Panasonic®

Programmable Controller

FP0H Positioning Unit RTEX

User's Manual

FPWIN Pro7

WUME-FP0HRTEXPRO7-09

2024.4 | industry.panasonic.com/

(MEMO)

Introduction

Thank you for purchasing a Panasonic product. Before you use the product, please carefully read through the user's manual, and understand it in detail to use the product properly.

Types of Manuals

- There are different types of user's manual for the FP0H series. Please refer to a relevant manual for the unit and purpose of your use.
- The manuals can be downloaded on our website: https://industry.panasonic.com/global/en/downloads/?tab=manual.

Unit name or purpose of use	Manual name	Manual code
FP0H Control Unit	FP0H User's Manual (Basic)	WUME-FP0HBAS
	FP0H Series Programming Manual	WUME-FP0HPGR
	FP0H Programming Manual (SD card access instruction)	WUME-FP0HSD
Positioning Function / PWM Output / High-speed Counter Function	FP0H User's Manual (Positioning Function/PWM Output/High-speed Counter Function)	WUME-FP0HPOS
Serial Communication Function	FP0H User's Manual (COM Communication)	WUME-FP0HCOM
Ethernet Communication Function	FP0H User's Manual (Ethernet Communication)	WUME-FP0HET
Ethernet/IP Communication Function	FP0H User's Manual (Ethernet/IP Communication)	WUME-FP0HEIP
Logging Trace Function	FP0H CPU Unit User's Manual (Logging Trace Function)	WUME-FP0HLOG
FP0H Extension (Communication) Cassette	FP0H User's Manual (COM Communication)	WUME-FP0HCOM
FP0H Positioning Unit	FP0H Positioning Unit User's Manual	WUME-FP0HPG
FP0H Positioning Unit RTEX	FP0H Positioning Unit RTEX User's Manual (FPWIN GR7)	WUME-FP0HRTEXGR7
	FP0H Positioning Unit RTEX User's Manual (FPWIN Pro7)	WUME-FP0HRTEXPRO7

Safety Precautions

- In order to prevent injuries and accidents, always adhere to the following.
- Always read this manual thoroughly before performing installation, operation, maintenance, and inspection, and use the device correctly.
- Ensure you are familiar with all device knowledge, safety information, and other precautions before use.
- In this manual, safety precaution levels are classified into "warnings" and "cautions".

⚠ **WARNING**	Cases where dangerous situations are expected to arise whereby the user could die or suffer serious injury if handled incorrectly

- Implement safety measures externally from this product so that the entire system can operate safely even if a failure occurs due to a fault in this product or some external factor.
- Do not use in an atmosphere containing flammable gases.

  Doing so could cause explosions.
- Do not place this product in fire.

This could cause splitting of batteries, electronic components, etc.

⚠ CAUTION	Cases where dangerous situations are expected to arise whereby the user could suffer injury or physical damage could occur if handled incorrectly

- In order to prevent the product from generating abnormal heat or emitting smoke, use the product with some margin to the guaranteed characteristics and performance values.
- Do not disassemble or modify the product.
  Doing so could cause abnormal heat generation or smoke.
- Do not touch electrical terminals while the power is on.
  There is a risk of electrical shock.
- Construct external emergency stop and interlock circuits.
- Securely connect wires and connectors.
  Poor connections can cause abnormal heat generation or smoke.
- Do not perform work (connection, disconnection, etc.) while the power is on.
  There is a risk of electrical shock.
- If methods other than those specified by our company are used when operating this product, the protection functions of the unit may be lost.
- This product was developed and manufactured for use in industrial environments.

Description on Copyright and Trademarks

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- EtherNet/IP is a registered trademark of ODVA (Open DeviceNet Vendor Association).
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Glossary

■ RTEX

RTEX, which stands for Realtime Express, is the motion-specific network connecting the positioning unit RTEX and amplifier.

* Realtime Express is the name of the network servo system manufactured by Panasonic Corporation.

■ AMP

“AMP” means a servo amplifier which controls a servo motor.

■ Configurator PM7-RTEX

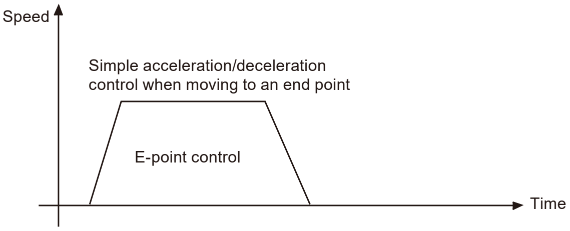
Configurator PM7-RTEX is a configuration tool for Positioning Unit RTEX. This tool is started from FPWIN Pro7. Using Configurator PM7-RTEX makes it possible to set positioning data and various positioning parameters, and perform various types of monitoring. As this tool is equipped with a tool operation mode that starts a motor without using a user program, it is especially convenient for verifying operations at the time of initial startup.

■ PANATERM

This is a setup support tool for the servo amplifiers of MINAS series manufactured by Panasonic Corporation. By using this tool, parameter setup within amplifiers, control status monitoring, setup support, machine analysis, and other operations can be executed on a PC.

■ E-point control

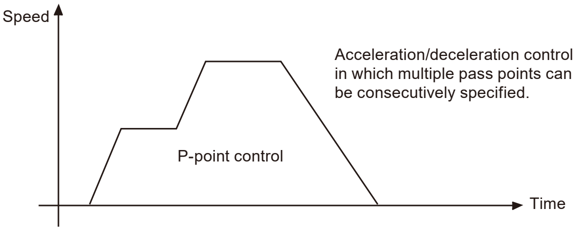
This refers to movement up to an "End Point" and, in this manual, this control is referred to as “E-point control”. This method is used for single-speed acceleration/deceleration control. It is also called “trapezoidal control”.



■ P-point control

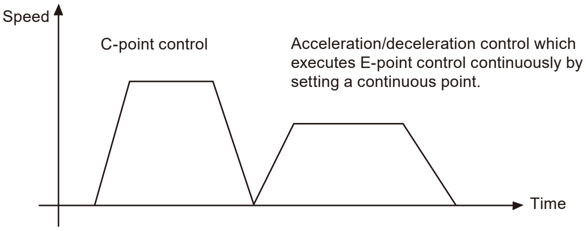
This refers to control passing through a “Pass Point” and, in this manual, this control is referred to as “P-point control”.

This method is used when target multi-stage speeds are specified in a sequence of motions.



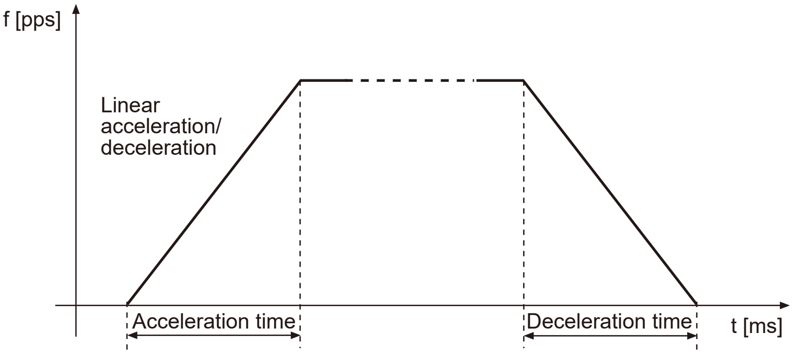
■ C-point control

This refers to control passing through a “Continuance Point” and, in this manual, this control is referred to as “C-point control”. This method is used to execute consecutive E-point controls by one-time startup.

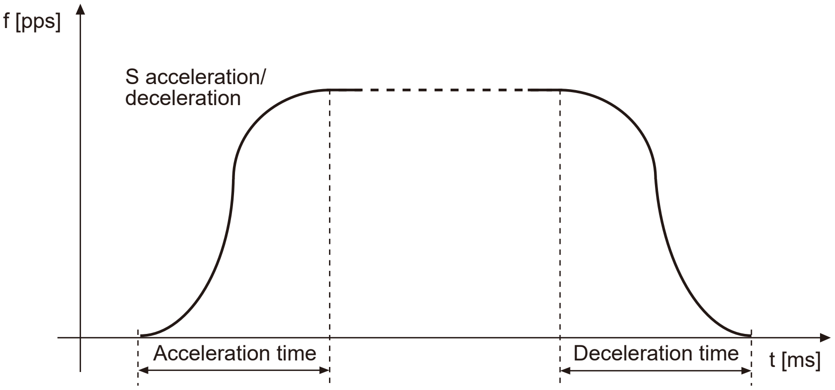


■ Linear acceleration / deceleration / S-shaped acceleration / deceleration

"Linear acceleration/deceleration" or "S-shaped acceleration/deceleration" can be selected as the acceleration/deceleration method. With linear acceleration / deceleration, acceleration and deceleration between the startup and the target speed are carried out in a straight line. Acceleration and deceleration take place at a constant percentage.



S-shaped acceleration / deceleration performs acceleration or deceleration curvedly. Acceleration/deceleration is performed relatively slowly at the beginning and then gradually becomes faster. Acceleration/deceleration is performed slowly as it approaches the end. The movement is relatively smooth. Acceleration/deceleration is completed in the acceleration/ deceleration time stored in the shared memory.



■ Acceleration time/deceleration time

For E-point control or C-point control, acceleration time is the time during which the speed changes from the startup speed of the motor to the target speed. Deceleration time is the time during which the speed changes from the target speed to zero (when the motor stops). For P-point control, acceleration time is the time during which the speed increases form the current speed to the next target speed, and deceleration time is the time during which the speed decreases from the current speed to the next target speed.

■ CW, CCW

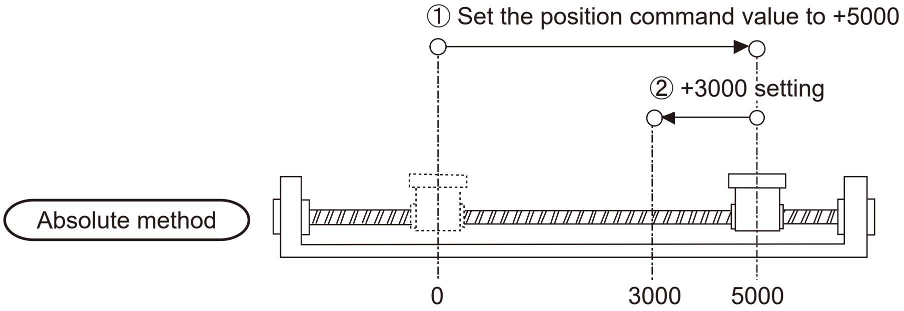
Generally, these indicate the direction in which the motor is rotating, with CW referring to clockwise rotation and CCW to counterclockwise rotation. CW is an abbreviation for clockwise and CCW is an abbreviation for counterclockwise.

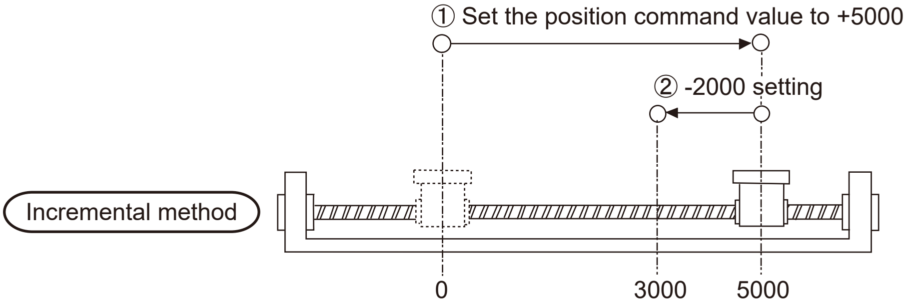
■ Absolute method (absolute value control method)

This is a control method in which the target position is specified as an absolute position from the home position. This is specified on the positioning data editing screen of Configurator PM7-RTEX.

■ Incremental method (relative value control method)

This is a control method in which the distance from the current position to the target position is specified as a relative position. This is specified on the positioning data editing screen of Configurator PM7-RTEX.





■ Automatic operation

This is an operation that is automatically performed. It means position control.

■ Manual operation

This is an operation that is performed at initial startup or during adjustment. Home return, JOG operation, and pulser operation are manual operations.

■ Position control

This is a generic term for E-point control, P-point control, and C-point control. For each control, control for single axes and interpolation control for multiple axes can be performed. Interpolation control can be selected from 2-axis linear interpolation, 2-axis circular interpolation, 3-axis linear interpolation, and 3-axis spiral interpolation.

■ JOG operation

This refers to an operation in which the motor is rotated only while operation commands are being input. This is used to forcibly rotate the motor using inputs from external switches during startup or adjustment, for example. This can also be applied to unlimited feed.

■ Stop-on-contact torque value for home return

The reference position for positioning is called a home position and an operation to travel to a home position is called home return. Each axis is moved to the preset home position and the coordinates of the home position are defined as absolute position zero. The motor rotation is reversed automatically when the limit input (+) or the limit input (-) is input and the home position or near home position is searched to return to the home position automatically.

■ Maximum speed for pulser operation

A manual operation can be performed using a device (pulser) that generates pulses manually. Outputs similar to encoders are obtained from pulsers, and the positioning unit RTEX is equipped with dedicated input terminals. Pulsers are also called “manual pulse generator”.

■ Deceleration stop

This is a function that interrupts the operation in progress, slows the rotation, and brings it to a stop. Deceleration time can be set individually.

■ Emergency stop

This is a function that interrupts the operation in progress, slows the rotation, and brings it to a stop. Generally, a time shorter than the time for deceleration stop is set. Deceleration time can be set individually.

■ Positioning table (Table)

A series of positioning data such as acceleration/deceleration time, target speed, and interpolation operation that is necessary for position control is managed as positioning tables. For example, one table is necessary for E-point control, and multiple tables are necessary for P-point control and C-point control depending on the number of pass points and continuance points.

■ Limit input (+), limit input (-)

This is a limit switch input that is used to limit the motor movement. Limit input (+) is the limit point on the side where the elapsed value increases and limit input (-) is the limit point on the side where the elapsed value decreases. In positioning unit RTEX systems, this input is connected to the amplifier.

■ Near home (DOG) input

A position at which deceleration is started in order to stop the axis at the home position is called a “near home position”. This is connected to an external input switch or sensor. In positioning unit RTEX systems, this input is connected to the amplifier.

■ Dwell Time

For E-point control, the time from the completion of a position command until the operation done flag turns ON can be specified as a dwell time. For C-point control, similarly, the time from deceleration stop until execution of the next positioning table can be specified as a dwell time.

■ Auxiliary output code / Auxiliary output contact

Both are used to check the operation of position control.

The auxiliary output code is a 16-bit code that can be specified for each positioning table and makes it possible to monitor which positioning table is being executed during position control.

The execution of position control can be checked by turning ON a dedicated auxiliary output contact for a certain time period.

■ Soft limits:

Limits in software can be set for the absolute coordinates managed within the positioning unit RTEX. When the range of soft limits is exceeded, an error occurs, causing the system to decelerate and stop. Deceleration time can be set individually.

■ Torque Limit

The output torque of the amplifier can be limited arbitrarily.

■ Servo lock / Servo free

The state in which the motor is controllable according to a command from the positioning unit RTEX is called the servo-locked status, and the state in which the motor is uncontrollable is called the servo-free status. Servo ON operation is required to invoke a servo lock state.

■ Serve ON / Servo OFF

The operation that changes the servo free state to a servo lock state is called “servo ON”, and the operation that changes the servo lock state to a servo free state is called “servo OFF”.

■ Linear interpolation

This is interpolation control that controls straight lines as loci for the operations of 2-axis motors with grouped X-axis and Y-axis or 3-axis motors with grouped X-axis, Y-axis, and Z-axis. There are two setting methods, which are a composite speed specification and long axis speed specification.

■ Circular interpolation

This is interpolation control that controls arcs as loci for the operation of 2-axis motors with grouped X-axis and Y-axis. There are two setting methods, which are a center point specification and pass point specification.

■ Spiral interpolation

This is interpolation control that controls spirals as loci for the operation of 3-axis motors with grouped X-axis, Y-axis, and Z-axis. Arbitrary 2 axes depict an arc, and the remaining one axis performs feed motion to achieve a spiral. There are two setting methods, which are a center point specification and pass point specification.

■ Edge type

This is one of the methods for detecting the request signals allocated to this unit. It executes each requested process by detecting a trigger that is the rising edge when the request signal turns ON.

Therefore, the next request cannot be accepted until the current request signal turns OFF.

■ Level type

This is one of the methods for detecting the request signals allocated to this unit. It executes each requested process by detecting a trigger that is the request signal in ON state, and continues the requested process while the request signal is ON.

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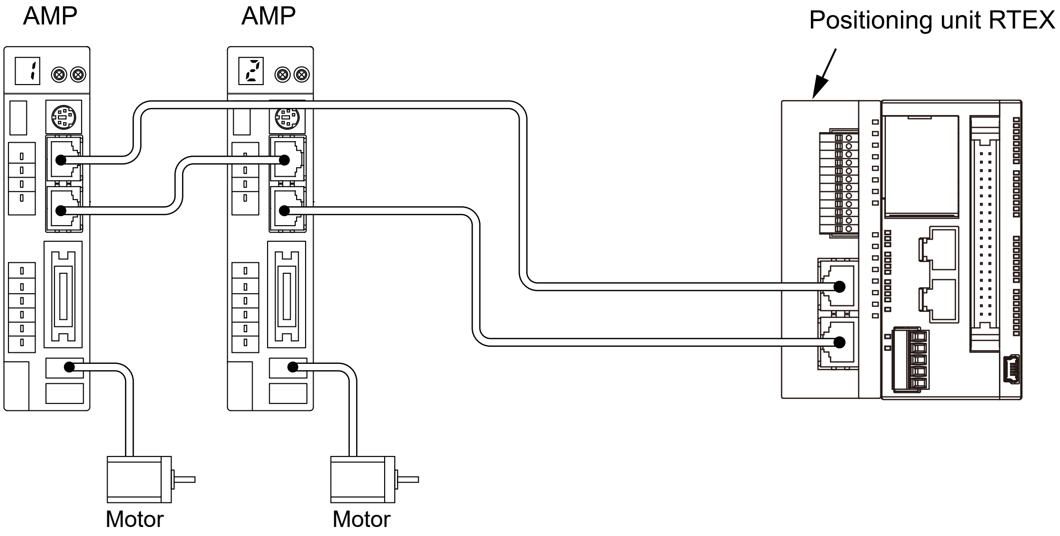
1 System Configuration

1.1 Functions of Positioning Unit RTEX

1.1.1 Functions of Unit

■ **Network control**

Motion-specific network Realtime Express (RTEX) makes it possible to easily construct network servo motor systems with Category 5e shielded cables.

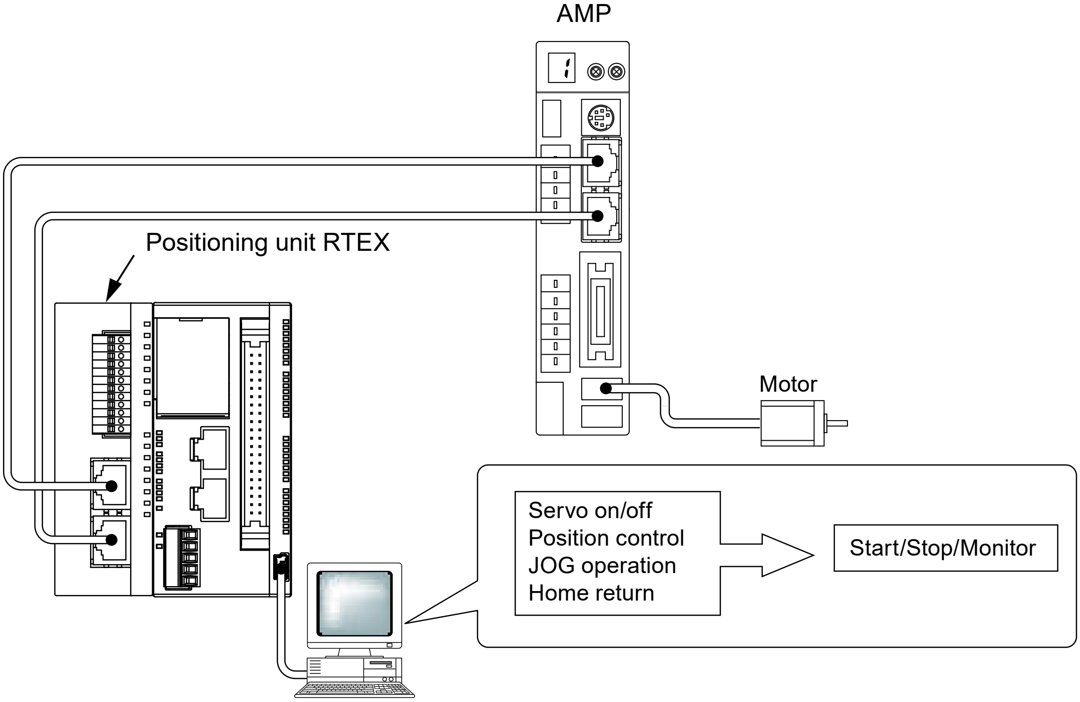


■ **Configuration of axes based on the system**

According to the number of required axes, 4-axis and 8-axis types are available.

■ **Checking operations with no need to use a user program**

Using the tool operation function of the dedicated tool Configurator PM7-RTEX makes it possible to conduct test runs without using a user program and check various items such as rotation directions, various input contacts, or automatic operation settings.

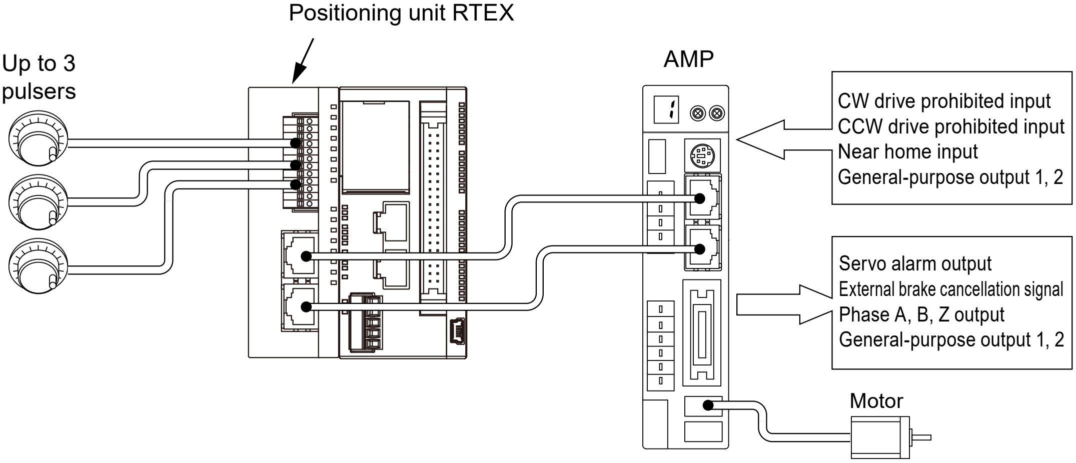


■ Two-axis and three-axis interpolation controls

2-axis linear interpolation, 2-axis circular interpolation, 3-axis linear interpolation and 3-axis spiral interpolation controls can be performed.

■ Inputs and outputs required for control are integrated in amplifiers

As the limit input and near home input are connected to the amplifier and sent to the positioning unit RTEX via the network, the wiring can be simplified.



■ Remote I/O with two inputs and two outputs for one amplifier

Two general-purpose inputs and two outputs (transistors) can be connected to the amplifier, and they can be programmed using the X contact and Y contact of the positioning unit RTEX. Simple inputs and outputs around the amplifier can be used as remote I/O.

■ Compatible with manual pulsers

Up to three manual pulsers can be connected. It is possible to change the axes corresponding to each pulser by adjusting the settings of the positioning unit RTEX.

1.1.2 Unit Types

The following table shows the main differences between the types of positioning unit RTEX.

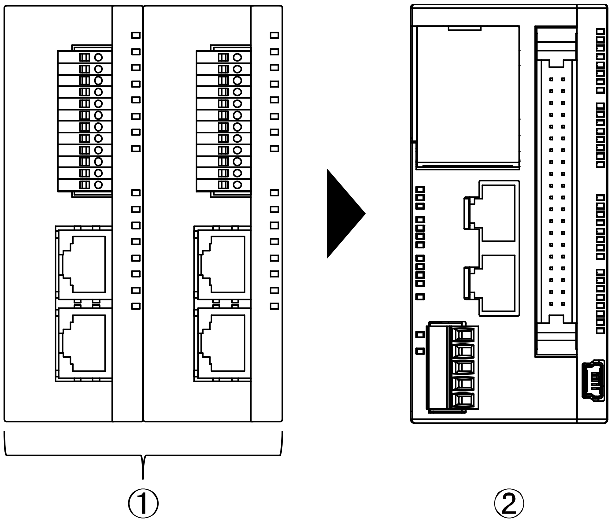
■ FP0H Positioning Unit RTEX

Type	Function	Model number
4-axis type	4-axis control	AFP0HM4N
8-axis type	8-axis control	AFP0HM8N

1.2 Restrictions on Use of Positioning Unit RTEX

■ Restrictions on mounting arrangement of positioning unit RTEX

- Up to two positioning units RTEX can be mounted on the left side of the FP0H Control Unit (Ver. 1.30 or later).



(1)	Positioning unit RTEX	(2)	FP0H Control Unit

1.3 Restrictions on Positioning Unit RTEX and Amplifier

1.3.1 Restrictions on Combinations of Positioning Unit RTEX and Amplifier

Observe the following restrictions on the combinations of positioning unit RTEX and MINAS series amplifier.

■ Combinations of positioning unit RTEX and amplifier

Positioning unit RTEX version		**Connectable amplifier**	
		A5N	**A6N**
Firmware	Ver.1.0 or later	●	●
Hardware			

■ Combination of amplifier series

Positioning unit RTEX version		**Connectable amplifier**		**Description**
		A5N	**A6N**	
Firmware	Ver.1.0 or later	●	●	A5N and A6N can be connected to the same network.
Hardware				

■ Setting ranges of movement amount and speed

The input range of the movement amount and speed specified in the positioning unit RTEX may differ from the upper and lower setting limits of the amplifier.

Info.

- A5N and A6N can be used by connecting them to the same network.

1.3.2 Restrictions on Amplifier Parameters

Some parameters on the amplifier side affect the operation of the positioning unit RTEX. Set parameters according to the following descriptions.

[A6N/A5N parameters]

number	**Name**	**Factory default Setting value**	**Settings**
Pr0.00	Rotational direction setup	1	The positioning unit RTEX automatically changes the setting. Do not change the value of this parameter.
Pr0.01	Control mode setup	0	Use “setting value 0 (semi-closed control)”.
Pr0.08	Number of command pulses per motor revolution	0	Factory default setting When Pr.0.08=0, Pr.0.09=1, and Pr.0.10=1

number	**Name**	**Factory default** **Setting value**	**Settings**
Pr0.09	Numerator of electronic gear	1	the position command input becomes the position command. (Note 1)
Pr0.10	Denominator of electronic gear	1	
Pr4.00 to Pr4.07	SI1 to SI8 Input selection	(Note 2)	The connection method and settings vary according to the home return method used.
Pr4.31	Positioning complete range	10	The FP0H control unit automatically changes the value. Do not change the value of this parameter.
Pr5.04	Over-travel inhibit input setup	1	Use "setting value 1 (over-travel inhibit input is disabled)".
Pr5.21	Selection of torque limit	1	The positioning unit RTEX automatically changes the setting. Do not change the value of this parameter.
Pr7.20	RTEX communication cycle setup	3	Use “setting value 3 (0.5 ms)”.
Pr7.21	RTEX command updating cycle ratio setting	2	Use “setting value 2 (2 times)”.
Pr7.22	RTEX function extended setup 1	0	Use “setting value 0 (16-byte mode)”.
Pr7.23	RTEX function extended setup 2	18	The positioning unit RTEX automatically changes the setting. Do not change the value of this parameter.
Pr7.25	RTEX speed unit setup	0	Use “setting value 0 (r/min)”.

(Note 1) For details of Pr0.08 to Pr0.10, refer to "Operating Instructions of AC Servo Driver A5N Series" or "Operating Instructions of AC Servo Driver A6N Series".

(Note 2) The factory default settings of Pr4.00 to Pr4.07 vary according to the parameter number. For details on how to set the parameters, refer to "11 Manual Operation (Home Return)".

1.4 Programming Tool

1.4.1 Software Usage Environment and Applicable Cables

■ Programming software

Item name	Applicable version	Applicable language	Product number	Remarks
Control FPWIN Pro7	Ver.7.3.0 or later	Japanese/ English Chinese/Korean	AFPSPR7A	-
			AFPSPR7AS	FP7 encryption function is supported

(Note 1) The differential files for updating to the latest version can be downloaded free of charge from our website. Use the latest version.

Our website:https://industry.panasonic.com/global/en/downloads/?tab=software

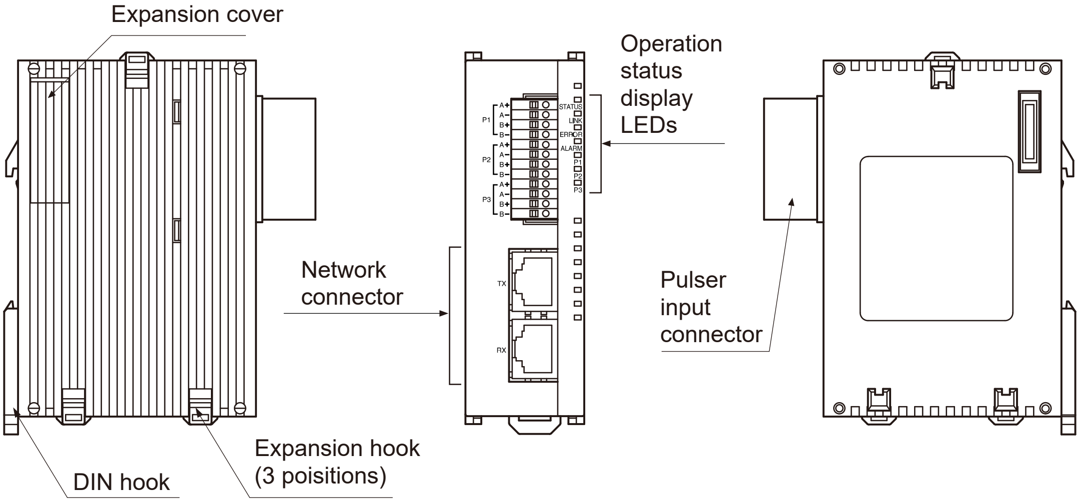
■ PC connection cable

- Use a commercial USB cable.

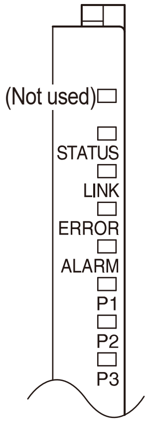
Cable type	Length
USB 2.0 cable (A/Mini B)	Max. 5 m

2 Names and Functions of Components

2.1 Names and Functions of Positioning Unit RTEX Components



2.2 Specifications of Operation Indicator LEDs



Name	Color	Status	Remarks
STATUS	Green	Blinking: Waiting until network connection is established Fast blinking: In version upgrade mode Lit: When network connection is established	
LINK	Green	Unlit: Not connected Lit: Normal connection state	State in which the TX of the sending node and the RX of the local node are electrically connected normally
ERROR	Red	Unlit: Normal Blinking: Warning occurred Lit: Error occurred	In the event of a warning, the operation continues. In the event of an error, the operation stops.
ALARM	Red	Unlit: Normal Lit: System error	If the LED lights up, the power must be turned OFF and then ON.
P1 P2 P3	Green	Unlit: Both phase A and phase B of each pulser are in the OFF state. Lit: Both phase A and phase B of each pulser are in the ON state.	Check the input signals of the pulsers.

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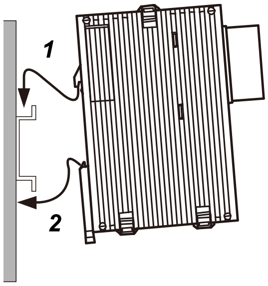
3 Installation and Wiring

3.1 Installation

3.1.1 Attaching to DIN Rail

1 2 Procedure

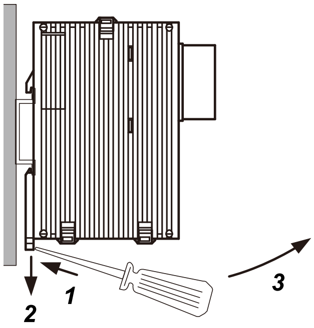
1. Fully pull out the DIN rail attachment lever on the back of the unit.
2. Fit the top of the unit attachment part into the DIN rail.
3. While pressing down the unit attachment part onto the DIN rail, fit the bottom of the unit attachment part into the DIN rail.
4. Push up the DIN rail attachment lever on the back of the unit until it clicks to lock.



3.1.2 Removing from DIN Rail

1 2 Procedure

1. Fully pull out the DIN rail attachment lever on the back of the unit.
2. Pull the bottom of the unit toward you.
3. While lifting the unit, remove it from the DIN rail.

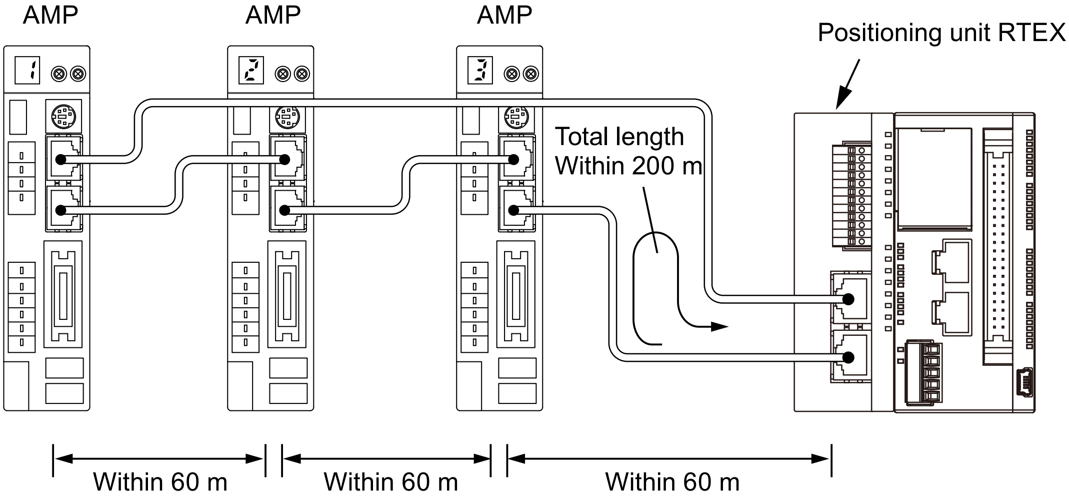


3.2 Wiring

3.2.1 Wiring of Network

For the wiring of the network, use the LAN cable of the Category 5e shielded cable type. To prevent the cable from coming off, securely connect the connector of the cable to the network connector (RJ45 connector) of the unit.

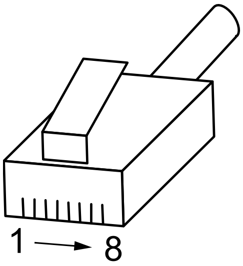
The length between each node should be within 60 m, and the total length of the communication loop should be within 200 m.



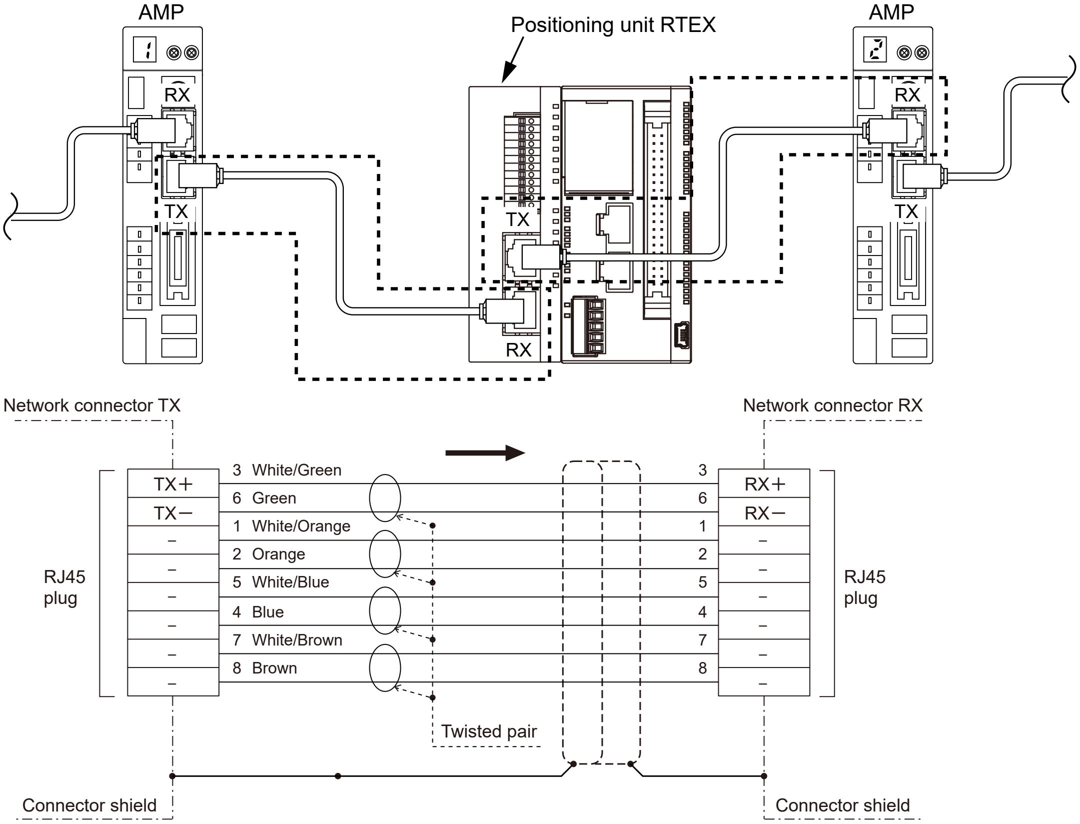
3.2.2 Network Connector

RJ45 plug is connected to the network connector.

■ Pins of RJ45 plug



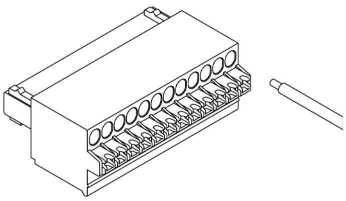
■ Wiring diagram



3.2.3 Wiring of Pulser Input Connector

■ Supplied connector/Compatible wire

A connector of the spring connection type is used. Use the following compatible wires for the wiring.



Supplied connector socket

Connector sockets manufactured by Dinkle International are used.

Number of pins	Model number
12 pins	ESC250V-12P-BK

Compatible wires (stranded wire)

Size	Nominal cross-sectional area
AWG#28 to 20	0.08 mm^2 to 0.5 mm^2

Rod terminal without compatible insulation sleeve

If rod terminals are used, choose the following model.

Manufacturer	Cross-sectional area	Size	Model number
Dinkle International Co. Ltd	0.5 mm^2	AWG#22	DN00508F

Crimping tool dedicated to rod terminals

Manufacturer	Model number
Dinkle International Co. Ltd	DNT13-0101

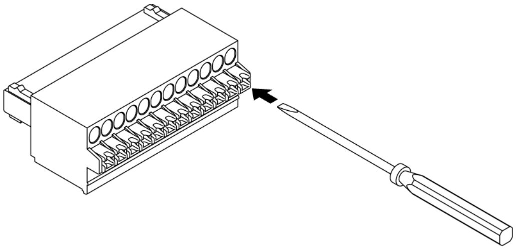
■ Wire installation tool

Use a screwdriver with a blade thickness of 0.4 mm to insert wires.

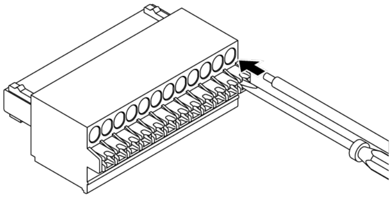
■ Wiring method

1. Remove a portion of the wire's insulation.

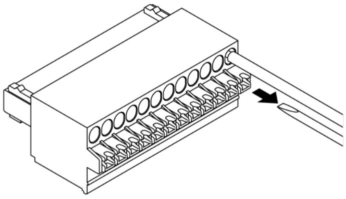
2. Press the lock release lever (orange) with a tool such as a flat-blade screwdriver.



3. While pressing the orange lever, insert the wire all the way into the connector.



4. Take the tool off the lock release lever.

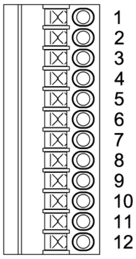


Precautions on wiring

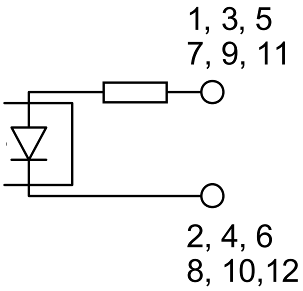
The following precautions should be observed to avoid broken or disconnected wires.

- When removing the wire’s insulation, be careful not to scratch the core wire.
- Do not twist the wires to connect them.
- Do not solder the wires to connect them. The solder may break due to vibration.
- After wiring, make sure stress is not applied to the wire.

Input Specifications and Pin Assignment



Input terminals of pulser input connector

Pin No.	Circuit	Signal name
1,5,9	 	Pulse input A (+)
2,6,10		Pulse input A (-)
3,7,11		Pulse input B (+)
4,8,12		Pulse input B (-)

(Note 1) When the pulser is connected to the pulse input, the elapsed value increases if phase A is proceeding more than phase B.

Input specifications

Item	Description
Operating voltage range	3.5 to 5.25 VDC (5 VDC, line driver specifications)
Min. ON voltage/current	3 VDC/4 mA
Max. OFF voltage/current	1 VDC/2 mA

Item	Description
Input impedance	Approx. 390Ω
Min. input pulse width	0.5 μs or more (Max. 1 MHz in each phase)

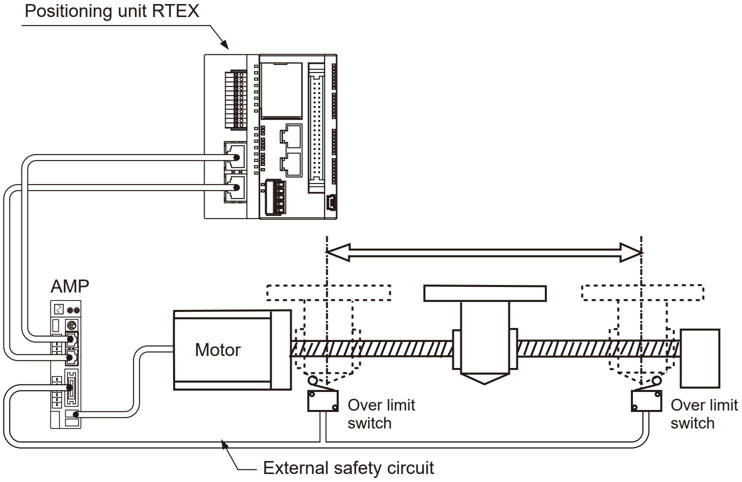
(MEMO)

4 Power ON/OFF and Items to Check

4.1 Safety Circuit Design

■ Example of a safety circuit

Installation of the over limit switch



Install over limit switches as shown above.

Connect them to the CW and CCW over-travel inhibition inputs of the parallel I/O connector of the amplifier. For the positioning unit RTEX, connect them to the limit input (+) and limit input (-) via the network.

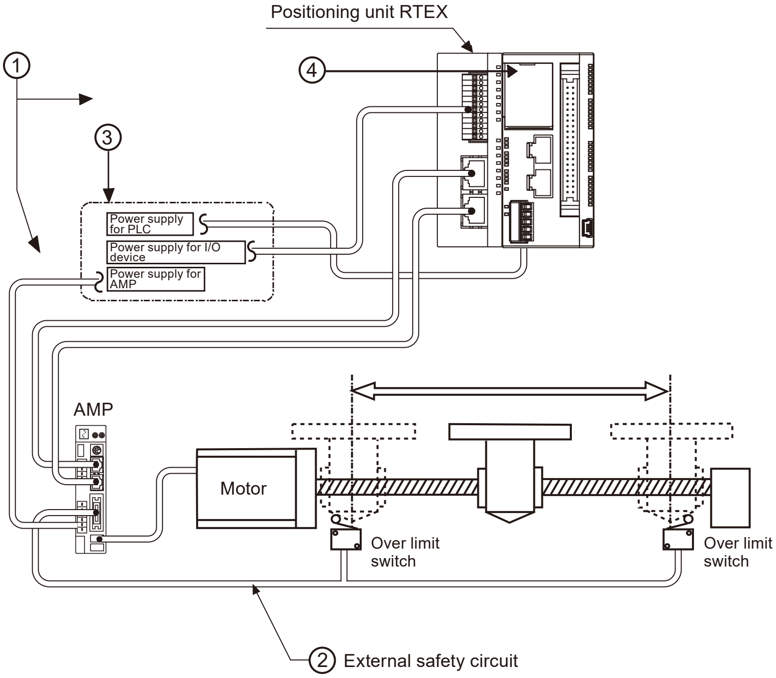
Install the safety circuit recommended by the manufacturer of the motor being used.

4.2 Before Turning On the Power

■ Items to check before turning ON the power

- When the power to the PLC is turned on, the starting contacts for the various operations of the positioning unit RTEX should be OFF. If they are ON, operations may be started unexpectedly.

System configuration example



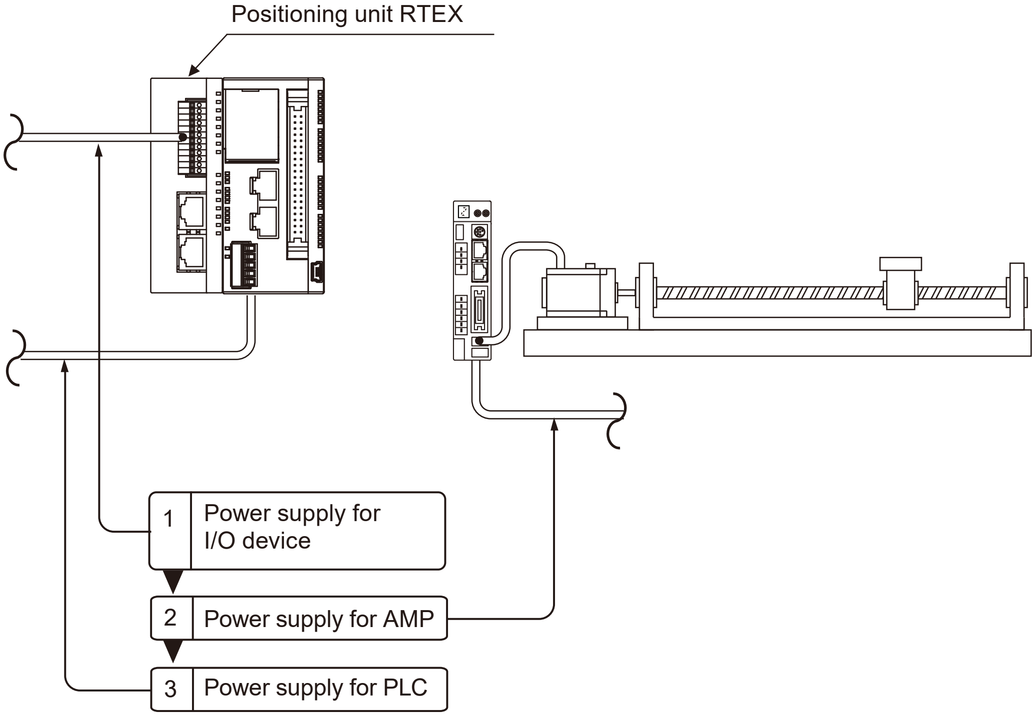
Number	Item	Description
(1)	Checking connections to the various devices	Check to make sure the various devices have been connected as indicated by the design.
(2)	Checking the installation of the external safety circuit	Check to make sure the safety circuit (wiring and installation of over limit switch) based on the external circuit has been installed properly.
(3)	Checking the settings for power ON sequence	Check whether settings have been configured so that the power is turned ON according to the sequence outlined in “Procedure for Turning On the Power”.
(4)	Checking the PLC mode selection switch	Set the PLC in PROG. mode. Setting it in the RUN mode can cause inadvertent operation.

4.3 Procedure for Turning On the Power

When turning on the power to the system incorporating the positioning unit RTEX, the performance and statuses of any external devices connected to the system should be taken into consideration, and sufficient care should be taken so that turning on the power does not trigger unexpected movements or operations.

1 2 Procedure

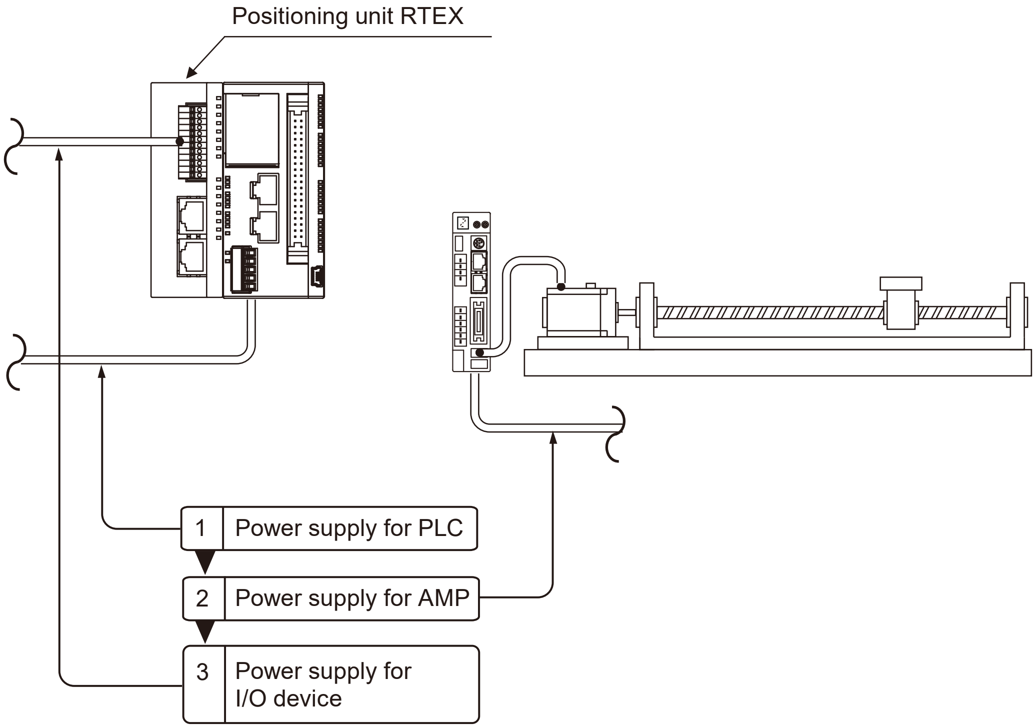
1. Turn ON the power supplies for the input and output devices connected to the PLC.
2. Turn ON the power supply for the amplifier.
3. Turn ON the power supply for the PLC.



4.4 Procedure for Turning Off the Power

1 2 Procedure

1. Make sure that the rotation of the motor has stopped, and then turn OFF the power supply for the PLC.
2. Turn OFF the power supply for the amplifier.
3. Turn OFF the power supplies for the input and output devices connected to the PLC.



(MEMO)

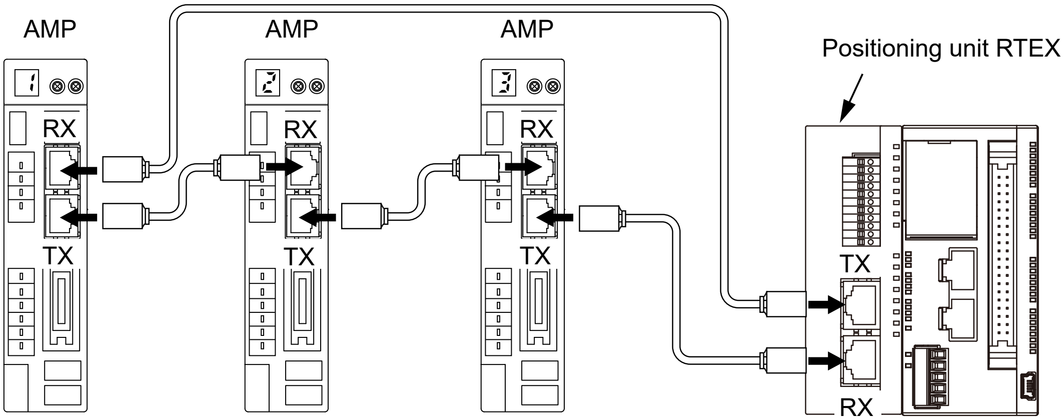
5 Preparation for Operation

5.1 Procedures for System Construction

5.1.1 Procedure 1: Wiring

For the wiring of the network, use the LAN cable of the Ethernet Category 5e shielded cable type. Connect the positioning unit RTEX with each amplifier in a loop. Connect "TX" of the positioning unit RTEX to "RX" of the first amplifier. Then, connect "TX" of the amplifier to "RX" of the next amplifier, and finally, connect "TX" of the last amplifier to "RX" of the positioning unit RTEX.

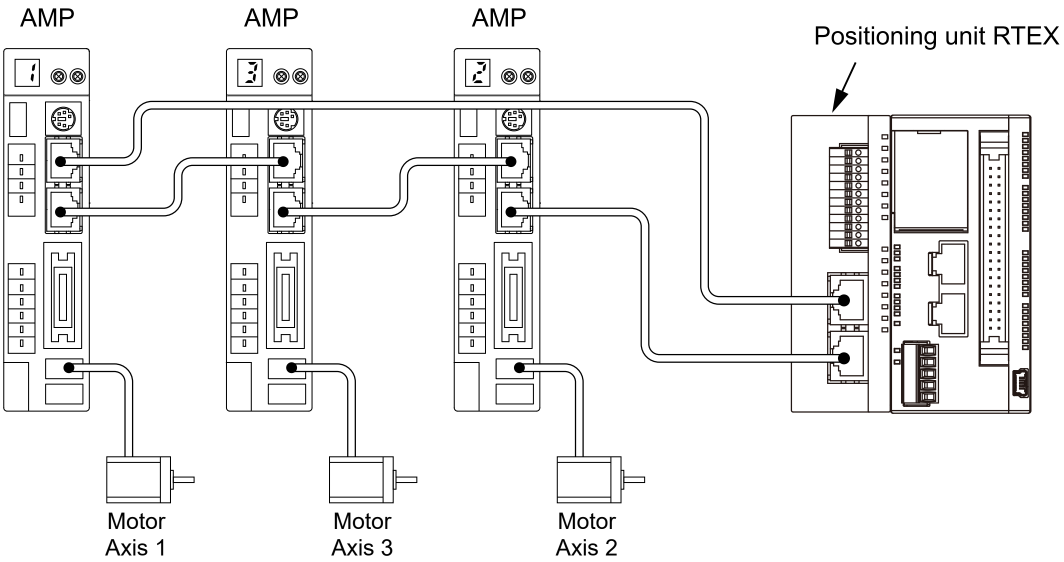
(Note 1): Turn OFF the power to the system before wiring cables.



5.1.2 Procedure 2: Axis Numbers and Unit Numbers of Amplifier

The axis numbers of the positioning unit RTEX match the station numbers of the rotary switch of the amplifier. As the order of connections on the network is unrelated to the axis numbers, the axis numbers can be determined after construction of the network.

Amplifier rotary switch number	Axis number
1	Axis 1
2	Axis 2
3	Axis 3
4	Axis 4
5	Axis 5
6	Axis 6
7	Axis 7
8	Axis 8



Stop

- An error will occur if settings are specified as below.
  - When the same unit number is redundantly specified on the same network.
  - When a unit number is set to 0.
  - When a station number larger than the maximum number of axes that can be specified for the positioning unit RTEX used is specified.
    (For the 4-axis type, station numbers that can be set are 1 to 4.)

5.1.3 Procedure 3: Powering on and Checking Network Connection Establishment

The power-on procedure is as follows:

1 2 Procedure

1. Turn ON the power supplies for the input and output devices connected to the PLC.
2. Turn ON the power supply for the amplifier.
3. Turn ON the power supply for the PLC.

After the power is turned ON, check if the operation status indicator LEDs of the positioning unit RTEX are in the following states.

STATUS: Lit

LINK: Lit

Info.

- If the STATUS LED is blinking, the network connection is not established.
- If the LINK LED is unlit, the "RX" of the positioning unit RTEX (receiver) and the "TX" of the amplifier (sender) are not electrically connected correctly.

5.1.4 Procedure 4: Checking Consistency with Amplifier Parameters

With the factory settings, the operating directions of the positioning unit RTEX and the amplifier differ as shown below.

- Parameters of positioning unit RTEX: CW direction is elapsed value (+) direction
- Parameters within amplifier: CW direction is elapsed value (-) direction

Therefore, they must be matched according to the following procedures.

Procedure

1. Start Configurator PM7-RTEX and set the corresponding axis.
2. Select **Online**>**Select Slot Number** from the menu, and select the slot number where the positioning unit RTEX is installed.
3. Select **File**>**Download to Unit** from the menu, and download the axis information and positioning parameter setting data.

   The prompt for writing into the FROM (flash memory) is displayed.
4. Select "Yes" to write to the FROM.
5. Upon completion of writing, turn OFF the power of the amplifier and PLC, and then turn them ON again.

   The system will be operated with the positioning parameters set in the positioning unit RTEX.

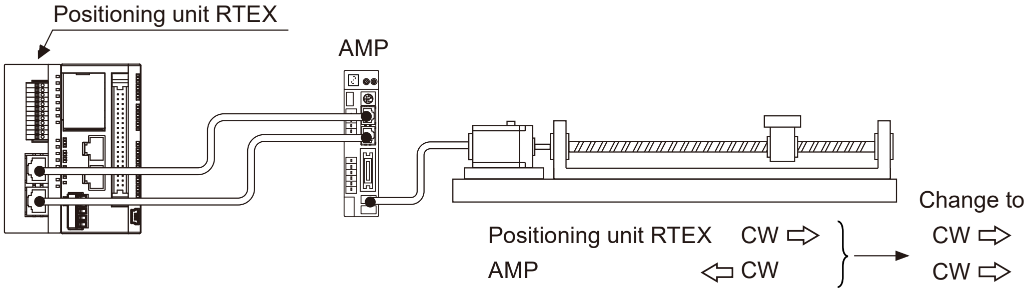
Info.

- Following are the parameters that are used to match the operating directions of the positioning unit RTEX and amplifier according to the above procedure.

  "CW/CCW direction setting"

  "Limit switch connection"

  As these parameters are important to construct the system, they will be applied to the operation of the motor by turning the power OFF and then ON after writing the parameters to the FROM (flash memory) of the positioning unit RTEX.

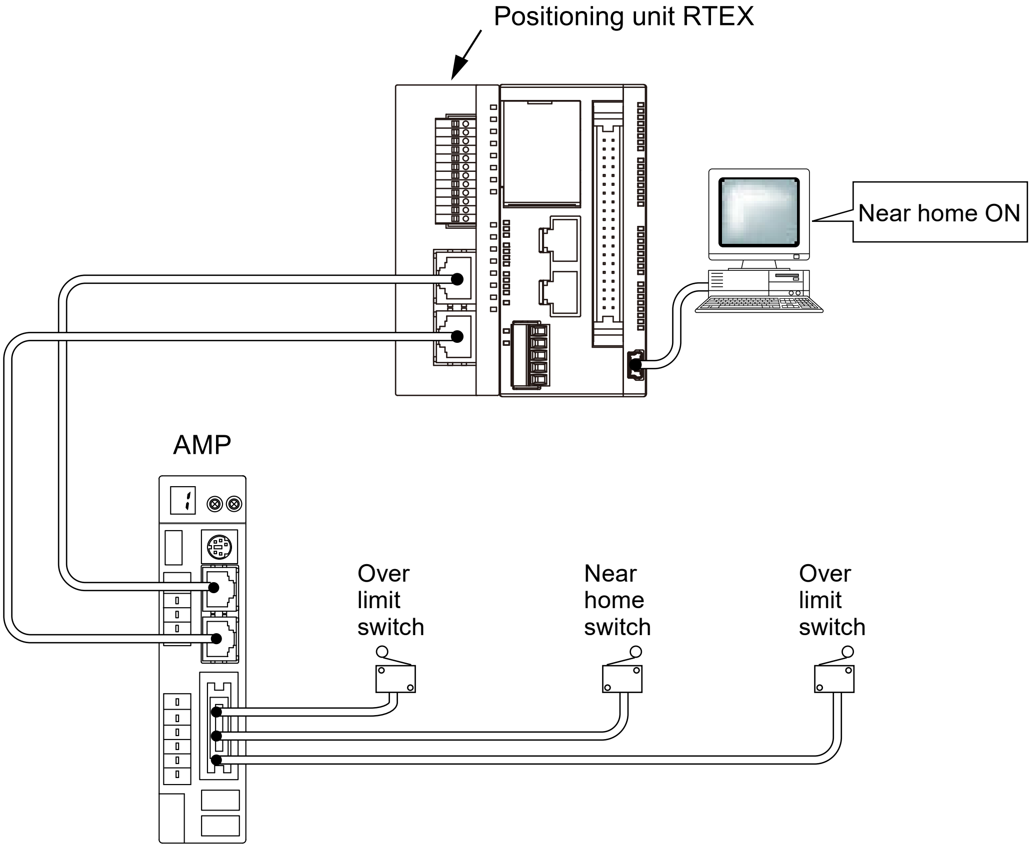


5.1.5 Procedure 5: Checking the Input Signals

Check the input of the over limit switch for the safety circuit connected to the amplifier and the input of the near home (DOG) switch. Check whether signal inputs are properly loaded into the positioning unit RTEX, with each switch operated forcibly. The statuses of the inputs of switches can be checked by using the input contacts of the positioning unit RTEX or on the "Status Display" screen of Configurator PM7-RTEX.

Info.

- If the operating direction of the motor is opposite to the position of the limits (+) and (-) after the installation of the over limit switch, the connection of the limits (+) and (-) can be set to "Reverse connection" in the positioning parameter settings of Configurator PM7-RTEX.



5.1.6 Procedure 6: Checking Rotating and Moving Directions and Moving Distance

Check whether the rotating and moving directions of the motor and the moving distance are correct. Operations can be easily checked by using the tool operation function of Configurator PM7-RTEX without using a user program.

1 2 Procedure

1. Perform JOG operations to check whether the rotating and moving directions of the motor are correct.

   Select **Online**>**Tool Operation** from the menu of Configurator PM7-RTEX and bring the corresponding axis into the servo-ON state to execute a JOG operation. When using a user program, turn ON the JOG forward or reverse rotation contact after turning ON the servo ON contact.

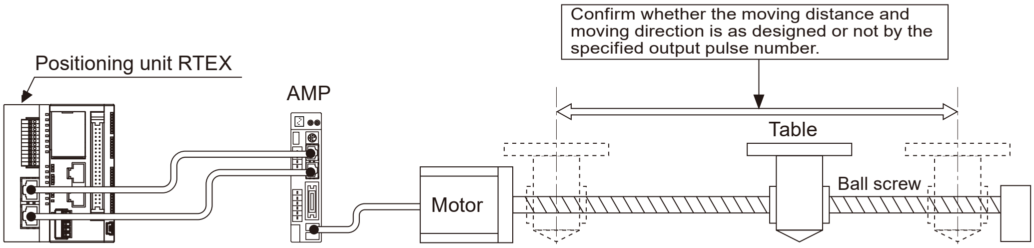
   The rotation direction is determined according to factors such as the installation of the ball screw and the "CW/CCW direction setting" positioning parameter.

2. Check whether the movement distance is as designed after position control is performed.

Set table 1 of the positioning data using Configurator PM7-RTEX, and select **Online**>**Tool Operation** from the menu of Configurator PM7-RTEX after downloading the table to the positioning unit RTEX, and bring the corresponding axis into the servo-ON state to execute a JOG operation. When using a user program, after turning ON the servo ON contact, set up the position control start table and then turn ON the positioning start contact.

The moving distance is determined according to the pitch of the ball screw, deceleration gear ratio, or setting movement amount of the positioning data.

(Note 1): Before performing JOG operation and position control, execute servo ON and bring the amplifier into a servo lock state.



5.1.7 Procedure 7: Settings of Positioning Parameters and Positioning Data

The basic operations of the positioning system have been checked in Procedure 6. In Procedure 7, set positioning parameters and positioning data in accordance with the actual operation.

Positioning parameters and positioning data are stored in the shared memory of the positioning unit RTEX. Although there are two methods of storing data in the shared memory, we recommend that Configurator PM7-RTEX be used to set up positioning parameters that are not changed so much before operation.

- Using Configurator PM7-RTEX
- Using the user program to write to the shared memory

■ When using Configurator PM7-RTEX

Start Configurator PM7-RTEX, and select **Set Axis**>**Parameter Settings** on the menu to set the positioning parameters. Also, create tables of positioning data on the positioning data editing screen. After setting the parameters and positioning data, download them to the positioning unit RTEX.

Note 1: After the positioning parameters and positioning data have been downloaded, the screen for selecting whether to write them to the FROM (flash memory) is displayed. When they are written to the flash memory, the positioning parameters and positioning data in the flash memory will be automatically reflected in the shared memory when the PLC is turned off and then on. If they are not written to the flash memory, the positioning parameters and positioning data finally stored in the flash memory will be reflected when the PLC is turned off and then on.

■ When using the user program to write to the shared memory

Use the F151 WRT instruction to write various positioning parameters and positioning data to the shared memory.

Info.

- For details on the storage addresses of each positioning parameter and positioning data, refer to "18.7 Details of Each Axis Setting Area in Shared Memory".
- For details on using the user program to write positioning data, refer to "18.7.3 Positioning Data Setting Area".

5.2 Preparation for Operation

5.2.1 Serve ON/Servo OFF

The servo motor must be brought into a servo lock state in order to perform JOG operation or position control.

Turn ON the servo ON request contact to bring the servo motor into a servo lock state. Turn ON the servo OFF request contact to change the servo lock state to a servo free state.

Servo ON or servo OFF can be achieved by using the tool operation mode of Configurator PM7-RTEX without having to create a user program.

■ Each contact when the positioning unit RTEX is installed in slot number 0

Allocation of each contact		Target axis	Name	Description
WX11	X110	Axis 1	Servo lock	Turns ON when the corresponding axis is in a servo lock state.
	X111	Axis 2		
	X112	Axis 3		
	X113	Axis 4		
	X114	Axis 5		
	X115	Axis 6		
	X116	Axis 7 (virtual)		
	X117	Axis 8 (virtual)		
WY10	Y108	Axis 1	Servo ON request	Requests servo lock for the corresponding amplifier. Servo lock state processing is requested by the ON edge of this contact. When RUN mode is switched to PROG mode while the axis is in a servo lock state, a servo free state does not occur automatically. To cause a servo free state, turn ON the servo OFF request contact. (The operation is the edge type.)
	Y109	Axis 2		
	Y10A	Axis 3		
	Y10B	Axis 4		
	Y10C	Axis 5		
	Y10D	Axis 6		
	Y10E	Axis 7 (virtual)		
	Y10F	Axis 8 (virtual)		
WY11	Y110	Axis 1	Servo OFF request	Requests a servo free state for the corresponding amplifier. Servo free state processing is requested by the ON edge of this contact. (The operation is the edge type.)
	Y111	Axis 2		
	Y112	Axis 3		
	Y113	Axis 4		
	Y114	Axis 5		
	Y115	Axis 6		
	Y116	Axis 7 (virtual)		

Allocation of each contact		**Target axis**	**Name**	**Description**
	Y117	Axis 8 (virtual)		

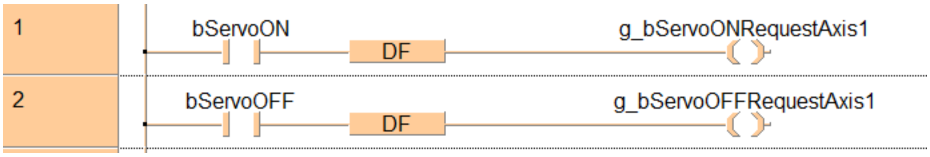
■ Sample programs

- The following sample program performs servo ON/OFF for Axis 1 of slot number 0.

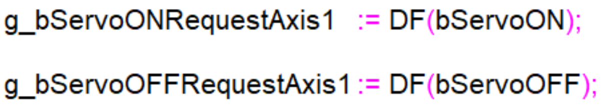
Variable list

Class name	**Variable name**	**FP address**	**Data type**	**Default**	**Comment**
VAR	bServoOFF		BOOL	FALSE	Servo OFF
VAR	bServoON		BOOL	FALSE	Servo ON
VAR_EXTERNAL	g_bServoOFFRequestAxis1	Y110	BOOL	FALSE	Axis 1 Servo OFF request
VAR_EXTERNAL	g_bServoONRequestAxis1	Y108	BOOL	FALSE	Axis 1 servo ON request

Ladder diagram (LD)



Structured text (ST)



```
g_bServoONRequestAxis1  := DF(bServoON);

g_bServoOFFRequestAxis1 := DF(bServoOFF);
```

6 I/O Allocation

6.1 Allocated I/O Area

As is the case with other I/O units, the positioning unit RTEX is used by allocating inputs (X) and outputs (Y). 256 points (128 input points and 128 output points) are allocated for any axis type (regardless of the number of axes).

Type	Number of allocated points
4-axis type 8-axis type	Input 128 points Output 128 points

Info.

- For details, refer to the "FP0H User’s Manual (Basic)".

6.2 Allocation of Each Contact

The contacts are indicated as allocated I/O when the positioning unit RTEX is installed in slot number 0.

WX10 (slot number 0: WX10, 1: WX18, 2: WX26, 3: WX34)

Allocation of each contact	Target axis	Name	Description
X100	All axes	Link establishment notification	Indicates that a network link was established and notifies that the system started running.
X101	All axes	System restart notification	When this contact is ON, the changed settings will not be reflected unless the power supply is restarted.
X102	-	-	-
X103	All axes	Writing to FROM in progress	Writing to FROM in progress
X104	All axes	Tool operation in progress	Contact that indicates that the tool is operating from Configurator PM7-RTEX.
X105	All axes	Error notification	Turns ON when an error occurs on any axis. Error details can be checked in the error notification & clearing area (Addresses 16#0110 to 16#01A7 in Bank 16#00).
X106	All axes	Warning notification	Turns ON when a warning occurs in any axis. Warning details can be checked in the warning notification & clearing area (Addresses 16#01A8 to 16#023F in Bank 16#00).
X107	All axes	Recalculation completion	If the recalculation request contact (Y107) turns ON, re-creation of the positioning data in the shared memory (standard area) will be started. This contact will turn ON after the re-creation is complete. If the recalculation request contact (Y107) turns ON again, this contact will be turned OFF once. Note 1: This contact is used only when positioning data has been rewritten using a user program.
X108	Axis 1	Each axis connection confirmation	Turns ON when the corresponding axis exists.
X109	Axis 2		
X10A	Axis 3		
X10B	Axis 4		
X10C	Axis 5		
X10D	Axis 6		
X10E	Axis 7 (virtual)		
X10F	Axis 8 (virtual)		

WX11 (Slot No. 0: WX11, 1: WX19, 2: WX27, 3: WX35)

Allocation of each contact	Target axis	Name	Description
X110	Axis 1	Servo lock	Turns ON when the corresponding axis is in a servo lock state.
X111	Axis 2		
X112	Axis 3		
X113	Axis 4		
X114	Axis 5		
X115	Axis 6		
X116	Axis 7 (virtual)		
X117	Axis 8 (virtual)		
X118	Axis 1	BUSY	Turns ON when the corresponding axis is operating.
X119	Axis 2		
X11A	Axis 3		
X11B	Axis 4		
X11C	Axis 5		
X11D	Axis 6		
X11E	Axis 7 (virtual)		
X11F	Axis 8 (virtual)		

WX12 (Slot No. 0: WX12, 1: WX20, 2: WX28, 3: WX36)

Allocation of each contact	Target axis	Name	Description
X120	Axis 1	Operation completion	Turns ON when the operation command for the corresponding axis is completed and the position deviation falls within the specified completion width. Turns ON when execution of all tables is completed for P-point control and C-point control of automatic operation. After this contact turns ON, the ON state continues until the next control is started.
X121	Axis 2		
X122	Axis 3		
X123	Axis 4		
X124	Axis 5		
X125	Axis 6		
X126	Axis 7 (virtual)		
X127	Axis 8 (virtual)		
X128	Axis 1	Home return completion	Turns ON when the home return operation for the corresponding axis is completed. After this contact turns ON, the ON state continues until the next control is started.
X129	Axis 2		
X12A	Axis 3		

Allocation of each contact	Target axis	Name	Description
X12B	Axis 4		
X12C	Axis 5		
X12D	Axis 6		
X12E	Axis 7 (virtual)		
X12F	Axis 8 (virtual)		

WX13 (Slot No. 0: WX13, 1: WX21, 2: WX29, 3: WX37)

Allocation of each contact	Target axis	Name	Description
X130	Axis 1	Near home	Contact for monitoring the near home input connected to the corresponding amplifier
X131	Axis 2		
X132	Axis 3		
X133	Axis 4		
X134	Axis 5		
X135	Axis 6		
X136	Axis 7 (virtual)		
X137	Axis 8 (virtual)		
X138	Axis 1	Auxiliary contact	Turns ON when the corresponding positioning table of the corresponding axis is executed. To configure the setting to enable and disable the auxiliary contact, use Configurator PM7-RTEX or directly write to the shared memory.
X139	Axis 2		
X13A	Axis 3		
X13B	Axis 4		
X13C	Axis 5		
X13D	Axis 6		
X13E	Axis 7 (virtual)		
X13F	Axis 8 (virtual)		

WX14 (Slot No. 0: WX14, 1: WX22, 2: WX30, 3: WX38)

Allocation of each contact	Target axis	Name	Description
X140	Axis 1	Limit +	Contact for monitoring the limit + and limit - inputs connected to the corresponding amplifier.
X141		Limit -	

Allocation of each contact	Target axis	Name	Description
X142	Axis 2	Limit +	During positioning operation, JOG operation, or pulser operation, deceleration stop is performed when a limit input that is located further in the operating direction turns ON. The deceleration stop time during limit input can be changed in the shared memory or Configurator PM7-RTEX. This is used as a contact that reverses the motor automatically when home return is performed.
X143		Limit -	
X144	Axis 3	Limit +	
X145		Limit -	
X146	Axis 4	Limit +	
X147		Limit -	
X148	Axis 5	Limit +	
X149		Limit -	
X14A	Axis 6	Limit +	
X14B		Limit -	
X14C	Axis 7 (virtual)	Limit +	
X14D		Limit -	
X14E	Axis 8 (virtual)	Limit +	
X14F		Limit -	

WX15 (Slot No. 0: WX15, 1: WX23, 2: WX31, 3: WX39)

Allocation of each contact	Target axis	Name	Description
X150	Axis 1	Synchronization setting completion	After the settings of synchronous control are changed with the program, synchronization settings in the unit are changed when the synchronization setting request contact (Y150 to Y157) is turned ON. The contact turns ON upon completion of the setting changes. This contact turns OFF when the synchronization setting request contact (Y150 to Y157) is turned OFF.
X151	Axis 2		
X152	Axis 3		
X153	Axis 4		
X154	Axis 5		
X155	Axis 6		
X156	Axis 7 (virtual)		
X157	Axis 8 (virtual)		
X158	Axis 1	Synchronization cancellation in-progress notification	Turns ON when synchronous operation is canceled by turning ON the synchronization contact cancellation contact (Y158 to Y15F). Synchronous operation cannot be executed on the axes for which this contact is turned ON.
X159	Axis 2		
X15A	Axis 3		
X15B	Axis 4		
X15C	Axis 5		
X15D	Axis 6		
X15E	Axis 7 (virtual)		

Allocation of each contact	Target axis	Name	Description
X15F	Axis 8 (virtual)		

WX16 (Slot No. 0: WX16, 1: WX24, 2: WX32, 3: WX40)

Allocation of each contact	Target axis	Name	Description
X160	Axis 1	Slave axis clutch operation notification	The clutch starts operating when the slave axis clutch ON request contact (Y160 to Y167) or clutch OFF request contact (Y168 to Y16F) turns ON. After the clutch operation is completed, the contact for the corresponding axis turns ON.
X161	Axis 2		
X162	Axis 3		
X163	Axis 4		
X164	Axis 5		
X165	Axis 6		
X166	Axis 7 (virtual)		
X167	Axis 8 (virtual)		
X168	-	-	-
X169	-	-	-
X16A	-	-	-
X16B	-	-	-
X16C	-	-	-
X16D	-	-	-
X16E	-	-	-
X16F	-	-	-

WY10 (Slot No. 0: WY10, 1: WY18, 2: WY26, 3: WY34)

Allocation of each contact	Target axis	Name	Description
Y100	All axes	System stop	Contact for requesting system stoppage. When it turns ON, all axes stop at zero deceleration time.
Y101	-	-	-
Y102	-	-	-
Y103	-	-	-
Y104	-	-	-
Y105	All axes	Error clearing request	Requests clearing of errors with all the connected amplifiers. When this signal turns ON, error recovery processing is performed and error logs are cleared.

Allocation of each contact	Target axis	Name	Description
			(Note 1): Recovery from unrecoverable errors is not possible even if this signal turns ON.
Y106	All axes	Warning clearing request	Requests clearing of warnings with all the connected amplifiers. The warning logs are cleared by turning ON this signal.
Y107	All axes	Recalculation request	Turn ON this signal when each piece of positioning data (in the standard area) in the shared memory is changed. By turning ON this signal, positioning data after the recalculation start table number stored in the shared memory can be re-created and made executable. When re-creation of positioning data is complete, the recalculation completion contact (X107) turns ON. Note 1: This contact is used only when positioning data has been rewritten using a user program.
Y108	Axis 1	Servo ON request	Requests servo lock for the corresponding amplifier. Servo lock state processing is requested by the ON edge of this contact. When RUN mode is switched to PROG mode while the axis is in a servo lock state, a servo free state does not occur automatically. To cause a servo free state, turn ON the servo OFF request contact. (The operation is the edge type.)
Y109	Axis 2		
Y10A	Axis 3		
Y10B	Axis 4		
Y10C	Axis 5		
Y10D	Axis 6		
Y10E	Axis 7 (virtual)		
Y10F	Axis 8 (virtual)		

WY11 (Slot No. 0: WY11, 1: WY19, 2: WY27, 3: WY35)

Allocation of each contact	Target axis	Name	Description
Y110	Axis 1	Servo OFF request	Requests a servo free state for the corresponding amplifier. Servo free state processing is requested by the ON edge of this contact. (The operation is the edge type.)
Y111	Axis 2		
Y112	Axis 3		
Y113	Axis 4		
Y114	Axis 5		
Y115	Axis 6		
Y116	Axis 7 (virtual)		
Y117	Axis 8 (virtual)		
Y118	Axis 1	Positioning startup	Requests positioning control for the corresponding amplifier. The execution start table is set in the area for specifying the position control starting table number in the shared memory. (The operation is the edge type.)
Y119	Axis 2		
Y11A	Axis 3		

Allocation of each contact	Target axis	Name	Description
Y11B	Axis 4		
Y11C	Axis 5		
Y11D	Axis 6		
Y11E	Axis 7 (virtual)		
Y11F	Axis 8 (virtual)		

WY12 (Slot No. 0: WY12, 1: WY20, 2: WY28, 3: WY36)

Allocation of each contact	Target axis	Name	Description
Y120	Axis 1	Home return startup	Requests home return for the corresponding amplifier. The direction, pattern, and other items of home return are set in the home return operation setting area in the shared memory or Configurator PM7-RTEX. (The operation is the edge type.)
Y121	Axis 2		
Y122	Axis 3		
Y123	Axis 4		
Y124	Axis 5		
Y125	Axis 6		
Y126	Axis 7 (virtual)		
Y127	Axis 8 (virtual)		
Y128	Axis 1	J-point positioning start contact	Turning ON this signal during the J-point operation for the corresponding axis terminates the J-point operation and shifts to the processing for the next table. (The operation is the edge type.)
Y129	Axis 2		
Y12A	Axis 3		
Y12B	Axis 4		
Y12C	Axis 5		
Y12D	Axis 6		
Y12E	Axis 7 (virtual)		
Y12F	Axis 8 (virtual)		

WY13 (Slot No. 0: WY13, 1: WY21, 2: WY29, 3: WY37)

Allocation of each contact	Target axis	Name	Description
Y130	Axis 1	Forward JOG	Requests JOG operation for the corresponding amplifier.
Y131		Reverse JOG	

Allocation of each contact	Target axis	Name	Description
Y132	Axis 2	Forward JOG	Acceleration time and other settings are specified in the JOG operation settings in the shared memory or by Configurator PM7-RTEX. (The operation is the level type.)
Y133		Reverse JOG	
Y134	Axis 3	Forward JOG	
Y135		Reverse JOG	
Y136	Axis 4	Forward JOG	
Y137		Reverse JOG	
Y138	Axis 5	Forward JOG	
Y139		Reverse JOG	
Y13A	Axis 6	Forward JOG	
Y13B		Reverse JOG	
Y13C	Axis 7 (virtual)	Forward JOG	
Y13D		Reverse JOG	
Y13E	Axis 8 (virtual)	Forward JOG	
Y13F		Reverse JOG	

WY14 (Slot No. 0: WY14, 1: WY22, 2: WY30, 3: WY38)

Allocation of each contact	Target axis	Name	Description
Y140	Axis 1	Emergency stop	Requests emergency stop for the corresponding amplifier. The deceleration time during emergency stop is specified using Configurator PM7-RTEX or the emergency stop settings in the shared memory. (The operation is the level type.) (Note 1): The deviation counter cannot be cleared.
Y141	Axis 2		
Y142	Axis 3		
Y143	Axis 4		
Y144	Axis 5		
Y145	Axis 6		
Y146	Axis 7 (virtual)		
Y147	Axis 8 (virtual)		
Y148	Axis 1	Deceleration stop	Requests deceleration stop for the corresponding amplifier. The deceleration time during deceleration stop is specified using Configurator PM7-RTEX or the deceleration stop settings in the shared memory. (The operation is the level type.) (Note 1): The deviation counter cannot be cleared.
Y149	Axis 2		
Y14A	Axis 3		
Y14B	Axis 4		
Y14C	Axis 5		
Y14D	Axis 6		
Y14E	Axis 7 (virtual)		

Allocation of each contact	Target axis	Name	Description
Y14F	Axis 8 (virtual)		

WY15 (Slot No. 0: WY15, 1: WY23, 2: WY31, 3: WY39)

Allocation of each contact	Target axis	Name	Description
Y150	Axis 1	Synchronization setting request	Turn ON this contact after changing the synchronous operation settings. Turn ON this contact when reflecting the setting changes in the synchronous control common area of the share memory. This flag is an edge trigger flag.
Y151	Axis 2		
Y152	Axis 3		
Y153	Axis 4		
Y154	Axis 5		
Y155	Axis 6		
Y156	Axis 7 (virtual)		
Y157	Axis 8 (virtual)		
Y158	Axis 1	Synchronization cancellation request	Turns ON the contact for the axis for which synchronous operation is to be canceled. The unit does not perform synchronous operation on the axis for which this contact is turned ON. Turn ON this contact to cancel the synchronous state temporarily during synchronous control. To set a synchronous state, turn OFF this contact.
Y159	Axis 2		
Y15A	Axis 3		
Y15B	Axis 4		
Y15C	Axis 5		
Y15D	Axis 6		
Y15E	Axis 7 (virtual)		
Y15F	Axis 8 (virtual)		

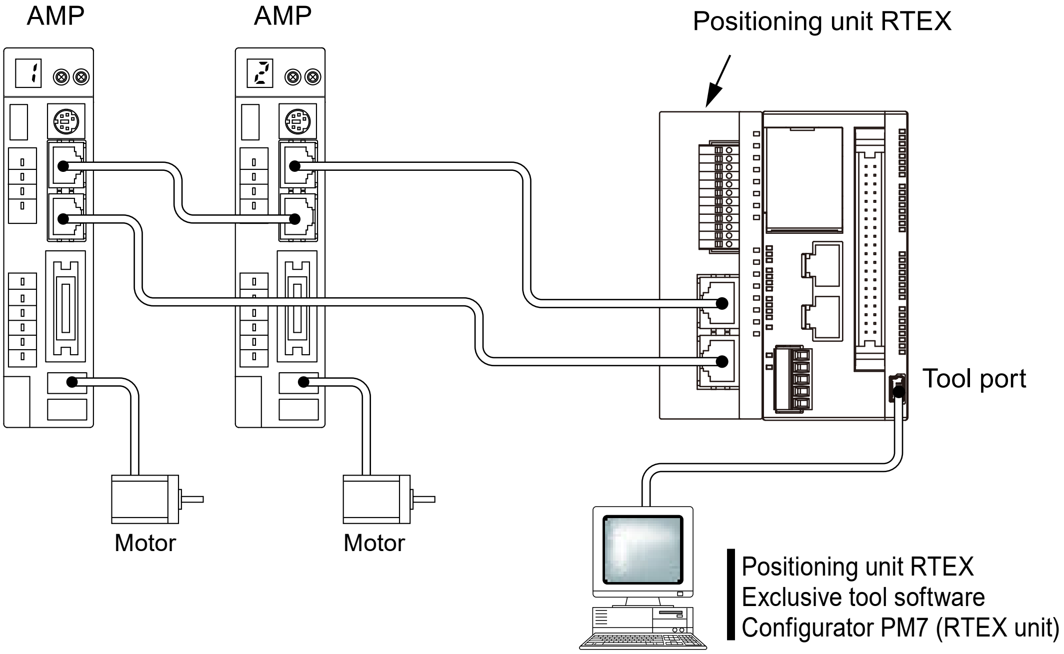
WY16 (Slot No. 0: WY16, 1: WY24, 2: WY32, 3: WY40)

Allocation of each contact	Target axis	Name	Description
Y160	Axis 1	Slave axis clutch ON request	Clutch ON operation is started by turning ON the contact for the corresponding axis during synchronous operation. Only axes that use a clutch are started. (Set the operation to level type, rising edge, or falling edge.)
Y161	Axis 2		
Y162	Axis 3		
Y163	Axis 4		
Y164	Axis 5		
Y165	Axis 6		

Allocation of each contact	Target axis	Name	Description
Y166	Axis 7 (virtual)		
Y167	Axis 8 (virtual)		
Y168	Axis 1	Slave axis clutch OFF request	Clutch OFF operation is started by turning ON the contact for the corresponding axis during synchronous operation. Only axes that use a clutch are started. (Set the operation to rising edge or falling edge.) These signals will be disabled while the slave axis clutch ON request signal is set to level type.
Y169	Axis 2		
Y16A	Axis 3		
Y16B	Axis 4		
Y16C	Axis 5		
Y16D	Axis 6		
Y16E	Axis 7 (virtual)		
Y16F	Axis 8 (virtual)		

7 Configurator PM7-RTEX Configuration Tool

7.1 Connecting to PC



Install the programming tool on a PC and connect it to the tool port of the FP0H control unit.

7.2 Functions of Configurator PM7-RTEX

7.2.1 Overview of Configurator PM7-RTEX

■ Copy and paste

Edited data can be copied and pasted into Microsoft® Excel or other software.

Similarly, positioning data calculated in Microsoft® Excel can also be pasted into Configurator PM7-RTEX.

■ Positioning parameter and data transfer

Specified positioning parameters and positioning data can be transferred to the positioning unit RTEX.

Positioning parameters and positioning data can also be loaded from the positioning unit RTEX.

■ Batch checking of positioning parameters and data

The contents of all positioning parameters and positioning data can be checked at once.

The cursor jumps to places where there are out-of-range positioning parameters or data.

This function is also executed automatically when positioning parameters and positioning data are transferred to the positioning unit RTEX.

■ Collation function

Edited positioning parameters and positioning data can be collated with the files on the disk or the settings in the positioning unit RTEX.

The collation result dialog box can be used to jump the cursor to any different data, making it easy to find any differences.

■ Search-and-replace functions

Search and replacement can be performed for each data item. Twenty searched strings and twenty replaced strings can be memorized, so it is convenient for repetitive searching or replacement.

■ Showing annotations for all positioning parameters and positioning data

Annotations are displayed for all positioning parameters and positioning data when settings are configured.

■ Up to 100 single-byte characters can be entered as data comments

Up to 100 single-byte characters (50 double-byte characters) of comments can be entered for each table of positioning data.

This is useful for the revision or management of programs.

However, comments cannot be stored in the positioning unit RTEX.

■ Tool Operation

Starting the tool operation mode enables the user to check the operations easily at the time of system installation and check the behaviors of the specified positioning parameters. There is no need to use a user program.

Also, the teaching function is provided, which reflects the current position to the movement amount of data item.

7.3 Starting Configurator PM7-RTEX

7.3.1 Starting Configurator PM7-RTEX

Use Configurator PM7-RTEX to specify positioning parameters. The following procedure is described assuming that FPWIN Pro7 has already been started.

Procedure

1. In the project tree, double-click **PLC**>**Positioning Table Configurator PM7-RTEX**.

Info.

- Configurator PMX (Pulse Output) and Configurator PM7 (RTEX) cannot be simultaneously used to edit data.

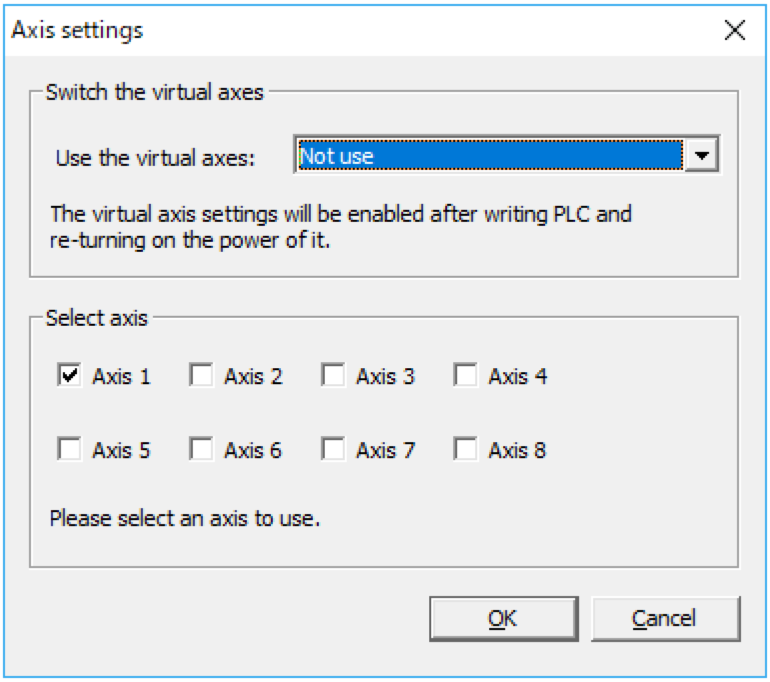
7.4 Allocation of Axes to Be Used

7.4.1 Settings in Configurator PM7-RTEX

Use Configurator PM7-RTEX to allocate the axes to be used and the usage of each axis. The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

Procedure

1. Select **Axis Settings**>**Change Axis** from the menu bar.
   The "Axis Settings" dialog box is displayed.



Use the virtual axes: Not use

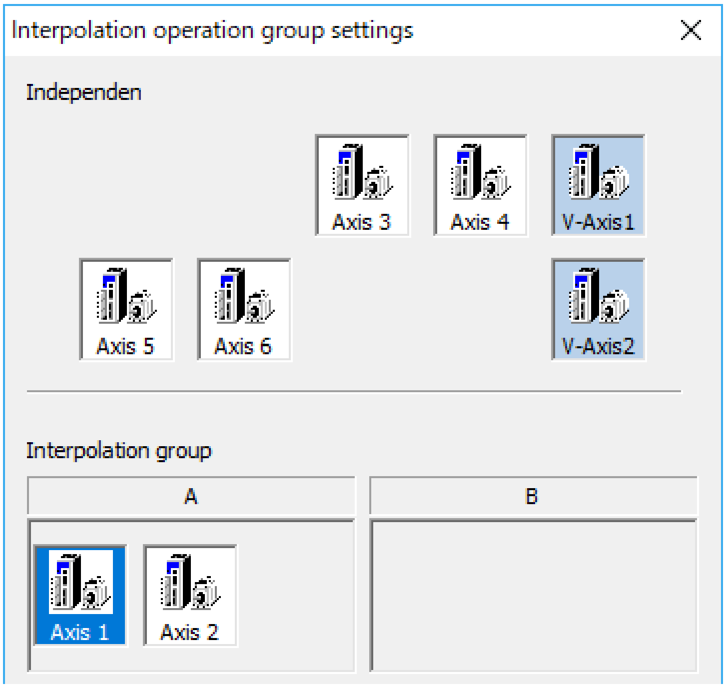
The virtual axis settings will be enabled after writing PLC and re-turning on the power of it.

☑ Axis 1 ☐ Axis 2 ☐ Axis 3 ☐ Axis 4

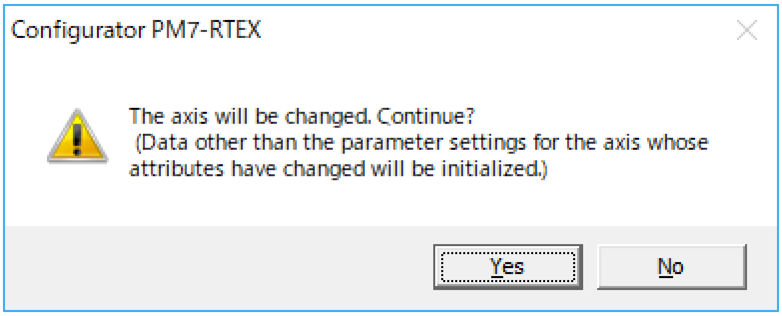
☐ Axis 5 ☐ Axis 6 ☐ Axis 7 ☐ Axis 8

Please select an axis to use.

2. When using virtual axes for synchronous control, select from the drop-down list.
   When "Virtual axis 1" is selected, "Axis 8" changes to "V-Axis 1".
   When "V-Axis 1 through V-Axis 2" is selected, "Axis 7" changes to "V-Axis 1", and "Axis 8" changes to "V-Axis 2".
3. Select the axes to be used, and click the [OK] button.
   The "Interpolation Operation Group Settings" dialog box is displayed.
4. To perform interpolation control, drag the icon of each axis to be allocated to interpolation to the interpolation group field.
   The following screenshot shows the allocation of Axis 1 and Axis 2 to the interpolation group.

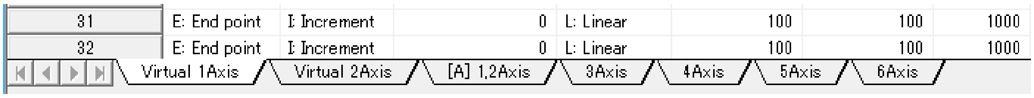


5. Click the [OK] button.
   A confirmation message will be displayed.



The axis will be changed. Continue?
(Data other than the parameter settings for the axis whose attributes have changed will be initialized.)

6. Confirm the changes and click the [Yes] button.
   A data table tab will be created for each set group.



31	E: End point	I: Increment	0	L: Linear	100	100	1000
32	E: End point	I: Increment	0	L: Linear	100	100	1000

Info.

- Setting items, such as the movement and interpolation of X-, Y-, and Z-axis, will be added to the data table, and group name [A] or [B] will be displayed on the tab when the interpolation group is set.
- Virtual axes and slave axes under synchronous control cannot be set to interpolation groups.

  The master axis under synchronous control can be set to interpolation groups.
- When changing the setting of “use of virtual axes”, turn the power OFF and then ON after writing to the PLC. The set information will be reflected.
- Closing the window by clicking the X mark during editing cancels and terminates the operation.

7.5 Saving and Managing Files

7.5.1 File Types

The set positioning parameters and positioning table information can be saved or exported in the following two formats.

File name	Extension	application	Operation of Configurator PM7-RTEX
Configurator PM7-RTEX file	.pm7rtx	Positioning parameters set using Configurator PM7-RTEX are saved as files. Saved data can also be reused among multiple units and projects.	Save settings Load settings
CSV file	.csv	Positioning parameters set using Configurator PM7-RTEX are exported in CSV format. These files can be used to check positioning parameters.	Export to CSV

7.5.2 Saving Positioning Parameters as Files

Positioning parameters set using Configurator PM7-RTEX can be saved as a file. The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

1 2 Procedure

1. Specify the file to save.

   The following methods are available to save files.

   (The procedure for saving and the operation of this software differ depending on whether the file is saved by overwriting an existing file or whether the file is saved under a new name.)

   - Saving a file by overwriting an existing file

     Select **File**>**Save** from the menu bar, or click the [Save] icon on the toolbar.
   - Saving a file under a new name

     Select **File**>**Save As** from the menu bar.

2. Enter the saving destination and file name, and click the [Save] button.

   Information on the positioning parameters and positioning tables is saved as a file with the extension ".pm7rtx".

Info.

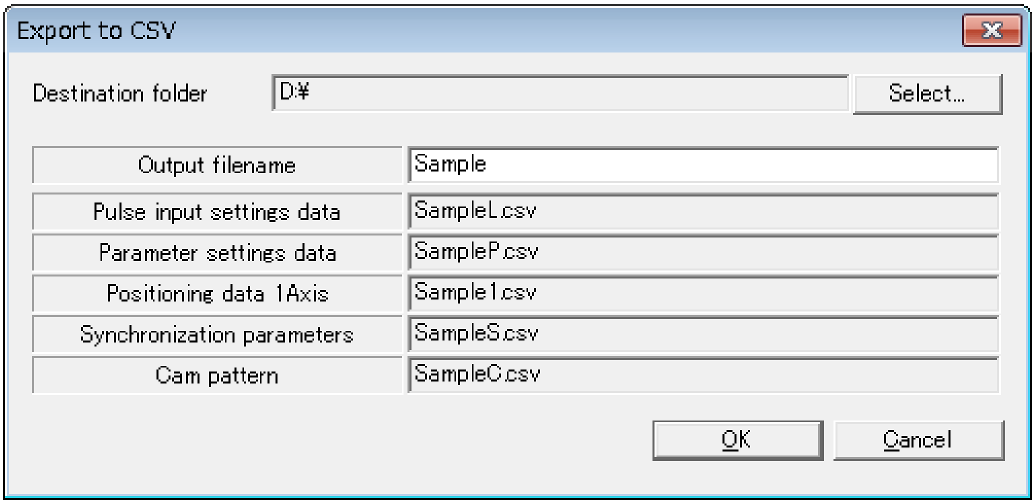
- The files saved by the above operations contain information on all positioning parameters and positioning tables set on Configurator PM7-RTEX.

7.5.3 Exporting to CSV File

Information on the set positioning parameters and positioning tables can also be exported in CSV format. It is possible to open the CSV files and check the settings of each positioning parameter and positioning table. The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

1 2 Procedure

1. Select **File**>**Export to CSV** from the menu bar.
The "Export to CSV" dialog box is displayed.



Destination folder: D:¥

Output filename	Sample
Pulse input settings data	SampleL.csv
Parameter settings data	SampleP.csv
Positioning data 1Axis	Sample1.csv
Synchronization parameters	SampleS.csv
Cam pattern	SampleC.csv

2. Enter an output file name and click the [OK] button.
CSV files with assigned file names will be saved for each positioning parameter type.

7.6 Exiting Configurator PM7-RTEX

To exit Configurator PM7-RTEX, select **File**>**Exit** from the menu bar or click the ✕ in the top right corner of the window.

If the file is unsaved, a message prompting for saving will be displayed.

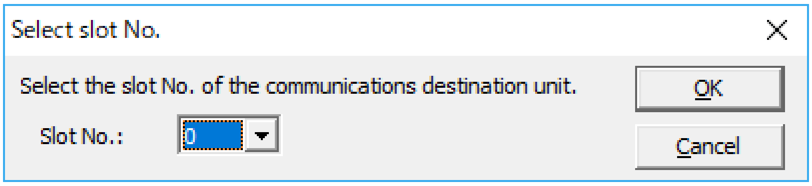
- Click [Yes] to save the file.
- Click [No] to close the window without saving the file.

7.7 Connecting to Positioning Unit RTEX

7.7.1 Selecting Slot Number

If Configurator PM7-RTEX will access the positioning unit RTEX, specify the mounting slot number of the positioning unit RTEX in advance.

Select **Online** > **Select Slot Number** from the menu bar. The following dialog box will be displayed.



Select slot No.

Select the slot No. of the communications destination unit.

Slot No.: 0

PLC	Slot No.
FP0H	The positioning unit RTEX is installed on the left side of the CPU unit, and is defined as shown below. Expansion unit 1: Slot number 0 Expansion unit 2: Slot number 1 Expansion unit 3: Slot number 2 Expansion unit 4: Slot number 3

7.7.2 Overview of Communication Settings

Configurator PM7-RTEX takes over the communication settings that are used when it is started from FPWIN Pro7.

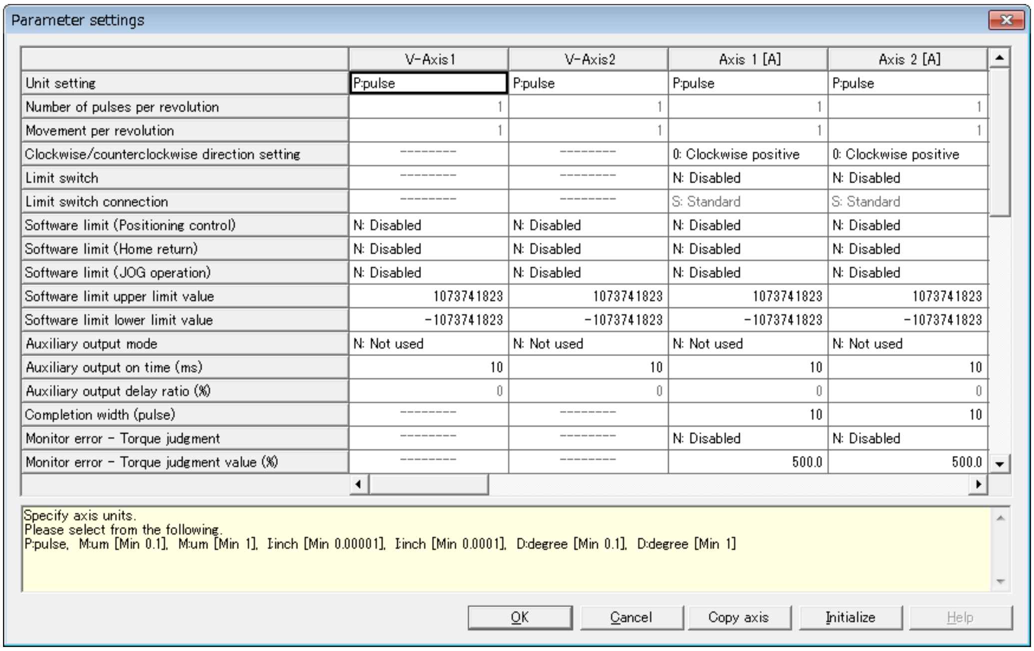
Therefore, settings are uploaded to or downloaded from the communication partner specified by FPWIN Pro7.

7.8 Positioning Parameter Settings

The positioning parameters common to various controls such as command units, connection directions of limit inputs, and stoppage time, and the positioning parameters related to home return and JOG operation are allocated using Configurator PM7-RTEX. The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

Procedure

1. Select **Axis Settings**>**Parameter Settings** from the menu bar.
   The "Positioning Parameters" dialog box is displayed.



	V-Axis1	V-Axis2	Axis 1 [A]	Axis 2 [A]
Unit setting	P:pulse	P:pulse	P:pulse	P:pulse
Number of pulses per revolution	1	1	1	1
Movement per revolution	1	1	1	1
Clockwise/counterclockwise direction setting	--------	--------	0: Clockwise positive	0: Clockwise positive
Limit switch	--------	--------	N: Disabled	N: Disabled
Limit switch connection	--------	--------	S: Standard	S: Standard
Software limit (Positioning control)	N: Disabled	N: Disabled	N: Disabled	N: Disabled
Software limit (Home return)	N: Disabled	N: Disabled	N: Disabled	N: Disabled
Software limit (JOG operation)	N: Disabled	N: Disabled	N: Disabled	N: Disabled
Software limit upper limit value	1073741823	1073741823	1073741823	1073741823
Software limit lower limit value	-1073741823	-1073741823	-1073741823	-1073741823
Auxiliary output mode	N: Not used	N: Not used	N: Not used	N: Not used
Auxiliary output on time (ms)	10	10	10	10
Auxiliary output delay ratio (%)	0	0	0	0
Completion width (pulse)	--------	--------	10	10
Monitor error - Torque judgment	--------	--------	N: Disabled	N: Disabled
Monitor error - Torque judgment value (%)	--------	--------	500.0	500.0

Specify axis units.
Please select from the following.
P:pulse, M:um [Min 0.1], M:um [Min 1], I:inch [Min 0.00001], I:inch [Min 0.0001], D:degree [Min 0.1], D:degree [Min 1]

2. Specify the necessary positioning parameters according to the application and click the [OK] button.
   After displaying the message "Updating data display", the screen returns to the base screen of Configurator PM7-RTEX.

3. Select **File**>**Apply Settings** from the menu bar.
   The positioning parameters set in Configurator PM7-RTEX are applied as the project data being edited.

Info.

- Closing the window by clicking the X mark during editing in the "Parameter Settings" dialog box cancels and terminates the operation.
- To save positioning parameters as a file, select **File**>**Save Setting**.

Positioning parameter setting items

Name	Description	Related page
Unit setting	Specify the unit of each axis. Select from the following items. "P: Pulses", "M: um [Min 0.1]", "M: um [Min 1]", "I: Inches [Min 0.0001]", "D: Degrees [Min 0.1]", "D: Degrees [Min 1]"	"5.1 Procedures for System Construction"
Number of pulses per revolution	Specify the number of pulses per motor rotation. (Default value: 1) pulse (Note 1)	
Movement amount per rotation	Specify the movement amount per motor rotation.	
CW/CCW direction setting	CW+: CW is the direction in which the elapsed value increases. CCW+: CCW is the direction in which the elapsed value increases.	
Limit switch	Set whether to enable or disable the limit switch. Select from the following items. "A: Enable", "N: Disable"	
Limit switch connection	Set the connections of the + direction limit switch and - direction limit switch. Select from the following items. "S: Standard", "R: Reverse connection"	
Soft limits: (Positioning control)	Set whether to enable or disable soft limits for positioning control, home return, JOG operation, and pulser operation. Select from the following items. "N: Disabled", "A: Enabled"	"14.2 Soft Limit"
Soft limits: (Home return)		
Soft limits: (JOG operation)		
Soft limits: (Pulser operation)		
Soft limits: Upper limit value	When any data that causes the current position to exceed this value is started during operation, an error occurs. For performing infinite rotation, set both soft limits to 0. Setting range: -2,147,482,624 to +2,147,482,624	
Soft limits: Lower limit value		
Auxiliary output mode	Set the timing when auxiliary output contact turns ON and the output timing of auxiliary output code. In With mode, auxiliary output is reflected in operation. In Delay mode, auxiliary output is reflected when the table moves by the amount of the delay ratio (%) to the total movement amount. Select from the following items. "N: Not used", "W: With mode", "D: Delay mode"	"14.3 Auxiliary Output"
Auxiliary output ON time (ms)	Set the time period during which auxiliary output contact is ON. Setting range: 0 to 255 ms (Default: 10 ms)	
Auxiliary output delay ratio (%)	Set the delay ratio (ratio of current movement amount to the total movement amount) when Delay mode is used for auxiliary output mode. Auxiliary output is reflected when the movement amount exceeds the delay ratio after positioning operation starts. Setting range: 0 to 100% (Default: 0%)	
Completion width (pulse)	Specify the width of the completion of command operation. Setting range: 0 to 2,147,482,624 pulses (Default: 10pulses)	"14.12 Operation

Name	Description	Related page
		Complete Signal"
Monitor error - Torque judgment	This is the setting to notify errors or warnings by setting judgement values for the torque command values of motors controlled by the amplifier of each axis. Select from the following items. "N: Disabled", "E: Enabled (Error)", "W: Enabled (Warning)"	"14.11 Monitor Error (Torque / Actual Speed Judgement)"
Monitor error - Torque judgment value (%)	This judgement value is not set in the amplifier, and used only for monitoring monitored values. Setting range: 0.0 to 500.0% (Default value: 500%)	
Monitor error - Actual speed judgment	This is the setting to notify errors or warnings by setting judgement values for the actual speed of motors controlled by the amplifier of each axis. Select from the following items. "N: Disabled", "E: Enabled (Error)", "W: Enabled (Warning)"	
Monitor error - Actual speed judgment value (rpm)	This judgement value is not set in the amplifier, and used only for monitoring monitored values. Setting range: 0 to 10,000 rpm (Default value: 5000 rpm)	
Stop-on-contact torque value for home return - Return setting code	Sets a pattern of home return. Select from the following items. "0: DOG method 1 (based on front end + Z phase)", "1: DOG method 2 (based on front end)" "2: DOG method 3 (based on back end + Z phase)", "3: Limit method 1 (limit signal + Z phase)" "4: Limit method 2 (limit signal)", "5: Z-phase method", "6: Stop-on-contact method 1" "7: Stop-on-contact method 2 (stop-on-contact + Z phase)", "8: Data set method" "9: DOG method 1 (E2) (based on front end + EXT2)" "A: DOG method 1 (E3) (based on front end + EXT3)" "B: DOG method 3 (E2) (based on back end + EXT2)" "C: DOG method 3 (E3) (based on back end + EXT3)" "D: Limit method 1 (E2) (limit signal + EXT2)" "E: Limit method 1 (E3) (limit signal + EXT3)", "F: EXT2 method" "G: EXT3 method", "H: Stop-on-contact method 2 (E2) (stop-on-contact + EXT2)" "I: Stop-on-contact method 2 (E3) (stop-on-contact + EXT3)", "J: High-speed home return method" "K: Absolute data set method"	"11.1 Types of Home Return (Incremental)"
Stop-on-contact torque value for home return - Stop-on-contact torque value (%)	Set the torque value for using the stop-on-contact method for home return. Whether the torque value of the amplifier exceeds the set value of this parameter due to stop-on-contact is used as the judgment criteria for home return. Setting range: 0 to 5000% (Default value: 100%)	
Stop-on-contact torque value for home return - Stop-on-contact judgment time (ms)	Set the judgement time for using the stop-on-contact method for home return. Whether this set time elapses after the torque value of the amplifier exceeds the stop-on-contact torque value in the event of stop-on-contact is regarded as a criterion for home return. Setting range: 0 to 10000 ms (Default: 100 ms)	

Name	Description	Related page
Stop-on-contact torque value for home return - Return direction	Sets the moving direction of home return. The limit (-) direction means the direction in which elapsed values decrease. The limit (+) direction means the direction in which elapsed values increase. Select from the following items. "0: Limit (-) direction", "1: Limit (+) direction"	
Stop-on-contact torque value for home return - Return acceleration time (ms)	Set the acceleration time or deceleration time during home return. Acceleration is performed for the specified acceleration time at the start of home return, deceleration is performed for the specified deceleration time after near home input , and then the speed changes to the creep speed. Setting range: 0 to 10000 ms (Default: 100 ms)	
Stop-on-contact torque value for home return - Return deceleration time (ms)		
Stop-on-contact torque value for home return - Return target speed	Set the target speed during home return. If there is no near home input after home return starts, acceleration is performed to shift to the target speed. Setting range: 1 to 2,147,482,624	
Stop-on-contact torque value for home return - Return creep speed	Set the speed to search for the home position after near home input. Setting range: 1 to 2,147,482,624	
Stop-on-contact torque value for home return - Home coordinates	The coordinates specified as the coordinates of the home position are registered as the home position upon completion of home return. Setting range: -2,147,482,624 to +2,147,482,624 (Default: 0)	
JOG operation - Acceleration/ deceleration method	Sets the acceleration/deceleration method for JOG operation. Select from the following items. "0: Linear acceleration/deceleration", "1: S-shaped acceleration/ deceleration"	"10.1 Settings and Operation of JOG Operation"
JOG operation - JOG acceleration time (ms)	Sets the acceleration time or deceleration time during JOG operation. Acceleration is performed for the specified acceleration time at the beginning of the JOG operation, deceleration is performed for the specified deceleration time when the starting contact (I/O) of JOG operation turns OFF, and then the motor stops. Setting range: 0 to 10000 ms (Default: 100 ms)	
JOG operation - JOG deceleration time (ms)		
JOG operation - JOG target speed	Sets the target speed for JOG operation. After the JOG operation is started, the specified acceleration operation is performed to shift to the target speed while the starting contact (I/O) of the JOG operation is ON. After the target speed is reached, operations are performed at the target speed. Setting range: 1 to 2,147,482,624	
Emergency stop deceleration time (ms)	When emergency stop is requested by I/O, the deceleration operation is completed in this deceleration time. Setting range: 0 to 10000 ms (Default: 100 ms)	"13.1 Types and Settings of Stop Function"
Limit stop deceleration time (ms)	The deceleration operation is completed in this deceleration time at the time of limit input. Setting range: 0 to 10000 ms (Default: 100 ms)	
Error stop deceleration time (ms)	When an error occurs, the deceleration operation is completed in this deceleration time. Setting range: 0 to 10000 ms (Default: 100 ms)	

Name	Description	Related page
J-point - Operation setting code	Sets the acceleration/deceleration method for J-point control. Select from the following items. "0: Linear acceleration/deceleration", "1: S-shaped acceleration/ deceleration"	"8.1.5 Settings and Operation of J-Point Control"
J-point - Acceleration time (ms)	Sets the acceleration time or deceleration time for J-point control. Setting range: 0 to 10000 ms (Default: 100 ms)	
J-point - Deceleration time (ms)		
J-point - Target speed	Sets the target speed for J-point control. After J- point control is started, the target speed is reached in the specified acceleration time. Setting range: 1 to 2,147,482,624 (Default: 1000)	
Pulsar operation setting code	Select from the channels whose pulse input application is set to “Pulser”. Select from the following items. "0: Pulse input CH1", "1: Pulse input CH2", "2: Pulse input CH3"	"12.2 Settings and Operation of Pulser Operation"
Pulser input method	Sets a pulser input method. Select from the following items. "0: Standard operation", "1: Speed limit (pulses held)", "2: Speed limit (time held)"	
Pulser operation ratio numerator	Sets the pulser operation ratio by multiplying the input pulse train from the pulser by (the pulser operation ratio numerator) / (the pulser operation ratio denominator) to obtain the number of amplifier movement pulses. Setting range: 1 to 32767 (Default: 1)	
Pulser operation ratio denominator		
Pulser operation maximum speed	Sets the maximum pulser operation speed. Setting range: 1 to 2,147,482,624 (Default value: 1)	

(Note 1) Set only if the set unit is μm, inches, or degrees.

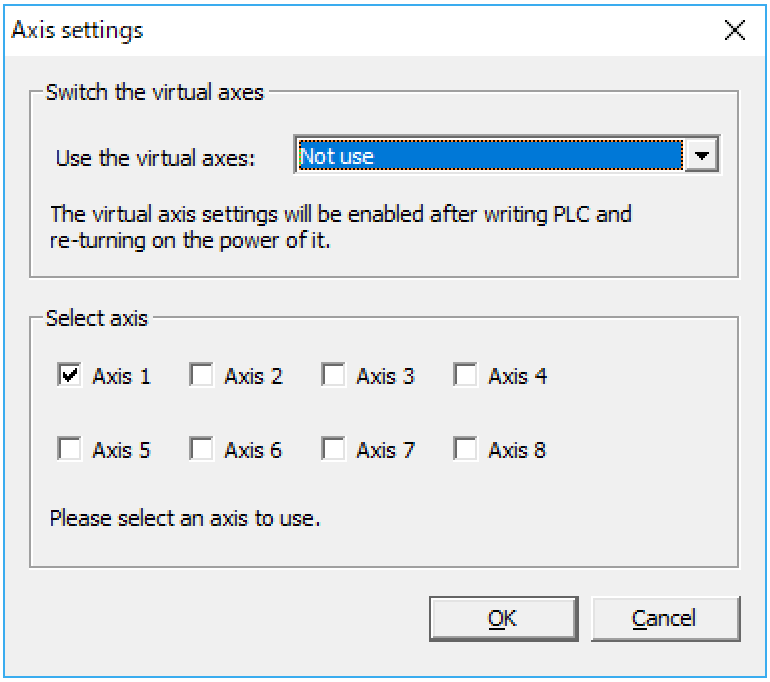
7.9 Changing Axis Information

Use Configurator PM7-RTEX to allocate the axes to be used and the usage of each axis. The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

Procedure

1. Select **Axis Settings**>**Change Axis** from the menu bar.

   The "Axis Settings" dialog box is displayed.



Axis settings

Switch the virtual axes

Use the virtual axes: Not use

The virtual axis settings will be enabled after writing PLC and re-turning on the power of it.

Select axis

☑ Axis 1 ☐ Axis 2 ☐ Axis 3 ☐ Axis 4

☐ Axis 5 ☐ Axis 6 ☐ Axis 7 ☐ Axis 8

Please select an axis to use.

2. When using virtual axes for synchronous control, select from the drop-down list.

   When "Virtual Axis 1" is selected, "Axis 8" changes to "V-Axis 1".

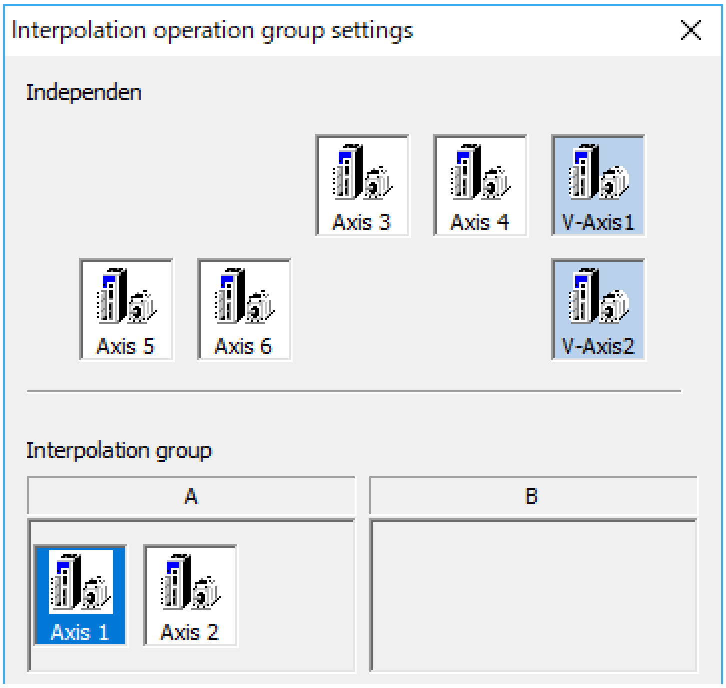
   When "V-Axis 1 through V-Axis 2" is selected, "Axis 7" changes to "V-Axis 1", and "Axis 8" changes to "V-Axis 2".

3. Select the axes to be used, and click the [OK] button.

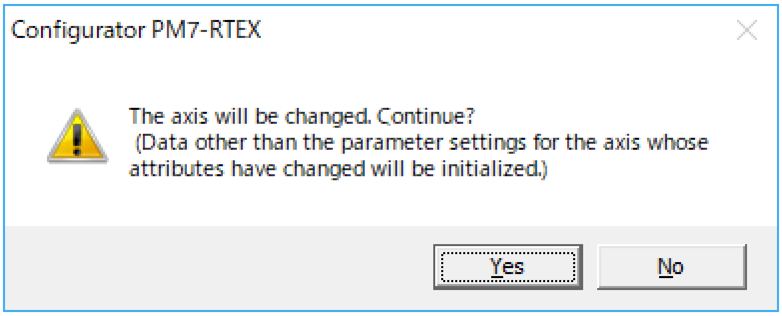
   The "Interpolation Operation Group Settings" dialog box is displayed.

4. To perform interpolation control, drag the icon of each axis to be allocated to interpolation to the interpolation group field.

   The following screenshot shows the allocation of Axis 1 and Axis 2 to the interpolation group.

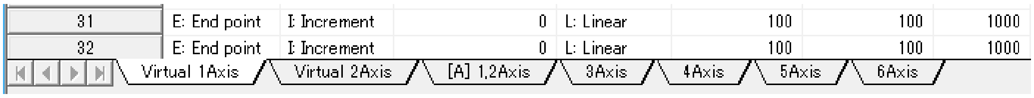


5. Click the [OK] button.
A confirmation message will be displayed.



The axis will be changed. Continue?
(Data other than the parameter settings for the axis whose attributes have changed will be initialized.)

6. Confirm the changes and click the [Yes] button.
A data table tab will be created for each set group.



31	E: End point	I: Increment	0	L: Linear	100	100	1000
32	E: End point	I: Increment	0	L: Linear	100	100	1000

Info.

- Setting items, such as the movement and interpolation of X-, Y-, and Z-axis, will be added to the data table, and group name [A] or [B] will be displayed on the tab when the interpolation group is set.
- Virtual axes and slave axes under synchronous control cannot be set to interpolation groups.

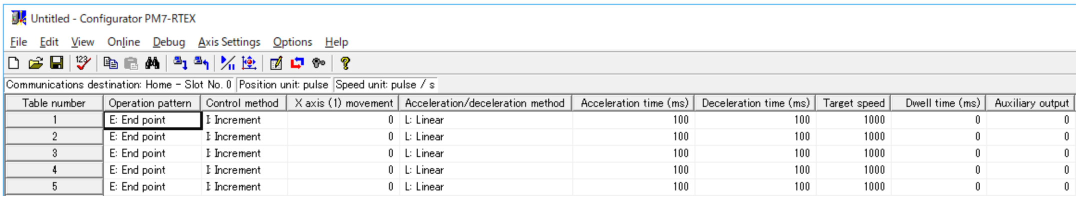
  The master axis under synchronous control can be set to interpolation groups.
- When changing the setting of “use of virtual axes”, turn the power OFF and then ON after writing to the PLC. The set information will be reflected.
- Closing the window by clicking the X mark during editing cancels and terminates the operation.

7.10 Setting Positioning Data

Use Configurator PM7-RTEX to allocate positioning data tables. The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

■ Initial display screen of Configurator PM7-RTEX

- Separate sheets are used for each axis and data tables can be set.



Communications destination: Home - Slot No. 0 | Position unit: pulse | Speed unit: pulse / s

Table number	Operation pattern	Control method	X axis (1) movement	Acceleration/deceleration method	Acceleration time (ms)	Deceleration time (ms)	Target speed	Dwell time (ms)	Auxiliary output
1	E: End point	I: Increment	0	L: Linear	100	100	1000	0	0
2	E: End point	I: Increment	0	L: Linear	100	100	1000	0	0
3	E: End point	I: Increment	0	L: Linear	100	100	1000	0	0
4	E: End point	I: Increment	0	L: Linear	100	100	1000	0	0
5	E: End point	I: Increment	0	L: Linear	100	100	1000	0	0

■ Setting item

Name	Description
Operation pattern	Select one from the following operation patterns. E-point: Executes trapezoidal control for only one table. C-point: Execute trapezoidal control continuously. Specify the end point (E-point) at the end of continuance point (C-point) control. P-point: Executes continuous speed change control. Specify the end point (E-point) at the end of pass point (P-point) control. J-point: Executes speed control. Specify the end point (E-point) at the end of speed control (J-point).
Control method	Select either incremental or absolute coordinates.
X-axis movement amount	Input the movement amount of X-axis. The movement amount depends on the unit system specified in the positioning parameter settings.
Acceleration/ deceleration method	Select an acceleration/deceleration method.
Acceleration time (ms)	Set an acceleration time. Settable unit: ms
Deceleration time (ms)	Set a deceleration time. Settable unit: ms
Target speed	Set a target speed. Settable units: pps, μm/s, inches/s, rev/s
Dwell time (ms)	Set the time from completion of the positioning command in E-point control until the operation done flag turns ON. For C-point control, dwell time is the waiting time between each table. For P-point control, dwell time is ignored.
Auxiliary Output	Set an auxiliary output code. If auxiliary output is enabled in the positioning parameter settings, the auxiliary output code specified here is output.
Comment	Arbitrary comments can be input for each table.

(Note 1) Details of the settings for each positioning parameter are displayed on the guidance bar.

(Note 2) If interpolation control is selected, interpolation, Y-axis movement amount, Z-axis movement amount, X-axis auxiliary point, Y-axis auxiliary point, Z-axis auxiliary point, and interpolation speed are also displayed as items.

7.11 How to Edit Positioning Data

7.11.1 Inputting Positioning Data

The cursor on the positioning data editing screen can be moved by clicking or double-clicking the mouse button or pressing the up, down, right, or left arrow key, the "Enter" key, or the "Tab" key.

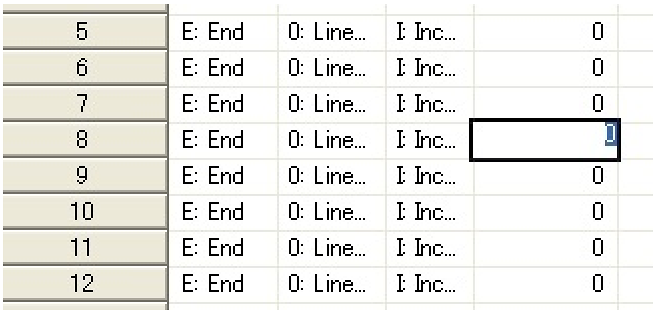
- **Moving the cursor to data items**

Using the up, down, right, or left arrow key moves the cursor to the adjacent cell in the direction of the arrow.

Using the mouse enables the cursor to be moved only by clicking the cell. If the cell you want to specify is not in the data editing screen, scroll the screen using the scroll bar until you can see the cell.

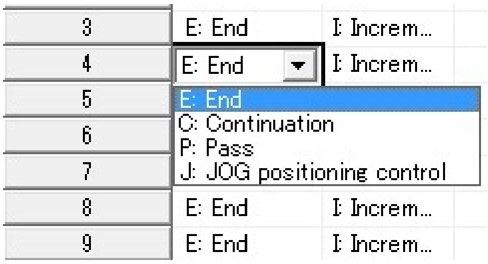
- **Entering data items**

Pressing any character input key or double-clicking the mouse button in the cell where you want to input data enables you to input the data as below.



5	E: End	0: Line...	I: Inc...	0
6	E: End	0: Line...	I: Inc...	0
7	E: End	0: Line...	I: Inc...	0
8	E: End	0: Line...	I: Inc...	0
9	E: End	0: Line...	I: Inc...	0
10	E: End	0: Line...	I: Inc...	0
11	E: End	0: Line...	I: Inc...	0
12	E: End	0: Line...	I: Inc...	0

However, in columns with a combo box as below, data items can be set only by inputting an initial character from the keyboard. For example, if you enter [C] directly in the pattern column, the data item will be [C: Continuance point]. It is also possible to select using the up or down arrow key after input is enabled.

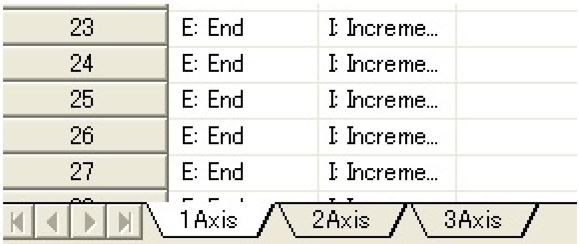


3	E: End	I: Increm...
4	E: End	I: Increm...
5		
6		
7		
8	E: End	I: Increm...
9	E: End	I: Increm...

- **Press the "Enter" key to confirm or the "ESC" key to cancel.**

- **Clicking the tab of a desired sheet to change to the sheet**

If a keyboard is used, the sheet can be switched by simultaneously pressing "Ctrl"+"Page Up" or "Ctrl"+"Page Down".



23	E: End	I: Increme...
24	E: End	I: Increme...
25	E: End	I: Increme...
26	E: End	I: Increme...
27	E: End	I: Increme...

7.11.2 Copying Positioning Data

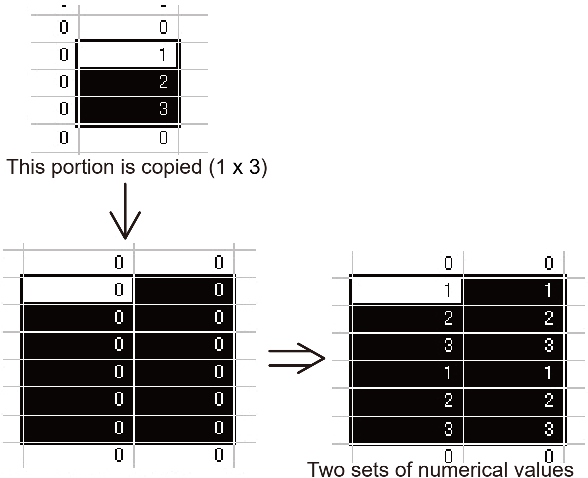
Data can be stored in the clipboard by specifying a cell selection area on the positioning data editing screen. The data stored in the clipboard can be pasted in Microsoft Excel® as well as the data editing screen of this software.

- Pasting is not possible if the contents of the clipboard do not match the attributes of the pasting area.

  If numerical values are contained in the contents of the clipboard, according to the maximum number of digits of data that can be pasted for the data item, only the maximum number of digits of data starting from the first digit will be pasted and the remaining digits will be truncated.

Info.

- If the structure of the pasting area is an integer multiple of the contents of the clipboard, a set of numerical values whose number is an integer multiple of the contents of the clipboard can be pasted using the same pattern as shown below.



This portion is copied (1 x 3)

The pasting area is specified (2 x 6)

Two sets of numerical values are paseted vertically in the two specified adjacent columns

7.11.3 Selecting All Cells

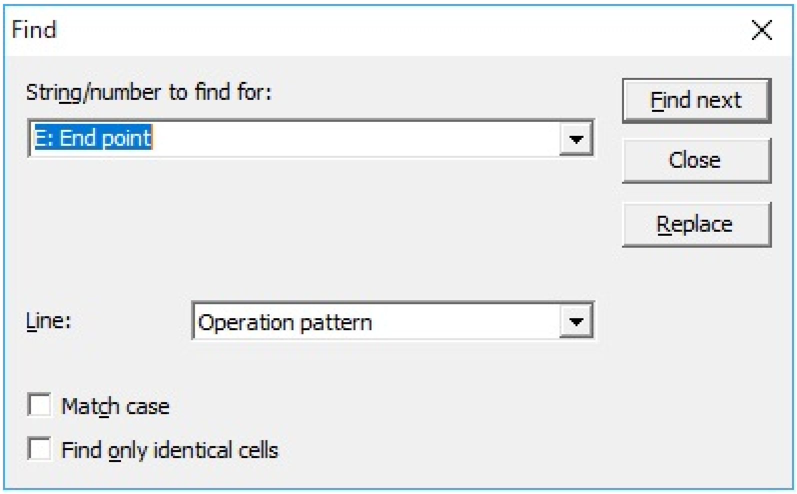
All cells can be selected before edited data is copied and pasted, for example. This function is convenient when all the settings of the specified axis are copied to another axis.

To select all cells, press "Ctrl" + "A" on the keyboard or click the [Table No.] header on the upper left corner of the data editing screen.

7.11.4 Searching Character Strings

1 2 Procedure

1. Select **Edit Data**>**Find** on the menu bar, or click the [Find] icon on the toolbar.
   The following dialog box is displayed.



Find

String/number to find for: E: End point

Line: Operation pattern

☐ Match case

☐ Find only identical cells

2. Input the character string to search in the "Character string to find" box, and select the target line (setting item).
3. Click [Next].

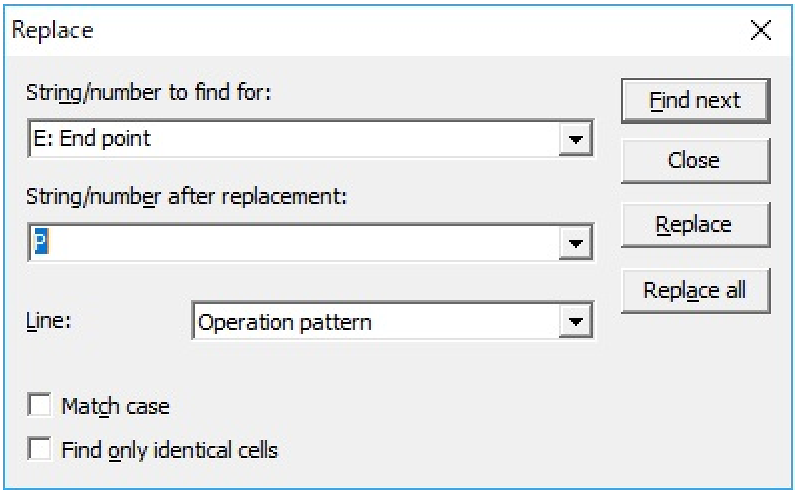
Info.

- Press "Esc" to cancel the search. Click [Replace] to switch to the "Replacement" screen.

7.11.5 Replacing Character Strings

1 2 Procedure

1. Select **Replace**>**Find** from the menu bar.
   The following dialog box will be displayed.



String/number to find for: E: End point

String/number after replacement: P

Line: Operation pattern

☐ Match case

☐ Find only identical cells

2. Input the character string to search in the "Character string to find" box.

3. Input the character string to replace it with in the "Character string after replacement" box.

4. Select the target line (setting item).

5. Click the [Next] button, [Replace] button, or [Replace all] button.

7.11.6 Selecting Rows

The cells in a row or multiple rows can be selected before edited data is copied and pasted, for example.

Click the [Table No.] header (displayed as the gray button) on the left end of the positioning data editing screen to select all the cells in one line. Drag the mouse up or down (with the left mouse button pressed) to select multiple lines.

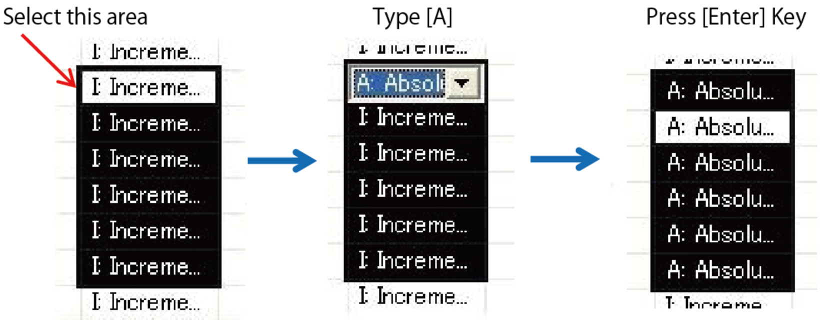
7.11.7 Selecting Columns

This function is convenient to use before copying and pasting data during data editing, as well as to edit all data collectively for each data item.

Click a header on the top of the data editing screen to select all the cells in one column. Drag a header on the top of the screen with the left mouse button pressed to select multiple columns.

7.11.8 Editing Data Items Collectively

Select a series of data items in the same column and change them all at once.



1 2 Procedure

1. Select the section to be changed with the mouse or the up and down arrow keys on the keyboard.
2. Enter data items.

   In the above example, to change the X-axis pattern from "I: Incremental" to "A: Absolute", press "A" on the keyboard.
3. Press the "Enter" key to finalize the selected data items.

   Using this procedure, data items can be edited collectively.

i Info.

When inputting data items using the edit box (e.g. movement amount, acceleration time, etc.), input the data items directly using numerical keys.

7.12 Customizing the Software

■ Changing the column width

Widen the column width to enable all the characters to be displayed during data editing, or narrow it when the resolution of the PC you use is low. As the column width is saved when the software is closed, the same width will be retained the next time the software is started.

Procedure

1. Move the mouse cursor to the right end of the target column (that you want to widen) in the header columns on the top of the data editing screen.

   The mouse cursor will change to a plus sign (+).
2. While the mouse is in this state, move the mouse right or left with the left mouse button pressed.
3. Release the left mouse button to finish changing the column width.

Info.

- While the mouse is in the state shown in step 1 above, double-clicking the mouse button causes the column width to return to the width at the time of startup.

■ Showing or hiding the toolbar

You can show or hide the toolbar.

■ Showing or hiding the status bar

You can show or hide the status bar.

From the menu bar, select **View**>**Status Bar** and select or clear the menu item. The status bar is displayed when the menu item is selected (there is a check mark), and is not displayed when the menu item is cleared (there is no check mark).

■ Showing or hiding the positioning parameter status bar

You can show or hide the positioning parameter status bar.

