

PROGRAMMABLE CONTROLLER  
FP2 Positioning Unit  
(Interpolation)  
**Technical Manual**

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# 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 safety.  
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.

## **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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# Glossary

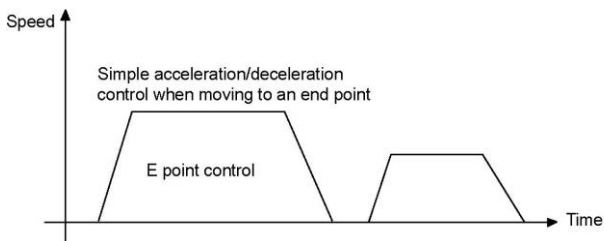
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## Configurator PM

Configurator PM is a setting tool for Positioning Unit (Interpolation type). 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.

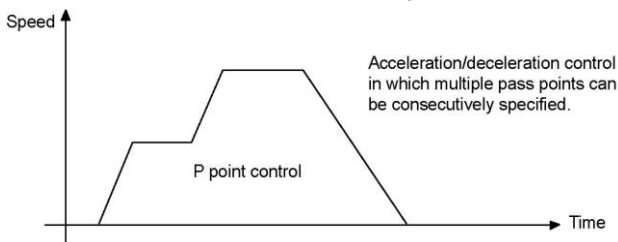
## E point control

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.



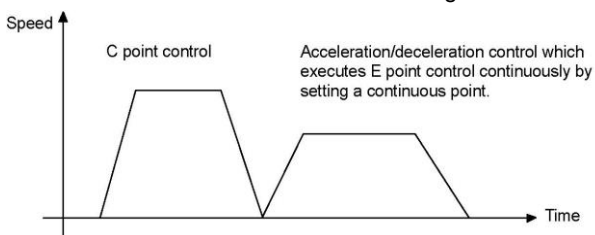
## P point control

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.



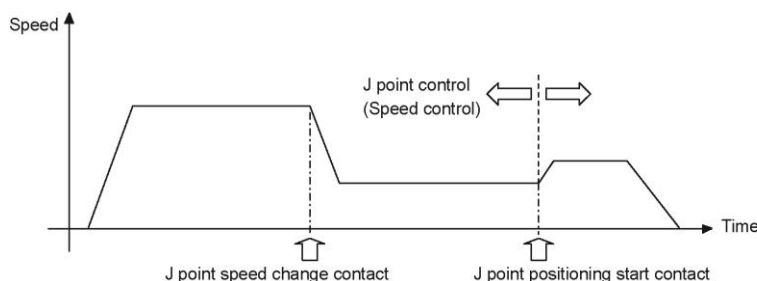
## C point control

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.



### J point control (JOG positioning control)

This refers to control which passes through a “JOG Operation Point”, and is called “J point control” in this manual. Executing the J point control performs the speed control until a “J point positioning start contact” turns on.



### Acceleration time/deceleration time

For the E point control or C point control, 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 acceleration time is the time during which the speed accelerates from 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

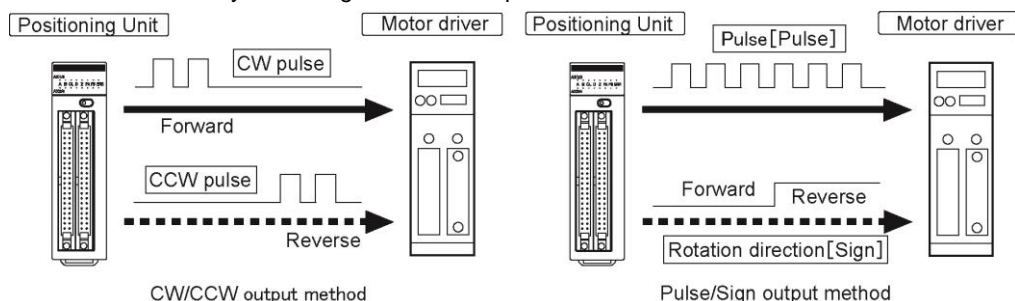
Generally, these indicate the direction in which the motor is rotating, with CW referring to clockwise rotation and CCW to counterclockwise rotation.

### CW/CCW output method (2-pulse output method)

This is a method in which control is carried out using two pulses, a forward rotation pulse and a reverse rotation pulse. With the FP2 positioning unit, this is specified using the control codes of the shared memory according to the driver specifications.

### Pulse/Sign output method (1-pulse output method)

This is a method in which control is carried out using one pulse to specify the speed and ON/OFF signals to specify the direction of rotation. With the FP2 positioning unit, this is specified using the control codes of the shared memory according to the driver specifications.

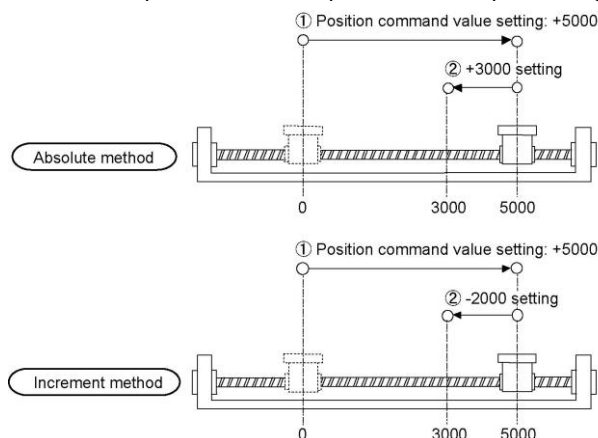


### Absolute method (absolute value control method)

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.

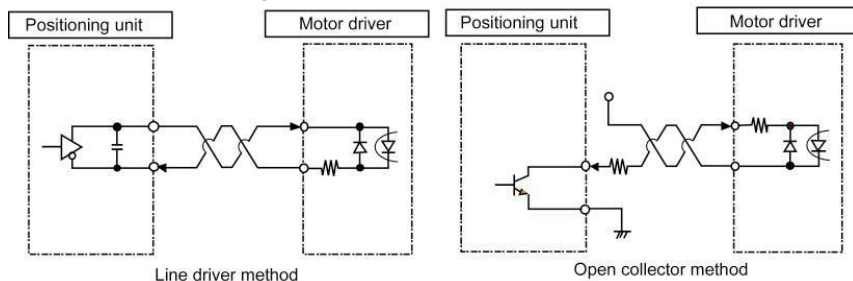


### Line driver output

This is one output format used in pulse output signal circuits, in which the push - pull output of the line driver is used. Because this format offers better resistance to noise than the open collector output format, a larger distance to the driver is possible. The line driver must be supported on the motor driver side. Most servo motor drivers are equipped with this format.

### Open collector output

This is one output format used in pulse output signal circuits, enabling to make connections in accordance with the voltage of the power supply being used by connecting an external resistance. This is used when connecting a driver that does not have line driver input, such as a stepping motor.



### 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 control, 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 spiral interpolation.

### **JOG operation**

This refers to an operation in which the motor is rotated only while operation commands are being input. This is used to forcibly rotate the motor using 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.

### **JOG positioning operation**

This refers to an operation to transfer a JOG operation to a positioning operation by an input from the external switch.

### **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 is the deceleration time during the operation.

### **Emergency stop**

This is a function that interrupts the operation in progress, slows the rotation and brings it to a stop. Generally, a time shorter than 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 execution of the position control can be confirmed by turning an exclusive auxiliary output contact on for a constant time.

### **Software limit**

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

### **Linear interpolation**

This is the interpolation control that controls positions as the locus 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 interpolation control that controls positions as the locus of the operation of the 2-axis motor with the grouped X axis and Y axis becomes a circular arc. There are two setting methods, which are a center point specification and pass point specification.

### **Spiral interpolation**

This is the interpolation control that controls positions as the locus 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**

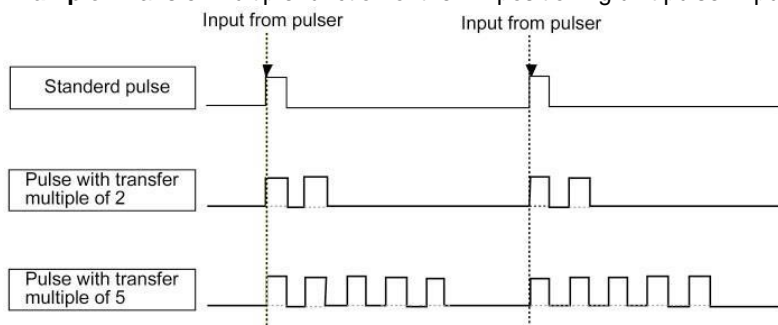
This is one of the methods to detect the request signals allocated to this unit. It executes each requested process by detecting a trigger that the request signal is on, and continues the requested process while the request signal is on.

## Transfer multiple

With the FP2 positioning unit, this can be specified when the pulser operation function is used.

Outputting the number of pulses doubled by the number of pulser input signals, the transfer multiple is said to be “2”, and when the number of pulses is five times that of the pulser input signals, the transfer multiple is said to be “5”.

**Example:** Transfer multiple function of the FP positioning unit pulser input

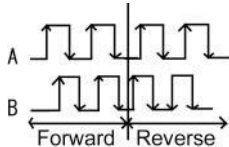


## Feedback pulse input

This counts the feedback pulse from the encoder. 2-phase input, direction distinction input and individual input can be handled.

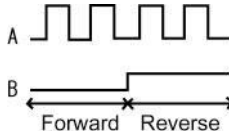
### 2-phase input method

This counts the signal of 2 pulses in the different phase (A phase, B phase). when A phase preceeds B phase, the motor is rotated clockwise(count increment) and when B phase preceeds A phase, the motor is rotated counter-clockwise (count decrement).



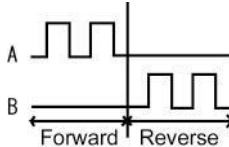
### Direction distinction input method

This is a method to count using ON/OFF signal specifying the pulse signal and count direction.



### Individual input method

This is a method to count using the count increment pulse signal and the count decrement pulse signal.





# **Chapter 1**

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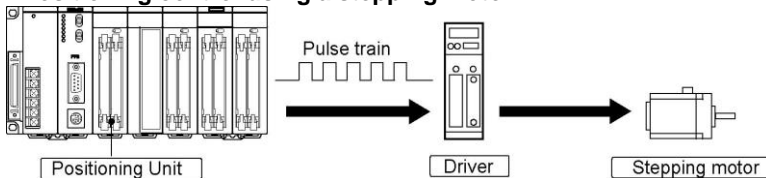
## **Functions of Unit and Restrictions on Combination**

# 1.1 Functions of FP2 Positioning Unit

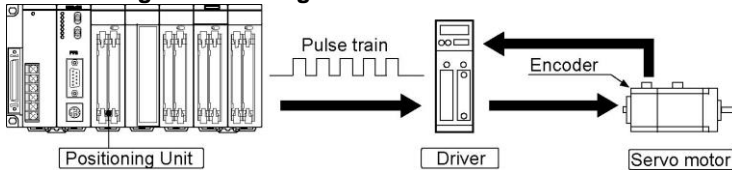
## 1.1.1 Functions of Unit

Positioning can be controlled through the combination of a servo motor and a stepping motor with a driver using the pulse train input method.

### - Positioning control using a stepping motor



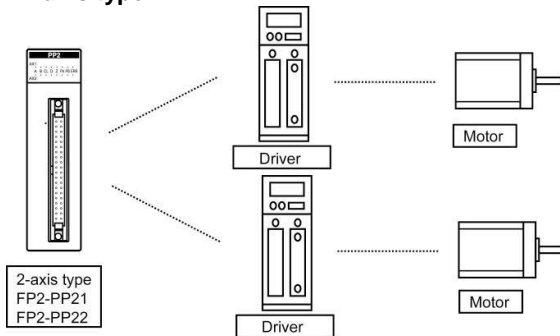
### - Positioning control using a servo motor



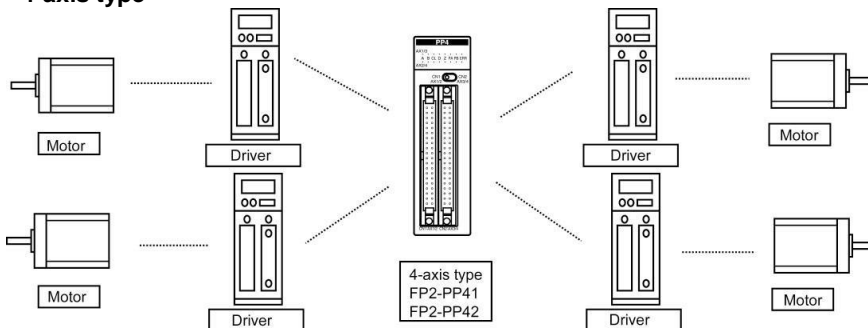
**2-axis and 4-axis types are available.**

Multiple axes (up to 4 axes) can be controlled with a single unit.

### - 2-axis type



### - 4-axis type



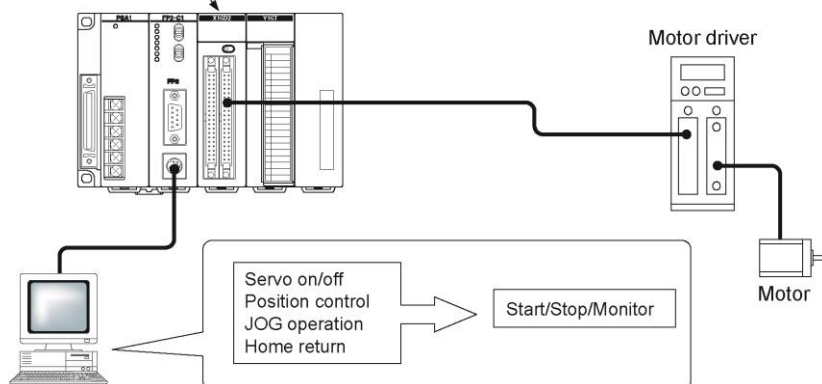
**Transistor output type (Open collector) and Line driver output type are available.**

The unit has 2 types; one is the Line driver output type, can handle the high-speed control, and another is the Transistor output type, can handle the driver can be connected with only the open collector such as a stepping motor. When either can be used, we recommend the Line driver output type.

### 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.

Positioning unit (Interpolation type)



### 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 controls can be performed.

#### 1.1.1 Unit Types

##### FP2 Positioning Unit (Interpolation type)

Type	Function	Part number	Product number
2-axis transistor output type	2-axis control	FP2-PP2T	AFP243710
4-axis transistor output type	4-axis control	FP2-PP4T	AFP243720
2-axis line driver output type	2-axis control	FP2-PP2L	AFP243711
4-axis line driver output type	4-axis control	FP2-PP4L	AFP243721

##### Setting software

Name	Applicable Ver.	Specifications	Product number
Control Configurator PM	Ver. 1.2	English	AFPS66510

## 1.2 Restrictions on Units Combination

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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.

### FP2 Positioning Unit (Interpolation type)

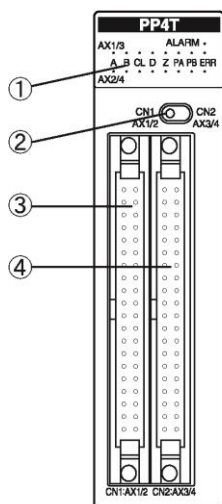
Type	Part number	Product number	Current consumption (from power supply)
2-axis type	FP2-PP2T	AFP243710	300 mA
2-axis type	FP2-PP2L	AFP243711	300 mA
4-axis type	FP2-PP4T	AFP243720	300 mA
4-axis type	FP2-PP4L	AFP243721	300 mA

## **Chapter 2**

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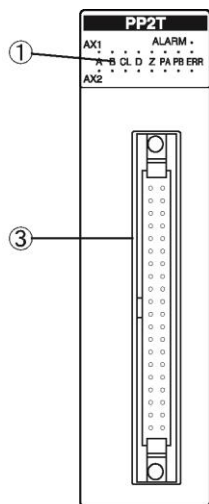
### **Parts and Functions**

## 2.1 Parts and Functions



Front

4-axis type FP2-PP4T  
FP2-PP4L



Front

2-axis type FP2-PP2T  
FP2-PP2L

### ① Operation status display LEDs

These display operation conditions for two axes.

### ② Operation status display switch (for FP2-PP4T, FP2-PP4L only)

This switches operation display between for axes 1 and 2, and for axes 3 and 4.

### ③ User interface connector for 1-axis/2-axis

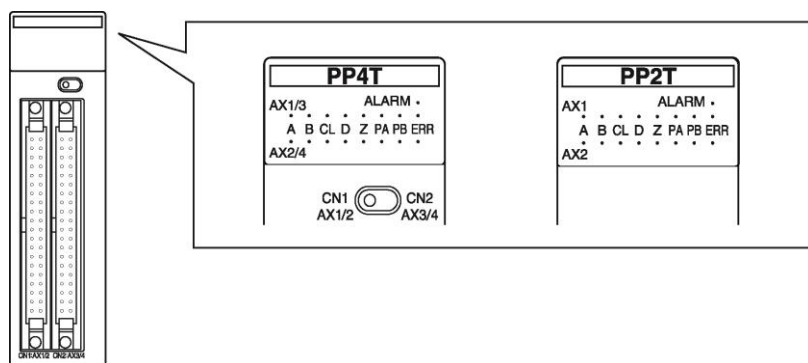
This connector is used to connect a motor driver or external interface.

### ④ User interface connector for 3-axis/4-axis (for FP2-PP4T, FP2-PP4L only)

This connector is used to connect a motor driver or external interface

## 2.2 Operation Status Display LEDs

Information on two axes can be displayed at once on the LEDs. For a 4-axis type, display can be switched between axes 1 and 2, and axes 3 and 4 with the switch. The LEDs show the same information for each axis.



Unit front

### Operation Status Display LEDs

LED	Description		Color	LED ON	LED OFF	LED blinks
A	Pulse output signal A display Note1)	When set to pulse/sign output method	Green	—	During stop	During pulse output
		When set to CW/CCW output method	Green	—	During stop (forward)	During pulse output (forward)
B	Pulse output signal B display Note1)	When set to pulse/sign output method	Green	Reverse direction command	Forward direction command	—
		When set to CW/CCW output method	Green	—	During stop (reverse)	During pulse output (reverse)
CL	Counter clear signal output display		Green	Output: ON	Output: OFF	—
D	Near home status display Note2)		Green	ON	OFF	—
Z	Home input status display Note2)		Green	ON	OFF	—
PA	Pulse input A signal display Note3)		Green	Displays the input status of the pulse input A signal.		
PB	Pulse input B signal display Note3)		Green	Displays the input status of the pulse input B signal.		
ERR	Setting value error display		Red	Error occurs	Normal	—
ALARM	Hardware error display		Red	Hardware error occurs	Normal	—

Note1) The pulse output signal display LEDs (A and B) blink at the output frequency (speed). For this reason, they may appear to light steadily at high-speed output.

Note2) The near home (D) and home input (Z) LEDs light when the respective input becomes valid. The input valid logic is specified using the control codes in the program.

(In the manual, "Z" is described as "ZSG", and "D" is described as "DOG".)

Note3) Pulse input signal (PA) and (PB) display the pulse signal input status.



## Chapter 3

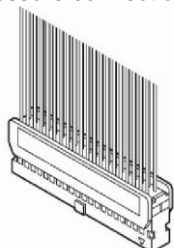
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## Wiring

## 3.1 Connecting using Connector for a Discrete-Wire

### 3.1.1 Specifications of Connector for Discrete-wire

This is a connector that allows loose wires to be connected without removing the wire's insulation. The pressure connection tool (AXY52000FP) is required to connect the loose wires.



Discrete-wire connector ( 40P )

#### Suitable wire (twisted wire)

Size	Official cross section area	Insulation thickness	Rated current
AWG22	0.3 mm <sup>2</sup>	1.5 to 1.1 dia.	3A
AWG24	0.2 mm <sup>2</sup>		

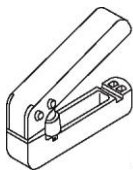
#### Discrete-wire connector (attached with a unit)

Manufacturer	Component parts	Unit type and required quantity	
		2-axis type	4-axis type
Panasonic Corp.	Housing(40P)	1 pc x 1	1 pc x 2
	Semi-cover(40P)	2 pcs x 1	2 pcs x 2
	Contact (for AWG22 and AWG24) 5pin	8 pcs x 1	8 pcs x 2

\* 1 connector set and 2 connector sets are supplied with the 2-axis type unit and 4-axis type unit, respectively.

#### Dedicated tool

Manufacturer	Product number
Panasonic Corp.	AXY52000FP



Pressure connection tool

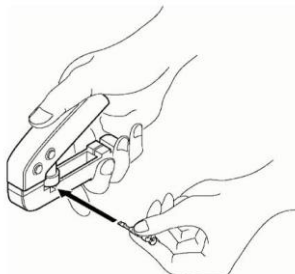
### 3.1.2 Assembly of Discrete-Wire Connector

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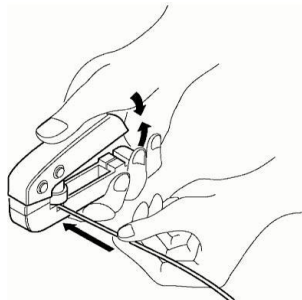
The wire end can be directly press-fitted without removing the wire's insulation, saving labor.

**Procedure:**

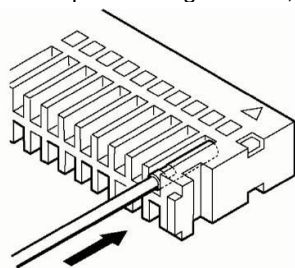
1. Bend the contact back from the carrier, and set it in the pressure connection tool.



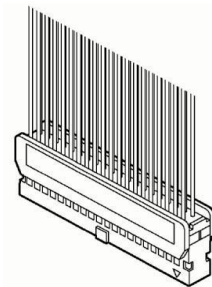
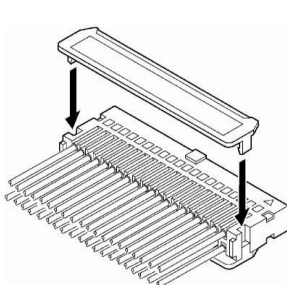
2. Insert the wire without removing its insulation until it stops, and lightly grip the tool.



3. After press-fitting the wire, insert it into the housing.

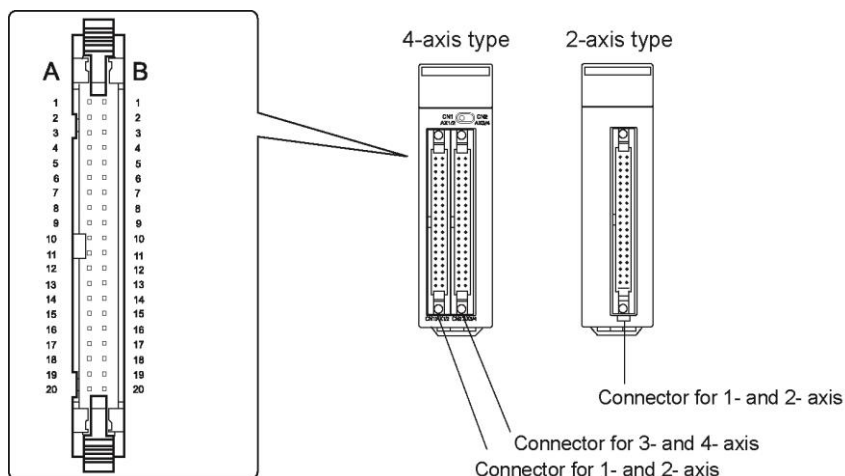


4. When all wires have been inserted, fit the semi-cover into place.



## 3.2 Input/Output Specifications and Terminal Layout

### 3.2.1 Input /Output Specifications



2 connectors are used to connect 4-axis type and 1 connector to connect 2-axis type. The signal pins for 2 axes are assigned to 2-axis type connector. AX1 and, and AX3 and 4 connectors for 4-axis type has the completely same pin assignments, so that the same pin No. functions the same. Between the Transistor type and the Line driver type, the pulse output terminal performance is different, but the input terminal and the power supply terminal are in the same specifications.

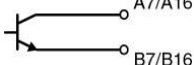
#### Output terminals (Transistor Output type)

Pin number		Circuit	Signal name		Item	Description
1/3 axis	2/4 axis					
A1	A10		Pulse output A: 5V DC output	Output Specifications	Output format	Open collector
B1	B10		Pulse output A: Open collector		Operating voltage range	4.75 V DC to 26.4 V DC
A2	A11		Pulse output B: 5V DC output		Max. load current	15 mA
B2	B11		Pulse output B: Open collector		ON Max. voltage drop	0.6 V

#### Output terminals (Line driver output type)

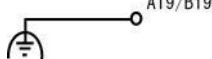
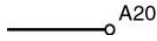

Pin number		Circuit	Signal name		Item	Description
1/3 axis	2/4 axis					
A1	A10		Pulse output A: Line driver (+)	Output Specifications	Output format	Line driver output Equivalent to AM26C31
B1	B10		Pulse output A: Line driver (-)			
A2	A11		Pulse output B: Line driver (+)			
B2	B11		Pulse output B: Line driver (-)			

### Output terminals (common)

Pin number		Circuit	Signal name		Item	Description
1/3 axis	2/4 axis					
A7	A16		Deviation counter clear (+)	Output Specifications	Output format	Open collector
					Operating voltage range	4.75 V DC to 26.4 V DC
B7	B16		Deviation counter clear (-)		Max. load current	10mA
					ON Max. voltage drop	1V

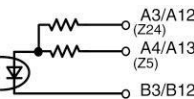
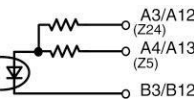
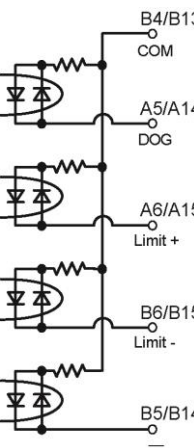
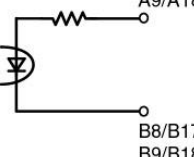
Note) The deviation counter clear signal is output when the Home Return is complete. Its ON time can be selected using the Control code of the shared memory, from the range of 1 to 100 ms.

### Power supply terminals and Earth terminals (common)

Pin number	Circuit	Signal name		Item	Description
A19/B19		F.E. (Field Earth)	Power specifications	—	—
A20		External power supply input: 24 V DC (+)		Power supply voltage range	21.4 V DC to 26.4 V DC
B20		External power supply input: 24 V DC (-)		Current consumption	4-axis type: 90 mA or less 2-axis type: 50 mA or less

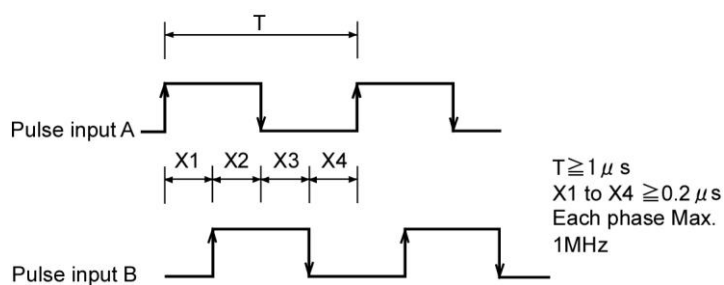
Note) F.E.s and the External power supply input terminals between 2 connectors are respectively conducted internally for 4-axis type.

## Input Terminals (common)

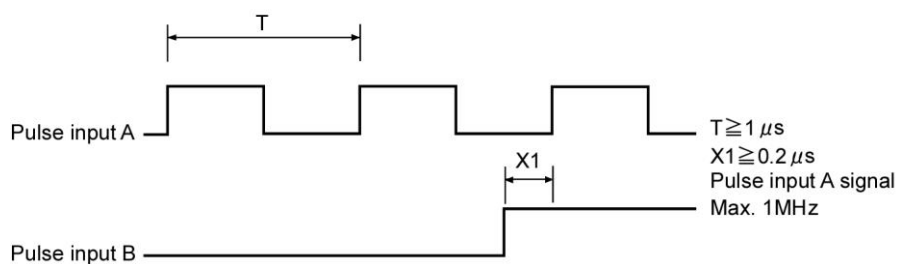
Pin number		Circuit	Signal name		Item	Description
1/3 axis	2/4 axis					
A3	A12		Home input: 24 V DC (+) (Z24)	Input specifications	Operating voltage range	21.6V DC to 26.4V DC
					Min. ON voltage/current	19.2V DC/5.5mA
					Max. OFF voltage/current	2V DC/2mA
					Input impedance	Approx 3k $\Omega$
					Min. input pulse width	100 $\mu$ s or more
A4	A13		Home input: 5V DC (+) (Z5)	Input specifications	Operating voltage range	3.5V DC to 5.25 (5V DC, Line driver specifications)
					Min. ON voltage/current	3V DC/4mA
					Max. OFF voltage/current	1V DC/0.5mA
					Input impedance	Approx. 390 $\Omega$
					Min. input pulse width	100 $\mu$ s or more
B3	B12		Home input (-)	-	-	-
B4	B13		COM	-	-	-
A5	A14		Near home input (DOG)	Input specifications	Operating voltage range	21.6V DC to 26.4V DC
					Min. ON voltage/current	Near home input (DOG) 19.2V DC/5.0mA
A6	A15		Over limit input (+) (Limit +)		Max. OFF voltage/current	Over limit input (+) (Limit +) Over limit input (-) (Limit -) 19.2V DC/2.6mA
					Input impedance	Near home input (DOG) Approx 3.6k $\Omega$
B6	B15		Over limit input (-) (Limit -)			Over limit input (+) (Limit +) Over limit input (-) (Limit -) Approx 6.8k $\Omega$
B5	B14		-	-	-	-
A8	A17		Pulse input A (+)	Input specifications	Operating voltage range	3.5 to 5.25 V DC (5V DC, Line driver specifications)
B8	B17		Pulse input A (-)		Min. ON voltage/current	3V DC/4mA
A9	A18		Pulse input B (+)		Max. OFF voltage/current	1V DC/0.5mA
					Input impedance	Approx 390 $\Omega$
B9	B18		Pulse input B (-)		Min. input pulse width	0.5 $\mu$ s(max. 1MHz each phase)

**Note: Please use under the specifications for pulse input A, B signal.**

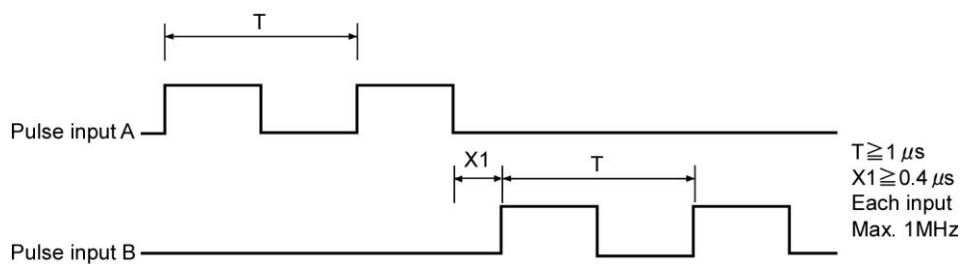
- 2 phases input method



- Direction distinction input method



- Individual input method

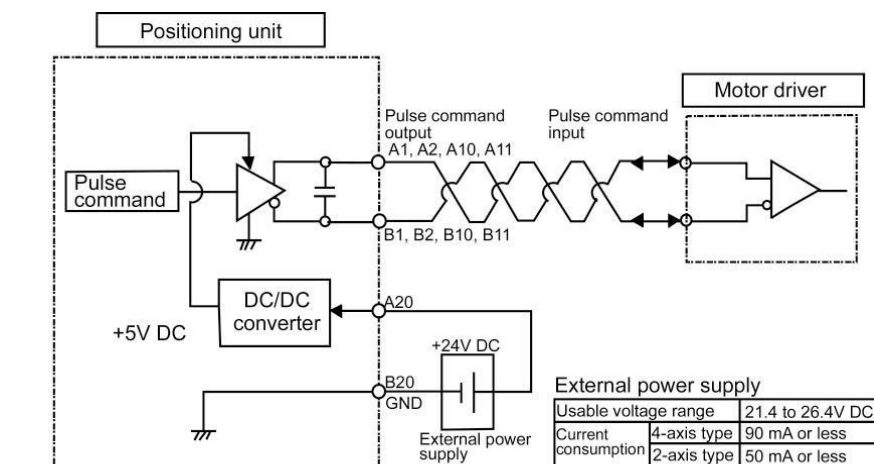


## 3.3 Supplying Power for Internal Circuit Drive

Always make sure an external +24V DC power supply is connected to the pins for external input power supply (pin No. A20 and B20).

The applied 24V DC passes through an internal DC/DC converter and is converted to 5 V DC voltage. It is then supplied to the various internal circuits as a power supply for internal circuit drive of the pulse command output pin.

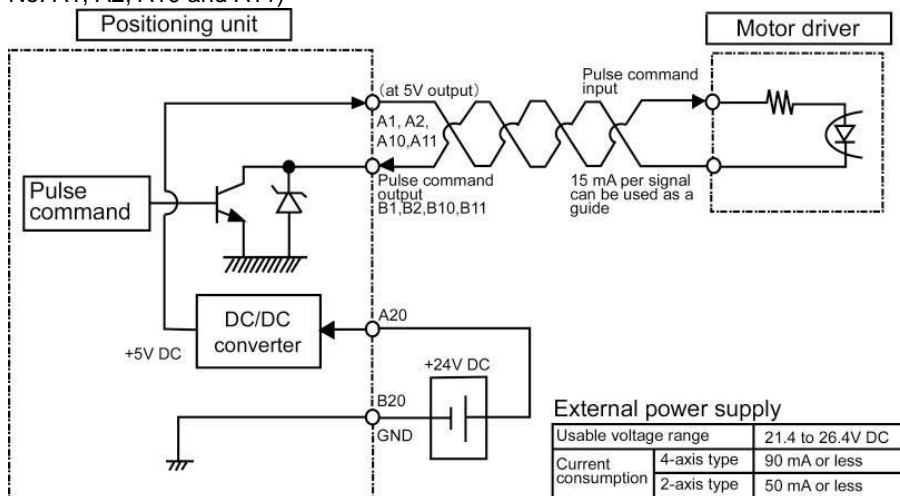
### 3.3.1 Line Driver Output Type



The illustration shows one signal component extracted from the overall configuration.

### 3.3.2 Transistor Output Type

The power supply for the pulser command output circuit can be taken from the 5V DC out put pins (pin No. A1, A2, A10 and A11)



**Note:**

When open collector pulse output (Transistor output) is used, the value of 15 mA per signal should be used as a guide. If exceeds the 15 mA, the appropriate resistance should be added.

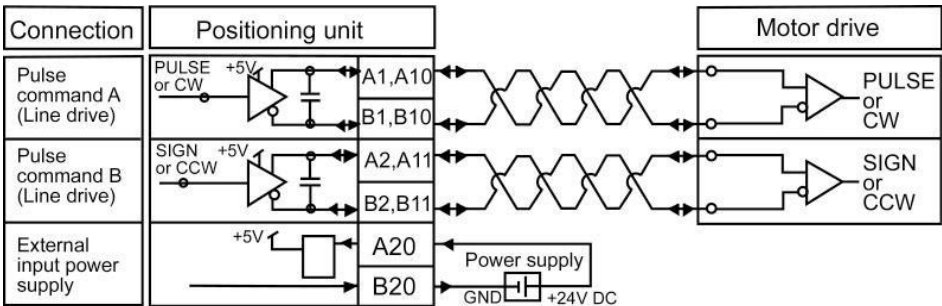
### 3.4 Connection of Pulse Command Output Signal

Two types of output types are available for the FP2 positioning unit due to two types of the interfaces of motor driver. Select and connect one or the other, depending on the interface of the motor driver being used.

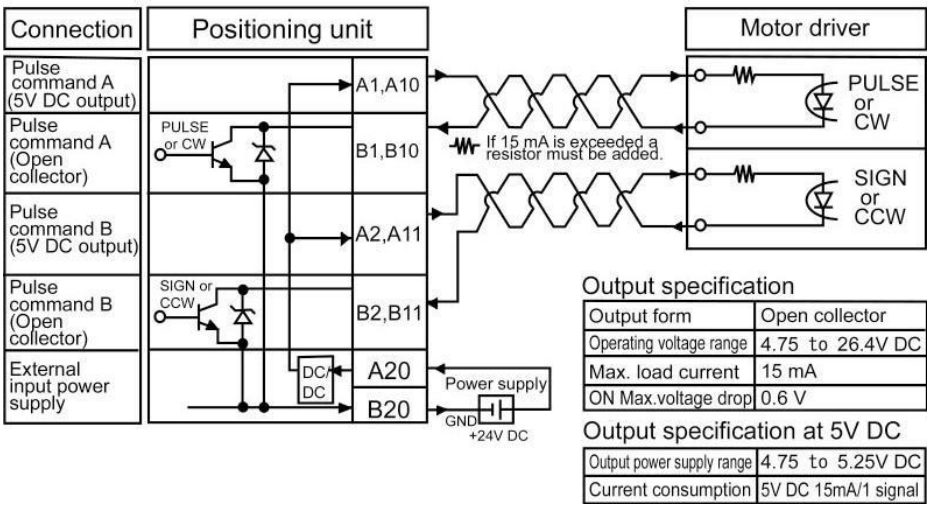
**Note:**

We recommend using twisted - pair cables as the wiring between the positioning unit output and the motor driver, or twisting the cables to be used.

#### 3.4.1 Line Driver Output type

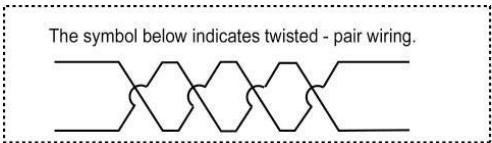


#### 3.4.2 Transistor Output Type



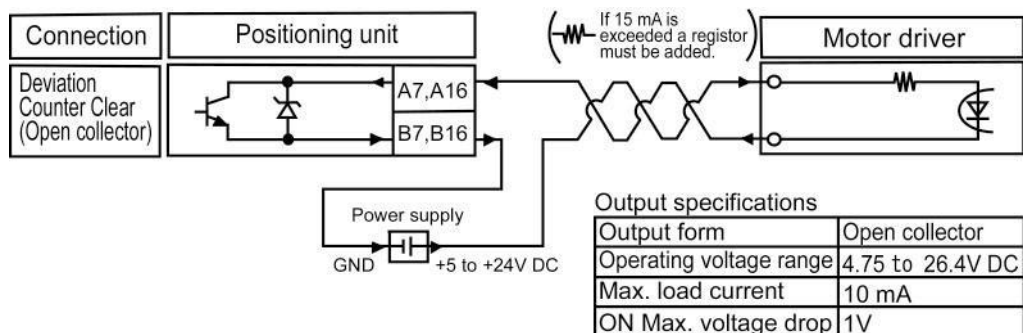
**Note:**

A value of 15 mA per signal should be used as a guide. If exceeds this, resistance should be added.



### 3.5 Connection of Deviation Counter Clear Output Signal (for servo motor)

This is an example showing connection of the counter clear input to the servo motor driver. An external power supply (+5 V DC to +24 V DC) must be provided for the connection.



#### Note:

Always use twisted - pair cables for wiring.

The Current which can be conducted as the deviation counter clear output signal is 10 mA max.

If 10 mA is exceeded, resistance should be added.

## 3.6 Connection of Home Input/Near Home Input Signals

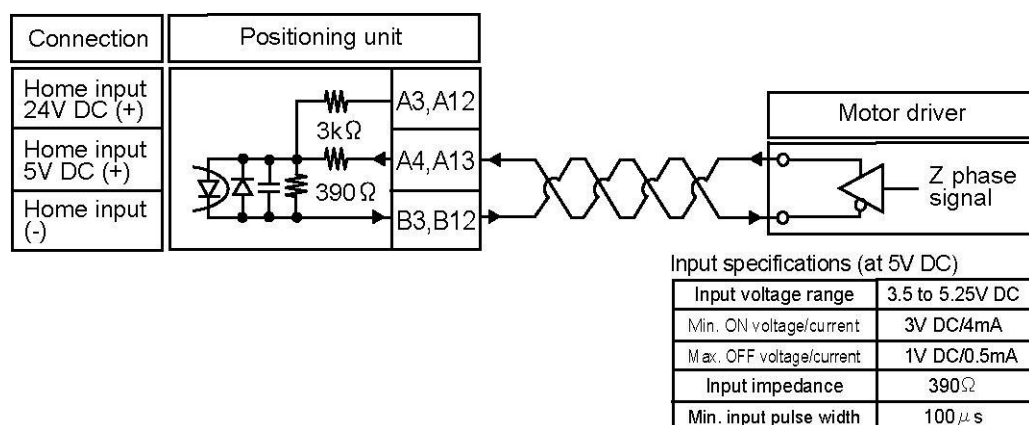
This is the home signal input connection for the home return.

It should be connected to the Z phase output (Line driver output or Transistor output) of the motor driver, or to an external switch and sensor.

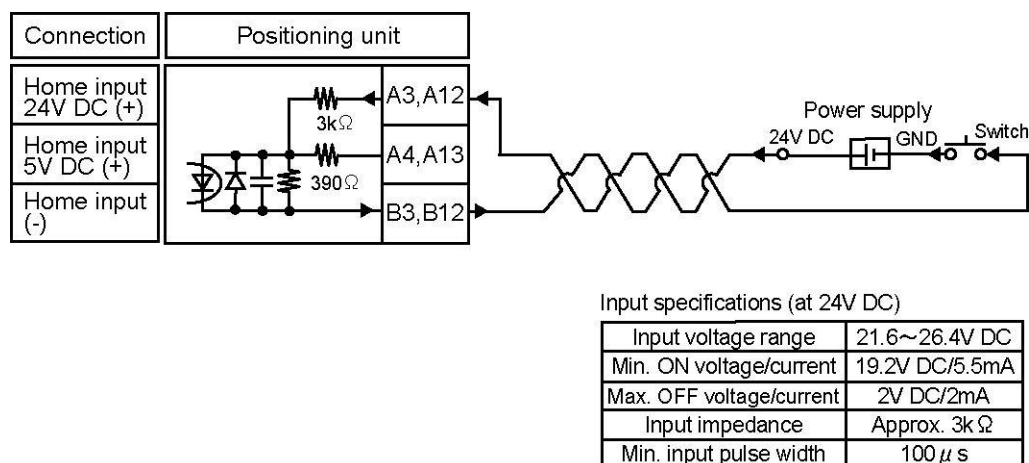
### Note:

We recommend using twisted - pair cables as the wiring between the positioning unit output and the motor driver, or twisting the cables used.

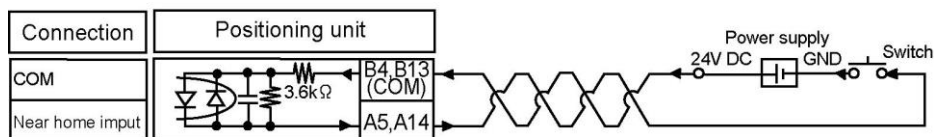
### 3.6.1 Connection of Home Input (When connecting to motor driver Z phase output)



### 3.6.2 Connection of Home Input (When connecting to an external switch/sensor)



### 3.6.3 Connection of Near Home Input Signal

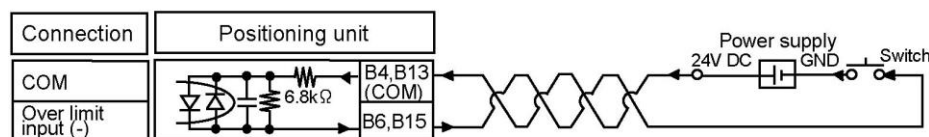
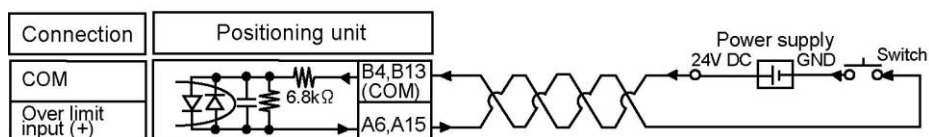


#### Input specifications

Input voltage range	21.6 to 26.4V DC
Min. ON voltage/current	19.2V DC/5.0mA
Max. OFF voltage/current	2V DC/1.5mA
Input impedance	Approx. 3.6k $\Omega$
Min. input pulse width	500 $\mu$ s

Note) No. B4 and B13 are common for the Near home input, Over limit input(+), Over limit input(-) and Positioning control start input (Timing input).

### 3.6.4 Connection of Over limit Input Signal



#### Input specifications

Input voltage range	21.6~26.4V DC
Min. ON voltage/current	19.2V DC/2.6mA
Max. OFF voltage/current	2V DC/1.5mA
Input impedance	Approx. 6.8k $\Omega$
Min. input pulse width	500 $\mu$ s

Note) No. B4 and B13 are common for the Near home input, Over limit input(+), Over limit input(-) and Positioning control start input (Timing input).

### 3.7 Connection of Pulse Input

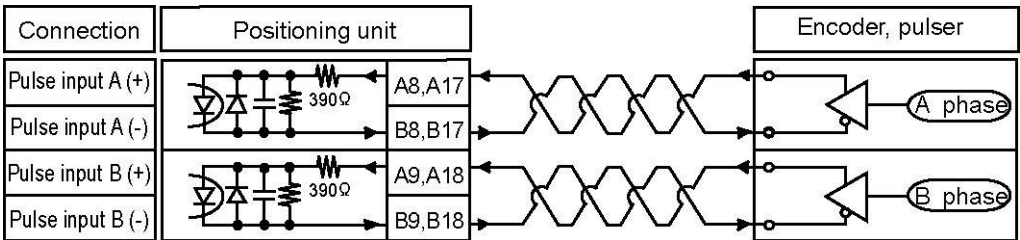
The signal output style may differ depending on Pulser or Encoder. Connect in accordance with the output style. Line driver type, Transistor open collector type and Transistor-resistance pull-up type are available for the output styles.

The same pulse input terminal is used for Pulser input operation and Feedback pulse count, so it is used for either.

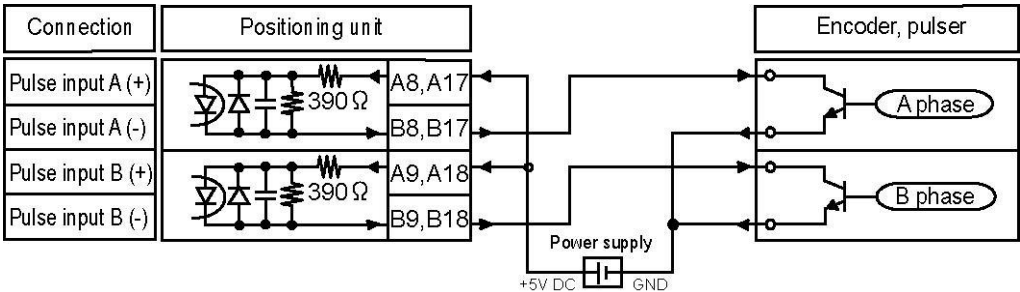
**Note:**

- We recommend using twisted - pair cables for connections, or twisting the cables used.
- When counting the 2-phase input such as the input from the encoder, set the pulse input transfer multiple to “4 multiple setting” (x 4) or “2 multiple setting” (x 2) using the control code to prevent counting error.

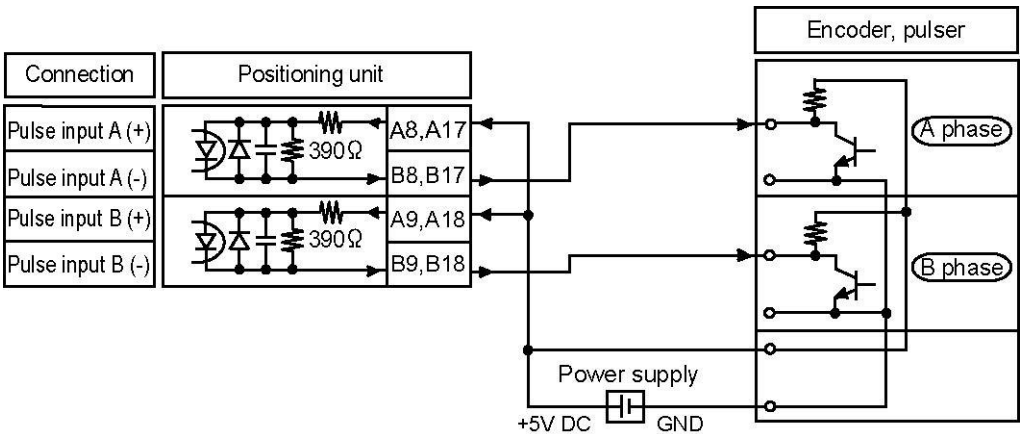
#### 3.7.1 Line Driver Type



#### 3.7.2 Transistor Open Collector Type



#### 3.7.3 Transistor - resistor Pull - up Type



## 3.8 Precautions on Wiring

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Connect the wire in less than or the following length between the Transistor output type and the motor driver , and between the Line driver output type and the motor driver.

<Signals applicable>

- Transistor output
- Line driver output
- Deviation counter clear output

Output type	Product number	Wiring length
Transistor output type	AFP243710	10 m
	AFP243720	
Line driver output type	AFP243711	
	AFP243721	

## **Chapter 4**

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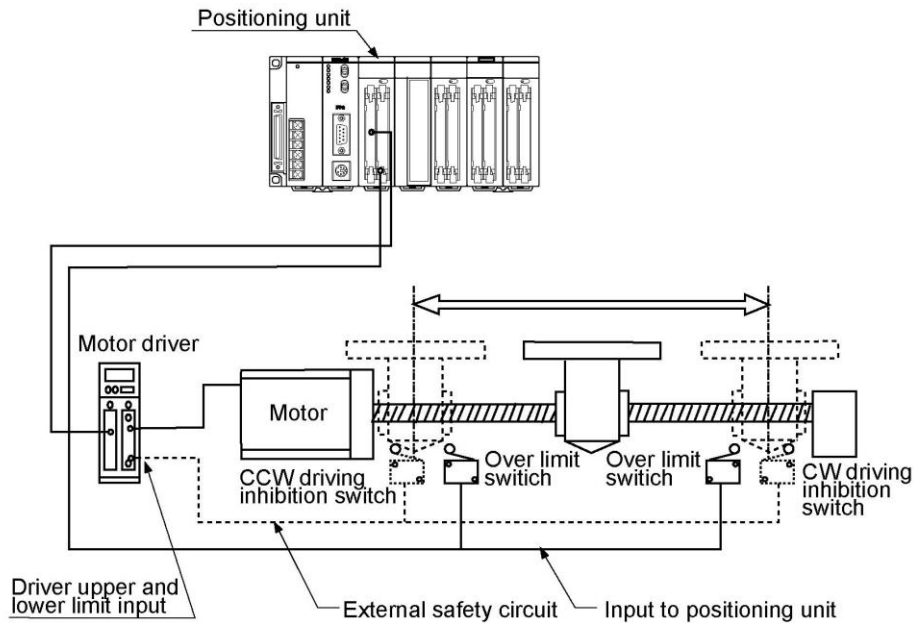
### **Power On/Off and Items to Check**

## 4.1 Safety Circuit Design

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### Example of a safety circuit

Installation of the Over limit switch



### Safety circuit based on Positioning unit

Install Over limit switches as shown above.

