KOHZU

Operation Manual

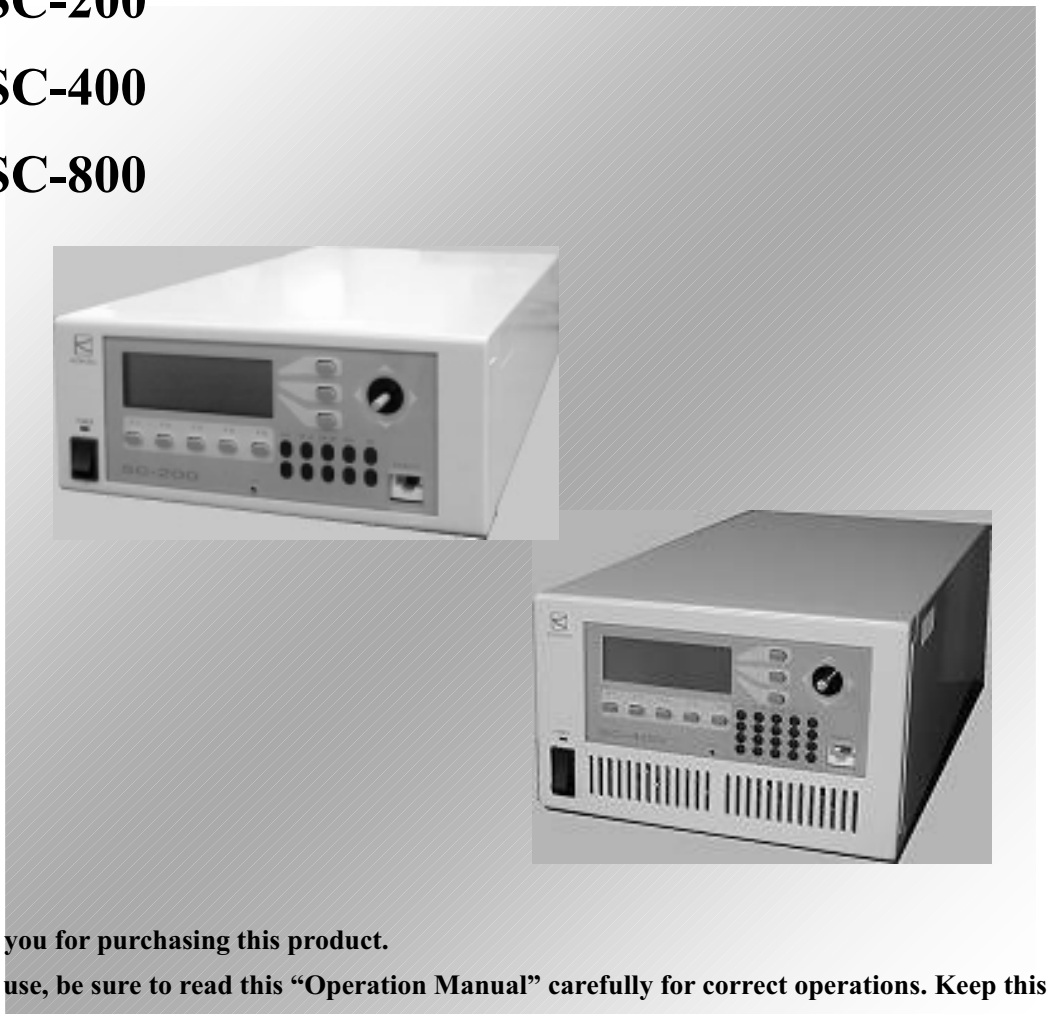
MontBlanc Series

Stepping Motor Controller

Model **SC-200**

SC-400

SC-800



- **Thank you for purchasing this product.**
- **Before use, be sure to read this "Operation Manual" carefully for correct operations. Keep this Operation Manual in a convenient place so that it can be referred to at any time when in doubt.**

VER. 1.04

Pioneering the door to the future with a commitment to technology

TI0211

KOHZU Precision Co., Ltd.

Precautions in Use

Symbol Identifications

This symbol indicates that there are descriptions that call attention (including warnings to the user). Make sure to read the descriptions when reading this manual.

This symbol indicates prohibitive activities. Make sure to read the descriptions when reading this manual.

This symbol indicates descriptions as reference or remarks.

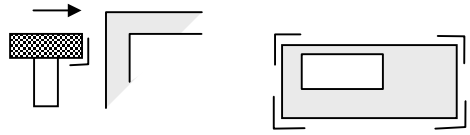
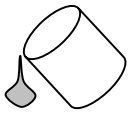
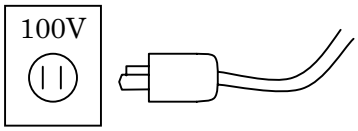
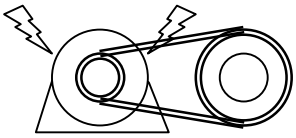
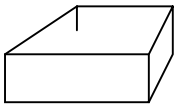
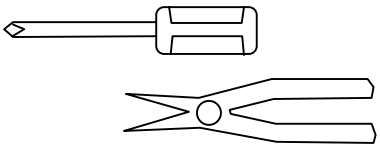
		Do not apply strong impact to the product, or avoid using in a place where vibration occurs frequently.
		Liquid or chemical splashes on this device are dangerous and cause failures. Do not use this device in such places.
		Use 100V AC (50/60Hz) as a power supply.
		This product is precision electronic equipment. It may malfunction near large sized-generating machinery or high voltage equipment, or equipment generating strong magnetism. Avoid using in such environments.
		Do not unnecessarily remove the fixed panel and cover except in cases where adjustment or setting of the integrated driver must be adjusted.
		Never rework or replace parts for use.
		Pay close attention when connecting the motor driven stage or a motor other than those specified by us.

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Table of Content

1. Introduction

1-1. Features of the Product

Thank you for purchasing our motor controller SC Series

The SC Series comprise extremely high cost performance products realizing a low price while featuring remarkable functions in comparison with conventional motor controllers.

- Completely responsive to our motor drive precision stage <MontBlanc Series>
- Micro step driver allowing for 250 splits at maximum is equipped as standard equipment
- Realizes smooth drive by S-shape drive
- Feedback control by encoder input is equipped as standard
- In conformity with EIA standards. Allows for integration with cabinet rack.
- Analog type joystick with excellent operability is equipped as standard.

■**Outside of product range:** The product does not offer the following items.

- The SC-200/400 and SC-800 cannot drive motors other than a 5-phase stepping motor.
- Not compatible with motors with an electromagnetic brake.
- No program function equipped. Automatic operation should be performed on the personal computer side.
- Not compatible with remote controls (sequencer connection, etc.,) other than RS-232C and GP-IB communications.

1-2. Product Configuration

Product configuration of the motor controller SC Series is as follows.

SC-200

2-axis driver integrated.

SC-400

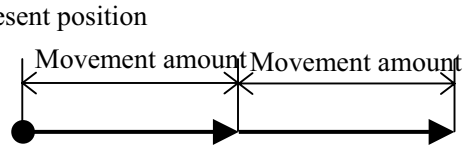
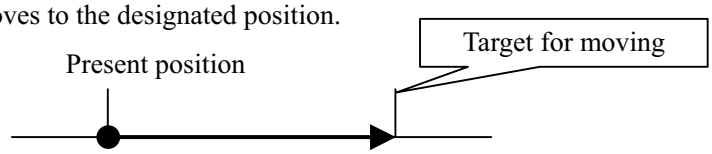
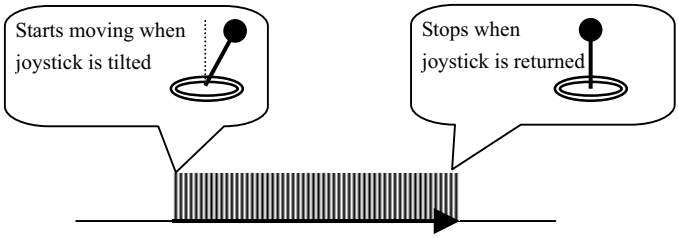
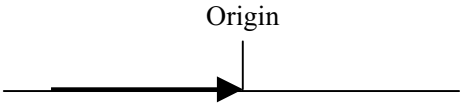
4-axis driver integrated.

SC-800

8-axis driver externally installed.

1-3. Positioning Method (Driving Method)

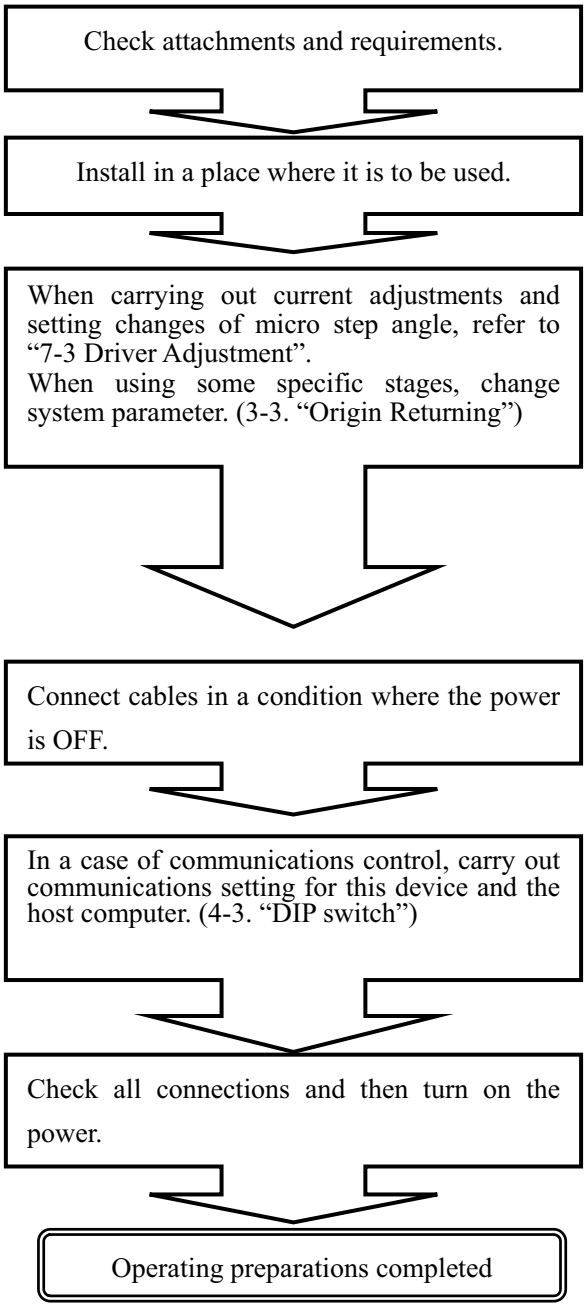
The SC Series allows for positioning control by the following methods.

Relative Position Movement	Moves toward the designated direction from the present position by a set value. 
Absolute Position Movement	Moves to the designated position. 
Jog Movement (Only For Manual Operation)	Moves continuously by joystick in manual operation. 
Origin Return Movement	Searches origin sensor and moves to origin position. 

2. Installation and Preparation

2-1. Proceeding with Installation and Preparation

Install the product in the following order.



Immediately contact the purchasing source or our sales department if any attachment is lost.

Do not install in a high temperature, low temperature or high humid location, or where noise frequently occurs.

→ "Driver Adjustment"

※ Our products are normally adjusted in accordance with customer use objectives prior to shipment. This adjustment is required if you attempt to change settings, or if this controller is shipped without stages.

→ "Origin Returning"

※ Our products are normally adjusted in accordance with customer use objectives prior to shipment.

Make sure to check that the power switch is OFF.

Power cables, stage connections and communications cables are connected.

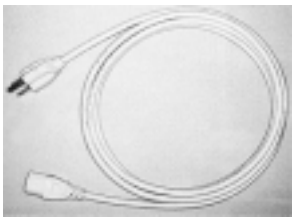
Refer to "6. Remote Control".

If you notice abnormalities such as an abnormal noise or smell, immediately turn off the power and investigate the cause.

2-2. Attachment and Options

The following items are attached to the products as attachments. Make sure to check that all items are included. Immediately contact us if any lost, or any attachments broken.

① Power cord (3P)
② Gender changer for RS-232C connector
③ CD-R (including Operating Manual and sample software)


Communications cables such as stage connecting cables and RS-232C/GP-IB are not included. Separately purchase the stage connecting cable. Additionally, for the communications cable, commercially available cables can be used, therefore, customers are advised to purchase in advance.

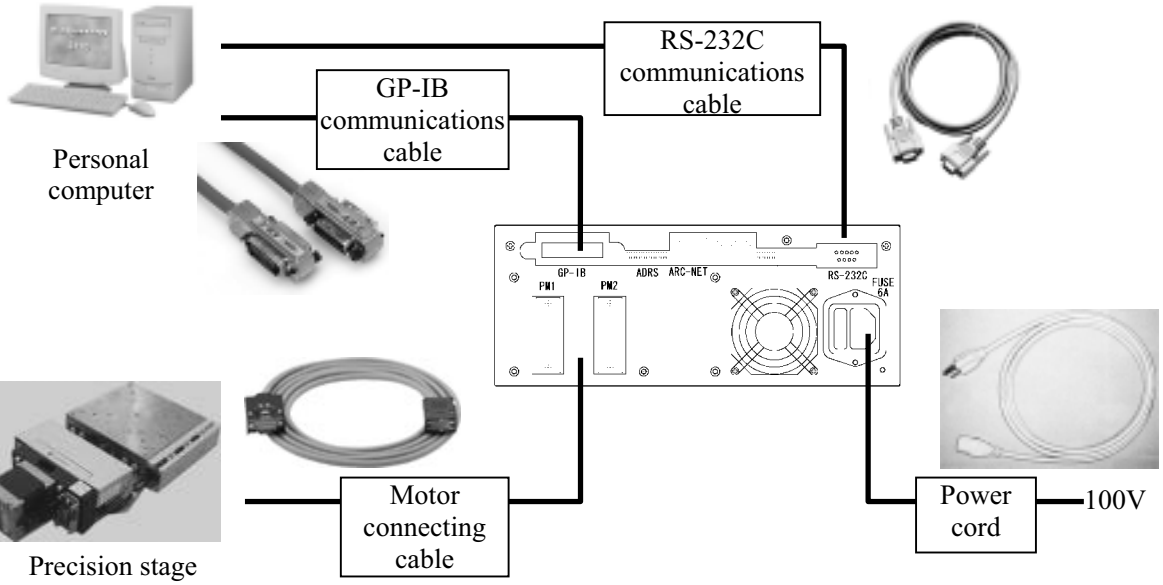
In order to save paper resources, a printed Operating Manual is not included. Print the file inside the CD-R if necessary.

The file of the Operating Manual is an Acrobat (PDF) format.

In order to view the PDF format file, Adobe Reader of Adobe Systems Inc. is required. Adobe Reader is not included in this CD-R.

2-3. How to Connect Cables

When pulling out or plugging in all cables such as the power cord, stage connecting cable and communications cable, carry out connections in a state where the power is disconnected.



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3. Functions

3-1. Speed Setting

3-1-1. Speed Table

In the SC controllers, speed setting in a range from 1 to 4,095,500PPS for 1 PPS unit can be carried out, however, adopt a method for selecting a setting from the **ten stages of the Speed Table** in order to easily perform speed setting since there are typically many cases where fine speed setting is not required.

(※ Setting for 1 PPS unit can be performed. → Refer to Table No.0 below.)

Speed can be designated for each axis. Speed when driving with a joystick during manual operation corresponds to Table No.10 and 11.

■ Speed Table

Speed Selection

Speed Table No.	Start speed	Maximum speed	Accelerating time	Decelerating time
0	500	5000	24	24
1	500	2000	20	20
2	500	3000	24	24
3	500	4000	28	28
4	500	5000	32	32
5	500	6000	36	36
6	500	7000	40	40
7	500	8000	44	44
8	500	9000	48	48
9	500	10000	52	52
10	10	8000	50	15
11	10	200	1	1

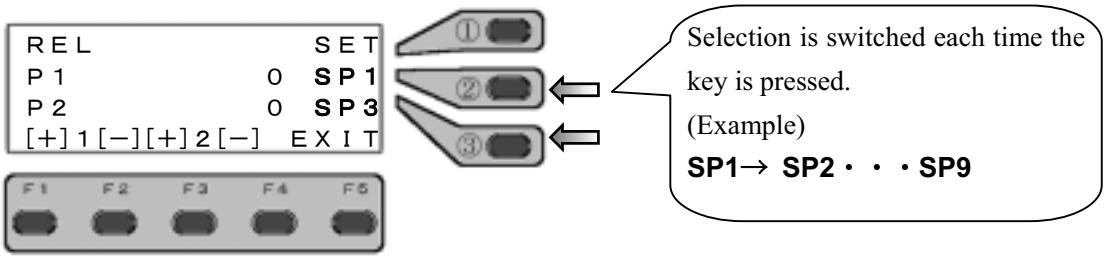
Values in the above table are default values.

Setting Examples

- No.1 Axis Speed Setting = 1
- No.2 Axis Speed Setting = 3
- Joystick High Speed
- Joystick Low Speed

3-1-2. Speed Change in Manual Operation

During manual operation, select the table on the panel screen before driving.

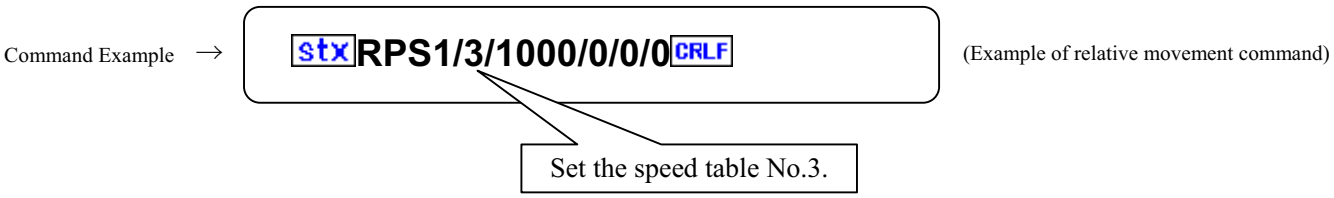


The speed table may not be selected depending on the screen.

On the absolute position moving operation screen, move the cursor to the right end (position on the "SP*" character) and press the key to switch the speed table (it cannot be switched when the cursor is on the coordinate value position).

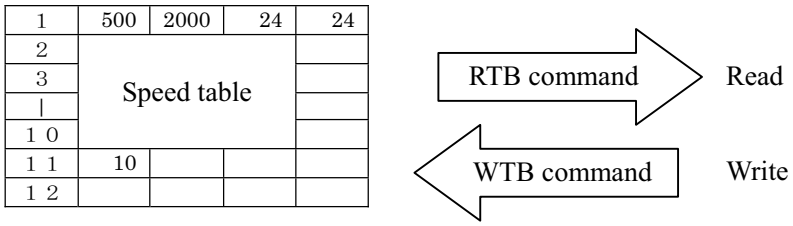
3-1-3. Speed Change in Remote Operation

In remote operation, designate the table No. in each movement command.



3-1-4. Reference and Change of Values in Speed Table

Values in the speed table can be referenced and changed with RTB and WTB commands. For details, refer to the explanation for respective commands of RTB and WTB.



3-1-5. Table No.0

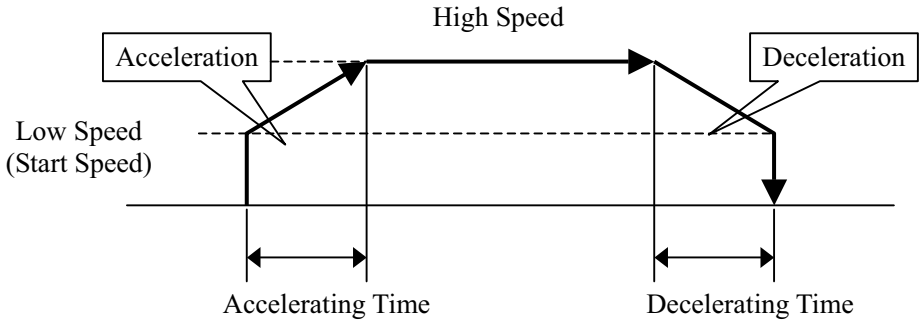
When attempting to perform fine setting for speed and accelerating and decelerating time, select the table No.0. The Table No.0 can be normally changed with the ASI command during remote operations, or with SYS setting during manual operation.

3-1-6. Table No.10 and No.11

With the Table No.10 and No.11, speed setting in jog movement by the joystick can be performed. No.10 is for a setting at a high speed (screen display: PSP-Hi) and No.11 is for a setting at a low speed (screen display: PSP-Lo).

3-2. Trapezoidal Drive and S-Shaped Drive

When moving an object, it cannot be suddenly moved at a high speed because of inertial force. In general, a stepping motor can also start from a low speed, gradually accelerate and reach a high speed.

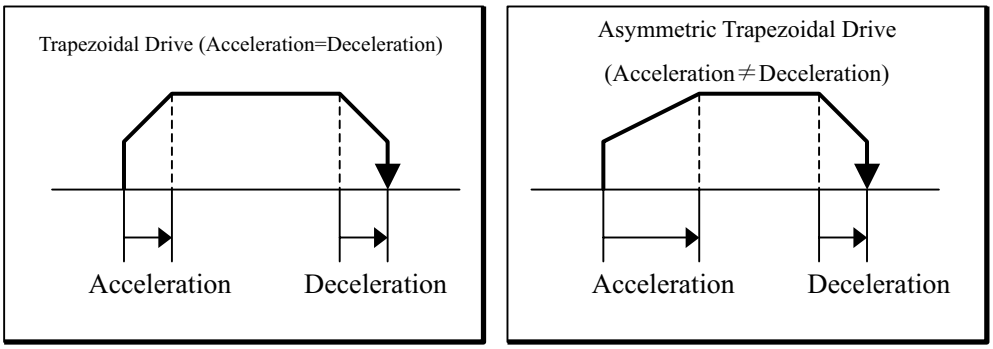


The SC-200/400/800 internally calculate the ratio of acceleration and deceleration and automatically perform a sequence of accelerating and decelerating movements by setting **low speed (start speed) and high speed (accelerating time or accelerating STEP and decelerating time or decelerating STEP)** (in asymmetric drive).

Trapezoidal Drive and Asymmetric Trapezoidal Drive

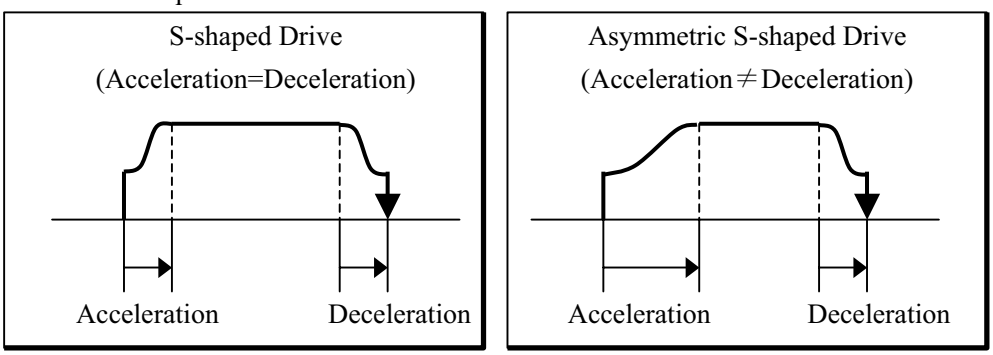
A method to increase and decrease acceleration and deceleration at a constant acceleration and deceleration ratio is called a **trapezoidal drive**.

With these products, **asymmetric trapezoidal drive** to accelerate and decelerate at different settings is available.



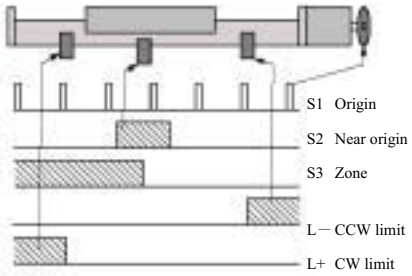
S-Shaped Drive And Asymmetric S-Shaped Drive

S-shaped drive is a method to realize smooth movement by accelerating and decelerating with a quadric curve.



3-3. Origin Returning

In the SC Series, 14 types of origin returning methods according to the combination of sensors in the positioning device to be used can be selected.



Sensor Configuration

Method	Sensor Configuration	Description
1	S1,S3	Returning direction is determined and origin is detected with zone sensor.
2	S3	Edge of the zone sensor is set to be the origin position.
3	S1,S2,L-	ORG (S1) located in NORG (S2) is origin position.
4	S2,L-	One sensor located in moving zone is set to be the origin position.
5	S1,L+	Origin sensor in proximity of CW limit is set to be the origin position.
6	S1,L-	Origin sensor in proximity of CCW limit is set to be the origin position.
7	L+	Edge of CW limit is set to be the origin position.
8	L-	Edge of CCW limit is set to be the origin position.
9	S1	Only origin sensor is used.
10	Non	Present position is set to be the origin position.
11	S1,L+	After the origin position is detected by method 5, and moved by the set amount, this position is set to be the origin.
12	S1,L-	After the origin position is detected by method 6, and moved by the set amount, this position is set to be the origin.
13	L+	After the origin position is detected by method 7, and moved by the set amount, this position is set to be the origin. .
14	L-	After the origin position is detected by method 7, and moved by the set amount, this position is set to be the origin.
15	Ref	Encoder reference (optional)

Default value is 3.

Most of our standard stages with S1 and S2 sensors adapt in default setting but a little stage without S1 sensor requires setting No.4.

Amounts of the movement form the machine origin in the methods 11 through 14 are set with system parameter No. 5.

3-3-2. Details of Method

Details for each method are described below.

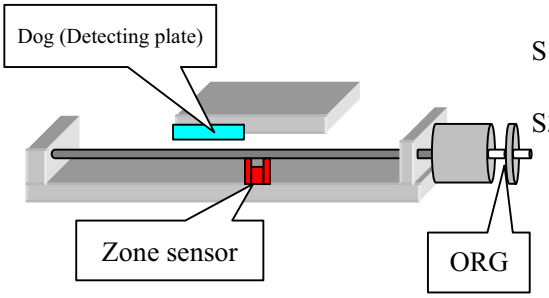
1 Zone sensor (DATUM) determines retuning direction and detects origin.

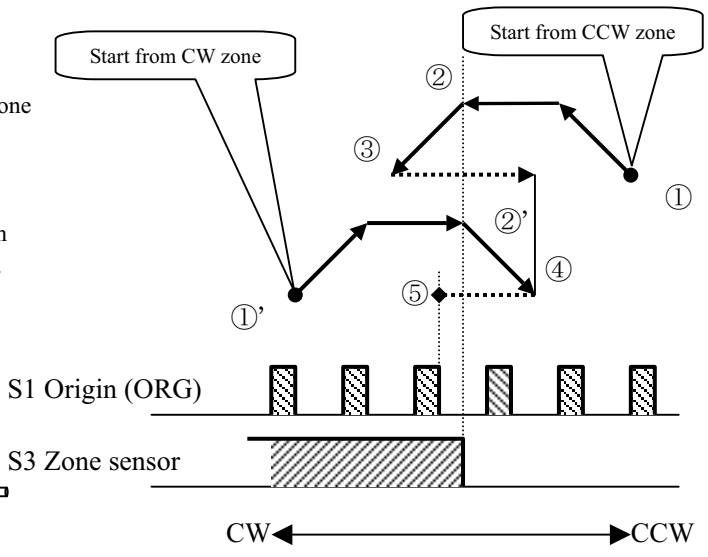
When in CCW zone

① Detection starts in CW direction with trapezoidal drive. ② Decelerates and stops by zone sensor ③ Reverses in CCW direction.
④ Reverses in CW direction when moving through zone sensor ⑤ Stops when origin is detected.

When in CW zone

① 'Detection starts in CW direction with trapezoidal drive. ②' Stops by deceleration when moving through zone sensor. ④ Moves at low speed in CW direction.
⑤ Stops when origin is detected.





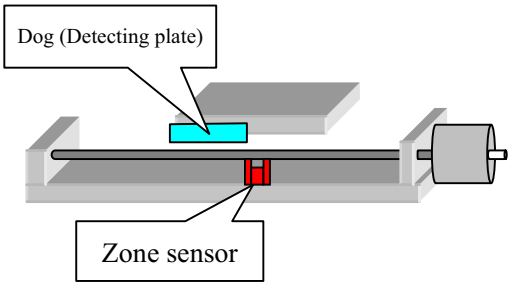
2 Edge of the zone sensor (DATUM) is origin position.

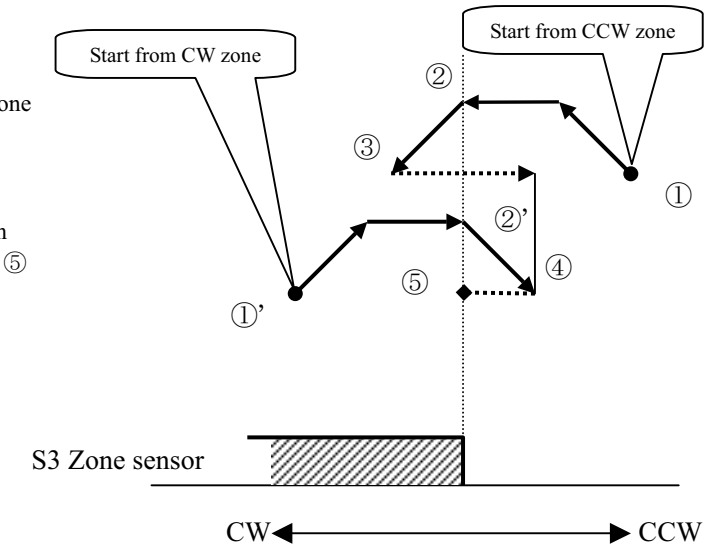
When in CCW zone

① Detection starts in CW direction with trapezoidal drive. ② Decelerates and stops by zone sensor ③ Reverses in CCW direction
④ Reverses in CW direction when moving through zone sensor ⑤ Stops at edge of zone sensor

When in CW zone

① 'Detection starts in CW direction with trapezoidal drive. ②' Stops by deceleration when moving through zone sensor ④ Moves at low speed in CW direction ⑤ Stops when origin is detected.





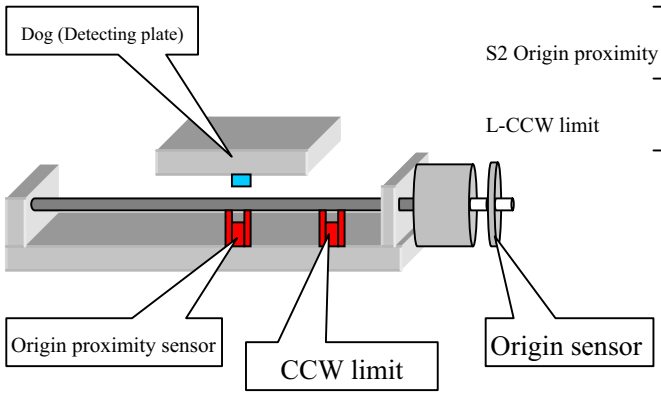
3 Origin (ORG) located in origin proximity (NORG) is origin position.

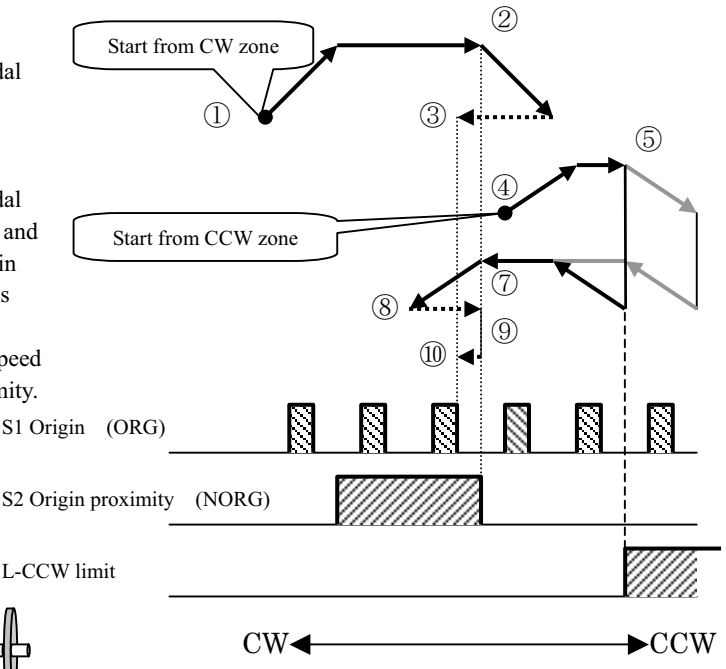
When in CW zone

① Detection starts in CCW direction with trapezoidal drive. ② Decelerates when moving through origin proximity. ③ Stops at first origin.

When in CCW zone

④ Detection starts in CCW direction with trapezoidal drive. ⑤ Stops when limit is detected (Decelerates and stops if limit deceleration stop is set). ⑥ Reverses in CW direction with trapezoidal drive. ⑦ Decelerates and stops when origin proximity is detected. ⑧ Reverses in CCW direction. ⑨ Moves at low speed in CW direction when moving through origin proximity. ⑩ Stops when origin is detected.





4 One sensor located in moving zone is origin position.

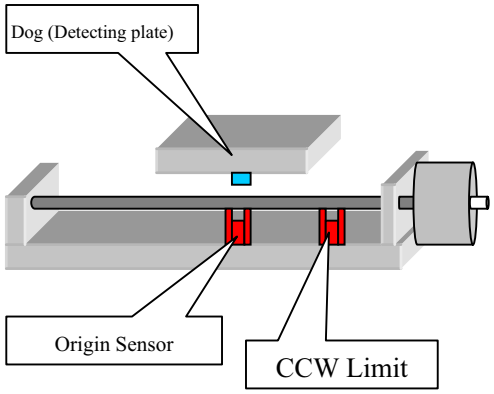
A little stage without origin senor in motor shaft requires this setting.

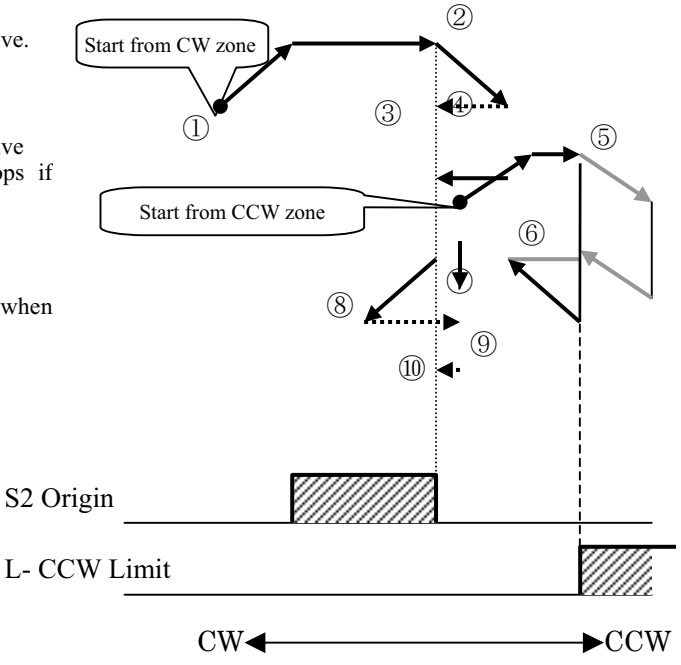
When in CW zone

① Detection starts in CCW direction with trapezoidal drive.
② Decelerates when moving through origin.
③ Stops at origin edge.

