

# **User's Manual**

## **(Command)**

## **HIT Mode**

**Three-axis Stage Controller**

**SHRC-203**

**HOURS**  
  
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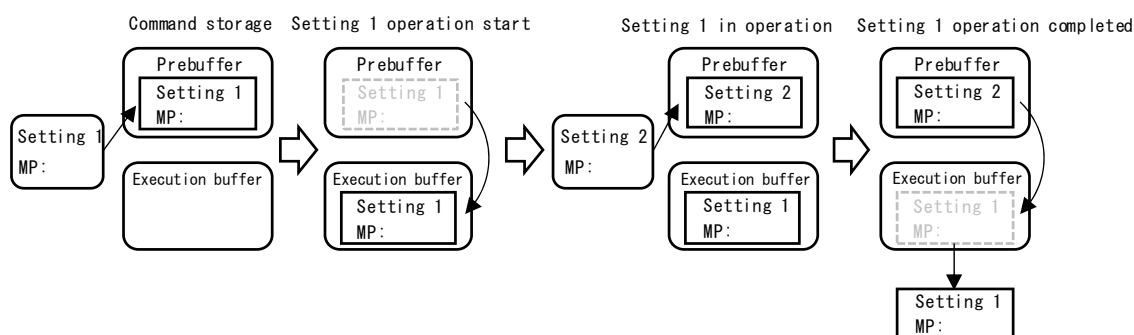
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## 1. Overview

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

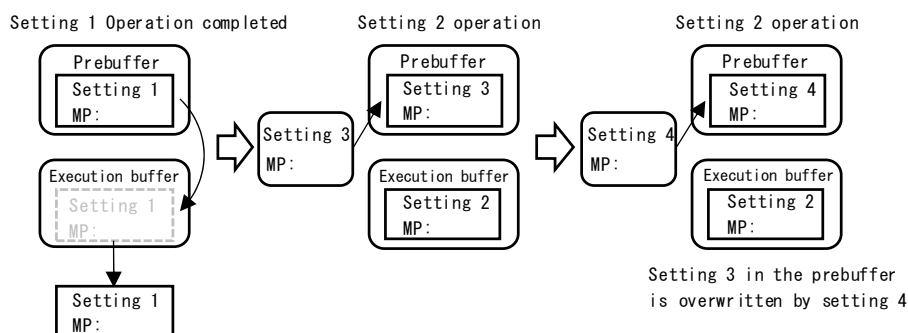
Commands	Contents	Memo
MP:	Relative travel distance setting	Prebuffer settings
AP:	Absolute travel distance setting	Prebuffer settings
EP:	Arc interpolation operation	Prebuffer settings
KP:	Linear interpolation operation	Prebuffer settings
WT:	Timed wait standby	
WI:	General-purpose input standby	

## 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:uc

Reply) c1,c2,c3

## • Parameters

Send) u : Unit setting N / U / M / D

N nanometer designation

U micrometer designation

M mm designation

D degree designation

No designation (If no unit is specified, it is assumed to be "pls".)

c : Counter specification E/C

E Scale counter

C Command counter

No designation (Memory switch STAGE UNIT setting for each axis)

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 ~ 1FFFFFFF (Hexadecimal)

s2 : 2nd axis status 0 ~ 1FFFFFFF (Hexadecimal)

s3 : 3rd axis status 0 ~ 1FFFFFFF (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

$$(200 * 10) / 2000 = 1\text{nm}$$

- 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

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

N nanometer designation

U micrometer designation

M mm designation

D degree designation

No designation (If no unit is specified, it is assumed to be "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



## 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

N nanometer designation

U micrometer designation

M mm designation

D degree designation

No designation (If no unit is specified, it is assumed to be "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

N nanometer designation

U micrometer designation

M mm designation

D degree designation

No designation (If no unit is specified, it is assumed to be "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

N nanometer designation

U micrometer designation

M mm designation

D degree designation

No designation (If no unit is specified, it is assumed to be "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 arc 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

N nanometer designation

U micrometer designation

M mm designation

No designation (If no unit is specified, it is assumed to be "pls".)

Reply) m : Arc 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	
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

N nanometer designation

U micrometer designation

M mm designation

No designation (If no unit is specified, it is assumed to be "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

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)

## 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

## 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

- Parameters

Reply) I : 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 mode

- Example

Send	Reply
?:FMT	HIT



## 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

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 :  $\pm 2 \sim 30000$ pls

SCALE MINUS :  $\pm 2 \sim 30000$ pls

- 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: Serial 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

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 N / U / M / D

u2 : 2nd axis unit designation N / U / M / D

u3 : 3rd axis unit designation N / U / M / D

N nanometer designation

U micrometer designation

M mm designation

D degree designation

No designation (If no unit is specified, it is assumed to be "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.