Connect them to Over limit input(+) and Over limit input (-) of the Positioning unit.

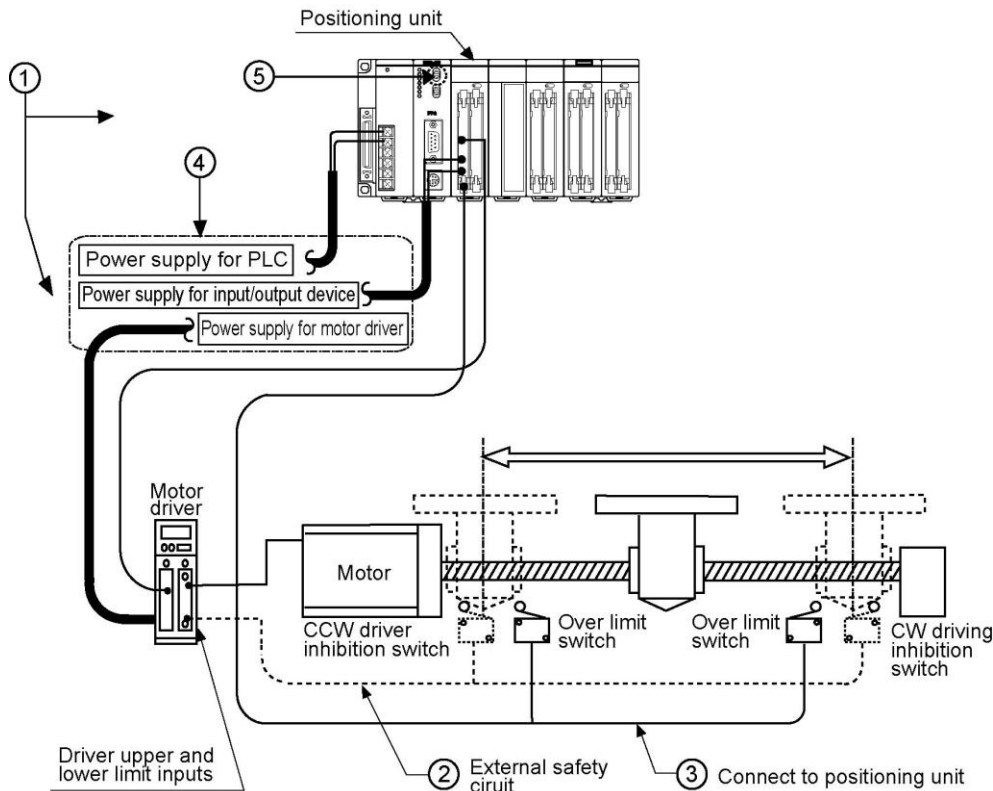
### Safety circuit based on external circuit

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



#### 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 installation of the safety circuit based on the Positioning unit.

Check to make sure the connection of the Positioning unit with Over limit switches.

Check to make sure that Over limit switches have been properly installed.

#### ④ 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 5.3.1, "Procedure for Turning ON the Power".

#### ⑤ Checking the CPU mode selection switch

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



#### Note:

When the power to the PLC is turned ON, internal data in the shared memory will be cleared (set to zero). Check to see whether the start flag for the various operations of the positioning unit are OFF. If they are ON, a set value error will occur for the positioning unit, unless the data settings for the shared memory have been entered.

## 4.3 Procedure for Turning ON the Power

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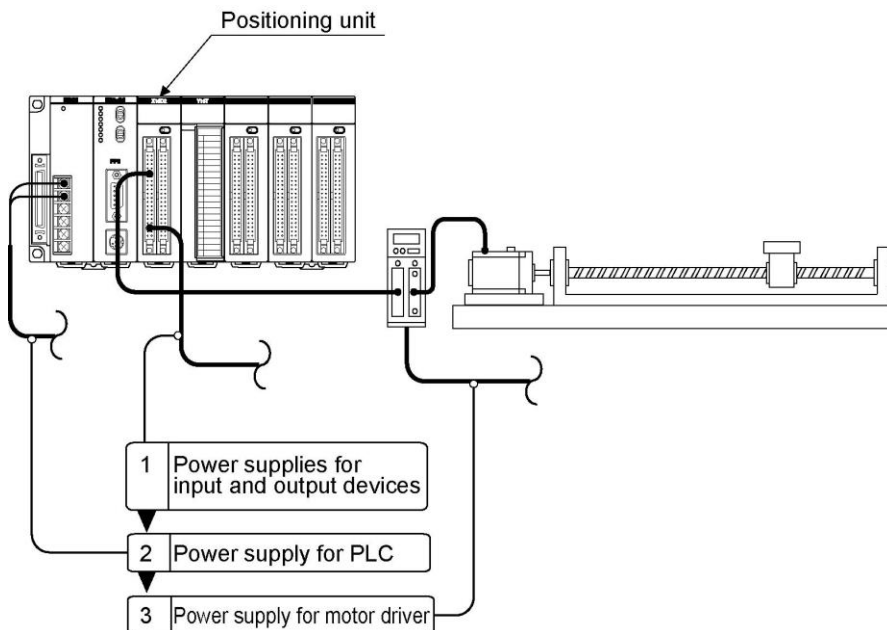
When turning ON the power to the system incorporating the positioning unit, the nature and statuses of any external devices connected to the system should be taken into consideration, and sufficient care should be taken that turning ON the power does not initiate unexpected movements or operations.

### 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 (including the power supply for the line driver output or open collector output).
2. Turn ON the power supply for the PLC.
3. Turn ON the power supply for the motor driver.

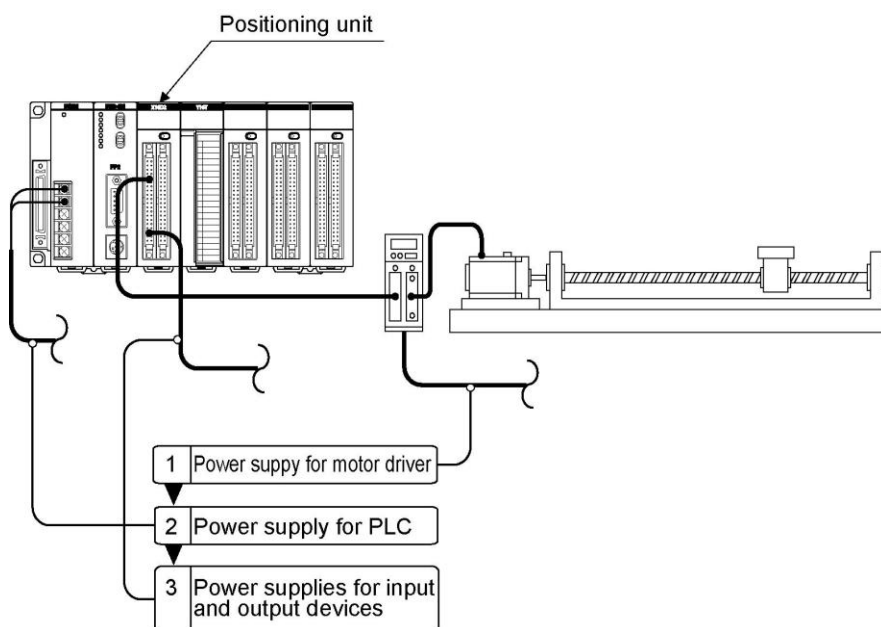


## 4.3.2 Procedure for Turning OFF the Power

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### Procedure:

1. Check to make sure the rotation of the motor has stopped, and then turn OFF the power supply for the motor driver.
2. Turn OFF the power supply for the PLC.
3. Turn OFF the power supplies for input and output devices connected to the PLC (including the power supply for the line driver output or open collector output).



### Precautions when rebooting the system

The flags of the operation memory are initialized simply by initializing the CPU, but the flags of the shared memory for the positioning unit are retained.

If the positioning unit is operated with data still in the shared memory, operation may be carried out based on any set values which have been retained, in some cases. The flags of the shared memory can be cleared when the power supply is turned OFF.



## **Chapter 5**

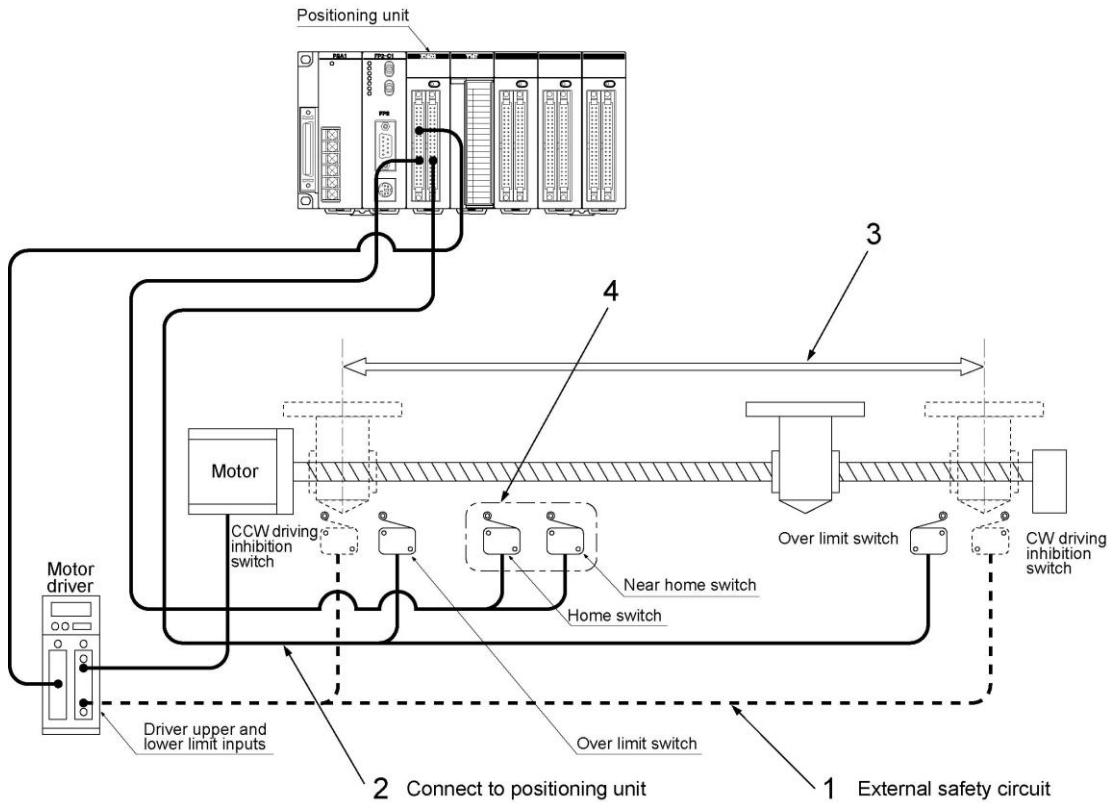
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# **Preparation For Operation**

## 5.1 Confirming while the Power is ON

### Items to check when the power is ON

System configuration example



Checking should be carried out in the four general stages described below.

## 5.2 Pulse Output Mode and Switch Logic Settings

The direction which an elapsed value increases is called CW and the direction which it decreases is called CCW on the positioning unit. Therefore, the limit input in the CW direction is Limit (+) valid, and the input in the CCW direction is Limit (–) valid.

The following settings for the positioning unit are required for the establishment of the system.

- Pulse output mode
- Various input valid logics

### [Parameter setting area]

#### 1st axis

Bank	Offset address	Name	Descriptions			
02H	015H	Pulse output control code	bit	Name	Default	Descriptions
			0	Output mode	0	0: Pulse/Sign 1: CW/CCW
			1	Rotation direction	0	0: Elapsed value (+) direction is CW. 1: Elapsed value (+) direction is CCW.
			2	Home valid logic	0	0: Normal Open 1: Normal Close
			3	Near home valid logic	0	0: Normal Open 1: Normal Close
			4	Limit (+) valid logic	1	0: Normal Open 1: Normal Close
			5	Limit (–) valid logic	1	0: Normal Open 1: Normal Close
			15 to 6	—	0	—

#### 2nd axis

Bank	Offset address	Name	Descriptions
0CH	015H	Pulse output control code	Refer to the 1st axis.

#### 3rd axis

Bank	Offset address	Name	Descriptions
16H	015H	Pulse output control code	Refer to the 1st axis.

#### 4th axis

Bank	Offset address	Name	Descriptions
20H	015H	Pulse output control code	Refer to the 1st axis.



**Reference:** <17.6.2 Parameter Setting Area>

## 5.3 Setting the Pulse Input Mode

The positioning unit supports the pulse input for every axis, and various input devices can be connected. The followings are input targets. It is necessary to specify which input is selected.

Input target	Description
Pulser	<ul style="list-style-type: none"> <li>- Set for using the manual pulser.</li> <li>- Using the pulser operation setting code enables to specify the pulse of an axis (ch) to be used.</li> <li>- The manual pulser is supported for 2-phase input (phase A/phase B) and multiple (x4) only.</li> </ul>
Feedback pulse	<ul style="list-style-type: none"> <li>- Set for connecting an encoder to monitor the rotation of a motor.</li> <li>- The positioning unit performs the feedback pulse count for its axis using the pulse input, and detects the difference between a command value and the feedback value. (Moving amount automatic check function)</li> <li>- The encoder is supported for 2-phase input (phase A/phase B) only.</li> </ul>
High-speed counter	<ul style="list-style-type: none"> <li>- Set for using as a general-purpose counter input. It is available for various input modes (2-phase input, direction discrimination input, individual input).</li> <li>- The positioning unit stores the input pulse in the monitor area.</li> </ul>

### [Parameter setting area]

#### 1st axis

Bank	Offset address	Name	Descriptions																												
02H	007H	Pulse input mode	Sets the pulse input signal. Set according to the application to be used as the pulse input.																												
			<table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>0</td><td>Rotation direction</td><td>0</td><td>Sets the rotation direction of pulse input. 0: Forward 1: Reverse</td></tr><tr><td>1</td><td>—</td><td>0</td><td>—</td></tr><tr><td>3~2</td><td>Pulse input mode</td><td>0</td><td>Sets the input mode of pulse input. Bit3 Bit2 0 0 : 2-phase input 0 1 : Direction discrimination input 1 0 : Individual input 1 1 : The setting is invalid.</td></tr><tr><td>5~4</td><td>Input transfer multiple</td><td>2</td><td>Sets the multiple when setting the pulse input mode to "2-phase input". Bit5 Bit4 0 0 : ×1 0 1 : ×2 1 0 : ×4 1 1 : The setting is invalid.</td></tr><tr><td>7~6</td><td>Pulse input purpose</td><td>0</td><td>Specifies the purpose of pulse input. Bit7 Bit6 0 0 : Pulser 0 1 : Feedback pulse 1 0 : High-speed counter 1 1 : The setting is invalid.</td></tr><tr><td>15~8</td><td>—</td><td>—</td><td>—</td></tr></table>	bit	Name	Default	Descriptions	0	Rotation direction	0	Sets the rotation direction of pulse input. 0: Forward 1: Reverse	1	—	0	—	3~2	Pulse input mode	0	Sets the input mode of pulse input. Bit3 Bit2 0 0 : 2-phase input 0 1 : Direction discrimination input 1 0 : Individual input 1 1 : The setting is invalid.	5~4	Input transfer multiple	2	Sets the multiple when setting the pulse input mode to "2-phase input". Bit5 Bit4 0 0 : ×1 0 1 : ×2 1 0 : ×4 1 1 : The setting is invalid.	7~6	Pulse input purpose	0	Specifies the purpose of pulse input. Bit7 Bit6 0 0 : Pulser 0 1 : Feedback pulse 1 0 : High-speed counter 1 1 : The setting is invalid.	15~8	—	—	—
			bit	Name	Default	Descriptions																									
			0	Rotation direction	0	Sets the rotation direction of pulse input. 0: Forward 1: Reverse																									
			1	—	0	—																									
			3~2	Pulse input mode	0	Sets the input mode of pulse input. Bit3 Bit2 0 0 : 2-phase input 0 1 : Direction discrimination input 1 0 : Individual input 1 1 : The setting is invalid.																									
			5~4	Input transfer multiple	2	Sets the multiple when setting the pulse input mode to "2-phase input". Bit5 Bit4 0 0 : ×1 0 1 : ×2 1 0 : ×4 1 1 : The setting is invalid.																									
			7~6	Pulse input purpose	0	Specifies the purpose of pulse input. Bit7 Bit6 0 0 : Pulser 0 1 : Feedback pulse 1 0 : High-speed counter 1 1 : The setting is invalid.																									
15~8	—	—	—																												

#### 2nd axis

Bank	Offset address	Name	Descriptions
0CH	007H	Pulse output control code	Refer to the 1st axis.

#### 3rd axis

Bank	Offset address	Name	Descriptions
16H	007H	Pulse output control code	Refer to the 1st axis.

#### 4th axis

Bank	Offset address	Name	Descriptions
20H	007H	Pulse output control code	Refer to the 1st axis.



Reference: <17.6.2 Parameter Setting Area>

### 5.3.1 Restrictions on Pulse Input Setting

The positioning unit supports various input mode and input purposes, however, the combinations of the settings are limited.

			Pulse input purpose		
			Pulser	Feedback pulser	High-speed counter
Pulse input mode parameter	Rotation direction	Forward	A	A	A
		Reverse	A	A	A
	Input mode	2-phase input	A	A	A
		Direction discrimination input	N/A	N/A	A
		Individual input	N/A	N/A	A
	Multiple	X 1	N/A	A	A
		X 2	N/A	A	A
		X 4	A	A	Available only when setting the input mode to "2-phase input".
	Pulse input allowed/not allowed	Allowed	A	A	A
		Not allowed	N/A	N/A	A
	Pulse count value set/clear	Clear	N/A	A	N/A
		Set	N/A	A	A

A: Available N/A: Not available

- When setting the pulse input purpose to "Pulser", the settings other than the 2-phase input (direction discrimination input, individual input) cannot be specified for the pulse input mode.
- When setting the pulse input purpose to "Feedback pulse", the settings other than the 2-phase input (direction discrimination input, individual input) cannot be specified for the pulse input mode.
- The pulse input transfer multiple (x4) can be specified only when setting the pulse input mode to "2-phase input". The "Direction discrimination input" and "Individual input" cannot be specified.

## 5.4 Checking the Safety Circuit

### 5.4.1 Checking the External Safety Circuit

Check the safety circuit recommended by the motor manufacturer to confirm the power supply cutoff of the motor driver and other functions by turning ON the CW/CCW driving inhibition switch of an external circuit.

### 5.4.2 Checking the Safety Circuit based on Positioning Unit

#### Procedure 1

Using forced operation of Over limit switch for the external safety circuit of the positioning unit, check to see if the Over limit input is being properly taken into the positioning unit.

Whether or not Over limit input is taken can be confirmed by the input flag. In addition, the Over limit input valid logics can be changed using the control code in the user program.

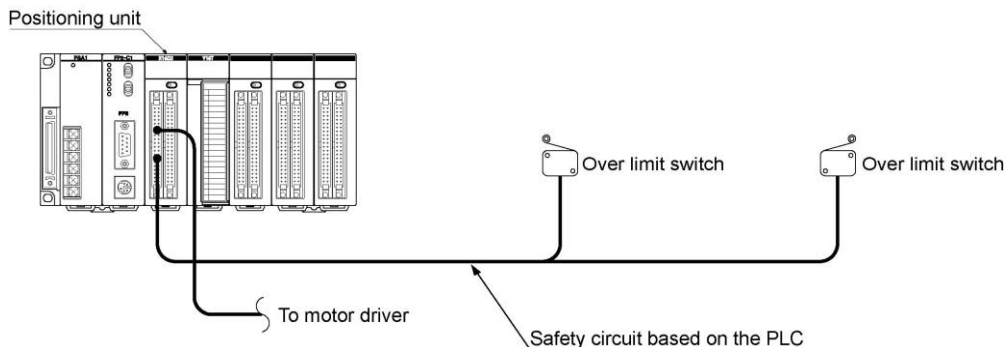
#### Procedure 2

If necessary, input a program to start the JOG operation. Then operate the over Over limit input forcibly to check whether the motor will stop.

It can be also checked by the tool operation of the Configurator PM, without programs.

#### Procedure 3

Using the JOG operation, check to see if the Over limit switch is functioning properly.



## 5.5 Operation Check

### 5.5.1 Checking the Operation of the Near Home Switch and Home Switch

#### Procedure 1

Using forced operation of the home input and near home input, check to make sure the operation display LEDs on the positioning unit light. At the same time, using programming tools, monitor the X\_6 and X\_7 flag (When X\_6 is ON, the home input is properly done. When X\_7 is ON, the near home input is properly done.), and check LEDs light.

#### Procedure 2

Input the home return program, and actually carry out a home return to check if near home input produces deceleration.

#### Points to check

The input valid logic for the home input and near home input is determined by the control codes of the program.

#### Procedure 3

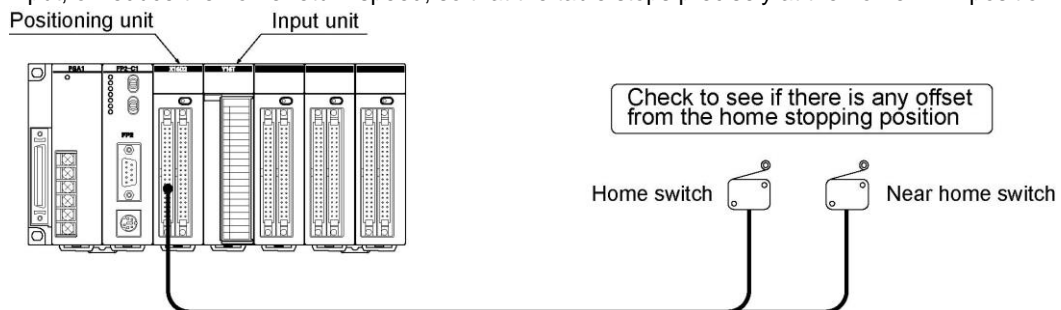
Using repeated JOG operation and home return operation, check to make sure the table stops properly at the home position, with no offset.

#### Points to check

There may be times when near home input, the home input position, and the return speed cause offset from the home position.

#### Procedure 4

If the table does not stop precisely at the home position, either change the position of the near home input, or reduce the home return speed, so that the table stops precisely at the home position.



## 5.5.2 Procedure 5: Checking Rotating and Moving Directions and Moving Distance

### Procedure 1

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 programs.

### Procedure 2

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 program, turn on the forward JOG and reverse contact after turning on the servo on contact.

#### Points to check

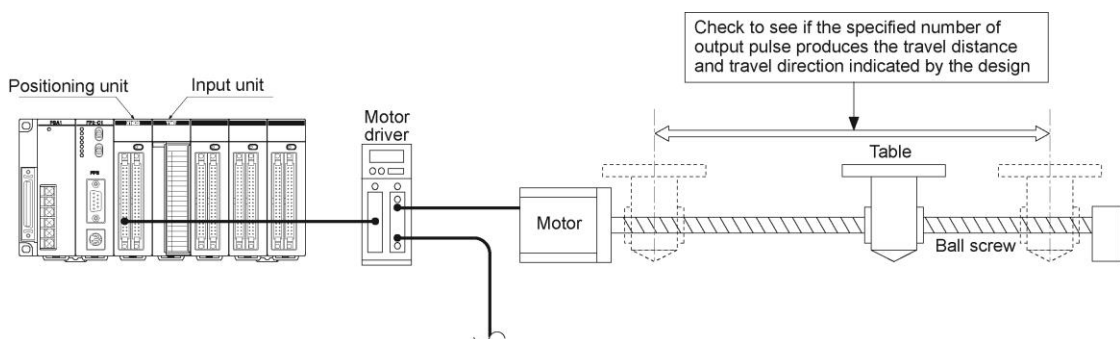
The rotating direction is determined according to the installation of the ball screw or the "CW/CCW direction setting" of the parameter.

### Procedure 3

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, and make the servo on for the corresponding axis to execute the the JOG operation. When using the program, set the position control starting table, and then turn on the positioning start contact after turning on the servo on contact.

#### Points to check

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





## 5.6 Procedure 6: Settings of Parameters and Positioning Data

---

### Procedure 1

Set the parameters and positioning data in accordance with the actual operation.

#### Points to check

The parameters and positioning data is stored in the shared memory of the positioning unit. 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 program to write into the shared memory

### Procedure 2.1

#### 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.

#### Points to check

After the parameters and positioning 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 finally stored in the flash memory will be reflected when the power supply of the PLC turns on.

### Procedure 2.2

#### 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 positioning 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>

## Chapter 6

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### I/O Allocation

## 6.1 Occupied I/O Area

---

The input (X)/output (Y) should be allocated to use the Positioning Unit (Interpolation type) 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 (128SX/128SY)

The I/O numbers vary depending on the installed position of the positioning unit.



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

## 6.2 Allocation of Each Contact

Followings are occupied I/O when FP2 Positioning unit (Interpolation type) is installed in the slot 0.

Contact allocation	Target axis	Name	Descriptions
WX0	X0	All axes	Positioning preparation ready
	X1	-	-
	X2	-	-
	X3	All axes	Write FROM
	X4	All axes	Tool operation
	X5	-	-
	X6	-	-
	X7	All axes	Recalculation done
	X8	-	-
	X9	-	-
	XA	-	-
	XB	-	-
	XC	-	-
	XD	-	-
	XE	-	-
	XF	-	-
WX1	X10	-	-
	X11	-	-
	X12	-	-
	X13	-	-
	X14	-	-
	X15	-	-
	X16	-	-
	X17	-	-
	X18	1 axis	BUSY
	X19	2 axis	
	X1A	3 axis	
	X1B	4 axis	
	X1C	-	-
	X1D	-	-
	X1E	-	-
	X1F	-	-

Contact allocation	Target axis	Name	Descriptions
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.
	X21	2 axis	
	X22	3 axis	
	X23	4 axis	
	X24	-	-
	X25	-	-
	X26	-	-
	X27	-	-
	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.
	X29	2 axis	
	X2A	3 axis	
	X2B	4 axis	
	X2C	-	-
	X2D	-	-
	X2E	-	-
	X2F	-	-
WX3	X30	1 axis	Home The contact to monitor the external home input signal for the corresponding axis.
	X31	2 axis	
	X32	3 axis	
	X33	4 axis	
	X34	-	-
	X35	-	-
	X36	-	-
	X37	-	-
	X38	1 axis	Near home The contact to monitor the external near home input signal for the corresponding axis.
	X39	2 axis	
	X3A	3 axis	
	X3B	4 axis	
	X3C	-	-
	X3D	-	-
	X3E	-	-
	X3F	-	-
WX4	X40	-	-
	X41	-	-
	X42	-	-
	X43	-	-
	X44	-	-
	X45	-	-
	X46	-	-
	X47	-	-
	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.
	X49	2 axis	
	X4A	3 axis	
	X4B	4 axis	
	X4C	-	-
	X4D	-	-
	X4E	-	-
	X4F	-	-

Contact allocation	Target axis	Name	Descriptions
WX5	X50	Limit +	Monitor contact of the limit + and – for the corresponding axis. 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.
	X51	Limit -	
	X52	Limit +	
	X53	Limit -	
	X54	Limit +	The deceleration stop time during the limit input can be changed in the shared memory.
	X55	Limit -	
	X56	Limit +	It will be the contact for the automatic inversion when performing the home return.
	X57	Limit -	
	X58	-	-
	X59	-	-
	X5A	-	-
	X5B	-	-
	X5C	-	-
	X5D	-	-
	X5E	-	-
	X5F	-	-
WX6	X60	1 axis	Error annunciation Turns on when an error occurs on the corresponding axis. The contacts of all axes turn on if an error occurs on all axes. The details of the error can be confirmed in the error annunciation area of the shared memory.
	X61	2 axis	
	X62	3 axis	
	X63	4 axis	
	X64	-	-
	X65	-	-
	X66	-	-
	X67	-	-
	X68	1 axis	Warning annunciation Turns on when a warning occurs on the corresponding axis. The contacts of all axes turn on if a warning occurs on all axes. The details of the warning can be confirmed in the warning annunciation area of the shared memory.
	X69	2 axis	
	X6A	3 axis	
	X6B	4 axis	
	X6C	-	-
	X6D	-	-
	X6E	-	-
	X6F	-	-
WX7	X70	-	-
	X71	-	-
	X72	-	-
	X73	-	-
	X74	-	-
	X75	-	-
	X76	-	-
	X77	-	-
	X78	-	-
	X79	-	-
	X7A	-	-
	X7B	-	-
	X7C	-	-
	X7D	-	-
	X7E	-	-
	X7F	-	-

Contact allocation	Target axis	Name	Descriptions
WY8	Y80	All axes	System stop
	Y81	-	-
	Y82	-	-
	Y83	-	-
	Y84	-	-
	Y85	-	-
	Y86	-	-
	Y87	All axes	Recalculation request
	Y88	-	-
	Y89	-	-
	Y8A	-	-
	Y8B	-	-
	Y8C	-	-
	Y8D	-	-
	Y8E	-	-
	Y8F	-	-
WY9	Y90	1 axis	Positioning start-up
	Y91	2 axis	
	Y92	3 axis	
	Y93	4 axis	
	Y94	-	-
	Y95	-	-
	Y96	-	-
	Y97	-	-
	Y98	1 axis	Home return start-up
	Y99	2 axis	
	Y9A	3 axis	
	Y9B	4 axis	
	Y9C	-	-
	Y9D	-	-
	Y9E	-	-
	Y9F	-	-

Contact allocation	Target axis	Name	Descriptions
WY10	Y100	1 axis	JOG forward
	Y101	1 axis	JOG reverse
	Y102	2 axis	JOG forward
	Y103	2 axis	JOG reverse
	Y104	3 axis	JOG forward
	Y105	3 axis	JOG reverse
	Y106	4 axis	JOG forward
	Y107	4 axis	JOG reverse
	Y108	-	-
	Y109	-	-
	Y10A	-	-
	Y10B	-	-
	Y10C	-	-
	Y10D	-	-
	Y10E	-	-
	Y10F	-	-
WY11	Y110	1 axis	Emergency stop
	Y111	2 axis	Emergency stop
	Y112	3 axis	Emergency stop
	Y113	4 axis	Emergency stop
	Y114	-	-
	Y115	-	-
	Y116	-	-
	Y117	-	-
	Y118	1 axis	Deceleration stop
	Y119	2 axis	Deceleration stop
	Y11A	3 axis	Deceleration stop
	Y11B	4 axis	Deceleration stop
	Y11C	-	-
	Y11D	-	-
	Y11E	-	-
	Y11F	-	-
WY12	Y120	1 axis	Pulser operation enabled
	Y121	2 axis	Pulser operation enabled
	Y122	3 axis	Pulser operation enabled
	Y123	4 axis	Pulser operation enabled
	Y124	-	-
	Y125	-	-
	Y126	-	-
	Y127	-	-
	Y128	1 axis	J point speed change
	Y129	2 axis	J point speed change
	Y12A	3 axis	J point speed change
	Y12B	4 axis	J point speed change
	Y12C	-	-
	Y12D	-	-
	Y12E	-	-
	Y12F	-	-

Contact allocation	Target axis	Name	Descriptions
WY13	Y130	-	-
	Y131	-	-
	Y132	-	-
	Y133	-	-
	Y134	-	-
	Y135	-	-
	Y136	-	-
	Y137	-	-
	Y138	1 axis	J point positioning start Requests to start the next positioning operation during the JOG positioning operation. (The operation is the edge type.)
	Y139	2 axis	
	Y13A	3 axis	
	Y13B	4 axis	
	Y13C	-	-
	Y13D	-	-
	Y13E	-	-
	Y13F	-	-
WY14	Y140	1 axis	Request error clear Requests the error clear for the corresponding axis. The processing to recover from errors is performed and the error logs are cleared by turning on this signal.  Note) Unrecoverable errors cannot be recovered even if this signal turned on.
	Y141	2 axis	
	Y142	3 axis	
	Y143	4 axis	
	Y144	-	-
	Y145	-	-
	Y146	-	-
	Y147	-	-
	Y148	1 axis	Request warning clear Requests the warning clear for the corresponding axis. The warning logs are cleared by turning on this signal.
	Y149	2 axis	
	Y14A	3 axis	
	Y14B	4 axis	
	Y14C	-	-
	Y14D	-	-
	Y14E	-	-
	Y14F	-	-
WY15	Y150	-	-
	Y151	-	-
	Y152	-	-
	Y153	-	-
	Y154	-	-
	Y155	-	-
	Y156	-	-
	Y157	-	-
	Y158	-	-
	Y159	-	-
	Y15A	-	-
	Y15B	-	-
	Y15C	-	-
	Y15D	-	-
	Y15E	-	-
	Y15F	-	-

## Chapter 7

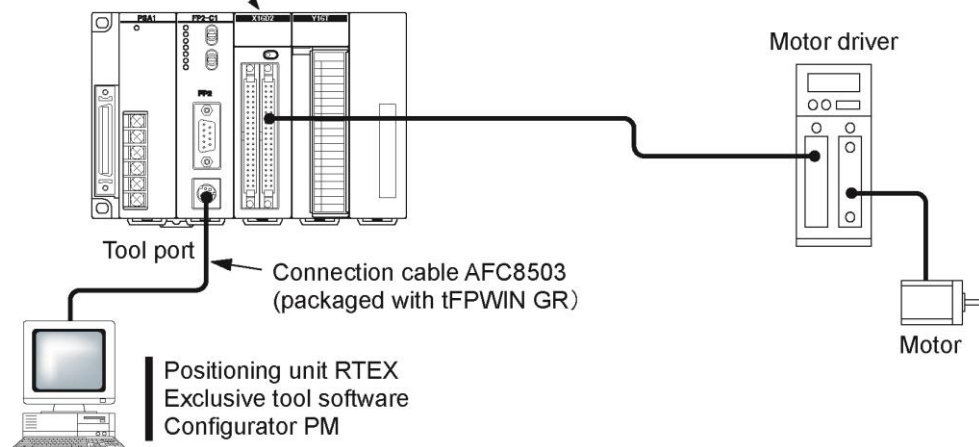
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### Setting Tool Configurator PM

## 7.1 Connection With Computer

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Positioning unit (Interpolation type)



Install the Configurator PM on a computer 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

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### 7.2.1 Overview

---

The Configurator PM is the Windows®-compliant setting software.

Using the Configurator PM enables to make the settings for the FP2 positioning unit (Interpolation type) and FP2/FPΣ positioning unit RTEΣ.

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 (Interpolation type).

Also, reads the parameters or positioning data within the positioning unit (Interpolation type).

#### **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.

#### **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.

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 the positioning 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.

#### **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

<b>Applicable OS</b>	Windows® 7 Windows® 8 Windows® 8.1 Windows® 10 (32-bit version/64-bit version)
<b>Required HDD capacity</b>	30MB or more

### Application specifications

<b>No. of characters of data comment</b>	100 bytes/table
<b>No. of histories of search/replace strings</b>	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.

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.

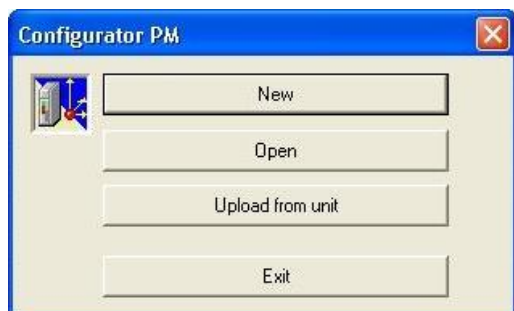
#### **3. Please execute the "Setup.exe" in set -up CD.**

Please install according to the instruction.

## 7.4 Startting Configurator PM

---

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



<b>[New]</b>	Create a new setting data for the positioning unit.
<b>[Open]</b>	Read the existing setting data.
<b>[Upload from Unit]</b>	Read the setting data of the positioning unit.
<b>[Exit]</b>	End this software.

## 7.5 Treating Files

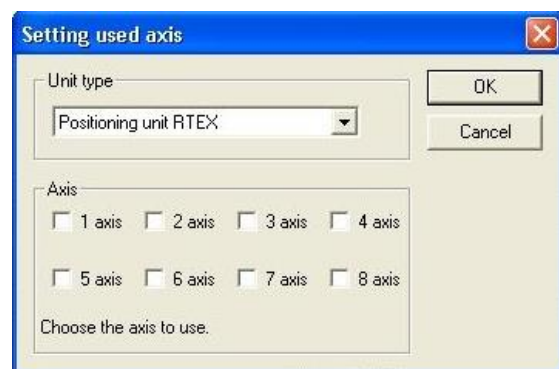
---

### 7.5.1 New

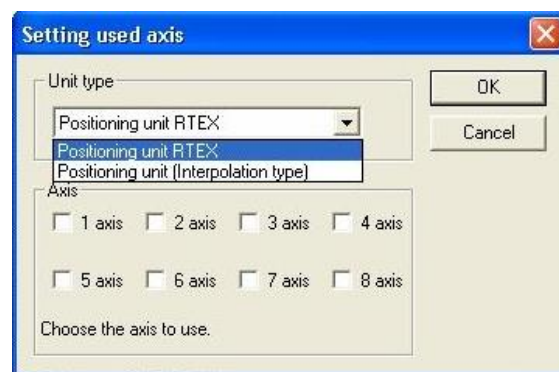
---

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.



2. Select a unit type to be used.



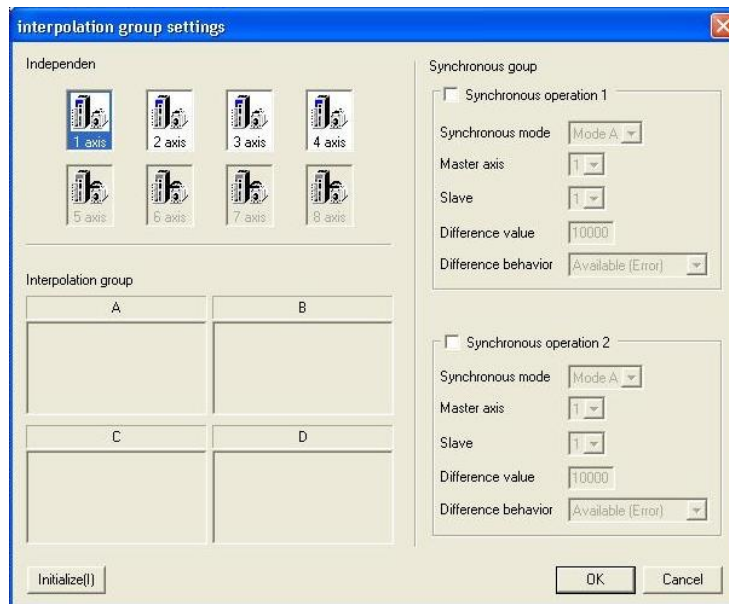
3. Check the axes to use, and click **[OK]**.



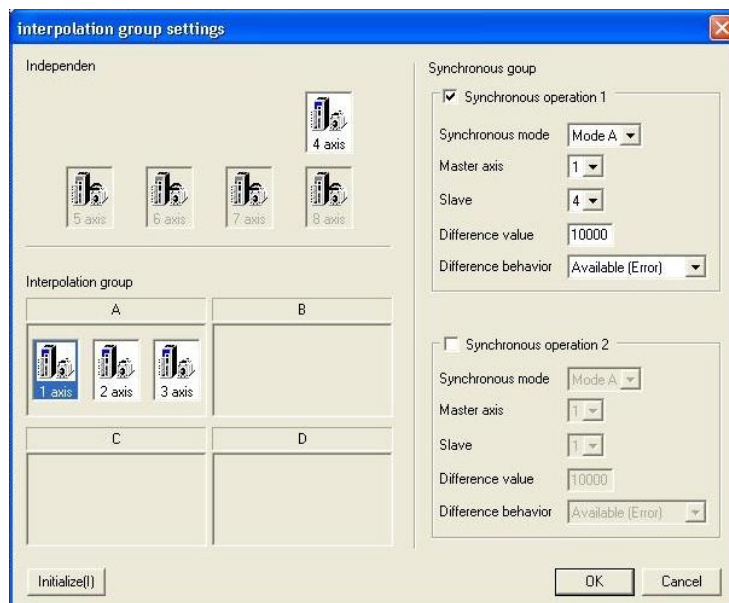
4. The [Interpolation group settings] dialog is shown. Set the grouping that the interpolation operation is executed for the selected axes in the above setting.

<b>Independent</b>	The area of the axes to be used as independent axes without performing the interpolation operation.
<b>Interpolation group</b>	The area of the groupings of the axes to perform the interpolation operation. Up to 4 groups can be specified.
<b>Synchronous group</b>	The area to be used for setting the synchronous operation.
<b>Synchronous operation 1</b>	It is used to set the synchronous operation group 1. Check the box to perform the synchronous operation.
<b>Synchronous operation 2</b>	It is used to set the synchronous operation group 2. Check the box to perform the synchronous operation.
<b>Synchronous mode</b>	It is used to set the synchronous operation mode. Select either Mode A or B.
<b>Master axis</b>	It is used to set the master axis for performing the synchronous operation.
<b>Slave axis</b>	It is used to set the slave axis for performing the synchronous operation. The slave axis can be specified for an independent axis only.
<b>Difference value</b>	It is used to set the maximum value of the difference between the master axis and the slave axis during the synchronous operation.
<b>Difference behavior</b>	It is used to set the operation to be performed when the difference between the master axis and slave axis exceeded the difference value.
<b>Initialize</b>	It is used to initialize the setting for the interpolation group and the synchronous operation.
<b>OK</b>	Determine the allocation of the interpolation groups.
<b>Cancel</b>	Back to the previous setting for the axes to use.

5. 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.



6. To perform the synchronous operation, check the synchronous operation and specify each setting.



Clicking [OK] determines the interpolation group.

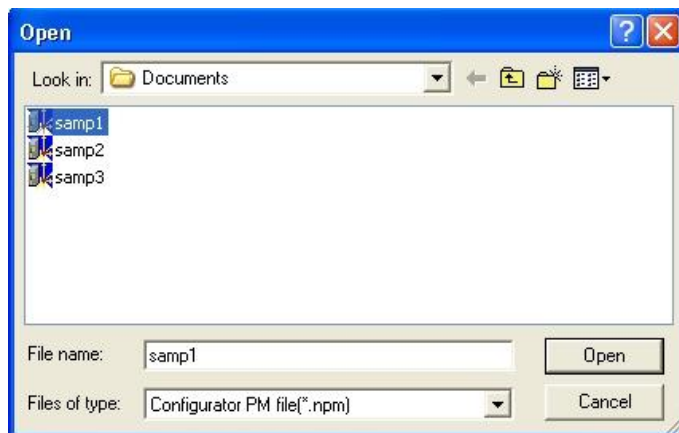
7. The data setting screen is shown, which enables the setting.

## 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



### Note:

Both files for the positioning unit (Interpolation type) and the positioning unit RTEK are read, however, it is necessary to change the unit type to read the files for the positioning unit RTEK.



**Reference:** <7.9 Changing Axis Information>

## 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.

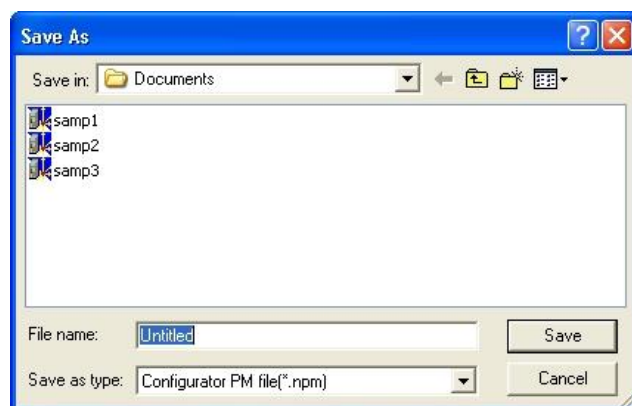
Select [File] => [Save] in the menu bar, or click the [Save] icon in the toolbar.

#### 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.

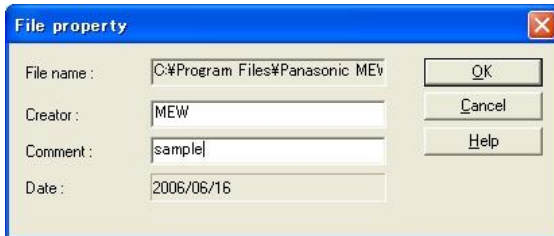
### 3. Click [Save].

## 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

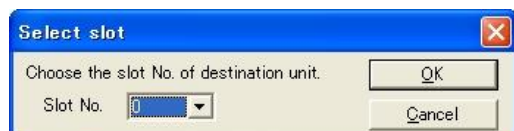
---

### 7.7.1 Selecting Slot Number

---

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

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



The positioning unit 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.

## 7.7.2 Communication Settings

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

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

Communication Setting

Network type: C-NET(RS232C) OK

COM port: COM1 Cancel

Baud rate: 115200 bps Initialize

Data length  
☐ 7 bits ☒ 8 bits

Stop bit  
☒ 1 bit ☐ 2 bits

Parity  
☐ Non ☒ Odd ☐ Even ☐ 0

Time-out: 5 sec

Parameter for automatic setting  
☒ Baud rate  
☒ Data Length  
☒ Parity

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.

## 7.8 Parameter Settings

Set the initial operation for the positioning unit.

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.

Unit setting	1 axis [A]	2 axis [A]	3 axis [A]	4 axis
Pulse number per rotation	1	1	1	1
Movement amount per rotation	1	1	1	1
Pulse output mode	0:Pulse/Sign	0:Pulse/Sign	0:Pulse/Sign	0:Pulse/Sign
Pulse output rotation direction	0:CW direction +	0:CW direction +	0:CW direction +	0:CW direction +
Limit switch	N:Not available	N:Not available	N:Not available	N:Not available
Limit (+) valid logic	1:Normal Close	1:Normal Close	1:Normal Close	1:Normal Close
Limit (-) valid logic	1:Normal Close	1:Normal Close	1:Normal Close	1:Normal Close
Home valid logic	0:Normal Open	0:Normal Open	0:Normal Open	0:Normal Open
Near home valid logic	0:Normal Open	0:Normal Open	0:Normal Open	0:Normal Open
Pulse input purpose	0:Pulse input	0:Pulse input	0:Pulse input	0:Pulse input
Pulse input rotation direction	0:Forward	0:Forward	0:Forward	0:Forward
Pulse input mode	0:2-phase input	0:2-phase input	0:2-phase input	0:2-phase input
Pulse input transfer multiple	2x4	2x4	2x4	2x4
Software limit (Positioning control)	N:Not available	N:Not available	N:Not available	N:Not available
Software limit (Home return)	N:Not available	N:Not available	N:Not available	N:Not available

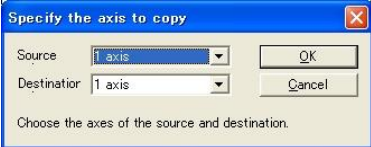
Specify the unit of each axis.  
Choose from the followings.  
P:pulse, M:um [Min 0.1], I:inch [Min 0.00001], L:inch [Min 0.0001], D:degree [Min 0.1], O:degree [Min 1]

OK Cancel Copy axis Initialize Help

### 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. (It should be cancelled down with the movement amount per rotation.)
Movement amount per rotation	The movement amount per rotation. (It should be cancelled down with the pulse number per rotation.)
Pulse output mode	The output method for the pulse - Pulse/Sign method - CW/CCW method
Pulse output rotation direction	The rotation direction for the pulse output CW+: + direction is CW. CCW+: + direction is CCW.
Limit switch	Enable/disable the limit switch.
Limit (+) valid logic	The logic of the limit switch in "+" direction
Limit (-) valid logic	The logic of the limit switch in "-" direction
Home valid logic	The logic of the home switch
Near home valid logic	The logic of the near home switch
Pulse input purpose	The purpose of the pulse input
Pulse input rotation direction	The rotation (CW/CCW) direction for the pulse input
Pulse input mode	The input method for the pulse input
Pulse input transfer multiple	The input transfer multiple for the pulse input

Parameter name	Description
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.
Moving amount check	The operation after checking the moving amount when using the moving amount check function.
Moving amount check value (Pulse)	The checking threshold for the moving amount check function.
Moving amount check correction numerator	Execute the moving amount check function by multiplying the pulse input value by the following ratio. (Moving amount check correction numerator) / (Moving amount check correction denominator)
Moving amount check correction denominator	
Moving amount check time (ms)	The time interval for executing the moving amount check function.
Startup speed	The startup speed for all operations (Initial speed)
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.
Home return – Coordinate origin	The current value after the completion of the home return.
JOG operation – Acceleration/Deceleration pattern settings	The acceleration/deceleration pattern mode 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
J point control – Accel./Decel. Pattern	The acceleration/deceleration pattern mode when performing the J point control (speed point)
J point control – Acceleration time (ms)	The acceleration time when performing the J point control (speed point)
J point control – Deceleration time (ms)	The deceleration time when performing the J point control (speed point)
J point control – Target speed	The target speed when performing the J point control. (speed point)
Pulser operation setting code	The pulser input (1 to 3) in the pulser operation.
Pulse input method	The input method 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. (Numerator of ratio of pulser operation)/(Denominator of ratio of pulser operation)
Pulser operation ratio denominator	
Pulse operation maximum speed	The maximum operation speed in the pulser operation

<b>OK</b>	Update the parameter settings with the specified contents.
<b>Cancel</b>	Close this dialog without updating the parameter settings.
<b>Copy axis</b>	<p>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].</p>  <p>The dialog box titled 'Specify the axis to copy' has a blue title bar with a close button. It contains two dropdown menus: 'Source' and 'Destination', both set to '1 axis'. There are 'OK' and 'Cancel' buttons on the right. Below the dropdowns, it says 'Choose the axes of the source and destination.'</p>
<b>Initialize</b>	Initialize the parameter settings.
<b>Help</b>	Indicate the help for this function.