When in CCW zone

④ Detection starts in CCW direction with trapezoidal drive
⑤ Stops when limit is detected (Decelerates and stops if limit deceleration stop is set).
⑥ Reverses in CW direction with trapezoidal drive.
⑦ Decelerates and stops when origin is detected.
⑧ Reverses in CCW direction.
⑨ Reverses and moves at low speed in CW direction when moving through origin.
⑩ Stops when origin is detected.





5 Origin (ORG) in proximity of CW limit is origin position.

When starting from outside of limit

① Detection starts in CW direction with trapezoidal drive.

② Stops when limit is detected (Decelerates and stops if limit deceleration stop is set).

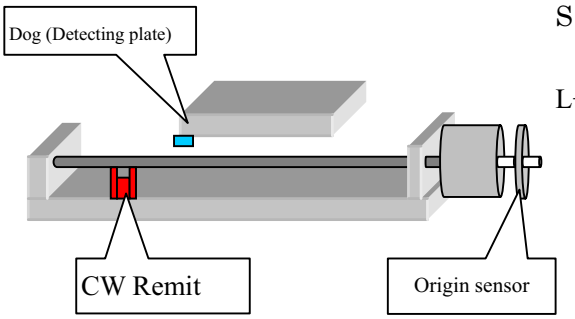
③ Moves at a low speed in CW direction.

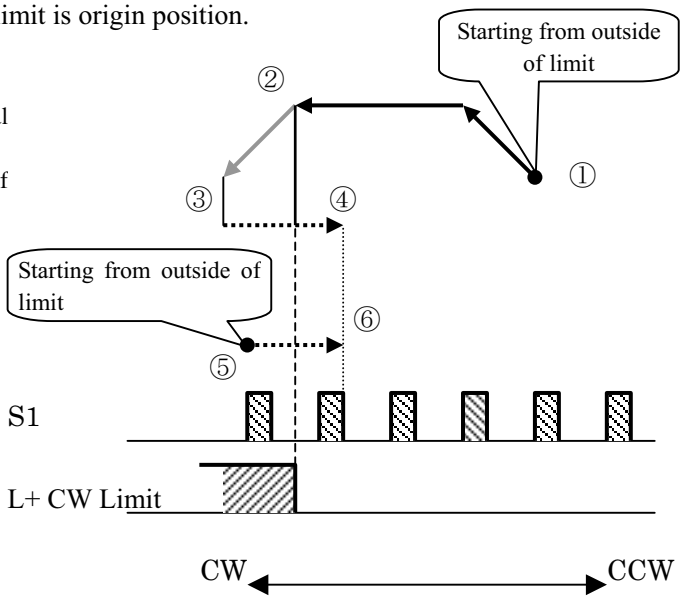
④ Stops at a position when moving through first origin.

When starting from inside of limit

⑤ Moves at low speed in CW direction.

⑥ Stops at a position when moving through first origin.





6 Origin (ORG) in proximity of CCW limit is origin position.

When starting from outside of limit

① Detection starts in CCW direction with trapezoidal drive.

② Stops when limit is detected (Decelerates and stops if limit deceleration stop is set).

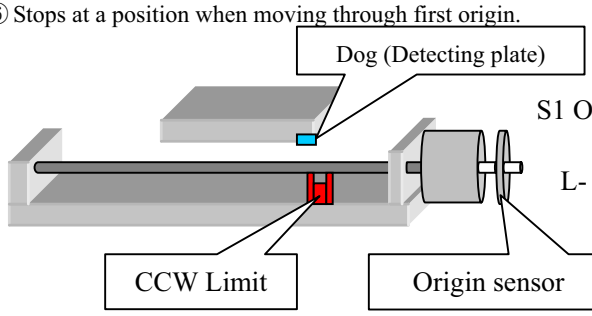
③ Moves at low speed in CW direction.

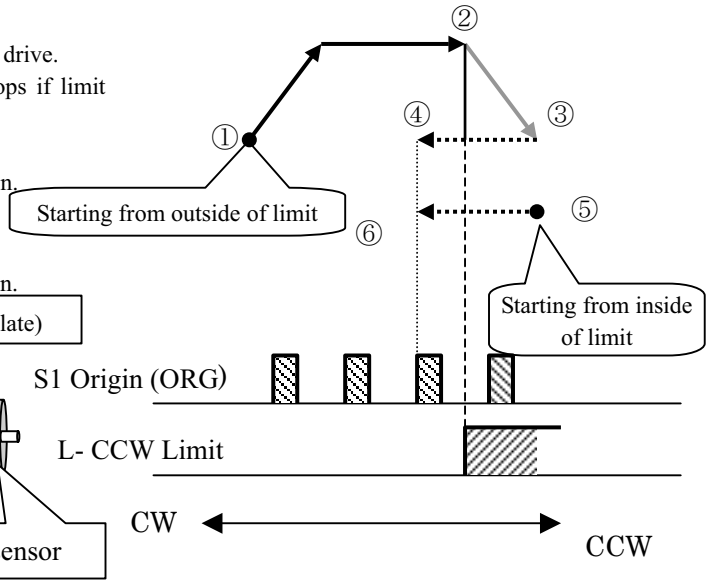
④ Stops at a position when moving through first origin.

When starting from inside of limit

⑤ Moves at a low speed in CW direction.

⑥ Stops at a position when moving through first origin.





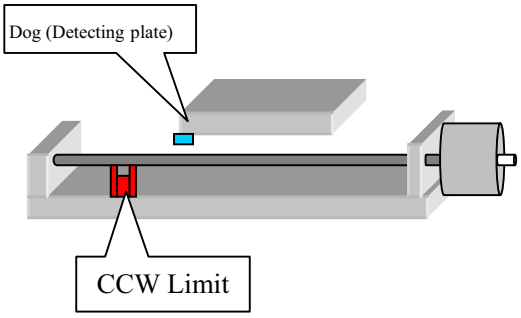
7 Edge of CW limit is origin position.

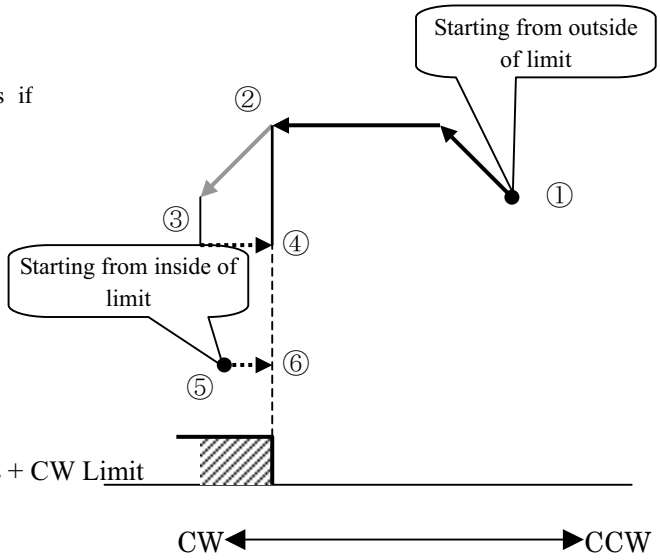
When starting from outside of limit

① Detection starts in CW direction with trapezoidal drive.
② Stops when limit is detected (Decelerates and stops if limit deceleration stop is set).
③ Moves at low speed in CCW direction.
④ A position when moving through limit is origin.

When starting from inside of limit

⑤ Moves at low speed in CCW direction.
⑥ Stops at a position when moving through limit.





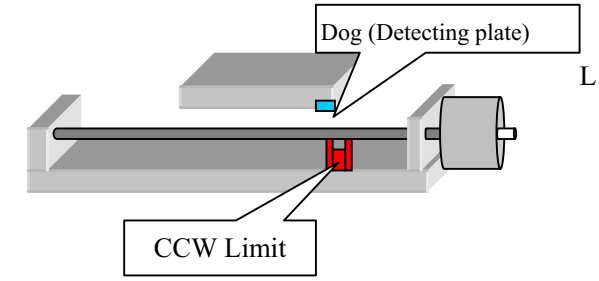
8 Edge of CCW limit is origin position.

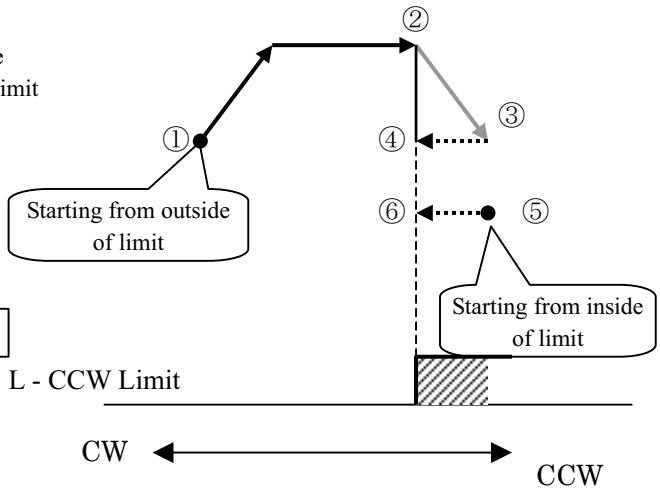
When starting from outside of limit

① Detection starts in CCW direction with trapezoidal drive
② Stops when limit is detected (Decelerates and stops if limit deceleration stop is set).
③ Moves at low speed in CW direction.
④ A position where moving through limit is origin.

When starting from inside of limit

⑤ Moves at low speed in CW direction.
⑥ Stops at a position where moving through first origin.





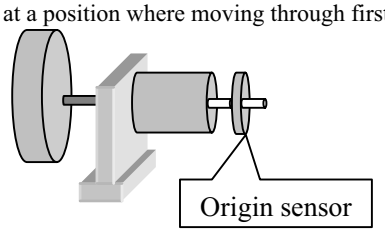
9 Only origin sensor is used.

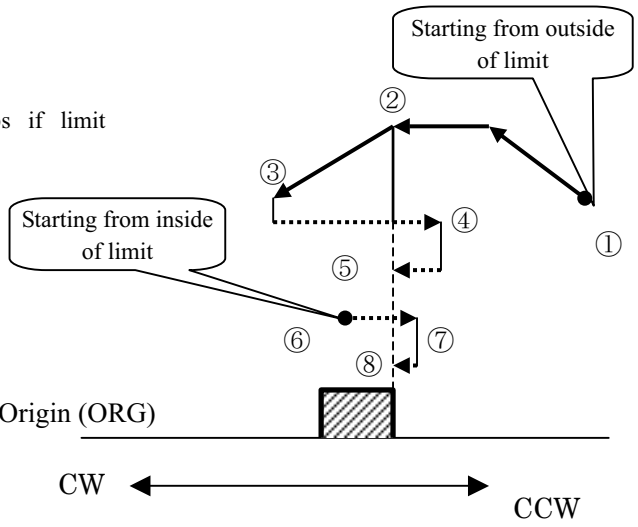
When starting from outside of sensor

① Detection starts in CW direction with trapezoidal drive
② Stops when limit is detected (Decelerates and stops if limit deceleration stop is set).
③ Moves at low speed in CCW direction
④A position where moving through limit is origin.
⑤ Stops when sensor detects.

When starting from inside of limit

⑤ Moves at low speed in CCW direction
⑥ Stops at a position where moving through first origin.





Stops if limit intervenes during return to origin

10 Present position is origin position.

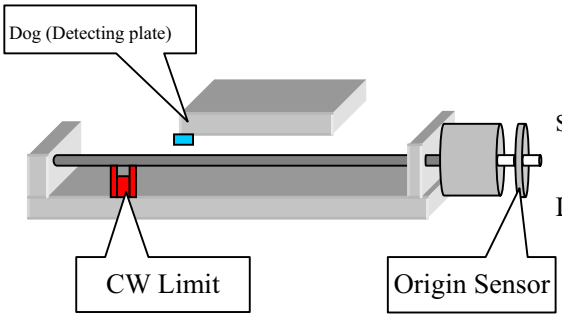
In this mode, the present position is set to be the origin position without driving and it is considered that detection of return to origin is completed.

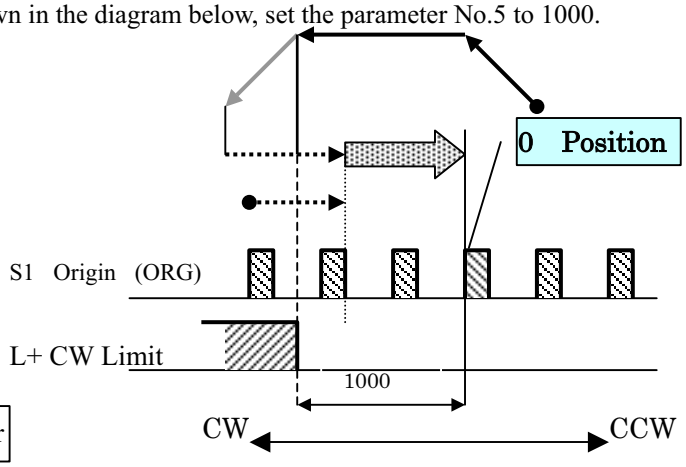
Present coordinate value can also be set by setting system parameter No.5 (ORG PRESET DATA).

11

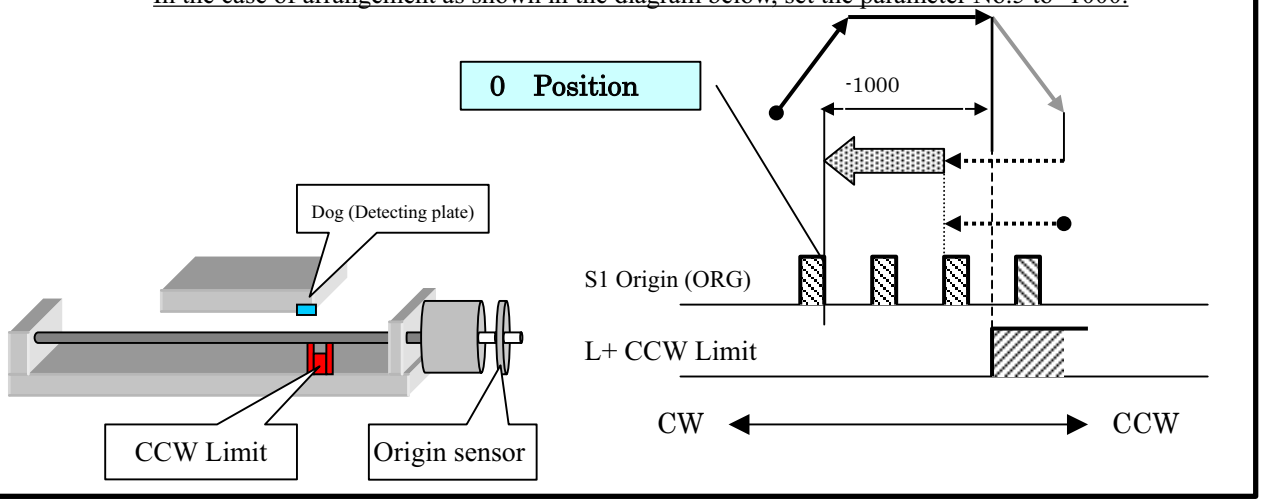
After returning to the origin by method 5, and moved by a set amount, this position is set to be the origin.

In the case of an arrangement as shown in the diagram below, set the parameter No.5 to 1000.

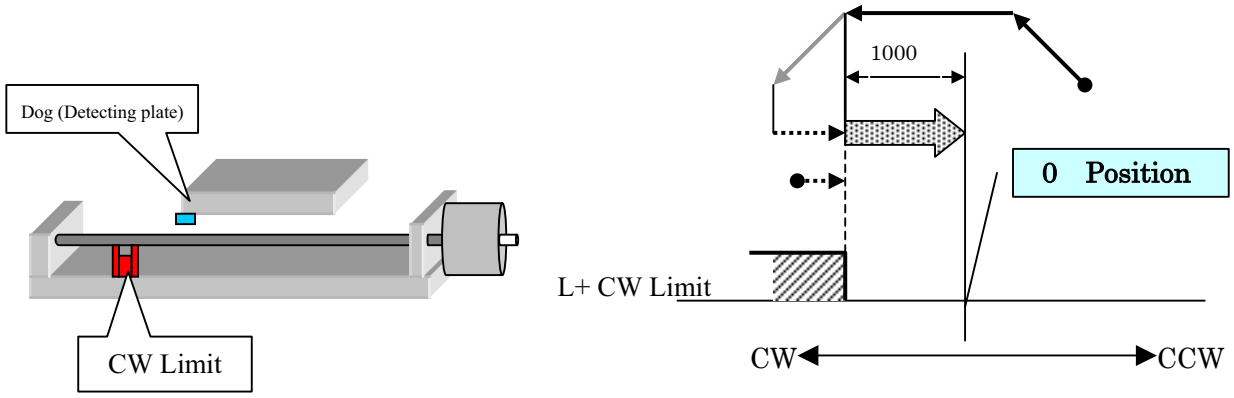




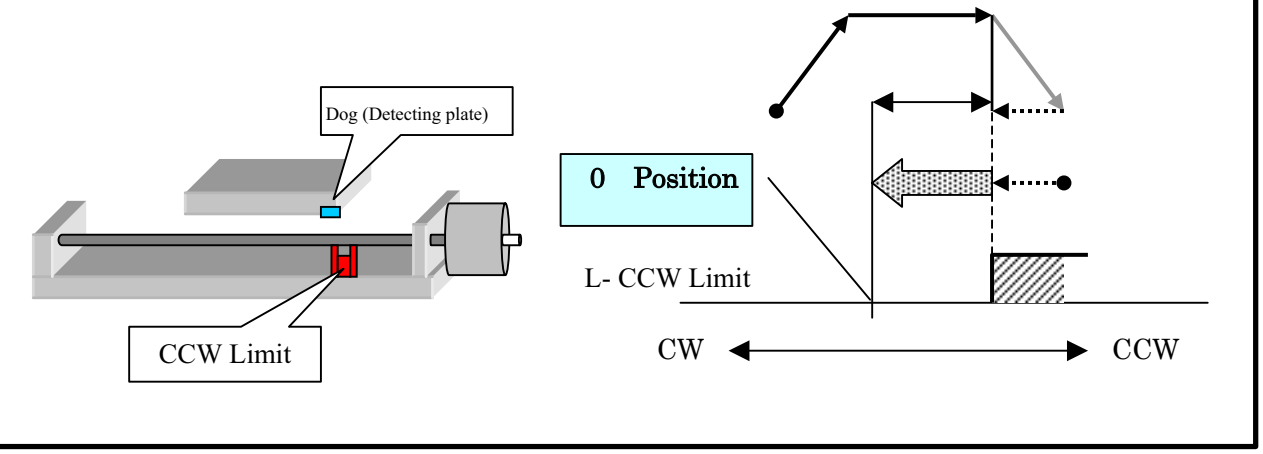
1 2 After returning to origin in method 6, and moved by the set amount, this position is set to be the origin.
In the case of arrangement as shown in the diagram below, set the parameter No.5 to -1000.



1 3 After returning to origin in method 7, and moved by the set amount, this position is set to be the origin.
In the case of arrangement as shown in the diagram below, set the parameter No.5 to 1000.



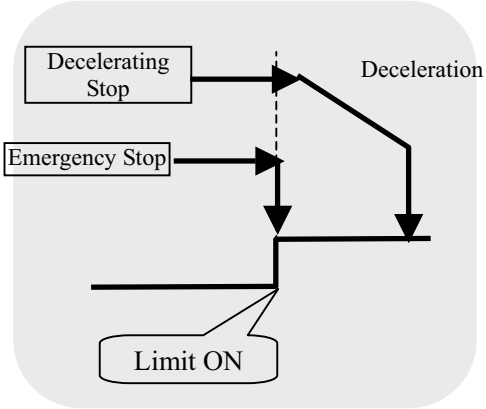
1 4 After returning to origin in method 8, and moved by the set amount, this position is set to be the origin.
In the case of arrangement as shown in the diagram below, set the parameter No.5 to -1000.



3-4. Limit Stop

The controller stops output when a limit signal is inputted.
Stop methods are the following two types

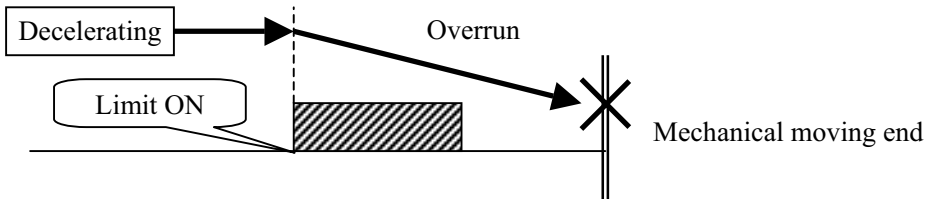
Setting	Stop Method	
0	Emergency stop	Immediately stops at the limit detected position.
1	Decelerating stop	Decelerates and stops. The decelerating time is the same as that of decelerating setting in normal drive.



In standard specifications, in order to eliminate the above trouble, "0: Emergency stop" is fixedly set.
If you wish to use in "1: Decelerating stop," please contact us.

To customers who set the "decelerating stop" setting to valid

In decelerating stop setting, attention must be paid because the amount of overrun becomes large and mechanical failures such as bumping the moving end may occur, if the decelerating time is set to be long.



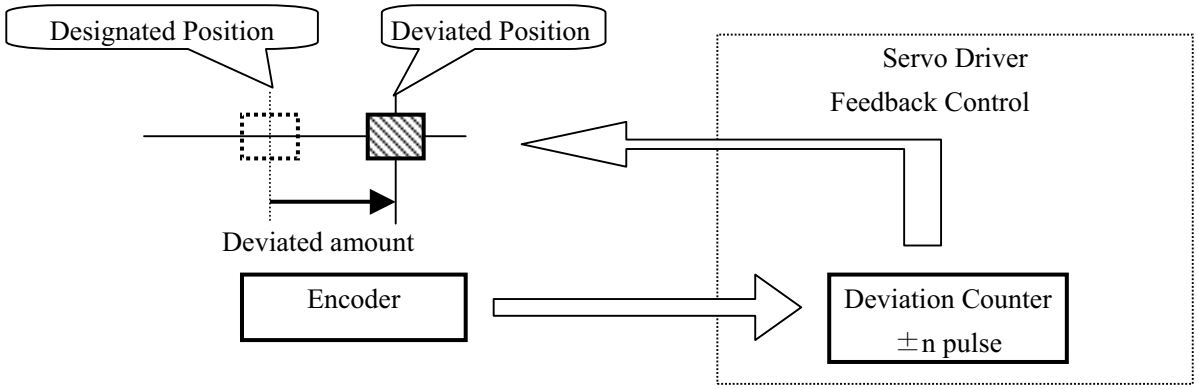
3-5. Feedback

3-5-1. Feedback

As a feature of the SC Series, feedback can be performed with encoder input. Methods for feedback are roughly classified into an incremental method and absolute method. This product adopts the absolute method.

Incremental Method

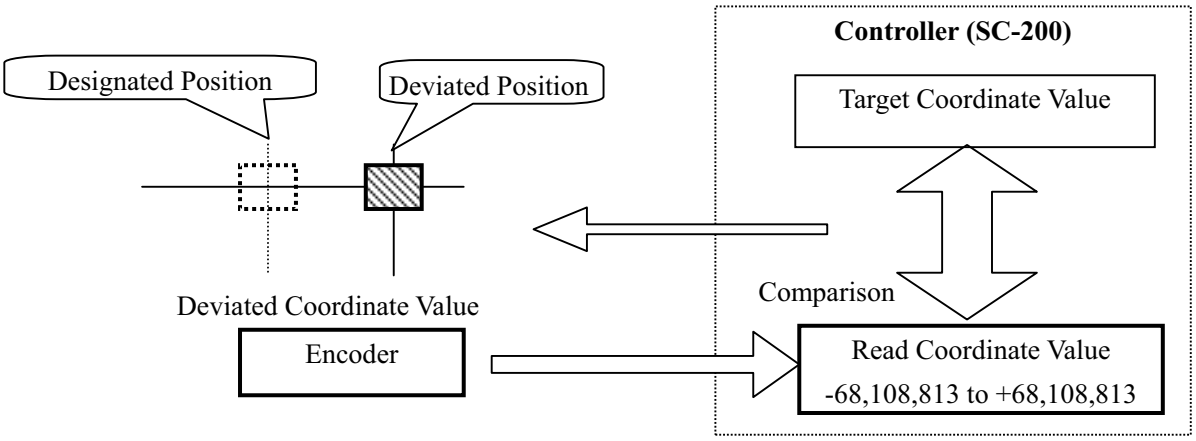
Control is performed with an increase in deviation from the present position. Servomotor driver or the like is controlled in this method.



The servo driver has an internal **deviation counter**, which counts deviating amounts. The counter reads signals from the encoder and attempts to reset by the deviated amount.

Absolute Method

Coordinate value (absolute value) is controlled and feedback control is performed. This product is controlled in this method.



The controller constantly reads coordinate values with signals from the encoder and compares these values with the designated position. When deviation between the read coordinate value and the designated position occurs, the controller drives the motor to reset it to the designated position. The coordinate range which this device can control is a wide range from -68,108,813 to +68,108,813, and the controller can reset even if the position deviates from this range.

3-5-2. Setting of Feedback

In order to perform correction (feedback) by encoder input, settings of items in the following table are required.

When performing setting in manual operation, use SYS mode ("5-8. System Setting"), and when in remote operation, perform with ESI command.

Function	Manual operation (System setting)			Remote operation
	SYS№.	Display	Setting	
* Encoder conversion Denominator	24	ENC CAL DIV 1/N	1～16,777,215	ESI command
* Encoder conversion Numerator	25	ENC CAL DIV N/1	1～16,777,215	ESI command
* Multiplication setting	26	ENC MULTIPLI 1-4	1,2,4	ESI command
0 clear position	27	ENC Permissible	0～16,777,215	ESI command
* Conversion rounding designation	28	ENC RoundOff 0-9	0～9	ESI command
* Correction setting	29	FEEDBACK TYPE 0-2	0,1,2	ESI command
Correction Permissible range	30	PERMIT RANGE PULS	0～±10,000	ESI command
Correction Retry number	31	Retry Count	1～10,000	ESI command
Correction Wait time	32	WaitTime(1ms)	1～10,000	ESI command
* Encoder adding direction	33	ENC ROTATE CHANGE	0,1	ESI command
Encoder coordinate synchronization	34	PM&ENC SYSC WRITE	0,1	—
Display selection (Second line)	43 (39)	Sor PMC=0:ENC=1	0,1	—
Display selection (Third line)	46 (42)	Sor PMC=0:ENC=1	0,1	—

Make sure to set and adjust the functions marked with ※ in the above table.

Parenthetical SYS Nos. are according to Controller Ver.0.985 or former.

3-5-3. Details of Functions (During Manual Operation)

* During remote operation, refer to the items for ESI command.

No.24 **No.25** **Encoder Conversion Denominator And Numerator**

When minimum resolution for the motor (movement amount per 1 pulse) is different from the minimum resolution for the encoder, set the conversion coefficient with this parameter.

For example,

SYS No.	Setting Range	Description
24	1～16,777,215	Denominator for conversion
25	1～16,777,215	Numerator for conversion

No.26 **Multiplication Setting**

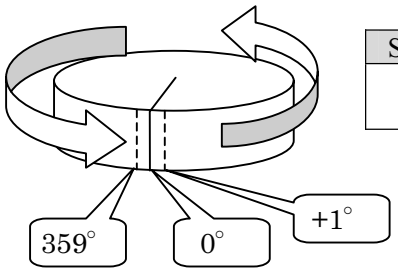
Multiply* count signal from the encoder to enhance resolution.

SYS No.	Setting Range	Description
26	**1**	Normal ×1
	2	2 Multiplication ×2
	4	3 Multiplication ×3

* Multiplication (multiply) means multiplying frequency by n.

No.27 **0 Clear Position**

When attempting to set the coordinate value to 0° by using the stage of the rotating system and turning by 360°, this sets the movement amount per one orbit.



SYS No.	Setting Range	Description
27	0～16,777,215	Movement amount per one orbit

No.28 **Conversion Rounding Designation**

When the conversion value for the encoder results in a decimal fraction, designates the digit to be rounded.

【Example】 Setting: In case of 4 Conversion value is 0.00288888 → 0.003

Setting: In case of 6 Conversion value is 0.00866666 → 0.00867

SYS No.	Setting Range	Description
28	0～9	Digit number right from decimal point. 0 is not rounded.

No.29 **Correction Setting**

Feedback control is implemented. Each one of the methods is for implementing only once after movement is completed, and for continuing feedback after movement is completed can be selected.

SYS No	Setting Range	Description
29	**0**	Feedback (encoder correction) is not performed.
	1	After movement, encoder correction is performed once and completed.
	2	After movement is completed, feedback continues.

During implementation of feedback, the BUSY lamp on the main body panel is lit even if the motor is suspended. However, BUSY flag is OFF in status response by feedback control.

No.30 **Correction Permissible Range**

N0.31 **Correction Retry Number**

No.32 **Correction Waiting Time**

Completion conditions for correction are set. If correction is not completed within the set conditions, feedback is completed and an error (drive system error No309) is returned.

SYS No.	Setting Range	Initial Setting	Description
30	0～±10,000	1	Correction pulse range is set
31	1～10,000	100	Set number
32	1～10,000	100	

No.33 Encoder Adding Direction

Increase and decrease polarity of counter value from encoder. That is, the rotating direction of the encoder.

SYS No.	Setting	Description
33	**0**	Normal
	1	Reverse: Positive and negative are reversed to setting 0.

No.34 Encoder Coordinate Synchronization

If this is set, the encoder coordinate value together with pulse display value are simultaneously rewritten to ORG RESET DATA in the case of Reset command and completion of return to origin.

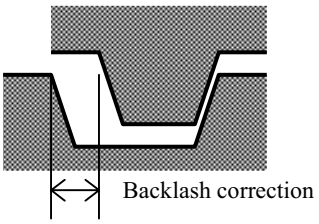
No.43 (39) No.46 (42) Display selection

Selection of display of pulse count number or display of encoder counter value in coordinate display is performed.

SYS No.	Setting	Content
43 (39)	**0:** Pulse display	Change in display on the second line
46 (42)	**1:** Encoder display	Change in display on the third line

3-6. Backlash Correction

Backlash generated in the gear mechanism, etc., can be corrected.
In order to carry out backlash correction, settings of corrected pulse amount and correcting method are required.



3-6-1. Remote control operation procedures

① Set a correction amount with motor-related initial setting (ASI command).
stx**ASI**・・・・・**/h/**・・・・CRLF Set with the 8th parameter.

* For details, refer to the "ASI command."

② Designate a method by the parameter of each moving command（such as APS or RPS.）

3-6-2. Manual operation setting

In order to carry out backlash correction by manual operation, carry out necessary settings with SYS parameters in advance.

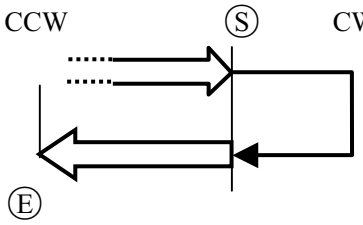
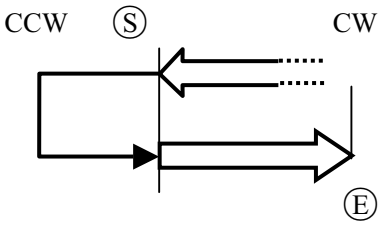
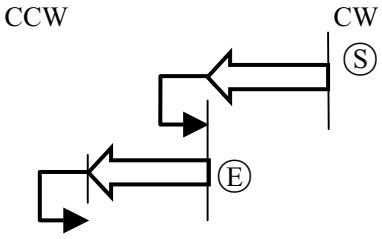
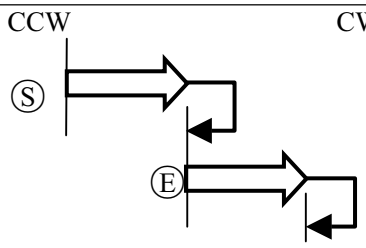
SYS No.	Setting	Content
7	**0～16,777,215**	Backlash correction pulse amount
8	**0～4**	Correction method

3-6-3. Backlash correction method

Executable backlash correction methods are as follows. The setting is common to remote operation and manual operation.

Method	Description
0	Backlash correction invalid
1	During inversion from the CW direction to CCW direction, reciprocating movement by correcting pulse amount is performed before moving.
2	During inversion from the CCW direction to CW direction, reciprocating movement by correcting pulse amount is performed before moving.
3	During moving in the CCW direction, reciprocating movement by correcting pulse amount is performed after moving.
4	During moving in the CW direction, reciprocating movement by correcting pulse amount is performed after moving.

3-6-4. Details of correcting method

1		When moving direction is changed from CW to CCW, reciprocating movement by the set correcting pulse amount is performed and then movement in the CCW direction is performed. In this method, error by backlash is generated, however, the error amount is constant.
2		When moving direction is changed from CCW to CW, reciprocating movement by the set correcting pulse amount is performed and then movement in the CW direction is performed. In this method, error by backlash is generated, however, the error amount is constant.
3		When moving in the CCW direction, at first, moving in the CCW direction, and reciprocating movement by the backlash correction amount is performed and then movement ends in the CW direction. With this method, lost motion is not generated because a stop is made on the determined gear surface side even when moving is performed from either the CW direction or CCW direction.
4		When moving in the CW direction, at first, moving in the CW direction, and reciprocating movement by the backlash correction amount is performed and then movement ends in the CW direction. With this method, lost motion is not generated because a stop is made on the determined gear surface side (opposite to 3) even when moving is performed from either the CW direction or CCW direction.

In the above table, Ⓢ represents a start position, and Ⓔ represents a moving end position.