## 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) Wl: 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) Wl: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
Wl:63,63,63	OK or NG	All axes designation (All effective axes IN1-6: ON)
Wl: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 N / U / M / D

u2 : 2nd axis unit designation N / U / M / D

u3 : 3rd axis unit designation N / U / M / D

N nanometer designation

U micrometer designation

M mm designation

D degree designation

No designation (If no unit is specified, it is assumed to be "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 N / U / M / D

u2 : 2nd axis unit designation N / U / M / D

u3 : 3rd axis unit designation N / U / M / D

N nanometer designation

U micrometer designation

M mm designation

D degree designation

No designation (If no unit is specified, it is assumed to be "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 : 2nd 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 N / U / M / D

u2 : 2nd axis unit designation N / U / M / D

u3 : 3rd axis unit designation N / U / M / D

N nanometer designation

U micrometer designation

M mm designation

D degree designation

No designation (If no unit is specified, it is assumed to be "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 N / U / M / D

u2 : 2nd axis unit designation N / U / M / D

u3 : 3rd axis unit designation N / U / M / D

N nanometer designation

U micrometer designation

M mm designation

D degree designation

No designation (If no unit is specified, it is assumed to be "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 : 2nd 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".

## 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 arc 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 : Arc axis setting

b : Arc 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

N nanometer designation

U micrometer designation

M mm designation

No designation (If no unit is specified, it is assumed to be "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 (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  $\mu\text{m}$

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

M Setting range : Value of pls converted to mm

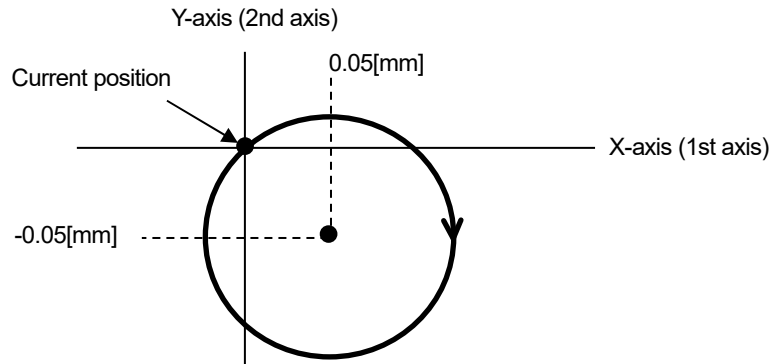
(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls)

• Example

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 : Arc axis setting

b : Arc 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

N nanometer designation

U micrometer designation

M mm designation

No designation (If no unit is specified, it is assumed to be "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 (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  $\mu\text{m}$

(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)

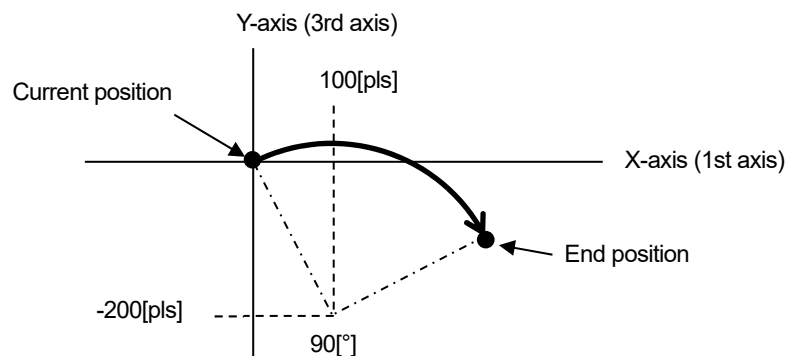
ae : End point angle (deg) setting (Setting range :  $0^\circ < ae \leq 360^\circ$ )

• 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  $90^\circ$  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 : Arc axis setting

b : Arc 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

N nanometer designation

U micrometer designation

M mm designation

No designation (If no unit is specified, it is assumed to be "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  $\mu\text{m}$

(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)

