**PROGRAMMABLE CONTROLLER**

# FP$\Sigma$/FP2
# Positioning Unit RTEX
# Technical Manual

# Safety Precautions

Observe the following notices to ensure personal safety or to prevent accidents.
To ensure that you use this product correctly, read this User's Manual thoroughly before use.
Make sure that you fully understand the product and information on safe.
This manual uses two safety flags to indicate different levels of danger.

## WARNING

**If critical situations that could lead to user's death or serious injury is assumed by mishandling of the product.**
-Always take precautions to ensure the overall safety of your system, so that the whole system
 remains safe in the event of failure of this product or other external factor.
-Do not use this product in areas with inflammable gas. It could lead to an explosion.
-Exposing this product to excessive heat or open flames could cause damage to the lithium battery
 or other electronic parts.
-Battery may explode if mistreated. Do not recharge, disassemble or dispose of fire.


## CAUTION

**If critical situations that could lead to user's injury or only property damage is assumed by mishandling of the product.**
-To prevent excessive exothermic heat or smoke generation, use this product at the values less than
 the maximum of the characteristics and performance that are assured in these specifications.
 -Do not dismantle or remodel the product. It could cause excessive exothermic heat or smoke
   generation.
-Do not touch the terminal while turning on electricity. It could lead to an electric shock.
-Use the external devices to function the emergency stop and interlock circuit.
-Connect the wires or connectors securely.
 The loose connection could cause excessive exothermic heat or smoke generation.
-Do not allow foreign matters such as liquid, flammable materials, metals to go into the inside of the
 product. It could cause excessive exothermic heat or smoke generation.
-Do not undertake construction (such as connection and disconnection) while the power supply is on.
 It could lead to an electric shock.


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 product without notice.

# Table of contents

# Glossary

**RTEX**

RTEX, which stands for Realtime Express, is the network exclusive for motion connecting the Positioning Unit RTEX and AMP.

* Realtime Express is the name of the network servo system produced by Matsushita Electric Industrial Co., Ltd..

**AMP**

AMP means a servo amplifier (which may be called a driver) that controls a servo motor.

**Configurator PM**

Configurator PM is a setting tool for Positioning Unit RTEX. Using the Configurator PM enables the settings for positioning data and various parameters, and various monitoring. As a tool operation mode to activate a motor without using ladder programs is provided in this tool, it is convenient especially to confirm the operation at the time of an initial start-up.

**PANATERM**

This is a setup support tool for the servo amplifiers of MINAS series made by Matsushita Electric Industrial Co., Ltd. By using this tool, the parameter settings within the AMP, monitoring control statuses, the setup support or analysis of machines can be executed on PC.

**E point control**

This is a method of control which is initiated up to an end point, and in this manual is referred to as "E point control". This method is used for a single - speed acceleration/deceleration. It is also called a trapezoidal control.
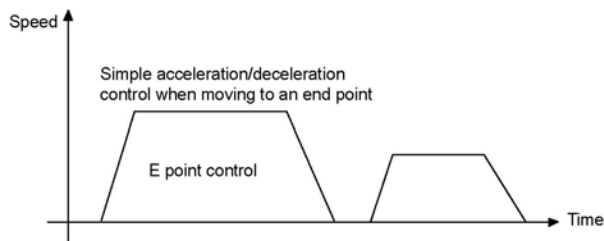


**P point control**

This refers to control which passes through a "Pass Point", and is called "P point control" in this manual. This method is used when a multi-stage speed is to be specified in the same motion.
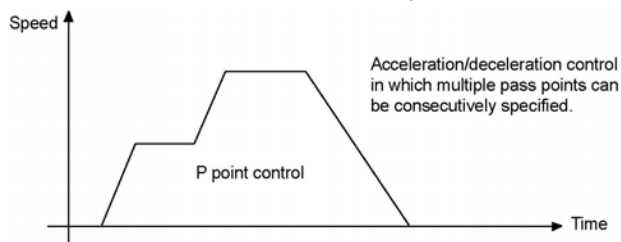
**C point control**

This refers to control which passes through a "Continuance Point", and is called "C point control" in this manual. This method is used for executing continuous E point controls by one-time start.
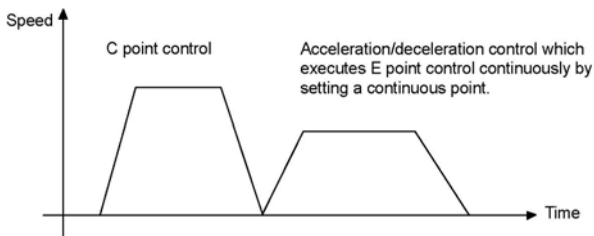


**Acceleration time/deceleration time**

For the E point control or C point contro, the acceleration time is the time during which the speed changes from the startup speed of a motor to the target speed. The deceleration time is the time during which the speed changes from the target speed to the stop. For the P point control, the acceleraiton time is the time during which the speed accelerates form the current speed to the next target speed, and the deceleration time is the time during which the speed decelerates 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.

**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 the Configurator PM.

**Increment 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 the Configurator PM.
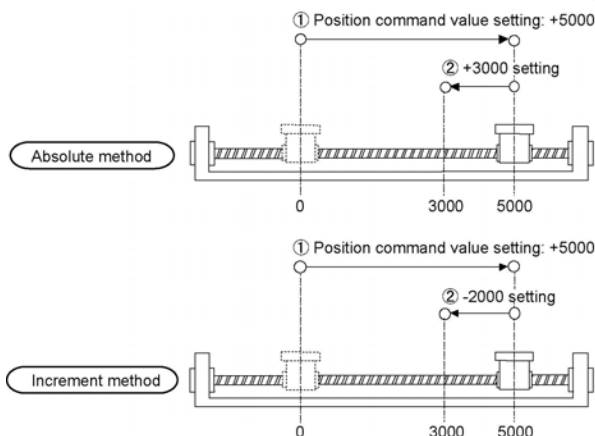


**Automatic operation**

This is an operation to be automatically executed, and means a position control.

**Manual operation**

This is an operation to be executed for an initial boot or adjustments. The home return, JOG operation and pulser operation are manual operations.

**Position control**

This is a generic term for the E point contro, P point control and C point control. For each control, the control of a single axis and the interpolation control of multiple axes are available.The interpolation control can be selected from a 2-axis linear interpolation, 2-axis circular interpolation, 3-axis linear interpolation and 3-axis sprial 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 input from an external switch, for instance when to make adjustments. Depending on the circumstances, this can also be applied to unlimited feeding in some cases.

**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. The home position should be set in advance. This operation moves to the home position and its coordinate is set to be 0.

The motor rotation is reversed automatically when the limit input (+) or the limit input (-) is input and the home position or the near home position is searched to return to the home position automatically.

**Pulser operation**

A manual operation is available using a device (pulser) which generates pulses manually. The output similar to an encoder is obtained from the pulser, and the positioning unit RTEX is equipped with exclusive input terminals. It is also called a manual pulse generator.

**Deceleration stop**

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

**Emergengy 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 a time for a deceleration stop is set. The deceleration time can be specified individually.

**Positioning table (Table)**

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

**Limit input (+), limit input (-)**

This is an input to set a limit the motor movement. Limit input (+) is the maximum limit and the limit  input (-) is the minimum limit. They are connected to the AMP for the positioning unit RTEX.

**Near home (DOG) input**

In order to stop the table at the home position, a position at which deceleration begins is called the near home position. This is connected to an external input switch or sensor. It is connected to the AMP for the positioning unit RTEX.

**Dwell time**

In case of the E point control, a time from the completion of a position commande until the operation done flag turns on can be specified as a dwell time.In case of the C point control, a time from the deceleration stop until the next table activates can be specified.

**Auxiliary output code, auxiliary output contact**
They are used to check the operation of a position control.
The auxiliary output code is a 16-bit code that can be specified for each positioning table, and enables to monitor which positioning table is being executed.
The exeuction fo the position control can be confirmed by turning an exclusive auxiliary output contact on for a constant time.

**Software limi**
Limits can be set for the absolute coordinate managed within the positioning unit RTEX. When exceeding the setting range of the software limit, an error occurs, and the system decelerates and stops. The decelration time can be set individually.

**Torque limit**
The output torque of the AMP can be limited arbitrary.

**Servo lock/Servo free**
According the command from the positioning unit, the state that the motor is controllable is called a servo lock state, and the state that the motor is uncontrollable is called a servo free state. The servo on operation is necessary to make it to the servo lock state.

**Servo ON/Servo OFF**
The operation that changes the servo free state to the servo lock state is called a servo on, and the operation that changes the servo lock state to the servo free state is called a servo off.

**Linear interpolation**
This is the interpolation control that controls positions as the locas of the operations of the 2-axis motor with the grouped X axis and Y axis or 3-axis motor with the grouped X axis, Y axis and Z axis becomes a straight line. There are two setting methods, which are a composition speed specification and long axis speed specification.

**Circular interpolation**
This is the inerpolation control that controls positions as the locas of the operation of the 2-axis motor with the grouped X axis and Y axis becomes a circular arc. Therea re tow setting methods, which are a center point specification and pass point specification.

**Spiral interpolation**
This is the interpolation control that controls positions as the loca of the operation of the 3-axis motor with the grouped X axis, Y axis and Z axis becomes a spiral. Arbitrary 2 axes describe an arc, and the remaining one axis moves 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 to detect the request signals allocated to this unit. It executes each requested process by detecting a trigger that is the leading edge when the request signal turns on.
Therefore, the next request cannot be accepted until the request signal turns off.

**Level type**
This si one of the methods to detect the request signals allocated to this unit. It executes each requested process by detecting a trigger that the request signal is on, and continues the requested process while the request signal is on.

# About Illustrations in This Manual

The **FPΣ Positioning Unit RTEX** and **FP2 Positioning Unit RTEX** are described in this manual.

The illustrations in this manual shows the status with the FPΣ.
If you use the FP2, please replace the illustrations of the FPΣ with the following illustration.

FP Σ Positioning Unit RTEX

FP2 Positioning Unit RTEX
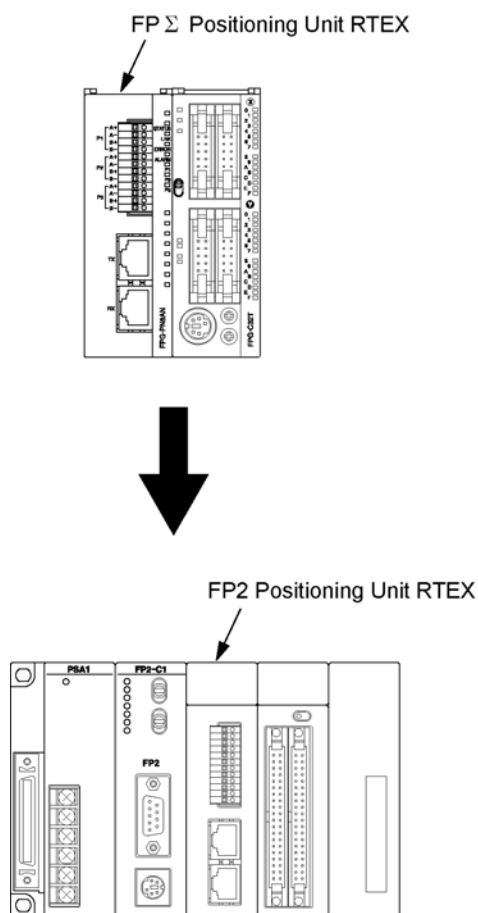
# Chapter 1

## Functions of Unit and Restrictions on Combination

# 1.1 Functions of Positioning Unit RTEX

## 1.1.1 Functions of Unit

**Network control**

The motion-only network Realtime Express (RTEX) enables to easily construct a system of network servo motors using the cables with a category 5e shield .
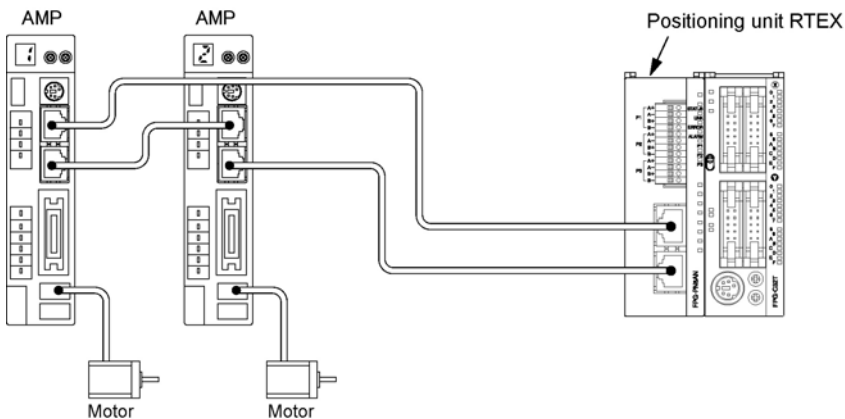


**Configuration of axes according to the system**

In accordance with the number of required axes, 2-axis, 4-axis and 8-axis unit are available.

**Can confirm operations without ladder programs**

Using the tool operation function of the Configurator PM enables a test run without a ladder program, and enables to confirm various items such as the rotating direction, various input contacts or automatic operation settings.
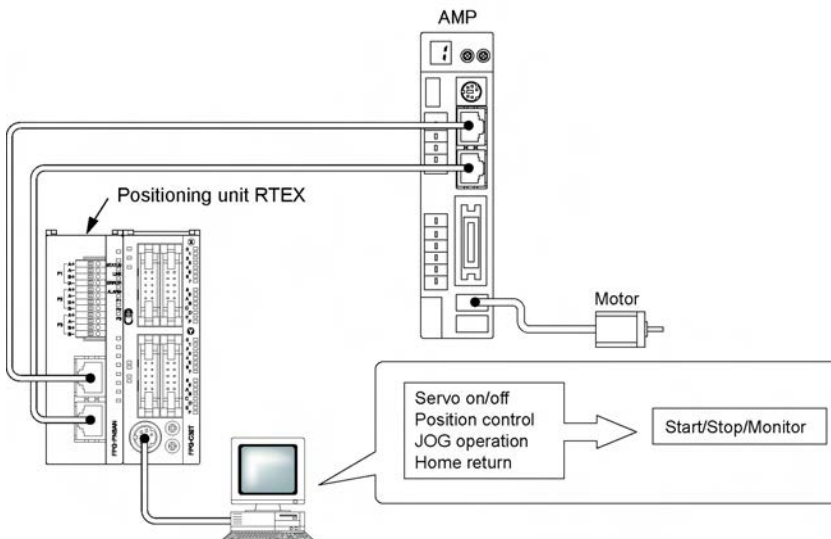


**Two-axis and three-axis interpolation controls**

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

**I/O required for the control is aggregated in the AMP**

As the limit input and near home input is connected to the AMP and given to the positioning unit RTEX through the network, the wiring can be simplified.
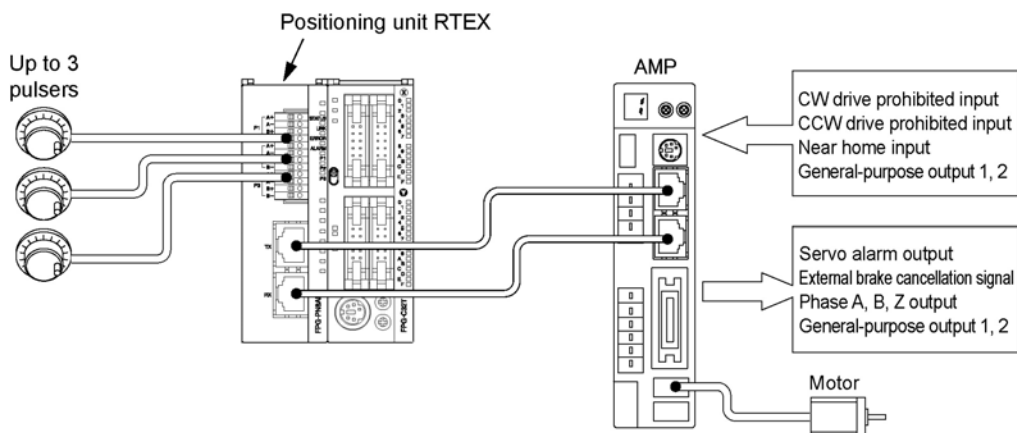


**Remote I/O of 2-input and 2-output for one AMP**

The 2-point general purpose input and output (transistors) can be connected to the AMP, and they can be programmed by the X contact and Y contact of the positioning unit RTEX. They can be used as the remote I/O for the input and output neighboring the AMP.

**Supports the manual pulser**

The maximum of three manual pulsers can be connected. It is possible to change the axes corresponding to each pulser by the setting of the positioning unit RTEX.

## 1.1.2 Unit Types

**FPΣ Positioning Unit RTEX**

| Type | Function | Part number | Product number |
|---|---|---|---|
| 2-axis type | 2-axis control | FPG-PN2AN | AFPG43610 |
| 4-axis type | 4-axis control | FPG-PN4AN | AFPG43620 |
| 8-axis type | 8-axis control | FPG-PN8AN | AFPG43630 |

**FP2 Positioning Unit RTEX**

| Type | Function | Part number | Product number |
|---|---|---|---|
| 2-axis type | 2-axis control | FP2-PN2AN | AFP243610 |
| 4-axis type | 4-axis control | FP2-PN4AN | AFP243620 |
| 8-axis type | 8-axis control | FP2-PN8AN | AFP243630 |

**Setting software**

| Name | Specifications | Product number |
|---|---|---|
| Control Configurator PM | English | AFPS66510 |

# 1.2 Restrictions on Units Combination

## 1.2.1 Restrictions on Combinations Based on Current Consumption (FP2 only)

For the FP2, when the system is configured, the other units being used should be taken into consideration, and a power supply unit with a sufficient capacity should be used. (For the FPΣ, there is no restrictions based on the current consumption.)

**FP2 Positioning Unit RTEX**

| Type | Part number | Product number | Current consumption (from power supply) |
|------|-------------|----------------|------------------------------------------|
| 2-axis type | FP2-PN2AN | AFP243610 | 300 mA |
| 4-axis type | FP2-PN4AN | AFP243620 | 300 mA |
| 8-axis type | FP2-PN8AN | AFP243630 | 300 mA |

## 1.2.2 Restrictions on the Number of Units Installed

**FPΣ Positioning Unit RTEX**
The maximum of 2 units can be installed.

**FP2 Positioning Unit RTEX**
There is no restriction on the number of units installed if it is within the restrictions on the current consumption.

# Chapter 2

## Parts and Functions

# 2.1 Parts and Functions

**FPΣ Positioning Unit RTEX**



**FP2 Positioning Unit RTEX**

Phone: 800.894.0412 - Fax: 888.723.4773 - Web: www.ctiautomation.net - Email: info@ctiautomation.net
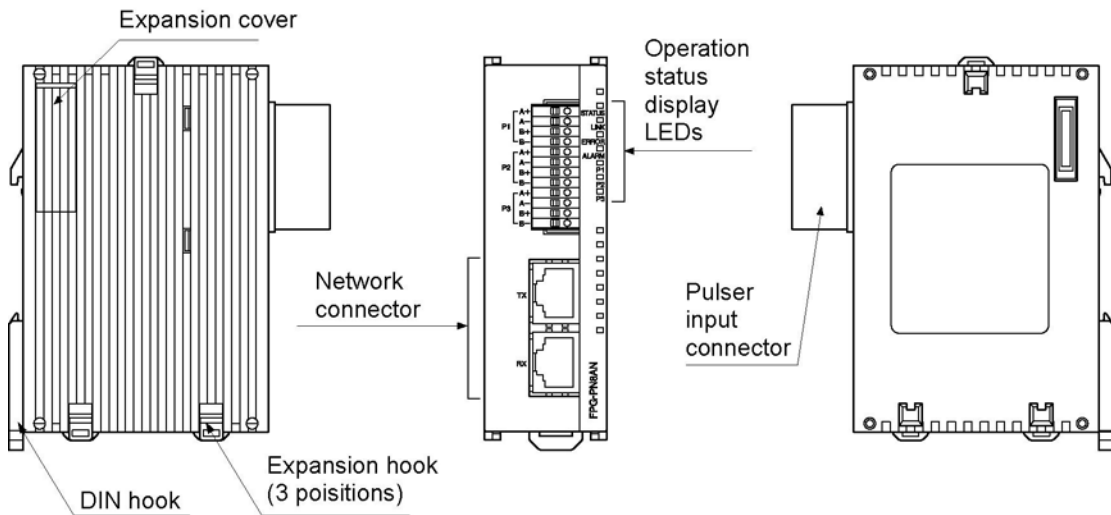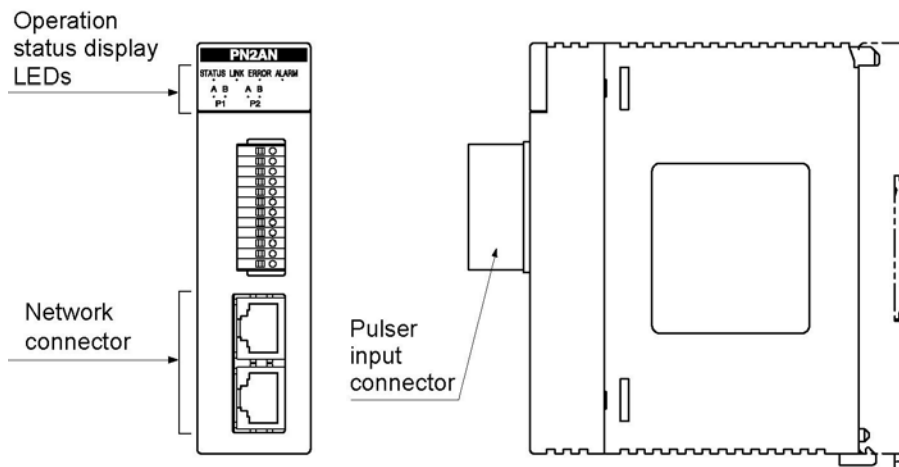
# 2.2 Operation Status Display LEDs

**FPΣ Positioning Unit RTEX**



| Name | Color | Status | | Remarks |
|------|-------|--------|--|---------|
| STATUS | Green | LED blinks: | Waiting for network establishment | |
| | | LED on: | Network establishment | |
| LINK | Green | LED off: | Not connected | The state that the TX of the sending node and the RX of the own node are electrically connected properly. |
| | | LED on: | Normal connection | |
| ERROR | Red | LED off: | Normal | In case of warning, the operation continues. In case of error, the operation stops. |
| | | LED blinks: | A warning occurred. | |
| | | LED on: | An error occurred. | |
| ALARM | Red | LED off: | Normal | If the LED turns on, the power supply should be turned off and on again. |
| | | LED on: | System error | |
| P1 P2 P3 | Green | LED off: | Either pahse A or phase B is in the off state | Check the input signals of the pulsers. |
| | | LED on: | Both phase A and phase B are in the on state | |

**FP2 Positioning Unit RTEX**



| Name | Color | Status | | Remarks |
|------|-------|--------|--|---------|
| STATUS | Green | LED blinks: | Waiting for network establishment | |
| | | LED on: | Network establishment | |
| LINK | Green | LED off: | Not connected | The state that the TX of the sending node and the RX of the own node are electrically connected properly. |
| | | LED on: | Normal connection | |
| ERROR | Red | LED off: | Normal | In case of warning, the operation continues. In case of error, the operation stops. |
| | | LED blinks: | A warning occurred. | |
| | | LED on: | An error occurred. | |
| ALARM | Red | LED off: | Normal | If the LED turns on, the power supply should be turned off and on again. |
| | | LED on: | System error | |
| P1A P1B P2A P2B P3A P3B | Green | LED off: | Off state | Check the input signals of the pulsers. |
| | | LED on: | On state | |

# Chapter 3

# Wiring

# 3.1 Wiring of Network

Use the LAN cable with the category 5e shielded type for the wiring of the network. 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.
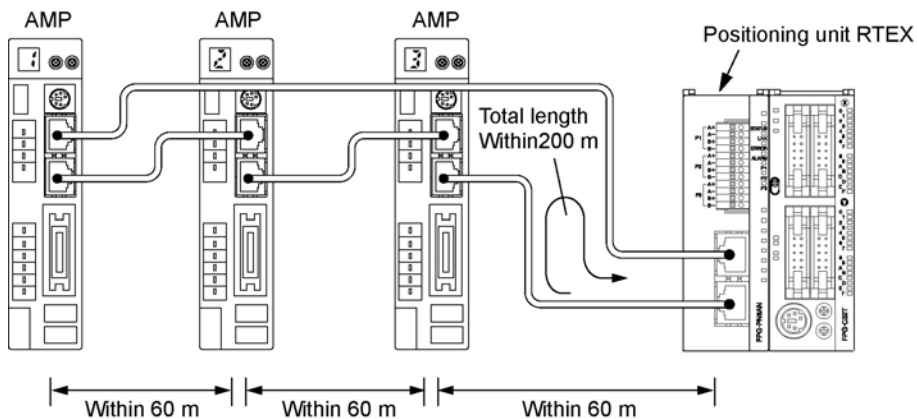
# 3.2 Network Connector

RJ45 plug is connected to the network connector.

**Pins of RJ45 plug**



1 → 8

**Connecting diagram**

Phone: 800.894.0412 - Fax: 888.723.4773 - Web: www.ctiautomation.net - Email: info@ctiautomation.net
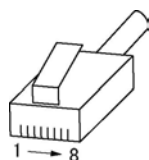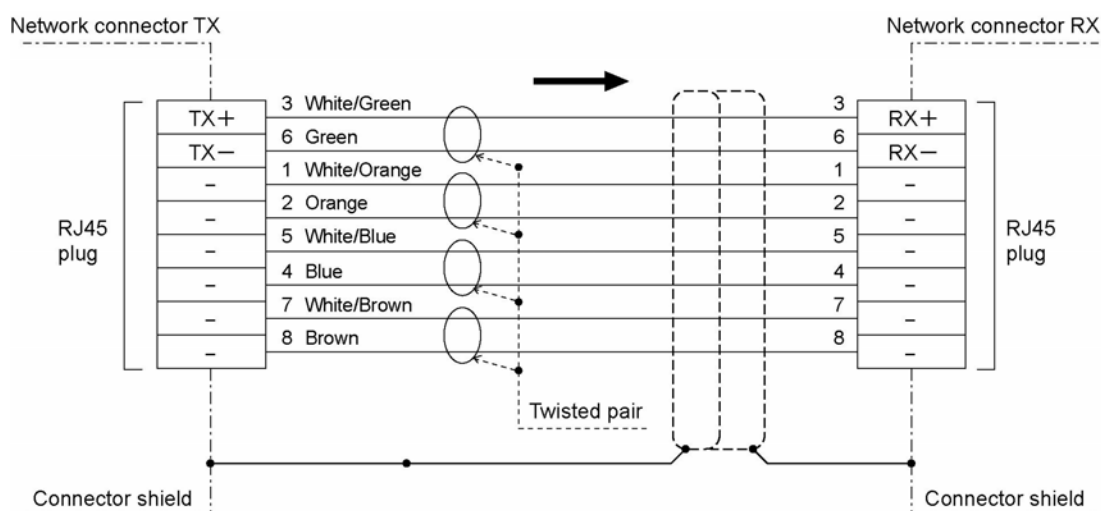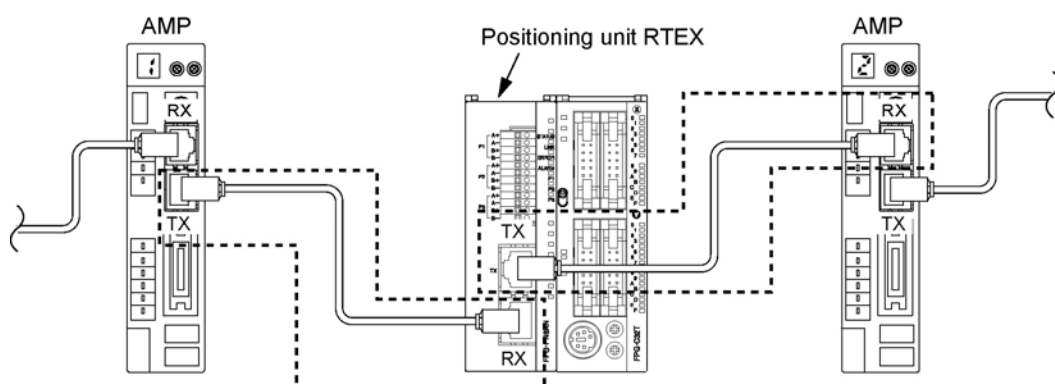
# 3.3 Wiring of Pulser Input Connector

**Supplied connector/Suitable wire**

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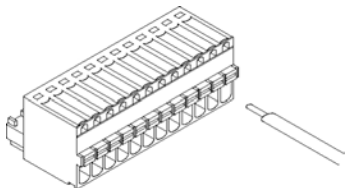


**Supplied connector socket**

The connector socket manufactured by Phoenix Contact Co. should be used.

| Manufacturer | Number of pins | Part No. | Product No. |
|---|---|---|---|
| Phoenix Contact Co. | 12 pins | FK-MC0, 5/12-ST-2,5 | 1881422 |

**Suitable wires (strand wire)**

| Suitable wires | Tightening torque |
|---|---|
| AWG# 28 to 20 | 0.14 to 0.5 mm$^2$ |

**Pole terminal with a compatible insulation sleeve**

If a pole terminal is being used, the following models manufactured by Phoenix Contact Co. should be used.

| Manufacturer | Cross-sectional area (mm$^2$) | Size | Part No. |
|---|---|---|---|
| Phoenix Contact Co. | 0.34 | AWG #22 | A 0, 34-7 |
| | 0.50 | AWG #20 | A 0, 5-6 |

**Pressure welding tool for pole terminals**

| Manufacturer | Part No. | Product No. |
|---|---|---|
| Phoenix Contact Co. | CRIMPFOX UD 6-4 | 1205244 |

**For tightening the connector**

For inserting the wires, use a screwdriver (Phoenix contact Co., Product No. 1205202) with a blade size of 0.4 × 2.0 (Part No. SZS 0.4×2.0).

**Wiring method**

**(1) Remove a portion of the wire's insulation.**



8 mm

**(2) Press the orange switch of the connector using a tool such as a flat-blade screwdriver.**
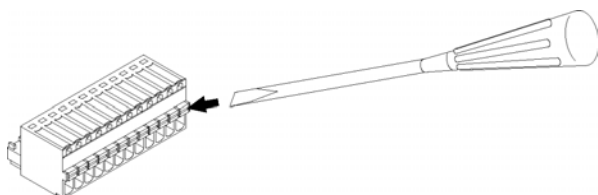


**(3) Insert the wire into the connector until it stops with pressing the orange switch.**
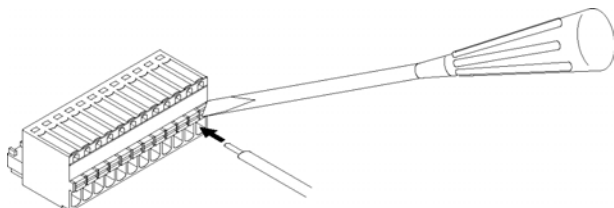


**(4) Take the tool off the switch.**
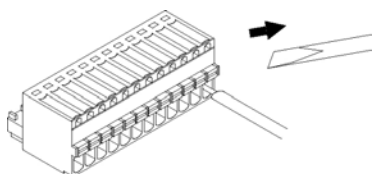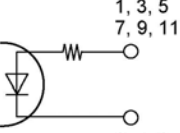


**Precautions on wiring**

- 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.

## 3.3.1 Input Specifications and Pin Configuration
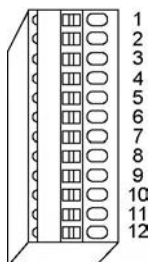


**Input terminals of pulser input connector**

| Pin number | Circuit | Signal name | | Item | Descriptions |
|---|---|---|---|---|---|
| 1, 5, 9 | | Pulse input A (+) | Input specifications | Operating voltage range | 3.5 to 5.25 V DC (5 VDC, line driver specifications) |
| 2, 6, 10 | 1, 3, 5 7, 9, 11 | Pulse input A (-) | | Minimum ON voltage/current | 3 V DC/4 mA |
| 3, 7, 11 | | Pulse input B (+) | | Maximum ON voltage/current | 1 V DC/2.0 mA |
| 4, 8, 12 | 2, 4, 6 8, 10,12 | Pulse input B (-) | | Input impedance | Approx. 390 Ω |
| | | | | Minimum input pulse width | 0.5 μs or more (Max. 1 MHz for each phase) |

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

# Chapter 4

## Power On/Off and Items to Check

# 4.1 Safety Circuit Design

**Example of a safety circuit**

Installation of the over limit switch
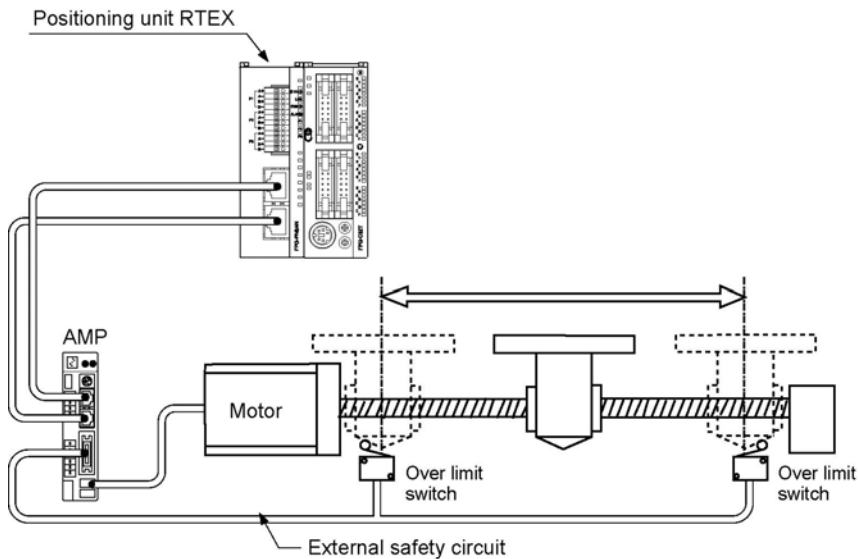


Install over limit switches as shown above.
Connect them to the CW and CCW driving inhibition input of the parallel I/O connector of AMP. For the positioning unit RTEX, connect them to the limit input (+) and limit input (-) through the network.

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**

System configuration example



Positioning unit RTEX

External safety circuit
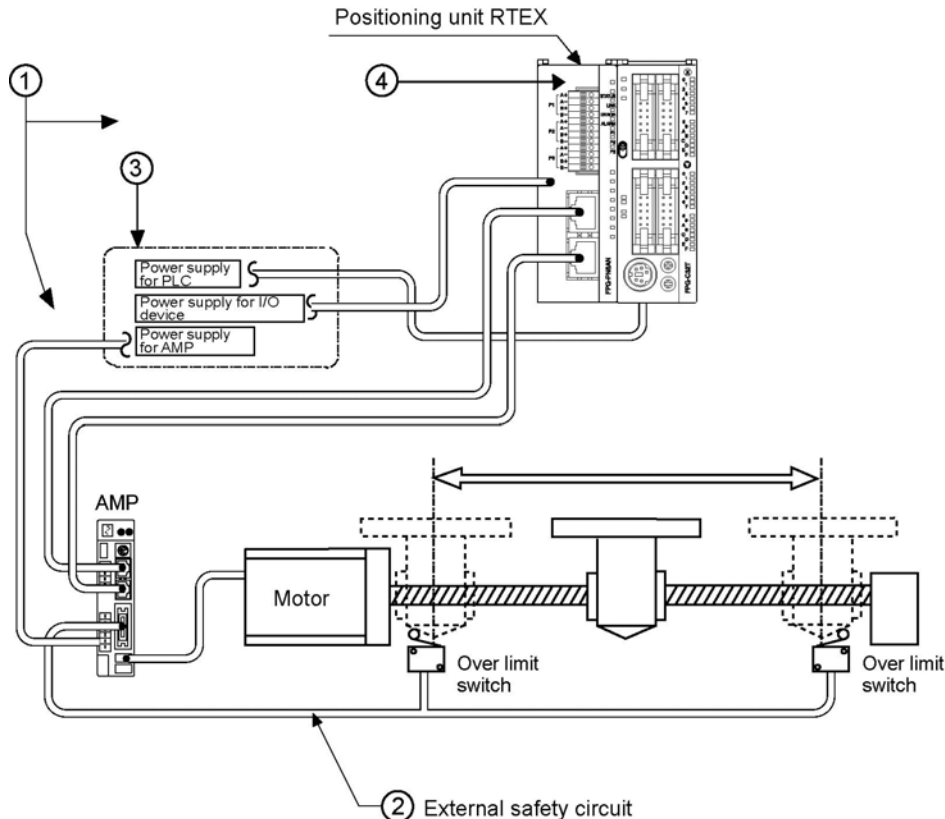
① **Checking connections to the various devices**

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 an external circuit has been installed securely.

③ **Checking the procedure settings for turning ON the power supplies**

Make sure settings have been entered so that power supplies will be turned on according to the procedure outlined in section "Procedure for Turning On the Power".

④ **Checking the CPU mode selection switch**

Set the PLC in the PROG. mode. Setting it in the RUN mode can cause inadvertent operation.

👉 **Note:**

When the power to the PLC is turned on, the start flags for the various operations of the positioning unit RTEX should be off. If they are on, they may activate improperly.

# 4.3 Procedure for Turning On the Power

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

## 4.3.1 Procedure for Turning On the Power

**Procedure**

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



Positioning unit RTEX

| 1 | Power supply for I/O device |
| 2 | Power supply for AMP |
| 3 | Power supply for PLC |
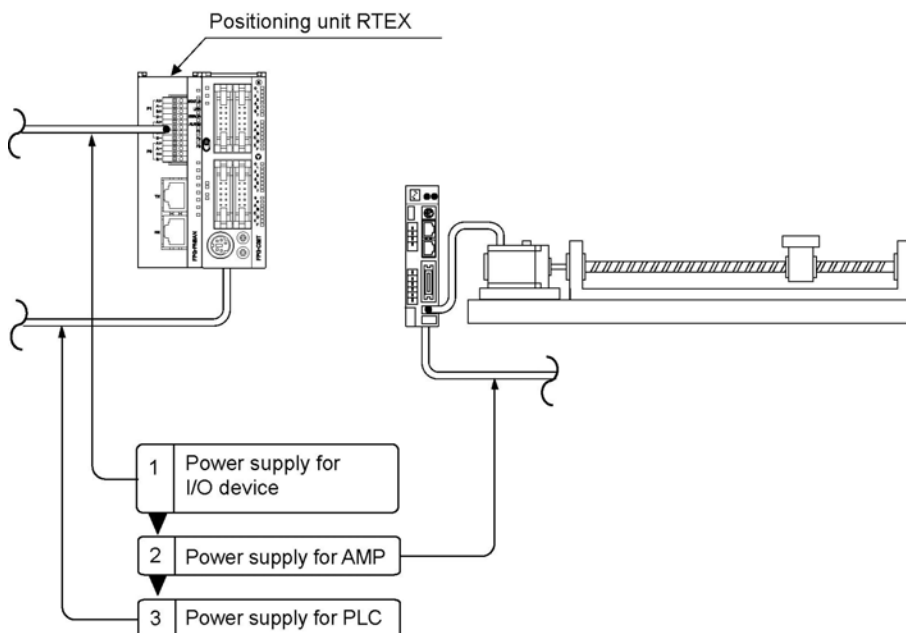
## 4.3.2 Procedure for Turning Off the Power

**Procedure**

1. Check to make sure 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 AMP.
3. Turn off the power supplies for the input and output devices connected to the PLC.
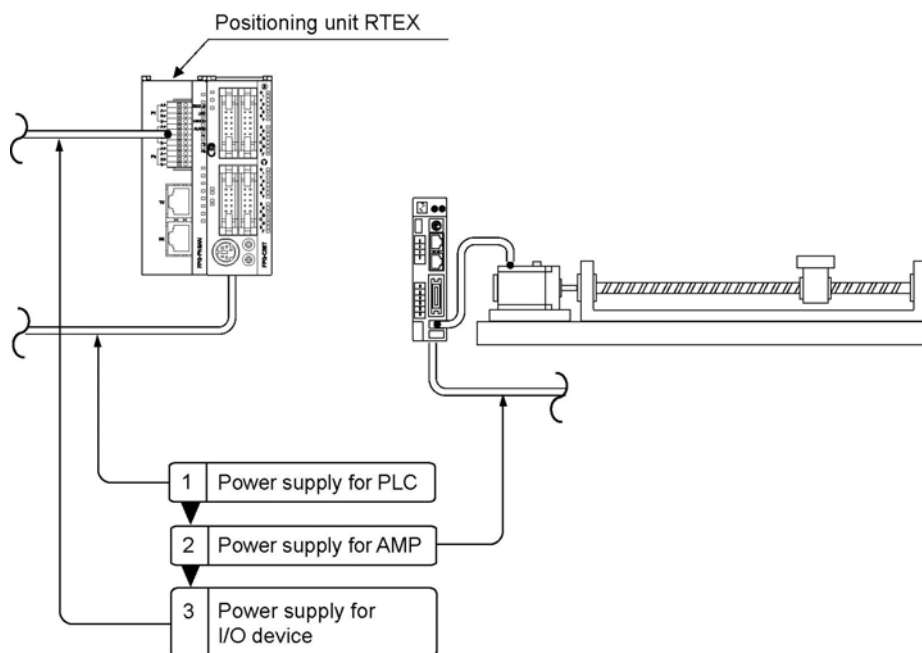
# Chapter 5

## Preparation For Operation

# 5.1 Procedures For System Establishment

## 5.1.1 Procedure 1: Wiring

Use the LAN cable with the Ethernet category 5e shielded type for the wiring of the network. Connect the positioning unit RTEX with each AMP in a loop. Connect the "TX" of the positioning unit RTEX to the "RX" of an AMP, and then connect the "TX" of the AMP to the "RX" of the next AMP. At the end, connect the "TX" of the last AMP to the "RX" of the positioning unit RTEX.

Note) Turn off the power supply of the system before wiring cables.
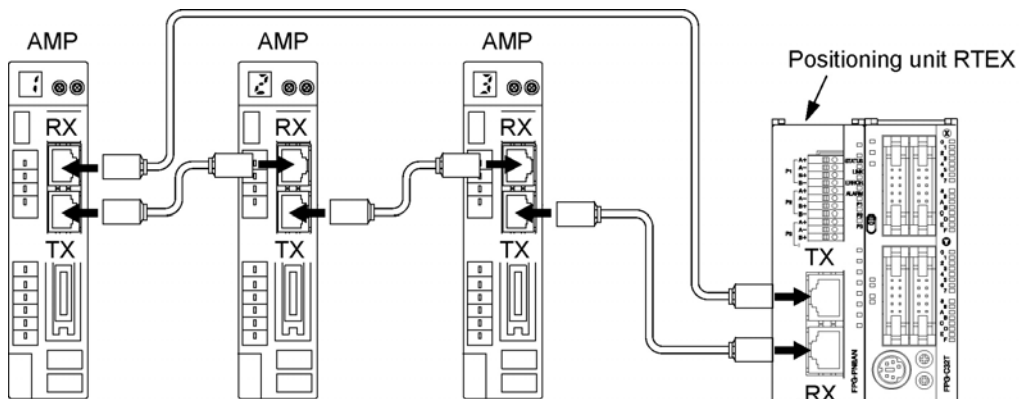
## 5.1.2 Procedure 2: Axis Numbers and Unit Numbers of AMP

The axis numbers of the positioning unit RTEX agree with the unit numbers of the rotary switch of the AMP. As the connected order on the network is not related to the axis numbers, the axis numbers can be determined after the establishment of the network.

| AMP 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 |
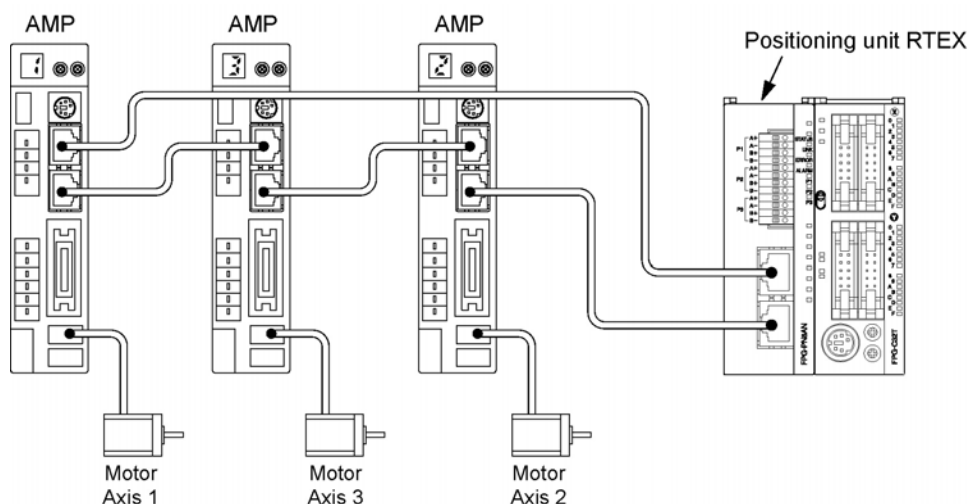


## Note:

An error occurs when the settings as below were specified.

• When the same unit number is redundantly specified on the same network.

• When a unit number was set to 0.

• When a unit number larger than the maximum axis number of the unit used was specified.
 (For the 4-axis type, the settable unit numbers are 1 to 4.)

## 5.1.3 Procedure 2: Power On and Checking Network Establishment

The power-on procedure is as follows.
1. Turn on the power supplies for input and output devices connected to the PLC.
2. Turn on the power supply for the AMP.
3. Turn on the power supply for the PLC.

After the power turned on, check if the operation status display LEDs of the positioning unit RTEX is in the following state.

    STATUS   : Lights up
    LINK      : Lights up

### Key Point:
- If the STATUS LED is blinking, the network is not established.
- If the LINK LED is off, the connection between the "RX" of the positioning unit RTEX (receiver) and the "TX" of the AMP (sender) is not electrically correct.

## 5.1.4 Procedure 3: Matching Parameters With AMP

**At the factory setting, the operating directions of the positioning unit RTEX and the AMP are different as below.**
- Parameters of positioning unit RTEX  : CW direction is elapsed value (+) direction
- Parameters of AMP                     : CW direction is elapsed value (-) direction

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

1. Boot the Configurator PM and set the corresponding axis.
2. Specify the "Select slot" from the "Online" on the menu, and select the slot number that the positioning unit RTEX is installed.
3. Specify the "Download to unit" from the "File" on the menu, and down the axis information and parameter setting data.
4. The indication for writing into the FROM (flash memory) is shown. Select "Yes" to carry out writing to the FROM.
5. After the completion of writing, turn off the power supplies of AMP and PLC, and then turn them on again.
6. After turning on the power supplies again, the system will be operated with the parameters set in the positioning unit RTEX.

### Key Point:
Followings are the parameters to match the operating directions of the positioning unit RTEX and AMP according to the above procedure.
"CW/CCW direction setting"
"Limit switch connection"
As these parameters are important to establish the system, they will be reflected to the operation of a motor by turning on the power supply again after writing them into the FROM (flash memory) of the positioning unit RTEX.
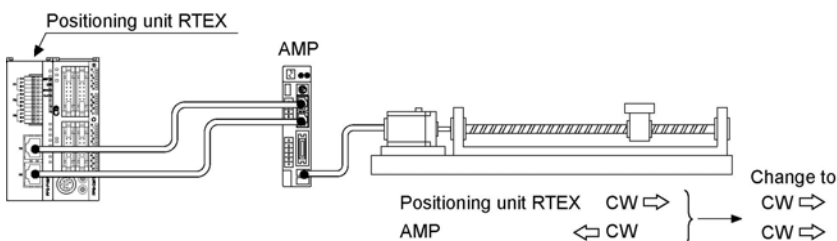
## 5.1.5 Procedure 4: Checking Input Signals

Check the input of the over limit switch for the protection circuit connected to the AMP and the input of the near home (DOG) switch. Confirm whether the input of the signals is properly loaded into the positioning unit RTEX or not, with operating each switch forcibly. The statuses of the input of switches can be confirmed on the status indication disply of the Configurator PM.

**Key Point:**

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 parameter setting of the Configurator PM.
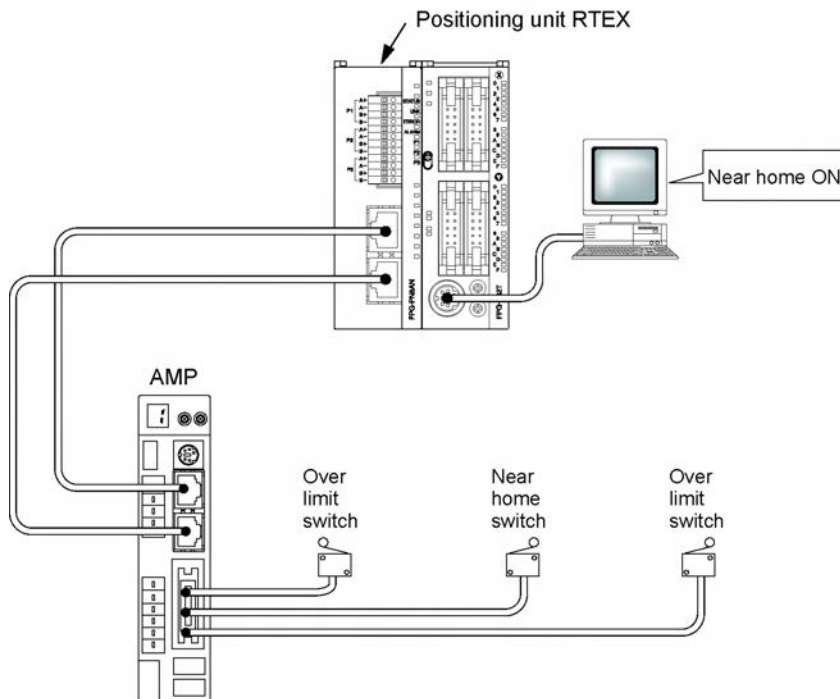
## 5.1.6 Procedure 5: Checking Rotating and Moving Directions and Moving Distance

Check whether the rotating and moving direction of the motor and the moving distance is correct or not. The operations can be easily confirmed using the tool operation function of the Configurator PM without ladder programs.

1. Confirm the rotating direction and moving direction of the motor by the JOG operation. Select the "Online" → "Tool operation" on the menu of the Configurator PM, and make the servo on for the corresponding axis to execute the the JOG operation. When using the ladder program, turn on the forward JOG and reverse contact after turning on the servo on contact.
The rotating direction is determined according to the installation of the ball screw or the "CW/CCW direction setting" of the parameter.

2. Confirm whether the moving distance is as designed or not by the position control. Set the table 1 of the positioning data using the Cofigurator PM, and select the "Online" → "Tool operation" on the menu of the Configurator PM after downloading the table to the positioning unit RTEX, and make the servo on for the corresponding axis to execute the the JOG operation. When using the ladder program, set the position control starting table, and then turn on the positioning start contact after turning on the servo on contact.
The moving distance is determined according to the pitch of the ball screw, deceleration gear rate or setting movement amount of the positioning data.

Note) Execute the servo on, and make the AMP under the condition that the servo is locked before performing the JOG operation and position control.
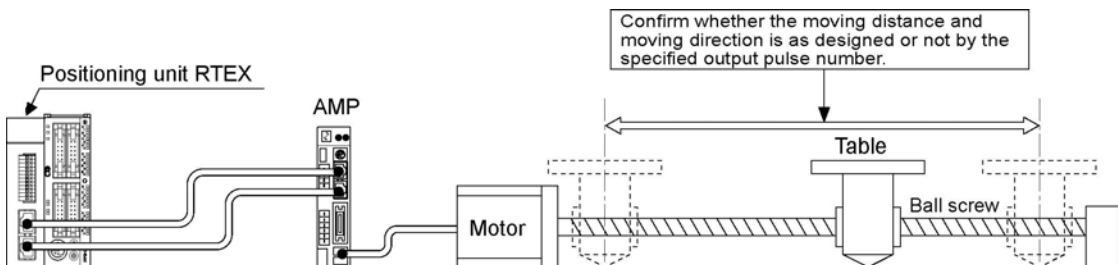
## 5.1.7 Procedure 6: Settings of Parameters and Positioning Data

The basic operation of the positioning system was checked in the procedure 5. In the procedure 6, set the parameters and positioning data in accordance with the actual operation.

The parameters and positioning data is stored in the shared memory of the positioning unit RTEX. Although there are two methods to store the data in the shared memory, it is recommended to set the parameters that are not changed so often using the Configurator PM.
• Use the Configurator PM
• Use the ladder program to write into the shared memory

**When using the Configurator PM**
Boot the Configurator PM, and select "Set axis" → "Parameter settings" on the menu to set the various parameters. Also, create the table for the positioning table on the positioning data editing screen. After setting the parameters and data, download them to the positioning unit RTEX.

Note) After the parameters and posiioning data was downloaded, the display to select whether to write them into the FROM (flash memory) or not is shown. When they are written into the flash memory, the parameters and positioning data in the flash memory will be automatically reflected to the shared memory when the power supply of the PLC turns on. When they are not written into the flash memory, the parameters and positioning data finaly stored in the flash memory will be reflected when the power supply of the PLC turns on.

**When using the ladder program to write into the shared memory**
Use the F151 instruction to write various parameters and positioning data into the shared memory.

**Reference:**
• For the information on the storage addresses of various parameters and postioning data,
  <17.6 Details of Each Axis Setting Area in Shared Memory>
• For the information on writing positioning data using ladder programs,
  <14.1.3. How to Use Standard Area and Extended Area of Positioning Data>

# 5.2 Preparation For Operation

## 5.2.1 Servo On/Servo Off

The servo motor should be in the state that the servo is locked in order to perform the JOG operation and position control. Turn on the servo on request contat to make the servo motor to be the state that the servo is locked. Turn on the servo off request contact to change the state that the servo is locked to the state that the servo is free. Set either the servo on/servo off by the tool operation of the Configurator PM without using the ladder program.

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

| Contact allocation | | | Target axis | Name | Descriptions |
|---|---|---|---|---|---|
| FPΣ | | FP2 | | | |
| WX11 | X110 | WX1 X10 | 1 axis | Servo lock | Turns on when the corresponding axis is in the state of servo lock. |
| | X111 | X11 | 2 axis | | |
| | X112 | X12 | 3 axis | | |
| | X113 | X13 | 4 axis | | |
| | X114 | X14 | 5 axis | | |
| | X115 | X15 | 6 axis | | |
| | X116 | X16 | 7 axis | | |
| | X117 | X17 | 8 axis | | |

| Contact allocation | | | Target axis | Name | Descriptions |
|---|---|---|---|---|---|
| FPΣ | | FP2 | | | |
| WY10 | Y108 | WY8 Y88 | 1 axis | Servo ON request | Requests the servo lock for the corresponding AMP. The servo lock is executed by the ON edge of this contact. The servo cannot be free automatically even in the program mode. To make the servo free, turn on the servo OFF request contact. (The operation is the edge type.) |
| | Y109 | Y89 | 2 axis | | |
| | Y10A | Y8A | 3 axis | | |
| | Y10B | Y8B | 4 axis | | |
| | Y10C | Y8C | 5 axis | | |
| | Y10D | Y8D | 6 axis | | |
| | Y10E | Y8E | 7 axis | | |
| | Y10F | Y8F | 8 axis | | |
| WY15 | Y150 | WY13 Y130 | 1 axis | Request servo off | Requests the servo free for the corresponding AMP. The servo free is executed by the ON edge of this contact. (The operation is the edge type.) |
| | Y151 | Y131 | 2 axis | | |
| | Y152 | Y132 | 3 axis | | |
| | Y153 | Y133 | 4 axis | | |
| | Y154 | Y134 | 5 axis | | |
| | Y155 | Y135 | 6 axis | | |
| | Y156 | Y136 | 7 axis | | |
| | Y157 | Y137 | 8 axis | | |

**Sample program**



```
R0                                          Y108(Y88)
 | |        ( DF )                              [   ]
Servo on                                    Servo on
                                            for axis 1
R1                                          Y150(Y130)
 | |        ( DF )                              [   ]
Servo off                                   Servo off
                                            for axis 1
```

The numbers in parenthesis are the flag and contact numbers for the FP2.

Note) The servo lock status continues if the PLC changed to the program mode.

# Chapter 6

## I/O Allocation

# 6.1 Occupied I/O Area

The input (X)/output (Y) should be allocated to use the Positioning Unit RTEX as well as other I/O units. 256 points (128-point input/128-point output) are occupied for any axis types.

| Type | Number of occupied points (allocated using a tool software) |
|---|---|
| 2-axis type | Input: 128 points |
| 4-axis type | Output: 128 points |
| 8-axis type | (128SX/128SY) |

With the FPΣ or FP2, the I/O numbers vary depending on the installed position of the positioning unit RTEX.