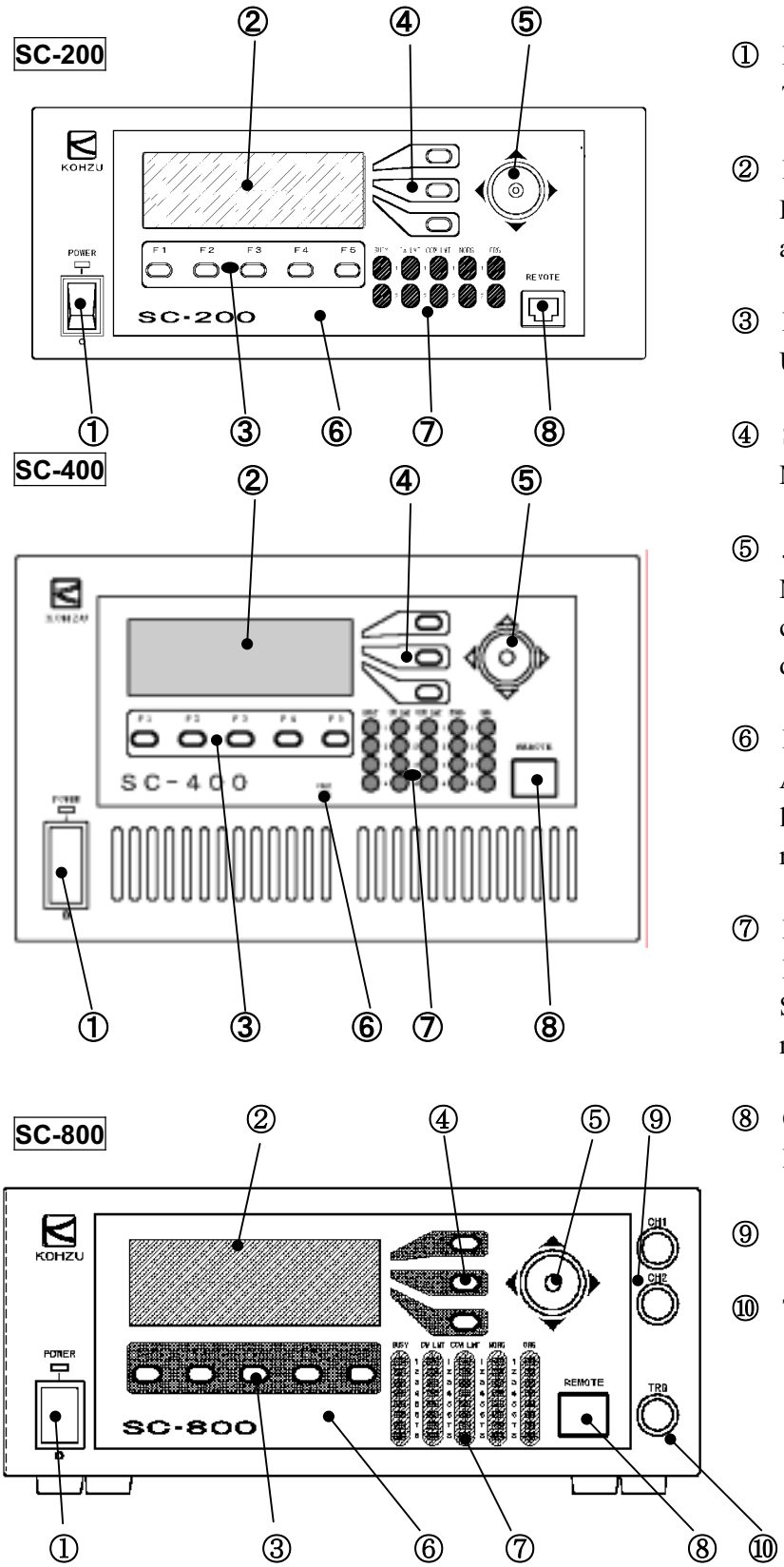
【Remark】

In the case of methods 3 and 4, a slightly longer period of time is required to complete moving.

MEMO

4. Part Names and Functions

4-1. Front Panel



① Power Switch POWER
Turns ON/OFF 100V AC power

② Liquid Crystal Display
Displays the present mode, pulse value and function of each key.

③ Function Switches F1 to F5
Used for selecting mode and driving.

④ Select Switch
Mainly used for switching operations.

⑤ Joystick
Moving direction and speed can be controlled depending on the tilt direction and tilt angle of the joystick.

⑥ Liquid Crystal Contrast Adjustments
Adjust the contrast if characters on the liquid crystal screen are difficult to read.

⑦ Limit and Position Sensor Display LED
Status of each position sensor and moving status is displayed.

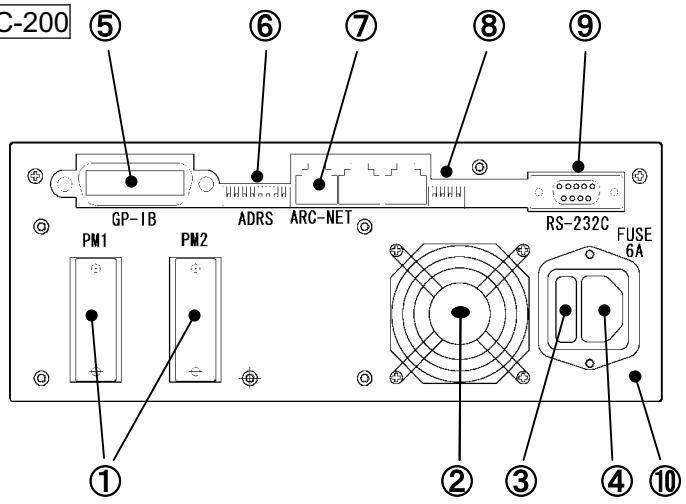
⑧ Connector for Connecting Externally Installed Operating Part

⑨ Scaler counter BNC

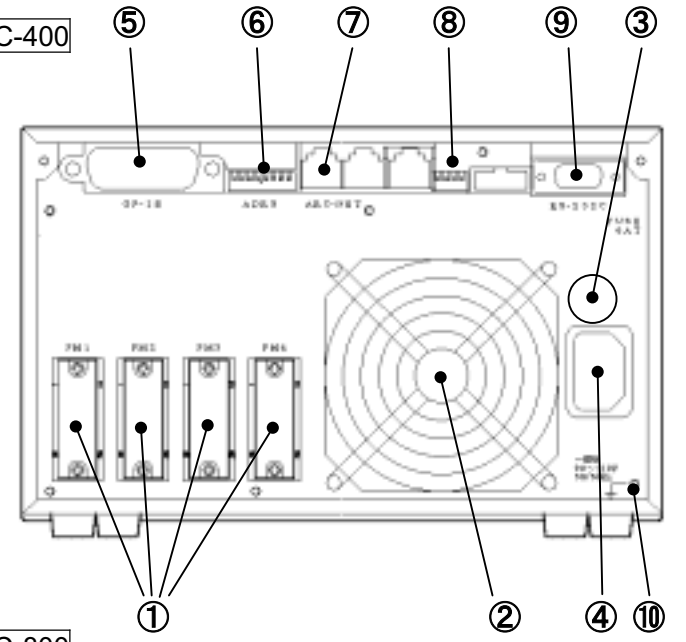
⑩ Trigger output BNC (option)

4-2. Rear Panel

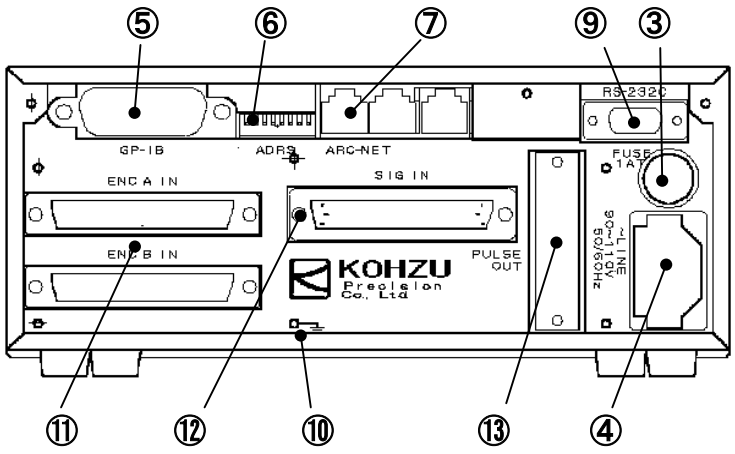
SC-200



SC-400



SC-800



① **Motor Connecting Connector**
Stage driving output, sensor input

② **Fan**

Never place an object behind the fan and obstruct exhaust.

③ **Fuse**

Make sure to use a specified rated fuse.

④ **Power Supply Connector (3P type)**
Input connector for 100V AC.

⑤ **GP-IB Connector**
GP-IB communications connector

⑥ **RS-232C/GP-IB Setting Switch**
DIP switch to set communications conditions for RS-232C and GP-IB (Refer to the next page)

⑦ Connector for Network (Option)

⑧ System Setting Switch

Do not change.

⑨ **RS-232C Connector**
Connector 9 pins for RS-232C communications line

⑩ Grounding Terminal
Make sure to establish a ground. Ground can also be established from the power supply connector (3 pins type).

⑪ Encoder input connectors A, B Refer to SD

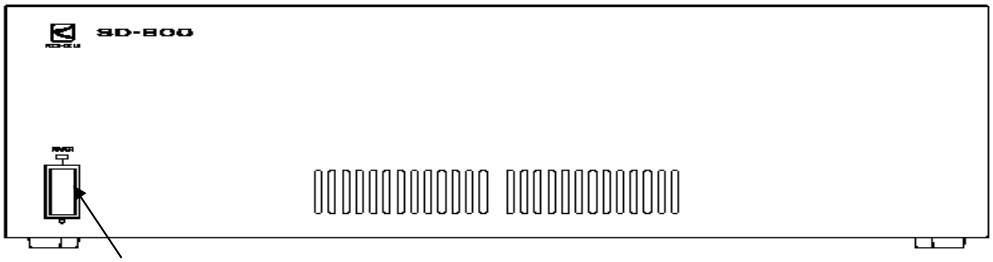
⑫ Sensor input connector Refer to SD

⑬ Pulse output connector Refer to SD

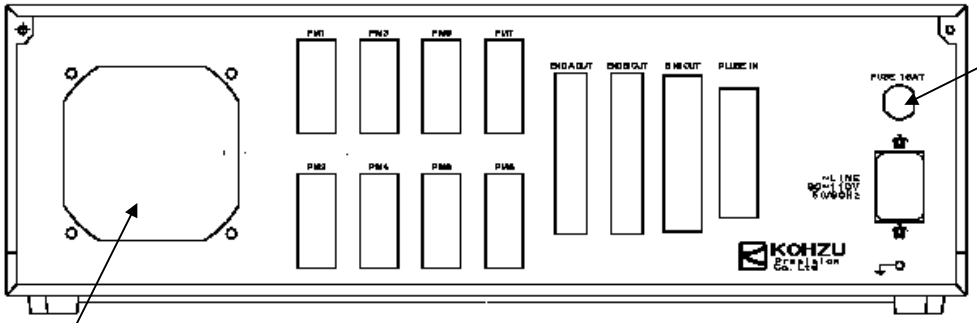
4-3. Driver BOX SD-800 for SC-800

A dedicated driver BOX SD-800 is available for SC-800.

4.3.1. SD-800 Front panel



4-3-2. SD-800 Rear panel



SC-800 Dedicated cable

① Encoder output connectors A, B

② Sensor output connector

③ Pulse input connector

Fuse

Make sure to use a specified rated fuse.

PM1 to PM8 Drive cables

Pin layout is the same as those of SC-200 and SC-400.

① Fan

Never place anything in the rear of the fan or block the exhaust.

Firmly connect respective connectors.

Do not pull out or plug in connector while power is ON.

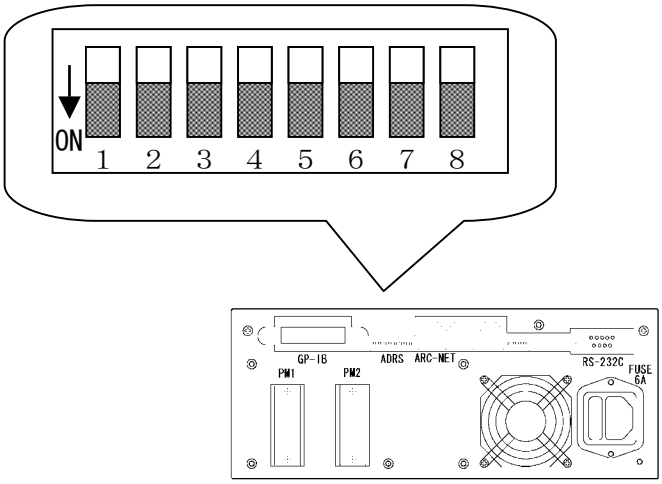
When pulling out or plugging in, make sure to turn power OFF.

4-4. DIP Switch (RS-232C/GP-IB Setting Switch)

Conditions for RS-232C and GP-IB communications can be set and changed with the DIP switch (ADRS) on the rear panel of the main body.

4-4-1. Position of DIP switch

The DIP switch is located at the upper part of the rear panel on the main body.



4-4-2. Settings

Settings are as in the table below.

Switch settings in the left half of the table are reflected in settings in the right half of the table.

Switch setting								Communi-cation mode	RS-232C setting				GP-IB	
1	2	3	4	5	6	7	8		Speed	Parity	Word length	S bit	Delimiter	Address
OFF	OFF	*	*	*	*	*	OFF	RS	38400	*	*	*	*	*
ON	OFF	*	*	*	*	*	OFF	RS	28800	*	*	*	*	*
OFF	ON	*	*	*	*	*	OFF	RS	19200	*	*	*	*	*
ON	ON	*	*	*	*	*	OFF	RS	9600	*	*	*	*	*
*	*	OFF	OFF	*	*	*	OFF	RS	*	NON	*	*	*	*
*	*	OFF	ON	*	*	*	OFF	RS	*	EVEN	*	*	*	*
*	*	ON	ON	*	*	*	OFF	RS	*	ODD	*	*	*	*
*	*	*	*	OFF	*	*	OFF	RS	*	*	8	*	*	*
*	*	*	*	ON	*	*	OFF	RS	*	*	7	*	*	*
*	*	*	*	*	OFF	*	OFF	RS	*	*	*	1	*	*
*	*	*	*	*	ON	*	OFF	RS	*	*	*	2	*	*
OFF	OFF	OFF	OFF	OFF	*	*	ON	GPIB	*	*	*	*	CRLF	0
ON	OFF	OFF	OFF	OFF	*	*	ON	GPIB	*	*	*	*	CRLF	1
OFF	ON	OFF	OFF	OFF	*	*	ON	GPIB	*	*	*	*	CRLF	2
ON	ON	OFF	OFF	OFF	*	*	ON	GPIB	*	*	*	*	CRLF	3
OFF	OFF	ON	OFF	OFF	*	*	ON	GPIB	*	*	*	*	CRLF	4
ON	OFF	ON	OFF	OFF	*	*	ON	GPIB	*	*	*	*	CRLF	5
ON	ON	ON	ON	OFF	*	*	ON	GPIB	*	*	*	*	CRLF	15
OFF	OFF	OFF	OFF	ON	*	*	ON	GPIB	*	*	*	*	CRLF	16
ON	ON	ON	ON	ON	*	*	ON	GPIB	*	*	*	*	CRLF	31

- GP-IB delimiters are fixed to CRLF.
- 6 to 14 and 17 to 30 in the GP-IB addresses are omitted in the above table.

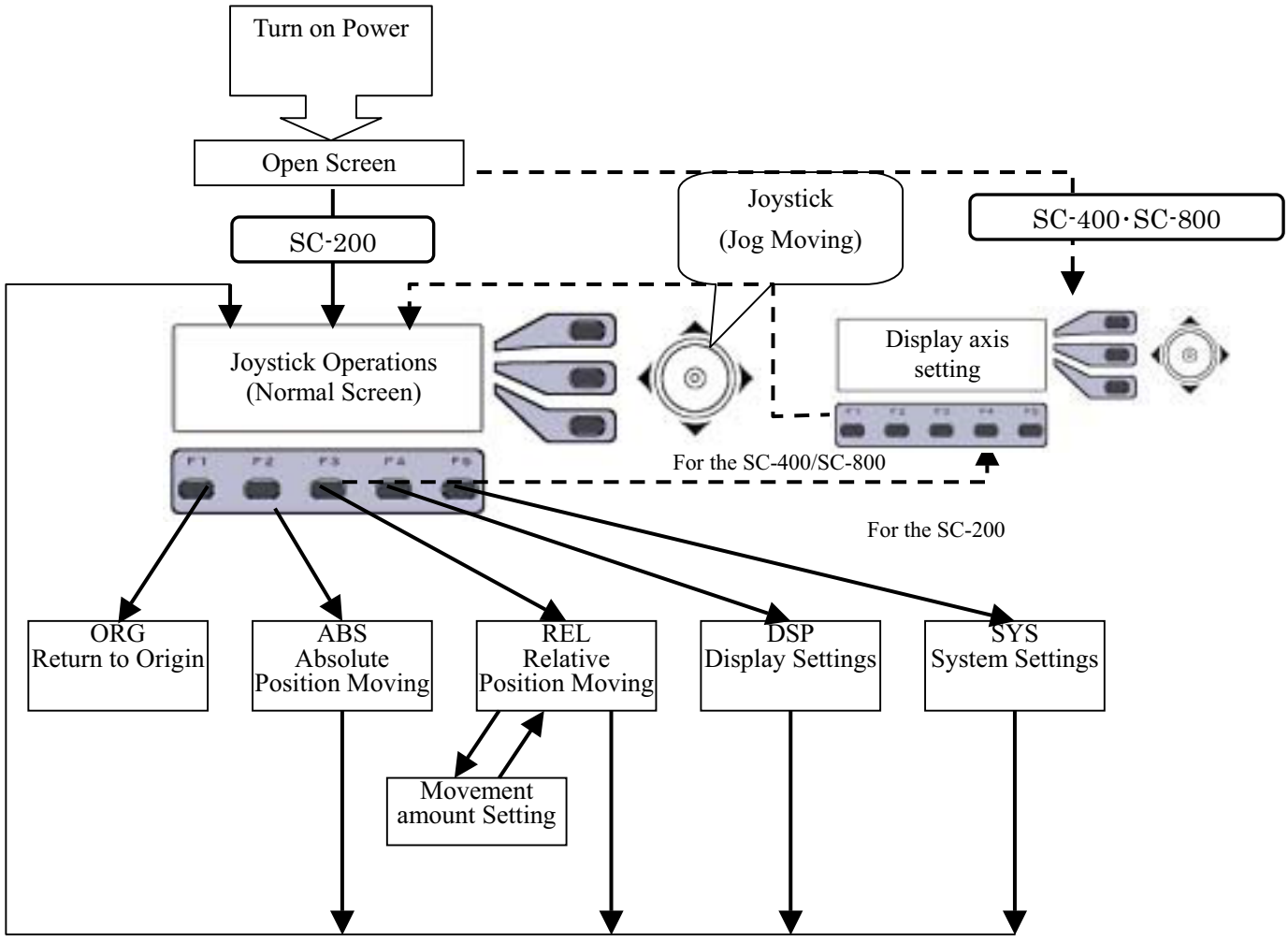
5. Manual Operations

5-1. Description

SC Series controllers can perform stage positioning and driving operations of a stage and motor as a unit without connecting to a personal computer. Most of the functions available in remote control can be performed even during manual operations.

During manual operations, respective functions are performed by a total of 8 function keys F1 to F5 arranged on the lower portion of the LCD screen and 3 keys arranged on the right portion of the LCD screen and joystick.

■ Flow of Manual Operations



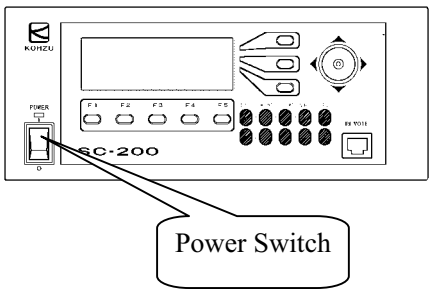
The functions of the 8 function keys vary according to screen and mode.

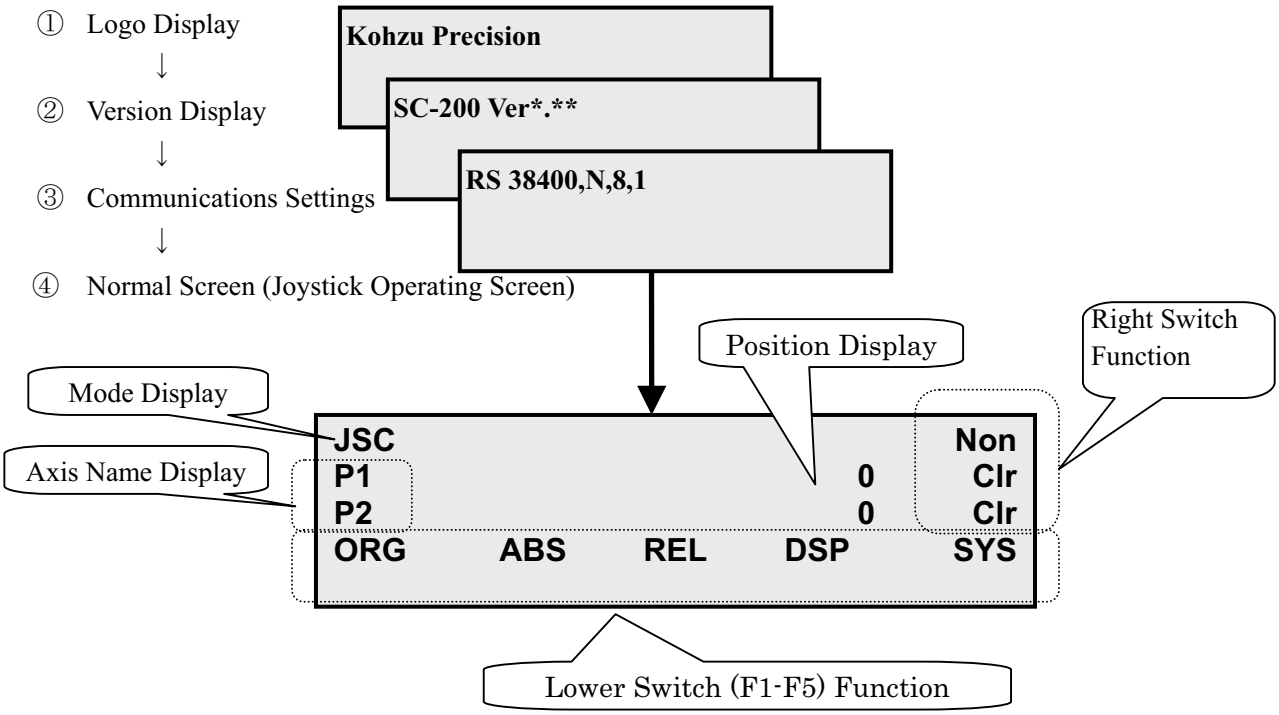
5-2. Turning on Power

For the SC-200

Check connections of the motor cable and communication cables, etc. and then turn on power.

When power is turned on, controller information is displayed on the display panel for a few seconds and then the normal screen appears.





RS-232C/GP-IB communications cannot be performed until the normal screen appears after the power is turned on.

The position display stores and displays values at the time when power is turned OFF.
Status displaying LED displays the status of the sensor at the time of starting.

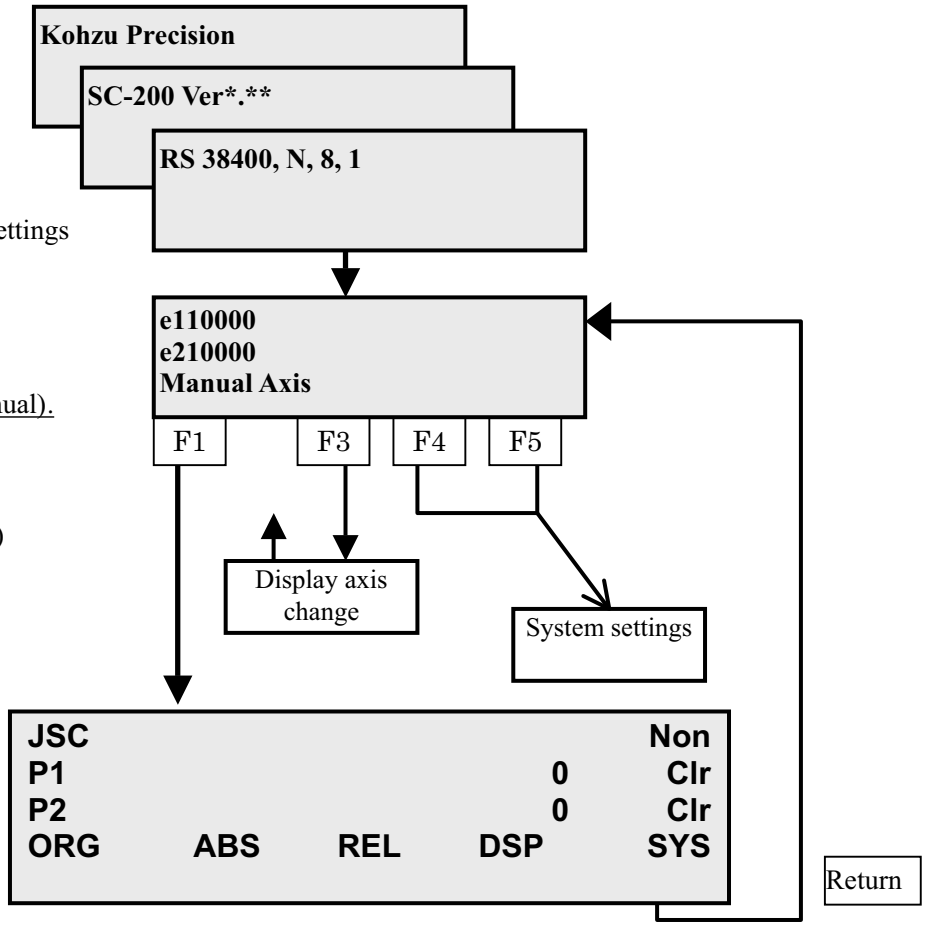
For the SC-400/SC-800

The screen at the time of start-up differs from that of SC-200. Pressing the "Manual" button displayed on the screen when start-up shifts to the operation screen.

① Logo Display
↓
② Version Display
↓
③ Communications Settings
↓
④ Start–up Screen

⑤ Press F 1 (Manual).

⑥ Normal screen
(Joystick operation)



5.2.1 System settings

In SC-400/800, system change button is Easter egg command. For system settings, pressing buttons F4 and F5 simultaneously on the start-up screen (screen on which "Manual" is displayed) displays a "SYS" mode button.

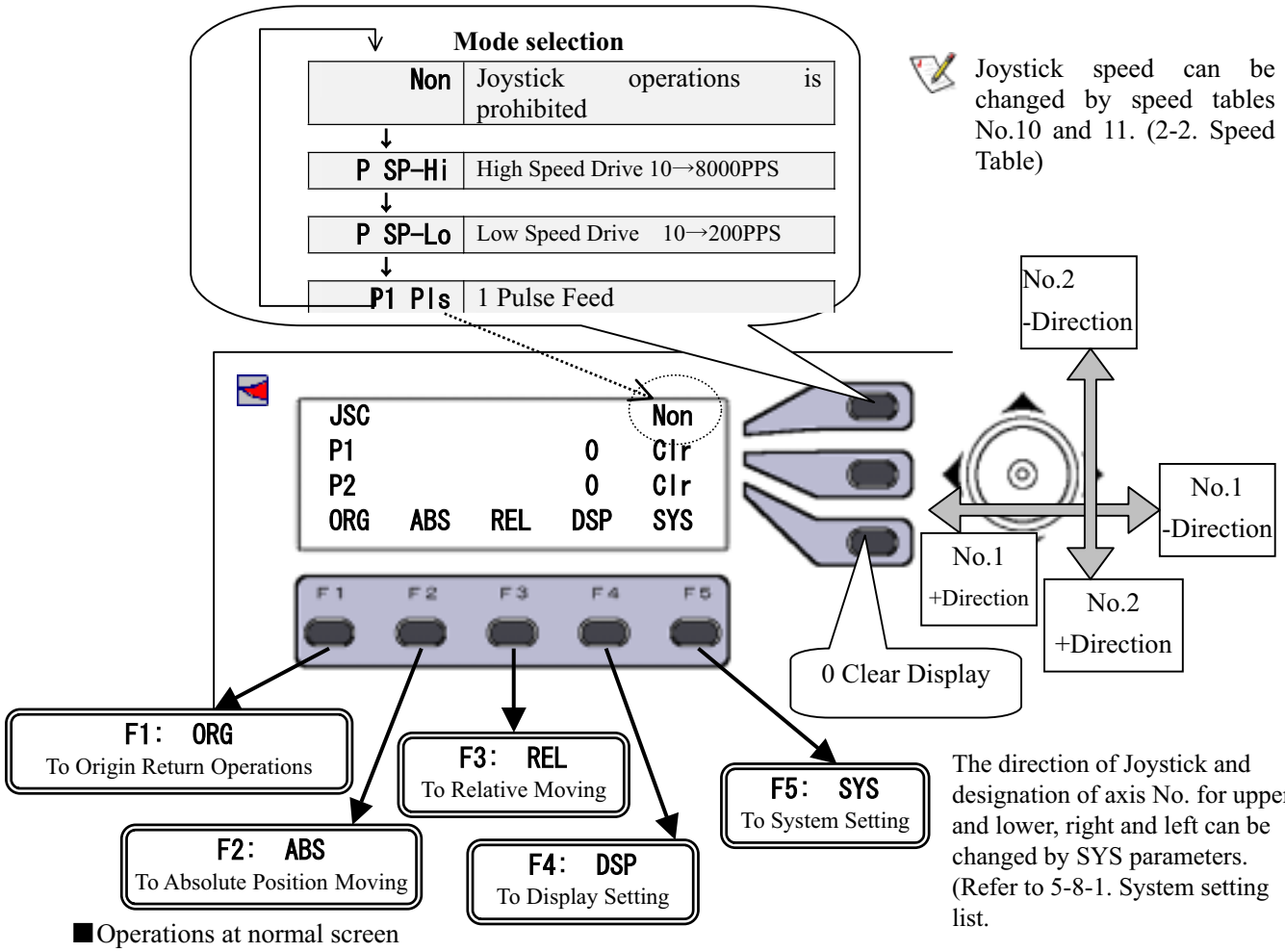
5.2.2 Change of the display axis

Pressing the button f· 3 (Axis) on the start-up screen shifts to the screen of "display axis settings" and carries out the following settings.

- Designation of display axis: two axes to be displayed can be selected among all axes. The same axes can be displayed.
- Display format (calculated value, non-calculated value) of each axis can be set with the select switch.
- Pn**********PLS Pulse value
- pn**********Cal Pulse angle conversion value
- En**********PLS Encoder value
- en**********Cal Encoder angle conversion value

5-3. Joystick Operations

After power is turned on, the normal screen appears, and operations of the joystick is enabled. The mode in joystick operations is switched by the key at the right upper. Please note that the joystick prohibiting (Non) mode is effective when power is turned on.



Joystick speed can be changed by speed tables No.10 and 11. (2-2. Speed Table)

The direction of Joystick and designation of axis No. for upper and lower, right and left can be changed by SYS parameters. (Refer to 5-8-1. System setting list.

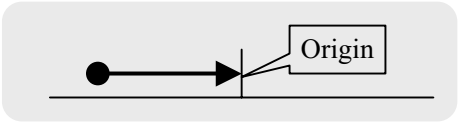
■Operations at normal screen

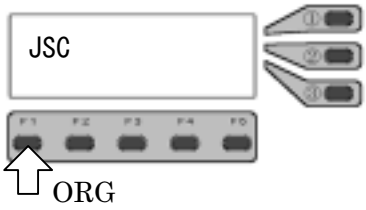
Operations		Functions		
		200	400/800	
Joystick	↑	1-	<-	No.1 axis moves while tilting in the - direction, or 1 step feed
	↓	1+	<-	No.1 axis moves while tilting in the +direction, or 1 step feed
	→	2-	<-	No.2 axis moves while tilting in the - direction, or 1 step feed
	←	2+	<-	No.2 axis moves while tilting in the +direction, or 1 step feed
Right key	Upper	***	<-	Joystick operations mode selection
	Middle	Clr	Pls/Cal	Value for the first axis is cleared to zero / Display style change
	Lower	Clr	Pls/Cal	Value for the second axis is cleared to zero / Display style change
F Key	F1	ORG	<-	To the origin return operations screen
	F2	ABS	<-	To the absolute value moving screen
	F3	REL	<-	To the relative position move screen
	F4	DSP	<-	To the setting screen for displayed value
	F5	SYS	MEU	To the system setting screen / Return to menu screen

When starting, the joystick operations mode is prohibited (Non) and the joystick does not work.

5-4. Origin Return

Function Performs origin sensor detection, and moves to origin position.





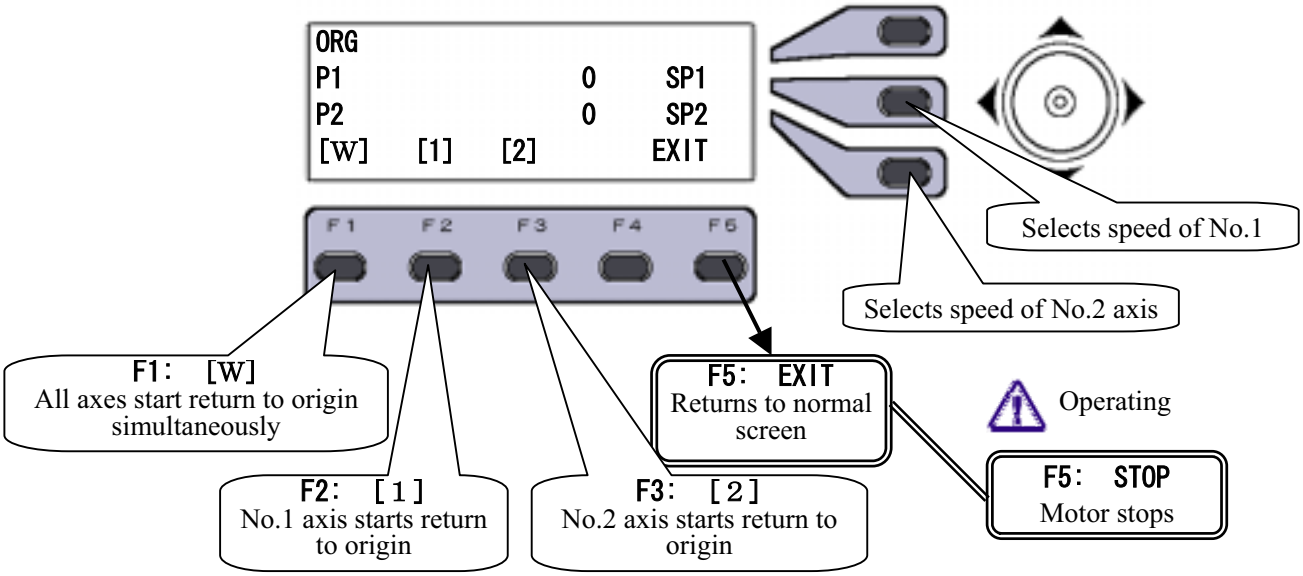
Selection The origin return operations screen appears by pressing the F1 **ORG** key on the normal screen (JSC).

Start Origin return movement starts by pressing any of the F1、F2、F3 keys.

Method selection Preset the origin return method by system parameters.

* Default value is 3(NORG+ORG).

Operations end The screen returns to the normal screen (joystick operations) by pressing the F5 **EXIT** key.



■Operations at origin return screen

Operations		Functions	
Joystick	↑ ↓ ←→	***	Invalid
Right key	Upper		
	Middle	SP*	Selects speed table for No.1 axis 0 → 9
	Lower	SP*	Selects speed table for No.2 axis 0 → 9
F key	F1	[W]	All axes start return to origin simultaneously
	F2	[1]	No.1 axis starts return to origin
	F3	[2]	No.2 axis starts return to origin
	F4		
	F5	EXIT	In suspended: Returns to normal screen(JSC)
		STOP	Operating: Stop key

■Selection of Origin Return Mode

The selection of origin return mode is set with system parameter No.9.

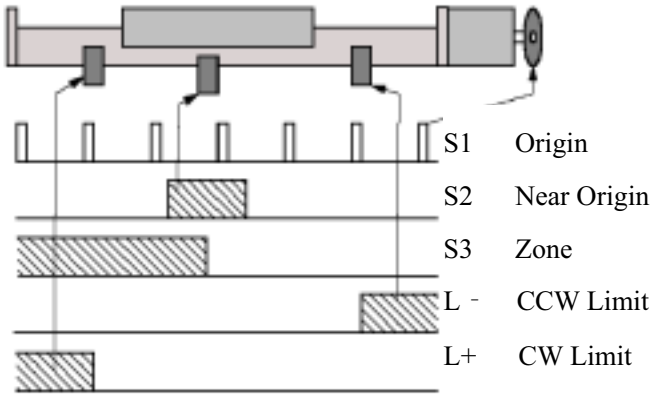
SYSNo.	Display	Function	Setting range	Initial value
9	**ORG Type 1-14**	Sets origin return mode	1～14	3

■Origin return Mode * No.3 is a default value. No.4 is used for a little stage without S1 sensor.