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

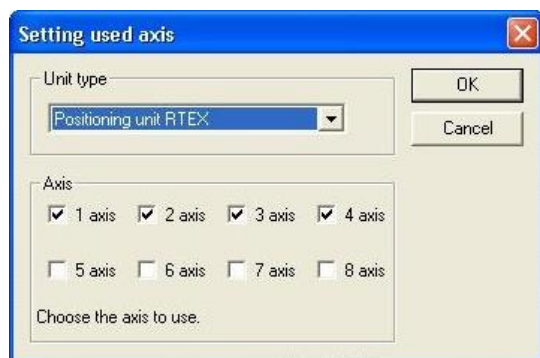
Click [OK] to determine the edited settings.

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.



- |                       |   |
|-----------------------|---|
| <b>Unit type</b>      | Select either one of the following unit type according to the model to be used. |
|                       | - Positioning unit RTE  |
|                       | - Positioning unit (Interpolation type)   |
| <b>Axis selection</b> | Select the axis to be used.   |

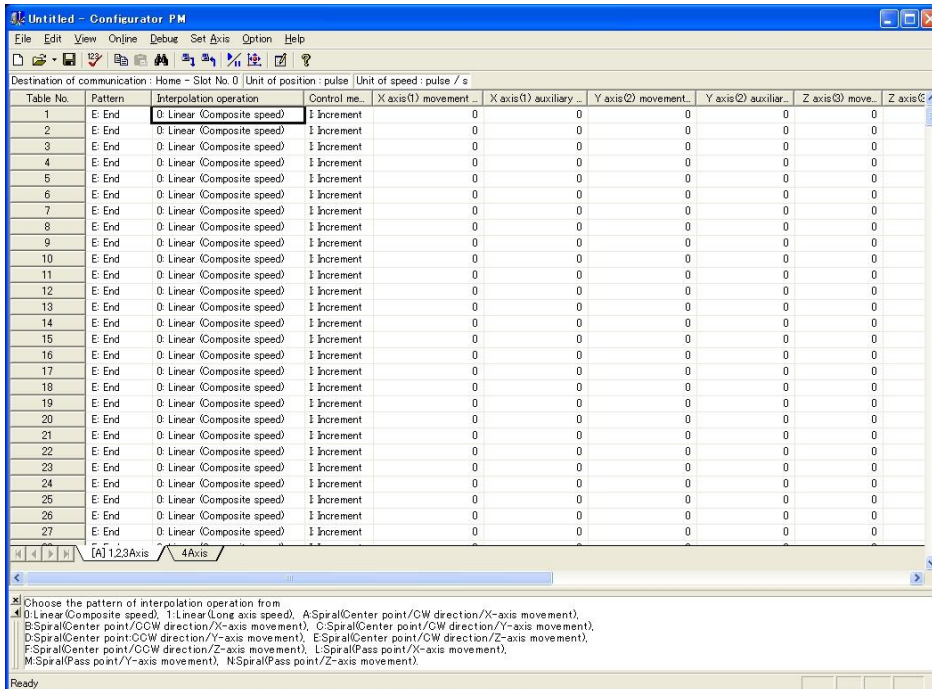
The editing dialog for the interpolation axis group is shown by clicking [OK] after selecting the used axes.

## 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. <ul style="list-style-type: none"> <li>• End point control: Execute the trapezoidal control of only one table.</li> <li>• Continuance point control : Execute the trapezoidal control continuously. Specify the end point at the end of the continuance point control.</li> <li>• Pass point control: Execute the continuous speed change control. Specify the end point at the end of the pass point control.</li> <li>• J point: Execute the speed control. Specify the end point at the end of the J point control.</li> </ul>
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. The details of the auxiliary points differ depending on the type of circular interpolation. <ul style="list-style-type: none"> <li>• Circular interpolation (Center point): The auxiliary point is used as the X axis of the center point.</li> <li>• Circular interpolation (Pass point): The auxiliary point is used as the X axis of the pass point.</li> </ul>

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. The details of the auxiliary points differ depending on the type of circular interpolation. <ul style="list-style-type: none"> <li>• Circular interpolation (Center point): The auxiliary point is used as the Y axis of the center point.</li> <li>• Circular interpolation (Pass point): The auxiliary point is used as the Y axis of the pass point.</li> </ul>
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. 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. The comments are saved in the positioning setting file (*.npm) of the PC only. They are not saved in the positioning unit.

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	O: Line...	I: Inc...	0
6	E: End	O: Line...	I: Inc...	0
7	E: End	O: Line...	I: Inc...	0
8	E: End	O: Line...	I: Inc...	
9	E: End	O: Line...	I: Inc...	0
10	E: End	O: Line...	I: Inc...	0
11	E: End	O: Line...	I: Inc...	0
12	E: End	O: 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	O: Line...	I: Inc...	
3	E: End	O: Line...	I: Inc...	
4	E: End	O: Line...	I: Inc...	
5	C: Continuation	O: Line...	I: Inc...	
6	E: End	O: Line...	I: Inc...	
7	P: Pass	O: Line...	I: Inc...	
8	E: End	O: Line...	I: Inc...	
9	E: End	O: 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 Positioning 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.



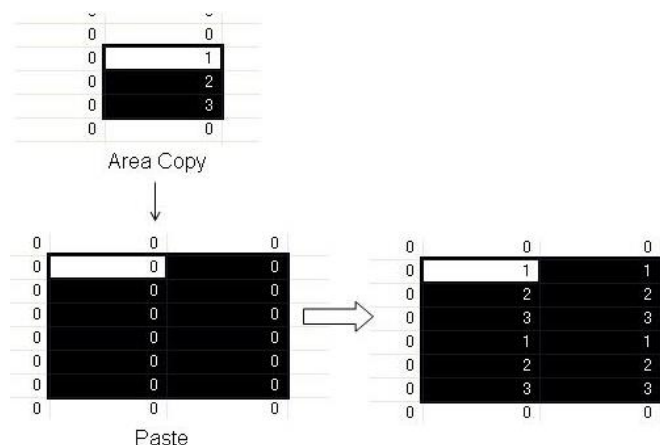
### Note:

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.



## 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 dialog 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 Columns

---

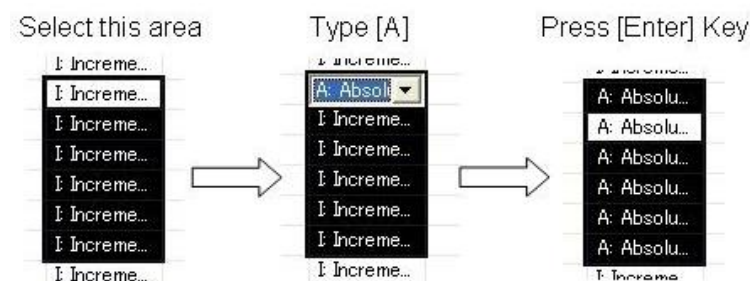
It is convenient for editing data collectively before the operations such as copy and paste, or for data item each.

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.

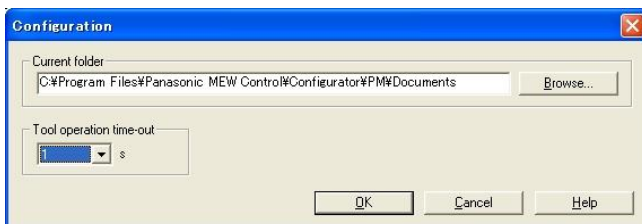
Select [View] → [Guidance Bar], and check or uncheck in the menu.

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.

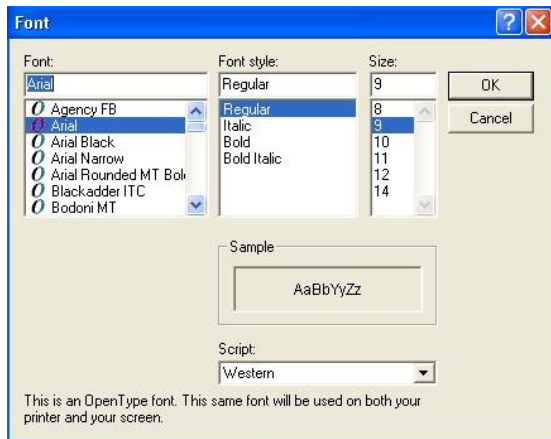
The current folder in the setting data file can be changed.



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.

## - Setting Font

Select [Option] → [Font] in the menu bar. The following dialog is shown.



## 7.13 Checking Settings

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### 7.13.1 Checking Parameters and Data Values

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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

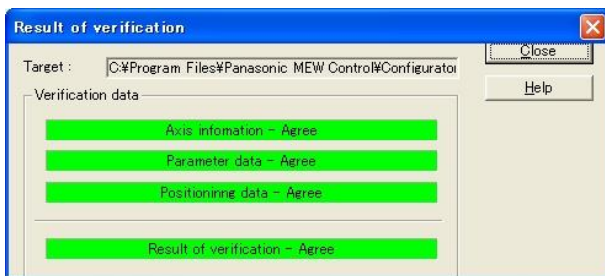
Verify the file currently being edited, and the files on the disk or the information in the unit. The following procedure is for the verification with the files on the disk.

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

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### 7.14.1 Uploading Setting Data from Positioning Unit

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Read the parameters and positioning data of the positioning unit.

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 by the communication settings and selecting the slot number.

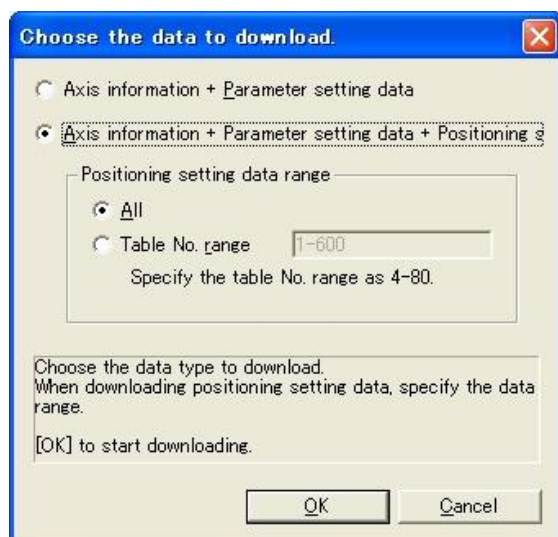
The data comments are not stored in the positioning unit. They are managed in the setting files of the PC.

## 7.14.2 Downloading Setting Data to Positioning Unit

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

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.



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

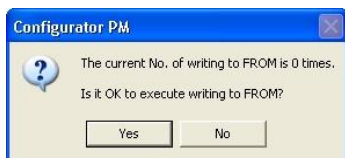
2. Click [OK] to start the download to the positioning unit. The time required for the download depends on the range of the positioning setting data.



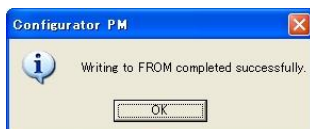
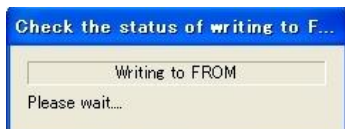
### Note:

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

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. 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.



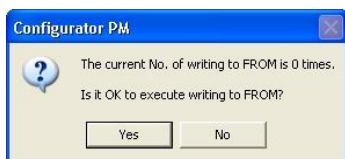
**Note:**

Writing to FROM is restricted up to 10000 times. The current number of write can be checked with the data monitor.

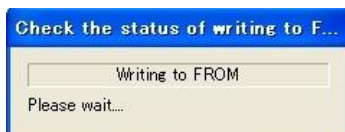
### 7.14.3 Writing Settings to FROM

Save the setting data written in the positioning unit in the FROM (Flash Memory) within the positioning unit. 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 checked with the data monitor.

## 7.15 Data Monitor

The internal data of the positioning unit 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.**

Axis[Group]	1 axis [A]	2 axis [A]	3 axis [A]	4 axis
Synchronous group	1/ Master	-----	-----	1/ Slave
Synchronous mode	Mode A	-----	-----	Mode A
Synchronous condition	Synchronous	-----	-----	Synchronous
Active table No.	0	0	0	0
Auxiliary output code	0	0	0	0
Current value	0	0	0	0
Current value after unit conversion	0 pulse	0 pulse	0 pulse	0 pulse
Puls input value	0	0	0	0
deviation	0	0	0	0
State of axis	Inactive	Inactive	Inactive	Inactive
Error code	-----	-----	-----	-----
Error Clear	Error Clear	Error Clear	Error Clear	Error Clear
Warning code	-----	-----	-----	-----
Warning Clear	Warning Clear	Warning Clear	Warning Clear	Warning Clear

<b>Axis [Group]</b>	The axis No. and group names to be monitored.
<b>Synchronous group</b>	Synchronous group name and master/slave axis type
<b>Synchronous mode</b>	The operation mode of synchronous operation
<b>Synchronous condition</b>	Synchronous/Asynchronous condition
<b>Active table number</b>	The table number that the positioning data is being executed or has completed.
<b>Auxiliary output code</b>	Auxiliary output code
<b>Current value(pulse)</b>	The current value of the positioning unit
<b>Current value after unit conversion</b>	The current value of the positioning unit after the unit conversion
<b>Pulse input value</b>	Monitor the pulse value to be input.
<b>Deviation</b>	Monitor the deviation value when activating the automatic difference behavior function.
<b>State of axis</b>	The operating states of axes or error and warning occurrences.
<b>Error code</b>	The latest error code when an error occurred.
<b>Error clear</b>	Clear the error by clicking this button, when an error occurred.
<b>Warning code</b>	Indicate the latest warning code when a warning occurs.
<b>Warning clear</b>	Clear the warning by clicking this button, when a warning occurred.
<b>Help</b>	Indicate the help regarding this function.
<b>Close</b>	Close this dialog.



### Note:

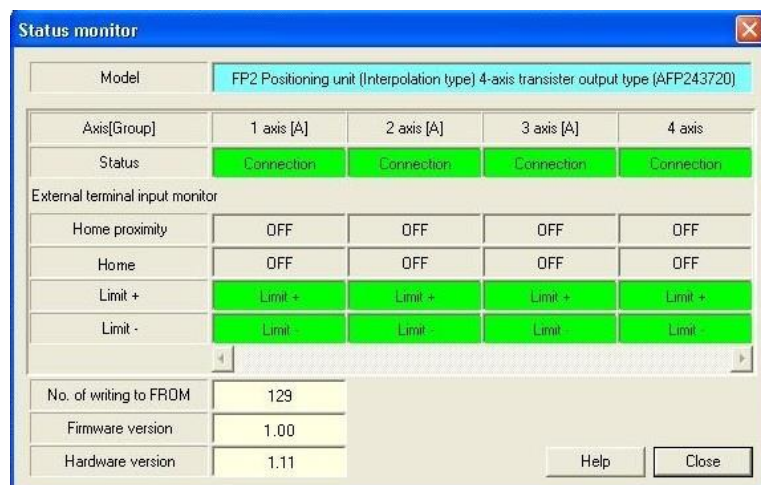
If a recoverable error occurred in the positioning unit, click [Error Clear] to clear the error.

If a warning occurred in the positioning unit, 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.**



<b>Model</b>	The model name of positioning unit
<b>Axis [Group]</b>	The axis number and group names to be monitored.
<b>Status</b>	The operating states of axes
<b>Home proximity</b>	The ON/OFF state of the near home switch
<b>Home</b>	The ON/OFF state of the home switch
<b>Limit +</b>	The ON/OFF state of the limit + switch
<b>Limit -</b>	The ON/OFF state of the limit - switch
<b>Number of writing to FROM</b>	The number of writing the setting data to FROM in the positioning unit.
<b>Firmware version</b>	The version of the software (firmware) for the positioning unit
<b>Hardware version</b>	The version of the hardware for the positioning unit
<b>Help</b>	Indicate the help regarding this function.
<b>Close</b>	Close this dialog.

## 7.17 Tool Operation

---

As the positioning unit 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.

### 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.

### 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 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 – Home Return

After the power supply of the positioning unit 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. Therefore, coordinate the home of the machine position with the home of the positioning unit. This setting is called Home return.

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

<b>Axis [Group]</b>	The axis numbers and group names to be monitored.
<b>Synchronous group</b>	The group name and the master/slave axis type for the synchronous operation.
<b>Synchronous mode</b>	The operation mode for the synchronous operation.
<b>Synchronous condition</b>	Indicate the synchronous/asynchronous condition in the synchronous operation. For the synchronous operation in the operation mode A, clicking [Synchronous change] changes the condition.
<b>Current value</b>	Indicate the feedback value for every axis after unit conversion. Clicking [Coordinate origin] displays the dialog for inputting the value, and it enables to change the value after the home return.
<b>Unit</b>	The unit of position for each axis specified in the parameter settings.
<b>Deviation (Pulse)</b>	Indicate the deviation when activating the moving amount automatic check function.
<b>Home return mode</b>	Indicate the contents of the home return setting code registered in the positioning setting data.
<b>Start/Stop</b>	Execute the operation to start/stop the home return. <ul style="list-style-type: none"> <li>Click [Start] to execute the home return operation. The button name changes to [Stop].</li> <li>Click [Stop] to execute the deceleration stop operation. The button name changes to [Start].</li> </ul>
<b>State of axis</b>	The operating states of axes or error and warning occurrences.
<b>Error code</b>	The latest error code when an error occurred.
<b>Error clear</b>	Clear the error by clicking this button, when an error occurred.
<b>Warning code</b>	Indicate the latest warning code when a warning occurs.
<b>Warning clear</b>	Clear the warning by clicking this button, when a warning occurred.
<b>Speed rate</b>	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..



### Note:

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

If a warning occurred in the positioning unit, click [Warning Clear] to clear the warning.

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

3. Click [Close] to close the dialog.



**Note:**

This dialog cannot be closed during the home return operation.

## 7.17.2 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. 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	1 axis [A]	2 axis [A]	3 axis [A]	4 axis
Synchronous group	1/ Master	-----	-----	1/ Slave
Synchronous mode	Mode A	-----	-----	Mode A
Synchronous condition	Synchronous	-----	-----	Synchronous
	Change synchronous	Change synchronous	Change synchronous	Change synchronous
Current value	0	0	0	0
	Current value update	Current value update	Current value update	Current value update
Unit	pulse	pulse	pulse	pulse
Deviation (pulse)	0	0	0	0
Active table No.	-----	-----	-----	-----
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

<b>Axis [Group]</b>	The axis numbers and group names to be monitored.
<b>Synchronous group</b>	The group name and the master/slave axis type for the synchronous operation.
<b>Synchronous mode</b>	The operation mode for the synchronous operation.
<b>Synchronous condition</b>	Monitor the synchronous/asynchronous condition in the synchronous operation. For the synchronous operation in the operation mode A, clicking [Synchronous change] changes the condition.
<b>Current value</b>	Monitor the feedback value for every axis after unit conversion. Clicking [Current value update] displays the dialog for inputting the value, and it enables to change the current value.
<b>Unit</b>	Indicate the unit of positions for the axes specified in the parameter settings each from the positioning unit.
<b>Deviation (Pulse)</b>	Indicate the deviation when activating the moving amount automatic check function.
<b>Active table number</b>	Indicate the table number during the operation or when it completes.
<b>Starting table number</b>	The starting table number for the positioning control. Click [Change] to change the starting table number.
<b>Operate/Stop</b>	Execute the operation to start/stop the home return. <ul style="list-style-type: none"> <li>Click [Operate] to execute the positioning operation. The button name changes to [Stop].</li> <li>Click [Stop] to execute the deceleration stop operation. The button name changes to [Operate].</li> </ul>
<b>State of axis</b>	The operating states of axes or error and warning occurrences.
<b>Error code</b>	The latest error code when an error occurred.
<b>Error clear</b>	Clear the error by clicking this button, when an error occurred.
<b>Warning code</b>	Indicate the latest warning code when a warning occurs.
<b>Warning clear</b>	Clear the warning by clicking this button, when a warning occurred.
<b>Speed rate</b>	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.



**Note:**

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

If a warning occurred in the positioning unit, 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 operation.**



**Note:**

- In the positioning unit, 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 [Close] to close the dialog.**



**Note:**

This dialog cannot be closed during the positioning operation.

### 7.17.3 Tool Operation – JOG Operation

Each axis can be operated manually using the tool operation.

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

Tool operation - JOG operation

Tool operation				
Axis[Group]	1 axis [A]	2 axis [A]	3 axis [A]	4 axis
Synchronous group	1/ Master	-----	-----	1/ Slave
Synchronous mode	Mode A	-----	-----	Mode A
Synchronous condition	Synchronous	-----	-----	Synchronous
	<input type="button" value="Change synchronous"/>	<input type="button" value="Change synchronous"/>	<input type="button" value="Change synchronous"/>	<input type="button" value="Change synchronous"/>
Current value	0	0	0	0
	<input type="button" value="Current value update"/>	<input type="button" value="Current value update"/>	<input type="button" value="Current value update"/>	<input type="button" value="Current value update"/>
Unit	pulse	pulse	pulse	pulse
Deviation (pulse)	0	0	0	0
Jog target speed	1000	1000	1000	1000
	<input type="button" value="Change"/>	<input type="button" value="Change"/>	<input type="button" value="Change"/>	<input type="button" value="Change"/>
JOG	<input type="button" value="+"/> <input type="button" value="-"/>	<input type="button" value="+"/> <input type="button" value="-"/>	<input type="button" value="+"/> <input type="button" value="-"/>	<input type="button" value="+"/> <input type="button" value="-"/>
State of axis	Inactive	Inactive	Inactive	Inactive
Error code	-----	-----	-----	-----
	<input type="button" value="Error clear"/>	<input type="button" value="Error clear"/>	<input type="button" value="Error clear"/>	<input type="button" value="Error clear"/>
Warning code	-----	-----	-----	-----
	<input type="button" value="Warning clear"/>	<input type="button" value="Warning clear"/>	<input type="button" value="Warning clear"/>	<input type="button" value="Warning clear"/>
Speed rate	100 %			
				<input type="button" value="Help"/> <input type="button" value="Exit"/>

<b>Axis [Group]</b>	The axis numbers and group names to be monitored.
<b>Synchronous group</b>	The group name and the master/slave axis type for the synchronous operation.
<b>Synchronous mode</b>	The operation mode for the synchronous operation.
<b>Synchronous condition</b>	Monitor the synchronous/asynchronous condition in the synchronous operation. For the synchronous operation in the operation mode A, clicking [Synchronous change] changes the condition.
<b>Current value</b>	Monitor the feedback value for every axis after unit conversion. Clicking [Current value update] displays the dialog for inputting the value, and it enables to change the current value.
<b>Unit</b>	Monitor the unit of positions for the axes specified in the parameter settings each from the positioning unit.
<b>Deviation (Pulse)</b>	Monitor the deviation when activating the moving amount automatic check function.
<b>JOG target speed</b>	Monitor and display the target speed in the JOG operation. Click [Change] to change the target speed for the JOG operation.
<b>JOG [+]</b>	Click [+] to perform the forward rotation.
<b>JOG [-]</b>	Click [-] to perform the reverse rotation.
<b>State of axis]</b>	The operating states of axes or error and warning occurrences.
<b>Error code</b>	The latest error code when an error occurred.
<b>Error clear</b>	Clear the error by clicking this button, when an error occurred.
<b>Warning code</b>	Indicate the latest warning code when a warning occurs.
<b>Warning clear</b>	Clear the warning by clicking this button, when a warning occurred.
<b>Speed rate</b>	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.



**Note:**

If a recoverable error occurred in the positioning unit, click [Error Clear] to clear the error.  
If a warning occurred in the positioning unit, 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 [Close] to close the dialog.**



**Note:**

This dialog cannot be closed during the JOG operation.

## 7.17.4 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 - Teaching

Tool operation				
Axis[Group]	1 axis [A]	2 axis [A]	3 axis [A]	4 axis
Synchronous group	1/ Master	-----	-----	1/ Slave
Synchronous mode	Mode A	-----	-----	Mode A
Synchronous condition	Synchronous	-----	-----	Synchronous
	[Change synchronous]	Change synchronous	Change synchronous	Change synchronous
Current value	0	0	0	0
	Current value update	Current value update	Current value update	Current value update
Unit	pulse	pulse	pulse	pulse
Deviation (pulse)	0	0	0	0
Jog target speed	1000	1000	1000	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

<b>Axis [Group]</b>	The axis numbers and group names to be monitored.
<b>Synchronous group</b>	The group name and the master/slave axis type for the synchronous operation.
<b>Synchronous mode</b>	The operation mode for the synchronous operation.
<b>Synchronous condition</b>	Monitor the synchronous/asynchronous condition in the synchronous operation. For the synchronous operation in the operation mode A, clicking [Synchronous change] changes the condition.
<b>Current value</b>	Monitor the feedback value for every axis after unit conversion. Clicking [Current value update] displays the dialog for inputting the value, and it enables to change the current value.
<b>Unit</b>	Monitor the unit of positions for the axes specified in the parameter settings each from the positioning unit.
<b>Deviation (Pulse)</b>	Monitor the deviation when activating the moving amount automatic check function.
<b>JOG target speed</b>	Monitor and display the target speed in the JOG operation. Click [Change] to change the target speed for the JOG operation.
<b>JOG [+]</b>	Click [+] to perform the forward rotation.
<b>JOG [-]</b>	Click [-] to perform the reverse rotation.
<b>Table number</b>	Indicate the table number to perform the teaching. Click [Teaching] to change the table number for the teaching and register the current value.
<b>State of axis</b>	The operating states of axes or error and warning occurrences.
<b>Error code</b>	The latest error code when an error occurred.
<b>Error clear</b>	Clear the error by clicking this button, when an error occurred.
<b>Warning code</b>	Indicate the latest warning code when a warning occurs.
<b>Warning clear</b>	Clear the warning by clicking this button, when a warning occurred.
<b>Speed rate</b>	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.



**Note:**

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

- Click [Teaching] after stopping the axis at the desired position by the JOG operation, and input the table number to execute the teaching operation.
- 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.

- Click [Close] to close the dialog.



**Note:**

This dialog cannot be closed during the JOG operation.



## **Chapter 8**

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### **Automatic Operation (Position Control)**

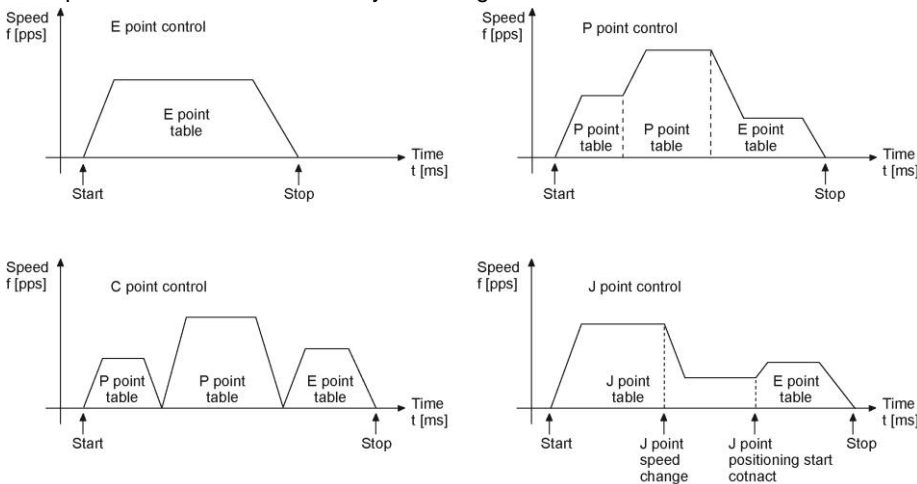
## 8.1 Basic Operation

### Type of operations

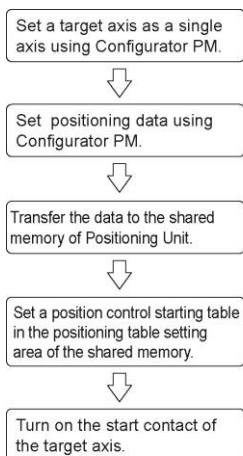
The automatic operation is an operation mode to be performed a position control. For the position control, there are a single axis control and an interpolation control that starts and stops multiple axes simultaneously.

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 operation 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.

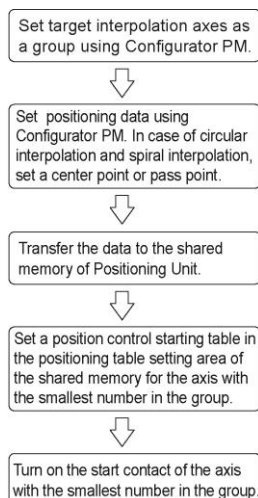
The J point control to perform a speed control is also available, besides the P point, C point and E point controls. The J point control is performed at the target speed from the beginning of the operation until the J point positioning start contact turns on, and once the contact turns on, the next position control will be started. In the J point control, the operation done flag turns on after the last table was executed, note that the J point control can be used only for a single axis.



### Operation flow of single axis control



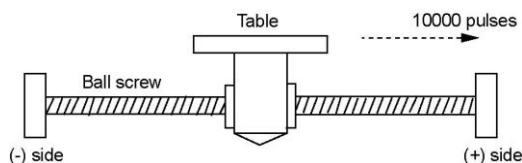
### Operation flow of interpolation control



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 control is determined according to the contents of the positioning data to be set.

### 8.1.1 Setting and Operation of E Point Control

The example below is the case of a single axis control for the 1st axis with the positioning unit installed in the slot 0. The movement amount setting is the increment method, and the unit is set to pulse.

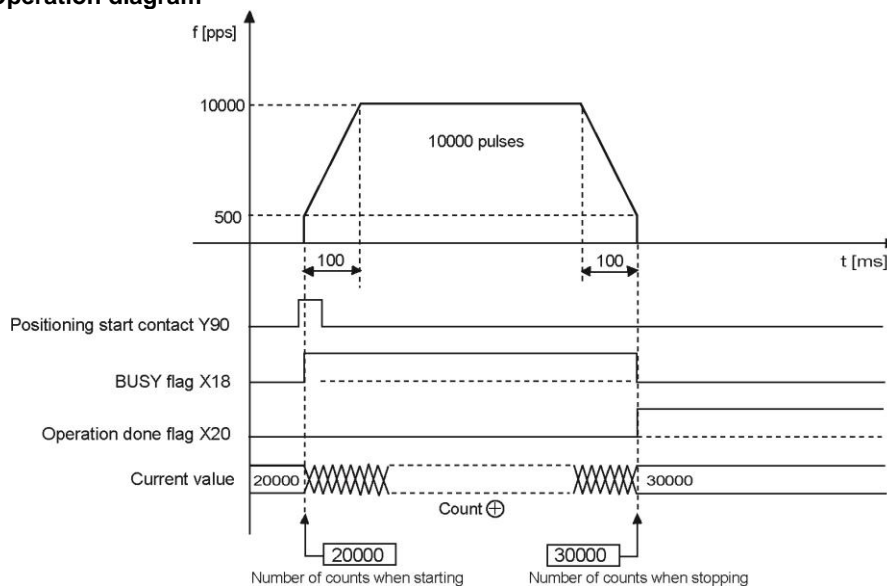


## Setting

The parameters necessary for the setting of the positioning 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 J: Speed 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 $\mu\text{m}$ (0.1 $\mu\text{m}$ ): -107,374,182.3 to 107,374,182.3 $\mu\text{m}$ $\mu\text{m}$ (1 $\mu\text{m}$ ): -1,073,741,823 to 1,073,741,823 $\mu\text{m}$ inch (0.00001 inch): -10,737.41823 to 10,737.41823 inch inch (0.0001 inch): -107,374.1823 to 1-7,374.1823 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
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 $\mu\text{m}$ : 1 to 32,767,000 $\mu\text{m/s}$ Inch: 0.001 to 32,767.000 inch/s degree: 0.001 to 32,767.000 rev/s

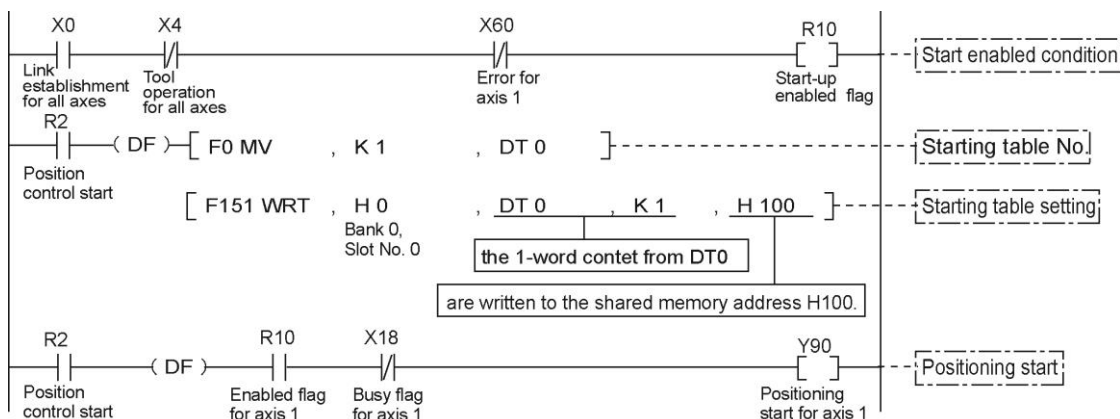
### Operation diagram



### Operations of each contact

- The BUSY flag (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 (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 flag turns on after the positioning unit has sent the command to move to the target position.

### Sample program



### Precautions on programming

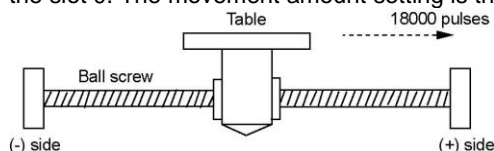
- If any value such as a movement amount, acceleration time, deceleration time or target speed is out of the specified range, a setting value error will occur when the position control starts.
- The number of the startup contact and flag varies depending on the number of axes and the installation position.
- 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 for the 1st axis with the positioning unit installed in the slot 0. The movement amount setting is the increment method, and the unit is set to pulse.

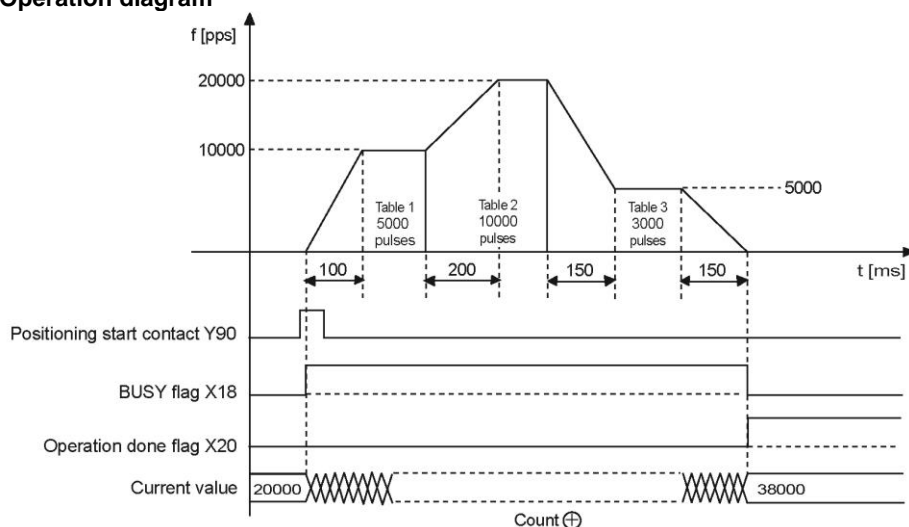


### Setting

The parameters necessary for the setting of the positioning 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 J: Speed 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 $\mu\text{m}$ (0.1 $\mu\text{m}$ ): -107,374,182.3 to 107,374,182.3 $\mu\text{m}$ $\mu\text{m}$ (1 $\mu\text{m}$ ): -1,073,741,823 to 1,073,741,823 $\mu\text{m}$ inch (0.00001 inch): -10,737.41823 to 10,737.41823 inch inch (0.0001 inch): -107,374.1823 to 1,073,741.823 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
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 $\mu\text{m}$ : 1 to 32,767,000 $\mu\text{m/s}$ Inch: 0.001 to 32,767.000 inch/s degree: 0.001 to 32,767.000 rev/s

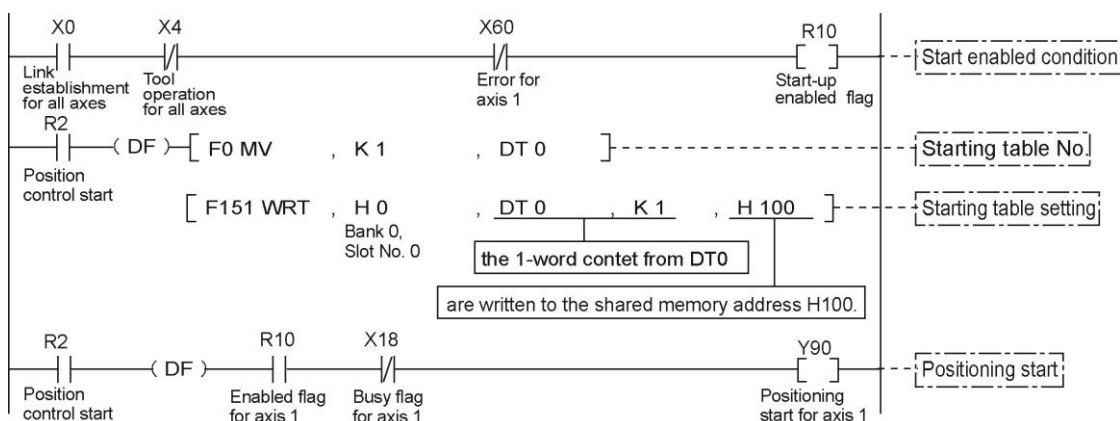
### Operation diagram



### Operations of each contact

- The BUSY flag (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 (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 flag turns on after the positioning unit has sent the command to move to the target position.

### Sample program



### Precautions on programming

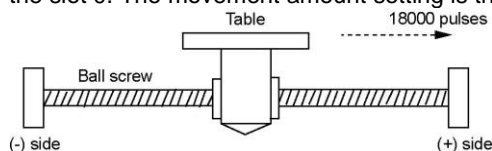
- Once starting the table 1, the operation continues up to the table 3 automatically. The last table should be set to E: End point.
- If any value such as a movement amount, acceleration time, deceleration time or target speed is out of the specified range, a setting value error will occur when the position 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 for the 1st axis with the positioning unit installed in the slot 0. The movement amount setting is the increment method, and the unit is set to pulse.

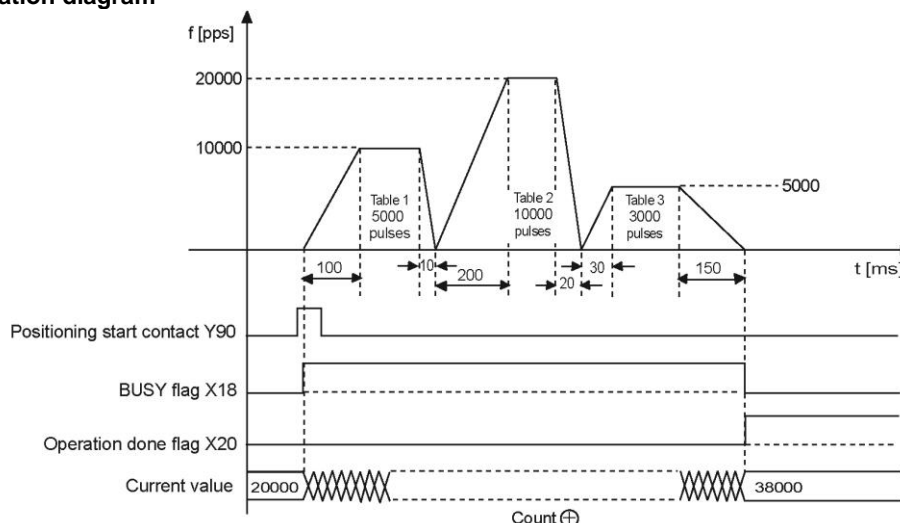


#### Setting

The parameters necessary for the setting of the positioning 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: Continuance point	C: Continuance point	E: End point	C: Continuance point E: End point P: Pass point J: Speed 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 $\mu\text{m}$ (0.1 $\mu\text{m}$ ): -107,374,182.3 to 107,374,182.3 $\mu\text{m}$ $\mu\text{m}$ (1 $\mu\text{m}$ ): -1,073,741,823 to 1,073,741,823 $\mu\text{m}$ inch (0.00001 inch): -10,737.41823 to 10,737.41823 inch inch (0.0001 inch): -107,374.1823 to 1,073,741.823 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
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 $\mu\text{m}$ : 1 to 32,767,000 $\mu\text{m/s}$ Inch: 0.001 to 32,767.000 inch/s degree: 0.001 to 32,767.000 rev/s

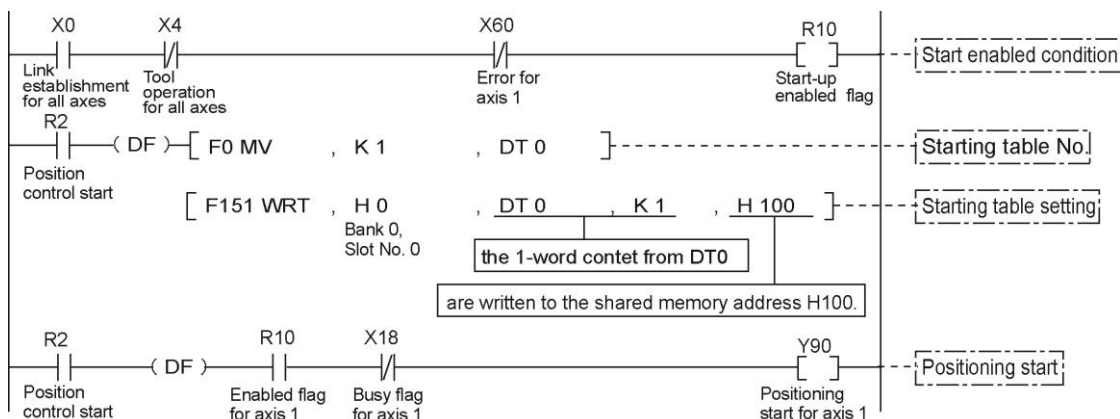
#### Operation diagram



### Operations of each contact

- The BUSY flag (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 (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 flag turns on after the positioning unit has sent the command to move to the target position.

### Sample program



### Precautions on programming

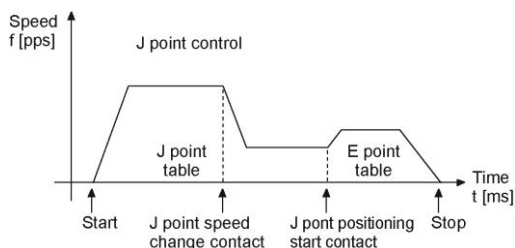
- Once starting the table 1, the operation continues up to the table 3 automatically. The last table should be set to E: End point.
- If any value such as a movement amount, acceleration time, deceleration time or target speed is out of the specified range, a setting value error will occur when the position 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.

## 8.1.4 Setting and Operation of J Point Control

The J point control is performed at the target speed from the beginning of the operation until the J point positioning start contact turns on, and once the contact turns on, the next position control will be started. The J point control can be used only for a single axis control. Note that it cannot be used for the interpolation control.



In the J point control, the speed can be changed during the operation. To change the speed, turn on the J point speed change contact after changing the following parameters in the parameter setting area.

- J point control code
- J point acceleration time
- J point deceleration time
- J point target speed



**Reference:** <17.6.2 Parameter Setting Area>



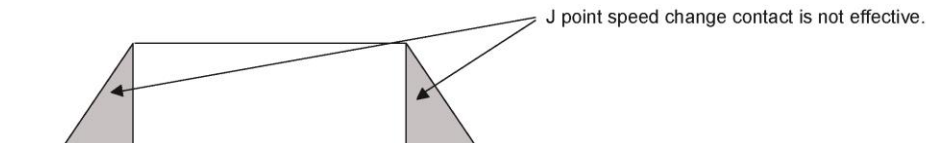
### Note:

The control code, acceleration (deceleration) time and target speed when starting the J point control are activated by each setting of the table that the J point control has been specified.

The J point control code, J point acceleration (deceleration) time and J point target speed will become effective when the speed for the J point control is changed.

### Precautions when performing the J point control

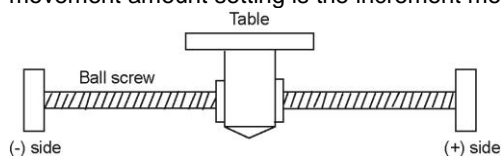
In the J point control, although the speed can be changed during the operation, it cannot be changed when accelerating (decelerating). The contact for changing the speed when accelerating (decelerating) is ignored, and the speed changes when operating at the constant speed.



Use the increment mode for the position setting method for the P point, C point and E point controls to be executed after the J point control.

The speed control is performed in the J point control, however, the positioning moving amount should be always a value that enables to have a constant speed area at the target speed.

The example below is the case of a single axis control with the positioning unit installed in the slot 0. The movement amount setting is the increment method, and the unit is set to pulse.

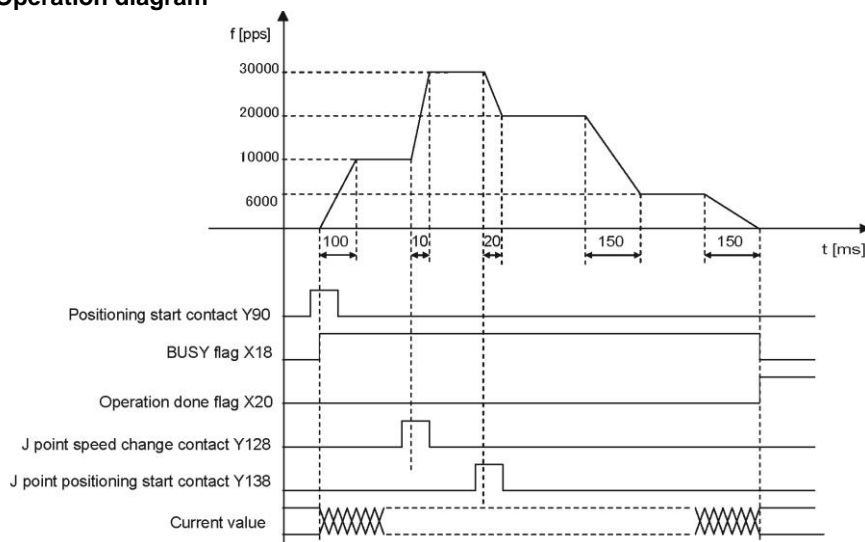


## Setting

The parameters necessary for the setting of the positioning 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	J: Speed point	P: Pass point	E: End point	C: Continuance point E: End point P: Pass point J: Speed 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 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 1,073,741.823 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
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 Inch: 0.001 to 32,767.000 inch/s degree: 0.001 to 32,767.000 rev/s
J point control code	Linear acceleration/deceleration			0: Linear acceleration/deceleration 1: S-shaped acceleration/deceleration
J point acceleration time	10 ms			0 to 10000 ms
J point deceleration time	10 ms			0 to 10000 ms
J point target speed	30000 pps			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

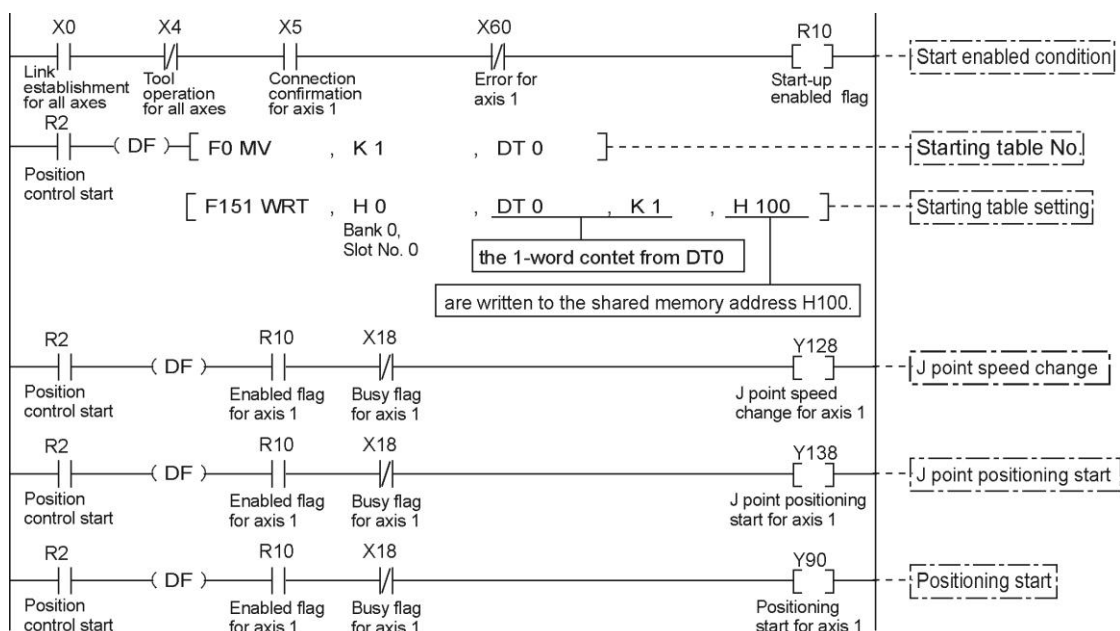
## Operation diagram



## Operations of each contact

- The BUSY flag (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 (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.
- Turning on the J point speed change contact changes the target speed during the J point control to the target speed specified as the J point target speed.
- Once the J point positioning start contact turns on, the operation for the next positioning table (table) will be started.

## Sample program



## 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 J 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 J point control	Forward	Limit input(+):ON	Deceleration stop, Error occurs.
	Reverse	Limit input (-):ON	Deceleration stop, Error occurs.

