

User's Manual

(Preparation and Operation)

Three-axis Stage Controller

SHRC-203



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For Your Safety

Before using this product, read this manual and all warnings or cautions in the documentation provided.

Only Factory Authorized Personnel should be changes and/or adjust the parts of controller.

The Symbols Used in This Manual

 WARNING	 CAUTION
This symbol marks warnings that should be read and used to prevent serious injury or death.	This symbol indicates where caution should be used to avoid possible injury to yourself or others, or damage to property.

The above indications are used together with the following symbols to indicate the exact nature of the warning or caution.

Examples of Symbols Accompanying Warnings and Cautions	
	△Symbols enclosed in a triangle indicate warnings and cautions. The exact nature of the warning or caution is indicated by the symbol inside (the symbol at left indicates risk of electrocution).
	○Symbols enclosed in a circle mark indicate prohibitions (actions that must not be performed). The exact nature of the prohibition is indicates by the symbol inside or next to the circle mark (the symbol at left indicates that the product must not be disassembled).
	●Symbols inside a black circle mark actions that must be performed to ensure safety. The exact nature of the action that must be performed is indicated by the symbol inside (the symbol at left is used in cases in which the AC adapter must be unplugged to ensure safety).

Symbols on the product

The symbol mark on the product calls your attention. Please refer to the manual, in the case that you operate the part of the symbol mark on the product.

	This symbol labeled on the portion calls your attention.
---	--

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- ① SIGMAKOKI CO., LTD. does not accept liability for damages resulting from the use of this product or the inability to use this product.
- ② SIGMAKOKI CO., LTD. does not accept liability for damages resulting from the use of this product that deviates from that described in the manual.
- ③ SIGMAKOKI CO., LTD. does not accept liability for damages resulting from the use of this product in extraordinary conditions, including fire, earthquakes, and other acts of God, action by any third party, other accidents, and deliberate or accidental misuse.
- ④ If the equipment is used in a manner not specified by the SIGMAKOKI CO., LTD., the protection provided by the equipment may be impaired.



WARNING

- Do not use this product in the presence of flammable gas, explosives, or corrosive substances, in areas exposed to high levels of moisture or humidity, in poorly ventilated areas, or near flammable materials.
- Do not connect or check the product while the power is on.
- Installation and connection should be performed only by a qualified technician.
- Do not bend, pull, damage, or modify the power or connecting cables.
- Do not touch the products internal parts.
- Connect the earth terminal to ground.
- Should the product overheat, or should you notice an unusual smell, heat, or unusual noises coming from the product, unplug the power cord from the AC connector immediately.
- Do not turn on the power in the event that it has received a strong physical shock as the result of a fall or other accident.
- There is an intake slit on the right side and an exhaust slit for the cooling fan on the left side. To prevent the internal temperature from rising, do not block the intake / exhaust slits. Also, provide a space of 50 mm or more on both sides.
- Do not touch the stage while operation.
- Use dry clothes only for cleaning the equipment.

Chapter 1: Before You Begin

1-1. Package Contents

Purchasers of the Stage Controller should find that the package contains the items listed below. Check the package contents using the following checklist. Contact your retailer as soon as possible in the event that you should find that any item is missing or damaged.

☐ SHRC-203 Stage Controller	:1
☐ User's Manual (This Manual)	:1
☐ AC Power Cable	:1

The user's manual for commands is not included, so please download it from the following website address.

- Three-axis Stage Controller SHRC-203 User's Manual (Command) SHOT / FC mode
- Three-axis Stage Controller SHRC-203 User's Manual (Command) HIT mode

View our home page

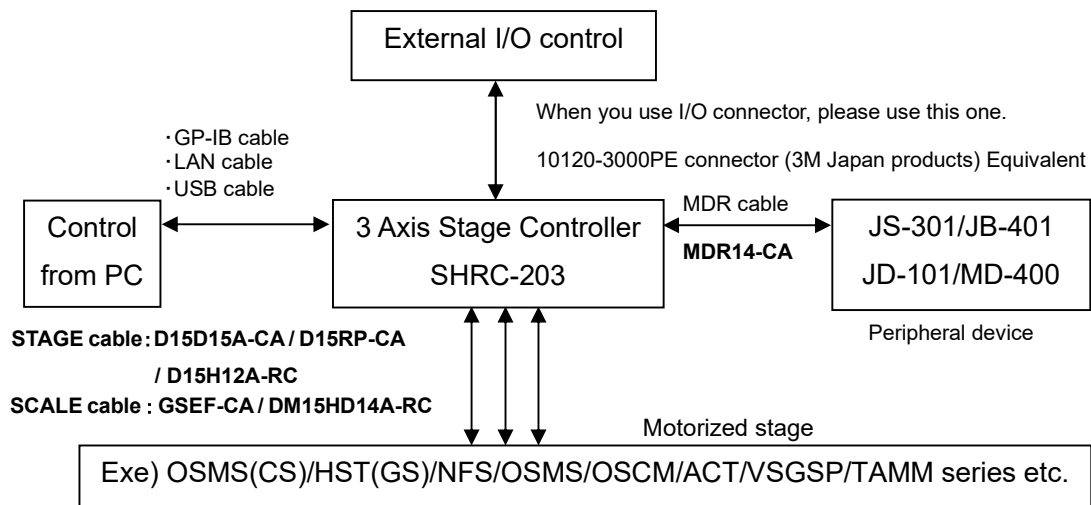
https://jp.optosigma.com/en_jp/software_motorize_controller-manual

1-2. Overview

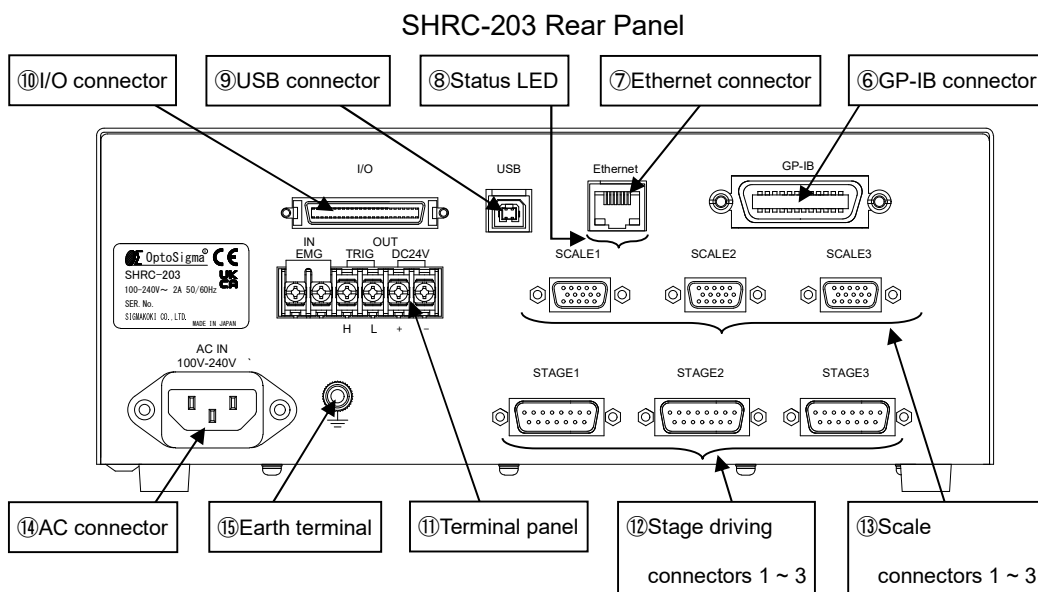
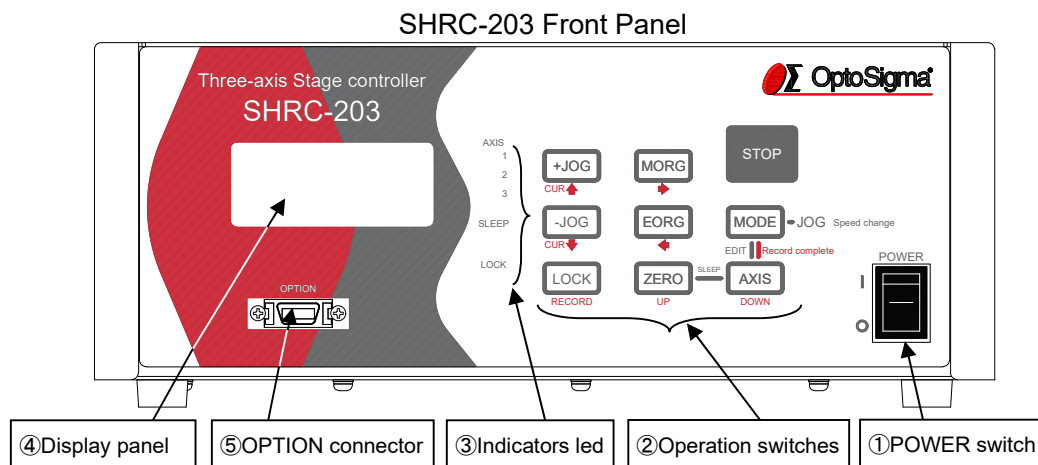
This controller is a stage controller for 3-axis total closed-loop control supporting glass scale and has a built-in driver to drive a 5-phase stepping motor, enabling independent control for each axis. Compatible with existing models, this controller offers excellent applicability across a wide range of requirements at a low cost.

When the SHRC-203 is connected to an ordinary personal computer via an USB, GP-IB or Ethernet interface, the stage can be accurately moved to the desired position by simple commands sent from the PC. Also, it is possible to save internal data via program data downloads and uploads. The program has been simplified for ease of construction of complicated control systems. Internal power supply for I/O (Input / Output) signals, trigger output signals, and DC24V output signals makes it possible to control external input or output devices or to output trigger signals synchronized with external measuring devices. In addition, manual operation is possible facility by connecting JOYSTICK, etc. (an optional product).

1-3. The SHRC-203 System



1-4. Parts and Functions



Functions :

- ① POWER switch : The product is on when the switch is set to ON("I" side). Set the switch to OFF("O" side) to turn the product off.
- ② Operation switches : These switches can be used to operate the stage, operate the Memory switch, perform sleep, and disable the operation switches.
- ③ Indicators led : The axis on which the stage can be operated by the operation switch, sleep execution, and operation switch invalidity are displayed by lighting the lamp.
- ④ Display panel : Displays the position coordinates for each axis and the operating mode.
- ⑤ OPTION connector : This connector is used when the JS-301/JB-401/JD-101/MD-400.
*) About the usage of OPTION (JS-301 / JB-401 / JD-101 / MD-400), confirm various User's manual.
- ⑥ GP-IB connector : This connector is used when the device is controlled from the computer via a GP-IB interface.
*) GP-IB communication has been tested with National Instruments GPIB-USB-HS+ and 778930-01.
- ⑦ Ethernet connector : This connector is used when the device is controlled from the computer via an Ethernet interface.
- ⑧ Status LED (Ethernet) : Green : Lights up when the communication speed is 100Mbps, and turns off when the communication speed is 10Mbps or when the cable is not connected.
Yellow : Lights up when a valid link is detected and blinks when data transmission or reception is detected.
- ⑨ USB connector : This connector is used when the device is controlled from the computer via an USB interface (Virtual COM).
- ⑩ I/O connector : This connector accepts a cable for sending and receiving I/O and control signals to/from an external device. It can also be used to drive motorized stages remotely or to start programmed operations.
- ⑪ Terminal panel : This terminal block is used when an emergency stop input, trigger output signal, and 24V DC power supply are required.
- ⑫ Stage driving connectors : Connect the motorized stage to be used. Supports up to three axes.
- ⑬ Scale connectors : Connects to the glass-scales to be used. Supports up to three axes.
- ⑭ AC connector : Connect the supplied 2.3 meter power cable here.

● USABLE DETACHABLE POWER CORDS

Type	Connector	Cord	Attachment plug cap
AC100-120 [V]	Use the detachable power cord set attached to the product only.		
AC200-240 [V]	IEC C-13 Rated 7[A], 250[V] UL, CSA Approved	Type SJT, No16 AWG Min. 3-Conductors (Single phased;2-current carrying & ground) UL, CSA Approved	Rated 7[A],250[V] UL, CSA Approved

Cable length of above Power Supply cord shall be shorter than 4.5[m].



Should the product overheat, or should you notice an unusual smell, heat, or unusual noises coming from the product, unplug the power cord from the AC connector immediately.

- ⑮ Earth terminal : Ground the equipment when in use.



For your own safety, make sure POWER is OFF before connecting every cable.

Chapter 2: Connection Procedures

2-1. SHRC-203 Connection Procedure

First, connect SHRC-203 to the motorized stages.

- ① Make sure the SHRC-203 power switch is off.
- ② For stepping motor specification motorized stages (OSMS series, OSCM series, ACT series, VSGSP series, TAMM series), please prepare D15D15A/D15RP-CA cable. For OSMS (CS) series and HST (GS) series motorized stages with scale-mounted stepping motor specifications, please prepare D15D15A-CA and GSEF-CA cables. For NFS series, please prepare D15H12A-RC and DM15HD14A-RC cables.
- ③ Connect the stage to be controlled as the first axis to the STAGE1 connector of the SHRC-203 controller. Also connect the stage controlled as the second axis to the STAGE2 connector. Also connect the stage controlled as the third axis to the STAGE3 connector.

For scale-mounted specifications, also connect to each SCALE connector.

2-2. Connecting to PC and Peripheral Device

Connect the SHRC-203 to a PC and peripherals (JS-301/JB-401/JD-101/MD-400).

- ① Make sure the SHRC-203 power switch is off.
- ② For USB, use the USB cable on the TypeA/TypeB male connector to connect it to the USB (Type B) connector on the SHRC-203. Connect the USB (Type A) connector to your PC. (Genuine cable : for example,model number is USB-1A / USB-2A)
Also, when use the USB cable on the Type C / Type B male connector to connect it to the USB (Type B) connector on the SHRC-203 in the same way. Connect the USB (Type C) connector to your PC.
- ③ For Ethernet, use a LAN cable to connect.
(It can be cross or straight.)
- ④ For GP-IB, connect using GP-IB cable.

When using peripheral devices, connect peripheral devices by the procedures ⑤ to ⑥.

- ⑤ Use the dedicated cable MDR14-CA-2.5 for peripheral cables.
- ⑥ The one side of MDR14-CA is connected with the connector of the peripheral device.
The connector on the other side of MDR14-CA is connected with the OPTION connector of SHRC-203.

2-3. Connecting power cable

Connect the supplied power cable to the AC connector on the rear panel of SHRC-203 to plug the cable into an outlet.



Caution

Be sure to ground the ground terminal of the power cable.

2-4. Installing USB Drivers

When using a USB cable to control from a PC, it is necessary to first install the driver on the PC side.

Please download the driver from our website.

After the download is complete, install the driver.

View our home page https://jp.optosigma.com/ja_jp/software_usb

For Windows 10 and 11, installation of this driver is not required.

Chapter 3: Settings

3-1. Set up SHRC-203

Various settings of SHRC-203 are set by the Memory switch.

Memory switch settings can be changed using front panel operations, commands, and sample software (SGSample).

When changing Memory switch settings use the Sample software (SGSample), which can be downloaded from https://jp.optosigma.com/en_jp/software_sample

3-1-1. Operation on the Front Panel

Pressing the [AXIS] button while hold down the [MODE] button in the MANUAL mode top screen switches to the classification selection screen. The Memory switch settings can be changed using the following front panel buttons.

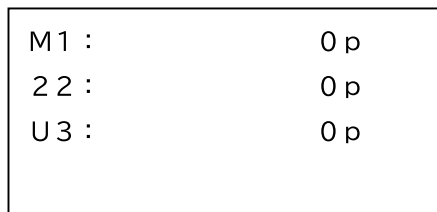


Fig. 3-1. MANUAL Mode Top screen

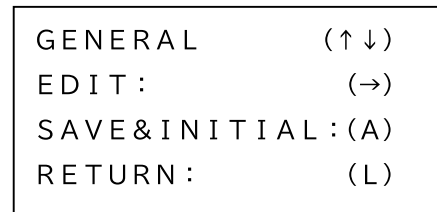


Fig. 3-2. Classification Selection screen

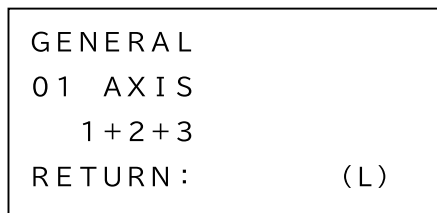


Fig. 3-3. Memory Switch Editing screen

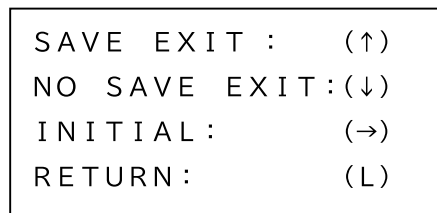


Fig. 3-4. Registration screen

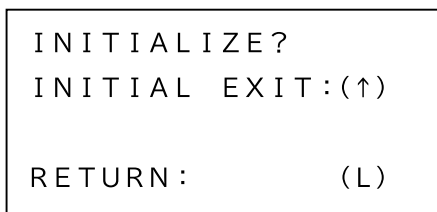


Fig. 3-5. Initialization screen

[+JOG] ① : Change the classification item.

(GENERAL → INTERFACE → ... → SOFT LIMIT → GENERAL)

② : Change the setting items. (No.N-1 → N → 1 → 2)

③ : Register the change data and return to the MANUAL mode top screen.

④ : Execute and register initialization and return to MANUAL mode top screen.

[-JOG] ① : Change the classification item.

(GENERAL → SOFT LIMIT → ... → INTERFACE → GENERAL)

② : Change the setting items. (No.2 → 1 → N → N-1)

③ : Discard the change data and return to MANUAL mode top screen.

[MORG] ① : Change to the Memory switch editing screen for editing.

② : Move the cursor to the right digit.

③ : For initialization, it changes to the initialization screen.

[EORG] Move the cursor to the left digit.

[ZERO] Change the settings. For numeric data, it increases.

[AXIS] ① : Change the settings. For numeric data, it decreases.

② : To register the edits, the display changes to the registration screen.

[LOCK] ① : Cancel the edit and return to manual mode top screen.

② : Keep the edits and return to the classification selection screen.

③ : Cancel registration and return to the Memory switch editing screen.

④ : Cancel initialization and return to the registration screen.

1) MANUAL Mode Selection

M 1 :	0 p
2 2 :	0 p
U 3 :	0 p

To enter MANUAL mode, press the [MODE] button until the upper left of the display becomes "M".

It changes to HOST "H" → MANUAL "M" → REMOTE "R" → TEACHING "T" → EDIT "E" → TEST "S" → HOST "H".

2) Memory Switch Edit Target Selection

GENERAL	(↑↓)
EDIT :	(→)
SAVE & INITIAL :	(A)
RETURN :	(L)

① After selecting MANUAL mode, hold down the [MODE] button and press the [AXIS] button, and select the Memory switch item with the [+JOG] (↑) or [-JOG] (↓) button. With the [+ JOG] (↑) button, "GENERAL" → "INTERFACE" → "SENSOR" → "AXIS" → "MOTOR DRIVER" → "SPEED" → "ORG" → "FEEDBACK" → "SOFT LIMIT" → "GENERAL" it will change. The [-JOG] (↓) button is reversed.

② Select the item to be changed and press the [MORG] (→) button to confirm.

To return to "1) MANUAL mode selection," press the [LOCK] (L) button.

As an operation example, "03 GP-IB ADDR" of "INTERFACE" will be changed from "8" to "18". Select "INTERFACE" and press the [MORG] (→) button.

3) Memory Switch Edit

```

INTERFACE
03 GP-IB ADDR
      8
RETURN :      (L)

```

- ① Select the contents to be changed by clicking [+JOG] (↑) or [-JOG] (↓) button.
In this example, press until "03 GP-IB ADDR" is displayed.
- ② Move the cursor with the [MORG] (→) or [EORG] (←) button and change the value with the [ZERO] (UP) or [AXIS] (DOWN) button. In this example, move the cursor to the second digit and change it to "18" with the [ZERO] (UP) button.
For selection types, there is no cursor.

```

INTERFACE
03 GP-IB ADDR
      18
RETURN :      (L)

```

- ③ To change another Memory switch item or exit editing, press the [LOCK] button.
The changes are kept and returned to "2) Memory switch editing target selection".
(If the Memory switch is changed, line 4 changes to "NO SAVE EXIT".)

```

GENERAL      (↑↓)
EDIT :      (→)
SAVE&INITIAL : (A)
NO SAVE EXIT : (L)

```

- ④ To save the changes, press [AXIS] (A).
To return to "1) MANUAL mode selection", press the [LOCK] (L) button.

4) Memory Switch Registration

SAVE EXIT	(↑)
NO SAVE EXIT:	(↓)
INITIAL:	(→)
RETURN:	(L)

- ① To save changes and exit, press the [+JOG] (↑) button.
The display returns to "1) MANUAL mode selection.
- ② To discard the changes and exit, press the [-JOG] (↓) button.
The display returns to "1) MANUAL mode selection.
- ③ To restore the factory settings, press the [MORG] (→) button.
Then press [+JOG] (↑) button.
To return to "4) Memory Switch Registration," press the [LOCK] (L) button.

INITIALIZE?	
INITIAL EXIT:	(↑)
RETURN:	(L)

3-1-2. Operation with Command

When editing from a personal computer, after transition from the HOST mode to the Memory Switch Edit mode, edit using the "Command" in the table and the "Command setting" and "Setting range" in the description.

Available commands are shown below.

MS : ON	Transition to Memory Switch Edit mode.
MS : SET(K)	Set the contents of the Memory switch.
MS : GET(K)	Get the contents of the Memory switch.
MS : DEF(K,R,RK)	Initialize the Memory switch contents.
MS : OFF	Return to the HOST mode.

For commands, refer to the separate "SHRC-203 User's Manual (Command)".

3-2. List of Memory Switch Items

Item	Contents	Remarks	Command
GENERAL	General settings	Axis setting, etc.	0
INTERFACE	Communication settings	Interfeiss settings, etc.	1
SENSOR	Sensor settings	Logic, etc.	2
AXIS	Axis settings	Stage type, etc.	3
MOTOR DRIVER	Motor driver settings	Number of divisions setting, etc.	4
SPEED	Speed setting	Speed selection, etc.	5
ORG	Return to origin setting	Return method, etc.	6
FEEDBACK	FEEDBACK control settings	Control system, etc.	7
SOFT LIMIT	Soft limit setting	Limit coordinate setting, etc.	8

3-3. Mark attached to the setting value of Memory Switch

The following marks is attached to the front side of the setting value of the item to be read when "AXIS"-"CONFIGx" is ON (some items are read even if it is OFF) by connecting the stage equipped with the auto config ROM.

