User's Manual

(Preparation and Operation)

Three-axis Stage Controller

SHRC-203

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Contents

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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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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).

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1-3. The SHRC-203 System

External I/O control

When you use I/O connector, please use this one.

·GP-IB cable
·LAN cable
·USB cable

10120-3000PE connector (3M Japan products) Equivalent

Control from PC	3 Axis Stage Controller SHRC-203	JS-301/JB-401 JD-101/MD-400

MDR cable
MDR14-CA

Peripheral device

STAGE cable：**D15D15A-CA / D15RP-CA**
/ D15H12A-RC
SCALE cable：**GSEF-CA / DM15HD14A-RC**

Motorized stage

Exe) OSMS(CS)/HST(GS)/NFS/OSMS/OSCM/ACT/VSGSP/TAMM series etc.

1-4. Parts and Functions

SHRC-203 Front Panel

Three-axis Stage controller
SHRC-203

OptoSigma

AXIS
1
2
3
SLEEP
LOCK

+JOG   MORG   STOP
CUR
-JOG   EORG   MODE · JOG Speed change
EDIT Record complete
LOCK   ZERO SLEEP AXIS
RECORD   UP   DOWN

POWER

④Display panel   ⑤OPTION connector   ③Indicators led   ②Operation switches   ①POWER switch

SHRC-203 Rear Panel

⑩I/O connector   ⑨USB connector   ⑧Status LED   ⑦Ethernet connector   ⑥GP-IB connector

I/O   USB   Ethernet   GP-IB

OptoSigma CE
SHRC-203
100~240~ 2A 50/60Hz
SER. No.
SIGMAKOKI CO., LTD.
MADE IN JAPAN
UK CA

IN   OUT
EMG   TRIG   DC24V

SCALE1   SCALE2   SCALE3

H L + −

AC IN
100V-240V

STAGE1   STAGE2   STAGE3

⑭AC connector   ⑮Earth terminal   ⑪Terminal panel   ⑫Stage driving connectors 1 ~ 3   ⑬Scale connectors 1 ~ 3

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	Connecter	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.

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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.

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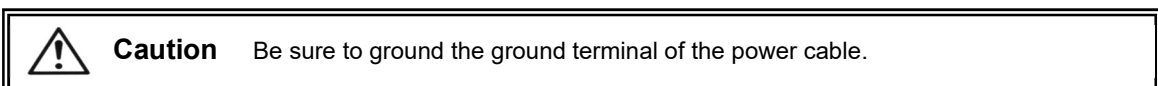
2-4. Installing USB Drivers

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.

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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.
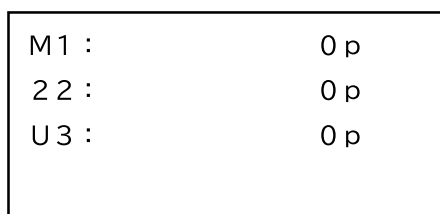
```
M1:            0 p
2 2:           0 p
U3:            0 p
```

Fig. 3-1. MANUAL Mode Top screen
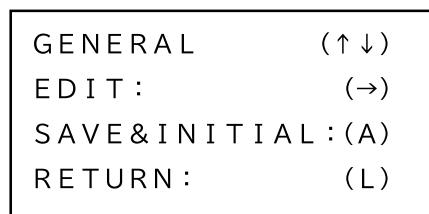
```
G E N E R A L          (↑↓)
E D I T :              (→)
S A V E & I N I T I A L :(A)
R E T U R N :          (L)
```

Fig. 3-2. Classification Selection screen

```
G E N E R A L
0 1  A X I S
   1 + 2 + 3
R E T U R N :          (L)
```

Fig. 3-3. Memory Switch Editing screen

```
S A V E  E X I T :    (↑)
N O  S A V E  E X I T :(↓)
I N I T I A L :        (→)
R E T U R N :          (L)
```

Fig. 3-4. Registration screen

```
I N I T I A L I Z E ?
I N I T I A L  E X I T :(↑)

R E T U R N :          (L)
```
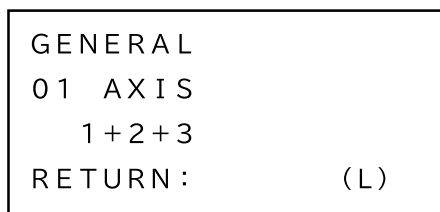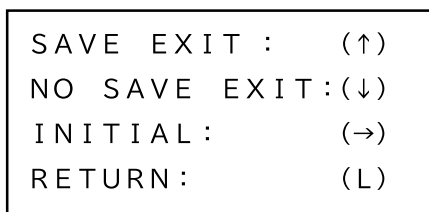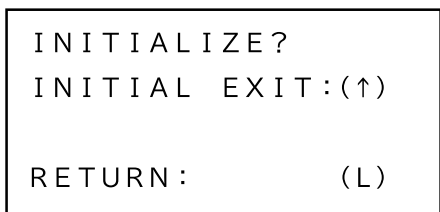
Fig. 3-5. Initialization screen

[+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

```
┌─────────────────────────────┐
│ M1 :             0 p        │
│ 22 :             0 p        │
│ U3 :             0 p        │
│                             │
│                             │
└─────────────────────────────┘
```

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

It changs 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.

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4) Memory Switch Registration

```
┌─────────────────────────────┐
│ S A V E   E X I T      (↑)   │
│ N O   S A V E   E X I T :(↓) │
│ I N I T I A L :        (→)   │
│ R E T U R N :          (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.

```
┌─────────────────────────────┐
│ I N I T I A L I Z E ?        │
│ I N I T I A L   E X I T :(↑) │
│                             │
│ R E T U R N :          (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
```
S E N S O R
0 1  L S／L E V 1
#  N O R M A L   O P E N
R E T U R N :          ( L )
```
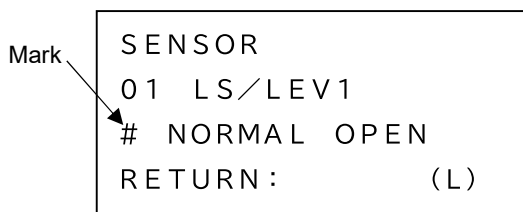
3-4. List of each Memory Switch Contents and Detailed Settings

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 ~ 252555255255	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] 0000000000000 ~ 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

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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]

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 [μm/s]
MICRO, SENSOR MICRO	1 [μm]	1 ~ 999999999 [μm/s]
MILI, SENSOR MILI	1 [nm]	0.000001 ~ 999.999999 [mm/s]
MILI, SENSOR MILI	1 [μm]	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 [μm]	4 or more	1 ~ 1000000 [μm/s]
MICRO	1 [μm]	2 or less	1 ~ 100000 [μm/s]
MICRO	1 [nm]	4 or more	0.001 ~ 1000.000 [μm/s]
MICRO	1 [nm]	2 or less	0.001 ~ 100.000 [μm/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".

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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

ORGx DIR Direction Limit sensor

ORGx (F)

Detect ORGx DIR direction limit sensor

1/10 of ORGx (S)

Detect limit sensor exit

ORGx (S)

Detect NEAR ORG sensor

1/10 of ORGx (S)

Detect ORG sensor

ORG sensor
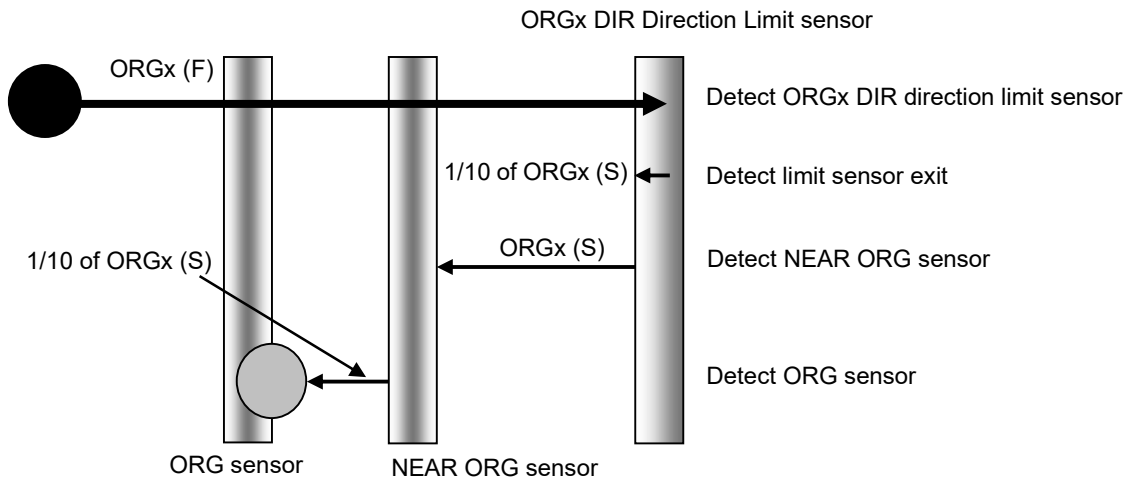
NEAR ORG sensor

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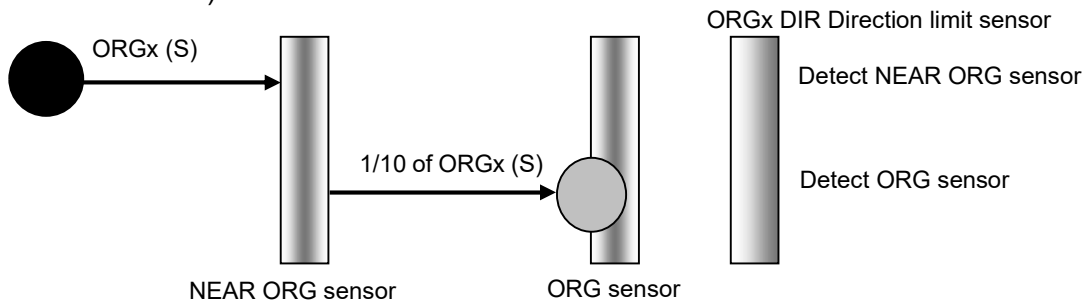
Caution 2) In case of the NEAR ORG sensor is detected and moved in the ORGx DIR direction, and the origin sensor cannot be detected (In case of no ORG sensor), it stops at the limit sensor in the opposite direction.

3-4-7-2. MINI method

ORGx OFFSET default value is 1000.
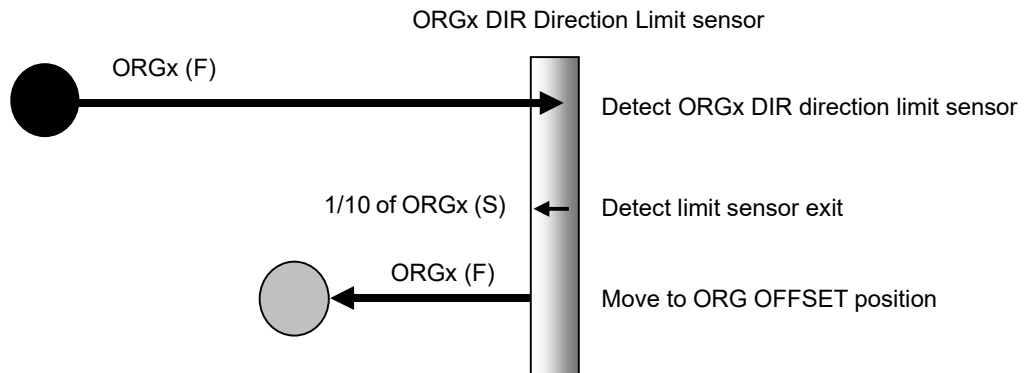
ORGx DIR Direction Limit sensor

ORGx (F)

Detect ORGx DIR direction limit sensor

1/10 of ORGx (S)

Detect limit sensor exit

ORGx (F)

Move to ORG OFFSET position

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3-4-7-3. NORMAL method

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

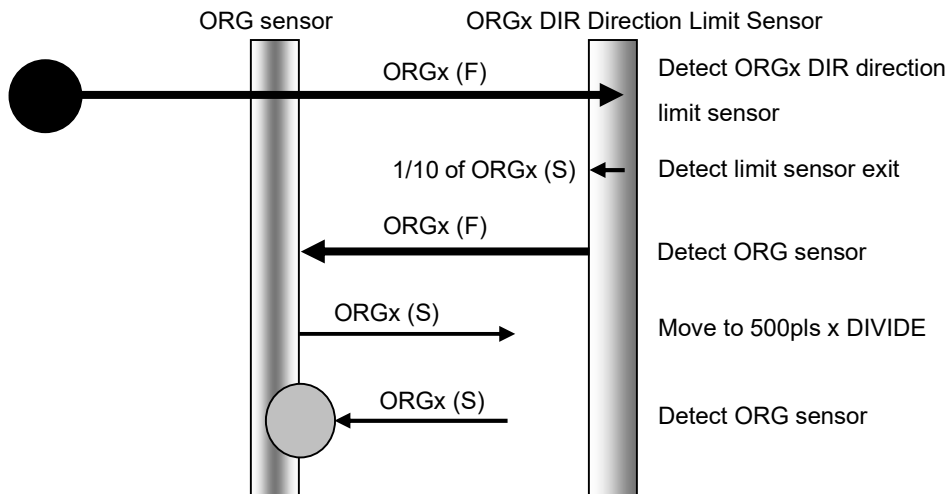ORGx DIR Direction limit sensor

Detect NEAR ORG sensor

ORGx (S)

1/10 of ORGx (S)

Detect ORG sensor

NEAR ORG sensor

ORG sensor

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".)

Opposite limit sensor

ORGx DIR Direction limit sensor

ORGx (F)

Detect ORGx DIR direction limit sensor

1/10 of ORGx (S)

Detect limit sensor exit

ORGx (F)

Detect opposite limit sensor

1/10 of ORGx (S)

Detect opposite limit sensor exit

ORGx (S)

Detect NEAR ORG sensor

1/10 of ORGx (S)

Detect ORG sensor

NEAR ORG sensor
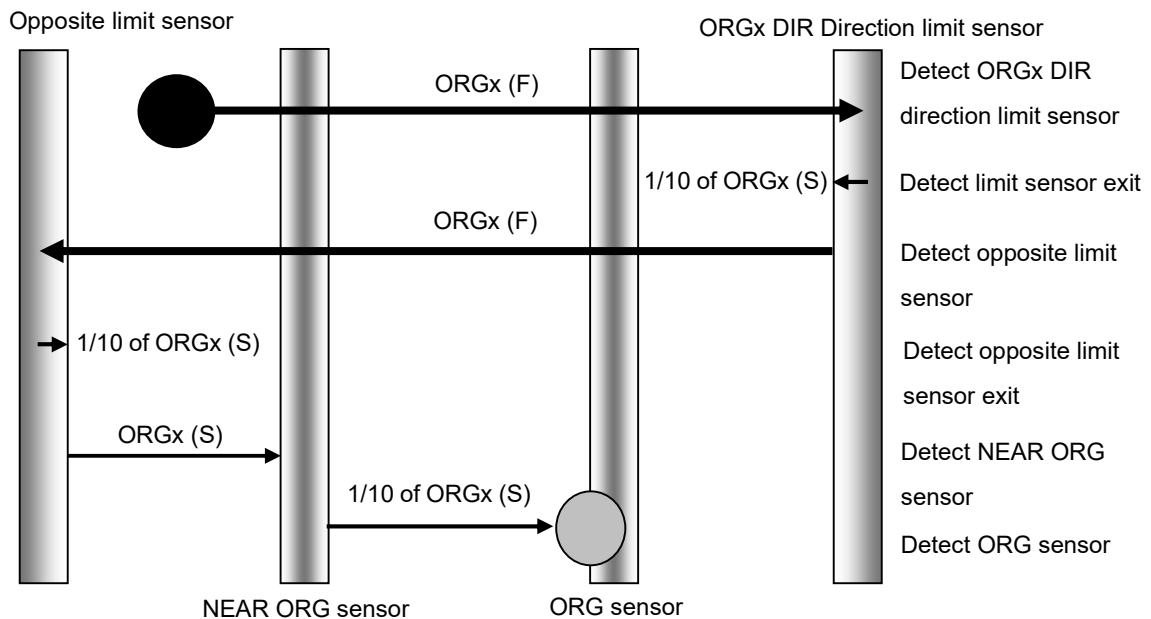
ORG sensor

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

Opposite limit sensor	ORGx DIR Direction limit sensor

- ORGx (F) — Detect ORGx DIR direction limit sensor
- 1/10 of ORGx (S) — Detect limit sensor exit
- ORGx — Detect opposite limit sensor
- 1/10 of ORGx (S) — Detect opposite limit sensor exit
- ORGx (F) — Move to 1/2 of CW/CCW limit

Midpoint
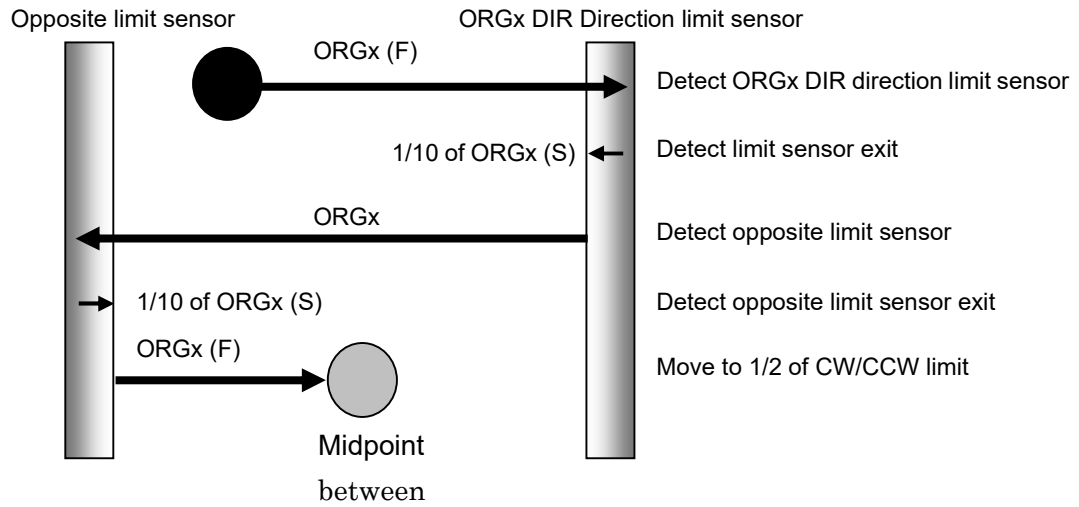
between

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".)
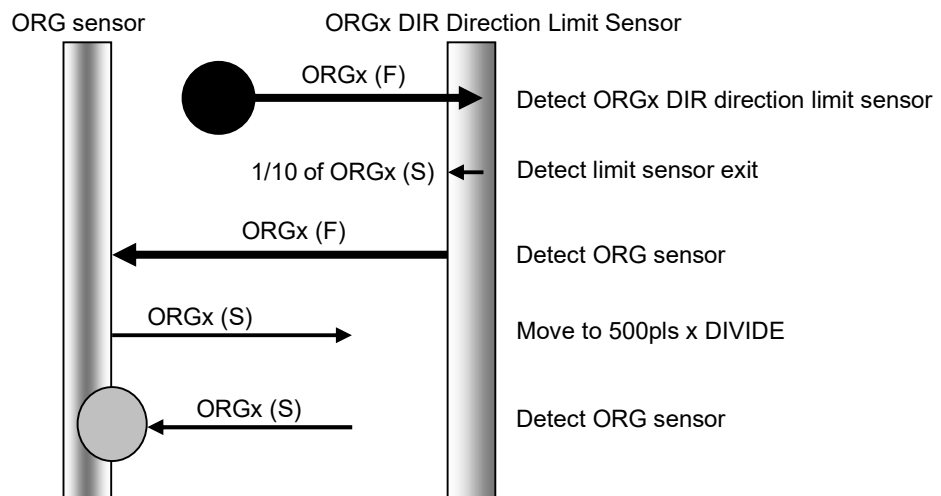
ORG sensor	ORGx DIR Direction Limit Sensor

- ORGx (F) — Detect ORGx DIR direction limit sensor
- 1/10 of ORGx (S) — Detect limit sensor exit
- ORGx (F) — Detect ORG sensor
- ORGx (S) — Move to 500pls x DIVIDE
- ORGx (S) — Detect ORG sensor

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".)

ORG sensor　　　ORGx DIR direction limit sensor

ORGx (F)

Detect ORG sensor

ORGx (S)

After exiting from the ORG sensor, move 500pls x DIVIDE

ORGx (S)

Detect ORG sensor

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

ORG sensor　　　ORGx DIR Direction Limit Sensor

ORGx (F)

Detect ORGx DIR direction limit sensor

1/10 of ORGx (S)

Detect limit sensor exit

ORGx (F)

Detect ORG sensor

ORGx (S)

Move to 500pls x DIVIDE

ORGx (S)
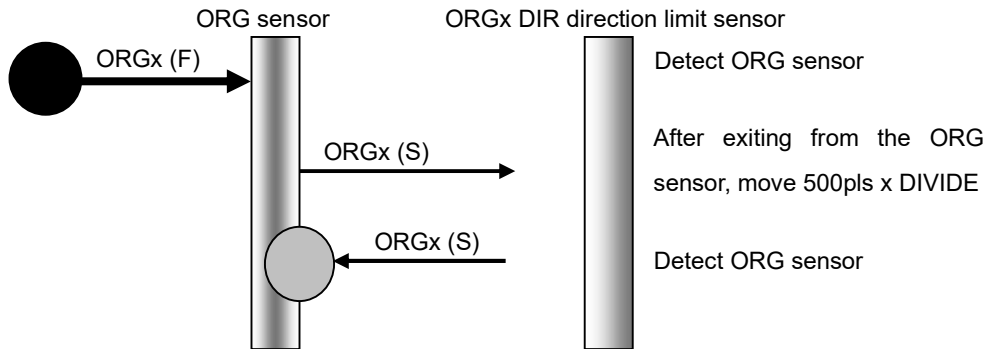
Detect ORG sensor

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 0.01µm

                 0 : 0 µm ~ +0.01 µm range

                 1 : 1×±0.01 = ±0.01µm range

                 99 : 99×±0.01 = ±0.99µm 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 µm / sec when the resolution is 10 nm or less, and 10 µm / 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
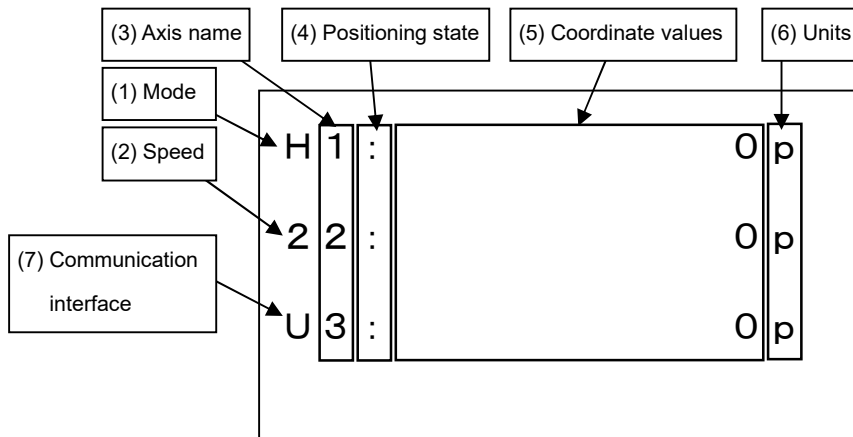
Fig.4-1. Startup screen

(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.

HOURS
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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.
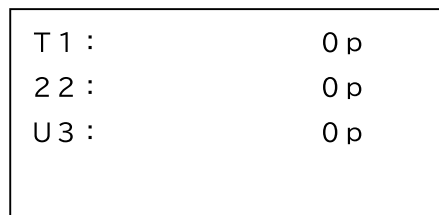
```
T 1 :              0 p
2 2 :              0 p
U 3 :              0 p
```
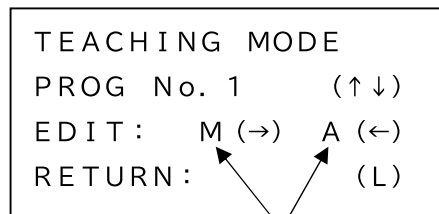
Fig. 5-1. TEACHING Mode Top screen

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.

```
T E A C H I N G   M O D E
P R O G   N o.  1        ( ↑ ↓ )
E D I T :      M ( → )    A ( ← )
R E T U R N :              ( L )
```

Operation pattern

Fig. 5-2. Program Number Selection screen

　　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.

Program number   Line number   Operation pattern

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, the operation pattern set in ② and coordinate values are registered.
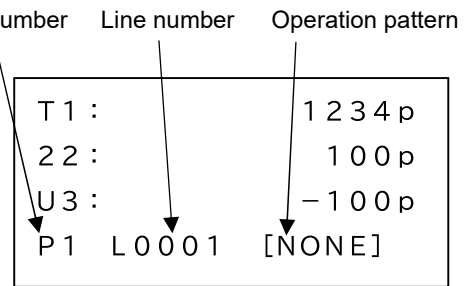
```
T 1 :              1 2 3 4 p
2 2 :                1 0 0 p
U 3 :              − 1 0 0 p
P 1  L 0 0 0 1   [ N O N E ]
```

Fig. 5-3. Registration screen

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
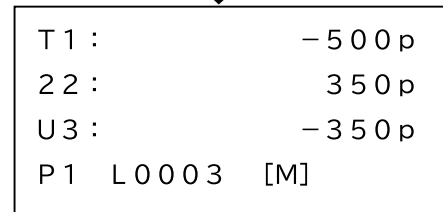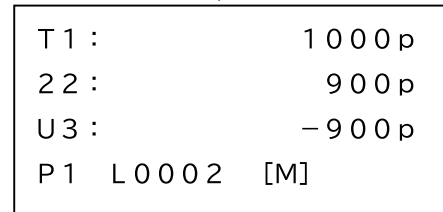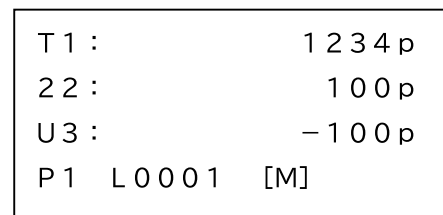POSOUT ON : Transmission enabled

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

```
SAVE EXIT        (↑)
NO SAVE EXIT:(↓)


RETURN:          (L)
```

Fig. 5-5. Setting Completion 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 Eentry 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.

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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          │
│                                 │
└─────────────────────────────────┘
```
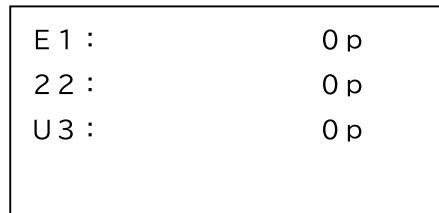Fig. 5-6. EDIT Mode Top screen

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.

```
┌─────────────────────────────────┐
│ E D I T   M O D E               │
│ P R O G   N o.  1      ( ↑ ↓ )  │
│ E D I T :              ( → )    │
│ R E T U R N :          ( L )    │
└─────────────────────────────────┘
```
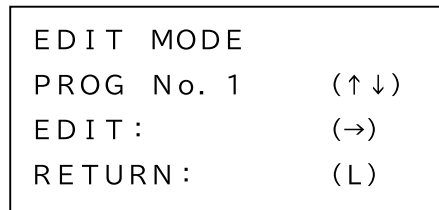Fig. 5-7. Program Number Selection screen

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
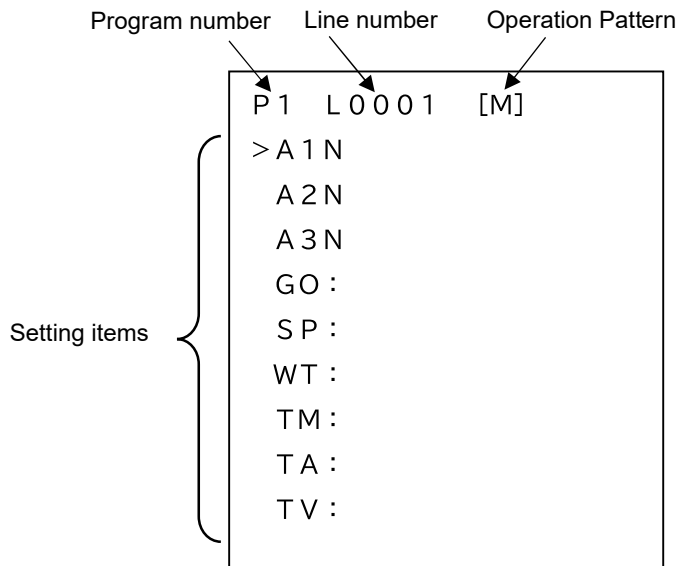   1 and "NONE" in other line numbers in the initialized program number.

Program number   Line number   Operation Pattern

```
┌─────────────────────────────────┐
│ P 1   L 0 0 0 1    [M]          │
│ > A 1 N                         │
│   A 2 N                         │
│   A 3 N                         │
│   G O :                         │
│   S P :                         │
│   W T :                         │
│   T M :                         │
│   T A :                         │
│   T V :                         │
│                                 │
└─────────────────────────────────┘
```
Setting items

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
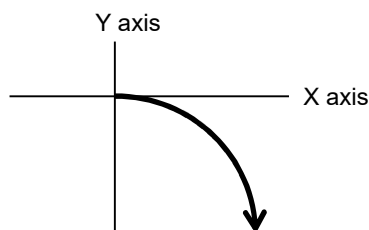axes.**

Otherwise, correct interpolation operation cannot be performed.
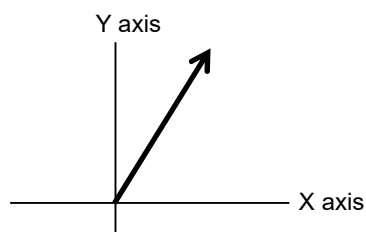
・E : Execute arc interpolation operation.

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

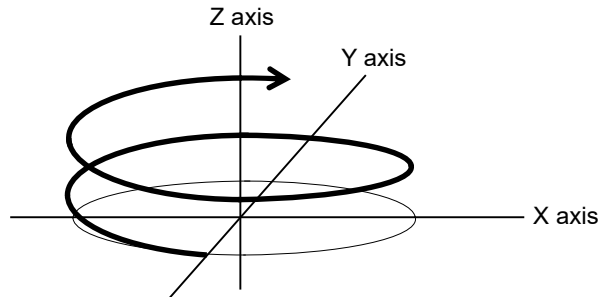**Otherwise, correct interpolation operation cannot be performed.**

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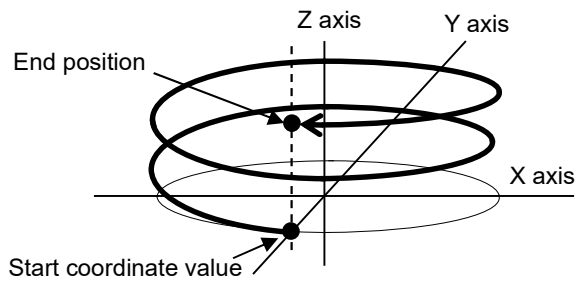
・C1 : Set the center point (Relative position from the start coordinate value) in the arc
interpolation of the axis with the smaller axis number (Main axis: X axis) on the
two axes selected in A1 to 3.
(When CIR, ANGLE CW or CIR, ANGLE CCW is selected in MD)
(Initial value : 0)

・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)

Y axis

C1 center point

Start coordinate value

X axis

C2 center point

In case of the MD setting is CIR CW
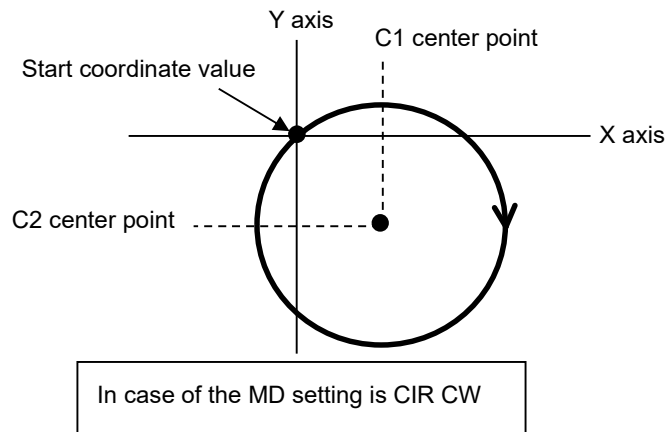
・AL : Set the rotation angle for arc interpolation.
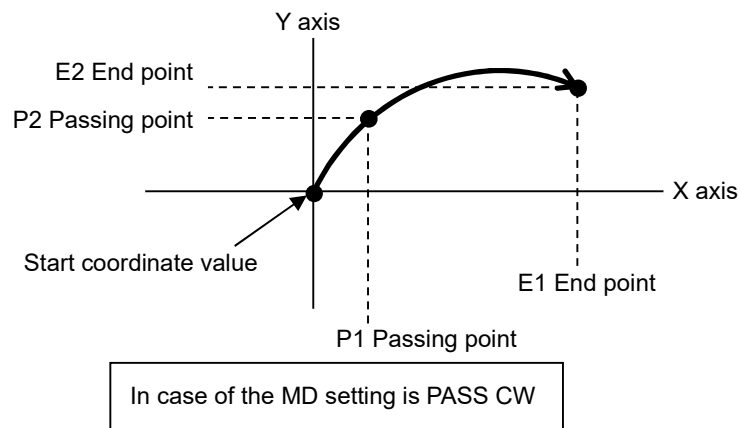(Operation pattern E : 0 ~ 360 [°], Operation pattern EH : 0 ~ 360000 [°])
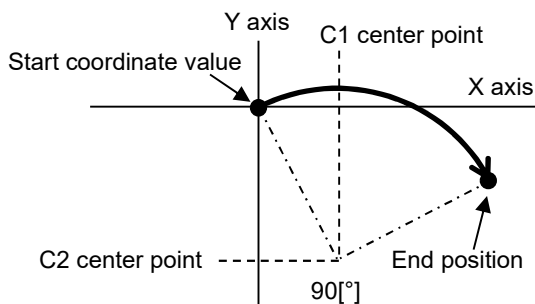
Y axis C1 center point

Start coordinate value

X axis

C2 center point

End position

90[°]

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

Z axis   Y axis

End position

X axis

Start coordinate value

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

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・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)

Y axis
E2 End point
P2 Passing point
X axis
Start coordinate value
E1 End point
P1 Passing point

In case of the MD setting is PASS CW

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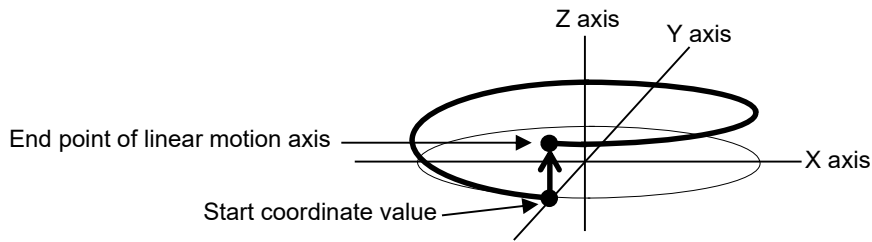
In case of the MD setting is CIR CW and the end point coordinates are on the upper side

・RT : Set the number of rotations when the center point is specified in helical
　　　interpolation.
　　　1 ~ 1000 (Initial value : 1)
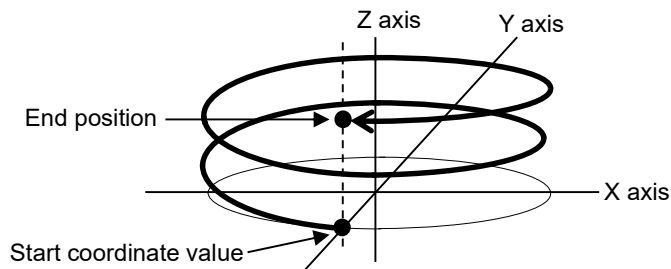
In the case of rotation number 2

・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 : ± 2 ~ 30000pls

  *) 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.

```
P1  L0001   [M]
>A1N
 A2N
 A3N
 GO:
 SP:
 WT:
 TM:
 TA:
 TV:
```
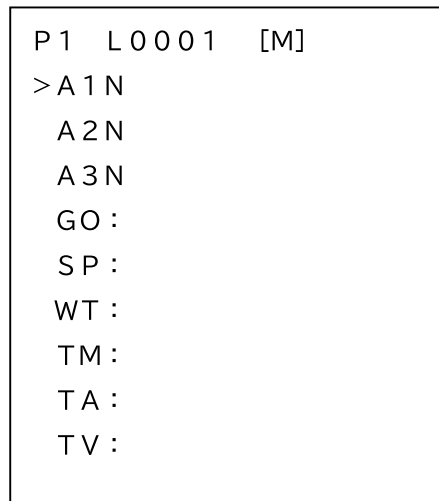
Fig. 5-9. Program Edit screen

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)
```
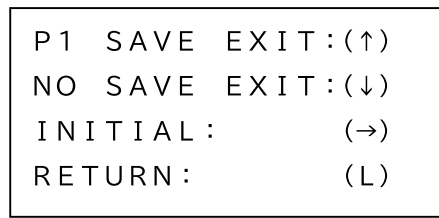
Fig. 5-10. Editing Completion
Confirmation screen

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
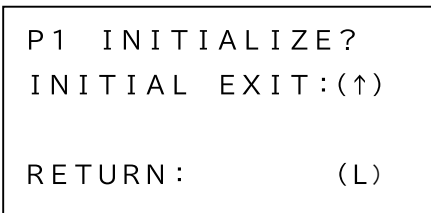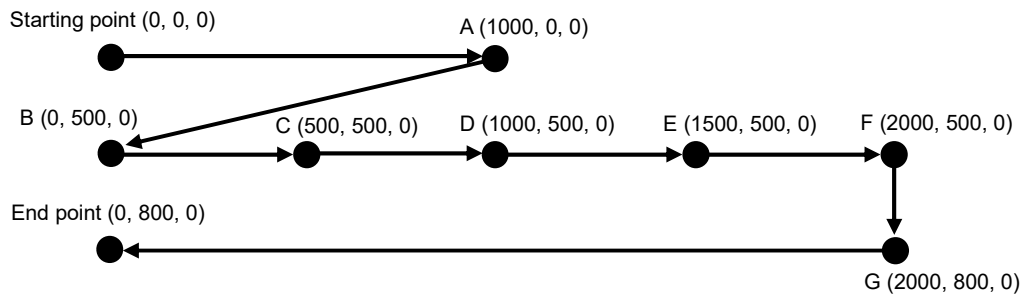screen, press the [LOCK] button.

```
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)

Starting point (0, 0, 0)   A (1000, 0, 0)

B (0, 500, 0)   C (500, 500, 0)   D (1000, 500, 0)   E (1500, 500, 0)   F (2000, 500, 0)

End point (0, 800, 0)

G (2000, 800, 0)

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

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

```
P1 L0004  [M]
>A1:        500p
 A2:          0p
 A3N
 GO:00
 SP:4
 WT:00010
 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 L0007 [M]
>A1:       -2000p
 A2:          0p
 A3N
 GO:00
 SP:4
 WT:00000
 TM:ONE  SHOT
```
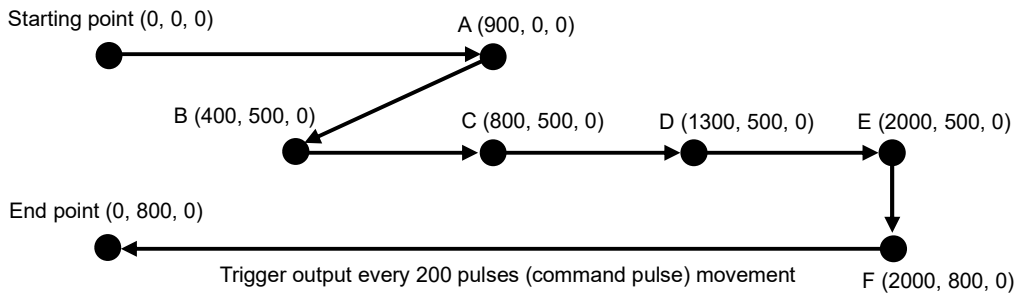
```
P1 L0008  [END]
```

(2) Program Example 2 (Continuous Operation)

Starting point (0, 0, 0)　　　　　　　　　　　A (900, 0, 0)

B (400, 500, 0)　　　　　C (800, 500, 0)　　　D (1300, 500, 0)　　E (2000, 500, 0)

End point (0, 800, 0)

Trigger output every 200 pulses (command pulse) movement　　　F (2000, 800, 0)

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

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

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

```
P1  L0005   [CM002]
>A1:          500p
 A2N
 A3N
```
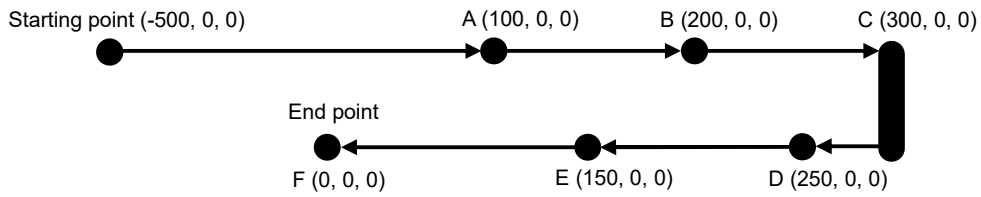
```
P1  L0006  [CM003]
>A1:           700p
 A2N
 A3N
```

```
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
```

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

Starting point (-500, 0, 0)　　　　　　A (100, 0, 0)　　B (200, 0, 0)　　C (300, 0, 0)

End point

F (0, 0, 0)　　　　　　E (150, 0, 0)　　　　D (250, 0, 0)

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:           100p
 A2:             0p
 A3:             0p
 GO:00
 SP:3
 WT:0000
 TM:SCALE
```

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

```
P1  L0002   [CA002]
>A1:           200p
 A2:             0p
 A3:             0p
```
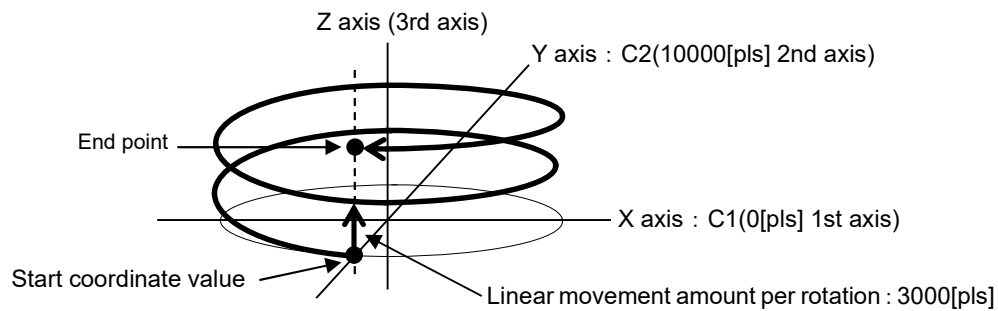
```
P1  L0005   [CA002]
>A1:           150p
 A2:             0p
 A3:             0p
```

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

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

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(4) Program Example 4 (Helical Interpolation)

Z axis (3rd axis)

Y axis : C2(10000[pls] 2nd axis)

End point

X axis : C1(0[pls] 1st axis)

Start coordinate value

Linear movement amount per rotation : 3000[pls]

・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:            0p
 C2:        10000p
 HL:         3000p
 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)".

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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


```
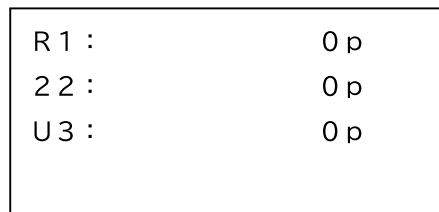
Fig. 5-12. REMOTE Mode Top screen

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)

```
P R O G   N o .  1 :    ( ↑ ↓ )
L I N E   N o .  0 0 0 1
S T A  ( → )    P A U S E  ( ← )

```
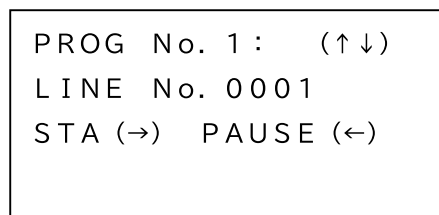
Fig. 5-13. Program Execution screen

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

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

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)".

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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

```
T E S T   M O D E
I N P U T :        (↑↓)
E N T E R :         (→)
R E T U R N :        (L)
```
Fig. 5-15. Input / Output
Selection screen

```
T E S T   M O D E   I N P U T
D I N 1 :          (↑↓)
 O F F [ H I G H ]
R E T U R N :         (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]

```
T E S T   M O D E
OUTPUT :          ( ↑ ↓ )
E N T E R :         ( → )
R E T U R N :        ( L )
```
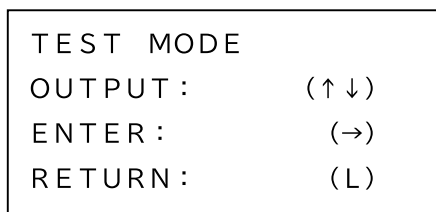
Fig. 5-17. Input / Output
Selection screen

```
T E S T   M O D E   O U T P U T
DOUT1 :          ( ↑ ↓ )
 OFF [LOW]        ( ← → )
R E T U R N :        ( L )
```
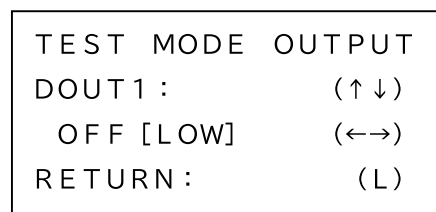
Fig. 5-18. Output Signal Test screen

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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 µs, 100 µs, or 1000 µs.

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.

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・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.
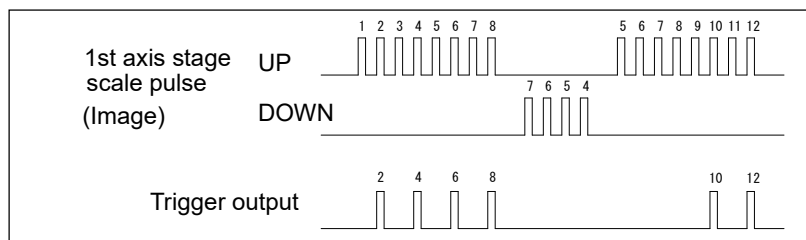
・Time Interval Trigger

Set the time interval for trigger output.

T: T [Trigger output-time intervals]

(Example) T: T10: Output trigger every 100msec (10×0.01 seconds)
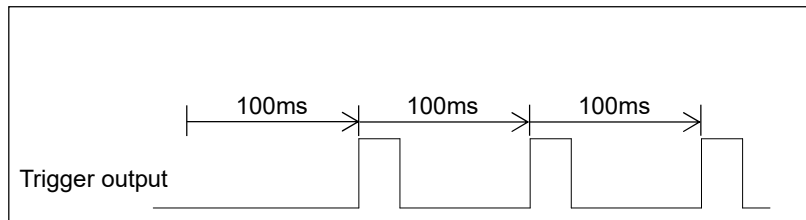
・Output trigger once when the command is executed.

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

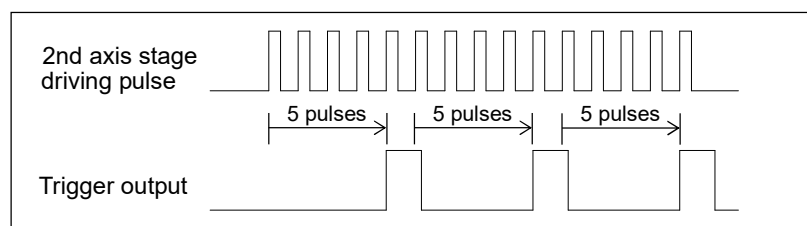・Scale Pulse Trigger output interval : ±2 to 3000 pulses

[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:PULSE
TA:2
TV:00005
```

Fig. 5-19. Program edit screen in EDIT mode
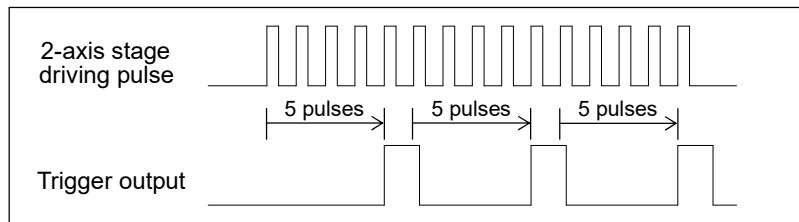
・Scale Pulse Trigger (Scale-mounted motorized stage only)

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
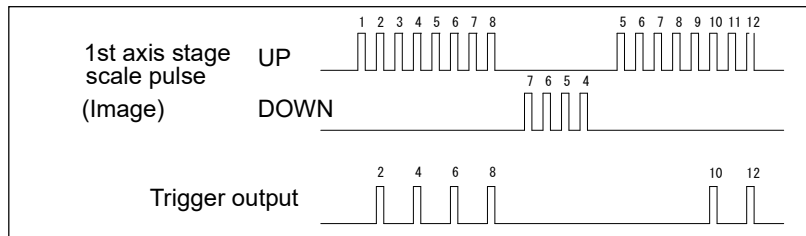
・Time Interval Trigger

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

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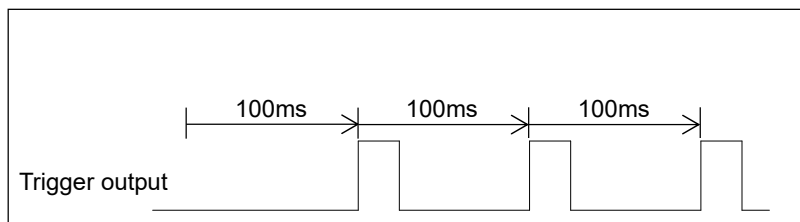
・One-Shot Trigger

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

```
T M : O N E   S H O T
```

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

Logical OR
of all axis stage states —————— Busy   Ready

Positioning
completed
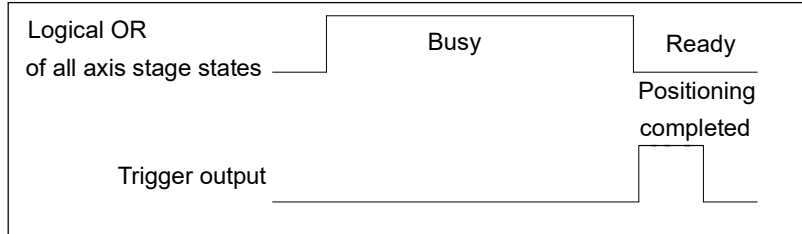
Trigger output

・Trigger Output Stop

```
T M : S T O P
```

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

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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  :**.**.***
```
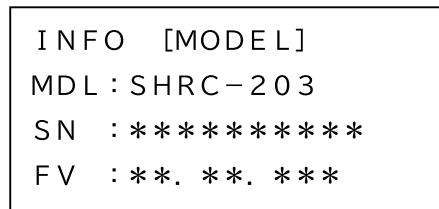
Fig. 5-24. Information top screen

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:***********
```
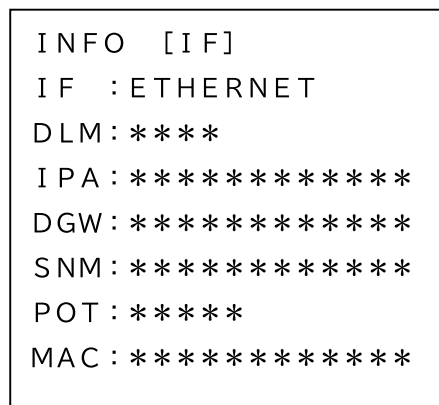
Fig. 5-27. Ethernet

・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

HOURS
www.hours-web.com

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".

```
R1:            0p
22:            0p
U3:            0p

```
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	Blac k: 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
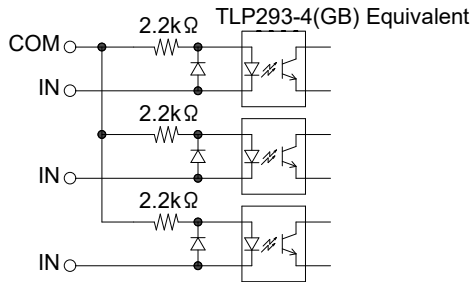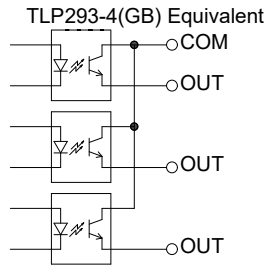
7-1. Input/Output Circuit
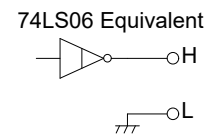
Fig. 7-1. I/O input circuit

Fig. 7-2. I/O output circuit

Fig. 7-3. TRIG output circuit

7-2. Reference Circuit
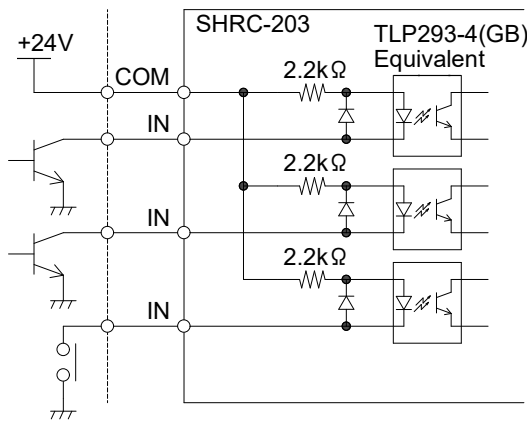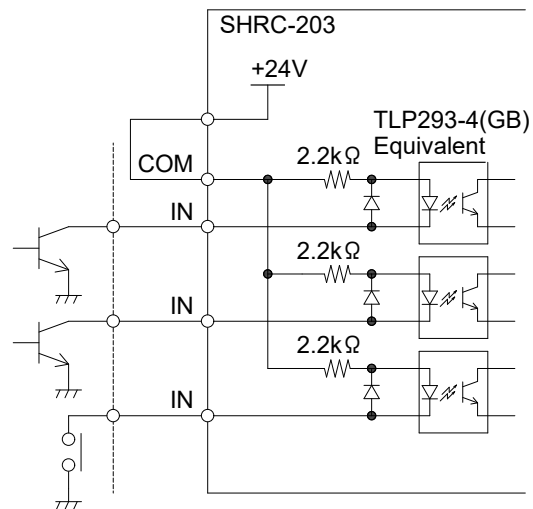
Fig. 7-4. Example input circuit

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.
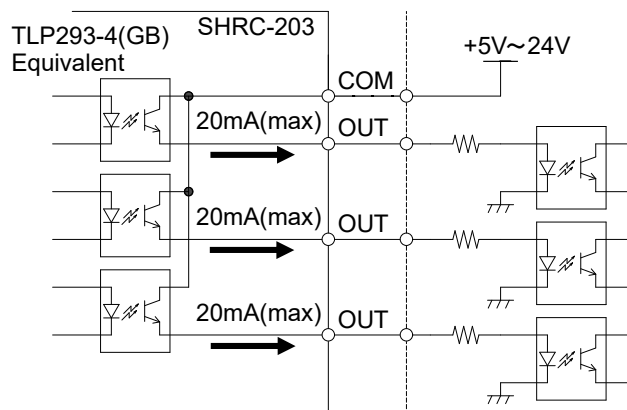
Fig. 7-6. Example output circuit

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

*) Be sure to insert a current limiting resistor.
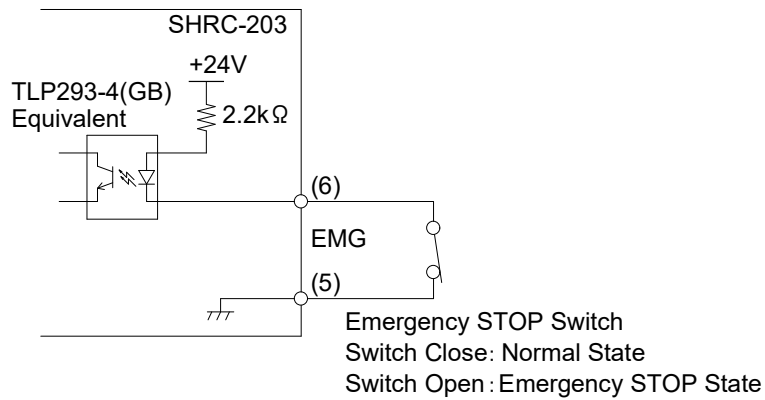
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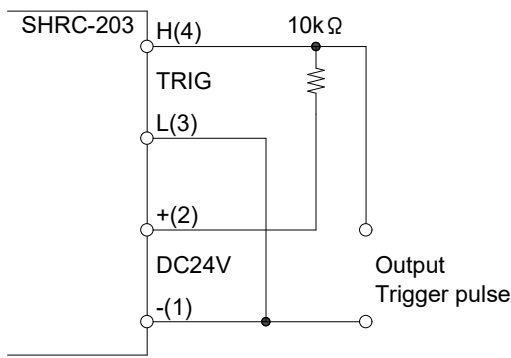
Fig. 7-7. Example Emergency STOP circuit

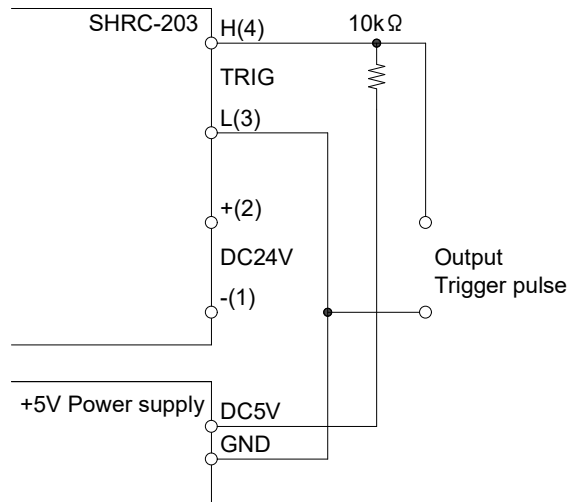Fig. 7-8. Example trigger output circuit

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 10kΩ 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.