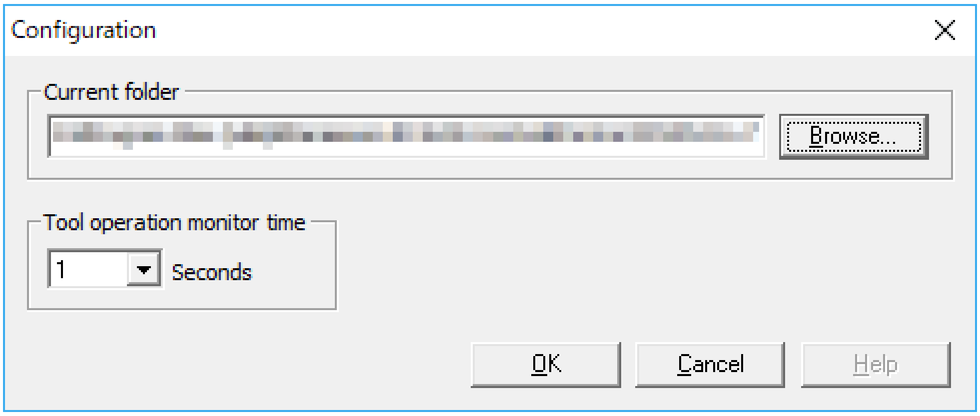
■ Showing or hiding the guidance bar

You can show or hide the guidance bar on the main screen that provides guidance on various settings.

■ Configuration settings

Select **Option**>**Configuration** from the menu bar. The following dialog box is displayed.

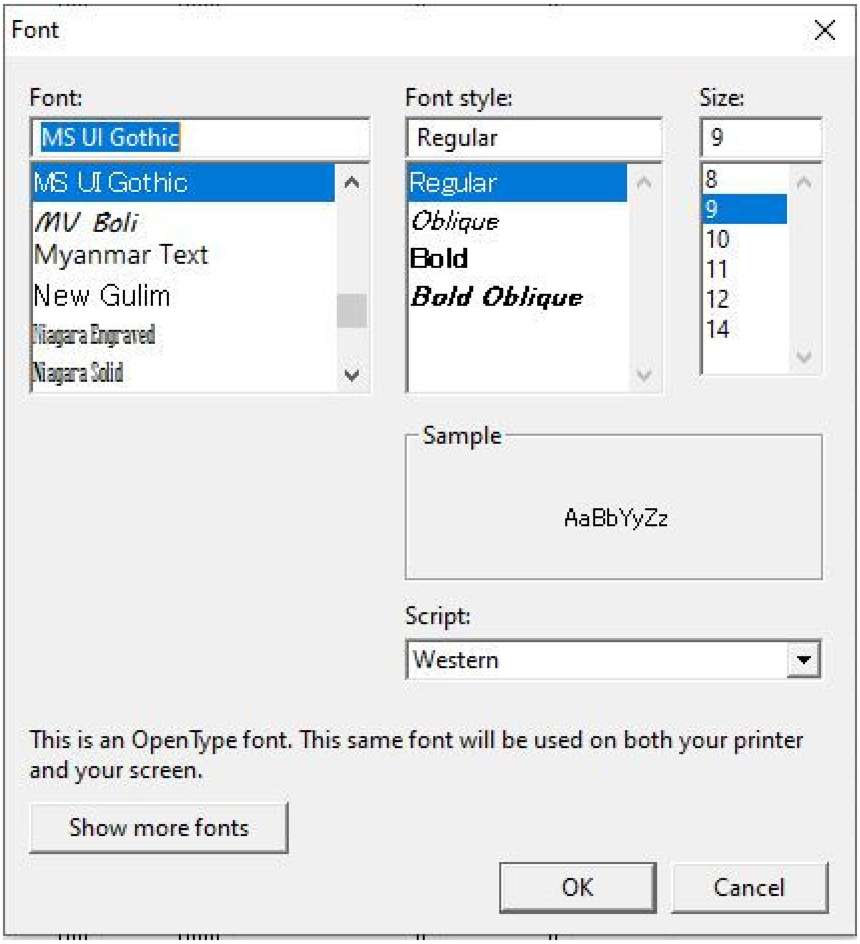
In the configuration settings window, the current folder of the setting data files can be changed.



Current folder	Specify the current folder to be used for this software.
Tool operation monitoring time	Set the communication error detection time during tool operation.

■ Setting the font to be used

Select **Option**>**Font** from the menu bar. The following dialog box is displayed.



Font

Font: MS UI Gothic

Font style: Regular

Size: 9

Script: Western

This is an OpenType font. This same font will be used on both your printer and your screen.

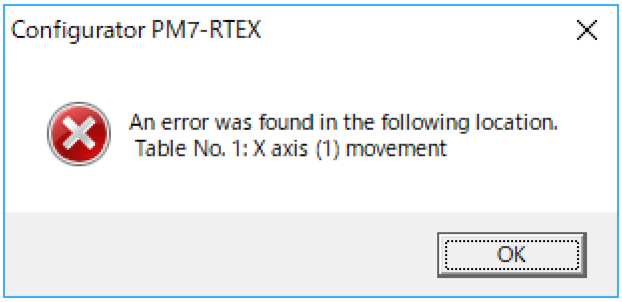
7.13 Checking Settings

7.13.1 Checking positioning parameter data

The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

1 2 Procedure

1. Select **Debug**>**Check Parameter and Data Values** from the menu bar.
   A message box will be displayed indicating the check results. If there is an error in the settings for the positioning data tables, an error message will appear and the cursor will move to the corresponding error position.


Configurator PM7-RTEX

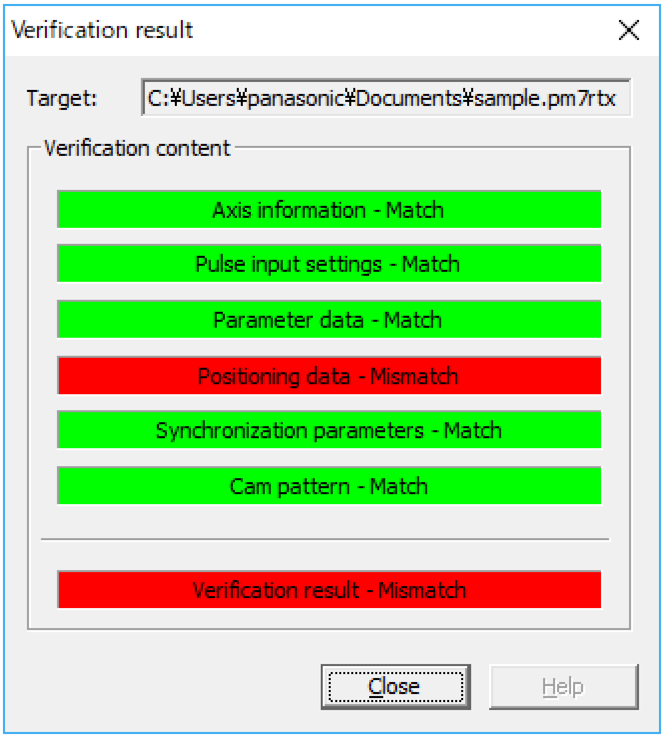
An error was found in the following location.
Table No. 1: X axis (1) movement

7.13.2 Collating Positioning Parameter Information (Collation with Files)

With Configurator PM7-RTEX, positioning parameter information being edited can be collated with the configuration information that has been stored. The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

1 2 Procedure

1. Select **Debug**>**Verify**>**File** from the menu bar.
   When "File" is selected, the "Select a File to Verify" dialog box appears.
2. In the "Select a File to Verify" dialog box, select the target file and click the [OK] button.
   The information being edited in Configurator PM7-RTEX will be compared with the configuration information stored in the file, and the comparison results will be displayed.



Verification result

Target: C:¥Users¥panasonic¥Documents¥sample.pm7rtx

Verification content

Axis information - Match

Pulse input settings - Match

Parameter data - Match

Positioning data - Mismatch

Synchronization parameters - Match

Cam pattern - Match

Verification result - Mismatch

7.13.3 Collating Positioning Parameter Information (Collation with PLC)

With Configurator PM7-RTEX, positioning parameter information being edited can be collated with the configuration information that has been stored. The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

1 2 Procedure

1. Select **Debug**>**Verify**>**Unit** from the menu bar.
   When "PLC" is selected, the information being edited in Configurator PM7-RTEX will be compared with the configuration information stored in the PLC, and the comparison results will be displayed.

Verification result

Target: Home - Slot No. 0

Verification content

Axis information - Match

Pulse input settings - Match

Parameter data - Match

Positioning data - Mismatch

Synchronization parameters - Match

Cam pattern - Match

Verification result - Mismatch

Comments associated with positioning settings data are not targeted for verification.

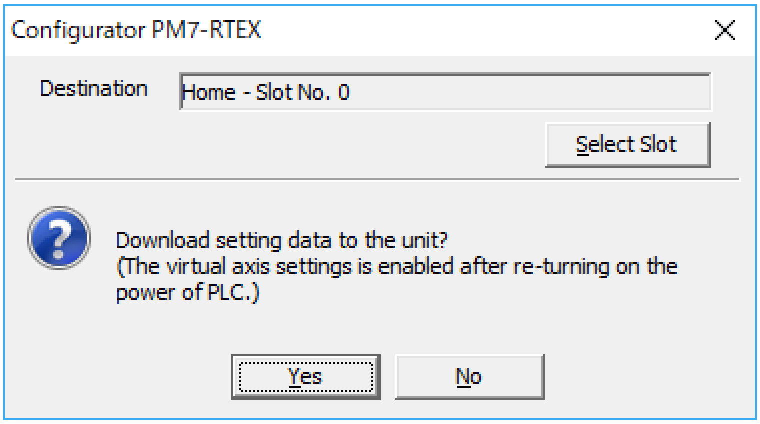
7.14 Transferring Positioning Parameters

7.14.1 Downloading Using Configurator PM7-RTEX

Positioning parameters and positioning data can be downloaded or uploaded using Configurator PM7-RTEX. The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

1 2 Procedure

1. Select **File**>**Download to Unit**.
   A confirmation message box will be displayed.



Configurator PM7-RTEX

Destination: Home - Slot No. 0

Download setting data to the unit?
(The virtual axis settings is enabled after re-turning on the power of PLC.)

2. When a download confirmation window appears, click the [Yes (Y)] button.
3. After the download is complete, a confirmation window is displayed asking whether to write to FROM. Click the [Yes (Y)] button.

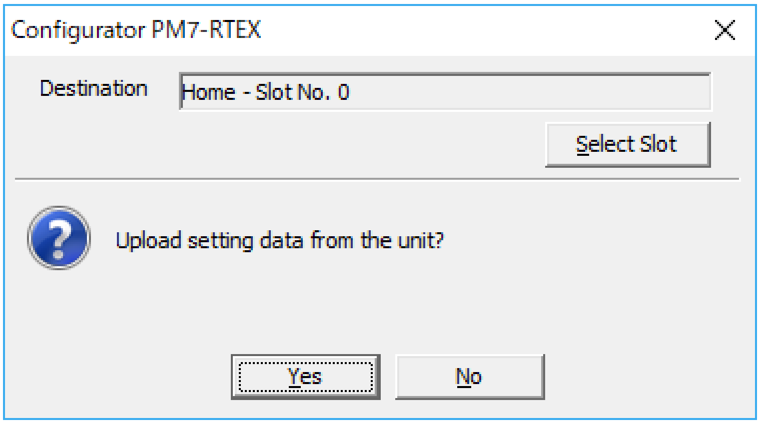
Info.

- Data is downloaded to the slot number specified by selecting **Online**>**Select Slot Number**.
- Even if FPWIN Pro7 is offline, data can be downloaded to the positioning unit RTEX.
- Even if PLC is in RUN mode, data can be downloaded.
- If data is not written to FROM, the data that has been downloaded will be erased when the positioning unit RTEX is turned OFF.

7.14.2 Uploading from Configurator PM7-RTEX

1 2 Procedure

1. Select **File**>**Upload from Unit** from the menu bar of Configurator PM7-RTEX.
   A confirmation message box will be displayed.



Destination: Home - Slot No. 0

Upload setting data from the unit?

2. When an upload confirmation window appears, click [Yes (Y)].

3. When a confirmation window is displayed asking whether to clear the comments, select "Yes (Y)" or "No (N)".

Info.

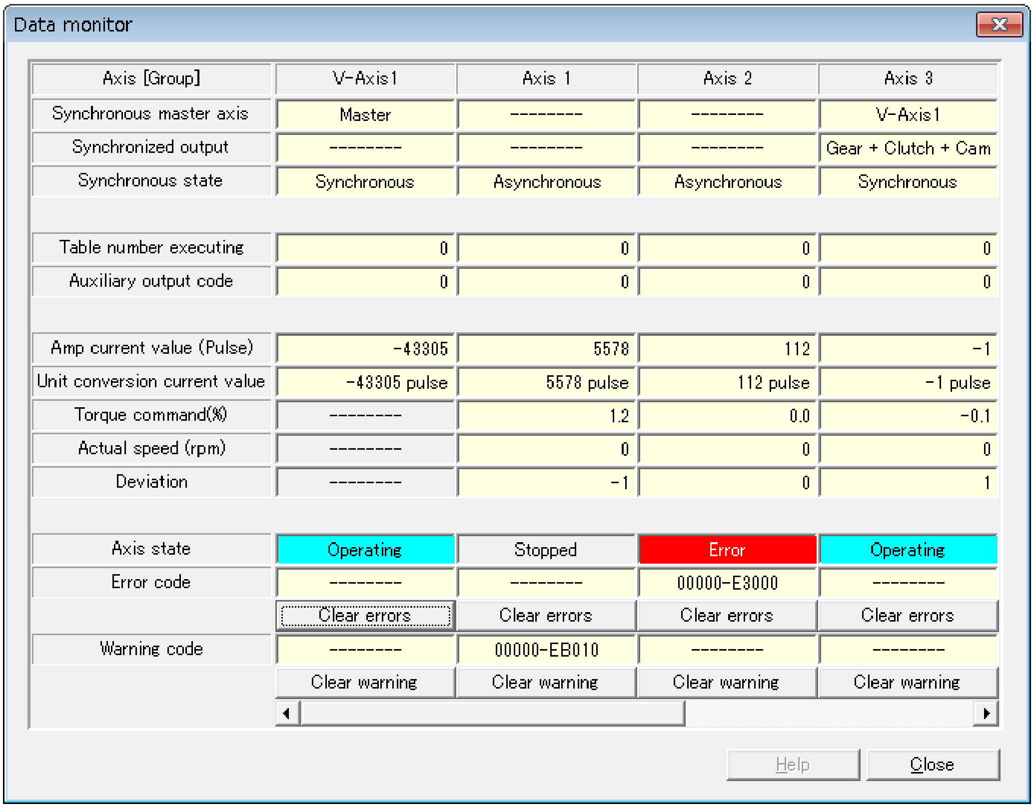
- Data is uploaded from the slot number specified by selecting **Online**>**Select Slot Number**.
- Even if FPWIN Pro7 is offline, data can be uploaded from the positioning unit RTEX.

7.15 Data Monitor

The connection state of each axis and input state of external terminals can be monitored. The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

Procedure

1. Select**Online**>**Data Monitor**from the menu bar.
   The"Data Monitor"dialog box is displayed.



Data monitor

Axis [Group]	V-Axis1	Axis 1	Axis 2	Axis 3
Synchronous master axis	Master	--------	--------	V-Axis1
Synchronized output	--------	--------	--------	Gear + Clutch + Cam
Synchronous state	Synchronous	Asynchronous	Asynchronous	Synchronous
Table number executing	0	0	0	0
Auxiliary output code	0	0	0	0
Amp current value (Pulse)	-43305	5578	112	-1
Unit conversion current value	-43305 pulse	5578 pulse	112 pulse	-1 pulse
Torque command(%)	--------	1.2	0.0	-0.1
Actual speed (rpm)	--------	0	0	0
Deviation	--------	-1	0	1
Axis state	Operating	Stopped	Error	Operating
Error code	--------	--------	00000-E3000	--------
Warning code	--------	00000-EB010	--------	--------

Monitoring Items

Item	Description	Related page
synchronous master axis	Displays"Master"when an axis has been set as a master axis. When an axis has been set as a slave axis, the master axis on which this axis is based is displayed. Example: When Axis 2 has been set as a slave axis for the master axis that is Axis 1,"Axis 1"is displayed in the column of Axis 2. Displays"--------"for axes that are not used for synchronous control.	"9.1 Synchronous control"
Synchronous output	The functions of synchronous operation that have been set for slave axes are displayed. "Gear","clutch","cam" "Gear + clutch","gear + cam","clutch + cam"	

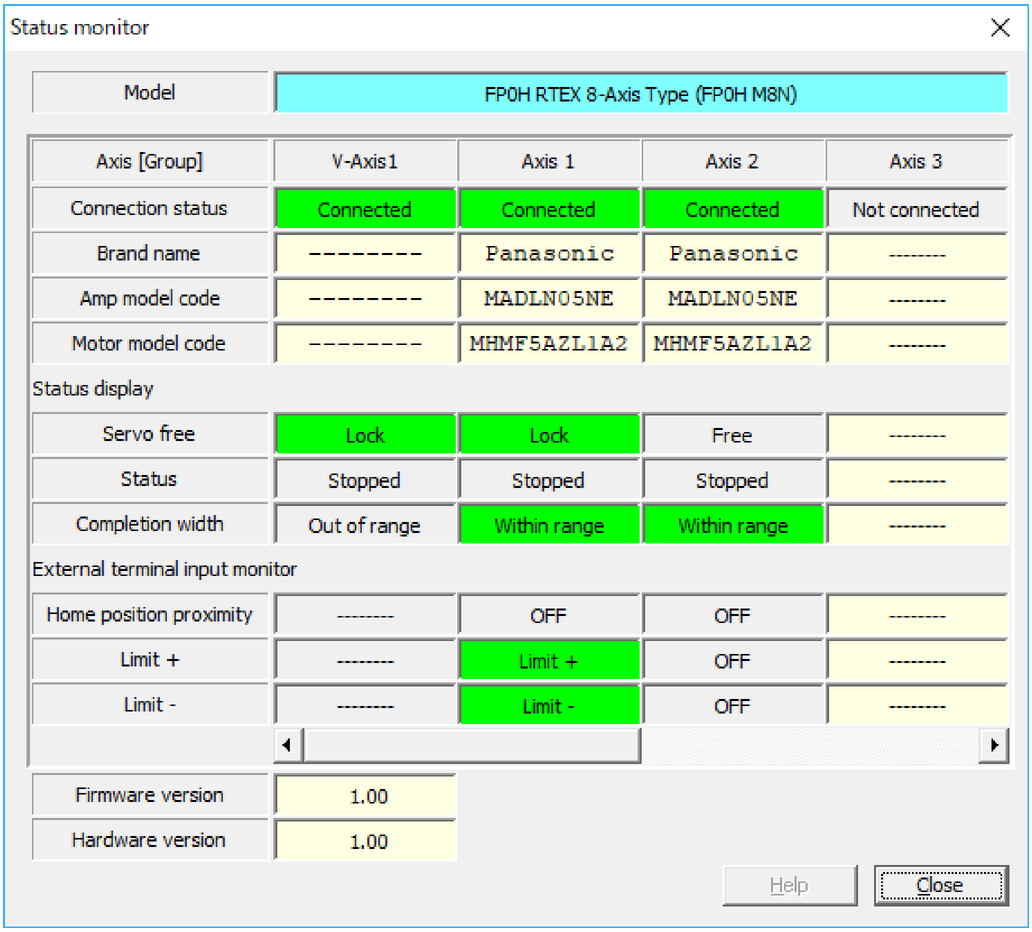
Item	Description	Related page
	"Gear + clutch + cam" Displays"--------"for the master axis and axes that are not used for synchronous control.	
Synchronous state	Displays the state ("synchronous"/"asynchronous") that has been set for each axis.	
Table number executing	Displays the number of the table where positioning data is being executed or has been executed.	"7.10 Setting Positioning Data"
Auxiliary output code	When the auxiliary output function is enabled, the output code is output in the range of 0 to 65,535.	"14.3 Auxiliary Output"
Amplifier current value	Displays the pulse value fed back from the servo amplifier. The value becomes "0" upon completion of home return.	"14.4 Home Coordinates""14.5 Current Value Update"
Unit-converted current value	Displays the pulse value fed back from the servo amplifier after unit conversion. The value becomes “0” upon completion of home return. If home coordinates have been set, the value will be preset to the home coordinates upon completion of home return.	
Torque command (%)	Monitors the torque command value of the servo amplifier.	"14.11 Monitor Error (Torque / Actual Speed Judgement)"
Actual speed (rpm)	Monitors the actual speed of the servo amplifier.	
Deviation	Monitors the difference (deviation) between the current position managed within the positioning unit RTEX and the current position fed back from the amplifier.	"14.13 Simplified Position Deviation Monitor"
Axis state	Displays the operating state of each axis. "Operating"(green): The motor is running. "Stopped"(gray): The motor is stopped. "Error"(red): An error has occurred.	
Error code	Displays the last error code when an error has occurred. Clicking the[Clear errors]button clears errors.	"15.3 Error Code List"
Warning code	Displays the last warning code when a warning has occurred. Clicking the[Clear warning]button clears the warning.	"15.4 Warning Code List"

7.16 Status Display

The connection status of each axis and input state of external terminals can be monitored. The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

Procedure

1. Select **Online**>**Status Display** from the menu bar.
   The "Status Monitor" dialog box is displayed.



Model	FP0H RTEX 8-Axis Type (FP0H M8N)			
Axis [Group]	V-Axis1	Axis 1	Axis 2	Axis 3
Connection status	Connected	Connected	Connected	Not connected
Brand name	--------	Panasonic	Panasonic	--------
Amp model code	--------	MADLN05NE	MADLN05NE	--------
Motor model code	--------	MHMF5AZL1A2	MHMF5AZL1A2	--------
Status display				
Servo free	Lock	Lock	Free	--------
Status	Stopped	Stopped	Stopped	--------
Completion width	Out of range	Within range	Within range	--------
External terminal input monitor				
Home position proximity	--------	OFF	OFF	--------
Limit +	--------	Limit +	OFF	--------
Limit -	--------	Limit -	OFF	--------

Firmware version	1.00
Hardware version	1.00

Monitored items

Item	Description
Model	Displays the model name of the positioning unit RTEX.
Axis [Group]	Indicates the axis numbers. For interpolation axes, group names (such as [A], [B], [C], and [D]) are also displayed.
Connection status	Indicates whether the network is established and whether the communication between the positioning unit RTEX and servo amplifier is normal.

Item	**Description**
	"Connected" (green): Communication is being performed. "Not connected" (gray): Communication is not being performed.
Brand name	Displays the brand names of the connected servo amplifier and motor and the model codes of the amplifier and motor.
Amplifier model code	
Motor model code	
Status display	
Servo free	Displays the servo-locked or servo-free status. "Locked" (green): Indicates the servo-locked status. "Free" (gray): Indicates the servo-free status.
Status	Displays the operating state of each axis. "Operating" (green): The motor is running. "Stopped" (gray): The motor is stopped. "------" (gray): The motor is not connected.
Completion width	Indicates whether the deviation counter is within the in-position range. "Within range" (green): The deviation counter is in an in-position state. "Out of range" (gray): The deviation counter is not in an in-position state.
External input terminal monitor	
Near home	Displays the input state of the near home and limit inputs connected to the servo amplifiers. "Near home" (green): The near home input is ON (enabled). "Limit +" (green): The limit (+) input is ON (enabled). "Limit -" (green): The limit (-) input is ON (enabled). "OFF" (gray): The above inputs are OFF (disabled).
Limit +	
Limit -	
Firmware version	Displays the firmware version and hardware version of the positioning unit RTEX.
Hardware version	

(Note 1) The input logics of the near home, limit +, and limit - inputs depend on the settings on the servo amplifier side.

7.17 Tool Operation

- With Configurator PM7-RTEX, you can perform commissioning using tool software before actually starting the user program.
- Before starting tool operation, be sure to apply the settings and download the project to the positioning unit RTEX.
- The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

1 2 Procedure

1. Select **Online**>**Tool Operation** from the menu bar.

The "Tool Operation" dialog box is displayed.

Types of tool operation

Item	Description
Serve ON/OFF	Controls servo ON/OFF setting for each axis.
Stop-on-contact torque value for home return	Performs home return to the origin of the machine coordinates according to the specified positioning parameter values.
positioning	Performs positioning starting from the start table number according to the settings of the positioning tables.
JOG operation	Moves the specified axis in the specified direction at the specified speed while the operation command is ON.
Teaching	Controls the axis manually in the same way as JOG operation, and reflects the resulting positioning address on the data editing screen.

Info.

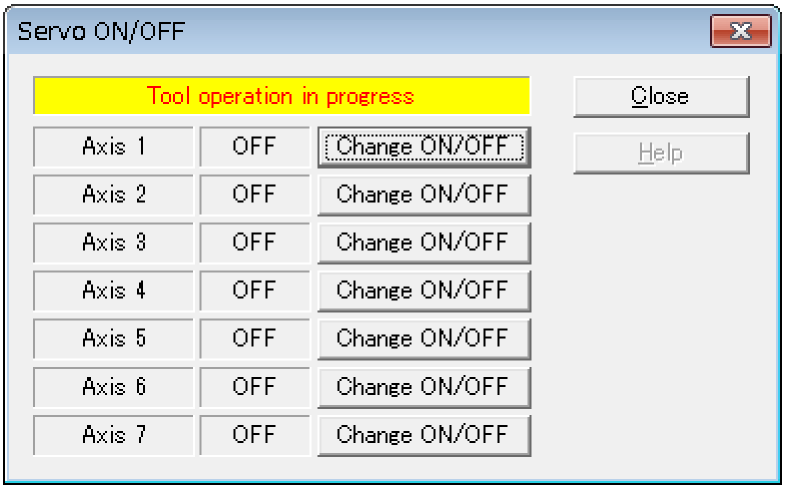
- The unit cannot be switched to tool operation mode while the unit is being operated with a user program.
- Operation requests based on I/O signals are disabled during tool operation.
- If a communication error occurs during tool operation, the positioning unit RTEX detects the error and stops automatically.
- If the previous tool operation did not finish properly due to a communication error, etc., the tool operation mode will be cancelled forcibly when the next tool operation starts.

7.17.1 Tool Operation: Servo ON/OFF

The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

Procedure

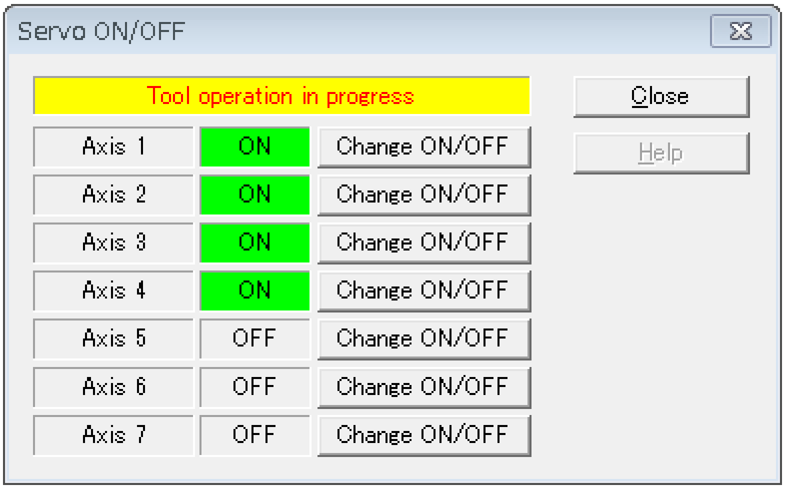
1. Select **Online**>**Tool Operation** from the menu bar.
   The "Tool Operation" dialog box is displayed.
2. Select [Servo ON/OFF] in the "Tool Operation" dialog box.
   The "Servo ON/OFF" dialog box is displayed.



Tool operation in progress

Axis 1	OFF	Change ON/OFF
Axis 2	OFF	Change ON/OFF
Axis 3	OFF	Change ON/OFF
Axis 4	OFF	Change ON/OFF
Axis 5	OFF	Change ON/OFF
Axis 6	OFF	Change ON/OFF
Axis 7	OFF	Change ON/OFF

3. Click the [Change ON/OFF] button for the desired axis.
   The state is switched between servo locked (ON) and servo free (OFF).



Tool operation in progress

Axis 1	ON	Change ON/OFF
Axis 2	ON	Change ON/OFF
Axis 3	ON	Change ON/OFF
Axis 4	ON	Change ON/OFF
Axis 5	OFF	Change ON/OFF
Axis 6	OFF	Change ON/OFF
Axis 7	OFF	Change ON/OFF

4. Confirm the servo ON/OFF status of the desired axis, and click the [Close] button.
   The display returns to the "Tool Operation" dialog box.

Info.

- If servo ON/OFF has been controlled using a user program, the servo-locked or servo-free status before the start of tool operation is maintained and the operation shifts to tool operation mode.
- Even if the tool operation mode is terminated, the servo-locked or servo-free status prior to the termination will be maintained.

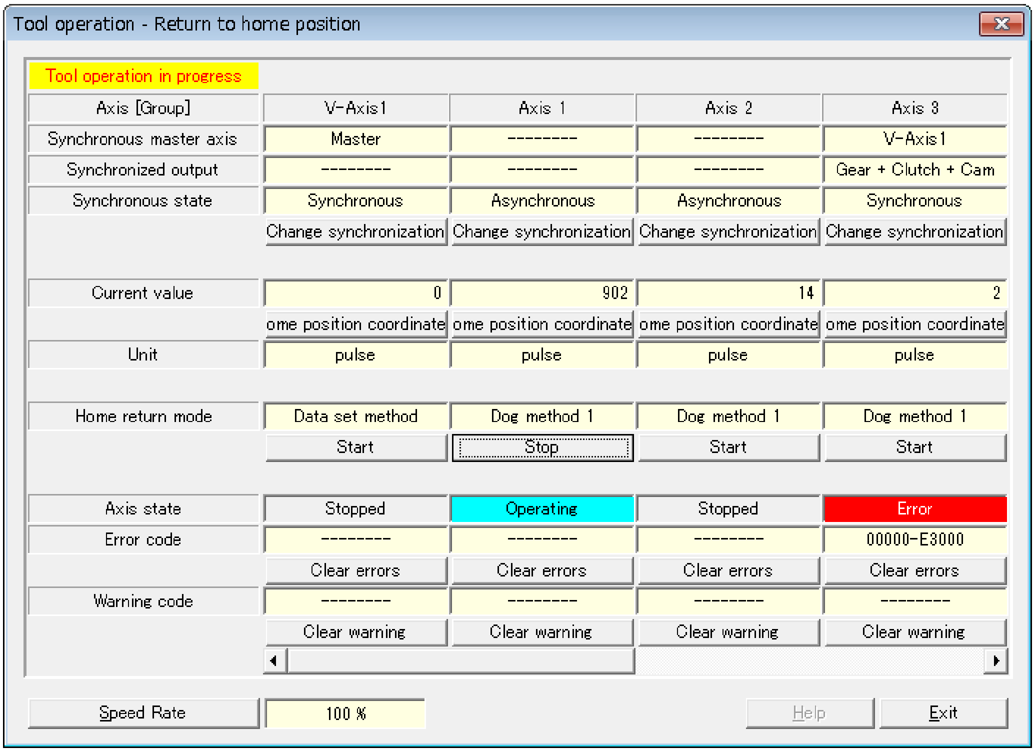
7.17.2 Tool Operation: Home Return

- When the power is turned ON, the coordinates of the positioning unit RTEX do not match those of the machine position home position. Execute home return before starting positioning operation.
- With Configurator PM7-RTEX, you can perform commissioning before actually starting the user program.
- The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

Procedure

1. Select **Online**>**Tool Operation** from the menu bar.
   The "Tool Operation" dialog box is displayed.

2. Select [Home Return] from the "Tool Operation" dialog box.
   The "Tool operation - Home Return" dialog box is displayed.



Tool operation - Return to home position

Tool operation in progress

Axis [Group]	V-Axis1	Axis 1	Axis 2	Axis 3
Synchronous master axis	Master	--------	--------	V-Axis1
Synchronized output	--------	--------	--------	Gear + Clutch + Cam
Synchronous state	Synchronous	Asynchronous	Asynchronous	Synchronous
	Change synchronization	Change synchronization	Change synchronization	Change synchronization
Current value	0	902	14	2
	ome position coordinate	ome position coordinate	ome position coordinate	ome position coordinate
Unit	pulse	pulse	pulse	pulse
Home return mode	Data set method	Dog method 1	Dog method 1	Dog method 1
	Start	Stop	Start	Start
Axis state	Stopped	Operating	Stopped	Error
Error code	--------	--------	--------	00000-E3000
	Clear errors	Clear errors	Clear errors	Clear errors
Warning code	--------	--------	--------	--------
	Clear warning	Clear warning	Clear warning	Clear warning

Speed Rate: 100 %

3. Click the [Start] button for the axis for which home return is to be performed.
Execute the home return operation.

4. Click the [Exit] button to terminate the home return operation.

Info.

- This dialog box cannot be closed during the operation.

Dialog box items

Item	Description	Related page
synchronous master axis	Displays "Master" when an axis has been set as a master axis. When an axis has been set as a slave axis, the master axis on which this axis is based is displayed. Example: When Axis 2 has been set as a slave axis for the master axis that is Axis 1, "Axis 1" is displayed in the column of Axis 2. Displays "--------" for axes that are not used for synchronous control.	"9.1 Synchronous control"
Synchronous output	The functions of synchronous operation that have been set for slave axes are displayed. "Gear", "clutch", "cam" "Gear + clutch", "gear + cam", "clutch + cam" "Gear + clutch + cam" Displays "--------" for the master axis and axes that are not used for synchronous control.	

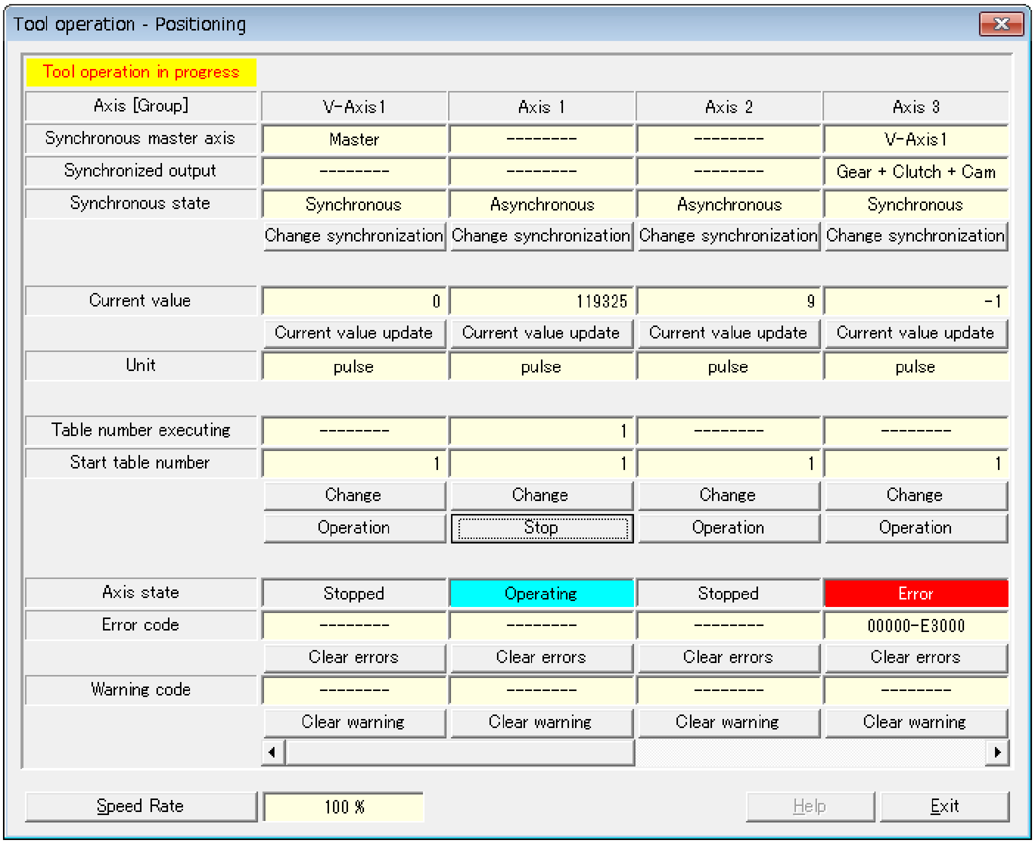
Item	Description	Related page
Synchronous state	Displays the state ("synchronous"/"asynchronous") that has been set for each axis. Clicking the [Change synchronization] button switches the state between synchronous and asynchronous.	
Current value	Displays the feedback values for each axis after unit conversion. Click [Home coordinates] to display the value input dialog box for changing the value after home return.	"14.4 Home Coordinates""14 .5 Current Value Update"
Unit	Displays the unit of position commands for each axis that is specified in positioning parameter settings.	
Home return mode	Displays the content of the home return setting code registered in the positioning setting data.	"11.1 Types of Home Return (Incremental)"
Start/Stop	Executes a home return start/stop operation. ● Click [Start] to execute a home return operation. The button name changes to [Stop]. ● Click [Stop] to execute a deceleration stop operation. The button name changes to [Start].	
Axis state	Displays the operating state of each axis. "Operating" (green): The motor is running. "Stopped" (gray): The motor is stopped. "Error" (red): An error has occurred.	
Error code	Displays the last error code when an error has occurred. If a recoverable error occurs in the positioning unit RTEX, click the [Clear errors] button to clear the error.	"15.3 Error Code List"
Warning code	Displays the last warning code when a warning has occurred. Clicking the [Clear warning] button clears the warning.	"15.4 Warning Code List"
Speed rate	An operation is executed at the specified speed rate, with the target speed of home return for each axis that is specified in the positioning parameter settings taken as 100%. Clicking [Speed rate] displays the value input dialog box.	

7.17.3 Tool Operation: Positioning

The tool operation function enables the user to specify a starting table number and check if positioning operation is performed correctly according to the starting table.

1 2 Procedure

1. Select **Online**>**Tool Operation** from the menu bar.
   The "Tool Operation" dialog box is displayed.
2. Select [Positioning] from the "Tool Operation" dialog box.
   The "Tool Operation - Positioning" dialog box is displayed.



Axis [Group]	V-Axis1	Axis 1	Axis 2	Axis 3
Synchronous master axis	Master	--------	--------	V-Axis1
Synchronized output	--------	--------	--------	Gear + Clutch + Cam
Synchronous state	Synchronous	Asynchronous	Asynchronous	Synchronous
Current value	0	119325	9	-1
Unit	pulse	pulse	pulse	pulse
Table number executing	--------	1	--------	--------
Start table number	1	1	1	1
Axis state	Stopped	Operating	Stopped	Error
Error code	--------	--------	--------	00000-E3000
Warning code	--------	--------	--------	--------

Speed Rate: 100 %

3. Click the [Change] button under the target start table number field.
The "Start Table No. Setting" dialog box is displayed.

4. Enter a start table number.

5. Click the [Operation] button.
Positioning will start from the specified start table number.

6. Click the [Exit] button to terminate the positioning operation.

Dialog box items

Item	Description	Related page
synchronous master axis	Displays "Master" when an axis has been set as a master axis. When an axis has been set as a slave axis, the master axis on which this axis is based is displayed. Example: When Axis 2 has been set as a slave axis for the master axis that is Axis 1, "Axis 1" is displayed in the column of Axis 2. Displays "--------" for axes that are not used for synchronous control.	"9.1 Synchronous control"
Synchronous output	The functions of synchronous operation that have been set for slave axes are displayed. "Gear", "clutch", "cam" "Gear + clutch", "gear + cam", "clutch + cam" "Gear + clutch + cam"	

Item	Description	Related page
	Displays "--------" for the master axis and axes that are not used for synchronous control.	
Synchronous state	Displays the state ("synchronous"/"asynchronous") that has been set for each axis. Clicking the [Change synchronization] button switches the state between synchronous and asynchronous.	
Current value	Displays the feedback values for each axis after unit conversion. Click [Current value update] to display the value input dialog box for changing the current value.	"14.5 Current Value Update"
Unit	Displays the unit of commands for each axis that is specified in positioning parameter settings.	
Table number executing	Displays the table number during the operation or when it completes.	"7.10 Setting Positioning Data"
Starting table number	Position control start table number Click [Change] to change the start table number.	
Operation/Stop	Executes a positioning control operation or stop operation. ● Click [Operate] to execute a positioning control operation. The button name changes to [Stop]. ● Click [Stop] to execute a deceleration stop operation. The button name changes to [Operate].	
Axis state	Displays the operating state of each axis. "Operating" (green): The motor is running. "Stopped" (gray): The motor is stopped. "Error" (red): An error has occurred.	
Error code	Displays the last error code when an error has occurred. If a recoverable error occurs in the positioning unit RTEX, click the [Clear errors] button to clear the error.	"15.3 Error Code List"
Warning code	Displays the last warning code when a warning has occurred. Clicking the [Clear warning] button clears the warning.	"15.4 Warning Code List"
Speed rate	The target speed of JOG operations for each axis that is specified in positioning parameter settings is regarded as 100%, and the operation is executed at the specified speed rate. Click the [Speed rate] button to display the value input dialog box.	

Info.

- For positioning operations, setting data must be downloaded to the positioning unit RTEX in advance. The operations after the starting table number vary depending on operation patterns.
- The positioning operation of the interpolation group starts and stops the axis with the smallest number in the group within the program. For the tool operation function, a positioning operation is also started by clicking the [Operate] button for any axis; however, a warning message is displayed when the [Operate] button for any axis other than the smallest axis number is clicked.
- This dialog box cannot be closed during the operation.
- If conditions are changed during tool operation, the positioning memory will be updated temporarily and the operation will be performed; however, the changed conditions will not be reflected in the configuration data written to the positioning unit RTEX. Therefore, when the mode is changed to RUN mode again, the unit will start based on the configuration data downloaded to the positioning unit RTEX.

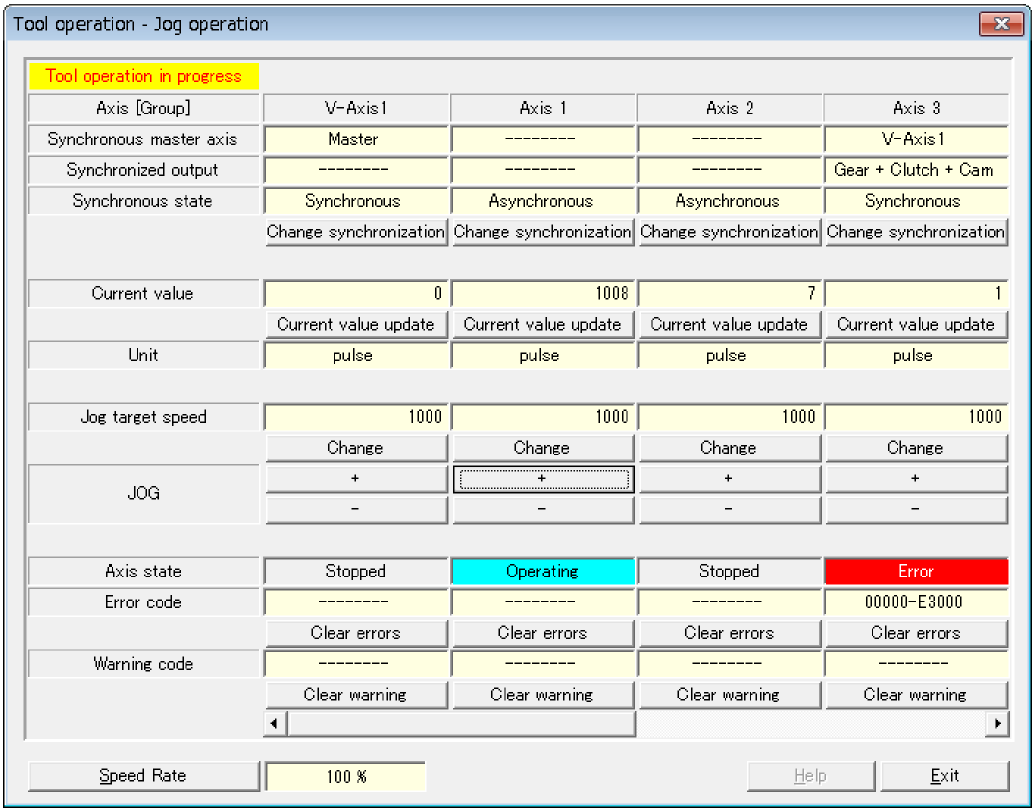
7.17.4 Tool Operation: JOG Operation

With Configurator PM7-RTEX, you can perform commissioning before actually starting the user program. The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

1 2 Procedure

1. Select **Online**>**Tool Operation** from the menu bar.
The "Tool Operation" dialog box is displayed.

2. Select [JOG Operation] from the "Tool Operation" dialog box.
The "Tool Operation - JOG Operation" dialog box is displayed.



Tool operation - Jog operation

Tool operation in progress

Axis [Group]	V-Axis1	Axis 1	Axis 2	Axis 3
Synchronous master axis	Master	--------	--------	V-Axis1
Synchronized output	--------	--------	--------	Gear + Clutch + Cam
Synchronous state	Synchronous	Asynchronous	Asynchronous	Synchronous
	Change synchronization	Change synchronization	Change synchronization	Change synchronization
Current value	0	1008	7	1
	Current value update	Current value update	Current value update	Current value update
Unit	pulse	pulse	pulse	pulse
Jog target speed	1000	1000	1000	1000
	Change	Change	Change	Change
JOG	+	+	+	+
	-	-	-	-
Axis state	Stopped	Operating	Stopped	Error
Error code	--------	--------	--------	00000-E3000
	Clear errors	Clear errors	Clear errors	Clear errors
Warning code	--------	--------	--------	--------
	Clear warning	Clear warning	Clear warning	Clear warning

Speed Rate 100 %

3. Click the [+] or [-] button in the JOG field.
The JOG operation will be executed.

4. Click the [Exit] button to terminate the JOG operation.

Info.

- This dialog box cannot be closed during the operation.

Dialog box items

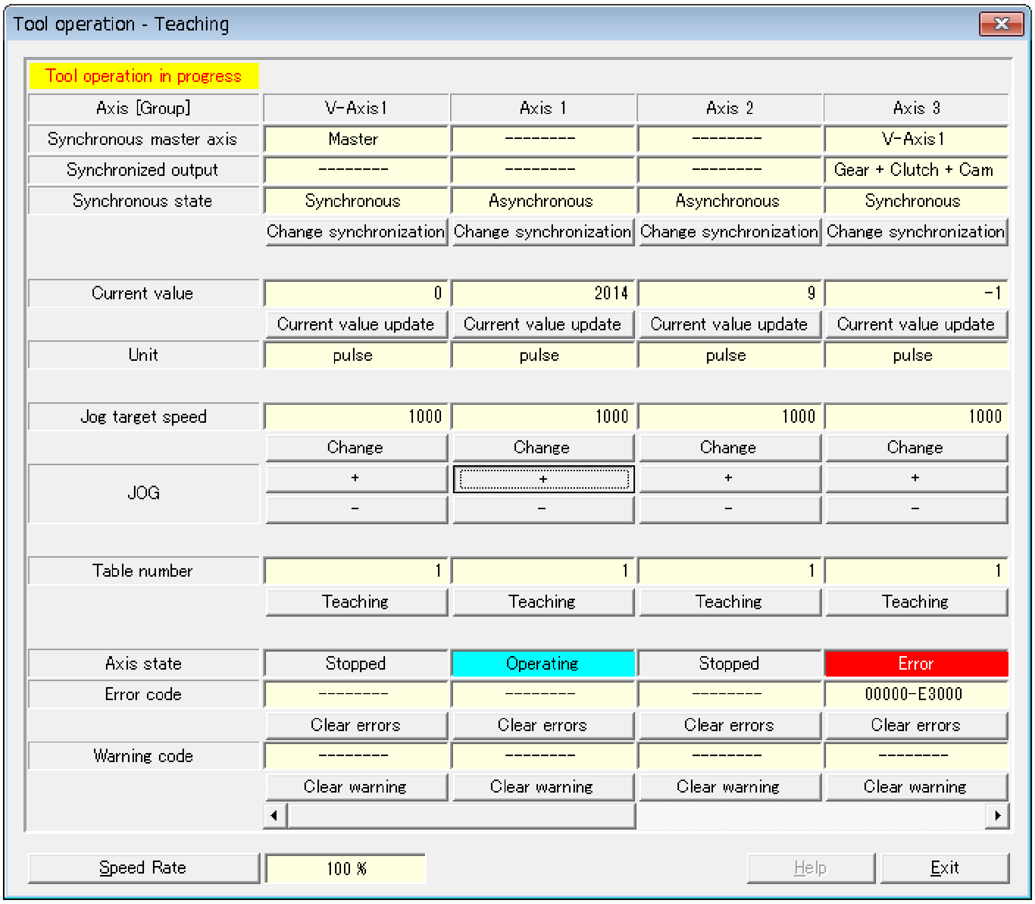
Item	Description	Related page
synchronous master axis	Displays "Master" when an axis has been set as a master axis. When an axis has been set as a slave axis, the master axis on which this axis is based is displayed. Example: When Axis 2 has been set as a slave axis for the master axis that is Axis 1, "Axis 1" is displayed in the column of Axis 2. Displays "--------" for axes that are not used for synchronous control.	"9.1 Synchronous control"
Synchronous output	The functions of synchronous operation that have been set for slave axes are displayed. "Gear", "clutch", "cam" "Gear + clutch", "gear + cam", "clutch + cam" "Gear + clutch + cam" Displays "--------" for the master axis and axes that are not used for synchronous control.	
Synchronous state	Displays the state ("synchronous"/"asynchronous") that has been set for each axis. Clicking the [Change synchronization] button switches the state between synchronous and asynchronous.	
Current value	Displays the feedback values for each axis after unit conversion. Click [Current value update] to display the value input dialog box for changing the current value.	"14.5 Current Value Update"
Unit	Displays the unit of position commands for each axis that is specified in positioning parameter settings.	
JOG target speed	Monitors and displays the target speed for JOG operation. Click [Change] to change the target speed for JOG operation.	"10.1 Settings and Operation of JOG Operation"
JOG [+]	Performs JOG forward rotation while [+] is being clicked.	
JOG [-]	Performs JOG reverse rotation while [-] is being clicked.	
Axis state	Displays the operating state of each axis. "Operating" (green): The motor is running. "Stopped" (gray): The motor is stopped. "Error" (red): An error has occurred.	
Error code	Displays the last error code when an error has occurred. If a recoverable error occurs in the positioning unit RTEX, click the [Clear errors] button to clear the error.	"15.3 Error Code List"
Warning code	Displays the last warning code when a warning has occurred. Clicking the [Clear warning] button clears the warning.	"15.4 Warning Code List"
Speed rate	The target speed of JOG operations for each axis that is specified in positioning parameter settings is regarded as 100%, and the operation is executed at the specified speed rate. Click the [Speed rate] button to display the value input dialog box.	

7.17.5 Tool Operation: Teaching

The tool operation function enables each axis to be operated manually and the position addresses where each axis stops to be registered as point data.

Procedure

1. Select **Online**>**Tool Operation** from the menu bar.
   The "Tool Operation" dialog box is displayed.
2. Select [Teaching] in the "Tool Operation" dialog box.
   The "Tool operation - Teaching" dialog box is displayed.



Tool operation - Teaching

Tool operation in progress

Axis [Group]	V-Axis1	Axis 1	Axis 2	Axis 3
Synchronous master axis	Master	--------	--------	V-Axis1
Synchronized output	--------	--------	--------	Gear + Clutch + Cam
Synchronous state	Synchronous	Asynchronous	Asynchronous	Synchronous
	Change synchronization	Change synchronization	Change synchronization	Change synchronization
Current value	0	2014	9	-1
	Current value update	Current value update	Current value update	Current value update
Unit	pulse	pulse	pulse	pulse
Jog target speed	1000	1000	1000	1000
	Change	Change	Change	Change
JOG	+	+	+	+
	-	-	-	-
Table number	1	1	1	1
	Teaching	Teaching	Teaching	Teaching
Axis state	Stopped	Operating	Stopped	Error
Error code	--------	--------	--------	00000-E3000
	Clear errors	Clear errors	Clear errors	Clear errors
Warning code	--------	--------	--------	--------
	Clear warning	Clear warning	Clear warning	Clear warning

Speed Rate: 100 %

3. Have the JOG operation stop the axis at the positioning point.
4. Click the [Teaching] button.
5. Enter the table number where the desired positioning information is registered, and click the [OK] button.
   The current value will be registered for the movement amount in the specified table number. Also, if the axis that has been taught is an interpolation axis, the current value is registered for the movement amount of the corresponding coordinates within the interpolation group.
6. Click the [Exit] button to terminate the teaching operation.

Dialog box items

Item	Description	Related page
synchronous master axis	Displays "Master" when an axis has been set as a master axis. When an axis has been set as a slave axis, the master axis on which this axis is based is displayed. Example: When Axis 2 has been set as a slave axis for the master axis that is Axis 1, "Axis 1" is displayed in the column of Axis 2. Displays "--------" for axes that are not used for synchronous control.	"9.1 Synchronous control"
Synchronous output	The functions of synchronous operation that have been set for slave axes are displayed. "Gear", "clutch", "cam" "Gear + clutch", "gear + cam", "clutch + cam" "Gear + clutch + cam" Displays "--------" for the master axis and axes that are not used for synchronous control.	
Synchronous state	Displays the state ("synchronous"/"asynchronous") that has been set for each axis. Clicking the [Change synchronization] button switches the state between synchronous and asynchronous.	
Current value	Displays the feedback values for each axis after unit conversion. Click [Current value update] to display the value input dialog box for changing the current value.	"14.5 Current Value Update"
Unit	Displays the unit of commands for each axis that is specified in positioning parameter settings.	
JOG target speed	Displays the target speed for JOG operation. Click [Change] to change the target speed for JOG operation.	"10.1 Settings and Operation of JOG Operation"
JOG [+]	If [+] is clicked, forward JOG is performed while [+] is being clicked.	
JOG [-]	If [-] is clicked, reverse JOG is performed while [-] is being clicked.	
Table No.	Displays the table number for which teaching is performed. Click [Teaching] to change the table number for which teaching is performed and register the current value.	"7.10 Setting Positioning Data"
Axis state	Displays the operating state of each axis. "Operating" (green): The motor is running. "Stopped" (gray): The motor is stopped. "Error" (red): An error has occurred.	
Error code	Displays the last error code when an error has occurred. If a recoverable error occurs in the positioning unit RTEX, click the [Clear errors] button to clear the error.	"15.3 Error Code List"
Warning code	Displays the last warning code when a warning has occurred. Clicking the [Clear warning] button clears the warning.	"15.4 Warning Code List"
Speed rate	The target speed of home return for each axis that is specified in positioning parameter settings is regarded as 100%, and the operation is executed at the specified speed rate. Click the [Speed rate] button to display the value input dialog box.	

Info.

- If teaching is performed, the control method for the table number for which teaching is performed will be automatically changed to “Absolute”.
- The results of the teaching operation take effect after the tool operation finishes and the setting data is downloaded to the positioning unit RTEX.
- This dialog box cannot be closed during the operation.

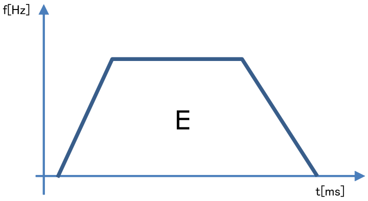
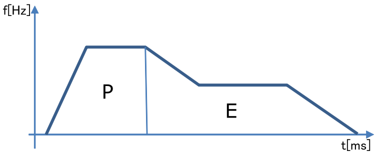
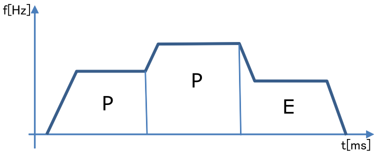
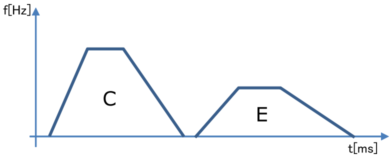
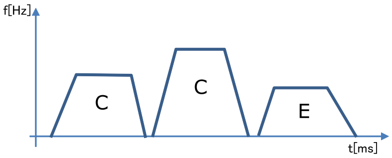
(MEMO)

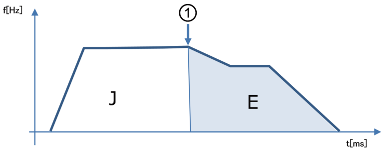
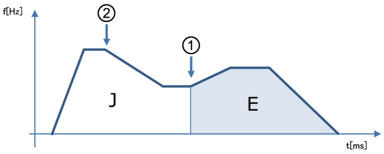
8 Automatic Operation (Position Control)

8.1 Basic Operations

8.1.1 Patterns of Position Control

■ Operation pattern

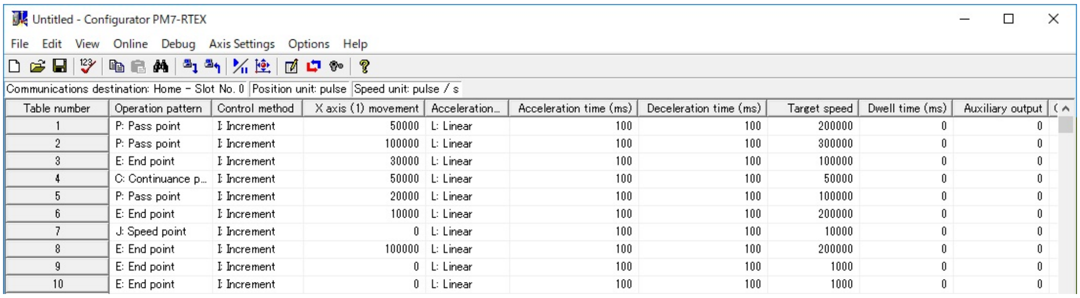
Name	**Timing chart**	**Operation and application**	**Repetition Return**	**Interpolation**
E-point Control		"E-point control" refers to movement up to an end point. This method is used for single-speed acceleration/deceleration control.	●	●
P-point Control	 	"P-point control" refers to control that passes through a pass point. This method is used for acceleration/deceleration control using two or more speeds. When P-point control is started, pulse output is performed for the specified amount of movement and then the control shifts to E-point control.	●	●
C-point Control	 	"C-point control" refers to control that passes through a continuance point. This method is used for successive single-speed positioning controls with different target speeds or acceleration/deceleration times. The time taken for shifting from C-point control to E-point control is specified as dwell time.	●	●

Name	Timing chart	Operation and application	Repetition Return	Interpolation
J-point Control	Without speed change  With speed change 	"J-point control" refers to control that passes through a speed point known as a "JOG Operation Point". After startup, control is performed at the specified speed. Once the J-point positioning start contact turns ON, positioning control starts. When the J-point speed change contact is set, the speed changes. (1) J-point positioning start contact (2) J-point speed change contact	-	-

Selecting the positioning operation mode

The positioning operation mode is selected on Configurator PM7-RTEX.

- For E-point control, enter the settings in one row.
- If consecutive tables are entered using P-point, C-point, and J-point controls, enter them in combination so that the last table is E-point control.



Communications destination: Home - Slot No. 0 | Position unit: pulse | Speed unit: pulse / s

Table number	Operation pattern	Control method	X axis (1) movement	Acceleration...	Acceleration time (ms)	Deceleration time (ms)	Target speed	Dwell time (ms)	Auxiliary output
1	P: Pass point	I: Increment	50000	L: Linear	100	100	200000	0	0
2	P: Pass point	I: Increment	100000	L: Linear	100	100	300000	0	0
3	E: End point	I: Increment	30000	L: Linear	100	100	100000	0	0
4	C: Continuance p...	I: Increment	50000	L: Linear	100	100	50000	0	0
5	P: Pass point	I: Increment	20000	L: Linear	100	100	100000	0	0
6	E: End point	I: Increment	10000	L: Linear	100	100	200000	0	0
7	J: Speed point	I: Increment	0	L: Linear	100	100	10000	0	0
8	E: End point	I: Increment	100000	L: Linear	100	100	200000	0	0
9	E: End point	I: Increment	0	L: Linear	100	100	1000	0	0
10	E: End point	I: Increment	0	L: Linear	100	100	1000	0	0

Info.

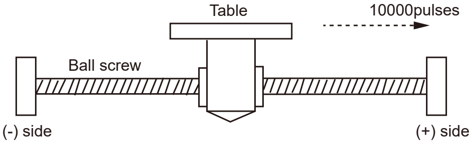
- If E: End point is not selected in the last row when using P: Pass point, C: Continuance point, or J: Speed point, a self-diagnostic error will be detected.

Settings of J-point control

- For J-point control, only "Incremental" can be selected as the control method.
- To change the speed during J-point control, set the post-change target speed in the "Positioning Parameter" dialog box.

8.1.2 Settings and Operation of E-Point Control

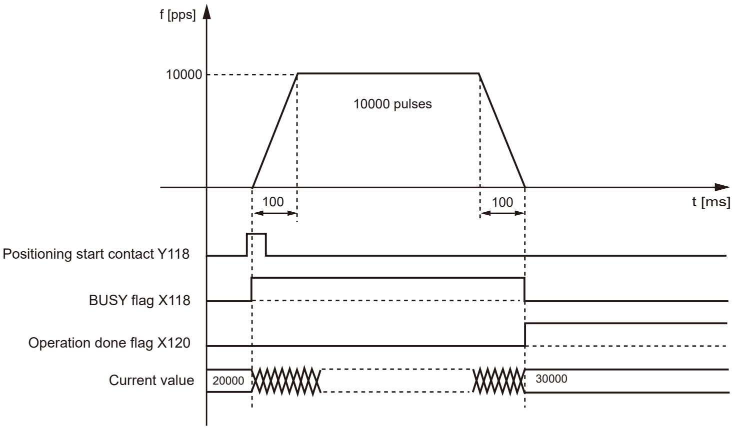
The example below is the case where single axis control is performed on Axis 1 by using slot number 0. The amount of movement is set using the incremental method and the unit is the number of pulses.



■ Settings

Item	Setting example
Operation pattern	E: End point
Control method	I: Incremental
X-axis movement amount	10,000 pulses
Acceleration/deceleration method	L: Linear
Acceleration time (ms)	100 ms
Deceleration time (ms)	100 ms
Target speed	10,000 pps

■ Operation diagram

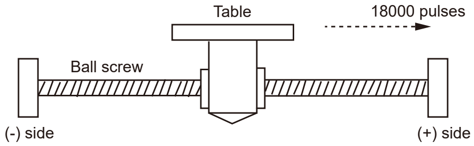


■ Operations of each contact

- The BUSY flag (X118), which indicates that the motor is running, turns ON when position control starts, and turns OFF when the operation is completed.
- The operation done flag (X120), which indicates the completion of the operation, turns ON when the current operation is completed, and remains ON until the next position control, JOG operation, home return, or pulser operation starts. The flag turns ON after the unit transmits commands up to the target position.

8.1.3 Settings and Operation of P-Point Control

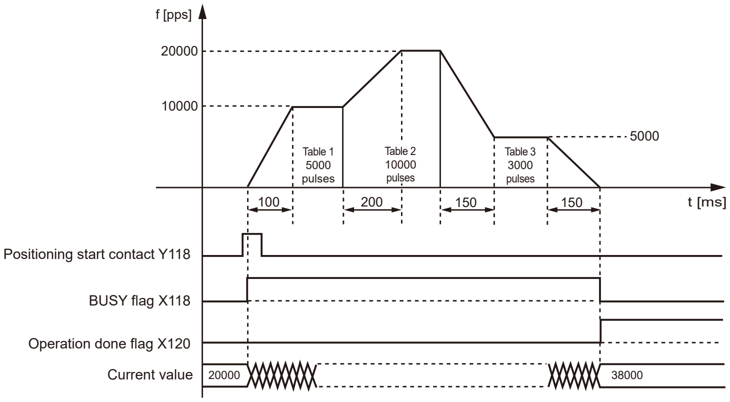
The example below is the case where single axis control is performed on Axis 1 by using slot number 0. The amount of movement is set using an incremental method and the unit is the number of pulses.



■ Settings

Item	Setting example		
	Table 1	Table 2	Table 3
Operation pattern	P: Pass point	P: Pass point	E: End point
Control method	I: Incremental	I: Incremental	I: Incremental
X-axis movement amount	5,000 pulses	10,000 pulses	3,000 pulses
Acceleration/deceleration method	L: Linear	L: Linear	L: Linear
Acceleration time (ms)	100 ms	200 ms	30 ms
Deceleration time (ms)	10 ms	20 ms	150 ms
Target speed	10,000 pps	20,000 pps	5,000 pps

■ Behavior diagram

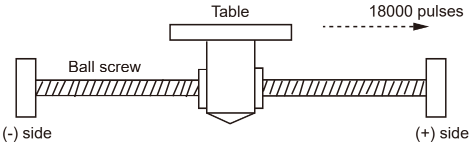


■ Behaviors of each contact

- The BUSY flag (X118), which indicates that the motor is running, turns ON when positioning control starts, and turns OFF when the operation is completed.
- The operation done flag (X120), which indicates the completion of operation, turns ON when the current operation is completed, and remains on hold until the next positioning control, JOG operation, home return, or pulser operation starts. The flag turns ON after the unit transmits commands up to the target position.

8.1.4 Settings and Operation of C-Point Control

The example below is the case where single axis control is performed on Axis 1 by using slot number 0. The amount of movement is set using the incremental method and the unit is the number of pulses.

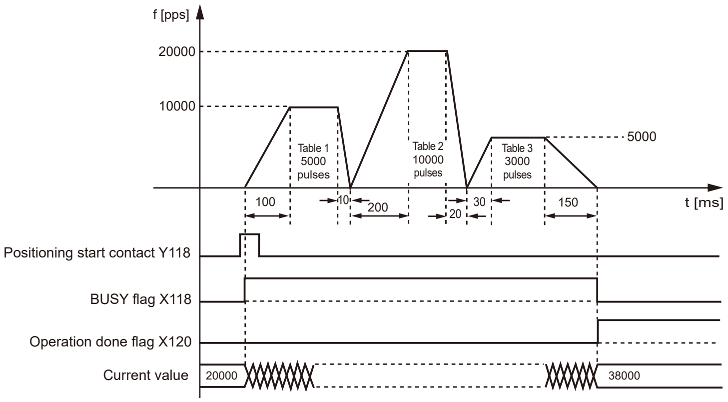


■ Settings

Use the tool software to set positioning data and positioning parameters. The unit is set to pulses.

Item	Setting example		
	Table 1	Table 2	Table 3
Operation pattern	C: Continuance point	C: Continuance point	E: End point
Control method	I: Incremental	I: Incremental	I: Incremental
X-axis movement amount	5,000 pulses	10,000 pulses	3,000 pulses
Acceleration/deceleration method	L: Linear	L: Linear	L: Linear
Acceleration time (ms)	100 ms	200 ms	30 ms
Deceleration time (ms)	10 ms	20 ms	150 ms
Target speed	10,000 pps	20,000 pps	5,000 pps
Dwell Time	0 ms	0 ms	0 ms

■ Behavior diagram



■ Behaviors of each contact

- The BUSY flag (X118), which indicates that the motor is running, turns ON when positioning control starts, and turns OFF when the operation is completed.
- The operation done flag (X120), which indicates the completion of operation, turns ON when the current operation is completed, and remains on hold until the next positioning control,

JOG operation, home return, or pulser operation starts. The flag turns ON after the unit transmits commands up to the target position.

8.1.5 Settings and Operation of J-Point Control

J-point control (speed point control) performs operations at the target speed until the starting contact of J-point positioning turns ON when the operation starts, and the next positioning control starts when the start contact of J-point positioning turns ON. (The example below is the case where slot No. 0 is used.)

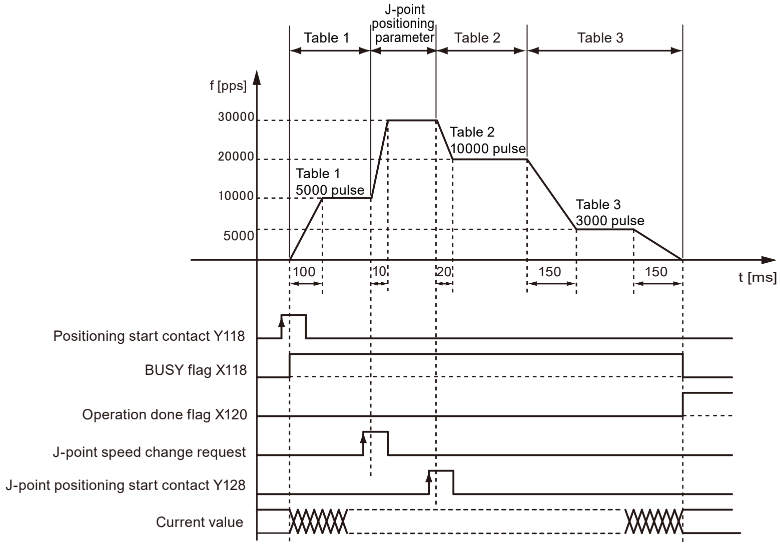
■ Settings

Item	Setting example			
	Table 1	J-point positioning Parameter Settings	Table 2	Table 3
Operation pattern	J: Speed point	-	P: Pass point	E: End point
Control method	I: Incremental	-	I: Incremental	I: Incremental
X-axis movement amount	5,000 pulses	-	10,000 pulses	3,000 pulses
Acceleration/ deceleration method	L: Linear	-	L: Linear	L: Linear
Acceleration time (ms)	100 ms	-	200 ms	30 ms
Deceleration time (ms)	10 ms	-	20 ms	150 ms
Target speed	10,000 pps	-	20,000 pps	5,000 pps
J-point operation setting code	-	Linear acceleration / deceleration	-	-
J-point acceleration time (ms)	-	10 ms	-	-
J-point deceleration time (ms)	-	10 ms	-	-
J-point target speed	-	30,000 pps	-	-

Info.

- Specify positioning parameters for operation startup in the positioning data table. Specify positioning parameters for speed change in the axis parameter setting menu.
- J-point control can be used for single-axis control only. It is not available for interpolation control.
- Use increment mode as a position specification method for P-point control, C-point control, or E-point control executed after J-point control.
- Speed control is performed during J-point control, so be sure to enter the amount of movement for positioning that can secure a constant speed zone based on the target speed.

Behavior diagram

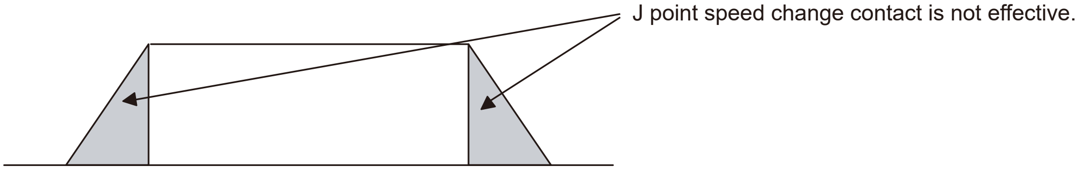


Behaviors of each contact

- The BUSY flag (X118) turns ON when the operation starts and turns OFF when the operation is completed.
- The operation done flag (X120) turns ON when the operation is completed, and remains on hold until the next positioning control, JOG operation, home return, or pulser operation starts.
- The target speed is changed when the J-point speed change request bit turns ON. The J-point speed change request bit is enabled at the edge where OFF changes to ON.
- Positioning control starts when the J-point positioning start contact (Y128) turns ON.

Behaviors when the speed change contact turns ON during acceleration or deceleration

- J-point control allows speed change during operation but does not allow speed change during acceleration or deceleration.
- If the speed change signal turns ON during acceleration or deceleration, speed change will be executed after the unit enters a constant speed state .



8.1.6 Notes on programming

Notes on programming

- The last table must be set as E: End point.

- If any value such as a movement amount, acceleration time, deceleration time or target speed is out of the specified range, a setting value error will occur when position control starts.
- The starting contact and flag number vary depending on the axis number.

■ Behavior at limit input

Condition	Direction	Limit status	Operation
When each control starts	Forward	Limit input (+): ON	Startup failure, error occurrence
		Limit input (-): ON	Startup failure, error occurrence
	Reverse	Limit input (+): ON	Startup failure, error occurrence
		Limit input (-): ON	Startup failure, error occurrence
While each control is being performed	Forward	Limit input (+): ON	Deceleration stoppage, error occurrence
	Reverse	Limit input (-): ON	Deceleration stoppage, error occurrence

8.1.7 Sample Program (E-Point, P-Point, and C-Point Control)

■ Sample programs

- The following sample programs perform single axis control on Axis 1 by using slot No. 0.
- It is assumed that positioning control is set from table No.1.

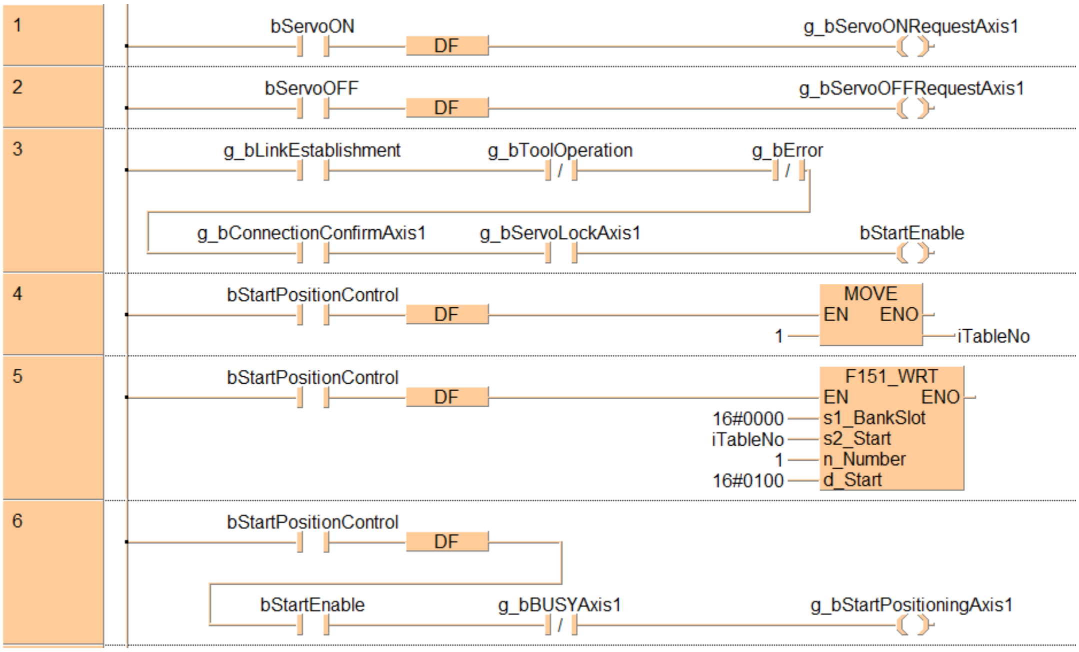
  (For examples of table settings using Configurator PM7-RTEX, refer to "Settings" in "8.1.2 Settings and Operation of E-Point Control" to "8.1.4 Settings and Operation of C-Point Control".)

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bServoOFF		BOOL	FALSE	Servo OFF
VAR	bServoON		BOOL	FALSE	Servo ON
VAR	bStartEnable		BOOL	FALSE	Start enable flag
VAR	bStartPositionControl		BOOL	FALSE	Position control start
VAR_EXTERNAL	g_bBUSYAxis1	X118	BOOL	FALSE	Axis 1 BUSY
VAR_EXTERNAL	g_bConnectionConfirmAxis1	X108	BOOL	FALSE	Axis 1 connection confirmation
VAR_EXTERNAL	g_bError	X105	BOOL	FALSE	Error notification
VAR_EXTERNAL	g_bLinkEstablishment	X100	BOOL	FALSE	Preparation completion notification
VAR_EXTERNAL	g_bServoLockAxis1	X110	BOOL	FALSE	Servo lock for axis 1
VAR_EXTERNAL	g_bServoOFFRequestAxis1	Y110	BOOL	FALSE	Axis 1 Servo OFF request

Class name	Variable name	FP address	Data type	Default	Comment
VAR_EXTERNAL	g_bServoONRequestAxis1	Y108	BOOL	FALSE	Axis 1 servo ON request
VAR_EXTERNAL	g_bStartPositioningAxis1	Y118	BOOL	FALSE	Positioning start for Axis 1
VAR_EXTERNAL	g_bToolOperation	X104	BOOL	FALSE	Tool operation in progress
VAR	iTableNo		INT	0	Start table number

Ladder diagram (LD)



Structured text (ST)

```
g_bServoONRequestAxis1  := DF(bServoON);

g_bServoOFFRequestAxis1 := DF(bServoOFF);

bStartEnable    := g_bLinkEstablishment AND NOT g_bToolOperation AND NOT g_bError
                   AND g_bConnectionConfirmAxis1 AND g_bServoLockAxis1;

if(DF(bStartPositionControl)) then
    iTableNo  := 1;
    F151_WRT(s1_BankSlot := 16#0000, s2_Start := iTableNo, n_Number := 1, d_Start := 16#0100);
end_if;

g_bStartPositioningAxis1  := DF(bStartPositionControl) AND bStartEnable AND NOT g_bBUSYAxis1;
```

8.1.8 Sample Programs (for J-point Control)

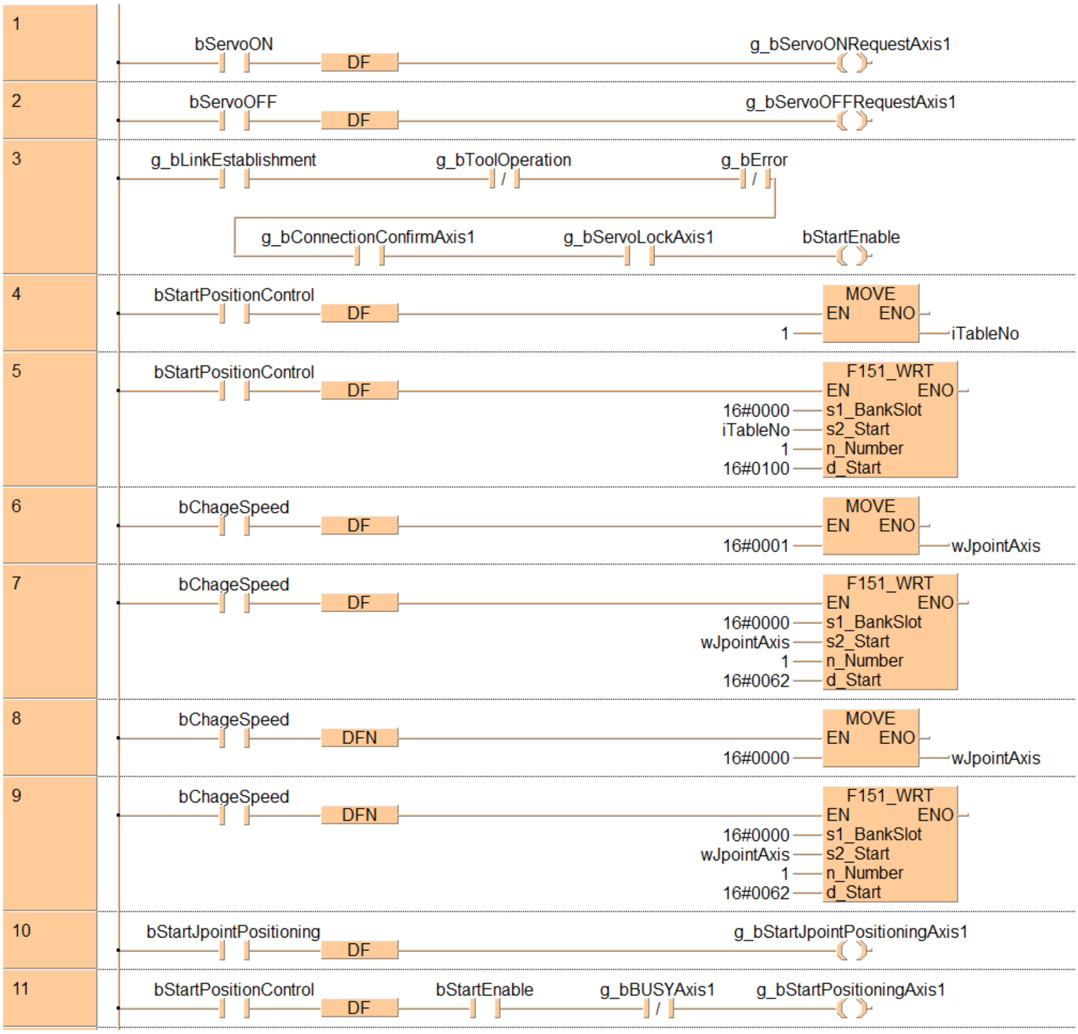
■ Sample programs

- The following sample programs perform single axis control on Axis 1 by using slot No. 0.
- It is assumed that positioning control is set from table No.1.
  (For examples of table settings using Configurator PM7-RTEX, refer to "Settings" in "8.1.5 Settings and Operation of J-Point Control".)

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bChageSpeed		BOOL	FALSE	Speed change start
VAR	bServoOFF		BOOL	FALSE	Servo OFF
VAR	bServoON		BOOL	FALSE	Servo ON
VAR	bStartEnable		BOOL	FALSE	Start enable flag
VAR	bStartJpointPositioning		BOOL	FALSE	J-point positioning start
VAR	bStartPositionControl		BOOL	FALSE	Positioning control start
VAR_EXTERNAL	g_bBUSYAxis1	X118	BOOL	FALSE	Axis 1 BUSY
VAR_EXTERNAL	g_bConnectionConfirmAxis1	X108	BOOL	FALSE	Axis 1 connection confirmation
VAR_EXTERNAL	g_bError	X105	BOOL	FALSE	Error notification
VAR_EXTERNAL	g_bLinkEstablishment	X100	BOOL	FALSE	Preparation completion notification
VAR_EXTERNAL	g_bServoLockAxis1	X110	BOOL	FALSE	Servo lock for axis 1
VAR_EXTERNAL	g_bServoOFFRequestAxis1	Y110	BOOL	FALSE	Axis 1 Servo OFF request
VAR_EXTERNAL	g_bServoONRequestAxis1	Y108	BOOL	FALSE	Axis 1 servo ON request
VAR_EXTERNAL	g_bStartJpointPositioningAxis1	Y128	BOOL	FALSE	Axis 1 J-point positioning start
VAR_EXTERNAL	g_bStartPositioningAxis1	Y118	BOOL	FALSE	Positioning start for Axis 1
VAR_EXTERNAL	g_bToolOperation	X104	BOOL	FALSE	Tool operation in progress
VAR	iTableNo		INT	0	Start table number
VAR	wJpointAxis		WORD	0	J-point speed change

Ladder diagram (LD)



Structured text (ST)

```
g_bServoONRequestAxis1  := DF(bServoON);

g_bServoOFFRequestAxis1 := DF(bServoOFF);

bStartEnable    := g_bLinkEstablishment AND NOT g_bToolOperation AND NOT g_bError
                   AND g_bConnectionConfirmAxis1 AND g_bServoLockAxis1;

if(DF(bStartPositionControl)) then
   iTableNo  := 1;
   F151_WRT(s1_BankSlot := 16#0000, s2_Start := iTableNo, n_Number := 1, d_Start := 16#0100);
end_if;

if(DF(bChageSpeed)) then
   wJpointAxis  := 16#0001;
   F151_WRT(s1_BankSlot := 16#0000, s2_Start := wJpointAxis, n_Number := 1, d_Start := 16#0062);
end_if;

if(DFN(bChageSpeed)) then
   wJpointAxis  := 16#0000;
   F151_WRT(s1_BankSlot := 16#0000, s2_Start := wJpointAxis, n_Number := 1, d_Start := 16#0062);
end_if;

g_bStartJpointPositioningAxis1   := DF(bStartJpointPositioning);

g_bStartPositioningAxis1 := DF(bStartPositionControl) AND bStartEnable AND NOT g_bBUSYAxis1;
```

■ Related positioning parameters

Bank	address End of offset	Name	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7 (virtual)	8 axes (virtual)
16#00 (common area)	16#0062	J-point speed change request	Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7

8.2 Interpolation Control

8.2.1 Types of Interpolation Control

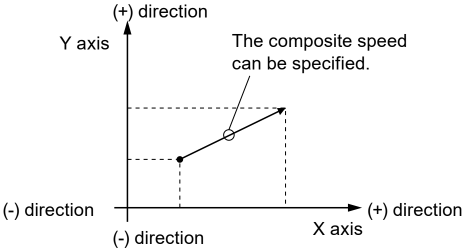
■ Types of operation

- Interpolation control is classified into 2-axis linear interpolation control, 2-axis circular interpolation control, 3-axis linear interpolation control, and 3-axis spiral interpolation control. The methods for specifying the operation of each interpolation control are shown in the table below. Select an appropriate method according to the application. The axes in a relationship of interpolation are called X-axis and Y-axis for 2-axis interpolation and are called X-axis, Y-axis and Z-axis for 3-axis interpolation. X-, Y-, and Z-axes are automatically assigned in ascending order of axis signal levels.
- In each interpolation control, E-point control that uses one table of positioning data, P-point control and C-point control that use multiple tables can be freely combined.
- For example, using P-point control enables continuous interpolation control from 2-axis linear interpolation control to 2-axis circular interpolation control. Acceleration time and deceleration time can be specified individually. For P-point and C-point controls, the last table must be set as an end point (E-point).

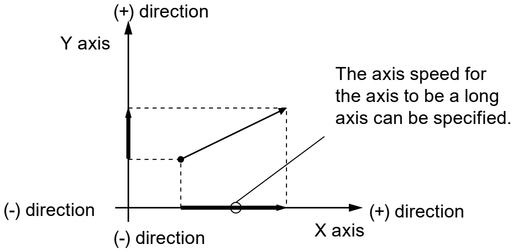
Type	Operation specification method	Necessary data
2-axis linear interpolation control	Composite speed specification	Composite speed of X-axis and Y-axis
	Long axis speed specification	Speed of long axis (axis whose movement distance is long)
2-axis circular interpolation control	Center point specification/CW direction	X-axis and Y-axis coordinates of center point
	Center point specification/CCW direction	X-axis and Y-axis coordinates of center point
	Pass point specification	X-axis and Y-axis coordinates of pass point on arc
3-axis linear interpolation control	Composite speed specification	Composite speed of X-axis, Y-axis, and Z-axis
	Long axis speed specification	Speed of long axis (axis whose movement distance is long)
3-axis spiral interpolation control	Center point specification/CW direction/ X-axis feed	Y-axis and Z-axis coordinates of center point
	Center point specification/CCW direction/X-axis feed	Y-axis and Z-axis coordinates of center point
	Center point specification/CW direction/ Y-axis feed	X-axis and Z-axis coordinates of center point
	Center point specification/CCW direction/Y-axis feed	X-axis and Z-axis coordinates of center point
	Center point specification/CW direction/ Z-axis feed	X-axis and Y-axis coordinates of center point
	Center point specification/CCW direction/Z-axis feed	X-axis and Y-axis coordinates of center point
	Pass point specification/X-axis feed	Y-axis and Z-axis coordinate of pass point on arc

Type	Operation specification method	Necessary data
	Pass point specification/Y-axis feed	X-axis and Z-axis coordinates of pass point on arc
	Pass point specification/ Z-axis feed	X-axis and Y-axis coordinates of pass point on arc

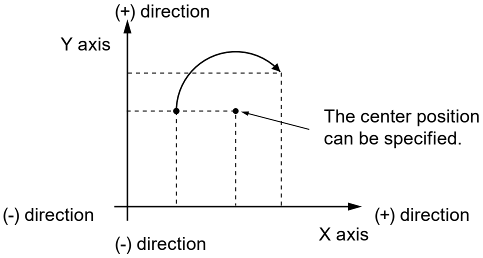
2-axis linear interpolation
(Composite speed specification)



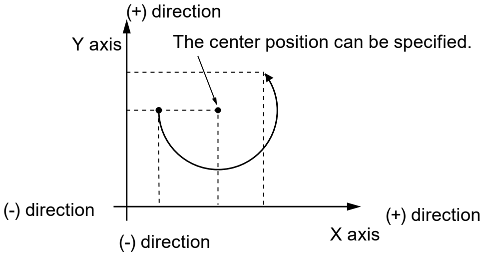
2-axis linear interpolation
(Long axis speed specification)



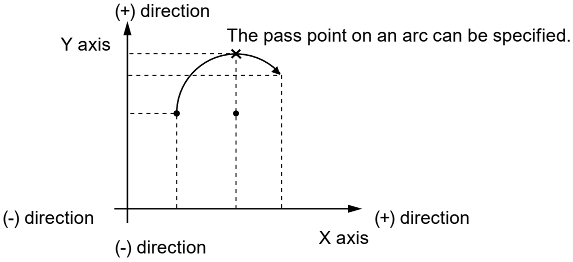
2-axis circular interpolation
(Center point specification/CW direction)



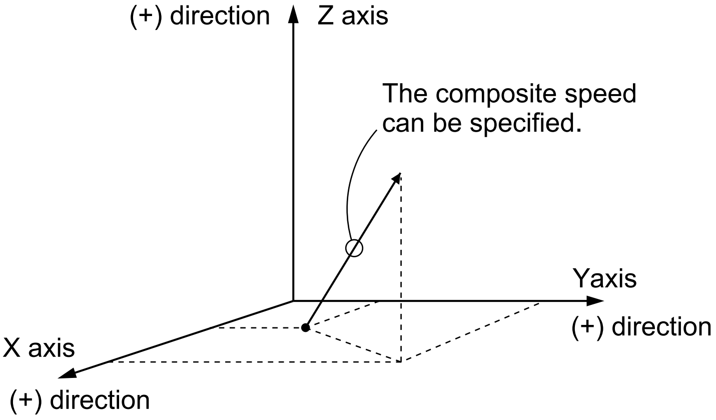
2-axis circular interpolation
(Center point specification/CCW direction)



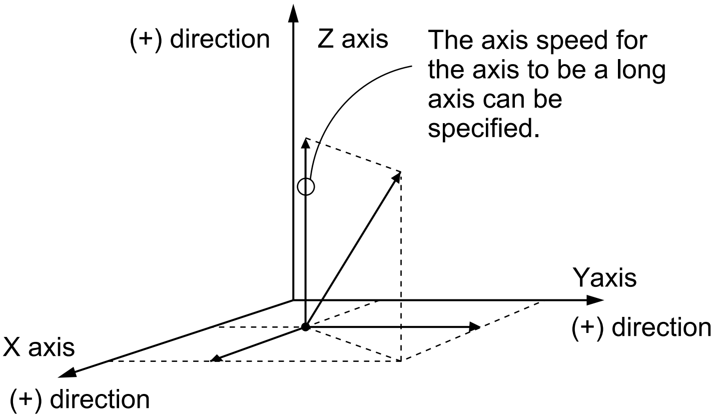
2-axis circular interpolation
(Pass point point specification)



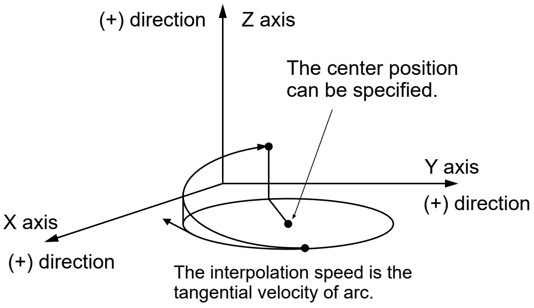
3-axis linear interpolation
(Composite speed specification)



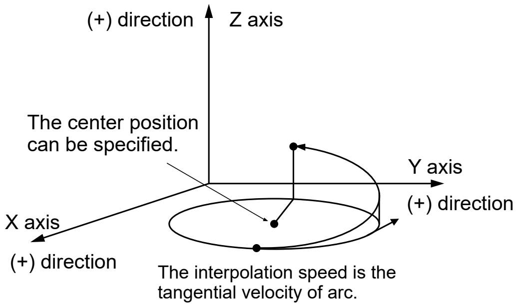
3-axis linear interpolation
(Composite speed specification)



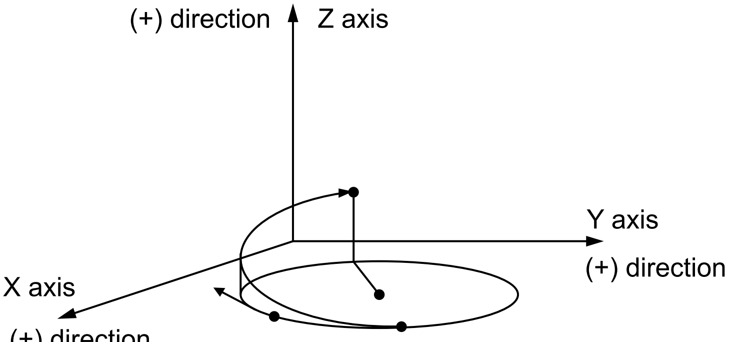
3-axis spiral interpolation (Center point specification/CW direction/Z-axis movement)



3-axis spiral interpolation (Center point specification/CCW direction/Z-axis movement)



3-axis spiral interpolation (Pass point specification/ Z-axis movement)



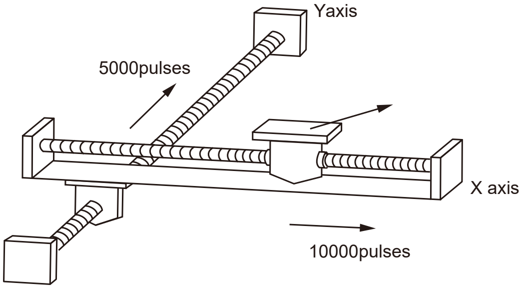
The pass point on an arc can be specifed.

The interpolation speed is the tangential velocity of arc.

(Note 1) If the X-axis and Y-axis are feed axes in 3-axis spiral interpolation, they behave as if each axis in the above diagram is replaced.

8.2.2 Settings and Operation of Two-Axis Linear Interpolation

The example below is the case where E-point control is performed. The X-axis is set as Axis 1and the Y-axis is set as Axis 2. The amount of movement is set using an incremental method and the unit is the number of pulses. (The example below is the case where slot No. 0 is used.)

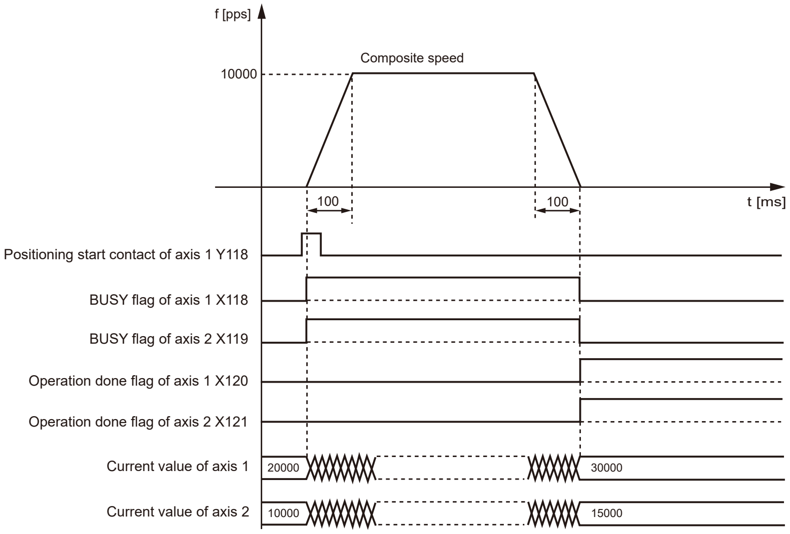


■ Settings

Item	Setting example
Operation pattern	E: End point
Interpolation operation	0: Linear (Composite speed)
Control method	I: Incremental
X-axis movement amount	10,000 pulses
X-axis auxiliary point	0
Y-axis movement amount	5,000 pulses
Y-axis auxiliary point	0
Acceleration/deceleration method	L: Linear

Item	Setting example
Acceleration time (ms)	100 ms
Deceleration time (ms)	100 ms
Interpolation speed	10,000 pps

■ Behavior diagram

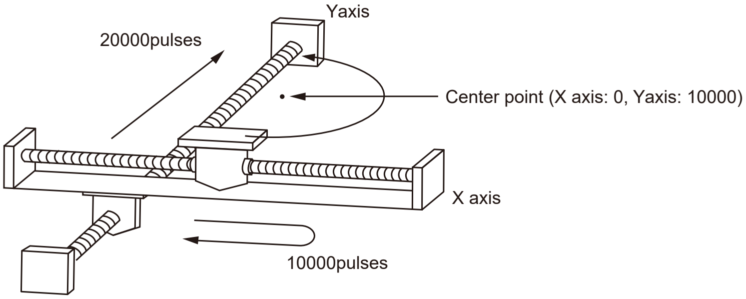


■ Behaviors of each contact

- Axis-1 and Axis-2 BUSY flags (X118 and X119), which indicate that the motor is running, turn ON when positioning control starts and turn OFF when the operation is completed.
- Axis-1 and Axis-2 operation done flags (X120 and X121), which indicate that the operation is completed, turn ON when the operation is completed and remain on hold until the next positioning control, JOG operation, home return, or pulser operation starts.

8.2.3 Settings and Operation of 2-Axis Circular Interpolation

The example below is the case where E-point control is performed. The X-axis is set as Axis 1 and the Y-axis is set as Axis 2. The amount of movement is set using the incremental method and the unit is pulses. (The example below is the case where slot number 0 is used.)

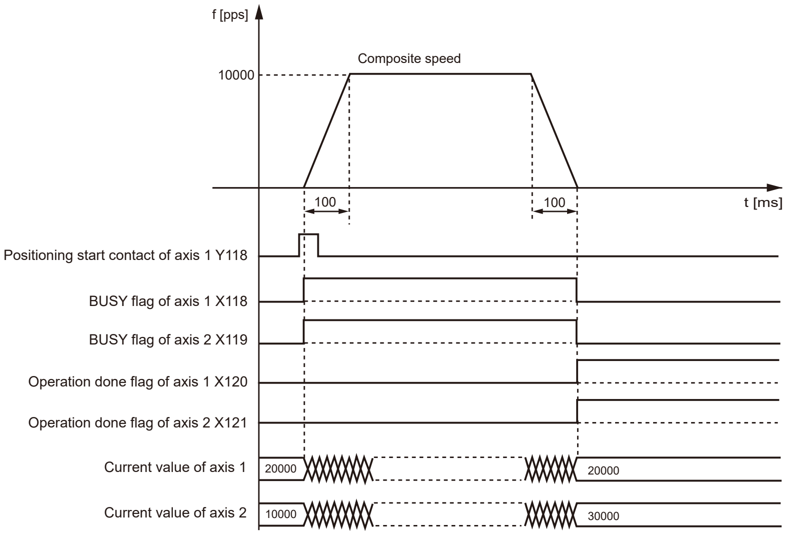


Settings

Use the tool software to set the positioning data and positioning parameters. The unit is set to pulses.

Item	Setting example
Operation pattern	E: End point
Interpolation operation	S: Circular (center point/CW direction)
Control method	I: Incremental
X-axis movement amount	0 pulses
X-axis auxiliary point	0 pulses
Y-axis movement amount	20,000 pulses
Y-axis auxiliary point	10,000 pulses
Acceleration/deceleration method	L: Linear
Acceleration time (ms)	100 ms
Deceleration time (ms)	100 ms
Interpolation speed	10,000 pps

Behavior diagram



Behaviors of each contact

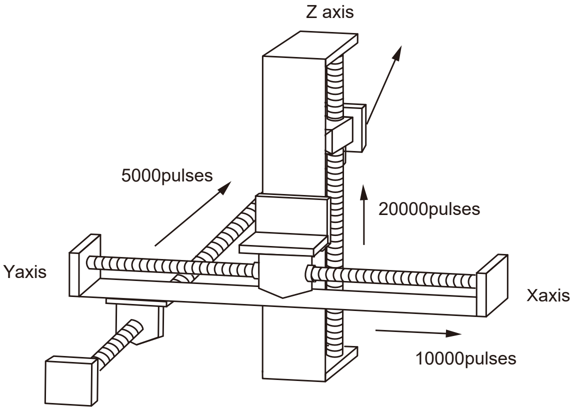
- The Axis-1 and Axis-2 BUSY flags (X118 and X119), which indicate that the motor is running, turn ON when position control starts and turn OFF when the operation is completed.
- The Axis-1 and Axis-2 operation done flags (X120 and X121), which indicate that the operation is completed, turn ON when the operation is completed and remain ON until the next position control, JOG operation, home return, or pulser operation starts.

■ Notes on programming

- To start interpolation control, turn ON the positioning start contact of the axis with the smallest number in the same group.
- For the center point specification, the X-axis auxiliary point is the center point of the X-axis, and the Y-axis auxiliary point is the center point of the Y-axis. Pass points must be set as the respective pass points of the X-axis and Y-axis.
- When the control method is the incremental method, both the center point and pass point are expressed as incremental coordinates from the start point.
- If the start point and the operation complete point are the same, one circular operation is performed when the center position method is used, but an error occurs when the pass position method is used.
- For the pass position method, if the start point, the pass point, and the operation complete point exist on the same straight line, an arc will not be formed, resulting in an error.
- For the long axis speed specification, composite speed is faster than long axis speed.
- If any value such as a movement amount, acceleration time, deceleration time, or target speed is out of the specified range, a setting value error will occur when position control starts.
- The starting contact and flag number vary depending on the axis number.

8.2.4 Settings and Operation of 3-Axis Linear Interpolation

The example below is the case where E-point control is performed. The X-axis is set as Axis 1, the Y-axis is set as Axis 2, and the Z-axis is set as Axis 3. The amount of movement is set using the incremental method and the unit is the number of pulses. (The example below is the case where slot No. 0 is used.)

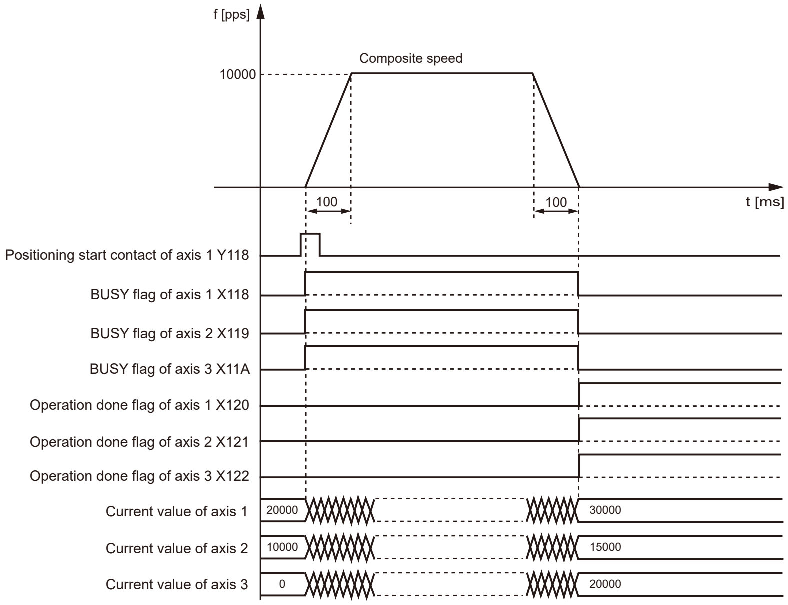


■ Settings

Item	Setting example
Operation pattern	E: End point
Interpolation operation	0: Linear (composite speed)
Control method	I: Incremental
X-axis movement amount	10,000 pulses

Item	Setting example
X-axis auxiliary point	0
Y-axis movement amount	5,000 pulses
Y-axis auxiliary point	0
Z-axis movement amount	20,000 pulses
Z-axis auxiliary point	0
Acceleration/deceleration method	L: Linear
Acceleration time (ms)	100 ms
Deceleration time (ms)	100 ms
Interpolation speed	10,000 pps

■ Behavior diagram



■ Behaviors of each contact

- Axis 1, Axis 2, and Axis 3 BUSY flags (X118, X119, and X11A), which indicate that the motor is running, turn ON when position control starts and turn OFF when the operation is completed.
- Axis 1, Axis 2, and Axis 3 operation done flags (X120, X121, and X122), which indicate that the operation is completed, turn ON when the operation is completed and remain ON until the next position control, JOG operation, home return, or pulser operation starts.

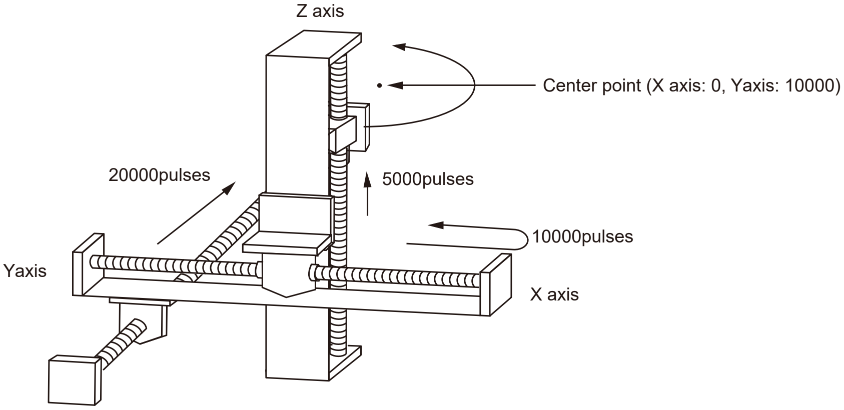
■ Notes on programming

- To start interpolation control, turn ON the positioning start contact of the axis with the smallest number in the same group.
- The values of the X-axis auxiliary point and Y-axis auxiliary point are invalid for linear interpolation.

- For long axis speed specification, composite speed is faster than long axis speed.
- If any value such as a movement amount, acceleration time, deceleration time or target speed is out of the specified range, a setting value error will occur when position control starts.
- The starting contact and flag number vary depending on the axis number.

8.2.5 Settings and Operation of 3-Axis Spiral Interpolation

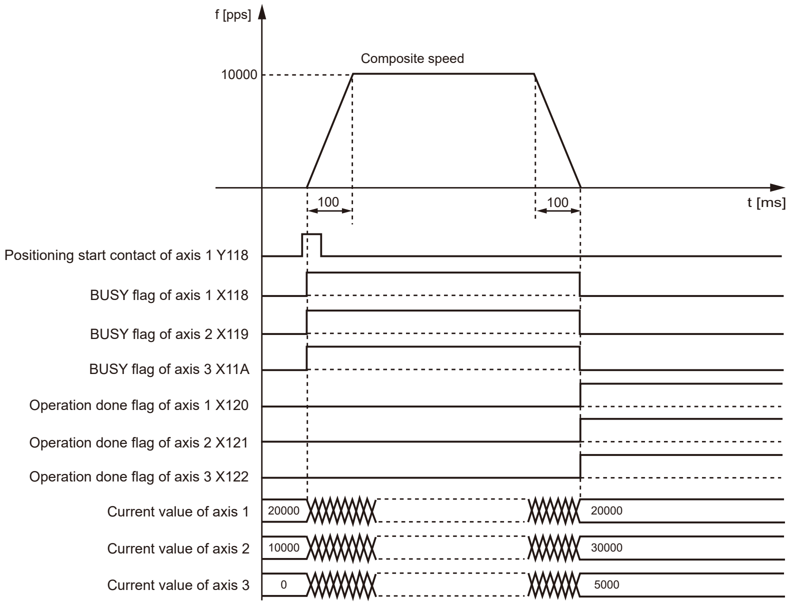
The example below is the case where E-point control is performed. The X-axis is set as Axis 1, the Y-axis is set as Axis 2, and the Z-axis is set as Axis 3. The amount of movement is set using an incremental method and the unit is the number of pulses. (The example below is the case where slot No. 0 is used.)



■ Settings

Item	Setting example
Operation pattern	E: End point
Interpolation operation	E: Spiral (Center point/CW direction/Z-axis feed)
Control method	I: Incremental
X-axis movement amount	0 pulses
X-axis auxiliary point	0 pulses
Y-axis movement amount	20,000 pulses
Y-axis auxiliary point	10,000 pulses
Z-axis movement amount	5,000 pulses
Z-axis auxiliary point	0
Acceleration/deceleration method	L: Linear
Acceleration time (ms)	100 ms
Deceleration time (ms)	100 ms
Interpolation speed	10,000 pps

■ Behavior diagram



■ Behaviors of each contact

- Axis-1, Axis-2, and Axis-3 BUSY flags (X118, X119, and X11A), which indicate that the motor is running, turn ON when positioning control starts and turn OFF when the operation is completed.
- Axis-1, Axis-2, and Axis-3 operation done flags (X120, X121, and X122), which indicate that the operation is completed, turn ON when the operation is completed and remain on hold until the next positioning control, JOG operation, home return, or pulser operation starts.

■ Notes on programming

- For center point specification, in the X-Y plane, the X-axis auxiliary point is the center point of the X-axis, and the Y-axis auxiliary point is the center point of the Y-axis. Pass points must be set as the respective pass points of the X-axis and Y-axis. The same applies to the Y-Z plane and X-Z plane.
- When the control method is the incremental method, both the center point and pass point are expressed as the incremental coordinates from the start point.
- If the start point and the operation completion point are the same, one circular operation is performed when the center point method is used, but an error occurs when the pass point method is used.
- For the pass point method, if the start point, the pass point, and the operation completion point exist on the same straight line, an arc will not be formed, resulting in an error.
- For long axis speed specification, composite speed is faster than long axis speed.
- If any value such as a movement amount, acceleration time, deceleration time or target speed is out of the specified range, a setting value error will occur when position control starts.
- The starting contact and flag number vary depending on the axis number.

8.2.6 Sample Programs (for Interpolation Control)

■ Sample programs

- The following sample programs perform three-axis interpolation control on Axes 1 to 3 by using slot No. 0.
- It is assumed that positioning control is set from table No.1.

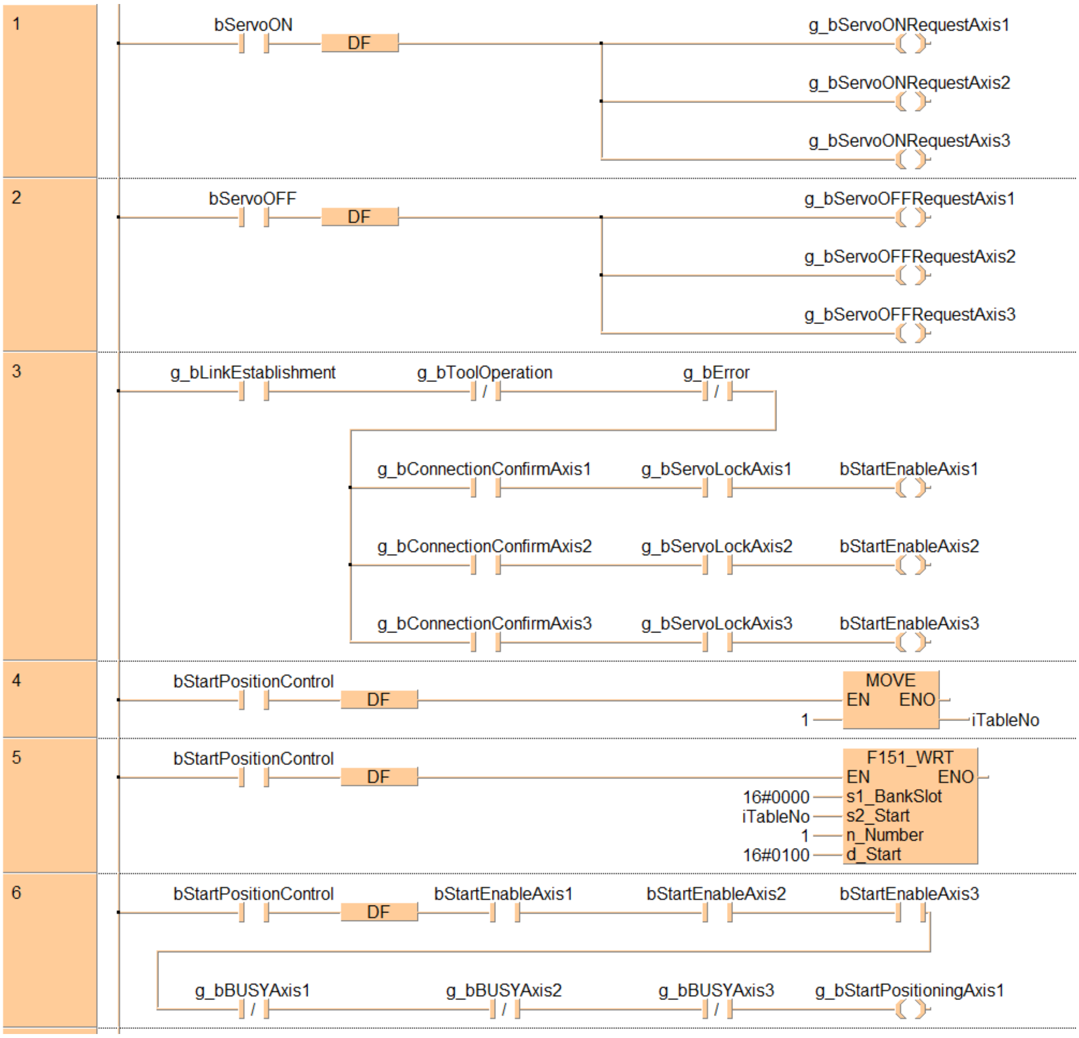
  (For examples of table settings using Configurator PM7-RTEX, refer to "Settings" in "8.2.4 Settings and Operation of 3-Axis Linear Interpolation" and "8.2.5 Settings and Operation of 3-Axis Spiral Interpolation".)

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bServoOFF		BOOL	FALSE	Servo OFF
VAR	bServoON		BOOL	FALSE	Servo ON
VAR	bStartEnableAxis1		BOOL	FALSE	Axis 1 start enable flag
VAR	bStartEnableAxis2		BOOL	FALSE	Axis 2 start enable flag
VAR	bStartEnableAxis3		BOOL	FALSE	Axis 3 start enable flag
VAR	bStartPositionControl		BOOL	FALSE	Positioning control start
VAR_EXTERNAL	g_bBUSYAxis1	X118	BOOL	FALSE	Axis 1 BUSY
VAR_EXTERNAL	g_bBUSYAxis2	X119	BOOL	FALSE	Axis 2 BUSY
VAR_EXTERNAL	g_bBUSYAxis3	X11A	BOOL	FALSE	Axis 3 BUSY
VAR_EXTERNAL	g_bConnectionConfirmAxis1	X108	BOOL	FALSE	Axis 1 connection confirmation
VAR_EXTERNAL	g_bConnectionConfirmAxis2	X109	BOOL	FALSE	Connection confirmation for Axis 2
VAR_EXTERNAL	g_bConnectionConfirmAxis3	X10A	BOOL	FALSE	Connection confirmation for Axis 3
VAR_EXTERNAL	g_bError	X105	BOOL	FALSE	Error notification
VAR_EXTERNAL	g_bLinkEstablishment	X100	BOOL	FALSE	Preparation completion notification
VAR_EXTERNAL	g_bServoLockAxis1	X110	BOOL	FALSE	Servo lock for axis 1
VAR_EXTERNAL	g_bServoLockAxis2	X111	BOOL	FALSE	Servo lock for Axis 2
VAR_EXTERNAL	g_bServoLockAxis3	X112	BOOL	FALSE	Servo lock for Axis 3
VAR_EXTERNAL	g_bServoOFFRequestAxis1	Y110	BOOL	FALSE	Axis 1 Servo OFF request
VAR_EXTERNAL	g_bServoOFFRequestAxis2	Y111	BOOL	FALSE	Servo OFF request for Axis 2

Class name	Variable name	FP address	Data type	Default	Comment
VAR_EXTERNAL	g_bServoOFFRequestAxis3	Y112	BOOL	FALSE	Servo OFF request for Axis 3
VAR_EXTERNAL	g_bServoONRequestAxis1	Y108	BOOL	FALSE	Axis 1 servo ON request
VAR_EXTERNAL	g_bServoONRequestAxis2	Y109	BOOL	FALSE	Servo ON request for Axis 2
VAR_EXTERNAL	g_bServoONRequestAxis3	Y10A	BOOL	FALSE	Servo ON request for Axis 3
VAR_EXTERNAL	g_bStartPositioningAxis1	Y118	BOOL	FALSE	Positioning start for Axis 1
VAR_EXTERNAL	g_bToolOperation	X104	BOOL	FALSE	Tool operation in progress
VAR	iTableNo		INT	0	Start table number

Ladder diagram (LD)



Structured text (ST)

```
g_bServoONRequestAxis1   := DF(bServoON);
g_bServoONRequestAxis2   := DF(bServoON);
g_bServoONRequestAxis3   := DF(bServoON);

g_bServoOFFRequestAxis1 := DF(bServoOFF);
g_bServoOFFRequestAxis2 := DF(bServoOFF);
g_bServoOFFRequestAxis3 := DF(bServoOFF);

bStartEnableAxis1    := g_bLinkEstablishment AND NOT g_bToolOperation AND NOT g_bError
                        AND g_bConnectionConfirmAxis1 AND g_bServoLockAxis1;

bStartEnableAxis2    := g_bLinkEstablishment AND NOT g_bToolOperation AND NOT g_bError
                        AND g_bConnectionConfirmAxis2 AND g_bServoLockAxis2;

bStartEnableAxis3    := g_bLinkEstablishment AND NOT g_bToolOperation AND NOT g_bError
                        AND g_bConnectionConfirmAxis3 AND g_bServoLockAxis3;

if(DF(bStartPositionControl)) then
    iTableNo   := 1;
    F151_WRT(s1_BankSlot := 16#0000, s2_Start := iTableNo, n_Number := 1, d_Start := 16#0100);
end_if;

g_bStartPositioningAxis1 := DF(bStartPositionControl) AND bStartEnableAxis1 AND bStartEnableAxis2 AND bStartEnableAxis3
                            AND NOT g_bBUSYAxis1 AND NOT g_bBUSYAxis2 AND NOT g_bBUSYAxis3;
```

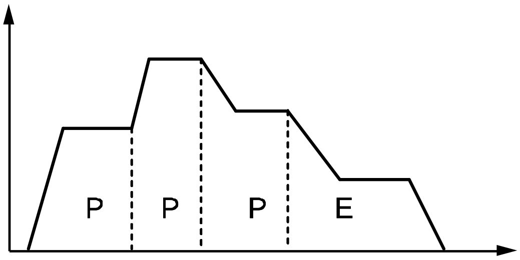
8.3 Positioning Repetition Function

8.3.1 Overview of positioning repeat function

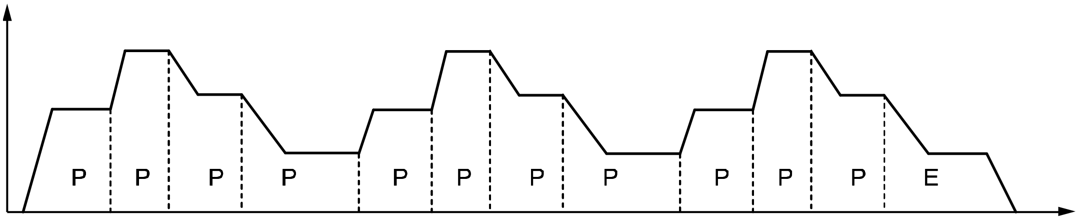
- The positioning repetition function executes continuous positioning control according to the specified number of repetitions.
- The number of repetitions is set in the area for specifying the number of positioning repetitions for each axis. The number of repetitions can be set within a range of 2 to 254. You can also specify an unlimited number of repetitions by setting 255 in the area for specifying the number of positioning repetitions.

■ Overview of positioning repetition function

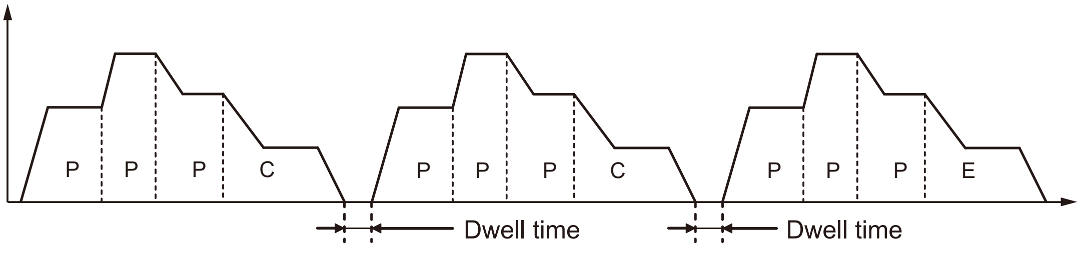
Positioning operations when positioning control is repeated three times are performed as shown in the figure below.



If a dwell time of 0 is set for E-point control (the end point of positioning control), the positioning unit RTEX will perform E-point control as P-point control and complete the operation after repeating positioning control three times continuously (without stopping the operation).



If the dwell time is set to a value other than 0 for E-point control (the end point of positioning control), the positioning unit RTEX will perform E-point control as C-point control and execute positioning control again after stopping for the time period specified as the dwell time (ms). The positioning unit RTEX completes the operation after repeating the positioning control three times.



■ Setting area for positioning repetition function (bank 16#00: common area)

This area is used to set the number of repetitions of positioning control to be started for each axis at the start of positioning control. The positioning unit RTEX repeats the started positioning control for the specified number of repetitions and then completes the operation. The number of repetitions is also changed to 0 (default value) at the beginning of the operation.

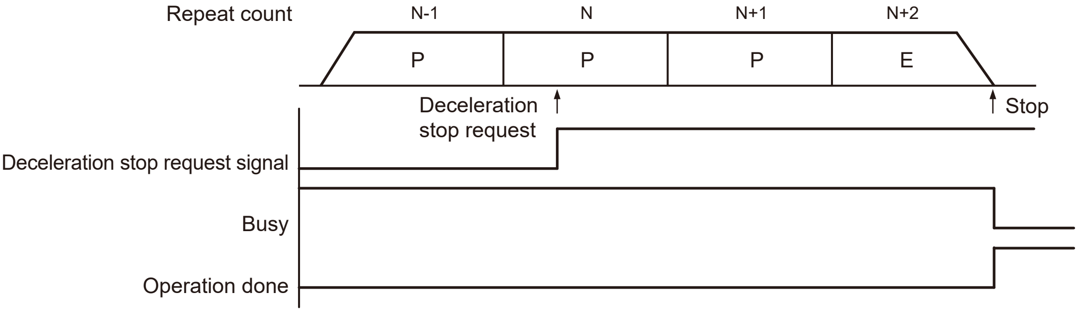
Positioning memory Offset address	Name	Description	Default	Setting range	Unit
16#0108	Axis 1 positioning Repetition count	Stores the number of repetitions of the operation starting from the position control start table number up to the E point. If 255 is set, positioning control is repeated unlimitedly until the operation is stopped.	0	0 to 255	Number of times
16#0109	Axis 2 positioning Repetition count				
16#010A	Axis 3 positioning Repetition count				
16#010B	Axis 4 positioning Repetition count				
16#010C	Axis 5 positioning Repetition count				
16#010D	Axis 6 positioning Repetition count				
16#010E	Axis 7 (virtual) positioning Repetition count				
16#010F	Axis 8 (virtual) positioning Repetition count				

■ Stop processing for repetitive positioning operations

The following operations will occur only if a deceleration stop is performed during repetitive positioning.

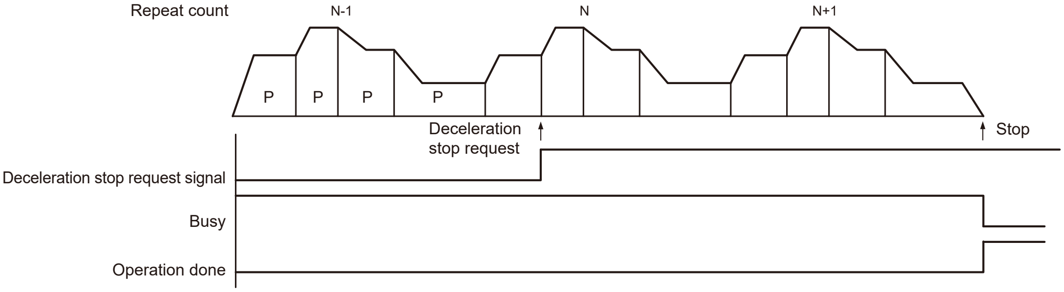
When repeating E-point control (dwell time: 0 ms)

When the positioning unit RTEX detects a deceleration stop, it comes to a stop after positioning control is repeated N+2 times.



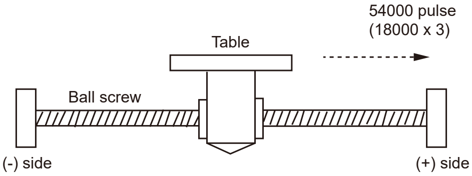
When executing multiple positioning tables continuously

When the positioning unit RTEX detects a deceleration stop, it comes to a stop after positioning control is repeated N+1 times.



8.3.2 Settings and Action of Positioning Repeat Function

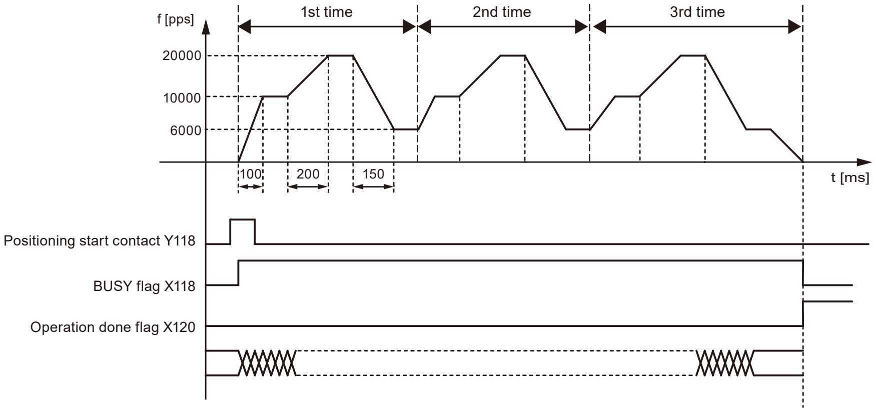
The example below is the case where single-axis control is performed using slot No. 0. The amount of movement is set using an incremental method and the unit is the number of pulses.



■ Settings

Item	Setting example		
	Table 1	**Table 2**	**Table 3**
Operation pattern	P: Pass point	P: Pass point	E: End point
Control method	I: Incremental	I: Incremental	I: Incremental
X-axis movement amount	5,000 pulses	10,000 pulses	3000 pulse
Acceleration/deceleration method	L: Linear	L: Linear	L: Linear
Acceleration time (ms)	100 ms	200 ms	30 ms
Deceleration time (ms)	10 ms	20 ms	150 ms
Target speed	10,000 pps	20000 pps	6000 pps
Dwell time	0 ms	0 ms	0 ms
Positioning repetition count	3 (Write to the setting area for the positioning repeat function)		

■ Behavior diagram



■ Behaviors of each contact

- The BUSY flag (X118), which indicates that the motor is running, turns ON when positioning control starts, and turns OFF when the operation is completed.
- The operation done flag (X120), which indicates the completion of operation, turns ON when the current operation is completed, and remains on hold until the next positioning control, JOG operation, home return, or pulser operation starts.

■ Sample programs

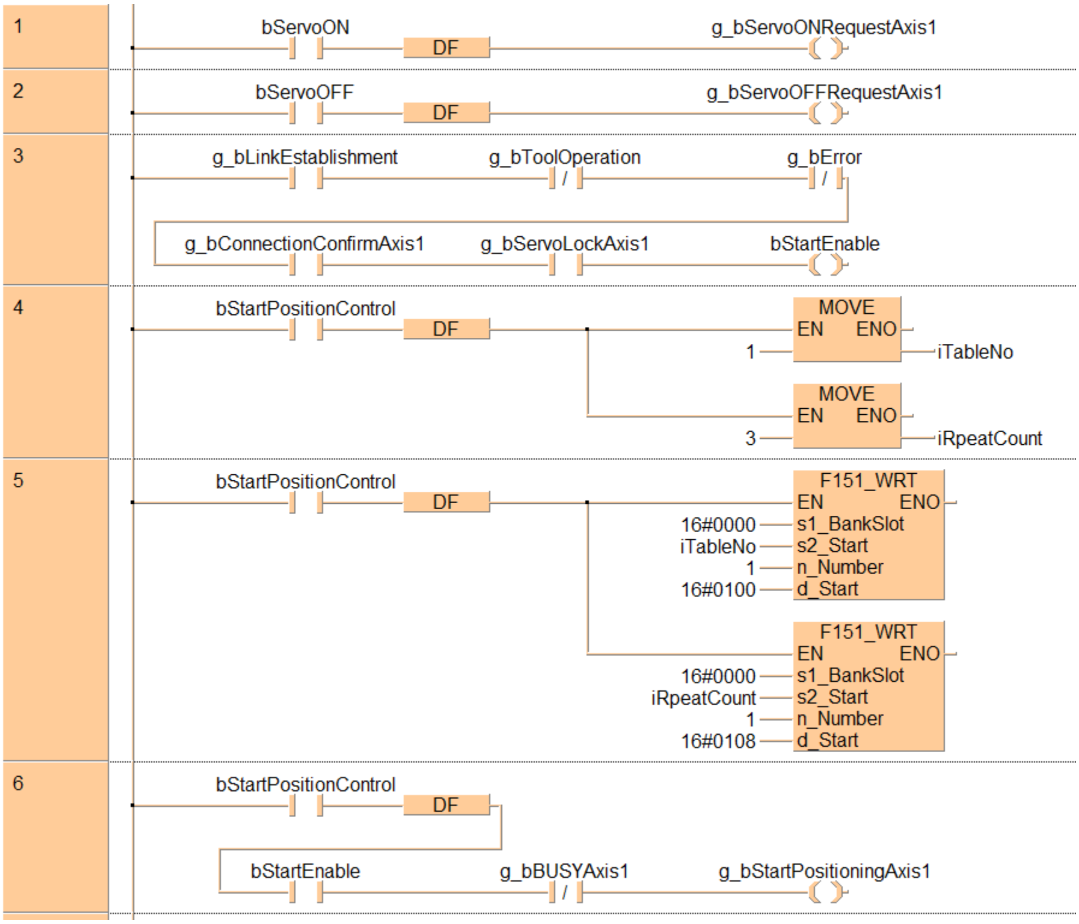
- The following sample program repeats single-axis control on Axis 1 three times by using slot number 0.
- It is assumed that positioning control is set from table No.1.
  (For examples of table settings using Configurator PM7-RTEX, refer to "Settings".)

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bServoOFF		BOOL	FALSE	Servo OFF
VAR	bServoON		BOOL	FALSE	Servo ON
VAR	bStartEnable		BOOL	FALSE	Start enable flag
VAR	bStartPositionControl		BOOL	FALSE	Positioning control start
VAR_EXTERNAL	g_bBUSYAxis1	X118	BOOL	FALSE	Axis 1 BUSY
VAR_EXTERNAL	g_bConnectionConfirmAxis1	X108	BOOL	FALSE	Axis 1 connection confirmation
VAR_EXTERNAL	g_bError	X105	BOOL	FALSE	Error notification
VAR_EXTERNAL	g_bLinkEstablishment	X100	BOOL	FALSE	Preparation completion notification
VAR_EXTERNAL	g_bServoLockAxis1	X110	BOOL	FALSE	Servo lock for axis 1
VAR_EXTERNAL	g_bServoOFFRequestAxis1	Y110	BOOL	FALSE	Axis 1 Servo OFF request

Class name	Variable name	FP address	Data type	Default	Comment
VAR_EXTERNAL	g_bServoONRequestAxis1	Y108	BOOL	FALSE	Axis 1 servo ON request
VAR_EXTERNAL	g_bStartPositioningAxis1	Y118	BOOL	FALSE	Positioning start for Axis 1
VAR_EXTERNAL	g_bToolOperation	X104	BOOL	FALSE	Tool operation in progress
VAR	iRpeatCount		INT	0	Repetition count
VAR	iTableNo		INT	0	Start table number

Ladder diagram (LD)



Structured text (ST)

```
g_bServoONRequestAxis1   := DF(bServoON);

g_bServoOFFRequestAxis1 := DF(bServoOFF);

bStartEnable    := g_bLinkEstablishment AND NOT g_bToolOperation AND NOT g_bError
                   AND g_bConnectionConfirmAxis1 AND g_bServoLockAxis1;

if(DF(bStartPositionControl)) then
   iTableNo  := 1;
   iRpeatCount := 3;
   F151_WRT(s1_BankSlot := 16#0000, s2_Start := iTableNo, n_Number := 1, d_Start := 16#0100);
   F151_WRT(s1_BankSlot := 16#0000, s2_Start := iRpeatCount, n_Number := 1, d_Start := 16#0108);
end_if;

g_bStartPositioningAxis1  := DF(bStartPositionControl) AND bStartEnable AND NOT g_bBUSYAxis1;
```

(MEMO)

9 Automatic Operation (Synchronous Control)

9.1 Synchronous control

9.1.1 Overview of Synchronous Control

■ What is synchronous control?

Synchronization control involves operating the master axis (the axis used as the operation reference) to operate the slave axis (the axis interlocked or synchronized with the master axis). The use of synchronous control provides the following advantages.

1. Ease of settings

   If the operations of multiple axes are related to each other, operations among multiple axes can be easily set up by, based on the master axis, designing the operations of other axes.

2. Ensuring operational safety

   If an axis comes to a stop for some reason while synchronous control is running, all the relevant axes under synchronous control will be stopped. Therefore, you can easily enhance the safety of the system.

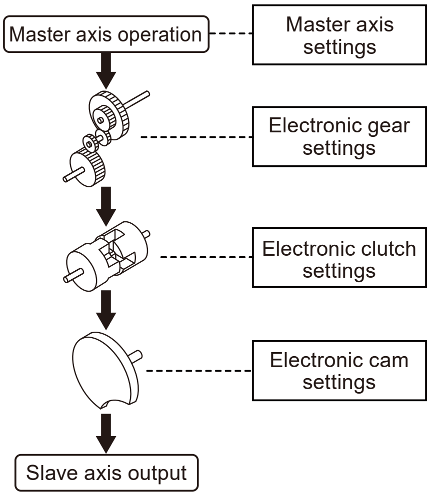
■ Functions of synchronous control

Synchronous control provides the following functions. These functions are executed in order, and the slave axes operate according to the operation result of each function.

Function	Overview
Electronic gear	The number of pulses multiplied by the preset electronic gear ratio is output according to the operation of the master axis.
Electronic clutch	The operations of the slave axes can be separated from the operation of the master axis by disengaging the clutch.
Electronic cam	A function to output pulses according to the preset cam pattern. Calculates the operational phase of the master axis and outputs cam pulses according to the phase. The cam pattern is set with the configuration tool.

■ Execution order and setup procedure of synchronous control

The functions achieved by synchronous control and the procedures for setting up the functions are outlined below.



Make master axis settings for each operating axis.
Each operating axis will work as a slave axis if master axis settings are made for the operating axis.

Select the use or non-use of the electronic gear. Various electronic gear settings are required if the electronic gear is used.

Select the use or non-use of the electronic clutch. Various electronic cutch settings are required if the electronic gear is used.

Select the use or non-use of the electronic cam. Various electronic cam settings are required if the electronic gear is used.
In addition, electronic cam pattern settings are required in the case of using the electronic cam.

9.2 Setting Up the Master Axis and Slave Axes

9.2.1 Selecting and Setting up the Master Axis

The master axis serves as the operation reference for synchronous control. Start and stop requests for various operations are made to the master axis under synchronous control. It is possible to select one of the following master axes.

■ Types of master axis

Master axis type	Overview
Real axis	Axis (one to eight axes) that can be physically controlled by the positioning unit RTEX. Use this type if the master axis also needs to be controlled. If a real axis is used as the master axis, all other axes (seven axes) can be used as slave axes.
Virtual axis	A virtual axis that exists in the positioning unit RTEX. Virtual axes are not subject to motor control. When using virtual axes, select the check box for virtual axes in the "Axis Settings" dialog box of Configurator PM7-RTEX.
Pulse input	The master axis operates according to the pulses input to the positioning unit RTEX. Use pulse input when an external device such as an external encoder is connected as the reference for synchronous control. If pulse input is used for the master axis, the slave axes will operate according to the pulse input. Therefore, take care when starting or stopping the operation of the positioning unit RTEX.

■ Types of master axis and possible operations

Operation		Master axis type		
		Real axis	Virtual axis	Pulse Input
Stop-on-contact torque value for home return		Possible	Possible only for "data set method"	Not possible
JOG operation		Possible	Possible	Not possible
positioning	Single axis	Possible	Possible	Not possible
	Interpolation	Possible	Not possible	Not possible
Stop Functions	System stop / Emergency stop / Deceleration stop	Possible	Possible	Not possible
	Limit stop	Possible	Possible for only stopped by soft limit because of no limit signal input	Not possible
	Error stop	Possible	Possible	Not possible

Info.

- While the unit is under synchronous control, slave axes set to use the master axis operate only in synchronization with the master axis, so the slave axes cannot operate independently.

■ Notes on selecting "pulse input"

When "pulse input" is selected for the master axis, you need to be aware of the following notes.

- Because slave axes are synchronous with external pulse input, the master axis cannot be controlled from the positioning unit RTEX. To stop synchronous control, stop the slave axes.
- The slave axes are not set to be synchronous at power ON. Follow the steps below to issue a synchronous setting request.
  1. Turn ON the positioning unit RTEX.
  2. Servo ON the slave axes.
  3. Turn ON the synchronous setting request signals (Y150 to Y157).
- If a synchronous setting request is made when the slave axes are servo OFF, a "synchronous operation not settable (pulse input)" (error code 16#0000_3046) error occurs.