- ** : This item is loaded even when OFF, and the setting cannot be changed.
- * : This is an item that is read even when OFF, and changing "FEEDBACK" - "CONT1 to 3" to "OPEN" will enable setting changes.
- # : This item is read only when ON. If "#" is marked, the setting can be changed, but the changes will be overwritten as the data is read when the power is turned on again. To save changes, turn it OFF before setting.

Mark

```

SENSOR
01 LS/LEV1
# NORMAL OPEN
RETURN :      (L)

```

3-4. List of each Memory Switch Contents and Detailed Settings

3-4-1. GENERAL (Command: 0)

No	Memory switch contents	Setting range / Select items	Initial value / setting	Command
1	AXIS	1, 2, 3, 1+2, 1+3, 2+3, 1+2+3	1+2+3	0
2	MODE SEL	HOST, MANUAL, REMOTE, TEACHING, EDIT, TEST	HOST	1
3	SLEEP SEL	OFF, ON	ON	2
4	BEEP SEL	OFF, ON	ON	3
5	JOG X SEL	1, 2, 3	1	4
6	JOG Y SEL	1, 2, 3	2	5
7	CMD FORMAT	SHOT/FC, HIT	SHOT/FC	6
8	TRG/LEV	HI, LO	HI	7
9	TRG WIDTH	10, 100, 1000	10	8

1) AXIS : Set the controllable axis.

[Select items] 1 : Valid only for the 1st axis	[Command setting : 0]
2 : Valid only for the 2nd axis	[Command setting : 1]
3 : Valid only for the 3rd axis	[Command setting : 2]
1+2 : 1st axis, 2nd axis valid	[Command setting : 3]
1+3 : 1st axis, 3rd axis valid	[Command setting : 4]
2+3 : 2nd axis, 3rd axis valid	[Command setting : 5]
1+2+3 : Valid for all axes	[Command setting : 6]

2) MODE SEL: Set the initial operating mode after powering up.

(It is necessary to turn on the power again for the reflection.)

[Select items] HOST : HOST Mode	[Command setting : 0]
MANUAL : MANUAL mode	[Command setting : 1]
REMOTE : REMOTE mode	[Command setting : 2]
TEACHING: TEACHING MODE	[Command setting : 3]
EDIT : EDIT mode	[Command setting : 4]
TEST : TEST mode	[Command setting : 5]

3) SLEEP SEL : Set whether to enable or disable the sleep function.

[Select items] OFF : Disable	[Command setting : 0]
ON : Enable	[Command setting : 1]

4) BEEP SEL : Set whether to enable or disable the beep.

[Select items] OFF : Disable	[Command setting : 0]
ON : Enable	[Command setting : 1]

5) JOG X SEL : Set the X-axis operation stage of the peripheral device.

[Select items] 1 : 1st axis	[Command setting : 0]
2 : 2nd axis	[Command setting : 1]
3 : 3rd axis	[Command setting : 2]

6) JOG Y SEL : Set the Y-axis operation stage of the peripheral device.

[Select items] 1 : 1st axis	[Command setting : 0]
2 : 2nd axis	[Command setting : 1]
3 : 3rd axis	[Command setting : 2]

7) CMD FORMAT : Set the command format.

(It is necessary to turn on the power again for the reflection.)

[Select items] SHOT/FC : SHOT and FC command format	[Command setting : 0]
HIT : HIT command format	[Command setting : 1]

8) TRG/LEV: Set the trigger output logic.

[Select items] HI : Positive (Active High)	[Command setting : 0]
LO : Negative (Active Low)	[Command setting : 1]

9) TRG WIDTH : Set the trigger output pulse width.

[Select items] 10 : 10μsec	[Command setting : 0]
100 : 100μsec	[Command setting : 1]
1000 : 1000μsec	[Command setting : 2]

3-4-2. INTERFACE (Command: 1)

No	Memory switch contents	Setting range / Select items	Initial value / setting	Command
1	INTERFACE	USB, ETHR, GP-IB	USB	0
2	DELIMIT	CR, LF, CRLF, EOI	CRLF	1
3	GP-IB ADDR	1 ~ 30	8	2
4	ETHR DHCP	OFF	OFF	3
5	ETHR IPADDR	000000000000 ~ 255255255255	192168000001	4
6	ETHR DGW	000000000000 ~ 255255255255	192168000001	5
7	ETHR SNM	000000000000 ~ 255255255255	255255255000	6
8	ETHR PORT	0 ~ 65535	9004	7
9	COMM/ACK	MAIN, SUB, ECHO	MAIN	8
10	POSOUT	OFF, ON	ON	9

1) INTERFACE : Set the communication interface.

[Select items] USB : USB

[Command setting : 0]

ETHR : Ethernet

[Command setting : 1]

GP-IB : GP-IB

[Command setting : 2]

2) DELIMIT : Set the delimiter.

[Select items] CR : CR

[Command setting : 0]

LF : LF

[Command setting : 1]

CRLF : CR+LF

[Command setting : 2]

EOI : EOI

[Command setting : 3]

*) EOI can only be used when GP-IB is selected.

3) GP-IB ADDR : Set the GP-IB address.

[Setting range] 1 ~ 30

4) ETHR DHCP : Set the Ethernet DHCP client function.

[Select items] OFF : Disables queries to the DHCP server.

[Command setting : 0]

5) ETHR IPADDR : Set the Ethernet IP address.

(It is necessary to turn on the power again for the reflection.)

[Setting range] 000000000000 ~ 255255255255

6) ETHR DGW : Set the Ethernet default gateway.

(It is necessary to turn on the power again for the reflection.)

[Setting range] 0000000000000 ~ 255255255255

7) ETHR SNM : Set the Ethernet subnet mask.

(It is necessary to turn on the power again for the reflection.)

[Setting range] 0000000000000 ~ 255255255255

8) ETHR PORT : Set Ethernet port number.

(It is necessary to turn on the power again for the reflection.)

[Setting range] 0 ~ 65535

9) COMM/ACK: Set the communication protocol.

[Select items] MAIN : Reply OK if the process is completed successfully, NG or NG_I

in case of error.

[Command setting : 0]

SUB : No reply regardless of normal or error.

[Command setting : 1]

ECHO : Reply as it is sent content.

[Command setting : 2]

In case of information acquisition command or error, what was sent

Add status or NG or NG_I to and reply.

Example 1 Normal (Configuration command)

COMM/ACK settings	Send	Reply
MAIN	BO:1	OK
SUB	BO:1	
ECHO	BO:1	BO:1

Example 2 Error (Configuration command)

COMM/ACK settings	Send	Reply 1	Reply 2
MAIN	BO:2	NG	NG_I
SUB	BO:2		
ECHO	BO:2	BO:2,NG	NG_I

Example 3 Normal (Information acquisition command)

COMM/ACK settings	Send	Reply
MAIN	BO?	1
SUB	BO?	1
ECHO	BO?	BO?,1

Example 4 Error (Information Retrieval Command)

COMM/ACK settings	Send	Reply 1	Reply 2
MAIN	BO?1	NG	NG_I
SUB	BO?1		
ECHO	BO?1	BO?1,NG	NG_I

10) POSOUT : Set whether or not the current coordinate values are transmitted from the communication interface in use during teaching registration.

[Select items] OFF : Transmission disabled [Command setting : 0]

ON : Transmission enabled [Command setting : 1]

3-4-3. SENSOR (Command: 2)

No	Memory switch contents	Setting range / Select items	Initial value / setting	Command
1	LS/LEV1	NORMAL CLOSE, NORMAL OPEN	NORMAL CLOSE	0
2	LS/LEV2	NORMAL CLOSE, NORMAL OPEN	NORMAL CLOSE	1
3	LS/LEV3	NORMAL CLOSE, NORMAL OPEN	NORMAL CLOSE	2
4	ORGS/LEV1	NORMAL CLOSE, NORMAL OPEN	NORMAL OPEN	3
5	ORGS/LEV2	NORMAL CLOSE, NORMAL OPEN	NORMAL OPEN	4
6	ORGS/LEV3	NORMAL CLOSE, NORMAL OPEN	NORMAL OPEN	5
7	NEARS/LEV1	NORMAL CLOSE, NORMAL OPEN	NORMAL OPEN	6
8	NEARS/LEV2	NORMAL CLOSE, NORMAL OPEN	NORMAL OPEN	7
9	NEARS/LEV3	NORMAL CLOSE, NORMAL OPEN	NORMAL OPEN	8

1 ~ 3) LS LVL1 ~ 3 : Set the limit sensor input logic for each axis.

[Select items] NORMAL CLOSE : Normally closed [Command setting : 0]

(Switches from ON to OFF when the limit sensor is detected.)

NORMAL OPEN : Normally open [Command setting : 1]

(Switches from OFF to ON when the limit sensor is detected.)

4 ~ 6) ORGS/LEV1 ~ 3 : Set the ORG sensor input logic for each axis.

[Select items] NORMAL CLOSE : Normally closed [Command setting : 0]

(Switches from ON to OFF when the ORG sensor is detected.)

NORMAL OPEN : Normally open [Command setting : 1]

(Switches from OFF to ON when the ORG sensor is detected.)

7 ~ 9) NEARS/LEV1 ~ 3 : Set the NEAR sensor input logic for each axis.

[Select items] NORMAL CLOSE : Normally closed [Command setting : 0]

(Switches from ON to OFF when the NEAR sensor is detected.)

NORMAL OPEN : Normally open [Command setting : 1]

(Switches from OFF to ON when the NEAR sensor is detected.)

3-4-4. AXIS (Command: 3)

No	Memory switch contents	Setting range / Select items	Initial value / setting	Command
1	STAGE TYPE1	LINEAR, ROTATE, GONIO	LINEAR	0
2	STAGE TYPE2	LINEAR, ROTATE, GONIO	LINEAR	1
3	STAGE TYPE3	LINEAR, ROTATE, GONIO	LINEAR	2
4	BASE RATE1	1 ~ 10000	200	3
5	BASE RATE2	1 ~ 10000	200	4
6	BASE RATE3	1 ~ 10000	200	5
7	MOVE1	POS, NEG	POS	6
8	MOVE2	POS, NEG	POS	7
9	MOVE3	POS, NEG	POS	8
10	ACC CONT1	S CURVE, LINEAR	LINEAR	9
11	ACC CONT2	S CURVE, LINEAR	LINEAR	10
12	ACC CONT3	S CURVE, LINEAR	LINEAR	11
13	STAGE1 UNIT	PULSE, NANO, MICRO, MILLI, DEG, SENSOR PULSE, SENSOR NANO, SENSOR MICRO, SENSOR MILLI, SENSOR DEG	PULSE	12
14	STAGE2 UNIT	PULSE, NANO, MICRO, MILLI, DEG, SENSOR PULSE, SENSOR NANO, SENSOR MICRO, SENSOR MILLI, SENSOR DEG	PULSE	13
15	STAGE3 UNIT	PULSE, NANO, MICRO, MILLI, DEG, SENSOR PULSE, SENSOR NANO, SENSOR MICRO, SENSOR MILLI, SENSOR DEG	PULSE	14
16	EMG MT EXCT1	OFF, ON	OFF	15
17	EMG MT EXCT2	OFF, ON	OFF	16
18	EMG MT EXCT3	OFF, ON	OFF	17
19	EMG BT EXCT	OFF, ON	ON	18
20	AXIS NAME1	1 ~ 9, A ~ Z	1	19
21	AXIS NAME2	1 ~ 9, A ~ Z	2	20

No	Memory switch contents	Setting range / Select items	Initial value / setting	Command
22	AXIS NAME3	1 ~ 9, A ~ Z	3	21
23	LMT FEEDBACK1	OFF, ON	OFF	22
24	LMT FEEDBACK2	OFF, ON	OFF	23
25	LMT FEEDBACK3	OFF, ON	OFF	24
26	LMT STOP SEL1	SD STOP, LM STOP	LM STOP	25
27	LMT STOP SEL2	SD STOP, LM STOP	LM STOP	26
28	LMT STOP SEL3	SD STOP, LM STOP	LM STOP	27
29	CD DRIVE1	OFF, ON	OFF	28
30	CD DRIVE2	OFF, ON	OFF	29
31	CD DRIVE3	OFF, ON	OFF	30
32	CONFIG1	OFF, ON	ON	31
33	CONFIG2	OFF, ON	ON	32
34	CONFIG3	OFF, ON	ON	33

1 ~ 3) STAGE TYPE 1 ~ 3 : Set the stage type of each axis.

[Select items] LINEAR : Linear motion stage [Command setting : 0]

ROTATE : Rotation stage [Command setting : 1]

(Limit sensor is invalid except for mechanical origin return operation)

GONIO : Gonio stage [Command setting : 2]

4 ~ 6) BASE RATE 1 ~ 3 : Sets the amount of movement per pulse at full step of each axis.

[Setting range] 1 ~ 10000

Stage	XYZ Linear motion stage					
Screw lead	1mm				2mm	5mm
Stepping motor type	Harmonic	Geared	High resolution	Standard		
Basic step angles	0.0072°	0.072°	0.36°	0.72°		
Travel per pulse at base step	0.02μm	0.2μm	1μm	2μm	4μm	10μm
BASE RATE	2	20	100	200	400	1000

Stage	XYZ Linear motion stage					Rotation stage
Screw lead	6mm	10mm	20mm	25mm	50mm	—
Stepping motor type	Standard					
Basic step angles	0.72°					
Travel per pulse at base step	12μm	20μm	40μm	50μm	100μm	0.005°
BASE RATE	1200	2000	4000	5000	10000	50

7 ~ 9) MOVE 1 ~ 3 : Set the direction of movement of each axis.

[Select items] POS : Positive rotation [Command setting : 0]

NEG : Negative rotation [Command setting : 1]

Item	Description
POS	It moves to the motor side by the movement instruction in the positive direction, and detects the limit sensor on the motor side as LS +.
NEG	It moves to the anti-motor side by the movement instruction in the positive direction, and detects the limit sensor on the anti-motor side as LS +.

10 ~ 12) ACC CONT1 ~ 3 : Set the acceleration / deceleration control for each axis.

[Select items] S CURVE : S-shaped curve [Command setting : 0]

LINEAR : Trapezoidal [Command setting : 1]

13 ~ 15) STAGE 1 ~ 3 UNI T: Set the coordinate value display unit of the LCD display of each axis and the LCD display of peripheral devices (JS-301, JB-401, MD-400).

[Select items] PULSE : Display drive pulse by pulse number [Command setting : 0]

NANO : Display drive pulse in nm [Command setting : 1]

MICRO : Display drive pulse in μm [Command setting : 2]

MILLI : Display drive pulse in mm [Command setting : 3]

DEG : Display drive pulse in degrees [Command setting : 4]

SENSOR PULSE : Display scale signal by pulse number [Command setting : 5]

SENSOR NANO : Display scale signal in nm [Command setting : 6]

SENSOR MICRO : Display scale signal in μm [Command setting : 7]

SENSOR MILLI : Display scale signal in mm [Command setting : 8]

SENSOR DEG : Display scale signal in degrees [Command setting : 9]

16 ~ 18) EMG MT EXCT1 ~ 3: Set the motor excitation state during emergency stop of each axis.

[Select items] OFF : De-excitation	[Command setting : 0]
ON : Excitation	[Command setting : 1]

19) EMG BT EXCT: Sets the 24V output state from the terminal block during an emergency stop.

[Select items] OFF : 24V OFF	[Command setting : 0]
ON : 24V ON Continuation	[Command setting : 1]

20 ~ 22) AXIS NAME1 ~ 3 : Sets the axis name for the LCD display of each axis and the LCD display of the peripheral devices (JS-301, JB-401, MD-400).

[Select items] 1(0), 2(1), 3(2), 4(3), 5(4), 6(5), 7(6), 8(7), 9(8), A(9), B(10), C(11), D(12), E(13), F(14), G(15), H(16), I(17), J(18), K(19), L(20), M(21), N(22), O(23), P(24), Q(25), R(26), S(27), T(28), U(29), V(30), W(31), X(32), Y(33), Z(34)	[Command setting : In parentheses]
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23 ~ 25) LMT FEEDBACK1 ~ 3 : Set whether or not to control feedback even within the limit sensor on each axis.

[Select items] OFF : Do not execute	[Command setting : 0]
ON : Execute	[Command setting : 1]

26 ~ 28) LMT STOP SEL1 ~ 3 : Set the stop method when inputting the limit sensor on each axis.

[Select items] SD STOP : Deceleration Stop	[Command setting : 0]
LM STOP : Immediate Stop	[Command setting : 1]

29 ~ 31) CD DRIVE1 ~ 3 : Sets whether or not to move with HOLD current when driving each axis.

[Select items] OFF : Do not execute	[Command setting : 0]
ON : Execute	[Command setting : 1]

32~ 34) CONFIG1 ~ 3: Set whether to enable or disable the auto-config function for each axis at startup.

(It is necessary to turn on the power again for the reflection.)

[Select items] OFF : Disable	[Command setting : 0]
ON : Enable	[Command setting : 1]

When the autoconfig is ON on the stage equipped with the autoconfig ROM, the Memory switch settings in Table 3-1 and 3-2 below are set according to the stage.

Table.3-1

Item	Memory switch No.	Memory switch contents	Description
SENSOR	1 ~ 3	LS/LEV1 ~ 3 [#]	Setting limit sensor input logic
	4 ~ 6	ORGS/LEV1 ~ 3 [#]	Setting ORG sensor input logic
	7 ~ 9	NEARS/LEV1 ~ 3 [#]	Setting proximity sensor input logic
AXIS	1 ~ 3	STAGE TYPE1 ~ 3 [#]	Select stage type
	4 ~ 6	BASE RATE1 ~ 3 [**]	Set the amount of movement per pulse in full steps
	7 ~ 9	MOVE1 ~ 3 [#]	Set travel direction
	10 ~ 12	ACC CONT1 ~ 3 [#]	Select acceleration and deceleration control) NFS series only
	13 ~ 15	STAGE1 ~ 3 UNIT [#]	LCD display and option (JS-301, JB-401, MD-400) Select the coordinate value display unit for the LCD display.
	26 ~ 28	LMT STOP SEL1 ~ 3 [#]	Set the stop method when entering the limit sensor

[**]: This item is loaded even when auto-config is OFF, and a "**" is added in front of the setting value.
Settings cannot be changed.

Table.3-2

Item	Memory switch No.	Memory switch contents	Description
MOTOR DRIVER	1 ~ 3	DIVIDE1 ~ 3 [*]	Set the number of motor driver divisions
	4 ~ 6	HOLD1 ~ 3 [#]	Set hold current for motor driver
	7 ~ 9	DRIVE1 ~ 3 [#]	Set the DRIVE current of the motor driver
SPEED	2 ~ 37	SPEED 1 ~ 3 1 ~ 4 (S) (F) (R) [#]	Set the moving speed *1,2)
	38 ~ 40	MAX SPEED1 ~ 3 [#]	Set maximum travel speed
ORG	1 ~ 3	ORG1 ~ 3 SEL [#]	Set origin return method
	4 ~ 6	ORG1 ~ 3 DIR [#]	Set return direction to origin
	7 ~ 9	ORG1 ~ 3 OFFSET [#]	Set the offset movement amount when returning to the mechanical origin (MINI method)
	10 ~ 18	ORG1 ~ 3 (S) (F) (R) [#]	Set the return to mechanical origin speed *1,2)
FEED-BACK	1 ~ 3	CONT1 ~ 3 [#]	Set up control methods
	4 ~ 6	INPOS1 ~ 3 [#]	Set in-position range *) NFS series only
	13 ~ 15	FB SPEED1 ~ 3 [#]	Set feedback pulse speed *) NFS series only
	19 ~ 21	COR1 ~ 3 MODE [#]	Set correction mode *) NFS series only

*1) For scaled stages, HST series, and HST-YAW series stages of the (CS) series and (GS) series, if "MAX SPEEDx " is exceeded, a "W4 SPD SETx " warning will be issued, so set it to "MAX SPEEDx " or lower.

*2) In the case of the NFS series, the full contents are set.

[*]: This item is loaded even when auto-config is OFF, and a "*" is added in front of the setting value.

Changing "FEEDBACK" - "CONTx" to "OPEN" will enable setting changes.

[#]: This item is loaded only when auto-config is ON, and a "#" is added in front of the setting value.

If "#" is marked, the setting can be changed, but the changes will be overwritten as the data is loaded when the power is turned on again. To save the changes, turn off the auto config before setting.

3-4-5. MOTOR DRIVER (Command: 4)

No	Memory switch contents	Setting range / Select items	Initial value / setting	Command
1	DIVIDE1	1, 2, 3, 4, 5, 6, 8, 10, 12, 20, 25, 30, 40, 50, 60, 80, 100, 120, 125, 200, 250, 300, 400, 600, 800, 1000, 2000, 4000, 8000	2	0
2	DIVIDE2	1, 2, 3, 4, 5, 6, 8, 10, 12, 20, 25, 30, 40, 50, 60, 80, 100, 120, 125, 200, 250, 300, 400, 600, 800, 1000, 2000, 4000, 8000	2	1
3	DIVIDE3	1, 2, 3, 4, 5, 6, 8, 10, 12, 20, 25, 30, 40, 50, 60, 80, 100, 120, 125, 200, 250, 300, 400, 600, 800, 1000, 2000, 4000, 8000	2	2
4	HOLD1	0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100	50	3
5	HOLD2	0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100	50	4
6	HOLD3	0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100	50	5
7	DRIVE1	0.3, 0.325, 0.35, 0.5, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.9, 1, 1.1, 1.2, 1.3, 1.4	0.75	6
8	DRIVE2	0.3, 0.325, 0.35, 0.5, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.9, 1, 1.1, 1.2, 1.3, 1.4	0.75	7
9	DRIVE3	0.3, 0.325, 0.35, 0.5, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.9, 1, 1.1, 1.2, 1.3, 1.4	0.75	8

1 ~ 3) DIVIDE 1 ~ 3 : Sets the number of motor driver divisions for each axis.