**Reference:** <FPΣ User's Manual  ARCT1F333>
<FP2/FP2SH User's Manual  ARCT1F320>

# 6.2 Allocation of Each Contact

Followings are occupied I/O when FPΣ/FP2 Positioning unit RTEX is installed in the slot 0.

| Contact allocation | | | Target axis | Name | Descriptions |
|---|---|---|---|---|---|
| FPΣ | | FP2 | | | |
| WX10 | X100 | X0 | All axes | Link establishment annunciation | Indicates that the network link was established, and announce the system started running. |
| | X101 | X1 | - | - | - |
| | X102 | X2 | - | - | - |
| | X103 | X3 | All axes | Write FROM | Announces that data such as positioning parameters in the shared memroy is being written in FROM. |
| | X104 | X4 | All axes | Tool operation | Contact to indicate the Tool operation from Configurator PM. The start-up from I/O is not available during the Tool operaiton. If it performs, a warning will occur. |
| | X105 | X5 | - | - | - |
| | X106 | X6 | - | - | - |
| | X107 | X7 | All axes | Recalculation done | If the recalculation request contact (Y_7) turns on, the positioning data of the shared memory (standard area) will be restructured. This contact will turn on after restructuring completes.<br>If the recalculation request contact (Y_7) turns on again, this contact will be off once.<br>Note) It is used only when the positioning data has been rewritten by laddar programs. |
| | X108 | X8 | 1 axis | Each axis connection confirmation | Turns on when the corresponding axis exists. |
| | X109 | X9 | 2 axis | | |
| | X10A | XA | 3 axis | | |
| | X10B | XB | 4 axis | | |
| | X10C | XC | 5 axis | | |
| | X10D | XD | 6 axis | | |
| | X10E | XE | 7 axis | | |
| | X10F | XF | 8 axis | | |
| WX11 | X110 | X10 | 1 axis | Servo lock | Turns on when the corresponding axis is in the state of servo lock. |
| | X111 | X11 | 2 axis | | |
| | X112 | X12 | 3 axis | | |
| | X113 | X13 | 4 axis | | |
| | X114 | X14 | 5 axis | | |
| | X115 | X15 | 6 axis | | |
| | X116 | X16 | 7 axis | | |
| | X117 | X17 | 8 axis | | |
| | X118 | X18 | 1 axis | BUSY | Turns on when the corresponding axis is operating. |
| | X119 | X19 | 2 axis | | |
| | X11A | X1A | 3 axis | | |
| | X11B | X1B | 4 axis | | |
| | X11C | X1C | 5 axis | | |
| | X11D | X1D | 6 axis | | |
| | X11E | X1E | 7 axis | | |
| | X11F | X1F | 8 axis | | |

Note: FP2 column shows WX0 for the X0–XF rows and WX1 for the X10–X1F rows.

| Contact allocation | | | Target axis | Name | Descriptions |
|---|---|---|---|---|---|
| FPΣ | | FP2 | | | |
| WX12 | X120 | WX2 | X20 | 1 axis | Operation done | Turns on when the operation command for the corresponding axis completed and the position error became in the specified completion width. For P point control and C point control of the automatic operation, turns on when the operation for all the tables completed. After this contact turned on, the on-state continues until the next control activates. |
| | X121 | | X21 | 2 axis | | |
| | X122 | | X22 | 3 axis | | |
| | X123 | | X23 | 4 axis | | |
| | X124 | | X24 | 5 axis | | |
| | X125 | | X25 | 6 axis | | |
| | X126 | | X26 | 7 axis | | |
| | X127 | | X27 | 8 axis | | |
| | X128 | | X28 | 1 axis | Home return done | Turns on when the home return operation for the corresponding axis completed. After this contact turned on, the on-state continues until the next control activates. |
| | X129 | | X29 | 2 axis | | |
| | X12A | | X2A | 3 axis | | |
| | X12B | | X2B | 4 axis | | |
| | X12C | | X2C | 5 axis | | |
| | X12D | | X2D | 6 axis | | |
| | X12E | | X2E | 7 axis | | |
| | X12F | | X2F | 8 axis | | |
| WX13 | X130 | WX3 | X30 | - | - | - |
| | X131 | | X31 | - | - | - |
| | X132 | | X32 | - | - | - |
| | X133 | | X33 | - | - | - |
| | X134 | | X34 | - | - | - |
| | X135 | | X35 | - | - | - |
| | X136 | | X36 | - | - | - |
| | X137 | | X37 | - | - | - |
| | X138 | | X38 | 1 axis | Near home | Monitor contact for the near home input connected to the corresnponding AMP. |
| | X139 | | X39 | 2 axis | | |
| | X13A | | X3A | 3 axis | | |
| | X13B | | X3B | 4 axis | | |
| | X13C | | X3C | 5 axis | | |
| | X13D | | X3D | 6 axis | | |
| | X13E | | X3E | 7 axis | | |
| | X13F | | X3F | 8 axis | | |
| WX14 | X140 | WX4 | X40 | 1 axis | Imposition | Turns on when the position error of the corresponding axis is within the imposition range specified in AMP. The setting of the imposition range can be changed by PANATERM that is a tool of AMP. |
| | X141 | | X41 | 2 axis | | |
| | X142 | | X42 | 3 axis | | |
| | X143 | | X43 | 4 axis | | |
| | X144 | | X44 | 5 axis | | |
| | X145 | | X45 | 6 axis | | |
| | X146 | | X46 | 7 axis | | |
| | X147 | | X47 | 8 axis | | |
| | X148 | | X48 | 1 axis | Auxiliary contact | Turns on when the corresponding positioning table of the corresponding axis was executed. Use Configurator PM or directly write in the shared memory for setting to able/disable the auxiliary contact. |
| | X149 | | X49 | 2 axis | | |
| | X14A | | X4A | 3 axis | | |
| | X14B | | X4B | 4 axis | | |
| | X14C | | X4C | 5 axis | | |
| | X14D | | X4D | 6 axis | | |
| | X14E | | X4E | 7 axis | | |
| | X14F | | X4F | 8 axis | | |

| Contact allocation | | Target axis | Name | Descriptions |
|---|---|---|---|---|
| FPΣ | FP2 | | | |
| X150 | X50 | 1 axis | Limit + | Monitor contact of the limit + and – connected to the corresponding AMP.<br>During the positioning operation, JOG operation or pulser operation, performs the deceleration stop when the limit input that is an extension of the operating direction turned on.<br>The deceleration stop time during the limit input can be changed in the shared memory.<br>It will be the contact for the automatic inversion when performing the home return. |
| X151 | X51 | | Limit - | |
| X152 | X52 | 2 axis | Limit + | |
| X153 | X53 | | Limit - | |
| X154 | X54 | 3 axis | Limit + | |
| X155 | X55 | | Limit - | |
| X156 | X56 | 4 axis | Limit + | |
| X157 | X57 | | Limit - | |
| X158 | X58 | 5 axis | Limit + | |
| X159 | X59 | | Limit - | |
| X15A | X5A | 6 axis | Limit + | |
| X15B | X5B | | Limit - | |
| X15C | X5C | 7 axis | Limit + | |
| X15D | X5D | | Limit - | |
| X15E | X5E | 8 axis | Limit + | |
| X15F | X5F | | Limit - | |
| X160 | X60 | 1 axis | Error annunciation | Turns on when an error occurs on the corresponding axis.<br>The contacts of all axes turn on if an error occurs on all axes.<br>The details of the error can be confirmed in the error annunciation area of the shared memory. |
| X161 | X61 | 2 axis | | |
| X162 | X62 | 3 axis | | |
| X163 | X63 | 4 axis | | |
| X164 | X64 | 5 axis | | |
| X165 | X65 | 6 axis | | |
| X166 | X66 | 7 axis | | |
| X167 | X67 | 8 axis | | |
| X168 | X68 | 1 axis | Warning annunciation | Turns on when a warning occurs on the corresponding axis.<br>The contacts of all axes turn on if a warning occurs on all axes.<br>The details of the warning can be confirmed in the warning annunciation area of the shared memory. |
| X169 | X69 | 2 axis | | |
| X16A | X6A | 3 axis | | |
| X16B | X6B | 4 axis | | |
| X16C | X6C | 5 axis | | |
| X16D | X6D | 6 axis | | |
| X16E | X6E | 7 axis | | |
| X16F | X6F | 8 axis | | |
| X170 | X70 | 1 axis | General-purpose input 1 | Monitor contact for the general-purpose input connected to the corresnponding AMP.<br>The input status of this contact does not affect on the operation of the motor or positioning unit. |
| X171 | X71 | | General-purpose input 2 | |
| X172 | X72 | 2 axis | General-purpose input 1 | |
| X173 | X73 | | General-purpose input 2 | |
| X174 | X74 | 3 axis | General-purpose input 1 | |
| X175 | X75 | | General-purpose input 2 | |
| X176 | X76 | 4 axis | General-purpose input 1 | |
| X177 | X77 | | General-purpose input 2 | |
| X178 | X78 | 5 axis | General-purpose input 1 | |
| X179 | X79 | | General-purpose input 2 | |
| X17A | X7A | 6 axis | General-purpose input 1 | |
| X17B | X7B | | General-purpose input 2 | |
| X17C | X7C | 7 axis | General-purpose input 1 | |
| X17D | X7D | | General-purpose input 2 | |
| X17E | X7E | 8 axis | General-purpose input 1 | |
| X17F | X7F | | General-purpose input 2 | |

Note: WX15 / WX5 group the Limit contacts; WX16 / WX6 group the Error and Warning annunciation; WX17 / WX7 group the General-purpose inputs.

| Contact allocation | | Target axis | Name | Descriptions |
|---|---|---|---|---|
| FPΣ | FP2 | | | |
| Y100 | Y80 | All axes | System stop | Contact for requesting the system stop. When it turns on, all axes will stop at the deceleration time 0. |
| Y101 | Y81 | - | - | - |
| Y102 | Y82 | - | - | - |
| Y103 | Y83 | - | - | - |
| Y104 | Y84 | - | - | - |
| Y105 | Y85 | - | - | - |
| Y106 | Y86 | - | - | - |
| Y107 (WY10) | Y87 (WY8) | All axes | Recalculation request | Turn on this signal when each positioning data (standard area) in the shared memory was changed. The positioning data after the table number starting the recalculation specified in the shared memory can be restructured and will be executable by turning on this signal. When restructuring of the positioning data completes, the recalculation done contact (X_7) will turn on. Note) It is used only when the positioning data has been rewritten by laddar programs. |
| Y108 | Y88 | 1 axis | Servo ON request | Requests the servo lock for the corresponding AMP. The servo lock is executed by the ON edge of this contact. The servo cannot be free automatically even in the program mode. To make the servo free, turn on the servo OFF request contact. (The operation is the edge type.) |
| Y109 | Y89 | 2 axis | | |
| Y10A | Y8A | 3 axis | | |
| Y10B | Y8B | 4 axis | | |
| Y10C | Y8C | 5 axis | | |
| Y10D | Y8D | 6 axis | | |
| Y10E | Y8E | 7 axis | | |
| Y10F | Y8F | 8 axis | | |
| Y110 (WY11) | Y90 (WY9) | 1 axis | Positioning start-up | Requests the positioning control for the corresponding AMP. The starting table is specified in the area for specifying the position control starting table number in the shared memory. (The operation is the edge type.) If this contact turns on during the Tool operation by Configurator PM, a warning will be output. |
| Y111 | Y91 | 2 axis | | |
| Y112 | Y92 | 3 axis | | |
| Y113 | Y93 | 4 axis | | |
| Y114 | Y94 | 5 axis | | |
| Y115 | Y95 | 6 axis | | |
| Y116 | Y96 | 7 axis | | |
| Y117 | Y97 | 8 axis | | |
| Y118 | Y98 | 1 axis | Home return start-up | Requests the home return for the corresponding AMP. The settings for the direction or pattern of the home return are specified by Configurtor PM or the home return operation setting area in the shared memory. (The operation is the edge type.) If this contact turns on during the Tool operation by Configurator PM, a warning will be output. |
| Y119 | Y99 | 2 axis | | |
| Y11A | Y9A | 3 axis | | |
| Y11B | Y9B | 4 axis | | |
| Y11C | Y9C | 5 axis | | |
| Y11D | Y9D | 6 axis | | |
| Y11E | Y9E | 7 axis | | |
| Y11F | Y9F | 8 axis | | |
| Y120 (WY12) | Y100 (WY10) | 1 axis | JOG forward | Requests the JOG operation for the corresponding AMP. The settings for acceleration time, etc are specified by Configurator PM or the JOG operation settings in the shared memory. (The operation is the level type.) If this contact turns on during the Tool operation by Configurator PM, a warning will be output. |
| Y121 | Y101 | | JOG reverse | |
| Y122 | Y102 | 2 axis | JOG forward | |
| Y123 | Y103 | | JOG reverse | |
| Y124 | Y104 | 3 axis | JOG forward | |
| Y125 | Y105 | | JOG reverse | |
| Y126 | Y106 | 4 axis | JOG forward | |
| Y127 | Y107 | | JOG reverse | |
| Y128 | Y108 | 5 axis | JOG forward | |
| Y129 | Y109 | | JOG reverse | |
| Y12A | Y10A | 6 axis | JOG forward | |
| Y12B | Y10B | | JOG reverse | |
| Y12C | Y10C | 7 axis | JOG forward | |
| Y12D | Y10D | | JOG reverse | |
| Y12E | Y10E | 8 axis | JOG forward | |
| Y12F | Y10F | | JOG reverse | |

| Contact allocation | | | Target axis | Name | Descriptions |
|---|---|---|---|---|---|
| FPΣ | | FP2 | | | |
| WY13 | Y130 | WY11 | Y110 | 1 axis | Emergency stop | Requests the emergency stop for the corresponding AMP. The deceleration time for the emegency stop is specified by Configurator PM or the emergency stop setting in the shared memory. (The operation is the level type.)  Note) The deviation counter cannot be cleared. |
| | Y131 | | Y111 | 2 axis | | |
| | Y132 | | Y112 | 3 axis | | |
| | Y133 | | Y113 | 4 axis | | |
| | Y134 | | Y114 | 5 axis | | |
| | Y135 | | Y115 | 6 axis | | |
| | Y136 | | Y116 | 7 axis | | |
| | Y137 | | Y117 | 8 axis | | |
| | Y138 | | Y118 | 1 axis | Deceleration stop | Requests the deceleration stop for the corresponding AMP. The deceleration time for the deceleration stop is specified by Configurator PM or the deceleration stop setting in the shared memory. (The operation is the level type.)  Note) The deviation counter cannot be cleared. |
| | Y139 | | Y119 | 2 axis | | |
| | Y13A | | Y11A | 3 axis | | |
| | Y13B | | Y11B | 4 axis | | |
| | Y13C | | Y11C | 5 axis | | |
| | Y13D | | Y11D | 6 axis | | |
| | Y13E | | Y11E | 7 axis | | |
| | Y13F | | Y11F | 8 axis | | |
| WY14 | Y140 | WY12 | Y120 | 1 axis | Pulser operation enabled | Requests the permission for the pulser operation of the corresponding AMP. The multiple setting and other settings for the pulser operation are specified by Configurator PM or the pulser operation setting area in the shared memory. (The operation is the level type.) |
| | Y141 | | Y121 | 2 axis | | |
| | Y142 | | Y122 | 3 axis | | |
| | Y143 | | Y123 | 4 axis | | |
| | Y144 | | Y124 | 5 axis | | |
| | Y145 | | Y125 | 6 axis | | |
| | Y146 | | Y126 | 7 axis | | |
| | Y147 | | Y127 | 8 axis | | |
| | Y148 | | Y128 | - | - | - |
| | Y149 | | Y129 | - | - | - |
| | Y14A | | Y12A | - | - | - |
| | Y14B | | Y12B | - | - | - |
| | Y14C | | Y12C | - | - | - |
| | Y14D | | Y12D | - | - | - |
| | Y14E | | Y12E | - | - | - |
| | Y14F | | Y12F | - | - | - |
| WY15 | Y150 | WY13 | Y130 | 1 axis | Request servo off | Requests the servo free for the corresponding AMP. The servo free is executed by the ON edge of this contact. (The operation is the edge type.) |
| | Y151 | | Y131 | 2 axis | | |
| | Y152 | | Y132 | 3 axis | | |
| | Y153 | | Y133 | 4 axis | | |
| | Y154 | | Y134 | 5 axis | | |
| | Y155 | | Y135 | 6 axis | | |
| | Y156 | | Y136 | 7 axis | | |
| | Y157 | | Y137 | 8 axis | | |
| | Y158 | | Y138 | - | - | - |
| | Y159 | | Y139 | - | - | - |
| | Y15A | | Y13A | - | - | - |
| | Y15B | | Y13B | - | - | - |
| | Y15C | | Y13C | - | - | - |
| | Y15D | | Y13D | - | - | - |
| | Y15E | | Y13E | - | - | - |
| | Y15F | | Y13F | - | - | - |

| Contact allocation | | Target axis | Name | Descriptions |
|---|---|---|---|---|
| FPΣ | FP2 | | | |
| Y160 | Y140 | 1 axis | Request error clear | Requests the error clear for the corresponding AMP. The processing to recover from errors is performed and the error logs are cleared by turning on this signal.<br><br>Note) Unrecoverable errors cannot be recovered even if this signal turned on. |
| Y161 | Y141 | 2 axis | | |
| Y162 | Y142 | 3 axis | | |
| Y163 | Y143 | 4 axis | | |
| Y164 | Y144 | 5 axis | | |
| Y165 | Y145 | 6 axis | | |
| Y166 | Y146 | 7 axis | | |
| Y167 | Y147 | 8 axis | | |
| Y168 | Y148 | 1 axis | Request warning clear | Requests the warning clear for the corresponding AMP. The warning logs are cleared by turning on this signal. |
| Y169 | Y149 | 2 axis | | |
| Y16A | Y14A | 3 axis | | |
| Y16B | Y14B | 4 axis | | |
| Y16C | Y14C | 5 axis | | |
| Y16D | Y14D | 6 axis | | |
| Y16E | Y14E | 7 axis | | |
| Y16F | Y14F | 8 axis | | |
| Y170 | Y150 | 1 axis | General-purpose output 1 | Contact for the general-purpose output connected to the corresponding AMP. The input status of this contact does not affect on the operation of the motor or positioning unit. |
| Y171 | Y151 | | General-purpose output 2 | |
| Y172 | Y152 | 2 axis | General-purpose output 1 | |
| Y173 | Y153 | | General-purpose output 2 | |
| Y174 | Y154 | 3 axis | General-purpose output 1 | |
| Y175 | Y155 | | General-purpose output 2 | |
| Y176 | Y156 | 4 axis | General-purpose output 1 | |
| Y177 | Y157 | | General-purpose output 2 | |
| Y178 | Y158 | 5 axis | General-purpose output 1 | |
| Y179 | Y159 | | General-purpose output 2 | |
| Y17A | Y15A | 6 axis | General-purpose output 1 | |
| Y17B | Y15B | | General-purpose output 2 | |
| Y17C | Y15C | 7 axis | General-purpose output 1 | |
| Y17D | Y15D | | General-purpose output 2 | |
| Y17E | Y15E | 8 axis | General-purpose output 1 | |
| Y17F | Y15F | | General-purpose output 2 | |

WY16 / WY14 (for error clear and warning clear rows), WY17 / WY15 (for general-purpose output rows)

# Chapter 7

## Setting Tool
## Configurator PM

# 7.1 Connection With Computer
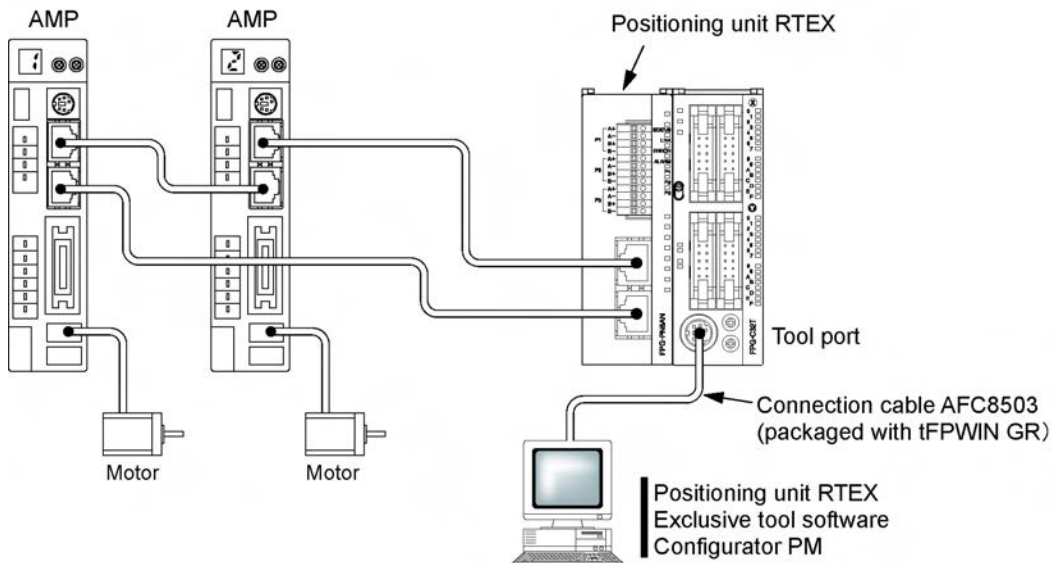


Install the Configurator PM on a computer, and connect it to the tool port of the FPΣ control unit like the above example as well as a programming tool.
For the FP2, connect to the tool port of the FP2 CPU unit.

# 7.2 Functions of Configurator PM

## 7.2.1 Overview

The Configurator PM is the Windows®-compliant setting software for our FP2/FPΣ Positioning Unit RTEX.
The positioning operations can be set by the input method similar to Microsoft® Excel.

**Copy & Paste**
Copies and pastes the data you are editing into Microsoft® Excel, etc.
Also, pastes the position data calculated in Microsoft® Excel into Configurator PM.

**Parameters and data transfer**
Transfers the setting parameter or positioning data to the positioning unit RTEX.
Also, reads the parameters or positioning data within the positioning unit RTEX.

**Batch checking of parameters and data**
Checks the contents of parameters and positioning data all at once.
Jumps to the place automatically if there are parameters or data out of the range.
Also, this function is automatically executed when sending parameters or positioning data to the positioning unit RTEX.

**Verify function**
Verifies the parameter or positioning data you are editing with the files on the disk or the settings values in the positioning unit RTEX.
You can jump the cursor to the data with differences from the dialog of the result of verification.

**Search and Replace functions**
The search or replacement for data item each is possible. Twenty search strings and twenty replace strings can be memorized, so it is convenient for the repeated search or replacement.

**Showing comments for all parameters and positioning data**
Shows the guidance for all parameters and positioning data when making the settings.

**Up to 100 one-byte characters of data comments can be input.**
Up to 100 one-byte characters (50 two-byte characters) of comments can be input for thepositioning data of 1 table each.
It is useful for the revision or the control of programs.
However, the comments cannot be stored within the positioning unit RTEX.

**Tool operation**
The tool operation enables to check the operation at the time that the system is installed or the operation of setting parameters without any ladder program.
Also, the teaching function is provided, which reflects the current position to the movement amount of data item.

## 7.2.2 Basic Specifications

**Operating environment**

| Applicable OS | Windows®95 (OSR2 or higher) |
|---|---|
| | Windows®98 |
| | Windows®Me |
| | WindowsNT® (Ver.4.0 or higher) |
| | Windows®2000 |
| | Windows®XP |
| **Required HDD capacity** | 20MB or more |
| **Recommended CPU** | Pentium 200MHz or higher |
| **Recommended resolution** | 800 * 600 or more |
| **Recommended memory** | 64MB or more (Depending on OS) |
| **Recommended display colors** | 256 colors or more |

**Application specifications**

| No. of characters of data comment | 100 bytes/table |
|---|---|
| No. of histories of search/replace strings | 20 each |

# 7.3 Installing Configurator PM

**Procedure for installing Configurator PM in a personal computer**

The Configurator PM is installed in a personal computer using the procedure outlined below.

For Windows NT®, Windows® 2000, please be aware that the Configurator PM cannot be installed unless you log in at the Administrator level when booting the system

**1. Exit any applications currently running.**

If there are any applications currently running, exit them.

**2. Insert the setup CD.**

Insert the Configurator PM setup CD in the CD drive.

**3. Select "Run".**

Click on the "Start" button at the lower left of the screen, or press the Ctrl + ESC keys to display the start menu of Windows® Operation System. Select "Run".



**4. Enter the name of the file on which the function is to be run.**

When "Run" is selected, the dialog box shown at the left is displayed. Enter **d:\setup.exe** and click on the [OK] button.
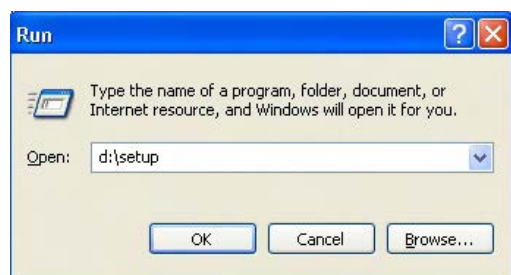


**Note:**

The drive name "d" varies depending on the computer configuration.

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**5. A confirmation message is displayed.**
When the setup program is booted, a confirmation dialog box is displayed. Confirm the contents and click on the [Next] button. To interrupt the installation, click on [Cancel].
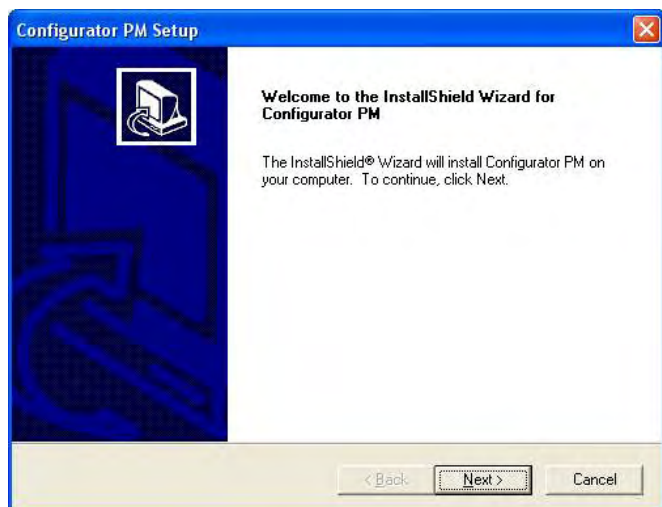


**6. Confirm the licensing agreement.**
The licensing agreement confirmation box is displayed. If you agree to all of the items in the displayed license agreement, click on [Yes].
The setup process begins.
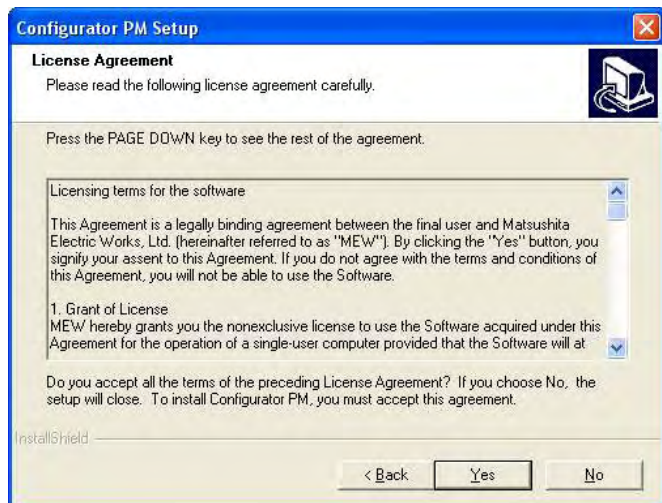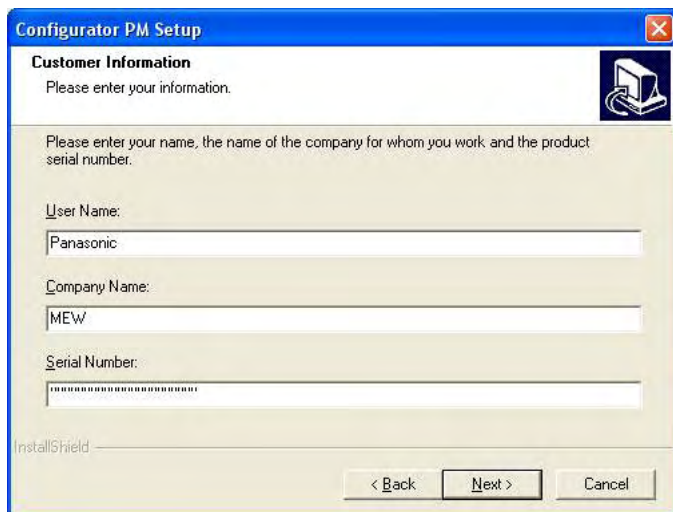
**7. Register the user information.**
A user information dialog box is displayed. Fill in the [User Name], [Company Name] and [Serial Number] items, and click on the [Next] button.
The serial number is noted on the user card included in the Configurator PM package. Make sure it is entered correctly.
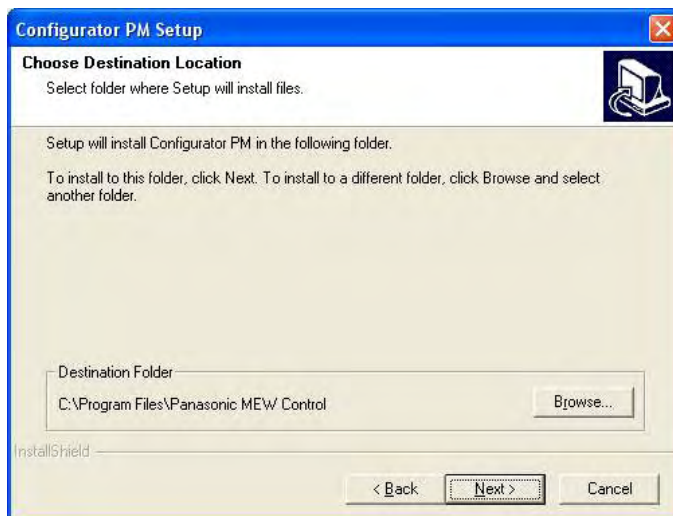


The contents entered here can be confirmed under "Version Information" on the splash screen, and in the Help function, when the Configurator PM is booted.

**8. Select the installation destination.**
A dialog box is displayed where the folder to which the Configurator PM is to be installed can be confirrmed. To install the program in the displayed folder, click on the [Next] button.
The standard destination is "c:\Program Files\Panasonic MEW Control".
To install the program in a different folder, click on the [Browse] button and specify a folder.

**9. Select the program folder.**
A dialog box is displayed where the program folder name can be confirmed. To use the displayed folder name, click on the [Next] button.
The standard folder name is "Panasonic MEW Control".
To use a different folder name, simply enter that name.

**Configurator PM Setup**

**Select Program Folder**
Please select a program folder.

Setup will add program icons to the Program Folder listed below. You may type a new folder name, or select one from the existing folders list. Click Next to continue.

Program Folders:

Panasonic MEW Control

Existing Folders:

Accessories
Administrative Tools
Ethereal
Games
Java Web Start
Panasonic MEW Control
Realtek Sound Manager
Startup

InstallShield

< Back    Next >    Cancel

**10. The installation process begins.**
A message is displayed on the screen indicating that the installation is in progress, and the Configurator PM setup begins.

**Configurator PM Setup**

**Setup Status**

Configurator PM Setup is performing the requested operations.

Installing:
C:\Program Files\NAiS MEWNET\NAiS_MEWINTER.dll

77%

InstallShield

Cancel
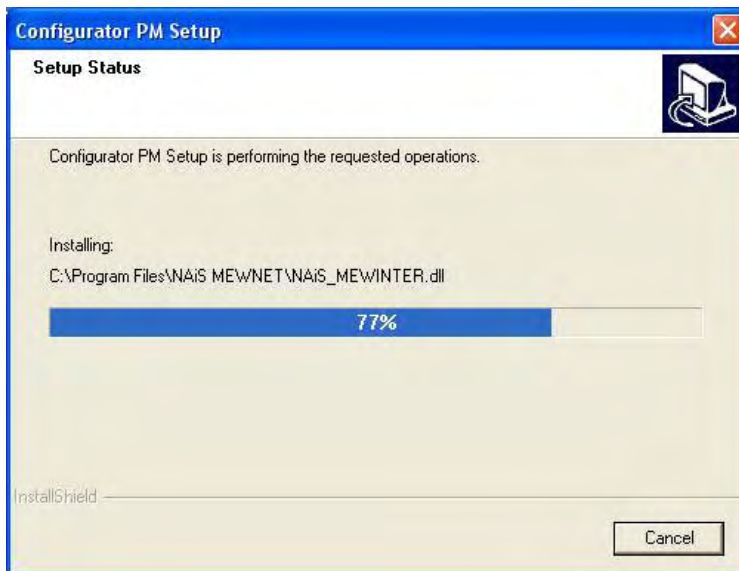
**11. Display the Readme file.**

When the setup process has been completed, a dialog box showing the completion is displayed.

The latest information is described in the Readme file.
Click on [Yes].
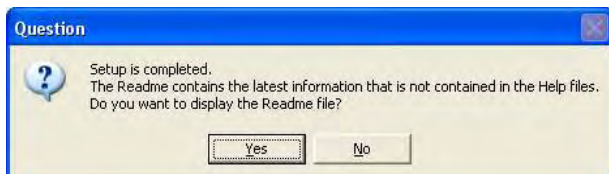


**12. Reboot the computer.**

When all of the process has been completed, a dialog box is displayed, confirming that the computer will be rebooted.
Select either radio button, reboot at once or reboot later, aand click on [Finish].
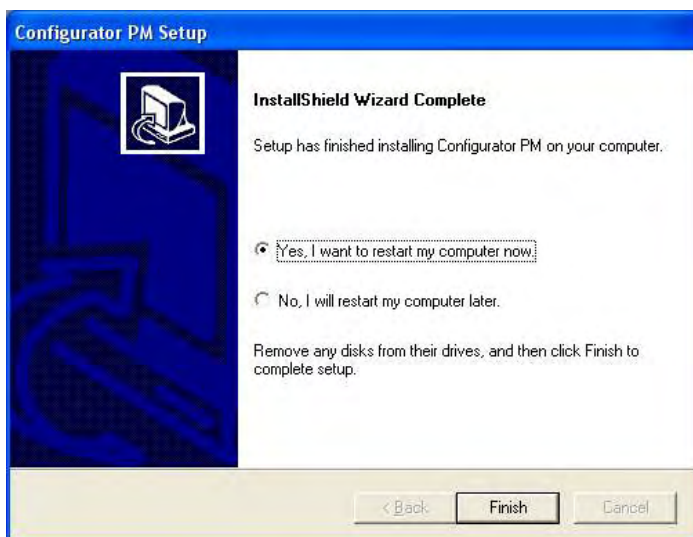


📖 **Reference:**

The above group icon is displayed only when the installation completed. The procedures of the start-up, refer to the sections of "Starting Configurator PM" and "Exiting Configurator PM".

☞ **Note:**

Never eject the CD during the installation process.

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# 7.4 Starting Configurator PM

Click the [Start] button on Windows, and click [Program], [Panasonic MEW Control] and [Setting software] in the order. And then click [Configurator PM]. The following dialog is shown.
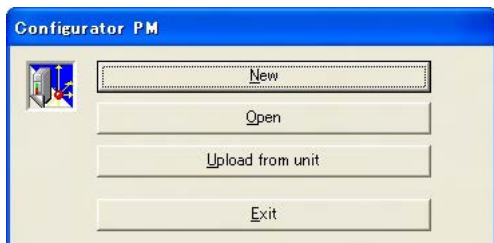


| [New] | Create a new setting data for the positioning unit RTEX. |
|---|---|
| [Open] | Read the existing setting data. |
| [Upload from Unit] | Read the setting data of the positioning unit RTEX. |
| [Exit] | End this software. |

# 7.5 Treating Files

## 7.5.1 New

Create a new file.

**1. Select [File] → [New] in the menu bar, or click [New file] icon in the toolbar. The [Select axes] dialog is shown.**

| Setting used axis | | | | |
|---|---|---|---|---|
| ☐ 1 axis | ☐ 2 axis | ☐ 3 axis | ☐ 4 axis | OK |
| ☐ 5 axis | ☐ 6 axis | ☐ 7 axis | ☐ 8 axis | Cancel |
| Choose the axis to use. | | | | |
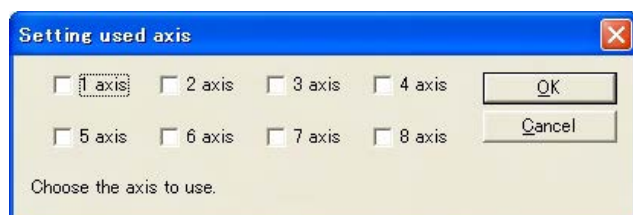
**2. Check the axes to use, and click [OK].**

| Setting used axis | | | | |
|---|---|---|---|---|
| ☑ 1 axis | ☑ 2 axis | ☑ 3 axis | ☑ 4 axis | OK |
| ☐ 5 axis | ☐ 6 axis | ☐ 7 axis | ☐ 8 axis | Cancel |
| Choose the axis to use. | | | | |
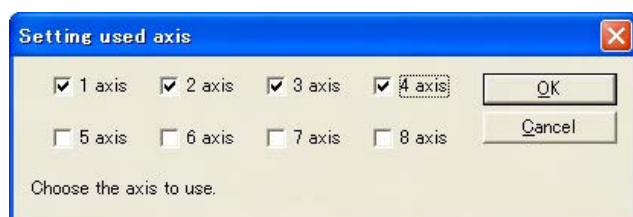
**3. The [Interpolation group settings] dialog is shown. Set the grouping that the interpolation operation is executed for the selected axes in the above setting.**
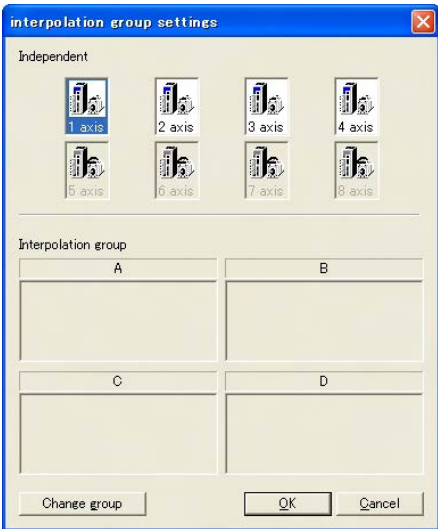


| [Independent] | The area of the axes to be used as independent axes without performing the interpolation operation. |
|---|---|
| [Interpolation group] | The area of the groupings of the axes to perform the interpolation operation. Up to 4 groups can be specified. |
| [Change group] | It is used to register the interpolation groups by other way than the drag and drop with the mouse. Click the axis icon at the top of the window, and select the groups to allocate by executing this function. |
| [OK] | Determine the allocation of the interpolation groups. |
| [Cancel] | Back to the previous setting for the axes to use. |

**4. Drag the axis icon at the top of the window with the mouse and drop it in any area of the groups (A to D) at the bottom of the window to determine the axes of the interpolation groups.**
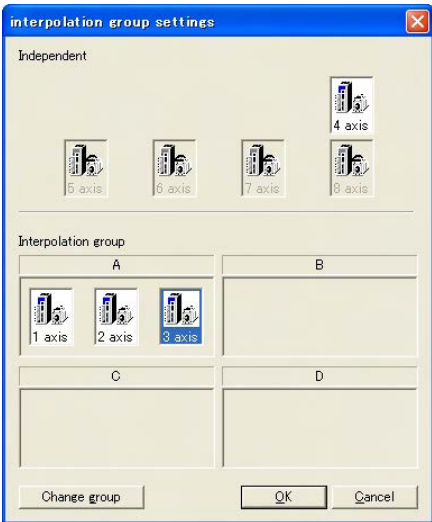


Click [OK] to determine the interpolation groups.

**5. The data setting screen is shown, which enables the setting.**

## 7.5.2 Reading from Files

Read the parameter settings or data settings from files.

**1. Select [File] → [Open] in the menu bar, or click [Open] icon in the toolbar. The following dialog is shown.**
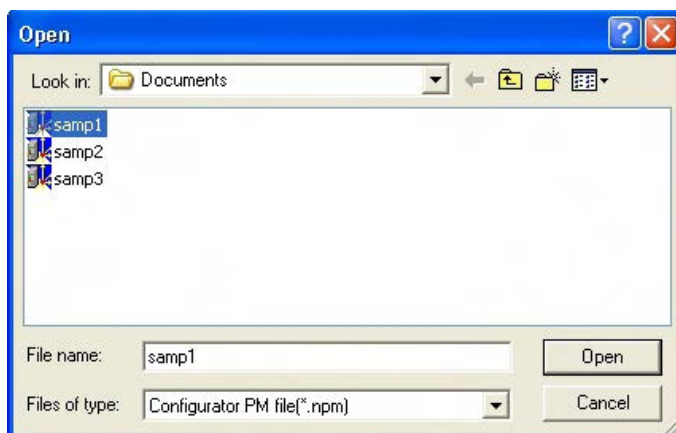


**2. Select the drive where the file is saved in the [Location of File] box.**

**3. Select the file name in the box listing the folders and files under the [Location of File] box.
If the file you want to read is not indicated, double-click the folder name where the file is saved.
Double-click the sub-folder names until the sub-folder where the file is saved is open.**

**4. Click the file name.**
The following contents are recorded in the positioning setting file (* npm) that can be used in this software.
・Axis information
・Parameter settings
・Data settings
・Data comments

**5. Click [Open].**

 **Key Point:**
Click the file name indicated at the bottom of the [File] menu to open the file that was previously active

## 7.5.3 Saving Files

Save the parameter settings or data settings in files.
The contents saved in files are axis information, parameter settings, data settings and data comments.

**1. The following methods are available to save files.**
(The operation procedures and the behaviors of this software differ depending on the case of overwrite save and the one saves as a new file.)

**Saving a file by overwriting an existing file.**
Select [File] => [Save] in the menu bar, or click the [Save] icon in the toolbar.

**Saving a file by naming a new name.**
Select [File] => [Save As] in the menu bar.

When saving a file by overwriting an existing file, the operation completes when the function is selected.
When saving a file by name a new name, the following dialog is shown.
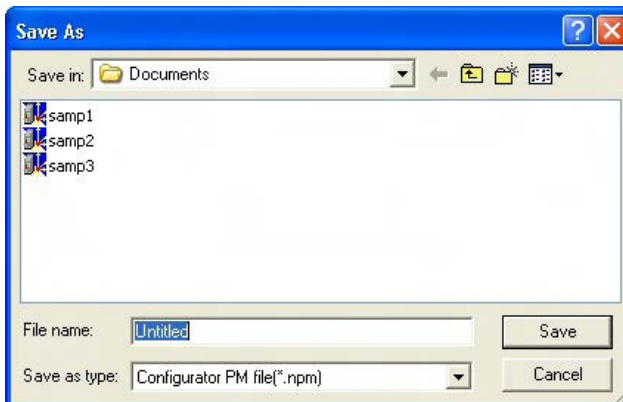


**2. Input a new file name in the [File name] box.**

**3. Click [Save].**

## 7.5.4 Setting File Properties

Set the property of a file (creator and comment).

**1. Select [File] => [File property] in the menu bar to specify the file property.**
**The following dialog is shown.**
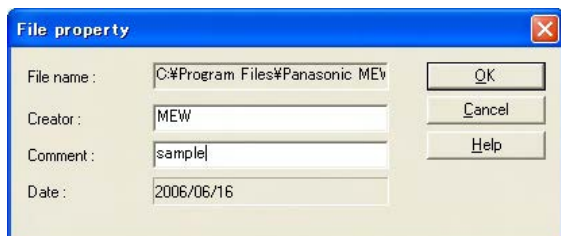


**2. Input the creator and comment, and click [OK].**
Up to 10 one-byte characters (5 two-byte characters) for the creator and 40 one-byte characters (20 two-byte characters) for the comment can be input.

## 7.6 Exiting Configurator PM

Select [File] → [Exit] in the menu bar to quit the Configurator PM.

If the file is not unsaved, a message asking for the save is shown.
 ・Click [Yes] to save the file.
 ・Click [No] to end the Configurator PM without saving the file.

# 7.7 Connection to Positioning Unit

## 7.7.1 Selecting Slot Number

When accessing the positioning unit RTEX in the Configurator PM, specify the slot number that the positioning unit RTEX is installed in advance.

**Select [Online] → [Select slot] in the menu bar. The following dialog is shown.**
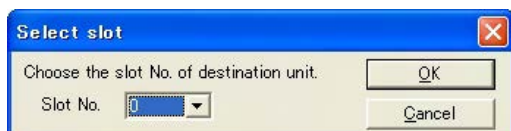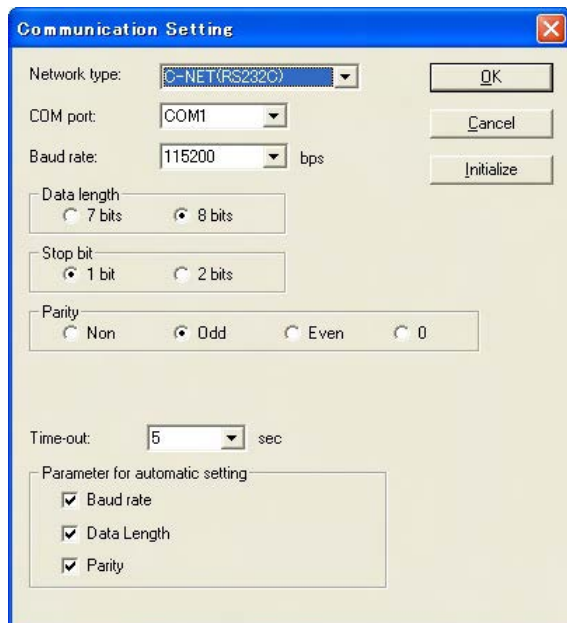


The slot numbers defined vary depending on the type of PLCs. See below.

| PLC | Slot No. |
|-----|----------|
| FPΣ | The positioning unit RTEX is installed on the left side of the CPU unit, and defined as below.<br>Expansion unit 1 : Slot No. 0<br>Expansion unit 2 : Slot No. 1<br>Expansion unit 3 : Slot No. 2<br>Expansion unit 4 : Slot No. 3 |
| FP2 | The positioning unit RTEX is installed on the CPU unit with the motherboard. The slot number for the unit installed on the right side of the CPU unit is the slot number 0, and then the slot number varies depending on the installed position of the motherboard. |

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## 7.7.2 Communication Settings

Set the condition to communicate with the PLC that the positioning unit RTEX has been installed.

**Select [Option] → [Communication settings] in the menu bar. The following dialog is shown.**



| Name | Setting value | Default |
|------|---------------|---------|
| **Port number** | Select a COM port to be used. | COM1 |
| **Baud rate** | 1200 to 115200 bps | 9600 |
| **Data length** | 7 bits, 8 bits: Set either 7 bits or 8 bits to send 1 byte. | 8 bits |
| **Stop bit** | 1 bit, 2 bits | 1 bit |
| **Parity** | None, Odd, Even | Odd |
| **Timeout** | Set the communication timeout time with PLC (0 to 60 seconds). | 5 seconds |
| **Automatic communication settings** | When the communication condition is different from the PLC, check the items to search the matched conditions. If all items are not checked, the communication condition is not automatically searched. | All items are checked. |

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# 7.8 Parameter Settings

Set the initial operation for the positioning unit RTEX.
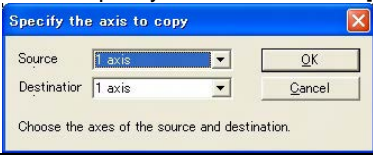
**1. Select [Set axis] → [Parameter settings] in the menu bar, or click the [Parameter setting] icon in the toolbar.**

**2. The parameter setting dialog is shown. Set the parameters.**
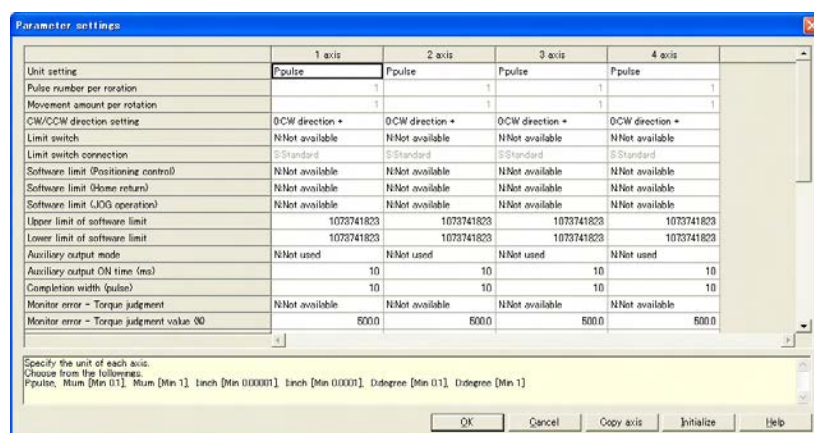


**Setting items**

| Parameter name | Description |
|---|---|
| Unit setting | The unit to be used for setting each axis. |
| Pulse number per rotation | The pulse number per rotation.<br>(It should be cancelled down with the movement amount per rotation.) |
| Movement amount per rotation | The movement amount per rotation.<br>(It should be cancelled down with the pulse number per rotation.) |
| CW/CCW direction setting | The directions of CW and CCW.<br>CW+: + direction is CW.<br>CCW+: + direction is CCW. |
| Limit switch | Enable/disable the limit switch. |
| Limit switch connection | The connections of the + direction limit switch and - direction limit switch.<br>Standard: + direction limit is CWL. - direction limit is CCWL.<br>Reverse connection: + direction limit is CCWL. - direction limit is CWL. |
| Software limit (Positioning control) | Enable/disable the software limit in the positioning control. |
| Software limit (Home return) | Enable/disable the software limit in the home return. |
| Software limit (JOG operation) | Enable/disable the software limit in the JOG operation. |
| Upper limit of software limit | The upper limit value of the software limit. |
| Lower limit of software limit | The lower limit value of the software limit. |
| Auxiliary output mode | Enable/disable the auxiliary output contact and auxiliary output code. |
| Auxiliary output ON time (ms) | The time that the auxiliary output contact is ON. |
| Completion width(pulse) | The width of the completion of command operation. |

| Parameter name | Description |
|---|---|
| Monitor error – Torque judgment | The judgment operation of the torque command for the motors controlled by the AMP of each axis.<br>Not available: Not perform the torque judgment.<br>Available (Warning): If the torque of the AMP exceeded the judgment value, a warning occurs. |
| Monitor error – Torque judgment value (%) | The torque command value of the motors controlled by the AMP of each axis. |
| Monitor error – Actual speed judgment | The judgment operation for the actual speed of the motors controlled by the AMP of each axis.<br>Not available: Not perform the actual speed judgment.<br>Available (Error): If the actual speed of the AMP exceeded the judgment value, an error occurs.<br>Available (Warning): If the actual speed of the AMP exceeded the judgment value, a warning occurs. |
| Monitor error – Actual speed judgment value | The actual speed of the motors controlled by the AMP of each axis. |
| Home return – Setting code | The pattern of the home return. |
| Home return – Direction | The operating direction of the home return. |
| Home return – Acceleration time | The acceleration time in the home return. |
| Home return – Deceleration time | The deceleration time in the home return. |
| Home return – Target speed | The target speed in the home return. |
| Home return – Creep speed | The speed to search the home position after the proximity input. |
| JOG operation – Acceleration/Deceleration type | The acceleration/deceleration type in the JOG operation. |
| JOG operation – Acceleration time | The acceleration time in the JOG operation. |
| JOG operation – Deceleration time | The deceleration time in the JOG operation. |
| JOG operation – JOG target rate | The target rate in the JOG operation. |
| Emergency stop deceleration time (ms) | The deceleration time when the emergency stop is requested by the input contact. |
| Limit stop deceleration time (ms) | The deceleration time for the deceleration operation when the limit is input. |
| Error stop deceleration time (ms) | The deceleration time for the deceleration operation when an error occurs |
| Pulser operation setting code | The pulser input (1 to 3) in the pulser operation. |
| Pulser operation ratio numerator | No. of movement pulse is calculated by multiplying the No. of input pulse from the pulser by the ratio below. |
| Pulser operation ratio denominator | (Numerator of ratio of pulser operation)/(Denominator of ratio of pulser operation) |

| OK | Update the parameter settings with the specified contents. |
|---|---|
| Cancel | Close this dialog without updating the parameter settings. |
| Copy axis | Specify the axes of the source and destination to copy the parameter setting between the axes.The following dialog is shown by clicking the [Copy axis] button. Specify the axes and click [OK].<br> |
| Initialize | Initialize the parameter settings. |
| Help | Indicate the help for this function. |

**3. Click [OK] to determine the settings.**

Click [OK] to determine the edited settings.

Click [Cancel] to cancel the edited settings.

# 7.9 Changing Axis Information

Change the used axes or the groups for the setting data being edited.

**Select [Set axis] → [Change axis] in the menu bar. The following dialog is shown.**
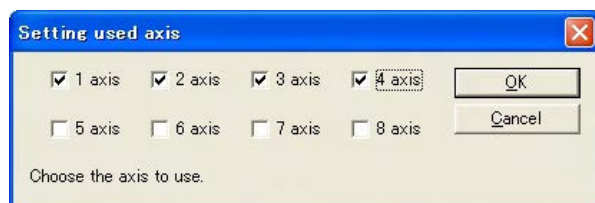


**The editing dialog for the interpolation axis group is shown by clicking [OK] after selecting the used axes.**

# 7.10 Setting Positioning Data

Set the various data to perform the positioning operation. They are set on the data setting screen.

This is an example for the interpolation group of 1 axis and 2 axis.

**Positioning data editing screen**



**Setting items**

| Parameter Name | Description |
|---|---|
| Operation pattern | Select one from the following operation patterns.<br>・End point control: Execute the trapezoidal control of only one table.<br>・Continuance point control : Execute the trapezoidal control continuously. Specify the end point at the end of the continuance point control.<br>・Pass point control: Execute the continuous speed change control. Specify the end point at the end of the pass point control. |
| Interpolation operation | Select the operation of interpolation. |
| X-axis control method | Select either increment or absolute coordinate. |
| X-axis movement amount | Input the movement amount of X axis. The movement amount depends on the unit system specified in the parameter settings. |
| X-axis auxiliary point | It is used when the circular interpolation is selected, and ignored when the linear interpolation is selected.<br>The details of the auxiliary points differ depending on the type of circular interpolation.<br>・Circular interpolation (Center point): The auxiliary point is used as the X axis of the center point.<br>・Circular interpolation (Pass point): The auxiliary point is used as the X axis of the pass point. |

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| Parameter Name | Description |
|---|---|
| Y-axis movement amount | Input the movement amount of Y axis. The movement amount depends on the unit system specified in the parameter settings. |
| Y-axis auxiliary point | It is used when the circular (spiral) interpolation is selected, and ignored when the linear interpolation is selected.<br>The details of the auxiliary points differ depending on the type of circular interpolation.<br>・Circular interpolation (Center point): The auxiliary point is used as the Y axis of the center point.<br>・Circular interpolation (Pass point): The auxiliary point is used as the Y axis of the pass point. |
| Acceleration/deceleration pattern | Select the pattern to accelerate/decelerate. |
| Acceleration time (ms) | Set the acceleration time. It is set in the ms unit. |
| Deceleration time (ms) | Set the deceleration time. It is set in the ms unit. |
| Interpolation speed | Set the interpolation speed. |
| Dwell time (ms) | Set the time from when the positioning command in the end point control completes till when the completion flag (Y contact) turns on.<br>For the continuance point control, it is the wait time between each table. For the pass point control, the dwell time is ignored. |
| Auxiliary output | Set the auxiliary output code. When the auxiliary output is set to enable in the parameter settings, the auxiliary output code specified here is output. |
| Comment | Input the comments of tables.<br>The comments are saved in the positioning setting file (*.npm) of the PC only. They are not saved in the positioning unit RTEX. |

Note) The details for the settings in each parameter are indicated in the guidance bar.

# 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, double-clicking with the mouse and with the arrow, Enter and Tab keys.

**Move the cursor to the data item.**
Using the arrow key enables to move the cursor to the adjacent cell in the direction of the arrow.

Using the mouse enables to move the cursor 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.

**Input the data item.**
Pressing any character input key or double-clicking the mouse on the cell you want to input data enables 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 the column with the combo box as below, the data item can be set only by inputting the initial character on the keyboard. For example, input [C] directly in the column of the pattern. Then the data item will be [C: Continuance point]. Also, it is possible to select with the arrow keys after the input is enable.

| 2 | E: End | 0: Line... | I: Inc... | ( |
|---|--------|-----------|-----------|---|
| 3 | E: End | 0: Line... | I: Inc... | ( |
| 4 | E: End ▼ | 0: Line... | I: Inc... | ( |
| 5 | C: Continuation | ne... | I: Inc... | ( |
| 6 | E: End | ne... | I: Inc... | ( |
| 7 | P: Pass | 0: Line... | I: Inc... | ( |
| 8 | E: End | 0: Line... | I: Inc... | ( |
| 9 | E: End | 0: Line... | I: Inc... | ( |

**Press [Enter] key to determine. Press [ESC] key to cancel.**

**Click the tab of a sheet to change to the sheet.**
When using the keyboard, press [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... |

|◄ ◄ ► ►|  \ 1Axis / \ 2Axis / \ 3Axis /

## 7.11.2 Copying Positioining Data

The data contents can be stored in the clipboard by setting the preference field of the cells on the positioning data editing screen. The data stored in the clipboard are pasted in Microsoft® Excel as well as the data editing screen of this software.

☞ **Note:**

Pasting is not possible if the content in the clipboard is different from the attributes of the pasted area.
If values are contained in the contents of the clipboard, the values can be pasted up to the maximum digit number of the data item.

**Key Point:**

If the pasted area is different from the data in the clipboard, paste as shown below.



Area Copy
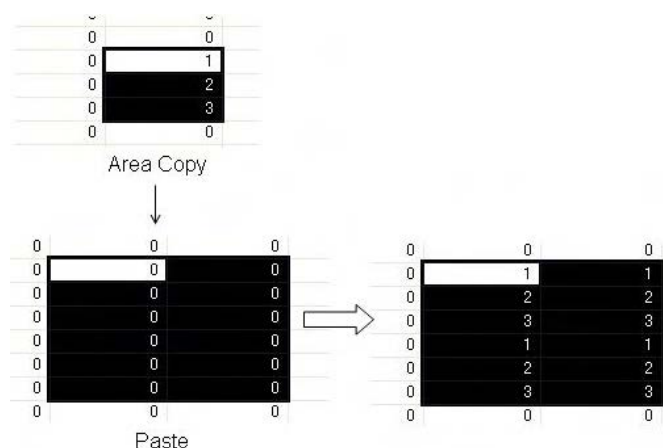
Paste

## 7.11.3 Selecting All Cells

All cells can be selected before the operations such as copy or paste are done.
It is convenient to copy all the settings of the specified axis to another axis.

Press [Ctrl] + [A] on the keyboard, or click the [Table No.] header on the upper-left corner of the data editing screen with the mouse to select all cells.

## 7.11.4 Searching Character Strings

**1. Select [Edit data] → [Find] in the menu bar, or click the [Find] icon in the toolbar. The following dialog is shown.**



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

**3. Click [Next].**

**Key Point:**

Press [Esc] to end the search.

Press [Replace] to change the replacement screen.

## 7.11.5 Replacing Character Strings

**1. Select [Replace] → [Find] in the menu bar. The following diaglo is shown.**



**2. Input the character string to search in the [Character string to find] box.**

**3. Input the character string after the replacement in the [Character string after replacement].**

**4. Select the target line (setting item).**

**5. Click [Next] and [Replace], or [Replace all].**

### 7.11.6 Selecting Lines

The cells in a line or multiple lines can be selected before the operations such as copy or paste are done.

Click the [Table No.] header on the upper-left corner of the positioning data editing screen with the mouse to select the all the cells in one line. Drag the mouse up and down (holding down the left click) to select multiple lines.

### 7.11.7 Selecting Colums

It is convenient for editing data collectively before the operations such as copy and paste, or for data item each.

Click the header on the upper corner of the data editing screen to select all the cells in one column. Drag the header holding down the left click on the mouse to select multiple columns.

### 7.11.8 Editing Data Items Collectively

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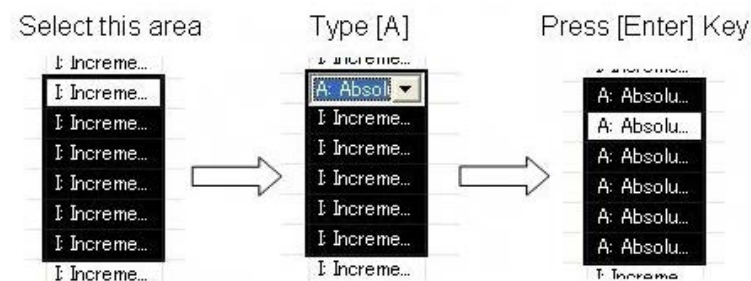


**1. Select the part to change with the mouse or the up and down arrows on the keyboard.**
**2. Input the data item. For example, press [A] on the keyboard to change the X-axis pattern from
   "I: Increment" to "A: Absolute".**
**3. Press the [Enter] key to determine the content of the data item.**

The data item can be edited collectively in the above procedure.

**Key Point:**
When inputting the data item using the edit box (e.g. movement amount, acceleration time, etc.), input the data item directly using the numbered keyboard.

# 7.12 Customizing Software

**Changing Column Width**

Widen the column width to enable all the characters to be shown during data editing, or narrow it when the resolution of the PC you use is small. As the column width is saved when this software quits, the same width will be recreated at the next time of the start-up.

**1. The mouse cursor changes to a mark like "+" by moving the mouse cursor to the right end of the column you want to widen the width in the header on the upper corner of the data editing screen.**
**2. Move the cursor left and right with clicking down the left button of the mouse.**
**3. Release the left button of the mouse to finish the change in the column width.**

**Key Point:**
The column width returns to the one on start-up by double-clicking the mouse in the state of the above procedure 1.

**- Showing/Hiding Toolbar**
Set to show or hide the toolbar.

**Select [View] → [Toolbar], and check or uncheck in the menu.**
The toolbar is indicated with the check, and it is not indicated without the check.

**- Showing/Hiding Status Bar**
Set to show or hide the status bar.

**Select [View] → [Status Bar], and check or uncheck in the menu.**
The status bar is indicated with the check, and it is not indicated without the check.

**- Showing/Hiding Parameter-Status Bar**
Set to show or hide the parameter-status bar.

**Select [View] → [Parameter-Status Bar], and check or uncheck in the menu.**
The parameter-status bar is indicated with the check, and it is not indicated without the check.

**- Showing/Hiding Guidance Bar**
Set to show or hide the guidance bar on the main screen that provides guidance on various settings.

**Select [View] → [Guidance Bar], and check or uncheck in the menu.**
The guidance bar is indicated with the check, and it is not indicated without the check.

**- Configuration setting**
**Select [Option] → [Configuration] in the menu bar. The following dialog is shown.**
The current folder in the setting data file can be changed.
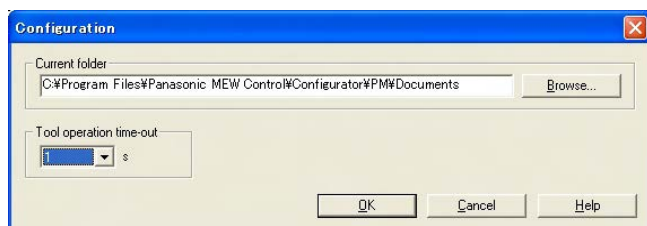


| Current folder | Specify a current folder to be used for this software. |
|---|---|
| Tool operation monitoring time | Set the communication error detection time in the Tool operation. |

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**- Setting Font**
**Select [Option] → [Font] in the menu bar. The following dialog is shown.**
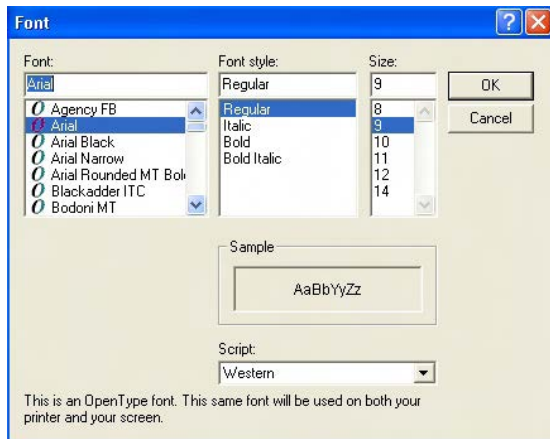
# 7.13 Checking Settings

## 7.13.1 Checking Parameters and Data Values

Collectively check the parameter setting first and then the positioning data if the values are within the range. If an error is found in the parameter setting, the parameter setting dialog is automatically indicated and the position where the error exists is focused. Also, if an error is found in the positioning data, the cursor moves to the position where the error exists.

**Select [Debug] → [Check Parameters and Data] in the menu bar, or click the [Check Parameter and Data] icon in the toolbar.**

**Verifying File Contents**
Verify the file currently being edited, and the files on the disk or the information in the unit. The following procedure is for the verification with the files on the disk.
Verify the axis information, parameters and positioning data collectively.

**Select [Debug] → [Verify] → [File] in the menu bar.**
The dialog to select the file to verify is shown as below. Select the file to verify.
The contents of the file currently being edited are verified with the selected file and the result is indicated in the dialog below.
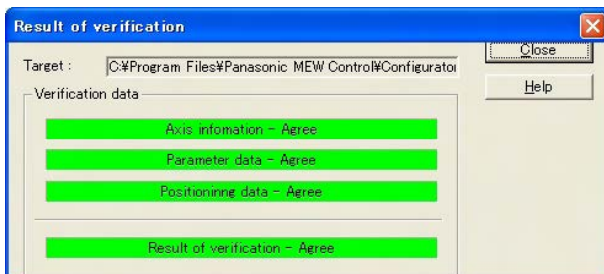


**Click [Close] to close the dialog.**

# 7.14 Transferring Setting Data

## 7.14.1 Uploading Setting Data from Positioning Unit RTEX

Read the parameters and positioning data of the positioning unit RTEX.

**1. Make the connection between a PC and PLC, and configure the settings. Then, select [File] →**
**   [Upload from Unit] in the menu bar, or click the [Upload from Unit] icon in the toolbar.**

**2. Execute reading the unit.**

**Note:**

The process of reading may take for a few minutes. Click [Cancel] to stop the read.

**3. When the read completes successfully, a message asking if the data comment will be held is**
**   indicated.**
**   - Click [Yes] to leave all the comments set in the data.**
**   - Click [No] to clear all the comments.**

**Note:**

To execute the upload, previously determine the target positioning unit RTEXby the communication
settings and selecting the slot number.

The data comments are not stored in the positioning unit RTEX. They are managed in the setting files of
the PC.

## 7.14.2 Downloading Setting Data to Positioning Unit RTEX

Transfer the setting parameters and positioning data to the positioning unit RTEX.

**1. Make the connection between a PC and PLC, and configure the settings. Then, select [File] →**
**[Download to Unit] in the menu bar, or click the [Download to Unit] icon in the toolbar.**
**The dialog is shown as below.**
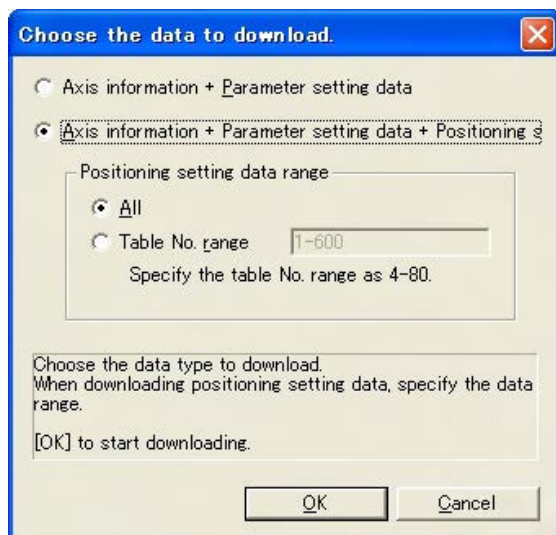


| Axis information + Parameter setting data | Select this to download axis information and parameter only. |
|---|---|
| Axis information + Parameter setting data + Positioning setting data | Select this to download all setting data. The range of the positioning data to download can be specified. |
| **Positioning setting data range** | |
| All | Download all setting data. |
| Table number range | Download the positioning data in the specified range. |
| OK | Start downloading with the selected settings. |
| Cancel | Stop downloading. |

**2. Click [OK] to start the download to the positioning unit. The time required for the download**
**depends on the range of the positioning setting data.**

☞ **Note:**
To execute the download, previously determine the target positioning unit RTEX by the communication settings and selecting the slot number.

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**3. Once the download completes, the following dialog is shown.**
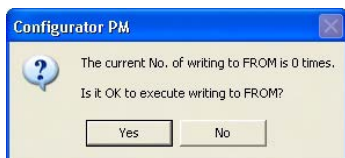
Clicking [Yes] indicates the following dialog and save the setting data in the FROM (Flash Memory) within the positioning unit RTEX. The saved setting data is automatically read when the power supply of the PLC turns on.

⇒
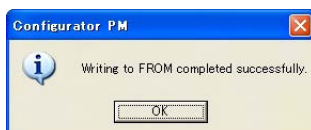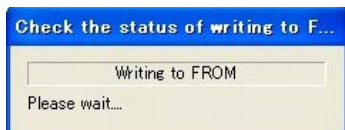
Click [No] not to write the setting data to the FROM. The downloaded data is erased when the power supply of the PLC turns off.

☞ **Note:**
Writing to FROM is restricted up to 10000 times. The current number of write can be monitored with the data monitor.

## 7.14.3 Writing Settings to FROM

Save the setting data written in the positioning unit RTEX in the FROM (Flash Memory) within the positioning unit RTEX. The saved setting data is automatically read when the power supply of the unit turns on.

**Make the connection between a PC and PLC, and configure the settings. Then, select [Tool] → [Write to FROM] in the menu bar. The following dialog is shown.**
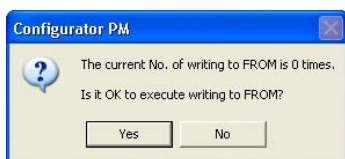
Clicking [Yes] indicates the following dialog and save the setting data in the FROM (Flash Memory) in the unit. The saved setting data is automatically read when the power supply of the PLC turns on.
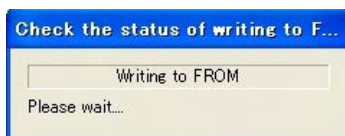
⇒

Click [No] not to write the setting data to the FROM. The downloaded data is erased when the power supply of the PLC turns off.

☞ **Note:**
Writing to FROM is restricted up to 10000 times. The current number of write can be monitored with the data monitor.

# 7.15 Data Monitor

The internal data of the positioning unit RTEX can be monitored.
**Make the connection between a PC and PLC, and configure the settings. Then, select [Online] →
[Data Monitor] in the menu bar. The following dialog is shown.**

| Data monitor | | | | |
|---|---|---|---|---|
| Axis[Group] | 1 axis | 2 axis | 3 axis | 4 axis |
| Active table No. | 0 | 0 | 0 | 0 |
| Auxiliary output code | 0 | 0 | 0 | 0 |
| | | | | |
| AMP current value (pulse) | 626501 | 626500 | 623000 | 1247 |
| Current value after unit conversion | 626501 pulse | 626500 pulse | 623000 pulse | 1247 pulse |
| Torque command (%) | 0.4 | 0.4 | 1.8 | 2.0 |
| Actual speed (rpm) | 0 | 0 | 0 | 0 |
| | | | | |
| State of axis | Inactive | Inactive | Inactive | Inactive |
| Error code | -------- | -------- | -------- | -------- |
| | Error Clear | Error Clear | Error Clear | Error Clear |
| Warning code | 00000-EB010 | 00000-EB010 | 00000-EB010 | 00000-EB010 |
| | Warning Clear | Warning Clear | Warning Clear | Warning Clear |

Help    Close

| | |
|---|---|
| **Axis [Group]** | The axis No. and group names to be monitored. |
| **Active table number** | The table number that the positioning data is being executed or has completed. |
| **Auxiliary output code** | Auxiliary output code |
| **AMP current value(pulse)** | Monitor the value of feedback pulses. |
| **Current value after unit conversion** | Monitor the feedback value of the AMP after the unit conversion. |
| **Torque command value** | Monitor the torque command value of the AMP |
| **Actual speed (rpm)** | Monitor the actual speed (rpm) of the AMP. |
| **State of axis** | The operating states of axes or error and warning occurrences. |
| **Error code** | The latest error code when an error occurred. |
| **Error clear** | Clear the error by clicking this button, when an error occurred. |
| **Warning code** | Indicate the latest warning code when a warning occurs. |
| **Warning clear** | Clear the warning by clicking this button, when a warning occurred. |
| **Help** | Indicate the help regarding this function. |
| **Close** | Close this dialog. |

☞ **Note:**
If an recoverable error occurred in the positioning unit RTEX, click [Error Clear] to clear the error.
If a warning occurred in the positioning unit RTEX, click [Warning Clear] to clear the warning.

# 7.16 Status Display

The states of the motors of each axis can be monitored.
**Make the connection between a PC and PLC. Then, select [Online] → [Status Display] in the menu bar. The following dialog is shown.**



| Model | The model name of positioning unit RTEX |
|---|---|
| **Axis [Group]** | The axis number and group names to be monitored. |
| **Connection status** | Monitor the connection statuses of each axis |
| **Brand name** | The individual brand names for each axis. |
| **AMP model code** | Obtain and display the model code of AMP. |
| **Motor model code** | Obtain and display the model code of a motor. |
| **servo free** | The state of the servo of the AMP whether it is locked or free. |
| **Status** | The operating states of axes |
| **Completion width** | The state of the deviation counter whether it is in the range of the imposition or out of the range of the imposition. |
| **Home proximity** | The state of the AMP input contact whether the home return is input or not. |
| **Limit +** | The limit + input state of the AMP input setting. |
| **Limit -** | The limit- input state of the AMP input setting. |
| **Number of writing to FROM** | The number of writing the setting data to FROM in the positioning unit RTEX. |
| **Version** | The version of the positioning unit RTEX |
| **Help** | Indicate the help regarding this function. |
| **Close** | Close this dialog. |

# 7.17 Tool Operation

As the positioning unit RTEX can activate without a ladder program in the tool operation, the operation can be checked quickly.

**Select [Online] → [Tool operation] in the menu bar, and click the [Tool operation] icon in the toolbar. The following dialog is shown.**



The followings are the operations that are selectable in the tool operation.

**Servo On/off**
Control the on/off state of the servo.

**Home return**
Move to the home position in the machine coordinate.

**Positioning**
Operate from the starting table number according to the settings of the data stored in the positioning unit RTEX.

**JOG operation**
The specified axis can be moved to the specified direction with the specified speed, while the operation command is on.

**Teaching**
Control the axis manually using the same operation as the JOG operation, and reflect the resulting positioning address on the data editing screen.

**☞ Note:**
It is not possible to change the mode to the tool operation mode during the ladder operation of PLC.
If any communication error occurs during the 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

Turn the servo on to make the motor be in the state that the servo is locked first in the operation of the servo motor.
Therefore, in the tool operation, set the servo to ON using this settin.

**1. Click [Servo ON/OFF] in Tool operation dialog. The following dialog is shown.**
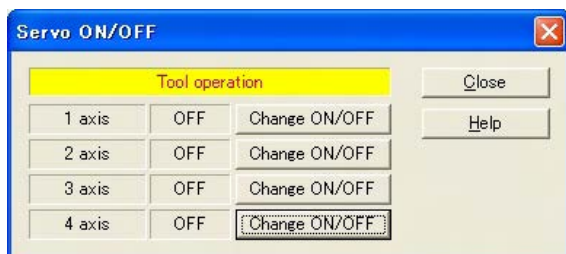


**2. Set the servo to on/off by clicking the [Change ON/OFF] for the equivalent axes.**
   **If the servo is on for the 1 axis to 3 axis, the setting is as below.**



**3. Click [Close] to close this dialog after completing the servo ON for the axes operated in the**
   **tool operation. The tool operation dialog is automatically shown once the dialog is closed.**

**☞ Note:**
If the servo ON/OFF has been controlled using the ladder program before starting the tool operation, the state of the servo lock/servo free is also kept in the tool operation.