```
H1:      S1  SCALE
22:             0p
U3:             0p
```

```
H1:             0p
22:             0p
U3:             0p
     CMD  ER
```

Fig. 8-1. Alarm display example 1   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 [℃]
Storage Temperature	－20 ~ 60 [℃]
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

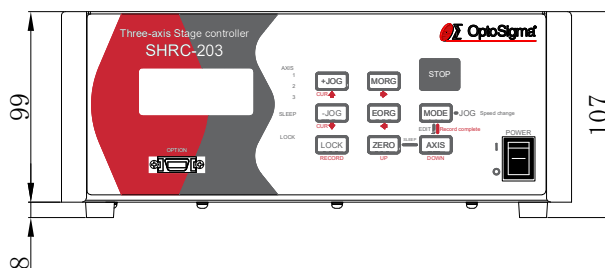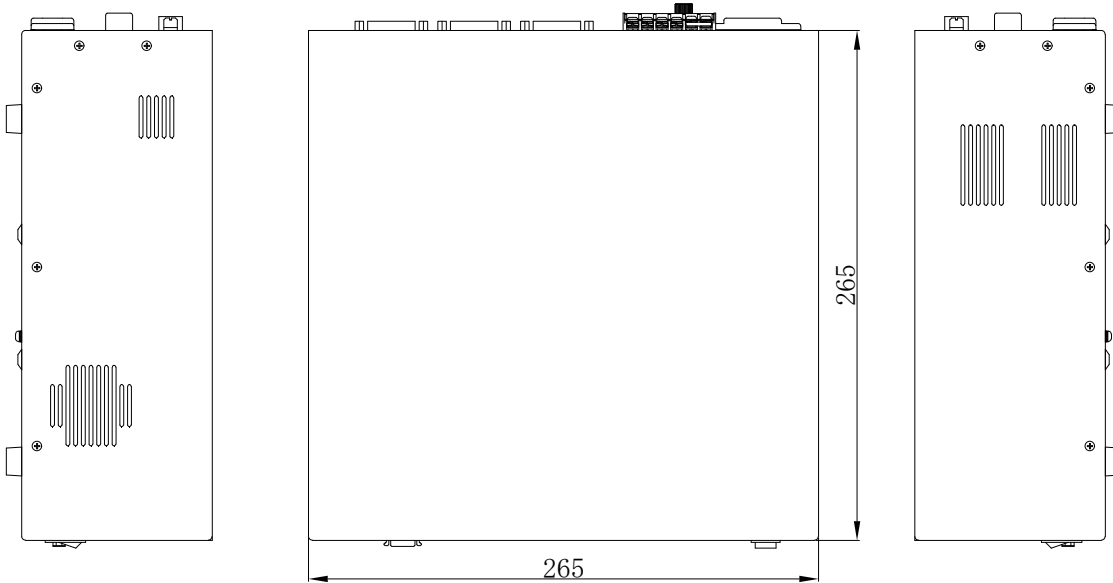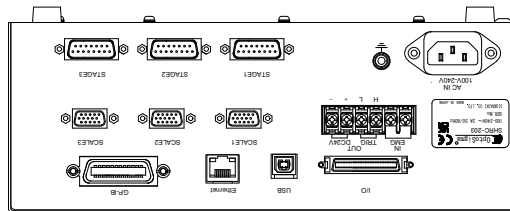|	
▪ Rotation	1 point
▪ Reverse rotation	1 point
▪ Return-to-origin	1 point
▪ Return-to-logical-origin	1 point
▪ Reset position coordinates to zero	1 point
▪ Operation mode change	1 point
▪ Operation axis select	1 point
▪ Stop	1 point

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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)

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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

User's Manual
(Command)
SHOT / FC Mode

Three-axis Stage Controller

SHRC-203

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1. Overview

This document describes the commands in the command format SHOT / FC mode in the 3-axis stage controller SHRC-203.

To use the command format SHOT / FC mode, select "SHOT / FC" with the memory switch "GENERAL"-"CMD FORMAT", or specify "SHOT / FC" with the "FMT:" command is needed. Before using, please understand the contents of the separate volume "Preparation and Operation".

2. About double buffer

In addition to the normal commands, SHRC-203 has a prebuffer command that can be sent in advance to automatically perform the next operation after the execution is completed.

When the operation setting is made in the prebuffer, the prebuffer setting value is migrated to the execution buffer, the prebuffer setting value is deleted, and the operation is started with the migrated execution buffer setting value.

When the execution buffer operation is completed, the prebuffer setting value is transferred to the execution buffer, the prebuffer setting value is deleted, and the operation completion character is returned.

After that, the operation starts with the automatically migrated execution buffer setting value. Continuous execution is possible by setting the prebuffer between the reply of the operation completion character and the reply of the next operation completion character.

If the prebuffer cannot be set during this reply, the automatic execution will end.

1) List of commands using double buffer

Commands	Contents	Memo
MP:	Relative travel distance setting	Prebuffer settings
AP:	Absolute travel distance setting	Prebuffer settings
EP:	Circle interpolation operation	Prebuffer settings
KP:	Linear interpolation operation	Prebuffer settings
WT:	Timed wait standby	
WI:	General-purpose input standby	
G	Start operation	
G:	Start operation	

2) Setting command conditions

Refer to the table below for the conditions for using the setting command.

Commands	MP:	AP:	KP:	EP:
Before the start of operation	Write in Overwrite	Write in Overwrite	Write in Overwrite	Write in Overwrite
in operation	Write in Overwrite	Write in Overwrite	Write in Overwrite	Write in Overwrite

To change the contents of the prebuffer, set it again.

3) About the standby command

It is possible to set a wait condition in the prebuffer, and there are two ways to specify the wait time, one is to specify the wait time and the other is to specify the general-purpose input status.

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・Timed wait standby

It can be used by sending the WT: command to the prebuffer, set the wait time from 0.1 to 256 seconds, and wait until the specified time is reached. After waiting, if there is a registration in the prebuffer, the prebuffer setting value moves to the execution buffer and the setting value is executed.The standby state can be canceled halfway by sending the WT: *, C command, and if there is a registration in the prebuffer, the prebuffer setting value is executed.(* Is the axis designation)

・General-purpose input standby

It can be used by sending the WI: command to the prebuffer, set general-purpose input conditions 0 to 63, and wait until the same conditions are met. After waiting, if there is a registration in the prebuffer, the prebuffer setting value moves to the execution buffer and the setting value is executed.By sending the WI: *, C command, the standby state can be canceled halfway, and if there is a registration in the prebuffer, the prebuffer setting value is executed.(* Is the axis designation)

4) About speed setting

When setting the prebuffer, the speed can be set along with the operation setting values using the MP :, AP :, KP :, and EP: commands.

The speed setting of the MP: and AP: commands sets the minimum speed, maximum speed, and acceleration / deceleration time for the operation specified axis.

KP :, EP: Command speed settings set the minimum speed, maximum speed, and acceleration / deceleration time for the axis with the smallest axis number to be interpolated.

3. About replying to the setting command

After sending the setting command, there will be a reply with the specified characters. See below.

Reply	Contents
OK	Replied when the command is successfully accepted.
OK_D	After operating with the command for double buffer, it is replying when it is successfully set to the prebuffer.
NG	Replied when the command was not accepted. Make sure the command string is correct. Also, please note that each command has transmission conditions.
NG_I	The reply will be returned if it contains NULL of ASCII code or non-ASCII code characters.

4. SHOT/FC mode command list

command	Contents
*IDN?	Equipment information
!:	Get the status (positioning information)
Q:	Get the status (coordinate values, Status, positioning information)
SRQ:	Get the status (status, positioning information)
?:	Setting information
PSET:	Coordinate value preset
RESET:	Perform a reset
SLEEP:	Run and wake up sleep
BO:	Front panel blackout
MODE:	Mode change
F:	Change of stage control method (Close and Open)
C:	Change of motor state (excitation and demagnetization)
BEC:	Execution of positioning incompleteness and error cancellation
BEEP:	Beep operation
S:	Switching the number of divisions
W:	Wait time setting
WT:	Wait for specified time (prebuffer setting)
WI:	purpose input state standby (prebuffer setting)
H:	Perform mechanical origin return
HRT:	Execute mechanical origin return (completion Reply)
Z:	Logical origin return
ZRT:	Execute logical origin return (completion Reply)
R:	logical origin setting (zero set)
L:	Operation stop and emergency stop
M:	Relative movement amount setting (execution buffer setting)
MP:	Relative movement amount setting (pre-buffer setting)
A:	Absolute coordinate value setting (execution buffer setting)
AP:	Absolute coordinate value setting (pre-buffer setting)
E:	Arc interpolation (execution buffer setting)
EP:	Arc interpolation (pre-buffer setting)
K:	Linear interpolation (execution buffer setting)
KP:	Linear interpolation (pre-buffer setting)
G	Start operation
G:	Start operation

command	Contents	
GC:	Delete operation setting value (execution buffer)	
J:	Jog operation command	
JO:	Jog operation (with speed override function)	
D:	Speed setting	
DS:	Minimum speed setting	
DF:	Maximum speed setting	
DR:	Acceleration / deceleration settings	
I:	Check the general-purpose input status	
O:	Change general-purpose output status	
T:	Trigger output	
P:	Internal program	
MS:	Memory switch setting	
PIT:	Location registration	
PAV:	Coordinate value registration	
FMT:	Command format settings	

*) If there is a description about the memory switch, refer to the separate "Preparation and Operation".

) " IDN?" "?: MODE" "?: CMD" "MODE:" can be used in all operation modes (HOST, MANUAL, REMOTE, TEACH, EDIT, TEST).

1) *IDN? Command (Get device information)
    ・Description
        Get controller information.
          *) Can be used in all operation modes (HOST, MANUAL, REMOTE, TEACH, EDIT, TEST).
    ・Command format
        Send)   *IDN?
        Reply)   v,m,s,f
    ・Parameters
        Reply)   v : Vendor name
               m : Model name
               s : Serial number
               f : Firmware version
    ・Example

Send	Reply
* IDN?	SIGMAKOKI, SHRC-203,2106001001,V2.00.000

2) !: Command (Get positioning status 1)
    ・Description
        Get the positioning status.
    ・Command format
        Send)   !:
        Reply)   r
    ・ Parameters
        Reply)   r : Positioning status R or B
              R   All controllable axes have been positioned (READY)
              B   One of the controllable axes has not been positioned (BUSY)
    ・Example

Send	Reply	Contents
!:!	R	All controllable axes are READY

3) !:S command (Get positioning status 2: Detailed information)
    ・Description
        Get the positioning status of each axis.
    ・Command format
        Send)   !:aS
        Reply)   r1, r2, r3
    ・Parameters
        Send)   a : Axis setting
               1   1st axis designation
               2   2nd axis designation
               3   3rd axis designation
               A   1st axis and 2nd axis designation
               B   1st axis and 3rd axis designation
               C   2nd and 3rd axis designation
               D   1st axis, 2nd axis and 3rd axis designation
               W   Specify all controllable axes
               Not specified   Specify all controllable axes

Reply)　r1：1st axis positioning state R or B

r2：2nd axis positioning state R or B

r3：3rd axis positioning state R or B

R　　Positioning of all controllable axes is complete (READY)

B　　Designated axis has not been positioned (BUSY)

・Example

Send	Reply	Contents
!:S	R,R,R	There are 3 controllable axes, and all axes are READY.
!:S	R,R	There are 2 controllable axes, and all axes are READY.
!:1S	R	1st axis is READY
!:AS	R,R	1st and 2nd axes are READY

4)　Q: Command (Get coordinate value and status 1)

・Description

Get the coordinate value and status.

・Command format

Send)　Q:

Reply)　c1,c2,c3,e,s,r

・　Parameters

Reply)　c1：1st axis coordinate value

c2：2nd axis coordinate value

c3：3rd axis coordinate value

*) Fixed to 10digits including the Sign.

*) Sign left justified, coordinates right justified.

e：Command error judgment

X　　Command error or parameter error

K　　Command accepted normally

s：status

1　　1st axis L S stop

2　　2nd axis L S stop

3　　3rd axis L S stop

C　　1st axis and 2nd axis L S Stop

D　　1st axis and 3rd axis L S Stop

E　　2nd axis and 3rd axis L S Stop

W　　All axes LS stop

R　　Error stop (S1,S2,S3,S4,S5,S6,S7,S9,S10,EMERGENCY)

*) For S1 to 10 and EMERGENCY, refer to the separate "Preparation and Operation".

K　　Normal stop

r：Axis positioning state R or B

R　　controllable axes have been positioned (READY)

B　　One of the controllable axes has not been positioned (BUSY)

*) Each item in the reply is separated by "," (comma).

・Example

The 1st axis coordinate value is +200pls, the 2nd axis coordinate value is -200pls, and the 3rd axis coordinate value is +100000pls.

Send	Reply
Q :	+␣␣␣␣␣200,-␣␣␣␣␣200,+␣␣␣100000,K,K,R

5) Q:S command (Get coordinate value and status 2 : Detailed information)
　・Description
　　　Get the coordinate values and detailed status of each axis.
　・Command format
　　　Send)　Q:Su
　　　Reply)　c1,c2,c3,s1,s2,s3,r1,r2,r3
　・Parameters
　　　Send)　　u : Unit setting N / U / M / D / P
　　　　　　　　N　　　nanometer designation
　　　　　　　　U　　　micrometer designation
　　　　　　　　M　　　mm designation
　　　　　　　　D　　　degree designation
　　　　　　　　P　　　Designation without unit (pulse)
　　　　　　　　No designation (Memory switch STAGE UNIT setting for each axis)
　　　Reply)　　c1 : 1st axis Unit (P, N, U, M, D) and coordinate values
　　　　　　　　c2 : 2nd axis Unit (P, N, U, M, D) and coordinate values
　　　　　　　　c3 : 3rd axis Unit (P, N, U, M, D) and coordinate values
　　　　　　　　　*) Reply 0 if the axis is invalid. Unlike "Q:" command, it is right-justified.
　　　　　　　　s1 : 1st axis status　　　　　0 ~ 1FFFFFF (Hexadecimal number)
　　　　　　　　s2 : 2nd axis status　　　　　0 ~ 1FFFFFF (Hexadecimal number)
　　　　　　　　s3 : 3rd axis status　　　　　0 ~ 1FFFFFF (Hexadecimal number)
　　　　　　　　　1bit　　　Normal (S1 to S10 and emergency stop has not occurred)
　　　　　　　　　2bit　　　Command error
　　　　　　　　　3bit　　　Scale error (S1)
　　　　　　　　　4bit　　　Disconnection error (S2)
　　　　　　　　　5bit　　　Overflow error (S4)
　　　　　　　　　6bit　　　Emergency stop
　　　　　　　　　7bit　　　Hunting error (S3)
　　　　　　　　　8bit　　　Limit error (S5)
　　　　　　　　　9bit　　　Counter overflow (S6)
　　　　　　　　　10bit　　Auto config error
　　　　　　　　　11bit　　24V IO overload warning (W1)
　　　　　　　　　12bit　　24V terminal block overload warning (W2)
　　　　　　　　　13bit　　System error (S7)
　　　　　　　　　14bit　　Motor driver overheat warning (W3)
　　　　　　　　　15bit　　Motor driver overheat error (S10)
　　　　　　　　　16bit　　Out of in-position range
　　　　　　　　　　　　　　　　(after positioning is completed) (READY)
　　　　　　　　　17bit　　Out of in-position range (During positioning operation) (BUSY)
　　　　　　　　　18bit　　Logical origin return is in progress
　　　　　　　　　19bit　　Mechanical origin return is in progress
　　　　　　　　　20bit　　CW limit detection
　　　　　　　　　21bit　　CCW limit detection
　　　　　　　　　22bit　　CW software limit stop
　　　　　　　　　23bit　　CCW software limit stop
　　　　　　　　　24bit　　NEAR sensor detection
　　　　　　　　　25bit　　ORG sensor detection
　　　　　　　　　*) ON when bit is 1. OFF when bit is 0. If the axis is invalid, reply 0 in hexadecimal.

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r1：1st axis positioning state R or B or D

r2：2nd axis positioning state R or B or D

r3：3rd axis positioning state R or B or D

    R   Positioning of all controllable axes is complete (READY)

    B   Designated axis has not been positioned (BUSY)

    D   Axis invalid

*) Each item in the reply is separated by "," (comma).

・Example

The 1st axis coordinate value is -1mm, the 2nd axis coordinate value is + 2mm, the 3rd axis coordinate value is + 3mm, the 1st axis is normal and READY, the 2nd axis is normal and BUSY, and the 3rd axis scale error is BUSY.

Send	Reply	Remarks
Q:SM	M-1,M+2,M+3,1,1,4,R,B,B	mm specification

6) SRQ: Command (Get status 1)

・Description

  Get the status.

・Command format

  Send)   SRQ:

  Reply)   e,s,r

・Parameters

  Reply)   e：Command error judgment

    X   Command error or parameter error

    K   Command accepted normally

  s：Status

    1   1st axis LS stop

    2   2nd axis LS stop

    3   3rd axis LS stop

    C   1st axis and 2nd axis LS Stop

    D   1st axis and 3rd axis LS Stop

    E   2nd axis and 3rd axis LS Stop

    W   All axes LS stop

    R   Error stop (S1,S2,S3,S4,S5,S6,S7,S9,S10,EMERGENCY)

      *) For S1 to 10 and EMERGENCY, refer to the separate "Preparation and Operation".

    K   Normal stop

  r：Axis positioning state R or B

    R   controllable axes have been positioned (READY)

    B   One of the controllable axes has not been positioned (BUSY)

*) Each item in the reply is separated by "," (comma).

·Example

Send	Reply	Contents
SRQ:	K, K, R	All controllable axes accept commands normally, stop normally, READY

7) SRQ:S command (Get status 2：Detailed information)
・Description
  Get the detailed status of each axis.
・Command format
  Send)   SRQ:aS
  Reply)   e1,e2,e3,s1,s2,s3,r1,r2,r3
・Parameters
  Send)   a：Axis setting
          1   1st axis designation
          2   2nd axis designation
          3   3rd axis designation
          A   1st axis and 2nd axis designation
          B   1st axis and 3rd axis designation
          C   2nd and 3rd axis designation
          D   1st axis, 2nd axis and 3rd axis designation
          W   Specify all controllable axes
          Not specified   Specify all controllable axes
  Reply)   s1：1st axis status   0 ~ 1FFFFFF (Hexadecimal number)
          s2：2nd axis status   0 ~ 1FFFFFF (Hexadecimal number)
          s3：3rd axis status   0 ~ 1FFFFFF (Hexadecimal number)
          1bit   Normal (S1 to S10 and emergency stop has not occurred)
          2bit   Command error
          3bit   Scale error (S1)
          4bit   Disconnection error (S2)
          5bit   Overflow error (S4)
          6bit   Emergency stop
          7bit   Hunting error (S3)
          8bit   Limit error (S5)
          9bit   Counter overflow (S6)
          10bit   Auto config error
          11bit   24V IO overload warning (W1)
          12bit   24V terminal block overload warning (W2)
          13bit   System error (S7)
          14bit   Motor driver overheat warning (W3)
          15bit   Motor driver overheat error (S10)
          16bit   Out of in-position range
                      (after positioning is completed) (READY)
          17bit   Out of in-position range (During positioning operation) (BUSY)
          18bit   Logical origin return is in progress
          19bit   Mechanical origin return is in progress
          20bit   CW limit detection
          21bit   CCW limit detection
          22bit   CW software limit stop
          23bit   CCW software limit stop
          24bit   NEAR sensor detection
          25bit   ORG sensor detection
                   *) ON when bit is 1. OFF when bit is 0.
                      If the axis is invalid, reply 0 in hexadecimal.

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r1：1st axis positioning state R or B

r2：2nd axis positioning state R or B

r3：3rd axis positioning state R or B

    R   Positioning of all controllable axes is complete (READY)

    B   Designated axis has not been positioned (BUSY)

    D   Axis invalid

*) Each item in the reply is separated by "," (comma).

・Example

Send	Reply	Contents
SRQ:S	1,1,1,R,B,R	The controllable axis is 3 axes, all axes are normal, and only the 2nd axis is BUSY.
SRQ:S	1,1,R,B	The controllable axis is 2 axes, all axes are normal, and only the 2nd axis is BUSY.
SRQ:1S	1,R	1st axis is normal and READY
SRQ:AS	1,1,R,R	1st and 2nd axes are normal and READY

8) ?:V command (Get setting 1: Version)

  ・Description

    Get the firmware version.

  ・Command format

    Send)   ?:V

    Reply)   f

  ・Parameters

    Reply)   f：Firmware version

  ・Example

Send	Reply
?:V	V2.00.000

9) ?:R command (Get setting 2: Scale resolution)

  ・Description

    Gets the scale resolution.

  ・Command format

    Send)   ?:Ra

    Reply)   r

  ・Parameters

    Send)   a：Axis setting

        1   1st axis designation

        2   2nd axis designation

        3   3rd axis designation

        A   1st axis and 2nd axis designation

        B   1st axis and 3rd axis designation

        C   2nd and 3rd axis designation

        D   1st axis, 2nd axis and 3rd axis designation

        W   Specify all controllable axes

        Not specified   Specify all controllable axes

    Reply)   r：Scale resolution (Unit: nm)

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·Example

Send	Reply	Contents
?:R	1,1,1	There are 3 controllable axes, and the scale resolution of all axes is 1 nm.
?:R	1,1	There are 2 controllable axes, and the scale resolution of all axes is 1 nm.
?:R1	1	Scale resolution of the first axis is 1 nm
?:RA	1,1	1st and 2nd axis scale resolution is 1nm

10)　　?:P command (Get setting 3 : Movement amount of 1 pulse)
　　・Description
　　　　Get the movement amount of 1 pulse calculated from the memory switch "AXIS"-"BASE RATE" and "MOTOR DRIVER"-"DIVIDE".
　　・a formula
　　　　1 pulse movement amount (nm) = (BASE RATE * 10) / DIVIDE
　　　　Example: BASE RATE = 200, DIVIDE = 2000
　　　　　　(200 * 10) / 2000 = 1 nm
　　・Command format
　　　　Send)　　?: Pa
　　　　Reply)　　p
　　・Parameters
　　　　Send)　　a : Axis setting
　　　　　　　　1　　1st axis designation
　　　　　　　　2　　2nd axis designation
　　　　　　　　3　　3rd axis designation
　　　　　　　　A　　1st axis and 2nd axis designation
　　　　　　　　B　　1st axis and 3rd axis designation
　　　　　　　　C　　2nd and 3rd axis designation
　　　　　　　　D　　1st axis, 2nd axis and 3rd axis designation
　　　　　　　　W　　Specify all controllable axes
　　　　　　　　Not specified　　Specify all controllable axes
　　　　Reply)　　p : Movement amount of 1 pulse (Unit: nm)
　　・Example

Send	Reply	Contents
?: P	1,1,1	The controllable axis is 3 axes, and the movement amount of 1 pulse of all axes is 1 nm.
?: P	1, 1	There are two controllable axes, and the amount of movement of one pulse on all axes is 1 nm.
?: P1	1	The amount of movement of one pulse on the first axis is 1 nm
?: PA	1, 1	The amount of movement of one pulse on the first and second axes is 1 nm.

11)　　?:S command (Get setting 4 : Motor driver division number)
　　・Description
　　　　Gets the number of divisions of the motor driver.
　　・Command format
　　　　Send)　　?: Sa
　　　　Reply)　　m

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・Parameters

Reply)　　a：Axis setting

1　　1st axis designation

2　　2nd axis designation

3　　3rd axis designation

A　　1st axis and 2nd axis designation

B　　1st axis and 3rd axis designation

C　　2nd and 3rd axis designation

D　　1st axis, 2nd axis and 3rd axis designation

W　　Specify all controllable axes

Not specified　　Specify all controllable axes

Reply)　　m：Number of motor driver divisions

・Example

Send	Reply	Contents
?:S	80,80,80	There are 3 Controllable axes, and the number of motor driver divisions for all axes is 80.
?:S	80,80	There are 2 Controllable axes, and the number of motor driver divisions for all axes is 80.
?:S1	80	The number of motor driver divisions for the first axis is 80
?:SA	80,80	The number of motor driver divisions for the 1st and 2nd axes is 80

12)　　　?:AN command (Get setting 5：Axis name)

・Description

Get the setting contents (axis name) of the memory switch "AXIS"-"AXIS NAME".

・Command format

Send)　　?: ANa

Reply)　　n

・Parameters

Send)　　a：Axis setting

1　　1st axis designation

2　　2nd axis designation

3　　3rd axis designation

A　　1st axis and 2nd axis designation

B　　1st axis and 3rd axis designation

C　　2nd and 3rd axis designation

D　　1st axis, 2nd axis and 3rd axis designation

W　　Specify all controllable axes

Not specified　　Specify all controllable axes

Reply)　　n：Axis names　　　　　　1-9, A-Z

・Example

Send	Reply	Contents
?:AN	1,2,3	The Controllable axis is 3 axes, the 1st axis axis name is "1", the 2nd axis axis name is "2", and the 3rd axis axis name is "3".
?:AN	1,2	Memory switch "GENERAL"-When "AXIS" is 1 + 2, the 1st axis axis name is "1" and the 2nd axis axis name is "2".
?:AN1	1	1st axis axis name is "1"
?:ANA	1,2	The 1st axis name is "1", the 2nd axis axis name is "2"
?:AN1	X	1st axis axis name is "X"

13)　　　?:D command (Get setting 6：Movement speed setting value)

　・Description

　　　Get the movement speed set by "D: Command".

　・Command format

　　　Send)　　?:Da

　　　Reply)　　d

　・　Parameters

　　　Send)　　a：Axis setting

　　　　　　　1　　　1st axis designation

　　　　　　　2　　　2nd axis designation

　　　　　　　3　　　3rd axis designation

　　　　　　　A　　　1st axis and 2nd axis designation

　　　　　　　B　　　1st axis and 3rd axis designation

　　　　　　　C　　　2nd and 3rd axis designation

　　　　　　　D　　　1st axis, 2nd axis and 3rd axis designation

　　　　　　　W　　　Specify all controllable axes

　　　　　　　Not specified　　Specify all controllable axes

　　　Reply)　　d：Operating speed setting value (S) (F) (R)

　・Example 1

Send	Reply	Contents
?:D	S100F1000R100, S200F2000R200, S300F3000R300	There are 3 controllable axes, ・The operating speed of the 1st axis is the minimum speed (S) 100 pls/s , the maximum speed (F) 1000 pls/s, and the acceleration / deceleration time (R) 100 ms . ・　The operating speed of the 2nd axis is the minimum speed (S) 200 pls/s , the maximum speed (F) 2000 pls/s, and the acceleration / deceleration time (R) 200 ms . ・　The operating speed of the 3rd axis is the minimum speed (S) 300 pls/s , the maximum speed (F) 3000 pls/s, and the acceleration / deceleration time (R) 200 ms .
?:D	S100F1000R100, S200F2000R200	When the memory switch "GENERAL"-"AXIS" is "1 + 2", ・The operating speed of the 1st axis is the minimum speed (S) 100 pls/s , the maximum speed (F) 1000 pls/s, and the acceleration / deceleration time (R) 100 ms . ・The operating speed of the 2nd axis is the minimum speed (S) 200 pls/s , the maximum speed (F) 2000 pls/s, and the acceleration / deceleration time (R) 200 ms .

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・Example 2

Send	Reply	Contents
?:D1	S100F1000R100	・The operating speed of the 1st axis is the minimum speed (S) 100 pls/s , the maximum speed (F) 1000 pls/s, and the acceleration / deceleration time (R) 100 ms .
?:DA	S100F1000R100, S200F2000R200	・The operating speed of the 1st axis is the minimum speed (S) 100 pls/s , the maximum speed (F) 1000 pls/s, and the acceleration / deceleration time (R) 100 ms . ・ The operating speed of the 2nd axis is the minimum speed (S) 200 pls/s , the maximum speed (F) 2000 pls/s, and the acceleration / deceleration time (R) 200 ms .

14)   ?:DS command (Get setting 7 : Minimum speed)
・Description
    Get the minimum speed set by "D: Command".
・Command format
    Send)   ?:DSa,u
    Reply)   uspd
・Parameters
    Send)   a : Axis setting
            1   1st axis designation
            2   2nd axis designation
            3   3rd axis designation
            A   1st axis and 2nd axis designation
            B   1st axis and 3rd axis designation
            C   2nd and 3rd axis designation
            D   1st axis, 2nd axis and 3rd axis designation
            W   Specify all controllable axes
            Not specified   Specify all controllable axes
            u: Unit setting
            F   Designation without unit (pulse)
            N   nanometer designation
            U   micrometer designation
            M   mm designation
            D   degree designation
    Reply)   u : Unit setting
            F   Designation without unit (pulse)
            N   nanometer designation
            U   micrometer designation
            M   mm designation
            D   degree designation

spd：Operating speed

F　　Setting range: 1 ~ 1,000,000 (Unit: pls/s)

N　　Setting range: pls/s converted to nm

　(Example: N1000 when the scale resolution is 1nm at 1,000 pls/s)

U　　Setting range: pls/s converted to μm

　(Example: U1 when the scale resolution is 1nm at 1,000 pls/s)

M　　Setting range: pls/s converted to mm

　(Example: M0.001 when the scale resolution is 1nm at 1,000 pls/s)

D　　Setting range: pls/s converted to an angle

　(Example: D0.001 when the scale resolution is 0.000001 ° at 1,000 pls/s)

・Example

Send	Reply	Contents
?:DS	1000,2000,3000	The controllable axis is 3 axes, the 1st axis is 1000 pls/s, the 2nd axis is 2000 pls/s, and the 3rd axis is 3000 pls/s.
?:DS	1000,2000	When the memory switch "GENERAL"-"AXIS" is "1 + 2", the 1st axis is 1000 pls / s and the 2nd axis is 2000 pls/s.
?:DS1	1000	The 1st axis is 1000 pls/s
?:DSA	1000,2000	The 1st axis is 1000 pls/s and the 2nd axis is 2000 pls/s.
?:DS2,U	10	The second axis is 10 μm/s

15)　　?:DF command (Get setting 8 : Maximum speed)

・Description

　Get the maximum speed set by "D: Command".

・Command format

Send)　　?:DFa,u

Reply)　　uspd

・Parameters

Send)　　a：Axis setting

1　　1st axis designation

2　　2nd axis designation

3　　3rd axis designation

A　　1st axis and 2nd axis designation

B　　1st axis and 3rd axis designation

C　　2nd and 3rd axis designation

D　　1st axis, 2nd axis and 3rd axis designation

W　　Specify all controllable axes

Not specified　　Specify all controllable axes

u：Unit setting

F　　Designation without unit (pulse)

N　　nanometer designation

U　　micrometer designation

M　　mm designation

D　　degree designation

Reply) u : Unit setting

F Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

D degree designation

spd : Operating speed

F Setting range: 1 ~ 1,000,000 (Unit: pls/s)

N Setting range: pls/s converted to nm

(Example: N1000 when the scale resolution is 1nm at 1,000 pls/s)

U Setting range: pls/s converted to µm

(Example: U1 when the scale resolution is 1nm at 1,000 pls/s)

M Setting range: pls/s converted to mm

(Example: M0.001 when the scale resolution is 1nm at 1,000 pls/s)

D Setting range: pls/s converted to an angl

(Example: D0.001 when the scale resolution is 0.000001° at 1,000pls/s)

・Example

Send	Reply	Contents
?:DF	1000,2000,3000	The controllable axis is 3 axes, the 1st axis is 1000 pls/s, the 2nd axis is 2000 pls/s, and the 3rd axis is 3000 pls/s.
?:DF	1000,2000	When the memory switch "GENERAL"-"AXIS" is "1 + 2", the 1st axis is 1000 pls/s and the 2nd axis is 2000 pls/s.
?:DF1	1000	The 1st axis is 1000 pls/s
?:DFA	1000,2000	The 1st axis is 1000 pls/s and the 2nd axis is 2000 pls/s.
?:DF2,U	10	The 2nd axis is 10 µm/s

16) ?:DR command (Get setting 9 : Acceleration / deceleration)

・Description

Get the acceleration / deceleration time set by "D: Command".

・Command format

Send) ?:DRa

Reply) r

・Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd and 3rd axis designation

D 1st axis, 2nd axis and 3rd axis designation

W Specify all controllable axes

Not specified Specify all controllable axes

Reply) r : Acceleration / deceleration time (R) setting 1 ~ 1000 (Unit: ms)

・Example

Send	Reply	Contents
?:DR	50,100,150	The Controllable axis is 3 axes, the 1st axis is 50 ms, the 2nd axis is 100 ms, and the 3rd axis is 150 ms.
?: DR	50,100	When the memory switch "GENERAL"-"AXIS" is "1 + 2", the 1st axis is 50 ms and the 2nd axis is 100 ms.
?: DR1	50	The 1st axis is 50 ms
?: DRA	50,100	1st axis is 50 ms, 2nd axis is 100 ms

17)　　?:B command (Get setting 10 : Machine origin return speed setting value)
・Description
　　　Get the movement speed set by "B: Command".
・Command format
　　　Send)　?:Ba
　　　Reply)　d
・　Parameters
　　　Send)　a : Axis setting
　　　　　　　1　　1st axis designation
　　　　　　　2　　2nd axis designation
　　　　　　　3　　3rd axis designation
　　　　　　　A　　1st axis and 2nd axis designation
　　　　　　　B　　1st axis and 3rd axis designation
　　　　　　　C　　2nd and 3rd axis designation
　　　　　　　D　　1st axis, 2nd axis and 3rd axis designation
　　　　　　　W　　Specify all controllable axes
　　　　　　　Not specified　　Specify all controllable axes
　　　Reply)　d : Operating speed setting value (S) (F) (R)
・Example 1

Send	Reply	Contents
?:B	S100F1000R100, S200F2000R200, S300F3000R300	There are 3 controllable axes, ・The operating speed of the 1st axis is the minimum speed (S) 100 pls/s , the maximum speed (F) 1000 pls/s, and the acceleration / deceleration time (R) 100 ms . ・ The operating speed of the 2nd axis is the minimum speed (S) 200 pls/s , the maximum speed (F) 2000 pls/s, and the acceleration / deceleration time (R) 200 ms . ・ The operating speed of the 3rd axis is the minimum speed (S) 300 pls/s , the maximum speed (F) 3000 pls/s, and the acceleration / deceleration time (R) 200 ms .
?:B	S100F1000R100, S200F2000R200	When the memory switch "GENERAL"-"AXIS" is "1 + 2", ・The operating speed of the 1st axis is the minimum speed (S) 100 pls/s , the maximum speed (F) 1000 pls/s, and the acceleration / deceleration time (R) 100 ms . ・The operating speed of the 2nd axis is the minimum speed (S) 200 pls/s , the maximum speed (F) 2000 pls/s, and the acceleration / deceleration time (R) 200 ms .

・Example 2

Send	Reply	Contents
?:B1	S100F1000R100	・The operating speed of the 1st axis is the minimum speed (S) 100 pls/s , the maximum speed (F) 1000 pls/s, and the acceleration / deceleration time (R) 100 ms .
?:BA	S100F1000R100, S200F2000R200	・The operating speed of the 1st axis is the minimum speed (S) 100 pls/s , the maximum speed (F) 1000 pls/s, and the acceleration / deceleration time (R) 100 ms . ・ The operating speed of the 2nd axis is the minimum speed (S) 200 pls/s , the maximum speed (F) 2000 pls/s, and the acceleration / deceleration time (R) 200 ms .

18) 　　?:M command (Get setting 11：Relative movement [Execution buffer])

・Description

　　Get the movement amount set by "M: Command".

・Command format

　　Send)　　?:Ma,u

　　Reply)　　m

・Parameters

　　Send)　　a：Axis setting

　　　　　　1　1st axis designation

　　　　　　2　2nd axis designation

　　　　　　3　3rd axis designation

　　　　　　A　1st axis and 2nd axis designation

　　　　　　B　1st axis and 3rd axis designation

　　　　　　C　2nd and 3rd axis designation

　　　　　　D　1st axis, 2nd axis and 3rd axis designation

　　　　　　W　Specify all controllable axes

　　　　　　Not specified　Specify all controllable axes

　　　　u：Unit setting

　　　　　　P　Designation without unit (pulse)

　　　　　　N　nanometer designation

　　　　　　U　micrometer designation

　　　　　　M　mm designation

　　　　　　D　degree designation

　　　　　　No designation　Designation without unit (pulse)

　　Reply)　　m：Movement amount (Unit: pls)

・Example 1

Send	Reply	Contents
?:M	1000,2000,3000	The controllable axis is 3 axes, the 1st axis is 1000 pls, the 2nd axis is 2000 pls, and the 3rd axis is 1000 pls.
?:M	1000,2000	When the memory switch "GENERAL"-"AXIS" is "1＋2", the 1st axis is 1000 pls and the 2nd axis is 2000 pls.
?:M1	1000	The 1st axis is 1000 pls
?:MA	1000,2000	1st axis is 1000 pls, 2nd axis is 2000 pls
?:M1,M	0.01	The 1st axis is 0.01 mm
?:M	NS,NS	Not set when the controllable axes are 1 axis and 2 axes

・Example 2

Send	Reply	Contents
?:M	NS,NS,NS	Not set when the controllable axes are 1, 2, and 3 axes.
?:M1	NS	Not set
?:MA	NS,NS	Not set

19)　　?:MP command (Get setting 12：Relative movement [Prebuffer])

・Description

Get the amount of movement set in "MP: Command".

*) "MP: command" is a command to preset the amount of movement in the relative value of the next
execution. refer to "65,66) MP: Commands" for more information.

・Command format

Send)　　?: MPa, u

Reply)　　m

・Parameters

Send)　　a：Axis setting

1　1st axis designation

2　2nd axis designation

3　3rd axis designation

A　1st axis and 2nd axis designation

B　1st axis and 3rd axis designation

C　2nd and 3rd axis designation

D　1st axis, 2nd axis and 3rd axis designation

W　Specify all controllable axes

Not specified　Specify all controllable axes

u：Unit setting

P　Designation without unit (pulse)

N　nanometer designation

U　micrometer designation

M　mm designation

D　degree designation

No designation　Designation without unit (pulse)

Reply)　　m：Movement amount (Unit: pls)

・Example

Send	Reply	Contents
?:MP	1000,2000,3000	The Controllable axis is 3 axes, the 1st axis is 1000 pls, the 2nd axis is 2000 pls, and the 3rd axis is 1000 pls.
?:MP	1000,2000	When the memory switch "GENERAL"-"AXIS" is "1＋2", the first axis is 1000 pls and the 2nd axis is 2000 pls.
?:MP1	1000	The 1st axis is 1000 pls
?:MPA	1000,2000	1st axis is 1000 pls, 2nd axis is 2000 pls
?:MP1,M	0.01	The 1st axis is 0.01 mm
?:MP	NS,NS	Not set when the controllable axes are 1 axis and 2 axes
?:MP	NS,NS,NS	Not set when the controllable axes are 1, 2, and 3 axes.
?:MP1	NS	Not set
?:MPA	NS,NS	Not set

20)   ?:A command (Get setting 13：Absolute movement [Execution buffer])
・Description
    Get the destination coordinate value set in "A: Command".
・Command format
    Send)   ?:Aa,u
    Reply)   m
・Parameters
    Send)   a：Axis setting
        1   1st axis designation
        2   2nd axis designation
        3   3rd axis designation
        A   1st axis and 2nd axis designation
        B   1st axis and 3rd axis designation
        C   2nd and 3rd axis designation
        D   1st axis, 2nd axis and 3rd axis designation
        W   Specify all controllable axes
        Not specified   Specify all controllable axes
    u：Unit setting
        P   Designation without unit (pulse)
        N   nanometer designation
        U   micrometer designation
        M   mm designation
        D   degree designation
        No designation   Designation without unit (pulse)
    Reply)   m：Movement amount (Unit: pls)
・Example

Send	Reply	Contents
?:A	1000,2000,3000	The Controllable axis is 3 axes, the 1st axis is 1000 pls, the 2nd axis is 2000 pls, and the 3rd axis is 1000 pls.
?:A	1000,2000	When the memory switch "GENERAL"-"AXIS" is "1 + 2", the 1st axis is 1000 pls and the 2nd axis is 2000 pls.
?:A1	1000	The 1st axis is 1000 pls
?:AA	1000,2000	1st axis is 1000 pls, 2nd axis is 2000 pls
?:A1,M	0.01	The 1st axis is 0.01 mm
?:A	NS,NS	Not set when the controllable axes are 1 axis and 2 axes
?:A	NS,NS,NS	Not set when the controllable axes are 1, 2, and 3 axes.
?:A1	NS	Not set
?:AA	NS,NS	Not set

21)   ?:AP command (Get setting 14：Absolute movement [Prebuffer])
・Description
    Get the destination coordinate value set in "AP: Command".
・Command format
    Send)   ?:APa,u
    Reply)   m

・Parameters
　　Send)　　a：Axis setting
　　　　　　　1　1st axis designation
　　　　　　　2　2nd axis designation
　　　　　　　3　3rd axis designation
　　　　　　　A　1st axis and 2nd axis designation
　　　　　　　B　1st axis and 3rd axis designation
　　　　　　　C　2nd and 3rd axis designation
　　　　　　　D　1st axis, 2nd axis and 3rd axis designation
　　　　　　　W　Specify all controllable axes
　　　　　　　Not specified　Specify all controllable axes
　　　　　u：Unit setting
　　　　　　　P　Designation without unit (pulse)
　　　　　　　N　nanometer designation
　　　　　　　U　micrometer designation
　　　　　　　M　mm designation
　　　　　　　D　degree designation
　　　　　　　No designation　Designation without unit (pulse)
　　Reply)　　m：Movement amount (Unit: pls)
・Example

Send	Reply	Contents
?:AP	1000,2000,3000	The controllable axis is 3 axes, the 1st axis is 1000pls, the 2nd axis is 2000pls, and the 3rd axis is 1000pls.
?:AP	1000,2000	When the memory switch "GENERAL"-"AXIS" is "1 + 2", the 1st axis is 1000pls and the 2nd axis is 2000pls.
?:AP1	1000	The 1st axis is 1000pls
?:APA	1000,2000	1st axis is 1000pls, 2nd axis is 2000pls
?:AP1,M	0.01	The 1st axis is 0.01mm
?:AP	NS,NS	Not set when the controllable axes are 1 axis and 2 axes
?:AP	NS,NS,NS	Not set when the controllable axes are 1, 2, and 3 axes.
?:AP1	NS	Not set
?:APA	NS,NS	Not set

22)　　?:E command (Get setting 15：Arc interpolation [Execution buffer])
　・Description
　　　Get the arc interpolation setting value set by "E: Command". If it is not set, "NS" will
　　　be replied.
　・Command format
　　　Send)　　?:E,u
　　　Reply)　　m
　・Parameters
　　　Send)　　u：Unit setting
　　　　　　　P　Designation without unit (pulse)
　　　　　　　N　nanometer designation
　　　　　　　U　micrometer designation
　　　　　　　M　mm designation
　　　　　　　D　degree designation
　　　　　　　No designation　Designation without unit (pulse)

Reply)   m：Arc interpolation setting value (Unit: pls)

・Example

Send	Reply	command
?:E	0,A,0,100,100	Perfect circle
?:E	1,A,0,100,100,170	angle
?:E	2,A,0,100,100,200,0	Passing point
?:E	3,A,0,1,100,100,300	Perfect circle helical
?:E	4,A,0,100,100,170,300	Angle helical
?:E	5,A,0,100,100,200,0,300	Passing point helical
?:E,M	0,A,0,0.0001,0.0001	Specify mm as a perfect circle
?:E	NS	Not set

*) The first letter of the reply is the * of the "E: *" command. Please refer to the "E: *" command for the details of the reply contents.

23)   ?:EP command (Get setting 16：Arc interpolation [Prebuffer])

・Description

Get the Arc interpolation setting value set in "EP: Command". If it is not set, "NS" will be replied.

・Command format

Send)   ?:EP,u

Reply)   m

・Parameters

Send)   u：Unit setting

P   Designation without unit (pulse)

N   nanometer designation

U   micrometer designation

M   mm designation

D   degree designation

No designation   Designation without unit (pulse)

Reply)   m：Arc interpolation setting value(Unit: pls)

・Example

Send	Reply	command
?:EP	0,A,0,100,100	Perfect circle
?:EP	1,A,0,100,100,170	angle
?:EP	2,A,0,100,100,200,0	Passing point
?:EP	3,A,0,1,100,100,300	Perfect circle helical
?:EP	4,A,0,100,100,170,300	Angle helical
?:EP	5,A,0,100,100,200,0,300	Passing point helical
?:EP,M	0,A,0,0.0001,0.0001	Specify mm as a perfect circle
?:EP	NS	Not set

*) The first letter of the reply is the * of the "EP: *" command. Please refer to the "EP: *" command for the details of the reply contents.

24)   ?:K command (Get setting 17：Linear interpolation [Execution buffer])

・Description

Get the linear interpolation setting value set by "K: command". If it is not set, "NS" will be replied.

・Command format
　　Send)　?:K,u
　　Reply)　m
・Parameters
　　Send)　u：Unit setting
　　　　　　　P　Designation without unit (pulse)
　　　　　　　N　nanometer designation
　　　　　　　U　micrometer designation
　　　　　　　M　mm designation
　　　　　　　D　degree designation
　　　　　　　No designation　Designation without unit (pulse)
　　Reply)　m：Line interpolation setting value(Unit: pls)
・Example

Send	Reply	Contents
?:K	D,1000,2000,3000	The controllable axis is 3 axes, the 1st axis is 1000pls, the 2nd axis is 2000pls, and the 3rd axis is 3000pls.
?:K	A,1000,2000	When the memory switch "GENERAL"-"AXIS" is "1 + 2", the 1st axis is 1000pls and the 2nd axis is 2000pls.
?:K,M	D,0.01,0.02,0.03	The Controllable axis is 3 axes, the 1st axis is 0.01 mm, the 2nd axis is 0.02 mm, and the 3rd axis is 0.03 mm.
?:K	NS	Not set

25)　　?:KP command (Get setting 18：Linear interpolation [Prebuffer])
　・Description
　　　Get the linear interpolation setting value set by "KP: command". If it is not set, "NS" will be replied.
　・Command format
　　　Send)　?:KP,u
　　　Reply)　m
　・Parameters
　　　Send)　u：Unit setting
　　　　　　　　P　Designation without unit (pulse)
　　　　　　　　N　nanometer designation
　　　　　　　　U　micrometer designation
　　　　　　　　M　mm designation
　　　　　　　　D　degree designation
　　　　　　　　No designation　Designation without unit (pulse)
　　　Reply)　m：Line interpolation setting value(Unit: pls)
　・Example

Send	Reply	Contents
?:KP	D,1000,2000,3000	The controllable axis is 3 axes, the 1st axis is 1000pls, the 2nd axis is 2000pls, and the 3rd axis is 3000pls.
?:KP	A,1000,2000	When the memory switch "GENERAL"-"AXIS" is "1 + 2", the 1st axis is 1000pls and the 2nd axis is 2000pls.
?:KP,M	D,0.01,0.02,0.03	The Controllable axis is 3 axes, the 1st axis is 0.01 mm, the 2nd axis is 0.02 mm, and the 3rd axis is 0.03 mm.
?:KP	NS	Not set

26)   ?:O command (Get setting 19：General-purpose output status)
　・Description
　　　Get the general-purpose output status.
　・Command format
　　　Send)   ?:O
　　　Reply)   o
　・Parameters
　　　Reply)   o：General-purpose output status   0 ~ 63
　・Example

Send	Reply	Contents
?:O	15	OUT1 ~ 4 : ON OUT5,6 : OFF

*) ON means that current is flowing through the transistor of the photocoupler.
　　For details, refer to the separate volume " Preparation and Operation ".

27)   ?:W command (Get setting 20：Wait time)
　・Description
　　　Get the wait time setting value.
　・Command format
　　　Send)   ?:W
　　　Reply)   w
　・Parameters
　　　Reply)   w：Wait time setting value   0 ~ 2550(Unit：0.1s)
　・Example

Send	Reply	Contents
?:W	255	25.5ms

28)   ?:WT command (Get setting 21：Wait time)
　・Description
　　　Get the wait time setting value for each axis.
　・Command format
　　　Send)   ?:WTa
　　　Reply)   w
　・Parameters
　　　Send)   a：Axis setting
　　　　　　　1   1st axis designation
　　　　　　　2   2nd axis designation
　　　　　　　3   3rd axis designation
　　　　　　　A   1st axis and 2nd axis designation
　　　　　　　B   1st axis and 3rd axis designation
　　　　　　　C   2nd axis and 3rd axis designation
　　　　　　　D   1st axis, 2nd axis and 3rd axis designation
　　　　　　　W   Specify all controllable axes
　　　　　　　Not specified   Specify all controllable axes
　　　Reply)   w：Wait time setting value   0 ~ 2550(Unit：0.1s)
　・Example 1

Send	Reply	Contents
?:WT	255,255,255	All axis setting value (25.5ms)
?:WT1	255	1-axis setting value (25.5ms)

・Example 2

Send	Reply	Contents
?:WTA	255,255	1st and 2nd axis set values (25.5ms)
?:WT	NS,NS	Not set when the controllable axes are 1 axis and 2 axes
?:WT	NS,NS,NS	Not set when the controllable axes are 1, 2, and 3 axes.
?:WT1	NS	Not set
?:WTA	NS,NS	Not set

29)   ?:WI command (Get setting 22：General-purpose input wait)
  ・Description
    Get the settings for waiting for general-purpose input.
  ・Command format
    Send)   ?:WIa
    Reply)   i
  ・Parameters
    Send)   a：Axis setting
          1   1st axis designation
          2   2nd axis designation
          3   3rd axis designation
          A   1st axis and 2nd axis designation
          B   1st axis and 3rd axis designation
          C   2nd axis and 3rd axis designation
          D   1st axis, 2nd axis and 3rd axis designation
          W   Specify all controllable axes
          Not specified   Specify all controllable axes
    Reply)   i：general-purpose input   0 ~ 63
  ・Example

Send	Reply	Contents
?:WI	63,63,63	All axis setting values (N1 to 6 are all ON)
?:WI1	63	1st axis set value (N1 to 6 are all ON)
?:WIA	63,63	1st and 2nd axis set values (N1 to 6 are all ON)
?:WI	NS,NS	Not set when the controllable axes are 1 axis and 2 axes
?:WI	NS,NS,NS	Not set when the controllable axes are 1, 2, and 3 axes.
?:WI1	NS	Not set
?:WIA	NS,NS	Not set

*) ON means that current is flowing through the transistor of the photocoupler.
    For details, refer to the separate volume " Preparation and Operation ".

30)   ?:N command (Get setting 23：Model name)
  ・Description
    Get the model name of this controller.
  ・Command format
    Send)   ?:N
    Reply)   n
  ・Parameters
    Reply)   n：model name

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・Example

Send	Reply
?:N	SHRC-203

31)　　?:J command (Get setting 24：Jog motion direction)
　　・Description
　　　　Get the operation direction setting set by "J: command". If it is not set, "NS" will be replied.
　　・Command format
　　　　Send)　　?:Ja
　　　　Reply)　　j
　　・Parameters
　　　　Send)　　a：Axis setting
　　　　　　　　1　1st axis designation
　　　　　　　　2　2nd axis designation
　　　　　　　　3　3rd axis designation
　　　　　　　　A　1st axis and 2nd axis designation
　　　　　　　　B　1st axis and 3rd axis designation
　　　　　　　　C　2nd axis and 3rd axis designation
　　　　　　　　D　1st axis, 2nd axis and 3rd axis designation
　　　　　　　　W　Specify all controllable axes
　　　　　　　　Not specified　Specify all controllable axes
　　　　Reply)　　j：Operating direction setting value　+ or -
　　・Example

Send	Reply	Contents
?:J	+,-,+	The Controllable axis is 3 axes, the 1st axis is in the + direction, the 2nd axis is in the - direction, and the 3rd axis is in the + direction.
?:J	+,-	When the memory switch "GENERAL"-"AXIS" is "1 + 2", the 1st axis is in the + direction and the 2nd axis is in the - direction.
?:J1	+	The 1st axis is in the + direction
?:JA	+,-	1st axis is + direction, 2nd axis is - direction
?:J	NS,NS	Not set when the controllable axes are 1 axis and 2 axes
?:J	NS,NS,NS	Not set when the controllable axes are 1, 2, and 3 axes.
?:J1	NS	Not set
?:JA	NS,NS	Not set

32)　　?:ACS command (Get setting 25：Auto-config status)
　　・Description
　　　　Get the current autoconfig status.
　　・Command format
　　　　Send)　　?:ACSa
　　　　Reply)　　j

・Parameters
　　Send)　a : Axis setting
　　　　　　1　1st axis designation
　　　　　　2　2nd axis designation
　　　　　　3　3rd axis designation
　　　　　　A　1st axis and 2nd axis designation
　　　　　　B　1st axis and 3rd axis designation
　　　　　　C　2nd axis and 3rd axis designation
　　　　　　D　1st axis, 2nd axis and 3rd axis designation
　　　　　　W　Specify all controllable axes
　　　　　Not specified　Specify all controllable axes
　　Reply)　j : Autoconfig status
　　　　　　0　Memory switch "CONFIG" is OFF
　　　　　　1　Memory switch "CONFIG" is ON, and normal reading is completed
　　　　　　E　Memory switch "CONFIG" is ON, and read error
　　　　　　D　Memory switch "CONFIG" is ON, and device unconnected error

・Example

Send	Reply	Contents
?:ACS	1,0,1	Memory switch CONFIG1 / CONFIG3 is ON, CONFIG2 is OFF, and it is read normally.
?:ACS1	1	When the memory switch CONFIG1 is ON and it is read normally
?:ACSA	1,E	memory switch CONFIG1 / CONFIG2 is ON and the device is connected to the 2nd axis and cannot be read.
?:ACSW	1,1,D	When the memory switch CONFIG1 / CONFIG2 / CONFIG3 is ON and the device on the 3rd axis cannot be confirmed.

33)　　　?:C command (Get setting 26 : Motor excitation state)
・Description
　　Get the current motor excitation state.
・Command format
　　Send)　　?:Ca
　　Reply)　　j
・Parameters
　　Send)　a : Axis setting
　　　　　　1　1st axis designation
　　　　　　2　2nd axis designation
　　　　　　3　3rd axis designation
　　　　　　A　1st axis and 2nd axis designation
　　　　　　B　1st axis and 3rd axis designation
　　　　　　C　2nd axis and 3rd axis designation
　　　　　　D　1st axis, 2nd axis and 3rd axis designation
　　　　　　W　Specify all controllable axes
　　　　　Not specified　Specify all controllable axes
　　Reply)　j : Excitation of the motor
　　　　　　0　Excitation OFF
　　　　　　1　Excitation ON

・Example

Send	Reply	Contents
?:C	1,0,1	Motor excitation is on the 1st and 3rd axes ON state, 2nd axis is OFF
?:C1	1	Motor excitation is on the 1st axis ON state
?:CA	1,0	Motor excitation is ON for the 1st axis and OF F for the 2nd axis
?:CW	1,0,0	the motor excitation is ON for the 1st axis, OFF for the 2nd axis, and OFF for the 3rd axis

34)　　?:F command (Get setting 27：Stage control status)

　・Description

　　　Get the current stage control state.

　・Command format

　　　Send)　　?:Fa

　　　Reply)　　j

　・Parameters

　　　Send)　　a：Axis setting

　　　　　　　　1　1st axis designation

　　　　　　　　2　2nd axis designation

　　　　　　　　3　3rd axis designation

　　　　　　　　A　1st axis and 2nd axis designation

　　　　　　　　B　1st axis and 3rd axis designation

　　　　　　　　C　2nd axis and 3rd axis designation

　　　　　　　　D　1st axis, 2nd axis and 3rd axis designation

　　　　　　　　W　Specify all controllable axes

　　　　　　　　Not specified　Specify all controllable axes

　　　Reply)　　j：Stage control state

　　　　　　　　0　Close loop control state

　　　　　　　　1　Open loop control state

　・Example

Send	Reply	Contents
?:F	0,1,0	The 1st and 3rd axes are in the closed loop control state, and the 2nd axis is in the open loop control state.
?:F1	0	The 1st axis is in the closed loop control state.
?:FA	0,1	The 1st axis is in the closed loop control state, and the 2nd axis is in the open loop control state.
?:FW	0,1,1	The 1st axis is in the closed loop control state, and the 2nd and 3rd axes are in the open loop control state.

35)　　?:SLEEP command (Get setting 28：Sleep state)

　・Description

　　　Get the sleep state.

　・Command format

　　　Send)　　?:SLEEP

　　　Reply)　　s

　・Parameters

　　　Reply)　　s：Sleep state　　　　　　0 or 1

　　　　　　　　0　Wake from sleep

　　　　　　　　1　Sleeping

・Example

Send	Reply
?:SLEEP	0

36)　　?:BO command (Get setting 29：The lighting status of the display)
　　・Description
　　　　Get the lighting status of the backlight and LED of the display part.
　　・Command format
　　　　Send)　　?:BO
　　　　Reply)　　l
　　・Parameters
　　　　Reply)　　l : Lights on and off　　　　0 or 1
　　　　　　　　　　0　Off
　　　　　　　　　　1　Lights on
　　・Example

Send	Reply
?:BO	0

37)　　?:MODE command (Get setting 30：Mode)
　　・Description
　　　　Gets the current mode. The reply "HOST, PROGRAM" will be sent when the program
　　　　mode is entered by the "P: R" command. "HOST, MS" will be returned when you
　　　　switch to the memory switch edit mode with "MS: ON".
　　　　*) Can be used in all operation modes (HOST, MANUAL, REMOTE, TEACH, EDIT, TEST).
　　・Command format
　　　　Send)　　?:MODE
　　　　Reply)　　m
　　・Parameters
　　　　Reply)　　m : Mode
　　　　　　　　　　HOST　　　　　　　　HOST mode
　　　　　　　　　　HOST,PROGRAM　　　Program mode (in HOST mode)
　　　　　　　　　　HOST,MS　　　　　　Memory switch edit mode (in HOST mode)
　　　　　　　　　　MANUAL　　　　　　MANUAL mode
　　　　　　　　　　REMOTE　　　　　　REMOTE mode
　　　　　　　　　　TEACHING　　　　　TEACHING mode
　　　　　　　　　　EDIT　　　　　　　EDIT mode
　　　　　　　　　　TEST　　　　　　　TEST mode
　　・Example

Send	Reply
?:MODE	REMOTE

38)　　?:FMT command (Get setting 31：Command format)
　　・Description
　　　　Get the current command format mode.
　　・Command format
　　　　Send)　　?:FMT
　　　　Reply)　　f

35

・Parameters
Reply)　f：Setting
SHOT_FC　　　SHOT_FC mode
HIT　　　　　HIT mode
・Example

Send	Reply
?:FMT	HIT

39)　　?:BEEP command (Get setting 32：Beep sound setting status)
・Description
Get the beep sound setting status.
・Command format
Send)　　?:BEEP
Reply)　　b
・Parameters
Reply)　　b：Beep state　　0 or 1
0　Beep OFF
1　Beep ON
・Example

Send	Reply
BEEP?	0

40)　　?:CMD command (Get setting 33：Previous sendcommand)
・Description
Get the command sent to the controller before sending this command.
*) Can be used in all operation modes (HOST, MANUAL, REMOTE, TEACH, EDIT, TEST).
・Command format
Send)　　?:CMD
Reply)　　c
・Parameters
Reply)　　c：Command sent before
・Example

Send	Reply
?:CMD	WI:W,C

41)　　?:L command (Get setting 34：The program execution status)
・Description
Get the program execution status.
・Command format
Send)　　?:L
Reply)　　pn,pr,pl,lc1, lc2, lc3, lc4, lc5, lc6, lc7, lc8, lc9,

・Parameters

Reply)   pn：Program number   1 ~ 8
          pr：Program execution status   0 ~ 8
              0 Not executed
              1 During execution
              2 During PAUSE
              3 During execution (one line)
              4 Stop while processing
                 (when controllable axis and program axis selection are different)
              5 Stop while processing
                 (If an error occurs)
              6 Stop while processing
                 (When an unexpected pattern is selected)
              7 Stop while processing
                 (When the motor excitation is OFF for the program-selected axis)
              8 Stop while processing
                 (When the program selection axis is BUSY)
          pl：Program execution line number   1 ~ 4000
          lc1：Nest 1 Loop number   0 ~ 65535
          lc2：Nest 2 Loop number   0 ~ 65535
          lc3：Nest 3 Loop number   0 ~ 65535
          lc4：Nest 4 Loop number   0 ~ 65535
          lc5：Nest 5 Loop number   0 ~ 65535
          lc6：Nest 6 Loop number   0 ~ 65535
          lc7：Nest 7 Loop number   0 ~ 65535
          lc8：Nest 8 Loop number   0 ~ 65535
          lc9：Nest 9 Loop number   0 ~ 65535

・Example

Program number 1 is executing on the 15th line, and the remaining number of all loops is 0.

Send	Reply
?:L	1,1,15,0,0,0,0,0,0,0,0,0,0

42)   ?:T command (Get setting 35：Trigger execution status)
  ・Description
      Get the trigger execution status. If it is not set, "NS" will be replied.
  ・Command format
      Send)   ?:T
      Reply1) m,a,v
      Reply2) m,v
       *) If the trigger execution content is PULSE, SCALE PLUS, SCALE MINUS,
          Reply 1), and if TIMER, Reply 2).
  ・Parameters
      Reply)   m：Trigger execution contents   0 ~ 3
                   0 PULSE(Drive pulse)
                   1 TIMER(Interval time)
                   2 SCALE PLUS(+ Directional scale pulse)
                   3 SCALE MINUS(- Directional scale pulse)
                a：Axis setting   1 ~ 3

v1：Setting value

PULSE	2 ~ 30000 pls
TIMER	1 ~ 10000 [0.01 sec unit]
SCALE PLUS	±2 ~ 30000 pls
SCALE MINUS	±2 ~ 30000 pls

・Example

Send	Reply	Contents
?:T	0,1,1000	The trigger target is the drive pulse of the first axis and is output every 1000 pls.
?:T	1,20	Triggered by TIMER, output every 0.2 seconds
?:T	NS	Not set

43) ?:SN command (Get setting 36: Serial number)
・Description
　Get the serial number.
・Command format
　Send)　　?:SN
　Reply)　　sn
・Parameters
　Reply)　　sn：Serial number
・Example

Send	Reply
?:SN	2106001001

44) ?:AXIS command (Get setting 37: Controllable axis)
・Description
　Acquires the setting information of the controllable axis (memory switch "GENERAL"-"AXIS").
・Command format
　Send)　　?:AXIS
　Reply)　　a
・Parameters
　Reply)　　a：0　　Valid only for the 1st axis
　　　　　　　　1　　Valid only for the 2nd axis
　　　　　　　　2　　Valid only for the 3rd axis
　　　　　　　　3　　1st and 2nd axis valid
　　　　　　　　4　　1st and 3rd axis valid
　　　　　　　　5　　2nd and 3rd axis valid
　　　　　　　　6　　1st, 2nd and 3rd axis valid
・Example

Send	Reply	Contents
?:AXIS	6	1st, 2nd and 3rd axis valid

45)　　PSET: command (Coordinate value preset)
・Description
　Preset the coordinate values.
・Command format
　Send)　　PSET:amuc

・Parameters

　Send)　a：Axis setting

　　　　1　1st axis designation

　　　　2　2nd axis designation

　　　　3　3rd axis designation

　　　　A　1st axis and 2nd axis designation

　　　　B　1st axis and 3rd axis designation

　　　　C　2nd axis and 3rd axis designation

　　　　D　1st axis, 2nd axis and 3rd axis designation

　　　　W　Specify all controllable axes

　　m：Sign　+ or - (If there is no sign, it will be "+")

　　u：Unit setting　N / U / M / D / P

　　　　N　nanometer designation

　　　　U　micrometer designation

　　　　M　mm designation

　　　　D　degree designation

　　　　P　Designation without unit (pulse)

　　c：Set coordinate values　Setting range：0 ~ 999,999,999 (Unit: pls)

・Example

Send	Reply	Contents
PSET:1+P1000	OK or NG	1st axis to 1000 pls
PSET:A+P1000+P2000	OK or NG	1st axis to 1000pls and the 2nd axis to 2000pls
PSET:B+P1000+P3000	OK or NG	1st axis to 1000pls and the 3rd axis to 3000pls

*) In the case of Busy, it will be "NG" and this command cannot be executed.

46)　RESET: command (Reset execution)

　・Description

　　Reboot the system.

　・Command format

　　Send)　RESET:

　・Example

Send	Reply
RESET:	OK or NG

47)　SLEEP: command (Sleep execution)

　・Description

　　Change the sleep state.

　・Command format

　　Send)　SLEEP:s

　・Parameters

　　Send)　s：Sleep state　　　　0 or 1

　　　　　　0　Wake from sleep

　　　　　　1　Go to sleep state

　・Example

Send	Reply
SLEEP:1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

*) If the position shifts during sleep with the CLOSE setting, it will return to the position before sleep when returning from the sleep state.

48)　　BO: command (Display lighting operation)
　　・Description
　　　　Change the lighting status of the backlight and LED of the display.
　　・Command format
　　　　Send)　　BO:l
　　・Parameters
　　　　Send)　　l : Lights on and off　　　　0 or 1
　　　　　　　　　　0　Off
　　　　　　　　　　1　Lights on
　　・Example

Send	Reply
BO:1	OK or NG

　*) In the case of Busy, it will be "NG" and this command cannot be executed.

49)　　MODE: command (Mode change)
　　・Description
　　　　Change the mode.
　　　　*) Can be used in all operation modes (HOST, MANUAL, REMOTE, TEACH, EDIT, TEST).
　　・Command format
　　　　Send)　　MODE:m
　　・Parameters
　　　　Send)　　m : Mode
　　　　　　　　　　HOST　　　　　HOST mode
　　　　　　　　　　MANUAL　　　MANUAL mode
　　　　　　　　　　REMOTE　　　REMOTE mode
　　　　　　　　　　TEACHING　　TEACHING mode
　　　　　　　　　　EDIT　　　　　EDIT mode
　　　　　　　　　　LOAD　　　　　LOAD mode
　　　　　　　　　　TEST　　　　　TEST mode
　　・Example

Send	Reply
MODE:MANUAL	OK or NG

　*) In the case of Busy, it will be "NG" and this command cannot be executed.

50)　　FMT: command (Command format change)
　　・Description
　　　　Change the command format.
　　・Command format
　　　　Send)　　FMT:f
　　・Parameters
　　　　Send)　　f : Setting
　　　　　　　　　　SHOT_FC　　　SHOT_FC mode
　　　　　　　　　　HIT　　　　　　HIT mode
　　・Example

Send	Reply
FMT:HIT	OK or NG

　*) In the case of Busy, it will be "NG" and this command cannot be executed.

51)   F: command (Stage control method change)
・Description
    Change the stage control method.
・Command format
    Send)   F:af
・Parameters
    Send)   a：Axis setting
            1   1st axis designation
            2   2nd axis designation
            3   3rd axis designation
            A   1st axis and 2nd axis designation
            B   1st axis and 3rd axis designation
            C   2nd axis and 3rd axis designation
            D   1st axis, 2nd axis and 3rd axis designation
            W   Specify all controllable axes
          f：Control method   0 or 1
            0   Close loop control
            1   Open loop control
・Example

Send	Reply	Contents
F:10	OK or NG	Set the 1st axis to closed loop control.
F:A0	OK or NG	Set the 1st and 2nd axes to closed loop.
F:W0	OK or NG	Set all controllable axes to closed loop.

*) In the case of Busy, it will be "NG" and this command cannot be executed.

52)   C: command (Motor state change)
・Description
    Change the motor status.
・Command format
    Send)   C:ac
・Parameters
    Send)   a：Axis setting
            1   1st axis designation
            2   2nd axis designation
            3   3rd axis designation
            A   1st axis and 2nd axis designation
            B   1st axis and 3rd axis designation
            C   2nd axis and 3rd axis designation
            D   1st axis, 2nd axis and 3rd axis designation
            W   Specify all controllable axes
          c：Motor status   0 or 1
            0   Excitation OFF
            1   Excitation ON

・Example

Send	Reply
C:10	OK or NG
C:A0	OK or NG
C:W0	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

53)   BEC: command (Positioning incomplete and error cancellation)
　・Description
　　　Releases positioning incomplete state (BUSY) and error.
　　　*) Can be canceled: Limit error / Overflow error / Emergency stop
　・Command format