[Select items] 1(0), 2(1), 3(2), 4(3), 5(4), 6(5), 8(6), 10(7), 12(8), 20(9), 25(10), 30(11),
40(12), 50(13), 60(14), 80(15), 100(16), 120(17), 125(18), 200(19),
250(20), 300(21), 400(22), 600(23), 800(24), 1000(25), 2000(26),
4000(27), 8000(28) [Command setting : In parentheses]

4 ~ 6) HOLD1 ~ 3 : Sets the HOLD current of the motor driver on each axis.

[Select items] 0(0), 5(1), 10(2), 15(3), 20(4), 25(5), 30(6), 35(7), 40(8), 45(9), 50(10),
60(11), 70(12), 80(13), 90(14), 100(15)
(unit : % of DRIVE current) [Command setting : In parentheses]

7 ~ 9) DRIVE1 ~ 3 : Sets the DRIVE current of the motor driver on each axis.

[Select items] 0.3(0), 0.325(1), 0.35(2), 0.5(3), 0.55(4), 0.6(5), 0.65(6), 0.7(7), 0.75(8),
0.8(9), 0.9(10), 1(11), 1.1(12), 1.2(13), 1.3(14), 1.4(15) (Unit : A/phase)
[Command setting : In parentheses]

3-4-6. SPEED (Command: 5)

No	Memory switch contents	Setting range / Select items	Initial value / setting	Command
1	SPEED SEL	1, 2, 3, 4	2	0
2	SPEED11 (S)	Within the range of "MAX SPEED1"	100	1
3	SPEED11 (F)	Within the range of "MAX SPEED1"	1000	2
4	SPEED11 (R)	1 ~ 1000	200	3
5	SPEED12 (S)	Within the range of "MAX SPEED1"	500	4
6	SPEED12 (F)	Within the range of "MAX SPEED1"	5000	5
7	SPEED12 (R)	1 ~ 1000	200	6
8	SPEED13 (S)	Within the range of "MAX SPEED1"	750	7
9	SPEED13 (F)	Within the range of "MAX SPEED1"	7500	8
10	SPEED13 (R)	1 ~ 1000	200	9
11	SPEED14 (S)	Within the range of "MAX SPEED1"	1000	10
12	SPEED14 (F)	Within the range of "MAX SPEED1"	10000	11
13	SPEED14 (R)	1 ~ 1000	200	12
14	SPEED21 (S)	Within the range of "MAX SPEED2"	100	13
15	SPEED21 (F)	Within the range of "MAX SPEED2"	1000	14
16	SPEED21 (R)	1 ~ 1000	200	15
17	SPEED22 (S)	Within the range of "MAX SPEED2"	500	16
18	SPEED22 (F)	Within the range of "MAX SPEED2"	5000	17
19	SPEED22 (R)	1 ~ 1000	200	18
20	SPEED23 (S)	Within the range of "MAX SPEED2"	750	19

No	Memory switch contents	Setting range / Select items	Initial value / setting	Command
21	SPEED23 (F)	Within the range of "MAX SPEED2"	7500	20
22	SPEED23 (R)	1~1000	200	21
23	SPEED24 (S)	Within the range of "MAX SPEED2"	1000	22
24	SPEED24 (F)	Within the range of "MAX SPEED2"	10000	23
25	SPEED24 (R)	1 ~ 1000	200	24
26	SPEED31 (S)	Within the range of "MAX SPEED3"	100	25
27	SPEED31 (F)	Within the range of "MAX SPEED3"	1000	26
28	SPEED31 (R)	1 ~ 1000	200	27
29	SPEED32 (S)	Within the range of "MAX SPEED3"	500	28
30	SPEED32 (F)	Within the range of "MAX SPEED3"	5000	29
31	SPEED32 (R)	1 ~ 1000	200	30
32	SPEED33 (S)	Within the range of "MAX SPEED3"	750	31
33	SPEED33 (F)	Within the range of "MAX SPEED3"	7500	32
34	SPEED33 (R)	1 ~ 1000	200	33
35	SPEED34 (S)	Within the range of "MAX SPEED3"	1000	34
36	SPEED34 (F)	Within the range of "MAX SPEED3"	10000	35
37	SPEED34 (R)	1 ~ 1000	200	36
38	MAX SPEED1	See detailed description	100000	37
39	MAX SPEED2	See detailed description	100000	38
40	MAX SPEED3	See detailed description	100000	39

1) SPEED SEL : Sets the speed at startup.

(It is necessary to turn on the power again for the reflection.)

[Select items] 1(0), 2(1), 3(2), 4(3)

[Command setting : In parentheses]

2 ~ 37) SPEED 1 ~ 3 1 ~ 4 (S)(F)(R) :

Set four types of movement speed (Minimum speed S, maximum speed F, acceleration / deceleration time R) for each axis. In addition, when operating the front panel, manually operating JS-301, JB-401, JD-101, MD-400, and operating the internal program, this movement speed setting is used for movement.

[Setting range] For minimum S speed and maximum F speed, refer to the detailed explanation of "MAX SPEED 1 ~ 3".

(R) : Acceleration / deceleration time 1 ~ 1,000ms

***) Set the minimum speed S to a value smaller than the maximum speed F in the speed setting.**

38 ~ 40) MAX SPEED 1 ~ 3 : Sets the maximum movement speed for each axis.

▪ Example when "FEEDBACK" - "CONTx" is "CLOSE"

Unit	Resolution	Setting range
PULSE, SENSOR PULSE	-	1 ~ 999999999 [pps]
NANO, SENSOR NANO	1 [nm]	1 ~ 999999999 [nm/s]
MICRO, SENSOR MICRO	1 [nm]	0.001 ~ 999999.999 [μ m/s]
MICRO, SENSOR MICRO	1 [μ m]	1 ~ 999999999 [μ m/s]
MILI, SENSOR MILI	1 [nm]	0.000001 ~ 999.999999 [mm/s]
MILI, SENSOR MILI	1 [μ m]	0.001 ~ 999999.999 [mm/s]
DEG, SENSOR DEG	0.000001 [°]	0.000001 ~ 999.999999 [°/s]
DEG, SENSOR DEG	0.001 [°]	0.001 ~ 999999.999 [°/s]

▪ Example when "FEEDBACK" - "CONTx" is "OPEN"

Unit	Amount of movement per pulse	Number of driver divisions	Setting range
PULSE	-	4 or more	1 ~ 1000000 [pps]
PULSE	-	2 or less	1 ~ 100000 [pps]
NANO	1 [nm]	4 or more	1 ~ 1000000 [nm/s]
NANO	1 [nm]	2 or less	1 ~ 100000 [nm/s]
MICRO	1 [μ m]	4 or more	1 ~ 1000000 [μ m/s]
MICRO	1 [μ m]	2 or less	1 ~ 100000 [μ m/s]
MICRO	1 [nm]	4 or more	0.001 ~ 1000.000 [μ m/s]
MICRO	1 [nm]	2 or less	0.001 ~ 100.000 [μ m/s]
MILI	1 [mm]	4 or more	1 ~ 1000000 [mm/s]
MILI	1 [mm]	2 or less	1 ~ 100000 [mm/s]
MILI	1 [nm]	4 or more	0.000001 ~ 1.000000 [mm/s]
MILI	1 [nm]	2 or less	0.000001 ~ 0.100000 [mm/s]
DEG	1 [°]	4 or more	1 ~ 1000000 [°/s]
DEG	1 [°]	2 or less	1 ~ 100000 [°/s]
DEG	0.000001 [°]	4 or more	0.000001 ~ 1.000000 [°/s]
DEG	0.000001 [°]	2 or less	0.000001 ~ 0.1 [°/s]

*) The unit depends on "AXIS" - "STAGEx UNIT".

3-4-7. ORG (Command: 6)

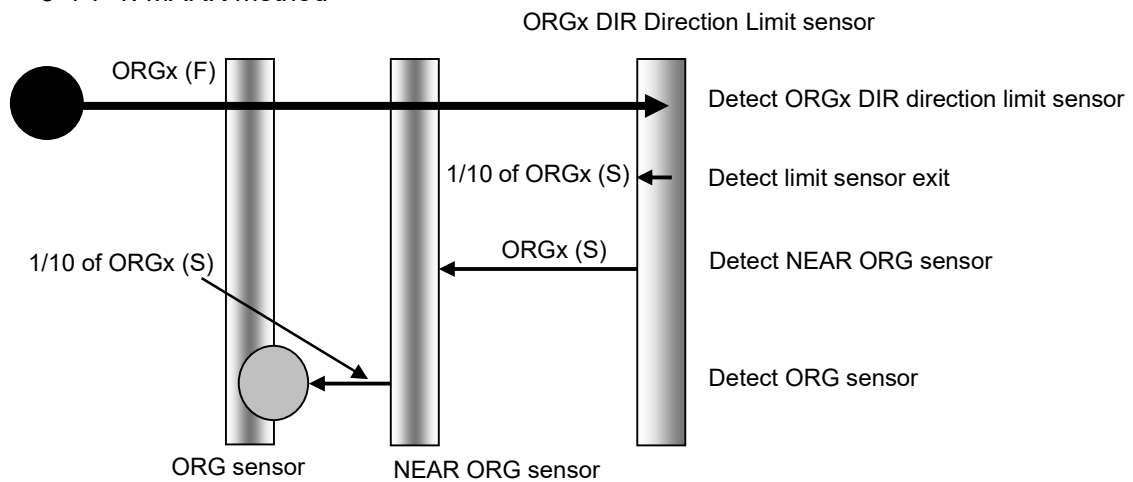
No	Memory switch contents	Setting range / Select items	Initial value / setting	Command
1	ORG1 SEL	MARK, MINI, MIDDLE, ORGS, NORMAL, OFF	MINI	0
2	ORG2 SEL	MARK, MINI, MIDDLE, ORGS, NORMAL, OFF	MINI	1
3	ORG3 SEL	MARK, MINI, MIDDLE, ORGS, NORMAL, OFF	MINI	2
4	ORG1 DIR	PLUS, MINUS	MINUS	3
5	ORG2 DIR	PLUS, MINUS	MINUS	4
6	ORG3 DIR	PLUS, MINUS	MINUS	5
7	ORG1 OFFSET	1 ~ 999999999	1000	6
8	ORG2 OFFSET	1 ~ 999999999	1000	7
9	ORG3 OFFSET	1 ~ 999999999	1000	8
10	ORG1 (S)	Within the range of "MAX SPEED1"	500	9
11	ORG1 (F)	Within the range of "MAX SPEED1"	5000	10
12	ORG1 (R)	1 ~ 1000	200	11
13	ORG2 (S)	Within the range of "MAX SPEED2"	500	12
14	ORG2 (F)	Within the range of "MAX SPEED2"	5000	13
15	ORG2 (R)	1 ~ 1000	200	14
16	ORG3 (S)	Within the range of "MAX SPEED3"	500	15
17	ORG3 (F)	Within the range of "MAX SPEED3"	5000	16
18	ORG3 (R)	1 ~ 1000	200	17

1 ~ 3) ORG1 ~ 3 SEL : Set the return to mechanical origin method for each axis.

[Select items]	MARK : MARK method	[Command setting : 0]
	MINI : MINI method	[Command setting : 1]
	NORMAL : Standard method	[Command setting : 2]
	MIDDLE : LS-to-LS Intermediate Method	[Command setting : 3]
	ORGS : ORG method	[Command setting : 4]
	OFF : Return to mechanical origin disabled	[Command setting : 5]

*) After the origin return is completed, the coordinate value is reset to zero.

3-4-7-1. MARK method

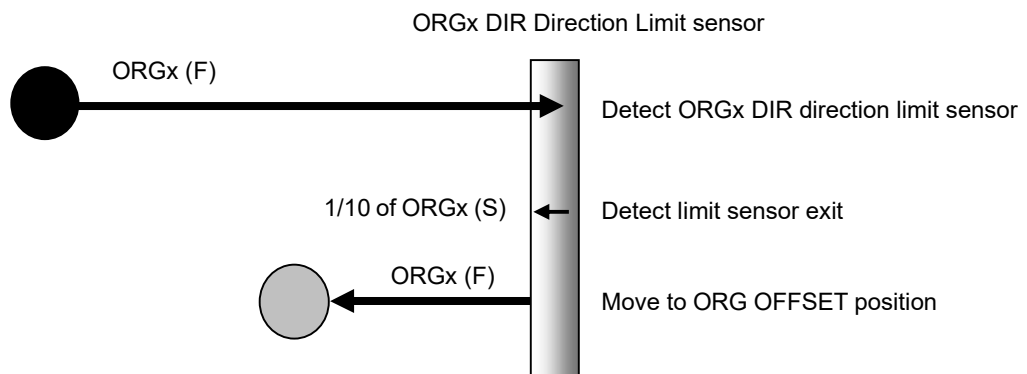


Caution 1) In case of the ORGx DIR direction limit sensor is detected and moved in the opposite direction and the NEAR ORG sensor cannot be detected (In case of no NEAR ORG sensor), it stops at the limit sensor in the opposite direction.

Caution 2) In case of the NEAR ORG sensor is detected and moved in the ORGx DIR direction, and the origin sensor cannot be detected (In case of no ORG sensor), it stops at the limit sensor in the opposite direction.

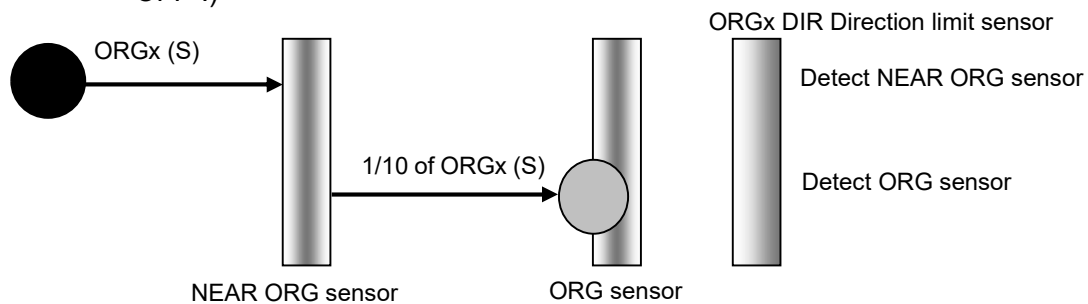
3-4-7-2. MINI method

ORGx OFFSET default value is 1000.



3-4-7-3. NORMAL method

(When Memory switch "FEEDBACK" - "CORRx MODE" is set to "TWO" or "OFF".)

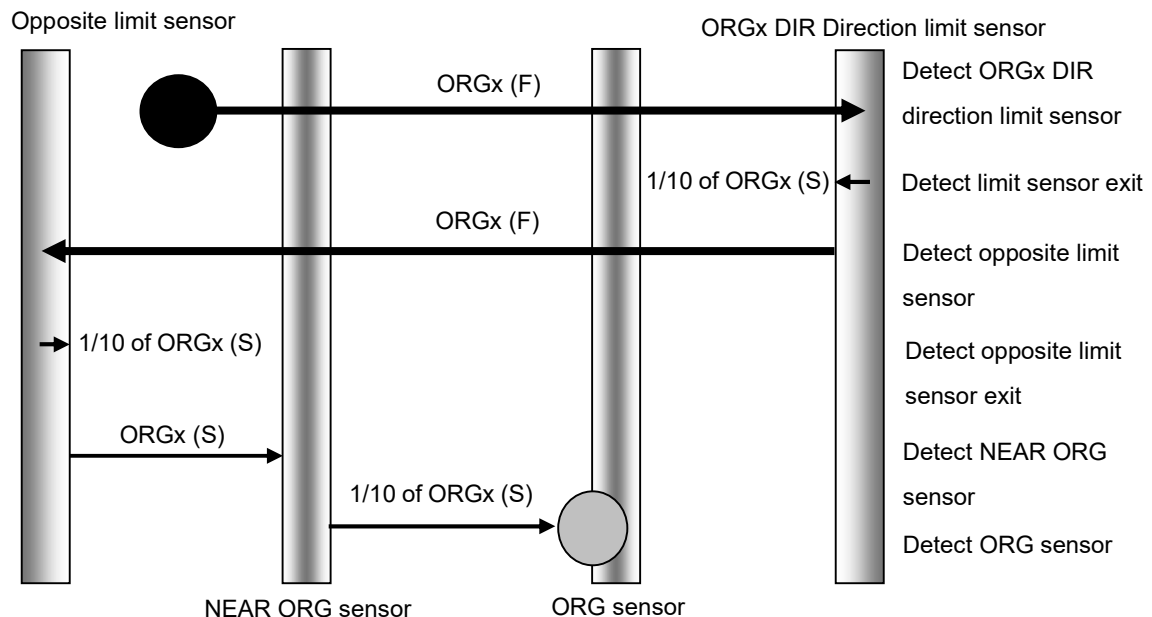


Caution 1) In case of the NEAR ORG sensor cannot be detected when moving in the ORGx DIR direction (If there is no NEAR ORG sensor), it will stop at the ORGx DIR direction limit sensor.

Caution 2) In case of the NEAR ORG sensor is detected and moved in the ORGx DIR direction and the ORG sensor cannot be detected (If there is no ORG sensor), it stops at the ORGx DIR direction limit sensor.

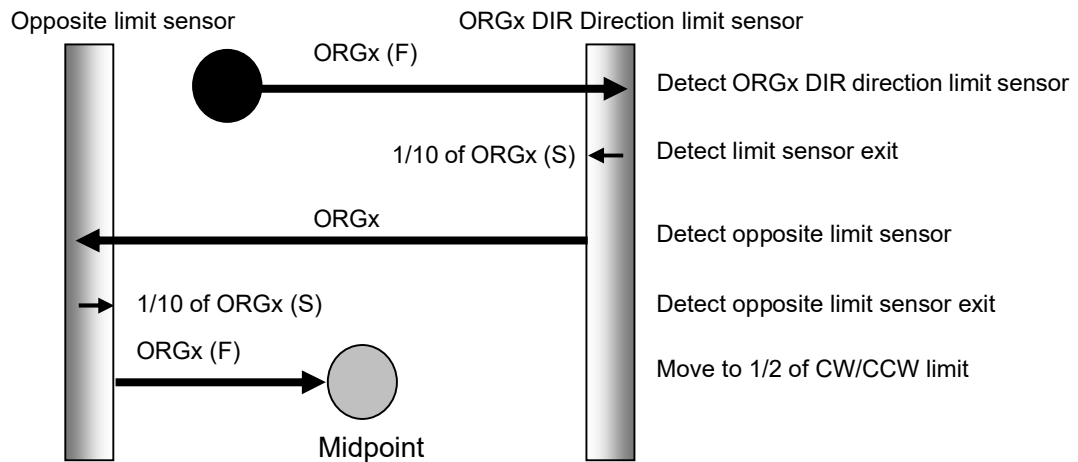
3-4-7-4. NORMAL method

(When Memory switch "FEEDBACK" - "CORRx MODE" is set to "MULTI".)



Caution) In case of the ORG sensor cannot be detected (If there is no ORG sensor) after the opposite limit sensor in the ORGx DIR direction is detected and the NEAR ORG sensor is detected, or the NEAR ORG sensor cannot be detected (If there is no NEAR ORG sensor), it stops at the ORGx DIR direction limit sensor.

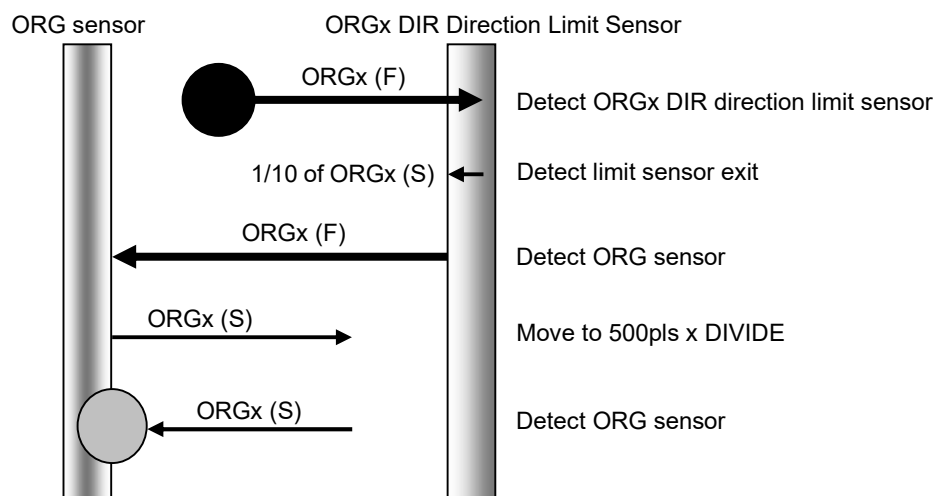
3-4-7-5. MIDDLE method



3-4-7-6. ORGS method

3-4-7-6-1. In case of stopped between the ORGx DIR direction limit sensor and the ORG sensor.

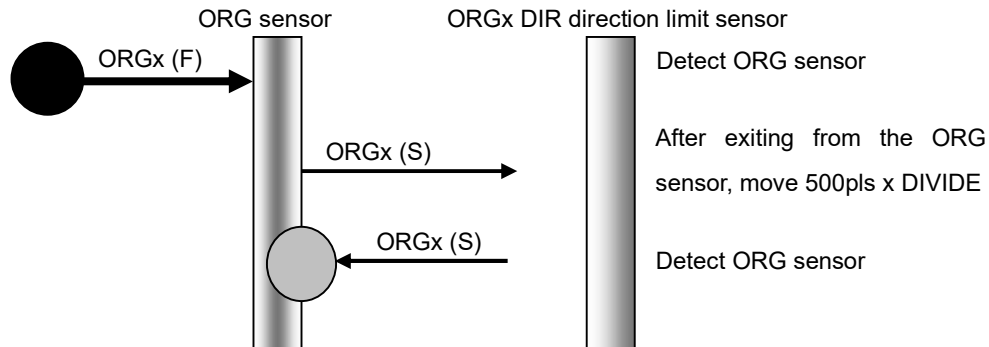
(When Memory switch "FEEDBACK" - "CORRx MODE" is set to "TWO" or "OFF".)