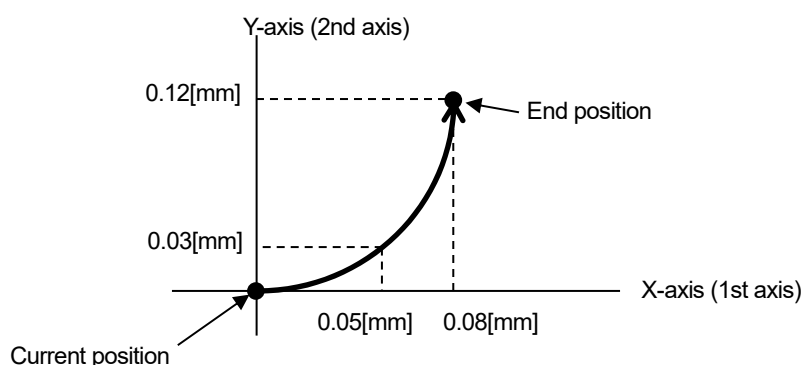
\*) If the passing point coordinates, end point coordinates and current position are on a straight line, an arc cannot be specified, so "NG" is returned.

• 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 : Arc axis setting

1 1st axis designation

b : Arc axis setting

2 2nd axis designation

h : Linear axis setting

3 3rd axis designation

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

N nanometer designation

U micrometer designation

M mm designation

No designation (If no unit is specified, it is assumed to be "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  $\mu\text{m}$

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

M Setting range : Value of pls converted to mm

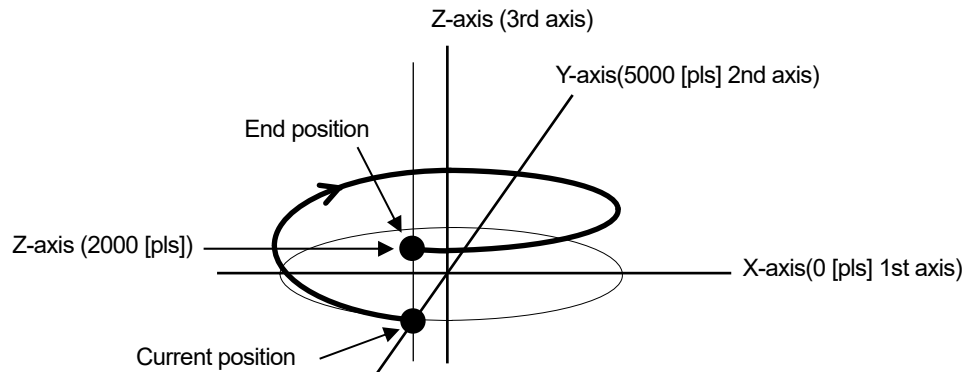
(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls)

- 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 : Arc axis setting

1 1st axis designation

b : Arc axis setting

2 2nd axis designation

h : Linear axis setting

3 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 N / U / M

N nanometer designation

U micrometer designation

M mm designation

No designation (If no unit is specified, it is assumed to be "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)

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)

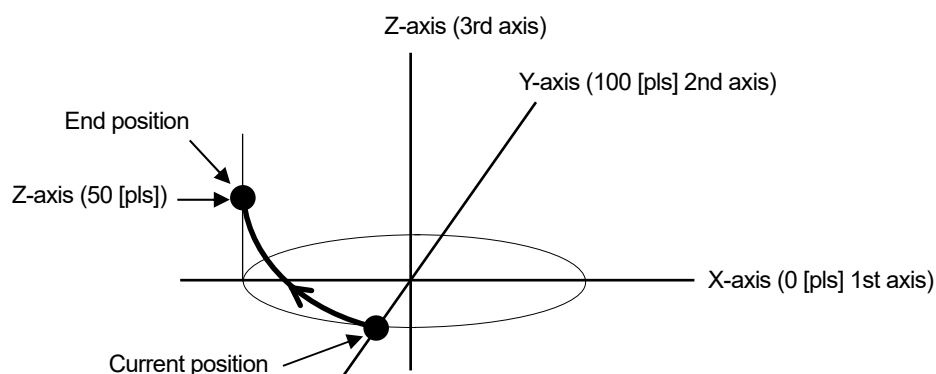
ae : End point angle (deg) setting (Setting range : 0° < ae ≤ 360000°)

• Example

On the 1st and 2nd 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, 2nd axis + 100pls). While doing, linear operation synchronized with arc interpolation with relative coordinates (3rd axis 50pls) as the destination.