## 7.17.2 Tool Operation – Home Return

After the power supply of the positioning unit RTEX turned on, the zero (home) of the machine position (coordinate) does not always agree with the zero of the coordinate value in the positioning unit RTEX. Therefore, coordinate the home of the machine position with the home of the positioning unit RTEX. This setting is called Home return.

☞ **Note:**

To perform the home return, the equivalent axes should be in the state that the servo is locked (servo ON).

**1. Click [Home Return] in the tool operation dialog. The following dialog is shown.**



| Axis [Group] | The axis numbers and group names to be monitored. |
|---|---|
| **Zero offset** | Monitor the feedback values after the unit system conversion for each axis. Click [Change] to display the dialog for inputting value to change the value of the zero offset. |
| **Unit** | The unit of position for each axis specified in the parameter settings. |
| **Home return mode** | Indicate the contents of the home return setting code specified in parameters. |
| **Start/Stop** | Execute the operation to start/stop the home return. ・Click [Start] to execute the home return operation. The button name changes to [Stop]. ・Click [Stop] to execute the deceleration stop operation. The button name changes to [Start]. |
| **State of axis** | The operating states of axes or error and warning occurrences. |
| **Error code** | The latest error code when an error occurred. |
| **Error clear** | Clear the error by clicking this button, when an error occurred. |
| **Warning code** | Indicate the latest warning code when a warning occurs. |
| **Warning clear** | Clear the warning by clicking this button, when a warning occurred. |
| **Speed rate** | The target speed of the home return specified in the parameter settings for each axis is regarded as 100%, and the operation is executed in the specified speed rate. Clicking [Speed rate] shows the dialog for inputting the value. The speed rate changed here is effective only in the tool operation, and it changes to the original speed rate automatically once the tool operation quits. |

☞ **Note:**

If an recoverable error occurred in the positioning unit RTEX, click [Error Clear] to clear the error.
If a warning occurred in the positioning unit RTEX, click [Warning Clear] to clear the warning.

**2. Click [Change] for the zero offset to change the offset after the home return operation. The value can be changed during the home return operation as well.**

**3. Execute the home return. Click [Start] for the axis to execute the home return.**

**4. Click [Close] to close the dialog.**

**Note:**
This dialog cannot be closed during the home return operation.

## 7.17.3 Tool Operation - Positioning

The test run is possible like actual positioning operations.
Specifying the starting table number enables to check if the positioning/interpolation from the starting table operates properly.

**Note:**
For the positioning operation, the setting data should be downloaded to the positioning unit in advance.
For the positioning operation, the equivalent axes should be in the state that the servo is locked (Servo ON).
The operations after the starting table number vary depending on the Operation patterns.

**1. Click [Positioning] in the Tool operation dialog. The following dialog is shown.**

| Tool operation – Positioning | | | | |
|---|---|---|---|---|
| Tool operation | | | | |
| Axis[Group] | 1 axis | 2 axis | 3 axis | 4 axis |
| Zero offset | 1226480 | 626492 | 622988 | 1225 |
| | Change | Change | Change | Change |
| Unit | pulse | pulse | pulse | pulse |
| | | | | |
| Active table No. | 6 | -------- | -------- | -------- |
| Starting table No. | 1 | 1 | 1 | 1 |
| | Change | Change | Change | Change |
| | Operate | Operate | Operate | Operate |
| | | | | |
| State of axis | Inactive | Inactive | Inactive | Inactive |
| Error code | -------- | -------- | -------- | -------- |
| | Error clear | Error clear | Error clear | Error clear |
| Warning code | -------- | -------- | -------- | -------- |
| | Warning clear | Warning clear | Warning clear | Warning clear |
| Speed rate | 100 % | | Help | Exit |

| Axis [Group] | The axis numbers and group names to be monitored. |
|---|---|
| Zero offset | Monitor the feedback values after the unit system conversion for each axis. Click [Change] to display the dialog for inputting value to change the value of the zero offset. |
| Unit | The unit of position for each axis specified in the parameter settings. |
| Active table number | Monitor the table number during the operation or when it completes. |
| Starting table number | The starting table number for the positioning control. Click [Change] to change the starting table number. |
| Operate/Stop | Execute the operation to start/stop the home return. ・Click [Operate] to execute the positioning operation. The button name changes to [Stop]. ・Click [Stop] to execute the deceleration stop operation. The button name changes to [Operate]. |
| State of axis | The operating states of axes or error and warning occurrences. |
| Error code | The latest error code when an error occurred. |
| Error clear | Clear the error by clicking this button, when an error occurred. |
| Warning code | Indicate the latest warning code when a warning occurs. |
| Warning clear | Clear the warning by clicking this button, when a warning occurred. |
| Speed rate | The target speed of the home return specified in the parameter settings for each axis is regarded as 100%, and the operation is executed in the specified speed rate. Clicking [Speed rate] shows the dialog for inputting the value. The speed rate changed here is effective only in the tool operation, and it changes to the original speed rate automatically once the tool operation quits. |

☞ **Note:**

If an recoverable error occurred in the positioning unit RTEX, click [Error Clear] to clear the error.
If a warning occurred in the positioning unit RTEX, click [Warning Clear] to clear the warning.

**2. Click [Change] in the starting table number field to specify the starting table number.**
**Specify the starting table number and click [Operate] to start the positioning opration.**

☞ **Note:**

• In the positioning unit RTEX, the positioning operation for the interpolation group is performed to request the start and stop for the smallest number of axes in the group.
• In the tool operation, the positioning operation for the interpolation group is performed by clicking [Operate] for any axes. However, due to the above specifications, a warning message is shown when any [Operate] button other than the one for the smallest axis number is clicked.

**3. Click [Change] for the zero offset to change the offset after the home return operation. The value can be changed during the positioning operation as well.**
**4. Click [Close] to close the dialog.**

☞ **Note:**

This dialog cannot be closed during the positioning operation.

## 7.17.4 Tool Operation – JOG Operation

Each axis can be operated manually using the tool operation.

👉 **Note:**

To perform the JOG operation, the equivalent axes should be in the state that the servo is locked (servo ON).

**1. Click [JOG operation] in the tool operation dialog. The following dialog is shown.**

| Tool operation – JOG operation | | | | |
|---|---|---|---|---|
| **Tool operation** | | | | |
| Axis[Group] | 1 axis | 2 axis | 3 axis | 4 axis |
| Zero offset | 1226480 | 626492 | 622988 | 1225 |
| | Change | Change | Change | Change |
| Unit | pulse | pulse | pulse | pulse |
| Jog target speed | 500000 | 500000 | 500000 | 1000 |
| | Change | Change | Change | Change |
| JOG | + | + | + | + |
| | – | – | – | – |
| State of axis | Inactive | Inactive | Inactive | Inactive |
| Error code | -------- | -------- | -------- | -------- |
| | Error clear | Error clear | Error clear | Error clear |
| Warning code | -------- | -------- | -------- | -------- |
| | Warning clear | Warning clear | Warning clear | Warning clear |
| Speed rate | 100 % | | Help | Exit |

| Axis [Group] | The axis numbers and group names to be monitored. |
|---|---|
| **Zero offset** | Monitor the feedback values after the unit system conversion for each axis. Click [Change] to display the dialog for inputting value to change the value of the zero offset. |
| **Unit** | The unit of position for each axis specified in the parameter settings. |
| **JOG target speed** | Monitor and display the target speed in the JOG operation. Click [Change] to change the target speed for the JOG operation. |
| **JOG [+]** | Click [+] to perform the forward rotation. |
| **JOG [-]** | Click [-] to perform the reverse rotation. |
| **State of axis]** | The operating states of axes or error and warning occurrences. |
| **Error code** | The latest error code when an error occurred. |
| **Error clear** | Clear the error by clicking this button, when an error occurred. |
| **Warning code** | Indicate the latest warning code when a warning occurs. |
| **Warning clear** | Clear the warning by clicking this button, when a warning occurred. |
| **Speed rate** | The target speed of the home return specified in the parameter settings for each axis is regarded as 100%, and the operation is executed in the specified speed rate.<br><br>Clicking [Speed rate] shows the dialog for inputting the value. The speed rate changed here is effective only in the tool operation, and it changes to the original speed rate automatically once the tool operation quits. |

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👉 **Note:**

If an recoverable error occurred in the positioning unit RTEX, click [Error Clear] to clear the error.
If a warning occurred in the positioning unit RTEX, click [Warning Clear] to clear the warning.

**2. Click the JOG[+] for the JOG operation in the forward rotation. Click the JOG[-] for the JOG operation in the reverse rotation.**

**3. Click [Change] for the zero offset to change the offset after the home return operation. The value can be changed during the JOG operation as well.**

**4. Click [Close] to close the dialog.**

👉 **Note:**

This dialog cannot be closed during the JOG operation.

---

## 7.17.5 Tool Operation - Teaching

Activate each axis manually by the tool operation, and register the positioning addresses where the axes stopped as the point data.

👉 **Note:**

To perform the teaching operation, the equivalent axes should be in the state that the servo is locked (servo ON).

**1. Click [Teaching] in the tool operation dialog. The following dialog is shown.**

| Tool operation | | | | |
|---|---|---|---|---|
| Axis[Group] | 1 axis | 2 axis | 3 axis | 4 axis |
| Zero offset | 1226480 | 626492 | 622988 | 1225 |
| | Change | Change | Change | Change |
| Unit | pulse | pulse | pulse | pulse |
| Jog target speed | 500000 | 500000 | 500000 | 1000 |
| | Change | Change | Change | Change |
| JOG | + | + | + | + |
| | – | – | – | – |
| Table No. | 1 | 1 | 1 | 1 |
| | Teaching | Teaching | Teaching | Teaching |
| State of axis | Inactive | Inactive | Inactive | Inactive |
| Error code | -------- | -------- | -------- | -------- |
| | Error clear | Error clear | Error clear | Error clear |
| Warning code | -------- | -------- | -------- | -------- |
| | Warning clear | Warning clear | Warning clear | Warning clear |

Speed rate    100 %         Help    Exit

| Axis [Group] | The axis numbers and group names to be monitored. |
|---|---|
| Zero offset | Monitor the feedback values after the unit system conversion for each axis. Click [Change] to display the dialog for inputting value to change the value of the zero offset. |
| Unit | The unit of position for each axis specified in the parameter settings. |
| JOG target speed | Monitor and display the target speed in the JOG operation. Click [Change] to change the target speed for the JOG operation. |
| JOG [+] | Click [+] to perform the forward rotation. |
| JOG [-] | Click [-] to perform the reverse rotation. |
| Table number | Indicate the table number to perform the teaching. Click [Teaching] to change the table number for the teaching and register the current value. |
| State of axis] | The operating states of axes or error and warning occurrences. |
| Error code | The latest error code when an error occurred. |
| Error clear | Clear the error by clicking this button, when an error occurred. |
| Warning code | Indicate the latest warning code when a warning occurs. |
| Warning clear | Clear the warning by clicking this button, when a warning occurred. |
| Speed rate | The target speed of the home return specified in the parameter settings for each axis is regarded as 100%, and the operation is executed in the specified speed rate. Clicking [Speed rate] shows the dialog for inputting the value. The speed rate changed here is effective only in the tool operation, and it changes to the original speed rate automatically once the tool operation quits. |

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👉 **Note:**

If an recoverable error occurred in the positioning unit RTEX, click [Error Clear] to clear the error.
If a warning occurred in the positioning unit RTEX, click [Warning Clear] to clear the warning.

**2. Click [Teaching] after stopping the axis at the desired position by the JOG operation, and input the table number to execute the teaching operation.**
**3. Click [OK] after inputting the table number. The current value is registered for the movement amount of the specified table number. Also, if the axis that the teaching operation is performed is the interpolation axis, the current value is registered for the movement amount of the equivalent coordinate in the interpolation group.**

👉 **Note:**

- The control method for the table number that the teaching operation was performed is automatically changed to "Absolute".
- The result of the teaching becomes effective once the tool operation quits and the setting data is downloaded to the positioning unit RTEX.

**4. Click [Close] to close the dialog.**

👉 **Note:**

This dialog cannot be closed during the JOG operation.

# Chapter 8

## Automatic Operation (Position Control)

# 8.1 Basic Operation

**Type of perations**

The automatic operation is an operation mode to be perform a position control. For the position control, there are a single axis control and an interpolation control that starts and stops multiple axes simultaneously.

For the operations of the position control, there are the E point control that uses the positioning data of 1 table, the P point control and C point control that use multiple tables for the single axis control or interpolation control. Each operaton is as mentioned below, and the acceleration time and deceleration time can be set individually. For the P point control and C point control, the E point should be set as the last table. Also, in the P point control and C point control, the operation done flag turns on after the last table was executed.
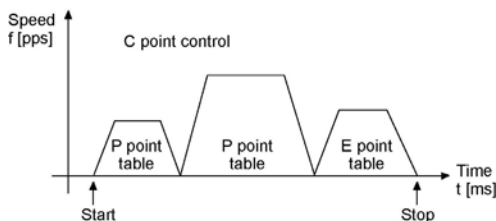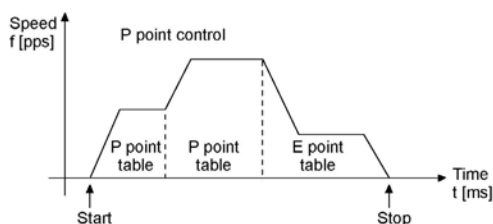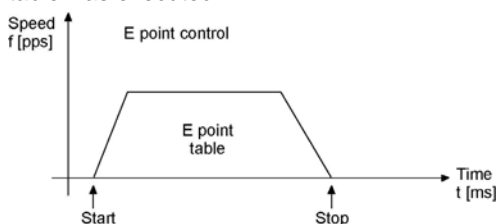




**Operation flow of single axis control**

Set a target axis as a single axis using Configurator PM.

⬇

Set positioning data using Configurator PM.

⬇

Transfer the data to the shared memory of Positioning Unit RTEX.

⬇

Set a position control starting table in the positioning table setting area of the shared memory.

⬇

Turn on the start contact of the target axis.
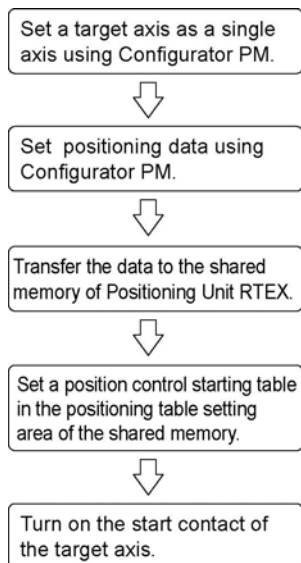
**Operation flow of interpolation control**

Set target interpolation axes as a group using Configurator PM.

⬇

Set positioning data using Configurator PM. In case of circular interpolation and spiral interpolation, set a center point or pass point.

⬇

Transfer the data to the shared memory of Positioning Unit RTEX.

⬇

Set a position control starting table in the positioning table setting area of the shared memory for the axis with the smallest number in the group.

⬇

Turn on the start contact of the axis with the smallest number in the group.

The procedures to set the positioning data and to start the position control are the same for the E point control, P point control and C point control. The operation of each cotntrol is determined according to the contents of the positioning data to be set.

8-2

## 8.1.1 Setting and Operation of E Point Control

The example below is the case of a single axis control when using the FPΣ with the positioning unit RTEX installed in the slot 0. The movement amount setting is the increment method, and the unit is set to pulse. When using the FP2, change the contact and flag numbers appropriately.



**Setting**

The parameters necessary for the setting of the positioining data and parameters are specified by the Configurator PM. The unit is set to pulse.

| Item | Setting example | Allowable range |
|---|---|---|
| Operation pattern | E: End point | C: Continuance point   E: End point   P: Pass point |
| Control method | I: Increment | I: Increment   A: Absolute |
| X-axis movement amount | 10000 pulse | Pulse: -1,073,741,823 to 1,073,741,823 pulse<br>μm (0.1 μm): -107,374,182.3 to 107,374,182.3 μm<br>μm (1 μm): -1,073,741,823 to 1,073,741,823 μm<br>inch (0.00001 inch): -10,737.41823 to 10,737.41823 inch<br>inch (0.0001 inch): -107,374.1823 to 1-7,374.1823 inch<br>degree (0.1 degree): -107,374,182.3 to 107,374,182.3 degree<br>degree (1 degree): -1,073,741,823 to 1,073,741,823 degree |
| Acceleration/deceleration pattern | L: Linear | L: Linear   S: S-shaped acceleration/deceleration |
| Acceleration time (ms) | 100 ms | 0 to 10000 ms |
| Deceleration time (ms) | 100 ms | 0 to 10000 ms |
| Target speed | 10000 pps | Pulse: 1 to 32,767,000 pps<br>μm: 1 to 32,767, 000 μm/s<br>Inch: 0.001 to 32,767.000 inch/s<br>degree:0.001 to 32,767.000 rev/s |

**Operation diagram**

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**Operations of each contact**

- The BUSY flag (FPΣ: X118, FP2: X18) indicating the state that a motor is running turns on when the position control started, and it turns off when the operation completed.
- The operation done flag (FPΣ: X120, FP2: X20) indicating the state that an operation completed turns on when the position control completed, and it will be held until any operation among the position control, JOG operation, home return and pulser operation starts. The timing of that the flag turns on is at the time that the current value of the AMP became within the completion width specified in the parameter setting of the Configurator PM after sending the command to move to the target position.

**Sample program**



The numbers in parenthesis are the flag and contact numbers for the FP2.

**Precautions on programming**

- 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 the position control starts.
- The number of the startup contact and flag varies depending on the number of axes and the installation position.
- The specified slot number varies depending on the installation position of the unit.

**Operation at limit input**

| Condition | Direction | Limit status | Operation |
|---|---|---|---|
| When E point control is executed | Forward | Limit input(+):ON | Not executable, Error occurs. |
| | | Limit input (-):ON | Not executable, Error occurs. |
| | Reverse | Limit input(+):ON | Not executable, Error occurs. |
| | | Limit input (-):ON | Not executable, Error occurs. |
| During E point control | Forward | Limit input(+):ON | Deceleration stop, Error occurs. |
| | Reverse | Limit input (-):ON | Deceleration stop, Error occurs. |

## 8.1.2 Setting and Operation of P Point Control

The example below is the case of a single axis control when using the FPΣ with the positioning unit RTEX installed in the slot 0. The movement amount setting is the increment method, and the unit is set to pulse. When using the FP2, change the contact and flag numbers appropriately.



**Setting**

The parameters necessary for the setting of the positioining data and parameters are specified by the Configurator PM. The unit is set to pulse.

| Item | Setting example | | | Allowable range |
|------|---------|---------|---------|-----------------|
|  | **Table 1** | **Table 2** | **Table 3** |  |
| Operation pattern | P: Pass point | P: Pass point | E: End point | C: Continuance point   E: End point   P: Pass point |
| Control method | I: Increment | I: Increment | I: Increment | I: Increment   A: Absolute |
| X-axis movement amount | 5000 pulses | 10000 pulses | 3000 pulses | Pulse: -1,073,741,823 to 1,073,741,823 pulse<br>μm (0.1 μm): -107,374,182.3 to 107,374,182.3 μm<br>μm (1 μm): -1,073,741,823 to 1,073,741,823 μm<br>inch (0.00001 inch): -10,737.41823 to 10,737.41823 inch<br>inch (0.0001 inch): -107,374.1823 to 1-7,374.1823 inch<br>degree (0.1 degree): -107,374,182.3 to 107,374,182.3 degree<br>degree (1 degree): -1,073,741,823 to 1,073,741,823 degree |
| Acceleration/ deceleration pattern | L: Linear | L: Linear | L: Linear | L: Linear   S: S-shaped acceleration/deceleration |
| Acceleration time (ms) | 100 ms | 200 ms | 30 ms | 0 to 10000 ms |
| Deceleration time (ms) | 10 ms | 20 ms | 150 ms | 0 to 10000 ms |
| Target speed | 10000 pps | 20000 pps | 5000 pps | Pulse: 1 to 32,767,000 pps<br>μm: 1 to 32,767, 000 μm/s<br>Inch: 0.001 to 32,767.000 inch/s<br>degree:0.001 to 32,767.000 rev/s |

**Operation diagram**



The numbers in parenthesis are the flag and contact numbers for the FP2.

**Operations of each contact**

- The BUSY flag (FPΣ: X118, FP2: X18) indicating the state that a motor is running turns on when the position control started, and it turns off when the operation completed.
- The operation done flag (FPΣ: X120, FP2: X20) indicating the state that an operation completed turns on when the position control completed, and it will be held until any operation among the position control, JOG operation, home return and pulser operation starts. The timing of that the flag turns on is at the time that the current value of the AMP became within the completion width specified in the parameter setting of the Configurator PM after sending the command to move to the target position.

**Sample program**



The numbers in parenthesis are the flag and contact numbers for the FP2.

**Precautions on programming**

- Once starting the table 1, the operation continues up to the table 3 automatically. The last table should be set to 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 the position control starts.
- The number of the startup contact and flag varies depending on the number of axes and the installation position.
- The specified slot number varies depending on the installation position of the unit.

**Operation at limit input**

| Condition | Direction | Limit status | Operation |
|---|---|---|---|
| When P point control is executed | Forward | Limit input(+):ON | Not executable, Error occurs. |
| | | Limit input (-):ON | Not executable, Error occurs. |
| | Reverse | Limit input(+):ON | Not executable, Error occurs. |
| | | Limit input (-):ON | Not executable, Error occurs. |
| During P point control | Forward | Limit input(+):ON | Deceleration stop, Error occurs. |
| | Reverse | Limit input (-):ON | Deceleration stop, Error occurs. |

## 8.1.3 Setting and Operation of C Point Control

The example below is the case of a single axis control when using the FPΣ with the positioning unit RTEX installed in the slot 0. The movement amount setting is the increment method, and the unit is set to pulse. When using the FP2, change the contact and flag numbers appropriately.



**Setting**

The parameters necessary for the setting of the positioining data and parameters are specified by the Configurator PM. The unit is set to pulse.

| Item | Setting example | | | Allowable range |
|---|---|---|---|---|
| | Table 1 | Table 2 | Table 3 | |
| Operation pattern | C: Continu-ance point | C: Continuance point | E: End point | C: Continuance point   E: End point   P: Pass point |
| Control method | I: Increment | I: Increment | I: Increment | I: Increment   A: Absolute |
| X-axis movement amount | 5000 pulses | 10000 pulses | 3000 pulses | Pulse: -1,073,741,823 to 1,073,741,823 pulse<br>μm (0.1 μm): -107,374,182.3 to 107,374,182.3 μm<br>μm (1 μm): -1,073,741,823 to 1,073,741,823 μm<br>inch (0.00001 inch): -10,737.41823 to 10,737.41823 inch<br>inch (0.0001 inch): -107,374.1823 to 1-7,374.1823 inch<br>degree (0.1 degree): -107,374,182.3 to 107,374,182.3 degree<br>degree (1 degree): -1,073,741,823 to 1,073,741,823 degree |
| Acceleration/ deceleration pattern | L: Linear | L: Linear | L: Linear | L: Linear   S: S-shaped acceleration/deceleration |
| Acceleration time (ms) | 100 ms | 200 ms | 30 ms | 0 to 10000 ms |
| Deceleration time (ms) | 10 ms | 20 ms | 150 ms | 0 to 10000 ms |
| Target speed | 10000 pps | 20000 pps | 5000 pps | Pulse: 1 to 32,767,000 pps   μm: 1 to 32,767, 000 μm/s<br>Inch: 0.001 to 32,767.000 inch/s   degree:0.001 to 32,767.000 rev/s |

**Operation diagram**



The numbers in parenthesis are the flag and contact numbers for the FP2.

**Operations of each contact**
- The BUSY flag (FPΣ: X118, FP2: X18) indicating the state that a motor is running turns on when the position control started, and it turns off when the operation completed.
- The operation done flag (FPΣ: X120, FP2: X20) indicating the state that an operation completed turns on when the position control completed, and it will be held until any operation among the position control, JOG operation, home return and pulser operation starts. The timing of that the flag turns on is at the time that the current value of the AMP became within the completion width specified in the parameter setting of the Configurator PM after sending the command to move to the target position.

**Sample program**



The numbers in parenthesis are the flag and contact numbers for the FP2.

**Precautions on programming**
- Once starting the table 1, the operation continues up to the table 3 automatically. The last table should be set to 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 the position control starts.
- The number of the startup contact and flag varies depending on the number of axes and the installation position.
- The specified slot number varies depending on the installation position of the unit.

**Operation at limit input**

| Condition | Direction | Limit status | Operation |
|---|---|---|---|
| When C point control is executed | Forward | Limit input(+):ON | Not executable, Error occurs. |
| | | Limit input (-):ON | Not executable, Error occurs. |
| | Reverse | Limit input(+):ON | Not executable, Error occurs. |
| | | Limit input (-):ON | Not executable, Error occurs. |
| During C point control | Forward | Limit input(+):ON | Deceleration stop, Error occurs. |
| | Reverse | Limit input (-):ON | Deceleration stop, Error occurs. |

# 8.2 Interpolation Control

**Type of perations**

For the interpolation control, there are 2-axis linear interpolation control, 2-axis circular interpolation control, 3-axis linear interpolation control, and 3-axis spiral interpolation control. The following methods are available to specify the operation of each interpolation control. Select any of them as usage. The axes in the relation of an interpolation are called X axis and Y axis for the 2-axis interpolation, and are called X axis, Y axis and Z axis for the 3-axis interpolation.

In each interpolation control, the E point control tha tuses one table, P point control and C point control that uses multiple tables can be combined arbitrarily as positioning data.

For example, using the P point control enables the continuous interpolation control from the 2-axis linear control to the 2-axis circular interpolation control. The acceleration time and deceleration time can be specified individually. For the P point control and C point control, the E point should be set as the last table.

| Type | Operation specification method | Necessary data |
|------|-------------------------------|----------------|
| 2-axis linear interpolati on control | Composite speed | Composite speed of X axis and Y axis |
| | Long axis speed | Speed of long axis (Axis of which moving distance is long) |
| 2-axis circular interpolati on control | Center point/CW direction | X-axis and Y-axis coordinate of center point |
| | Center point/CCW direcvtion | X-axis and Y-axis coordinate of center point |
| | Pass point | X-axis and Y-axis coordinate of pass point on arc |
| 3-axis linear interpolati on control | Composite speed | Composite speed of X axis and Y axis |
| | Long axis speed | Speed of long axis (Axis of which moving distance is long) |
| 3-axis spiral interpolati on control | Center point/CW direction/ X-axis movement | Y-axis and Z-axis coordinate of center point |
| | Center point/CCW direction/ X-axis movement | Y-axis and Z-axis coordinate of center point |
| | Center point/CW direction/ Y-axis movement | X-axis and Z-axis coordinate of center point |
| | Center point/CCW direction/ Y-axis movement | X-axis and Z-axis coordinate of center point |
| | Center point/CW direction/ Z-axis movement | X-axis and Y-axis coordinate of center point |
| | Center point/CCW direction/ Z-axis movement | X-axis and Y-axis coordinate of center point |
| | Pass point/X-axis movement | Y-axis and Z-axis coordinate of pass point on arc |
| | Pass point/Y-axis movement | X-axis and Z-axis coordinate of pass point on arc |
| | Pass point/Z-axis movement | Y-axis and Z-axis coordinate of pass point on arc |

**2-axis linear interpolation**
**(Composite speed specification)**
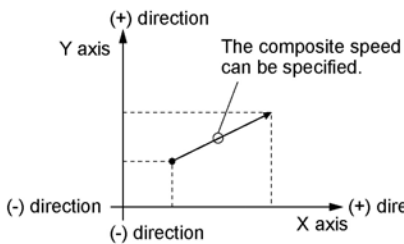
The composite speed can be specified.

Y axis — (+) direction

X axis — (+) direction

(-) direction

**2-axis linear interpolation**
**(Long axis speed specification)**

The axis speed for the axis to be a long axis can be specified.

Y axis — (+) direction

X axis — (+) direction

(-) direction

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

The center position can be specified.

Y axis — (+) direction

X axis — (+) direction

(-) direction

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

The center position can be specified.
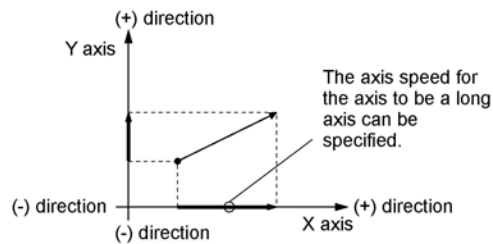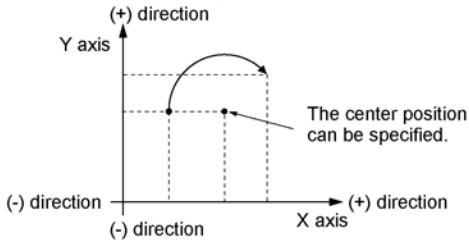
Y axis — (+) direction

X axis — (+) direction

(-) direction
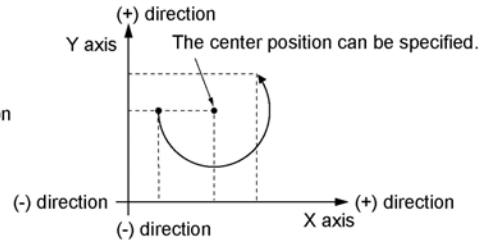
**2-axis circular interpolation**
**(Pass point point specification)**

The pass point on a arc can be specified.

Y axis — (+) direction

X axis — (+) direction

(-) direction

**3-axis linear interpolation**
**(Composite speed specification)**

(+) direction ▲ Z axis

The composite speed can be specified.

Y axis
(+) direction

X axis
(+) direction

**3-axis linear interpolation**
**(Composite speed specification)**

(+) direction Z axis

The axis speed for the axis to be a long axis can be specified.

Y axis
＋方向

X axis
(+) direction

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

(+) direction ▲ Z axis

The center position can be specified.

Y axis
(+) direction

X axis
(+) direction

The interpolation speed is the tangential velocity of arc.

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

(+) direction ▲ Z axis

The center position can be specified.

Y axis
(+) direction

X axis
(+) direction

The interpolation speed is the tangential velocity of arc.

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

(+) direction ▲ Z axis

Y axis
(+) direction

X axis
(+) direction

The pass point on an arc can be specifed.

The interpolation speed is the tangential velocity of arc.

When the X axis and Y axis is the moving axes, each axis in the above diagram is replaced.

## 8.2.1 Setting and Operation of Two-Axis Linear Interpolation

The example below is the case of a single axis control when using the FPΣ with the positioning unit RTEX installed in the slot 0. The X axis is set to the 1st axis and the Y axis is set to the 2nd axis. The movement amount setting is the increment method, and the unit is set to pulse. When using the FP2, change the contact and flag numbers appropriately.
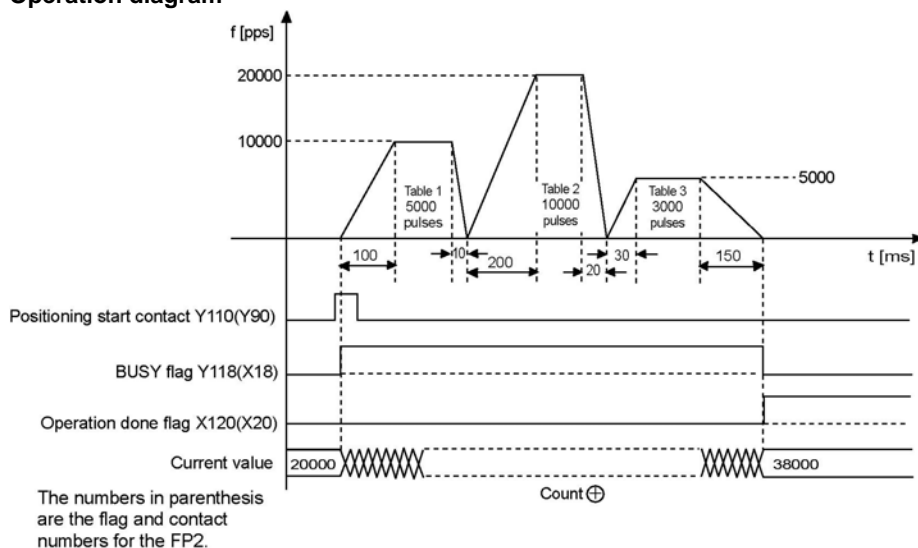


**Setting**

The parameters necessary for the setting of the positioining data and parameters are specified by the Configurator PM. The unit is set to pulse.

| Item | Setting example | Allowable range |
|---|---|---|
| Operation pattern | E: End point | C: Continuance point   E: End point   P: Pass point |
| Interpolation operation | 0: Linear (Composite speed) | 0: Linear (Composite speed)   1: Linear (Long axis speed) <br> S: Circular (Pass point/CW direction) <br> T: Circular (Pass point/CCW direction   U: Circular (Pass point) |
| Control method | I: Increment | I: Increment   A: Absolute |
| X-axis movement amount | 10000 pulses | Pulse: -1,073,741,823 to 1,073,741,823 pulse <br> μm (0.1 μm): -107,374,182.3 to 107,374,182.3 μm |
| X-axis auxiliary point | 0 | μm (1 μm): -1,073,741,823 to 1,073,741,823 μm |
| Y-axis movement amount | 5000 pulses | inch (0.00001 inch): -10,737.41823 to 10,737.41823 inch <br> inch (0.0001 inch): -107,374.1823 to 1-7,374.1823 inch |
| Y-axis auxiliary point | 0 | degree (0.1 degree): -107,374,182.3 to 107,374,182.3 degree <br> degree (1 degree): -1,073,741,823 to 1,073,741,823 degree |
| Acceleration/ deceleration pattern | L: Linear | L: Linear   S: S-shaped acceleration/deceleration |
| Acceleration time (ms) | 100 ms | 0 to 10000 ms |
| Deceleration time (ms) | 100 ms | 0 to 10000 ms |
| Interpolation speed | 10000 pps | Pulse: 1 to 32,767,000 pps   μm: 1 to 32,767, 000 μm/s <br> Inch: 0.001 to 32,767.000 inch/s   degree:0.001 to 32,767.000 rev/s |

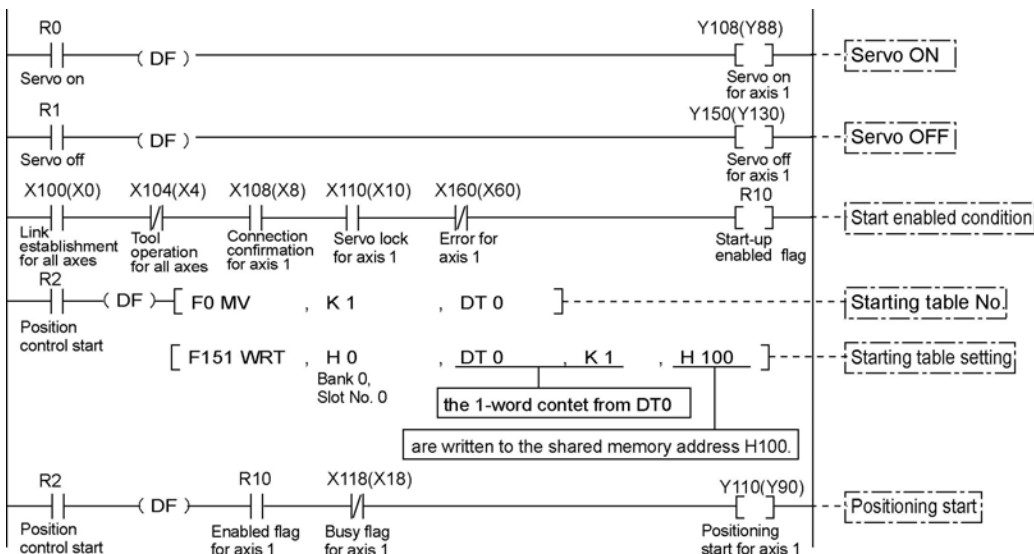**Operation diagram**

**Operations of each contact**

- The BUSY flag for the axis 1 and 2 (FPΣ: X118, X119, FP2: X18, X19) indicating the state that a motor is running turns on when the position control started, and it turns off when the operation completed.
- The operation done flag for the axis 1 and 2 (FPΣ: X120, X121, FP2: X20, X21) indicating the state that an operation completed turns on when the position control completed, and it will be held until any operation among the position control, JOG operation, home return and pulser operation starts. The timing of that the flag turns on is at the time that the current value of the AMP became within the completion width specified in the parameter setting of the Configurator PM after sending the command to move to the target position.

**Sample program**



The numbers in parenthesis are the flag and contact numbers for the FP2.

**Precautions on programming**

- To start the 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 the linear interpolation.
- When setting the long axis speed, the composite speed is faster than the 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 the position control starts.
- The number of the startup contact and flag varies depending on the number of axes and the installation position.
- The specified slot number varies depending on the installation position of the unit.

## 8.2.2 Setting and Operation of Two-Axis Circular Interpolation

The example below is the case of a single axis control when using the FPΣ with the positioning unit RTEX installed in the slot 0. The X axis is set to the 1st axis and the Y axis is set to the 2nd axis. The movement amount setting is the increment method, and the unit is set to pulse. When using the FP2, change the contact and flag numbers appropriately.



**Setting**

The parameters necessary for the setting of the positioining data and parameters are specified by the Configurator PM. The unit is set to pulse.

| Item | Setting example | Allowable range |
|---|---|---|
| Operation pattern | E: End point | C: Continuance point   E: End point   P: Pass point |
| Interpolation operation | S: Circular (Pass point/CW direction) | 0: Linear (Composite speed)   1: Linear (Long axis speed)<br>S: Circular (Pass point/CW direction)<br>T: Circular (Pass point/CCW direction   U: Circular (Pass point) |
| Control method | I: Increment | I: Increment   A: Absolute |
| X-axis movement amount | 0 pulse | Pulse: -1,073,741,823 to 1,073,741,823 pulse<br>μm (0.1 μm): -107,374,182.3 to 107,374,182.3 μm |
| X-axis auxiliary point | 0 pulse | μm (1 μm): -1,073,741,823 to 1,073,741,823 μm |
| Y-axis movement amount | 20000 pulses | inch (0.00001 inch): -10,737.41823 to 10,737.41823 inch<br>inch (0.0001 inch): -107,374.1823 to 1-7,374.1823 inch |
| Y-axis auxiliary point | 10000 pulses | degree (0.1 degree): -107,374,182.3 to 107,374,182.3 degree<br>degree (1 degree): -1,073,741,823 to 1,073,741,823 degree |
| Acceleration/ deceleration pattern | L: Linear | L: Linear   S: S-shaped acceleration/deceleration |
| Acceleration time (ms) | 100 ms | 0 to 10000 ms |
| Deceleration time (ms) | 100 ms | 0 to 10000 ms |
| Interpolation speed | 10000 pps | Pulse: 1 to 32,767,000 pps   μm: 1 to 32,767, 000 μm/s<br>Inch: 0.001 to 32,767.000 inch/s   degree:0.001 to 32,767.000 rev/s |

**Operation diagram**

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## Operations of each contact

- The BUSY flag for the axis 1 and 2 (FPΣ: X118, X119, FP2: X18, X19) indicating the state that a motor is running turns on when the position control started, and it turns off when the operation completed.
- The operation done flag for the axis 1 and 2 (FPΣ: X120, X121, FP2: X20, X21) indicating the state that an operation completed turns on when the position control completed, and it will be held until any operation among the position control, JOG operation, home return and pulser operation starts. The timing of that the flag turns on is at the time that the current value of the AMP became within the completion width specified in the parameter setting of the Configurator PM after sending the command to move to the target position.

## Sample program



The numbers in parenthesis are the flag and contact numbers for the FP2.

## Precautions on programming

- To start the interpolation control, turn on the positioning start contact of the axis with the smallest number in the same group.
- In case of the center point specification, the X-axis auxiliary point is the center point of X axis, and the Y-axis auxiliary point is the center point of Y axis. In case of the pass point, each pass point is set as the pass point of X axis and Y axis.
- When the control method is increment, both the center point and pass point are the increment coordinatefrom the start point.
- When the start point and the operaton done point is the same, it performs one circular operation when using the center point method. However, when using the pass point method, an error occurs.
- In case of the pass point method, when the start point, pass point and operation done pont exsit in the same straight line, an arc is not comprised, and an error occurs.
- When setting the long axis speed, the composite speed is faster than the 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 the position control starts.
- The number of the startup contact and flag varies depending on the number of axes and the installation position.
- The specified slot number varies depending on the installation position of the unit.

## 8.2.3 Setting and Operation of Three-Axis Linear Interpolation

The example below is the case of a single axis control when using the FPΣ with the positioning unit RTEX installed in the slot 0. The X axis is set to the 1st axis and the Y axis is set to the 2nd axis. The movement amount setting is the increment method, and the unit is set to pulse. When using the FP2, change the contact and flag numbers appropriately.



**Setting**

The parameters necessary for the setting of the positioining data and parameters are specified by the Configurator PM. The unit is set to pulse.

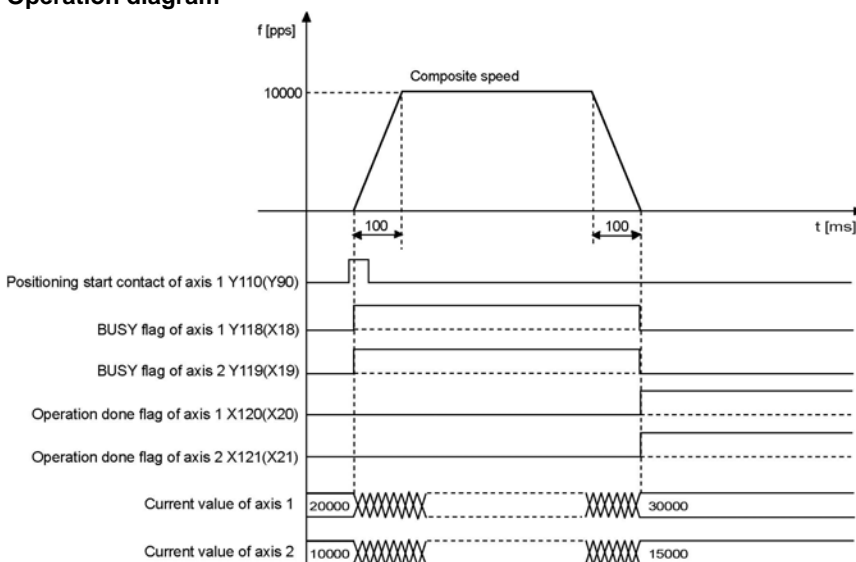| Item | Setting example | Allowable range |
|---|---|---|
| Operation pattern | E: End point | C: Continuance point   E: End point   P: Pass point |
| Interpolation operation | 0: Linear (Composite speed) | 0: Linear (Composite speed)   1: Linear (Long axis speed)<br>A: Spiral (Center point/CW direction/X-axis movemet)<br>B: Spiral (Center point/CCW direction/X-axis movemet)<br>C: Spiral (Center point/CW direction/Y-axis movemet)<br>D: Spiral (Center point/CCW direction/Y-axis movemet)<br>E: Spiral (Center point/CW direction/Z-axis movemet)<br>F: Spiral (Center point/CCW direction/Z-axis movemet)<br>L: Spiral (Pass point/X-axis movement)<br>M: Spiral (Pass point/Y-axis movement)<br>N: Spiral (Pass point/Z-axis movement) |
| Control method | I: Increment | I: Increment   A: Absolute |
| X-axis movement amount | 10000 pulses | Pulse: -1,073,741,823 to 1,073,741,823 pulse |
| X-axis auxiliary point | 0 | μm (0.1 μm): -107,374,182.3 to 107,374,182.3 μm |
| Y-axis movement amount | 5000 pulses | μm (1 μm): -1,073,741,823 to 1,073,741,823 μm |
| Y-axis auxiliary point | 0 | inch (0.00001 inch): -10,737.41823 to 10,737.41823 inch |
| Z-axis movement amount | 20000 pulses | inch (0.0001 inch): -107,374.1823 to 1-7,374.1823 inch |
| Z-axis auxiliary point | 0 | degree (0.1 degree): -107,374,182.3 to 107,374,182.3 degree<br>degree (1 degree): -1,073,741,823 to 1,073,741,823 degree |
| Acceleration/ deceleration pattern | L: Linear | L: Linear   S: S-shaped acceleration/deceleration |
| Acceleration time (ms) | 100 ms | 0 to 10000 ms |
| Deceleration time (ms) | 100 ms | 0 to 10000 ms |
| Interpolation speed | 10000 pps | Pulse: 1 to 32,767,000 pps   μm: 1 to 32,767, 000 μm/s<br>Inch: 0.001 to 32,767.000 inch/s   degree:0.001 to 32,767.000 rev/s |

**Operation diagram**



**Operations of each contact**

- The BUSY flag for the axes 1, 2 and 3 (FPΣ: X118, X119, X11A, FP2: X18, X19, X1A) indicating the state that a motor is running turns on when the position control started, and it turns off when the operation completed.

- The operation done flag for the axes 1, 2 and 3 (FPΣ: X120, X121, X122, FP2: X20, X21, X22) indicating the state that an operation completed turns on when the position control completed, and it will be held until any operation among the position control, JOG operation, home return and pulser operation starts. The timing of that the flag turns on is at the time that the current value of the AMP became within the completion width specified in the parameter setting of the Configurator PM after sending the command to move to the target position.

**Sample program**



The numbers in parenthesis are the flag and contact numbers for the FP2.

**Precautions on programming**

- To start the 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 invalide for the linear interpolation.
- When setting the long axis speed, the composite speed is faster than the 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 the position control starts.
- The number of the startup contact and flag varies depending on the number of axes and the installation position.
- The specified slot number varies depending on the installation position of the unit.

## 8.2.4 Setting and Operation of Three-Axis Linear Interpolation

The example below is the case of a single axis control when using the FPΣ with the positioning unit RTEX installed in the slot 0. The X axis is set to the 1st axis and the Y axis is set to the 2nd axis. The movement amount setting is the increment method, and the unit is set to pulse. When using the FP2, change the contact and flag numbers appropriately.



**Setting**

The parameters necessary for the setting of the positioining data and parameters are specified by the Configurator PM. The unit is set to pulse.

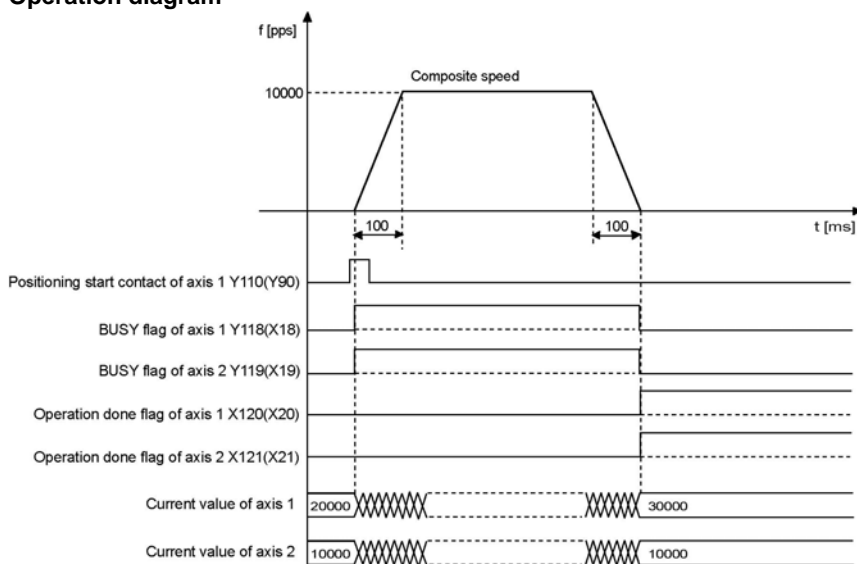| Item | Setting example | Allowable range |
|---|---|---|
| Operation pattern | E: End point | C: Continuance point   E: End point   P: Pass point |
| Interpolation operation | E: Spiral (Center point/CW direction/Z-axis movement) | 0: Linear (Composite speed)  1: Linear (Long axis speed)<br>A: Spiral (Center point/CW direction/X-axis movemet)<br>B: Spiral (Center point/CCW direction/X-axis movemet)<br>C: Spiral (Center point/CW direction/Y-axis movemet)<br>D: Spiral (Center point/CCW direction/Y-axis movemet)<br>E: Spiral (Center point/CW direction/Z-axis movemet)<br>F: Spiral (Center point/CCW direction/Z-axis movemet)<br>L: Spiral (Pass point/X-axis movement)<br>M: Spiral (Pass point/Y-axis movement)<br>N: Spiral (Pass point/Z-axis movement) |
| Control method | I: Increment | I: Increment   A: Absolute |
| X-axis movement amount | 0 pulse | Pulse: -1,073,741,823 to 1,073,741,823 pulse |
| X-axis auxiliary point | 0 pulse | $\mu$m (0.1 $\mu$m): -107,374,182.3 to 107,374,182.3 $\mu$m |
| Y-axis movement amount | 20000 pulses | $\mu$m (1 $\mu$m): -1,073,741,823 to 1,073,741,823 $\mu$m |
| Y-axis auxiliary point | 10000 pulses | inch (0.00001 inch): -10,737.41823 to 10,737.41823 inch |
| Z-axis movement amount | 5000 pulses | inch (0.0001 inch): -107,374.1823 to 1-7,374.1823 inch |
| Z-axis auxiliary point | 0 | degree (0.1 degree): -107,374,182.3 to 107,374,182.3 degree<br>degree (1 degree): -1,073,741,823 to 1,073,741,823 degree |
| Acceleration/ deceleration pattern | L: Linear | L: Linear   S: S-shaped acceleration/deceleration |
| Acceleration time (ms) | 100 ms | 0 to 10000 ms |
| Deceleration time (ms) | 100 ms | 0 to 10000 ms |
| Interpolation speed | 10000 pps | Pulse: 1 to 32,767,000 pps   $\mu$m: 1 to 32,767, 000 $\mu$m/s<br>Inch: 0.001 to 32,767.000 inch/s   degree:0.001 to 32,767.000 rev/s |

**Operation diagram**



**Operations of each contact**

- The BUSY flag for the axes 1, 2 and 3 (FPΣ: X118, X119, X11A, FP2: X18, X19, X1A) indicating the state that a motor is running turns on when the position control started, and it turns off when the operation completed.

- The operation done flag for the axes 1, 2 and 3 (FPΣ: X120, X121, X122, FP2: X20, X21, X22) indicating the state that an operation completed turns on when the position control completed, and it will be held until any operation among the position control, JOG operation, home return and pulser operation starts. The timing of that the flag turns on is at the time that the current value of the AMP became within the completion width specified in the parameter setting of the Configurator PM after sending the command to move to the target position.

**Sample program**

```
R0                                                    Y108(Y88)
─┤↑├──( DF )────────────────────────────────────────[   ]
Servo on                                            Servo on
                                                    for axis 1
                                                      Y109(Y89)
                                                      [   ]───── Servo ON
                                                    Servo on
                                                    for axis 2
                                                      Y10A(Y8A)
                                                      [   ]
                                                    Servo on
                                                    for axis 3

R1                                                    Y150(Y130)
─┤↑├──( DF )────────────────────────────────────────[   ]
Servo off                                           Servo off
                                                    for axis 1
                                                      Y151(Y131)
                                                      [   ]───── Servo OFF
                                                    Servo off
                                                    for axis 2
                                                      Y152(Y132)
                                                      [   ]
                                                    Servo off
                                                    for axis 3

X100(X0)  X104(X4)  X108(X8)   X110(X10)  X160(X60)   R10
─┤├───────┤/├──────┤├──────────┤├─────────┤/├────────[   ]
Link       Tool     Connection  Servo lock  Error for  Start-up enabled
establish- operation confirmation for axis 1 axis 1    flag for axis 1
ment for   for all  for axis 1
all axes   axes
                    X109(X9)    X111(X11)  X161(X61)   R11
                   ┤├──────────┤├─────────┤/├────────[   ]───── Start enabled condition
                    Connection  Servo lock  Error for  Start-up enabled
                    confirmation for axis 2 axis 2     flag for axis 2
                    for axis 2
                    X10A(XA)    X112(X12)  X162(X62)   R12
                   ┤├──────────┤├─────────┤/├────────[   ]
                    Connection  Servo lock  Error for  Start-up enabled
                    confirmation for axis 3 axis 3     flag for axis 3
                    for axis 3

R2
─┤↑├──( DF )──[ F0 MV      , K 1      , DT 0   }──────────── Starting table No.
Position
control start
              [ F151 WRT  , H 0      , DT 0    , K 1    , H 100 }─── Starting table setting
                           Bank 0,
                           Slot No. 0
                                      ┌─────────────────────────┐
                                      │ the 1-word contet from DT0│
                                      └─────────────────────────┘
                              ┌──────────────────────────────────────────┐
                              │ are written to the shared memory address H100. │
                              └──────────────────────────────────────────┘

R2                R10   R11   R12   X118(X18) X119(X19) X11A(X1A)  Y110(Y90)
─┤↑├──( DF )─────┤├────┤├────┤├────┤/├───────┤/├───────┤/├────────[   ]──── Positioning start
Position         Enabled Enabled Enabled Busy flag  Busy flag  Busy flag  Positioning
control start    flag for flag for flag for for axis 1 for axis 2 for axis 3 start for axis 1
                 axis 1  axis 2  axis 3
```
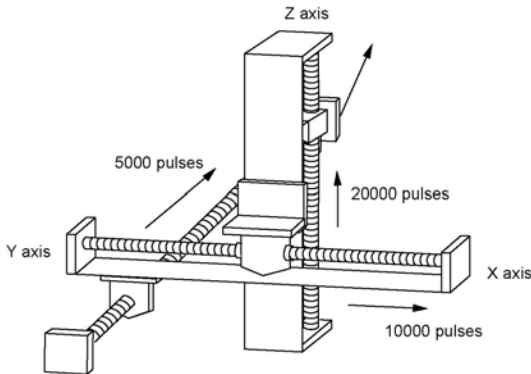
The numbers in parenthesis are the flag and contact numbers for the FP2.

**Precautions on programming**

- For X-Y plane, in case of the center point specification, the X-axis auxiliary point is the center point of X axis, and the Y-axis auxiliary point is the center point of Y axis. In case of the pass point, each pass point is set as the pass point of X axis and Y axis. These settings are the same for Y-Z plane and X-Z plane.
- When the control method is increment, both the center point and pass point are the increment coordinatefrom the start point.
- When the start point and the operaton done point is the same, it performs one circular operation when using the center point method. However, when using the pass point method, an error occurs.
- In case of the pass point method, when the start point, pass point and operation done pont exsit in the same straight line, an arc is not comprised, and an error occurs.
- When setting the long axis speed, the composite speed is faster than the 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 the position control starts.
- The number of the startup contact and flag varies depending on the number of axes and the installation position.
- The specified slot number varies depending on the installation position of the unit.

# Chapter 9

## Manual Operation (JOG Operation)

# 9.1 Setting and Operation of Home Return

The example below is a case when using the FPΣ with the positioning unit RTEX installed in the slot 0. The unit is set to pulse. When using the FP2, change the contact and flag numbers appropriately.
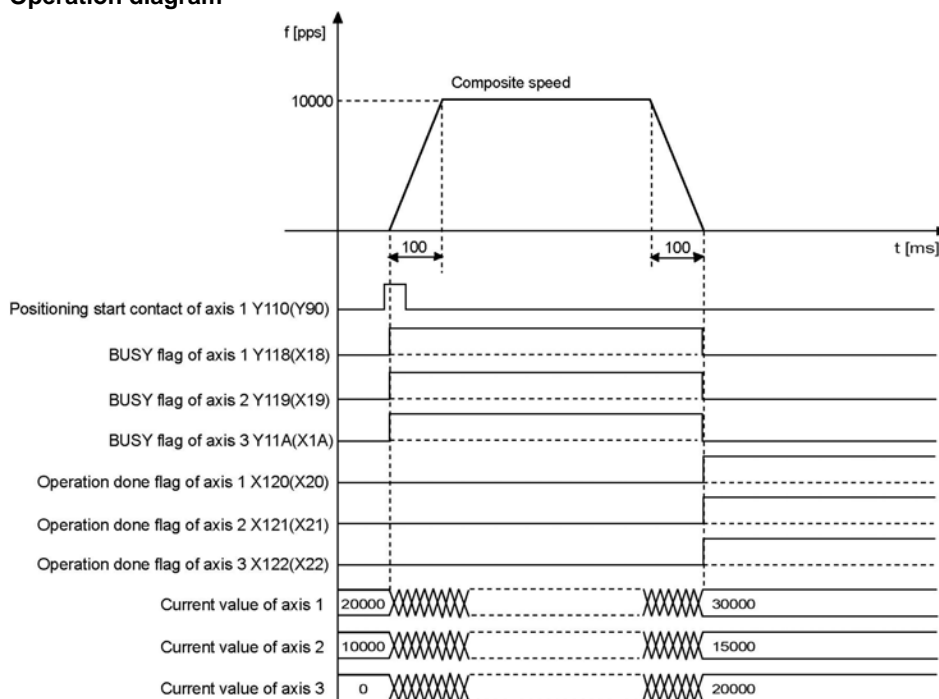


**Setting**

The parameters necessary for the setting of the JOG operation are specified by the Configurator PM. The unit is set to pulse.

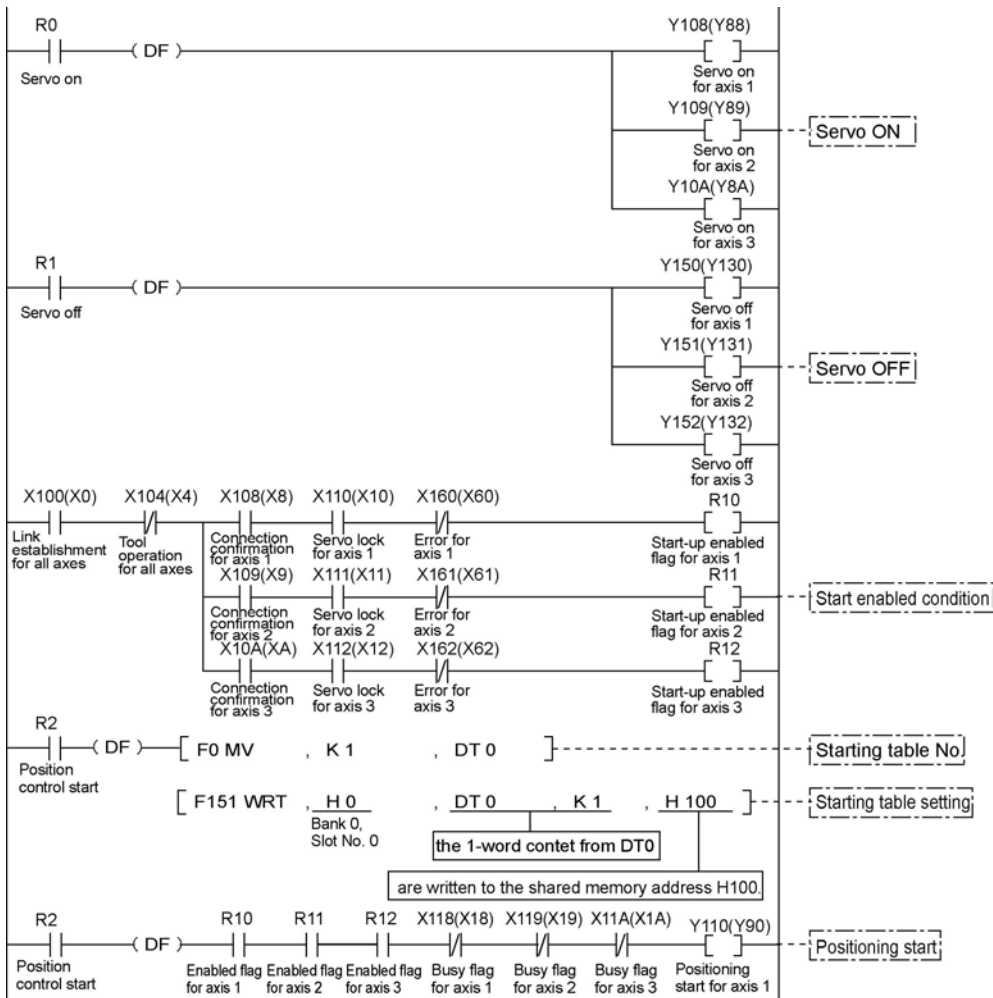| Item | Setting example | Allowable range |
|---|---|---|
| Acceleration/deceleration pattern | 0: Linear acceleration/deceleration | 0: Linear acceleration/deceleration<br>1: S-shaped acceleration/deceleration |
| Acceleration time (ms) | 100 ms | 0 to 10000 ms |
| Deceleration time (ms) | 100 ms | 0 to 10000 ms |
| Target speed | 10000 pps | Pulse: 1 to 32,767,000 pps<br>μm: 1 to 32,767, 000 μm/s<br>Inch: 0.001 to 32,767.000 inch/s<br>degree:0.001 to 32,767.000 rev/s |

**Operation diagram**



The numbers in parenthesis are the flag and contact numbers for the FP2.

**Operations of each contact**

- The BUSY flag (FPΣ: X118, FP2: X18) indicating the state that a motor is running turns on when the JOG operation started, and it turns off when the operation completed.
- The operation done flag (FPΣ: X120, FP2: X20) indicating the state that an operation completed turns on when the JOG operation completed, and it will be held until any operation among the position control, JOG operation, home return and pulser operation starts. The timing of that the flag turns on is at the time that the current value of the AMP became within the completion width specified in the parameter setting of the Configurator PM after sending the command to move to the stop position of the JOG operation.
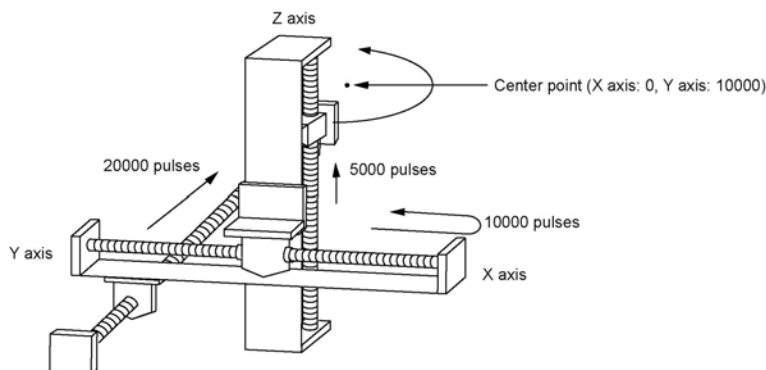
**Sample program**
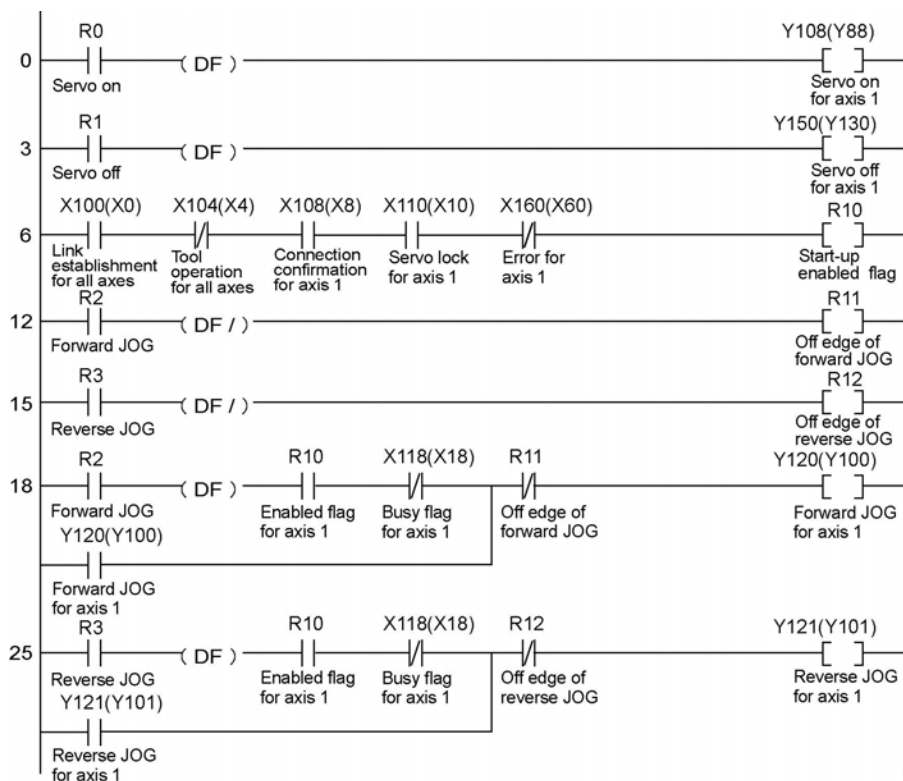


The numbers in parenthesis are the flag and contact numbers for the FP2.

**Precautions on programming**

- The number of the startup contact and flag varies depending on the number of axes and the installation position.
- The specified slot number varies depending on the installation position of the unit.

**Operation at limit input**

| Condition | Direction | Limit status | Operation |
|-----------|-----------|--------------|-----------|
| When JOG operation is executed | Forward | Limit input(+):ON | Not executable, Error occurs. |
| | | Limit input (-):ON | Executable |
| | Reverse | Limit input(+):ON | Executable |
| | | Limit input (-):ON | Not executable, Error occurs. |
| During JOG operation | Forward | Limit input(+):ON | Deceleration stop, Error occurs. |
| | Reverse | Limit input (-):ON | Deceleration stop, Error occurs. |

# 9.2 Changing the Speed During JOG Operation

The target speed can be changed during the JOG operation.

