

8. Parameters

8.1 Parameter Table

Category: a: Parameter relating to the actuator stroke range
 b: Parameter relating to the actuator operating characteristics
 c: Parameter relating to the external interface
 d: Servo gain adjustment

No.	Category	Symbol	Name	Unit	Default factory setting
1	a	ZONM	Zone boundary 1+	mm	Effective actuator length
2	a	ZONL	Zone boundary 1-	mm	Effective actuator length
3	a	LIMM	Soft limit+	mm	Effective actuator length
4	a	LIML	Soft limit-	mm	Effective actuator length
5	a	ORG	Home return direction [0: Reverse / 1: Forward]	-	(In accordance with the specification at the time of order)
6	b	PSWT	Push & hold stop judgment period	msec	255
7	d	PLG0	Servo gain number	-	6
8	b	VCMD	Default speed	mm/sec	Set individually in accordance with the actuator characteristics.
9	b	ACMD	Default acceleration/deceleration	G	Set individually in accordance with the actuator characteristics.
10	b	INP	Default positioning band (in-position)	mm	Set individually in accordance with the actuator characteristics.
12	b	SPOW	Current-limiting value at standstill during positioning	%	60
13	b	ODPW	Current-limiting value during home return	%	Set individually in accordance with the actuator characteristics.
15	c	FPIO	Pause input disable selection [0: Enable / 1: Disable]	-	0 [Enable]
16	c	BRSL	SIO communication speed	bps	38400
17	c	RTIM	Minimum delay time for slave transmitter activation	msec	5
18	b	LS	Home sensor input polarity	-	Set individually in accordance with the actuator characteristics.
21	c	SON	Servo ON input [0: Enable / 1: Disable]		1
22	a	OFST	Home return offset	mm	Set individually in accordance with the actuator characteristics.
23	a	ZNM2	Zone boundary 2+	mm	Effective actuator length
24	a	ZNL2	Zone boundary 2-	mm	Effective actuator length
25	c	IOPN	PIO pattern selection	-	0 [Standard type]
26	b	IOJV	PIO jog speed	mm/sec	100
27	c	FPIO	Movement command type [0: Level / 1: Edge]	-	0 [Level]
28	b	PHSP	Default direction of excited-phase signal detection [0: Reverse / 1: Forward]		Set individually in accordance with the actuator characteristics.
29	b	PHSP	Excited-phase signal detection time	msec	Set individually in accordance with the actuator characteristics.
31	d	VLPG	Speed loop proportional gain	-	Set individually in accordance with the actuator characteristics.
32	d	VLPT	Speed loop integral gain	-	Set individually in accordance with the actuator characteristics.
33	d	TRQF	Torque filter time constant	-	Set individually in accordance with the actuator characteristics.
34	b	PSHV	Push speed	mm/sec	Set individually in accordance with the actuator characteristics.
35	b	SAFV	Safety speed	mm/sec	100
36	b	ASO1	Automatic servo-off delay time 1	sec	0
37	b	ASO2	Automatic servo-off delay time 2	sec	0
38	b	ASO3	Automatic servo-off delay time 3	sec	0
39	c	FPIO	Output mode of position complete signal [0: PEND / 1: INP]	-	0 [PEND]
40	c	HOME	Home-return input disable selection [0: Enable / 1: Disable]	-	0 [Enable]