Send	Reply
E:4,1,2,3,0,0,100,90,50	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 : Arc axis setting

1 1st axis designation

b : Arc axis setting

2 2nd axis designation

h : Linear axis setting

3 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 N / U / M

N nanometer designation

U micrometer designation

M mm designation

No designation (If no unit is specified, it is assumed to be "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  $\mu\text{m}$

(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)

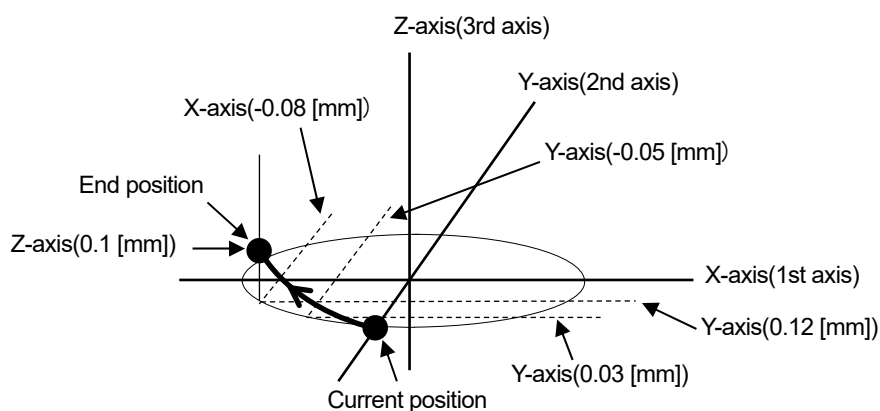
\*) If the passing point coordinates, end point coordinates and current position are on a straight line, an arc cannot be specified, so "NG" is returned.

• 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 : Arc axis setting

b : Arc 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

N nanometer designation

U micrometer designation

M mm designation

No designation (If no unit is specified, it is assumed to be "pls" or "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  $\mu\text{m}$

(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  $\mu\text{m}$

(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)

\*) 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.

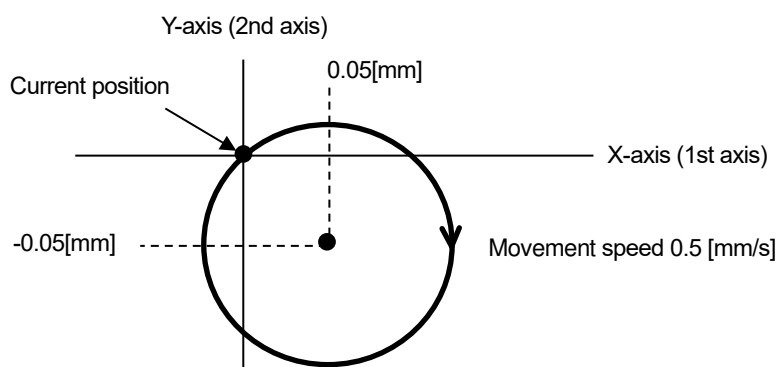
#### • Example

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 : Arc axis setting

b : Arc 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

N nanometer designation

U micrometer designation

M mm designation

No designation (If no unit is specified, it is assumed to be "pls" or "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  $\mu\text{m}$

(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 :  $0^\circ < ae \leq 360^\circ$ )

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  $\mu\text{m}$

(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)

\*) 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.

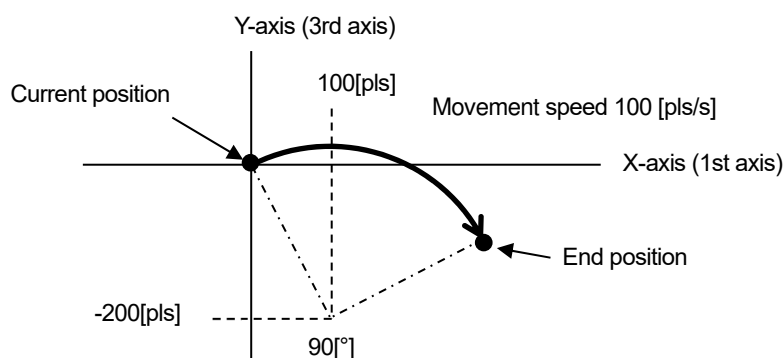
#### ▪ Example

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  $90^\circ$  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".