　　　Send)   BEC:a
　・Parameters
　　　Send)   a : Axis setting
　　　　　　1   1st axis designation
　　　　　　2   2nd axis designation
　　　　　　3   3rd axis designation
　　　　　　A   1st axis and 2nd axis designation
　　　　　　B   1st axis and 3rd axis designation
　　　　　　C   2nd axis and 3rd axis designation
　　　　　　D   1st axis, 2nd axis and 3rd axis designation
　　　　　　W   Specify all controllable axes
　　　　　　Not specified   Specify all controllable axes
　・Example

Send	Reply
BEC:1	OK or NG
BEC:A	OK or NG
BEC:W	OK or NG

54)   BEEP: command (Beep operation)
　・Description
　　　Select whether to make a beep sound.
　・Command format
　　　Send)   BEEP:b
　・Parameters
　　　Send)   b : Beep state   0 or 1
　　　　　　0   Beep OFF
　　　　　　1   Beep ON
　・Example

Send	Reply
BEEP:0	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

42

55)   S: command (Number of divisions setting)

・Description

Set the number of divisions of the motor driver.

*) When the power is turned on, the value of the memory switch "MOTOR DRIVER"-"DIVIDE" is set.

*) If the memory switch "AXIS"-"CONFIG" is ON, this command is invalid.

・Command format

Send)   S:a,m

・Parameters

Send)   a : Axis setting

1   1st axis designation

2   2nd axis designation

3   3rd axis designation

A   1st axis and 2nd axis designation

B   1st axis and 3rd axis designation

C   2nd axis and 3rd axis designation

D   1st axis, 2nd axis and 3rd axis designation

W   Specify all controllable axes

m : Number of motor driver divisions

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

*) If the number of divisions is other than the above, a command error will occur.

・Example

Send	Reply	Contents
S:1,100	OK or NG	1st axis is divided into 100
S:A,100,200	OK or NG	1st axis is divided into 100, 2nd axis is divided into 200
S:B,100,400	OK or NG	1st axis is divided into 100, 3rd axis is divided into 400
S:W,200,200,400	OK or NG	The 1st axis is divided into 200, the 2nd axis is divided into 200, and the 3rd axis is divided into 400.

*) In the case of Busy, it will be "NG" and this command cannot be executed.

56)   W: command (Waiting time)

・Description

Set the waiting time until READY is reached after determining that positioning is complete.

・Command format

Send)   W:w

・Parameters

Send)   w : Waiting time   0 ~ 2550   (Unit : 0.1s)

・Example

Send	Reply
W:255	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

57)　　WT: command (Wait for specified time [Prebuffer])

　　・Description

　　　This is a prebuffer command that waits for a specified time. If a waiting time is set in "W: command", the waiting process of this command will start after the waiting time has elapsed.

　　　If "0" is specified, the running timer operation is stopped.

　　　*) This command can be used only when the double buffer function is enabled.
　　　　For details, refer to "2. About double buffer".

　　・Command format

　　　Send)　　WT:a,w

　　・Parameters

　　　Send)　　a：Axis setting

　　　　　　　1　1st axis designation
　　　　　　　2　2nd axis designation
　　　　　　　3　3rd axis designation
　　　　　　　A　1st axis and 2nd axis designation
　　　　　　　B　1st axis and 3rd axis designation
　　　　　　　C　2nd axis and 3rd axis designation
　　　　　　　D　1st axis, 2nd axis and 3rd axis designation
　　　　　　　W　Specify all controllable axes

　　　　　　w：Waiting time　0 ~ 2550　　　　　(Unit：0.1s)

　　・Example

Send	Reply	Contents
WT:1,1	OK or NG	0.1 sec for the first axis
WT:A,10,20	OK or NG	1 sec for 1st axis, 2 sec for 1st axis
WT:W,2550,2550,2550	OK or NG	255 sec for all Controllable axes
WT:W,0	OK or NG	0 sec for all Controllable axes

58)　　WI: command (General purpose input state wait [Prebuffer])

　　・Description

　　　This is a prebuffer command that waits until the specified general-purpose input is set.

　　　*) This command can be used only when the double buffer function is enabled.
　　　　For details, refer to "2. About double buffer".

　　・Command format

　　　Send)　　WI:a,i

　　・Parameters

　　　Send)　　a：Axis setting

　　　　　　　1　1st axis designation
　　　　　　　2　2nd axis designation
　　　　　　　3　3rd axis designation
　　　　　　　A　1st axis and 2nd axis designation
　　　　　　　B　1st axis and 3rd axis designation
　　　　　　　C　2nd axis and 3rd axis designation
　　　　　　　D　1st axis, 2nd axis and 3rd axis designation
　　　　　　　W　Specify all controllable axes

i : General purpose input   0 ~ 63 or C

     0 ~ 63

     C   Cancel waiting

・Example

Send	Reply	Contents
WI:1,1	OK or NG	1st axis designation (IN1: ON IN2 ~ 6: OFF)
WI:A,1,2	OK or NG	1st axis and 2nd axis designation (1st axis IN1: ON IN2 ~ 6: OFF) (2nd axis IN2: ON IN1,3 ~ 6: OFF)
WI:W,63,63,63	OK or NG	Controllable axis all axis designation (Controllable axis all axis IN1 ~ 6: ON)
WI:W,C	OK or NG	Designation of all controllable axes (release of standby for all Controllable axes)

*) ON means that current is flowing through the transistor of the photocoupler.

For details, refer to the separate volume " Preparation and Operation ".

59)   H: command (Mechanical origin return 1)

・Description

Performs mechanical origin return. After completion, the coordinate values will be reset to zero. The operating speed follows the setting of the "B:" command.

・Command format

Send)   Hm:a

・Parameters

Send)   m : Origin return method specification   0 or 1 or 2 or 3 or 4 or Not specified

     0   MARK

     1   MINI

     2   MIDDLE

     3   ORGS

     4   NORMAL

    Not specified   Follows memory switch setting

a : Axis setting

    1   1st axis designation

    2   2nd axis designation

    3   3rd axis designation

    A   1st axis and 2nd axis designation

    B   1st axis and 3rd axis designation

    C   2nd axis and 3rd axis designation

    D   1st axis, 2nd axis and 3rd axis designation

    W   Specify all controllable axes

    Not specified   Specify all controllable axes

・Example1

Send	Reply	Contents
H:1	OK or NG	1st axis designation
H:A	OK or NG	1st axis and 2nd axis designation
H:B	OK or NG	1st axis and 3rd axis designation
H:W	OK or NG	Specify all controllable axes
H:	OK or NG	Specify all controllable axes

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

60)　　HRT: command (Mechanical origin return 2：Completion reply)

・Description

The mechanical origin is restored, and there is a reply for each axis after completion. After completion, the coordinate values will be reset to zero. The operating speed follows the setting of the "B:" command.

・Command format

Send)　　HRTm:a

Reply)　　r

・Parameters

Send)　　m：Origin return method specification0 or 1 or 2 or 3 or 4 or Not specified

0　MARK

1　MINI

2　MIDDLE

3　ORGS

4　NORMAL

Not specified　　Follows memory switch setting

a：Axis setting

1　1st axis designation

2　2nd axis designation

3　3rd axis designation

A　1st axis and 2nd axis designation

B　1st axis and 3rd axis designation

C　2nd axis and 3rd axis designation

D　1st axis, 2nd axis and 3rd axis designation

W　Specify all controllable axes

Not specified　Specify all controllable axes

Reply)　　r：Positioning complete axis　　　　1 or 2 or 3

・Example

Send	Reply	Reply after home return operation is completed	Contents
HRT:1	OK or NG	1	1st axis designation
HRT:A	OK or NG	1 and 2	1st axis and 2nd axis designation
HRT:B	OK or NG	1 and 3	1st axis and 3rd axis designation
HRT:W	OK or NG	1, 2 and 3	1st axis, 2nd axis and 3rd axis designation
HRT:W	OK or NG	Depends on the Controllable axis	Specify all controllable axes
HRT:	OK or NG	Depends on the Controllable axis	Specify all controllable axes

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

61)　　Z: command (Logical origin return 1)

・Description

Move to the position of the logical origin "0". The operating speed follows the setting of the "D:" command.

・Command format

Send)　　Z:a

HOURS
www.hours-web.com

・Parameters
  Send)   a：Axis setting
        1 1st axis designation
        2 2nd axis designation
        3 3rd axis designation
        A 1st axis and 2nd axis designation
        B 1st axis and 3rd axis designation
        C 2nd axis and 3rd axis designation
        D 1st axis, 2nd axis and 3rd axis designation
        W   Specify all controllable axes
        Not specified   Specify all controllable axes

・Example

Send	Reply	Contents
Z:1	OK or NG	1st axis designation
Z:A	OK or NG	1st axis and 2nd axis designation
Z:B	OK or NG	1st axis and 3rd axis designation
Z:W	OK or NG	Specify all controllable axes
Z:	OK or NG	Specify all controllable axes

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

62)   ZRT: command (Logical origin return 2：Completion reply)
  ・Description
    Move to the position of the logical origin "0", and there is a reply for each axis after completion. The operating speed follows the setting of the "D:" command.
  ・Command format
    Send)   ZRT:a
    Reply)   r
  ・Parameters
    Send)   a：Axis setting
        1 1st axis designation
        2 2nd axis designation
        3 3rd axis designation
        A 1st axis and 2nd axis designation
        B 1st axis and 3rd axis designation
        C 2nd axis and 3rd axis designation
        D 1st axis, 2nd axis and 3rd axis designation
        W   Specify all controllable axes
        Not specified   Specify all controllable axes
    Reply)   r：Positioning complete axis   1 or 2 or 3
  ・Example 1

Send	Reply	Reply after home return operation is completed	Contents
ZRT:1	OK or NG	1	1st axis designation
ZRT:A	OK or NG	1 and 2	1st axis and 2nd axis designation
ZRT:B	OK or NG	1 and 3	1st axis and 3rd axis designation
ZRT:D	OK or NG	1, 2 and 3	1st axis, 2nd axis and 3rd axis designation

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

・Example 2

Send	Reply	Reply after home return operation is completed	Contents
ZRT:W	OK or NG	Depends on the Controllable axis	Specify all controllable axes
ZRT:	OK or NG	Depends on the Controllable axis	Specify all controllable axes

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

63)   R: command (Logical origin setting)
　　・Description
　　　Reset the coordinate value to "0".
　　・Command format
　　　Send)   R:a
　　・Parameters
　　　Send)   a : Axis setting
　　　　　　　1   1st axis designation
　　　　　　　2   2nd axis designation
　　　　　　　3   3rd axis designation
　　　　　　　A   1st axis and 2nd axis designation
　　　　　　　B   1st axis and 3rd axis designation
　　　　　　　C   2nd axis and 3rd axis designation
　　　　　　　D   1st axis, 2nd axis and 3rd axis designation
　　　　　　　W   Specify all controllable axes
　　　　　　　Not specified   Specify all controllable axes
　　・Example

Send	Reply	Contents
R:1	OK or NG	1st axis designation
R:A	OK or NG	1st axis and 2nd axis designation
R:B	OK or NG	1st axis and 3rd axis designation
R:W	OK or NG	Specify all controllable axes
R:	OK or NG	Specify all controllable axes

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

64)   RC: command (Initialization of logical origin setting)
　　・Description
　　　This command cancels the logical origin setting. For example, after setting zero with the "R: command" at the position of coordinate value +1000, and then moving to the position of coordinate value +500, executing this command the current coordinate value becomes 1500.
　　・Command format
　　　Send)   RC:a

・Parameters
    Send)   a：Axis setting
             1   1st axis designation
             2   2nd axis designation
             3   3rd axis designation
             A   1st axis and 2nd axis designation
             B   1st axis and 3rd axis designation
             C   2nd axis and 3rd axis designation
             D   1st axis, 2nd axis and 3rd axis designation
             W   Specify all controllable axes
             Not specified   Specify all controllable axes

・Example

Send	Reply	Contents
RC:1	OK or NG	1st axis designation
RC:A	OK or NG	1st axis and 2nd axis designation
RC:B	OK or NG	1st axis and 3rd axis designation
RC:W	OK or NG	Specify all controllable axes
RC:	OK or NG	Specify all controllable axes

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

65)   L: command (Stop operation 1)
  ・Description
      Decelerate and stop the stage.
  ・Command format
      Send)   L:a
  ・Parameters
      Send)   a：Axis setting
             1   1st axis designation
             2   2nd axis designation
             3   3rd axis designation
             A   1st axis and 2nd axis designation
             B   1st axis and 3rd axis designation
             C   2nd axis and 3rd axis designation
             D   1st axis, 2nd axis and 3rd axis designation
             W   Specify all controllable axes
             Not specified   Specify all controllable axes

・Example

Send	Reply	Contents
L:1	OK or NG	1st axis designation
L:A	OK or NG	1st axis and 2nd axis designation
L:B	OK or NG	1st axis and 3rd axis designation
L:W	OK or NG	Specify all controllable axes
L:	OK or NG	Specify all controllable axes

*) In the case of the motor excitation is OFF, it will be "NG" and this command cannot be executed.

66)   L:E command (Stop operation 2：Emergency stop)
　・Description
　　　Immediately stop the stages of all axes and put them in an emergency stop state.
　　　The excitation of the motor in case of emergency stop depends on the memory switch "AXIS"-"EMG MT EXCT *".
　　　To cancel, send the "BEC:" command.
　・Command format
　　　Send)   L:E
　・Example

Send	Reply
L:E	OK or NG

67)   M: command (Relative movement amount setting 1：[Execution buffer])
　・Description
　　　command sets the movement axis, movement direction, and relative movement amount. The operation start command "G" or "G:" is always required after executing this command. Operation is acceleration / deceleration drive.
　　　The operating speed follows the setting of the "D:" command.
　・Command format
　　　Send)   M:amuy
　・Parameters
　　　Send)   a：Axis setting
　　　　　　1   1st axis designation
　　　　　　2   2nd axis designation
　　　　　　3   3rd axis designation
　　　　　　A   1st axis and 2nd axis designation
　　　　　　B   1st axis and 3rd axis designation
　　　　　　C   2nd axis and 3rd axis designation
　　　　　　D   1st axis, 2nd axis and 3rd axis designation
　　　　　　W   Specify all controllable axes
　　　　　m：Sign   + or －
　　　　　u：Unit setting
　　　　　　P   Designation without unit (pulse)
　　　　　　N   nanometer designation
　　　　　　U   micrometer designation
　　　　　　M   mm designation
　　　　　　D   degree designation

　y：Moving distance
　　　P　Setting range：0 ~ 999,999,999 (Unit: pls)
　　　N　Setting range：Value converted from pls to nm
　　　　　Example):
　　　　　If the scale resolution is 1 nm at 1,000 pls, it will be N1000
　　　U　Setting range：Value converted from pls to µm
　　　　　Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1
　　　M　Setting range：Value converted from pls to mm
　　　　　Example):
　　　　　If the scale resolution is 1 nm at 1,000 pls, it will be M0.001
　　　D　Setting range：Value converted from pls to angle
　　　　　Example):
　　　　　If the scale resolution is 0.000001° at 1,000 pls, it will be D0.001

・Example

Send	Reply	Contents
M:1+P1000	OK or NG	1000 pulse movement setting in the 1st axis + direction.
M:A+P1000+P2000	OK or NG	1000 pulse movement setting in the 1st axis + direction, 2000 pulse movement setting in the 2nd axis + direction.
M:B+P1000+P3000	OK or NG	1000 pulse movement setting in the 1st axis + direction, 2000 pulse movement setting in the 3rd axis + direction.
M:W+P1000+P2000+P3000	OK or NG	1st axis + direction 1000 pulse, 2nd axis + direction 2000 pulse, 3rd axis + direction 3000 pulse movement setting.
M:W+U10+N5+M50	OK or NG	1st axis + direction 10µm, 2nd axis + direction 5nm, 3rd axis + direction 50mm movement setting.

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

68)　　MP: command (Relative movement amount setting 2：[Prebuffer])
　・Description
　　This is a prebuffer command that sets the movement axis, movement direction, relative movement amount, and movement speed. If the operation is set up with this command, a reply will be sent when the operation is completed.
　　The operation start command "G" or "G:" is always required after executing this command. Operation is acceleration / deceleration drive. If the operation speed setting is omitted, the setting of the "D:" command is followed.
　　*) When setting the operation speed, it will be overwritten with the speed setting set by the "D:" command when the operation is started by the "G" command etc. after sending the "MP:" command.
　　*) This command can be used with the double buffer function. For details, refer to "2. About double buffer".
　・Command format
　　Send)　　MP:amuy,SspdsFspdfRr

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・Parameters
  Send)   a：Axis setting
        1 1st axis designation
        2 2nd axis designation
        3 3rd axis designation
        A 1st axis and 2nd axis designation
        B 1st axis and 3rd axis designation
        C 2nd axis and 3rd axis designation
        D 1st axis, 2nd axis and 3rd axis designation
        W   Specify all controllable axes
    m：Sign   + or -
    u：Unit setting
        P   Designation without unit
          (movement amount pls and operating speed pls/s)
        N   nanometer designation
          (Movement amount nm and operating speed nm/s)
        U   micrometer designation
          (Movement amount µm and operating speed µm/s)
        M   mm designation
          (Movement amount mm and operating speed mm/s)
        D   Degree designation
          (Movement amount °(degree) and operating speed °(degree)/s)
    y：Moving distance
        P   Setting range：0 ~ 999,999,999 (Unit: pls)
        N   Setting range：Value converted from pls to nm
          Example):
          If the scale resolution is 1 nm at 1,000 pls, it will be N1000.
        U   Setting range：Value converted from pls to µm
          Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1
        M   Setting range：Value converted from pls to mm
          Example):
          If the scale resolution is 1 nm at 1,000 pls, it will be M0.001)
        D   Setting range：Value converted from pls to angle
          Example):
          If the scale resolution is 0.000001° at 1,000 pls, it will be D0.001)
    spds：Minimum speed (S) setting   Setting range：1 ~ 1,000,000 pls/s
    spdf：Maximum speed (F) setting   Setting range：1 ~ 1,000,000 pls/s
            *) Please set it to the minimum speed (S) or higher.
    r：Acceleration / deceleration time (R) setting
            Setting range：1 ~ 1,000 ms

・Example

Send	Reply	Contents
MP:1+P1000	OK or OK_D or NG	1000 pulse movement setting in the 1st axis + direction, the operating speed is the setting value with the memory switch "SPEED" or the setting value with the already set "D:" command.
MP:1+P1000, S100F1000R50	OK or OK_D or NG	1000 pulse movement setting in the 1st axis + direction, the operating speed is minimum speed (S) 100pls / s, maximum speed (F) 1000pls / s, acceleration / deceleration time (R) 50ms.
MP:A+P1000+P2000, S100F1000R50 S200F2000R100	OK or OK_D or NG	・ 1000 pulse movement setting in the 1st axis + direction, the operating speed is minimum speed (S) 100pls / s, maximum speed (F) 1000pls / s, acceleration / deceleration time (R) 50ms. ・ 2000 pulse movement setting in the 2nd axis + direction, the operating speed is minimum speed (S) 200pls / s, maximum speed (F) 2000pls / s, acceleration / deceleration time (R) 100ms.
MP:W+U10+N200+M0.03, S100F1000R50 S200F2000R100 S0.03F0.3R150	OK or OK_D or NG	・ 10 μm movement setting in the 1st axis + direction, the operating speed is minimum speed (S) 100pls / s, maximum speed (F) 1000pls / s, acceleration / deceleration time (R) 50ms. ・ 200nm movement setting in the 2nd axis + direction, the operating speed is minimum speed (S) 200nm / s, maximum speed (F) 2000nm / s, acceleration / deceleration time (R) 100ms. ・ 0.03mm movement setting in the 3rd axis + direction, the operating speed is minimum speed (S) 0.03mm / s, maximum speed (F) 0.3mm / s, acceleration / deceleration time (R) 150ms.

*) In the case of the motor excitation is OFF, it will be "NG" and this command cannot be executed.

69)　　A: command (Absolute coordinate value setting 1 : [Execution buffer])
　・Description
　　　This command sets the axis of movement, direction of movement, and position of movement. The operation start comman "G" or " G: " is always required after executing this command. Operation is acceleration / deceleration drive. This command also allows the stage to be moved to the logical origin.
　　　The operating speed follows the setting of the "D:" command.

・Command format

   Send)　A:amuy

・Parameters

   Send)　　a：Axis setting

          1　1st axis designation

          2　2nd axis designation

          3　3rd axis designation

          A　1st axis and 2nd axis designation

          B　1st axis and 3rd axis designation

          C　2nd axis and 3rd axis designation

          D　1st axis, 2nd axis and 3rd axis designation

          W　　Specify all controllable axes

      m：Sign　+ or -

      u：Unit setting

          P　Designation without unit (pulse)

          N　nanometer designation

          U　micrometer designation

          M　mm designation

          D　degree designation

      y：Moving distance

          P　Setting range：0 ~ 999,999,999 (Unit: pls)

          N　Setting range：Value converted from pls to nm

             Example)：

             If the scale resolution is 1 nm at 1,000 pls, it will be N1000

          U　Setting range：Value converted from pls to µm

             Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1

          M　Setting range：Value converted from pls to mm

             Example)：

             If the scale resolution is 1 nm at 1,000 pls, it will be M0.001

          D　Setting range：Value converted from pls to angle

             Example)：

             If the scale resolution is 0.000001° at 1,000 pls, it will be D0.001

・Example 1

Send	Reply	Contents
A:1+P1000	OK or NG	Set to move the 1st axis to the +1000 pulse position
A:A+P1000+P2000	OK or NG	Set to move the 1st axis to the +1000 pulse position and the 2nd axis to the +2000 pulse position.
A:B+P1000+P3000	OK or NG	Set to move the 1st axis to the +1000 pulse position and the 3rd axis to the +3000 pulse position.
A:W+P1000+P2000+P3000	OK or NG	Set to move the 1st axis to the +1000 pulse position, the 2nd axis to the +2000 pulse position, and the 3rd axis to the +3000 pulse position.

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

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・Example 2

Send	Reply	Contents
A:W+U10+N5+M50	OK or NG	Set to move the 1st axis to the + 10µm position, the 2nd axis to the + 5nm position, and the 3rd axis to the + 50mm position.

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

70)   AP: command (Absolute coordinate value setting 2：[Prebuffer])

・Description

This is a prebuffer command that sets the movement axis, movement direction, movement position, and movement speed. If the operation is set up with this command, a reply will be sent when the operation is completed.

The operation start comman "G" or " G: " is always required after executing this command. Operation is acceleration / deceleration drive. If the operation speed setting is omitted, the setting of the "D:" command is followed.

*) When setting the operation speed, it will be overwritten with the speed setting set by the "D:" command when the operation is started by the "G" command etc. after sending the "AP:" command.

*) This command can be used with the double buffer function.

For details, refer to "2. About double buffer".

・Command format

Send)   AP:amuy,SspdsFspdfRr

・Parameters

Send)   a：Axis setting

1   1st axis designation

2   2nd axis designation

3   3rd axis designation

A   1st axis and 2nd axis designation

B   1st axis and 3rd axis designation

C   2nd axis and 3rd axis designation

D   1st axis, 2nd axis and 3rd axis designation

W   Specify all controllable axes

m：Sign   + or -

u：Unit setting

P   Designation without unit

(movement amount pls and operating speed pls/s)

N   nanometer designation

(Movement amount nm and operating speed nm/s)

U   micrometer designation

(Movement amount µm and operating speed µm/s)

M   mm designation

(Movement amount mm and operating speed mm/s)

D   degree designation

(Movement amount °(degree) and operating speed °(degree)/s)

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y : Moving distance
   P Setting range : 0 ~ 999,999,999 (Unit: pls)
   N Setting range : Value converted from pls to nm
      Example):
      If the scale resolution is 1 nm at 1,000 pls, it will be N1000
   U Setting range : Value converted from pls to μm
      Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1
   M Setting range : Value converted from pls to mm
      Example):
      If the scale resolution is 1 nm at 1,000 pls, it will be M0.001
   D Setting range : Value converted from pls to angle
      Example):
      If the scale resolution is 0.000001° at 1,000 pls, it will be D0.001
spds : Minimum speed (S) setting   Setting range : 1 ~ 1,000,000 pls/s
spdf : Maximum speed (F) setting   Setting range : 1 ~ 1,000,000 pls/s
             *) Please set it to the minimum speed (S) or higher.
  r : Acceleration / deceleration time (R) setting
              Setting range : 1 ~ 1,000 ms

・Example 1

Send	Reply	Contents
AP:1+P1000	OK or OK_D or NG	Set to move the 1st axis to the +1000 pulse position. The movement speed is the value set by the memory switch "SPEED" or by the already set "D:" command.
AP:1+P1000, S100F1000R50	OK or OK_D or NG	Set to move the 1st axis to the +1000 pulse position. The moving speed is a minimum speed (S) 100pls / s, a maximum speed (F) 1000pls / s, and an acceleration / deceleration time (R) 50ms.
AP:A+P1000+P2000, S100F1000R50 S200F2000R100	OK or OK_D or NG	・Set to move the 1st axis to the +1000 pulse position. The moving speed is a minimum speed (S) 100pls / s, a maximum speed (F) 1000pls / s, and an acceleration / deceleration time (R) 50ms. ・Set to move the 2nd axis to the +2000 pulse position. The moving speed is a minimum speed (S) 200pls / s, a maximum speed (F) 2000pls / s, and an acceleration / deceleration time (R) 100ms.

*) In the case of the motor excitation is OFF, it will be "NG" and this command cannot be executed.

・Example 2

Send	Reply	Contents
AP:W+U10+N200+M 0.03, S100F1000R50 S200F2000R100 S0.03F3R150	OK or OK_D or NG	・Set to move the 1st axis to the +10 µm position. The moving speed is 100 µm / s for the minimum speed (S), 1000 µm / s for the maximum speed (F), and 50 ms for the acceleration / deceleration time (R). ・Set to move the 2nd axis to the +200 nm position. The moving speed is 200 nm / s for the minimum speed (S), 2000 nm / s for the maximum speed (F), and 100 ms for the acceleration / deceleration time (R). ・Set to move the 3rd axis to the +0.03 mm position. The moving speed is 0.03 mm / s for the minimum speed (S), 3 mm / s for the maximum speed (F), and 150 ms for the acceleration / deceleration time (R).

*) In the case of the motor excitation is OFF, it will be "NG" and this command cannot be executed.

71)   E:0 command (Arc interpolation 1 : Perfect circle [Execution buffer])

・Description

This command sets the axis of movement, direction of rotation, and center coordinates for an arc interpolation move (perfect circle). After executing this command, the operation start comman "G", "G:" or "G: W" is always required.

*) The interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed for the axis with the smaller axis number.

*) The distance traveled per pulse must be the same between the interpolation axes. If they are different, the correct interpolation operation will not be performed.

・Command format

Send)   E:0admuc1muc2

・Parameters

Send)   a : Axis setting

A   1st and 2nd axis designation

B   1st and 3rd axis designation

C   2nd and 3rd axis designation

d : Rotation direction setting

0   CW ROTATION (CLOCKWISE)

1   CCW ROTATION (COUNTERCLOCKWISE)

m : Sign   + or - (If there is no sign, it will be "+")

u : Unit setting

P   Designation without unit (pulse)

N   nanometer designation

U   micrometer designation

M   mm designation

c1,c2：Center coordinate setting (relative position from the current position)

(c1：Set value of the axis with a small axis number (X axis))

(c2：Set value of the axis with a large axis number (Y axis))

Setting range

P　Setting range：0 ~ 999,999,999 (Unit: pls)

N　Setting range：Value converted from pls to nm

Example):

If the scale resolution is 1 nm at 1,000 pls, it will be N1000

U　Setting range：Value converted from pls to □m

Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1

M　Setting range：Value converted from pls to mm

Example):

If the scale resolution is 1 nm at 1,000 pls, it will be M0.001

・Example

Operation to draw a circle clockwise from the current position on the 1st and 2nd axis stages to the current position around the relative position from the current position (1st axis 0.05mm, 2nd axis -0.05mm)

Send	Reply
E:0A0M0.05-M0.05	OK or NG

*) In the case of Busy, the motor excitation is OFF or the limit sensor is detected, it will be "NG" and this command cannot be executed.
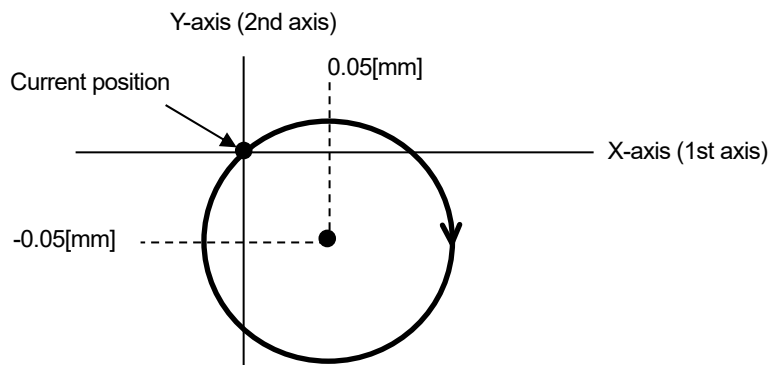
72)　　E:1 command (Arc interpolation 2：Angle [Execution buffer])

・Description

This command sets the axis of movement, direction of rotation, center coordinates, and end point angle (deg) for a circular interpolation move. After executing this command, the operation start comman "G", "G:" or "G: W" is always required.

*) The interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed for the axis with the smaller axis number.

*) An error occurs because the end point coordinates are calculated. Please use it after confirming it with the actual machine.

*) The distance traveled per pulse must be the same between the interpolation axes. If they are different, the correct interpolation operation will not be performed.

・Command format

Send)　　E:1admuc1muc2Dae

・Parameters

Send)   a：Axis setting

  A   1st axis and 2nd axis designation

  B   1st axis and 3rd axis designation

  C   2nd axis and 3rd axis designation

 d：Rotation direction setting

  0   CW ROTATION (CLOCKWISE)

  1   CCW ROTATION (COUNTERCLOCKWISE)

m：Sign   + or - (If there is no sign, it will be "+")

u：Unit setting

 P   Designation without unit (pulse)

 N   nanometer designation

 U   micrometer designation

 M   mm designation

c1,c2：Center coordinate setting (relative position from the current position)

  (c1：Set value of the axis with a small axis number (X axis))

  (c2：Set value of the axis with a large axis number (Y axis))

Center coordinates   Setting range

 P   Setting range：0 ~ 999,999,999 (Unit: pls)

 N   Setting range：Value converted from pls to nm

  Example):

  If the scale resolution is 1 nm at 1,000 pls, it will be N1000

 U   Setting range：Value converted from pls to □m

  Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1

 M   Setting range：Value converted from pls to mm

  Example):

  If the scale resolution is 1 nm at 1,000 pls, it will be M0.001

ae：End point angle (deg) setting   Setting range：0°< ae ≦360°

・Example

On the 1st and 3rd axis stages, an arc is drawn in the CW direction from the current position to the end point angle of 90 ° around the relative position from the current position (1st axis + 100pls, 3rd axis -200pls).

Send	Reply
E:1B0+P100-P200D90	OK or NG

*) In the case of Busy, the motor excitation is OFF or the limit sensor is detected, it will be "NG" and this command cannot be executed.
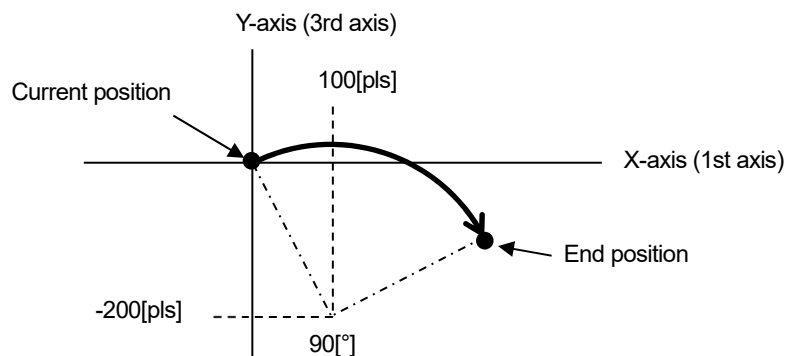
73)   E:2 command (Arc interpolation 3：Passing point [Execution buffer])
・Description
This command sets the axis of movement, pass point coordinates, and end point coordinates for a circular interpolation move. After executing this command, the operation start command "G" or "G:" is always required.
*) The interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed for the axis with the smaller axis number.
*) An error occurs because the center coordinates are calculated. Please use it after confirming it with the actual machine.
*) The distance traveled per pulse must be the same between the interpolation axes.
If they are different, the correct interpolation operation will not be performed.
・Command format
Send)   E:2admup1mup2mue1mue2
・Parameters
Send)   a：Axis setting
A   1st axis and 2nd axis designation
B   1st axis and 3rd axis designation
C   2nd axis and 3rd axis designation
d：Rotation direction setting
0   CW ROTATION (CLOCKWISE)
1   CCW ROTATION (COUNTERCLOCKWISE)
m：Sign   + or - (If there is no sign, it will be "+")
u：Unit setting
P   Designation without unit (pulse)
N   nanometer designation
U   micrometer designation
M   mm designation
p1,p2：Passing point coordinate setting
(relative position from the current position)
(p1：Set value of the axis with a small axis number (X axis))
(p2：Set value of the axis with a large axis number (Y axis))
e1,e2：End point coordinate setting
(relative position from the current position)
(e1：Set value of the axis with a small axis number (X axis))
(e2：Set value of the axis with a large axis number (Y axis))
Passing point coordinates, end point coordinates   Setting range
P   Setting range：0 ~ 999,999,999 (Unit: pls)
N   Setting range：Value converted from pls to nm
Example):
If the scale resolution is 1 nm at 1,000 pls, it will be N1000
U   Setting range：Value converted from pls to μm
Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1
M   Setting range：Value converted from pls to mm
Example):
If the scale resolution is 1 nm at 1,000 pls, it will be M0.001
*) If the current position is on a straight line with Passing point coordinates and end point coordinates, an arc cannot be specified, so "NG" is replied.

・Example

Arc drawing operation from the current position to the end point coordinates (1st axis +0.08mm, 2nd axis +0.12mm) via the passing point coordinates (1st axis +0.05mm, 2nd axis 2 +0.03mm) at the stage of 1st axis and 2nd axis.

Send	Reply
E:2A0+M0.05+M0.03+M0.08+M0.12	OK or NG

*) In the case of Busy, the motor excitation is OFF or the limit sensor is detected, it will be "NG" and this command cannot be executed.

74)   E:3 command (Arc interpolation 4：Perfect circle helical [Execution buffer])

・Description

This command sets the move axis, rotation direction, and center coordinates of an arc interpolation move (perfect circle) and the move destination coordinates of a linear move axis synchronized with an arc interpolation move. After executing this command, the operation start command "G" or "G:" is always required.

*) The interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed for the axis with the smaller axis number.

*) The distance traveled per pulse must be the same between the interpolation axes.
   If they are different, the correct interpolation operation will not be performed.

・Command format

Send)   E:3adNnmue1mue2muz

・Parameters

Send)   a：Arc axis setting

        A   1st axis and 2nd axis designation

        B   1st axis and 3rd axis designation

        C   2nd axis and 3rd axis designation

    d：Rotation direction setting

        0   CW ROTATION (CLOCKWISE)

        1   CCW ROTATION (COUNTERCLOCKWISE)

    n：Number of rotations   1 ~ 1000

    m：Sign   + or - (If there is no sign, it will be "+")

    u：Unit setting

        P   Designation without unit (pulse)

        N   nanometer designation

        U   micrometer designation

        M   mm designation

c1,c2：Center coordinate setting (relative position from the current position)

(c1：Set value of the axis with a small axis number (X axis))

(c2：Set value of the axis with a large axis number (Y axis))

z：Linear movement amount setting

(movement amount per rotation from the current position)

For example, if the number of rotations is specified as 2 rotations and the linear movement amount setting is 100pls, the total linear movement amount will be 200pls.

*) The axis not set by the arc interpolation axis becomes the linear motion axis.

Center coordinates, Linear destination coordinates　Setting range

P　Setting range：0 ~ 999,999,999 (Unit: pls)

N　Setting range：Value converted from pls to nm

Example):

If the scale resolution is 1 nm at 1,000 pls, it will be N1000

U　Setting range：Value converted from pls to □m

Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1

M　Setting range：Value converted from pls to mm

Example):

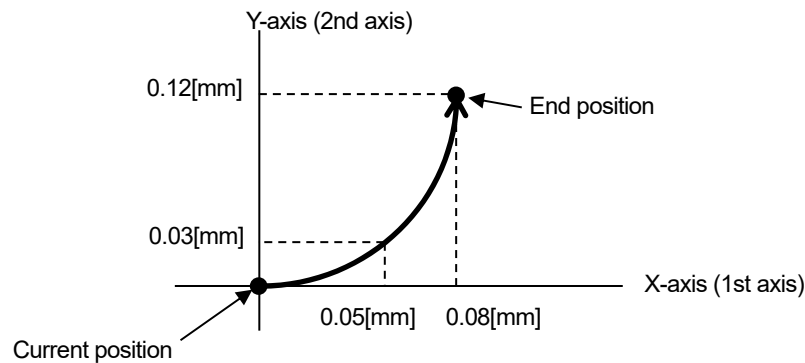If the scale resolution is 1 nm at 1,000 pls, it will be M0.001

・Example

At the stage of the 1st and 2nd axes, the operation of drawing a circle clockwise from the current position to the current position centering on the relative coordinates (1st axis 0pls, 2nd axis 5000pls). Linear operation with relative coordinates (3rd axis 2000pls) synchronized with this as the destination

Send	Reply
E:3A0N1+P0+P5000+P2000	OK or NG

*) In the case of Busy, the motor excitation is OFF or the limit sensor is detected, it will be "NG" and this command cannot be executed.
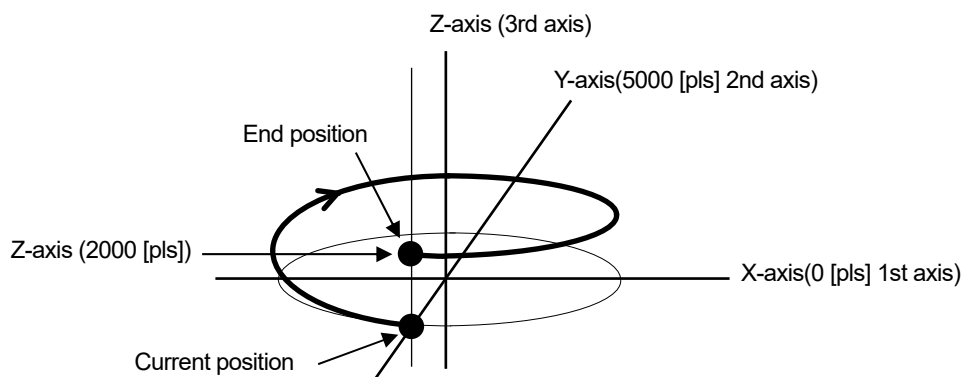
75)   E:4 command (Arc interpolation 5：Angle helical [Execution buffer])
・Description
This command sets the move axis, rotation direction, center coordinates, and end point angle (deg) of an arc interpolation move and the move destination coordinates of a linear move axis synchronized with an arc interpolation move. After executing this command, the operation start command "G" or "G:" is always required.

*) The interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed for the axis with the smaller axis number.

*) An error occurs because the end point coordinates are calculated. Please use it after confirming it with the actual machine.

*) The distance traveled per pulse must be the same between the interpolation axes. If they are different, the correct interpolation operation will not be performed.

・Command format
Send)   E:4admuc1muc2Daemuz
・Parameters
Send)   a：Arc axis setting
   A   1st axis and 2nd axis designation
   B   1st axis and 3rd axis designation
   C   2nd axis and 3rd axis designation
d：Rotation direction setting
   0   CW ROTATION (CLOCKWISE)
   1   CCW ROTATION (COUNTERCLOCKWISE)
m：Sign   + or - (If there is no sign, it will be "+")
u：Unit setting
   P   Designation without unit (pulse)
   N   nanometer designation
   U   micrometer designation
   M   mm designation
c1,c2：Center coordinate setting (relative position from the current position)
   (c1：Set value of the axis with a small axis number (X axis))
   (c2：Set value of the axis with a large axis number (Y axis))
z: Linear movement amount setting
   (Amount of movement from the current position)
   If the angle is less than 360 °, the amount of movement until the angle is moved is 360 ° or more, the amount of movement per rotation. For example, if the linear movement amount is set to 100pls at 540 ° (one and a half rotations), the total linear movement amount will be 150pls.
   *) Since the total linear movement amount is calculated, an error will occur. Please use it after confirming it with the actual machine.
   P   Setting range：0 ~ 999,999,999 (Unit: pls)
   N   Setting range：Value converted from pls to nm
      Example):
      If the scale resolution is 1 nm at 1,000 pls, it will be N1000
   U   Setting range：Value converted from pls to μm
      Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1
   M   Setting range：Value converted from pls to mm
      Example):
      If the scale resolution is 1 nm at 1,000 pls, it will be M0.001

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ae：End point angle (deg) setting　　　Setting range：0°< ae ≦360000°

・Example

On the 1st and 3rd axis stages, an arc is drawn in the CW direction from the current position to the end point angle of 90 ° around the relative position from the current position (1st axis 0pls, 3rd axis + 100pls). A linear operation with the relative coordinates (2nd axis 50pls) synchronized with this as the destination.

Send	Reply
E:4B0+P0+P100D90+P50	OK or NG

*) In the case of Busy, the motor excitation is OFF or the limit sensor is detected, it will be "NG" and this command cannot be executed.
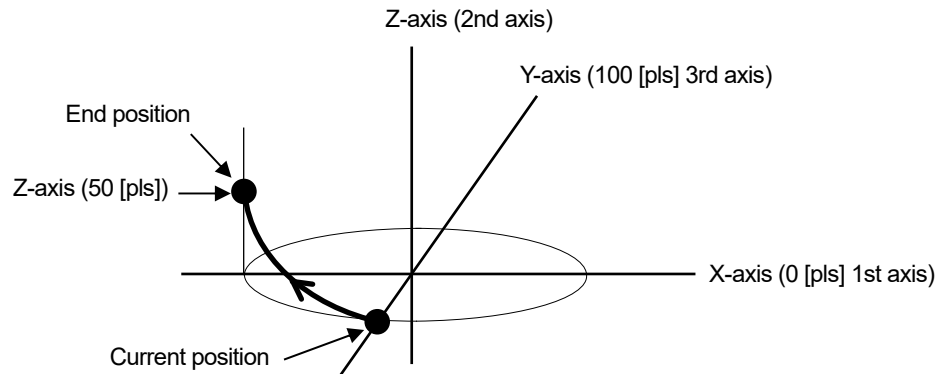
76)　　　E:5 command (Arc interpolation 6：Passing point helical [Execution buffer])

・Description

This command sets the moving axis, passing point coordinates, and end point coordinates of an arc interpolation move and the destination coordinates of a linear move axis synchronized with an arc interpolation move. After executing this command, the operation start command "G" or "G:" is always required.

*) The interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed for the axis with the smaller axis number.

*) An error occurs because the center coordinates are calculated. Please use it after confirming it with the actual machine.

*) The distance traveled per pulse must be the same between the interpolation axes. If they are different, the correct interpolation operation will not be performed.

・Command format

Send)　　E:5admup1mup2mue1mue2muz

・Parameters

Send)　　a：Arc axis setting

　　　A　1st axis and 2nd axis designation

　　　B　1st axis and 3rd axis designation

　　　C　2nd axis and 3rd axis designation

　　m：Sign　+ or - (If there is no sign, it will be "+")

　　u：Unit setting

　　　P　Designation without unit (pulse)

　　　N　nanometer designation

　　　U　micrometer designation

　　　M　mm designation

p1,p2：Passing point coordinate setting
　　　　(relative position from the current position)
　　　　(p1：Set value of the axis with a small axis number (X axis))
　　　　(p2：Set value of the axis with a large axis number (Y axis))
e1,e2：End point coordinate setting
　　　　(relative position from the current position)
　　　　(e1：Set value of the axis with a small axis number (X axis))
　　　　(e2：Set value of the axis with a large axis number (Y axis))
z：Linear movement destination coordinate setting
　　(relative position from the current position)
　　*) The axis not set by the arc interpolation axis becomes the linear motion axis.
　　Passing point coordinates, End point coordinates and
　　Linear destination coordinates　Setting range
　　P　Setting range：0 ~ 999,999,999 (Unit: pls)
　　N　Setting range：Value converted from pls to nm
　　　　Example):
　　　　If the scale resolution is 1 nm at 1,000 pls, it will be N1000
　　U　Setting range：Value converted from pls to □m
　　　　Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1
　　M　Setting range：Value converted from pls to mm
　　　　Example):
　　　　If the scale resolution is 1 nm at 1,000 pls, it will be M0.001
　　*) If the current position is on a straight line with Passing point coordinates and end
　　　point coordinates, an arc cannot be specified, so "NG" is replied.

・Example

From the current position on the 1st and 2nd axis stages, via the passing point coordinates (1st axis-0.05mm, 2nd axis +0.03mm) and the end point coordinates (1st axis-0.08mm, 2nd axis +0.12mm) The action of drawing an arc up to. A linear operation with the relative coordinates (3rd axis + 0.1 mm) synchronized with this as the destination.

Send	Reply
E:5A0-M0.05+M0.03-M0.08+M0.12+M0.1	OK or NG

*) In the case of Busy, the motor excitation is OFF or the limit sensor is detected, it will be "NG" and this command cannot be executed.
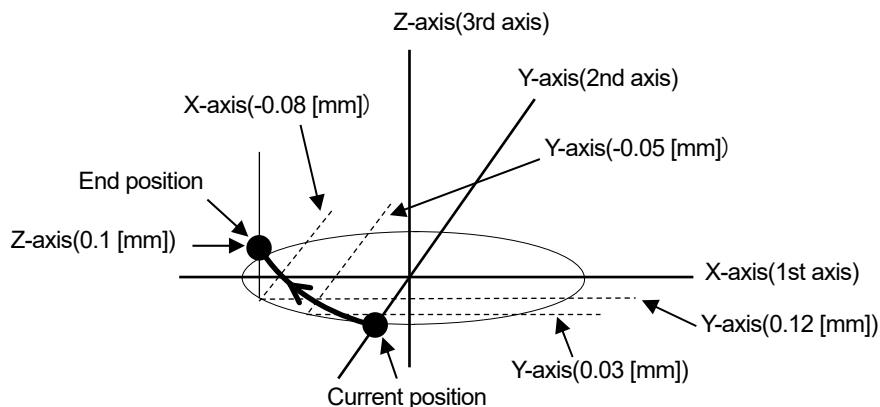
77)   EP:0 command (Arc interpolation 1 : Perfect circle [Prebuffer])

・Description

This is a prebuffer command that sets the axis of movement, direction of rotation, center coordinates, and movement speed for a circular interpolation move (perfect circle). If the operation is set up with this command, a reply will be sent when the operation is completed. The operation start command "G" or "G:" is always required after executing this command.

*) If the speed is not set with this command, the interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed of the axis with the smaller axis number.

*) When the speed is set with this command, the speed setting of the axis with the smaller axis number is rewritten, so it is necessary to set all of the minimum speed (S), maximum speed (F), and acceleration / deceleration time (R).

*) This command can be used with the double buffer function. For details, refer to "2. About double buffer".

*) The distance traveled per pulse must be the same between the interpolation axes. If they are different, the correct interpolation operation will not be performed.

・Command format

Send)   EP:0admuc1muc2,SspdsFspdfRr

・Parameters

Send)   a : Arc axis setting

A   1st axis and 2nd axis designation

B   1st axis and 3rd axis designation

C   2nd axis and 3rd axis designation

d : Rotation direction setting

0   CW rotation (Clockwise)

1   CCW rotation (Counterclockwise)

m : Sign   + or - (If there is no sign, it will be "+")

u : Unit setting

P   Designation without unit

(movement amount pls and operating speed pls/s)

N   nanometer designation

(Movement amount nm and operating speed nm/s)

U   micrometer designation

(Movement amount μm and operating speed μm/s)

M   mm designation

(Movement amount mm and operating speed mm/s)

c1,c2：Center coordinate setting (relative position from the current position)
(c1：Set value of the axis with a small axis number (X axis))
(c2：Set value of the axis with a large axis number (Y axis))
Center coordinates   Setting range
P   Setting range：0 ~ 999,999,999 (Unit: pls)
N   Setting range：Value converted from pls to nm
Example):
If the scale resolution is 1 nm at 1,000 pls, it will be N1000
U   Setting range：Value converted from pls to μm
Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1
M   Setting range：Value converted from pls to mm
Example):
If the scale resolution is 1 nm at 1,000 pls, it will be M0.001

spds：Minimum speed (S) setting   Setting range：1 ~ 1,000,000 pls/s
*) Set only for axes with a small axis number.
spdf：Maximum speed (F) setting   Setting range：1 ~ 1,000,000 pls/s
*) Set only for axes with a small axis number.
*) Please set it to the minimum speed (S) or higher.
r：Acceleration / deceleration time (R) setting
Setting range：1 ~ 1,000 ms
*) Set only for axes with a small axis number.

spds：Minimum speed (S) setting
spdf：Maximum speed (F) setting
No unit specified Setting range: 1 to 1,000,000 (unit: pls / s)
Unit specification N Setting range: Value obtained by converting pls / s to nm
(Example: N1000 when the scale resolution is 1 nm at 1,000 pls / s)
Unit specification U Setting range: Value obtained by converting pls / s to μm
(Example: U1 when the scale resolution is 1 nm at 1,000 pls / s)
Unit specification M Setting range: Value obtained by converting pls / s to mm
(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls / s)
Unit specification D Setting range: Value obtained by converting pls / s to an angle
(Example: D0.001 when the scale resolution is 0.000001° at 1,000 pls / s)
*) Set only for axes with a small axis number.
*) The unit of the axis with the smaller axis number is reflected in the speed setting.
*) The maximum speed should be greater than or equal to the minimum speed.
r：Acceleration / deceleration time setting
Setting range：1 ~ 1,000 ms
*) Set only for axes with a small axis number.

・Example

Operation to draw a circle clockwise from the current position on the 1st and 2nd axis stages to the current position around the relative position from the current position (1st axis 0.05mm, 2nd axis -0.05mm).

Set the minimum speed (S) to 0.5mm / s, the maximum speed (F) to 5mm / s, and the acceleration / deceleration time (R) to 50 ms.

Send	Reply
EP:0A0M0.05-M0.05,S0.5F5R50	OK or OK_D or NG

*) In the case of the motor excitation is OFF or the limit sensor is detected, it will be "NG" and this command cannot be executed.

78)　　EP:1 command (Arc interpolation 8：Angle [Prebuffer])

・Description

This is a prebuffer command that sets the axis of movement, direction of rotation, center coordinates, end point angle (deg), and move speed for a circular interpolation move. If the operation is set up with this command, a reply will be sent when the operation is completed. The operation start command "G" or "G:" is always required after executing this command.

*) If the speed is not set with this command, the interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed of the axis with the smaller axis number.

*) When the speed is set with this command, the speed setting of the axis with the smaller axis number is rewritten, so it is necessary to set all of the minimum speed (S), maximum speed (F), and acceleration / deceleration time (R).

*) This command can be used with the double buffer function.
For details, refer to "2. About double buffer".

*) An error occurs because the end point coordinates are calculated. Please use it after confirming it with the actual machine.

*) The distance traveled per pulse must be the same between the interpolation axes.
If they are different, the correct interpolation operation will not be performed.

・Command format

Send)　　EP:1admuc1muc2Dae,SspdsFspdfRr

・Parameters

Send)　　a：Arc axis setting

　　　　A　1st axis and 2nd axis designation
　　　　B　1st axis and 3rd axis designation
　　　　C　2nd axis and 3rd axis designation

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d：Rotation direction setting
    0　CW rotation (Clockwise)
    1　CCW rotation (Counterclockwise)
m：Sign　+ or - (If there is no sign, it will be "+")
u：Unit setting
    P　Designation without unit
     (movement amount pls and operating speed pls/s)
    N　nanometer designation
     (Movement amount nm and operating speed nm/s)
    U　micrometer designation
     (Movement amount μm and operating speed μm/s)
    M　mm designation
     (Movement amount mm and operating speed mm/s)
c1,c2：Center coordinate setting (relative position from the current position)
    (c1：Set value of the axis with a small axis number (X axis))
    (c2：Set value of the axis with a large axis number (Y axis))
  Center coordinates　Setting range
  P　Setting range：0 ~ 999,999,999 (Unit: pls)
  N　Setting range：Value converted from pls to nm
    Example):
    If the scale resolution is 1 nm at 1,000 pls, it will be N1000
  U　Setting range：Value converted from pls to μm
    Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1
  M　Setting range：Value converted from pls to mm
    Example):
    If the scale resolution is 1 nm at 1,000 pls, it will be M0.001
ae：End point angle (deg) setting　　　Setting range：0°< ae ≦ 360°
spds：Minimum speed (S) setting
spdf：Maximum speed (F) setting
  No unit specified Setting range: 1 to 1,000,000 (unit: pls / s)
  Unit specification N Setting range: Value obtained by converting pls / s to nm
   (Example: N1000 when the scale resolution is 1 nm at 1,000 pls / s)
  Unit specification U Setting range: Value obtained by converting pls / s to μm
   (Example: U1 when the scale resolution is 1 nm at 1,000 pls / s)
  Unit specification M Setting range: Value obtained by converting pls / s to mm
   (Example: M0.001 when the scale resolution is 1 nm at 1,000 pls / s)
  Unit specification D Setting range: Value obtained by converting pls / s to an
  angle
  (Example: D0.001 when the scale resolution is 0.000001° at 1,000 pls / s)
   *) Set only for axes with a small axis number.
   *) The unit of the axis with the smaller axis number is reflected in the speed setting.
   *) The maximum speed should be greater than or equal to the minimum speed.
r：Acceleration / deceleration time setting
  Setting range：1 ~ 1,000 ms
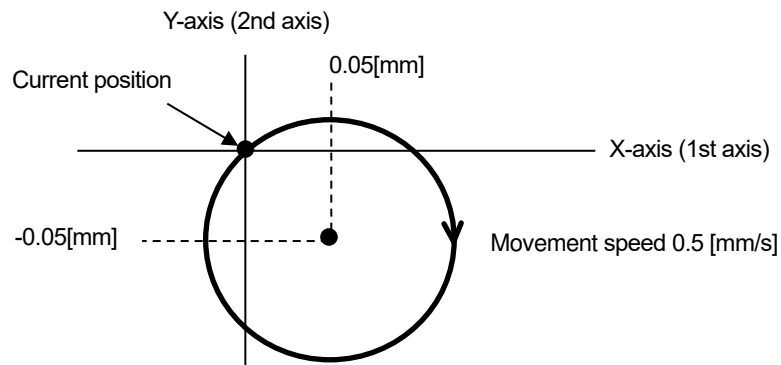   *) Set only for axes with a small axis number.

・Example

On the 1st and 3rd axis stages, an arc is drawn in the CW direction from the current position to the end point angle of 90 ° around the relative position from the current position (1st axis + 100pls, 3rd axis -200pls).

Set the minimum speed (S) to 100 pls / s, the maximum speed (F) to 1000 pls / s, and the acceleration / deceleration time (R) to 50 ms.

Send	Reply
EP:1B0+P100-200D90,S100F1000R50	OK or OK_D or NG

*) In the case of the motor excitation is OFF or the limit sensor is detected, it will be "NG" and this command cannot be executed.
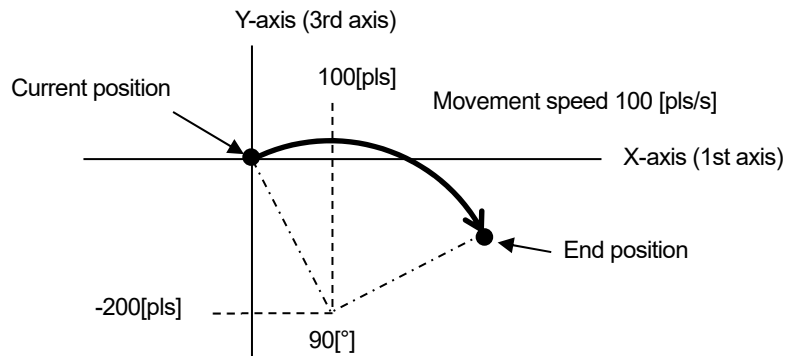
79)　　EP:2 command (Arc interpolation 9 : Passing point indication [Prebuffer])

・Description

This is a pre-buffer command that sets the move axis, passing point coordinates, end point coordinates, and move speed for a circular interpolation move. If the operation is set up with this command, a reply will be sent when the operation is completed.

The operation start command "G" or "G:" is always required after executing this command.

*) If the speed is not set with this command, the interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed of the axis with the smaller axis number.

*) When the speed is set with this command, the speed setting of the axis with the smaller axis number is rewritten, so it is necessary to set all of the minimum speed (S), maximum speed (F), and acceleration / deceleration time (R).

*) This command can be used with the double buffer function.
   For details, refer to "2. About double buffer".

*) An error occurs because the Center coordinates are calculated. Please use it after confirming it with the actual machine.

*) The distance traveled per pulse must be the same between the interpolation axes.
   If they are different, the correct interpolation operation will not be performed.

・Command format

Send)　　EP:2admup1mup2mue1mue2,SspdsFspdfRr

・Parameters

Send)　　a : Arc axis setting

A　1st axis and 2nd axis designation

B　1st axis and 3rd axis designation

C　2nd axis and 3rd axis designation

d：Rotation direction setting
    0 CW rotation (Clockwise)
    1 CCW rotation (Counterclockwise)
m：Sign　+ or - (If there is no sign, it will be "+")
u：Unit setting
    P Designation without unit
       (movement amount pls and operating speed pls/s)
    N nanometer designation
       (Movement amount nm and operating speed nm/s)
    U micrometer designation
       (Movement amount µm and operating speed µm/s)
    M mm designation
       (Movement amount mm and operating speed mm/s)
p1,p2：Passing point coordinate setting
    (relative position from the current position)
    (p1：Set value of the axis with a small axis number (X axis))
    (p2：Set value of the axis with a large axis number (Y axis))
e1,e2：End point coordinate setting
    (relative position from the current position)
    (e1：Set value of the axis with a small axis number (X axis))
    (e2：Set value of the axis with a large axis number (Y axis))
    Passing point coordinates, end point coordinates　Setting range
    P Setting range：0 ~ 999,999,999 (Unit: pls)
    N Setting range：Value converted from pls to nm
       Example):
       If the scale resolution is 1 nm at 1,000 pls, it will be N1000
    U Setting range：Value converted from pls to µm
       Example):
       If the scale resolution is 1 nm at 1,000 pls, it will be U1
    M Setting range：Value converted from pls to mm
       Example):
       If the scale resolution is 1 nm at 1,000 pls, it will be M0.001
spds：Minimum speed (S) setting
spdf：Maximum speed (F) setting
  No unit specified Setting range: 1 to 1,000,000 (unit: pls / s)
  Unit specification N Setting range: Value obtained by converting pls / s to nm
   (Example: N1000 when the scale resolution is 1 nm at 1,000 pls / s)
  Unit specification U Setting range: Value obtained by converting pls / s to µm
   (Example: U1 when the scale resolution is 1 nm at 1,000 pls / s)
  Unit specification M Setting range: Value obtained by converting pls / s to mm
   (Example: M0.001 when the scale resolution is 1 nm at 1,000 pls / s)
  Unit specification D Setting range: Value obtained by converting pls / s to an angle
  (Example: D0.001 when the scale resolution is 0.000001° at 1,000 pls / s)
   *) Set only for axes with a small axis number.
   *) The unit of the axis with the smaller axis number is reflected in the speed setting.
   *) The maximum speed should be greater than or equal to the minimum speed.

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r : Acceleration / deceleration time setting

Setting range : 1 ~ 1,000 ms

*) Set only for axes with a small axis number.

*) If the current position is on a straight line with Passing point coordinates and end point coordinates, an arc cannot be specified, so "NG" is replied.

・Example

Arc drawing operation from the current position to the end point coordinates (1st axis +0.08mm, 2nd axis +0.12mm) via the passing point coordinates (1st axis +0.05mm, 2nd axis 2 +0.03mm) at the stage of 1st axis and 2nd axis.

Set the minimum speed (S) to 0.5mm / s, the maximum speed (F) to 5mm / s, and the acceleration / deceleration time (R) to 50 ms.

Send	Reply
EP:2A0+M0.05+M0.03+M0.08+M0.12,S0.5F5R50	OK or OK_D or NG

*) In the case of the motor excitation is OFF or the limit sensor is detected, it will be "NG" and this command cannot be executed.

80)　　EP:3 command (Arc interpolation 10 : Perfect circle helical [Prebuffer])

・Description

This is a prebuffer command that sets the move axis, rotation direction, center coordinates, and move speed of an arc interpolation move (perfect circle) and the move destination coordinates of a linear move axis synchronized with an arc interpolation move. If the operation is set up with this command, a reply will be sent when the operation is completed. The operation start command "G" or "G:" is always required after executing this command.

*) If the speed is not set with this command, the interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed of the axis with the smaller axis number.

*) When the speed is set with this command, the speed setting of the axis with the smaller axis number is rewritten, so it is necessary to set all of the minimum speed (S), maximum speed (F), and acceleration / deceleration time (R).

*) This command can be used with the double buffer function. For details, refer to "2. About double buffer".

*) The distance traveled per pulse must be the same between the interpolation axes.
If they are different, the correct interpolation operation will not be performed.

・Command format

Send)　　EP:3adNnmuc1muc2muz,SspdsFspdfRr

・Parameters
Send)　a：Arc axis setting
　　　　　A　1st axis and 2nd axis designation
　　　　　B　1st axis and 3rd axis designation
　　　　　C　2nd axis and 3rd axis designation
　　　d：Rotation direction setting
　　　　　0　CW rotation (Clockwise)
　　　　　1　CCW rotation (Counterclockwise)
　　　n：Number of rotations　　　1 ~ 1000
　　　m：Sign　　　　　　　　　　+ or - (If there is no sign, it will be "+")
　　　u：Unit setting
　　　　　P　Designation without unit
　　　　　　 (movement amount pls and operating speed pls/s)
　　　　　N　nanometer designation
　　　　　　 (Movement amount nm and operating speed nm/s)
　　　　　U　micrometer designation
　　　　　　 (Movement amount μm and operating speed μm/s)
　　　　　M　mm designation
　　　　　　 (Movement amount mm and operating speed mm/s)
　　　c1,c2：Center coordinate setting (relative position from the current position)
　　　　　　 (c1：Set value of the axis with a small axis number (X axis))
　　　　　　 (c2：Set value of the axis with a large axis number (Y axis))
　　　z：Linear movement amount setting
　　　　 (movement amount per rotation from the current position)
　　　　 For example, if the number of rotations is specified as 2 rotations and
　　　　 the linear movement amount setting is 100pls, the total linear
　　　　 movement amount will be 200pls.
　　　　 *) The axis not set by the arc interpolation axis becomes the linear motion axis.
　　　　 Center coordinates, Linear destination coordinates　Setting range
　　　　 P　Setting range：0 ~ 999,999,999 (Unit: pls)
　　　　 N　Setting range：Value converted from pls to nm