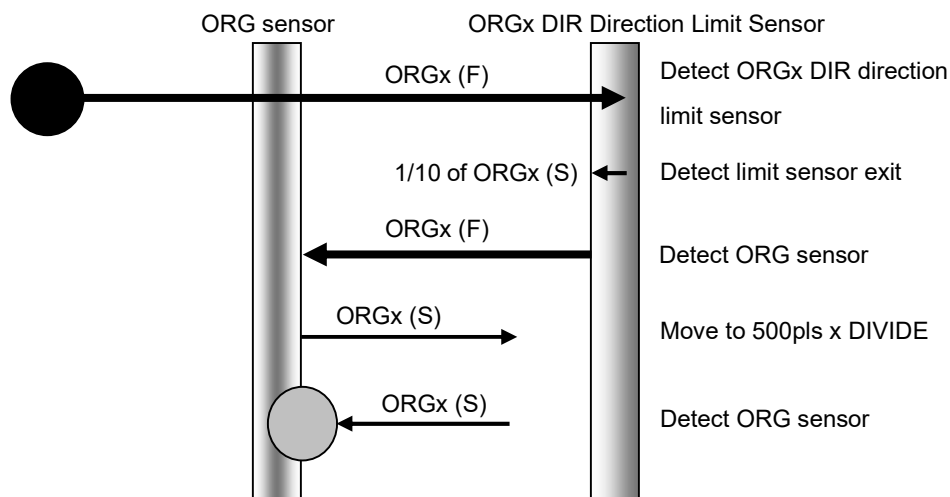
Caution) In case of the ORGx DIR direction limit sensor is detected, moved in the opposite direction and the ORG sensor cannot be detected (if there is no origin sensor), it stops at the limit sensor in the opposite direction to the ORGx DIR direction limit sensor.

3-4-7-6-2. In case of the ORG sensor is in front of the ORGx DIR direction limit sensor.

(When Memory switch "FEEDBACK" - "CORRx MODE" is set to "TWO" or "OFF".)



3-4-7-6-3. When Memory switch "FEEDBACK" - "CORRx MODE" is set to "MULTI".



Caution) In case of the ORGx DIR direction limit sensor is detected, moved in the opposite direction and the ORG sensor cannot be detected (If there is no origin sensor), it stops at the limit sensor in the opposite direction to the ORGx DIR direction limit sensor.

3-4-7-7. OFF Does not perform return to mechanical origin operation.

4 ~ 6) ORG1 ~ 3 DIR : Sets the return direction of mechanical origin for each axis.

[Select items] PLUS : Limit sensor in the positive direction [Command setting : 0]

MINUS : Limit sensor in the negative direction [Command setting : 1]

7 ~ 9) ORG1 ~ 3 OFFSET : Set the offset movement amount when returning to the mechanical origin of each axis (MINI method).

[Setting range] 1 ~ 999999999

10 ~ 18) ORG1 ~ 3(S)(F)(R) : Set the mechanical origin return speed of each axis.

(Minimum speed S, Maximum speed F, Acceleration / Deceleration time R)

[Setting range] For minimum S speed and maximum F speed, refer to the detailed explanation of "MAX SPEED 1 ~ 3".

(R) : Acceleration / deceleration time 1 to 1,000ms

***) Set the minimum speed S to a value smaller than the maximum speed F in the speed setting.**

3-4-8. FEEDBACK (Command: 7)

No	Memory switch contents	Setting range / Select items	Initial value / setting	Command
1	CONT1	CLOSE, OPEN	OPEN	0
2	CONT2	CLOSE, OPEN	OPEN	1
3	CONT3	CLOSE, OPEN	OPEN	2
4	INPOS1	0 ~ 99	4	3
5	INPOS2	0 ~ 99	4	4
6	INPOS3	0 ~ 99	4	5
7	INP DEC1	NORMAL, SHORT	NORMAL	6
8	INP DEC2	NORMAL, SHORT	NORMAL	7
9	INP DEC3	NORMAL, SHORT	NORMAL	8
10	FBT SEL1	NORMAL, AFTER	NORMAL	9
11	FBT SEL2	NORMAL, AFTER	NORMAL	10
12	FBT SEL3	NORMAL, AFTER	NORMAL	11
13	FB SPEED1	NORMAL, FAST	NORMAL	12
14	FB SPEED2	NORMAL, FAST	NORMAL	13
15	FB SPEED3	NORMAL, FAST	NORMAL	14
16	ZERO CONT1	OFF, ON	ON	15
17	ZERO CONT2	OFF, ON	ON	16
18	ZERO CONT3	OFF, ON	ON	17
19	COR1 MODE	TWO, MULTI, OFF	OFF	18
20	COR2 MODE	TWO, MULTI, OFF	OFF	19
21	COR3 MODE	TWO, MULTI, OFF	OFF	20

1 ~ 3) CONT1 ~ 3 : Set the control method for each axis.

(It is necessary to turn on the power again for the reflection.)

[Select items]	CLOSE : Closed loop	[Command setting : 0]
	OPEN: Open loop	[Command setting : 1]

4 ~ 6) INPOS 1 ~ 3 : When the closed loop control method is selected, set the in-position range (Positioning completion range at the time of positioning) of each axis.

[Setting range] 0 ~ 99

Example : For a scale resolution of 0.01 μ m

0 : 0 μ m ~ +0.01 μ m range

1 : 1 $\times$ $\pm$ 0.01 = $\pm$ 0.01 μ m range

99 : 99 $\times$ $\pm$ 0.01 = $\pm$ 0.99 μ m range

7 ~ 9) INP DEC1 ~ 3 : Set the in-position determination time for each axis.

[Select items]	NORMAL : Normal	[Command setting : 0]
	SHORT : Shorten	[Command setting : 1]

***) In the in-position judgment time, SHORT can be used for shortening the takt time, but positioning is completed even if it does not stay within the in-position range stably, so be sure to test with the actual stage when selecting.**

10 ~ 12) FBT SEL 1 ~ 3 : Set the feedback control start timing of each axis.

[Select items]	NORMAL : Normal	[Command setting : 0]
	AFTER : After the drive pulse is finished	[Command setting : 1]

***) At the feedback control start timing, even with NORMAL, feedback control starts after the end of the drive pulse, but if the moving speed of the scale-mounted motorized stage is less than a certain speed, it will move while feedback control. The threshold is scale resolution x 1 μ m / sec when the resolution is 10 nm or less, and 10 μ m / sec otherwise.**

13 ~ 15) FB SPEED1 ~ 3 : Set the feedback pulse speed for each axis.

[Select items]	NORMAL : Normal	[Command setting : 0]
	FAST : Fast	[Command setting : 1]

***) At the feedback pulse rate, FAST can be used for takt time shortening applications when the load of the motorized stage with scale is light, but even if the load is light, hunting may occur due to uneven load and high workpiece height, etc. Therefore, please be sure to test the selection of FAST on the actual stage. Please note that there are models with FAST as standard setting in the motorized stage with scale.**

16 ~ 18) ZERO CONT1 ~ 3 : Set whether to enable the zero control function for each axis.

[Select items] OFF : Disable

[Command setting : 0]

ON : Enable

[Command setting : 1]

***) In the ZERO CONTROL function, when ON, feedback control is performed except for the target coordinate value. When OFF, feedback control is not performed within the in-position range.**

19 ~ 21) COR1 ~ 3 MODE : Set the correction mode for each axis.

[Select items] OFF : Disable

[Command setting : 0]

TWO : 2-point correction

[Command setting : 1]

MULT : Multipoint Correction

[Command setting : 2]

*) MULTI can be selected when a stage equipped with multi-point correction data is connected.

3-4-9. SOFT LIMIT (Command: 8)

No	Memory switch contents	Setting range / Select items	Initial value / setting	Command
1	SOFTLMT SEL1	OFF, ON	OFF	0
2	SOFTLMT SEL2	OFF, ON	OFF	1
3	SOFTLMT SEL3	OFF, ON	OFF	2
4	+SOFTLMT POS1	See detailed description	9999999	3
5	+SOFTLMT POS2	See detailed description	9999999	4
6	+SOFTLMT POS3	See detailed description	9999999	5
7	-SOFTLMT POS1	See detailed description	9999999	6
8	-SOFTLMT POS2	See detailed description	9999999	7
9	-SOFTLMT POS3	See detailed description	9999999	8

1 ~ 3) SOFTLMT SEL 1 ~ 3 : Set whether to enable the soft limit function for each axis.

[Select items] OFF : Disable

[Command setting : 0]

ON : Enable

[Command setting : 1]

4 ~ 6) + SOFTLMT POS : Sets the positive side position of the soft limit.

7 ~ 9) - SOFTLMT POS : Sets the negative side position of the soft limit.

Example of soft limit setting range

Unit	Resolution *	Setting range
PULSE, SENSOR PULSE	-	1 ~ 999999999 [pulse]
NANO, SENSOR NANO	1 [nm]	1 ~ 999999999 [nm]
MICRO, SENSOR MICRO	1 [nm]	0.001 ~ 999999.999 [μm]
MICRO, SENSOR MICRO	1 [μm]	1 ~ 999999999 [μm]
MILI, SENSOR MILI	1 [nm]	0.000001 ~ 999.999999 [mm]
MILI, SENSOR MILI	1 [μm]	0.001 ~ 999999.999 [mm]
DEG, SENSOR DEG	0.000001 [°]	0.000001 ~ 999.999999 [°]
DEG, SENSOR DEG	0.001 [°]	0.001 ~ 999999.999 [°]

*) When "FEEDBACK" - "CONTx" is "CLOSE", it is the scale resolution.

When "FEEDBACK" - "CONTx" is "OPEN", it is the amount of movement per pulse.

Chapter 4: Operations

The SHRC-203 has six operating modes. The motorized stage can be operated (Controlled) for various purposes in each mode. To change the operation mode, press the [MODE] button to switch from HOST → MANUAL → REMOTE → TEACHING → EDIT → TEST → HOST.

An overview of each operating mode is as follows.

HOST mode : It can be controlled by sending and receiving commands from a personal computer.

MANUAL mode : Operation can be performed on the front panel and peripheral devices.

REMOTE mode: Program operation and stage control can be performed by switch operations on the front panel and I/O signals from external operations.

TEACHING mode : Any position data can be stored and sent to a PC.

EDIT mode : Edit the program data.

TEST mode : I/O control signal input/output operation can be checked.

4-1. Screen Description

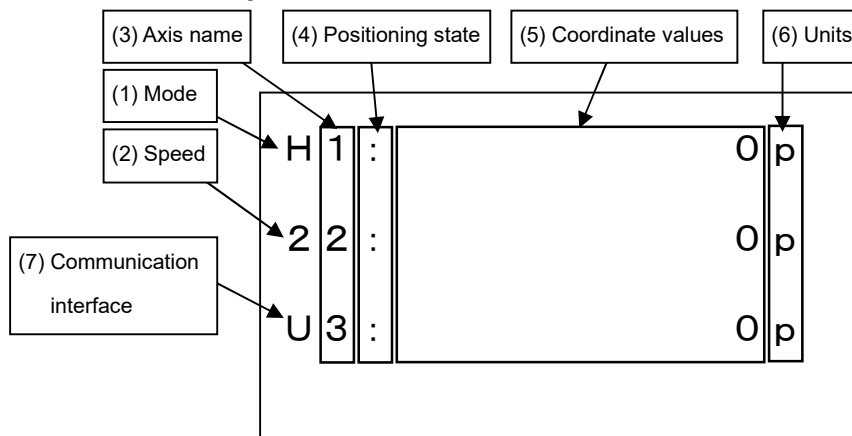


Fig.4-1. Startup screen

(1) Mode : Operating

Symbol	Mode	Symbol	Mode
H	HOST	E	EDIT
M	MANUAL	S	TEST
R	REMOTE	P	Program
T	TEACHING	C	Memory Switch Edit

*) At shipment, the Memory switch is set to "HOST".

The Program mode and Memory Switch Edit mode transitions from the HOST mode by command.

(2) Speed : Movement speed. (1 ~ 4)

(3) Axis Name : From the top, it is the first axis, the second axis, and the third axis.

It is also possible to change the axis name with a Memory switch.

(4) Positioning State :

Symbol	State
None	Command in operation. (BUSY)
>	Positioning after command operation. (BUSY)
:	Positioning is complete and staying within in-position range. (READY)
	After the positioning is completed, it is out of the positioning completion range and feedback control is in progress. (READY)

(5) Coordinate Values : The coordinate value of each axis.

(6) Units : The coordinate value units for each axis.

It is also possible to change the unit with a Memory switch.

If error correction is enabled, the letters will be in uppercase.

(7) Communication Interface :

Symbol	Communication Interface
U	USB
G	GPIB
E	Ethernet

4-2. Indicators Description

AXIS ○ 1 ○ 2 ○ 3 ○ SLEEP	AXIS	The operable axis during front panel operation lights up in green.
	SLEEP	Lights up orange when in sleep state.
	LOCK	Lights up red when front panel button operation is disabled.

LOCK
○

4-3. Move the Motorized Stage with the Front Pnel or Peripherals

In MANUAL mode, each button on the front panel and peripheral devices can be used to move the motorized stage. When all controllable axes are READY, the operated operation system (front panel, peripheral equipment) has priority. For example, if you are operating on the front panel and want to change to a peripheral device, operate the peripheral device after all controllable axes are READY.

4-1-1. Front Panel

[AXIS] : Selects the operating axis.

Hold [MODE] and press [+JOG] : Select the movement speed. (1 → 2 → 3 → 4)

Hold [MODE] and press [-JOG] : Select the movement speed. (4 → 3 → 2 → 1)

Click [+JOG] : Move one pulse in the positive direction.

Hold [+JOG] : Move continuously in the positive direction.

Click [-JOG] : Move one pulse in the negative direction.

Hold [-JOG] : Move continuously in the negative direction.

[MORG] : Moves the selected operation axis to the mechanical origin position.

[EORG] : Moves the selected operation axis to the logical origin "0" position.

*) Moves at the selected movement speed.

[ZERO] : Resets the coordinate value of the selected operation axis to "0".

[STOP] : Immediately stops all axes of the moving motorized stage.

4-1-2. Peripheral Equipment

Refer to the operating instructions for each peripheral device.

4-4. Move the Motorized Stage on a personal computer.

In HOST mode, it is used by connecting to a personal computer via either GP-IB, USB or Ethernet interface.

The motorized stage can be controlled accurately by sending a command (Character string) from a personal computer to the controller.

When SHRC-203 is turned on for the first time at the time of purchase, it is in HOST mode.

For commands, refer to the separate "SHRC-203 User's Manual (Command)".

In the HOST mode, the command is controlled from a PC, and therefore, no buttons other than the [MODE], [LOCK] and [STOP] buttons on the front panel and on peripheral devices can be used.

Chapter 5: How to Use Useful Features

As a convenient operation to fully understand and use the functions of SHRC-203, the operation outline and detailed explanation page for moving the motorized stage are described below.

5-1. Recording Positions in Teaching Mode

In TEACHING mode, the motorized stage is moved to an arbitrary position and the coordinate values are recorded.

5-1-1. Recording Selections and Operating Motorized Stages ⇒ P43

5-1-2. Example of Program Editing Operation ⇒ P44

5-2. Editing Programs in Edit Mode

In EDIT mode, edit and set the operation pattern, 1 to 3 axis coordinate values, output instructions, speed settings, and standby time.

5-2-1. Selection Registration and Data Entry Operations ⇒ P47

5-2-2. Example of Program Editing Operation ⇒ P48

5-2-3. Program Example ⇒ P57

5-2-4. Program Editing by Personal Computer ⇒ P63

5-3. Move Motorized Stage according to Program

In REMOTE mode, motorized stages such as program selection, start, pause, single-line execution, and stop created in TEACHING mode and EDIT mode can be controlled by front panel buttons or rear panel I/O connector control signals. In addition, the same control can be done by command instruction from a personal computer.

5-3-1. Start Program Operation from Front Panel Operation ⇒ P64

5-3-2. Start Program Operation from I/O Signals ⇒ P65

5-3-3. Start Program Operation from the PC ⇒ P66

5-3-4. Display of Execution Stop Factors ⇒ P67

5-4. Testing I/O Signal Connections

In TEST mode, the connection status and wiring can be checked for control signals from the I/O connectors on the rear panel.

5-4-1. Operation on the Front Panel ⇒ P68

5-4-2. Example Operation with an Input Signal Monitor ⇒ P68

5-4-3. Example Operation with an Output Signal Test ⇒ P70

5-5. Output the Trigger Signal to an External Device ⇒ P71

5-6. Check Controller Information and Communication Settings ⇒ P76

5-7. Other Features ⇒ P77

5-1. Recording Positions in Teaching Mode

In TEACHING mode, the motorized stage can be moved to any position by button operation on the front panel, and the position data can be written to the internal program or sent to the personal computer.

5-1-1. Recording Selections and Operating Motorized Stages

1) Record Buttons

[+JOG] : ① Change the program number. (7 → 8 → 1 → 2)

② Register the program and exit.

(Return to the TEACHING Mode Top screen)

[-JOG] : ① Change the program number. (2 → 1 → 8 → 7)

② Discard the program and exit.

(Return to the TEACHING Mode Top screen)

[MORG] : Select operation pattern "M" and change to the TEACHING registration screen to acquire position data.

[EORG] : Select operation pattern "A" and change to the TEACHING registration screen to acquire position data.

[LOCK] : ① Cancel program number selection and return to the top screen of the TEACHING mode.

② Cancel the end and resume from the line next to the registered line.

③ Register the relative position data and output the pulse from the trigger output terminal of the terminal block on the rear panel. Also, if the setting of the Memory switch "POSOUT" allows the transmission of position data, the current coordinates will be transmitted to the PC.

Hold [MODE] and press [AXIS] :

Finish the registration operation and change to the Setting Completion Confirmation screen.

Hold [MODE] and press [LOCK] : Delete the registered coordinate value.

(Set the operation pattern to "NONE".)

Hold [MODE] and press [MORG] : Select a line number. (1 → 2 → 3 → 4 → ...)

Hold [MODE] and press [EORG] : Select a line number. (... → 4 → 3 → 2 → 1)

Hold [MODE] and press [ZERO] :

Displays the coordinate position data registered for the current line number.

2) Motorized Stage Operation Buttons

[AXIS]: Selects the operating axis.

Hold [MODE] and press [+JOG] : Select the movement speed. (1 → 2 → 3 → 4)

Hold [MODE] and press [-JOG] : Select the movement speed. (4 → 3 → 2 → 1)

Click [+JOG] : Move one pulse in the positive direction.

Hold [+JOG] : Move continuously in the positive direction.

Click [-JOG] : Move one pulse in the negative direction.

Hold [-JOG] : Move continuously in the negative direction.

[MORG] : Moves the selected operation axis to the mechanical origin position.

[EORG] : Moves the selected operation axis to the logical origin "0" position.

*) Moves at the selected movement speed.

[ZERO] : Resets the coordinate value of the selected operation axis to "0".

[STOP] : Immediately stops all axes of the moving motorized stage.

5-1-2. Example of Program Editing Operation

While operating the motorized stage, the position data is registered.

- ① On the top screen of the TEACHING mode, hold down the [MODE] button and press the [AXIS] button. The display changes to the Program Number Selection screen.

T 1 :	0 p
2 2 :	0 p
U 3 :	0 p

Fig. 5-1. TEACHING Mode Top screen

- ② Select the program number with the [+JOG] and [-JOG] buttons.

[+JOG] No.7 → 8 → 1 → 2

[-JOG] No.2 → 1 → 8 → 7

In this section, position data is registered in program number 1.

Select the operation pattern with the [MORG] button or the [EORG] button, and set the coordinate values to be registered.

M : Relative coordinate values are registered.

A : Absolute coordinate values are registered.

*) For the operation pattern, refer to "5-2. Editing Programs in Edit Mode".

In this example, register with relative coordinate values (Operation pattern "M").

When "PROG No. 1" is displayed, pressing the [MORG] (→) button changes to the TEACHING registration screen and enables motorized stage operation.

TEACHING MODE		
PROG No. 1	(↑↓)	
EDIT :	M (→)	A (←)
RETURN :		(L)

Operation pattern

Fig. 5-2. Program Number Selection screen

- ③ Move the motorized stage to the desired position by operating the buttons on the front panel. To register the position of each axis of the motorized stage, press the [LOCK] (RECORD) button. The line number and operation pattern before pressing the [LOCK] (RECORD) button are the current registration details, and when the button is pressed,

Program number	Line number	Operation pattern
T 1 :		1 2 3 4 p
2 2 :		1 0 0 p
U 3 :		- 1 0 0 p
P 1	L 0 0 0 1	[NONE]

Fig. 5-3. Registration screen

the operation pattern set in ② and coordinate values are registered.

The position data is registered, and while the [LOCK] button is pressed, the registered line number and the position coordinates of each axis are displayed as shown in Fig. 5-4. At this time, the following processing is done at the same time.

- The coordinate values of 1 to 3 axes are registered in program number 1.
 - Transmit coordinate values of 1 to 3 axes to a PC.
- (Example transmission format) 1234, 100, -100

*) If the Memory switch "POSOUT" setting allows position data transmission, the coordinate values are sent to a PC.
 POSOUT OFF : Transmission disabled
 POSOUT ON : Transmission enabled

Pulse output from the trigger output terminal on the terminal block located on the rear panel.

Repeat the above operation to register an arbitrary number of coordinate values.

T 1 :		1 2 3 4 p
2 2 :		1 0 0 p
U 3 :		- 1 0 0 p
P 1	L 0 0 0 1	[M]



T 1 :		1 0 0 0 p
2 2 :		9 0 0 p
U 3 :		- 9 0 0 p
P 1	L 0 0 0 2	[M]



T 1 :		- 5 0 0 p
2 2 :		3 5 0 p
U 3 :		- 3 5 0 p
P 1	L 0 0 0 3	[M]

Fig. 5-4. Entering Position Data

- ④ To delete the registered contents, select the line number by pressing the [MORG] button or [EORG] button while pressing the [MODE] button on the TEACHING registration screen, and then press the [LOCK] button while pressing the [MODE] button. The registered coordinate values are deleted and the operation pattern is registered with "NONE".

*) For the operation pattern, refer to "5-2. Editing Programs in Edit Mode".

- ⑤ After completing the registration process, hold down the [MODE] button and press the [AXIS] button to change to the Setting Completion Confirmation screen.

SAVE EXIT	(↑)
NO SAVE EXIT :	(↓)
RETURN :	(L)

To add position data again, press the [LOCK] (L) button.

Fig. 5-5. Setting Completion

To discard the position data, press the [-JOG] (↓) button. Confirmation screen

- ⑥ Press [+JOG] (↑) button to register position data and return to the TEACHING Mode Top screen.