Mode	Sensor configuration	Description
1	S1、S3	Return direction is determined and origin is detected with zone sensor.
2	S3	Edge of the zone sensor is set to be the origin position.
3	S1、S2、L-	ORG (Origin S1) located in NORG (S2 Origin Proximity) is set to be the origin position.
4	S2、L-	One sensor located in moving zone is set to be the origin position.
5	S1、L+	Origin sensor in proximity of CW limit is set to be the origin position.
6	S1、L-	Origin sensor in proximity of CCW limit is set to be the origin position.
7	L+	Edge of CW limit is set to be the origin position.
8	L-	Edge of CCW limit is set to be the origin position.
9	S1	Only origin sensor is used.
10	Non	The present position is set to be the origin position.
11	S1、L+	After the origin position is detected by method 5, and moved by the set value, this position is set to be the origin position.
12	S1、L-	After the origin position is detected by method 6, and moved by the set value, this position is set to be the origin position.
13	L+	After the origin position is detected by method 7, and moved by the set value, this position is set to be the origin position.
14	L-	After the origin position is detected by method 8, and moved by the set value, this position is set to be the origin position.
15	Ref	Encoder reference Option

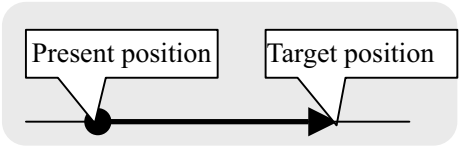
For details of origin return mode, refer to “3-3. Origin Return Method”.

Sensor Configuration



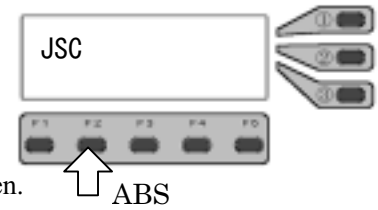
5-5. Absolute Position Moving

Function Performs moving to the inputted designated position.



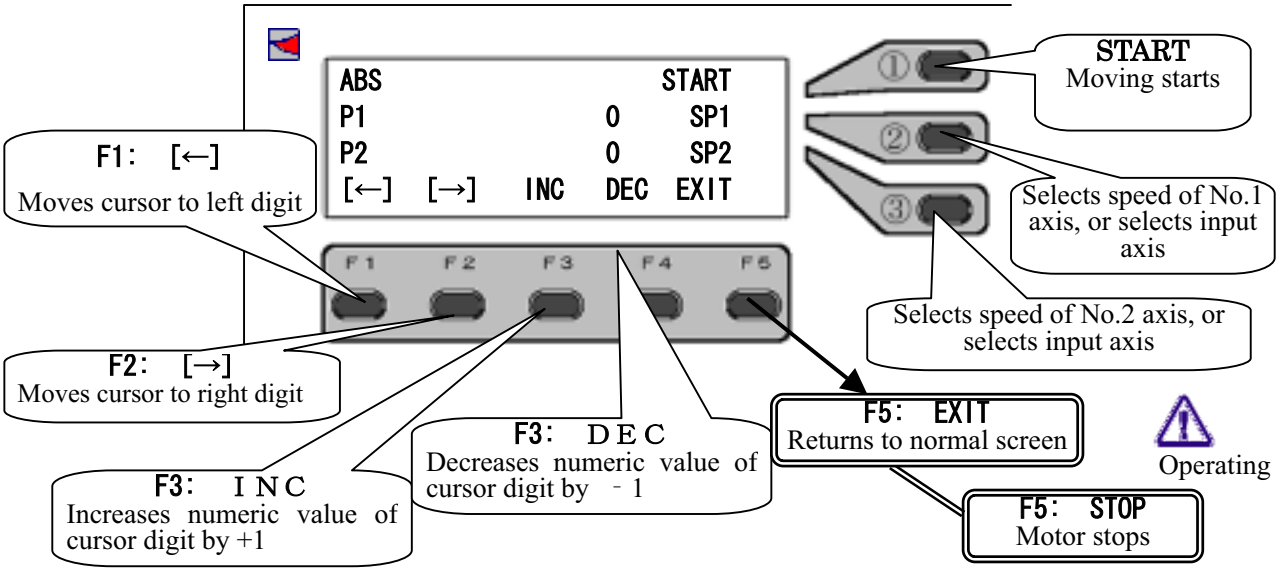
Selection The absolute position moving operations screen appears by pressing the F2 ABS key on the normal screen (JSC).

The present coordinate value is displayed on the screen.



Start Set the moving target value by using a function key.
Moving starts by pressing the right upper START key.

Operations end The screen returns to the normal screen (joystick operations) by pressing the F5**EXIT** key.

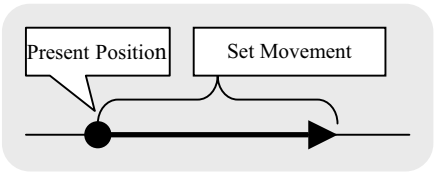


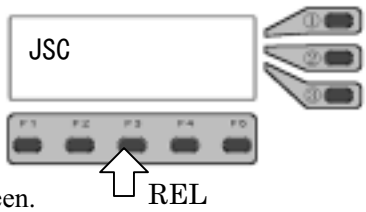
■Operations at absolute position moving screen

Operations		Functions	
Joystick	↑ ↓ ←→	***	Invalid
Right key	Upper	START	Starts absolute position moving
	Middle	SP*	Selects speed of No.1 axis, or selects input axis
	Lower	SP*	Selects speed of No.2 axis, or selects input axis ⚠When selecting speed, move the cursor to the right end.
F key	F1	[←]	Moves the cursor to the left digit
	F2	[→]	Moves the cursor to the right digit
	F3	INC	Increases numeric value of a digit where the cursor is placed by +1
	F4	DEC	Decreases numeric value of a digit where the cursor is placed by －1
	F5	EXIT	In suspended: Returns to the normal screen (JSC)
		STOP	Operating: Stop key

5-6. Relative Position Moving

Function Performs moving from the present position by set amount.





Selection The relative moving operations screen appears by pressing the F3 REL key on the normal screen (JSC).

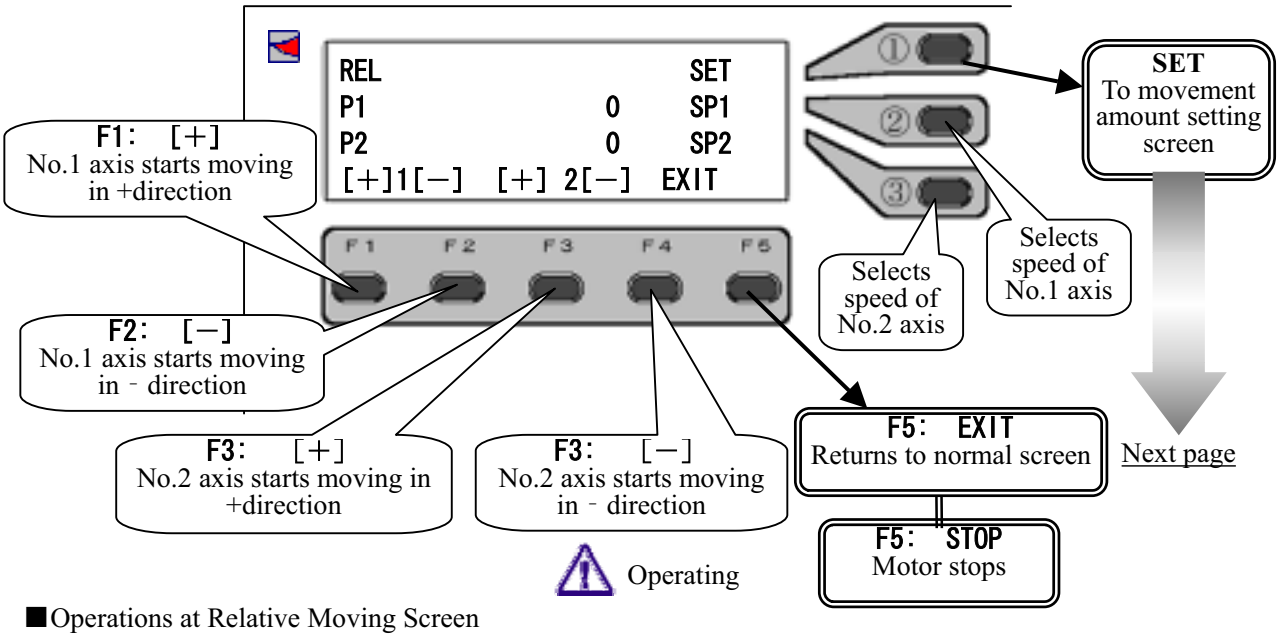
The present moving set value is displayed on the screen.

Start Designate axis and direction with the F1 F2 F3 F4 keys to start moving.

Movement amount settings Change or setting of the movement amount is performed by pressing the right upper SET key for switching to the normal screen.

Operations end The screen returns to the normal screen (joystick operations) by pressing the F5 **EXIT** key.

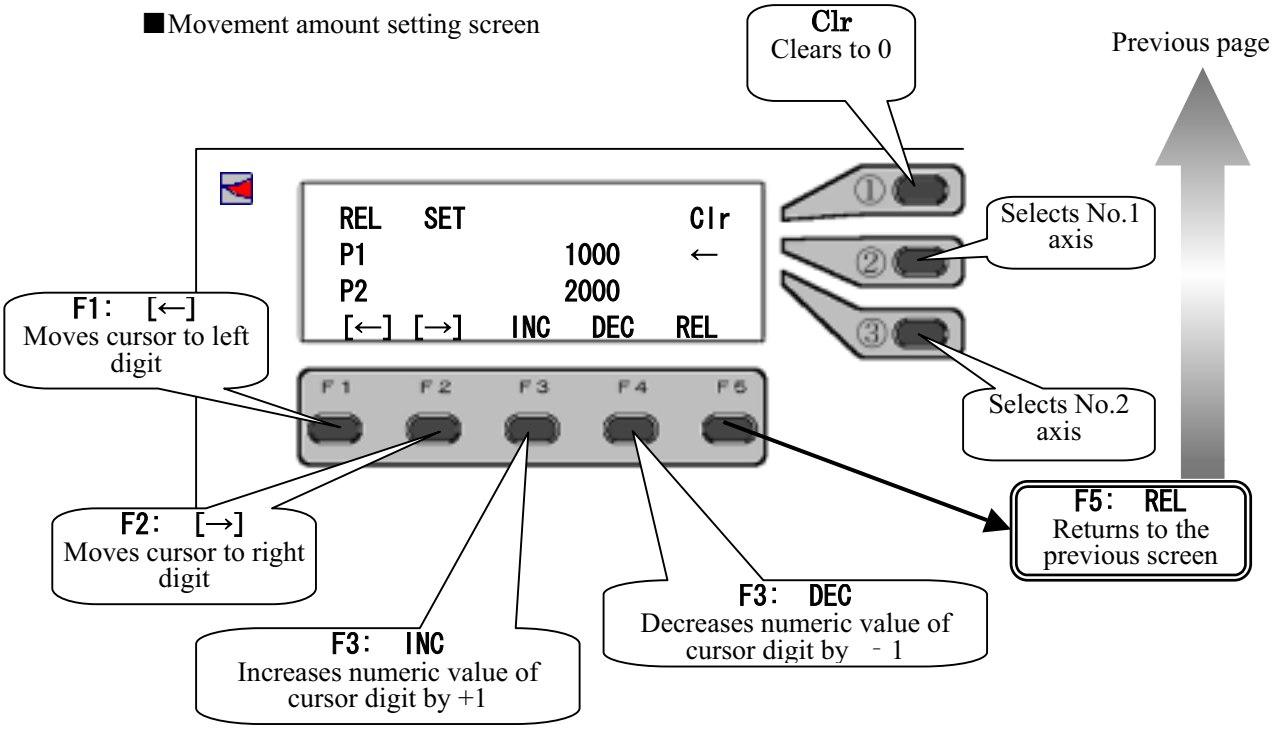
■Moving Implementation Screen



■Operations at Relative Moving Screen

Operations		Functions	
Joystick	↑ ↓ ←→	***	Invalid
Right key	Upper	SET	Moves to the movement amount setting screen
	Middle	SP*	Selects speed of No.1 axis
	Lower	SP*	Selects speed of No.2 axis
F key	F1	[-]	Moves No.1 axis in - direction by a set amount.
	F2	[+]	Moves No.1 axis in +direction by a set amount.
	F3	[-]	Moves No.2 axis in - direction by a set amount.
	F4	[+]	Moves No.2 axis in +direction by a set amount.
	F5	EXIT	In suspended: Returns to the normal screen (JSC).
		STOP	Operating: Stop key

■Movement amount setting screen

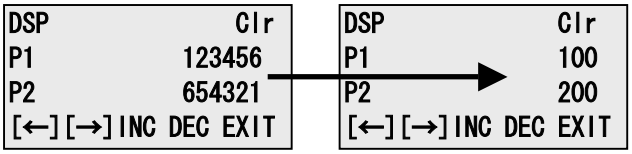


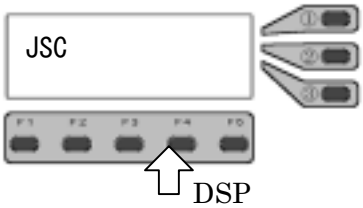
■Operations at movement amount setting screen

Operations		Functions	
Joystick	↑ ↓ ←→	***	Invalid
Right key	Upper	Clr	Clears numeric value to 0.
	Middle	←	Selects input for No.1 axis.
	Lower	←	Selects input for No.2 axis.
F key	F1	[←]	Moves the cursor to the left digit.
	F2	[→]	Moves the cursor to the right digit.
	F3	INC	Increases numeric value of a digit where the cursor is placed by +1.
	F4	DEC	Decreases numeric value of a digit where the cursor is placed by －1.
	F5	REL	Returns to the relative moving implementation screen.

5-7. Change in Displayed Value

Function Rewrites coordinate displayed value.



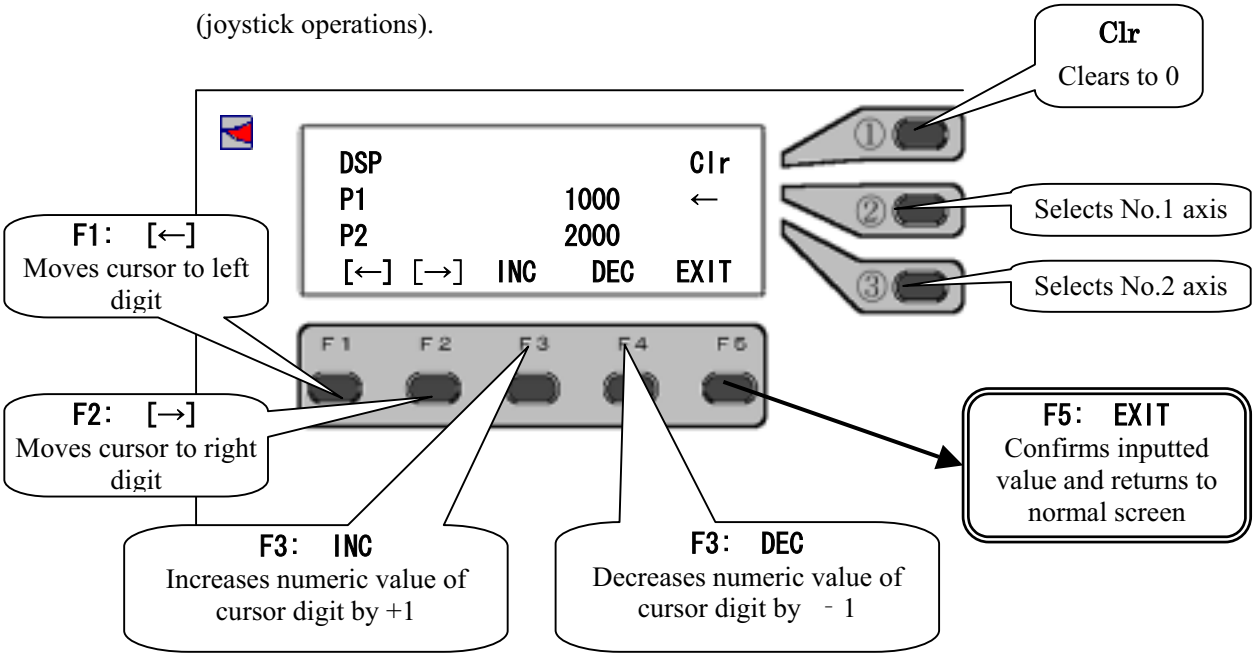


Selection Press the F4 DSP key on the normal screen (JSC) to move to the display change screen.

Present value appears on the screen after moving.

Setting Change the numeric values with the F1 F2 F3 F4 keys.

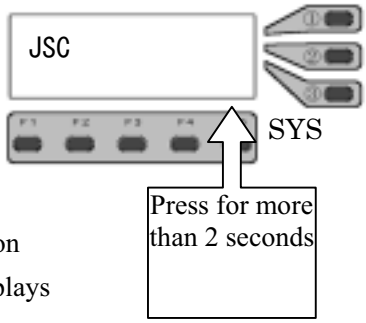
Setting end The input is confirmed by pressing the F5 key and the screen returns to the normal screen (joystick operations).



■Operations at displayed value change screen

Operations		Functions	
Joystick	↑ ↓ ←→	***	Invalid
Right key	Upper	Clr	Clears numeric value to 0.
	Middle	←	Selects input for No.1 axis.
	Lower	←	Selects input for No.2 axis.
F key	F1	[←]	Moves the cursor to the left digit.
	F2	[→]	Moves the cursor to the right digit.
	F3	INC	Increases numeric value of a digit where the cursor is placed by +1
	F4	DEC	Decreases numeric value of a digit where the cursor is placed by －1
	F5	REL	Confirms the inputted value and returns to the normal screen.

5-8. System Setting

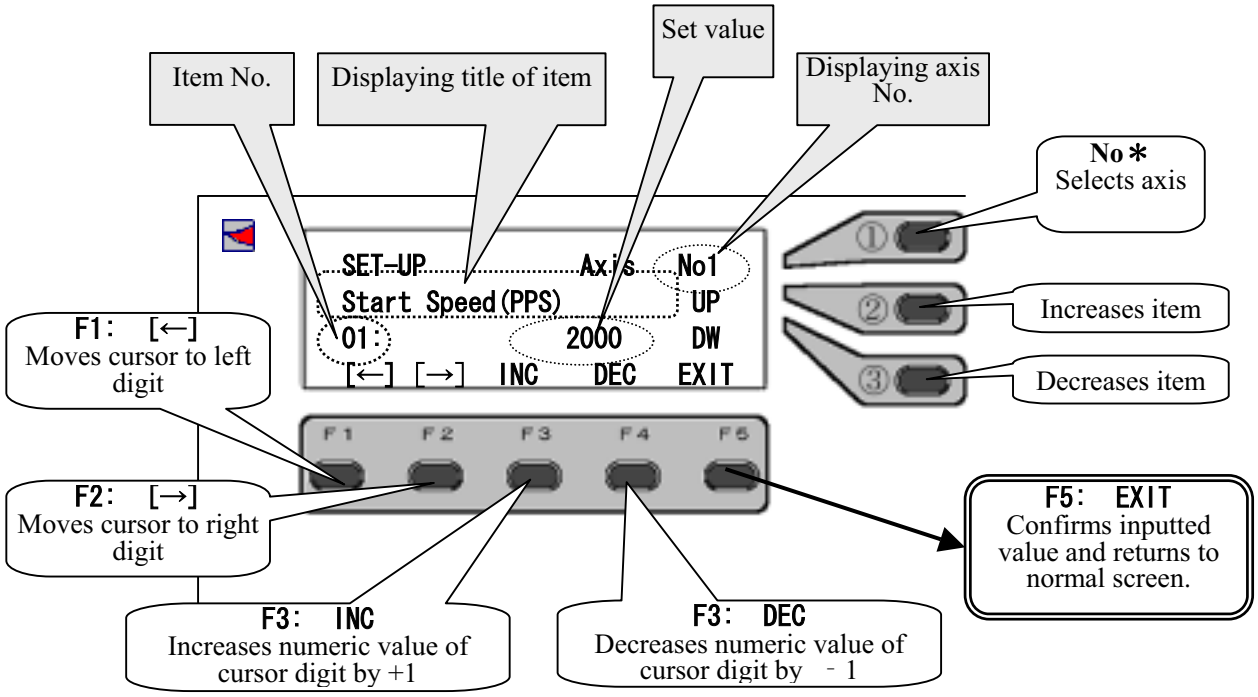


Function Changes and sets system settings for motor control.

Selection (SC-200) The screen changes to the system setting screen by pressing the F5 **SYS** key on the normal screen (JSC) for more than 2 seconds.
(SC-400/800) Pressing buttons F4 and F5 simultaneously on the start-up screen (screen on which "Manual" is displayed) displays a "SYS" mode button.

Selection of item Selects item with the UP DW.

Operations end The screen returns to the normal screen (joystick operations) by pressing the F5 key.



■Operations at the displayed value change screen

Operations		Functions	
Joystick	↑ ↓ ←→	***	Invalid
Right key	Upper	No*	Selects axis.
	Middle	UP	Increases item No. of the system parameters
	Lower	DW	Decreases item No. of the system parameters
F key	F1	[←]	Moves the cursor to the left digit
	F2	[→]	Moves the cursor to the right digit
	F3	INC	Increases numeric value of a digit where the cursor is placed by +1
	F4	DEC	Decreases numeric value of a digit where the cursor is placed by －1
	F5	EXIT	Confirms the inputted value and returns to the normal screen.

5-8-1. System Setting List

SYS№.	Display	Function	Setting range	Initial value
1	**Start speed (PPS)**	Start speed of Speed Table NO.0	1～4,095,500	500
2	**Top Speed (PPS)**	Maximum speed of Speed Table NO.0	1～4,095,500	5,000
3	**ACC Time**	Accelerating time of Speed Table NO.0	1～1,000,000	24
4	**DEC Time**	Decelerating time of Speed Table NO.0	1～1,000,000	24
5	**ORG PRESET DATA**	Coordinate value after return to origin	-16,777,215 ～+16,777,215	0
6	**PM PRESCALER**	(Pre-scaler setting)	0～16,777,215	0
7	**Backlash PULSE**	Backlash correction Pulse number	0～16,777,215	0
8	**BK N:0 CW:1 CCW:2**	Backlash correction 0: Invalid 1: CW direction 2: CCW direction	0～4	0
9	**ORG Type 1-14**	Selection of method for return to origin	1～14	3
10	**PLS CAL DIV 1/N**	Angle conversion Denominator	0～16,777,215	1
11	**PLS CAL DIV N/1**	Angle conversion Numerator	1～16,777,215	1
12	**PLS RND 0-9**	Angle conversion Designating rounding	0～9	1
13	**Stop EMG:0 SLW: 1**	Limit stop method (This function is optional.) 0: Emergency 1: Deceleration	0,1	0
14	**OFFSET_DATA**	Offset	-16,777,215 ～+16,777,215	0
15	**PM ROTATE CHANGE**	Change of rotating direction	0,1	0
16	**CWL NON:0 INV:1**	CW limiter signal logic	0,1	0
17	**CCWL NON:0 INV: 1**	CCW limiter signal logic	0,1	0
18	**NORG NON:0 INV:1**	NORG sensor signal logic	0,1	0
19	**ORG NON:0 INV:1**	ORG sensor signal logic	0,1	0
20	**LMT SWAP N:0 Y:1**	CCW limiter	0,1	0
21	**C OFF ON:0 OFF:1**	Motor excitation 0: Excitation ON 1: Excitation OFF	0,1	0
22	**ACC CURVE 1-5**	Selection of motor drive method 1: Rectangular drive 2: Trapezoidal drive 3: Asymmetric trapezoidal drive 4: S-shaped drive 5: Asymmetric S-shaped drive	1～5	2
23	**CONSTANT PULSE**			0
24	**ENC CAL DIV 1/N**	Output pulse Angle conversion Denominator	1～16,777,215	1
25	**ENC CAL DIV N/1**	Output pulse Angle conversion Numerator	1～16,777,215	1
26	**ENC MULTIPLI 1-4**	Multiplication settings 1:1 multiplication 2:2 multiplication 4:4 multiplication	1,2,4	1
27	**ENC Permissible**	0 clear position when using the multi-rotation table	0～16,777,215	0
28	**ENC Round Off 0-9**	Encoder Angle conversion Designating rounding	0～9	1
29	**FEEDBACK TYPE 0-2**	Encoder correction settings 0: Not correct 1: Correct (only in positioning) 2: Correct (constant)	0～2	0
30	**PERMIT RANGE PULS**	Encoder correction Permissible range (Pulse)	1～±10,000	1
31	**Retry Count**	Encoder correction Retry number (times)	1～10,000	100
32	**Wait Time(1ms)**	Encoder correction Wait time (mS)	1～10,000	100
33	**ENC ROTATE CHANGE**	Encoder addition direction	0,1	0
34	**PM&ENC SYNC WRITE**	Encoder coordinate synchronization	0,1	0

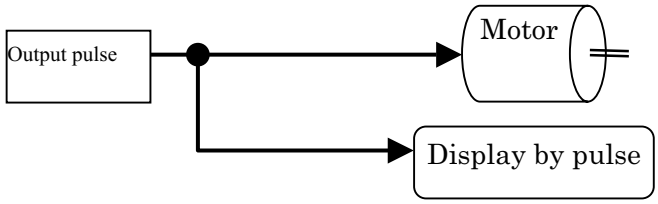
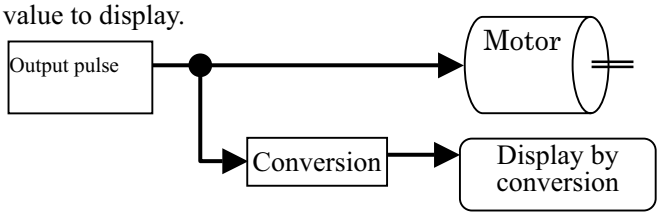
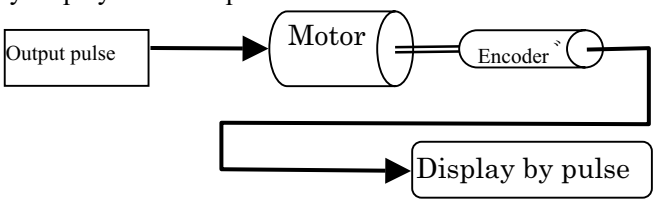
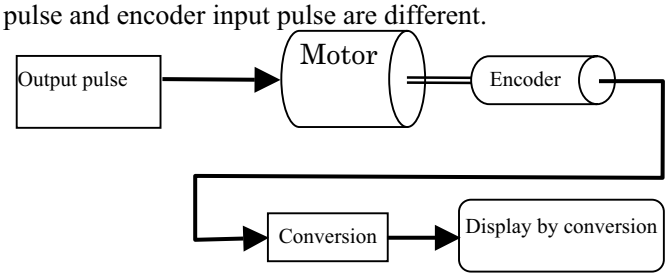
No.	Display	Function	Setting range	Initial value
35	**SPD Table 1-300**	Speed table multiple setting	1～300	1
36	**Exec=1 : Pass=0**	Initialization of system	0,1	0
37	**P=0 :R=1 :P&R=2**	Selection of joystick 0: On main body side 1: External 2: Possible on both sides	0～2	0
38	**Axis_No Select**	LCD panel Axis No. displayed on second line	1,2	1
39	**Sor PMC=0:ENC=1**	Selection of display (Second line) 0: Pulse display 1: Encoder display	0,1	0
40	**Hi Speed**	Joystick High Speed change	0～4,095,500	8,000
41	**Low Speed**	Joystick Low Speed change	0～4,095,500	200
42	**Axis_No Select**	LCD panel Axis No. displayed in second line	1～8	1
43	**Sor PMC=0:ENC=1**	Selection of display (Second line) 0: Pulse display 1: Encoder display	0,1	0
44	**Cal Pls=0:Cal=1**	Selection of conversion display (Second line) 0: Non conversion display 1: Angle conversion display	0,1	0
45	**Axis_No Select**	LCD panel Axis No. displayed on third line	1～8	2
46	**Sor PMC=0:ENC=1**	Selection of display (Third line) 0: Pulse display 1: Encoder display	0,1	0
47	**Cal Pls=0:Cal=1**	Selection of conversion display (Third line) 0: Non conversion display 1: Angle conversion display	0,1	0

SYS in accordance with version (Ver. 0.994) or later.

5-9. Display of Position

5-9-1. Type of Display

In this device, the following 4 method types can be selected for position numerical display. Change in display is carried out by the system settings of manual operations. (→ "5-8. System Settings")

① Display by pulse SYS settings No.43 ←0 (No.1 axis) No.46 ←0 (No.2 axis)	Directly displays the same value as the pulse number outputted to the motor. 
② Display by conversion value SYS settings No.44 ←1 (No.1 axis) No.47 ←1 (No.2 axis)	Converts the pulse number into an actual distance or angle by the set conversion value to display. 
③ Display by encoder input SYS settings No.43 ←1 (No.1 axis) No.46 ←1 (No.2 axis)	Directly displays the read pulse number from the connected encoder. 
④ Display by encoder conversion SYS settings No.43 ←1 (No.1 axis) No.44 ←1 No.46 ←1 (No.2 axis) No.47 ←1	・ Converts the pulse from the connected encoder into an actual distance and angle with the set conversion value to display. ・ Or, converts and displays the value of the position if ratios of output pulse and encoder input pulse are different. 

【Reference】

"5-8. System Settings"

6. Remote Control

6-1. Remote Control

6-1-1. Transmission and Reception

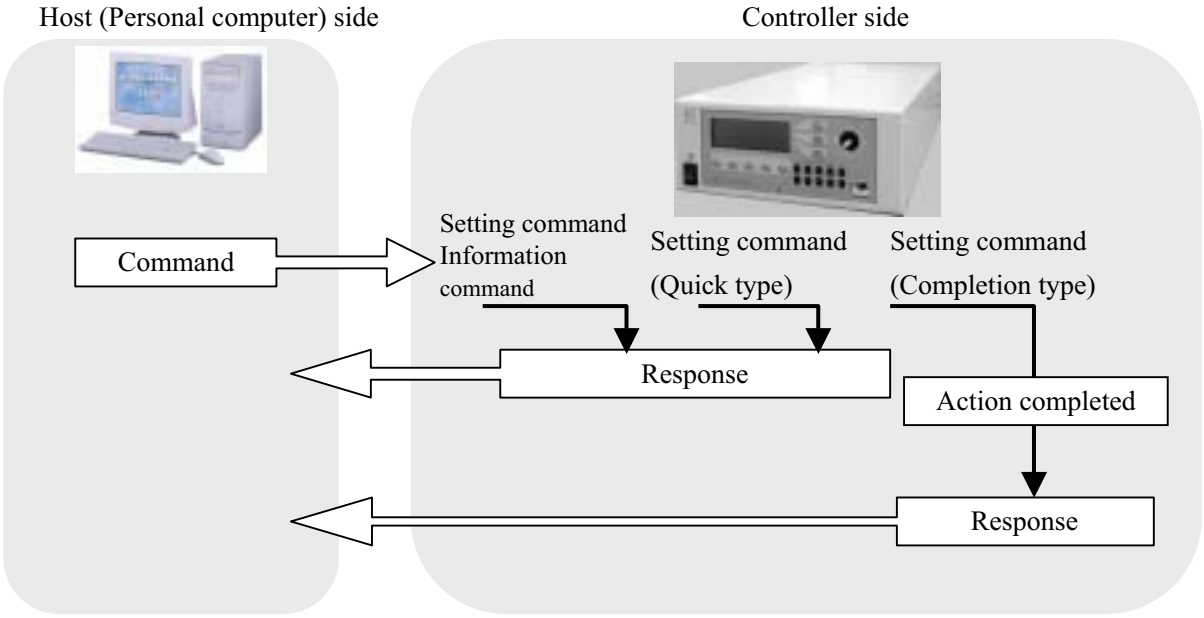
The controller returns one Response for one command.
The Response timing varies according to the type of command or selection of Response method.

① **Setting Command** Commands such as MPC and ASI immediately return a Response.

② **Drive Command** For drive-related commands, two types of Response methods can be selected. (in RS-232C communications)

1. Returns a Response after completion of operations. (Completion mode)
2. Returns a Response immediately after receipt of the command, and confirms completion of operations by the STA command (Status Check). (Quick mode)

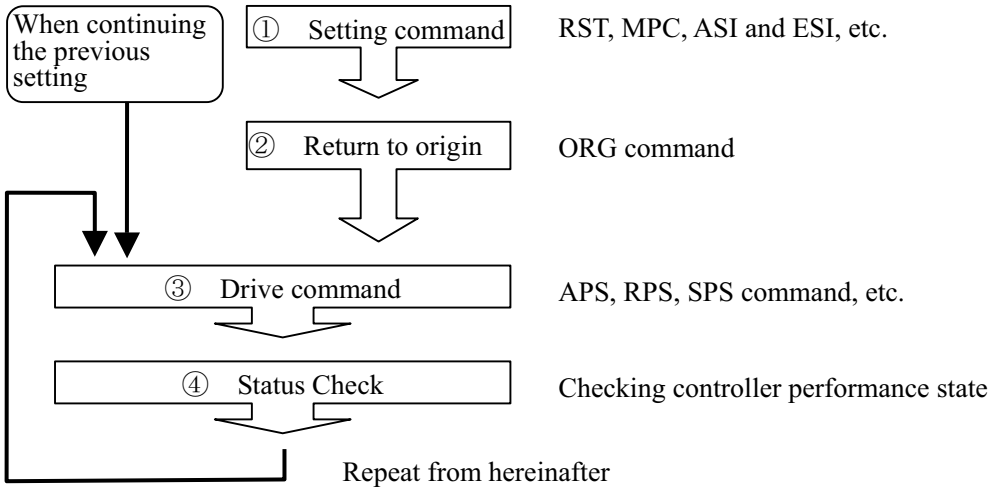
③ **Information Request Command** This command returns requested data.



All Responses in GP-IB communications are of quick mode.

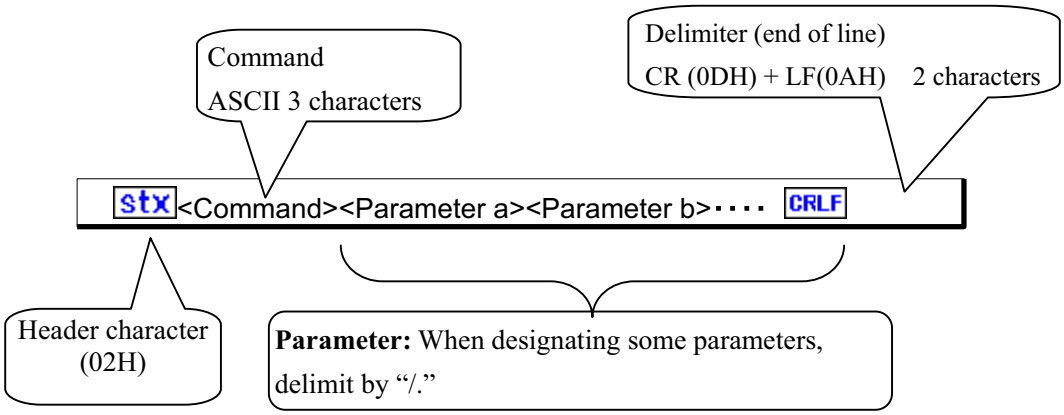
6-1-2. Remote Control Procedures

When using for the first time and using after a change in the setting, it is required to start from the command setting at the beginning of remote control procedures.