## 8.2 Interpolation Control

### Type of operations

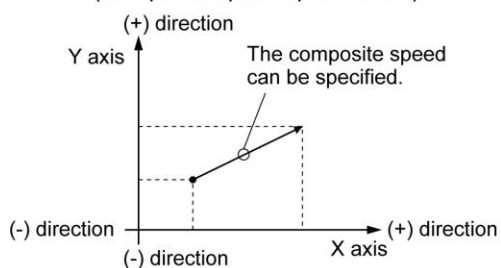
For the interpolation control, there are 2-axis linear interpolation control, 2-axis circular interpolation control, 3-axis linear interpolation control, and 3-axis spiral interpolation control. The following methods are available to specify the operation of each interpolation control. Select any of 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. Also, X, Y, Z axes are automatically allocated from the smallest axis number.

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

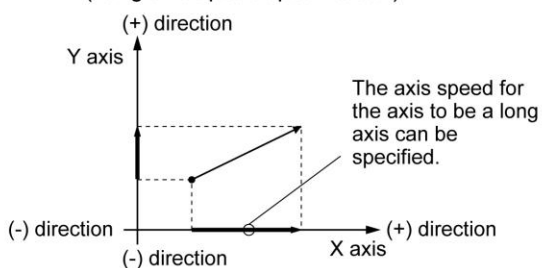
For example, using the P point control enables the continuous interpolation control from the 2-axis linear control to the 2-axis circular interpolation control. The acceleration time and deceleration time can be specified individually. For the P point control and C point control, the E point should be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

Type	Operation specification method	Necessary data
2-axis linear interpolation 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 interpolation control	Center point/CW direction	X-axis and Y-axis coordinate of center point
	Center point/CCW direction	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 interpolation control	Composite speed	Composite speed of X axis, Y axis and Z axis.
	Long axis speed	Speed of long axis (Axis of which moving distance is long)
3-axis spiral interpolation 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

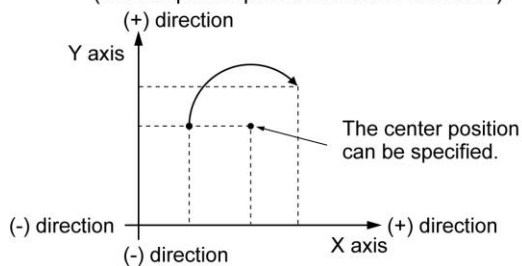
2-axis linear interpolation  
(Composite speed specification)



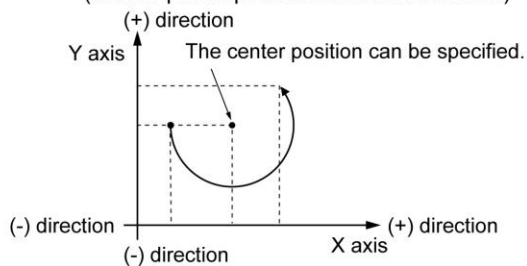
2-axis linear interpolation  
(Long axis speed specification)



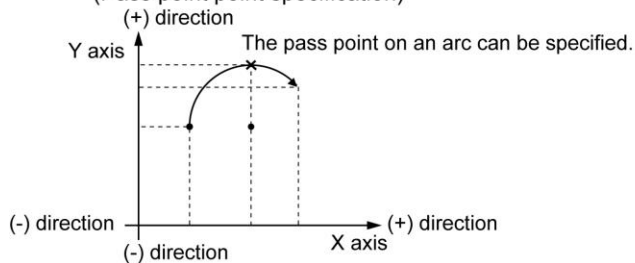
2-axis circular interpolation  
(Center point specification/CW direction)

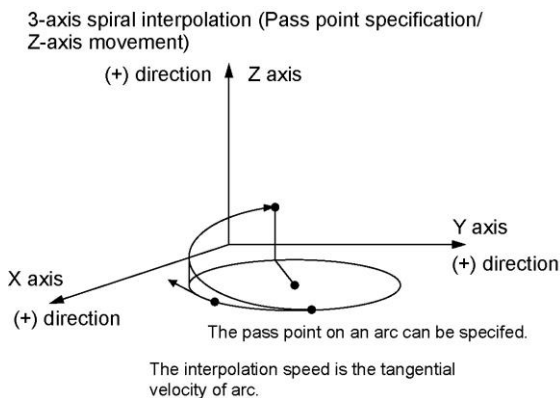
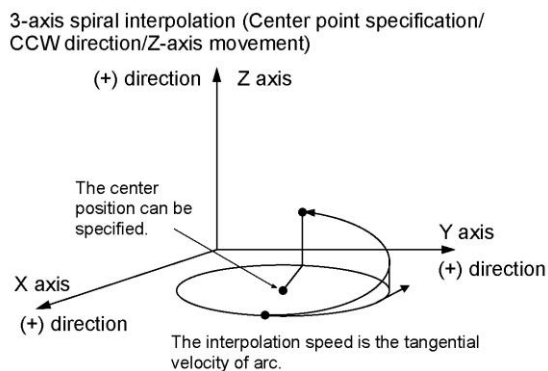
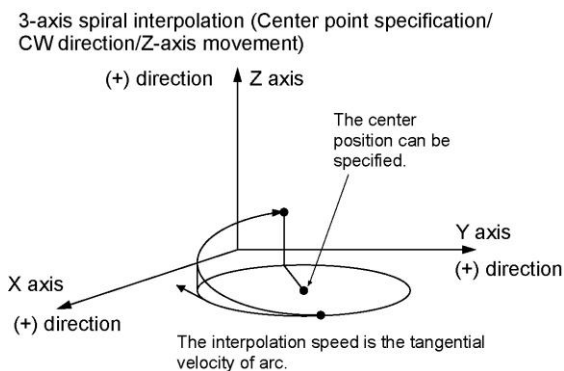
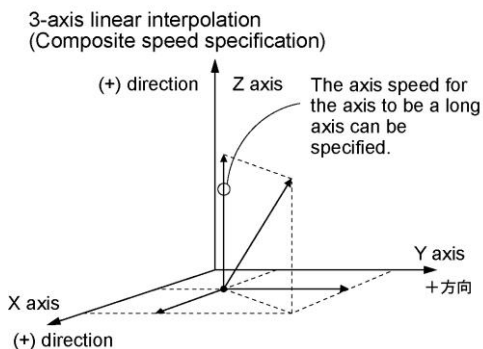
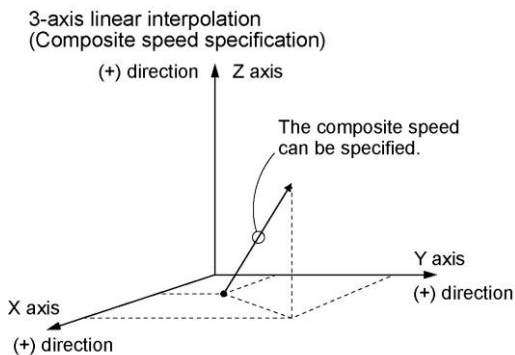


2-axis circular interpolation  
(Center point specification/CCW direction)



2-axis circular interpolation  
(Pass point point specification)

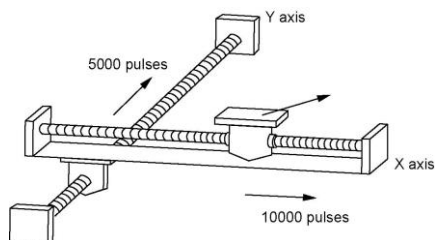




When the X axis and Y axis is the moving axes, each axis in the above diagram is replaced.

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

The example below is the case of the E point control with the positioning unit 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.

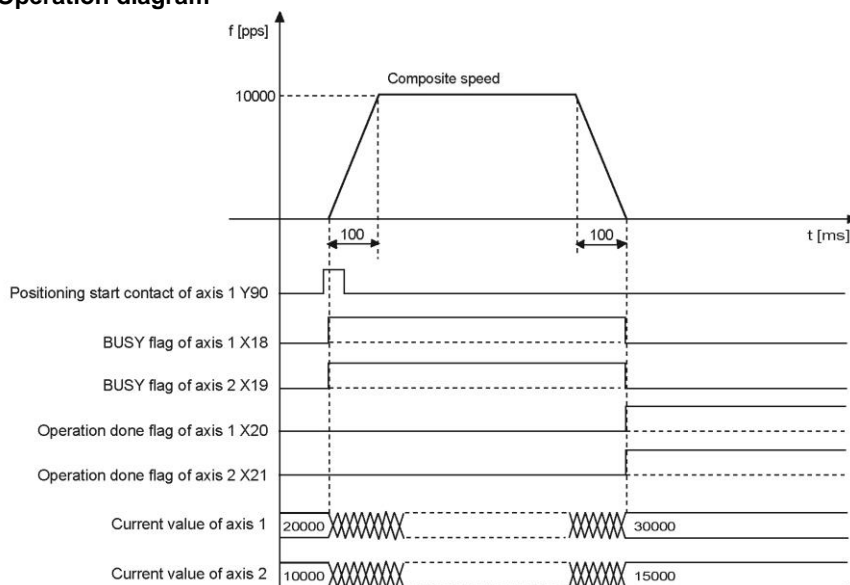


### Setting

The parameters necessary for the setting of the positioning 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) S: Circular (Pass point/CW direction) 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 $\mu\text{m}$ (0.1 $\mu\text{m}$ ): -107,374,182.3 to 107,374,182.3 $\mu\text{m}$ $\mu\text{m}$ (1 $\mu\text{m}$ ): -1,073,741,823 to 1,073,741,823 $\mu\text{m}$
X-axis auxiliary point	0	inch (0.00001 inch): -10,737.41823 to 10,737.41823 inch inch (0.0001 inch): -107,374.1823 to 1-7,374.1823 inch
Y-axis movement amount	5000 pulses	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
Y-axis auxiliary point	0	
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 $\mu\text{m}$ : 1 to 32,767,000 $\mu\text{m/s}$ Inch: 0.001 to 32,767.000 inch/s degree: 0.001 to 32,767.000 rev/s

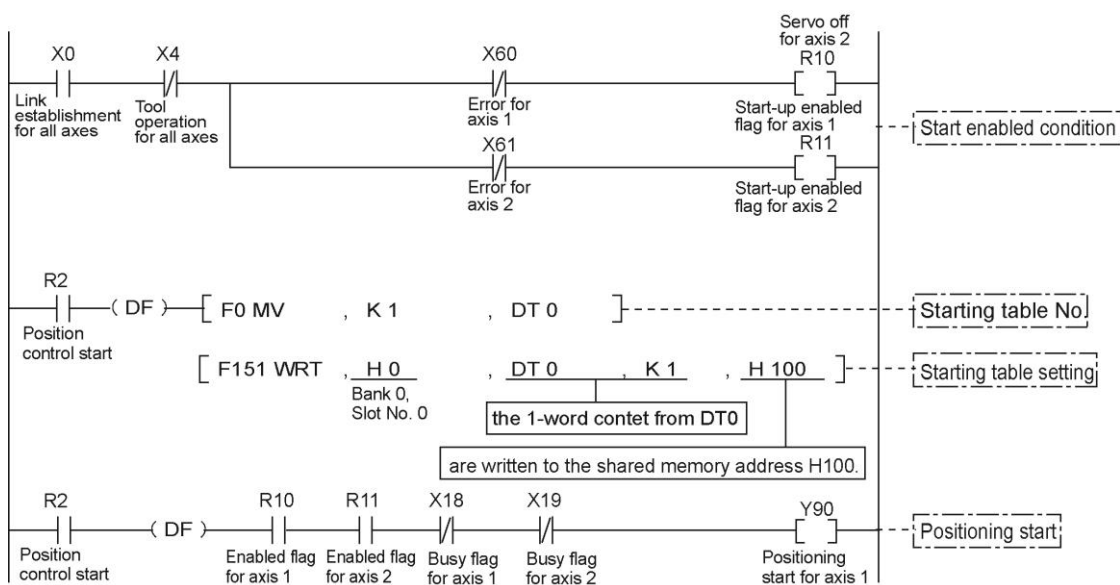
### Operation diagram



## Operations of each contact

- The BUSY flag for the axis 1 and 2 (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 (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.

## Sample program

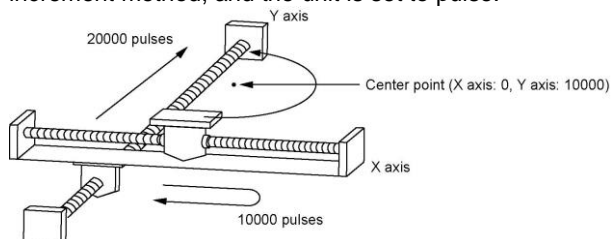


## Precautions on programming

- 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.

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

The example below is the case of the E point control with the positioning unit 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.

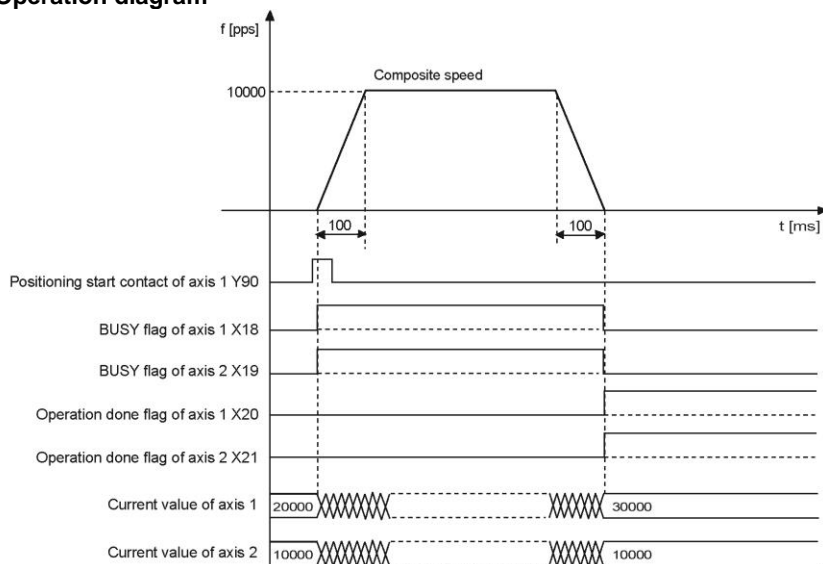


### Setting

The parameters necessary for the setting of the positioning 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) S: Circular (Pass point/CW direction) 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 $\mu\text{m}$ (0.1 $\mu\text{m}$ ): -107,374,182.3 to 107,374,182.3 $\mu\text{m}$ $\mu\text{m}$ (1 $\mu\text{m}$ ): -1,073,741,823 to 1,073,741,823 $\mu\text{m}$
X-axis auxiliary point	0 pulse	inch (0.00001 inch): -10,737.41823 to 10,737.41823 inch inch (0.0001 inch): -107,374.1823 to 1-7,374.1823 inch
Y-axis movement amount	20000 pulses	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
Y-axis auxiliary point	10000 pulses	
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 $\mu\text{m}$ : 1 to 32,767,000 $\mu\text{m}/\text{s}$ Inch: 0.001 to 32,767.000 inch/s degree: 0.001 to 32,767.000 rev/s

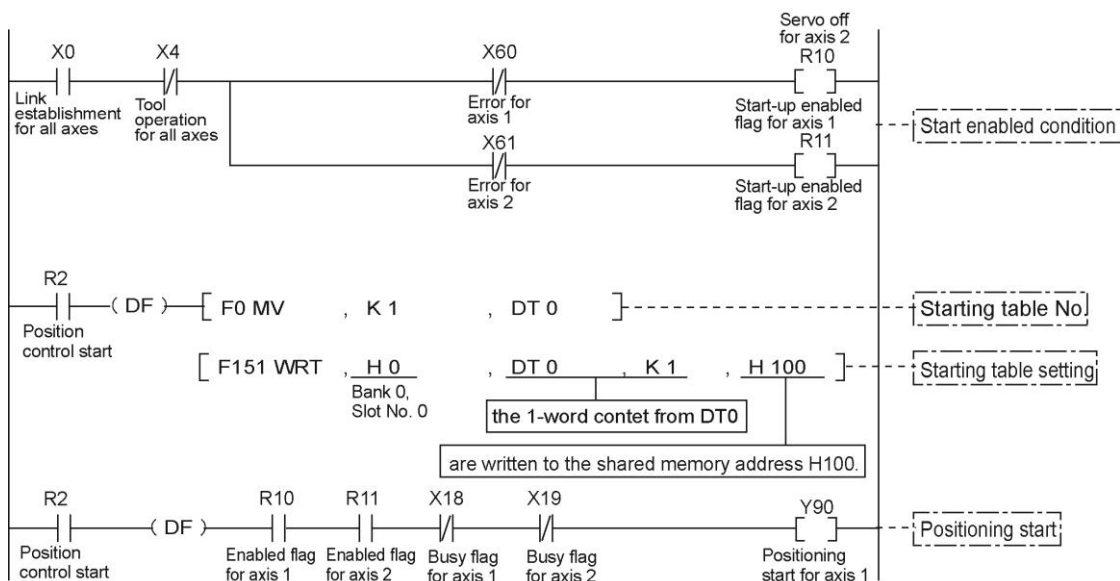
### Operation diagram



## Operations of each contact

- The BUSY flag for the axis 1 and 2 (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 (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.

## Sample program

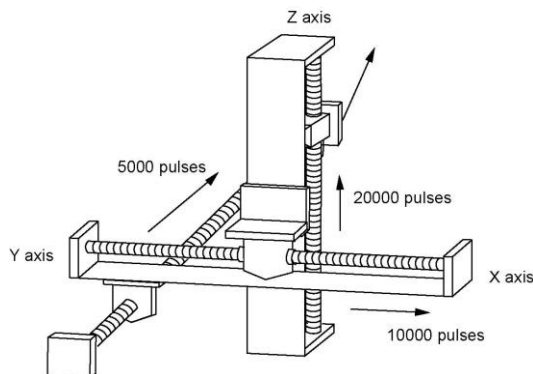


## Precautions on programming

- 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 coordinate from the start point.
- When the start point and the operation 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 point exist 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 the E point control with the positioning unit 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.

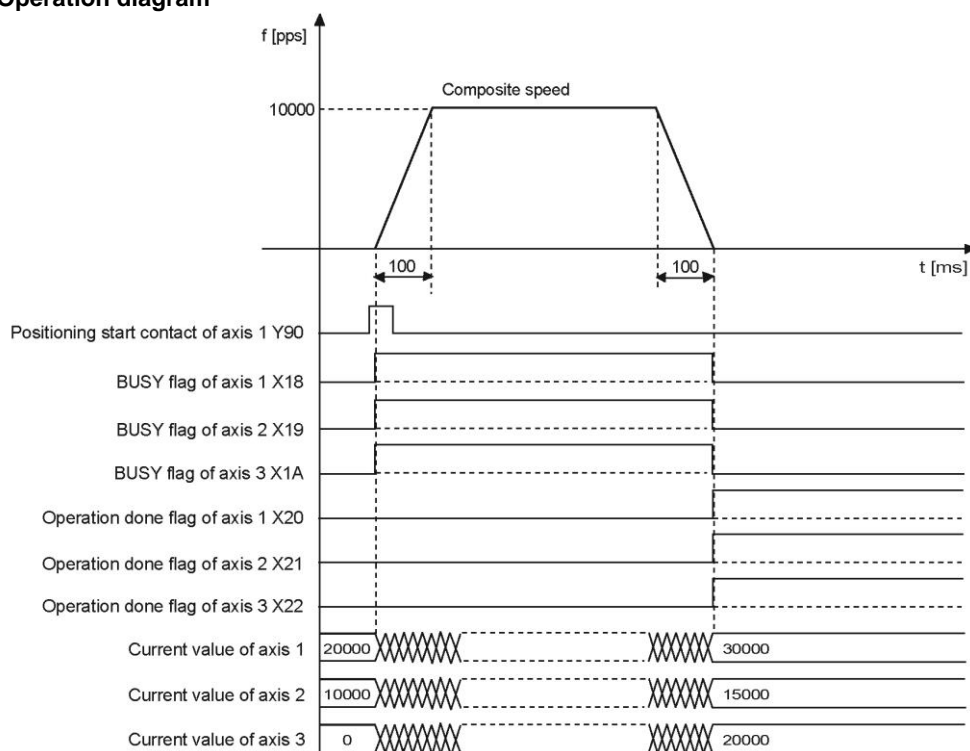


### Setting

The parameters necessary for the setting of the positioning 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) A: Spiral (Center point/CW direction/X-axis movemet) B: Spiral (Center point/CCW direction/X-axis movemet) C: Spiral (Center point/CW direction/Y-axis movemet) D: Spiral (Center point/CCW direction/Y-axis movemet) E: Spiral (Center point/CW direction/Z-axis movemet) F: Spiral (Center point/CCW direction/Z-axis movemet) L: Spiral (Pass point/X-axis movement) M: Spiral (Pass point/Y-axis movement) 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	$\mu\text{m}$ (0.1 $\mu\text{m}$ ): -107,374,182.3 to 107,374,182.3 $\mu\text{m}$
Y-axis movement amount	5000 pulses	$\mu\text{m}$ (1 $\mu\text{m}$ ): -1,073,741,823 to 1,073,741,823 $\mu\text{m}$
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 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 $\mu\text{m}$ : 1 to 32,767, 000 $\mu\text{m}/\text{s}$ Inch: 0.001 to 32,767.000 inch/s degree:0.001 to 32,767.000 rev/s

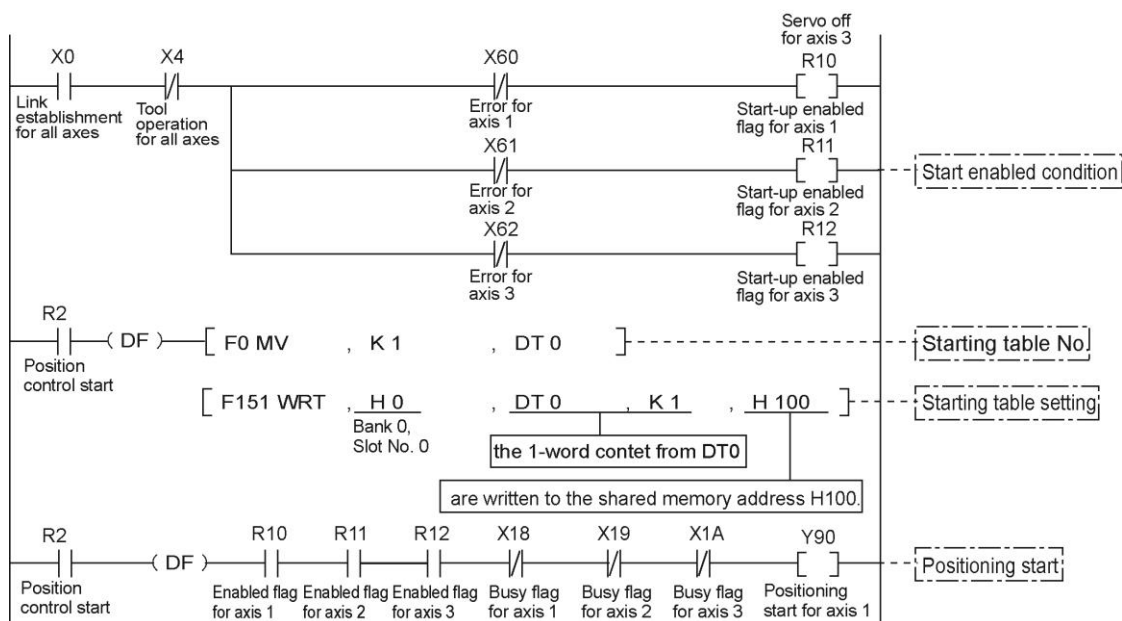
## Operation diagram



### Operations of each contact

- The BUSY flag for the axes 1, 2 and 3 (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 (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.

## Sample program

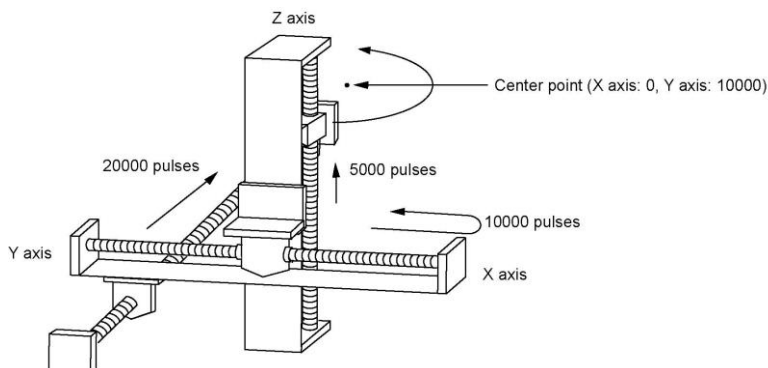


## Precautions on programming

- 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 the E point control with the positioning unit installed in the slot 0. The X axis is set to the 1st axis, the Y axis is set to the 2nd axis and the Z axis is set to the 3rd axis. The movement amount setting is the increment method, and the unit is set to pulse.

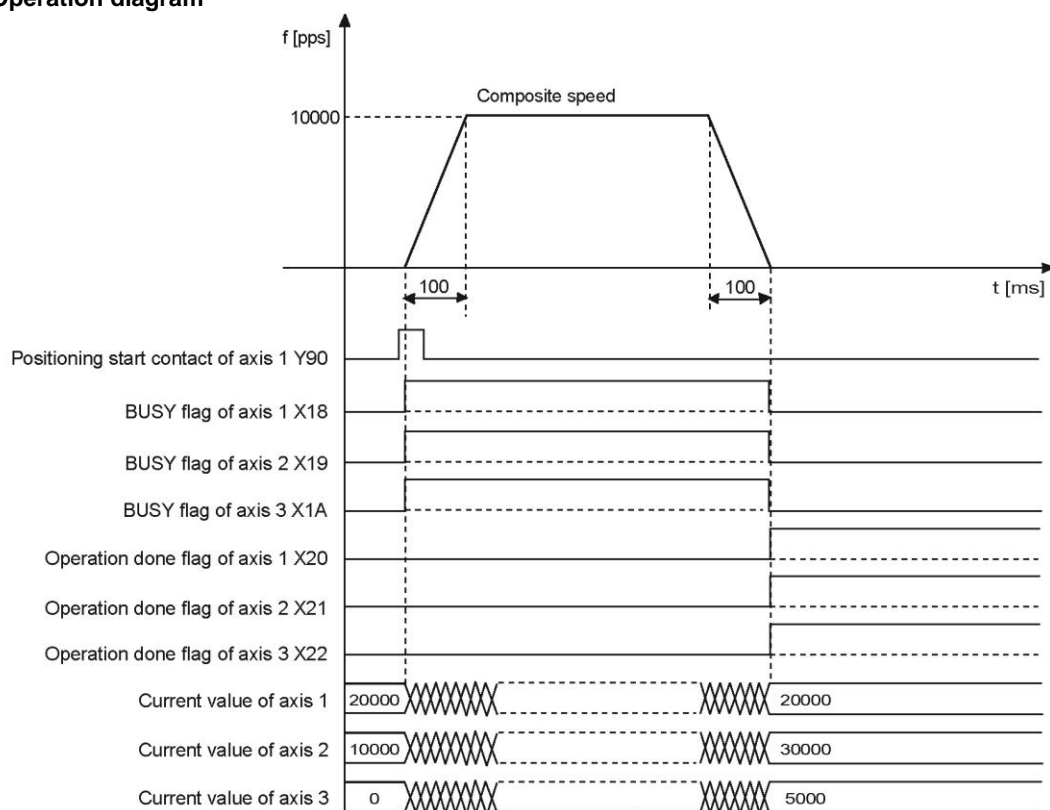


### Setting

The parameters necessary for the setting of the positioning 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) A: Spiral (Center point/CW direction/X-axis movement) B: Spiral (Center point/CCW direction/X-axis movement) C: Spiral (Center point/CW direction/Y-axis movement) D: Spiral (Center point/CCW direction/Y-axis movement) E: Spiral (Center point/CW direction/Z-axis movement) F: Spiral (Center point/CCW direction/Z-axis movement) L: Spiral (Pass point/X-axis movement) M: Spiral (Pass point/Y-axis movement) 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	$\mu\text{m}$ (0.1 $\mu\text{m}$ ): -107,374,182.3 to 107,374,182.3 $\mu\text{m}$
Y-axis movement amount	20000 pulses	$\mu\text{m}$ (1 $\mu\text{m}$ ): -1,073,741,823 to 1,073,741,823 $\mu\text{m}$
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 107,374.1823 inch
Z-axis auxiliary point	0	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
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 $\mu\text{m}$ : 1 to 32,767,000 $\mu\text{m/s}$ Inch: 0.001 to 32,767.000 inch/s degree: 0.001 to 32,767.000 rev/s

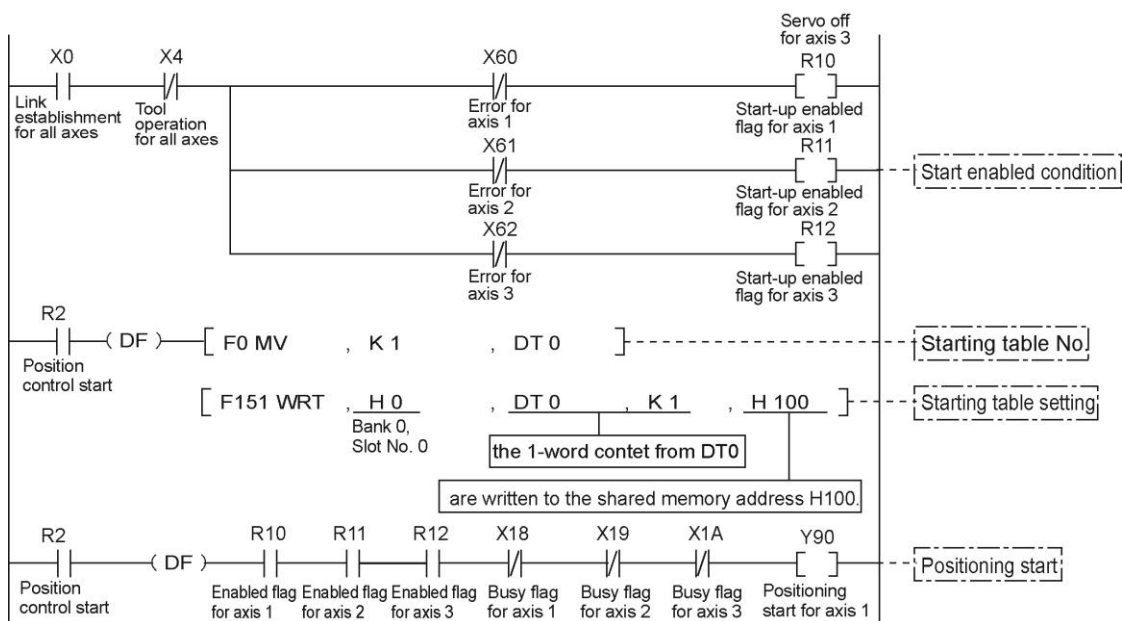
## Operation diagram



### Operations of each contact

- The BUSY flag for the axes 1, 2 and 3 (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 (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.

## Sample program



## 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 coordinate from the start point.
- When the start point and the operation 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 point exist 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.

## 8.3 Synchronous Operation

### 8.3.1 Overview of Synchronous Operation

The synchronous operation is a function to set an axis to be the standard (master axis) and an axis to be synchronized (slave axis), and make the operations the master and slave axes identical (synchronous).

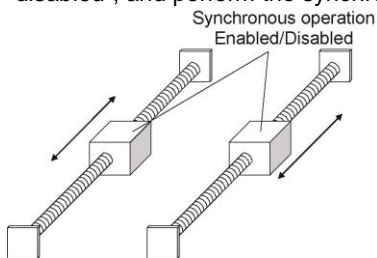
The features of the synchronous operation are as below.

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

Two types of synchronous operation can be selected.

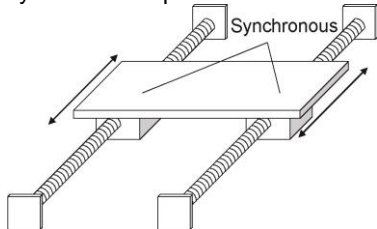
#### 1. Synchronous mode A

Using this mode enables to switch the setting of the synchronous operation between “enabled” and “disabled”, and perform the synchronous operation as necessary.



#### 2. Synchronous 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 disabled in the mode B..



#### Differences in the operations of synchronous modes

	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 synchronous group.	
Enabled/disabled of synchronous operation	It can be selected either Enabled or Disabled.	Only Enabled
Positioning operation	【Synchronous: When enabled】 Operates with the setting of the master axis. The positioning starts for the master axis.	Operates with the setting of the master axis. The positioning starts for the master axis.
JOG operation	【Synchronous: When disabled】	
Operation stop Pulser operation	The master and slave axes are operated according to the respective settings for each axis. The positioning starts for each axis.	
Home return	It is performed for each axis. It is necessary to set the synchronous operation to be “Disabled” when performing the home return.	Some home return methods cannot be used. The connection of the switch of the positioning unit may be changed according to the home return methods.

## 8.3.2 Home Return in Synchronous Operation

The usable home return methods vary according to the synchronous mode to be used in the synchronous operation.

A: Available N/A: Not available

■ Home return method	■ Synchronous mode A	■ Synchronous mode B
■ DOG method 1	■ A	■ N/A
■ DOG method 2	■ A	■ A
■ DOG method 3	■ A	■ N/A
■ Limit method 1	■ A	■ N/A
■ Limit method 2	■ A	■ A
■ Home method	■ A	■ N/A
■ Data set method	■ A	■ A
■ Remarks	■ Set the synchronous operation to be “Disabled” when performing the home return.	■ The connections for each switch are different when using the home return.

### Home return when using synchronous mode A

In the synchronous mode A, the home return is performed for each axis individually.

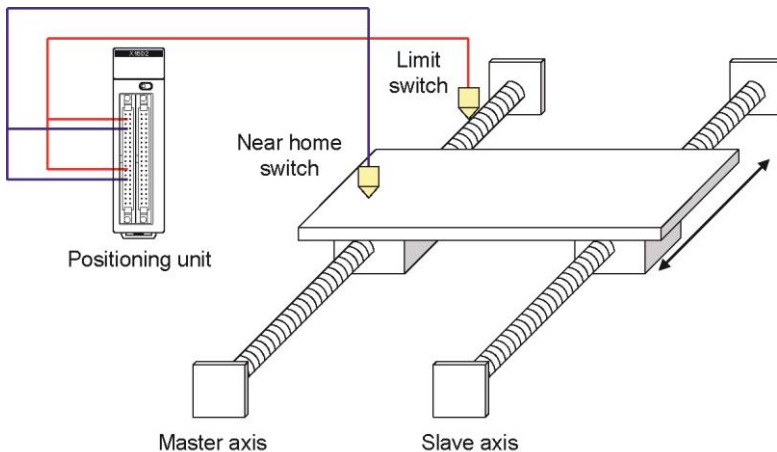
[Procedure]

1. Disable the synchronous operation.
2. Execute the home return for the master axis and slave axis individually.
3. Enable the synchronous operation after confirming the completion of the home return for the master and slave axes.

### Home return when using synchronous mode B

In the synchronous mode B, the home return is performed simultaneously for the master and slave axes by executing the home return for the master axis.

Connect the near home switch and limit switch as below to perform the home return using the “DOG method 2” and “Limit method 2”.



DOG method: Connect the near home switch input of the master axis to the slave axis, too.  
Limit method: Connect the limit switch input of the master axis to the slave axis, too.



**Reference:** <Chapter 10 Manual Operation (Home Return)>

### 8.3.3 Synchronous Operation Difference Behavior Check Function

The difference behavior check function is used to check if the master and slave axes perform the synchronous operation properly, and detect the feedback pulse value between the master and slave axes exceeds the threshold by comparing the feedback pulse value.

The operations when the difference between the moving amounts of master and slave axes exceeds the specified difference value can be selected from the followings.

Difference check	Operation
<ul style="list-style-type: none"> <li><b>Error</b></li> <li><b>Warning</b></li> <li><b>None</b></li> </ul>	<ul style="list-style-type: none"> <li><b>An error occurs, and the operations of master and slave axes stop.</b></li> <li><b>The operations cannot start until the error is cleared.</b></li> <li><b>A warning occurs.</b></li> <li><b>The operations continue.</b></li> <li><b>The difference behavior check is not performed.</b></li> </ul>



#### Note:

The difference behavior check function in the synchronous operation is available only when setting the pulse input method for the master and slave axes to the feedback pulse.



**Reference:** <5.3 Setting the Pulse Output Mode>

### 8.3.4 Controlling and Monitoring Synchronous Operation

The following area is used to set the synchronous operation to be enabled/disabled, and check the synchronous status.

#### [Synchronous operation control/monitor area]

Bank	Offset address	Name	Description																					
00H	2B0H	Synchronous group 1 operation Enabled/disabled	<div>The setting for the synchronous operation can be switched between “Enabled” and “Disabled”. When using the synchronous mode B, this setting is ignored, and the operation is always performed in the synchronized state.</div> <table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>0</td><td>Group attribute of n axis</td><td>0</td><td>0: Execute the synchronous operation. 1: Cancel the synchronous operation.</td></tr><tr><td>1 to 7</td><td>—</td><td>—</td><td>—</td></tr><tr><td>15 to 8</td><td>—</td><td>—</td><td>—</td></tr></table>	bit	Name	Default	Descriptions	0	Group attribute of n axis	0	0: Execute the synchronous operation. 1: Cancel the synchronous operation.	1 to 7	—	—	—	15 to 8	—	—	—					
	bit	Name	Default	Descriptions																				
	0	Group attribute of n axis	0	0: Execute the synchronous operation. 1: Cancel the synchronous operation.																				
	1 to 7	—	—	—																				
	15 to 8	—	—	—																				
	2B1H	Synchronous group 2 operation Enabled/disabled																						
	2B4H	Synchronous operation monitor	<table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>0</td><td>Synchronous state of axis 1</td><td>0</td><td rowspan="4">0: Asynchronous state 1: Target axis for synchronous operation  All the axes to be targeted for the synchronous operation are indicated in this area.</td></tr><tr><td>1</td><td>Synchronous state of axis 2</td><td>0</td></tr><tr><td>2</td><td>Synchronous state of axis 3</td><td>0</td></tr><tr><td>3</td><td>Synchronous state of axis 4</td><td>0</td></tr><tr><td>15 to 4</td><td>—</td><td>—</td><td>—</td></tr></table>	bit	Name	Default	Descriptions	0	Synchronous state of axis 1	0	0: Asynchronous state 1: Target axis for synchronous operation  All the axes to be targeted for the synchronous operation are indicated in this area.	1	Synchronous state of axis 2	0	2	Synchronous state of axis 3	0	3	Synchronous state of axis 4	0	15 to 4	—	—	—
	bit	Name	Default	Descriptions																				
	0	Synchronous state of axis 1	0	0: Asynchronous state 1: Target axis for synchronous operation  All the axes to be targeted for the synchronous operation are indicated in this area.																				
	1	Synchronous state of axis 2	0																					
	2	Synchronous state of axis 3	0																					
	3	Synchronous state of axis 4	0																					
15 to 4	—	—	—																					



#### Note:

Setting to enable/disable the synchronous mode is available in the synchronous mode A only.

## 8.3.5 Operation of Master and Slave Axes

### Operation of master and slave axes

Various positioning parameters should be set to perform operations on the positioning unit. The parameters to be applied vary in the synchronous operation as follows.

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	
Moving amount per rotation	
Pulse I/O 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	
Home return – Setting code	Varies depending on the operation mode of the synchronous operation. Synchronous mode A: Operates by the setting of each axis. Synchronous mode B: Follows the operation of a master axis.
Home return – Direction	
Home return – Acceleration time	
Home return – Deceleration time	
Home return – Target speed	
Home return – Creep speed	
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, see the following “Stop function in 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	

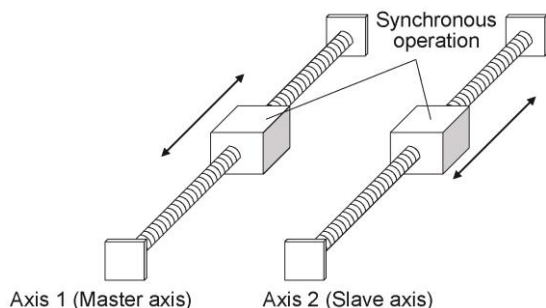
### Stop function in synchronous operation

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

Stop operation	Operational overview	Axis requested to stop	
		Master axis	Slave axis
System stop	All axes stop without deceleration time.	All axes stop.	
Emergency stop Deceleration stop	A specified axis stops with a deceleration time.	Stops with the deceleration time for the master axis.	
Limit stop	Stops with a deceleration time when a limit occurred.	Stops with the deceleration time for the master axis.	
Error stop	Stop the operation with a deceleration time when an error occurs.	After stop, the error code occurred on the master axis is set for the master/slave axes.	

### 8.3.6 Setting and Operation of Synchronous Operation

The example below is the case of the synchronous operation for 2 axes with the positioning unit installed in the slot 0. The movement amount setting is the increment method, and the unit is set to pulse.

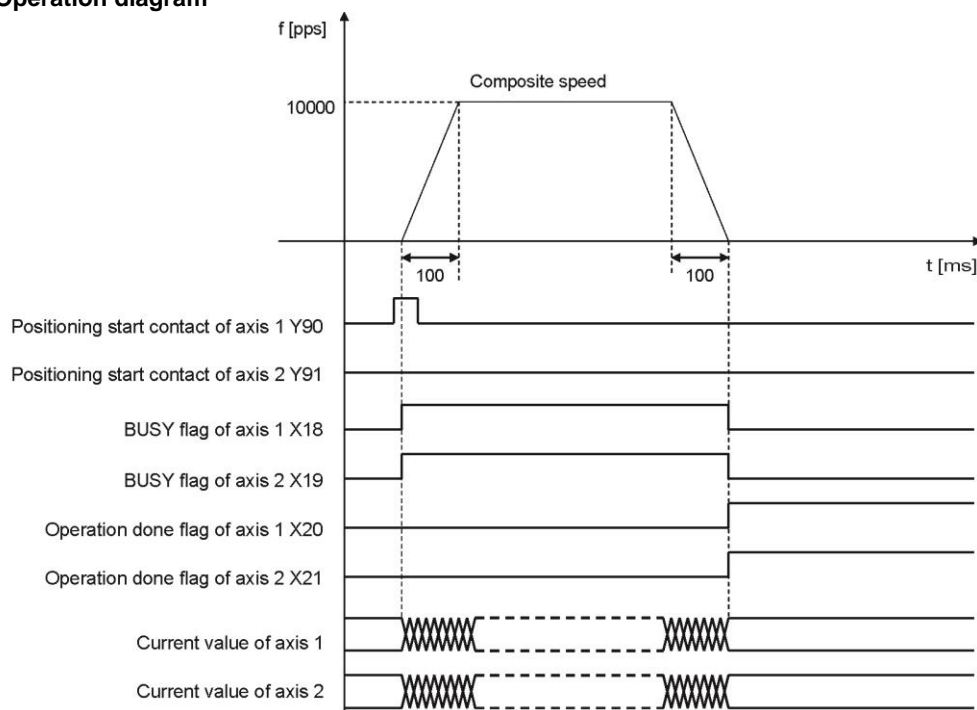


#### Setting

The parameters necessary for the setting of the positioning 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 pulses	Pulse: -1,073,741,823 to 1,073,741,823 pulse $\mu\text{m}$ (0.1 $\mu\text{m}$ ): -107,374,182.3 to 107,374,182.3 $\mu\text{m}$ $\mu\text{m}$ (1 $\mu\text{m}$ ): -1,073,741,823 to 1,073,741,823 $\mu\text{m}$ inch (0.00001 inch): -10,737.41823 to 10,737.41823 inch inch (0.0001 inch): -107,374.1823 to 1,073,741.823 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
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 $\mu\text{m}$ : 1 to 32,767,000 $\mu\text{m/s}$ Inch: 0.001 to 32,767.000 inch/s degree: 0.001 to 32,767.000 rev/s
Synchronous group	Group 1	
Master axis	Axis 1	
Slave axis	Axis 2	
Synchronous mode	Synchronous mode A	

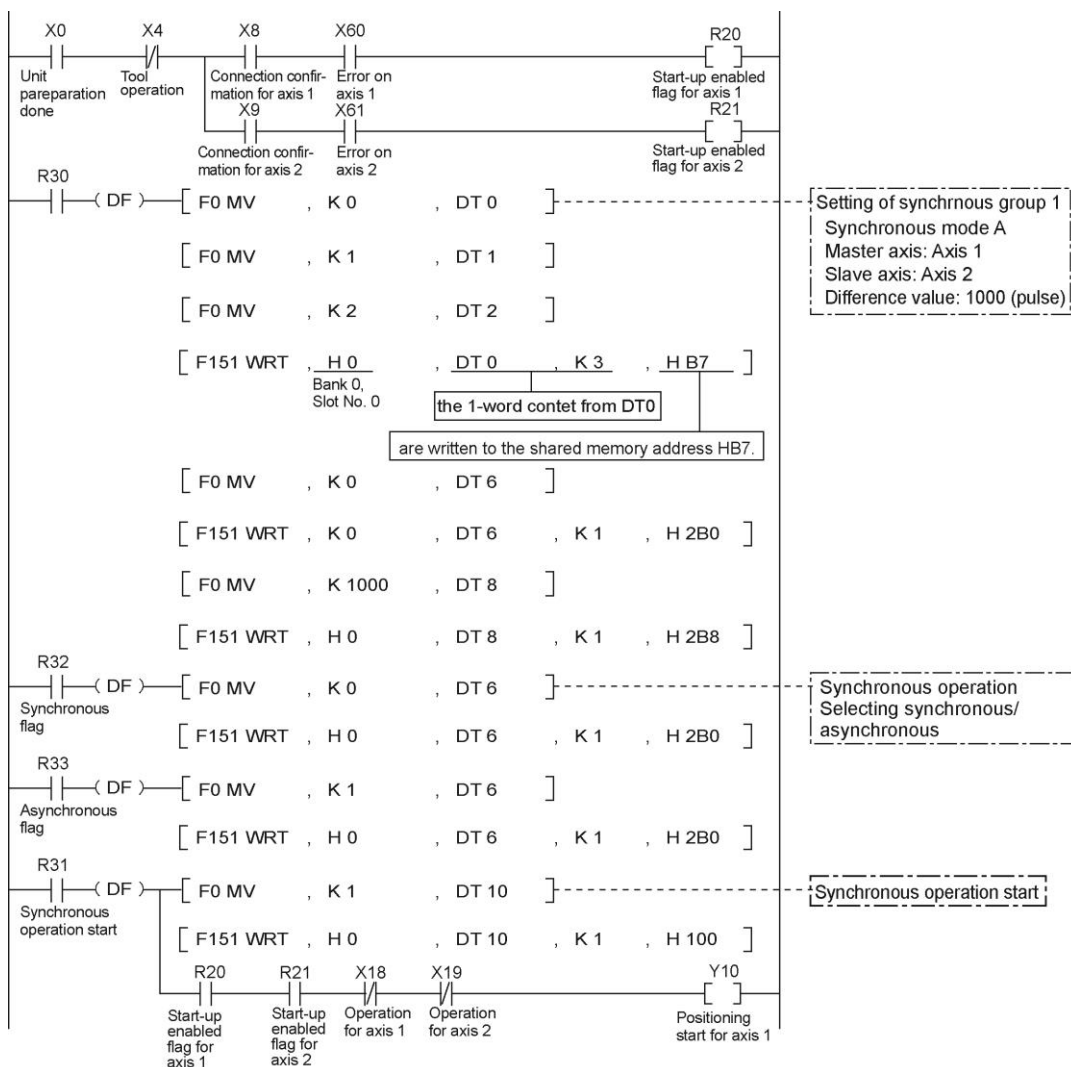
## Operation diagram



### Operations of each contact

- The BUSY flag (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 (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.
- In the synchronous operation, the request for the operation of the slave axis is ignored.

## Sample program



## 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.

# 8.4 Setting and Operation of Positioning Repeat Function

The positioning repeat function is a function to execute the positioning control repeatedly for the specified times.

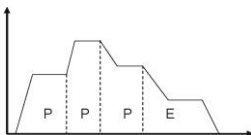
The repeat count is specified in the positioning repeat count area for each axis. It can be specified in the range of 2 to 254 times. Setting the positioning repeat count area to 255 specifies the unlimited repeat count.



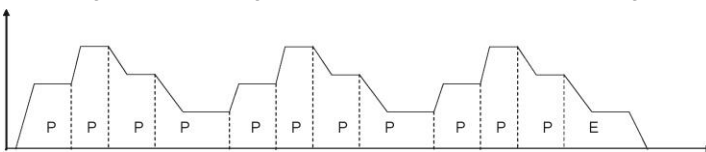
**Reference:** <17.4.8 Positioning Control Area>

## Overview of positioning repeat function

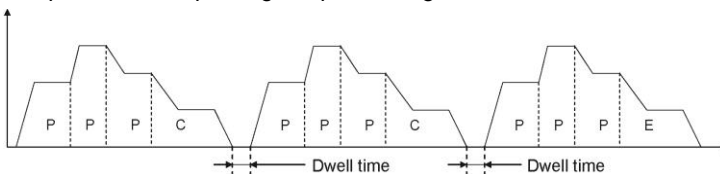
The operation when the following positioning control is repeated for 3 times is as below.



When setting the dwell time to 0 for the E point control that is the last of the positioning control, the positioning unit processes the E point control as the P point control, and completes the operation after repeating the positioning control for 3 times without stopping the operation.



When setting the dwell time to a number other than 0 for the E point control that is the last of the positioning control, the positioning unit processes the E point control as the C point control, and execute the positioning control again after stopping the operation for the dwell time (ms). The positioning unit completes after repeating the positioning control for 3 times.

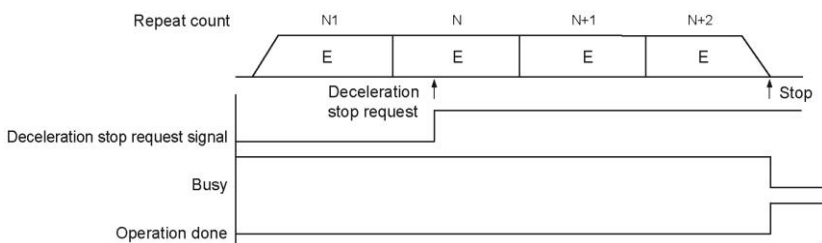


## Stop processing in positioning repeat operation

The following operation is carried out only if performing the deceleration stop while repeating the positioning.