No.	Category	Symbol	Name	Unit	Default factory setting
41	c	FPIO	Operating-mode input disable selection [0: Enable / 1: Disable]	-	0 [Enable]
42	b	ENBL	Enable function [0: Enable/1: Disable]	-	1 [Disable]
43	b	HMC	Polarity of home check sensor input [0: Contact a / 1: Contact b]	-	Set individually in accordance with the actuator characteristics.
45	c	SIVM	Silent interval multiplier	-	0 [Do not apply multiplier]
46	b	OVRD	Speed override	%	100
47	b	IOV2	PIO jog speed	mm/sec	100
48	b	IOID	PIO inching distance	mm	0.1
49	b	IOD2	PIO inching distance 2	mm	0.1
50	b	LDWT	Load output judgment time	msec	0
51	b	TRQZ	Torque check range [0: Enable / 1: Disable]	-	0 [Enable]
53	b	HSTP	Default stop mode	-	0 [Power-saving mode is disabled]
77	b	LEAD	Ball screw lead	mm	Set individually in accordance with the actuator characteristics.
78	b	ATYP	Axis operation type	-	Set individually in accordance with the actuator characteristics.
79	b	ATYP	Rotational axis mode selection	-	Set individually in accordance with the actuator characteristics.
80	b	ATYP	Shortcut selection for rotation	-	Set individually in accordance with the actuator characteristics.
83	b	ETYP	Absolute unit [0: Not used / 1: Used]	-	Set individually in accordance with the actuator characteristics.

8.2 Detail Explanation of Parameters

If a parameter has been changed, always restart the controller using a software reset command or by reconnecting the power.

8.2.1 Parameters Relating to the Actuator Stroke Range

- Soft limit (No.3/4 LIMM/LIML)

Set the soft limit in the positive direction in parameter No. 3, and that in the negative direction in parameter No. 4.

The factory setting for the soft limits conforms to the effective actuator length. Change the settings, as necessary, to prevent crash with an obstacle or when the actuator must be stroked slightly beyond its effective length.

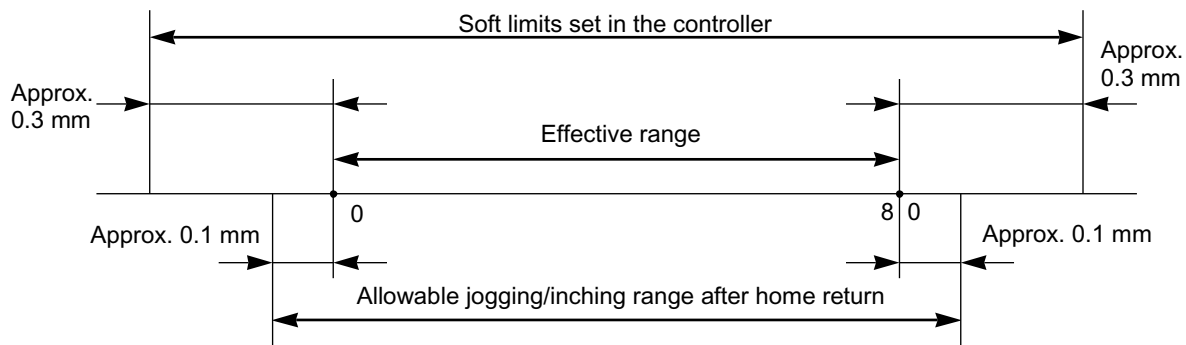
A wrong soft limit setting will cause the actuator to crash into the mechanical end, so exercise due caution. The minimum setting unit is "0.01 [mm]."

(Note) To change a soft limit, set a value corresponding to 0.3 mm outside of the effective range.

Example) Set the effective range to between 0 mm and 80 mm

Parameter No. 3 (positive side) 80.3

Parameter No. 4 (negative side) -0.3



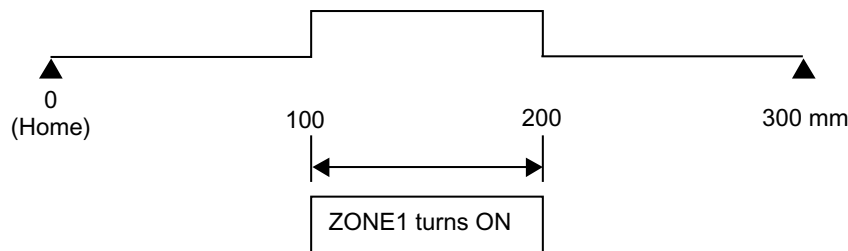
- Zone boundary (1: No.1/2 ZONM/ZONL 2: No.23/24 ZNM2/ZNL2)

These parameters set the zone within which the zone output signal (ZONE1) turns ON when the selected PIO pattern is "0" (standard type), "4" (7-point type) or "5" (3-point type).