## 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 : Arc axis setting

b : Arc 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

N nanometer designation

U micrometer designation

M mm designation

No designation (If no unit is specified, it is assumed to be "pls" or "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, end 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  $\mu\text{m}$

(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  $\mu\text{m}$

(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)

\*) 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

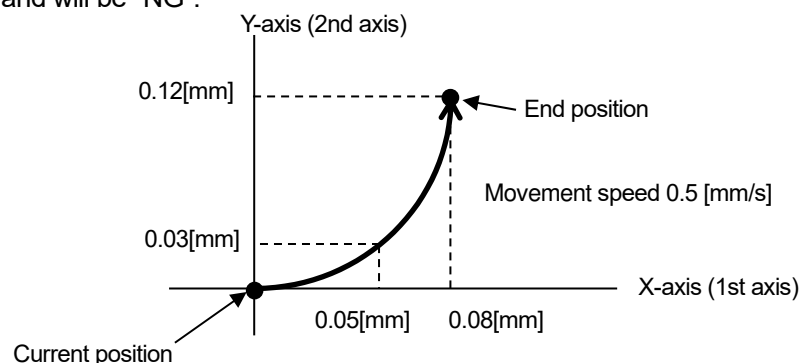
The operation of drawing an arc from the current position to the end point coordinates (1st axis + 0.08mm, 2nd axis + 0.12mm) via the passing point coordinates on the 1st and 2nd axis stages (1st axis +0.05mm, 2nd axis +0.03mm).

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 : Arc axis setting

1 1st axis designation

b : Arc axis setting

2 2nd axis designation

h : Linear axis setting

3 3rd axis designation

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

N nanometer designation

U micrometer designation

M mm designation

No designation (If no unit is specified, it is assumed to be "pls" or "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)

U Setting range : Value of pls converted to  $\mu\text{m}$

(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  $\mu\text{m}$

(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)

\*) 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.

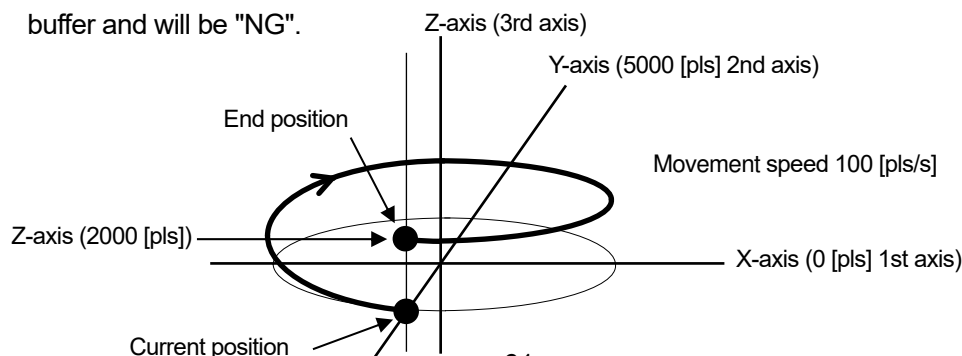
#### • Example

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 : Arc axis setting

1 1st axis designation

b : Arc axis setting

2 2nd axis designation

h : Linear axis setting

3 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 N / U / M

N nanometer designation

U micrometer designation

M mm designation

No designation (If no unit is specified, it is assumed to be "pls" or "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 :  $0^\circ < ae \leq 360000^\circ$ )

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)

\*) 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

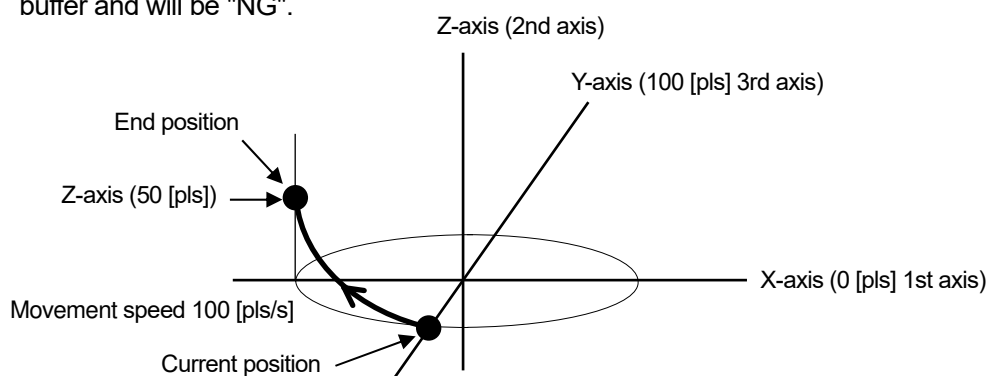
On the 1st and 2nd axis stages, an arc is drawn in the CW direction from the current position to the end point angle of 90 ° around the relative position from the current position (1st axis 0pls, 2nd axis + 100pls). Linear operation synchronized with arc interpolation with relative coordinates (3rd axis 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:4,1,2,3,0,0,100,90,50,100,1000,50	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 : Arc axis setting

1 1st axis designation

b : Arc axis setting

2 2nd axis designation

h : Linear axis setting

3 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 N / U / M

N nanometer designation

U micrometer designation

M mm designation

No designation (If no unit is specified, it is assumed to be "pls" or "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  $\mu\text{m}$

(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  $\mu\text{m}$

(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)

\*) 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.