　　　　　　 Example):
　　　　　　 If the scale resolution is 1 nm at 1,000 pls, it will be N1000
　　　　 U　Setting range：Value converted from pls to μm
　　　　　　 Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1
　　　　 M　Setting range：Value converted from pls to mm
　　　　　　 Example):
　　　　　　 If the scale resolution is 1 nm at 1,000 pls, it will be M0.001

spds：Minimum speed (S) setting

spdf：Maximum speed (F) setting

No unit specified Setting range: 1 to 1,000,000 (unit: pls / s)

Unit specification N Setting range: Value obtained by converting pls / s to nm

(Example: N1000 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification U Setting range: Value obtained by converting pls / s to μm

(Example: U1 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification M Setting range: Value obtained by converting pls / s to mm

(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification D Setting range: Value obtained by converting pls / s to an

angle

(Example: D0.001 when the scale resolution is 0.000001° at 1,000 pls / s)

*) Set only for axes with a small axis number.

*) The unit of the axis with the smaller axis number is reflected in the speed setting.

*) The maximum speed should be greater than or equal to the minimum speed.

r：Acceleration / deceleration time setting

Setting range：1 ~ 1,000 ms

*) Set only for axes with a small axis number.

・Example

At the stage of the 1st and 2nd axes, the operation of drawing a circle clockwise from
the current position to the current position centering on the relative coordinates (1st axis
0pls, 2nd axis 5000pls). Linear operation with relative coordinates (3rd axis 2000pls)
synchronized with this as the destination

Set the minimum speed (S) to 100 pls / s, the maximum speed (F) to 1000 pls / s, and the
acceleration / deceleration time (R) to 50 ms.

Send	Reply
EP:3A0N1+P0+P5000+P2000,S100F1000R50	OK or OK_D or NG

*) In the case of the motor excitation is OFF or the limit sensor is detected, it will be "NG" and this
command cannot be executed.
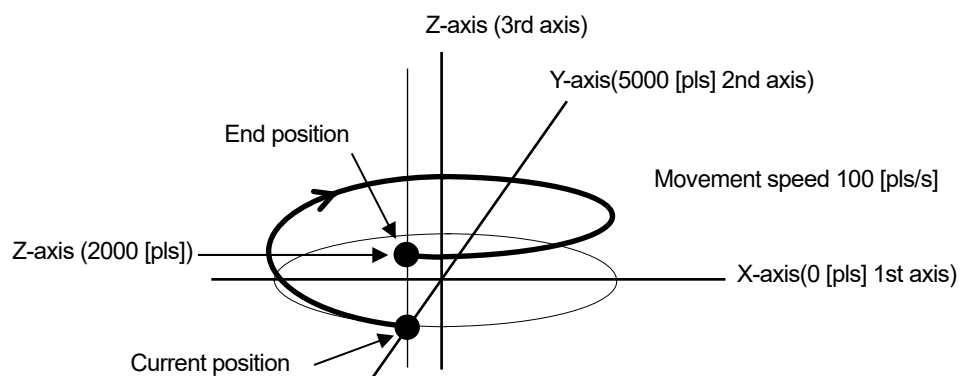
81)　　EP:4 command (Arc interpolation 11：Angular helical [Prebuffer])
　　・Description
　　　　This is a pre-buffer command that sets the move axis, rotation direction, center coordinates, end point angle (deg), and move speed of an arc interpolation move and the move destination coordinates of a linear move axis synchronized with an arc interpolation move. If the operation is set up with this command, a reply will be sent when the operation is completed. The operation start command "G" or "G:" is always required after executing this command.

　　　　*) If the speed is not set with this command, the interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed of the axis with the smaller axis number.

　　　　*) When the speed is set with this command, the speed setting of the axis with the smaller axis number is rewritten, so it is necessary to set all of the minimum speed (S), maximum speed (F), and acceleration / deceleration time (R).

　　　　*) This command can be used with the double buffer function.
　　　　　For details, refer to "2. About double buffer".

　　　　*) An error occurs because the end point coordinates are calculated. Please use it after confirming it with the actual machine.

　　　　*) The distance traveled per pulse must be the same between the interpolation axes.
　　　　　If they are different, the correct interpolation operation will not be performed.

　　・Command format
　　　　Send)　　EP:4admuc1muc2Daemuz ,SspdsFspdfRr
　　・Parameters
　　　　Send)　　a：Arc axis setting
　　　　　　　　　A　1st axis and 2nd axis designation
　　　　　　　　　B　1st axis and 3rd axis designation
　　　　　　　　　C　2nd axis and 3rd axis designation
　　　　　　　　d：Rotation direction setting
　　　　　　　　　0　CW rotation (Clockwise)
　　　　　　　　　1　CCW rotation (Counterclockwise)
　　　　　　　m：Sign　+ or - (If there is no sign, it will be "+")
　　　　　　　u：Unit setting
　　　　　　　　　P　Designation without unit
　　　　　　　　　　(movement amount pls and operating speed pls/s)
　　　　　　　　　N　nanometer designation
　　　　　　　　　　(Movement amount nm and operating speed nm/s)
　　　　　　　　　U　micrometer designation
　　　　　　　　　　(Movement amount μm and operating speed μm/s)
　　　　　　　　　M　mm designation
　　　　　　　　　　(Movement amount mm and operating speed mm/s)
　　　　　c1,c2：Center coordinate setting (relative position from the current position)
　　　　　　　　　(c1：Set value of the axis with a small axis number (X axis))
　　　　　　　　　(c2：Set value of the axis with a large axis number (Y axis))

z: Linear movement amount setting

(Amount of movement from the current position)

If the angle is less than 360 °, the amount of movement until the angle is moved is 360 ° or more, the amount of movement per rotation. For example, if the linear movement amount is set to 100pls at 540 ° (one and a half rotations), the total linear movement amount will be 150pls.

*) Since the total linear movement amount is calculated, an error will occur. Please use it after confirming it with the actual machine.

P　Setting range：0 ~ 999,999,999 (Unit: pls)

N　Setting range：Value converted from pls to nm

Example):

If the scale resolution is 1 nm at 1,000 pls, it will be N1000

U　Setting range：Value converted from pls to µm

Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1

M　Setting range：Value converted from pls to mm

Example):

If the scale resolution is 1 nm at 1,000 pls, it will be M0.001

ae：End point angle (deg) setting　　　Setting range：0°< ae ≦ 360000°

spds：Minimum speed (S) setting

spdf：Maximum speed (F) setting

No unit specified Setting range: 1 to 1,000,000 (unit: pls / s)

Unit specification N Setting range: Value obtained by converting pls / s to nm

(Example: N1000 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification U Setting range: Value obtained by converting pls / s to µm

(Example: U1 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification M Setting range: Value obtained by converting pls / s to mm

(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification D Setting range: Value obtained by converting pls / s to an angle

(Example: D0.001 when the scale resolution is 0.000001° at 1,000 pls / s)

*) Set only for axes with a small axis number.

*) The unit of the axis with the smaller axis number is reflected in the speed setting.

*) The maximum speed should be greater than or equal to the minimum speed.

r：Acceleration / deceleration time setting

Setting range：1 ~ 1,000 ms

*) Set only for axes with a small axis number.

・Example

On the 1st and 3rd axis stages, an arc is drawn in the CW direction from the current position to the end point angle of 90 ° around the relative position from the current position (1st axis 0pls, 3rd axis + 100pls). A linear operation with the relative coordinates (2nd axis 50pls) synchronized with this as the destination. Set the minimum speed (S) to 100 pls / s, the maximum speed (F) to 1000 pls / s, and the acceleration / deceleration time (R) to 50 ms.

Send	Reply
EP:4B0+P0+P100D90+P50,S100F1000R50	OK or OK_D or NG

*) In the case of the motor excitation is OFF or the limit sensor is detected, it will be "NG" and this command cannot be executed.
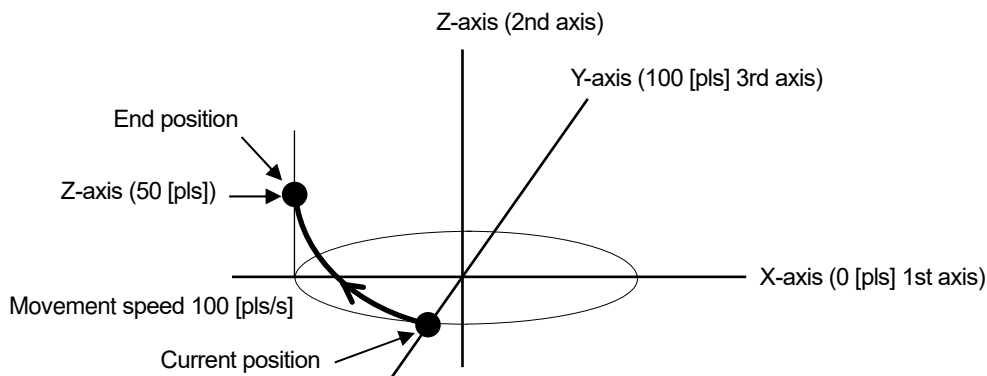
82)   EP:5 command (Arc interpolation 12 : Passing point indication helical [Prebuffer])
・Description

This is a pre-buffer command to set the moving axis of arc interpolation move, passing point coordinates, end point coordinates, moving speed, and moving destination coordinates of the linear move axis synchronized with the arc interpolation move. If the operation is set up with this command, a reply will be sent when the operation is completed. The operation start command "G" or "G:" is always required after executing this command.

*) If the speed is not set with this command, the interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed of the axis with the smaller axis number.

*) When the speed is set with this command, the speed setting of the axis with the smaller axis number is rewritten, so it is necessary to set all of the minimum speed (S), maximum speed (F), and acceleration / deceleration time (R).

*) This command can be used with the double buffer function.
For details, refer to "2. About double buffer".

*) An error occurs because the center coordinates are calculated. Please use it after confirming it with the actual machine.

*) The distance traveled per pulse must be the same between the interpolation axes.
If they are different, the correct interpolation operation will not be performed.

・Command format
Send)   EP:5admup1mup2mue1mue2muz,SspdsFspdfRr

・Parameters

Send)　　a：Arc axis setting

　　A　1st axis and 2nd axis designation

　　B　1st axis and 3rd axis designation

　　C　2nd axis and 3rd axis designation

d：Rotation direction setting

　　0　CW rotation (Clockwise)

　　1　CCW rotation (Counterclockwise)

m：Sign　+ or - (If there is no sign, it will be "+")

u：Unit setting

　　P　Designation without unit

　　　(movement amount pls and operating speed pls/s)

　　N　nanometer designation

　　　(Movement amount nm and operating speed nm/s)

　　U　micrometer designation

　　　(Movement amount µm and operating speed µm/s)

　　M　mm designation

　　　(Movement amount mm and operating speed mm/s)

p1,p2：Passing point coordinate setting

　　(relative position from the current position)

　　(p1：Set value of the axis with a small axis number (X axis))

　　(p2：Set value of the axis with a large axis number (Y axis))

e1,e2：End point coordinate setting

　　(relative position from the current position)

　　(e1：Set value of the axis with a small axis number (X axis))

　　(e2：Set value of the axis with a large axis number (Y axis))

z：Linear movement destination coordinate setting

　(relative position from the current position)

　*) The axis not set by the arc interpolation axis becomes the linear motion axis.

　Passing point coordinates, end point coordinates, and

　Linear destination coordinates　Setting range

　P　Setting range：0 ~ 999,999,999 (Unit: pls)

　N　Setting range：Value converted from pls to nm

　　　Example):

　　　If the scale resolution is 1 nm at 1,000 pls, it will be N1000

　U　Setting range：Value converted from pls to µm

　　　Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1

　M　Setting range：Value converted from pls to mm

　　　Example):

　　　If the scale resolution is 1 nm at 1,000 pls, it will be M0.001

spds：Minimum speed (S) setting

spdf：Maximum speed (F) setting

No unit specified Setting range: 1 to 1,000,000 (unit: pls / s)

Unit specification N Setting range: Value obtained by converting pls / s to nm

(Example: N1000 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification U Setting range: Value obtained by converting pls / s to μm

(Example: U1 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification M Setting range: Value obtained by converting pls / s to mm

(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification D Setting range: Value obtained by converting pls / s to an angle

(Example: D0.001 when the scale resolution is 0.000001° at 1,000 pls / s)

*) Set only for axes with a small axis number.

*) The unit of the axis with the smaller axis number is reflected in the speed setting.

*) The maximum speed should be greater than or equal to the minimum speed.

r：Acceleration / deceleration time setting

Setting range：1 ~ 1,000 ms

*) Set only for axes with a small axis number.

*) If the current position is on a straight line with Passing point coordinates and end point coordinates, an arc cannot be specified, so "NG" is replied.

・Example

From the current position on the 1st and 2nd axis stages, via the passing point coordinates (1st axis-0.05mm, 2nd axis +0.03mm) and the end point coordinates (1st axis-0.08mm, 2nd axis +0.12mm) The action of drawing an arc up to. A linear operation with the relative coordinates (3rd axis + 0.1 mm) synchronized with this as the destination. Set the minimum speed (S) to 0.5mm / s, the maximum speed (F) to 5mm / s, and the acceleration / deceleration time (R) to 50 ms.

Send	Reply
EP:5A0-M0.05+M0.03-M0.08+M0.12+M0.1,S0.5F5R50	OK or OK_D or NG

*) In the case of the motor excitation is OFF or the limit sensor is detected, it will be "NG" and this command cannot be executed.
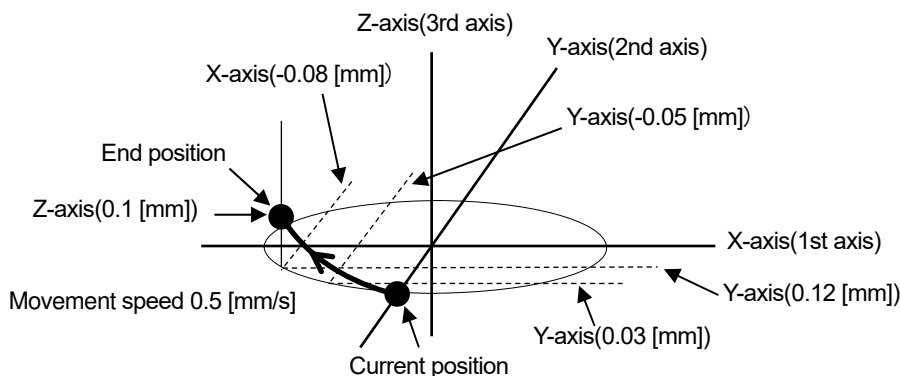
83)　　K: command (Linear interpolation 1 : [Execution buffer])
　　・Description

　　　　This command sets the move axis, move direction, and relative move amount for a linear interpolation move. After executing this command, the operation start command "G" or "G:" is always required.

　　　　*) The interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed for the axis with the smaller axis number.

　　　　*) The distance traveled per pulse must be the same between the interpolation axes.
　　　　　If they are different, the correct interpolation operation will not be performed.

　　・Command format
　　　　Send)　K:amuy

　　・Parameters
　　　　Send)　a：Axis setting
　　　　　　　A　1st axis and 2nd axis designation
　　　　　　　B　1st axis and 3rd axis designation
　　　　　　　C　2nd axis and 3rd axis designation
　　　　　　　D　1st axis, 2nd axis and 3rd axis designation
　　　　　　m：Sign　+ or - (If there is no sign, it will be "+")
　　　　　　u：Unit setting
　　　　　　　P　Designation without unit (pulse)
　　　　　　　N　nanometer designation
　　　　　　　U　micrometer designation
　　　　　　　M　mm designation
　　　　　　y：Moving distance
　　　　　　　P　Setting range：0 ~ 999,999,999 (Unit: pls)
　　　　　　　N　Setting range：Value converted from pls to nm
　　　　　　　　Example):
　　　　　　　　If the scale resolution is 1 nm at 1,000 pls, it will be N1000
　　　　　　　U　Setting range：Value converted from pls to μm
　　　　　　　　Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1
　　　　　　　M　Setting range：Value converted from pls to mm
　　　　　　　　Example):
　　　　　　　　If the scale resolution is 1 nm at 1,000 pls, it will be M0.001

　・Example

Send	Reply	Contents
K:A+P1000+P200	OK or NG	1000 pulse movement setting in the 1st axis + direction, 2000 pulse movement setting in the 2nd axis + direction
K:D+U1000+P200+M0.3	OK or NG	1st axis + direction 1000μm, 2nd axis + direction 200pls, 3rd axis + direction 0.3mm movement setting

*) In the case of Busy, the motor excitation is OFF or the limit sensor is detected, it will be "NG" and this command cannot be executed.

84) KP: command (Linear Interpolation 2：[Prebuffer])
・Description
This is a pre-buffer command that sets the move axis, move direction, and relative move amount for a linear interpolation move. If the operation is set up with this command, a reply will be sent when the operation is completed.
The operation start command "G" or "G:" is always required after executing this command.

*) If the speed is not set with this command, the interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed of the axis with the smaller axis number.

*) When the speed is set with this command, the speed setting of the axis with the smaller axis number is rewritten, so it is necessary to set all of the minimum speed (S), maximum speed (F), and acceleration / deceleration time (R).

*) This command can be used with the double buffer function.
For details, refer to "2. About double buffer".

*) The distance traveled per pulse must be the same between the interpolation axes.
If they are different, the correct interpolation operation will not be performed.

・Command format
Send) KP:amuy, spds,spdf,r

・Parameters
Send) a：Axis setting
A 1st axis and 2nd axis designation
B 1st axis and 3rd axis designation
C 2nd axis and 3rd axis designation
D 1st axis, 2nd axis and 3rd axis designation
m：Sign ＋ or - (If there is no sign, it will be "+")
u：Unit setting
P Designation without unit (pulse)
N nanometer designation
U micrometer designation
M mm designation
D degree designation
y：Moving distance
P Setting range：0 ~ 999,999,999 (Unit: pls)
N Setting range：Value converted from pls to nm
Example):
If the scale resolution is 1 nm at 1,000 pls, it will be N1000
U Setting range：Value converted from pls to μm
Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1
M Setting range：Value converted from pls to mm
Example):
If the scale resolution is 1 nm at 1,000 pls, it will be M0.001

spds：Minimum speed (S) setting

spdf：Maximum speed (F) setting

No unit specified Setting range: 1 to 1,000,000 (unit: pls / s)

Unit specification N Setting range: Value obtained by converting pls / s to nm

(Example: N1000 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification U Setting range: Value obtained by converting pls / s to μm

(Example: U1 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification M Setting range: Value obtained by converting pls / s to mm

(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification D Setting range: Value obtained by converting pls / s to an

angle

(Example: D0.001 when the scale resolution is 0.000001° at 1,000 pls / s)

*) Set only for axes with a small axis number.

*) The unit of the axis with the smaller axis number is reflected in the speed setting.

*) The maximum speed should be greater than or equal to the minimum speed.

r：Acceleration / deceleration time setting

Setting range：1 ~ 1,000 ms

*) Set only for axes with a small axis number.

・Example

Send	Reply	Contents
KP:A+P1000+P200 ,S100F1000R200	OK or OK_D or NG	1000 pulse movement setting in the 1st axis + direction and 200 pulse movement setting in the 2nd axis + direction, the operating speed is 100 pls / s.
KP:D+U1000+P200+M0.3 ,S100F1000R200	OK or OK_D or NG	1000μm movement setting in the 1st axis + direction and 200 pulse movement setting in the 2nd axis + direction, 0.3mm movement setting in the 3rd axis + direction, the operating speed is 100 μm/ s.

*) In the case of the motor excitation is OFF or the limit sensor is detected, it will be "NG" and this command cannot be executed.

85)   G command (Start operation 1)

・Description

After sending the "M:", "MP:", "A:", "AP:", "E:", "EP:", "K:", "KP:" commands, this command is used to specify all controllable axes and start the operation.

・Command format

Send)   G

・Example

Example of operation settings	Send	Reply	Reply after positioning is completed
M:1+P10	G	OK or NG	
MP:A+P10+P20	G	OK or NG	1 2 *) Operation completed in the order of 1st axis, 2nd axis

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

86)   G: command (Start operation 2)
    ・Description
        After sending the "M:", "MP:", "A:", "AP:", "E:", "EP:", "K:" and "KP:" commands, this
        command is used to start operation.
    ・Command format
        Send)   G:a
    ・Parameters
        Send)   a : Axis setting
                1   1st axis designation
                2   2nd axis designation
                3   3rd axis designation
                A   1st axis and 2nd axis designation
                B   1st axis and 3rd axis designation
                C   2nd axis and 3rd axis designation
                D   1st axis, 2nd axis and 3rd axis designation
                W   Specify all controllable axes
                Not specified   Specify all controllable axes
    ・Example

Example of operation settings	Send	Reply	Reply after positioning is completed	Contents
M:1+P10	G:1	OK or NG		1st axis designation
M:A+P10+P20	G:A	OK or NG		1st axis and 2nd axis designation
M:B+P10+P30	G:B	OK or NG		1st axis and 3rd axis designation
M:W+P10+P20+P30	G:W	OK or NG		Specify all controllable axes
M:W+P10+P20+P30	G:	OK or NG		Specify all controllable axes
MP:1+P10	G:1	OK or NG	1	1st axis designation
MP:A+P10+P20	G:A	OK or NG	1 2 *) Operation completed in the order of 1st axis, 2nd axis	1st axis and 2nd axis designation

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

87)   GC: command (Delete operation setting value)
    ・Description
        Deletes the values set by the "M:", "A:", "E:", and "K:" commands.
    ・Command format
        Send)   GC:a

・Parameters

    Send)   a : Axis setting

        1   1st axis designation

        2   2nd axis designation

        3   3rd axis designation

        A   1st axis and 2nd axis designation

        B   1st axis and 3rd axis designation

        C   2nd axis and 3rd axis designation

        D   1st axis, 2nd axis and 3rd axis designation

        W   Specify all controllable axes

        Not specified   Specify all controllable axes

・Example

Send	Reply	Contents
GC:1	OK or NG	Delete the 1st axis
GC:A	OK or NG	Delete the 1st and 2nd axis
GC:B	OK or NG	Deleted the 1st and 3rd axes
GC:W	OK or NG	Delete all controllable axes
GC:	OK or NG	Delete all controllable axes

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

88)   J: command (Jog driving operation 1)

・Description

This command drives the stage continuously at the minimum speed (S) (constant speed drive).

To stop, send the stop command "L:". It also stops when the limit sensor is detected. The operation start command "G" or "G:" is always required after executing this command.

・Command format

    Send)   J:am

・Parameters

    Send)   a : Axis setting

        1   1st axis designation

        2   2nd axis designation

        3   3rd axis designation

        A   1st axis and 2nd axis designation

        B   1st axis and 3rd axis designation

        C   2nd axis and 3rd axis designation

        D   1st axis, 2nd axis and 3rd axis designation

        W   Specify all controllable axes

       m : Sign   + or - (If there is no sign, it will be "+")

・Example

Send	Reply	Contents
J:1+	OK or NG	1st axis + direction
J:A+-	OK or NG	1st axis + direction, 2nd axis-direction
J:B++	OK or NG	1st axis + direction, 3rd axis + direction
J:W+-+	OK or NG	The Controllable axis is 3 axes, 1st axis + direction, 2nd axis-direction, 3rd axis + direction

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

89)　　D: command (Speed setting)
・Description
Sets the stage operating speed. When the power is turned on, the minimum speed (S), maximum speed (F), and acceleration/deceleration time (R) are initially set according to the speed number set by the memory switch "SPEED"-"SPEED SEL" setting.
・Command format
Send)　D:aSspdsFspdfRr
・Parameters
Send)　a : Axis setting
1　1st axis designation
2　2nd axis designation
3　3rd axis designation
A　1st axis and 2nd axis designation
B　1st axis and 3rd axis designation
C　2nd axis and 3rd axis designation
D　1st axis, 2nd axis and 3rd axis designation
W　Specify all controllable axes

spds : Minimum speed (S) setting　　Setting range : 1 ~ 1,000,000 pls/s
spdf : Maximum speed (F) setting　　Setting range : 1 ~ 1,000,000 pls/s

*) Please set it to the minimum speed (S) or higher.

r : Acceleration / deceleration time (R) setting

Setting range : 1 ~ 1,000 ms

・Example 1

Send	Reply	Contents
D:1S100F1000R100	OK or NG	The operating speed of the first axis is the minimum speed (S) 100pls / s, the maximum speed (F) 1000pls / s, acceleration / deceleration time (R) 100ms.
D:AS100F1000R100 S200F2000R200	OK or NG	・The operating speed of the first axis is minimum speed (S) 100pls / s, maximum speed (F) 1000pls / s, acceleration / deceleration time (R) 100ms. ・The operating speed of the second axis is minimum speed (S) 200pls / s, maximum speed (F) 2000pls / s, acceleration / deceleration time (R) 200ms.

*) In the case of Busy, it will be "NG" and this command cannot be executed.

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・Example 2

Send	Reply	Contents
D:WS100F1000R100 S200F2000R200 S300F3000R200	OK or NG	here are 3 controllable axes, ・ The operating speed of the first axis is minimum speed (S) 100pls / s, maximum speed (F) 1000pls / s, acceleration / deceleration time (R) 100ms. ・ The operating speed of the second axis is minimum speed (S) 200pls / s, maximum speed (F) 2000pls / s, acceleration / deceleration time (R) 200ms. ・ The operating speed of the 3rd axis is minimum speed (S) 300pls / s, maximum speed (F) 3000pls / s, acceleration / deceleration time (R) 200ms.

*) In the case of Busy, it will be "NG" and this command cannot be executed.

90)   DS: command (Minimum speed setting)

・Description

Sets the minimum speed (S) of the stage. When the power is turned on, the minimum speed (S) is initially set to the speed number based on the "SPEED" - "SPEED SEL" setting of the memory switch.

・Command format

Send)   DS:auspd

・Parameters

Send)   a : Axis setting

1   1st axis designation

2   2nd axis designation

3   3rd axis designation

A   1st axis and 2nd axis designation

B   1st axis and 3rd axis designation

C   2nd axis and 3rd axis designation

D   1st axis, 2nd axis and 3rd axis designation

W   Specify all controllable axes

u : Unit setting

F   Designation without unit (pulse)

N   nanometer designation

U   micrometer designation

M   mm designation

D   degree designation

spd：Operating speed

　F　Setting range：1 ~ 1,000,000(Unit: pls/s)

　N　Setting range：Value converted from pls to nm

　　　Example):

　　　If the scale resolution is 1 nm at 1,000 pls/s, it will be N1000

　U　Setting range：Value converted from pls to μm

　　　Example):

　　　If the scale resolution is 1 nm at 1,000 pls/s, it will be U1

　M　Setting range：Value converted from pls to mm

　　　Example):

　　　If the scale resolution is 1 nm at 1,000 pls/s, it will be M0.001

　D　Setting range：Value converted from pls to angle

　　　Example):

　　　If the scale resolution is 0.000001° at 1,000 pls/s, it will be D0.001

・Example

Send	Reply	Contents
DS:1F100	OK or NG	Minimum speed (S) of the first axis is 100 pls/s
DS:AF100F200	OK or NG	The minimum speed (S) of the 1st axis is 100 pls / s, and the minimum speed (S) of the 2nd axis is 200 pls / s.
DS:BF100F300	OK or NG	The minimum speed (S) of the 1st axis is 100 pls / s, and the minimum speed (S) of the 3rd axis is 300 pls / s.
DS:WM0.001M0.002M0.003	OK or NG	The controllable axis is 3 axes, the minimum speed (S) of the 1st axis is 100 pls / s, the minimum speed (S) of the 2nd axis is 200 pls / s, and the minimum speed (S) of the 3rd axis is 300 pls / s.

*) In the case of Busy, it will be "NG" and this command cannot be executed.

91)　　DF: command (Maximum speed setting)

・Description

Sets the maximum speed (F) of the stage. When the power is turned on, the maximum speed (F) of the speed number by the "SPEED" - "SPEED SEL" setting of the memory switch is initially set.

・Command format

Send)　DF:auspd

・Parameters

Send)　a：Axis setting

　1　1st axis designation

　2　2nd axis designation

　3　3rd axis designation

　A　1st axis and 2nd axis designation

　B　1st axis and 3rd axis designation

　C　2nd axis and 3rd axis designation

　D　1st axis, 2nd axis and 3rd axis designation

　W　Specify all controllable axes

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u：Unit setting

    F   Designation without unit (pulse)

    N   nanometer designation

    U   micrometer designation

    M   mm designation

    D   degree designation

spd：Operating speed

    F   Setting range：1 ~ 1,000,000(Unit: pls/s)

    N   Setting range：Value converted from pls to nm

        Example):

        If the scale resolution is 1 nm at 1,000 pls/s, it will be N1000

    U   Setting range：Value converted from pls to μm

        Example):

        If the scale resolution is 1 nm at 1,000 pls/s, it will be U1

    M   Setting range：Value converted from pls to mm

        Example):

        If the scale resolution is 1 nm at 1,000 pls/s, it will be M0.001

    D   Setting range：Value converted from pls to angle

        Example):

        If the scale resolution is 0.000001° at 1,000 pls/s, it will be D0.001

・Example

Send	Reply	Contents
DF:1F1000	OK or NG	Maximum speed (S) of the 1st axis is 1000 pls/s
DF:AF1000F2000	OK or NG	The maximum speed (S) of the 1st axis is 1000 pls / s, and the maximum speed (S) of the 2nd axis is 2000 pls / s.
DF:BF1000F3000	OK or NG	The maximum speed (S) of the 1st axis is 1000 pls / s, and the maximum speed (S) of the 3rd axis is 3000 pls / s.
DF:WF1000F2000F3000	OK or NG	The controllable axis is 3 axes, the maximum speed (S) of the 1st axis is 1000 pls / s, the maximum speed (S) of the 2nd axis is 2000 pls / s, and the maximum speed (S) of the 3rd axis is 3000 pls / s.
DF:WM0.01M0.02M0.03	OK or NG	The controllable axis is 3 axes, the maximum speed (S) of the 1st axis is 0.01mm / s, the maximum speed (S) of the 2nd axis is 0.02mm / s, and the maximum speed (S) of the 3rd axis is 0.01mm / s.

*) In the case of Busy, it will be "NG" and this command cannot be executed.

92)   DR: command (Acceleration / deceleration setting)

・Description

Sets the acceleration/deceleration time (R) of the stage. When the power is turned on, the acceleration/deceleration time (R) of the speed number set by the "SPEED" - "SPEED SEL" setting of the memory switch is initially set.

・Command format
    Send)   DR:a r
・Parameters
    Send)   a : Axis setting
                1   1st axis designation
                2   2nd axis designation
                3   3rd axis designation
                A   1st axis and 2nd axis designation
                B   1st axis and 3rd axis designation
                C   2nd axis and 3rd axis designation
                D   1st axis, 2nd axis and 3rd axis designation
                W   Specify all controllable axes
            r : Acceleration / deceleration time (R) setting   1 ~ 1000 (Unit: ms)
・Example

Send	Reply	Contents
DR:1 50	OK or NG	Acceleration / deceleration time (R) of the 1st axis is 50ms
DR:A 50,100	OK or NG	The acceleration / deceleration time (R) of the 1st axis is 50 ms, and the acceleration / deceleration time (R) of the 2nd axis is 100 ms.
DR:W 50,100,150	OK or NG	The controllable axis is 3 axes, the acceleration / deceleration time (R) of the 1st axis is 50ms, the acceleration / deceleration time (R) of the 2nd axis is 100ms, and the acceleration / deceleration time (R) of the 3rd axis is 150ms.

*) In the case of Busy, it will be "NG" and this command cannot be executed.

93)   JD: command (Setting for speed override during jog operation)
    ・Description
        Change the operating speed while operating with the "J:" command.
        *) At the end of the "J:" command operation, the maximum speed set by the "D:"
            command is overwritten.
    ・Command format
        Send)   JD:auspd
    ・Parameters
        Send)   a : Axis setting
                    1   1st axis designation
                    2   2nd axis designation
                    3   3rd axis designation
                    A   1st axis and 2nd axis designation
                    B   1st axis and 3rd axis designation
                    C   2nd axis and 3rd axis designation
                    D   1st axis, 2nd axis and 3rd axis designation
                    W   Specify all controllable axes

u ： Unit setting

    F   Designation without unit (pulse)

    N   nanometer designation

    U   micrometer designation

    M   mm designation

    D   degree designation

spd ： Operating speed

    F   Setting range ： 1 ~ 1,000,000(Unit: pls/s)

    N   Setting range ： Value converted from pls to nm

       Example):

       If the scale resolution is 1 nm at 1,000 pls/s, it will be N1000

    U   Setting range ： Value converted from pls to μm

       Example):

       If the scale resolution is 1 nm at 1,000 pls/s, it will be U1

    M   Setting range ： Value converted from pls to mm

       Example):

       If the scale resolution is 1 nm at 1,000 pls/s, it will be M0.001

    D   Setting range ： Value converted from pls to angle

       Example):

       If the scale resolution is 0.000001° at 1,000 pls/s, it will be D0.001

・Example

Send	Reply		Contents
JD:1F1000	OK	or	Changed the operating speed of the 1st axis to
	NG		1000pls / s
JD:AF1000F2000	OK	or	Changed the operating speed of the 1st axis to
	NG		1000pls / s and the operating speed of the 2nd axis to 2000pls / s.
JD:BF1000F3000	OK	or	Changed the operating speed of the 1st axis to
	NG		1000pls / s and the operating speed of the 3rd axis to 3000pls / s.
JD:WM0.01M0.02M0.03	OK	or	The controllable axis is 3 axes, the operating
	NG		speed of the 1st axis is changed to 0.01.mm / s, the operating speed of the 2nd axis is changed to 0.02 mm / s, and the operating speed of the 3rd axis is changed to 0.03 mm / s.

*) It can be used only during operation with the "J:" command.

94)   B: command (Origin return speed setting)

   ・Description

      Set the home origin return speed of the stage. When the power is turned on, the "ORG (S)", "ORG (F)", and "ORG (R)" of the memory switch "ORG" are initially set.

   ・Command format

      Send)   B:aSspdsFspdfRr

・Parameters

Send)   a : Axis setting

    1   1st axis designation

    2   2nd axis designation

    3   3rd axis designation

    A   1st axis and 2nd axis designation

    B   1st axis and 3rd axis designation

    C   2nd axis and 3rd axis designation

    D   1st axis, 2nd axis and 3rd axis designation

    W   Specify all controllable axes

spds : Minimum speed (S) setting   Setting range : 1 ~ 1,000,000 pls/s

spdf : Maximum speed (F) setting   Setting range : 1 ~ 1,000,000 pls/s

*) Please set it to the minimum speed (S) or higher

r : Acceleration / deceleration time (R) setting

Setting range : 1 ~ 1,000 ms

・Example 1

Send	Reply	Contents
B:1S100F1000R100	OK or NG	The origin return speed of the 1st axis is the minimum speed (S) 100pls / s, the maximum speed (F) 1000pls / s, and the acceleration / deceleration time (R) 100ms.
B:AS100F1000R100 S200F2000R200	OK or NG	・The origin return speed of the 1st axis is the minimum speed (S) 100pls / s, the maximum speed (F) 1000pls / s, and the acceleration / deceleration time (R) 100ms. ・The origin return speed of the 2nd axis is the minimum speed (S) 200pls / s, the maximum speed (F) 2000pls / s, and the acceleration / deceleration time (R) 200ms.
B:BS100F1000R100 S300F3000R200	OK or NG	・The origin return speed of the 1st axis is the minimum speed (S) 100pls / s, the maximum speed (F) 1000pls / s, and the acceleration / deceleration time (R) 100ms. ・The origin return speed of the 3rd axis is the minimum speed (S) 300pls / s, the maximum speed (F) 3000pls / s, and the acceleration / deceleration time (R) 200ms.

*) In the case of Busy, it will be "NG" and this command cannot be executed.

・Example 2

Send	Reply	Contents
B:WS100F1000R100 S200F2000R200 S300F3000R200	OK or NG	The controllable axis is 3 axes, ・The origin return speed of the 1st axis is the minimum speed (S) 100pls / s, the maximum speed (F) 1000pls / s, and the acceleration / deceleration time (R) 100ms. ・The origin return speed of the 2nd axis is the minimum speed (S) 200pls / s, the maximum speed (F) 2000pls / s, and the acceleration / deceleration time (R) 200ms. ・The origin return speed of the 3rd axis is the minimum speed (S) 300pls / s, the maximum speed (F) 3000pls / s, and the acceleration / deceleration time (R) 200ms.

*) In the case of Busy, it will be "NG" and this command cannot be executed.

95)   I: command (General-purpose IO input confirmation)
　　・Description
　　　　Check the input status of general-purpose input.
　　・Command format
　　　　Send)   I:
　　　　Reply)   i
　　・Parameters
　　　　Reply)   i : General-purpose input signal state   0 ~ 63
　　・General-purpose input signal status (Blanks are OFF)

Set value	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																

Set value	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																

Set value	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
IN1		ON		ON		ON		ON		ON		ON			ON	
IN2			ON	ON			ON	ON			ON	ON				ON
IN3					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

Set value	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
IN1		ON		ON		ON		ON		ON		ON		ON	O	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

・Example

Send	Reply	Contents
I:	16	Only general-purpose input IN5 is ON

96)　　O: command (General-purpose IO output command)
　・Description
　　　Set the general-purpose output status.
　・Command format
　　　Send)　O:s
　・Parameters
　　　Send)　s：General purpose output signal state　　0 ~ 63
・General-purpose output status (Blanks are OFF)

Set value	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																

Set value	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																

Set value	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

Set value	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

*) The output state is maintained until the next "O:" command is sent.

・Example

Send	Reply	Contents
O:32	OK or NG	Only OUT6 is ON

97) T:T command (Trigger output 1 : Timer value specified)
・Description
Specifies the trigger time interval to output the trigger.
・Command format
Send) T:Ta
・Parameters
Send) a : Timer value   Setting range : 1 ~ 10000
(0.01 ~ 100.00 sec)

・Example

Send	Reply	Contents
T:T100	OK or NG	Pulse output every second

*) In the case of Busy, it will be "NG" and this command cannot be executed.

98)　　T:P command (Trigger output 2：Pulse value specified)

・Description

Drive pulse Specify the target axis for trigger output and the trigger pulse interval for the drive pulse.

*) When executing the command, set the operating speed of the automatic stage to 56 kpps or less. (Trigger may not be output if operated at 56kpps or higher.)

・Command format

Send)　　T:PaPb

・Parameters

Send)　　a：Axis setting　　1 or 2 or 3
　　　　　b：Pulse value　　2 ~ 30000

・Example

Send	Reply	Contents
T:P2P5	OK or NG	2nd axis outputs a pulse every 5 pulse movements

*) In the case of Busy, it will be "NG" and this command cannot be executed.

99)　　T:S command (Trigger output 3：Pulse output prohibited)

・Description

Prohibits trigger output.

・Command format

Send)　　T:S

・Example

Send	Reply
T:S	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

100)　　T:M command (Trigger output 4：One-shot trigger output)

・Description

Outputs a one-shot trigger.

・Command format

Send)　　T:M

・Example

Send	Reply
T:M	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

101)　T:E command (Trigger output 5: Scale pulse value specified)
・Description
　　Specifies the target axis for trigger output and the trigger pulse interval for scale pulses.

　　*) When executing the command, set the operating speed of the automatic stage to 56 kpps or less.
　　　(Trigger may not be output if operated at 56kpps or higher.)

・Command format
　　Send)　T:EaPmb
・Parameters
　　Send)　a : Axis setting　　1 or 2 or 3
　　　　　m : Sign setting　　+ or- (Sign cannot be omitted)
　　　　　b : Pulse value　　2 ~ 30000
・Example

Send	Reply	Contents
T:E1P+2	OK or NG	Pulse output every 2 pulse movements in the + direction on the 1st axis

*) In the case of Busy, it will be "NG" and this command cannot be executed.

*) Even if the trigger returns in the reverse direction due to vibration, etc., it will not output a duplicate trigger.

102)　P:R command (Program 1 : Program mode transition)
・Description
　　Moves to program mode.
・Command format
　　Send)　P:R
・Example

Send	Reply
P:R	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

・Commands available in program mode

*IDN?	!:	!:S	Q:	Q:S	SRQ:	SRQ:S	?:
L:E	BEC:	P:H	P:P	P:S	P:O	P:E	P:U
P:C	P:T	P:ON					

103)　P:H command (Program 2 : Transition to host mode)
・Description
　　Return to host mode.
・Command format
　　Send)　P:H

・Example

Send	Reply
P:H	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

104)   P:P command (Program 3：Program number designation)
   ・Description
      Specify the program number.
   ・Command format
      Send)   P:Pp
   ・Parameters
      Send)   p：Program number   Setting range：1 ~ 8
   ・Example

Send	Reply	Contents
P:P2	OK or NG	Select program number 2

*) In the case of Busy, it will be "NG" and this command cannot be executed.

105)   P:S command (Program 4：Program operation：Operation start)
   ・Description
      The program operation will start.
   ・Command format
      Send)   P:S
   ・Example

Send	Reply
P:S	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

106)   P:O command (Program 5：Program operation：One-line execution operation start)
   ・Description
      The one-line execution operation is started by the program operation.
      It can be used during pause with the "P: U" command.
   ・Command format
      Send)   P:O
   ・Example

Send	Reply
P:O	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

107)   P:E command (Program 6：Program operation：Stop operation)
   ・Description
      Stops the program operation.
   ・Command format
      Send)   P:E
   ・Example

Send	Reply
P:E	OK or NG

108)   P:U command (Program 7: Program operation：Pause)
・Description
Pauses program operation.
・Command format
Send)   P:Uu
・Parameters
Send)   u：Pause   0 or 1
0   Pause
1   Unpause
・Example

Send	Reply	Contents
P:U0	OK or NG	Pause program operation

109)   P:C command (Program 8：Program operation：Send completion signal)
・Description
When the program operation is completed, the "COMP" character string is replied to the PC.
・Command format
Send)   P:Cc
・Parameters
Send)   c：Signal transmission   0 or 1
0   Signal transmission prohibited
1   Signal transmission enabled
・Example

Send	Reply	Contents
P:C1	OK or NG	Enables completion signal transmission during program operation

*) In the case of Busy, it will be "NG" and this command cannot be executed.

110)   P:T command (Program 9：Program operation：Send trigger signal)
・Description
When the trigger is output during program operation, the "TRIG" character string is sent to the PC.
・Command format
Send)   P:Tt

・Parameters
Send)   t：Trigger signal transmission   0 or 1
0   Prohibition of trigger signal transmission
1   Trigger signal transmission controllable
・Example

Send	Reply	Contents
P:T0	OK or NG	Prohibition of trigger signal transmission at the time of trigger output during program operation

*) In the case of Busy, it will be "NG" and this command cannot be executed.

111)　P:ON command (Program 10：Shift to edit mode)
　　・Description
　　　　It shifts from the state where it is in the program mode to the program edit mode.
　　　　*) The program number can be edited with the number set by the "P: P" command.
　　・Command format
　　　　Send)　　P:ON
　　・Example

Send	Reply
P:ON	OK or NG

　　*) In the case of Busy, it will be "NG" and this command cannot be executed.

　　・Commands available in program mode

P:OFF	P:DEL	P:SET	P:GET	P:INIT

112)　P:OFF command (Program 11：Program mode transition)
　　・Description
　　　　From the program edit mode, if there is no "END" in all registered lines, "END" is automatically added, the set content is saved, and the program mode is entered.
　　　　*) If up to the 4000th line is registered, "END" will not be added automatically.
　　・Command format
　　　　Send)　　P:OFF
　　・Example

Send	Reply
P:OFF	OK or NG

　　*) In the case of Busy, it will be "NG" and this command cannot be executed.

113)　P:DEL command (Program 12：Delete program line designation)
　　・Description
　　　　Delete the program contents by specifying a line in the program edit mode.
　　・Command format
　　　　Send)　　P:DEL,n
　　・Parameters
　　　　Send)　　n：Program number　　　　1 ~ 4000
　　・Example

Send	Reply	Contents
P:DEL,1500	OK or NG	Deleted line 1500 of program number 1

　　*) In the case of Busy, it will be "NG" and this command cannot be executed.

114)　P:SET command (Program 13：Program line designation setting)
　　・Description
　　　　Set the program contents by specifying the line in the program edit mode.
　　　　*) Setting items differ depending on the operation pattern.
　　　　*) As for the program number, the number set by the "P: P" command will be edited.

　(1)　Operation pattern：　Relative value operation M, absolute value operation A,
　　　　　　　　　　　　　　　linear interpolation K
　　　　Performs relative, absolute, and linear interpolation.

・Command format
　　Send1)　P:SET,n,p,as1,as2,as3,ap1,ap2,ap3,o,s,w,tm,ta,tv
　　Send2)　P:SET,n,p,as1,as2,as3,ap1,ap2,ap3,o,s,w,tm

　　　　　*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is
　　　　　　Send1), and if the trigger mode is other than that, Send2).
　　　　*) If the trigger mode is for a certain period of time, specify 1 for the trigger target axis ta.

・Parameters
　　Send)　　n : Program number　　　　1 ~ 000
　　　　　　 p : Driving pattern　　　　　M or A or K

　　　　　　　　　　　　　　　　*) In case of K, please enable 2 or more axes for the
　　　　　　　　　　　　　　　　　following axis states.

　　　　　　 as1 : 1st axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　 as2 : 2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　 as3 : 3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　 ap1 : 1st axis coordinate value　　　-999,999,999 ~ 999,999,999 pls
　　　　　　 ap2 : 2nd axis coordinate value　　　-999,999,999 ~ 999,999,999 pls
　　　　　　 ap3 : 3rd axis coordinate value　　　-999,999,999 ~ 999,999,999 pls
　　　　　　 o : General-purpose output instruction　0 ~ 63
　　　　　　 s : Operating speed　　　　1 ~ 4
　　　　　　 w : Wait time　　　　　　　0 ~ 2560 (0.1 sec unit)
　　　　　　 tm : Trigger mode　　　　　0　Drive pulse designation
　　　　　　　　　　　　　　　　　　　1　Specify a certain time
　　　　　　　　　　　　　　　　　　　2　+ Scale pulse designation
　　　　　　　　　　　　　　　　　　　3　- Scale pulse designation
　　　　　　　　　　　　　　　　　　　4　One-shot trigger designation
　　　　　　　　　　　　　　　　*) Output after positioning of all effective axes
　　　　　　　　　　　　　　　　　　　5　Trigger issuance prohibited
　　　　　　　　　　　　　　　　　　　6　Take over the previous trigger setting
　　　　　　　　　　　　　　　　*) When specifying the drive pulse, + scale pulse, and-
　　　　　　　　　　　　　　　　　scale pulse, set the set speed to 56 kpps or less.
　　　　　　 ta : Trigger target axis　　1 ~ 3
　　　　　　 tv : Trigger output interval　Trigger mode 0 : 2 ~ 30000 pls
　　　　　　　　　　　　　　　　　　　Trigger mode 1 : 1 ~ 10000 (0.01sec uint)
　　　　　　　　　　　　　　　　　　　Trigger mode 2,3 : ±2 ~ 30000 pls

・Example
　Relative value operation on the 1500th line, 1st, 2nd and 3rd axis controllable, 1st axis
　movement amount: 100pls, 2nd axis movement amount: 200pls, 3rd axis movement
　amount: 300pls, general-purpose output instruction: 0, movement speed 1, Wait time:
　0 seconds, Trigger mode: Drive pulse, Trigger target axis: 1st axis, Trigger output
　interval: 100pls set

Send	Reply
P:SET:1500,M,1,1,1,100,200,300,0,1,0,0,1,100	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(2)   Operation pattern :   Relative continuous operation CM,
                                                Absolute continuous operation CA

Performs continuous operation with relative and absolute values. The specified coordinate value is considered as a passing point and operates continuously without stopping, and a trigger is output when the specified coordinate value is passed. (If it is continuous, the maximum is 256 lines.)

*) When using the trigger output, set the set speed to 56kpps or less.

・Command format

　　Send)   P:SET,n,p,as1,as2,as3,ap1,ap2,ap3,o,s,w,tm

・Parameters

Send)   n : Program number   1 ~ 4000
               p : Driving pattern   CM or CA
               as1 : 1st axis state   0 (axis invalid) or 1 (axis controllable)
               as2 : 2nd axis state   0 (axis invalid) or 1 (axis controllable)
               as3 : 3rd axis state   0 (axis invalid) or 1 (axis controllable)

                    *) Only one axis can be enabled. If multiple axes are enabled, a command error
                       will occur.

               ap1 : 1st axis coordinate value   -999,999,999 ~ 999,999,999 pls
               ap2 : 2nd axis coordinate value   -999,999,999 ~ 999,999,999 pls
               ap3 : 3rd axis coordinate value   -999,999,999 ~ 999,999,999 pls
               o : General-purpose output instruction   0 ~ 63
               s : Operating speed   1 ~ 4
               w : Wait time   0 ~ 2560 (0.1 sec unit)
               tm : Trigger mode   0   Drive pulse designation
                                                        2   Scale pulse designation

・Example

Relative continuous operation on the 1500th line, controllable only for the 1st axis, 1st axis movement amount: 100pls, 2nd axis movement amount: 0pls, 3rd axis movement amount: 0pls, general-purpose output instruction: 0, movement speed: 1, Wait time: 0 seconds, Trigger mode: Set drive pulse

Send	Reply
P:SET,1500,CM,1,0,0,100,0,0,0,1,0,0	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(3)   Operation pattern :   Arc interpolation E (Perfect circle)

Executes the arc interpolation operation (specify a perfect circle).

・Command format

　　Send1)   P:SET,n,p,as1,as2, as3,cm,c1,c2,o,s,w,tm,ta,tv
　　Send2)   P:SET,n,p,as1,as2, as3,cm,c1,c2,o,s,w,tm

                    *) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is
                       Send1), and if the trigger mode is other than that, Send2).

                    *) If the trigger mode is for a certain period of time, specify 1 for the trigger target axis ta.

                    *) The pulse speed and the movement speed per pulse must be the same between the
                       interpolation axes. If these are different, the correct interpolation operation will not be
                       performed.

・Parameters

Send)　n：Program number　　　　1 ~ 4000

p：Driving pattern　　　　　　E

as1：1st axis state　　　　　0 (axis invalid) or 1 (axis controllable)

as2：2nd axis state　　　　　0 (axis invalid) or 1 (axis controllable)

as3：3rd axis state　　　　　0 (axis invalid) or 1 (axis controllable)

　　　*) Two axes can be enabled. If all are enabled, a command error will occur.

cm：Circle mode　　　　　　0　Perfect circle designation

　　　　　　　　　　　　　　　CW rotation direction

　　　　　　　　　　　　　1　Perfect circle designation

　　　　　　　　　　　　　　　CCW rotation direction

c1：Center point coordinate value　　-999,999,999 ~ 999,999,999 pls

　　*) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in
　　　as1 to 3 and the axis number is small, and is the relative position from the current
　　　position.

c2：Center point coordinate value　　-999,999,999 ~ 999,999,999 pls

　　*) It is the center point coordinate value of the axis (Y axis) with the larger axis
　　　number on the 2 axes enabled in as1 ~ 3, and is the relative position from the
　　　current position.

o：General-purpose output instruction　0 ~ 63

s：Operating speed　　　　　1 ~ 4 (Minimum velocity of c1 axis (S))

w：Wait time　　　　　　　0 ~ 2560 (0.1 sec unit)

tm：Trigger mode　　　　　　0　Drive pulse designation

　　　　　　　　　　　　　1　Specify a certain time

　　　　　　　　　　　　　2　+ Scale pulse designation

　　　　　　　　　　　　　3　- Scale pulse designation

　　　　　　　　　　　　　4　One-shot trigger designation

　　　　　　　　　　　　*) Output after positioning of all effective axes

　　　　　　　　　　　　　5　Trigger issuance prohibited

　　　　　　　　　　　　　6　Take over the previous trigger setting

　　　　　　　　　　　　*) When specifying the drive pulse, + scale pulse, and-
　　　　　　　　　　　　　scale pulse, set the set speed to 56 kpps or less.

ta：Trigger target axis　　　1 ~ 3

tv：Trigger output interval　　Trigger mode 0：2 ~ 30000 pls

　　　　　　　　　　　　　　Trigger mode 1：1 ~ 10000 (0.01sec uint)

　　　　　　　　　　　　　　Trigger mode 2,3：±2 ~ 30000 pls

・Example

On the 1500th line, arc interpolation operation, 1st and 3rd axis controllable, arc mode: perfect circle specification CW rotation direction, 1st axis center point coordinate value: 100pls, 3rd axis center point coordinate value: 200pls, general-purpose output instruction: 0, movement speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis: 1st axis, trigger output interval: 100pls is set, and the operation returns to the current position.

Send	Reply
P:SET,1500,E,1,0,1,0,100,200,0,1,0,0,1,100	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

Y axis (2nd axis)

200[pls]

X axis(1st axis)

Current position

100[pls]

(4) Operation pattern： Arc interpolation E (Angle)

Performs circle interpolation operation (angle specification).

> *) The pulse speed and the movement speed per pulse must be the same between the interpolation axes. If these are different, the correct interpolation operation will not be performed.

・Command format
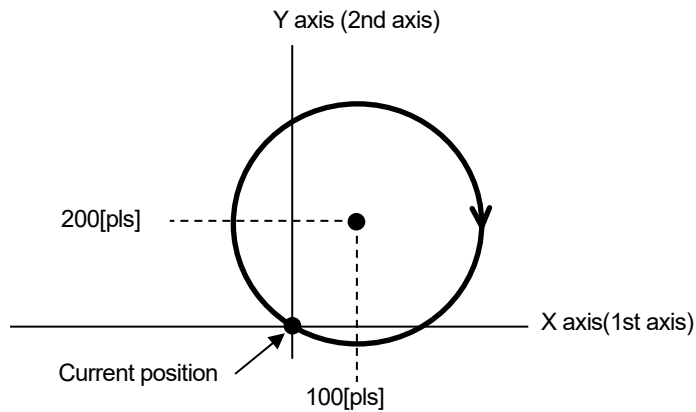
Send1) P:SET,n,p,as1,as2, as3,cm,c1,c2,al,o,s,w,tm,ta,tv

Send2) P:SET,n,p,as1,as2, as3,cm,c1,c2,al,o,s,w,tm

> *) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Send1), and if the trigger mode is other than that, Send2).

> *) If the trigger mode is for a certain period of time, specify 1 for the trigger target axis ta.

・Parameters

Send) n：Program number   1 ~ 4000

p：Driving pattern   E

as1：1st axis state   0 (axis invalid) or 1 (axis controllable)

as2：2nd axis state   0 (axis invalid) or 1 (axis controllable)

as3：3rd axis state   0 (axis invalid) or 1 (axis controllable)

> *) Two axes can be enabled. If all are enabled, a command error will occur.

cm：Circle mode   2 Angle specification
CW rotation direction

3 Angle specification
CCW rotation direction

c1：Center point coordinate value   -999,999,999 ~ 999,999,999 pls

> *) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in as1 to 3 and the axis number is small, and is the relative position from the current position.

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c2 : Center point coordinate value   -999,999,999 ~ 999,999,999 pls

*) It is the center point coordinate value of the axis (Y axis) with the larger axis number on the 2 axes enabled in as1 ~ 3, and is the relative position from the current position.

al : Degree   0 ~ 360 (Degree)

o : General-purpose output instruction   0 ~ 63

s : Operating speed   1 ~ 4 (Minimum velocity of c1 axis (S))

w : Wait time   0 ~ 2560 (0.1 sec unit)

tm : Trigger mode   0   Drive pulse designation

1   Specify a certain time

2   + Scale pulse designation

3   - Scale pulse designation

4   One-shot trigger designation

*) Output after positioning of all effective axes

5   Trigger issuance prohibited

6   Take over the previous trigger setting

*) When specifying the drive pulse, + scale pulse, and- scale pulse, set the set speed to 56 kpps or less.

ta : Trigger target axis   1 ~ 3

tv : Trigger output interval   Trigger mode 0 : 2 ~ 30000 pls

Trigger mode 1 : 1 ~ 10000 (0.01sec uint)

Trigger mode 2,3 : ±2 ~ 30000 pls

*) An error will occur because the center coordinates are calculated. Please use it after confirming it with the actual machine.

・Example

On the 1500th line, arc interpolation operation, 1st and 2nd axis controllable, arc mode: angle specification CW rotation direction, 1st axis center point coordinate value: 100pls, 2nd axis center point coordinate value: -200pls, angle: 90 degrees, General-purpose output instruction: 0, Operating speed: 1, Standby time: 0 seconds, Trigger mode: Drive pulse, Trigger target axis: 1st axis, Trigger output interval: 100pls set

Send	Reply
P:SET,1500,E,1,1,0,2,100,-200,90,0,1,0,0,1,100	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(5)   Operation pattern :   Arc interpolation E (Passing point)

Executes arc interpolation operation. (passing point specification).

・Command format

Send1)   P:SET,n,p,as1,as2, as3,cm,p1,p2,e1,e2,o,s,w,tm,ta,tv

Send2)   P:SET,n,p,as1,as2, as3,cm,p1,p2,e1,e2,o,s,w,tm

       *) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is
       Send1), and if the trigger mode is other than that, Send2).

       *) If the trigger mode is for a certain period of time, specify 1 for the trigger target axis ta.

       *) The pulse speed and the movement speed per pulse must be the same between the
       interpolation axes. If these are different, the correct interpolation operation will not be
       performed.

・Parameters

Send)   n：Program number   1 ~ 4000

          p：Driving pattern   E

          as1：1st axis state   0 (axis invalid) or 1 (axis controllable)

          as2：2nd axis state   0 (axis invalid) or 1 (axis controllable)

          as3：3rd axis state   0 (axis invalid) or 1 (axis controllable)

               *) Two axes can be enabled. If all are enabled, a command error will occur.

          cm：Circle mode   4   Specifying a passing point
                                   CW rotation direction
                             5   Specifying a passing point
                                   CW rotation direction

          p1：Passing point coordinate value   -999,999,999 ~ 999,999,999 pls

            *) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in
            as1 to 3 and the axis number is small, and is the relative position from the current
            position.

          p2：Passing point coordinate value   -999,999,999 ~ 999,999,999 pls

            *) It is the center point coordinate value of the axis (Y axis) with the larger axis
            number on the 2 axes enabled in as1 ~ 3, and is the relative position from the
            current position.

          e1：End point coordinate value   -999,999,999 ~ 999,999,999 pls

            *) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in
            as1 to 3 and the axis number is small, and is the relative position from the current
            position.

          e2：End point coordinate value   -999,999,999 ~ 999,999,999 pls

            *) It is the center point coordinate value of the axis (Y axis) with the larger axis
            number on the 2 axes enabled in as1 ~ 3, and is the relative position from the
            current position.

          o：General-purpose output instruction   0 ~ 63

          s：Operating speed   1 ~ 4 (Minimum velocity of p1, e1 axis (S))

          w：Wait time   0 ~ 2560 (0.1 sec unit)

          tm：Trigger mode   0   Drive pulse designation
                                  1   Specify a certain time
                                2   + Scale pulse designation
                                3   - Scale pulse designation
                                4   One-shot trigger designation
                          *) Output after positioning of all effective axes
                                5   Trigger issuance prohibited
                                6   Take over the previous trigger setting
                 *) When specifying the drive pulse, + scale pulse, and-
                   scale pulse, set the set speed to 56 kpps or less.

          ta：Trigger target axis   1 ~ 3

tv：Trigger output interval　Trigger mode 0：2 ~ 30000 pls
　　　　　　　　　　　　　　Trigger mode 1：1 ~ 10000 (0.01sec uint)
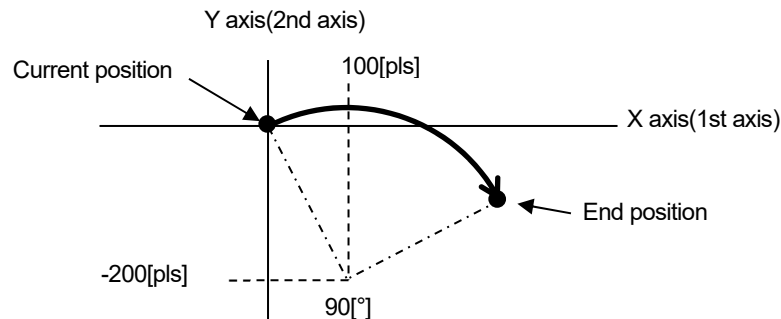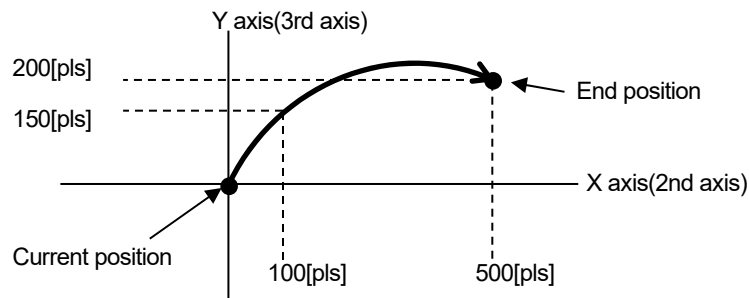　　　　　　　　　　　　　　Trigger mode 2,3：±2 ~ 30000 pls

・Example
On the 1500th line, arc interpolation operation, 2nd and 3rd axis controllable, arc mode: passing point specification CW rotation direction, 2nd axis passing point coordinate value: 100pls, 3rd axis passing point coordinate value: 150pls, 2nd axis end point Coordinate value: 500pls, 3rd axis end point coordinate value: 200pls, general-purpose output instruction: 0, movement speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis: 2nd axis, trigger output interval: 100pls The set

Send	Reply
P:SET,1500,E,0,1,1,4,100,150,500,200,0,1,0,0,2,100	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(6)　Operation pattern：　Helical interpolation EH (Perfect circle)
Executes helical interpolation operation. (specify a perfect circle).
　　*) The pulse speed and the movement speed per pulse must be the same between the interpolation axes. If these are different, the correct interpolation operation will not be performed.

・Command format
　Send1)　P:SET,n,p,as1,as2, as3,cm,c1,c2,hl,r,o,s,w,tm,ta,tv
　Send2)　P:SET,n,p,as1,as2, as3,cm,c1,c2,hl,r,o,s,w,tm
　　*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Send1), and if the trigger mode is other than that, Send2).
　　*) If the trigger mode is for a certain period of time, specify 1 for the trigger target axis ta.

・Parameters
　Send)　　n：Program number　　　1 ~ 4000
　　　　　　p：Driving pattern　　　　EH
　　　　　　as1：1st axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　　*) Enable 2 axes of circle interpolation axis. If all are enabled, a command error will occur.
　　　　　　cm：Circle mode　　　　0　Perfect circle designation