The zone output signal turns ON when the current position is between the negative-side boundary and positive-side boundary. Set the positive-side boundary in parameter No. 1, and negative-side boundary in No. 2.

The minimum setting unit is "0.01 [mm]."

Example) To turn ON the ZONE1 signal when the actuator with a 300-mm stroke enters the section of 100 to 200 mm, set 200.00 in parameter No. 1 (Zone boundary+) and 100.00 in parameter No. 2 (Zone boundary-).



(Note) This controller does not use parameter No. 23 (Zone boundary 2+) and parameter No. 24 (Zone boundary 2-).

- Home return direction (No.5 ORG)

Unless specified by the user, the home return direction is set to the motor direction at the factory. Should a need arise to change the home direction after the actuator has been assembled into your system, reverse the setting in parameter No. 5 between “0” and “1.”

If necessary, also change the home return offset, soft limit and excited-phase signal detection direction parameters.

Caution: The home direction cannot be reversed for a rod-type actuator.

- Home return offset (No.22 OFST)

The controller is shipped from the factory with an optimal value set in parameter No. 22, so the distance from each mechanical end to the home becomes uniform.

The minimum setting unit is “0.01 [mm].”

The home return offset can be adjusted in the following conditions:

- [1] Want to align the actuator home and the system’s mechanical home after the actuator has been assembled into the system
- [2] Want to set a new home after reversing the factory-set home direction
- [3] Want to eliminate a slight deviation generated after replacing the actuator

Caution: If the home return offset has been changed, the soft limit parameters must also be adjusted accordingly.

8.2.2 Parameters Relating to the Actuator Operating Characteristics

- PIO jog speed (No.26 IOJV)

When the selected PIO pattern is “1” (teaching type), this parameter defines the jog speed to be applied when jog input commands are received from the PLC.

The factory setting is “100 [mm/sec].”

Set an appropriate value in parameter No. 26 in accordance with the purpose of use.

The maximum speed is limited to “250 [mm/sec].”

(Note) Parameter No. 47 (PIO jog speed 2) is not used for this controller.

- PIO inching distance (No.48 IOID)

When the selected PIO pattern is “1” (teaching type), this parameter defines the inching distance to be applied when inching input commands are received from the PLC.

The factory setting is “0.1 [mm].”

Set an appropriate value in parameter No. 48 in accordance with the purpose of use.

The maximum limit is limited to “1 [mm].”

(Note) Parameter No. 49 (PIO inching distance 2) is not used for this controller.

- Default speed (No.8 VCMD)

The factory setting is the rated speed of the actuator.

When a target position is set in an unregistered position table, the setting in this parameter will be used as the speed data for the applicable position number.

To reduce the default speed from the rated speed, change the setting in parameter No. 8.

- Default acceleration/deceleration (No.9 ACMD)

The factory setting is the rated acceleration/deceleration of the actuator.

When a target position is written to an unregistered position table or the current position is read in the teaching mode, the setting in this parameter will be used as the acceleration/deceleration data for the applicable position number.

To reduce the default acceleration/deceleration from the rated acceleration/deceleration, change the setting in parameter No. 9.

- Default positioning band (in-position) (No.10 INP)

The factory setting is "0.10 [mm]."

When a target position is written to an unregistered position table or the current position is read in the teaching mode, the setting in this parameter will be used as the positioning band data for the applicable position number.

Increasing the default positioning band will allow the position complete signal to be output early. Change the setting in parameter No. 10, as necessary.

- Current-limiting value at standstill during positioning (No.12 SPOW)

The factory setting conforms to the standard specification of the actuator.

Increasing this setting will increase the holding torque at standstill.