9.2.2 Selecting and Setting Up the Slave Axis

■ Selecting the slave axis

- One to eight axes can be used as slave axes. Virtual axes can be used only as the master axis.
- When "Synchronous master axis" is selected for the axis to be operated as a slave axis in the "Synchronization Parameter Settings" dialog box of Configurator PM7-RTEX, the axis will operate as a slave axis for the master axis specified as "Synchronous master axis".
- Up to eight slave axes can be set for a single master axis.

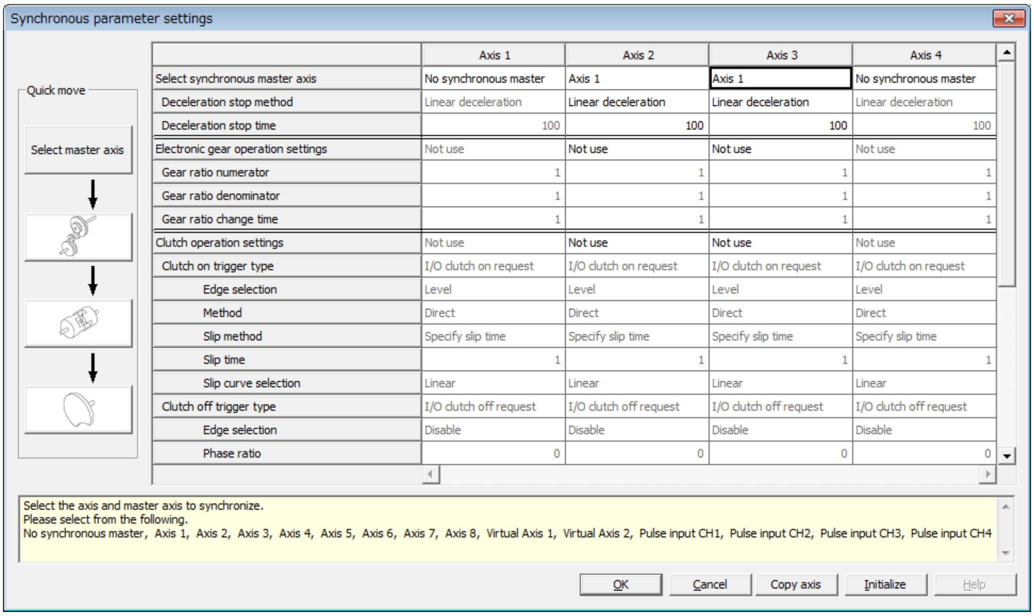
Slave axes can be allocated by using the "Synchronization Parameter Settings" dialog box of Configurator PM7-RTEX. The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

Procedure

1. Select **Axis Settings**>**Synchronization Parameter Settings** from the menu bar.

   The "Synchronization Parameter Settings" dialog box is displayed.
2. In the slave axis column of the dialog box, select the axis to be set as a slave axis for the master axis.

   In the following screenshot, Axis 1 is set as the master axis and Axes 2 and 3 are set as a slave axis.



	Axis 1	Axis 2	Axis 3	Axis 4
Select synchronous master axis	No synchronous master	Axis 1	Axis 1	No synchronous master
Deceleration stop method	Linear deceleration	Linear deceleration	Linear deceleration	Linear deceleration
Deceleration stop time	100	100	100	100
Electronic gear operation settings	Not use	Not use	Not use	Not use
Gear ratio numerator	1	1	1	1
Gear ratio denominator	1	1	1	1
Gear ratio change time	1	1	1	1
Clutch operation settings	Not use	Not use	Not use	Not use
Clutch on trigger type	I/O clutch on request	I/O clutch on request	I/O clutch on request	I/O clutch on request
Edge selection	Level	Level	Level	Level
Method	Direct	Direct	Direct	Direct
Slip method	Specify slip time	Specify slip time	Specify slip time	Specify slip time
Slip time	1	1	1	1
Slip curve selection	Linear	Linear	Linear	Linear
Clutch off trigger type	I/O clutch off request	I/O clutch off request	I/O clutch off request	I/O clutch off request
Edge selection	Disable	Disable	Disable	Disable
Phase ratio	0	0	0	0

Select the axis and master axis to synchronize.
Please select from the following.
No synchronous master, Axis 1, Axis 2, Axis 3, Axis 4, Axis 5, Axis 6, Axis 7, Axis 8, Virtual Axis 1, Virtual Axis 2, Pulse input CH1, Pulse input CH2, Pulse input CH3, Pulse input CH4

3. Click the [OK] button.

Info.

- Axes set as slave axes operate in synchronization with the master axis as long as synchronous control is enabled. No slave axes can perform positioning and other control independently from the master axis while synchronous control is enabled.

■ Slave axis positioning parameter settings

Slave axes operate in synchronization with the master axis, but the following items are basic axis settings and must be set for each slave axis.

- Unit setting
- Number of pulses per revolution
- Movement amount per rotation

Info.

- For details of positioning parameter setting items, refer to "7.8 Positioning Parameter Settings".

9.3 Starting and Canceling Synchronous Control

9.3.1 Starting and Canceling Synchronous Control

■ Startup and cancellation operations

- It is possible to cancel synchronous control temporarily by turning ON the sync cancellation request signal.
- It is possible to operate any slave axes individually while synchronous control is being canceled.
- Synchronous control can be started again by turning OFF the sync cancellation request signal.
- Synchronous control can be cancelled even while the master axis is running.

■ Related positioning parameters

Signal name	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Warning clearing for Axis 7 (virtual)	Axis 8 (virtual)	Operation
Synchronization cancellation request	Y158	Y159	Y15A	Y15B	Y15C	Y15D	Y15E	Y15F	ON: Cancel synchronous control OFF: Execute synchronous control
Synchronization cancellation in progress notification	X158	X159	X15A	X15B	X15C	X15D	X15E	X15F	ON: Synchronization canceled OFF: Under synchronous control

■ Behaviors while synchronous control is being performed or canceled

Operation request for axis	Behavior while synchronous control is being performed		Behavior while synchronous control is being canceled
	Master axis	Slave axis	Master/slave axis
Stop-on-contact torque value for home return	× Home return operation is performed on the master axis. Hoe return operation is not performed on slave axes. Synchronous operation is performed according to output from the master axis. Before performing home return, cancel synchronous control.	× The slave axes do not operate in response to operation requests.	○ Regardless of master or slave axes, home return operation is performed only on the axes that are so requested.
JOG operation	○		○

Operation request for axis		**Behavior while synchronous control is being performed**		**Behavior while synchronous control is being canceled**
		Master axis	**Slave axis**	**Master/slave axis**
positioning	Single axis	The slave axes operate in synchronization with the operation request for the master axis.		Regardless of master or slave axes, JOG operation is performed only on the axes that are so requested.
	Interpolation	○ Interpolation is executed upon request if the master axis is the start axis of interpolation. The slave axes operate in synchronization with the master axis.		○ Interpolation is executed upon request if the requested axis is the start axis of interpolation.
Stop Functions	System stop	All the axes come to a stop regardless of the synchronization settings.		
	Emergency stop	○ The master axis comes to a stop upon request. The slave axes come to a stop in synchronization with the master axis.	○ Only requested axes come to a stop. The master axis and other slave axes set for the same master axis continue operating.	○ Only requested axes come to a stop. (All the target axes come to a stop during interpolation operation.)
	Deceleration stop			
	Limit stop	The master axis and all the slave axes come to a stop.		Only axes resulting in a limit error come to a stop.
	Error stop			Only axes resulting in an error come to a stop.

(Note 1) If an error occurs on the master axis or any slave axis, all axes will stop at the same time as the master axis stops.

(Note 2) If a limit stop or error stop occurs on any slave axis, the master axis will stop. Consequently all slave axes will stop at the same time as the master axis stops.

9.3.2 Notes on Canceling or Starting Synchronous Control

■ Notes on canceling synchronous control

- Synchronous control can be canceled during the master operation, however, slave axes will stop immediately.
- We recommend that synchronous control be canceled after slave axes are stopped using the clutch function.
- When synchronous control is canceled, relays related to synchronous control (relays for synchronous slave gear ratio change state notification and synchronous slave clutch connection state notification) turn OFF.

■ Conditions for starting synchronous control

Synchronous control can only be started when the following conditions are met.

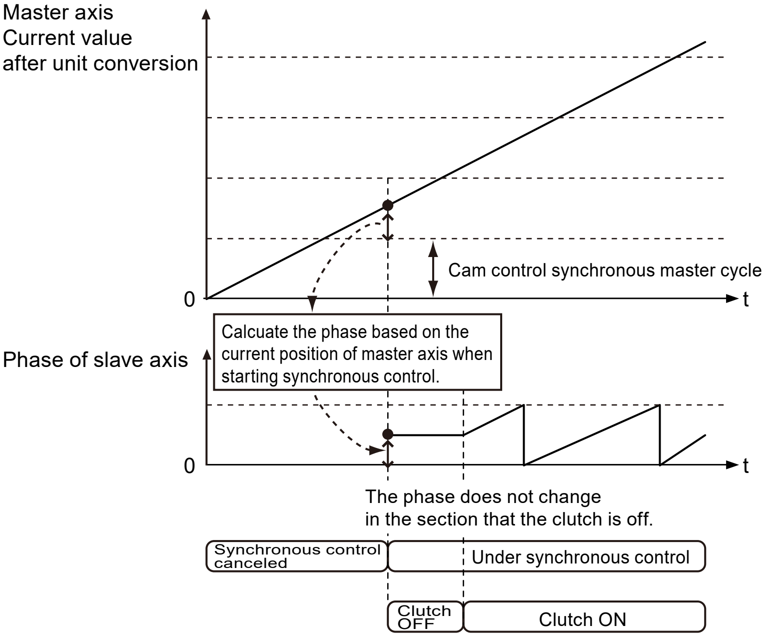
- Slave axes must be stopped.
- No stop request for slave axes must be generated.

- No error must occur on slave axes.

If these conditions are not met, the unit will not enter a synchronous state and the synchronization cancellation in-progress notification will not turn OFF. If the synchronization cancellation request remains OFF while the conditions are not met, synchronous control will start once the conditions for starting synchronous control are met.

■ Phase at the start of synchronous control

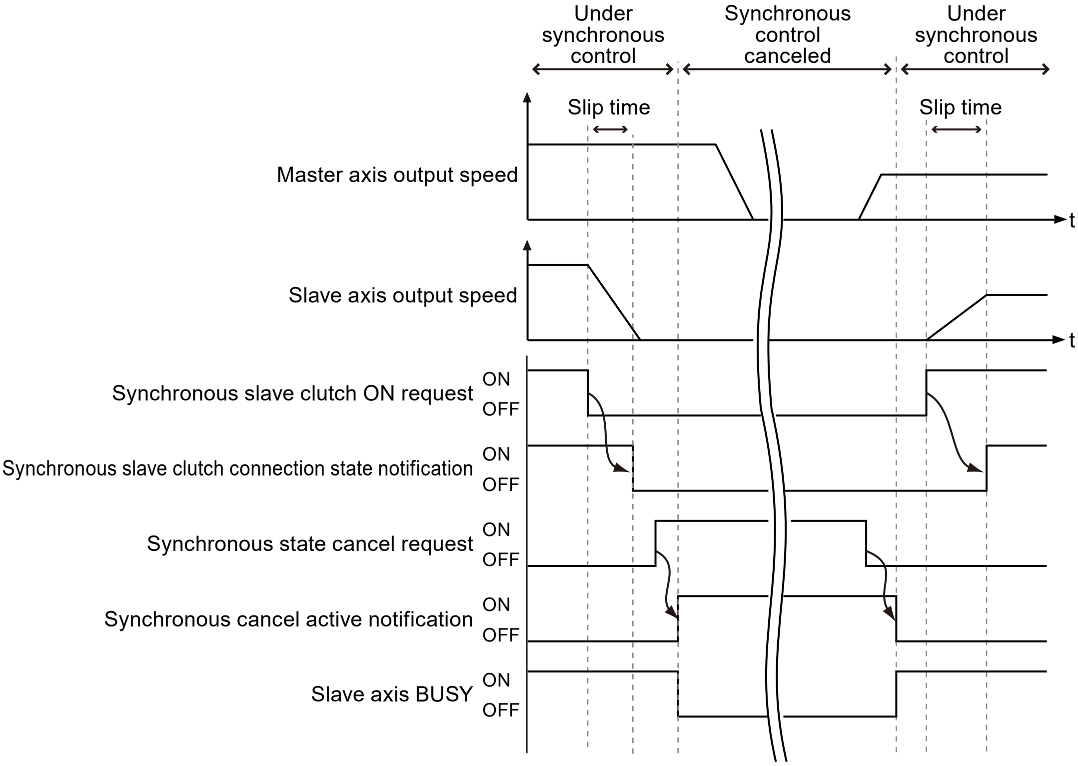
The phase is calculated from the “current value after unit conversion” parameter and the “cam control synchronous master axis cycle” synchronization parameter for the master axis. The remainder obtained by dividing “current value after unit conversion” by “cam control synchronous master axis cycle” is used as the phase.



■ Procedures for canceling and starting synchronous control

As an example, the following shows the procedures when "Level" is selected for the clutch trigger type.

Section	Procedure	Operation by user program and operation by the unit
Synchronization cancellation	1	The user program turns OFF the synchronous slave clutch ON request.
	2	The unit turns OFF the synchronous slave clutch connection state notification.
	3	The user program turns ON the synchronous state cancellation request.
	4	The unit cancel synchronous control when the synchronization cancellation in-progress notification turns ON.
Synchronization startup	5	The user program turns OFF the synchronization cancellation request.
	6	The unit turns OFF the synchronization cancellation in-progress notification.
	7	The user program turns ON the synchronous slave clutch ON request.
	8	The slave axis starts synchronous operation when the synchronous slave clutch connection state notification turns ON.

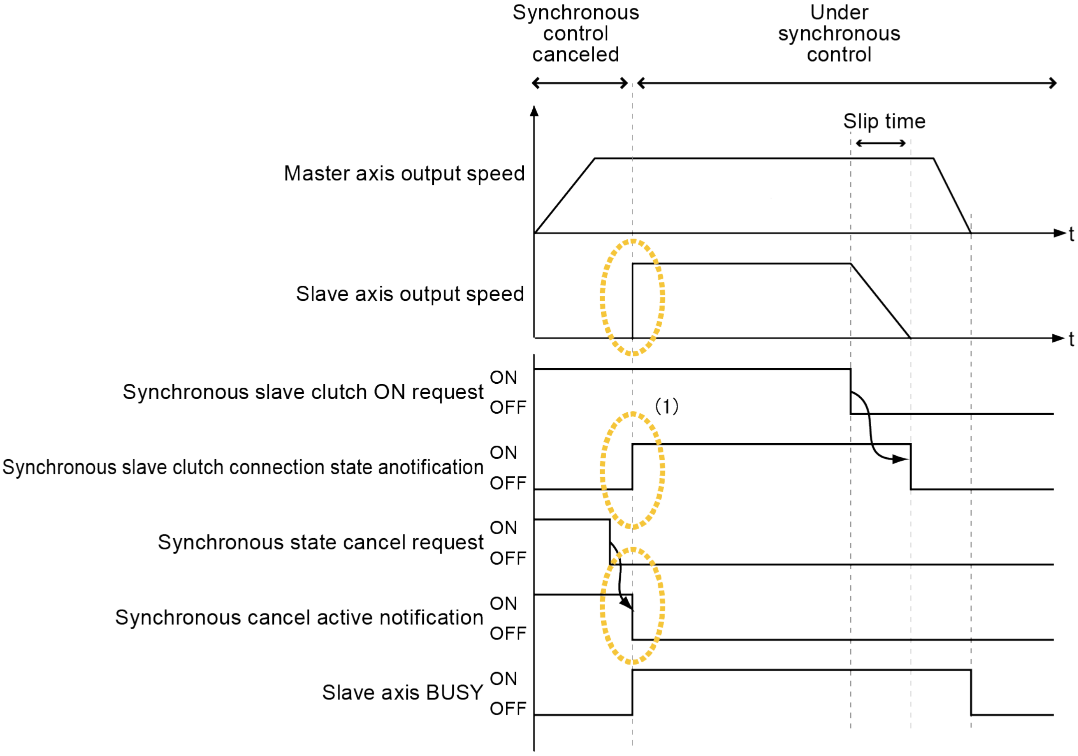


Signal name	**Axis 1**	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Warning clearing for Axis 7 (virtual)**	**Axis 8 (virtual)**
Synchronization cancellation request	Y158	Y159	Y15A	Y15B	Y15C	Y15D	Y15E	Y15F
Synchronization cancellation in-progress notification	X158	X159	X15A	X15B	X15C	X15D	X15E	X15F
Synchronous slave axis clutch ON request	Y160	Y161	Y162	Y163	Y164	Y165	Y166	Y167
Synchronous slave axis clutch operation notification	X160	X161	X162	X163	X164	X165	X166	X167
Slave axis BUSY	X118	X119	X11A	X11B	X11C	X11D	X11E	X11F

■ Operation when "Level" is selected for the clutch ON trigger type

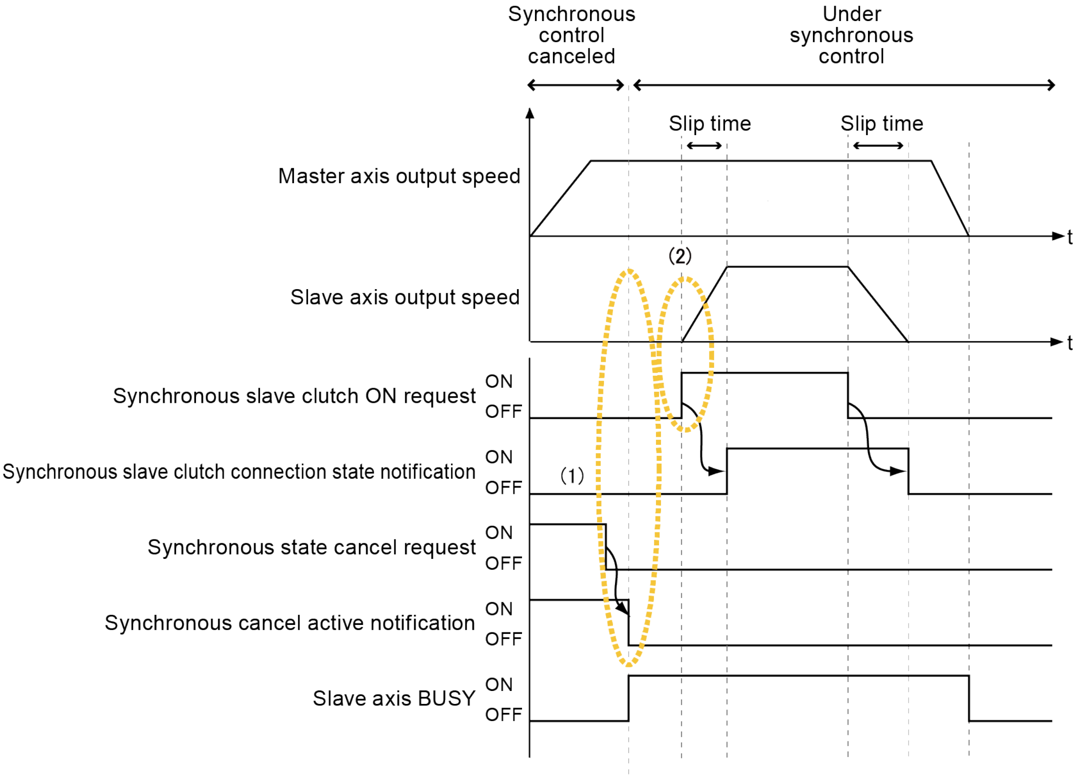
- If the "synchronous slave clutch ON request" is ON when synchronous control start processing is executed, the clutch will be connected by the direct method regardless of the setting of "slip method".
- However, if the “synchronous slave clutch ON request” is OFF when synchronous control start processing is executed, the clutch will be connected according to the setting of “slip method”.

When the synchronous slave clutch ON request is on when synchronous control start processing is executed



(1)	The slave axes start operations immediately because the clutch is connected (synchronous slave clutch connection state notification: ON) when synchronous control starts (synchronization cancellation in-progress notification: OFF).

When the synchronous slave clutch ON request is OFF when synchronous control start processing is executed



(1)	The slave axes do not operate immediately because the clutch is not connected (synchronous slave clutch connection state notification: OFF) when synchronous control starts (synchronization cancellation in-progress notification: OFF).
(2)	Slave axes start operations according to the synchronous slave clutch ON request.

■ I/O allocations

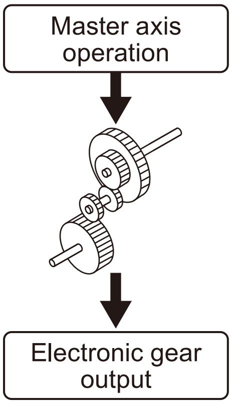
Signal name	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Warning clearing for Axis 7 (virtual)	Axis 8 (virtual)
Synchronization cancellation request	Y158	Y159	Y15A	Y15B	Y15C	Y15D	Y15E	Y15F
Synchronization cancellation in-progress notification	X158	X159	X15A	X15B	X15C	X15D	X15E	X15F
Synchronous slave axis clutch ON request	Y160	Y161	Y162	Y163	Y164	Y165	Y166	Y167
Synchronous slave axis clutch operation notification	X160	X161	X162	X163	X164	X165	X166	X167
Slave axis BUSY	X118	X119	X11A	X11B	X11C	X11D	X11E	X11F

9.4 Electronic gear function

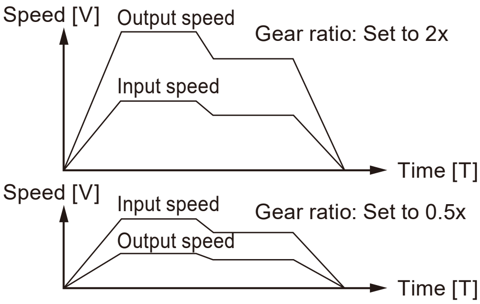
9.4.1 Overview of Electronic Gear Function

■ Electronic gear function

The electronic gear function operates the positioning unit at the speed of the master axis that is multiplied by a preset gear ratio.



$$\underset{\text{(Speed after gear change)}}{\text{Output speed}} = \underset{\text{(Information on master axis speed)}}{\text{Input speed}} \times \frac{\text{Gear ratio numerator}}{\text{Gear ratio denominator}}$$



■ Noes on using the electronic gear function

The use of the electronic gear function makes it possible to set the slave axes to a desired speed relative to the master axis. The movement amount of the slave axes, however, is obtained from the following formula. Therefore, the movement amount of the master axis does not match that of the slave axes.

Movement amount of slave axes = Movement amount of master axis × (Gear ratio numerator/ Gear ratio denominator)

Note: When the gear ratio is
constant during operation

Do not use the electronic gear function if the movement amount of the master axis needs to match that of the slave axes.

- Keep in mind that the slave axes may come to a sudden stop if an emergency stop or deceleration stop is executed while the gear ratio is being changed.

9.4.2 Types and Contents of Positioning Parameters to Set

The following positioning parameters must be set up when electronic gears are used.

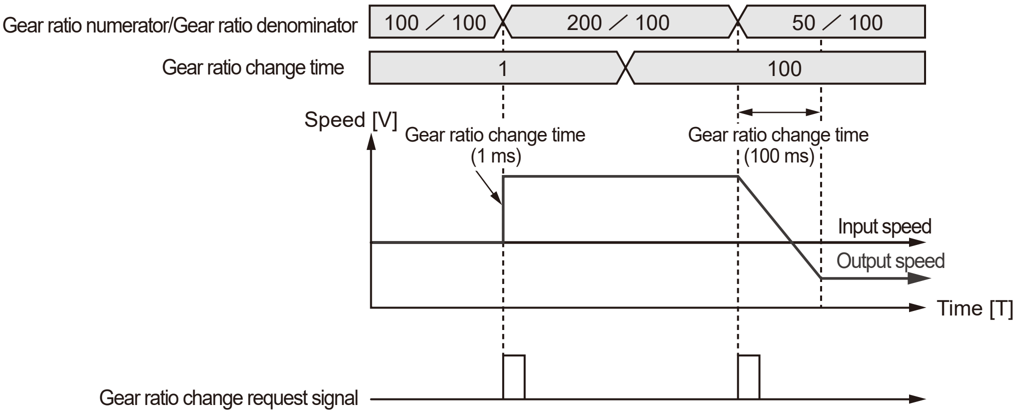
Name	Overview
Electronic gear operation setting	Specifies whether to use the electronic gear function. If the electronic gear is not used, the gear ratio of the electronic gear is fixed at 1:1 and the operation of the master axis is input directly into the electronic clutch function.

Name	Overview
Gear ratio numerator	Determines the gear ratio of the electronic gear. The gear ratios of electronic gears are determined by the following formula: Output speed of electronic gear = Operating speed of master axis x (Gear ratio numerator/Gear ratio denominator)
Gear ratio denominator	
Gear ratio change time	The time required to change the current gear ratio to a new gear ratio when the gear ratio of the electronic gear is changed during operation.

9.4.3 Changing the Gear Ratio during Operation

■ Notes on changing the gear ratio during operation

- If the gear ratio is changed during operation, the new gear ratio will take effect after the time specified for "Gear ratio change time" has elapsed.
- If "Gear ratio change time" is set to 1, the gear ratio will be changed at an acceleration/deceleration time of 0.
- Acceleration or deceleration during gear ratio change is linear acceleration/deceleration. S-shaped acceleration/deceleration cannot be used.



■ Programming method

When changing the gear ratio during operation, use the following procedure to write a user program.

1. Changing the gear ratio
    - Change the "gear ratio numerator" and "gear ratio denominator" of the electronic gear in the electronic gear setting area.
    - The gear ratio set in this area is the one at the time of starting the positioning unit RTEX. Therefore, when returning the gear ratio to the one at the time of starting the positioning unit RTEX, we recommend that the pre-change gear ratio be saved.
2. Turning ON the gear ratio change request contact
    - Turn ON the "slave axis gear ratio change request" bit in the common area of the positioning unit memory for the target axis allocated to the unit.
    - This signal becomes enabled by the "edge type" detection method. Start of gear ratio change is triggered when the "slave axis gear ratio change request" bit turns ON.

■ Related positioning parameters

Bank	**address** **End of offset**	**Name**	**Axis 1**	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7 (virtual)**	**8 axes (virtual)**
16#00 (common area)	16#0064	Slave axis gear ratio change request	Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
	16#0076	Slave axis gear ratio change state notification	Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7

Turn OFF the “slave axis gear ratio change request” bit after changing the gear ratio.

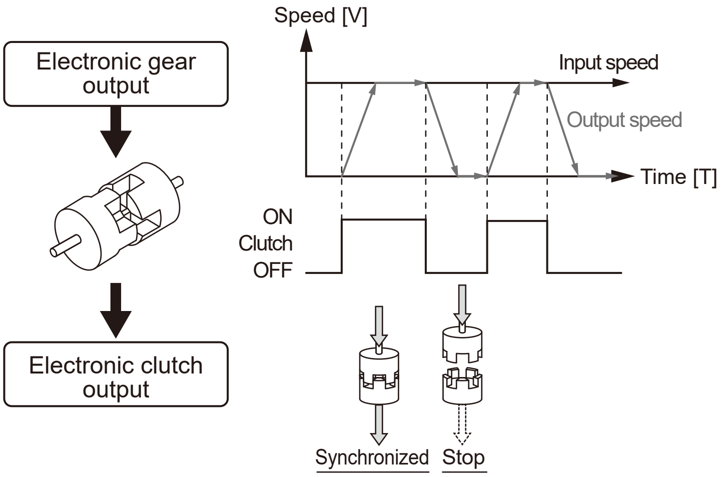
Info.

- For details of the gear ratio setting area, refer to "18.9 Synchronous Control Setting Area in Shared Memory".

9.5 Electronic clutch function

9.5.1 What Is the Electronic Clutch Function?

The electronic clutch function engages (turns ON) or disengages (turns OFF) the clutch in response to output from the electronic gear function. When the electronic clutch is disengaged (turned OFF), the master axis is disconnected from the slave axes and the slave axes are no longer interlocked with the master axis and come to a stop. When the electronic clutch is engaged (turned ON), the master axis and slave axes will operate in synchronization.



Stop
- Keep in mind that the slave axes may come to a sudden stop if the clutch is disengaged while the master axis is decelerating.

9.5.2 Types and Contents of Positioning Parameters to Set

The following positioning parameters must be set up when electronic clutches are used.

Name		**Overview**
Electronic clutch use/non-use		Specify whether to use the electronic clutch function. When the electronic clutch function is used, the electronic clutch is disengaged (OFF) by default. When performing an operation, be sure to engage the electronic clutch according to the operation. If the electronic clutch function is not used, the electronic clutch will remain engaged, causing output data from the electronic gear to be input directly into the electronic cam. In this case, the master axis always operates in synchronization with the slave axes.
Clutch ON	trigger type	Set "I/O clutch ON request" as the trigger to be detected.
	edge selection	Select from "Level", "Rise", or "Fall" for the method of detecting trigger signals.
	method	Select "Direct" or "Slip" for the clutch engagement method.
	slip time	If "Slip" is selected for the method, set the slip time.

Name		Overview
Clutch OFF	trigger type	Set "I/O clutch OFF request" or "I/O + Phase after clutch (phase specification clutch OFF function)" as the trigger to be detected.
	edge selection	Select "Invalid", "Rise", or "Fall" as the method of detecting trigger signals.
	method	Select "Direct" or "Slip" for the clutch engagement method.
	slip time	If "Slip" is selected for the method, set the slip time.
	Phase ratio	Set if "I/O + Phase after clutch" is selected as the trigger type. After performing clutch OFF using the clutch request signal, continue operation until the slave axis phase reaches the set value.

Info.

- For details of the mode to stop at any phase after clutch OFF (I/O + Phase after clutch), refer to "9.5.5 Phase specification clutch OFF function".

9.5.3 Trigger Types for Electronic Clutch

The following methods are used to engage (turn ON) or disengage (turn OFF) the electronic clutch.

■ Clutch request signals (Y160 to Y167, Y168 to Y16F)

The electronic clutch is controlled by the "clutch request signals", which are I/O signals allocated to the unit.

■ I/O allocations

Signal name	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7 (virtual)	8 axes (virtual)	Operation
Slave axis clutch ON request	Y160	Y161	Y162	Y163	Y164	Y165	Y166	Y167	
Slave axis clutch OFF request	Y168	Y169	Y16A	Y16B	Y16C	Y16D	Y16E	Y16F	
Slave axis clutch operation notification	X160	X161	X162	X163	X164	X165	X166	X167	ON: Engaged, OFF: Disengaged

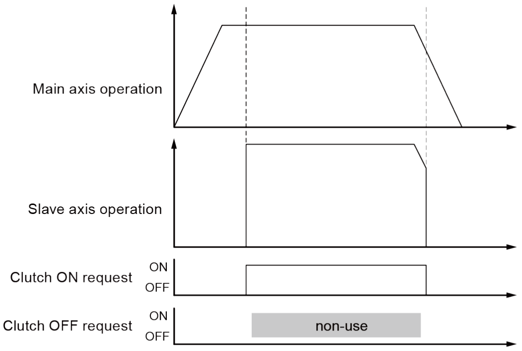
■ edge selection

edge selection	Operation
Level	The clutch operation is switched by using only the slave axis clutch ON request (Y160 to Y167). It can be used by setting the slave axis clutch ON trigger type to "Level". When "Level" is selected for the edge, clutch OFF edge selection and the slave clutch OFF request (Y168 to Y16F) are disabled.
Rise	The clutch turns ON at the rise of the slave clutch ON request (Y160 to Y167). Also, the clutch turns OFF at the rise of the slave clutch OFF request (Y168 to Y16F).

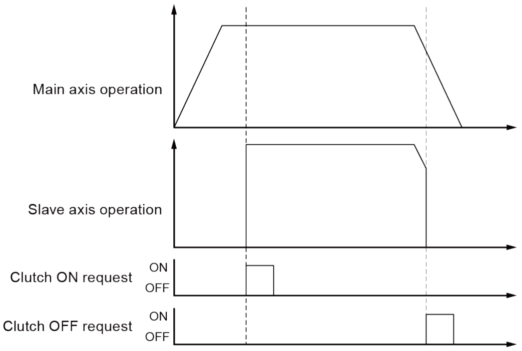
edge selection	Operation
Fall	The clutch turns ON at the fall of the slave clutch ON request (Y160 to Y167). Also, the clutch turns OFF at the fall of the slave clutch OFF request (Y168 to Y16F).

■ Operation of each edge selection

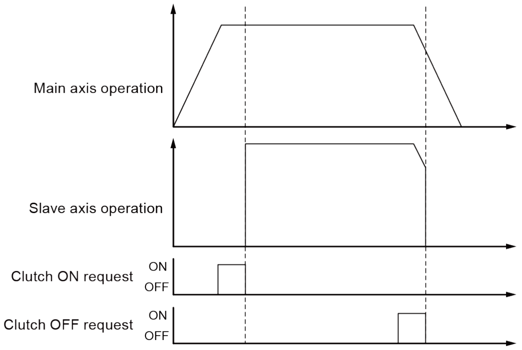
The operation of each edge selection is as follows. (Using "Direct method" as the clutch connection method.)



Edge selection : Level



Edge selection : Rise



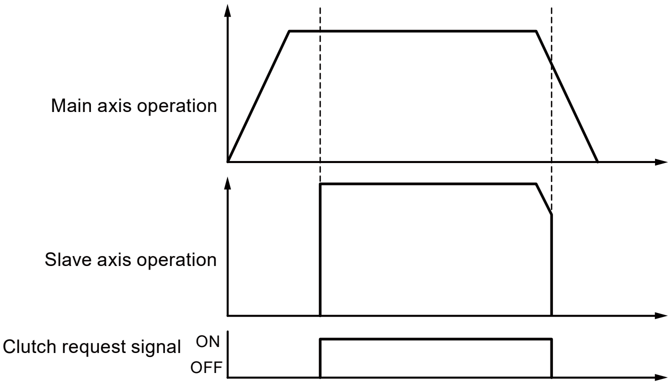
Edge selection : Fall

9.5.4 Electronic Clutch Engagement Method

The electronic clutch function engages (turns ON) the clutch to start operating the slave axes and disengages (turns OFF) the clutch to stop operating the slave axes. The acceleration or deceleration of the slave axes can be set as shown below.

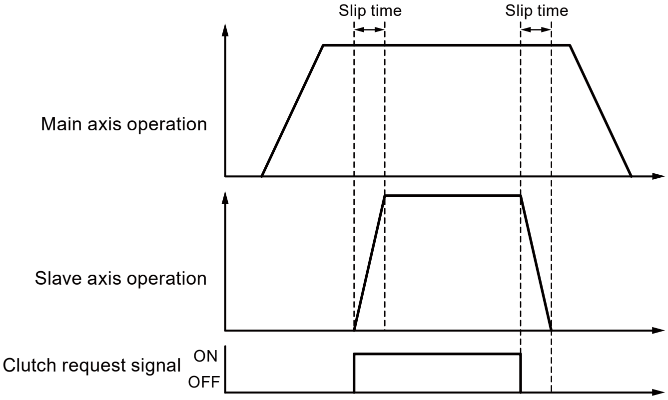
■ Direct method

This method detects the engagement (ON) or disengagement (OFF) of the clutch to adjust the operating speed of the master axis to match that of the slave axes. With the direct method, the speed of the slave axes with the clutch engaged (ON) or disengaged (OFF) matches the operating speed of the master axis with the acceleration/deceleration time set to 0.



■ slip method

This method detects the engagement (ON) or disengagement (OFF) of the clutch and sets the slip time to the acceleration time and deceleration time so that the operating speed of the slave axes can follow the operation speed of the master axis. The acceleration/deceleration method is linear acceleration/deceleration.



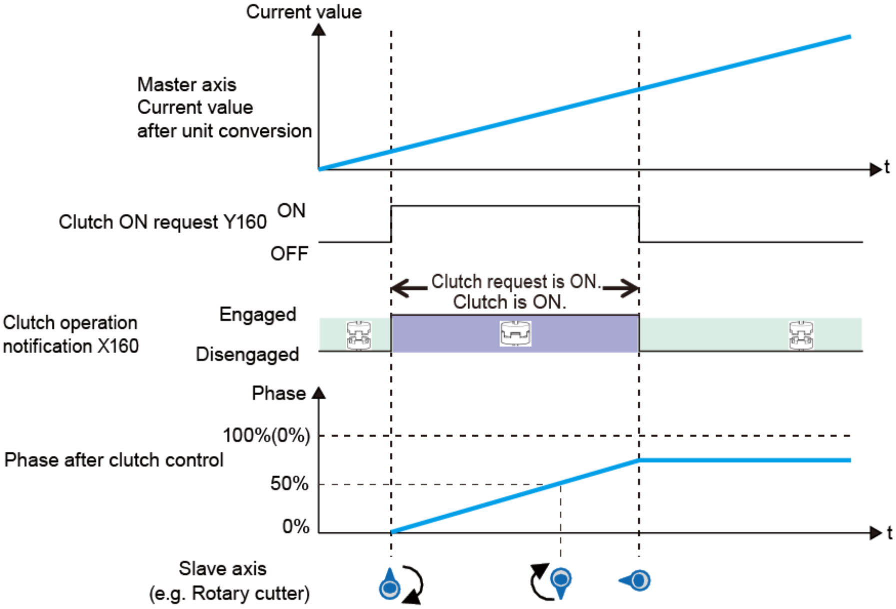
9.5.5 Phase specification clutch OFF function

The phase specification clutch OFF function turns OFF an electronic clutch at any specified phase. This function provides consistent control when operations are repeatedly started and stopped at the same phase, for example.

■ Operation when not using the phase specification clutch OFF function

When an OFF request is issued as an I/O signal, clutch OFF operation is executed regardless of the phase.

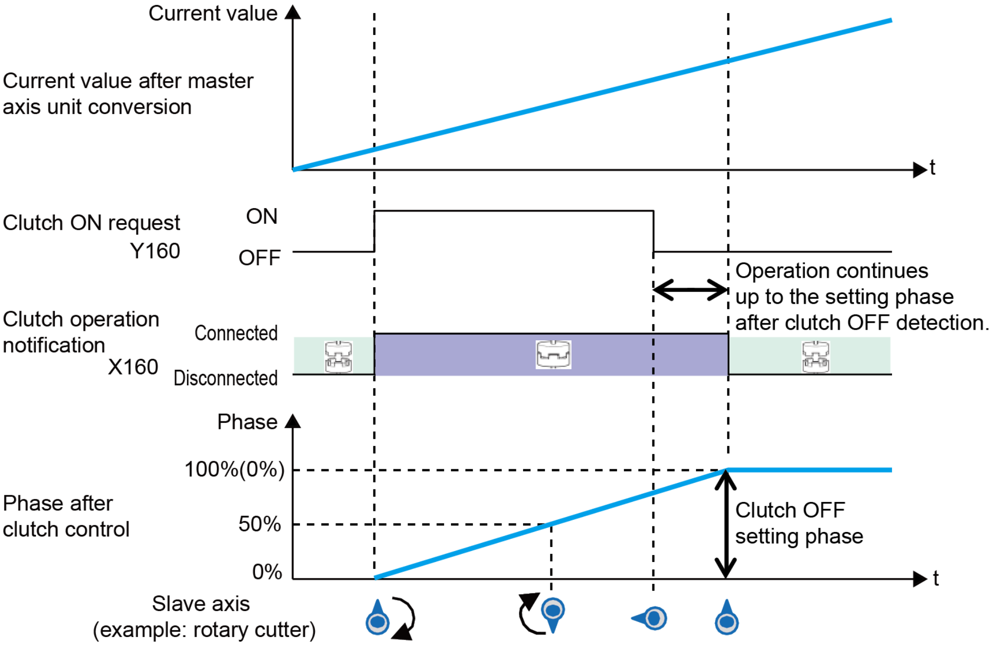
[Edge selection: Level]



Using the phase specification clutch OFF function disengages the clutch when the phase reaches the set phase after a clutch OFF request is received as an I/O signal.

■ Operation when using the phase specification clutch OFF function

[Edge selection: Level]

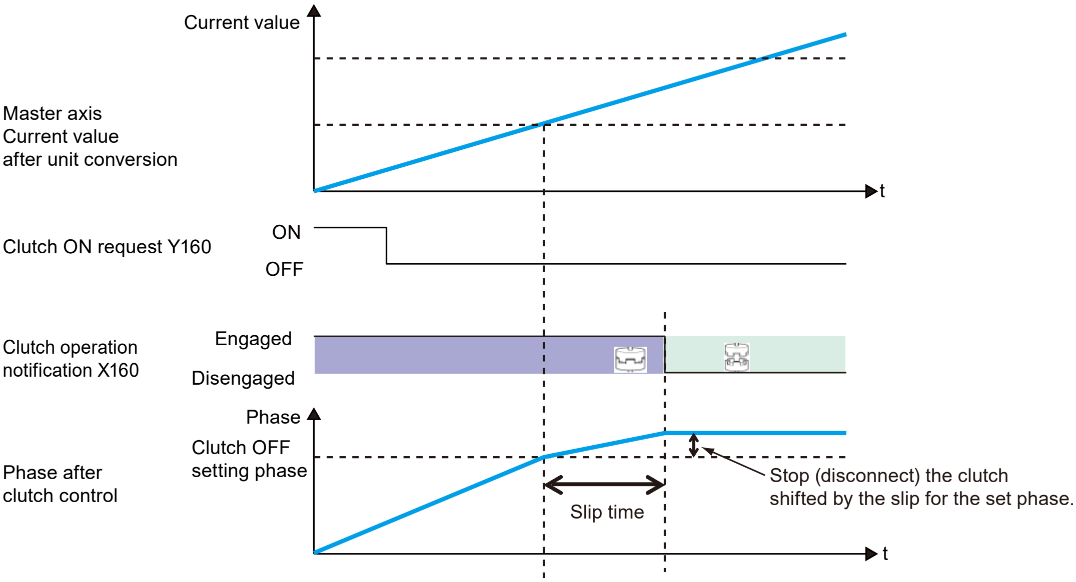


(Note 1) The above figure shows the case where the clutch ON request is set to "Level". Also, either"Rise"or"Fall"can be selected.

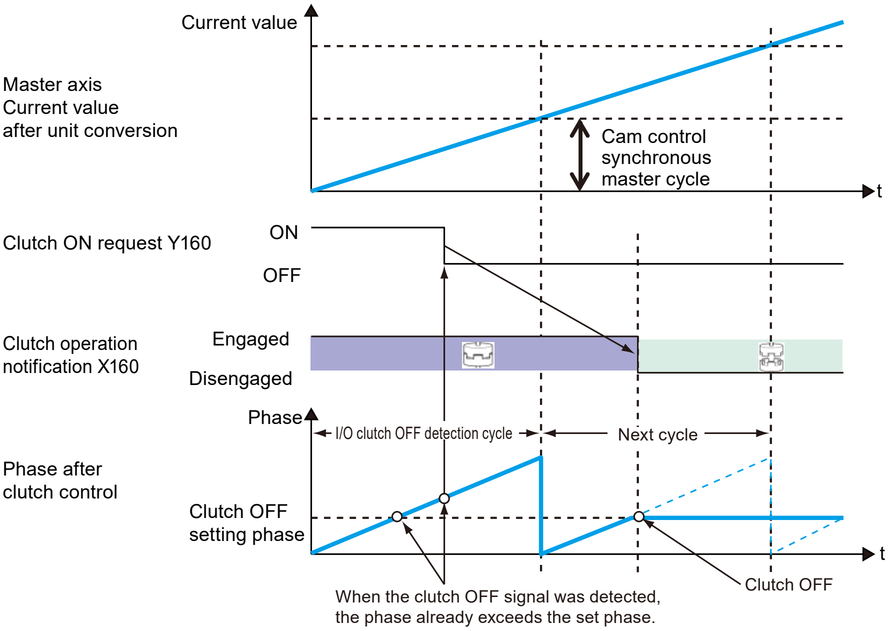
(Note 2) The above figure shows the case where the clutch OFF setting phase ratio is set to "0%". The phase ratio can be set to 0% to 99%.

■ Notes on operation characteristics

- If “Slip” is set for the clutch OFF method, deceleration stop will be performed when the specified slip time elapses after the phase reaches the clutch OFF setting ratio. To stop the motor at the phase matching the set ratio, set the clutch OFF method to “Direct” beforehand.



- If the clutch OFF trigger signal is detected at a phase larger than the set clutch OFF setting ratio (0% to 99%), the clutch will be disengaged the next time the phase reaches the set ratio.

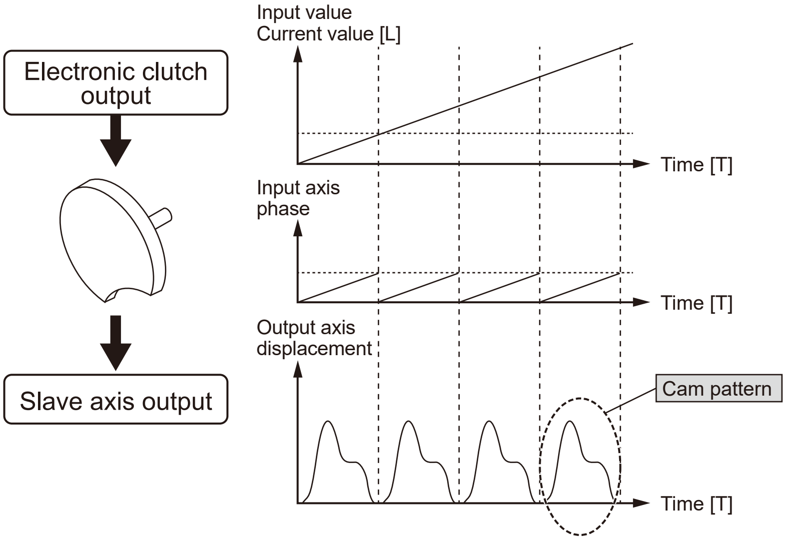


9.6 Electronic Cam Function

9.6.1 Overview of Electronic Cam Function

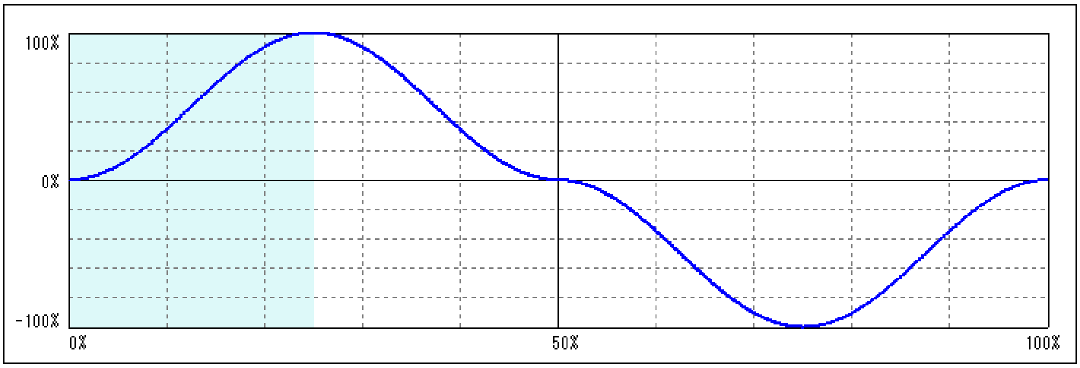
■ What is the electronic cam function?

The electronic cam function uses a preset cam pattern, determines the movement amount of the slave axes according to the operation of the master axis (phase information) and cam pattern, and outputs the movement amount. The cam pattern uses one rotation of the master axis as an operation reference, based on which the displacement of the slave axes in each phase (rotation angle) of the master axis is defined and set on the "Configurator" screen.



■ Cam pattern

Cam patterns use one rotation of the master axis as an operation reference, based on which the displacement of the slave axes in each phase (rotation angle) of the master axis is defined. Cam patterns are defined with the phase (rotation angle) of the master axis based on one rotation as a reference on the X-axis and the displacement on the Y-axis in percent. Cam patterns are set on the configuration screen of Configurator PM7-RTEX.



■ Cam pattern specifications

Setting item	Specifications
Resolution	1024, 2048, 4096, 8192, 16384, 32768
No. of cam patterns	16 when the resolution is 1024, 2048, 4096, or 8192 8 when the resolution is 16384 4 when the resolution is 32768
Section setting	100%/cycle, 20 sections max.
Displacement setting	100% setting
Cam curve	Select one of the following methods: Uniform velocity/Constant acceleration/Simple harmonic motion/Cycloid/Modified trapezoid/Modified sine/Modified uniform velocity/Trapecloid One-dwell cycloidal m = 1/One-dwell cycloidal m = 2/3/One-dwell modified trapezoid m = 2/3/One dwell modified trapezoidal (Ferguson)/One-dwell modified sine/One-dwell trapecloid/No-dwell modified trapezoid/No-dwell modified uniform velocity/NC2 curve/Asymmetric cycloid/Asymmetric modified trapezoid
Adjustment function	Function to adjust the displacement of desired point data: Max. 1,000 points (in units of cam data)
Shift function	Phase shift in created cam data: 0 %to 100%
Display	Displacement/Speed/Acceleration/Jerk Desired display can be specified by check box.

Info.

- The phase (current value) of each slave axis is stored in the positioning memory (each axis information area: 16#0020 to 16#0021). Values can be read using the F150 READ instruction. For details on the positioning memory, refer to "18.6.2 Each Axis Information & Monitor Area".

9.6.2 Types and Contents of Positioning Parameters to Set

The following positioning parameters must be set up when electronic cams are used.

Name	Overview
Electronic cam use/non-use	Select the use or non-use of the electronic cam function. If the electronic cam is not used, the electronic cam function will not work, and outputs from the electronic clutch will be output as pulses.
Cam pattern	The cam pattern is the most fundamental setting for using the electronic cam function. Cam patterns are set on the "Cam Pattern Settings" screen opened from the configuration screen. The positioning unit RTEX manages cam patterns by converting them into point data according to the preset cam curves and resolution.
Cam control master axis cycle	Set the number of pulses equivalent to all phases of the cam pattern used (master axis single-turn data).
Used cam pattern number	Specify the number of the cam pattern to be used from multiple cam patterns created.
Cam stroke amount	Set the number of pulses equivalent to the total displacement (100%) of the cam pattern to be used.

Name	Overview
Advance angle correction operation setting	Select the use or non-use of the advance angle correction function.
reference amount	The unit follows the unit system of the master axis. Setting range: -2,147,482,624 to +2,147,482,624 (The decimal point position is based on the unit system.)
reference speed	The unit follows the unit system of the master axis. Setting range: 1 to 2,147,482,624 (The decimal point position is based on the unit system.)
Parameter change time	Setting range: 1 to 10,000 (ms)

9.6.3 Rewriting the Cam Pattern with Program

The function for editing cam patterns with programs changes cam patterns with user programs.

■ Procedure for editing cam patterns

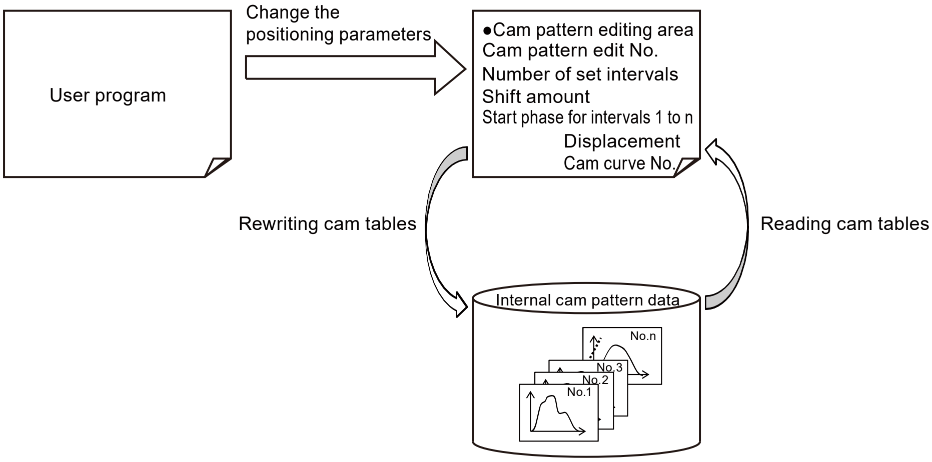
Editing cam patterns is executed by two operations: "reading cam tables" and "rewriting cam tables". These operations are performed using the "cam pattern editing area" in the positioning memory.

(1) Procedure for changing a cam pattern that has already been set

Procedure	Operation by the user program and operation by the unit
1	Read a cam table into the cam pattern editing area.
2	Change the positioning parameters in the cam table read into the cam pattern editing area.
3	Rewrite the cam table.

(2) Procedure for creating a new cam pattern

Procedure	Operation by user program and operation by the unit
1	Write the positioning parameters of cam pattern data to be created to the cam pattern editing area.
2	Rewrite the cam pattern data.



■ Execution conditions for editing cam patterns

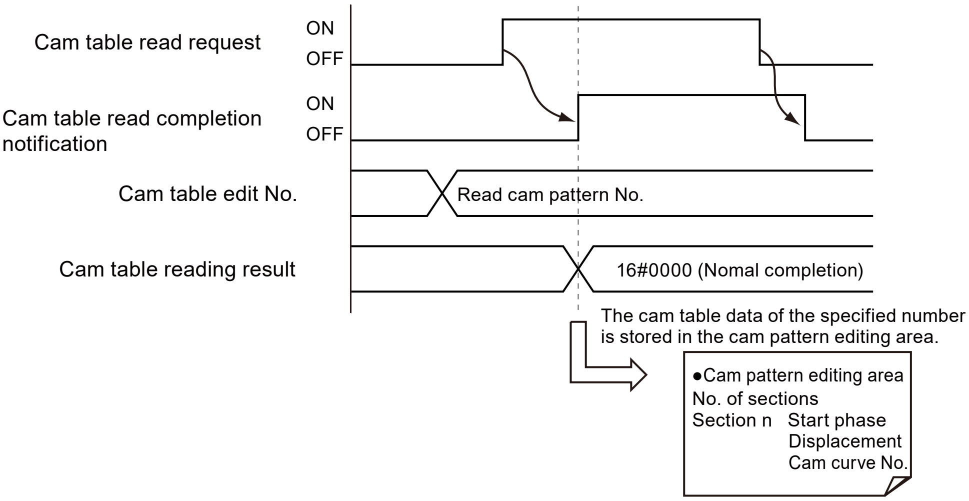
Editing cam patterns by using a program can be executed when the following three conditions are met.

- No axis is in the process of synchronous operation. (The synchronization cancellation in-progress notification flag for each axis is ON.)
- No axis is operating. (The BUSY flag of each axis is OFF.)
- Positioning parameters are set correctly.

Also, when a read request and a rewrite request are executed simultaneously, reading takes priority. In this case, the execution result of the rewrite request is abnormal termination (response code: 16#FF21).

■ Procedure for reading cam pattern data

Procedure	Operation by user program and operation by the unit
1	The user program sets the cam pattern number to be loaded into the cam pattern editing area.
2	The user program turns ON the cam table read request.
3	After reading is complete, the unit stores the response code in "Cam table read result" and then turns ON the cam pattern read completion notification flag.
4	Once the cam table read request turns OFF, the unit turns OFF the cam pattern loading completion notification flag.

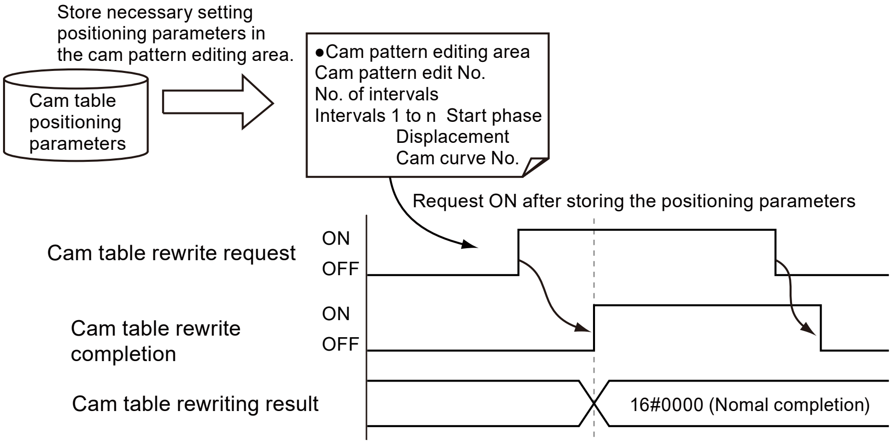


■ Related positioning parameters

Bank	address End of offset	Name	Default	Description
16#60 (cam pattern editing area)	16#0054	Cam table read request/ completion	16#0000	16#0000: Cam table read request OFF 16#0001: Cam table read request ON
	16#0058	Cam pattern Read result	16#0000	Stores the result of read processing (response code). [Range] (Hexadecimal) 16#0000: Normal termination Other than 16#0000: Abnormal termination

■ Procedure for rewriting cam pattern data

Proce dure	Operation by user program and operation by the unit
1	The user program stores the necessary setting/positioning parameters in the cam pattern editing area. Rewriting cam pattern number Number of sections: The following positioning parameters for sections 1 to n (n is the specified number of sections) Start phase Displacement Cam curve no.
2	The user program turns ON the cam table rewrite request.
3	After rewriting is complete, the unit stores the response code in "Cam table rewrite result" and then turns ON the cam pattern rewrite completion notification flag.
4	Once the cam table rewrite request turns OFF, the unit turns OFF the cam pattern rewrite completion notification flag.



■ Related positioning parameters

Bank	address End of offset	Name	Default	Description
16#60 (cam pattern editing area)	16#0055	Cam table rewrite request/ completion	16#0000	16#0000: Cam table rewrite request OFF 16#0001: Cam table rewrite request ON
	16#0059	Cam pattern rewriting result	16#0000	Stores the result of rewriting processing (response code). [Range] (Hexadecimal) 16#0000: Normal termination Other than 16#0000: Abnormal termination

■ Sample programs

- The following sample program shows the case where slot number 0 is used, Axis 1 is set as the master axis and axes 2 to 8 are set as slave axes, and the phase, displacement, and curve type of section 3 of cam table number 2 are changed.
- Synchronous control cancellation is executed for all the slave axes (axes 2 to 8). It is verified that all slave axes (axes 2 to 8) are not in the process of synchronous control and all axes (axes 1 to 8) are not active.
- The cam table is read and positioning parameters are changed and rewritten.

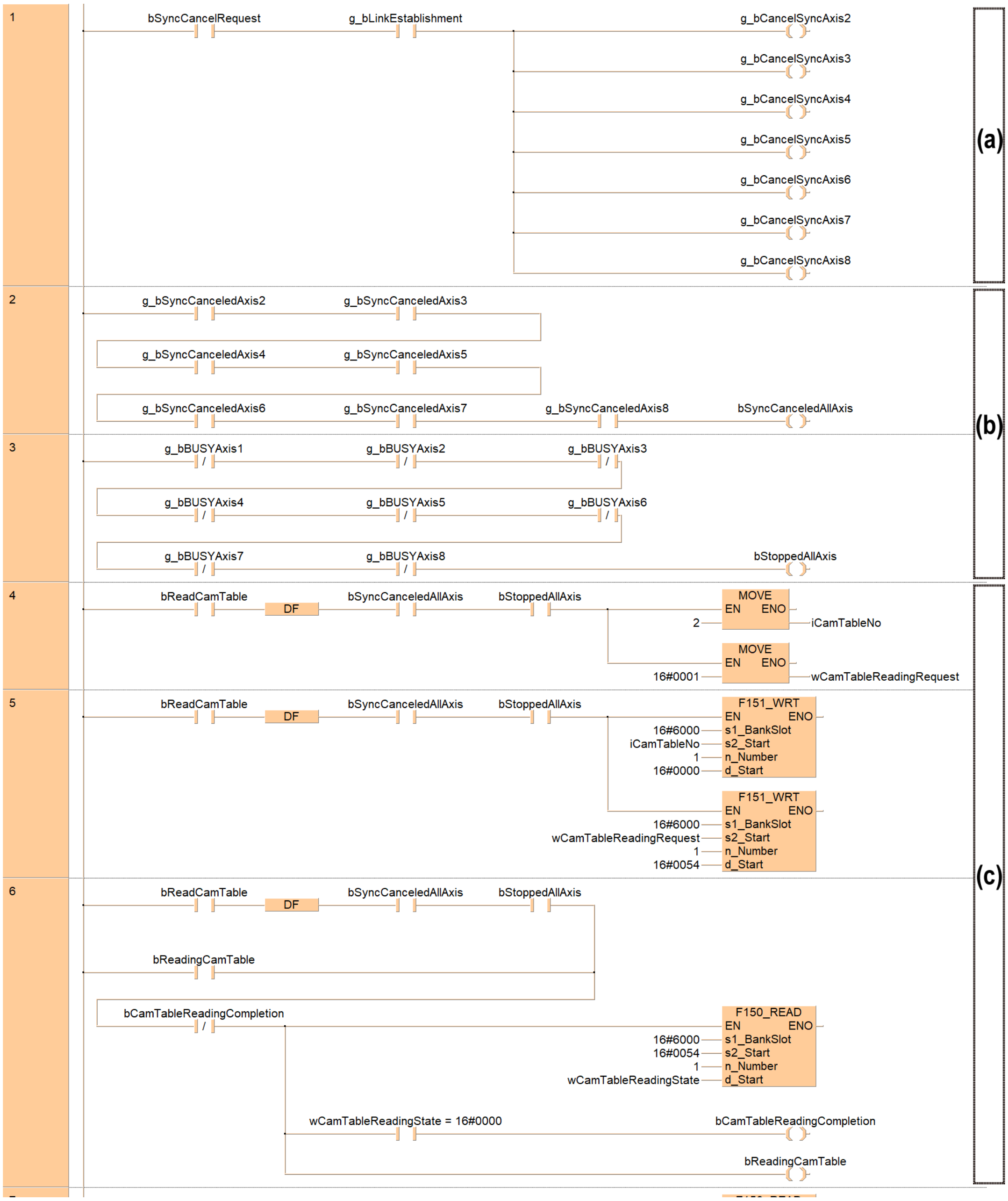
Variable list

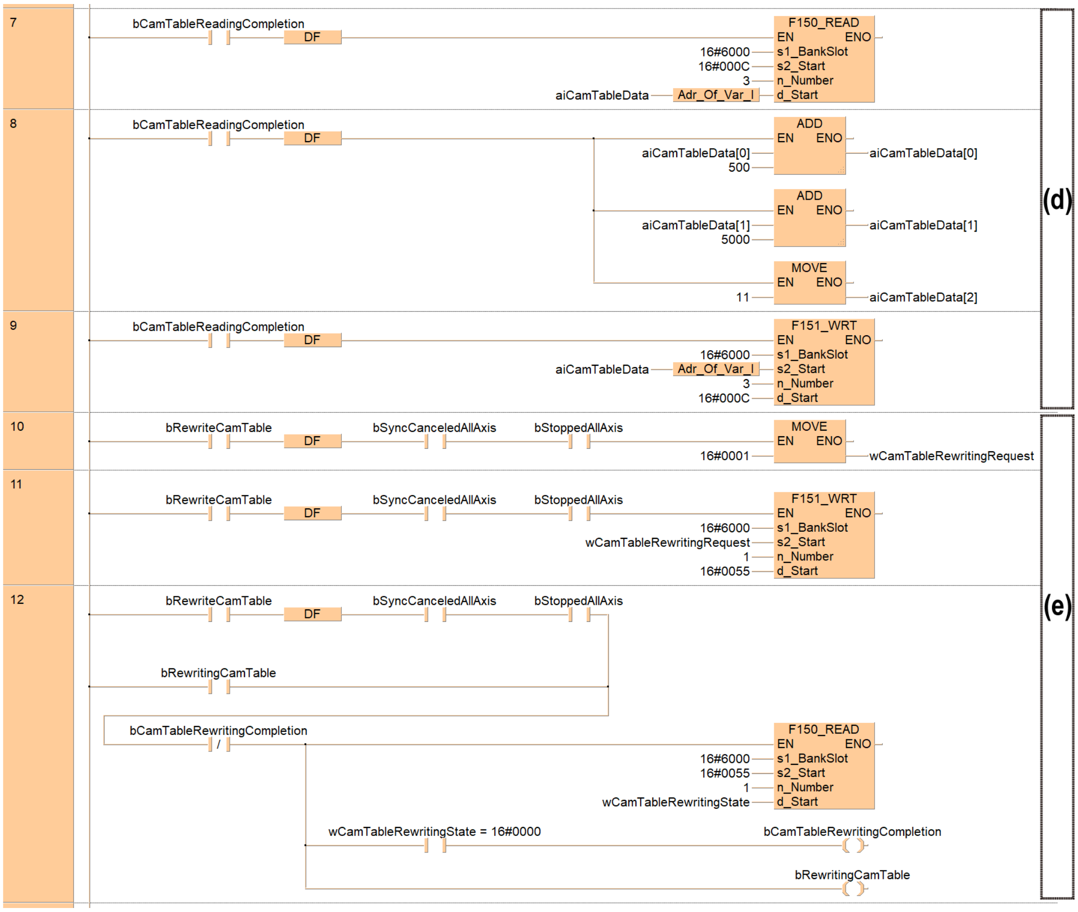
Class name	Variable name	FP address	Data type	Default	Comment
VAR	aiCamTableData		ARRAY [0...2] OF INT	[3(0)]	Cam table data
VAR	bCamTableReadingCompletion		BOOL	FALSE	Cam table reading completion
VAR	bCamTableRewritingCompletion		BOOL	FALSE	Cam table rewriting completion

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bReadCamTable		BOOL	FALSE	Starting to read cam tables
VAR	bReadingCamTable		BOOL	FALSE	Cam table reading in progress
VAR	bRewriteCamTable		BOOL	FALSE	Starting to rewrite cam tables
VAR	bRewritingCamTable		BOOL	FALSE	Cam table rewriting in progress
VAR	bStoppedAllAxis		BOOL	FALSE	All axes stopped
VAR	bSyncCancelRequest		BOOL	FALSE	Synchronization cancellation request
VAR	bSyncCanceledAllAxis		BOOL	FALSE	Synchronization cancellation in progress
VAR_EXTERNAL	g_bBUSYAxis1	X118	BOOL	FALSE	Axis 1 BUSY
VAR_EXTERNAL	g_bBUSYAxis2	X119	BOOL	FALSE	Axis 2 BUSY
VAR_EXTERNAL	g_bBUSYAxis3	X11A	BOOL	FALSE	Axis 3 BUSY
VAR_EXTERNAL	g_bBUSYAxis4	X11B	BOOL	FALSE	Axis 4 BUSY
VAR_EXTERNAL	g_bBUSYAxis5	X11C	BOOL	FALSE	Axis 5 BUSY
VAR_EXTERNAL	g_bBUSYAxis6	X11D	BOOL	FALSE	Axis 6 BUSY
VAR_EXTERNAL	g_bBUSYAxis7	X11E	BOOL	FALSE	Axis 7 BUSY
VAR_EXTERNAL	g_bBUSYAxis8	X11F	BOOL	FALSE	Axis 8 BUSY
VAR_EXTERNAL	g_bCancelSyncAxis2	Y159	BOOL	FALSE	Axis 2 synchronization cancellation
VAR_EXTERNAL	g_bCancelSyncAxis3	Y15A	BOOL	FALSE	Axis 3 synchronization cancellation
VAR_EXTERNAL	g_bCancelSyncAxis4	Y15B	BOOL	FALSE	Axis 4 synchronization cancellation
VAR_EXTERNAL	g_bCancelSyncAxis5	Y15C	BOOL	FALSE	Axis 5 synchronization cancellation
VAR_EXTERNAL	g_bCancelSyncAxis6	Y15D	BOOL	FALSE	Axis 6 synchronization cancellation
VAR_EXTERNAL	g_bCancelSyncAxis7	Y15E	BOOL	FALSE	Axis 7 synchronization cancellation
VAR_EXTERNAL	g_bCancelSyncAxis8	Y15F	BOOL	FALSE	Axis 8 synchronization cancellation

Class name	**Variable name**	**FP address**	**Data type**	**Default**	**Comment**
VAR_EXTERNAL	g_bLinkEstablishment	X100	BOOL	FALSE	Preparation completion notification
VAR_EXTERNAL	g_bSyncCanceledAxis2	X159	BOOL	FALSE	Axis 2 synchronization cancellation in progress
VAR_EXTERNAL	g_bSyncCanceledAxis3	X15A	BOOL	FALSE	Axis 3 synchronization cancellation in progress
VAR_EXTERNAL	g_bSyncCanceledAxis4	X15B	BOOL	FALSE	Axis 4 synchronization cancellation in progress
VAR_EXTERNAL	g_bSyncCanceledAxis5	X15C	BOOL	FALSE	Axis 5 synchronization cancellation in progress
VAR_EXTERNAL	g_bSyncCanceledAxis6	X15D	BOOL	FALSE	Axis 6 synchronization cancellation in progress
VAR_EXTERNAL	g_bSyncCanceledAxis7	X15E	BOOL	FALSE	Axis 7 synchronization cancellation in progress
VAR_EXTERNAL	g_bSyncCanceledAxis8	X15F	BOOL	FALSE	Axis 8 synchronization cancellation in progress
VAR	iCamTableNo		INT	0	Cam table number
VAR	wCamTableReadingRequest		WORD	0	Cam table read request
VAR	wCamTableReadingState		WORD	0	Cam table reading state
VAR	wCamTableRewritingRequest		WORD	0	Cam table rewrite request
VAR	wCamTableRewritingState		WORD	0	Cam table rewriting state

Ladder diagram (LD)




7
bCamTableReadingCompletion
DF
F150_READ
EN ENO
16#6000 s1_BankSlot
16#000C s2_Start
3 n_Number
aiCamTableData Adr_Of_Var_I d_Start
8
bCamTableReadingCompletion
DF
ADD
EN ENO
aiCamTableData[0]
500
aiCamTableData[0]
ADD
EN ENO
aiCamTableData[1]
5000
aiCamTableData[1]
MOVE
EN ENO
11
aiCamTableData[2]
9
bCamTableReadingCompletion
DF
F151_WRT
EN ENO
16#6000 s1_BankSlot
aiCamTableData Adr_Of_Var_I s2_Start
3 n_Number
16#000C d_Start
10
bRewriteCamTable
DF
bSyncCanceledAllAxis
bStoppedAllAxis
MOVE
EN ENO
16#0001
wCamTableRewritingRequest
11
bRewriteCamTable
DF
bSyncCanceledAllAxis
bStoppedAllAxis
F151_WRT
EN ENO
16#6000 s1_BankSlot
wCamTableRewritingRequest s2_Start
1 n_Number
16#0055 d_Start
12
bRewriteCamTable
DF
bSyncCanceledAllAxis
bStoppedAllAxis
bRewritingCamTable
bCamTableRewritingCompletion
/
F150_READ
EN ENO
16#6000 s1_BankSlot
16#0055 s2_Start
1 n_Number
wCamTableRewritingState d_Start
wCamTableRewritingState = 16#0000
bCamTableRewritingCompletion
bRewritingCamTable
(d)
(e)

Structured text (ST)

(a)

```
g_bCancelSyncAxis2   := bSyncCancelRequest AND g_bLinkEstablishment;
g_bCancelSyncAxis3   := bSyncCancelRequest AND g_bLinkEstablishment;
g_bCancelSyncAxis4   := bSyncCancelRequest AND g_bLinkEstablishment;
g_bCancelSyncAxis5   := bSyncCancelRequest AND g_bLinkEstablishment;
g_bCancelSyncAxis6   := bSyncCancelRequest AND g_bLinkEstablishment;
g_bCancelSyncAxis7   := bSyncCancelRequest AND g_bLinkEstablishment;
g_bCancelSyncAxis8   := bSyncCancelRequest AND g_bLinkEstablishment;
```

(b)

```
bSyncCanceledAllAxis  := g_bSyncCanceledAxis2 AND g_bSyncCanceledAxis3 AND g_bSyncCanceledAxis4
                         AND g_bSyncCanceledAxis5 AND g_bSyncCanceledAxis6 AND g_bSyncCanceledAxis7
                         AND g_bSyncCanceledAxis8;

bStoppedAllAxis   := NOT g_bBUSYAxis1 AND NOT g_bBUSYAxis2 AND NOT g_bBUSYAxis3 AND NOT g_bBUSYAxis4
                     AND NOT g_bBUSYAxis5 AND NOT g_bBUSYAxis6 AND NOT g_bBUSYAxis7 AND NOT g_bBUSYAxis8;
```

(c)

```
if (DF(bReadCamTable) AND bSyncCanceledAllAxis AND bStoppedAllAxis) then
  iCamTableNo   := 2;
  wCamTableReadingRequest    := 16#0001;
  F151_WRT(s1_BankSlot := 16#6000, s2_Start := iCamTableNo, n_Number := 1, d_Start := 16#0000);
  F151_WRT(s1_BankSlot := 16#6000, s2_Start := wCamTableReadingRequest, n_Number := 1, d_Start := 16#0054);
end_if;

if (((DF(bReadCamTable) AND bSyncCanceledAllAxis AND bStoppedAllAxis)
  OR bReadingCamTable)
  AND NOT bCamTableReadingCompletion) then
  F150_READ(s1_BankSlot := 16#6000, s2_Start := 16#0054, n_Number := 1, d_Start := wCamTableReadingState);
end_if;

bCamTableReadingCompletion := ((DF(bReadCamTable) AND bSyncCanceledAllAxis AND bStoppedAllAxis)
                              OR bReadingCamTable)
                              AND NOT bCamTableReadingCompletion
                              AND (wCamTableReadingState = 16#0000);

bReadingCamTable  := ((DF(bReadCamTable) AND bSyncCanceledAllAxis AND bStoppedAllAxis)
                     OR bReadingCamTable)
                     AND NOT bCamTableReadingCompletion;
```

(d)

```
if (DF(bCamTableReadingCompletion)) then
  F150_READ(s1_BankSlot := 16#6000, s2_Start := 16#000C, n_Number := 3, d_Start := Adr_Of_Var(aiCamTableData));
  aiCamTableData[0]  := aiCamTableData[0] + 500;
  aiCamTableData[1]  := aiCamTableData[1] + 5000;
  aiCamTableData[2]  := 11;
  F151_WRT(s1_BankSlot := 16#6000, s2_Start := Adr_Of_Var(aiCamTableData), n_Number := 3, d_Start := 16#000C);
end_if;
```

(e)

```
if (DF(bRewriteCamTable) AND bSyncCanceledAllAxis AND bStoppedAllAxis) then
  wCamTableRewritingRequest  := 16#0001;
  F151_WRT(s1_BankSlot := 16#6000, s2_Start := wCamTableRewritingRequest, n_Number := 1, d_Start := 16#0055);
end_if;

if (((DF(bRewriteCamTable) AND bSyncCanceledAllAxis AND bStoppedAllAxis)
  OR bRewritingCamTable)
  AND NOT bCamTableRewritingCompletion) then
  F150_READ(s1_BankSlot := 16#6000, s2_Start := 16#0055, n_Number := 1, d_Start := wCamTableRewritingState);
end_if;

bCamTableRewritingCompletion   := ((DF(bRewriteCamTable) AND bSyncCanceledAllAxis AND bStoppedAllAxis)
                                  OR bRewritingCamTable)
                                  AND NOT bCamTableRewritingCompletion
                                  AND (wCamTableRewritingState = 16#0000);

bRewritingCamTable     := ((DF(bRewriteCamTable) AND bSyncCanceledAllAxis AND bStoppedAllAxis)
                         OR bRewritingCamTable)
                         AND NOT bCamTableRewritingCompletion;
```

Code	Items specified in the program	Description
(a)	Cancelling synchronous control for all axes	Cancels synchronous control for all slave axes.

Code	Items specified in the program	Description
(b)	Confirming the conditions for execution permission	Confirms that all slave axes are in the process of synchronous control cancellation and all axes are stopped.
(c)	Starting to read cam tables	Specifies a cam pattern number and executes a read request.
(d)	Changing positioning parameters in the cam table editing area	Edits the cam table data for section 3 upon completion of reading the cam table. In this example, start phase + 5%, displacement +50%, and cam curve are set to constant acceleration.
(e)	Starting to rewrite cam tables	Rewrites the specified cam pattern data.

■ Notes on rewriting cam patterns with a program

- Even if cam pattern data is rewritten by this function, the cam pattern data of positioning parameters will not be updated.
- If the mode changes from PROG. mode to RUN mode when the power is turned ON or configuration data is rewritten, the cam pattern will be rewritten again to the cam pattern set in Configurator PM7-RTEX. If necessary, rewrite the cam pattern again using a program.
- The “cam pattern update” flag can be used to check whether the cam pattern has been rewritten with the positioning parameter data.
- If a read request specifying an unregistered cam pattern number is issued at the time of read processing, all the read data will be “0”.
- If a rewrite request is issued when no cam is registered (a resolution is undetermined), rewriting will be performed assuming that the resolution is 1024.
- Cam adjustment data set in Configurator PM7-RTEX cannot be used. Also, when rewriting is executed, the pre-rewrite adjustment data will be initialized.

Info.

- For details on the "cam pattern update" flag, refer to "18.11.3 Cam Pattern Editing Execution Confirmation Area".

■ Notes on using phase shift

(1) For the values of cam pattern parameters (start phase, displacement, and cam curve), specify the values that are obtained when the phase shift amount is 0(%).

(2) The start phase of section number 1 is 0(%). If any values other than 0(%) are set, an error will occur. For the start phases after section number 2, specify any start phase. When settings are read or written, the phase that is the nearest to the resolution within the unit is automatically calculated.

(3) After setting the cam pattern that is obtained when the phase shift amount is 0(%), set a phase shift amount. For the phase shift amount also, when settings are read or written, the value that is the nearest to the resolution within the unit is automatically calculated.

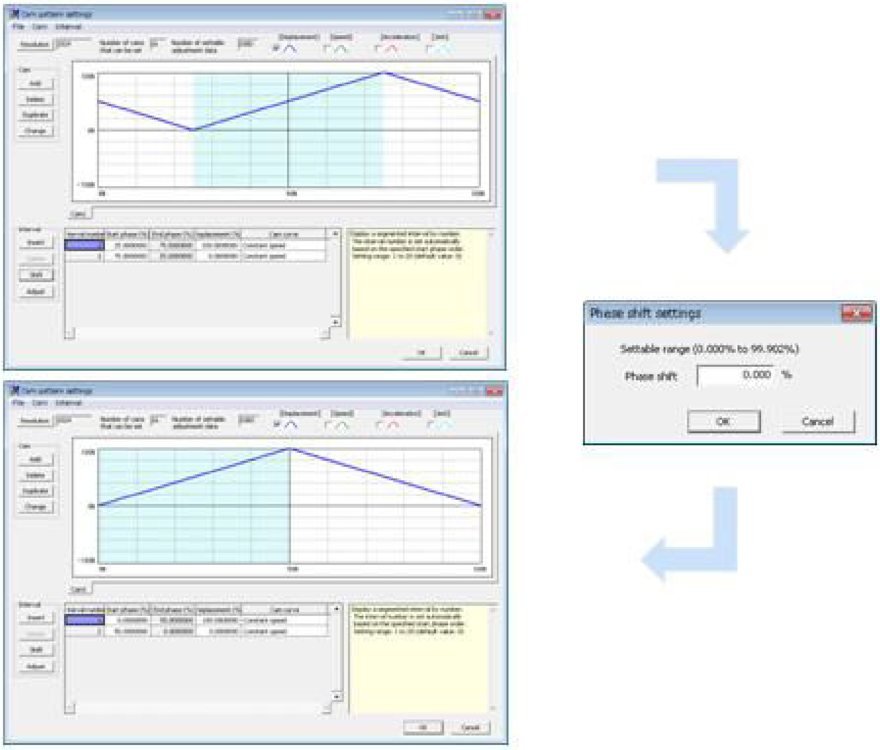
When replacing the cam pattern set in Configurator PM7-RTEX (configuration tool software) with a user program, perform the following procedure.

(5) Record the phase shift amount specified in Configurator PM7-RTEX.

(6) The start phase displayed in Configurator PM7-RTEX is the one to which the phase shift amount has been added. Set the phase shift amount to 0(%) to check the values of the cam pattern parameters (start phase, displacement, and cam curve).

(7) In the user program, use the parameter values obtained in (6). For the start phase, use values to two decimal places.

(8) Set the phase shift amount recorded in (5). As is the case with the start phase, use values to two decimal places.



Phase shift settings

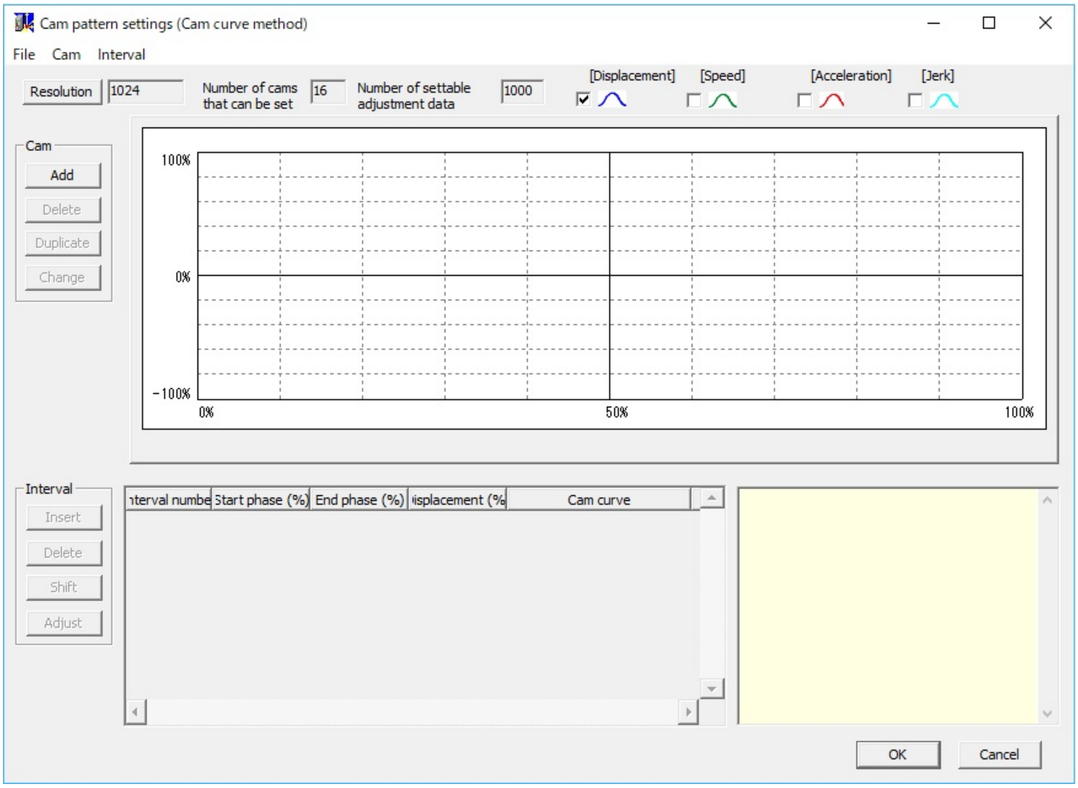
Settable range (0.000% to 99.902%)

Phase shift 0.000 %

9.6.4 Cam Pattern Setting Method (Cam Curve Method)

■ Starting the cam pattern setting screen

- In FPWIN Pro7, selecting "Positioning Table Configurator PM7-RTEX" in the project tree starts the configuration tool.
- Select **Axis Settings**>**Cam Pattern Settings** from the menu bar of the unit setting tool or click the icon on the toolbar. The "Cam Pattern Settings" screen will be displayed.
- A blank screen is displayed for a new file, or settings of cam pattern 1 are displayed when data already exists.



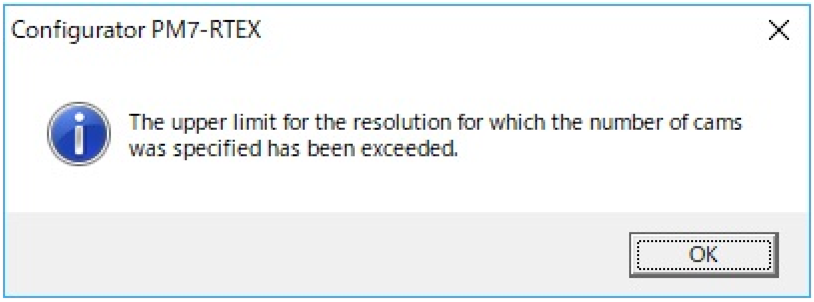
Resolution: 1024
Number of cams that can be set: 16
Number of settable adjustment data: 1000
☑ [Displacement] ☐ [Speed] ☐ [Acceleration] ☐ [Jerk]

■ Resolution settings

Click the [Resolution] button on the "Cam Pattern Settings" screen. The Resolution Settings screen is displayed. Select "Resolution" and click the [OK] button.

Info.

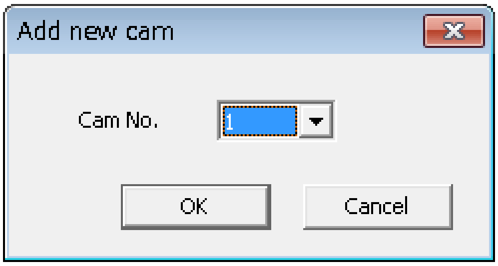
- The resolution is valid for all cam patterns. You cannot set a different resolution for each cam pattern.
- The number of cam patterns that can be set varies with each resolution. The current resolution cannot be changed to a new resolution if the current number of cam patterns exceeds the number of cam patterns that can be used for the new resolution. In this case, delete cam patterns and then change the resolution again.



The upper limit for the resolution for which the number of cams was specified has been exceeded.

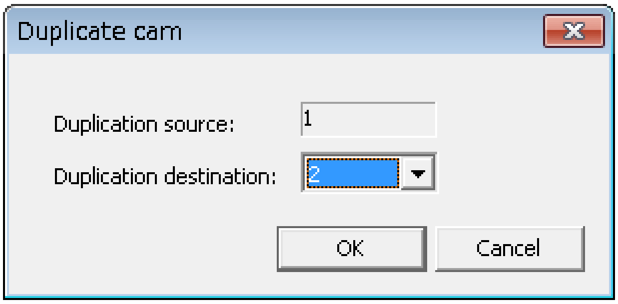
■ Creating or copying new cam patterns

The cam number selection screen is displayed by clicking the [Add] button in the "Cam" field. Select the desired cam number and click the [OK] button.



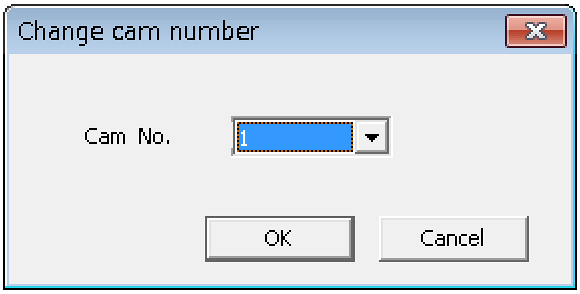
Cam No. 1

Cam patterns can also be copied. Click the [Copy] button and select the cam pattern numbers for the copy destination and copy source.



Duplication source: 1
Duplication destination: 2

When changing the cam number, click the [Change] button and select a new cam number.

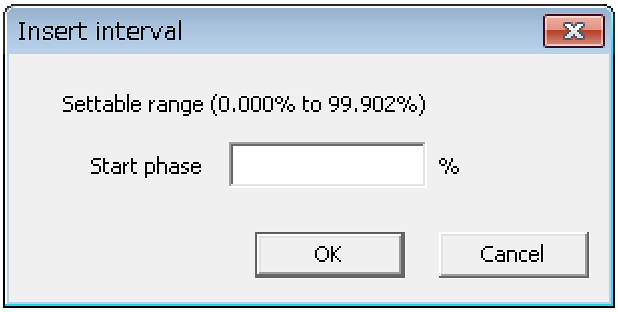


Cam No. 1

(Note 1) Existing cam pattern numbers cannot be set.

■ Setting cam patterns

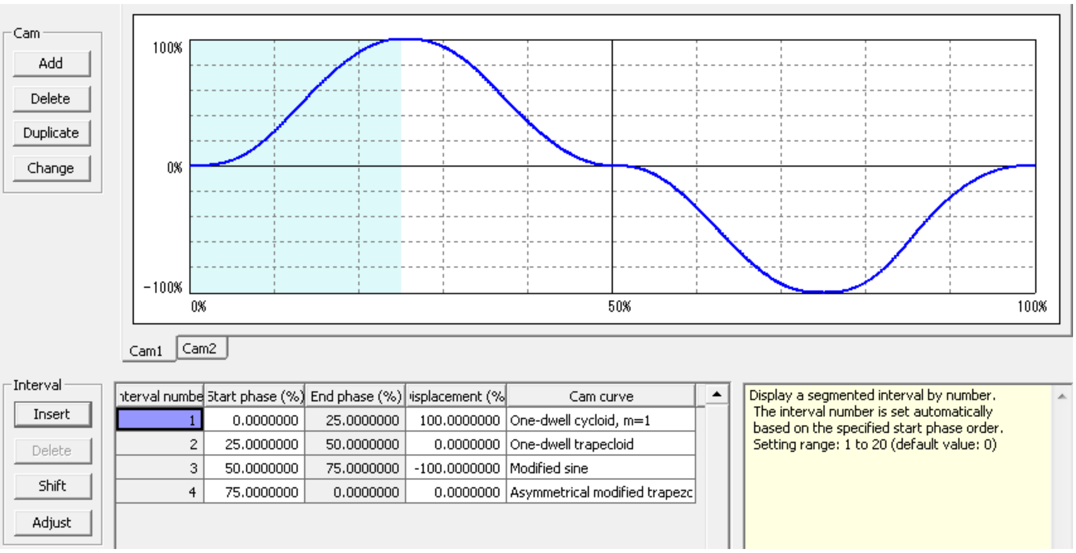
Click the [Insert] button in the “Section” field. Set the start phase, and click the [OK] button.
By default, only one section whose phase is 0% to 100% is set for the cam pattern.
By setting the start phase, the above section is divided into multiple sections.



Settable range (0.000% to 99.902%)

Start phase %

The background of selected sections is displayed in white, and the background of unselected sections is displayed in gray.



terval numbe	Start phase (%)	End phase (%)	isplacement (%	Cam curve
1	0.0000000	25.0000000	100.0000000	One-dwell cycloid, m=1
2	25.0000000	50.0000000	0.0000000	One-dwell trapecloid
3	50.0000000	75.0000000	-100.0000000	Modified sine
4	75.0000000	0.0000000	0.0000000	Asymmetrical modified trapezc

Display a segmented interval by number.
The interval number is set automatically based on the specified start phase order.
Setting range: 1 to 20 (default value: 0)

Note

- The start phase may not become the specified phase value, depending on the resolution.

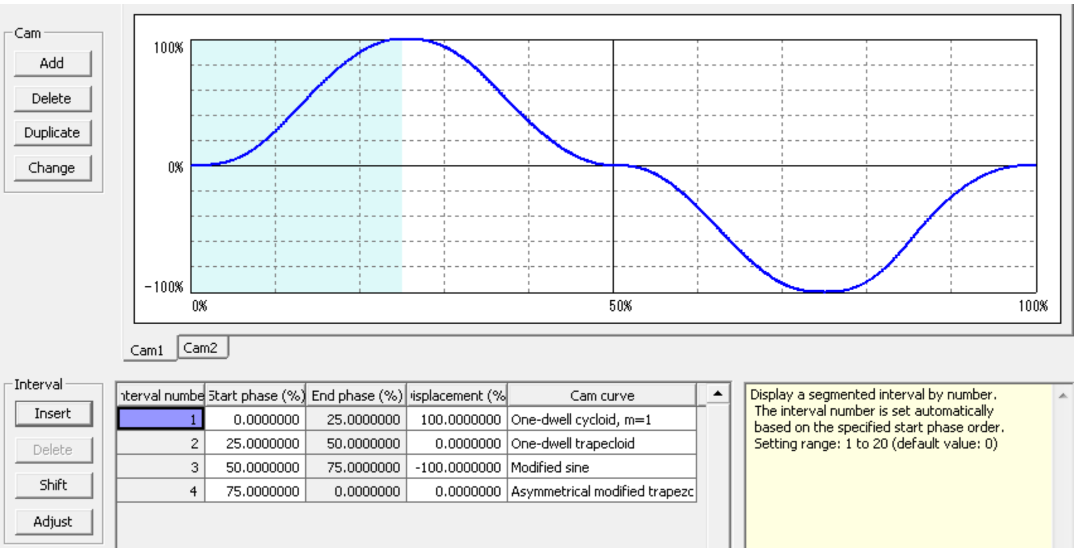
■ Editing the cam table

You can edit the cam table data that has been created.

Set the following items for each section that has been set.

- Start phase (%)
- Displacement (%)
- Cam curve

The cam curve changes according to the settings.



nterval numbe	Start phase (%)	End phase (%)	isplacement (%	Cam curve
1	0.0000000	25.0000000	100.0000000	One-dwell cycloid, m=1
2	25.0000000	50.0000000	0.0000000	One-dwell trapecloid
3	50.0000000	75.0000000	-100.0000000	Modified sine
4	75.0000000	0.0000000	0.0000000	Asymmetrical modified trapezc

Display a segmented interval by number.
The interval number is set automatically
based on the specified start phase order.
Setting range: 1 to 20 (default value: 0)

Info.

- The end phase cannot be set. The end phase is automatically changed when the start phase is changed.
- Do not change to rapid displacement on the cam curve that has been set. In the case of rapid displacement, the motor may not be able to follow the output.
- Similarly, set the 0% and 100% of the phase to be the same displacement.

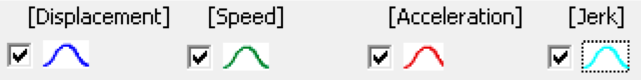
■ Checking the cam table

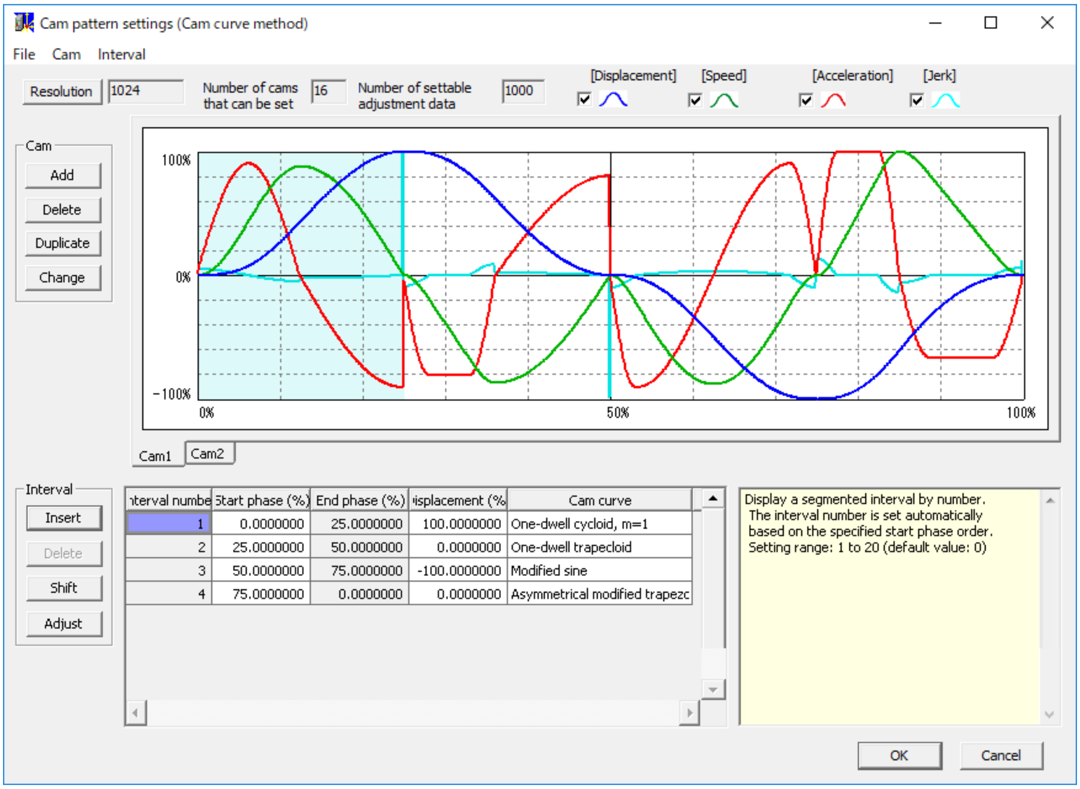
Check the set cam table (cam curve). In synchronous control, slave axes operate by following the cam curve. Therefore, the motor may not be able to follow the output if the change in the cam curve is rapid. For changes in the cam curve, information such as not only displacement but also acceleration is important. The following information including displacement can be displayed on the "Cam Table Setting" screen.

Display item	Overview
Displacement	This item is set in the cam table.
Speed	The operating speed of the cam table with a set displacement amount is displayed. Also, the speed is displayed as a relative value.
Acceleration	Accelerations in each phase are displayed. Care is required, as a rapid speed change occurs in any section where acceleration significantly changes.

Display item	Overview
Jerk	Jerk refers to a change rate of acceleration. It is obtained by differentiating acceleration by time.

Each displayed item can be set by selecting the following check boxes on the "Cam Table Setting" screen. Refer to each display items, and change the cam table settings.





Resolution 1024

Number of cams that can be set 16

Number of settable adjustment data 1000

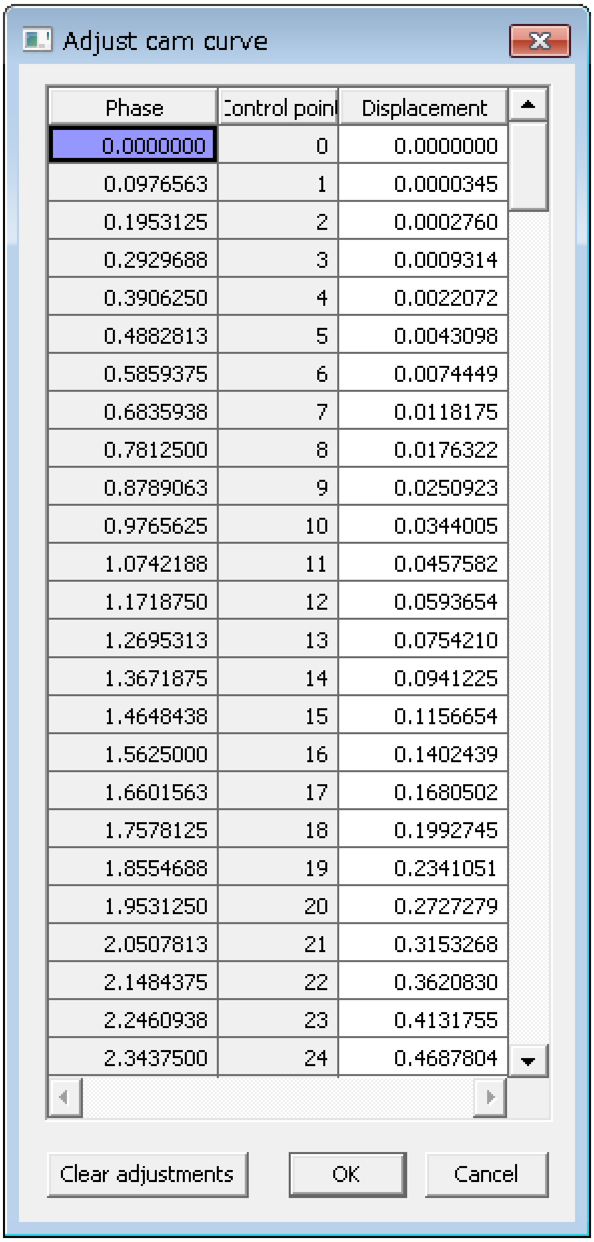
☑ [Displacement] ☑ [Speed] ☑ [Acceleration] ☑ [Jerk]

terval numbe	Start phase (%)	End phase (%)	isplacement (%	Cam curve
1	0.0000000	25.0000000	100.0000000	One-dwell cycloid, m=1
2	25.0000000	50.0000000	0.0000000	One-dwell trapecloid
3	50.0000000	75.0000000	-100.0000000	Modified sine
4	75.0000000	0.0000000	0.0000000	Asymmetrical modified trapezc

Display a segmented interval by number.
The interval number is set automatically based on the specified start phase order.
Setting range: 1 to 20 (default value: 0)

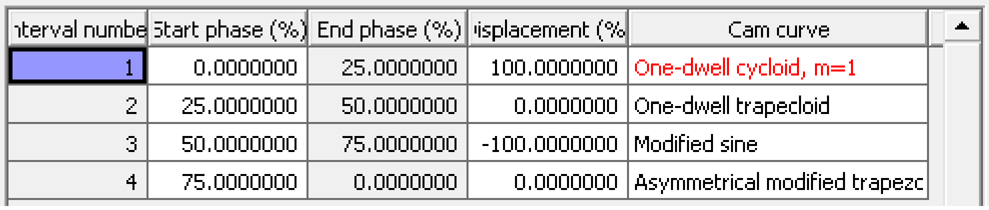
■ Adjusting the cam table

The "Cam Table Setting" screen provides a function to finely adjust data for set cam curves. Rapid change can be lessened by performing fine adjustments for set cam data using the adjustment function. To perform adjustment, select the section number to be adjusted and click the [Adjust] button. The adjustment screen will be displayed. The adjustment screen shows the table of the portion corresponding to the specified section number among all the sections (0% to 100%) divided by the specified resolution.



Phase	Control poin	Displacement
0.0000000	0	0.0000000
0.0976563	1	0.0000345
0.1953125	2	0.0002760
0.2929688	3	0.0009314
0.3906250	4	0.0022072
0.4882813	5	0.0043098
0.5859375	6	0.0074449
0.6835938	7	0.0118175
0.7812500	8	0.0176322
0.8789063	9	0.0250923
0.9765625	10	0.0344005
1.0742188	11	0.0457582
1.1718750	12	0.0593654
1.2695313	13	0.0754210
1.3671875	14	0.0941225
1.4648438	15	0.1156654
1.5625000	16	0.1402439
1.6601563	17	0.1680502
1.7578125	18	0.1992745
1.8554688	19	0.2341051
1.9531250	20	0.2727279
2.0507813	21	0.3153268
2.1484375	22	0.3620830
2.2460938	23	0.4131755
2.3437500	24	0.4687804

Select the data of the phase (control point) you want to adjust and change the displacement data. Select [OK] to reflect the adjustment. Select [Clear Adjustment] to clear the set adjustment data. The cam curve of the section number for which the adjustment was executed is displayed in red, indicating that adjustment has been performed.

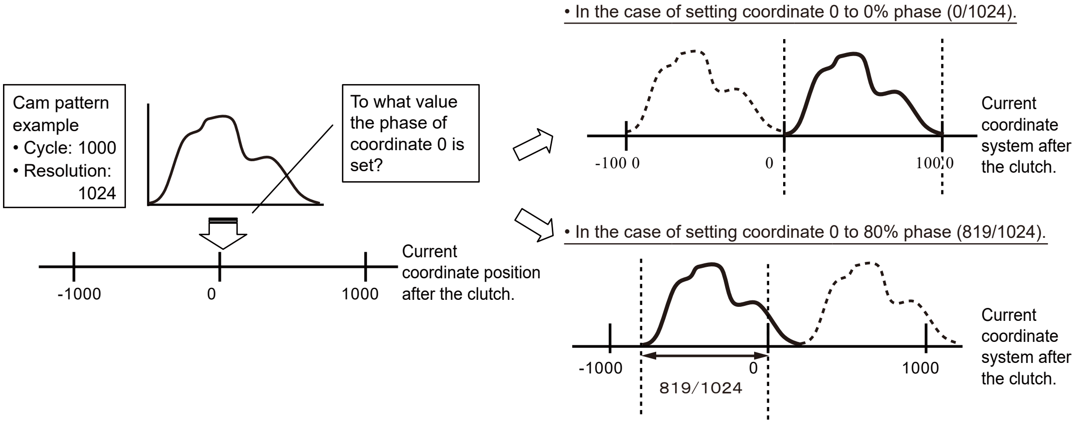


nterval numbe	Start phase (%)	End phase (%)	isplacement (%	Cam curve
1	0.0000000	25.0000000	100.0000000	One-dwell cycloid, m=1
2	25.0000000	50.0000000	0.0000000	One-dwell trapecloid
3	50.0000000	75.0000000	-100.0000000	Modified sine
4	75.0000000	0.0000000	0.0000000	Asymmetrical modified trapezc

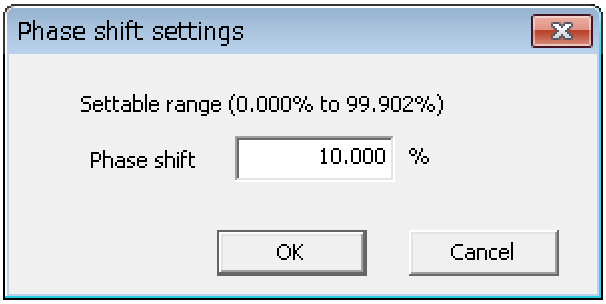
■ Shifting the cam table

The cam pattern that has been created is defined as phase 0% to 100%. In actual operations, created cam patterns may not match the phases used as the references. Cam table shifting is a function that set the percentage of the phase of a position in current value coordinate system 0 to the created cam pattern.

Image of shifting electronic cam



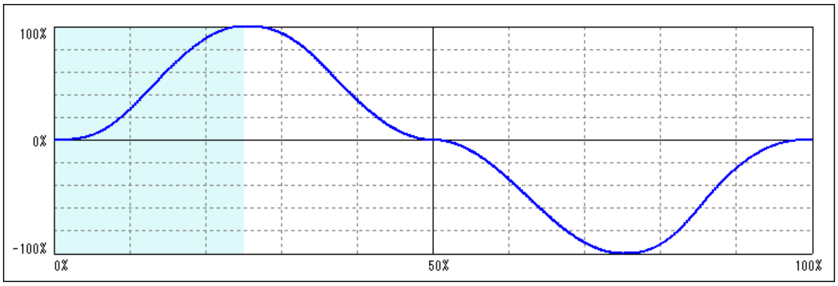
Select “Shift” from “Section”, and set a shift amount.

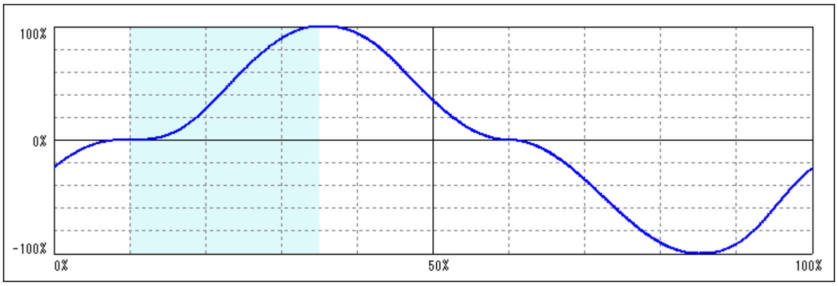


Settable range (0.000% to 99.902%)

Phase shift 10.000 %

The created cam pattern is shifted by 10% and the display is refreshed.

Before change	

After change	

■ Saving the cam table

Created cam tables can be automatically saved by clicking the [OK] button on the "Cam Table Setting" screen. Saved cam tables are managed by FPWIN Pro7, and set by downloading them to the positioning unit RTEX.

9.6.5 Cam Pattern Setting Method (Cam Point Method)

The cam point method enables electronic cams to be used by loading cam data created with external tools.

- Cam data created with external tools must be data obtained by splitting a cam curve by resolution (cam point data).
- The specifications of the cam point method are as below.

Item	Description
Resolution	32,769 points For point data, be sure to set 32,769 points. (Control point 0 is fixed at displacement 0%.) Express master axis phases as 0% to 100% and slave axis displacements as ±100%. Displacements from control point 1 to control point 32768 can be set freely.
Number of cam patterns	Max. 4
Cam point data creation	Use spreadsheet software to create data. Data can also be edited on the "Cam Pattern Settings (Cam Point Method)" screen of Configurator PM7-RTEX.
Cam point data input	Copy the slave axis displacement data edited in spreadsheet software to the displacement cell of the cam point data in Configurator PM7-RTEX.
Cam operation method	Select the cam pattern number to be used in the "Synchronization Parameter Settings" dialog box of Configurator PM7-RTEX.

Precautions when using "Cam point method"

- “Cam curve method” and “Cam point method” cannot be used at the same time.
- If the cam pattern setting method is switched between “Cam curve method” and “Cam point method”, the pre-switchover data will be discarded when the settings are applied after the switchover.

- Restrictions apply to the combinations of FP0H Positioning Unit RTEX and Configurator PM7-RTEX versions. Check the restrictions in the table below.

Combinations of FP0H Positioning Unit RTEX and Configurator PM7-RTEX versions

FP0H Positioning Unit RTEX version	Configurator PM7-RTEX version	
	2.11.0.0 or earlier	2.12.0.0 or later
Ver1.02 or earlier	Old	x
Ver1.10 or later	x	New

(Note 1) "Old": Resolution is 32,769 points and control point 0 is fixed at displacement 0%

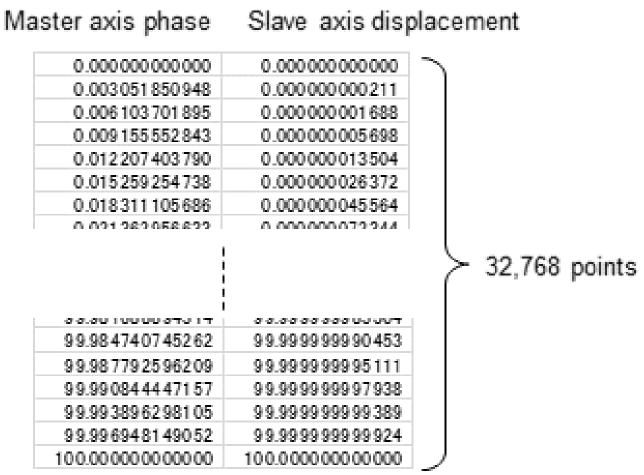
"New": Resolution is 32,768 points and control point 0 can be set to any displacement

x: Not available

- "Cam point data" created when FP0H Positioning Unit RTEX V1.02 or earlier is used cannot be directly used with FP0H Positioning Unit RTEX V1.10 or later.
- To reuse data for old versions, data must be recreated in a new environment.

Cam point data creation method

Use spreadsheet software to create cam point data.
Create cam point data according to the following rules.



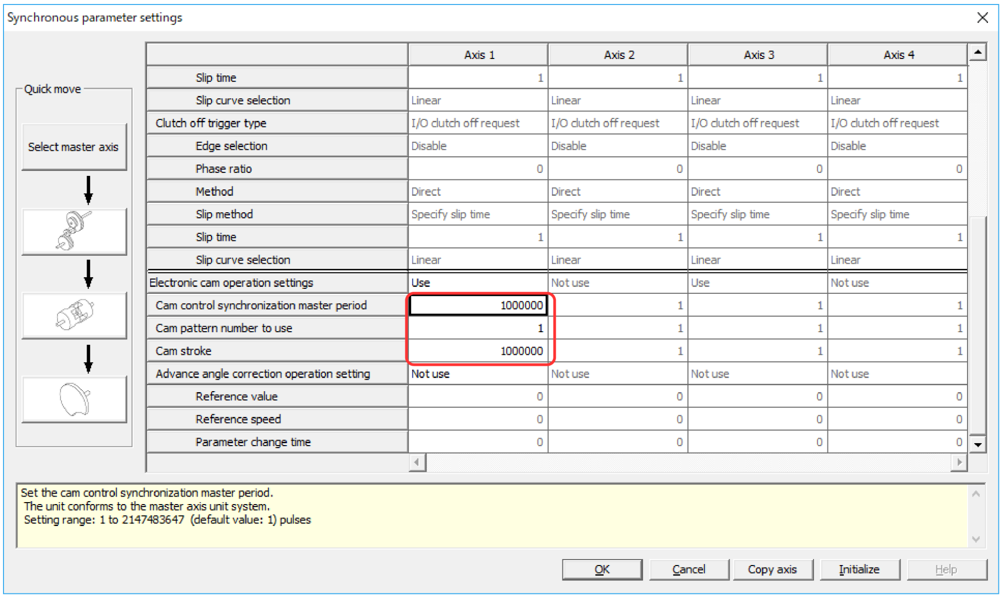
Master axis phase	Slave axis displacement
0.000000000000	0.000000000000
0.003051850948	0.000000000211
0.006103701895	0.000000001688
0.009155552843	0.000000005698
0.012207403790	0.000000013504
0.015259254738	0.000000026372
0.018311105686	0.000000045564
99.984740745262	99.999999990453
99.987792596209	99.999999995111
99.990844447157	99.999999997938
99.993896298105	99.999999999389
99.996948149052	99.999999999924
100.000000000000	100.000000000000

Master axis phase	Slave axis displacement
Create cam point data for 32,768 points from the phase of control point 1 (0.0030518%) to the end phase (100%). (Start phase 0% for control point 0 is fixed.)	Specify a displacement for each phase within a range of -100% to +100%.

Info.

- Set the following items in the "Synchronization Parameter Settings" dialog box of Configurator PM7-RTEX.

Name	Description
Cam synchronous control master axis cycle	Set the movement amount of the master axis when the phase is 100%.
Used cam pattern number	Select the cam pattern to be used from the registered cam patterns.
Cam stroke amount	Set the movement amount of the slave axis when the phase is 100%.



	Axis 1	Axis 2	Axis 3	Axis 4
Slip time	1	1	1	1
Slip curve selection	Linear	Linear	Linear	Linear
Clutch off trigger type	I/O clutch off request	I/O clutch off request	I/O clutch off request	I/O clutch off request
Edge selection	Disable	Disable	Disable	Disable
Phase ratio	0	0	0	0
Method	Direct	Direct	Direct	Direct
Slip method	Specify slip time	Specify slip time	Specify slip time	Specify slip time
Slip time	1	1	1	1
Slip curve selection	Linear	Linear	Linear	Linear
Electronic cam operation settings	Use	Not use	Use	Not use
Cam control synchronization master period	1000000	1	1	1
Cam pattern number to use	1	1	1	1
Cam stroke	1000000	1	1	1
Advance angle correction operation setting	Not use	Not use	Not use	Not use
Reference value	0	0	0	0
Reference speed	0	0	0	0
Parameter change time	0	0	0	0

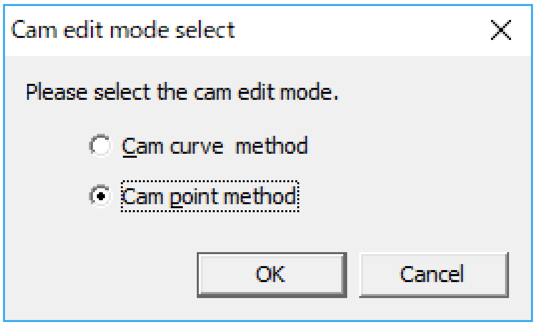
Set the cam control synchronization master period.
The unit conforms to the master axis unit system.
Setting range: 1 to 2147483647 (default value: 1) pulses

Cam point data registration method

Use the following procedure to register the created cam point data to Configurator PM7-RTEX. The following procedure is explained assuming that Configurator PM7-RTEX has already been started.

1 2 Procedure

1. Select **Axis Settings**>**Cam Pattern Settings** from the menu bar.
   The "Select Cam Editing Mode" dialog box is displayed.



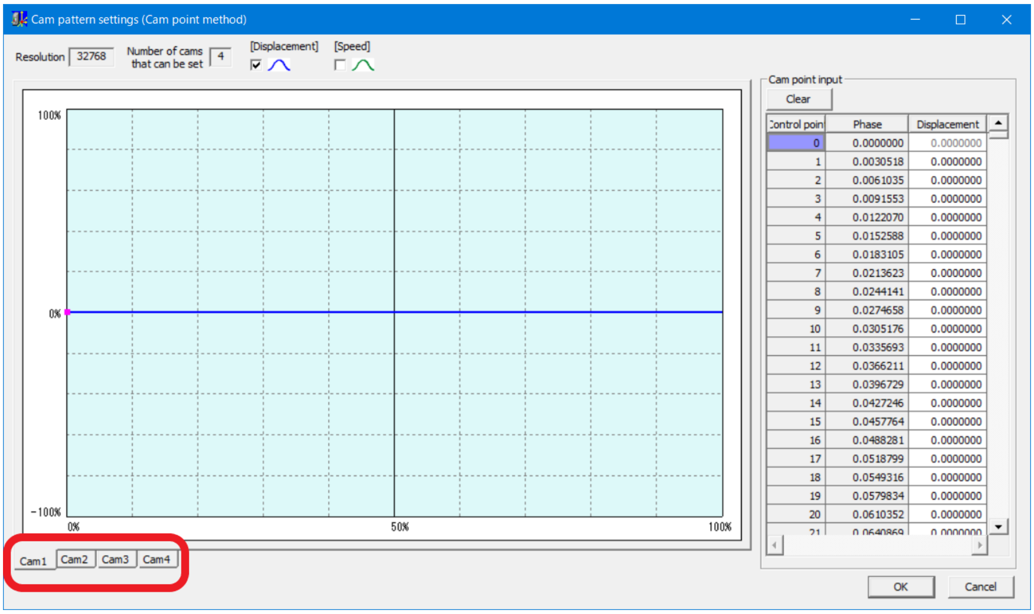
Cam edit mode select

Please select the cam edit mode.

○ Cam curve method

● Cam point method

2. Select "Cam Point Method".
The "Cam Pattern Settings (Cam Point Method)" screen is displayed.



Cam pattern settings (Cam point method)

Resolution 32768

Number of cams that can be set 4

[Displacement] ☑

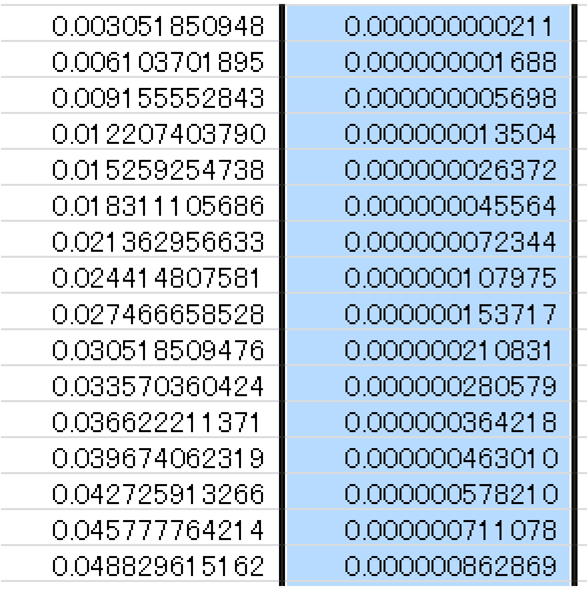
[Speed] ☐

Cam point input

ontrol poin	Phase	Displacement
0	0.0000000	0.0000000
1	0.0030518	0.0000000
2	0.0061035	0.0000000
3	0.0091553	0.0000000
4	0.0122070	0.0000000
5	0.0152588	0.0000000
6	0.0183105	0.0000000
7	0.0213623	0.0000000
8	0.0244141	0.0000000
9	0.0274658	0.0000000
10	0.0305176	0.0000000
11	0.0335693	0.0000000
12	0.0366211	0.0000000
13	0.0396729	0.0000000
14	0.0427246	0.0000000
15	0.0457764	0.0000000
16	0.0488281	0.0000000
17	0.0518799	0.0000000
18	0.0549316	0.0000000
19	0.0579834	0.0000000
20	0.0610352	0.0000000
21	0.0640869	0.0000000

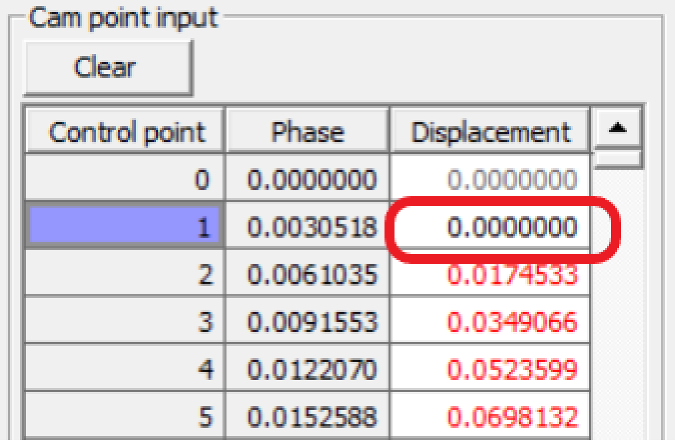
3. Use one of the tabs on the bottom left of the screen to select the cam number to be registered.

4. Open the cam point data created with the spreadsheet software and select and copy all the slave axis displacement data.



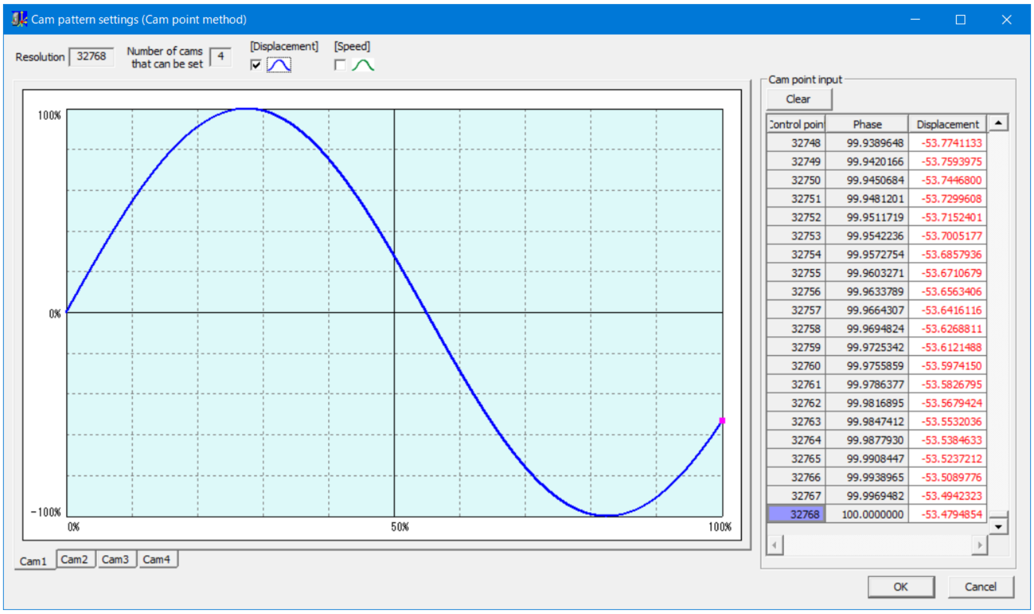
0.003051850948	0.000000000211
0.006103701895	0.000000001688
0.009155552843	0.000000005698
0.012207403790	0.000000013504
0.015259254738	0.000000026372
0.018311105686	0.000000045564
0.021362956633	0.000000072344
0.024414807581	0.000000107975
0.027466658528	0.000000153717
0.030518509476	0.000000210831
0.033570360424	0.000000280579
0.036622211371	0.000000364218
0.039674062319	0.000000463010
0.042725913266	0.000000578210
0.045777764214	0.000000711078
0.048829615162	0.000000862869

5. Select the position of "Control point 0" in the "Cam point input" area and paste the copied data.



Control point	Phase	Displacement
0	0.0000000	0.0000000
1	0.0030518	0.0000000
2	0.0061035	0.0174533
3	0.0091553	0.0349066
4	0.0122070	0.0523599
5	0.0152588	0.0698132

6. The point data created with the spreadsheet software is registered.
The displacement data of each control point (0 to 32,767) can be edited in the "Cam point input" area.



Resolution 32768

Number of cams that can be set 4

☑ [Displacement]

☐ [Speed]

Control poin	Phase	Displacement
32748	99.9389648	-53.7741133
32749	99.9420166	-53.7593975
32750	99.9450684	-53.7446800
32751	99.9481201	-53.7299608
32752	99.9511719	-53.7152401
32753	99.9542236	-53.7005177
32754	99.9572754	-53.6857936
32755	99.9603271	-53.6710679
32756	99.9633789	-53.6563406
32757	99.9664307	-53.6416116
32758	99.9694824	-53.6268811
32759	99.9725342	-53.6121488
32760	99.9755859	-53.5974150
32761	99.9786377	-53.5826795
32762	99.9816895	-53.5679424
32763	99.9847412	-53.5532036
32764	99.9877930	-53.5384633
32765	99.9908447	-53.5237212
32766	99.9938965	-53.5089776
32767	99.9969482	-53.4942323
32768	100.0000000	-53.4794854

9.6.6 Advance Angle Correction Function

The "advance angle correction function" is used to correct any delays in responses from the mechanical system connected to an electronic cam output or any delays in the PLC arithmetic processing time.

■ Specification of advance angle correction amount

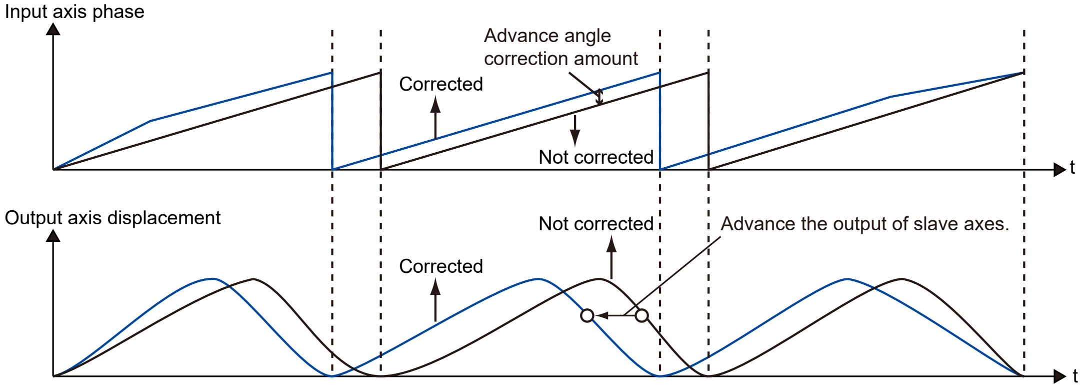
- Advance angle correction amounts are specified for each slave axis by using tool software or a user program.
- By setting the "advance angle correction reference speed" and "advance angle correction reference amount", correction amounts are automatically calculated using "master axis input speed" during operation. The advance angle correction amount is calculated using the following formula.

$$\text{Advance angle correction amount} = \text{Master axis input speed} \ \text{X} \ \frac{\text{Advance angle correction reference amount}}{\text{Advance angle correction reference speed}}$$

(*) Master axis input speed : Speed after clutch control

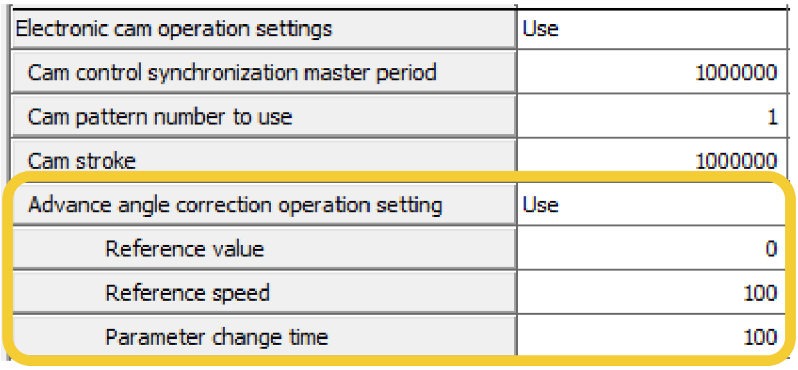
■ Internal processing for advance angle correction

The phase of the master axis that is used as the reference for slave axis correction is obtained as calculation data according to the set value of the advance angle correction amount. The value is used as a reference when the correction amount for the slave axis is obtained.



■ Settings using tool software

Specify settings in the "Synchronous Control Setting" dialog box.



Electronic cam operation settings	Use
Cam control synchronization master period	1000000
Cam pattern number to use	1
Cam stroke	1000000
Advance angle correction operation setting	Use
Reference value	0
Reference speed	100
Parameter change time	100

Name	Overview
Advance angle correction operation setting	Select the use or non-use of the advance angle correction function.
Reference amount	The unit follows the unit system of the master axis. Setting range: -2,147,482,624 to +2,147,482,624 (The decimal point position is based on the unit system.)
Reference speed	The unit follows the unit system of the master axis. Setting range: 1 to 2,147,482,624 (The decimal point position is based on the unit system.)
Parameter change time	Setting range: 1 to 10,000 (ms)

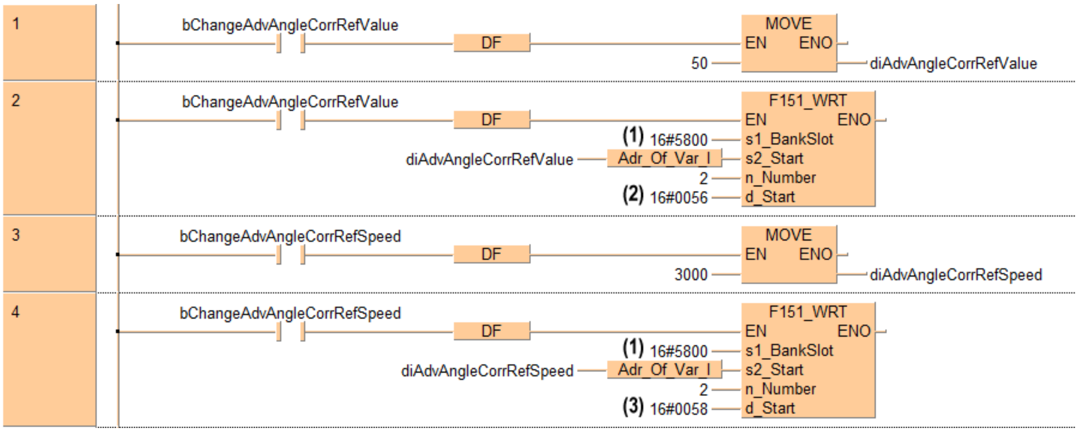
■ Sample programs

The following sample program uses slot number 0 to change the advance angle correction reference value and advance angle correction reference speed of Axis 1 to 50 and 3000, respectively.

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bChangeAdvAngleCorrRefSpeed		BOOL	FALSE	Advance angle correction reference speed change request
VAR	bChangeAdvAngleCorrRefValue		BOOL	FALSE	Advance angle correction reference amount change request
VAR	diAdvAngleCorrRefSpeed		DINT	0	Advance angle correction reference speed
VAR	diAdvAngleCorrRefValue		DINT	0	Advance angle correction reference amount

Ladder diagram (LD)



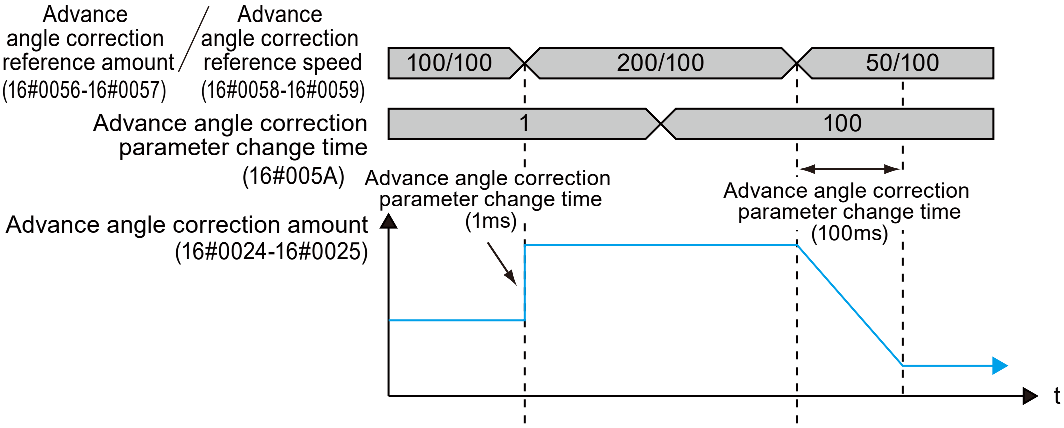
Structured text (ST)

```
if (DF(bChangeAdvAngleCorrRefValue)) then
    diAdvAngleCorrRefValue := 50;
    F151_WRT(s1_BankSlot := 16#5800, s2_Start := Adr_Of_Var(diAdvAngleCorrRefValue), n_Number := 2, d_Start := 16#0056);
end_if;                        (1)                                                                                   (2)

if (DF(bChangeAdvAngleCorrRefSpeed)) then
    diAdvAngleCorrRefSpeed := 3000;
    F151_WRT(s1_BankSlot := 16#5800, s2_Start := Adr_Of_Var(diAdvAngleCorrRefSpeed), n_Number := 2, d_Start := 16#0058);
end_if;                        (1)                                                                                   (3)
```

Code	Items specified in the program	Values specified in the program							
		Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7 (virtual)	8 axes (virtual)
(1)	Bank, slot No.	16#5800 (bank 16#58, slot No. 0)							
(2)	Advance angle correction reference setting area	16#0056 to 16#0057	16#00C6 to 16#00C7	16#0136-16#0137	16#01A6-16#01A7	16#0216-16#0217	16#0286-16#0287	16#02F6-16#02F7	16#0366-16#0367
(3)	Advance angle correction reference speed setting area	16#0058-16#0059	16#00C8-16#00C9	16#0138-16#0139	16#01A8-16#01A9	16#0218-16#0219	16#0288-16#0289	16#02F8-16#02F9	16#0368-16#0369

■ Changing the advance angle correction amount during operation

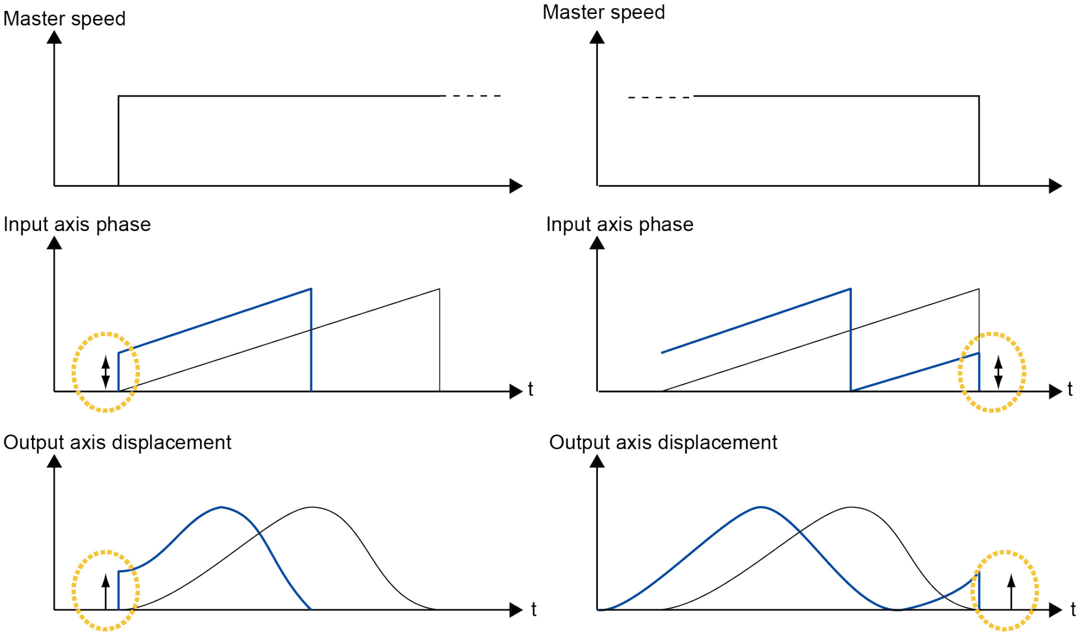
- The advance angle correction amount can be changed during operation.
- After the unit detects any change in "advance angle correction reference speed" or "advance angle correction reference amount", the advance angle correction amount is reflected after the specified "advance angle correction change time" has elapsed.