***) In TEACHING mode, only the coordinate values and operation patterns "M", "A", "NONE" and "END" are stored for each line number of the program. Other operation patterns and information data (output instructions, set speed, waiting time, etc.) should be edited in EDIT mode.**

In addition, "END" is automatically added to the next line of the last line where the coordinate position data is registered.

***) The data after the next line of "END" will be deleted.**

Example of position coordinates registered in program number 1
(Display screen in EDIT mode)

P1	L0001	[M]
>A1:	1234p	
A2:	100p	
A3:	-1000p	
GO:	0	
SP:	1	
WT:	0	
TM:	PULSE	
TA:	1	
TV:	2	

P1	L0002	[M]
>A1:	1000p	
A2:	900p	
A3:	-900p	
GO:	0	
SP:	1	
WT:	0	
TM:	PULSE	
TA:	1	
TV:	2	

P1	L0003	[M]
>A1:	-500p	
A2:	350p	
A3:	-350p	
GO:	0	
SP:	1	
WT:	0	
TM:	PULSE	
TA:	1	
TV:	2	

5-2. Editing Programs in Edit Mode

Program data registered in the controller can be edited in the EDIT mode.

There are eight types (4,000 lines each) of programs (No.1 to 8).

5-2-1. Selection Registration and Data Entry Operations

The editing operation of the program is performed by each button on the front panel.

1) Selective Registration

- [+JOG] (1) Change the program number. (7 → 8 → 1 → 2)
(2) Register the edited contents and exit.
(Return to the EDIT Mode Top screen.)
(3) Initialize the program and exit.
(Return to the EDIT Mode Top screen.)
- [-JOG] (1) Change the program number. (2 → 1 → 8 → 7)
(2) Discard the edited contents and exit.
(Return to the EDIT Mode Top screen.)
- [MORG] (1) Change to the Program Edit screen for editing.
(2) Change the operation pattern. (END → M → A → CM)
(3) Move the cursor to the right.
(4) Change to the initialization screen.
- [EORG] (1) Change the operation pattern. (CM → A → M → END)
(2) Move the cursor to the left.
- [LOCK] (1) Return to the EDIT Mode Top screen.
(2) Return to the Program Edit screen.
(3) Return to the Editing Completion Confirmation screen.

Hold [MODE] and press [MORG] Insert one line in the current line.

Hold [MODE] and press [EORG] Deletes the current line and closes the line.

Hold [MODE] and press [AXIS] Finish the editing process and change to the Editing Completion Confirmation screen.

2) Data Entry

- [+JOG] Increases the line number. Press and hold to increase continuously.
- [-JOG] Decrements the line number. Press and hold to decrease continuously.
- [MORG] Move the cursor to the right digit.
- [EORG] Moves the cursor to the left digit.
- [AXIS] (1) Scroll down the screen.
(2) Change the setting. For numerical values, increase the value.
- [ZERO] (1) Scroll up the screen.
(2) Change the setting. For numerical values, decrease the value.
- [LOCK] Move the cursor inside the item.

5-2-2. Example of Program Editing Operation

1. On the EDIT mode top screen, hold down the [MODE] button and press the [AXIS] button.
The screen changes to the program number selection screen.

E 1 :	0 p
2 2 :	0 p
U 3 :	0 p

Fig. 5-6. EDIT Mode Top screen

2. Select the program number with the [+JOG] and [-JOG] buttons.

[+JOG] No.7 → 8 → 1 → 2

[-JOG] No.2 → 1 → 8 → 7

In this example, edit program number 1.

When "PROG No. 1" is displayed, press the [MORG] (→) button to switch to the Program Edit screen.

To return to the EDIT Mode Top screen, press the [LOCK] (L) button.

EDIT MODE	
PROG No. 1	(↑↓)
EDIT :	(→)
RETURN :	(L)

Fig. 5-7. Program Number Selection screen

3. In the Program Edit screen, the first line is a common item, and the rest of the setting items displayed vary depending on the operation pattern.

Lines 5 and after are displayed when the screen is scrolled.

When the power is turned on for the first time at the time of purchase of SHRC-203, "END" is already registered for line number 1 of all program numbers and "NONE" for all other line numbers. When the program is initialized, "END" is registered in line 1 and "NONE" in other line numbers in the initialized program number.

Program number	Line number	Operation Pattern
P 1	L 0 0 0 1	[M]
Setting items {		
> A 1 N		
A 2 N		
A 3 N		
GO :		
S P :		
W T :		
T M :		
T A :		
T V :		

Fig. 5-8. Program Edit screen

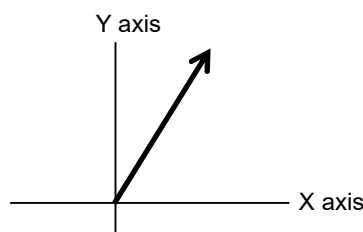
In case of operation pattern "M"

● Operation Pattern

- M : Execute relative value operation. (Positioning is performed to the specified movement amount and stops after the operation.)
- A : Execute absolute value operation. (Positioning is performed to the specified coordinates and stops after the operation.)
- CM : Executes continuous operation by relative value. The specified coordinate value is used as a passing point and moves continuously without stopping, and a trigger is output when the designated coordinate value is passed. Only one axis can be selected. (If it is continuous, the maximum is 256 lines.)
 - *) When using trigger output, set the setting speed to 56 kpps or less.
- CA : Executes continuous operation by absolute value. The specified coordinate value is used as a passing point and moves continuously without stopping, and a trigger is output when the designated coordinate value is passed. Only one axis can be selected. (If it is continuous, the maximum is 256 lines.)
 - *) When using trigger output, set the setting speed to 56 kpps or less.
 - *) Since "CA001" is the start position, the trigger is not output at the coordinate value registered in "CA001".
 - *) Be sure to register multiple lines. If only "CA001" is registered, the "W5 PxL**** PS" warning will occur during execution.
- K : Execute linear interpolation operation.

The movement distance per pulse must be the same between interpolation axes.

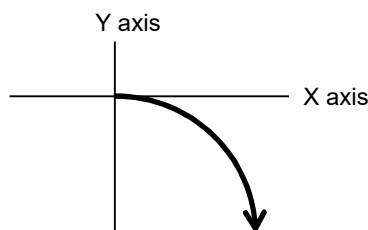
Otherwise, correct interpolation operation cannot be performed.



- E : Execute arc interpolation operation.

The movement distance per pulse must be the same between interpolation axes.

Otherwise, correct interpolation operation cannot be performed.

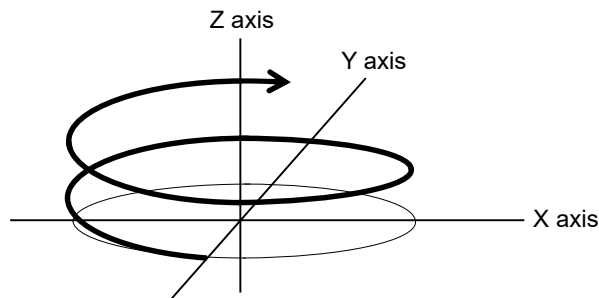


- EH : Executes a helical interpolation move.

This operation synchronizes an arc interpolation operation with a linear operation of other axes.

The movement distance per pulse must be the same between interpolation axes.

Otherwise, correct interpolation operation cannot be performed.



- PAV : Operates to the registered position.
- H : Return to origin operation
- Z : Moves to the logical origin "0" position.
- R : Resets the coordinate value to "0".
- INPUT : Waits for the general-purpose input pattern of the specified I / O terminal.
- F : Loop number and number of times are specified at the start of the loop setting.
 - *) When "F" is specified, be sure to specify "N" below.
- N : Returns to the start position "F" of the specified loop number at the end of the loop setting. When executed the specified number of times, the next line is executed.
 - *) When N is specified, be sure to specify "F" above.
- END : Specifies the end line of execution.
- NONE : Unregistered line that does not execute anything. Skip this line.

● Setting Items

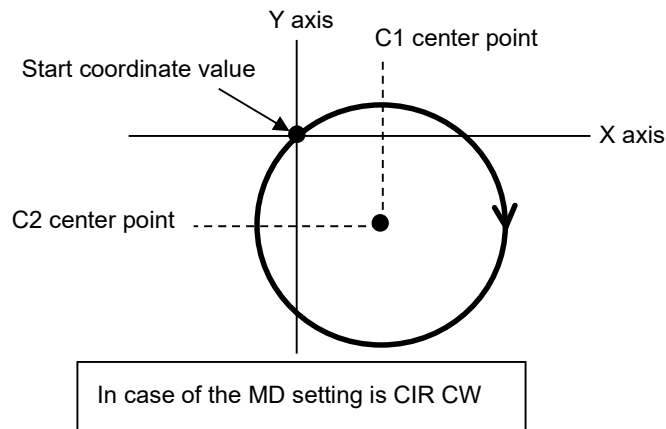
The setting items displayed according to the operation pattern are as follows.

*) There are no setting items for the operation patterns "END" and "NONE".

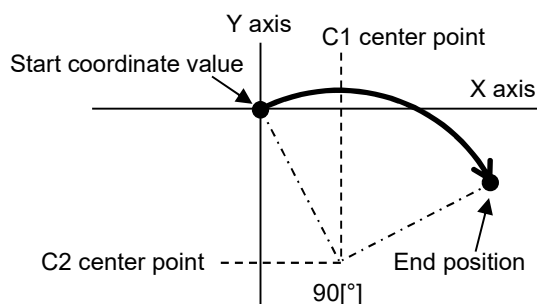
Setting items	Operation pattern													
	M	A	CM	CA	K	E	EH	PAV	H	Z	R	INPUT	F	N
A1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
A2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
A3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
MD						✓	✓							
C1						✓	✓							
C2						✓	✓							
AL						✓	✓							
P1						✓	✓							
P2						✓	✓							
E1						✓	✓							
E2						✓	✓							
HL							✓							
RT							✓							
PT								✓						
GI												✓		
LL													✓	✓
LV													✓	
GO	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
SP	✓	✓	✓	✓	✓	✓	✓	✓		✓				
WT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
TM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
TA	✓	✓			✓	✓	✓	✓						
TV	✓	✓			✓	✓	✓	✓						

- A1 : Set the valid / invalid of the 1st axis and the coordinate value (Initial value : 0).
(" : " : Valid, "N" : Invalid (Initial setting))
- A2 : Set the valid / invalid of the 2nd axis and the coordinate value (Initial value : 0).
(" : " : Valid, "N" : Invalid (Initial setting))
- A3 : Set the valid / invalid of the 3rd axis and the coordinate value (Initial value : 0).
(" : " : Valid, "N" : Invalid (Initial setting))
 - *) When the operation pattern "E" (Arc interpolation) is set, enable only 2 axes.
 - *) When the operation pattern "K" (Straight line interpolation) is set, enable 2 or 3 axes.
 - *) When the operation pattern "EH" (Helical interpolation) is set, only two axes of the arc interpolation axis should be valid. The invalid axis is the linear interpolation axis for helical interpolation operation.
 - *) In the case of operation patterns "E" and "EH", coordinate values cannot be input.
 - *) In the case of interpolation operation, the axis with the smaller axis number is the main axis (X axis), but in the case of helical interpolation, the axis with the smaller axis number of the arc interpolation axis is the main axis (X axis).
 - *) The coordinate value unit depends on the setting of the Memory switch "AXIS"-"STAGEx UNIT", so set the coordinate value according to the setting unit.
- MD : Set the specification method and rotation direction in arc interpolation.
 - Specify the center point
(In the case of arc interpolation, rotate once and stop at the start coordinate value.)
CIR CW : CW direction (Initial setting)
CIR CCW : CCW direction
 - Specify the rotation angle
ANGLE CW : CW direction
ANGLE CCW : CCW direction
 - *) An error occurs because the end point coordinates are calculated. Please use it after confirming it with the actual stage.
 - Specify the passing point
PASS CW : CW direction
PASS CCW : CCW direction
 - *) An error will occur because the center coordinates are calculated. Please use it after confirming it with the actual stage.

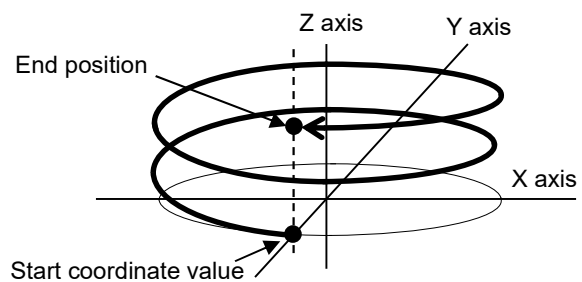
- C1 : Set the center point (Relative position from the start coordinate value) in the arc interpolation of the axis with the smaller axis number (Main axis: X axis) on the two axes selected in A1 to 3.
(When CIR, ANGLE CW or CIR, ANGLE CCW is selected in MD)
(Initial value : 0)
- C2 : Set the center point (Relative position from the start coordinate value) in the arc interpolation of the axis with the larger axis number (Slave axis: Y axis) on the two axes selected in A1 to 3.
(When CIR, ANGLE CW or CIR, ANGLE CCW is selected in MD)
(Initial value : 0)



- AL : Set the rotation angle for arc interpolation.
(Operation pattern E : 0 ~ 360 [°], Operation pattern EH : 0 ~ 360000 [°])

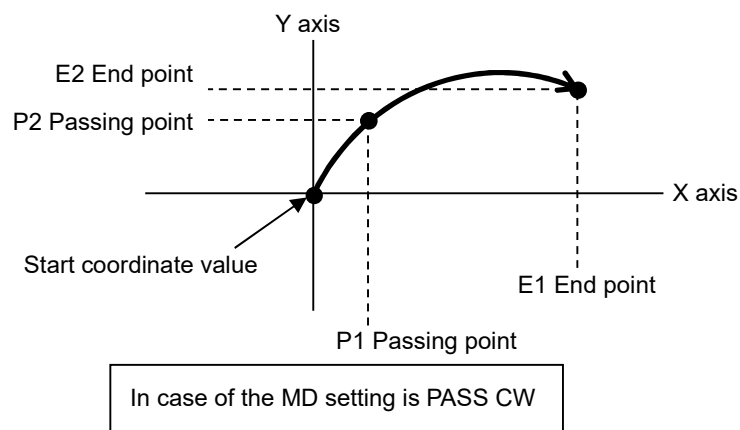


In the case of arc interpolation with MD setting ANGLE CW and AL set to 90 [°]

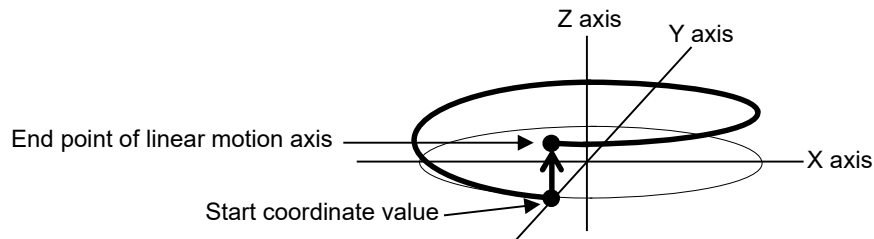


In the case of helical interpolation with MD setting ANGLE CW and AL set to 720 [°]

- P1 : Set the passing point (Relative position from the starting coordinate value) in the arc interpolation of the axis with the smaller axis number (main axis: X axis) on the two axes selected in A1 to 3.
(When PASS CW or PASS CCW is selected in MD) (Initial value : 0)
- P2 : Set the passing point (Relative position from the start coordinate value) in the arc interpolation of the axis with the larger axis number (Slave axis: Y axis) on the two axes selected in A1 to 3.
(When PASS CW or PASS CCW is selected in MD) (Initial value : 0)
- E1 : Set the end point (Relative position from the start coordinate value) in the arc interpolation of the axis with the smaller axis number (Main axis: X axis) on the two axes selected in A1 to 3.
(When PASS CW or PASS CCW is selected in MD) (Initial value : 0)
- E2 : Set the end point (Relative position from the start coordinate value) in the arc interpolation of the axis with the larger axis number (Slave axis: Y axis) on the two axes selected in A1 to 3.
(When PASS CW or PASS CCW is selected in MD) (Initial value : 0)



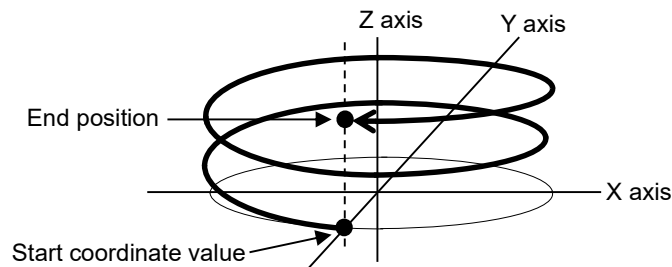
- HL : Set the end point (Relative position from the start coordinate value) of the linear motion axis during helical interpolation.
If the passing point specification and rotation angle specification are less than 360 °, set the amount of movement at the end position of arc interpolation.
When specifying the number of rotations when specifying a center point, and when specifying a rotation angle of 360° or more, set the amount of movement per rotation from the start coordinate value.
For example, if the rotation angle setting is 540 ° (One and a half rotations) and this setting value is 100pls, the linear movement amount will be 150pls.
An error will occur because the amount of linear movement when a rotation angle of 360 ° or more is specified is calculated.
Please use it after confirming it with the actual stage.



In case of the MD setting is CIR CW and the end point coordinates are on the upper side

- RT : Set the number of rotations when the center point is specified in helical interpolation.

1 ~ 1000 (Initial value : 1)



In the case of rotation number 2

- PT : Set the number of the position registered by the "PAV:" command to move the stage. (1 to 20) (Initial value : 1)
- GI : Set the input waiting pattern for the I / O input terminals (IN1 ~ 6).
(0 ~ 63) (Initial value : 0)

Example: 2 (Binary code)

IN6	IN5	IN4	IN3	IN2	IN1
				ON	

Blanks are OFF

- LL : Set the loop hierarchy. (1 ~ 9) (Initial value : 1)
- LV : Set the number of loops. (1 ~ 65535) (Initial value : 1)
- GO : Select the output of the I / O output terminals (OUT1 ~ 6).
(0 ~ 63) (Initial value : 0)

Example: 2 (Binary code)

OUT 6	OUT 5	OUT 4	OUT 3	OUT 2	OUT 1
				ON	

Blanks are OFF

- SP : Set the operating speed. (1 ~ 4) (Initial value : 1)
The movement speed (composite speed) in the case of interpolation operation moves at the minimum speed S of the main axis.
- WT : Set the waiting time. (0 ~ 2560 [0.1 second unit]) (Initial value : 0)
- TM : Set the trigger output target. (Initial value : PULSE)
PULSE : Command pulse
SCALE PLUS : Positive direction scale pulse
SCALE MINUS : Negative Direction scale pulse
TIMER : Time
SCALE : Scale pulse (Operation pattern CM, CA only)
ONE SHOT : One-shot trigger (After positioning of all valid axes)
STOP : Trigger issuance prohibited
TAKE OVER : Inherit the trigger condition of the previous line
*) When selecting PULSE, SCALE PLUS, SCALE MINUS, or SCALE, set the setting speed to 56 kpps or less.
- TA: Set the target axis when PULSE, SCALE PULS, SCALE MINUS, or TIMER is set in TM.
(1 ~ 3) (Initial value : 1)
*) If TM is TIMER set to "1".
- TV: Set the trigger output interval. (Initial value : 2)
PULSE : 2 ~ 30000pls
TIMER : 1 ~ 10000 [0.01 second unit]
SCALE PLUS, SCALE MINUS : $\pm 2 \sim 30000$ pls
*) Not displayed when TM is set to SCALE, ONE SHOT, STOP, or TAKE OVER.

4. First, select the operation pattern with the [MORG] (→) and [EORG] (←) buttons.
Use the [ZERO] (UP) or [AXIS] (DOWN) button to move the cursor (>) to the item to be edited, and the [LOCK] button to move the cursor (_) inside the item. For numeric items, use the [MORG](→) or [EORG](←) buttons to move the digit, and use the [ZERO](UP) and [AXIS] (DOWN) buttons to edit or select. When editing is complete, press the [LOCK] button to return the cursor (>) to the item.

To delete the contents of a line number, set the operation pattern to "NONE".

To change the line number, press the [+JOG] or [-JOG] button.

```
P 1  L 0 0 0 1  [M]
> A 1 N
  A 2 N
  A 3 N
  GO :
  SP :
  WT :
  TM :
  TA :
  TV :
```

Fig. 5-9. Program Edit screen

5. After finishing the editing process, press the [AXIS] button while hold down the [MODE] button to change to the Editing Completion Confirmation screen.

Click the [+JOG] button to register the edited data and return to the EDIT mode top screen.

To discard the edited data, click the [-JOG] button. EDIT mode Returns to the top screen.

To edit the data again, press the [LOCK] button.

P1	SAVE	EXIT:(↑)
NO	SAVE	EXIT:(↓)
INITIAL:		(→)
RETURN:		(L)

Fig. 5-10. Editing Completion Confirmation screen

6. Press the [MORG] button to change to the initialization screen to initialize the selected program contents.

Press the [+ JOG] button to initialize and return to the EDIT mode top screen.

To return to the edit completion confirmation screen, press the [LOCK] button.

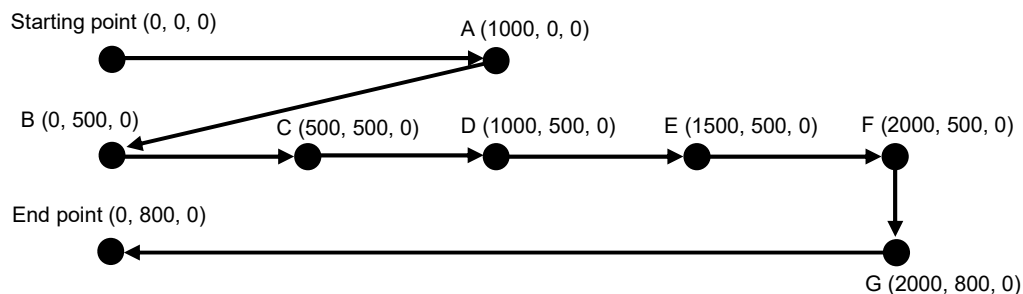
P1	INITIALIZE?
INITIAL	EXIT:(↑)
RETURN:	(L)

Fig. 5-11. Initialization screen

5-2-3. Program Examples

A simple program example is shown below.