This setting need not be changed in normal conditions of use. However, to prevent hunting caused by large external force applied while the actuator is at standstill, the value set in parameter No. 12 must be increased.

(Do not increase the value beyond 70%.)

- Current-limiting value during home return (No.13 ODPW)

The factory setting conforms to the standard specification of the actuator.

Increasing this setting will increase the home return torque.

This setting need not be changed in normal conditions of use. However, if an increased slide resistance causes the home return to complete before the correct position depending on the affixing method, load condition or other factor when the actuator is used in a vertical application, the value set in parameter No. 13 must be increased.

(As a guide, the maximum limit is 100% for the RA3C/RA3D types and 75% for all other types.)

- Home sensor input polarity (No. 18, LS)

This parameter is supported when a RCP2-RTB/RTC rotational axis is used in the home sensor mode.

Definition of settings : 0 (Sensor not used)

: 1 (Sensor polarity of contact a)

: 2 (Sensor polarity of contact b)

- Speed override (No.46 OVRD)

Use this parameter when moving the actuator at a slower speed to prevent danger when the system is initially started for test operation.

When move commands are issued from the PLC, the moving speed set in the "Speed" field of the position table can be overridden by the value set by parameter No. 46.

Actual moving speed = [Speed set in the position table] x [Value of parameter No. 46] ÷ 100

Example) Value in the "Speed" field of the position table 500 (mm/s)

Value of parameter No. 46 20 (%)

Under the above settings, the actual moving speed becomes 100 mm/s.

The minimum setting unit is "1 [%]," while the input range is "1 to 100 [%]." The factory setting is "100 [%]."

(Note) This parameter is ignored for move commands from the PC and teaching pendant.

- Default direction of excited-phase signal detection (No.28 PHSP)

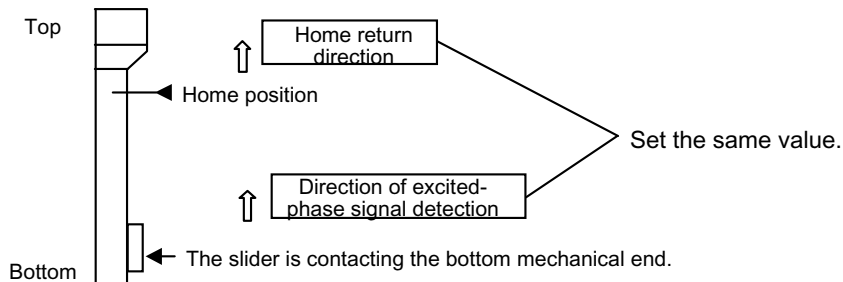
When the servo is turned on for the first time after the power on, excited-phase detection is performed. This parameter defines the direction of this detection.

The parameter need not be changed in normal conditions. In certain situations, such as when the actuator was contacting a mechanical end or obstacle when the power was turned on and cannot be moved by hand, change the direction to one that allows the motor to operate smoothly.

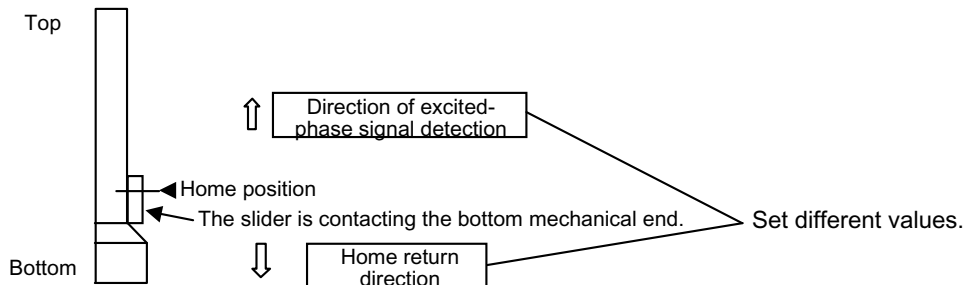
To do so, set parameter No. 28 to "0" or "1." If the detection direction should be the same as the home return direction, specify the same value currently set in parameter No. 5 (Home return direction).