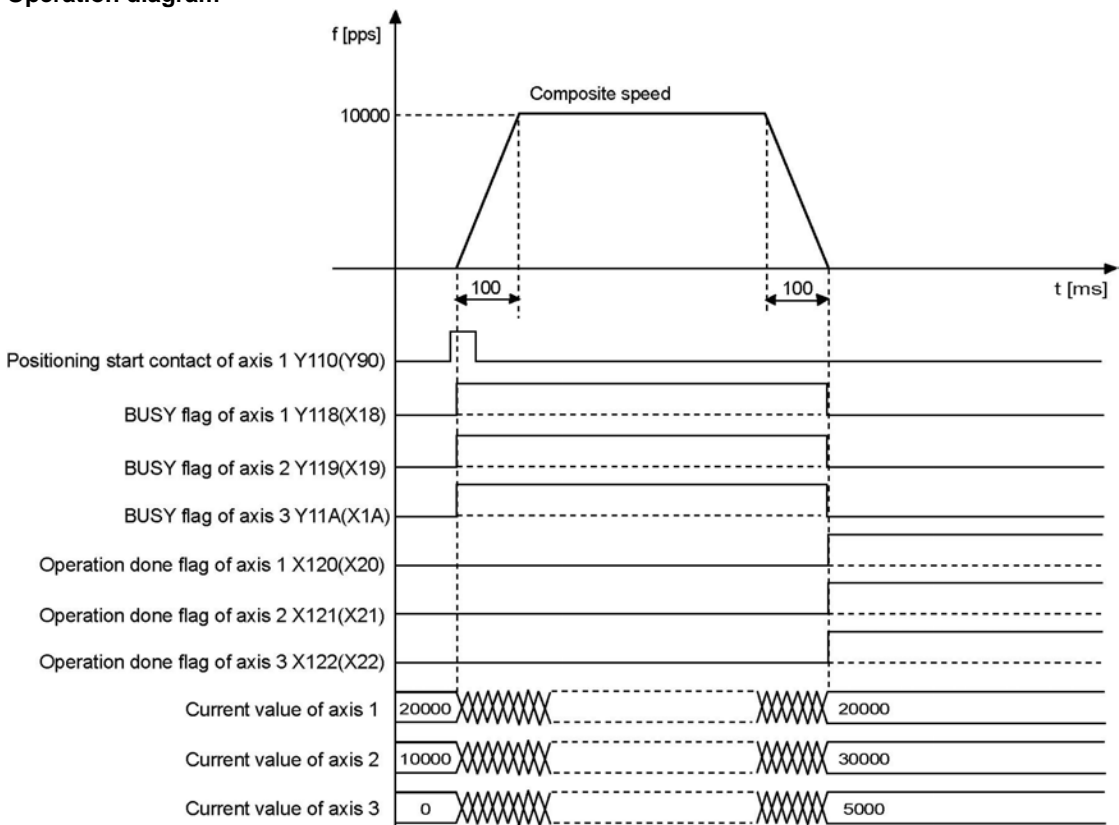**Setting**

The parameters necessary for the setting of the JOG operation are specified by the Configurator PM. The unit is set to pulse.

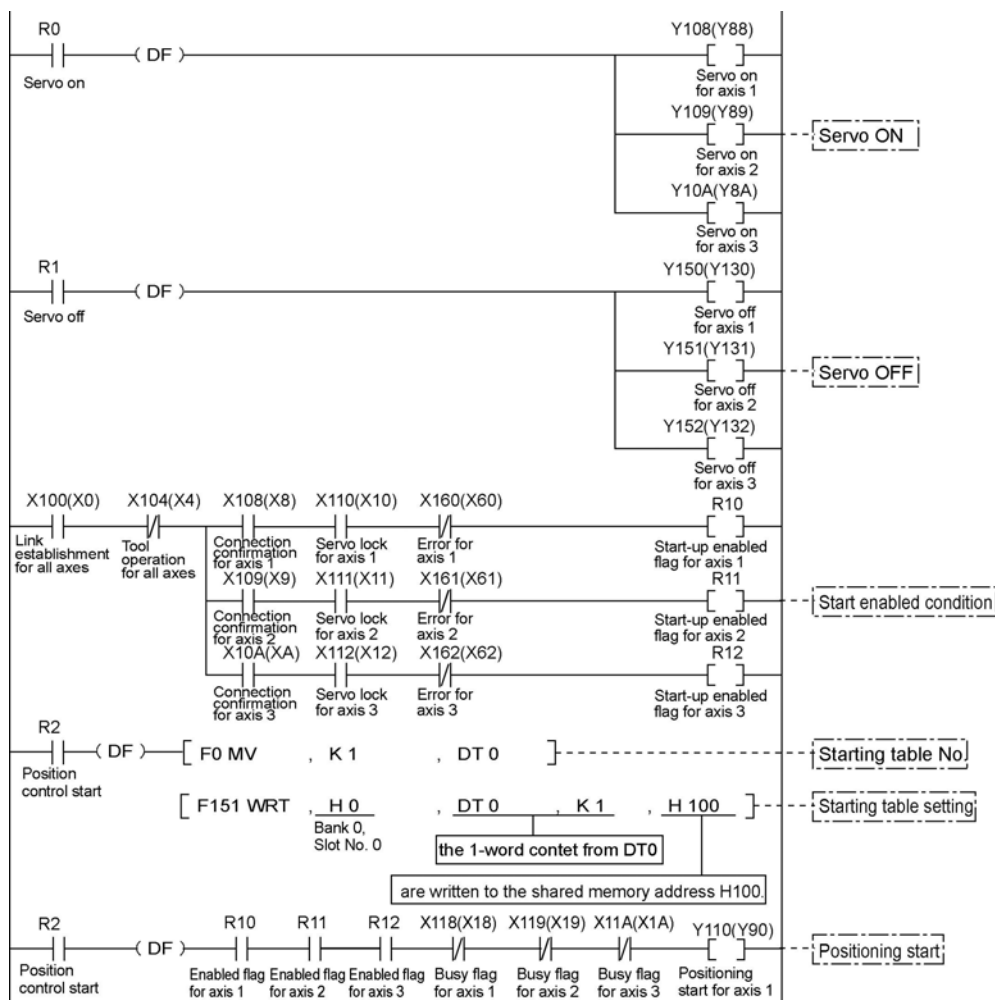| Item | Setting example | Allowable range |
|---|---|---|
| Acceleration/deceleration pattern | 0: Linear acceleration/deceleration | 0: Linear acceleration/deceleration<br>1: S-shaped acceleration/deceleration |
| Acceleration time 1 (ms) | 100 ms | 0 to 10000 ms |
| Deceleration time 1 (ms) | 50 ms | 0 to 10000 ms |
| Target speed 1 | 10000 pps | Pulse: 1 to 32,767,000 pps<br>$\mu$m: 1 to 32,767, 000 $\mu$m/s<br>Inch: 0.001 to 32,767.000 inch/s<br>degree:0.001 to 32,767.000 rev/s |
| Acceleration time 2 (ms) | 200 ms | 0 to 10000 ms |
| Deceleration time 2 (ms) | 150 ms | 0 to 10000 ms |
| Target speed 2 | 20000 pps | Pulse: 1 to 32,767,000 pps<br>$\mu$m: 1 to 32,767, 000 $\mu$m/s<br>Inch: 0.001 to 32,767.000 inch/s<br>degree:0.001 to 32,767.000 rev/s |

**Operation diagram**
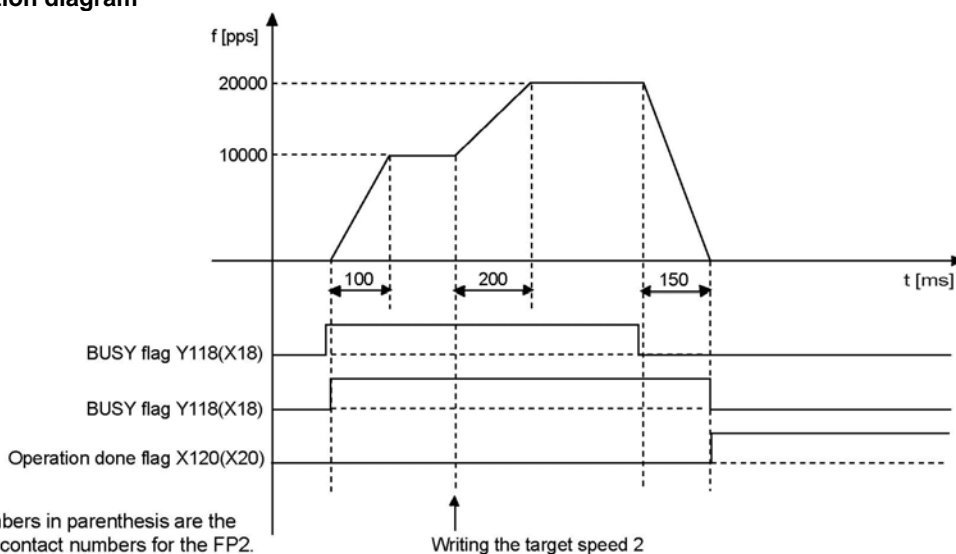


The numbers in parenthesis are the flag and contact numbers for the FP2.

**Operations of each contact**

- The BUSY flag (FP$\Sigma$: X118, FP2: X18) indicating the state that a motor is running turns on when the JOG operation started, and it turns off when the operation completed.
- The operation done flag (FP$\Sigma$: X120, FP2: X20) indicating the state that an operation completed turns on when the JOG operation completed, and it will be held until any operation among the position control, JOG operation, home return and pulser operation starts. The timing of that the flag turns on is at the time that the current value of the AMP became within the completion width specified in the parameter setting of the Configurator PM after sending the command to move to the stop position of the JOG operation.

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**Sample program**

```
        R0                                              Y108(Y88)
   0   ─┤├─────( DF )──────────────────────────────────────[ ]──
      Servo on                                            Servo on
                                                          for axis 1
        R1                                              Y150(Y130)
   3   ─┤├─────( DF )──────────────────────────────────────[ ]──
      Servo off                                           Servo off
                                                          for axis 1
     X100(X0)    X104(X4)   X108(X8)   X110(X10)  X160(X60)   R10
   6 ─┤├──────────┤/├─────────┤├─────────┤├─────────┤/├──────( )──
     Link       Tool       Connection  Servo lock  Error for  Start-up
     establishment operation confirmation for axis 1 axis 1   enabled flag
     for all axes for all axes for axis 1
        R2                                                  R11
  12   ─┤├─────( DF / )──────────────────────────────────────( )──
      Forward JOG                                          Off edge of
                                                           forward JOG
        R2                     R10       X118(X18)   R11   Y120(Y100)
  15   ─┤├─────( DF )──────────┤├─────────┤/├─────────┤/├─────( )──
      Forward JOG            Enabled flag Busy flag  Off edge of Forward JOG
                            for axis 1   for axis 1  forward JOG for axis 1
      Y120(Y100)
       ─┤├─
      Forward JOG
      for axis 1
        R2
  22   ─┤├─────( DF )──────[ F0 MV      , K 100     , DT 0      ]
      Forward JOG                                   JOG acceleration
                                                    time 1
                           [ F0 MV      , K 50      , DT 1      ]
                                                    JOG deceleration
                                                    time 1
                           [ F1 DMV     , K 10000   , DT 2      ]
                                                    JOG target
                                                    speed 1
                           [ F151 WRT , H 200     , DT 0    , K 4     , H2A ]
                                                    JOG acceleration
                                                    time 1
        R4
  50   ─┤├─────( DF )──────[ F0 MV      , K 200     , DT 10     ]
      Speed change                                  JOG acceleration
                                                    time 2
                           [ F0 MV      , K 150     , DT 11     ]
                                                    JOG deceleration
                                                    time 2
                           [ F1 DMV     , K 20000   , DT 12     ]
                                                    JOG target
                                                    speed 2
                           [ F151 WRT , H 200     , DT 10   , K 4     , H2A ]
                                                    JOG acceleration
                                                    time 2
```

The numbers in parenthesis are the flag and contact numbers for the FP2.
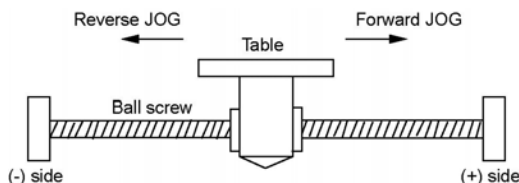
**Precautions on programming**
- As the acceleration time and deceleration time will be retrieved when the speed is changed during the JOG operation, the acceleration/deceleration speed can be changed.
- The number of the startup contact and flag varies depending on the number of axes and the installation position.
- The specified slot number varies depending on the installation position of the unit.

# Chapter 10

## Manual Operation (Home Return)

# 10.1 Setting and Operation of Home Return

The example below is a case when using the FPΣ with the positioning unit RTEX installed in the slot 0. The unit is set to pulse. When using the FP2, change the contact and flag numbers appropriately.
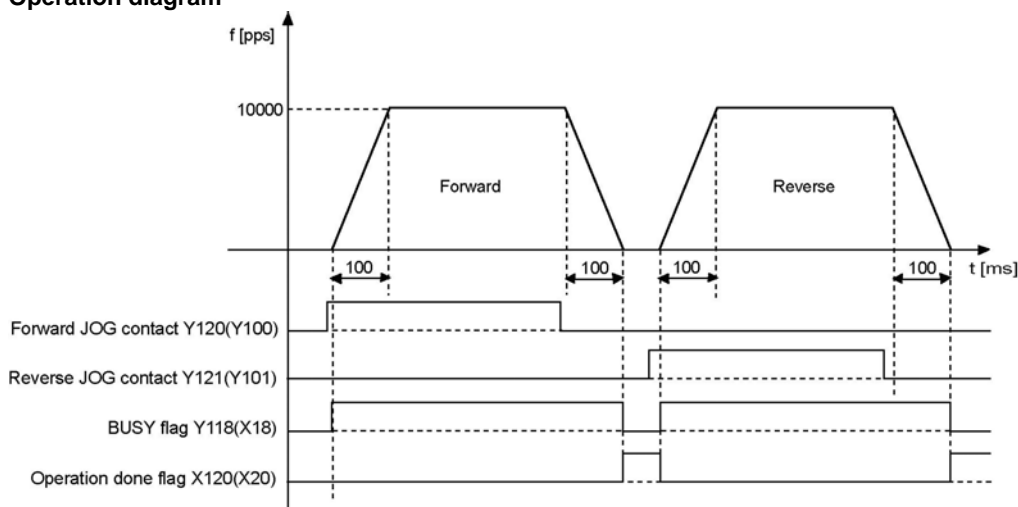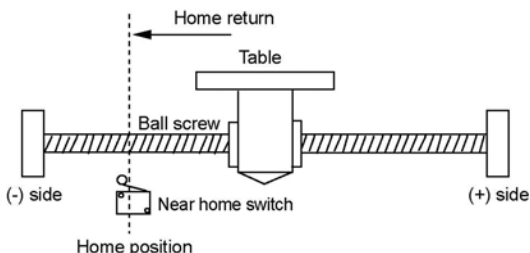


**Setting**

The parameters necessary for the setting of the home return are specified by the Configurator PM. The unit is set to pulse.

| Item | Setting example | Allowable range |
|------|-----------------|-----------------|
| Return setting | 0: Near point dog type | 0: Near point dog type |
| Return direction | 0: Limit (-) direction | 0: Limit (-) direction   1: Limit (+) direction |
| Acceleration time (ms) | 100 ms | 0 to 10000 ms |
| Deceleration time (ms) | 100 ms | 0 to 10000 ms |
| Target speed | 10000 pps | Pulse: 1 to 32,767,000 pps<br>μm: 1 to 32,767, 000 μm/s |
| Return creep speed | 1000 pps | Inch: 0.001 to 32,767.000 inch/s<br>degree:0.001 to 32,767.000 rev/s |
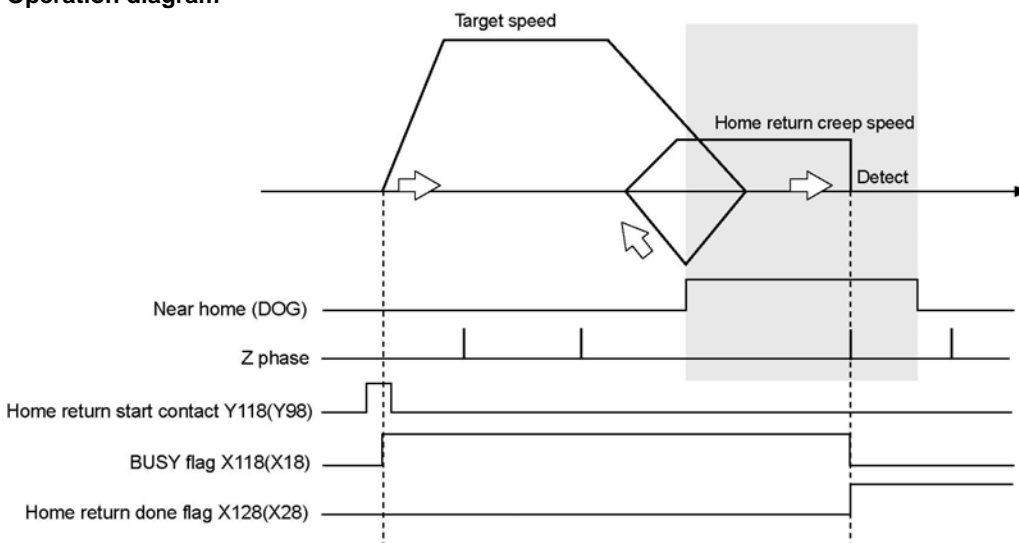
**Operation diagram**



**Operations of each contact**

- The BUSY flag (FPΣ: X118, FP2: X18) indicating the state that a motor is running turns on when the home return started, and it turns off when the operation completed.
- The home return done flag (FPΣ: X128, FP2: X28) indicating the state that an operation completed turns on when the home return operation completed, and it will be held until any operation among the position control, JOG operation, home return and pulser operation starts. The timing of that the flag turns on is at the time that the home return operation completed.
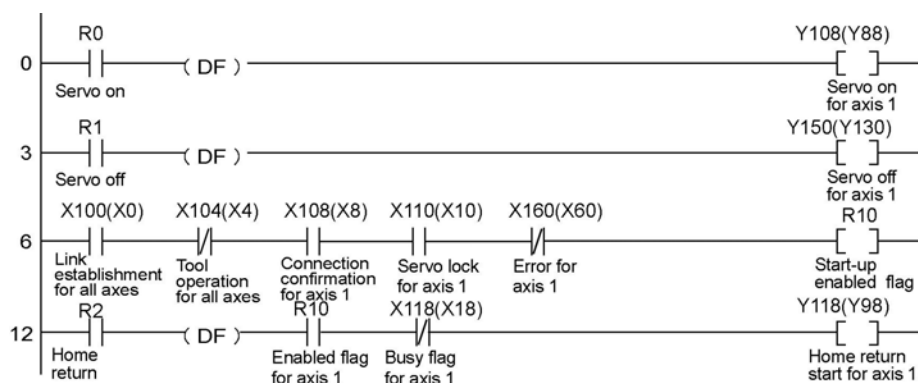
10-2

**Sample program**



The numbers in parenthesis are the flag and contact numbers for the FP2.

**Precautions on programming**
- The number of the startup contact and flag varies depending on the number of axes and the installation position.
- The specified slot number varies depending on the installation position of the unit.

**Operation at limit input**

| Condition | Direction | Limit status | Operation |
|---|---|---|---|
| When Home return operation is executed | 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 operaiton |
| | Reverse | Limit input (-):ON | Automatic reverse operaiton |

# Chapter 11

## Manual Operation (Pulser Operation)

# 11.1 Setting and Operation of Pulser Operation

The example below is a case when using the FPΣ with the positioning unit RTEX installed in the slot 0. The unit is set to pulse. When using the FP2, change the contact and flag numbers appropriately.
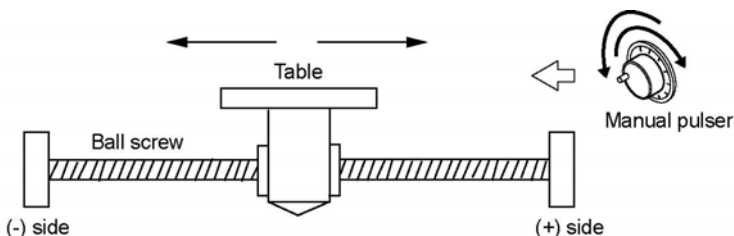


**Setting**

The parameters necessary for the setting of the pulser operation are specified by the Configurator PM. The unit is set to pulse.

| Item | Setting example | Allowable range |
|---|---|---|
| Operation setting code | 0: Pulser 1 | 0: Pulser 1, 1: Pulser 2, 2: Pulser 3 |
| Pulser operation ratio numerator | 2 | 1 to 32,767 |
| Pulser operation ratio denominator | 1 | 1 to 32,767 |

**Operation diagram**
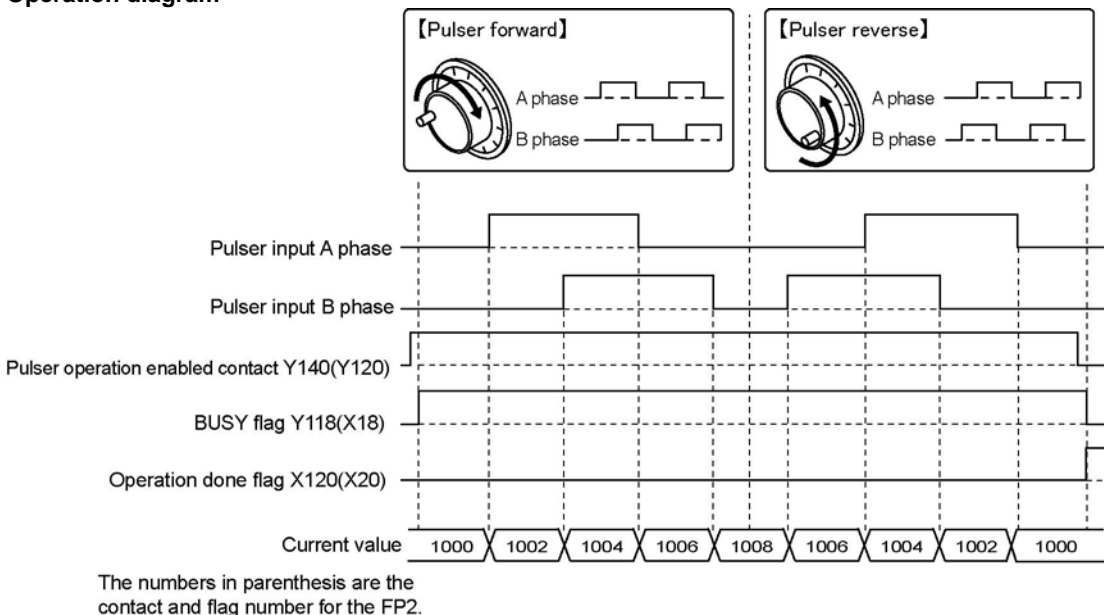


The numbers in parenthesis are the contact and flag number for the FP2.

**Operations of each contact**

- The BUSY flag (FPΣ: X118, FP2: X18) indicating the state that a motor is running turns on when a pulser operation enabled contact turned on, and it turns off when the pulser operation enabled contact turned off.
- The operation done flag (FPΣ: X120, FP2: X20) indicating the state that an operation completed turns on when an pulser operation enabled contact turned off, and it will be held until any operation among the position control, JOG operation, Home return and pulser operation starts.

**Sample program**
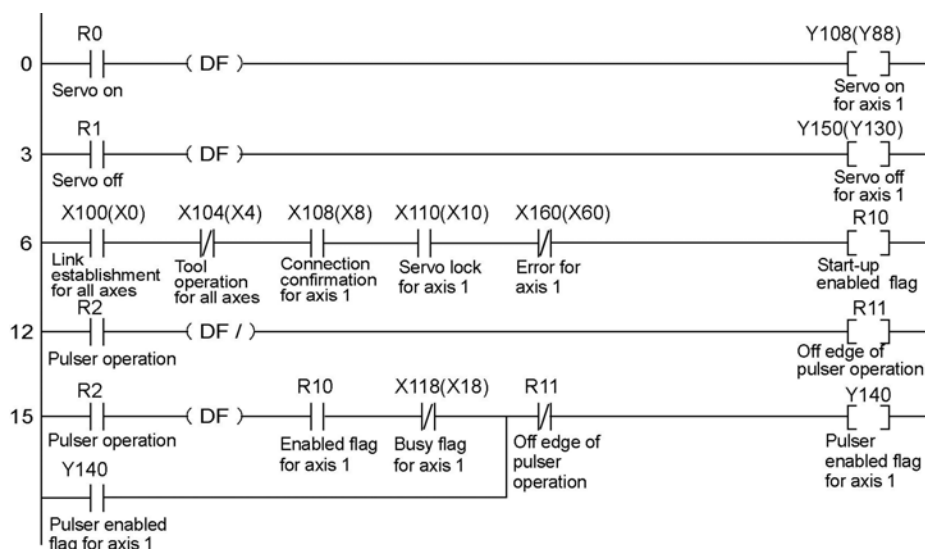


The numbers in parenthesis are the flag and contact numbers for the FP2.

**Precautions on programming**

- The movement amount per an 1-pulse signal from the pulser can be changed by setting the ratio numerator and ratio denominator for the input signal of the pulser.
- The number of the startup contact and flag varies depending on the number of axes and the installation position.
- The specified slot number varies depending on the installation position of the unit.

**Operation at limit input**

| Condition | Direction | Limit status | Operation |
|---|---|---|---|
| When Pulser operation is executed | Forward | Limit input(+):ON | Not executable, Limit error occurs. |
| | | Limit input (-):ON | Executable |
| | Reverse | Limit input(+):ON | Executable |
| | | Limit input (-):ON | Not executable, Limit error occurs. |
| During Pulser operation | Forward | Limit input(+):ON | Deceleration stop, Limit error occurs. |
| | Reverse | Limit input (-):ON | Deceleration stop, Limit error occurs. |

# Chapter 12

# Stop Functions

# 12.1 Settings and Operations of Stop Functions

Following stop functions are available during operations. Each deceleration time can be set individually.
Set the deceleration time according to each occurrence condition of the stop operation.

| Name | Occurrence condition | Operation | Time until stop |
|---|---|---|---|
| Deceleration stop | when the deceleration stop contact turns on | Decelerate and stop | Deceleration condtion for the control being operated. |
| Emergency stop | when the emergency stop contact turns on | Decelerate and stop | Can be set individually. |
| Limit stop | when the input of limit switch turns on | Decelerate and stop | Can be set individually. |
| Software limit stop | when exceeding the range of the software limit | Decelerate and stop | Same as limit stop. |
| Error stop | when an error occurred | Decelerate and stop | Can be set individually. |
| System stop | when the system stop contact turns on | Stop without deceleraiton time | 0 |

Refer to the following table for the stop by turning contacts on. It indicates the allocated I/O when the
FPΣ/FP2 positioning unit RTEX is installed in the slot 0.

| Contact allocation | | | | Target axis | Name | Descriptions |
|---|---|---|---|---|---|---|
| FPΣ | | FP2 | | | | |
| | Y100 | | Y80 | All axes | System stop | Contact for requesting the system stop. When it turns on, all axes will stop with 0-deceleration time. |
| WY13 | Y130 | WY11 | Y110 | 1 axis | Emergency stop | Requests the emergency stop for the corresponding AMP. The deceleration time for the emegency stop is specified by Configurator PM or the emergency stop setting in the shared memory. (The operation is the level type.) Note) The deviation counter cannot be cleared. |
| | Y131 | | Y111 | 2 axis | | |
| | Y132 | | Y112 | 3 axis | | |
| | Y133 | | Y113 | 4 axis | | |
| | Y134 | | Y114 | 5 axis | | |
| | Y135 | | Y115 | 6 axis | | |
| | Y136 | | Y116 | 7 axis | | |
| | Y137 | | Y117 | 8 axis | | |
| | Y138 | | Y118 | 1 axis | Deceleration stop | Requests the deceleration stop for the corresponding AMP. The deceleration time for the deceleration stop is specified by Configurator PM or the deceleration stop setting in the shared memory. (The operation is the level type.) Note) The deviation counter cannot be cleared. |
| | Y139 | | Y119 | 2 axis | | |
| | Y13A | | Y11A | 3 axis | | |
| | Y13B | | Y11B | 4 axis | | |
| | Y13C | | Y11C | 5 axis | | |
| | Y13D | | Y11D | 6 axis | | |
| | Y13E | | Y11E | 7 axis | | |
| | Y13F | | Y11F | 8 axis | | |

# Chapter 13

## Supplementary Functions

# 13.1 Dwell Time

The time taken until the next operation after the completion of an executed positioning table in the automatic operation is called dwell time.
The operations of the dwell time vary according to control methods slightly. Followings are the operations in each control method.

**For E point control**
The dwell time is the time taken from the completion of the position command until the operation done flag turns on.
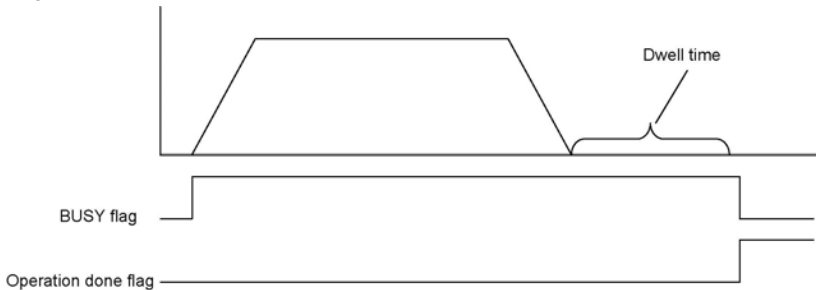


**For P point control**
In the P point control, the positioning table operates consecutively, therefore, the dwell time is ignored.
For the last table (E point), as well as the E point control, the dwell time is the time taken from the completion of the position command until the operation done flag turns on.
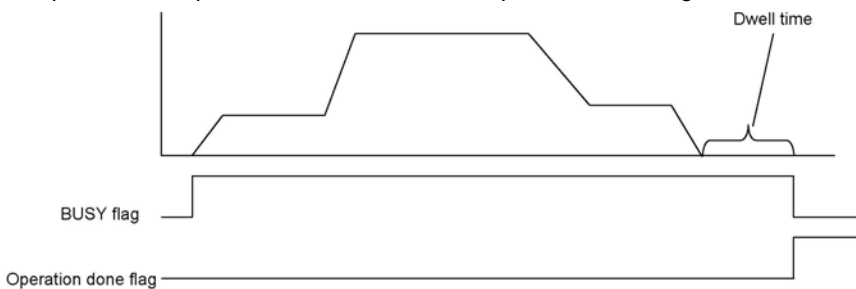


**For C point control**
The dwell time is the waiting time for executing the next table from the completion of the positioning talble (deceleraiton stop).
For the last table (E point), as well as the E point control, the dwell time is the time taken from the completion of the position command until the operation done flag turns on.
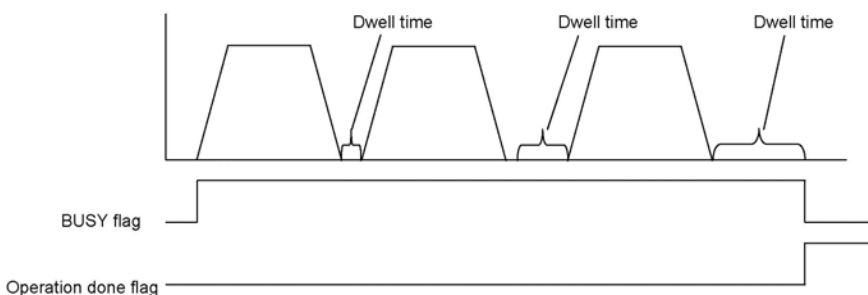
# 13.2 Software Limit

The system is designed to mechanically set the limit (+) and limit (-) to restrict the moving range of a motor.

Separately from the mechanical limits (+) and (-), the software limit is a function to add the limits for the absolute coordinate managed within the positioning unit RTEX. As the software limit is a function for the protection of the motor and AMP, it is recommended to set them to the values within the range of the mechanical limits (+) and (-) as below.
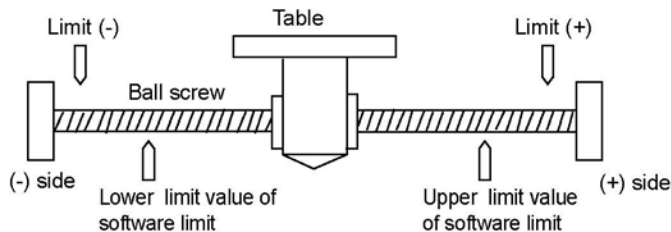


When exceeding the setting range of the software limit (upper and lower limit values), an error occurs, and the deceleration stop is executed. It is necessary to clear the erro and move the motor into the range of the softwarelimit using an operation such as JOG operation after the stop.
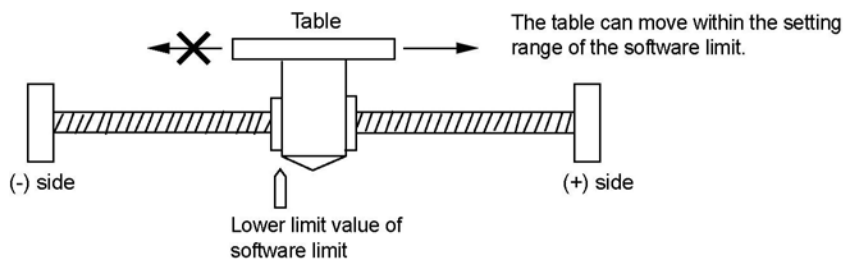


Whether the software limit is set to be available or not can be specified individually for the positioning control, JOG operation and home return each. For example, it is possible to set the limit software to be invalid only in the home return operation.

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# 13.3 Torque Limit

The positioning unit RTEX supports a function (torque limit) to change the maximum torque for the AMP in real time. The torque limit can be arbitrarily changed during the torque limit operaiton, however, note that the torque cannot be changed in the home return operation.

The specified torque limit value is used as the maximum torque during the torque limit operation. Also, the torque limit cannot be specified by the setting tool, Configurator PM. Data must be written into the shared memory from the PLC in order to carry out the torque limit. Followings are the details of the shared memory to carry out the torque limit.

**Torque limit setting area (Shared memory, Bank 0)**

| Address | Name | Descriptions | Default value | Setting range | Unit |
|---|---|---|---|---|---|
| 0D8H | Torque limit enabled flag | Sets whehter to enable or disable the execution of the torque limit for each axis. | 0H | | |
| 0D9H to 0DFH | Not used | | | | |
| 0E0H | Torque limit value of axis 1 | Stores the torque limit value of axis 1. | 3000 | 1 to 5000 | 0.1 % |
| 0E1H | Torque limit value of axis 2 | Stores the torque limit value of axis 2. | 3000 | 1 to 5000 | 0.1 % |
| 0E2H | Torque limit value of axis 3 | Stores the torque limit value of axis 3. | 3000 | 1 to 5000 | 0.1 % |
| 0E3H | Torque limit value of axis 4 | Stores the torque limit value of axis 4. | 3000 | 1 to 5000 | 0.1 % |
| 0E4H | Torque limit value of axis 5 | Stores the torque limit value of axis 5. | 3000 | 1 to 5000 | 0.1 % |
| 0E5H | Torque limit value of axis 6 | Stores the torque limit value of axis 6. | 3000 | 1 to 5000 | 0.1 % |
| 0E6H | Torque limit value of axis 7 | Stores the torque limit value of axis 7. | 3000 | 1 to 5000 | 0.1 % |
| 0E7H | Torque limit value of axis 8 | Stores the torque limit value of axis 8. | 3000 | 1 to 5000 | 0.1 % |

**Torque limit enabled flag**

| bit | Name | Default value | Descriptions |
|---|---|---|---|
| 0 | Torque limit of axis 1 | 0 | |
| 1 | Torque limit of axis 2 | 0 | |
| 2 | Torque limit of axis 3 | 0 | |
| 3 | Torque limit of axis 4 | 0 | 0: Torque limit desabled (Default) |
| 4 | Torque limit of axis 5 | 0 | 1: Torque limit enabled |
| 5 | Torque limit of axis 6 | 0 | |
| 6 | Torque limit of axis 7 | 0 | |
| 7 | Torque limit of axis 8 | 0 | |
| 15 to 8 | - | - | - |

**Torque limit values of axes 1 to 8**

| bit | Name | Default value | Descriptions |
|---|---|---|---|
| 15 to 0 | Torque limit value | 3000 | Sets the torque limit value. The unit is (0.1%). If 2000 is written in this area, it operates with "2000 x 0.1 = 200 (%)" as the maximum torque. |

# 13.4 Auxiliary Output Code and Auxiliary Output Contact

The auxiliary output contact is a function to inform about which table's operation is performing when the automatic operation (E point control, C point control, P point control) is executed.
The auxiliary output contact and the auxiliary output code can be used by setting the parameter "auxiliary output mode" of each axis to the With mode.
Note that it is not available if the "auxiliary output mode" is not used.

**Auxiliary output contact**

When the automatic operation started, the auxiliary contact flag of the corresponding axis allocated to I/O turns on. Also, the ON time of the auxiliary contact falg can be specified in the ms unit.

**Auxiliary output data**

The auxiliary output data (1 word) can be set for each table of the positioning data. The content of the process currently carried out can be confirmed by setting the auxiliary output. The values in the auxiliary output data are held until the next positioning table is executed. Also, the auxiliary output data that was output just before the completion of the automatic operation is held.
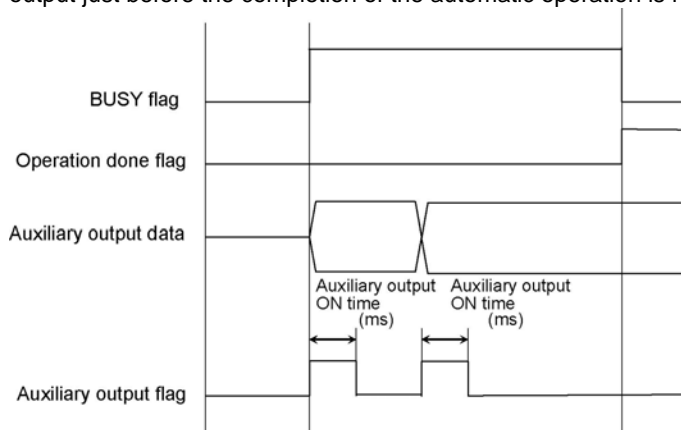
# 13.5 Actual Speed/Torque Value Judgment

These are the functions that monitor the actual speed/torque of the AMP in real time and to give an error or warning when the monitored values exceed the judgment values.
The judgment values for the actual speed and torque can be specified for axis each, and it is possible to select either to give an error or warning.

When an error occurs, the oprationstops with the error stopdeceleration time, and the next operation cannot be executed until performing the error clear.
When giving a warning, the warning is just informed, and the operation continues.
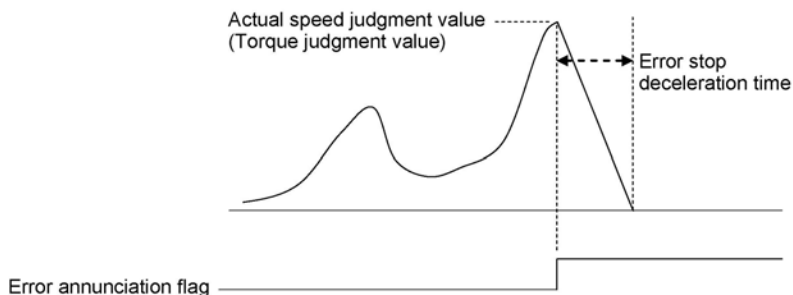
# 13.6 Imposition Flag and Completion Width

**Imposition**
The imposition flag is a flag to inform the imposition status of the AMP allocated to the I/O, and it turns on when the position error of the corresponding axis is within the setting range speciifed in the AMP. It does not relate to the control of the positioning RTEX. It is the imposiiton monitor of the AMP.
The imposition range must be directly specifieid in the AMP. Use the PANATERM that is a setting tool for the AMP.

Note) The PANATERM is the setting tool software for the AMP manufactured by Matsushita Electric Industrial Co., Ltd.

**Completion width**
It is used to set the timing to turn on the operaiton done flag allocated to the I/O of the positioning unit RTEX.
The operation done flag turns when the current position is in the range of the +/- completion width (pulse) of the target command position after the completion of the pulse output. The completion width is monitored by the positioning unit RTEX unlike the position error of the AMP. Therefore, note that the timing of which the imposition flag turns on may differ from the timing of which the operaiton done flag turns on.

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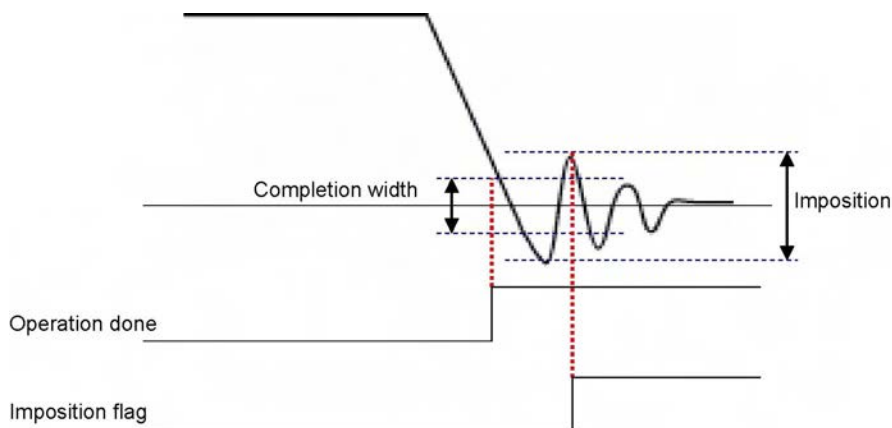
# 13.7 Home Change

The positionig unit RTEX manages the coordinate origin (default is 0). When the position command method is set to "Absolute", it operates as the position command for the coordinate origin.
The home change is a function to set the managed home position to an aubitrary coordinate positon.
Data must be written into the shared memory from the PLC in order to carry out the home change.
Followings are the details of the shared memory to carry out the home change.

**Home change area (Shared memory, Bank 0)**

| address | Name | Descriptions |
|---------|------|--------------|
| 0C0H | Home change request flag | Only when the corresponding bits fo reach axis changed to 1 from 0, the coordinate origin managed in the positioning unit will be changed to the following home change coordiates.<br>Afther the change, the positioning unit clear the corresponding bits to 0 automatically.<br><br>_(bit table below)_ |

| bit | Name | Default | Descriptions |
|-----|------|---------|--------------|
| 0 | Request home change of axis 1 | 0 | |
| 1 | Request home change of axis 2 | 0 | |
| 2 | Request home change of axis 3 | 0 | |
| 3 | Request home change of axis 4 | 0 | 0: No change. |
| 4 | Request home change of axis 5 | 0 | 1: Change the coordinate origin. |
| 5 | Request home change of axis 6 | 0 | (After the change, the positioning unit sets to 0 automatically.) |
| 6 | Request home change of axis 7 | 0 | |
| 7 | Request home change of axis 8 | 0 | |
| 15 to 8 | — | — | — |

| address | Name | Descriptions |
|---------|------|--------------|
| 0C8H<br>0C9H | Home change coordinate of axis 1 | Stores the coordinate to change the original point of axis 1. |
| 0CAH<br>0CBH | Home change coordinate of axis 2 | Stores the coordinate to change the original point of axis 2. |
| 0CCH<br>0CDH | Home change coordinate of axis 3 | Stores the coordinate to change the original point of axis 3. |
| 0CEH<br>0CFH | Home change coordinate of axis 4 | Stores the coordinate to change the original point of axis 4. |
| 0D0H<br>0D1H | Home change coordinate of axis 5 | Stores the coordinate to change the original point of axis 5. |
| 0D2H<br>0D3H | Home change coordinate of axis 6 | Stores the coordinate to change the original point of axis 6. |
| 0D4H<br>0D5H | Home change coordinate of axis 7 | Stores the coordinate to change the original point of axis 7. |
| 0D6H<br>0D7H | Home change coordinate of axis 8 | Stores the coordinate to change the original point of axis 8. |

**Procedures of home change**
1. Write an coordinate to be the home in the home change coordinate area of the target axis.
2. Write the value at the time that the bit of the target axis set to 1 in the home change request flag area. As the home change process is performed for the axis that is 1 in the home request flag area, do not set any bit to 1 other than the target axis.
3. Execute the home return for the target axis to make the home change value valid. After the completion of the home return, the operation is carried out with the coordinate specified in the above 1 as the home position

---

# Chapter 14

## Precautions During Programming

# 14.1 Precautions During Programming

## 14.1.1 Turning Off Power Supply Clears Contents in Shared Memory

The data in the shared memory of the positioning unit RTEX is cleared when the power supply of the PLC turns off. So, if you want to perform the positioning control with the current settings of the shared memory the next time the power supply turns on, the positioning data should be written in the FROM (flash memory) within the positioning unit RTEX.

When parameters and positioning data has been set using the Configurator PM, it is selectable whether to store them in the FROM (flash memory) or not at the time of downloading to the positioning unit.

## 14.1.2 Once starting an Operation,

Once any start-up contact of the automatic operation (position control), manual operations (JOG operation, home return, pulser operation) turns on and the operation starts, it will not change to another operation even if the contact of the other contact turns on.

However, the stop operation (deceleration stop, emergency stop, system stop) can be executed during other operations.

## 14.1.3 How to Use Standard Area and Extended Area of Positioning Data

When executing the automatic operation (position control) with the positioning unit RTEX, specify the number of the positioning table that has been specified in advance, and start the position control. After the start-up, the motor is automatically controlled according to the settings of the table. There are the method that creates the positioning table using Configurator PM that is an exclusive setting tool, and the other method that writes the positioning table in a prescribed address by ladder programs.
There are the standard area of 600 points that is specified by No. 1 to 600, and the extended area of 25 points that is specified by No. 10001 to 10025.

The standard area is used when the setting values of the positioning table are predetermined. It can be set using Configurator PM, and can be rewritten from the ladder programs, too. However, if the positioning table is changed by the ladder program, the caulculation is necessary to restructure the positioning data before executing the automatic operation. This function enables to read the positioning data of 600 points in advance and to prepare for the start-up within the positioning unit, and enables to shorten the start-up time for the positioning. When using Configurator PM to download the positioning data, the data is restructured automatically, so the calculation is not necessary. However, the calculation is necessary after rewriting the poisitoning data from the ladder program.  The procedures for the calculation are as follows.
1. Change the positioning table in the shared memory.
2. Turn on the output contact Y_7 (recalculation request contact).
3. Confirm the input contact X_7 (recalculation done contact) is on (Confim the completion of the recalculation.)

If the data is not recalculated after rewriting the positioning table by the ladder program, note that the operation will be executed with the positioning table before the rewriting.

The extended area is used when the setting values of the positioning table cannot be determined until just before executing the positioning operation. For example, in the application of alignment using an image processing, the moving distance is determined by the image processing. Therefore, the positioning table cannot be determined until just before sarting the positioning operation. In that case, the positioning table is set just before the start-up of the positioning. In the extended area, the positioning table can be rewritten as needed, and the recalculation is not necessary. However, it is up to 25 tables, and Configurator PM cannot be used. The ladder programs should be used to write the positioning table in the prescribed address in the shared memory. The start-up time is longer than the standard area, and when performing the P point control or C point control in the extended area, note that the start-up time varies depending on the number of tables to be executed consecutively.
How to use each area and the precautions are as below.

|  | How to use | Number of points | Table number | Setting using Configurator PM | Setting using ladder program |
|---|---|---|---|---|---|
| Standard area | Area to be used when the setting value of the positioning table is predetermined. | 600 points | 1 to 600 | Available | Available (Calculation for restructuring is necessary.) |
| Extended area | Area to be used when the setting value of the positioning table cannot be determined until just before executing the positioning operation. | 25 points | 10001 to 10025 | Not available | Available (Calculation for restructuring is not necessary.) |

### 14.1.4 Operation When the Mode of PLC Changed to PROG. from RUN

Any start-up contact of the automatic operation (position control), manual operations (JOG operation, home return, pulser operation) turns on, and the operation will continue even if the PLC changes to the PROG. mode from the RUN mode after starting the operation.

# Chapter 15

## Errors and Warnings

# 15.1 Errors and Warnings

## 15.1.1 About Errors and Warnings

When any operational unconformity occurs in the positioningn unit RTEX, errors or warnings will occur.
When errors or warnings occur, the following operations will be performed.

| | |
|---|---|
| **Errors** | Occurs in any abnormal conditions. When a motor is operating, the operation stops. The motor stopped due to the occurrence of error will not activate until the error clear is executed. |
| **Warnings** | Occurs when any operational unconformity not abnormal conditions exist. The operation can continue even after the occurrence of warnings, and the motor continues running if the motor is operating. |

The errors and warnings can be confirmed on the data monitor and status monitor screens of the Configurator PM.

The errors and warnings occur in the positioning unit RTEX and AMP.
The area that errors/warnings occurred and the details can be indentified by the error/warning codes.

## 15.1.2 Error and Warning Logs

There are log areas to store the error/warning logs within the positioning unit RTEX.

| | |
|---|---|
| **Error log** | Max. 7 error codes can be stored for each axis (axis 1 to 8). |
| **Warnings log** | Max. 7 warning codes can be stored for each axis (axis 1 to 8). |

Once an error/warning occurs, the error/warning code will be stored in the log area of the axis that the error occurred.
When an error/warning that is not related to the axes occurs, such as an failure in the unit, the error/warning code will be stored in the log areas of all axes.
The latest error/warning codes for each axis can be checked with the Configurator PM.
When referring the error and warning logs for each axis, read the following shared memory from the PLC.

**Error log area (Shared memory  Bank 0)**

| Address | Name |
|---|---|
| 128H | Error log area of axis 1 |
| 138H | Error log area of axis 2 |
| 148H | Error log area of axis 3 |
| 158H | Error log area of axis 4 |
| 168H | Error log area of axis 5 |
| 178H | Error log area of axis 6 |
| 188H | Error log area of axis 7 |
| 198H | Error log area of axis 8 |

| Offset | Name |
|---|---|
| 00H | — |
| 01H | No. of occurrences of errors |
| 02H / 03H | Error code annunciation buffer 1 |
| 04H / 05H | Error code annunciation buffer 2 |
| 06H / 07H | Error code annunciation buffer 3 |
| 08H / 09H | Error code annunciation buffer 4 |
| 0AH / 0BH | Error code annunciation buffer 5 |
| 0CH / 0DH | Error code annunciation buffer 6 |
| 0EH / 0FH | Error code annunciation buffer 7 |

**Warning log area (Shared memory  Bank 0)**

| Address | Name |
|---|---|
| 1A8H | Warning log area of axis 1 |
| 1B8H | Warning log area of axis 2 |
| 1C8H | Warning log area of axis 3 |
| 1D8H | Warning log area of axis 4 |
| 1E8H | Warning log area of axis 5 |
| 1F8H | Warning log area of axis 6 |
| 208H | Warning log area of axis 7 |
| 218H | Warning log area of axis 8 |

| Offset | Name |
|---|---|
| 00H | — |
| 01H | No. of occurrences of warnings |
| 02H / 03H | Warning code annunciation buffer 1 |
| 04H / 05H | Warning code annunciation buffer 2 |
| 06H / 07H | Warning code annunciation buffer 3 |
| 08H / 09H | Warning code annunciation buffer 4 |
| 0AH / 0BH | Warning code annunciation buffer 5 |
| 0CH / 0DH | Warning code annunciation buffer 6 |
| 0EH / 0FH | Warning code annunciation buffer 7 |

| | |
|---|---|
| **Number of occcurrences of errors/warnings** | Stores the number of occurrences of errors and warnings. |
| **Error/warning annunciation buffers (1 to 8)** | Stores error and warning codes. The buffer 1 is always the latest code. |

## 15.1.3 Errro and Warning Clear

When an error/warning occurred, it can be cleared at the each axis that the error occurred.
Note that all the contents of the error log will be initialized, once the error/warning clear is executed.

The error/warning clear can be executed on the data monotor screen of the Configurator PM, but errors/warnings can be cleared by the error clear request flag or warning clear request flag allocated for the I/O.

Note) When an error occurred, the axis that the error occurred will not be operated until the execution of the error clear.

## 15.1.4 Errro and Warning Code Format

The error and warning codes are 32-bit data and in the format as follows.

| 32 bits (double word) | |
|---|---|
| 16 bits (word) | 16 bits (word) |
| Not used | Error/warning code |

## 15.1.5 Sample Program

The program below is a sample program to detect the occurrence of error, and to clear the error after reading the error log.
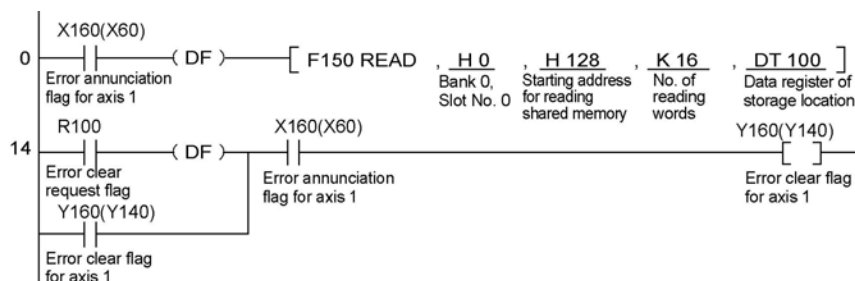


The numbers in parenthesis are the I/O numbers for the FP2.

Error logs will be stored in the following registers.

| DT101 | Number of occurrences |
|---|---|
| DT103 | Error log buffer 1 |
| DT105 | Error log buffer 2 |
| DT107 | Error log buffer 3 |
| DT109 | Error log buffer 4 |
| DT111 | Error log buffer 5 |
| DT113 | Error log buffer 6 |
| DT115 | Error log buffer 7 |

# 15.2 Change in Error Recovery Process (Ver.1.13 or later)

## 15.2.1 Overview of Operational Change

For the Positioning Unit RTEX, the whole sysmem (RTEX and AMP) should be rebooted when an unrecoverable error occurred. The methods to recover errors have been changed to decrease the man-hour taken to recover errors.
The method to recover from error occurrence varies according to the states when errors occur.

| Status when an error occurred | Description | Error type |
|---|---|---|
| Recoverable state (○) | -After an error occurred, the operating axes stop.<br>-After an error occurred, the Positioning Unit RTEX can recover the error at any timing. | All error types |
| Unrecoverable state (×) | -Error when a critical trouble occurred on the Positioning Unit RTEX system<br>-When an unrecoverable error occurred, the power supply of the Positioning Unit RTEX should be restored.<br>-However, the power supply of the AMP does not need to be restored. | System error<br>AMP communication error<br>Axis operation error |
| Recovered state after restoring the power supply of the AMP (△) | -Error occurred when a problem was cuased on AMP such as a network error and proteciton error during operation.<br>-When an error occurred, the error can be recoevered by restoring the power supply of the AMP after removing the error factor. | AMP error |

\* Refer to "List of Error Code" for the details of error types.

## 15.2.2 State of Servo After an Error Occurred

The state of the servo of the AMP after an error occurred varies depending on the occurred error types and code.

| Error type/Error code | State of servo when an error occurred | State of servo after an error was recovered |
|---|---|---|
| AMP error (From 0000H) | ・When an error occurred on the AMP, the servo automatically becomes free regardless of the state of the error occurrence.<br>・The servo lock flags (X10 to X17) also turns off automatically. | -If the state when an errro occcurred is "Recovered state after restoring the power supply", remove the error factor and restore the power supply of the AMP.<br>-After that, clear the error and make the servo on request (Y88 to 8F) again. |
| Network communication time-out (2003H) | -When communication time-out occurrred, the error information on the AMP may not be obtained. Therefoere, the state of servo at that time is one of the followings.<br><br>-When the "Communication time-out protection error" occurred on the AMP When an error occurred, the serveo automatically becomes free.<br><br>-When an error occurred on the Positioning Unit RTEX (no AMP error) The state of servo is held even if an error occurred. | -When the "Communication time-out protection error" occurred on the AMP After an error was recovered, make the servo on request (Y88 to 8F) again lock the servo.<br><br>-When an error occurred on the Positioning Unit RTEX (no AMP error) After an error was recovered, the servo automatically returns to the state before the occurrence of error. |
| Other errors | -The state of servo is held even if an error occurred. | After an error was recovered, the servo automatically returns to the state before the error occurrence. |

# 15.3 List of Error Codes (Ver.1.00 to 1.01)

The areas that errors occurred can be identified according to the range of error codes. When the error code is in the range of 0001H to 0FFFH, it indicates that the error occurred in the AMP. When the error code is one from 1000H, it indicates that the error occurred in the positioning unit.

## 15.3.1 AMP Errors (From 0001H) (Ver1.00 to 1.01)

The alarms to be output from the AMP are output as error codes as they are.
The alarms occurred in the AMP is written in decimal, however, the error codes of the positioning unit are written in hexadecimal.
(For the details of each error code and the way of handling, refer to the manual of the AMP.)
The errors occurred in the AMP cannot be basically cleared, and also the power supply of the unit must be turned off and on again.

N/A: Not available

| Error code | Error name | Description | Object | Clear |
|---|---|---|---|---|
| 000AH | Input voltage error (Generator error) | Refer to the specifications of AMP. | Each axis | N/A |
| 000BH | Control power supply shortage voltage protection | Refer to the specifications of AMP. | Each axis | N/A |
| 000CH | Overvoltage protection | Refer to the specifications of AMP. | Each axis | N/A |
| 000DH | Main power supply shortage voltage protection | Refer to the specifications of AMP. | Each axis | N/A |
| 000EH | Overcurrent protection | Refer to the specifications of AMP. | Each axis | N/A |
| 000FH | Overheat protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0010H | Overload protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0011H | A/D converter error protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0012H | Regenerative overload protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0013H | Motor thermal protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0014H | Encoder Phase A/B error protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0015H | Encoder Communication error protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0016H | Encoder Wiring error protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0017H | Encoder Communication data error | Refer to the specifications of AMP. | Each axis | N/A |
| 0018H | Positioning deviation overprotection | Refer to the specifications of AMP. | Each axis | N/A |
| 0019H | Hybrid deviation excessive error | Refer to the specifications of AMP. | Each axis | N/A |
| 001AH | Over-speed protection | Refer to the specifications of AMP. | Each axis | N/A |
| 001BH | Command error protection | Refer to the specifications of AMP. | Each axis | N/A |
| 001CH | External scale communication data error | Refer to the specifications of AMP. | Each axis | |
| 001DH | Deviation counter overflow protection | Refer to the specifications of AMP. | Each axis | N/A |
| 001EH | CPU error/WDT error | Refer to the specifications of AMP. | Each axis | N/A |
| 0022H | Software limit protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0023H | External scale communication error protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0024H | EEPROM Parameter error protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0025H | EEPROM Check code error protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0026H | Drive inhibit input protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0027H | External input trip command | Refer to the specifications of AMP. | Each axis | N/A |
| 0028H | Absolute System down error | Refer to the specifications of AMP. | Each axis | N/A |
| 0029H | Absolute Counter over error | Refer to the specifications of AMP. | Each axis | N/A |
| 002AH | Absolute Overspeed error | Refer to the specifications of AMP. | Each axis | N/A |
| 002BH | Absolute Battery error | Refer to the specifications of AMP. | Each axis | N/A |
| 002CH | Absolute One rotation counter error | Refer to the specifications of AMP. | Each axis | N/A |
| 002DH | Absolute Multi rotations counter error | Refer to the specifications of AMP. | Each axis | N/A |
| 002EH | Absolute Other errors | Refer to the specifications of AMP. | Each axis | N/A |
| 002FH | Absolute Status error | Refer to the specifications of AMP. | Each axis | N/A |

| Error code | Error name | Description | Object | Clear |
|---|---|---|---|---|
| 0030H | Encoder Phase Z error | Refer to the specifications of AMP. | Each axis | N/A |
| 0031H | Encoder CS signal error | Refer to the specifications of AMP. | Each axis | N/A |
| 0032H | External scales Status 0 Protection error | Refer to the specifications of AMP. | Each axis | N/A |
| 0033H | External scales Status 1 Protection error | Refer to the specifications of AMP. | Each axis | N/A |
| 0034H | External scales Status 2 Protection error | Refer to the specifications of AMP. | Each axis | N/A |
| 0035H | External scales Status 3 Protection error | Refer to the specifications of AMP. | Each axis | N/A |
| 0036H | External scales Status 4 Protection error | Refer to the specifications of AMP. | Each axis | N/A |
| 0037H | External scales Status 5 Protection error | Refer to the specifications of AMP. | Each axis | N/A |
| 0038H | Software limit input error | Refer to the specifications of AMP. | Each axis | N/A |
| 0039H | Current position overflow error | Refer to the specifications of AMP. | Each axis | N/A |
| 003AH | External scale Other error protection | Refer to the specifications of AMP. | Each axis | N/A |
| 003BH | Setup error | Refer to the specifications of AMP. | Each axis | N/A |
| 003CH | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 003DH | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 003EH | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 003FH | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 0040H | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 0041H | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 0042H | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 0043H | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 0044H | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 0045H | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 0046H | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 0047H | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 0048H | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 0049H | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 004AH | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 004BH | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 004CH | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 004DH | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 004EH | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 004FH | Self-diagnosis error | Refer to the specifications of AMP. | Each axis | N/A |
| 0050H | Parameter initialization sequence error | Refer to the specifications of AMP. | Each axis | N/A |
| 0051H | Serial communication error | Refer to the specifications of AMP. | Each axis | N/A |
| 0052H | Node address setting error | Refer to the specifications of AMP. | Each axis | N/A |
| 0053H | Continuous communication error protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0054H | Communication timeout error proteciton | Refer to the specifications of AMP. | Each axis | N/A |
| 0055H | Optical communication ID duplicate error/Duplicate MACID error | Refer to the specifications of AMP. | Each axis | N/A |
| 0056H | Cyclic-data not receivable | Refer to the specifications of AMP. | Each axis | N/A |
| 0057H | Emergency stop input error | Refer to the specifications of AMP. | Each axis | |
| 0058H | Microcomputer memory error | Refer to the specifications of AMP. | Each axis | |
| 005EH | Encoder EEPROM verify error | Refer to the specifications of AMP. | Each axis | N/A |
| 005FH | Motor automatic recognition error protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0060H | SEN signal selection error protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0061H | Control mode setting error protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0062H | Microcomputer peripheral system error protection | Refer to the specifications of AMP. | Each axis | N/A |
| 0063H | Other errors | Refer to the specifications of AMP. | Each axis | N/A |

## 15.3.2 System Errors (From 1000H) (Ver.1.00 to 1.01)

These are the errors that occur due to any failure within the positioning unit. The system errors are defined as the fatal errors for the system. Except for some items, the power supply must be turned off and on again to recover from the errors.

A: Available   N/A: Not available

| Error code | Error name | Description | Object | Clear | Countermeasures |
|---|---|---|---|---|---|
| 1000H | System runaway | System runaway (If the error occurred, the ALARM LED on the positioning unit is lighted. | All axes | N/A | Turn off the power supply and turn it on again.<br>If the error occurred repeatedly, please contact us. |
| 1001H | Hardware error | An error occurred in the hardware test when the power supply turned on. | All axes | N/A | |
| 1002H | Unit error | Any error occurred in the internal processing. | All axes | N/A | |
| 1003H | System processing error | An error occurred in the system processing due to any reason. | All axes | A | Check the settings.<br>If the setting values are correct and the error occurred repeatedly, please contact us. |
| 1010H | FROM writing error | An error occurred when the positioning settings were written in the positioning unit. | All axes | A | Rewrite into the FROM again.<br>If the error occurred repeatedly, please contact us. |
| 1020H | Tool operation abnormal end | An error occurred in the communication with a PC in the tool operation by the Configurator PM. | All axes | A | Check the connection of the RS232C cable connecting the PC and PLC.<br>Reboot the PC. |

## 15.3.3 AMP Communication Errors (From 2000H) (Ver.1.00 to 1.01

These are the errors occurred in the communication beteween the positioning unit and AMP.
They occur when the communication data was judged as abnormal.

A: Available   N/A: Not available

| Error code | Error name | Description | Object | Clear | Countermeasures |
|---|---|---|---|---|---|
| 2000H | AMP Communication error | A communication error occurred after the network communication has been established. | All axes | N/A | Check the power supply of the AMP is on.<br>Check the communication pathway. Carefully check the connector failure and breaking of the communication cable.<br>Also, check if any excessive noise is caused in the usage environment.<br>If the error occurred repeatedly, please contact us. |
| 2001H | AMP Data acquisition error | Failed in the data acquisition of each AMP. | Each axis | N/A | Check the status of the AMP that the error occurred. |
| 2002H | AMP Parameter error | The communication parameters of each AMP are incorrect. | Each axis | A | Check the communication pathway. Carefully check the connector failure and breaking of the communication cable.<br>Also, check if any excessive noise is caused in the usage environment.<br>If the error occurred repeatedly, please contact us. |
| 2010H | AMP Excess No. of connections | The number of the AMPs connected to the network exceeded the limit (maximum No. of axes) of the positioning unit. | All axes | A | Afer checking the connection and settings of the AMP, turn off the power supply and turn it on again. If the error occurred repeatedly, please contact us. |
| 2020H | AMP Node duplication | The AMPs with the same node number exist in the network. | All axes | N/A | |
| 2030H | AMP Node No. setting error | The AMP with a node number other than the numbers below exists.<br> 2-axis type: 1 to 2<br> 4-axis type: 1 to 4<br> 8-axis type: 1 to 8 | All axes | N/A | |

## 15.3.4 Axis Operation Errors (From 3000H) (Ver.1.00 to 1.01)

These are the errors occurred while various operations are being executed.

A: Available   N/A: Not available

| Error code | Error name | Description | Object | Clear | Countermeasures |
|---|---|---|---|---|---|
| 3000H | Not servo ready | The axis that servo is not locked was started. | Each axis | A | Confirm the servo is locked while each axis is operating. |
| 3001H | Servo off detection in operation | The servo became off during the operation being processed. | Each axis | A | Turn off the servo on input when the Busy signal for the target axis is not on.<br>Check the status of the AmP. |
| 3010H | Limit + signal detection | The input on the plus side of the limit turned on. | Each axis | A | Move the motor into the range of the limit by an operation such as the JOG operation.<br>Check the limit singal is correct. |
| 3011H | Limit – signal detection | The input on the minus side of the limit turned on. | Each axis | A | |
| 3012H | Limit signal error | Both inputs on the plus and minus sides of the limit turned on. | Each axis | A | Check the status of the limit signal.<br>Turn off the power supply and turn it on again. |
| 3020H | Software limit (plus side) detection | The movement amount of the motor exceeded the upper limit of the software limit. | Each axis | A | Move the motor into the range of the limit by an operation such as the JOG operation.<br>Check the setting values of the software limit. |
| 3021H | Software limit (minus side) detection | The movement amount of the motor exceeded the lower limit of the software limit. | Each axis | A | |
| 3030H | Axis operation error | An error occurred in the operation processing of each axis due to any reason. | Each axis | A | Check the setting values and parameters of the positioning unit.<br>If the error occurred repeatedly with the correct setting values, please contact us. |
| 3031H | Operation abnormal end | An error occurred in the operation processing of each axis due to any reason. | Each axis<br>All axes | N/A | Turn off the power supply and turn it on again.<br>If the error occurred repeatedly, please contact us. |
| 3033H | Interpolation operation error | The operation stopped as an error occurred on other interpolation axis during the interpolation operation. | Each axis | A | Check the setting values of the positioning data for the interpolation operation.<br>If the error occurred repeatedly with the correct setting values, please contact us. |
| 3050H | Torque judgment error | The torque value exceeds the setting upper and lower limit values.<br><br>This error occurs when setting<br>- torque judgment to "Available"<br>- annunciation method to "Error" | Each axis | A | Design the system within the range that the torque of the motor does not exceed the judgment value.<br>Check the torque judgment value. |
| 3051H | Actual speed judgment value error | The actual speed exceeded the setting upper and lower limit values.<br><br>This error occurs when setting<br>- actual speed judgment to "Available"<br>- annunciation method to "Error" | Each axis | A | Design the system within the range that the actual speed of the motor does not exceed the judgment value.<br>Check the actual speed judgment value. |

## 15.3.5 Setting Value Errors (From 0x4000)

These are the errors in the various setting values specified using the Configurator PM or ladder programs.