(1) Program Example 1 (Positioning Operation)



1. Move to point A at speed 3. Trigger output after stop.
2. Linear interpolation movement to point B at a moving speed of speed 4 (Minimum speed S at the Memory switch on the main axis). After stopping, OUT = 1 output and trigger output, and wait for 2 seconds.
3. Moves 500 pulses on the 1st axis at a speed of 4. Trigger is output after stopping and waits for 1 second. Repeat the above operation 4 times.
4. Move to point G at speed 2. OUT = 2 output and trigger output after stop.
5. Move at speed 4 to the end point. OUT = 0 output and trigger output after stop.

```

P1 L0001 [M]
>A1:      1000p
  A2:      0p
  A3N
  GO:00
  SP:3
  WT:00000
  TM:ONE SHOT

```

```

P1 L0005 [N]
>LL:1

```

```

P1 L0006 [M]
>A1:      0p
  A2:      300p
  A3N
  GO:02
  SP:2
  WT:00000
  TM:ONE SHOT

```

```

P1 L0002 [K]
>A1:      -1000p
  A2:      500p
  A3N
  GO:01
  SP:4
  WT:00020
  TM:ONE SHOT

```

```

P1 L0007 [M]
>A1:      -2000p
  A2:      0p
  A3N
  GO:00
  SP:4
  WT:00000
  TM:ONE SHOT

```

```

P1 L0003 [F]
>LL:1
  LV:4

```

```

P1 L0008 [END]

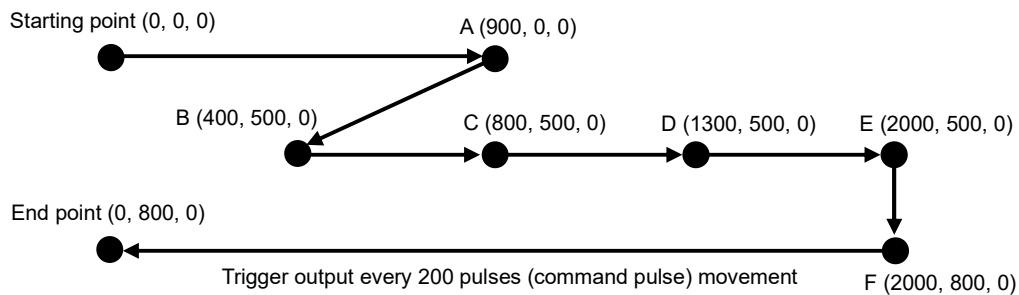
```

```

P1 L0004 [M]
>A1:      500p
  A2:      0p
  A3N
  GO:00
  SP:4
  WT:00010
  TM:ONE SHOT

```

(2) Program Example 2 (Continuous Operation)



1. Move to point A at speed 3. OUT = 0 output after stopping. (No trigger output)
2. Linear interpolation movement to point B at a moving speed of speed 4 (Minimum speed S at the Memory switch of the main axis). After stopping, OUT = 1 output and trigger output, and wait for 2 seconds.
3. Wait until the input condition I = 1.
4. Move to point E at speed 4. Points C and D output a trigger when passing.
The trigger target is a scale pulse. Point E outputs a trigger when the command position (Scale pulse) is reached (In-position trigger is not output).
5. Move to point F at speed 2. OUT = 1 output after stopping. (No trigger output)
6. Move at speed 4 to the end point. At this time, the trigger output is performed every 200 pulses (Command pulse) movement on the 1st axis. OUT = 2 output after stopping.

```
P1 L0001 [M]
>A1:      900p
A2:       0p
A3N
GO:00
SP:3
WT:0000
TM:STOP
```

```
P1 L0003 [INPUT]
>GI:1
```

```
P1 L0002 [K]
>A1:     -500p
A2:      500p
A3N
GO:01
SP:4
WT:0020
TM:ONE SHOT
```

```
P1 L0004 [CM001]
>A1:      400p
A2N
A3N
GO:00
SP:4
WT:0000
TM:SCALE
```

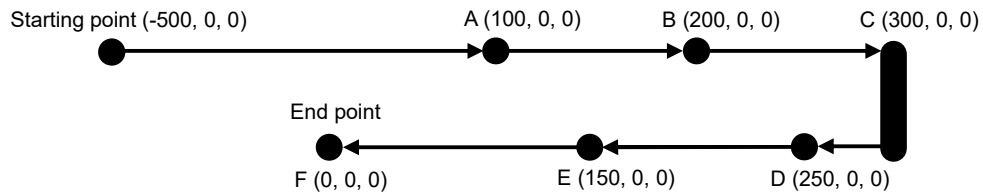
```
P1 L0005 [CM002]
>A1:      500p
A2N
A3N
```

P1 L0006 [CM003]
>A1: 700p
A2N
A3N

P1 L0007 [M]
>A1: 0p
A2: 300p
A3N
GO:01
SP:2
WT:0000
TM:STOP

P1 L0008 [M]
>A1: -2000p
A2: 0p
A3N
GO:02
SP:4
WT:0000
TM:PULSE
TA:1
TV:00200

(3) Program Example 3 (Continuous Operation by specifying Absolute Value)



1. Move to point A at speed 3. (No trigger output)
 2. Move to point C at speed 3. Point B output a trigger when passing.
The trigger target is a scale pulse. Point C outputs a trigger when the command position (Scale pulse) is reached (In-position trigger is not output).
OUT = 0 output after stopping.
 3. Move to point D at speed 4. (No trigger output)
 4. Move to point F at speed 4. Point E output a trigger when passing.
The trigger target is a scale pulse. Point F outputs a trigger when the command position (Scale pulse) is reached (In-position trigger is not output).
OUT = 1 output after stopping.
- *) Be sure to register multiple lines. If only "CA001" is registered, the " W5 PxL**** PS
" warning will occur during execution.

```
P1 L0001 [CA001]
>A1 :      100 p
A2 :      0 p
A3 :      0 p
GO:00
SP:3
WT:0000
TM:SCALE
```

```
P1 L0004 [CA001]
>A1 :      250 p
A2 :      0 p
A3 :      0 p
GO:01
SP:4
WT:0000
TM:SCALE
```

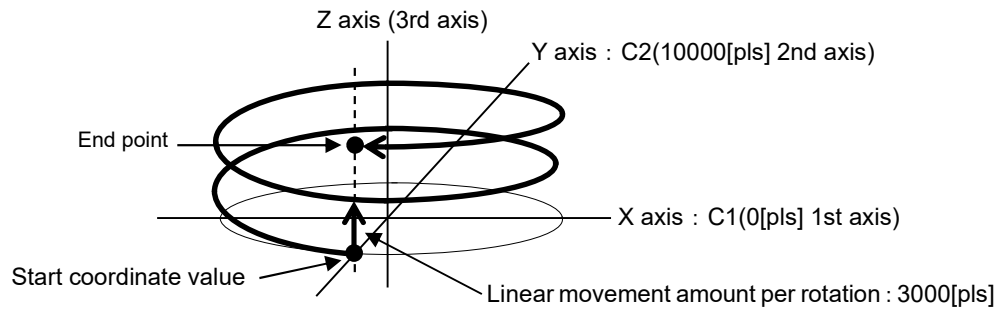
```
P1 L0002 [CA002]
>A1 :      200 p
A2 :      0 p
A3 :      0 p
```

```
P1 L0005 [CA002]
>A1 :      150 p
A2 :      0 p
A3 :      0 p
```

```
P1 L0003 [CA003]
>A1 :      300 p
A2 :      0 p
A3 :      0 p
```

```
P1 L0006 [CA003]
>A1 :      0 p
A2 :      0 p
A3 :      0 p
```

(4) Program Example 4 (Helical Interpolation)



- Arc interpolation axis : 1st axis (Main axis: X axis), 2nd axis (Slave axis: Y axis)
- Linear operation axis : 3rd axis
- Arc designation, rotation direction : CW direction with center point designation
- Center point (Main axis) : 0 [pls] (1st axis)
- Center point (Slave axis) : 10000 [pls] (second axis)
- Linear movement amount (Per rotation) : 3000 [pls]
- Number of arc rotation : 2
- OUT : 1 is output from general-purpose output after stopping
- Movement speed : 1 (Minimum speed S of the 1st axis, which is the main axis)
- Waiting time after the move is completed : 0 seconds
- Trigger : Output every 10 pulses with the command pulse of the 1st axis

```

P1 L0001 [EH]
>A1 :
A2 :
A3N
MD:CIR CW
C1 : 0 p
C2 : 10000 p
HL : 3000 p
RT:0002
GO:01
SP:1
WT:0000
TM:PULSE
TA:1
TV:00010

```

5-2-4. Program Editing by Personal Computer

When editing from a personal computer, after transitioning from HOST mode to program mode, follow the commands and order below.

P:R	Enter the Program mode.
P:P[No.]	Set program number. (1 ~ 8) [No.] 1 to 8
P:ON	Enter Program edit mode to edit the selected program number.
P:SET	Set the program content.
P:GET	Used when confirming the contents of the program.
P:DEL	Used when delete the contents of the program.
P:INIT	Used when delete all lines of the selected program number.
P:OFF	Saves edits and returns to Program mode.
P:H	Return to the HOST mode.

For commands, refer to the separate "SHRC-203 User's Manual (Command)".

5-3. Move Motorized Stage according to Program

Programs edited in EDIT mode or downloaded from a computer are used to operate the motorized stage via front panel switches, commands received from the computer or signals from the rear panel I/O connectors.

There are eight programs, No. 1 to 8. As end-of-operation signals are output when each operation is completed, programmed operation can be used for easy remote control while confirming the operating condition of each stage.

The LCD display during programmed operation shows the program number and the line currently being executed.

5-3-1. Start Program Operation from Front Panel Operation

Program operation can be performed on the front panel in REMOTE mode even without a PC or I/O signal connected.

[+JOG] : Change program numbers. (7 → 8 → 1 → 2)

[-JOG] : Change program numbers. (2 → 1 → 8 → 7)

[MORG] : Start running. When paused, single line is executed for each press.

[EORG] : Pause and release. When used at execution stop, it pauses at the first line.

[STOP] : Stops execution and returns to line number 1.

▪ Example of Operation

- ① On the REMOTE mode top screen, hold down the [MODE] button and press the [AXIS] button. The screen changes to the program execution screen.

R 1 :	0 p
2 2 :	0 p
U 3 :	0 p

Fig. 5-12. REMOTE Mode Top screen

- ② Select the program number with the [+JOG] (↑) and [-JOG] (↓) buttons, and operate with the [MORG] (→), [EORG] (←) and [STOP] buttons.

STA : Press [MORG](→) button to start.

(Blinks during execution)

PAUSE : Press [EORG] (←) button to pause.

(Blinks during pause)

ONE : Press [MORG](→) button to single line execution.

(Blinks during execution)

PROG No. 1 :	(↑↓)
LINE No. 0001	
STA (→)	PAUSE (←)

Fig. 5-13. Program Execution screen

- ③ Press the [AXIS] button while hold down the [MODE] button to return to the REMOTE mode top screen.

5-3-2. Start Program Operation from I/O Signals

When starting programmed operations from an external device, automatic operation according to program data can be performed by turning on the START input of the I/O connector signal on the rear panel.

During automatic operation, pause, single-line execution, and emergency stop are performed using the pause (PAUSE input on continuously), single-line execution (START input on while PAUSE input is on continuously), and stop (STOP input on) signals. There are eight programs, No. 1 to 8, which can be selecting using I/O signals.

Program No.	I/O PRG No.			Program No.	I/O PRG No.		
	PRG1	PRG2	PRG3		PRG1	PRG2	PRG3
1				5			ON
2	ON			6	ON		ON
3		ON		7		ON	ON
4	ON	ON		8	ON	ON	ON

Blanks are OFF

Motorized stages can be operated (returned to mechanical origin, turned clockwise or counter-clockwise, have their speed settings changed, etc.) by turning I/O connector signals on or off.

End-of-operation signals, output from the I/O connectors when each operation is completed, make it possible to control stages remotely while confirming the operating condition of each stage.

For details, refer to "Chapter 6 : Connector Pin Numbers and Signals" - "6-1. I/O Signals".

5-3-3. Start Program Operation from the PC

When starting from a personal computer, after shifting from the HOST mode to the Program mode, automatic operation (positioning) can be performed according to the program data by sending a command for program operation instead of an external control signal. Available commands are shown below.

P:R	Enter the Program mode.
P:P[No.]	Set program number. (1 ~ 8) [No.] 1 to 8
P:S	Start independent programmed operation.
P:E	Stop independent programmed operation. If the stage is moving, the program stops after the movement is complete.
L:E	If the stage is moving, stop it immediately and stop the program.
P:U0	Temporarily suspend independent programmed operation.
P:U1	End temporary pause of independent programmed operation.
P:O	Executes line by line while the program is paused.
P:C0	Prevent transmission of "operation complete" (COMP) signal when programmed operation completed.
P:C1	Allow transmission of "operation complete" (COMP) signal when programmed operation is completed. *) The controller will send the data string " COMP " when programmed operation is complete.
P:T0	Prevent transmission of trigger signal data (TRIG) when trigger is output
P:T1	Allow transmission of trigger signal data (TRIG) when trigger is output *) The controller will send the data string " TRIG " when trigger signal is output.
*IDN?	Get the controller information.
BEC:	Releases positioning incomplete state (BUSY) and error.
?:	Get the various settings.
?:L	Get the program execution status.
!:	Get the positioning status.
!:S	Get the positioning status of each axis.
Q:	Get the coordinate value and status.
Q:S	Get the coordinate values and detailed status of each axis.
SRQ:	Get the status.
SRQ:S	Get the detailed status of each axis.
P:H	Return to the HOST mode.

Unlike the REMOTE mode, operation by I/O signals is not possible in the Program mode. For commands, refer to the separate "SHRC-203 User's Manual (Command)".

5-3-4. Display of Execution Stop Factors

If a registered sequence of operations stops during program execution, return to the top screen in Remote or Program mode, and display the stop factor on the fourth line on the display screen.

In Program mode, the factors can also be checked using "?:L" command.

W5 PxL**** ES : An error occurs during program execution and the program stops.

Action : Release the displayed error.

W5 PxL**** PS : Stopped due to incomplete line contents.

Action : Check the registration details.

W5 PxL**** BS : The program stopped because it was BUSY when it tried to execute a line contents.

Action : Since there may be an intrusion of intense electromagnetic noise, etc., re-run the program after improving the environment.

W5 PxL**** AS : The valid axis in the program is different from the controllable axis of the Memory switch.

Action : Change the controllable axis of the Memory switch
"GENERAL" - "AXIS".

W5 PxL**** ME : Excitation of one or more of the valid axes in the program is OFF.

Action : Turn on the excitation.

*) x is the program number.

**** is the line number. In the case of 0000, it means that the event occurred before the first line was executed.

To turn off this factor display, use the [STOP] button or ALMRST signal for REMOTE mode, and the [STOP] button or BEC: command for Program mode.

5-4. Testing I/O Signal Connections

Test mode is used to monitor input signals from the I/O connector and to test output signals from the I/O connector. Connections to external devices can be checked easily.

5-4-1. Operation on the Front Panel

- [+JOG] : ① Select from input signal monitoring or output signal tests
(INPUT → OUTPUT → INPUT →...)
② Select the signals used for I/O tests
(INPUT : STOP → ALMRST → DIN1 → DIN2 →...)
(OUTPUT : COMP→ALARM→DOUT1→DOUT2→...)
- [-JOG] : ① Select from input signal monitoring or output signal tests
(INPUT → OUTPUT → INPUT →...)
② Select the signals used for I/O tests
(INPUT : DIN2 → DIN1 → ALMRST → STOP →...)
(OUTPUT : DOUT2→DOUT1→ALARM→COMP→...)
- [MORG] : ① Change to the test screen for testing.
② Change the signal when the output test. (ON→OFF→ON...)
- [EORG] : ① Cancels the test and returns to the TEST Mode Top screen.
② Change the signal when the output test. (ON→OFF→ON...)
- [LOCK] : ① When monitoring the input, the screen returns to the Input / Output Selection screen when the monitor ends.
② At the time of output test, when the test ends, the Input / Output Selection screen returns to the OFF setting.

5-4-2. Example Operation with an Input Signal Monitor

Check the input signal on the I/O connector.

▪ Operation Method

- ① On the TEST mode top screen, hold down the [MODE] button and press the [AXIS] button. The screen will change to the Input / Output Selection screen.
 - ② Press [+JOG] (↑) or [-JOG] (↓) button to change the display to "INPUT".
Press the [LOCK] (L) button to return to the TEST Mode Top screen.
After confirmation, press the [MORG] (→) button to change to the Input Signal Monitor screen.
 - ③ Pressing the [+ JOG] (↑) or [- JOG] (↓) button changes the name of the input signal and confirms the level (OFF / ON: HIGH / LOW) of each signal.
Pressing the [LOCK] (L) button returns to the Input/Output Selection screen.
- *) ON means that current flows through the diode of the photocoupler in the SHRC-203. Refer to "7-2 Reference circuit".

▪ Input Signal Contents

〈Input Signal〉	〈Name〉	〈Parameter〉
I/O Input	DIN1	OFF[HIGH] / ON[LOW]
	DIN2	OFF[HIGH] / ON[LOW]
	DIN3	OFF[HIGH] / ON[LOW]
	DIN4	OFF[HIGH] / ON[LOW]
	DIN5	OFF[HIGH] / ON[LOW]
	DIN6	OFF[HIGH] / ON[LOW]
1st Axis Clockwise Rotation	AXIS1 JOG+	OFF[HIGH] / ON[LOW]
1st Axis Counter-Clockwise Rotation	AXIS1 JOG-	OFF[HIGH] / ON[LOW]
2nd Axis Clockwise Rotation	AXIS2 JOG+	OFF[HIGH] / ON[LOW]
2nd Axis Counter-Clockwise Rotation	AXIS2 JOG-	OFF[HIGH] / ON[LOW]
3rd Axis Clockwise Rotation	AXIS3 JOG+	OFF[HIGH] / ON[LOW]
3rd Axis Counter-Clockwise Rotation	AXIS3 JOG-	OFF[HIGH] / ON[LOW]
Return to the 1st Axis Origin	AXIS1 ORG	OFF[HIGH] / ON[LOW]
Return to the 2nd Axis Origin	AXIS2 ORG	OFF[HIGH] / ON[LOW]
Return to the 3rd Axis Origin	AXIS3 ORG	OFF[HIGH] / ON[LOW]
Speed Setting 1	SPEED1	OFF[HIGH] / ON[LOW]
Speed Setting 2	SPEED2	OFF[HIGH] / ON[LOW]
Program No. Selection	PRG1	OFF[HIGH] / ON[LOW]
	PRG2	OFF[HIGH] / ON[LOW]
	PRG3	OFF[HIGH] / ON[LOW]
Program operation start	START	OFF[HIGH] / ON[LOW]
Pause	PAUSE	OFF[HIGH] / ON[LOW]
Stop	STOP	OFF[HIGH] / ON[LOW]
Alarm Reset	ALMRST	OFF[HIGH] / ON[LOW]

S 1 :	0 p
2 2 :	0 p
U 3 :	0 p

Fig. 5-14. TEST Mode

Top screen

TEST MODE	
INPUT :	(↑↓)
ENTER :	(→)
RETURN :	(L)

Fig. 5-15. Input / Output

Selection screen

TEST MODE INPUT	
DIN1 :	(↑↓)
OFF [HIGH]	
RETURN :	(L)

Fig. 5-16. Input Signal

Monitor screen

5-4-3. Example Operation with an Output Signal Test

Check the Output Signal on the I/O Connector.

▪ Operation Method

- ① On the TEST mode top screen, hold down the [MODE] button and press the [AXIS] button. The screen will change to the Input / Output Selection screen.
- ② Press the [+JOG] (↑) or [-JOG] (↓) button to change the display to "OUTPUT". Press the [LOCK] (L) button to return to the TEST Mode Top screen. After confirmation, press the [MORG] (→) button to change to the Output Signal Test screen.
- ③ Press the [+JOG] (↑) or [-JOG] (↓) button changes the name of the output signal. Press the [MORG] (→) or [EORG] (←) button to change "ON [HIGH]" / "OFF [LOW]".
In this screen, press the [LOCK] (L) button sets the setting to "OFF [LOW]" and returns to the Input/Output Selection screen.

*) ON means that current flows through the transistor of the photocoupler in the SHRC-203. Refer to "7-2 Reference circuit".

▪ Output Signal Contents

〈Output Signal〉	〈Name〉	〈Parameter〉
I/O Output	DOUT1	OFF[LOW] / ON[HIGH]
	DOUT2	OFF[LOW] / ON[HIGH]
	DOUT3	OFF[LOW] / ON[HIGH]
	DOUT4	OFF[LOW] / ON[HIGH]
	DOUT5	OFF[LOW] / ON[HIGH]
	DOUT6	OFF[LOW] / ON[HIGH]
1st Axis Busy	AXIS1 BUSY	OFF[LOW] / ON[HIGH]
2nd Axis Busy	AXIS2 BUSY	OFF[LOW] / ON[HIGH]
3rd Axis Busy	AXIS3 BUSY	OFF[LOW] / ON[HIGH]
Program Operation Complete	COMP	OFF[LOW] / ON[HIGH]
Alarm	ALARM	OFF[LOW] / ON[HIGH]

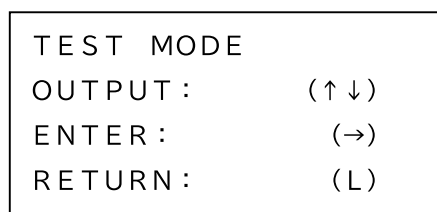


Fig. 5-17. Input / Output
Selection screen

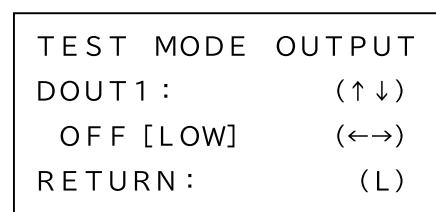


Fig. 5-18. Output Signal Test screen

5-5. Output the Trigger Signal to an External Device

The trigger signal is output from the trigger signal terminal block (TRIG) on the rear panel of SHRC-203 as a pulse wave signal that turns ON for a certain period of time to an external device. For the signal output circuit, see Fig. 7-3 in "Chapter 7: I/O Circuits and Connection Examples". The trigger-signal pulse width (The length of time the signal is ON) is set in the TRG WIDTH Memory switch stored in the controller (Three values (lengths) are available).

The pulse width can be selected from 10 μ s, 100 μ s, or 1000 μ s.