6-1-3. Command Format

One command consists of a header character (STX) and command, parameters, and delimiter (CRLF).



【Example】 Present position writing command: When setting the second axis to 1000

Sequence	1	2	3	4	5	6	7	8	9	10	11、12
Command	stx	W	R	P	2	/	1	0	0	0	CRLF
Hexadecimal	02	57	52	50	32	2F	31	30	30	30	0D,0A

Characters which can be used in the command are numerical values (0 to 9), uppercase letters (A to Z), code (+, -) and symbol (/, ?).

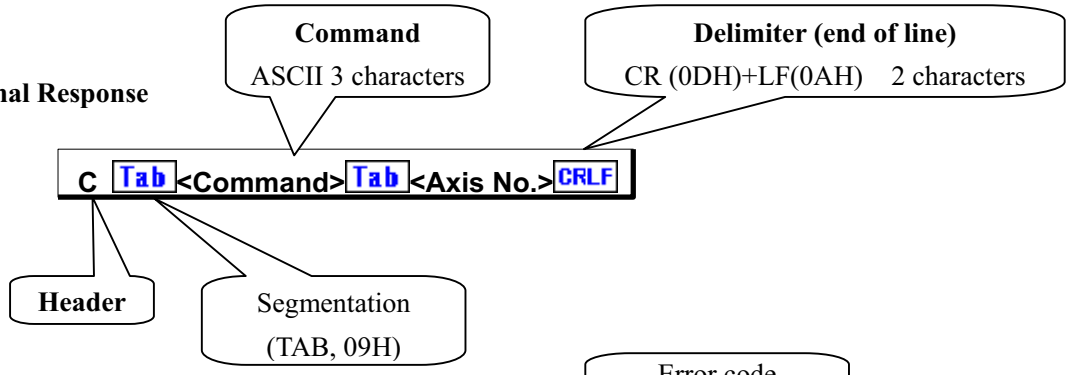
Space (20H) cannot be used in the command.

Parameter is required, which cannot be omitted.

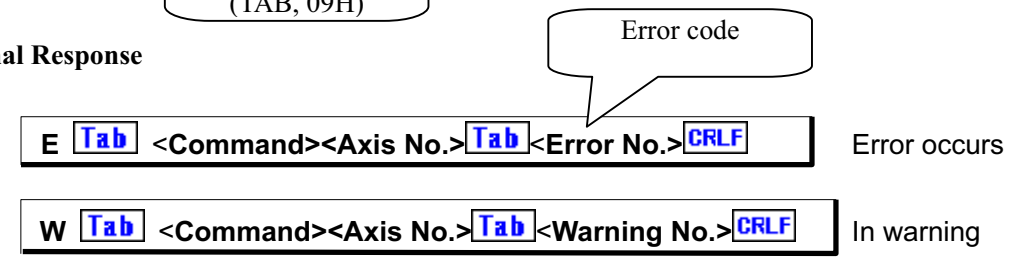
6-1-4. Response

Format for Response is as follows. When an abnormality occurs, abnormal Response is returned. The Response varies depending on each command, therefore, refer to the detailed page for each command.

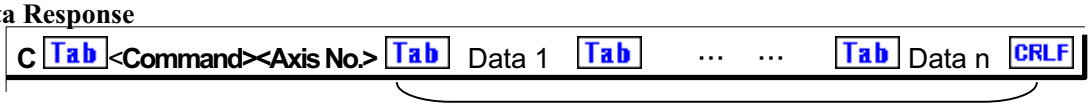
① **Normal Response**



② **Abnormal Response**



③ **Data Response**



In a case where a plurality of these characters exist, these are segmented by TAB and sent.

6-1-5. Characters Used

Characters described in the table below are characters which can be used in communications.

	0*	1*	2*	3*	4*	5*	6*	7*	8* – F*
*0	×	×	×	**0**	×	**P**	×	×	×
*1	×	×	×	**1**	**A**	**Q**	×	×	×
*2	stx	×	×	**2**	**B**	**R**	×	×	×
*3	×	×	×	**3**	**C**	**S**	×	×	×
*4	×	×	×	**4**	**D**	**T**	×	×	×
*5	×	×	×	**5**	**E**	**U**	×	×	×
*6	×	×	×	**6**	**F**	**V**	×	×	×
*7	×	×	×	**7**	**G**	**W**	×	×	×
*8	×	×	×	**8**	**H**	**X**	×	×	×
*9	Tab	×	×	**9**	**I**	**Y**	×	×	×
*A	LF	×	×	×	**J**	**Z**	×	×	×
*B	×	×	**+**	×	**K**	×	×	×	×
*C	CR	×	×	×	**L**	×	×	×	×
*D	×	×	**-**	×	**M**	×	×	×	×
*E	×	×	**.**	×	**N**	×	×	×	×
*F	×	×	**/**	**?**	**O**	×	×	×	×

Low-case letters (a to z) cannot be used.

6-2. List of Command

Commands which can be used in the SC Series are as in the table below. For details, refer to the pages for respective commands.

Command			Applicable model SC-			Page
Type	Description	Function	200	400	800	
Settings	**RST**	System reset	○	○	○	68
	MPC	Motor-related Polarity change	○	○	○	57
	ASI	Motor-related Initial settings (Designates acceleration and deceleration by time)	○	○	○	48
	MSI	Motor-related Initial settings (Designates acceleration and deceleration with STEP)	○	○	○	48
	ESI	Encoder settings	○	○	○	54
	LNK	Electronic synchronizing proportional drive	2 axes	3 axes	3 axes	56
	DSP	Display switching	○	○	○	53
Drive	**ORG**	Origin search	○	○	○	59
	APS	Absolute position Drive	○	○	○	47
	RPS	Relative position Drive	○	○	○	67
	SPS	Linear interpose Drive	○	○		72
	MPS	Multi axis simultaneous Drive	2 axes	4 axes	4 axes	58
	OSC	Repetition (oscillation) Drive	○	○	○	60
	FRP	Continuous Rotation	○	○	○	55
	STP	Stop	○	○	○	70
	COF	ON/OFF for excitation	○	○	○	52
Coordinate	**RDP**	Position read	○	○	○	63
	WRP	Position write	○	○	○	75
	RDE	Encoder read	○	○	○	61
	WRE	Encoder write	○	○	○	74
	RDO	Offset read (Optical offset)	○	○	○	62
	WRO	Offset write (Optical offset)	○	○	○	74
Information	**STR**	Status read	○	○	○	71
	RSY	System setting information read	○	○	○	68
	RMS	Motor setting information read	○	○	○	66
	RMP	MPC polarity setting information read	○	○	○	65
	RES	ESI encoder setting information read	○	○	○	64
	IDN	Version read	○	○	○	55
Speed Table	**WTB**	Speed table settings	○	○	○	76
	RTB	Speed table reference	○	○	○	69
Teaching	**TAS**	Teaching axis setting	2 axes	3 axes	3 axes	77
	TMS	Teaching coordinate setting	2 axes	3 axes	3 axes	78
	RDT	Teaching coordinate read (for edition)	2 axes	3 axes	3 axes	80
	WRT	Teaching coordinate write (for edition)	2 axes	3 axes	3 axes	80
	TPS	Teaching drive execution	2 axes	3 axes	3 axes	79

Commands in this table are in accordance with the version (Ver. 0.99) as of October 2002 or later.

Commands which can be used in the SC Series are as in the table below. For details, refer to the pages for respective commands.

Command			Applicable model SC-			Page
Type	Description	Function	200	400	800	
Easy control (Internal setting dependence)	**PMS**	Speed setting	○	○	○	81
	PMP	Relative position movement	○	○	○	81
	PMA	Absolute position movement	○	○	○	82
	PMH	Origin search	○	○	○	82
Measurement	**SCN**	Continuous SCAN (Movement & scaler read)	○	○	○	83
	RBU	Data read for continuous SCAN	○	○	○	85
	SFT	FT method (Time fixed, Count value measurement)	○	○	○	87
Drive aid	**RCP**	Constant pulse read	○	○	○	88
	WCP	Constant pulse write	○	○	○	88

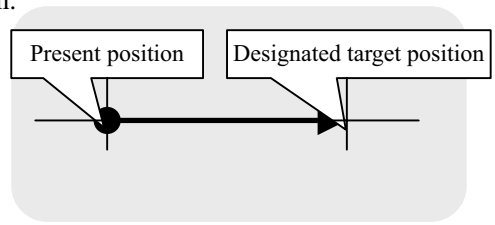
Commands in this table are in accordance with the version (Ver. 0.99) as of October 2002 or later.

6-3. Details of Command

Details of each command are described below in alphabetical order.

APS — *Absolute Position Drive* — SC-200 SC-400 SC-800

【Function】 Moves to a target position by controlling absolute position.



【Format】 stx **APSa/b/c/d/e/f/g/h** CRLF

Parameter = 8

Space between characters cannot be used.
Each parameter cannot be omitted.
For SC-800 control, the axis number of synchronous motion is 4.

Command parameters

	Function	Setting	Remarks
a	Designating axis	1 ~ 8	Varies according to model
b	Accelerating and decelerating mode	1: Rectangular drive 2: Trapezoidal drive 3: Asymmetric trapezoidal drive 4: S-shaped drive 5: Asymmetric S-shaped drive	
c	Synchronizing mode	0: Invalid 1: Valid	Refer to LNK command.
d	Selection of speed table	0 ~ 9	
e	Moving target position	-68,108,813 ~ 68,108,813	
f	Backlash correction	0: Invalid 1: CW direction1 2: CCW direction1 3: CW direction2 4: CCW direction2	Refer to ASI command
g	Encoder correction	0: Invalid 1: Valid 2: Continue	Refer to ESI command
h	Response method	0: Completed 1: Quick	* 1 → Refer

【Response】 Returns status information. * Return timing varies depending on the Response method.

Status	Response data
Normal	C Tab APS< Axis No.> CRLF
Abnormal	W Tab APS< Axis No.> Tab <Warning No.> CRLF
	E Tab APS< Axis No.> Tab <Error No.> CRLF

For <Error No.> and <Warning No.>, refer to the "6-4. Error Code."

【Example】

1. Moves No. 1 axis to a position of 10000 with trapezoidal drive.
   stx **APS1/2/0/0/10000/0/0/0** CRLF
2. Moves No. 2 axis to a position of -2000 with rectangular drive of speed 5 (Table No.).
   stx **APS2/1/0/5/-2000/0/0/0** CRLF

【Remarks】

- Carries out stop during driving with stop command. → Refer to STP command.

(Note) When the Response method is 0: standard, no Response is returned if stopped by the STP command.

* 1. When controlling by GPIB, operations are constantly carried out as "1: Quick" regardless of settings.

ASI MSI	*Motor Related Initial Setting*	SC-200 SC-400 SC-800

【Function】 Performs various settings to drive motor. For parameter details, refer to the next page and thereafter.
ASI = (Sets acceleration and deceleration by time) MSI = (Sets acceleration and deceleration with STEP)

【Format】 stx **ASIa/b/c/d/e/f/g/h/i/j/k/l/m/n** CRLF Parameter = 14

【Format】 stx **MSIa/b/c/d/e/f/g/h/i/j/k/l/m/n** CRLF Parameter = 14

Space between characters cannot be used. Each parameter cannot be omitted.

Command parameters

Function		Setting	Remark	SYS
a	Axis No.	1 ~ 8	Varies according to model	–
b	Start speed	1 ~ 4,095,500 PPS	* Effective when designating speed Table No. 0 (Refer to "3-1. Speed Setting")	1
c	Maximum speed	1 ~ 4,095,500 PPS		2
d	Accelerating time (ASI) Accelerating STEP (MSI)	1 ~ 1,000,000 ×0.01second 1 ~ 1,000,000 STEP		3
e	Decelerating time (ASI) Decelerating STEP (MSI)	1 ~ 1,000,000 ×0.01second 1 ~ 1,000,000 STEP		4
f	Position after detecting origin	-16,777,215 ~ 16,777,215		5
g	Prescale	0 ~ 16,777,215 pulse		6
h	Backlash correction	0 ~ 16,777,215 pulse		7
i	Angle conversion Denominator	0 ~ 16,777,215		10
j	Angle conversion Numerator	1 ~ 16,777,215		11
k	(Conversion: Trigonometric function)	0	Fixed to 0 * Option	–
l	(Conversion: Distance from center)	0	Fixed to 0 * Option	–
m	Designating rounding converted value	0 ~ 9		12
n	Stop method when detecting limit	0: Emergency stop (1: Decelerating stop)	* Fixed to 0 in case of standard specifications	13

* SYS in the above table is the SYS setting No. during manual operations. Refer to "5-8. System Settings."

【Response】 Returns status information. * Returns immediately after receiving the command.

Status	Response data
Normal	C Tab ASI <Axis No.> CRLF
	C Tab ASI <Axis No.> CRLF
Abnormal	E Tab ASI <Axis No.> Tab <Error No.> CRLF
	E Tab ASI <Axis No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Example】 When setting the same value as the default value on the No.2 axis, details of the parameter are as follows.

stx**ASI2/500/5000/24/24/0/0/0/1/1/0/0/0/0**CRLF

stx**ASI2/500/5000/658/658/0/0/0/1/1/0/0/0/0**CRLF

【Remarks】

- Note that if the stop method during limit detection is set to "1: Deceleration," the moving end limit is exceeded if the decelerating time is long, whereby mechanical damage may occur. (Standard specification is fixedly set to "0: Emergency stop.")

- Details that has been set is stored in the backup memory.
- When settings of the same item are changed by manual operation after setting by remote control, the details of the setting by manual operation is stored.

【Caution】

- Please note that a maximum speed up to 4,095,500PPS can be outputted, however, this does not mean that the motor and stage actually operate at that speed.
- Speed and other settings cannot be changed during driving.

■ASI Command : Details of Parameter

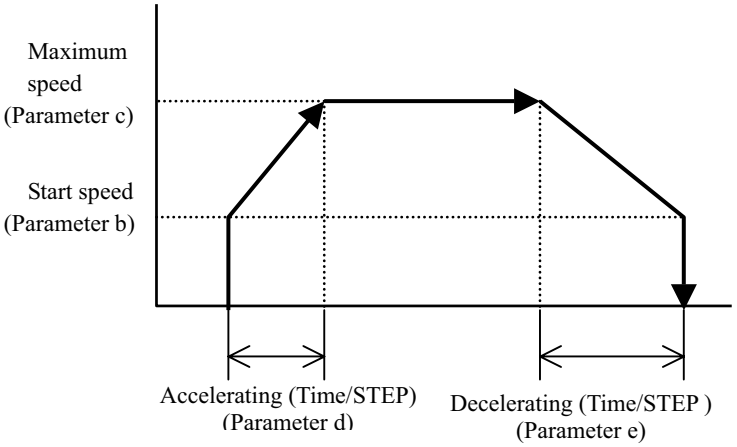
b **Start Speed**

c **Maximum Speed**

d **Accelerating Time/ Accelerating STEP**

e **Decelerating Time/ Decelerating STEP**

Sets the start speed, maximum speed, accelerating time and decelerating time. Relationships among them are as in the figure on the right.

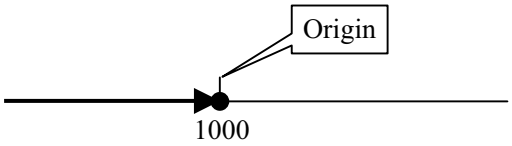


This setting becomes effective when designating the Speed Table No. 0. In a case where designating the Speed Table Nos. 1 – 9, speed is driven with each table setting value.

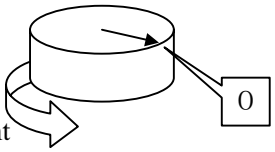
f **Position After Detecting Origin**

Sets coordinate value (pulse amount) after origin detection (ORG) completed.

(Example) When f=1000 was set, coordinate value of origin position becomes 1000 after returning to origin completed.

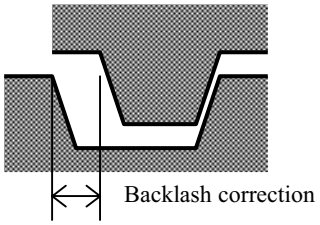


g Pre-Scale



When the set coordinate value is reached, it is automatically reset to 0.
This is used when returning to the original position by the rotating movement such as the rotating stage.

h Backlash Correction Pulse Number



Corrects backlash generated by gear mechanism.

Implementation of backlash correction is set by a moving command (such as APS and RPS).

【Reference】Selection of backlash correction method.

Backlash correction method is selected from the following methods in implementation.

Setting	Details
0	Backlash correction invalid
1	During inversion from the CW direction to CCW direction, reciprocating movement by correcting pulse amount is performed before moving.
2	During inversion from the CCW direction to CW direction, reciprocating movement by correcting pulse amount is performed before moving.
3	During inversion from the CW direction to CCW direction, reciprocating movement by correcting pulse amount is performed after moving.
4	During inversion from the CCW direction to CW direction, reciprocating movement by correcting pulse amount is performed after moving.

i J Angle Conversion Numerator and Denominator

Defines a ratio between the actual output pulse number of the motor and the coordinate display value or encoder input value.

【Function】

- Conversion of angle display, or when designating angle with RDP (position read) command.
- Sets resolution when supplementing encoder.

k l Trigonometric Function and Distance From Center

This function is not equipped with the standard-spec products. Normally set this function to 0.

m Angle Conversion Value Designating Digit to be Rounded off

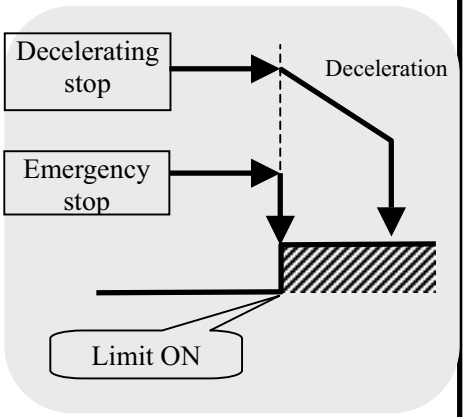
When using the angle conversion function, designates the digit of conversion data to be rounded off.

n Stop Method When Detecting Limit

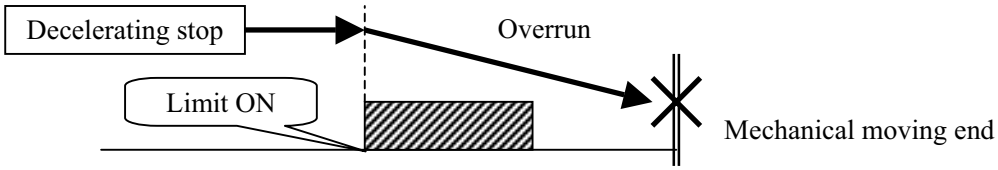
Defines the stop method when detecting the limit sensor at the moving end.

The following are the two methods.

Setting	Stop method	
0	Emergency stop	Immediately stops at the limit detected position.
1	Decelerating stop	Decelerates and stops. The decelerating time is the same as that of the decelerating setting in normal drive.



In decelerating stop setting, attention must be paid because if the decelerating time is set to be long, the amount of overrun becomes large and a mechanical failure such as bumping to the moving end occurs.



With standard specifications, in order to eliminate the above trouble, “0: Emergency stop” becomes a fixed setting. If you would like to use in “1: Decelerating stop,” contact us for how to make a change in setting since a change can be made with internal setting.

COF *ON/OFF for excitation* SC-200 SC-400 SC-800

【Function】Switches ON/OFF for motor output current.

【Format】

STX COFa/b CRLF Parameter = 2

Space between characters cannot be used. Each parameter cannot be omitted.

COF command parameters

Function		Setting	Remark
a	Axis designation	1 ~ 8	Varies according to model
b	Excitation output switching	0, 1	0: Excitation ON 1: Excitation OFF

【Response】Returns status information. * Returns immediately after receiving the command.

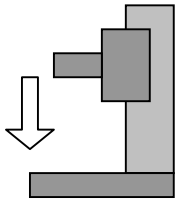
Status	Response data
Normal	C Tab COF<Axis name> CRLF
Abnormal	E Tab COF<Axis name> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Example】

Error occurs if transmitting the drive-related command in a state of excitation OFF. (Error code No.308)

When using it for the Z axis, pay attention because falling off may occur when turning excitation OFF.

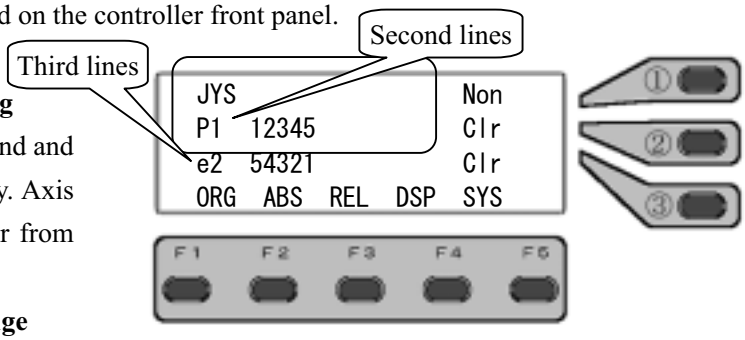


When turning excitation OFF, the position may deviate because the motor becomes free. It is recommended to carry out origin return operations again after turning excitation ON.

When turning off the power of the controller in the excitation OFF state and turning on the power again, the controller starts up in the excitation ON state.

DSP *Display Switching* SC-200 SC-400 SC-800

【Function】 Switches description displayed on the controller front panel.



Function 1. Displayed axis No. switching

Switches axis No. displayed on the second and third lines from the liquid crystal display. Axis No. is displayed at the second character from the left.

Function 2. Pulse/Encoder display change

Switches pulse value display and encoder counter value display. In the case of pulse display, "P" or "p" is displayed for the first character from the right, and in the case of encoder display, "E" or "e" is displayed.

Function 3. Conversion value, Non conversion value switching

Determines whether pulse and respective encoder counter values are directly displayed or conversion-displayed by the set coefficient. Panel displays are distinguished by upper and lower case characters such as "P" and "p."

Meaning of displayed characters

P	Pulse display value (Non conversion value)	**E**	Encoder count value (Non conversion value)
p	Pulse display value (Conversion value)	**e**	Encoder count value (Conversion value)

【Format】

stx **DSPa/b/c** CRLF Parameter = 3

Space between characters cannot be used. Each parameter cannot be omitted.

DSP command parameters * SYS is the SYS setting No. during manual operations.

Function		Setting	Remarks	SYS
a	Designating display line	1, 2	1: Second line 2: Third line	—
b	Axis No.	1 ~ 8	Varies according to model	42,45
c	Selection of method	0, 1, 2, 3, 4	0: Pulse display (Non conversion) 1: Encoder value (Non conversion value) 3: Pulse value (Conversion value) 4: Encoder value (Conversion value)	43,44 46,47

【Response】 Returns status information. * Returns immediately after receiving the command.

Status	Response data
Normal	C Tab DSP <Line No.> CRLF
Abnormal	E Tab DSP <Line No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Reference】 Pulse conversion setting (System setting = No. 10 and 11), Encoder conversion setting (System setting = No. 24 and 25)

【Remarks】

- Details that has been set is stored in the backup memory.
- When settings of the same item are changed by manual operation after setting by remote control, the details of the setting by manual operation is stored.

ESI *Encoder Initial Setting* SC-200 SC-400 SC-800

【Function】 Performs initial setting when using the encoder.

Function 1. When reading a value of the encoder and only displaying → Setting of format ①

Function 2. When performing feedback control (supplement) with position data of encoder → Setting of format ②

【Format】

Parameter

① stx **ESIa/b/c/d/e/f/g** CRLF ····· Reading out encoder value = 7

② stx **ESIa/b/c/d/e/f/g/h/i/j/k** CRLF ····· When supplementing encoder = 11

Space between characters cannot be used. Each parameter cannot be omitted.

ESI command parameters

Function		Setting	Remarks	SYS
a	Designating encoder axis	1 ~ 8	Varies according to model	-
b	N.C	0	Fixed to 0	-
c	Resolution conversion Denominator	1 ~ 16,777,215		24
d	Resolution conversion Numerator	1 ~ 16,777,215		25
e	Pre-scale	0 ~ 16,777,215		27
f	Multiplication	1, 2, 4-fold		26
g	Encoder polarity change	0: Normal 1: Reverse		33
h	Retry number	1 ~ 10,000 times		31
i	Permissible stop range	0 ~ ±10,000 pulses	Encoder input pulse	30
j	Waiting time	1 ~ 10,000 x 10mSec		32
k	Conversion designating rounding	0 ~ 9 digits	→ Refer to RDE command	28

* SYS in the above table is the SYS setting No. during manual operations. Refer to "5-8. System Setting."

【Response】 Returns status information. * Returns immediately after receiving the command.

Status	Response data
Normal	C Tab ESI<Encoder No.> CRLF
Abnormal	E Tab ESI<Encoder No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Remarks】

If this command is issued, the present encoder data becomes invalid.

- Details that has been set is stored in the backup memory.
- When settings of the same item are changed by manual operation after setting by remote control, the details of the setting by manual operation is stored.

FRP *Continuous Rotation* SC-200 SC-400 SC-800

【Function】 Continuous operation is carried out until Stop command (STP) is issued.

【Format】 stx FRPa/b/c/d/e/f CRLF Parameter = 6

Space between characters cannot be used.
Each parameter cannot be omitted.
For SC-800 control, the axis number of synchronous motion is 4.

Command parameters

Function		Setting	Remarks
a	Designating axis	1 – 8	Varies according to model
b	Accelerating and decelerating mode	1: Rectangular drive 2: Trapezoidal drive 3: Asymmetric trapezoidal drive 4: S-shaped drive 5: Asymmetric S-shaped drive	
c	Synchronizing mode	0: Invalid 1: Valid	Refer to LNK command.
d	Selection of speed table	0 ~ 9	
e	Rotational direction	1: CW direction 0: CCW direction	
f	Response method	0: Completed 1: Quick	* 1

【Response】 Returns status information. * Return timing varies depending on the Response method.

Status	Response data
Normal	C Tab APS< Axis No.> CRLF
Abnormal	W Tab APS< Axis No.> Tab <Warning No.> CRLF
	E Tab APS< Axis No.> Tab <Error No.> CRLF

For <Error No.> and <Warning No.>, refer to the "6-4. Error Code."

【Example】

1. Continuously rotates the No. 1 axis in the CW direction by trapezoidal drive.

stx FRP1/2/0/0/1/0 CRLF

【Remarks】

- Carries out stop during driving with stop command. → Refer to STP command.

(Note) The Response method is processed by quick setting.

* 1. When controlling by GPIB, operations are constantly carried out as "1: Quick" regardless of settings.

IDN *Version Read* SC-200 SC-400 SC-800

【Function】 Responds with the model name of the controller body and the version of the system program.

【Format】 stx IDN CRLF Parameter = 0

【Response】 C Tab IDN0 Tab <Model name> Tab <Version> CRLF

【Example of Response】 C Tab IDN0 Tab 200 Tab 1000 CRLF "SC-200 Ver1.000"

【Example of Response】 C Tab IDN0 Tab 400 Tab 1000 CRLF "SC-400 Ver1.000"

【Example of Response】 C Tab IDN0 Tab 800 Tab 1000 CRLF "SC-800 Ver1.000"

LNK	*Electric coupling ratio settings*	SC-200 SC-400 SC-800

【Functions】 Sets ratio of electronic coupling.

【Format】**Master+ Slave 1** stx **LNKa/b/c** CRLF Parameter = 3

【Format】**Master+ Slave 1+ Slave 2** stx **LNKa/b/c/d/e** CRLF Parameter = 5

⚠ Space between characters cannot be used. Each parameter cannot be omitted.

Parameters

Function		Settings	Remarks
a	Master axis designation	1 ~ 8	Varies according to model
b	Slave 1 axis designation	1 ~ 8	Varies according to model
c	Slave 1 ratio	1 ~ 256	
d	Slave 2 axes designation	1 ~ 8	Varies according to model
g	Slave 2 ratio	1 ~ 256	

【Response】Returns status information. * Return timing depends on Response method.

Status	Response Data
Normal	C Tab LNK <Axis No.> CRLF
Abnormal	E Tab LNK <Axis No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

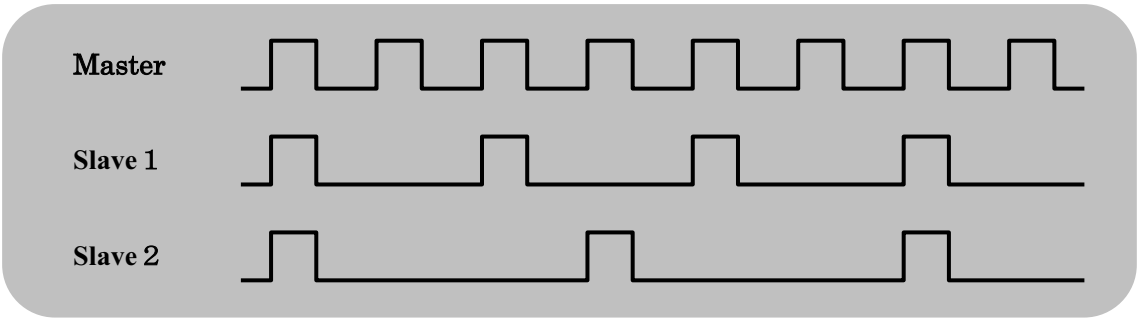
【Example】

Sets No. 1 ratio on Master axis, No. 2 ratio 2 on Slave 1 axis, and No. 3 ratio 3 on Slave 2 axes.

stx **LNK1/2/2/3/3** CRLF

Moves No. 1 axis to the position of 10000 in synchronization mode by trapezoidal drive. (Synchronization mode 1 : Valid)

stx **APS1/2/1/0/10000/0/0** CRLF



【Remarks】

- Details that has been set is stored in the backup memory.

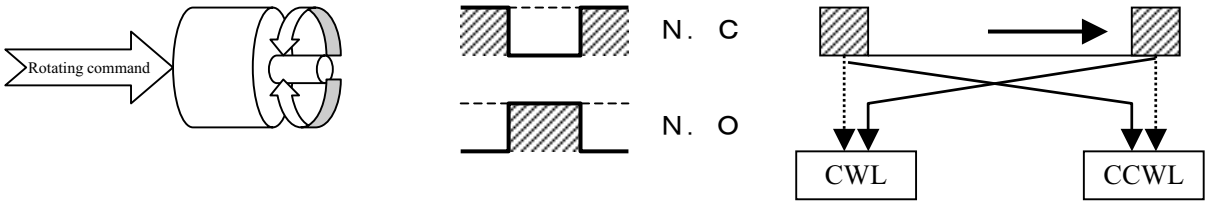
MPC *Motor Related Polarity Change* SC-200 SC-400 SC-800

【Function】Changes and sets input logic of each sensor such as rotating direction of the motor, limit and origin.

① Motor rotating direction
Sets actual rotating direction to rotating command.

② Sensor input logic
Sets logic (N.C, N.O) in agreement with the connected sensor.

③ CW, CCW swap
Electrically switches effective limit sensor for moving direction.



【Format】 stx **MPCa/b/c/d/e/f/g** CRLF Parameter = 7

Space between characters cannot be used. Each parameter cannot be omitted.

Parameters

Function		Setting range	Remark
a	Designating axis	1 ~ 8	Varies according to model
b	Motor rotating direction	0: Forward rotation 1: Reverse rotation	
c	CW limit sensor	0: Positive 1: Negative	
d	CCW limit sensor	0: Positive 1: Negative	
e	NORG sensor	0: Positive 1: Negative	
f	ORG sensor	0: Positive 1: Negative	
g	CW, CCW swap	0: Positive 1: Negative	

【Response】Returns status information. * Return timing depends on Response method.

Status	Response data
Normal	C Tab MPC <Axis No.> CRLF
Abnormal	E Tab MPC <Axis No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Related】

RMP command MPC setting information read (Refer to page 65)

【Remarks】

- Details that has been set is stored in the backup memory.
- When settings of the same item are changed by manual operation after setting by remote control, the details of the setting by manual operation is stored.

MPS *Multi Axis Simultaneous Drive* SC-200 SC-400 SC-800

【Function】Performs simultaneous drive of No.2 to No.4 axes.

【Explanation】 In general, periods of time required for movement differ and loci are depicted as shown by the broken line as in the right handed figure, if the moving distance and moving speed differ from each other in the 2 axes simultaneous drive. However, if the linear interpolation (SPS) command is designated, the speeds of the respective axes are automatically calculated.

【Format】

①Designating 2 axes	stx **MPSa/b/c/d/i** CRLF	Parameter = 5
①Designating 3 axes	stx **MPSa/b/c/d/e/f/i** CRLF	Parameter = 7
①Designating 4 axes	stx **MPSa/b/c/d/e/f/g/h/i** CRLF	Parameter = 9

Space between characters cannot be used. Each parameter cannot be omitted.
Designating 3 and 4 axes cannot be carried out in SC-200.
For SC-800 control, the axis number of synchronous motion is 4.

Command parameters

Function		Setting	Remarks
a	No. 1 axis designation	1 ~ 8	Varies according to model
b	No. 1 axis target position	-68,108,813 ~ 68,108,813	
c	No. 2 axis designation	1 ~ 8	Varies according to model
d	No. 2 axis target position	-68,108,813 ~ 68,108,813	
e	No. 3 axis designation	1 ~ 8	Varies according to model
f	No. 3 axis target position	-68,108,813 ~ 68,108,813	
g	No. 4 axis designation	1 ~ 8	Varies according to model
h	No. 4 axis target position	-68,108,813 ~ 68,108,813	
i	Response method	0: Completed 1: Quick	

【Response】Returns status information. * Return timing depends on Response method.

Status	Response data
Normal	C Tab APS< No. 1 Axis No.> CRLF
Abnormal	W Tab APS< No. 1 Axis No.> Tab <Warning No.> CRLF
	E Tab APS< No. 1 Axis No.> Tab <Error No.> CRLF

For <Error No.> and <Warning No.>, refer to the "6-4. Error Code."

【Example】When simultaneously driving with MPS command for No. 1 to No. 3 axes

1. Sets the drive condition by setting the target positions of No. 1 to No. 3 axes to ?. (Type ? character)

stx **APS1/2/0/0/?/0/0/0** CRLF
stx **APS2/2/0/0/?/0/0/0** CRLF
stx **APS3/2/0/0/?/0/0/0** CRLF

2. Sets No.1 axis to the target position 1000, No.2 axis to the target position 2000, and No.1 axis to the target position 1500.

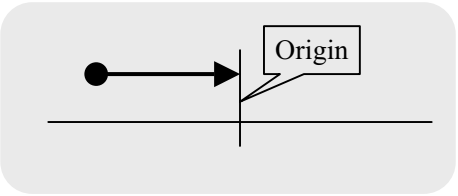
stx **MPS1/1000/2/2000/3/1500/0** CRLF

【Remarks】

・ The content set in APS ? is stored in the backup memory as MPS data.

ORG *Origin Search* SC-200 SC-400 SC-800

【Function】 Performs origin position detection according to the selected method. For return to origin, 14 methods can be selected. For details, refer to "2-3. Origin Return Method."

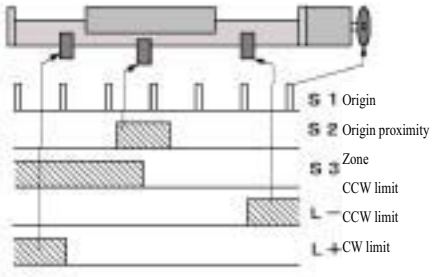


【Format】 stx **ORGa/b/c/d/e/f** CRLF Parameter = 6

⚠ Space between characters cannot be used. Each parameter cannot be omitted.
For SC-800 control, the axis number of synchronous motion is 4.