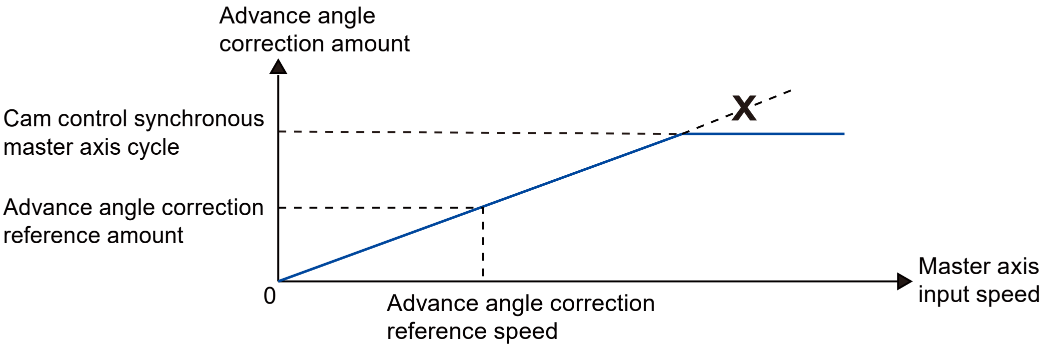
- "Advance angle correction reference speed" and "advance angle correction reference amount" are 32-bit data. If they are changed in 16-bit (1-word) units, they may be changed to unintended values. Always rewrite them in 32-bit (2-word) units.
- If "advance angle correction reference speed" or "advance angle correction reference amount" is changed during operation, the timing of changed data acquisition by the unit may be delayed. Change the synchronization parameter of either "advance angle correction reference speed" or "advance angle correction reference amount" to prevent the "advance angle correction amount" from being rapidly changed.

■ Notes on settings

- An overshoot or undershoot may occur depending on the settings when sufficient acceleration/deceleration time is not set for the start or stop of the master axis when the advance angle correction function is used or when the input speed is rapidly increased or decreased by directly engaging or disengaging the clutch when the master axis is operating.
- When using the advance angle correction function, set a sufficient acceleration/deceleration time for the master axis. When using the clutch function in combination, specify settings to prevent the occurrence of rapid acceleration or deceleration by using the slip function.



- Depending on the setting of "advance angle correction reference speed" or "advance angle correction reference amount", the calculated advance angle correction amount may exceed the "cam control synchronous master axis cycle". If the advance angle correction amount exceeds the "cam control synchronous master axis cycle", the "synchronous cam master axis cycle" will be the upper limit as shown in the figure below. Set the advance angle correction positioning parameter that matches the input speed.

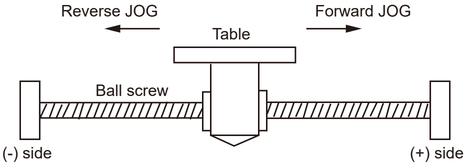


(MEMO)

10 Manual Operation (JOG Operation)

10.1 Settings and Operation of JOG Operation

The example below is the case where JOG operation is performed on Axis 1 by using slot number 0. The unit is the number of pulses.

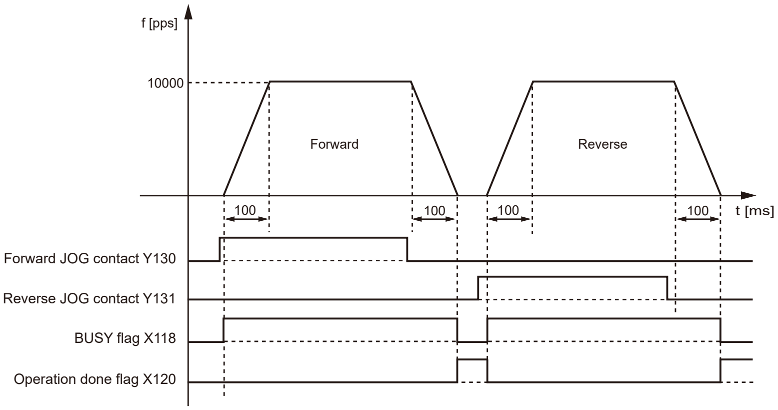


■ Settings

The positioning parameters required for setting up JOG operation are specified in the positioning setting menu of the programming tool.

Item	Setting example
Acceleration/deceleration method	0: Linear acceleration / deceleration
JOG acceleration time (ms)	100 ms
JOG deceleration time (ms)	100 ms
JOG target speed	10,000 pps

■ Behavior diagram



■ Behaviors of each contact

- The BUSY flag (X118), which indicates that the motor is running, turns ON when JOG operation starts, and turns OFF when the operation is completed.
- The operation done flag (X120), which indicates the completion of operation, turns ON when the current operation is completed, and remains on hold until the next positioning control, JOG operation, home return, or pulser operation starts.

■ Notes on programming

The starting contact and flag number vary depending on the axis number.

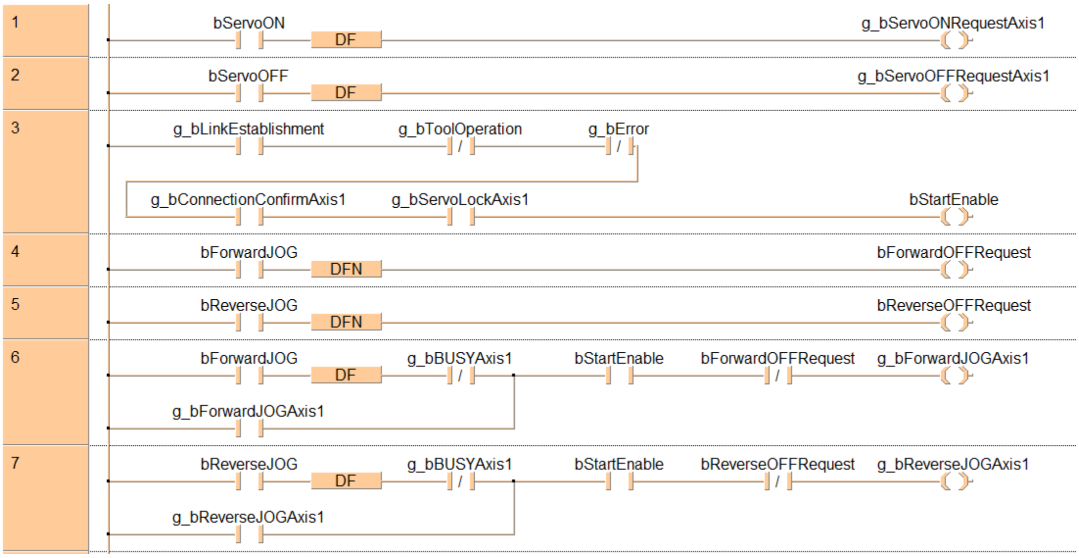
■ Sample programs

- The following sample programs perform JOG operation on Axis 1 by using slot No. 0.
- For setting examples of JOG operation and positioning parameters, refer to “Settings”.

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bForwardJOG		BOOL	FALSE	Forward JOG
VAR	bForwardOFFRequest		BOOL	FALSE	Forward OFF edge
VAR	bReverseJOG		BOOL	FALSE	Reverse JOG
VAR	bReverseOFFRequest		BOOL	FALSE	Reverse OFF edge
VAR	bServoOFF		BOOL	FALSE	Servo OFF
VAR	bServoON		BOOL	FALSE	Servo ON
VAR	bStartEnable		BOOL	FALSE	Start enable flag
VAR_EXTERNAL	g_bBUSYAxis1	X118	BOOL	FALSE	Axis 1 BUSY
VAR_EXTERNAL	g_bConnectionConfirmAxis1	X108	BOOL	FALSE	Axis 1 connection confirmation
VAR_EXTERNAL	g_bError	X105	BOOL	FALSE	Error notification
VAR_EXTERNAL	g_bForwardJOGAxis1	Y130	BOOL	FALSE	Axis 1 forward JOG
VAR_EXTERNAL	g_bLinkEstablishment	X100	BOOL	FALSE	Preparation completion notification
VAR_EXTERNAL	g_bReverseJOGAxis1	Y131	BOOL	FALSE	Axis 1 reverse JOG
VAR_EXTERNAL	g_bServoLockAxis1	X110	BOOL	FALSE	Servo lock for axis 1
VAR_EXTERNAL	g_bServoOFFRequestAxis1	Y110	BOOL	FALSE	Axis 1 Servo OFF request
VAR_EXTERNAL	g_bServoONRequestAxis1	Y108	BOOL	FALSE	Axis 1 servo ON request
VAR_EXTERNAL	g_bToolOperation	X104	BOOL	FALSE	Tool operation in progress

Ladder diagram (LD)



Structured text (ST)

```
g_bServoONRequestAxis1  := DF(bServoON);

g_bServoOFFRequestAxis1 := DF(bServoOFF);

bStartEnable     := g_bLinkEstablishment AND NOT g_bToolOperation AND NOT g_bError
                    AND g_bConnectionConfirmAxis1 AND g_bServoLockAxis1;

bForwardOFFRequest := DFN(bForwardJOG);

bReverseOFFRequest := DFN(bReverseJOG);

g_bForwardJOGAxis1  := ((DF(bForwardJOG) AND NOT g_bBUSYAxis1)
                        OR g_bForwardJOGAxis1)
                        AND bStartEnable AND NOT bForwardOFFRequest;

g_bReverseJOGAxis1  := ((DF(bReverseJOG) AND NOT g_bBUSYAxis1)
                        OR g_bReverseJOGAxis1)
                        AND bStartEnable AND NOT bReverseOFFRequest;
```

■ Behavior at limit input

Condition	Direction	Limit status	Operation
When JOG operation is started	Forward	Limit input (+): ON	Startup failure, error occurrence
		Limit input (-): ON	Startup possible
	Reverse	Limit input (+): ON	Executable
		Limit input (-): ON	Startup failure, error occurrence
During JOG operation	Forward	Limit input (+): ON	Deceleration stoppage, error occurrence

Condition	Direction	Limit status	Operation
	Reverse	Limit input (-): ON	Deceleration stoppage, error occurrence

10.2 Changing the Speed During JOG Operation

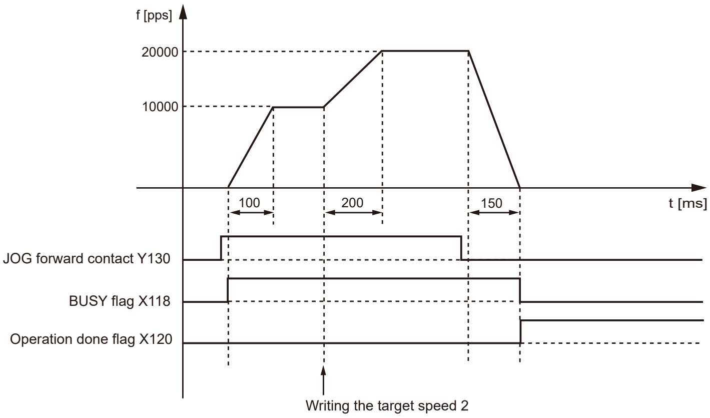
The example below is the case where the target speed is changed while JOG operation is being performed on Axis 1 by using slot number 0.

■ Settings

The positioning parameters required for setting up JOG operation are specified in the positioning setting menu of the programming tool.

Item	Setting example	
Acceleration/deceleration pattern	0: Linear acceleration / deceleration	
Acceleration time 1 (ms)	100 ms	
Deceleration time 1 (ms)	50 ms	
Target speed 1	10,000 pps	
Acceleration time 2 (ms)	200 ms	After the speed is changed, the set values of acceleration time, deceleration time, and target speed are written to the positioning memory by the program.
Deceleration time 2 (ms)	150 ms	
Target speed 2	20000 pps	

■ Behavior diagram



■ Behaviors of each contact

- The BUSY flag (X118), which indicates that the motor is running, turns ON when JOG operation starts, and turns OFF when the operation is completed.
- The target speed can be freely changed during JOG operation. Change the target speed by using the program.
- The operation done flag (X120), which indicates the completion of operation, turns ON when the current operation is completed, and remains on hold until the next positioning control, JOG operation, home return, or pulser operation starts.

■ Notes on programming

- To change the speed during JOG operation, use the user program to rewrite the values of the positioning parameter setting area for each axis (addresses 16#002A to 16#002D in the bank of each axis). The following items in the user program are set in each address of the positioning memory. (16#002A: JOG acceleration time, 16#002B: JOG deceleration time, 16#002C to 16#002D: JOG target speed)

- The starting contact and flag number vary depending on the axis number.

■ Sample programs

- The following sample programs perform JOG operation on Axis 1 by using slot No. 0.
- For setting examples of JOG operation and positioning parameters, refer to “Settings”.
- The speed during JOG operation is changed when a set value is written into the positioning memory.

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bChangeSpeed		BOOL	FALSE	Speed change
VAR	bForwardJOG		BOOL	FALSE	Forward JOG
VAR	bForwardOFFRequest		BOOL	FALSE	Forward OFF edge
VAR	bServoOFF		BOOL	FALSE	Servo OFF
VAR	bServoON		BOOL	FALSE	Servo ON
VAR	bStartEnable		BOOL	FALSE	Start enable flag
VAR_EXTERNAL	g_bBUSYAxis1	X118	BOOL	FALSE	Axis 1 BUSY
VAR_EXTERNAL	g_bConnectionConfirmAxis1	X108	BOOL	FALSE	Axis 1 connection confirmation
VAR_EXTERNAL	g_bError	X105	BOOL	FALSE	Error notification
VAR_EXTERNAL	g_bForwardJOGAxis1	Y130	BOOL	FALSE	Axis 1 forward JOG
VAR_EXTERNAL	g_bLinkEstablishment	X100	BOOL	FALSE	Preparation completion notification
VAR_EXTERNAL	g_bServoLockAxis1	X110	BOOL	FALSE	Servo lock for axis 1
VAR_EXTERNAL	g_bServoOFFRequestAxis1	Y110	BOOL	FALSE	Axis 1 Servo OFF request
VAR_EXTERNAL	g_bServoONRequestAxis1	Y108	BOOL	FALSE	Axis 1 servo ON request
VAR_EXTERNAL	g_bToolOperation	X104	BOOL	FALSE	Tool operation in progress
VAR	DUT_JOGAccelTimeSetting		JOGSetting		JOG acceleration time setting
VAR	iAccelTime		INT	0	Acceleration time
VAR	iDecelTime		INT	0	deceleration time
VAR	diTargetSpeed		DINT	0	Target speed

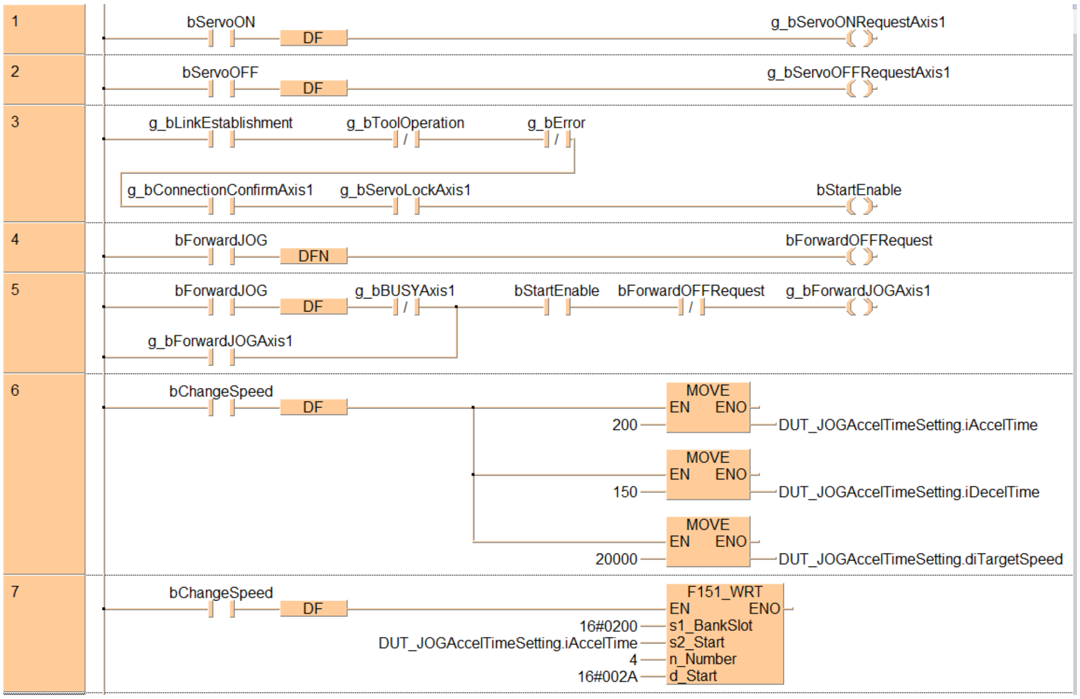
Variable list of structure "JOGSetting"

Class name	Variable name	FP address	Data type	Default	Comment
VAR	iAccelTime		INT	0	Acceleration time
VAR	iDecelTime		INT	0	deceleration time

Class name	Variable name	FP address	Data type	Default	Comment
VAR	diTargetSpeed		DINT	0	Target speed

(Note 1) When creating a new structure, always clear the "Allow duplicate element" check box.

Ladder diagram (LD)



Structured text (ST)

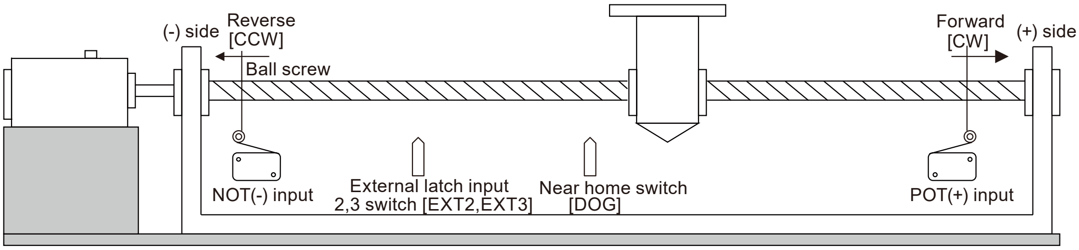
```
g_bServoONRequestAxis1  := DF(bServoON);

g_bServoOFFRequestAxis1 := DF(bServoOFF);

bStartEnable    := g_bLinkEstablishment AND NOT g_bToolOperation AND NOT g_bError
                   AND g_bConnectionConfirmAxis1 AND g_bServoLockAxis1;

bForwardOFFRequest := DFN(bForwardJOG);

g_bForwardJOGAxis1  := ((DF(bForwardJOG) AND NOT g_bBUSYAxis1)
                        OR g_bForwardJOGAxis1)
                        AND bStartEnable AND NOT bForwardOFFRequest;

if (DF(bChangeSpeed)) then
   DUT_JOGAccelTimeSetting.iAccelTime    := 200;
   DUT_JOGAccelTimeSetting.iDecelTime    := 150;
   DUT_JOGAccelTimeSetting.diTargetSpeed  := 20000;
   F151_WRT(s1_BankSlot := 16#0200, s2_Start := DUT_JOGAccelTimeSetting.iAccelTime, n_Number := 4, d_Start := 16#002A);
end_if;
```

11 Manual Operation (Home Return)

11.1 Types of Home Return (Incremental)

Home return is a function that moves the axis to the preset reference position (home position) and set the coordinates of the position to 0.

If an incremental encoder is used for the servomotor, the home return methods shown in the table below can be selected.



Types of home return		Reference home position	Behavior overview
DOG method 1		Home (Z phase): Based on front edge	After the rising edge (front edge) of the near home switch (DOG) is detected, the rising edge of the first home position (Z phase) is detected and the motor stops. The stop position is set as the home position. (Note 1)
	E2	External latch input 2: Based on front edge	
	E3	External latch input 3: Based on front end	
DOG method 2		Edge detection of near home switch	The rising edge of the near home switch (DOG) is detected and the motor stops. The stopping position is set as the home position.
DOG method 3		Home (Z phase): Based on rear edge	After the falling edge (rear edge) of the near home switch (DOG) is detected, the rising edge of the first home position (Z phase) in the home return direction is detected and the motor stops. The stop position is set as the home position. (Note 1)
	E2	External latch input 2: Based on rear edge	
	E3	External latch input 3: Based on back end	
Limit method 1		Home (Z phase): Based on front edge	After the rising edge of the limit switch on the opposite side of the home return direction is detected, the rotation of the motor is reversed. Then, the rising edge of the first home position (Z phase) is detected and the motor stops. The stop position is set as the home position. (Note 1)
	E2	External latch input 2: Based on front edge	
	E3	External latch input 3: Based on front end	
Limit Method 2		Edge detection of limit switch	The rising edge of the limit switch in the home return direction is detected and the motor stops. The stopping position is set as the home position.
Z-phase method		Edge detection of home position (Z phase)	The axis moves from the current value toward the direction of home return. Then, the rising edge of the first home position (Z phase) is detected and the motor stops. The stop position is set as the home position. (Note 1)
EXT2 method		Edge detection of external latch input 2	
EXT3 method		Edge detection of external latch input 3	
Stop-on-contact Method 1		Stop-on-contact detection	The axis is stopped by a mechanical stopping mechanism such as a stopper. Then, when the torque value exceeding the specified value

<table>
<tr><th colspan="2">Types of home return</th><th>Reference home position</th><th>Behavior overview</th></tr>
<tr><td colspan="2"></td><td></td><td>continues for a certain period of time, the axis stops. The stopping position is set as the home position.</td></tr>
<tr><td colspan="2">Stop-on-contact method 2</td><td>Home (Z phase): Based on front edge</td><td rowspan="3">After the axis is stopped by a mechanical stopping mechanism such as a stopper, the rotation of the motor is reversed. Then, the rising edge of the first home position (Z phase) is detected and the motor stops. The stop position is set as the home position. (Note 1)</td></tr>
<tr><td></td><td>E2</td><td>External latch input 2: Based on front edge</td></tr>
<tr><td></td><td>E3</td><td>External latch input 3: Based on front end</td></tr>
<tr><td colspan="2">Data setting method</td><td>——————</td><td>The current value is set as the home position.</td></tr>
</table>

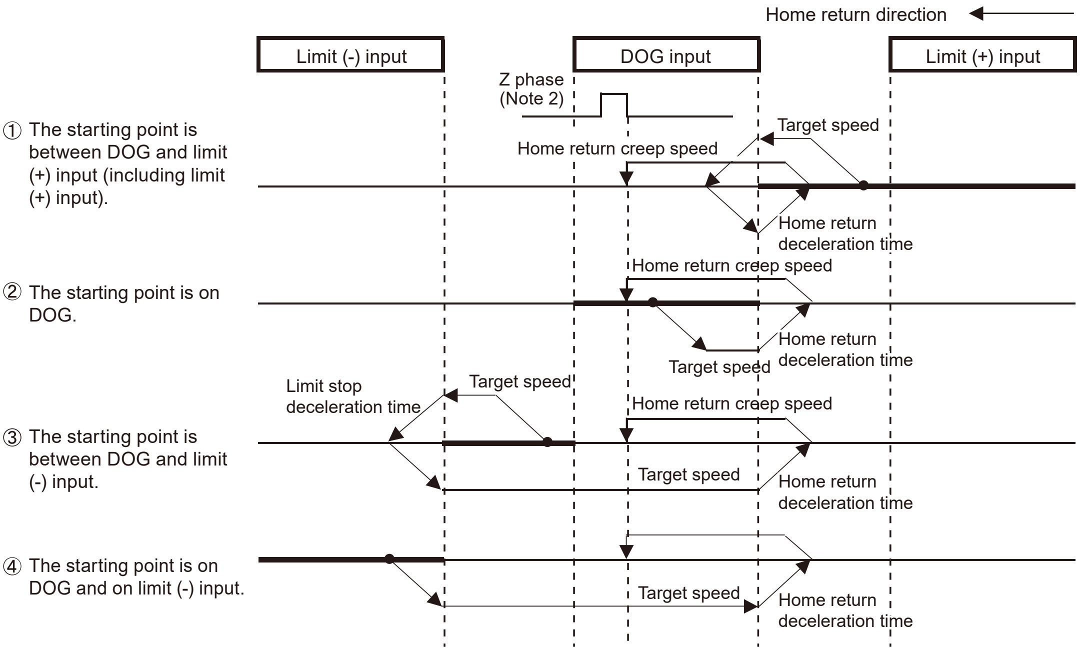
(Note 1) For E2, external latch input 2 (EXT2) is used instead of the home position (Z phase).
For E3, external latch input 3 (EXT3) is used instead of the home position (Phase Z).

11.1.1 DOG Method 1 [Edge detection of near home switch + Home position (Z phase) based on front edge]

After the rising edge (front edge) of the near home switch (DOG) is detected, the rising edge of the first home position (Z phase) is detected and the motor stops. The stopping position is set as the home position.

The reference home position can be selected from the three types shown in the following table.

Type	Reference home position
DOG method 1	Edge detection of near home switch + Home position (Z phase) based on front edge
DOG method 1 (E2)	Edge detection of near home switch + External latch input 2 (EXT2) based on front edge
DOG method 1 (E3)	Edge detection of near home switch + External latch input 3 (EXT3) based on front end

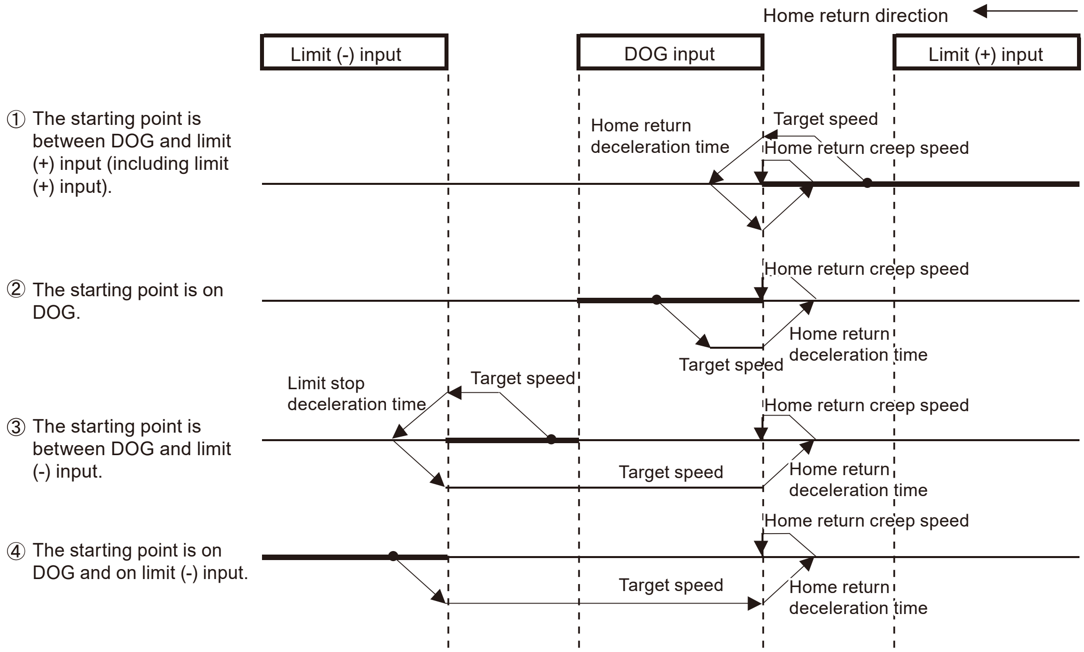


(Note 1) If the home position (Z phase) is ON at the time of startup, it will not be regarded as a home position (Z phase). Searches for a near home switch (DOG) will be started.

(Note 2) The reference home position differs according to the selected home return type. (Z-phase, EXT2, EXT3)

11.1.2 DOG Method 2 (Edge Detection of Near Home Switch)

The rising edge of the near home switch (DOG) is detected and the motor stops. The stopping position is set as the home position.

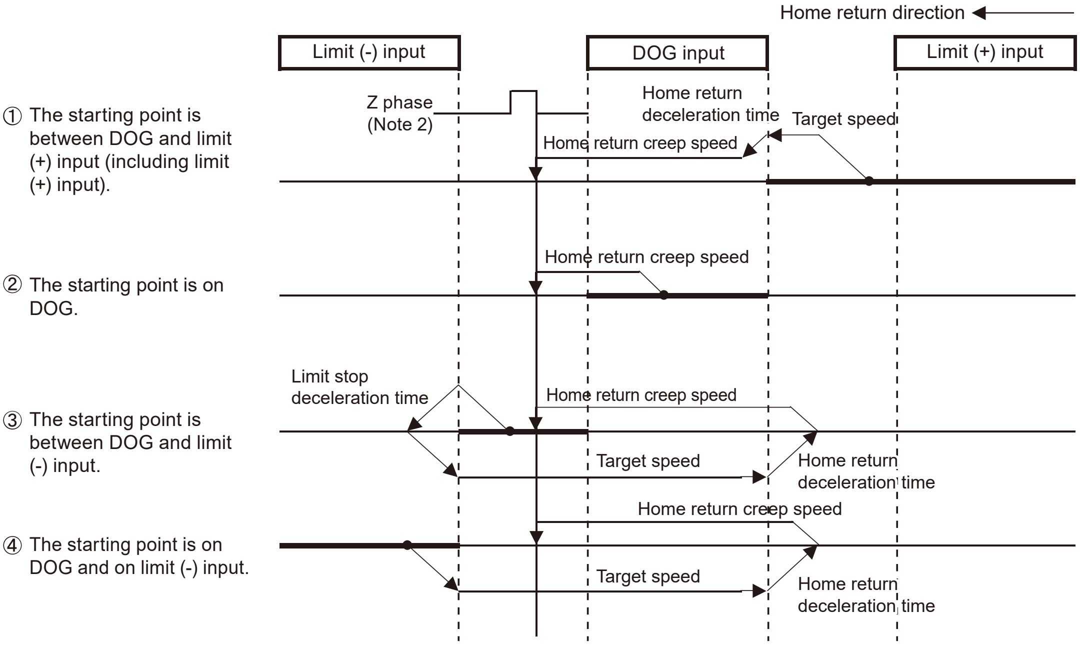


11.1.3 DOG Method 3 [Edge detection of near home switch + Home position (Z phase) based on rear edge]

After the falling edge (rear edge) of the near home switch (DOG) is detected, the rising edge of the first home position (Z phase) in the home return direction is detected and the motor stops. The stopping position is set as the home position.

The reference home position can be selected from the three types shown in the following table.

Type	Reference home position
DOG method 3	Edge detection of near home switch + Home position (Z phase) based on rear edge
DOG method 3 (E2)	Edge detection of near home switch + External latch input 2 (EXT2) based on rear edge
DOG method 3 (E3)	Edge detection of near home switch + External latch input 3 (EXT3) based on back end



(Note 1) If the home position (Z phase) is ON at the time of startup, it will not be regarded as a home position (Z phase). Searches for a near home switch (DOG) will be started.

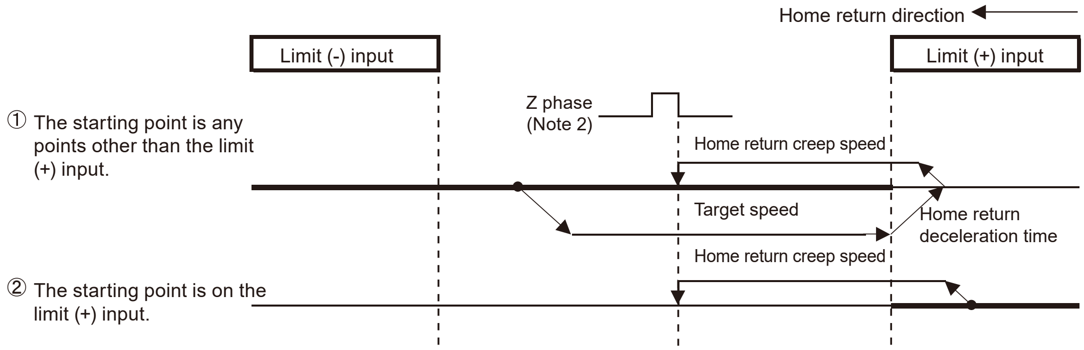
(Note 2) The reference home position differs according to the selected home return type. (Z-phase, EXT2, EXT3)

11.1.4 Limit Method 1 [Edge detection of limit switch + Home position (Z phase) based on front edge]

After the rising edge of the limit switch on the opposite side of the home return direction is detected, the rotation of the motor is reversed. Then, the rising edge of the first home position (Z phase) is detected and the motor stops. The stopping position is set as the home position.

The reference home position can be selected from the three types shown in the following table.

Type	Reference home position
Limit method 1	Edge detection of limit switch + Home position (Z phase) based on front edge
Limit method 1 (E2)	Edge detection of limit switch + External latch input 2 (EXT2) based on front edge
Limit method 1 (E3)	Edge detection of limit switch + External latch input 3 (EXT3) based on front end

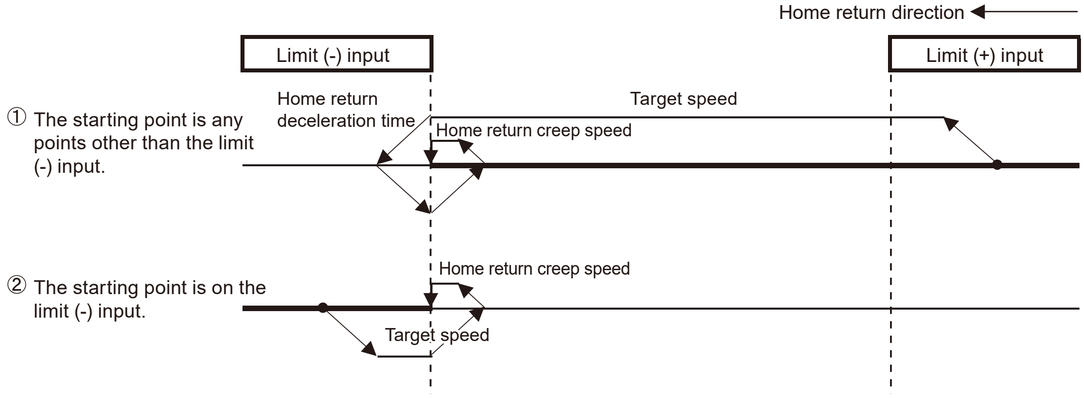


(Note 1) If the home position (Z phase) is ON at the time of startup, it will not be regarded as a home position (Z phase). Searches for a limit switch will be started.

(Note 2) The reference home position differs according to the selected home return type. (Z-phase, EXT2, EXT3)

11.1.5 Limit Method 2 (Edge Detection of Limit Switch)

The rising edge of the limit switch in the home return direction is detected and the motor stops. The stopping position is set as the home position.

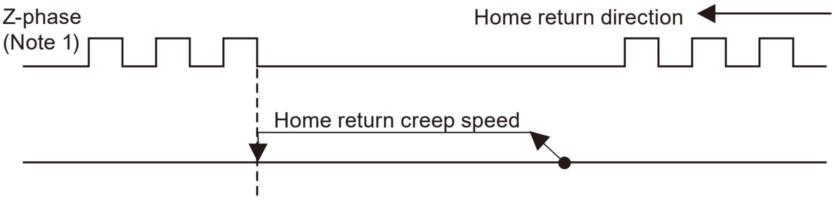


11.1.6 Z-phase Method [Edge detection of home position (Z phase)]

The axis moves from the current value toward the direction of home return. Then, the rising edge of the first home position (Z phase) is detected and the motor stops. The stopping position is set as the home position.

The reference home position can be selected from the three types shown in the following table.

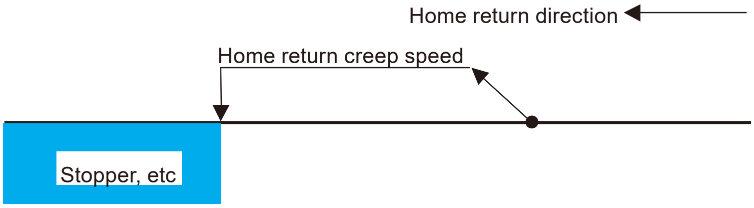
Type	Reference home position
Z-phase method 1	Edge detection of home position (Z phase)
EXT2 method	Edge detection of external latch input 2 (EXT2)
EXT3 method	Edge detection of external latch input 3 (EXT3)



(Note 1) The reference home position differs according to the selected home return type. (Z-phase, EXT2, EXT3)

11.1.7 Stop-on-contact Method 1

The axis is stopped by a mechanical stopping mechanism such as a stopper. Then, when the torque value exceeding the specified value continues for a certain period of time, the axis stops. The stopping position is set as the home position.

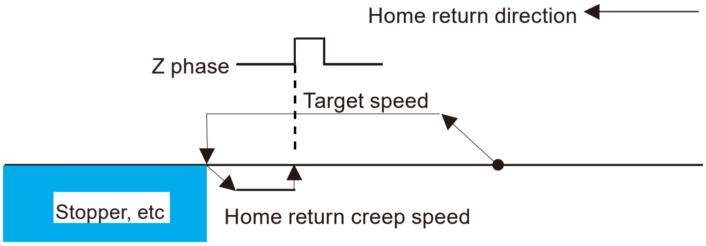


11.1.8 Stop-on-Contact Method 2 [Stop-on-Contact Detection + Home Position (Z Phase) Based on Front End]

After the axis is stopped by a mechanical stopping mechanism such as a stopper, the rotation of the motor is reversed. Then, the rising edge of the first home position (Z phase) is detected and the motor stops. The stopping position is set as the home position.

The reference home position can be selected from the three types shown in the following table.

Type	**Reference home position**
Stop-on-contact method 2	Stop-on-contact detection + Home position (Z phase) based on front end
Stop-on-contact method 2 (E2)	Stop-on-contact detection + External latch input 2 (EXT2) based on front end
Stop-on-contact method 2 (E3)	Stop-on-contact detection + External latch input 3 (EXT3) based on front end

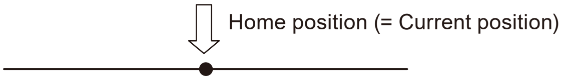


(Note 1) If the home position (Z phase) is ON at the time of startup, it will not be regarded as a home position (Z phase). Searches for a limit switch will be started.

(Note 2) The reference home position differs according to the selected home return type. (Z-phase, EXT2, EXT3)

11.1.9 Data setting method

The current position is set as the home position.



11.2 Combination of Parameters and Home Return

When using either "DOG method 2" or "Limit method 2" as the home return method, change the paramers on the AMP side to pattern B shown below. If the operation is executed with the pattern A setting (factory default setting), the latch input allocation error protection (error code 0821H: 3-38) will occur.

11.2.1 Home Return Method and AMP Parameter Setting

(●: Available, Blank: Not available)

FP0H Positioning Unit Home return method	Reference home position	A6N / A5N parameters	
		Pattern A	Pattern B
DOG method 1	Home (Z phase)	●	●
DOG method 1 (E2)	External latch input 2	●	
DOG method 1 (E3)	External latch input 3	●	
DOG method 2	Near home (DOG)		●
DOG method 3	Home (Z phase)	●	●
DOG method 3 (E2)	External latch input 2	●	
DOG method 3 (E3)	External latch input 3	●	
Limit method 1	Home (Z phase)	●	●
Limit method 1 (E2)	External latch input 2	●	
Limit method 1 (E3)	External latch input 3	●	
Limit Method 2	Limit - (NOT) / Limit + (POT)		●
Z phase method	Home (Z phase)	●	●
EXT2 method	External latch input 2	●	
EXT3 method	External latch input 3	●	
Stop-on-contact method 1	Mechanical stop mechanism such as a stopper	●	●
Stop-on-contact Method 2	Home (Z phase)	●	●
Stop-on-contact method 2 (E2)	External latch input 2	●	
Stop-on-contact method 2 (E3)	External latch input 3	●	
Data set method	-	●	●

11.2.2 Patterns

Pattern A (factory default setting)

Parameter No.	X4 connector		Parameter value (HEX)	Pin assignment setting		Revised items
	Terminal name	Terminal No.				
Pr 4.00	SI1	5	00323232H	SI-MON5	A contact	
Pr 4.01	SI2	7	00818181H	POT	B contact	●
Pr 4.02	SI3	8	00828282H	NOT	B contact	●
Pr 4.03	SI4	9	002E2E2EH	SI-MON1	A contact	
Pr 4.04	SI5	10	00222222H	HOME	A contact	
Pr 4.05	SI6	11	00212121H	EXT2	A contact	●
Pr 4.06	SI7	12	002B2B2BH	EXT3	A contact	●
Pr 4.07	SI8	13	00313131H	SI-MON4	A contact	

Pattern B (after change)

Parameter No.	X4 connector		Parameter value (HEX)	Pin assignment setting		Revised items
	Terminal name	Terminal No.				
Pr 4.00	SI1	5	00323232H	SI-MON5	A contact	
Pr 4.01	SI2	7	00000000H	Disabled		●
Pr 4.02	SI3	8	00000000H	Disabled		●
Pr 4.03	SI4	9	002E2E2EH	SI-MON1	A contact	
Pr 4.04	SI5	10	00222222H	HOME	A contact	
Pr 4.05	SI6	11	00010101H	POT	A contact	●
Pr 4.06	SI7	12	00020202H	NOT	A contact	●
Pr 4.07	SI8	13	00313131H	SI-MON4	A contact	

11.3 Types of Home Return (Absolute)

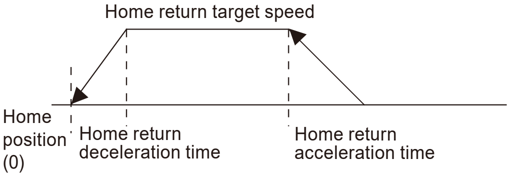
With the MINAS A6N Ver1.24 or higher version, the home return type available for the incremental encoder can also be used for the absolute encoder.

When using an amplifier with a version lower than the above, only the home return type described in the following section is available.

11.3.1 High-speed Home Return

Executing high-speed home return enables the axis to move to the home position (position 0) of the coordinate system for the absolute encoder.

The operation is similar to that of a positioning operation. After home return is complete, the deviation counter is not cleared.

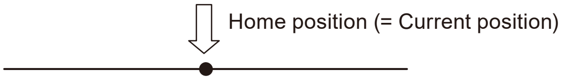


Info.

- If clearing the deviation counter is required, it must be executed separately. For details on the deviation counter clearing function, refer to "14.7 Deviation Counter Clearing Function".

11.3.2 Absolute Data Setting Method

The current position is set as the home position.

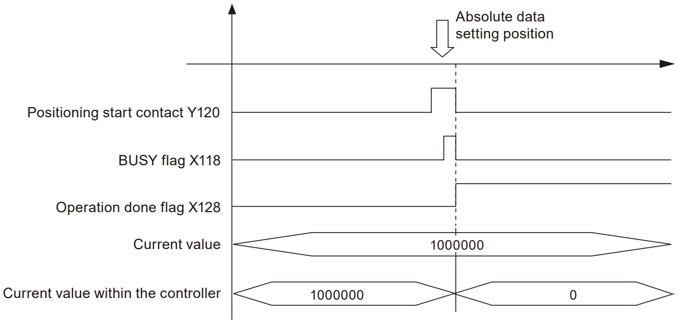


Behavior of absolute data setting method

- The current value managed within the controller becomes 0, but the current value of the servo amplifier does not become 0.
- The controller reads the current value from the servo amplifier. The data that has been read is stored in addresses 16#0330 to 16#033F in bank 16#00 (common area) as data set offset values.

Behavior diagram of absolute data setting method

When home return is executed by the absolute data set method when both the current value of the servo amplifier and the current value within the controller are "1000000"

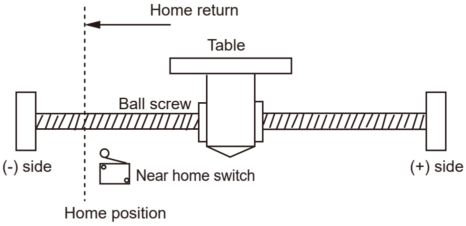


Info.

- With the FP0H Positioning Unit RTEX, no backup processing is required because the home position is managed by the unit. The data offset value is retained even after the system is restarted and, therefore, the data offset value is deducted from the current value within the controller as a display value.
- When using a servo amplifier of the MINAS A6N Ver.1.24 or higher version, the "Data set method" available for the incremental encoder can be used. The current value of the amplifier is set to 0 when the "Data set method" is used.

11.4 Settings and Operation of Home Return

The example below is the case where home return is performed on Axis 1 by using slot number 0. The unit is the number of pulses.

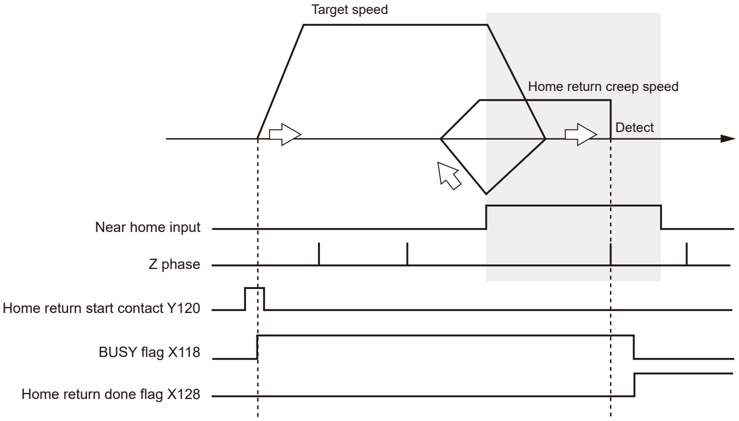


Settings

Positioning parameters required for setting up home return can be set in **Axis Settings** >**Parameter Settings** on Configurator PM7-RTEX.

Item	Setting example
Return setting code	0: DOG method 1
Return direction	0: Limit (-) direction
Acceleration time (ms)	100 ms
Deceleration time (ms)	100 ms
Target speed	10,000 pps
Return creep speed	1000 pps

Behavior diagram



Behaviors of each contact

- The BUSY flag (X118), which indicates that the motor is running, turns ON when home return starts, and turns OFF when the operation is completed.
- The home return complete flag (X128), which indicates the completion of operation, turns ON when the home return operation is completed, and remains ON until the next position control, JOG operation, home return, or pulser operation starts. The flag turns ON upon completion of the home return.

■ Notes on programming

- The starting contact and flag number vary depending on the axis number.

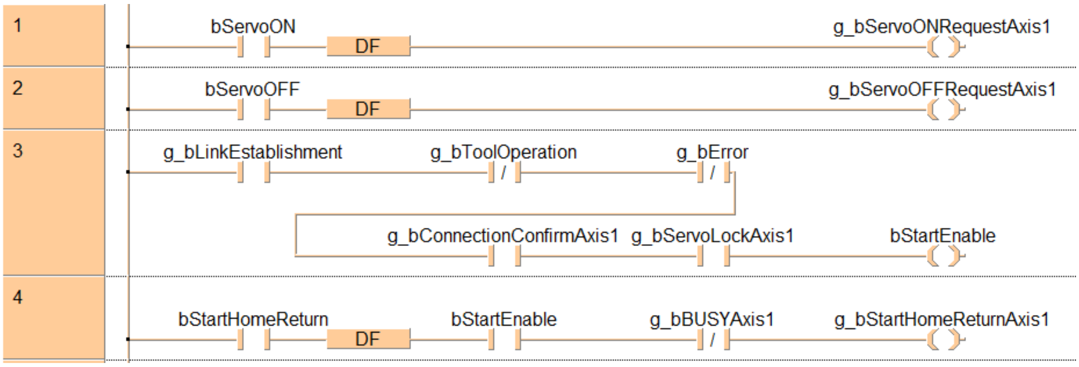
■ Sample programs

- The following sample program performs a home return operation on Axis 1 by using slot number 0.
- For setting examples of positioning parameters for home return, refer to "Settings".

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bServoOFF		BOOL	FALSE	Servo OFF
VAR	bServoON		BOOL	FALSE	Servo ON
VAR	bStartEnable		BOOL	FALSE	Start enable flag
VAR	bStartHomeReturn		BOOL	FALSE	Stop-on-contact torque value for home return
VAR_EXTERNAL	g_bBUSYAxis1	X118	BOOL	FALSE	Axis 1 BUSY
VAR_EXTERNAL	g_bConnectionConfirmAxis1	X108	BOOL	FALSE	Axis 1 connection confirmation
VAR_EXTERNAL	g_bError	X105	BOOL	FALSE	Error notification
VAR_EXTERNAL	g_bLinkEstablishment	X100	BOOL	FALSE	Preparation completion notification
VAR_EXTERNAL	g_bServoLockAxis1	X110	BOOL	FALSE	Servo lock for axis 1
VAR_EXTERNAL	g_bServoOFFRequestAxis1	Y110	BOOL	FALSE	Axis 1 Servo OFF request
VAR_EXTERNAL	g_bServoONRequestAxis1	Y108	BOOL	FALSE	Axis 1 servo ON request
VAR_EXTERNAL	g_bStartHomeReturnAxis1	Y120	BOOL	FALSE	Axis 1 home position start
VAR_EXTERNAL	g_bToolOperation	X104	BOOL	FALSE	Tool operation in progress

Ladder diagram (LD)



Structured text (ST)

```
g_bServoONRequestAxis1   := DF(bServoON);

g_bServoOFFRequestAxis1 := DF(bServoOFF);

bStartEnable    := g_bLinkEstablishment AND NOT g_bToolOperation AND NOT g_bError
                   AND g_bConnectionConfirmAxis1 AND g_bServoLockAxis1;

g_bStartHomeReturnAxis1 := DF(bStartHomeReturn) AND bStartEnable AND NOT g_bBUSYAxis1;
```

■ Behavior at limit input

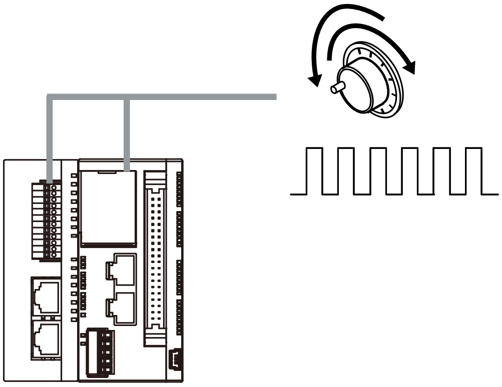
Condition	Direction	Limit status	Operation
At home return startup	Forward	Limit input (+): ON	Executable
		Limit input (-): ON	Executable
	Reverse	Limit input (+): ON	Executable
		Limit input (-): ON	Executable
During home return operation	Forward	Limit input (+): ON	Automatic reverse operation
	Reverse	Limit input (-): ON	Automatic reverse operation

12 Pulse Input Function

12.1 Pulse Input

12.1.1 Applications of pulse input

Pulse inputs can be used for the two applications shown below. Applications are selected in the **Axis Settings**>**Pulse Input Settings** dialog box of Configurator PM7-RTEX.



■ Specifications

Item	Description
Number of channels	Max. 3 channels (for both pulser input and high-speed counter)
Countable range	Countable range: -2,147,483,648 to +2,147,483,647 pulses
Input mode	2-phase input, direction identification input, individual input (multiplication function provided for each mode)

■ Applications of pulse input

Input target	Description
Pulser	Set this type when using a manual pulser. The pulser operation setting code can be used to specify the axis whose pulser is to be used .
High-speed counter	Set this type when using inputs for general-purpose counters. Various input methods (2-phase input, direction identification input, and individual input) are supported. The unit stores the number of input pulses in the monitor area.

■ Restrictions on combinations according to the application

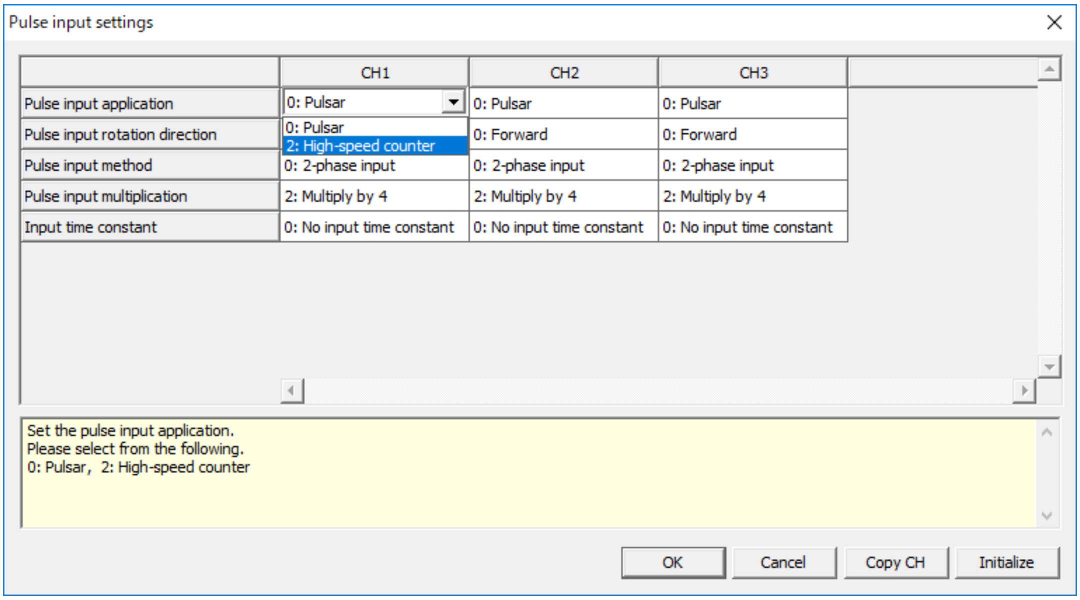
Pulse input method		Pulse input application	
		Pulser	High-speed counter
Input mode	2-phase input	○	○
	Direction identification input	×	○
	Individual input	×	○
Multiplication	Multiply by 1	×	○

Pulse input method		**Pulse input application**	
		Pulser	**High-speed counter**
	Multiply by 2	×	○
	Multiply by 4	○	○(Note 1)

(Note 1) This method can be set only when the input mode is "2-phase input".

12.1.2 Selecting the Pulse Input Application

The applications and methods for pulse input circuits are selected in the **Axis Settings**>**Pulse Input Setting** dialog box of Configurator PM7-RTEX.



Pulse input settings

	CH1	CH2	CH3
Pulse input application	0: Pulsar	0: Pulsar	0: Pulsar
Pulse input rotation direction	0: Pulsar 2: High-speed counter	0: Forward	0: Forward
Pulse input method	0: 2-phase input	0: 2-phase input	0: 2-phase input
Pulse input multiplication	2: Multiply by 4	2: Multiply by 4	2: Multiply by 4
Input time constant	0: No input time constant	0: No input time constant	0: No input time constant

Set the pulse input application.
Please select from the following.
0: Pulsar, 2: High-speed counter

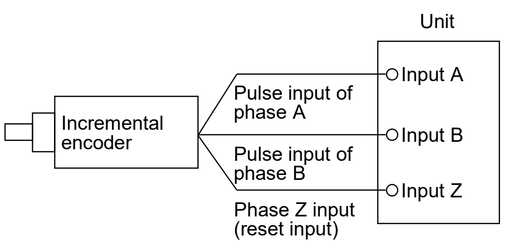
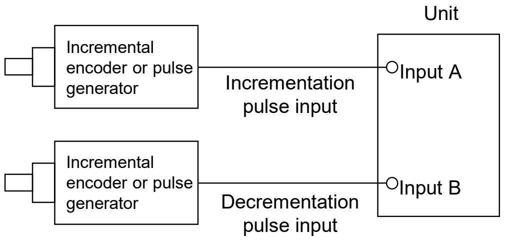
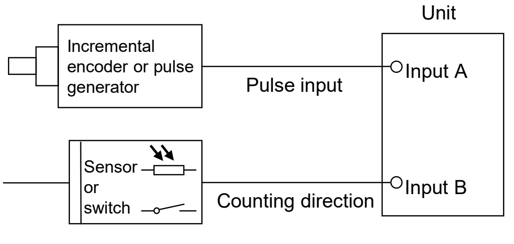
■ Setting item

Item	Default	Range
Pulse input application	0: Pulser	0: Pulser, 2: High-speed counter
Pulse input rotation direction	0: Forward	0: Forward, 1: Reverse
Pulse input method	0: 2-phase input	0: 2-phase input, 1: Direction identification input (Pulse/Sign), 2: Individual input (CW/CCW)
Pulse input multiplication	2: Multiply by 4	0: Multiply by 1, 1: Multiply by 2, 2: Multiply by 4
Input time constant	0: No input time constant	0: No input time constant, 1: 0.1us, 2: 0.5us, 3: 1.0us, 4: 2.0us, 5: 10.0us

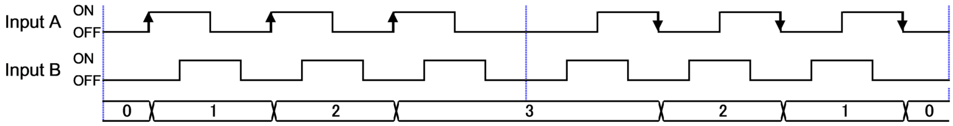
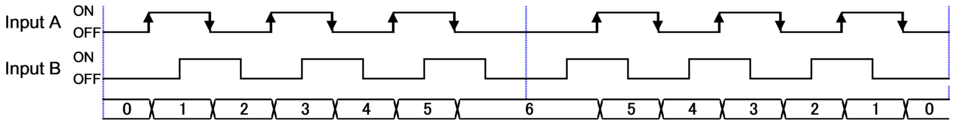
12.1.3 Input Methods of Pulse Input

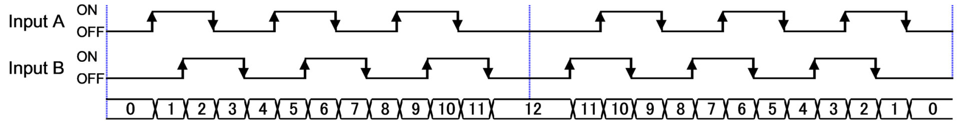
- Select from the following three types according to input devices to be connected.
- The count operation varies depending on the multiplication factor setting as shown below.

■ Input mode

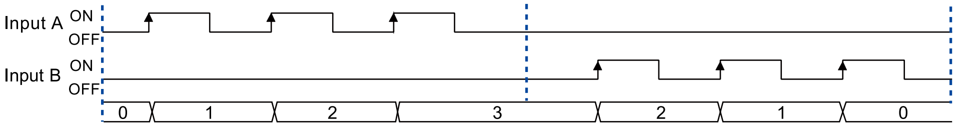
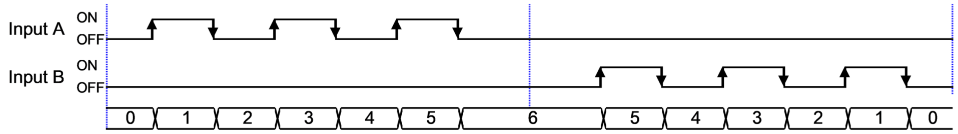
Method	Connection	Count
2-phase (phase difference)		For 2-phase input, the input A signal and input B signal of each counter are connected to phase A and phase B, respectively, in the encoder. The count direction depends on the phase difference between phases A and B. When phase A is ahead of phase B by 90 degrees in terms of the electrical angle, the count value is incremented. When phase A is behind phase B by 90 degrees in terms of the electrical angle, the count value is decremented.
Individual		For individual input, the counter is incremented when the level of the input A signal rises or falls, and decremented when the level of the input B signal rises or falls.
Direction identification		For direction identification input, the count signal is connected to the input A signal. The count direction is controlled by the direction signal level of the input B signal. When the input B signal is OFF, the counter is incremented when the level of the input A signal rises or falls. When the input B signal is ON, the counter is decremented.

■ Count operation of 2-phase input

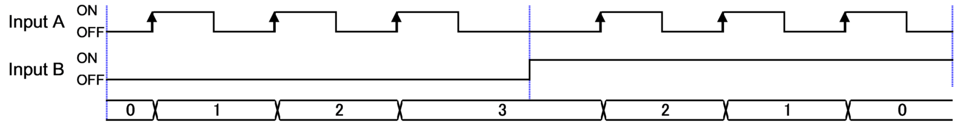
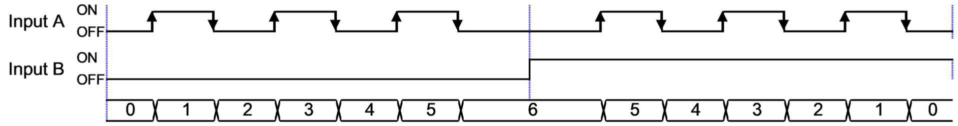
Multiplication	Timing chart		
		Incrementation	Decrementation
Multiply by 1			
Multiply by 2			

Multiplication	Timing chart	
	Incrementation	Decrementation
Multiply by 4		

Count operation of individual input

Multiplication	Timing chart	
	Incrementation	Decrementation
Multiply by 1		
Multiply by 2		

Count operation of direction identification input

Multiplication	Timing chart	
	Incrementation	Decrementation
Multiply by 1		
Multiply by 2		

12.1.4 Monitoring the Pulse Input Values

- Pulse input values are stored in the positioning memory (addresses 16#03C0 to 16#03C7 in bank 16#00). Pulse input values can be read and monitored by using a user program.
- Pulse input values are stored according to the pulse input application (pulser or high-speed counter). (Unit: pulses)
- Pulse input values are cumulatively stored, and cleared when the pulse input application is changed or when processing for clearing pulse input values is performed.

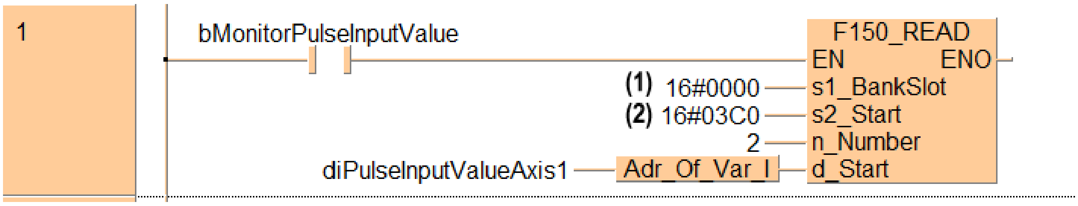
Sample programs

The following sample program monitors the pulse input value for CH1 of slot number 0.

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bMonitorPulseInputValue		BOOL	FALSE	Pulse input value monitor start
VAR	diPulseInputValueAxis1		DINT	0	Pulse input value of CH1

Ladder diagram (LD)



Structured text (ST)

```
if (bMonitorPulseInputValue) then
   F150_READ(s1_BankSlot := 16#0000, s2_Start := 16#03C0, n_Number := 2, d_Start :=Adr_Of_Var(diPulseInputValueAxis1));
end_if;                            (1)                   (2)
```

Code	Description	Values specified in the program		
		CH1	CH2	CH3
(1)	Bank, slot No.	16#0000 (bank 16#00, slot number 0)		
(2)	Pulse input value area	16#03C0-16#03C1	16#03C2-16#03C3	16#03C4-16#03C5

12.1.5 Pulse Input Value Change Function

When "High-speed counter" is selected as the pulse input application, a user program can be used to change the pulse input values stored in the positioning memory.

■ Pulse count control area (bank 16#00: common area)

<table>
<tr><th>Offset address</th><th>Name</th><th>Description</th></tr>
<tr><td>16#03A9</td><td>Pulse count value change request flag</td><td>When the bit corresponding to each axis changes from 0 to 1, the pulse input value is changed to the post-change pulse input value that has been set.
This flag is an edge trigger flag. When changing the pulse count value, always change this flag from 0 to 1.
After the pulse count value is changed, the unit automatically clears the corresponding bit to 0.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>CH1 pulse count change</td><td>0</td><td>0: Do not change the pulse input value
0→1: Change the pulse input value</td></tr>
<tr><td>1</td><td>CH2 pulse count change</td><td>0</td><td></td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Description</th></tr>
<tr><td></td><td></td><td><table><tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>2</td><td>CH3 pulse count change</td><td>0</td><td></td></tr><tr><td>15 to 3</td><td>-</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>16#03B0 to 16#03B1</td><td>CH1 pulse input changed value</td><td>Set the pulse input value to be changed for CH1.</td></tr>
<tr><td>16#03B2 to 16#03B3</td><td>CH2 pulse input changed value</td><td>Set the pulse input value to be changed for CH2.</td></tr>
<tr><td>16#03B4 to 16#03B5</td><td>CH3 pulse input changed value</td><td>Set the pulse input value to be changed for CH3.</td></tr>
</table>

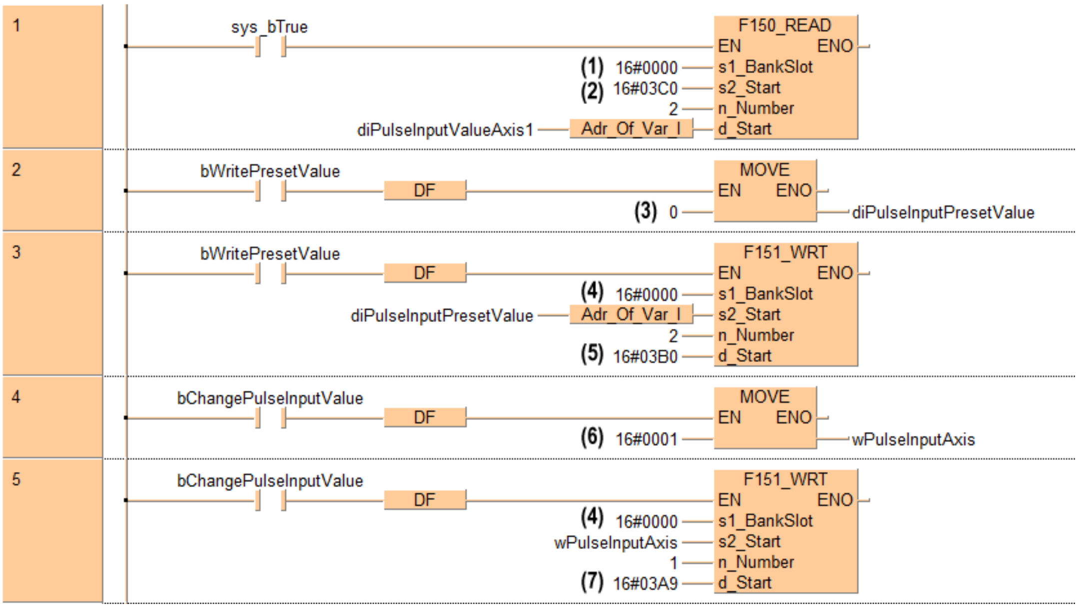
■ Sample programs

- The following sample program presets the pulse input value for CH1 in slot number 0 to an arbitrary value of 0. The first line of the program reads and monitors the pulse input value.
- The value to be written to the pulse input value is preset in the corresponding positioning memory and the changed value request flag for the corresponding channel is set. When the input value change is completed, the change request flag area (address 16#03A9 in bank 16#00) is reset to 0.

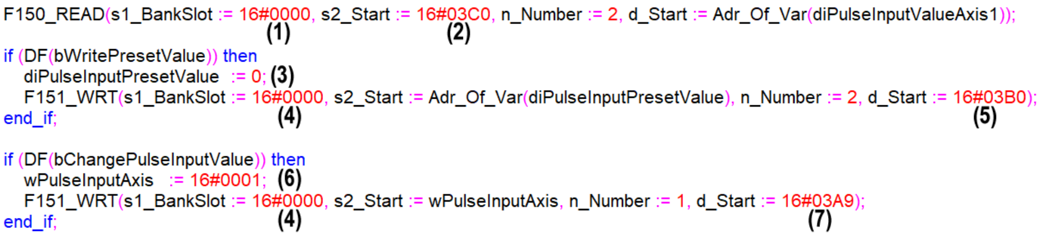
Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bChangePulseInputValue		BOOL	FALSE	Pulse input value change request
VAR	bWritePresetValue		BOOL	FALSE	Pulse input changed value setting
VAR	diPulseInputPresetValue		DINT	0	Pulse input changed value
VAR	diPulseInputValueAxis1		DINT	0	Axis 1 pulse input value
VAR	wPulseInputAxis		WORD	0	Pulse count value change request flag

Ladder diagram (LD)



Structured text (ST)



```
F150_READ(s1_BankSlot := 16#0000, s2_Start := 16#03C0, n_Number := 2, d_Start := Adr_Of_Var(diPulseInputValueAxis1));
                         (1)                  (2)
if (DF(bWritePresetValue)) then
    diPulseInputPresetValue  := 0; (3)
    F151_WRT(s1_BankSlot := 16#0000, s2_Start := Adr_Of_Var(diPulseInputPresetValue), n_Number := 2, d_Start := 16#03B0);
end_if;                    (4)                                                                                  (5)

if (DF(bChangePulseInputValue)) then
    wPulseInputAxis   := 16#0001;  (6)
    F151_WRT(s1_BankSlot := 16#0000, s2_Start := wPulseInputAxis, n_Number := 1, d_Start := 16#03A9);
end_if;                    (4)                                                          (7)
```

Code	Items specified in the program	Values specified in the program		
		CH1	CH2	CH3
(1)	Bank, slot No.	16#0000 (bank 16#00, slot number 0)		
(2)	Area storing pulse input values	16#03C0	16#03C2	16#03C4
(3)	Changed value	Arbitrary value		
(4)	Bank, slot No.	16#0000 (bank 16#00, slot number 0)		
(5)	Pulse count value changed value area	16#03B0	16#03B2	16#03B4
(6)	Set value in pulse count value change request flag area	16#0001	16#0002	16#0004
(7)	Pulse count value change request flag area	16#03A9		

12.2 Settings and Operation of Pulser Operation

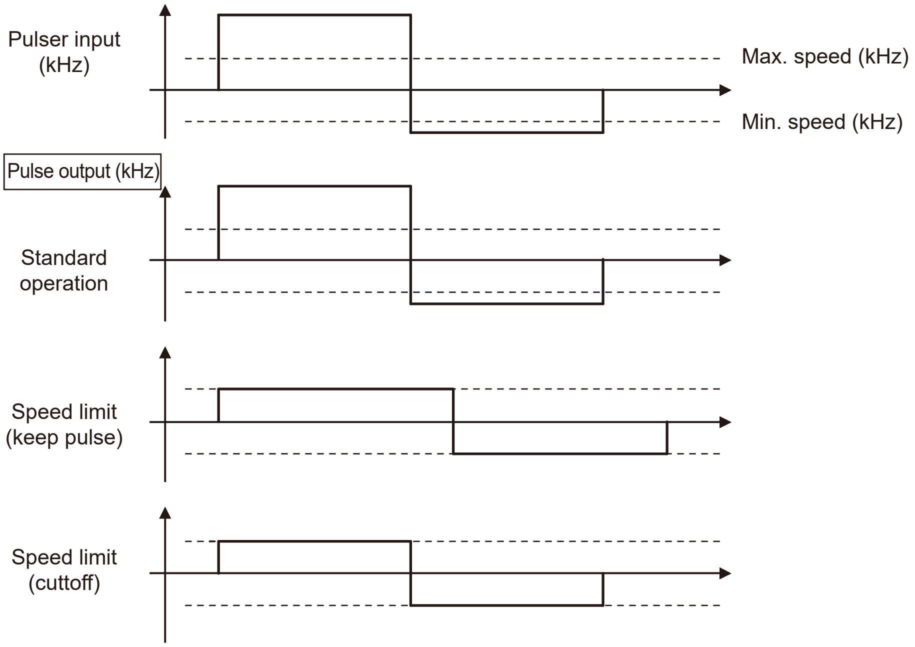
12.2.1 Overview of Pulser Operation

This function is used to connect axes by manual operation via the pulsers connected to the pulser input connectors of the positioning unit RTEX.

- Pulsers for up to three channels can be connected.
- Pulsers can be operated for up to eight axes. A pulser connected as an internal signal can be selected for each axis. Multiple channels can be activated simultaneously with one pulsar.

■ Pulser input method

Operation method	Operation
Standard operation	The number of pulses from a pulser is obtained every 1 ms to perform operations. The input contents of a pulser are reflected directly in actual operations.
Speed limit (Pulses held)	When the pulser input speed exceeds the specified maximum speed, operations are performed by holding the maximum speed. Pulses input from a pulser are held. Therefore, pulses that cannot be output are held, so pulses may be output even if there is no input from the pulser. The unit of speed is “Set unit x 1000/s”.
Speed limit (Time held)	When the pulser input speed exceeds the specified maximum speed, operations are performed by holding the maximum speed. Pulses that cannot be output are discarded, and pulse output is interlocked with pulser operation. The unit of speed is “Set unit x 1000/s”.

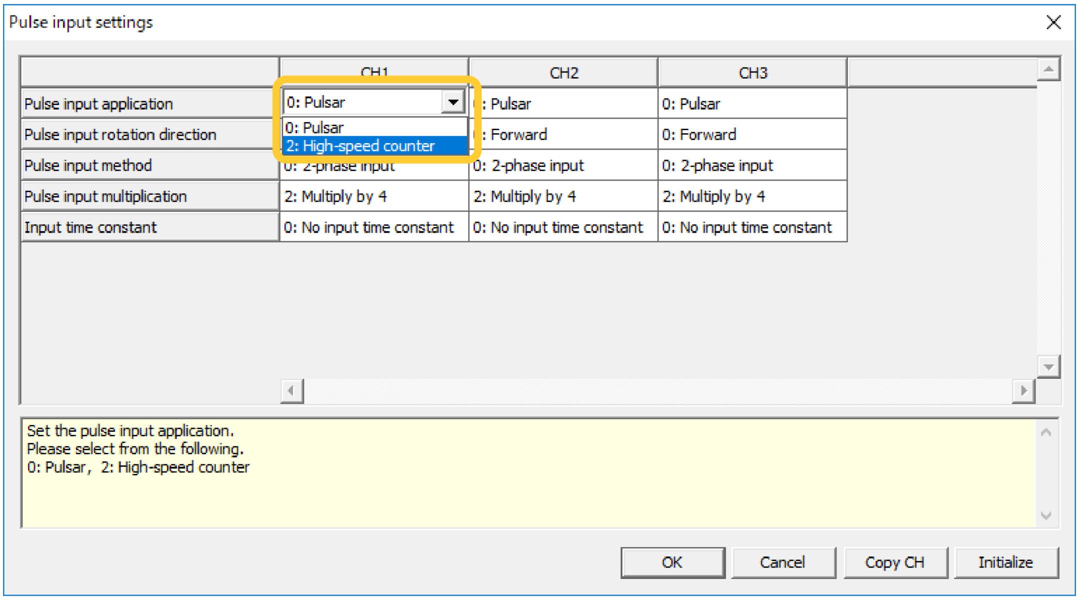


12.2.2 Settings for Pulser Operation

When performing pulser operation, set the parameters in the two dialog boxes "Pulse Input Settings" and "Parameter Settings" in Configurator PM7-RTEX.

■ Pulse input settings

Select "Pulser" from the Pulse input application row.



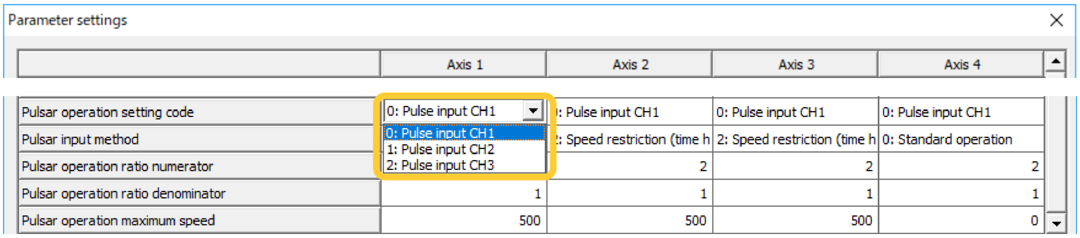
	CH1	CH2	CH3
Pulse input application	0: Pulsar	: Pulsar	0: Pulsar
Pulse input rotation direction		: Forward	0: Forward
Pulse input method	0: 2-phase input	0: 2-phase input	0: 2-phase input
Pulse input multiplication	2: Multiply by 4	2: Multiply by 4	2: Multiply by 4
Input time constant	0: No input time constant	0: No input time constant	0: No input time constant

Set the pulse input application.
Please select from the following.
0: Pulsar, 2: High-speed counter

Item	Setting example	Range
Pulse input application	0: Pulser	"0: Pulser"
Pulse input rotation direction	0: Forward	"0: Forward", "1: Reverse"
Pulse input method	0: 2-phase input	When using the pulser, only "0: 2-phase input" can be set.
Pulse input multiplication	2: Multiply by 4	When using the pulser, only "2: Multiply by 4" can be set.

■ Parameter Settings menu

- For the "Pulser operation setting code" item for the axis on which the pulser operation is performed, select the channel number of the pulse input to be connected.
- The movement amount per pulse signal from the pulser can be changed by setting the ratio numerator and ratio denominator for the input signal from the pulser.

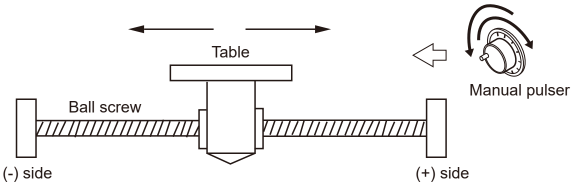


	Axis 1	Axis 2	Axis 3	Axis 4
Pulsar operation setting code	0: Pulse input CH1	: Pulse input CH1	0: Pulse input CH1	0: Pulse input CH1
Pulsar input method		: Speed restriction (time h	2: Speed restriction (time h	0: Standard operation
Pulsar operation ratio numerator		2	2	2
Pulsar operation ratio denominator	1	1	1	1
Pulsar operation maximum speed	500	500	500	0

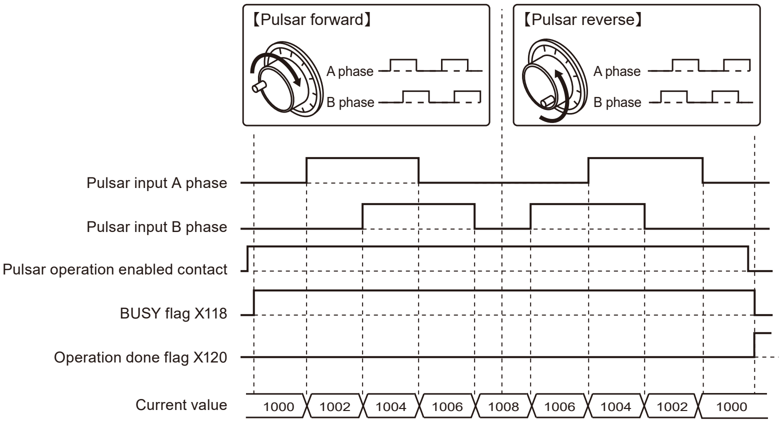
Item	Setting example	Range
Pulsar operation setting code	0: Pulse input CH1	"0: Pulse input CH1", "1: Pulse input CH2", "2: Pulse input CH3"
Pulser input method	2: Speed limit (time held)	"0: Standard operation", "1: Speed limit (pulses held)", "2: Speed limit (time held)"
Pulser operation ratio numerator	2	1 to 32,767
Pulser operation ratio denominator	1	1 to 32,767
Pulser operation maximum speed	500	Pulses: 0 to 2,147,482,624 pps

12.2.3 Operations during Pulser Operation

The example below is the case where pulser operation is performed for Axis 1. The unit is the number of pulses.



■ Behavior diagram



■ Behaviors of each contact

- The BUSY flag (X118), which indicates that the motor is running, turns ON when the pulser operation enabled contact turns ON, and turns OFF when the pulser operation enabled contact turns OFF.
- The operation done flag (X120), which indicates the completion of operation, turns ON when the pulser operation enabled contact turns OFF, and remains ON until the next position control, JOG operation, home return, or pulser operation starts.

Notes on programming

- The starting contact and flag number vary depending on the axis number.

Related positioning parameters

Bank	address End of offset	Name	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7 (virtual)	8 axes (virtual)
16#00 (common area)	16#0063	Maximum speed for pulser operation Permit	Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7

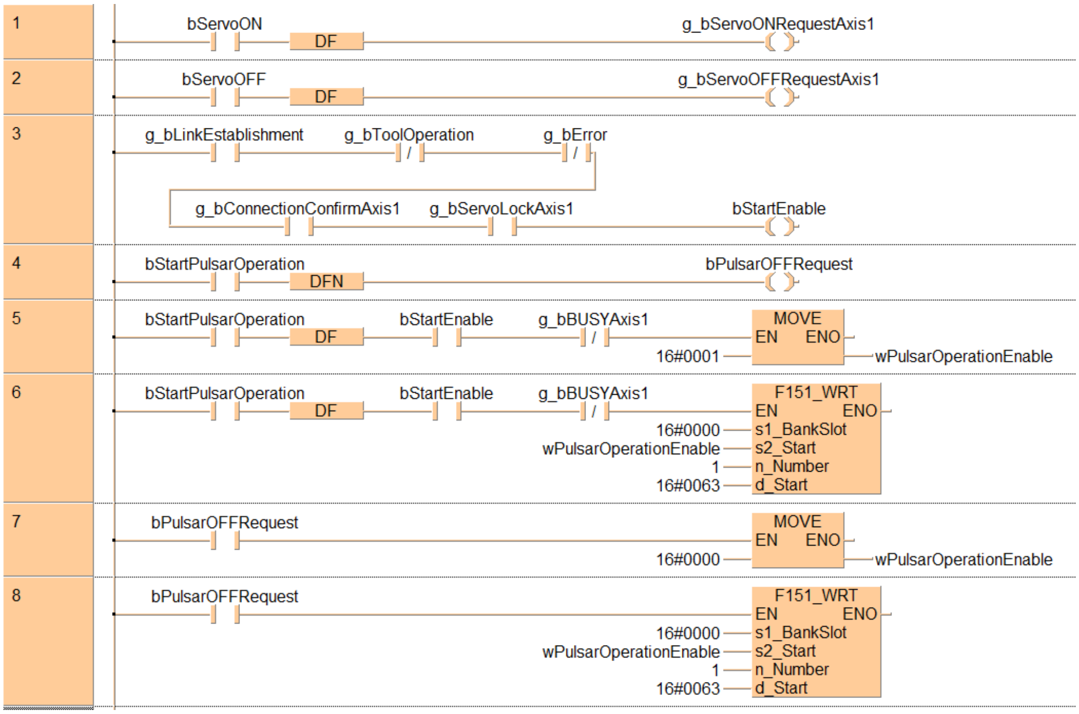
Sample programs

- The following sample program performs a pulser operation on Axis 1 of slot number 0.
- For details on pulser operation settings, refer to "Pulse input settings" and "Parameter settings menu" in "12.2.2 Settings for Pulser Operation".

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bPulsarOFFRequest		BOOL	FALSE	Pulser OFF edge
VAR	bServoOFF		BOOL	FALSE	Servo OFF
VAR	bServoON		BOOL	FALSE	Servo ON
VAR	bStartEnable		BOOL	FALSE	Start enable flag
VAR	bStartPulsarOperation		BOOL	FALSE	Maximum speed for pulser operation
VAR_EXTERNAL	g_bBUSYAxis1	X118	BOOL	FALSE	Axis 1 BUSY
VAR_EXTERNAL	g_bConnectionConfirmAxis1	X108	BOOL	FALSE	Axis 1 connection confirmation
VAR_EXTERNAL	g_bError	X105	BOOL	FALSE	Error notification
VAR_EXTERNAL	g_bLinkEstablishment	X100	BOOL	FALSE	Preparation completion notification
VAR_EXTERNAL	g_bServoLockAxis1	X110	BOOL	FALSE	Servo lock for axis 1
VAR_EXTERNAL	g_bServoOFFRequestAxis1	Y110	BOOL	FALSE	Axis 1 Servo OFF request
VAR_EXTERNAL	g_bServoONRequestAxis1	Y108	BOOL	FALSE	Axis 1 servo ON request
VAR_EXTERNAL	g_bToolOperation	X104	BOOL	FALSE	Tool operation in progress
VAR	wPulsarOperationEnable		WORD	0	Pulser operation enabled flag

Ladder diagram (LD)



Structured text (ST)

```
g_bServoONRequestAxis1  := DF(bServoON);

g_bServoOFFRequestAxis1 := DF(bServoOFF);

bStartEnable     := g_bLinkEstablishment AND NOT g_bToolOperation AND NOT g_bError
                    AND g_bConnectionConfirmAxis1 AND g_bServoLockAxis1;

bPulsarOFFRequest    := DFN(bStartPulsarOperation);

if (DF(bStartPulsarOperation)AND bStartEnable AND NOT g_bBUSYAxis1) then
   wPulsarOperationEnable  := 16#0001;
   F151_WRT(s1_BankSlot := 16#0000, s2_Start := wPulsarOperationEnable, n_Number := 1, d_Start := 16#0063);
end_if;

if (bPulsarOFFRequest) then
   wPulsarOperationEnable  := 16#0000;
   F151_WRT(s1_BankSlot := 16#0000, s2_Start := wPulsarOperationEnable, n_Number := 1, d_Start := 16#0063);
end_if;
```

■ Behavior at limit input

Condition	Direction	Limit status	Operation
When pulser operation starts	Forward	Limit input (+): ON	Startup failure, error occurrence
		Limit input (-): ON	Executable
	Reverse	Limit input (+): ON	Executable
		Limit input (-): ON	Startup failure, error occurrence

Condition	Direction	Limit status	Operation
During pulser operation	Forward	Limit input (+): ON	Deceleration stoppage, error occurrence
	Reverse	Limit input (-): ON	Deceleration stoppage, error occurrence

12.3 High-speed Counter Function

12.3.1 Overview of High-speed Counter Function

Setting the pulse input application to “High-speed counter” enables the unit to use pulse inputs as external counters.

Info.

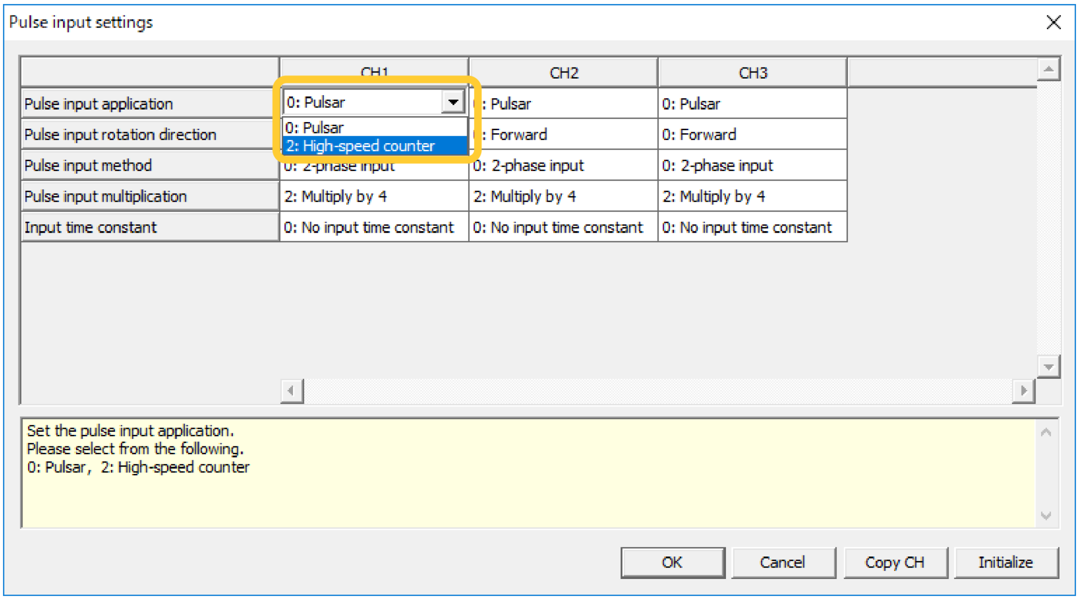
- For details on monitoring the count value, refer to "12.1.4 Monitoring the Pulse Input Values".
- For details on how to preset the count value, refer to "12.1.5 Pulse Input Value Change Function".
- For details on the high-speed counter function of the general-purpose I/O unit, refer to the “FP0H User’s Manual (Positioning / PWM Output / High-speed Counter)”.

12.3.2 Settings for Using the High-speed Counter

When using the pulse input function as a high-speed counter, specify settings in the "Pulse Input" dialog box of Configurator PM7-RTEX.

■ Pulse input settings

Select "High-speed counter" from the Pulse input application row.



Pulse input settings

	CH1	CH2	CH3
Pulse input application	0: Pulsar	: Pulsar	0: Pulsar
Pulse input rotation direction	0: Pulsar 2: High-speed counter	: Forward	0: Forward
Pulse input method	0: 2-phase input	0: 2-phase input	0: 2-phase input
Pulse input multiplication	2: Multiply by 4	2: Multiply by 4	2: Multiply by 4
Input time constant	0: No input time constant	0: No input time constant	0: No input time constant

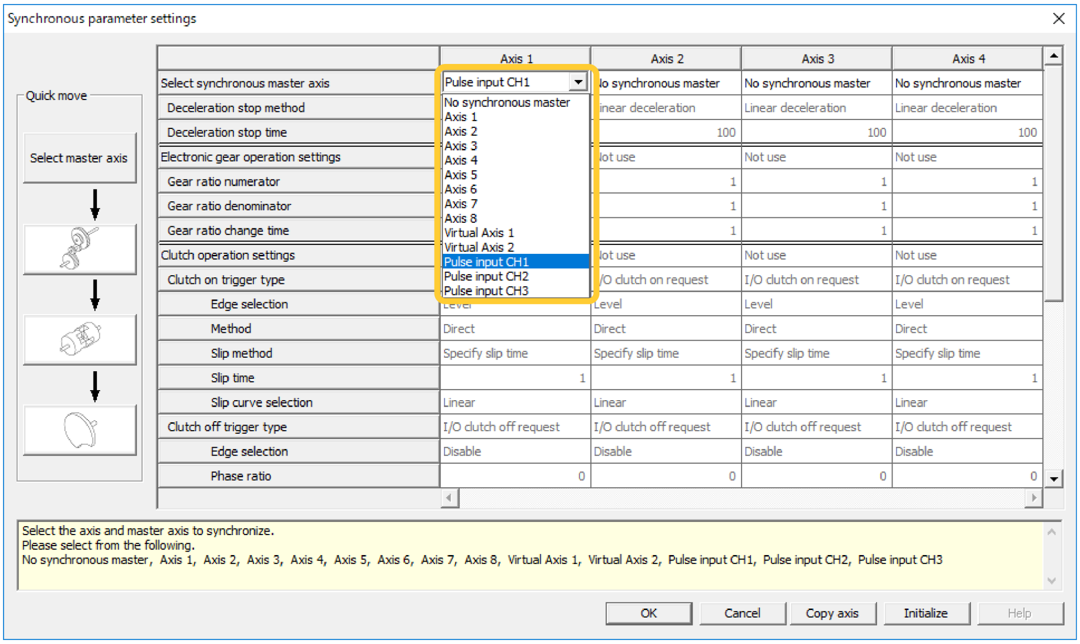
Set the pulse input application.
Please select from the following.
0: Pulsar, 2: High-speed counter

Item	Setting example	Range
Pulse input application	2: High-speed counter	"2: High-speed counter"
Pulse input rotation direction	0: Forward	"0: Forward", "1: Reverse"

Item	Setting example	Range
Pulse input method	0: 2-phase input	"0: 2-phase input", "1: Direction identification input (Pulse/Sign)", "2: Individual input (CW/CCW)"
Pulse input multiplication	2: Multiply by 4	"0: Multiply by 1", "1: Multiply by 2", "2: Multiply by 4"
Input time constant	0: No input time constant	"0: No input time constant", "1: 0.1 us", "2: 0.5 us", "3: 1.0 us", "4: 2.0 us", "5: 10.0 us"

Info.

- When using pulse inputs as the master axis for synchronous control, select an arbitrary pulse input channel from the "Select synchronous master axis" item in the "Synchronization Parameter Settings" dialog box.



	Axis 1	Axis 2	Axis 3	Axis 4
Select synchronous master axis	Pulse input CH1	lo synchronous master	No synchronous master	No synchronous master
Deceleration stop method		inear deceleration	Linear deceleration	Linear deceleration
Deceleration stop time		100	100	100
Electronic gear operation settings		lot use	Not use	Not use
Gear ratio numerator		1	1	1
Gear ratio denominator		1	1	1
Gear ratio change time		1	1	1
Clutch operation settings		lot use	Not use	Not use
Clutch on trigger type		/O clutch on request	I/O clutch on request	I/O clutch on request
Edge selection	Level	Level	Level	Level
Method	Direct	Direct	Direct	Direct
Slip method	Specify slip time	Specify slip time	Specify slip time	Specify slip time
Slip time	1	1	1	1
Slip curve selection	Linear	Linear	Linear	Linear
Clutch off trigger type	I/O clutch off request	I/O clutch off request	I/O clutch off request	I/O clutch off request
Edge selection	Disable	Disable	Disable	Disable
Phase ratio	0	0	0	0

Select the axis and master axis to synchronize.
Please select from the following.
No synchronous master, Axis 1, Axis 2, Axis 3, Axis 4, Axis 5, Axis 6, Axis 7, Axis 8, Virtual Axis 1, Virtual Axis 2, Pulse input CH1, Pulse input CH2, Pulse input CH3

12.3.3 Count Disable/Enable Control

■ Pulse input control

- If "High-speed counter" is selected for the pulse input application, counting the pulse input value can be stopped anytime. When counting the pulse input value is stopped, the current pulse input value is held.
- Whether to disable or enable counting of pulse inputs is set by writing to the following area by using a user program.

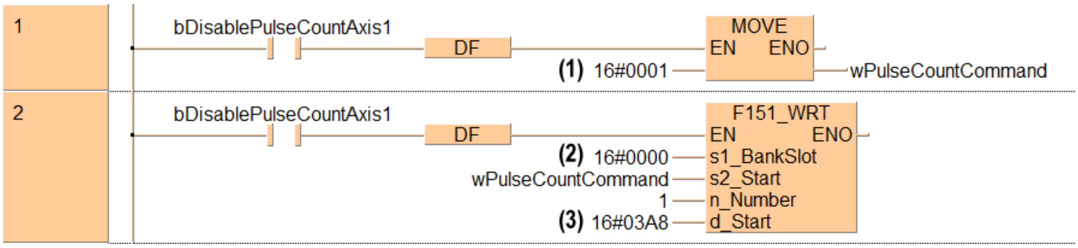
■ Sample programs

The following sample program disables pulse input for CH1 of slot number 0.

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bDisablePulseCountAxis1		BOOL	FALSE	Pulse input count disable request
VAR	wPulseCountCommand	DT3277	WORD	0	Pulse count enable flag

Ladder diagram (LD)



Structured text (ST)

```
if (DF(bDisablePulseCountAxis1)) then
   wPulseCountCommand    := 16#0001;  (1)
   F151_WRT(s1_BankSlot := 16#0000, s2_Start := wPulseCountCommand, n_Number := 1, d_Start := 16#03A8);
end_if;                           (2)                                                            (3)
```

Code	Description	Values specified in the program		
		CH1	CH2	CH3
(1)	Value corresponding to the axis for which counting is disabled	16#0001 (bit0)	16#0002 (bit1)	16#0004 (bit2)
(2)	Bank, slot No.	16#0000 (bank 16#00, slot number 0)		
(3)	Pulse count enable flag area	16#03A8		

(MEMO)

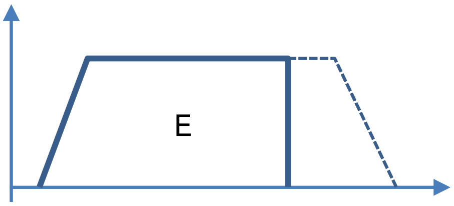
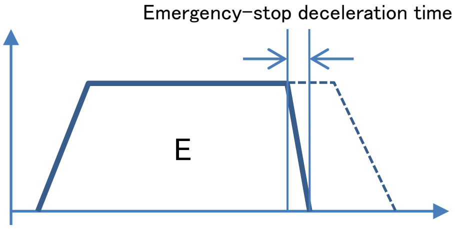
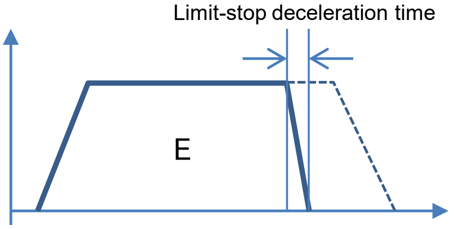
13 Stop Functions

13.1 Types and Settings of Stop Function

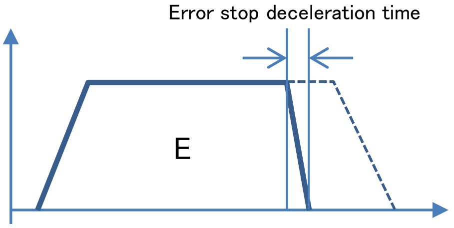
13.1.1 Stop Types

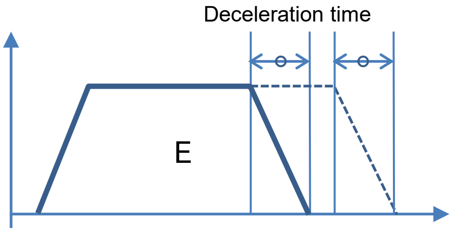
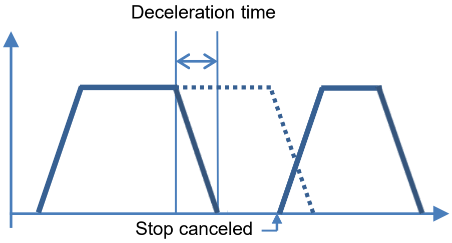
- The following seven types of stop are available.
- System stop, emergency stop, deceleration stop, and pause take effect when allocated output signals are turned ON by the user program.
- Limit stop, soft limit stop, and error stop take effect when the corresponding conditions are met.

■ Types of stop operation

Name	Time chart	Occurrence condition and operation
System stop		When the system stop contact (Y100) turns ON, the operations of all the axes immediately stop. System stop occurs in a deceleration time of 0 ms. A similar operation is also performed when the operating mode of the positioning unit RTEX is switched from RUN to PROG.
Emergency stop		When an emergency stop contact (Y140 to Y147) turns ON, the operation of the corresponding axis stops. Deceleration stop is performed in the "Emergency stop deceleration time" specified in the parameter settings menu of Configurator PM7-RTEX.
Limit stop		When limit input (+) or limit input (-) (X140 to X14F) turns ON, the operation of the corresponding axis stops. Deceleration is performed in the "Limit stop deceleration time" specified in the parameter settings menu of Configurator PM7-RTEX.

(Note 1) The contacts are indicated as allocated I/O when the positioning unit RTEX is installed in slot number 0.

Name	Timing chart	Occurrence condition and operation
Soft Limit stop		When the soft limit function is enabled, the operation of the corresponding axis stops when the range of the soft limit is exceeded. Deceleration is performed in the "Error stop deceleration time" specified in the parameter settings menu of Configurator PM7-RTEX.
Error stop		When a self-diagnostic error (error code 44: positioning operation error) occurs, the operation of the corresponding axis (all axes or each axis) stops.

Name	Timing chart	Occurrence condition and operation
		Deceleration is performed in the "Error stop deceleration time" specified in the parameter settings menu of Configurator PM7-RTEX. (Note 1)
Deceleration time stop (Note 1)		When a deceleration stop contact (Y148 to Y14F) turns ON, the operation of the corresponding axis stops. Deceleration is performed in the deceleration time specified for active positioning operations.
Temporary stop (Note 1)		When a deceleration stop (Y148 to Y14F) turns ON, the operation of the corresponding axis stops. Deceleration is performed in the deceleration time specified for active positioning operations. When a deceleration stop signal turns OFF, the deceleration stop is canceled and the stopped control restarts.

(Note 1) The operations of deceleration stop and pause are switched by using a user program to set up the system operation setting area in the positioning memory.

(Note 2) The contacts are indicated as allocated I/O when the positioning unit RTEX is installed in slot number 0.

■ Allocation of I/O signals

Signal name	I/O number							
	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7 (virtual)	8 axes (virtual)
System stop	Y100							
Emergency stop (Operation: Level type)	Y140	Y141	Y142	Y143	Y144	Y145	Y146	Y147
Deceleration stop (Operation: Level type)	Y148	Y149	Y14A	Y14B	Y14C	Y14D	Y14E	Y14F

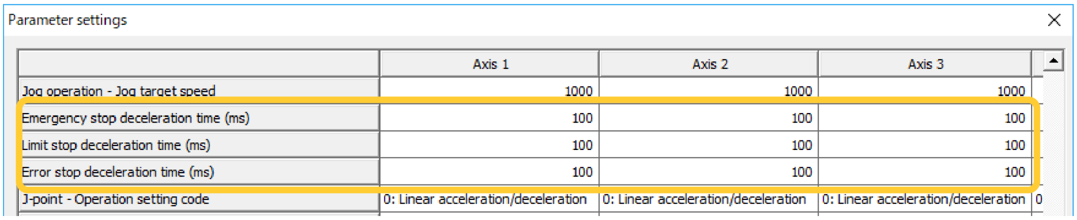
(Note 1) For interpolation control, turn ON the contact corresponding to the smallest axis number in the interpolation group.

(Note 2) The contacts are indicated as allocated I/O when the positioning unit RTEX is installed in slot number 0.

13.1.2 Setting the Stop Time

The stop time is specified for each axis using Configurator PM7-RTEX.

■ Setting stop time



Parameter settings

	Axis 1	Axis 2	Axis 3
Jog operation - Jog target speed	1000	1000	1000
Emergency stop deceleration time (ms)	100	100	100
Limit stop deceleration time (ms)	100	100	100
Error stop deceleration time (ms)	100	100	100
J-point - Operation setting code	0: Linear acceleration/deceleration	0: Linear acceleration/deceleration	0: Linear acceleration/deceleration

Item	Description
Emergency stop deceleration time	Set the deceleration time for emergency stop. 0 to 10,000 ms (Default value: 100 ms)
Limit stop deceleration time	Set the deceleration time for limit stop. 0 to 10000 ms (Default: 100 ms)
Error stop deceleration time	Set the deceleration time for error stop and soft limit stop. 0 to 10000 ms (Default: 100 ms)

13.2 Processing during Stop

■ Operation during stop

- System stop, emergency stop, deceleration stop, and pause are performed by turning ON each request contact in the I/O area.
- The stopped state is held while each contact is ON and until each request signal turns OFF. No operations can be performed during stop. The same applies to limit stop, soft limit stop, and error stop.

■ Priorities of each stop operation

- When stop control requests are made simultaneously, stop operations are executed according to the following priorities.

  (1) System stop > (2) Error stop/Soft limit stop/Limit stop > (3) Emergency stop > (4) Pause > (5) Deceleration stop
- The priorities of error stop, soft limit stop, and limit stop are the same.
- For stop operations with the same priority, the axis will stop at the stopping time of the stop operation that occurs first.

■ Dwell time setting

- Dwell time settings are disabled for stop operations, regardless of the pattern.
- However, dwell time settings are enabled for positioning operations after pause.

■ Flag processing

- For system stop, the BUSY signal turns OFF and the operation complete signal turns ON.
- For emergency stop, limit stop, soft limit stop, error stop, and deceleration stop, the BUSY signal turns OFF and the operation complete signal turns ON upon completion of deceleration.

■ Current value coordinates

- Even during stop operation, the current value coordinate area is always updated.
- After the emergency stop, limit stop, soft limit stop, error stop, deceleration stop, or pause, deceleration is performed in each specified deceleration time, and the values at the time of operation stop are stored.
- For system stop, the value at the time of operation stop is stored.

13.3 Pause Function

13.3.1 Overview of Pause Function

- The pause function temporarily stops the control during operation. The pause function is used by switching between the pause and deceleration stop functions.
- When the deceleration stop request contact turns ON, the pause function performs a deceleration stop in the deceleration time of the active control . The stopped state is then held while the deceleration stop request contact (Y148 to Y14F) is ON, and the stopped control is restarted when the deceleration stop request contact turns OFF.

Info.

- Deceleration stop cannot be executed while the pause function is being used. Use the emergency stop function to execute a stop operation when using the pause function.
- The pause function is valid only when automatic operation (positioning control) is being performed. During manual operation (JOG operation/home return/pulser operation), the operation is the same as for deceleration stop.
- As is the case with other stop functions, the pause function holds the stopped state while the deceleration stop request signal is ON. If an emergency stop or system stop is executed during a stop, the pause function will be canceled and the state will change to an emergency stop or system stop state.

13.3.2 Pause Settings

- The operations of deceleration stop and pause are switched by using a user program to set up the system operation setting area (address 16#0389 in bank 16#00) in the positioning memory.

■ **System operation setting area (bank 16#00: common area)**

Offset address	Name	Default	Description
16#0389	Deceleration stop operation	0	Specify the operation when the deceleration stop request signal is set to "Active" (changed from OFF to ON).
			0: Deceleration stop During repetitive operation, the axis stops after operations are performed up to the E-point of the repetitive operation.
			1: Pause Performs a deceleration stop, and restarts the positioning operation when the deceleration stop request signal is canceled (changed from ON to OFF). Also, the same operation as deceleration stop is performed during any operation other than a positioning operation. During repetitive operation, the axis stops after operations are performed up to the E-point of the repetitive operation and the positioning operation is restarted when the deceleration stop request signal is canceled (changed from ON to OFF). If a system stop or emergency stop is executed while the positioning unit is paused, the pause state will be canceled and the operation will not

Offset address	Name	Default	Description
			restart even if the deceleration stop request signal is canceled (changed from ON to OFF).

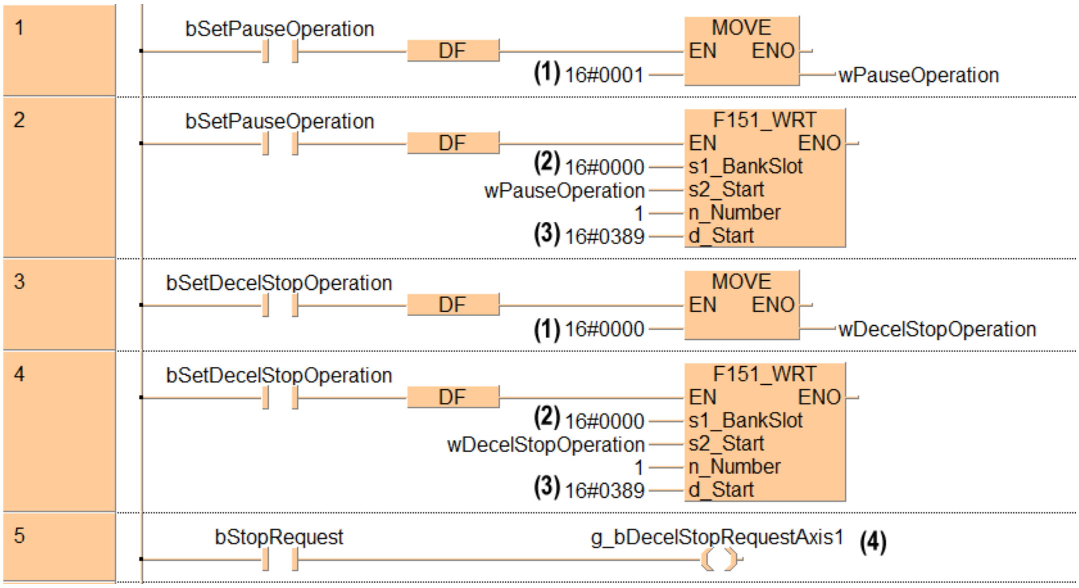
■ Sample program

- The following sample program switches the operation when the deceleration stop contact for Axis 1 of slot number 0 turns ON.
- The parameters corresponding to the operation to be performed are set in the system operation area (address 16#0389 in bank 16#00).

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bSetDecelStopOperation		BOOL	FALSE	Deceleration stop switchover request
VAR	bSetPauseOperation		BOOL	FALSE	Pause switchover request
VAR	bStopRequest		BOOL	FALSE	Deceleration stop request
VAR_EXTERNAL	g_bDecelStopRequestAxis1	Y148	BOOL	FALSE	Axis 1 deceleration stop request
VAR	wDecelStopOperation		WORD	0	Deceleration stop switchover flag
VAR	wPauseOperation		WORD	0	Pause switchover flag

Ladder diagram (LD)



Structured text (ST)

```
if (DF(bSetPauseOperation)) then
   wPauseOperation:= 16#0001; (1)
   F151_WRT(s1_BankSlot := 16#0000, s2_Start := wPauseOperation, n_Number := 1, d_Start := 16#0389);
end_if;                       (2)                                                                (3)

if (DF(bSetDecelStopOperation)) then
   wDecelStopOperation  := 16#0000; (1)
   F151_WRT(s1_BankSlot := 16#0000, s2_Start := wDecelStopOperation, n_Number := 1, d_Start := 16#0389);
end_if;                       (2)                                                                    (3)

g_bDecelStopRequestAxis1 := bStopRequest;
                    (4)
```

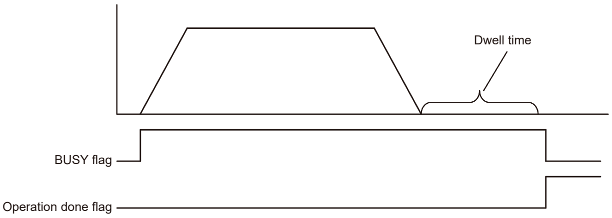
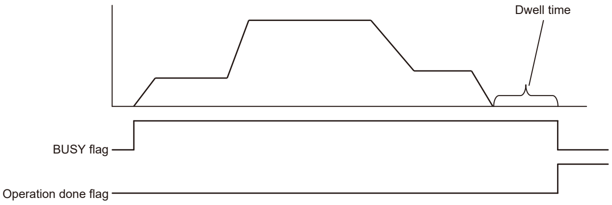
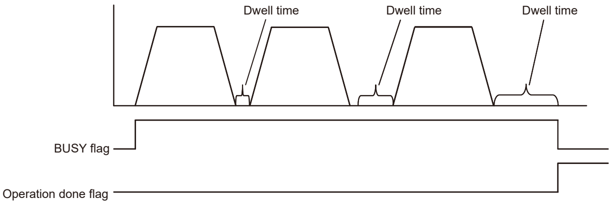
Code	Description	Values specified in the program							
		Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7 (virtual)	8 axes (virtual)
(1)	Positioning parameter values for switching operations	16#0000: Deceleration stop operation, 16#0001: Pause operation							
(2)	Bank, slot number	16#0000 (bank 16#00, slot number 0)							
(3)	System stop	16#0389							
(4)	Deceleration stop (Operation: Level type)	Y148	Y149	Y14A	Y14B	Y14C	Y14D	Y14E	Y14F

14 Auxiliary Functions

14.1 Dwell Time

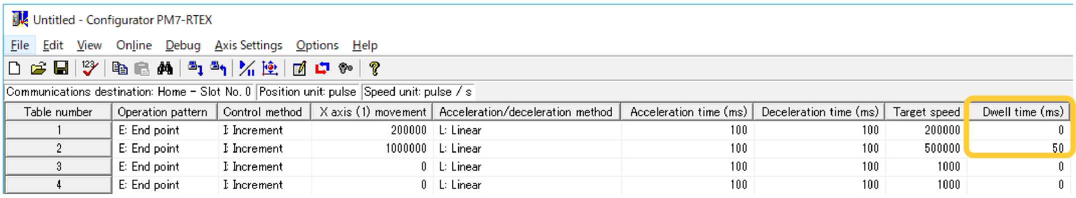
Dwell time refers to the time from the completion of execution of a positioning table during automatic operation until transition to the next operation.

■ Operation pattern and dwell time

Operation pattern	Dwell time and operation	
E-point control		The dwell time is the time taken from the completion of the position command until the operation done flag turns ON.
P-point control		For P-point control, dwell time is invalid, as positioning tables operate continuously. For the final table (E point), as is the case with E-point control, the dwell time is the time from the completion of the position command until the operation done flag turns ON.
C-point control		The dwell time is the waiting time required to execute the next table after completion of the positioning table (deceleration stop). For the last table (E point), as is the case with E-point control, dwell time is the time from the completion of the position command until the operation done flag turns ON.

■ Dwell time setting

- Dwell time is specified for each positioning table by using Configurator PM7-RTEX.
- Dwell time can be specified for each positioning data table within a range of 0 to 32,767 (ms).



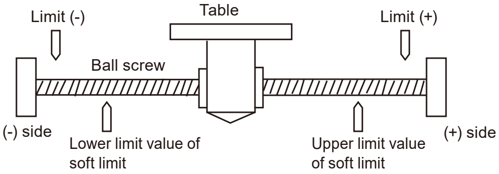
Communications destination: Home - Slot No. 0 | Position unit: pulse | Speed unit: pulse / s

Table number	Operation pattern	Control method	X axis (1) movement	Acceleration/deceleration method	Acceleration time (ms)	Deceleration time (ms)	Target speed	Dwell time (ms)
1	E: End point	I: Increment	200000	L: Linear	100	100	200000	0
2	E: End point	I: Increment	1000000	L: Linear	100	100	500000	50
3	E: End point	I: Increment	0	L: Linear	100	100	1000	0
4	E: End point	I: Increment	0	L: Linear	100	100	1000	0

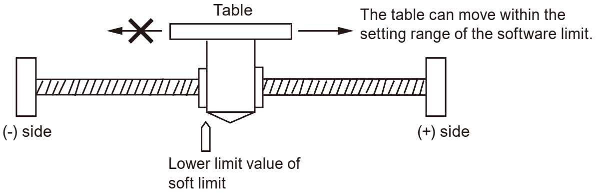
14.2 Soft Limit

■ Soft limit function

- The system is designed to mechanically set the limit (+) and limit (-) to restrict the moving range of the motor.
- Soft limits are a function that adds software-based limits relative to the absolute coordinates managed within the unit, aside from mechanical limits (+) and (-). As soft limits are a function for the protection of motors, servo amplifiers, and motor drivers, we recommend that soft limits be set within the range of mechanical limits (+) and (-) as below.

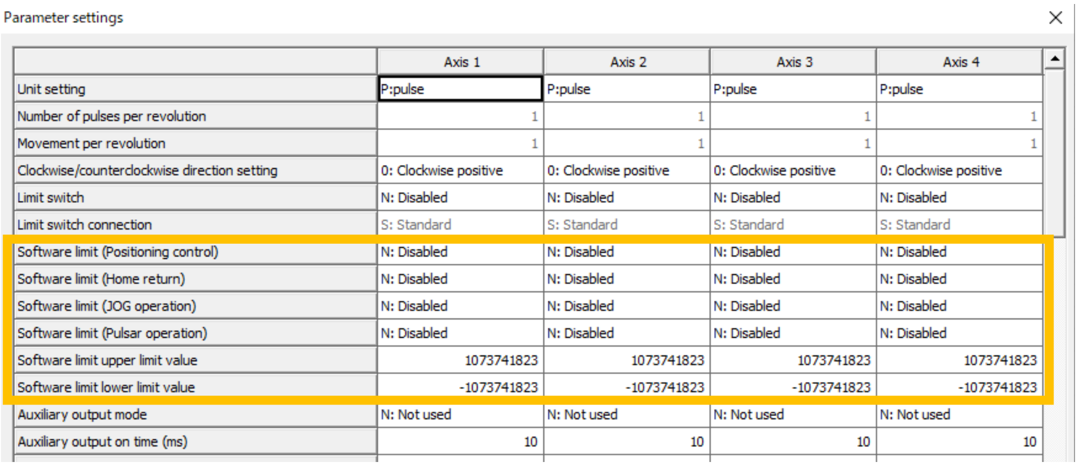


- When the setting range of soft limits (upper and lower limit values) is exceeded, an error occurs and deceleration stop is executed. After the motor stops, it is necessary to clear the error and move the motor within the range of soft limits by using an operation such as JOG operation.



■ Setting the soft limits

- Soft limits can be enabled or disabled using the "Parameter Settings" dialog box of Configurator PM7-RTEX.
- Soft limits can be enabled or disabled separately for positioning control, home return, JOG operation, and pulser operation. For example, soft limits can be disabled during home return or JOG operation.
- The soft limits of the slave axes when pulse input is specified for the master axis enable when the soft limits for pulser operation are enabled.

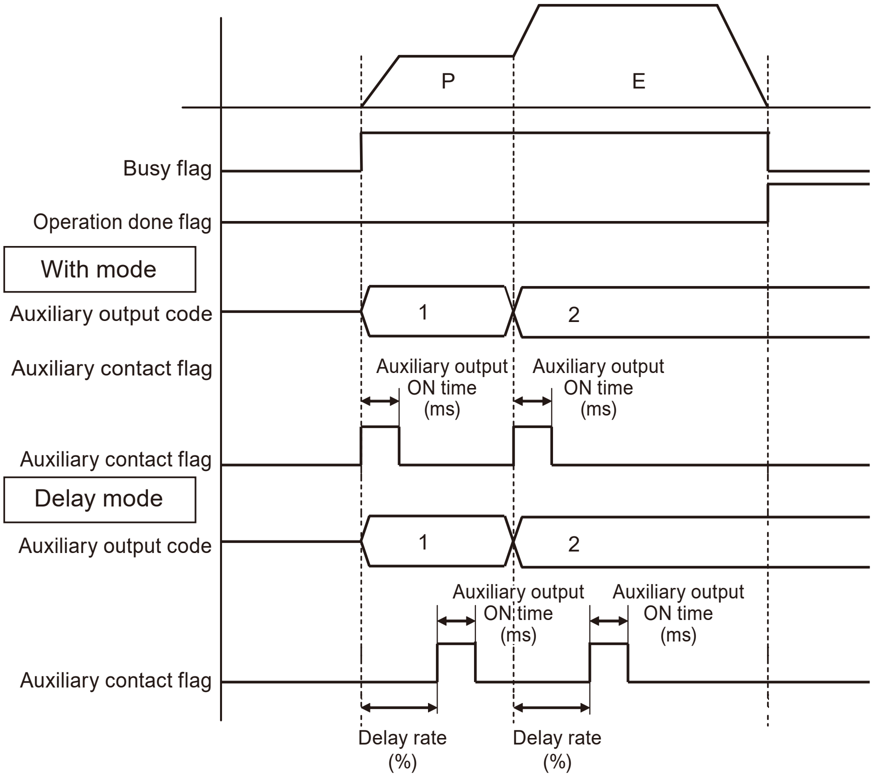


	Axis 1	Axis 2	Axis 3	Axis 4
Unit setting	P:pulse	P:pulse	P:pulse	P:pulse
Number of pulses per revolution	1	1	1	1
Movement per revolution	1	1	1	1
Clockwise/counterclockwise direction setting	0: Clockwise positive	0: Clockwise positive	0: Clockwise positive	0: Clockwise positive
Limit switch	N: Disabled	N: Disabled	N: Disabled	N: Disabled
Limit switch connection	S: Standard	S: Standard	S: Standard	S: Standard
Software limit (Positioning control)	N: Disabled	N: Disabled	N: Disabled	N: Disabled
Software limit (Home return)	N: Disabled	N: Disabled	N: Disabled	N: Disabled
Software limit (JOG operation)	N: Disabled	N: Disabled	N: Disabled	N: Disabled
Software limit (Pulsar operation)	N: Disabled	N: Disabled	N: Disabled	N: Disabled
Software limit upper limit value	1073741823	1073741823	1073741823	1073741823
Software limit lower limit value	-1073741823	-1073741823	-1073741823	-1073741823
Auxiliary output mode	N: Not used	N: Not used	N: Not used	N: Not used
Auxiliary output on time (ms)	10	10	10	10

14.3 Auxiliary Output

14.3.1 Auxiliary Output Function

- The auxiliary output function informs external devices which table is being executed when automatic operation (E-point control, C-point control, P-point control, or J-point control) is performed.
- The auxiliary output contact and auxiliary output code change according to the table currently being executed.
- The values in the auxiliary output code are held until the next positioning table is executed. Also, the auxiliary output code that is output immediately before the completion of automatic operation is held.

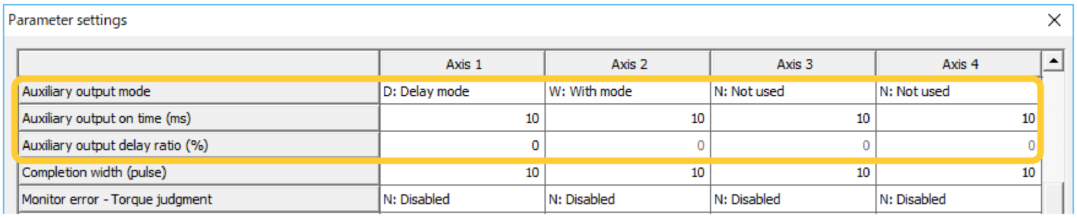


- The auxiliary output function is provided with two modes: With mode and Delay mode. The auxiliary output mode, auxiliary output ON time, and delay ratio are set on Configurator PM7-RTEX.
- Auxiliary output contacts can be monitored with the input contacts (X138 to X13F) allocated to each axis.
- Auxiliary output codes can be set for each positioning data table on Configurator PM7-RTEX. Auxiliary output codes can be monitored by reading them from the positioning memory (each axis information area).

14.3.2 Setting Auxiliary Outputs

Auxiliary outputs are specified for each axis in Configurator PM7-RTEX. The auxiliary output function is enabled when auxiliary output mode is selected in the "Parameter Settings" dialog box.

■ Settings of auxiliary output mode and auxiliary output contact operation



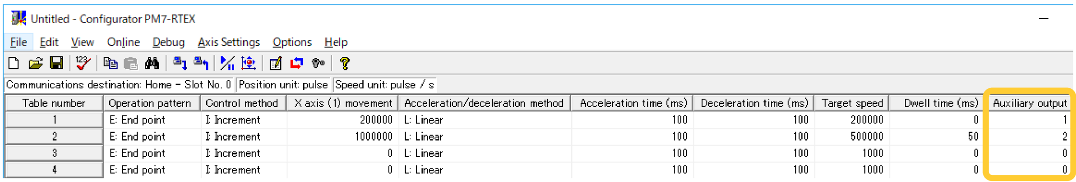
Parameter settings

	Axis 1	Axis 2	Axis 3	Axis 4
Auxiliary output mode	D: Delay mode	W: With mode	N: Not used	N: Not used
Auxiliary output on time (ms)	10	10	10	10
Auxiliary output delay ratio (%)	0	0	0	0
Completion width (pulse)	10	10	10	10
Monitor error - Torque judgment	N: Disabled	N: Disabled	N: Disabled	N: Disabled

Item	Description	
Auxiliary output mode	N: Not used	Select this item when no auxiliary output contact or auxiliary output code is used.
	W: With mode	At the same time the automatic operation starts, the auxiliary contact flag of the corresponding axis allocated to the I/O area turns ON.
	D: Delay mode	The auxiliary contact flag of the corresponding axis allocated to the I/O area turns ON according to the ratio (%) of the positioning movement amount of the automatic operation. However, when the automatic operation is set to J-point control, the operation is the same as that in With mode.
Auxiliary output ON time	Set the time period during which the auxiliary output contact is ON. 0 to 255 ms (Default value: 10 ms)	
Auxiliary output Delay ratio	When Delay mode is selected as the auxiliary output mode, specify the ratio of the delay in the time until the auxiliary output contact turns ON. Setting range: 0 to 100% (Default value: 0%)	

■ Setting auxiliary output codes

Auxiliary output codes (one word) can be set for each table of positioning data.



Untitled - Configurator PM7-RTEX

Communications destination: Home - Slot No. 0 | Position unit: pulse | Speed unit: pulse / s

Table number	Operation pattern	Control method	X axis (1) movement	Acceleration/deceleration method	Acceleration time (ms)	Deceleration time (ms)	Target speed	Dwell time (ms)	Auxiliary output
1	E: End point	I: Increment	200000	L: Linear	100	100	200000	0	1
2	E: End point	I: Increment	1000000	L: Linear	100	100	500000	50	2
3	E: End point	I: Increment	0	L: Linear	100	100	1000	0	0
4	E: End point	I: Increment	0	L: Linear	100	100	1000	0	0

Info.

- Even if you use only auxiliary output codes, select either With mode or Delay mode as the auxiliary output mode.
- Auxiliary output codes are stored at the same time as the positioning operation starts, regardless of the auxiliary output mode (With mode or Delay mode).

14.3.3 Monitoring Auxiliary Outputs

Auxiliary output contacts can be monitored with input contacts during operation. Auxiliary output codes can also be monitored by reading them from the positioning memory area.

■ Allocation of auxiliary output contacts

Item	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7 (virtual)	8 axes (virtual)
Auxiliary output contact	X138	X139	X13A	X13B	X13C	X13D	X13E	X13F

■ Monitoring auxiliary output codes

- Auxiliary output codes indicating the current status are stored in address 16#0039 in the each axis information area (bank 16#01) within the positioning memory. Read auxiliary output codes with a user program.
- Auxiliary output codes can also be monitored by using the data monitor function of Configurator PM7-RTEX.

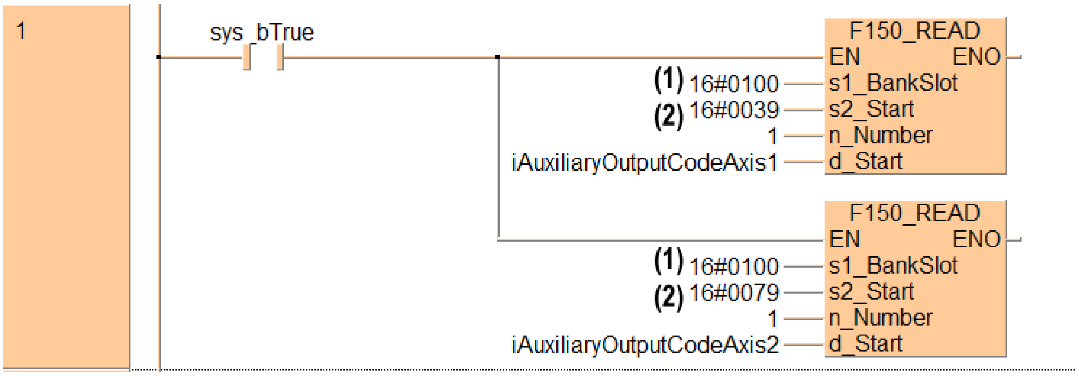
■ Sample programs

The following sample program loads the auxiliary output codes for Axis 1 and Axis 2 of slot number 0 into iAuxiliaryOutputCodeAxis1 and iAuxiliaryOutputCodeAxis2.

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	iAuxiliaryOutputCodeAxis1		INT	0	Auxiliary output code for Axis 1
VAR	iAuxiliaryOutputCodeAxis2		INT	0	Auxiliary output code for Axis 2

Ladder diagram (LD)



Structured text (ST)

```
                               (1)                  (2)
F150_READ(s1_BankSlot := 16#0100, s2_Start := 16#0039, n_Number := 1, d_Start := iAuxiliaryOutputCodeAxis1);
F150_READ(s1_BankSlot := 16#0100, s2_Start := 16#0079, n_Number := 1, d_Start := iAuxiliaryOutputCodeAxis2);
                               (1)                  (2)
```

Code	**Items specified in the program**	**Values specified in the program**							
		Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7 (virtual)**	**8 axes (virtual)**
(1)	Bank, slot No.	16#0100 (bank 16#01, slot number 0)							
(2)	Area in which auxiliary output codes are stored	16#0039	16#0079	16#00B9	16#00F9	16#0139	16#0179	16#01B9	16#01F9

14.3.4 Behavior when Movement Amount is Changed during Operation

■ Notes on changing the movement amount during positioning operation

If the delay ratio is set to 1% to 99%, the auxiliary contact will behave as below when the movement amount is changed during positioning operation.

- If a request to change the movement amount is issued before the auxiliary contact turns ON, the auxiliary contact will turn ON according to the delay ratio that exists before the movement amount is changed.
- If the movement amount that causes the auxiliary contact to turn ON is below the post-change target value, the auxiliary contact will turn ON upon completion of table execution.

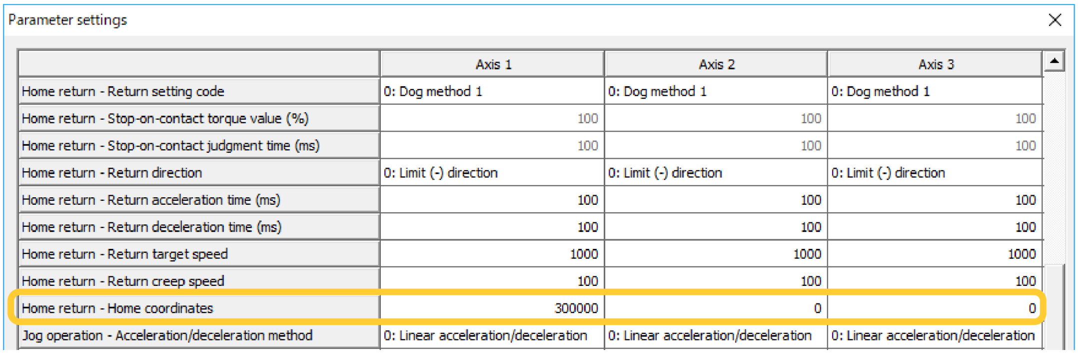
14.4 Home Coordinates

Home coordinates is a function that enables the coordinates upon completion of home return processing to be set to arbitrary values.

- Coordinates upon completion of home return can be set in the positioning memory by using the "Parameter Settings" dialog box of Configurator PM7-RTEX or a user program.
- The set coordinates become the home coordinates when home return is executed for the target axis.

■ Setting home coordinates

Home coordinates can be set for each axis by using the "Parameter Settings" dialog box of Configurator PM7-RTEX.



Parameter settings

	Axis 1	Axis 2	Axis 3
Home return - Return setting code	0: Dog method 1	0: Dog method 1	0: Dog method 1
Home return - Stop-on-contact torque value (%)	100	100	100
Home return - Stop-on-contact judgment time (ms)	100	100	100
Home return - Return direction	0: Limit (-) direction	0: Limit (-) direction	0: Limit (-) direction
Home return - Return acceleration time (ms)	100	100	100
Home return - Return deceleration time (ms)	100	100	100
Home return - Return target speed	1000	1000	1000
Home return - Return creep speed	100	100	100
Home return - Home coordinates	300000	0	0
Jog operation - Acceleration/deceleration method	0: Linear acceleration/deceleration	0: Linear acceleration/deceleration	0: Linear acceleration/deceleration

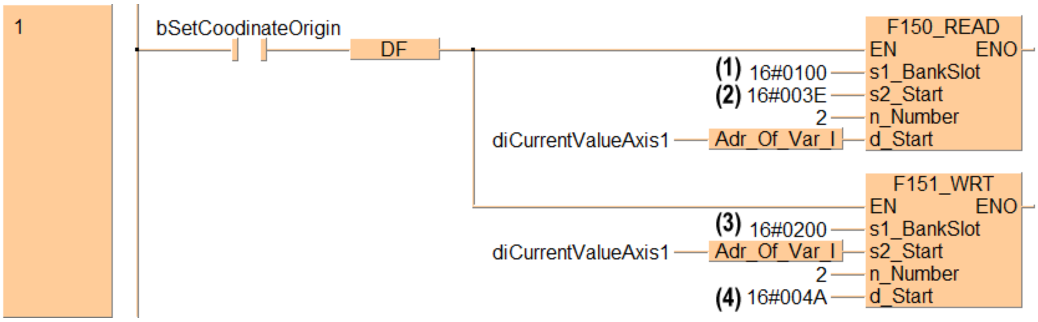
■ Sample programs

The following sample program reads the unit-converted current value for Axis 1 of slot number 0 and sets it as the home coordinates.

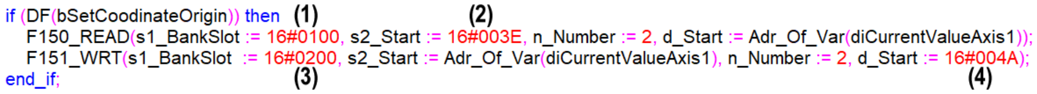
Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bSetCoodinateOrigin		BOOL	FALSE	Home coordinates setting
VAR	diCurrentValueAxis1		DINT	0	Current value of Axis 1

Ladder diagram (LD)



Structured text (ST)



```
if (DF(bSetCoodinateOrigin)) then
   F150_READ(s1_BankSlot := 16#0100, s2_Start := 16#003E, n_Number := 2, d_Start := Adr_Of_Var(diCurrentValueAxis1));
   F151_WRT(s1_BankSlot  := 16#0200, s2_Start := Adr_Of_Var(diCurrentValueAxis1), n_Number := 2, d_Start := 16#004A);
end_if;
```

Code	Items specified in the program	Values specified in the program							
		Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7 (virtual)**	**8 axes (virtual)**
(1)	Bank, slot No.	16#0100 (bank 16#01, slot number 0)							
(2)	Storage area for unit-converted current value	16#003E -16#003F	16#007E to 16#007F	16#00BE -16#00BF	16#00FE -16#00FF	16#013E -16#013F	16#017E -16#017F	16#01BE -16#01BF	16#01FE -16#01FF
(3)	Bank, slot No.	16#0200	16#0C00	16#1600	16#2000	16#2A00	16#3400	16#3E00	16#4800
(4)	Home coordinates setting area	16#004A to 16#004B							

Info.

- For home coordinates, set an integer value equivalent to the unit-converted current value.
  Example: When the unit is μm (0.1 μm), set "10,000" if the unit-converted current value is 1,000.0 μm.

14.5 Current Value Update

Current value update is a function that sets the "unit-converted current value" stored in the positioning memory to an arbitrary value.

- The value to be set as the current value is set in the current value update coordinate area (addresses 16#00C8 to 16#00D7 in bank 16#00) in the positioning memory by using a user program.
- The unit-converted current value in the each axis information area (address 16#00C0 in bank 16#00) is changed to the specified current value when the bit corresponding to the target axis in the current value update request flag area (addresses 16#003E to 16#003F in bank 16#01) is turned ON.

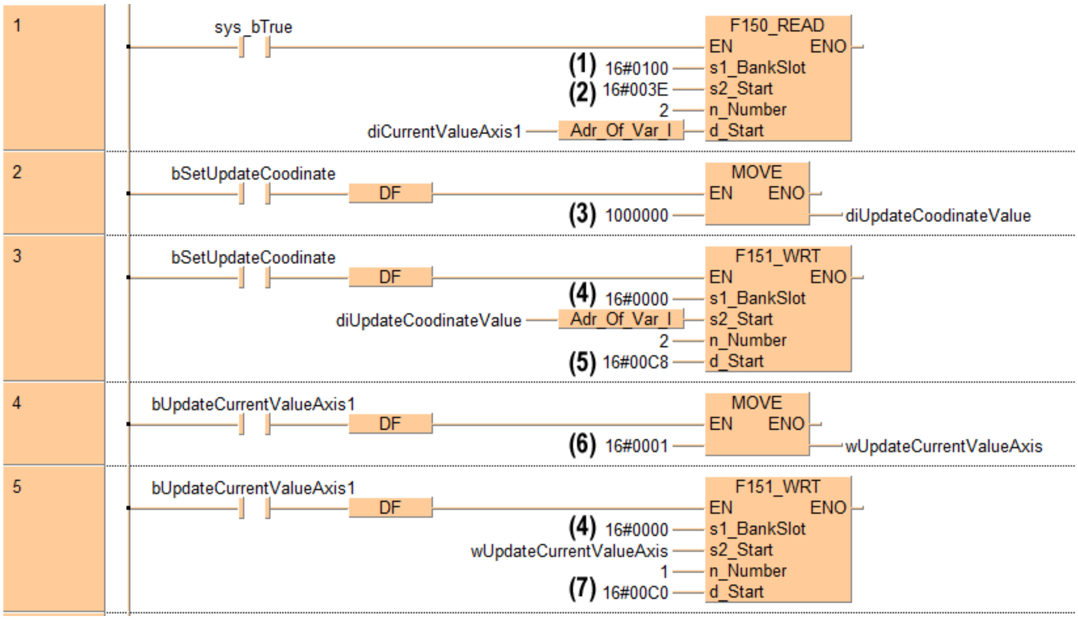
■ Sample programs

The following sample program uses slot number 0 to preset the arbitrary value "100000" in the positioning memory area and update the unit-converted current value for Axis 1. The first line of the program monitors the unit-converted current value for Axis 1 by reading it into data register diCurrentValueAxis1.