Trigger signals can be output at specified positions or intervals synchronized with the positioning of a motorized stage. As a result, they can be used to give instructions to an external device during positioning.

Trigger signals can also be output at the completion of motorized stage positioning, allowing instructions to be given to external devices when the stage has reached a specified position.

The following three methods are available for trigger-signal output :

- (1) Trigger signals are output once when the [LOCK] button on the front panel is pressed when positioning information is acquired in TEACHING (PROGRAM) mode.
- (2) Trigger signals can be output according to control commands from the computer in HOST mode. Use the "T:" command to trigger output by command in HOST mode.

[T command settings]

- Trigger output target axis : 1 to 3
- Time Interval Trigger interval : 1 to 10000 (Intervals of 0.01 to 100.00 seconds)
- Drive Pulse Trigger output interval : 2 to 3000 pulses
- Scale Pulse Trigger output interval : ± 2 to 3000 pulses

[T command format]

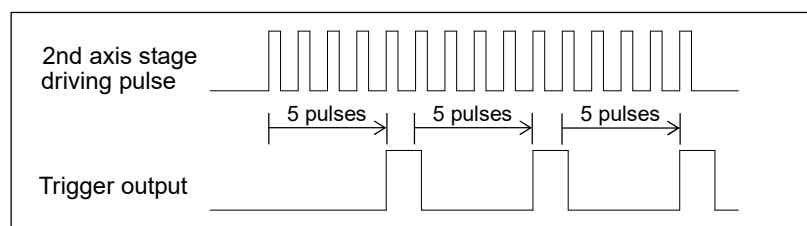
- Driving Pulse Trigger

Set the target axis for driving pulse trigger output and the trigger pulse interval for during positioning.

T: P [axis for trigger output] P [trigger pulse interval]

*) Set the movement speed for motorized stages to less than 56kpps when using the above commands. (Trigger signals may not output at speeds of over 56kpps.)

(Example) T: P2P5: Output every 5 pulses during the positioning movement of the 2nd axis.



- Scale Pulse Trigger (Scale-mounted motorized stage only)

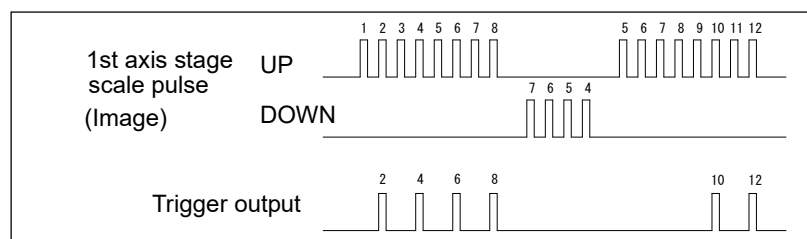
Set the target axis for scale pulse trigger output and the trigger pulse interval for during positioning.

T: E [axis for trigger output] P [direction] [trigger pulse interval]

*) Set the movement speed for motorized stages to less than 56kpps when using the above commands. (Trigger signals may not output at speeds of over 56kpps.)

(Example) T: E1P+2: Trigger output every 2 pulses when the 1st axis stage moves in the positive direction.

Even if the stage moves back in the reverse direction due to vibration, etc., the trigger is not output in duplicate.

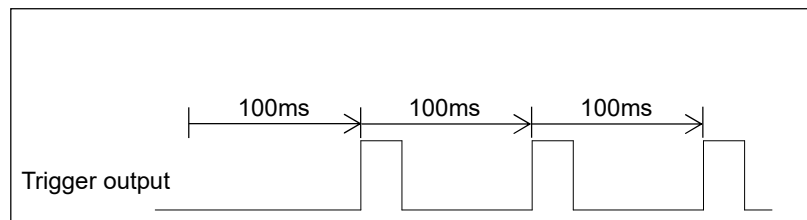


- Time Interval Trigger

Set the time interval for trigger output.

T: T [Trigger output-time intervals]

(Example) T: T10: Output trigger every 100msec (10×0.01 seconds)



- Output trigger once when the command is executed.

T: M

- Disable trigger output after the command is executed.

T: S

(3) Output according to the output instruction of the program in REMOTE mode.

In program output setting instructions, triggers are output during positioning or when positioning is completed.

[Output instruction settings]

- Positioning time trigger output interval : 1 to 10000
(Intervals of 0.01 to 100.00 seconds)
- Drive Pulse Trigger output interval : 2 to 3000 pulses
- Scale Pulse Trigger output interval : ± 2 to 3000 pulses

[Output indication contents]

▪ Driving Pulse Trigger

Set the target axis for driving pulse trigger output and the trigger pulse interval for during positioning.

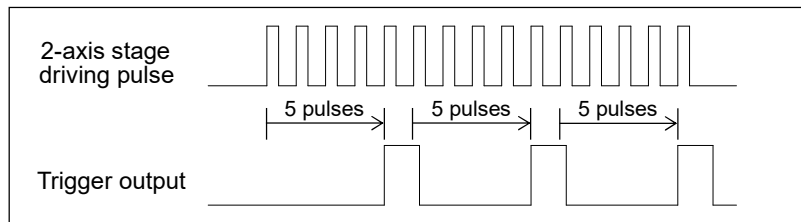
*) Set the movement speed of the automatic stage to 56kpps or less.

(Trigger signals may not output at speeds of over 56kpps.)

(Example) Output every 5 pulses during the positioning movement of the 2nd axis.

TM : P U L S E TA : 2 TV : 0 0 0 0 5
--

Fig. 5-19. Program edit screen in EDIT mode



▪ Scale Pulse Trigger (Scale-mounted motorized stage only)

Set the target axis for scale pulse trigger output and the trigger pulse interval for during positioning.

*) Set the movement speed of the automatic stage to 56kpps or less.

(Trigger signals may not output at speeds of over 56kpps.)

(Example) Output every 2 pulses during the 1st axis stage is positioning movement in the positive direction.

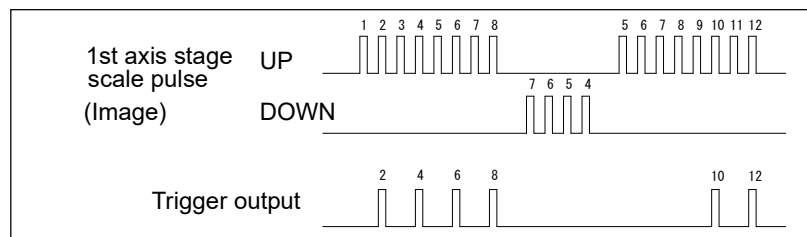
Even if the stage moves back in the reverse direction due to vibration, etc., the trigger is not output in duplicate.

```

TM : SCALE PLUS
TA : 1
TV : 00002

```

Fig. 5-20. Program edit screen in EDIT mode



▪ Time Interval Trigger

Set the time interval for trigger output.

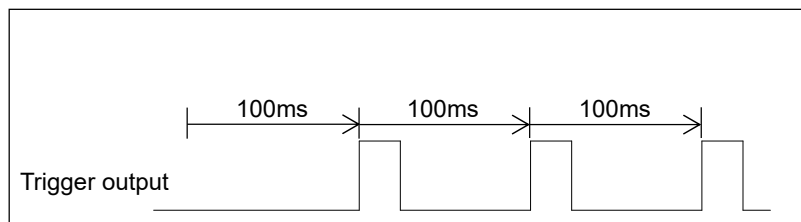
(Example) Output every 100ms. (10 x 0.01 seconds)

```

TM : TIMER
TV : 00010

```

Fig. 5-21. Program edit screen in EDIT mode

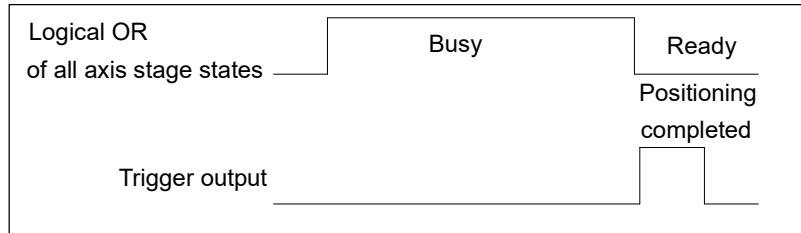


- One-Shot Trigger

After the positioning of all stages is completed, the trigger is output once.



Fig. 5-22. Program edit screen in EDIT mode



- Trigger Output Stop



Fig. 5-23. Program edit screen in EDIT mode

5-6. Check Controller Information and Communication Settings

In all modes, information about the controller and the currently selected communication interface settings can be viewed.

5-6-1 Operation of Information

Information display operations are performed using the buttons on the front panel.

Hold [MODE] and press [LOCK] :

Display the information top screen.

*) When any command is sent, it will return to the mode before the transition.

[MORG] or [EORG] : Change the information content. (MODEL → IF → MODEL)

[+ JOG] Scroll up the displayed items.

[-JOG] Scroll down the display items.

[MODE] Returns to the mode before the transition.

5-6-2. Information Display

On the top screen of each mode, hold down the [MODE] button and press the [LOCK] button.

Change to the information top screen
(MODEL information).

```

INFO  [MODEL]
MDL : SHRC-203
SN   : *****
FV   : **. **. **

```

Fig. 5-24. Information top screen

5-6-3. Changing Information

For the currently selected interface information, select [IF] with the [MORG] or [EORG] button.

```

INFO  [IF]
IF   : USB
DLM : ***

```

Fig. 5-25. USB

```

INFO  [IF]
IF   : GPIB
DLM : ***
ADR : **

```

Fig. 5-26. GP-IB

```

INFO  [IF]
IF   : ETHERNET
DLM : ***
IPA : *****
DGW : *****
SNM : *****
POT : *****
MAC : *****

```

Fig. 5-27. Ethernet

- SN : Serial number ▪ FV : Firmware version ▪ DLM : Delimiter ▪ ADR : Address
- IPA : IP address ▪ DGW : Default gateway ▪ SNM : Subnet mask
- POT : Port number ▪ MAC : Mac address

5-7. Other Features

It is equipped with a function to prevent erroneous operation, reduction of power consumption (Sleep function), and a function to turn off all lamps necessary for use in a dark room. The button operations on the front panel are as follows.

- Prevent erroneous operation function

[LOCK] : The operation of the [+JOG], [-JOG], [MORG], [EORG], [ZERO], and [AXIS] buttons on the front panel is prohibited.

At this time, the red LOCK LED lights up.

Hold [LOCK] : All buttons that were prohibited on the front panel will be made available.

At this time, the red LOCK LED turns off.

- All lamps off

[MODE] while the LOCK LED is on : All lights turn off or on with each click.

(MANUAL mode only)

- Sleep

Hold [AXIS] and press [ZERO] : Turn off the motor excitation, turn off the LCD back light, turn off the lamps other than the SLEEP LED, cooling fan stopped, cut off the 24V output of the terminal block, and cut off the power supply of peripheral device.

At this time, the orange SLEEP LED lights up.

When a motorized stage with a scale is connected, the power may be kept on even when not in use to maintain coordinate values, but power consumption can be reduced at that time.

However, if "S1 SCALE" occurs during sleep, the coordinate values cannot be retained.

(MANUAL mode only)

***) The cooling fan may rotate due to the rise in internal temperature.**

Buttons other than [STOP] while SLEEP LED is on : Wake up from sleep.

For operations of other functions from a personal computer, refer to the separate "SHRC-203 User's Manual (Command)".

Chapter 6: Connector Pin Numbers and Signals

6-1. I/O Signals

I/O signals are enabled when the controller's operating mode is set to REMOTE mode.

Motorized stages can be operated (Returned to mechanical origin, turned clockwise or counter-clockwise, have their speed settings changed, etc.) by turning I/O connector signals on or off from a remote device.

Motorized operations can be performed following the instructions in a controller-internal program using START, PAUSE, and STOP signals. Eight programs, No. 1 to 8, are available for selection. As end-of-operation signals are output when each operation is completed, programmed operation can be used for easy remote control while confirming the operating condition of each stage.

***) The pulse width of the input signal should be 10 ms or more.**

6-1-1. I/O Signal for Manual Operation

(1) Description of Input Signals

- ALMRST input Release the alarm. (When the signal is ON)
- AXIS1 ORG input Return 1st axis to mechanical origin. (When the signal is ON)
- AXIS2 ORG input Return 2nd axis to mechanical origin. (When the signal is ON)
- AXIS3 ORG input Return 3rd axis to mechanical origin. (When the signal is ON)
- AXIS1 JOG + input Move 1st axis in positive direction. (While the signal is ON)
- AXIS1 JOG - input Move 1st axis in negative direction. (While the signal is ON)
- AXIS2 JOG + input Move 2nd axis in positive direction. (While the signal is ON)
- AXIS2 JOG - input Move 2nd axis in negative direction. (While the signal is ON)
- AXIS3 JOG + input Move 3rd axis in positive direction. (While the signal is ON)
- AXIS3 JOG - input Move 3rd axis in negative direction. (While the signal is ON)
- SPEED 1, 2 input Speed command (Stage moves at the speed set in the speed-setting Memory switch (SPEED1 ~ 4) through combinations of SPEED1 and SPEED2 input signals)

Selected speed	SPEED1	SPEED2	SPEED3	SPEED4
SPEED1 signal		ON		ON
SPEED2 signal			ON	ON

Blanks are OFF

▪ IN1 ~ 6

Input conditions can be checked as six-bit data.

Input	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
IN1		ON		ON		ON		ON		ON		ON		ON		ON
IN2			ON	ON			ON	ON			ON	ON			ON	ON
IN3					ON	ON	ON	ON					ON	ON	ON	ON
IN4									ON	ON	ON	ON	ON	ON	ON	ON
IN5																
IN6																

Blanks are OFF

Input	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
IN1		ON		ON		ON		ON		ON		ON		ON		ON
IN2			ON	ON			ON	ON			ON	ON			ON	ON
IN3					ON	ON	ON	ON					ON	ON	ON	ON
IN4									ON	ON	ON	ON	ON	ON	ON	ON
IN5	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
IN6																

Blanks are OFF

Input	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
IN1		ON		ON		ON		ON		ON		ON		ON		ON
IN2			ON	ON			ON	ON			ON	ON			ON	ON
IN3					ON	ON	ON	ON					ON	ON	ON	ON
IN4									ON	ON	ON	ON	ON	ON	ON	ON
IN5																
IN6	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON

Blanks are OFF

Input	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
IN1		ON		ON		ON		ON		ON		ON		ON		ON
IN2			ON	ON			ON	ON			ON	ON			ON	ON
IN3					ON	ON	ON	ON					ON	ON	ON	ON
IN4									ON	ON	ON	ON	ON	ON	ON	ON
IN5	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
IN6	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON

Blanks are OFF

(2) Description of Output Signals

- ALARM output Alarm (ON when an alarm is generated).
- AXIS1 BUSY output 1st axis BUSY (Turns ON when the 1st axis is moving, and turns OFF when the stage stops for open-loop control or when positioning is completed for closed-loop control.)
- AXIS2 BUSY output 2nd axis BUSY (Turns ON when the 2nd axis is moving, and turns OFF when the stage stops for open-loop control or when positioning is completed for closed-loop control.)
- AXIS3 BUSY output 3rd axis BUSY (Turns ON when the 3rd axis is moving, and turns OFF when the stage stops for open-loop control or when positioning is completed for closed-loop control.)

▪ OUT 1 ~ 4 Output as six-bit data

Output	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
OUT1		ON		ON		ON		ON		ON		ON		ON		ON
OUT2			ON	ON			ON	ON			ON	ON			ON	ON
OUT3					ON	ON	ON	ON					ON	ON	ON	ON
OUT4									ON	ON	ON	ON	ON	ON	ON	ON
OUT5																
OUT6																

Blanks are OFF

Output	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
OUT1		ON		ON		ON		ON		ON		ON		ON		ON
OUT2			ON	ON			ON	ON			ON	ON			ON	ON
OUT3					ON	ON	ON	ON					ON	ON	ON	ON
OUT4									ON	ON	ON	ON	ON	ON	ON	ON
OUT5	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
OUT6																

Blanks are OFF

Output	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
OUT1		ON		ON		ON		ON		ON		ON		ON		ON
OUT2			ON	ON			ON	ON			ON	ON			ON	ON
OUT3					ON	ON	ON	ON					ON	ON	ON	ON
OUT4									ON	ON	ON	ON	ON	ON	ON	ON
OUT5																
OUT6	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON

Blanks are OFF

Output	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
OUT1		ON		ON		ON		ON		ON		ON		ON		ON
OUT2			ON	ON			ON	ON			ON	ON			ON	ON
OUT3					ON	ON	ON	ON					ON	ON	ON	ON
OUT4									ON	ON	ON	ON	ON	ON	ON	ON
OUT5	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
OUT6	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON

Blanks are OFF

6-1-2. I/O Signals for Automatic Operations

Motorized stage operation by the program starts when the START input of the I/O signal is turned on in the REMOTE mode top screen. During operation, the LCD display shows the program number and the line number of the program being operated, as shown in Fig 6-2. When an execution completed, a stop operation or an error occurs, the screen returns to the REMOTE Mode Top screen. For the error, refer to "5-3-4. Display of Execution Stop Factors".

R 1 :	0 p
2 2 :	0 p
U 3 :	0 p

Fig. 6-1. REMOTE Mode Top screen

I/O OPERATION
PROG No. 1
LINE No. 0001
EXECUTION STATE

Fig. 6-2. Example during operation

(1) Description of Input (Start/Stop) Signals

- PRG Input Choose the program.

(Secifies the number of the program data to be executed.)

Program No.	I/O PRG No.			Program No.	I/O PRG No.		
	PRG1	PRG2	PRG3		PRG1	PRG2	PRG3
1				5			ON
2	ON			6	ON		ON
3		ON		7		ON	ON
4	ON	ON		8	ON	ON	ON

Blanks are OFF

- START Input : Start command for motorized operations
(Program execution begins when signal is on. At that time, "EXECUTION STATE" is displayed on the fourth line of the display screen.)
- PAUSE Input : Pause command
(Operations are paused while signal is on. At that time, "PAUSE STATE" is displayed on the fourth line of the display screen. In this state, turning the START input on executes only single line of the program. At that time, "ONE LINE STATE" is displayed on the fourth line of the display screen. When the signal is turned off, program operation is resumed.)
- Stop Input : Stop command for motorized operations
(Programmed operations stop when signal is turned on.)
It can be used regardless of the mode.
- ALMRST Input : Release the alarm
(The error is release when the signal is turned on.)

(2) Descriptions of Output Signals

- COMP Output : Program completed
(On when automatic operations are complete.)
Signal output as 100ms pulse.
- AXIS1 BUSY output 1st axis BUSY
(Turns ON when the 1st axis is moving, and turns OFF when the stage stops for open-loop control or when positioning is completed for closed-loop control.)
- AXIS2 BUSY output 2nd axis BUSY
(Turns ON when the 2nd axis is moving, and turns OFF when the stage stops for open-loop control or when positioning is completed for closed-loop control.)
- AXIS3 BUSY output 3rd axis BUSY
(Turns ON when the 3rd axis is moving, and turns OFF when the stage stops for open-loop control or when positioning is completed for closed-loop control.)
- ALARM Output : Alarm (On when an alarm is generated.)

6-1-3. I/O Connector Signals

No.	Name	No.	Name
1	COM1	26	AXIS3 BUSY(COM1)
2	AXIS2 BUSY(COM1)	27	AXIS1 BUSY(COM1)
3	COM2	28	COMP(COM2)
4	ALARM(COM2)	29	N.C
5	COM3	30	ALMRST(COM3)
6	SPEED2(COM3)	31	SPEED1(COM3)
7	COM4	32	AXIS3 JOG—(COM4)
8	AXIS3 JOG+(COM4)	33	AXIS2 JOG—(COM4)
9	COM5	34	AXIS2 JOG+(COM5)
10	AXIS1 JOG—(COM5)	35	AXIS1 JOG+(COM5)
11	COM6	36	AXIS3 ORG(COM6)
12	AXIS2 ORG(COM6)	37	AXIS1 ORG(COM6)
13	COM7	38	STOP(COM7)
14	PAUSE(COM7)	39	START(COM7)
15	COM8	40	PRG3(COM8)
16	PRG2(COM8)	41	PRG1(COM8)
17	+V(DC24V)	42	GND (0V)
18	COM9	43	OUT6(COM9)
19	OUT5(COM9)	44	OUT4(COM9)
20	COM10	45	OUT3(COM10)
21	OUT2(COM10)	46	OUT1(COM10)
22	COM11	47	IN6(COM11)
23	IN5(COM11)	48	IN4(COM11)
24	COM12	49	IN3(COM12)
25	IN2(COM12)	50	IN1(COM12)

Connector used : 10250-52A2PL (Manufactured by 3M products) equivalent

*) The black faces are outputs.

() is the corresponding COM terminal.

Terminal No. 17 "+V (DC24V)" should be used at 0.5A or less.

6-2. Terminal Block

No. (From right)	Name	No. (From right)	Name
1	DC24V —	4	TRIG H
2	DC24V +	5	EMG
3	TRIG L	6	EMG

Parts used : ML-250-S2GYF-6P (Manufactured by SATO Parts products) Equivalent
Jumper bracket ML-1000-3H1 attached to terminals 5-6.

*) The black faces are outputs.

*) Terminal No. 2 "24V" should be used at 1A or less.

6-3. STAGE 1 ~ 3 Connector

No.	Name	No.	Name
1	Blue : Motor wiring	9	Autoconfig
2	Red : Motor wiring	10	Reserve
3	Orange : Motor wiring	11	LS(+) : Limit detection on +
4	Green : Motor wiring	12	LS(−) : Limit detection on −
5	Black : Motor wiring	13	GND : Common sensor
6	GND : Common sensor	14	NEAR : Proximity detection
7	ORG : Mechanical origin detection	15	+24V : Sensor power supply
8	+24V : Sensor power supply		

Connector used : XM3B-1522 (Manufactured by OMRON products) equivalent

*) The black faces are outputs.

6-4. SCALE 1 ~ 3 Connector

No.	Name	No.	Name
1	Signal GND	9	Alarm—
2	Signal GND	10	Phase A+
3	+5V	11	Phase A—
4	+5V	12	Phase B+
5	—	13	Phase B—
6	—	14	—
7	—	15	FG
8	—		

Connector used : D02-M15SAG-21L9E (Manufactured by JAE products) equivalent

*) The black faces are outputs.