　　　　　　　　　　　　　　　　　　　CW rotation direction
　　　　　　　　　　　　　　　　　1　Perfect circle designation
　　　　　　　　　　　　　　　　　　　CCW rotation direction
　　　　　c1：Center point coordinate value　　-999,999,999 ~ 999,999,999 pls
　　　　　　　　*) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in as1 to 3 and the axis number is small, and is the relative position from the current position.

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c2：Center point coordinate value   -999,999,999 ~ 999,999,999 pls

*) It is the center point coordinate value of the axis (Y axis) with the larger axis number on the 2 axes enabled in as1 ~ 3, and is the relative position from the current position.

hl：Linear movement amount setting   -999,999,999 ~ 999,999,999 pls

*) The amount of linear movement of the axis (Z axis) disabled in as1 to 3, and the amount of movement per rotation from the current position. For example, if the number of rotations is specified as 2 rotations and the linear movement amount setting is 100pls, the total linear movement amount will be 200pls.

r：Rotation value   1 ~ 1000
o：General-purpose output instruction   0 ~ 63
s：Operating speed   1 ~ 4 (Minimum velocity of c1 axis (S))
w：Wait time   0 ~ 2560 (0.1 sec unit)
tm：Trigger mode   0   Drive pulse designation
                           1   Specify a certain time
                           2   + Scale pulse designation
                           3   - Scale pulse designation
                           4   One-shot trigger designation
                            *) Output after positioning of all effective axes
                           5   Trigger issuance prohibited
                           6   Take over the previous trigger setting
                          *) When specifying the drive pulse, + scale pulse, and-scale pulse, set the set speed to 56 kpps or less.

ta：Trigger target axis   1 ~ 3
tv：Trigger output interval   Trigger mode 0：2 ~ 30000 pls
                             Trigger mode 1：1 ~ 10000 (0.01sec uint)
                             Trigger mode 2,3：±2 ~ 30000 pls

・Example

Helical interpolation operation on the 1500th line, 1st and 2nd axis controllable, arc mode: perfect circle specification CW rotation direction, 1st axis center point coordinate value: 0pls, 2nd axis center point coordinate value: 200pls, 3rd axis movement Destination coordinates: 100pls, general-purpose output instruction: 0, operating speed: 1, waiting time: 0 seconds, trigger mode: drive pulse, trigger target axis: 1st axis, trigger output interval: 100pls set

Send	Reply
P:SET,1500,EH,1,1,0,0,0,200,100,1,0,1,0,0,1,100	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

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(7)　Operation pattern ：　Helical interpolation EH (Angle)
　　　Performs helical interpolation operation. (angle specification).
　　・Command format
　　　Send1)　P:SET,n,p,as1,as2, as3,cm,c1,c2,al,hl,o,s,w,tm,ta,tv
　　　Send2)　P:SET,n,p,as1,as2, as3,cm,c1,c2,al,hl,o,s,w,tm

> *) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is
>   Send1), and if the trigger mode is other than that, Send2).
>
> *) If the trigger mode is for a certain period of time, specify 1 for the trigger target axis ta.
>
> *) The pulse speed and the movement speed per pulse must be the same between the
>   interpolation axes. If these are different, the correct interpolation operation will not be
>   performed.

　　・Parameters
　　　Send)　　n：Program number　　　　1 ~ 4000
　　　　　　　　p：Driving pattern　　　　　EH
　　　　　　　　as1：1st axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　　as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　　as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)

> *) Enable 2 axes of circle interpolation axis. If all are enabled, a command error
>   will occur.

　　　　　　　　cm：Circle mode　　　　2　Angle specification
　　　　　　　　　　　　　　　　　　　　　　CW rotation direction
　　　　　　　　　　　　　　　　　　　3　Angle specification
　　　　　　　　　　　　　　　　　　　　　　CCW rotation direction
　　　　　　　c1：Center point coordinate value　　-999,999,999 ~ 999,999,999 pls

> *) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in
>   as1 to 3 and the axis number is small, and is the relative position from the current
>   position.

　　　　　　　c2：Center point coordinate value　　-999,999,999 ~ 999,999,999 pls

> *) It is the center point coordinate value of the axis (Y axis) with the larger axis
>   number on the 2 axes enabled in as1 to 3, and is the relative position from the
>   current position.

　　　　　　　al：Angle　　　　　　　　0 ~ 360000 (Degree)
　　　　　　　hl：Linear movement amount setting　　-999,999,999 ~ 999,999,999 pls

> *) If the linear movement destination coordinate value of the axis (Z axis) disabled in
>   as1 to 3 and the angle is less than 360 °, the amount of movement until moving
>   that angle is 360 ° or more, per rotation. It will be the amount of movement. For
>   example, if the linear movement amount is set to 100pls at 540 ° (one and a half
>   rotations), the total linear movement amount will be 150pls.
>
> *) Since the total linear movement amount is calculated, an error will occur. Please
>   use it after confirming it with the actual machine.

　　　　　　　o：General-purpose output instruction　　0 ~ 63
　　　　　　　s：Operating speed　　　　1 ~ 4 (Minimum speed of c1 axis (S))
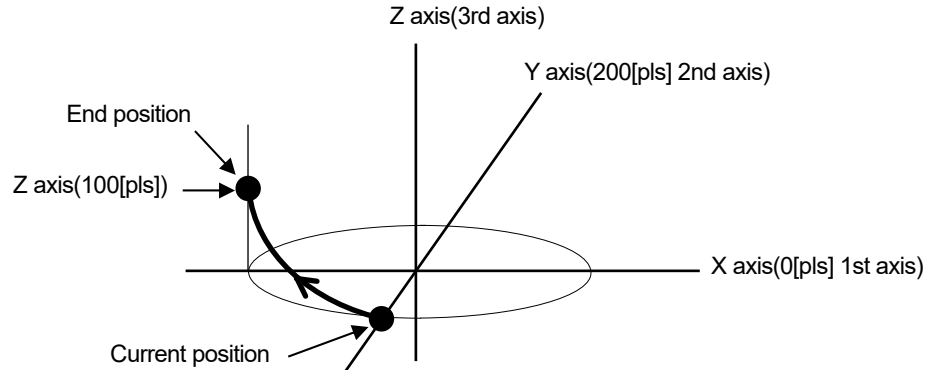　　　　　　　w：Wait time　　　　　　0 ~ 2560 (0.1 sec unit)

	tm：Trigger mode	0	Drive pulse designation
		1	Specify a certain time
		2	+ Scale pulse designation
		3	- Scale pulse designation
		4	One-shot trigger designation

*) Output after positioning of all effective axes

		5	Trigger issuance prohibited
		6	Take over the previous trigger setting

*) When specifying the drive pulse, + scale pulse, and- scale pulse, set the set speed to 56 kpps or less.

ta：Trigger target axis　　　1 ~ 3

tv：Trigger output interval　Trigger mode 0：2 ~ 30000 pls

Trigger mode 1：1 ~ 10000 (0.01sec uint)

Trigger mode 2,3：±2 ~ 30000 pls

・Example

Helical interpolation operation on the 1500th line, 1st and 2nd axis controllable, arc mode: angle specification CW rotation direction, 1st axis center point coordinate value: 0pls, 2nd axis center point coordinate value: 200pls, angle: 90 degrees, 3rd axis move destination coordinates: 100pls, general-purpose output instruction: 0, movement speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis: 1st axis, trigger output interval: 100pls set

Send	Reply
P:SET,1500,EH,1,1,0,2,0,200,90,100,0,1,0,0,1,100	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(8)　Operation pattern：　Helical interpolation EH (Passing point)

Performs helical interpolation operation. (passing point specification).

*) The pulse speed and the movement speed per pulse must be the same between the interpolation axes. If these are different, the correct interpolation operation will not be performed.

・Command format

Send1)　P:SET,n,p,as1,as2, as3,cm,p1,p2,e1,e2,hl,o,s,w,tm,ta,tv

Send2)　P:SET,n,p,as1,as2, as3,cm,p1,p2,e1,e2,hl,o,s,w,tm

*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Send1), and if the trigger mode is other than that, Send2).

*) If the trigger mode is for a certain period of time, specify 1 for the trigger target axis ta.
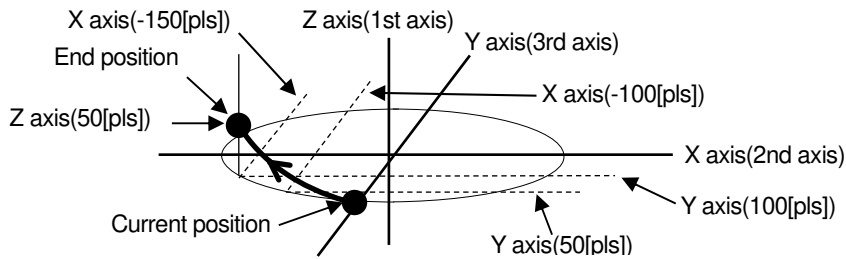
・Parameters

Send)　　n：Program number　　　　1 ~ 4000

　　　　　p：Driving pattern　　　　　　EH

　　　　　as1：1st axis state　　　　　0 (axis invalid) or 1 (axis controllable)

　　　　　as2：2nd axis state　　　　　0 (axis invalid) or 1 (axis controllable)

　　　　　as3：3rd axis state　　　　　0 (axis invalid) or 1 (axis controllable)

　　　　　　　*) Enable 2 axes of circle interpolation axis. If all are enabled, a command error
　　　　　　　　 will occur.

　　　　　cm：Circle mode　　　　　4　　Specifying a passing point
　　　　　　　　　　　　　　　　　　　　　CW rotation direction

　　　　　　　　　　　　　　　　5　　Specifying a passing point
　　　　　　　　　　　　　　　　　　　　　CCW rotation direction

　　　　　p1：Passing point coordinate value　　-999,999,999 ~ 999,999,999 pls

　　　　　　　*) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in
　　　　　　　　 as1 to 3 and the axis number is small, and is the relative position from the current
　　　　　　　　 position.

　　　　　p2：Passing point coordinate value　　-999,999,999 ~ 999,999,999 pls

　　　　　　　*) It is the center point coordinate value of the axis (Y axis) with the larger axis
　　　　　　　　 number on the 2 axes enabled in as1 ~ 3, and is the relative position from the
　　　　　　　　 current position.

　　　　　e1：End point coordinate value　　　-999,999,999 ~ 999,999,999 pls

　　　　　　　*) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in
　　　　　　　　 as1 to 3 and the axis number is small, and is the relative position from the current
　　　　　　　　 position.

　　　　　e2：End point coordinate value　　　-999,999,999 ~ 999,999,999 pls

　　　　　　　*) It is the center point coordinate value of the axis (Y axis) with the larger axis
　　　　　　　　 number on the 2 axes enabled in as1 ~ 3, and is the relative position from the
　　　　　　　　 current position.

　　　　　hl：Linear destination coordinate value　　-999,999,999 ~ 999,999,999 pls

　　　　　　　*) The linear movement destination coordinate value of the axis (Z axis) disabled in
　　　　　　　　 as1 to 3, which is the relative position from the current position.

　　　　　o：General-purpose output instruction　　0 ~ 63

　　　　　s：Operating speed　　　　1 ~ 4 (Minimum velocity of p1, e1 axis (S))

　　　　　w：Wait time　　　　　　　0 ~ 2560 (0.1 sec unit)

　　　　　tm：Trigger mode　　　　　0　　Drive pulse designation
　　　　　　　　　　　　　　　　　1　　Specify a certain time
　　　　　　　　　　　　　　　　　2　　+ Scale pulse designation
　　　　　　　　　　　　　　　　　3　　- Scale pulse designation
　　　　　　　　　　　　　　　　　4　　One-shot trigger designation
　　　　　　　　　　　　　　　　　 *) Output after positioning of all effective axes
　　　　　　　　　　　　　　　　　5　　Trigger issuance prohibited
　　　　　　　　　　　　　　　　　6　　Take over the previous trigger setting

　　　　　　　*) When specifying the drive pulse, + scale pulse, and-
　　　　　　　　 scale pulse, set the set speed to 56 kpps or less.

　　　　　ta：Trigger target axis　　　1 ~ 3

　　　　　tv：Trigger output interval　　Trigger mode 0：2 ~ 30000 pls
　　　　　　　　　　　　　　　　　　　Trigger mode 1：1 ~ 10000 (0.01sec uint)
　　　　　　　　　　　　　　　　　　　Trigger mode 2,3：±2 ~ 30000 pls

・Example

On the 1500th line, arc interpolation operation, 2nd and 3rd axis controllable, arc mode: passing point specification CW rotation direction, 2nd axis passing point coordinate value: -100pls, 3rd axis passing point coordinate value: 50pls, 2nd axis End point coordinate value: -150pls, 3rd axis end point coordinate value: 50pls, general-purpose output instruction: 0, movement speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis: 2nd axis, trigger output interval 10pls set

Send	Reply
P:SET,1500,EH,0,1,1,4,-100,50,-150,100,50,0,1,0,0,2,10	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(9)　peration pattern：　　Registered coordinate operation PAV

Executes the operation to the coordinate value registered by the "PAV:" command.

*) The pulse speed and the movement speed per pulse must be the same between the interpolation axes. If these are different, the correct interpolation operation will not be performed.

・Command format

Send1)　P:SET,n,p,as1,as2,as3,m,o,s,w,tm,ta,tv

Send2)　P:SET,n,p,as1,as2,as3,m,o,s,w,tm

*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Send1), and if the trigger mode is other than that, Send2).

・Parameters

Send)　n：Program number　　　　1 ~ 4000

p：Driving pattern　　　　PAV

as1：1st axis state　　　　0 (axis invalid) or 1 (axis controllable)

as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)

as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)

m：Coordinate value information registration number　　1 ~ 20

o：General-purpose output instruction　　0 ~ 63

s：Operating speed　　　　1 ~ 4

w：Wait time　　　　0 ~ 2560 (0.1 sec unit)

tm：Trigger mode　　　　0　Drive pulse designation

1　Specify a certain time

2　+ Scale pulse designation

3　- Scale pulse designation

4　One-shot trigger designation

*) Output after positioning of all effective axes

5　Trigger issuance prohibited

6　Take over the previous trigger setting

*) When specifying the drive pulse, + scale pulse, and- scale pulse, set the set speed to 56 kpps or less.

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ta：Trigger target axis　　　1 ~ 3

tv：Trigger output interval　Trigger mode 0：2 ~ 30000 pls

Trigger mode 1：1 ~ 10000 (0.01sec uint)

Trigger mode 2,3：±2 ~ 30000 pls

・Example

On the 1500th line, registration position operation, 1st, 2nd, 3rd axis controllable, 1st axis registration number: 1, 2nd axis registration number: 2, 3rd axis registration number: 3, general-purpose output instruction: 0, movement speed 1, Wait time: 0 seconds, Trigger mode: Drive pulse, Trigger target axis: 1st axis, Trigger output interval: 100pls set

Send	Reply
P:SET,1500,PAV,1,1,1,1,2,3,0,1,0,0,1,100	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(10) Operation pattern：Mechanical origin return H Performs mechanical origin return.

・Command format

Send)　　P:SET,n,p,as1,as2,as3,o,w,tm

・Parameters

Send)　　n：Program number　　　　1 ~ 4000

p：Driving pattern　　　　　H

as1：1st axis state　　　　　0 (axis invalid) or 1 (axis controllable)

as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)

as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)

o：General-purpose output instruction　0 ~ 63

w：Wait time　　　　　　　0 ~ 2560 (0.1 sec unit)

tm：Trigger mode　　　　　4　One-shot trigger specification

*) Output after positioning of all effective axes

5　Trigger issuance prohibited

・Example

Mechanical origin return operation, 1st, 2nd and 3rd axis controllable, general-purpose output instruction: 0, standby time: 0 seconds, trigger mode: one-shot trigger is set on the 1500th line.

Send	Reply
P:SET,1500,H,1,1,1,0,0,4	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(11) Operation pattern：Logical origin return Z Performs logical origin return.

・Command format

Send)　　P:SET,n,p,as1,as2,as3,o,s,w,tm

・Parameters

Send)　　n：Program number　　　　1 ~ 4000

p：Driving pattern　　　　　Z

as1：1st axis state　　　　　0 (axis invalid) or 1 (axis controllable)

as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)

as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)

o：General-purpose output instruction　0 ~ 63

s：Operating speed　　　　1 ~ 4

w：Wait time　　　　　　　0 ~ 2560 (0.1 sec unit)

tm：Trigger mode　　　　4　One-shot trigger specification

*) Output after positioning of all effective axes

　　　　　　　　　　　　　　5　Trigger issuance prohibited

・Example

Mechanical origin return operation, 1st, 2nd and 3rd axis controllable, general-purpose output instruction: 0, standby time: 0 seconds, trigger mode: one-shot trigger is set on the 1500th line.

Send	Reply
P:SET,1500,Z,1,1,1,0,1,0,4	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(12) Operation pattern：Logical origin setting R

Performs the logical origin setting.

・Command format

　　Send)　　P:SET,n,p,as1,as2,as3

・Parameters

Send)　　n：Program number	1 ~ 4000	
p：Driving pattern	Z	
as1：1st axis state	0 (axis invalid) or 1 (axis controllable)	
as2：2nd axis state	0 (axis invalid) or 1 (axis controllable)	
as3：3rd axis state	0 (axis invalid) or 1 (axis controllable)	

・Example

Set the logical origin and enable the 1st, 2nd, and 3rd axes on the 1500th line.

Send	Reply
P:SET,1500,R,1,1,1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(13) Operation pattern：General-purpose I/O INPUT

Wait until the specified I / O terminal is in the general-purpose input state.

・Command format

　　Send)　　P:SET,n,p,i

・Parameters

　　Send)　　n：Program number　　　　1 ~ 4000

　　　　　　p：Driving pattern　　　　　INPUT

　　　　　　i：General-purpose input status　　0 ~ 63

・Example

General-purpose input, general-purpose input status: 1 (only IN1 is ON) is set on the 1500th line.

Send	Reply
P:SET,1500,INPUT,1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(14) Operation pattern：Loop start F

Set the loop start position. Loop ends A loop within the same loop nest a specified number of times between "N".

・Command format

　　Send)　　P:SET,n,p,ll,lv

・Parameters
　　Send)　　n：Program number　　　1 ~ 4000
　　　　　　　p：Driving pattern　　　　F
　　　　　　　ll：Loop nest　　　　　　 1 ~ 9
　　　　　　　lv：Loop value　　　　　　1 ~ 65535
・Example
　Set loop start, loop nest: 1, loop count: 100 on line 1500

Send	Reply
P:SET,1500,F,1,100	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(15) Operation pattern：Loop end N
　　Set the loop end position. It returns to the loop start "F" position of the specified loop nest and executes the next line after being executed the specified number of times.
　・Command format
　　Send)　　P:SET,n,p,ll
　・Parameters
　　Send)　　n：Program number　　　1 ~ 4000
　　　　　　　p：Driving pattern　　　　N
　　　　　　　ll：Loop nest　　　　　　 1 ~ 9
　・Example
　Set loop end, loop nest: 1 on line 1500

Send	Reply
P:SET,1500,N,1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(16) Operation pattern：End of execution END
　　Specify the execution end line.
　　*) If up to the 4000th line is registered, it is not necessary to register "END".
　　*) "END" is registered in the first line of the initial value of the program.
　・Command format
　　Send)　　P:SET,n,p
　・Parameters
　　Send)　　n：Program number　　　1 ~ 4000
　　　　　　　p：Driving pattern　　　　END
　・Example
　Set the end of execution on the 1500th line

Send	Reply
P:SET,1500,END	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(17) Operation pattern：Unregistered NONE
　　Delete the contents of the already registered line and register the unregistered line that does nothing.
　　*) As the initial value of the program, "NONE" is registered from the first line onward.
　・Command format
　　Send)　　P:SET,n,p

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・Parameters

Send) n：Program number 1 ~ 4000

p：Driving pattern NONE

・Example

Delete the registered contents on the 1500th line

Send	Reply
P:SET,1500,NONE	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

115) P:GET command (Program 13：Get program line designation)

・Description

Get the program contents by specifying a line in the program edit mode.

(1) Operation pattern： Relative value operation M, Absolute value operation A,

Linear interpolation K

・Command format

Send) P:GEL,n

Reply1) p,as1,as2,as3,ap1,ap2,ap3,o,s,w,tm,ta,tv

Reply2) p,as1,as2,as3,ap1,ap2,ap3,o,s,w,tm

*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is

Peply1), and if the trigger mode is other than that, Reply2).

・Parameters

Send) n：Program number 1 ~ 4000

Reply) p：Driving pattern M or A or K

as1：1st axis state 0 (axis invalid) or 1 (axis controllable)

as2：2nd axis state 0 (axis invalid) or 1 (axis controllable)

as3：3rd axis state 0 (axis invalid) or 1 (axis controllable)

ap1：1st axis coordinate value -999,999,999 ~ 999,999,999 pls

ap2：2nd axis coordinate value -999,999,999 ~ 999,999,999 pls

ap3：3rd axis coordinate value -999,999,999 ~ 999,999,999 pls

o：General-purpose output instruction 0 ~ 63

s：Operating speed 1 ~ 4

w：Wait time 0 ~ 2560 (0.1 sec unit)

tm：Trigger mode 0 Drive pulse designation

1 Specify a certain time

2 + Scale pulse designation

3 - Scale pulse designation

4 One-shot trigger designation

*) Output after positioning of all effective axes

5 Trigger issuance prohibited

6 Take over the previous trigger setting

ta：Trigger target axis 1 ~ 3

tv：Trigger output interval Trigger mode 0：2 ~ 30000 pls

Trigger mode 1：1 ~ 10000 (0.01sec uint)

Trigger mode 2,3：±2 ~ 30000 pls

・Example

Line 1500 is relative value operation, 1st, 2nd, 3rd axis controllable, 1st axis movement amount: 100pls, 2nd axis movement amount: 200pls, 3rd axis movement amount: 300pls, general-purpose output instruction: 0, movement speed 1, Wait time: 0 seconds, Trigger mode: Drive pulse, Trigger target axis: 1st axis, Trigger output interval: Registered at 100pls

Send	Reply
P:GET,1500	M,1,1,1,100,200,300,0,1,0,0,1,100

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(2) Operation pattern： Relative continuous operation CM,

Absolute continuous operation CA

・Command format

Send)   P:GEL,n

Reply)   p,as1,as2,as3,ap1,ap2,ap3,o,s,w,tm

・Parameters

Send)   n：Program number   1 ~ 4000

Reply)   p：Driving pattern   CM or CA

as1：1st axis state   0 (axis invalid) or 1 (axis controllable)

as2：2nd axis state   0 (axis invalid) or 1 (axis controllable)

as3：3rd axis state   0 (axis invalid) or 1 (axis controllable)

ap1：1st axis coordinate value   -999,999,999 ~ 999,999,999 pls

ap2：2nd axis coordinate value   -999,999,999 ~ 999,999,999 pls

ap3：3rd axis coordinate value   -999,999,999 ~ 999,999,999 pls

o：General-purpose output instruction   0 ~ 63

s：Operating speed   1 ~ 4

w：Wait time   0 ~ 2560 (0.1 sec unit)

tm：Trigger mode   0   Drive pulse designation

2   Scale pulse designation

・Example

Line 1500 is relative continuous operation, controllable only for 1st axis, 1st axis movement amount: 100pls, 2nd axis movement amount: 0pls, 3rd axis movement amount: 0pls, general-purpose output instruction: 0, movement speed: 1, Wait time: 0 seconds, Trigger mode: Register with drive pulse

Send	Reply
P:GET,1500	CM,1,0,0,100,0,0,0,1,0,0

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(3) Operation pattern： Arc interpolation E (Perfect circle)

・Command format

Send)   P:GEL,n

Reply1)   p,as1,as2, as3,cm,c1,c2,o,s,w,tm,ta,tv

Reply2)   p,as1,as2, as3,cm,c1,c2,o,s,w,tm

*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Peply1), and if the trigger mode is other than that, Reply2).

・Parameters

Send)   n：Program number   1 ~ 4000

Reply)   p：Driving pattern   E

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as1 : 1st axis state	0 (axis invalid) or 1 (axis controllable)	
as2 : 2nd axis state	0 (axis invalid) or 1 (axis controllable)	
as3 : 3rd axis state	0 (axis invalid) or 1 (axis controllable)	
cm : Circle mode	0	Perfect circle designation CW rotation direction
	1	Perfect circle designation CCW rotation direction
c1 : Center point coordinate value	-999,999,999 ~ 999,999,999 pls	
c2 : Center point coordinate value	-999,999,999 ~ 999,999,999 pls	
o : General-purpose output instruction	0 ~ 63	
s : Operating speed	1 ~ 4	
w : Wait time	0 ~ 2560 (0.1 sec unit)	
tm : Trigger mode	0	Drive pulse designation
	1	Specify a certain time
	2	+ Scale pulse designation
	3	- Scale pulse designation
	4	One-shot trigger designation
		*) Output after positioning of all effective axes
	5	Trigger issuance prohibited
	6	Take over the previous trigger setting
ta : Trigger target axis	1 ~ 3	
tv : Trigger output interval	Trigger mode 0 : 2 ~ 30000 pls	
	Trigger mode 1 : 1 ~ 10000 (0.01sec uint)	
	Trigger mode 2,3 : ±2 ~ 30000 pls	

・Example

Line 1500 is arc interpolation operation, 1st and 3rd axis controllable, arc mode: perfect circle specification CW rotation direction, 1st axis center point coordinate value: 100pls, 3rd axis center point coordinate value: 200pls, general-purpose output instruction: 0, operating speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis: 1st axis, trigger output interval: 100pls registered

Send	Reply
P:GET,1500	E,1,0,1,0,100,200,0,1,0,0,1,100

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(4) Operation pattern : Arc interpolation E (Angle)

・Command format

    Send)   P:GEL,n

    Reply1) p,as1,as2, as3,cm,c1,c2,al,o,s,w,tm,ta,tv

    Reply2) p,as1,as2, as3,cm,c1,c2,al,o,s,w,tm

          *) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Peply1), and if the trigger mode is other than that, Reply2).

・Parameters

Send)	n : Program number	1 ~ 4000
Reply)	p : Driving pattern	E
	as1 : 1st axis state	0 (axis invalid) or 1 (axis controllable)
	as2 : 2nd axis state	0 (axis invalid) or 1 (axis controllable)
	as3 : 3rd axis state	0 (axis invalid) or 1 (axis controllable)

cm：Circle mode | 2 | Angle specification
CW rotation direction
3 | Angle specification
CCW rotation direction

c1：Center point coordinate value   -999,999,999 ~ 999,999,999 pls
c2：Center point coordinate value   -999,999,999 ~ 999,999,999 pls
al：Angle   0 ~ 360(Degree)
o：General-purpose output instruction   0 ~ 63
s：Operating speed   1 ~ 4
w：Wait time   0 ~ 2560 (0.1 sec unit)

tm：Trigger mode | 0 | Drive pulse designation
| 1 | Specify a certain time
| 2 | + Scale pulse designation
| 3 | - Scale pulse designation
| 4 | One-shot trigger designation
| | *) Output after positioning of all effective axes
| 5 | Trigger issuance prohibited
| 6 | Take over the previous trigger setting

ta：Trigger target axis   1 ~ 3
tv：Trigger output interval   Trigger mode 0：2 ~ 30000 pls
Trigger mode 1：1 ~ 10000 (0.01sec uint)
Trigger mode 2,3：±2 ~ 30000 pls

・Example

Line 1500 is arc interpolation operation, 1st and 2nd axis controllable, arc mode: angle specification CW rotation direction, 1st axis center point coordinate value: 100pls, 2nd axis center point coordinate value: -200pls, angle: 90 degrees, General-purpose output instruction: 0, Operating speed: 1, Standby time: 0 seconds, Trigger mode: Drive pulse, Trigger target axis: 1st axis, Trigger output interval: Registered at 100pls

Send	Reply
P:GET,1500	E,1,1,0,2,100,-200,90,0,1,0,0,1,100

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(5) Operation pattern： Arc interpolation E (Passing point)
・Command format
Send)   P:GEL,n
Reply1)   p,as1,as2, as3,cm,p1,p2,e1,e2,o,s,w,tm,ta,tv
Reply2)   p,as1,as2, as3,cm,p1,p2,e1,e2,o,s,w,tm

*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Peply1), and if the trigger mode is other than that, Reply2).

・Parameters
Send)   n：Program number   1 ~ 4000
Reply)   p：Driving pattern   E
as1：1st axis state   0 (axis invalid) or 1 (axis controllable)
as2：2nd axis state   0 (axis invalid) or 1 (axis controllable)
as3：3rd axis state   0 (axis invalid) or 1 (axis controllable)

		cm : Circle mode	4	Specifying a passing point CW rotation direction
			5	Specifying a passing point CCW rotation direction

p1 : Passing point coordinate value   -999,999,999 ~ 999,999,999 pls
p2 : Passing point coordinate value   -999,999,999 ~ 999,999,999 pls
e1 : End point coordinate value   -999,999,999 ~ 999,999,999 pls
e2 : End point coordinate value   -999,999,999 ~ 999,999,999 pls
o : General-purpose output instruction   0 ~ 63
s : Operating speed   1 ~ 4
w : Wait time   0 ~ 2560 (0.1 sec unit)
tm : Trigger mode   0   Drive pulse designation
                           1   Specify a certain time
                           2   + Scale pulse designation
                           3   - Scale pulse designation
                           4   One-shot trigger designation
                            *) Output after positioning of all effective axes
                           5   Trigger issuance prohibited
                           6   Take over the previous trigger setting
ta : Trigger target axis   1 ~ 3
tv : Trigger output interval   Trigger mode 0 : 2 ~ 30000 pls
                               Trigger mode 1 : 1 ~ 10000 (0.01sec uint)
                               Trigger mode 2,3 : ±2 ~ 30000 pls

・Example

Line 1500 is arc interpolation operation, 2nd and 3rd axis controllable, arc mode: passing point specification CW rotation direction, 2nd axis passing point coordinate value: 100pls, 3rd axis passing point coordinate value: 150pls, 2nd axis end point Coordinate value: 500pls, 3rd axis end point coordinate value: 200pls, general-purpose output instruction: 0, movement speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis: 2nd axis, trigger output interval: Register at 100pls

Send	Reply
P:GET,1500	E,0,1,1,4,100,150,500,200,0,1,0,0,2,100

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(6)   Operation pattern :   Helical interpolation EH (Perfect circle)
  ・Command format
      Send)   P:GEL,n
      Reply1) p,as1,as2, as3,cm,c1,c2,hl,r,o,s,w,tm,ta,tv
      Reply2) p,as1,as2, as3,cm,c1,c2,hl,r,o,s,w,tm
                *) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is
                    Peply1), and if the trigger mode is other than that, Reply2).

  ・Parameters
      Send)   n : Program number   1 ~ 4000
      Reply)   p : Driving pattern   EH
               as1 : 1st axis state   0 (axis invalid) or 1 (axis controllable)
               as2 : 2nd axis state   0 (axis invalid) or 1 (axis controllable)
               as3 : 3rd axis state   0 (axis invalid) or 1 (axis controllable)

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	cm：Circle mode	0	Perfect circle designation
			CW rotation direction
		1	Perfect circle designation
			CCW rotation direction

c1：Center point coordinate value　　　-999,999,999 ~ 999,999,999 pls
c2：Center point coordinate value　　　-999,999,999 ~ 999,999,999 pls
hl：Linear destination coordinate value　-999,999,999 ~ 999,999,999 pls
r：Rotation value　　　　　　1 ~ 1000
o：General-purpose output instruction　0 ~ 63
s：Operating speed　　　　　1 ~ 4
w：Wait time　　　　　　　　0 ~ 2560 (0.1 sec unit)

	tm：Trigger mode	0	Drive pulse designation
		1	Specify a certain time
		2	+ Scale pulse designation
		3	- Scale pulse designation
		4	One-shot trigger designation
			*) Output after positioning of all effective axes
		5	Trigger issuance prohibited
		6	Take over the previous trigger setting

ta：Trigger target axis　　　1 ~ 3
tv：Trigger output interval　　Trigger mode 0：2 ~ 30000 pls
　　　　　　　　　　　　　　　Trigger mode 1：1 ~ 10000 (0.01sec uint)
　　　　　　　　　　　　　　　Trigger mode 2,3：±2 ~ 30000 pls

・Example
Line 1500 is helical interpolation operation, 1st and 2nd axis controllable, arc mode: perfect circle specification CW rotation direction, 1st axis center point coordinate value: 0pls, 2nd axis center point coordinate value: 200pls, 3rd axis movement Destination coordinates: 100pls, general-purpose output instruction: 0, operating speed: 1, waiting time: 0 seconds, trigger mode: drive pulse, trigger target axis: 1st axis, trigger output interval: registered at 100pls

Send	Reply
P:GET,1500	EH,1,1,0,0,0,200,100,0,1,0,0,1,100

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(7)　Operation pattern：　Helical interpolation EH (Angle)
・Command format
　　Send)　P:GEL,n
　　Reply1)　p,as1,as2, as3,cm,c1,c2,al,hl,o,s,w,tm,ta,tv
　　Reply2)　p,as1,as2, as3,cm,c1,c2,al,hl,o,s,w,tm
　　　　　　*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Peply1), and if the trigger mode is other than that, Reply2).

・Parameters
　　Send)　n：Program number　　　1 ~ 4000
　　Reply)　p：Driving pattern　　　　EH
　　　　　　as1：1st axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)

	cm：Circle mode	2	Angle specification
			CW rotation direction
		3	Angle specification
			CCW rotation direction

c1：Center point coordinate value   -999,999,999 ~ 999,999,999 pls
c2：Center point coordinate value   -999,999,999 ~ 999,999,999 pls
al：Angle   0 ~ 360000(Degree)
hl：Linear destination coordinate value   -999,999,999 ~ 999,999,999 pls
o：General-purpose output instruction   0 ~ 63
s：Operating speed   1 ~ 4
w：Wait time   0 ~ 2560 (0.1 sec unit)

	tm：Trigger mode	0	Drive pulse designation
		1	Specify a certain time
		2	+ Scale pulse designation
		3	- Scale pulse designation
		4	One-shot trigger designation
		*) Output after positioning of all effective axes	
		5	Trigger issuance prohibited
		6	Take over the previous trigger setting

ta：Trigger target axis	1 ~ 3
tv：Trigger output interval	Trigger mode 0：2 ~ 30000 pls
	Trigger mode 1：1 ~ 10000 (0.01sec uint)
	Trigger mode 2,3：±2 ~ 30000 pls

・Example

Line 1500 is helical interpolation operation, 1st and 2nd axis controllable, arc mode: angle specification CW rotation direction, 1st axis center point coordinate value: 0pls, 2nd axis center point coordinate value: 200pls, angle: 90 degrees, 3rd axis move destination coordinates: 100pls, general-purpose output instruction: 0, movement speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis: 1st axis, trigger output interval: 100pls

Send	Reply
P:GET,1500	EH,1,1,0,2,0,200,90,100,0,1,0,0,1,100

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(8) Operation pattern： Helical interpolation EH (Passing point)

・Command format

Send)   P:GEL,n
Reply1)   p,as1,as2, as3,cm,p1,p2,e1,e2,hl,o,s,w,tm,ta,tv
Reply2)   p,as1,as2, as3,cm,p1,p2,e1,e2,hl,o,s,w,tm

*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Peply1), and if the trigger mode is other than that, Reply2).

・Parameters

Send)	n：Program number	1 ~ 4000
Reply)	p：Driving pattern	EH
	as1：1st axis state	0 (axis invalid) or 1 (axis controllable)
	as2：2nd axis state	0 (axis invalid) or 1 (axis controllable)
	as3：3rd axis state	0 (axis invalid) or 1 (axis controllable)

	cm：Circle mode	4	Specifying a passing point
			CW rotation direction
		5	Specifying a passing point
			CW rotation direction

p1：Passing point coordinate value　　　-999,999,999 ~ 999,999,999 pls
p2：Passing point coordinate value　　　-999,999,999 ~ 999,999,999 pls
e1：End point coordinate value　　　　-999,999,999 ~ 999,999,999 pls
e2：End point coordinate value　　　　-999,999,999 ~ 999,999,999 pls
hl：Linear destination coordinate value　-999,999,999 ~ 999,999,999 pls
o：General-purpose output instruction　　0 ~ 63
s：Operating speed　　　　1 ~ 4
w：Wait time　　　　0 ~ 2560 (0.1 sec unit)

tm：Trigger mode	0	Drive pulse designation
	1	Specify a certain time
	2	+ Scale pulse designation
	3	- Scale pulse designation
	4	One-shot trigger designation
	*)	Output after positioning of all effective axes
	5	Trigger issuance prohibited
	6	Take over the previous trigger setting

ta：Trigger target axis　　　1 ~ 3
tv：Trigger output interval　Trigger mode 0：2 ~ 30000 pls
　　　　　　　　　　　　　Trigger mode 1：1 ~ 10000 (0.01sec uint)
　　　　　　　　　　　　　Trigger mode 2,3：±2 ~ 30000 pls

・Example
Line 1500 is arc interpolation operation, 2nd and 3rd axis controllable, arc mode: passing point specification CW rotation direction, 2nd axis passing point coordinate value: -100pls, 3rd axis passing point coordinate value: 50pls, 2nd axis End point coordinate value: -150pls, 3rd axis end point coordinate value: 50pls, general-purpose output instruction: 0, movement speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis: 2nd axis, trigger output interval Register at 10pls

Send	Reply
P:GET,1500	EH,0,1,1,4,-100,50,-150,100,50,0,1,0,0,2,10

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(9)　Operation pattern：　Registered coordinate operation PAV
　・Command format
　　Send)　　P:GEL,n
　　Reply1)　p,as1,as2,as3,o,s,w,tm,ta,tv
　　Reply2)　p,as1,as2,as3,o,s,w,tm
　　　　　　*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Peply1), and if the trigger mode is other than that, Reply2).

　・Parameters
　　Send)　　n：Program number　　　1 ~ 4000
　　Reply)　　p：Driving pattern　　　PAV

　　　　　　as1：1st axis state　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　as2：2nd axis state　　　0 (axis invalid) or 1 (axis controllable)

as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)

o：General-purpose output instruction　0 ~ 63

s：Operating speed　　　　1 ~ 4

w：Wait time　　　　　　　0 ~ 2560 (0.1 sec unit)

tm：Trigger mode

0	Drive pulse designation
1	Specify a certain time
2	+ Scale pulse designation
3	- Scale pulse designation
4	One-shot trigger designation

*) Output after positioning of all effective axes

5	Trigger issuance prohibited
6	Take over the previous trigger setting

ta：Trigger target axis　　　1 ~ 3

tv：Trigger output interval

Trigger mode 0：2 ~ 30000 pls

Trigger mode 1：1 ~ 10000 (0.01sec uint)

Trigger mode 2,3：±2 ~ 30000 pls

・Example

Line 1500 is registration position operation, 1st, 2nd, 3rd axis controllable, 1st axis registration number: 1, 2nd axis registration number: 2, 3rd axis registration number: 3, general-purpose output instruction: 0, movement speed 1, Wait time: 0 seconds, Trigger mode: Drive pulse, Trigger target axis: 1st axis, Trigger output interval: Registered at 100pls

Send	Reply
P:GET,1500	PAV,1,1,1,1,2,3,0,1,0,0,1,100

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(10) Operation pattern：Mechanical origin return H

・Command format

Send)　　P:GEL,n

Reply)　　p,as1,as2,as3,o,w,tm

・Parameters

Send)　　n：Program number　　　1 ~ 4000

Reply)　　p：Driving pattern H

as1：1st axis state　　　　0 (axis invalid) or 1 (axis controllable)

as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)

as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)

o：General-purpose output instruction　0 ~ 63

w：Wait time　　　　　　　0 ~ 2560 (0.1 sec unit)

tm：Trigger mode　4　One-shot trigger specification

　　　　　　　　　　　　5　Trigger issuance prohibited

・Example

Line 1500 is mechanical origin return operation, 1st, 2nd, 3rd axis controllable, general-purpose output instruction: 0, standby time: 0 seconds, trigger mode: registered with one-shot trigger

Send	Reply
P:GET,1500	H,1,1,1,0,0,4

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(11) Operation pattern：Logical origin return Z
・Command format
Send)　P:GEL,n
Reply)　p,as1,as2,as3,o,s,w,tm
・Parameters
Send)　n：Program number　　　1 ~ 4000
Reply)　p：Driving pattern Z
　　　　　as1：1st axis state　　　0 (axis invalid) or 1 (axis controllable)
　　　　　as2：2nd axis state　　　0 (axis invalid) or 1 (axis controllable)
　　　　　as3：3rd axis state　　　0 (axis invalid) or 1 (axis controllable)
　　　　　o：General-purpose output instruction　0 ~ 63
　　　　　s：Operating speed　　　1 ~ 4
　　　　　w：Wait time　　　　　0 ~ 2560 (0.1 sec unit)
　　　　　tm：Trigger mode　4　One-shot trigger specification
　　　　　　　　　　　　　　　5　Trigger issuance prohibited
・Example
Line 1500 is logical origin return operation, 1st, 2nd, 3rd axis controllable, general-purpose output instruction: 0, standby time: 0 seconds, trigger mode: registered with one-shot trigger

Send	Reply
P:GET,1500	Z,1,1,1,0,1,0,4

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(12) Operation pattern：Logical origin setting R
・Command format
Send)　P:GEL,n
Reply)　p,as1,as2,as3
・Parameters
Send)　n：Program number　　　1 ~ 4000
Reply)　p：Driving pattern　　　Z
　　　　　as1：1st axis state　　　0 (axis invalid) or 1 (axis controllable)
　　　　　as2：2nd axis state　　　0 (axis invalid) or 1 (axis controllable)
　　　　　as3：3rd axis state　　　0 (axis invalid) or 1 (axis controllable)
・Example
The 1500th line is registered with the logical origin setting and the 1st, 2nd, and 3rd axes controllable.

Send	Reply
P:GET,1500	R,1,1,1

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(13) Operation pattern：General-purpose I/O INPUT
・Command format
Send)　P:GEL,n
Reply)　p,i
・Parameters
Send)　n：Program number　　　　　1 ~ 4000
Reply)　p：Driving pattern　　　　　INPUT
　　　　　i：General-purpose input status　0 ~ 63

124

・Example

Line 1500 is registered with general-purpose input, input status: 1 (only IN1 is ON)

Send	Reply
P:GET,1500	INPUT,1

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(14) Operation pattern：Loop start F

・Command format

　　Send)　　P:GEL,n

　　Reply)　　p,ll,lv

・Parameters

　　Send)　　n：Program number　　1 ~ 4000

　　Reply)　　p：Driving pattern　　F

　　　　　　ll：Loop nest　　1 ~ 9

　　　　　　lv：Loop value　　1 ~ 65535

・Example

"Loop start", "Loop hierarchy: 1", "Loop count: 100" are registered in the 1500th line.

Send	Reply
P:GET,1500	F,1,100

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(15) Operation pattern：Loop end N

・Command format

　　Send)　　P:GEL,n

　　Reply)　　p,ll

・Parameters

　　Send)　　n：Program number　　1 ~ 4000

　　Reply)　　p：Driving pattern　　N

　　　　　　ll：Loop nest　　1 ~ 9

・Example

The 1500th line is registered with " loop end " and "loop hierarchy: 1".

Send	Reply
P:GET,1500	N,1

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(16) Operation pattern：End of execution END

・Command format

　　Send)　　P:GEL,n

　　Reply)　　p

・Parameters

　　Send)　　n：Program number　　1 ~ 4000

　　Reply)　　p：Driving pattern　　END

・Example

Line 1500 is registered at the end of execution

Send	Reply
P:GET,1500	END

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(17) Operation pattern：Unregistered NONE
・Command format
　　Send)　　P:GEL,n
　　Reply)　　p
・Parameters
　　Send)　　n：Program number　　　　1 ~ 4000
　　Reply)　　p：Driving pattern　　　　NONE
・Example
　Line 1500 is unregistered

Send	Reply
P:GET,1500	NONE

*) In the case of Busy, it will be "NG" and this command cannot be executed.

116)　　P: INIT command (Program 15：Delete all lines of the program)
・Description
　　Delete all the program contents in the program edit mode.
・Command format
　　Send) P:INIT
・Example

Send	Reply
P:INIT	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

117)　　MS:ON command (Memory switch operation 1：Edit mode transition)
・Description
　　Moves from host mode to memory switch edit mode. The commands that can be
　　used in the memory switch edit mode are "MS: OFF", "MS: SET", "MS: GET", "MS:
　　DEF", and "MS: DEFR".
・Command format
　　Send)　　MS:ON
・Example

Send	Reply
MS:ON	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

・Commands available in memory switch edit mode

*IDN?	?:	MS:OFF	MS:SET	MS:GET	MS:DEF
MS:DEFR	MS:SETK	MS:GETK	MS:DEFK	MS:DEFRK	

118)　　MS:OFF command (Memory switch operation 2：Host mode transition)
・Description
　　Saves the settings and returns from memory switch edit mode to host mode.
・Command format
　　Send)　　MS:OFF
・Example

Send	Reply
MS:OFF	OK or NG

119) MS:SET command (Memory switch operation 3：Setting)
　　・Description
　　　Memory switch Set the contents of the memory switch in the edit mode.
　　・Command format
　　　Send)　　MS:SET,k,n,s
　　・Parameters
　　　Send)　　k：Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

　　　　n：Memory switch content number
　　　　s：Memory switch setting number
　　　　　*) For details on each memory switch item, content number, and setting number,
　　　　　　refer to the separate " Preparation and Operation ".

　・Example 1
　Set "MODE SEL (1)" of "GENERAL (0)" to "MANUAL mode (1)".

Send	Reply
MS:SET,0,1,1	OK or NG

　・Example 2
　Set "SPEED12 (S)" (4) of "SPEED" (5) to "1000pps".

Send	Reply
MS:SET,5,4,1000	OK or NG

120) MS:GET command (Memory switch operation 4：Get)
　　・Description
　　　Get the contents of the memory switch in the memory switch edit mode.
　　・Command format
　　　Send)　　MS:GET,k,n
　　　Reply)　　s
　　・Parameters
　　　Send)　　k：Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

　　　　n：Memory switch content number

127

Reply)   s：Memory switch setting number

> *) For details on each memory switch item, content number, and setting number, refer to the separate " Preparation and Operation ".

・Example

"MODE SEL (1)" setting of "GENERAL (0)" is "MANUAL mode (1)"

Send	Reply
MS:GET,0,1	1

121)   MS:DEF command (Memory switch operation 5：Initialization)

・Description

Initialize the contents of the memory switch in the memory switch edit mode.

・Command format

Send)   MS:DEF,k,n

・Parameters

Send)   k：Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

n：Memory switch content number

> *) For details on each memory switch item, and content number, refer to the separate " Preparation and Operation ".

・Example

Initialize "MODE SEL (1)" of "GENERAL (0)" (HOST mode).

Send	Reply
MS:DEF,0,1	OK or NG

122)　　MS:DEFR command (Memory switch operation 6 : Get the initial value)
　　・Description
　　　　Get the initial value of the memory switch contents in the memory switch edit mode.
　　・Command format
　　　　Send)　　MS:DEFR,k,n
　　　　Reply)　　s
　　・Parameters
　　　　Send)　　k : Memory switch item
　　　　　　　　0　　GENERAL　　　　　　General settings
　　　　　　　　1　　INTERFACE　　　　　Communication settings
　　　　　　　　2　　SENSOR　　　　　　　Sensor settings
　　　　　　　　3　　AXIS　　　　　　　　　Axis settings
　　　　　　　　4　　MOTOR DRIVER　　　Motor driver settings
　　　　　　　　5　　SPEED　　　　　　　　Speed settings
　　　　　　　　6　　ORG　　　　　　　　　Origin settings
　　　　　　　　7　　FEEDBACK　　　　　Feedback control settings
　　　　　　　　8　　SOFT LIMIT　　　　　Soft limit settings
　　　　　　　n : Memory switch content number
　　　　Reply)　　s : Default setting number of memory switch contents
　　　　　　　　　*) For details on each memory switch item, content number, and default setting
　　　　　　　　　　number, refer to the separate " Preparation and Operation ".
　　・Example
　　　Gets the default setting for "AXIS (0)" for "GENERAL (0)".

Send	Reply	Memo
MS:DEFR,0,0	6	The default setting for "AXIS (0)" is "1 + 2 + 3 (6)"

123)　　MS:SETK command (Memory switch operation command 3 : Setting command)
　　・Description
　　　　Set all the contents of the memory switch item in the memory switch edit mode.
　　・Command format
　　　　Send)　　MS:SETK,k,s1,s2,…,sn
　　・Parameters
　　　　Send)　　k : Memory switch item
　　　　　　　　0　　GENERAL　　　　　　General settings
　　　　　　　　1　　INTERFACE　　　　　Communication settings
　　　　　　　　2　　SENSOR　　　　　　　Sensor settings
　　　　　　　　3　　AXIS　　　　　　　　　Axis settings
　　　　　　　　4　　MOTOR DRIVER　　　Motor driver settings
　　　　　　　　5　　SPEED　　　　　　　　Speed settings
　　　　　　　　6　　ORG　　　　　　　　　Origin settings
　　　　　　　　7　　FEEDBACK　　　　　Feedback control settings
　　　　　　　　8　　SOFT LIMIT　　　　　Soft limit settings
　　　　　　　s1 ~ sn : Setting number
　　　　　　　　　*) The number of settings varies depending on the memory switch item.
　　　　　　　　　*) For details on each memory switch item, content number, and setting
　　　　　　　　　　number, refer to the separate " Preparation and Operation ".

・Example
　Set the "GENERAL (0)" setting as follows.
　　No.1 AXIS: 1 + 2 + 3 (6)　　　　　No.6 JOG Y SEL: 2nd axis (1)
　　No.2 MODE SEL: HOST mode (0)　　No.7 CMD FORMAT: SHOT / FC mode (0)
　　No.3 SLEEP SEL: ON (1)　　　　　No.8 TRG / LEV: Positive logic (0)
　　No.4 BEEP SEL: ON (1)　　　　　No.9 TRG WIDTH: 10 µsec (0)
　　No.5 JOG X SEL: 1st axis (0)

Send	Reply
MS:SETK,0,6,0,1,1,0,1,0,0,0	OK or NG

124)　　MS:GETK command (Memory switch operation 4 : Get)
　・Description
　　Get all the contents of the memory switch item in the memory switch edit mode.
　・Command format
　　Send)　　MS:GETK,k
　　Reply)　　s1,s2,….sn
　・Parameters
　　Send)　　k : Memory switch item
　　　　　　0　　GENERAL　　　　　　General settings
　　　　　　1　　INTERFACE　　　　　Communication settings
　　　　　　2　　SENSOR　　　　　　Sensor settings
　　　　　　3　　AXIS　　　　　　　Axis settings
　　　　　　4　　MOTOR DRIVER　　　Motor driver settings
　　　　　　5　　SPEED　　　　　　　Speed settings
　　　　　　6　　ORG　　　　　　　Origin settings
　　　　　　7　　FEEDBACK　　　　　Feedback control settings
　　　　　　8　　SOFT LIMIT　　　　Soft limit settings
　　Reply)　　s1 ~ sn　 : Setting number
　　　　　　　　*) The number of settings varies depending on the memory switch item.
　　　　　　　　*) For details on each memory switch item, and setting number, refer to
　　　　　　　　　　the separate " Preparation and Operation ".
　・Example
　Gets the "GENERAL (0)" setting.
　　No.1 AXIS: 1 + 2 + 3 (6)　　　　　No.6 JOG Y SEL: 2nd axis (1)
　　No.2 MODE SEL: HOST mode (0)　　No.7 CMD FORMAT: SHOT / FC mode (0)
　　No.3 SLEEP SEL: ON (1)　　　　　No.8 TRG / LEV: Positive logic (0)
　　No.4 BEEP SEL: ON (1)　　　　　No.9 TRG WIDTH: 10 µsec (0)
　　No.5 JOG X SEL: 1st axis (0)

Send	Reply
MS:GETK,0	6,0,1,1,0,1,0,0,0

125)　　MS:DEFK command (Memory switch operation 5 : Initialization)
　・Description
　　Initialize all the contents of the memory switch item in the memory switch edit mode.
　・Command format
　　Send)　　MS:DEFK,k

・Parameters

Send)   k：Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

*) For details on each memory switch item, refer to the separate
" Preparation and Operation ".

・Example

Send	Reply	Contents
MS:DEFK,0	OK or NG	Initialize GENERAL (0)

126)   MS:DEFRK command (Memory switch operation 6：Get the initial value)

・Description

Get the initial value of all the contents of the memory switch item in the memory switch edit mode.

・Command format

Send)   MS:DEFRK,k

Reply)   s1 ~ sn

・Parameters

Send)   k：Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

Reply)   s1 ~ sn：Default setting number of memory switch contents

*) The number of settings varies depending on the memory switch item.

*) For details on each memory switch item, and default setting number, refer to the separate " Preparation and Operation ".

・Example

Gets the default setting for "GENERAL (0)".

Send	Reply
MS:DEFRK,0	6,0,1,1,0,1,0,0,0

No.1 AXIS: 1 + 2 + 3 (6)	No.6 JOG Y SEL: 2nd axis (1)
No.2 MODE SEL: HOST mode (0)	No.7 CMD FORMAT: SHOT / FC mode (0)
No.3 SLEEP SEL: ON (1)	No.8 TRG / LEV: Positive logic (0)
No.4 BEEP SEL: ON (1)	No.9 TRG WIDTH: 10 µsec (0)
No.5 JOG X SEL: 1st axis (0)	

127)   PIT:DEL command (Position registration 1：Delete)
　・Description
　　　Delete the registered location information contents.
　・Command format
　　　Send)   PIT:DEL,n
　・Parameters
　　　Send)   n：Location information registration number   1 ~ 20
　・Example
　　Delete the registration details of registration number 1.

Send	Reply
PIT:DEL,1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

128)   PIT:SET command (Position registration 2：Registration)
　・Description
　　　Registers the current position with the specified registration number.
　　　*) If the power of this device is turned off, reset, or the memory switch that automatically restarts is
　　　　changed, the registered position will be discarded.
　・Command format
　　　Send)   PIT:SET,n
　・Parameters
　　　Send)   n：Location information registration number   1 ~ 20
　・Example
　　Registers the current position as registration number 1.

Send	Reply
PIT:SET,1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

129)   PIT:GET command (Position registration 3：Get)
　・Description
　　　Get the registered location information content.
　　　*) If the counter is set to zero after registering with the "PIT_SET:" command, the coordinate value
　　　　obtained by this command will be the calculation result of the registered position and the coordinate
　　　　value immediately before zero setting.

　・Command format
　　　Send)   PIT:GET,n
　　　Reply)   c1,c2,c3
　・Parameters
　　　Send)   n：Location information registration number   1 ~ 20
　　　Reply)   c1：1st axis coordinate value (unit: pls)
　　　　　　　c2：2nd axis coordinate value (unit: pls)
　　　　　　　c3：3rd axis coordinate value (unit: pls)

・Example

Get the location of registration number 3.

Send	Reply	Contents
PIT:GET,3	10000,5000,10	Coordinate values are registered as + 10000pls for the 1st axis, +5000pls for the 2nd axis, and +10pls for the 3rd axis.

130)   PIT:G command (Position registration 4 : Operation 1)

・Description

Moves to the position registered in the specified location information registration number.

*) Since the position is not based on the zero of the coordinate value, the registered position does not change even if the counter is set to zero.

*) If the power of this device is turned off, reset, or the memory switch that automatically restarts is changed, the registered position will be discarded.

・Command format

Send)   PIT:G,n

・Parameters

Send)   n : Location information registration number   1 ~ 20

・Example

Moves to the coordinate value registered in registration number 5.

Send	Reply
PIT:G,5	OK or NG

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

131)   PIT:GRT command (Position registration 5 : Operation order 2 : Completion reply)

・Description

It moves to the location registered in the specified location information registration number and replies to each axis after completion.

*) Since the position is not based on the zero of the coordinate value, the registered position does not change even if the counter is set to zero.

*) If the power of this device is turned off, reset, or the memory switch that automatically restarts is changed, the registered position will be discarded.

・Command format

Send)   PIT:GRT,n

Reply)   r

・Parameters

Send)   n : Location information registration number   1 ~ 20

Reply)   r : Positioning complete axis   1 or 2 or 3

・Example

Move to the position registered in registration number 5, and the operation is completed in the order of the 2nd axis and the 1st axis.

Send	Reply	Reply after the operation is completed
PIT:GRT,5	OK or NG	2
		1

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

132)   PAV:DEL command (Coordinate value registration 1：Delete)
・Description
The registered coordinate value information content is deleted from the main memory
of the controller.
・Command format
Send)   PAV:DEL,n
・Parameters
Send)   n：Coordinate value information registration number   1 ~ 20
・Example
Delete the registration details of registration number 1.

Send	Reply
PAV:DEL,1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

133)   PAV:SET command (Coordinate value registration 2：Registration)
・Description
Registers the current coordinate values in the controller's main memory to the
specified registration number.
・Command format
Send)   PAV:SET,n
・Parameters
Send)   n：Coordinate value information registration number   1 ~ 20
・Example
Register the current coordinate value in registration number 1.

Send	Reply
PAV:SET,1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

134)   PAV:GET command (Coordinate value registration 3：Get)
・Description
Get the registered coordinate value information contents from the main memory of
the controller.
・Command format
Send)   PAV:GET,n
Reply)   c1,c2,c3
・Parameters
Send)   n：Coordinate value information registration number   1 ~ 20
Reply)   c1：1st axis coordinate value (unit: pls)
c2：2nd axis coordinate value (unit: pls)
c3：3rd axis coordinate value (unit: pls)
・Example
Get the coordinate value of registration number 3.

Send	Reply	Contents
PAV:GET,3	10000,5000,10	Coordinate values are registered as + 10000pls for the 1st axis, +5000pls for the 2nd axis, and +10pls for the 3rd axis.

135)　PAV:G command(Coordinate value registration 4：Operation 1)
・Description
　　Moves to the position registered in the specified coordinate value information registration number.
・Command format
　　Send)　PAV:G,n
・Parameters
　　Send)　n：Coordinate value information registration number　　1 ~ 20
・Example
　Moves to the coordinate value registered in registration number 5.

Send	Reply
PAV: G,5	OK or NG

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

136)　PAV:GRT command (Coordinate value registration 5 : Operation 2 : Completion reply)
・Description
　　It moves to the position registered in the specified coordinate value information registration number, and replies for each axis after completion.
・Command format
　　Send)　PAV:GRT,n
　　Reply)　r
・Parameters
　　Send)　n：Coordinate value information registration number　　1 ~ 20
　　Reply)　r：Positioning complete axis　　1 or 2 or 3
・Example
　Move to the coordinate value registered in registration number 5, and the operation is completed in the order of the 2nd axis and the 1st axis.

Send	Reply	Reply after the operation is completed
PAV:GRT,5	OK or NG	2
		1

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

User's Manual
(Command)
HIT Mode

Three-axis Stage Controller

<u>SHRC-203</u>

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1. Overview

This document describes the command format HIT mode commands in the 3-axis stage controller SHRC-203. To use the command format HIT mode, you need to select "HIT" with the memory switch "GENERAL"-"CMD FORMAT" or set it to "HIT" with the "FMT:" command. Before using, please understand the contents of the separate volume "Preparation and Operation".

2. About double buffer

In addition to the normal commands, SHRC-203 has a prebuffer command that can be sent in advance to automatically perform the next operation after the execution is completed.When the operation setting is made in the prebuffer, the prebuffer setting value is migrated to the execution buffer, the prebuffer setting value is deleted, and the operation is started with the migrated execution buffer setting value.When the execution buffer operation is completed, the prebuffer setting value is transferred to the execution buffer, the prebuffer setting value is deleted, and the operation completion character is returned.After that, the operation starts with the automatically migrated execution buffer setting value. Continuous execution is possible by setting the prebuffer between the reply of the operation completion character and the reply of the next operation completion character.If the prebuffer cannot be set during this reply, the automatic execution will end.

1) List of commands using double buffer

Commands	Contents	Memo
MP:	Relative travel distance setting	Prebuffer settings
AP:	Absolute travel distance setting	Prebuffer settings
EP:	Circle interpolation operation	Prebuffer settings
KP:	Linear interpolation operation	Prebuffer settings
WT:	Timed wait standby	
WI:	General-purpose input standby	

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2) Setting command conditions

Refer to the table below for the conditions for using the setting command.

Commands	MP:	AP:	KP:	EP:
Before the start of operation	Write in Overwrite	Write in Overwrite	Write in Overwrite	Write in Overwrite
in operation	Write in Overwrite	Write in Overwrite	Write in Overwrite	Write in Overwrite

If you want to change the contents of the prebuffer, set it again.
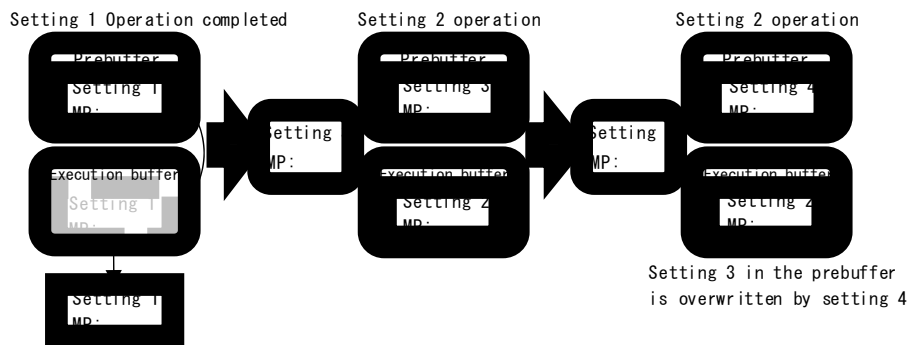
3) About the standby command

It is possible to set a wait condition in the prebuffer, and there are two ways to specify the wait time, one is to specify the wait time and the other is to specify the general-purpose input status.

・Timed wait standby

It can be used by sending the WT: command to the prebuffer, set the wait time from 0.1 to 256 seconds, and wait until the specified time is reached. After waiting, if there is a registration in the prebuffer, the prebuffer setting value moves to the execution buffer and the setting value is executed.

The standby state can be canceled halfway by sending the WT: *, C command, and if there is a registration in the prebuffer, the prebuffer setting value is executed.

(* Is the axis designation)

・General-purpose input standby

It can be used by sending the WI: command to the prebuffer, set general-purpose input conditions 0 to 63, and wait until the same conditions are met. After waiting, if there is a registration in the prebuffer, the prebuffer setting value moves to the execution buffer and the setting value is executed.

By sending the WI: *, C command, the standby state can be canceled halfway, and if there is a registration in the prebuffer, the prebuffer setting value is executed.

(* Is the axis designation)

4) About speed setting

When setting the prebuffer, the speed can be set along with the operation setting values using the MP :, AP :, KP :, and EP: commands.

The speed setting of the MP: and AP: commands sets the minimum speed, maximum speed, and acceleration / deceleration time for the operation specified axis.

KP :, EP: Command speed settings set the minimum speed, maximum speed, and acceleration / deceleration time for the axis with the smallest axis number to be interpolated.

3. About replying to the setting command

After sending the setting command, there will be a reply with the specified characters. I will explain the contents of the reply.

Reply	Contents
OK	A reply will be sent if the command is accepted successfully.
OK_D	After operating with the double buffer command, it will be returned when it is normally set in the prebuffer.
NG	If the command is not accepted, it will be returned. Make sure the command string is correct. Also, please note that each command has transmission conditions.
NG_I	The reply will be returned if it contains NULL of ASCII code or non-ASCII code characters.

4. List of HIT mode commands

Commands	Contents
*IDN?	Equipment information
!:	Acquisition of status (positioning information)
Q:	Get status (coordinates or his status, positioning information)
Q:S	Acquisition of status (status, positioning information)
?:	Setting information
PSET:	Coordinate value preset
RESET:	Perform a reset
SLEEP:	Run and wake up sleep
BO:	Front panel blackout
MODE:	Mode change
F:	Change of stage control method (Close and Open)
C:	Change of motor state (excitation and demagnetization)
BEC:	Execution of positioning incompleteness and error cancellation
BEEP:	Beep operation
S:	Switching the number of divisions
W:	Wait time setting
WT:	Wait for specified time (pre-buffer setting)
WI:	General-purpose input state standby (pre-buffer setting)
H:	Perform machine origin return
HRT:	Execute machine origin return (complete return)
Z:	Executes the theory origin return
ZRT:	Execute logical origin return (return completion)
R:	Execute the theoretical origin setting (zero set)
L:	Operation stop and emergency stop