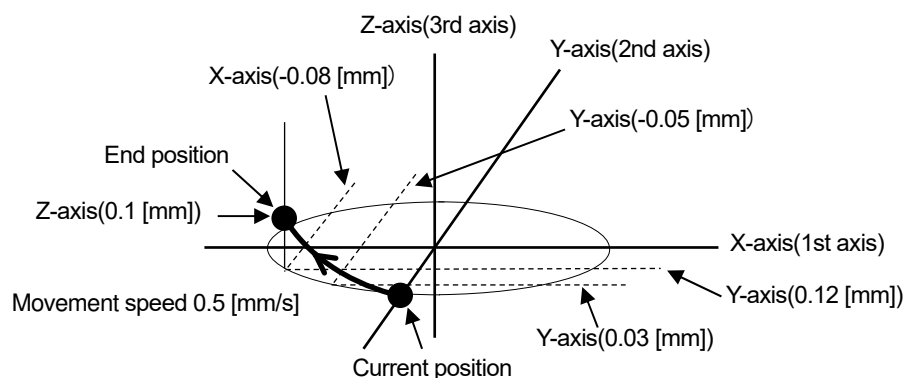
#### • Example

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 N / U / M

u2 : 2nd Unit setting N / U / M

u3 : 3rd Unit setting N / U / M

N nanometer designation

U micrometer designation

M mm designation

No designation (If no unit is specified, it is assumed to be "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  $\mu\text{m}$

(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)

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".

\*) 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 N / U / M

u2 : 2nd Unit setting N / U / M

u3 : 3rd Unit setting N / U / M

N nanometer designation

U micrometer designation

M mm designation

No designation (If no unit is specified, it is assumed to be "pls" or "pls/s".)

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  $\mu\text{m}$

(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)

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  $\mu\text{m}$

(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)

\*) 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  $\mu$ m 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  $\mu$ m designation
- M mm designation
- D degree designation

spd : Operating speed

- P Setting range : 1 ~ 1,000,000(Units : 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  $\mu$ m/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  $\mu$ m 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	
OUT2			ON	ON			ON	ON			ON	ON				ON
OUT3					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
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

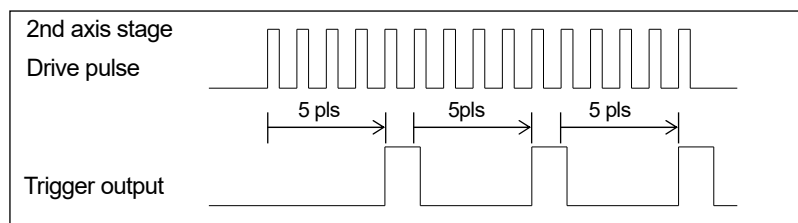
## • Parameters

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

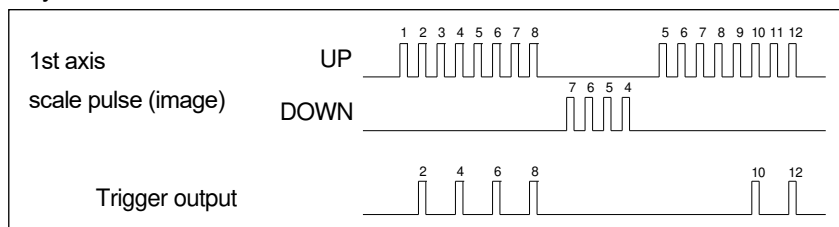
\*) In the case of Busy, it will be "NG" and this command cannot be executed.