To set a direction opposite to the home return direction, specify the value different from the one currently set in parameter No. 5 (Home return direction).

(Example 1) Power was turned on when the slider was contacting the bottom mechanical end in a configuration where the actuator is installed vertically with the motor at the top.



(Example 2) Power was turned on when the slider was contacting the bottom mechanical end in a configuration where the actuator is installed vertically with the motor at the bottom.



- Excited-phase signal detection time (No.29 PHSP)

When the servo is turned on for the first time after the power on, excited-phase detection is performed. This parameter defines the time of this detection.

The parameter need not be changed in normal conditions, because a detection time appropriate for the standard specification of the actuator has been set at the factory.

Should an excitation detection error or abnormal operation occur when the servo is turned on for the first time after the power on, one remedial action that can be taken is to change the detection time set by parameter No. 29.

If you wish to change this parameter, contact IAI beforehand.

- Safety speed (No.35 SAFV)

This parameter defines the feed speed to be applied during manual operation.

The factory setting is "100 [mm/sec]."

To change this speed, set an optimal value in parameter No. 35.

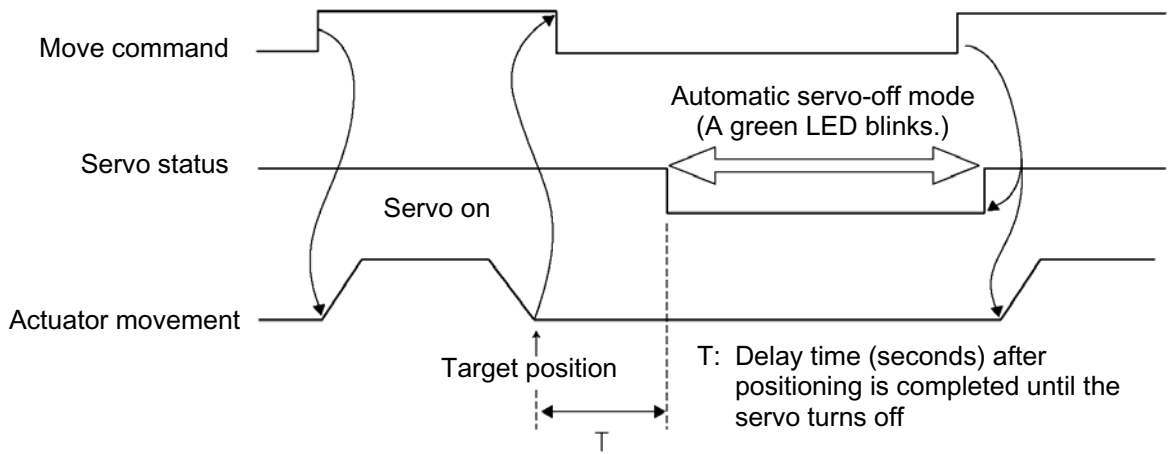
Take note that the maximum speed is limited to "250 [mm/s]" and that you should set a speed not exceeding this value.

- Automatic servo-off delay time (No.36 ASO1/No.37 ASO2/No.38 ASO3)

This parameter defines the delay time after the positioning is completed until the servo turns off automatically, when the "Standstill mode" field of the position table is set to "1," "2" or "3" (automatic servo-off control enabled) or parameter No. 53 (Default standstill mode) is set to "1," "2" or "3"(automatic servo-off control enabled).

Meaning of settings: 1: T becomes the value set by parameter No. 36.
 2: T becomes the value set by parameter No. 37.
 3: T becomes the value set by parameter No. 38.

The factory setting is "0 [sec]."



- Default standstill mode (No.35 HSTP)

[1] In PIO patterns 0 to 4, either the automatic servo-off mode or full servo control mode can be selected when the actuator stands by for a long time after completing the home return effected by the HOME input signal.