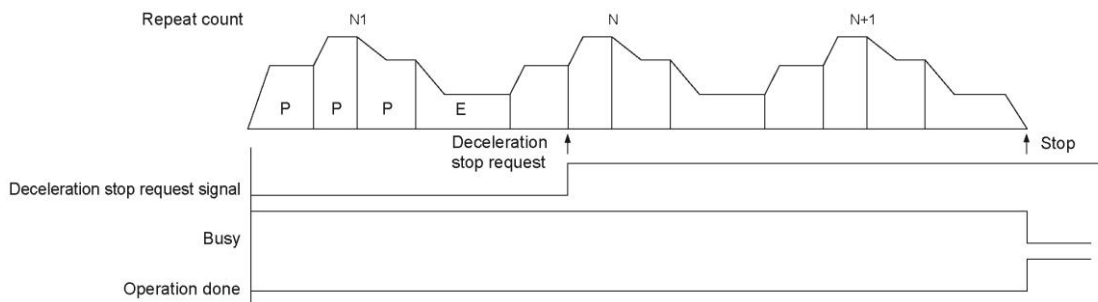
### - When repeating the E point control (dwell time: 0 ms)

Once the positioning unit detects the deceleration stop, it will stop the positioning control after repeating for N+2 times.

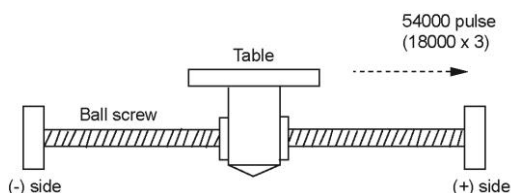


### - When executing multiple positioning table consecutively

Once the positioning unit detects the deceleration stop, it will stop the positioning control after repeating for N+1 times.



The example below is the case of a single axis control with the positioning unit installed in the slot 0. The movement amount setting is the increment method, and the unit is set to pulse.

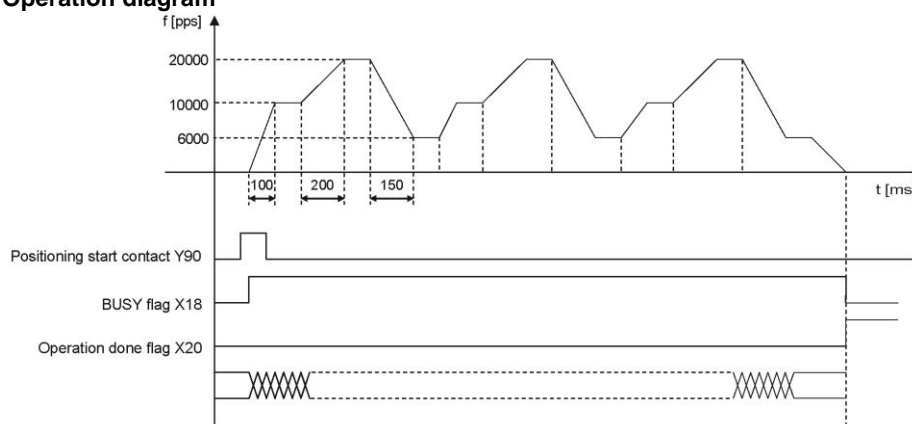


### Setting

The parameters necessary for the setting of the positioning 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	J: Speed point	P: Pass point	E: End point	C: Continuance point E: End point P: Pass point J: Speed 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 $\mu\text{m}$ (0.1 $\mu\text{m}$ ): -107,374,182.3 to 107,374,182.3 $\mu\text{m}$ $\mu\text{m}$ (1 $\mu\text{m}$ ): -1,073,741,823 to 1,073,741,823 $\mu\text{m}$ inch (0.00001 inch): -10,737.41823 to 10,737.41823 inch inch (0.0001 inch): -107,374.1823 to 1-7,374.1823 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
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 $\mu\text{m}$ : 1 to 32,767,000 $\mu\text{m/s}$ Inch: 0.001 to 32,767.000 inch/s degree: 0.001 to 32,767.000 rev/s
Positioning repeat count	3			2 to 254: Repeat count 255: Unlimited repeat

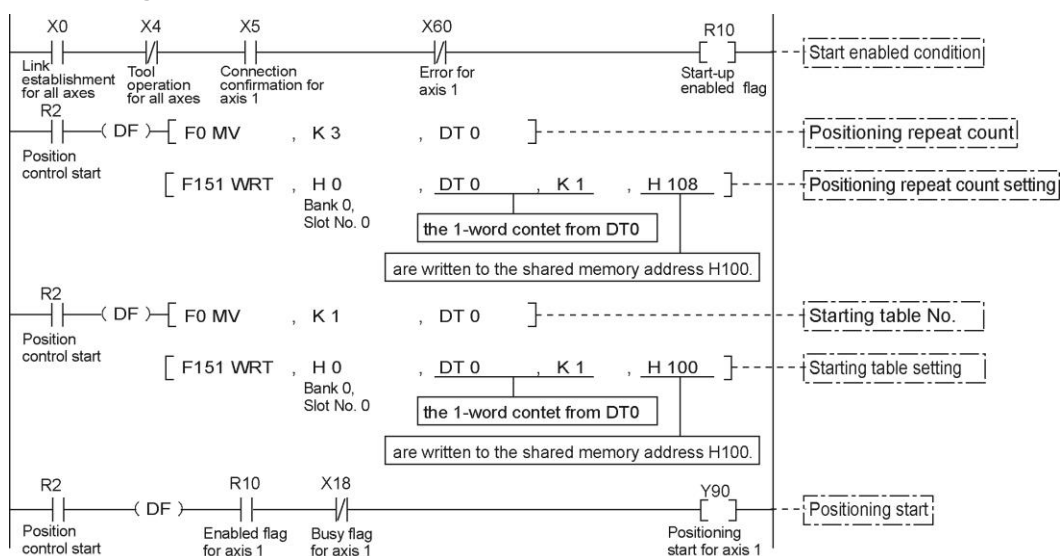
## Operation diagram



## Operations of each contact

- The BUSY flag (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 (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.

## Sample program



## 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 J 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 J point control	Forward	Limit input(+):ON	Deceleration stop, Error occurs.
	Reverse	Limit input (-):ON	Deceleration stop, Error occurs.

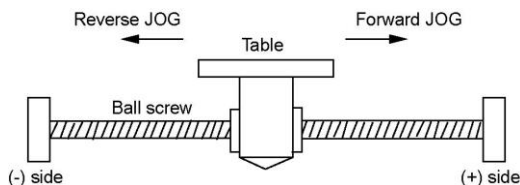
## **Chapter 9**

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### **Manual Operation (JOG Operation)**

## 9.1 Setting and Operation of Home Return

The example below is the case of the positioning unit installed in the slot 0. The unit is set to pulse.

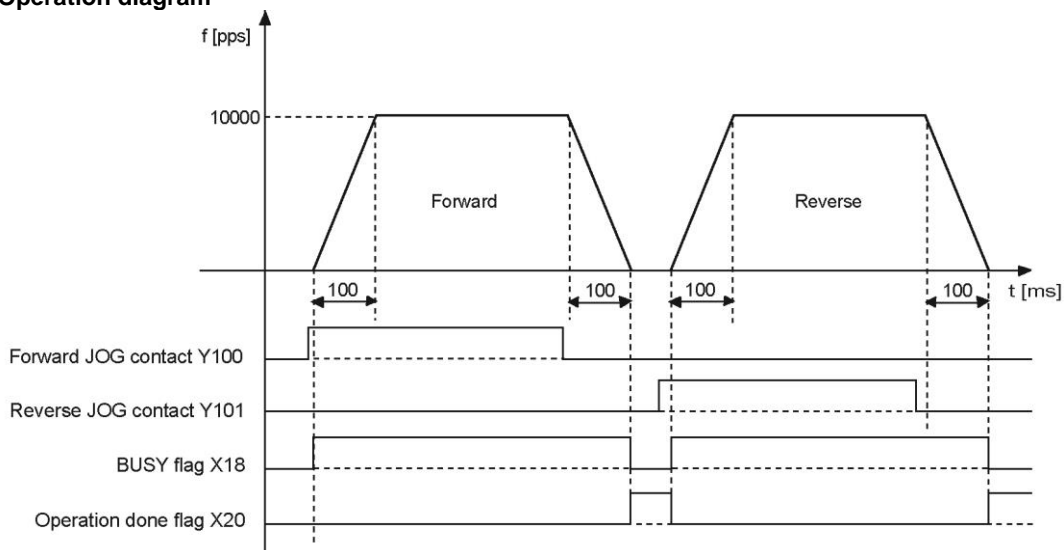


### Setting

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 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 $\mu$ m: 1 to 32,767,000 $\mu$ m/s Inch: 0.001 to 32,767.000 inch/s degree: 0.001 to 32,767.000 rev/s

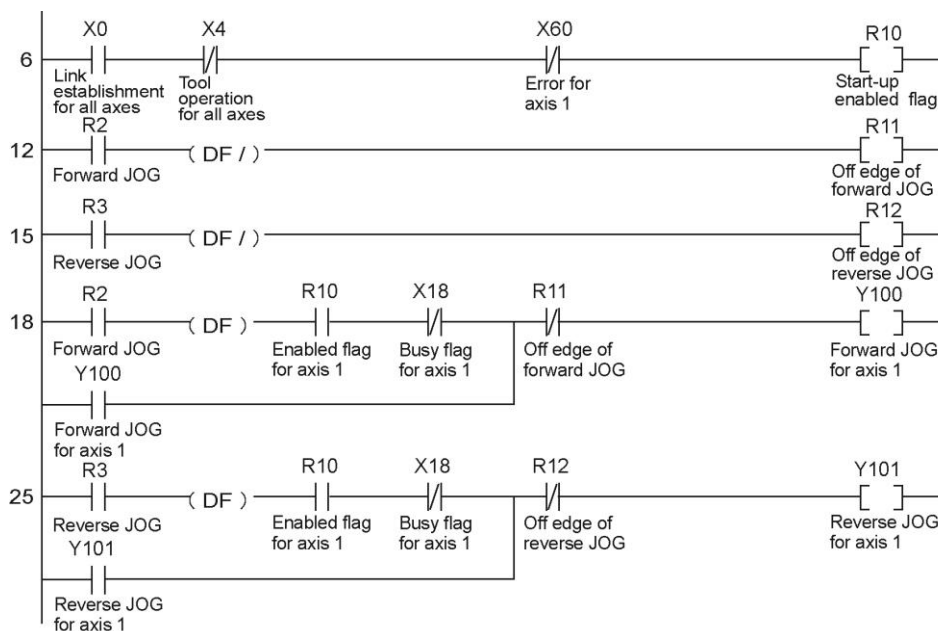
### Operation diagram



### Operations of each contact

- The BUSY flag (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 (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.

## Sample program



## 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

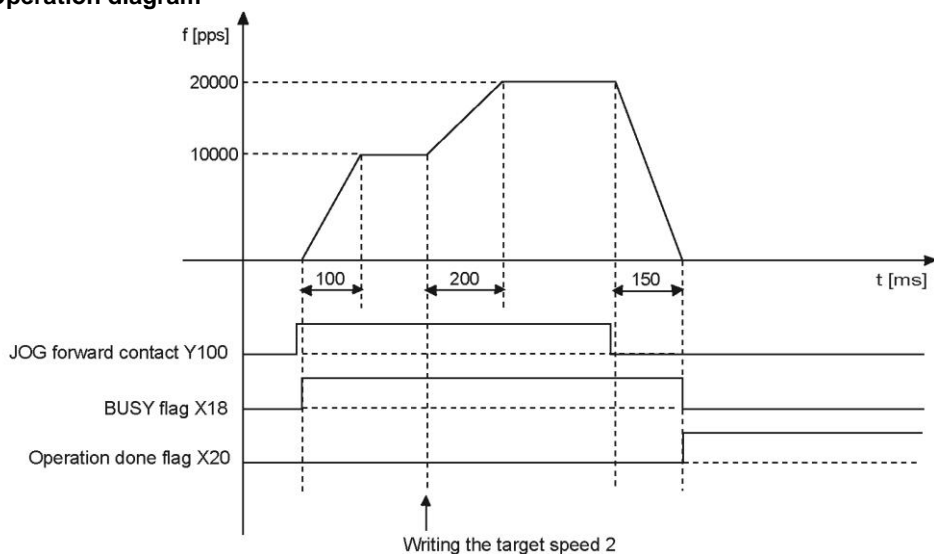
The target speed can be changed during the JOG operation.

### 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 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 $\mu\text{m}$ : 1 to 32,767,000 $\mu\text{m/s}$ Inch: 0.001 to 32,767.000 inch/s 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 $\mu\text{m}$ : 1 to 32,767,000 $\mu\text{m/s}$ Inch: 0.001 to 32,767.000 inch/s degree: 0.001 to 32,767.000 rev/s

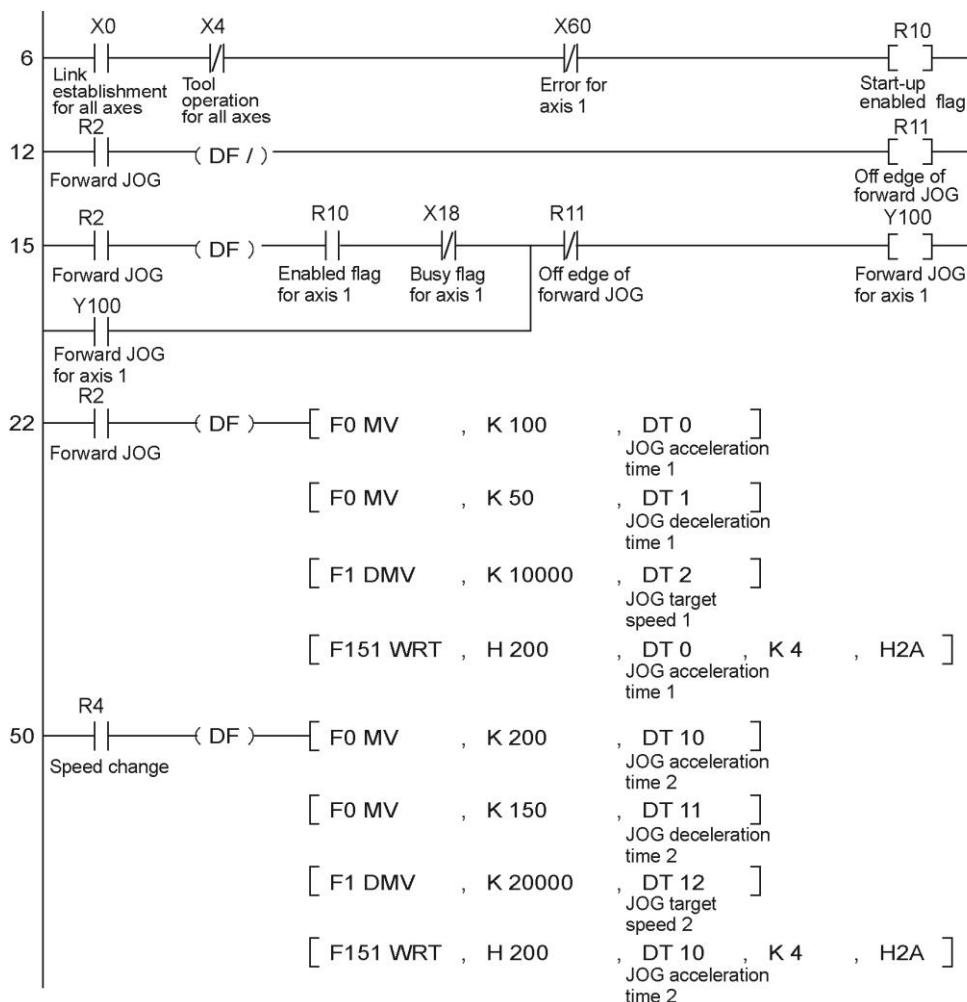
### Operation diagram



### Operations of each contact

- The BUSY flag (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 target speed can be changed freely in the JOG operation. Use a program to change the target speed.
- The operation done flag (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.

## Sample program



## 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**

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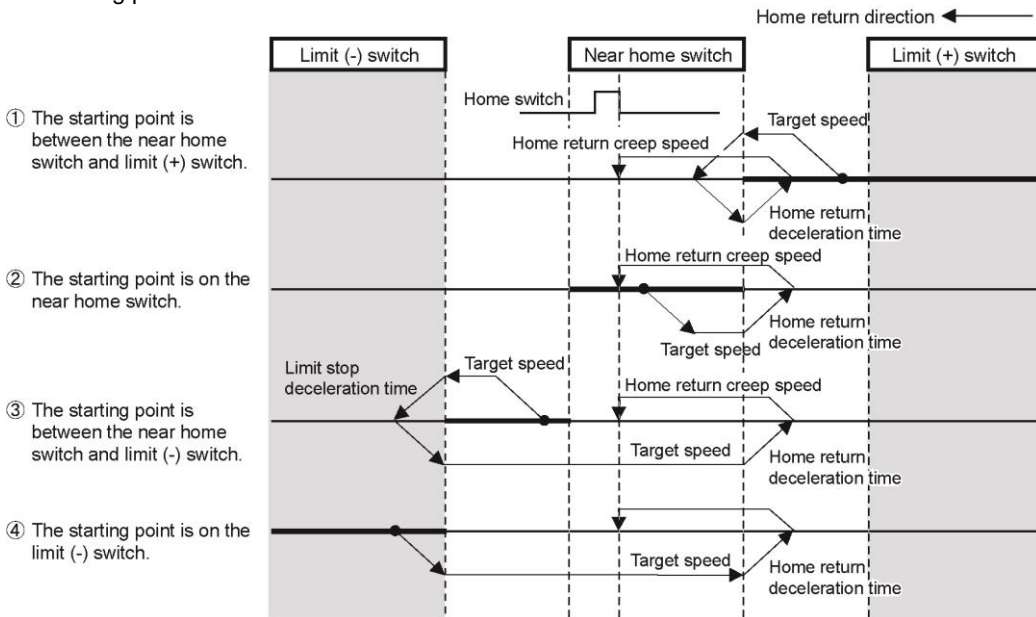
### **Manual Operation (Home Return)**

## 10.1 Types of Home Return

The home return is a function to move to the preset reference position and to set its coordinate to 0. The following home return methods are available for the positioning unit.

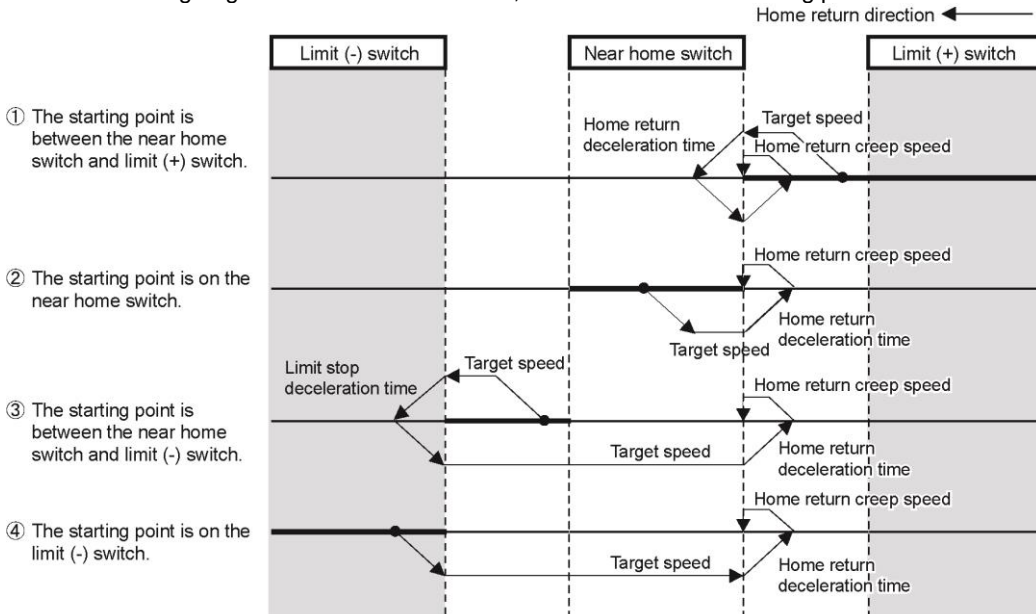
### DOG method 1 (Edge detection of near home switch + Home switch based on front-end)

Detects the rising edge of the near home switch, and the rising edge of the first home switch becomes the starting point.



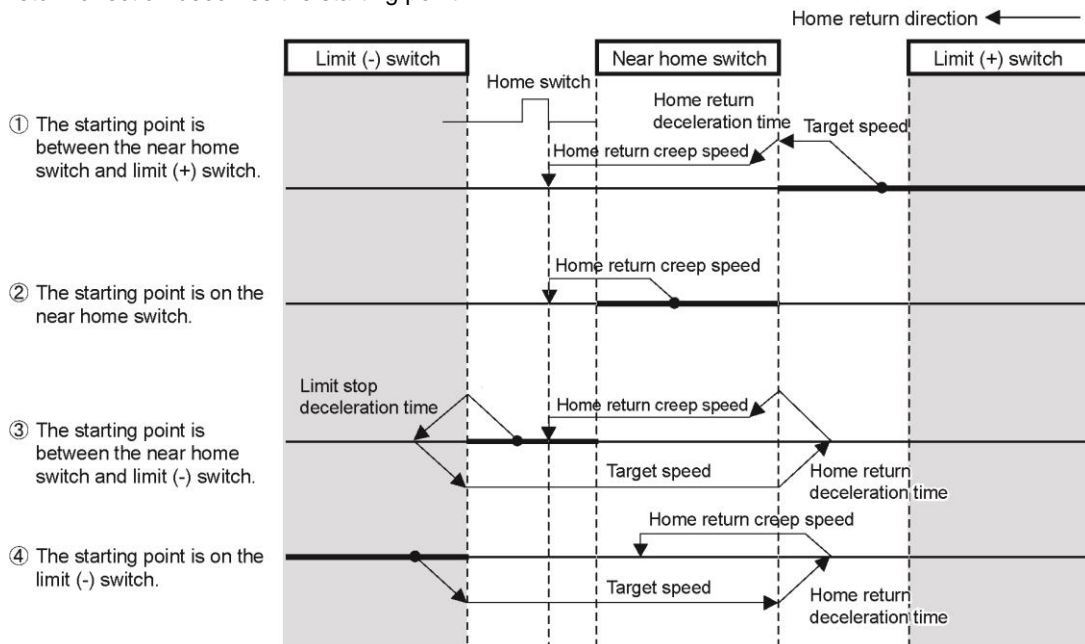
### DOG method 2 (Edge detection of near home switch)

Detects the rising edge of the near home switch, and it becomes the starting point.



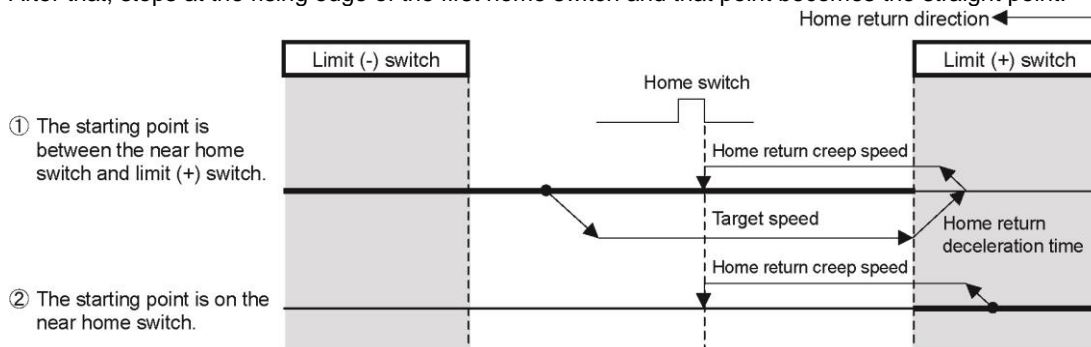
### DOG method 3 (Edge detection of near home switch + Home switch based on back-end)

Detects the trailing edge of the near home switch, and the first rising edge of the home switch in the home return direction becomes the starting point.



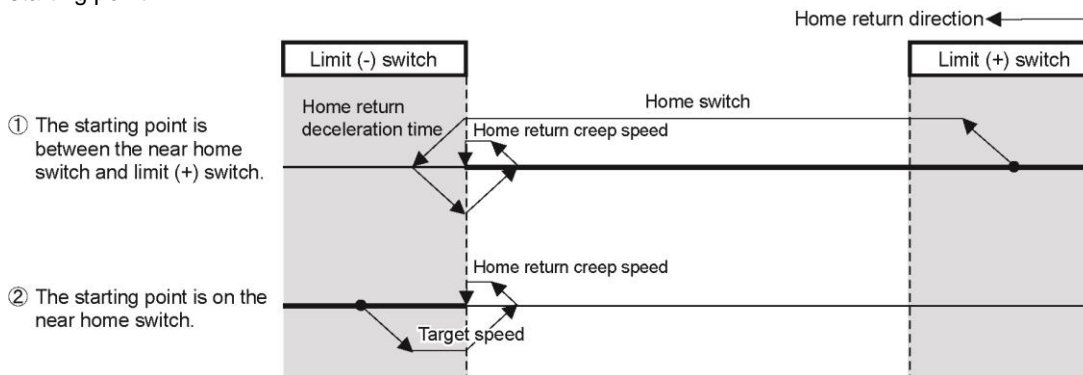
### Limit method 1 (Edge detection of limit switch + Home switch based on front-end)

Reverses after detecting the rising edge of the limit switch in the opposite direction of the home return. After that, stops at the rising edge of the first home switch and that point becomes the straight point.



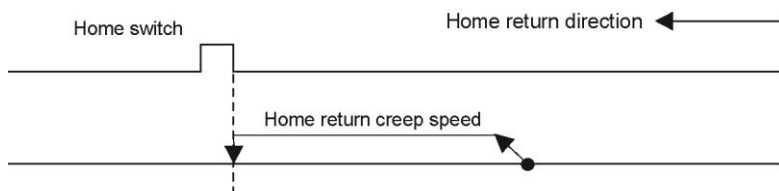
### Limit method 2 (Edge detection of limit switch)

Detects the rising edge of the limit switch in the home return direction and stops. That point becomes the starting point.



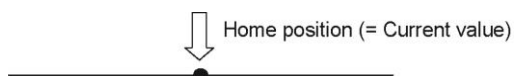
### Home method (Edge detection of home switch)

Moves toward the home return direction from the current value, stops after detecting the rising edge of the first home switch. That point becomes the starting point.



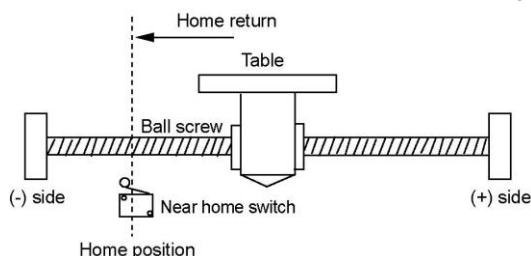
### Data set method

The current value becomes the starting point.



## 10.2 Setting and Operation of Home Return

The example below is the case of the positioning unit installed in the slot 0. The unit is set to pulse.

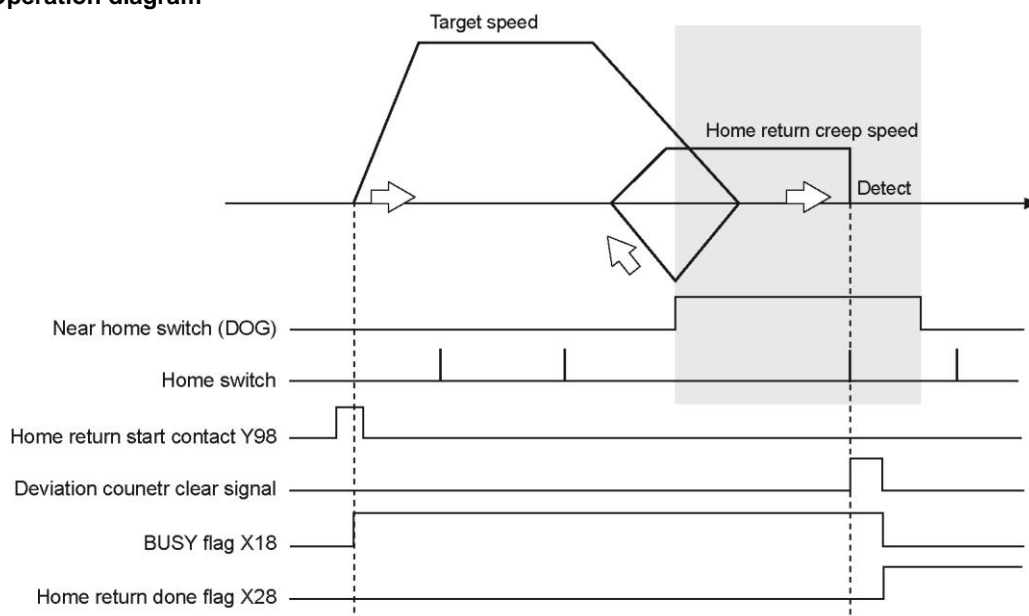


### Setting

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 code	0: DOG method 1	0: DOG method 1
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 $\mu\text{m}$ : 1 to 32,767,000 $\mu\text{m/s}$ Inch: 0.001 to 32,767.000 inch/s degree: 0.001 to 32,767.000 rev/s
Return creep speed	1000 pps	
Deviation counter clear signal ON time	1 ms	1 to 100 ms

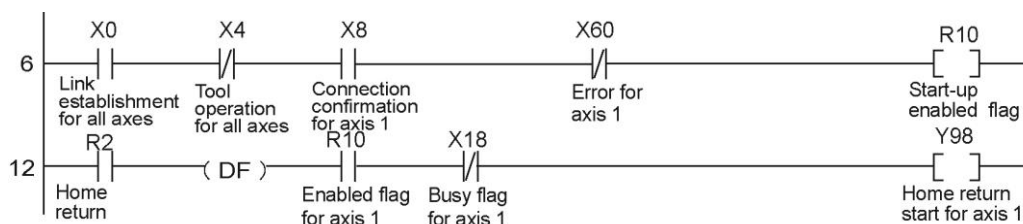
### Operation diagram



### Operations of each contact

- The BUSY flag (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 deviation counter clear signal turns on during the deviation counter clear signal ON time on completion of the home return operation.
- The home return done flag (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.

### Sample program



### 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**

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### **Manual Operation (Pulser Operation)**

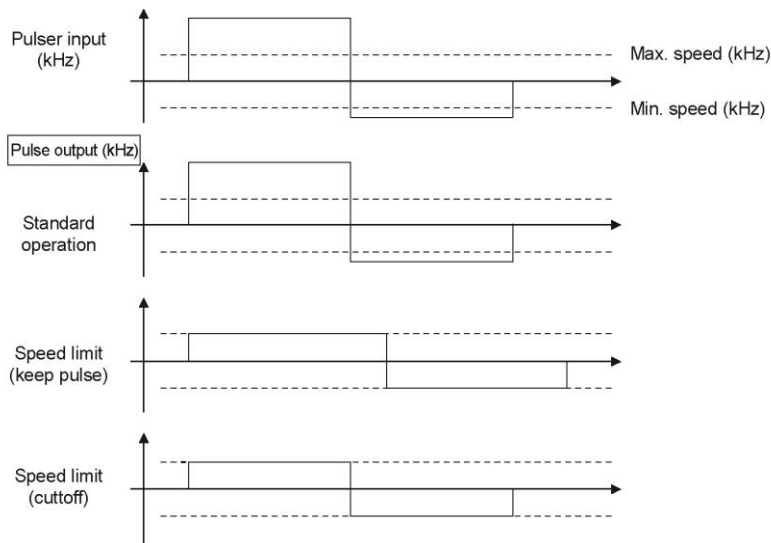
## 11.1 Setting and Operation of Pulser Operation

### Types of pulse operation

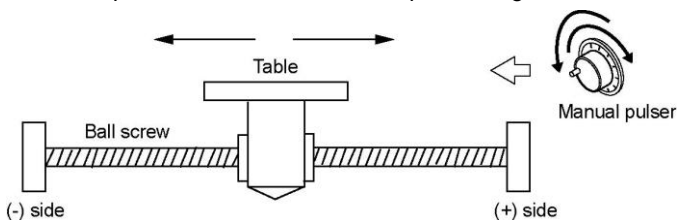
The pulser operation is a function to output pulses in the manual operation using the pulser connected to the positioning unit.

The following operation methods can be used.

Operation method	Operation
Standard operation	Obtains the number of pulses of the pulser in increment of 1 ms, and operates. The content of the input from the pulser are reflected in the actual operation as it is.
Speed limit (keep pulse)	Operates keeping the maximum speed, once the speed of the pulser input exceeds the specified maximum speed. The number of pulses that has been input with the pulser is kept. As the pulse that could not be output is kept, the pulse may be output even without input from the pulser. Speed unit is "Set unit X1000/s".
Speed limit (cutoff)	Operates keeping the maximum speed, once the speed of the pulser input exceeds the specified maximum speed The pulse that could not be output is cut off, and the pulse output is processed simultaneously with the operation of the pulser. Speed unit is "Set unit X1000/s".



The example below is the case of the positioning unit installed in the slot 0. The unit is set to pulse.

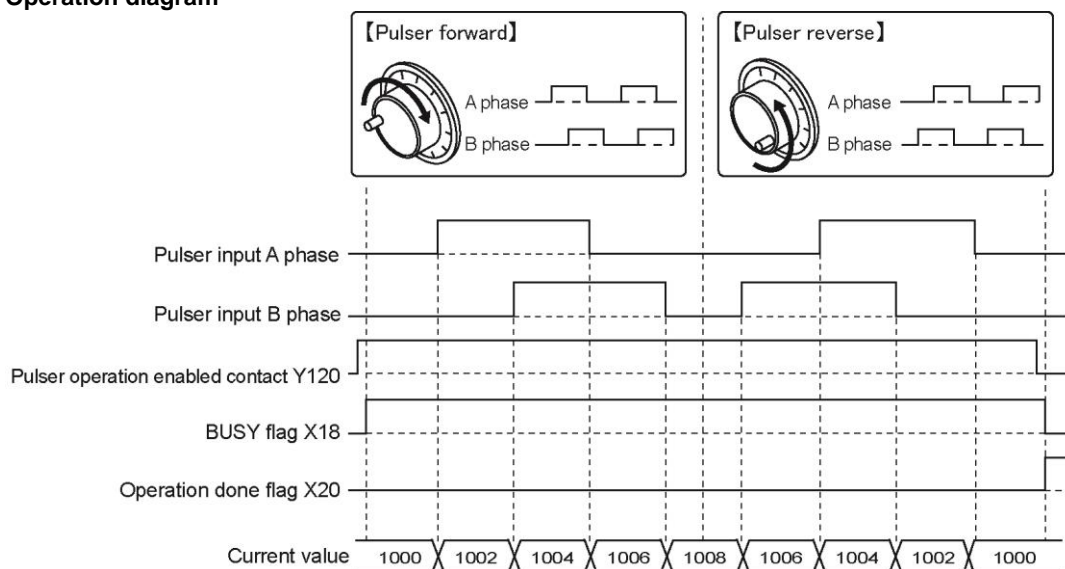


## Setting

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
Pulser operation method	2: Speed limit (cutoff)	0: Standard 1: Speed limit (keep pulse) 2: Speed limit (cutoff)
Pulser operation max. speed	500	Pulse: 1 to 32,767,000 kpps

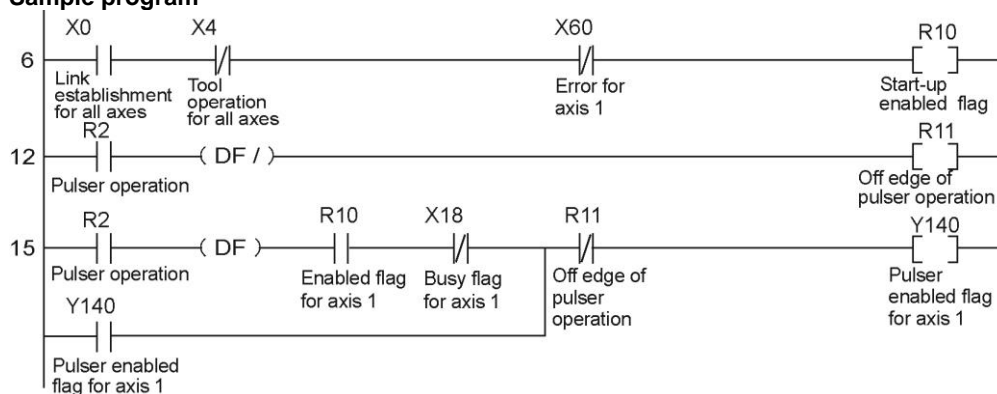
## Operation diagram



## Operations of each contact

- The BUSY flag (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 (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



### 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. Error occurs.
		Limit input (-):ON	Executable
	Reverse	Limit input(+):ON	Executable
		Limit input (-):ON	Not executable. Error occurs.
During Pulser operation	Forward	Limit input(+):ON	Deceleration stop. Error occurs.
	Reverse	Limit input (-):ON	Deceleration stop. Error occurs.

## Chapter 12

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### 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	Axis stopped	Operation
Deceleration stop	when the deceleration stop contact turns on	Each axis	Stops in deceleration time of the control being operated.
Pause	when the deceleration stop contact turns on	Each axis	Stops in deceleration time of the control being operated, and restarts the stopped control once the deceleration stop is reset.
Emergency stop	when the emergency stop contact turns on	Each axis	Stops in the emergency stop deceleration time.
Limit stop	when the input of limit switch turns on	Each axis	Stops in the limit stop deceleration time.
Software limit stop	when exceeding the range of the software limit	Each axis	
Error stop	when an error occurred	Each axis	Stops in the error stop deceleration time.
System stop	when the system stop contact turns on	All axes	Stops without deceleration time

The deceleration stop (pause), emergency stop and system stop is performed by turning on each request contact in the I/O area. The stopped state is held while each contact is on until each request signal turns off. Any operation cannot be performed in the stopped state.

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

Contact allocation	Target axis	Name	Descriptions
Y80	All axes	System stop	Contact for requesting the system stop. When it turns on, all axes will stop with 0-deceleration time.
Y110	1 axis	Emergency stop	Requests the emergency stop for the corresponding axes The deceleration time for the emergency stop is specified in the emergency stop deceleration time area of the shared memory. (The operation is the level type.)  Note) The deviation counter cannot be cleared.
Y111	2 axis		
Y112	3 axis		
Y113	4 axis		
Y114	-	-	-
Y115	-	-	-
Y116	-	-	-
Y117	-	-	-
Y118	1 axis	Deceleration stop	Requests the deceleration stop for the corresponding axes. The deceleration time for the deceleration stop is the deceleration time in operation. (The operation is the level type.)  Note) The deviation counter cannot be cleared.
Y119	2 axis		
Y11A	3 axis		
Y11B	4 axis		
Y11C	-	-	-
Y11D	-	-	-
Y11E	-	-	-
Y11F	-	-	-

## 12.2 Setting and Operation of Pause Function

The pause function is a function to temporarily stop the control in operation. The pause function is used switching between the deceleration stop function.

Using the pause function enables to perform the deceleration stop in the deceleration time of the control being operated by turning on the deceleration stop request contact.

After that, the stopped state is kept while the deceleration stop request contact is on, and the control stopped is restarted by turning off the deceleration stop request contact.

Switching between the pause function and deceleration stop function is carried out in the system operation setting area of the shared memory.

### System operation setting area

Bank	Offset address	Name	Description
00H	389H	Deceleration stop operation	<p>Specify the operation when turning on the deceleration stop request contact.</p> <p>0: Deceleration stop 1: Pause</p> <ul style="list-style-type: none"><li>- Performs the deceleration stop, and restarts the positioning operation when resetting "Deceleration stop request signal" (from ON to OFF).</li><li>- Performs the same operation as the deceleration stop except during the positioning operation.</li><li>- In the repeat operation, operates until getting to the E point targeted for repeating and stops. Restarts the repeat operation when resetting "Deceleration stop request signal" (from ON to OFF).</li><li>- When executing the system stop or emergency stop in paused state, the pause will be reset and the operation will not be restarted even if the "Deceleration stop request signal" is reset (from ON to OFF).</li></ul> <p>[Default] 0: Deceleration stop</p>



**Reference:** <17.4.13 System Operation Setting Area>



### Note:

The deceleration stop cannot be executed when using the pause function. Use the emergency stop function to execute the stop operation when using the pause function.

The pause function is available only when performing the automatic operation (positioning control). In the manual operation, it is the same operation as the deceleration stop.

The pause function keeps the stopped state as well as other stop functions when the deceleration stop (pause) request signal is on. If executing the emergency stop or system stop in paused state, the pause will be cancelled and the state will change to the one of the emergency stop or system stop.

The pause function cannot be specified by the Configurator PM. Change the operation with the program to use the pause function.



## **Chapter 13**

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### **Supplementary Functions**

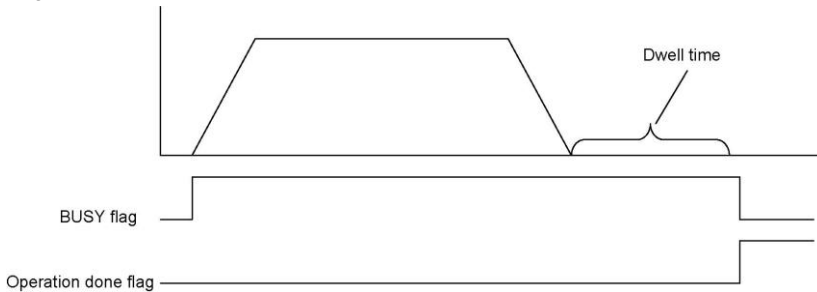
## 13.1 Dwell Time

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.

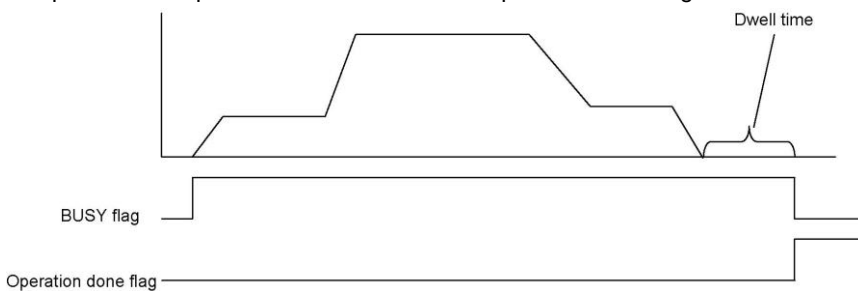
### For E point control

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

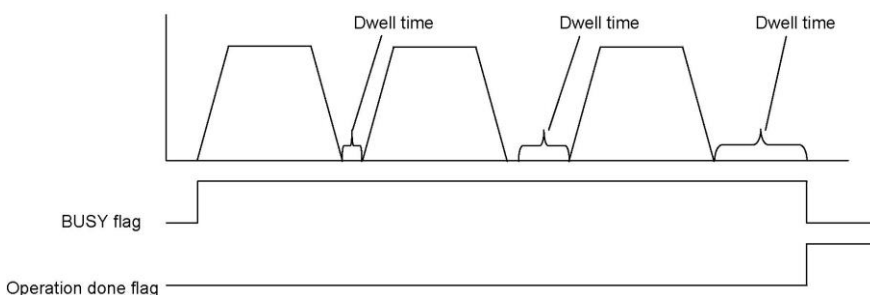
In the P point control, the positioning table operates consecutively, therefore, the dwell time is ignored. For the last table (E point), as well as the E point control, the dwell time is the time taken from the completion of the position command until the operation done flag turns on.



### For C point control

The dwell time is the waiting time for executing the next table from the completion of the positioning table (deceleration stop).

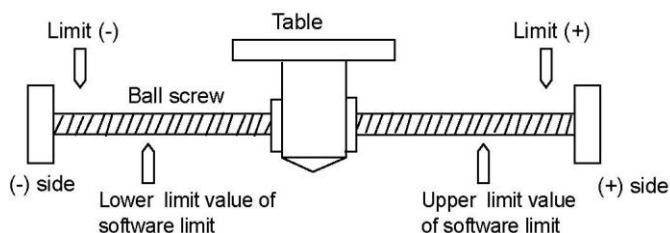
For the last table (E point), as well as the E point control, the dwell time is the time taken from the completion of the position command until the operation done flag turns on.



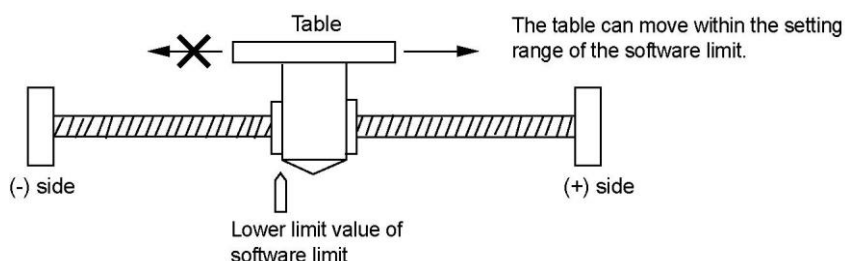
## 13.2 Software Limit

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. 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 error and move the motor into the range of the software limit 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.

## 13.3 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, J 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 or Delay mode.

### Auxiliary output contact

The With mode and Delay mode are available for the operation of the auxiliary output contact.

Auxiliary output mode	Operation
With mode	At the same time the automatic operation starts, the auxiliary contact flag of the corresponding axis allocated in the I/O area turns on.
Delay mode	The auxiliary contact flag of the corresponding axis allocated in the I/O area turns on according to the rate (%) of positioning moving amount in the automatic operation. The rate to turn on the flag in the Delay mode is specified in the auxiliary output delay rate area of the shared memory. However, if the J point control has been specified for the automatic operation, the operation is the same as the one in the With mode.

Also, the ON time of the auxiliary contact flag can be specified in the ms unit



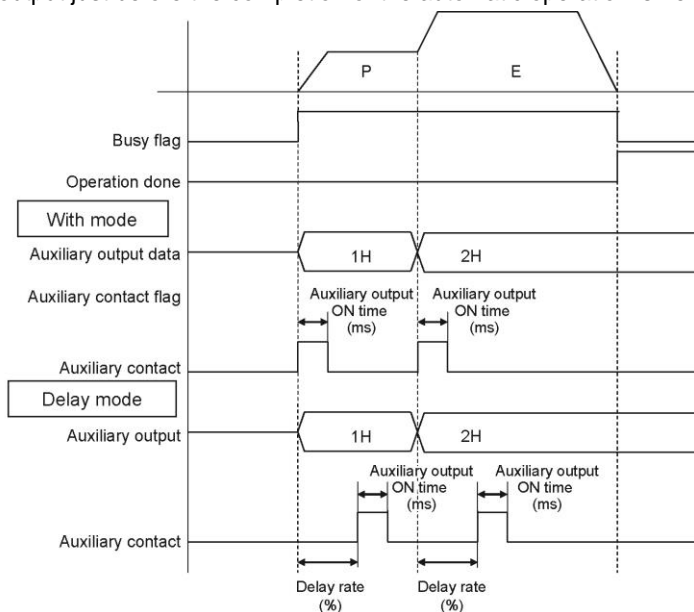
**Reference:** <17.6.2 Parameter Setting Area>



**Note:** When performing the J point control, the operation in the Delay mode is the same as the one in the With mode.

### 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.



**Note:** The auxiliary output data is stored when the positioning starts regardless of the type of auxiliary output modes (With mode or Delay mode).

## 13.4 Home Change

The current value update is a function to change the current value managed in the positioning unit to an arbitrary value.

Data must be written into the shared memory from the PLC in order to carry out the current value update. Followings are the details of the shared memory to carry out the current value update.

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

address	Name	Descriptions																																	
0C0H	Current value update request flag	Only when the corresponding bits for each axis changed to 1 from 0, the current value coordinate managed in the positioning unit is changed to the following current value update coordinate. After the change, the positioning unit clears the corresponding bits to 0 automatically.																																	
		<table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>0</td><td>Current value update request for axis 1</td><td>0</td><td rowspan="8">0: No change 1: Change the coordinate origin. (After the change, the positioning unit sets to 0 automatically.)</td></tr><tr><td>1</td><td>Current value update request for axis 2</td><td>0</td></tr><tr><td>2</td><td>Current value update request for axis 3</td><td>0</td></tr><tr><td>3</td><td>Current value update request for axis 4</td><td>0</td></tr><tr><td>4</td><td>Current value update request for axis 5</td><td>0</td></tr><tr><td>5</td><td>Current value update request for axis 6</td><td>0</td></tr><tr><td>6</td><td>Current value update request for axis 7</td><td>0</td></tr><tr><td>7</td><td>Current value update request for axis 8</td><td>0</td></tr><tr><td>15 to 8</td><td>—</td><td>—</td><td>—</td></tr></table>	bit	Name	Default	Descriptions	0	Current value update request for axis 1	0	0: No change 1: Change the coordinate origin. (After the change, the positioning unit sets to 0 automatically.)	1	Current value update request for axis 2	0	2	Current value update request for axis 3	0	3	Current value update request for axis 4	0	4	Current value update request for axis 5	0	5	Current value update request for axis 6	0	6	Current value update request for axis 7	0	7	Current value update request for axis 8	0	15 to 8	—	—	—
		bit	Name	Default	Descriptions																														
		0	Current value update request for axis 1	0	0: No change 1: Change the coordinate origin. (After the change, the positioning unit sets to 0 automatically.)																														
		1	Current value update request for axis 2	0																															
		2	Current value update request for axis 3	0																															
		3	Current value update request for axis 4	0																															
		4	Current value update request for axis 5	0																															
		5	Current value update request for axis 6	0																															
		6	Current value update request for axis 7	0																															
7	Current value update request for axis 8	0																																	
15 to 8	—	—	—																																
0C8H	Current value update coordinate of axis 1	Stores the coordinate to change the current value of axis 1.																																	
0C9H																																			
0CAH	Current value update coordinate of axis 2	Stores the coordinate to change the current value of axis 2.																																	
0CBH																																			
0CCH	Current value update coordinate of axis 3	Stores the coordinate to change the current value of axis 3.																																	
0CDH																																			
0CEH	Current value update coordinate of axis 4	Stores the coordinate to change the current value of axis 4.																																	
0CFH																																			
0D0H	Current value update coordinate of axis 5	Stores the coordinate to change the current value of axis 5.																																	
0D1H																																			
0D2H	Current value update coordinate of axis 6	Stores the coordinate to change the current value of axis 6.																																	
0D3H																																			
0D4H	Current value update coordinate of axis 7	Stores the coordinate to change the current value of axis 7.																																	
0D5H																																			
0D6H	Current value update coordinate of axis 8	Stores the coordinate to change the o current value of axis 8.																																	
0D7H																																			

### Procedures of current value update

1. Write an coordinate to be the current value in the current value update 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 current value request flag area.  
As the current value update process is performed for the axis that is 1 in the current value request flag area, do not set any bit to 1 other than the target axis.
3. The current value after unit conversion in each axis information and monitor area is changed to the specified current value.