## 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 :  $\pm 2 \sim 30000$  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 : Arc mode 0 Perfect circle designation  
CW rotation direction

1 Perfect circle designation  
CCW rotation direction

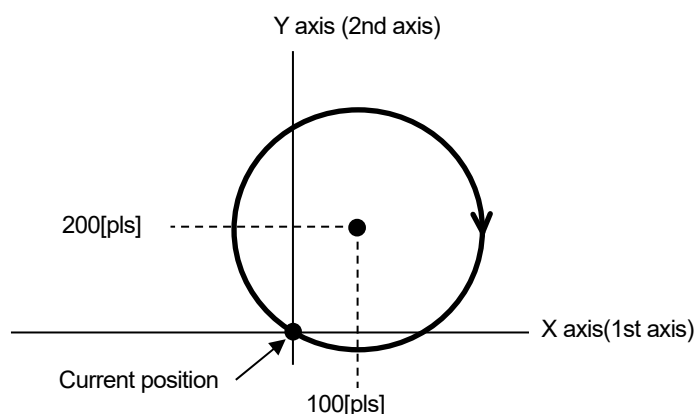
- c1 : Center point coordinate value    -999,999,999 ~ 999,999,999 pls  
 \*) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in as1 to 3 and the axis number is small, and is the relative position from the current position.
- c2 : Center point coordinate value    -999,999,999 ~ 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 unit)  
   Trigger mode 2,3 :  $\pm 2 \sim 30000$  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 : Arc 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 :  $\pm 2 \sim 30000$  pls

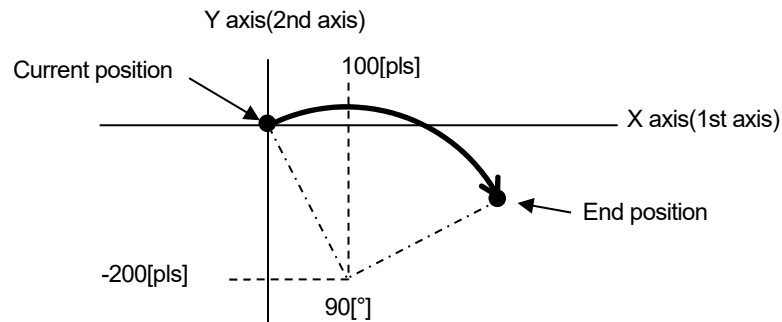
\*) An error will occur because the center coordinates are calculated. Please use it after confirming it with the actual machine.

▪ 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).

- \*) 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 : Arc 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)

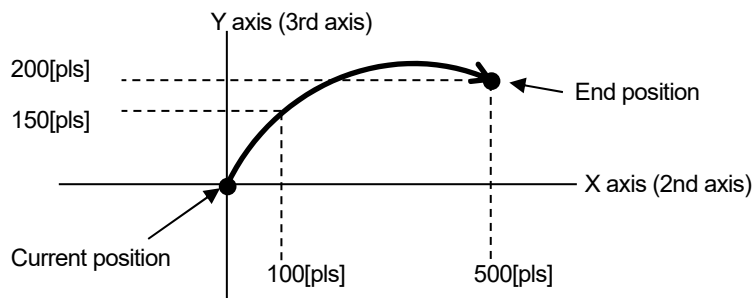
tm : Trigger mode	0 Drive pulse designation 1 Specify a certain time 2 + Scale pulse designation 3 - Scale pulse designation 4 One-shot trigger designation *) Output after positioning of all effective axes 5 Trigger issuance prohibited 6 Take over the previous trigger setting *) When specifying the drive 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 : $\pm 2 \sim 30000$ 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 : Arc 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

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



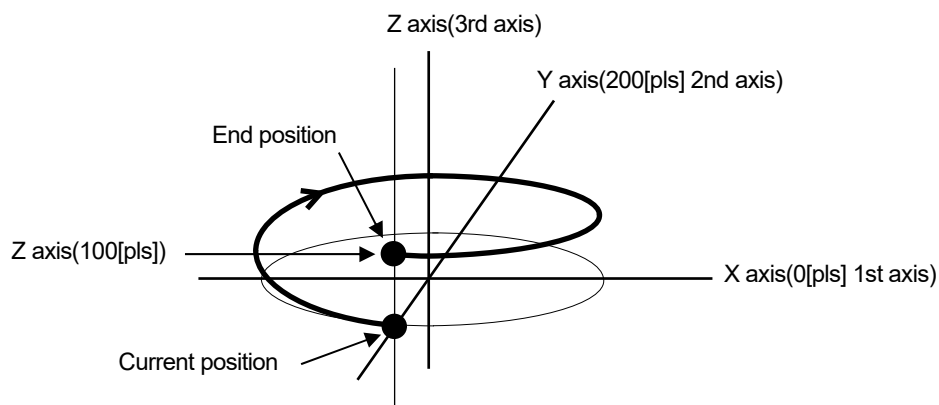
ta : Trigger target axis 1 ~ 3  
 tv : Trigger output interval Trigger mode 0 : 2 ~ 30000 pls  
 Trigger mode 1 : 1 ~ 10000 (0.01sec uint)  
 Trigger mode 2,3 :  $\pm 2 \sim 30000$  pls

▪ 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.