[2] In PIO pattern 5, the full servo control mode can be selected when the actuator stands by for a long time after the power has been turned on.

The factory setting is "0 [Disable]."

	Setting
All power-saving modes are disabled.	0
Automatic servo-off mode. The delay time is defined by parameter No. 36.	1
Automatic servo-off mode. The delay time is defined by parameter No. 37.	2
Automatic servo-off mode. The delay time is defined by parameter No. 38.	3
Full servo control mode	4

Automatic servo-off mode

After positioning is completed, the servo will turn off automatically upon elapse of a specified time. (Since no holding current flows, power consumption will decrease.)

When the next movement command is received from the PLC, the servo will turn on and the actuator will start moving.

Refer to the above timing chart.

Full servo control mode

The pulse motor is servo-controlled to reduce the holding current.

Although the exact degree of current reduction varies depending on the actuator model, load condition, etc., the holding current decreases to approx. 1/2 to 1/4.

Since the servo remains on, position deviation will not occur.

The actual holding current can be checked in the current monitor screen of the PC software.

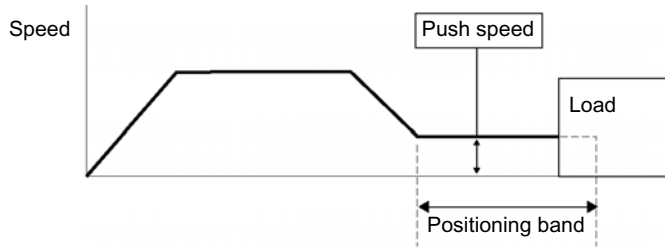
- Push speed (No.34 PSHV)

This parameter defines the push speed to be applied after the actuator reaches the target position in push & hold operation.

Before the shipment, this parameter has been set to the default value selected in accordance with the characteristics of the actuator.

Set an appropriate speed in parameter No. 34 by considering the material and shape of the load, and so on.

Take note that maximum speed is limited to “20 [mm/sec]” even on high-speed types and that you should use the actuator at push speeds not exceeding this level.



⚠ Caution: It is recommended that you set the push speed to 5 [mm/s] or above to minimize the negative effect of push force variation.

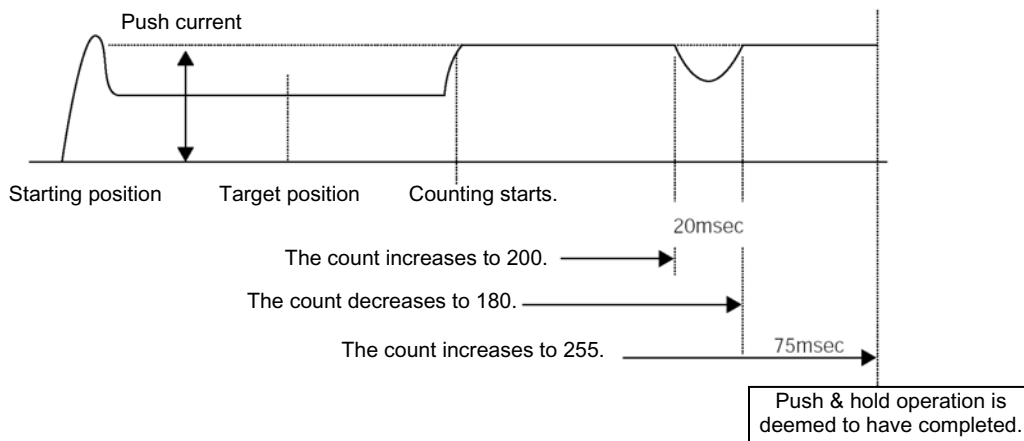
- Push completion judgment time (No.6 PSWT)

This parameter is used as a condition for determining that the load was contacted and the push & hold operation has completed.

As for the specific method of judgment, the push & hold operation is deemed to have completed if the current-limiting value set in the position table has been retained for the time set by parameter No. 6. Set an optimal time matching the current-limiting value, by considering the material and shape of the load, and so on.