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bSetUpdateCoodinate		BOOL	FALSE	Updated coordinate setting
VAR	bUpdateCurrentValueAxis1		BOOL	FALSE	Current value update
VAR	diCurrentValueAxis1		DINT	0	Current value of Axis 1
VAR	diUpdateCoodinateValue		DINT	0	Updated coordinate value
VAR	wUpdateCurrentValueAxis		WORD	0	Current value update request flag

Ladder diagram (LD)



Structured text (ST)

```
F150_READ(s1_BankSlot := 16#0100, s2_Start := 16#003E, n_Number := 2, d_Start := Adr_Of_Var(diCurrentValueAxis1));
                          (1)                  (2)
if (DF(bSetUpdateCoodinate)) then
   diUpdateCoodinateValue  := 1000000; (3)
   F151_WRT(s1_BankSlot := 16#0000, s2_Start := Adr_Of_Var(diUpdateCoodinateValue), n_Number := 2, d_Start := 16#00C8);
end_if;                      (4)                                                                                  (5)

if (DF(bUpdateCurrentValueAxis1)) then
   wUpdateCurrentValueAxis    := 16#0001; (6)
   F151_WRT(s1_BankSlot := 16#0000, s2_Start := wUpdateCurrentValueAxis, n_Number := 1, d_Start := 16#00C0);
end_if;                      (4)                                                                     (7)
```

Code	Items specified in the program	Values specified in the program							
		Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7 (virtual)	8 axes (virtual)
(1)	Bank, slot No.	16#0100 (bank 16#01, slot number 0)							
(2)	Storage area for unit-converted current value	16#003E	16#007E	16#00BE	16#00FE	16#013E	16#017E	16#01BE	16#01FE
(3)	Updated value	Arbitrary value							
(4)	Bank, slot No.	16#0000 (bank 16#00, slot number 0)							
(5)	Current value update coordinate area	16#00C8	16#00CA	16#00CC	16#00CE	16#00D0	16#00D2	16#00D4	16#00D6
(6)	Set value of current value update request flag area	16#0001	16#0002	16#0004	16#0008	16#0010	16#0020	16#0040	16#0080

Code	Items specified in the program	Values specified in the program							
		Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7 (virtual)	8 axes (virtual)
(7)	Current value update request flag area	16#00C0							

■ Current value update area (bank 16#00: common area)

<table>
<tr><th>Memory address (Hex)</th><th>Name</th><th>Description</th></tr>
<tr><td>16#00C0</td><td>Current value update request flag</td><td>Only when the bit corresponding to each axis changes from 0 to 1, the unit-converted current value coordinates (each axis offset addresses 16#003E to 16#003F) managed by the unit are changed to the values set in the current value update coordinate area (addresses 16#00C8 to 16#00D7).
Upon completion of the change, the unit automatically clears the corresponding bit in the current value update request flag area (16#C0) to 0.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Current value update request for Axis 1</td><td>0</td><td rowspan="8">0: No change
1: Change the home coordinates of the corresponding information
(After execution, the unit automatically clears the corresponding bit to 0.)</td></tr>
<tr><td>1</td><td>Current value update request for Axis 2</td><td>0</td></tr>
<tr><td>2</td><td>Current value update request for Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Current value update request for Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Current value update request for Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Current value update request for Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Current value update request for Axis 7 (virtual)</td><td>0</td></tr>
<tr><td>7</td><td>Current value update request for Axis 8 (virtual)</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>16#00C8 to 16#00C9</td><td>Current value update coordinates for Axis 1</td><td rowspan="5">The coordinate value to be preset is stored as the current value.</td></tr>
<tr><td>16#00CA to 16#00CB</td><td>Current value update coordinates for Axis 2</td></tr>
<tr><td>16#00CC to 16#00CD</td><td>Current value update coordinates for Axis 3</td></tr>
<tr><td>16#00CE to 16#00CF</td><td>Current value update coordinates for Axis 4</td></tr>
<tr><td>16#00D0 to 16#00D1</td><td>Current value update coordinates for Axis 5</td></tr>
</table>

Memory address (Hex)	Name	Description
16#00D2 to 16#00D3	Current value update coordinates for Axis 6	
16#00D4 to 16#00D5	Current value update coordinates for Axis 7 (virtual)	
16#00D6 to 16#00D7	Current value update coordinates for Axis 8 (virtual)	

(Note 1) The current value update request flag is specified as a 16# constant. When an update request is issued for Axes 1 and 2, 16#0003 will be written.

Info.

- The values changed by updating the current values are "unit-converted current values".
- Set "unit-converted current values" so that the values do not exceed the upper and lower pulse limits (-2,147,483,648 to +2,147,483,647) when converted to pulse unit current values. If the set values exceed the upper or lower pulse limit, a "current value update error" (error code 16#4250) occurs.
  - Use the following formula to calculate pulse unit current values.

    Pulse unit current value = Unit-converted current value × Number of pulses per revolution / Movement amount per revolution

14.6 Multi-turn Data Clearing Function

14.6.1 Overview of Multi-turn Data Clearing

The multi-turn data clearing function clears the multi-turn data managed by servo amplifiers.

- Execute this function when using an absolute encoder for the servo motor.
- Use this function when installing an absolute encoder or replacing the battery for retaining absolute encoder values.
- If this function is executed when no absolute encoder is used, a multi-turn data clearing failure error (error code 16#3061) will occur.

14.6.2 Memory Area Used

The multi-turn data clearing function uses the following address in the "bank 16#00: common area" of the positioning memory.

Bank 16#00: Common area

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>16#00C2</td><td>Multi-turn data clearing request flag</td><td>16#0000</td><td>Turn ON the bit corresponding to the axis for which the multi-turn data clearing function is to be executed.
After multi-turn data clearing is completed, all the bits in this area are turned OFF by the controller.
<table>
<tr><th>Bit No.</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Axis 1</td><td>0</td><td rowspan="8">0: No request (execution completed)
1: Use the multi-turn data clearing function</td></tr>
<tr><td>1</td><td>Axis 2</td><td>0</td></tr>
<tr><td>2</td><td>Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Axis 7</td><td>0</td></tr>
<tr><td>7</td><td>8 axes</td><td>0</td></tr>
<tr><td>15 to 8</td><td>Not used</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
</table>

14.6.3 Setting up the Multi-turn Data Clearing Function

If multi-turn data clearing is executed for Axis 1, the following procedure can be performed by a user program to achieve this processing.

Procedure	Description
1	Perform servo OFF for Axis 1. If necessary, use the braking function or another similar function to prevent the motor from rotating.
2	Turn ON bit 0 of the "multi-turn data clearing request flag".
3	The controller executes multi-turn data clearing processing for Axis 1.
4	The multi-turn data for the servo amplifier is cleared and bit 0 of the "multi-turn data clearing request flag" is turned OFF.
5	If multi-turn data clearing terminates abnormally, a "multi-turn data clearing failure error" (error code 16#3061) will occur on Axis 1 and bit 0 of the "multi-turn data clearing request flag" will be turned OFF.
6	Perform servo ON for Axis 1.

Note

- The multi-turn data clearing function is subject to the following restrictions due to the specifications of servo amplifiers.

Item	Restriction
Servo status	Be sure to invoke a servo OFF state when executing the multi-turn data clearing function. If necessary, use a braking mechanism to prevent the motor from rotating.
Operation after multi-turn data clearing	After the multi-turn data clearing function is executed, the operation can be continued as it is. However, due to the specifications of servo amplifiers, we recommend that the servo amplifier be restarted.
Battery error	When an error occurs with the battery for retaining absolute encoder values, the servo amplifier error can be cleared only after the multi-turn data clearing function has been executed. Be sure to execute the processing in the following order: Error occurrence > Clear multi-turn data > Clear error

14.7 Deviation Counter Clearing Function

14.7.1 Overview of Deviation Counter Clearing Function

The deviation counter clearing function clears the deviations (differences between each position command value and current position) managed by servo amplifiers.

- Deviation counter clearing is performed by matching the position information (position command value) managed by the positioning unit RTEX with the current position stored in the servo amplifier.
- Clearing the deviation counter in a timely manner enables subsequent positioning operations to be performed accurately.

14.7.2 Operation of Deviation Counter Clearing

Starting a positioning operation for positioning table No.1000 executes the deviation counter clearing function.

- Positioning table No.1000 is provided as a table dedicated to the deviation counter clearing function.
- Positioning parameters are automatically set as shown in the following table.

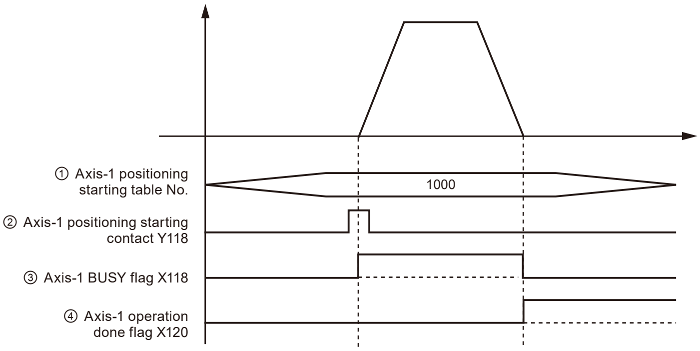
Item	Setting value
Positioning table No.	1000
Operation pattern	E: End point
Control method	I: Incremental
X-axis movement amount	Stores the difference between the position command value and the current value in the servo amplifier.
Acceleration/deceleration method / Acceleration time / Deceleration time	L: Linear / 10 ms / 10 ms
Target speed	Stores the JOG target speed of the target axis.

(Note 1) The settings of positioning table No.1000 cannot be changed or monitored.

■ Setting procedure for each contact

Procedure	Description
1	Use the F151 WRT instruction to set the Axis-1 positioning start table No. to "1000".
2	Turn ON the Axis-1 positioning start request contact.
3	The positioning unit RTEX automatically sets the movement amount and speed and performs a positioning operation. At this time, the servo amplifier does not operate.
4	When the positioning operation (deviation counter clearing) is completed, the operation done flag turns ON.

■ Behavior diagram

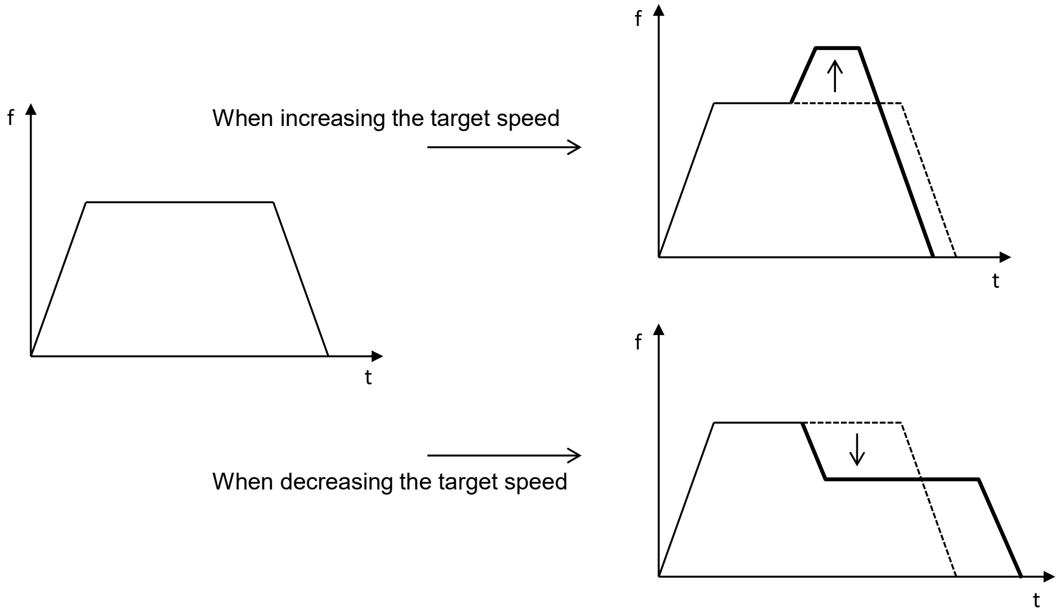


- The deviation counter clearing function cannot be executed during axis operation. Always execute the function while all axes are stopped.
- For deviation counter clearing for interpolation axes, set the JOG target speed for the X-axis as the interpolation speed (composite speed). Deviation counter clearing must be executed for all target axes by performing interpolation operations for which the movement amount for each axis has been calculated automatically.
- When performing deviation counter clearing for synchronized axes, cancel the synchronous state of the synchronized axes (by turning ON the synchronization cancellation request contact).

14.8 Target Speed Change Function

14.8.1 Overview of Target Speed Change Function

The target speed change function is used to change the target speed on an active positioning table to an arbitrary speed. Even if the speed is changed, the movement amount in the table does not change.



■ **Conditions of use**

Position control	Control Method	Single axis control	○	● For synchronous control, the speed can be changed only for the master axis. (Slave axes operate according to the master axis.)
		Interpolation control	×	
		Synchronous control	○	
	Operation Pattern	E-point	○	● The speed can be changed more than once in one table. ● The speed cannot be changed during deceleration accompanying a stop operation. ● The speed cannot be changed during deceleration in C-point control. ● The speed cannot be changed during the dwell time in C-point control. ● For J-point control, use the J-point speed change contact to change the speed.
		P-point	○	
		C-point	○	
		J-point	×	
		Repetitive control	○	
JOG operation			×	● For JOG operation, change "JOG operation target speed" directly to change the speed.
Stop-on-contact torque value for home return			×	

■ Speed change method

Direct speed specification	This is a method in which a desired speed is specified directly and requested by I/O. The valid range of the function can be selected from two patterns: "Active table only" and "Active table until operation is complete".
ratio specification (Override)	This is a function that changes the set speed by the specified percentage (%). No change request by I/O is required, and the change is reflected when the set value (ratio) is changed. The function is valid for all positioning operations after the setting is specified. The ratio specification remains in effect even if the speed is changed by direct speed specification.

14.8.2 Setting Procedure and Operations (Direct Speed Specification Method)

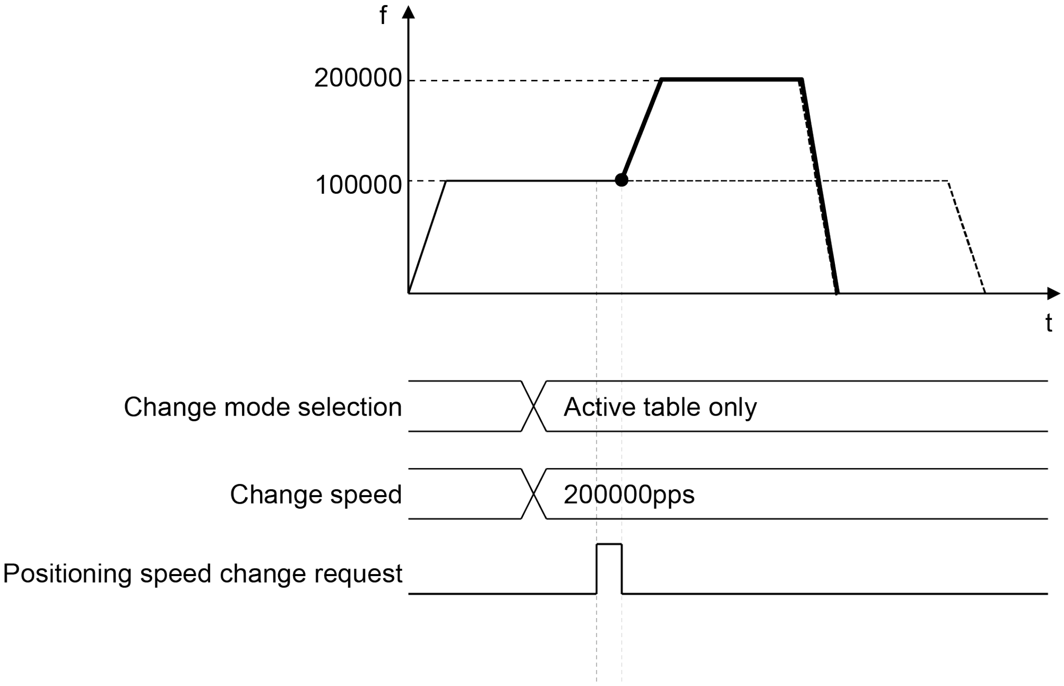
■ Setting procedure and operations of direct speed specification method

The target speed change function based on the direct speed specification method is activated during a positioning operation according to the following procedure.

1. "Change mode selection" and "Change speed" are set in the positioning memory.
2. Turn ON the "positioning speed change request" for each axis.

   For details of errors and warnings, refer to "18.10.2 Positioning Speed Change Setting Area".

   After receiving the speed change request, the positioning unit RTEX turns OFF.



(Note 1) The acceleration time to the changed speed and the deceleration time from the changed speed follow the set values in the active table.

(Note 2) The movement amount does not change even if the speed is changed.

■ Positioning parameters to set for the direct speed specification method

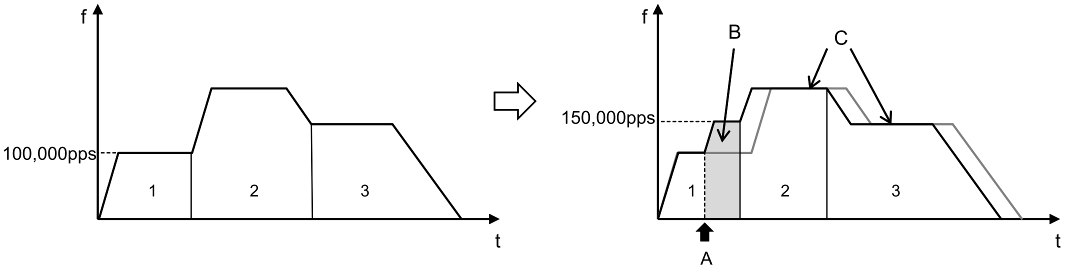
The following positioning parameters are used for the target speed change function based on the direct speed specification method.

Positioning operation change setting area (bank 16#5F)

Offset address	Name	Default	Description
16#0001	Positioning speed change change mode selection	16#0000	Area for setting the range of change when the positioning speed is changed. 16#0000: Active table only 16#0001: Active table to E-point table (until operation is complete) In the case of other values, the unit operates as if 16#0000 ("Active table only") is set.
16#0002 to 16#0003	Positioning speed change: Changed speed	100	Area for setting the changed speed when the positioning speed is changed. Set a unit-converted value. 1 to 2,147,482,624 (specified unit system)
16#0004	Positioning speed change request	16#0000	When this bit changes from 0 to 1, the target speed during operation is changed to the value specified in "Positioning speed change: Changed speed". After positioning speed change processing is completed, the positioning unit RTEX automatically resets the bit to 0.

■ Example of operation (1): Direct speed specification, "Active table only"

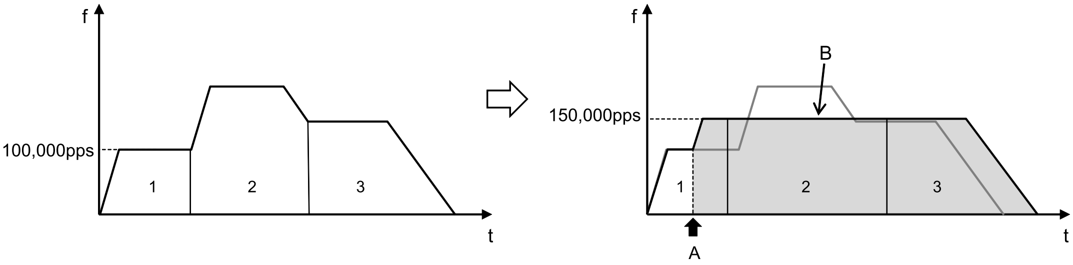
Name	Setting value
mode selection	16#0000 (active table only)
Changed speed	150,000 (pps)



A	The speed change request contact turns ON.
B	Only the speed in Table 1 is changed to 150,000 pps.
C	The speeds in Tables 2 and 3 do not change.

■ Example of operation (2): Direct speed specification, "Active table to E-point table (until operation is complete)"

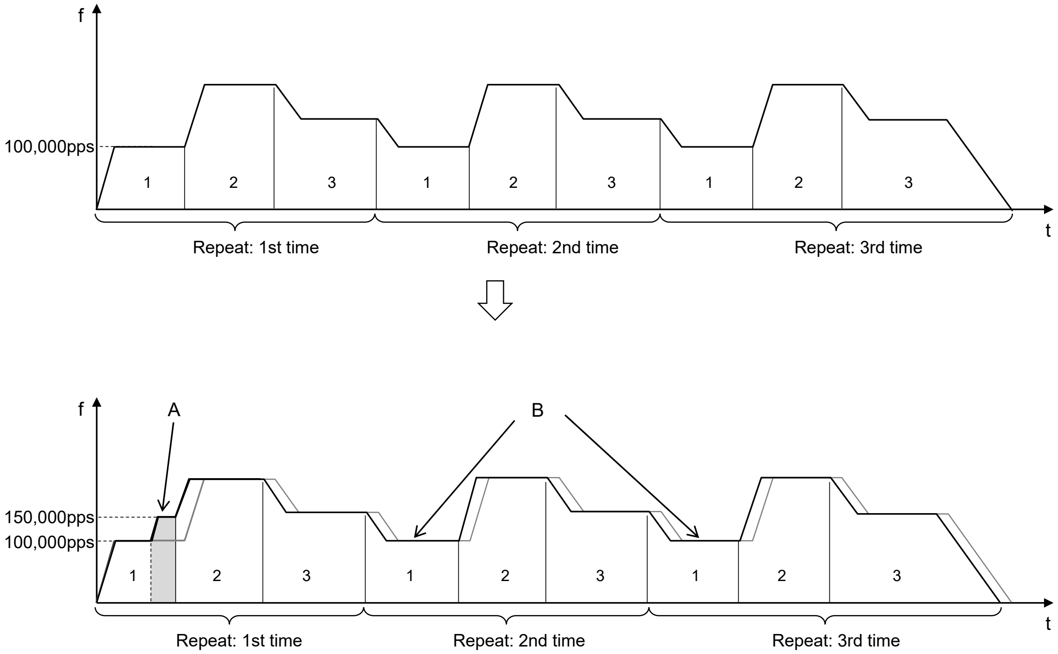
Name	Setting value
mode selection	16#0001 (active table to E-point table)
Changed speed	150,000 (pps)



A	Speed change request contact turns ON.
B	The speeds in all consecutive tables are changed to 150,000 pps.

■ Example of operation (for repetitive operations)

When speed change (direct speed specification, active table only) is performed during repetitive positioning operations, only the speed in the active table in the active repetition cycle is changed.

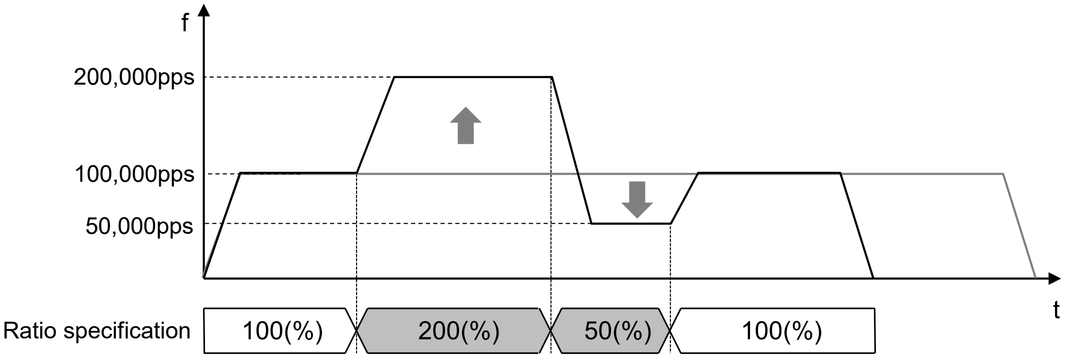


A	Only the speed in Table 1 in the first repetition cycle is changed to 150,000 pps.
B	The speeds in Table 1 in the second and third repetition cycles are not changed.

14.8.3 Setting Procedure and Behaviors (Ratio Specification Method)

■ Setting procedure and operation of ratio specification method (override)

For ratio specification, the command speed is immediately reflected in the specified ratio when the ratio specification in the positioning memory is changed.



(Note 1) The acceleration time to the changed speed and the deceleration time from the changed speed follow the set values in the active table.

(Note 2) The movement amount does not change even if the speed is changed.

■ Positioning parameters to set for ratio specification method

The following positioning parameters are used for the target speed change function based on the ratio specification method.

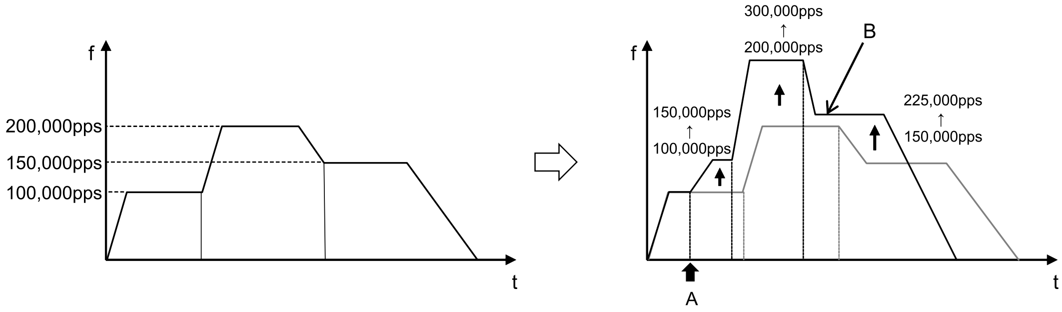
Positioning operation change setting area (bank 16#5F)

Offset address	Name	Default	Description
16#0000	Positioning speed change: ratio specification (Override)	100	Area for setting the ratio (override) of change relative to the commanded speed when the positioning speed is changed. No speed change request by I/O is required, and the change becomes valid when a value (ratio) is set. 1 to 300(%)

■ Example of operation

When the ratio specification is changed from 100% to 150%

Name	Setting value
Ratio specification	100(%) → 150(%)

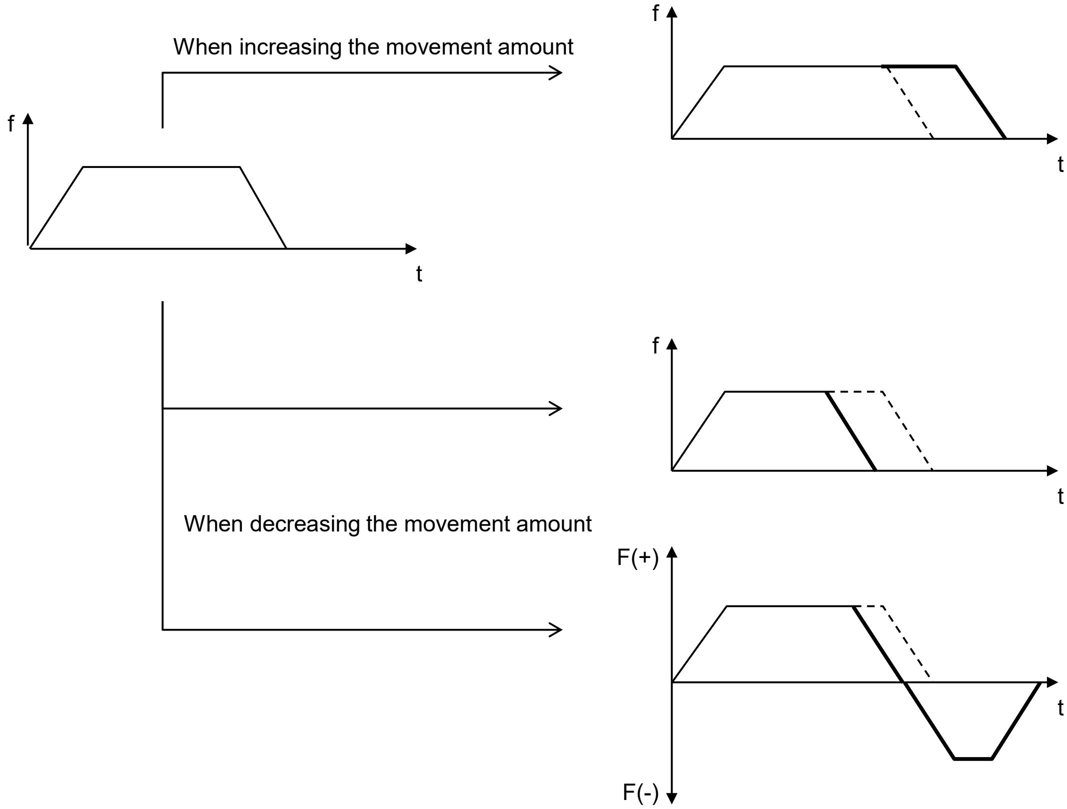


A	The ratio specification is changed from 100 to 150(%).
B	All consecutive tables follow the set ratio.

14.9 Movement Amount Change Function

14.9.1 Overview of Movement Amount Change Function

- The movement amount change function is used to change the movement amount in the active positioning table to an arbitrary amount.
- Even when the movement amount is changed, the target speed is the same.



■ Conditions of use

Position control	Control Method	Single axis control	○	• For synchronous control, the movement amount can be changed only for the master axis. (Slave axes operate according to the master axis.)
		Interpolation control	×	
		Synchronous control	○	
	Operation Pattern	E-point	○	• The movement amount can be changed more than once in one table. • The movement amount cannot be changed during deceleration accompanying a stop operation. • The movement amount cannot be changed during deceleration in C-point control.
		P-point	○	
		C-point	○	
		J-point	×	

		Repetitive control	○	● The movement amount cannot be changed during the dwell time in C-point control.
JOG operation			×	
Stop-on-contact torque value for home return			×	

14.9.2 Setting procedure and behaviors of movement amount change function

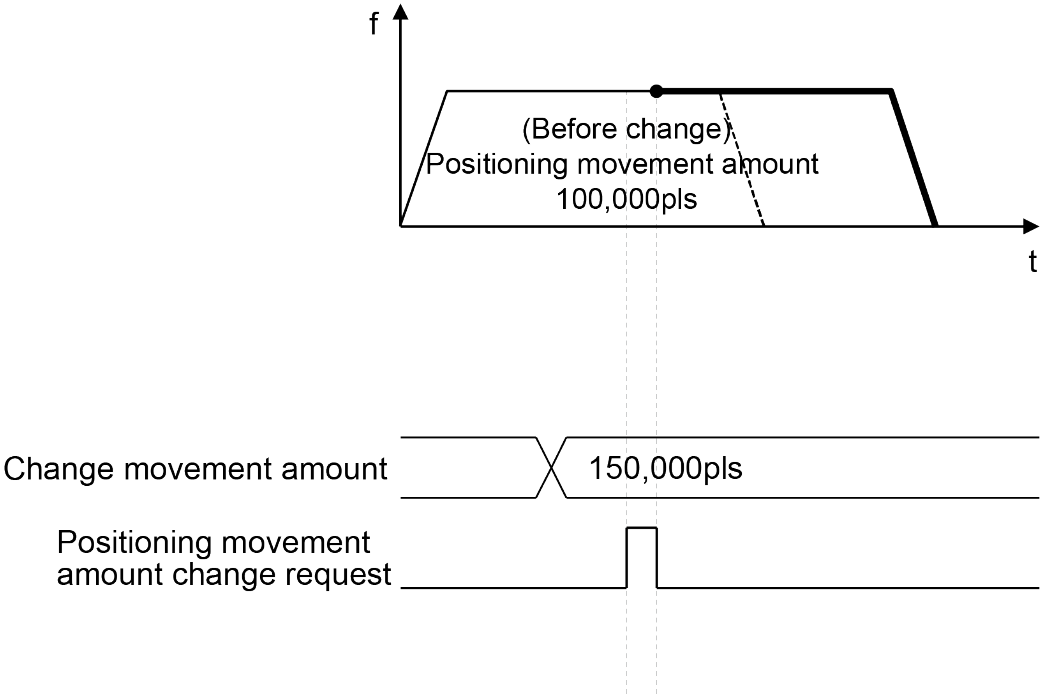
■ Setting procedure and behaviors of movement amount change function

The movement amount change function is activated during positioning operation according to the following procedure.

1. "Change movement amount" in the positioning memory is set.
2. Turn ON the "positioning movement amount change request" for each axis.

   For details of errors and warnings, refer to "18.10.3 Positioning Movement Amount Change Setting Area".

   After receiving the movement amount change request, the RTEX unit turns OFF.



■ Positioning parameters to set

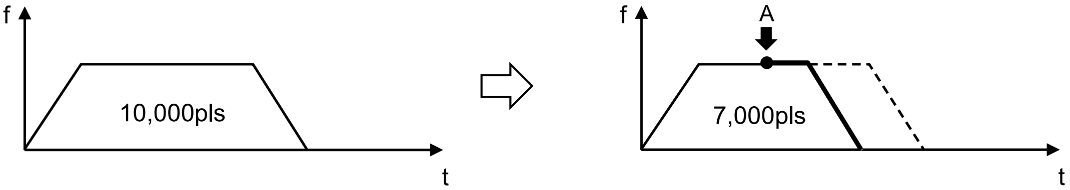
The following positioning parameters are used for the movement amount change function.

Positioning operation change setting area (bank 16#5F)

Offset address	Name	Default	Description
16#000A to 16#000B	Positioning movement amount change: Changed movement amount	0	Area for setting a changed movement amount when the positioning movement amount is changed. -2,147,482,624 to +2,147,482,624 (specified unit system)

■ Example of operation (1): When reducing the movement amount (changed movement amount > current value)

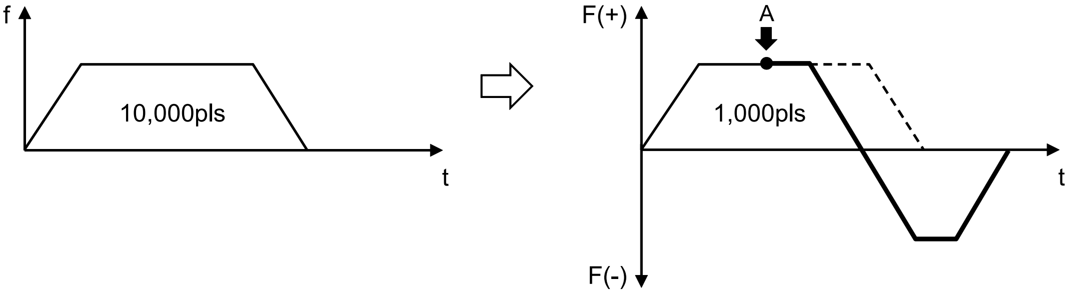
Name	Setting value
Control method	Incremental
Positioning movement amount (before change)	10,000 (pls)
Positioning movement amount (after change)	7,000 (pls)



A	Movement amount change request contact ON

■ Example of operation (2): When reducing the movement amount (changed movement amount < current value)

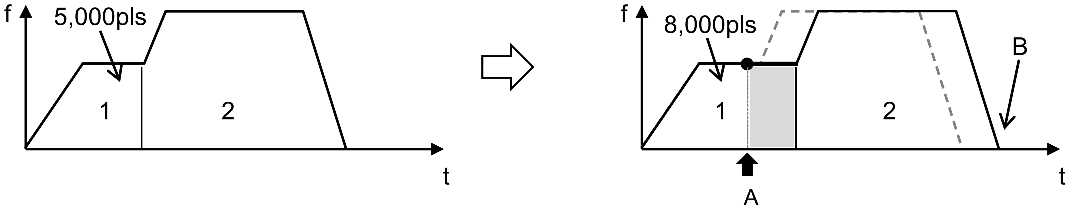
Name	Setting value
Control method	Incremental
Positioning movement amount (Before change)	10,000 (pls)
Positioning movement amount (After change)	1,000 (pls)



A	Movement amount change request contact ON

■ Example of operation (3): When continuous table operation is performed (incremental)

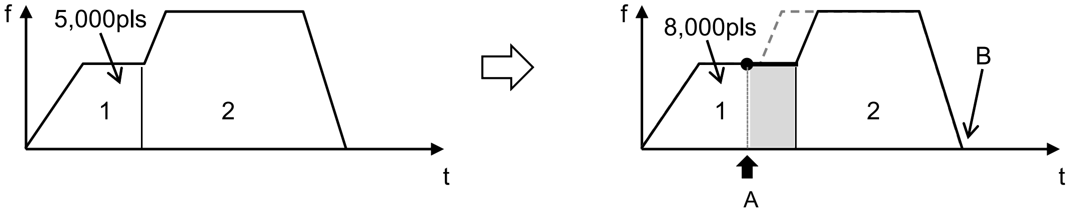
Name	Setting value
Control method	Incremental
Positioning movement amount in Table 1 (before change)	5,000 (pls)
Positioning movement amount in Table 1 (after change)	8,000 (pls)



A	Movement amount change request contact ON
B	Because incremental is set, the stopping position in Table 2 also changes.

■ Example of operation (4): When continuous table operation is performed (absolute)

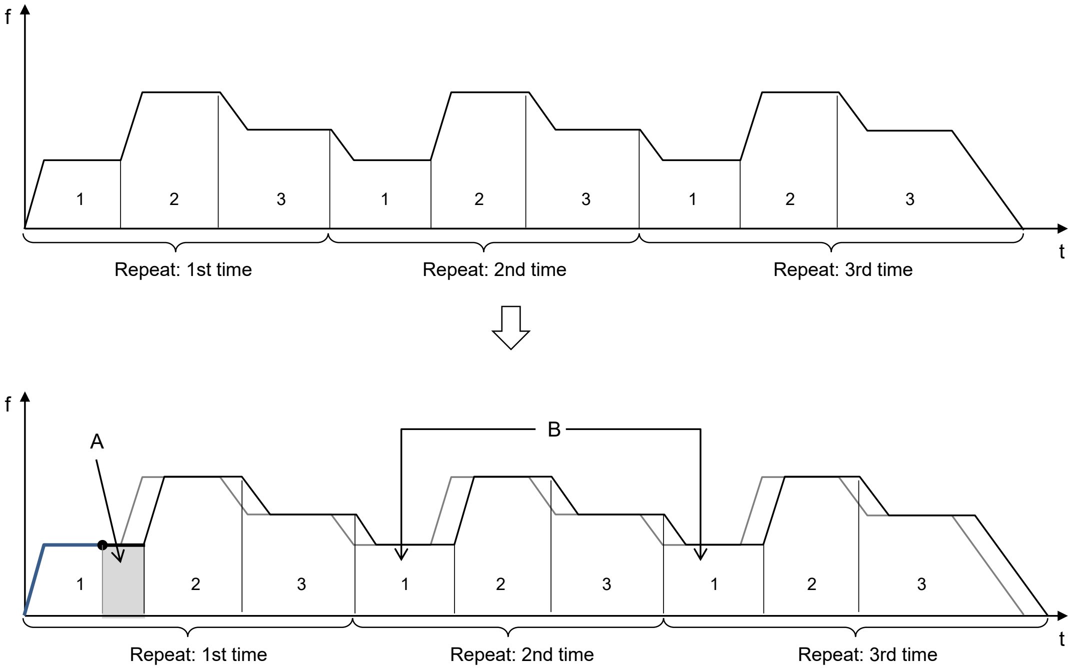
Name	Setting value
Control method	Absolute
Positioning movement amount in Table 1 (Before change)	5,000 (pls)
Positioning movement amount in Table 1 (After change)	8,000 (pls)



A	Movement amount change request contact ON
B	Because absolute is set, the stopping position in Table 2 does not change.

■ Example of behavior (For repetitive operations)

When the movement amount change function is executed during repetitive positioning operations, only the movement amount in the active table in the active repetition cycle is changed.



A	Only the movement amount in Table 1 in the first repetition cycle is changed to 8,000 pls.
B	The movement amounts in Table 1 in the second and third repetition cycles are not changed.

■ Auxiliary output when movement amounts are changed

When auxiliary output is set to Delay mode, even if the movement amount is changed, the auxiliary contact will turn ON at the position corresponding to the delay ratio relative to the pre-change movement amount. However, if the delay ratio is set to 100%, the auxiliary contact will turn ON upon completion of the operation.

14.10 Torque Limit

The torque limit function enables the maximum output torque of the amplifier to be changed in real time.

- The torque limit function is executed by using a user program to set the "Torque limit enable flag" in the positioning memory and write it to the "Torque limit value". The setting to enable or disable the torque limit function and the torque limit values can be set for each axis.
- The torque limit function can be executed during position control, synchronous control, or JOG operation. It cannot be executed during home return.
- The torque limit function cannot be executed when amplifier parameter R/W processing or amplifier monitoring is being performed.

■ Torque limit area (bank 16#00)

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>16#00D8</td><td>Torque limit enable flag</td><td>16#0000</td><td>Axis-based torque limit execution request flag
Executes the torque limit function when the bit corresponding to each axis turns ON.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Torque limit for Axis 1</td><td>0</td><td rowspan="8">0: Disable torque limit
(Default)
1: Enable torque limit</td></tr>
<tr><td>1</td><td>Torque limit for Axis 2</td><td>0</td></tr>
<tr><td>2</td><td>Torque limit for Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Torque limit for Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Torque limit for Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Torque limit for Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Torque limit for Axis 7</td><td>0</td></tr>
<tr><td>7</td><td>Torque limit for Axis 8</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>16#00D9
to
16#00DF</td><td>System reserved</td><td>—</td><td>—</td></tr>
<tr><td>16#00E0</td><td>Torque limit value for Axis 1</td><td>3000</td><td rowspan="3">Set the torque limit values.
The unit is (0.1%).
If 2000 is written in this area,
"2000 × 0.1 = 200(%)"
is used as the maximum torque during operation.</td></tr>
<tr><td>16#00E1</td><td>Torque limit value for Axis 2</td><td>3000</td></tr>
<tr><td>16#00E2</td><td>Torque limit value for Axis 3</td><td>3000</td></tr>
</table>

Offset address	Name	Default	Description
16#00E3	Torque limit value for Axis 4	3000	
16#00E4	Torque limit value for Axis 5	3000	
16#00E5	Torque limit value for Axis 6	3000	
16#00E6	Torque limit value for Axis 7	3000	
16#00E7	Torque limit value for Axis 8	3000	

■ Sample programs

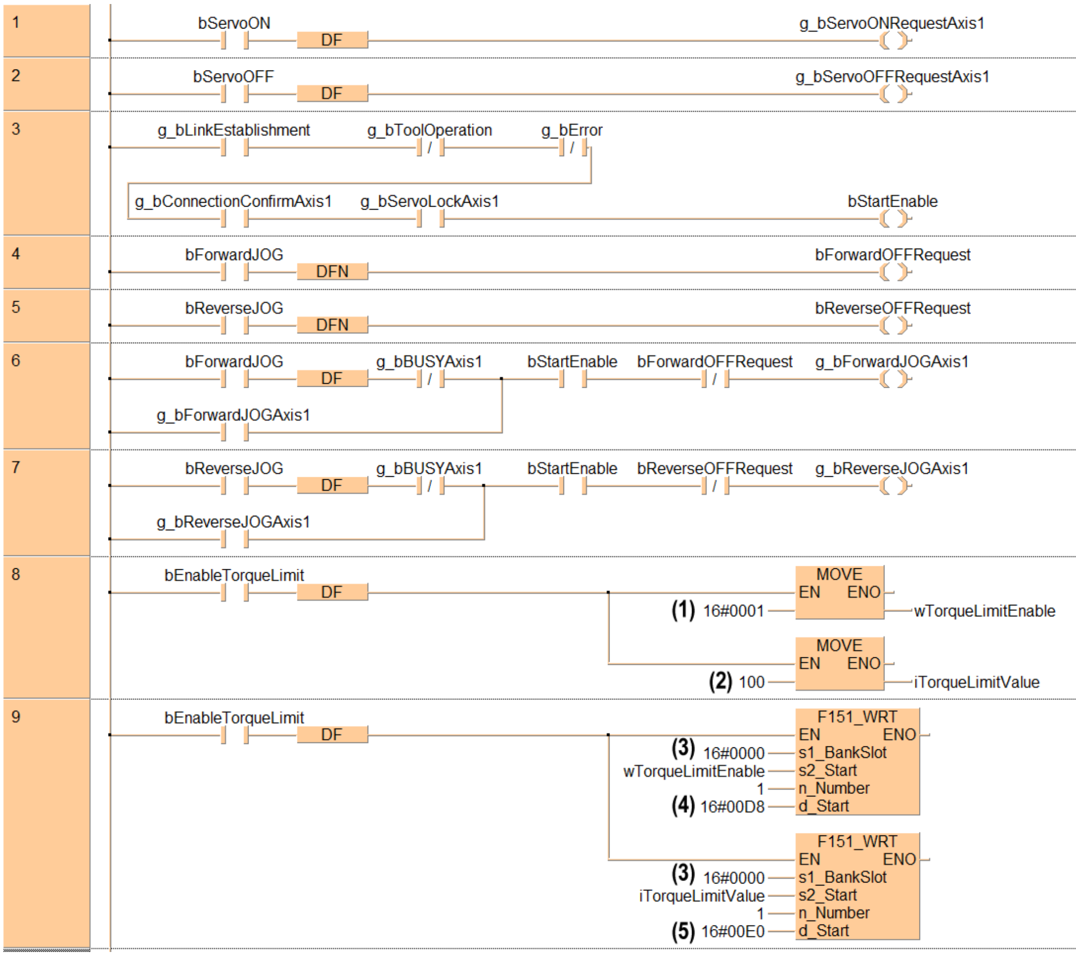
The following sample program uses slot number 0 to apply real-time torque limits during the JOG operation for Axis 1. This sample program uses a user program to set the "Torque limit enable flag" in the positioning memory and write it to the "Torque limit value".

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bEnableTorqueLimit		BOOL	FALSE	Torque change flag
VAR	bForwardJOG		BOOL	FALSE	Forward JOG
VAR	bForwardOFFRequest		BOOL	FALSE	Forward OFF edge
VAR	bReverseJOG		BOOL	FALSE	Reverse JOG
VAR	bReverseOFFRequest		BOOL	FALSE	Reverse OFF edge
VAR	bServoOFF		BOOL	FALSE	Servo OFF
VAR	bServoON		BOOL	FALSE	Servo ON
VAR	bStartEnable		BOOL	FALSE	Start enable flag
VAR_EXTERNAL	g_bBUSYAxis1	X118	BOOL	FALSE	Axis 1 BUSY
VAR_EXTERNAL	g_bConnectionConfirmAxis1	X108	BOOL	FALSE	Axis 1 connection confirmation
VAR_EXTERNAL	g_bError	X105	BOOL	FALSE	Error notification
VAR_EXTERNAL	g_bForwardJOGAxis1	Y130	BOOL	FALSE	Axis 1 forward JOG
VAR_EXTERNAL	g_bLinkEstablishment	X100	BOOL	FALSE	Preparation completion notification
VAR_EXTERNAL	g_bReverseJOGAxis1	Y131	BOOL	FALSE	Axis 1 reverse JOG
VAR_EXTERNAL	g_bServoLockAxis1	X110	BOOL	FALSE	Servo lock for axis 1

Class name	Variable name	FP address	Data type	Default	Comment
VAR_EXTERNAL	g_bServoOFFRequestAxis1	Y110	BOOL	FALSE	Axis 1 Servo OFF request
VAR_EXTERNAL	g_bServoONRequestAxis1	Y108	BOOL	FALSE	Axis 1 servo ON request
VAR_EXTERNAL	g_bToolOperation	X104	BOOL	FALSE	Tool operation in progress
VAR	iTorqueLimitValue		INT	0	Torque limit value
VAR	wTorqueLimitEnable		WORD	0	Torque limit enable flag

Ladder diagram (LD)



Structured text (ST)

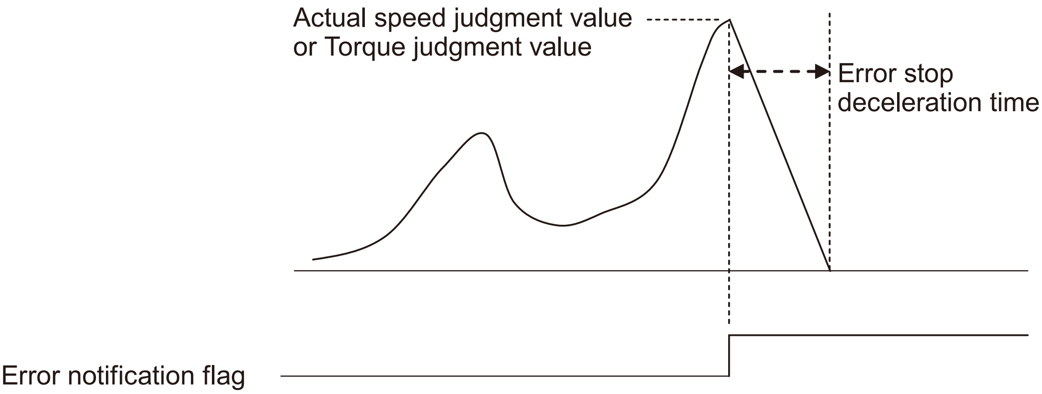
```
g_bServoONRequestAxis1   := DF(bServoON);

g_bServoOFFRequestAxis1 := DF(bServoOFF);

bStartEnable    := g_bLinkEstablishment AND NOT g_bToolOperation AND NOT g_bError
                   AND g_bConnectionConfirmAxis1 AND g_bServoLockAxis1;

bForwardOFFRequest := DFN(bForwardJOG);

bReverseOFFRequest := DFN(bReverseJOG);

g_bForwardJOGAxis1  := ((DF(bForwardJOG) AND NOT g_bBUSYAxis1)
                       OR g_bForwardJOGAxis1)
                       AND bStartEnable AND NOT bForwardOFFRequest;

g_bReverseJOGAxis1  := ((DF(bReverseJOG) AND NOT g_bBUSYAxis1)
                       OR g_bReverseJOGAxis1)
                       AND bStartEnable AND NOT bReverseOFFRequest;

if (DF(bEnableTorqueLimit)) then
   wTorqueLimitEnable := 16#0001; (1)
   iTorqueLimitValue:= 100; (2)    (3)                                              (4)
   F151_WRT(s1_BankSlot := 16#0000, s2_Start := wTorqueLimitEnable, n_Number := 1, d_Start := 16#00D8);
   F151_WRT(s1_BankSlot := 16#0000, s2_Start := iTorqueLimitValue, n_Number := 1, d_Start := 16#00E0);
end_if;                            (3)                                              (5)
```

Code	Description	Values specified in the program							
		Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes
(1)	Torque limit enable flag area setting value	16#0001	16#0002	16#0004	16#0008	16#0010	16#0020	16#0040	16#0080
(2)	Torque limit value	Arbitrary value							
(3)	Bank, slot No.	16#0000 (bank 16#00, slot number 0)							
(4)	Torque limit enable flag area	16#00D8							
(5)	Torque limit value area	16#00E0	16#00E1	16#00E2	16#00E3	16#00E4	16#00E5	16#00E6	16#00E7

14.11 Monitor Error (Torque / Actual Speed Judgement)

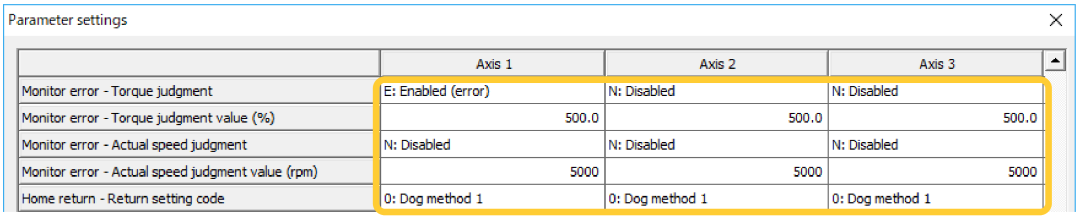
This function monitors the actual speed and torque of the servo amplifier and generates an error or warning on the positioning unit RTEX side when the specified judgment value is exceeded.

- Monitor errors are set in the "Parameter Settings" dialog box of Configurator PM7-RTEX. Judgement values can be set separately for torque and actual speed for each axis.
- When an error occurs, the operation stops in “error stop deceleration time” and operation processing cannot be executed until the error is cleared. When a warning occurs, only the occurrence is informed and the operation continues.



(Note 1) The above figure is an operational diagram that shows error occurrence.

■ Parameter settings in Configurator PM7-RTEX



	Axis 1	Axis 2	Axis 3
Monitor error - Torque judgment	E: Enabled (error)	N: Disabled	N: Disabled
Monitor error - Torque judgment value (%)	500.0	500.0	500.0
Monitor error - Actual speed judgment	N: Disabled	N: Disabled	N: Disabled
Monitor error - Actual speed judgment value (rpm)	5000	5000	5000
Home return - Return setting code	0: Dog method 1	0: Dog method 1	0: Dog method 1

Name	Default	Description
Monitor error - Torque judgment	N: Disabled	Select the operation of the positioning unit RTEX that is performed when the torque value of the amplifier exceeds the judgment value. "N: Disabled", "E: Enabled (Error)", "W: Enabled (Warning)"
Monitor error - Torque judgment value (%)	500.0	Sets a torque judgement value. Range: 0 to 500.0 (%)
Monitor error - Actual speed judgment	N: Disabled	Select the operation of the positioning unit RTEX that is performed when the actual speed of the amplifier exceeds the judgment value. "N: Disabled", "E: Enabled (Error)", "W: Enabled (Warning)"
Monitor error - Actual speed judgment value (rpm)	5000	Sets an actual speed judgement value. Range: 0 to 10000 rpm

Info.

- For details of errors and warnings, refer to "15 Error/Warning Notification Function".

14.12 Operation Complete Signal

14.12.1 Operation Done Flag and In-position Flag

The flags that notify the completion of operation are the "operation done flag" controlled by the positioning unit RTEX and the "in-position flag" controlled by the servo amplifier.

■ Operation done flag

- The operation done flag is a signal to confirm "operation complete" on the positioning unit RTEX side.
- The operation done flag turns OFF when each operation starts, and turns ON when the operation is completed. The completion of operation differs according to the operation.

Operation mode	Timing regarded as the completion of operation
Positioning operation	The operation command specifying the movement amount is completed.
JOG operation	The JOG request signal turns OFF and deceleration stop is completed.
Stop-on-contact torque value for home return	The home return operation is completed (the axis stops at the home position).

- When any stop operation such as deceleration stop, emergency stop, or error stop is executed during operation, the operation done flag also turns ON when the stop operation is completed.
- The range of "completion width" regarded as operation complete is specified in the positioning unit RTEX by using Configurator PM7-RTEX or a user program. The completion width can be set for each axis.
- The set completion width is transferred to the servo amplifier and set in the positioning parameter "positioning completion range" (Pr4.31) of the servo amplifier.

■ In-position flag

- The in-position (INP) flag is a signal to confirm the completion of positioning operation on the servo amplifier side.
- The condition and output settings for “in-position” state are specified in the servo amplifier using PANATERM.
- The in-position flag can be monitored on the positioning unit RTEX side via the positioning memory.

14.13 Simplified Position Deviation Monitor

"Simplified position deviation monitor" is a function that monitors the difference between the current position controlled within the positioning unit RTEX and the current position fed back from the amplifier.

- Deviations can be read from the each axis information area in the positioning memory by using a user program.
- Deviations can also be monitored with the "data monitor" function of Configurator PM7-RTEX.

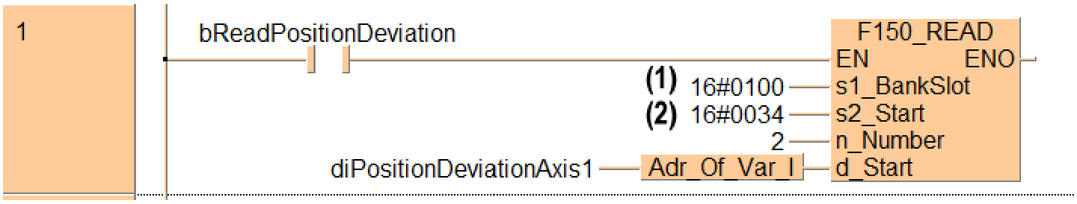
■ Sample programs

The following sample program monitors the position deviation values for Axis 1 of slot number 0 by loading them to diPositionDeviationAxis1.

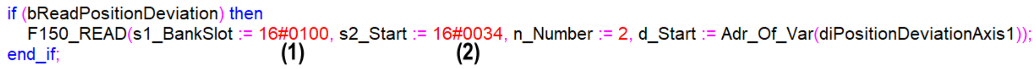
Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bReadPositionDeviation		BOOL	FALSE	Position deviation read start
VAR	diPositionDeviationAxis1		DINT	0	Position deviation of axis 1

Ladder diagram (LD)



Structured text (ST)



```
if (bReadPositionDeviation) then
   F150_READ(s1_BankSlot := 16#0100, s2_Start := 16#0034, n_Number := 2, d_Start := Adr_Of_Var(diPositionDeviationAxis1));
end_if;                          (1)                   (2)
```

Code	Items specified in the program	Values specified in the program							
		Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7 (virtual)	8 axes (virtual)
(1)	Bank, slot No.	16#0100 (bank 16#01, slot number 0)							
(2)	Storage area for unit-converted current value	16#0034-16#0035	16#0074 to 16#0075	16#00B4-16#00B5	16#00F4-16#00F5	16#0134-16#0135	16#0174-16#0175	16#01B4-16#01B5	16#01F4-16#01F5

Info.

- As the deviations read with the simplified position deviation monitor function are calculated within the positioning unit RTEX, they may differ from the deviation counter values within the amplifier.
- The display of the position deviation monitor is refreshed every 10 ms.

14.14 Amplifier Parameter R/W Function

14.14.1 Overview of Amplifier Parameter R/W function

The positioning unit RTEX can execute the following operations on the amplifier connected to the network. Any of these operations can be controlled by a user program via the amplifier parameter control area (addresses 16#0000 to 16#0027 in bank 16#52) in the positioning memory of the positioning unit RTEX.

■ Operation types （●: Executable, No mark: Non-executable)

Operation	Description	Status of target axis for operation	
		Stopped	Running
Reading amplifier parameters	Parameters are read from the amplifier and stored in the positioning memory (amplifier parameter control area) of the positioning unit RTEX.	●	● (Note 1)
Writing amplifier parameters	The values stored in the positioning memory (amplifier parameter control area) of the positioning unit RTEX are written to the amplifier.	●	
Saving Amplifier Parameters (Writing to EEPROM)	The parameters set in the amplifier are written into the EEPROM built in the amplifier.	●	
Amplifier reset (restart)	The amplifier is reset.	● (Note 2)	

(Note 1) Parameters cannot be read during home return operation.

(Note 2) Reset the amplifier only when all axes are stopped.

Note

- When executing the amplifier reset function, perform servo OFF for all the axes connected to the network. When the amplifier reset function is executed, the network will be disconnected, causing an error to occur on all the axes connected to the network, resulting in a servo OFF state.
- When a network disconnection error occurs, this function cannot be executed because communication is not available.

14.14.2 Reading Parameters from the Amplifier

Parameters can be read from the amplifier by using user programs according to the following procedure.

Procedure	Description
1	Check that the target axis exists on the network (for Axis 1: X108=ON).
2	Set the following items in the amplifier parameter control area (addresses 16##0000, 16#0003, and 16#00024 in bank 16#52). (AMP ID No., parameter category, parameter number)

Procedure	Description
	Set the control flag in the amplifier parameter control area (address 16#0001 in bank 16#52) to "16#0002" (read request). The positioning unit RTEX issues a parameter read request to the amplifier.
3	When processing is complete, "16#0000" (no request) is stored in the control flag in the amplifier parameter control area (address 16#0001 in bank 16#52).
4	Check that the status of the amplifier parameter control area (address 16#0002 in bank 16#52) is 16#0002 (normal termination). If an error occurs, 16#0004 to 16#0006 will be stored.
5	Read the parameter values from the amplifier parameter control area (addresses 16#0026 and 16#0027 in bank 16#52) into an arbitrary area.

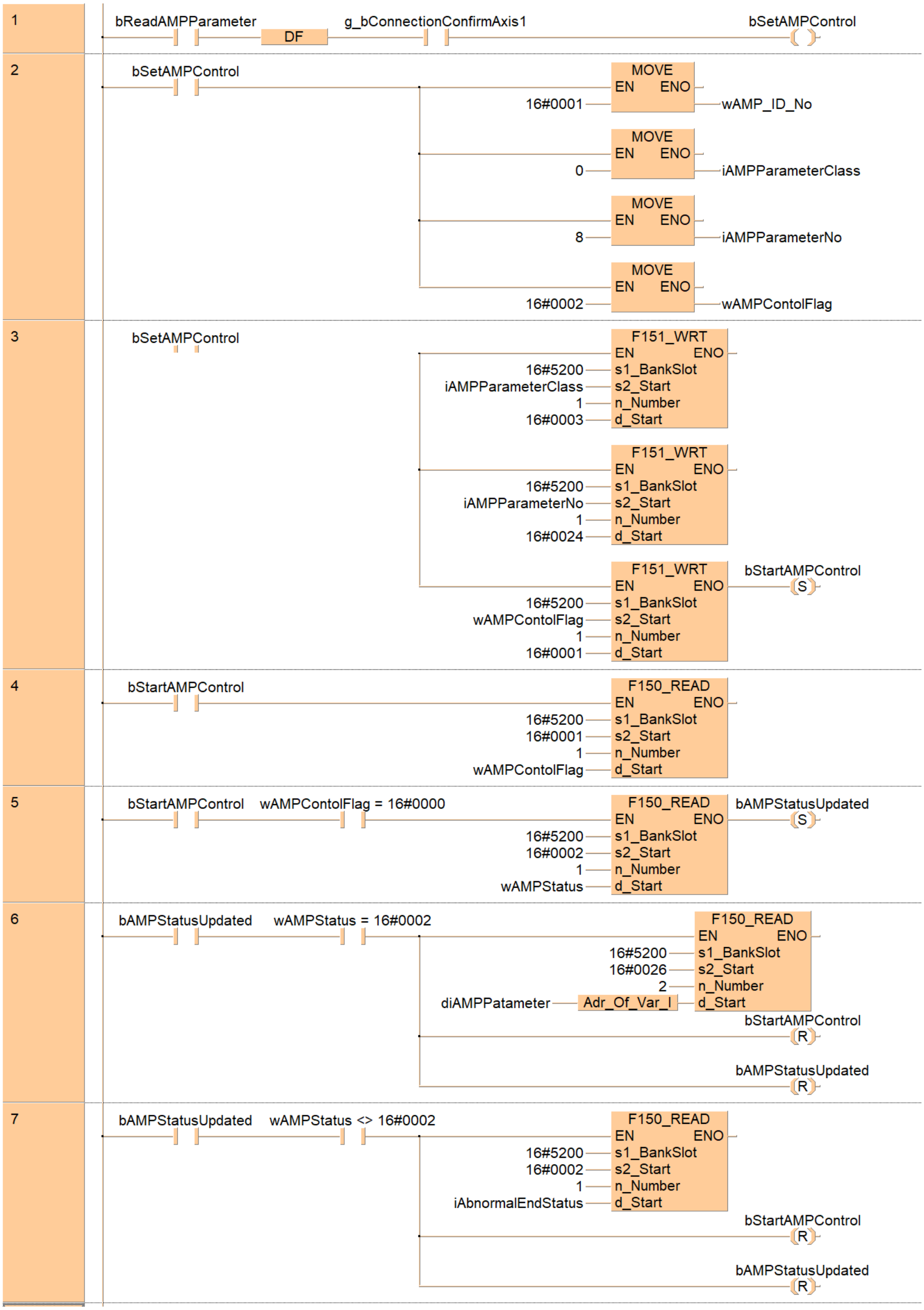
■ Sample programs

The following sample program reads the amplifier parameter Pr0.08 for Axis 1 of slot number 0.

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bAMPStatusUpdated		BOOL	FALSE	AMP status acquisition
VAR	bReadAMPParameter		BOOL	FALSE	Amplifier read flag
VAR	bSetAMPControl		BOOL	FALSE	AMP control setting (AMP control start)
VAR	bStartAMPControl		BOOL	FALSE	AMP control start (control start)
VAR_EXTERNAL	g_bConnectionConfirmAxis1	X108	BOOL	FALSE	Axis 1 connection confirmation
VAR	diAMPPatameter		DINT	0	AMP parameter
VAR	iAMPParameterClass		INT	0	AMP parameter category
VAR	iAMPParameterNo		INT	0	AMP parameter No.
VAR	iAbnormalEndStatus		INT	0	Abnormal termination status
VAR	wAMPContolFlag		WORD	0	AMP control flag
VAR	wAMPStatus		WORD	0	AMP status
VAR	wAMP_ID_No		WORD	0	AMP_ID_No

Ladder diagram (LD)



Structured text (ST)

```
bSetAMPControl  := DF(bReadAMPParameter) AND g_bConnectionConfirmAxis1;

if (bSetAMPControl) then (* AMP parameter settting : Read request *)
    wAMP_ID_No  := 16#0001;
    iAMPParameterClass  := 0;
    iAMPParameterNo   := 8;
    wAMPContolFlag  := 16#0002;
    F151_WRT(s1_BankSlot := 16#5200, s2_Start := wAMP_ID_No, n_Number := 1, d_Start := 16#0000);
    F151_WRT(s1_BankSlot := 16#5200, s2_Start := iAMPParameterClass, n_Number := 1, d_Start := 16#0003);
    F151_WRT(s1_BankSlot := 16#5200, s2_Start := iAMPParameterNo, n_Number := 1, d_Start := 16#0024);
    F151_WRT(s1_BankSlot := 16#5200, s2_Start := wAMPContolFlag, n_Number := 1, d_Start := 16#0001);
    bStartAMPControl    := TRUE;
end_if;

if (bStartAMPControl) then (* Request completion check *)
    F150_READ(s1_BankSlot := 16#5200, s2_Start := 16#0001, n_Number := 1, d_Start := wAMPContolFlag);
    if (wAMPContolFlag = 16#0000) then
        F150_READ(s1_BankSlot := 16#5200, s2_Start := 16#0002, n_Number := 1, d_Start := wAMPStatus);
        bAMPStatusUpdated    :=TRUE;
    end_if;
end_if;

if (bAMPStatusUpdated AND (wAMPStatus = 16#0002) ) then (* Normal end *)
    F150_READ(s1_BankSlot := 16#5200, s2_Start := 16#0026, n_Number := 2, d_Start := Adr_Of_Var(diAMPPatameter));
    bStartAMPControl    := FALSE;
    bAMPStatusUpdated    := FALSE;
end_if;

if (bAMPStatusUpdated AND (wAMPStatus <> 16#0002) ) then (* Abnormal end *)
    F150_READ(s1_BankSlot := 16#5200, s2_Start := 16#0002, n_Number := 1, d_Start := iAbnormalEndStatus);
    bStartAMPControl    := FALSE;
    bAMPStatusUpdated    := FALSE;
end_if;
```

14.14.3 Writing Parameters to the Amplifier

Parameters can be written to the amplifier by using user programs according to the following procedure.

Procedure	Description
1	Check that the target axis exists on the network (for Axis 1: X108=ON) and that the axis is not operating (for Axis 1: X118=OFF).
2	Set the following items in the amplifier parameter control area (addresses 16#0000, 16#0003, 16#00024, and 16#00026 and 16#00027 in bank 16#52). [AMP ID No., parameter category, parameter number, parameter data (2words)]
	Set the control flag in the amplifier parameter control area (address 16#0001 in bank 16#52) to "16#0004" (write request). The positioning unit RTEX issues a parameter write request to the amplifier.
3	When processing is complete, "16#0000" (no request) is stored in the control flag in the amplifier parameter control area (address 16#0001 in bank 16#52).
4	Check that the status of the amplifier parameter control area (address 16#0002 in bank 16#52) is 16#0002 (normal termination). If an error occurs, 16#0004 to 16#0006 will be stored.

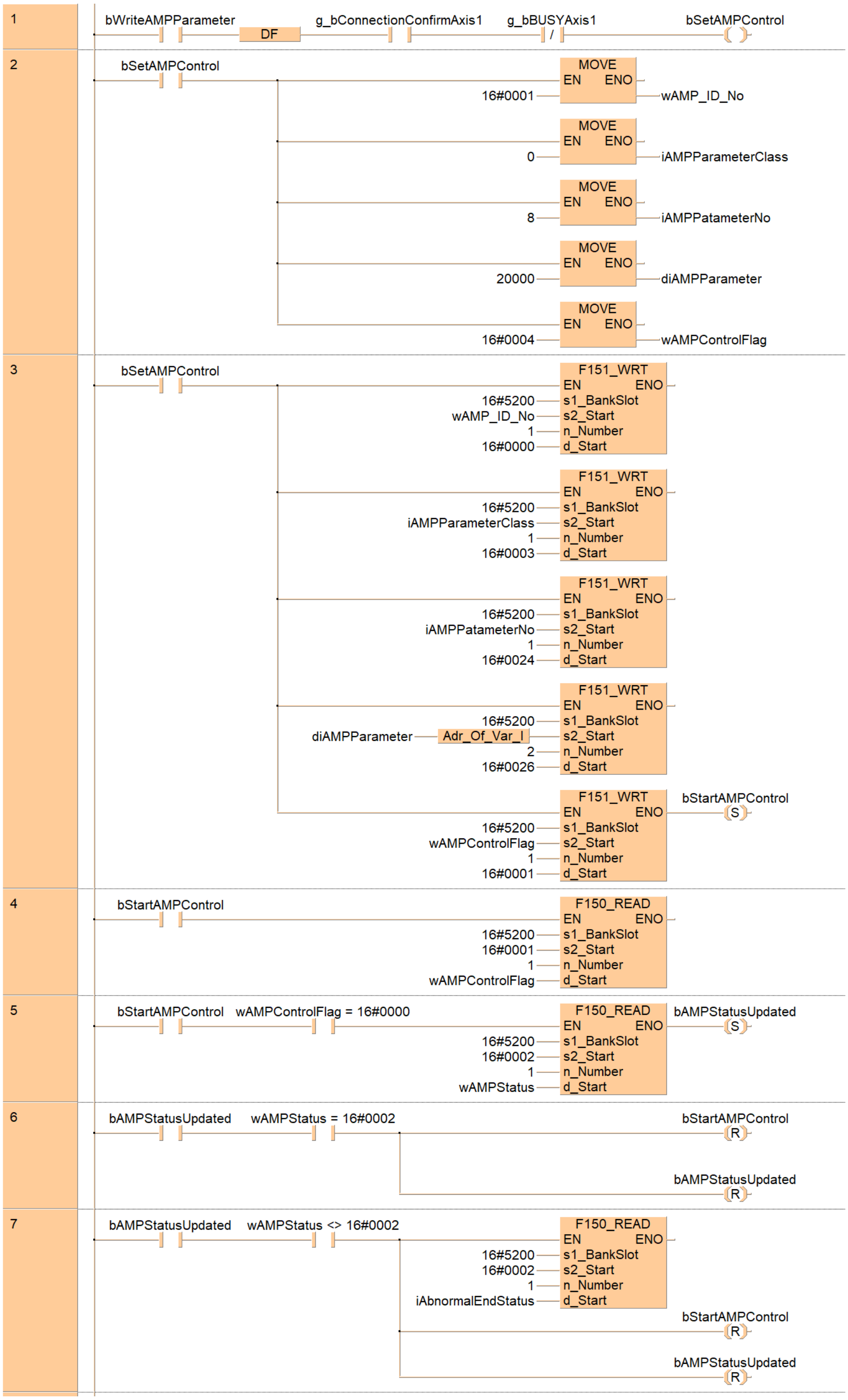
■ Sample programs

The following sample program writes the amplifier parameter Pr0.08 for Axis 1 of slot number 0.

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bAMPStatusUpdated		BOOL	FALSE	AMP status acquisition
VAR	bSetAMPControl		BOOL	FALSE	AMP control setting (AMP control start)
VAR	bStartAMPControl		BOOL	FALSE	AMP control start (control start)
VAR	bWriteAMPParameter		BOOL	FALSE	AMP write flag
VAR_EXTERNAL	g_bBUSYAxis1	X118	BOOL	FALSE	Axis 1 BUSY
VAR_EXTERNAL	g_bConnectionConfirmAxis1	X108	BOOL	FALSE	Axis 1 connection confirmation
VAR	diAMPParameter		DINT	0	AMP parameter
VAR	iAMPParameterClass		INT	0	AMP parameter category
VAR	iAMPPatameterNo		INT	0	AMP parameter No.
VAR	iAbnormalEndStatus		INT	0	Abnormal termination status
VAR	wAMPControlFlag		WORD	0	AMP control flag
VAR	wAMPStatus		WORD	0	AMP status
VAR	wAMP_ID_No		WORD	0	AMP_ID_No

Ladder diagram (LD)



Structured text (ST)

```
bSetAMPControl  := DF(bWriteAMPParameter) AND g_bConnectionConfirmAxis1 AND NOT g_bBUSYAxis1;

if (bSetAMPControl) then (* AMP parameter settting : Write request *)
   wAMP_ID_No  := 16#0001;
   iAMPParameterClass  := 0;
   iAMPPatameterNo   := 8;
   diAMPParameter  := 20000;
   wAMPControlFlag   :=16#0004;
   F151_WRT(s1_BankSlot := 16#5200, s2_Start := wAMP_ID_No, n_Number := 1, d_Start := 16#0000);
   F151_WRT(s1_BankSlot := 16#5200, s2_Start := iAMPParameterClass, n_Number := 1, d_Start := 16#0003);
   F151_WRT(s1_BankSlot := 16#5200, s2_Start := iAMPPatameterNo, n_Number := 1, d_Start := 16#0024);
   F151_WRT(s1_BankSlot := 16#5200, s2_Start := Adr_Of_Var(diAMPParameter), n_Number := 2, d_Start := 16#0026);
   F151_WRT(s1_BankSlot := 16#5200, s2_Start := wAMPControlFlag, n_Number := 1, d_Start := 16#0001);
   bStartAMPControl   := TRUE;
end_if;

if (bStartAMPControl) then (* Request completion check *)
   F150_READ(s1_BankSlot := 16#5200, s2_Start := 16#0001, n_Number := 1, d_Start := wAMPControlFlag);
   if (wAMPControlFlag = 16#0000) then
      F150_READ(s1_BankSlot := 16#5200, s2_Start := 16#0002, n_Number := 1, d_Start := wAMPStatus);
      bAMPStatusUpdated   := TRUE;
   end_if;
end_if;

if (bAMPStatusUpdated AND (wAMPStatus = 16#0002) ) then (* Normal end *)
   bStartAMPControl   := FALSE;
   bAMPStatusUpdated   := FALSE;
end_if;

if (bAMPStatusUpdated AND (wAMPStatus <> 16#0002) ) then (* Abnormal end *)
   F150_READ(s1_BankSlot := 16#5200, s2_Start := 16#0002, n_Number := 1, d_Start := iAbnormalEndStatus);
   bStartAMPControl   := FALSE;
   bAMPStatusUpdated   := FALSE;
end_if;
```

14.14.4 Saving Amplifier Parameters (Writing to EEPROM)

Amplifier parameters can be written into EEPROM by using user programs according to the following procedure.

Procedure	Description
1	Check that the target axis exists on the network (for Axis 1: X108=ON) and that the axis is not operating (for Axis 1: X118=OFF).
2	Set the control flag in the amplifier parameter control area (address 16#0001 in bank 16#52) to "16#0005" (EEPROM request). The positioning unit RTEX issues an EEPROM write request to the amplifier.
3	When processing is complete, "16#0000" (no request) is stored in the control flag in the amplifier parameter control area (address 16#0001 in bank 16#52).
4	Check that the status of the amplifier parameter control area (address 16#0002 in bank 16#52) is 16#0002 (normal termination). If an error occurs, 16#0004 or 16#0006 will be stored.

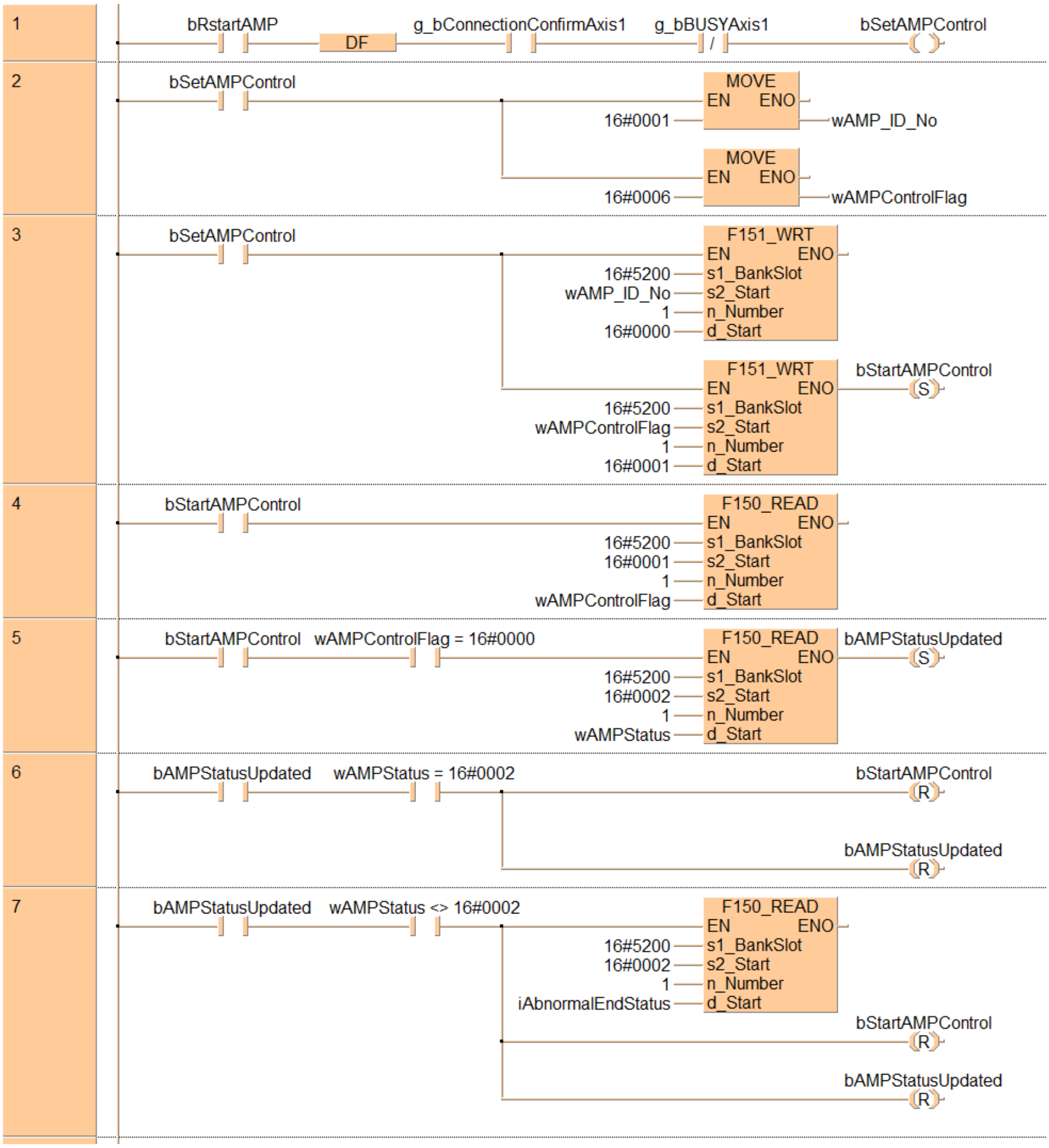
■ Sample programs

The following sample program saves the amplifier parameter for Axis 1 of slot number 0.

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bAMPStatusUpdated		BOOL	FALSE	AMP status acquisition
VAR	bSaveAMPParameter		BOOL	FALSE	Amplifier parameter save flag
VAR	bSetAMPControl		BOOL	FALSE	AMP control setting (AMP control start)
VAR	bStartAMPControl		BOOL	FALSE	AMP control start (control start)
VAR_EXTERNAL	g_bBUSYAxis1	X118	BOOL	FALSE	Axis 1 BUSY
VAR_EXTERNAL	g_bConnectionConfirmAxis1	X108	BOOL	FALSE	Axis 1 connection confirmation
VAR	iAbnormalEndStatus		INT	0	Abnormal termination status
VAR	wAMPControlFlag		WORD	0	AMP control flag
VAR	wAMPStatus		WORD	0	AMP status
VAR	wAMP_ID_No		WORD	0	AMP_ID_No

Ladder diagram (LD)



Structured text (ST)

```
bSetAMPControl  := DF(bSaveAMPParameter) AND g_bConnectionConfirmAxis1 AND NOT g_bBUSYAxis1;

if (bSetAMPControl) then (* AMP parameter settting : EEPROM request *)
   wAMP_ID_No  := 16#0001;
   wAMPControlFlag    := 16#0005;
   F151_WRT(s1_BankSlot := 16#5200, s2_Start := wAMP_ID_No, n_Number := 1, d_Start := 16#0000);
   F151_WRT(s1_BankSlot := 16#5200, s2_Start := wAMPControlFlag, n_Number := 1, d_Start := 16#0001);
   bStartAMPControl    := TRUE;
end_if;

if (bStartAMPControl) then (* Request completion check *)
   F150_READ(s1_BankSlot := 16#5200, s2_Start := 16#0001, n_Number := 1, d_Start := wAMPControlFlag);
   if (wAMPControlFlag = 16#0000) then
      F150_READ(s1_BankSlot := 16#5200, s2_Start := 16#0002, n_Number := 1, d_Start := wAMPStatus);
      bAMPStatusUpdated    :=TRUE;
   end_if;
end_if;

if (bAMPStatusUpdated AND (wAMPStatus = 16#0002) ) then (* Normal end *)
   bStartAMPControl    := FALSE;
   bAMPStatusUpdated    := FALSE;
end_if;

if (bAMPStatusUpdated AND (wAMPStatus <> 16#0002) ) then (* Abnormal end *)
   F150_READ(s1_BankSlot := 16#5200, s2_Start := 16#0002, n_Number := 1, d_Start := iAbnormalEndStatus);
   bStartAMPControl    := FALSE;
   bAMPStatusUpdated    := FALSE;
end_if;
```

14.14.5 Resetting the Amplifier (Restart)

The amplifier can be reset by using a user program according to the following procedure.

Procedure	Description
1	Check that the target axis exists on the network (for Axis 1: X108=ON) and that the axis is not operating (for Axis 1: X118=OFF).
2	Set the control flag in the amplifier parameter control area (address 16#0001 in bank 16#52) to "16#0006" (amplifier reset request). The positioning unit RTEX issues an amplifier reset request to the amplifier.
3	When processing is complete, "16#0000" (no request) is stored in the control flag in the amplifier parameter control area (address 16#0001 in bank 16#52).
4	Check that the status of the amplifier parameter control area (address 16#0002 in bank 16#52) is 16#0002 (normal termination). If an error occurs, 16#0004 or 16#0006 will be stored.

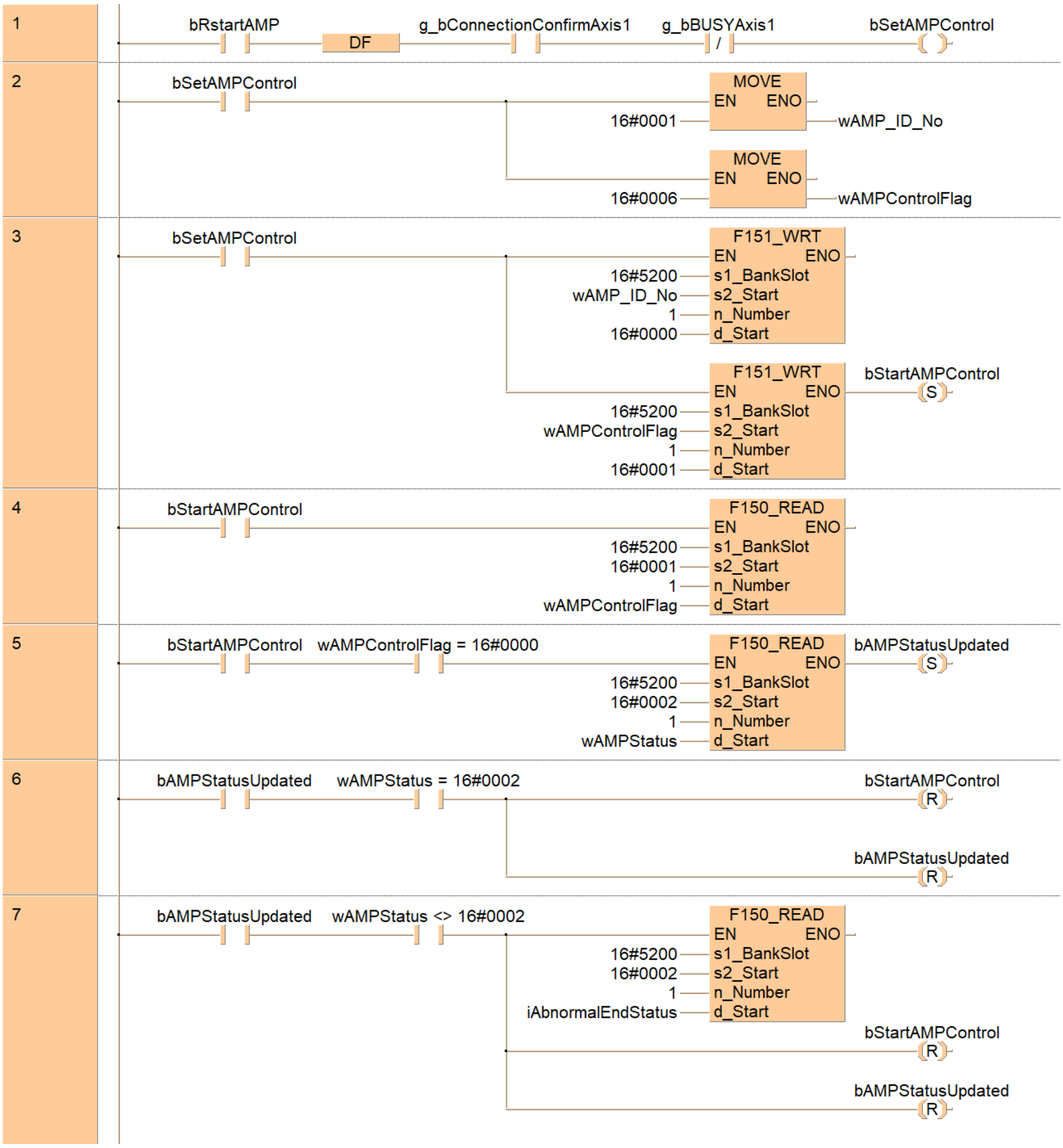
■ Sample programs

The following sample program resets the amplifier for Axis 1 (ID) of slot number 0.

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bAMPStatusUpdated		BOOL	FALSE	Amplifier status acquisition
VAR	bRstartAMP		BOOL	FALSE	Amplifier reset flag
VAR	bSetAMPControl		BOOL	FALSE	Amplifier control setting (amplifier control start)
VAR	bStartAMPControl		BOOL	FALSE	Amplifier control start (control start)
VAR_EXTERNAL	g_bBUSYAxis1	X118	BOOL	FALSE	Axis 1 BUSY
VAR_EXTERNAL	g_bConnectionConfirmAxis1	X108	BOOL	FALSE	Axis 1 connection confirmation
VAR	iAbnormalEndStatus		INT	0	Abnormal termination status
VAR	wAMPControlFlag		WORD	0	Amplifier control flag
VAR	wAMPStatus		WORD	0	Amplifier status
VAR	wAMP_ID_No		WORD	0	AMP_ID_No

Ladder diagram (LD)



Structured text (ST)

```
bSetAMPControl  := DF(bRstartAMP) AND g_bConnectionConfirmAxis1 AND NOT g_bBUSYAxis1;

if (bSetAMPControl) then (* AMP parameter settting :  AMP reset request *)
   wAMP_ID_No  := 16#0001;
   wAMPControlFlag    := 16#0006;
   F151_WRT(s1_BankSlot := 16#5200, s2_Start := wAMP_ID_No, n_Number := 1, d_Start := 16#0000);
   F151_WRT(s1_BankSlot := 16#5200, s2_Start := wAMPControlFlag, n_Number := 1, d_Start := 16#0001);
   bStartAMPControl    := TRUE;
end_if;

if (bStartAMPControl) then (* Request completion check *)
   F150_READ(s1_BankSlot := 16#5200, s2_Start := 16#0001, n_Number := 1, d_Start := wAMPControlFlag);
   if (wAMPControlFlag = 16#0000) then
      F150_READ(s1_BankSlot := 16#5200, s2_Start := 16#0002, n_Number := 1, d_Start := wAMPStatus);
      bAMPStatusUpdated    :=TRUE;
   end_if;
end_if;

if (bAMPStatusUpdated AND (wAMPStatus = 16#0002) ) then (* Normal end *)
   bStartAMPControl    := FALSE;
   bAMPStatusUpdated    := FALSE;
end_if;

if (bAMPStatusUpdated AND (wAMPStatus <> 16#0002) ) then (* Abnormal end *)
   F150_READ(s1_BankSlot := 16#5200, s2_Start := 16#0002, n_Number := 1, d_Start := iAbnormalEndStatus);
   bStartAMPControl    := FALSE;
   bAMPStatusUpdated    := FALSE;
end_if;
```

Note

- When using the amplifier reset function, perform servo OFF for all the axes connected to the network.
- When the amplifier is reset, the network will be disconnected, causing an error to occur on all the axes connected to the network, resulting in a servo OFF state.

14.15 Amplifier Monitor Function

14.15.1 Overview of Amplifier Monitoring Function

This function enables the positioning unit RTEX to monitor the status information of the servo amplifier by using RTEX monitor commands.

- Information can be read from the amplifier monitoring and control area (addresses 16#0390 to 16#0395 in bank 16#00) in the positioning memory of the positioning unit RTEX by controlling the area by using a user program.
- The amplifier monitoring function can be used even during axis operation. Note, however, that monitoring cannot be performed during home return operation.
- When a network disconnection error occurs, this function cannot be executed because communication is not available.

14.15.2 Monitoring Items

The following table shows the type codes that can be read by the positioning unit RTEX, as well as the names of these type codes.

Type code (HEX)	Name	Type code (HEX)	Name
01	Position deviation	31	Inertia ratio
02	Encoder resolution	32	Automatic motor recognition enabled state
04	Internal command position (after filtering)	33	Cause of no rotation
05	Actual speed	34	Warning flags
06	Torque command	41	Mechanical angle (Single-turn data)
07	Actual position	42	Electrical angle
08	Internal command position (before filtering)	43	Multi-turn data
09	Latch position 1	61	Power-ON cumulative time
0A	Latch position 2	62	Servo amplifier temperature
0C	Command speed (after filtering)	63	Encoder temperature
11	Regenerative load factor	64	Number of inrush resistor relay changes
12	Overload factor	65	Number of dynamic brake relay changes
21	Logical input signal	66	Fan operating time
22	Logical output signal	67	Fan life expectancy integrated value
23	Logical input signal (expansion portion)	68	Capacitor life expectancy integrated value
24	Logical output signal (expansion portion)	69	Voltage across a p–n junction

Type code (HEX)	Name	Type code (HEX)	Name
25	Physical input signal	71	Cumulative number of RTEX communication errors
26	Physical output signal	81	Cumulative number of encoder communication errors

(Note 1) Refer to the latest instruction manual and technical reference for the servo amplifier.

14.15.3 Monitoring Procedure

Monitoring can be performed by using a user program according to the following procedure.

Procedure	Description
1	Check that the target axis exists on the network (for Axis 1: X108 = ON).
2	Amplifier monitor & control area In AMP ID No., set the axis number (AMP ID No.) to be read. Set the type code to be monitored in the control flag.
3	The positioning unit RTEX sets 16#0001 (processing in progress) as the status and stores the monitor data.
4	Check that the status in the amplifier monitor & control area is 16#0002 (normal termination).
5	Copy the monitoring data to the desired area.

■ Sample programs

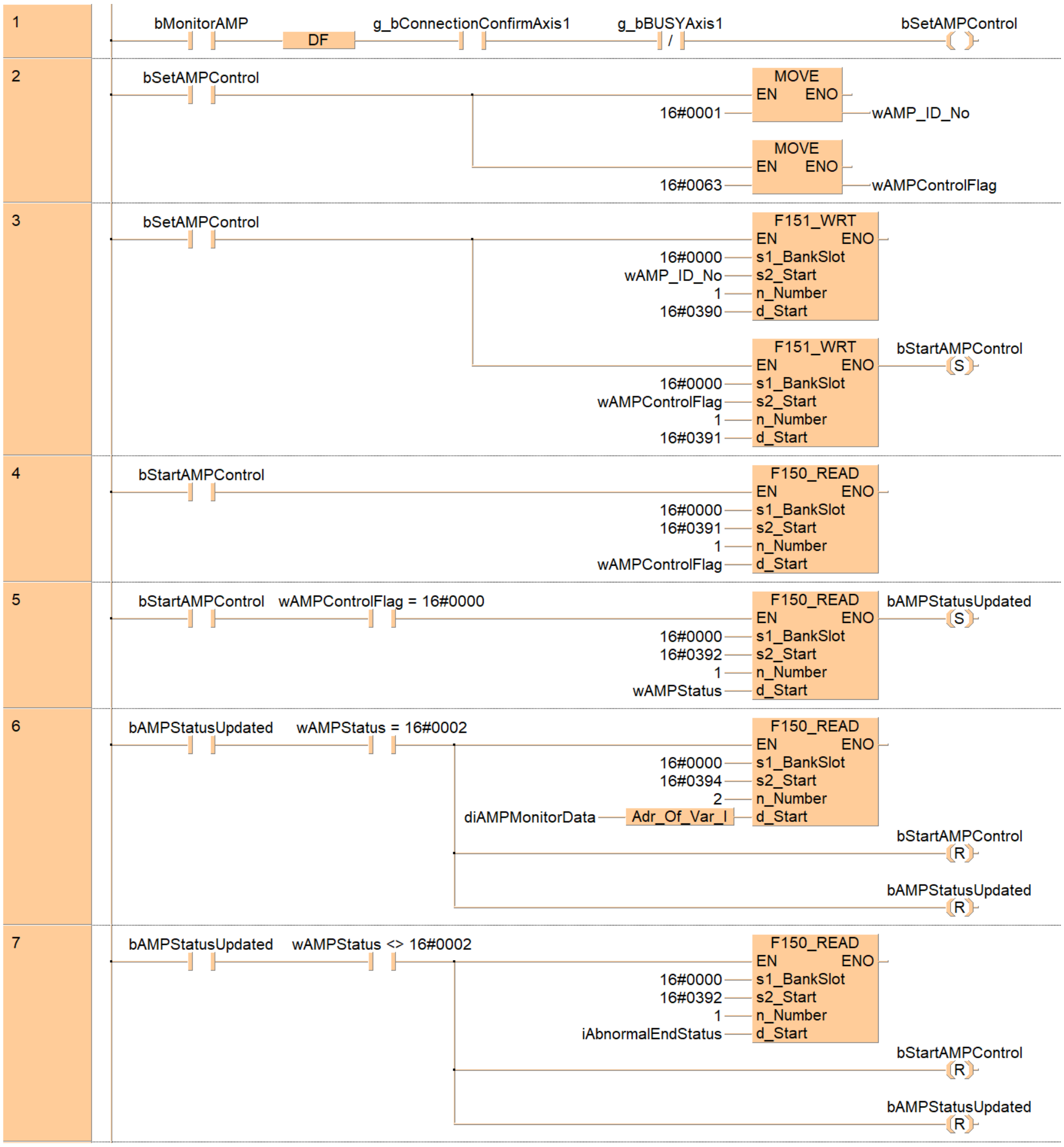
The following sample program monitors the encoder temperature (type code 63) for Axis 1 of slot number 0.

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bAMPStatusUpdated		BOOL	FALSE	AMP status acquisition
VAR	bMonitorAMP		BOOL	FALSE	AMP monitor start
VAR	bSetAMPControl		BOOL	FALSE	AMP control setting (AMP control start)
VAR	bStartAMPControl		BOOL	FALSE	AMP control start (control start)
VAR_EXTERNAL	g_bBUSYAxis1	X118	BOOL	FALSE	Axis 1 BUSY
VAR_EXTERNAL	g_bConnectionConfirmAxis1	X108	BOOL	FALSE	Axis 1 connection confirmation
VAR	diAMPMonitorData		DINT	0	AMP monitor data

Class name	Variable name	FP address	Data type	Default	Comment
VAR	iAbnormalEndStatus		INT	0	Abnormal termination status
VAR	wAMPControlFlag		WORD	0	AMP control flag
VAR	wAMPStatus		WORD	0	AMP status
VAR	wAMP_ID_No		WORD	0	AMP_ID_No

Ladder diagram (LD)



Structured text (ST)

```
bSetAMPControl  := DF(bMonitorAMP) AND g_bConnectionConfirmAxis1 AND NOT g_bBUSYAxis1;

if (bSetAMPControl) then (* AMP parameter settting : Monitoring request *)
    wAMP_ID_No  := 16#0001;
    wAMPControlFlag    := 16#0063;
    F151_WRT(s1_BankSlot := 16#0000, s2_Start := wAMP_ID_No, n_Number := 1, d_Start := 16#0390);
    F151_WRT(s1_BankSlot := 16#0000, s2_Start := wAMPControlFlag, n_Number := 1, d_Start := 16#0391);
    bStartAMPControl    := TRUE;
end_if;

if (bStartAMPControl) then (* Request completion check *)
    F150_READ(s1_BankSlot := 16#0000, s2_Start := 16#0391, n_Number := 1, d_Start := wAMPControlFlag);
    if (wAMPControlFlag = 16#0000) then
        F150_READ(s1_BankSlot := 16#0000, s2_Start := 16#0392, n_Number := 1, d_Start := wAMPStatus);
        bAMPStatusUpdated    :=TRUE;
    end_if;
end_if;

if (bAMPStatusUpdated AND (wAMPStatus = 16#0002) ) then (* Normal end *)
    F150_READ(s1_BankSlot := 16#0000, s2_Start := 16#0394, n_Number := 2, d_Start := Adr_Of_Var(diMonitorData));
    bStartAMPControl    := FALSE;
    bAMPStatusUpdated    := FALSE;
end_if;

if (bAMPStatusUpdated AND (wAMPStatus <> 16#0002) ) then (* Abnormal end *)
    F150_READ(s1_BankSlot := 16#0000, s2_Start := 16#0392, n_Number := 1, d_Start := iAbnormalEndStatus);
    bStartAMPControl    := FALSE;
    bAMPStatusUpdated    := FALSE;
end_if;
```

14.16 Latch Correction J-point Control Function

14.16.1 Overview of Latch Correction J-point Control Function

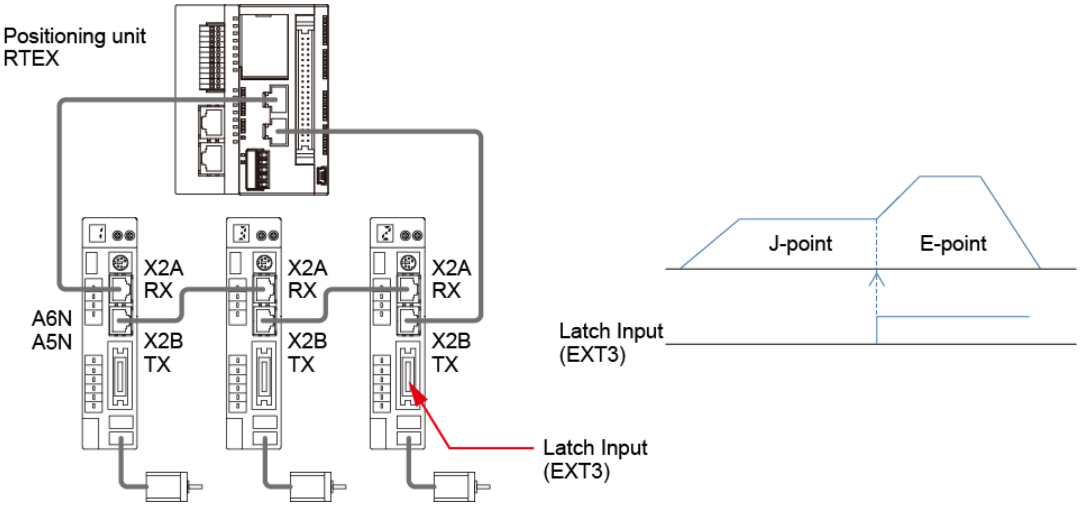
This function uses the latch function of MINAS A5N and A6N servo amplifiers to perform positioning after a JOG positioning operation.

14.16.2 Overview and Applications of Latch Correction J-point Control Function

The latch function detects latch inputs from the servo amplifier and obtains the current value at the time of detection from the servo amplifier.

The JOG positioning function is the controller’s own function. When operations are started, the function performs the operations at the target speed until the J-point positioning start contact turns ON and then starts the next positioning control when the J-point positioning start contact turns ON.

The latch correction J-point control function executes positioning operations after J-point control, by using latch inputs from the servo amplifier as the "J-point positioning start contact" signals during the J-point operation mentioned above. When sensor inputs or other inputs are used as triggers for JOG positioning, this function enables the next position control to be started with minimal effect on the controller program. This function can also obtain the current value at the time of latch input, making it possible to perform position adjustment for next position control.



This function is dedicated to J-point operation and cannot be used for other operations.

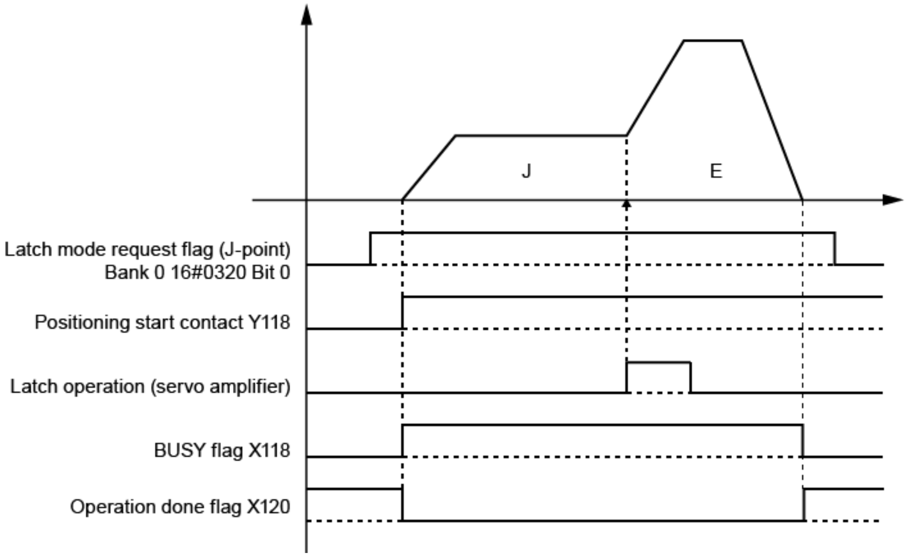
14.16.3 Settings and Operations of Latch J-Point

The example below is the case where the latch correction J-point function is executed on Axis 1 by using slot number 0. The unit is the number of pulses.

■ Settings

Item	Setting example		
	Table 1	J-point axis positioning parameter settings	Table 2
Operation pattern	J: Speed point	-	E: End point
Control method	I: Incremental	-	I: Incremental
X-axis movement amount	5,000 pulses	-	10,000 pulses
Acceleration/ deceleration method	L: Linear	-	L: Linear
Acceleration time (ms)	100 ms	-	200 ms
Deceleration time (ms)	10 ms	-	20 ms
Target speed	10,000 pps	-	20000 pps
J-point operation setting mode	-	Linear acceleration / deceleration	-
J-point acceleration time (ms)	-	10 ms	-
J-point deceleration time (ms)	-	10 ms	-
J-point target speed	-	30000 pps	-

■ Behavior diagram



■ Behaviors of each contact

- Before starting operation, turn ON the latch mode request flag (J-point).
- The controller is ready to run this function and enters the latch input wait state.
- Start the positioning operation.

- When latch input turns ON while the J-point positioning table is active, the servo amplifier notifies the controller of the latch input and latch position.

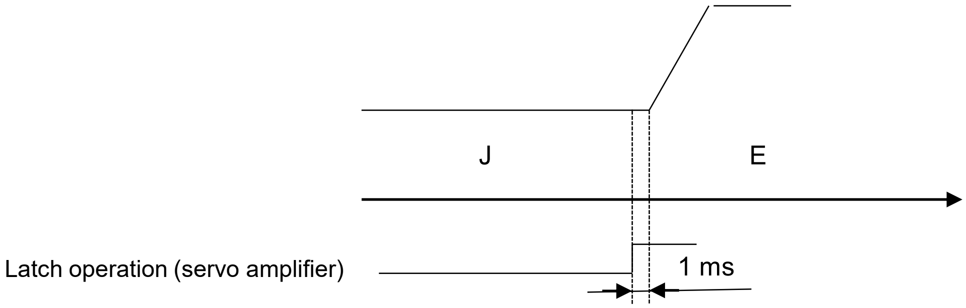
  The controller detects the latch input and activates the next positioning table (E-point).

  J-point positioning start contacts are ignored while this function is operating.
- After the positioning operation is complete, check that the BUSY flag is OFF (the operation done flag is ON) and then turn OFF the latch mode request flag (J-point).

14.16.4 Restrictions on Latch Correction J-Point Control Function

The followings are restrictions on using the latch correction J-point control function.

- This function can only be used for J-point operations. Therefore, use only single axes with this function.
- For the movement amount in the J-point positioning table, specify a value that is equal to or greater than the movement speed multiplied by the acceleration time.
- This function can minimize time delays within the controller, but there is a time delay of 1 ms from when latch is detected until the positioning operation following J-point control is started.



- This function can only be used a single time between operation start and operation complete. If it is used two times, "correction latch used multiple times" (error code 16#3070) is output and an error stop is performed.
- When the latch correction J-point function is enabled while the J-point positioning table is active, the "Actual speed" and "Torque command" in the monitor area cannot be monitored.

REFERENCE

18.6.2 Each Axis Information & Monitor Area

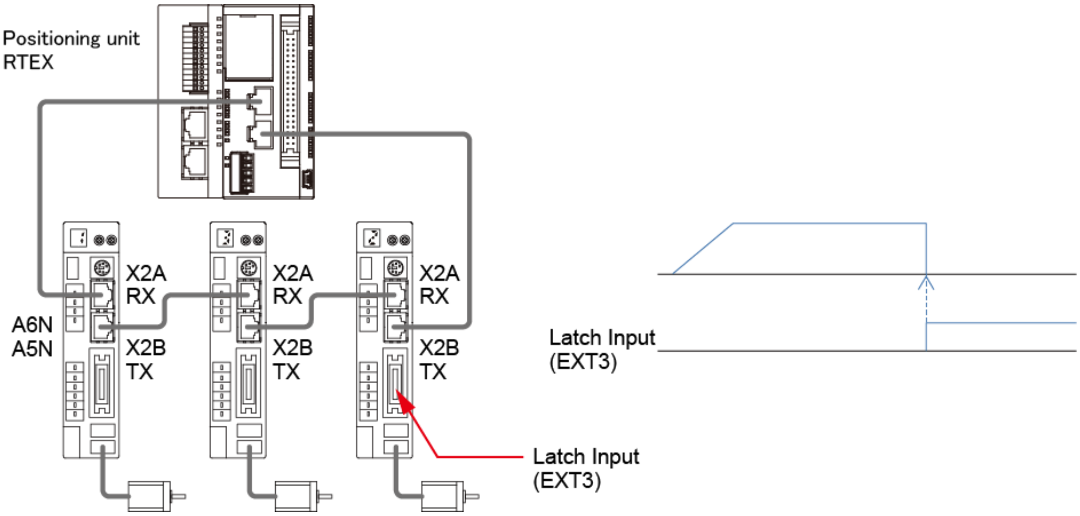
14.17 Latch Stop Function

14.17.1 Overview of Latch Stop Function

This function is for using the "latch mode with a stop function" for MINAS A6N servo amplifiers.

14.17.2 Overview and Applications of Latch Stop Function

The latch stop function uses latch inputs from the servo amplifier as triggers to cause the servo amplifier to stop the motor at a latching position.



Using the latch stop function enables the motor to be stopped in minimum time in response to stop requests from external devices. Therefore, by turning ON the latch input when torque values from the servo amplifier exceed a certain value, operations such as press fit or screw tightening can be stopped without delays.

The latch stop function is only deigned to stop the motor at a latching position and so cannot be used for any purpose other than stoppage.

14.17.3 Settings and Operations of the Latch Stop Function

■ Operating procedure

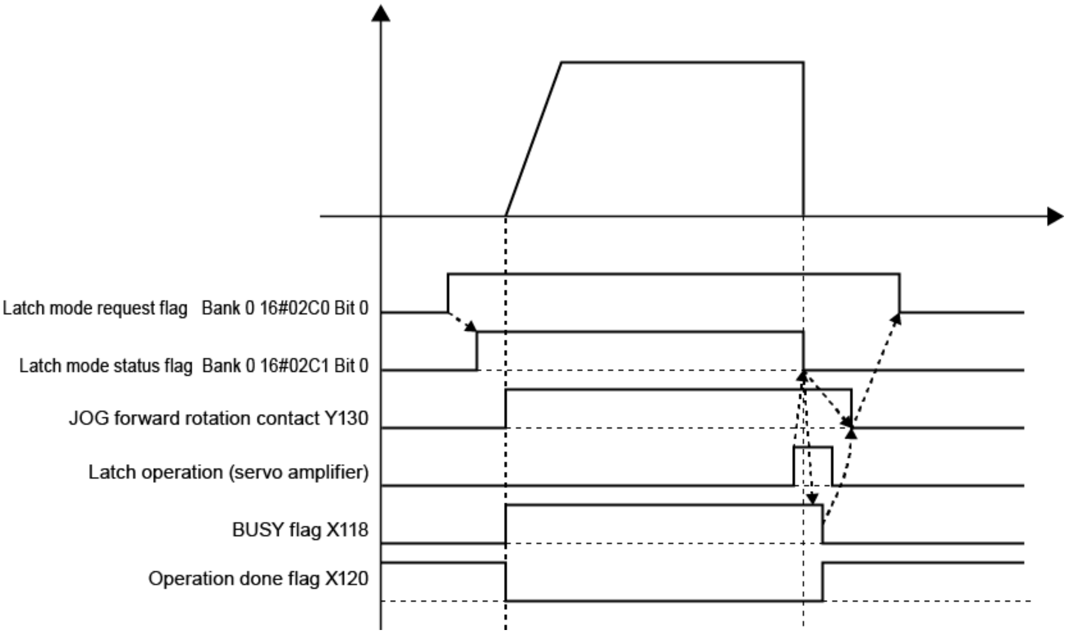
The example below is the case where the latch stop function is executed on Axis 1 by using slot number 0. The unit is the number of pulses.

● Settings

Item	Setting example
JOG acceleration/deceleration pattern	0: Linear acceleration / deceleration
JOG acceleration time (ms)	100 ms

Item	Setting example
JOG deceleration time (ms)	100 ms
JOG target speed	10,000 pps
Axis on which latch mode with a stop function runs	Axis 1
Latch trigger signal input for Axis 1	3 (rising edge of EXT3)

- **Behavior diagram**



- **Operations of each contact**

- Before starting operation, turn ON the latch mode request flag. The latch mode request flag can also be turned ON during JOG operation.
- When the positioning unit RTEX is ready to run the latch stop function and enters the latch input wait state, the latch status flag turns ON.
- Start the JOG operation.
- When latch input turns ON, the servo amplifier stops the motor at the latch position.

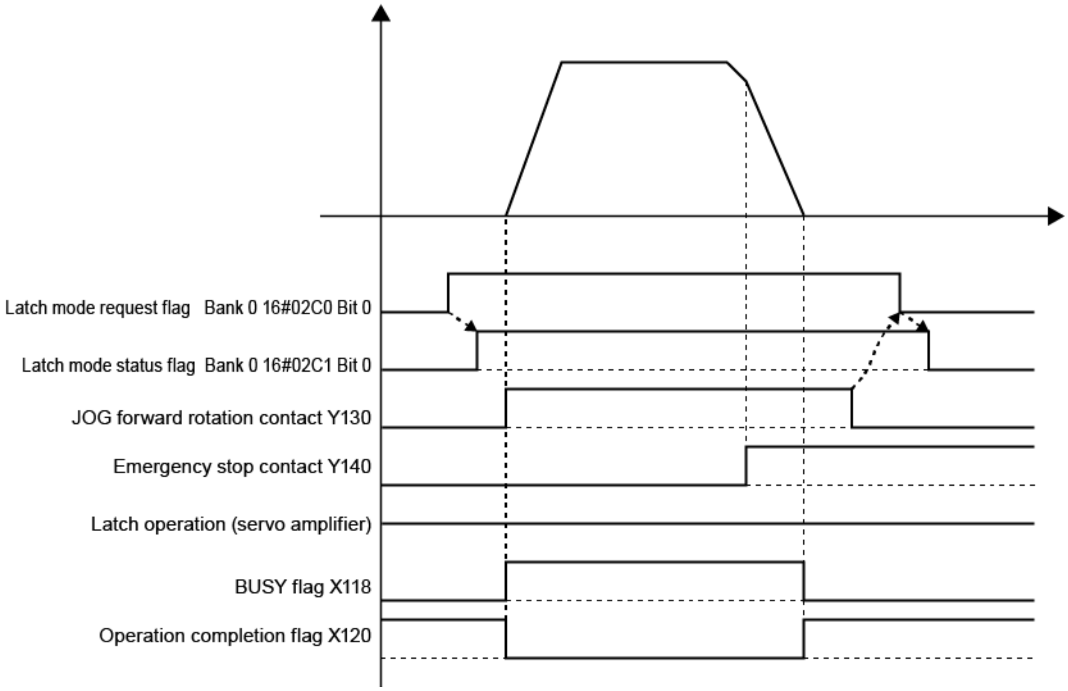
  The positioning unit RTEX detects the latch input and turns OFF the latch mode status flag.

  After verifying that the motor has stopped, the positioning unit RTEX determines that the JOG operation is completed, turns OFF the BUSY flag, and then turns ON the operation done flag.
- Check that the latch mode status flag is OFF and the BUSY flag is OFF, and then turn OFF the JOG Forward/Reverse signal.
- Turn OFF the latch mode request flag.

  Note that unless the latch mode request flag is turned ON again after it was turned OFF, this function cannot be subsequently operated.

■ Operation discontinuation procedure

The following is the procedure for operation discontinuation (such as deceleration stop or emergency stop) before latch input after the latch stop function is executed.



● Operations of each contact

- Before starting operation, turn ON the latch mode request flag.
- When the positioning unit RTEX is ready to run the latch stop function and enters the latch input wait state, the latch status flag turns ON.
- Start the JOG operation.
- Before latch input turns ON, an emergency stop is performed.

  Emergency stop processing causes the positioning unit RTEX to stop the axis, turn OFF the BUSY flag, and then turn ON the operation done flag.
- After confirming that the axis has stopped, turn OFF the JOG Forward/Reverse signal.
- Turn OFF the latch mode request flag. When the latch mode request flag is turned OFF, the positioning unit RTEX interrupts the latch stop function and turns OFF the latch mode status flag.

14.17.4 Restrictions on the Latch Stop Function

● Restrictions during operation

- While the latch stop function is running, only JOG operations can be performed. Note that other operations (such as positioning) cannot be performed.
- The latch stop function can only be executed on single axes. It cannot be used for axes targeted for synchronous operation.

When using this function for axes targeted for synchronous operation, change the synchronous group settings and exclude the target axes from the synchronous group beforehand. When doing this, turn OFF the latch mode request flag.

- Before executing the latch stop function, check that the latch request signal is OFF.
- To confirm that the operation of the latch stop function is complete, check that the following flags are as follows:

  Latch status flag = OFF

  Busy flag = OFF

- To turn OFF the request signal after the operation is complete, perform the following procedure.

  1. Turn OFF the JOG request signal.
  2. Turn OFF the latch mode request flag.

  Steps 1 and 2 above can also be executed at the same time.

- When the latch stop function is executed, the "Actual speed" and "Torque command" in the monitor area cannot be monitored.

● **Restrictions on servo amplifiers**

- For servo amplifiers, use MINAS A6N Ver. 1.22 or later.

  If any other model or version is used, an axis error will occur.

- If the latch stop function is used for any axes for which command positions in command units wrap around (such as shafts that rotate limitlessly in one direction), set an integer multiple of the electronic gear ratio of the servo amplifier.

  If the set value is not an integer multiple of the electronic gear ratio, the latch position may differ from the intended position (operations are not performed normally).

  (For wraparound, refer to the specifications of the servo amplifier.)

REFERENCE

18.6.2 Each Axis Information & Monitor Area

14.18 Counter Positioning Function

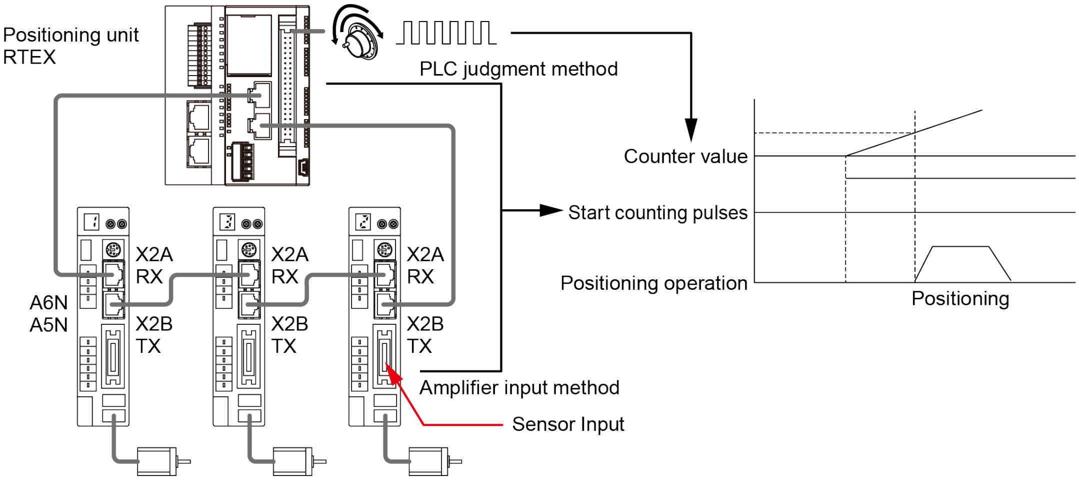
14.18.1 Overview of Counter Positioning Function

The positioning unit RTEX performs various positioning operations, but because positioning is started by a program, response delays may occur.

The counter positioning function counts the number of input pulses and executes positioning operations when the number of pulses exceeds the threshold value. The following two methods are provided as triggers for starting counting pulses in order to achieve quick positioning operations.

Method	Overview
PLC judgment method	Use this method to start counting by internal processing of the PLC.
Amplifier input method	Use this method to use input signals from the servo amplifier as triggers for counting pulses.

Using the counter positioning function enables positioning operations to be performed quickly in response to pulses input from external devices or sensors.



14.18.2 Settings and Operations of Counter Positioning Function

PLC judgment method

Use the PLC judgment method to perform positioning operations for Axis 1. Settings are shown in the following table.

- **Settings for counter positioning function**

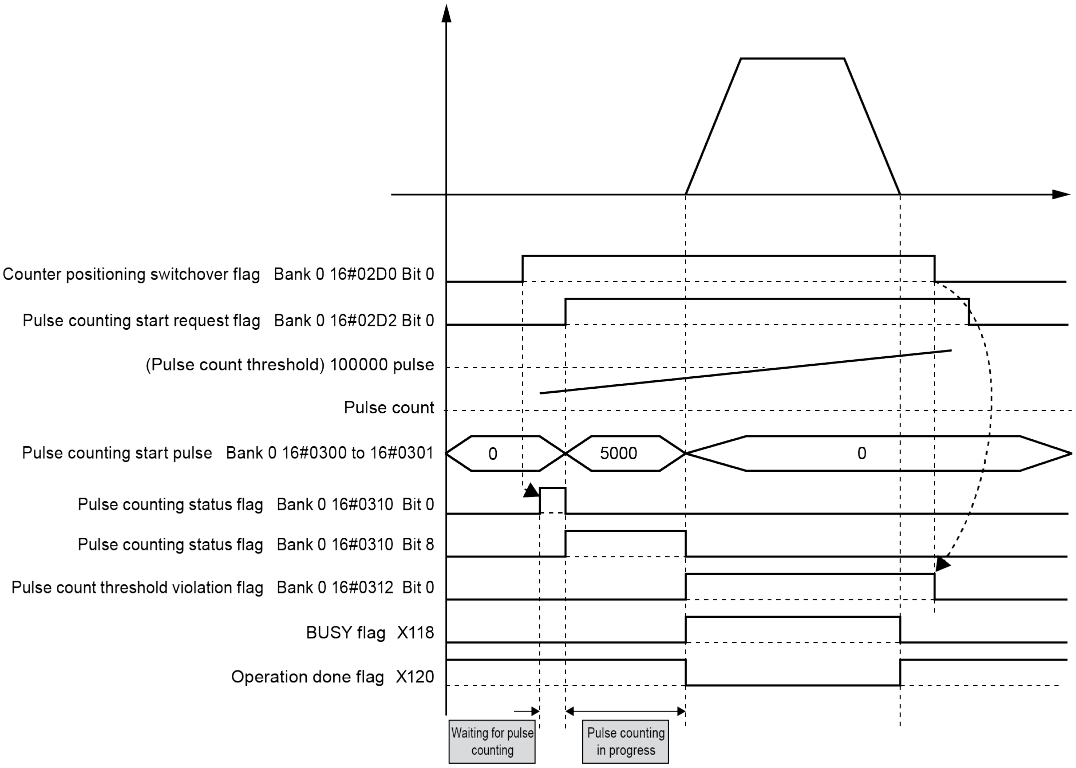
Item	Setting example
Counter positioning mode for Axis 1	16#0001: PLC judgment method

Item	Setting example
Pulse counting channel for Axis 1	16#0000: Pulse input ch1
Pulse count threshold for Axis 1	100,000 pulses
(Number of pulses at the start of counter positioning)	50,000 pulses

● Positioning settings

Item	Setting example
Positioning table No.	100
Operation pattern	E: End point
Control method	I: Incremental
X-axis movement amount	10,000 pulses
Acceleration/deceleration method / Acceleration time / Deceleration time	L: Linear / 100 ms / 100 ms
Target speed	10,000 pps

● Behavior diagram



● Procedure and operations of each contact

1 2 Procedure

1. Set the pulse count channel for Axis 1 to 0 (ch1).
2. Set the pulse count threshold for Axis 1 to 100000.
3. Set the position control start table number (address 16#0100 in bank 16#00) for Axis 1 in the positioning control start table number setting area to 100.
4. Set the counter positioning mode for Axis 1 to 1 (PLC judgment method).
5. Turn ON bit 0 (pulse count positioning operation for Axis 1) of the counter positioning switchover flag.
    1. Bit 0 of the pulse counting status flag turns ON and the positioning unit RTEX enters the pulse count wait state. The positioning unit RTEX also internally starts preliminary calculations for positioning based on positioning table No. 100.
6. Turn ON bit 0 of the pulse counting start flag. (Counting the number of input pulses will start.)
    1. Bit 0 of the pulse count status flag turns OFF and bit 8 turns ON (pulse counting in progress). The pulse count value at the start of pulse counting is stored in "Pulses at the start of pulse counting".
    2. The positioning unit RTEX compares the pulse count threshold for Axis 1 with the current pulse count value.

        When the pulse count value exceeds the threshold, operations based on positioning table No. 100 start.
    3. When positioning operations start, the positioning unit RTEX performs the following operations:
        - The BUSY flag for Axis 1 turns ON and the operation done flag turns OFF.
        - Bit 0 of the pulse count threshold violation flag turns ON.
        - Bit 8 of the pulse count status flag turns OFF.
        - "Pulses at the start of pulse counting" is reset to 0.
    4. After the positioning operations are complete, the BUSY flag for Axis 1 turns OFF and the operation done flag turns ON.
7. Check that the positioning operation for Axis 1 is complete and then turn OFF bit 0 of the counter positioning switchover flag.
    1. Bit 0 of the pulse count threshold violation flag turns OFF.
8. Turn OFF bit 0 of the pulse counting start flag.

Amplifier input method

Use the counter positioning function (amplifier input method) to perform positioning operations for Axis 1. Settings are shown in the following table.

- **Settings for counter positioning function**

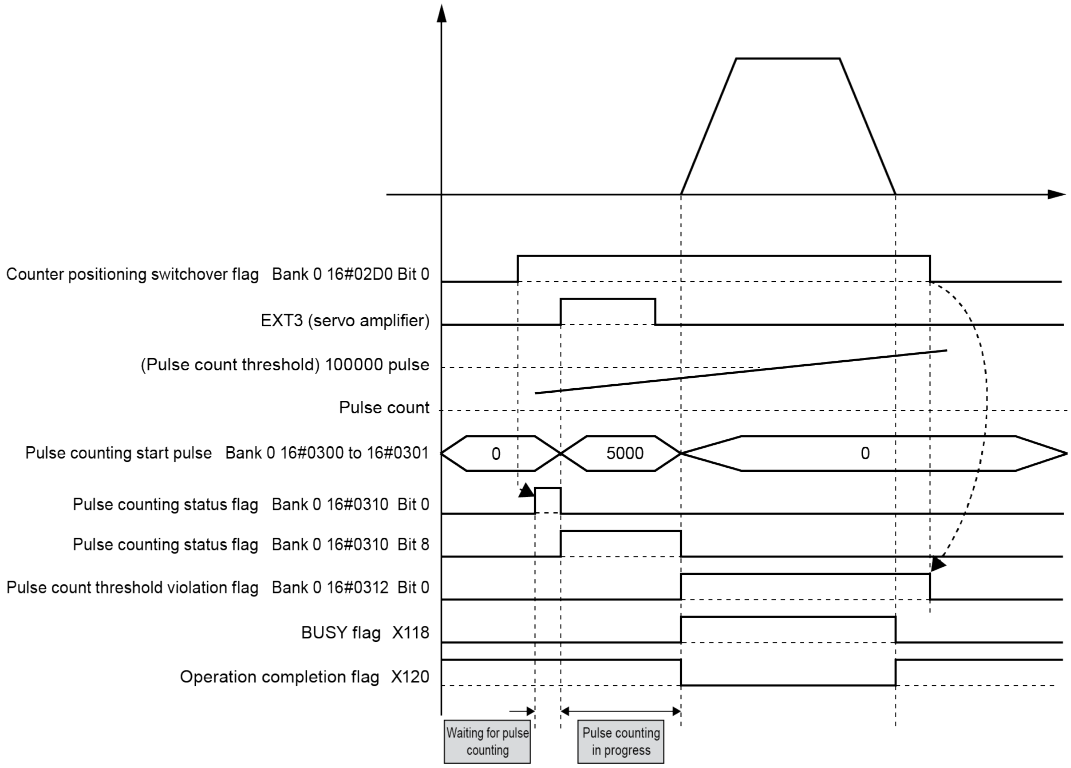
Item	Setting example
Counter positioning mode for Axis 1	16#0000: Amplifier input method
Pulse count start input signal for Axis 1	2: Rising edge of EXT3

Item	Setting example
Pulse counting channel for Axis 1	16#0000: Pulse input ch1
Pulse count threshold for Axis 1	100,000 pulses
(Number of pulses at the start of counter positioning)	50,000 pulses

● Positioning settings

Item	Setting example
Positioning table No.	100
Operation pattern	E: End point
Control method	I: Incremental
X-axis movement amount	10,000 pulses
Acceleration/deceleration method	L: Linear
Acceleration time (ms)/Deceleration time (ms)	100 ms
Target speed	10,000 pps

● Behavior diagram



● Procedure and operations of each contact

Procedure

1. Set the pulse count channel for Axis 1 to 0 (ch1).
2. Set the pulse count threshold for Axis 1 to 100000.
3. Set "Pulse counting start input signal for Axis 1" to 2 (rising edge of EXT3).
4. Set the position control start table number (address 16#0100 in bank 16#00) for Axis 1 in the positioning control start table number setting area to 100.
5. Set the counter positioning mode for Axis 1 to 0 (amplifier input method).
6. Turn ON bit 0 (pulse count positioning operation for Axis 1) of the counter positioning switchover flag.
    1. Bit 0 of the pulse counting status flag turns ON and the positioning unit RTEX enters the pulse count wait state.

       The positioning unit RTEX also internally starts preliminary calculations for positioning based on positioning table number 100.
    2. When input signal EXT3 for the amplifier turns ON, the positioning unit RTEX starts counting the number of input pulses.
    3. Bit 0 of the pulse count status flag turns OFF and bit 8 turns ON (pulse counting in progress).

       The pulse count value at the start of pulse counting is stored in “Pulses at the start of pulse counting”.
    4. The positioning unit RTEX compares the pulse count threshold for Axis 1 with the current pulse count value.

       If the pulse count value exceeds the threshold, operations based on positioning table number 100 start.
    5. When positioning operations start, the positioning unit RTEX performs the following operations:
        - The BUSY flag for Axis 1 turns ON and the operation done flag turns OFF.
        - Bit 0 of the pulse count threshold violation flag turns ON.
        - Bit 8 of the pulse count status flag turns OFF.
        - "Pulses at the start of pulse counting" is reset to 0.
    6. After the positioning operations are complete, the BUSY flag for Axis 1 turns OFF and the operation done flag turns ON.
7. Check that the positioning operation for Axis 1 is complete and then turn OFF bit 0 of the counter positioning switchover flag.

   Bit 0 of the pulse count threshold violation flag turns OFF.

   The next counter positioning operation cannot be performed until after the counter positioning switchover flag turns OFF and the amplifier input contact turns OFF.

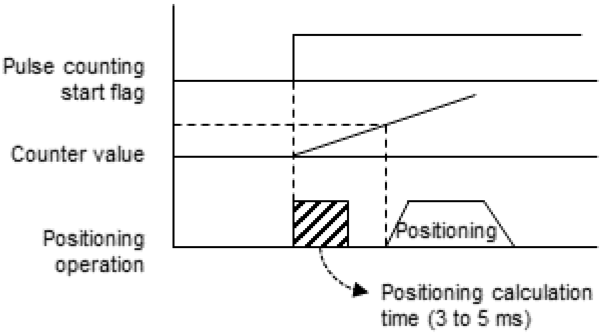
14.18.3 Operating Time of Counter Positioning

Info.

- The counter positioning function enables positioning operations to be performed quickly by using input pulse values (PLC judgment method) or input signals (amplifier input method). For the positioning times based on these methods, use the following information as a guide.

■ Preliminary calculation for positioning operation

Positioning operations are started after preliminary calculations are executed. To shorten the positioning operation startup time, the counter positioning function starts preliminary calculations when the pulse counting start flag turns ON.



Therefore, positioning operations cannot be performed within at least 3 ms after the pulse counting start flag turns ON.

If an attempt is made to perform positioning before the above time, positioning operations will be performed after preliminary calculations have been performed.

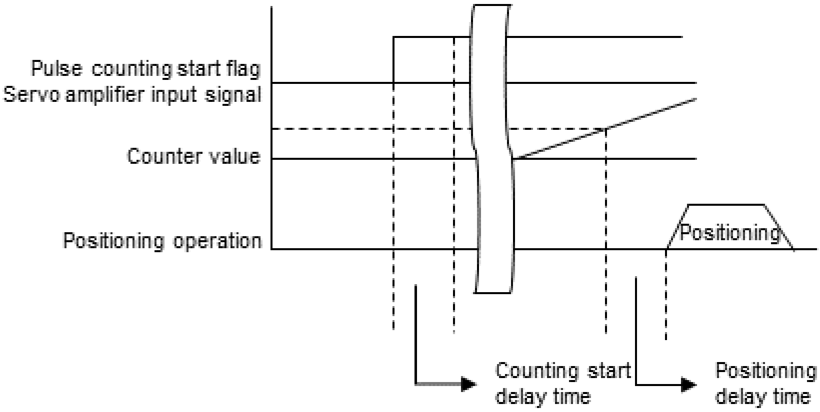
■ Response time until pulse counting starts

Time delays and response time variations until startup of pulse counting differ between each method, as below.

The actual time required until startup of pulse counting (counting delay time) is the sum of these times (time delay plus response time variation).

Method	Time delay	Response time variation
PLC judgment method	1ms	Scan time
Amplifier input method	2ms	1ms

The maximum time delay in the execution of a positioning operation after checking the counter threshold value (positioning delay time) is 1 ms.



14.18.4 Restrictions on Counter Positioning Function

The following are restrictions on using the counter positioning function.

- When the counter positioning function is used, positioning operations for target axes are only performed by counter positioning.

  Note that conventional positioning is not performed even if the conventional positioning start request flag is turned ON.
- Allocate at least 3 ms to the time from when counting is started until the conditions for positioning are satisfied.

  Time delays in this operation must also be taken into consideration.

14.19 Positioning speed hold mode

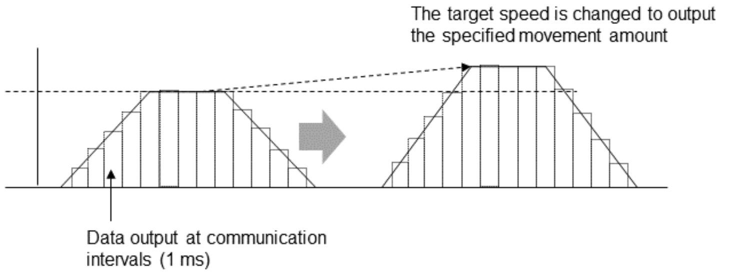
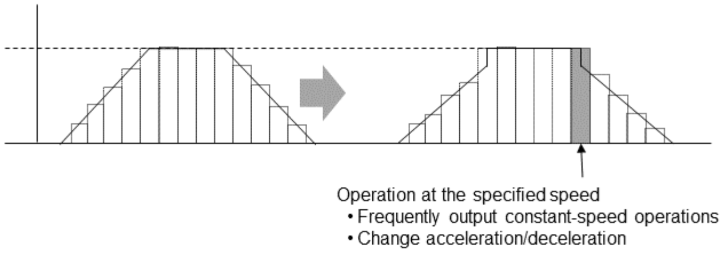
14.19.1 Overview and Applications of Positioning Speed Hold Mode

The positioning unit RTEX is controlled at 1-ms cycles by connecting it to a servo amplifier via the motion network Realtime Express (RTEX).

Positioning operations must be completed using the specified movement amount. Therefore, to control the positioning unit RTEX at the communication cycle (1 ms), there were cases where the target speed was changed by combining the positioning parameters.

In positioning speed hold mode, positioning operations can be executed while the movement amount and speed are being held by changing the acceleration and deceleration operations.

The following figure shows the conventional positioning operation and the positioning operation in positioning speed hold mode.

Conventional positioning operation	
Operation in positioning speed hold mode	

For general positioning operations, the target speed does not change even for conventional positioning operations. For fast positioning operations with small movement amounts and minute sections, however, the target speed may change. In such cases, positioning operations may be improved by using positioning speed hold mode.

14.19.2 Unit Memory

■ Bank 16#00: Common area

Offset address	Name	Default	Description
16#038B	Positioning operation code	16#0000	Turn ON the bit corresponding to the axis for which the latch correction J-point control function is used. This area is used by the controller to determine the positioning operation when positioning is started. The set value cannot be changed during positioning operation.

Offset address	Name	Default	Description
			Setting value / **Positioning operation mode** 16#0000: Conventional positioning operation 16#0001: Positioning speed hold mode Other: Operates as if 16#0000 is set.

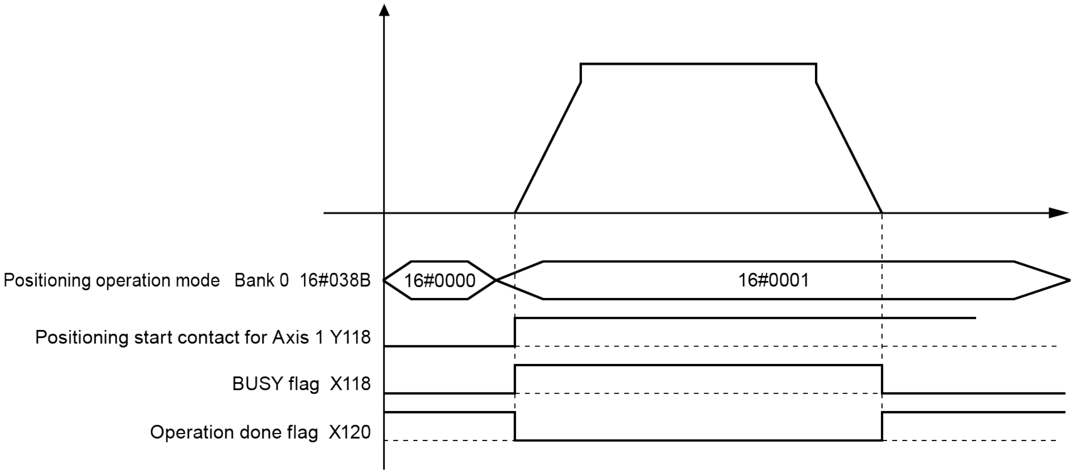
14.19.3 Operation in Positioning Speed Hold Mode

The example below is the case where positioning speed hold mode is used for Axis 1.

■ Positioning settings

Item	Setting example
Positioning table No.	100
Operation pattern	E: End point
Control method	I: Incremental
X-axis movement amount	45000 pulse
Acceleration/deceleration method / Acceleration time / Deceleration time	L: Linear / 6 ms / 6 ms
Target speed	5000000 pps

■ Behavior diagram



■ Behaviors of each contact

- Before starting operation, set the positioning operation mode to 16#0001 (positioning speed hold mode).
- The controller is ready to run in positioning speed hold mode.

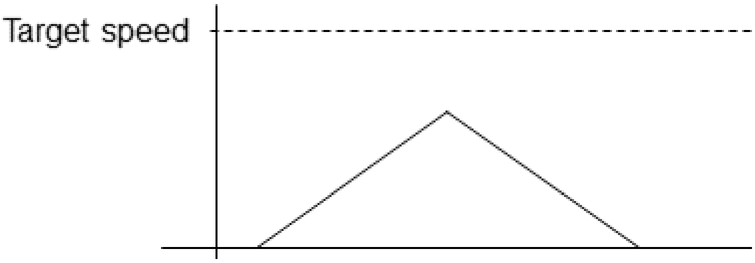
- Start the positioning operation.
- The BUSY flag turns ON, the operation done flag turns OFF, and operation in positioning speed hold mode starts.
- After positioning is complete, check that the BUSY flag is OFF (the operation done flag is ON) and set the positioning operation mode to 16#0000 (conventional positioning operation).

14.19.4 Restrictions on Positioning Speed Hold Mode

The following are restrictions on using positioning speed hold mode.