**Note:** The value to be changed by updating the current value is the current value after unit conversion.

## 13.5 Coordinate Origin

The positioning unit sets the coordinate managed to 0 by the home return process. Coordinate origin is a function to set the coordinate after the home return process to an arbitrary value.

### Procedure of coordinate origin process

1. Write the coordinate to be the origin in the coordinate origin value area for the axis of which coordinate will be changed after the home return.
2. Execute the home return for the target axis. After the home return, the coordinated specified in the above 1 becomes the origin.



**Reference:** <17.6.2 Parameter Setting Area>

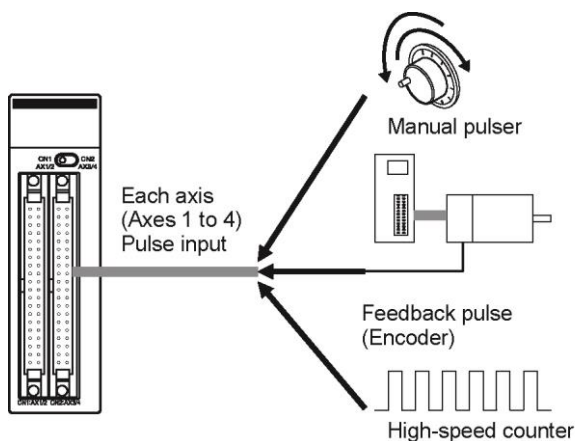


**Note:** The coordinate origin value should be specified in the specified unit.

## 13.6 Pulse Input

The positioning unit is equipped with the pulse input for each axis, and various input devices can be connected. Input devices are as follows.

Input device	Description
Pulser	<ul style="list-style-type: none"> <li>- Set for using the manual pulser.</li> <li>- Using the pulser operation setting code enables to specify which axis (ch) is used.</li> </ul>
Feedback pulse	<ul style="list-style-type: none"> <li>- Set for connecting an encoder to monitor the rotation of a motor.</li> <li>- When selecting the feedback pulse, the positioning unit counts the feedback pulse of one's axis using the pulse input value, and detects the difference between the command value and pulse input value. (Moving amount automatic check function)</li> </ul>
High-speed counter	<ul style="list-style-type: none"> <li>- Set for using as a general-purpose counter input. Various input modes (2-phase input, direction discrimination input, individual input) are available.</li> <li>- The positioning unit stores the number of input pulses in the monitor area.</li> </ul>



**Reference:** <5.3 Setting the Pulse Input Mode>

## 13.6.1 Monitoring Pulse Input Values

The pulse input values can be monitored from programs on the positioning unit.  
The following areas are used for monitoring the pulse input values.

### [Axis information & monitor area]

#### 1st axis

Bank	Offset address	Name	Descriptions
01H	036H	Pulse input value of axis 1	Stores the pulse input value according to the pulse input purpose (pulser, feedback pulse, high-speed counter). (Unit: pulse) The pulse input value is stored, and cleared by changing the pulse input purpose or clearing the pulse input value.
	037H		

#### 2nd axis

Bank	Offset address	Name	Descriptions
01H	076H	Pulse input value of axis 2	Refer to the description of 1st axis.
	077H		

#### 3rd axis

Bank	Offset address	Name	Descriptions
01H	0B6H	Pulse input value of axis 3	Refer to the description of 1st axis.
	0B7H		

#### 4th axis

Bank	Offset address	Name	Descriptions
01H	0F6H	Pulse input value of axis 4	Refer to the description of 1st axis.
	0F7H		



Reference: <17.5.2 Each Axis Information & Monitor Area>

## 13.6.2 Pulse Input Function

A manual pulser can be used by setting the pulse input purpose of the positioning unit to “Pulser”.  
With the manual pulser, pulsers connected to different axes can be used according to the setting.  
Therefore, more than one axis can be operated simultaneously with one pulser. However, a care should be taken to set the axis which the pulser is connected and the axis which the pulser operates.  
Refer to the table below to set the pulse input purpose.

Setting of pulse input purpose		Pulser operation	
Axis that pulser is connected	Axis that pulser operates	Operation	Description
Feedback pulse	Feedback pulse High-speed counter Pulser	Not available	As the positioning unit does not recognize the input pulse as the manual pulser, it does not perform the pulser operation.
High-speed counter			
Pulser	Feedback pulse	Available	Performs the pulser operation. The function of the feedback pulse is available during the pulser operation.
	High-speed counter	Available	Performs the pulser operation. The function of the high-speed counter is available during the pulser operation.
	Pulser	Available	Performs the pulser operation.



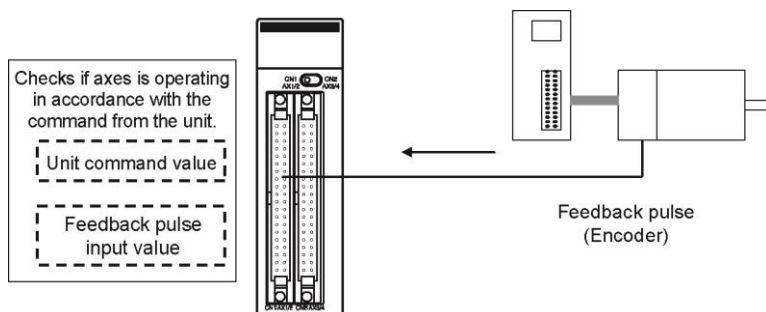
Reference: <5.3 Setting the Pulse Input Mode >

### 13.6.3 Function of Feedback Pulse

The function using the feedback pulse from an encoder can be used by setting the pulse input purpose to “Feedback pulse” on the positioning unit.

#### Moving amount automatic check function

It is a function to check whether an operating axis is activating in accordance with the command value. The difference (deviation) between the current value (absolute) managed within the unit and the feedback pulse value to be input is compared to the preset threshold. The moving amount automatic check function activates in all operations. This function activates only when setting the pulse input purpose to “Feedback pulse”, and this is ignored when setting to “Pulse” or “High-speed counter”.



The setting for the moving amount automatic check function is specified in the following area.

#### 1st axis

Bank	Offset address	Name	Descriptions
02H	008H	Moving amount automatic check correction numerator	Set the correction value for the pulse input to be performed when executing the moving amount automatic check.
	009H	Moving amount automatic check correction denominator	The deviation feedback value (pulse input value after correction) is calculated with the pulse input value by the following calculating formula, and the moving amount automatic check is executed. Deviation feedback value = (Correction numerator / Correction denominator) x Pulse input
	00AH	Moving amount automatic check operation	Set the operation to be performed when the difference between the command value and feedback value exceeds the moving amount check value.  0: Error occurs. If the difference between the feedback value and the command moving amount exceeded the moving amount check value (threshold), an error occurs and the operation stops. The pulse input value will be cleared after clearing the error. 1: Warning occurs. If the difference between the feedback value and the command moving amount exceeded the moving amount check value (threshold), a warning occurs and the operation continues. The pulse input value will be cleared after clearing the warning. 2: Off The moving amount check is not performed.
	018H	Moving amount automatic check value	Set the shreshold to perform the moving amount automatic check function.
	01AH	Moving amount automatic check interval	Set the interval to perform the moving amount automatic check function. (unit: ms)

## 2nd axis

Bank	Offset address	Name	Descriptions
0CH	008H	Moving amount automatic check correction numerator	Refer to the description of 1st axis.
	009H	Moving amount automatic check correction denominator	
	00AH	Moving amount automatic check operation	Refer to the description of 1st axis.
	018H	Moving amount automatic check value	Refer to the description of 1st axis.
	01AH	Moving amount automatic check interval	Refer to the description of 1st axis.

## 3rd axis

Bank	Offset address	Name	Descriptions
16	008H	Moving amount automatic check correction numerator	Refer to the description of 1st axis.
	009H	Moving amount automatic check correction denominator	
	00AH	Moving amount automatic check operation	Refer to the description of 1st axis.
	018H	Moving amount automatic check value	Refer to the description of 1st axis.
	01AH	Moving amount automatic check interval	Refer to the description of 1st axis.

## 4th axis

Bank	Offset address	Name	Descriptions
20H	008H	Moving amount automatic check correction numerator	Refer to the description of 1st axis.
	009H	Moving amount automatic check correction denominator	
	00AH	Moving amount automatic check operation	Refer to the description of 1st axis.
	018H	Moving amount automatic check value	Refer to the description of 1st axis.
	01AH	Moving amount automatic check interval	Refer to the description of 1st axis.



**Reference:** <17.6.2 Parameter Setting Area>

## Operation of moving amount automatic check function

The moving amount automatic check function activates in the following procedure in all operations.

1. The current value that has been held by the positioning unit is stored in the positioning unit at the same time that the operation starts.
2. After the start of operation, the moving amount automatic check function stops until “Moving amount automatic check interval” elapses.
3. After the moving amount automatic check interval, the deviation feedback value calculated from the current pulse input value is compared to the stored pulse input value, and it is checked if the difference (deviation) between those values exceeds the specified value for the moving amount automatic check value.
4. The current value that has been held by the positioning unit is stored in the positioning unit.
5. The above 2 to 4 operations are continued.



**Note:** The moving amount automatic check interval should be specified in consideration of the response time of the encoder used.

### Monitoring the moving amount automatic check function

The value (deviation) that is calculated by the moving amount automatic check function can be checked with a program.

The following areas are used for monitoring the deviation.

#### [Axis information & monitor area]

##### 1st axis

Bank	Offset address	Name	Descriptions
01H	034H	Deviation of axis 1	Stores the maximum value of deviation (difference between the pulse input value and command value) of 1st axis.
	035H		

##### 2nd axis

Bank	Offset address	Name	Descriptions
01H	074H	Deviation of axis 2	Refer to the description of 1st axis.
	075H		

##### 3rd axis

Bank	Offset address	Name	Descriptions
01H	0B4H	Deviation of axis 3	Refer to the description of 1st axis.
	0B5H		

##### 4th axis

Bank	Offset address	Name	Descriptions
01H	0F4H	Deviation of axis 4	Refer to the description of 1st axis.
	0F5H		



**Reference:** <17.5.2 Each Axis Information & Monitor Area>

### Clearing pulse input values

Pulses that have been input as feedback pulses are calculated and stored as pulse input values. When using "Feedback pulse" for the pulse input purpose, the pulse input value is cleared when performing the home return.

### Changing pulse input values

The pulse input value that has been input can be changed to an arbitrary value when setting the pulse input purpose to the feedback pulse.

The following area is used for changing the pulse input value.

#### [Pulse count control area]

Bank	Offset address	Name	Descriptions																					
00H	241H	Pulse count value change request flag	When turns the corresponding bits for each axis from 0 to 1, the pulse input value will be changed to the specified pulse count changed value. This flag is an edge trigger. It should be always turned to 1 from 0 when changing the value.																					
			<table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>0</td><td>Pulse count change of axis 1</td><td>0</td><td rowspan="4">0: Not change the pulse input value. 0 → 1 : Change the pulse input value.</td></tr><tr><td>1</td><td>Pulse count change of axis 2</td><td>0</td></tr><tr><td>2</td><td>Pulse count change of axis 3</td><td>0</td></tr><tr><td>3</td><td>Pulse count change of axis 4</td><td>0</td></tr><tr><td>15 to 4</td><td>—</td><td>—</td><td>—</td></tr></table>	bit	Name	Default	Descriptions	0	Pulse count change of axis 1	0	0: Not change the pulse input value. 0 → 1 : Change the pulse input value.	1	Pulse count change of axis 2	0	2	Pulse count change of axis 3	0	3	Pulse count change of axis 4	0	15 to 4	—	—	—
			bit	Name	Default	Descriptions																		
			0	Pulse count change of axis 1	0	0: Not change the pulse input value. 0 → 1 : Change the pulse input value.																		
			1	Pulse count change of axis 2	0																			
			2	Pulse count change of axis 3	0																			
			3	Pulse count change of axis 4	0																			
	15 to 4	—	—	—																				
	248H	Pulse input changed value of axis 1	Set the pulse input value of axis 1 to be changed.																					
	249H																							
	24AH	Pulse input changed value of axis 2	Set the pulse input value of axis 2 to be changed.																					
	24BH																							
	24CH	Pulse input changed value of axis 3	Set the pulse input value of axis 3 to be changed.																					
24DH																								
24EH	Pulse input changed value of axis 4	Set the pulse input value of axis 4 to be changed.																						
24FH																								



Reference: <17.4.11 Pulse Count Control Area>

## 13.6.4 Function of High-speed Counter

Setting the pulse input purpose to “High-speed counter” enables the pulse input to be used as an external counter.

### Control of pulse input

On the positioning unit, when setting the pulse input purpose to “High-speed counter”, the count of pulse input value can be arbitrarily stopped. When the count of pulse input value stops, the current pulse input value is held.

The following area is used to specify to disable/enable the count of pulse input.

#### [Pulse count control area]

Bank	Offset address	Name	Descriptions			
00H	240H	Pulse count enable flag	When the corresponding bits for each axis is 0, the count of pulse input value is performed.			
			bit	Name	Default	Descriptions
			0	Pulse count permission of axis 1	0	0: Permit pulse count. 1: Disable pulse count.
			1	Pulse count permission of axis 2	0	
			2	Pulse count permission of axis 3	0	
			3	Pulse count permission of axis 4	0	
			15 to 4	—	—	—



Reference: <17.4.11 Pulse Count Control Area>

## Changing pulse input values

The pulse input value that has been input can be changed to an arbitrary value when setting the pulse input purpose to the high-speed counter.

The following area is used for changing the pulse input value.

### [Pulse count control area]

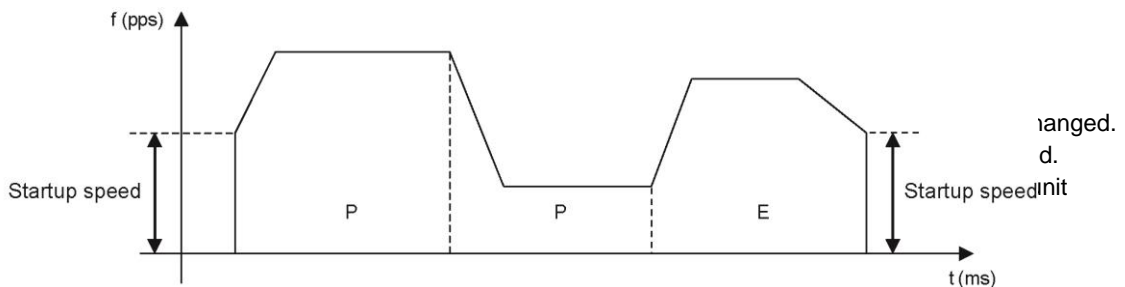
Bank	Offset address	Name	Descriptions																					
00H	241H	Pulse count value change request flag	When turns the corresponding bits for each axis from 0 to 1, the pulse input value will be changed to the specified pulse count changed value. This flag is an edge trigger. It should be always turned to 1 from 0 when changing the value.																					
			<table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>0</td><td>Pulse count change of axis 1</td><td>0</td><td rowspan="4">0: Not change the pulse input value. 0 → 1 : Change the pulse input value.</td></tr><tr><td>1</td><td>Pulse count change of axis 2</td><td>0</td></tr><tr><td>2</td><td>Pulse count change of axis 3</td><td>0</td></tr><tr><td>3</td><td>Pulse count change of axis 4</td><td>0</td></tr><tr><td>15 to 4</td><td>—</td><td>—</td><td>—</td></tr></table>	bit	Name	Default	Descriptions	0	Pulse count change of axis 1	0	0: Not change the pulse input value. 0 → 1 : Change the pulse input value.	1	Pulse count change of axis 2	0	2	Pulse count change of axis 3	0	3	Pulse count change of axis 4	0	15 to 4	—	—	—
			bit	Name	Default	Descriptions																		
			0	Pulse count change of axis 1	0	0: Not change the pulse input value. 0 → 1 : Change the pulse input value.																		
			1	Pulse count change of axis 2	0																			
			2	Pulse count change of axis 3	0																			
	3	Pulse count change of axis 4	0																					
	15 to 4	—	—	—																				
	248H	Pulse input changed value of axis 1	Set the pulse input value of axis 1 to be changed.																					
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24DH																								
24EH	Pulse input changed value of axis 4	Set the pulse input value of axis 4 to be changed.																						
24FH																								



Reference: <17.4.11 Pulse Count Control Area>

## 13.7 Startup Speed

The startup speed when starting various operations can be specified. The startup speed can be used for the positioning control, JOG operation and home return.



## **Chapter 14**

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### **Precautions During Programming**

## **14.1 Precautions During Programming**

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

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The data in the shared memory of the positioning unit 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.

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 An Operation Started does Not Change to Another Operation**

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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 RTE<sub>X</sub>, 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 calculation 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 positioning 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 recalculation request contact (Y87) in the I/O area.
3. Confirm the recalculation done contact (X7) in the I/O area is on. (Confirm 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 starting 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**

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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

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### Errors and Warnings

## 15.1 Errors and Warnings

### 15.1.1 About Errors and Warnings

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

<b>Errors</b>	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.
<b>Warnings</b>	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.

### 15.1.2 Error and Warning Logs

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

<b>Error log</b>	Max. 7 error codes can be stored for each axis (axis 1 to 4).
<b>Warnings log</b>	Max. 7 warning codes can be stored for each axis (axis 1 to 4).

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 a 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	Offset	Name
128H	Error log area of axis 1	00H	—
		01H	No. of occurrences of errors
138H	Error log area of axis 2	02H	Error code annunciation buffer 1
		03H	Error code annunciation buffer 2
148H	Error log area of axis 3	04H	Error code annunciation buffer 3
		05H	Error code annunciation buffer 4
158H	Error log area of axis 4	06H	Error code annunciation buffer 5
		07H	Error code annunciation buffer 6
		08H	Error code annunciation buffer 7
		09H	Error code annunciation buffer 8
		0AH	Error code annunciation buffer 9
		0BH	Error code annunciation buffer 10
		0CH	Error code annunciation buffer 11
		0DH	Error code annunciation buffer 12
		0EH	Error code annunciation buffer 13
		0FH	Error code annunciation buffer 14

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

Address	Name	Offset	Name
1A8H	Warning log area of axis 1	00H	—
		01H	No. of occurrences of warnings
1B8H	Warning log area of axis 2	02H	Warning code annunciation buffer 1
		03H	Warning code annunciation buffer 2
1C8H	Warning log area of axis 3	04H	Warning code annunciation buffer 3
		05H	Warning code annunciation buffer 4
1D8H	Warning log area of axis 4	06H	Warning code annunciation buffer 5
		07H	Warning code annunciation buffer 6
		08H	Warning code annunciation buffer 7
		09H	Warning code annunciation buffer 8
		0AH	Warning code annunciation buffer 9
		0BH	Warning code annunciation buffer 10
		0CH	Warning code annunciation buffer 11
		0DH	Warning code annunciation buffer 12
		0EH	Warning code annunciation buffer 13
		0FH	Warning code annunciation buffer 14

<b>Number of occurrences of errors/warnings</b>	Stores the number of occurrences of errors and warnings.
<b>Error/warning annunciation buffers (1 to 4)</b>	Stores error and warning codes. The buffer 1 is always the latest code.

### 15.1.3 Error 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 monitor screen of the Configurator PM, but errors/warnings can be cleared by the error clear request flag or warning clear request flag allocated in the I/O area.

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

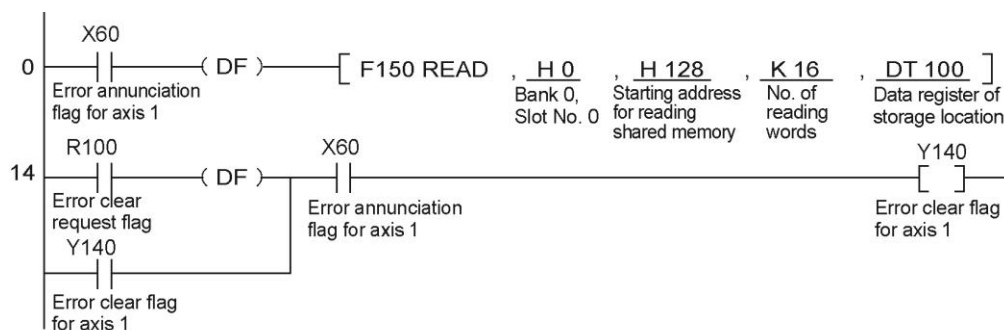
### 15.1.4 Error and Warning Code Format

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.



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)

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### 15.2.1 Overview of Operational Change

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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. -After an error occurred, the Positioning Unit can recover the error at any timing.	All error types
Unrecoverable state (×)	-Error when a critical trouble occurred on the Positioning Unit system -When an unrecoverable error occurred, the power supply of the Positioning Unit should be restored.	System error Axis operation error

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

## 15.3 List of System Codes

### 15.3.1 System Errors (From 1000H)

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. Item: Writing error Verify error Erase error	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.
1030H	High-order CPU error	An alarm occurred on a higher-order CPU (control unit or CPU).	All axes	N/A	Check the status of higher-order CPU. Turn on the power supply again.

## 15.3.2 Axis Operation Errors (From 3000H)

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
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. 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 error	Both inputs on the plus and minus sides of the limit turned on.	Each axis	A	Check the status of the limit signal. 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. 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.	Each axis	A	Check the setting values and parameters of the positioning unit. 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.	Each axis All axes	A	Turn off the power supply and turn it on again. 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. - The setting of axis group is out of the range	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 operation.	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 operation.	Each axis	A	Changing the axis group should be performed when the pulser operation enabled signal is off.
3035H	Positioning moving amount error	The positioning moving amount exceeded the upper/lower limit value.	Each axis	A	Check the setting values.
3040H	Synchronous operation group error	The synchronous group was changed during the synchronous operation or when requesting the stop in the synchronous operation.  - The setting of synchronous group is out of the range. - 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. Also, it should be performed when various stop request signals (system stop, emergency stop, deceleration stop) are off.  Specify an axis number existing on the network.

Error code	Error name	Description	Object	Clear	Countermeasures
3042H	Synchronous operation home return error	<p>- The home return process was executed with setting the synchronous operation to "Enabled" when using the synchronous mode A.</p> <p>- A method other than the usable home return methods was executed when using the synchronous mode B.</p>	Each axis	A	<p>Simultaneous mode A: Set the simultaneous operation to "Disabled" when performing the home return.</p> <p>Simultaneous mode B: Select a usable home return method.</p>
3043H	Synchronous operation error	The operation was stopped as an error has occurred on another axis in the synchronous operation.	Each axis	A	Check the unit setting of the stopped axis. 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 operation 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 axis difference check 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.
3046H	Moving amount automatic check value error	The difference between the command value and feedback value exceeded the moving amount automatic check value with the moving amount automatic check function.	Each axis	A	Check the operation of the target axis. Check the parameter for the moving amount automatic check function.

### 15.3.3 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. <ul style="list-style-type: none"> <li>- The same axis number has been registered in more than one group.</li> <li>- Four or more axes have been set in one group.</li> <li>- The group is composed of one axis only.</li> </ul>
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. Pulse, $\mu$ m, inch, degree
4004H	Pulse number error per rotation	The pulse number is out of the range.	Each axis	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	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 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 error 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	
4028H	Auxiliary output setting error	The settings of auxiliary output are not correct. <ul style="list-style-type: none"> <li>- A mode other than With mode or Delay mode for the auxiliary output mode has been set.</li> <li>- A value other than 0 to 100 (%) was specified for the auxiliary output delay ratio in the delay mode.</li> </ul>	Each axis	A	
4030H	Synchronous group setting error	<ul style="list-style-type: none"> <li>- The same axis has been set for the synchronous groups 1 and 2.</li> <li>- Either master axis or slave axis has not been set.</li> <li>- Multiple axes have been set for the master or slave axis.</li> <li>- The same axis has been set for the master and slave axes.</li> <li>- The slave axis has been set to the interpolation group.</li> </ul>	Each axis	A	

A: Available N/A: Not available

Error code	Error name	Description	Object	Clear	Countermeasures
4031H	Synchronous operation method setting error	The operation setting for the synchronous operation difference check function is incorrect.	Each axis	A	Check the setting value. If the error occurred repeatedly with the correct setting value, please contact us.
4042H	Pulser setting error	The pulser input mode is incorrect. The pulser operation method is incorrect. The pulser operation maximum speed is incorrect.	Each axis	A	
4043H	Pulser disable error	The pulse input purpose for the axis that has been set to enable the pulser input is not set to "Pulser".	Each axis	A	
4044H	Speed rate error	The setting of the speed rate is out of the range.	Each axis	A	Check the the setting of pulser input purpose. Set the input purpose to "Pulser" when using the pulser.
4050H	Startup speed error	The setting of the startup speed 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	
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. (It occurs when the home return method is set to the stop-on-contact method 1 or 2.)	Each axis	A	Check the setting value. If the error occurred repeatedly with the correct setting value, please contact us.
4120H	Coordinate origin error	The coordinate origin is out of the range.	Each axis	A	
4201H	JOG operation target speed error	The target speed of the JOG operation is out of the range.	Each axis	A	
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	

A: Available N/A: Not available

Error code	Error name	Description	Object	Clear	Countermeasures
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	
4600H	Pulse input setting error	The setting of the pulse input mode is incorrect.	Each axis	A	Cehck the setting value. Check the combination of the input mode, input multiplying, input purpose.
4605H	Pulse count changed value setting error	The specified pulse count changed value is out of the range.	Each axis	A	Check the setting value.
4609H	Moving amount automatic check operation method setting error	The setting for the operation of moving amount automatic check function is incorrect.	Each axis	A	
4610H	Moving amount automatic check correction numerator setting error	The moving amount automatic check correction numerator is out of the range.	Each axis	A	
4611H	Moving amount automatic check correction denominator setting error	The moving amount automatic check correction denominator is out of the range.	Each axis	A	
4613H	Moving amount automatic check interval setting error	The moving amount automatic check interval is out of the range.	Each axis	A	

## 15.4 List of Warning Codes)

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

### 15.4.1 Unit Warnings (From B000H)

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. - 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	A	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.
B045H	Synchronous axis difference check warning	The difference of the moving amount of the target axis for the synchronous operation exceeded the specified threshold.  This warning occurs when setting the synchronous operation method and the synchronous difference check function to "Warning".	Each axis	A	Check the operation of the target axis.
B046H	Moving amount automatic check warning	The difference between the command value and feedback value exceeded the specified moving amount automatic check value with the moving amount automatic check function.  This warning occurs when setting the moving amount automatic check operation to "Warning".	Each axis	A	Check the operation of the target axis.
B304H	Recalculation error warning	An error occurred during recalculation processing.	Each axis	A	Check the setting of parameters or interpolation group for each axis.



## Chapter 16

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## Troubleshooting

## 16.1 Troubleshooting

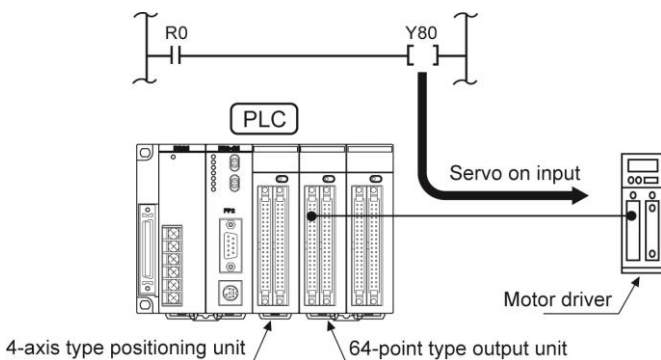
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### 16.1.1 If the Motor Does Not Turn or Operate (if the LED for pulse output A or B is flashing or lighted)

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#### Solution 1: For the servomotor

Check to make sure the servo on input is set to "ON".



#### Solution 2

Check to make sure the power supply for the driver is ON.

#### Solution 3

Check to make sure the wiring between the positioning unit and the driver has been correctly connected.

#### Solution 4

Check to make sure the settings for the pulse output method (CW/CCW method or Pulse/Sign method) are appropriate for the driver.

### 16.1.2 If the Motor Does Not Turn or Operate (if the LED for pulse output A or B is not lighted)

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#### Solution

Review the program and correct it if necessary.

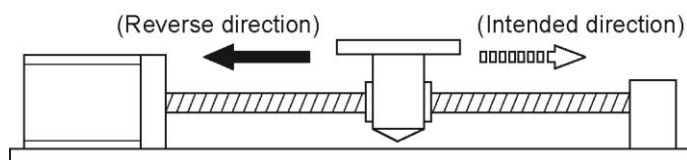
#### Points to check:

1. Check to make sure the I/O numbers are appropriate.
2. Check non-rewriting of the start flag in the program.
3. Check the input valid logic of the Over limit switch. (In this case, Error LED is blinking.)

### 16.1.3 Rotation/Movement Direction is Reversed

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**Example of reversed rotation/movement direction:**



#### **Solution 1**

Make sure the wiring between the positioning unit and the driver has been correctly connected.

#### **Point to check:**

Make sure the CW/CCW output or the Pulse/Sign output has been connected to the pertinent input on the driver side.

#### **Solution 2**

Change the pulse output rotation direction in the parameters for each axis, and set the rotation to the reverse direction.



## Chapter 17

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## Specifications

## 17.1 Table of Specificationa

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### 17.1.1 General Specifications

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Item	Description
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	1500 V AC, 1 minute 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) 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. Double amplitude of 0.75 mm, 10 min. each in the X, Y, Z directions
Shock resistance	Shock of 98 m/s <sup>2</sup> , 4 times in the X, Y, Z directions
Noise immunity	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
Weight	Approx. 150 g

## 17.1.2 Performance Specifications

Item			Description				
			2-axis type		4-axis type		
Product number			AFP243710	AFP243711	AFP243720	AFP243721	
Part number			FP2-PP2T	FP2-PP2L	FP2-PP4T	FP2-PP4L	
Output type			Transistor	Line driver	Transistor	Line driver	
Number of axes controlled			2 axes			4 axes	
Interpolation control			2-axis linear interpolation 2-axis circular interpolation			2-axis linear interpolation 2-axis circular interpolation 3-axis linear interpolation 3-axis spiral 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			
		Operation maximum speed		500 kpps	4 Mpps	500 kpps	4 Mpps
		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), Speed control (J point control)			
		2-axis interpolation	Linear	E point, P point, C point control Composite speed or long axis speed specification			
			Circular	E point, P point, C point control Center point or pass point specification			
		3-axis interpolation	Linear	E point, P point, C point control Composite speed or long axis speed specification			
			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	
Product number			AFP243710	AFP243711	AFP243720	AFP243721
Part number			FP2-PP2T	FP2-PP2L	FP2-PP4T	FP2-PP4L
Output type			Transistor	Line driver	Transistor	Line driver
Manual operation	JOG	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)			
	Home return	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			
		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 (3 types), limit method (2 types), data set method, home 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), all axes stop			
Other specifications	Software limit function	Setting 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			
	Backup		Parameters and positioning data are stored in flash memory. (Battery is not required.)			
	High-speed counter function *1	Counting range	-2,147,483,648 to 2,147,483,647pulse			
		Input mode	Phase difference input, direction discrimination input, individual input (Multiple function is available for each mode.)			
	Limit input CWL, CCWL monitor, Near home (DOG) monitor Auxiliary output contact, auxiliary output code					
Internal consumption current (5 V DC)			300 mA or less	300 mA or less	300 mA or less	300 mA or less
External power supply	Voltage		21.6 V DC to 26.4 V DC			
	Consumption current		50 mA	90 mA	50 mA	90 mA
Weight			Approx. 130 g	Approx. 150 g	Approx. 130 g	Approx. 150 g

Note1) As the same pulse input terminal is used for the pulser input function and the high-speed counter function, these two functions cannot be used at the same time.

## 17.2 Allocation of Each Contact

Followings are occupied I/O when FP2 Positioning unit (Interpolation type) is installed in the slot 0.

Contact allocation	Target axis	Name	Descriptions
WX0	X0	All axes	Positioning preparation ready
	X1	-	-
	X2	-	-
	X3	All axes	Write FROM
	X4	All axes	Tool operation
	X5	-	-
	X6	-	-
	X7	All axes	Recalculation done
	X8	-	-
	X9	-	-
	XA	-	-
	XB	-	-
	XC	-	-
	XD	-	-
	XE	-	-
	XF	-	-
WX1	X10	-	-
	X11	-	-
	X12	-	-
	X13	-	-
	X14	-	-
	X15	-	-
	X16	-	-
	X17	-	-
	X18	1 axis	BUSY
	X19	2 axis	
	X1A	3 axis	
	X1B	4 axis	
	X1C	-	-
	X1D	-	-
	X1E	-	-
	X1F	-	-

Contact allocation	Target axis	Name	Descriptions
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.
	X21	2 axis	
	X22	3 axis	
	X23	4 axis	
	X24	-	-
	X25	-	-
	X26	-	-
	X27	-	-
	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.
	X29	2 axis	
	X2A	3 axis	
	X2B	4 axis	
	X2C	-	-
	X2D	-	-
	X2E	-	-
	X2F	-	-
WX3	X30	1 axis	Home The contact to monitor the external home input signal for the corresponding axis.
	X31	2 axis	
	X32	3 axis	
	X33	4 axis	
	X34	-	-
	X35	-	-
	X36	-	-
	X37	-	-
	X38	1 axis	Near home The contact to monitor the external near home input signal for the corresponding axis.
	X39	2 axis	
	X3A	3 axis	
	X3B	4 axis	
	X3C	-	-
	X3D	-	-
	X3E	-	-
	X3F	-	-
WX4	X40	-	-
	X41	-	-
	X42	-	-
	X43	-	-
	X44	-	-
	X45	-	-
	X46	-	-
	X47	-	-
	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.
	X49	2 axis	
	X4A	3 axis	
	X4B	4 axis	
	X4C	-	-
	X4D	-	-
	X4E	-	-
	X4F	-	-

Contact allocation	Target axis	Name	Descriptions
WX5	X50	Limit +	Monitor contact of the limit + and – for the corresponding axis. 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.
	X51	Limit -	
	X52	Limit +	
	X53	Limit -	
	X54	Limit +	The deceleration stop time during the limit input can be changed in the shared memory.
	X55	Limit -	
	X56	Limit +	It will be the contact for the automatic inversion when performing the home return.
	X57	Limit -	
	X58	-	-
	X59	-	-
	X5A	-	-
	X5B	-	-
	X5C	-	-
	X5D	-	-
	X5E	-	-
	X5F	-	-
WX6	X60	1 axis	Error annunciation Turns on when an error occurs on the corresponding axis. The contacts of all axes turn on if an error occurs on all axes. The details of the error can be confirmed in the error annunciation area of the shared memory.
	X61	2 axis	
	X62	3 axis	
	X63	4 axis	
	X64	-	-
	X65	-	-
	X66	-	-
	X67	-	-
	X68	1 axis	Warning annunciation Turns on when a warning occurs on the corresponding axis. The contacts of all axes turn on if a warning occurs on all axes. The details of the warning can be confirmed in the warning annunciation area of the shared memory.
	X69	2 axis	
	X6A	3 axis	
	X6B	4 axis	
	X6C	-	-
	X6D	-	-
	X6E	-	-
	X6F	-	-
WX7	X70	-	-
	X71	-	-
	X72	-	-
	X73	-	-
	X74	-	-
	X75	-	-
	X76	-	-
	X77	-	-
	X78	-	-
	X79	-	-
	X7A	-	-
	X7B	-	-
	X7C	-	-
	X7D	-	-
	X7E	-	-
	X7F	-	-

Contact allocation	Target axis	Name	Descriptions
WY8	Y80	All axes	System stop
	Y81	-	-
	Y82	-	-
	Y83	-	-
	Y84	-	-
	Y85	-	-
	Y86	-	-
	Y87	All axes	Recalculation request
	Y88	-	-
	Y89	-	-
	Y8A	-	-
	Y8B	-	-
	Y8C	-	-
	Y8D	-	-
	Y8E	-	-
	Y8F	-	-
WY9	Y90	1 axis	Positioning start-up
	Y91	2 axis	
	Y92	3 axis	
	Y93	4 axis	
	Y94	-	-
	Y95	-	-
	Y96	-	-
	Y97	-	-
	Y98	1 axis	Home return start-up
	Y99	2 axis	
	Y9A	3 axis	
	Y9B	4 axis	
	Y9C	-	-
	Y9D	-	-
	Y9E	-	-
	Y9F	-	-

Contact allocation	Target axis	Name	Descriptions
WY10	Y100	1 axis	JOG forward
	Y101	1 axis	JOG reverse
	Y102	2 axis	JOG forward
	Y103	2 axis	JOG reverse
	Y104	3 axis	JOG forward
	Y105	3 axis	JOG reverse
	Y106	4 axis	JOG forward
	Y107	4 axis	JOG reverse
	Y108	-	-
	Y109	-	-
	Y10A	-	-
	Y10B	-	-
	Y10C	-	-
	Y10D	-	-
	Y10E	-	-
	Y10F	-	-
WY11	Y110	1 axis	Emergency stop
	Y111	2 axis	Emergency stop
	Y112	3 axis	Emergency stop
	Y113	4 axis	Emergency stop
	Y114	-	-
	Y115	-	-
	Y116	-	-
	Y117	-	-
	Y118	1 axis	Deceleration stop
	Y119	2 axis	Deceleration stop
	Y11A	3 axis	Deceleration stop
	Y11B	4 axis	Deceleration stop
	Y11C	-	-
	Y11D	-	-
	Y11E	-	-
	Y11F	-	-
WY12	Y120	1 axis	Pulser operation enabled
	Y121	2 axis	Pulser operation enabled
	Y122	3 axis	Pulser operation enabled
	Y123	4 axis	Pulser operation enabled
	Y124	-	-
	Y125	-	-
	Y126	-	-
	Y127	-	-
	Y128	1 axis	J point speed change
	Y129	2 axis	J point speed change
	Y12A	3 axis	J point speed change
	Y12B	4 axis	J point speed change
	Y12C	-	-
	Y12D	-	-
	Y12E	-	-
	Y12F	-	-

Contact allocation	Target axis	Name	Descriptions
WY13	Y130	-	-
	Y131	-	-
	Y132	-	-
	Y133	-	-
	Y134	-	-
	Y135	-	-
	Y136	-	-
	Y137	-	-
	Y138	1 axis	J point positioning start Requests to start the next positioning operation during the JOG positioning operation. (The operation is the edge type.)
	Y139	2 axis	
	Y13A	3 axis	
	Y13B	4 axis	
	Y13C	-	-
	Y13D	-	-
	Y13E	-	-
	Y13F	-	-
WY14	Y140	1 axis	Request error clear Requests the error clear for the corresponding axis. The processing to recover from errors is performed and the error logs are cleared by turning on this signal.  Note) Unrecoverable errors cannot be recovered even if this signal turned on.
	Y141	2 axis	
	Y142	3 axis	
	Y143	4 axis	
	Y144	-	-
	Y145	-	-
	Y146	-	-
	Y147	-	-
	Y148	1 axis	Request warning clear Requests the warning clear for the corresponding axis. The warning logs are cleared by turning on this signal.
	Y149	2 axis	
	Y14A	3 axis	
	Y14B	4 axis	
	Y14C	-	-
	Y14D	-	-
	Y14E	-	-
	Y14F	-	-
WY15	Y150	-	-
	Y151	-	-
	Y152	-	-
	Y153	-	-
	Y154	-	-
	Y155	-	-
	Y156	-	-
	Y157	-	-
	Y158	-	-
	Y159	-	-
	Y15A	-	-
	Y15B	-	-
	Y15C	-	-
	Y15D	-	-
	Y15E	-	-
	Y15F	-	-

## 17.3 Configuration of Shared Memory Areas

The positioning unit 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.

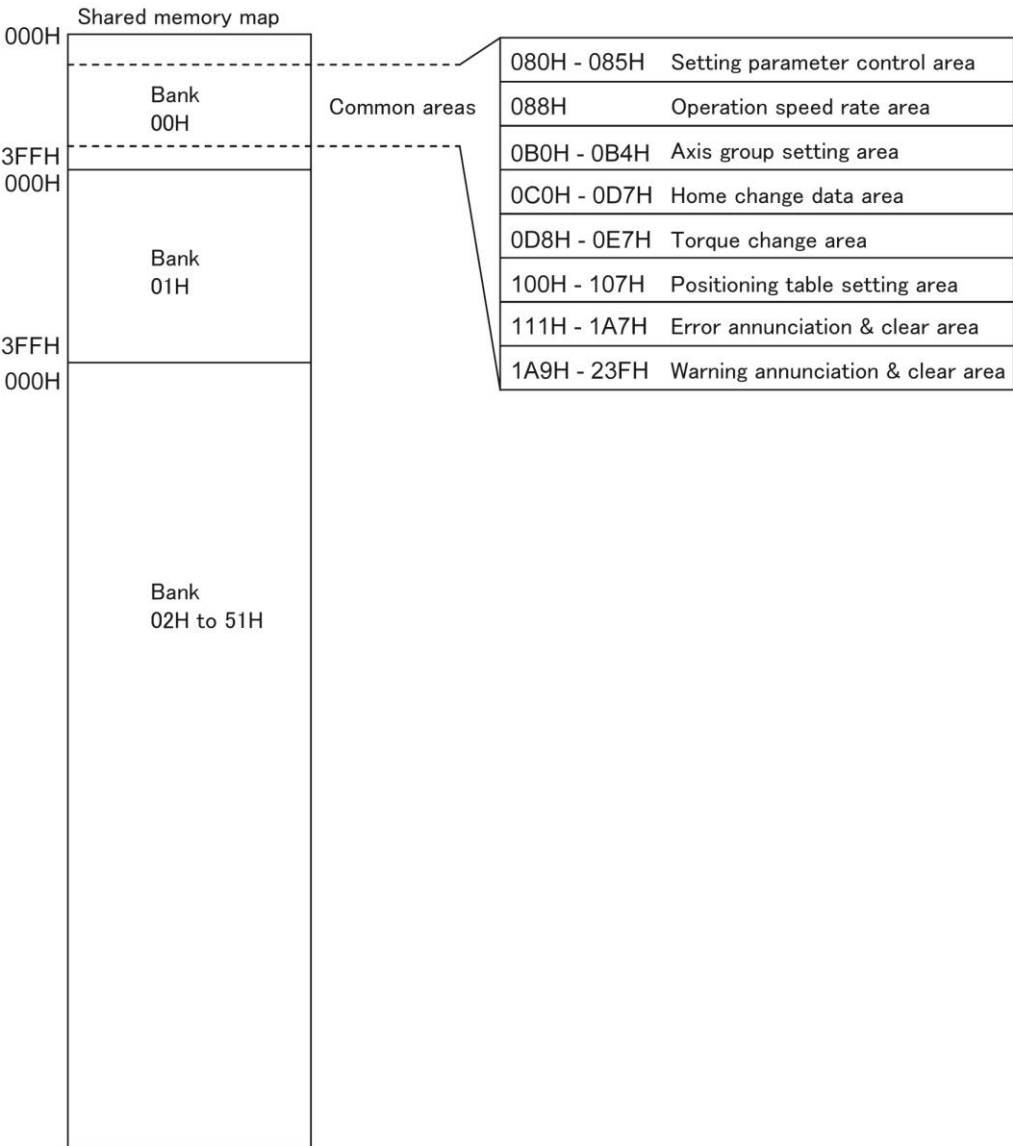
Area name	Shared memory bank	Individual name of each area	
Common area	00H	Setting parameter control area	
		Operation speed rate area	
		Axis group setting area	
		Synchronous group setting area	
		Current value update data area	
		Torque limit area	
		Positioning control starting table number setting area	
		Positioning control area	
		Error annunciation & clear area	
		Warning annunciation & clear area	
		Pulse count control area	
		Synchronous operation control/monitor area	
		System operation setting area	
Each axis information area <small>Note)</small>	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
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)

Note) Firstly confirm that the link establishment annunciation flag (X0) is on when reading the axis information area using the 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.



## 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(Flash memory), or to execute the recalculation of the positioning data. The number of writing to FROM in the positioning unit is announced to the CPU 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.  1. Write 5555H in this area by the ladder program. 2. The positioning unit checks 5555H, and write 6666H over in the same area. 3. Check 6666H by the ladder program, and write AAAAH over. (Time out of 6666H is 30 seconds.) 4. The positioning unit copies the content of the shared memory into FROM. 5. The positioning unit checks writing. When OK: The unit sets 0000H. When NG: The unit sets FFFFH. 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 (Y87 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 performed 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	<p>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.</p> <p>Maximum number of interpolation axis per group is 3. The same axis cannot be set in more than one group.</p> <table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>0</td><td>Group attribute of axis 1</td><td>0</td><td>0: Not belong to the group.</td></tr><tr><td>1</td><td>Group attribute of axis 2</td><td>0</td><td>1: Belong to the group.</td></tr><tr><td>2</td><td>Group attribute of axis 3</td><td>0</td><td rowspan="2">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>3</td><td>Group attribute of axis 4</td><td>0</td></tr><tr><td>15 to 4</td><td>—</td><td>—</td><td>—</td></tr></table>	bit	Name	Default	Descriptions	0	Group attribute of axis 1	0	0: Not belong to the group.	1	Group attribute of axis 2	0	1: Belong to the group.	2	Group attribute of axis 3	0	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.	3	Group attribute of axis 4	0	15 to 4	—	—	—
	bit	Name		Default	Descriptions																					
	0	Group attribute of axis 1		0	0: Not belong to the group.																					
	1	Group attribute of axis 2		0	1: Belong to the group.																					
	2	Group attribute of axis 3		0	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.																					
3	Group attribute of axis 4	0																								
15 to 4	—	—	—																							
0B1H	Group B axis settings																									
0B2H	Group C axis settings																									
0B3H	Group D axis settings																									
0B4H	Independent axis settings		<p>For the axes that do not belong to the interpolation relation, set the corresponding bits to 1.</p> <table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>0</td><td>Group attribute of axis 1</td><td>0</td><td>0: Not belong to the group.</td></tr><tr><td>1</td><td>Group attribute of axis 2</td><td>0</td><td>1: Belong to the group.</td></tr><tr><td>2</td><td>Group attribute of axis 3</td><td>0</td><td rowspan="2">An error occurs if the same axis is set to 1 in another group.</td></tr><tr><td>3</td><td>Group attribute of axis 4</td><td>0</td></tr><tr><td>15 to 4</td><td>—</td><td>—</td><td>—</td></tr></table>	bit	Name	Default	Descriptions	0	Group attribute of axis 1	0	0: Not belong to the group.	1	Group attribute of axis 2	0	1: Belong to the group.	2	Group attribute of axis 3	0	An error occurs if the same axis is set to 1 in another group.	3	Group attribute of axis 4	0	15 to 4	—	—	—
bit	Name	Default	Descriptions																							
0	Group attribute of axis 1	0	0: Not belong to the group.																							
1	Group attribute of axis 2	0	1: Belong to the group.																							
2	Group attribute of axis 3	0	An error occurs if the same axis is set to 1 in another group.																							
3	Group attribute of axis 4	0																								
15 to 4	—	—	—																							

## 17.4.5 Synchronous Group Setting Area

For the synchronous operation, one slave axis is set for a master axis, and a maximum of 2 groups can be specified for the group of synchronous operation.

Bank	Offset address	Name	Descriptions																					
00H	0B7H	Synchronous group 1 Synchronous mode	Set the operation mode of synchronous operation. 00H: Synchronous mode A 01H: Synchronous mode B																					
	0B8H	Synchronous group 1 Master axis	Turn on the corresponding bits to be the master and slave axes for the synchronous operation. Each synchronous axis can be set for one axis only.																					
	0B9H	Synchronous group 1 Slave axis	<table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>0</td><td>Synchronous attribute of axis 1</td><td>0</td><td rowspan="4">0: Not perform synchronous operation. 1: Master/slave axis setting for synchronous group</td></tr><tr><td>1</td><td>Synchronous attribute of axis 1</td><td>0</td></tr><tr><td>2</td><td>Synchronous attribute of axis 1</td><td>0</td></tr><tr><td>3</td><td>Synchronous attribute of axis 1</td><td>0</td></tr><tr><td>15 to 4</td><td>—</td><td>—</td><td>—</td></tr></table>	bit	Name	Default	Descriptions	0	Synchronous attribute of axis 1	0	0: Not perform synchronous operation. 1: Master/slave axis setting for synchronous group	1	Synchronous attribute of axis 1	0	2	Synchronous attribute of axis 1	0	3	Synchronous attribute of axis 1	0	15 to 4	—	—	—
	bit	Name	Default	Descriptions																				
	0	Synchronous attribute of axis 1	0	0: Not perform synchronous operation. 1: Master/slave axis setting for synchronous group																				
	1	Synchronous attribute of axis 1	0																					
	2	Synchronous attribute of axis 1	0																					
3	Synchronous attribute of axis 1	0																						
15 to 4	—	—	—																					
0BAH	Synchronous group 2 Synchronous mode	Set the operation mode of synchronous operation. 00H: Synchronous mode A 01H: Synchronous mode B																						
0BBH	Synchronous group 2 Master axis	Turn on the corresponding bits to be the master and slave axes for the synchronous operation. Each synchronous axis can be set for one axis only.																						
0BCH	Synchronous group 2 Slave axis	<table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>0</td><td>Synchronous attribute of axis 1</td><td>0</td><td rowspan="4">0: Not perform synchronous operation. 1: Master/slave axis setting for synchronous group</td></tr><tr><td>1</td><td>Synchronous attribute of axis 1</td><td>0</td></tr><tr><td>2</td><td>Synchronous attribute of axis 1</td><td>0</td></tr><tr><td>3</td><td>Synchronous attribute of axis 1</td><td>0</td></tr><tr><td>15 to 4</td><td>—</td><td>—</td><td>—</td></tr></table>	bit	Name	Default	Descriptions	0	Synchronous attribute of axis 1	0	0: Not perform synchronous operation. 1: Master/slave axis setting for synchronous group	1	Synchronous attribute of axis 1	0	2	Synchronous attribute of axis 1	0	3	Synchronous attribute of axis 1	0	15 to 4	—	—	—	
bit	Name	Default	Descriptions																					
0	Synchronous attribute of axis 1	0	0: Not perform synchronous operation. 1: Master/slave axis setting for synchronous group																					
1	Synchronous attribute of axis 1	0																						
2	Synchronous attribute of axis 1	0																						
3	Synchronous attribute of axis 1	0																						
15 to 4	—	—	—																					

## 17.4.6 Current Value Update Data Area

For changing the current values for each axis that are managed by the positioning unit, store the changed coordinate in this area and turn on the current value update request flag.