The minimum setting unit is “1 [msec],” while the maximum value is “9999 [msec].” The factory setting is “255 [msec].”

(Note) The chart below explains how completion of push & hold operation is determined if the load shifted during the judgment and the current has changed as a result, based on a judgment time of 255 msec.



If the motor current remains at or above the push current for 200 msec and then drops below this level for 20 msec, the count will decrease by 20. When the push current is reached again thereafter, counting will start from 180. If the motor current remains at or above the push current for 75 msec, the count will increase to 255 and thus push & hold operation will be deemed to have completed.

In total, 295 msec was required for the judgment.

- Enable function (No.42 FDIO4)

Whether to enable or disable the deadman switch function on an ANSI-type teaching pendant is defined by parameter No. 42.

* An ANSI-type teaching pendant will be developed in the future.

	Setting
Enable (Use)	0
Disable (Do not use)	1

The factory setting is "1 [Disable]."

- Polarity of home check sensor input (No.43 AIOF)

The home check sensor is not included in the standard specification, but it can be installed as an option. Normally this parameter need not be changed, but if the customer wishes to change the mode after the shipment, change the value of Parameter No. 43.

Definition of settings: 0 (Standard specification without home check sensor)

1 (Use the home check sensor based on contact-a sensor polarity)

2 (Use the home check sensor based on contact-b sensor polarity)

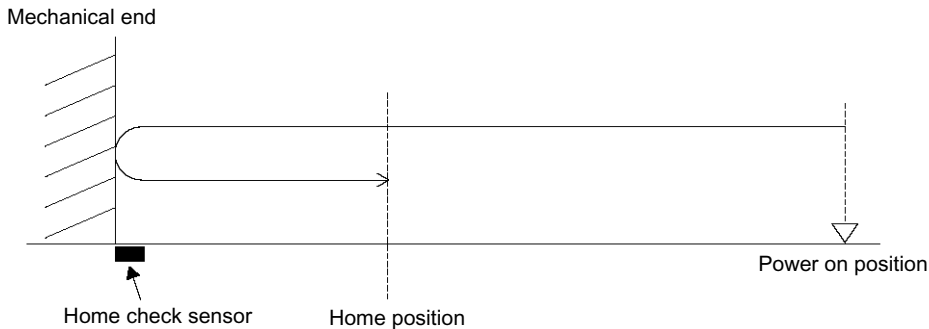
[Explanation of operation]

[1] When a home return command is issued, the actuator moves until contacting the mechanical end.

Upon contact with the mechanical end, the home check sensor signal is detected.

[2] Next, the actuator reverses its direction and stops at the home position.

[3] The controller determines that the movement has completed successfully if the home check sensor signal had changed when the actuator stopped. If the sensor signal remains the same, the controller recognizes that "position deviation" has occurred, in which case the controller will generate a "Home sensor not detected" error and output an alarm signal.



- Load output judgment time (No.50 LDWT)

If the torque check function is used in push & hold operation, the load output (LOAD signal) will turn ON when a specified condition is met. Since the command torque does not remain constant but fluctuates within a certain band while the actuator is moving, whether or not to turn ON the load output is determined based on whether the total duration of periods in which the command torque has exceeded the threshold corresponds at least to a specified time. This specified time is set using this parameter. The default value is "255 msec."

- Torque check range (No.51 TRQZ)

This parameter sets whether or not to use the check range when determining if the threshold has been exceeded. The default value is "0," i.e., to enable the check range.

	Setting
Enable (Use the check range to make judgment)	0
Disable (Do not use the check range to make judgment)	1

- Ball screw lead length (No.77 LEAD)

This parameter defines the ball screw lead length.

A default value appropriate for the characteristics of the actuator is set at the factory.

- Axis operation type (No.78 ATYP)

This parameter defines the type of the actuator used.