6-5. USB Connector

No.	Name	No.	Name
1	+5V	3	DATA +
2	DATA –	4	GND

Connector used : XM7B-0442 (Manufactured by OMRON products) equivalent

6-6. Ethernet Connector

No.	Name	No.	Name
1	TX +	5	—
2	TX –	6	RX –
3	RX +	7	—
4	—	8	—

Connector used : J0026D01BNL (Manufactured by Pulse Electronics products) equivalent

6-7. GP-IB Connector

No.	Name	No.	Name
1	DATA1	13	DATA5
2	DATA2	14	DATA6
3	DATA3	15	DATA7
4	DATA4	16	DATA8
5	EOI	17	REN
6	HND (DAV)	18	GND
7	HND (NRFD)	19	GND
8	HND (NDAC)	20	GND
9	IFC	21	GND
10	SRQ	22	GND
11	ATN	23	GND
12	SHIELD	24	GND

Connector used : 57LE-20240-7700(D35G)-CA (Manufactured by DDK products) equivalent

6-8. OPTION Connector

No.	Name	No.	Name
1	GND	8	GND
2	+5V	9	+5V
3	RXD+	10	RXD—
4	TXD+	11	TXD—
5	STOP	12	CONNECT
6	—	13	—
7	—	14	—

Connector used : 10214-6202PL (Manufactured by 3M products) equivalent

*) The black faces are outputs.

Chapter 7: I/O Circuits and Connection Examples

7-1. Input/Output Circuit

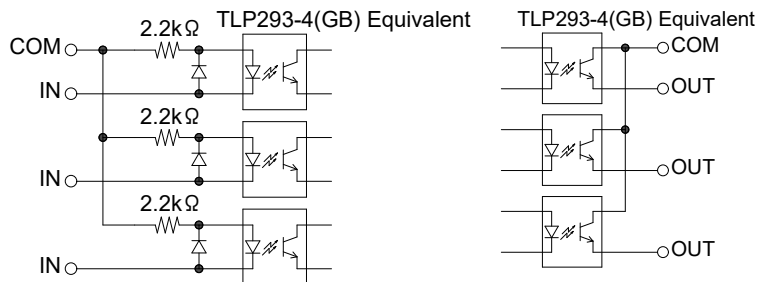


Fig. 7-1. I/O input circuit

Fig. 7-2. I/O output circuit

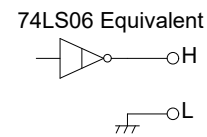


Fig. 7-3. TRIG output circuit

7-2. Reference Circuit

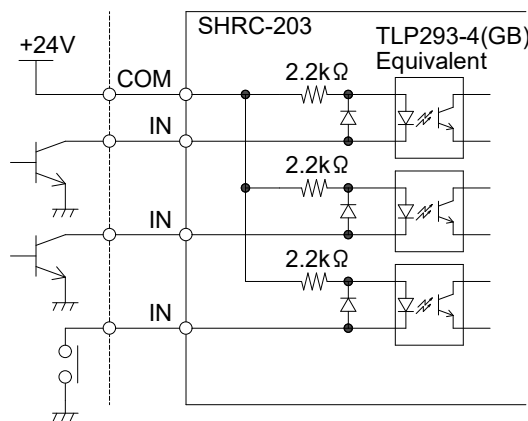


Fig. 7-4. Example input circuit

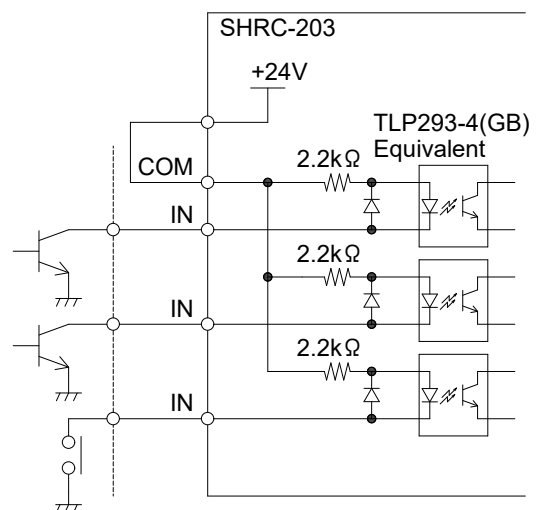


Fig. 7-5. Example of input circuit when using SHRC-203 internal power source

*) When current flows through the diode of the photocoupler in the SHRC-203, it is recognized as ON.

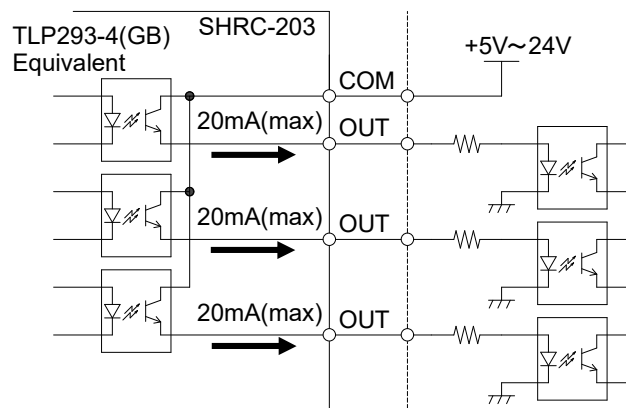


Fig. 7-6. Example output circuit

*) When turned ON, current flows through the transistor of the photocoupler in the SHRC-203.

*) Be sure to insert a current limiting resistor.

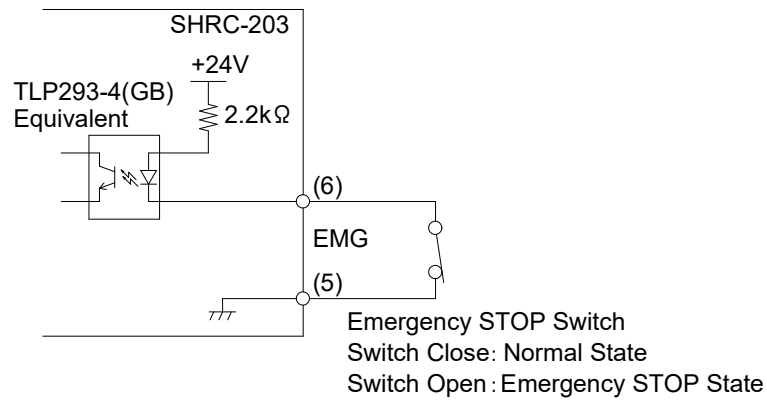


Fig. 7-7. Example Emergency STOP circuit

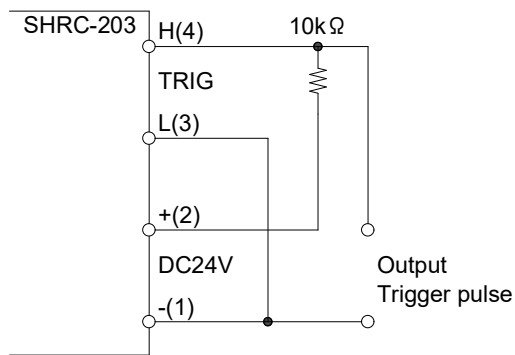
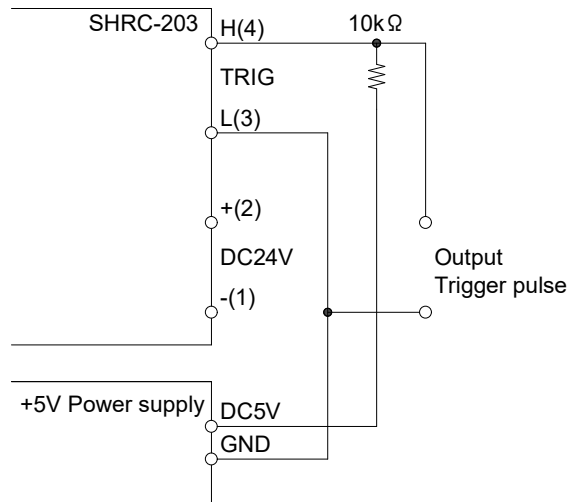


Fig. 7-8. Example trigger output circuit

Fig. 7-9. Example of trigger output circuit
when using external power supply

The open collector gate(74LS06) is used for the trigger output circuit in the controller. In the Fig. 7-8, the amplitude of the trigger output pulse is 24V, because of the DC24V power supply connection.

In the Fig. 7-9, the amplitude of the trigger output pulse is 5V, because of the +5V power supply connection. In this case, a +5V power supply must be prepared.

*) Since direct connection of the power supply to the H terminal of the trigger will result in failure, be sure to connect a 10k Ω load resistor.

Chapter 8: Alarm

When an abnormal condition arises, for example, the glass-scale is out of order or a cable is broken, an alarm (Out of order) appears with the description of the abnormal condition on the LCD of the SHRC-203. (See Fig. 8-1, 8-2)

*) Unconnected axes should be removed from the controllable axes of the Memory switch "GENERAL" - "AXIS".

Failure to exclude it will result in anomalous recognition.

If an alarm occurs, remove the cause of the abnormality and then cancel it by the following method.

H 1 :	S 1	S C A L E
2 2 :		0 p
U 3 :		0 p

Fig. 8-1. Alarm display example 1

H 1 :		0 p
2 2 :		0 p
U 3 :		0 p
	C M D	E R

Fig. 8-2. Alarm display example 2

Display	S1 SCALE		
Description	▪ Alarm from the scale is output ▪ Scale cable not connected		
Occurrence cases	Overspeed, interpolation error, etc.		
Release	Top screen of all modes TEACHING operation screen	HOST mode	REMOTE mode top screen
	STOP button	BEC: Command	ALMRST signal ON
	When unplugging and plugging in the scale cable, do so after the power is turn off.		
Status after release	Zero reset coordinate values and positioning complete		

Display	S2 DISCONNECT , S4 OVER FLOW		
Description	The difference between the coordinate value and the command position is 5 mm or more		
Occurrence cases	Breakage of scale signal line, step-out due to overload, etc.		
Release	Top screen of all modes TEACHING operation screen	HOST mode	REMOTE mode top screen
	STOP button	BEC: Command	ALMRST signal ON
	When unplugging and plugging in the scale cable, do so after the power is turn off.		
Status after release	In case of disconnection of scale signal line, positioning is completed at the coordinate value at the point of disconnection. In the case of step-out, positioning is completed at the step-out position. (The coordinate values are maintained unless the power is turned off.)		

Display	S3 HUNTING		
Description	Positioning is not completed even if feedback control is applied the specified number of times.		
Occurrence cases	Stage is subjected to vibration, or stage drive unit failure, etc.		
Release	Top screen of all modes TEACHING operation screen	HOST mode	REMOTE mode top screen
	STOP button	BEC: Command	ALMRST signal ON
Status after release	Positioning completed (Coordinate values are maintained)		

*) Feedback control will be disabled after "S3 HUNTING" occurs, but positioning may be completed within the in-position range and automatically released even if feedback control is not performed.

Display	S5 LIMIT		
Description	+LS, -LS both detection		
Occurrence cases	- The polarity of the limit sensor is different. - Break of limit sensor wire - Motor cable not connected		
Release	- Change the polarity of the limit sensor of the Memory switch - Replace or connect the motor cable after the power is turn off.		
Status after release	Same as normal startup		

Display	S6 COUNT OVER		
Description	The LCD display limit of the coordinate value has been exceeded.		
Mode	Top screen of all modes TEACHING operation screen	HOST mode	REMOTE mode top screen
Release	STOP button	BEC: Command	ALMRST signal ON
Status after release	Zero reset coordinate values and positioning complete		

Display	S7 CONFIG		
Description	Unable to get Auto Config Data		
Release	Turn on the power again (If the problem is not resolved after the power is turned on again, please contact our sales department.)		

Display	S8 CMD
Description	Received undefined command
Release	Receive a normal command

Display	S9 SYSTEM
Description	Internal processing error
Release	Turn on the power again (If the problem is not resolved after the power is turned on again, please contact our sales department.)

Display	S10 OVERHEAT1
Description	1st axis motor driver overheat alarm (Excitation on, Operation stopped)
Release	Lower the ambient temperature and wait until the "S10 OVERHEAT1" and "W3 OVERHEAT1" display disappears.

Display	S10 OVERHEAT2
Description	2nd axis motor driver overheat alarm (Excitation on, Operation stopped)
Release	Lower the ambient temperature and wait until the "S10 OVERHEAT2" and "W3 OVERHEAT2" display disappears.

Display	S10 OVERHEAT3
Description	3rd axis motor driver overheat alarm (Excitation on, Operation stopped)
Release	Lower the ambient temperature and wait until the "S10 OVERHEAT3" and "W3 OVERHEAT3" display disappears.

Display	EMERGENCY
Description	Emergency stop input state
Release	Short circuit the EMG terminal on the terminal block

Display	W1 24V OL IO
Description	24V output overload warning for I / O connector (Output voltage drop or cutoff)
Release	Remove the load and turn on the power about 10 seconds after the power is turned off.

Display	W2 24V OL TB
Description	24V output overload warning for terminal block (Output voltage drop or cutoff)
Release	Remove the load and turn on the power about 10 seconds after the power is turned off.

Display	W3 OVERHEAT1
Description	1st axis motor driver overheat warning
Release	Lower the ambient temperature or stop the operation and wait until the warning disappears.

Display	W3 OVERHEAT2
Description	2nd axis motor driver overheat warning
Release	Lower the ambient temperature or stop the operation and wait until the warning disappears.

Display	W3 OVERHEAT3
Description	3rd axis motor driver overheat warning
Release	Lower the ambient temperature or stop the operation and wait until the warning disappears.

Display	W4 SPD SET1
Description	1st axis speed setting warning
Release	Change each speed to the Memory switch "AXIS" - "MAX SPEED1" or lower.

Display	W4 SPD SET2
Description	2nd axis speed setting warning
Release	Change each speed to the Memory switch "AXIS" - "MAX SPEED2" or lower.

Display	W4 SPD SET3
Description	3rd axis speed setting warning
Release	Change each speed to the Memory switch "AXIS" - "MAX SPEED3" or lower.

Display	W5 P*L**** **	
Description	A factor that stopped halfway during the program operation.	
Turn off the display	REMOTE mode top screen	Program mode
	STOP button, ALMRST signal ON	STOP button, BEC: Command

*) For detail, refer to "5-3-4. Display of Execution Stop Factors".

Chapter 9: Specifications

9-1. Specifications

(1). General Specifications

Power Source	AC100-240±10% [V] 50/60 [Hz]
Current Consumption	2 [A]
Operating Temperature	5 ~ 40 [°C]
Storage Temperature	−20 ~ 60 [°C]
Altitude	up to 2000 [m]
Indoor use only	
Overvoltage Category	II
Installation Category	II
Pollution Degree	2
Disconnection Device	AC connector
Ambient Humidity	20 ~ 80%[RH] (No condensation)
External Dimensions	265W×265D×99H (excluding projections) [mm]
Weight	4.6 [kg]

(2). Performance

Controlling Axis	3 axis																
Maximum Driving Speed (F)	1 ~ 1000000 [PPS]																
Minimum Driving Speed (S)	1 ~ 1000000 [PPS]																
Maximum Number of Travel Pulses	−2147483648[Pulse] ~ +2147483647 [Pulse]																
Acceleration/Deceleration Time (R)	1 ~ 1000 [ms]																
Sensor Input	Origin sensor / Proximity sensor / CW (-) Limit / CCW (+) Limit (Memory switch can be used to change input logic for sensors.)																
User Interface	9 switches <table border="0"> <tr> <td>▪ Rotation</td><td>1 point</td></tr> <tr> <td>▪ Reverse rotation</td><td>1 point</td></tr> <tr> <td>▪ Return-to-origin</td><td>1 point</td></tr> <tr> <td>▪ Return-to-logical-origin</td><td>1 point</td></tr> <tr> <td>▪ Reset position coordinates to zero</td><td>1 point</td></tr> <tr> <td>▪ Operation mode change</td><td>1 point</td></tr> <tr> <td>▪ Operation axis select</td><td>1 point</td></tr> <tr> <td>▪ Stop</td><td>1 point</td></tr> </table>	▪ Rotation	1 point	▪ Reverse rotation	1 point	▪ Return-to-origin	1 point	▪ Return-to-logical-origin	1 point	▪ Reset position coordinates to zero	1 point	▪ Operation mode change	1 point	▪ Operation axis select	1 point	▪ Stop	1 point
▪ Rotation	1 point																
▪ Reverse rotation	1 point																
▪ Return-to-origin	1 point																
▪ Return-to-logical-origin	1 point																
▪ Reset position coordinates to zero	1 point																
▪ Operation mode change	1 point																
▪ Operation axis select	1 point																
▪ Stop	1 point																

Communication Interface USB Interface (Virtual COM)

Communication Parameters

- Baud Rate 9600 / 38400 / 57600 [bps]
- Data Bits 8bit
- Parity None
- Stop Bit 1bit
- Flow Control Hardware
- Delimiters CR+LF,CR,LF

Ethernet Interface

Communication Parameters

- Data Rate 10/100M[bps](Full duplex)
- Port number 0 ~ 65535
- HP Auto MDIX Support
- Delimiters CR+LF,CR,LF

GP-IB Interface

Communication Parameters

- Setting address 1 ~ 30
- Delimiters CR+LF,CR,LF,EOI
- Flow Control None

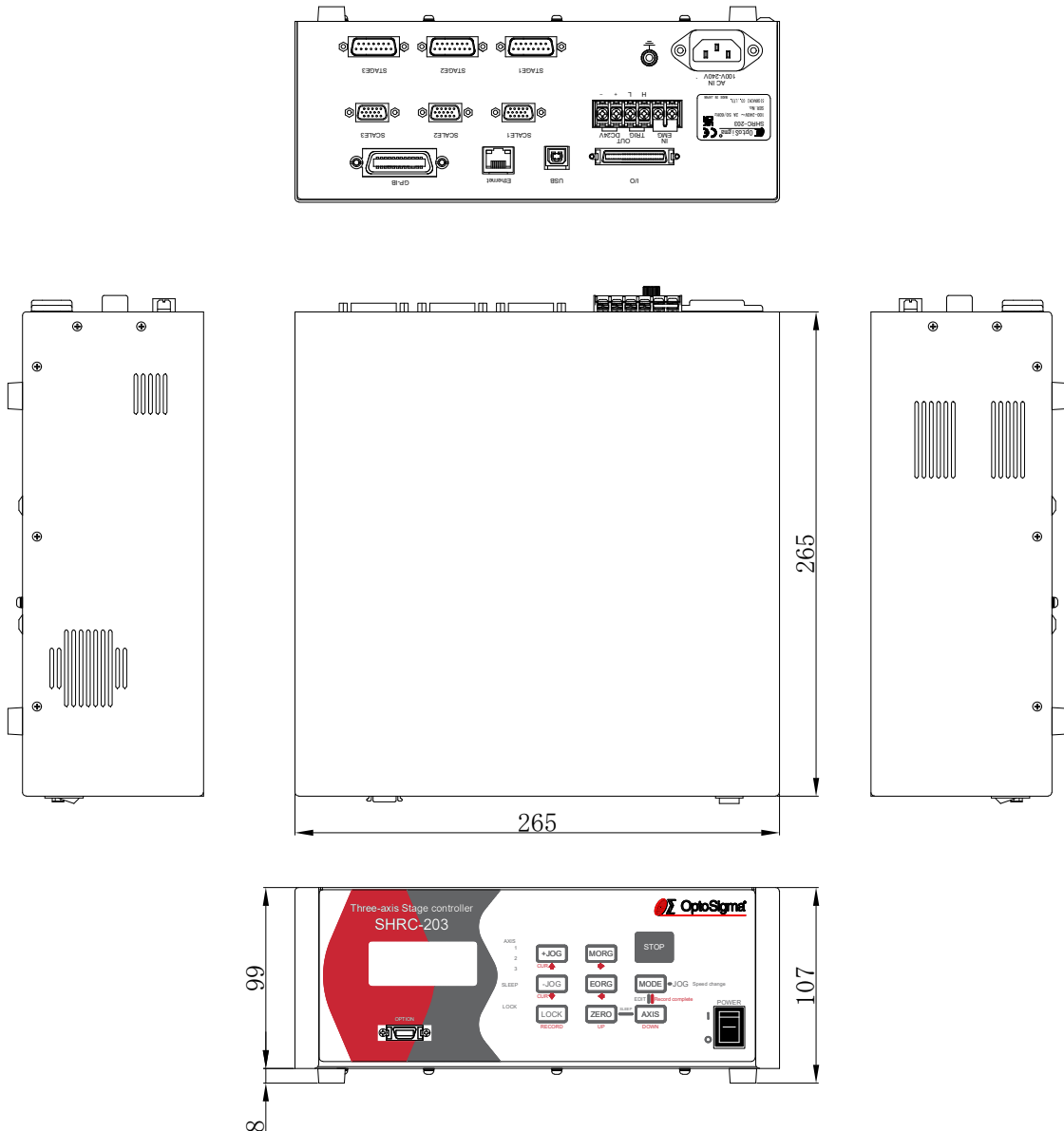
I/O	Input	6 points (Photo-coupler Input, Internal Resistance 2.2[kΩ])
	Output	6 points (Open-collector Output Maximum Use Conditions DC24[V] 20[mA])
	Control Signals	19 input points (Photo-coupler Input, Internal Resistance 2.2[kΩ]) ▪ Program number 3 points ▪ Operating command 1 point ▪ Return-to-origin command 3 points ▪ Pause 1 point ▪ Stop 1 point ▪ Rotation 3 points ▪ Reverse rotation 3 points ▪ Speed setting 2 points ▪ Alarm reset 1 point ▪ Emergency stop 1 point
	Status Outputs	5 output points (open-collector output, maximum use conditions DC24[V] 20[mA]) ▪ Program operation completed 1 point ▪ BUSY 3 point ▪ ALARM 1 point
	Power Output	DC24V 1 point (0.5[A] MAX)

Terminal Block	Emergency Stop Input	1 point (Normally closed)
	Trigger Pulse Output	1 point (open-collector output maximum use conditions DC24[V] 30[mA] MAX)
	24V Output	1 point (1[A] MAX)

(3). Driver Specifications

Driver Type	Bi-polar new pentagon constant current drive system
Excitation Type	Micro-step
Driving Electric Current (output current)	0.3 ~ 1.4 [A/phase]
Current Down (stop current)	0 ~ 100% of the specified driving electric current
Division (micro-step) Settings	1 ~ 8000 divisions

9-2. Outlines



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