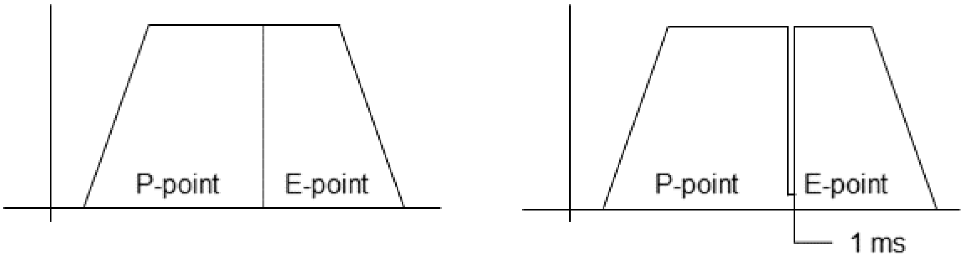
1. Positioning speed hold mode is only valid for positioning operations on single axes.

   (During interpolation operations on Axis 2 and Axis 3 such as linear interpolation, conventional positioning operations are performed even if positioning speed hold mode is specified.)
2. If the specified movement amount is too small for the target speed, deceleration may be performed before the target speed is reached.



   In such a case, conventional positioning operations are performed even if positioning speed hold mode is specified.
3. The "target speed change function" and "movement amount change function" positioning operations cannot be used.

   The above operations are ignored while positioning speed hold mode is running.
4. If the target speed remains the same when a P-point operation is performed, the speed may become slower during one communication cycle (1 ms) when the current table shifts to the next table. We recommend that conventional positioning be used when a P-point operation is performed.



Conventional positioning operation

Positioning speed hold mode

(MEMO)

15 Error/Warning Notification Function

15.1 Errors and Warnings

15.1.1 Overview of Errors and Warnings

■ Significances of Errors and Warnings

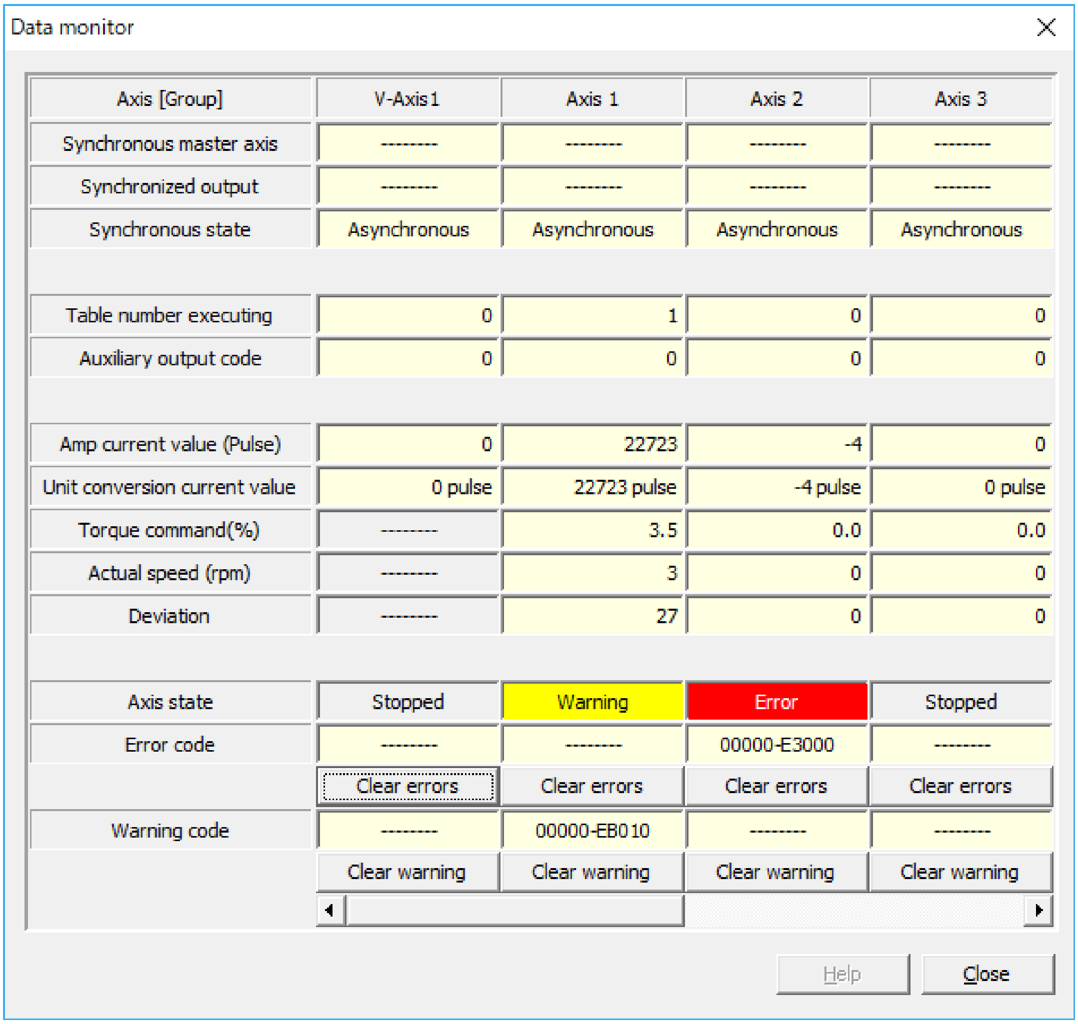
- If some sort of operational inconsistency occurs in the positioning unit RTEX, an error or warning will occur.
- When errors or warnings occur, the following operations are performed.

Error	An error occurs in any abnormal situation. When a motor is operating, the operation will stop if an error occurs. The motor that stopped due to an error cannot be restarted until the error is cleared.
Warning	A warning occurs when there is a behavior inconsistency rather than an abnormality. The operation can continue even after a warning occurs. When a motor is operating, the operation will continue even if a warning occurs.

- Errors and warnings can be checked in the data monitor and status monitor screens of Configurator PM7-RTEX.
- Errors and warnings occur in the positioning unit RTEX and amplifier.
- The location and details of each error or warning can be identified with their error or warning code.

15.1.2 Checking and Clearing Errors and Warnings on Configurator PM7-RTEX

Errors and warnings can be checked and cleared for each axis by selecting **Online**>**Data Monitor** in the Configurator PM7-RTEX programming tool.



Axis [Group]	V-Axis1	Axis 1	Axis 2	Axis 3
Synchronous master axis	--------	--------	--------	--------
Synchronized output	--------	--------	--------	--------
Synchronous state	Asynchronous	Asynchronous	Asynchronous	Asynchronous
Table number executing	0	1	0	0
Auxiliary output code	0	0	0	0
Amp current value (Pulse)	0	22723	-4	0
Unit conversion current value	0 pulse	22723 pulse	-4 pulse	0 pulse
Torque command(%)	--------	3.5	0.0	0.0
Actual speed (rpm)	--------	3	0	0
Deviation	--------	27	0	0
Axis state	Stopped	Warning	Error	Stopped
Error code	--------	--------	00000-E3000	--------
	Clear errors	Clear errors	Clear errors	Clear errors
Warning code	--------	00000-EB010	--------	--------
	Clear warning	Clear warning	Clear warning	Clear warning

15.1.3 Error and Warning Logs

The unit is equipped with log areas that store error and warning codes when errors and warnings occur.

Error logs	Up to seven error codes can be stored for each axis.
Warning logs	Up to seven warning codes can be stored for each axis.

- When an error or warning occurs, the corresponding error or warning code is stored in the log area of the axis where the error or warning occurred.
- Only the latest error and warning codes for each axis can be checked from the positioning setting menu of the programming tool.
- When viewing the error and warning logs for each axis, read them from the error and warning log areas in positioning memory bank 16#00.

Error log

16#0128 to 16#0137	Axis 1 error log area
16#0138 to 16#0147	Axis 2 error log area
16#0148 to 16#0157	Axis 3 error log area
16#0158 to 16#0167	Axis 4 error log area
16#0168 to 16#0177	Axis 5 error log area
16#0178 to 16#0187	Axis 6 error log area
16#0188 to 16#0197	Axis 7 (virtual) error log area
16#0198 to 16#01A7	Axis 8 (virtual) error log area

16#0128	–
16#0129	Number of errors occurrences
16#012A to 16#012B	Error code notification buffer 1
16#012C to 16#012D	Error code notification buffer 2
16#012E to 16#012F	Error code notification buffer 3
16#0130 to 16#0131	Error code notification buffer 4
16#0132 to 16#0133	Error code notification buffer 5
16#0134 to 16#0135	Error code notification buffer 6
16#0136 to 16#0137	Error code notification buffer 7

Warning log area

16#01C0 to 16#01CF	Axis 1 warning log area
16#01D0 to 16#01DF	Axis 2 warning log area
16#01E0 to 16#01EF	Axis 3 warning log area
16#01F0 to 16#01FF	Axis 4 warning log area
16#0200 to 16#020F	Axis 5 warning log area
16#0210 to 16#021F	Axis 6 warning log area
16#0220 to 16#022F	Axis 7 (virtual) warning log area
16#0230 to 16#023F	Axis 8 (virtual) warning log area

16#01C0	–
16#01C1	Number of warning occurrences
16#01C2 to 16#01C3	Warning code notification buffers 1
16#01C4 to 16#01C5	Warning code notification buffers 2
16#01C6 to 16#01C7	Warning code notification buffers 3
16#01C8 to 16#01C9	Warning code notification buffers 4
16#01CA to 16#01CB	Warning code notification buffers 5
16#01CC to 16#01CD	Warning code notification buffers 6
16#01CE to 16#01CF	Warning code notification buffers 7

Number of error/warning occurrences	Stores the number of occurrences of errors and warnings.
Error/warning notification buffers	Stores error and warning codes. Buffer 1 always contains the latest error/warning code. Error/warning codes are stored in each buffer in reverse-chronological order, as shown below. Buffer 1 => Buffer 2 ...

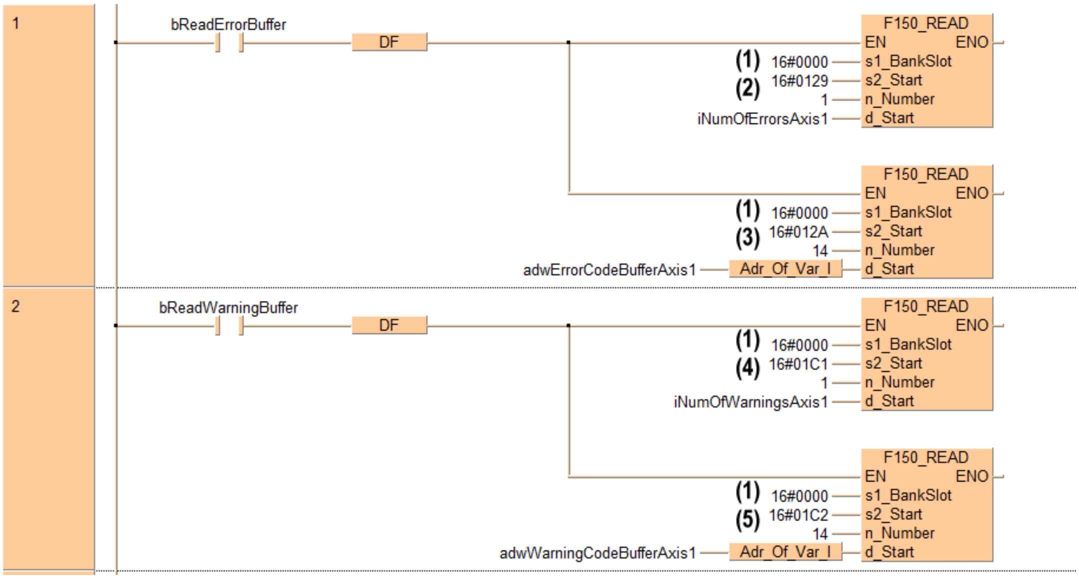
■ Sample programs

- The following sample program loads the number of error occurrences on Axis 1 of slot number 0 into iNumOfErrorsAxis1 and the error codes stored in error notification buffers 1 to 7 into adwErrorCodeBufferAxis1 (14 words in total).
- Similarly, the sample program loads the number of warning occurrences on Axis 1 of slot number 0 into iNumOfWarningsAxis1 and the warning codes stored in warning notification buffers 1 to 7 into adwWarningCodeBufferAxis1 (14 words in total).
- Each error code or warning code is loaded as 2-word data.

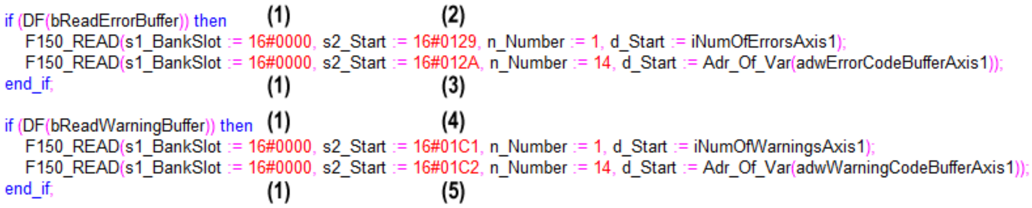
Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	adwErrorCodeBufferAxis1		ARRAY [1…7] OF DWORD	[7(0)]	Error code for Axis 1
VAR	adwWarningCodeBufferAxis1		ARRAY [1…7] OF DWORD	[7(0)]	Warning code for Axis 1
VAR	bReadErrorBuffer		BOOL	FALSE	Error log read request
VAR	bReadWarningBuffer		BOOL	FALSE	Warning log read request
VAR	iNumOfErrorsAxis1		INT	0	Number of error occurrences on Axis 1
VAR	iNumOfWarningsAxis1		INT	0	Number of warning occurrences on Axis 1

Ladder diagram (LD)



Structured text (ST)



```
if (DF(bReadErrorBuffer)) then       (1)                    (2)
   F150_READ(s1_BankSlot := 16#0000, s2_Start := 16#0129, n_Number := 1, d_Start := iNumOfErrorsAxis1);
   F150_READ(s1_BankSlot := 16#0000, s2_Start := 16#012A, n_Number := 14, d_Start := Adr_Of_Var(adwErrorCodeBufferAxis1));
end_if;                              (1)                    (3)

if (DF(bReadWarningBuffer)) then     (1)                    (4)
   F150_READ(s1_BankSlot := 16#0000, s2_Start := 16#01C1, n_Number := 1, d_Start := iNumOfWarningsAxis1);
   F150_READ(s1_BankSlot := 16#0000, s2_Start := 16#01C2, n_Number := 14, d_Start := Adr_Of_Var(adwWarningCodeBufferAxis1));
end_if;                              (1)                    (5)
```

Code	Items specified in the program	Values specified in the program							
		Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7 (virtual)	8 axes (virtual)
(1)	Bank, slot No.	16#0000 (bank 16#00, slot number 0)							
(2)	Number of error occurrences	16#0129	16#0139	16#0149	16#0159	16#0169	16#0179	16#0189	16#0199
(3)	Starting address of error code notification buffer	16#012A	16#013A	16#014A	16#015A	16#016A	16#017A	16#018A	16#019A
(4)	Number of warning occurrences	16#01C1	16#01D1	16#01E1	16#01F1	16#0201	16#0211	16#0221	16#0231
(5)	Starting address of warning notification buffer	16#01C2	16#01D2	16#01E2	16#01F2	16#0202	16#0212	16#0222	16#0232

15.1.4 Clearing Errors and Warnings Using User Programs

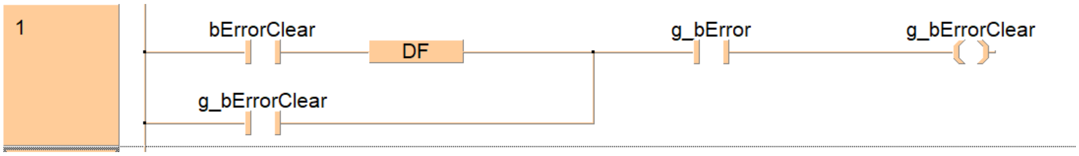
■ Clearing errors and warnings for all axes by I/O signals

- Errors and warnings can be cleared for all axes by turning ON the error/warning clearing request flags allocated to the I/O area. The following program clears errors for slot number 0.

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bErrorClear		BOOL	FALSE	Error clearing request
VAR_EXTERNAL	g_bError	X105	BOOL	FALSE	Error notification
VAR_EXTERNAL	g_bErrorClear	Y105	BOOL	FALSE	Error clearing flag

Ladder diagram (LD)



Structured text (ST)

```
g_bErrorClear := (DF(bErrorClear) OR g_bErrorClear) AND g_bError;
```

■ Allocation of I/O signals

Signal name	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Warning clearing for Axis 7 (virtual)	Axis 8 (virtual)
Error notification	X105							
Warning notification	X106							
Error clearing request	Y105							
Warning clearing request	Y106							

15.2 Error Return Processing

15.2.1 Overview of Error Recovery Processing

The method for recovering from errors differs according to the state at the time of error occurrence.

State at the time of error occurrence	Description
Recoverable state (○)	● After an error occurs, the operating axis stops. ● After an error occurs, the positioning unit RTEX can perform error return at any time.
Unrecoverable state (×)	● This type of error is a serious abnormality that occurs in the positioning unit RTEX system. ● When a non-recoverable error occurs, the power must be turned OFF and then ON.

15.3 Error Code List

15.3.1 Amplifier Errors (From 16#0000_0001)

- Alarms and errors occurring on the amplifier side are output as error codes on the positioning unit RTEX side.
- Amplifier errors differ according to the type of amplifier. For details on treatments for amplifier errors, refer to the manual of the servo amplifier.
- When an amplifier error occurs, the system automatically enters a servo-free state. After clear the error, issue a servo ON request.

■ How to read amplifier error codes

- An amplifier error is divided into a main code and sub-code.
- Error codes stored in the error notification area of the positioning unit RTEX are hexadecimal 4-digit codes.
- To check error codes on the amplifier side, convert the hexadecimal codes to decimal codes, as below.

Example: When encoder communication error protection occurs

Error code on the unit: 16#0000_0115

↓

Main code: 16#15, Sub-code: 16#01

↓

Convert each hexadecimal number to a decimal number

Error code on the amplifier side

Main: 21, Sub: 1

■ Amplifier error code table [For A6N]

- Refer to the latest instruction manual and technical reference for the servo amplifier.

Error code	A6N error no.		Description
	Main code	Sub-code	
16#0000_000B	11	0	Control power supply undervoltage protection
16#0000_000C	12	0	Overvoltage protection
16#0000_000D	13	0	Main power supply undervoltage protection (Insufficient voltage across a p–n junction)
16#0000_010D	13	1	Main power supply undervoltage protection (AC interception detection)
16#0000_000E	14	0	Overcurrent protection
16#0000_010E	14	1	IPM error protection
16#0000_000F	15	0	Overheat protection
16#0000_010F	15	1	Encoder overheat error protection
16#0000_0010	16	0	Overload protection
16#0000_0110	16	1	Torque saturation error protection
16#0000_0012	18	0	Regenerative overload protection

Error code	A6N error no.		Description
	Main code	Sub-code	
16#0000_0112	18	1	Regenerative transistor error protection
16#0000_0015	21	0	Encoder communication line breakage fault protection
16#0000_0115	21	1	Encoder communication error protection
16#0000_0017	23	0	Encoder communication data error protection
16#0000_0018	24	0	Position deviation excess protection
16#0000_0118	24	1	Speed deviation excess protection
16#0000_0019	25	0	Hybrid deviation excess protection
16#0000_001A	26	0	Overspeed protection
16#0000_011A	26	1	2nd overspeed protection
16#0000_011B	27	1	Absolute clearing protection
16#0000_041B	27	4	Command error protection 1
16#0000_051B	27	5	Command generation error protection
16#0000_061B	27	6	Operation command contention protection
16#0000_071B	27	7	Position information initialization error protection
16#0000_001C	28	0	Pulse regeneration limit protection
16#0000_011D	29	1	Counter overflow protection 1
16#0000_021D	29	2	Counter overflow protection 2
16#0000_001F	31	0	Safety function error protection 1
16#0000_021F	31	2	Safety function error protection 2
16#0000_0021	33	0	Interface input duplicated allocation error-1 protection
16#0000_0121	33	1	Interface input duplicated allocation error-2 protection
16#0000_0221	33	2	Interface input function number error-1 protection
16#0000_0321	33	3	Interface input function number error-2 protection
16#0000_0421	33	4	Interface output function number error-1 protection
16#0000_0521	33	5	Interface output function number error-2 protection
16#0000_0821	33	8	Latch input allocation error protection
16#0000_0022	34	0	Motor operable range setting error protection
16#0000_0024	36	0	EEPROM parameter error protection
16#0000_0124	36	1	EEPROM parameter error protection
16#0000_0025	37	0	EEPROM check code error protection
16#0000_0125	37	1	EEPROM check code error protection
16#0000_0225	37	2	EEPROM check code error protection
16#0000_0026	38	0	Over-travel inhibit input protection 1
16#0000_0126	38	1	Over-travel inhibit input setup protection 2
16#0000_0226	38	2	Over-travel inhibit input setup protection 3
16#0000_0028	40	0	Absolute system failure protection

Error code	A6N error no.		Description
	Main code	Sub-code	
16#0000_0029	41	0	Absolute counter limit excess protection
16#0000_002B	43	0	Encoder initialization error protection
16#0000_002C	44	0	Single-turn counter error protection
16#0000_002D	45	0	Multi-turn counter error protection
16#0000_0030	48	0	Encoder Z-phase error protection
16#0000_0031	49	0	Encoder CS-phase error protection
16#0000_0032	50	0	External scale wiring error protection
16#0000_0132	50	1	External scale communication data error protection
16#0000_0033	51	0	External scale ST error protection 0
16#0000_0133	51	1	External scale ST error protection 1
16#0000_0233	51	2	External scale ST error protection 2
16#0000_0333	51	3	External scale ST error protection 3
16#0000_0433	51	4	External scale ST error protection 4
16#0000_0533	51	5	External scale ST error protection 5
16#0000_0037	55	0	Phase-A wiring error protection
16#0000_0137	55	1	Phase-B wiring error protection
16#0000_0237	55	2	Phase-Z wiring error protection
16#0000_0052	82	0	RTEX node address setting error protection
16#0000_0053	83	0	RTEX continuous communication error protection 1
16#0000_0153	83	1	RTEX continuous communication error protection 2
16#0000_0054	84	0	RTEX timeout error protection
16#0000_0354	84	3	RTEX synchronization establishment initialization error protection
16#0000_0554	84	5	RTEX communication cycle error protection
16#0000_0056	86	0	RTEX cyclic data error protection 1
16#0000_0156	86	1	RTEX cyclic data error protection 2
16#0000_0256	86	2	RTEX update counter error protection
16#0000_0057	87	0	Forced alarm input protection
16#0000_025A	90	2	RTEX multi-axis synchronization establishment error protection
16#0000_015B	91	1	RTEX command error protection
16#0000_005C	92	0	Encoder data restoration error protection
16#0000_015C	92	1	External scale data restoration error protection
16#0000_035C	92	3	Multi-turn data upper-limit value mismatch error protection
16#0000_005D	93	0	Parameter setting error protection 1
16#0000_025D	93	2	Parameter setting error protection 2
16#0000_035D	93	3	External scale connection error protection

Error code	A6N error no.		Description
	Main code	Sub-code	
16#0000_055D	93	5	Parameter setting error protection 4
16#0000_085D	93	8	Parameter setting error protection 6
16#0000_025E	94	2	Home return error protection
16#0000_035E	94	3	Home return error protection 2
16#0000_005F	95	0	Motor automatic recognition error protection
16#0000_015F	95	1	Motor automatic recognition error protection
16#0000_025F	95	2	Motor automatic recognition error protection
16#0000_035F	95	3	Motor automatic recognition error protection
16#0000_045F	95	4	Motor automatic recognition error protection
16#0000_0260	96	2	Control unit error protection 1
16#0000_0360	96	3	Control unit error protection 2
16#0000_0460	96	4	Control unit error protection 3
16#0000_0560	96	5	Control unit error protection 4
16#0000_0660	96	6	Control unit error protection 5
16#0000_0760	96	7	Control unit error protection 6
16#0000_0162	98	1	RTEX hardware error protection 1
16#0000_0262	98	2	RTEX hardware error protection 2
16#0000_0362	98	3	RTEX hardware error protection 3
-	Other numbers		Other error protections

■ Amplifier error code table [for A5N]

- Refer to the latest instruction manual and technical reference for the servo amplifier.

Error code	A5N error number		Description
	Main code	Sub-code	
16#0000_000B	11	0	Control power supply undervoltage protection
16#0000_000C	12	0	Overvoltage protection
16#0000_000D	13	0	Main power supply undervoltage protection (Insufficient voltage across a p–n junction)
16#0000_010D	13	1	Main power supply undervoltage protection (AC interception detection)
16#0000_000E	14	0	Overcurrent protection
16#0000_010E	14	1	IPM error protection
16#0000_000F	15	0	Overheat protection
16#0000_0010	16	0	Overload protection
16#0000_0110	16	1	Torque saturation error protection
16#0000_0012	18	0	Regenerative overload protection
16#0000_0112	18	1	Regenerative transistor error protection

Error code	A5N error number		Description
	Main code	Sub-code	
16#0000_0015	21	0	Encoder communication line breakage fault protection
16#0000_0115	21	1	Encoder communication error protection
16#0000_0017	23	0	Encoder communication data error protection
16#0000_0018	24	0	Position deviation excess protection
16#0000_0118	24	1	Speed deviation excess protection
16#0000_0019	25	0	Hybrid deviation excess protection
16#0000_001A	26	0	Overspeed protection
16#0000_011A	26	1	2nd overspeed protection
16#0000_011B	27	1	Absolute clearing protection
16#0000_041B	27	4	Command error protection 1
16#0000_051B	27	5	Command generation error protection
16#0000_061B	27	6	Operation command contention protection
16#0000_071B	27	7	Position information initialization error protection
16#0000_001C	28	0	Pulse regeneration limit protection
16#0000_011D	29	1	Counter overflow protection 1
16#0000_021D	29	2	Counter overflow protection 2
16#0000_001E	30	0	Safety input protection [Only for special products]
16#0000_0021	33	0	Interface input duplicated allocation error-1 protection
16#0000_0121	33	1	Interface input duplicated allocation error-2 protection
16#0000_0221	33	2	Interface input function number error-1 protection
16#0000_0321	33	3	Interface input function number error-2 protection
16#0000_0421	33	4	Interface output function number error-1 protection
16#0000_0521	33	5	Interface output function number error-2 protection
16#0000_0821	33	8	Latch input allocation error protection
16#0000_0022	34	0	Motor operable range setting error protection
16#0000_0024	36	0	EEPROM parameter error protection
16#0000_0124	36	1	EEPROM parameter error protection
16#0000_0224	36	2	EEPROM parameter error protection
16#0000_0025	37	0	EEPROM check code error protection
16#0000_0125	37	1	EEPROM check code error protection
16#0000_0225	37	2	EEPROM check code error protection
16#0000_0026	38	0	Over-travel inhibit input protection 1
16#0000_0126	38	1	Over-travel inhibit input setup protection 2
16#0000_0226	38	2	Over-travel inhibit input setup protection 3
16#0000_0028	40	0	Absolute system failure protection
16#0000_0029	41	0	Absolute counter limit excess protection

Error code	A5N error number		Description
	Main code	Sub-code	
16#0000_002A	42	0	Absolute overspeed protection
16#0000_002B	43	0	Incremental encoder initialization error protection
16#0000_002C	44	0	● For absolute encoders: Absolute single-turn counter error protection ● For incremental encoders: Incremental single-turn counter error protection
16#0000_002D	45	0	● For absolute encoders: Absolute multi-turn counter error protection ● For incremental encoders: Incremental count error protection
16#0000_002F	47	0	Absolute status error protection
16#0000_0030	48	0	Incremental encoder Z-phase error protection
16#0000_0031	49	0	Incremental encoder CS-phase error protection
16#0000_0032	50	0	External scale wiring error protection
16#0000_0132	50	1	External scale communication data error protection
16#0000_0033	51	0	External scale ST error protection 0
16#0000_0133	51	1	External scale ST error protection 1
16#0000_0233	51	2	External scale ST error protection 2
16#0000_0333	51	3	External scale ST error protection 3
16#0000_0433	51	4	External scale ST error protection 4
16#0000_0533	51	5	External scale ST error protection 5
16#0000_0037	55	0	Phase-A wiring error protection
16#0000_0137	55	1	Phase-B wiring error protection
16#0000_0237	55	2	Phase-Z wiring error protection
16#0000_0052	82	0	RTEX node address setting error protection
16#0000_0053	83	0	RTEX continuous communication error protection 1
16#0000_0153	83	1	RTEX continuous communication error protection 2
16#0000_0054	84	0	RTEX timeout error protection
16#0000_0354	84	3	RTEX synchronization establishment initialization error protection
16#0000_0554	84	5	RTEX communication cycle error protection
16#0000_0056	86	0	RTEX cyclic data error protection 1
16#0000_0156	86	1	RTEX cyclic data error protection 2
16#0000_0256	86	2	RTEX update counter error protection
16#0000_0057	87	0	Forced alarm input protection
16#0000_025A	90	2	RTEX multi-axis synchronization establishment error protection
16#0000_015B	91	1	RTEX command error protection
16#0000_005C	92	0	Encoder data restoration error protection

Error code	A5N error number		Description
	Main code	Sub-code	
16#0000_015C	92	1	External scale data restoration error protection
16#0000_005D	93	0	Parameter setting error protection 1
16#0000_025D	93	2	Parameter setting error protection 2
16#0000_035D	93	3	External scale connection error protection
16#0000_055D	93	5	Parameter setting error protection 4
16#0000_025E	94	2	Home return error protection
16#0000_005F	95	0	Motor automatic recognition error protection
16#0000_015F	95	1	Motor automatic recognition error protection
16#0000_025F	95	2	Motor automatic recognition error protection
16#0000_035F	95	3	Motor automatic recognition error protection
16#0000_045F	95	4	Motor automatic recognition error protection
16#0000_0162	98	1	RTEX hardware error protection 1
16#0000_0262	98	2	RTEX hardware error protection 2
16#0000_0362	98	3	RTEX hardware error protection 3
-	Other numbers		Other error protections

15.3.2 System Errors (From 16#0000_1000)

System errors occur due to any abnormality within the unit. System errors are defined as fatal errors for the system. Except for some errors, the power must be turned OFF and then ON to recover from the errors.

Code	Name	Description	Processing	Recovery	Countermeasures
16#0000_1000	System out of control	The system is running out of control.	All axes	×	Turn the power off and then on. If the error occurs repeatedly, please contact our sales office.
16#0000_1001	Hardware error	An error occurred in hardware testing when the power was turned ON.	All axes	×	
16#0000_1002	Unit error	Some sort of error occurred in internal processing.	All axes	×	
16#0000_1003	System processing error	An error occurred in system processing for some reason.	All axes	○	Check the settings. If the error occurs repeatedly when the set values are all correct, please contact our sales office.
16#0000_1010	FROM write error	An error occurred while writing the positioning settings to the FROM in the unit. ● Error item • Write error	All axes	○	Perform the FROM write again. If the error occurs repeatedly, please contact our sales office.

Code	Name	Description	Processing	Recovery	Countermeasures
		• Verify error • Erase error			
16#0000_1020	Tool Operation Abnormal termination	An error occurred in communication with the PC when tool operation was performed using the positioning setting menu of the programming tool.	All axes	○	Check the connection of the cable connecting the PC and PLC. Restart the PC.
16#0000_1021	Download data error	Downloading the cam point method cam data failed.	All axes	○	Perform the download again. If the error occurs repeatedly, please contact our sales office.
16#0000_1030	FP0H control unit error	An alarm occurred in the FP0H control unit.	All axes	×	Check the condition of the FP0H control unit. Turn the power off and then on.
16#0000_1031	FP0H control unit operating mode error	The operation was stopped because the FP0H control unit was switched to PROG. mode while the positioning unit RTEX was performing positioning operations.	All axes	○	Check the status of the positioning unit RTEX. Set the FP0H control unit to RUN mode.

15.3.3 Amplifier Communication Errors (From 16#0000_2000)

These errors occur in network communication between the positioning unit RTEX and the amplifier.

Code	Name	Description	Target	Recovery	Countermeasures
16#0000_2000	Amplifier communication error	After communication was established, a communication error occurred for some reason.	All axes	×	● Check that the amplifier is ON. ● Check the communication path. In particular, carefully check the communication cables for any connector faults or broken wires. Also, check if excessive noise is generated in the operating environment. ● If the error occurs repeatedly, please contact our sales office.
16#0000_2001	Amplifier data acquisition error	Data acquisition from each amplifier failed.	Each axis	○	● Check the status of the amplifier where the error occurred. ● Check the communication path. In particular, carefully check the communication cables for any connector faults or broken wires.
16#0000_2002	Amplifier parameter error	The parameters used for communication with each amplifier are incorrect.	Gear ratio change time	○	

Code	Name	Description	Target	Recovery	Countermeasures
			for each axis		Also, check if excessive noise is generated in the operating environment. ● If the error occurs repeatedly, please contact our sales office.
16#0000_2003	Network communication timeout	A timeout occurred in communication between the positioning unit RTEX and the amplifier, and the communication was disconnected.	Gear ratio change time for each axis	○	Check the status of the amplifier. (As information about the amplifier cannot be obtained while communication is disconnected, amplifier errors may not be able to be obtained.) Check the communication cables.
16#0000_2004	Amplifier parameter control error	A communication error occurred during amplifier parameter processing (read, write, save, or reset).	Gear ratio change time for each axis	○	● Check the condition of the amplifier. ● Check that the control mode of the amplifier is correctly set. (Speed control mode and torque control mode cannot be used.)
16#0000_2010	Too many amplifiers connected	The number of amplifiers connected to the network exceeded the maximum connection limit for the unit (maximum number of axes of the unit).	All axes	×	● After checking the connections and settings of the amplifiers, turn the power OFF and then ON. ● If the error occurs repeatedly, please contact our sales office. ● When using a virtual axis, set the AMP station numbers as follows: When using one virtual axis: 1 to 7 When using two virtual axes: 1 to 6
16#0000_2020	Amplifier node duplication	Amplifiers with the same station number exist in the network.	All axes	×	
16#0000_2021	Virtual axis duplication error	Virtual axes are used, but amplifiers with the following station number are connected: When using one virtual axis: Station number 8 When using two virtual axes: Station numbers 7 and 8	All axes	×	
16#0000_2030	Amplifier node number setting error	Amplifiers with a station number other than those below exist. 1 to 8	All axes	×	
16#0000_2040	Amplifier reset failure	An error occurred in amplifier reset processing and the system stopped.	All axes	×	Turn the system OFF and then ON.
16#0000_2050	Amplifier connection error	The connected amplifiers are a mixture of A4N and A6N/A5N.	All axes	×	Check the configuration of the connected amplifiers to make sure that A4N and A6N/A5N are not mixed.

15.3.4 Axis Operation Errors (From 16#0000_3000)

These errors occur while various operations are being executed.

Code	Name	Description	Processing	Recovery	Countermeasures
16#0000_3000	Not servo ready	An attempt was made to start an axis that is not in a servo lock state.	Gear ratio change time for each axis	○	When operating an axis, check that it is in a servo lock state.
16#0000_3001	Servo OFF detection during operation	The servo turned OFF during operation.	Gear ratio change time for each axis	○	● Turn OFF the servo ON input when the BUSY signal for the target axis is not ON. ● Check the condition of the amplifier.
16#0000_3005	Main power supply OFF error	A servo ON request was issued when the main power supply of the amplifier was OFF.	Gear ratio change time for each axis	○	● Turn the servo ON after the main power supply has been turned ON. ● Check the voltage of the main power supply.
16#0000_3010	Limit + signal detection	The input on the plus side of the limit turned ON.	Gear ratio change time for each axis	○	Move the motor into the range of the limit by performing an operation such as JOG operation. Check if the limit signals are normal.
16#0000_3011	Limit - signal detection	The input on the minus side of the limit turned ON.	Gear ratio change time for each axis	○	
16#0000_3012	Limit signal error	Both inputs on the plus and minus sides of the limit turned ON.	Gear ratio change time for each axis	○	Check the status of the limit signal.
16#0000_3020	Soft limits: (Plus side) detection	The movement amount of the motor exceeded the upper limit value of the soft limit.	Gear ratio change	○	Move the motor into the range of the soft limit by performing an operation such as JOG operation.

Code	Name	Description	Processing	Recovery	Countermeasures
			time for each axis		Check the set values of the soft limit.
16#0000_3021	Soft limits: (Minus side) detection	The movement amount of the motor exceeded the lower limit value of the soft limit.	Gear ratio change time for each axis	○	
16#0000_3025	Command speed calculation error 1	In the internal calculation process of the command speed, the calculation failed due to overflow.	Gear ratio change time for each axis	○	Lower the set speed. Check the specified number of pulses per revolution and the specified movement amount per revolution.
16#0000_3026	Command speed calculation error 2		Gear ratio change time for each axis	○	
16#0000_3027	Command speed calculation error 3		Gear ratio change time for each axis	○	
16#0000_3030	Axis operation error	An error occurred in the operation processing of each axis.	Gear ratio change time for each axis	○	Check the set values and parameters of positioning data. Furthermore, this error may be notified when an AMP warning occurs. Therefore, refer also to the warning history. If an error occurs repeatedly when the set values are all correct and there is no error in the AMP, please contact our sales office.
16#0000_3031	Operation abnormal termination	An error occurred in the operation processing of each axis.	Gear ratio change time for each axis	○	If the error occurs repeatedly, please contact our sales office.

Code	Name	Description	Processing	Recovery	Countermeasures
			All axes		
16#0000_3032	Axis group operation error	The settings of the axis group were changed during operation or while a stop request was being issued. The settings of the axis group are out of range.	Gear ratio change time for each axis	○	Change the axis group while the axes are stopped. Do not issue a stop request. Check the axis group settings.
16#0000_3033	Interpolation operation error	The operation stopped as an error occurred on another interpolation axis during interpolation operation.	Gear ratio change time for each axis	○	Check the set values of positioning data for interpolation operation. If the error occurs repeatedly when the set values are all correct, please contact our sales office.
16#0000_3034	Axis group not settable (During pulser operation)	The axis group settings were changed during pulser operation.	Gear ratio change time for each axis	○	Change the axis group when the pulser operation enabled signal is OFF.
16#0000_3035	Positioning movement amount error	The positioning movement amount has exceeded the upper or lower limit value.	Gear ratio change time for each axis	○	Check the set values.
16#0000_3043	Synchronous operation error	The operation was stopped as an error occurred on another axis during the synchronous operation.	Gear ratio change time for each axis	○	Check the unit settings of the stopped axis. If the error occurs repeatedly when the set values are all correct, please contact our sales office.
16#0000_3046	Synchronous operation not settable	Synchronous setting was executed with the pulse input as master when the slave axes were servo OFF.	Gear ratio change time for each axis	○	Synchronous setting with the pulse input as master should be executed with all slave axes in the servo ON status.
16#0000_3050	Torque judgment value error	The torque value exceeded the specified upper or lower limit value. This error occurs when bit 0 and bit 1 of the monitored value error setting are set to 1	Gear ratio change time for	○	● Design the system so that the torque of the motor does not exceed the judgment value. ● Check the torque judgment value.

Code	Name	Description	Processing	Recovery	Countermeasures
		(enable torque judgment values) and 0 (report an error when enabled), respectively.	each axis		
16#0000_3051	Actual speed judgment value error	The actual speed exceeded the specified upper or lower limit value. This error occurs when bit 2 and bit 3 of the monitored value error setting are set to 1 (enable actual speed judgment values) and 0 (report an error when enabled), respectively.	Gear ratio change time for each axis	○	● Design the system so that the actual speed of the motor does not exceed the judgment value. ● Check the actual speed judgment value.
16#0000_3060	Home return non-executable error	Home return could not be executed as amplifier parameter settings or signal inputs were not appropriate. This error occurs when A6N/A5N is used as the amplifier.	Gear ratio change time for each axis	○	Check the amplifier parameters and signal inputs.
16#0000_3061	Multi-turn data clearing not possible	This error occurs when multi-turn data clearing is judged to be impossible. ● Servo is ON ● Servo is in incremental mode ● Absolute single-turn function is enabled for servo ● Servo is in fully closed control mode	Gear ratio change time for each axis	○	Check the set values of the servomotor.
16#0000_3070	Correction latch used multiple times	The correction latch was used two or more times in the period until the positioning operation was complete.	Gear ratio change time for each axis	○	When using the correction latch as the J-point trigger, do not use it two or more times in the period until the positioning operation is complete.

15.3.5 Setting Value Errors (From 16#0000_4000)

These errors occur with various settings specified using the positioning setting menu of the programming tool or a user program.

Code	Name	Description	Processing	Recovery	Countermeasures
16#0000_4000	Axis group setting error	The settings of axis groups are incorrect.	Gear ratio chan	○	Check for the following problems with the settings of

Code	Name	Description	Processing	Recovery	Countermeasures
		When virtual axes are used, they are not registered in the independent axis area of the axis group.	ge time for each axis		the axis group and independent axis. ● The same axis number is registered in more than one group. ● Four or more axes are set in one group. ● The axis group is composed of one axis only. ● No virtual axes are registered in the independent axis area of the axis group.
16#0000_4001	Virtual axis setting error	The virtual axis usage setting (number of virtual axes) is incorrect.	All axes	○	Check the settings.
16#0000_4002	Unit setting error	The set unit is out of range.	Gear ratio change time for each axis	○	Check if the unit is one of the following: pulses, μm, inches, degrees
16#0000_4004	Invalid number of pulses per revolution	The number of pulses is out of range.	Gear ratio change time for each axis	○	Check the set values. If the setting value is out of range, reduce the fraction with the following formula. (Number of pulses per revolution) / (Movement amount per revolution)
16#0000_4005	Invalid movement amount per revolution	The movement amount is out of range.	Gear ratio change time for each axis	○	
16#0000_4010	Soft limit setting error	The upper or lower limit value of soft limit is out of range.	Gear ratio change time for each axis	○	Check the set values. If the error occurs repeatedly when the set values are all correct, please contact our sales office.
16#0000_4020	Limit stop deceleration time error	The limit stop deceleration time is out of range.	Gear ratio change time for each axis	○	

Code	Name	Description	Processing	Recovery	Countermeasures
16#0000_4021	Error stop deceleration time error	The error stop deceleration time is out of range.	Gear ratio change time for each axis	○	
16#0000_4022	Emergency stop deceleration time error	The emergency stop deceleration time is out of range.	Gear ratio change time for each axis	○	
16#0000_4028	Auxiliary Output setting error	The settings of auxiliary output are invalid. Any mode other than With mode or Delay mode has been set for the auxiliary output mode. The auxiliary output delay ratio of Delay mode is not in the range of 0 to 100 (%).	Gear ratio change time for each axis	○	
16#0000_4042	Pulser setting Error	The pulser input mode is incorrect. The pulser operation method is incorrect. The maximum pulser operation speed is incorrect.	Gear ratio change time for each axis	○	Check the set values. If the error occurs repeatedly when the set value is correct, please contact our sales office.
16#0000_4043	Use pulser inoperable error	The pulse input application of the axis to which pulses are permitted to be input from the pulser is not set to Pulser.	Gear ratio change time for each axis	○	Check the pulse input application. When using a pulser, set the input application to “Pulser”.
16#0000_4044	Speed rate error	The setting of the speed rate is out of range.	Gear ratio change time for each axis	○	Check the set values. If the error occurs repeatedly when the set values are all correct, please contact our sales office.
16#0000_4080	JOG positioning Acceleration/deceleration method error	The acceleration/deceleration method for JOG positioning operation is out of range.	Gear ratio change time for	○	

Code	Name	Description	Processing	Recovery	Countermeasures
			each axis		
16#0000_4081	JOG positioning Acceleration time error	The acceleration time of JOG positioning operation is out of range.	Gear ratio change time for each axis	○	
16#0000_4082	JOG positioning Deceleration time error	The deceleration time of JOG positioning operation is out of range.	Gear ratio change time for each axis	○	
16#0000_4083	JOG positioning Target speed error	The target speed of JOG positioning operation is out of range.	Gear ratio change time for each axis	○	
16#0000_4102	Stop-on-contact torque value for home return Target speed error	The target speed of home return is out of range.	Gear ratio change time for each axis	○	
16#0000_4105	Stop-on-contact torque value for home return Acceleration time error	The acceleration time of home return is out of range.	Gear ratio change time for each axis	○	
16#0000_4106	Stop-on-contact torque value for home return Deceleration time error	The deceleration time of home return is out of range.	Gear ratio change time for each axis	○	
16#0000_4107	Stop-on-contact torque value for home return Setting code error	The home return setting code is invalid.	Gear ratio change time for	○	

Code	Name	Description	Processing	Recovery	Countermeasures
			each axis		
16#0000_4110	Stop-on-contact torque value for home return Creep rate error	The creep speed of home return is out of range.	Gear ratio change time for each axis	○	
16#0000_4111	Stop-on-contact torque value for home return return direction error	The moving direction of home return is invalid.	Gear ratio change time for each axis	○	
16#0000_4112	Stop-on-contact torque value for home return Limit error	The limit switch is disabled. (This error occurs when the home return method is set to limit method 1 or 2.)	Gear ratio change time for each axis	○	
16#0000_4115	Stop-on-contact torque value for home return Stop-on-contact torque value error	The home return stop-on-contact torque value is out of range. (This error occurs when the home return method is set to stop-on-contact method 1 or 2.)	Gear ratio change time for each axis	○	
16#0000_4116	Stop-on-contact torque value for home return Stop-on-contact judgment time error	The home return stop-on-contact judgment time is out of range. (This error occurs when the home return method is set to stop-on-contact method 1 or 2.)	Gear ratio change time for each axis	○	
16#0000_4120	Home position coordinate error	The specified coordinates of the home position are out of range.	Gear ratio change time for each axis	○	Use the following formula to convert the set values to pulse unit current values, and check that the values do not exceed the upper and lower pulse limits (-2,147,483,648 to +2,147,483,647). Pulse unit current value = Unit-converted current value × Number of pulses per revolution / Movement amount per revolution
16#0000_4201	JOG operation	The target speed of JOG operation is out of range.	Gear ratio	○	Check the set values.

Code	Name	Description	Processing	Recovery	Countermeasures
	Target speed error		change time for each axis		If the error occurs repeatedly when the set values are all correct, please contact our sales office.
16#0000_4203	JOG operation Acceleration/ deceleration method error	The acceleration/deceleration method for JOG operation is invalid.	Gear ratio change time for each axis	○	
16#0000_4204	JOG operation Acceleration time error	The acceleration time of JOG operation is out of range.	Gear ratio change time for each axis	○	
16#0000_4205	JOG operation Deceleration time error	The deceleration time of JOG operation is out of range.	Gear ratio change time for each axis	○	
16#0000_4250	Current value update error	The set value of current value updating is out of range.	Gear ratio change time for each axis	○	Use the following formula to convert the set values to pulse unit current values, and check that the values do not exceed the upper and lower pulse limits (-2,147,483,648 to +2,147,483,647). Pulse unit current value = Unit-converted current value × Number of pulses per revolution / Movement amount per revolution
16#0000_4251	Real-time torque limit value error	The specified real-time torque value is out of range.	Gear ratio change time for each axis	○	Check the set values. If the error occurs repeatedly when the set values are all correct, please contact our sales office.
16#0000_4301	Absolute/ incremental specification error	A value other than "Absolute" or "Incremental" is set for the control method.	Gear ratio change time for	○	

Code	Name	Description	Processing	Recovery	Countermeasures
			each axis		
16#0000_4302	Dwell Time error	The set value of dwell time is out of range.	Gear ratio change time for each axis	○	
16#0000_4303	Positioning start Table No. error	The specified table number is 0 or greater than the maximum table number.	Gear ratio change time for each axis	○	
16#0000_4304	Table settings error	The last table of the positioning setting tables is not a table specifying E-point.	Gear ratio change time for each axis	○	
16#0000_4400	Positioning movement amount setting error	The movement amount of positioning operation is out of range.	Gear ratio change time for each axis	○	
16#0000_4401	positioning Acceleration/ deceleration method error	The acceleration/deceleration method of positioning operation is invalid.	Gear ratio change time for each axis	○	
16#0000_4402	positioning Acceleration time error	The acceleration time of positioning operation is out of range.	Gear ratio change time for each axis	○	
16#0000_4403	positioning Deceleration time error	The deceleration time of positioning operation is out of range.	Gear ratio change time for	○	

Code	Name	Description	Processing	Recovery	Countermeasures
			each axis		
16#0000_4404	positioning Target speed error	The target speed of positioning operation is out of range.	Gear ratio change time for each axis	○	
16#0000_4500	Interpolation type error	The specified interpolation type is invalid.	Gear ratio change time for each axis	○	
16#0000_4504	Circular interpolation execution not possible	Circular interpolation parameters (such as center point or pass point) are invalid.	Gear ratio change time for each axis	○	
16#0000_4505	Spiral interpolation execution not possible	As the set value is invalid, an error occurred during spiral interpolation execution.	Gear ratio change time for each axis	○	
16#0000_4510	Positioning speed change speed error	The positioning speed change speed is out of range.	Gear ratio change time for each axis	○	
16#0000_4520	Post-change positioning movement amount error	The positioning movement amount change movement amount is out of range.	Gear ratio change time for each axis	○	
16#0000_4600	Pulse input setting error	The specified pulse input mode is invalid.	Gear ratio change time for	○	Check the set values. Check the combination of input mode, input multiplication, and input application.

Code	Name	Description	Processing	Recovery	Countermeasures
			each axis		
16#0000_4605	Pulse count change value setting error	The specified new (post-change) pulse count value is out of range.	Gear ratio change time for each axis	○	Check the set values.

15.3.6 Synchronization Parameter Setting Errors (From 16#0000_5000)

■ Synchronization parameters: Common errors (from 16#0000_5000)

Code	Name	Description	Processing	Recovery	Countermeasures
16#0000_5000	Synchronous master set value invalid	The settings for the synchronous master axis are invalid. ⇒ Setting error (Invalid values) → Local axis setting	Gear ratio change time for each axis	○	Check the set values. If the error occurs repeatedly when the set value is correct, please contact our sales office.
16#0000_5002	Synchronization setting inoperable error	A synchronous setting request was issued in the following axis states. ● The local axis (slave axis) is set as the master axis for another axis. ● The master axis is set as a slave axis for another axis. ● The local axis (slave axis) belongs to an interpolation group.	Gear ratio change time for each axis	○	
16#0000_5006	Synchronous slave single deceleration stop Deceleration time error	The setting for synchronous slave single deceleration stop time is invalid.	Gear ratio change time for each axis	○	Check the set values. If the error occurs repeatedly when the set value is correct, please contact our sales office.

■ Synchronization parameters: Electronic gear related errors (from 16#0000_5100)

Code	Name	Description	Processing	Recovery	Countermeasures
16#0000_5100	Electronic gear Gear ratio numerator setting error	The setting for the electronic gear ratio numerator is invalid.	Gear ratio change time for each axis	○	Check the set values. If the error occurs repeatedly when the set value is correct, please contact our sales office.
16#0000_5101	Electronic gear Gear ratio denominator setting error	The setting for the electronic gear ratio denominator is invalid.	Gear ratio change time for each axis	○	
16#0000_5102	Electronic gear Gear ratio change time setting error	The setting for electronic gear ratio change time is invalid.	Gear ratio change time for each axis	○	

■ Synchronization parameters: Electronic clutch related errors (from 16#0000_5200)

Code	Name	Description	Processing	Recovery	Countermeasures
16#0000_5200	Electronic clutch Clutch ON trigger type setting error	The setting for the electronic clutch ON trigger type is invalid.	Gear ratio change time for each axis	○	Check the set values. If the error occurs repeatedly when the set value is correct, please contact our sales office.
16#0000_5201	Electronic clutch Clutch ON edge selection setting error	The setting for electronic clutch ON edge selection is invalid.	Gear ratio change time for each axis	○	
16#0000_5203	Electronic clutch Clutch OFF trigger type setting error	The setting for the electronic clutch OFF trigger type is invalid.	Gear ratio change time for	○	

Code	Name	Description	Processing	Recovery	Countermeasures
			each axis		
16#0000_5204	Electronic clutch Clutch OFF edge selection setting error	The setting for electronic clutch OFF edge selection is invalid.	Gear ratio change time for each axis	○	
16#0000_5207	Electronic clutch Clutch ON method setting error	The setting for the electronic clutch ON method is invalid.	Gear ratio change time for each axis	○	
16#0000_5208	Electronic clutch Clutch ON slip method setting error	The setting for the electronic clutch ON slip method is invalid.	Gear ratio change time for each axis	○	
16#0000_5209	Electronic clutch Clutch ON slip time setting error	The setting for the electronic clutch ON slip time is invalid.	Gear ratio change time for each axis	○	
16#0000_5210	Electronic clutch Clutch ON slip curve selection setting error	The setting for electronic clutch ON slip curves is invalid.	Gear ratio change time for each axis	○	
16#0000_5211	Electronic clutch Clutch OFF method setting error	The setting for the electronic clutch OFF method is invalid.	Gear ratio change time for each axis	○	
16#0000_5212	Electronic clutch Clutch OFF slip method setting error	The setting for the electronic clutch OFF slip method is invalid.	Gear ratio change time for	○	

Code	Name	Description	Processing	Recovery	Countermeasures
			each axis		
16#0000_5213	Electronic clutch Clutch OFF slip time setting error	The setting for the electronic clutch OFF slip time is invalid.	Gear ratio change time for each axis	○	
16#0000_5214	Electronic clutch Clutch OFF slip curve selection setting error	The setting for electronic clutch OFF slip curves is invalid.	Gear ratio change time for each axis	○	

- **Synchronization parameters: Electronic cam related errors (from 16#0000_5300)**

Code	Name	Description	Processing	Recovery	Countermeasures
16#0000_5300	Electronic cam Cam control synchronous master axis cycle setting error	The setting for the electronic cam control synchronous master axis cycle is invalid.	Gear ratio change time for each axis	○	Check the set values. If the error occurs repeatedly when the set value is correct, please contact our sales office.
16#0000_5301	Electronic cam Used cam pattern number setting error	The electronic cam pattern number to be used is out of range. The cam pattern number to be used is unregistered.	Gear ratio change time for each axis	○	
16#0000_5302	Electronic cam Cam stroke amount setting error	The setting for electronic cam stroke amounts is invalid.	Gear ratio change time for each axis	○	

■ Cam pattern related errors (from 16#0000_5400)

Code	Name	Description	Processing	Recovery	Countermeasures
16#0000_5400	Cam pattern resolution setting error	The setting for electronic cam pattern resolution is out of range.	Gear ratio change time for each axis	○	Check the set values. If the error occurs repeatedly when the set value is correct, please contact our sales office.
16#0000_5401	Cam pattern count setting error	The specified number of electronic cam patterns is out of range.	Gear ratio change time for each axis	○	
16#0000_5402	Cam pattern section function setting error	The setting for the electronic cam pattern section function is out of range.	Gear ratio change time for each axis	○	
16#0000_5403	Cam pattern control start position setting error	The setting for the electronic cam pattern control start position (shift) is out of range.	Gear ratio change time for each axis	○	
16#0000_5404	Cam pattern start phase setting error	The start phase setting for each section of electronic cam patterns is out of range.	Gear ratio change time for each axis	○	
16#0000_5405	Cam pattern displacement setting error	The displacement for each section of electronic cam patterns is out of range.	Gear ratio change time for each axis	○	
16#0000_5406	Cam pattern cam curve number setting error	The curve number for each section of electronic cam patterns is out of range.	Gear ratio change time for	○	

Code	Name	Description	Processing	Recovery	Countermeasures
			each axis		
16#0000_5410	Adjustment data total count setting error	The total number of electronic cam pattern adjustment data items is out of range.	Gear ratio change time for each axis	○	
16#0000_5411	Adjustment data count setting error	The number of electronic cam pattern adjustment data items is out of range (for each cam pattern).	Gear ratio change time for each axis	○	
16#0000_5413	Adjustment data control point setting error	The control point of electronic cam pattern adjustment data is out of range.	Gear ratio change time for each axis	○	
16#0000_5414	Adjustment data out-of-range setting error	The adjustment value of electronic cam pattern adjustment data is out of range.	Gear ratio change time for each axis	○	

15.4 Warning Code List

15.4.1 Amplifier Warnings (From 16#0000_A000)

- Warnings occurring on the amplifier side are output as warning codes on the positioning unit RTEX side.
- The warning codes output from the positioning unit RTEX are hexadecimal numbers and the warning numbers output from amplifiers (A6N/A5N) are also hexadecimal numbers.
- Amplifier warnings differ according to the type of amplifier. For details on the handling of amplifier warnings, refer to the manual of the servo amplifier.

■ How to read amplifier warning codes (for A6N/A5N)

The warning numbers on the amplifier side are obtained by subtracting 16#0000_A000 from the warning codes of the positioning unit.

Example: When an overload warning occurs

Warning code of positioning unit: 16#0000_A0A0

↓

Subtract 16#0000_A000 from the warning code: 16#0000_00A0

↓

Warning number on amplifier side: 16#A0

15.4.2 Unit Warnings (From 16#0000_B000)

These warning codes are issued when warnings occur in the unit.

Code	Name	Description	Processing	Recovery	Countermeasures
16#0000_B004	Real-time torque limit protection	The real-time torque limit function was not executed as amplifier parameter processing or amplifier monitor processing was in progress.	Gear ratio change time for each axis	○	Execute the real-time torque limit function when amplifier parameter processing or amplifier monitor processing is not used.
16#0000_B010	Duplicate startup	An attempt was made to start the operation of an axis when its previous operation had not finished.	Gear ratio change time for each axis	○	An operation request cannot be issued to any axis that is currently operating. However, the following requests can be issued even when the target axis is operating. ● Deceleration stop request flag (for each axis) ● Emergency stop request flag (for each axis) ● System stop request flag (for all axes)

Code	Name	Description	Processing	Recovery	Countermeasures
16#0000_B020	Non-existent axis started	A positioning operation request was executed on a non-existent axis	Gear ratio change time for each axis	○	Check the axis settings. Check the positioning start process.
16#0000_B030	J-point simultaneous startup warning	The J-point speed change request (in bank 16#00 or 16#0062) and J-point positioning start contact turned ON simultaneously during a JOG positioning operation. The J-point speed change request (in bank 16#00 or 16#0062) turned ON during acceleration or deceleration.	Gear ratio change time for each axis	○	When both contacts turn ON simultaneously, the "J-point positioning start contact" is given priority and the "J-point speed change request (in bank 16#00 or 16#0062)" is ignored. Configure settings so that the J-point speed change request (in bank 16#00 or 16#0062) turns ON during constant-speed operation.
16#0000_B031	J-point speed change request warning	The J-point speed change request (in bank 16#00 or 16#0062) turned ON while J-point control was inactive.	Gear ratio change time for each axis	○	Check the timing of the J-point speed change request (in bank 16#00 or 16#0062) turning ON.
16#0000_B032	J-point positioning start request warning	The J-point positioning start contact turned ON while J-point control was inactive.	Gear ratio change time for each axis	○	Check the timing of the J-point positioning start contact turning ON.
16#0000_B050	Torque judgment value warning	The monitored torque value exceeded the specified upper/lower limit value. This warning occurs when bit 0 and bit 1 of monitored value error judgment are set to 1 (enable torque judgment value) and 1 (issue a warning when enabled), respectively.	Gear ratio change time for each axis	○	Design the system so that the torque value of the motor does not exceed the judgment value. Check the set value of torque judgment.
16#0000_B051	Actual speed judgment value warning	The monitored actual speed exceeded the specified upper/lower limit value. This warning occurs when bit 2 and bit 3 of monitored value error judgment are set to 1 (enable actual speed judgment value) and 1 (issue a warning when enabled), respectively.	Gear ratio change time for each axis	○	Design the system so that the actual speed of the motor does not exceed the judgment value. Check the set value of actual speed judgment.

Code	Name	Description	Processing	Recovery	Countermeasures
16#0000_B055	Pulse input setting warning	The pulse input setting is out of range.	All axes	○	Check the set values. Check the combination of input mode, input multiplication, and input application.
16#0000_B056	Pulse count changed value setting warning	The specified pulse count changed value is out of range.	All axes	○	Check the set values.
16#0000_B060	Positioning speed change rejection warning (during other than positioning)	The positioning speed change request turned ON while a positioning operation was not being performed.	Gear ratio change time for each axis	○	Check the timing of the speed change request turning ON.
16#0000_B062	Positioning speed change rejection warning (during J-point operation)	The positioning speed change request turned ON during a J-point operation.	Gear ratio change time for each axis	○	
16#0000_B063	Positioning speed change rejection warning (for synchronous slave axes)	The positioning speed change request for synchronous slave axes turned ON.	Gear ratio change time for each axis	○	
16#0000_B064	Positioning speed change rejection warning (upon completion of positioning output)	The positioning speed change request turned ON after positioning output was completed.	Gear ratio change time for each axis	○	
16#0000_B065	Positioning speed change rejection warning (during positioning stop processing)	The positioning speed change request turned ON during the processing of a positioning stop.	Gear ratio change time for each axis	○	
16#0000_B066	Positioning speed change rejection warning (during dwell time processing)	The positioning speed change request turned ON during positioning dwell time processing.	Gear ratio change time for	○	

Code	Name	Description	Processing	Recovery	Countermeasures
			each axis		
16#0000_B070	Positioning movement amount change rejection warning (during other than positioning)	The positioning movement amount change request turned ON while a positioning operation was not being performed.	Gear ratio change time for each axis	○	Check the timing of the movement amount change request turning ON.
16#0000_B071	Positioning movement amount change rejection warning (during interpolation operation)	The positioning movement amount change request turned ON during an interpolation operation.	Gear ratio change time for each axis	○	
16#0000_B072	Positioning movement amount change rejection warning (during J-point operation)	The positioning movement amount change request turned ON during a J-point operation.	Gear ratio change time for each axis	○	
16#0000_B073	Positioning movement amount change rejection warning (for synchronous slave axes)	The positioning movement amount change request for synchronous slave axes turned ON.	Gear ratio change time for each axis	○	
16#0000_B074	Positioning movement amount change rejection warning (upon completion of positioning output)	The positioning movement amount change request turned ON after positioning output was completed.	Gear ratio change time for each axis	○	
16#0000_B075	Positioning movement amount change rejection warning (during positioning stop processing)	The positioning movement amount change request turned ON during the processing of a positioning stop.	Gear ratio change time for each axis	○	

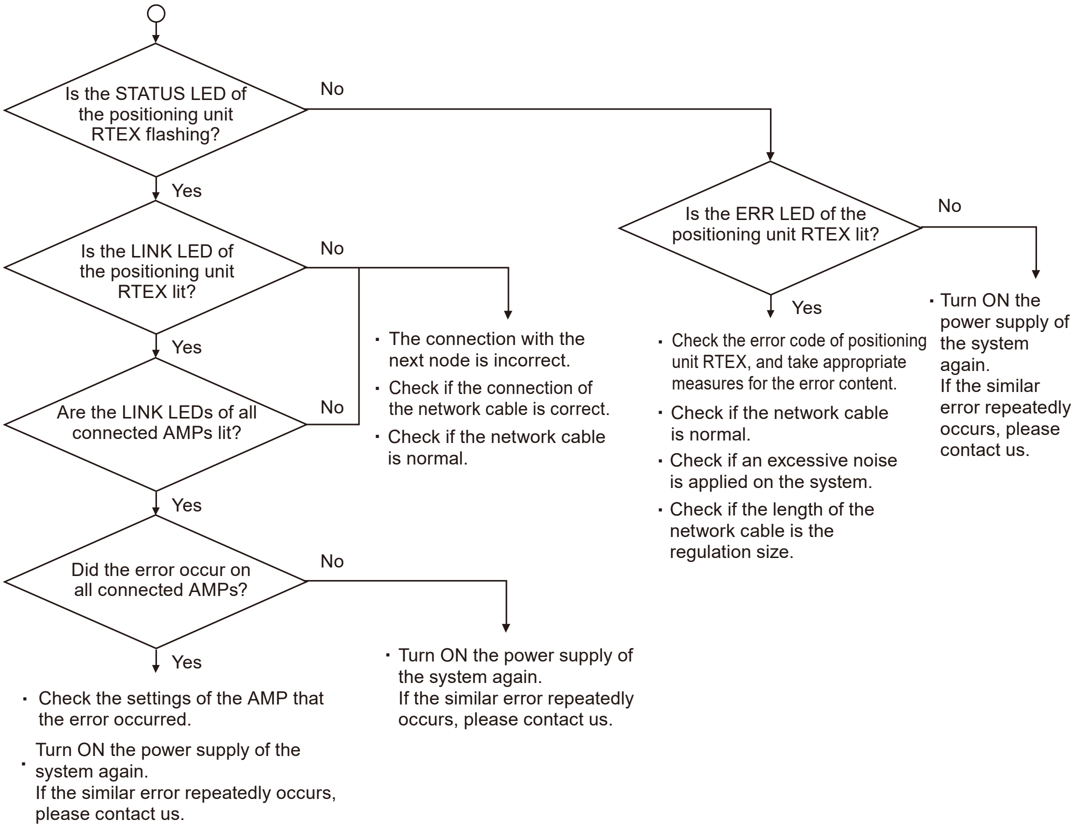
Code	**Name**	**Description**	**Processing**	**Recovery**	**Countermeasures**
16#0000_B076	Positioning movement amount change rejection warning (during dwell time processing)	The positioning movement amount change request turned ON during positioning dwell time processing.	Gear ratio change time for each axis	○	
16#0000_B110	Cam pattern table read failure warning	Processing in response to a cam pattern table read request terminated abnormally because the set values were invalid or the execution conditions were not satisfied.	All axes	○	● Check the set values of the parameters required for reading cam patterns. ● Check whether there are any synchronized axes. If so, cancel the synchronization before reading the cam pattern tables. Note: The detailed cause of the occurrence of this warning is stored in the "cam pattern read result" area of the positioning memory.
16#0000_B111	Cam pattern table rewrite failure warning	Processing in response to a cam pattern table rewrite request terminated abnormally because the set values were invalid or the execution conditions were not satisfied.	All axes	○	● Check the set values of the parameters required for rewriting cam patterns. ● Check whether there are any synchronized axes. If so, cancel the synchronization before rewriting the cam pattern tables. Note: The detailed cause of the occurrence of this warning is stored in the "cam pattern rewrite result" area of the positioning memory.
16#0000_B304	Recalculation failure warning	An error occurred when recalculation processing was executed.	Gear ratio change time for each axis	○	Check the parameters and interpolation group settings for each axis.

16 Troubleshooting

16.1 What to Do If an Error Occurs

16.1.1 The Unit Cannot Communicate with the Amplifier

■ Action



16.1.2 The Motor Does Not Rotate or Operate

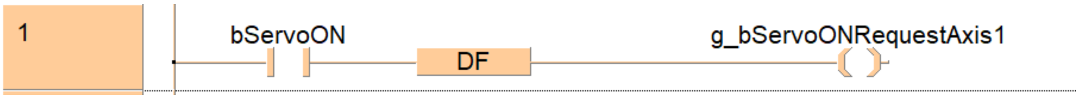
■ Action 1

Check whether the servo ON request is ON and the amplifier is in the servo-locked status. If an attempt is made to start an axis that is not in the servo-locked status, a Servo Not Ready error (16#3000) will occur.

Variable list

Class name	Variable name	FP address	Data type	Default	Comment
VAR	bServoON		BOOL	FALSE	Servo ON
VAR_EXTERNAL	g_bServoONRequestAxis1	Y108	BOOL	FALSE	Axis 1 servo ON request

Ladder diagram (LD)



Structured text (ST)

```
g_bServoONRequestAxis1  := DF(bServoON);
```

■ Action method 2

Review the program.

Points to check

1. Check whether the I/O numbers are correct.
2. Check whether the starting contact has been rewritten in the program.
3. Check the input logic of the over limit switch. (In this case, the ERR. LED is lit.)

(MEMO)

17 Maintenance and Inspection

17.1 Inspection

To always use the unit in optimal condition, carry out routine or periodic inspections.

■ Inspection item

Inspection item	Inspection details	Criterion	Related page
Installation status	Attachment to and tightness of DIN rail Unit tightness and rattling	The unit must have been installed properly.	"P.3-2"
Connection status	Connector looseness	The connectors must not be loose.	"P.3-3"
Usage conditions	Ambient temperature, temperature inside panel Ambient humidity, humidity inside panel Atmosphere	0 to +55°C 10 to 95% RH Free of dust and corrosive gases	"P.18-3"

18 Specifications

18.1 List of Specifications

18.1.1 General Specifications

Item	**Specifications**
Operating ambient temperature	0 to +55℃
Storage ambient temperature	-40 to +70℃
Operating ambient humidity	10 to 95% RH (at +25℃, non-condensing and non-freezing)
Storage ambient humidity	10 to 95% RH (at +25℃, non-condensing and non-freezing)
Dielectric strength (Leakage current: 10 mA)	All of pulse input terminals and RTEX connectors - All of control unit power supply terminals 500 VAC for 1 minute
Insulation resistance	All of pulse input terminals and RTEX connectors - All of control unit power supply terminals 100 MΩ or more (Test voltage: 500 VDC)
Vibration resistance	5 to 8.4 Hz, 3.5-mm single amplitude 8.4 to 150 Hz, acceleration of 9.8 m/s^2 10 sweeps each in X, Y, and Z directions (1 octave/min.)
Shock resistance	147 m/s^2, 4 times in the X, Y, Z directions
Noise resistance	1000 V [p-p] with pulse widths of 1 μs and 50 ns (using a noise simulator)
Atmosphere	Free of corrosive gases and excessive dust
Weight	Approx. 80 g

18.1.2 Network Specifications

Item	**Specifications**
Baud rate	100 Mbps
Physical layer	100BASE-TX full duplex mode
Cable	Shielded twisted-pair cable (Category 5e or higher)
Topology	Ring
Insulation	Pulse transformer (with built-in common mode choke)
Connector	8-pin RJ45
Maximum cable length	Between nodes: 60 m, total length: 200 m
Communication cycle	0.5 ms (position command update: 1 ms)
Maximum number of axes	8 axes

Item	Specifications
Operation command	Position command

18.1.3 Performance Specifications of the Unit

Item	Specifications	
	4-axis type	8-axis type
Product number	AFP0HM4N	AFP0HM8N
Number of axes controlled	4 axes per system	8 axes per system
Number of occupied I/O points	128 input points, 128 output points	
Installation limit	Up to two units can be connected as additional units on the left side of the control unit, regardless of the number of axes.	

18.1.4 Common Specifications

Item			Specifications	
			4-axis type	8-axis type
Number of axes controlled			Axis 4	8 axes
Interpolation control			2-axis linear interpolation, 2-axis circular interpolation 3-axis linear interpolation, 3-axis spiral interpolation	
Number of occupied inputs/outputs			128 input points, 128 output points	
Automatic operation	Position control	Position specification mode	Absolute (absolute position specification), incremental (relative position specification)	
		Units of position specification	Pulses μm (Minimum unit of specification: 0.1 μm or 1 μm) Inches (Minimum unit of specification: 0.00001 inch or 0.0001 inch) Degrees (Minimum unit of specification: 0.1 degree or 1 degree)	
		Position command range	Pulses: -2,147,482,624 to +2,147,482,624 pulses μm (0.1 μm): -214,748,262.4 to 214,748,262.4 μm μm (1 μm): -2,147,482,624 to 2,147,482,624 μm Inches (0.00001 inch): -21,474.82624 to 21,474.82624 inches Inches (0.0001 inch):—214,748.2624 to 214,748.2624 inch Degree (0.1 degree): -214,748,262.4 to 214,748,262.4 degrees Degree (1 degree): -2,147,482,624 to 2,147,482,624 degrees	
		Speed command range	Pulses: 0 to 2,147,482,624 pps μm: 1 to 2,147,482,624 μm/s Inches: 0.001 to 2,147,482.624 inches/s Degrees: 0.001 to 2,147,482.624 rev/s	
		Acceleration/ deceleration method	Linear acceleration / deceleration, S-shaped acceleration / deceleration	

Item					Specifications	
					4-axis type	8-axis type
		Acceleration time			0 to 10,000 ms (Settable by 1 ms)	
		deceleration time			0 to 10,000 ms (Settable by 1 ms)	
		Number of positioning tables			For each axis: 600 tables in standard area and 89 tables in extended area	
Automatic operation	Position control	Control method	Single axis		PTP control (E-point control, C-point control), CP control (P-point control), speed control (J-point control)	
			2-axis interpolation	Linear interpolation	E-point, P-point, and C-point control: Composite speed or long axis speed specification	
				Circular interpolation	E-point, P-point, and C-point control: Center point or pass point specification	
			3-axis interpolation	Linear interpolation	E-point, P-point, and C-point control: Composite speed or long axis speed specification	
				Spiral interpolation	E-point, P-point, and C-point control: Center point or pass point specification	
		Startup time			Standard area: 3 ms or less, extended area: 5 ms or less	
		Others Function		Dwell time	0 to 32,767 ms (settable in 1 ms units)	
Manual operation	JOG operation	Speed command range			Pulses: 0 to 2,147,482,624 pps µm: 1 to 2,147,482,624 µm/s Inches: 0.001 to 2,147,482.624 inches/s Degrees: 0.001 to 2,147,482.624 rev/s	
		Acceleration/ deceleration method			Linear acceleration / deceleration, S-shaped acceleration / deceleration	
		Acceleration time			0 to 10,000 ms (Settable by 1 ms)	
		deceleration time			0 to 10,000 ms (Settable by 1 ms)	
	Stop-on-contact torque value for home return	Speed command range			Pulses: 0 to 2,147,482,624 pps µm: 1 to 2,147,482,624 µm/s Inches: 0.001 to 2,147,482.624 inches/s Degrees: 0.001 to 2,147,482.624 rev/s	
		Acceleration/ deceleration method			Linear acceleration / deceleration	
		Acceleration time			0 to 10,000 ms (Settable by 1 ms)	
		deceleration time			0 to 10,000 ms (Settable by 1 ms)	
		Return method			DOG method (3 types), limit method (2 types), data set method, Z-phase method, and stop-on-contact method (2 types)	
	Pulser Operation	Speed command range			Operation synchronized with inputs from pulser	

Item			Specifications	
			4-axis type	**8-axis type**
Stop Functions	Deceleration stop	deceleration time	Deceleration time of activated operation	
	Emergency stop		0 to 10,000 ms (Settable by 1 ms)	
	Limit stop		0 to 10,000 ms (Settable by 1 ms)	
	Error stop		0 to 10,000 ms (Settable by 1 ms)	
	System stop		Immediate stop (0 ms)	
Synchronization functions	Corresponding functions		Electronic gear, electronic clutch, electronic cam	
	Number of axes	Synchronous group number	4 groups	
		Master axis	Selectable from "Real axes", "Virtual axes", and "Pulse inputs"	
		Slave axis	Max. 8 axes per master axis	
	Electronic gear	Operation setting	Gear ratio setting	
		Operation method	Direct method, linear acceleration / deceleration method	
	Electronic clutch	trigger type	Clutch ON trigger: Contact type Clutch OFF trigger: Contact input, contact input + phase specification Contact method is selectable from edge or level	
		Connection method	Direct method, linear slip method	
	Electronic cam	Cam curve	Selectable from 20 types. Multiple curves can be specified within a phase (0 to 100%).	
		Resolution	1024, 2048, 4096, 8192, 16384, 32768	
		No. of cam patterns	4 to 6 (according to resolution)	
		Cam pattern setting method	Cam curve method, cam point method (Set up from Configurator PM7-RTEX)	
Other specifications	Soft limit function	Setting range	Pulses: -2,147,482,624 to +2,147,482,624 pulses μm (0.1 μm): -214,748,262.4 to 214,748,262.4 μm μm (1 μm): -2,147,482,624 to 2,147,482,624 μm Inches (0.00001 inch): -21,474.82624 to 21,474.82624 inches Inches (0.0001 inch):－214,748.2624 to 214,748.2624 inch Degree (0.1 degree): -214,748,262.4 to 214,748,262.4 degrees Degree (1 degree): -2,147,482,624 to 2,147,482,624 degrees	
	Monitor judgment	Torque judgement	Selectable from torque judgment disabled, torque judgment enabled (error), and torque judgment enabled (warning) 0.0 to ± 500.0% (settable in 0.1% units)	
		Actual speed judgement	Selectable from actual speed judgment disabled, actual speed judgment enabled (error), and actual speed judgment enabled (warning) 0.0 to ± 10000 rpm (settable in 1 rpm units)	
	Backup		Positioning parameters and positioning data are saved in flash memory. (Batteryless)	
	● Limit input CWL, CCWL monitor, proximity (DOG) monitor ● General-purpose input 2 points, general-purpose output 2 points (I/O from amplifier)			

Item		Specifications	
		4-axis type	8-axis type
	● Auxiliary output contact, auxiliary output code ● Torque limit function		

18.2 List of I/O Memories

The contacts are indicated as allocated I/O when the positioning unit RTEX is installed in slot number 0.

WX10 (slot number 0: WX10, 1: WX18, 2: WX26, 3: WX34)

Allocation of each contact	Target axis	Name	Description
X100	All axes	Link establishment notification	Indicates that a network link was established and notifies that the system started running.
X101	All axes	System restart notification	When this contact is ON, the changed settings will not be reflected unless the power supply is restarted.
X102	-	-	-
X103	All axes	Writing to FROM in progress	Writing to FROM in progress
X104	All axes	Tool operation in progress	Contact that indicates that the tool is operating from Configurator PM7-RTEX.
X105	All axes	Error notification	Turns ON when an error occurs on any axis. Error details can be checked in the error notification & clearing area (addresses 16#0110 to 16#01A7 in bank 16#00).
X106	All axes	Warning notification	Turns ON when a warning occurs in any axis. Warning details can be checked in the warning notification & clearing area (addresses 16#01A8 to 16#023F in bank 16#00).
X107	All axes	Recalculation completion	If the recalculation request contact (Y107) turns ON, re-creation of the positioning data in the shared memory (standard area) will be started. This contact will turn ON after the re-creation is complete. If the recalculation request contact (Y107) turns ON again, this contact will be turned OFF once. Note 1: This contact is used only when positioning data has been rewritten using a user program.
X108	Axis 1	Each axis connection confirmation	Turns ON when the corresponding axis exists.
X109	Axis 2		
X10A	Axis 3		
X10B	Axis 4		
X10C	Axis 5		
X10D	Axis 6		
X10E	Warning clearing for Axis 7 (virtual)		
X10F	Axis 8 (virtual)		

WX11 (Slot No. 0: WX11, 1: WX19, 2: WX27, 3: WX35)

Allocation of each contact	Target axis	Name	Description
X110	Axis 1	Servo lock	Turns ON when the corresponding axis is in a servo lock state.
X111	Axis 2		
X112	Axis 3		
X113	Axis 4		
X114	Axis 5		
X115	Axis 6		
X116	Warning clearing for Axis 7 (virtual)		
X117	Axis 8 (virtual)		
X118	Axis 1	BUSY	Turns ON when the corresponding axis is operating.
X119	Axis 2		
X11A	Axis 3		
X11B	Axis 4		
X11C	Axis 5		
X11D	Axis 6		
X11E	Warning clearing for Axis 7 (virtual)		
X11F	Axis 8 (virtual)		

WX12 (Slot No. 0: WX12, 1: WX20, 2: WX28, 3: WX36)

Allocation of each contact	Target axis	Name	Description
X120	Axis 1	Operation completion	Turns ON when the operation command for the corresponding axis is completed and the position deviation falls within the specified completion width. Turns ON when execution of all tables is completed for P-point control and C-point control of automatic operation. After this contact turns ON, the ON state continues until the next control is started.
X121	Axis 2		
X122	Axis 3		
X123	Axis 4		
X124	Axis 5		
X125	Axis 6		
X126	Warning clearing for Axis 7 (virtual)		

Allocation of each contact	Target axis	Name	Description
X127	Axis 8 (virtual)		
X128	Axis 1	Home return completion	Turns ON when the home return operation for the corresponding axis is completed. After this contact turns ON, the ON state continues until the next control is started.
X129	Axis 2		
X12A	Axis 3		
X12B	Axis 4		
X12C	Axis 5		
X12D	Axis 6		
X12E	Warning clearing for Axis 7 (virtual)		
X12F	Axis 8 (virtual)		

WX13 (Slot No. 0: WX13, 1: WX21, 2: WX29, 3: WX37)

Allocation of each contact	Target axis	Name	Description
X130	Axis 1	Near home	Contact for monitoring the near home input connected to the corresponding amplifier
X131	Axis 2		
X132	Axis 3		
X133	Axis 4		
X134	Axis 5		
X135	Axis 6		
X136	Warning clearing for Axis 7 (virtual)		
X137	Axis 8 (virtual)		
X138	Axis 1	Auxiliary contact	Turns ON when the corresponding positioning table of the corresponding axis is executed. To configure the setting to enable and disable the auxiliary contact, use Configurator PM7-RTEX or directly write to the shared memory.
X139	Axis 2		
X13A	Axis 3		
X13B	Axis 4		
X13C	Axis 5		
X13D	Axis 6		
X13E	Warning clearing for Axis 7 (virtual)		

Allocation of each contact	Target axis	Name	Description
X13F	Axis 8 (virtual)		

WX14 (Slot No. 0: WX14, 1: WX22, 2: WX30, 3: WX38)

Allocation of each contact	Target axis	Name	Description
X140	Axis 1	Limit +	Contact for monitoring the limit + and limit - inputs connected to the corresponding amplifier. During positioning operation, JOG operation, or pulser operation, deceleration stop is performed when a limit input that is located further in the operating direction turns ON. The deceleration stop time during limit input can be changed in the shared memory or Configurator PM7-RTEX. This is used as a contact that reverses the motor automatically when home return is performed.
X141		Limit -	
X142	Axis 2	Limit +	
X143		Limit -	
X144	Axis 3	Limit +	
X145		Limit -	
X146	Axis 4	Limit +	
X147		Limit -	
X148	Axis 5	Limit +	
X149		Limit -	
X14A	Axis 6	Limit +	
X14B		Limit -	
X14C	Warning clearing for Axis 7 (virtual)	Limit +	
X14D		Limit -	
X14E	Axis 8 (virtual)	Limit +	
X14F		Limit -	

WX15 (Slot No. 0: WX15, 1: WX23, 2: WX31, 3: WX39)

Allocation of each contact	Target axis	Name	Description
X150	Axis 1	Synchronization setting completion	After the settings of synchronous control are changed with the program, synchronization settings in the unit are changed when the synchronization setting request contact (Y150 to Y157) is turned ON. The contact turns ON upon completion of the setting changes. This contact turns OFF when the synchronization setting request contact (Y150 to Y157) is turned OFF.
X151	Axis 2		
X152	Axis 3		
X153	Axis 4		
X154	Axis 5		
X155	Axis 6		
X156	Warning clearing for Axis 7 (virtual)		

Allocation of each contact	Target axis	Name	Description
X157	Axis 8 (virtual)		
X158	Axis 1	Synchronization cancellation in-progress notification	Turns ON when synchronous operation is canceled by turning ON the synchronization contact cancellation contact (Y158 to Y15F). Synchronous operation cannot be executed on the axes for which this contact is turned ON.
X159	Axis 2		
X15A	Axis 3		
X15B	Axis 4		
X15C	Axis 5		
X15D	Axis 6		
X15E	Warning clearing for Axis 7 (virtual)		
X15F	Axis 8 (virtual)		

WX16 (Slot No. 0: WX16, 1: WX24, 2: WX32, 3: WX40)

Allocation of each contact	Target axis	Name	Description
X160	Axis 1	Slave axis clutch operation notification	The clutch starts operating when the slave axis clutch ON request contact (Y160 to Y167) or clutch OFF request contact (Y168 to Y16F) turns ON. After the clutch operation is completed, the contact for the corresponding axis turns ON.
X161	Axis 2		
X162	Axis 3		
X163	Axis 4		
X164	Axis 5		
X165	Axis 6		
X166	Warning clearing for Axis 7 (virtual)		
X167	Axis 8 (virtual)		
X168	-	-	-
X169	-	-	-
X16A	-	-	-
X16B	-	-	-
X16C	-	-	-
X16D	-	-	-
X16E	-	-	-
X16F	-	-	-

WY10 (Slot No. 0: WY10, 1: WY18, 2: WY26, 3: WY34)

Allocation of each contact	Target axis	Name	Description
Y100	All axes	System stop	Contact for requesting system stoppage. When it turns ON, all axes stop at zero deceleration time.
Y101	-	-	-
Y102	-	-	-
Y103	-	-	-
Y104	-	-	-
Y105	All axes	Error clearing request	Requests clearing of errors with all the connected amplifiers. When this signal turns ON, error recovery processing is performed and error logs are cleared. (Note 1): Recovery from unrecoverable errors is not possible even if this signal turns ON.
Y106	All axes	Warning clearing request	Requests clearing of warnings with all the connected amplifiers. The warning logs are cleared by turning ON this signal.
Y107	All axes	Recalculation request	Turn ON this signal when each piece of positioning data (in the standard area) in the shared memory is changed. By turning ON this signal, positioning data after the recalculation start table number stored in the shared memory can be re-created and made executable. When re-creation of positioning data is complete, the recalculation completion contact (X107) turns ON. Note 1: This contact is used only when positioning data has been rewritten using a user program.
Y108	Axis 1	Servo ON request	Requests servo lock for the corresponding amplifier. Servo lock state processing is requested by the ON edge of this contact. When RUN mode is switched to PROG mode while the axis is in a servo lock state, a servo free state does not occur automatically. To cause a servo free state, turn ON the servo OFF request contact. (The operation is the edge type.)
Y109	Axis 2		
Y10A	Axis 3		
Y10B	Axis 4		
Y10C	Axis 5		
Y10D	Axis 6		
Y10E	Warning clearing for Axis 7 (virtual)		
Y10F	Axis 8 (virtual)		

WY11 (Slot No. 0: WY11, 1: WY19, 2: WY27, 3: WY35)

Allocation of each contact	Target axis	Name	Description
Y110	Axis 1	Servo OFF request	Requests a servo free state for the corresponding amplifier. Servo free state processing is requested by the ON edge of this contact.
Y111	Axis 2		

Allocation of each contact	Target axis	Name	Description
Y112	Axis 3		(The operation is the edge type.)
Y113	Axis 4		
Y114	Axis 5		
Y115	Axis 6		
Y116	Warning clearing for Axis 7 (virtual)		
Y117	Axis 8 (virtual)		
Y118	Axis 1	Positioning startup	Requests positioning control for the corresponding amplifier. The execution start table is set in the area for specifying the position control starting table number in the shared memory. (The operation is the edge type.)
Y119	Axis 2		
Y11A	Axis 3		
Y11B	Axis 4		
Y11C	Axis 5		
Y11D	Axis 6		
Y11E	Warning clearing for Axis 7 (virtual)		
Y11F	Axis 8 (virtual)		

WY12 (Slot No. 0: WY12, 1: WY20, 2: WY28, 3: WY36)

Allocation of each contact	Target axis	Name	Description
Y120	Axis 1	Home return startup	Requests home return for the corresponding amplifier. The direction, pattern, and other items of home return are set in the home return operation setting area in the shared memory or Configurator PM7-RTEX. (The operation is the edge type.)
Y121	Axis 2		
Y122	Axis 3		
Y123	Axis 4		
Y124	Axis 5		
Y125	Axis 6		
Y126	Warning clearing for Axis 7 (virtual)		
Y127	Axis 8 (virtual)		
Y128	Axis 1	J-point positioning start contact	Turning ON this signal during the J-point operation for the corresponding axis terminates the J-point operation and shifts to the processing for the next table.
Y129	Axis 2		

Allocation of each contact	Target axis	Name	Description
Y12A	Axis 3		(The operation is the edge type.)
Y12B	Axis 4		
Y12C	Axis 5		
Y12D	Axis 6		
Y12E	Warning clearing for Axis 7 (virtual)		
Y12F	Axis 8 (virtual)		

WY13 (Slot No. 0: WY13, 1: WY21, 2: WY29, 3: WY37)

Allocation of each contact	Target axis	Name	Description
Y130	Axis 1	Forward JOG	Requests JOG operation for the corresponding amplifier. Acceleration time and other settings are specified in the JOG operation settings in the shared memory or by Configurator PM7-RTEX. (The operation is the level type.)
Y131		Reverse JOG	
Y132	Axis 2	Forward JOG	
Y133		Reverse JOG	
Y134	Axis 3	Forward JOG	
Y135		Reverse JOG	
Y136	Axis 4	Forward JOG	
Y137		Reverse JOG	
Y138	Axis 5	Forward JOG	
Y139		Reverse JOG	
Y13A	Axis 6	Forward JOG	
Y13B		Reverse JOG	
Y13C	Warning clearing for Axis 7 (virtual)	Forward JOG	
Y13D		Reverse JOG	
Y13E	Axis 8 (virtual)	Forward JOG	
Y13F		Reverse JOG	

WY14 (Slot No. 0: WY14, 1: WY22, 2: WY30, 3: WY38)

Allocation of each contact	Target axis	Name	Description
Y140	Axis 1	Emergency stop	Requests emergency stop for the corresponding amplifier.
Y141	Axis 2		

Allocation of each contact	Target axis	Name	Description
Y142	Axis 3		The deceleration time during emergency stop is specified using Configurator PM7-RTEX or the emergency stop settings in the shared memory. (The operation is the level type.) (Note 1): The deviation counter cannot be cleared.
Y143	Axis 4		
Y144	Axis 5		
Y145	Axis 6		
Y146	Warning clearing for Axis 7 (virtual)		
Y147	Axis 8 (virtual)		
Y148	Axis 1	Deceleration stop	Requests deceleration stop for the corresponding amplifier. The deceleration time during deceleration stop is specified using Configurator PM7-RTEX or the deceleration stop settings in the shared memory. (The operation is the level type.) (Note 1): The deviation counter cannot be cleared.
Y149	Axis 2		
Y14A	Axis 3		
Y14B	Axis 4		
Y14C	Axis 5		
Y14D	Axis 6		
Y14E	Warning clearing for Axis 7 (virtual)		
Y14F	Axis 8 (virtual)		

WY15 (Slot No. 0: WY15, 1: WY23, 2: WY31, 3: WY39)

Allocation of each contact	Target axis	Name	Description
Y150	Axis 1	Synchronization setting request	Turn ON this contact after changing the synchronous operation settings. Turn ON this contact when reflecting the setting changes in the synchronous control common area of the share memory. This flag is an edge trigger flag.
Y151	Axis 2		
Y152	Axis 3		
Y153	Axis 4		
Y154	Axis 5		
Y155	Axis 6		
Y156	Warning clearing for Axis 7 (virtual)		
Y157	Axis 8 (virtual)		
Y158	Axis 1	Synchronization cancellation request	Turns ON the contact for the axis for which synchronous operation is to be canceled.
Y159	Axis 2		

Allocation of each contact	Target axis	Name	Description
Y15A	Axis 3		The unit does not perform synchronous operation on the axis for which this contact is turned ON. Turn ON this contact to cancel the synchronous state temporarily during synchronous control. To set a synchronous state, turn OFF this contact.
Y15B	Axis 4		
Y15C	Axis 5		
Y15D	Axis 6		
Y15E	Warning clearing for Axis 7 (virtual)		
Y15F	Axis 8 (virtual)		

WY16 (Slot No. 0: WY16, 1: WY24, 2: WY32, 3: WY40)

Allocation of each contact	Target axis	Name	Description
Y160	Axis 1	Slave axis clutch ON request	Clutch ON operation is started by turning ON the contact for the corresponding axis during synchronous operation. Only axes that use a clutch are started. (Set the operation to level type, rising edge, or falling edge.)
Y161	Axis 2		
Y162	Axis 3		
Y163	Axis 4		
Y164	Axis 5		
Y165	Axis 6		
Y166	Warning clearing for Axis 7 (virtual)		
Y167	Axis 8 (virtual)		
Y168	Axis 1	Slave axis clutch OFF request	Clutch OFF operation is started by turning ON the contact for the corresponding axis during synchronous operation. Only axes that use a clutch are started. (Set the operation to rising edge or falling edge.) These signals will be disabled while the slave axis clutch ON request signal is set to level type.
Y169	Axis 2		
Y16A	Axis 3		
Y16B	Axis 4		
Y16C	Axis 5		
Y16D	Axis 6		
Y16E	Warning clearing for Axis 7 (virtual)		
Y16F	Axis 8 (virtual)		

18.3 Configuration of Entire Shared Memory Area

The positioning unit RTEX uses the shared memory to manage the set values of positioning parameters and positioning data.

All set values are set using programming tool software or a user program.

The following table shows the contents of the shared memory.

Name of each area	Shared memory Bank	Offset address	Individual name of each area
I/O control area	16#00	16#0060 to 16#0073	Request area for each function [Output signal (Y)]
		16#0074 to 16#007F	Notification area for each function [Input signal (X)]
Common area		16#0080 to 16#0087	Setting/positioning parameter control area
		16#0088	Operating speed rate area
		16#00B0 to 16#00BF	Axis group setting area
		16#00C0 to 16#00D7	Current value update data area
		16#00D8 to 16#00EF	Torque Limit Area
		16#0100 to 16#0107	Positioning control start table number setting area
		16#0108 to 16#010F	Positioning control area
		16#0110 to 16#01A7	Error Notification & Clearing Area
		16#01A8 to 16#023F	Warning Notification & Clearing Area
		16#02B0 to 16#02BF	Synchronous control monitor area
		16#02C0 to 16#02CF	Latch stop function area
		16#02D0 to 16#031F	Counter positioning function area
		16#0320 to 16#032F	Latch Correction J-Point Control Function Area
		16#0330 to 16#033F	Absolute data set function area
		16#0340 to 16#034F	Virtual full-close mode function area
		16#0389	System operation setting area
		16#0390 to 16#0395	Amplifier monitor & control area
		16#03A0 to 16#03A7	Pulse Input Setting Area

Name of each area	Shared memory Bank	Offset address	Individual name of each area	
		16#03A8 to 16#03BF	Pulse count control area	
		16#03C0 to 16#03CF	Pulse input monitor area	
Each axis information monitor area	16#01	16#0000 to 16#003F	Axis 1	Each Axis Information & Monitor Area
		16#0040 to 16#007F	Axis 2	Each Axis Information & Monitor Area
		16#0080 to 16#00BF	Axis 3	Each Axis Information & Monitor Area
		16#00C0 to 16#00FF	Axis 4	Each Axis Information & Monitor Area
		16#0100 to 16#013F	Axis 5	Each Axis Information & Monitor Area
		16#0140 to 16#017F	Axis 6	Each Axis Information & Monitor Area
		16#0180 to 16#01BF	Warning clearing for Axis 7 (virtual)	Each Axis Information & Monitor Area
		16#01C0 to 16#01FF	Axis 8 (virtual)	Each Axis Information & Monitor Area
Each axis setting area	16#02 to 16#0B	16#0000 to 16#004F	Axis 1	Positioning parameter setting area
		16#0050 to 16#03FF 16#0000 to 16#03FF		Positioning Data Setting Area (600 tables in the standard area and 25 tables in the extended area)
	16#0C to 16#15	16#0000 to 16#004F	Axis 2	Positioning parameter setting area
		16#0050 to 16#03FF 16#0000 to 16#03FF		Positioning Data Setting Area (600 tables in the standard area and 25 tables in the extended area)
	16#16 to 16#1F	16#0000 to 16#004F	Axis 3	Positioning parameter setting area
		16#0050 to 16#03FF 16#0000 to 16#03FF		Positioning Data Setting Area (600 tables in the standard area and 25 tables in the extended area)
	16#20 to 16#29	16#0000 to 16#004F	Axis 4	Positioning parameter setting area
		16#0050 to 16#03FF 16#0000 to 16#03FF		Positioning Data Setting Area (600 tables in the standard area and 25 tables in the extended area)

Name of each area	Shared memory Bank	Offset address	Individual name of each area	
	16#2A to 16#33	16#0000 to 16#004F	Axis 5	Positioning parameter setting area
		16#0050 to 16#03FF 16#0000 to 16#03FF		Positioning Data Setting Area (600 tables in the standard area and 25 tables in the extended area)
	16#34 to 16#3D	16#0000 to 16#004F	Axis 6	Positioning parameter setting area
		16#0050 to 16#03FF 16#0000 to 16#03FF		Positioning Data Setting Area (600 tables in the standard area and 25 tables in the extended area)
	16#3E to 16#47	16#0000 to 16#004F	Warning clearing for Axis 7 (virtual)	Positioning parameter setting area
		16#0050 to 16#03FF 16#0000 to 16#03FF		Positioning Data Setting Area (600 tables in the standard area and 25 tables in the extended area)
	16#48 to 16#51	16#0000 to 16#004F	Axis 8 (virtual)	Positioning parameter setting area
		16#0050 to 16#03FF 16#0000 to 16#03FF		Positioning Data Setting Area (600 tables in the standard area and 25 tables in the extended area)
Amplifier parameter control area	16#52	16#0000 to 16#002F	Amplifier parameter setting area	
Synchronous Control Setting Area	16#58	16#0000 to 16#000F	Axis 1	Synchronous control common setting area
		16#0010 to 16#001F		Electronic gear setting area
		16#0020 to 16#004F		Clutch setting area
		16#0050 to 16#006F		Electronic cam setting area
		16#0070 to 16#007F	Axis 2	Synchronous control common setting area
		16#0080 to 16#008F		Electronic gear setting area
		16#0090 to 16#00BF		Clutch setting area
		16#00C0 to 16#00DF		Electronic cam setting area
		16#00E0 to 16#00EF	Axis 3	Synchronous control common setting area
		16#00F0 to 16#00FF		Electronic gear setting area

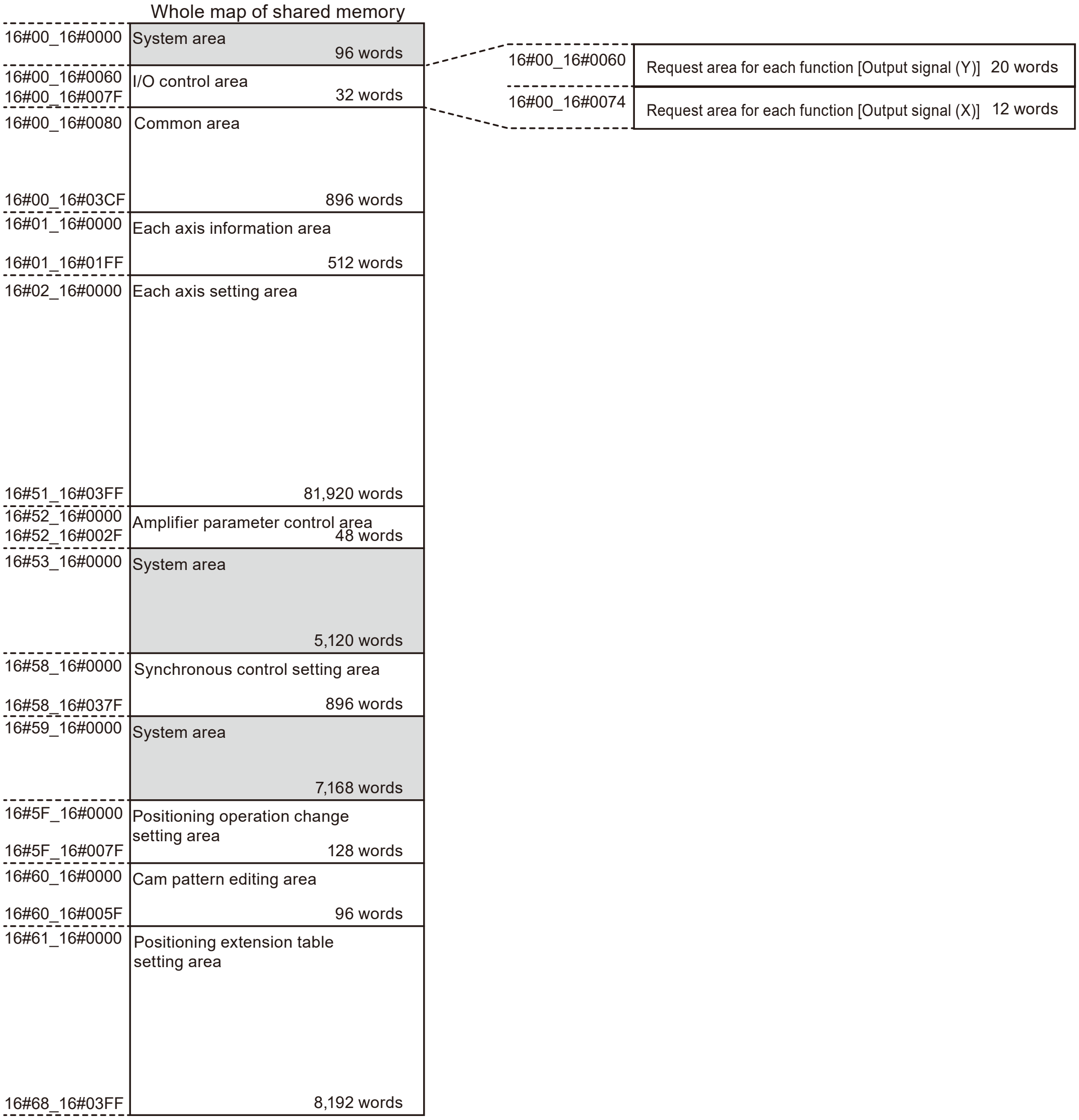
Name of each area	Shared memory Bank	Offset address	Individual name of each area	
		16#0100 to 16#012F		Clutch setting area
		16#0130 to 16#014F		Electronic cam setting area
		16#0150 to 16#015F	Axis 4	Synchronous control common setting area
		16#0160 to 16#016F		Electronic gear setting area
		16#0170 to 16#019F		Clutch setting area
		16#01A0 to 16#01BF		Electronic cam setting area
		16#01C0 to 16#01CF	Axis 5	Synchronous control common setting area
		16#01D0 to 16#01DF		Electronic gear setting area
		16#01E0 to 16#020F		Clutch setting area
		16#0210 to 16#022F		Electronic cam setting area
		16#0230 to 16#023F	Axis 6	Synchronous control common setting area
		16#0240 to 16#024F		Electronic gear setting area
		16#0250 to 16#027F		Clutch setting area
		16#0280 to 16#029F		Electronic cam setting area
		16#02A0 to 16#02AF	Warning clearing for Axis 7 (virtual)	Synchronous control common setting area
		16#02B0 to 16#02BF		Electronic gear setting area
		16#02C0 to 16#02EF		Clutch setting area
		16#02F0 to 16#030F		Electronic cam setting area
		16#0310 to 16#031F	Axis 8 (virtual)	Synchronous control common setting area
		16#0320 to 16#032F		Electronic gear setting area
		16#0330 to 16#035F		Clutch setting area
		16#0360 to 16#037F		Electronic cam setting area

Name of each area	Shared memory Bank	Offset address	Individual name of each area	
Positioning operation change setting area	16#5F	16#0000 to 16#000F	Axis 1	Speed change setting area Movement amount change setting area
		16#0010 to 16#001F	Axis 2	Speed change setting area Movement amount change setting area
		16#0020 to 16#002F	Axis 3	Speed change setting area Movement amount change setting area
		16#0030 to 16#003F	Axis 4	Speed change setting area Movement amount change setting area
		16#0040 to 16#004F	Axis 5	Speed change setting area Movement amount change setting area
		16#0050 to 16#005F	Axis 6	Speed change setting area Movement amount change setting area
		16#0060 to 16#006F	Warning clearing for Axis 7 (virtual)	Speed change setting area Movement amount change setting area
		16#0070 to 16#007F	Axis 8 (virtual)	Speed change setting area Movement amount change setting area
Cam pattern editing area	16#60	16#0000 to 16#005F	Cam Pattern Setting Area Cam pattern editing execution confirmation area	
positioning Extended table settings Area	16#61	16#0000 to 16#03FF	Axis 1	Positioning extension table setting area (For 64 extension tables)
	16#62	16#0000 to 16#03FF	Axis 2	Positioning extension table setting area (For 64 extension tables)
	16#63	16#0000 to 16#03FF	Axis 3	Positioning extension table setting area (For 64 extension tables)
	16#64	16#0000 to 16#03FF	Axis 4	Positioning extension table setting area (For 64 extension tables)
	16#65	16#0000 to 16#03FF	Axis 5	Positioning extension table setting area (For 64 extension tables)
	16#66	16#0000 to 16#03FF	Axis 6	Positioning extension table setting area (For 64 extension tables)

Name of each area	**Shared memory Bank**	**Offset address**	**Individual name of each area**	
	16#67	16#0000 to 16#03FF	Warning clearing for Axis 7 (virtual)	Positioning extension table setting area (For 64 extension tables)
	16#68	16#0000 to 16#03FF	Axis 8 (virtual)	Positioning extension table setting area (For 64 extension tables)

18.4 Details of I/O Control Area in Shared Memory

18.4.1 Configuration of I/O Control Area



Whole map of shared memory

16#00_16#0000	System area	96 words
16#00_16#0060 16#00_16#007F	I/O control area	32 words
16#00_16#0080 16#00_16#03CF	Common area	896 words
16#01_16#0000 16#01_16#01FF	Each axis information area	512 words
16#02_16#0000 16#51_16#03FF	Each axis setting area	81,920 words
16#52_16#0000 16#52_16#002F	Amplifier parameter control area	48 words
16#53_16#0000	System area	5,120 words
16#58_16#0000 16#58_16#037F	Synchronous control setting area	896 words
16#59_16#0000	System area	7,168 words
16#5F_16#0000 16#5F_16#007F	Positioning operation change setting area	128 words
16#60_16#0000 16#60_16#005F	Cam pattern editing area	96 words
16#61_16#0000 16#68_16#03FF	Positioning extension table setting area	8,192 words

16#00_16#0060	Request area for each function [Output signal (Y)]	20 words
16#00_16#0074	Request area for each function [Output signal (X)]	12 words

18.4.2 Request Area for Each Function [Output Signal (Y)]

Bank	Offset address	Name	Default	Description
16#00	16#0060	General-purpose output 1/2	16#0000	The ON/OFF states of RTEX operation outputs (EX-OUT1/EX-OUT2), which are external output signals

Bank	Offset address	Name	Default	Description
				connected to the amplifier, are output as control signals.

Bit	Name		Default	Description
0	Axis 1	General-purpose output 1	0	0: OFF 1: ON
1		General-purpose output 2	0	
2	Axis 2	General-purpose output 1	0	
3		General-purpose output 2	0	
4	Axis 3	General-purpose output 1	0	
5		General-purpose output 2	0	
6	Axis 4	General-purpose output 1	0	
7		General-purpose output 2	0	
8	Axis 5	General-purpose output 1	0	
9		General-purpose output 2	0	
10	Axis 6	General-purpose output 1	0	
11		General-purpose output 2	0	
12	Axis 7	General-purpose output 1	0	
13		General-purpose output 2	0	
14	8 axes	General-purpose output 1	0	

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td>15</td><td></td><td>General-purpose output 2</td><td>0</td><td></td></tr>
</table>
General-purpose output 1: EX-OUT1 / General-purpose output 2: EX-OUT2
</td></tr>
<tr><td></td><td>16#0061</td><td>Axis group setting change request/ Complete</td><td>16#0000</td><td>
After the axis group settings are changed, this bit is set to “1”.
After axis group change processing is completed, the positioning unit RTEX automatically resets the bit to 0.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Axis group settings
change request</td><td>0</td><td>0: No change
1: Axis group
settings change request</td></tr>
<tr><td>15 to 1</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>16#00</td><td>16#0062</td><td>J-point speed change request</td><td>16#0000</td><td>
Only when this bit changes from 0 to 1 while the axis corresponding to each bit is performing a positioning (J-point) operation, the speed changes to the target speed in the specified acceleration/deceleration time or pattern.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Axis 1
J-point speed change request</td><td>0</td><td rowspan="7">0: No speed change
1: Target axis J-point speed change request</td></tr>
<tr><td>1</td><td>Axis 2
J-point speed change request</td><td>0</td></tr>
<tr><td>2</td><td>Axis 3
J-point speed change request</td><td>0</td></tr>
<tr><td>3</td><td>Axis 4
J-point speed change request</td><td>0</td></tr>
<tr><td>4</td><td>Axis 5
J-point speed change request</td><td>0</td></tr>
<tr><td>5</td><td>Axis 6
J-point speed change request</td><td>0</td></tr>
<tr><td>6</td><td>Warning clearing for Axis 7 (virtual)
J-point speed change request</td><td>0</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="2"></td><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>7</td><td>Axis 8 (virtual)
J-point speed change request</td><td>0</td><td></td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>16#0063</td><td>Pulser operation enabled</td><td>16#0000</td><td>
When the bit corresponding to each axis is set to 1, a request to permit pulser operation is issued.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Axis 1
Pulser operation enabled</td><td>0</td><td rowspan="8">0: Pulser operation disabled
1: Pulser operation enable request</td></tr>
<tr><td>1</td><td>Axis 2
Pulser operation enabled</td><td>0</td></tr>
<tr><td>2</td><td>Axis 3
Pulser operation enabled</td><td>0</td></tr>
<tr><td>3</td><td>Axis 4
Pulser operation enabled</td><td>0</td></tr>
<tr><td>4</td><td>Axis 5
Pulser operation enabled</td><td>0</td></tr>
<tr><td>5</td><td>Axis 6
Pulser operation enabled</td><td>0</td></tr>
<tr><td>6</td><td>Warning clearing for Axis 7 (virtual)
Pulser operation enabled</td><td>0</td></tr>
<tr><td>7</td><td>Axis 8 (virtual)
Pulser operation enabled</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>16#00</td><td>16#0064</td><td>Slave axis gear ratio change request</td><td>16#0000</td><td>
The gear ratio is changed to the specified ratio only when this bit for the axis corresponding to each bit changes from 0 to 1 during synchronous operation.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Gear ratio change notification</td><td>0</td><td>0: No change to gear ratio</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td>for Axis-1 slave axis</td><td></td><td rowspan="8">1: Slave axis gear ratio change request</td></tr>
<tr><td>1</td><td>Gear ratio change notification
for Axis-2 slave axis</td><td>0</td></tr>
<tr><td>2</td><td>Gear ratio change notification
for Axis-3 slave axis</td><td>0</td></tr>
<tr><td>3</td><td>Gear ratio change notification
for Axis-4 slave axis</td><td>0</td></tr>
<tr><td>4</td><td>Gear ratio change notification
for Axis-5 slave axis</td><td>0</td></tr>
<tr><td>5</td><td>Gear ratio change notification
for Axis-6 slave axis</td><td>0</td></tr>
<tr><td>6</td><td>Warning clearing for Axis 7 (virtual)
Slave axis gear ratio change request</td><td>0</td></tr>
<tr><td>7</td><td>Axis 8 (virtual)
Slave axis gear ratio change request</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td></td><td>16#0065 to 16#0073</td><td>-</td><td>-</td><td>-</td></tr>
</table>

18.4.3 Notification Area for Each Function [Input Signal (X)]

Bank	Offset address	Name	Default	Description
16#00	16#0074	General-purpose output 1/2	16#0000	This area stores information for general-purpose monitor inputs (SI-MON1/SI-MON2), which are the external input signals connected to the amplifier.

Bank	Offset address	Name	Default	Description				
				Bit	Name		Default	Description
				0	Axis 1	General-purpose input 1	0	0: OFF 1: ON
				1		General-purpose input 2	0	
				2	Axis 2	General-purpose input 1	0	
				3		General-purpose input 2	0	
				4	Axis 3	General-purpose input 1	0	
				5		General-purpose input 2	0	
				6	Axis 4	General-purpose input 1	0	
				7		General-purpose input 2	0	
				8	Axis 5	General-purpose input 1	0	
				9		General-purpose input 2	0	
				10	Axis 6	General-purpose input 1	0	
				11		General-purpose input 2	0	
				12	Axis 7	General-purpose input 1	0	
				13		General-purpose input 2	0	
				14	8 axes	General-purpose input 1	0	
				15		General-purpose input 2	0	

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td></td><td>General-purpose input 1: SI-MON1 / General-purpose input 2: SI-MON2</td></tr>
<tr><td></td><td>16#0075</td><td>In-position</td><td>16#0000</td><td>Turns ON when the position deviation of the corresponding axis is within the in-position range specified in the amplifier.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Axis 1 in-position</td><td>0</td><td rowspan="8">0: Deviation counter is outside the in-position range.
1: Deviation counter is within the in-position range.</td></tr>
<tr><td>1</td><td>Axis 2 in-position</td><td>0</td></tr>
<tr><td>2</td><td>Axis 3 in-position</td><td>0</td></tr>
<tr><td>3</td><td>Axis 4 in-position</td><td>0</td></tr>
<tr><td>4</td><td>Axis 5 in-position</td><td>0</td></tr>
<tr><td>5</td><td>Axis 6 in-position</td><td>0</td></tr>
<tr><td>6</td><td>Axis 7 in-position</td><td>0</td></tr>
<tr><td>7</td><td>Axis 8 in-position</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td>16#00</td><td>16#0076</td><td>Slave axis gear ratio change state notification</td><td>16#0000</td><td>Changes the gear ratio according to the slave axis change request (offset address 16#0064 in bank 16#00).
After the gear ratio is changed, the bit corresponding to the axis is set to 1.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Gear ratio change notification
for Axis-1 slave axis</td><td>0</td><td rowspan="6">0: No change to gear ratio
1: Slave axis gear ratio change complete</td></tr>
<tr><td>1</td><td>Gear ratio change notification
for Axis-2 slave axis</td><td>0</td></tr>
<tr><td>2</td><td>Gear ratio change notification for Axis-3 slave axis</td><td>0</td></tr>
<tr><td>3</td><td>Gear ratio change notification
for Axis-4 slave axis</td><td>0</td></tr>
<tr><td>4</td><td>Gear ratio change notification
for Axis-5 slave axis</td><td>0</td></tr>
<tr><td>5</td><td>Gear ratio change notification</td><td>0</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td>for Axis-6 slave axis</td><td></td><td rowspan="3"></td></tr>
<tr><td>6</td><td>Gear ratio change notification
for Axis-7 slave axis (virtual)</td><td>0</td></tr>
<tr><td>7</td><td>Gear ratio change notification
for Axis-8 slave axis (virtual)</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>16#00</td><td>16#0077 ~ 16#007F</td><td>-</td><td>-</td><td>-</td></tr>
</table>

18.5 Details of Common Area in Shared Memory

18.5.1 Configuration of Common Area

The shared memory is composed of banks. The common area is allocated to bank 16#00 in the shared memory and is used to configure common settings for each axis.

Whole map of shared memory

16#00_16#0000	System area	96 words
16#00_16#0060 16#00_16#007F	I/O control area	32 words
16#00_16#0080 16#00_16#03CF	Common area	896 words
16#01_16#0000 16#01_16#01FF	Each axis information area	512 words
16#02_16#0000 16#51_16#03FF	Each axis setting area	81,920 words
16#52_16#0000 16#52_16#002F	Amplifier parameter control area	48 words
16#53_16#0000	System area	5,120 words
16#58_16#0000 16#58_16#037F	Synchronous control setting area	896 words
16#59_16#0000	System area	7,168 words
16#5F_16#0000 16#5F_16#007F	Positioning operation change setting area	128 words
16#60_16#0000 16#60_16#005F	Cam pattern editing area	96 words
16#61_16#0000 16#68_16#03FF	Positioning extension table setting area	8,192 words

16#0080	Setting/positioning parameter control area	8 words
16#0088	Operating speed rate area	1 words
16#00B0	Axis group setting area	16 words
16#00C0	Current value update data area	24 words
16#00D8	Torque limit area	24 words
16#0100	Positioning control starting table number setting area	8 words
16#0108	Positioning control area	8 words
16#0110	Error notification & clearing area	152 words
16#01A8	Warning notification & clearing area	152 words
16#02B0	Synchronous control monitor area	16 words
16#02C0	Latch stop function area	16 words
16#02D0	Counter positioning function area	80 words
16#0320	Latch correction J-point control function area	16 words
16#0330	Absolute data setting function area	16 words
16#0340	Virtual full-close mode function area	16 words
16#0380	System operation setting area	16 words
16#0390	Amplifier monitor & control area	16 words
16#03A0	Pulse input setting error	8 words
16#03A8	Pulse count control area	24 words
16#03C0	Pulse input monitor area	16 words

18.5.2 Setting Parameter Control Area

This area is used for performing control when shared memory positioning parameters or positioning data setting values are written to FROM, or when executing recalculation of positioning data.

The number of FROM writes from positioning unit RTEX to the FP0H control unit is reported and writes of shared memory positioning parameters and positioning data to FROM are requested via this area. This area is also used to set a recalculation start table number in order to recalculate the positioning data in the standard area.

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>16#00</td><td>16#0080</td><td>Notification of number of writes to FROM</td><td>0</td><td>Reports the number of writes of shared memory positioning parameters and positioning data to FROM.</td></tr>
<tr><td></td><td>16#0082</td><td>FROM write request</td><td>0000H</td><td>When FROM is written to using Configurator PM7-RTEX, the following procedure is performed automatically.
The method of writing from a ladder program requires that the following Configurator PM7-RTEX operation is implemented by the ladder program.
1. The ladder program writes 16#1111 to this area.
2. The positioning unit RTEX confirms the 16#1111 and rewrites 16#2222 to the same area.
3. The ladder program confirms the 16#2222 and rewrites 16#5555.
4. The positioning unit RTEX confirms the 16#5555 and rewrites 16#6666 to the same area.
5. The ladder program confirms the 16#6666 and rewrites 16#AAAA to the same area.
6. The positioning unit RTEX copies the content of the shared memory to FROM.
7. The positioning unit RTEX confirms the write.
If OK: The positioning unit RTEX sets 16#0000.
If error: The positioning unit RTEX sets 16#FFFF.
8. If the ladder program confirms 16#0000, it has terminated successfully, and if it confirms 16#FFFF, it has terminated in an error, and the same area is rewritten with 16#0000.</td></tr>
<tr><td></td><td>16#0085</td><td>Recalculation start
Table number</td><td>1</td><td>When the turning ON of the recalculation request signal (Y107) has been detected, the positioning unit RTEX recalculates the positioning data for all the axes from this table number to number 600.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Recalculation starting
Table number</td><td>1</td><td>Setting range: 1 to 600</td></tr>
</table>
</td></tr>
</table>

18.5.3 Operating Speed Rate Area

This area is used to control all operations related to axis operations by using the specified rate of the operating speed.

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>16#00</td><td>16#0088</td><td>Operating speed rate</td><td>100</td><td>All operations relating to axis operations (positioning, JOG operation, and home return) can be performed at the specified rate of the operating speed.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Operating speed rate</td><td>100</td><td>Setting range: 1 to 100
Unit: %</td></tr>
</table>
The unit is % and values can be entered in the range of 1 to 100 (%).</td></tr>
</table>

18.5.4 Axis Group Setting Area

The interpolation groups for each axis are set in this area. For the axis to be connected to the network, set the bit corresponding to the axis to 1 by using one of the settings shown below.

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="4">16#00</td><td>16#00B0</td><td>Group A axis settings</td><td rowspan="4">16#0000</td><td rowspan="4">Use this area to set either independent or interpolation operation for each axis. For interpolation operation, each axis belongs to one of Groups A to D. For example, if Axes 1, 2, and 3 belong to Group A and 3-axis interpolation is performed, set the corresponding three bits to 1 in the interpolation axis settings of Group A. For single-axis independent operation settings, such axes do not belong to any group, so turn ON the corresponding bits in the independent axis settings described later. The maximum number of interpolation axes per group is three. The same axis cannot be set in more than one group.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Group attribute of Axis 1</td><td>0</td><td rowspan="6">0: Does not belong to any interpolation group
1: Belongs to an interpolation group
An error occurs if 4 or more bits are set to 1 in a group, or the same axis is set to 1 in another group.</td></tr>
<tr><td>1</td><td>Group attribute of Axis 2</td><td>0</td></tr>
<tr><td>2</td><td>Group attribute of Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Group attribute of Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Group attribute of Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Group attribute of Axis 6</td><td>0</td></tr>
</table></td></tr>
<tr><td>16#00B1</td><td>Group B axis settings</td></tr>
<tr><td>16#00B2</td><td>Group C axis settings</td></tr>
<tr><td>16#00B3</td><td>Group D axis settings</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="2"></td><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>6</td><td>Group attribute of Axis 7 (virtual)</td><td>0</td><td rowspan="2"></td></tr>
<tr><td>7</td><td>Group attribute of Axis 8 (virtual)</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>16#00B4</td><td>Independent axis settings</td><td>16#0000</td><td>For axes that do not belong to any interpolation relationship, set the target bits in this area to 1.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Group attribute of Axis 1</td><td>0</td><td rowspan="8">0: Belongs to an interpolation group. Alternately, not set on the used axis.
1: Independent axis
(Does not belong to any interpolation group.)
If the same axis is set to 1 in the interpolation group settings, an error will occur.</td></tr>
<tr><td>1</td><td>Group attribute of Axis 2</td><td>0</td></tr>
<tr><td>2</td><td>Group attribute of Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Group attribute of Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Group attribute of Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Group attribute of Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Group attribute of Axis 7 (virtual)</td><td>0</td></tr>
<tr><td>7</td><td>Group attribute of Axis 8 (virtual)</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td rowspan="2">16#00</td><td>16#00B5 to 16#00BE</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#00BF</td><td>Number of virtual axes</td><td>16#0000</td><td>Sets the number of virtual axes to be used.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>Number of virtual axes</td><td>16#0000: No virtual axes
16#0001: Number of virtual axes used
1 axis used.
16#0002: Number of virtual axes used
2 axes used.
Any other settings will result in an error.</td></tr>
</table>
</td></tr>
</table>

18.5.5 Current Value Update Data Area

When changing the current value of each axis controlled by the positioning unit RTEX, store the changed coordinates in this area and turn ON the current value update request flag.

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="3">16#00</td><td>16#00C0</td><td>Current value update request flag</td><td>16#0000</td><td>The current value controlled by the positioning unit RTEX is changed to the new value only when the bit corresponding to each axis changes from 0 to 1. After the current value is changed, the positioning unit RTEX automatically clears the corresponding bit to 0.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Current value update request for Axis 1</td><td>0</td><td rowspan="8">0: No change
1: Update the current value of the target axis.</td></tr>
<tr><td>1</td><td>Current value update request for Axis 2</td><td>0</td></tr>
<tr><td>2</td><td>Current value update request for Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Current value update request for Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Current value update request for Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Current value update request for Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Current value update request for Axis 7 (virtual)</td><td>0</td></tr>
<tr><td>7</td><td>Current value update request for Axis 8 (virtual)</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td>16#00C1</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#00C2</td><td>Multi-turn data clear request flag</td><td>16#0000</td><td>When the bit corresponding to each axis changes from 0 to 1, the multi-turn data clearing command is issued to clear the multi-turn data.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Multi-turn data clearing request for Axis 1</td><td>0</td><td rowspan="2">0: No change
Multi-turn data clearing request</td></tr>
<tr><td>1</td><td>Multi-turn data clearing request</td><td>0</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td>for Axis 2</td><td></td><td rowspan="7"></td></tr>
<tr><td>2</td><td>Multi-turn data clearing request for Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Multi-turn data clearing request for Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Multi-turn data clearing request for Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Multi-turn data clearing request for Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Multi-turn data clearing request for Axis 7 (virtual)</td><td>0</td></tr>
<tr><td>7</td><td>Multi-turn data clearing request for Axis 8 (virtual)</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td rowspan="15">16#00</td><td>16#00C3 to 16#00C7</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#00C8</td><td rowspan="2">Axis 1
Current value update coordinates</td><td rowspan="2">0</td><td rowspan="14">Stores the coordinate value (the current value for each axis) to be preset by the current value update function.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Current value update coordinate</td><td>0</td><td>Setting range:
-2147482624 to +2147482624</td></tr>
</table>
</td></tr>
<tr><td>16#00C9</td></tr>
<tr><td>16#00CA</td><td rowspan="2">Axis 2
Current value update coordinate</td><td rowspan="2">0</td></tr>
<tr><td>16#00CB</td></tr>
<tr><td>16#00CC</td><td rowspan="2">Axis 3
Current value update coordinate</td><td rowspan="2">0</td></tr>
<tr><td>16#00CD</td></tr>
<tr><td>16#00CE</td><td rowspan="2">Axis 4
Current value update coordinate</td><td rowspan="2">0</td></tr>
<tr><td>16#00CF</td></tr>
<tr><td>16#00D0</td><td rowspan="2">Axis 5
Current value update coordinate</td><td rowspan="2">0</td></tr>
<tr><td>16#00D1</td></tr>
<tr><td>16#00D2</td><td rowspan="2">Axis 6
Current value update coordinate</td><td rowspan="2">0</td></tr>
<tr><td>16#00D3</td></tr>
<tr><td>16#00D4</td><td rowspan="2">Warning clearing for Axis 7 (virtual)</td><td rowspan="2">0</td></tr>
<tr><td>16#00D5</td></tr>
</table>

Bank	Offset address	Name	Default	Description
		Current value update coordinate		
	16#00D6	Axis 8 (virtual) Current value update coordinate	0	
	16#00D7			

18.5.6 Torque Limit Area

Output torque from an amplifier to a motor can be changed. The setting range is 1 to 5000, which is equivalent to 0.1% to 500.0%.

The torque limit function can be executed during position control, synchronous control, or JOG operation. It cannot be executed during the home return operation.

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="4">16#00</td><td>16#00D8</td><td>Torque limit enable flag</td><td>16#0000</td><td>Set whether to enable or disable the torque limit function for each axis. To enable the torque limit function, set the corresponding bit to 1.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Torque limit for Axis 1</td><td>0</td><td rowspan="8">0: Disable
Default
1: Enable</td></tr>
<tr><td>1</td><td>Torque limit for Axis 2</td><td>0</td></tr>
<tr><td>2</td><td>Torque limit for Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Torque limit for Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Torque limit for Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Torque limit for Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Torque limit for Axis 7</td><td>0</td></tr>
<tr><td>7</td><td>Torque limit for Axis 8</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td>16#00D9 to 16#00DF</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#00E0</td><td>Torque limit value for Axis 1</td><td>3000
[300.0%]</td><td rowspan="2">Set a torque limit value for each axis.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Torque limit value</td><td>3000</td><td>Setting range: 1 to 5,000
Unit: 0.1 %</td></tr>
</table></td></tr>
<tr><td>16#00E1</td><td>Torque limit value for Axis 2</td><td>3000
[300.0%]</td></tr>
</table>

Bank	Offset address	Name	Default	Description
	16#00E2	Torque limit value for Axis 3	3000 [300.0%]	
	16#00E3	Torque limit value for Axis 4	3000 [300.0%]	
	16#00E4	Torque limit value for Axis 5	3000 [300.0%]	
	16#00E5	Torque limit value for Axis 6	3000 [300.0%]	
	16#00E6	Torque limit value for Axis 7	3000 [300.0%]	
	16#00E7	Torque limit value for Axis 8	3000 [300.0%]	
	16#00E8 to 16#00EF			

18.5.7 Positioning control starting table number setting area

This area is used to specify the start table number of positioning data for each axis when starting positioning control.

The setting ranges are 1 to 600 in the standard area, and 10001 to 10089 in the extended area.

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="7">16#00</td><td>16#0100</td><td>Position control start table number for Axis 1</td><td>1</td><td rowspan="7">Set a position control start table number.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Positioning control start
Table number</td><td>1</td><td>Setting range: 1 to 600, 10001 to 10089</td></tr>
</table></td></tr>
<tr><td>16#0101</td><td>Position control start table number for Axis 2</td><td>1</td></tr>
<tr><td>16#0102</td><td>Position control start table number for Axis 3</td><td>1</td></tr>
<tr><td>16#0103</td><td>Position control start table number for Axis 4</td><td>1</td></tr>
<tr><td>16#0104</td><td>Position control start table number for Axis 5</td><td>1</td></tr>
<tr><td>16#0105</td><td>Position control start table number for Axis 6</td><td>1</td></tr>
<tr><td>16#0106</td><td>Position control start table number for Axis 7</td><td>1</td></tr>
</table>

Bank	Offset address	Name	Default	Description
	16#0107	Position control start table number for Axis 8	1	

18.5.8 Positioning Control Area

This area is used to specify the number of repetitions of positioning control for each axis. After positioning control is repeated by the specified number of times, it is completed . The number of repetitions is also changed to 0 (default value) at the beginning of the operation.

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="8">16#00</td><td>16#0108</td><td>Axis 1 positioning
Repetition count</td><td>0</td><td rowspan="8">Sets the number of repetitions of the operation from the positioning starting table number through to the table set for the E-point control.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>positioning Repetition count</td><td>0</td><td>Setting range: 0 to 255
Unit: Number of times</td></tr>
</table>
If 255 is set, positioning control will be repeated unlimitedly until it is stopped.</td></tr>
<tr><td>16#0109</td><td>Axis 2 positioning
Repetition count</td><td>0</td></tr>
<tr><td>16#010A</td><td>Axis 3 positioning
Repetition count</td><td>0</td></tr>
<tr><td>16#010B</td><td>Axis 4 positioning
Repetition count</td><td>0</td></tr>
<tr><td>16#010C</td><td>Axis 5 positioning
Repetition count</td><td>0</td></tr>
<tr><td>16#010D</td><td>Axis 6 positioning
Repetition count</td><td>0</td></tr>
<tr><td>16#010E</td><td>Axis 7 (virtual) positioning
Repetition count</td><td>0</td></tr>
<tr><td>16#010F</td><td>Axis 8 (virtual) positioning
Repetition count</td><td>0</td></tr>
</table>

18.5.9 Error Notification & Clearing Area

This area stores the number of error occurrences and error codes of errors (accompanying stoppages) for each axis. If error clearing is executed, the number of error occurrences and error codes will be cleared once, but if the error conditions continue, error judgments and resulting errors will occur even after the error clearing. If global errors such as network faults occur, they will be stored in the error notification buffer for all axes. Up to seven error logs are stored.

Error clearing can be executed by using not only this area but also the error clearing contact (for all axes).

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="2">16#00</td><td>16#0110</td><td>Error occurrence notification for each axis</td><td>16#0000</td><td>When a warning occurs on an axis, the corresponding bit is set to 1.
When a warning targeting all axes occurs, the bits of all axes are set to 1.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Error notification for Axis 1</td><td>0</td><td rowspan="8">0: No error
1: Error occurred</td></tr>
<tr><td>1</td><td>Error notification for Axis 2</td><td>0</td></tr>
<tr><td>2</td><td>Error notification for Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Error notification for Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Error notification for Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Error notification for Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Error notification for Axis 7 (virtual)</td><td>0</td></tr>
<tr><td>7</td><td>Error notification for Axis 8 (virtual)</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td>16#0111</td><td>Error clearing specification
for each axis</td><td>16#0000</td><td>Executes error clearing for each axis.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Error clearing for Axis 1</td><td>0</td><td rowspan="8">0: No error clearing
1: Execute error clearing
(After warning clearing is executed, the positioning unit RTEX automatically resets the bit to 0.)</td></tr>
<tr><td>1</td><td>Error clearing for Axis 2</td><td>0</td></tr>
<tr><td>2</td><td>Error clearing for Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Error clearing for Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Error clearing for Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Error clearing for Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Error clearing for Axis 7 (virtual)</td><td>0</td></tr>
<tr><td>7</td><td>Error clearing for Axis 8 (virtual)</td><td>0</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="2"></td><td></td><td></td><td></td><td><table><tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>16#0112 to 16#0128</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td rowspan="18">16#00</td><td>16#0129</td><td>Number of error occurrences on Axis 1</td><td>0</td><td>Reports the number of error occurrences on Axis 1.<table><tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>15 to 0</td><td>Number of error occurrences on Axis 1</td><td>0</td><td>Reports the number of errors currently occurring on Axis 1.
Range of warning occurrences: 0 to 65,535</td></tr></table></td></tr>
<tr><td>16#012A</td><td rowspan="2">Error code notification buffer 1 for Axis 1</td><td rowspan="2">16#0000_0000</td><td rowspan="14">Stores the latest error codes in order from buffer 1.<table><tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>31 to 0</td><td>Error code notification buffer n for Axis 1</td><td>16#0000_0000</td><td>Reports the error code.</td></tr></table></td></tr>
<tr><td>16#012B</td></tr>
<tr><td>16#012C</td><td rowspan="2">Error code notification buffer 2 for Axis 1</td><td rowspan="2">16#0000_0000</td></tr>
<tr><td>16#012D</td></tr>
<tr><td>16#012E</td><td rowspan="2">Error code notification buffer 3 for Axis 1</td><td rowspan="2">16#0000_0000</td></tr>
<tr><td>16#012F</td></tr>
<tr><td>16#0130</td><td rowspan="2">Error code notification buffer 4 for Axis 1</td><td rowspan="2">16#0000_0000</td></tr>
<tr><td>16#0131</td></tr>
<tr><td>16#0132</td><td rowspan="2">Error code notification buffer 5 for Axis 1</td><td rowspan="2">16#0000_0000</td></tr>
<tr><td>16#0133</td></tr>
<tr><td>16#0134</td><td rowspan="2">Error code notification buffer 6 for Axis 1</td><td rowspan="2">16#0000_0000</td></tr>
<tr><td>16#0135</td></tr>
<tr><td>16#0136</td><td rowspan="2">Error code notification buffer 7 for Axis 1</td><td rowspan="2">16#0000_0000</td></tr>
<tr><td>16#0137</td></tr>
<tr><td>16#0138</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0139</td><td>Number of error occurrences on Axis 2</td><td>0</td><td>Reports the number of error occurrences on Axis 2.</td></tr>
<tr><td>16#013A</td><td rowspan="2">Error code notification buffer 1 for Axis 2</td><td rowspan="2">16#0000_0000</td><td rowspan="3">Stores the latest error codes in order from buffer 1.</td></tr>
<tr><td>16#013B</td></tr>
<tr><td>16#013C</td><td>Error code notification buffer 2 for Axis 2</td><td>16#0000_0000</td></tr>
</table>

Bank	Offset address	Name	Default	Description
	16#013D			
	16#013E	Error code notification buffer 3 for Axis 2	16#0000_ 0000	
	16#013F			
	16#0140	Error code notification buffer 4 for Axis 2	16#0000_ 0000	
	16#0141			
	16#0142	Error code notification buffer 5 for Axis 2	16#0000_ 0000	
	16#0143			
	16#0144	Error code notification buffer 6 for Axis 2	16#0000_ 0000	
	16#0145			
	16#0146	Error code notification buffer 7 for Axis 2	16#0000_ 0000	
	16#0147			
16#00	16#0148	-	-	-
	16#0149	Number of error occurrences on Axis 3	0	Reports the number of error occurrences on Axis 3.
	16#014A	Error code notification buffer 1 for Axis 3	16#0000_ 0000	Stores the latest error codes in order from buffer 1.
	16#014B			
	16#014C	Error code notification buffer 2 for Axis 3	16#0000_ 0000	
	16#014D			
	16#014E	Error code notification buffer 3 for Axis 3	16#0000_ 0000	
	16#014F			
	16#0150	Error code notification buffer 4 for Axis 3	16#0000_ 0000	
	16#0151			
	16#0152	Error code notification buffer 5 for Axis 3	16#0000_ 0000	
	16#0153			
	16#0154	Error code notification buffer 6 for Axis 3	16#0000_ 0000	
	16#0155			
	16#0156	Error code notification buffer 7 for Axis 3	16#0000_ 0000	
	16#0157			
	16#0158	-	-	-
	16#0159	Number of error occurrences on Axis 4	0	Reports the number of error occurrences on Axis 4.
	16#015A	Error code notification buffer 1 for Axis 4	16#0000_ 0000	Stores the latest error codes in order from buffer 1.
	16#015B			

Bank	Offset address	Name	Default	Description
	16#015C	Error code notification buffer 2 for Axis 4	16#0000_0000	
	16#015D			
	16#015E	Error code notification buffer 3 for Axis 4	16#0000_0000	
	16#015F			
	16#0160	Error code notification buffer 4 for Axis 4	16#0000_0000	
	16#0161			
	16#0162	Error code notification buffer 5 for Axis 4	16#0000_0000	
	16#0163			
	16#0164	Error code notification buffer 6 for Axis 4	16#0000_0000	
	16#0165			
	16#0166	Error code notification buffer 7 for Axis 4	16#0000_0000	
	16#0167			
16#00	16#0168	-	-	-
	16#0169	Number of error occurrences on Axis 5	0	Reports the number of error occurrences on Axis 5.
	16#016A	Error code notification buffer 1 for Axis 5	16#0000_0000	Stores the latest error codes in order from buffer 1.
	16#016B			
	16#016C	Error code notification buffer 2 for Axis 5	16#0000_0000	
	16#016D			
	16#016E	Error code notification buffer 3 for Axis 5	16#0000_0000	
	16#016F			
	16#0170	Error code notification buffer 4 for Axis 5	16#0000_0000	
	16#0171			
	16#0172	Error code notification buffer 5 for Axis 5	16#0000_0000	
	16#0173			
	16#0174	Error code notification buffer 6 for Axis 5	16#0000_0000	
	16#0175			
	16#0176	Error code notification buffer 7 for Axis 5	16#0000_0000	
	16#0177			
	16#0178	-	-	-
	16#0179	Number of error occurrences on Axis 6	0	Reports the number of error occurrences on Axis 6.
	16#017A	Error code notification buffer 1 for Axis 6	16#0000_0000	Stores the latest error codes in order from buffer 1.
	16#017B			

Bank	Offset address	Name	Default	Description
	16#017C	Error code notification buffer 2 for Axis 6	16#0000_0000	
	16#017D			
	16#017E	Error code notification buffer 3 for Axis 6	16#0000_0000	
	16#017F			
	16#0180	Error code notification buffer 4 for Axis 6	16#0000_0000	
	16#0181			
	16#0182	Error code notification buffer 5 for Axis 6	16#0000_0000	
	16#0183			
	16#0184	Error code notification buffer 6 for Axis 6	16#0000_0000	
	16#0185			
	16#0186	Error code notification buffer 7 for Axis 6	16#0000_0000	
	16#0187			
16#00	16#0188	-	-	-
	16#0189	Number of error occurrences on Axis 7 (virtual)	0	Reports the number of error occurrences on Axis 7 (virtual).
	16#018A	Error code notification buffer 1 for Axis 7 (virtual)	16#0000_0000	Stores the latest error codes in order from buffer 1.
	16#018B			
	16#018C	Error code notification buffer 2 for Axis 7 (virtual)	16#0000_0000	
	16#018D			
	16#018E	Error code notification buffer 3 for Axis 7 (virtual)	16#0000_0000	
	16#018F			
	16#0190	Error code notification buffer 4 for Axis 7 (virtual)	16#0000_0000	
	16#0191			
	16#0192	Error code notification buffer 5 for Axis 7 (virtual)	16#0000_0000	
	16#0193			
	16#0194	Error code notification buffer 6 for Axis 7 (virtual)	16#0000_0000	
	16#0195			
	16#0196	Error code notification buffer 7 for Axis 7 (virtual)	16#0000_0000	
	16#0197			
	16#0198	-	-	-
	16#0199	Number of error occurrences on Axis 8 (virtual)	0	Reports the number of error occurrences on Axis 8 (virtual).
	16#019A	Error code notification buffer 1 for Axis 8 (virtual)	16#0000_0000	Stores the latest error codes in order from buffer 1.
	16#019B			

Bank	Offset address	Name	Default	Description
	16#019C 16#019D	Error code notification buffer 2 for Axis 8 (virtual)	16#0000_ 0000	
	16#019E 16#019F	Error code notification buffer 3 for Axis 8 (virtual)	16#0000_ 0000	
	16#01A0 16#01A1	Error code notification buffer 4 for Axis 8 (virtual)	16#0000_ 0000	
	16#01A2 16#01A3	Error code notification buffer 5 for Axis 8 (virtual)	16#0000_ 0000	
	16#01A4 16#01A5	Error code notification buffer 6 for Axis 8 (virtual)	16#0000_ 0000	
	16#01A6 16#01A7	Error code notification buffer 7 for Axis 8 (virtual)	16#0000_ 0000	

18.5.10 Warning Notification & Clearing Area

This area stores the number of warning occurrences and warning codes of warnings (not accompanying stoppages) for each axis. If warning clearing is executed, the number of warning occurrences and warning codes will be cleared once, but if the warning conditions continue, warning judgments and resulting warnings will occur even after the warning clearing. Up to seven warning logs are stored.