Bank	Offset address	Name	Descriptions																								
00H	0C0H	Current value update request flag	<div>Only when the corresponding bits to each axis changes to 1 from 0, the current value managed in the positioning unit will be changed to the following current value. After the change, the positioning unit clears the corresponding bits to 0 automatically.</div> <table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>0</td><td>Current value update request of axis 1</td><td>0</td><td>0: No change.</td></tr><tr><td>1</td><td>Current value update request of axis 2</td><td>0</td><td>1: Update the current value of target axis. (After the update, the positioning unit sets to 0 automatically.)</td></tr><tr><td>2</td><td>Current value update request of axis 3</td><td>0</td><td></td></tr><tr><td>3</td><td>Current value update request of axis 4</td><td>0</td><td></td></tr><tr><td>15 to 4</td><td>—</td><td>—</td><td>—</td></tr></table>	bit	Name	Default	Descriptions	0	Current value update request of axis 1	0	0: No change.	1	Current value update request of axis 2	0	1: Update the current value of target axis. (After the update, the positioning unit sets to 0 automatically.)	2	Current value update request of axis 3	0		3	Current value update request of axis 4	0		15 to 4	—	—	—
	bit	Name	Default	Descriptions																							
	0	Current value update request of axis 1	0	0: No change.																							
	1	Current value update request of axis 2	0	1: Update the current value of target axis. (After the update, the positioning unit sets to 0 automatically.)																							
	2	Current value update request of axis 3	0																								
	3	Current value update request of axis 4	0																								
	15 to 4	—	—	—																							
	0C8H	Current value update coordinate of axis 1	Store the coordinate to perform the current value update for axis 1.																								
	0C9H																										
	0CAH	Current value update coordinate of axis 2	Store the coordinate to perform the current value update for axis 2.																								
0CBH																											
0CCH	Current value update coordinate of axis 3	Store the coordinate to perform the current value update for axis 3.																									
0CDH																											
0CEH	Current value update coordinate of axis 4	Store the coordinate to perform the current value update for axis 4.																									
0CFH																											

## 17.4.7 Positioning Control Starting Table Number Setting Area

It is used to specify the table number of each axis to start the positioning 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	Store 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	Store 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	Store 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	Store the table number of 4th axis starting the position control.	1	1 to 600 10001 to 10025	-

## 17.4.8 Positioning Control Area

It is used to specify the repeat count for each axis respectively for the positioning control that starts when starting the positioning control. The positioning unit repeats the positioning control started for the specified repeat count, and then completes the operation.

The specified repeat count changes to the default on completion of the operation.

Bank	Offset address	Name	Descriptions	Default value	Setting range	Unit
00H	108H	Repeat count for positioning of 1st axis	Store the repeat count for the operation starting from the positioning starting table number of 1st axis to E point. When storing 255, the operation is unlimitedly repeated until stopping the operation.	0	0 to 255	Times
	109H	Repeat count for positioning of 2nd axis	Store the repeat count for the operation starting from the positioning starting table number of 2nd axis to E point. When storing 255, the operation is unlimitedly repeated until stopping the operation.	0	0 to 255	Times
	10AH	Repeat count for positioning of 3rd axis	Store the repeat count for the operation starting from the positioning starting table number of 3rd axis to E point. When storing 255, the operation is unlimitedly repeated until stopping the operation.	0	0 to 255	Times
	10BH	Repeat count for positioning of 4th axis	Store the repeat count for the operation starting from the positioning starting table number of 4th axis to E point. When storing 255, the operation is unlimitedly repeated until stopping the operation.	0	0 to 255	Times

## 17.4.9 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	<p>Executes the error clear for each axis.</p> <table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>0</td><td>Error clear of axis 1</td><td>0</td><td>0: No error clear</td></tr><tr><td>1</td><td>Error clear of axis 2</td><td>0</td><td>1: Executes error clear</td></tr><tr><td>2</td><td>Error clear of axis 3</td><td>0</td><td>(After the execution of error clear, the positioning unit sets to 0 automatically.)</td></tr><tr><td>3</td><td>Error clear of axis 4</td><td>0</td><td></td></tr><tr><td>15 to 4</td><td>—</td><td>—</td><td>—</td></tr></table>	bit	Name	Default	Descriptions	0	Error clear of axis 1	0	0: No error clear	1	Error clear of axis 2	0	1: Executes error clear	2	Error clear of axis 3	0	(After the execution of error clear, the positioning unit sets to 0 automatically.)	3	Error clear of axis 4	0		15 to 4	—	—	—
	bit	Name	Default	Descriptions																							
	0	Error clear of axis 1	0	0: No error clear																							
	1	Error clear of axis 2	0	1: Executes error clear																							
	2	Error clear of axis 3	0	(After the execution of error clear, the positioning unit sets to 0 automatically.)																							
	3	Error clear of axis 4	0																								
	15 to 4	—	—	—																							
	129H	Number of error occurrences of axis 1	<p>Announces the number of occurrences of errors at axis 1.</p> <table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>15 to 0</td><td>No. of error occurrences at axis 1</td><td>0</td><td>Announces No. of error of axis 1 currently occurred.</td></tr></table>	bit	Name	Default	Descriptions	15 to 0	No. of error occurrences at axis 1	0	Announces No. of error of axis 1 currently occurred.																
	bit	Name	Default	Descriptions																							
	15 to 0	No. of error occurrences at axis 1	0	Announces No. of error of axis 1 currently occurred.																							
	12AH	Error code annunciation buffer 1 of axis 1	<p>Stores the latest error code from the buffer number 1 in order.</p> <table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>31 to 0</td><td>Error code annunciation buffer n of each axis</td><td>0</td><td>Announces error codes.</td></tr></table>	bit	Name	Default	Descriptions	31 to 0	Error code annunciation buffer n of each axis	0	Announces error codes.																
	bit	Name		Default	Descriptions																						
	31 to 0	Error code annunciation buffer n of each axis		0	Announces error codes.																						
	12BH	Error code annunciation buffer 2 of axis 1																									
	12CH	Error code annunciation buffer 3 of axis 1																									
	12DH	Error code annunciation buffer 4 of axis 1																									
	12EH	Error code annunciation buffer 5 of axis 1																									
	12FH	Error code annunciation buffer 6 of axis 1																									
	130H	Error code annunciation buffer 7 of axis 1																									
	131H	Error code annunciation buffer 8 of axis 1																									
	132H	Error code annunciation buffer 9 of axis 1																									
	133H	Error code annunciation buffer 10 of axis 1																									
	134H	Error code annunciation buffer 11 of axis 1																									
	135H	Error code annunciation buffer 12 of axis 1																									
	136H	Error code annunciation buffer 13 of axis 1																									
	137H	Error code annunciation buffer 14 of axis 1																									
	139H	Number of error occurrences of axis 2	<p>Announces the number of occurrences of errors at axis 2.</p>																								
13AH	Error code annunciation buffer 1 of axis 2	<p>Announces the code when an error occurred.</p>																									
13BH	Error code annunciation buffer 2 of axis 2																										
13CH	Error code annunciation buffer 3 of axis 2	<p>Announces the code when an error occurred.</p>																									
13DH	Error code annunciation buffer 4 of axis 2																										
13EH	Error code annunciation buffer 5 of axis 2	<p>Announces the code when an error occurred.</p>																									
13FH	Error code annunciation buffer 6 of axis 2																										

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		

## 17.4.10 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	<p>Executes the warning clear for each axis.</p> <table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>0</td><td>Warning clear of axis 1</td><td>0</td><td rowspan="4">0: No warning clear 1: Executes warning clear (After the execution of warning clear, the positioning unit sets to 0 automatically.)</td></tr><tr><td>1</td><td>Warning clear of axis 2</td><td>0</td></tr><tr><td>2</td><td>Warning clear of axis 3</td><td>0</td></tr><tr><td>3</td><td>Warning clear of axis 4</td><td>0</td></tr><tr><td>15 to 4</td><td>—</td><td>—</td><td>—</td></tr></table>	bit	Name	Default	Descriptions	0	Warning clear of axis 1	0	0: No warning clear 1: Executes warning clear (After the execution of warning clear, the positioning unit sets to 0 automatically.)	1	Warning clear of axis 2	0	2	Warning clear of axis 3	0	3	Warning clear of axis 4	0	15 to 4	—	—	—
	bit	Name	Default	Descriptions																				
	0	Warning clear of axis 1	0	0: No warning clear 1: Executes warning clear (After the execution of warning clear, the positioning unit sets to 0 automatically.)																				
	1	Warning clear of axis 2	0																					
	2	Warning clear of axis 3	0																					
	3	Warning clear of axis 4	0																					
	15 to 4	—	—	—																				
	1C1H	Number of warning occurrences of axis 1	<p>Announces the number of occurrences of warnings at axis 1.</p> <table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>15 to 0</td><td>No. of warning occurrences at axis 1</td><td>0</td><td>Announces No. of warning of axis 1 currently occurred</td></tr></table>	bit	Name	Default	Descriptions	15 to 0	No. of warning occurrences at axis 1	0	Announces No. of warning of axis 1 currently occurred													
	bit	Name	Default	Descriptions																				
	15 to 0	No. of warning occurrences at axis 1	0	Announces No. of warning of axis 1 currently occurred																				
	1C2H	Warning code annunciation buffer 1 of axis 1	<p>Stores the latest warning code from the buffer number 1 in order.</p> <table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>31 to 0</td><td>Warning code annunciation buffer n of each axis</td><td>0</td><td>Announces warning codes.</td></tr></table>	bit	Name	Default	Descriptions	31 to 0	Warning code annunciation buffer n of each axis	0	Announces warning codes.													
	bit	Name		Default	Descriptions																			
	31 to 0	Warning code annunciation buffer n of each axis		0	Announces warning codes.																			
	1C3H	Warning code annunciation buffer 2 of axis 1																						
	1C4H	Warning code annunciation buffer 3 of axis 1																						
	1C5H	Warning code annunciation buffer 4 of axis 1																						
	1C6H	Warning code annunciation buffer 5 of axis 1																						
	1C7H	Warning code annunciation buffer 6 of axis 1																						
	1C8H	Warning code annunciation buffer 7 of axis 1																						
	1C9H	Warning code annunciation buffer 8 of axis 1																						
	1CAH	Warning code annunciation buffer 9 of axis 1																						
	1CBH	Warning code annunciation buffer 10 of axis 1																						
	1CCH	Warning code annunciation buffer 11 of axis 1																						
	1CDH	Warning code annunciation buffer 12 of axis 1																						
	1CEH	Warning code annunciation buffer 13 of axis 1																						
	1CFH	Warning code annunciation buffer 14 of axis 1																						
	1D1H	No. of warning occurrences of axis 2	<p>Announces the number of occurrences of warnings at axis 2.</p>																					
1D2H	Warning code annunciation buffer 1 of axis 2	<p>Announces the code when a warning occurred.</p>																						
1D3H	Warning code annunciation buffer 2 of axis 2																							
1D4H	Warning code annunciation buffer 3 of axis 2	<p>Announces the code when a warning occurred.</p>																						
1D5H	Warning code annunciation buffer 4 of axis 2																							
1D6H	Warning code annunciation buffer 5 of axis 2	<p>Announces the code when an error occurred.</p>																						
1D7H	Warning code annunciation buffer 6 of axis 2																							

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

## 17.4.11 Pulse Count Control Area

It is used to change the input pulse when setting the pulse input to the high-speed pulse.

Bank	Offset address	Name	Descriptions																																
00H	240H	Pulse count enable flag	When the corresponding bit to each axis turns to 0, the count of pulse input will start. This flag is available only when setting the pulse input purpose to “High-speed counter”.																																
			bit	Name	Default	Descriptions	0	Pulse count enable of axis 1	0	0: Counts pulse input. 1: Not count pulse input.	1	Pulse count enable of axis 2	0	2	Pulse count enable of axis 3	0	3	Pulse count enable of axis 4	0	—	4	—	—	5	—	—	6	—	—	7	—	—	15 to 8	—	—
			bit	Name	Default	Descriptions																													
			0	Pulse count enable of axis 1	0	0: Counts pulse input. 1: Not count pulse input.																													
			1	Pulse count enable of axis 2	0																														
			2	Pulse count enable of axis 3	0																														
			3	Pulse count enable of axis 4	0	—																													
			4	—	—																														
			5	—	—																														
			6	—	—																														
	7	—	—																																
	15 to 8	—	—																																
	241H	Pulse count value change request flag	When the corresponding bit to each axis changes to 1 from 0, the pulse input will be changed to the pulse count change value that the pulse input count value has been set. This flag is an edge trigger. Always change this flag to 1 from 0 before change.																																
			bit	Name	Default	Descriptions	0	Pulse count change of axis 1	0	0: Not change pulse count value. 0 → 1: Change pulse count value.	1	Pulse count change of axis 2	0	2	Pulse count change of axis 3	0	3	Pulse count change of axis 4	0	—	4	—	—	5	—	—	6	—	—	7	—	—	15 to 8	—	—
			bit	Name	Default	Descriptions																													
			0	Pulse count change of axis 1	0	0: Not change pulse count value. 0 → 1: Change pulse count value.																													
			1	Pulse count change of axis 2	0																														
			2	Pulse count change of axis 3	0																														
			3	Pulse count change of axis 4	0	—																													
			4	—	—																														
5			—	—																															
6			—	—																															
7	—	—																																	
15 to 8	—	—																																	
248H	Pulse count change value of axis 1	Set the pulse count value to be changed.																																	
249H																																			
24AH																																			
24BH																																			
24CH																																			
24DH																																			
24EH																																			
24FH																																			

## 17.4.12 Synchronous Operation Control/Monitor Area

It is used to set to enable/disable the synchronous operation, and to check the current synchronous settings.

Bank	Offset address	Name	Descriptions																					
00H	2B0H	Synchronous group 1 Operation enable/disable	Set to enable/disable the synchronous operation. When using the synchronous mode B, this setting is ignored, and always performs the synchronous operation.																					
	2B1H	Synchronous group 2 Operation enable/disable	<table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>0</td><td>Group attribute of axis 1</td><td>0</td><td rowspan="4">0: Executes synchronous operation. 1: Cancel synchronous operation.</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>15 to 4</td><td>—</td><td>—</td><td>—</td></tr></table>	bit	Name	Default	Descriptions	0	Group attribute of axis 1	0	0: Executes synchronous operation. 1: Cancel synchronous operation.	1	Group attribute of axis 2	0	2	Group attribute of axis 3	0	3	Group attribute of axis 4	0	15 to 4	—	—	—
			bit	Name	Default	Descriptions																		
			0	Group attribute of axis 1	0	0: Executes synchronous operation. 1: Cancel synchronous operation.																		
			1	Group attribute of axis 2	0																			
			2	Group attribute of axis 3	0																			
	3	Group attribute of axis 4	0																					
	15 to 4	—	—	—																				
	2B4H	Synchronous operation monitor	<table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>0</td><td>Synchronous state of axis 1</td><td>0</td><td rowspan="4">0: Asynchronous state 1: Target axis for synchronous operation</td></tr><tr><td>1</td><td>Synchronous state of axis 2</td><td>0</td></tr><tr><td>2</td><td>Synchronous state of axis 3</td><td>0</td></tr><tr><td>3</td><td>Synchronous state of axis 4</td><td>0</td></tr><tr><td>15 to 4</td><td>—</td><td>—</td><td>—</td></tr></table>	bit	Name	Default	Descriptions	0	Synchronous state of axis 1	0	0: Asynchronous state 1: Target axis for synchronous operation	1	Synchronous state of axis 2	0	2	Synchronous state of axis 3	0	3	Synchronous state of axis 4	0	15 to 4	—	—	—
			bit	Name	Default	Descriptions																		
0			Synchronous state of axis 1	0	0: Asynchronous state 1: Target axis for synchronous operation																			
1			Synchronous state of axis 2	0																				
2			Synchronous state of axis 3	0																				
3	Synchronous state of axis 4	0																						
15 to 4	—	—	—																					
2B8H	Synchronous group 1 Synchronous operation difference value	The difference threshold for the moving amounts of master and slave axes that the synchronous operation is performed in the synchronous group 1. Checks whether the difference between the moving amounts of master and slave axes exceeds the threshold or not. This difference value is specified by the unit used for the master axis. Default: 10000																						
2B9H	-	-																						
2BAH	Synchronous group 2 Synchronous operation difference value	The difference threshold for the moving amounts of master and slave axes that the synchronous operation is performed in the synchronous group 2. Checks whether the difference between the moving amounts of master and slave axes exceeds the threshold or not. This difference value is specified by the unit used for the master axis. Default: 10000																						
2BBH	-	-																						
2BCH	Synchronous group 1 Operation method	Specify the operation of the difference check (i.e. function to check if the difference between the moving amounts of master and slave axes exceeds “Synchronous operation difference value”) during the synchronous operation.																						
2BDH	Synchronous group 2 Operation method	0: Error occurs. When the difference between the moving amounts of master and slave axes exceeded the threshold using the difference check, an error occurs and the operation stops. 1: Warning occurs. When the difference between the moving amounts of master and slave axes exceeded the threshold using the difference check, a warning occurs and the operation continues. 2: Not perform difference check. The difference check is not performed. Default: 0																						

## 17.4.13 System Operation Setting Area

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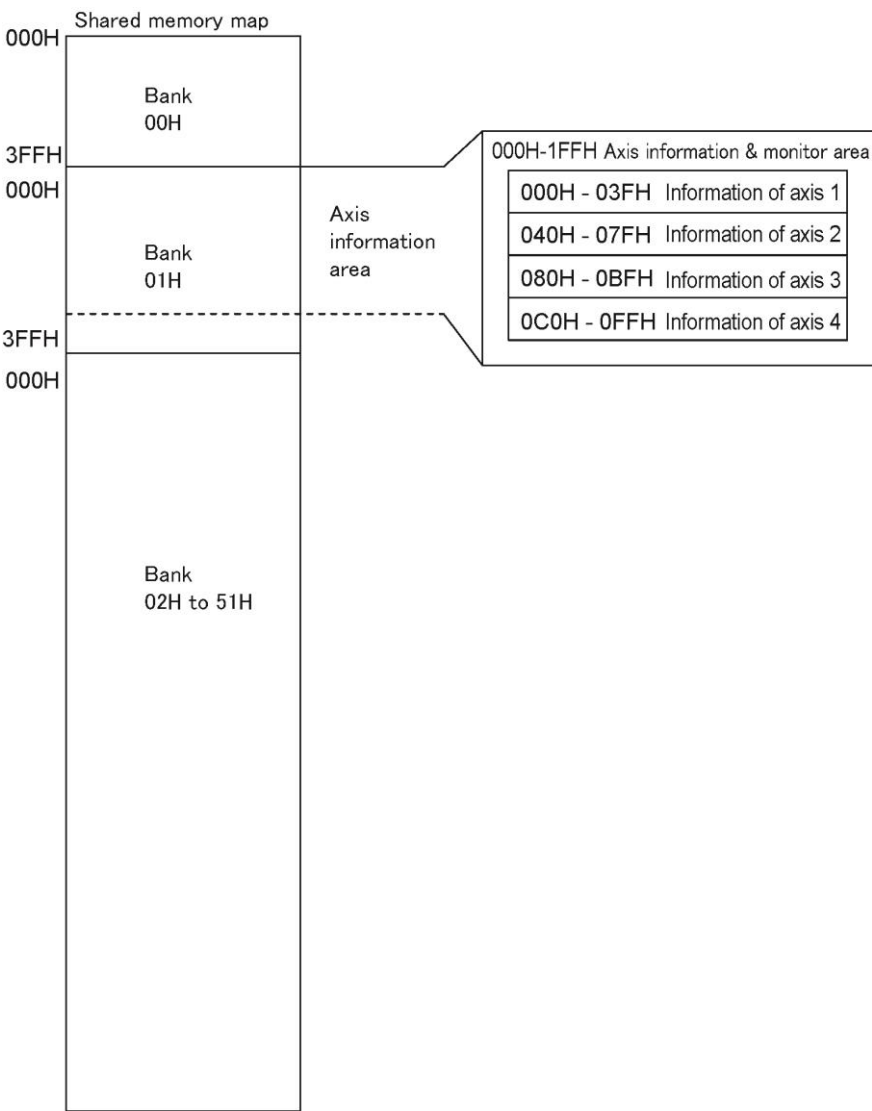
It is used to change the operation of positioning unit.

Bank	Offset address	Name	Descriptions
00H	389H	Deceleration stop operation	<p>Specify the operation when setting the deceleration stop request signal to "Active" (from OFF to ON).</p> <p>0: Deceleration stop When performing the repeat operation, stops after reaching E point that is targeted for the repeat operation.</p> <p>1: Pause - Performs the deceleration stop, and restarts the positioning operation when turning "Deceleration stop request signal" to OFF from ON. - Also, performs the same operation as the deceleration stop in all states except during the positioning operation. - When performing the repeat operation, stops after reaching E point that is targeted for the repeat operation, and restarts the positioning operation when turning "Deceleration stop request signal" to OFF from ON. - If the system stop or emergency stop is executed during the pause, the pause will be cancelled. The operation will not restart even if turning "Deceleraiton stop request signal" to OFF from ON.</p> <p>Default: 0</p>

# 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 4 is allowcated for each address in this area.



**Note:** Firstly confirm that the link establishment annunciation flag (X0) 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 information of each axis and monitoring operation states.

### Axis information of axis 1

Bank	Offset address	Name	Descriptions	Default value	Setting range	Unit	
01H	031H	External terminal input monitor of axis 1	Stores the information of I/O connected to each axis.				
			bit	Name	Default	Descriptions	
			0	Limit (+)	0	0: Non active	
			1	Limit (-)	0	1: Active	
			2	Near home	0		
			3	Home	0		
	15 to 4				—	—	—
	034H	Moving amount automatic check value of axis 1	Stores the maximum value of difference between the command value and feedback value of the unit.	-	-	-	
	035H						
	036H	Pulse input value of axis 1	Stores the pulse input values (pulser, feedback pulse, couner) according to the pulse input purposes.  The pulse input value is stored by integrating the pulse input values until changing the pulse input purpose or clearing the pulse input.	-	-	pulse	
	037H						
	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		-	
	03AH	Repeat count setting value of axis 1	Stores the setting value of repeat count for positioning. 1 is stored not to repeat the operation. When specifying the repeat count to be unlimited, 255 is stored.	0	0 to 255	times	
	03BH	Repeat count current value of axis 1	Stores the repeat count in operation. 1 is stored not to repeat the operation. When the repeat count exceeds the upper limit, it returns to 0.	0	0 to 65,535	times	
03CH	Current value of axis 1	Stores the current value.	0	-	pulse		
03DH							
03EH	Unit system conversion	Stores the current value after the unit was converted.	0	-	-		
03FH	current value of axis 1						

### Axis information of axis 2

Bank	Offset address	Name	Descriptions
01H	071H	External terminal input monitor of axis 2	Refer to the descriptions of axis 1.
	074H	Position deviation of axis 2	Refer to the descriptions of axis 1.
	076H	Pulse input value of axis 2	Refer to the descriptions of axis 1.
	078H	Active 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.
	07AH	Repeat count setting value of axis 2	Refer to the descriptions of axis 1.
	07BH	Repeat count current value of axis 2	Refer to the descriptions of axis 1.
	07CH	Current value of axis 2	Refer to the descriptions of axis 1.
	07DH		
	07EH	Unit system conversion current value of axis 2	Refer to the descriptions of axis 1.
	07FH		

### Axis information of axis 3

Bank	Offset address	Name	Descriptions
01H	0B1H	External terminal input monitor of axis 3	Refer to the descriptions of axis 1.
	0B4H	Position deviation of axis 3	Refer to the descriptions of axis 1.
	0B6H	Pulse input value of axis 3	Refer to the descriptions of axis 1.
	0B8H	Active 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.
	0BAH	Repeat count setting value of axis 3	Refer to the descriptions of axis 1.
	0BBH	Repeat count current value of axis 3	Refer to the descriptions of axis 1.
	0BCH	Current value of axis 3	Refer to the descriptions of axis 1.
	0BDH		
	0BEH	Unit system conversion current value of axis 3	Refer to the descriptions of axis 1.
	0BFH		

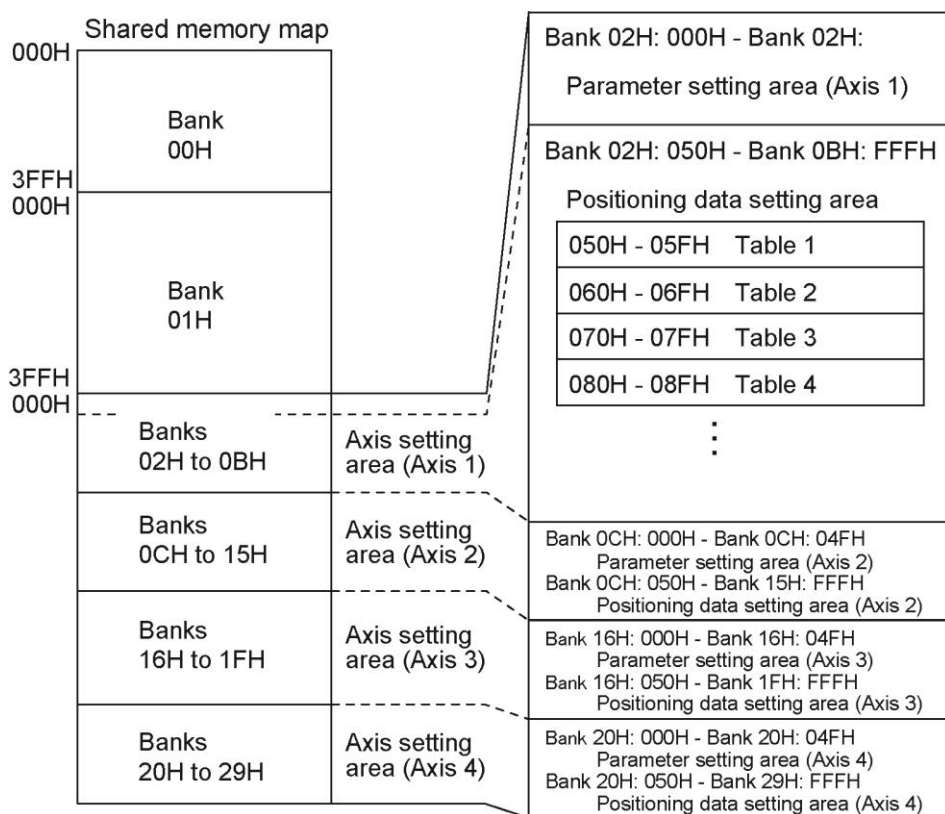
### Axis information of axis 4

Bank	Offset address	Name	Descriptions
01H	0F1H	External terminal input monitor of axis 4	Refer to the descriptions of axis 1.
	0F4H	Position deviation of axis 4	Refer to the descriptions of axis 1.
	0F6H	Pulse input value of axis 4	Refer to the descriptions of axis 1.
	0F8H	Active table or execution done table of axis 4	Refer to the descriptions of axis 1.
	0F9H	Auxiliary output code of axis 4	Refer to the descriptions of axis 1.
	0FAH	Repeat count setting value of axis 4	Refer to the descriptions of axis 1.
	0FBH	Repeat count current value of axis 4	Refer to the descriptions of axis 1.
	0FCH	Current value of axis 4	Refer to the descriptions of axis 1.
	0FDH		
	0FEH	Unit system conversion current value of axis 4	Refer to the descriptions of axis 1.
	0FFH		

## 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 29H 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 4. The positioning setting area of each axis is composed of 600 tables of the standard area and 25 tables of the extended area.



## 17.6.2 Parameter Setting Area

### Positioning parameters of each axis

Data in the following forams 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.				
		bit	Name	Default	Descriptions	
		15 to 0	Unit setting	000H	Sets the unit of movement amount of positioning control. 000H: Pulse 0100H: mm (Minimum position command 0.1 μm) 0101H: mm (Minimum position command 1 μm) 0200H: inch (Minimum position command 0.1 inch) 0201H: inch (Minimum position command 1 inch) 0300H: degree (Minimum position command 0.1 degree) 0301H: degree (Minimum position command 1 degree) Any other settings will be errors.	
001H	-	-				
002H	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.				
003H		bit	Name	Default	Descriptions	
		15 to 0	Pulse number per rotation	1	Pulse number per rotation Setting range: 1 to 32,767 Any other settings will be errors.	
004H	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.				
005H		bit	Name	Default	Descriptions	
		31 to 0	Movement amount per rotation	1	Movement amount per rotation Setting range: 1 to 32,767 Any other settings will be errors. Interpretation is changed by the unit setting. mm: 1 μm inchi: 1/10,000 inchi degree: 1degree	
006H	-	-				

Offset address	Name	Descriptions	Default value	Setting range	Unit																					
007H	Pulse input mode	Set the pulse input signal. Set according to the application to be used as the pulse input.																								
		<table><tr><th>bit</th><th>Name</th><th>Descriptions</th></tr><tr><td>0</td><td>Rotation direction</td><td>Set the rotation direction of pulse input. 0 : Forward 1 : Reverse</td></tr><tr><td>1</td><td>—</td><td>—</td></tr><tr><td>2 to 3</td><td>Pulse input mode</td><td>Set the input mode of pulse input. Bit3 Bit2 0 0 : 2-phase input 0 1 : Direction discrimination input 1 0 : Individual input 1 1 : Reserve (When specified, the setting is the default.)</td></tr><tr><td>4 to 5</td><td>Input transfer multiple</td><td>Set the multiple when setting the pulse input mode (Bit2-3) to "2-phase input". Bit5 Bit4 0 0 : × 1 0 1 : × 2 1 0 : × 4 1 1 : Reserve (When specified, the setting is the default.)</td></tr><tr><td>6 to 7</td><td>Pulse input purpose</td><td>Specify the purpose of pulse input for each axis. •Pulser : Connect a manual pulser to the pulse input. •Feedback pulse : Connect the feedback pulse from an encoder to the pulse input. •High-speed counter Bit7 Bit6 0 0 : Pulser 0 1 : Feedback pulse 1 0 : High-speed counter 1 1 : Reserve (When specified, the setting is the default.)</td></tr><tr><td>8 to 15</td><td>—</td><td>—</td></tr></table>	bit	Name	Descriptions	0	Rotation direction	Set the rotation direction of pulse input. 0 : Forward 1 : Reverse	1	—	—	2 to 3	Pulse input mode	Set the input mode of pulse input. Bit3 Bit2 0 0 : 2-phase input 0 1 : Direction discrimination input 1 0 : Individual input 1 1 : Reserve (When specified, the setting is the default.)	4 to 5	Input transfer multiple	Set the multiple when setting the pulse input mode (Bit2-3) to "2-phase input". Bit5 Bit4 0 0 : × 1 0 1 : × 2 1 0 : × 4 1 1 : Reserve (When specified, the setting is the default.)	6 to 7	Pulse input purpose	Specify the purpose of pulse input for each axis. •Pulser : Connect a manual pulser to the pulse input. •Feedback pulse : Connect the feedback pulse from an encoder to the pulse input. •High-speed counter Bit7 Bit6 0 0 : Pulser 0 1 : Feedback pulse 1 0 : High-speed counter 1 1 : Reserve (When specified, the setting is the default.)	8 to 15	—	—			
		bit	Name	Descriptions																						
		0	Rotation direction	Set the rotation direction of pulse input. 0 : Forward 1 : Reverse																						
		1	—	—																						
		2 to 3	Pulse input mode	Set the input mode of pulse input. Bit3 Bit2 0 0 : 2-phase input 0 1 : Direction discrimination input 1 0 : Individual input 1 1 : Reserve (When specified, the setting is the default.)																						
		4 to 5	Input transfer multiple	Set the multiple when setting the pulse input mode (Bit2-3) to "2-phase input". Bit5 Bit4 0 0 : × 1 0 1 : × 2 1 0 : × 4 1 1 : Reserve (When specified, the setting is the default.)																						
6 to 7	Pulse input purpose	Specify the purpose of pulse input for each axis. •Pulser : Connect a manual pulser to the pulse input. •Feedback pulse : Connect the feedback pulse from an encoder to the pulse input. •High-speed counter Bit7 Bit6 0 0 : Pulser 0 1 : Feedback pulse 1 0 : High-speed counter 1 1 : Reserve (When specified, the setting is the default.)																								
8 to 15	—	—																								
		Default: 20H																								
008H	Moving amount automatic check correction numerator	Set the correction value for the pulse input to be performed when executing the moving amount automatic check.																								
009H	Moving amount automatic check correction denominator	The deviation feedback value (pulse input value after correction) is calculated with the pulse input value to be input from the pulse input terminal by the following calculating formula, and the moving amount automatic check is executed.  Deviation feedback value = (Correction numerator / Correction denominator) x Pulse input  Setting range: 1 to 32767 Default: 1																								
00AH	Moving amount automatic check operaiton	Set the operation to be performed when the difference between the command value and feedback value exceeds the moving amount check value.  0: Error occurs. If the difference between the feedback value and the command moving amount exceeded the moving amount check value (threshold), an error occurs and the operation stops. 1: Warning occurs. If the difference between the feedback value and the command moving amount exceeded the moving amount check value (threshold), a warning occurs and the operation continues. 2: Off The moving amount check is not performed.																								

Offset address	Name	Descriptions	Default value	Setting range	Unit
00BH	Software limit enabled/disabled setting	Sets the software limit to be enabled or disabled for each control.			
		bit	Name	Default	Descriptions
		0	Software limit enabled/disabled setting for positioning control	0	0: Disables the software limit in positioning 1: Enables the software limit in positioning
		1	Software limit enabled/disabled setting for home return	0	0: Disables the software limit in home return 1: Enables the software limit in home return
		2	Software limit enabled/disabled setting for JOG operation	0	0: Disables the software limit in JOG operation 1: Enables the software limit in JOG operation
		15 to 3	—	—	—
00CH	Upper limit of software limit	Sets the upper limit value of the software limit for absolute coordinates.			
00DH		bit	Name	Default	Descriptions
		31 to 0	Upper limit of software limit	1,073,741,823	Upper limit of software limit Interpretation is changed by the unit setting. pulse: -1,073,741,823 to 1,073,741,823 pulse $\mu\text{m}$ (0.1 $\mu\text{m}$ ): -107,374,182.3 to 107,374,182.3 $\mu\text{m}$ $\mu\text{m}$ (1 $\mu\text{m}$ ): -1,073,741,823 to 1,073,741,823 $\mu\text{m}$ inch (0.0001inch): -10,737.41823 to 10,737.41823 inch inch (0.0001inch): -107,374.1823 to 107,374.1823 inch degree (0.1degree): -107,374,182.3 to 107,374,182.3 degree degree (1degree): -1,073,741,823 to 1,073,741,823 degree Any other settings will be errors.

Offset address	Name	Descriptions	Default value	Setting range	Unit																															
00EH	Lower limit of software limit	Sets the lower limit value of the software limit for absolute coordinates.																																		
00FH		<table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>31 to 0</td><td>Lower limit of software limit</td><td>1,073,741,823</td><td>Lower limit of software limit Interpretation is changed by the unit setting. 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(1 μm): -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): 0.0 to 359.9 degree degree(1degree): 0 to 359 degree Any other settings will be errors.</td></tr></table>	bit	Name	Default	Descriptions	31 to 0	Lower limit of software limit	1,073,741,823	Lower limit of software limit Interpretation is changed by the unit setting. 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(1 μm): -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): 0.0 to 359.9 degree degree(1degree): 0 to 359 degree Any other settings will be errors.																										
bit	Name	Default	Descriptions																																	
31 to 0	Lower limit of software limit	1,073,741,823	Lower limit of software limit Interpretation is changed by the unit setting. 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(1 μm): -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): 0.0 to 359.9 degree degree(1degree): 0 to 359 degree 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 enabled or disabled. The time that the auxiliary output contact is on is determined by the following auxiliary output ON time.																																		
		<table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>1 to 7</td><td>Auxiliary output mode</td><td>0</td><td>0000H: Not use the auxiliary output function (auxiliary output contact, auxiliary output code). 0001H: Use With mode. 0002H: Use Delay mode.</td></tr><tr><td>15 to 4</td><td>Auxiliary output ON time</td><td>10</td><td>Setting range: 00H (0 ms) to FFH (255 ms)</td></tr></table>	bit	Name	Default	Descriptions	1 to 7	Auxiliary output mode	0	0000H: Not use the auxiliary output function (auxiliary output contact, auxiliary output code). 0001H: Use With mode. 0002H: Use Delay mode.	15 to 4	Auxiliary output ON time	10	Setting range: 00H (0 ms) to FFH (255 ms)																						
bit	Name	Default	Descriptions																																	
1 to 7	Auxiliary output mode	0	0000H: Not use the auxiliary output function (auxiliary output contact, auxiliary output code). 0001H: Use With mode. 0002H: Use Delay mode.																																	
15 to 4	Auxiliary output ON time	10	Setting range: 00H (0 ms) to FFH (255 ms)																																	
013H	Auxiliary output delay ratio	Specify the ratio (%) of output when using the Delay mode for the auxiliary output. The allowable range is 0 to 100 (%). When specifying 50%, the auxiliary output is performed if the positioning moving amount exceeds 50%. Default: 0 (%)																																		
014H	-	-																																		
015H	Pulse output control code	Set the pulse output, home, near home and limit signal.																																		
		<table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>0</td><td>Output method</td><td>0</td><td>0:Pulse/Sign 1: CW/CCW</td></tr><tr><td>1</td><td>Rotation direction</td><td>0</td><td>0: Elapsed value (+) direction is CW. 1: Elapsed value (+) direction is CCW.</td></tr><tr><td>2</td><td>Home logic</td><td>0</td><td>0: Normal Open 1: Normal Close</td></tr><tr><td>3</td><td>Near home logic</td><td>0</td><td>0: Normal Open 1: Normal Close</td></tr><tr><td>4</td><td>Limit (+) logic</td><td>1</td><td>0: Normal Open 1: Normal Close</td></tr><tr><td>5</td><td>Limit (-) logic</td><td>1</td><td>0: Normal Open 1: Normal Close</td></tr><tr><td>15 to 6</td><td>—</td><td>0</td><td>—</td></tr></table>	bit	Name	Default	Descriptions	0	Output method	0	0:Pulse/Sign 1: CW/CCW	1	Rotation direction	0	0: Elapsed value (+) direction is CW. 1: Elapsed value (+) direction is CCW.	2	Home logic	0	0: Normal Open 1: Normal Close	3	Near home logic	0	0: Normal Open 1: Normal Close	4	Limit (+) logic	1	0: Normal Open 1: Normal Close	5	Limit (-) logic	1	0: Normal Open 1: Normal Close	15 to 6	—	0	—		
bit	Name	Default	Descriptions																																	
0	Output method	0	0:Pulse/Sign 1: CW/CCW																																	
1	Rotation direction	0	0: Elapsed value (+) direction is CW. 1: Elapsed value (+) direction is CCW.																																	
2	Home logic	0	0: Normal Open 1: Normal Close																																	
3	Near home logic	0	0: Normal Open 1: Normal Close																																	
4	Limit (+) logic	1	0: Normal Open 1: Normal Close																																	
5	Limit (-) logic	1	0: Normal Open 1: Normal Close																																	
15 to 6	—	0	—																																	
016H	Startup speed	Set the startup speed when starting each operation. The change in startup speed should be done before starting each operation.  Setting range: 0 to 32,767,000  Any other settings will be errors. 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  Default: 0																																		
017H																																				

Offset address	Name	Descriptions	Default value	Setting range	Unit
018H	Moving amount automatic check value	Set the threshold for executing the moving amount automatic check function.  Setting range: 0 to 65536 Default: 10000 (pulse)			
019H	-	-			
01AH	Moving amount automatic check interval	Set the interval for executing the moving amount automatic check function.  Setting range: 0 to 32767 (ms) Default: 0 (ms)			
01BH	-	-			
01CH	-	-			
01DH	-	-			
01EH	-	-			
01FH	-	-			

Offset address	Name	Descriptions	Default value	Setting range	Unit
020H	Home return setting code	Set the pattern of the home return.			
		bit	Name	Default	Descriptions
		15 to 0	Home return setting code	0	0: DOG method 1: DOG method 2 2: DOG method 3 3: Limit method 1 4: Limit method 1 5: Z phase method 8: Data set Any other settings will be errors.
021H	Home return direction	Set the operating direction of the home return.			
		bit	Name	Default	Descriptions
		15 to 0	Home return direction	0	0: Elapsed value decreasing direction (Limit "-" direction) 1: Elapsed value increasing direction (Limit "+" direction) Any other settings will be errors.
022H	Home return acceleration time	Set the acceleration/deceleration time when performing the home return. 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
		15 to 0	Home return acceleration time Home return deceleration time	100	Setting range: 0 to 10,000 (ms) Any other settings will be errors.
024H	Home return target speed	Set the target speed when performing the home return. When there is no proximity input after starting the home return, accelerates to the target speed.			
		bit	Name	Default	Descriptions
		31 to 0	Home return target	1,000	Setting range: 1 to 32,767,000 Any other settings will be errors. The ranges vary depending on the unit pulse: 1 to 32,767,000 pps $\mu$ m: 1 to 32,767,000 $\mu$ m/s inch: 0.001 to 32,767.000 inch/s degree: 0.001 to 32,767.000 rev/s
026H	Home return creep speed	Set the speed to search the home position after the proximity input. Set the value lower than the home return target speed.			
		bit	Name	Default	Descriptions
		31 to 0	Home return creep speed	100	Setting range: 1 to 32,767,000 Any other settings will be errors. The ranges vary depending on the unit settings as below. pulse: 1 to 32,767,000 pps $\mu$ m: 1 to 32,767,000 $\mu$ m/s inch: 0.001 to 32,767.000 inch/s degree: 0.001 to 32,767.000 rev/s
028H	Deviation counter clear signal ON time	Set the ON time of deviation counter clear signal after the completion of home return.  Default: 1 (ms) Setting range: 1 to 100 (ms) When setting a value larger than 100 ms, the time is 100 ms.			
029H	JOG operation setting code	Set the mode of the JOG operation.			
		bit	Name	Default	Descriptions
		0	—	—	—
		1	Acceleration/deceleration pattern setting	0	0: Linear acceleration/deceleration 1: S-shaped acceleration/deceleration
		2 to 15	—	—	—

Offset address	Name	Descriptions	Default value	Setting range	Unit											
02AH	JOG operation acceleration 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><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></tr><tr><td>15 to 0</td><td>JOG operation acceleration time</td><td>100</td><td>Setting range: 0 to 10,000(ms)</td></tr><tr><td></td><td>JOG operation deceleration</td><td></td><td>Any other settings will be errors.</td></tr></table>	bit	Name	Default	Descriptions	15 to 0	JOG operation acceleration time	100	Setting range: 0 to 10,000(ms)		JOG operation deceleration		Any other settings will be errors.		
bit	Name	Default	Descriptions													
15 to 0	JOG operation acceleration time	100	Setting range: 0 to 10,000(ms)													
	JOG operation deceleration		Any other settings will be errors.													
02CH	JOG operation target speed	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																
		<table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></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>	bit	Name	Default	Descriptions	31 to 0	JOG operation target speed	1,000	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						
bit	Name	Default	Descriptions													
31 to 0	JOG operation target speed	1,000	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													
02EH	-	-														
02FH	-	-														
030H	-	-														
031H	-	-														
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><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></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>	bit	Name	Default	Descriptions	15 to 0	Emergency stop deceleration time	100	Setting range: 0 to 10,000(ms) Any other settings will be errors.						
bit	Name	Default	Descriptions													
15 to 0	Emergency stop deceleration time	100	Setting range: 0 to 10,000(ms) Any other settings will be errors.													
034H	-	-														
035H	Limit stop deceleraiton time	When the limit is input, the deceleration operation will complete in this deceleration time.														
		<table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></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>	bit	Name	Default	Descriptions	15 to 0	Limit stop deceleration time	100	Setting range: 0 to 10,000(ms) Any other settings will be errors.						
bit	Name	Default	Descriptions													
15 to 0	Limit stop deceleration time	100	Setting range: 0 to 10,000(ms) Any other settings will be errors.													
036H	-	-														
037H	Error stop deceleration time	When an error occurred, it will be valid, and the deceleration operation will complete in this deceleration time.														
		<table><tr><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></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>	bit	Name	Default	Descriptions	15 to 0	Error stop deceleration time	100	Setting range: 0 to 10,000(ms) Any other settings will be errors.						
bit	Name	Default	Descriptions													
15 to 0	Error stop deceleration time	100	Setting range: 0 to 10,000(ms) Any other settings will be errors.													
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><th>bit</th><th>Name</th><th>Default</th><th>Descriptions</th></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 3:Pulser input 4 Any other settings will be errors.</td></tr></table>	bit	Name	Default	Descriptions	15 to 0	Pulser operation setting code	0	0:Pulser input 1 1:Pulser input 2 2:Pulser input 3 3:Pulser input 4 Any other settings will be errors.						
bit	Name	Default	Descriptions													
15 to 0	Pulser operation setting code	0	0:Pulser input 1 1:Pulser input 2 2:Pulser input 3 3:Pulser input 4 Any other settings will be errors.													

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. (Number of command pulses) = (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. (Number of command pulses) = (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	Pulse operation method	Set the single or interpolation operation pattern for the positioning operation.				
		bit	Name	Default	Descriptions	
		15 to 0	Pulse operation method	0	0 : Standard operation 1 : Speed limit (keep pulse) 2 : Speed limit (Cutoff) Any other settings will be errors.	
03CH	-	-				
03DH	-	-				
03EH	-	-				
03FH	-	-				
040H	-	-				
041H	J point control code	Set the control code of the J point control.				
		bit	Name	Default	Descriptions	
		0	—	—	—	
		1	Acceleration/deceleration pattern setting	0	0: Linear acceleration/deceleration 1: S-shaped acceleration/deceleration	
		2 to 15	—	—	—	
042H	J point acceleration time	Set the acceleration/deceleration time of the J point control.				
		bit	Name	Default	Descriptions	
		15 to 0	J point acceleration time J point deceleration time	100	Setting range : 0 to 10,000 (ms)  Any other settings will be errors.	
043H	J point deceleration time					
044H		Set the target speed of the J point control.				
		bit	Name	Default	Descriptions	
		31 to 0	J point target speed	1,000	Setting range: 1 to 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	
045H	J point target speed					
046H	-	-				
047H	-	-				

Offset address	Name	Descriptions	Default value	Setting range	Unit
048H	Pulser operation maximum speed	<p>The maximum speed when selecting the speed limit for the pulser operation method.</p> <p>When the speed calculated by multiplying (pulser operation numerator / pulser operation denominator) by the pulser input is ver the specified maximum speed, the operation is performed at the maximum speed.</p> <p>Unit: Set unit X1000/s Input range: 0 to 32767000 (pulse/s) Default: 0</p> <p>* If this area has been set to 0, it is the minimum speed in the set unit.</p>			
049H					
04AH	Coordinate origin value	Stores the coordinate origin value after the home return.			
04BH					
04CH	-	-			
04DH	-	-			
04EH	-	-			
04FH	-	-			

#### Starting address of each positioning parameter

Axis 1	Axis 2	Axis 3	Axis 4	Address	Descriptions
Bank No.					
02H	0CH	16H	20H	050H	Starting address of parameters

## 17.6.3 Positioning Data Setting Areas

They are the areas for setting positioning data. The positioning data for 4 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, 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 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 programs, too. However, if the positioning table is changed by the program, the calculation 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 positioning data from the program. The procedures for the calculation are as follows.