A: Available   N/A: Not available

| Error code | Error name | Description | Object | Clear | Countermeasures |
|---|---|---|---|---|---|
| 4000H | Axis group setting error | The settings of axis groups are not correct. | Each axis | A | Check the following items in the settings of the axis group and independent axis.<br>- The same axis number has been registered in more than one group.<br>- Four or more axes have been set in one group.<br>- The group is composed of one axis only. |
| 4002H | Unit setting error | The unit system for the axis setting is out of the range. | Each axis | N/A | Check if the unit is one of the followings.<br>  Pulse, mm, inch, degree |
| 4004H | Pulse number error per rotation | The pulse number is out of the range. | Each axis | N/A | Check the setting value. If the setting value is out of the range, reduce it by the following formula. (Pulse number per rotation) / (Movement amount per rotation) |
| 4005H | Movement amount error per rotation | The movement amount is out of the range. | Each axis | N/A | |
| 4010H | Software limit setting error | The upper or lower limit value of software limit is out of the range. | Each axis | N/A | Check the setting value. If the error occurred repeatedly with the correct setting value, please contact us. |
| 4020H | Limit stop deceleration time error | The limit stop deceleration time is out of the range. | Each axis | A | |
| 4021H | Error stop deceleration time error | The rror stop deceleration time is out of the range. | Each axis | A | |
| 4022H | Emergency stop deceleration time error | The emergency stop deceleration time is out of the range. | Each axis | A | |
| 4041H | Positioning completion width error | The posiitoning completion width is out of the range. | Each axis | A | |
| 4042H | Pulser setting error | The pulser input mode is incorrect. | Each axis | A | |
| 4044H | Speed rate error | The setting of the speed rate is out of the range. | Each axis | A | |
| 4102H | Home return target speed error | The target speed of the home return is out of the range. | Each axis | A | |
| 4105H | Home return acceleration time error | The acceleration time of the home return is out of the range. | Each axis | A | |
| 4106H | Home return deceleration time error | The deceleration time of the home return is out of the range. | Each axis | A | |
| 4107H | Home return setting code error | The home return setting code is incorrect. | Each axis | A | |
| 4110H | Home return creep speed error | The creep speed of the home return is out of the range. | Each axis | A | |
| 4111H | Home return returning direction error | The moving direction of the home return is out of the range. | Each axis | A | |

| Error code | Error name | Description | Object | Clear | Countermeasures |
|---|---|---|---|---|---|
| 4201H | JOG operation target speed error | The target speed of the JOG operation is out of the range. | Each axis | A | Check the setting value. If the error occurred repeatedly with the correct setting value, please contact us. |
| 4203H | JOG operation acceleration/deceleration type error | The acceleration/deceleration type of the JOG operaiton is incorrect. | Each axis | A | |
| 4204H | JOG operation acceleration time error | The acceleraiton time of the JOG operation is out of the range. | Each axis | A | |
| 4205H | JOG operation deceleration time error | The deceleraiton time of the JOG operation is out of the range. | Each axis | A | |
| 4301H | Absolute/Incremental setting error | A value other than the absolute/increment is set for the move method. | Each axis | A | |
| 4302H | Dwell time error | The setting value of the dwell time is out of the range. | Each axis | A | |
| 4303H | Positioning starting table No. error | The specified table number is 0, or it exceeds the maximum table number. | Each axis | A | |
| 4304H | Table setting error | The last table of the positioning setting tables is not point E. | Each axis | A | |
| 4400H | Positioning movement amount setting error | The movement amount of the positioning operation is out of the range. | Each axis | A | |
| 4401H | Positioning rotating acceleration/deceleration type error | The acceleration/deceleration type of the positioning operation is incorrect. | Each axis | A | |
| 4402H | Positioning acceleration time error | The acceleration time of the positioning operation is out of the range. | Each axis | A | |
| 4403H | Positioning deceleration time error | The deceleration time of the positioning operation is out of the range. | Each axis | A | |
| 4404H | Positioning target speed error | The target speed of the positioning operation is out of the range. | Each axis | A | |
| 4500H | Interpolation type error | The setting of the interpolation type is incorrect. | Each axis | A | |
| 4504H | Circular interpolation not executable | The parameter of the circular interpolation (such as center point or pass point) is incorrect. | Each axis | A | |
| 4505H | Spiral interpolation not executable | The error occurred during the spiral interpolation as the setting value is incorrect. | Each axis | A | |

# 15.4 List of Warning Codes (Ver.1.00 to 1.01)

Warning codes are from 0xA000 to differentiate from the error codes.

## 15.4.1 AMP Warnings (From A000H) (Ver.1.00 to 1.01)

These are the warning codes to be given by the unit when warnings occurred in the AMP. The warning codes to be output are represented by the warning codes output from the AMP + 0xA000.
The warning codes of the AMP are written in decimal, however, the warning codes of the positioning unit are written in hexadecimal.
(For the details of each warning code and the way of handling, refer to the manual of the AMP.)

N/A: Not available

| Warning code | Warning name | Description | Object | Clear |
|---|---|---|---|---|
| A010H | Overload warning | Refer to the specifications of AMP. | Each axis | A |
| A012H | Regenerative warning | Refer to the specifications of AMP. | Each axis | A |
| A028H | Battery warning | Refer to the specifications of AMP. | Each axis | A |
| A053H | Continuous communication error warning | Refer to the specifications of AMP. | Each axis | A |
| A054H | Communication error accumulated warning | Refer to the specifications of AMP. | Each axis | A |
| A056H | Update Counter warning | Refer to the specifications of AMP. | Each axis | A |
| A058H | Fan lock warning | Refer to the specifications of AMP. | Each axis | A |
| A059H | External scale warning | Refer to the specifications of AMP. | Each axis | A |

## 15.4.2 Unit Warnings (From B000H) (Ver.1.00 to 1.01)

These are the warning codes to be given when the warnings occurred in the positioning unit.

A: Available   N/A: Not available

| Error code | Error name | Description | Object | Clear | Countermeasures |
|---|---|---|---|---|---|
| B000H | Tool operation | The following request signals were turned on by the host PLC during the Tool operation.<br>- Positioning startup request flag (each axis)<br>- Home return request flag (each axis)<br>- JOG forward/reverse rotation request flag (each axis) | Each axis | A | Various requests from the PLC cannot be executed during the Tool operation, except the following requests.<br>- Deceleration stop request flag (each axis)<br>- Emergency stop request flag (each axis)<br>- System stop request flag (all axes)<br>- Pulser operation enabled flag (each axis) |
| B010H | Duplicate startup | The same axis was requested to start even though the axis operation has not completed. | Each axis | A | The requests for the axes being operated cannot be executed, except the following requests.<br>- Deceleration stop request flag (each axis)<br>- Emergency stop request flag (each axis)<br>- System stop request flag (all axes) |
| B050H | Torque judgment value warning | The monitored torque value exceeded the specified upper/lower limit value.<br><br>This warning occurs when setting<br>- torque judgment to "Available"<br>- annunciation method to "Warning" | Each axis | A | Design the system within the range that the torque of the motor does not exceed the judgment value.<br>Check the torque judgment value. |
| B051H | Actual speed judgment value warning | The monitored actual speed exceeded the specified upper/lower limit value.<br><br>This warning occurs when setting<br>- actual speed judgment to "Available"<br>- annunciation method to "Warning" | Each axis | A | Design the system within the range that the actual speed of the motor does not exceed the judgment value.<br>Check the actual speed judgment value. |

# 15.5 List of Error Codes (Ver.1.13 or later)

The followings are the list of error codes to be displayed on the RTEX of Ver.1.13 or later.
The areas that errors occurred can be identified according to the range of error codes. When the error code is in the range of 0001H to 0FFFH, it indicates that the error occurred in the AMP. When the error code is one from 1000H, it indicates that the error occurred in the positioning unit.
Also, the recovery method for each error code varies according to the state when each error occurred. In the following list of error code, the recoverable state is indicated with "○", the unrecoverable state is indicated with "×", and the recovered state after restoring the power supply of the AMP is indicated with "△".

## 15.5.1 AMP Errors (From 0001H) (Ver.1.13 or later)

The alarms to be output from the AMP are output as error codes as they are.
The alarms occurred in the AMP is written in decimal, however, the error codes of the positioning unit are written in hexadecimal.
(For the details of each error code and the way of handling, refer to the manual of the AMP.)
When an AMP error occurs,
When an error occurred on the AMP, the servo automatically becomes free. Execute the servo on request again after clearing the error.

| Error code | Error name | Description | Object | Clear |
|---|---|---|---|---|
| 000BH | Control power supply shortage voltage protection | Refer to the specifications of AMP. | Each axis | ○ |
| 000CH | Overvoltage protection | Refer to the specifications of AMP. | Each axis | ○ |
| 000DH | Main power supply shortage voltage protection | Refer to the specifications of AMP. | Each axis | ○ |
| 000EH | Overcurrent protection | Refer to the specifications of AMP. | Each axis | △ |
| 000FH | Overheat protection | Refer to the specifications of AMP. | Each axis | △ |
| 0010H | Overload protection | Refer to the specifications of AMP. | Each axis | ○ |
| 0012H | Regenerative overload protection | Refer to the specifications of AMP. | Each axis | △ |
| 0015H | Encoder communication error protection | Refer to the specifications of AMP. | Each axis | △ |
| 0017H | Encoder communication data error | Refer to the specifications of AMP. | Each axis | △ |
| 0018H | Positioning deviation overprotection | Refer to the specifications of AMP. | Each axis | ○ |
| 0019H | Hybrid deviation excessive error | Refer to the specifications of AMP. | Each axis | △ |
| 001AH | Over-speed protection | Refer to the specifications of AMP. | Each axis | ○ |
| 001BH | Command error protection | Refer to the specifications of AMP. | Each axis | ○ |
| 001CH | External scale communication data error | Refer to the specifications of AMP. | Each axis | △ |
| 001DH | Deviation counter overflow protection | Refer to the specifications of AMP. | Each axis | ○ |
| 0022H | Software limit protection | Refer to the specifications of AMP. | Each axis | ○ |
| 0023H | External scale communication error protection | Refer to the specifications of AMP. | Each axis | △ |
| 0024H | EEPROM parameter error protection | Refer to the specifications of AMP. | Each axis | △ |
| 0025H | EEPROM check code error protection | Refer to the specifications of AMP. | Each axis | △ |
| 0026H | Drive inhibit input protection | Refer to the specifications of AMP. | Each axis | ○ |
| 0028H | Absolute system down error | Refer to the specifications of AMP. | Each axis | △ |
| 0029H | Absolute counter over error | Refer to the specifications of AMP. | Each axis | △ |
| 002AH | Absolute overspeed error | Refer to the specifications of AMP. | Each axis | △ |
| 002CH | Absolute one rotation counter error | Refer to the specifications of AMP. | Each axis | △ |
| 002DH | Absolute multi rotations counter error | Refer to the specifications of AMP. | Each axis | △ |
| 002FH | Absolute status error | Refer to the specifications of AMP. | Each axis | △ |

| Error code | Error name | Description | Object | Clear |
|---|---|---|---|---|
| 0030H | Encoder phase Z error | Refer to the specifications of AMP. | Each axis | △ |
| 0031H | Encoder CS signal error | Refer to the specifications of AMP. | Each axis | △ |
| 0032H | External scales status 0 protection error | Refer to the specifications of AMP. | Each axis | △ |
| 0033H | External scales status 1 protection error | Refer to the specifications of AMP. | Each axis | △ |
| 0034H | External scales status 2 protection error | Refer to the specifications of AMP. | Each axis | △ |
| 0035H | External scales status 3 protection error | Refer to the specifications of AMP. | Each axis | △ |
| 0036H | External scales status 4 protection error | Refer to the specifications of AMP. | Each axis | △ |
| 0037H | External scales status 5 protection error | Refer to the specifications of AMP. | Each axis | △ |
| 003AH | External scale other error protection | Refer to the specifications of AMP. | Each axis | △ |
| 0052H | Node address setting error | Refer to the specifications of AMP. | Each axis | △ |
| 0053H | Continuous communication error protection | Refer to the specifications of AMP. | Each axis | ○ |
| 0054H | Communication timeout error protection | Refer to the specifications of AMP. | Each axis | ○ |
| 0056H | Cyclic-data not receivable | Refer to the specifications of AMP. | Each axis | ○ |
| 0057H | Emergenty stop input error | Refer to the specifications of AMP. | Each axis | ○ |
| 005FH | Motor automatic recognition error protection | Refer to the specifications of AMP. | Each axis | △ |
|  | Other errors | Contact the dealer of the AMP. | Each axis | ─ |

## 15.5.2 System Errors (From 1000H) (Ver.1.13 or later)

These are the errors that occur due to any failure within the positioning unit. The system errors are defined as the fatal errors for the system. Except for some items, the power supply must be turned off and on again to recover from the errors.

A: Available   N/A: Not available

| Error code | Error name | Description | Object | Clear | Countermeasures |
|---|---|---|---|---|---|
| 1000H | System runaway | System runaway (If the error occurred, the ALARM LED on the positioning unit is lighted. | All axes | N/A | Turn off the power supply and turn it on again. If the error occurred repeatedly, please contact us. |
| 1001H | Hardware error | An error occurred in the hardware test when the power supply turned on. | All axes | N/A | |
| 1002H | Unit error | Any error occurred in the internal processing. | All axes | N/A | |
| 1003H | System processing error | An error occurred in the system processing due to any reason. | All axes | A | Check the settings. If the setting values are correct and the error occurred repeatedly, please contact us. |
| 1010H | FROM writing error | An error occurred when the positioning settings were written in the positioning unit. | All axes | A | Rewrite into the FROM again. If the error occurred repeatedly, please contact us. |
| 1020H | Tool operation abnormal end | An error occurred in the communication with a PC in the tool operation by the Configurator PM. | All axes | A | Check the connection of the RS232C cable connecting the PC and PLC. Reboot the PC. |

## 15.5.3 AMP Communication Errors (From 2000H) (Ver.1.13 or later)

These are the errors occurred in the communication beteween the positioning unit and AMP.
They occur when the communication data was judged as abnormal.

A: Available   N/A: Not available

| Error code | Error name | Description | Object | Clear | Countermeasures |
|---|---|---|---|---|---|
| 2000H | AMP Communication error | A communication error occurred after the network communication has been established. | All axes | N/A | Check the power supply of the AMP is on. Check the communication pathway. Carefully check the connector failure and breaking of the communication cable. Also, check if any excessive noise is caused in the usage environment. If the error occurred repeatedly, please contact us. |
| 2001H | AMP Data acquisition error | Failed in the data acquisition of each AMP. | Each axis | A | Check the status of the AMP that the error occurred. |
| 2002H | AMP Parameter error | The communication parameters of each AMP are incorrect. | Each axis | A | Check the communication pathway. Carefully check the connector failure and breaking of the communication cable. Also, check if any excessive noise is caused in the usage environment. If the error occurred repeatedly, please contact us. |
| 2003H | Network communication timeout | Time-out occurred in communication between the Positioning Unit RTEX and AMP, and communication was cut off. | Each axis | A | Check the status of the AMP. (As information on the AMP cannot be obtained when communication is cut off, an error on the AMP may not be obtained.) Check the communication cable. |
| 2010H | AMP Excess No. of connections | The number of the AMPs connected to the network exceeded the limit (maximum No. of axes) of the positioning unit. | All axes | N/A | Afer checking the connection and settings of the AMP, turn off the power supply and turn it on again. If the error occurred repeatedly, please contact us. |
| 2020H | AMP Node duplication | The AMPs with the same node number exist in the network. | All axes | N/A | |
| 2030H | AMP Node No. setting error | The AMP with a node number other than the numbers below exists. 2-axis type: 1 to 2 4-axis type: 1 to 4 8-axis type: 1 to 8 | All axes | N/A | |

## 15.5.4 Axis Operation Errors (From 3000H) (Ver.1.13 or later)

These are the errors occurred while various operations are being executed.

| Error code | Error name | Description | Object | Clear | Countermeasures |
|---|---|---|---|---|---|
| 3000H | Not servo ready | The axis that servo is not locked was started. | Each axis | A | Confirm the servo is locked while each axis is operating |
| 3001H | Servo off detection in operation | The servo became off during the operation being processed. | Each axis | A | Turn off the servo on inptu when the Busy signal for the target axis is not on. Check the status of the AMP. |
| 3005H | Main power supply off error | The servo on was requested when the main power supply of the AMP was off. | Each axis | A | - Turn the servo on after the main power supply has been turned on. - Check the voltage of the main power supply. |
| 3010H | Limit + signal detection | The input on the plus side of the limit turned on. | Each axis | A | Move the motor into the range fo the limit by an operation such as the JOG operation. Check the limit signal is correct. |
| 3011H | Limit – signal detection | The input on the minus side of the limit turned on. | Each axis | A | |
| 3012H | Limit signal erro | Both inputs on the plus and imnus sides of the limit turned on. | Each axis | A | Check the status of the limit signal. |
| 3020H | Software limit (plus side) detection | The movement amount of the motor exceeded the upper limit of the software limit. | Each axis | A | Move the motor into the range of the limit by an operation such as the JOG operation. Check the setting values of the software limit. |
| 3021H | Software limit (minus side) detection | The movement amount of the motor exceeded the lower limit of the software limit. | Each axis | A | |
| 3030H | Axis operation error | An error occurred in the operation processing of each axis due to any reason. | Each axis | A | Check the setting values and parameters of the positioning unit. If the error occurred repeatedly with the correct settign values, please contact us. |
| 3031H | Operation abnormal end | An error occurred in the operation processing of each axis due to any reason. | Each axis All axes | A | If the error occurred repeatedly, please contact us. |
| 3032H | Axis group operation error | ・The setting of axis group was changed during the operation or when requesting the stop. ・An unconnected axis was specified for the axis group. | Each axis | A | Changing the axis group should be performed when the axis stops. Also, do not make the stop request. Check the setting of the axis group. |
| 3033H | Interpolation operation error | The operation stopped as an error occurred on other interpolation axis during the interpolation operaiton. | Each axis | A | Check the setting values of the positioning data for the interpolation operation. If the error occurred repeatedly with the correct setting values, please contact us. |
| 3034H | Axis group not settable （In pulser operation） | The setting of the axis group was changed during the pulser operaiton. | Each axis | A | Changing the axis group should be performed when the pulser operation enalbed signal is off. |
| 3050H | Torque judgment erro | The torque value exceeds the setting upper and lower limit values. This error occurs when setting - torque judgment to "Available" - annunciation emthod to "Error" | Each axis | A | Design the system within the range that the torque of the motor does nto exceed the judgment value. Check the torque judgment value. |

| Error code | Error name | Description | Object | Clear | Countermeasures |
|---|---|---|---|---|---|
| 3040H | Synchronous operation group error | The synchronous group was changed during the synchronous operation or when requesting the stop in the synchronous operation.<br><br>・An unconnected axis number was specified.<br>・An error occurred in the home return of the synchronous operation. | Each axis | A | Changing the synchronous group should be performed when the busy signal for the axes to be synchronized is off.<br>Also, it should be performed when various stop request signals (system stop, emergency stop, deceleration stop) are off.<br><br>Specify an axis number existing on the network. |
| 3042H | Synchronous operation home return error | ・The home return process was executed with setting the synchronous operation to "Enabled" when using the synchronous mode A.<br><br>・A method other than the usable home return mothods was executed when using the synchronous mode B. | Each axis | A | Simultaneous mode A:<br>Set the simultaneous operation to "Disabled" when performing the home return.<br><br>Simultaneous mode B:<br>Select a usable home return method. |
| 3043H | Synchronous operation error | The operation was stopped as an error has occurred on another axis in the synchronous operaiton. | Each axis | A | Check the unit setting of the stopped axis and the AMP setting. If the error occurred repeatedly with the correct setting values, please contact us. |
| 3044H | Synchronous operation not settable （In pulser operation） | The setting of the synchronous opration was changed during the pulser operation. | Each axis | A | Changing the setting of the synchronous operation should be performed when the pulser operation enabled signal is off. |
| 3045H | Synchronous operation mismatch error | The difference between the movement amounts of the target axes for the synchronous operation exceeded the specified difference threshold. | Each axis | A | Check the operation of the target axes for the synchronous operation. |
| 3050H | Torque judgment erro | The torque value exceeds the setting upper and lower limit values.<br><br>This error occurs when setting<br>- torque judgment to "Available"<br>- annunciation emthod to "Error" | Each axis | A | Design the system within the range that the torque of the motor does nto exceed the judgment value.<br>Check the torque judgment value. |
| 3051H | Actual speed judgment value error | The actual speed exceeded the setting upper and lower limit values.<br><br>This error occurs when setting<br>- actual speed judgment to "Available"<br>- annunciation method to "Error" | Each axis | A | Design the system within the range that the actual speed of the motor does not exceed the judgment value.<br>Check the actual speed jdgement value. |

## 15.5.5 Setting Value Errors (From 4000H) (Ver.1.13 or later)

These are the errors in the various setting values specified using the Configurator PM or ladder programs.

| Error code | Error name | Description | Object | Clear | Countermeasures |
|---|---|---|---|---|---|
| 4000H | Axis group setting error | The settings of axis groups are not correct. | Each axis | A | Check the following items in the settings of the axis group and independent axis. <br> - The same axis number has been registered in more than one group. <br> - Four or more axes have been set in one group. <br> - The group is composed of one axis only. |
| 4002H | Unit setting error | The unit system for the axis setting is out of the range. | Each axis | A | Check if the unit is one of the followings. <br> Pulse, mm, inch, degree |
| 4004H | Pulse number error per rotation | The pulse number is out of the range. | Each axis | A | Check the setting value. <br> If the setting value is out of the range, reduce it by the following formula. <br> (Pulse number per rotation) / (Movement amount per rotation) |
| 4005H | Movement amount error per rotation | The movement amount is out of the range. | Each axis | A | |
| 4010H | Software limit setting error | The upper or lower limit value of software limit is out of the range. | Each axis | A | Check the settign value. <br> If the error occurred repeatedly with the correct setting value, please contact us. |
| 4020H | Limit stop deceleration time error | The limit stop deceleration time is out of the range. | Each axis | A | |
| 4021H | Error stop deceleration time error | The error stop deceleration time is out of the range. | Each axis | A | |
| 4022H | Emergency stop deceleration tiem error | The emergency stop deceleration time is out of the range. | Each axis | A | |
| 4028H | Auxiliary output setting error | The settings of auxiliary output are not correct. <br><br> ・A mode other than With mode or Delay mode for the auxiliary output mode has been set. <br> ・A value other than 0 to 100 (%) was specified for the auxiliary output delay ratio in the delay mode. | Each axis | A | |

| Error code | Error name | Description | Object | Clear | Countermeasures |
|---|---|---|---|---|---|
| 4030H | Synchronous group setting error | The settings of synchronous group are not correct.<br><br>・The same axis has been set for the synchronous groups 1 and 2.<br>・Either master axis or slave axis has not been set. (All bits are off.)<br>・Multiple axes have been set for the master or slave axis.<br>・The same axis has been set for the master and slave axes.<br>・The slave axis has been set to the interpolation group. | Each axis | A | |
| 4041H | Positioning completion width error | The positioning completion width is out of the range. | Each axis | A | |
| 4042H | Pulser setting error | The pulser inptu mode is incorrect. | Each axis | A | |
| 4044H | Speed rate error | The stting of th speed rate is out of the range. | Each axis | A | |
| 4080H | JOG positioning acceleration/deceleration method error | The acceleration/deceleration method of the JOG positioning is out of the range. | Each axis | A | |
| 4081H | JOG positioning acceleration time error | The acceleration time of the JOG positioning is out of the range. | Each axis | A | |
| 4082H | JOG positioning deceleration time error | The deceleration time of the JOG positioning is out of the range. | Each axis | A | |
| 4083H | JOG positioning target speed error | The target speed of the JOG positioning is out of the range. | Each axis | A | Check the settign value.<br>If the error occurred repeatedly with the correct setting value, please contact us. |
| 4102H | Home return target speed error | The target speed of the home return is out of the range. | Each axis | A | |
| 4105H | Home return acceleration time error | The acceleration time of the home return is out of the range. | Each axis | A | |
| 4106H | Home return deceleration time error | The deceleration time of the home return is out of the range. | Each axis | A | |
| 4107H | Home return setting code error | The home return setting code is incorrect. | Each axis | A | |
| 4110H | Home return creep speed error | The creep speed of the home return is out of the range. | Each axis | A | |
| 4111H | Home return returning direction error | The moving direction of the home return is out of the range. | Each axis | A | |
| 4112H | Home return limit error | The limit switch is disabled.<br>(It occurs when the home return method is set to the stop-on-contact method 1 or 2.) | Each axis | A | |
| 4115H | Home return stop-on-contact torque value error | The home return stop-on-contact torque value is out of the range.<br>(It occurs when the home return method is set to the stop-on-contact method 1 or 2.) | Each axis | A | |
| 4116H | Home return stop-on-contact judgment time error | The home return stop-on-contact judgment time is out of the range.<br>(It occurs when the home return method is set to the stop-on-contact method 1 or 2.) | Each axis | A | |
| 4120H | Coordinate origin error | The coordinate origin is out of the range. | Each axis | A | |
| 4201H | JOG operaiton target speed error | The target speed of the JOG operation is out of the range. | Each axis | A | |

| Error code | Error name | Description | Object | Clear | Countermeasures |
|---|---|---|---|---|---|
| 4203H | JOG operation acceleration/deceleration type error | The acceleration/deceleration type of the JOG operation is incorrect. | Each axis | A | |
| 4204H | JOG operation acceleration time error | The acceleration time of the JOG operation is out of the range. | Each axis | A | |
| 4205H | JOG operation deceleration time error | The deceleration time of the JOG operation is out of the range. | Each axis | A | |
| 4250H | Current value update error | The setting value of the current value update is out of the range. | Each axis | A | |
| 4251H | Realtime torque limit value error | The specified realtime torque value is out of the range. | Each axis | A | |
| 4301H | Absolute/incremental setting error | A value other than the absolute/increment is set for the move method. | Each axis | A | |
| 4302H | Dwell time error | The setting value of the dwell time is out of the range. | Each axis | A | |
| 4303H | Positioning starting table No. error | The specified table number is 0, or it exceeds the maximum table number. | Each axis | A | |
| 4304H | Table setting error | The last table of the positioning setting tables is not point E. | Each axis | A | Check the settign value. If the error occurred repeatedly with the correct setting value, please contact us. |
| 4400H | Positioning movement amount setting error | The movement amount of the positioning operation is out of the range. | Each axis | A | |
| 4401H | Positioning acceleration/deceleration type error | The acceleration/deceleration type of the positioning operation is incorrect. | Each axis | A | |
| 4402H | Positioning acceleration time error | The acceleration time of the positioning operation is out of the range. | Each axis | A | |
| 4403H | Positioning deceleration time error | The deceleration time of the positionign operation is out of the range. | Each axis | A | |
| 4404H | Positioning target speed error | The target speed of the positioning operation is out of the range. | Each axis | A | |
| 4500H | Interpolation type error | The setting of the interpolation type is incorrect. | Each axis | A | |
| 4504H | Circular interpolation not executable | The parameter of the circular interpolation (such as center point or pass point) is incorrect. | Each axis | A | |
| 4505H | Spiral interpolation not executable | The error occurred during the spiral interpolation as the setting value is incorrect. | Each axis | A | |

# 15.6 List of Warning Codes (Ver.1.13 or later)

Warning codes are from A000H to differentiate from the error codes.

## 15.6.1 AMP Warning (From A000H) (Ver.1.13 or later)

These are the warning codes to be given by the unit when warnings occurred in the AMP. The warning codes to be output are represented by the warning codes output from the AMP + A000H.
The warning codes of the AMP are written in decimal, however, the warning codes of the positioning unit are written in hexadecimal.
(For the details of each warning code and the way of handling, refer to the manual of the AMP.)

A: Available

| Warning code | Warning name | Description | Object | Clear |
|---|---|---|---|---|
| A010H | Overload warning | Refer to the specifications of AMP. | Each axis | A |
| A012H | Regenerative warning | Refer to the specifications of AMP. | Each axis | A |
| A028H | Battery warning | Refer to the specifications of AMP. | Each axis | A |
| A053H | Continuous communication error warning | Refer to the specifications of AMP. | Each axis | A |
| A054H | Communication error accumulated warning | Refer to the specifications of AMP. | Each axis | A |
| A056H | Update Counter warning | Refer to the specifications of AMP. | Each axis | A |
| A058H | Fan lock warning | Refer to the specifications of AMP. | Each axis | A |
| A059H | External scale warning | Refer to the specifications of AMP. | Each axis | A |

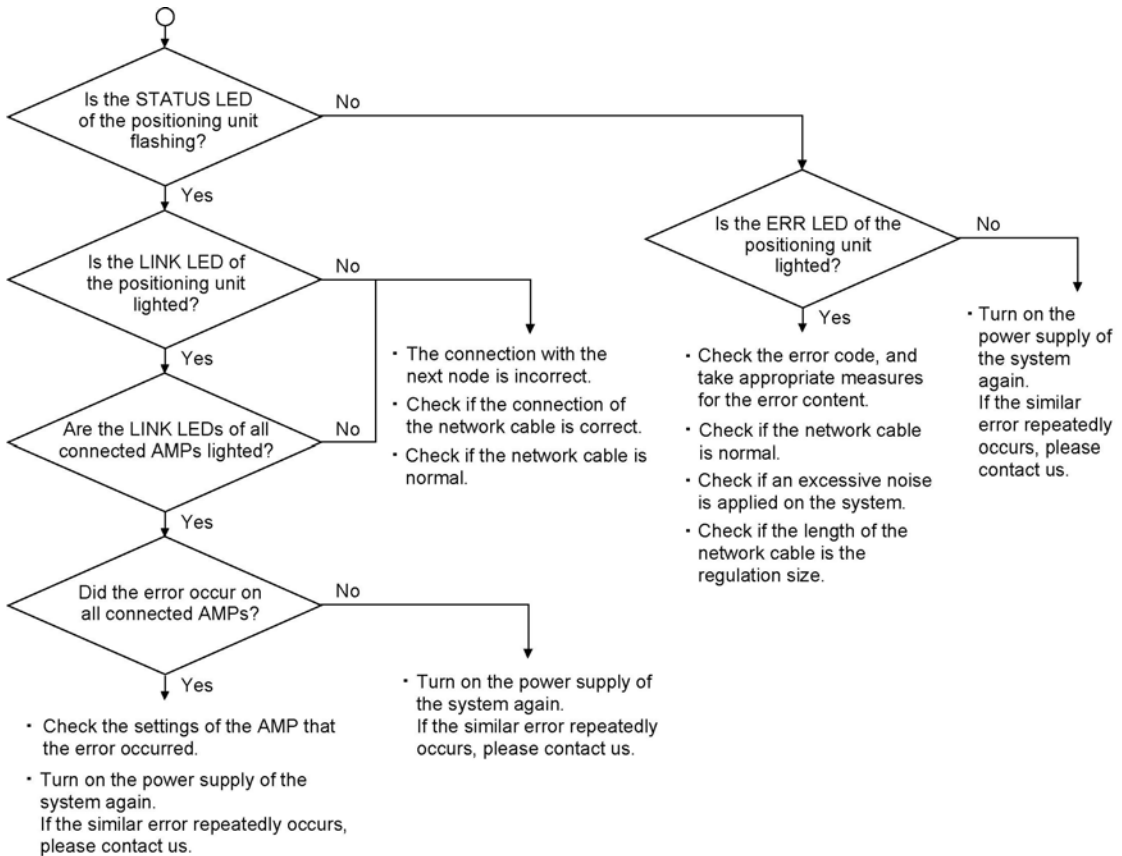## 15.6.2 Unit Warnings (From B000H) (Ver.1.13 or later)

These are the warning codes to be given when the warnings occurred in the positioning unit.

| Error code | Error name | Description | Object | Clear | Countermeasures |
|---|---|---|---|---|---|
| B000H | Tool operation | The following request signals were turned on by the host PLC during the Tool operation. Positioning startup request flag (each axis) Home return request flag (each axis) JOG forward/reverse rotation request flag (each axis) | Each axis | A | Various requests from the PLC cannot be executed during the Tool operation, except the following requests. Deceleration stop request flag (each axis) Emergency stop request flag (each axis) System stop request flag (all axes) Pulser operation enabled flag (each axis) |
| B010H | Duplicate startup | The same axis was requested to start even though the axis operation has not completed. | Each axis | A | The requests for the axes being operated cannot be executed, except the following requests. Deceleration stop request flag (each axis) Emergency stop request flag (each axis) System stop request flag (all axes) |
| B030H | J point simultaneous startup warning | "J point sepped change contact" and J point positioning start contact" was turned on simultaneously during the JOG positioning (J point) operation. | Each axis | ○ | When the both contacts have been turned on simultaneously, "J point positioning start contact" has a priority, and "J point speed change contact" is ignored. |
| B050H | Torque judgment value warning | The monitored torque value exceeded the specified upper/lower limit value.  This warning occurs when setting - torque judgment to "Available" annunciation method to "Warning" | Each axis | A | Design the system within the range that the torque of the motor does not exceed the judgment value. Check the torque judgment value. |
| B051H | Actual speed judgment value warning | The monitored actual speed exceeded the specified upper/lower limit value.  This warning occurs when setting - actual speed judgment to "Available" annunciation method to "Warning" | Each axis | A | Design the system within the range that the actual speed of the motor does not exceed the judgment value. Check the actual speed judgment value. |

# Chapter 16

# Troubleshooting

# 16.1 Cannot Communication With AMP

Is the STATUS LED of the positioning unit flashing?

- No

Yes

Is the LINK LED of the positioning unit lighted?

- No

Yes

Are the LINK LEDs of all connected AMPs lighted?

- No

Yes

Did the error occur on all connected AMPs?

- No

Yes

- Check the settings of the AMP that the error occurred.
- Turn on the power supply of the system again.
  If the similar error repeatedly occurs, please contact us.

- The connection with the next node is incorrect.
- Check if the connection of the network cable is correct.
- Check if the network cable is normal.

- Turn on the power supply of the system again.
  If the similar error repeatedly occurs, please contact us.

Is the ERR LED of the positioning unit lighted?

- No

Yes

- Check the error code, and take appropriate measures for the error content.
- Check if the network cable is normal.
- Check if an excessive noise is applied on the system.
- Check if the length of the network cable is the regulation size.

- Turn on the power supply of the system again.
  If the similar error repeatedly occurs, please contact us.

# Chapter 17

# Specifications

# 17.1 Table of Specificationa

## 17.1.1 General Specifications

| Item | Description | |
|---|---|---|
| | **FPΣ Positioning Unit RTEX** | **FP2 Positioning Unit RTEX** |
| Ambient operating temperature | 0 to +55 °C | |
| Ambient storage temperature | -20 to +70 °C | |
| Ambient operating humidity | 30 to 85 % RH (at25 °C non-condensing) | |
| Ambient storage humidity | 30 to 85 % RH (at25 °C non-condensing) | |
| Breakdown voltage | 500 V AC, 1 minute<br>Between the various pins of the external connector and the ground (However, excluding F.E. terminal) | 1500 V AC, 1 minute<br>Between the various pins of the external connector and the ground (However, excluding F.E. terminal) |
| Insulation resistance | 100MΩ or more (measured with 500 V DC testing)<br>Between the various pins of the external connector and the ground (However, excluding F.E. terminal) | |
| Vibration resistance | 10 to 55 Hz, 1 cycle/min.<br>Double amplitude of 0.75 mm, 10 min. each in the X, Y, Z directions | |
| Shock resistance | Shock of 98 m/s $^2$ or more, 4 times in the X, Y, Z directions | |
| Noise immunity | 1000 V[P-P] with pulse widths 50ns and 1µs (based on in-house measurements) | 1500 V[P-P] with pulse widths 50ns and 1µs (based on in-house measurements) |
| Operating environment | Free of corrosive gases and excessive dust | |
| Internal current consumption | 300 mA or less | 300 mA or less |
| Weight | Approx. 90 g | Approx. 120 g |

## 17.1.2 Network Specifications

| Item | Description |
|---|---|
| Baud rate | 100 Mbps |
| Physical layer | 100 BASE-TX Full duplex |
| Cable | Shielded twisted-pair cable (category 5e or more) |
| Topology | Ring |
| Insulation | Pulse transformer (Common mode choke is built in.) |
| Connector | 8-pin RJ45 |
| Max. cable length | Between nodes: 60 m   Total length: 200 m |
| Communication cycle | 0.5 ms (1 ms for update of position command) |
| Max. number of axes | 8 axes |
| Operation command | Position command |

## 17.1.3 Performance Specifications of Units

**FPΣ Positioning unit RTEX individual specifications**

| Item | Description | | |
|---|---|---|---|
| | **2-axis type** | **4-axis type** | **8-axis type** |
| Product number | AFPG43610 | AFPG43620 | AFPG43630 |
| Part number | FPG-PN2AN | FPG-PN4AN | FPG-PN8AN |
| Number of axes controlled | 2 axes/1 system | 4 axes/1 system | 8 axes/1 system |
| Occupied I/O points | Input: 128 points, Output: 128 points (SX128, SY128) | | |
| Restriction on installation | A maximum of 2 units can be connected on the left side of the control unit regardless of number of axes. | | |

**FP2 Positioning unit RTEX individual specifications**

| Item | Description | | |
|---|---|---|---|
| | **2-axis type** | **4-axis type** | **8-axis type** |
| Product number | AFP243610 | AFP243620 | AFP243630 |
| Part number | FP2-PN2AN | FP2-PN4AN | FP2-PN8AN |
| Number of axes controlled | 2 axes/1 system | 4 axes/1 system | 8 axes/1 system |
| Occupied I/O points | Input: 128 points, Output: 128 points (SX128, SY128) | | |
| Restriction on installation | Only the restriction of the supply current of power supply unit. | | |

## 17.1.4 Common Specifications

<table>
<tr><th colspan="2" rowspan="2">Item</th><th colspan="3">Description</th></tr>
<tr><th>2-axis type</th><th>4-axis type</th><th>8-axis type</th></tr>
<tr><td colspan="2">Number of axes controlled</td><td>2 axes/1 system</td><td>4 axes/1 system</td><td>8 axes/1 system</td></tr>
<tr><td colspan="2">Interpolation control</td><td>2-axis linear interpolation, 2-axis circular interpolation</td><td colspan="2">2-axis linear interpolation, 3-axis linear interpolation<br>2-axis circular interpolation, 3-axis sprial interpolation</td></tr>
<tr><td colspan="2">Occupied I/O points</td><td colspan="3">Input: 128 points, Output: 128 points (SX128, SY128)</td></tr>
<tr><td rowspan="19" style="writing-mode:vertical">Automatic operation</td></tr>
</table>

| Item | | | Description | | |
|---|---|---|---|---|---|
| | | | 2-axis type | 4-axis type | 8-axis type |
| Number of axes controlled | | | 2 axes/1 system | 4 axes/1 system | 8 axes/1 system |
| Interpolation control | | | 2-axis linear interpolation, 2-axis circular interpolation | 2-axis linear interpolation, 3-axis linear interpolation 2-axis circular interpolation, 3-axis sprial interpolation | |
| Occupied I/O points | | | Input: 128 points, Output: 128 points (SX128, SY128) | | |
| Automatic operation | Position control | Position setting modes | Absolute (absolute position setting), Increment (relative position setting) | | |
| | | Position setting units | pulse μm (Minimum command unit is selected from 0.1 μm or 1 μm.) inch ((Minimum command unit is selected from 0.00001 inch or 0.0001 inch.) degree ((Minimum command unit is selected from 0.1 degree or 1 degree.) | | |
| | | Position command range | Pulse: -1,073,741,823 to 1,073,741, 823 pulse μm (0.1 μm): -107,374,182.3 to 107,374,182.3 μm μm (1 μm): 1,073,741,823 to 1,073,741,823 μm inch (0.00001 inch): -10,737.41823 to 10,737.41823 inch inch (0.0001 inch): -107,374.1823 to 107,374.1823 inch degree (0.1 degree): -107,374,182.3 to 107,374,182.3 degree degree (1 degree): -1,073,741,823 to 1,073,741,823 degree | | |
| | | Speed command range | Pulse:1 to 32,767,000 pps μm: 1 to 32,767,000 μm/s inch: 0.001 to 32,767.000 inch/s degree: 0.001 to 32,767.000 rev/s | | |
| | | Acceleration/ deceleration | Linear acceleration/deceleration, S-shaped acceleration/deceleration | | |
| | | Acceleration time | 0 to 10,000 ms (can set in 1 ms) | | |
| | | Deceleration time | 0 to 10,000 ms (can set in 1 ms) | | |
| | | Number of positioning tables | Each axis   Standard area: 600 points, extended area: 25 points | | |
| | | Control method — Independent | PTP control (E point control, C point control), CP control (P point control) | | |
| | | Control method — 2-axis interpolation — Linear | E point, P point, C point control   Composite speed or long axis speed specification | | |
| | | Control method — 2-axis interpolation — Circular | E point, P point, C point control   Center point or pass point specification | | |
| | | Control method — 3-axis interpolation — Linear | E point, P point, C point control   Composite speed or long axis speed specification | | |
| | | Control method — 3-axis interpolation — Spiral | E point, P point, C point control   Center point or pass point specification | | |
| | | Start-up speed | Standard area: 3 ms or less, extended area: 5 ms or less | | |
| | | Other functions — Dwell time | 0 to 32,767 ms (can set in 1ms) | | |

| Item | | | Description | | |
|---|---|---|---|---|---|
| | | | **2-axis type** | **4-axis type** | **8-axis type** |
| Manual operation | JOG | Speed command range | Pulse:1 to 32,767,000 pps<br>μm: 1 to 32,767,000 μm/s<br>inch: 0.001 to 32,767.000 inch/s<br>degree: 0.001 to 32,767.000 rev/s | | |
| | | Acceleration/deceleration | Linear acceleration/deceleration, S-shaped acceleration/deceleration | | |
| | | Acceleration time | 0 to 10,000 ms (can set in 1 ms) | | |
| | | Deceleration time | 0 to 10,000 ms (can set in 1 ms) | | |
| | Home return | Speed command range | Pulse:1 to 32,767,000 pps<br>μm: 1 to 32,767,000 μm/s<br>inch: 0.001 to 32,767.000 inch/s<br>degree: 0.001 to 32,767.000 rev/s | | |
| | | Acceleration/deceleration | Linear acceleration/deceleration | | |
| | | Acceleration time | 0 to 10,000 ms (can set in 1 ms) | | |
| | | Deceleration time | 0 to 10,000 ms (can set in 1 ms) | | |
| | | Return method | DOG method | | |
| | Pulser | Speed command range | Activates in synchronization with pulser input | | |
| Stop function | Deceleration stop | Deceleration time | Deceleration time of active operation | | |
| | Emergency stop | Deceleration time | 0 to 10,000 ms (can set in 1 ms) | | |
| | Limit stop | Deceleration time | 0 to 10,000 ms (can set in 1 ms) | | |
| | Error stop | Deceleration time | 0 to 10,000 ms (can set in 1 ms) | | |
| | System stop | Deceleration time | Immediate stop (0 ms) | | |
| Other specifications | Software limit function | Setting range | Pulse: -1,073,741,823 to 1,073,741, 823 pulse<br>μm (0.1 μm): -107,374,182.3 to 107,374,182.3 μm<br>μm (1 μm): 1,073,741,823 to 1,073,741,823 μm<br>inch (0.00001 inch): -10,737.41823 to 10,737.41823 inch<br>inch (0.0001 inch): -107,374.1823 to 107,374.1823 inch<br>degree (0.1 degree): 0.0 to 359.9 degree<br>degree (1 degree): 0 to 359 degree | | |
| | Monitor judgment | Torque judgment | Torque judgment  Valid/invalid  Error/warning  selectable<br>0.0 to 500% | | |
| | | Actual speed judgment | Actual speed judgment  Valid/invalid  Error/warning  selectable<br>0.0 to ±5000 rpm | | |
| | Backup | | Parameters and positioning data are stored in flash memory. (Battery is not required.) | | |
| | - Limit input CWL, CCWL monitor, Near home (DOG) monitor<br>- General-purpose input: 2 points, general-purpose output: 2 points (Input/output from AMP)<br>- Auxiliary output contact, auxiliary output code<br>- Torque | | | | |

# 17.2 Table of I/O Area

**Followings are occupied I/O when FPΣ/FP2 Positioning unit RTEX is installed in the slot 0.**

| Contact allocation FPΣ | | Contact allocation FP2 | | Target axis | Name | Descriptions |
|---|---|---|---|---|---|---|
| WX10 | X100 | WX0 | X0 | All axes | Link establishment annunciation | Indicates that the network link was established, and announce the system started running. |
| | X101 | | X1 | - | **-** | - |
| | X102 | | X2 | - | - | - |
| | X103 | | X3 | All axes | Write FROM | Announces that data such as positioning parameters in the shared memroy is being written in FROM. |
| | X104 | | X4 | All axes | Tool operation | Contact to indicate the Tool operation from Configurator PM. The start-up from I/O is not available during the Tool operaiton. If it performs, a warning will occur. |
| | X105 | | X5 | - | - | - |
| | X106 | | X6 | - | - | - |
| | X107 | | X7 | All axes | Recalculation done | If the recalculation request contact (Y_7) turns on, the positioning data of the shared memory (standard area) will be restructured. This contact will turn on after restructuring completes.<br>If the recalcuation request contact (Y_7) turns on again, this contact will be off once.<br>Note) It is used only when the positioning data has been rewritten by laddar programs. |
| | X108 | | X8 | 1 axis | Each axis connection confirmation | Turns on when the corresponding axis exists. |
| | X109 | | X9 | 2 axis | | |
| | X10A | | XA | 3 axis | | |
| | X10B | | XB | 4 axis | | |
| | X10C | | XC | 5 axis | | |
| | X10D | | XD | 6 axis | | |
| | X10E | | XE | 7 axis | | |
| | X10F | | XF | 8 axis | | |
| WX11 | X110 | WX1 | X10 | 1 axis | Servo lock | Turns on when the corresponding axis is in the state of servo lock. |
| | X111 | | X11 | 2 axis | | |
| | X112 | | X12 | 3 axis | | |
| | X113 | | X13 | 4 axis | | |
| | X114 | | X14 | 5 axis | | |
| | X115 | | X15 | 6 axis | | |
| | X116 | | X16 | 7 axis | | |
| | X117 | | X17 | 8 axis | | |
| | X118 | | X18 | 1 axis | BUSY | Turns on when the corresponding axis is operating. |
| | X119 | | X19 | 2 axis | | |
| | X11A | | X1A | 3 axis | | |
| | X11B | | X1B | 4 axis | | |
| | X11C | | X1C | 5 axis | | |
| | X11D | | X1D | 6 axis | | |
| | X11E | | X1E | 7 axis | | |
| | X11F | | X1F | 8 axis | | |

| Contact allocation | | Target axis | Name | Descriptions |
|---|---|---|---|---|
| FPΣ | FP2 | | | |
| WX12 X120 | WX2 X20 | 1 axis | Operation done | Turns on when the operation command for the corresponding axis completed and the position error became in the specified completion width. For P point control and C point control of the automatic operation, turns on when the operation for all the tables completed. After this contact turned on, the on-state continues until the next control activates. |
| X121 | X21 | 2 axis | | |
| X122 | X22 | 3 axis | | |
| X123 | X23 | 4 axis | | |
| X124 | X24 | 5 axis | | |
| X125 | X25 | 6 axis | | |
| X126 | X26 | 7 axis | | |
| X127 | X27 | 8 axis | | |
| X128 | X28 | 1 axis | Home return done | Turns on when the home return operation for the corresponding axis completed. After this contact turned on, the on-state continues until the next control activates. |
| X129 | X29 | 2 axis | | |
| X12A | X2A | 3 axis | | |
| X12B | X2B | 4 axis | | |
| X12C | X2C | 5 axis | | |
| X12D | X2D | 6 axis | | |
| X12E | X2E | 7 axis | | |
| X12F | X2F | 8 axis | | |
| WX13 X130 | WX3 X30 | - | - | - |
| X131 | X31 | - | - | - |
| X132 | X32 | - | - | - |
| X133 | X33 | - | - | - |
| X134 | X34 | - | - | - |
| X135 | X35 | - | - | - |
| X136 | X36 | - | - | - |
| X137 | X37 | - | - | - |
| X138 | X38 | 1 axis | Near home | Monitor contact for the near home input connected to the corresnponding AMP. |
| X139 | X39 | 2 axis | | |
| X13A | X3A | 3 axis | | |
| X13B | X3B | 4 axis | | |
| X13C | X3C | 5 axis | | |
| X13D | X3D | 6 axis | | |
| X13E | X3E | 7 axis | | |
| X13F | X3F | 8 axis | | |
| WX14 X140 | WX4 X40 | 1 axis | Imposition | Turns on when the position error of the corresponding axis is within the imposition range specified in AMP. The setting of the imposition range can be changed by PANATERM that is a tool of AMP. |
| X141 | X41 | 2 axis | | |
| X142 | X42 | 3 axis | | |
| X143 | X43 | 4 axis | | |
| X144 | X44 | 5 axis | | |
| X145 | X45 | 6 axis | | |
| X146 | X46 | 7 axis | | |
| X147 | X47 | 8 axis | | |
| X148 | X48 | 1 axis | Auxiliary contact | Turns on when the corresponding positioning table of the corresponding axis was executed. Use Configurator PM or directly write in the shared memory for setting to able/disable the auxiliary contact. |
| X149 | X49 | 2 axis | | |
| X14A | X4A | 3 axis | | |
| X14B | X4B | 4 axis | | |
| X14C | X4C | 5 axis | | |
| X14D | X4D | 6 axis | | |
| X14E | X4E | 7 axis | | |
| X14F | X4F | 8 axis | | |

| Contact allocation | | | Target axis | Name | Descriptions |
|---|---|---|---|---|---|
| FPΣ | | FP2 | | | |
| WX15 | X150 | X50 | 1 axis | Limit + | Monitor contact of the limit + and – connected to the corresponding AMP.<br>During the positioning operation, JOG operation or pulser operation, performs the deceleration stop when the limit input that is an extension of the operating direction turned on.<br>The deceleration stop time during the limit input can be changed in the shared memory.<br>It will be the contact for the automatic inversion when performing the home return. |
| | X151 | X51 | | Limit - | |
| | X152 | X52 | 2 axis | Limit + | |
| | X153 | X53 | | Limit - | |
| | X154 | X54 | 3 axis | Limit + | |
| | X155 | X55 | | Limit - | |
| | X156 | X56 | 4 axis | Limit + | |
| | X157 | X57 | | Limit - | |
| | X158 | X58 | 5 axis | Limit + | |
| | X159 | X59 | | Limit - | |
| | X15A | X5A | 6 axis | Limit + | |
| | X15B | X5B | | Limit - | |
| | X15C | X5C | 7 axis | Limit + | |
| | X15D | X5D | | Limit - | |
| | X15E | X5E | 8 axis | Limit + | |
| | X15F | X5F | | Limit - | |
| WX16 | X160 | X60 | 1 axis | Error annunciation | Turns on when an error occurs on the corresponding axis.<br>The contacts of all axes turn on if an error occurs on all axes.<br>The details of the error can be confirmed in the error annunciation area of the shared memory. |
| | X161 | X61 | 2 axis | | |
| | X162 | X62 | 3 axis | | |
| | X163 | X63 | 4 axis | | |
| | X164 | X64 | 5 axis | | |
| | X165 | X65 | 6 axis | | |
| | X166 | X66 | 7 axis | | |
| | X167 | X67 | 8 axis | | |
| | X168 | X68 | 1 axis | Warning annunciation | Turns on when a warning occurs on the corresponding axis.<br>The contacts of all axes turn on if a warning occurs on all axes.<br>The details of the warning can be confirmed in the warning annunciation area of the shared memory. |
| | X169 | X69 | 2 axis | | |
| | X16A | X6A | 3 axis | | |
| | X16B | X6B | 4 axis | | |
| | X16C | X6C | 5 axis | | |
| | X16D | X6D | 6 axis | | |
| | X16E | X6E | 7 axis | | |
| | X16F | X6F | 8 axis | | |
| WX17 | X170 | X70 | 1 axis | General-purpose input 1 | Monitor contact for the general-purpose input connected to the corresnponding AMP.<br>The input status of this contact does not affect on the operation of the motor or positioning unit. |
| | X171 | X71 | | General-purpose input 2 | |
| | X172 | X72 | 2 axis | General-purpose input 1 | |
| | X173 | X73 | | General-purpose input 2 | |
| | X174 | X74 | 3 axis | General-purpose input 1 | |
| | X175 | X75 | | General-purpose input 2 | |
| | X176 | X76 | 4 axis | General-purpose input 1 | |
| | X177 | X77 | | General-purpose input 2 | |
| | X178 | X78 | 5 axis | General-purpose input 1 | |
| | X179 | X79 | | General-purpose input 2 | |
| | X17A | X7A | 6 axis | General-purpose input 1 | |
| | X17B | X7B | | General-purpose input 2 | |
| | X17C | X7C | 7 axis | General-purpose input 1 | |
| | X17D | X7D | | General-purpose input 2 | |
| | X17E | X7E | 8 axis | General-purpose input 1 | |
| | X17F | X7F | | General-purpose input 2 | |

Note: The FPΣ column group is labeled "WX15", "WX16", "WX17" (rotated) and the FP2 column group is labeled "WX5", "WX6", "WX7" (rotated).

| Contact allocation | | | Target axis | Name | Descriptions |
|---|---|---|---|---|---|
| FPΣ | | FP2 | | | |
| | Y100 | | Y80 | All axes | System stop | Contact for requesting the system stop. When it turns on, all axes will stop at the deceleration time 0. |
| | Y101 | | Y81 | - | - | - |
| | Y102 | | Y82 | - | - | - |
| | Y103 | | Y83 | - | - | - |
| | Y104 | | Y84 | - | - | - |
| | Y105 | | Y85 | - | - | - |
| | Y106 | | Y86 | - | - | - |
| WY10 | Y107 | WY8 | Y87 | All axes | Recalculation request | Turn on this signal when each positioning data (standard area) in the shared memory was changed. The positioning data after the table number starting the recalculation specified in the shared memory can be restructured and will be executable by turning on this signal. When restructuring of the positioning data completes, the recalculation done contact (X_7) will turn on.<br><br>Note) It is used only when the positioning data has been rewritten by laddar programs. |
| | Y108 | | Y88 | 1 axis | Servo ON request | Requests the servo lock for the corresponding AMP. The servo lock is executed by the ON edge of this contact. The servo cannot be free automatically even in the program mode. To make the servo free, turn on the servo OFF request contact. (The operation is the edge type.) |
| | Y109 | | Y89 | 2 axis | | |
| | Y10A | | Y8A | 3 axis | | |
| | Y10B | | Y8B | 4 axis | | |
| | Y10C | | Y8C | 5 axis | | |
| | Y10D | | Y8D | 6 axis | | |
| | Y10E | | Y8E | 7 axis | | |
| | Y10F | | Y8F | 8 axis | | |
| WY11 | Y110 | WY9 | Y90 | 1 axis | Positioning start-up | Requests the positioning control for the corresponding AMP. The starting table is specified in the area for specifying the position control starting table number in the shared memory. (The operation is the edge type.)<br><br>If this contact turns on during the Tool operation by Configurator PM, a warning will be output. |
| | Y111 | | Y91 | 2 axis | | |
| | Y112 | | Y92 | 3 axis | | |
| | Y113 | | Y93 | 4 axis | | |
| | Y114 | | Y94 | 5 axis | | |
| | Y115 | | Y95 | 6 axis | | |
| | Y116 | | Y96 | 7 axis | | |
| | Y117 | | Y97 | 8 axis | | |
| | Y118 | | Y98 | 1 axis | Home return start-up | Requests the home return for the corresponding AMP. The settings for the direction or pattern of the home return are specified by Configurtor PM or the home return operation setting area in the shared memory. (The operation is the edge type.)<br><br>If this contact turns on during the Tool operation by Configurator PM, a warning will be output. |
| | Y119 | | Y99 | 2 axis | | |
| | Y11A | | Y9A | 3 axis | | |
| | Y11B | | Y9B | 4 axis | | |
| | Y11C | | Y9C | 5 axis | | |
| | Y11D | | Y9D | 6 axis | | |
| | Y11E | | Y9E | 7 axis | | |
| | Y11F | | Y9F | 8 axis | | |
| WY12 | Y120 | WY10 | Y100 | 1 axis | JOG forward | Requests the JOG operation for the corresponding AMP. The settings for acceleration time, etc are specified by Configurator PM or the JOG operation settings in the shared memory. (The operation is the level type.)<br><br>If this contact turns on during the Tool operation by Configurator PM, a warning will be output. |
| | Y121 | | Y101 | | JOG reverse | |
| | Y122 | | Y102 | 2 axis | JOG forward | |
| | Y123 | | Y103 | | JOG reverse | |
| | Y124 | | Y104 | 3 axis | JOG forward | |
| | Y125 | | Y105 | | JOG reverse | |
| | Y126 | | Y106 | 4 axis | JOG forward | |
| | Y127 | | Y107 | | JOG reverse | |
| | Y128 | | Y108 | 5 axis | JOG forward | |
| | Y129 | | Y109 | | JOG reverse | |
| | Y12A | | Y10A | 6 axis | JOG forward | |
| | Y12B | | Y10B | | JOG reverse | |
| | Y12C | | Y10C | 7 axis | JOG forward | |
| | Y12D | | Y10D | | JOG reverse | |
| | Y12E | | Y10E | 8 axis | JOG forward | |
| | Y12F | | Y10F | | JOG reverse | |

| Contact allocation | | | | Target axis | Name | Descriptions |
|---|---|---|---|---|---|---|
| FPΣ | | FP2 | | | | |
| WY13 | Y130 | WY11 | Y110 | 1 axis | Emergency stop | Requests the emergency stop for the corresponding AMP. The deceleration time for the emegency stop is specified by Configurator PM or the emergency stop setting in the shared memory. (The operation is the level type.) Note) The deviation counter cannot be cleared. |
| | Y131 | | Y111 | 2 axis | | |
| | Y132 | | Y112 | 3 axis | | |
| | Y133 | | Y113 | 4 axis | | |
| | Y134 | | Y114 | 5 axis | | |
| | Y135 | | Y115 | 6 axis | | |
| | Y136 | | Y116 | 7 axis | | |
| | Y137 | | Y117 | 8 axis | | |
| | Y138 | | Y118 | 1 axis | Deceleration stop | Requests the deceleration stop for the corresponding AMP. The deceleration time for the deceleration stop is specified by Configurator PM or the deceleration stop setting in the shared memory. (The operation is the level type.) Note) The deviation counter cannot be cleared. |
| | Y139 | | Y119 | 2 axis | | |
| | Y13A | | Y11A | 3 axis | | |
| | Y13B | | Y11B | 4 axis | | |
| | Y13C | | Y11C | 5 axis | | |
| | Y13D | | Y11D | 6 axis | | |
| | Y13E | | Y11E | 7 axis | | |
| | Y13F | | Y11F | 8 axis | | |
| WY14 | Y140 | WY12 | Y120 | 1 axis | Pulser operation enabled | Requests the permission for the pulser operation of the corresponding AMP. The multiple setting and other settings for the pulser operation are specified by Configurator PM or the pulser operation setting area in the shared memory. (The operation is the level type.) |
| | Y141 | | Y121 | 2 axis | | |
| | Y142 | | Y122 | 3 axis | | |
| | Y143 | | Y123 | 4 axis | | |
| | Y144 | | Y124 | 5 axis | | |
| | Y145 | | Y125 | 6 axis | | |
| | Y146 | | Y126 | 7 axis | | |
| | Y147 | | Y127 | 8 axis | | |
| | Y148 | | Y128 | - | - | - |
| | Y149 | | Y129 | - | - | - |
| | Y14A | | Y12A | - | - | - |
| | Y14B | | Y12B | - | - | - |
| | Y14C | | Y12C | - | - | - |
| | Y14D | | Y12D | - | - | - |
| | Y14E | | Y12E | - | - | - |
| | Y14F | | Y12F | - | - | - |
| WY15 | Y150 | WY13 | Y130 | 1 axis | Request servo off | Requests the servo free for the corresponding AMP. The servo free is executed by the ON edge of this contact. (The operation is the edge type.) |
| | Y151 | | Y131 | 2 axis | | |
| | Y152 | | Y132 | 3 axis | | |
| | Y153 | | Y133 | 4 axis | | |
| | Y154 | | Y134 | 5 axis | | |
| | Y155 | | Y135 | 6 axis | | |
| | Y156 | | Y136 | 7 axis | | |
| | Y157 | | Y137 | 8 axis | | |
| | Y158 | | Y138 | - | - | - |
| | Y159 | | Y139 | - | - | - |
| | Y15A | | Y13A | - | - | - |
| | Y15B | | Y13B | - | - | - |
| | Y15C | | Y13C | - | - | - |
| | Y15D | | Y13D | - | - | - |
| | Y15E | | Y13E | - | - | - |
| | Y15F | | Y13F | - | - | - |

| Contact allocation | | Target axis | Name | Descriptions |
|---|---|---|---|---|
| FPΣ | FP2 | | | |
| WY16 Y160 | WY14 Y140 | 1 axis | Request error clear | Requests the error clear for the corresponding AMP. The processing to recover from errors is performed and the error logs are cleared by turning on this signal. |
| Y161 | Y141 | 2 axis | | |
| Y162 | Y142 | 3 axis | | |
| Y163 | Y143 | 4 axis | | |
| Y164 | Y144 | 5 axis | | |
| Y165 | Y145 | 6 axis | | |
| Y166 | Y146 | 7 axis | | |
| Y167 | Y147 | 8 axis | | |
| Y168 | Y148 | 1 axis | Request warning clear | Requests the warning clear for the corresponding AMP. The warning logs are cleared by turning on this signal. |
| Y169 | Y149 | 2 axis | | |
| Y16A | Y14A | 3 axis | | |
| Y16B | Y14B | 4 axis | | |
| Y16C | Y14C | 5 axis | | |
| Y16D | Y14D | 6 axis | | |
| Y16E | Y14E | 7 axis | | |
| Y16F | Y14F | 8 axis | | |
| WY17 Y170 | WY15 Y150 | 1 axis | General-purpose output 1 | Contact for the general-purpose output connected to the corresponding AMP. The input status of this contact does not affect on the operation of the motor or positioning unit. |
| Y171 | Y151 | | General-purpose output 2 | |
| Y172 | Y152 | 2 axis | General-purpose output 1 | |
| Y173 | Y153 | | General-purpose output 2 | |
| Y174 | Y154 | 3 axis | General-purpose output 1 | |
| Y175 | Y155 | | General-purpose output 2 | |
| Y176 | Y156 | 4 axis | General-purpose output 1 | |
| Y177 | Y157 | | General-purpose output 2 | |
| Y178 | Y158 | 5 axis | General-purpose output 1 | |
| Y179 | Y159 | | General-purpose output 2 | |
| Y17A | Y15A | 6 axis | General-purpose output 1 | |
| Y17B | Y15B | | General-purpose output 2 | |
| Y17C | Y15C | 7 axis | General-purpose output 1 | |
| Y17D | Y15D | | General-purpose output 2 | |
| Y17E | Y15E | 8 axis | General-purpose output 1 | |
| Y17F | Y15F | | General-purpose output 2 | |

# 17.3 Configuration of Shared Memory Areas

The positioning unit RTEX manages all the setting values of parameters and positioning data in the shared memory. Therefore, all the setting values can be specified by ladder programs as well as Configurator PM.

Followings are the details of the shared memory.

| Area name | Shared memory bank | Individual name of each area | |
|---|---|---|---|
| Common area | 00H | Setting parameter control area | |
| | | Operation speed rate area | |
| | | Axis group setting area | |
| | | Home change data area | |
| | | Torque limit area | |
| | | Position control starting table number setting area | |
| | | Error annunciation & clear area | |
| | | Warning annunciation & clear area | |
| Each axis information area Note) | 01H | 1 axis | Each axis information & monitor area |
| | | 2 axis | Each axis information & monitor area |
| | | 3 axis | Each axis information & monitor area |
| | | 4 axis | Each axis information & monitor area |
| | | 5 axis | Each axis information & monitor area |
| | | 6 axis | Each axis information & monitor area |
| | | 7 axis | Each axis information & monitor area |
| | | 8 axis | Each axis information & monitor area |
| Each axis setting area | 02H to 0BH | 1 axis | Parameter setting area |
| | | | Positioning data setting area (Standard: for 600 points, Extended: for 25 points) |
| | 0CH to 15H | 2 axis | Parameter setting area |
| | | | Positioning data setting area (Standard: for 600 points, Extended: for 25 points) |
| | 16H to 1FH | 3 axis | Parameter setting area |
| | | | Positioning data setting area (Standard: for 600 points, Extended: for 25 points) |
| | 20H to 29H | 4 axis | Parameter setting area |
| | | | Positioning data setting area (Standard: for 600 points, Extended: for 25 points) |
| | 2AH to 33H | 5 axis | Parameter setting area |
| | | | Positioning data setting area (Standard: for 600 points, Extended: for 25 points) |
| | 34H to 3DH | 6 axis | Parameter setting area |
| | | | Positioning data setting area (Standard: for 600 points, Extended: for 25 points) |
| | 3EH to 47H | 7 axis | Parameter setting area |
| | | | Positioning data setting area (Standard: for 600 points, Extended: for 25 points) |
| | 48H to 51H | 8 axis | Parameter setting area |
| | | | Positioning data setting area (Standard: for 600 points, Extended: for 25 points) |

Note) Firstly confirm that the link establishment annunciation flag is on when reading the axis information area using the ladder program.

# 17.4 Details of Common Area in Shared Memory

## 17.4.1 Configuration of Common Area

The shared memory is composed of banks. The common area is allocated in the bank 00H in the shared memory, and is used for the common settings of each axis.

| Address | Area |
|---|---|
| 080H - 085H | Setting parameter control area |
| 088H | Operation speed rate area |
| 0B0 - 0B4H | Axis group setting area |
| 0C0H - 0D7H | Home change data area |
| 0D8H - 0E7H | Torque change area |
| 100H - 107H | Positioning table setting area |
| 111H - 1A7H | Error annunciation & clear area |
| 1A9H - 23FH | Warning annunciation & clear area |

Shared memory map:
- Bank 00H (000H – 3FFH) — Common areas
- Bank 01H (000H – 3FFH)
- Bank 02H to 51H (000H – ...)