Warning clearing can be executed by using not only this area but also the warning clearing contact (for all axes).

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default value</th><th>Description</th></tr>
<tr><td>16#00</td><td>16#01A8</td><td>Warning occurrence notification for each axis</td><td>16#0000</td><td>When a warning occurs on an axis, the corresponding bit is set to 1.
When a warning targeting all axes occurs, the bits of all axes are set to 1.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Warning notification for Axis 1</td><td>0</td><td rowspan="3">0: No warning
1: Warring occurred</td></tr>
<tr><td>1</td><td>Warning notification for Axis 2</td><td>0</td></tr>
<tr><td>2</td><td>Warning notification for Axis 3</td><td>0</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default value</th><th>Description</th></tr>
<tr><td rowspan="3"></td><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>3</td><td>Warning notification for Axis 4</td><td>0</td><td rowspan="5"></td></tr>
<tr><td>4</td><td>Warning notification for Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Warning notification for Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Warning notification for Axis 7 (virtual)</td><td>0</td></tr>
<tr><td>7</td><td>Warning notification for Axis 8 (virtual)</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>16#01A9</td><td>Warning clearing specification for each axis</td><td>16#0000</td><td>Executes warning clearing for each axis.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Warning clearing for Axis 1</td><td>0</td><td rowspan="8">0: No warning clearing
1: Execute warning clearing
(After warning clearing is executed, the positioning unit RTEX automatically resets the bit to 0.)</td></tr>
<tr><td>1</td><td>Warning clearing for Axis 2</td><td>0</td></tr>
<tr><td>2</td><td>Warning clearing for Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Warning clearing for Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Warning clearing for Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Warning clearing for Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Warning clearing for Axis 7 (virtual)</td><td>0</td></tr>
<tr><td>7</td><td>Warning clearing for Axis 8 (virtual)</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>16#01AA to 16#01C0</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#00</td><td>16#01C1</td><td>Number of warning occurrences on Axis 1</td><td>0</td><td>Reports the number of warning occurrences on Axis 1.</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default value</th><th>Description</th></tr>
<tr><td rowspan="25"></td><td></td><td></td><td></td><td><table><tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>15 to 0</td><td>Number of warning occurrences on Axis 1</td><td>0</td><td>Reports the number of warnings currently occurring on Axis 1.
Range of warning occurrences: 0 to 65,535</td></tr></table></td></tr>
<tr><td>16#01C2</td><td rowspan="2">Warning code notification buffer 1 for Axis 1</td><td rowspan="2">16#0000_0000</td><td rowspan="14">Stores the latest warning codes in order from buffer number 1.<table><tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>31 to 0</td><td>Warning code notification buffer n for Axis 1</td><td>16#0000–0000</td><td>Reports the warning code.</td></tr></table></td></tr>
<tr><td>16#01C3</td></tr>
<tr><td>16#01C4</td><td rowspan="2">Warning code notification buffer 2 for Axis 1</td><td rowspan="2">16#0000_0000</td></tr>
<tr><td>16#01C5</td></tr>
<tr><td>16#01C6</td><td rowspan="2">Warning code notification buffer 3 for Axis 1</td><td rowspan="2">16#0000_0000</td></tr>
<tr><td>16#01C7</td></tr>
<tr><td>16#01C8</td><td rowspan="2">Warning code notification buffer 4 for Axis 1</td><td rowspan="2">16#0000_0000</td></tr>
<tr><td>16#01C9</td></tr>
<tr><td>16#01CA</td><td rowspan="2">Warning code notification buffer 5 for Axis 1</td><td rowspan="2">16#0000_0000</td></tr>
<tr><td>16#01CB</td></tr>
<tr><td>16#01CC</td><td rowspan="2">Warning code notification buffer 6 for Axis 1</td><td rowspan="2">16#0000_0000</td></tr>
<tr><td>16#01CD</td></tr>
<tr><td>16#01CE</td><td rowspan="2">Warning code notification buffer 7 for Axis 1</td><td rowspan="2">16#0000_0000</td></tr>
<tr><td>16#01CF</td></tr>
<tr><td>16#01D0</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#01D1</td><td>Number of warning occurrences on Axis 2</td><td>0</td><td>Reports the number of warning occurrences on Axis 2.</td></tr>
<tr><td>16#01D2</td><td rowspan="2">Warning code notification buffer 1 for Axis 2</td><td rowspan="2">16#0000_0000</td><td rowspan="8">Stores the latest warning codes in order from buffer number 1.</td></tr>
<tr><td>16#01D3</td></tr>
<tr><td>16#01D4</td><td rowspan="2">Warning code notification buffer 2 for Axis 2</td><td rowspan="2">16#0000_0000</td></tr>
<tr><td>16#01D5</td></tr>
<tr><td>16#01D6</td><td rowspan="2">Warning code notification buffer 3 for Axis 2</td><td rowspan="2">16#0000_0000</td></tr>
<tr><td>16#01D7</td></tr>
<tr><td>16#01D8</td><td rowspan="2">Warning code notification buffer 4 for Axis 2</td><td rowspan="2">16#0000_0000</td></tr>
<tr><td>16#01D9</td></tr>
</table>

Bank	Offset address	Name	Default value	Description
	16#01DA	Warning code notification buffer 5 for Axis 2	16#0000_ 0000	
	16#01DB			
	16#01DC	Warning code notification buffer 6 for Axis 2	16#0000_ 0000	
	16#01DD			
	16#01DE	Warning code notification buffer 7 for Axis 2	16#0000_ 0000	
	16#01DF			
16#00	16#01E0	-	-	-
	16#01E1	Number of warning occurrences on Axis 3	0	Reports the number of warning occurrences on Axis 3.
	16#01E2	Warning code notification buffer 1 for Axis 3	16#0000_ 0000	Stores the latest warning codes in order from buffer number 1.
	16#01E3			
	16#01E4	Warning code notification buffer 2 for Axis 3	16#0000_ 0000	
	16#01E5			
	16#01E6	Warning code notification buffer 3 for Axis 3	16#0000_ 0000	
	16#01E7			
	16#01E8	Warning code notification buffer 4 for Axis 3	16#0000_ 0000	
	16#01E9			
	16#01EA	Warning code notification buffer 5 for Axis 3	16#0000_ 0000	
	16#01EB			
	16#01EC	Warning code notification buffer 6 for Axis 3	16#0000_ 0000	
	16#01ED			
	16#01EE	Warning code notification buffer 7 for Axis 3	16#0000_ 0000	
	16#01EF			
	16#01F0	-	-	-
	16#01F1	Number of warning occurrences on Axis 4	0	Reports the number of warning occurrences on Axis 4.
	16#01F2	Warning code notification buffer 1 for Axis 4	16#0000_ 0000	Stores the latest warning codes in order from buffer number 1.
	16#01F3			
	16#01F4	Warning code notification buffer 2 for Axis 4	16#0000_ 0000	
	16#01F5			
	16#01F6	Warning code notification buffer 3 for Axis 4	16#0000_ 0000	
	16#01F7			
	16#01F8	Warning code notification buffer 4 for Axis 4	16#0000_ 0000	
	16#01F9			

Bank	Offset address	Name	Default value	Description
	16#01FA 16#01FB	Warning code notification buffer 5 for Axis 4	16#0000_ 0000	
	16#01FC 16#01FD	Warning code notification buffer 6 for Axis 4	16#0000_ 0000	
	16#01FE 16#01FF	Warning code notification buffer 7 for Axis 4	16#0000_ 0000	
16#00	16#0200	-	-	-
	16#0201	Number of warning occurrences on Axis 5	0	Reports the number of warning occurrences on Axis 5.
	16#0202 16#0203	Warning code notification buffer 1 for Axis 5	16#0000_ 0000	Stores the latest warning codes in order from buffer number 1.
	16#0204 16#0205	Warning code notification buffer 2 for Axis 5	16#0000_ 0000	
	16#0206 16#0207	Warning code notification buffer 3 for Axis 5	16#0000_ 0000	
	16#0208 16#0209	Warning code notification buffer 4 for Axis 5	16#0000_ 0000	
	16#020A 16#020B	Warning code notification buffer 5 for Axis 5	16#0000_ 0000	
	16#020C 16#020D	Warning code notification buffer 6 for Axis 5	16#0000_ 0000	
	16#020E 16#020F	Warning code notification buffer 7 for Axis 5	16#0000_ 0000	
	16#0210	-	-	-
	16#0211	Number of warning occurrences on Axis 6	0	Reports the number of warning occurrences on Axis 6.
	16#0212 16#0213	Warning code notification buffer 1 for Axis 6	16#0000_ 0000	Stores the latest warning codes in order from buffer number 1.
	16#0214 16#0215	Warning code notification buffer 2 for Axis 6	16#0000_ 0000	
	16#0216 16#0217	Warning code notification buffer 3 for Axis 6	16#0000_ 0000	
	16#0218 16#0219	Warning code notification buffer 4 for Axis 6	16#0000_ 0000	

Bank	Offset address	Name	Default value	Description
	16#021A	Warning code notification buffer 5 for Axis 6	16#0000_ 0000	
	16#021B			
	16#021C	Warning code notification buffer 6 for Axis 6	16#0000_ 0000	
	16#021D			
	16#021E	Warning code notification buffer 7 for Axis 6	16#0000_ 0000	
	16#021F			
16#00	16#0220	-	-	-
	16#0221	Number of warning occurrences on Axis 7 (virtual)	0	Reports the number of warning occurrences on Axis 7 (virtual).
	16#0222	Warning code notification buffer 1 for Axis 7 (virtual)	16#0000_ 0000	Stores the latest warning codes in order from buffer number 1.
	16#0223			
	16#0224	Warning code notification buffer 2 for Axis 7 (virtual)	16#0000_ 0000	
	16#0225			
	16#0226	Warning code notification buffer 3 for Axis 7 (virtual)	16#0000_ 0000	
	16#0227			
	16#0228	Warning code notification buffer 4 for Axis 7 (virtual)	16#0000_ 0000	
	16#0229			
	16#022A	Warning code notification buffer 5 for Axis 7 (virtual)	16#0000_ 0000	
	16#022B			
	16#022C	Warning code notification buffer 6 for Axis 7 (virtual)	16#0000_ 0000	
	16#022D			
	16#022E	Warning code notification buffer 7 for Axis 7 (virtual)	16#0000_ 0000	
	16#022F			
	16#0230	-	-	-
	16#0231	Number of warning occurrences on Axis 8 (virtual)	0	Reports the number of warning occurrences on Axis 8 (virtual).
	16#0232	Warning code notification buffer 1 for Axis 8 (virtual)	16#0000_ 0000	Stores the latest warning codes in order from buffer number 1.
	16#0233			
	16#0234	Warning code notification buffer 2 for Axis 8 (virtual)	16#0000_ 0000	
	16#0235			
	16#0236	Warning code notification buffer 3 for Axis 8 (virtual)	16#0000_ 0000	
	16#0237			
	16#0238	Warning code notification buffer 4 for Axis 8 (virtual)	16#0000_ 0000	
	16#0239			

Bank	Offset address	Name	Default value	Description
	16#023A	Warning code notification buffer 5 for Axis 8 (virtual)	16#0000_ 0000	
	16#023B			
	16#023C	Warning code notification buffer 6 for Axis 8 (virtual)	16#0000_ 0000	
	16#023D			
	16#023E	Warning code notification buffer 7 for Axis 8 (virtual)	16#0000_ 0000	
	16#023F			

18.5.11 Synchronous Control Monitor Area

This area is used to monitor the setting status of synchronous control.

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="2">16#00</td><td>16#02B0</td><td>Synchronous master axis information monitoring
for Axis 1</td><td>16#FFFF</td><td>Stores the setting status of the master axis under synchronous control.
<table>
<tr><th colspan="2">Stored value</th><th rowspan="2">Master axis</th></tr>
<tr><th>Under synchronous control</th><th>Synchronization cancellation in progress</th></tr>
<tr><td>16#FFFF</td><td>16#FFFF</td><td>No synchronous setting</td></tr>
<tr><td>16#0000</td><td>16#8000</td><td>The target axis for monitoring is the master axis.</td></tr>
<tr><td>16#0001</td><td>16#8001</td><td>Axis 1</td></tr>
<tr><td>16#0002</td><td>16#8002</td><td>Axis 2</td></tr>
<tr><td>16#0003</td><td>16#8003</td><td>Axis 3</td></tr>
<tr><td>16#0004</td><td>16#8004</td><td>Axis 4</td></tr>
<tr><td>16#0005</td><td>16#8005</td><td>Axis 5</td></tr>
<tr><td>16#0006</td><td>16#8006</td><td>Axis 6</td></tr>
<tr><td>16#0007</td><td>16#8007</td><td>Axis 7</td></tr>
<tr><td>16#0008</td><td>16#8008</td><td>Axis 8</td></tr>
<tr><td>16#0010</td><td>16#8010</td><td>Virtual axis 1</td></tr>
<tr><td>16#0011</td><td>16#8011</td><td>Virtual axis 2</td></tr>
<tr><td>16#0021</td><td>16#8021</td><td>Pulse input 1</td></tr>
<tr><td>16#0022</td><td>16#8022</td><td>Pulse input 2</td></tr>
<tr><td>16#0023</td><td>16#8023</td><td>Pulse input 3</td></tr>
</table></td></tr>
<tr><td>16#02B1</td><td>Synchronous output function</td><td>16#0000</td><td>Stores the status of the synchronous operation function set for the axis.</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="3"></td><td></td><td>status monitoring for Axis 1</td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Electronic gear operation setting</td><td>0</td><td rowspan="4">0: Do not use
1: Use</td></tr>
<tr><td>1</td><td>Clutch operation setting</td><td>0</td></tr>
<tr><td>2</td><td>Electronic cam operation setting</td><td>0</td></tr>
<tr><td>3</td><td>Advance angle correction synchronization setting</td><td>0</td></tr>
<tr><td>15 to 4</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>16#02B2</td><td>Synchronous master axis information monitoring for Axis 2</td><td>16#FFFF</td><td>Refer to the corresponding item for Axis 1.</td></tr>
<tr><td>16#02B3</td><td>Synchronous output function selection status monitoring for Axis 2</td><td>16#0000</td><td>Refer to the same item corresponding to Axis 1.</td></tr>
<tr><td rowspan="8">16#00</td><td>16#02B4</td><td>Synchronous master axis information monitoring for Axis 3</td><td>16#FFFF</td><td>Refer to the same item corresponding to Axis 1.</td></tr>
<tr><td>16#02B5</td><td>Synchronous output function selection monitoring for Axis 3</td><td>16#0000</td><td>Refer to the same item corresponding to Axis 1.</td></tr>
<tr><td>16#02B6</td><td>Synchronous master axis information monitoring for Axis 4</td><td>16#FFFF</td><td>Refer to the same item corresponding to Axis 1.</td></tr>
<tr><td>16#02B7</td><td>Synchronous output function selection monitoring for Axis 4</td><td>16#0000</td><td>Refer to the same item corresponding to Axis 1.</td></tr>
<tr><td>16#02B8</td><td>Synchronous master axis information monitoring for Axis 5</td><td>16#FFFF</td><td>Refer to the same item corresponding to Axis 1.</td></tr>
<tr><td>16#02B9</td><td>Synchronous output function selection monitoring for Axis 5</td><td>16#0000</td><td>Refer to the same item corresponding to Axis 1.</td></tr>
<tr><td>16#02BA</td><td>Synchronous master axis information monitoring for Axis 6</td><td>16#FFFF</td><td>Refer to the same item corresponding to Axis 1.</td></tr>
<tr><td>16#02BB</td><td>Synchronous output function</td><td>16#0000</td><td>Refer to the same item corresponding to Axis 1.</td></tr>
</table>

Bank	Offset address	Name	Default	Description
		selection monitoring for Axis 6		
	16#02BC	Synchronous master axis information monitoring for Axis 7 (virtual)	16#FFFF	Refer to the same item corresponding to Axis 1.
	16#02BD	Synchronous output function selection status monitoring for Axis 7 (virtual)	16#0000	Refer to the same item corresponding to Axis 1.
	16#02BE	Synchronous master axis information monitoring for Axis 8 (virtual)	16#FFFF	Refer to the same item corresponding to Axis 1.
	16#02BF	Axis 8 (virtual) synchronous output function selection status monitoring for Axis 8 (virtual)	16#0000	Refer to the same item corresponding to Axis 1.

18.5.12 Latch stop function area

This area is used to configure settings when using “latch mode with a stop function” for MINAS servo amplifiers (A6N). “Latch mode with a stop function” is a function that stops the motor at a latching position by using the latch input of the servo amplifier as a trigger.

- This function works with MINAS A6N Ver.1.22 or later.

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>16#00</td><td>16#02C0</td><td>Latch mode request flag</td><td>16#0000</td><td>Turn ON the bit corresponding to the axis for which latch mode with a stop function is used.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Axis 1</td><td>0</td><td rowspan="8">0: Conventional behavior
1: Latch mode with a stop function is running
external latch
Input enabled</td></tr>
<tr><td>1</td><td>Axis 2</td><td>0</td></tr>
<tr><td>2</td><td>Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Warning clearing for Axis 7 (virtual)</td><td>0</td></tr>
<tr><td>7</td><td>Axis 8 (virtual)</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="2"></td><td>16#02C1</td><td>Latch mode status notification</td><td>16#0000</td><td>The bit corresponding to the relevant axis turns ON while latch mode with a stop function is running. When this flag is ON, it indicates that latch mode with a stop function is running and the servo amplifier is waiting for the motor to stop.
After stoppage is completed in latch mode with a stop function, this flag turns OFF.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Axis 1</td><td>0</td><td rowspan="8">0: Non-operating state
1: Latch mode
with a stop function
is running
(Waiting for latching)</td></tr>
<tr><td>1</td><td>Axis 2</td><td>0</td></tr>
<tr><td>2</td><td>Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Warning clearing for Axis 7 (virtual)</td><td>0</td></tr>
<tr><td>7</td><td>Axis 8 (virtual)</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>16#02C2 to 16#02C7</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#00</td><td>16#02C8</td><td>Latch trigger signal input selection for Axis 1</td><td>16#0003</td><td>Sets external latch input 1, external latch input 2, and external latch input 3, which are input from the amplifier I/O connectors used for latch mode requests.
<table>
<tr><th>Bit</th><th>Description</th></tr>
<tr><td>3 to 0</td><td>16#0001: Rising edge of EXT1
16#0002: Rising edge of EXT2
16#0003: Rising edge of EXT3
16#0007: Rising edge of Pr7.111-specified
logical output signal
16#0009: Falling edge of EXT1
16#000A: Falling edge of EXT2
16#000B: Falling edge of EXT3
16#000F: Falling edge of Pr7.111-specified
logical output signal
If any setting other than the above is specified, “Rising edge of EXT3” will be assumed.</td></tr>
<tr><td>15 to 8</td><td>-</td></tr>
</table>
For home return operations, do not use POT/NOT for the DOG or limit methods.</td></tr>
</table>

Bank	Offset address	Name	Default	Description
	16#02C9	Latch trigger signal input selection for Axis 2	16#0003	Refer to the same item corresponding to Axis 1.
	16#02CA	Latch trigger signal input selection for Axis 3	16#0003	Refer to the same item corresponding to Axis 1.
	16#02CB	Latch trigger signal input selection for Axis 4	16#0003	Refer to the same item corresponding to Axis 1.
	16#02CC	Latch trigger signal input selection for Axis 5	16#0003	Refer to the same item corresponding to Axis 1.
	16#02CD	Latch trigger signal input selection for Axis 6	16#0003	Refer to the same item corresponding to Axis 1.
	16#02CE	Latch trigger signal input selection for Axis 7 (virtual)	16#0003	Refer to the same item corresponding to Axis 1.
	16#02CF	Latch trigger signal input selection for Axis 8 (virtual)	16#0003	Refer to the same item corresponding to Axis 1.

18.5.13 Counter Positioning Function Area

Counter positioning setting area

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="2">16#00</td><td>16#02D0</td><td>Counter positioning switchover flag</td><td>16#0000</td><td>Turn ON the bit corresponding to the axis for which the counter positioning function is used.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Axis 1</td><td>0</td><td rowspan="8">0: Conventional behavior
1: Use the counter positioning function</td></tr>
<tr><td>1</td><td>Axis 2</td><td>0</td></tr>
<tr><td>2</td><td>Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Warning clearing for Axis 7 (virtual)</td><td>0</td></tr>
<tr><td>7</td><td>Axis 8 (virtual)</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td>16#02D1</td><td>-</td><td>-</td><td>-</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="2"></td><td>16#02D2</td><td>Start counting pulses request flag</td><td>16#0000</td><td>Turn ON the flag when starting counting pulses.
After positioning operations are complete, the positioning unit RTEX turns OFF the applicable bit.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Axis 1</td><td>0</td><td rowspan="8">0: No pulse counting request
1: Pulse counting request</td></tr>
<tr><td>1</td><td>Axis 2</td><td>0</td></tr>
<tr><td>2</td><td>Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Warning clearing for Axis 7 (virtual)</td><td>0</td></tr>
<tr><td>7</td><td>Axis 8 (virtual)</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td>16#02D3 to 16#02D7</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td rowspan="12">16#00</td><td>16#02D8</td><td>Counter positioning mode for Axis 1</td><td>16#0000</td><td rowspan="8">Sets a counter positioning operation method.
<table>
<tr><th>Setting value</th><th>Counter positioning mode</th></tr>
<tr><td>16#0000</td><td>Amplifier input method</td></tr>
<tr><td>16#0001</td><td>PLC judgment method</td></tr>
<tr><td>Other</td><td>Operates as if 16#0 (amplifier input method) is set.</td></tr>
</table></td></tr>
<tr><td>16#02D9</td><td>Counter positioning mode for Axis 2</td><td>16#0000</td></tr>
<tr><td>16#02DA</td><td>Counter positioning mode for Axis 3</td><td>16#0000</td></tr>
<tr><td>16#02DB</td><td>Counter positioning mode for Axis 4</td><td>16#0000</td></tr>
<tr><td>16#02DC</td><td>Counter positioning mode for Axis 5</td><td>16#0000</td></tr>
<tr><td>16#02DD</td><td>Counter positioning mode for Axis 6</td><td>16#0000</td></tr>
<tr><td>16#02DE</td><td>Counter positioning mode for Axis 7</td><td>16#0000</td></tr>
<tr><td>16#02DF</td><td>Counter positioning mode for Axis 8</td><td>16#0000</td></tr>
<tr><td>16#02E0</td><td>Pulse counting channel for Axis 1</td><td>16#0000</td><td rowspan="4">Set the motion part pulse input channel to be used for pulse counting.
<table>
<tr><th>Setting value</th><th>Pulse count channel</th></tr>
<tr><td>16#0000</td><td>Pulse input ch1</td></tr>
<tr><td>16#0001</td><td>Pulse input ch2</td></tr>
<tr><td>16#0003</td><td>Pulse input ch3</td></tr>
<tr><td>16#0004</td><td>Pulse input ch4</td></tr>
</table></td></tr>
<tr><td>16#02E1</td><td>Pulse count channel for Axis 2</td><td>16#0000</td></tr>
<tr><td>16#02E2</td><td>Pulse count channel for Axis 3</td><td>16#0000</td></tr>
<tr><td>16#02E3</td><td>Pulse count channel for Axis 4</td><td>16#0000</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="12"></td><td>16#02E4</td><td>Pulse count channel for Axis 5</td><td>16#0000</td><td rowspan="4"><table><tr><th>Setting value</th><th>Pulse count channel</th></tr><tr><td>Other</td><td>Operates as if 16#0 (pulse input ch1) is set.</td></tr></table></td></tr>
<tr><td>16#02E5</td><td>Pulse count channel for Axis 6</td><td>16#0000</td></tr>
<tr><td>16#02E6</td><td>Pulse count channel for Axis 7</td><td>16#0000</td></tr>
<tr><td>16#02E7</td><td>Pulse count channel for Axis 8</td><td>16#0000</td></tr>
<tr><td>16#02E8 to 16#02E9</td><td>Pulse count threshold for Axis 1</td><td>1000</td><td rowspan="8">Specify a threshold value (2 words) that is used to trigger the startup of positioning operation.
0 to 2,147,483,647 pulses (default value = 1000)
Note: If "0" is set, positioning will start immediately.</td></tr>
<tr><td>16#02EA to 16#02EB</td><td>Pulse count threshold for Axis 2</td><td>1000</td></tr>
<tr><td>16#02EC to 16#02ED</td><td>Pulse count threshold for Axis 3</td><td>1000</td></tr>
<tr><td>16#02EE to 16#02EF</td><td>Pulse count threshold for Axis 4</td><td>1000</td></tr>
<tr><td>16#02F0 to 16#02F1</td><td>Pulse count threshold for Axis 5</td><td>1000</td></tr>
<tr><td>16#02F2 to 16#02F3</td><td>Pulse count threshold for Axis 6</td><td>1000</td></tr>
<tr><td>16#02F4 to 16#02F5</td><td>Pulse count threshold for Axis 7</td><td>1000</td></tr>
<tr><td>16#02F6 to 16#02F7</td><td>Pulse count threshold for Axis 8</td><td>1000</td></tr>
</table>

Counter positioning setting area (amplifier input method)

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="4">16#00</td><td>16#02F8</td><td>Pulse count start input signal for Axis 1</td><td>2</td><td rowspan="4">Use this area when the counter positioning mode is set to "Amplifier input method".
Set the servo amplifier input type to be used as the pulse count start signal.<table><tr><th>Setting value</th><th>Pulse counting start input signal</th></tr><tr><td>0</td><td>Rising edge of EXT1</td></tr><tr><td>1</td><td>Rising edge of EXT2</td></tr><tr><td>2</td><td>Rising edge of EXT3</td></tr><tr><td>3</td><td>SI-MON1 (level type)</td></tr><tr><td>4</td><td>SI-MON4 (level type)</td></tr></table></td></tr>
<tr><td>16#02F9</td><td>Pulse count start input signal for Axis 2</td><td>2</td></tr>
<tr><td>16#02FA</td><td>Pulse count start input signal for Axis 3</td><td>2</td></tr>
<tr><td>16#02FB</td><td>Pulse count start input signal for Axis 4</td><td>2</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="4"></td><td>16#02FC</td><td>Pulse count start input signal for Axis 5</td><td>2</td><td rowspan="4"><table><tr><th>Setting value</th><th>Pulse counting start input signal</th></tr><tr><td>5</td><td>SI-MON5 (level type)</td></tr><tr><td>Other</td><td>Operates as if 2 (rising edge of EXT3) is set.</td></tr></table></td></tr>
<tr><td>16#02FD</td><td>Pulse count start input signal for Axis 6</td><td>2</td></tr>
<tr><td>16#02FE</td><td>Pulse count start input signal for Axis 7</td><td>2</td></tr>
<tr><td>16#02FF</td><td>Pulse count start input signal for Axis 8</td><td>2</td></tr>
</table>

Counter positioning information monitor area

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="8">16#00</td><td>16#0300 to 16#0301</td><td>Pulses at the start of pulse counting for Axis 1</td><td>0</td><td rowspan="8">Stores the number of pulses at the start of pulse counter positioning operation. (2 words)
0 to 2,147,483,647 pulses</td></tr>
<tr><td>16#0302 to 16#0303</td><td>Pulses at the start of pulse counting for Axis 2</td><td>0</td></tr>
<tr><td>16#0304 to 16#0305</td><td>Pulses at the start of pulse counting for Axis 3</td><td>0</td></tr>
<tr><td>16#0306 to 16#0307</td><td>Pulses at the start of pulse counting for Axis 4</td><td>0</td></tr>
<tr><td>16#0308 to 16#0309</td><td>Pulses at the start of pulse counting for Axis 5</td><td>0</td></tr>
<tr><td>16#030A to 16#030B</td><td>Pulses at the start of pulse counting for Axis 6</td><td>0</td></tr>
<tr><td>16#030C to 16#030D</td><td>Pulses at the start of pulse counting for Axis 7</td><td>0</td></tr>
<tr><td>16#030E to 16#030F</td><td>Pulses at the start of pulse counting for Axis 8</td><td>0</td></tr>
<tr><td>16#00</td><td>16#0310</td><td>Pulse counting status flag</td><td>16#0000</td><td>Used to check whether pulses are being counted while the counter positioning function is running.
After positioning operations are complete, the applicable bit is turned OFF from the motion side.<table><tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>0</td><td>Waiting for pulse counting startup for Axis 1</td><td>0</td><td>0: No pulse counting request</td></tr></table></td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>1</td><td>Waiting for pulse count start for Axis 2</td><td>0</td><td>1: Pulse counting request</td></tr>
<tr><td>2</td><td>Waiting for pulse count start for Axis 3</td><td>0</td><td></td></tr>
<tr><td>3</td><td>Waiting for pulse count start for Axis 4</td><td>0</td><td></td></tr>
<tr><td>4</td><td>Waiting for pulse count start for Axis 5</td><td>0</td><td></td></tr>
<tr><td>5</td><td>Waiting for pulse count start for Axis 6</td><td>0</td><td></td></tr>
<tr><td>6</td><td>Waiting for pulse count start for Axis 7</td><td>0</td><td></td></tr>
<tr><td>7</td><td>Waiting for pulse count start for Axis 8</td><td>0</td><td></td></tr>
<tr><td>8</td><td>Currently counting pulses for Axis 1</td><td>0</td><td>0: Waiting for pulse counting
1: Currently counting pulses</td></tr>
<tr><td>9</td><td>Currently counting pulses for Axis 2</td><td>0</td><td></td></tr>
<tr><td>10</td><td>Currently counting pulses for Axis 3</td><td>0</td><td></td></tr>
<tr><td>11</td><td>Currently counting pulses for Axis 4</td><td>0</td><td></td></tr>
<tr><td>12</td><td>Currently counting pulses for Axis 5</td><td>0</td><td></td></tr>
<tr><td>13</td><td>Currently counting pulses for Axis 6</td><td>0</td><td></td></tr>
<tr><td>14</td><td>Currently counting pulses for Axis 7</td><td>0</td><td></td></tr>
<tr><td>15</td><td>Currently counting pulses for Axis 8</td><td>0</td><td></td></tr>
</table>
</td></tr>
<tr><td></td><td>16#0311</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#00</td><td>16#0312</td><td>Pulse count threshold violation flag</td><td>16#0000</td><td>When the number of counted pulses exceeds the threshold, the bit corresponding to the axis turns ON.
After positioning operations are complete, this flag is turned OFF by turning OFF the counter positioning switchover flag.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Axis 1</td><td>0</td><td>0: Threshold not reached</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Defa ult</th><th>Description</th></tr>
<tr><td>1</td><td>Axis 2</td><td>0</td><td rowspan="7">1: Counted pulses exceeded the threshold</td></tr>
<tr><td>2</td><td>Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Warning clearing for Axis 7 (virtual)</td><td>0</td></tr>
<tr><td>7</td><td>Axis 8 (virtual)</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
</table>

18.5.14 Latch Correction J-Point Control Function Area

External latch inputs can be used by using the latch correction J-point control function as the contact for starting next position control when J-point control (speed control) is performed during positioning operations.

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="3">16#00</td><td>16#0320</td><td>Latch mode request flag</td><td>16#0000</td><td>Turn ON the bit corresponding to the axis for which the latch correction J-point control function is used.
<table>
<tr><th>Bit</th><th>Name</th><th>Defa ult</th><th>Description</th></tr>
<tr><td>0</td><td>Axis 1</td><td>0</td><td rowspan="8">0: J-point positioning start contact used
(Conventional operation)
1: J-point positioning external latch input used</td></tr>
<tr><td>1</td><td>Axis 2</td><td>0</td></tr>
<tr><td>2</td><td>Axis 3</td><td>0</td></tr>
<tr><td>3</td><td>Axis 4</td><td>0</td></tr>
<tr><td>4</td><td>Axis 5</td><td>0</td></tr>
<tr><td>5</td><td>Axis 6</td><td>0</td></tr>
<tr><td>6</td><td>Warning clearing for Axis 7 (virtual)</td><td>0</td></tr>
<tr><td>7</td><td>Axis 8 (virtual)</td><td>0</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>16#0321 to 16#0327</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0328</td><td>Latch input signal selection for Axis 1</td><td>16#0003</td><td>Sets external latch input 1, external latch input 2, and external latch input 3, which are input from the</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td></td><td>amplifier I/O connectors used for latch mode requests.
<table>
<tr><th>Bit</th><th>Description</th></tr>
<tr><td>3 to 0</td><td>16#0001: Rising edge of EXT1
16#0002: Rising edge of EXT2
16#0003: Rising edge of EXT3
16#0007: Rising edge of Pr7.111-specified logic output signal
16#0009: Falling edge of EXT1
16#000A: Falling edge of EXT2
16#000B: Falling edge of EXT3
16#000F: Falling edge of Pr7.111-specified logic output signal
If any setting other than the above is specified, the operation will be as if the rising edge of EXT3 is set.</td></tr>
<tr><td>15 to 8</td><td>-</td></tr>
</table></td></tr>
<tr><td></td><td>16#0329</td><td>Latch input signal selection for Axis 2</td><td>16#0003</td><td>Refer to the same item corresponding to Axis 1.</td></tr>
<tr><td></td><td>16#032A</td><td>Latch input signal selection for Axis 3</td><td>16#0003</td><td>Refer to the same item corresponding to Axis 1.</td></tr>
<tr><td>16#00</td><td>16#032B</td><td>Latch input signal selection for Axis 4</td><td>16#0003</td><td>Refer to the same item corresponding to Axis 1.</td></tr>
<tr><td></td><td>16#032C</td><td>Latch input signal selection for Axis 5</td><td>16#0003</td><td>Refer to the same item corresponding to Axis 1.</td></tr>
<tr><td></td><td>16#032D</td><td>Latch input signal selection for Axis 6</td><td>16#0003</td><td>Refer to the same item corresponding to Axis 1.</td></tr>
<tr><td></td><td>16#032E</td><td>Latch input signal selection for Axis 7</td><td>16#0003</td><td>Refer to the same item corresponding to Axis 1.</td></tr>
<tr><td></td><td>16#032F</td><td>Latch input signal selection for Axis 8</td><td>16#0003</td><td>Refer to the same item corresponding to Axis 1.</td></tr>
</table>

18.5.15 Absolute Data Setting Function Area

This function achieves home return (data setting) operations virtually by setting the current value coordinate to 0 in the positioning unit RTEX without changing the position information held by the servo amplifier if, for example, home return cannot be performed when an absolute motor is used.

Bank	Offset address	Name	Default	Description
16#00	16#0330	1-axis data setting offset value	0	The area bank stores the current value of the amplifier that is obtained when home return is executed by the absolute data setting method. This data is used as the offset value for absolute data setting.
	16#0331			
	16#0332	Axis 2 data set offset value	0	
	16#0333			

Bank	Offset address	Name	Default	Description
	16#0334 16#0335	Axis 3 data set offset value	0	
	16#0336 16#0337	Axis 4 data set offset value	0	
	16#0338 16#0339	Axis 5 data set offset value	0	
	16#033A 16#033B	Axis 6 data set offset value	0	
	16#033C 16#033D	Axis 7 data set offset value	0	
	16#033E 16#033F	Axis 8 data set offset value	0	

18.5.16 System Operation Setting Area

This area is used to switch the operation of the positioning unit.

Bank	Offset address	Name	Default	Description
16#00	16#0389	Deceleration stop operation	0	Specify the operation when setting the deceleration stop request signal to "Active" (changed from OFF to ON). 0: Deceleration stop During repetitive operation, the axis stops after operations are performed up to the E-point of the repetitive operation. 1: Pause ● Performs a deceleration stop, and restarts the positioning operation when the deceleration stop request signal is canceled (changed from ON to OFF). ● Also, the same operation as deceleration stop is performed during any operation other than positioning operation. ● During repetitive operation, the axis stops after operations are performed up to the E-point of the repetitive operation and the positioning operation is restarted when the deceleration stop request signal is canceled (changed from ON to OFF). ● If a system stop or emergency stop is executed while the positioning unit is paused, the pause state will be canceled and the operation will not restart even if the deceleration stop request signal is canceled (changed from ON to OFF).
	16#038B	Positioning operation code	16#0000	Turn ON the bit corresponding to the axis for which the latch correction J-point control function is used.

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td></td><td>This area is used by the controller to determine the positioning operation when positioning is started.
The set value cannot be changed during positioning operation.
<table>
<tr><th>Setting value</th><th>Positioning operation mode</th></tr>
<tr><td>16#0000</td><td>Conventional positioning operation</td></tr>
<tr><td>16#0001</td><td>Positioning speed hold mode</td></tr>
<tr><td>Other</td><td>Operates as if 16#0 is set.</td></tr>
</table>
</td></tr>
</table>

18.5.17 Amplifier Monitor & Control Area

This area is used to read, write, save, and reset parameters and perform other operations on the amplifier connected to the network.

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="5">16#00</td><td>16#0390</td><td>AMP ID number</td><td>1</td><td>Specify the target axis number (AMP ID No.) for which amplifier parameters are to be monitored.</td></tr>
<tr><td>16#0391</td><td>Control flag</td><td>16#0000</td><td>Specify the type code of the item to be monitored.
After detecting the change of this flag from 16#0 to 16#xx, the positioning unit RTEX executes the monitoring processing requested by the flag and then changes the flag to 16#0 (no request) at the same time as processing completes.</td></tr>
<tr><td>16#0392</td><td>Status</td><td>16#0000</td><td>Stores the processing status of amplifier monitoring. The positioning unit RTEX changes this area to 16#1 at the same time as processing starts. It then stores the processing result and sets the control flag to 16#0.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>Status</td><td>16#0000: No processing
16#0001: Processing
16#0002: Normal termination
16#0003: Abnormal termination
16#0004: ID error
(Amplifier ID number not connected)
16#0005: Inoperable state
(Network disconnected, etc.)</td></tr>
</table>
</td></tr>
<tr><td>16#0393</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0394</td><td>Monitor data</td><td>-</td><td>Stores the monitoring result of the requested monitoring item.</td></tr>
</table>

Bank	Offset address	Name	Default	Description
	16#0395			
	16#0396 to 16#039F	-	-	-

18.5.18 Pulse Input Setting Area

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>16#00</td><td>16#03A0</td><td>Pulse input mode for ch1</td><td>16#0020</td><td>Sets up the pulse input signal.
Set up the signal according to the application of pulse input.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>Rotation direction</td><td>Sets the rotation direction of pulse input.
0: Forward
1: Reverse</td></tr>
<tr><td>1</td><td>-</td><td>-</td></tr>
<tr><td>3 to 2</td><td>Pulse input method</td><td>Sets the input method of pulse input.
Bit 3 Bit 2
0 0: 2-phase input
0 1: Direction identification input
1 0: Individual input
1 1: System reserved</td></tr>
<tr><td>5 to 4</td><td>Input multiplication</td><td>Sets the multiple of the pulse count when the pulse input method (bit 3 and bit 2) is set to "2-phase input".
Bit5 Bit4
0 0: ×1 (Multiply by 1)
0 1: ×2 (Multiply by 2)
1 0: ×4 (Multiply by 4)
1 1: System reserved</td></tr>
<tr><td>7 to 6</td><td>Pulse Input application</td><td>Specifies "Pulser" or "High-speed counter" as the pulse input application for each axis.
Pulser: Connects a manual pulser to the pulse input.
High-speed counter:
Bit7 Bit6
0 0: Pulser
0 1: System reserved</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td></td><td><table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td></td><td></td><td>1 0: High-speed counter
1 1: System reserved</td></tr></table></td></tr>
<tr><td rowspan="4">16#00</td><td>16#03A0</td><td>Pulse input mode for ch1</td><td>16#0020</td><td><table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>10 to 8</td><td>Pulse Input time constant</td><td>Sets the time constant for each pulse input signal. Pulse inputs A and B of the same axis are set to the same input time constant.
Bit 10 Bit 9 Bit 8
0 0 0: No input time constant
0 0 1: 0.1 us
0 1 0: 0.5us
0 1 1: 1.0us
1 0 0: 2.0us
1 0 1: 10.0 us
1 1 0: No input time constant
1 1 1: No input time constant</td></tr><tr><td>15 to 11</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>16#03A1</td><td>Pulse input mode for ch2</td><td>16#0020</td><td>Refer to "Pulse input mode for ch1".</td></tr>
<tr><td>16#03A2</td><td>Pulse input mode for ch3</td><td>16#0020</td><td>Refer to “Pulse input mode for ch1”.</td></tr>
<tr><td>16#03A3 to 16#03A7</td><td>-</td><td>-</td><td>-</td></tr>
</table>

18.5.19 Pulse Count Control Area

This area is used to control pulse input when the selected pulse input application is "High-speed counter".

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>16#00</td><td>16#03A8</td><td>Pulse count enable flag</td><td>16#0000</td><td>When the bit corresponding to each channel is set to 0, pulse inputs are counted.
This flag is enabled only when the pulse input application is set to "High-speed counter".<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>0</td><td>ch1 pulse count enable</td><td>0: Count pulse inputs.
1: Do not count pulse inputs.</td></tr></table></td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="10"></td><td></td><td></td><td></td><td><table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>1</td><td>ch2 pulse count enable</td><td rowspan="2"></td></tr><tr><td>2</td><td>ch3 pulse count enable</td></tr><tr><td>15 to 3</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>16#03A9</td><td>Pulse count value change request flag</td><td>16#0000</td><td>When the bit corresponding to each channel changes from 0 to 1, the pulse count value is changed to the post-change pulse count value that has been set.
This flag is an edge trigger flag. When changing the pulse count value, always change this flag from 0 to 1.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>0</td><td>Change pulse count for ch1 count change</td><td rowspan="3">0: Do not change pulse count value.
1: Change pulse count value.</td></tr><tr><td>1</td><td>ch2 pulse count change</td></tr><tr><td>2</td><td>ch3 pulse count change</td></tr><tr><td>15 to 3</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>16#03AA to 16#03AF</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#03B0</td><td rowspan="2">Pulse count change value for ch1</td><td rowspan="2">0</td><td rowspan="6">Set the pulse count value to be changed for each channel.<table><tr><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>Pulse count Changed value</td><td>0</td><td>Setting range:
-2,147,483,648 to +2,147,483,647</td></tr></table></td></tr>
<tr><td>16#03B1</td></tr>
<tr><td>16#03B2</td><td rowspan="2">Pulse count change value for ch2</td><td rowspan="2">0</td></tr>
<tr><td>16#03B3</td></tr>
<tr><td>16#03B4</td><td rowspan="2">Pulse count change value for ch3</td><td rowspan="2">0</td></tr>
<tr><td>16#03B5</td></tr>
<tr><td>16#03B6 to 16#03CF</td><td>-</td><td>-</td><td>-</td></tr>
</table>

18.5.20 Pulse Input Monitor Area

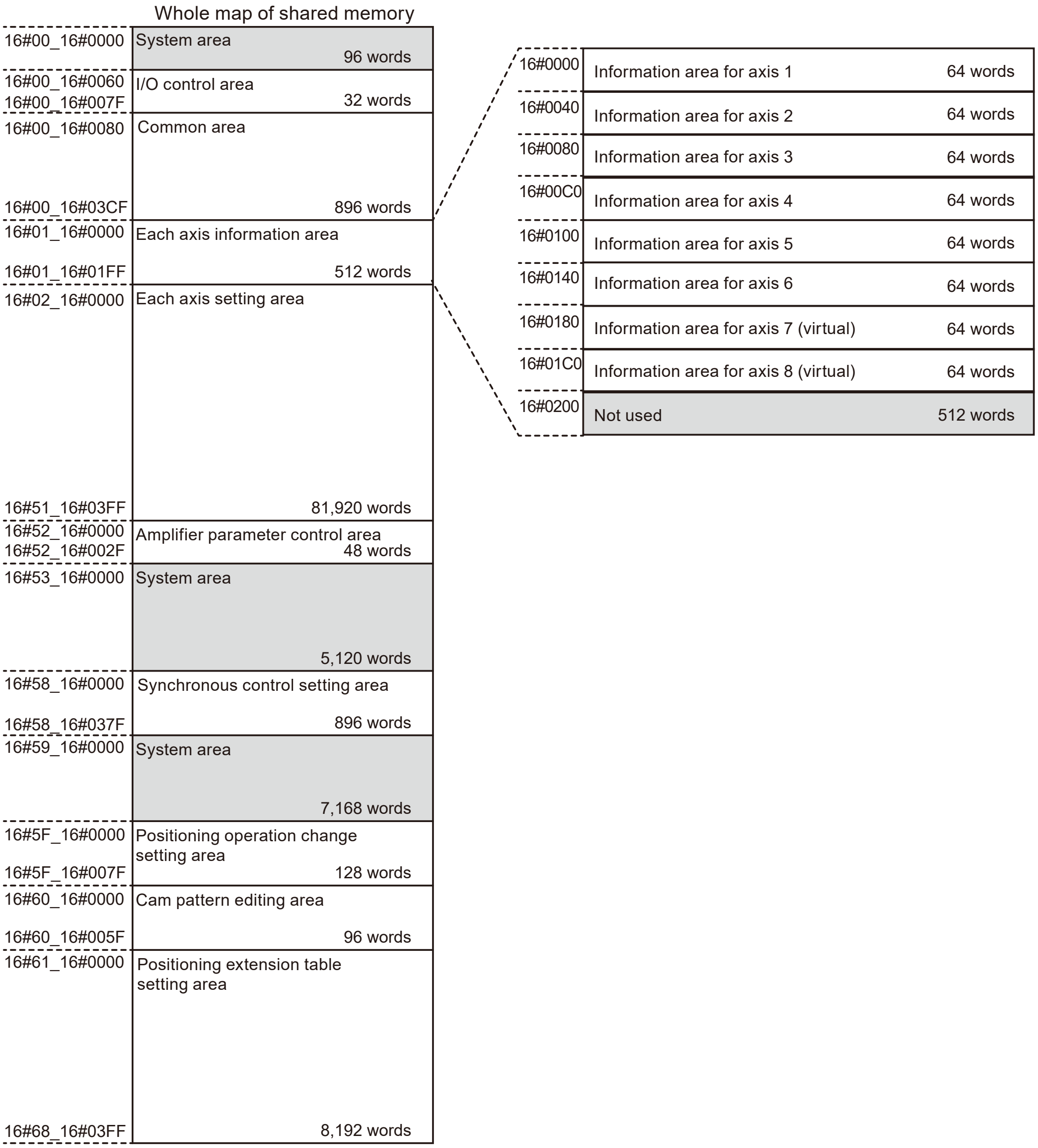
This area stores pulse inputs according to the selected pulse input application ("Pulser" or "High-speed counter").

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="7">16#00</td><td>16#03C0</td><td rowspan="2">Pulse count value for ch1</td><td rowspan="2">0</td><td rowspan="6">Pulse input values are stored according to the pulse input application ("Pulser" or "High-speed counter"). Pulse input values are cumulatively stored until the pulse input application is changed or all pulse inputs are cleared.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Pulse count value</td><td>0</td><td>Setting range:
-2,147,483,648 to +2,147,483,647
Unit: Pulses</td></tr>
</table></td></tr>
<tr><td>16#03C1</td></tr>
<tr><td>16#03C2</td><td rowspan="2">Pulse count value for ch2</td><td rowspan="2">0</td></tr>
<tr><td>16#03C3</td></tr>
<tr><td>16#03C4</td><td rowspan="2">Pulse count value for ch3</td><td rowspan="2">0</td></tr>
<tr><td>16#03C5</td></tr>
<tr><td>16#03C6 to 16#03CF</td><td>-</td><td>-</td><td>-</td></tr>
</table>

18.6 Details of Each Axis information Area in Shared Memory

18.6.1 Configuration of Each Axis Information Area

The shared memory is composed of banks. The each axis information area is allocated to bank 16#01 in the shared memory to enable the user to check information for each axis.



18.6.2 Each Axis Information & Monitor Area

This area is used to monitor amplifier system information and operating status for each axis.

■ Information for Axis 1

Bank	Offset address	Name	Default	Description
16#01	16#0000 to 16#0007	System ID of Axis 1 (Brand name or vendor name)	-	Stores the brand name or vendor name. This is stored as up to 16 bytes (16 characters) of ASCII code .
	16#0008 to 16#000F	System ID of Axis 1 (Amplifier model code)	-	Stores the model code of the amplifier. This is stored as up to 16 bytes (16 characters) of ASCII code .
	16#0010 to 16#0017	System ID of Axis 1 (Firmware version)	-	Stores the firmware version of the amplifier. This is stored as up to 16 bytes (16 characters) of ASCII code .
	16#0018 to 16#001F	System ID of Axis 1 (Motor model code)	-	Stores the model code of the motor. This is stored as up to 16 bytes (16 characters) of ASCII code .
	16#0020 16#0021	Phase of Axis-1 slave axis	0	Stores the phase of the slave axis after clutch control. Information is stored in this area when the target axis is set as a slave axis and the electronic cam function is used. The unit system of the master axis is used. If phase information is used in percent (%), perform the following calculation: Phase (%) = (Phase after clutch control)/(Synchronous master axis cycle) x 100 “Phase of slave axis” is cleared at the following timing: ● When the unit starts ● When the slave axis settings are canceled ● When synchronization is canceled
	16#0022 to 16#0023	-	-	-
	16#0024 16#0025	Advance angle correction amount for Axis 1	0	Stores the advance angle correction amount. This area stores the values converted to the unit (pulses, μm, inches, or degrees) selected for the master axis.
	16#0026 to 16#002B	-	-	-
	16#002C 16#002D	Axis 1 pulse command value	0	Stores the pulse command value sent from the positioning unit RTEX. When home return is completed, the value is reset to "0".

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="3"></td><td></td><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Pulse command value</td><td>-</td><td>Setting range:
-2,147,483,648 to +2,147,483,647
Unit: Pulses</td></tr>
</table>
</td></tr>
<tr><td>16#002E</td><td rowspan="2">Unit-converted command value for Axis 1</td><td rowspan="2">0</td><td rowspan="2">Stores the command value based on the pulse command value sent from the positioning unit RTEX. This value is converted to the unit (pulses, μm, inches, or degrees) selected in the setting area for each axis. When home return is completed, the value set in “Home coordinates” is stored. If “0” is set in “Home coordinates”, the value will be reset to “0”.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Unit-converted
command value</td><td>-</td><td>Setting range:
-2,147,483,648 to +2,147,483,647
Unit: pulses, μm, inches, degrees</td></tr>
</table>
</td></tr>
<tr><td>16#002F</td></tr>
<tr><td>16#01</td><td>16#0030</td><td>Status display for Axis 1</td><td>16#0000</td><td>Stores the displayed status of the amplifier.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>In-position</td><td>0: Deviation counter is outside
the in-position range.
1: Deviation counter is within
the in-position range.</td></tr>
<tr><td>1</td><td>Internal operating status</td><td>0: Internal position command is running
1: Internal position command is stopped</td></tr>
<tr><td>2</td><td>Home return completion</td><td>0: Home return is not complete
1: Home return is complete</td></tr>
<tr><td>3</td><td>Torque limit</td><td>0: Normal
1: Contact detection (Torque limit)</td></tr>
<tr><td>4</td><td>Warning</td><td>0: Normal
1: Warring occurred</td></tr>
<tr><td>5</td><td>Alarm</td><td>0: Normal
1: Alarm occurred</td></tr>
<tr><td>6</td><td>Servo ready</td><td>0: Cannot shift to servo ON state.
1: Servo ready state</td></tr>
<tr><td>7</td><td>Servo
active</td><td>0: Servo OFF
1: Servo ON</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="4"></td><td></td><td></td><td></td><td><table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>15 to 8</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>16#0031</td><td>External terminal input
monitoring for Axis 1</td><td>16#0000</td><td>Stores information for the I/O connected to the amplifier.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>0</td><td>CWL</td><td rowspan="8">0: Inactive
1: Active</td></tr><tr><td>1</td><td>CCWL</td></tr><tr><td>2</td><td>HOME (proximity)</td></tr><tr><td>3</td><td>EX-IN1</td></tr><tr><td>4</td><td>EX-IN2</td></tr><tr><td>5</td><td>EX-IN3</td></tr><tr><td>6</td><td>EX-SON/
EX-IN4</td></tr><tr><td>7</td><td>EMG-STP</td></tr><tr><td>15 to 8</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>16#0032</td><td>Torque command for Axis 1</td><td>-</td><td>Stores the torque monitor values.<table><tr><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>Torque command</td><td>-</td><td>Display range: 0 to 32,766
Unit: 0.1 %</td></tr></table></td></tr>
<tr><td>16#0033</td><td>Actual speed for Axis 1</td><td>-</td><td>Stores the actual speed monitor values.<table><tr><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>Actual speed</td><td>-</td><td>Setting range: 0 to 10,000
Unit: rpm</td></tr></table></td></tr>
<tr><td rowspan="4">16#01</td><td>16#0034</td><td rowspan="2">Deviation for Axis 1</td><td rowspan="2">-</td><td rowspan="2">Stores the difference (deviation) between the current position managed within the unit and the current position fed back from the amplifier.<table><tr><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>Deviation</td><td>-</td><td>Setting range: -2,147,483,648 to +2,147,483,647
Unit: Pulses</td></tr></table>For virtual axes, the deviation is axis 0.</td></tr>
<tr><td>16#0035</td></tr>
<tr><td>16#0036 to 16#0037</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0038</td><td>Active table or completed table for Axis 1</td><td>0</td><td>Stores the number of an active or completed positioning table.</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td></td><td><table><tr><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>Active or completed table</td><td>0</td><td>Setting range: 1 to 600,
10001 to 10089</td></tr></table></td></tr>
<tr><td></td><td>16#0039</td><td>Auxiliary output code for Axis 1</td><td>0</td><td>Stores the auxiliary output code.<table><tr><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>Auxiliary output code</td><td>0</td><td>Setting range: 0 to 65,535</td></tr></table></td></tr>
<tr><td></td><td>16#003A</td><td>Repetition count setting value
for Axis 1</td><td>0</td><td>Stores the specified number of positioning operations to be repeated. If positioning operation is not repeated, 1 is stored.
If positioning operation is repeated limitlessly, 255 is stored.<table><tr><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>Repetition count
setting value</td><td>-</td><td>Setting range: 0 to 255
Unit: Number of times</td></tr></table></td></tr>
<tr><td></td><td>16#003B</td><td>Repetition count current value
for Axis 1</td><td>0</td><td>Stores the current number of repetitions during the operation. If operation is not repeated, 1 is stored.
When the current number of repetitions exceeds the upper limit, this number returns to "0".<table><tr><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>Repetition count
setting value</td><td>-</td><td>Setting range: 0 to 65,535
Unit: Number of times</td></tr></table></td></tr>
<tr><td></td><td>16#003C</td><td rowspan="2">Current value of Axis 1</td><td rowspan="2">0</td><td rowspan="2">Stores the current value based on the machine zero point (home position) as the number of pulses.
When home return is completed, the value is reset to 0.<table><tr><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>Current value</td><td>-</td><td>Setting range:
-2,147,483,648 to +2,147,483,647
Unit: Pulses</td></tr></table>The value is not updated when the current value update function is executed.</td></tr>
<tr><td></td><td>16#003D</td></tr>
<tr><td rowspan="2">16#01</td><td>16#003E</td><td rowspan="2">Unit-converted current value for Axis 1
Current value</td><td rowspan="2">0</td><td rowspan="2">Stores the current value based on the electrical zero point (the value set in “Home coordinates”). This value is converted to the unit (pulses, μm, inches, or degrees) selected in the setting area for each axis.
When home return is completed, the value set in “Home coordinates” is stored. If “0” is set in “Home coordinates”, the value will be reset to “0”.</td></tr>
<tr><td>16#003F</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Current value</td><td>-</td><td>Setting range:
-2,147,483,648 to +2,147,483,647
Unit: pulses, μm, inches, degrees</td></tr>
</table>
This area is also updated when the current value update coordinate function is used.</td></tr>
</table>

■ Information for Axis 2

Bank	Offset address	Name	Default	Description
16#01	16#0040 to 16#0047	System ID of Axis 2 (Brand name or vendor name)	-	Refer to the same item corresponding to Axis 1.
	16#0048 to 16#004F	System ID of Axis 2 (Amplifier model code)	-	Refer to the same item corresponding to Axis 1.
	16#0050 to 16#0057	System ID of Axis 2 (Firmware version)	-	Refer to the same item corresponding to Axis 1.
	16#0058 to 16#005F	System ID of Axis 2 (Motor model code)	-	Refer to the same item corresponding to Axis 1.
	16#0060	Phase of Axis-2 slave axis	0	Refer to the same item corresponding to Axis 1.
	16#0061			
	16#0062 to 16#0063	-	-	-
	16#0064	Advance angle correction amount for Axis 2	0	Refer to the same item corresponding to Axis 1.
	16#0065			
	16#0066 to 16#006B	-	-	-
	16#006C	Axis 2 pulse command value	0	Refer to the same item corresponding to Axis 1.
	16#006D			
	16#006E	Unit-converted command value for Axis 2	0	Refer to the same item corresponding to Axis 1.
	16#006F			
	16#0070	Status display for Axis 2	16#0000	Refer to the same item corresponding to Axis 1.
	16#0071	External terminal input monitoring for Axis 2	16#0000	Refer to the same item corresponding to Axis 1.

Bank	Offset address	Name	Default	Description
	16#0072	Torque command for Axis 2	-	Refer to the same item corresponding to Axis 1.
	16#0073	Actual speed for Axis 2	-	Refer to the same item corresponding to Axis 1.
	16#0074	Deviation for Axis 2	-	Refer to the same item corresponding to Axis 1.
	16#0075			
	16#0076	-	-	-
	16#0077	-	-	-
	16#0078	Active table or completed table for Axis 2	0	Refer to the same item corresponding to Axis 1.
	16#0079	Auxiliary output code for Axis 2	0	Refer to the same item corresponding to Axis 1.
	16#007A	Repetition count setting value for Axis 2	0	Refer to the same item corresponding to Axis 1.
	16#007B	Repetition count current value for Axis 2	0	Refer to the same item corresponding to Axis 1.
	16#007C	Current value of Axis 2	0	Refer to the same item corresponding to Axis 1.
	16#007D			
	16#007E	Unit-converted current value for Axis 2 Current value	0	Refer to the same item corresponding to Axis 1.
	16#007F			

■ Information for Axis 3

Bank	Offset address	Name	Default	Description
16#01	16#0080 to 16#0087	System ID of Axis 3 (Brand name or vendor name)	-	Refer to the same item corresponding to Axis 1.
	16#0088 to 16#008F	System ID of Axis 3 (Amplifier model code)	-	Refer to the same item corresponding to Axis 1.
	16#0090 to 16#0097	System ID of Axis 3 (Firmware version)	-	Refer to the same item corresponding to Axis 1.
	16#0098 to 16#009F	System ID of Axis 3 (Motor model code)	-	Refer to the same item corresponding to Axis 1.
	16#00A0	Phase of Axis-3 slave axis	0	Refer to the same item corresponding to Axis 1.
	16#00A1			

Bank	**Offset address**	**Name**	**Default**	**Description**
	16#00A2 to 16#00A3	-	-	-
	16#00A4	Advance angle correction amount for Axis 3	0	Refer to the same item corresponding to Axis 1.
	16#00A5			
	16#00A6 to 16#00AB	-	-	-
	16#00AC	Axis 3 pulse command value	0	Refer to the same item corresponding to Axis 1.
	16#00AD			
	16#00AE	Unit-converted command value for Axis 3	0	Refer to the same item corresponding to Axis 1.
	16#00AF			
	16#00B0	Status display for Axis 3	16#0000	Refer to the same item corresponding to Axis 1.
	16#00B1	External terminal input monitoring for Axis 3	16#0000	Refer to the same item corresponding to Axis 1.
	16#00B2	Torque command for Axis 3	-	Refer to the same item corresponding to Axis 1.
	16#00B3	Actual speed for Axis 3	-	Refer to the same item corresponding to Axis 1.
	16#00B4	Deviation for Axis 3	-	Refer to the same item corresponding to Axis 1.
	16#00B5			
	16#00B6	-	-	-
	16#00B7	-	-	-
	16#00B8	Active table or completed table for Axis 3	0	Refer to the same item corresponding to Axis 1.
	16#00B9	Auxiliary output code for Axis 3	0	Refer to the same item corresponding to Axis 1.
	16#00BA	Repetition count setting value for Axis 3	0	Refer to the same item corresponding to Axis 1.
	16#00BB	Repetition count current value for Axis 3	0	Refer to the same item corresponding to Axis 1.
	16#00BC	Current value of Axis 3	0	Refer to the same item corresponding to Axis 1.
	16#00BD			
	16#00BE	Unit-converted current value for Axis 3 Current value	0	Refer to the same item corresponding to Axis 1.
	16#00BF			

■ Information for Axis 4

Bank	Offset address	Name	Default	Description
16#01	16#00C0 to 16#00C7	System ID of Axis 4 (Brand name or vendor name)	-	Refer to the same item corresponding to Axis 1.
	16#00C8 to 16#00CF	System ID of Axis 4 (Amplifier model code)	-	Refer to the same item corresponding to Axis 1.
	16#00D0 to 16#00D7	System ID of Axis 4 (Firmware version)	-	Refer to the same item corresponding to Axis 1.
	16#00D8 to 16#00DF	System ID of Axis 4 (Motor model code)	-	Refer to the same item corresponding to Axis 1.
	16#00E0	Phase of Axis-4 slave axis	0	Refer to the same item corresponding to Axis 1.
	16#00E1			
	16#00E2 to 16#00E3	-	-	-
	16#00E4	Advance angle correction amount for Axis 4	0	Refer to the same item corresponding to Axis 1.
	16#00E5			
	16#00E6 to 16#00EB	-	-	-
	16#00EC	Axis 4 pulse command value	0	Refer to the same item corresponding to Axis 1.
	16#00ED			
	16#00EE	Unit-converted command value for Axis 4	0	Refer to the same item corresponding to Axis 1.
	16#00EF			
	16#00F0	Status display for Axis 4	16#0000	Refer to the same item corresponding to Axis 1.
	16#00F1	External terminal input monitoring for Axis 4	16#0000	Refer to the same item corresponding to Axis 1.
	16#00F2	Torque command for Axis 4	-	Refer to the same item corresponding to Axis 1.
	16#00F3	Actual speed for Axis 4	-	Refer to the same item corresponding to Axis 1.
	16#00F4	Deviation for Axis 4	-	Refer to the same item corresponding to Axis 1.
	16#00F5			
	16#00F6	-	-	-
	16#00F7	-	-	-
	16#00F8	Active table or completed table for Axis 4	0	Refer to the same item corresponding to Axis 1.

Bank	Offset address	Name	Default	Description
	16#00F9	Auxiliary output code for Axis 4	0	Refer to the same item corresponding to Axis 1.
	16#00FA	Repetition count setting value for Axis 4	0	Refer to the same item corresponding to Axis 1.
	16#00FB	Repetition count current value for Axis 4	0	Refer to the same item corresponding to Axis 1.
	16#00FC	Current value of Axis 4	0	Refer to the same item corresponding to Axis 1.
	16#00FD			
	16#00FE	Unit-converted current value for Axis 4 Current value	0	Refer to the same item corresponding to Axis 1.
	16#00FF			

■ Information for Axis 5

Bank	Offset address	Name	Default	Description
16#01	16#0100 to 16#0107	System ID of Axis 5 (Brand name or vendor name)	-	Refer to the same item corresponding to Axis 1.
	16#0108 to 16#010F	System ID of Axis 5 (Amplifier model code)	-	Refer to the same item corresponding to Axis 1.
	16#0110 to 16#0117	System ID of Axis 5 (Firmware version)	-	Refer to the same item corresponding to Axis 1.
	16#0118 to 16#011F	System ID of Axis 5 (Motor model code)	-	Refer to the same item corresponding to Axis 1.
	16#0120	Phase of Axis-5 slave axis	0	Refer to the same item corresponding to Axis 1.
	16#0121			
	16#0122 to 16#0123	-	-	-
	16#0124	Advance angle correction amount for Axis 5	0	Refer to the same item corresponding to Axis 1.
	16#0125			
	16#0126 to 16#012B	-	-	-
	16#012C	Axis 5 pulse command value	0	Refer to the same item corresponding to Axis 1.
	16#012D			
	16#012E	Unit-converted command value for Axis 5	0	Refer to the same item corresponding to Axis 1.
	16#012F			

Bank	Offset address	Name	Default	Description
	16#0130	Status display for Axis 5	16#0000	Refer to the same item corresponding to Axis 1.
	16#0131	External terminal input monitoring for Axis 5	16#0000	Refer to the same item corresponding to Axis 1.
	16#0132	Torque command for Axis 5	-	Refer to the same item corresponding to Axis 1.
	16#0133	Actual speed for Axis 5	-	Refer to the same item corresponding to Axis 1.
	16#0134	Deviation for Axis 5	-	Refer to the same item corresponding to Axis 1.
	16#0135			
	16#0136	-	-	-
	16#0137	-	-	-
	16#0138	Active table or completed table for Axis 5	0	Refer to the same item corresponding to Axis 1.
	16#0139	Auxiliary output code for Axis 5	0	Refer to the same item corresponding to Axis 1.
	16#013A	Repetition count setting value for Axis 5	0	Refer to the same item corresponding to Axis 1.
	16#013B	Repetition count current value for Axis 5	0	Refer to the same item corresponding to Axis 1.
	16#013C	Current value of Axis 5	0	Refer to the same item corresponding to Axis 1.
	16#013D			
	16#013E	Unit-converted current value for Axis 5	0	Refer to the same item corresponding to Axis 1.
	16#013F			

■ Information for Axis 6

Bank	Offset address	Name	Default	Description
16#01	16#0140 to 16#0147	System ID of Axis 6 (Brand name or vendor name)	-	Refer to the same item corresponding to Axis 1.
	16#0148 to 16#014F	System ID of Axis 6 (Amplifier model code)	-	Refer to the same item corresponding to Axis 1.
	16#0150 to 16#0157	System ID of Axis 6 (Firmware version)	-	Refer to the same item corresponding to Axis 1.
	16#0158 to 16#015F	System ID of Axis 6 (Motor model code)	-	Refer to the same item corresponding to Axis 1.

Bank	Offset address	Name	Default	Description
	16#0160	Phase of Axis-6 slave axis	0	Refer to the same item corresponding to Axis 1.
	16#0161			
	16#0162 to 16#0163	-	-	-
	16#0164	Advance angle correction amount for Axis 6	0	Refer to the same item corresponding to Axis 1.
	16#0165			
	16#0166 to 16#016B	-	-	-
	16#016C	Axis 6 pulse command value	0	Refer to the same item corresponding to Axis 1.
	16#016D			
	16#016E	Unit-converted command value for Axis 6	0	Refer to the same item corresponding to Axis 1.
	16#016F			
	16#0170	Status display for Axis 6	16#0000	Refer to the same item corresponding to Axis 1.
	16#0171	External terminal input monitoring for Axis 6	16#0000	Refer to the same item corresponding to Axis 1.
	16#0172	Torque command for Axis 6	-	Refer to the same item corresponding to Axis 1.
	16#0173	Actual speed for Axis 6	-	Refer to the same item corresponding to Axis 1.
	16#0174	Deviation for Axis 6	-	Refer to the same item corresponding to Axis 1.
	16#0175			
	16#0176	-	-	-
	16#0177	-	-	-
	16#0178	Active table or completed table for Axis 6	0	Refer to the same item corresponding to Axis 1.
	16#0179	Auxiliary output code for Axis 6	0	Refer to the same item corresponding to Axis 1.
	16#017A	Repetition count setting value for Axis 6	0	Refer to the same item corresponding to Axis 1.
	16#017B	Repetition count current value for Axis 6	0	Refer to the same item corresponding to Axis 1.
	16#017C	Current value of Axis 6	0	Refer to the same item corresponding to Axis 1.
	16#017D			
	16#017E	Unit-converted current value for Axis 6	0	Refer to the same item corresponding to Axis 1.
	16#017F			

■ Information for Axis 7 (virtual)

Bank	Offset address	Name	Default	Description
16#01	16#0180 to 16#0187	System ID of Axis 7 (Brand name or vendor name)	-	Refer to the same item corresponding to Axis 1.
	16#0188 to 16#018F	System ID of Axis 7 (Amplifier model code)	-	Refer to the same item corresponding to Axis 1.
	16#0190 to 16#0197	System ID of Axis 7 (Firmware version)	-	Refer to the same item corresponding to Axis 1.
	16#0198 to 16#019F	System ID of Axis 7 (Motor model code)	-	Refer to the same item corresponding to Axis 1.
	16#01A0	Phase of Axis-7 slave axis	0	Refer to the same item corresponding to Axis 1.
	16#01A1			
	16#01A2 to 16#01A3	-	-	-
	16#01A4	Advance angle correction amount for Axis 7	0	Refer to the same item corresponding to Axis 1.
	16#01A5			
	16#01A6 to 16#01AB	-	-	-
	16#01AC	Axis 7 pulse command value	0	Refer to the same item corresponding to Axis 1.
	16#01AD			
	16#01AE	Unit-converted command value for Axis 7	0	Refer to the same item corresponding to Axis 1.
	16#01AF			
	16#01B0	Status display for Axis 7	16#0000	Refer to the same item corresponding to Axis 1.
	16#01B1	External terminal input monitoring for Axis 2	16#0000	Refer to the same item corresponding to Axis 1.
	16#01B2	Torque command for Axis 7	-	Refer to the same item corresponding to Axis 1.
	16#01B3	Actual speed for Axis 7	-	Refer to the same item corresponding to Axis 1.
	16#01B4	Deviation for Axis 7	-	Refer to the same item corresponding to Axis 1.
	16#01B5			
	16#01B6	-	-	-
	16#01B7	-	-	-
	16#01B8	Active table or completed table for Axis 7	0	Refer to the same item corresponding to Axis 1.

Bank	Offset address	Name	Default	Description
	16#01B9	Auxiliary output code for Axis 7	0	Refer to the same item corresponding to Axis 1.
	16#01BA	Repetition count setting value for Axis 7	0	Refer to the same item corresponding to Axis 1.
	16#01BB	Repetition count current value for Axis 7	0	Refer to the same item corresponding to Axis 1.
	16#01BC	Current value of Axis 7	0	Refer to the same item corresponding to Axis 1.
	16#01BD			
	16#01BE	Unit-converted current value for Axis 7 Current value	0	Refer to the same item corresponding to Axis 1.
	16#01BF			

■ Information for Axis 8 (virtual)

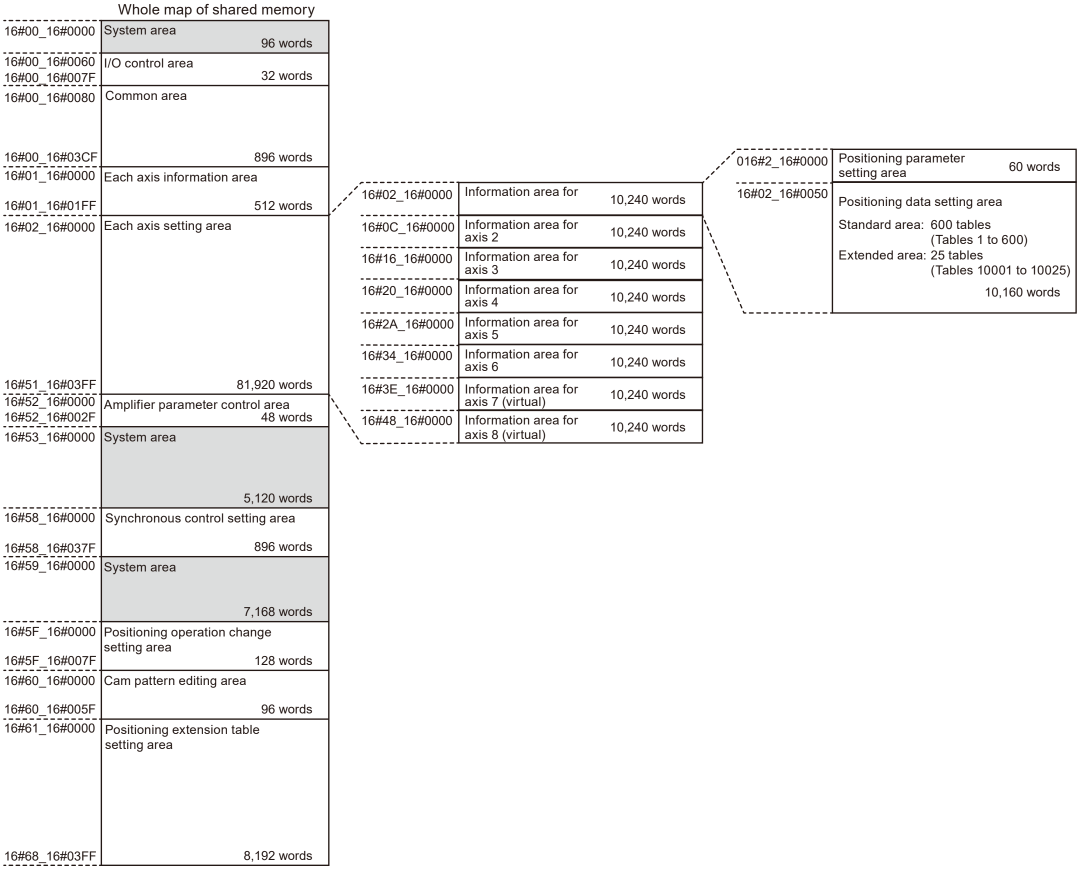
Bank	Offset address	Name	Default	Description
16#01	16#01C0 to 16#01C7	System ID of Axis 8 (Brand name or vendor name)	-	Refer to the same item corresponding to Axis 1.
	16#01C8 to 16#01CF	System ID of Axis 8 (Amplifier model code)	-	Refer to the same item corresponding to Axis 1.
	16#01D0 to 16#01D7	System ID of Axis 8 (Firmware version)	-	Refer to the same item corresponding to Axis 1.
	16#01D8 to 16#01DF	System ID of Axis 8 (Motor model code)	-	Refer to the same item corresponding to Axis 1.
	16#01E0	Phase of Axis-8 slave axis	0	Refer to the same item corresponding to Axis 1.
	16#01E1			
	16#01E2 to 16#01E3	-	-	-
	16#01E4	Advance angle correction amount for Axis 8	0	Refer to the same item corresponding to Axis 1.
	16#01E5			
	16#01E6 to 16#01EB	-	-	-
	16#01EC	Axis 8 pulse command value	0	Refer to the same item corresponding to Axis 1.
	16#01ED			
	16#01EE	Unit-converted command value for Axis 8	0	Refer to the same item corresponding to Axis 1.
	16#01EF			

Bank	**Offset address**	**Name**	**Default**	**Description**
	16#01F0	Status display for Axis 8	16#0000	Refer to the same item corresponding to Axis 1.
	16#01F1	External terminal input monitoring for Axis 8	16#0000	Refer to the same item corresponding to Axis 1.
	16#01F2	Torque command for Axis 8	-	Refer to the same item corresponding to Axis 1.
	16#01F3	Actual speed for Axis 8	-	Refer to the same item corresponding to Axis 1.
	16#01F4	Deviation for Axis 8	-	Refer to the same item corresponding to Axis 1.
	16#01F5			
	16#01F6	-	-	-
	16#01F7	-	-	-
	16#01F8	Active table or completed table for Axis 8	0	Refer to the same item corresponding to Axis 1.
	16#01F9	Auxiliary output code for Axis 8	0	Refer to the same item corresponding to Axis 1.
	16#01FA	Repetition count setting value for Axis 8	0	Refer to the same item corresponding to Axis 1.
	16#01FB	Repetition count current value for Axis 8	0	Refer to the same item corresponding to Axis 1.
	16#01FC	Current value of Axis 8	0	Refer to the same item corresponding to Axis 1.
	16#01FD			
	16#01FE	Unit-converted current value for Axis 8 Current value	0	Refer to the same item corresponding to Axis 1.
	16#01FF			

18.7 Details of Each Axis Setting Area in Shared Memory

18.7.1 Configuration of Each Axis Setting Area

The each axis setting area is used to set positioning parameters and positioning data. Positioning data settings for each axis are composed of 600 tables in the standard area and 25 tables (Tables 10001 to 10025) in the extended area.



18.7.2 Positioning Parameter Setting Area

The shared memory addresses of positioning parameters are the starting addresses allocated to each axis plus an offset address.

■ Starting addresses of positioning parameters for each axis

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	Axis 8	Address	Description
Bank									
16#02	16#0C	16#16	16#20	16#2A	16#34	16#3E	16#48	16#0000	Starting addresses of positioning parameters

■ Positioning parameters for each axis

Data in the following format is stored in the memory starting from the starting address of the positioning parameters for each axis.

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>16#0000</td><td>Unit setting</td><td>16#0000</td><td>Sets the unit system for the movement amount for positioning control of each axis. Set the same unit system for all interpolation axes.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>Unit setting</td><td>Sets the unit of movement amounts for positioning control.
16#0000: Pulses
16#0100: um (Minimum position command: 0.1 um)
16#0101: um (Minimum position command: 1 um)
16#0200: inch
(Minimum position command: 0.1 inches)
16#0201: inch (Minimum position command: 1 inch)
16#0300: degree
(Minimum position command: 0.1 degree)
16#0301: degree
(Minimum position command: 1 degree)
Any other settings will result in an error.</td></tr>
</table></td></tr>
<tr><td>16#0001</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0002</td><td rowspan="2">Number of pulses per revolution</td><td rowspan="2">1</td><td rowspan="2">Sets the number of pulses per motor revolution. This is required to convert the number of pulses in terms of mm, inches, or degrees.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>31 to 0</td><td>Number of pulses per revolution</td><td>Number of pulses per motor revolution
Setting range: 1 to 16,777,215
Unit: mm, inches, degrees
Any other settings will result in an error.</td></tr>
</table></td></tr>
<tr><td>16#0003</td></tr>
<tr><td>16#0004</td><td rowspan="2">Movement amount per revolution</td><td rowspan="2">1</td><td rowspan="2">Sets the movement amount per motor revolution. This is required to convert the number of pulses in terms of mm, inches, or degrees.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>31 to 0</td><td>Movement amount per revolution</td><td>Movement amount per motor revolution
Setting range: 1 to 16,777,215
Unit: mm; 1 um</td></tr>
</table></td></tr>
<tr><td>16#0005</td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td></td><td></td><td>inch: 1/10,000 inch
degree: 1 degree
Any other settings will result in an error.</td></tr>
</table>
</td></tr>
<tr><td>16#0006</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0007</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0008</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0009</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#000A</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#000B</td><td>Soft limit enable/ disable setting</td><td>16#0000</td><td>Enables or disables soft limits for each control.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>Enable/disable soft limits during positioning control</td><td>0: Disables soft limits during positioning control.
1: Enables soft limits during positioning control.</td></tr>
<tr><td>1</td><td>Enable/disable soft limits during home return</td><td>0: Disables soft limits during home return.
1: Enables soft limits during home return.</td></tr>
<tr><td>2</td><td>Enable/disable soft limits during JOG operation</td><td>0: Disables soft limits during JOG operation.
1: Enables soft limits during JOG operation.</td></tr>
<tr><td>3</td><td>Enable/disable soft limits during pulser operation</td><td>0: Disables soft limits during pulser operation.
1: Enables soft limits during pulser operation.</td></tr>
<tr><td>15 to 4</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>16#000C</td><td rowspan="2">Soft limits: Upper limit value</td><td rowspan="2">+2147482624</td><td rowspan="2">Sets the upper limit value of soft limits for absolute coordinates.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Soft limits: Upper limit value</td><td>+2147482624</td><td>Setting range: -2147482624 to +2147482624
Any other settings will result in an error.</td></tr>
</table>
Interpretation changes according to the unit settings as below.
Pulses: -2,147,482,624 to 2,147,482,624 pulses
μm (0.1 μm): -214,748,262.4 to 214,748,262.4 μm
μm (1 μm): -2,147,482,624 to 2,147,482,624 μm
inch (0.00001 inch): -21,474.82624 to 21,474.82624 inches
inch (0.0001 inch): -214,748.2624 to 214,748.2624 inch
degree (0.1 degree): -214,748,262.4 to 214,748,262.4 degrees
degree (1 degree): -2,147,482,624 to 2,147,482,624 degrees</td></tr>
<tr><td>16#000D</td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>16#000E</td><td rowspan="2">Soft limits: Lower limit value</td><td rowspan="2">-2147482624</td><td rowspan="2">Sets the lower limit value of soft limits for absolute coordinates.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Soft limits: Lower limit value</td><td>-2147482624</td><td>Setting range: -2147482624 to +2147482624
Any other settings will result in an error.</td></tr>
</table>
Interpretation changes according to the unit settings as below.
Pulses: -2,147,482,624 to 2,147,482,624 pulses
μm (0.1 μm): -214,748,262.4 to 214,748,262.4 μm
μm (1 μm): -2,147,482,624 to 2,147,482,624 μm
inch (0.00001 inch): -21,474.82624 to 21,474.82624 inches
inch (0.0001 inch): -214,748.2624 to 214,748.2624 inch
degree (0.1 degree): -214,748,262.4 to 214,748,262.4 degrees
degree (1 degree): -2,147,482,624 to 2,147,482,624 degrees</td></tr>
<tr><td>16#0000F</td></tr>
<tr><td>16#0010</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0011</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0012</td><td>Auxiliary output mode</td><td>16#0A00</td><td>Sets whether to use the auxiliary output function for auxiliary output contacts and auxiliary output codes. The ON time of the auxiliary output contact is determined by “Auxiliary output ON time” below.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>7 to 0</td><td>Auxiliary output mode</td><td>16#00: Do not use auxiliary output function (auxiliary output contacts, auxiliary output codes).
16#01: Use With mode.
16#02: Use Delay mode.
Any other settings will result in an error.</td></tr>
<tr><td>15 to 8</td><td>Auxiliary output ON time</td><td>Setting range:
16#00 (0 ms) to 16#FF (255 ms)</td></tr>
</table></td></tr>
<tr><td>16#0013</td><td>Auxiliary output Delay ratio</td><td>0</td><td>When using Delay mode for auxiliary output, specifies the ratio (%) of output. The setting range is 0% to 100%. If the setting is 50%, auxiliary output will be performed when the positioning movement amount exceeds 50%.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>Auxiliary output
Delay ratio</td><td>Set the delay ratio.
Setting range: 0 to 100
Unit: %
Any other settings will result in an error.</td></tr>
</table></td></tr>
<tr><td>16#0014</td><td>Amplifier operation settings</td><td>16#0001</td><td>Enables/disables the limit input of amplifiers and sets the movement direction or limit connection method, etc.</td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td>(Note 1): The settings must be written to EEPROM within the amplifier, so the amplifier must be restarted after the settings are complete.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>Limit enable/ disable</td><td>0: Use the input of the limit signal.
1: Ignore the input of the limit signal.</td></tr>
<tr><td>1</td><td>CW/CCW
movement direction</td><td>0: CW+/CCW-
1: CCW+/CW-</td></tr>
<tr><td>2</td><td>Limit connection</td><td>0: Standard connection
(Forward: CWL, Reverse: CCWL)
1: Reverse connection
(Forward: CCWL, Reverse: CWL)</td></tr>
<tr><td>15 to 3</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td>16#0015 to 16#0019</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#001A</td><td rowspan="2">Completion width</td><td rowspan="2">10</td><td rowspan="2">The complete flag turns ON when the specified movement amount or the current value of the amplifier falls within the completion width during positioning control or JOG operation.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>31 to 0</td><td>Completion width</td><td>Set the completion width.
Setting range: 0 to 2,147,482,624
Unit: Pulses
Any other settings will result in an error.</td></tr>
</table></td></tr>
<tr><td>16#001B</td></tr>
<tr><td>16#001C</td><td>Monitor value error setting</td><td>16#0000</td><td>The judgment value for the torque monitor value and the actual speed of each axis can be set to issue an error or warning.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>Enable torque judgment value</td><td>0: Disables torque judgment values.
1: Enables torque judgment values.</td></tr>
<tr><td>1</td><td>Torque judgment value error/ warning setting</td><td>0: Issues an error when enabled.
1: Issues a warning when enabled.</td></tr>
<tr><td>2</td><td>Enable actual speed judgment value</td><td>0: Disables actual speed judgment values.
1: Enables actual speed judgment values.</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td><table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>3</td><td>Actual speed judgment value error/warning setting</td><td>0: Issues an error when enabled.
1: Issues a warning when enabled.</td></tr><tr><td>15 to 4</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>16#001D</td><td>Torque judgment value</td><td>5000</td><td>Sets a limit value for the torque.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>15 to 0</td><td>Torque judgement value</td><td>Sets a torque judgement value.
Setting range: 0 to 5,000
Unit: 0.1%
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td>16#001E</td><td rowspan="2">Actual speed judgment value</td><td rowspan="2">5000</td><td rowspan="2">Sets a limit value for the actual speed.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>31 to 0</td><td>Actual speed judgement value</td><td>Sets an actual speed judgement value.
Setting range: 0 to 10,000
Unit: rpm
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td>16#001F</td></tr>
<tr><td>16#0020</td><td>Home return setting code</td><td>16#0000</td><td>Sets a pattern of home return.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>15 to 0</td><td>Home return setting code</td><td>16#0000: DOG method 1
16#0001: DOG method 2
16#0002: DOG method 3
16#0003: Limit method 1
16#0004: Limit method 2
16#0005: Z-phase method
16#0006: Stop-on-contact method 1
16#0007: Stop-on-contact method 2
16#0008: Data set
16#0100: High-speed home return method
16#0101: Absolute data set method
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td>16#0021</td><td>Home return direction</td><td>0</td><td>Sets the moving direction of home return.</td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td><table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>15 to 0</td><td>Home return direction</td><td>0: Direction in which elapsed value decreases (Limit “-” direction)
1: Direction in which elapsed value increases (Limit “+” direction)
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td>16#0022</td><td>Home return acceleration time</td><td>100</td><td rowspan="2">Sets the acceleration or deceleration time during home return.
At the start of home return, acceleration is performed for the specified acceleration time, deceleration is performed for the specified deceleration time after near home input, and then the speed changes to the creep rate.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>15 to 0</td><td>Home return acceleration time
Home return deceleration time</td><td>Sets acceleration time or deceleration time.
Setting range: 0 to 10,000
Unit: ms
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td>16#0023</td><td>Home return deceleration time</td><td>100</td></tr>
<tr><td>16#0024</td><td rowspan="2">Home return target speed</td><td rowspan="2">1,000</td><td rowspan="2">Sets the target speed for home return.
If there is no near home input after home return starts, acceleration is performed to shift to the target speed.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>31 to 0</td><td>Home return target speed</td><td>Setting range: 1 to 2,147,482,624
Unit: Dependent upon the specified unlit
Any other settings will result in an error.
The setting range changes according to the unit settings as below.
Pulses: 1 to 2,147,482,624 pps
μm: 1 to 2,147,482,624 μm/s
inch: 0.001 to 2,147,482.624 inches/s
degree: 0.001 to 2,147,482.624 rev/s</td></tr></table></td></tr>
<tr><td>16#0025</td></tr>
<tr><td>16#0026</td><td rowspan="2">Home position return creep speed</td><td rowspan="2">100</td><td rowspan="2">Sets the speed of searching for the home position after near home input.
Set a value lower than the home return target speed.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>31 to 0</td><td>Home return creep speed</td><td>Setting range: 1 to 2,147,482,624
Unit: Dependent upon the specified unlit</td></tr></table></td></tr>
<tr><td>16#0027</td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td></td><td></td><td>Any other settings will result in an error.
The setting range changes according to the unit settings as below.
Pulses: 1 to 2,147,482,624 pps
μm: 1 to 2,147,482,624 μm/s
inch: 0.001 to 2,147,482.624 inches/s
degree: 0.001 to 2,147,482.624 rev/s</td></tr>
</table>
</td></tr>
<tr><td>16#0028</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0029</td><td>JOG operation setting code</td><td>16#0000</td><td>Sets the mode of JOG operation.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>-</td><td>-</td></tr>
<tr><td>1</td><td>Acceleration/ deceleration pattern setting</td><td>0: Linear acceleration / deceleration
1: S-shaped acceleration / deceleration</td></tr>
<tr><td>15 to 2</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>16#002A</td><td>JOG operation acceleration time</td><td>100</td><td rowspan="2">Sets the acceleration time or deceleration time for JOG operation.
Acceleration is performed for the specified acceleration time at the beginning of JOG operation and deceleration is performed for the specified deceleration time when the starting contact of JOG operation turns OFF.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>JOG operation acceleration time
JOG operation deceleration time</td><td>Sets acceleration time or deceleration time.
Setting range: 0 to 10,000
Unit: ms
Any other settings will result in an error.</td></tr>
</table>
</td></tr>
<tr><td>16#002B</td><td>JOG operation deceleration time</td><td>100</td></tr>
<tr><td>16#002C
16#002D</td><td>JOG operation target speed</td><td>1,000</td><td>Sets the target speed for JOG operation.
After JOG operation is started, acceleration operation is performed to shift to the target speed while the starting contact of JOG operation is ON. After the target speed is reached, operations are performed at the target speed.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>31 to 0</td><td>JOG operation target speed</td><td>Setting range: 1 to 2,147,482,624
Unit: Dependent upon the specified unlit
Any other settings will result in an error.</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td><table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td></td><td></td><td>The setting range changes according to the unit settings as below.
Pulses: 1 to 2,147,482,624 pps
μm: 1 to 2,147,482,624 μm/s
inch: 0.001 to 2,147,482.624 inches/s
degree: 0.001 to 2,147,482.624 rev/s</td></tr>
</table></td></tr>
<tr><td>16#002E to 16#0032</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0033</td><td>Emergency stop deceleration time</td><td>-</td><td>This parameter takes effect when an emergency stop is requested by I/O, causing the deceleration operation to be completed in the specified deceleration time.<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>Emergency stop deceleration time</td><td>Sets the deceleration time for stop operation.
Setting range: 0 to 10,000
Unit: ms
Any other settings will result in an error.</td></tr>
</table></td></tr>
<tr><td>16#0034</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0035</td><td>Limit stop deceleration time</td><td></td><td>This parameter takes effect when the limit is input during operation, causing the deceleration operation to be completed in the specified deceleration time.<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>Limit stop deceleration time</td><td>Sets the deceleration time for stop operation.
Setting range: 0 to 10,000
Unit: ms
Any other settings will result in an error.</td></tr>
</table></td></tr>
<tr><td>16#0036</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0037</td><td>Error stop deceleration time</td><td></td><td>This parameter takes effect when an error occurs, causing the deceleration operation to be completed in the specified deceleration time.<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>Error stop deceleration time</td><td>Sets the deceleration time for stop operation.
Setting range: 0 to 10,000
Unit: ms
Any other settings will result in an error.</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>16#0038</td><td>Pulser operation setting code</td><td>16#0000</td><td>Selects the channel (1 to 3) to be used in the pulse input circuit when pulser operation is requested by I/O.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>15 to 0</td><td>Pulser operation setting code</td><td>0: Pulse input CH1
1: Pulse input CH2
2: Pulse input CH3
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td>16#0039</td><td>Pulser operation ratio numerator</td><td>1</td><td>Sets a multiplier for input pulse trains during pulser operation.
Multiply the input pulse train from the pulser by
(Pulser operation ratio numerator) / (Pulser operation ratio denominator)
to obtain the number of command pulses.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>15 to 0</td><td>Pulser operation ratio numerator</td><td>Setting range: 1 to 32,767
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td>16#003A</td><td>Pulser operation ratio denominator</td><td>1</td><td>Sets a multiplier for input pulse trains during pulser operation.
Multiply the input pulse train from the pulser by
(Pulser operation ratio numerator) / (Pulser operation ratio denominator)
to obtain the number of command pulses.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>15 to 0</td><td>Pulser operation ratio denominator</td><td>Setting range: 1 to 32,767
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td>16#003B</td><td>Pulser operation method</td><td>16#0000</td><td>Sets the pulser operation method.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>15 to 0</td><td>Pulser operation method</td><td>0: Standard operation
1: Speed limit (Pulse retention)
2: Speed limit (Pulse truncation)
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td>16#003C</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#003D</td><td>Stop-on-contact torque value for home return</td><td>100</td><td>Use this parameter when stop-on-contact method 1 or 2 is specified for the home return method.
It is regarded as a criterion for judging the home return once the torque value of the AMP exceeded this set value by the stop-on-contact.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>15 to 0</td><td>Stop-on-contact torque value for home return</td><td>Sets the deceleration time for stop operation.</td></tr></table></td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td></td><td></td><td>Setting range: 0 to 5,000
Unit: %
Any other settings will result in an error.</td></tr>
</table>
</td></tr>
<tr><td>16#003E</td><td>Stop-on-contact torque value for home return
Stop-on-contact judgment time</td><td>100</td><td>Use this parameter when stop-on-contact method 1 or 2 is specified for the home return method.
Whether the specified time has elapsed since the torque value of the amplifier exceeded the set value of "Stop-on-contact torque value for home return" due to stop-on-contact is used as the judgment criteria for home return.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>Stop-on-contact torque value for home return
Stop-on-contact judgment time</td><td>Sets the deceleration time for stop operation.
Setting range: 0 to 10,000
Unit: ms
Any other settings will result in an error.</td></tr>
</table>
</td></tr>
<tr><td>16#003F</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0040</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0041</td><td>J-point control code</td><td>16#0000</td><td>Sets the control code for J-point control.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>-</td><td>-</td></tr>
<tr><td>1</td><td>Acceleration/ deceleration pattern setting</td><td>0: Linear acceleration / deceleration
1: S-shaped acceleration / deceleration</td></tr>
<tr><td>15 to 2</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>16#0042</td><td>J-point acceleration time</td><td>100</td><td rowspan="2">Sets the acceleration/deceleration time for J-point control.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>J-point acceleration time
J-point deceleration time</td><td>Sets acceleration time or deceleration time.
Setting range: 0 to 10,000
Unit: ms
Any other settings will result in an error.</td></tr>
</table>
</td></tr>
<tr><td>16#0043</td><td>J-point deceleration time</td><td>100</td></tr>
<tr><td>16#0044</td><td rowspan="2">J-point target speed</td><td rowspan="2">1,000</td><td rowspan="2">Sets the target speed for J-point control.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>31 to 0</td><td>J-point target speed</td><td>Setting range: 1 to 2,147,482,624
Unit: Dependent upon the specified unlit
Any other settings will result in an error.</td></tr>
</table>
</td></tr>
<tr><td>16#0045</td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td></td><td></td><td>The setting range changes according to the unit settings as below.
Pulses: 1 to 2,147,482,624 pps
μm: 1 to 2,147,482,624 μm/s
inch: 0.001 to 2,147,482.624 inches/s
degree: 0.001 to 2,147,482.624 rev/s</td></tr>
</table>
</td></tr>
<tr><td>16#0046</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0047</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0048</td><td rowspan="2">Pulser operation
maximum speed</td><td rowspan="2">1</td><td rowspan="2">Sets the maximum speed when speed limit is selected for the pulser operation method.
When the speed calculated by multiplying the pulser input by
(Pulser operation ratio numerator) / (Pulser operation ratio denominator)
is over the specified maximum speed, the operation is performed at the maximum speed.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>31 to 0</td><td>Pulser operation
maximum speed</td><td>Setting range: 1 to 2,147,482,624
Unit: Specified unit × 1000/s
Any other settings will result in an error.</td></tr>
</table>
* If this area is set to 0, the minimum speed will be used in the specified unit.</td></tr>
<tr><td>16#0049</td></tr>
<tr><td>16#004A</td><td rowspan="2">Home coordinates value</td><td rowspan="2">0</td><td rowspan="2">Sets the home coordinates value to be used after a home return operation.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Home coordinates</td><td>0</td><td>Setting range: -2147482624 to +2147482624</td></tr>
</table>
</td></tr>
<tr><td>16#004B</td></tr>
<tr><td>16#004C</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#004D</td><td>Input time constant
Pulse Input</td><td>16#0000</td><td>Sets the time constant for each pulse input signal.
Pulse inputs A and B for the same channel are set to the same input time constant.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>2 to 0</td><td>Input time constant
pulse input</td><td>16#0000: No input time constant
16#0001: 0.1 us
16#0002: 0.5 us
16#0003: 1.0 us
16#0004: 2.0 us
16#0005: 10.0 us
16#0006: No input time constant</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td><table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td></td><td></td><td>16#0007: No input time constant</td></tr>
<tr><td>15 to 3</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td>16#004E</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#004F</td><td>-</td><td>-</td><td>-</td></tr>
</table>

18.7.3 Positioning Data Setting Area

- This area is used to set positioning data. It enables the user to set positioning data independently for eight axes. Positioning data is stored as 689 tables for each axis.
- When executing an automatic operation (position control) with the positioning unit RTEX, the number of a positioning table that has been set up in advance is specified and position control is started. After position control is started, the motor is automatically controlled according to the settings in the table.
- Positioning tables can be created by either using the dedicated configuration tool Configurator PM7-RTEX or by writing positioning tables to the specified addresses using a user program.
- Positioning tables are stored in the standard area and the extended area. The standard area can store up to 600 positioning tables (tables 1 to 600) and the extended table can store up to 89 positioning tables (tables 10001 to 10089).
- The standard area is used when values are set in positioning tables beforehand. Positioning tables can be set up by using Configurator PM7-RTEX and rewritten by using a user program. However, if positioning tables are changed by using a user program, a re-creation calculation for the positioning data will be required before automatic operation is executed. This is required to shorten the positioning startup time by loading 600 positioning tables beforehand and preparing for startup within the positioning unit. If positioning data is downloaded by Configurator PM7-RTEX, data will be re-created automatically, so re-creation calculation processing will not be required. However, if positioning data is rewritten by using a user program, a re-creation calculation will be required after the data is rewritten.
- The procedure for re-creation calculation is as below.

  Procedure

  1. Change the positioning tables in the shared memory.
  2. Turn ON output contact Y107 (recalculation request contact).
  3. Check that input contact X107 (recalculation completion contact) turns ON. (Confirm that the re-creation recalculation processing is complete.)
- If positioning data is not recalculated after positioning tables are rewritten by using a user program, note that operations will be performed with the pre-rewrite positioning tables.
- The extended area is used when values cannot be set in positioning tables until immediately before positioning operations are performed.
- In an alignment application using image processing, for example, the moving distance is determined by the image processing, so positioning tables cannot be determined until immediately before positioning is started. In that case, positioning tables are set up immediately before positioning is started. In the extended area, positioning tables can be rewritten as needed, and recalculation is not required. However, up to only 89 positioning tables can be stored in the extended area and positioning tables cannot be set in the

extended area by using Configurator PM7-RTEX. A user program must be used to write each positioning table to the specified address in the shared memory. The startup time of positioning tables in the extended area is longer than that of positioning tables in the standard area, so when P-point control or C-point control is performed in the extended area, note that the startup time changes according to the number of tables to be executed consecutively.

The usage and precautions for each area are shown below.

	Usage	**Number of tables**	**Table number**	**Setup using Configurator PM7-RTEX**	**Setup using user program**
Standard area	Area that is used when set values in positioning tables are predetermined	600	1 to 600	Possible	Possible (Re-creation calculation is required)
Extended area	Area that is used when set values in positioning tables cannot be determined until immediately before positioning operations are performed	89	10001 to 10089	Not possible	Possible (Re-creation calculation is not required)

There are two extended areas for positioning tables. We recommend that an extended area with consecutive shared memory address numbers be selected according to the number of tables to be used.

■ Positioning table

Data in the following format is stored in the memory starting from the starting address of positioning tables for each axis.

For details of the starting addresses of each positioning table, refer to the lists on page "Starting addresses of each positioning table (Standard area: Tables 1 to 600)""P.18-101" and subsequent pages.

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th colspan="3">Description</th></tr>
<tr><td rowspan="5">16#0000</td><td rowspan="5">Control code</td><td rowspan="5">16#0000</td><td colspan="3">Sets the position command mode and acceleration/deceleration pattern for positioning operations.</td></tr>
<tr><td>Bit</td><td>Name</td><td>Description</td></tr>
<tr><td>0</td><td>Incremental/ absolute mode setting</td><td>0: Incremental mode
1: Absolute mode</td></tr>
<tr><td>1</td><td>Acceleration/ deceleration pattern setting</td><td>0: Linear acceleration / deceleration
1: S-shaped acceleration / deceleration</td></tr>
<tr><td>15 to 2</td><td>-</td><td>-</td></tr>
<tr><td>16#0001</td><td>Operation pattern</td><td>16#0000</td><td colspan="3">Sets single and interpolation patterns for positioning operations.
The interpolation relationship depends on the settings in the axis group setting area in the common area of the shared memory. For interpolation operations, the settings of the axis with the smallest number in an axis group take effect.</td></tr>
</table>

Offset address	Name	Default	Description		
			Bit	**Name**	**Description**
			7 to 0	Control pattern	16#00: E-point control (end point control) 16#01: P-point control (pass point control) 16#02: C-point control (continuance point control) 16#03: J-point control (speed point control) Any other settings will result in an error.
			15 to 8	Interpolation setting	16#00: Linear interpolation (composite speed specification) 16#01: Linear interpolation (long axis speed specification) 16#10: Circular interpolation (Center point specification/CW direction) 16#11: Circular interpolation (center point specification/CCW direction) 16#20: Circular interpolation (pass point specification) 16#50: Spiral interpolation (Center point specification/CW direction/X-axis feed) 16#51: Spiral interpolation (center point specification/CCW direction/X-axis feed) 16#52: Spiral interpolation (Center point specification/CW direction/Y-axis feed) 16#53: Spiral interpolation (center point specification/CCW direction/Y-axis feed) 16#54: Spiral interpolation (Center point specification/CW direction/Z-axis feed) 16#55: Spiral interpolation (center point specification/CCW direction/Z-axis feed) 16#60: Spiral interpolation (Pass point specification/X-axis feed) 16#61: Spiral interpolation (Pass point specification/Y-axis feed) 16#62: Spiral interpolation

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td></td><td></td><td>(Pass point specification/Z-axis feed)
Any other settings will result in an error.</td></tr>
</table>
</td></tr>
<tr><td>16#0002</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0003</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0004</td><td>Positioning acceleration time</td><td>100</td><td rowspan="2">Sets acceleration and deceleration times for positioning operations
Acceleration time and deceleration time can be set individually.
For interpolation operations, the settings of the axis with the smallest number in an axis group take effect.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>Positioning acceleration time
Positioning deceleration time</td><td>Sets acceleration time or deceleration time.
Setting range: 0 to 10,000
Unit: ms
Any other settings will result in an error.</td></tr>
</table>
</td></tr>
<tr><td>16#0005</td><td>Positioning deceleration time</td><td>100</td></tr>
<tr><td>16#0006</td><td rowspan="2">Positioning target speed
(Interpolation speed)</td><td rowspan="2">1,000</td><td rowspan="2">For single operations (non-interpolation), the target speed is that of the relevant axis. For interpolation operations, the target speed is that for interpolation.
For interpolation operations, the settings of the axis with the smallest number in an axis group take effect.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>31 to 0</td><td>Positioning target speed
(Interpolation speed)</td><td>Setting range: 1 to 2,147,482,624
Unit: Dependent upon the specified unlit
Any other settings will result in an error.
The setting range changes according to the unit settings as below.
Pulses: 1 to 2,147,482,624 pps
μm : 1 to 2,147,482,624 μm/s
Inches: 0.001 to 2,147,482.624 inches/s
Degrees: 0.001 to 2,147,482.624 rev/s</td></tr>
</table>
</td></tr>
<tr><td>16#0007</td></tr>
<tr><td>16#0008</td><td rowspan="2">Positioning movement amount</td><td rowspan="2">0</td><td rowspan="2">Sets the movement amount for positioning operations.
Interpretation switches between the incremental movement amount and absolute movement amount according to the control code setting.</td></tr>
<tr><td>16#0009</td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td><table><tr><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>Positioning movement amount</td><td>0</td><td>Setting range: -2147482624 to +2147482624
Any other settings will result in an error.</td></tr></table>Interpretation changes according to the unit settings as below.
Pulses: -2,147,482,624 to 2,147,482,624 pulses
µm (0.1 µm)：-214,748,262.4 to 214,748,262.4 µm
µm (1 µm): -2,147,482,624 to 2,147,482,624 µm
Inches (0.00001 inch): -21,474.82624 to 21,474.82624 inches
inch (0.0001 inch): -214,748.2624 to 214,748.2624 inch
Degrees (0.1 degree): -214,748,262.4 to 214,748,262.4 degrees
Degrees (1 degree): -2,147,482,624 to 2,147,482,624</td></tr>
<tr><td>16#000A</td><td rowspan="2">Auxiliary point</td><td rowspan="2">0</td><td rowspan="2">Sets auxiliary points (center point and pass point coordinates) for circular interpolation or spiral interpolation control.<table><tr><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>Auxiliary point</td><td>0</td><td>Setting range: -2147483648 to 2147483647
Any other settings will result in an error.</td></tr></table>Interpretation changes according to the unit settings as below.
Pulses: -2,147,482,624 to 2,147,482,624 pulses
µm (0.1 µm)：-214,748,262.4 to 214,748,262.4 µm
µm (1 µm): -2,147,482,624 to 2,147,482,624 µm
Inches (0.00001 inch): -21,474.82624 to 21,474.82624 inches
inch (0.0001 inch): -214,748.2624 to 214,748.2624 inch
Degrees (0.1 degree): -214,748,262.4 to 214,748,262.4 degrees
Degrees (1 degree): -2,147,482,624 to 2,147,482,624</td></tr>
<tr><td>16#000B</td></tr>
<tr><td>16#000C</td><td>Dwell Time</td><td>0</td><td>For “C: Continuance point”, when the positioning operation of this table is complete, the motor is stopped for the specified dwell time and then the positioning operation of the next table is started. For “P: Pass point”, the dwell time setting is ignored. For “E: End point”, the motor enters standby mode for the specified dwell time and then the operation done flag turns ON.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>15 to 0</td><td>Dwell Time</td><td>Setting range: 0 to 32,767
Unit: ms
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td>16#000D</td><td>Auxiliary output code</td><td>0</td><td>Sets the data to be output to the auxiliary output code in the each axis information & monitor area according to the setting of the auxiliary output mode in the positioning parameter setting area.</td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td><table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>15 to 0</td><td>Auxiliary output code</td><td>Setting range: 0 to 65,535</td></tr></table></td></tr>
<tr><td>16#000E</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#000F</td><td>-</td><td>-</td><td>-</td></tr>
</table>

■ Starting addresses of each positioning table (Standard area: Tables 1 to 600)

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
16#02	16#0C	16#16	16#20	16#2A	16#34	16#3E	16#48	16#0050	Starting address of Table 1
								16#0060	Starting address of Table 2
								16#0070	Starting address of Table 3
								16#0080	Starting address of Table 4
								16#0090	Starting address of Table 5
								16#00A0	Starting address of Table 6
								16#00B0	Starting address of Table 7
								16#00C0	Starting address of Table 8
								16#00D0	Starting address of Table 9
								16#00E0	Starting address of Table 10
								16#00F0	Starting address of Table 11
								16#0100	Starting address of Table 12
								16#0110	Starting address of Table 13
								16#0120	Starting address of Table 14
								16#0130	Starting address of Table 15
								16#0140	Starting address of Table 16
								16#0150	Starting address of Table 17

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
								16#0160	Starting address of Table 18
								16#0170	Starting address of Table 19
								16#0180	Starting address of Table 20
								16#0190	Starting address of Table 21
								16#01A0	Starting address of Table 22
								16#01B0	Starting address of Table 23
								16#01C0	Starting address of Table 24
								16#01D0	Starting address of Table 25
								16#01E0	Starting address of Table 26
								16#01F0	Starting address of Table 27
								16#0200	Starting address of Table 28
								16#0210	Starting address of Table 29
								16#0220	Starting address of Table 30
								16#0230	Starting address of Table 31
								16#0240	Starting address of Table 32
								16#0250	Starting address of Table 33
								16#0260	Starting address of Table 34
								16#0270	Starting address of Table 35
								16#0280	Starting address of Table 36
16#02	16#0C	16#16	16#20	16#2A	16#34	16#3E	16#48	16#0290	Starting address of Table 37
								16#02A0	Starting address of Table 38
								16#02B0	Starting address of Table 39
								16#02C0	Starting address of Table 40

Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7**	**8 axes**	**address**	**Description**
Bank									
								16#02D0	Starting address of Table 41
								16#02E0	Starting address of Table 42
								16#02F0	Starting address of Table 43
								16#0300	Starting address of Table 44
								16#0310	Starting address of Table 45
								16#0320	Starting address of Table 46
								16#0330	Starting address of Table 47
								16#0340	Starting address of Table 48
								16#0350	Starting address of Table 49
								16#0360	Starting address of Table 50
								16#0370	Starting address of Table 51
								16#0380	Starting address of Table 52
								16#0390	Starting address of Table 53
								16#03A0	Starting address of Table 54
								16#03B0	Starting address of Table 55
								16#03C0	Starting address of Table 56
								16#03D0	Starting address of Table 57
								16#03E0	Starting address of Table 58
								16#03F0	Starting address of Table 59
16#03	16#0D	16#17	16#21	16#2B	16#35	16#3F	16#49	16#0000	Starting address of Table 60
								16#0010	Starting address of Table 61
								16#0020	Starting address of Table 62
								16#0030	Starting address of Table 63

Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7**	**8 axes**	**address**	**Description**
Bank									
								16#0040	Starting address of Table 64
								16#0050	Starting address of Table 65
								16#0060	Starting address of Table 66
								16#0070	Starting address of Table 67
								16#0080	Starting address of Table 68
								16#0090	Starting address of Table 69
								16#00A0	Starting address of Table 70
								16#00B0	Starting address of Table 71
								16#00C0	Starting address of Table 72
								16#00D0	Starting address of Table 73
								16#00E0	Starting address of Table 74
								16#00F0	Starting address of Table 75
								16#0100	Starting address of Table 76
								16#0110	Starting address of Table 77
								16#0120	Starting address of Table 78
								16#0130	Starting address of Table 79
								16#0140	Starting address of Table 80
								16#0150	Starting address of Table 81
								16#0160	Starting address of Table 82
								16#0170	Starting address of Table 83
								16#0180	Starting address of Table 84
								16#0190	Starting address of Table 85
								16#01A0	Starting address of Table 86

Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7**	**8 axes**	**address**	**Description**
Bank									
								16#01B0	Starting address of Table 87
								16#01C0	Starting address of Table 88
								16#01D0	Starting address of Table 89
								16#01E0	Starting address of Table 90
								16#01F0	Starting address of Table 91
								16#0200	Starting address of Table 92
								16#0210	Starting address of Table 93
								16#0220	Starting address of Table 94
								16#0230	Starting address of Table 95
								16#0240	Starting address of Table 96
								16#0250	Starting address of Table 97
								16#0260	Starting address of Table 98
								16#0270	Starting address of Table 99
								16#0280	Starting address of Table 100
								16#0290	Starting address of Table 101
								16#02A0	Starting address of Table 102
								16#02B0	Starting address of Table 103
								16#02C0	Starting address of Table 104
								16#02D0	Starting address of Table 105
								16#02E0	Starting address of Table 106
								16#02F0	Starting address of Table 107
								16#0300	Starting address of Table 108
								16#0310	Starting address of Table 109

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
								16#0320	Starting address of Table 110
16#03	16#0D	16#17	16#21	16#2B	16#35	16#3F	16#49	16#0330	Starting address of Table 111
								16#0340	Starting address of Table 112
								16#0350	Starting address of Table 113
								16#0360	Starting address of Table 114
								16#0370	Starting address of Table 115
								16#0380	Starting address of Table 116
								16#0390	Starting address of Table 117
								16#03A0	Starting address of Table 118
								16#03B0	Starting address of Table 119
								16#03C0	Starting address of Table 120
								16#03D0	Starting address of Table 121
								16#03E0	Starting address of Table 122
								16#03F0	Starting address of Table 123
16#04	16#0E	16#18	16#22	16#2C	16#36	16#40	16#4A	16#0000	Starting address of Table 124
								16#0010	Starting address of Table 125
								16#0020	Starting address of Table 126
								16#0030	Starting address of Table 127
								16#0040	Starting address of Table 128
								16#0050	Starting address of Table 129
								16#0060	Starting address of Table 130
								16#0070	Starting address of Table 131
								16#0080	Starting address of Table 132

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
								16#0090	Starting address of Table 133
								16#00A0	Starting address of Table 134
								16#00B0	Starting address of Table 135
								16#00C0	Starting address of Table 136
								16#00D0	Starting address of Table 137
								16#00E0	Starting address of Table 138
								16#00F0	Starting address of Table 139
								16#0100	Starting address of Table 140
								16#0110	Starting address of Table 141
								16#0120	Starting address of Table 142
								16#0130	Starting address of Table 143
								16#0140	Starting address of Table 144
								16#0150	Starting address of Table 145
								16#0160	Starting address of Table 146
								16#0170	Starting address of Table 147
16#04	16#0E	16#18	16#22	16#2C	16#36	16#40	16#4A	16#0180	Starting address of Table 148
								16#0190	Starting address of Table 149
								16#01A0	Starting address of Table 150
								16#01B0	Starting address of Table 151
								16#01C0	Starting address of Table 152
								16#01D0	Starting address of Table 153
								16#01E0	Starting address of Table 154
								16#01F0	Starting address of Table 155

Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7**	**8 axes**	**address**	**Description**
Bank									
								16#0200	Starting address of Table 156
								16#0210	Starting address of Table 157
								16#0220	Starting address of Table 158
								16#0230	Starting address of Table 159
								16#0240	Starting address of Table 160
								16#0250	Starting address of Table 161
								16#0260	Starting address of Table 162
								16#0270	Starting address of Table 163
								16#0280	Starting address of Table 164
								16#0290	Starting address of Table 165
								16#02A0	Starting address of Table 166
								16#02B0	Starting address of Table 167
								16#02C0	Starting address of Table 168
								16#02D0	Starting address of Table 169
								16#02E0	Starting address of Table 170
								16#02F0	Starting address of Table 171
								16#0300	Starting address of Table 172
								16#0310	Starting address of Table 173
								16#0320	Starting address of Table 174
								16#0330	Starting address of Table 175
								16#0340	Starting address of Table 176
								16#0350	Starting address of Table 177
								16#0360	Starting address of Table 178

Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7**	**8 axes**	**address**	**Description**
Bank									
								16#0370	Starting address of Table 179
								16#0380	Starting address of Table 180
								16#0390	Starting address of Table 181
								16#03A0	Starting address of Table 182
								16#03B0	Starting address of Table 183
								16#03C0	Starting address of Table 184
16#04	16#0E	16#18	16#22	16#2C	16#36	16#40	16#4A	16#03D0	Starting address of Table 185
								16#03E0	Starting address of Table 186
								16#03F0	Starting address of Table 187
16#05	16#0F	16#19	16#23	16#2D	16#37	16#41	16#4B	16#0000	Starting address of Table 188
								16#0010	Starting address of Table 189
								16#0020	Starting address of Table 190
								16#0030	Starting address of Table 191
								16#0040	Starting address of Table 192
								16#0050	Starting address of Table 193
								16#0060	Starting address of Table 194
								16#0070	Starting address of Table 195
								16#0080	Starting address of Table 196
								16#0090	Starting address of Table 197
								16#00A0	Starting address of Table 198
								16#00B0	Starting address of Table 199
								16#00C0	Starting address of Table 200
								16#00D0	Starting address of Table 201

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
								16#00E0	Starting address of Table 202
								16#00F0	Starting address of Table 203
								16#0100	Starting address of Table 204
								16#0110	Starting address of Table 205
								16#0120	Starting address of Table 206
								16#0130	Starting address of Table 207
								16#0140	Starting address of Table 208
								16#0150	Starting address of Table 209
								16#0160	Starting address of Table 210
								16#0170	Starting address of Table 211
								16#0180	Starting address of Table 212
								16#0190	Starting address of Table 213
								16#01A0	Starting address of Table 214
								16#01B0	Starting address of Table 215
								16#01C0	Starting address of Table 216
								16#01D0	Starting address of Table 217
								16#01E0	Starting address of Table 218
								16#01F0	Starting address of Table 219
								16#0200	Starting address of Table 220
								16#0210	Starting address of Table 221
16#05	16#0F	16#19	16#23	16#2D	16#37	16#41	16#4B	16#0220	Starting address of Table 222
								16#0230	Starting address of Table 223
								16#0240	Starting address of Table 224

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
								16#0250	Starting address of Table 225
								16#0260	Starting address of Table 226
								16#0270	Starting address of Table 227
								16#0280	Starting address of Table 228
								16#0290	Starting address of Table 229
								16#02A0	Starting address of Table 230
								16#02B0	Starting address of Table 231
								16#02C0	Starting address of Table 232
								16#02D0	Starting address of Table 233
								16#02E0	Starting address of Table 234
								16#02F0	Starting address of Table 235
								16#0300	Starting address of Table 236
								16#0310	Starting address of Table 237
								16#0320	Starting address of Table 238
								16#0330	Starting address of Table 239
								16#0340	Starting address of Table 240
								16#0350	Starting address of Table 241
								16#0360	Starting address of Table 242
								16#0370	Starting address of Table 243
								16#0380	Starting address of Table 244
								16#0390	Starting address of Table 245
								16#03A0	Starting address of Table 246
								16#03B0	Starting address of Table 247

Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7**	**8 axes**	**address**	**Description**
Bank									
								16#03C0	Starting address of Table 248
								16#03D0	Starting address of Table 249
								16#03E0	Starting address of Table 250
								16#03F0	Starting address of Table 251
16#06	16#10	16#1A	16#24	16#2E	16#38	16#42	16#4C	16#0000	Starting address of Table 252
								16#0010	Starting address of Table 253
								16#0020	Starting address of Table 254
								16#0030	Starting address of Table 255
								16#0040	Starting address of Table 256
								16#0050	Starting address of Table 257
								16#0060	Starting address of Table 258
16#06	16#10	16#1A	16#24	16#2E	16#38	16#42	16#4C	16#0070	Starting address of Table 259
								16#0080	Starting address of Table 260
								16#0090	Starting address of Table 261
								16#00A0	Starting address of Table 262
								16#00B0	Starting address of Table 263
								16#00C0	Starting address of Table 264
								16#00D0	Starting address of Table 265
								16#00E0	Starting address of Table 266
								16#00F0	Starting address of Table 267
								16#0100	Starting address of Table 268
								16#0110	Starting address of Table 269
								16#0120	Starting address of Table 270

Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7**	**8 axes**	**address**	**Description**
Bank									
								16#0130	Starting address of Table 271
								16#0140	Starting address of Table 272
								16#0150	Starting address of Table 273
								16#0160	Starting address of Table 274
								16#0170	Starting address of Table 275
								16#0180	Starting address of Table 276
								16#0190	Starting address of Table 277
								16#01A0	Starting address of Table 278
								16#01B0	Starting address of Table 279
								16#01C0	Starting address of Table 280
								16#01D0	Starting address of Table 281
								16#01E0	Starting address of Table 282
								16#01F0	Starting address of Table 283
								16#0200	Starting address of Table 284
								16#0210	Starting address of Table 285
								16#0220	Starting address of Table 286
								16#0230	Starting address of Table 287
								16#0240	Starting address of Table 288
								16#0250	Starting address of Table 289
								16#0260	Starting address of Table 290
								16#0270	Starting address of Table 291
								16#0280	Starting address of Table 292
								16#0290	Starting address of Table 293

Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7**	**8 axes**	**address**	**Description**
Bank									
								16#02A0	Starting address of Table 294
								16#02B0	Starting address of Table 295
16#06	16#10	16#1A	16#24	16#2E	16#38	16#42	16#4C	16#02C0	Starting address of Table 296
								16#02D0	Starting address of Table 297
								16#02E0	Starting address of Table 298
								16#02F0	Starting address of Table 299
								16#0300	Starting address of Table 300
								16#0310	Starting address of Table 301
								16#0320	Starting address of Table 302
								16#0330	Starting address of Table 303
								16#0340	Starting address of Table 304
								16#0350	Starting address of Table 305
								16#0360	Starting address of Table 306
								16#0370	Starting address of Table 307
								16#0380	Starting address of Table 308
								16#0390	Starting address of Table 309
								16#03A0	Starting address of Table 310
								16#03B0	Starting address of Table 311
								16#03C0	Starting address of Table 312
								16#03D0	Starting address of Table 313
								16#03E0	Starting address of Table 314
								16#03F0	Starting address of Table 315
16#07	16#11	16#1B	16#25	16#2F	16#39	16#43	16#4D	16#0000	Starting address of Table 316

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
								16#0010	Starting address of Table 317
								16#0020	Starting address of Table 318
								16#0030	Starting address of Table 319
								16#0040	Starting address of Table 320
								16#0050	Starting address of Table 321
								16#0060	Starting address of Table 322
								16#0070	Starting address of Table 323
								16#0080	Starting address of Table 324
								16#0090	Starting address of Table 325
								16#00A0	Starting address of Table 326
								16#00B0	Starting address of Table 327
								16#00C0	Starting address of Table 328
								16#00D0	Starting address of Table 329
								16#00E0	Starting address of Table 330
								16#00F0	Starting address of Table 331
								16#0100	Starting address of Table 332
16#07	16#11	16#1B	16#25	16#2F	16#39	16#43	16#4D	16#0110	Starting address of Table 333
								16#0120	Starting address of Table 334
								16#0130	Starting address of Table 335
								16#0140	Starting address of Table 336
								16#0150	Starting address of Table 337
								16#0160	Starting address of Table 338
								16#0170	Starting address of Table 339

Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7**	**8 axes**	**address**	**Description**
Bank									
								16#0180	Starting address of Table 340
								16#0190	Starting address of Table 341
								16#01A0	Starting address of Table 342
								16#01B0	Starting address of Table 343
								16#01C0	Starting address of Table 344
								16#01D0	Starting address of Table 345
								16#01E0	Starting address of Table 346
								16#01F0	Starting address of Table 347
								16#0200	Starting address of Table 348
								16#0210	Starting address of Table 349
								16#0220	Starting address of Table 350
								16#0230	Starting address of Table 351
								16#0240	Starting address of Table 352
								16#0250	Starting address of Table 353
								16#0260	Starting address of Table 354
								16#0270	Starting address of Table 355
								16#0280	Starting address of Table 356
								16#0290	Starting address of Table 357
								16#02A0	Starting address of Table 358
								16#02B0	Starting address of Table 359
								16#02C0	Starting address of Table 360
								16#02D0	Starting address of Table 361
								16#02E0	Starting address of Table 362

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
								16#02F0	Starting address of Table 363
								16#0300	Starting address of Table 364
								16#0310	Starting address of Table 365
								16#0320	Starting address of Table 366
								16#0330	Starting address of Table 367
								16#0340	Starting address of Table 368
								16#0350	Starting address of Table 369
16#07	16#11	16#1B	16#25	16#2F	16#39	16#43	16#4D	16#0360	Starting address of Table 370
								16#0370	Starting address of Table 371
								16#0380	Starting address of Table 372
								16#0390	Starting address of Table 373
								16#03A0	Starting address of Table 374
								16#03B0	Starting address of Table 375
								16#03C0	Starting address of Table 376
								16#03D0	Starting address of Table 377
								16#03E0	Starting address of Table 378
								16#03F0	Starting address of Table 379
16#08	16#12	16#1C	16#26	16#30	16#3A	16#44	16#4E	16#0000	Starting address of Table 380
								16#0010	Starting address of Table 381
								16#0020	Starting address of Table 382
								16#0030	Starting address of Table 383
								16#0040	Starting address of Table 384
								16#0050	Starting address of Table 385

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
								16#0060	Starting address of Table 386
								16#0070	Starting address of Table 387
								16#0080	Starting address of Table 388
								16#0090	Starting address of Table 389
								16#00A0	Starting address of Table 390
								16#00B0	Starting address of Table 391
								16#00C0	Starting address of Table 392
								16#00D0	Starting address of Table 393
								16#00E0	Starting address of Table 394
								16#00F0	Starting address of Table 395
								16#0100	Starting address of Table 396
								16#0110	Starting address of Table 397
								16#0120	Starting address of Table 398
								16#0130	Starting address of Table 399
								16#0140	Starting address of Table 400
								16#0150	Starting address of Table 401
								16#0160	Starting address of Table 402
								16#0170	Starting address of Table 403
								16#0180	Starting address of Table 404
								16#0190	Starting address of Table 405
								16#01A0	Starting address of Table 406
16#08	16#12	16#1C	16#26	16#30	16#3A	16#44	16#4E	16#01B0	Starting address of Table 407
								16#01C0	Starting address of Table 408

Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7**	**8 axes**	**address**	**Description**
Bank									
								16#01D0	Starting address of Table 409
								16#01E0	Starting address of Table 410
								16#01F0	Starting address of Table 411
								16#0200	Starting address of Table 412
								16#0210	Starting address of Table 413
								16#0220	Starting address of Table 414
								16#0230	Starting address of Table 415
								16#0240	Starting address of Table 416
								16#0250	Starting address of Table 417
								16#0260	Starting address of Table 418
								16#0270	Starting address of Table 419
								16#0280	Starting address of Table 420
								16#0290	Starting address of Table 421
								16#02A0	Starting address of Table 422
								16#02B0	Starting address of Table 423
								16#02C0	Starting address of Table 424
								16#02D0	Starting address of Table 425
								16#02E0	Starting address of Table 426
								16#02F0	Starting address of Table 427
								16#0300	Starting address of Table 428
								16#0310	Starting address of Table 429
								16#0320	Starting address of Table 430
								16#0330	Starting address of Table 431

Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7**	**8 axes**	**address**	**Description**
Bank									
								16#0340	Starting address of Table 432
								16#0350	Starting address of Table 433
								16#0360	Starting address of Table 434
								16#0370	Starting address of Table 435
								16#0380	Starting address of Table 436
								16#0390	Starting address of Table 437
								16#03A0	Starting address of Table 438
								16#03B0	Starting address of Table 439
								16#03C0	Starting address of Table 440
								16#03D0	Starting address of Table 441
								16#03E0	Starting address of Table 442
								16#03F0	Starting address of Table 443
16#09	16#13	16#1D	16#27	16#31	16#3B	16#45	16#4F	16#0000	Starting address of Table 444
								16#0010	Starting address of Table 445
								16#0020	Starting address of Table 446
								16#0030	Starting address of Table 447
								16#0040	Starting address of Table 448
								16#0050	Starting address of Table 449
								16#0060	Starting address of Table 450
								16#0070	Starting address of Table 451
								16#0080	Starting address of Table 452
								16#0090	Starting address of Table 453
								16#00A0	Starting address of Table 454

Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7**	**8 axes**	**address**	**Description**
Bank									
								16#00B0	Starting address of Table 455
								16#00C0	Starting address of Table 456
								16#00D0	Starting address of Table 457
								16#00E0	Starting address of Table 458
								16#00F0	Starting address of Table 459
								16#0100	Starting address of Table 460
								16#0110	Starting address of Table 461
								16#0120	Starting address of Table 462
								16#0130	Starting address of Table 463
								16#0140	Starting address of Table 464
								16#0150	Starting address of Table 465
								16#0160	Starting address of Table 466
								16#0170	Starting address of Table 467
								16#0180	Starting address of Table 468
								16#0190	Starting address of Table 469
								16#01A0	Starting address of Table 470
								16#01B0	Starting address of Table 471
								16#01C0	Starting address of Table 472
								16#01D0	Starting address of Table 473
								16#01E0	Starting address of Table 474
								16#01F0	Starting address of Table 475
								16#0200	Starting address of Table 476
								16#0210	Starting address of Table 477

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
								16#0220	Starting address of Table 478
								16#0230	Starting address of Table 479
								16#0240	Starting address of Table 480
16#09	16#13	16#1D	16#27	16#31	16#3B	16#45	16#4F	16#0250	Starting address of Table 481
								16#0260	Starting address of Table 482
								16#0270	Starting address of Table 483
								16#0280	Starting address of Table 484
								16#0290	Starting address of Table 485
								16#02A0	Starting address of Table 486
								16#02B0	Starting address of Table 487
								16#02C0	Starting address of Table 488
								16#02D0	Starting address of Table 489
								16#02E0	Starting address of Table 490
								16#02F0	Starting address of Table 491
								16#0300	Starting address of Table 492
								16#0310	Starting address of Table 493
								16#0320	Starting address of Table 494
								16#0330	Starting address of Table 495
								16#0340	Starting address of Table 496
								16#0350	Starting address of Table 497
								16#0360	Starting address of Table 498
								16#0370	Starting address of Table 499
								16#0380	Starting address of Table 500

Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7**	**8 axes**	**address**	**Description**
Bank									
								16#0390	Starting address of Table 501
								16#03A0	Starting address of Table 502
								16#03B0	Starting address of Table 503
								16#03C0	Starting address of Table 504
								16#03D0	Starting address of Table 505
								16#03E0	Starting address of Table 506
								16#03F0	Starting address of Table 507
16#0A	16#14	16#1E	16#28	16#32	16#3C	16#46	16#50	16#0000	Starting address of Table 508
								16#0010	Starting address of Table 509
								16#0020	Starting address of Table 510
								16#0030	Starting address of Table 511
								16#0040	Starting address of Table 512
								16#0050	Starting address of Table 513
								16#0060	Starting address of Table 514
								16#0070	Starting address of Table 515
								16#0080	Starting address of Table 516
								16#0090	Starting address of Table 517
16#0A	16#14	16#1E	16#28	16#32	16#3C	16#46	16#50	16#00A0	Starting address of Table 518
								16#00B0	Starting address of Table 519
								16#00C0	Starting address of Table 520
								16#00D0	Starting address of Table 521
								16#00E0	Starting address of Table 522
								16#00F0	Starting address of Table 523

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
								16#0100	Starting address of Table 524
								16#0110	Starting address of Table 525
								16#0120	Starting address of Table 526
								16#0130	Starting address of Table 527
								16#0140	Starting address of Table 528
								16#0150	Starting address of Table 529
								16#0160	Starting address of Table 530
								16#0170	Starting address of Table 531
								16#0180	Starting address of Table 532
								16#0190	Starting address of Table 533
								16#01A0	Starting address of Table 534
								16#01B0	Starting address of Table 535
								16#01C0	Starting address of Table 536
								16#01D0	Starting address of Table 537
								16#01E0	Starting address of Table 538
								16#01F0	Starting address of Table 539
								16#0200	Starting address of Table 540
								16#0210	Starting address of Table 541
								16#0220	Starting address of Table 542
								16#0230	Starting address of Table 543
								16#0240	Starting address of Table 544
								16#0250	Starting address of Table 545
								16#0260	Starting address of Table 546

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
								16#0270	Starting address of Table 547
								16#0280	Starting address of Table 548
								16#0290	Starting address of Table 549
								16#02A0	Starting address of Table 550
								16#02B0	Starting address of Table 551
								16#02C0	Starting address of Table 552
								16#02D0	Starting address of Table 553
								16#02E0	Starting address of Table 554
16#0A	16#14	16#1E	16#28	16#32	16#3C	16#46	16#50	16#02F0	Starting address of Table 555
								16#0300	Starting address of Table 556
								16#0310	Starting address of Table 557
								16#0320	Starting address of Table 558
								16#0330	Starting address of Table 559
								16#0340	Starting address of Table 560
								16#0350	Starting address of Table 561
								16#0360	Starting address of Table 562
								16#0370	Starting address of Table 563
								16#0380	Starting address of Table 564
								16#0390	Starting address of Table 565
								16#03A0	Starting address of Table 566
								16#03B0	Starting address of Table 567
								16#03C0	Starting address of Table 568
								16#03D0	Starting address of Table 569

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
								16#03E0	Starting address of Table 570
								16#03F0	Starting address of Table 571
16#0B	16#15	16#1F	16#29	16#33	16#3D	16#47	16#51	16#0000	Starting address of Table 572
								16#0010	Starting address of Table 573
								16#0020	Starting address of Table 574
								16#0030	Starting address of Table 575
								16#0040	Starting address of Table 576
								16#0050	Starting address of Table 577
								16#0060	Starting address of Table 578
								16#0070	Starting address of Table 579
								16#0080	Starting address of Table 580
								16#0090	Starting address of Table 581
								16#00A0	Starting address of Table 582
								16#00B0	Starting address of Table 583
								16#00C0	Starting address of Table 584
								16#00D0	Starting address of Table 585
								16#00E0	Starting address of Table 586
								16#00F0	Starting address of Table 587
								16#0100	Starting address of Table 588
								16#0110	Starting address of Table 589
								16#0120	Starting address of Table 590
								16#0130	Starting address of Table 591
16#0B	16#15	16#1F	16#29	16#33	16#3D	16#47	16#51	16#0140	Starting address of Table 592

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
								16#0150	Starting address of Table 593
								16#0160	Starting address of Table 594
								16#0170	Starting address of Table 595
								16#0180	Starting address of Table 596
								16#0190	Starting address of Table 597
								16#01A0	Starting address of Table 598
								16#01B0	Starting address of Table 599
								16#01C0	Starting address of Table 600
								16#01D0	-
								16#01E0	-
								16#01F0	-
								16#0200	-
								16#0210	-
								16#0220	-
								16#0230	-
								16#0240	-
								16#0250	-
								16#0260	-

- **Starting addresses of each positioning table (Extended area: Tables 10001 to 10025)**

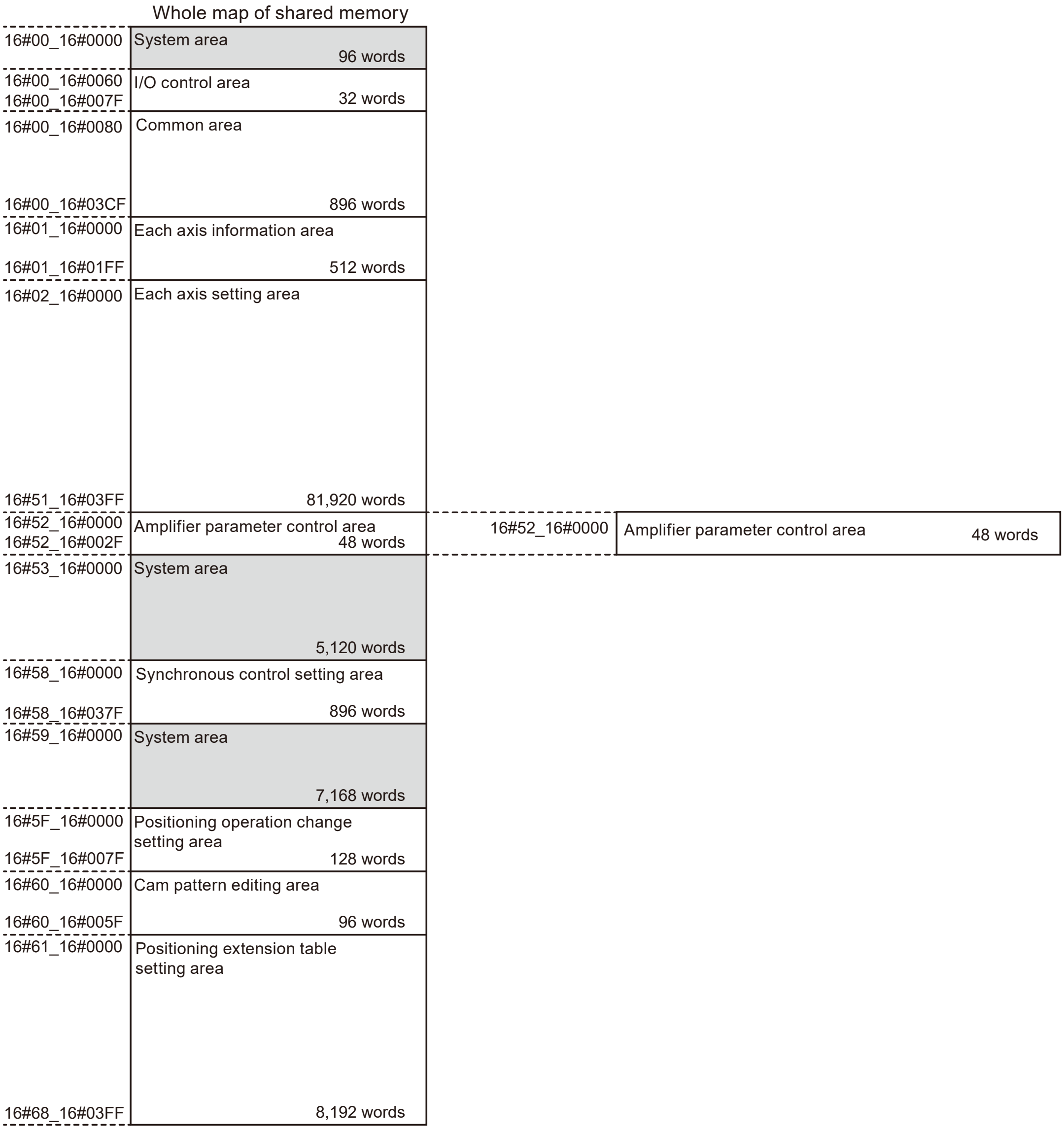
Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
16#0B	16#15	16#1F	16#29	16#33	16#3D	16#47	16#51	16#0270	Starting address of Table 10001
								16#0280	Starting address of Table 10002
								16#0290	Starting address of Table 10003
								16#02A0	Starting address of Table 10004
								16#02B0	Starting address of Table 10005

Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7**	**8 axes**	**address**	**Description**
Bank									
								16#02C0	Starting address of Table 10006
								16#02D0	Starting address of Table 10007
								16#02E0	Starting address of Table 10008
								16#02F0	Starting address of Table 10009
								16#0300	Starting address of Table 10010
								16#0310	Starting address of Table 10011
								16#0320	Starting address of Table 10012
								16#0330	Starting address of Table 10013
								16#0340	Starting address of Table 10014
								16#0350	Starting address of Table 10015
								16#0360	Starting address of Table 10016
								16#0370	Starting address of Table 10017
								16#0380	Starting address of Table 10018
								16#0390	Starting address of Table 10019
								16#03A0	Starting address of Table 10020
								16#03B0	Starting address of Table 10021
								16#03C0	Starting address of Table 10022
								16#03D0	Starting address of Table 10023
								16#03E0	Starting address of Table 10024
								16#03F0	Starting address of Table 10025

18.8 Amplifier Parameter Control Area in Shared Memory

18.8.1 Configuration of Amplifier Parameter Control Area

This area is used to read, write, save, and reset parameters and perform other operations on the amplifier.