M:	Relative movement setting operation (execution buffer setting)
MP:	Relative movement setting operation (pre-buffer setting) (completion return)
A:	Absolute coordinate value setting operation (execution buffer setting)
AP:	Absolute coordinate value setting operation (pre-buffer setting) (completion return)
E:	Arc interpolation setting operation (execution buffer setting)
EP:	Arc interpolation setting operation (pre-buffer setting) (completion return)
K:	Linear interpolation setting operation (execution buffer setting)

Commands	Contents
KP:	Linear interpolation setting operation (pre-buffer setting) (completion return)
J:	Jog operation command
JD:	Jog operation (with speed override function)
D:	Speed setting
I:	Check the general-purpose input status
O:	Change general-purpose output status
T:	Trigger output
P:	Internal program
MS:	Memory switch setting
PIT:	Location registration
PAV:	Coordinate value registration
FMT:	Command format settings

*) If there is a description about the memory switch, refer to the separate "Preparation and Operation".

) " IDN?" "?: MODE" "?: CMD" "MODE:" can be used in all operation modes (HOST, MANUAL, REMOTE, TEACH, EDIT, TEST).

1)　*IDN? Command (Get device information)
　　・Description
　　　　Get controller information.
　　　　　*) Can be used in all operation modes (HOST, MANUAL, REMOTE, TEACH, EDIT, TEST).
　　・Command format
　　　　Send) *IDN?
　　　　Reply) v,m,s,f
　　・Parameters
　　　　Reply) v ： Vendor name
　　　　　　　m ： Model name
　　　　　　　s ： Serial number
　　　　　　　f ： Firmware version
　　・Example

Send	Reply
*IDN?	SIGMAKOKI,SHRC-203,2106001001,V2.00.000

2)　!: Command (Get positioning status 1)
　　・Description
　　　　Acquires the positioning status.
　　・Command format
　　　　Send) !:a
　　　　Reply) r1,r2,r3
　　・Parameters
　　　　Send) a ： Axis setting
　　　1　1st axis designation
　　　2　2nd axis designation
　　　3　3rd axis designation
　　　　　　　Not specified All axes specified
　　　　Reply) r1 ： 1st axis positioning state　0 or 1
　　　　　　　r2 ： 2nd axis positioning state　0 or 1
　　　　　　　r3 ： 3rd axis positioning state　0 or 1
　　　　　　　0　Positioning of all controllable axes is complete（READY）
　　　　　　　1　One of the controllable axes has not been positioned（BUSY）
　　・Example

Send	Reply
!:	1,0,0
!:1	1
!:2	0

3) Q: command (Get coordinate values)
　　・Description
　　　　Get the coordinate values.
　　・Command format
　　　　Send) Q:u
　　　　Reply) c1,c2,c3
　　・Parameters
　　　　Send) u：Unit setting
　　　　　　　N / U / M / D (If there is no unit specified, it is judged as pls)
　　　　Reply) c1：1st axis coordinate value
　　　　　　　c2：2nd axis coordinate value
　　　　　　　c3：3rd axis coordinate value
　　　　*) Reply Each item is separated by (comma)
　　・Example

Send	Reply
Q:	-1000,2000,3000
Q:M	M-0.1,M0.2,M0.3

4) Q:S command (Get status)
　　・Description
　　　　Get the detailed status of each axis.
　　・Command format
　　　　Send) Q:S
　　　　Reply) s1,s2,s3
　　・Parameters
　　　　Reply) s1：1st axis status　　　　　　0 ~ 1FFFFFF (Hexadecimal)
　　　　　　　s2：2nd axis status　　　　　　0 ~ 1FFFFFF (Hexadecimal)
　　　　　　　s3：3rd axis status　　　　　　0 ~ 1FFFFFF (Hexadecimal)
　　　　　1bit　Normal (S1 to S10 and emergency stop has not occurred)
　　　　　2bit　Command error (S8)
　　　　　3bit　Scale error (S1)
　　　　　4bit　Disconnect error (S2)
　　　　　5bit　Overflow error (S4)
　　　　　6bit　Emergency
　　　　　7bit　Hunting error (S3)
　　　　　8bit　Limit error (S5)
　　　　　9bit　Counter overflow error (S6)
　　　　　10bit　Config error (S7)
　　　　　11bit　24V IO overload warning (W1)
　　　　　12bit　24V Terminal block overload warning (W2)
　　　　　13bit　System error (S9)
　　　　　14bit　Over heat warning (W3)
　　　　　15bit　Over heat error (S10)
　　　　　16bit　Out of in-position range (after positioning is completed) (READY)
　　　　　17bit　Out of in-position range (during positioning operation) (BUSY)
　　　　　18bit　Logical origin return is in progress

19bit Machine origin return is in progress

20bit CW Limit detection

21bit CCW Limit detection

22bit CW software limit stop

23bit CCW software limit stop

24bit NEAR sensor detection

25bit ORG sensor detection

bit is 1   ON

bit is 0   OFF

・Example

Send	Reply	Memo
Q:S	1,1,1	Memory switch "GENERAL"-"AXIS" is 1 + 2 + 3
Q:S	1,1,	Memory switch "GENERAL"-"AXIS" is 1 + 2

5) ?:V command (Get setting 1: Version)

・Description

Get the firmware version.

・Command format

Send) ?:V

Reply) f

・Parameters

Reply) f : Firmware version

・Example

Send	Reply
?:V	V2.00.000

6) ?:R command (Get setting 2: Scale resolution)

・Description

Gets the scale resolution.

・Command format

Send) ?:Ra

Reply) r1,r2,r3

・Parameters

Send) a : Axis setting

1   1st axis designation

2   2nd axis designation

3   3rd axis designation

Not specified All axes specified

Reply) r1 : 1st axis scale resolution (unit: nm)

r2 : 2nd axis scale resolution (unit: nm)

r3 : 3rd axis scale resolution (unit: nm)

・Example

Send	Reply
?:R	1,10,50
?:R1	1
?:R2	10

7)   ?:P command (Get setting 3：Movement amount of 1 pulse)
  ・Description
    Acquires the movement amount of one pulse calculated from the memory
    switches "AXIS"-"BASE RATE" and "MOTOR DRIVER"-"DIVIDE".
  ・Formula
    1 pulse movement amount (nm) = (BASE RATE * 10) / DIVIDE
    Example：BASE RATE = 200, DIVIDE = 2000
             (200 * 10) / 2000 = 1nm
  ・Command format
    Send) ?:Pa
    Reply) p1,p2,p3
  ・Parameters
    Send) a：Axis setting
        1   1st axis designation
        2   2nd axis designation
        3   3rd axis designation
        Not specified All axes specified
    Reply) p1：1st axis 1 pulse movement amount (unit: nm)
          p2：2nd axis 1 pulse movement amount (unit: nm)
          p3：3rd axis 1 pulse movement amount (unit: nm)
  ・Example

Send	Reply
?:P	1,5,10
?:P1	1
?:P2	5

8)   ?:S command (Get setting 4：Motor driver division number)
  ・Description
    Gets the number of divisions of the motor driver.
  ・Command format
    Send) ?:Sa
    Reply) m1,m2,m3
  ・Parameters
    Reply) a：Axis setting
        1   1st axis designation
        2   2nd axis designation
        3   3rd axis designation
        Not specified All axes specified

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Reply) m1：1st axis motor driver divisions

m2：2nd axis motor driver divisions

m3：3rd axis motor driver divisions

・Example

Send	Reply
?:S	20,40,80
?:S1	20
?:S2	40

9)　　?:AN command (Get setting 5：Axis name)

・Description

Memory switch "AXIS"-Acquires the setting contents (axis name) of "AXIS NAME".

・Command format

Send) ?:ANa

Reply) n1,n2,n3

・Parameters

Send) a：Axis setting

1　1st axis designation

2　2nd axis designation

3　3rd axis designation

Not specified All axes specified

Reply) n1：1st axis axis name

n2：2nd axis axis name

n3：3rd axis axis name

1 ~ 9, A ~ Z

・Example

Send	Reply
?:AN	1,2,3
?:AN1	1
?:AN2	2

10) ?:D command (Get setting 6：Movement speed setting value)
　　・Description
　　　　Acquires the operation speed at the time of command operation.
　　・Command format
　　　　Send) ?:Dua
　　　　Reply) s1,f1,r1,s2,f2,r2,s3,f3,r3
　　・Parameters
　　　　Send) u：Unit setting
　　　　　　　N / U / M / D (If there is no unit specified, it is judged as pls)

　　　　　　　a：Axis setting
　　　　　　　　1   1st axis designation
　　　　　　　　2   2nd axis designation
　　　　　　　　3   3rd axis designation
　　　　　　　　Not specified All axes specified
　　　　Reply) d1：1st axis operating speed setting value
　　　　　　　d2：2nd axis operating speed setting value
　　　　　　　d3：3rd axis operating speed setting value
　　　　　　　　Minimum speed setting range: 1 ~ 1,000,000 (when pulse is specified)
　　　　　　　　Maximum speed setting range: 1 ~ 1,000,000 (when pulse is specified)
　　　　　　　　Acceleration / deceleration time setting range: 1 ~ 1,000 mS
　　・Example

Send	Reply	Memo
?:D	100,1000,200,200,2000,200,300,3000,300	Memory switch "GENERAL"-"AXIS" is 1 + 2 + 3
?:D	100,1000,200,200,2000,200,,,	Memory switch "GENERAL"-"AXIS" is 1 + 2
?:D1	100,1000,200	
?:D2	200,2000,200	
?:D1M	0.001,0.01,200	mm / S designation

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11) ?:B command (Get setting 7 : Machine origin return speed setting value)
・Description
Acquires the machine origin return operation speed during command operation.
・Command format
Send) ?:Dua
Reply) s1,f1,r1,s2,f2,r2,s3,f3,r3
・Parameters
Send) u：Unit setting
N / U / M / D (If there is no unit specified, it is judged as pls)
a：Axis setting
1　1st axis designation
2　2nd axis designation
3　3rd axis designation
Not specified All axes specified
Reply) d1：1st axis operating speed setting value
d2：2nd axis operating speed setting value
d3：3rd axis operating speed setting value
Minimum speed setting range: 1 ~ 1,000,000 (when pulse is specified)
Maximum speed setting range: 1 ~ 1,000,000 (when pulse is specified)
Acceleration / deceleration time setting range: 1 ~ 1,000 mS
・Example

Send	Reply	Memo
?:B	100,1000,200,200,2000,200,300,3000,300	Memory switch "GENERAL"-"AXIS" is 1 + 2 + 3
?:B	100,1000,200,200,2000,200,,,	Memory switch "GENERAL"-"AXIS" is 1 + 2
?:B1	100,1000,200	
?:B2	200,2000,200	
?:B1M	0.001,0.01,200	mm / S designation

12) ?:MP command (Get setting 8：Relative movement [Prebuffer])
　　・Description
　　　　Acquires the movement amount set by the MP: command. If it is not set, ",," will be returned.
　　・Command format
　　　　Send) ?:MPu
　　　　Reply) m1,m2,m3
　　・Parameters
　　　　Send) u：Unit setting
　　　　　　　N / U / M / D (If there is no unit specified, it is judged as pls)
　　　　Reply) m1：1st axis movement amount　　　　　　　　　　　　(unit: pls)
　　　　　　　m2：2nd axis movement amount　　　　　　　　　　　　(unit: pls)
　　　　　　　m3：3rd axis movement amount　　　　　　　　　　　　(unit: pls)
　　・Example

Send	Reply	Memo
?:MP	1000,2000,3000	Memory switch "GENERAL"-"AXIS" is 1 + 2 + 3
?:MP	1000,2000,	Memory switch "GENERAL"-"AXIS" is 1 + 2
?:MP	1000,,3000	Memory switch "GENERAL"-"AXIS" is 1 + 3

13) ?:AP command (Get setting 9：Absolute movement [Prebuffer])
　　・Description
　　　　Acquires the destination coordinate value set by the AP: command.If it is not set, ",," will be returned.
　　・Command format
　　　　Send) ?:Au
　　　　Reply) m1,m2,m3
　　・Parameters
　　　　Send) u：Unit setting
　　　　　　　N / U / M / D (If there is no unit specified, it is judged as pls)
　　　　Reply) m1：1st axis coordinate value　　　　　　　　　　(unit: pls)
　　　　　　　m2：2nd axis coordinate value　　　　　　　　　　(unit: pls)
　　　　　　　m3：3rd axis coordinate value　　　　　　　　　　(unit: pls)
　　・Example

Send	Reply	Memo
?:AP	1000,2000,3000	Memory switch "GENERAL"-"AXIS" is 1 + 2 + 3
?:AP	1000,2000,	Memory switch "GENERAL"-"AXIS" is 1 + 2
?:AP	1000,,3000	Memory switch "GENERAL"-"AXIS" is 1 + 3

14) ?:EP command (Get setting 10：Arc interpolation [Prebuffer])
　　・Description
　　　　Gets the circle interpolation setting value set by the EP: command. If it is not set,
　　　　",," will be returned.
　　・Command format
　　　　Send) ?:EPu
　　　　Reply) m
　　・Parameters
　　　　Send) u：Unit setting
　　　　　　　N / U / M / D (If there is no unit specified, it is judged as pls)
　　　　Reply) m：Circle interpolation setting value　　　　　　　　　　　(unit: pls)
　　・Example

Command	Send	Reply	Memo
Perfect circle	?:EP	0,1,2,0,100,100	
Angle	?:EP	1,1,2,0,0,0,170	
Passing point indication	?:EP	2,1,2,0,0,0,100,100	
Perfect circle helical	?:EP	3,1,2,3,0,1,100,100,1000	
Command	Send	Reply	Memo
Angle helical	?:EP	4,1,2,0,0,0,170,1000	
Passing point indication helical	?:EP	5,1,2,3,0,0,0,100,100,1000	
Perfect circle	?:EP,M	0,1,2,0,0.001,0.001	mm designation

15) ?:KP command (Get setting 11：Linear interpolation [Prebuffer])
　　・Description
　　　　Gets the linear interpolation setting value set by the KP: command. If it is not set,
　　　　",," will be returned.
　　・Command format
　　　　Send) ?:KPu
　　　　Reply) m
　　・Parameters
　　　　Send) u：Unit setting
　　　　　　　N / U / M / D (If there is no unit specified, it is judged as pls)
　　　　Reply) m：Linear interpolation setting value　　　　　　　　　(unit: pls)
　　・Example

Send	Reply	Memo
?:KP	1000,2000,3000	Set on the 1st, 2nd, and 3rd axes
?:KP	1000,2000,	Set on the 1st, 2nd axes
?:KP	1000,,3000	Set on the 1st, 3rd axes
?:KPM	0.01,0.02,0.03	Set on the 1st, 2nd, and 3rd axes, mm designation

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16) ?:O command (Get setting 12：General-purpose output status)
- ・Description
    - Gets the general-purpose output status.
- ・Command format
    - Send) ?:O
    - Reply) o
- ・Parameters
    - Reply) o：General-purpose output status 0 ~ 63
- ・Example

Send	Reply	Memo
?:O	15	OUT1 ~ 4：ON　OUT5,6：OFF

*) ON means that current is flowing through the transistor of the photocoupler.

For details, refer to the separate volume " Preparation and Operation ".

17) ?:W command (Get setting 13：Wait time)
- ・Description
    - Gets the wait time setting value.
- ・Command format
    - Send) ?:W
    - Reply) w
- ・Parameters
    - Reply) w：Wait time set value 0 ~ 2550　　　　　　　　　　(unit: 0.1 sec)
- ・Example

Send	Reply	Memo
?:W	255	25.5ms

18) ?:WT command (Get setting 14：Wait time)
- ・Description
    - Gets the wait time setting value for each axis. If it is not set, ",," will be returned.
- ・Command format
    - Send) ?:WT
    - Reply) w1,w2,w3
- ・Parameters
    - Reply) w1：1st axis wait time set value 1-2550　　　　　(unit: 0.1sec)
    - 　　　　w2：2nd axis wait time set value 1-2550　　　　(unit: 0.1sec)
    - 　　　　w3：3rd axis wait time set value 1-2550　　　　(unit: 0.1sec)
- ・Example

Send	Reply	Memo
?:WT	255,255,255	All axis setting value (25.5ms)

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19) ?:WI command (Get setting 15：General-purpose input wait)
   ・Description
     Gets the settings for waiting for general-purpose input. If it is not set, ",," will be
     returned.
   ・Command format
     Send) ?:WI
     Reply) i1,i2,i3
   ・Parameters
     Reply) i1：1st axis General-purpose input wait setting 0 ~ 63
         i2：2nd axis General-purpose input wait setting 0 ~ 63
         i3：3rd axis General-purpose input wait setting 0 ~ 63
   ・Example

Send	Reply	Memo
?:WI	63,63,63	All axis setting values (N1 ~ 6 are all ON)

  *) ON means that current is flowing through the transistor of the photocoupler.
    For details, refer to the separate volume " Preparation and Operation ".

20) ?:N command (Get setting 16：Model name)
   ・Description
     Acquires the model name of this controller.
   ・Command format
     Send) ?:N
     Reply) n
   ・Parameters
     Reply) n：Model name
   ・Example

Send	Reply
?:N	SHRC-203

21) ?:J command (Get setting 17：Jog motion direction)
   ・Description
     J: Acquires the operation direction setting set by the command. If it is not set, ",,"
     will be returned.
   ・Command format
     Send) ?:J
     Reply) j
   ・Parameters
     Reply) j：Operating direction setting value + or -
   ・Example

Send	Reply	Memo
?:J	+,-,+	Memory switch "GENERAL"-"AXIS" is 1 + 2 + 3

22) ?:ACS command (Get setting 18：Auto-config status)
・Description
  Gets the current autoconfig status.
・Command format
  Send) ?:ACSa
  Reply) j
・Parameters
  Send) a：Axis setting
       1   1st axis designation
       2   2nd axis designation
       3   3rd axis designation
       Not specified All axes specified
  Reply) j：Auto-config status
       0   Memory switch CONFIG OFF
       1   Memory switch CONFIG is ON. Normal reading completed.
       E   Memory switch CONFIG is ON. Read error.
       D   Memory switch CONFIG is ON. Device not connected error.
・Example

Send	Reply	Memo
?:ACS	1,0,1	When the memory switches CONFIG1 and CONFIG3 are ON and CONFIG2 is OFF and read normally
?:ACS	,,1	Memory switch "GENERAL"-"AXIS" is 3
?:ACS1	1	When the memory switch CONFIG1 is ON and read normally

23) ?:C command Get setting 19：Motor excitation state)
・Description
  Gets the current motor excitation state.
・Command format
  Send) ?:Ca
  Reply) j
・Parameters
  Send) a：Axis setting
       1   1st axis designation
       2   2nd axis designation
       3   3rd axis designation
       Not specified All axes specified
  Reply) j：Motor excitation state
       0   Motor excitation OFF
       1   Motor excitation ON
・Example

Send	Reply	Memo
?:C	1,0,1	Motor excitation is ON for the 1st and 3rd axes, OFF for the 2nd axis
?:C	,,1	Memory switch "GENERAL"-"AXIS" is 3
?:C1	1	Motor excitation is ON for the first axis

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24) ?:F command (Get setting 20：Stage control status)
・Description
　　Gets the current stage control state.
・Command format
　　Send) ?:Fa
　　Reply) j
・Parameters
　　Send) a：Axis setting
　　　　　1　1st axis designation
　　　　　2　2nd axis designation
　　　　　3　3rd axis designation
　　　　　Not specified All axes specified
　　Reply) j：Stage control state
　　　　　0　Close control state
　　　　　1　Open control state
・Example

Send	Reply	Memo
?:F	0,1,0	The stage control state is the 1st and 3rd axis Closed control states, and the 2nd axis is Open control state.
?:F	,,0	Memory switch "GENERAL"-"AXIS" is 3
?:F1	0	Stage control state is 1st axis Close control state

25) ?:SLEEP command (Get setting 21：Sleep state)
・Description
　　Get the sleep state.
・Command format
　　Send) ?:SLEEP
　　Reply) s
・Parameters
　　Reply) s：Sleep state 0 or 1
　　　　　0　Wake from sleep
　　　　　1　Sleeping
・Example

Send	Reply
?:SLEEP	0

26) ?:BO command (Get setting 22：The lighting status of the display)
・Description
　　Acquires the lighting status of the backlight and LED of the display unit.
・Command format
　　Send) ?:BO
　　Reply) l

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・Parameters

Reply) l：Backlight and LED on and off 0 or 1

  0 OFF

  1 ON

・Example

Send	Reply
?:BO	0

27)　?:MODE command (Get setting 23：Mode)

 ・Description

  Gets the current mode. The reply "HOST, PROGRAM" will be sent when the program mode is entered by the "P: R" command. "HOST, MS" will be returned when you switch to the memory switch edit mode with "MS: ON".

   *) Can be used in all operation modes (HOST, MANUAL, REMOTE, TEACH, EDIT, TEST).

 ・Command format

  Send) ?:MODE

  Reply) m

 ・Parameters

  Reply) m：Mode

HOST	HOST mode
HOST,PROGRAM	Program mode (in HOST mode)
HOST,MS	Memory switch edit mode (in HOST mode)
MANUAL	MANUAL mode
REMOTE	REMOTE mode
TEACHING	TEACHING mode
EDIT	EDIT mode
TEST	TEST mode

 ・Example

Send	Reply
?:MODE	REMOTE

28)　?:FMT command (Get setting 24：Command format)

 ・Description

  Gets the current command format mode.

 ・Command format

  Send) ?:FMT

  Reply) f

 ・Parameters

  Reply) f：Command format

SHOT_FC	SHOT_FC mode
HIT	HIT mdoe

 ・Example

Send	Reply
?:FMT	HIT

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29) ?:BEEP command (Get setting 25 : Beep sound setting status)
   ・Description
      Gets the beep sound setting status.
   ・Command format
      Send) ?:BEEP
      Reply) b
   ・Parameters
      Reply) b : Beep state 0 or 1
             0   Beep state OFF
             1   Beep state ON
   ・Example

Send	Reply
?:BEEP	0

30) ?:CMD command (Get setting 26 : Previous sendcommand)
   ・Description
      Acquires the command sent to the controller before sending this command.
        *) Can be used in all operation modes (HOST, MANUAL, REMOTE, TEACH, EDIT, TEST).
   ・Command format
      Send) ?:CMD
      Reply) c
   ・Parameters
      Reply) c : Forward command content
   ・Example

Send	Reply
?:CMD	WI:W,C

31) ?:L command (Get setting 27 : The program execution status)
   ・Description
      Gets the program execution status.
   ・Command format
      Send) ?:L
      Reply) pn,pr,pl,lc1, lc2, lc3, lc4, lc5, lc6, lc7, lc8, lc9
   ・Parameters
      Reply) pn : Program numbers   1 ~ 8
           pr : Program execution status 0 ~ 8
              0 Not executed
              1 During execution
              2 During PAUSE
              3 During execution (one line)
              4 Stop while processing
                 (when controllable axis and program axis selection are different)
              5 Stop while processing
                 (If an error occurs)
              6 Stop while processing
                 (When an unexpected pattern is selected)

    7 Stop while processing

    (When the motor excitation is OFF for the program-selected axis)

    8 Stop while processing

    (When the program selection axis is BUSY)

   pl：Program execution line number   1 ~ 4000

   lc1：Nest 1 Loop number   0 ~ 65535

   lc2：Nest 2 Loop number   0 ~ 65535

   lc3：Nest 3 Loop number   0 ~ 65535

   lc4：Nest 4 Loop number   0 ~ 65535

   lc5：Nest 5 Loop number   0 ~ 65535

   lc6：Nest 6 Loop number   0 ~ 65535

   lc7：Nest 7 Loop number   0 ~ 65535

   lc8：Nest 8 Loop number   0 ~ 65535

   lc9：Nest 9 Loop number   0 ~ 65535

・Example

Send	Reply
?:L	1,1,15,0,0,0,0,0,0,0,0,0,0

32) ?:T command (Get setting 28：Trigger execution status)

 ・Description

  Gets the trigger execution status. If it is not set, "NS" will be replied.

 ・Command format

  Send) ?:T

  Reply 1) m,a,v

  Reply 2) m,v

 ・Parameters

  Reply) m：Trigger execution content 0 ~ 3

    0：PULSE (Issued every set number of pulses)

    1：TIMER (Issued every set time)

    2：SCALE PLUS

    (Issued for each set number of plus direction scale pulses)

    3：SCALE MINUS

    (Issued for each set number of minus direction scale pulses)

  a：Axis setting 1 ~ 3

    1 1st axis designation

    2 2nd axis designation

    3 3rd axis designation

  v：Setting value

    PULSE：2 ~ 30000pls

    TIMER：1 ~ 10000 [0.01 sec unit]

    SCALE PLUS：±2 ~ 30000pls

    SCALE MINUS：±2 ~ 30000pls

・Example

Send	Reply	Contents
?:T	0,1,1000	When the trigger execution content is PULSE, SCALE PLUS, SCALE MINUS
?:T	1,20	When the trigger execution content is TIMER

33) ?:SN command (Get setting 29: Setial number)
  ・Description
    Get the serial number.
  ・Command format
    Send) ?:SN
    Reply) sn
  ・Parameters
    Reply) sn：Serial number   (Example：2106001001)
  ・Example

Send	Reply
?:SN	2106001001

34) ?:AXIS command (Get setting 30: Controllable axis)
  ・Description
    Acquires the setting information of the controllable axis (memory switch "GENERAL"-"AXIS").
  ・Command format
    Send)   ?:AXIS
    Reply)   a
  ・Parameters
    Reply)   a： 0   Valid only for the 1st axis
                  1   Valid only for the 2nd axis
                  2   Valid only for the 3rd axis
                  3   1st and 2nd axis valid
                  4   1st and 3rd axis valid
                  5   2nd and 3rd axis valid
                  6   1st, 2nd and 3rd axis valid
  ・Example

Send	Reply	Contents
?:AXIS	6	1st, 2nd and 3rd axis valid

35)   PSET: command (Coordinate value preset)
  ・Description
    Preset the coordinate values.
  ・Command format
    Send) PSET:m1u1c1,m2u2c2,m3u3c3
  ・Parameters
    Send) m1：1st axis sign
        m2：2nd axis sign

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m3：3rd axis sign

　+ Is set to plus direction,-is set to minus direction

　(if there is no sign, it is judged as +)

u1：1st axis unit designation

u2：2nd axis unit designation

u3：3rd axis unit designation

　N / U / M / D (If there is no unit specified, it is judged as pls)

c1：1st axis coordinate value

c2：2nd axis coordinate value

c3：3rd axis coordinate value

　Setting range：0 ~ 999,999,999 (In the case of pulse)

・Example

Send	Reply	Memo
PSET:1000,,	OK or NG	1st axis designation
PSET:M0.01,,M0.03	OK or NG	1st and 3rd axis designation
PSET:1000,2000,3000	OK or NG	All axes designation

*) In the case of Busy, it will be "NG" and this command cannot be executed.

36)　RESET: command (Reset execution)

・Description

　Reboot the controller.

・Command format

　Send) RESET:

・Example

Send	Reply
RESET:	OK or NG

37)　SLEEP: command (Sleep execution)

・Description

　Toggle sleep state.

・Command format

　Send) SLEEP:s

・Parameters

　Send) s：Sleep state　　　　0 or 1

　　　0　Wake from sleep

　　　1　Go to sleep

・Example

Send	Reply
SLEEP:1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

*) If the position shifts during sleep with the CLOSE setting, it will return to the position before sleep when returning from the sleep state.

38)　　BO: command (Display lighting operation)
　・Description
　　　Switches the lighting status of the backlight and LED of the display unit.
　・Command format
　　　Send) BO:l
　・Parameters
　　　Send) l : Turn off or turn on the backlight and LED　　　　　　　0 or 1
　　　　　　　0　OFF
　　　　　　　1　ON
　・Example

Send	Reply
BO:1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

39)　　MODE: command (Mode change)
　・Description
　　　Change the mode.
　　　*) Can be used in all operation modes (HOST, MANUAL, REMOTE, TEACH, EDIT, TEST).
　・Command format
　　　Send) MODE:m
　・Parameters
　　　Send) m : Change destination mode
　　　　　　　HOST　　　　　　HOST mode
　　　　　　　MANUAL　　　　　MANUAL mode
　　　　　　　REMOTE　　　　　REMOTE mode
　　　　　　　TEACHING　　　　TEACHING mode
　　　　　　　EDIT　　　　　　EDIT mode
　　　　　　　TEST　　　　　　TEST mode
　・Example

Send	Reply
MODE:MANUAL	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

40)　FMT: command (Command format change)
　・Description
　　　Change the command format.
　・Command format
　　　Send) FMT:f
　・Parameters
　　　Send) f : Command format
　　　　　　　SHOT_FC　　　　SHOT_FC mode
　　　　　　　HIT　　　　　　　HIT mode

・Example

Send	Reply
FMT:HIT	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

41) F: command (Stage control method change)
　　・Description
　　　　Change the stage control method.
　　・Command format
　　　　Send) F:f1,f2,f3
　　・Parameters
　　　　Send) f1：1st axis control method
　　　　　　　f2：2nd axis control method
　　　　　　　f3：3rd axis control method
　　　　　　　　0　Close control state
　　　　　　　　1　 Open control state

　　・Example

Send	Reply	Memo
F:0,0,0	OK or NG	All axes designation
F:0,0,	OK or NG	1st and 2nd axis designation

*) In the case of Busy, it will be "NG" and this command cannot be executed.

42)　　C: command (Motor state change)
　　・Description
　　　　Change the motor status.
　　・Command format
　　　　Send) C:c1,c2,c3
　　・Parameters
　　　　Send) c1：1st axis motor excitation state
　　　　　　　c2：2nd axis motor excitation state
　　　　　　　c3：3rd axis motor excitation state
　　　　　　　　0　Excitation state OFF
　　　　　　　　1　Excitation state ON

　　・Example

Send	Reply	Memo
C:1,1,1	OK or NG	All axes designation
C:1,1,	OK or NG	1st and 2nd axis designation

*) In the case of Busy, it will be "NG" and this command cannot be executed.

43) BEC: command (Positioning incomplete and error cancellation)
・Description
Clears the positioning incomplete state (BUSY) and the error.
*) Can be canceled: Limit error / Overflow error / Emergency stop
・Command format
Send) BEC:b1,b2,b3
・Parameters
Send) b1：1st axis release
b2：2nd axis release
b3：3rd axis release
0　No release
1　Release
・Example

Send	Reply	Memo
BEC:1,1,1	OK or NG	
BEC:1,1,0	OK or NG	1st and 2nd axis designation, 3rd no release
BEC:1,1,	OK or NG	1st and 2nd axis designation

44)　　BEEP: command (Beep operation)
・Description
Switches whether or not to make a beep sound.
・Command format
Send) BEEP:b
・Parameters
Send) b：Beep state　　　　　　　0 or 1
0　Beep OFF
1　Beep ON
・Example

Send	Reply
BEEP:0	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

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45) S: command (Number of divisions setting)
・Description
Set the number of divisions of the motor driver.
*) When the power is turned on, the value of the memory switch "MOTOR DRIVER"-"DIVIDE" is set.
*) If the memory switch "AXIS"-"CONFIG" is ON, this command is invalid.
・Command format
Send) S:m1,m2,m3
・Parameters
Send) m1 : 1st axis motor driver division
　　　　　m2 : 2nd axis motor driver division
　　　　　m3 : 3rd axis motor driver division
　　　　　　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
　　　　　　*) If the number of divisions is other than the above, a command error will occur.
・Example

Send	Reply	Memo
S:100,200,400	OK or NG	All axes designation
S:100,200,	OK or NG	1st and 2nd axis designation

*) In the case of Busy, it will be "NG" and this command cannot be executed.

46)　　W: command (Waiting time)
・Description
Set the waiting time until READY is reached after determining that positioning is complete.
・Command format
Send) W:w
・Parameters
Send) w : Waiting time　　　0 ~ 2550　　　　　(0.1sec unit)
・Example

Send	Reply
W:255	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

47)　　WT: command (Wait for specified time [prebuffer])
・Description
This is a prebuffer command that waits for a specified time. If a waiting time is set in the W: command, the waiting process of this command starts after the waiting time has elapsed. If "0" is specified, the running timer operation is stopped.
*) This command can be used only when the double buffer function is enabled.
For details, refer to "2. About the double buffer".
・Command format
Send) WT:w1,w2,w3

・Parameters
　　Send) w1 : 1st axis waiting time
　　　　　 w2 : 2nd axis waiting time
　　　　　 w3 : 3rd axis waiting time
　　　　　　　0 ~ 2550　　　　　(0.1sec unit)

・Example

Send	Reply	Memo
WT:255,255,255	OK or NG	All axes designation
WT:255,255,	OK or NG	1st and 2nd axis designation

*) This command was sent while the operation was being executed by the "H:", "HRT:", "Z:", "ZRT:", "M:", "A:", "E:", "K:", and "J:" commands. In that case, it cannot be set as a double buffer and will be "NG".

48)　WI: command (General purpose input state wait [Prebuffer])
　・Description
　　　This is a prebuffer command that waits until the specified general-purpose input is set.
　　　*) This command can be used only when the double buffer function is enabled.
　　　　For details, refer to "2. About the double buffer".
　・Command format
　　　Send) WI:i1,i2,i3
　・Parameters
　　　Send) i1 : 1st axis general-purpose input
　　　　　　 i2 : 2nd axis general-purpose input
　　　　　　 i3 : 3rd axis general-purpose input
　　　　　　　0 to 63
　　　　　　　C　　　　　Cancel waiting
　・Example

Send	Reply	Memo
WI:63,63,63	OK or NG	All axes designation (All effective axes IN1-6: ON)
WI:1,2,	OK or NG	1st and 2nd axis designation (1st axis IN1: ON IN2-6: OFF) (2nd axis IN2: ON IN1,3-6: OFF)

*) ON means that current is flowing through the transistor of the photocoupler. For details, refer to the separate volume " Preparation and Operation ".

*) This command was sent while the operation was being executed by the "H:", "HRT:", "Z:", "ZRT:", "M:", "A:", "E:", "K:", and "J:" commands. In that case, it cannot be set as a double buffer and will be "NG".

49)　　H: command (Machine origin return 1)

・Description

Performs mechanical origin return. After completion, the coordinate values will be reset to zero. The operating speed follows the setting of the "B:" command.

・Command format

Send) Hm:o1,o2,o3

・Parameters

Send) m：Origin return method designation　　0 or 1 or 2 or 3 or 4 or unspecified

　　　　0　MARK
　　　　1　MINI
　　　　2　MIDDLE
　　　　3　ORGS
　　　　4　NORMAL
　　　Unspecified　Execute with memory switch setting
　　o1：1st axis return execution
　　o2：2nd axis return execution
　　o3：3rd axis return execution
　　　0　Do not perform a return
　　　1　Perform a return

・Example

Send	Reply	Memo
H:1,1,1	OK or NG	All axes designation
H0:1,1,1	OK or NG	MARK method designation

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

50) HRT: command (Mechanical origin return 2：Completion reply)

・Description

The machine origin is returned, and after completion, there will be a reply for each axis. After completion, the coordinate values will be reset to zero. The operating speed follows the setting of the "B:" command.

・Command format

Send) HRTm:o1,o2,o3

Reply) r

・Parameters

Send) m：Origin return method designation　　0 or 1 or 2 or 3 or 4 or unspecified

　　　　0　MARK
　　　　1　MINI
　　　　2　MIDDLE
　　　　3　ORGS
　　　　4　NORMAL
　　　Unspecified　Execute with memory switch setting
　　o1：1st axis return execution
　　o2：2nd axis return execution
　　o3：3rd axis return execution
　　　0　Do not perform a return
　　　1　Perform a return

Reply) r：Positioning complete axis   1 or 2 or 3

・Example

Send	Reply	Reply after the operation is completed	Memo
HRT:1,1,1	OK or NG	1 and 2, 3	All axes designation
HRT:1,1,0	OK or NG	1 and 2	1st and 2nd axis designation
HRT0:1,1,1	OK or NG	1 and 2, 3	MARK method designation

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

51) Z: command (Logical origin return 1)

・Description

 Move ~ the position of the logical origin "0". The operating speed follows the setting of the "D:" command.

・Command format

 Send) Z:o1,o2,o3

・Parameters

 Send) o1：1st axis return execution

 o2：2nd axis return execution

 o3：3rd axis return execution

 0   Do not perform a return

 1   Perform a return

・Example

Send	Reply	Memo
Z:1,1,1	OK or NG	All axes designation

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

52) ZRT: command (Logical origin return 2：Completion reply)

・Description

 Move to the position of the logical origin "0", and after completion, there will be a reply for each axis. The operating speed follows the setting of the "D:" command.

・Command format

 Send) ZRT:o1,o2,o3

 Reply) r

・Parameters

 Send) o1：1st axis return execution

 o2：2nd axis return execution

 o3：3rd axis return execution

 0   Do not perform a return

 1   Perform a return

 Reply) r：Positioning complete axis   1 or 2 or 3

・Example

Send	Reply	Reply after the operation is completed	Memo
ZRT:1,1,1	OK or NG	1 and 2, 3	All axes designation
ZRT:1,1,0	OK or NG	1 and 2	1st and 2nd axis designation

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

53)   R: command (Logical origin setting)
　・Description
Reset the coordinate value to "0".
　・Command format
　　　Send) R:o1,o2,o3
　・Parameters
　　　Send) o1：1st axis origin setting
　　　　　　o2：2nd axis origin setting
　　　　　　o3：3rd axis origin setting
　　　　　　　0   Do not perform origin setting
　　　　　　　1   Perform origin setting
　・Example

Send	Reply	Memo
R:1,1,1	OK or NG	All axes designation
R:1,1,0	OK or NG	1st and 2nd axis designation

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

54)   RC: command (Initialization of logical origin setting)
　・Description
　　　Cancels the logical origin setting. For example, if you set zero at the position of the coordinate value +1000 with the "R: command", move it to the position of the coordinate value +500, and then execute this command, the current coordinate value will be 1500.
　・Command format
　　　Send) RC:r1,r2,r3
　・Parameters
　　　Send) o1：1st axis initialization
　　　　　　o2：2nd axis initialization
　　　　　　o3：3rd axis initialization
　　　　　　　0   No initialization
　　　　　　　1   Initialization
　・Example

Send	Reply	Memo
RC:1,1,1	OK or NG	All axes designation
RC:1,1,0	OK or NG	1st and 2nd axis designation

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

55)   L: command (Stop operation 1)

・Description

Decelerate and stop the stage.

・Command format

Send) L:a1,a2,a3

・Parameters

Send) o1：1st axis stop execution

o2：2nd axis stop execution

o3：3rd axis stop execution

0   No stop execution

1   Stop execution

・Example

Send	Reply	Memo
L:1,1,1	OK or NG	All axes designation
L:1,1,0	OK or NG	1st and 2nd axis designation

*) In the case of the motor excitation is OFF, it will be "NG" and this command cannot be executed.

56) L:E command (Stop operation 2：Emergency stop)

・Description

Immediately stop the stages of all axes and put them in an emergency stop state.

The excitation of the motor in case of emergency stop depends on the memory switch "AXIS"-"EMG MT EXCT *".

To cancel, send the "BEC:" command.

・Command format

Send) L:E

・Example

Send	Reply
L:E	OK or NG

57)　M: command (Relative movement amount setting 1 [Execution buffer])
・Description
It is a command to set the movement axis, movement direction, and relative movement amount and operate the relative value. The operation is acceleration / deceleration drive. The operating speed follows the setting of the "D:" command.
・Command format
Send) M:m1u1c1,m2u2c2,m3u3c3
・Parameters
Send) m1：1st axis sign
　　　m2：2nd axis sign
　　　m3：3rd axis sign
　　　　+ Is set to plus direction,-is set to minus direction
　　　　(if there is no sign, it is judged as +)
　　　u1：1st axis unit designation
　　　u2：2nd axis unit designation
　　　u3：3rd axis unit designation
　　　　N / U / M / D (If there is no unit specified, it is judged as pls)
　　　c1：1st axis set movement amount
　　　c2：2nd axis set movement amount
　　　c3：3rd axis set movement amount
　　　　Setting range：0 ~ 999,999,999 (In the case of pulse)
・Example

Send	Reply	Memo
M:1000,-2000,3000	OK or NG	1000 pulse movement in the 1st axis + direction, -2000 pulse movement in the 2nd axis + direction, 3000 pulse movement in the 3rd axis + direction
M:1000,,3000	OK or NG	1000 pulse movement in the 1st axis + direction, 3000 pulse movement in the 3rd axis + direction
M:M0.01,-M0.02,M0.03	OK or NG	0.01mm movement in the 1st axis + direction, -0.02mm movement in the 2nd axis + direction, 0.03mm movement in the 3rd axis + direction

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

58)　　MP: command (Relative movement amount setting 2 [Prebuffer])

・Description

This command sets the movement axis, movement direction, relative movement amount, and movement speed, and operates relative values. The operation is acceleration / deceleration drive. If the operation speed setting is omitted, the setting of the "D:" command is followed.

＊) This command can be used with the double buffer function. For details, refer to "2. About the double buffer".

・Command format

Send) MP:m1u1c1,m2u2c2,m3u3c3,s1,f1,r1,s2,f2,r2,s3,f3,r3

・Parameters

Send) m1：1st axis sign

m2：2nd axis sign

m3：3rd axis sign

+ Is set to plus direction,-is set to minus direction

(if there is no sign, it is judged as +)

u1：1st axis unit designation

u2：2nd axis unit designation

u3：3rd axis unit designation

N / U / M / D (If there is no unit specified, it is judged as pls)

c1：1st axis set movement amount

c2：2nd axis set movement amount

c3：3rd axis set movement amount

Setting range：0 ~ 999,999,999 (In the case of pulse)

s1：1st axis minimum speed setting

s2：2ndt axis minimum speed setting

s3：3rd axis minimum speed setting

Setting range: 1 ~ 1,000,000 pls/s

s1：1st axis maximum speed setting

s2：2nd axis maximum speed setting

s3：3rd axis maximum speed setting

Setting range: 1 ~ 1,000,000 pls / s

(Please set it above the minimum speed)

r1：1st axis acceleration / deceleration time setting

r2：2nd axis acceleration / deceleration time setting

r3：3rd axis acceleration / deceleration time setting

Setting range: 1 ~ 1,000 ms

・Example

Send	Reply	Memo
MP:1000,,	OK or OK_D or NG	1st axis + direction 1000 pulse movement, The operating speed is the set value of the memory switch "SPEED" or the set value of the set "D:" command.
MP:1000,, ,100,1000,50 ,,,,,,	OK or OK_D or NG	1st axis + direction 1000 pulse movement, minimum speed 100pls/s, maximum speed 1000pls/s, acceleration / deceleration time 50ms
MP:1000,2000, ,100,1000,50 ,200,2000,100 ,,,	OK or OK_D or NG	1st axis + direction 1000 pulse movement, minimum speed 100pls/s, maximum speed 1000pls/s, acceleration / deceleration time 50ms, 2nd axis + direction 2000 pulse movement, minimum speed 200pls/s, maximum speed 2000pls/s, acceleration / deceleration time 100ms
MP:1000,,3000 ,100,1000,50 ,,, ,300,3000,150	OK or OK_D or NG	1st axis + direction 1000 pulse movement, minimum speed 100pls/s, maximum speed 1000pls/s, acceleration / deceleration time 50ms, 3rd axis + direction 3000 pulse movement, minimum speed 300pls/s, maximum speed 3000pls/s, acceleration / deceleration time 150ms
MP:M0.01,- M0.02,M0.03 ,0.001,0.01,100 ,0.002,0.02,200 ,0.003,0.03,300	OK or OK_D or NG	1st axis + direction 0.01mm movement, minimum speed 0.001mm/s, maximum speed 0.01mm/s, acceleration / deceleration time 100ms, 2nd axis + direction 0.02mm movement, minimum speed 0.002mm/s, maximum speed 0.02mm/s, acceleration / deceleration time 200ms, 3rd axis + direction 0.03mm movement, minimum speed 0.003mm/s, maximum speed 0.03mm/s, acceleration / deceleration time 300ms

*) In the case of the motor excitation is OFF, it will be "NG" and this command cannot be executed.

*) This command was sent while the operation was being executed by the "H:", "HRT:", "Z:", "ZRT:", "M:", "A:", "E:", "K:", and "J:" commands. In that case, it cannot be set as a double buffer and will be "NG".

59)   A: command (Absolute coordinate value setting 1 [Execution buffer])

・Description

It is a command to set the movement axis, movement direction, and movement position and operate in absolute value. The operation is acceleration / deceleration drive. The operating speed follows the setting of the "D:" command.

・Command format

Send) A:m1u1c1,m2u2c2,m3u3c3

・Parameters

Send) m1：1st axis sign

m2：2nd axis sign

m3：3rd axis sign

+ Is set to plus direction,-is set to minus direction

(if there is no sign, it is judged as +)

u1：1st axis unit designation

u2：2nd axis unit designation

u3：3rd axis unit designation

N / U / M / D (If there is no unit specified, it is judged as pls)

c1：1st axis coordinate value

c2：2nd axis coordinate value

c3：3rd axis coordinate value

Setting range：0 ~ 999,999,999 (In the case of pulse)

・Example1

Send	Reply	Memo
A:1000,-2000,3000	OK or NG	Move to the position of 1000 pulses in the 1st axis + direction, -2000 pulses in the 2nd axis + direction, 3000 pulses in the 3rd axis + direction.
A:1000,,3000	OK or NG	Move to the position of 1000 pulses in the 1st axis + direction and 3000 pulses in the 3rd axis + direction.
A:M0.01,-M0.02,M0.03	OK or NG	Move to the position of 0.01 mm in the 1st axis + direction, -0.02 mm in the 2nd axis + direction, and 0.03 mm in the 3rd axis + direction.

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

60)　　AP: command (Absolute coordinate value setting 2 [Prebuffer])
　・Description
　　It is a command to set the movement axis, movement direction, movement position, and operation speed and make it operate absolutely. The operation is acceleration / deceleration drive. If the operation speed setting is omitted, the setting of the "D:" command is followed.

　　*) This command can be used with the double buffer function. For details, refer to "2. About the double buffer".

　・Command format
　　Send) AP:m1u1c1,m2u2c2,m3u3c3,s1,f1,r1,s2,f2,r2,s3,f3,r3

　・Parameters
　　Send) m1：1st axis sign
　　　　　m2：2nd axis sign
　　　　　m3：3rd axis sign
　　　　　＋ Is set to plus direction,-is set to minus direction
　　　　　(if there is no sign, it is judged as +)
　　　　　u1：1st axis unit designation
　　　　　u2：2nd axis unit designation
　　　　　u3：3rd axis unit designation
　　　　　N / U / M / D (If there is no unit specified, it is judged as pls)
　　　　　c1：1st axis coordinate value
　　　　　c2：2nd axis coordinate value
　　　　　c3：3rd axis coordinate value
　　　　　Setting range：0 ~ 999,999,999 (In the case of pulse)
　　　　　s1：1st axis minimum speed setting
　　　　　s2：2ndt axis minimum speed setting
　　　　　s3：3rd axis minimum speed setting
　　　　　Setting range: 1 ~ 1,000,000 pls/s
　　　　　s1：1st axis maximum speed setting
　　　　　s2：2nd axis maximum speed setting
　　　　　s3：3rd axis maximum speed setting
　　　　　Setting range: 1 ~ 1,000,000 pls / s
　　　　　(Please set it above the minimum speed)
　　　　　r1：1st axis acceleration / deceleration time setting
　　　　　r2：2nd axis acceleration / deceleration time setting
　　　　　r3：3rd axis acceleration / deceleration time setting
　　　　　Setting range: 1 ~ 1,000 ms

・Example

Send	Reply	Memo
AP:1000,,	OK or OK_D or NG	Move to the position of 1000 pulses in the 1st axis + direction. The operating speed is the set value of the memory switch "SPEED" or the set value of the set "D:" command.
AP:1000,, ,100,1000,50 ,,,,,,	OK or OK_D or NG	Move to the position of 1000 pulses in the 1st axis + direction. The minimum operating speed is 100pls / s, the maximum speed is 1000pls / s, and the acceleration / deceleration time is 50ms.
AP:1000,2000, ,100,1000,50 ,200,2000,100 ,,,	OK or OK_D or NG	Move to the position of 1000 pulses in the 1st axis + direction. The minimum operating speed is 100pls / s, the maximum speed is 1000pls / s, and the acceleration / deceleration time is 50ms. Move to the position of 2000 pulses in the 2nd axis + direction. The minimum operating speed is 200pls / s, the maximum speed is 2000pls / s, and the acceleration / deceleration time is 100ms.
AP:1000,,3000 ,100,1000,50 ,,, ,300,3000,150	OK or OK_D or NG	Move to the position of 1000 pulses in the 1st axis + direction. The minimum operating speed is 100pls / s, the maximum speed is 1000pls / s, and the acceleration / deceleration time is 50ms. Move to the position of 3000 pulses in the 3rd axis + direction. The minimum operating speed is 300pls / s, the maximum speed is 3000pls / s, and the acceleration / deceleration time is 150ms.
AP:M0.01,- M0.02,M0.03 ,0.001,0.01,100 ,0.002,0.02,200 ,0.003,0.03,300	OK or OK_D or NG	Moved to the position of 0.01 mm in the 1st axis + direction. The minimum operating speed is 0.001 mm / s, the maximum speed is 0.01 mm / s, and the acceleration / deceleration time is 100 ms. Moved to the position of 0.02 mm in the 2nd axis + direction. The minimum operating speed is 0.002 mm / s, the maximum speed is 0.02 mm / s, and the acceleration / deceleration time is 200 ms. Move to the position of 0.03mm in the 3rd axis + direction. The minimum operating speed is 0.003mm / s, the maximum speed is 0.03mm / s, and the acceleration / deceleration time is 300ms.

*) In the case of the motor excitation is OFF, it will be "NG" and this command cannot be executed.

*) This command was sent while the operation was being executed by the "H:", "HRT:", "Z:", "ZRT:", "M:", "A:", "E:", "K:", and "J:" commands. In that case, it cannot be set as a double buffer and will be "NG".

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61)　　E:0 command (Arc interpolation 1: Perfect circle [Execution buffer])

・Description

　This command sets and operates the movement axis, rotation direction, and center coordinates of the circle interpolation operation (perfect circle).

　*) The interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed for the axis with the smaller axis number.

　*) The distance traveled per pulse must be the same between the interpolation axes. If they are different, the correct interpolation operation will not be performed.

・Command format

　Send) E:0,a,b,d,muc1,muc2

・Parameters

　Send) a：Circle axis setting

　　　　b：Circle axis setting

　　　　　1　1st axis designation

　　　　　2　2nd axis designation

　　　　　3　3rd axis designation

　　　　　*) Set different axes for a, b, and h.

　　　　　*) For a, set the younger axis for b.

　　　　d：Rotation direction setting

　　　　　0　CW rotation (Clockwise)

　　　　　1　CCW rotation (Counterclockwise)

　　　　m：Sign + or-(If there is no sign, it will be "+")

　　　　u：Unit setting

　　　　N / U / M / D (If there is no unit specified, it is judged as pls)

　　　　c1,c2：Center coordinate setting

　　　　　(relative position from the current position)

　　　　　(c1: Set value of the axis with a small axis number (X axis))

　　　　　(c2: Set value of the axis with a large axis number (Y axis))

　　　　　Center coordinates setting range

　　　　　No specified　Setting range：0 ~ 999,999,999 (Uint：pls)

　　　　　N　Setting range：Value of pls converted to nm

　　　　　　(Example: N1000 when the scale resolution is 1 nm at 1,000 pls)

　　　　　U　Setting range：Value of pls converted to μm

　　　　　　(Example: U1 when the scale resolution is 1 nm at 1,000 pls)

　　　　　M　Setting range：Value of pls converted to mm

　　　　　　(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls)

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・Example

The operation of drawing a circle clockwise from the current position on the stage of the 1st and 2nd axes to the current position centering on the relative position from the current position (1st axis 0.05mm, 2nd axis -0.05mm).

Send	Reply
E:0,1,2,0,M0.05,-M0.05	OK or NG

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

62)   E:1 command (Arc interpolation 2: Angle [Execution buffer])

・Description

It is a command to set and operate the movement axis, rotation direction, center coordinates, and end point angle (deg) of the arc interpolation operation.

*) The interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed for the axis with the smaller axis number.

*) An error will occur because the end point coordinates are calculated. Please use it after confirming it with the actual machine.

*) The distance traveled per pulse must be the same between the interpolation axes.
  If they are different, the correct interpolation operation will not be performed.

・Command format

Send) E:1,a,b,d,muc1,muc2,ae

・Parameters

Send) a：Circle axis setting

   b：Circle axis setting

      1   1st axis designation

      2   2nd axis designation

      3   3rd axis designation

      *) Set different axes for a, b, and h.

      *) For a, set the younger axis for b.

   d：Rotation direction setting

      0   CW rotation (Clockwise)

      1   CCW rotation (Counterclockwise)

   m：Sign + or-(If there is no sign, it will be "+")

   u：Unit setting

      N / U / M / D (If there is no unit specified, it is judged as pls)

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c1,c2 ： Center coordinate setting
　　　(relative position from the current position)
　　(c1: Set value of the axis with a small axis number (X axis))
　　(c2: Set value of the axis with a large axis number (Y axis))
　Center coordinates setting range
　No specified　Setting range ： 0 ～ 999,999,999 (Unit: pls)
　　N　Setting range ： Value of pls converted to nm
　　　(Example: N1000 when the scale resolution is 1 nm at 1,000 pls)
　　U　Setting range ： Value of pls converted to μm
　　　(Example: U1 when the scale resolution is 1 nm at 1,000 pls)
　　M　Setting range ： Value of pls converted to mm
　　　(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls)
　ae ： End point angle (deg) setting　　(Setting range ： 0°< ae ≦360°)

・Example

On the 1st and 3rd axis stages, an arc is drawn in the CW direction from the current position to the end point angle of 90 ° around the relative position from the current position (1st axis + 100pls, 3rd axis -200pls).

Send	Reply
E:1,1,3,0,+100,-200,90	OK or NG

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

63)   E:2 command (Arc interpolation 3: Passing point [Execution buffer])
・Description
It is a command to set and operate the movement axis, passing point coordinates, and end point coordinates of the arc interpolation operation.

*) The interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed for the axis with the smaller axis number.

*) An error will occur because the center coordinates are calculated. Please use it after confirming it with the actual machine.

*) The distance traveled per pulse must be the same between the interpolation axes. If they are different, the correct interpolation operation will not be performed.

・Command format
Send) E:2,a,b,d,mup1,mup2,mue1,mue2

・Parameters
Send) a：Circle axis setting
b：Circle axis setting
1   1st axis designation
2   2nd axis designation
3   3rd axis designation
*) Set different axes for a, b, and h.
*) For a, set the younger axis for b.
d：Rotation direction setting
0   CW rotation (Clockwise)
1   CCW rotation (Counterclockwise)
m：Sign + or-(If there is no sign, it will be "+")
u：Unit setting
N / U / M / D (If there is no unit specified, it is judged as pls)
p1,p2：Passing point coordinate setting
(relative position from the current position)
(p1: Set value of the axis with a small axis number (X axis))
(p2: Set value of the axis with a large axis number (Y axis))
e1,e2：End point coordinate setting
(relative position from the current position)
(e1: Set value of the axis with a small axis number (X axis))
(e2: Set value of the axis with a large axis number (Y axis))
Passing point coordinates, ending point coordinates   Setting range
No specified   Setting range：0 ~ 999,999,999 (Unit: pls)
N   Setting range：Value of pls converted to nm
(Example: N1000 when the scale resolution is 1 nm at 1,000 pls)
U   Setting range：Value of pls converted to μm
(Example: U1 when the scale resolution is 1 nm at 1,000 pls)
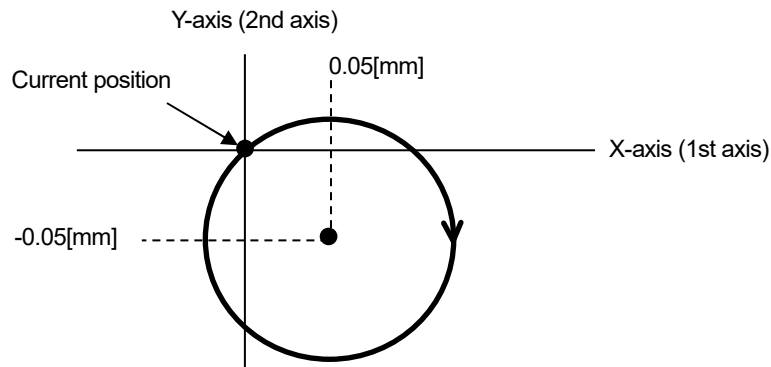M   Setting range：Value of pls converted to mm
(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls)
*) If the passing point coordinates, end point coordinates and current position are on a straight line, an arc cannot be specified, so "NG" is returned.

・Example

The operation of drawing an arc from the current position to the end point coordinates (1st axis + 0.08mm, 2nd axis + 0.12mm) via the passing point coordinates (1st axis + 0.05mm, 2nd axis + 0.03mm) on the 1st and 2nd axis stages.

Send	Reply
E:2,1,2,1,M0.05,M0.03,M0.08,M0.12	OK or NG

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.
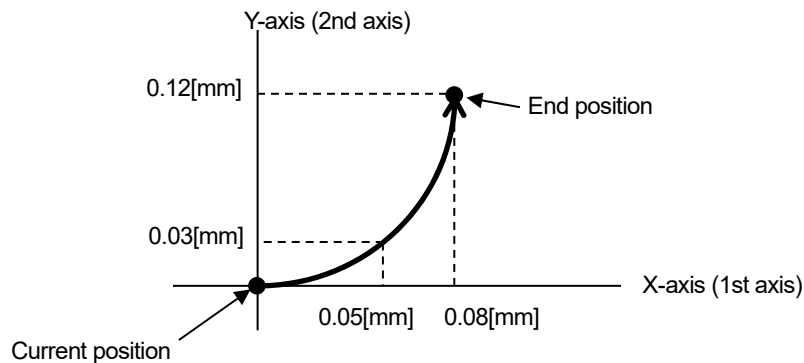
64)   E:3 command (Arc interpolation 4: Perfect circle helical [Execution buffer])

・Description

This command sets and operates the movement axis, rotation direction, center coordinates of the arc interpolation operation (perfect circle) and the movement destination coordinates of the linear operation axis synchronized with the arc interpolation operation.

*) The interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed for the axis with the smaller axis number.

*) The distance traveled per pulse must be the same between the interpolation axes.
If they are different, the correct interpolation operation will not be performed.

・Command format

Send) E:3,a,b,h,d,n,muc1,muc2,muz

・Parameters

Send) a : Circle axis setting

b : Circle axis setting

h : Helical axis setting

1　1st axis designation

2　2nd axis designation

3　3rd axis designation

*) Set different axes for a, b, and h.

*) For a, set the younger axis for b.

d : Rotation direction setting

0　CW rotation (clockwise)

1　CCW rotation (counterclockwise)

n : Rotation value

1 ~ 1000

m : Sign + or-(If there is no sign, it will be "+")

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u：Unit setting

　N / U / M / D (If there is no unit specified, it is judged as pls)

c1,c2：Center coordinate setting

　(relative position from the current position)

　(c1: Set value of the axis with a small axis number (X axis))

　(c2: Set value of the axis with a large axis number (Y axis))

z：Linear movement amount setting

　(movement amount per rotation from the current position)

　For example, if the number of rotations is specified as 2 rotations and

　the linear movement amount setting is 100pls, the total linear

　movement amount will be 200pls.

　　No specified　Setting range：0 ~ 999,999,999 (Unit: pls)

　　N　Setting range：Value of pls converted to nm

　　　(Example: N1000 when the scale resolution is 1 nm at 1,000 pls)

　　U　Setting range：Value of pls converted to μm

　　　(Example: U1 when the scale resolution is 1 nm at 1,000 pls)

　　M　Setting range：Value of pls converted to mm

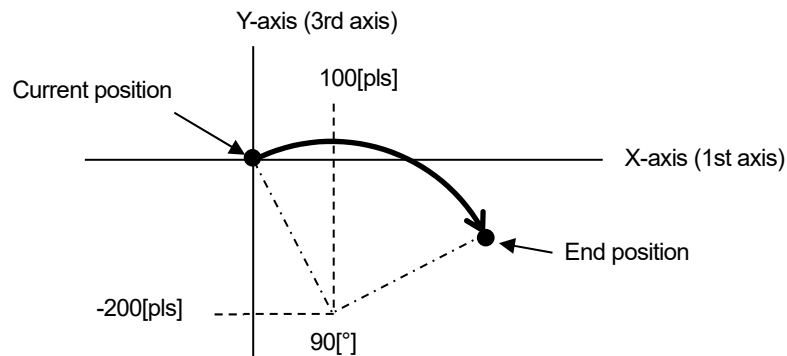　　　(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls)

・Example

Relative coordinates (3rd axis 2000pls) while drawing a circle clockwise from the current position to the current position around the relative coordinates (1st axis 0pls, 2nd axis 5000pls) on the 1st and 2nd axis stages) Is the destination of the linear motion synchronized with the arc interpolation.

Send	Reply
E:3,1,2,3,0,1,0,5000,2000	OK or NG

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.
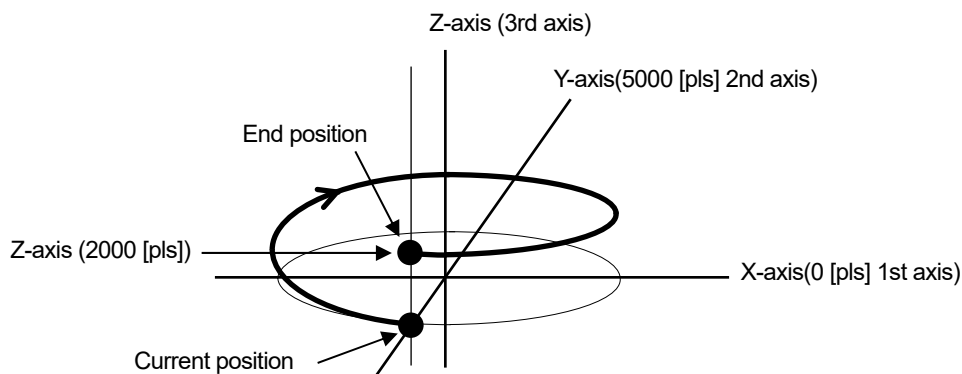
65)   E:4 command (Arc interpolation 5: Angle helical [Execution buffer])
・Description
This command sets and operates the movement axis, rotation direction, center coordinates, end point angle (deg) of the arc interpolation operation and the movement destination coordinates of the linear operation axis synchronized with the arc interpolation operation.

*) The interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed for the axis with the smaller axis number.

*) An error will occur because the end point coordinates are calculated. Please use it after confirming it with the actual machine.

*) The distance traveled per pulse must be the same between the interpolation axes.
If they are different, the correct interpolation operation will not be performed.

・Command format
Send) E:4,a,b,h,d,muc1,muc2,ae,muz
・Parameters
Send) a：Circle axis setting
        b：Circle axis setting
        h：Helical axis setting
            1   1st axis designation
            2   2nd axis designation
            3   3rd axis designation
            *) Set different axes for a, b, and h.
            *) For a, set the younger axis for b.
        d：Rotation direction setting
            0   CW rotation (Clockwise)
            1   CCW rotation (counterclockwise)
        m：Sign + or-(If there is no sign, it will be "+")
        u：Unit setting
            N / U / M / D (If there is no unit specified, it is judged as pls)
        c1,c2：Center coordinate setting
            (relative position from the current position)
            (c1: Set value of the axis with a small axis number (X axis))
            (c2: Set value of the axis with a large axis number (Y axis))
        z: Linear movement amount setting
            (Amount of movement from the current position)
            If the angle is less than 360 °, the amount of movement until the angle is moved is 360 ° or more, the amount of movement per rotation. For example, if the linear movement amount is set to 100pls at 540 ° (one and a half rotations), the total linear movement amount will be 150pls.
            *) Since the total linear movement amount is calculated, an error will occur.
                Please use it after confirming it with the actual machine.
                No specified   Setting range：0 ~ 999,999,999 (Unit: pls)
                N   Setting range：Value of pls converted to nm
                    (Example: N1000 when the scale resolution is 1 nm at 1,000 pls)

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U   Setting range：Value of pls converted to μm
(Example: U1 when the scale resolution is 1 nm at 1,000 pls)
M   Setting range：Value of pls converted to mm
(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls)

ae：End point angle (deg) setting   (Setting range：0°< ae ≦360000°)

・Example

On the 1st and 3rd axis stages, an arc is drawn in the CW direction from the current position to the end point angle of 90 ° around the relative position from the current position (1st axis 0pls, 3rd axis + 100pls). While doing, linear operation synchronized with arc interpolation with relative coordinates (2nd axis 50pls) as the destination.

Send	Reply
E:4,1,3,2,0,0,100,90,50	OK or NG

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.
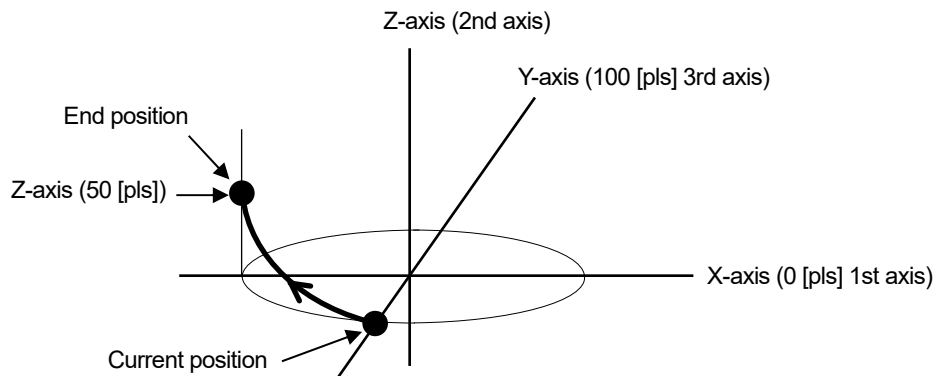
66)   E:5 command (Arc interpolation 6: Passing point helical [Execution buffer])
・Description

This command sets and operates the movement axis of the arc interpolation operation, the passing point coordinates, the end point coordinates, and the movement destination coordinates of the linear operation axis synchronized with the arc interpolation operation.

*) The interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed for the axis with the smaller axis number.

*) An error will occur because the center coordinates are calculated. Please use it after confirming it with the actual machine.

*) The distance traveled per pulse must be the same between the interpolation axes. If they are different, the correct interpolation operation will not be performed.

・Command format

Send) E:5,a,b,h,d,mup1,mup2,mue1,mue2,muz

・Parameters

Send) a：Circle axis setting

b：Circle axis setting

h：Helical axis setting

1   1st axis designation

2   2nd axis designation

3   3rd axis designation

*) Set different axes for a, b, and h.

*) For a, set the younger axis for b.

m：Sign + or-(If there is no sign, it will be "+")

u：Unit setting

N / U / M / D (If there is no unit specified, it is judged as pls)

p1,p2：Passing point coordinate setting

(relative position from the current position)

(p1: Set value of the axis with a small axis number (X axis))

(p2: Set value of the axis with a large axis number (Y axis))

e1,e2：End point coordinate setting

(relative position from the current position)