## 17.4.2 Setting Parameter Control Area

This is the area to write the setting values of the positioning parameters and positioning data in the shared memory into FROM, or to execute the recalculation of the positioning data.
The number of writing to FROM in the positioning unit is announced to the CPU unit (control unit) through this area, and writing the positioning parameters and positioning data in the shared memory to FROM is requested. Also, the recalculation starting table number is set to recalculate the positioning data in the standard area.

| Bank | Offset address | Name | Descriptions | Default value | Setting range | Unit |
|------|----------------|------|--------------|---------------|---------------|------|
| 00H | 080H | Annunciation of number of writing to FROM | Announces the number of writing the positioning parameters and data in the shared memory into FROM. | 0 | - | times |
| | 081H | Request for writing to FROM | When writing into FROM by Configurator PM, the following procedures will be automatically performed. When writing into FROM by ladder programs, it is necessary to achieve the following Configurator PM operation by the ladder programs.<br><br>1. Write 5555H in this area by the ladder program.<br>2. The positioning unit checks 5555H, and write 6666H over in the same area.<br>3. Check 6666H by the ladder program, and write AAAAH over. (Time out of 6666H is 30 seconds.)<br>4. The positioning unit copies the content of the shared memory into FROM.<br>5. The positioning unit checkes writing. When OK: The unit sets 0000H. When NG: The unit sets FFFFH.<br>6. When confirming 0000H by the ladder program, the operation will be completed successfully. When confirming FFFFH, an error will occur. In that case, write 0000H over in this area. | 0000H | - | - |
| | 085H | Recalculation starting table number | When the recalculation request signal (Y_7 contact) turns on, the positioning unit will recalculate the positioning data of all the axes from this table number to No. 600. | 1 | 1 to 600 | - |

## 17.4.3 Operation Speed Rate Area

| Bank | Offset address | Name | Descriptions | Default value | Setting range | Unit |
|------|----------------|------|--------------|---------------|---------------|------|
| 00H | 088H | Operation speed rate | All operations relating to axes (positioning, JOG, home return) can be perfomred at the specified rate. The unit is %, and can be input in the range of 1 to 100 (%). | 100 | 1 to 100 | % |

## 17.4.4 Setting Parameter Control Area

The interpolation groups for each axis are set in this area. For the axis connected to network, set the bit of the corresponding axis to 1 in any setting as below.

| Bank | Offset address | Name | Descriptions |
|---|---|---|---|
| 00H | 0B0H | Group A axis settings | Set either independent or interpolation for each axis in this area. In case of interpolation, each axis belongs to any group among A to D. For example, the axes 1, 2, and 3 belong to group A and are 3-axis interpolation, set the corresponding 3 bits to 1 in the interpolation axis setting of group A. In case of single axis independent setting, it does not belong to any group. Turn on the corresponding bits of the rest of the independent axis settings.<br>Maximum number of interpolation axis per group is 3. The same axis cannot be set in more than one group. |
| | 0B1H | Group B axis settings | |
| | 0B2H | Group C axis settings | |
| | 0B3H | Group D axis settings | <table><tr><td>bit</td><td>Name</td><td>Default</td><td>Descriptions</td></tr><tr><td>0</td><td>Group attribute of axis 1</td><td>0</td><td rowspan="9">0: Not belong to the group.<br>1: Belong to the group.<br><br>An error occurs if more than 4 bits are set to 1 in the 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><tr><td>6</td><td>Group attribute of axis 7</td><td>0</td></tr><tr><td>7</td><td>Group attribute of axis 8</td><td>0</td></tr><tr><td>15 to 8</td><td>—</td><td>—</td></tr></table> |
| | 0B4H | Independent axis settings | For the axes that do not belong to the interpolation relation, set the corresponding bits to 1.<br><table><tr><td>bit</td><td>Name</td><td>Default</td><td>Descriptions</td></tr><tr><td>0</td><td>Independent axis attribute of axis 1</td><td>0</td><td rowspan="9">0: Not belong to the independent axis.<br>1: Belong to teh independent axis.<br><br>An error occurs if the same axis is set to 1 in another group (A to D).</td></tr><tr><td>1</td><td>Independent axis attribute of axis 2</td><td>0</td></tr><tr><td>2</td><td>Independent axis attribute of axis 3</td><td>0</td></tr><tr><td>3</td><td>Independent axis attribute of axis 4</td><td>0</td></tr><tr><td>4</td><td>Independent axis attribute of axis 5</td><td>0</td></tr><tr><td>5</td><td>Independent axis attribute of axis 6</td><td>0</td></tr><tr><td>6</td><td>Independent axis attribute of axis 7</td><td>0</td></tr><tr><td>7</td><td>Independent axis attribute of axis 8</td><td>0</td></tr><tr><td>15 to 8</td><td>—</td><td>—</td></tr></table> |

## 17.4.5 Home Change Data Area

To change the coordinate origin (default is 0) of each axis managed in the positioning unit, store the changed coordinate in this area, and turn on the home change request flag.

| Bank | Offset address | Name | Descriptions |
|---|---|---|---|
| 00H | 0C0H | Home change request flag | Only when the corresponding bits fo reach axis changed to 1 from 0, the coordinate origin managed in the positioning unit will be changed to the following home change coordiates.<br>Affther the change, the positioning unit clear the corresponding bits to 0 automatically.<br><br>_(See bit table below)_ |
| | 0C8H | Home change coordinate of axis 1 | Stores the coordinate to change the original point of axis 1. |
| | 0C9H | | |
| | 0CAH | Home change coordinate of axis 2 | Stores the coordinate to change the original point of axis 2. |
| | 0CBH | | |
| | 0CCH | Home change coordinate of axis 3 | Stores the coordinate to change the original point of axis 3. |
| | 0CDH | | |
| | 0CEH | Home change coordinate of axis 4 | Stores the coordinate to change the original point of axis 4. |
| | 0CFH | | |
| | 0D0H | Home change coordinate of axis 5 | Stores the coordinate to change the original point of axis 5. |
| | 0D1H | | |
| | 0D2H | Home change coordinate of axis 6 | Stores the coordinate to change the original point of axis 6. |
| | 0D3H | | |
| | 0D4H | Home change coordinate of axis 7 | Stores the coordinate to change the original point of axis 7. |
| | 0D5H | | |
| | 0D6H | Home change coordinate of axis 8 | Stores the coordinate to change the original point of axis 8. |
| | 0D7H | | |

| bit | Name | Default | Descriptions |
|---|---|---|---|
| 0 | Request home change of axis 1 | 0 | |
| 1 | Request home change of axis 2 | 0 | |
| 2 | Request home change of axis 3 | 0 | 0: No change. |
| 3 | Request home change of axis 4 | 0 | 1: Change the coordinate origin. |
| 4 | Request home change of axis 5 | 0 | (After the change, the positioning unit sets to 0 |
| 5 | Request home change of axis 6 | 0 | automatically.) |
| 6 | Request home change of axis 7 | 0 | |
| 7 | Request home change of axis 8 | 0 | |
| 15 to 8 | — | — | — |

## 17.4.6 Torque Limit Area

The output torque from the AMP to motor can be changed. The setting range of 1 to 5000 is equivalent to 0.1 to 500.0 %. It cannot be changed during the positioning operation. The change done during the positioning operation will be affected at the next start-up.

| Bank | Offset address | Name | Descriptions | Default value | Setting range | Unit |
|------|------|------|------|------|------|------|
| 00H | 0D8H | Torque limit enabled flag | Sets whehter to enable or disable the execution of the torque limit for each axis. To enable the torque limit, set the corresponding bit to 1.<br><br>{table below} | | | |
| | 0E0H | Torque limit value of axis 1 | Stores the torque limit value of axis 1. | 3000 | 1 to 5000 | 0.1 % |
| | 0E1H | Torque limit value of axis 2 | Stores the torque limit value of axis 2. | 3000 | 1 to 5000 | 0.1 % |
| | 0E2H | Torque limit value of axis 3 | Stores the torque limit value of axis 3. | 3000 | 1 to 5000 | 0.1 % |
| | 0E3H | Torque limit value of axis 4 | Stores the torque limit value of axis 4. | 3000 | 1 to 5000 | 0.1 % |
| | 0E4H | Torque limit value of axis 5 | Stores the torque limit value of axis 5. | 3000 | 1 to 5000 | 0.1 % |
| | 0E5H | Torque limit value of axis 6 | Stores the torque limit value of axis 6. | 3000 | 1 to 5000 | 0.1 % |
| | 0E6H | Torque limit value of axis 7 | Stores the torque limit value of axis 7. | 3000 | 1 to 5000 | 0.1 % |
| | 0E7H | Torque limit value of axis 8 | Stores the torque limit value of axis 8. | 3000 | 1 to 5000 | 0.1 % |

Bit table for 0D8H:

| bit | Name | Default | Descriptions |
|------|------|------|------|
| 0 | Torque limit of axis | 0 | |
| 1 | Torque limit of axis | 0 | |
| 2 | Torque limit of axis | 0 | |
| 3 | Torque limit of axis | 0 | 0: Torque limit disabled (Default) |
| 4 | Torque limit of axis | 0 | 1: Torque limit enabled |
| 5 | Torque limit of axis | 0 | |
| 6 | Torque limit of axis | 0 | |
| 7 | Torque limit of axis | 0 | |
| 15 to 8 | — | — | — |

## 17.4.7 Positioning Table Setting Area

Used to specify the table number to start the position control.
The setting ranges are 1 to 600 in the standard area, and 10001 to 10025 in the extended area.

| Bank | Offset address | Name | Descriptions | Default value | Setting range | Unit |
|---|---|---|---|---|---|---|
| 00H | 100H | Position control starting table number of 1st axis | Stores the table number of 1st axis starting the position control. | 1 | 1 to 600 10001 to 10025 | - |
| | 101H | Position control starting table number of 2nd axis | Stores the table number of 2nd axis starting the position control. | 1 | 1 to 600 10001 to 10025 | - |
| | 102H | Position control starting table number of 3rd axis | Stores the table number of 3rd axis starting the position control. | 1 | 1 to 600 10001 to 10025 | - |
| | 103H | Position control starting table number of 4th axis | Stores the table number of 4th axis starting the position control. | 1 | 1 to 600 10001 to 10025 | - |
| | 104H | Position control starting table number of 5th axis | Stores the table number of 5th axis starting the position control. | 1 | 1 to 600 10001 to 10025 | - |
| | 105H | Position control starting table number of 6th axis | Stores the table number of 6th axis starting the position control. | 1 | 1 to 600 10001 to 10025 | - |
| | 106H | Position control starting table number of 7th axis | Stores the table number of 7th axis starting the position control. | 1 | 1 to 600 10001 to 10025 | - |
| | 107H | Position control starting table number of 8th axis | Stores the table number of 8th axis starting the position control. | 1 | 1 to 600 10001 to 10025 | - |

## 17.4.8 Error Annunciation & Clear Area

When an error occurs (that leads to the stop), the error and the number of occurrences for each axis will be stored in this area. Once the error clear is executed, the error and number of occurrences will be cleared, and then the error will be judged again. If the error condition still continues, the error will occur again even after the execution of error clear. When an error targeted to all axes such as a network failure occurs, it will be stored in the error annunciation buffers of all axes. Up to 7 errors are stored in the error history.

The error clear can be executed by the error clear contact as well.

| Bank | Offset address | Name | Descriptions |
|------|----------------|------|--------------|
| 00H | 111H | Error clear individual axis setting | Executes the error clear for each axis.<br><br>| bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 0 | Error clear of axis 1 | 0 | |<br>| 1 | Error clear of axis 2 | 0 | |<br>| 2 | Error clear of axis 3 | 0 | |<br>| 3 | Error clear of axis 4 | 0 | 0: No error clear |<br>| 4 | Error clear of axis 5 | 0 | 1: Executes error clear |<br>| 5 | Error clear of axis 6 | 0 | (After the execution of error clear, the positioning unit |<br>| 6 | Error clear of axis 7 | 0 | sets to 0 automatically.) |<br>| 7 | Error clear of axis 8 | 0 | |<br>| 8 to 15 | — | — | — | |
| | 129H | Number of error occurrences of axis 1 | Announces the number of occurrences of errors at axis 1.<br><br>| bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 15 to 0 | No. of error occurrences at axis 1 | 0 | Announces No. of error of axis 1 currently occurred. | |
| | 12AH<br>12BH | Error code annunciation buffer 1 of axis 1 | |
| | 12CH<br>12DH | Error code annunciation buffer 2 of axis 1 | |
| | 12EH<br>12FH | Error code annunciation buffer 3 of axis 1 | Stores the latest error code from the buffer number 1 in order.<br><br>| bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 31 to 0 | Error code annunciation buffer n of each axis | 0 | Announces error codes. | |
| | 130H<br>131H | Error code annunciation buffer 4 of axis 1 | |
| | 132H<br>133H | Error code annunciation buffer 5 of axis 1 | |
| | 134H<br>135H | Error code annunciation buffer 6 of axis 1 | |
| | 136H<br>137H | Error code annunciation buffer 7 of axis 1 | |
| | 139H | Number of error occurrences of axis 2 | Announces the number of occurrences of errors at axis 2. |
| | 13AH<br>13BH | Error code annunciation buffer 1 of axis 2 | Announces the code when an error occurred. |
| | 13CH<br>13DH | Error code annunciation buffer 2 of axis 2 | Announces the code when an error occurred. |
| | 13EH<br>13FH | Error code annunciation buffer 3 of axis 2 | Announces the code when an error occurred. |

| Bank | Offset address | Name | Descriptions |
|------|---------------|------|--------------|
| 00H | 140H | Error code annunciation buffer 4 of axis 2 | Announces the code when an error occurred. |
| | 141H | | |
| | 142H | Error code annunciation buffer 5 of axis 2 | Announces the code when an error occurred. |
| | 143H | | |
| | 144H | Error code annunciation buffer 6 of axis 2 | Announces the code when an error occurred. |
| | 145H | | |
| | 146H | Error code annunciation buffer 7 of axis 2 | Announces the code when an error occurred. |
| | 147H | | |
| | 149H | Number of error occurrences of axis 3 | Announces the number of occurrences of errors at axis 3. |
| | 14AH | Error code annunciation buffer 1 of axis 3 | Announces the code when an error occurred. |
| | 14BH | | |
| | 14CH | Error code annunciation buffer 2 of axis 3 | Announces the code when an error occurred. |
| | 14DH | | |
| | 14EH | Error code annunciation buffer 3 of axis 3 | Announces the code when an error occurred. |
| | 14FH | | |
| | 150H | Error code annunciation buffer 4 of axis 3 | Announces the code when an error occurred. |
| | 151H | | |
| | 152H | Error code annunciation buffer 5 of axis 3 | Announces the code when an error occurred. |
| | 153H | | |
| | 154H | Error code annunciation buffer 6 of axis 3 | Announces the code when an error occurred. |
| | 155H | | |
| | 156H | Error code annunciation buffer 7 of axis 3 | Announces the code when an error occurred. |
| | 157H | | |
| | 159H | Number of error occurrences of axis 4 | Announces the number of occurrences of errors at axis 4. |
| | 15AH | Error code annunciation buffer 1 of axis 4 | Announces the code when an error occurred. |
| | 15BH | | |
| | 15CH | Error code annunciation buffer 2 of axis 4 | Announces the code when an error occurred. |
| | 15DH | | |
| | 15EH | Error code annunciation buffer 3 of axis 4 | Announces the code when an error occurred. |
| | 15FH | | |
| | 160H | Error code annunciation buffer 4 of axis 4 | Announces the code when an error occurred. |
| | 161H | | |
| | 162H | Error code annunciation buffer 5 of axis 4 | Announces the code when an error occurred. |
| | 163H | | |
| | 164H | Error code annunciation buffer 6 of axis 4 | Announces the code when an error occurred. |
| | 165H | | |
| | 166H | Error code annunciation buffer 7 of axis 4 | Announces the code when an error occurred. |
| | 167H | | |

| Bank | Offset address | Name | Descriptions |
|------|----------------|------|--------------|
| 00H | 169H | Number of error occurrences of axis 5 | Announces the number of occurrences of errors at axis 5. |
| | 16AH | Error code annunciation buffer 1 of axis 5 | Announces the code when an error occurred. |
| | 16BH | | |
| | 16CH | Error code annunciation buffer 2 of axis 5 | Announces the code when an error occurred. |
| | 16DH | | |
| | 16EH | Error code annunciation buffer 3 of axis 5 | Announces the code when an error occurred. |
| | 16FH | | |
| | 170H | Error code annunciation buffer 4 of axis 5 | Announces the code when an error occurred. |
| | 171H | | |
| | 172H | Error code annunciation buffer 5 of axis 5 | Announces the code when an error occurred. |
| | 173H | | |
| | 174H | Error code annunciation buffer 6 of axis 5 | Announces the code when an error occurred. |
| | 175H | | |
| | 176H | Error code annunciation buffer 7 of axis 5 | Announces the code when an error occurred. |
| | 177H | | |
| | 179H | Number of error occurrences of axis 6 | Announces the number of occurrences of errors at axis 6. |
| | 17AH | Error code annunciation buffer 1 of axis 6 | Announces the code when an error occurred. |
| | 17BH | | |
| | 17CH | Error code annunciation buffer 2 of axis 6 | Announces the code when an error occurred. |
| | 17DH | | |
| | 17EH | Error code annunciation buffer 3 of axis 6 | Announces the code when an error occurred. |
| | 17FH | | |
| | 180H | Error code annunciation buffer 4 of axis 6 | Announces the code when an error occurred. |
| | 181H | | |
| | 182H | Error code annunciation buffer 5 of axis 6 | Announces the code when an error occurred. |
| | 183H | | |
| | 184H | Error code annunciation buffer 6 of axis 6 | Announces the code when an error occurred. |
| | 185H | | |
| | 186H | Error code annunciation buffer 7 of axis 6 | Announces the code when an error occurred. |
| | 187H | | |

| Bank | Offset address | Name | Descriptions |
|------|---------------|------|--------------|
| 00H | 189H | Number of error occurrences of axis 7 | Announces the number of occurrences of errors at axis 7. |
| | 18AH<br>18BH | Error code annunciation buffer 1 of axis 7 | Announces the code when an error occurred. |
| | 18CH<br>18DH | Error code annunciation buffer 2 of axis 7 | Announces the code when an error occurred. |
| | 18EH<br>18FH | Error code annunciation buffer 3 of axis 7 | Announces the code when an error occurred. |
| | 190H<br>191H | Error code annunciation buffer 4 of axis 7 | Announces the code when an error occurred. |
| | 192H<br>193H | Error code annunciation buffer 5 of axis 7 | Announces the code when an error occurred. |
| | 194H<br>195H | Error code annunciation buffer 6 of axis 7 | Announces the code when an error occurred. |
| | 196H<br>197H | Error code annunciation buffer 7 of axis 7 | Announces the code when an error occurred. |
| | 199H | Number of error occurrences of axis 8 | Announces the number of occurrences of errors at axis 8. |
| | 19AH<br>19BH | Error code annunciation buffer 1 of axis 8 | Announces the code when an error occurred. |
| | 19CH<br>19DH | Error code annunciation buffer 2 of axis 8 | Announces the code when an error occurred. |
| | 19EH<br>19FH | Error code annunciation buffer 3 of axis 8 | Announces the code when an error occurred. |
| | 1A0H<br>1A1H | Error code annunciation buffer 4 of axis 8 | Announces the code when an error occurred. |
| | 1A2H<br>1A3H | Error code annunciation buffer 5 of axis 8 | Announces the code when an error occurred. |
| | 1A4H<br>1A5H | Error code annunciation buffer 6 of axis 8 | Announces the code when an error occurred. |
| | 1A6H<br>1A7H | Error code annunciation buffer 7 of axis 8 | Announces the code when an error occurred. |

## 17.4.9 Warning Annunciation & Clear Area

When a warning occurs (that does not lead to the stop), the warning and the number of occurrences for each axis will be stored in this area. Once the warning clear is executed, the warning and number of occurrences will be cleared, and then the warning will be judged again. If the warning condition still continues, the warning will occur again even after the execution of warning clear. When a warning targeted to all axes occurs, it will be stored in the warning annunciation buffers of all axes. Up to 7 warnings are stored in the warning history.
The warning clear can be executed by the warning clear contact as well.

| Bank | Offset address | Name | Descriptions |
|---|---|---|---|
| 00H | 1A9H | Warning clear individual axis setting | Executes the warning clear for each axis.<br><br>| bit | Name | Default | Descriptions |<br>\|---\|---\|---\|---\|<br>\| 0 \| Warning clear of axis 1 \| 0 \| \|<br>\| 1 \| Warning clear of axis 2 \| 0 \| \|<br>\| 2 \| Warning clear of axis 3 \| 0 \| \|<br>\| 3 \| Warning clear of axis 4 \| 0 \| 0: No warning clear<br>1: Executes warning clear<br>(After the execution of warning clear, the positioning unit sets to 0 automatically.) \|<br>\| 4 \| Warning clear of axis 5 \| 0 \| \|<br>\| 5 \| Warning clear of axis 6 \| 0 \| \|<br>\| 6 \| Warning clear of axis 7 \| 0 \| \|<br>\| 7 \| Warning clear of axis 8 \| 0 \| \|<br>\| 8 to 15 \| — \| — \| — \| |
| | 1C1H | Number of warning occurrences of axis 1 | Announces the number of occurrences of warnings at axis 1.<br><br>| bit | Name | Default | Descriptions |<br>\|---\|---\|---\|---\|<br>\| 15 to 0 \| No. of warning occurrences at axis 1 \| 0 \| Announces No. of warning of axis 1 currently occurred \| |
| | 1C2H<br>1C3H | Warning code annunciation buffer 1 of axis 1 | Stores the latest warning code from the buffer number 1 in order.<br><br>| bit | Name | Default | Descriptions |<br>\|---\|---\|---\|---\|<br>\| 31 to 0 \| Warning code annunciation buffer n of each axis \| 0 \| Announces warning codes. \| |
| | 1C4H<br>1C5H | Warning code annunciation buffer 2 of axis 1 | |
| | 1C6H<br>1C7H | Warning code annunciation buffer 3 of axis 1 | |
| | 1C8H<br>1C9H | Warning code annunciation buffer 4 of axis 1 | |
| | 1CAH<br>1CBH | Warning code annunciation buffer 5 of axis 1 | |
| | 1CCH<br>1CDH | Warning code annunciation buffer 6 of axis 1 | |
| | 1CEH<br>1CFH | Warning code annunciation buffer 7 of axis 1 | |
| | 1D1H | No. of warning occurrences of axis 2 | Announces the number of occurrences of warnings at axis 2. |
| | 1D2H<br>1D3H | Warning code annunciation buffer 1 of axis 2 | Announces the code when a warning occurred. |
| | 1D4H<br>1D5H | Warning code annunciation buffer 2 of axis 2 | Announces the code when a warning occurred. |
| | 1D6H<br>1D7H | Warning code annunciation buffer 3 of axis 2 | Announces the code when an error occurred. |

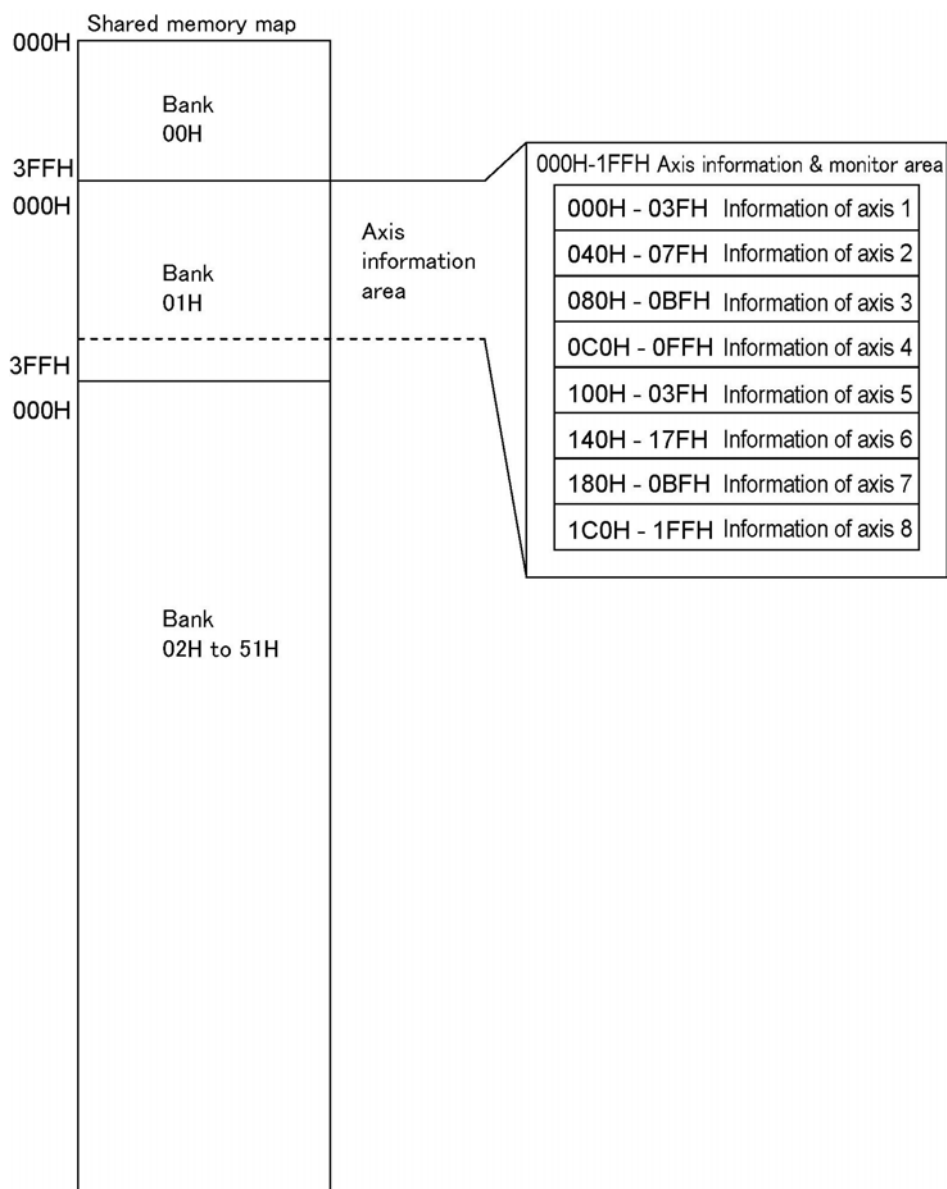| Bank | Offset address | Name | Descriptions |
|------|------|------|------|
| 00H | 1D8H<br>1D9H | Warning code annunciation buffer 4 of axis 2 | Announces the code when a warning occurred. |
| | 1DAH<br>1DBH | Warning code annunciation buffer 5 of axis 2 | Announces the code when a warning occurred. |
| | 1DCH<br>1DDH | Warning code annunciation buffer 6 of axis 2 | Announces the code when a warning occurred. |
| | 1DEH<br>1DFH | Warning code annunciation buffer 7 of axis 2 | Announces the code when a warning occurred. |
| | 1E1H | No. of warning occurrences of axis 3 | Announces the number of occurrences of warnings at axis 3. |
| | 1E2H<br>1E3H | Warning code annunciation buffer 1 of axis 3 | Announces the code when a warning occurred. |
| | 1E4H<br>1E5H | Warning code annunciation buffer 2 of axis 3 | Announces the code when a warning occurred. |
| | 1E6H<br>1E7H | Warning code annunciation buffer 3 of axis 3 | Announces the code when a warning occurred. |
| | 1E8H<br>1E9H | Warning code annunciation buffer 4 of axis 3 | Announces the code when a warning occurred. |
| | 1EAH<br>1EBH | Warning code annunciation buffer 5 of axis 3 | Announces the code when a warning occurred. |
| | 1ECH<br>1EDH | Warning code annunciation buffer 6 of axis 3 | Announces the code when a warning occurred. |
| | 1EEH<br>1EFH | Warning code annunciation buffer 7 of axis 3 | Announces the code when a warning occurred. |
| | 1F1H | No. of warning occurrences of axis 4 | Announces the number of occurrences of warnings at axis 4. |
| | 1F2H<br>1F3H | Warning code annunciation buffer 1 of axis 4 | Announces the code when a warning occurred. |
| | 1F4H<br>1F5H | Warning code annunciation buffer 2 of axis 4 | Announces the code when a warning occurred. |
| | 1F6H<br>1F7H | Warning code annunciation buffer 3 of axis 4 | Announces the code when a warning occurred. |
| | 1F8H<br>1F9H | Warning code annunciation buffer 4 of axis 4 | Announces the code when a warning occurred. |
| | 1FAH<br>1FBH | Warning code annunciation buffer 5 of axis 4 | Announces the code when a warning occurred. |
| | 1FCH<br>1FDH | Warning code annunciation buffer 6 of axis 4 | Announces the code when a warning occurred. |
| | 1FEH<br>1FFH | Warning code annunciation buffer 7 of axis 4 | Announces the code when a warning occurred. |

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| Bank | Offset address | Name | Descriptions |
|------|----------------|------|--------------|
| 00H | 201H | No. of warning occurrences of axis 5 | Announces the number of occurrences of warnings at axis 5. |
| | 202H | Warning code annunciation buffer 1 of axis 5 | Announces the code when a warning occurred. |
| | 203H | | |
| | 204H | Warning code annunciation buffer 2 of axis 5 | Announces the code when a warning occurred. |
| | 205H | | |
| | 206H | Warning code annunciation buffer 3 of axis 5 | Announces the code when a warning occurred. |
| | 207H | | |
| | 208H | Warning code annunciation buffer 4 of axis 5 | Announces the code when a warning occurred. |
| | 209H | | |
| | 20AH | Warning code annunciation buffer 5 of axis 5 | Announces the code when a warning occurred. |
| | 20BH | | |
| | 20CH | Warning code annunciation buffer 6 of axis 5 | Announces the code when a warning occurred. |
| | 20DH | | |
| | 20EH | Warning code annunciation buffer 7 of axis 5 | Announces the code when a warning occurred. |
| | 20FH | | |
| | 211H | No. of warning occurrences of axis 6 | Announces the number of occurrences of warnings at axis 6. |
| | 212H | Warning code annunciation buffer 1 of axis 6 | Announces the code when a warning occurred. |
| | 213H | | |
| | 214H | Warning code annunciation buffer 2 of axis 6 | Announces the code when a warning occurred. |
| | 215H | | |
| | 216H | Warning code annunciation buffer 3 of axis 6 | Announces the code when a warning occurred. |
| | 217H | | |
| | 218H | Warning code annunciation buffer 4 of axis 6 | Announces the code when a warning occurred. |
| | 219H | | |
| | 21AH | Warning code annunciation buffer 5 of axis 6 | Announces the code when a warning occurred. |
| | 21BH | | |
| | 21CH | Warning code annunciation buffer 6 of axis 6 | Announces the code when a warning occurred. |
| | 21DH | | |
| | 21EH | Warning code annunciation buffer 7 of axis 6 | Announces the code when a warning occurred. |
| | 21FH | | |

| Bank | Offset address | Name | Descriptions |
|------|----------------|------|--------------|
| 00H | 221H | No. of warning occurrences of axis 7 | Announces the number of occurrences of warnings at axis 7. |
| | 222H | Warning code annunciation buffer 1 of axis 7 | Announces the code when a warning occurred. |
| | 223H | | |
| | 224H | Warning code annunciation buffer 2 of axis 7 | Announces the code when a warning occurred. |
| | 225H | | |
| | 226H | Warning code annunciation buffer 3 of axis 7 | Announces the code when a warning occurred. |
| | 227H | | |
| | 228H | Warning code annunciation buffer 4 of axis 7 | Announces the code when a warning occurred. |
| | 229H | | |
| | 22AH | Warning code annunciation buffer 5 of axis 7 | Announces the code when a warning occurred. |
| | 22BH | | |
| | 22CH | Warning code annunciation buffer 6 of axis 7 | Announces the code when a warning occurred. |
| | 22DH | | |
| | 22EH | Warning code annunciation buffer 7 of axis 7 | Announces the code when a warning occurred. |
| | 22FH | | |
| | 231H | No. of warning occurrences of axis 8 | Announces the number of occurrences of warnings at axis 8. |
| | 232H | Warning code annunciation buffer 1 of axis 8 | Announces the code when a warning occurred. |
| | 233H | | |
| | 234H | Warning code annunciation buffer 2 of axis 8 | Announces the code when a warning occurred. |
| | 235H | | |
| | 236H | Warning code annunciation buffer 3 of axis 8 | Announces the code when a warning occurred. |
| | 237H | | |
| | 238H | Warning code annunciation buffer 4 of axis 8 | Announces the code when a warning occurred. |
| | 239H | | |
| | 23AH | Warning code annunciation buffer 5 of axis 8 | Announces the code when a warning occurred. |
| | 23BH | | |
| | 23CH | Warning code annunciation buffer 6 of axis 8 | Announces the code when a warning occurred. |
| | 23DH | | |
| | 23EH | Warning code annunciation buffer 7 of axis 8 | Announces the code when a warning occurred. |
| | 23FH | | |

# 17.5 Details of Each Axis Information Area in Shared Memory

## 17.5.1 Configuration of Each Axis Information Area

The shared memory is composed of banks. The each axis information area is allocated in the bank 01H in the shared memory. Also the information on the axes 1 to 8 is allowcated for each address in this area.

Shared memory map

| Address | Bank |
|---|---|
| 000H | Bank 00H |
| 3FFH / 000H | Bank 01H |
| 3FFH / 000H | Bank 02H to 51H |

Axis information area

000H-1FFH Axis information & monitor area

| Address | Information |
|---|---|
| 000H - 03FH | Information of axis 1 |
| 040H - 07FH | Information of axis 2 |
| 080H - 0BFH | Information of axis 3 |
| 0C0H - 0FFH | Information of axis 4 |
| 100H - 03FH | Information of axis 5 |
| 140H - 17FH | Information of axis 6 |
| 180H - 0BFH | Information of axis 7 |
| 1C0H - 1FFH | Information of axis 8 |

☞ Note: Firstly confirm that the link establishment annunciation flag is on when reading the axis information area using the ladder program.

## 17.5.2 Each Axis Information & Monitor Area

These are the areas for the AMP system information of each axis and monitoring operation states.

**Axis information of axis 1**

| Bank | Offset address | Name | Descriptions | Default value | Setting range | Unit |
|------|------|------|------|------|------|------|
| 01H | 000H<br>001H<br>002H<br>003H<br>004H<br>005H<br>006H<br>007H | System ID of axis 1 (Brand name or vendor name) | Stores the brand name or vendor name. Each information is stored as ASCII code of 16 bytes (Max. 16 characters). | 0H | - | - |
| | 008H<br>009H<br>00AH<br>00BH<br>00CH<br>00DH<br>00EH<br>00FH | System ID of axis 1 (Model code of AMP) | Stores the model code of AMP. Each information is stored as ASCII code of 16 bytes (Max. 16 characters). | 0H | - | - |
| | 010H<br>011H<br>012H<br>013H<br>014H<br>015H<br>016H<br>017H | System ID of axis 1 (Version of firmware) | Stores the version of firmware of AMP. Each information is stored as ASCII code of 16 bytes (Max. 16 characters). | 0H | - | - |
| | 018H<br>019H<br>01AH<br>01BH<br>01CH<br>01DH<br>01EH<br>01FH | System ID of axis 1 (Model code of motor) | Stores the model code of motor. Each information is stored as ASCII code of 16 bytes (Max. 16 characters). | 0H | - | - |
| | 020H<br>021H<br>022H<br>023H<br>024H<br>025H<br>026H<br>027H | System ID of axis 1 (Serial number of motor) | Stores the serial number of motor. Each information is stored as ASCII code of 16 bytes (Max. 16 characters). | 0H | - | - |

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| Bank | Offset address | Name | Descriptions | Default value | Setting range | Unit |
|---|---|---|---|---|---|---|
| 01H | 030H | Status indication of axis 1 | Stores the status indication of AMP<br><br>| bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 0 | Imposition | 0 | 0: Deviation counter is outside of the imposition range.<br>1: Deviation counter is in the imposition range. |<br>| 1 | — | 0 | — |<br>| 2 | Home return done | 0 | 0: Home return has not compelted.<br>1: Home return has completed. |<br>| 3 | Torque limit | 0 | 0: Normal<br>1: Contact detection (Torque limit) |<br>| 4 | Warning | 0 | 0: Normal<br>1: Warning occurred. |<br>| 5 | Alarm | 0 | 0: Normal<br>1: Alarm occurred. |<br>| 6 | Servo ready | 0 | 0: Cannot shift to the on-state<br>1: Servo ready |<br>| 7 | Servo active | 0 | 0: Servo off<br>1: Servo on |<br>| 15 to 8 | — | 0 | — | | | | |
| | 031H | External terminal input monitor of axis 1 | Stores the information of I/O connected to the AMPs of each axis.<br><br>| bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 0 | CWL | 0 | |<br>| 1 | CCWL | 0 | |<br>| 2 | HOME（proximit) | 0 | 0: Non active |<br>| 3 | EX-IN1 | 0 | 1: Active |<br>| 4 | EX-IN2 | 0 | |<br>| 5 | EX-IN3 | 0 | |<br>| 6 | EX-SON/EX-IN4 | 0 | |<br>| 7 | EMG-STP | 0 | |<br>| 15 to 8 | — | — | — | | | | |
| | 032H | Torque command of axis 1 | Stores the torque monitor value. | - | 0 to 5000 | 0.1 % |
| | 033H | Actual speed of axis 1 | Stores the actual speed monitor value. | - | 0 to 5000 | 0.1 rps or 0.1 rpm |
| | 038H | Acitve table or execution done table of axis 1 | Stores the number of active positioning table or when the operation completed. | 1 | 1 to 600 | - |
| | 039H | Auxiliary output code of axis 1 | Stores the auxiliary output code. | 0 | | - |
| | 03CH<br>03DH | Feedback value of axis 1 | Stores the current value (absolute coordinate) of AMP. | 0 | - | pulse |
| | 03EH<br>03FH | Unit system conversion feedback value of axis 1 | Stores the current value after the unit was converted. | 0 | - | - |

**Axis information of axis 2**

| Bank | Offset address | Name | Descriptions |
|------|------|------|------|
| 01H | 040H | System ID of axis 2 (Brand name or vendor name) | Refer to the descriptions of axis 1. |
| | 041H | | |
| | 042H | | |
| | 043H | | |
| | 044H | | |
| | 045H | | |
| | 046H | | |
| | 047H | | |
| | 048H | System ID of axis 2 (Model code of AMP) | Refer to the descriptions of axis 1. |
| | 049H | | |
| | 04AH | | |
| | 04BH | | |
| | 04CH | | |
| | 04DH | | |
| | 04EH | | |
| | 04FH | | |
| | 050H | System ID of axis 2 (Version of firmware) | Refer to the descriptions of axis 1. |
| | 051H | | |
| | 052H | | |
| | 053H | | |
| | 054H | | |
| | 055H | | |
| | 056H | | |
| | 057H | | |
| | 058H | System ID of axis 2 (Model code of motor) | Refer to the descriptions of axis 1. |
| | 059H | | |
| | 05AH | | |
| | 05BH | | |
| | 05CH | | |
| | 05DH | | |
| | 05EH | | |
| | 05FH | | |
| | 060H | System ID of axis 2 (Serial number of motor) | Refer to the descriptions of axis 1. |
| | 061H | | |
| | 062H | | |
| | 063H | | |
| | 064H | | |
| | 065H | | |
| | 066H | | |
| | 067H | | |
| | 070H | Status indication of axis 2 | Refer to the descriptions of axis 1. |
| | 071H | External terminal input monitor of axis 2 | Refer to the descriptions of axis 1. |
| | 072H | Torque command of axis 2 | Refer to the descriptions of axis 1. |
| | 073H | Actual speed of axis 2 | Refer to the descriptions of axis 1. |
| | 078H | Acitve table or execution done table of axis 2 | Refer to the descriptions of axis 1. |
| | 079H | Auxiliary output code of axis 2 | Refer to the descriptions of axis 1. |
| | 07CH | Feedback value of axis 2 | Refer to the descriptions of axis 1. |
| | 07DH | | |
| | 07EH | Unit system conversion feedback value of axis 2 | Refer to the descriptions of axis 1. |
| | 07FH | | |

**Axis information of axis 3**

| Bank | Offset address | Name | Descriptions |
|------|--------|------|--------------|
| 01H | 080H<br>081H<br>082H<br>083H<br>084H<br>085H<br>086H<br>087H | System ID of axis 3 (Brand name or vendor name) | Refer to the descriptions of axis 1. |
| | 088H<br>089H<br>08AH<br>08BH<br>08CH<br>08DH<br>08EH<br>08FH | System ID of axis 3 (Model code of AMP) | Refer to the descriptions of axis 1. |
| | 090H<br>091H<br>092H<br>093H<br>094H<br>095H<br>096H<br>097H | System ID of axis 3 (Version of firmware) | Refer to the descriptions of axis 1. |
| | 098H<br>099H<br>09AH<br>09BH<br>09CH<br>09DH<br>09EH<br>09FH | System ID of axis 3 (Model code of motor) | Refer to the descriptions of axis 1. |
| | 0A0H<br>0A1H<br>0A2H<br>0A3H<br>0A4H<br>0A5H<br>0A6H<br>0A7H | System ID of axis 3 (Serial number of motor) | Refer to the descriptions of axis 1. |
| | 0B0H | Status indication of axis 3 | Refer to the descriptions of axis 1. |
| | 0B1H | External terminal input monitor of axis 3 | Refer to the descriptions of axis 1. |
| | 0B2H | Torque command of axis 3 | Refer to the descriptions of axis 1. |
| | 0B3H | Actual speed of axis 3 | Refer to the descriptions of axis 1. |
| | 0B8H | Acitve table or execution done table of axis 3 | Refer to the descriptions of axis 1. |
| | 0B9H | Auxiliary output code of axis 3 | Refer to the descriptions of axis 1. |
| | 0BCH<br>0BDH | Feedback value of axis 3 | Refer to the descriptions of axis 1. |
| | 0BEH<br>0BFH | Unit system conversion feedback value of axis 3 | Refer to the descriptions of axis 1. |

**Axis information of axis 4**

| Bank | Offset address | Name | Descriptions |
|------|------|------|------|
| 01H | 0C0H | System ID of axis 4 (Brand name or vendor name) | Refer to the descriptions of axis 1. |
| | 0C1H | | |
| | 0C2H | | |
| | 0C3H | | |
| | 0C4H | | |
| | 0C5H | | |
| | 0C6H | | |
| | 0C7H | | |
| | 0C8H | System ID of axis 4 (Model code of AMP) | Refer to the descriptions of axis 1. |
| | 0C9H | | |
| | 0CAH | | |
| | 0CBH | | |
| | 0CCH | | |
| | 0CDH | | |
| | 0CEH | | |
| | 0CFH | | |
| | 0D0H | System ID of axis 4 (Version of firmware) | Refer to the descriptions of axis 1. |
| | 0D1H | | |
| | 0D2H | | |
| | 0D3H | | |
| | 0D4H | | |
| | 0D5H | | |
| | 0D6H | | |
| | 0D7H | | |
| | 0D8H | System ID of axis 4 (Model code of motor) | Refer to the descriptions of axis 1. |
| | 0D9H | | |
| | 0DAH | | |
| | 0DBH | | |
| | 0DCH | | |
| | 0DDH | | |
| | 0DEH | | |
| | 0DFH | | |
| | 0E0H | System ID of axis 4 (Serial number of motor) | Refer to the descriptions of axis 1. |
| | 0E1H | | |
| | 0E2H | | |
| | 0E3H | | |
| | 0E4H | | |
| | 0E5H | | |
| | 0E6H | | |
| | 0E7H | | |
| | 0E0H | Status indication of axis 4 | Refer to the descriptions of axis 1. |
| | 0E1H | External terminal input monitor of axis 4 | Refer to the descriptions of axis 1. |
| | 0E2H | Torque command of axis 4 | Refer to the descriptions of axis 1. |
| | 0E3H | Actual speed of axis 4 | Refer to the descriptions of axis 1. |
| | 0E8H | Acitve table or execution done table of axis 4 | Refer to the descriptions of axis 1. |
| | 0E9H | Auxiliary output code of axis 4 | Refer to the descriptions of axis 1. |
| | 0ECH | Feedback value of axis 4 | Refer to the descriptions of axis 1. |
| | 0EDH | | |
| | 0EEH | Unit system conversion feedback value of axis 4 | Refer to the descriptions of axis 1. |
| | 0EFH | | |

**Axis information of axis 5**

| Bank | Offset address | Name | Descriptions |
|---|---|---|---|
| 01H | 100H | System ID of axis 5 (Brand name or vendor name) | Refer to the descriptions of axis 1. |
| | 101H | | |
| | 102H | | |
| | 103H | | |
| | 104H | | |
| | 105H | | |
| | 106H | | |
| | 107H | | |
| | 108H | System ID of axis 5 (Model code of AMP) | Refer to the descriptions of axis 1. |
| | 109H | | |
| | 10AH | | |
| | 10BH | | |
| | 10CH | | |
| | 10DH | | |
| | 10EH | | |
| | 10FH | | |
| | 110H | System ID of axis 5 (Version of firmware) | Refer to the descriptions of axis 1. |
| | 111H | | |
| | 112H | | |
| | 113H | | |
| | 114H | | |
| | 115H | | |
| | 116H | | |
| | 117H | | |
| | 118H | System ID of axis 5 (Model code of motor) | Refer to the descriptions of axis 1. |
| | 119H | | |
| | 11AH | | |
| | 11BH | | |
| | 11CH | | |
| | 11DH | | |
| | 11EH | | |
| | 11FH | | |
| | 120H | System ID of axis 5 (Serial number of motor) | Refer to the descriptions of axis 1. |
| | 121H | | |
| | 122H | | |
| | 123H | | |
| | 124H | | |
| | 125H | | |
| | 126H | | |
| | 127H | | |
| | 130H | Status indication of axis 5 | Refer to the descriptions of axis 1. |
| | 131H | External terminal input monitor of axis 5 | Refer to the descriptions of axis 1. |
| | 132H | Torque command of axis 5 | Refer to the descriptions of axis 1. |
| | 133H | Actual speed of axis 5 | Refer to the descriptions of axis 1. |
| | 138H | Acitve table or execution done table of axis 5 | Refer to the descriptions of axis 1. |
| | 139H | Auxiliary output code of axis 5 | Refer to the descriptions of axis 1. |
| | 13CH | Feedback value of axis 5 | Refer to the descriptions of axis 1. |
| | 13DH | | |
| | 13EH | Unit system conversion feedback value of axis 5 | Refer to the descriptions of axis 1. |
| | 13FH | | |

**Axis information of axis 6**

| Bank | Offset address | Name | Descriptions |
|------|------|------|------|
| 01H | 140H | System ID of axis 6 (Brand name or vendor name) | Refer to the descriptions of axis 1. |
| | 141H | | |
| | 142H | | |
| | 143H | | |
| | 144H | | |
| | 145H | | |
| | 146H | | |
| | 147H | | |
| | 148H | System ID of axis 6 (Model code of AMP) | Refer to the descriptions of axis 1. |
| | 149H | | |
| | 14AH | | |
| | 14BH | | |
| | 14CH | | |
| | 14DH | | |
| | 14EH | | |
| | 14FH | | |
| | 150H | System ID of axis 6 (Version of firmware) | Refer to the descriptions of axis 1. |
| | 151H | | |
| | 152H | | |
| | 153H | | |
| | 154H | | |
| | 155H | | |
| | 156H | | |
| | 157H | | |
| | 158H | System ID of axis 6 (Model code of motor) | Refer to the descriptions of axis 1. |
| | 159H | | |
| | 15AH | | |
| | 15BH | | |
| | 15CH | | |
| | 15DH | | |
| | 15EH | | |
| | 15FH | | |
| | 160H | System ID of axis 6 (Serial number of motor) | Refer to the descriptions of axis 1. |
| | 161H | | |
| | 162H | | |
| | 163H | | |
| | 164H | | |
| | 165H | | |
| | 166H | | |
| | 167H | | |
| | 170H | Status indication of axis 6 | Refer to the descriptions of axis 1. |
| | 171H | External terminal input monitor of axis 6 | Refer to the descriptions of axis 1. |
| | 172H | Torque command of axis 6 | Refer to the descriptions of axis 1. |
| | 173H | Actual speed of axis 6 | Refer to the descriptions of axis 1. |
| | 178H | Acitve table or execution done table of axis 6 | Refer to the descriptions of axis 1. |
| | 179H | Auxiliary output code of axis 6 | Refer to the descriptions of axis 1. |
| | 17CH | Feedback value of axis 6 | Refer to the descriptions of axis 1. |
| | 17DH | | |
| | 17EH | Unit system conversion feedback value of axis 6 | Refer to the descriptions of axis 1. |
| | 17FH | | |

**Axis information of axis 7**

| Bank | Offset address | Name | Descriptions |
|---|---|---|---|
| 01H | 180H<br>181H<br>182H<br>183H<br>184H<br>185H<br>186H<br>187H | System ID of axis 7 (Brand name or vendor name) | Refer to the descriptions of axis 1. |
| | 188H<br>189H<br>18AH<br>18BH<br>18CH<br>18DH<br>18EH<br>18FH | System ID of axis 7 (Model code of AMP) | Refer to the descriptions of axis 1. |
| | 190H<br>191H<br>192H<br>193H<br>194H<br>195H<br>196H<br>197H | System ID of axis 7 (Version of firmware) | Refer to the descriptions of axis 1. |
| | 198H<br>199H<br>19AH<br>19BH<br>19CH<br>19DH<br>19EH<br>19FH | System ID of axis 7 (Model code of motor) | Refer to the descriptions of axis 1. |
| | 1A0H<br>1A1H<br>1A2H<br>1A3H<br>1A4H<br>1A5H<br>1A6H<br>1A7H | System ID of axis 7 (Serial number of motor) | Refer to the descriptions of axis 1. |
| | 1B0H | Status indication of axis 7 | Refer to the descriptions of axis 1. |
| | 1B1H | External terminal input monitor of axis 7 | Refer to the descriptions of axis 1. |
| | 1B2H | Torque command of axis 7 | Refer to the descriptions of axis 1. |
| | 1B3H | Actual speed of axis 7 | Refer to the descriptions of axis 1. |
| | 1B8H | Acitve table or execution done table of axis 7 | Refer to the descriptions of axis 1. |
| | 1B9H | Auxiliary output code of axis 7 | Refer to the descriptions of axis 1. |
| | 1BCH<br>1BDH | Feedback value of axis 7 | Refer to the descriptions of axis 1. |
| | 1BEH<br>1BFH | Unit system conversion feedback value of axis 7 | Refer to the descriptions of axis 1. |

**Axis information of axis 8**

| Bank | Offset address | Name | Descriptions |
|------|------|------|------|
| 01H | 1C0H | System ID of axis 8 (Brand name or vendor name) | Refer to the descriptions of axis 1. |
| | 1C1H | | |
| | 1C2H | | |
| | 1C3H | | |
| | 1C4H | | |
| | 1C5H | | |
| | 1C6H | | |
| | 1C7H | | |
| | 1C8H | System ID of axis 8 (Model code of AMP) | Refer to the descriptions of axis 1. |
| | 1C9H | | |
| | 1CAH | | |
| | 1CBH | | |
| | 1CCH | | |
| | 1CDH | | |
| | 1CEH | | |
| | 1CFH | | |
| | 1D0H | System ID of axis 8 (Version of firmware) | Refer to the descriptions of axis 1. |
| | 1D1H | | |
| | 1D2H | | |
| | 1D3H | | |
| | 1D4H | | |
| | 1D5H | | |
| | 1D6H | | |
| | 1D7H | | |
| | 1D8H | System ID of axis 8 (Model code of motor) | Refer to the descriptions of axis 1. |
| | 1D9H | | |
| | 1DAH | | |
| | 1DBH | | |
| | 1DCH | | |
| | 1DDH | | |
| | 1DEH | | |
| | 1DFH | | |
| | 1E0H | System ID of axis 8 (Serial number of motor) | Refer to the descriptions of axis 1. |
| | 1E1H | | |
| | 1E2H | | |
| | 1E3H | | |
| | 1E4H | | |
| | 1E5H | | |
| | 1E6H | | |
| | 1E7H | | |
| | 1F0H | Status indication of axis 8 | Refer to the descriptions of axis 1. |
| | 1F1H | External terminal input monitor of axis 8 | Refer to the descriptions of axis 1. |
| | 1F2H | Torque command of axis 8 | Refer to the descriptions of axis 1. |
| | 1F3H | Actual speed of axis 8 | Refer to the descriptions of axis 1. |
| | 1F8H | Acitve table or execution done table of axis 8 | Refer to the descriptions of axis 1. |
| | 1F9H | Auxiliary output code of axis 8 | Refer to the descriptions of axis 1. |
| | 1FCH | Feedback value of axis 8 | Refer to the descriptions of axis 1. |
| | 1FDH | | |
| | 1FEH | Unit system conversion feedback value of axis 8 | Refer to the descriptions of axis 1. |
| | 1FFH | | |

# 17.6 Details of Each Axis Setting Area in Shared Memory

## 17.6.1 Configuration of Each Axis Setting Area

The shared memory is composed of banks. The each axis setting area is allocated in the banks 02H to 51H in the shared memory. The each axis setting area is used to store positioning parameters and positioning data, and the setting values are allocated to every address from the axes 1 to 8. The positioning setting area of each axis is composed of 600 tables of the standard area and 25 tables of the extended area.

Phone: 800.894.0412 - Fax: 888.723.4773 - Web: www.ctiautomation.net - Email: info@ctiautomation.net
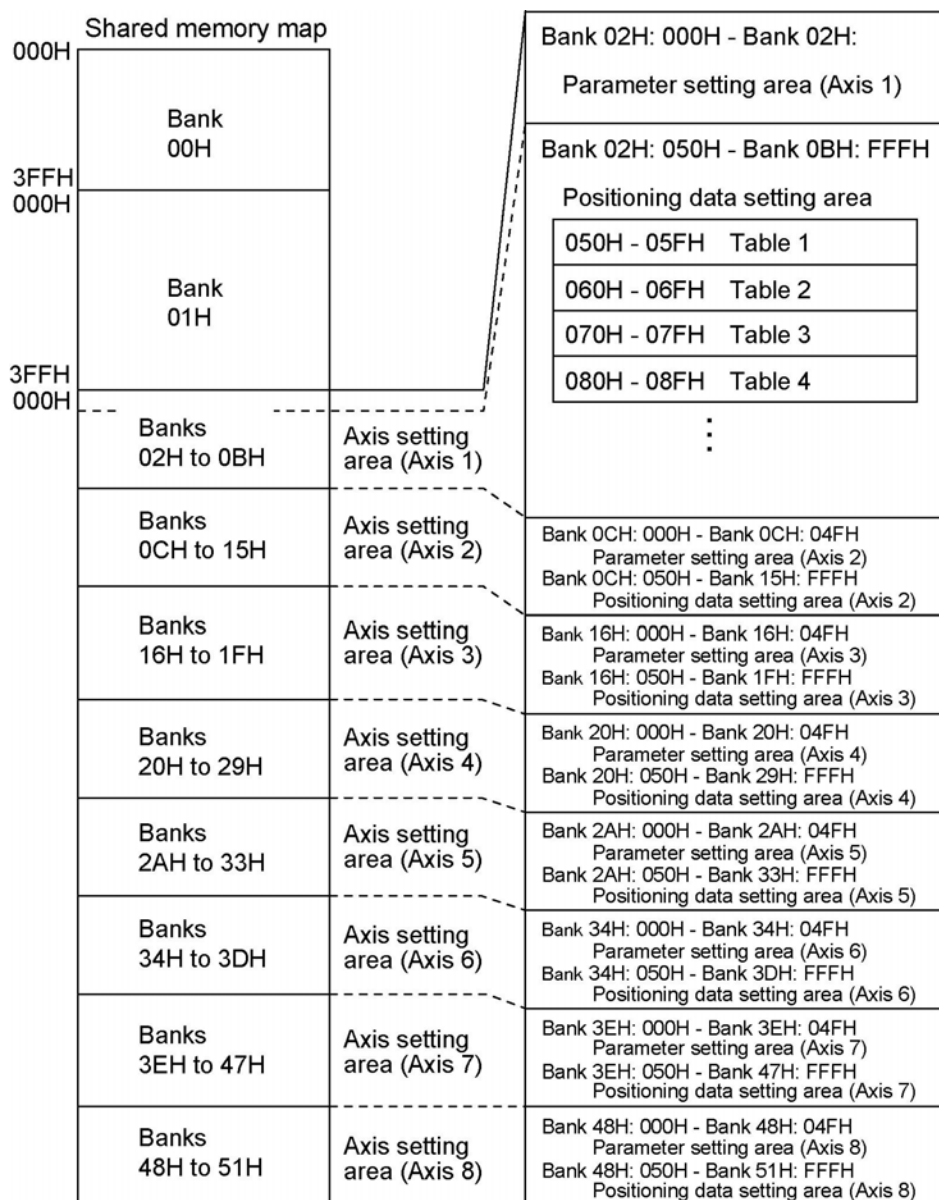
## 17.6.2 Parameter Setting Area

**Positioning parameters of each axis**

Data in the following foramts are stored from the starting address of positioning parameters of each axis.

| Offset address | Name | Descriptions | Default value | Setting range | Unit |
|---|---|---|---|---|---|
| 000H | Unit setting | Sets the unit system of movement amounts of the positioning control for each axis. The same unit system should be set for all interpolation axes. <table><tr><td>bit</td><td>Name</td><td>Default</td><td>Descriptions</td></tr><tr><td>15 to 0</td><td>Unit setting</td><td>000H</td><td>Sets the unit of movement amount of positioning control.<br>000H: Pulse<br>0100H: mm (Minimum position command 0.1 µm)<br>0101H: mm (Minimum position command 1 µm)<br>0200H: inch (Minimum position command 0.1 inch)<br>0201H: inch (Minimum position command 1 inch)<br>0300H: degree (Minimum position command 0.1 degree)<br>0301H: degree (Minimum position command 1 degree)<br>Any other settings will be errors.</td></tr></table> | | | |
| 001H | - | - | | | |
| 002H 003H | Pulse number per rotation | Sets the pulse number per rotation. It is necessary for the conversion of the pulse number in the settings of mm, inch and degree. <table><tr><td>bit</td><td>Name</td><td>Default</td><td>Descriptions</td></tr><tr><td>15 to 0</td><td>Pulse number per rotation</td><td>1</td><td>Pulse number per rotation<br>Setting range: 1 to 32,767<br>Any other settings will be errors.</td></tr></table> | | | |
| 004H 005H | Movement amount per rotation | Sets the movement amount per rotation. It is necessary for the conversion of the pulse number in the settings of mm, inch and degree. <table><tr><td>bit</td><td>Name</td><td>Default</td><td>Descriptions</td></tr><tr><td>31 to 0</td><td>Movement amount per rotation</td><td>1</td><td>Movement amount per rotation<br>Setting range: 1 to 32,767<br>Any other settings will be errors.<br>Interpretation is changed by the unit setting.<br>mm: 1 µm<br>inchi: 1/10,000 inchi<br>degree: 1degree</td></tr></table> | | | |
| 006H | - | - | | | |
| 007H | - | - | | | |
| 008H | - | - | | | |
| 009H | - | - | | | |
| 00AH | - | - | | | |
| 00BH | Software limit enabled/ disabled setting | Sets the software limit to be enabled or disabled for each control. <table><tr><td>bit</td><td>Name</td><td>Default</td><td>Descriptions</td></tr><tr><td>0</td><td>Software limit enbled/disabled setting for positioning control</td><td>0</td><td>0: Disables the software limit in positioning<br>1: Enables the software limit in positioning</td></tr><tr><td>1</td><td>Software limit enbled/disabled setting for home return</td><td>0</td><td>0: Disables the software limit in home return<br>1: Enables the software limit in home return</td></tr><tr><td>2</td><td>Software limit enbled/disabled setting for JOG operation</td><td>0</td><td>0: Disables the software limit in JOG operation<br>1: Enables the software limit in JOG operation</td></tr><tr><td>15 to 3</td><td>—</td><td>—</td><td>—</td></tr></table> | | | |
| 00CH 00DH | Upper limit of software limit | Sets the upper limit value of the software limit for absolute coordinates. <table><tr><td>bit</td><td>Name</td><td>Default</td><td>Descriptions</td></tr><tr><td>31 to 0</td><td>Upper limit of software limit</td><td>1,073,741,823</td><td>Upper limit of software limit<br>Interpretation is changed by the unit setting.<br>pulse: -1,073,741,823 to 1,073,741,823 pulse<br>µm(0.1 µm): -107,374,182.3 to 107,374,182.3<br>µm(1 µm): -1,073,741,823 to 1,073,741,823<br>inch(0.00001inch): -10,737.41823 to 10,737.41823<br>inch(0.0001inch): -107,374.1823 to 107,374.1823<br>degree(0.1degree): 0.0 to 359.9 degree<br>degree(1degree): 0 to 359 degree<br>Any other settings will be errors.</td></tr></table> | | | |

| Offset address | Name | Descriptions | Default value | Setting range | Unit |
|---|---|---|---|---|---|
| 00EH<br><br><br>00FH | Lower limit of software limit | Sets the lower limit value of the software limit for absolute coordinates.<br><br>| bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 31 to 0 | Lower limit of software limit | 1,073,741,823 | Lower limit of software limit<br>Interpretation is changed by the unit setting.<br>pulse: -1,073,741,823 to 1,073,741,823 pulse<br>μm(0.1μm): -107,374,182.3 to 107,374,182.3<br>μm(1μm): -1,073,741,823 to 1,073,741,823<br>inch(0.00001inch): -10,737.41823 to 10,737.41823<br>inch(0.0001inch): -107,374.1823 to 107,374.1823<br>degree(0.1degree): 0.0 to 359.9 degree<br>degree(1degree): 0 to 359 degree<br>Any other settings will be errors. | | | |
| 010H | - | - | | | |
| 011H | - | - | | | |
| 012H | Auxiliary output mode | Sets the auxiliary output function of the auxiliary output contact and code to be enalbed or disabled. The time that the auxiliary output contact is on is determined by the following auxiliary output ON time.<br><br>| bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 0 to 7 | Auxiliary output time | 0 | 0000H: Not use the auxiliary output function (auxiliary output contact, code).<br>0001H: Use the auxiliary output function. |<br>| 15 to 8 | Auxiliary output ON time | 10 | Setting range: 00H(0ms) to FFH(255ms). | | | |
| 013H | - | - | | | |
| 014H | AMP operation settings | Sets to enble or disable the limit input of the AMP, and sets the moving direction and connection method.<br>Note) This setting is should be written in the EEPROM within the AMP, and the AMP should be rebooted after changing the setting.<br><br>| bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 0 | Limit enabled/disabled | 0 | 0: Use the input of the limit signal<br>1: Ignore the input of the limit signal |<br>| 1 | CW/CCW moving direction | 0 | 0: CW+ / CCW−<br>1: CCW+ / CW− |<br>| 2 | Limit connection | 0 | 0: Standard connection (Forward: CWL Reverse: CCWL)<br>1: Reverse connection (Forward: CWL Reverse: CCWL |<br>| 4 to 15 | — | — | — | | | |
| 015H | - | - | | | |
| 016H | - | - | | | |
| 017H | - | - | | | |
| 018H | - | - | | | |
| 018H | - | - | | | |
| 01AH | - | - | | | |
| 01BH | Completion width | After the movement of the specified amount in the positioning control or JOG operation, the completion flag will turn on when the current value of the AMP becomes in this completion width. | 10 | Positive | Pulse |
| 01CH | Monitor value error settings | This is the setting to give an error or warning by setting judgment values for the torque monitor values and actual speed of each axis.<br><br>| bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 0 | Torque judgment value enabled | 0 | 0: Disables the torque judgment value<br>1: Enables the torque judgment value |<br>| 1 | Torque judgment value error/warning setting | 0 | 0: Announces an error when it is enabled<br>1: Announces a warning when it is enabled |<br>| 2 | Actual speed judgment value enabled | 0 | 0: Disables the actual speed judgment value<br>1: Enables the actual speed judgment value |<br>| 3 | Actual speed judgment value error/waning setting | 0 | 0: Announces an error when it is enabled<br>1: Announces a warning when it is enabled |<br>| 4 to 15 | — | — | — | | | |
| 01DH | Torque judgment value | Sets the limit value of the torque. | 5000 | 0 to 5000 | 0.1% |
| 01EH | Actual speed judement value | Sets the limit value of the actual speed. | 5000 | 0 to 5000 | 0.1rps or 0.1rpm |
| 01FH | - | - | | | |

| Offset address | Name | Descriptions | Default value | Setting range | Unit |
|---|---|---|---|---|---|
| 020H | Home return setting code | Sets the pattern of the home return.<br><br>| bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 15 to 0 | Home return setting code | 0 | 0:DOG method<br>1:Limit method<br>Any other settings will be errors. | | | |
| 021H | Home return direction | Sets the operating direction of the home return.<br><br>| bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 15 to 0 | Home return direction | 0 | 0:Elapsed value decreasing direction (Limit "-" direction)<br>1:Elapsed value increasing direction (Limit "+" direction)<br>Any other settings will be errors. | | | |
| 022H | Home return acceleration time | Sets the acceleration/deceleration time when performing the home return.<br>At the beginning of the home return, accelerates for the specified acceleration time, decelerates for the specified deceleration time after the proximity input and changes to the creep speed. | | | |
| 023H | Home return deceleration time | | bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 15 to 0 | Home return acceleration time<br>Home return deceleration time | 100 | Setting range: 0 to 10,000(ms)<br>Any other settings will be errors. | | | |
| 024H | Home return target speed | Sets the target speed when performing the home return.<br>When there is no proximity input after starting the home return, accelerates to the target speed. | | | |
| 025H | | | bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 31 to 0 | Home return target | 1,000 | Setting range: 1 to 32,767,000<br>Any other settings will be errors.<br>The ranges vary depending on the unit<br>pulse: 1 to 32,767,000 pps<br>$\mu$m: 1 to 32,767,000 $\mu$m/s<br>inch: 0.001 to 32,767.000 inch/s<br>degree: 0.001 to 32,767.000 rev/s | | | |
| 026H | Home return creep speed | Sets the speed to search the home position after the proximity input.<br>Sets the value lower than the home return target speed. | | | |
| 027H | | | bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 31 to 0 | Home return searching speed | 100 | Setting range: 1 to 32,767,000<br>Any other settings will be errors.<br>The ranges vary depending on the unit settings as below.<br>pulse: 1 to 32,767,000 pps<br>$\mu$m: 1 to 32,767,000 $\mu$m/s<br>inch: 0.001 to 32,767.000 inch/s<br>degree: 0.001 to 32,767.000 rev/s | | | |
| 028H | - | - | | | |
| 029H | JOG operation setting code | Sets the mode of the JOG operation.<br><br>| bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 0 | — | — | — |<br>| 1 | Acceleration/deceleration pattern setting | 0 | 0:Linear acceleration/deceleration<br>1:S-shaped acceleration/deceleration |<br>| 2 to 15 | — | — | — | | | |

| Offset address | Name | Descriptions | Default value | Setting range | Unit |
|---|---|---|---|---|---|
| 02AH | JOG operation acceleraiton time | Sets the acceleration/deceleraion time when performing the JOG operaiton. At the beginning of the JOG operation, accelerates for the specified acceleration time, decelerates for specified deceleraiton time when the starting contact of the JOG operation turns off, and stops. | | | |
| 02BH | JOG operation deceleration time | <table><tr><td>bit</td><td>Name</td><td>Default</td><td>Descriptions</td></tr><tr><td>15 to 0</td><td>JOG operation acceleration time JOG operation deceleration</td><td>100</td><td>Setting range: 0 to 10,000 (ms) Any other settings will be errors.</td></tr></table> | | | |
| 02CH | | Sets the target speed when performing the JOG operation. After starting the JOG operation, accelerates with the specified operation to the target speed while the starting contact of the JOG operation is on. After reaching the target speed, operates with the target speed. | | | |
| 02DH | JOG operation target speed | <table><tr><td>bit</td><td>Name</td><td>Default</td><td>Descriptions</td></tr><tr><td>31 to 0</td><td>JOG operation target speed</td><td>1,000</td><td>Setting range: 1～32,767,000 Any other settings will be errors. The interpretation is changed by the unit setting. pulse: 1 to 32,767,000 pps μm: 1 to 32,767,000 μm/s inch: 0.001 to 32,767.000 inch/s degree: 0.001 to 32,767.000 rev/s</td></tr></table> | | | |
| 02EH | - | - | | | |
| 02FH | - | - | | | |
| 030H | - | - | | | |
| 031H | Deceleration stop deceleration time | When the deceleration stop is requested by I/O, it will be valid, and the deceleraiton operation will complete in this deceleration time. <table><tr><td>bit</td><td>Name</td><td>Default</td><td>Descriptions</td></tr><tr><td>15 to 0</td><td>Deceleration stop deceleration time</td><td>100</td><td>Setting range: 0 to 10,000 (ms) Any other settings will be errors.</td></tr></table> | | | |
| 032H | - | - | | | |
| 033H | Emergency stop deceleration time | When the emergency stop is requested by I/O, it will be valid, and the deceleration operation will complete in this deceleration time. <table><tr><td>bit</td><td>Name</td><td>Default</td><td>Descriptions</td></tr><tr><td>15 to 0</td><td>Emergency stop deceleration time</td><td>100</td><td>Setting range: 0 to 10,000 (ms) Any other settings will be errors.</td></tr></table> | | | |
| 034H | - | - | | | |
| 035H | Limit stop deceleraiton time | When the limit is input, the deceleration operation will complete in this deceleration time. <table><tr><td>bit</td><td>Name</td><td>Default</td><td>Descriptions</td></tr><tr><td>15 to 0</td><td>Limit stop deceleration time</td><td>100</td><td>Setting range: 0 to 10,000 (ms) Any other settings will be errors.</td></tr></table> | | | |
| 036H | - | - | | | |
| 037H | Error stop deceleraiton time | When an error occurred, it will be valid, and the deceleration operation will complete in this deceleration time. <table><tr><td>bit</td><td>Name</td><td>Default</td><td>Descriptions</td></tr><tr><td>15 to 0</td><td>Error stop deceleration time</td><td>100</td><td>Setting range: 0 to 10,000 (ms) Any other settings will be errors.</td></tr></table> | | | |
| 038H | Pulser operation setting code | Specify one pulser among 1 to 3 for the input, for the case that pulser operation is requested by I/O. <table><tr><td>bit</td><td>Name</td><td>Default</td><td>Descriptions</td></tr><tr><td>15 to 0</td><td>Pulser operation setting code</td><td>0</td><td>0: Pulser input 1 1: Pulser input 2 2: Pulser input 3 Any other settings will be errors.</td></tr></table> | | | |

| Offset address | Name | Descriptions | | | | | Default value | Setting range | Unit |
|---|---|---|---|---|---|---|---|---|---|
| 039H | Pulser operation ratio numerator | Sets the multiplier for the input pulse string in the pulser operation. (Moving pulse number of AMP) = (Pulse strings of input from pulser) x (Numerator of ratio of pulser operation) / (Denominator of ratio of pulser operation). | | | | | | | |
| | | bit | Name | Default | Descriptions | | | | |
| | | 15 to 0 | Pulser operation ratio numerator | 1 | Setting range: 1 to 32,767 Any other settings will be errors. | | | | |
| 03AH | Pulser operation ratio denominator | Sets the divisor for the input pulse string in the pulser operation. (Moving pulse number of AMP) = (Pulse strings of input from pulser) x (Denominator of ratio of pulser operation) / (Numerator of ratio of pulser operation). | | | | | | | |
| | | bit | Name | Default | Descriptions | | | | |
| | | 15 to 0 | Pulser operation ratio denominator | 1 | Setting range: 1 to 32,767 Any other settings will be errors. | | | | |
| 03BH | - | - | | | | | | | |
| 03CH | - | - | | | | | | | |
| 03DH | - | - | | | | | | | |
| 03EH | - | - | | | | | | | |
| 03FH | - | - | | | | | | | |
| 040H | - | - | | | | | | | |
| 041H | - | - | | | | | | | |
| 042H | - | - | | | | | | | |
| 043H | - | - | | | | | | | |
| 044H | - | - | | | | | | | |
| 045H | - | - | | | | | | | |
| 046H | - | - | | | | | | | |
| 047H | - | - | | | | | | | |
| 048H | - | - | | | | | | | |
| 049H | - | - | | | | | | | |
| 04AH | - | - | | | | | | | |
| 04BH | - | - | | | | | | | |
| 04CH | - | - | | | | | | | |
| 04DH | - | - | | | | | | | |
| 04EH | - | - | | | | | | | |
| 04FH | - | - | | | | | | | |

**Starting address of each positioning parameter**

| Axis 1 | Axis 2 | Axis 3 | Axis 4 | Axis 5 | Axis 6 | Axis 7 | Axis 8 | | |
|---|---|---|---|---|---|---|---|---|---|
| **Bank No.** | | | | | | | | Address | **Descriptions** |
| 02H | 0CH | 16H | 20H | 2AH | 34H | 3EH | 48H | 050H | Starting address of parameters |

## 17.6.3 Positioning Data Setting Areas

They are the areas for setting positioning data. The positioning data for 8 axes can be set individually. The positioning data is stored in the table format of 625 points per axis.