16#00_16#0000	System area	96 words
16#00_16#0060 16#00_16#007F	I/O control area	32 words
16#00_16#0080 16#00_16#03CF	Common area	896 words
16#01_16#0000 16#01_16#01FF	Each axis information area	512 words
16#02_16#0000 16#51_16#03FF	Each axis setting area	81,920 words
16#52_16#0000 16#52_16#002F	Amplifier parameter control area	48 words
16#53_16#0000	System area	5,120 words
16#58_16#0000 16#58_16#037F	Synchronous control setting area	896 words
16#59_16#0000	System area	7,168 words
16#5F_16#0000 16#5F_16#007F	Positioning operation change setting area	128 words
16#60_16#0000 16#60_16#005F	Cam pattern editing area	96 words
16#61_16#0000 16#68_16#03FF	Positioning extension table setting area	8,192 words

16#52_16#0000	Amplifier parameter control area	48 words

18.8.2 Amplifier Parameter Control Area

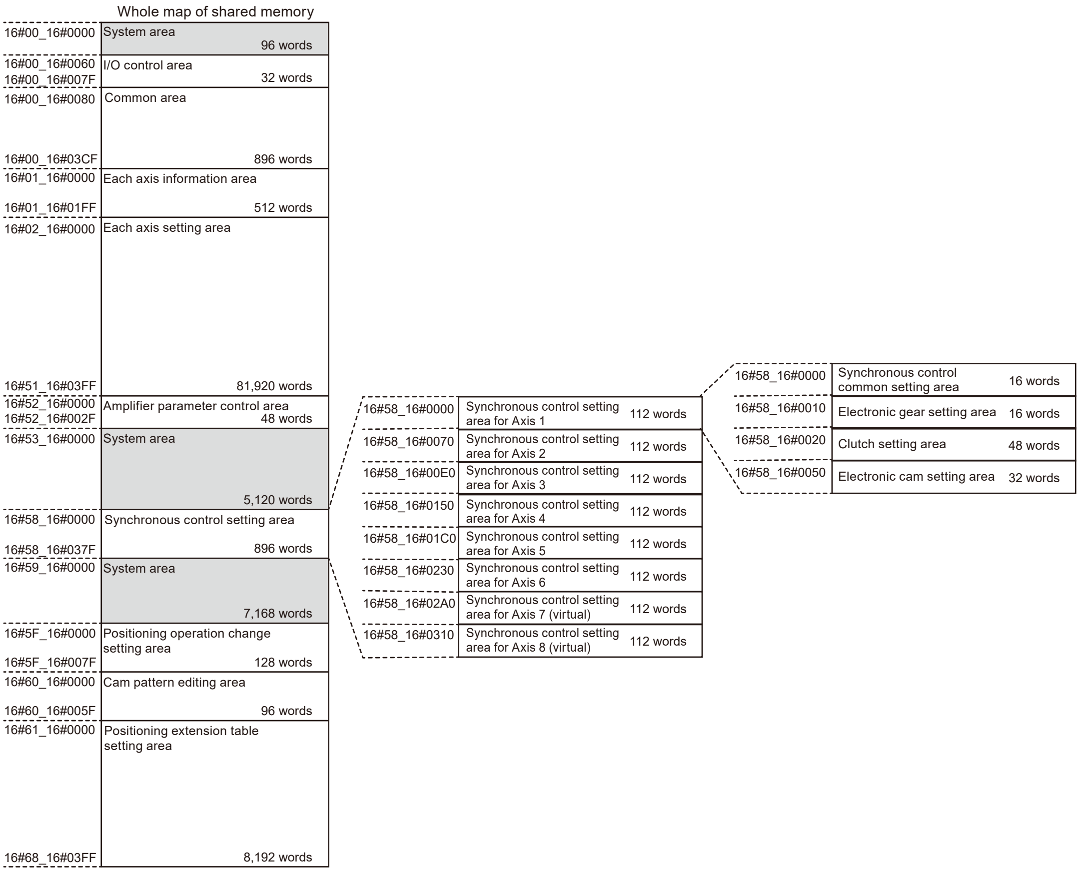
<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="4">16#52</td><td>16#0000</td><td>AMP ID No.</td><td>1</td><td>Specify the axis number (AMP ID No.) for which each processing such as changing parameters is to be performed.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>AMP ID No.</td><td>1</td><td>Setting range: 1 to 8
Any other settings will result in an error.</td></tr>
</table></td></tr>
<tr><td>16#0001</td><td>Control flag</td><td>16#0000</td><td>Specify the amplifier parameter processing to be performed.
This area is set to 16#0000 when the positioning unit RTEX completes the processing.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Control flag</td><td>16#0000</td><td>Setting range: 1 to 6
16#0000: No request
16#0002: Read request
16#0004: Write request
16#0005: EEPROM request
16#0006: Amplifier reset request</td></tr>
</table></td></tr>
<tr><td>16#0002</td><td>Status</td><td>16#0000</td><td>Stores the processing status of the amplifier parameter.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Status</td><td>16#0000</td><td>Setting range: 0 to 6
16#0000: No processing
16#0001: Processing
16#0002: Normal termination (Read/Write/ EEPROM/Reset)
16#0003: Abnormal termination (Read/Write/ EEPROM/Reset)
16#0004: ID error
16#0005: Parameter error
16#0006: Request non-executable state</td></tr>
</table></td></tr>
<tr><td>16#0003</td><td>A6N/A5N
Parameter category</td><td>0</td><td>Specify the category code of the parameter whose value is to be read or written when A6N or A5N is used.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>A6N/A5N Parameter category</td><td>0</td><td>Setting range: 0 to 8
Any other settings will result in an error.</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="2"></td><td></td><td></td><td></td><td>Note: There is no need to write to this area when writing to EEPROM or resetting the amplifier.</td></tr>
<tr><td>16#0004
to
16#0023</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td rowspan="4">16#52</td><td>16#0024</td><td>Individual parameter number</td><td>16#FFFF</td><td>Specify the number of the parameter whose value is to be read or written.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Individual parameter number</td><td>16#FFFF</td><td>Setting range: 16#0000 to 16#007F
Specify a parameter number within the category code.
Any other settings will result in an error.</td></tr>
</table>
* There is no need to write to this area when writing to EEPROM or resetting the amplifier.</td></tr>
<tr><td>16#0026</td><td rowspan="2">A6N/A5N
Parameter data</td><td rowspan="2">0</td><td rowspan="2">Stores the data of each parameter when A6N or A5N is used.
When reading: Stores the parameter values of the amplifier.
When writing: Store the parameter values to be updated.</td></tr>
<tr><td>16#0027</td></tr>
<tr><td>16#0028
to
16#002F</td><td>-</td><td>-</td><td>-</td></tr>
</table>

18.9 Synchronous Control Setting Area in Shared Memory

18.9.1 Configuration of Synchronous Control Setting Area

This area is used to set up synchronous control.



18.9.2 Synchronous Control Setting Area

Bank	Offset address	Description	
16#58	16#0000 to 16#000F	Axis 1 Synchronous control setting area	Synchronous control common setting area
	16#0010 to 16#001F		Electronic gear setting area
	16#0020 to 16#004F		Clutch setting area
	16#0050 to 16#006F		Electronic cam setting area
	16#0070 to 16#007F	Axis 2 Synchronous control setting area	Synchronous control common setting area
	16#0080 to 16#008F		Electronic gear setting area
	16#0090 to 16#00BF		Clutch setting area

Bank	Offset address	Description	
	16#00C0 to 16#00DF		Electronic cam setting area
	16#00E0 to 16#00EF	Axis 3 Synchronous control setting area	Synchronous control common setting area
	16#00F0 to 16#00FF		Electronic gear setting area
	16#0100 to 16#012F		Clutch setting area
	16#0130 to 16#014F		Electronic cam setting area
	16#0150 to 16#015F	Axis 4 Synchronous control setting area	Synchronous control common setting area
	16#0160 to 16#016F		Electronic gear setting area
	16#0170 to 16#019F		Clutch setting area
	16#01A0 to 16#01BF		Electronic cam setting area
	16#01C0 to 16#01CF	Axis 5 Synchronous control setting area	Synchronous control common setting area
	16#01D0 to 16#01DF		Electronic gear setting area
	16#01E0 to 16#020F		Clutch setting area
	16#0210 to 16#022F		Electronic cam setting area
	16#0230 to 16#023F	Axis 6 Synchronous control setting area	Synchronous control common setting area
	16#0240 to 16#024F		Electronic gear setting area
	16#0250 to 16#027F		Clutch setting area
	16#0280 to 16#029F		Electronic cam setting area
	16#02A0 to 16#02AF	Warning clearing for Axis 7 (virtual) Synchronous control setting area	Synchronous control common setting area
	16#02B0 to 16#02BF		Electronic gear setting area
	16#02C0 to 16#02EF		Clutch setting area
	16#02F0 to 16#030F		Electronic cam setting area
	16#0310 to 16#031F	Axis 8 (virtual) Synchronous control setting area	Synchronous control common setting area
	16#0320 to 16#032F		Electronic gear setting area
	16#0330 to 16#035F		Clutch setting area
	16#0360 to 16#037F		Electronic cam setting area

18.9.3 Details of Synchronous Control Setting Area

■ Synchronous control common setting area for each axis

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="17">16#58</td><td>16#0000</td><td>Axis 1</td><td rowspan="8">synchronous master axis selection</td><td rowspan="8">16#0000</td><td rowspan="8">Sets the master axis for each axis.<table><tr><th>Setting value</th><th>Master axis</th></tr><tr><td>16#0000</td><td>No synchronous master axis is used or the target axis is used as a master axis.</td></tr><tr><td>16#0001</td><td>Axis 1</td></tr><tr><td>16#0002</td><td>Axis 2</td></tr><tr><td>16#0003</td><td>Axis 3</td></tr><tr><td>16#0004</td><td>Axis 4</td></tr><tr><td>16#0005</td><td>Axis 5</td></tr><tr><td>16#0006</td><td>Axis 6</td></tr><tr><td>16#0007</td><td>Axis 7</td></tr><tr><td>16#0008</td><td>8 axes</td></tr><tr><td>16#0010</td><td>Virtual axis 1</td></tr><tr><td>16#0011</td><td>Virtual axis 2</td></tr><tr><td>16#0021</td><td>Pulse input 1</td></tr><tr><td>16#0022</td><td>Pulse input 2</td></tr><tr><td>16#0023</td><td>Pulse input 3</td></tr></table>Any other settings will result in an error.</td></tr>
<tr><td>16#0070</td><td>Axis 2</td></tr>
<tr><td>16#00E0</td><td>Axis 3</td></tr>
<tr><td>16#0150</td><td>Axis 4</td></tr>
<tr><td>16#01C0</td><td>Axis 5</td></tr>
<tr><td>16#0230</td><td>Axis 6</td></tr>
<tr><td>16#02A0</td><td>Axis 7</td></tr>
<tr><td>16#0310</td><td>8 axes</td></tr>
<tr><td>16#0001</td><td>Axis 1</td><td rowspan="8">Synchronous output function selection</td><td rowspan="8">16#0000</td><td rowspan="8">Sets the status of the synchronous operation function set for each axis.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>0</td><td>Electronic gear operation setting</td><td rowspan="4">0: Do not use
1: Use</td></tr><tr><td>1</td><td>Clutch operation setting</td></tr><tr><td>2</td><td>Electronic cam operation setting</td></tr><tr><td>3</td><td>Advance angle correction synchronization setting</td></tr><tr><td>15 to 4</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>16#0071</td><td>Axis 2</td></tr>
<tr><td>16#00E1</td><td>Axis 3</td></tr>
<tr><td>16#0151</td><td>Axis 4</td></tr>
<tr><td>16#01C1</td><td>Axis 5</td></tr>
<tr><td>16#0231</td><td>Axis 6</td></tr>
<tr><td>16#02A1</td><td>Axis 7</td></tr>
<tr><td>16#0311</td><td>8 axes</td></tr>
<tr><td>16#0002</td><td>Axis 1</td><td>Synchronous slave</td><td>16#0000</td><td>Sets the deceleration method to be used when a deceleration stop is performed during synchronous operation.</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="7"></td><td>16#0072</td><td>Axis 2</td><td rowspan="7">single deceleration stop
Deceleration method</td><td rowspan="7"></td><td rowspan="7"><table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>0</td><td>-</td><td>-</td></tr><tr><td>1</td><td>Deceleration method setting</td><td>0: Linear deceleration
1: S-shaped deceleration</td></tr><tr><td>15 to 2</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>16#00E2</td><td>Axis 3</td></tr>
<tr><td>16#0152</td><td>Axis 4</td></tr>
<tr><td>16#01C2</td><td>Axis 5</td></tr>
<tr><td>16#0232</td><td>Axis 6</td></tr>
<tr><td>16#02A2</td><td>Axis 7</td></tr>
<tr><td>16#0312</td><td>8 axes</td></tr>
<tr><td rowspan="15">16#58</td><td>16#0003</td><td>Axis 1</td><td rowspan="8">Synchronous slave
single deceleration stop
deceleration time</td><td rowspan="8">0</td><td rowspan="8">Sets the deceleration time to be used when a deceleration stop is performed during synchronous operation.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>15 to 0</td><td>Synchronous slave
single deceleration stop
deceleration time</td><td>Set the deceleration time.
Setting range: 0 to 10,000
Unit: ms
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td>16#0073</td><td>Axis 2</td></tr>
<tr><td>16#00E3</td><td>Axis 3</td></tr>
<tr><td>16#0153</td><td>Axis 4</td></tr>
<tr><td>16#01C3</td><td>Axis 5</td></tr>
<tr><td>16#0233</td><td>Axis 6</td></tr>
<tr><td>16#02A3</td><td>Axis 7</td></tr>
<tr><td>16#0313</td><td>8 axes</td></tr>
<tr><td>16#0004</td><td>Axis 1</td><td rowspan="7">Pulse Input
BUSY flag OFF
judgment time</td><td rowspan="7">5</td><td rowspan="7">If the master axis type is set to pulse input, the BUSY flag will turn OFF when pulses in the low section of pulse input do not change within the specified judgment time.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>15 to 0</td><td>Pulse Input
Busy flag OFF
judgement time</td><td>Sets the pulse input BUSY flag OFF judgment time.
Setting range: 0 to 1,000
Unit: ms
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td>16#0074</td><td>Axis 2</td></tr>
<tr><td>16#00E4</td><td>Axis 3</td></tr>
<tr><td>16#0154</td><td>Axis 4</td></tr>
<tr><td>16#01C4</td><td>Axis 5</td></tr>
<tr><td>16#0234</td><td>Axis 6</td></tr>
<tr><td>16#02A4</td><td>Axis 7</td></tr>
</table>

Bank	Offset address	Name		Default	Description
	16#0314	8 axes			
	16#0005 to 16#000F	Axis 1	-	-	-
	16#0075 to 16#007F	Axis 2			
	16#00E5 to 16#00EF	Axis 3			
	16#0155 to 16#015F	Axis 4			
	16#01C5 to 16#01CF	Axis 5			
	16#0235 to 16#023F	Axis 6			
	16#02A5 to 16#02AF	Axis 7			
	16#0315 to 16#031F	8 axes			

■ Electronic gear ratio setting area for each axis

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="14">16#58</td><td>16#0010</td><td rowspan="2">Axis 1</td><td rowspan="14">Gear ratio change time for each axis
Gear ratio numerator</td><td rowspan="14">1</td><td rowspan="14">Sets the numerator and denominator separately for the gear ratios of electronic gears.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>31 to 0</td><td>Gear ratio numerator of each axis
Gear ratio denominator of each axis</td><td>Setting range: 1 to 2,147,483,647
Any other settings will result in an error.</td></tr>
</table>
The gear ratios of electronic gears are determined by the following formula:
Output speed of electronic gear = Operating speed of master axis × (Gear ratio numerator) / (Gear ratio denominator)</td></tr>
<tr><td>16#0011</td></tr>
<tr><td>16#0080</td><td rowspan="2">Axis 2</td></tr>
<tr><td>16#0081</td></tr>
<tr><td>16#00F0</td><td rowspan="2">Axis 3</td></tr>
<tr><td>16#00F1</td></tr>
<tr><td>16#0160</td><td rowspan="2">Axis 4</td></tr>
<tr><td>16#0161</td></tr>
<tr><td>16#01D0</td><td rowspan="2">Axis 5</td></tr>
<tr><td>16#01D1</td></tr>
<tr><td>16#0240</td><td rowspan="2">Axis 6</td></tr>
<tr><td>16#0241</td></tr>
<tr><td>16#02B0</td><td rowspan="2">Axis 7</td></tr>
<tr><td>16#02B1</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="18"></td><td>16#0320</td><td rowspan="2">8 axes</td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="18"></td></tr>
<tr><td>16#0321</td></tr>
<tr><td>16#0012</td><td rowspan="2">Axis 1</td><td rowspan="16">Gear ratio change time for each axis
Gear ratio denominator</td><td rowspan="16">1</td></tr>
<tr><td>16#0013</td></tr>
<tr><td>16#0082</td><td rowspan="2">Axis 2</td></tr>
<tr><td>16#0083</td></tr>
<tr><td>16#00F2</td><td rowspan="2">Axis 3</td></tr>
<tr><td>16#00F3</td></tr>
<tr><td>16#0162</td><td rowspan="2">Axis 4</td></tr>
<tr><td>16#0163</td></tr>
<tr><td>16#01D2</td><td rowspan="2">Axis 5</td></tr>
<tr><td>16#01D3</td></tr>
<tr><td>16#0242</td><td rowspan="2">Axis 6</td></tr>
<tr><td>16#0243</td></tr>
<tr><td>16#02B2</td><td rowspan="2">Axis 7</td></tr>
<tr><td>16#02B3</td></tr>
<tr><td>16#0322</td><td rowspan="2">8 axes</td></tr>
<tr><td>16#0323</td></tr>
<tr><td rowspan="10">16#58</td><td>16#0014</td><td>Axis 1</td><td rowspan="8">Gear ratio change time
for each axis</td><td rowspan="8">1</td><td rowspan="8">Sets the time required to change the current gear ratio to a new gear ratio when the gear ratio of the electronic gear is changed during operation.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>Gear ratio change time
for each axis</td><td>Sets the time required to change the gear ratio.
Setting range: 0 to 10,000
Unit: ms
Any other settings will result in an error.</td></tr>
</table></td></tr>
<tr><td>16#0084</td><td>Axis 2</td></tr>
<tr><td>16#00F4</td><td>Axis 3</td></tr>
<tr><td>16#0164</td><td>Axis 4</td></tr>
<tr><td>16#01D4</td><td>Axis 5</td></tr>
<tr><td>16#0244</td><td>Axis 6</td></tr>
<tr><td>16#02B4</td><td>Axis 7</td></tr>
<tr><td>16#0324</td><td>8 axes</td></tr>
<tr><td>16#0015 to 16#001F</td><td>Axis 1</td><td rowspan="2">-</td><td rowspan="2">-</td><td rowspan="2">-</td></tr>
<tr><td>16#0085 to 16#008F</td><td>Axis 2</td></tr>
</table>

Bank	Offset address	Name		Default	Description
	16#00F5 to 16#00FF	Axis 3			
	16#0165 to 16#016F	Axis 4			
	16#01D5 to 16#01DF	Axis 5			
	16#0245 to 16#024F	Axis 6			
	16#02B5 to 16#02BF	Axis 7			
	16#0325 to 16#032F	8 axes			

■ Clutch setting area for each axis

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="12">16#58</td><td>16#0020</td><td>Axis 1</td><td rowspan="8">Clutch ON trigger type</td><td rowspan="8">16#0000</td><td rowspan="8">Sets the trigger type that is used to detect that the clutch has turned ON.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>7 to 0</td><td>Clutch ON trigger type</td><td>16#0000: I/O clutch ON request
Any other settings will result in an error.</td></tr><tr><td>15 to 8</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>16#0090</td><td>Axis 2</td></tr>
<tr><td>16#0100</td><td>Axis 3</td></tr>
<tr><td>16#0170</td><td>Axis 4</td></tr>
<tr><td>16#01E0</td><td>Axis 5</td></tr>
<tr><td>16#0250</td><td>Axis 6</td></tr>
<tr><td>16#02C0</td><td>Axis 7</td></tr>
<tr><td>16#0330</td><td>8 axes</td></tr>
<tr><td>16#0021</td><td>Axis 1</td><td rowspan="4">Clutch ON edge selection</td><td rowspan="4">16#0000</td><td rowspan="4">Sets the valid condition of clutch ON trigger signals.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>1 to 0</td><td>Clutch ON edge selection</td><td>16#0000: Level
16#0001: Rising edge
16#0002: Falling edge
16#0003: ————</td></tr><tr><td>15 to 2</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>16#0091</td><td>Axis 2</td></tr>
<tr><td>16#0101</td><td>Axis 3</td></tr>
<tr><td>16#0171</td><td>Axis 4</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="12"></td><td>16#01E1</td><td>Axis 5</td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td></tr>
<tr><td>16#0251</td><td>Axis 6</td></tr>
<tr><td>16#02C1</td><td>Axis 7</td></tr>
<tr><td>16#0331</td><td>8 axes</td></tr>
<tr><td>16#0022 to 16#0027</td><td>Axis 1</td><td rowspan="8">-</td><td rowspan="8">-</td><td rowspan="8">-</td></tr>
<tr><td>16#0092 to 16#0097</td><td>Axis 2</td></tr>
<tr><td>16#0102 to 16#0107</td><td>Axis 3</td></tr>
<tr><td>16#0172 to 16#0177</td><td>Axis 4</td></tr>
<tr><td>16#01E2 to 16#01E7</td><td>Axis 5</td></tr>
<tr><td>16#0252 to 16#0257</td><td>Axis 6</td></tr>
<tr><td>16#02C2 to 16#02C7</td><td>Axis 7</td></tr>
<tr><td>16#0332 to 16#0337</td><td>8 axes</td></tr>
<tr><td rowspan="7">16#58</td><td>16#0028</td><td>Axis 1</td><td rowspan="7">Clutch OFF trigger type</td><td rowspan="7">16#0000</td><td rowspan="7">Sets the trigger type that is used to detect that the clutch has turned OFF.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>7 to 0</td><td>Clutch OFF trigger type</td><td>16#0000: I/O clutch OFF request
16#0011: I/O + Clutch OFF in
phase after clutch control
Any other settings will result in an error.</td></tr>
<tr><td>15 to 8</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td>16#0098</td><td>Axis 2</td></tr>
<tr><td>16#0108</td><td>Axis 3</td></tr>
<tr><td>16#0178</td><td>Axis 4</td></tr>
<tr><td>16#01E8</td><td>Axis 5</td></tr>
<tr><td>16#0258</td><td>Axis 6</td></tr>
<tr><td>16#02C8</td><td>Axis 7</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="17"></td><td>16#0338</td><td>8 axes</td><td></td><td></td><td></td></tr>
<tr><td>16#0029</td><td>Axis 1</td><td rowspan="8">Clutch OFF edge selection</td><td rowspan="8">16#0000</td><td rowspan="8">Sets the valid condition of trigger signals.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>1 to 0</td><td>Clutch OFF edge selection</td><td>16#0000: Level
16#0001: Rising edge
16#0002: Falling edge
16#0003: ————</td></tr>
<tr><td>15 to 2</td><td>-</td><td>-</td></tr>
</table>
If
"16#0000: Level" is selected for "Clutch ON edge selection" (offset address 16#0021), set "16#0000: Level" in this area (offset address 16#0029).</td></tr>
<tr><td>16#0099</td><td>Axis 2</td></tr>
<tr><td>16#0109</td><td>Axis 3</td></tr>
<tr><td>16#0179</td><td>Axis 4</td></tr>
<tr><td>16#01E9</td><td>Axis 5</td></tr>
<tr><td>16#0259</td><td>Axis 6</td></tr>
<tr><td>16#02C9</td><td>Axis 7</td></tr>
<tr><td>16#0339</td><td>8 axes</td></tr>
<tr><td>16#002A</td><td>Axis 1</td><td rowspan="8">Clutch OFF edge phase ratio</td><td rowspan="8">0</td><td rowspan="8">Sets the ratio for the phase at which the clutch turns OFF when "I/O + Phase after clutch control" is selected for the clutch OFF trigger type.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>Clutch OFF edge phase ratio</td><td>Sets the ratio for the phase at which the clutch turns OFF.
Setting range: 0 to 99
Unit: %
Any other settings will result in an error.</td></tr>
</table></td></tr>
<tr><td>16#009A</td><td>Axis 2</td></tr>
<tr><td>16#010A</td><td>Axis 3</td></tr>
<tr><td>16#017A</td><td>Axis 4</td></tr>
<tr><td>16#01EA</td><td>Axis 5</td></tr>
<tr><td>16#025A</td><td>Axis 6</td></tr>
<tr><td>16#02CA</td><td>Axis 7</td></tr>
<tr><td>16#033A</td><td>8 axes</td></tr>
<tr><td rowspan="3">16#58</td><td>16#002B to 16#002F</td><td>Axis 1</td><td rowspan="3">-</td><td rowspan="3">-</td><td rowspan="3">-</td></tr>
<tr><td>16#009B to 16#009F</td><td>Axis 2</td></tr>
<tr><td>16#010B to 16#010F</td><td>Axis 3</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="23"></td><td>16#017B to 16#017F</td><td>Axis 4</td><td rowspan="5"></td><td rowspan="5"></td><td rowspan="5"></td></tr>
<tr><td>16#01EB to 16#01EF</td><td>Axis 5</td></tr>
<tr><td>16#025B to 16#025F</td><td>Axis 6</td></tr>
<tr><td>16#02CB to 16#02CF</td><td>Axis 7</td></tr>
<tr><td>16#033B to 16#033F</td><td>8 axes</td></tr>
<tr><td>16#0030</td><td>Axis 1</td><td rowspan="8">Clutch ON method</td><td rowspan="8">16#0000</td><td rowspan="8">Sets "Direct" or "Slip" as the operation method to be used when clutch ON is detected.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>Clutch ON method</td><td>0: Direct
1: Slip</td></tr>
<tr><td>15 to 1</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td>16#00A0</td><td>Axis 2</td></tr>
<tr><td>16#0110</td><td>Axis 3</td></tr>
<tr><td>16#0180</td><td>Axis 4</td></tr>
<tr><td>16#01F0</td><td>Axis 5</td></tr>
<tr><td>16#0260</td><td>Axis 6</td></tr>
<tr><td>16#02D0</td><td>Axis 7</td></tr>
<tr><td>16#0340</td><td>8 axes</td></tr>
<tr><td>16#0031</td><td>Axis 1</td><td rowspan="7">-</td><td rowspan="7">-</td><td rowspan="7">-</td></tr>
<tr><td>16#00A1</td><td>Axis 2</td></tr>
<tr><td>16#0111</td><td>Axis 3</td></tr>
<tr><td>16#0181</td><td>Axis 4</td></tr>
<tr><td>16#01F1</td><td>Axis 5</td></tr>
<tr><td>16#0261</td><td>Axis 6</td></tr>
<tr><td>16#02D1</td><td>Axis 7</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="10"></td><td>16#0341</td><td>8 axes</td><td></td><td></td><td></td></tr>
<tr><td>16#0032</td><td>Axis 1</td><td rowspan="9">Clutch ON slip method</td><td rowspan="9">16#0000</td><td rowspan="9">Sets the slip method to be used when "Slip" is selected for the clutch ON method.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>Clutch ON slip method</td><td>0: Slip time setting
1: ————</td></tr>
<tr><td>15 to 1</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td>16#00A2</td><td>Axis 2</td></tr>
<tr><td>16#0112</td><td>Axis 3</td></tr>
<tr><td>16#0182</td><td>Axis 4</td></tr>
<tr><td>16#01F2</td><td>Axis 5</td></tr>
<tr><td>16#0262</td><td>Axis 6</td></tr>
<tr><td>16#02D2</td><td>Axis 7</td></tr>
<tr><td>16#0342</td><td>8 axes</td></tr>
<tr><td>16#0033</td><td>Axis 1</td><td rowspan="9">Clutch ON slip time</td><td rowspan="9">1</td><td rowspan="9">Sets the slip time that causes the movement speed of the slave axes to follow the movement speed of the master axis when "Slip" is selected for the clutch ON method.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>Clutch ON slip time</td><td>Sets the slip time for turning the clutch ON.
Setting range: 1 to 10,000
Unit: ms
Any other settings will result in an error.</td></tr>
</table></td></tr>
<tr><td rowspan="11">16#58</td><td>16#00A3</td><td>Axis 2</td></tr>
<tr><td>16#0113</td><td>Axis 3</td></tr>
<tr><td>16#0183</td><td>Axis 4</td></tr>
<tr><td>16#01F3</td><td>Axis 5</td></tr>
<tr><td>16#0263</td><td>Axis 6</td></tr>
<tr><td>16#02D3</td><td>Axis 7</td></tr>
<tr><td>16#0343</td><td>8 axes</td></tr>
<tr><td>16#0034 to 16#0035</td><td>Axis 1</td><td rowspan="3">-</td><td rowspan="3">-</td><td rowspan="3">-</td></tr>
<tr><td>16#00A4 to 16#00A5</td><td>Axis 2</td></tr>
<tr><td>16#0114 to 16#0115</td><td>Axis 3</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="13"></td><td>16#0184 to 16#0185</td><td>Axis 4</td><td rowspan="5"></td><td rowspan="5"></td><td rowspan="5"></td></tr>
<tr><td>16#01F4 to 16#01F5</td><td>Axis 5</td></tr>
<tr><td>16#0264 to 16#0265</td><td>Axis 6</td></tr>
<tr><td>16#02D4 to 16#02D5</td><td>Axis 7</td></tr>
<tr><td>16#0344 to 16#0345</td><td>8 axes</td></tr>
<tr><td>16#0036</td><td>Axis 1</td><td rowspan="8">Clutch ON
slip curve selection</td><td rowspan="8">16#0000</td><td rowspan="8">Sets the acceleration pattern to be used when "Slip" is selected for the clutch ON method.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>Clutch ON
slip curve selection</td><td>0: Linear
1: ————</td></tr>
<tr><td>15 to 1</td><td>-</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>16#00A6</td><td>Axis 2</td></tr>
<tr><td>16#0116</td><td>Axis 3</td></tr>
<tr><td>16#0186</td><td>Axis 4</td></tr>
<tr><td>16#01F6</td><td>Axis 5</td></tr>
<tr><td>16#0266</td><td>Axis 6</td></tr>
<tr><td>16#02D6</td><td>Axis 7</td></tr>
<tr><td>16#0346</td><td>8 axes</td></tr>
<tr><td rowspan="5">16#58</td><td>16#0037 to 16#003F</td><td>Axis 1</td><td rowspan="5">-</td><td rowspan="5">-</td><td rowspan="5">-</td></tr>
<tr><td>16#00A7 to 16#00AF</td><td>Axis 2</td></tr>
<tr><td>16#0117 to 16#011F</td><td>Axis 3</td></tr>
<tr><td>16#0187 to 16#018F</td><td>Axis 4</td></tr>
<tr><td>16#01F7 to 16#01FF</td><td>Axis 5</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="22"></td><td>16#0267 to 16#026F</td><td>Axis 6</td><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td>16#02D7 to 16#02DF</td><td>Axis 7</td></tr>
<tr><td>16#0347 to 16#034F</td><td>8 axes</td></tr>
<tr><td>16#0040</td><td>Axis 1</td><td rowspan="8">Clutch OFF method</td><td rowspan="8">16#0000</td><td rowspan="8">Sets "Direct" or "Slip" as the operation method to be used when clutch OFF is detected.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>Clutch OFF method</td><td>0: Direct
1: Slip</td></tr>
<tr><td>15 to 1</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td>16#00B0</td><td>Axis 2</td></tr>
<tr><td>16#0120</td><td>Axis 3</td></tr>
<tr><td>16#0190</td><td>Axis 4</td></tr>
<tr><td>16#0200</td><td>Axis 5</td></tr>
<tr><td>16#0270</td><td>Axis 6</td></tr>
<tr><td>16#02E0</td><td>Axis 7</td></tr>
<tr><td>16#0350</td><td>8 axes</td></tr>
<tr><td>16#0041</td><td>Axis 1</td><td rowspan="8">-</td><td rowspan="8">-</td><td rowspan="8">-</td></tr>
<tr><td>16#00B1</td><td>Axis 2</td></tr>
<tr><td>16#0121</td><td>Axis 3</td></tr>
<tr><td>16#0191</td><td>Axis 4</td></tr>
<tr><td>16#0201</td><td>Axis 5</td></tr>
<tr><td>16#0271</td><td>Axis 6</td></tr>
<tr><td>16#02E1</td><td>Axis 7</td></tr>
<tr><td>16#0351</td><td>8 axes</td></tr>
<tr><td>16#0042</td><td>Axis 1</td><td rowspan="2">Clutch OFF slip method</td><td rowspan="2">16#0000</td><td rowspan="2">Sets the slip method to be used when "Slip" is selected for the clutch OFF method.</td></tr>
<tr><td>16#00B2</td><td>Axis 2</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="6"></td><td>16#0122</td><td>Axis 3</td><td rowspan="6"></td><td rowspan="6"></td><td rowspan="6"><table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>0</td><td>Clutch OFF slip method</td><td>0: Slip time setting
1: ————</td></tr><tr><td>15 to 1</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>16#0192</td><td>Axis 4</td></tr>
<tr><td>16#0202</td><td>Axis 5</td></tr>
<tr><td>16#0272</td><td>Axis 6</td></tr>
<tr><td>16#02E2</td><td>Axis 7</td></tr>
<tr><td>16#0352</td><td>8 axes</td></tr>
<tr><td rowspan="14">16#58</td><td>16#0043</td><td>Axis 1</td><td rowspan="8">Clutch OFF slip time</td><td rowspan="8">1</td><td rowspan="8">Sets the slip time that causes the movement speed of the slave axes to follow the movement speed of the master axis when "Slip" is selected for the clutch OFF method.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>15 to 0</td><td>Clutch OFF slip time</td><td>Sets the slip time for turning the clutch OFF.
Setting range: 1 to 10,000
Unit: ms
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td>16#00B3</td><td>Axis 2</td></tr>
<tr><td>16#0123</td><td>Axis 3</td></tr>
<tr><td>16#0193</td><td>Axis 4</td></tr>
<tr><td>16#0203</td><td>Axis 5</td></tr>
<tr><td>16#0273</td><td>Axis 6</td></tr>
<tr><td>16#02E3</td><td>Axis 7</td></tr>
<tr><td>16#0353</td><td>8 axes</td></tr>
<tr><td>16#0044 to 16#0045</td><td>Axis 1</td><td rowspan="6">-</td><td rowspan="6">-</td><td rowspan="6">-</td></tr>
<tr><td>16#00B4 to 16#00B5</td><td>Axis 2</td></tr>
<tr><td>16#0124 to 16#0125</td><td>Axis 3</td></tr>
<tr><td>16#0194 to 16#0195</td><td>Axis 4</td></tr>
<tr><td>16#0204 to 16#0205</td><td>Axis 5</td></tr>
<tr><td>16#0274 to 16#0275</td><td>Axis 6</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="10"></td><td>16#02E4 to 16#02E5</td><td>Axis 7</td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td>16#0354 to 16#0355</td><td>8 axes</td></tr>
<tr><td>16#0046</td><td>Axis 1</td><td rowspan="8">Clutch OFF slip curve selection</td><td rowspan="8">16#0000</td><td rowspan="8">Sets the acceleration pattern to be used when "Slip" is selected for the clutch OFF method.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>0</td><td>Clutch OFF slip curve selection</td><td>0: Linear
1: ————</td></tr><tr><td>15 to 1</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>16#00B6</td><td>Axis 2</td></tr>
<tr><td>16#0126</td><td>Axis 3</td></tr>
<tr><td>16#0196</td><td>Axis 4</td></tr>
<tr><td>16#0206</td><td>Axis 5</td></tr>
<tr><td>16#0276</td><td>Axis 6</td></tr>
<tr><td>16#02E6</td><td>Axis 7</td></tr>
<tr><td>16#0356</td><td>8 axes</td></tr>
<tr><td rowspan="8">16#58</td><td>16#0047 to 16#004F</td><td>Axis 1</td><td rowspan="8">-</td><td rowspan="8">-</td><td rowspan="8">-</td></tr>
<tr><td>16#00B7 to 16#00BF</td><td>Axis 2</td></tr>
<tr><td>16#0127 to 16#012F</td><td>Axis 3</td></tr>
<tr><td>16#0197 to 16#019F</td><td>Axis 4</td></tr>
<tr><td>16#0207 to 16#020F</td><td>Axis 5</td></tr>
<tr><td>16#0277 to 16#027F</td><td>Axis 6</td></tr>
<tr><td>16#02E7 to 16#02EF</td><td>Axis 7</td></tr>
<tr><td>16#0357 to 16#035F</td><td>8 axes</td></tr>
</table>

■ Electronic cam setting area for each axis

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="28">16#58</td><td>16#0050</td><td rowspan="2">Axis 1</td><td rowspan="16">Cam control synchronous master axis cycle</td><td rowspan="16">1</td><td rowspan="16">Sets the cam control synchronous master cycle.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>31 to 0</td><td>Cam control synchronous master axis cycle</td><td>Setting range: 1 to 2,147,483,647
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td>16#0051</td></tr>
<tr><td>16#00C0</td><td rowspan="2">Axis 2</td></tr>
<tr><td>16#00C1</td></tr>
<tr><td>16#0130</td><td rowspan="2">Axis 3</td></tr>
<tr><td>16#0131</td></tr>
<tr><td>16#01A0</td><td rowspan="2">Axis 4</td></tr>
<tr><td>16#01A1</td></tr>
<tr><td>16#0210</td><td rowspan="2">Axis 5</td></tr>
<tr><td>16#0211</td></tr>
<tr><td>16#0280</td><td rowspan="2">Axis 6</td></tr>
<tr><td>16#0281</td></tr>
<tr><td>16#02F0</td><td rowspan="2">Axis 7</td></tr>
<tr><td>16#02F1</td></tr>
<tr><td>16#0360</td><td rowspan="2">8 axes</td></tr>
<tr><td>16#0361</td></tr>
<tr><td>16#0052</td><td>Axis 1</td><td rowspan="8">-</td><td rowspan="8">-</td><td rowspan="8">-</td></tr>
<tr><td>16#00C2</td><td>Axis 2</td></tr>
<tr><td>16#0132</td><td>Axis 3</td></tr>
<tr><td>16#01A2</td><td>Axis 4</td></tr>
<tr><td>16#0212</td><td>Axis 5</td></tr>
<tr><td>16#0282</td><td>Axis 6</td></tr>
<tr><td>16#02F2</td><td>Axis 7</td></tr>
<tr><td>16#0362</td><td>8 axes</td></tr>
<tr><td>16#0053</td><td>Axis 1</td><td rowspan="4">Used cam pattern number</td><td rowspan="4">1</td><td rowspan="4">Sets the registered cam pattern number to be used.<table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td>15 to 0</td><td>Used cam pattern number</td><td>Setting range: 1 to 16
Any other settings will result in an error.</td></tr></table>The upper limit of usable cam pattern numbers depends on the resolution.</td></tr>
<tr><td>16#00C3</td><td>Axis 2</td></tr>
<tr><td>16#0133</td><td>Axis 3</td></tr>
<tr><td>16#01A3</td><td>Axis 4</td></tr>
</table>

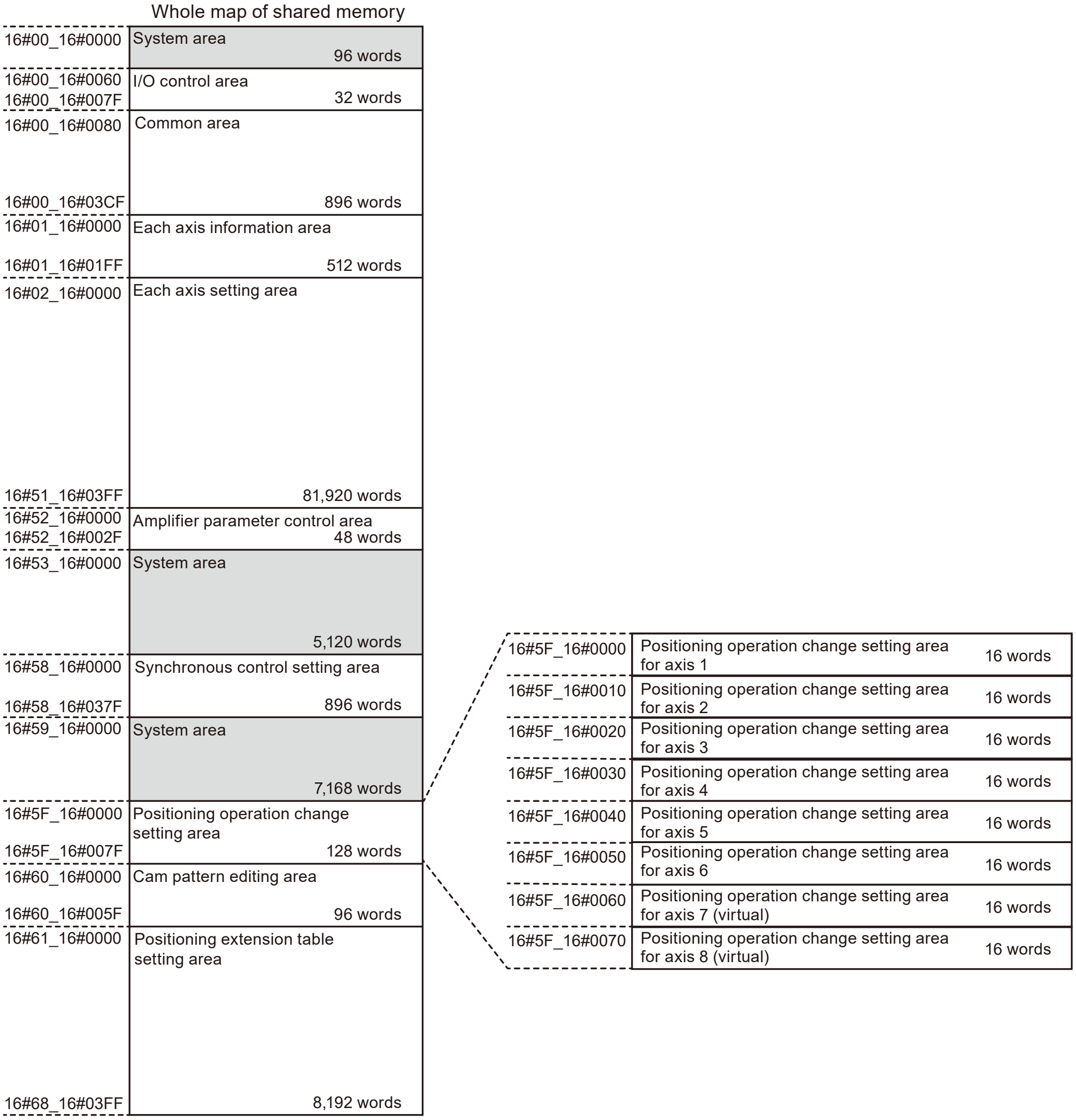
<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="4"></td><td>16#0213</td><td>Axis 5</td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td></tr>
<tr><td>16#0283</td><td>Axis 6</td></tr>
<tr><td>16#02F3</td><td>Axis 7</td></tr>
<tr><td>16#0363</td><td>8 axes</td></tr>
<tr><td rowspan="30">16#58</td><td>16#0054</td><td rowspan="2">Axis 1</td><td rowspan="16">Cam stroke amount</td><td rowspan="16">1</td><td rowspan="16">Sets the upper limit of displacement for cam control.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>31 to 0</td><td>Cam stroke amount</td><td>Setting range: 1 to 2,147,483,647
Any other settings will result in an error.</td></tr>
</table></td></tr>
<tr><td>16#0055</td></tr>
<tr><td>16#00C4</td><td rowspan="2">Axis 2</td></tr>
<tr><td>16#00C5</td></tr>
<tr><td>16#0134</td><td rowspan="2">Axis 3</td></tr>
<tr><td>16#0135</td></tr>
<tr><td>16#01A4</td><td rowspan="2">Axis 4</td></tr>
<tr><td>16#01A5</td></tr>
<tr><td>16#0214</td><td rowspan="2">Axis 5</td></tr>
<tr><td>16#0215</td></tr>
<tr><td>16#0284</td><td rowspan="2">Axis 6</td></tr>
<tr><td>16#0285</td></tr>
<tr><td>16#02F4</td><td rowspan="2">Axis 7</td></tr>
<tr><td>16#02F5</td></tr>
<tr><td>16#0364</td><td rowspan="2">8 axes</td></tr>
<tr><td>16#0365</td></tr>
<tr><td>16#0056</td><td rowspan="2">Axis 1</td><td rowspan="14">Advance angle correction
reference amount</td><td rowspan="14">0</td><td rowspan="14">Sets the correction reference amount required for the unit to calculate the advance angle correction amount when the advance angle correction function is used.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Advance angle correction
reference amount</td><td>0</td><td>Setting range: -2147482624 to +2147482624
Any other settings will result in an error.</td></tr>
</table>
The unit follows the unit system of the master axis and interpretation changes according to the unit settings.
Pulses: -2,147,482,624 to 2,147,482,624 pulses
μm (0.1 μm)：-214,748,262.4 to 214,748,262.4 μm
μm (1 μm): -2,147,482,624 to 2,147,482,624 μm
Inches (0.00001 inch): -21,474.82624 to 21,474.82624 inches
inch (0.0001 inch): -214,748.2624 to 214,748.2624 inch</td></tr>
<tr><td>16#0057</td></tr>
<tr><td>16#00C6</td><td rowspan="2">Axis 2</td></tr>
<tr><td>16#00C7</td></tr>
<tr><td>16#0136</td><td rowspan="2">Axis 3</td></tr>
<tr><td>16#0137</td></tr>
<tr><td>16#01A6</td><td rowspan="2">Axis 4</td></tr>
<tr><td>16#01A7</td></tr>
<tr><td>16#0216</td><td rowspan="2">Axis 5</td></tr>
<tr><td>16#0217</td></tr>
<tr><td>16#0286</td><td rowspan="2">Axis 6</td></tr>
<tr><td>16#0287</td></tr>
<tr><td>16#02F6</td><td rowspan="2">Axis 7</td></tr>
<tr><td>16#02F7</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="2"></td><td>16#0366</td><td rowspan="2">8 axes</td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2">Degrees (0.1 degree): -214,748,262.4 to 214,748,262.4 degrees
Degree (1 degree): -2,147,482,624 to 2,147,482,624 degrees</td></tr>
<tr><td>16#0367</td></tr>
<tr><td rowspan="25">16#58</td><td>16#0058</td><td rowspan="2">Axis 1</td><td rowspan="16">Advance angle correction
reference speed</td><td rowspan="16">100</td><td rowspan="16">Sets the reference speed required for the unit to calculate the advance angle correction amount when the advance angle correction function is used.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>31 to 0</td><td>Advance angle correction
reference speed</td><td>Setting range: 1 to 2,147,482,624
Unit: Dependent upon the specified unlit
Any other settings will result in an error.
The unit follows the unit system of the master axis and the range changes according to the unit settings as shown below.
Pulses: 1 to 2,147,482,624 pps
μm : 1 to 2,147,482,624 μm/s
Inches: 0.001 to 2,147,482.624
inches/s
Degrees: 0.001 to 2,147,482.624
rev/s</td></tr>
</table></td></tr>
<tr><td>16#0059</td></tr>
<tr><td>16#00C8</td><td rowspan="2">Axis 2</td></tr>
<tr><td>16#00C9</td></tr>
<tr><td>16#0138</td><td rowspan="2">Axis 3</td></tr>
<tr><td>16#0139</td></tr>
<tr><td>16#01A8</td><td rowspan="2">Axis 4</td></tr>
<tr><td>16#01A9</td></tr>
<tr><td>16#0218</td><td rowspan="2">Axis 5</td></tr>
<tr><td>16#0219</td></tr>
<tr><td>16#0288</td><td rowspan="2">Axis 6</td></tr>
<tr><td>16#0289</td></tr>
<tr><td>16#02F8</td><td rowspan="2">Axis 7</td></tr>
<tr><td>16#02F9</td></tr>
<tr><td>16#0368</td><td rowspan="2">8 axes</td></tr>
<tr><td>16#0369</td></tr>
<tr><td>16#005A</td><td>Axis 1</td><td rowspan="8">Advance angle correction
parameter
change time</td><td rowspan="8">100</td><td rowspan="8">Sets the time required to reflect the changed value when a parameter related to advance angle correction (advance angle correction reference speed or advance angle correction reference amount) is changed during electronic cam operation.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>Advance angle correction
parameter
change time</td><td>Setting range: 1 to 10,000
Unit: ms
Any other settings will result in an error.</td></tr>
</table></td></tr>
<tr><td>16#00CA</td><td>Axis 2</td></tr>
<tr><td>16#013A</td><td>Axis 3</td></tr>
<tr><td>16#01AA</td><td>Axis 4</td></tr>
<tr><td>16#021A</td><td>Axis 5</td></tr>
<tr><td>16#028A</td><td>Axis 6</td></tr>
<tr><td>16#02FA</td><td>Axis 7</td></tr>
<tr><td>16#036A</td><td>8 axes</td></tr>
<tr><td>16#005B to 16#006F</td><td>Axis 1</td><td>-</td><td>-</td><td>-</td></tr>
</table>

Bank	Offset address	Name		Default	Description
	16#00CB to 16#00DF	Axis 2			
	16#013B to 16#014F	Axis 3			
	16#01AB to 16#01BF	Axis 4			
	16#021B to 16#022F	Axis 5			
	16#028B to 16#029F	Axis 6			
	16#02FB to 16#030F	Axis 7			
	16#036B to 16#037F	8 axes			

18.10 Positioning Operation Change Setting Area in Shared Memory

18.10.1 Configuration of Positioning Operation Change Setting Area



Whole map of shared memory

16#00_16#0000	System area	96 words
16#00_16#0060 16#00_16#007F	I/O control area	32 words
16#00_16#0080 16#00_16#03CF	Common area	896 words
16#01_16#0000 16#01_16#01FF	Each axis information area	512 words
16#02_16#0000 16#51_16#03FF	Each axis setting area	81,920 words
16#52_16#0000 16#52_16#002F	Amplifier parameter control area	48 words
16#53_16#0000	System area	5,120 words
16#58_16#0000 16#58_16#037F	Synchronous control setting area	896 words
16#59_16#0000	System area	7,168 words
16#5F_16#0000 16#5F_16#007F	Positioning operation change setting area	128 words
16#60_16#0000 16#60_16#005F	Cam pattern editing area	96 words
16#61_16#0000 16#68_16#03FF	Positioning extension table setting area	8,192 words

16#5F_16#0000	Positioning operation change setting area for axis 1	16 words
16#5F_16#0010	Positioning operation change setting area for axis 2	16 words
16#5F_16#0020	Positioning operation change setting area for axis 3	16 words
16#5F_16#0030	Positioning operation change setting area for axis 4	16 words
16#5F_16#0040	Positioning operation change setting area for axis 5	16 words
16#5F_16#0050	Positioning operation change setting area for axis 6	16 words
16#5F_16#0060	Positioning operation change setting area for axis 7 (virtual)	16 words
16#5F_16#0070	Positioning operation change setting area for axis 8 (virtual)	16 words

18.10.2 Positioning Speed Change Setting Area

Bank	Offset address	Name		Default	Description
16#5F	16#0000	Axis 1	positioning Speed change	100	Area for setting the ratio (override) of change relative to the commanded speed when the positioning speed

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="28"></td><td>16#0010</td><td>Axis 2</td><td rowspan="7">ratio specification
(Override)</td><td rowspan="7"></td><td rowspan="7">is changed. No speed change request by I/O is required, and the change becomes valid when a value (ratio) is set.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>positioning
Speed change
ratio specification</td><td>100</td><td>Setting range: 1 to 300
Unit: %
Any other settings will result in an error.</td></tr>
</table></td></tr>
<tr><td>16#0020</td><td>Axis 3</td></tr>
<tr><td>16#0030</td><td>Axis 4</td></tr>
<tr><td>16#0040</td><td>Axis 5</td></tr>
<tr><td>16#0050</td><td>Axis 6</td></tr>
<tr><td>16#0060</td><td>Axis 7</td></tr>
<tr><td>16#0070</td><td>8 axes</td></tr>
<tr><td>16#0001</td><td>Axis 1</td><td rowspan="8">positioning
Speed change
mode selection</td><td rowspan="8">16#0000</td><td rowspan="8">Area for setting the range of positioning speed change.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>positioning
Speed change
mode selection</td><td>16#0000: Active table only
16#0001: Active table to E-point table
(until operation is complete)</td></tr>
</table>
In the case of other values, the unit operates as if 16#0000 ("Active table only") is set.</td></tr>
<tr><td>16#0011</td><td>Axis 2</td></tr>
<tr><td>16#0021</td><td>Axis 3</td></tr>
<tr><td>16#0031</td><td>Axis 4</td></tr>
<tr><td>16#0041</td><td>Axis 5</td></tr>
<tr><td>16#0051</td><td>Axis 6</td></tr>
<tr><td>16#0061</td><td>Axis 7</td></tr>
<tr><td>16#0071</td><td>8 axes</td></tr>
<tr><td>16#0002</td><td rowspan="2">Axis 1</td><td rowspan="12">positioning
Speed change
Changed speed</td><td rowspan="12">100</td><td rowspan="12">Area for specifying a new speed when positioning speed is changed.
Unit-converted values are set.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>31 to 0</td><td>positioning
Speed change</td><td>Setting range: 1 to 2,147,482,624
Unit: Dependent upon the specified unlit
Any other settings will result in an error.
The setting range changes according to the unit settings as below.
Pulses: 1 to 2,147,482,624 pps</td></tr>
</table></td></tr>
<tr><td>16#0003</td></tr>
<tr><td>16#0012</td><td rowspan="2">Axis 2</td></tr>
<tr><td>16#0013</td></tr>
<tr><td>16#0022</td><td rowspan="2">Axis 3</td></tr>
<tr><td>16#0023</td></tr>
<tr><td>16#0032</td><td rowspan="2">Axis 4</td></tr>
<tr><td>16#0033</td></tr>
<tr><td>16#0042</td><td rowspan="2">Axis 5</td></tr>
<tr><td>16#0043</td></tr>
<tr><td>16#0052</td><td rowspan="2">Axis 6</td></tr>
<tr><td>16#0053</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="4"></td><td>16#0062</td><td rowspan="2">Axis 7</td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"><table><tr><th>Bit</th><th>Name</th><th>Description</th></tr><tr><td></td><td></td><td>µm: 1 to 2,147,482,624 µm/s
Inches: 0.001 to 2,147,482.624
inches/s
Degrees: 0.001 to 2,147,482.624
rev/s</td></tr></table></td></tr>
<tr><td>16#0063</td></tr>
<tr><td>16#0072</td><td rowspan="2">8 axes</td></tr>
<tr><td>16#0073</td></tr>
<tr><td rowspan="15">16#5F</td><td>16#0004</td><td>Axis 1</td><td rowspan="8">positioning
speed change request</td><td rowspan="8">16#0000</td><td rowspan="8">If the target speed is changed during positioning operation, when this bit changes from 0 to 1, the target speed during operation is changed to the value specified in “Positioning speed change: Changed speed”. After the change processing is completed, the positioning unit RTEX automatically resets the bit to 0.<table><tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>0</td><td>positioning
speed change request</td><td>0</td><td>0: No change
1: Change the positioning
movement amount
for the target axis</td></tr><tr><td>15 to 1</td><td>-</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td>16#0014</td><td>Axis 2</td></tr>
<tr><td>16#0024</td><td>Axis 3</td></tr>
<tr><td>16#0034</td><td>Axis 4</td></tr>
<tr><td>16#0044</td><td>Axis 5</td></tr>
<tr><td>16#0054</td><td>Axis 6</td></tr>
<tr><td>16#0064</td><td>Axis 7</td></tr>
<tr><td>16#0074</td><td>8 axes</td></tr>
<tr><td>16#0005 to 16#0009</td><td>Axis 1</td><td rowspan="7">-</td><td rowspan="7">-</td><td rowspan="7">-</td></tr>
<tr><td>16#0015 to 16#0019</td><td>Axis 2</td></tr>
<tr><td>16#0025 to 16#0029</td><td>Axis 3</td></tr>
<tr><td>16#0035 to 16#0039</td><td>Axis 4</td></tr>
<tr><td>16#0045 to 16#0049</td><td>Axis 5</td></tr>
<tr><td>16#0055 to 16#0059</td><td>Axis 6</td></tr>
<tr><td>16#0065 to 16#0069</td><td>Axis 7</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td>16#0075
to
16#0079</td><td>8 axes</td><td></td><td></td><td></td></tr>
</table>

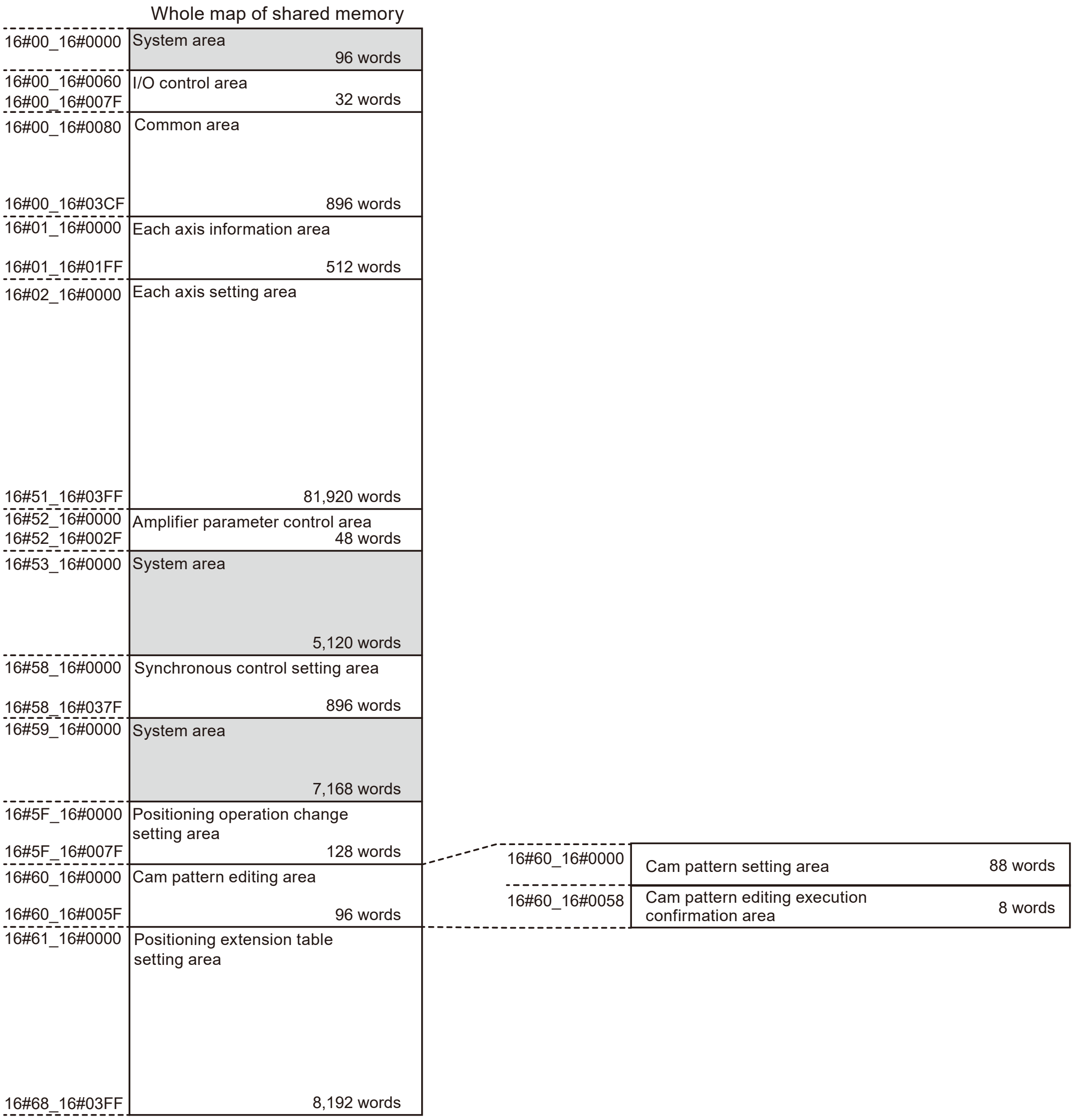
18.10.3 Positioning Movement Amount Change Setting Area

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="23">16#5F</td><td>16#000A</td><td rowspan="2">Axis 1</td><td rowspan="16">positioning
movement amount change
Changed movement amount</td><td rowspan="16">0</td><td rowspan="16">Area for setting a changed movement amount when the positioning movement amount is changed. Unit-converted values are set.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>positioning
movement amount change
Changed movement amount</td><td>0</td><td>Setting range:
-2147482624 to +2147482624
Any other settings will result in an error.</td></tr>
</table>
Interpretation changes according to the unit settings as below.
Pulses: -2,147,482,624 to 2,147,482,624 pulses
μm (0.1 μm)：-214,748,262.4 to 214,748,262.4 μm
μm (1 μm): -2,147,482,624 to 2,147,482,624 μm
Inches (0.00001 inch): -21,474.82624 to 21,474.82624 inches
inch (0.0001 inch): -214,748.2624 to 214,748.2624 inch
Degrees (0.1 degree): -214,748,262.4 to 214,748,262.4 degrees
Degree (1 degree): -2,147,482,624 to 2,147,482,624 degrees</td></tr>
<tr><td>16#000B</td></tr>
<tr><td>16#001A</td><td rowspan="2">Axis 2</td></tr>
<tr><td>16#001B</td></tr>
<tr><td>16#002A</td><td rowspan="2">Axis 3</td></tr>
<tr><td>16#002B</td></tr>
<tr><td>16#003A</td><td rowspan="2">Axis 4</td></tr>
<tr><td>16#003B</td></tr>
<tr><td>16#004A</td><td rowspan="2">Axis 5</td></tr>
<tr><td>16#004B</td></tr>
<tr><td>16#005A</td><td rowspan="2">Axis 6</td></tr>
<tr><td>16#005B</td></tr>
<tr><td>16#006A</td><td rowspan="2">Axis 7</td></tr>
<tr><td>16#006B</td></tr>
<tr><td>16#007A</td><td rowspan="2">8 axes</td></tr>
<tr><td>16#007B</td></tr>
<tr><td>16#000C</td><td>Axis 1</td><td rowspan="7">positioning
movement amount change request</td><td rowspan="7">16#0000</td><td rowspan="7">If the target movement amount is changed during a positioning operation, when this bit changes from 0 to 1, the target movement amount during the operation is changed to the value specified in "Positioning movement amount change: Changed movement amount". After the change processing is completed, the positioning unit RTEX automatically resets the bit to 0.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>positioning
movement amount change request</td><td>0</td><td>0: No change
1: Change the positioning movement amount for the target axis.</td></tr>
</table></td></tr>
<tr><td>16#001C</td><td>Axis 2</td></tr>
<tr><td>16#002C</td><td>Axis 3</td></tr>
<tr><td>16#003C</td><td>Axis 4</td></tr>
<tr><td>16#004C</td><td>Axis 5</td></tr>
<tr><td>16#005C</td><td>Axis 6</td></tr>
<tr><td>16#006C</td><td>Axis 7</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th colspan="2">Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td>16#007C</td><td>8 axes</td><td></td><td></td><td><table><tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>15 to 1</td><td>-</td><td>-</td><td>-</td></tr></table></td></tr>
<tr><td rowspan="8">16#5F</td><td>16#000D to 16#000F</td><td>Axis 1</td><td rowspan="8">-</td><td rowspan="8">-</td><td rowspan="8">-</td></tr>
<tr><td>16#001D to 16#001F</td><td>Axis 2</td></tr>
<tr><td>16#002D to 16#002F</td><td>Axis 3</td></tr>
<tr><td>16#003D to 16#003F</td><td>Axis 4</td></tr>
<tr><td>16#004D to 16#004F</td><td>Axis 5</td></tr>
<tr><td>16#005D to 16#005F</td><td>Axis 6</td></tr>
<tr><td>16#006D to 16#006F</td><td>Axis 7</td></tr>
<tr><td>16#007D to 16#007F</td><td>8 axes</td></tr>
</table>

18.11 Cam Pattern Editing Area in Shared Memory

18.11.1 Configuration of Cam Pattern Editing Area



18.11.2 Cam Pattern Setting Area

Bank	Offset address	Name	Default	Description
16#60	16#0000	Cam pattern number	0	When reading: Set a cam pattern number to be read.

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="4"></td><td></td><td></td><td></td><td>When writing: Set a cam pattern number to be rewritten.
The setting range changes according to the resolution.
<table><tr><th>Pattern resolution</th><th>Settable range</th></tr><tr><td>1024, 2048, 4096, 8192</td><td>Setting range: 1 to 16</td></tr><tr><td>16384</td><td>Setting range: 1 to 8</td></tr><tr><td>32768</td><td>Setting range: 1 to 4</td></tr></table>Any other settings will result in an error.</td></tr>
<tr><td>16#0001</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0002</td><td>Cam pattern setting
Number of sections</td><td>0</td><td>When reading: Stores the number of set sections read from the cam pattern table.
When writing: Sets the number of set sections to be rewritten in the cam pattern table.
<table><tr><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>Cam pattern
Set number of sections</td><td>0</td><td>Setting range: 1 to 20
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td>16#0003</td><td>Shift amount</td><td>0</td><td>When reading: Stores the shift amount in the cam pattern table that has been read
When writing: Sets the shift amount in the cam pattern table to be rewritten
<table><tr><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>Shift amount</td><td>0</td><td>Setting range: 0 to 10,000
Unit: 0.01%
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td rowspan="2">16#60</td><td rowspan="2">16#0004</td><td rowspan="2">Start phase of Section 1</td><td rowspan="2">0</td><td>When reading: Stores the start phase of Section 1 in the cam pattern table that has been read. The read value is always 0.
When writing: Sets the start phase of Section 1 in the cam pattern table to be rewritten. When any value other than 0 is set in Section 1, it cannot be rewritten correctly.
<table><tr><th>Name</th><th>Default</th><th>Description</th></tr><tr><td>Start phase of Section 1</td><td>0</td><td>Setting range: 0 to 10,000
Unit: 0.01%
Any other settings will result in an error.</td></tr></table></td></tr>
<tr><td>When reading: Stores data after truncating all digits after the third decimal place
When writing: Registers data after the unit calculates all digits after the third decimal place</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>16#60</td><td>16#0005</td><td>Displacement of Section 1</td><td>0</td><td>When reading: Stores the displacement of Section 1 in the cam pattern table that has been read.
When writing: Sets the displacement of Section 1 in the cam pattern table to be rewritten.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Displacement of Section 1</td><td>0</td><td>Setting range: -10,000 to +10,000
Unit: 0.01%
Any other settings will result in an error.</td></tr>
</table>
When reading: Stores data after truncating all digits after the third decimal place
When writing: Registers data after padding zeros to all digits after the third decimal place</td></tr>
<tr><td>16#60</td><td>16#0006</td><td>Cam curve of Section 1</td><td>0</td><td>When reading: Stores the cam curve number in the cam pattern table that has been read
When writing: Sets the cam curve number in the cam pattern table to be rewritten
<table>
<tr><th>Setting value</th><th>Cam curve name</th></tr>
<tr><td>10</td><td>Constant velocity</td></tr>
<tr><td>11</td><td>Constant acceleration</td></tr>
<tr><td>12</td><td>Simple harmonic motion</td></tr>
<tr><td>22</td><td>Cycloid</td></tr>
<tr><td>25</td><td>Modified trapezoid</td></tr>
<tr><td>26</td><td>Modified sine</td></tr>
<tr><td>27</td><td>Modified constant velocity</td></tr>
<tr><td>33</td><td>Asymmetric cycloid</td></tr>
<tr><td>34</td><td>Asymmetric modified trapezoid</td></tr>
<tr><td>35</td><td>Trapecloid</td></tr>
<tr><td>43</td><td>One-dwell cycloid m=1</td></tr>
<tr><td>44</td><td>One-dwell cycloid m=2/3</td></tr>
<tr><td>45</td><td>One-dwell modified trapezoid m=1</td></tr>
<tr><td>46</td><td>One-dwell modified trapezoid (Ferguson)</td></tr>
<tr><td>47</td><td>One-dwell modified trapezoid m=2/3</td></tr>
<tr><td>48</td><td>One-dwell modified sine</td></tr>
<tr><td>49</td><td>One-dwell trapecloid</td></tr>
<tr><td>50</td><td>No-dwell simple harmonic motion</td></tr>
<tr><td>51</td><td>No-dwell modified trapezoid</td></tr>
<tr><td>52</td><td>No-dwell modified constant velocity</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="7"></td><td></td><td></td><td></td><td><table><tr><th>Setting value</th><th>Cam curve name</th></tr><tr><td>92</td><td>NC2 curve</td></tr></table>Any other settings will result in an error.</td></tr>
<tr><td>16#0007</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0008 to 16#000B</td><td>Area for Section 2</td><td>-</td><td rowspan="5">As is the case with the area for Section 1, one word is allocated to each of the start phase, displacement, cam curve, and system area.<table><tr><th></th><th>Start phase in section</th><th>Displacement in section</th><th>Cam curve in section</th><th>System reserved</th></tr><tr><td rowspan="4">Offset address last number</td><td>16#xx0</td><td>16#xx1</td><td>16#xx2</td><td>16#xx3</td></tr><tr><td>16#xx4</td><td>16#xx5</td><td>16#xx6</td><td>16#xx7</td></tr><tr><td>16#xx8</td><td>16#xx9</td><td>16#xxA</td><td>16#xxB</td></tr><tr><td>16#xxC</td><td>16#xxD</td><td>16#xxE</td><td>16#xxF</td></tr></table></td></tr>
<tr><td>16#000C to 16#000F</td><td>Area for Section 3</td><td>-</td></tr>
<tr><td>16#0010 to 16#0013</td><td>Area for Section 4</td><td>-</td></tr>
<tr><td>16#0014 to 16#0017</td><td>Area for Section 5</td><td>-</td></tr>
<tr><td>16#0018 to 16#001B</td><td>Area for Section 6</td><td>-</td></tr>
<tr><td rowspan="9">16#60</td><td>16#001C to 16#001F</td><td>Area for Section 7</td><td>-</td><td rowspan="9">As is the case with the area for Section 1, one word is allocated to each of the start phase, displacement, cam curve, and system area.<table><tr><th></th><th>Start phase in section</th><th>Displacement in section</th><th>Cam curve in section</th><th>System reserved</th></tr><tr><td rowspan="4">Offset address last number</td><td>16#xx0</td><td>16#xx1</td><td>16#xx2</td><td>16#xx3</td></tr><tr><td>16#xx4</td><td>16#xx5</td><td>16#xx6</td><td>16#xx7</td></tr><tr><td>16#xx8</td><td>16#xx9</td><td>16#xxA</td><td>16#xxB</td></tr><tr><td>16#xxC</td><td>16#xxD</td><td>16#xxE</td><td>16#xxF</td></tr></table></td></tr>
<tr><td>16#0020 to 16#0023</td><td>Area for Section 8</td><td>-</td></tr>
<tr><td>16#0024 to 16#0027</td><td>Area for Section 9</td><td>-</td></tr>
<tr><td>16#0028 to 16#002B</td><td>Area for Section 10</td><td>-</td></tr>
<tr><td>16#002C to 16#002F</td><td>Area for Section 11</td><td>-</td></tr>
<tr><td>16#0030 to 16#0033</td><td>Area for Section 12</td><td>-</td></tr>
<tr><td>16#0034 to 16#0037</td><td>Area for Section 13</td><td>-</td></tr>
<tr><td>16#0038 to 16#003B</td><td>Area for Section 14</td><td>-</td></tr>
<tr><td>16#003C to 16#003F</td><td>Area for Section 15</td><td>-</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="6"></td><td>16#0040 to 16#0043</td><td>Area for Section 16</td><td>-</td><td rowspan="5"></td></tr>
<tr><td>16#0044 to 16#0047</td><td>Area for Section 17</td><td>-</td></tr>
<tr><td>16#0048 to 16#004B</td><td>Area for Section 18</td><td>-</td></tr>
<tr><td>16#004C to 16#004F</td><td>Area for Section 19</td><td>-</td></tr>
<tr><td>16#0050 to 16#0053</td><td>Area for Section 20</td><td>-</td></tr>
<tr><td>16#0054</td><td>Cam table
read request</td><td>16#0000</td><td>When this bit changes from 0 to 1, the cam table corresponding to the specified cam pattern number is read. After the cam table is read, the positioning unit RTEX automatically resets the bit to 0.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Cam table
read request</td><td>0</td><td>0: Do not rewrite
1: Issue cam table read request.</td></tr>
<tr><td>15 to 1</td><td>-</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td rowspan="2">16#60</td><td>16#0055</td><td>Cam table
rewrite request</td><td>16#0000</td><td>When this bit changes from 0 to 1, the cam table corresponding to the specified cam pattern number is rewritten. After the cam table is rewritten, the positioning unit RTEX automatically resets the bit to 0.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Cam table
rewrite request</td><td>0</td><td>0: Do not rewrite
1: Issue cam table rewrite request.</td></tr>
<tr><td>15 to 1</td><td>-</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td>16#0056 to 16#0057</td><td>-</td><td>-</td><td>-</td></tr>
</table>

18.11.3 Cam Pattern Editing Execution Confirmation Area

Bank	Offset address	Name	Default	Description
16#60	16#0058	Cam pattern Read result	16#0000	Stores the result of read processing (response code). 16#0000: Normal termination Other than 16#0000: Abnormal termination
	16#0059	Cam pattern Rewrite result	16#0000	Stores the result of rewriting processing (response code). 16#0000: Normal termination Other than 16#0000: Abnormal termination

(Note 1) In the case of abnormal termination, the codes in the following table are stored.

Code	Name	Description	Processing		Countermeasures
			Read	Write	
16#FF01	Cam pattern number setting error	The set cam pattern number is out of range.	○	○	Check the set cam pattern number.
16#FF02	Invalid number of set cam pattern sections	The set number of cam pattern sections is out of range.	-	○	Check the set number of sections.
16#FF03	Shift amount setting error	The set shift amount is out of range.	-	○	Check the set shift amount.
16#FF05	Start phase setting error 1	The set start phase is out of range.	-	○	Check the set start phase of each section.
16#FF06	Start phase setting error 2	The set start phase is equal to or smaller than the start phase of the previous section.	-	○	Check if the relation between the start phases of each section is (Start phase of section n-1) < (Start phase of section n).
16#FF07	Start phase setting error 3	The set start phase of Section 1 is not 0.	-	○	Always set the start phase of Section 1 to 0.
16#FF0A	Displacement setting error	The set displacement is out of range.	-	○	Check the set phase of each section.
16#FF0B	Cam curve no. setting error	The set cam curve number is out of range.	-	○	Check the set cam curve number of each section.
16#FF10	Cam pattern reading non-executable error 1	There are axes under synchronous control.	○	-	Cancel the synchronous control before reading the cam pattern.
16#FF11	Cam pattern reading non-executable error 2	Operating axes exist.	○	-	Make sure that there are no operating axes before reading the cam pattern.
16#FF20	Cam pattern rewriting non-executable error 1	There are axes under synchronous control.	-	○	Cancel the synchronous control before rewriting the cam pattern.

Code	Name	Description	Processing		Countermeasures
			Read	Write	
16#FF 21	Cam pattern rewriting non-executable error 2	Operating axes exist.	-	○	Make sure that there are no operating axes before rewriting the cam pattern.
16#FF 22	Cam pattern rewriting non-executable error 3	The read request and rewrite request contacts turned ON simultaneously.	-	○	Check whether the read request and rewrite request contacts turn ON simultaneously. When the read request and rewrite request contacts turn ON simultaneously, the read request is given priority.

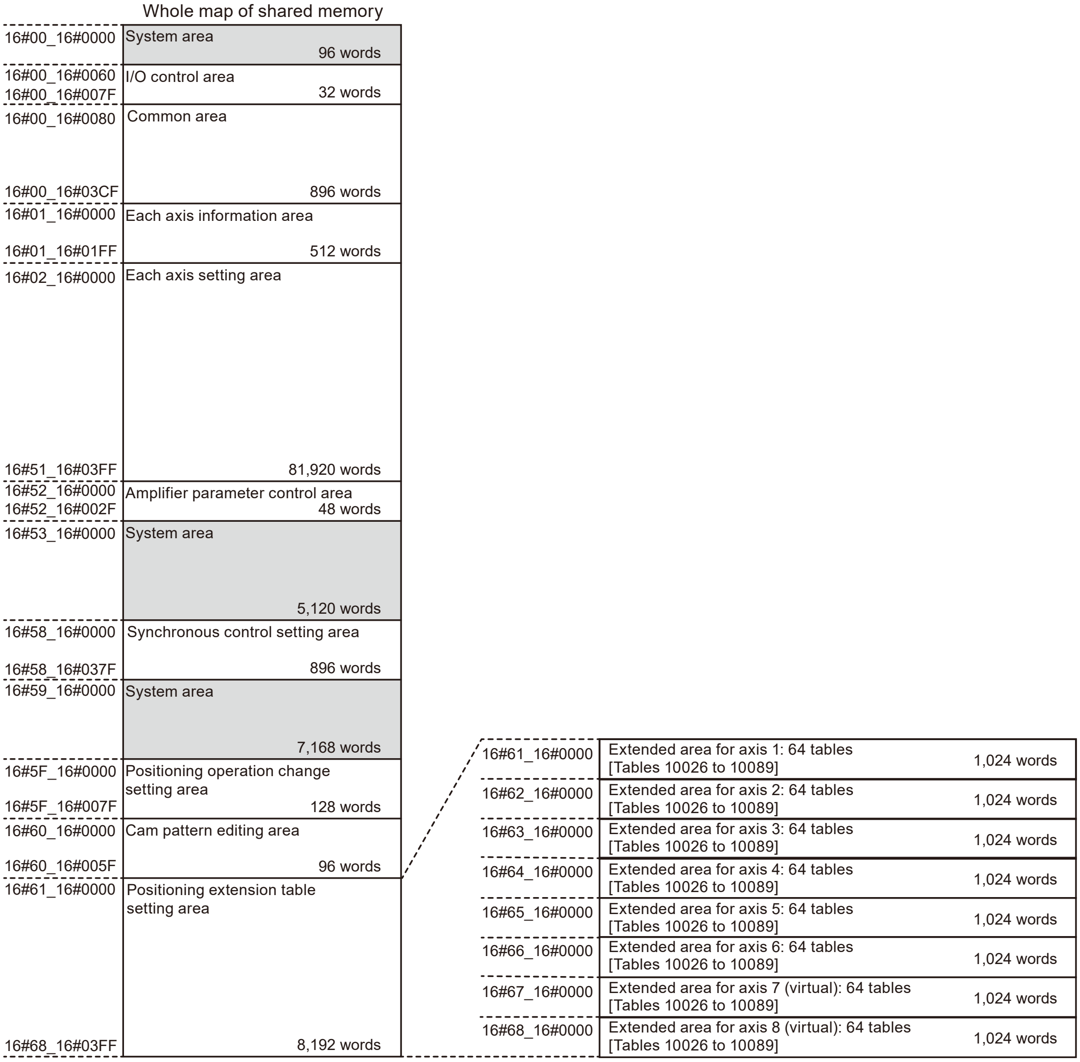
<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>16#60</td><td>16#005A</td><td>Cam pattern
Update flag</td><td>16#FFFF</td><td>Notifies the valid cam pattern table data.
Bits are allocated to cam pattern numbers 1 to 16.
When the control unit switches to RUN mode and the configuration data set by the tool software takes effect, bits 0 to 15 are all set to "1". When the user program rewrites a cam pattern, the bit corresponding to the cam pattern number is set to "0".
(Note 1): Never rewrite this area. If the area is rewritten, the status cannot be notified normally.
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>0</td><td>Cam pattern No.1 validity condition</td><td>1</td><td rowspan="11">0: Cam pattern table after rewriting by user program is enabled.
1: Configuration data from tool software is enabled.</td></tr>
<tr><td>1</td><td>Cam pattern No.2 enable status</td><td>1</td></tr>
<tr><td>2</td><td>Cam pattern No.3 enable status</td><td>1</td></tr>
<tr><td>3</td><td>Cam pattern No.4 enable status</td><td>1</td></tr>
<tr><td>4</td><td>Cam pattern No.5 enable status</td><td>1</td></tr>
<tr><td>5</td><td>Cam pattern No.6 enable status</td><td>1</td></tr>
<tr><td>6</td><td>Cam pattern No.7 enable status</td><td>1</td></tr>
<tr><td>7</td><td>Cam pattern No.8 enable status</td><td>1</td></tr>
<tr><td>8</td><td>Cam pattern No.9 enable status</td><td>1</td></tr>
<tr><td>9</td><td>Cam pattern No.10 enable status</td><td>1</td></tr>
<tr><td>10</td><td>Cam pattern No.11 enable status</td><td>1</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Bank</th><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td rowspan="2"></td><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>11</td><td>Cam pattern No.12 enable status</td><td>1</td><td rowspan="5"></td></tr>
<tr><td>12</td><td>Cam pattern No.13 enable status</td><td>1</td></tr>
<tr><td>13</td><td>Cam pattern No.14 enable status</td><td>1</td></tr>
<tr><td>14</td><td>Cam pattern No.15 enable status</td><td>1</td></tr>
<tr><td>15</td><td>Cam pattern No.16 enable status</td><td>1</td></tr>
</table>
</td></tr>
<tr><td>16#005B to 16#005F</td><td>-</td><td>-</td><td>-</td></tr>
</table>

18.12 Details of Positioning Extension Table Setting Area in Shared Memory

18.12.1 Configuration of Positioning Extended Table Setting Area

Positioning data settings for each axis are composed of 64 tables (Tables 10026 to 10089) in the extended area.



Whole map of shared memory

16#00_16#0000	System area	96 words
16#00_16#0060 16#00_16#007F	I/O control area	32 words
16#00_16#0080 16#00_16#03CF	Common area	896 words
16#01_16#0000 16#01_16#01FF	Each axis information area	512 words
16#02_16#0000 16#51_16#03FF	Each axis setting area	81,920 words
16#52_16#0000 16#52_16#002F	Amplifier parameter control area	48 words
16#53_16#0000	System area	5,120 words
16#58_16#0000 16#58_16#037F	Synchronous control setting area	896 words
16#59_16#0000	System area	7,168 words
16#5F_16#0000 16#5F_16#007F	Positioning operation change setting area	128 words
16#60_16#0000 16#60_16#005F	Cam pattern editing area	96 words
16#61_16#0000 16#68_16#03FF	Positioning extension table setting area	8,192 words

16#61_16#0000	Extended area for axis 1: 64 tables [Tables 10026 to 10089]	1,024 words
16#62_16#0000	Extended area for axis 2: 64 tables [Tables 10026 to 10089]	1,024 words
16#63_16#0000	Extended area for axis 3: 64 tables [Tables 10026 to 10089]	1,024 words
16#64_16#0000	Extended area for axis 4: 64 tables [Tables 10026 to 10089]	1,024 words
16#65_16#0000	Extended area for axis 5: 64 tables [Tables 10026 to 10089]	1,024 words
16#66_16#0000	Extended area for axis 6: 64 tables [Tables 10026 to 10089]	1,024 words
16#67_16#0000	Extended area for axis 7 (virtual): 64 tables [Tables 10026 to 10089]	1,024 words
16#68_16#0000	Extended area for axis 8 (virtual): 64 tables [Tables 10026 to 10089]	1,024 words

18.12.2 Positioning Data Setting Area

Data in the following format is stored in the memory starting from the starting address of positioning tables for each axis.

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>16#0000</td><td>Control code</td><td>16#0000</td><td>Sets the position command mode and acceleration/deceleration pattern for positioning operations.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>Incremental/ absolute mode setting</td><td>0: Incremental mode
1: Absolute mode</td></tr>
<tr><td>1</td><td>Acceleration/ deceleration pattern setting</td><td>0: Linear acceleration / deceleration
1: S-shaped acceleration / deceleration</td></tr>
<tr><td>15 to 2</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td>16#0001</td><td>Operation pattern</td><td>16#0000</td><td>Sets single and interpolation patterns for positioning operations.
The interpolation relationship depends on the settings in the axis group setting area in the common area of the shared memory. For interpolation operations, the settings of the axis with the smallest number in an axis group take effect.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>7 to 0</td><td>Control pattern</td><td>16#00: E-point control (end point control)
16#01: P-point control (pass point control)
16#02: C-point control (continuance point control)
16#03: J-point control (speed point control)
Any other settings will result in an error.</td></tr>
<tr><td>15 to 8</td><td>Interpolation setting</td><td>16#00: Linear interpolation (composite speed specification)
16#01: Linear interpolation (long axis speed specification)
16#10: Circular interpolation
(Center point specification/CW direction)
16#11: Circular interpolation
(center point specification/CCW direction)
16#20: Circular interpolation (pass point specification)
16#50: Spiral interpolation
(Center point specification/CW direction/X-axis feed)
16#51: Spiral interpolation
(center point specification/CCW direction/X-axis feed)
16#52: Spiral interpolation
(Center point specification/CW direction/Y-axis feed)</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td></td><td></td><td>16#53: Spiral interpolation
(center point specification/CCW direction/Y-axis feed)
16#54: Spiral interpolation
(Center point specification/CW direction/Z-axis feed)
16#55: Spiral interpolation
(center point specification/CCW direction/Z-axis feed)
16#60: Spiral interpolation
(Pass point specification/X-axis feed)
16#61: Spiral interpolation
(Pass point specification/Y-axis feed)
16#62: Spiral interpolation
(Pass point specification/Z-axis feed)
Any other settings will result in an error.</td></tr>
</table>
</td></tr>
<tr><td>16#0002</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0003</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#0004</td><td>Positioning acceleration time</td><td>100</td><td rowspan="2">Sets acceleration and deceleration times for positioning operations
Acceleration time and deceleration time can be set individually.
For interpolation operations, the settings of the axis with the smallest number in an axis group take effect.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>Positioning acceleration time
Positioning deceleration time</td><td>Sets acceleration time or deceleration time.
Setting range: 0 to 10,000
Unit: ms
Any other settings will result in an error.</td></tr>
</table>
</td></tr>
<tr><td>16#0005</td><td>Positioning deceleration time</td><td>100</td></tr>
<tr><td>16#0006</td><td rowspan="2">Positioning target speed
(Interpolation speed)</td><td rowspan="2">1,000</td><td rowspan="2">For single operations (non-interpolation), the target speed is that of the relevant axis. For interpolation operations, the target speed is that for interpolation.
For interpolation operations, the settings of the axis with the smallest number in an axis group take effect.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>31 to 0</td><td>Positioning target speed
(Interpolation speed)</td><td>Setting range: 1 to 2,147,482,624
Unit: Dependent upon the specified unlit</td></tr>
</table>
</td></tr>
<tr><td>16#0007</td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td></td><td></td><td>Any other settings will result in an error.
The setting range changes according to the unit settings as below.
Pulses: 0 to 2,147,482,624 pps
μm : 1 to 2,147,482,624 μm/s
Inches: 0.001 to 2,147,482.624 inches/s
Degrees: 0.001 to 2,147,482.624 rev/s</td></tr>
</table>
</td></tr>
<tr><td>16#0008</td><td rowspan="2">Positioning movement amount</td><td rowspan="2">0</td><td rowspan="2">Sets the movement amount for positioning operations.
Interpretation switches between the incremental movement amount and absolute movement amount according to the control code setting.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Positioning movement amount</td><td>0</td><td>Setting range: -2147482624 to +2147482624
Any other settings will result in an error.</td></tr>
</table>
Interpretation changes according to the unit settings as below.
Pulses: -2,147,482,624 to 2,147,482,624 pulses
μm (0.1 μm)：-214,748,262.4 to 214,748,262.4 μm
μm (1 μm): -2,147,482,624 to 2,147,482,624 μm
Inches (0.00001 inch): -21,474.82624 to 21,474.82624 inches
inch (0.0001 inch): -214,748.2624 to 214,748.2624 inch
Degrees (0.1 degree): -214,748,262.4 to 214,748,262.4 degrees
Degree (1 degree): -2,147,482,624 to 2,147,482,624 degrees</td></tr>
<tr><td>16#0009</td></tr>
<tr><td>16#000A</td><td rowspan="2">Auxiliary point</td><td rowspan="2">0</td><td rowspan="2">Sets auxiliary points (center point and pass point coordinates) for circular interpolation or spiral interpolation control.
<table>
<tr><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>Auxiliary point</td><td>0</td><td>Setting range: -2147482624 to +2147482624
Any other settings will result in an error.</td></tr>
</table>
Interpretation changes according to the unit settings as below.
Pulses: -2,147,482,624 to 2,147,482,624 pulses
μm (0.1 μm)：-214,748,262.4 to 214,748,262.4 μm
μm (1 μm): -2,147,482,624 to 2,147,482,624 μm
Inches (0.00001 inch): -21,474.82624 to 21,474.82624 inches
inch (0.0001 inch): -214,748.2624 to 214,748.2624 inch
Degrees (0.1 degree): -214,748,262.4 to 214,748,262.4 degrees
Degree (1 degree): -2,147,482,624 to 2,147,482,624 degrees</td></tr>
<tr><td>16#000B</td></tr>
</table>

<table>
<tr><th>Offset address</th><th>Name</th><th>Default</th><th>Description</th></tr>
<tr><td>16#000C</td><td>Dwell Time</td><td>0</td><td>For “C: Continuance point”, when the positioning operation of this table is complete, the motor is stopped for the specified dwell time and then the positioning operation of the next table is started. For “P: Pass point”, the dwell time setting is ignored. For “E: End point”, the motor enters standby mode for the specified dwell time and then the operation done flag turns ON.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>Dwell Time</td><td>Setting range: 0 to 32,767
Unit: ms
Any other settings will result in an error.</td></tr>
</table></td></tr>
<tr><td>16#000D</td><td>Auxiliary output code</td><td>0</td><td>Sets the data to be output to the auxiliary output code in the each axis information & monitor area according to the setting of the auxiliary output mode in the parameter setting area.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th></tr>
<tr><td>15 to 0</td><td>Auxiliary output code</td><td>Setting range: 0 to 65,535</td></tr>
</table></td></tr>
<tr><td>16#000E</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16#000F</td><td>-</td><td>-</td><td>-</td></tr>
</table>

■ Starting addresses of each positioning table (Extended area: Tables 10026 to 10089)

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
16#61	16#62	16#63	16#64	16#65	16#66	16#67	16#68	16#0000	Starting address of Table 10026
								16#0010	Starting address of Table 10027
								16#0020	Starting address of Table 10028
								16#0030	Starting address of Table 10029
								16#0040	Starting address of Table 10030
								16#0050	Starting address of Table 10031
								16#0060	Starting address of Table 10032
								16#0070	Starting address of Table 10033
								16#0080	Starting address of Table 10034
								16#0090	Starting address of Table 10035

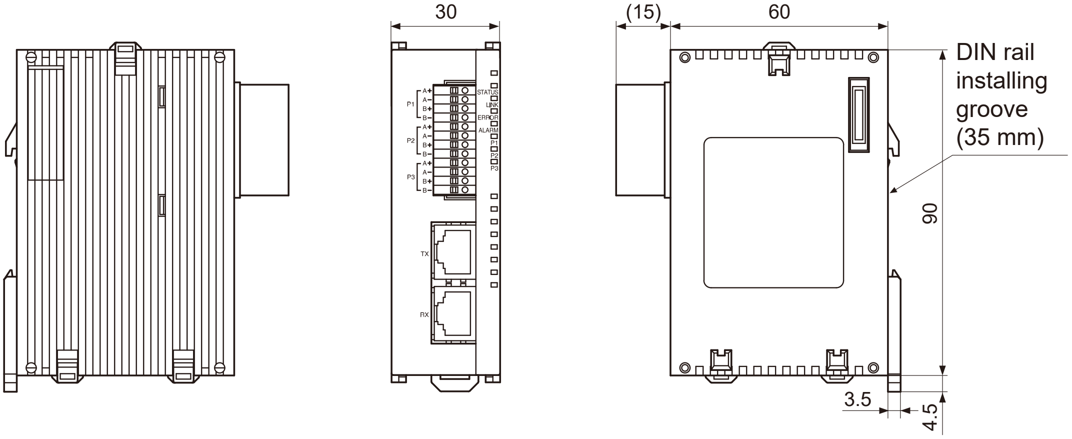
Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7**	**8 axes**	**address**	**Description**
Bank									
								16#00A0	Starting address of Table 10036
								16#00B0	Starting address of Table 10037
								16#00C0	Starting address of Table 10038
								16#00D0	Starting address of Table 10039
								16#00E0	Starting address of Table 10040
								16#00F0	Starting address of Table 10041
								16#0100	Starting address of Table 10042
								16#0110	Starting address of Table 10043
								16#0120	Starting address of Table 10044
								16#0130	Starting address of Table 10045
								16#0140	Starting address of Table 10046
								16#0150	Starting address of Table 10047
								16#0160	Starting address of Table 10048
								16#0170	Starting address of Table 10049
								16#0180	Starting address of Table 10050
								16#0190	Starting address of Table 10051
								16#01A0	Starting address of Table 10052
								16#01B0	Starting address of Table 10053
								16#01C0	Starting address of Table 10054
								16#01D0	Starting address of Table 10055
								16#01E0	Starting address of Table 10056
								16#01F0	Starting address of Table 10057
								16#0200	Starting address of Table 10058

Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6	Axis 7	8 axes	address	Description
Bank									
								16#0210	Starting address of Table 10059
								16#0220	Starting address of Table 10060
16#61	16#62	16#63	16#64	16#65	16#66	16#67	16#68	16#0230	Starting address of Table 10061
								16#0240	Starting address of Table 10062
								16#0250	Starting address of Table 10063
								16#0260	Starting address of Table 10064
								16#0270	Starting address of Table 10065
								16#0280	Starting address of Table 10066
								16#0290	Starting address of Table 10067
								16#02A0	Starting address of Table 10068
								16#02B0	Starting address of Table 10069
								16#02C0	Starting address of Table 10070
								16#02D0	Starting address of Table 10071
								16#02E0	Starting address of Table 10072
								16#02F0	Starting address of Table 10073
								16#0300	Starting address of Table 10074
								16#0310	Starting address of Table 10075
								16#0320	Starting address of Table 10076
								16#0330	Starting address of Table 10077
								16#0340	Starting address of Table 10078
								16#0350	Starting address of Table 10079
								16#0360	Starting address of Table 10080
								16#0370	Starting address of Table 10081

Axis 1	**Axis 2**	**Axis 3**	**Axis 4**	**Axis 5**	**Axis 6**	**Axis 7**	**8 axes**	**address**	**Description**
Bank									
								16#0380	Starting address of Table 10082
								16#0390	Starting address of Table 10083
								16#03A0	Starting address of Table 10084
								16#03B0	Starting address of Table 10085
								16#03C0	Starting address of Table 10086
								16#03D0	Starting address of Table 10087
								16#03E0	Starting address of Table 10088
								16#03F0	Starting address of Table 10089

18.13 Dimensions

18.13.1 Dimensions



Unit: mm

19 Program Using Positioning Unit RTEX Library

19.1 About FP0H Positioning Unit RTEX Library

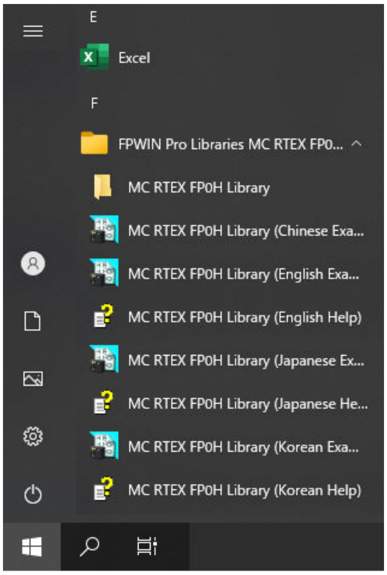
This section introduces sample programs using "FP0H Positioning Unit RTEX Library".

19.1.1 Procedure for Installing on a Personal Computer

You can download "FP0H Positioning Unit RTEX Library" from our website.
https://industry.panasonic.com/global/en/downloads/?tab=software
Download "setup_fpwinpro_mc_rtex_fp0h_library_xxxx.zip" into a desired folder, unzip the file, and run the (*.exe) file. (“xxxx” indicates a version number.)

Info.

- The library installed on a personal computer can be checked from the Windows® Start menu.



MC RTEX FP0H Library

Open the folder containing the library.

MC RTEX FP0H Library (*** Help)**

Open the help file that lists all the instructions contained in the library.

The help file is available in different languages.

MC RTEX FP0H Library (*** Example)**

Open the sample program that lists all the instructions contained in the library.

The program sample is available in different languages.

It is different from the sample program introduced in this section.

- The following information is stored in the folder where the library is stored.

MC_RTEX_FP0H_Library.sul	This is the main file of the library.
MC_RTEX_FP0H_Library.chm	This is the help file that lists all the instructions contained in the library. Stored in each language folder.
MC_RTEX_FP0H_Library_Example.pce	This is the program sample that lists all the instructions contained in the library. It is different from the sample program introduced in this section. Stored in each language folder.

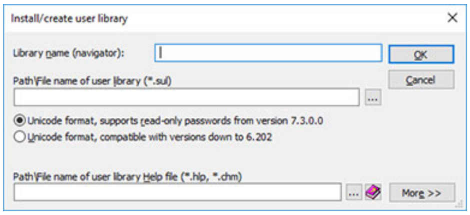
19.1.2 Procedure for Installing on FPWIN Pro7 Project

When the library is installed on FPWIN Pro7 Project, the instructions in the library can be used in the project.

Procedure

1. Start FPWIN Pro7 and open the project file for installing the library.

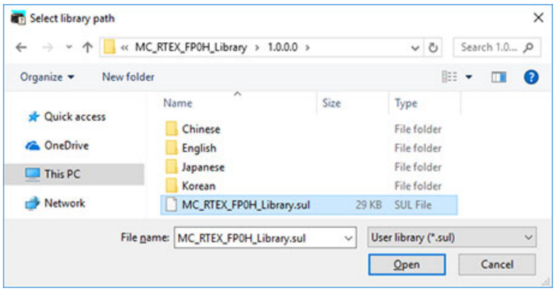
2. Right-click on"Libraries" on the project tree and select **Library**>**Install/Create**.
   The "Install/create user library" screen will be displayed.



● Unicode format, supports read-only passwords from version 7.3.0.0
○ Unicode format, compatible with versions down to 6.202

3. Specify the library file and help file to be installed. Click the […] button located next to the specification area of each file.
   The library storage location can be checked by selecting Windows® **Start Menu**>**FPWIN Pro Libraries MC RTEX FP0H Library**>**MC FP0H Library**.

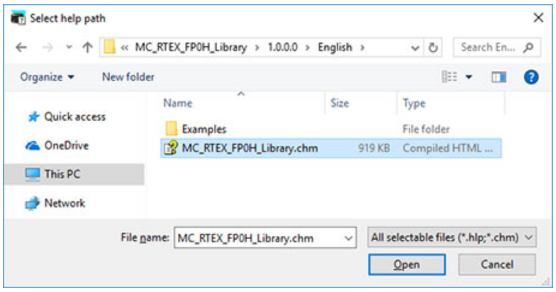
   3-1 Specify the library file (*.sul).
   The library file is located in the "xxxx" (version number) folder.



Name	Size	Type
Chinese		File folder
English		File folder
Japanese		File folder
Korean		File folder
MC_RTEX_FP0H_Library.sul	29 KB	SUL File

File name: MC_RTEX_FP0H_Library.sul
User library (*.sul)

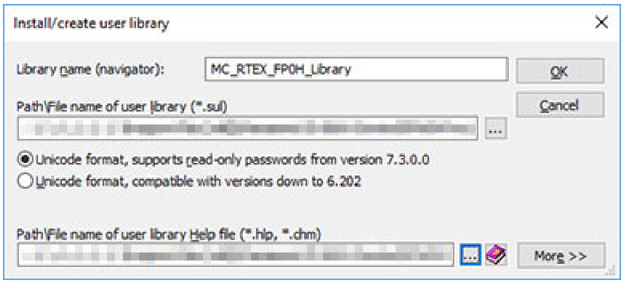
   3-2 Specify the help file (*.chm).
   The help file is located in each language folder in the "xxxx" (version number) folder.



Name	Size	Type
Examples		File folder
MC_RTEX_FP0H_Library.chm	919 KB	Compiled HTML ...

File name: MC_RTEX_FP0H_Library.chm
All selectable files (*.hlp;*.chm)

4. After specifying the library file and the help file, click the [OK] button.



Install/create user library

Library name (navigator): MC_RTEX_FP0H_Library

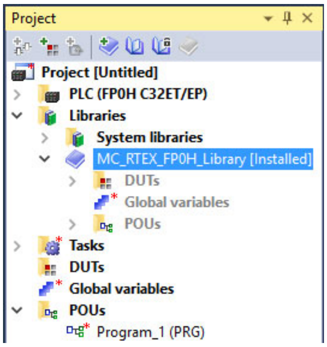
Path\File name of user library (*.sul)

● Unicode format, supports read-only passwords from version 7.3.0.0

○ Unicode format, compatible with versions down to 6.202

Path\File name of user library Help file (*.hlp, *.chm)

5. When the library is displayed in the project tree, the installation process is complete.



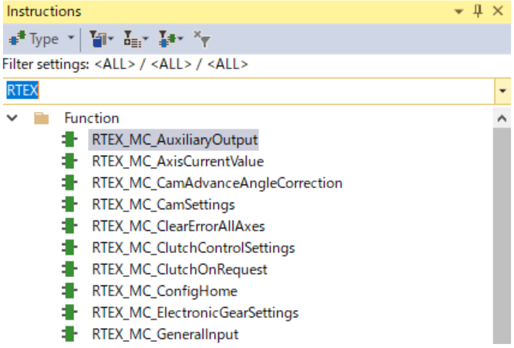
Project

- Project [Untitled]
  - PLC (FP0H C32ET/EP)
  - Libraries
    - System libraries
    - MC_RTEX_FP0H_Library [Installed]
      - DUTs
      - Global variables
      - POUs
  - Tasks
  - DUTs
  - Global variables
  - POUs
    - Program_1 (PRG)

19.1.3 How to Use Each Instruction in the Library

This section explains how to use each instruction in the library. For detailed explanation of each instruction, refer to the help screen.

- Search and use the instructions in the "FP0H Positioning Unit RTEX Library" on the "Instructions" pane in the same way as for other instructions.



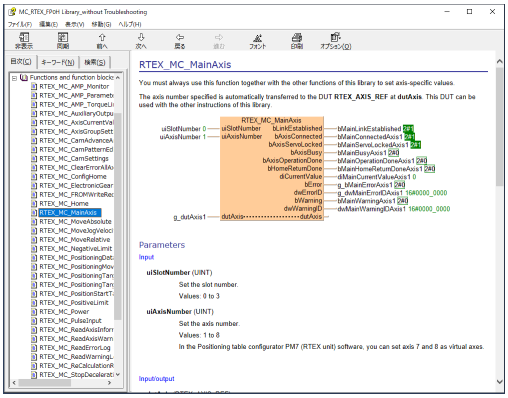
Instructions

Filter settings: <ALL> / <ALL> / <ALL>

RTEX

- Function
  - RTEX_MC_AuxiliaryOutput
  - RTEX_MC_AxisCurrentValue
  - RTEX_MC_CamAdvanceAngleCorrection
  - RTEX_MC_CamSettings
  - RTEX_MC_ClearErrorAllAxes
  - RTEX_MC_ClutchControlSettings
  - RTEX_MC_ClutchOnRequest
  - RTEX_MC_ConfigHome
  - RTEX_MC_ElectronicGearSettings
  - RTEX_MC_GeneralInput

- Right-click each instruction on the "Instructions" pane and select "Display help" to display the help screen.



RTEX_MC_MainAxis

You must always use this function together with the other functions of this library to set axis-specific values.

The axis number specified is automatically transferred to the DUT **RTEX_AXIS_REF** at **dutAxis**. This DUT can be used with the other instructions of this library.

Parameters

Input

uiSlotNumber (UINT)

Set the slot number.

Values: 0 to 3

uiAxisNumber (UINT)

Set the axis number.

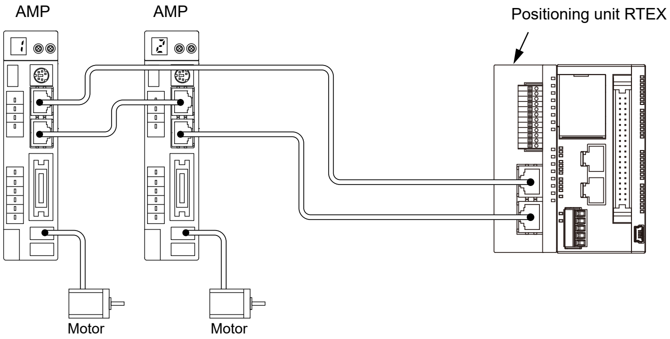
Values: 1 to 8

In the Positioning table configurator PM7 (RTEX unit) software, you can set axis 7 and 8 as virtual axes.

Input/output

19.2 Sample programs

19.2.1 Basic Configuration of Sample Programs



- The positioning unit RTEX is installed in slot number 0.
- The servo motors connected to the positioning unit RTEX are set to Axis 1 and Axis 2.
- The 2-axis linear interpolation is used as a sample operation.
- The axis parameters are set with **Configurator PM7-RTEX** and saved to the positioning unit RTEX.

19.2.2 List of Main Variables Used in Sample Programs

■ Global variables

Class	Variable name	Data type	Default	Comment
VAR_GLOBAL	g_dutAxis1	RTEX_AXIS_REF		Axis structure of FP0H RTEX Library
VAR_GLOBAL	g_dutAxis2	RTEX_AXIS_REF		Axis structure of FP0H RTEX Library

■ Local variables

Class	Variable name	Data type	Default	Comment
VAR	bPower	BOOL	FALSE	Servo ON/OFF
VAR	bHome	BOOL	FALSE	Start home return.
VAR	bJogAxis1	BOOL	FALSE	Start JOG for Axis 1.
VAR	bJogAxis2	BOOL	FALSE	Start JOG for Axis 2.
VAR	bJogDirAxis1	BOOL	FALSE	Axis 1 JOG direction
VAR	bJogDirAxis2	BOOL	FALSE	Axis 2 JOG direction
VAR	bErrorClear	BOOL	FALSE	Error/warning clearing request
VAR	bMainErrorAxis1	BOOL	FALSE	Error occurrence notification for Axis 1

Class	Variable name	Data type	Default	Comment
VAR	bMainErrorAxis2	BOOL	FALSE	Error occurrence notification for Axis 2
VAR	bMainWarningAxis1	BOOL	FALSE	Warning notification for Axis 1
VAR	bMainWarningAxis2	BOOL	FALSE	Warning notification for Axis 2
VAR	bPosStart1	BOOL	FALSE	Start positioning (registered data)
VAR	bPosStart2	BOOL	FALSE	Start positioning (rewriting data using program)
VAR	dwMainErrorIDAxis1	DWORD	0	Axis 1 error code
VAR	dwMainErrorIDAxis2	DWORD	0	Axis 2 error code
VAR	dwMainWarningIDAxis1	DWORD	0	Axis 1 warning code
VAR	dwMainWarningIDAxis2	DWORD	0	Axis 2 warning code
VAR	uiSlotNumber	UINT	0	Positioning unit mounting slot No.
VAR CONSTANT	uiTable1	UINT	1	Table No. 1 specification table No.
VAR	uiTableNo	UINT	1	Setting/starting positioning table No. (1 or 10001)
VAR	dutPosDataAxis1	RTEX_PositionData		RTEX Library positioning table data structure
VAR	dutPosDataAxis2	RTEX_PositionData		RTEX Library positioning table data structure

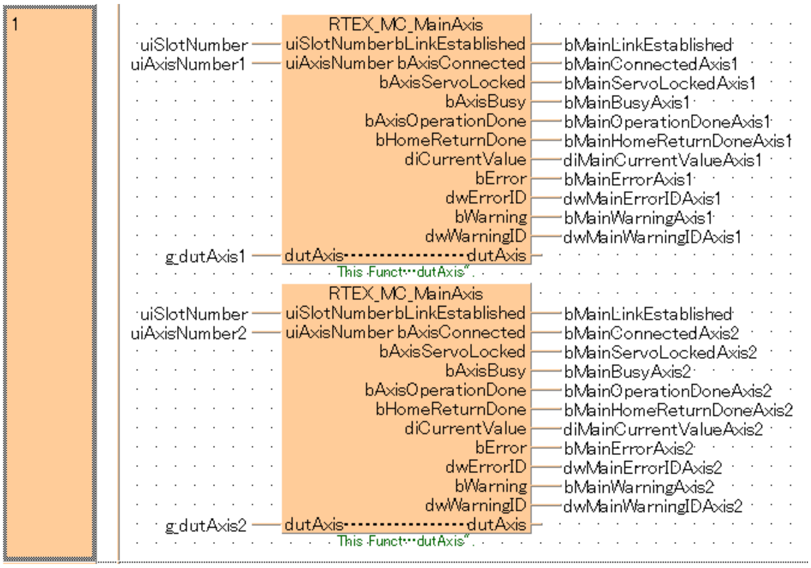
19.2.3 Axis Setting

The following is a sample program designed to specify a target axis in the instructions explained in later sections.

Basic information of the specified axis is stored in **g_dutAxis*** (structure) of each axis.

Slot No. = uiSlotNumer
Axis number = uiAxisNumber1, uiAxisNumber2

LD program



ST program

```
RTEX_MC_MainAxis(uiSlotNumber := uiSlotNumber,
                  uiAxisNumber := uiAxisNumber1,
                  dutAxis := g_dutAxis1,
                  bLinkEstablished => bMainLinkEstablished,
                  bAxisConnected => bMainConnectedAxis1,
                  bAxisServoLocked => bMainServoLockedAxis1,
                  bAxisBusy => bMainBusyAxis1,
                  bAxisOperationDone => bMainOperationDoneAxis1,
                  bHomeReturnDone => bMainHomeReturnDoneAxis1,
                  diCurrentValue => diMainCurrentValueAxis1,
                  bError => bMainErrorAxis1,
                  dwErrorID => dwMainErrorIDAxis1,
                  bWarning => bMainWarningAxis1,
                  dwWarningID => dwMainWarningIDAxis1);

RTEX_MC_MainAxis(uiSlotNumber := uiSlotNumber,
                  uiAxisNumber := uiAxisNumber2,
                  dutAxis := g_dutAxis2,
                  bLinkEstablished => bMainLinkEstablished,
                  bAxisConnected => bMainConnectedAxis2,
                  bAxisServoLocked => bMainServoLockedAxis2,
```

```
                     bAxisBusy => bMainBusyAxis2,
                     bAxisOperationDone => bMainOperationDoneAxis2,
                     bHomeReturnDone => bMainHomeReturnDoneAxis2,
                     diCurrentValue => diMainCurrentValueAxis2,
                     bError => bMainErrorAxis2,
                     dwErrorID => dwMainErrorIDAxis2,
                     bWarning => bMainWarningAxis2,
                     dwWarningID => dwMainWarningIDAxis2);
```

Info.

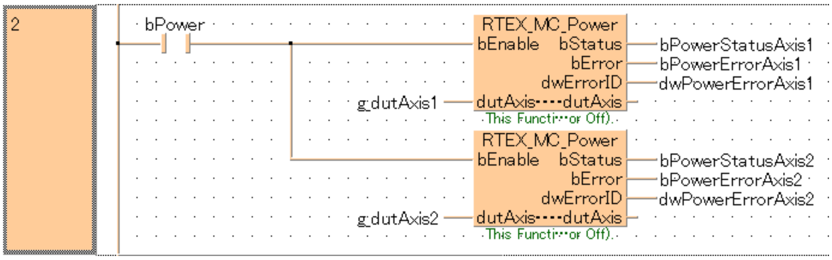
- For the role of each instruction and detailed explanation of input, output and I/O, refer to the help screen of "FP0H Positioning Unit RTEX Library".

19.2.4 Servo ON/OFF

The following is a sample program designed to perform servo ON/OFF for Axis 1 and Axis 2 when bPower is TRUE.

When using this program alone, use it together with "19.2.3 Axis Setting".

LD program



ST program

```
RTEX_MC_Power(bEnable := bPower, dutAxis := g_dutAxis1,
              bStatus => bPowerStatusAxis1,
              bError => bPowerErrorAxis1,
              dwErrorID => dwPowerErrorAxis1);

RTEX_MC_Power(bEnable := bPower, dutAxis := g_dutAxis2,
              bStatus => bPowerStatusAxis2,
              bError => bPowerErrorAxis2,
              dwErrorID => dwPowerErrorAxis2);
```

Info.

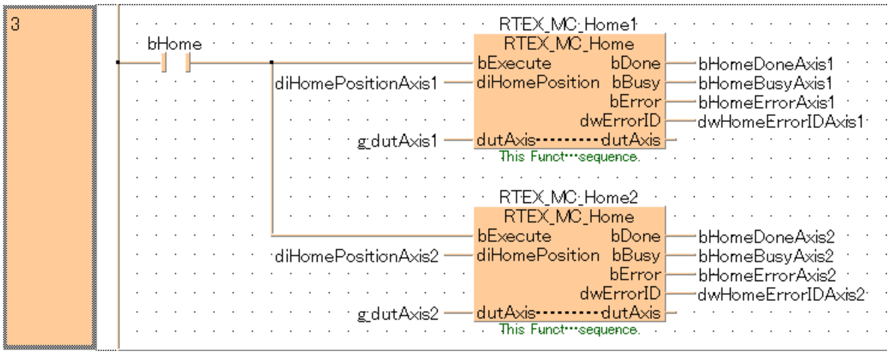
- For the role of each instruction and detailed explanation of input, output and I/O, refer to the help screen of "FP0H Positioning Unit RTEX Library".

19.2.5 Home Return

The following is a sample program designed to perform home return of Axis 1 and Axis 2 when bHome is TRUE.

When using this program alone, use it together with "19.2.3 Axis Setting".

LD program



ST program

```
RTEX_MC_Home11(bExecute := bHome, diHomePosition := diHomePositionAxis1,
               dutAxis := g_dutAxis1, bDone => bHomeDoneAxis1,
               bBusy => bHomeBusyAxis1, bError => bHomeErrorAxis1,
               dwErrorID => dwHomeErrorIDAxis1);

RTEX_MC_Home12(bExecute := bHome, diHomePosition := diHomePositionAxis2,
               dutAxis := g_dutAxis2, bDone => bHomeDoneAxis2,
               bBusy => bHomeBusyAxis2, bError => bHomeErrorAxis2,
               dwErrorID => dwHomeErrorIDAxis2);
```

Info.

- For the role of each instruction and detailed explanation of input, output and I/O, refer to the help screen of "FP0H Positioning Unit RTEX Library".

19.2.6 JOG Operation

The following is a sample program designed to perform JOG operation for Axis 1 when bJogAxis1 is TRUE and for Axis 2 when bJogAxis2 is TRUE.

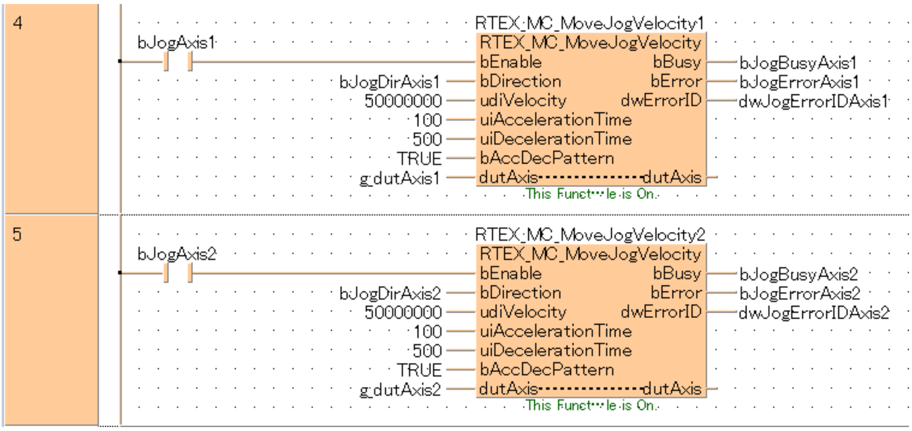
You can specify the operation direction using **bJogDirAxis*** for each axis.

TRUE: + Direction

FALSE: - Direction

When using this program alone, use it together with "19.2.3 Axis Setting".

LD program



ST program

```
RTEX_MC_MoveJogVelocity1(bEnable := bJogAxis1, bDirection := bJogDirAxis1,
                         udiVelocity := 50000000,
                         uiAccelerationTime := 100,
                         uiDecelerationTime := 500,
                         bAccDecPattern := TRUE,
                         dutAxis := g_dutAxis1, bBusy => bJogBusyAxis1,
                         bError => bJogErrorAxis1,
                         dwErrorID => dwJogErrorIDAxis1);

RTEX_MC_MoveJogVelocity2(bEnable := bJogAxis2, bDirection := bJogDirAxis2,
                          udiVelocity := 50000000,
                          uiAccelerationTime := 100,
                          uiDecelerationTime := 500,
                          bAccDecPattern := TRUE,
                          dutAxis := g_dutAxis2, bBusy => bJogBusyAxis2,
                          bError => bJogErrorAxis2,
                          dwErrorID => dwJogErrorIDAxis2);
```

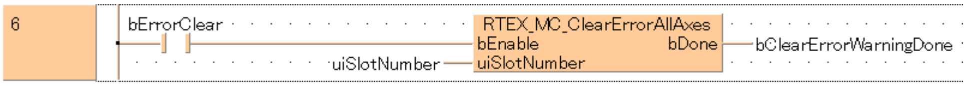
Info.

- For the role of each instruction and detailed explanation of input, output and I/O, refer to the help screen of "FP0H Positioning Unit RTEX Library".

19.2.7 Error Clearing Process

The following is a sample program designed to clear error and warning of all axes when bErrorClear is TRUE.

LD program



ST program

```
RTEX_MC_ClearErrorAllAxes(bEnable := bErrorClear,
                          uiSlotNumber := uiSlotNumber,
                          bDone => bClearErrorWarningDone);
```

Note

- As described in "19.2.3 Axis Setting", error information of each axis can be checked using the following variables.

Description	Axis 1	Axis 2
Error occurrence	bMainErrorAxis1	bMainErrorAxis2
Error code	dwMainErrorIDAxis1	dwMainErrorIDAxis2
Warning occurrence	bMainWarningAxis1	bMainWarningAxis2
Warning code	dwMainWarningIDAxis1	dwMainWarningIDAxis2

Info.

- For the role of each instruction and detailed explanation of input, output and I/O, refer to the help screen of "FP0H Positioning Unit RTEX Library".

19.2.8 Positioning Operation

This section provides sample programs for the following two cases.

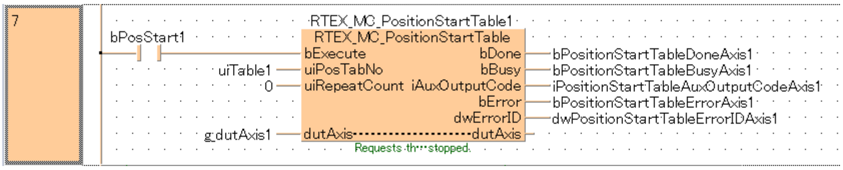
- When performing positioning operation already registered in Configurator PM7-RTEX
- When performing positioning operation by creating a positioning data program

When Setting Positioning Data Using Configurator PM7-RTEX

The following is a sample program designed to start positioning operation set using Configurator PM7-RTEX from table No. 1.

When using this program alone, use it together with "19.2.3 Axis Setting".

LD program



ST program

```
RTEX_MC_PositionStartTable1(bExecute := bPosStart1,
                uiPosTabNo := uiTable1,
                  uiRepeatCount := 0, dutAxis := g_dutAxis1,
                 bDone => bPositionStartTableDoneAxis1,
                 bBusy => bPositionStartTableBusyAxis1,
                 iAuxOutputCode => iPositionStartTableAuxOutputCodeAxis1,
                 bError => bPositionStartTableErrorAxis1,
                 dwErrorID => dwPositionStartTableErrorIDAxis1);
```

Info.

- For the role of each instruction and detailed explanation of input, output and I/O, refer to the help screen of "FP0H Positioning Unit RTEX Library".

When Setting Positioning Data Using Program

The following is a sample program designed to set the positioning data using program and then to start positioning operation.

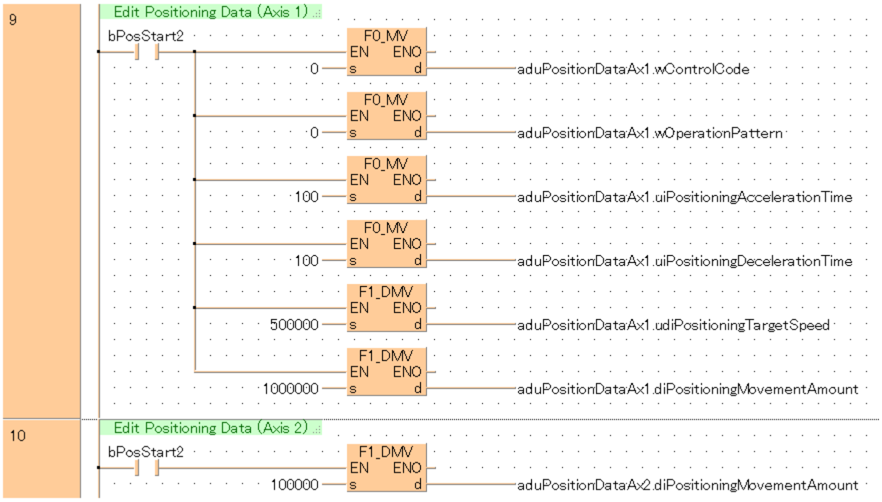
When using this program alone, use it together with "19.2.3 Axis Setting".

■ Creating positioning table data

Specify the table number to be changed in **uiTableNo** and then create positioning data for Axis 1 and Axis 2 respectively.

Setting ranges of **uiTableNo**: 1 to 600 in the standard area and 10001 to 10089 in the extended area.

LD program



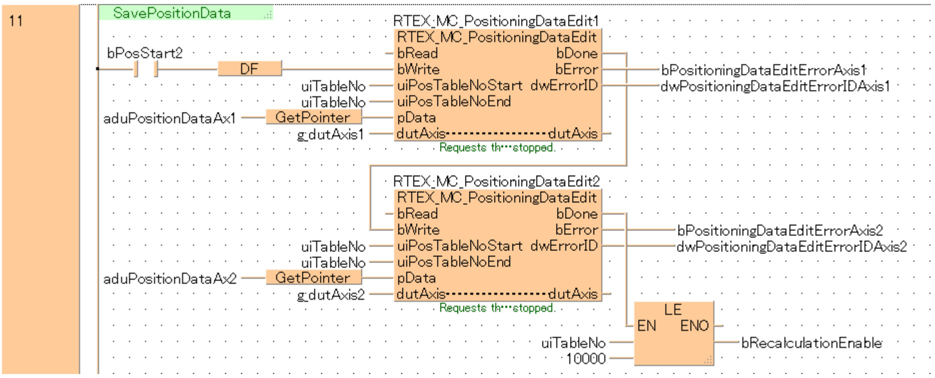
ST program

```
(* Edit Table Data *)
if (bPosStart2) then
    aduPositionDataAxis1.wControlCode                   := 0;
    aduPositionDataAxis1.wOperationPattern              := 0;
    aduPositionDataAxis1.uiPositioningAccelerationTime := 100;
    aduPositionDataAxis1.uiPositioningDecelerationTime := 100;
    aduPositionDataAxis1.udiPositioningTargetSpeed     := 500000;
    aduPositionDataAxis1.diPositioningMovementAmount   := 1000000;
    aduPositionDataAxis2.diPositioningMovementAmount   := 100000;
end_if;
```

■ Saving positioning table data in the table number to be changed

Save the created positioning table data in the table number to be changed.

LD program



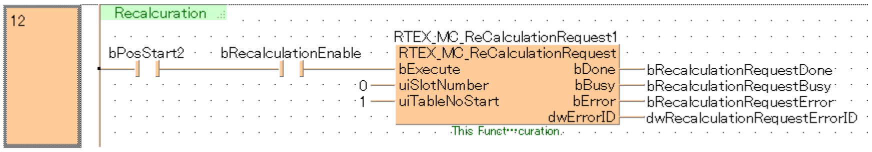
ST program

```
(* Save Position Data *)
RTEX_MC_PositioningDataEdit1(bRead := FALSE, bWrite := bPosStart2,
                              uiPosTableNoStart := uiTableNo,
                              uiPosTableNoEnd := uiTableNo,
                              pData := GetPointer(aduPositionDataAxis1),
                              dutAxis := g_dutAxis1,
                              bDone => bPositionDataEditDoneAxis1,
                              bError => bPositionDataEditErrorAxis1,
                              dwErrorID => dwPositionDataEditErrorIDAxis1);

RTEX_MC_PositioningDataEdit2(bRead := FALSE, bWrite := bPosStart2,
                              uiPosTableNoStart := uiTableNo,
                              uiPosTableNoEnd := uiTableNo,
                              pData := GetPointer(aduPositionDataAxis2),
                              dutAxis := g_dutAxis2,
                              bDone => bPositionDataEditDoneAxis2,
                              bError => bPositionDataEditErrorAxis2,
                              dwErrorID => dwPositionDataEditErrorIDAxis2);
```

■ Recalculation process

Perform recalculation process if the table number to be changed is in the standard area (1 to 600).

LD program



ST program

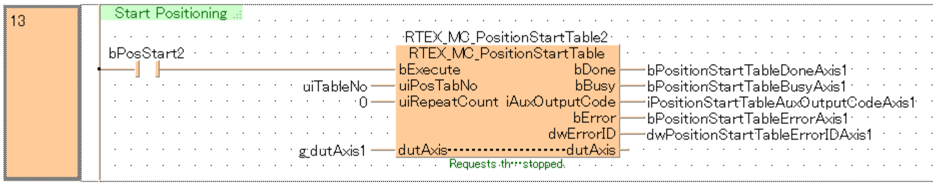
```
(* Recalcuration *)
if (bPosStart2 AND bPositionDataEditDoneAxis1
    AND bPositionDataEditDoneAxis2) then
    if (uiTableNo<10000) then
        bRecalcReq := TRUE;
```

```
    end_if;
else
    bRecalcReq := FALSE;
end_if;

RTEX_MC_ReCalculationRequest1(bExecute := bRecalcReq,
                               uiSlotNumber := 0, uiTableNoStart := 1,
                               bDone => bRecalcReqDone,
                               bBusy => bRecalcReqBusy,
                               bError => bRecalcReqError,
                               dwErrorID => dwRecalcReqErrorID);
```

■ Starting positioning operation

Start the positioning operation.

LD program



ST program

```
(* Start Positioning *)
RTEX_MC_PositionStartTable2(bExecute := bPosStart2,
                uiPosTabNo := uiTableNo,
                uiRepeatCount := 0, dutAxis := g_dutAxis1,
                bDone => bPositionStartTableDoneAxis1,
                bBusy => bPositionStartTableBusyAxis1,
                iAuxOutputCode => iPositionStartTableAuxOutputCodeAxis1,
                bError => bPositionStartTableErrorAxis1,
                dwErrorID => dwPositionStartTableErrorIDAxis1);
```

Info.

- For the role of each instruction and detailed explanation of input, output and I/O, refer to the help screen of "FP0H Positioning Unit RTEX Library".

(MEMO)

Record of Changes

The manual number is specified at the bottom of the cover page.

Issue date	Manual number	Description of changes
April 2019	-	-
May 2019	-	- Changed and corrected errors in sample programs.
July 2019	WUME-FP0HRTEXPRO7-01	1st edition(English) Added error codes and the area used to monitor amplifier system information and operating status.
November 2019	-	4th edition Changed the manual style. Corrected errors.
March 2021	WUME-FP0HRTEXPRO7-02	2nd edition Version upgrade of the unit firmware (Ver. 1.10)
May 2021	WUME-FP0HRTEXPRO7-06	6th Edition Added countermeasure for axis movement errors.
January 2023	WUME-FP0HRTEXPRO7-07	7th Edition Added "soft limit" function at pulser operation. Corrected errors.
July 2023	WUME-FP0HRTEXPRO7-08	8th Edition Added "19 Program Using Positioning Unit RTEX Library".
April 2024	WUME-FP0HRTEXPRO7-09	9th Edition Change in Corporate name

Order Placement Recommendations and Considerations

The Products and Specifications listed in this document are subject to change (including specifications, manufacturing facility and discontinuing the Products) as occasioned by the improvements of Products. Consequently, when you place orders for these Products, Panasonic Industry Co., Ltd. asks you to contact one of our customer service representatives and check that the details listed in the document are commensurate with the most up-to-date information.

[Safety precautions]
Panasonic Industry Co., Ltd. is consistently striving to improve quality and reliability. However, the fact remains that electrical components and devices generally cause failures at a given statistical probability. Furthermore, their durability varies with use environments or use conditions. In this respect, check for actual electrical components and devices under actual conditions before use. Continued usage in a state of degraded condition may cause the deteriorated insulation. Thus, it may result in abnormal heat, smoke or fire. Carry out safety design and periodic maintenance including redundancy design, design for fire spread prevention, and design for malfunction prevention so that no accidents resulting in injury or death, fire accidents, or social damage will be caused as a result of failure of the Products or ending life of the Products.

The Products are designed and manufactured for the industrial indoor environment use. Make sure standards, laws and regulations in case the Products are incorporated to machinery, system, apparatus, and so forth. With regard to the mentioned above, confirm the conformity of the Products by yourself.

Do not use the Products for the application which breakdown or malfunction of Products may cause damage to the body or property.
i) usage intended to protect the body and ensure security of life
ii) application which the performance degradation or quality problems, such as breakdown, of the Products may directly result in damage to the body or property

It is not allowed the use of Products by incorporating into machinery and systems indicated below because the conformity, performance, and quality of Products are not guaranteed under such usage.
i) transport machinery (cars, trains, boats and ships, etc.)
ii) control equipment for transportation
iii) disaster-prevention equipment / security equipment
iv) control equipment for electric power generation
v) nuclear control system
vi) aircraft equipment, aerospace equipment, and submarine repeater
vii) burning appliances
viii) military devices
ix) medical devices (except for general controls)
x) machinery and systems which especially require the high level of reliability and safety

[Acceptance inspection]
In connection with the Products you have purchased from us or with the Products delivered to your premises, please perform an acceptance inspection with all due speed and, in connection with the handling of our Products both before and during the acceptance inspection, please give full consideration to the control and preservation of our Products.

[Warranty period]
Unless otherwise stipulated by both parties, the warranty period of our Products is three years after the purchase by you or after their delivery to the location specified by you. The consumable items such as battery, relay, filter and other supplemental materials are excluded from the warranty.

[Scope of warranty]
In the event that Panasonic Industry Co., Ltd. confirms any failures or defects of the Products by reasons solely attributable to Panasonic Industry Co., Ltd. during the warranty period, Panasonic Industry Co., Ltd. shall supply the replacements of the Products, parts or replace and/or repair the defective portion by free of charge at the location where the Products were purchased or delivered to your premises as soon as possible.

However, the following failures and defects are not covered by warranty and we are not responsible for such failures and defects.

(1) When the failure or defect was caused by a specification, standard, handling method, etc. which was specified by you.
(2) When the failure or defect was caused after purchase or delivery to your premises by an alteration in construction, performance, specification, etc. which did not involve us.
(3) When the failure or defect was caused by a phenomenon that could not be predicted by the technology at purchasing or contracted time.
(4) When the use of our Products deviated from the scope of the conditions and environment set forth in the instruction manual and specifications.
(5) When, after our Products were incorporated into your products or equipment for use, damage resulted which could have been avoided if your products or equipment had been equipped with the functions, construction, etc. the provision of which is accepted practice in the industry.
(6) When the failure or defect was caused by a natural disaster or other force majeure.
(7) When the equipment is damaged due to corrosion caused by corrosive gases etc. in the surroundings.

The above terms and conditions shall not cover any induced damages by the failure or defects of the Products, and not cover your production items which are produced or fabricated by using the Products. In any case, our responsibility for compensation is limited to the amount paid for the Products.

[Scope of service]
The cost of delivered Products does not include the cost of dispatching an engineer, etc. In case any such service is needed, contact our sales representative.

Panasonic Industry Co., Ltd.

105-FADBU-RD-04(R1)

(MEMO)

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Please visit our website for inquiries and about our sales network.

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