## (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 : Arc 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)

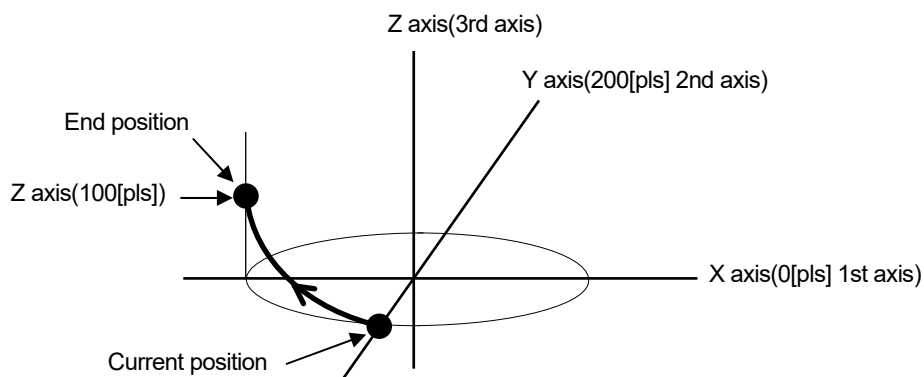
tm : Trigger mode	0 Drive pulse designation 1 Specify a certain time 2 + Scale pulse designation 3 - Scale pulse designation 4 One-shot trigger designation *) Output after positioning of all effective axes 5 Trigger issuance prohibited 6 Take over the previous trigger setting *) When specifying the drive 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 : $\pm 2 \sim 30000$ 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 : Arc 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)

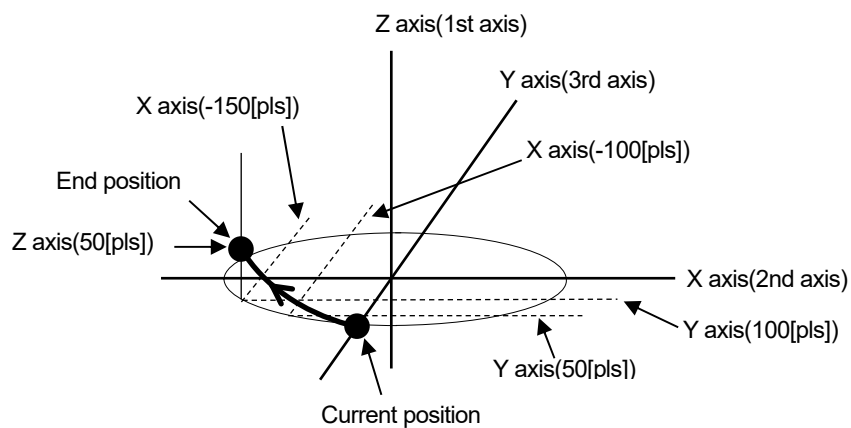
tm : Trigger mode	0 Drive pulse designation
	1 Specify a certain time
	2 + Scale pulse designation
	3 - Scale pulse designation
	4 One-shot trigger designation
	*) Output after positioning of all effective axes
	5 Trigger issuance prohibited
	6 Take over the previous trigger setting
	*) When specifying 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 : $\pm 2 \sim 30000$ 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 unit)  
                                   Trigger mode 2,3 :  $\pm 2$  ~ 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

- 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 unit)

Trigger mode 2,3 :  $\pm 2 \sim 30000$  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

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 : Arc 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 unit)  
Trigger mode 2,3 :  $\pm 2$  ~ 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 : Arc mode 2 Angle specification  
CW rotation direction3 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 :  $\pm 2$  ~ 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

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 : Arc 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 :  $\pm 2$  ~ 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 : Arc 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 :  $\pm 2$  ~ 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

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 : Arc 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 :  $\pm 2$  ~ 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 : Arc 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 unit)

Trigger mode 2,3 :  $\pm 2$  ~ 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 unit)

Trigger mode 2,3 :  $\pm 2 \sim 30000$  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  $\mu$ sec (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

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.

## 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.