When executing the automatic operation (position control) with the positioning unit RTEX, specify the number of the positioning table that has been specified in advance, and start the position control. After the start-up, the motor is automatically controlled according to the settings of the table. There are the method that creates the positioning table using Configurator PM that is an exclusive setting tool, and the other method that writes the positioning table in a prescribed address by ladder programs.
There are the standard area of 600 points that is specified by No. 1 to 600, and the extended area of 25 points that is specified by No. 10001 to 10025.

The standard area is used when the setting values of the positioning table are predetermined. It can be set using Configurator PM, and can be rewritten from the ladder programs, too. However, if the positioning table is changed by the ladder program, the caulculation is necessary to restructure the positioning data before executing the automatic operation. This function enables to read the positioning data of 600 points in advance and to prepare for the start-up within the positioning unit, and enables to shorten the start-up time for the positioning. When using Configurator PM to download the positioning data, the data is restructured automatically, so the calculation is not necessary. However, the calculation is necessary after rewriting the poisitoning data from the ladder program.  The procedures for the calculation are as follows.
1. Change the positioning table in the shared memory.
2. Turn on the output contact Y_7 (recalculation request contact).
3. Confirm the input contact X_7 (recalculation done contact) is on (Confim the completion of the recalculation.)

If the data is not recalculated after rewriting the positioning table by the ladder program, note that the operation will be executed with the positioning table before the rewriting.

The extended area is used when the setting values of the positioning table cannot be determined until just before executing the positioning operation. For example, in the application of alignment using an image processing, the moving distance is determined by the image processing. Therefore, the positioning table cannot be determined until just before sarting the positioning operation. In that case, the positioning table is set just before the start-up of the positioning. In the extended area, the positioning table can be rewritten as needed, and the recalculation is not necessary. However, it is up to 25 tables, and Configurator PM cannot be used. The ladder programs should be used to write the positioning table in the prescribed address in the shared memory. The start-up time is longer than the standard area, and when performing the P point control or C point control in the extended area, note that the start-up time varies depending on the number of tables to be executed consecutively.

**How to use each area and the precautions are as below.**

|  | How to use | Number of points | Table number | Setting using Configurator PM | Setting using ladder program |
|---|---|---|---|---|---|
| Standard area | Area to be used when the setting value of the positioning table is predetermined. | 600 points | 1 to 600 | Available | Available (Calculation for restructuring is necessary.) |
| Extended area | Area to be used when the setting value of the positioning table cannot be determined until just before executing the positioning operation. | 25 points | 10001 to 10025 | Not available | Available (Calculation for restructuring is not necessary.) |

**Positioning tables**

Data in the following formats is stored from the starting address of positioning tables of each axis.

| Offset address | Name | Descriptions |
|---|---|---|
| 000H | Control code | Sets the position setting mode and acceleration/deceleration pattern for the positioning operation.<br><br>| bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 0 | Increment/absolute setting | 00H | 00: Increment mode<br>1: Absolute mode |<br>| 1 | Acceleration/deceleration pattern setting | 00H | 00: Linear acceleration/deceleration<br>1: S-shaped acceleration/deceleration |<br>| 15 to 4 | — | — | — | |
| 001H | Operation pattern | Sets the independent and interpolation patterns for the positioning operation.<br>The relation of the inerpolation depends on the settings in the axis group setting area in the common area of the shared memroy.<br><br>| bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 7 to 0 | Control pattern | 00H | 00H: E point control (End point control)<br>01H: P point control (Pass point control)<br>02H: C point control (Continuation point)<br><br>Any other settings will be errors. |<br>| 15 to 8 | Interpolation setting | 00H | 00H: Linear interpolation (Composite speed)<br>01H: Linear interpolation (Long axis speed)<br>10H: Circular interpolation (Center point/CW direction)<br>11H: Circular interpolation (Center point/CCW direction)<br>20H: Circular interpolation (Pass point)<br>50H: Spiral interpolation (Center point/CW direction/X-axis movement)<br>51H: Spiral interpolation (Center point/CCW direction/X-axis movement)<br>52H: Spiral interpolation (Center point/CW direction/Y-axis movement)<br>53H: Spiral interpolation (Center point/CCW direction/Y-axis movement)<br>54H: Spiral interpolation (Center point/CW direction/Z-axis movement)<br>55H: Spiral interpolation (Center point/CCW direction/Z-axis movement)<br>60H: Spiral interpolation (Pass point/X-axis movement)<br>61H: Spiral interpolation (Pass point/Y-axis movement)<br>62H: Spiral interpolation (Pass point/Z-axis movement)<br><br>Any other settings will be errors. | |
| 002H | - | - |
| 003H | - | - |
| 004H | Positioning acceleration time | Sets the acceleration and deceleration time for the positioning operation.<br>The acceleration time and deceleration time can be set individually.<br><br>| bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 15 to 0 | Acceleration time<br>Deceleration time | 100 | Setting range: 0 to 10,000 (ms)<br>Any other settings will be errors. | |
| 005H | Positioning deceleration time | |
| 006H | Positioning target speed (interpolation speed) | In case of the individual operation (no interpolation), it is the target speed of the corresponding axis. In case of the interpolation operaiton, it is the target speed of the interpolation.<br>In the interpolation operation, the target speed for the axis of the smallest number in a group is valid.<br><br>| bit | Name | Default | Descriptions |<br>|---|---|---|---|<br>| 31 to 0 | Psotioning target (Interpolation speed) | 1000 | Setting range: 1 to 32,767,000<br>Any other settings will be errors.<br>The interpretation is changed by the unit setting.<br>pulse: 1 to 32,767,000 pps　　　　$\mu$m: 1 to 32,767,000 $\mu$m/s<br>inch: 0.001 to 32,767.000 inch/s　degree: 0.001 to 32,767.000 rev/s | |
| 007H | | |

| Offset address | Name | Descriptions |
|---|---|---|
| 008H<br><br>009H | Positioning movement amount | The area to set the movement amount for the positioning operation.<br>The interpretation is chagned for the increment movement amount or absolute coordiate by the control code setting.<br><br>| bit | Name | Default | Descriptions |<br>\|---\|---\|---\|---\|<br>| 31 to 0 | Positioning movement amount | 0 | Setting range:-1,073,741,823 to 1,073,741,823<br>Any other settings will be errors.<br>The interpretation alters depending on the unit setting.<br>pulse: -1,073,741,823 to 1,073,741,823 pulse<br>$\mu$m(0.1$\mu$m): -107,374,182.3 to 107,374,182.3 $\mu$m<br>$\mu$m(1$\mu$m): -1,073,741,823 to 1,073,741,823 $\mu$m<br>inch(0.00001inch): -10,737.41823 to 10,737.41823 inch<br>inch(0.0001inch): -107,374.1823 to 107,374.1823 inch<br>degree(0.1degree): -107,374,182.3 to 107,374,182.3 degree<br>idegree(1degree): -1,073,741,823 to 1,073,741,823 degree | |
| 00AH<br><br>00BH | Auxiliary point | The area to set the auxiliary points (center poijnt, pass point coordinates) in case of the circular interpolation or spiral interpolation control.<br><br>| bit | Name | Default | Descriptions |<br>\|---\|---\|---\|---\|<br>| 31 to 0 | Auxiliary point | 0 | Setting range:-1,073,741,823 to 1,073,741,823<br>Any other settings will be errors.<br>The interpretation alters depending on the unit setting.<br>pulse: -1,073,741,823 to 1,073,741,823 pulse<br>$\mu$m(0.1$\mu$m): -107,374,182.3 to 107,374,182.3 $\mu$m<br>$\mu$m(1$\mu$m): -1,073,741,823 to 1,073,741,823 $\mu$m<br>inch(0.00001inch): -10,737.41823 to 10,737.41823 inch<br>inch(0.0001inch): -107,374.1823 to 107,374.1823 inch<br>degree(0.1degree): -107,374,182.3 to 107,374,182.3 degree<br>idegree(1degree): -1,073,741,823 to 1,073,741,823 degree | |
| 00CH | Dwell time | After the completion of the positioning control of this table,<br>when the mode is C: Continuation point, stops the motor operation for the dwell time and starts the operation of the next table.<br>when the mode is P: Pass point, this setting is ignored.<br>when the mode is E: End point, the positioning done contact will turn on after waiting for the dwell time.<br><br>| bit | Name | Default | Descriptions |<br>\|---\|---\|---\|---\|<br>| 15 to 0 | Dwell time | 0 | 0 to 32,767: The unit is ms.<br>Any other settings will be errors. | |
| 00DH | Auxiliary output code | Sets the data to be output to the auxiliary output code in each axis information & monitor area by the setting of the auxiliary output mode in the parameter setting area.<br><br>| bit | Name | Default | Descriptions |<br>\|---\|---\|---\|---\|<br>| 15 to 0 | Auxiliary output code | 0 | No specific setting range. | |
| 00EH | - | - |
| 00DH | - | - |

**Starting address of each positioning table**

| Axis 1 | Axis 2 | Axis 3 | Axis 4 | Axis 5 | Axis 6 | Axis 7 | Axis 8 | Address | Descriptions |
|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------------|
| Bank No. | | | | | | | | | |
| 02H | 0CH | 16H | 20H | 2AH | 34H | 3EH | 48H | 050H | Starting address of table 1 |
| | | | | | | | | 060H | Starting address of table 2 |
| | | | | | | | | 070H | Starting address of table 3 |
| | | | | | | | | 080H | Starting address of table 4 |
| | | | | | | | | 090H | Starting address of table 5 |
| | | | | | | | | 0A0H | Starting address of table 6 |
| | | | | | | | | 0B0H | Starting address of table 7 |
| | | | | | | | | 0C0H | Starting address of table 8 |
| | | | | | | | | 0D0H | Starting address of table 9 |
| | | | | | | | | 0E0H | Starting address of table 10 |
| | | | | | | | | 0F0H | Starting address of table 11 |
| | | | | | | | | 100H | Starting address of table 12 |
| | | | | | | | | 110H | Starting address of table 13 |
| | | | | | | | | 120H | Starting address of table 14 |
| | | | | | | | | 130H | Starting address of table 15 |
| | | | | | | | | 140H | Starting address of table 16 |
| | | | | | | | | 150H | Starting address of table 17 |
| | | | | | | | | 160H | Starting address of table 18 |
| | | | | | | | | 170H | Starting address of table 19 |
| | | | | | | | | 180H | Starting address of table 20 |
| | | | | | | | | 190H | Starting address of table 21 |
| | | | | | | | | 1A0H | Starting address of table 22 |
| | | | | | | | | 1B0H | Starting address of table 23 |
| | | | | | | | | 1C0H | Starting address of table 24 |
| | | | | | | | | 1D0H | Starting address of table 25 |
| | | | | | | | | 1E0H | Starting address of table 26 |
| | | | | | | | | 1F0H | Starting address of table 27 |
| | | | | | | | | 200H | Starting address of table 28 |
| | | | | | | | | 210H | Starting address of table 29 |
| | | | | | | | | 220H | Starting address of table 30 |
| | | | | | | | | 230H | Starting address of table 31 |
| | | | | | | | | 240H | Starting address of table 32 |
| | | | | | | | | 250H | Starting address of table 33 |
| | | | | | | | | 260H | Starting address of table 34 |
| | | | | | | | | 270H | Starting address of table 35 |
| | | | | | | | | 280H | Starting address of table 36 |
| | | | | | | | | 290H | Starting address of table 37 |
| | | | | | | | | 2A0H | Starting address of table 38 |
| | | | | | | | | 2B0H | Starting address of table 39 |
| | | | | | | | | 2C0H | Starting address of table 40 |
| | | | | | | | | 2D0H | Starting address of table 41 |
| | | | | | | | | 2E0H | Starting address of table 42 |
| | | | | | | | | 2F0H | Starting address of table 43 |
| | | | | | | | | 300H | Starting address of table 44 |
| | | | | | | | | 310H | Starting address of table 45 |
| | | | | | | | | 320H | Starting address of table 46 |
| | | | | | | | | 330H | Starting address of table 47 |
| | | | | | | | | 340H | Starting address of table 48 |
| | | | | | | | | 350H | Starting address of table 49 |
| | | | | | | | | 360H | Starting address of table 50 |
| | | | | | | | | 370H | Starting address of table 51 |
| | | | | | | | | 380H | Starting address of table 52 |
| | | | | | | | | 390H | Starting address of table 53 |
| | | | | | | | | 3A0H | Starting address of table 54 |
| | | | | | | | | 3B0H | Starting address of table 55 |
| | | | | | | | | 3C0H | Starting address of table 56 |
| | | | | | | | | 3D0H | Starting address of table 57 |
| | | | | | | | | 3E0H | Starting address of table 58 |
| | | | | | | | | 3F0H | Starting address of table 59 |

| Axis 1 | Axis 2 | Axis 3 | Axis 4 | Axis 5 | Axis 6 | Axis 7 | Axis 8 | Address | Descriptions |
|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------------|
| Bank No. | | | | | | | | | |
| 03H | 0DH | 17H | 21H | 2BH | 35H | 3FH | 49H | 000H | Starting address of table 60 |
| | | | | | | | | 010H | Starting address of table 61 |
| | | | | | | | | 020H | Starting address of table 62 |
| | | | | | | | | 030H | Starting address of table 63 |
| | | | | | | | | 040H | Starting address of table 64 |
| | | | | | | | | 050H | Starting address of table 65 |
| | | | | | | | | 060H | Starting address of table 66 |
| | | | | | | | | 070H | Starting address of table 67 |
| | | | | | | | | 080H | Starting address of table 68 |
| | | | | | | | | 090H | Starting address of table 69 |
| | | | | | | | | 0A0H | Starting address of table 70 |
| | | | | | | | | 0B0H | Starting address of table 71 |
| | | | | | | | | 0C0H | Starting address of table 72 |
| | | | | | | | | 0D0H | Starting address of table 73 |
| | | | | | | | | 0E0H | Starting address of table 74 |
| | | | | | | | | 0F0H | Starting address of table 75 |
| | | | | | | | | 100H | Starting address of table 76 |
| | | | | | | | | 110H | Starting address of table 77 |
| | | | | | | | | 120H | Starting address of table 78 |
| | | | | | | | | 130H | Starting address of table 79 |
| | | | | | | | | 140H | Starting address of table 80 |
| | | | | | | | | 150H | Starting address of table 81 |
| | | | | | | | | 160H | Starting address of table 82 |
| | | | | | | | | 170H | Starting address of table 83 |
| | | | | | | | | 180H | Starting address of table 84 |
| | | | | | | | | 190H | Starting address of table 85 |
| | | | | | | | | 1A0H | Starting address of table 86 |
| | | | | | | | | 1B0H | Starting address of table 87 |
| | | | | | | | | 1C0H | Starting address of table 88 |
| | | | | | | | | 1D0H | Starting address of table 89 |
| | | | | | | | | 1E0H | Starting address of table 90 |
| | | | | | | | | 1F0H | Starting address of table 91 |
| | | | | | | | | 200H | Starting address of table 92 |
| | | | | | | | | 210H | Starting address of table 93 |
| | | | | | | | | 220H | Starting address of table 94 |
| | | | | | | | | 230H | Starting address of table 95 |
| | | | | | | | | 240H | Starting address of table 96 |
| | | | | | | | | 250H | Starting address of table 97 |
| | | | | | | | | 260H | Starting address of table 98 |
| | | | | | | | | 270H | Starting address of table 99 |
| | | | | | | | | 280H | Starting address of table 100 |
| | | | | | | | | 290H | Starting address of table 101 |
| | | | | | | | | 2A0H | Starting address of table 102 |
| | | | | | | | | 2B0H | Starting address of table 103 |
| | | | | | | | | 2C0H | Starting address of table 104 |
| | | | | | | | | 2D0H | Starting address of table 105 |
| | | | | | | | | 2E0H | Starting address of table 106 |
| | | | | | | | | 2F0H | Starting address of table 107 |
| | | | | | | | | 300H | Starting address of table 108 |
| | | | | | | | | 310H | Starting address of table 109 |
| | | | | | | | | 320H | Starting address of table 110 |
| | | | | | | | | 330H | Starting address of table 111 |
| | | | | | | | | 340H | Starting address of table 112 |
| | | | | | | | | 350H | Starting address of table 113 |
| | | | | | | | | 360H | Starting address of table 114 |
| | | | | | | | | 370H | Starting address of table 115 |
| | | | | | | | | 380H | Starting address of table 116 |
| | | | | | | | | 390H | Starting address of table 117 |
| | | | | | | | | 3A0H | Starting address of table 118 |
| | | | | | | | | 3B0H | Starting address of table 119 |
| | | | | | | | | 3C0H | Starting address of table 120 |
| | | | | | | | | 3D0H | Starting address of table 121 |
| | | | | | | | | 3E0H | Starting address of table 122 |
| | | | | | | | | 3F0H | Starting address of table 123 |

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| Axis 1 | Axis 2 | Axis 3 | Axis 4 | Axis 5 | Axis 6 | Axis 7 | Axis 8 | Address | Descriptions |
|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------------|
| **Bank No.** | | | | | | | | | |
| 04H | 0EH | 18H | 22H | 2CH | 36H | 40H | 4AH | 000H | Starting address of table 124 |
| | | | | | | | | 010H | Starting address of table 125 |
| | | | | | | | | 020H | Starting address of table 126 |
| | | | | | | | | 030H | Starting address of table 127 |
| | | | | | | | | 040H | Starting address of table 128 |
| | | | | | | | | 050H | Starting address of table 129 |
| | | | | | | | | 060H | Starting address of table 130 |
| | | | | | | | | 070H | Starting address of table 131 |
| | | | | | | | | 080H | Starting address of table 132 |
| | | | | | | | | 090H | Starting address of table 133 |
| | | | | | | | | 0A0H | Starting address of table 134 |
| | | | | | | | | 0B0H | Starting address of table 135 |
| | | | | | | | | 0C0H | Starting address of table 136 |
| | | | | | | | | 0D0H | Starting address of table 137 |
| | | | | | | | | 0E0H | Starting address of table 138 |
| | | | | | | | | 0F0H | Starting address of table 139 |
| | | | | | | | | 100H | Starting address of table 140 |
| | | | | | | | | 110H | Starting address of table 141 |
| | | | | | | | | 120H | Starting address of table 142 |
| | | | | | | | | 130H | Starting address of table 143 |
| | | | | | | | | 140H | Starting address of table 144 |
| | | | | | | | | 150H | Starting address of table 145 |
| | | | | | | | | 160H | Starting address of table 146 |
| | | | | | | | | 170H | Starting address of table 147 |
| | | | | | | | | 180H | Starting address of table 148 |
| | | | | | | | | 190H | Starting address of table 149 |
| | | | | | | | | 1A0H | Starting address of table 150 |
| | | | | | | | | 1B0H | Starting address of table 151 |
| | | | | | | | | 1C0H | Starting address of table 152 |
| | | | | | | | | 1D0H | Starting address of table 153 |
| | | | | | | | | 1E0H | Starting address of table 154 |
| | | | | | | | | 1F0H | Starting address of table 155 |
| | | | | | | | | 200H | Starting address of table 156 |
| | | | | | | | | 210H | Starting address of table 157 |
| | | | | | | | | 220H | Starting address of table 158 |
| | | | | | | | | 230H | Starting address of table 159 |
| | | | | | | | | 240H | Starting address of table 160 |
| | | | | | | | | 250H | Starting address of table 161 |
| | | | | | | | | 260H | Starting address of table 162 |
| | | | | | | | | 270H | Starting address of table 163 |
| | | | | | | | | 280H | Starting address of table 164 |
| | | | | | | | | 290H | Starting address of table 165 |
| | | | | | | | | 2A0H | Starting address of table 166 |
| | | | | | | | | 2B0H | Starting address of table 167 |
| | | | | | | | | 2C0H | Starting address of table 168 |
| | | | | | | | | 2D0H | Starting address of table 169 |
| | | | | | | | | 2E0H | Starting address of table 170 |
| | | | | | | | | 2F0H | Starting address of table 171 |
| | | | | | | | | 300H | Starting address of table 172 |
| | | | | | | | | 310H | Starting address of table 173 |
| | | | | | | | | 320H | Starting address of table 174 |
| | | | | | | | | 330H | Starting address of table 175 |
| | | | | | | | | 340H | Starting address of table 176 |
| | | | | | | | | 350H | Starting address of table 177 |
| | | | | | | | | 360H | Starting address of table 178 |
| | | | | | | | | 370H | Starting address of table 179 |
| | | | | | | | | 380H | Starting address of table 180 |
| | | | | | | | | 390H | Starting address of table 181 |
| | | | | | | | | 3A0H | Starting address of table 182 |
| | | | | | | | | 3B0H | Starting address of table 183 |
| | | | | | | | | 3C0H | Starting address of table 184 |
| | | | | | | | | 3D0H | Starting address of table 185 |
| | | | | | | | | 3E0H | Starting address of table 186 |
| | | | | | | | | 3F0H | Starting address of table 187 |

| Axis 1 | Axis 2 | Axis 3 | Axis 4 | Axis 5 | Axis 6 | Axis 7 | Axis 8 | Address | Descriptions |
|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------------|
| **Bank No.** | | | | | | | | | |
| 05H | 0FH | 19H | 23H | 2DH | 37H | 41H | 4BH | 000H | Starting address of table 188 |
| | | | | | | | | 010H | Starting address of table 189 |
| | | | | | | | | 020H | Starting address of table 190 |
| | | | | | | | | 030H | Starting address of table 191 |
| | | | | | | | | 040H | Starting address of table 192 |
| | | | | | | | | 050H | Starting address of table 193 |
| | | | | | | | | 060H | Starting address of table 194 |
| | | | | | | | | 070H | Starting address of table 195 |
| | | | | | | | | 080H | Starting address of table 196 |
| | | | | | | | | 090H | Starting address of table 197 |
| | | | | | | | | 0A0H | Starting address of table 198 |
| | | | | | | | | 0B0H | Starting address of table 199 |
| | | | | | | | | 0C0H | Starting address of table 200 |
| | | | | | | | | 0D0H | Starting address of table 201 |
| | | | | | | | | 0E0H | Starting address of table 202 |
| | | | | | | | | 0F0H | Starting address of table 203 |
| | | | | | | | | 100H | Starting address of table 204 |
| | | | | | | | | 110H | Starting address of table 205 |
| | | | | | | | | 120H | Starting address of table 206 |
| | | | | | | | | 130H | Starting address of table 207 |
| | | | | | | | | 140H | Starting address of table 208 |
| | | | | | | | | 150H | Starting address of table 209 |
| | | | | | | | | 160H | Starting address of table 210 |
| | | | | | | | | 170H | Starting address of table 211 |
| | | | | | | | | 180H | Starting address of table 212 |
| | | | | | | | | 190H | Starting address of table 213 |
| | | | | | | | | 1A0H | Starting address of table 214 |
| | | | | | | | | 1B0H | Starting address of table 215 |
| | | | | | | | | 1C0H | Starting address of table 216 |
| | | | | | | | | 1D0H | Starting address of table 217 |
| | | | | | | | | 1E0H | Starting address of table 218 |
| | | | | | | | | 1F0H | Starting address of table 219 |
| | | | | | | | | 200H | Starting address of table 220 |
| | | | | | | | | 210H | Starting address of table 221 |
| | | | | | | | | 220H | Starting address of table 222 |
| | | | | | | | | 230H | Starting address of table 223 |
| | | | | | | | | 240H | Starting address of table 224 |
| | | | | | | | | 250H | Starting address of table 225 |
| | | | | | | | | 260H | Starting address of table 226 |
| | | | | | | | | 270H | Starting address of table 227 |
| | | | | | | | | 280H | Starting address of table 228 |
| | | | | | | | | 290H | Starting address of table 229 |
| | | | | | | | | 2A0H | Starting address of table 230 |
| | | | | | | | | 2B0H | Starting address of table 231 |
| | | | | | | | | 2C0H | Starting address of table 232 |
| | | | | | | | | 2D0H | Starting address of table 233 |
| | | | | | | | | 2E0H | Starting address of table 234 |
| | | | | | | | | 2F0H | Starting address of table 235 |
| | | | | | | | | 300H | Starting address of table 236 |
| | | | | | | | | 310H | Starting address of table 237 |
| | | | | | | | | 320H | Starting address of table 238 |
| | | | | | | | | 330H | Starting address of table 239 |
| | | | | | | | | 340H | Starting address of table 240 |
| | | | | | | | | 350H | Starting address of table 241 |
| | | | | | | | | 360H | Starting address of table 242 |
| | | | | | | | | 370H | Starting address of table 243 |
| | | | | | | | | 380H | Starting address of table 244 |
| | | | | | | | | 390H | Starting address of table 245 |
| | | | | | | | | 3A0H | Starting address of table 246 |
| | | | | | | | | 3B0H | Starting address of table 247 |
| | | | | | | | | 3C0H | Starting address of table 248 |
| | | | | | | | | 3D0H | Starting address of table 249 |
| | | | | | | | | 3E0H | Starting address of table 250 |
| | | | | | | | | 3F0H | Starting address of table 251 |

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| Axis 1 | Axis 2 | Axis 3 | Axis 4 | Axis 5 | Axis 6 | Axis 7 | Axis 8 | Address | Descriptions |
|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------------|
| Bank No. | | | | | | | | | |
| 06H | 10H | 1AH | 24H | 2EH | 38H | 42H | 4CH | 000H | Starting address of table 252 |
| | | | | | | | | 010H | Starting address of table 253 |
| | | | | | | | | 020H | Starting address of table 254 |
| | | | | | | | | 030H | Starting address of table 255 |
| | | | | | | | | 040H | Starting address of table 256 |
| | | | | | | | | 050H | Starting address of table 257 |
| | | | | | | | | 060H | Starting address of table 258 |
| | | | | | | | | 070H | Starting address of table 259 |
| | | | | | | | | 080H | Starting address of table 260 |
| | | | | | | | | 090H | Starting address of table 261 |
| | | | | | | | | 0A0H | Starting address of table 262 |
| | | | | | | | | 0B0H | Starting address of table 263 |
| | | | | | | | | 0C0H | Starting address of table 264 |
| | | | | | | | | 0D0H | Starting address of table 265 |
| | | | | | | | | 0E0H | Starting address of table 266 |
| | | | | | | | | 0F0H | Starting address of table 267 |
| | | | | | | | | 100H | Starting address of table 268 |
| | | | | | | | | 110H | Starting address of table 269 |
| | | | | | | | | 120H | Starting address of table 270 |
| | | | | | | | | 130H | Starting address of table 271 |
| | | | | | | | | 140H | Starting address of table 272 |
| | | | | | | | | 150H | Starting address of table 273 |
| | | | | | | | | 160H | Starting address of table 274 |
| | | | | | | | | 170H | Starting address of table 275 |
| | | | | | | | | 180H | Starting address of table 276 |
| | | | | | | | | 190H | Starting address of table 277 |
| | | | | | | | | 1A0H | Starting address of table 278 |
| | | | | | | | | 1B0H | Starting address of table 279 |
| | | | | | | | | 1C0H | Starting address of table 280 |
| | | | | | | | | 1D0H | Starting address of table 281 |
| | | | | | | | | 1E0H | Starting address of table 282 |
| | | | | | | | | 1F0H | Starting address of table 283 |
| | | | | | | | | 200H | Starting address of table 284 |
| | | | | | | | | 210H | Starting address of table 285 |
| | | | | | | | | 220H | Starting address of table 286 |
| | | | | | | | | 230H | Starting address of table 287 |
| | | | | | | | | 240H | Starting address of table 288 |
| | | | | | | | | 250H | Starting address of table 289 |
| | | | | | | | | 260H | Starting address of table 290 |
| | | | | | | | | 270H | Starting address of table 291 |
| | | | | | | | | 280H | Starting address of table 292 |
| | | | | | | | | 290H | Starting address of table 293 |
| | | | | | | | | 2A0H | Starting address of table 294 |
| | | | | | | | | 2B0H | Starting address of table 295 |
| | | | | | | | | 2C0H | Starting address of table 296 |
| | | | | | | | | 2D0H | Starting address of table 297 |
| | | | | | | | | 2E0H | Starting address of table 298 |
| | | | | | | | | 2F0H | Starting address of table 299 |
| | | | | | | | | 300H | Starting address of table 300 |
| | | | | | | | | 310H | Starting address of table 301 |
| | | | | | | | | 320H | Starting address of table 302 |
| | | | | | | | | 330H | Starting address of table 303 |
| | | | | | | | | 340H | Starting address of table 304 |
| | | | | | | | | 350H | Starting address of table 305 |
| | | | | | | | | 360H | Starting address of table 306 |
| | | | | | | | | 370H | Starting address of table 307 |
| | | | | | | | | 380H | Starting address of table 308 |
| | | | | | | | | 390H | Starting address of table 309 |
| | | | | | | | | 3A0H | Starting address of table 310 |
| | | | | | | | | 3B0H | Starting address of table 311 |
| | | | | | | | | 3C0H | Starting address of table 312 |
| | | | | | | | | 3D0H | Starting address of table 313 |
| | | | | | | | | 3E0H | Starting address of table 314 |
| | | | | | | | | 3F0H | Starting address of table 315 |

| Axis 1 | Axis 2 | Axis 3 | Axis 4 | Axis 5 | Axis 6 | Axis 7 | Axis 8 | Address | Descriptions |
|---|---|---|---|---|---|---|---|---|---|
| Bank No. | | | | | | | | | |
| 07H | 11H | 1BH | 25H | 2FH | 39H | 43H | 4DH | 000H | Starting address of table 316 |
| | | | | | | | | 010H | Starting address of table 317 |
| | | | | | | | | 020H | Starting address of table 318 |
| | | | | | | | | 030H | Starting address of table 319 |
| | | | | | | | | 040H | Starting address of table 320 |
| | | | | | | | | 050H | Starting address of table 321 |
| | | | | | | | | 060H | Starting address of table 322 |
| | | | | | | | | 070H | Starting address of table 323 |
| | | | | | | | | 080H | Starting address of table 324 |
| | | | | | | | | 090H | Starting address of table 325 |
| | | | | | | | | 0A0H | Starting address of table 326 |
| | | | | | | | | 0B0H | Starting address of table 327 |
| | | | | | | | | 0C0H | Starting address of table 328 |
| | | | | | | | | 0D0H | Starting address of table 329 |
| | | | | | | | | 0E0H | Starting address of table 330 |
| | | | | | | | | 0F0H | Starting address of table 331 |
| | | | | | | | | 100H | Starting address of table 332 |
| | | | | | | | | 110H | Starting address of table 333 |
| | | | | | | | | 120H | Starting address of table 334 |
| | | | | | | | | 130H | Starting address of table 335 |
| | | | | | | | | 140H | Starting address of table 336 |
| | | | | | | | | 150H | Starting address of table 337 |
| | | | | | | | | 160H | Starting address of table 338 |
| | | | | | | | | 170H | Starting address of table 339 |
| | | | | | | | | 180H | Starting address of table 340 |
| | | | | | | | | 190H | Starting address of table 341 |
| | | | | | | | | 1A0H | Starting address of table 342 |
| | | | | | | | | 1B0H | Starting address of table 343 |
| | | | | | | | | 1C0H | Starting address of table 344 |
| | | | | | | | | 1D0H | Starting address of table 345 |
| | | | | | | | | 1E0H | Starting address of table 346 |
| | | | | | | | | 1F0H | Starting address of table 347 |
| | | | | | | | | 200H | Starting address of table 348 |
| | | | | | | | | 210H | Starting address of table 349 |
| | | | | | | | | 220H | Starting address of table 350 |
| | | | | | | | | 230H | Starting address of table 351 |
| | | | | | | | | 240H | Starting address of table 352 |
| | | | | | | | | 250H | Starting address of table 353 |
| | | | | | | | | 260H | Starting address of table 354 |
| | | | | | | | | 270H | Starting address of table 355 |
| | | | | | | | | 280H | Starting address of table 356 |
| | | | | | | | | 290H | Starting address of table 357 |
| | | | | | | | | 2A0H | Starting address of table 358 |
| | | | | | | | | 2B0H | Starting address of table 359 |
| | | | | | | | | 2C0H | Starting address of table 360 |
| | | | | | | | | 2D0H | Starting address of table 361 |
| | | | | | | | | 2E0H | Starting address of table 362 |
| | | | | | | | | 2F0H | Starting address of table 363 |
| | | | | | | | | 300H | Starting address of table 364 |
| | | | | | | | | 310H | Starting address of table 365 |
| | | | | | | | | 320H | Starting address of table 366 |
| | | | | | | | | 330H | Starting address of table 367 |
| | | | | | | | | 340H | Starting address of table 368 |
| | | | | | | | | 350H | Starting address of table 369 |
| | | | | | | | | 360H | Starting address of table 370 |
| | | | | | | | | 370H | Starting address of table 371 |
| | | | | | | | | 380H | Starting address of table 372 |
| | | | | | | | | 390H | Starting address of table 373 |
| | | | | | | | | 3A0H | Starting address of table 374 |
| | | | | | | | | 3B0H | Starting address of table 375 |
| | | | | | | | | 3C0H | Starting address of table 376 |
| | | | | | | | | 3D0H | Starting address of table 377 |
| | | | | | | | | 3E0H | Starting address of table 378 |
| | | | | | | | | 3F0H | Starting address of table 379 |

| Axis 1 | Axis 2 | Axis 3 | Axis 4 | Axis 5 | Axis 6 | Axis 7 | Axis 8 | Address | Descriptions |
|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------------|
| Bank No. | | | | | | | | | |
| 08H | 12H | 1CH | 26H | 30H | 3AH | 44H | 4EH | 000H | Starting address of table 380 |
| | | | | | | | | 010H | Starting address of table 381 |
| | | | | | | | | 020H | Starting address of table 382 |
| | | | | | | | | 030H | Starting address of table 383 |
| | | | | | | | | 040H | Starting address of table 384 |
| | | | | | | | | 050H | Starting address of table 385 |
| | | | | | | | | 060H | Starting address of table 386 |
| | | | | | | | | 070H | Starting address of table 387 |
| | | | | | | | | 080H | Starting address of table 388 |
| | | | | | | | | 090H | Starting address of table 389 |
| | | | | | | | | 0A0H | Starting address of table 390 |
| | | | | | | | | 0B0H | Starting address of table 391 |
| | | | | | | | | 0C0H | Starting address of table 392 |
| | | | | | | | | 0D0H | Starting address of table 393 |
| | | | | | | | | 0E0H | Starting address of table 394 |
| | | | | | | | | 0F0H | Starting address of table 395 |
| | | | | | | | | 100H | Starting address of table 396 |
| | | | | | | | | 110H | Starting address of table 397 |
| | | | | | | | | 120H | Starting address of table 398 |
| | | | | | | | | 130H | Starting address of table 399 |
| | | | | | | | | 140H | Starting address of table 400 |
| | | | | | | | | 150H | Starting address of table 401 |
| | | | | | | | | 160H | Starting address of table 402 |
| | | | | | | | | 170H | Starting address of table 403 |
| | | | | | | | | 180H | Starting address of table 404 |
| | | | | | | | | 190H | Starting address of table 405 |
| | | | | | | | | 1A0H | Starting address of table 406 |
| | | | | | | | | 1B0H | Starting address of table 407 |
| | | | | | | | | 1C0H | Starting address of table 408 |
| | | | | | | | | 1D0H | Starting address of table 409 |
| | | | | | | | | 1E0H | Starting address of table 410 |
| | | | | | | | | 1F0H | Starting address of table 411 |
| | | | | | | | | 200H | Starting address of table 412 |
| | | | | | | | | 210H | Starting address of table 413 |
| | | | | | | | | 220H | Starting address of table 414 |
| | | | | | | | | 230H | Starting address of table 415 |
| | | | | | | | | 240H | Starting address of table 416 |
| | | | | | | | | 250H | Starting address of table 417 |
| | | | | | | | | 260H | Starting address of table 418 |
| | | | | | | | | 270H | Starting address of table 419 |
| | | | | | | | | 280H | Starting address of table 420 |
| | | | | | | | | 290H | Starting address of table 421 |
| | | | | | | | | 2A0H | Starting address of table 422 |
| | | | | | | | | 2B0H | Starting address of table 423 |
| | | | | | | | | 2C0H | Starting address of table 424 |
| | | | | | | | | 2D0H | Starting address of table 425 |
| | | | | | | | | 2E0H | Starting address of table 426 |
| | | | | | | | | 2F0H | Starting address of table 427 |
| | | | | | | | | 300H | Starting address of table 428 |
| | | | | | | | | 310H | Starting address of table 429 |
| | | | | | | | | 320H | Starting address of table 430 |
| | | | | | | | | 330H | Starting address of table 431 |
| | | | | | | | | 340H | Starting address of table 432 |
| | | | | | | | | 350H | Starting address of table 433 |
| | | | | | | | | 360H | Starting address of table 434 |
| | | | | | | | | 370H | Starting address of table 435 |
| | | | | | | | | 380H | Starting address of table 436 |
| | | | | | | | | 390H | Starting address of table 437 |
| | | | | | | | | 3A0H | Starting address of table 438 |
| | | | | | | | | 3B0H | Starting address of table 439 |
| | | | | | | | | 3C0H | Starting address of table 440 |
| | | | | | | | | 3D0H | Starting address of table 441 |
| | | | | | | | | 3E0H | Starting address of table 442 |
| | | | | | | | | 3F0H | Starting address of table 443 |

| Axis 1 | Axis 2 | Axis 3 | Axis 4 | Axis 5 | Axis 6 | Axis 7 | Axis 8 | Address | Descriptions |
|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------------|
| **Bank No.** | | | | | | | | | |
| 09H | 13H | 1DH | 27H | 31H | 3BH | 45H | 4FH | 000H | Starting address of table 444 |
| | | | | | | | | 010H | Starting address of table 445 |
| | | | | | | | | 020H | Starting address of table 446 |
| | | | | | | | | 030H | Starting address of table 447 |
| | | | | | | | | 040H | Starting address of table 448 |
| | | | | | | | | 050H | Starting address of table 449 |
| | | | | | | | | 060H | Starting address of table 450 |
| | | | | | | | | 070H | Starting address of table 451 |
| | | | | | | | | 080H | Starting address of table 452 |
| | | | | | | | | 090H | Starting address of table 453 |
| | | | | | | | | 0A0H | Starting address of table 454 |
| | | | | | | | | 0B0H | Starting address of table 455 |
| | | | | | | | | 0C0H | Starting address of table 456 |
| | | | | | | | | 0D0H | Starting address of table 457 |
| | | | | | | | | 0E0H | Starting address of table 458 |
| | | | | | | | | 0F0H | Starting address of table 459 |
| | | | | | | | | 100H | Starting address of table 460 |
| | | | | | | | | 110H | Starting address of table 461 |
| | | | | | | | | 120H | Starting address of table 462 |
| | | | | | | | | 130H | Starting address of table 463 |
| | | | | | | | | 140H | Starting address of table 464 |
| | | | | | | | | 150H | Starting address of table 465 |
| | | | | | | | | 160H | Starting address of table 466 |
| | | | | | | | | 170H | Starting address of table 467 |
| | | | | | | | | 180H | Starting address of table 468 |
| | | | | | | | | 190H | Starting address of table 469 |
| | | | | | | | | 1A0H | Starting address of table 470 |
| | | | | | | | | 1B0H | Starting address of table 471 |
| | | | | | | | | 1C0H | Starting address of table 472 |
| | | | | | | | | 1D0H | Starting address of table 473 |
| | | | | | | | | 1E0H | Starting address of table 474 |
| | | | | | | | | 1F0H | Starting address of table 475 |
| | | | | | | | | 200H | Starting address of table 476 |
| | | | | | | | | 210H | Starting address of table 477 |
| | | | | | | | | 220H | Starting address of table 478 |
| | | | | | | | | 230H | Starting address of table 479 |
| | | | | | | | | 240H | Starting address of table 480 |
| | | | | | | | | 250H | Starting address of table 481 |
| | | | | | | | | 260H | Starting address of table 482 |
| | | | | | | | | 270H | Starting address of table 483 |
| | | | | | | | | 280H | Starting address of table 484 |
| | | | | | | | | 290H | Starting address of table 485 |
| | | | | | | | | 2A0H | Starting address of table 486 |
| | | | | | | | | 2B0H | Starting address of table 487 |
| | | | | | | | | 2C0H | Starting address of table 488 |
| | | | | | | | | 2D0H | Starting address of table 489 |
| | | | | | | | | 2E0H | Starting address of table 490 |
| | | | | | | | | 2F0H | Starting address of table 491 |
| | | | | | | | | 300H | Starting address of table 492 |
| | | | | | | | | 310H | Starting address of table 493 |
| | | | | | | | | 320H | Starting address of table 494 |
| | | | | | | | | 330H | Starting address of table 495 |
| | | | | | | | | 340H | Starting address of table 496 |
| | | | | | | | | 350H | Starting address of table 497 |
| | | | | | | | | 360H | Starting address of table 498 |
| | | | | | | | | 370H | Starting address of table 499 |
| | | | | | | | | 380H | Starting address of table 500 |
| | | | | | | | | 390H | Starting address of table 501 |
| | | | | | | | | 3A0H | Starting address of table 502 |
| | | | | | | | | 3B0H | Starting address of table 503 |
| | | | | | | | | 3C0H | Starting address of table 504 |
| | | | | | | | | 3D0H | Starting address of table 505 |
| | | | | | | | | 3E0H | Starting address of table 506 |
| | | | | | | | | 3F0H | Starting address of table 507 |

| Axis 1 | Axis 2 | Axis 3 | Axis 4 | Axis 5 | Axis 6 | Axis 7 | Axis 8 | Address | Descriptions |
|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------------|
| Bank No. | | | | | | | | | |
| 0AH | 14H | 1EH | 28H | 32H | 3CH | 46H | 50H | 000H | Starting address of table 508 |
| | | | | | | | | 010H | Starting address of table 509 |
| | | | | | | | | 020H | Starting address of table 510 |
| | | | | | | | | 030H | Starting address of table 511 |
| | | | | | | | | 040H | Starting address of table 512 |
| | | | | | | | | 050H | Starting address of table 513 |
| | | | | | | | | 060H | Starting address of table 514 |
| | | | | | | | | 070H | Starting address of table 515 |
| | | | | | | | | 080H | Starting address of table 516 |
| | | | | | | | | 090H | Starting address of table 517 |
| | | | | | | | | 0A0H | Starting address of table 518 |
| | | | | | | | | 0B0H | Starting address of table 519 |
| | | | | | | | | 0C0H | Starting address of table 520 |
| | | | | | | | | 0D0H | Starting address of table 521 |
| | | | | | | | | 0E0H | Starting address of table 522 |
| | | | | | | | | 0F0H | Starting address of table 523 |
| | | | | | | | | 100H | Starting address of table 524 |
| | | | | | | | | 110H | Starting address of table 525 |
| | | | | | | | | 120H | Starting address of table 526 |
| | | | | | | | | 130H | Starting address of table 527 |
| | | | | | | | | 140H | Starting address of table 528 |
| | | | | | | | | 150H | Starting address of table 529 |
| | | | | | | | | 160H | Starting address of table 530 |
| | | | | | | | | 170H | Starting address of table 531 |
| | | | | | | | | 180H | Starting address of table 532 |
| | | | | | | | | 190H | Starting address of table 533 |
| | | | | | | | | 1A0H | Starting address of table 534 |
| | | | | | | | | 1B0H | Starting address of table 535 |
| | | | | | | | | 1C0H | Starting address of table 536 |
| | | | | | | | | 1D0H | Starting address of table 537 |
| | | | | | | | | 1E0H | Starting address of table 538 |
| | | | | | | | | 1F0H | Starting address of table 539 |
| | | | | | | | | 200H | Starting address of table 540 |
| | | | | | | | | 210H | Starting address of table 541 |
| | | | | | | | | 220H | Starting address of table 542 |
| | | | | | | | | 230H | Starting address of table 543 |
| | | | | | | | | 240H | Starting address of table 544 |
| | | | | | | | | 250H | Starting address of table 545 |
| | | | | | | | | 260H | Starting address of table 546 |
| | | | | | | | | 270H | Starting address of table 547 |
| | | | | | | | | 280H | Starting address of table 548 |
| | | | | | | | | 290H | Starting address of table 549 |
| | | | | | | | | 2A0H | Starting address of table 550 |
| | | | | | | | | 2B0H | Starting address of table 551 |
| | | | | | | | | 2C0H | Starting address of table 552 |
| | | | | | | | | 2D0H | Starting address of table 553 |
| | | | | | | | | 2E0H | Starting address of table 554 |
| | | | | | | | | 2F0H | Starting address of table 555 |
| | | | | | | | | 300H | Starting address of table 556 |
| | | | | | | | | 310H | Starting address of table 557 |
| | | | | | | | | 320H | Starting address of table 558 |
| | | | | | | | | 330H | Starting address of table 559 |
| | | | | | | | | 340H | Starting address of table 560 |
| | | | | | | | | 350H | Starting address of table 561 |
| | | | | | | | | 360H | Starting address of table 562 |
| | | | | | | | | 370H | Starting address of table 563 |
| | | | | | | | | 380H | Starting address of table 564 |
| | | | | | | | | 390H | Starting address of table 565 |
| | | | | | | | | 3A0H | Starting address of table 566 |
| | | | | | | | | 3B0H | Starting address of table 567 |
| | | | | | | | | 3C0H | Starting address of table 568 |
| | | | | | | | | 3D0H | Starting address of table 569 |
| | | | | | | | | 3E0H | Starting address of table 570 |
| | | | | | | | | 3F0H | Starting address of table 571 |

| Axis 1 | Axis 2 | Axis 3 | Axis 4 | Axis 5 | Axis 6 | Axis 7 | Axis 8 | Address | Descriptions |
|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------------|
| **Bank No.** | | | | | | | | | |
| 0BH | 15H | 1FH | 29H | 33H | 3DH | 47H | 51H | 000H | Starting address of table 572 |
| | | | | | | | | 010H | Starting address of table 573 |
| | | | | | | | | 020H | Starting address of table 574 |
| | | | | | | | | 030H | Starting address of table 575 |
| | | | | | | | | 040H | Starting address of table 576 |
| | | | | | | | | 050H | Starting address of table 577 |
| | | | | | | | | 060H | Starting address of table 578 |
| | | | | | | | | 070H | Starting address of table 579 |
| | | | | | | | | 080H | Starting address of table 580 |
| | | | | | | | | 090H | Starting address of table 581 |
| | | | | | | | | 0A0H | Starting address of table 582 |
| | | | | | | | | 0B0H | Starting address of table 583 |
| | | | | | | | | 0C0H | Starting address of table 584 |
| | | | | | | | | 0D0H | Starting address of table 585 |
| | | | | | | | | 0E0H | Starting address of table 586 |
| | | | | | | | | 0F0H | Starting address of table 587 |
| | | | | | | | | 100H | Starting address of table 588 |
| | | | | | | | | 110H | Starting address of table 589 |
| | | | | | | | | 120H | Starting address of table 590 |
| | | | | | | | | 130H | Starting address of table 591 |
| | | | | | | | | 140H | Starting address of table 592 |
| | | | | | | | | 150H | Starting address of table 593 |
| | | | | | | | | 160H | Starting address of table 594 |
| | | | | | | | | 170H | Starting address of table 595 |
| | | | | | | | | 180H | Starting address of table 596 |
| | | | | | | | | 190H | Starting address of table 597 |
| | | | | | | | | 1A0H | Starting address of table 598 |
| | | | | | | | | 1B0H | Starting address of table 599 |
| | | | | | | | | 1C0H | Starting address of table 600 |
| | | | | | | | | 1D0H | - |
| | | | | | | | | 1E0H | - |
| | | | | | | | | 1F0H | - |
| | | | | | | | | 200H | - |
| | | | | | | | | 210H | - |
| | | | | | | | | 220H | - |
| | | | | | | | | 230H | - |
| | | | | | | | | 240H | - |
| | | | | | | | | 250H | - |
| | | | | | | | | 260H | - |
| | | | | | | | | 270H | Starting address of table 10001 |
| | | | | | | | | 280H | Starting address of table 10002 |
| | | | | | | | | 290H | Starting address of table 10003 |
| | | | | | | | | 2A0H | Starting address of table 10004 |
| | | | | | | | | 2B0H | Starting address of table 10005 |
| | | | | | | | | 2C0H | Starting address of table 10006 |
| | | | | | | | | 2D0H | Starting address of table 10007 |
| | | | | | | | | 2E0H | Starting address of table 10008 |
| | | | | | | | | 2F0H | Starting address of table 10009 |
| | | | | | | | | 300H | Starting address of table 10010 |
| | | | | | | | | 310H | Starting address of table 10011 |
| | | | | | | | | 320H | Starting address of table 10012 |
| | | | | | | | | 330H | Starting address of table 10013 |
| | | | | | | | | 340H | Starting address of table 10014 |
| | | | | | | | | 350H | Starting address of table 10015 |
| | | | | | | | | 360H | Starting address of table 10016 |
| | | | | | | | | 370H | Starting address of table 10017 |
| | | | | | | | | 380H | Starting address of table 10018 |
| | | | | | | | | 390H | Starting address of table 10019 |
| | | | | | | | | 3A0H | Starting address of table 10020 |
| | | | | | | | | 3B0H | Starting address of table 10021 |
| | | | | | | | | 3C0H | Starting address of table 10022 |
| | | | | | | | | 3D0H | Starting address of table 10023 |
| | | | | | | | | 3E0H | Starting address of table 10024 |
| | | | | | | | | 3F0H | Starting address of table 10025 |

# Chapter 18

# Dimensions

# 18.1 FPΣ Positioning Unit RTEX

(Unit: mm)

30

(15)  60

DIN rail
installing
groove
(35 mm)

90

3.5

4.5
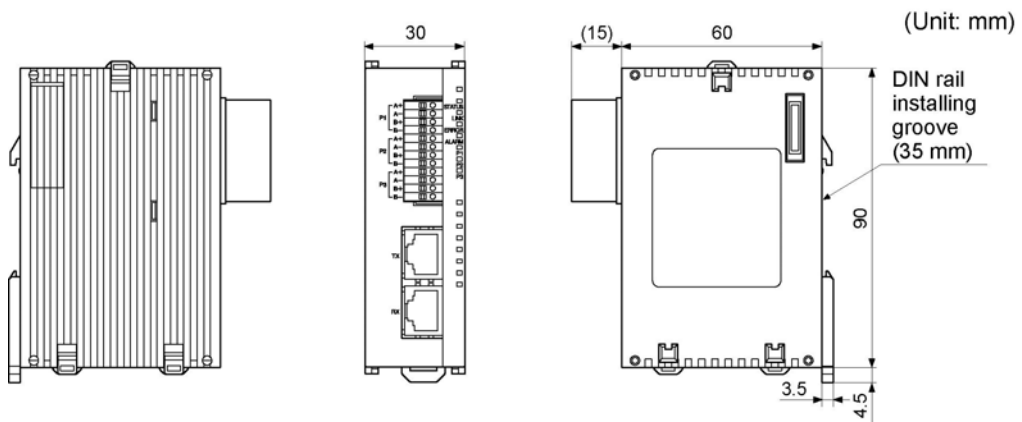
## 18.2 FP2 Positioning Unit RTEX

(Unit: mm)

28   (15)   93   100
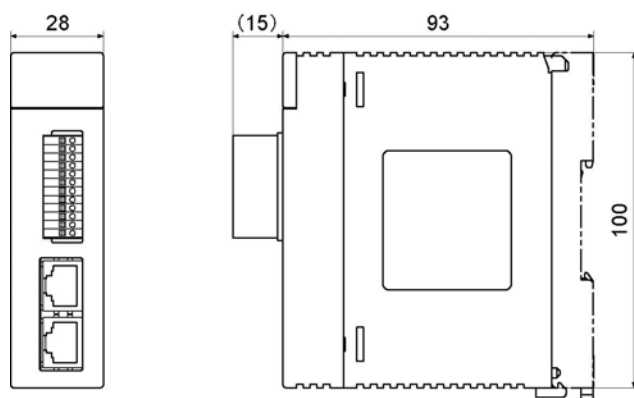
# Chapter 19

## Sample Programs

# 19.1 Basic Configuration and Contact Allocations of Sample Programs

In the sample programs, the internal relays are used for the start-up contacts of each operation.
If necessary, reconnect them to the input contacts that switches, etc are connected.

**Basic Configuration**
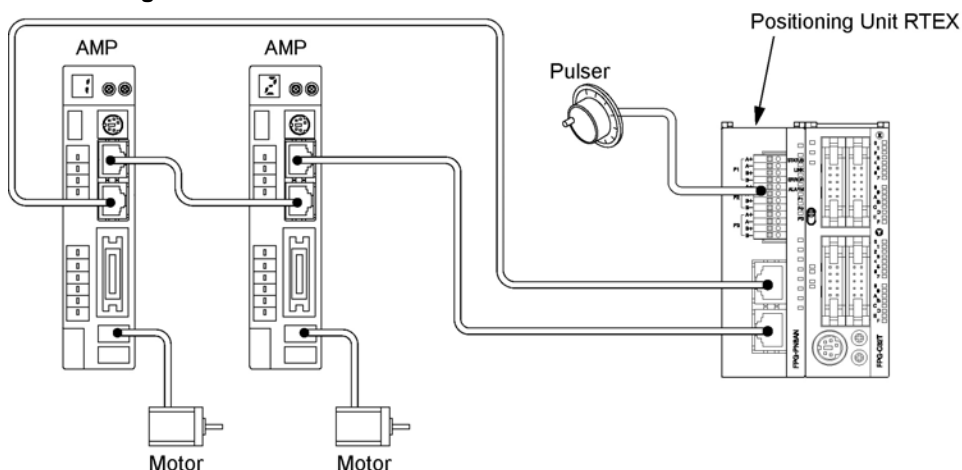


The FPΣ positioning unit RTEX is installed in the slot 0. Also, the axes 1 and 2 are designated as the axes used, and the linear interpolation of 2 axes is designated as a sample operation, by the Configurator PM in advance.
The FP2 positioning unit RTEX is also installed in the slot 0.

**Used contacts and data registers**

| Number | Descriptions |
|--------|-------------|
| R0 | Request servo on |
| R1 | Request servo off |
| R2 | Request home return |
| R3 | Request positioning start |
| R4 | Request forward JOG for axis 1 |
| R5 | Request reverse JOG for axis 1 |
| R6 | Request forward JOG for axis 2 |
| R7 | Request reverse JOG for axis 2 |
| R8 | Request pulser operation for axis 1 |
| R9 | Request pulser operation for axis 2 |
| R10 | Error clear |
| R11 | Request setting value change |
| R100 | Operation enabled flag for axis 1 |
| R101 | Off edge of forward JOG for axis 1 |
| R102 | Off edge of reverse JOG for axis 1 |
| R103 | Off edge of pulser operation for axis 1 |
| R200 | Operation enabled flag for axis 2 |
| R201 | Off edge of forward JOG for axis 2 |
| R202 | Off edge of reverse JOG for axis 2 |
| R203 | Off edge of pulser operation for axis 2 |

| Number | | Descriptions |
|---|---|---|
| FPΣ | FP2 | |
| X100 | X0 | Link establishment for all axes |
| X104 | X4 | Tool operation for all axes |
| X107 | X7 | Recalculation done flag |
| X108 | X8 | Connection confirmation for axis 1 |
| X109 | X9 | Connection confirmation for axis 2 |
| X110 | X10 | Servo lock for axis 1 |
| X111 | X11 | Servo lock for axis 2 |
| X118 | X18 | Busy flag for axis 1 |
| X119 | X19 | Busy flag for axis 2 |
| X160 | X60 | Error occurrence annunciation for axis 1 |
| X161 | X61 | Error occurrence annunciation for axis 2 |
| Y107 | Y87 | Request recalculation |
| Y108 | Y88 | Servo on for axis 1 |
| Y109 | Y89 | Servo on for axis 2 |
| Y110 | Y90 | Positioning start for axis 1 |
| Y118 | Y98 | Home return for axis 1 |
| Y119 | Y99 | Home return for axis 2 |
| Y120 | Y100 | Forward JOG for axis 1 |
| Y121 | Y101 | Reverse JOG for axis 1 |
| Y122 | Y102 | Forward JOG for axis 2 |
| Y123 | Y103 | Reverse JOG for axis 2 |
| Y140 | Y120 | Pulser operation for axis 1 |
| Y141 | Y121 | Pulser operation for axis 2 |
| Y150 | Y130 | Servo off for axis 1 |
| Y151 | Y131 | Servo off for axis 2 |
| Y160 | Y140 | Error clear for axis 1 |
| Y161 | Y141 | Error clear for axis 2 |

| Number | Descriptions |
|---|---|
| DT0 | Starting table number |
| DT101 | Number of errors of axis 1 |
| DT102 to DT115 | Error contents of axis 1 |
| DT121 | Number of errors of axis 2 |
| DT122 to DT135 | Error contents of axis 2 |
| DT10 to DT25 | Positioning data (of 1 table) of axis 1 |
| DT30 to DT45 | Positioning data (of 1 table) of axis 2 |

# 19.2 Sample Programs

**There are 3 patterns for setting positioning data.**

1. When the positioning data has been already set in the standard area with the Configurator PM.
2. When setting the positioning data in the extended area using the ladder program.
3. When setting the positioning data in the standard area using the ladder program.

**Sample program**
**The positioning start** is the setting that has been already set in the standard area by the Configurator PM.



The numbers in parenthesis are the contact numbers for the FP2.

**66** | R5 ─( DF )─ R100 ─ X118(X18) ─ R102 ──────── Y121(Y101)
Reverse JOG / Enabled flag for axis 1 / Busy flag for axis 1 / Off edge of reverse JOG / Reverse JOG for axis 1
Y121(Y101)
Reverse JOG for axis 1

**73** | R6 ─( DF/ )──────────── R201
Forward JOG / Off edge of forward JOG

**76** | R7 ─( DF/ )──────────── R202
Reverse JOG / Off edge of reverse JOG

**79** | R6 ─( DF )─ R200 ─ X119(X19) ─ R201 ──────── Y122(Y102)
Forward JOG / Enabled flag for axis 2 / Busy flag for axis 2 / Off edge of forward JOG / Forward JOG for axis 2
Y122(Y102)
Forward JOG for axis 2

**86** | R7 ─( DF )─ R200 ─ X119(X19) ─ R202 ──────── Y123(Y103)
Reverse JOG / Enabled flag for axis 2 / Busy flag for axis 2 / Off edge of reverse JOG / Reverse JOG for axis 2
Y123(Y103)
Reverse JOG for axis 2

**93** | ****** Pulser operation ******

| R8 ─( DF/ )──────────── R103
Pulser operation / Off edge of pulser operation

**96** | R8 ─( DF )─ R100 ─ X118(X18) ─ R101 ──────── Y140(Y120)
Pulser operation / Enabled flag for axis 1 / Busy flag for axis 1 / Off edge of pulser operation / Pulser enabled flag for axis 1
Y140(Y120)
Pulser enabled flag for axis 1

**103** | R9 ─( DF/ )──────────── R203
Pulser operation / Off edge of pulser operation

**106** | R9 ─( DF )─ R200 ─ X119(X19) ─ R201 ──────── Y141(Y121)
Pulser operation / Enabled flag for axis 2 / Busy flag for axis 2 / Off edge of pulser operation / Pulser enabled flag for axis 2
Y141(Y121)
Pulser enabled flag for axis 2

**113** | ****** Error annunciation and clear ******
DT101 Announces the number of errors occurred on the axis 1.
DT102 to 115 Error codes occurred on the axis 1.
DT121 Announces the number of errors occurred on the axis 2.
DT122 to 135 Error codes occurred on the axis 2.

| R9010 ─[ F150 READ, H 0 , H 129 , K 15 , DT 101 ]
Error content for axis 1
[ F150 READ, H 0 , H 139 , K 15 , DT 121 ]
Error content for axis 2

**133** | R10 ─( DF )─ X160(X60) ──────── Y160(Y140)
Error clear / Error for axis 1 / Error clear for axis 1
Y160(Y140)
Error clear for axis 1

**138** | R10 ─( DF )─ X161(X61) ──────── Y161(Y141)
Error clear / Error for axis 2 / Error clear for axis 2
Y161(Y141)
Error clear for axis 2

**143** | ─────────────────────────( ED )

The numbers in parenthesis are the contact numbers for the FP2.