Definition of settings : 0 (Linear axis)
: 1 (Rotational axis)

- Rotational axis mode selection (No.79 ATYP)

If the axis operation type (No. 78) is set to "rotational axis," selecting the index mode will fix the current value to a range of 0 to 359.99. If the index mode is selected, shortcut control can be used.

Definition of settings : 0 (Normal mode)
: 1 (Index mode)

Caution: Push & hold operation cannot be performed in the index mode. If push action data is entered in the position data, the data will be disabled and the actuator will perform normal movement. The positioning band will correspond to the default positioning band set by the applicable parameter.

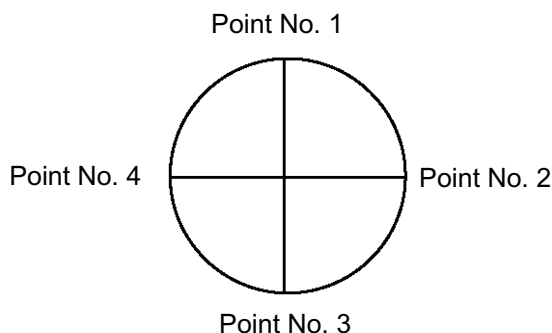
- Shortcut selection for rotational axis (No.80 ATYP)

Set this parameter if you want to rotate the rotational axis in a specific direction.

"Shortcut" refers to a type of operation in which the actuator moves to the next point by taking the shortest path.

	Setting
Do not select	0
Select	1

* When shortcut is selected, the actuator can be rotated in a specific direction.



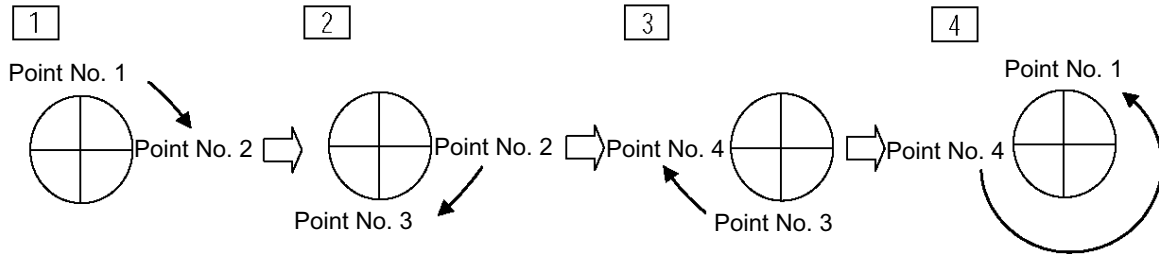
Positions

Point number	Position data
1	0
2	90
3	180
4	270

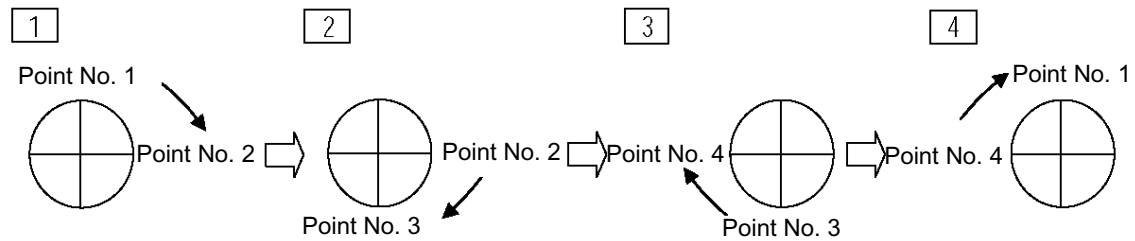
One degree of position data corresponds to 1 mm.

If the actuator is moved in the order to positions 1 → 2 → 3 → 4, the actuator will operate differently depending on whether or not shortcut is selected, as explained below.

When shortcut is not selected



When shortcut is selected



- Absolute unit (No.83 ETYP)

Parameter No. 83 sets whether or not an optional simple absolute unit is used.

	Setting
Not used	0
Used	1