1. Change the positioning table in the shared memory.
2. Turn on the recalculation request contact (Y87) in the I/O area.
3. Confirm the recalculation done contact (X7) is on (Confirm 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 starting 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 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.			
		bit	Name	Default	Descriptions
		0	Increment/absolute setting	00H	00: Increment mode 1: Absolute mode
		1	Acceleration/deceleration pattern setting	00H	00: Linear acceleration/deceleration 1: S-shaped acceleration/deceleration
		15 to 2	—	—	—
001H	Operation pattern	Sets the independent and interpolation patterns for the positioning operation. The relation of the interpolation depends on the settings in the axis group setting area in the common area of the shared memory. In the interpolation operation, the setting for the axis with the smallest number in an axis group is effective.			
		bit	Name	Default	Descriptions
		7 to 0	Control pattern	00H	00H: E point control (End point control) 01H: P point control (Pass point control) 02H: C point control (Continuation point) 03H: J point control (Speed point control) Any other settings will be errors.
		15 to 8	Interpolation setting	00H	00H: Linear interpolation (Composite speed) 01H: Linear interpolation (Long axis speed) 10H: Circular interpolation (Center point/CW direction) 11H: Circular interpolation (Center point/CCW direction) 20H: Circular interpolation (Pass point) 50H: Spiral interpolation (Center point/CW direction/X-axis movement) 51H: Spiral interpolation (Center point/CCW direction/X-axis movement) 52H: Spiral interpolation (Center point/CW direction/Y-axis movement) 53H: Spiral interpolation (Center point/CCW direction/Y-axis movement) 54H: Spiral interpolation (Center point/CW direction/Z-axis movement) 55H: Spiral interpolation (Center point/CCW direction/Z-axis movement) 60H: Spiral interpolation (Pass point/X-axis movement) 61H: Spiral interpolation (Pass point/Y-axis movement) 62H: Spiral interpolation (Pass point/Z-axis movement) Any other settings will be errors.
002H	-	-			
003H	-	-			
004H	Positioning acceleration time	Sets the acceleration and deceleration time for the positioning operation. The acceleration time and deceleration time can be set individually. In the interpolation operation, the setting for the axis with the smallest number in an axis group is effective.			
005H	Positioning deceleration time	bit	Name	Default	Descriptions
		15 to 0	Acceleration time Deceleration time	100	Setting range: 0 to 10,000 (ms) Any other settings will be errors.
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 operation, it is the target speed of the interpolation.			
007H		In the interpolation operation, the target speed for the axis of the smallest number in a group is valid.			
		bit	Name	Default	Descriptions
		31 to 0	Positioning target (Interpolation speed)	1000	Setting range: 1 to 32,767,000 Any other settings will be errors. The interpretation is changed by the unit setting. pulse: 1 to 32,767,000 pps $\mu$ m: 1 to 32,767,000 $\mu$ m/s inch: 0.001 to 32,767,000 inch/s      degree: 0.001 to 32,767,000 rev/s

Offset address	Name	Descriptions			
008H	Positioning movement amount	The area to set the movement amount for the positioning operation. The interpretation is chained for the increment movement amount or absolute coordinate by the control code setting.			
009H		bit	Name	Default	Descriptions
		31 to 0	Positioning movement amount	0	Setting range: -1,073,741,823 to 1,073,741,823 Any other settings will be errors. The interpretation alters depending on the unit setting. pulse: -1,073,741,823 to 1,073,741,823 pulse $\mu\text{m}$ (0.1 $\mu\text{m}$ ): -107,374,182.3 to 107,374,182.3 $\mu\text{m}$ $\mu\text{m}$ (1 $\mu\text{m}$ ): -1,073,741,823 to 1,073,741,823 $\mu\text{m}$ inch(0.00001inch): -10,737.41823 to 10,737.41823 inch inch(0.0001inch): -107,374.1823 to 107,374.1823 inch degree(0.1degree): -107,374,182.3 to 107,374,182.3 degree degree(1degree): -1,073,741,823 to 1,073,741,823 degree
00AH	Auxiliary point	The area to set the auxiliary points (center point, pass point coordinates) in case of the circular interpolation or spiral interpolation control.			
00BH		bit	Name	Default	Descriptions
		31 to 0	Auxiliary point	0	Setting range: -1,073,741,823 to 1,073,741,823 Any other settings will be errors. The interpretation alters depending on the unit setting. pulse: -1,073,741,823 to 1,073,741,823 pulse $\mu\text{m}$ (0.1 $\mu\text{m}$ ): -107,374,182.3 to 107,374,182.3 $\mu\text{m}$ $\mu\text{m}$ (1 $\mu\text{m}$ ): -1,073,741,823 to 1,073,741,823 $\mu\text{m}$ inch(0.00001inch): -10,737.41823 to 10,737.41823 inch inch(0.0001inch): -107,374.1823 to 107,374.1823 inch degree(0.1degree): -107,374,182.3 to 107,374,182.3 degree degree(1degree): -1,073,741,823 to 1,073,741,823 degree
00CH	Dwell time	After the completion of the positioning control of this table, when the mode is C: Continuation point, stops the motor operation for the dwell time and starts the operation of the next table. when the mode is P: Pass point, this setting is ignored. when the mode is E: End point, the positioning done contact will turn on after waiting for the dwell time.			
		bit	Name	Default	Descriptions
		15 to 0	Dwell time	0	0 to 32,767: The unit is ms. 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.			
		bit	Name	Default	Descriptions
		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		
Bank No.				Address	Descriptions
02H	0CH	16H	20H	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		
Bank No.				Address	Descriptions
03H	0DH	17H	21H	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

Axis 1	Axis 2	Axis 3	Axis 4		
Bank No.				Address	Descriptions
04H	0EH	18H	22H	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		
Bank No.				Address	Descriptions
05H	0FH	19H	23H	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

Axis 1	Axis 2	Axis 3	Axis 4		
Bank No.				Address	Descriptions
06H	10H	1AH	24H	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		
Bank No.				Address	Descriptions
07H	11H	1BH	25H	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		
Bank No.				Address	Descriptions
08H	12H	1CH	26H	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		
Bank No.				Address	Descriptions
09H	13H	1DH	27H	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		
Bank No.				Address	Descriptions
0AH	14H	1EH	28H	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		
Bank No.				Address	Descriptions
0BH	15H	1FH	29H	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

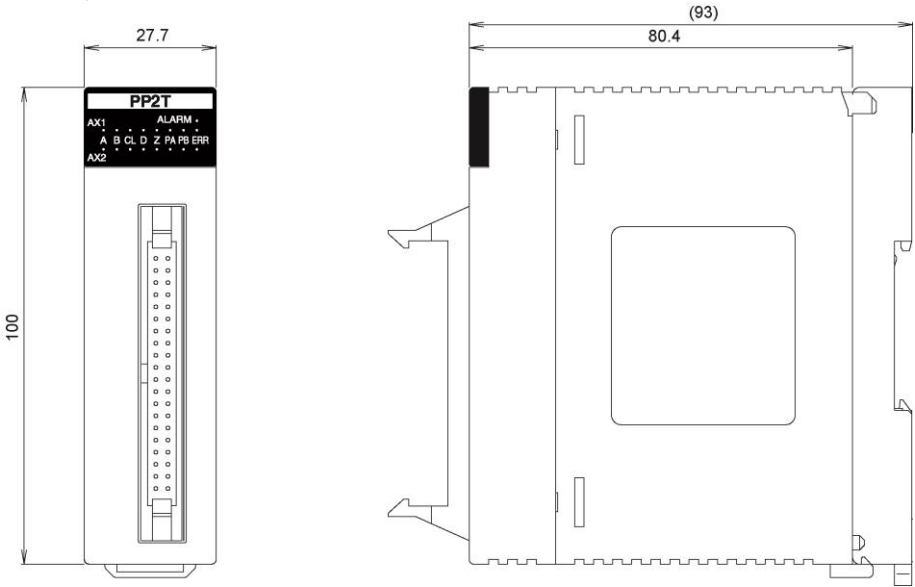
## Chapter 18

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## Dimensions

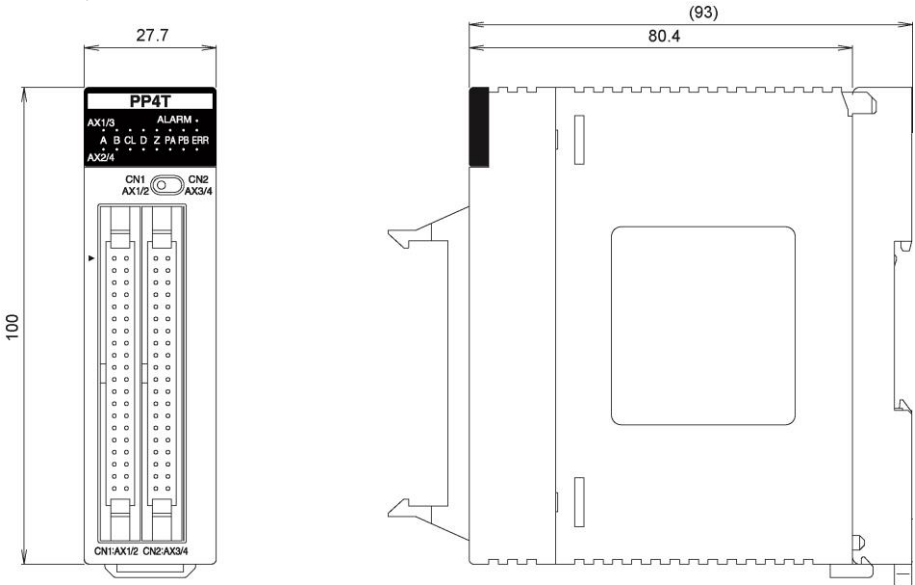
# 18.1 FP2 Positioning Unit (Interpolation Type)

## 2-axis type



(Unit: mm)

## 4-axis type



(Unit: mm)

## Chapter 19

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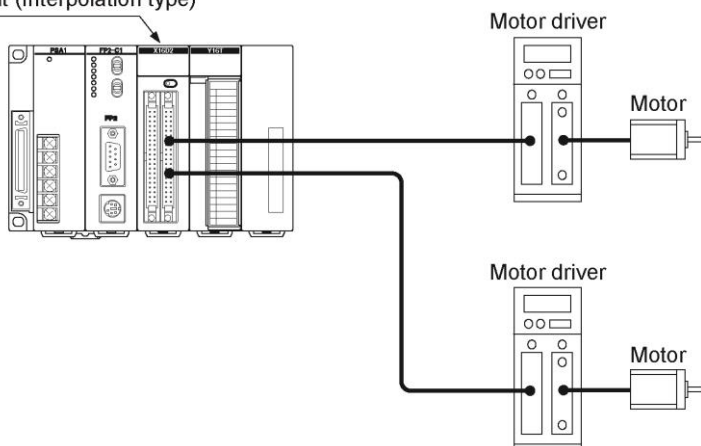
### Sample Programs

## 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

Positioning unit (Interpolation type)



The positioning unit is installed in the slot 0. Stepping motors are connected to the first and second axes of the positioning unit, and the linear interpolation of 2 axes is designated as a sample operation. Also, the parameters for each axis are specified by Configurator PM, and they will be stored in the positioning unit.

### Used contacts and data registers

Number	Descriptions
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
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
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

Number	Descriptions
X0	Unit preparation ready
X4	Tool operation for all axes
X7	Recalculation done flag
X18	Busy flag for axis 1
X19	Busy flag for axis 2
X60	Error occurrence annunciation for axis 1
X61	Error occurrence annunciation for axis 2
Y87	Request recalculation
Y90	Positioning start for axis 1
Y98	Home return for axis 1
Y99	Home return for axis 2
Y100	Forward JOG for axis 1
Y101	Reverse JOG for axis 1
Y102	Forward JOG for axis 2
Y103	Reverse JOG for axis 2
Y140	Error clear for axis 1
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

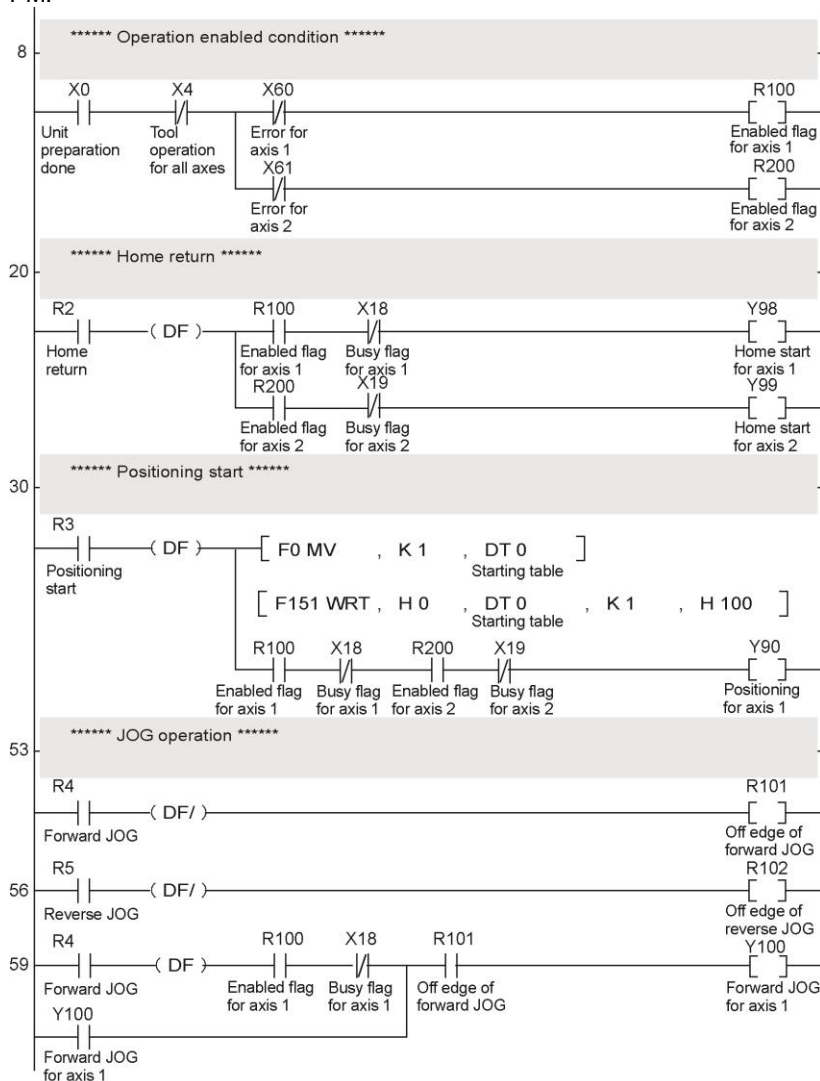
## 19.2 Sample Programs

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 with the program.
3. When setting the positioning data in the standard area with the program.

### Sample program

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

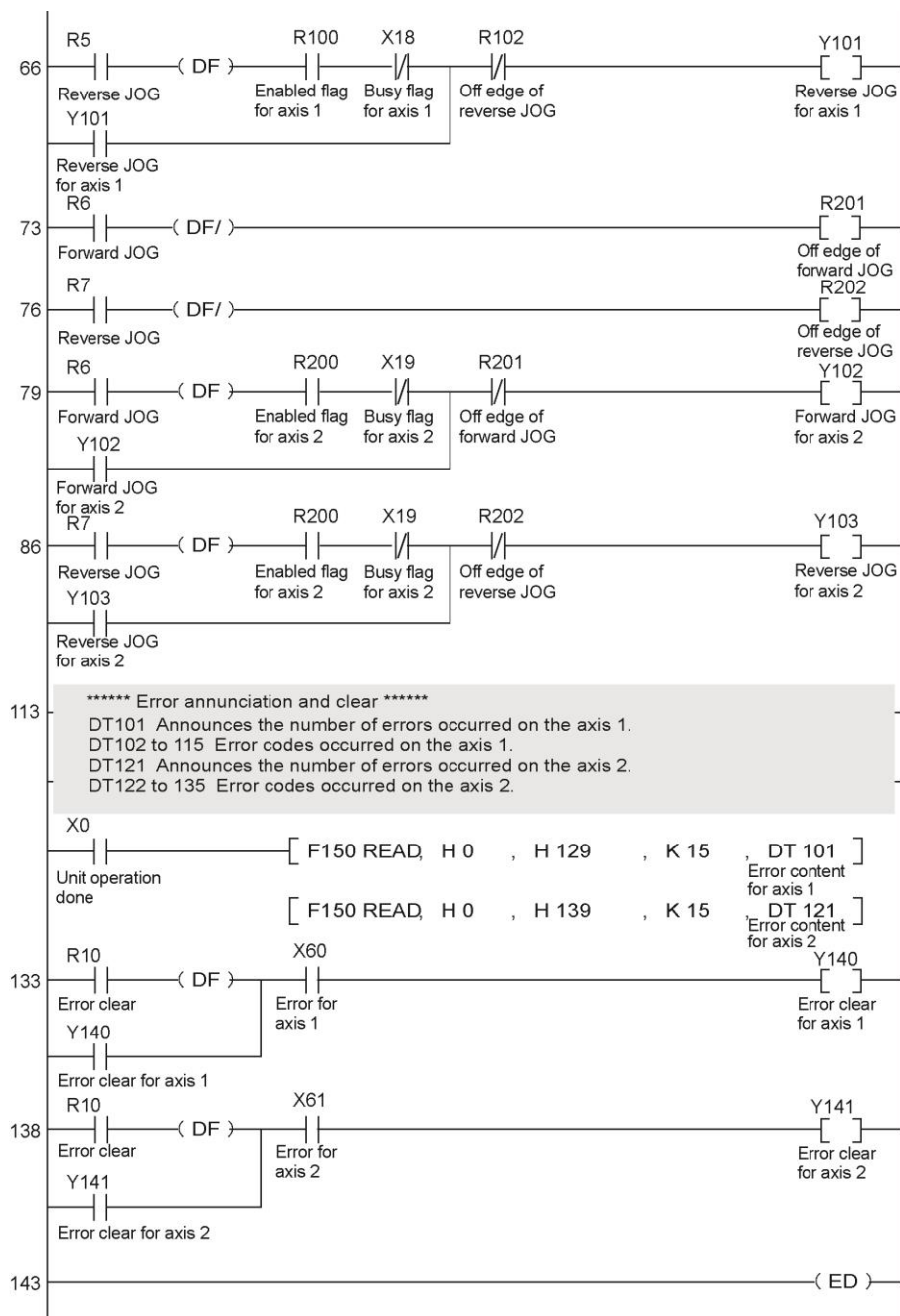


### Positioning start

The programs in this part vary depending on the setting methods.

This program is the one when the data has been already set by the configurator PM.

When the data is set using other 2 methods, please replace this part.





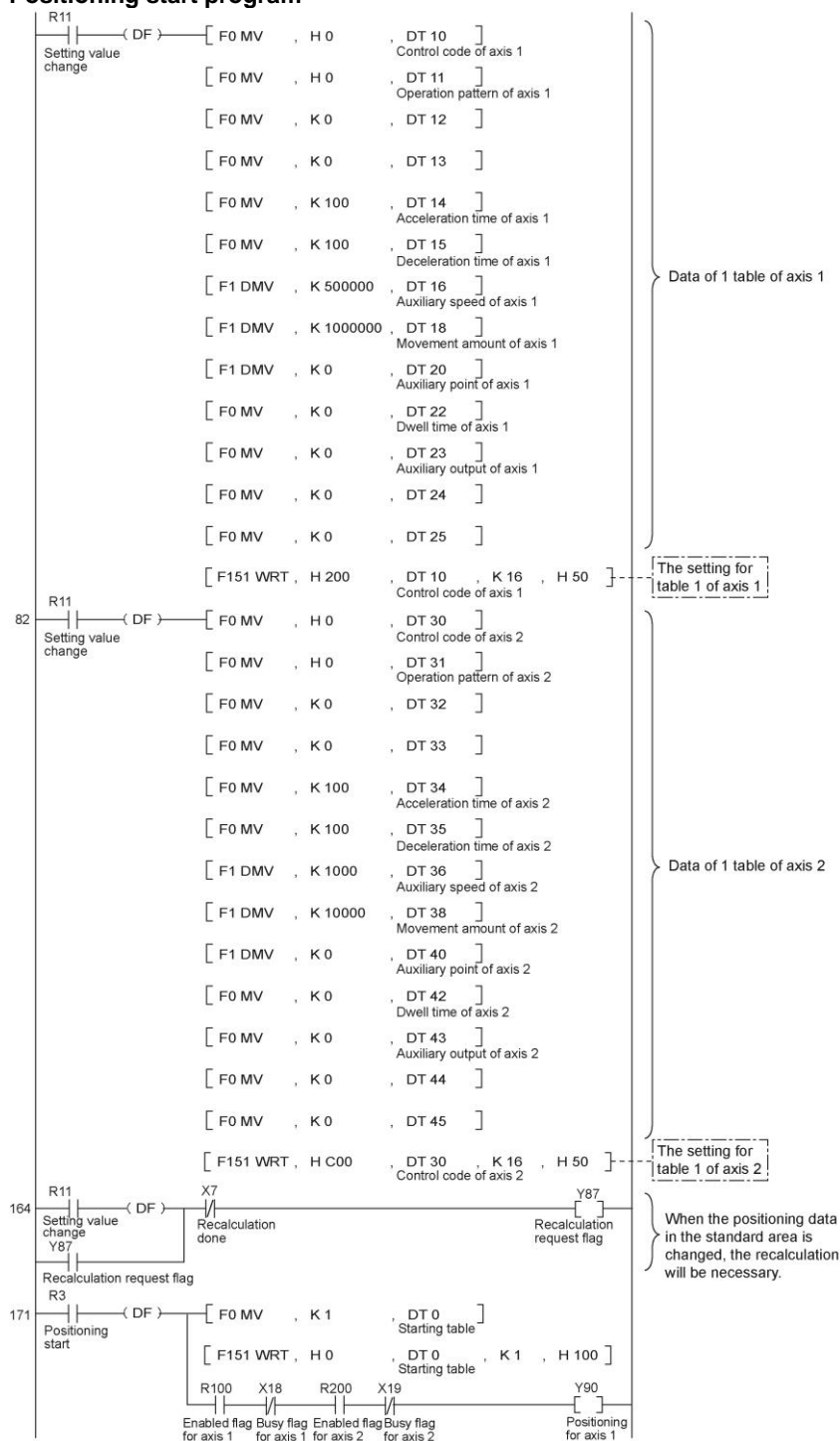
## 19.2.2 When Setting Positioning Data in Standard Area Using Program

Write positioning data in the standard area using the program.

Recalculating the positioning data is necessary after setting the positioning data.

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

**Positioning start program**





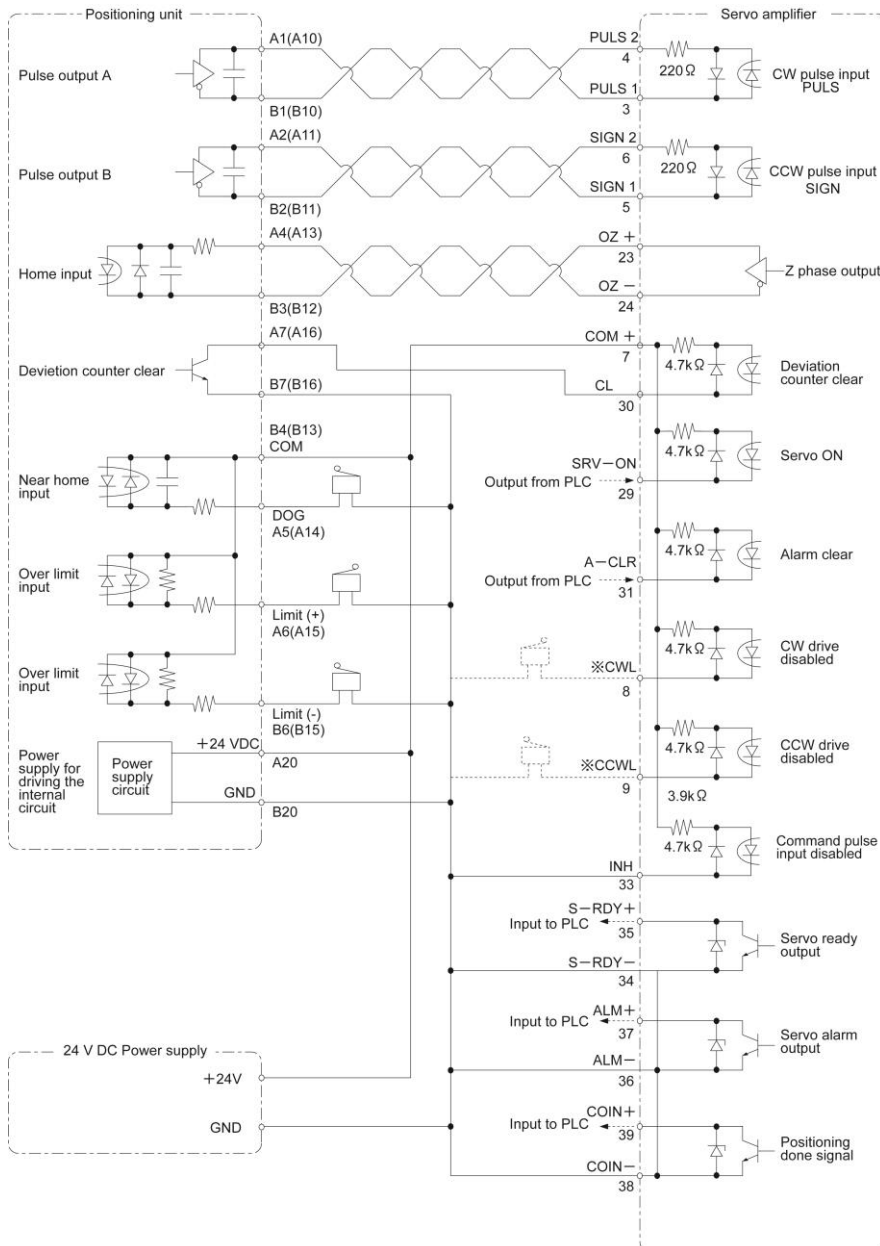
## Chapter 20

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### Driver Wiring

## 20.1 Wiring for Motor Driver

### 20.1.1 Panasonic MINAS A/A4 Series

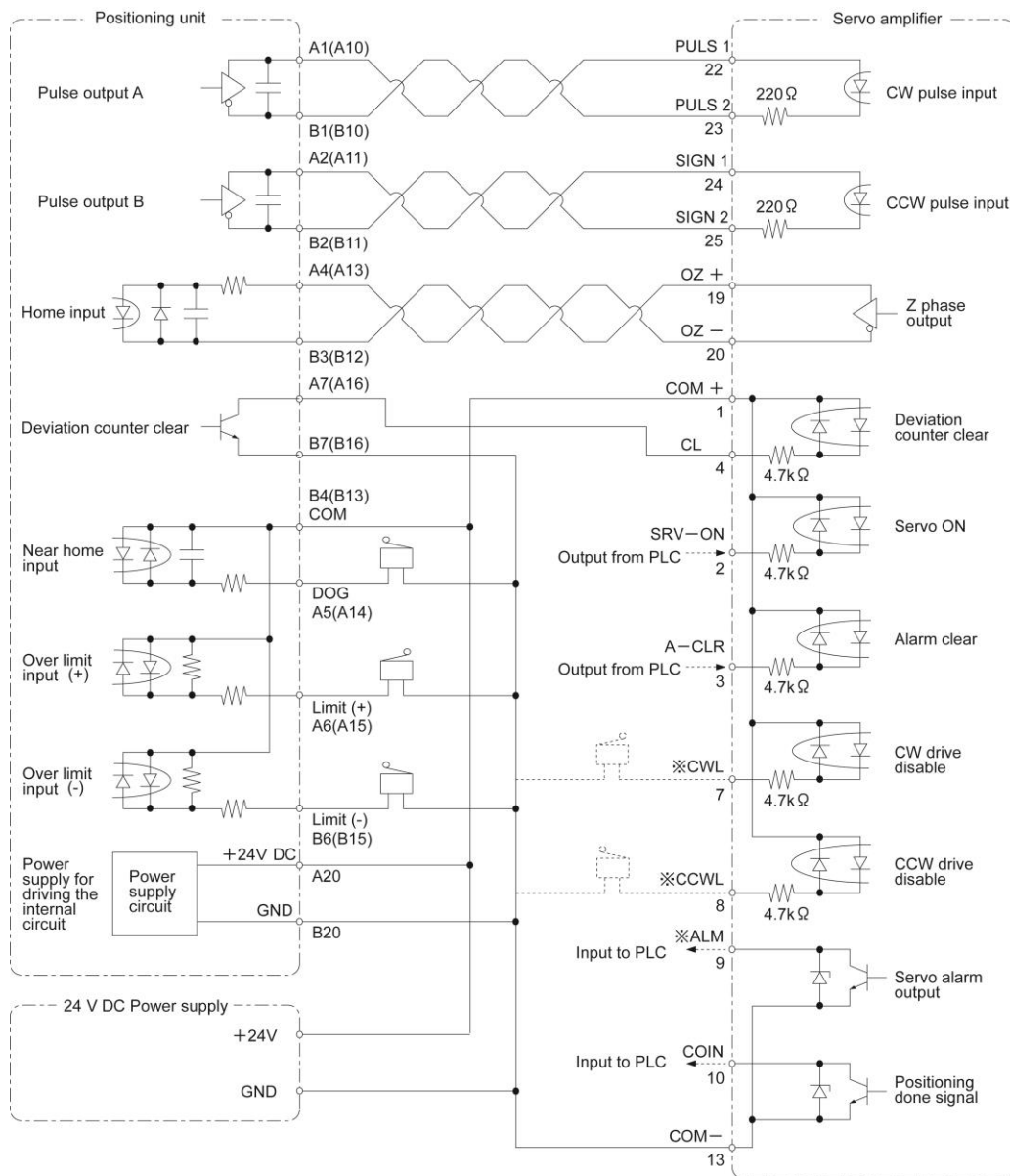


\* When connecting the CW drive disabled and CCW drive disabled input, the servo ready output, and the servo alarm output on the motor driver side, the circuits recommended by the various motor manufacturers should be used.

Numbers in parentheses after the unit side indicate the pin number for the second or fourth axis.

The above wiring is for the line driver output type.

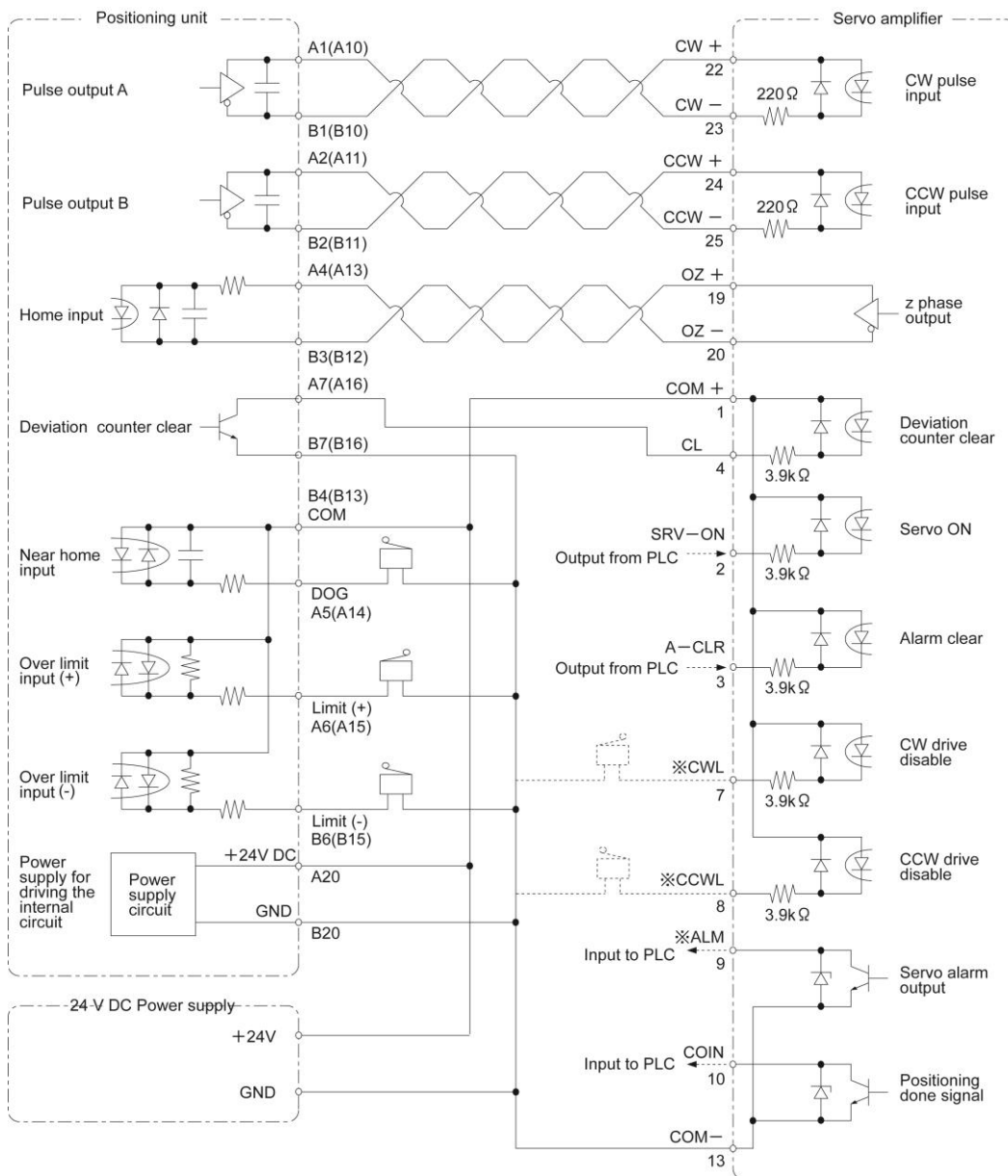
## 20.1.2 Panasonic MINAS S Series / E Series



\* When connecting the CW drive disabled and CCW drive disabled input and the servo alarm output on the motor driver side, the circuits recommended by the various motor manufacturers should be used. Numbers in parentheses after the unit side indicate the pin number for the second or fourth axis.

The above wiring is for the line driver output type.

## 20.1.3 Panasonic MINAS EX Series

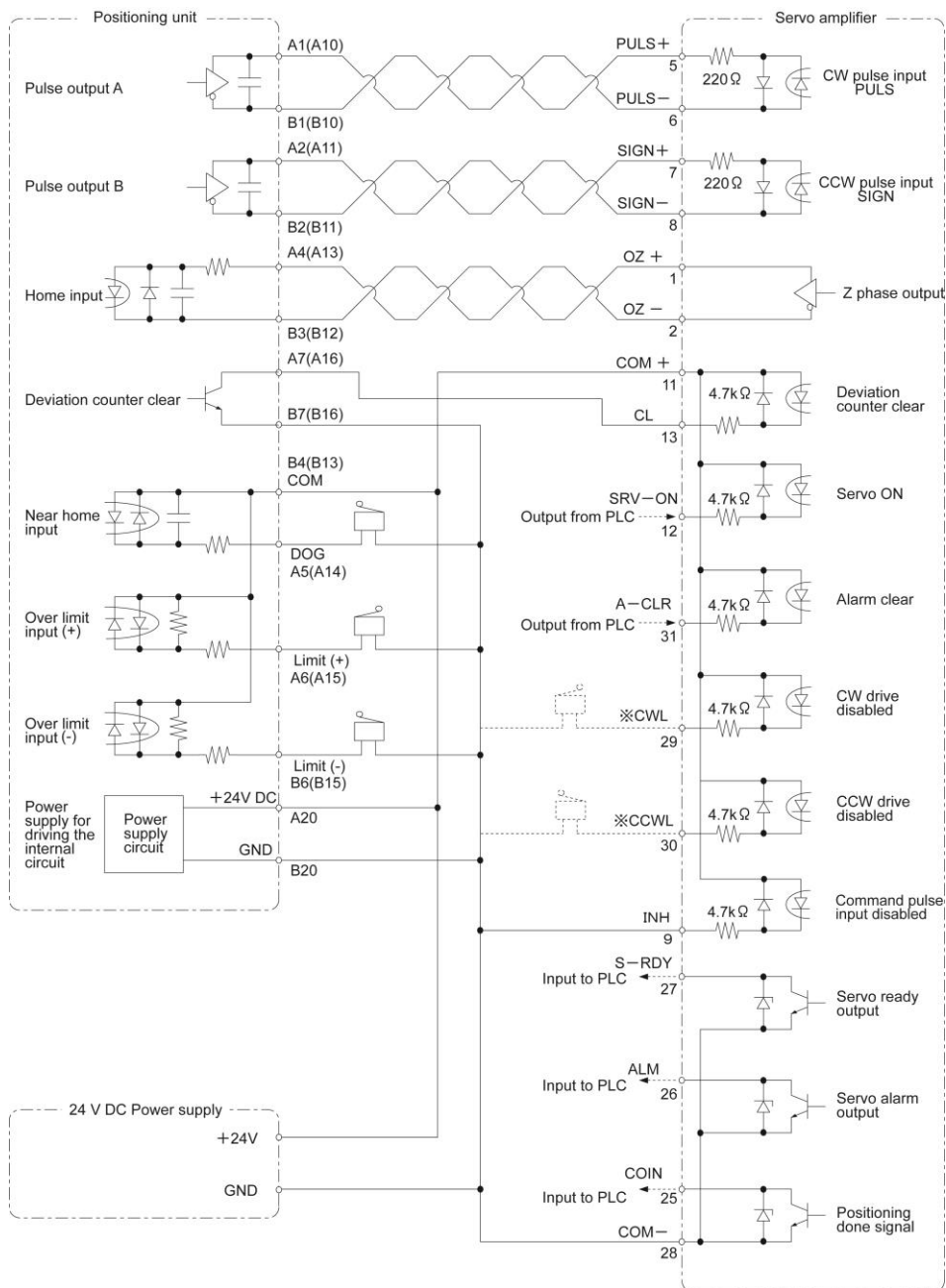


\* When connecting the CW drive disabled and CCW drive disabled input and the servo alarm output on the motor driver side, the circuits recommended by the various motor manufacturers should be used. Numbers in parentheses after the unit side indicate the pin number for the second or fourth axis.

The above wiring is for the line driver output type.

As of October 2008, this is the end-of-life (EOL) product.

## 20.1.4 Panasonic MINAS X (XX) Series



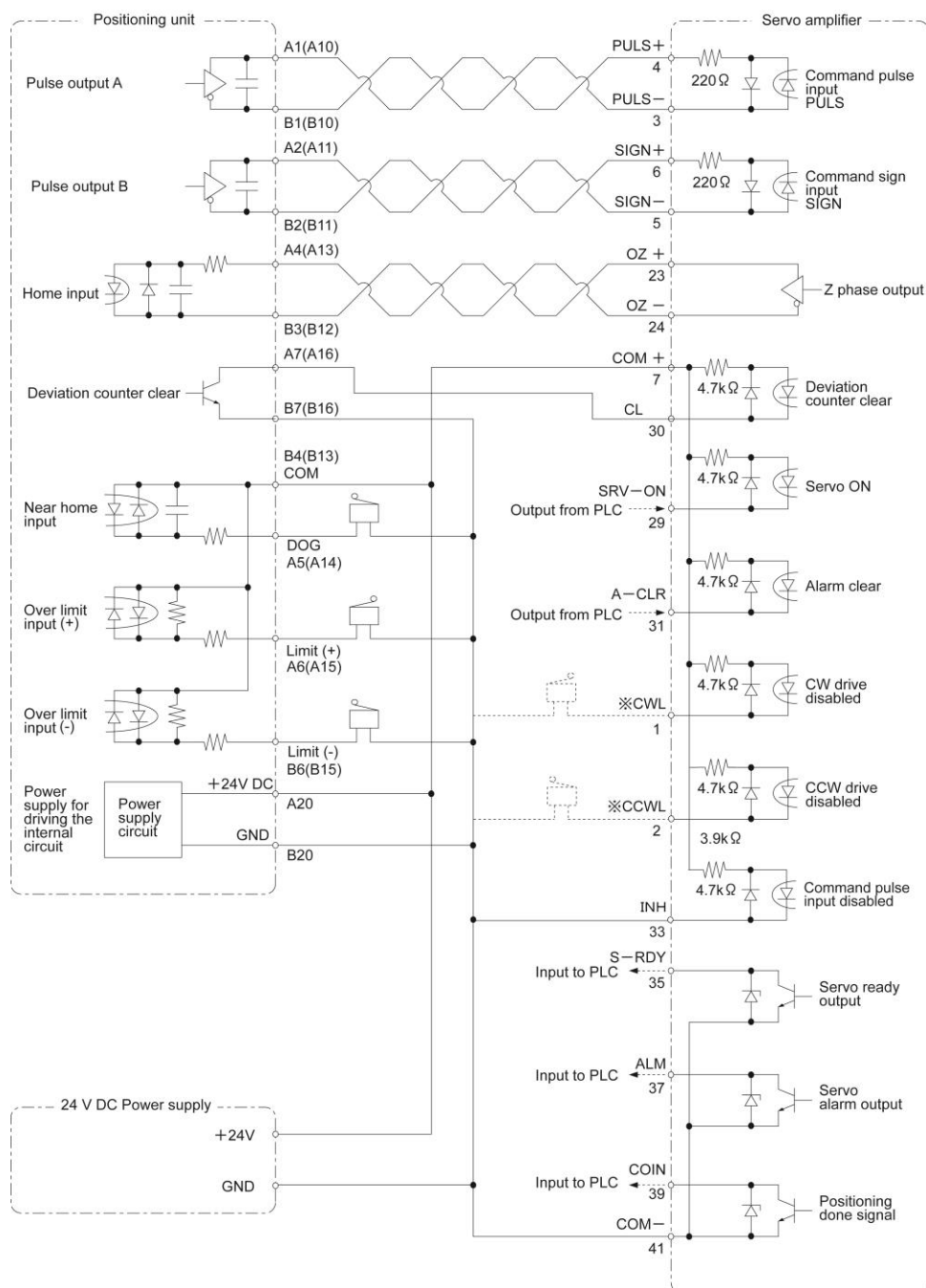
\* When connecting the CW drive disabled and CCW drive disabled input, the servo ready output, and the servo alarm output on the motor driver side, the circuits recommended by the various motor manufacturers should be used.

Numbers in parentheses after the unit side indicate the pin number for the second or fourth axis.

The above wiring is for the line driver output type.

As of October 2008, this is the end-of-life (EOL) product.

## 20.1.5 Panasonic MINAS X (V) Series



\* When connecting the CW drive disabled and CCW drive disabled input, the servo ready output, and the servo alarm output on the motor driver side, the circuits recommended by the various motor manufacturers should be used.

Numbers in parentheses after the unit side indicate the pin number for the second or fourth axis.

The above wiring is for the line driver output type.

As of October 2008, this is the end-of-life (EOL) product.

## 20.1.6 Combination with MINAS Motor

When using FP2 Positioning Unit with MINAS Motor, an easy-connectable “Motor driver I/F terminal” is recommended.

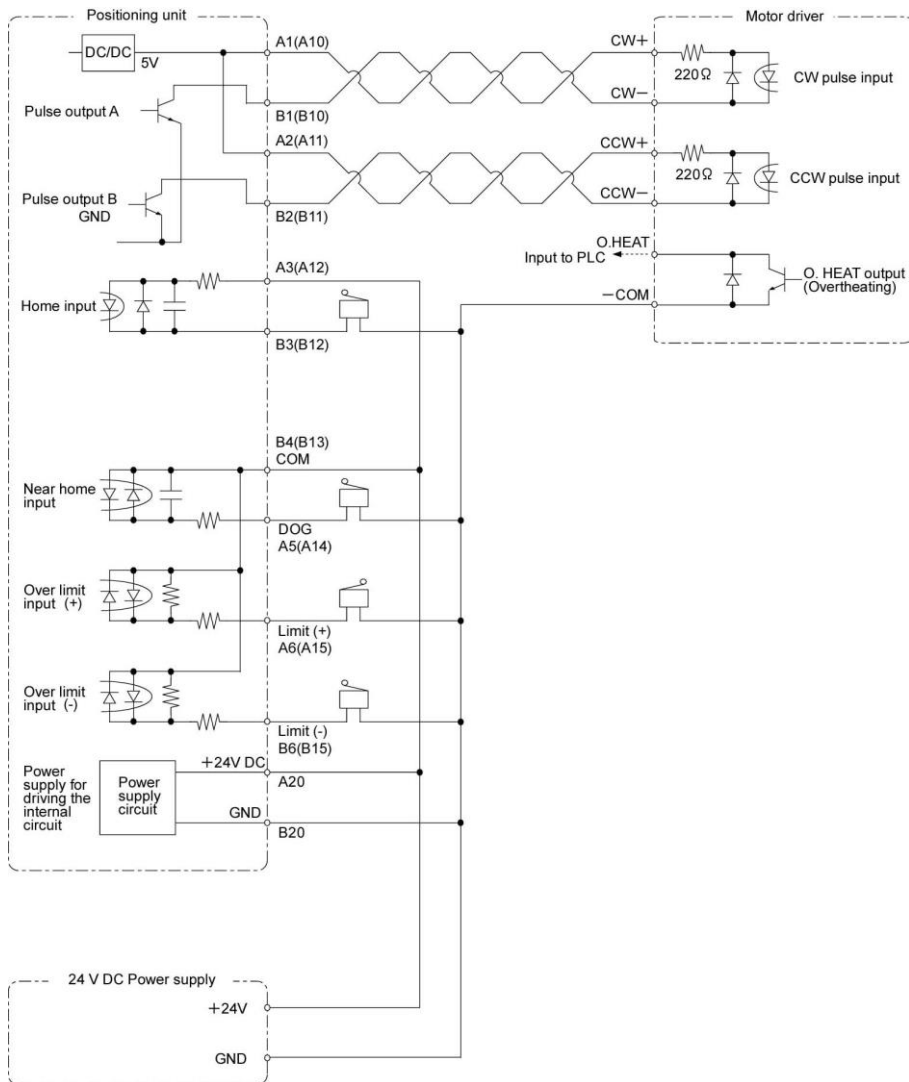


**Reference:** < Motor driver I/F terminal catalog >

### Unit type and available MINAS motor

	Motor driver I/F terminal	Connection cable used with a positioning unit	MINAS A $\beta$ series	MINAS S series E series	MINAS A series
FP2 positioning unit (Interpolation type) AFP243711, 243721	Motor driver I/F terminal II 1-axis type: AFP8503 2-axis type: AFP8504	FP2 positioning connection cable  0.5 mm: AFP85100  1 mm: AFP85101	Dedicated cable for AIII series 1 m: AFP85131 2 m: AFP85132	Dedicated cable for S series 1 m: AFP85141 2 m: AFP85142	Dedicated cable for AIII series 1 m: AFP85131 2 m: AFP85132

## 20.1.7 Oriental Motor UPK-W Series



Numbers in parentheses after the unit side indicate the pin number for the second or fourth axis.

## Record of changes

Manual No.	Date	Description of changes
ARCT1F448E	AUG.2008	First edition
ARCT1F448E-1	NOV.2008	Second edition - Change in Corporate name
ARCT1F448E-2	JUL.2009	Third edition
ARCT1F448E-3	AUG.2011	Fourth edition - Change in Corporate name - Fixed Errors
ARCT1F448E-4	JUL.2013	Fifth edition - Change in Corporate name
WUME-FP2POSP-01	Oct.2021	Sixth edition -Change of supported OS

## Order Placement Recommendations and Considerations

The Products and Specifications listed in this document are subject to change (including specifications, manufacturing facility and discontinuing the Products) as occasioned by the improvements of Products. Consequently, when you place orders for these Products, Panasonic Industrial Devices SUNX asks you to contact one of our customer service representatives and check that the details listed in the document are commensurate with the most up-to-date information.

### [Safety precautions]

Panasonic Industrial Devices SUNX is consistently striving to improve quality and reliability. However, the fact remains that electrical components and devices generally cause failures at a given statistical probability. Furthermore, their durability varies with use environments or use conditions. In this respect, check for actual electrical components and devices under actual conditions before use. Continued usage in a state of degraded condition may cause the deteriorated insulation. Thus, it may result in abnormal heat, smoke or fire. Carry out safety design and periodic maintenance including redundancy design, design for fire spread prevention, and design for malfunction prevention so that no accidents resulting in injury or death, fire accidents, or social damage will be caused as a result of failure of the Products or ending life of the Products.

The Products are designed and manufactured for the industrial indoor environment use. Make sure standards, laws and regulations in case the Products are incorporated to machinery, system, apparatus, and so forth. With regard to the mentioned above, confirm the conformity of the Products by yourself.

Do not use the Products for the application which breakdown or malfunction of Products may cause damage to the body or property.

- i) usage intended to protect the body and ensure security of life
- ii) application which the performance degradation or quality problems, such as breakdown, of the Products may directly result in damage to the body or property

It is not allowed the use of Products by incorporating into machinery and systems indicated below because the conformity, performance, and quality of Products are not guaranteed under such usage.

- i) transport machinery (cars, trains, boats and ships, etc.)
- ii) control equipment for transportation
- iii) disaster-prevention equipment / security equipment
- iv) control equipment for electric power generation
- v) nuclear control system
- vi) aircraft equipment, aerospace equipment, and submarine repeater
- vii) burning appliances
- viii) military devices
- ix) medical devices (except for general controls)
- x) machinery and systems which especially require the high level of reliability and safety

### [Acceptance inspection]

In connection with the Products you have purchased from us or with the Products delivered to your premises, please perform an acceptance inspection with all due speed and, in connection with the handling of our Products both before and during the acceptance inspection, please give full consideration to the control and preservation of our Products.

### [Warranty period]

Unless otherwise stipulated by both parties, the warranty period of our Products is 3 years after the purchase by you or after their delivery to the location specified by you. The consumable items such as battery, relay, filter and other supplemental materials are excluded from the warranty.

### [Scope of warranty]

In the event that Panasonic Industrial Devices SUNX confirms any failures or defects of the Products by reasons solely attributable to Panasonic Industrial Devices SUNX during the warranty period, Panasonic Industrial Devices SUNX shall supply the replacements of the Products, parts or replace and/or repair the defective portion by free of charge at the location where the Products were purchased or delivered to your premises as soon as possible.

However, the following failures and defects are not covered by warranty and we are not responsible for such failures and defects.

- (1) When the failure or defect was caused by a specification, standard, handling method, etc. which was specified by you.
- (2) When the failure or defect was caused after purchase or delivery to your premises by an alteration in construction, performance, specification, etc. which did not involve us.
- (3) When the failure or defect was caused by a phenomenon that could not be predicted by the technology at purchasing or contracted time.
- (4) When the use of our Products deviated from the scope of the conditions and environment set forth in the instruction manual and specifications.
- (5) When, after our Products were incorporated into your products or equipment for use, damage resulted which could have been avoided if your products or equipment had been equipped with the functions, construction, etc. the provision of which is accepted practice in the industry.
- (6) When the failure or defect was caused by a natural disaster or other force majeure.
- (7) When the equipment is damaged due to corrosion caused by corrosive gases etc. in the surroundings.

The above terms and conditions shall not cover any induced damages by the failure or defects of the Products, and not cover your production items which are produced or fabricated by using the Products. In any case, our responsibility for compensation is limited to the amount paid for the Products.

### [Scope of service]

The cost of delivered Products does not include the cost of dispatching an engineer, etc. In case any such service is needed, contact our sales representative.

Panasonic Industrial Devices S U N X Co., Ltd.



Please contact .....

## Panasonic Corporation

Panasonic Industrial Devices SUNX Co., Ltd.  
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