19-5

## 19.2.1 When Setting Positioning Data in Extended Area Using Ladder Program

Write positioning data in the extended area using the ladder program.
Recalculating the positioning data is not necessary as the extended area is used.

**Replace the part of the positioning start program in the sample program**
**Positioning start program**



The numbers in parenthesis are the contact numbers for the FP2.
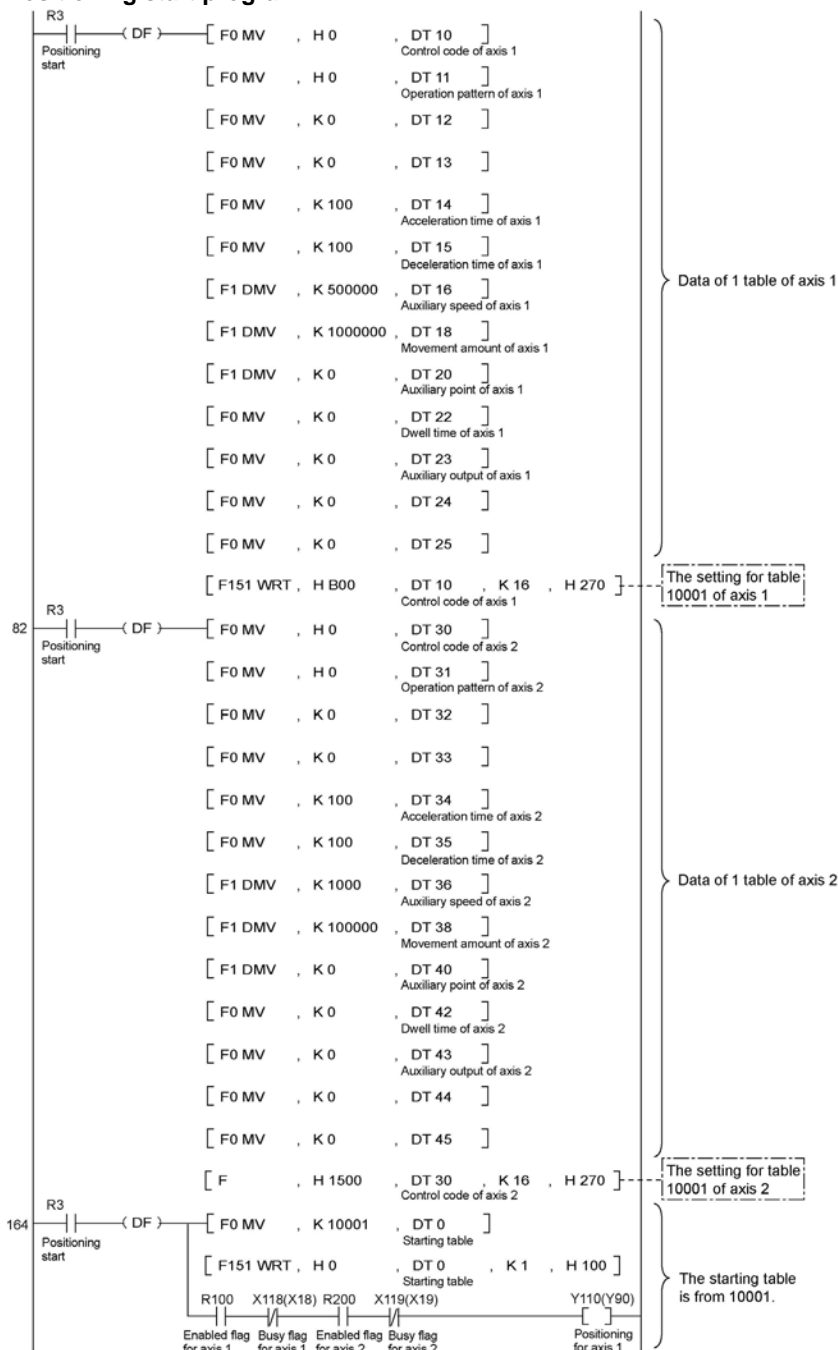
## 19.2.2 When Setting Positioning Data in Standard Area Using Ladder Program

Write positioning data in the standard area using the ladder program.
Recalculating the positioning data is necessary after setting the positioining data.

**Replace the part of the positioning start program in the sample program**
**Positioning start program**



The numbers in parenthesis are the contact numbers for the FP2.
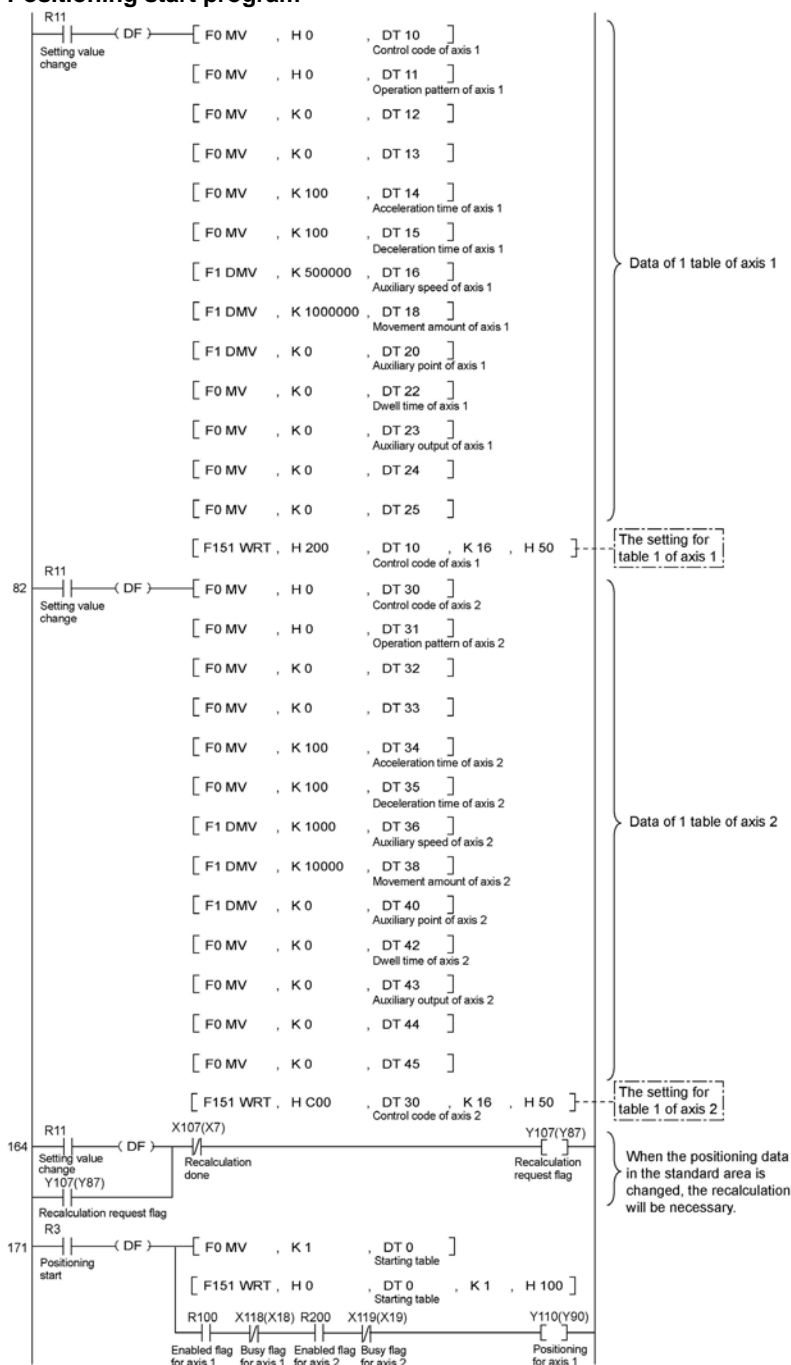
# Chapter 20

## Power ON/OFF(Ver.1.13 or later)

# 20.1 Operational Change When System Starts

**Operational Overview**

To start the Positioning Unit RTEX(Ver.1.00,1.01), both the control power supply and main power supply of the AMP must be on.
The startup process is changed to enable the unit to normally start even if the main power supply of the AMP is off, in order to respond to various startup methods.

# Chapter 21

## Position control (Ver.1.13 or later)

# 21.1 Positioning Repeat Function

When the same operation is repeated in an application for machines such as a coil widing machine.

## 21.1.1 Function and setting method

Set the repeat count in a prescribed address to repeat the operation for N times.

**Operation of the positioning unit**
Set the number of repeat count in the repeat count area of an axis number to be start before startring positioning.

The positioning unit refers to the repeat count (positioning control area) when starting positioning. When the operation completes (repeats for N times), the operation done signal will turn on.

The repeat count area will be cleared when the repeat operation completes for the target axes regardless of a single axis and interpolation group.

**Reference: 17.4.7 Positioning Table Setting Area**
**Addition of 17.4.7:Position control area (Ver.1.13 or later)**

| Bank | Offset address | Name | Descriptions | Default value | Setting range | Unit |
|------|------|------|------|------|------|------|
| 00H | 108H | Positioning repeat count of axis 1 | Sets the No. of times for repeating the operation starting from the position control starting table No. of the first axis until the E point. | 0 | 0 to 255 | Times |
| | 109H | Positioning repeat count of axis 2 | Same as above. | 0 | 0 to 255 | Times |
| | 10AH | Positioning repeat count of axis 3 | Same as above. | 0 | 0 to 255 | Times |
| | 10BH | Positioning repeat count of axis 4 | Same as above. | 0 | 0 to 255 | Times |
| | 10CH | Positioning repeat count of axis 5 | Same as above. | 0 | 0 to 255 | Times |
| | 10DH | Positioning repeat count of axis 6 | Same as above. | 0 | 0 to 255 | Times |
| | 10EH | Positioning repeat count of axis 7 | Same as above. | 0 | 0 to 255 | Times |
| | 10FH | Positioning repeat count of axis 8 | Same as above. | 0 | 0 to 255 | Times |

The following operations are performed depending on the setting values of the positioning repeat count.

| Positioning repeat count | Positioning operation |
|------|------|
| 0, 1 | The positioning repeat operation is not performed. The specified positioning operation is performed only once. |
| 2 to 254 | The positioning operation is performed repeatedly for the specified number of times. |
| 255 | The positioning operation is performed repeatedly without limit. （Unlimited repeat) The "Emergency stop" or "Deceleration stop" should be executed to stop the positioning operation. |

## 21.1.2 Examples of operations

**Examples of operations when N times have been specified**

Table 1: P point
Table 2: P point
Table 3: P point
Table 4: E point

1.When N = 0 or N = 1
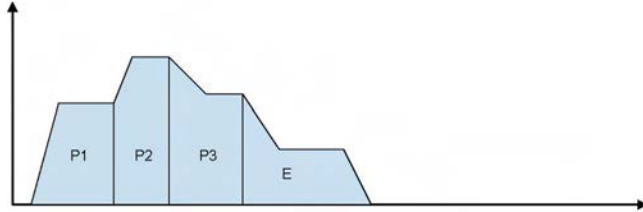


2.When N = 3, and when the dwell time = 0 at the E point table,
the E point in the repeat operation is treated as the P point.
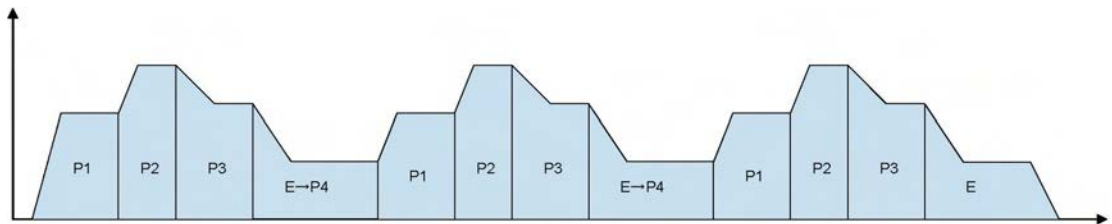


3.When N = 3, and when the dwell time $\neq$ 0 at the E point table,
the E point in the repeat operation is treated as the C point.
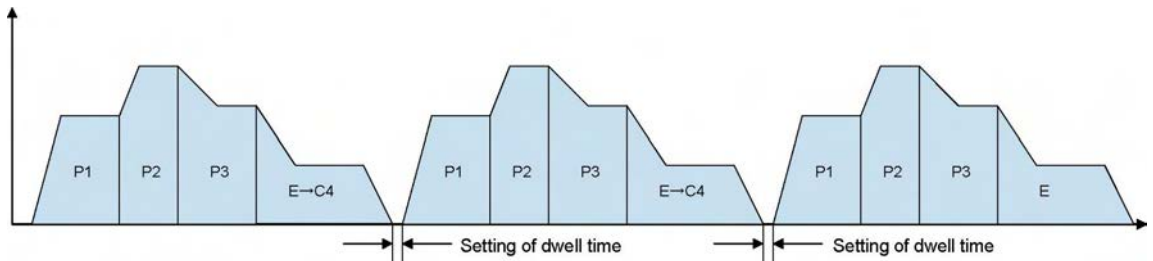


The operations of the BUSY flag and operation done flag are the same as the Ver.1.00 and Ver.1.01 operation.

## 21.1.3 Sample program

Refer to "Repeat function ladder program for demo.fp".

## 21.1.4 Each Axis Information & Monitor Area

**Monitoring repeat count**

The each axis information & monitor area to confirm the active repeat count.

📖 **Reference: 17.5.2 Each Axis Information & Monitor Area**

Addition of 17.5.2 : Axis information of axis 1 to 8 (ver.1.13 or later)

| Bank | Offset address | Name | Descriptions | Default value | Setting range | Unit |
|------|------|------|------|------|------|------|
| 01H | 3AH | Repeat count setting value of axis 1 | Feeds back and stores the setting value of the repeat count specified for the 1st axis. This area is 1 if the positioning repeat does not perform (repeat count: 0, 1). Also, when the repeat count is set to be unlimited, 255 is stored in this area. | 0 | 0 to 255 | Times |
| | 3BH | Repeat count Current value of axis 1 | Repeat count that is currently being performed on the first axis. This area is 1 if the positioning repeat does not perform. The upper limit is 65535 in this area. If the repeat count exceeds the upper limit, the count will be started from 0. | 0 | 0 to 65535 | Times |
| | 7AH | Repeat count setting value of axis 2 | | 0 | 0 to 255 | Times |
| | 7BH | Repeat count Current value of axis 2 | | 0 | 0 to 65535 | Times |
| | BAH | Repeat count setting value of axis 3 | | 0 | 0 to 255 | Times |
| | BBH | Repeat count Current value of axis 3 | | 0 | 0 to 65535 | Times |
| | FAH | Repeat count setting value of axis 4 | | 0 | 0 to 255 | Times |
| | FBH | Repeat count Current value of axis 4 | | 0 | 0 to 65535 | Times |
| | 13AH | Repeat count setting value of axis 5 | | 0 | 0 to 255 | Times |
| | 13BH | Repeat count Current value of axis 5 | | 0 | 0 to 65535 | Times |
| | 17AH | Repeat count setting value of axis 6 | | 0 | 0 to 255 | Times |
| | 17BH | Repeat count Current value of axis 6 | | 0 | 0 to 65535 | Times |
| | 1BAH | Repeat count setting value of axis 7 | | 0 | 0 to 255 | Times |
| | 1BBH | Repeat count Current value of axis 7 | | 0 | 0 to 65535 | Times |
| | 1FAH | Repeat count setting value of axis 8 | | 0 | 0 to 255 | Times |
| | 1FBH | Repeat count Current value of axis 8 | | 0 | 0 to 65535 | Times |

# 21.2 Synchronous Operation

**Overview of Synchronous Operation**

The synchronous operation is a function to set master and slave axes and operate a slave axis with the same operation (synchrounous) as the master axis. The features of the synchronous operation are as below.

-A maximum of 2 groups can be set for the synchrounous operation. (The master and slave axis can be set for laxis each.)

-Supports two types of synchronous operation.

1. Synchrounous mode A
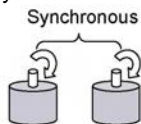


Master axis   Slave axis

This is a standard mode of the synchronous operation. It is possible to switch the setting of the synchrounous operation between "enabled" and "disabled", and perform the synchrounous operation as necessary.

2. Synchrounous mode B

This mode is used to drive a large-sized table such as a carrier machine with two motors. The synchronous operation cannot be cancelled as the target axes (master and slave) are mechanically coupled.
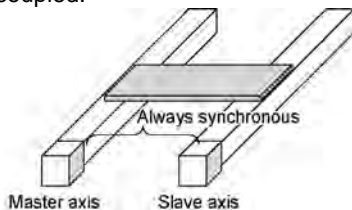


Master axis   Slave axis

It is possible to switch the setting of the synchrounous operation between "enabled" and "disabled". (In the synchronous mode A only)

## 21.2.1 Synchronous Mode

The followings are the differences in the operations between the synchronous modes supported with the synchronous operation.

| | Synchronous mode A | Synchronous mode B |
|---|---|---|
| Synchronous setting | A maximum of 2 groups can be set for the synchronous group. An individual operation mode can be set for each synchrounous group. | |
| Enabled/disabled of synchronous operation | It can be selected either Enabled or Disabled. | Only Enabled (The Disabled setting is ignored.) |
| Positioning operation JOG operation Operation stop Pulser operation | 【Synchronous: Enabled】 Operates with the setting of the master axis. (The setting of the slave axis is ignored.) The positioning starts for the master axis. | Operates with the setting of the master axis. (The setting of the slave axis is ignored.) The positioning starts for the master axis. |
| | 【Synchronous: Disabled】 The master and slave axes is operated with each setting. The positioning starts for each axis. | |
| Home return | **The home return is performed for each axis individually. (Executed with the setting that the synchrounous operaiton is disalbed.)** Set the synchronous operation to be "Disabled" when performing the home return. It is necessary to cancel the synchronous operation. If the home return is executed with the setting that the synchronous operaiton is enabled, an error will occur. The home return cannot be executed. | **It is not possible to perform the home return for each axis individually. (The synchronous operation cannot be set to be disabaled.)** Therefore, the executable home return methods are restricted. The connection of sensors to the AMP may be changed according to the home return methods.  (as hereinafter described) |

## 21.2.2 Home Return Method in Synchronous Operation When using Synchronous Mode A

In the synchronous mode A, the home return should be performed for each axis individually. Therefore, set the synchronous operation to be disabled when performing the home return.
If the synchronous operation is enabled when the home return operation starts, an error will occur and the home return cannot be executed.
All the home return methods currently supported by the Positioning Unit RTEX can be used.

## 21.2.3 Home Return Method in Synchronous Operation When using Synchronous Mode B

As the synchronous operation cannot be set to be disabled (always enabled) in the synchronous mode B, only the home return can be executed in the synchronous operation. Therefore, the executable home return methods are restricted.
The followings are the home return methods to be available in the synchronous mode B.
  1: DOG method 2
  4: Limit method 2
  6: Stop-on-contact method 1
  8: Data set (* Each numbers are the home return setting code.)

Also, when performing the home return usign the "1: DOG method 2" and "4: Limit method 2", the input from the DOG sensor and limit sensor should be connected as below.
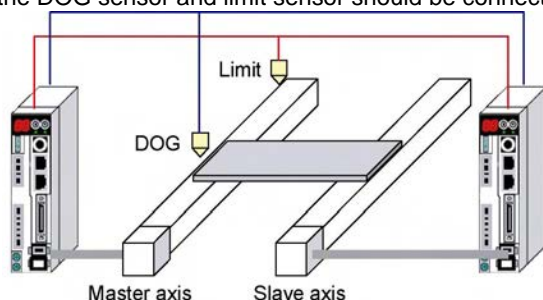


DOG method: Connect the DOG sensor of the master axis to the AMP of the slave axis, too.
Limit method: Connect the master sensor of the master axis to the AMP of the slave axis, too.

## 21.2.4 Synchronous Operation Setting

Note the precautions below when using the synchronous operation.
One slave axis can be specified for each synchronized master axis.
The master axis can belong to an inerpolation group, however, the slave can be specified for independent axis.
Up to 2 groups of master/slave axes can be set.
If the synchronous setting is specified, the synchronous operation is always performed on the master and slave axes.
The slave axis can be oprated individually by the setting "Synchronous group n Enabled/Disabled" in the shared memory. (In the synchronous mode A only)

The slave axis is synchronized with the master slave during the synchronous operation, however, the operations of the master and slave axes may not be synchronized due to a reason such as a mechanical error. The Positioning Unit RTEX monitors the current values of the master and slave axes, and it stops the operation if the difference in the operations of the master and slave axes exceeds a certain value (synchronous operation difference value).

## 21.2.5 Synchronous Operation Setting

For the synchronous operation, one slave axis is set for one master axis. Up to two groups can be set.

**Reference: 17.4.4 Setting Parameter Control Area**

Addition of 17.4.4 : Setting Parameter Control Area (ver.1.13 or later)

| Bank | Offset address | Name | Description |
|------|------|------|-------------|
| 00H | | | |
| | 0B7H | Synchronous group 1 Synchronous mode | Sets the operation mode of the synchronous operation.<br>00H: Synchronous mode A 01H: Synchronous mode B |
| | 0B8H | Synchronous group 1 Master axis | Turn on the corresponding bit for the axes to be the master and slave axes in the synchronous operation.<br><br>Bit Name Default Description<br>0 Synchronous attribute of axis 1 0 0: Not execute the<br>1 Synchronous attribute of axis 2 0 synchronous operation.<br>2 Synchronous attribute of axis 3 0 1: Synchronous |
| | 0B9H | Synchronous group 1 Slave axis | 3 Synchronous attribute of axis 4 0 operation<br>4 Synchronous attribute of axis 5 0 master/slave<br>5 Synchronous attribute of axis 6 0 axis setting of group<br>6 Synchronous attribute of axis 7 0<br>7 Synchronous attribute of axis 8 0<br>15 to 8 — — —<br><br>Each synchronous axis can be set for only one axis. |
| | 0BAH | Synchronous group 2 Synchronous mode | Sets the operation mode of the synchronous operation.<br>00H: Synchronous mode A 01H: Synchronous mode B |
| | 0BBH | Synchronous group 1 Master axis | Turn on the corresponding bit for the axes to be the master and slave axes in the synchronous operation.<br><br>Bit Name Default Description<br>0 Synchronous attribute of axis 1 0 0: Not execute the<br>1 Synchronous attribute of axis 2 0 synchronous operation.<br>2 Synchronous attribute of axis 3 0 1: Synchronous operation |
| | 0BCH | Synchronous group 1 Slave axis | 3 Synchronous attribute of axis 4 0 master/slave<br>4 Synchronous attribute of axis 5 0 axis setting of group<br>5 Synchronous attribute of axis 6 0<br>6 Synchronous attribute of axis 7 0<br>7 Synchronous attribute of axis 8 0<br>15 to 8 — — —<br><br>Each synchronous axis can be set for only one axis. |

## 21.2.6 Canceling and Monitoring Synchronous Operation

The "synchronous operation control/monitor area" is added to the shared memory common area to set the synchronous operation to be enalbed/disabled and to confirm the current synchronous setting.

📖 **Reference: 17.4 Details of Common Area in Shared Memory**

Addition of 17.4: 17.4.10_Synchronous control/monitor area (ver.1.13 or later)

| Bank | Offset address s | Name | Description |
|---|---|---|---|
| 00H | 2B0H | Synchronous group 1 operation Enabled/disabled | The setting for the synchronous operation can be switched between "Enabled" and "Disabled". When using the synchronous mode B, this setting is ignored, and an operation always being synchronized is perfomred. <br><br> Bit / Name / Default / Description <br> 0 — Group attribute of r axis — 0 — 0: Execute the synchronous operation. 1: Cancel the synchronous operation. <br> 1-7 — — — <br> 15 to 8 — — — |
| | 2B1H | Synchronous group 2 operation Enabled/disabled | |
| | | | |
| | 2B4H | Synchronous operation monitor | Bit / Name / Default / Description <br> 0 — Axis 1 is synchronous. 0 — 0: Not syvchronous. <br> 1 — Axis 2 is synchronous. 0 — 1: Synchronous operation target axis <br> 2 — Axis 3 is synchronous. 0 — The bit of the axis whrere the <br> 3 — Axis 4 is synchronous. 0 — synchronous operation performs is <br> 4 — Axis 5 is synchronous. 0 — turned on in this area,regardless of <br> 5 — Axis 6 is synchronous. 0 — a synchronous gourp master axis <br> 6 — Axis 7 is synchronous. 0 — or slave axis.. <br> 7 — Axis 8 is synchronous. 0 <br> 15 to 8 — — — |
| | | | |
| | 2B8H | Synchronous operation difference value | Difference threshold of the movement amounts of the master/slave axis that the synchronous operation performs. If the difference of he movement amounts of master/slaves axis exceeds this threshold, 3045H error will occur (synchronous axis operation mismatch error). This difference value is specified in a unit used for the master axis. Default:: 10000 |

1.This area is used to set the synchrounous operation to "Enabled" or "Disabled" for the synchronouls gorup that is enabled and to monitor the synchronous state when the synchronous operation setting in the axis group setting area has been set to be enabled.

2.When the bit1 in the synchronous operation enabled/disabled area is on, the synchronous operation can be cancelled temporarily only when using the synchronous mode A, and the JOG operation, home return and positioning operation can be independently executed.

3.The bit 1 in the synchronous operation enabled/disabled area is off,  the synchronous operation is enabled. The operation of the slave axis is perfectly synchronized with the master axis.

4.In the synchronous operation monitor area, when the synchronous operation is enalbed, the target bits of all master/slave axes to be synchronized are turned on, and the bits of axes to be normally operated and the axes of synchronous groups that the synchronous operation is disabled are turned off.

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## 21.2.7 Positioning Parameters in Synchronous Operation

**Operational Overview of Positioning Parameters**

Various positioning parameters should be set to perform operations on the positioning unit RTEX. As the table below, there are the parameters that operate by the types of positioning parameters and the ones that operate by the settings for each axis during the synchronous operation. Note that when setting the positioning parameters.

**Positioning parameters**

| Parameter name | Operation during synchronous operation |
|---|---|
| Unit setting | Operates by the setting of each axis. Specify the same settings for the axes to be synchronized when performing the synchronous operation. |
| Pulse number per rotation | |
| Movement amount per rotation | |
| CW/CCW direction setting | |
| Limit switch | Follows the operation of the master axis during the synchronous operation. |
| Limit switch connection | |
| Software limit (Positioning control) | |
| Software limit (Home return) | |
| Software limit (JOG operation) | |
| Upper limit of software limit | |
| Lower limit of software limit | |
| Auxiliary output mode | |
| Auxiliary output ON time (ms) | |
| Auxiliary output Delay rate | |
| Completion width (pulse) | |
| Monitor error – Torque judgment | |
| Monitor error – Torque judgment valeu (%) | |
| Monitor error – Actual spped judgment | |
| Monitor error – Actual speed judgment value | |
| Home – Setting code | Varies depending on the operation mode of the synchronous operation. <br><br>Synchronous mode A: Operates by the setting of each axis. <br>Synchronous mode B: Follows the operation of a master axis. |
| Home return – Direction | |
| Home return – Acceleration time | |
| Home return – Deceleration time | |
| Home return – Traget speed | |
| Home return – Creep speed | |
| Home return – Stop-on-contact torque value | |
| Home return – Stop-on-contact judgment time | |
| JOG operation – Acceleration/Deceleration type | Follows the operation of the master axis during the synchronous operation. |
| JOG operation – Acceleration time | |
| JOG operation – Deceleration time | |
| JOG operation – Target speed | |
| JOG positioning operation setting code | |
| JOG positioning operation acceleration time | |
| JOG positioning operation deceleration time | |
| JOG positioning operation target speed | |
| Emergency stop deceleration time (ms) | The operation varies according to the type of stop operations. For the details, refer to "3.5.2 Stop Operation During Synchronous Operation". |
| Limit stop deceleration time (ms) | |
| Error stop deceleration time (ms) | |
| Pulser operation setting code | Operates by the setting of each axis. Specify the same settings for the axes to be synchronized when performing the synchronous operation. |
| Pulser operation ratio numerator | |
| Pulser operation ratio denominator | |

## 21.2.8 Stop Operation During Synchronous Operation

If the stop operaiton is executed for the master and slave axis during the synchronous operation, the operation is as follows.

| | | Axis requested to stop | |
|---|---|---|---|
| Stop operation | Operational overview | Master axis | Slave axis |
| Emergency stop | All axes stop without deceleration time. | All axes stop, regardless the master or slave axis. | |
| Deceleration stop | A specified axis stops with a deceleration time. | Both master and slave axes stop with the deceleraiton time for the master axis. | The request to stop the slave axis is ignored. |
| Limit stop | Stops with a decelerationn tiem when a limit occurred. | Both master and slave axes stop with the deceleraiton time for the master axis. After those stopped, the error code occurred on the master axis is set for the master/slave axes. | |
| Error stop | Stop the operation with a deceleration time when an error occurs. | | Both master and slave axes stop with the deceleraiton time for the master axis. After those stopped, the error code occurred on the slave axis is set for the master/slave axes. |

## 21.2.9 Precautions When Using Synchronous Operation

-The positioning unit RTEX always performs the ysnchronous operation if the setting has been set to the synchronous group.
Set the settings of the master and slave axes in the synchronous groups 1 and 2 to 0H (all bits: off) not to perform the synchronous operation.

-During the synchronous operation, the Busy signal of the slave axis turns on once the operation of the master axis starts, and the operaiton doen signal of the slave axis turns on when the operation of the master slave completes.

-When the synchronous operation is enalbed, a request for the slave axis to operate is not accepted.

-The servo on/off can be executed independently regardless of whether the synchronous operation is enabled or disabled.

-The slave axis can accept the request to stop the operation (deceleration stop, emergency stop and system stop) regardless of whether the synchronous operation is enabled or disabled.. When requested to stop, the master axis also stops being perfectly synchronized.

**\* When the synchronous group has been set to be disabled, the setting of the synchronous group cannot be changed in the operation sample.**
**Set the synchronous group to "Enabled" you want to change the setting for changing the synchronous group.**

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## 21.2.10 Sample Program

Refer to "Synchronous operation ladder program for demo.fp".

## 21.2.11 Errors occurred in Synchronous Operation

The following operations are errors in the synchronous operation.

The operating synchronous group cannot be changed during the synchronous operation. If the group is changed during the synchronous operation, the synchronous group error (3040H) will occur and the the operating axis will stop.。

If the AMP error occrus during the synchronous operation, the synchronous operation error (3043H) will occru on other corresponding axes, and the axes will stop.

The home return method during the synchronous operation vaires depending on the synchronous modes.
  -Synchronous mode A: There is no restriction on the home return method, however, it is necessary to set the synchoronous operation to "disabled" before the home return. If the synchronous operation is set to "enabled", the home return prodess will be an error.
  -Synchronous mode B: If a home return method other than usable methods has been set, an error occurs when starting the home return process, and the home return process cannot be executed.

The following settings specified for the synchronous group become errors.
Also, when both master and slave axes are not set (all bits are off), the normal operation is performed.
- The same axis has been set for the synchronous groups 1 and 2.
- Either master axis or slave axis has not been set. (All bits are off.)
- Multiple axes have been set for the master or slave axis.
- The same axis has been set for the master and slave axes.
- The slave axis has been set to the interpolation group.

# 21.3 JOG Positioning Control

**Overview of Operation**

The overview of the JOG positioning control function is as below.

1. The JOG positioning control can be set for independent axis only.

2. The JOG positioning is executed by combining the JOG positioning control (J point) and the positioning control (E point).

3. Accelerates with a specified acceleration time after starting the speed control, and operates at a constant speed  (target speed).

4. The speed can be changed in multiple stages during the speed control. Also, the acceleration/deceleration time can be changed according the change in speed.

   The speed is changed by turning on the "J point speed change contact" that is allocated as I/O of PLC.

5. The speed control moves to the positioning control by turning on the "J point positioning starting contact" that is allocated as I/O of PLC.

6. In the positioning contro, moves for the specified pulse number, and decelerates and stops. (The operation completes)
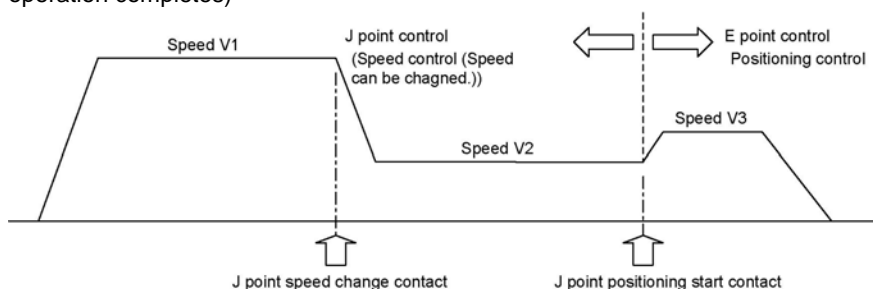


## 21.3.1 Example of Operation

The positioning unit RTEX performs the control set for the positioning table up to E-point control continuously. Therefore, numerous operations are achievable by bombining the positioning control (P-point, C-point and E-point control) and speed control (J-point control). The examples are as follows.

<< Example 1 >>
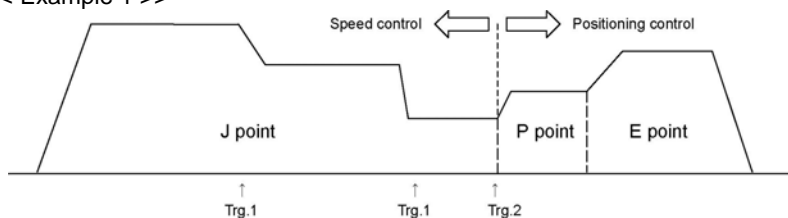


<< Example 2 >>
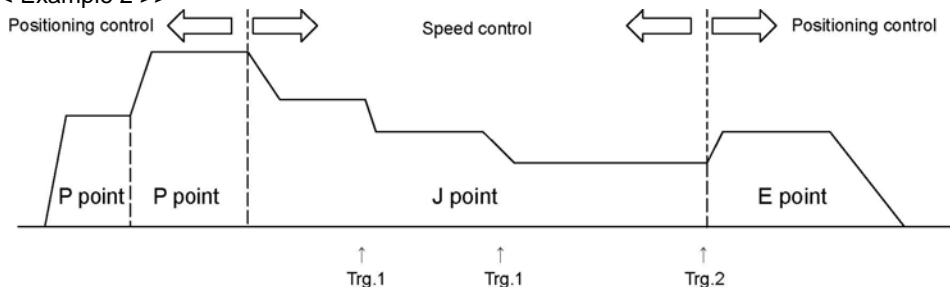


※Trg. 1 : J point speed change contact      Trg.2: J point positioning start contact

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## 21.3.2 Setting Method

Each setting items to perform the JOG positioning control are described below.

1. "J: JOG positioning point" is added to the operation patterns of positioning operation.
The following item is added to the operation of offsett address below of the positioning table starting
address of each axis.

**📖 Reference: 17.6.3 Positioning Data Setting Areas**

Addition of 17.6.3: Positioning Data Setting Areas (ver.1.13 or later)

| | | Area to set the single and interpolation operation pattern for the positioning operaiton.<br>The underlined black-faced parts are the additional contents. |
|---|---|---|
| 001H | Operation pattern | Bit          Name                  Default          Description<br>7 to 0      Control patterns      00H              00H: E point control (End point control)<br>                                                                       01H: P point control (Pass point control)<br>                                                                       02H: C point control (Continuance point control)<br>                                                                       03H: J point control (JOG positioning control)<br>                                                                             Any other settings will be an error.<br><br>15 to 8      Interpolation setting   00H   The interpolation setting is invalid for the J-point<br>control. |

The JOG positioning control (J point) is available only for a single axis control. The setting will be an
error if it is specified for the interpolation control.

2. Starts the JOG positioning control by writing the table number that the J-poin control has been
specified in the positioninga table settimg area and turning on the "positioning starting flag" for an
appropriate axis. After that, consecutive table numbers are exectued up to the table number that the end
point control (E point) has been specified. The acceleration/deceleration time and target speed when
starting the J-point operation is set in the positioning table area as well as other operation patterns.
For the details, refer to "17.6.3".
The speed can be changed in during the J-point control. To change the speed, the "J-point speed
change contact" should be on after writing a prescribed value in the following offset address in the "each
axis positioning parameter area".

## 《**Each Axis Positioning Parameter Area**》

The parameters for the JOG positionign control are set in the following offset addresses (words) in each axis positioning parater area.

### 📖 **Reference: 17.6.2 Parameter Setting Area**

Addition of 17.6.2: Parameter Setting Area (ver.1.13 or later)

| Address | Name | Description |
|---|---|---|
| 041H | JOG positioning operation setting code | Sets the mode of the JOG positioning operation.<br><br>Bit    Name       Default   Description<br>0    —      —    —<br>1    Acceleration/       0    0: Linear cceleration/deceleration<br>    deceleration pattern setting        1: S-shaped acceleration/deceleration<br><br>2 to 15   —      —    — |
| 042H | JOG positioning operation acceleration time | Sets the acceleration/deceleration time when performing the JOG positioning operation.<br>Bit     Name       Default    Description |
| 043H | JOG positioning operation deceleration time | 15to 0   JOG operation      100     Setting range:  0 to 10,000（ms）<br>       acceleration time          Any other settings will be an error.<br>      JOG operation<br>       deceleration time |
| 044H | JOG positioning operation target speed | Set the target speed when performing the JOG positioning operation.<br>Bit     Name      Defaul   Description<br>31 to 0   JOG operation   1,000   Setting range: 1 to 32,767,000<br>      target speed         Any other settings will be an error. Interpretation<br>                is changed by the unit setting. |
| 045H | |                Pulse: 1 to 32,767,000 pps<br>               $\mu$ m:1 to 32,767,000 $\mu$ m/s<br>               Inch: 0.001 to 32,767.000 inch/s<br>               Degree:0.001 to 32,767.000 rev/s |

《 **J point speed change contact** 》

This flag is assigned to the following I/O that is directly controlled from the CPU unit. Note that the I/O allocation varies according to the type of the JOG operation deceleration time CPU or the number of connected units.

📖 **Reference: 17.2 Table of I/O Area**

Addition of 17.2: Table of I/O Area (ver.1.13 or later)

| Contact allocation | | | Target axis | Name | Descriptions |
|---|---|---|---|---|---|
| FP Σ | | FP2 | | | |
| WY14 | Y148 | WY12 Y128 | 1 axis | J point speed change contact | The speed changes by turning on this signal during the J-point operation to the target speed with the specified acceleration/deceleration time and pattern. (The operation is the edge type.) |
| | Y149 | Y129 | 2 axis | | |
| | Y14A | Y12A | 3 axis | | |
| | Y14B | Y12B | 4 axis | | |
| | Y14C | Y12C | 5 axis | | |
| | Y14D | Y12D | 6 axis | | |
| | Y14E | Y12E | 7 axis | | |
| | Y14F | Y12F | 8 axis | | |

3.Turning on "J point positioning start contact" in the J-point operation proceeds the operation to the positioning process for the next table, and completes the operation after performing the process for the E-point table.

《 **J point positioning start contact** 》

📖 **Reference: 17.2 Table of I/O Area**

Addition of 17.2: Table of I/O Area (ver.1.13 or later)

| Contact allocation | | | Target axis | Name | Descriptions |
|---|---|---|---|---|---|
| FP Σ | | FP2 | | | |
| WY15 | Y158 | WY13 Y138 | 1 axis | J point positioning start contact | Turning on this signal during the J-poing operation for the appropriate axis ends the J-point operation, and moves to the process for the next table. (The operation is the edge type.) |
| | Y159 | Y139 | 2 axis | | |
| | Y15A | Y13A | 3 axis | | |
| | Y15B | Y13B | 4 axis | | |
| | Y15C | Y13C | 5 axis | | |
| | Y15D | Y13D | 6 axis | | |
| | Y15E | Y13E | 7 axis | | |
| | Y15F | Y13F | 8 axis | | |

## 21.3.3 Sample Program

Refer to "J point control ladder program for demo.fp".

## 21.3.4 Restrictions on JOG Positioning Control

The JOG positioning target speed can be changed by turning on the "J-point speed change contact" in the JOG positioning contorol, however, the speed cannot be changed while it is accelerating or decelerating.
Therefore, the "J-point speed change contact" is ignored while the speed is accelerating/decelerating. After the speed becomes a constant speed, the speed will be changed.
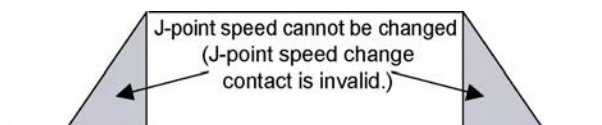


Also, only the increment method is available for the position setting for points P, C and E following point J.

## 21.3.5 Repeat Accuracy of JOG Positioning Control

As each request contact during the speed control (J point speed change cotnact, J point positionign start contact) is controlled by I/O in the JOG positioning control, the positioning accuracy depends on the scan time of I/O.
In JOG positioning control, the speed cange/positioning operation can be started within 1 to 2 ms after the Positioning Unit RTEX detected the above contact signal. In the actual operation, the movement amount at 1 ms that is calculated from the items such as the speed during the speed control and the ratio of the motor rotations to the movement amount of the actual work becomes a repeat error. Also, ladder programs to output the contact signals affect on the error note that when creating ladder programs.

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# Chapter 22

## Home Return (Ver.1.13 or later)

# 22.1 Additional of Home Return Method

The following 8methods are added to the home return method in addition to the DOG method. A total of 9 types are supported.

DOG method 2 (Edge detection of near home DOG)
DOG method 3　　（Near home ODG + Phase Z (based on back-end)）
Limit method 1　　（Limit switch + Phase Z)）
Limit method 2　　（Edge detection of limit switch）
Phase Z method
Stop-on-contact method 1　（Stop-on-contact）
Stop-on-contact method 2　（Stop-on-contact & phase Z）
Data set method

## 22.1.1 Setting Method of Home Return Methods

The type of the home return is set to a prescribed address in the shared memory.

**Reference: 17.6.2 Parameter Setting Area**

Addition of 17.6.2: Positioning parameters of each axis (Ver.1.13 or later)

| Offset address | Name | Description |
|---|---|---|
| 020H | Home return setting code | Sets the pattern of the home return.<br>Bit　　Name　　　　　　　　Default　Descriptions<br>15 to 0　Home return setting code　0　　　0 : DOG method 1<br>　　　　　　　　　　　　　　　　　　1 : DOG method 2<br>　　　　　　　　　　　　　　　　　　2 : DOG method 3<br>　　　　　　　　　　　　　　　　　　3 : Limit method 1<br>　　　　　　　　　　　　　　　　　　4 : Limit method 2<br>　　　　　　　　　　　　　　　　　　5 : Phase Z method<br>　　　　　　　　　　　　　　　　　　6 : Stop-on-contact method 1<br>　　　　　　　　　　　　　　　　　　7 : Stop-on-contact method 2<br>　　　　　　　　　　　　　　　　　　8 : Data set<br>　　　　　　　　　　　　　　　　　　Any other settings will be errors. |
| | | |
| 03DH | Home return Stop-on-cotnact torque value | It is used when the stop-on-contact method 1 or 2 has been specified for the home return method.<br> By the stop-on-contact<br>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.<br><br>　Default: 100（％）　　Unit: ％　　Setting range: 0 to 5000 |
| 03EH | Home return Stop-on-contact judgment time | It is used when the stop-on-contact method 1 or 2 has been specified for the home return method.<br>It is regarded as a criterion for judging the home return once this set time has passed after the torque value of the AMP exceeded the "home return stop-on-contact torque value" by the stop-on-contact.<br><br>　Default: 100（ms）　　Unit: ms　　Setting range: 0 to 10000 |

## 22.1.2 DOG method 1

The phase Z after detecting the rising edge of near home DOG becomes the starting point.
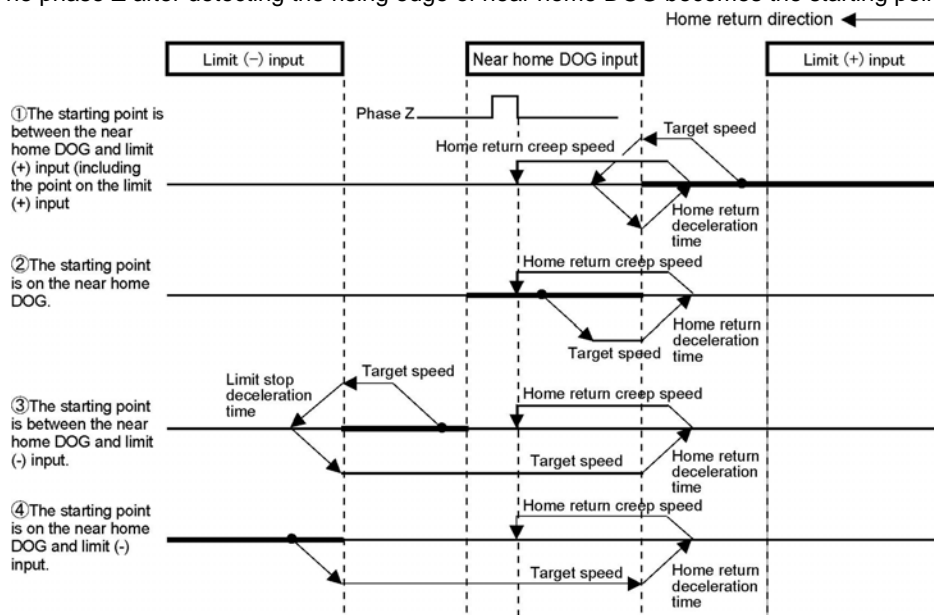


## 22.1.3 DOG method 2

The rising edge of near home DOG is detected. It becomes the starting point.
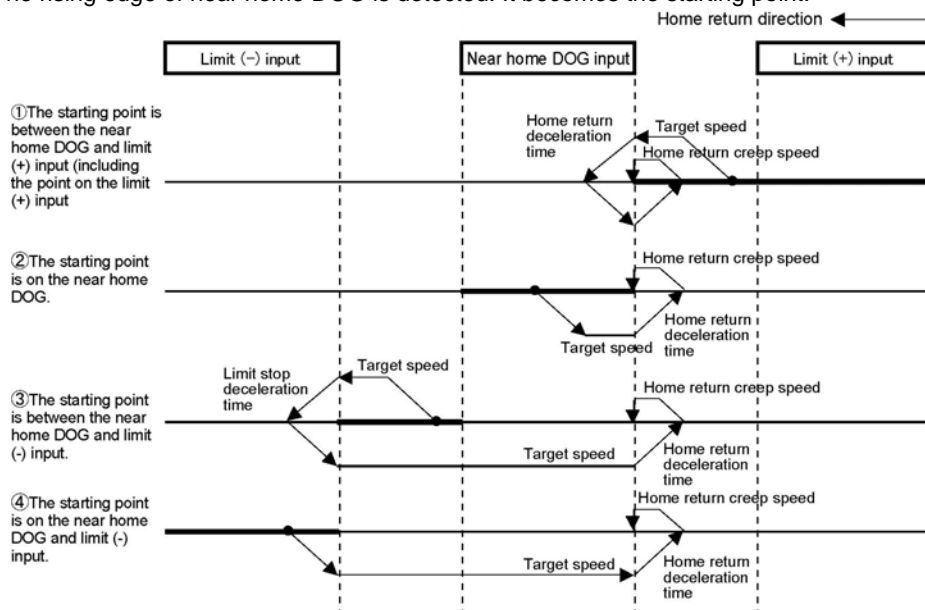
## 22.1.4 DOG method 3

Stops at the first phase Z in the home return direction by detecting the trailing edge(back-end) of near home DOG, and the position becomes the starting point.
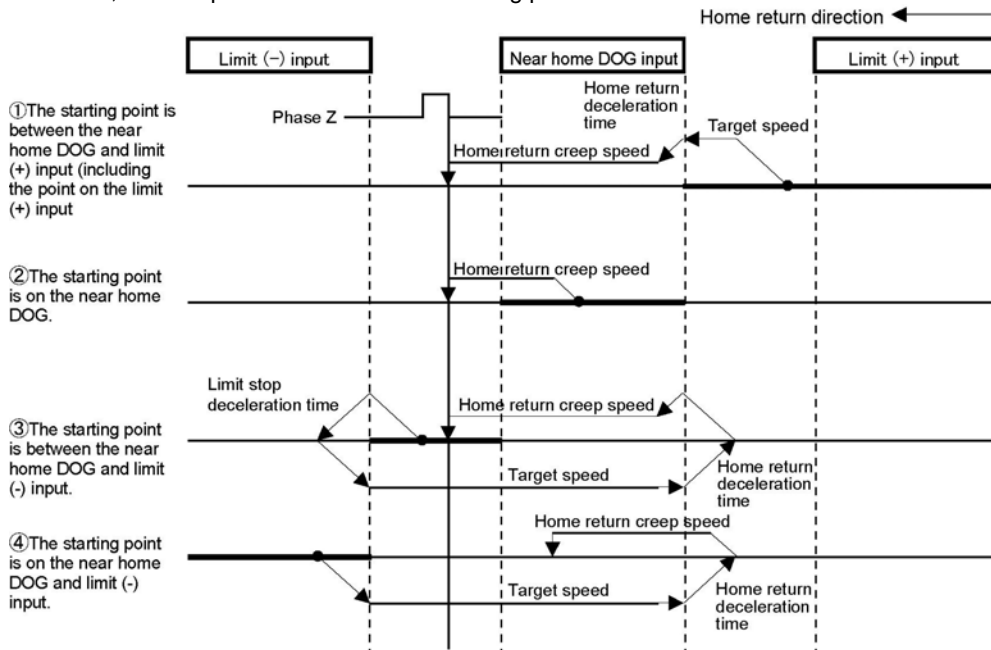


## 22.1.5 Limit Method 1

Reverses after detecting the rising edge of the limit switch on the opposite side of the home return direction. After that, stops at the first phase Z, and that point becomes the starting point.
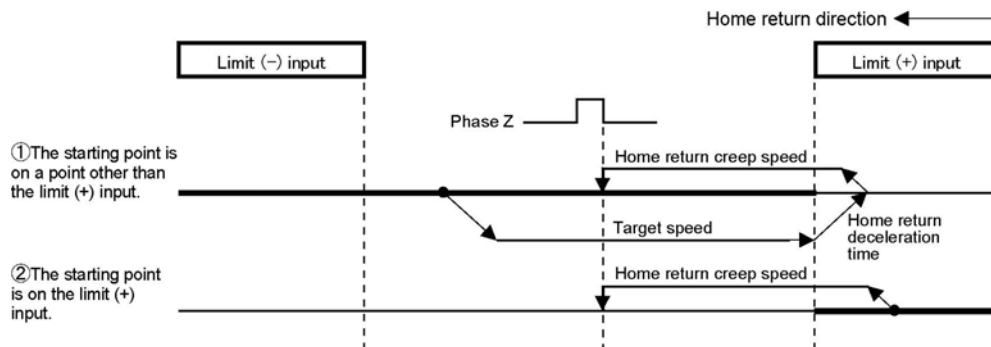
## 22.1.6 Limit Method 2

Detects the rising edge of the limit switch in the home return direction and stops. That point becomes the starting point.
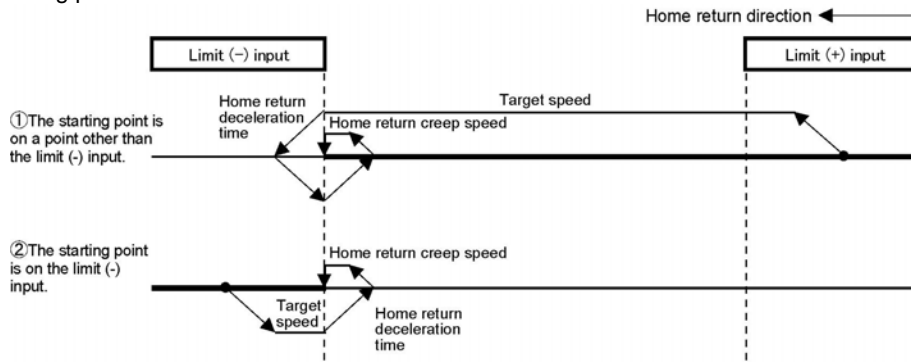


## 22.1.7 Phase Z Method

Moves toward the home return direction from the current value and stops at the first phase Z detection. That point becomes the starting point.
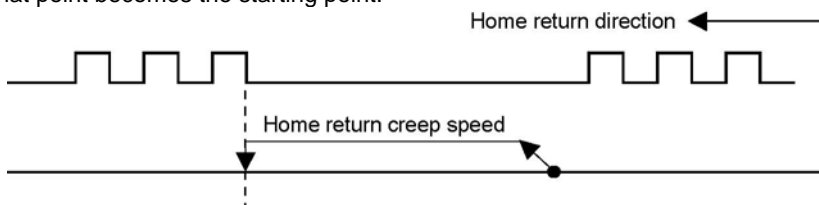


## 22.1.8 Stop-on-contact Method 1

The position reached after a constant time has passed at the torque value higher than a specified value using an automatic stop mechanism such as a stopper is regarded as orign.
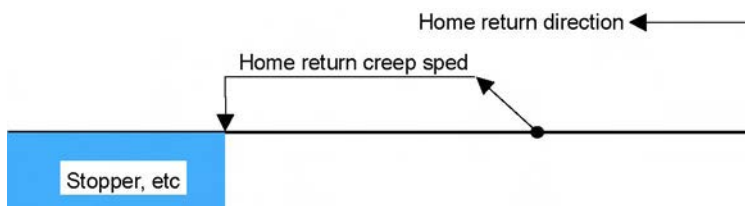
## 22.1.9 Home Return Stop-on-contact Method 2

Although the operation is similar to the stop-on-contact method, the position where the first phase Z was detected performing the reverse operation after the stop by a stopper is regarded as origin
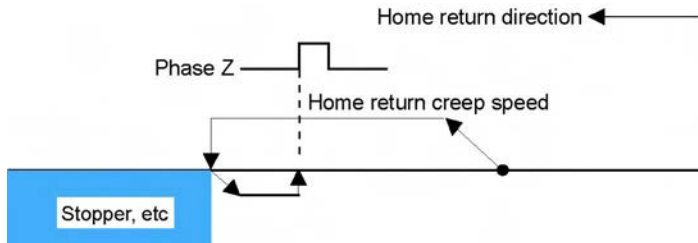


## 22.1.10 Data Set Method

The current value is considered as the origin.
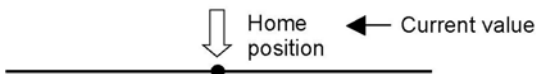


## 22.1.11 Sample Program

Refer to "Home return ladder program for demo.fp".

# Chapter 23

## Supplementary functions (Ver.1.13 or later)

# 23.1 Realtime Torque Limit

**Operational Overview**

It enables the torque limit value to be changed during the Busy state of the JOG operation or positioning operation. (The torque value cannot be changed during the Busy state (in axis operation) by the Positioning Unit RTEX Ver.1.00 and ver.1.01.)

## 23.1.1 Restrictions on Real-time Torque Limit

The realtime torque limit function cannot be used for the home return operation.
As a paramter of AMP "Primary torque limit value" is used, do not change the used torqu e limit by PANATERM, etc when using the torque limit.

## 23.1.2 Sample Program

Refer to "Real-time limit ladder program for demo.fp".

## 23.1.3 Each Axis Information & Monitor Area

**Reference: 17.5.2 Each Axis Information & Monitor Area**

# 23.2 Auxiliary Contact (Delay Mode)

**Overview of Operation**

The Delya mode is a new operation mode added to the auxiliary output contacts. Using this mode enables the auxiliary output contact to turn on according to the ratio of the positioning movement amount. (Example)
If the rate has been set to 50% in the delay mode, the auxiliary output contact will turn on once it moves to the position where is 50% of the movement amount of the positioning table.
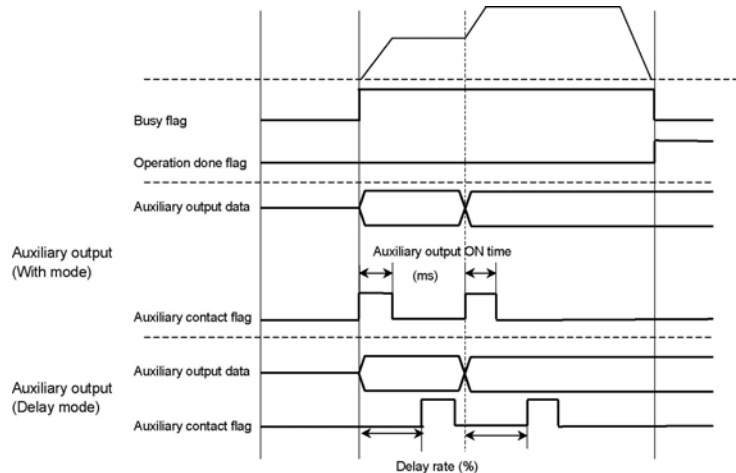


## 23.2.1 Delay Mode Setting

"Delay mode" is added to the auxiliary output mode. The Ver1.00 and Ver.1.01 auxiliary output mode is "With mode".
Also, the delay rate of the delay mode is added to "Each axis positioning parameter setting area".

**Reference: 17.6.2 Parameter Setting Area**
**Addition of 17.6.2:Each axis positioning parameter setting area (Ver.1.13 or later)**

| Offset address | Name | Descriptions |
|---|---|---|
| 012H | Auxiliary output mode | Set the auxiliary output contact and auxiliary output function of the auxiliary output code whether to be used or unused. The on time of the auxiliary output contact is determined by the following auxiliary output on time. <br> Bit   Name           Default    Description <br> 0 to 7  Auxiliary output mode    0    0000H: Not use the auxiliary output function (auxiliary output contact and code) <br>     0001H: Use With mode. <br>     0002H: Use Delay mode. <br><br> 15 to 8  Auxiliary output on time  10     The setting range is 00H((0 ms) to FFH(225 ms). |
| 013H | Auxiliary outptu Delay rate | When using the delay mode for the auxiliary output, specify the ratio (%) to output. The setting range is 0(%) to 100(%). If the setting is 50%, the auxiliary output will be perfomred when the positioning movement amount exceeds 50%. <br> Default:: 0 (%) |

# 23.3 Current Value Update Function

**Functional Overview of Current Value Update**

The current value update function is a function to change the current value controlled by the Positioning Unit RTEX to

an arbitrary value.

The "home change (home offset)" function is provided for the Positioning Unit RTEX(Ver.1.00 and Ver.1.01), however, the "home offset" function is eliminated on the Positioning Unit RTEX of Ver.1.13 or later, and the "current update" and "coordinate origin" functions are added.

## 23.3.1 Differences with Home Offset Function

The differences in the "home change (home offset)", "current value update" and "coordinate origin" are as below.

| Version of Positioning Unit RTEX | Function | Operation |
|---|---|---|
| Ver1.00,1.01 specifications | Home change (Home offset) | -This is a function to set the home position controlled by Positioning Unit RTEX to an arbitrary coordinate position.<br>-The current coordinate controlled by Positioning Unit RTEX becomes the offset value from the specified home position.<br>-Once the home return is executed, the set coordinate will be registered as origin.<br>-The coordinate after the home return is as below.<br>　Positioning Unit RTEX internal coordinate: Specified coordinate origin<br>　AMP coordinate: 0 |
| Ver.1.13 or later specifications | Current value update Note) | ・The current vaue controlled by Positioning Unit RTEX is changed to an arbitrary value.<br>・The coordinate origin does not change due to the current value update. |
| | Coordinate origin | ・The coordinate origin is changed to an arbitrary value.<br>・Once the home return is executed, the set coordinate will be registered as origin.<br>・The coordinate after the home return is as below.<br>　Positioning Unit RTEX internal coordinate: Specified coordinate origin<br>　AMP coordinate: 0<br>・Unlike the home change (home offset) function, the current value is changed after the home return has completed. |

Note) In Configurator PM, "Current value update " is written as "Home offset".

## 23.3.2 Current Value Update

-Changes the current value that is controlled by the Positioning Unit RTEX to any value.
-The current value update can be executed only when the target axes stop. The current updated executing during the axis operation (Busy) is ignored, and the current value will be updated once the axis operation stops.
-The coordinate origin does not change.
-The current value update can be set in the unit specified in the parameter setting.
 The settable range varies depending on the unit to be used as below.

| Specified unit | Settable range |
|---|---|
| pulse | -1,073,741,823 to 1,073,741,823 |
| $\mu$m （0.1$\mu$m） | -107,374,182.3 to 107,374,182.3 |
| $\mu$m （1$\mu$m） | -1,073,741,823 to 1,073,741,823 |
| inch （0.00001inch） | -10,737.41823 to 10,737.41823 |
| inch （0.0001inch） | -107,374.1823 to 107,374.1823 |
| degree （0.1degree） | -107,374,182.3 to 107,374,182.3 |
| degree （1degree） | -1,073,741,823 to 1,073,741,823 |

## 23.3.3 Coordinate Origin

-Changes the coordinate origin to an arbitrary value.
-After setting the coordinate origin, the coordinate origin set by the coordinate origin is registered as origin by performing the home return and when the home return completed.
-The coordinate origin is set in pulse units in regardless of the unit specified in the parameter setting.
-The coordinates after the home return are as follows.
 Positioning Unit RTEX control coordinate: Specified coordinate origin
 AMP coordinate: 0

## 23.3.4 Setting Method, Current Value Update

The "Home change data area" is changed to "Current value update data area". The setting method is the same as the one for the home change (home offset) function.

**Current value update data area**

| Bank | Offset address | Name | Description |
|------|------|------|------|
| 00H | 0C0H | Current value update request flag | Only when the corresponding bit for each axis changes to 1 from 0, the current coordinate controlled by the positioning unit to the following current value.<br>After change, the positioning unit clears the corresponding bits to 0 automatically.<br><br>Bit    Name                      Default<br>0     Current value update request for axis 1   0<br>1     Current value update request for axis 2   0<br>2     Current value update request for axis 3   0<br>3     Current value update request for axis 4   0<br>4     Current value update request for axis 5   0<br>5     Current value update request for axis 6   0<br>6     Current value update request for axis 7   0<br>7     Current value update request for axis 8   0<br>Description<br>0: No change<br>1: Changes the current value of a target axis.<br>   (After change, the positioning unit clears the correponding bits to 0 automatically.)<br><br>Bit     Name             Default    Description<br>15 to 8   —            —        — |
| | 0C8H<br>0C9H | Current value update coordinate of axis 1 | Stores the coordinate to update the current value of axis 1. |
| | 0CAH<br>0CBH | Current value update coordinate of axis 2 | Stores the coordinate to update the current value of axis 2. |
| | 0CCH<br>0CDH | Current value update coordinate of axis 3 | Stores the coordinate to update the current value of axis 3. |
| | 0CEH<br>0CFH | Current value update coordinate of axis 4 | Stores the coordinate to update the current value of axis 4. |
| | 0D0H<br>0D1H | Current value update coordinate of axis 5 | Stores the coordinate to update the current value of axis 5. |
| | 0D2H<br>0D3H | Current value update coordinate of axis 6 | Stores the coordinate to update the current value of axis 6. |
| | 0D4H<br>0D5H | Current value update coordinate of axis 7 | Stores the coordinate to update the current value of axis 7. |
| | 0D6H<br>0D7H | Current value update coordinate of axis 8 | Stores the coordinate to update the current value of axis 8. |

-Set the coordinate to update the current value, and turn on the current value update request flag.
-The positioning unit changes the current value to the specified coordinate.
-After changing the coordinate, the positioning unit turns off the current value update request flag automatically.

## 23.3.5 Coordinate Origin

The "Coordinate origin" is added to each axis positioning parameter.

**Reference: 17.6.2 Parameter Setting Area**

Addition of 17.6.2:Each axis positioning parameter setting area (Ver.1.13 or later)

| Offset address | Name | Description |
|---|---|---|
| 04AH<br>04BH | Cooridnate origin | Stores the value of coordinate origin after the home return. |

-Set the coordinate origin after the home return to the coordinate origin of the target axis.

-Execute the home return process.

-After the home return completed, the coordinate origin is changed to a set value.

## 23.3.6 Sample Program

**Current Value Update**

Refer to "Current value update ladder program for demo.fp".

**Coordinate Origin**

Refer to "Coordinate origin ladder program for demo.fp".

## 23.3.7 Restrictions on Operation

The current value update can be executed only when the target axes stop. The current updated executing during the axis operation (Busy) is ignored, and the current value will be updated once the axis operation stops.

# 23.4 Position Deviation Simple Monitor

**Functional Overview**

The position deviation is the difference between the current value controlled by the positioning unit RTEX and the AMP current position fed back from the AMP.

This function is the same as the deviation counter provided in the AMP. The difference between the command value of the positionign unit in the positioning process and the current value of the AMP can be confirmed by indicating this deviation in the monitor area on the positioning unit.

## 23.4.1 Monitoring Method

"Positioning deviation" is added in the each axis information & monitor area.

**Reference: 17.5.2 Each Axis Information & Monitor Area**

Addition of 17.5.2: Axis information of axis 1 to 8 (Ver.1.13 or later)

| Bank | Offset addres | Name | Description |
|------|--------|------|-------------|
| 01H | 034H 035H | Posiition deviation of axis 1 | The posiition deviation calculated on the unit of axis 1 is stored. |
| | 074H 075H | Posiition deviation of axis 2 | The posiition deviation calculated on the unit of axis 2 is stored. |
| | 0B4H 0B5H | Posiition deviation of axis 3 | The posiition deviation calculated on the unit of axis 3 is stored. |
| | 0F4H 0F5H | Posiition deviation of axis 4 | The posiition deviation calculated on the unit of axis 4 is stored. |
| | 134H 135H | Posiition deviation of axis 5 | The posiition deviation calculated on the unit of axis 5 is stored. |
| | 174H 175H | Posiition deviation of axis 6 | The posiition deviation calculated on the unit of axis 6 is stored. |
| | 1B4H 1B5H | Posiition deviation of axis 7 | The posiition deviation calculated on the unit of axis 7 is stored. |
| | 1F4H 1F5H | Posiition deviation of axis 8 | The posiition deviation calculated on the unit of axis 8 is stored. |

## 23.4.2 Sample Program

Refer to "Position deviation ladder program for demo.fp".

## 23.4.3 Restrictions on Operation

-As the deviation to be displayed with the position deviation simple monitor is calculated within the positioning unit, a deffirence may occur with the deviation counter value of the AMP.

-The display of the position deviation monitor is updated in 10-ms units.

# Record of changes

| Manual No. | Date | Desceiption of changes |
|---|---|---|
| ARCT1F421E | NOV.2006 | First Edition |
| ARCT1F421E-1 | Feb.2008 | Addition function of Ver1.13 or later |