Command parameter

Function		Setting	Remark
a	Designating axis	1～8	Varies according to model
b	Accelerating and decelerating mode	1: Rectangular drive 2: Trapezoidal drive 3: Asymmetric trapezoidal drive 4: S-shaped drive 5: Asymmetric S-shaped drive	
c	(Synchronizing mode)	0	Refer to LNK command.
d	Speed table selection	0 ~ 9	
e	Origin return mode selection	1 ~ 14	→ Refer to "3-3. Origin Return Method"
f	Response method	0: Completed 1: Quick	* 1 → Refer



Sensor configuration

Method	Sensor configuration	Description
1	S1,S3	Returning direction is determined and origin is detected with zone sensor.
2	S3	Edge of the zone sensor is set to be the origin position.
3	S1,S2,L-	ORG (Origin S1) located in NORG (S2 Origin Proximity) is set to be the origin position.
4	S2,L-	One sensor located in moving zone is set to be the origin position.
5	S1,L+	Origin sensor in proximity of CW limit is set to be the origin position.
6	S1,L-	Origin sensor in proximity of CCW limit is set to be the origin position.
7	L+	Edge of CW limit is set to be the origin position.
8	L-	Edge of CCW limit is set to be the origin position.
9	S1	Only origin sensor is used.
10	None	The present position is set to be the origin position.
11	S1,L+	After the origin position is detected by method 5, and moved by the set value, this position is set to be the origin position.
12	S1,L-	After the origin position is detected by method 6, and moved by the set value, this position is set to be the origin position.
13	L+	After the origin position is detected by method 7, and moved by the set value, this position is set to be the origin position.
14	L-	After the origin position is detected by method 8, and moved by the set value, this position is set to be the origin position.

【Response】 Returns status information. * Return timing depends on Response method.

Status	Response data
Normal	**C** Tab **ORG <Axis No.>** CRLF
Abnormal	**E** Tab **ORG <Axis No.>** Tab **<Error No.>** CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Remarks】

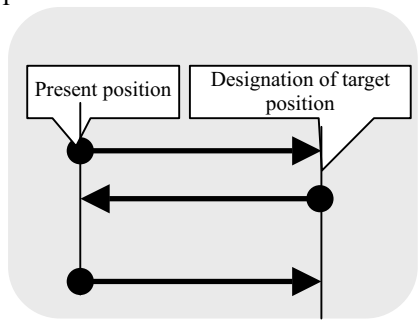
Speed setting of manual operation cannot be changed by speed setting of ORG command.

OSC *Repetition (oscillation) Drive* SC-200 SC-400 SC-800

【Function】 Oscillation moves between the present position and the target position.

【Format】 stx **APSa/b/c/d/e/f/g/h/i/j/k** CRLF

Parameter = 11



Space between characters cannot be used.
Each parameter cannot be omitted.
For SC-800 control, the axis number of synchronous motion is 4.

Command parameter

Function		Setting	Remarks
a	Designating axis	1 – 8	Varies according to model
b	Accelerating and decelerating mode	1: Rectangular drive 2: Trapezoidal drive 3: Asymmetric trapezoidal drive 4: S-shaped drive 5: Asymmetric S-shaped drive	
c	Synchronizing mode	0: Invalid 1: Valid	Refer to LNK command.
d	Selection of speed table	0 ~ 9	
e	Oscillating direction	1: CW 0: CCW	
f	Moving target position	-68,108,813 ~ 68,108,813	
g	Oscillating times	1 ~ 65,534	One reciprocation by 2 times
h	Stop time	0 ~ 65,534 ×10mSec	
i	Shutter synchronization	0: Invalid 1: Valid	Fixed to 0 * Optional function
j	Backlash correction	0: Invalid 1: CW direction1 2: CCW direction1 3: CW direction2 4: CCW direction2	→ Refer to the ASI command
k	Response method	0: Completed 1: Quick	* 1 → Refer

【Response】 Returns status information. * Return timing varies depending on the Response method.

Status	Response data
Normal	C Tab OSC <Axis No.> CRLF
Abnormal	W Tab OSC <Axis No.> Tab <Warning No.> CRLF
	E Tab OSC <Axis No.> Tab <Error No.> CRLF

For <Error No.> and <Warning No.>, refer to the "6-4. Error Code."

【Example】

1. Perform 5 reciprocations of the No. 1 axis between the present position and the position of 10000.
   (Stop time when reversing: 0.1 seconds)

   stx **OSC1/2/0/0/10000/10/100/0/0/0** CRLF

【Remarks】

- Carry out a stop during driving by the stop (STP) command. Refer to the STP command.
- When the Response method is set to be Quick, the present oscillating times can be known with the STR command.

(Note) When the Response method is 0: standard, no Response is returned if stopped by the STP command.

* 1. When controlling by GPIB, operations are constantly performed as "1: Quick" regardless of settings.

RDE	*Encoder Read*	SC-200 SC-400 SC-800

【Function】Responds with the counter value of the connected encoder input.

【Format】 stx **RDE<u>a</u>/<u>b</u>** CRLF Parameter = 2

Space between characters cannot be used. Each parameter cannot be omitted.

Command parameters

Function		Setting	Remarks
a	Designating input No.	1 ~ 8	Varies according to model
b	(Mode)	0: Pulse 1: Pulse + Offset 2: Angle conversion value 3: Angle conversion value + Offset	

【Response】Returns counter value.

Status	Response data
Normal	**C** Tab **RDE <No.>** Tab **<Counter value>** CRLF
Abnormal	**E** Tab **RDE <No.>** Tab **<Error No.>** CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Example】Reads the second encoder value.

Command: stx **RDE2/0** CRLF

↓ ↓

Response: **C** Tab **RDE2** Tab **-2000** CRLF

【Related】

ESI command Initial setting of the encoder

RDO	*Offset read*	SC-200 SC-400 SC-800

【Function】Makes a response to the present set offset.

【Format】 stx **RDOa** CRLF Parameter = 1

Space between characters cannot be used. Each parameter cannot be omitted.

Command parameters

Function		Setting	Remarks
a	Designating axis	1 ~ 8	Varies according to model

【Response】Returns an offset value.

Status	Response data
Normal	C Tab RDO<Axis No.> Tab <Offset value>CRLF
Abnormal	E Tab RDO<Axis No.> Tab <Error No.>CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Example】Reads the offset value of the first axis.

Command: stx **RDO1** CRLF

↓

Response: C Tab **RDO1** Tab **100**CRLF

RDP	*Position Read*	SC-200 SC-400 SC-800

【Function】Responds with the present position information (counter value).

【Format】 stx **RDP<u>a</u>/<u>b</u>** CRLF Parameter = 2

Space between characters cannot be used. Each parameter cannot be omitted.

Command parameters

Function		Setting	Remark
a	Designating axis	1 ~ 8	Varies according to model
b	(Mode)	0: Pulse 1: Pulse + Offset 2: Angle conversion value 3: Angle conversion value + Offset	

【Response】Returns the counter value.

Status	Response data
Normal	C Tab RDP <Axis No.> Tab <Counter value> CRLF
Abnormal	E Tab RDP <Axis No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

If encoder correction was set, Response values read and converted by the encoder.

Reference APS RPS command

【Example】Reads the second coordinate value.

Command: stx **RDP2/0** CRLF

↓ ↓

Response: **C** Tab **RDP2** Tab **123456** CRLF

RES *(ESI) Encoder Setting Information Read* SC-200 SC-400 SC-800

【Function】Responds with present encoder setting information set by ESI command.

【Format】 STX **RESa** CRLF Parameter = 1

⚠ Space between characters cannot be used. Each parameter cannot be omitted.

Command parameters

Function		Setting	Remark
a	Designating encoder axis	1 ~ 8	Varies according to model

【Response】Returns encoder setting information.

Plural parameters are returned wile being sandwiched by the Tab codes.

Status	Response Data
Normal	C Tab RES<Axis No.> Tab <Parameter b > Tab ~ Tab <Parameter k> CRLF
Abnormal	E Tab RES<Axis No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

Details of parameters

Function		Setting	Remarks
b	N.C	0	Fixed to 0
c	Resolution conversion Denominator	1 ~ 16,777,215	
d	Resolution conversion Numerator	1 ~ 16,777,215	
e	Pre-scale	0 ~ 16,777,215	
f	Multiplication	1, 2, 4 - fold	
g	Encoder polarity change	0: Normal 1: Reverse	
h	Retry number	1 ~ 10,000 times	
i	Permissible stop range	0 ~ ±10,000pulses	Encoder input pulse
j	Waiting time	1 ~ 10,000 msec	
k	Conversion Designating rounding	0 ~ 9 digits	Refer to RDE command

【Example】Reads the setting of No.2 axis.

Command: STX **RES2** CRLF

↓ ↓

Response: C Tab RES2 Tab 0 Tab 1 Tab 1 Tab 0 Tab 1 Tab 0 Tab 10 Tab 1 Tab 10 Tab 0 CRLF

【Related】

ESI Initial settings of the encoder

RMP	*MPC Motor polarity setting read*	SC-200 SC-400 SC-800

【Function】Responds with present motor related polarity setting information set by MPC command.

【Format】 stx **RMPa** CRLF Parameter = 1

Space between characters cannot be used. Each parameter cannot be omitted.

Command parameter

Function		Setting	Remark
a	Designating axis	1 ~ 8	Varies according to model

【Response】Returns motor related polarity setting information.

Plural parameters are returned wile being sandwiched by the Tab codes.

Status	Response Data
Normal	C Tab RMP<Axis No.> Tab <Parameter b> Tab ~ Tab <Parameter g> CRLF
Abnormal	E Tab RMP<Axis No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

Details of parameters

Function		Setting range	Remarks
b	Motor rotating direction	0: Forward rotation 1: Reverse rotation	
c	CW limit sensor	0: Positive 1: Negative	
d	CCW limit sensor	0: Positive 1: Negative	
e	NORG sensor	0: Positive 1: Negative	
f	ORG sensor	0: Positive 1: Negative	
g	CW, CCW swap	0: Positive 1: Negative	

【Example】Reads setting of No. 1 axis.

Command: stx RMP1 CRLF

↓ ↓

Response: C Tab RMP1 Tab 0 Tab 1 Tab 1 Tab 0 Tab 1 Tab 0 CRLF

【Related】

MPC command Motor related polarity setting

RMS — *Motor setting Information Read* — SC-200 SC-400 SC-800

【Function】 Responds with present motor related initial setting information set by ASI and MSI commands.

【Format】 stx **RMSa** CRLF Parameter =1

Space between characters cannot be used. Each parameter cannot be omitted.

Command parameter

Function		Setting	Remark
a	Designating encoder axis	1 ~ 8	Varies according to model

【Response】 Returns motor related initial setting information.

Plural parameters are returned wile being sandwiched by the Tab codes.

Status	Response Data
Normal	C Tab RMS<Axis No.> Tab <Parameter b> Tab ~ Tab <Parameter g> CRLF
Abnormal	E Tab RMS<Axis No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

Details of parameters

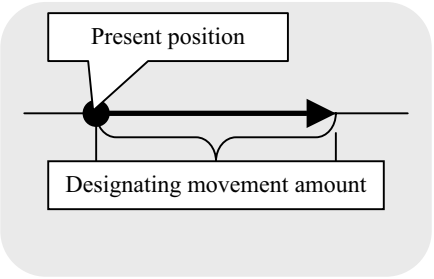
Function		Setting	Remark
b	Start speed	1 ~ 4,095,500 PPS	* Setting value of speed Table No. 0 (Refer to "2-2. Speed setting")
c	Maximum speed	1 ~ 4,095,500 PPS	
d	Accelerating pulse number	0 ~ 1,000,000 pulse	
e	Decelerating pulse number	0 ~ 1,000,000 pulse	
f	Position after detecting origin	-16,777,215 ~ 16,777,215	
g	Pre-scale	0 ~ 16,777,215 pulse	
h	Backlash correction	0 ~ 16,777,215 pulse	
i	Angle conversion Denominator	0 ~ 16,777,215	
j	Angle conversion Numerator	1 ~ 16,777,215	
k	(Conversion Trigonometric function)	0	* Option
l	(Conversion Distance from center)	0	* Option
m	Designating rounding off converted value	0 ~9	
n	Stop method when detecting limit	0: Emergency stop (1: Decelerating stop)	* Fixed to 0 for standard specification
o	Origin return mode	1 ~ 14	Returns present origin return mode.
p	Accelerating time	1 ~ 1,000,000	*10msec
q	Decelerating time	1 ~ 1,000,000	

【Related】

MPC command Motor related polarity setting

RPS *Relative Position Drive* SC-200 SC-400 SC-800

【Function】 Moves from the present position to a position by a set movement amount.



【Format】 stx **RPSa/b/c/d/e/f/g/h** CRLF

Parameter = 8

Space between characters cannot be used. Each parameter cannot be omitted.
For SC-800 control, the axis number of synchronous motion is 4.

Command parameters

Function		Setting	Remark
a	Designating axis	1 ~ 8	Varies according to model
b	Accelerating and decelerating mode	1: Rectangular drive 2: Trapezoidal drive 3: Asymmetric trapezoidal drive 4: S-shaped drive 5: Asymmetric S-shaped drive	
c	Synchronizing mode	0: Valid 1: Invalid	Refer to LNK command.
d	Selection of speed table	0 ~ 9	
e	Movement amount	-68,108,813 ~ 68,108,813	
f	Backlash correction	0: Invalid 1: CW direction1 2: CCW direction1 3: CW direction2 4: CCW direction2	→ Refer to ASI command
g	Encoder correction	0: Invalid 1:Valid 2: Continue	→ Refer to ESI command
h	Response method	0: When completed 1: Quick	* 1 → Refer

【Response】Returns status information. * Return timing depends on Response method.

Status	Response data
Normal	C Tab RPS<Axis No.>CRLF
Abnormal	W Tab RPS <Axis No.>Tab<Warning No.>CRLF
	E Tab RPS <Axis No.>Tab<Error No.>CRLF

For <Error No.> and <Warning No.>, refer to the "6-4. Error Code."

【Example】

1. Moves No. 1 axis with trapezoidal drive by 1000 pulses.
   stx **RPS1/2/0/0/1000/0/0/0** CRLF
2. Moves No. 2 axis in negative direction by 2000 pulses with rectangular drive of speed 5
   stx **RPS2/1/0/5/-2000/0/0/0** CRLF

【Remark】

- Carried out a stop during driving by the stop (STP) command. Refer to the STP command.

(Note) When the Response method is 0: standard, no Response is returned if stopped by the STP command.

* 1. When controlling by GPIB, operations are constantly performed as "1: Quick" regardless of settings.

RPS command exerts no influence on setting of relative movement (REL) in manual operation.

RST *System Reset* SC-200 SC-400 SC-800

【Function】 Resets all settings in the controller to the initial status (settings when shipping from the factory).

【Format】 stx RST CRLF Parameter = 0

⚠ Space cannot be used in the command sentence.

【Response】Returns status information.

Status	Response data
Normal	C Tab RST CRLF
Abnormal	E Tab RST Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Remark】

✎ About 60 mS is required to complete the reset (Response) after transmitting RST command.

RSY *System Setting Information Read* SC-200 SC-400 SC-800

【Function】 Reads the present set value of the system setting parameters.
For system setting, refer to the "5-8-1. List of System Settings."

【Format】 stx RSYa/b CRLF Parameter = 2

⚠ Space between characters cannot be used. Each parameter cannot be omitted.

Command parameters

Function		Setting	Remark
a	Designating axis	1 ~ 8	Varies according to model
b	System No.	1 ~ 47	

【Response】Returns set value.

Status	Response data
Normal	C Tab RSY<Axis No.> Tab <System No.> Tab <Set value> CRLF
Abnormal	E Tab RSY<Axis No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Example】

1. Check the excitation output status ON/OFF of No. 1 axis.
   stx RSY1/21 CRLF -> C Tab RSY1 Tab 21 Tab 0 CRLF ···Excitation ON
2. Check the origin return method of No. 2 axis.
   stx RSY2/9 CRLF -> C Tab RSY2 Tab 9 Tab 3 CRLF ···Setting 3

RTB *Speed Table Setting Information Read* SC-200 SC-400 SC-800

【Function】Reads the present set value in the speed table.

【Format】 stx **RTBa/b** CRLF Parameter = 2

Space between characters cannot be used. Each parameter cannot be omitted.

Command parameters

Function		Setting	Remark
a	Designating axis	1 ~ 8	Varies according to model
b	Table No.	1 ~ 11	

* Tables No. 1 to 9 are used for drive commands such as APS and RPS.
Tables No. 10 and 11 are for joystick operation speed during manual operations. No. 10 is the setting in high speed operations, and No. 11 is the setting in low speed operations.

【Response】Returns set value.

Status	Response data
Normal	C Tab RTB <Axis No.> Tab b Tab c Tab d Tab e Tab f Tab g Tab h Tab i CRLF
Abnormal	E Tab RTB <Axis No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

Response data

Item		Data range	Remarks
b	Table No.	1 ~ 11	1 - 9: For drive system 10, 11: Joystick operation speed
c	Setting method check	0:MSI 1:ASI	*1
d	Start speed	1 ~ 4,095,500	PPS
e	Maximum speed	1 ~ 4,095,500	PPS
f	Accelerating pulse number	1 ~ 1,000,000	Pulse
g	Decelerating pulse number	1 ~ 1,000,000	Pulse
h	Accelerating time	1 ~ 1,000,000	×0.01Second
i	Decelerating time	1 ~ 1,000,000	×0.01Second

* 1 Returns command type (MSI or ASI) used for motor setting.

【Reference】
WTB command, APS command, RPS command

STP	Stop	SC-200 SC-400 SC-800

【Function】 Stops the motor during driving. Stop only designated axis or stop all axes can be designated.

【Format】

① stx **STPa/b** CRLF …… Stop designated axis

② stx **STP0/b** CRLF …… Stop all axes

Parameter =2

Space between characters cannot be used. Each parameter cannot be omitted.

Command parameters

Function		Setting	Remarks
a	Designating axis	0: All axes stop 1 ~ 8: Designating axis	Varies according to model
b	Selecting stop mode	0: Decelerate and stop 1: Emergency stop	

【Response】Returns set value.

Status	Response data
Normal	C Tab STP<Axis No.>CRLF
Abnormal	E Tab STP<Axis No.>Tab <Error No.>CRLF

For <Error No.>, refer to the item of “6-4. Error Code.”

Response is transmitted at the time when the axis completely stops.

STR	*Status Read*	SC-200 SC-400 SC-800

【Function】 Checks status of the controller.

① Checking driving operations
② Status of limit and sensor
③ Error information

【Format】 stx STRa/b CRLF Parameter = 2

Space between characters cannot be used. Each parameter cannot be omitted.

Command parameters

Function		Setting	Remark
a	(Mode)	1	Fixed to 1 (For standard specification)
b	Designating axis	1 ~ 8	Varies according to model

* Designation of mode a is used for special specifications. Normally setting is fixed to 1.

【Response】 Returns status of controller.

Status	Response data
Normal	C Tab STR<Axis No.> Tab <Mode> Tab c Tab d Tab e Tab f Tab g Tab h Tab i CRLF
Abnormal	E Tab STR<Axis No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

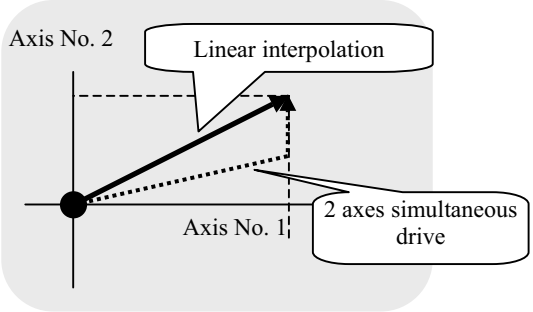
Response data

Item		Status	Remark
c	Driving operations	0: In suspended 1: Operating alone 2: Operating as slave of link 3: Operating with multi-axes drive	
d	NORG signal	0:OFF 1:ON	
e	ORG signal	0:OFF 1:ON	
f	CW limit signal	0:OFF 1:ON	
g	CCW limit signal	0:OFF 1:ON	
h	Swing drive count number	Returns count number	In oscillation drive[*1] During normal time, the count number is 0.
i	Error	Returns error No.	If read once, it is cleared to 0.

SPS — *Linear Interpolation Drive* — SC-200 SC-400 SC-800

【Function】 Performs linear interpolation in simultaneous drive of 2 or more axes.

【Description】 In general 2 axes simultaneous drive, if the moving distances or moving speeds of the axes are different from each other, the time period required to move also differs as shown by the broken line as shown in the figure on the right, however, if linear interpolation is designated, the velocities of respective axes are automatically calculated and respective axes move linearly.



【Format】

① Designating 2 axes stx SPSa/b/c/d/g/h/i/j/l/m CRLF — Parameter =10

② Designating 3 axes stx SPSa/b/c/d/e/f/g/h/i/j/k/l/m CRLF — Parameter = 13

Space between characters cannot be used. Each parameter cannot be omitted.
Designation of 3 axes cannot be used for SC-200.
For SC-800 control, the axis number of synchronous motion is 4.

Command parameters

Function		Setting	Remarks
a	Designating No. 1 axis	1 ~ 8	Varies according to model
b	No. 1 axis target position	-68,108,813 ~ 68,108,813	
c	Designating No. 2 axis	1 ~ 8	Varies according to model
d	No. 2 axis target position	-68,108,813 ~ 68,108,813	
e	Designating No. 3 axis	1 ~ 8	Varies according to model
f	No. 3 axis target position	-68,108,813 ~ 68,108,813	
g	Accelerating and decelerating mode	1: Rectangular drive 2: Trapezoidal drive 3: Asymmetric trapezoidal drive 4: S-shaped drive 5: Asymmetric S-shaped drive	
h	Speed table selection	0 ~ 9	
i	No. 1 axis encoder correction	0: Invalid 1: Valid 2: Continue	→ Refer to ESI command
j	No. 2 axis encoder correction	0: Invalid 1: Valid 2: Continue	
k	No. 3 axis encoder correction	0: Invalid 1: Valid 2: Continue	
l	Backlash correction	0: Invalid 1: CW direction1 2: CCW direction1 3: CW direction2 4: CCW direction2	→ Refer to ASI command
m	Response method	0: When completed 1: Quick	

【Response】 Returns status information. * Return timing depends on the Response method.

Status	Response data
Normal	C Tab SPS<No. 1 axis> CRLF
Abnormal	W Tab SPS<No. 1 axis> Tab <Warning No.> CRLF
	E Tab SPS<No. 1 axis> Tab <Error No.> CRLF

For the <Error No.> and <Warning No.>, refer to the "6-4. Error Code."

【Example】

1. Moves No. 1and No. 2 axes to respective positions of No. 1=1000 and No. 2=2000 with trapezoidal drive and at speed 3.

   stx **SPS1/1000/2/2000/2/3/0/0/0/0** CRLF

2. Performs encoder correction for all 3 axes of No. 1, No. 2 and No. 3 when they move to positions of No. 1=100, No. 2=-200 and No. 3=500 respectively at speed 5 (table No.).

   stx **SPS1/100/2/-200/3/500/2/5/1/1/1/0/0** CRLF

【Remarks】

・Carries out a stop during driving by the stop (STP) command. Refer to the STP command.

(Note) When the Response method is 0: normal, Response is not returned if stopped by the STP command.

* 1. When controlling by GPIB, operations are constantly performed as “1: Quick” regardless of setting.

WRE *Encoder write* SC-200 SC-400 SC-800

【Function】 Rewrites the counter value of the encoder. The counter value by the encoder signal continues to increase and decrease from the rewritten value.

【Format】 stx **WREa/b** CRLF Parameter = 2

⚠ Space between characters cannot be used. Each parameter cannot be omitted.

Command parameters

Function		Setting	Remarks
a	Designating encoder axis	1 ~ 8	Varies according to model
b	Set value	-68,108,813 ~ 68,108,813	Pulse

【Response】 Returns status.

Status	Response data
Normal	C Tab **WRE<Encoder axis No.>** CRLF
Abnormal	E Tab **WRE<Encoder axis No.>** Tab **<Error No.>** CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

WRO *Offset write* SC-200 SC-400 SC-800

【Function】 Rewrites the offset value.

【Format】 stx **WROa/b** CRLF Parameter = 2

⚠ Space between characters cannot be used. Each parameter cannot be omitted.

Command parameters

Function		Setting	Remarks
a	Designating axis	1 ~ 8	Varies according to model
b	Offset value	-68,108,813 ~ 68,108,813	Pulse

【Response】 Returns status.

Status	Response data
Normal	C Tab **WRO<Axis No.>** CRLF
Abnormal	E Tab **WRO<Axis No.>** Tab **<Error No.>** CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

Writes offset 100 to the present coordinate.

Command: stx **RDP2/1** CRLF ⇒ C Tab **RDP2** Tab **0** CRLF

Command: stx **WRO2/100** CRLF ⇒ C Tab **RDO** CRLF

Command: stx **RDP2/1** CRLF ⇒ C Tab **RDP2** Tab **100** CRLF

【Remarks】

⚠ · The offset is also reflected on the read values converted to in angles. Issue the ASI and ESI commands in advance.

WRP *Rewriting present position* SC-200 SC-400 SC-800

【Function】Rewrites the value of the present position.

【Format】 stx **WRPa/b** CRLF Parameter =2

Space between characters cannot be used. Each parameter cannot be omitted.

Command parameters

Function		Setting	Remarks
a	Designating axis	1 ~ 8	Varies according to model
b	Set value	-68,108,813 ~ 68,108,813	Pulse

【Response】Returns status.

Status	Response data
Normal	**C** Tab **WRP<Axis No.>** CRLF
Abnormal	**E** Tab **WRP<Axis No.>** Tab **<Error No.>** CRLF

For <Error No.>, refer to the item of “6-4. Error Code.”

WTB *Speed Table Setting Information Write* SC-200 SC-400 SC-800

【Function】Rewrites the set value of the speed table.

【Format】 stx **WTBa/b/c/d/e/f** CRLF Parameter = 6


Space between characters cannot be used. Each parameter cannot be omitted.

Command parameters

Function		Setting	Remark
a	Designating axis	1 ~ 8	Varies according to model
b	Table No.	1 ~ 11	1 ~ 9: For drive system 10, 11: Joystick operation speed
c	Start speed	1 ~ 4,095,500	PPS
d	Maximum speed	1 ~ 4,095,500	PPS Maximum speed >Start speed
e	Accelerating time	1 ~ 1,000,000	×0.01second
f	Decelerating time	1 ~ 1,000,000	×0.01second

* Tables No. 1 to 9 are used for drive commands such as APS and RPS.
Tables No. 10 and 11 are for joystick operation speed during manual operations. No. 10 is the setting in high speed operations, and No. 11 is the setting in low speed operations.

【Response】Returns status.

Status	Response data
Normal	C Tab WTB<Axis No.>CRLF
Abnormal	E Tab WTB<Axis No.>Tab<Error No.>CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Reference】
RTB Command, APS Command, RPS Command

【Remarks】

The set content is stored in the backup memory.

TAS *Teaching Function* *Axis Information Set* SC-200 SC-400 SC-800

【Function】Sets teaching of the n axes. (Links axis No. with the coordinate memory.)

【Format】One axis stx **TASa** CRLF Parameter = 1
【Format】Two axis stx **TASa/b** CRLF Parameter = 2
【Format】Three axes stx **TASa/b/c** CRLF Parameter = 3

Space between characters cannot be used. Each parameter cannot be omitted.
3 axes setting cannot be used for SC-200.

Command parameter

Function		Setting	Remark
a	Designating axis of coordinate memory 1	1 ~ 8	Varies according to model
b	Designating axis of coordinate memory 2	1 ~ 8	Varies according to model
c	Designating axis of coordinate memory 3	1 ~ 8	Varies according to model

【Response】Returns status of controller.

Status	Response data
Normal	C Tab WTB<Axis No.>CRLF
Abnormal	E Tab WTB<Axis No.>Tab<Error No.>CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Example】

1. Sets teaching of 1 axis. stx **TAS1** CRLF
   Position data of axis No. 1 is registered into the coordinate memory 1.

【Example】

2. Sets teaching of 2 axes. stx **TAS1/2** CRLF
   Position data of axis No. 1 is registered into the coordinate memory 1.
   Position data of axis No. 2 is registered into the coordinate memory 2.

【Example】

3. Sets teaching of 1 axis. stx **TAS1/2/4** CRLF
   Position data of axis No. 1 is registered into the coordinate memory 1.
   Position data of axis No. 2 is registered into the coordinate memory 2.
   Position data of axis No. 3 is registered into the coordinate memory 3.

【Remarks】 Relation between the axis No. and coordinate memory set by this command is stored in the backup memory.

When teaching of 1 axis is performed, writing in the coordinate memory 2 or 3 (WRT command), even if it is carried out, is invalid.

TMS — *Teaching Function Position Information set* — SC-200 SC-400 SC-800

【Function】 Writes the coordinate value of the axis No. linked by TAS command in the designated memory address.

【Format】 stx **TMSa** CRLF Parameter = 1

⚠ Space between characters cannot be used. Each parameter cannot be omitted.

Command parameters

Function		Setting	Remark
a	Coordinate memory address	0 ~ 10,000	

【Response】 Returns status of controller.

Status	Response data
Normal	C Tab TMS<Axis No.>CRLF<Memory address>CRLF
Abnormal	E Tab TMS<Axis No.>Tab<Error No.>CRLF

<Number of axes> 1 axis = 1, 2 axes = 2, 3 axes = 3 For <Error No.>, refer to the item of "6-4. Error Code."

【Example】

Performs teaching to write the coordinate values of 3 axes.

stx TAS1/2/4 CRLF
stx APS1/2/0/0/100/0/0 CRLF
stx APS2/2/0/0/100/0/0 CRLF
stx APS4/0/0/0/100/0/0 CRLF
stx TMS0 CRLF

stx APS1/2/0/0/110/0/0 CRLF
stx APS2/2/0/0/120/0/0 CRLF
stx APS4/0/0/0/130/0/0 CRLF
stx TMS1 CRLF

stx APS1/2/0/0/115/0/0 CRLF
stx APS2/2/0/0/125/0/0 CRLF
stx APS4/0/0/0/140/0/0 CRLF
stx TMS2 CRLF

stx APS1/2/0/0/10/0/0 CRLF
stx APS2/2/0/0/20/0/0 CRLF
stx APS4/0/0/0/30/0/0 CRLF
stx TMS3 CRLF

Address	Axis No. 1		Axis No. 2		Axis No. 4	
	Coordinate value	Speed	Coordinate value	Speed	Coordinate value	Speed
0	100	0	100	0	100	0
1	110	0	120	0	130	0
2	115	0	125	0	140	0
3	10	0	20	0	30	0
4		0		0		0
5		0		0		0
6		0		0		0
7		0		0		0
8		0		0		0
9		0		0		0
10		0		0		0
		0		0		0
9999		0		0		0

【Related】

RDT Command read teaching table
WRT Command write teaching table

【Remarks】

⚠ For the speed tables, the speed table 0 is stored as a default when the TMS command is issued. When attempting to change the speed table, use the WRT command to change.

TPS	*Teaching Function* *Teaching Drive*	SC-200 SC-400 SC-800

【Function】Drives axis according to the value of the designated coordinate memory address.

【Format】 stx TPSa/b CRLF Parameter = 2

Space between characters cannot be used. Each parameter cannot be omitted.
For SC-800 control, the axis number of synchronous motion is 4.

Function		Setting	Remark
a	Coordinate memory address	0 ~ 10,000	Varies according to model
b	Response method	0:Copmpleted 1:Quick	

【Response】Returns status of controller.

Status	Response data
Normal	C Tab TPS< Number of axes> CRLF
Abnormal	W Tab TPS< Number of axes> CRLF <Waning No.> CRLF
	E Tab TPS< Number of axes > Tab <Error No.> CRLF

<Number of axes> 1 axis = 1, 2 axes = 2, 3 axes = 3 For the <Error No.> and <Warning No.>, refer to the "6-4. Error Code."

【Example】
When the coordinate data is set as in the table below.

stx TPS0 CRLF	⇨	C Tab TPS3 Tab 0 CRLF	Moves to the coordinate of memory address 0
stx TPS1 CRLF	⇨	C Tab TPS3 Tab 1 CRLF	Moves to the coordinate of memory address 1
stx TPS2 CRLF	⇨	C Tab TPS3 Tab 2 CRLF	Moves to the coordinate of memory address 2
stx TPS3 CRLF	⇨	C Tab TPS3 Tab 3 CRLF	Moves to the coordinate of memory address 3
stx TPS4 CRLF	⇨	W Tab TPS3 Tab 100 CRLF	Coordinate data is not set

Status	Axis No. 1		Axis No. 2		Axis No. 4	
	Coordinate value	Speed	Coordinate value	Speed	Coordinate value	Speed
0	100	0	100	0	100	0
1	110	0	120	0	130	0
2	115	0	125	0	140	0
3	10	0	20	0	30	0
4	-----	-----	-----	-----	-----	-----
----	----	-----	-----	-----	-----	-----
9999	----	-----	-----	-----	-----	-----

RDT — *Teaching Function* — *Position Data Read* — SC-200 SC-400 SC-800

【Functions】 Reads out teaching data. * This can be used as an editing function.

【Format】 stx RDTa/b CRLF Parameter = 2

⚠ Space between characters cannot be used. Each parameter cannot be omitted.

Command parameters

Function		Setting	Remark
a	Designating axis	1 ~ 8	Varies according to model
b	Coordinate memory address	0 ~ 10,000	

【Response】 Returns the position information and speed table No.

Status	Response data
Normal	C Tab RDT<Axis No.> Tab <Position information> Tab <Speed Table No CRLF
Abnormal	W Tab RDT<Axis No.> Tab <Warning No.> CRLF
	E Tab RDT<Axis No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Example】 Reads out the coordinate memory address 100 of axis No. 1.

stx RDT1/100 CRLF ⇨ C Tab RDT1 Tab 1234 Tab 0 CRLF

WRT — *Teaching Function* — *Position Data Write* — SC-200 SC-400 SC-800

【Functions】 Rewrites the teaching data. This can be used as editing function.

【Format】 stx WRTa/b CRLF Parameter = 2

⚠ Space between characters cannot be used. Each parameter cannot be omitted.

Function		Setting	Remarks
a	Designating axis	1 ~ 8	Varies according to model
b	Coordinate memory address	0 ~ 10000	
c	Set value	-68,108,813 ~ 68,108,813	Pulse
d	Speed table selection	0 ~ 9	

【Response】 Returns status of controller.

Status	Response data
Normal	C Tab WRT<Axis No.> CRLF
Abnormal	E Tab WRT<Axis No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Example】 Writes the position information 1245 and speed table selection 7 in the coordinate memory 100 of axis No. 1.

stx WRT1/100/1245/7 CRLF ⇨ C Tab WRT1 CRLF

⚠ Easy control commands are a group of commands to drive with minimum parameters by using parameters set via manual operation.
Therefore, please notice that the movement changes when the internal parameters are changed via manual operation.

PMS *Easy Control* *Speed Change* SC-200 SC-400 SC-800

【Functions】 Designates a speed table when executing easy control command.

【Format】 stx PMSa/b CRLF Parameter = 2

⚠ Space between characters cannot be used. Each parameter cannot be omitted.