(e1: Set value of the axis with a small axis number (X axis))

(e2: Set value of the axis with a large axis number (Y axis))

z：Linear movement destination coordinate setting

(relative position from the current position)

Passing point coordinates, ending point coordinates,

Linear destination coordinates   Setting range

No specified   Setting range：0 ~ 999,999,999 (Unit: pls)

N   Setting range：Value of pls converted to nm

(Example: N1000 when the scale resolution is 1 nm at 1,000 pls)

U   Setting range：Value of pls converted to μm

(Example: U1 when the scale resolution is 1 nm at 1,000 pls)

M   Setting range：Value of pls converted to mm

(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls)

*) If the passing point coordinates, end point coordinates and current position are on a straight line, an arc cannot be specified, so "NG" is returned.

・Example

At the stage of the 1st and 2nd axes, from the current position via the passing point coordinates (1st axis-0.05mm, 2nd axis +0.03mm) and the end point coordinates (1st axis-0.08mm, 2nd axis +0.12mm) A straight line operation synchronized with arc interpolation with the relative coordinates (third axis + 0.1 mm) as the destination while drawing an arc up to.

Send	Reply
E:5,1,2,3,0,M0.05,M0.03,M0.08,M0.12,M0.1	OK or NG

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.
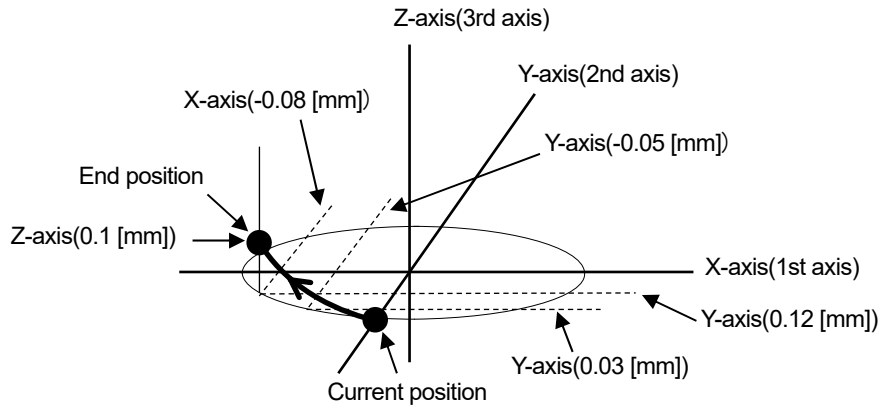
67)   EP:0 command (Arc interpolation 7: Perfect circle [Prebuffer])

・Description

It is a command to set the movement axis, rotation direction, center coordinates, and operation speed of the arc interpolation operation (perfect circle) and operate it.

*) If the speed is not set with this command, the interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed of the axis with the smaller axis number.

*) When the speed is set with this command, the speed setting of the axis with the smaller axis number is rewritten, so it is necessary to set all the minimum speed, maximum speed, and acceleration / deceleration time.

*) This command can be used with the double buffer function. For details, refer to "2. About the double buffer".

*) The distance traveled per pulse must be the same between the interpolation axes.

If they are different, the correct interpolation operation will not be performed.

・Command format

Send) EP:0,a,b,d,muc1,muc2,s,f,r

・Parameters

Send) a：Circle axis setting

b：Circle axis setting

1　1st axis designation

2　2nd axis designation

3　3rd axis designation

*) Set different axes for a, b, and h.

*) For a, set the younger axis for b.

d：Rotation direction setting

0　CW rotation (Clockwise)

1　CCW rotation (Counterclockwise)

m：Sign + or-(If there is no sign, it will be "+")

u：Unit setting

N / U / M / D (If there is no unit specified, it is judged as pls and pls/s)

c1,c2：Center coordinate setting

(relative position from the current position)

(c1: Set value of the axis with a small axis number (X axis))

(c2: Set value of the axis with a large axis number (Y axis))

Center coordinates setting range

No specified   Setting range：0 ~ 999,999,999 (Unit: pls)

N   Setting range：Value of pls converted to nm

(Example: N1000 when the scale resolution is 1 nm at 1,000 pls)

U   Setting range：Value of pls converted to μm

(Example: U1 when the scale resolution is 1 nm at 1,000 pls)

M   Setting range：Value of pls converted to mm

(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls)

s：Minimum speed setting

f：Maximum speed setting

No unit specified Setting range: 1 to 1,000,000 (unit: pls / s)

Unit specification N Setting range: Value obtained by converting pls / s to nm

(Example: N1000 when the scale resolution is 1 nm at 1,000 pls / s)

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Unit specification U Setting range: Value obtained by converting pls / s to μm

(Example: U1 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification M Setting range: Value obtained by converting pls / s to mm

(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification D Setting range: Value obtained by converting pls / s to an angle

(Example: D0.001 when the scale resolution is 0.000001° at 1,000 pls / s)

*) Set only for axes with a small axis number.

*) The unit of the axis with the smaller axis number is reflected in the speed setting.

*) The maximum speed should be greater than or equal to the minimum speed.

r : Acceleration / deceleration time setting

Setting range : 1 ~ 1,000 ms

*) Set only for axes with a small axis number.

・Example

The operation of drawing a circle clockwise from the current position on the stage of the 1st and 2nd axes to the current position centering on the relative position from the current position (1st axis 0.05mm, 2nd axis -0.05mm). Set the minimum speed to 0.5mm / s, the maximum speed to 5mm / s, and the acceleration / deceleration time to 50ms.

Send	Reply
EP:0,1,2,0,M0.05,-M0.05,0.5,5,50	OK or OK_D or NG

*) In the case of the motor excitation is OFF, it will be "NG" and this command cannot be executed.

*) This command was sent while the operation was being executed by the "H:", "HRT:", "Z:", "ZRT:", "M:", "A:", "E:", "K:", and "J:" commands. In that case, it cannot be set as a double buffer and will be "NG".
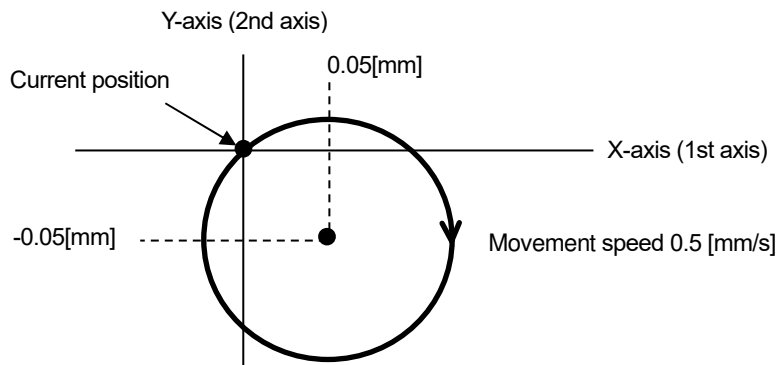
68)   EP:1 command (Arc interpolation 8: Angle [Prebuffer])

・Description

It is a command to set the movement axis, rotation direction, center coordinates, end point angle (deg), and operation speed of the arc interpolation operation.

*) If the speed is not set with this command, the interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed of the axis with the smaller axis number.

*) When the speed is set with this command, the speed setting of the axis with the smaller axis number is rewritten, so it is necessary to set all the minimum speed, maximum speed, and acceleration / deceleration time.

*) This command can be used with the double buffer function.For details, refer to "2. About the double buffer".

*) An error will occur because the end point coordinates are calculated. Please use it after confirming it with the actual machine.

*) The distance traveled per pulse must be the same between the interpolation axes.
  If they are different, the correct interpolation operation will not be performed.

・Command format

Send) EP:1,a,b,d,muc1,muc2,ae,s,f,r

・Parameters

Send) a : Circle axis setting

b : Circle axis setting

1   1st axis designation

2   2nd axis designation

3   3rd axis designation

*) Set different axes for a, b, and h.

*) For a, set the younger axis for b.

d : Rotation direction setting

0   CW ROTATION (CLOCKWISE)

1   CCW rotation (counterclockwise)

m : Sign + or-(If there is no sign, it will be "+")

u : Unit setting

N / U / M / D (If there is no unit specified, it is judged as pls and pls/s)

c1,c2 : Center coordinate setting

(relative position from the current position)

(c1: Set value of the axis with a small axis number (X axis))

(c2: Set value of the axis with a large axis number (Y axis))

Center coordinates setting range

No specified   Setting range : 0 ~ 999,999,999 (Unit: pls)

N   Setting range : Value of pls converted to nm

(Example: N1000 when the scale resolution is 1 nm at 1,000 pls)

U   Setting range : Value of pls converted to μm

(Example: U1 when the scale resolution is 1 nm at 1,000 pls)

M   Setting range : Value of pls converted to mm

(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls)

ae : End point angle (deg) setting   (Setting range : 0°< ae $\leqq$ 360°)

s：Minimum speed setting

f：Maximum speed setting

No unit specified Setting range: 1 to 1,000,000 (unit: pls / s)

Unit specification N Setting range: Value obtained by converting pls / s to nm

(Example: N1000 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification U Setting range: Value obtained by converting pls / s to μm

(Example: U1 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification M Setting range: Value obtained by converting pls / s to mm

(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification D Setting range: Value obtained by converting pls / s to an angle

(Example: D0.001 when the scale resolution is 0.000001° at 1,000 pls / s)

*) Set only for axes with a small axis number.

*) The unit of the axis with the smaller axis number is reflected in the speed setting.

*) The maximum speed should be greater than or equal to the minimum speed.

r：Acceleration / deceleration time setting

Setting range：1 ~ 1,000 ms

*) Set only for axes with a small axis number.

・Example

On the 1st and 3rd axis stages, an arc is drawn in the CW direction from the current position to the end point angle of 90 ° around the relative position from the current position (1st axis + 100pls, 3rd axis -200pls). Set the minimum speed to 100pls / s, the maximum speed to 1000pls / s, and the acceleration / deceleration time to 50ms.

Send	Reply
EP:1,1,3,0,100,-200,90,100,1000,50	OK or OK_D or NG

*) In the case of the motor excitation is OFF, it will be "NG" and this command cannot be executed.

*) This command was sent while the operation was being executed by the "H:", "HRT:", "Z:", "ZRT:", "M:", "A:", "E:", "K:", and "J:" commands. In that case, it cannot be set as a double buffer and will be "NG".

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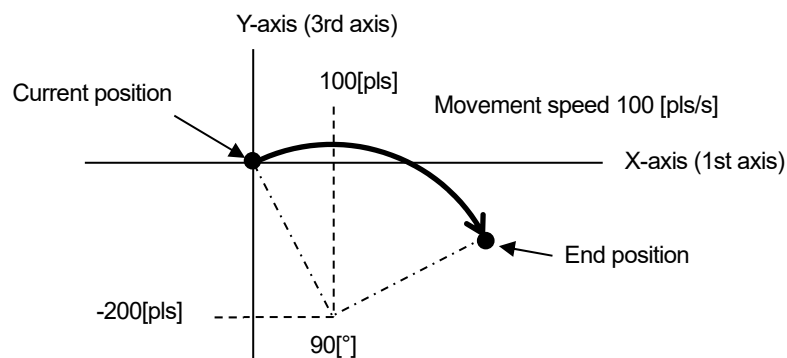
69)　　EP:2 command (Arc interpolation 9: Passing point [Prebuffer])

・Description

It is a command to set and operate the movement axis, passing point coordinates, end point coordinates, and operation speed of the arc interpolation operation.

*) If the speed is not set with this command, the interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed of the axis with the smaller axis number.

*) When the speed is set with this command, the speed setting of the axis with the smaller axis number is rewritten, so it is necessary to set all the minimum speed, maximum speed, and acceleration / deceleration time.

*) This command can be used with the double buffer function. For details, refer to "2. About the double buffer".

*) An error will occur because the center coordinates are calculated. Please use it after confirming it with the actual machine.

*) The distance traveled per pulse must be the same between the interpolation axes.
If they are different, the correct interpolation operation will not be performed.

・Command format

Send) EP:2,a,b,d,mup1,mup2,mue1,mue2,s,f,r

・Parameters

Send) a ： Circle axis setting

b ： Circle axis setting

1　1st axis designation

2　2nd axis designation

3　3rd axis designation

*) Set different axes for a, b, and h.

*) For a, set the younger axis for b.

d ： Rotation direction setting

0　CW ROTATION (CLOCKWISE)

1　CCW rotation (counterclockwise)

m ： Sign + or-(If there is no sign, it will be "+")

u ： Unit setting

N / U / M / D (If there is no unit specified, it is judged as pls and pls/s)

p1,p2 ： Passing point coordinate setting

(relative position from the current position)

(p1: Set value of the axis with a small axis number (X axis))

(p2: Set value of the axis with a large axis number (Y axis))

e1,e2 ： End point coordinate setting

(relative position from the current position)

(e1: Set value of the axis with a small axis number (X axis))

(e2: Set value of the axis with a large axis number (Y axis))

Passing point coordinates, ending point coordinates　Setting range

No specified　Setting range ： 0 ~ 999,999,999 (Unit: pls)

N　Setting range ： Value of pls converted to nm

(Example: N1000 when the scale resolution is 1 nm at 1,000 pls)

U　Setting range ： Value of pls converted to μm

(Example: U1 when the scale resolution is 1 nm at 1,000 pls)

  M Setting range：Value of pls converted to mm

   (Example: M0.001 when the scale resolution is 1 nm at 1,000 pls)

 s：Minimum speed setting

 f：Maximum speed setting

  No unit specified Setting range: 1 to 1,000,000 (unit: pls / s)

  Unit specification N Setting range: Value obtained by converting pls / s to nm

   (Example: N1000 when the scale resolution is 1 nm at 1,000 pls / s)

  Unit specification U Setting range: Value obtained by converting pls / s to μm

   (Example: U1 when the scale resolution is 1 nm at 1,000 pls / s)

  Unit specification M Setting range: Value obtained by converting pls / s to mm

   (Example: M0.001 when the scale resolution is 1 nm at 1,000 pls / s)

  Unit specification D Setting range: Value obtained by converting pls / s to an angle

  (Example: D0.001 when the scale resolution is 0.000001° at 1,000 pls / s)

   *) Set only for axes with a small axis number.

   *) The unit of the axis with the smaller axis number is reflected in the speed setting.

   *) The maximum speed should be greater than or equal to the minimum speed.

 r：Acceleration / deceleration time setting

  Setting range：1 ~ 1,000 ms

   *) Set only for axes with a small axis number.

 *) If the passing point coordinates, end point coordinates and current position are on a straight
  line, an arc cannot be specified, so "NG" is returned.

・Example

 The operation of drawing an arc from the current position to the end point coordinates (1st axis + 0.08mm, 2nd axis + 0.12mm) via the passing point coordinates on the 1st and 2nd axis stages (1st axis +0.05mm, 2nd axis +0.03mm).

 Set the minimum speed to 0.5mm / s, the maximum speed to 5mm / s, and the acceleration / deceleration time to 50ms.

Send	Reply
EP:2,1,2,0,M0.05,M0.03,M0.08,M0.12,0.5,5,50	OK or OK_D or NG

*) In the case of the motor excitation is OFF, it will be "NG" and this command cannot be executed.

*) This command was sent while the operation was being executed by the "H:", "HRT:", "Z:", "ZRT:", "M:", "A:", "E:", "K:", and "J:" commands. In that case, it cannot be set as a double buffer and will be "NG".
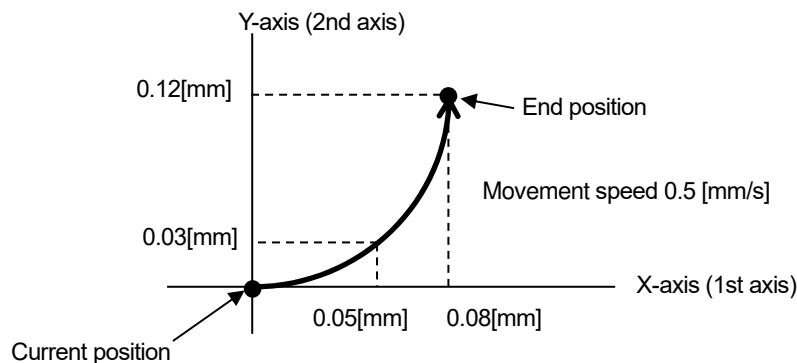
70)   EP:3 command (Arc interpolation 10: Perfect circle helical [Prebuffer])
・Description
   This command sets and operates the movement axis, rotation direction, center coordinates, movement speed, and movement destination coordinates of the linear movement axis synchronized with the arc interpolation movement (perfect circle).
   *) If the speed is not set with this command, the interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed of the axis with the smaller axis number.
   *) When the speed is set with this command, the speed setting of the axis with the smaller axis number of the arc interpolation axis is rewritten, so it is necessary to set all the minimum speed, maximum speed, and acceleration / deceleration time.
   *) This command can be used with the double buffer function. For details, refer to "2. About the double buffer".
   *) The distance traveled per pulse must be the same between the interpolation axes.
   If they are different, the correct interpolation operation will not be performed.
・Command format
   Send) EP:3,a,b,h,d,n,muc1,muc2,muz,s,f,r
・Parameters
   Send) a : Circle axis setting
            b : Circle axis setting
            h : Helical axis setting
               1   1st axis designation
               2   2nd axis designation
               3   3rd axis designation
               *) Set different axes for a, b, and h.
               *) For a, set the younger axis for b.
            d : Rotation direction setting
               0   CW ROTATION (CLOCKWISE)
               1   CCW rotation (counterclockwise)
            n : Rotation value
               1 ~ 1000
            m : Sign + or-(If there is no sign, it will be "+")
            u : Unit setting
               N / U / M / D (If there is no unit specified, it is judged as pls and pls/s)
          c1,c2 : Center coordinate setting
               (relative position from the current position)
               (c1: Set value of the axis with a small axis number (X axis))
               (c2: Set value of the axis with a large axis number (Y axis))
            z : Linear movement amount setting
               (movement amount per rotation from the current position)
               For example, if the number of rotations is specified as 2 rotations and the linear movement amount setting is 100pls, the total linear movement amount will be 200pls.
                  No specified   Setting range : 0 ~ 999,999,999 (Unit: pls)
                  N   Setting range : Value of pls converted to nm
                     (Example: N1000 when the scale resolution is 1 nm at 1,000 pls)

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U　Setting range：Value of pls converted to μm
(Example: U1 when the scale resolution is 1 nm at 1,000 pls)
M　Setting range：Value of pls converted to mm
(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls)
s：Minimum speed setting
f：Maximum speed setting
No unit specified Setting range: 1 to 1,000,000 (unit: pls / s)
Unit specification N Setting range: Value obtained by converting pls / s to nm
(Example: N1000 when the scale resolution is 1 nm at 1,000 pls / s)
Unit specification U Setting range: Value obtained by converting pls / s to μm
(Example: U1 when the scale resolution is 1 nm at 1,000 pls / s)
Unit specification M Setting range: Value obtained by converting pls / s to mm
(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls / s)
Unit specification D Setting range: Value obtained by converting pls / s to an angle
(Example: D0.001 when the scale resolution is 0.000001° at 1,000 pls / s)
*) Set only for axes with a small axis number.
*) The unit of the axis with the smaller axis number is reflected in the speed setting.
*) The maximum speed should be greater than or equal to the minimum speed.
r：Acceleration / deceleration time setting
Setting range：1 ~ 1,000 ms
*) Set only for axes with a small axis number.

・Example
The operation of drawing a circle clockwise from the current position to the current position around the relative coordinates (1st axis 0pls, 2nd axis 5000pls) on the 1st and 2nd axis stages.Linear operation synchronized with arc interpolation with relative coordinates (2000pls on the 3rd axis) as the destination.Set the minimum speed to 100pls / s, the maximum speed to 1000pls / s, and the acceleration / deceleration time to 50ms.

Send	Reply
EP:3,1,2,3,0,1,0,5000,2000,100,1000,50	OK or OK_D or NG

*) In the case of the motor excitation is OFF, it will be "NG" and this command cannot be executed.

*) This command was sent while the operation was being executed by the "H:", "HRT:", "Z:", "ZRT:", "M:", "A:", "E:", "K:", and "J:" commands. In that case, it cannot be set as a double buffer and will be "NG".
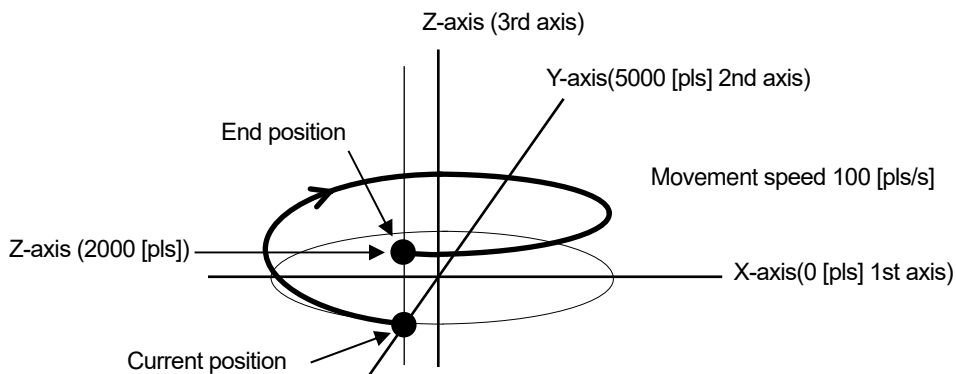
71)   EP:4 command (Arc interpolation 11: Angle helical [Prebuffer])
・Description
This command sets and operates the movement axis, rotation direction, center coordinates, end point angle (deg), movement speed, and movement destination coordinates of the linear movement axis synchronized with the arc interpolation movement.

　*) If the speed is not set with this command, the interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed of the axis with the smaller axis number.

　*) When the speed is set with this command, the speed setting of the axis with the smaller axis number of the arc interpolation axis is rewritten, so it is necessary to set all the minimum speed, maximum speed, and acceleration / deceleration time.

　*) This command can be used with the double buffer function. For details, refer to "2. About the double buffer".

　*) An error will occur because the end point coordinates are calculated. Please use it after confirming it with the actual machine.

　*) The distance traveled per pulse must be the same between the interpolation axes.
If they are different, the correct interpolation operation will not be performed.

・Command format
Send) EP:4,a,b,h,d,muc1,muc2,ae,muz,s,f,r
・Parameters
Send) a：Circle axis setting
        b：Circle axis setting
        h：Helical axis setting
            1   1st axis designation
            2   2nd axis designation
            3   3rd axis designation
          *) Set different axes for a, b, and h.
          *) For a, set the younger axis for b.
        d：Rotation direction setting
            0   CW ROTATION (CLOCKWISE)
            1   CCW rotation (counterclockwise)
        m：Sign + or-(If there is no sign, it will be "+")
        u：Unit setting
          N / U / M / D (If there is no unit specified, it is judged as pls and pls/s)
        c1,c2：Center coordinate setting
           (relative position from the current position)
           (c1: Set value of the axis with a small axis number (X axis))
           (c2: Set value of the axis with a large axis number (Y axis))

z: Linear movement amount setting

(Amount of movement from the current position)

If the angle is less than 360 °, the amount of movement until the angle is moved is 360 ° or more, the amount of movement per rotation. For example, if the linear movement amount is set to 100pls at 540 ° (one and a half rotations), the total linear movement amount will be 150pls.

*) Since the total linear movement amount is calculated, an error will occur. Please use it after confirming it with the actual machine.

No specified   Setting range : 0 ~ 999,999,999 (Unit: pls)

N   Setting range : Value of pls converted to nm

(Example: N1000 when the scale resolution is 1 nm at 1,000 pls)

U   Setting range : Value of pls converted to μm

(Example: U1 when the scale resolution is 1 nm at 1,000 pls)

M   Setting range : Value of pls converted to mm

(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls)

ae : End point angle (deg) setting   (Setting range : 0°< ae ≦360000°)

s : Minimum speed setting

f : Maximum speed setting

No unit specified Setting range: 1 to 1,000,000 (unit: pls / s)

Unit specification N Setting range: Value obtained by converting pls / s to nm

(Example: N1000 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification U Setting range: Value obtained by converting pls / s to μm

(Example: U1 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification M Setting range: Value obtained by converting pls / s to mm

(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification D Setting range: Value obtained by converting pls / s to an angle

(Example: D0.001 when the scale resolution is 0.000001° at 1,000 pls / s)

*) Set only for axes with a small axis number.

*) The unit of the axis with the smaller axis number is reflected in the speed setting.

*) The maximum speed should be greater than or equal to the minimum speed.

r : Acceleration / deceleration time setting

Setting range : 1 ~ 1,000 ms

*) Set only for axes with a small axis number.

・Example

On the 1st and 3rd axis stages, an arc is drawn in the CW direction from the current position to the end point angle of 90 ° around the relative position from the current position (1st axis 0pls, 3rd axis + 100pls). Linear operation synchronized with arc interpolation with relative coordinates (2nd axis 50pls) as the destination.

Set the minimum speed to 100pls / s, the maximum speed to 1000pls / s, and the acceleration / deceleration time to 50ms.

Send	Reply
EP:4,1,3,2,0,0,100,90,50,100,1000,50	OK or OK_D or NG

*) In the case of the motor excitation is OFF, it will be "NG" and this command cannot be executed.

*) This command was sent while the operation was being executed by the "H:", "HRT:", "Z:", "ZRT:", "M:", "A:", "E:", "K:", and "J:" commands. In that case, it cannot be set as a double buffer and will be "NG".
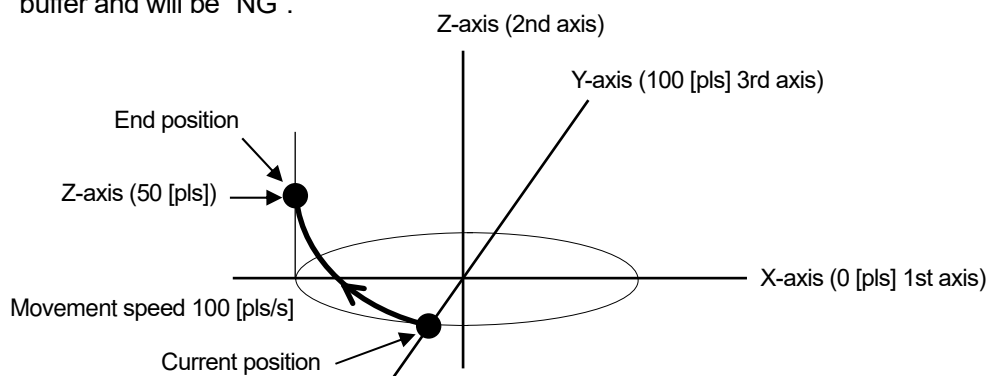
72)   EP:5 command (Arc interpolation 12: Passing point helical [Prebuffer])

・Description

This command sets and operates the movement axis of the arc interpolation operation, the passing point coordinates, the end point coordinates, the operation speed, and the movement destination coordinates of the linear operation axis synchronized with the arc interpolation operation.

*) If the speed is not set with this command, the interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed of the axis with the smaller axis number.

*) When the speed is set with this command, the speed setting of the axis with the smaller axis number of the arc interpolation axis is rewritten, so it is necessary to set all the minimum speed, maximum speed, and acceleration / deceleration time.

*) This command can be used with the double buffer function. For details, refer to "2. About the double buffer".

*) An error will occur because the center coordinates are calculated. Please use it after confirming it with the actual machine.

*) The distance traveled per pulse must be the same between the interpolation axes.
If they are different, the correct interpolation operation will not be performed.

・Command format

Send) EP:5,a,b,h,d,mup1,mup2,mue1,mue2,muz,s,f,r

・Parameters

Send) a：Circle axis setting

b：Circle axis setting

h：Helical axis setting

1　1st axis designation

2　2nd axis designation

3　3rd axis designation

*) Set different axes for a, b, and h.

*) For a, set the younger axis for b.

d：Rotation direction setting

0　CW ROTATION (CLOCKWISE)

1　CCW rotation (counterclockwise)

m：Sign + or-(If there is no sign, it will be "+")

u：Unit setting

N / U / M / D (If there is no unit specified, it is judged as pls and pls/s)

p1,p2：Passing point coordinate setting

(relative position from the current position)

(p1: Set value of the axis with a small axis number (X axis))

(p2: Set value of the axis with a large axis number (Y axis))

e1,e2：End point coordinate setting

(relative position from the current position)

(e1: Set value of the axis with a small axis number (X axis))

(e2: Set value of the axis with a large axis number (Y axis))

z：Linear movement destination coordinate setting

(relative position from the current position)

Passing point coordinates, ending point coordinates,

Linear destination coordinates　Setting range

No specified　Setting range：0 ~ 999,999,999 (Unit: pls)

N　Setting range：Value of pls converted to nm

(Example: N1000 when the scale resolution is 1 nm at 1,000 pls)

U　Setting range：Value of pls converted to μm

(Example: U1 when the scale resolution is 1 nm at 1,000 pls)

M　Setting range：Value of pls converted to mm

(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls)

s：Minimum speed setting

f：Maximum speed setting

No unit specified Setting range: 1 to 1,000,000 (unit: pls / s)

Unit specification N Setting range: Value obtained by converting pls / s to nm

(Example: N1000 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification U Setting range: Value obtained by converting pls / s to μm

(Example: U1 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification M Setting range: Value obtained by converting pls / s to mm

(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification D Setting range: Value obtained by converting pls / s to an angle

(Example: D0.001 when the scale resolution is 0.000001° at 1,000 pls / s)

*) Set only for axes with a small axis number.

*) The unit of the axis with the smaller axis number is reflected in the speed setting.

*) The maximum speed should be greater than or equal to the minimum speed.

r : Acceleration / deceleration time setting

Setting range : 1 ~ 1,000 ms

*) Set only for axes with a small axis number.

*) If the passing point coordinates, end point coordinates and current position are on a straight line, an arc cannot be specified, so "NG" is returned.

・Example

An arc operation that operates from the current position to the end point coordinates (1st axis-0.08mm, 2nd axis +0.12mm) via the passing point coordinates (1st axis-0.05mm, 2nd axis + 0.03mm) on the 1st and 2nd axis stages. At the same time, linear operation synchronized with arc interpolation with relative coordinates (third axis + 0.1 mm) as the destination. Set the minimum speed to 0.5mm / s, the maximum speed to 5mm / s, and the acceleration / deceleration time to 50ms.

Send	Reply
EP:5,1,2,3,0,-M0.05,M0.03,-M0.08,M0.12,M0.1,0.5,5,50	OK or OK_D or NG

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

*) This command was sent while the operation was being executed by the "H:", "HRT:", "Z:", "ZRT:", "M:", "A:", "E:", "K:", and "J:" commands. In that case, it cannot be set as a double buffer and will be "NG".
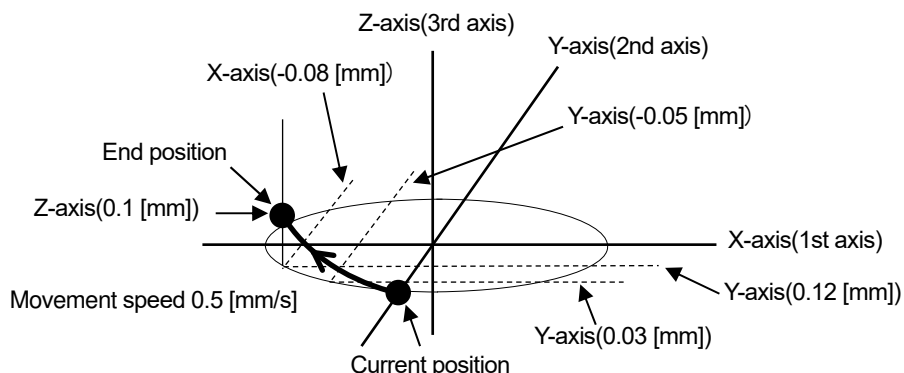
73)   K: command (Linear interpolation: 1 [Execution buffer])

・Description

It is a command to set the movement axis, movement direction, and relative movement amount of linear interpolation operation and operate it.

*) The interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed for the axis with the smaller axis number.

*) The distance traveled per pulse must be the same between the interpolation axes. If they are different, the correct interpolation operation will not be performed.

・Command format

Send) K:m1u1c1,m2u2c2,m3u3c3

・Parameters

    Send)m1：1st Sign setting

        m2：2nd Sign setting

        m3：3rd Sign setting

          + or-(If there is no sign, it will be "+")

        u1：1st Unit setting

        u2：2nd Unit setting

        u3：3rd Unit setting

          N / U / M / D (If there is no unit specified, it is judged as pls)

        c1：1st Set movement amount

        c2：2nd Set movement amount

        c3：3rd Set movement amount

          N   Setting range：Value of pls converted to nm

             (Example: N1000 when the scale resolution is 1 nm at 1,000 pls)

          U   Setting range：Value of pls converted to μm

             (Example: U1 when the scale resolution is 1 nm at 1,000 pls)

          M   Setting range：Value of pls converted to mm

             (Example: M0.001 when the scale resolution is 1 nm at 1,000 pls)

          D   Setting range：The value of pls converted to an degree

             (Example: D0.001 when the scale resolution is 0.000001 ° at

              1,000 pls)

        Not specified Setting range: 0 ~ 999,999,999 (Unit: pls)

・Example

Send	Reply	Memo
K:1000,200,	OK or NG	1000 pulse movement in the 1st axis + direction, 200 pulse movement in the 2nd axis + direction
K:U1000,200,M0.3	OK or NG	1000 pulse movement in the 1st axis + direction, 200 pulse movement in the 2nd axis + direction, 0.3mm movement in the 3rd axis + direction

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

74)　　KP: command (Linear interpolation: 2 [Prebuffer])

・Description

It is a command to set the movement axis, movement direction, and relative movement amount of linear interpolation operation and operate it. If the movement speed is omitted, it will operate at the same speed as the previous operation.

*) If the speed is not set with this command, the interpolation operation speed (composite speed) operates at the minimum speed of the "D:" command setting speed of the axis with the smaller axis number.

*) When the speed is set with this command, the speed setting of the axis with the smaller axis number is rewritten, so it is necessary to set all the minimum speed, maximum speed, and acceleration / deceleration time.

*) This command can be used with the double buffer function. For details, refer to "2. About the double buffer".

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　　　*) The distance traveled per pulse must be the same between the interpolation axes.
　　　　If they are different, the correct interpolation operation will not be performed.
・Command format
　　Send) KP:m1u1c1,m2u2c2,m3u3c3,s,f,r
・Parameters
　　Send)m1：1st Sign setting
　　　　　m2：2nd Sign setting
　　　　　m3：3rd Sign setting
　　　　　　+ or-(If there is no sign, it will be "+")
　　　　　u1：1st Unit setting
　　　　　u2：2nd Unit setting
　　　　　u3：3rd Unit setting
　　　　　　N / U / M / D (If there is no unit specified, it is judged as pls)
　　　　　c1：1st Set movement amount
　　　　　c2：2nd Set movement amount
　　　　　c3：3rd Set movement amount
　　　　　　N　Setting range：Value of pls converted to nm
　　　　　　　　(Example: N1000 when the scale resolution is 1 nm at 1,000 pls)
　　　　　　U　Setting range：Value of pls converted to μm
　　　　　　　　(Example: U1 when the scale resolution is 1 nm at 1,000 pls)
　　　　　　M　Setting range：Value of pls converted to mm
　　　　　　　　(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls)
　　　　　　D　Setting range：The value of pls converted to an degree
　　　　　　　　(Example: D0.001 when the scale resolution is 0.000001 ° at
　　　　　　　　 1,000 pls)
　　　　　Not specified Setting range: 0 ~ 999,999,999 (Unit: pls)
　　　s：Minimum speed setting
　　　f：Maximum speed setting
　　　　No unit specified Setting range: 1 to 1,000,000 (unit: pls / s)
　　　　Unit specification N Setting range: Value obtained by converting pls / s to nm
　　　　　(Example: N1000 when the scale resolution is 1 nm at 1,000 pls / s)
　　　　Unit specification U Setting range: Value obtained by converting pls / s to μm
　　　　　(Example: U1 when the scale resolution is 1 nm at 1,000 pls / s)
　　　　Unit specification M Setting range: Value obtained by converting pls / s to mm
　　　　　(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls / s)
　　　　Unit specification D Setting range: Value obtained by converting pls / s to an angle
　　　　　(Example: D0.001 when the scale resolution is 0.000001° at 1,000 pls / s)
　　　　　　*) Set only for axes with a small axis number.
　　　　　　*) The unit of the axis with the smaller axis number is reflected in the speed setting.
　　　　　　*) The maximum speed should be greater than or equal to the minimum speed.
　　　r：Acceleration / deceleration time setting
　　　　Setting range：1 ~ 1,000 ms
　　　　　　*) Set only for axes with a small axis number.

・Example

Send	Reply	Memo
KP:1000,200,, 100,1000,200	OK or OK_D or NG	1st axis + direction 1000 pulse movement, 2nd axis + direction 200 pulse movement, operating speed 100pls/s
KP: U1000,200,M0.3 ,100,1000,200	OK or OK_D or NG	1st axis + direction 1000 pulse movement, 2nd axis + direction 200 pulse movement, 3rd axis + direction 0.3mm movement, operating speed 100pls/s

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

*) This command was sent while the operation was being executed by the "H:", "HRT:", "Z:", "ZRT:", "M:", "A:", "E:", "K:", and "J:" commands. In that case, it cannot be set as a double buffer and will be "NG".

75)   J: command (Jog driving operation 1)
・Description
This command drives the stage continuously at the minimum speed (constant speed drive). To stop it, send the stop command "L:". It also stops when the limit sensor is detected. The operating speed follows the setting of the "D:" command.
・Command format
Send) J:m1,m2,m3
・Parameters
Send) m1 : 1st axis operation direction setting
m2 : 2nd axis operation direction setting
m3 : 3rd axis operation direction setting
+   Plus direction setting with +
-   Minus direction setting with -
・Example

Send	Reply	Memo
J:+,,	OK or NG	1st axis + direction
J:+,-,	OK or NG	1st axis + direction, 2nd axis - direction
J:+,,+	OK or NG	1st axis + direction, 3rd axis + direction
J:+,-,+	OK or NG	1st axis + direction, 2nd axis - direction, 3rd axis + direction

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

76)   D: command (Speed setting)
・Description
Set the operating speed of the stage. When the power is turned on, the minimum speed, maximum speed, and acceleration / deceleration time of the speed number are initially set by setting "SPEED"-"SPEED SEL" of the memory switch.
・Command format
Send 1) D:a,s,f,r
Send 2) D:a,u,s,f,r

・Parameters

Send) a：Axis setting

　1　1st axis designation

　2　2nd axis designation

　3　3rd axis designation

u：Unit setting

　P　pls designation

　N　nm designation

　U　μm designation

　M　mm designation

　D　degree designation

s：Minimum speed setting　　Setting range：1 ~ 1,000,000 pls/s

f：Maximum speed setting　　Setting range：1 ~ 1,000,000 pls/s

*) Make sure it is at least the minimum speed.

r：Acceleration and deceleration time　Setting range：1 ~ 1,000 ms

・Example

Send	Reply	Memo
D:1,100,1000,100	OK or NG	1st axis speed setting Minimum speed 100pls/s, maximum speed 1000pls/s, acceleration / deceleration time 100ms
D:2,200,2000,200	OK or NG	2nd axis speed setting Minimum speed 200pls/s, maximum speed 2000pls/s, acceleration / deceleration time 200ms

*) In the case of Busy, it will be "NG" and this command cannot be executed.

77)　　JD: command (Setting for speed override during jog operation)

・Description

Change the operating speed while operating with the "J:" command.

*) At the end of the "J:" command operation, the maximum speed set by the "D:"
command is overwritten.

・Command format

Send 1) JD:a,f

Send 2) JD:a,u,f

・Parameters

Send) a：Axis setting

　1　1st axis designation

　2　2nd axis designation

　3　3rd axis designation

u：Unit setting

　P　pls designation

　N　nm designation

　U　μm designation

　M　mm designation

　D　degree designation

spd：Operating speed
    P Setting range：1 ~ 1,000,000(Uint：pls/s)
    N   Setting range：Value obtained by converting pls/s to nm/s
        (Example: N1000 when the scale resolution is 1 nm at 1,000 pls/s)
    U   Setting range：Value obtained by converting pls/s to μm/s
        (Example: U1 when the scale resolution is 1 nm at 1,000 pls/s)
    M   Setting range：Value obtained by converting pls/s to mm/s
        (Example: M0.001 when the scale resolution is 1 nm at 1,000 pls/s)
    D   Setting range：Value obtained by converting pls/s to °/s
        (Example: D0.001 when the scale resolution is 0.000001 ° at
        1,000 pls/s)

・Example

Send	Reply	Memo
JD:1,1000	OK or NG	Changed the operating speed of the 1st axis to 1000pls/s
JD:2,P,2000	OK or NG	Changed the operating speed of the 1st axis to 1000pls/s and the operating speed of the 2nd axis to 2000pls/s.

*) It can be used only during operation with the "J:" command.

78) B: command (Origin return speed setting)
  ・Description
    Set the machine origin return speed of the stage. When the power is turned on, the memory switches "ORG"-"ORG (S)", "ORG (F)", and "ORG (R)" are initially set.
  ・Command format
    Send 1) B:a,s,f,r
    Send 2) B:a,u,s,f,r
  ・Parameters
    Send) a：Axis setting
          1   1st axis designation
          2   2nd axis designation
          3   3rd axis designation
       u：Unit setting
        P   pls designation
        N   nm designation
        U   μm designation
        M   mm designation
        D   degree designation
      s：Minimum speed setting   Setting range：1 ~ 1,000,000 pls/s
      f：Maximum speed setting   Setting range：1 ~ 1,000,000 pls/s
                            *) Make sure it is at least the minimum speed.
     r：Acceleration and deceleration time   Setting range：1 ~ 1,000 ms

・Example

Send	Reply	Memo
B:1,100,1000,100	OK or NG	1st axis speed setting Minimum speed 100pls/s, maximum speed 1000pls/s, acceleration / deceleration time 100ms
B:2,200,2000,200	OK or NG	2nd axis speed setting Minimum speed 200pls/s, maximum speed 2000pls/s, acceleration / deceleration time 200ms

*) In the case of Busy, it will be "NG" and this command cannot be executed.

79) I: command (General-purpose IO input confirmation)
　・Description
　　　Check the input status of general-purpose input.
　・Command format
　　　Send)　　I:
　　　Reply)　　i
　・Parameters
　　　Reply)　　i : General-purpose input signal state　　　0 ~ 63
　・General-purpose input signal status (blanks are OFF)

Set value	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																

Set value	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																

Set value	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
IN1		ON		ON		ON		ON		ON		ON			ON	
IN2			ON	ON			ON	ON			ON	ON				ON
IN3					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

Set value	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
IN1		ON		ON		ON		ON		ON		ON		ON	O	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

・Example

Send	Reply	Contents
I:	16	Only general-purpose input IN5 is ON

80) O: command (General-purpose IO output command)
　　・Description
　　　　Set the general-purpose output status.
　　・Command format
　　　　Send)　　O:s
　　・Parameters
　　　　Send)　　s : General purpose output signal state　　　0 ~ 63
　　・General-purpose output status (blanks are OFF)

Set value	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																

Set value	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																

Set value	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

Set value	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

*) The output state is maintained until the next "O:" command is sent.

・Example

Send	Reply	Contents
O:32	OK or NG	Only OUT6 is ON

81) T:T command (Trigger output 1 : Timer value specified)

　・Description

　　Specifies the trigger time interval to output the trigger.

　・Command format

　　Send)　　T:Ta

　・Parameters

　　Send)　　a : Timer value　　Setting range : 1 ~ 10000

　　　　　　　　　　　　　　　　　　　　(0.01 ~ 100.00 sec)

・Example

Send	Reply	Contents
T:T100	OK or NG	Pulse output every second

*) In the case of Busy, it will be "NG" and this command cannot be executed.

82) T:P command (Trigger output 2 : Pulse value specified)
　　・Description

　　　　Drive pulse Specify the target axis for trigger output and the trigger pulse interval for the drive pulse.

　　　*) When executing the command, set the operating speed of the automatic stage to 56 kpps or less.
　　　　(Trigger may not be output if operated at 56kpps or higher.)

　　・Command format
　　　　Send)　　T:PaPb

　　・Parameters
　　　　Send)　　a : Axis setting　　1 or 2 or 3
　　　　　　　　　b : Pulse value　　2 ~ 30000

　　・Example

Send	Reply	Contents
T:P2P5	OK or NG	2nd axis outputs a pulse every 5 pulse movements

*) In the case of Busy, it will be "NG" and this command cannot be executed.

83) T:S command (Trigger output 3 : Pulse output prohibited)
　　・Description
　　　　Prohibits trigger output.
　　・Command format
　　　　Send)　　T:S
　　・Example

Send	Reply
T:S	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

84) T:M command (Trigger output 4：One-shot trigger output)
・Description
Outputs a one-shot trigger.
・Command format
Send)   T:M
・Example

Send	Reply
T:M	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

85) T:E command (Trigger output 5: Scale pulse value specified)
・Description
Specifies the target axis for trigger output and the trigger pulse interval for scale pulses.
*) When executing the command, set the operating speed of the automatic stage to 56 kpps or less.
(Trigger may not be output if operated at 56kpps or higher.)
・Command format
Send)   T:EaPmb
・Parameters
Send)   a：Axis setting   1 or 2 or 3
m：Sign setting   + or- (Sign cannot be omitted)
b：Pulse value   2～30000
・Example

Send	Reply	Contents
T:E1P+2	OK or NG	Pulse output every 2 pulse movements in the + direction on the 1st axis

*) In the case of Busy, it will be "NG" and this command cannot be executed.

*) Even if the trigger returns in the reverse direction due to vibration, etc., it will not output a duplicate trigger.

86) P:R command (Program 1：Program mode transition)
・Description
Moves to program mode.
・Command format
Send)   P:R
・Example

Send	Reply
P:R	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

・Commands available in program mode

*IDN?	!:	Q:	Q:S	?:	L:E	BEC:
P:H	P:P	P:S	P:O	P:E	P:U	P:C
P:T	P:ON					

87) P:H command (Program 2：Transition to host mode)
　　・Description
　　　　Return to host mode.
　　・Command format
　　　　Send)　　P:H
　　・Example

Send	Reply
P:H	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

88) P:P command (Program 3：Program number designation)
　　・Description
　　　　Specify the program number.
　　・Command format
　　　　Send)　　P:Pp
　　・Parameters
　　　　Send)　　p：Program number　　　Setting range：1 ~ 8
　　・Example

Send	Reply	Contents
P:P2	OK or NG	Select program number 2

*) In the case of Busy, it will be "NG" and this command cannot be executed.

89) P:S command (Program 4：Program operation：Operation start)
　　・Description
　　　　The program operation will start.
　　・Command format
　　　　Send)　　P:S
　　・Example

Send	Reply
P:S	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

90) P:O command (Program 5：Program operation：One-line execution operation start)
　　・Description
　　　　The one-line execution operation is started by the program operation.
　　　　It can be used during pause with the "P: U" command.
　　・Command format
　　　　Send)　　P:O

・Example

Send	Reply
P:O	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

91) P:E command (Program 6：Program operation：Stop operation)
　　・Description
　　　　Stops the program operation.
　　・Command format
　　　　Send)　P:E
　　・Example

Send	Reply
P:E	OK or NG

92) P:U command (Program 7: Program operation：Pause)
　　・Description
　　　　Pauses program operation.
　　・Command format
　　　　Send)　P:Uu
　　・Parameters
　　　　Send)　u：Pause　　　　0 or 1
　　　　　　　　0　Pause
　　　　　　　　1　Unpause
　　・Example

Send	Reply	Contents
P:U0	OK or NG	Pause program operation

93) P:C command (Program 8：Program operation：Send completion signal)
　　・Description
　　　　When the program operation is completed, the "COMP" character string is replied to the
　　　　PC.
　　・Command format
　　　　Send)　P:Cc
　　・Parameters
　　　　Send)　c：Signal transmission　　　0 or 1
　　　　　　　　0　Signal transmission prohibited
　　　　　　　　1　Signal transmission enabled
　　・Example

Send	Reply	Contents
P:C1	OK or NG	Enables completion signal transmission during program operation

*) In the case of Busy, it will be "NG" and this command cannot be executed.

94) P:T command (Program 9：Program operation：Send trigger signal)
    ・Description
       When the trigger is output during program operation, the "TRIG" character string is sent to the PC.
    ・Command format
       Send)　　P:Tt
    ・Parameters
       Send)　　t : Trigger signal transmission　　　　0 or 1
             0　Prohibition of trigger signal transmission
             1　Trigger signal transmission controllable
    ・Example

Send	Reply	Contents
P:T0	OK or NG	Prohibition of trigger signal transmission at the time of trigger output during program operation

*) In the case of Busy, it will be "NG" and this command cannot be executed.

95) P:ON command (Program 10：Shift to edit mode)
    ・Description
       It shifts from the state where it is in the program mode to the program edit mode.
       *) The program number can be edited with the number set by the "P: P" command.
    ・Command format
       Send)　　P:ON
    ・Example

Send	Reply
P:ON	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

    ・Commands available in program mode

P:OFF	P:DEL	P:SET	P:GET	P:INIT

96) P:OFF command (Program 11：Program mode transition)
    ・Description
       From the program edit mode, if there is no "END" in all registered lines, "END" is automatically added, the set content is saved, and the program mode is entered.
       *) If up to the 4000th line is registered, "END" will not be added automatically.
    ・Command format
       Send)　　P:OFF
    ・Example

Send	Reply
P:OFF	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

97) P:DEL command (Program 12：Delete program line designation)
　　　・Description
　　　　Delete the program contents by specifying a line in the program edit mode.
　　　・Command format
　　　　Send)　P:DEL,n
　　　・Parameters
　　　　Send)　n：Program number　　　1 ~ 4000
　　　・Example

Send	Reply	Contents
P:DEL,1500	OK or NG	Deleted line 1500 of program number 1

　　*) In the case of Busy, it will be "NG" and this command cannot be executed.

98) P:SET command (Program 13：Program line designation setting)
　　　・Description
　　　　Set the program contents by specifying the line in the program edit mode.
　　　　*) Setting items differ depending on the operation pattern.
　　　　*) As for the program number, the number set by the "P: P" command will be edited.

　(1)　Operation pattern：Relative value operation M, absolute value operation A,
　　　　　　　　　　　　　　linear interpolation K
　　　Performs relative, absolute, and linear interpolation.
　　・Command format
　　　Send1)　P:SET,n,p,as1,as2,as3,ap1,ap2,ap3,o,s,w,tm,ta,tv
　　　Send2)　P:SET,n,p,as1,as2,as3,ap1,ap2,ap3,o,s,w,tm
　　　　　　　*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Send1),
　　　　　　　　and if the trigger mode is other than that, Send2).
　　　　　　　*) If the trigger mode is for a certain period of time, specify 1 for the trigger target axis ta.
　　・Parameters
　　　Send)　n：Program number　　　1 ~ 000
　　　　　　　p：Driving pattern　　　　M or A or K
　　　　　　　　　　　　　　　　　　*) In case of K, please enable 2 or more axes for the
　　　　　　　　　　　　　　　　　　　following axis states.
　　　　　　　as1：1st axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　ap1：1st axis coordinate value　　　-999,999,999 ~ 999,999,999 pls
　　　　　　　ap2：2nd axis coordinate value　　　-999,999,999 ~ 999,999,999 pls
　　　　　　　ap3：3rd axis coordinate value　　　-999,999,999 ~ 999,999,999 pls
　　　　　　　o：General-purpose output instruction　　0 ~ 63
　　　　　　　s：Operating speed　　　1 ~ 4
　　　　　　　w：Wait time　　　　　　0 ~ 2560 (0.1 sec unit)
　　　　　　　tm：Trigger mode　　　　0　Drive pulse designation
　　　　　　　　　　　　　　　　　　　1　Specify a certain time
　　　　　　　　　　　　　　　　　　　2　+ Scale pulse designation
　　　　　　　　　　　　　　　　　　　3　- Scale pulse designation
　　　　　　　　　　　　　　　　　　　4　One-shot trigger designation

*) Output after positioning of all effective axes

   5   Trigger issuance prohibited

   6   Take over the previous trigger setting

*) When specifying the drive pulse, + scale pulse, and-scale pulse, set the set speed to 56 kpps or less.

ta : Trigger target axis	1 ~ 3	
tv : Trigger output interval	Trigger mode 0 : 2 ~ 30000 pls	
	Trigger mode 1 : 1 ~ 10000 (0.01sec uint)	
	Trigger mode 2,3 : ±2 ~ 30000 pls	

・Example

Relative value operation on the 1500th line, 1st, 2nd and 3rd axis controllable, 1st axis movement amount: 100pls, 2nd axis movement amount: 200pls, 3rd axis movement amount: 300pls, general-purpose output instruction: 0, movement speed 1, Wait time: 0 seconds, Trigger mode: Drive pulse, Trigger target axis: 1st axis, Trigger output interval: 100pls set

Send	Reply
P:SET:1500,M,1,1,1,100,200,300,0,1,0,0,1,100	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(2) Operation pattern : Relative continuous operation CM,

                              Absolute continuous operation CA

Performs continuous operation with relative and absolute values. The specified coordinate value is considered as a passing point and operates continuously without stopping, and a trigger is output when the specified coordinate value is passed. (If it is continuous, the maximum is 256 lines.)

*) When using the trigger output, set the set speed to 25kpps or less.

・Command format

    Send)   P:SET,n,p,as1,as2,as3,ap1,ap2,ap3,o,s,w,tm

・Parameters

Send)	n : Program number	1 ~ 4000
	p : Driving pattern	CM or CA
	as1 : 1st axis state	0 (axis invalid) or 1 (axis controllable)
	as2 : 2nd axis state	0 (axis invalid) or 1 (axis controllable)
	as3 : 3rd axis state	0 (axis invalid) or 1 (axis controllable)

          *) Only one axis can be enabled. If multiple axes are enabled, a command error will occur.

	ap1 : 1st axis coordinate value	-999,999,999 ~ 999,999,999 pls
	ap2 : 2nd axis coordinate value	-999,999,999 ~ 999,999,999 pls
	ap3 : 3rd axis coordinate value	-999,999,999 ~ 999,999,999 pls
	o : General-purpose output instruction	0 ~ 63
	s : Operating speed	1 ~ 4
	w : Wait time	0 ~ 2560 (0.1 sec unit)
	tm : Trigger mode	0 Drive pulse designation
		2 Scale pulse designation

・Example
Relative continuous operation on the 1500th line, controllable only for the 1st axis, 1st axis movement amount: 100pls, 2nd axis movement amount: 0pls, 3rd axis movement amount: 0pls, general-purpose output instruction: 0, movement speed: 1, Wait time: 0 seconds, Trigger mode: Set drive pulse

Send	Reply
P:SET,1500,CM,1,0,0,100,0,0,0,1,0,0	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(3)　Operation pattern：Arc interpolation E (Perfect circle)
　　Executes the arc interpolation operation (specify a perfect circle).

 *) The pulse speed and the movement speed per pulse must be the same between the interpolation axes. If these are different, the correct interpolation operation will not be performed.

・Command format
 Send1)　P:SET,n,p,as1,as2, as3,cm,c1,c2,o,s,w,tm,ta,tv
 Send2)　P:SET,n,p,as1,as2, as3,cm,c1,c2,o,s,w,tm

  *) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Send1), and if the trigger mode is other than that, Send2).

  *) If the trigger mode is for a certain period of time, specify 1 for the trigger target axis ta.

  *) The pulse speed and the movement speed per pulse must be the same between the interpolation axes. If these are different, the correct interpolation operation will not be performed.

・Parameters
 Send)　n：Program number　　　　1 ~ 4000
    p：Driving pattern　　　　　E
    as1：1st axis state　　　　0 (axis invalid) or 1 (axis controllable)
    as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)
    as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)
     *) Two axes can be enabled. If all are enabled, a command error will occur.
    cm：Circle mode　　　　0　Perfect circle designation
           CW rotation direction
         1　Perfect circle designation
           CCW rotation direction
    c1：Center point coordinate value　　-999,999,999 ~ 999,999,999 pls
     *) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in as1 to 3 and the axis number is small, and is the relative position from the current position.
    c2：Center point coordinate value　　-999,999,999 ~ 999,999,999 pls
     *) It is the center point coordinate value of the axis (Y axis) with the larger axis number on the 2 axes enabled in as1 ~ 3, and is the relative position from the current position.
    o ：General-purpose output instruction　　0 ~ 63
    s：Operating speed　　　　1 ~ 4 (Minimum velocity of c1 axis (S))
    w：Wait time　　　　　　0 ~ 2560 (0.1 sec unit)
    tm：Trigger mode　　　　0　Drive pulse designation
           1　Specify a certain time
           2　+ Scale pulse designation
           3　- Scale pulse designation

4　One-shot trigger designation

*) Output after positioning of all effective axes

5　Trigger issuance prohibited

6　Take over the previous trigger setting

*) When specifying the drive pulse, + scale pulse, and-
scale pulse, set the set speed to 56 kpps or less.

ta： Trigger target axis　　　1 ~ 3

tv： Trigger output interval　Trigger mode 0：2 ~ 30000 pls

Trigger mode 1：1 ~ 10000 (0.01sec uint)

Trigger mode 2,3：±2 ~ 30000 pls

・Example

On the 1500th line, arc interpolation operation, 1st and 3rd axis controllable, arc mode: perfect circle specification CW rotation direction, 1st axis center point coordinate value: 100pls, 3rd axis center point coordinate value: 200pls, general-purpose output instruction: 0, movement speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis: 1st axis, trigger output interval: 100pls is set, and the operation returns to the current position.

Send	Reply
P:SET,1500,E,1,0,1,0,100,200,0,1,0,0,1,100	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(4)   Operation pattern :   Arc interpolation E (Angle)
Performs circle interpolation operation (angle specification).

*) The pulse speed and the movement speed per pulse must be the same between the interpolation axes.
If these are different, the correct interpolation operation will not be performed.

・Command format
Send1)   P:SET,n,p,as1,as2, as3,cm,c1,c2,al,o,s,w,tm,ta,tv
Send2)   P:SET,n,p,as1,as2, as3,cm,c1,c2,al,o,s,w,tm

*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Send1),
and if the trigger mode is other than that, Send2).

*) If the trigger mode is for a certain period of time, specify 1 for the trigger target axis ta.

・Parameters
Send)   n : Program number   1 ~ 4000
p : Driving pattern   E
as1 : 1st axis state   0 (axis invalid) or 1 (axis controllable)
as2 : 2nd axis state   0 (axis invalid) or 1 (axis controllable)
as3 : 3rd axis state   0 (axis invalid) or 1 (axis controllable)

*) Two axes can be enabled. If all are enabled, a command error will occur.

cm : Circle mode   2   Angle specification
CW rotation direction

3   Angle specification
CCW rotation direction

c1 : Center point coordinate value   -999,999,999 ~ 999,999,999 pls

*) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in as1
to 3 and the axis number is small, and is the relative position from the current position.

c2 : Center point coordinate value   -999,999,999 ~ 999,999,999 pls

*) It is the center point coordinate value of the axis (Y axis) with the larger axis number
on the 2 axes enabled in as1 ~ 3, and is the relative position from the current position.

al : Degree   0 ~ 360 (Degree)
o : General-purpose output instruction   0 ~ 63
s : Operating speed   1 ~ 4 (Minimum velocity of c1 axis (S))
w : Wait time   0 ~ 2560 (0.1 sec unit)
tm : Trigger mode   0   Drive pulse designation
1   Specify a certain time
2   + Scale pulse designation
3   - Scale pulse designation
4   One-shot trigger designation

*) Output after positioning of all effective axes

5   Trigger issuance prohibited
6   Take over the previous trigger setting

*) When specifying the drive pulse, + scale pulse, and-
scale pulse, set the set speed to 56 kpps or less.

ta : Trigger target axis   1 ~ 3
tv : Trigger output interval   Trigger mode 0 : 2 ~ 30000 pls
Trigger mode 1 : 1 ~ 10000 (0.01sec uint)
Trigger mode 2,3 : ±2 ~ 30000 pls

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*) An error will occur because the center coordinates are calculated. Please use it after confirming it with the actual machine.

・Example

On the 1500th line, arc interpolation operation, 1st and 2nd axis controllable, arc mode: angle specification CW rotation direction, 1st axis center point coordinate value: 100pls, 2nd axis center point coordinate value: -200pls, angle: 90 degrees, General-purpose output instruction: 0, Operating speed: 1, Standby time: 0 seconds, Trigger mode: Drive pulse, Trigger target axis: 1st axis, Trigger output interval: 100pls set

Send	Reply
P:SET,1500,E,1,1,0,2,100,-200,90,0,1,0,0,1,100	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(5)   Operation pattern : Arc interpolation E (Passing point)
      Executes arc interpolation operation. (passing point specification).
      *) The pulse speed and the movement speed per pulse must be the same between the interpolation axes.
         If these are different, the correct interpolation operation will not be performed.
   ・Command format
      Send1)   P:SET,n,p,as1,as2, as3,cm,p1,p2,e1,e2,o,s,w,tm,ta,tv
      Send2)   P:SET,n,p,as1,as2, as3,cm,p1,p2,e1,e2,o,s,w,tm
            *) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Send1),
               and if the trigger mode is other than that, Send2).
            *) If the trigger mode is for a certain period of time, specify 1 for the trigger target axis ta.
            *) The pulse speed and the movement speed per pulse must be the same between the
               interpolation axes. If these are different, the correct interpolation operation will not be
               performed.
   ・Parameters
      Send)   n : Program number   1 ~ 4000
                p : Driving pattern   E
                as1 : 1st axis state   0 (axis invalid) or 1 (axis controllable)
                as2 : 2nd axis state   0 (axis invalid) or 1 (axis controllable)
                as3 : 3rd axis state   0 (axis invalid) or 1 (axis controllable)
                     *) Two axes can be enabled. If all are enabled, a command error will occur.
                cm : Circle mode   4   Specifying a passing point
                                                  CW rotation direction
                                              5   Specifying a passing point
                                                  CW rotation direction
                p1 : Passing point coordinate value   -999,999,999 ~ 999,999,999 pls
                     *) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in as1
                        to 3 and the axis number is small, and is the relative position from the current position.
                p2 : Passing point coordinate value   -999,999,999 ~ 999,999,999 pls
                     *) It is the center point coordinate value of the axis (Y axis) with the larger axis number
                        on the 2 axes enabled in as1 ~ 3, and is the relative position from the current position.
                e1 : End point coordinate value   -999,999,999 ~ 999,999,999 pls
                     *) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in as1
                        to 3 and the axis number is small, and is the relative position from the current position.
                e2 : End point coordinate value   -999,999,999 ~ 999,999,999 pls
                     *) It is the center point coordinate value of the axis (Y axis) with the larger axis number
                        on the 2 axes enabled in as1 ~ 3, and is the relative position from the current position.
                o : General-purpose output instruction   0 ~ 63
                s : Operating speed   1 ~ 4 (Minimum velocity of p1, e1 axis (S))
                w : Wait time   0 ~ 2560 (0.1 sec unit)

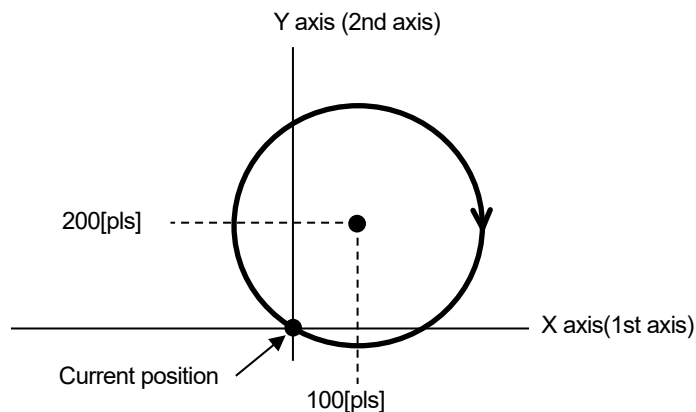| tm：Trigger mode	0	Drive pulse designation
	1	Specify a certain time
	2	+ Scale pulse designation
	3	- Scale pulse designation
	4	One-shot trigger designation

      *) Output after positioning of all effective axes

     5   Trigger issuance prohibited

     6   Take over the previous trigger setting

*) When specifying the drive pulse, + scale pulse, and-scale pulse, set the set speed to 56 kpps or less.

ta：Trigger target axis   1 ~ 3

tv：Trigger output interval   Trigger mode 0：2 ~ 30000 pls

                                 Trigger mode 1：1 ~ 10000 (0.01sec uint)
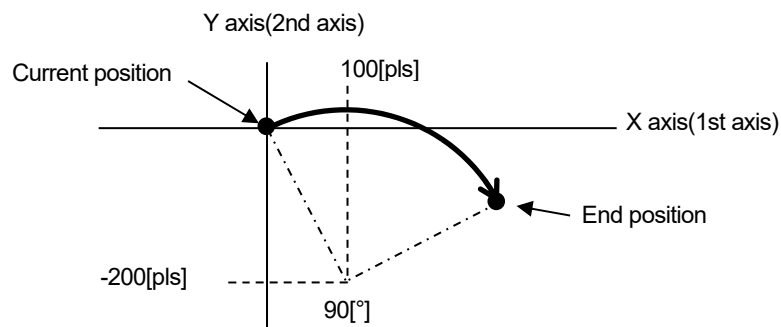
                                 Trigger mode 2,3：±2 ~ 30000 pls

・Example

On the 1500th line, arc interpolation operation, 2nd and 3rd axis controllable, arc mode: passing point specification CW rotation direction, 2nd axis passing point coordinate value: 100pls, 3rd axis passing point coordinate value: 150pls, 2nd axis end point Coordinate value: 500pls, 3rd axis end point coordinate value: 200pls, general-purpose output instruction: 0, movement speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis: 2nd axis, trigger output interval: 100pls The set

Send	Reply
P:SET,1500,E,0,1,1,4,100,150,500,200,0,1,0,0,2,100	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(6) Operation pattern：Helical interpolation EH (Perfect circle)
Executes helical interpolation operation. (specify a perfect circle).

*) The pulse speed and the movement speed per pulse must be the same between the interpolation axes.
If these are different, the correct interpolation operation will not be performed.

・Command format
Send1)   P:SET,n,p,as1,as2, as3,cm,c1,c2,hl,r,o,s,w,tm,ta,tv
Send2)   P:SET,n,p,as1,as2, as3,cm,c1,c2,hl,r,o,s,w,tm

*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Send1),
and if the trigger mode is other than that, Send2).

*) If the trigger mode is for a certain period of time, specify 1 for the trigger target axis ta.

・Parameters
Send)   n：Program number   1 ~ 4000
p：Driving pattern   EH
as1：1st axis state   0 (axis invalid) or 1 (axis controllable)
as2：2nd axis state   0 (axis invalid) or 1 (axis controllable)
as3：3rd axis state   0 (axis invalid) or 1 (axis controllable)

*) Enable 2 axes of circle interpolation axis. If all are enabled, a command error will
occur.

cm：Circle mode   0   Perfect circle designation
CW rotation direction
1   Perfect circle designation
CCW rotation direction

c1：Center point coordinate value   -999,999,999 ~ 999,999,999 pls

*) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in as1
to 3 and the axis number is small, and is the relative position from the current position.

c2：Center point coordinate value   -999,999,999 ~ 999,999,999 pls

*) It is the center point coordinate value of the axis (Y axis) with the larger axis number
on the 2 axes enabled in as1 ~ 3, and is the relative position from the current position.

hl：Linear movement amount setting   -999,999,999 ~ 999,999,999 pls

*) The amount of linear movement of the axis (Z axis) disabled in as1 to 3, and the
amount of movement per rotation from the current position. For example, if the
number of rotations is specified as 2 rotations and the linear movement amount setting
is 100pls, the total linear movement amount will be 200pls.

r：Rotation value   1 ~ 1000
o：General-purpose output instruction   0 ~ 63
s：Operating speed   1 ~ 4 (Minimum velocity of c1 axis (S))
w：Wait time   0 ~ 2560 (0.1 sec unit)
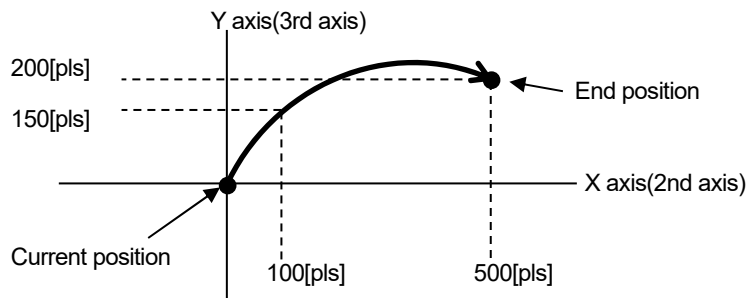tm：Trigger mode   0   Drive pulse designation
1   Specify a certain time
2   + Scale pulse designation
3   - Scale pulse designation
4   One-shot trigger designation
*) Output after positioning of all effective axes
5   Trigger issuance prohibited
6   Take over the previous trigger setting

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*) When specifying the drive pulse, + scale pulse, and-
   scale pulse, set the set speed to 56 kpps or less.

ta：Trigger target axis   1 ~ 3
tv：Trigger output interval   Trigger mode 0：2 ~ 30000 pls
                             Trigger mode 1：1 ~ 10000 (0.01sec uint)
                             Trigger mode 2,3：±2 ~ 30000 pls

・Example

Helical interpolation operation on the 1500th line, 1st and 2nd axis controllable, arc mode: perfect circle specification CW rotation direction, 1st axis center point coordinate value: 0pls, 2nd axis center point coordinate value: 200pls, 3rd axis movement Destination coordinates: 100pls, general-purpose output instruction: 0, operating speed: 1, waiting time: 0 seconds, trigger mode: drive pulse, trigger target axis: 1st axis, trigger output interval: 100pls set

Send	Reply
P:SET,1500,EH,1,1,0,0,0,200,100,1,0,1,0,0,1,100	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

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(7)　Operation pattern：　Helical interpolation EH (Angle)

Performs helical interpolation operation. (angle specification).

*) The pulse speed and the movement speed per pulse must be the same between the interpolation axes. If these are different, the correct interpolation operation will not be performed.

・Command format

Send1)　P:SET,n,p,as1,as2, as3,cm,c1,c2,al,hl,o,s,w,tm,ta,tv

Send2)　P:SET,n,p,as1,as2, as3,cm,c1,c2,al,hl,o,s,w,tm

*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Send1), and if the trigger mode is other than that, Send2).

*) If the trigger mode is for a certain period of time, specify 1 for the trigger target axis ta.

*) The pulse speed and the movement speed per pulse must be the same between the interpolation axes. If these are different, the correct interpolation operation will not be performed.

・Parameters

Send)			
	n：Program number	1 ~ 4000	
	p：Driving pattern	EH	
	as1：1st axis state	0 (axis invalid) or 1 (axis controllable)	
	as2：2nd axis state	0 (axis invalid) or 1 (axis controllable)	
	as3：3rd axis state	0 (axis invalid) or 1 (axis controllable)	

*) Enable 2 axes of circle interpolation axis. If all are enabled, a command error will occur.

cm：Circle mode	2	Angle specification	
		CW rotation direction	
	3	Angle specification	
		CCW rotation direction	

c1：Center point coordinate value　　-999,999,999 ~ 999,999,999 pls

*) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in as1 to 3 and the axis number is small, and is the relative position from the current position.

c2：Center point coordinate value　　-999,999,999 ~ 999,999,999 pls

*) It is the center point coordinate value of the axis (Y axis) with the larger axis number on the 2 axes enabled in as1 to 3, and is the relative position from the current position.

al：Angle　　　　　　　　　0 ~ 360000 (Degree)

hl：Linear movement amount setting　　-999,999,999 ~ 999,999,999 pls

*) If the linear movement destination coordinate value of the axis (Z axis) disabled in as1 to 3 and the angle is less than 360 °, the amount of movement until moving that angle is 360 ° or more, per rotation. It will be the amount of movement. For example, if the linear movement amount is set to 100pls at 540 ° (one and a half rotations), the total linear movement amount will be 150pls.

*) Since the total linear movement amount is calculated, an error will occur. Please use it after confirming it with the actual machine.

o：General-purpose output instruction　0 ~ 63

s：Operating speed　　　　1 ~ 4 (Minimum speed of c1 axis (S))

w：Wait time　　　　　　　0 ~ 2560 (0.1 sec unit)

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	tm：Trigger mode	0	Drive pulse designation
		1	Specify a certain time
		2	+ Scale pulse designation
		3	- Scale pulse designation
		4	One-shot trigger designation

*) Output after positioning of all effective axes

		5	Trigger issuance prohibited
		6	Take over the previous trigger setting

*) When specifying the drive pulse, + scale pulse, and-
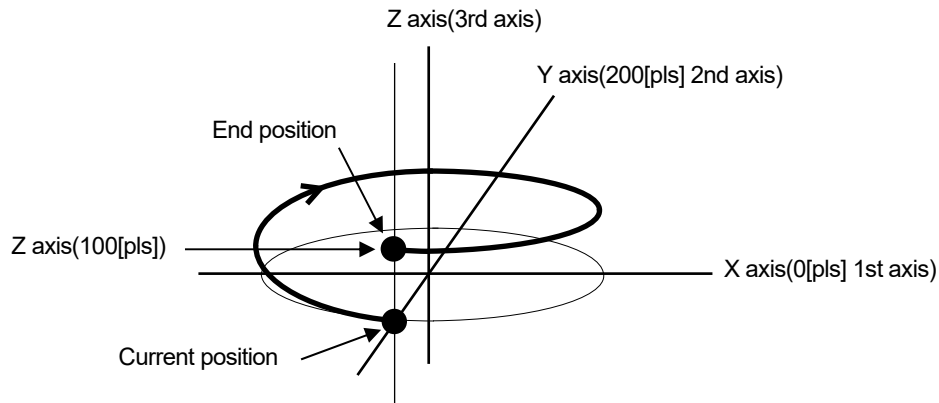 scale pulse, set the set speed to 56 kpps or less.

ta：Trigger target axis	1 ~ 3
tv：Trigger output interval	Trigger mode 0：2 ~ 30000 pls
	Trigger mode 1：1 ~ 10000 (0.01sec uint)
	Trigger mode 2,3：±2 ~ 30000 pls

・Example

Helical interpolation operation on the 1500th line, 1st and 2nd axis controllable, arc mode: angle specification CW rotation direction, 1st axis center point coordinate value: 0pls, 2nd axis center point coordinate value: 200pls, angle: 90 degrees, 3rd axis move destination coordinates: 100pls, general-purpose output instruction: 0, movement speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis: 1st axis, trigger output interval: 100pls set

Send	Reply
P:SET,1500,EH,1,1,0,2,0,200,90,100,0,1,0,0,1,100	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(8) Operation pattern：Helical interpolation EH (Passing point)

　　　Performs helical interpolation operation. (passing point specification).

*) The pulse speed and the movement speed per pulse must be the same between the interpolation axes.
If these are different, the correct interpolation operation will not be performed.

・Command format

Send1)　P:SET,n,p,as1,as2, as3,cm,p1,p2,e1,e2,hl,o,s,w,tm,ta,tv

Send2)　P:SET,n,p,as1,as2, as3,cm,p1,p2,e1,e2,hl,o,s,w,tm

*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Send1), and if the trigger mode is other than that, Send2).

*) If the trigger mode is for a certain period of time, specify 1 for the trigger target axis ta.

・Parameters

Send)	n：Program number	1 ~ 4000
	p：Driving pattern	EH
	as1：1st axis state	0 (axis invalid) or 1 (axis controllable)
	as2：2nd axis state	0 (axis invalid) or 1 (axis controllable)
	as3：3rd axis state	0 (axis invalid) or 1 (axis controllable)

*) Enable 2 axes of circle interpolation axis. If all are enabled, a command error will occur.

cm：Circle mode　　　　　4　Specifying a passing point
　　　　　　　　　　　　　　　CW rotation direction

　　　　　　　　　　　　　 5　Specifying a passing point
　　　　　　　　　　　　　　　CCW rotation direction

p1：Passing point coordinate value　-999,999,999 ~ 999,999,999 pls

*) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in as1 to 3 and the axis number is small, and is the relative position from the current position.

p2：Passing point coordinate value　-999,999,999 ~ 999,999,999 pls

*) It is the center point coordinate value of the axis (Y axis) with the larger axis number on the 2 axes enabled in as1 ~ 3, and is the relative position from the current position.

e1：End point coordinate value　　　-999,999,999 ~ 999,999,999 pls

*) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in as1 to 3 and the axis number is small, and is the relative position from the current position.

e2：End point coordinate value　　　-999,999,999 ~ 999,999,999 pls

*) It is the center point coordinate value of the axis (Y axis) with the larger axis number on the 2 axes enabled in as1 ~ 3, and is the relative position from the current position.

hl：Linear destination coordinate value　-999,999,999 ~ 999,999,999 pls

*) The linear movement destination coordinate value of the axis (Z axis) disabled in as1 to 3, which is the relative position from the current position.

o：General-purpose output instruction　0 ~ 63

s：Operating speed　　　　　1 ~ 4 (Minimum velocity of p1, e1 axis (S))

w：Wait time　　　　　　　　0 ~ 2560 (0.1 sec unit)
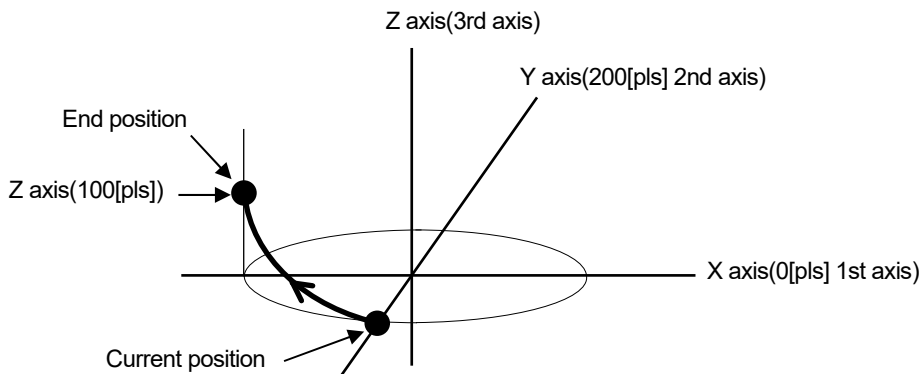
tm：Trigger mode		0	Drive pulse designation
		1	Specify a certain time
		2	+ Scale pulse designation
		3	- Scale pulse designation
		4	One-shot trigger designation

*) Output after positioning of all effective axes

5　Trigger issuance prohibited

6　Take over the previous trigger setting

*) When specifying the drive pulse, + scale pulse, and-scale pulse, set the set speed to 56 kpps or less.

ta：Trigger target axis　　　1 ~ 3

tv：Trigger output interval　　Trigger mode 0：2 ~ 30000 pls

Trigger mode 1：1 ~ 10000 (0.01sec uint)

Trigger mode 2,3：±2 ~ 30000 pls

・Example

On the 1500th line, arc interpolation operation, 2nd and 3rd axis controllable, arc mode: passing point specification CW rotation direction, 2nd axis passing point coordinate value: -100pls, 3rd axis passing point coordinate value: 50pls, 2nd axis End point coordinate value: -150pls, 3rd axis end point coordinate value: 50pls, general-purpose output instruction: 0, movement speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis: 2nd axis, trigger output interval 10pls set

Send	Reply
P:SET,1500,EH,0,1,1,4,-100,50,-150,100,50,0,1,0,0,2,10	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(9)　Operation pattern：　Registered coordinate operation PAV
　　　　Executes the operation to the coordinate value registered by the "PAV:" command.

*) The pulse speed and the movement speed per pulse must be the same between the interpolation axes.
　If these are different, the correct interpolation operation will not be performed.

・Command format
　　Send1)　P:SET,n,p,as1,as2,as3,m,o,s,w,tm,ta,tv
　　Send2)　P:SET,n,p,as1,as2,as3,m,o,s,w,tm

　　　　　　*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Send1),
　　　　　　　and if the trigger mode is other than that, Send2).

・Parameters

Send)	n：Program number	1 ~ 4000
	p：Driving pattern	PAV
	as1：1st axis state	0 (axis invalid) or 1 (axis controllable)
	as2：2nd axis state	0 (axis invalid) or 1 (axis controllable)
	as3：3rd axis state	0 (axis invalid) or 1 (axis controllable)
	m：Coordinate value information registration number	1 ~ 20
	o：General-purpose output instruction	0 ~ 63
	s：Operating speed	1 ~ 4
	w：Wait time	0 ~ 2560 (0.1 sec unit)
	tm：Trigger mode	0　Drive pulse designation
		1　Specify a certain time
		2　+ Scale pulse designation
		3　- Scale pulse designation
		4　One-shot trigger designation
		*) Output after positioning of all effective axes
		5　Trigger issuance prohibited
		6　Take over the previous trigger setting
		*) When specifying the drive pulse, + scale pulse, and- scale pulse, set the set speed to 56 kpps or less.
	ta：Trigger target axis	1 ~ 3
	tv：Trigger output interval	Trigger mode 0：2 ~ 30000 pls
		Trigger mode 1：1 ~ 10000 (0.01sec uint)
		Trigger mode 2,3：±2 ~ 30000 pls

・Example
On the 1500th line, registration position operation, 1st, 2nd, 3rd axis controllable, 1st axis registration number: 1, 2nd axis registration number: 2, 3rd axis registration number: 3, general-purpose output instruction: 0, movement speed 1, Wait time: 0 seconds, Trigger mode: Drive pulse, Trigger target axis: 1st axis, Trigger output interval: 100pls set

Send	Reply
P:SET,1500,PAV,1,1,1,1,2,3,0,1,0,0,1,100	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(10) Operation pattern：Mechanical origin return H Performs mechanical origin return.
　・Command format
　　　Send)　　P:SET,n,p,as1,as2,as3,o,w,tm
　・Parameters
　　　Send)　　n：Program number　　　1 ~ 4000
　　　　　　　p：Driving pattern　　　　H
　　　　　　　as1：1st axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　o：General-purpose output instruction　　0 ~ 63
　　　　　　　w：Wait time　　　　　　0 ~ 2560 (0.1 sec unit)
　　　　　　　tm：Trigger mode　　　　4　One-shot trigger specification
　　　　　　　　　　　　　　　　　　*) Output after positioning of all effective axes
　　　　　　　　　　　　　　　　　5　Trigger issuance prohibited
　・Example
　Mechanical origin return operation, 1st, 2nd and 3rd axis controllable, general-purpose output instruction: 0, standby time: 0 seconds, trigger mode: one-shot trigger is set on the 1500th line.

Send	Reply
P:SET,1500,H,1,1,1,0,0,4	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(11) Operation pattern：Logical origin return Z Performs logical origin return.
　・Command format
　　　Send)　　P:SET,n,p,as1,as2,as3,o,s,w,tm
　・Parameters
　　　Send)　　n：Program number　　　1 ~ 4000
　　　　　　　p：Driving pattern　　　　Z
　　　　　　　as1：1st axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　o：General-purpose output instruction　　0 ~ 63
　　　　　　　s：Operating speed　　　　1 ~ 4
　　　　　　　w：Wait time　　　　　　0 ~ 2560 (0.1 sec unit)
　　　　　　　tm：Trigger mode　　　　4　One-shot trigger specification
　　　　　　　　　　　　　　　　　　*) Output after positioning of all effective axes
　　　　　　　　　　　　　　　　　5　Trigger issuance prohibited
　・Example
　Mechanical origin return operation, 1st, 2nd and 3rd axis controllable, general-purpose output instruction: 0, standby time: 0 seconds, trigger mode: one-shot trigger is set on the 1500th line.

Send	Reply
P:SET,1500,Z,1,1,1,0,1,0,4	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

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(12) Operation pattern：Logical origin setting R

Performs the logical origin setting.

・Command format

Send)　　P:SET,n,p,as1,as2,as3

・Parameters

Send)　　n：Program number　　　1 ~ 4000

p：Driving pattern　　　　Z

as1：1st axis state　　　　0 (axis invalid) or 1 (axis controllable)

as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)

as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)

・Example

Set the logical origin and enable the 1st, 2nd, and 3rd axes on the 1500th line.

Send	Reply
P:SET,1500,R,1,1,1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(13) Operation pattern：General-purpose I/O INPUT

Wait until the specified I / O terminal is in the general-purpose input state.

・Command format

Send)　　P:SET,n,p,i

・Parameters

Send)　　n：Program number　　　1 ~ 4000

p：Driving pattern　　　　INPUT

i：General-purpose input status　　　0 ~ 63

・Example

General-purpose input, general-purpose input status: 1 (only IN1 is ON) is set on the 1500th line.

Send	Reply
P:SET,1500,INPUT,1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(14) Operation pattern：Loop start F

Set the loop start position. Loop ends A loop within the same loop nest a specified number of times between "N".

・Command format

Send)　　P:SET,n,p,ll,lv

・Parameters

Send)　　n：Program number　　　1 ~ 4000

p：Driving pattern　　　　F

ll：Loop nest　　　　　　1 ~ 9

lv：Loop value　　　　　1 ~ 65535

・Example

Set loop start, loop nest: 1, loop count: 100 on line 1500

Send	Reply
P:SET,1500,F,1,100	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(15) Operation pattern：Loop end N

Set the loop end position. It returns to the loop start "F" position of the specified loop nest and executes the next line after being executed the specified number of times.

・Command format

Send)　　P:SET,n,p,ll

・Parameters

Send)　　n：Program number　　　1 ~ 4000

　　　　　p：Driving pattern　　　　N

　　　　　ll：Loop nest　　　　　　1 ~ 9

・Example

Set loop end, loop nest: 1 on line 1500

Send	Reply
P:SET,1500,N,1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(16) Operation pattern：End of execution END

Specify the execution end line.

　*) If up to the 4000th line is registered, it is not necessary to register "END".

　*) "END" is registered in the first line of the initial value of the program.

・Command format

Send)　　P:SET,n,p

・Parameters

Send)　　n：Program number　　　1 ~ 4000

　　　　　p：Driving pattern　　　　END

・Example

Set the end of execution on the 1500th line

Send	Reply
P:SET,1500,END	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(17) Operation pattern：Unregistered NONE

Delete the contents of the already registered line and register the unregistered line that does nothing.

　*) As the initial value of the program, "NONE" is registered from the first line onward.

・Command format

Send)　　P:SET,n,p

・Parameters

Send)   n：Program number   1 ~ 4000
        p：Driving pattern   NONE

・Example

Delete the registered contents on the 1500th line

Send	Reply
P:SET,1500,NONE	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

99) P:GET command (Program 13：Get program line designation)
    ・Description

        Get the program contents by specifying a line in the program edit mode.

(1) Operation pattern：Relative value operation M, Absolute value operation A,
                        Linear interpolation K

・Command format
    Send)   P:GEL,n
    Reply)   p,as1,as2,as3,ap1,ap2,ap3,o,s,w,tm,ta,tv
            *) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Reply1),
               and if the trigger mode is other than that, Reply2).

・Parameters
    Send)   n：Program number   1 ~ 4000
    Reply)   p：Driving pattern   M or A or K
            as1：1st axis state   0 (axis invalid) or 1 (axis controllable)
            as2：2nd axis state   0 (axis invalid) or 1 (axis controllable)
            as3：3rd axis state   0 (axis invalid) or 1 (axis controllable)
            ap1：1st axis coordinate value   -999,999,999 ~ 999,999,999 pls
            ap2：2nd axis coordinate value   -999,999,999 ~ 999,999,999 pls
            ap3：3rd axis coordinate value   -999,999,999 ~ 999,999,999 pls
            o：General-purpose output instruction   0 ~ 63
            s：Operating speed   1 ~ 4
            w：Wait time   0 ~ 2560 (0.1 sec unit)
            tm：Trigger mode   0   Drive pulse designation
                                      1   Specify a certain time
                                      2   + Scale pulse designation
                                      3   - Scale pulse designation
                                      4   One-shot trigger designation
                                       *) Output after positioning of all effective axes
                                      5   Trigger issuance prohibited
                                      6   Take over the previous trigger setting
            ta：Trigger target axis   1 ~ 3
            tv：Trigger output interval Trigger mode 0：2 ~ 30000 pls
                                      Trigger mode 1：1 ~ 10000 (0.01sec uint)
                                      Trigger mode 2,3：±2 ~ 30000 pls

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・Example
Line 1500 is relative value operation, 1st, 2nd, 3rd axis controllable, 1st axis movement amount: 100pls, 2nd axis movement amount: 200pls, 3rd axis movement amount: 300pls, general-purpose output instruction: 0, movement speed 1, Wait time: 0 seconds, Trigger mode: Drive pulse, Trigger target axis: 1st axis, Trigger output interval: Registered at 100pls

Send	Reply
P:GET,1500	M,1,1,1,100,200,300,0,1,0,0,1,100

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(2)　Operation pattern：Relative continuous operation CM,
　　　　　　　　　　　 Absolute continuous operation CA
・Command format
　　Send)　　P:GEL,n
　　Reply)　　p,as1,as2,as3,ap1,ap2,ap3,o,s,w,tm
・Parameters
　　Send)　　n：Program number　　　1 ~ 4000
　　Reply)　　p：Driving pattern　　　CM or CA
　　　　　　as1：1st axis state　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　as2：2nd axis state　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　as3：3rd axis state　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　ap1：1st axis coordinate value　　　-999,999,999 ~ 999,999,999 pls
　　　　　　ap2：2nd axis coordinate value　　　-999,999,999 ~ 999,999,999 pls
　　　　　　ap3：3rd axis coordinate value　　　-999,999,999 ~ 999,999,999 pls
　　　　　　o：General-purpose output instruction　　0 ~ 63
　　　　　　s：Operating speed　　　1 ~ 4
　　　　　　w：Wait time　　　0 ~ 2560 (0.1 sec unit)
　　　　　　tm：Trigger mode　　　0　Drive pulse designation
　　　　　　　　　　　　　　　　　2　Scale pulse designation

・Example
Line 1500 is relative continuous operation, controllable only for 1st axis, 1st axis movement amount: 100pls, 2nd axis movement amount: 0pls, 3rd axis movement amount: 0pls, general-purpose output instruction: 0, movement speed: 1, Wait time: 0 seconds, Trigger mode: Register with drive pulse

Send	Reply
P:GET,1500	CM,1,0,0,100,0,0,0,1,0,0

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(3)　Operation pattern：Arc interpolation E (Perfect circle)
・Command format
　　Send)　　P:GEL,n
　　Reply)　　p,as1,as2, as3,cm,c1,c2,o,s,w,tm,ta,tv
　　　　　　*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Reply1),
　　　　　　　　and if the trigger mode is other than that, Reply2).
・Parameters
　　Send)　　n：Program number　　　1 ~ 4000

Reply) p：Driving pattern   E
        as1：1st axis state   0 (axis invalid) or 1 (axis controllable)
        as2：2nd axis state   0 (axis invalid) or 1 (axis controllable)
        as3：3rd axis state   0 (axis invalid) or 1 (axis controllable)
        cm：Circle mode   0   Perfect circle designation
                                          CW rotation direction
                                      1   Perfect circle designation
                                          CCW rotation direction
        c1：Center point coordinate value   -999,999,999 ~ 999,999,999 pls
        c2：Center point coordinate value   -999,999,999 ~ 999,999,999 pls
        o：General-purpose output instruction   0 ~ 63
        s：Operating speed   1 ~ 4
        w：Wait time   0 ~ 2560 (0.1 sec unit)
        tm：Trigger mode   0   Drive pulse designation
                                      1   Specify a certain time
                                      2   + Scale pulse designation
                                      3   - Scale pulse designation
                                      4   One-shot trigger designation
                                       *) Output after positioning of all effective axes
                                      5   Trigger issuance prohibited
                                      6   Take over the previous trigger setting
        ta：Trigger target axis   1 ~ 3
        tv：Trigger output interval   Trigger mode 0：2 ~ 30000 pls
                                      Trigger mode 1：1 ~ 10000 (0.01sec uint)
                                      Trigger mode 2,3：±2 ~ 30000 pls

・Example
Line 1500 is arc interpolation operation, 1st and 3rd axis controllable, arc mode: perfect circle specification CW rotation direction, 1st axis center point coordinate value: 100pls, 3rd axis center point coordinate value: 200pls, general-purpose output instruction: 0, operating speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis: 1st axis, trigger output interval: 100pls registered

Send	Reply
P:GET,1500	E,1,0,1,0,100,200,0,1,0,0,1,100

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(4) Operation pattern：Arc interpolation E (Angle)
　　・Command format
　　　　Send)　　P:GEL,n
　　　　Reply)　　p,as1,as2, as3,cm,c1,c2,al,o,s,w,tm,ta,tv
　　　　　　　　*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Reply1),
　　　　　　　　　and if the trigger mode is other than that, Reply2).

　　・Parameters
　　　　Send)　　n：Program number　　　　1 ~ 4000
　　　　Reply)　　p：Driving pattern　　　　E
　　　　　　　　as1：1st axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　　as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　　as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　　cm：Circle mode　　　　　2　Angle specification
　　　　　　　　　　　　　　　　　　　　　　CW rotation direction
　　　　　　　　　　　　　　　　　　　3　Angle specification
　　　　　　　　　　　　　　　　　　　　　　CCW rotation direction
　　　　　　　　c1：Center point coordinate value　　　-999,999,999 ~ 999,999,999 pls
　　　　　　　　c2：Center point coordinate value　　　-999,999,999 ~ 999,999,999 pls
　　　　　　　　al：Angle　　　　　　　　0 ~ 360(Degree)
　　　　　　　　o：General-purpose output instruction　　0 ~ 63
　　　　　　　　s：Operating speed　　　　1 ~ 4
　　　　　　　　w：Wait time　　　　　　　0 ~ 2560 (0.1 sec unit)
　　　　　　　　tm：Trigger mode　　　　　0　Drive pulse designation
　　　　　　　　　　　　　　　　　　　1　Specify a certain time
　　　　　　　　　　　　　　　　　　　2　+ Scale pulse designation
　　　　　　　　　　　　　　　　　　　3　- Scale pulse designation
　　　　　　　　　　　　　　　　　　　4　One-shot trigger designation
　　　　　　　　　　　　　　　　　　　　*) Output after positioning of all effective axes
　　　　　　　　　　　　　　　　　　　5　Trigger issuance prohibited
　　　　　　　　　　　　　　　　　　　6　Take over the previous trigger setting
　　　　　　　　ta：Trigger target axis　　　1 ~ 3

　　　　　　　　tv：Trigger output interval　　Trigger mode 0：2 ~ 30000 pls
　　　　　　　　　　　　　　　　　　　　　　Trigger mode 1：1 ~ 10000 (0.01sec uint)
　　　　　　　　　　　　　　　　　　　　　　Trigger mode 2,3：±2 ~ 30000 pls
　　・Example
　　　　Line 1500 is arc interpolation operation, 1st and 2nd axis controllable, arc mode: angle specification CW rotation direction, 1st axis center point coordinate value: 100pls, 2nd axis center point coordinate value: -200pls, angle: 90 degrees, General-purpose output instruction: 0, Operating speed: 1, Standby time: 0 seconds, Trigger mode: Drive pulse, Trigger target axis: 1st axis, Trigger output interval: Registered at 100pls

Send	Reply
P:GET,1500	E,1,1,0,2,100,-200,90,0,1,0,0,1,100

*) In the case of Busy, it will be "NG" and this command cannot be executed.

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(5) Operation pattern : Arc interpolation E (Passing point)
　・Command format
　　　　Send)　　P:GEL,n
　　　　Reply)　　p,as1,as2, as3,cm,p1,p2,e1,e2,o,s,w,tm,ta,tv
　　　　　　　*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Reply1),
　　　　　　　　　and if the trigger mode is other than that, Reply2).

　・Parameters
　　　　Send)　　n : Program number　　　　1 ~ 4000
　　　　Reply)　　p : Driving pattern　　　　E
　　　　　　　as1 : 1st axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　as2 : 2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　as3 : 3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　cm : Circle mode　　　　4　Specifying a passing point
　　　　　　　　　　　　　　　　　　　CW rotation direction
　　　　　　　　　　　　　　　　5　Specifying a passing point
　　　　　　　　　　　　　　　　　　　CCW rotation direction
　　　　　　　p1 : Passing point coordinate value　　-999,999,999 ~ 999,999,999 pls
　　　　　　　p2 : Passing point coordinate value　　-999,999,999 ~ 999,999,999 pls
　　　　　　　e1 : End point coordinate value　　　　-999,999,999 ~ 999,999,999 pls
　　　　　　　e2 : End point coordinate value　　　　-999,999,999 ~ 999,999,999 pls
　　　　　　　o : General-purpose output instruction　　0 ~ 63
　　　　　　　s : Operating speed　　　　1 ~ 4
　　　　　　　w : Wait time　　　　0 ~ 2560 (0.1 sec unit)
　　　　　　　tm : Trigger mode　　　　0　Drive pulse designation
　　　　　　　　　　　　　　　　1　Specify a certain time
　　　　　　　　　　　　　　　　2　+ Scale pulse designation
　　　　　　　　　　　　　　　　3　- Scale pulse designation
　　　　　　　　　　　　　　　　4　One-shot trigger designation
　　　　　　　　　　　　　　　　*) Output after positioning of all effective axes
　　　　　　　　　　　　　　　　5　Trigger issuance prohibited
　　　　　　　　　　　　　　　　6　Take over the previous trigger setting
　　　　　　　ta : Trigger target axis　　　　1 ~ 3

　　　　　　　tv : Trigger output interval　　Trigger mode 0 : 2 ~ 30000 pls
　　　　　　　　　　　　　　　　　　　　Trigger mode 1 : 1 ~ 10000 (0.01sec uint)
　　　　　　　　　　　　　　　　　　　　Trigger mode 2,3 : ±2 ~ 30000 pls

　・Example
　　Line 1500 is arc interpolation operation, 2nd and 3rd axis controllable, arc mode: passing
　　point specification CW rotation direction, 2nd axis passing point coordinate value: 100pls,
　　3rd axis passing point coordinate value: 150pls, 2nd axis end point Coordinate value:
　　500pls, 3rd axis end point coordinate value: 200pls, general-purpose output instruction: 0,
　　movement speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis:
　　2nd axis, trigger output interval: Register at 100pls

Send	Reply
P:GET,1500	E,0,1,1,4,100,150,500,200,0,1,0,0,2,100

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(6)   Operation pattern：Helical interpolation EH (Perfect circle)
　　・Command format
　　　　Send)   P:GEL,n
　　　　Reply)   p,as1,as2, as3,cm,c1,c2,hl,r,o,s,w,tm,ta,tv
　　　　　　*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Reply1),
　　　　　　　and if the trigger mode is other than that, Reply2).

　　・Parameters
　　　　Send)   n：Program number   1 ~ 4000
　　　　Reply)   p：Driving pattern   EH
　　　　　　as1：1st axis state   0 (axis invalid) or 1 (axis controllable)
　　　　　　as2：2nd axis state   0 (axis invalid) or 1 (axis controllable)
　　　　　　as3：3rd axis state   0 (axis invalid) or 1 (axis controllable)
　　　　　　cm：Circle mode   0   Perfect circle designation
　　　　　　　　　　　　　　　　　　　　CW rotation direction
　　　　　　　　　　　　　　　　1   Perfect circle designation
　　　　　　　　　　　　　　　　　　　　CCW rotation direction
　　　　　　c1：Center point coordinate value   -999,999,999 ~ 999,999,999 pls
　　　　　　c2：Center point coordinate value   -999,999,999 ~ 999,999,999 pls
　　　　　　hl：Linear destination coordinate value   -999,999,999 ~ 999,999,999 pls
　　　　　　r：Rotation value   1 ~ 1000
　　　　　　o：General-purpose output instruction   0 ~ 63
　　　　　　s：Operating speed   1 ~ 4
　　　　　　w：Wait time   0 ~ 2560 (0.1 sec unit)
　　　　　　tm：Trigger mode   0   Drive pulse designation
　　　　　　　　　　　　　　　　1   Specify a certain time
　　　　　　　　　　　　　　　　2   + Scale pulse designation
　　　　　　　　　　　　　　　　3   - Scale pulse designation
　　　　　　　　　　　　　　　　4   One-shot trigger designation
　　　　　　　　　　　　　　　　　*) Output after positioning of all effective axes
　　　　　　　　　　　　　　　　5   Trigger issuance prohibited
　　　　　　　　　　　　　　　　6   Take over the previous trigger setting
　　　　　　ta：Trigger target axis   1 ~ 3
　　　　　　tv：Trigger output interval   Trigger mode 0：2 ~ 30000 pls
　　　　　　　　　　　　　　　　　　　Trigger mode 1：1 ~ 10000 (0.01sec uint)
　　　　　　　　　　　　　　　　　　　Trigger mode 2,3：±2 ~ 30000 pls

　　・Example
　　Line 1500 is helical interpolation operation, 1st and 2nd axis controllable, arc mode: perfect circle specification CW rotation direction, 1st axis center point coordinate value: 0pls, 2nd axis center point coordinate value: 200pls, 3rd axis movement Destination coordinates: 100pls, general-purpose output instruction: 0, operating speed: 1, waiting time: 0 seconds, trigger mode: drive pulse, trigger target axis: 1st axis, trigger output interval: registered at 100pls

Send	Reply
P:GET,1500	EH,1,1,0,0,0,200,100,0,1,0,0,1,100

*) In the case of Busy, it will be "NG" and this command cannot be executed.

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(7)　Operation pattern：Helical interpolation EH (Angle)
　　・Command format
　　　　Send)　　P:GEL,n
　　　　Reply)　　p,as1,as2, as3,cm,c1,c2,al,hl,o,s,w,tm,ta,tv
　　　　　　　*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Reply1),
　　　　　　　　　and if the trigger mode is other than that, Reply2).
　　・Parameters
　　　　Send)　　n：Program number　　　　1 ~ 4000
　　　　Reply)　　p：Driving pattern　　　　EH
　　　　　　　　as1：1st axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　　as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　　as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　　cm：Circle mode　　　　　　2　Angle specification
　　　　　　　　　　　　　　　　　　　　　　 CW rotation direction
　　　　　　　　　　　　　　　　　　　3　Angle specification
　　　　　　　　　　　　　　　　　　　　　 CCW rotation direction
　　　　　　　　c1：Center point coordinate value　　-999,999,999 ~ 999,999,999 pls
　　　　　　　　c2：Center point coordinate value　　-999,999,999 ~ 999,999,999 pls
　　　　　　　　al：Angle　　　　　　　　　0 ~ 360000(Degree)
　　　　　　　　hl：Linear destination coordinate value　　-999,999,999 ~ 999,999,999 pls
　　　　　　　　o：General-purpose output instruction　　0 ~ 63
　　　　　　　　s：Operating speed　　　　1 ~ 4
　　　　　　　　w：Wait time　　　　　　　0 ~ 2560 (0.1 sec unit)
　　　　　　　　tm：Trigger mode　　　　　0　Drive pulse designation
　　　　　　　　　　　　　　　　　　　　　1　Specify a certain time
　　　　　　　　　　　　　　　　　　　　　2　+ Scale pulse designation
　　　　　　　　　　　　　　　　　　　　　3　- Scale pulse designation
　　　　　　　　　　　　　　　　　　　　　4　One-shot trigger designation
　　　　　　　　　　　　　　　　　　　　　 *) Output after positioning of all effective axes
　　　　　　　　　　　　　　　　　　　　　5　Trigger issuance prohibited
　　　　　　　　　　　　　　　　　　　　　6　Take over the previous trigger setting
　　　　　　　　ta：Trigger target axis　　　1 ~ 3

　　　　　　　　tv：Trigger output interval　　Trigger mode 0 : 2 ~ 30000 pls
　　　　　　　　　　　　　　　　　　　　　　Trigger mode 1 : 1 ~ 10000 (0.01sec uint)
　　　　　　　　　　　　　　　　　　　　　　Trigger mode 2,3 : ±2 ~ 30000 pls

　　・Example
　　Line 1500 is helical interpolation operation, 1st and 2nd axis controllable, arc mode: angle
　　specification CW rotation direction, 1st axis center point coordinate value: 0pls, 2nd axis
　　center point coordinate value: 200pls, angle: 90 degrees, 3rd axis move destination
　　coordinates: 100pls, general-purpose output instruction: 0, movement speed: 1, standby
　　time: 0 seconds, trigger mode: drive pulse, trigger target axis: 1st axis, trigger output
　　interval: 100pls

Send	Reply
P:GET,1500	EH,1,1,0,2,0,200,90,100,0,1,0,0,1,100

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(8) Operation pattern : Helical interpolation EH (Passing point)
・Command format
　　Send)　P:GEL,n
　　Reply)　p,as1,as2, as3,cm,p1,p2,e1,e2,hl,o,s,w,tm,ta,tv
　　　　　　*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Reply1),
　　　　　　　and if the trigger mode is other than that, Reply2).
・Parameters
　　Send)　n : Program number　　　　　　1 ~ 4000
　　Reply)　p : Driving pattern　　　　　　 EH
　　　　　as1 : 1st axis state　　　　　 0 (axis invalid) or 1 (axis controllable)
　　　　　as2 : 2nd axis state　　　　　 0 (axis invalid) or 1 (axis controllable)
　　　　　as3 : 3rd axis state　　　　　 0 (axis invalid) or 1 (axis controllable)
　　　　　cm : Circle mode　　　　　　 4　Specifying a passing point
　　　　　　　　　　　　　　　　　　　　　　CW rotation direction
　　　　　　　　　　　　　　　　　　 5　Specifying a passing point
　　　　　　　　　　　　　　　　　　　　　　CW rotation direction
　　　　　p1 : Passing point coordinate value　　-999,999,999 ~ 999,999,999 pls
　　　　　p2 : Passing point coordinate value　　-999,999,999 ~ 999,999,999 pls
　　　　　e1 : End point coordinate value　　-999,999,999 ~ 999,999,999 pls
　　　　　e2 : End point coordinate value　　-999,999,999 ~ 999,999,999 pls
　　　　　hl : Linear destination coordinate value　　-999,999,999 ~ 999,999,999 pls
　　　　　o : General-purpose output instruction　　0 ~ 63
　　　　　s : Operating speed　　　　　 1 ~ 4
　　　　　w : Wait time　　　　　　　　 0 ~ 2560 (0.1 sec unit)
　　　　　tm : Trigger mode　　　　　　 0　Drive pulse designation
　　　　　　　　　　　　　　　　　　 1　Specify a certain time
　　　　　　　　　　　　　　　　　　 2　+ Scale pulse designation
　　　　　　　　　　　　　　　　　　 3　- Scale pulse designation
　　　　　　　　　　　　　　　　　　 4　One-shot trigger designation
　　　　　　　　　　　　　　　　　　　 *) Output after positioning of all effective axes
　　　　　　　　　　　　　　　　　　 5　Trigger issuance prohibited
　　　　　　　　　　　　　　　　　　 6　Take over the previous trigger setting
　　　　　ta : Trigger target axis　　　 1 ~ 3
　　　　　tv : Trigger output interval　　Trigger mode 0 : 2 ~ 30000 pls
　　　　　　　　　　　　　　　　　　 Trigger mode 1 : 1 ~ 10000 (0.01sec uint)
　　　　　　　　　　　　　　　　　　 Trigger mode 2,3 : ±2 ~ 30000 pls
・Example
　　Line 1500 is arc interpolation operation, 2nd and 3rd axis controllable, arc mode: passing
　　point specification CW rotation direction, 2nd axis passing point coordinate value: -100pls,
　　3rd axis passing point coordinate value: 50pls, 2nd axis End point coordinate value: -150pls,
　　3rd axis end point coordinate value: 50pls, general-purpose output instruction: 0,
　　movement speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis:
　　2nd axis, trigger output interval Register at 10pls

Send	Reply
P:GET,1500	EH,0,1,1,4,-100,50,-150,100,50,0,1,0,0,2,10

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(9)　Operation pattern :　Registered coordinate operation PAV
・Command format
　　　Send)　　P:GEL,n
　　　Reply)　　p,as1,as2,as3,o,s,w,tm,ta,tv
　　　　　　　　*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Reply1),
　　　　　　　　　　and if the trigger mode is other than that, Reply2).

・Parameters
　　　Send)　　n : Program number　　　　1 ~ 4000
　　　Reply)　　p : Driving pattern　　　　PAV
　　　　　　　　as1 : 1st axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　　as2 : 2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　　as3 : 3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　　o : General-purpose output instruction　　0 ~ 63
　　　　　　　　s : Operating speed　　　　1 ~ 4
　　　　　　　　w : Wait time　　　　0 ~ 2560 (0.1 sec unit)
　　　　　　　　tm : Trigger mode　　　　0　Drive pulse designation
　　　　　　　　　　　　　　　　　　　　1　Specify a certain time
　　　　　　　　　　　　　　　　　　　　2　+ Scale pulse designation
　　　　　　　　　　　　　　　　　　　　3　- Scale pulse designation
　　　　　　　　　　　　　　　　　　　　4　One-shot trigger designation
　　　　　　　　　　　　　　　　　　　　　*) Output after positioning of all effective axes
　　　　　　　　　　　　　　　　　　　　5　Trigger issuance prohibited
　　　　　　　　　　　　　　　　　　　　6　Take over the previous trigger setting
　　　　　　　　ta : Trigger target axis　　　1 ~ 3
　　　　　　　　tv : Trigger output interval　　Trigger mode 0 : 2 ~ 30000 pls
　　　　　　　　　　　　　　　　　　　　　Trigger mode 1 : 1 ~ 10000 (0.01sec uint)
　　　　　　　　　　　　　　　　　　　　　Trigger mode 2,3 : ±2 ~ 30000 pls

・Example
Line 1500 is registration position operation, 1st, 2nd, 3rd axis controllable, 1st axis registration number: 1, 2nd axis registration number: 2, 3rd axis registration number: 3, general-purpose output instruction: 0, movement speed 1, Wait time: 0 seconds, Trigger mode: Drive pulse, Trigger target axis: 1st axis, Trigger output interval: Registered at 100pls

Send	Reply
P:GET,1500	PAV,1,1,1,1,2,3,0,1,0,0,1,100

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(10) Operation pattern：Mechanical origin return H

　　・Command format

　　　　Send)　　P:GEL,n

　　　　Reply)　　p,as1,as2,as3,o,w,tm

　　・Parameters

　　　　Send)　　n：Program number　　　　1 ~ 4000

　　　　Reply)　　p：Driving pattern　　　　　H

　　　　　　　　as1：1st axis state　　　　　0 (axis invalid) or 1 (axis controllable)

　　　　　　　　as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)

　　　　　　　　as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)

　　　　　　　　o：General-purpose output instruction　　0 ~ 63

　　　　　　　　w：Wait time　　　　　　　0 ~ 2560 (0.1 sec unit)

　　　　　　　　tm：Trigger mode　　　　　4　　One-shot trigger specification

　　　　　　　　　　　　　　　　　　　　　5　　Trigger issuance prohibited

　　・Example

　　Line 1500 is mechanical origin return operation, 1st, 2nd, 3rd axis controllable, general-purpose output instruction: 0, standby time: 0 seconds, trigger mode: registered with one-shot trigger

Send	Reply
P:GET,1500	H,1,1,1,0,0,4

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(11) Operation pattern：Logical origin return Z

　　・Command format

　　　　Send)　　P:GEL,n

　　　　Reply)　　p,as1,as2,as3,o,s,w,tm

　　・Parameters

　　　　Send)　　n：Program number　　　　1 ~ 4000

　　　　Reply)　　p：Driving pattern　　　　　Z

　　　　　　　　as1：1st axis state　　　　　0 (axis invalid) or 1 (axis controllable)

　　　　　　　　as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)

　　　　　　　　as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)

　　　　　　　　o：General-purpose output instruction　　0 ~ 63

　　　　　　　　s：Operating speed　　　　1 ~ 4

　　　　　　　　w：Wait time　　　　　　　0 ~ 2560 (0.1 sec unit)

　　　　　　　　tm：Trigger mode　　　　　4　　One-shot trigger specification

　　　　　　　　　　　　　　　　　　　　　5　　Trigger issuance prohibited

　　・Example

　　Line 1500 is logical origin return operation, 1st, 2nd, 3rd axis controllable, general-purpose output instruction: 0, standby time: 0 seconds, trigger mode: registered with one-shot trigger

Send	Reply
P:GET,1500	Z,1,1,1,0,1,0,4

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(12) Operation pattern：Logical origin setting R
・Command format
　　Send)　　P:GEL,n
　　Reply)　　p,as1,as2,as3
・Parameters
　　Send)　　n：Program number　　　1 ~ 4000
　　Reply)　　p：Driving pattern　　　　Z
　　　　　　　as1：1st axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　as2：2nd axis state　　　　0 (axis invalid) or 1 (axis controllable)
　　　　　　　as3：3rd axis state　　　　0 (axis invalid) or 1 (axis controllable)
・Example
The 1500th line is registered with the logical origin setting and the 1st, 2nd, and 3rd axes controllable.

Send	Reply
P:GET,1500	R,1,1,1

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(13) Operation pattern：General-purpose I/O INPUT
・Command format
　　Send)　　P:GEL,n
　　Reply)　　p,i
・Parameters
　　Send)　　n：Program number　　　1 ~ 4000
　　Reply)　　p：Driving pattern　　　　INPUT
　　　　　　　i：General-purpose input status　　0 ~ 63
・Example
Line 1500 is registered with general-purpose input, general-purpose input status: 1 (only IN1 is ON)

Send	Reply
P:GET,1500	INPUT,1

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(14) Operation pattern：Loop start F
・Command format
　　Send)　　P:GEL,n
　　Reply)　　p,ll,lv
・Parameters
　　Send)　　n：Program number　　　1 ~ 4000
　　Reply)　　p：Driving pattern　　　　F
　　　　　　　ll：Loop nest　　　　　　1 ~ 9
　　　　　　　lv：Loop value　　　　　1 ~ 65535

・Example

"Loop start", "Loop hierarchy: 1", "Loop count: 100" are registered in the 1500th line.

Send	Reply
P:GET,1500	F,1,100

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(15) Operation pattern：Loop end N

　・Command format

　　　Send)　　P:GEL,n

　　　Reply)　　p,ll

　・Parameters

　　　Send)　　n：Program number　　　1 ~ 4000

　　　Reply)　　p：Driving pattern　　　　N

　　　　　　　　ll：Loop nest　　　　　　1 ~ 9

　・Example

　　The 1500th line is registered with " loop end " and "loop hierarchy: 1".

Send	Reply
P:GET,1500	N,1

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(16) Operation pattern：End of execution END

　・Command format

　　　Send)　　P:GEL,n

　　　Reply)　　p

　・Parameters

　　　Send)　　n：Program number　　　1 ~ 4000

　　　Reply)　　p：Driving pattern　　　　END

　・Example

　　Line 1500 is registered at the end of execution

Send	Reply
P:GET,1500	END

*) In the case of Busy, it will be "NG" and this command cannot be executed.

(17) Operation pattern：Unregistered NONE

　・Command format

　　　Send)　　P:GEL,n

　　　Reply)　　p

　・Parameters

　　　Send)　　n：Program number　　　1 ~ 4000

　　　Reply)　　p：Driving pattern　　　　NONE

　・Example

　　Line 1500 is unregistered

Send	Reply
P:GET,1500	NONE

*) In the case of Busy, it will be "NG" and this command cannot be executed.

100) P: INIT command (Program 15：Delete all lines of the program)
・Description
Delete all the program contents in the program edit mode.
・Command format
Send) P:INIT
・Example

Send	Reply
P:INIT	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

101) MS:ON command (Memory switch operation 1：Edit mode transition)
・Description
Moves from host mode to memory switch edit mode. The commands that can be used in the memory switch edit mode are "MS: OFF", "MS: SET", "MS: GET", "MS: DEF", and "MS: DEFR".
・Command format
Send)   MS:ON
・Example

Send	Reply
MS:ON	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

・Commands available in memory switch edit mode

*IDN?	?:	MS:OFF	MS:SET	MS:GET	MS:DEF
MS:DEFR	MS:SETK	MS:GETK	MS:DEFK	MS:DEFRK	

102) MS:OFF command (Memory switch operation 2：Host mode transition)
・Description
Saves the settings and returns from memory switch edit mode to host mode.
・Command format
Send)   MS:OFF
・Example

Send	Reply
MS:OFF	OK or NG

103) MS:SET command (Memory switch operation 3：Setting)
・Description
Memory switch Set the contents of the memory switch in the edit mode.
・Command format
Send)   MS:SET,k,n,s
・Parameters
Send)   k：Memory switch item
    0   GENERAL   General settings
    1   INTERFACE   Communication settings
    2   SENSOR   Sensor settings

	3	AXIS	Axis settings
	4	MOTOR DRIVER	Motor driver settings
	5	SPEED	Speed settings
	6	ORG	Origin settings
	7	FEEDBACK	Feedback control settings
	8	SOFT LIMIT	Soft limit settings

n : Memory switch content number

s : Memory switch setting number

*) For details on each memory switch item, content number, and setting number, refer to the separate " Preparation and Operation ".

・Example 1

Set "MODE SEL (1)" of "GENERAL (0)" to "MANUAL mode (1)".

Send	Reply
MS:SET,0,1,1	OK or NG

・Example 2

Set "SPEED12 (S)" (4) of "SPEED" (5) to "1000pps".

Send	Reply
MS:SET,5,4,1000	OK or NG

104) MS:GET command (Memory switch operation 4 : Get)

・Description

Get the contents of the memory switch in the memory switch edit mode.

・Command format

Send)　　MS:GET,k,n

Reply)　　s

・Parameters

Send)　　k : Memory switch item

	0	GENERAL	General settings
	1	INTERFACE	Communication settings
	2	SENSOR	Sensor settings
	3	AXIS	Axis settings
	4	MOTOR DRIVER	Motor driver settings
	5	SPEED	Speed settings
	6	ORG	Origin settings
	7	FEEDBACK	Feedback control settings
	8	SOFT LIMIT	Soft limit settings

n : Memory switch content number

Reply)　　s : Memory switch setting number

*) For details on each memory switch item, content number, and setting number, refer to the separate " Preparation and Operation ".

・Example

"MODE SEL (1)" setting of "GENERAL (0)" is "MANUAL mode (1)"

Send	Reply
MS:GET,0,1	1

105) MS:DEF command (Memory switch operation 5：Initialization)
　　・Description
　　　Initialize the contents of the memory switch in the memory switch edit mode.
　　・Command format
　　　Send) MS:DEF,k,n
　　・Parameters
　　　Send) k：Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

　　　　n：Memory switch content number
　　　　　*) For details on each memory switch item, and content number, refer to the separate "
　　　　　　Preparation and Operation ".
　　・Example
　　Initialize "MODE SEL (1)" of "GENERAL (0)" (HOST mode).

Send	Reply
MS:DEF,0,1	OK or NG

106) MS:DEFR command (Memory switch operation 6：Get the initial value)
　　・Description
　　　Get the initial value of the memory switch contents in the memory switch edit mode.
　　・Command format
　　　Send) MS:DEFR,k,n
　　　Reply) s
　　・Parameters
　　　Send) k：Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

　　　　n：Memory switch content number
　　　Reply) s：Default setting number of memory switch contents
　　　　　*) For details on each memory switch item, content number, and default setting number,
　　　　　　refer to the separate " Preparation and Operation ".

・Example

Gets the default setting for "AXIS (0)" for "GENERAL (0)".

Send	Reply	Memo
MS:DEFR,0,0	6	The default setting for "AXIS (0)" is "1 + 2 + 3 (6)"

107) MS:SETK command (Memory switch operation command 3 : Setting command)

・Description

Set all the contents of the memory switch item in the memory switch edit mode.

・Command format

Send)　　MS:SETK,k,s1,s2,…,sn

・Parameters

Send)　　k : Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

　　　　　s1 ~ sn : Setting number

*) The number of settings varies depending on the memory switch item.

*) For details on each memory switch item, content number, and setting number, refer to the separate " Preparation and Operation ".

・Example

Set the "GENERAL (0)" setting as follows.

No.1 AXIS: 1 + 2 + 3 (6)

No.2 MODE SEL: HOST mode (0)

No.3 SLEEP SEL: ON (1)

No.4 BEEP SEL: ON (1)

No.5 JOG X SEL: 1st axis (0)

No.6 JOG Y SEL: 2nd axis (1)

No.7 CMD FORMAT: SHOT / FC mode (0)

No.8 TRG / LEV: Positive logic (0)

No.9 TRG WIDTH: 10 µsec (0)

Send	Reply
MS:SETK,0,6,0,1,1,0,1,0,0,0	OK or NG

108) MS:GETK command (Memory switch operation 4：Get)
　　・Description
　　　　Get all the contents of the memory switch item in the memory switch edit mode.
　　・Command format
　　　　Send)　　MS:GETK,k
　　　　Reply)　　s1,s2,….sn
　　・Parameters
　　　　Send)　　k：Memory switch item

	0	GENERAL	General settings
	1	INTERFACE	Communication settings
	2	SENSOR	Sensor settings
	3	AXIS	Axis settings
	4	MOTOR DRIVER	Motor driver settings
	5	SPEED	Speed settings
	6	ORG	Origin settings
	7	FEEDBACK	Feedback control settings
	8	SOFT LIMIT	Soft limit settings

　　　　Reply)　　s1 ~ sn　：Setting number

　　　　　　　　　　*) The number of settings varies depending on the memory switch item.
　　　　　　　　　　*) For details on each memory switch item, and setting number, refer to
　　　　　　　　　　　　the separate " Preparation and Operation ".

　・Example
　　Gets the "GENERAL (0)" setting.
　　　No.1 AXIS: 1 + 2 + 3 (6)
　　　No.2 MODE SEL: HOST mode (0)
　　　No.3 SLEEP SEL: ON (1)
　　　No.4 BEEP SEL: ON (1)
　　　No.5 JOG X SEL: 1st axis (0)
　　　No.6 JOG Y SEL: 2nd axis (1)
　　　No.7 CMD FORMAT: SHOT / FC mode (0)
　　　No.8 TRG / LEV: Positive logic (0)
　　　No.9 TRG WIDTH: 10 µsec (0)

Send	Reply
MS:GETK,0	6,0,1,1,0,1,0,0,0

109) MS:DEFK command (Memory switch operation 5：Initialization)
　　・Description
　　　　Initialize all the contents of the memory switch item in the memory switch edit mode.
　　・Command format
　　　　Send)　　MS:DEFK,k
　　・Parameters
　　　　Send)　　k：Memory switch item

	0	GENERAL	General settings
	1	INTERFACE	Communication settings
	2	SENSOR	Sensor settings
	3	AXIS	Axis settings

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4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

*) For details on each memory switch item, refer to the separate
" Preparation and Operation ".

・Example

Send	Reply	Contents
MS:DEFK,0	OK or NG	Initialize GENERAL (0)

110) MS:DEFRK command (Memory switch operation 6 : Get the initial value)
　・Description
　　Get the initial value of all the contents of the memory switch item in the memory switch
　　edit mode.
　・Command format
　　Send)　MS:DEFRK,k
　　Reply)　s1 ~ sn
　・Parameters
　　Send)　k : Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

　　Reply)　s1 ~ sn : Default setting number of memory switch contents

*) The number of settings varies depending on the memory switch item.
*) For details on each memory switch item, and default setting number,
refer to the separate " Preparation and Operation ".

・Example
Gets the default setting for "GENERAL (0)".

Send	Reply
MS:DEFRK,0	6,0,1,1,0,1,0,0,0

No.1 AXIS: 1 + 2 + 3 (6)
No.2 MODE SEL: HOST mode (0)
No.3 SLEEP SEL: ON (1)
No.4 BEEP SEL: ON (1)
No.5 JOG X SEL: 1st axis (0)
No.6 JOG Y SEL: 2nd axis (1)
No.7 CMD FORMAT: SHOT / FC mode (0)
No.8 TRG / LEV: Positive logic (0)
No.9 TRG WIDTH: 10 μsec (0)

111) PIT:DEL command (Position registration 1 : Delete)
　　・Description
　　　Delete the registered location information contents.
　　・Command format
　　　Send)　　PIT:DEL,n
　　・Parameters
　　　Send)　　n : Location information registration number　　1 ~ 20
　　・Example
　　Delete the registration details of registration number 1.

Send	Reply
PIT:DEL,1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

112) PIT:SET command (Position registration 2 : Registration)
　　・Description
　　　Registers the current position with the specified registration number.
　　　*) If the power of this device is turned off, reset, or the memory switch that automatically restarts is changed, the registered position will be discarded.
　　・Command format
　　　Send)　　PIT:SET,n
　　・Parameters
　　　Send)　　n : Location information registration number　　1 ~ 20
　　・Example
　　Registers the current position as registration number 1.

Send	Reply
PIT:SET,1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

113) PIT:GET command (Position registration 3 : Get)
　　・Description
　　　Get the registered location information content.
　　　*) If the counter is set to zero after registering with the "PIT_SET:" command, the coordinate value obtained by this command will be the calculation result of the registered position and the coordinate value immediately before zero setting.
　　・Command format
　　　Send)　　PIT:GET,n
　　　Reply)　　c1,c2,c3
　　・Parameters
　　　Send)　　n : Location information registration number　　1 ~ 20
　　　Reply)　　c1 : 1st axis coordinate value (unit: pls)
　　　　　　　　c2 : 2nd axis coordinate value (unit: pls)
　　　　　　　　c3 : 3rd axis coordinate value (unit: pls)

・Example

Get the location of registration number 3.

Send	Reply	Contents
PIT:GET,3	10000,5000,10	Coordinate values are registered as + 10000pls for the 1st axis, +5000pls for the 2nd axis, and +10pls for the 3rd axis.

114) PIT:G command (Position registration 4 : Operation 1)

・Description

Moves to the position registered in the specified location information registration number.

*) Since the position is not based on the zero of the coordinate value, the registered position does not change even if the counter is set to zero.

*) If the power of this device is turned off, reset, or the memory switch that automatically restarts is changed, the registered position will be discarded.

・Command format

Send)   PIT:G,n

・Parameters

Send)   n : Location information registration number   1 ~ 20

・Example

Moves to the coordinate value registered in registration number 5.

Send	Reply
PIT:G,5	OK or NG

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

115) PIT:GRT command (Position registration 5 : Operation order 2 : Completion reply)

・Description

It moves to the location registered in the specified location information registration number and replies to each axis after completion.

*) Since the position is not based on the zero of the coordinate value, the registered position does not change even if the counter is set to zero.

*) If the power of this device is turned off, reset, or the memory switch that automatically restarts is changed, the registered position will be discarded.

・Command format

Send)   PIT:GRT,n

Reply)   r

・Parameters

Send)   n : Location information registration number   1 ~ 20

Reply)   r : Positioning complete axis   1 or 2 or 3

・Example

Move to the position registered in registration number 5, and the operation is completed in the order of the 2nd axis and the 1st axis.

Send	Reply	Reply after the operation is completed
PIT:GRT,5	OK or NG	2
		1

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

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116) PAV:DEL command (Coordinate value registration 1：Delete)
　　・Description
　　　　The registered coordinate value information content is deleted from the main memory of the controller.
　　・Command format
　　　　Send)　　PAV:DEL,n
　　・Parameters
　　　　Send)　　n：Coordinate value information registration number　　1 ~ 20
　　・Example
　　　Delete the registration details of registration number 1.

Send	Reply
PAV:DEL,1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

117) PAV:SET command (Coordinate value registration 2：Registration)
　　・Description
　　　　Registers the current coordinate values in the controller's main memory to the specified registration number.
　　・Command format
　　　　Send)　　PAV:SET,n
　　・Parameters
　　　　Send)　　n：Coordinate value information registration number　　1 ~ 20
　　・Example
　　　Register the current coordinate value in registration number 1.

Send	Reply
PAV:SET,1	OK or NG

*) In the case of Busy, it will be "NG" and this command cannot be executed.

118) PAV:GET command (Coordinate value registration 3：Get)
　　・Description
　　　　Get the registered coordinate value information contents from the main memory of the controller.
　　・Command format
　　　　Send)　　PAV:GET,n
　　　　Reply)　　c1,c2,c3
　　・Parameters
　　　　Send)　　n：Coordinate value information registration number　　1 ~ 20
　　　　Reply)　　c1：1st axis coordinate value (unit: pls)
　　　　　　　　　c2：2nd axis coordinate value (unit: pls)
　　　　　　　　　c3：3rd axis coordinate value (unit: pls)

・Example
Get the coordinate value of registration number 3.

Send	Reply	Contents
PAV:GET,3	10000,5000,10	Coordinate values are registered as + 10000pls for the 1st axis, +5000pls for the 2nd axis, and +10pls for the 3rd axis.

119) PAV:G command(Coordinate value registration 4 : Operation 1)
・Description
Moves to the position registered in the specified coordinate value information registration number.
・Command format
Send)   PAV:G,n
・Parameters
Send)   n : Coordinate value information registration number   1 ~ 20
・Example
Moves to the coordinate value registered in registration number 5.

Send	Reply
PAV: G,5	OK or NG

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.

120) PAV:GRT command (Coordinate value registration 5 : Operation 2 : Completion reply)
・Description
It moves to the position registered in the specified coordinate value information registration number, and replies for each axis after completion.
・Command format
Send)   PAV:GRT,n
Reply)   r
・Parameters
Send)   n : Coordinate value information registration number   1 ~ 20
Reply)   r : Positioning complete axis   1 or 2 or 3
・Example
Move to the coordinate value registered in registration number 5, and the operation is completed in the order of the 2nd axis and the 1st axis.

Send	Reply	Reply after the operation is completed
PAV:GRT,5	OK or NG	2
		1

*) In the case of Busy or the motor excitation is OFF, it will be "NG" and this command cannot be executed.