Function		Setting	Remarks
a	Designating axis	1 ~ 8	Varies according to model
b	Speed table selection	0 ~ 9	

【Response】 The Response method is Quick fix

Status	Response data
Normal	C Tab PMS<Axis No.> CRLF
Abnormal	E Tab PMS<Axis No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Example】 Designates the speed table to 5 when executing easy control command.

stx PMS1/5 CRLF ⟹ C Tab PMS1 CRLF

PMP *Easy Control* *Relative position Drive* SC-200 SC-400 SC-800

【Functions】 Performs relative position movement.

【Format】 stx PMPa/b CRLF Parameter = 2

⚠ Space between characters cannot be used. Each parameter cannot be omitted.
For SC-800 control, the axis number of synchronous motion is 4.

Function		Setting	Remarks
a	Designating axis	1 ~ 8	Varies according to model
b	Movement amount	-68,108,813 ~ 68,108,813	Pulse

【Response】 The Response method is Quick fix. Use the STR command to check the end.

Status	Response data
Normal	C Tab PMP<Axis No.> CRLF
Abnormal	E Tab PMP<Axis No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Example】 Performs relative position movement of the axis No. 1 by 1000 pulses.

stx PMP1/5 CRLF ⟹ C Tab PMP1 CRLF

PMA *Easy Control* *Absolute position Drive* SC-200 SC-400 SC-800

【Functions】Performs absolute position movement.

【Format】 stx **PMAa/b** CRLF Parameter = **2**

Space between characters cannot be used. Each parameter cannot be omitted.
For SC-800 control, the axis number of synchronous motion is 4.

Function		Setting	Remarks
a	Designating axis	1 ~ 8	Varies according to model
b	Moving target position	-68,108,813 ~ 68,108,813	Pulse

【Response】 The Response method is Quick fix. Use the STR command to check the end.

Status	Response data
Normal	C Tab PMA<Axis No.> CRLF
Abnormal	E Tab PMA<Axis No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Example】Performs absolute position movement of the axis No. 1 by 1000 pulses.

stx **PMA1/1000** CRLF ⇨ C Tab **PMA1** CRLF

PMH *Easy Control* *Origin search* SC-200 SC-400 SC-800

【Functions】Performs relative position movement.

【Format】 stx **PMHa** CRLF Parameter = 1

Space between characters cannot be used. Each parameter cannot be omitted.
For SC-800 control, the axis number of synchronous motion is 4.

Function		Setting	Remarks
a	Designating axis	1 ~ 8	Varies according to model

【Response】 The Response method is Quick fix. Use the STR command to check the end.

Status	Response data
Normal	C Tab PMH<Axis No.> CRLF
Abnormal	E Tab PMH<Axis No.> Tab <Error No.> CRLF

For <Error No.>, refer to the item of "6-4. Error Code."

【Example】 Performs origin search for the axis No. 1.

Origin search mode is dependent on SYS No. 5 ORG TYPE during manual operation.

stx **PMH1** CRLF ⇨ C Tab **PMH1** CRLF

SCN	*Measurement* *Continuous Scan*	SC-400 SC-800

【Functions】 Collect data with two scaler counters while moving by the designated movement amount from the present position.

【Format】 stx **SCNa/b/c/d/e/f/g/h/i/j** CRLF Parameter = 10

Space between characters cannot be used. Each parameter cannot be omitted.

SCN Command parameter

Function		Setting	Remarks
a	Designating axis	1 ~ 8	Varies according to model
b	Accelerating and decelerating mode	1: Rectangular drive 2: Trapezoidal drive 3: Asymmetric trapezoidal drive 4: S-shaped drive 5: Asymmetric S-shaped drive	
c	(Synchronizing mode)	0: Valid 1: Invalid	Refer to LNK command.
d	Selection of speed table	0 ~ 9	
e	Movement amount (relative value)	-68,108,813 ~ 68,108,813	Pulse
f	Measuring STEP	1 ~ 68,108,813	Pulse
g	Measuring time	0 ~ 16,777,215	g) Measuring time = 0 the depends on the D) speed of the Selection of speed table.
h	Backlash correction	0: Invalid 1: CW direction1 2: CCW direction1 3: CW direction2 4: CCW direction2	→ Refer to ASI command
i	Encoder correction	0: Invalid 1:Valid 2: Continue	→ Refer to ESI command
j	Response method	0: When completed 1: Quick	* 1 → Refer

【Response】 Returns status information. * Return timing depends on Response method.

Status	Response data
Normal	C Tab SCN<Axis No.> CRLF
Abnormal	W Tab SCN<Axis No.> Tab <Warning No.> CRLF
	E Tab SCN<Axis No.> Tab <Error No.> CRLF

For the <Error No.> and <Warning No.>, refer to the "6-4. Error Code."

Maximum sampling numbers (movement amount/measuring STEP) are 20000 points for Ch1 and Ch2 respectively.

The collected data can be read with the RBU command.

【Example 1】 When executing the SCN command by 1 axis control

Parameter setting method when using a goniometer with minimum resolution of 0.001°/step.

【Measuring condition】 Measuring range **0° ~ 10°**
Measuring speed **0.1° STEP/SEC** (Moves by 0.1° for 1 second)
Present value **10°**

【Set value】 Movement amount **100000** 【Pulse】
Measuring step **100** 【Step】
Measuring time **1** 【SEC】

stx **APS1/2/0/0/0/0/0** CRLF Moves to 0° by absolute position movement

stx **SCN1/2/0/0/100000/100/1/0/0/1** CRLF ⟹ **C** Tab **SCN1** CRLF

【Example 2】 When executing the SCN command by 2 axes synchronizing proportional control

AXIS__A Parameter setting method when using a goniometer with minimum resolution of 0.001°/step

AXIS__B Parameter setting method when using a goniometer with minimum resolution of 0.001°/step

【Measurement condition】

AXIS_A

	Measuring range	**0º ~ 10º**
	Measuring speed	**0.1º STEP/SEC** (Moves by 0.1°for 1 second)
	Axis No. 1	
	Present value	**1 0º**
AXIS__B	Measuring range	**0º ~ 50º**
	Measuring speed	**0.05º STEP/SEC** (Moves by 0.05°for 1 second)
	Axis No. 2	
	Present value	**10º**
【Set value】	Movement amount	**100000** 【Pulse】
	Measuring step	**100** 【Step】
	Measuring time	**1**【SEC】

stxLNK1/2/2 CRLF

Set AXIS_B so as to perform synchronizing proportional movement with half of AXIS_A.

stxAPS1/2/0/0/0/0/0 CRLF

Moves AXIS_A to 0° by absolute position movement.

stxAPS2/2/0/0/0/0/0 CRLF

Moves AXIS_B to 0° by absolute position movement.

stxSCN1/2/1/0/100000/100/1/0/0/1 CRLF ***Designates synchronizing proportion.***

【Example 3】How to high speed Scan Setting

Please set the g） Measuring time to 0.

Measurement speed depends on D) depends the Selection of speed table .

【Remarks】

・ Carry out a stop during driving by the stop (STP) command. Refer to the STP command.

(Note) When the Response method is 0: standard, no Response is returned if stopped by the STP command.

* 1. When controlling by GPIB, operations are constantly performed as “1: Quick” regardless of settings.

RBU	*Measurement* *SCAN Data Read*	SC-400 SC-800

【Functions】 Reads the counter data collected by the SCN command.

【Format】 stx **RBUa/b** CRLF Parameter = 2

⚠ Space between characters cannot be used. Each parameter cannot be omitted.

AP Command parameter

Function		Setting	Remark
a	Data source	1:Ch1 2: Ch2 3:Ch1 & Ch2 4:Ch1 & Ch2& Position	
b	Data No	0 ~ 20,000	

【Response】 Returns status information. * Return timing depends on Response method.

Status	Response data
Normal	C Tab BUFa Tab b Tab c CRLF
	C Tab BUFa Tab b Tab c Tab d CRLF
Abnormal	W Tab BUF<Data source> Tab <Warning No.> CRLF
	E Tab BUF<Data source> Tab <Error No.> CRLF

For the <Error No.> and <Warning No.>, refer to items of "6-4. Error Code."

【Response data】

Item		Status	Remark
a	Data source	1: Ch1 2: Ch2 3: Ch1 & Ch2 4: Ch1 & Ch2 & Position	Ch1: Scaler counter1 Ch2: Scaler counter2
b	Status	0: Data unconfirmed 1: Data confirmed 2: Data completed	
c	Count value	0 ~ 4,000,000	Input frequency Max 4MHz
d	Count value	0 ~ 4,000,000	Input frequency Max 4MHz

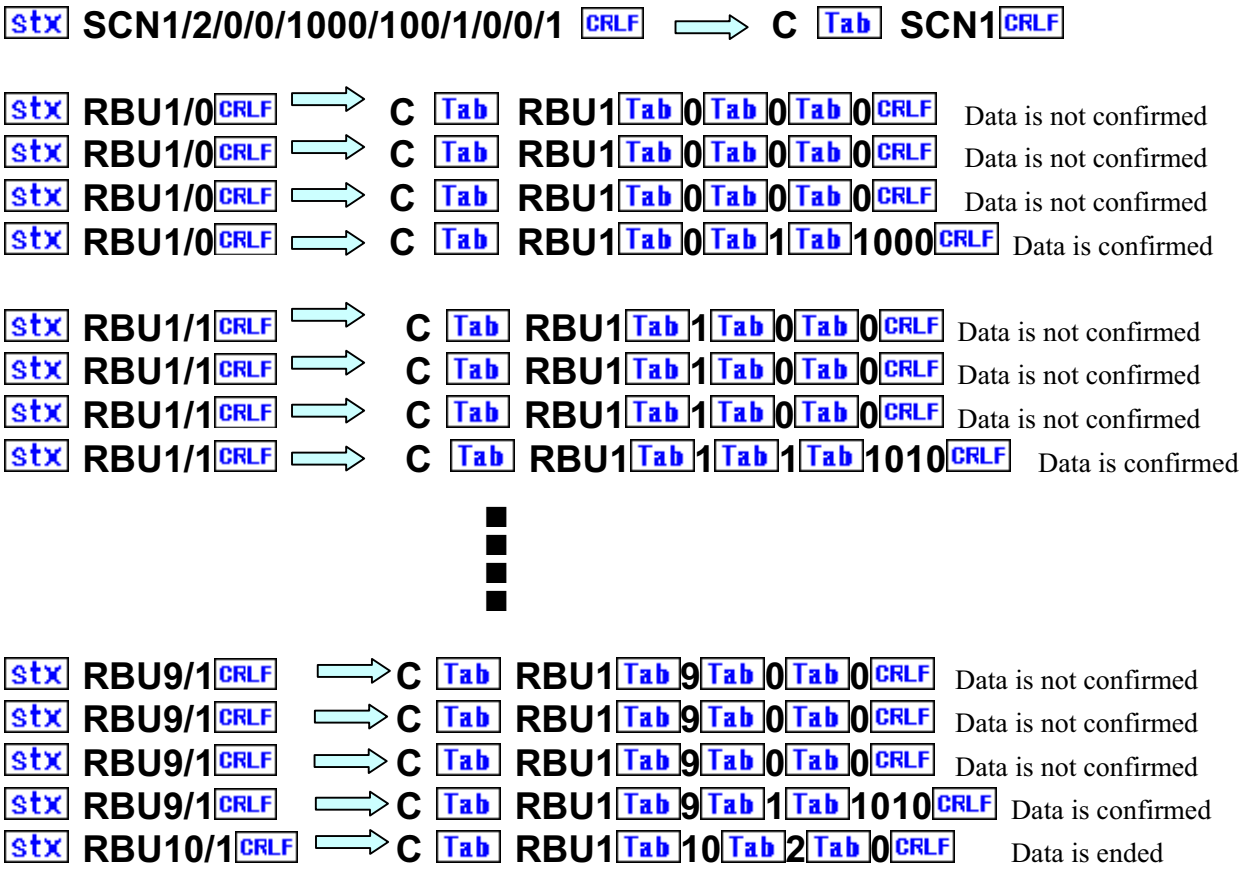
【Explanation of Response parameter】

The Response parameter varies with selection of data source for transmission command.

stx RBU1/0 CRLF ⇒ C Tab RBU1 Tab <Status> Tab Ch1 Data CRLF
stx RBU2/0 CRLF ⇒ C Tab RBU1 Tab <Status> Tab Ch2 Data CRLF
stx RBU3/0 CRLF ⇒ C Tab RBU1 Tab <Status> Tab Ch1 Data Tab Ch2 Data CRLF
stx RBU4/0 CRLF ⇒ C Tab RBU1 Tab <Status> Tab Ch1 Data Tab Ch2 Data Tab Position CRLF

【Example】 Explains a method for use in combination with the SCN command.

SCAN is started. The Response method is Quick.



【Remarks】

- The captured scaler data is held until the next SCN command is issued.
- The captured scaler data is stored in the backup memory.
- Carry out a stop during driving by the stop (STP) command. → Refer to the STP command.

(Note) When the Response method is 0: standard, no Response is returned if stopped by the STP command.

* 1. When controlling by GPIB, operations are constantly performed as “1: Quick” regardless of settings.

SFT	*Measurement* *Fixed Time Measurement*	SC-400 SC-800

【Functions】 Returns the number of pulses inputted into the data source within the set measuring period of time.

【Format】 stx **SFTa/b** CRLF Parameter = 2

⚠ Space between characters cannot be used. Each parameter cannot be omitted.

APS Command parameters

Function		Setting	Remark
a	Data source	1: Ch1 2: Ch2 3: Ch1 & Ch2	
b	Measuring time	1 ~ 16,777,215	mSec

【Response】 Returns status information. * Return timing depends on the Response method.

Status	Response data
Normal	C Tab SFT<Data source> Tab Ch1 Data CRLF
	C Tab SFT<Data source> Tab Ch2 Data CRLF
	C Tab SFT<Data source> Tab Ch1 Data Tab Ch2 Data CRLF
Abnormal	W Tab SFT<Axis No.> Tab <Warning No.> CRLF
	E Tab SFT<Axis No.> Tab <Error No.> CRLF

For the <Error No.> and <Warning No.>, refer to the "6-4. Error Code."

【Explanation of Response parameter】

The Response parameter varies with selection of data source for transmission command.

stx **SFT1/1000** CRLF ⇨ **C Tab SFT1 Tab Ch1 Data CRLF**
stx **SFT2/1000** CRLF ⇨ **C Tab SFT2 Tab Ch2 Data CRLF**
stx **SFT3/1000** CRLF ⇨ **C Tab SFT3 Tab Ch1 Data Tab Ch2 Data CRLF**

【Example】

1. Measurement of pulse inputted into CH1 for one second is carried out.

stx **SFT1/1000** CRLF ⇨ **C Tab SFT1 Tab Ch1 Data CRLF**

1. Measurement of pulse inputted into CH1 and CH2 for one second is carried out.

stx **SFT3/1000** CRLF ⇨ **C Tab SFT1 Tab Ch1 Data Tab Ch2 Data CRLF**

【Remarks】

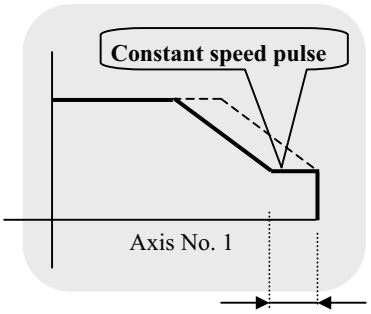
· Carry out a stop during driving by the stop (STP) command. Refer to the STP command.

(Note) When the Response method is 0: standard, no Response is returned if stopped by the STP command.

⚠ * 1. When controlling by GPIB, operations are constantly performed as "1: Quick" regardless of settings.

WCP — *Drive Aid* *Constant PULSE write* SC-400 SC-800

【Functions】 Outputs constant speed pulses by the designated number of pulses at deceleration.



【Format】 stx WCP a/b CRLF Parameter = 2

Space between characters cannot be used. Each parameter cannot be omitted.

WCP Command parameter

Function		Setting	Remarks
a	Designating axis	1 ~ 8	Varies according to model
b	Constant speed pulse	0 ~ 20,000	

【Response】 Returns status information. * Return timing depends on the Response method.

Status	Response data
Normal	C Tab WCP<Axis No.> CRLF
Abnormal	E Tab WCP<Axis No.> Tab <Error No.> CRLF

For the <Error No.> and <Warning No.>, refer to the "6-4. Error Code."

【Remarks】

The set content is stored in the backup memory.

RCP — *Drive Aid* *Constant PULSE read* SC-400 SC-800

【Functions】 Reads out the set constant speed pulse.

【Format】 stx RCP a CRLF Parameter = 1

Space between characters cannot be used. Each parameter cannot be omitted.

R CP Command parameter

Function		Setting	Remarks
a	Designating axis	1 ~ 8	Varies according to model

【Response】 Returns status information. * Return timing depends on the Response method.

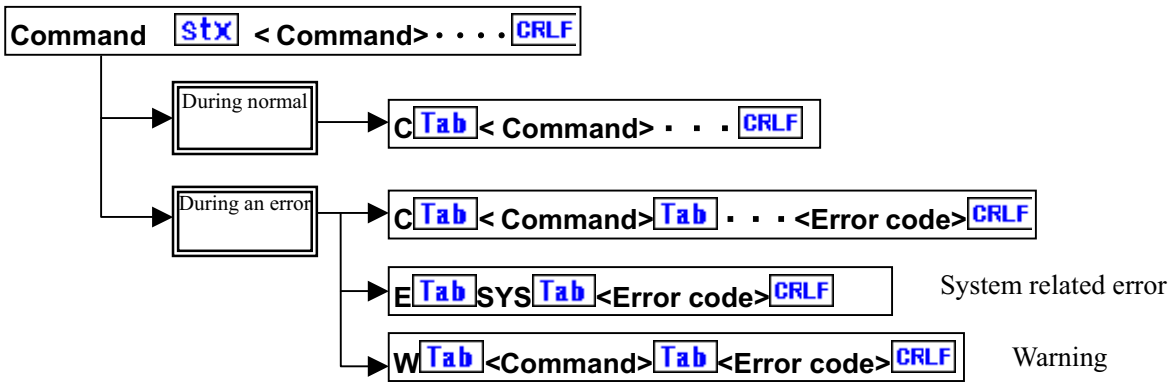
Status	Response data
Normal	C Tab RCP <Axis No.> CRLF
Abnormal	E Tab RCP <Axis No.> Tab <Error No.> CRLF

For the <Error No.> and <Warning No.>, refer to the "6-4. Error Code."

6-4. Error Code

6-4-1. Error Code

If an error is confirmed when transmitting a command, the controller returns an acknowledgement with the error code.
In addition, after a drive error occurs, an error code can be checked with status read (STR).



When in normal, the head character is C. When an error occurs, an error code with E or W is returned.

6-4-2. List of Error Codes

System Related Error (* independent of command type)

Error code	Description	Remarks
1	No STX on head of command.	
2	Total number of commands is short.	
3	Absence of CR+LF	
4	Character other than specified characters and figures is included.	
5	No applicable command.	
10	Now operating in manual mode.	

Parameter Error

Error code	Description	Remarks
100	Total number of parameters is incorrect.	
10n	Numerical value of n^{th} parameter is out of range.	n=1 ~ 7
120	Value is designated so that movable value at one time is exceeded.	

Command Issue Sequence Error

Error code	Description	Remarks
200	Reset command is not issued.	
201	MSI and ASI commands are not issued.	
202	Link command is not issued.	
205	ORG command is not issued. (Origin is not detected))	
206	APS/RPS? command corresponding to the first parameter of MPS command is not issued.	
207	APS/RPS? command corresponding to the second parameter of MPS command is not issued.	
208	APS/RPS? command corresponding to the third parameter of MPS command is not issued.	
209	APS/RPS? command corresponding to the fourth parameter of MPS command is not issued.	
210	ESI command is not issued.	

Drive Related Error

Error code	Description	Remarks
300	PMG is in use.	Inside IC (Integrated circuit) related error
301	Speed setting is 0 in rectangular drive.	
302	Operating the axis during driving.	
303	Tried to rewrite the present value of the axis during driving.	
304	Stopped by CW limiter during driving.	
305	Stopped by CCW limiter during driving.	
306	Any axis on MPS driving stopped by limiter.	
307	Both of CW and CCW limiters are activated.	
308	Tried to move the axis for which excitation is OFF.	
309	Out of the control range in feedback control.	

Link Related Error * SC-800 Command

Error code	Description	Remarks
400	Hardware which does not allow for LNK driving.	
401	Operating axis during LNK driving.	
402	Link counter is now in use.	
403	Tried to rewrite present value of axis during LNK driving.	
404	Designated to stop axis which is driving by slave axis.	
405	Axis designation of LNK slave 1 is incorrect.	
406	Axis designation of LNK slave 2 is incorrect.	

Multi-Axes Setting Error

Error code	Description	Remarks
501	First parameter and second parameter are the same.	
502	First parameter and third parameter are the same.	
503	First parameter and fourth parameter are the same	
504	Second parameter and third parameter are the same.	
505	Second parameter and fourth parameter are the same.	
506	Third parameter and fourth parameter are the same.	

ASI, WTB, RTB Command Calculation Error

Error code	Description	Remarks
600	Accelerating pulse number is large, or accelerating time is long.	
601	Accelerating pulse number is small, or accelerating time is short.	
602	Decelerating pulse number is large, or decelerating time is long.	
603	Decelerating pulse number is small, or decelerating time is short.	
604	Preparation failure of speed table with WTB command.	

Warning Message

Error code	Description	Remarks
1	The target position and present position are the same.	
2	In one move setting, waiting time is designated with OSC command.	* SC-800
100	Designated address to which a coordinate is not registered by the TPS command.	

MEMO

7. Internal Motor Driver

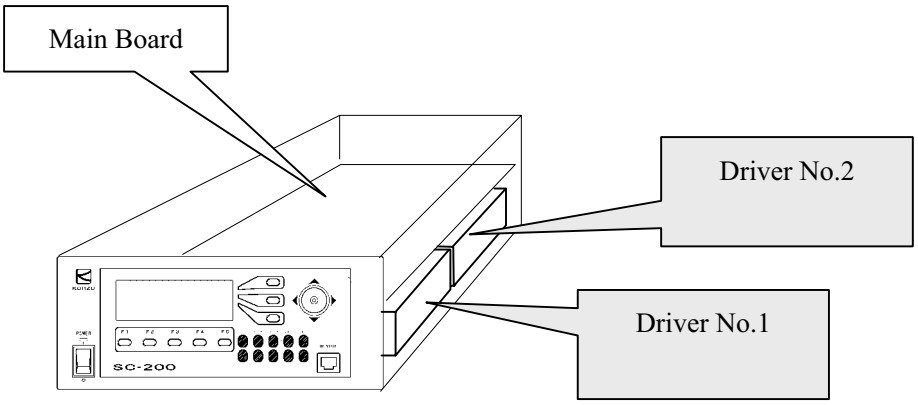
7-1. Driver Specifications

Model	MD-501A (SC specifications)
Driving Method	Micro Step Drive
Input Power	100 to 115V AC 50/60Hz 3.5A
Driving Current	0.5 to 1.4 A/Phase
Number of Divisions	16 stages, 1, 2, 4, 5, 8, 10, 16, 20, 25, 40, 50, 80, 100, 125, 200, 250
Low Vibration Drive	Internal 16 division drive when division number 1 and 2 are selected
Input Signal	Photo coupler Input resistance F, R: 300Ω HO: 390Ω
Maximum Response Frequency	500Kpps
Output Signal	Photo coupler insulation, Open collector output
Functions	Pulse input method switching, Automatic current down, Step angle switching, Drive voltage switching, Self-diagnosis function
Cooling Method	Natural convection air-cooling method
Weight	750g
Insulation Resistance	Value measured between AC input and case with 500V DC megger at room temperature and room humidity is 50MΩ or more.
Insulation Strength	No abnormality even when 1500V AC is applied to AC input for one minute at room temperature and room humidity.
Operating Environmental Temperature	0 to 40ºC No freezing.
Operating Environmental Humidity	0 to 85% No condensation.

※The above are specifications for a single driver.

7-2. Arrangement of Driver

The built-in stepping motor driver is arranged under the main board.



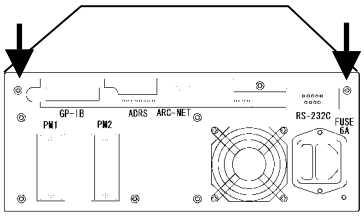
The above diagram is for SC-200. Similarly, for SC-400, 4 drivers are arranged under the main board.

7-3 Open and close of Enclosure, Adjustment of Driver

Adjustments of the driver in the controller are required in order to perform setting of the division number for the micro step or to adjust output current.
Method to open and close the controller enclosure is as follows.

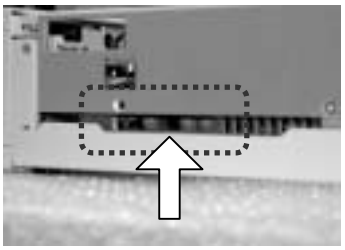
■ Opening and Closing Enclosure

① Remove the 2 screws on the rear panel.

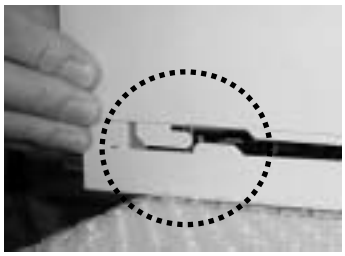


② Slightly move the upper cover backward, and lift it up.

③ The adjustment part for the driver is seen from the gap on the side, and make adjustments by using tweezers and a clock driver.



④ When closing, align pawls of the upper cover with that of the lower cover to close.

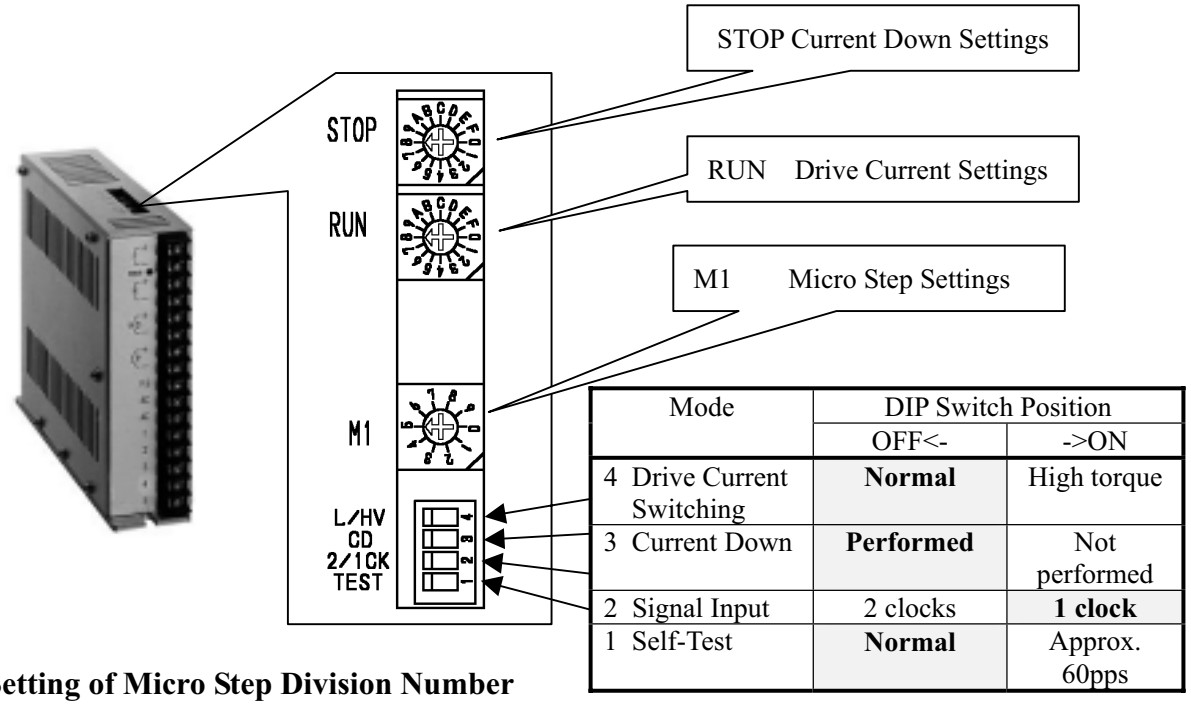


Carry out carefully so that no breakage or abnormality occurs.

A change in parts other than the driver adjustment part such as the switch is not allowed.

Please be advised that some products in the SC Series differ in the method of opening the enclosure depending on the specifications.

■ Internal Driver



Mode	DIP Switch Position	
	OFF<-	->ON
4 Drive Current Switching	**Normal**	High torque
3 Current Down	**Performed**	Not performed
2 Signal Input	2 clocks	**1 clock**
1 Self-Test	**Normal**	Approx. 60pps

◇ Setting of Micro Step Division Number

Set the micro step division number with the rotary digital switch M1. The setting of the switch and the division number is as in the following table ("Setting table for division number")

Setting table for division number **M1**

Setting	0	**1**	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Division number	1	**2**	4	5	8	10	20	40	80	16	25	50	100	125	200	250

The driver is set to the setting 1 (2 divisions) when shipped from the factory.

◇ Setting of Drive Current

Set the current when the motor is running with the digital switch indicated as RUN. The setting and the current value is as in the following table.

Setting table for drive current **RUN**

Setting	0	1	2	**3**	4	5	6	7	8	9
Current value	0.5	0.58	0.66	**0.75**	0.81	0.88	0.96	1.03	1.10	1.15

A	B	C	D	E	F
1.25	1.30	1.40	1.47	1.53	1.60

The driver is set to the setting 3 (0.75A) when shipped from the factory.

If the product and our motor drive stage are purchased simultaneously, the settings of the motor and the stage are made compatible before shipment. In a case of replacement with another stage (motor), check the drive current of the motor for the setting.

◇ Setting of Current-Down

If setting of automatic current down has been set (C.D switch is OFF), current down is performed at the set ratio when the motor stops. Set with the digital switch indicated as STOP.

Setting table for current down **STOP**

Setting	0	1	2	3	4	**5**	6	7	8	9
%	27	31	36	40	45	**50**	54	58	62	66

A	B	C	D	E	F
70	74	78	82	86	90

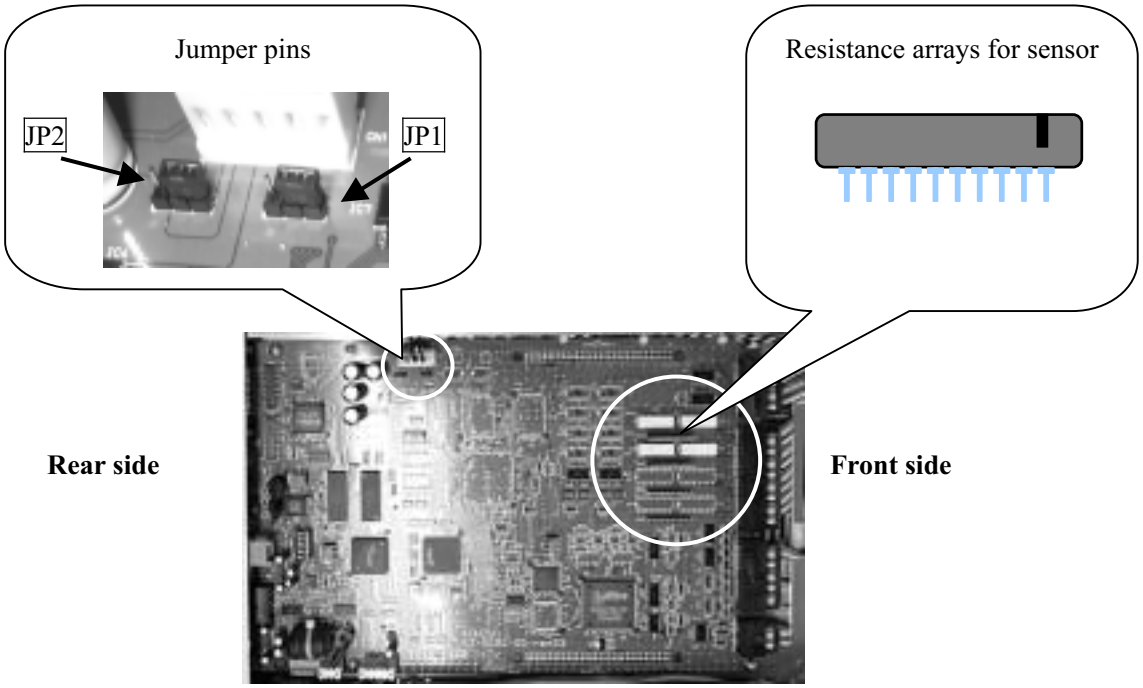
In general, the driver is set to the setting 5 (50%) when shipped from the factory.

When it is considered that the automatic current down has not been performed, check the switch setting for the correct setting.

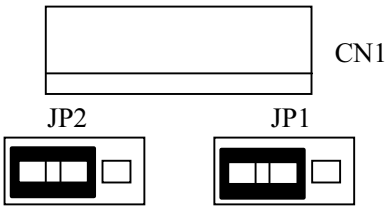
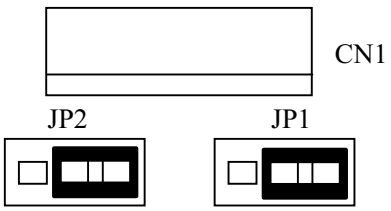
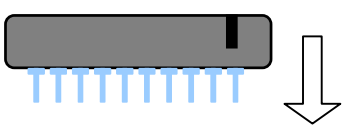
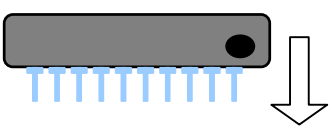
7-4 Voltage change of Sensor Power Source

Power supply to each sensor, such as origin and limit can be changed to 5V or 24V.
When changing voltage, replacement of the jumper pins and resistance arrays are required. The setting is 24V at shipment.

7-4-1. Position of resistance array and jumper pins



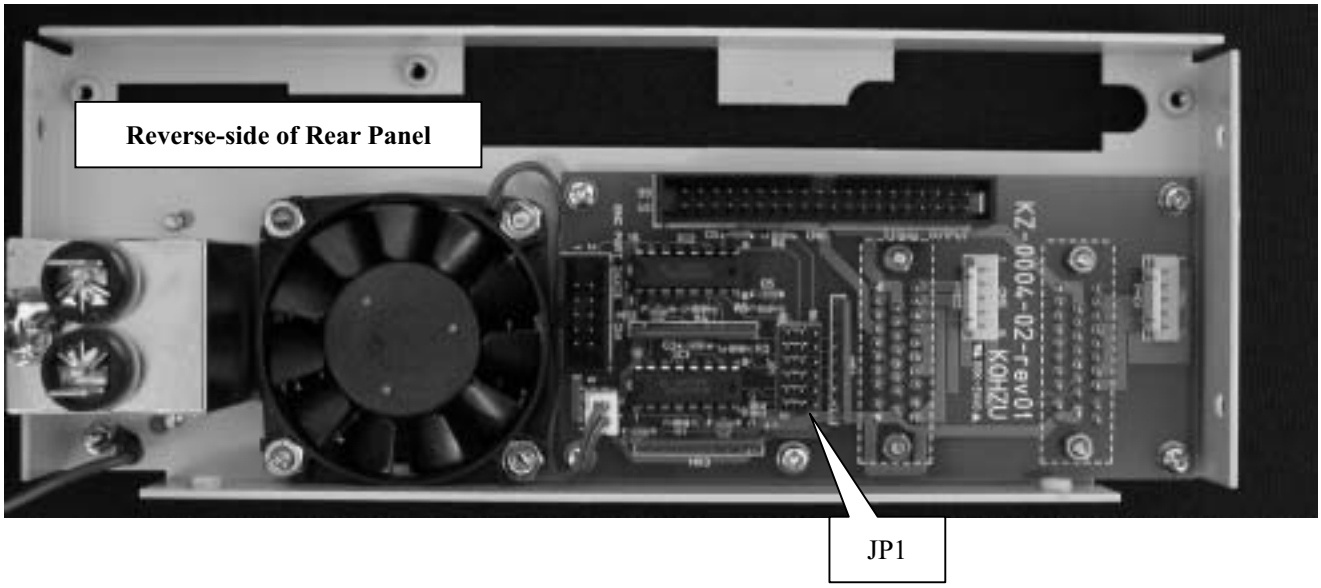
7-4-2. Setting

Supply voltage	5V	24V(Setting at shipment)
Jumper pins		
Resistance arrays (Resistance value)	470Ω 	3.3KΩ 

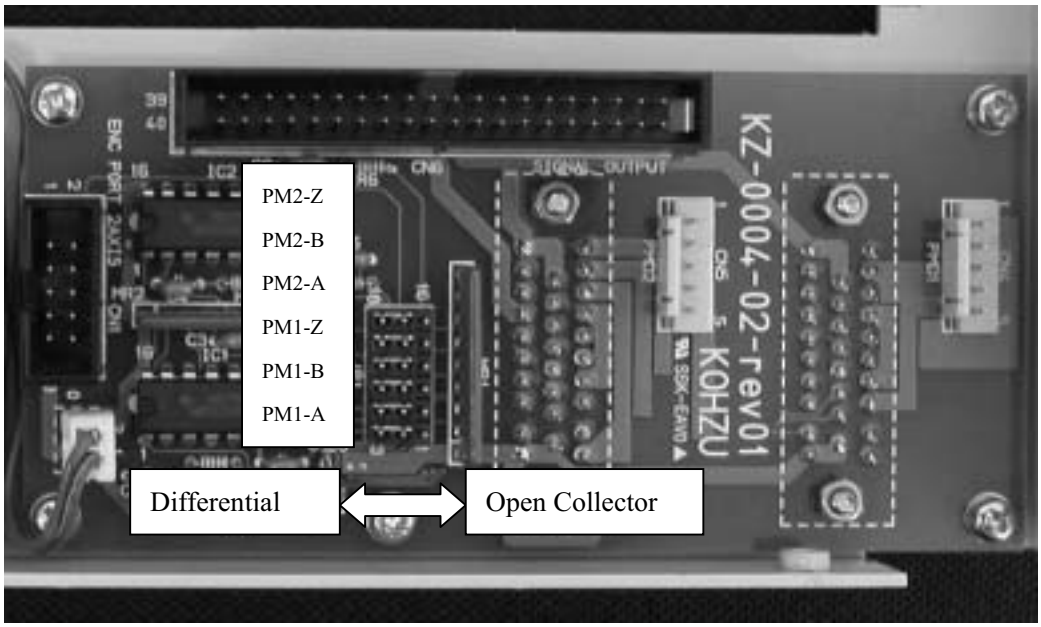
7-5 Change in encoder input system

About SC-200

1. Open Enclosure (refer to 93 page), and operate the jumper-pin on the substrate mounted in the reverse-side of a rear panel.

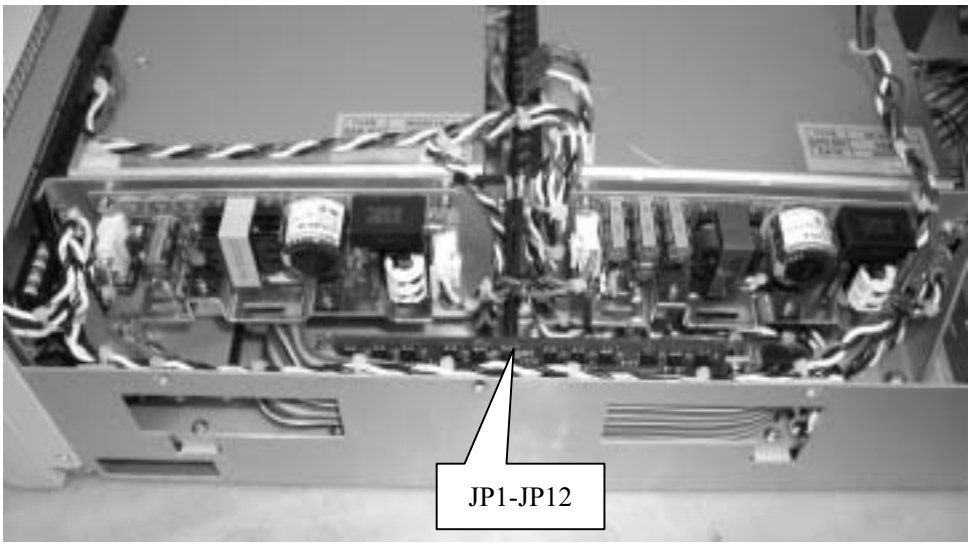


2 .”Differential input" or "Open collector input” can be chosen by the jumper pin.

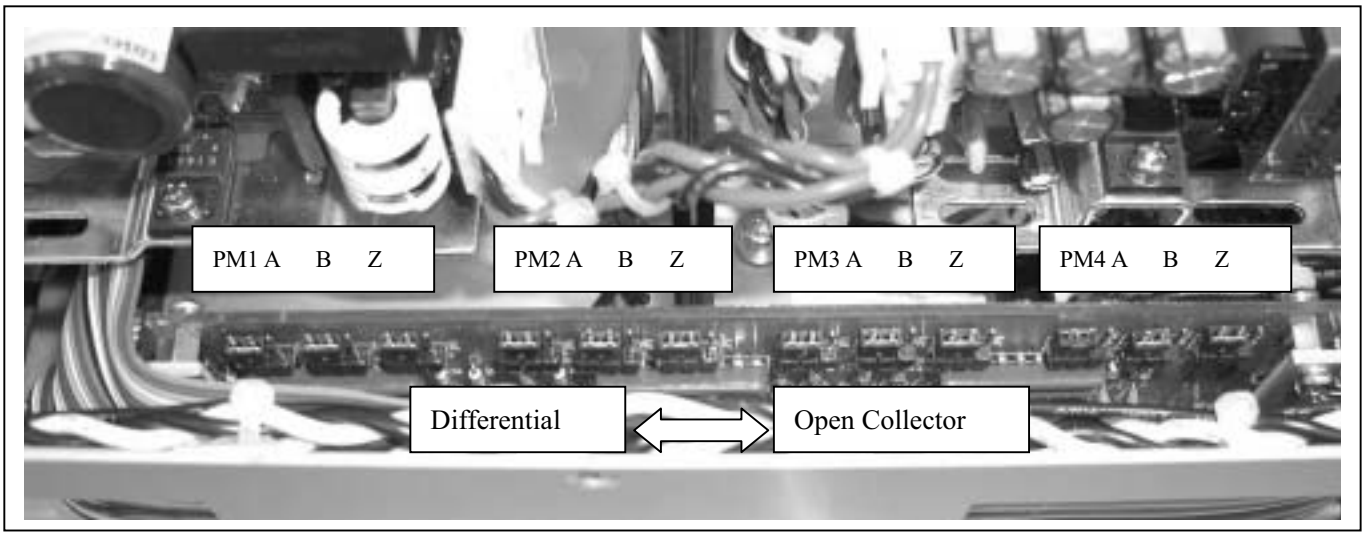


About SC-400

1. Open Enclosure (refer to 93 pages), and operate the jumper-pin on the substrate mounted in the left-hand side when you look at a rear panel.

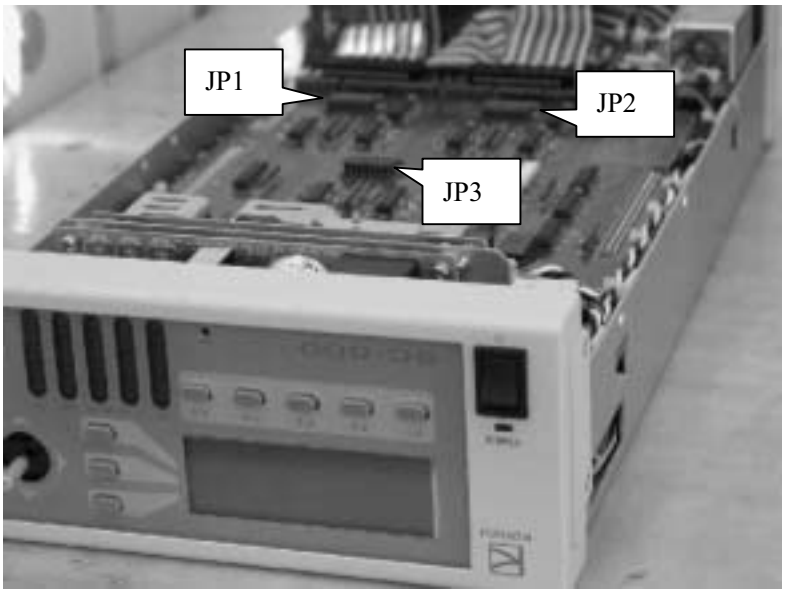


2 .”Differential input" or "Open collector input” can be chosen by the jumper pin.

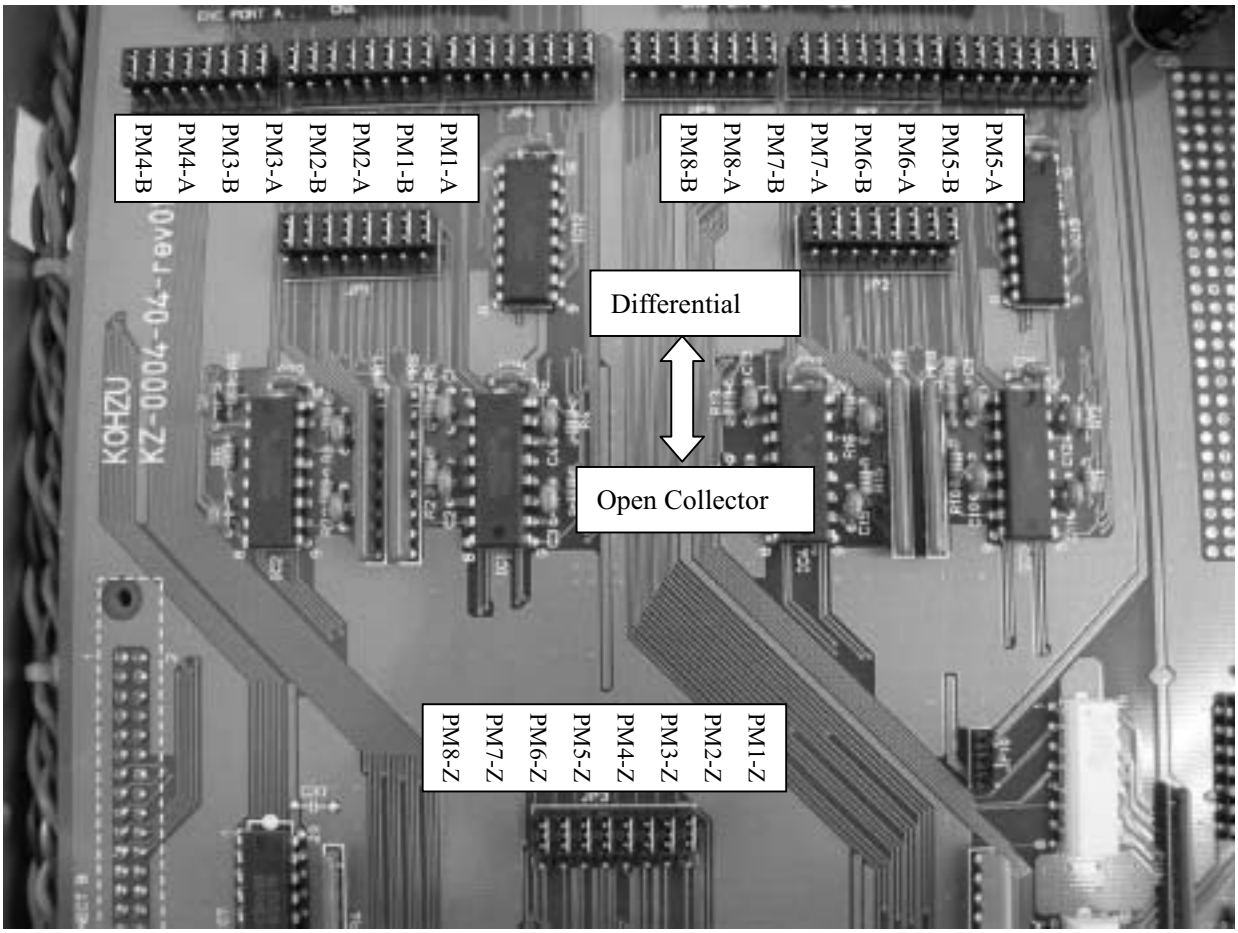


About SC-800

1. Open Enclosure (refer to 93 pages), and operate jumper-pins on the substrate looked when you remove a bottom panel.



2 .”Differential input" or "Open collector input” can be chosen by the jumper pin.



8. Maintenance and After-Service

■ Power is not turned on

◇ Is the power cord pulled out or loosened?

→ Plug the power cord into the main body securely.

◇ Is the fuse on the rear panel inserted or burnt?

→ Insert or replace with a new fuse.

(If the fuse frequently burns out, this may be caused by an internal failure.)

◇ Is power conducted to the outlet?

→ Plug the power cord of another electric appliance into the outlet, and check if the appliance operates.

→ Check if power is applied with a voltmeter such as a tester.

◇ Is the power cord broken at some point ?

→ Check conductivity between both ends of the cord if you have a tester.

◇ The display plate and switches on the front panel do not light up while the heat release fan is rotating.

→ After turning off the power, turn on the power again. If the same phenomenon occurs, this is considered to be an internal failure.

■ Display on the front panel is incorrect.

◇ Characters displayed are incorrect. That is, not displayed correctly.

→ After turning off the power, turn on the power again. If the same phenomenon occurs, this is considered to be an internal failure.

■ The device does not operate even when the joystick is tilted

◇ Is “NON” displayed on the right upper portion of the liquid crystal screen?

→ This is in the prohibitive mode for joystick operations. Press the switch on the right upper portion of the display, and change the mode.

◇ Is there a rotating sound or abnormal sound?

→ This is considered to be an out-of-adjustment of the motor, therefore, change the speed, or adjust the output current of the driver.

◇ (When there is a rotating sound), is the motor rotating ?

→ If the device has been used for a long period of time, the coupling of the motor shaft may be loosened in some rare cases.

◇ (When there is no rotating sound), do the limit indications light up?

→ The device stopped by the limit switch. Move in the reverse direction and move through the limit zone.

◇ (When there is no rotating sound), is the stage connecting cable pulled out, or loosened ?

→ Securely plug the stage connector into the main body connector.

◇ (In case of multi-axes specification), do all axes of the move ?

→ If some axes move, but others do not, exchange the connectors of respective axes (motor), and determine whether trouble is caused on the main body side or motor side.

■Origin return operations cannot be performed

◇ Do the motors completely operate ?

→ Check the other items such as “The device does not operate even when the joystick is tilted”.

◇ (The axis stops at position which is not origin), is the origin sensor correctly installed ?

→ Adjust the origin sensor.

→ In such a case where the moving range is small, the limit sensor range may overlap with the origin sensor range. In this case, the device does not operate properly. Make an adjustment so that the origin sensor range is out of the limit range.

→ When using the origin proximity sensor and origin sensor, take the positional relationship into account. If the origin is out of the origin proximity sensor range, the axis cannot return to the origin properly. Make an adjustment of the origin position.

◇ (The axis stops at a position which is not the origin), is logic for origin sensor properly set ?

→ Switch the input logic for the sensor (Normal open, Normal close).

■ Positional deviation

◇ Is the setting such that the moving step value is incorrect?

→ Check each setting according to the Operation Manual.

◇ Is the motor properly operating ? Does an abnormal sound occur ?

→ An out-of adjustment may be considered, therefore, change the speed, or adjust the output current of the driver.

◇ Is the load exceeding the rated applied ?

→ Check the load. Also try to lower the speed.

◇ Is the axis in the limit range ?

→ In a case where the axis is in the limit range, the stop position and counter value are not guaranteed. Use it out of the limit range.

◇ Is there any problem with the motor assembly and driving portions ?

→ If the device has been used for a long period of time, the coupling of the motor shaft may be loosened.

■ Remote control (RS-232C, GP-IB) does not operate properly

◇ Is the communications cable pulled out or loosened ?

→ Securely plug the connector of the communications cable into the connector of the main body.

◇ Have the parameter settings of RS-232C and address settings of GP-IB been properly performed ?

→ Read the setting method in the Operation Manual for a check.
(When the settings have been changed, turn on the power again.)

◇ Is a proper cable used ?

→ Check the arrangement of the connector pins on each cable.

◇ During communications, is any error code transmitted ?

→ Take measures for an error on the host computer.

◇ Is there any error in the control program on the host computer ?

→ Check the program. Please note that errors such as distinction between upper and lower case letters and setting of the delimiter code frequently occur.

→ Are commands transmitted and received properly ? Make sure to receive data for commands which have a response (for example, status reading).

◇ Checking by support software. Support software which can be easily operated is also available.

→ If proper operations can be performed by the support software, it is considered that the user's software is not correctly written.

◇ Are communications forcedly interrupted mid-stream?

→ Press the [RESET] switch, or turn on the power again.

8-2. Maintenance of Product

■ Maintenance of Controller

- In such cases of using in a dusty room, carry out internal cleaning periodically.
- When not using or storing for a long period of time, make sure to disconnect the power cord from the outlet and also to remove the other cables.
- Maintenance and service other than troubleshooting shall be carried out only by us at cost.

■ Maintenance of Stage

【Lubrication】

【Looseness of screws】

【Looseness of couplings】

8-3. Contact

If you have question about our products, fill in the necessary items below and notify us by FAX or mail. Questions by E-mail are also acceptable.

To KOHZU Precision Co., Ltd., Sales Department

Zip 215-8521, 2-6-15 Kurigi, Asao-Ward, Kawasaki-City, Kanagawa-Prefecture

FAX +81-44-981-2181 E-mail: sale@kohzu.co.jp

<table>
<tr><td colspan="3">Product name SC-</td><td colspan="2">Contact date
Serial No. Date / / ( )</td></tr>
<tr><td rowspan="3">Customer</td><td>Name</td><td></td><td>TEL
Extension</td><td>FAX</td></tr>
<tr><td>Name of company, school or institution</td><td></td><td colspan="2">E-mail</td></tr>
<tr><td>Department, Affiliation</td><td></td><td colspan="2">Address 〒</td></tr>
<tr><td colspan="5">Reason for contact ☐Failure ☐How to use ☐Hardware ☐Software</td></tr>
</table>

※ Please do not hesitate to notify us of your questions and opinions about our company and our products.

8-4. Warranty and After-Service

If the product fails within the warranty period, we will repair free of charge under our stipulations.

Warranty Period	One year from the date of shipment

■ Request for repair within warranty period

Please contact the sales agent or commercial firm from which you purchased our product, or our Sales Department.

■ Repair after warranty period has elapsed

Even if the warranty period has elapsed, initially, consult the sales agent or commercial firm from which you purchased the product. Repairs shall be carried out depending on failure at cost.

■ Maintenance for repairing parts

We will carry out maintenance of most parts for repair within a period specified by us after discontinuing production. Please understand that repair requiring parts for which the warranty period has elapsed may be rejected. Also, this condition may not be satisfied due to inconvenience of the parts supply maker.

9. Specification

9-1. General specifications

	SC-200	SC-400	SC-800
Number of axes controlled	2 axes	4axes	8axes
Number of axes controlled simultaneously	2 axes	4 axes	4 axes
Drive motor	5 phases stepping motor	<-	<-
Driver type	Micro step drive	<-	<-
Power for driver	100V	<-	<-
Driving current	Maximum 1.4A/Phase	<-	<-
Power	100V AC ± 10%, 50/60Hz	<-	<-
electricity consumption	430VA(2 axes motion)	790VA(4 axes motion)	890VA(4 axes motion)
Operating environment	Temperature 0°C to 45°C Humidity 0 to 85%	<-	<-
Exterior dimensions	W215×H88×D425(mm)	W215×H133×D425(mm)	W215×H88×D425(mm)
Weight	5.8kg	8.6kg	4.6kg

The electricity consumption value of SC-800 is shown in case of SD-800 connection.

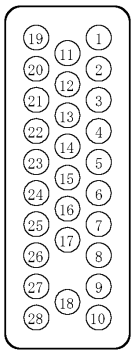
9-2. Performance Specifications

	SC-200/SC-400/SC-800
Driving Function	2 axes simultaneously/independently, 2 axes linear interpolation, 3 axes linear interpolation (SC-400/SC-800), Trapezoidal/asymmetric trapezoidal drive, S-shaped/asymmetric S-shaped drive
Micro Step Division Number	16 stages 1/2/4/5/8/10/16/20/25/40/50/80/100/125/200/250
Set Movement amount	1 to 16,777,215 pulse
Driving Frequency	1 to 500Kpps (according to driver)
Origin Return Method	14 methods
Display Type	Display by pulse, Display by angle conversion, Display by encoder
Communications Function	RS-232C/GP-IB
Others	Continuous drive, Swing drive

9-3. Connector

9-3-1. Motor Connecting Connector

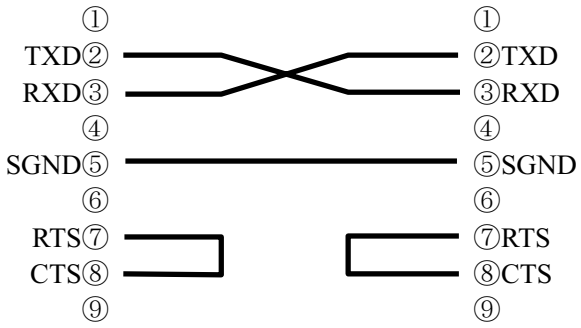
Connector model : S-1328 made by HIROSE ELECTRIC



⑲ +24V	⑪ +24V	①Blue	Motor wire connection
⑳ CW limit	⑫ CCW limit	②Purple	
㉑ Origin proximity	⑬ Origin	③Red	
㉒ GND	⑭ GND	④Grey	
㉓ +5V	⑮ +5V	⑤Yellow	
㉔ Encoder +A	⑯ Encoder -A	⑥Black	
㉕ Encoder +B	⑰ Encoder -B	⑦White	
㉖ Encoder +Z	⑱ GND	⑧Orange	
㉗ Encoder -Z		⑨Green	
㉘ GND		⑩Brown	

9-3-2. RS-232C Connector

Connector Model : D-sub 9pins (DE-9)



9-3-3. GP-IB Connector

■Connector Arrangement

Signal Name	Pin Arrangement		Signal Name
DIO1	1	13	DIO5
DIO2	2	14	DIO6
DIO3	3	15	DIO7
DIO4	4	16	DIO8
EOI	5	17	REN
DAV	6	18	GND
NRFD	7	19	GND
NDAC	8	20	GND
IFC	9	21	GND
SRQ	10	22	GND
ATN	11	23	GND
FG	12	24	GND

9-3-4. Pulse Connecting Connector (For SC-800, SD-800)

Connector model : S-1345(SC-800), P-1345(SD-800) made by HIROSE ELECTRIC

Pin Arrangement	Signal Name	Pin Arrangement		Pin Arrangement	Signal Name
1	+5V			30	PM1_PLS
2	PM1_DIR	17	NC	31	PM1_COFF
3	+5V	18	NC	32	PM2_PLS
4	PM2_DIR	19	NC	33	PM2_COFF
5	+5V	20	NC	34	PM3_PLS
6	PM3_DIR	21	NC	35	PM3_COFF
7	+5V	22	NC	36	PM4_PLS
8	PM4_DIR	23	NC	37	PM4_COFF
9	+5V	24	NC	38	PM5_PLS
10	PM5_DIR	25	NC	39	PM5_COFF
11	+5V	26	NC	40	PM6_PLS
12	PM6_DIR	27	NC	41	PM6_COFF
13	+5V	28	NC	42	PM7_PLS
14	PM7_DIR			43	PM7_COFF
15	+5V	29	NC	44	PM8_PLS
16	PM8_DIR			45	PM8_COFF

9-3-5. Signal Connecting Connector (For SC-800, SD-800)

Connector model : D-sub50pin female (SC-800), D-sub50pin male(SD-800)

Pin Arrangement	Signal Name	Pin Arrangement		Pin Arrangement	Signal Name
1	PM1_CWLS			34	PM1_CCWLS
2	PM1_NORG	18	+24V	35	PM1_ORG
3	PM2_CWLS	19	SGND	36	PM2_CCWLS
4	PM2_NORG	20	+24V	37	PM2_ORG
5	PM3_CWLS	21	SGND	38	PM3_CCWLS
6	PM3_NORG	22	+24V	39	PM3_ORG
7	PM4_CWLS	23	SGND	40	PM4_CCWLS
8	PM4_NORG	24	+24V	41	PM4_ORG
9	PM5_CWLS	25	SGND	42	PM5_CCWLS
10	PM5_NORG	26	+24V	43	PM5_ORG
11	PM6_CWLS	27	SGND	44	PM6_CCWLS
12	PM6_NORG	28	+24V	45	PM6_ORG
13	PM7_CWLS	29	SGND	46	PM7_CCWLS
14	PM7_NORG	30	+24V	47	PM7_ORG
15	PM8_CWLS	31	SGND	48	PM8_CCWLS
16	PM8_NORG	32	+24V	49	PM8_ORG
17	NC	33	SGND	50	NC

Supply voltage can be change +24V to +5V, refer to the “7-4. Voltage change of Sensor Power Source.”

9-3-6. Encoder Connecting Connector A/B (For SC-800, SD-800)

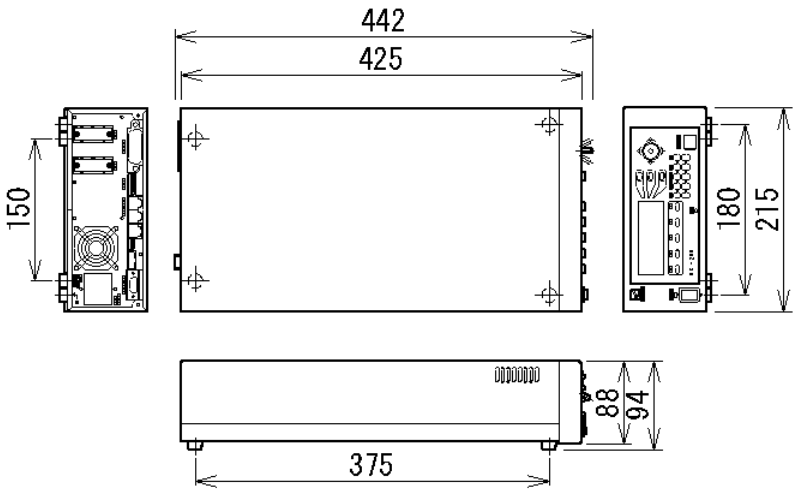
Connector model : D-sub37pin female (SC-800), D-sub37pin male (SD-800)

Pin Arrangement	Signal Name	Pin Arrangement	Signal Name
1	+5V	20	PM1_ENC_A
2	/PM1_ENC_A	21	GND
3	PM1_ENC_B	22	/PM1_ENC_B
4	GND	23	PM1_ENC_Z
5	/PM1_ENC_Z	24	+5V
6	PM2_ENC_A	25	/PM2_ENC_A
7	GND	26	PM2_ENC_B
8	/PM2_ENC_B	27	GND
9	PM2_ENC_Z	28	/PM2_ENC_Z
10	＋5V	29	PM3_ENC_A
11	/PM3_ENC_A	30	GND
12	PM3_ENC_B	31	/PM3_ENC_B
13	GND	32	PM3_ENC_Z
14	/PM3_ENC_Z	33	+5V
15	PM4_ENC_A	34	/PM4_ENC_A
16	GND	35	PM4_ENC_B
17	/PM4_ENC_B	36	GND
18	PM4_ENC_Z	37	/PM4_ENC_Z
19	NC		

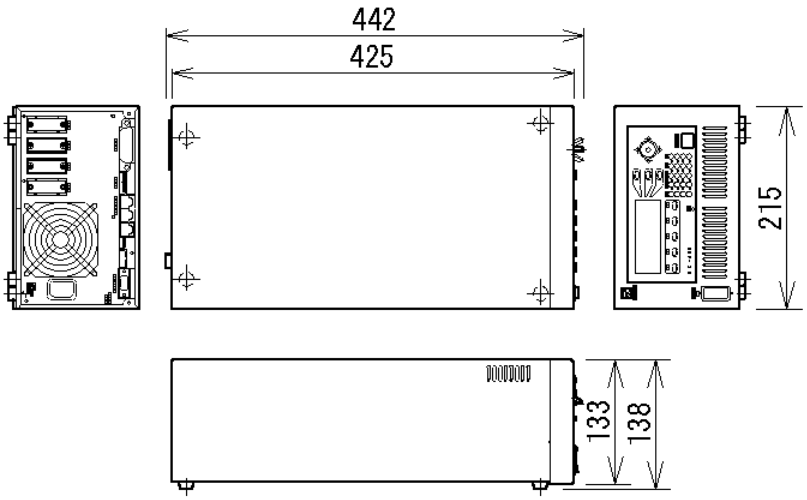
This figure shows type A, (B 1~4->5~8).

9-4. Exterior Dimensions

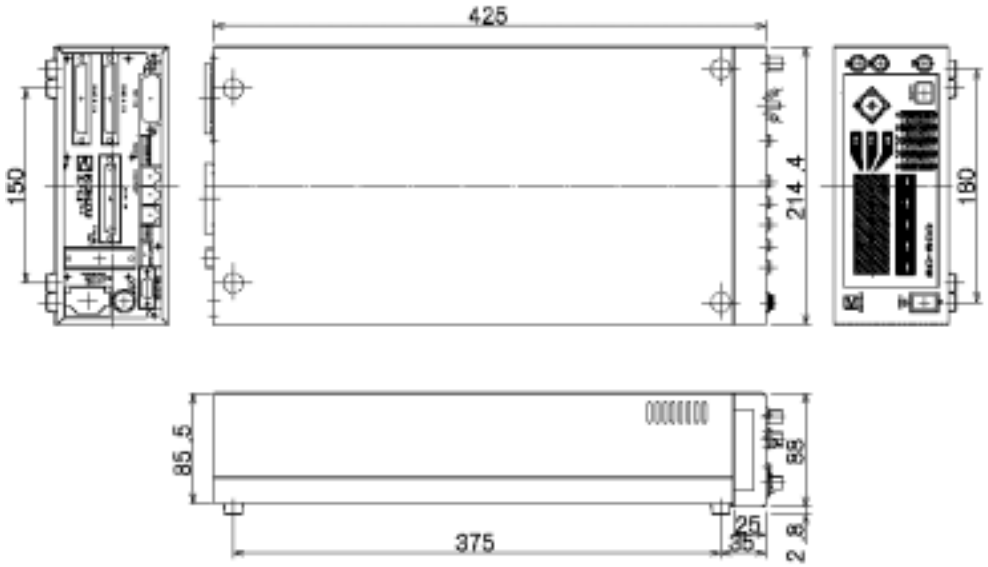
SC-200



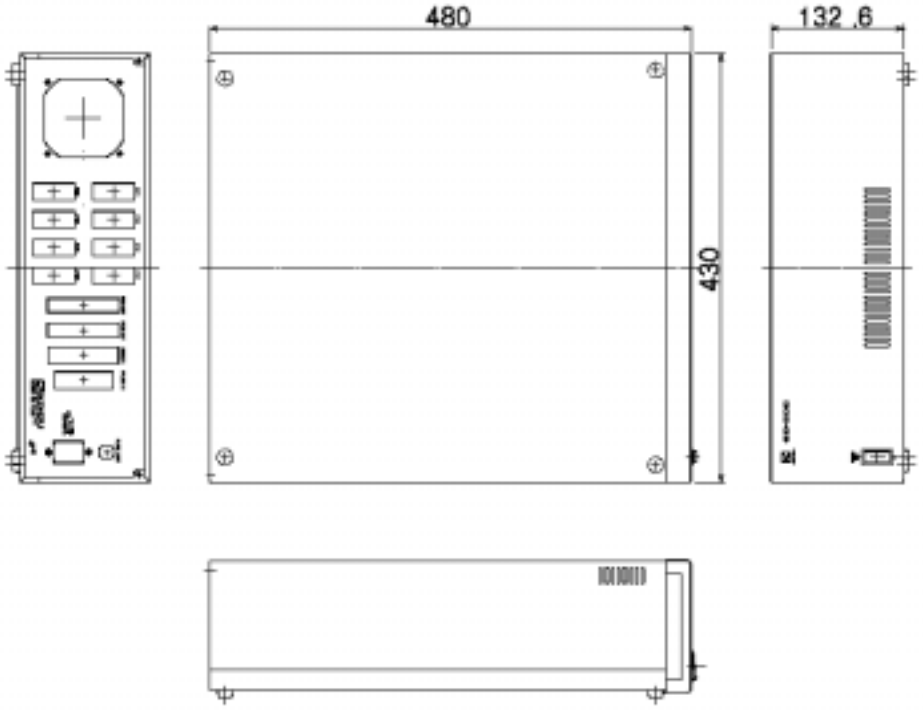
SC-400



SC-800



SD-800



10. Attached CD-R

10-1. Configuration

The description of the attached CD-R is as follows.

Description	Folder name, File name	Remark
Operating Manual		This reference
Introduction Manual		
MD-501A Operating Manual(J)		Operating Manual for built-in driver
Sample software		RS-232C, GP-IB
Design files		DXF format

※ Descriptions may be subject to change without prior notice.

10-2. Sample software

■ The sample software is for Microsoft Visual Basic6.0 and Visual C++6.0. To execute software, the developing software is required. GP-IB sample software is for National Instruments GP-IB board.

■ History of change

August, 2002	
January, 2003	Joystick related SYS settings changed
July, 2004	Correct misprint, add general spec, add connector arrangement (SC-800, SD-800), add annotation for remote command.
December,2004	'RBU Command' additional mode . 'SCN Command' additional mode .

Pioneering the door to the future with a commitment to technology

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Web Site: http://www.kohzuamerica.com/

Section for recording

Purchased Date ____ Year ____ Month ____ Date

Purchased from

Person in charge ____ TEL ____

Production No.

Special note

• •	
• •	
• •	
• •	
• •	
• •	
• •	
• •	

Change Check-Sheet

Record a change in the setting of the main body and driver if made.

Customer Name		Serial No.	
Person in Charge		Date shipped/purchased	
Remarks			

DIP Switch

Changed date	ADRS																							
	1	2	3	4	5	6	7	8																
・ ・																								
・ ・																								

Speed Table

Axis Name																			
Selection		L	H	A	D	L	H	A	D	L	H	A	D	L	H	A	D		
Speed Table	0																		
	1																		
	2																		
	3																		
	4																		
	5																		
	6																		
	7																		
	8																		
	9																		
	10																		
	11																		

Setting for each axis

Changed Date		・ ・	・ ・	・ ・	・ ・	・ ・	・ ・	・ ・	・ ・
Axis Name									
SYS Parameter Setting	No=								
	No=								
	No=								
	No=								
	No=								
	No=								
	No=								
	No=								
	No=								
	No=								
	No=								
	No=								
	No=								
	No=								
	No=								
	No=								
	No=								
Sensor Voltage									
Internal Driver	Model								
	STOP								
	RUN (Current)								
	M1 (Division number)								
	2/1CK								
	CD								
	L/HV								