

# **User's Manual**

## **(Command)**

## **SHOT / FC Mode**

### **Three-axis Stage Controller**

#### **SHRC-203**



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## 1. Overview

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

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

## 2. About double buffer

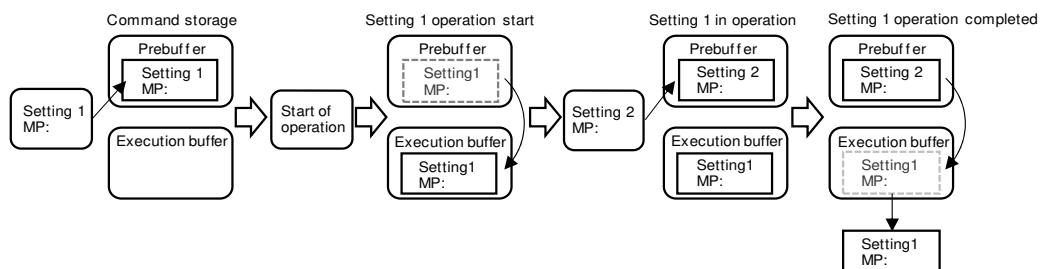
In addition to the normal commands, SHRC-203 has a prebuffer command that can be sent in advance to automatically perform the next operation after the execution is completed.

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

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

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

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



## 1) List of commands using double buffer

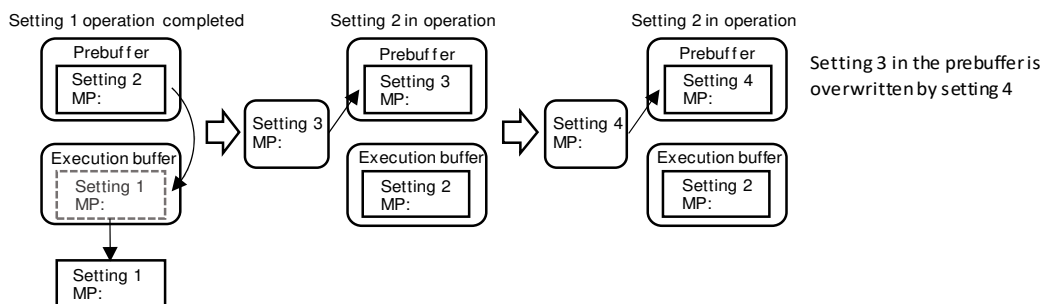
Commands	Contents	Memo
MP:	Relative travel distance setting	Prebuffer settings
AP:	Absolute travel distance setting	Prebuffer settings
EP:	Circle interpolation operation	Prebuffer settings
KP:	Linear interpolation operation	Prebuffer settings
WT:	Timed wait standby	
WI:	General-purpose input standby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

## 2) Setting command conditions

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

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

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



## 3) About the standby command

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

- Timed wait standby

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

- General-purpose input standby

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

#### 4) About speed setting

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

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

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

### 3. About replying to the setting command

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

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



**4. SHOT/FC mode command list**

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

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

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

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

## 1) \*IDN? Command (Get device information)

## • Description

Get controller information.

\*) Can be used in all operation modes (HOST, MANUAL, REMOTE, TEACH, EDIT, TEST).

## • Command format

Send) \*IDN?

Reply) v,m,s,f

## • Parameters

Reply) v : Vendor name

m : Model name

s : Serial number

f : Firmware version

## • Example

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

## 2) !: Command (Get positioning status 1)

## • Description

Get the positioning status.

## • Command format

Send) !:

Reply) r

## • Parameters

Reply) r : Positioning status R or B

R All controllable axes have been positioned (READY)

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

## • Example

Send	Reply	Contents
!:	R	All controllable axes are READY

## 3) !:S command (Get positioning status 2: Detailed information)

## • Description

Get the positioning status of each axis.

## • Command format

Send) !:aS

Reply) r1, r2, r3

## • Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

Reply) r1 : 1st axis positioning state R or B  
 r2 : 2nd axis positioning state R or B  
 r3 : 3rd axis positioning state R or B  
       R   Positioning of all controllable axes is complete (READY)  
       B   Designated axis has not been positioned (BUSY)

• Example

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

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

• Description

Get the coordinate value and status.

• Command format

Send) Q:

Reply) c1,c2,c3,e,s,r

• Parameters

Reply) c1 : 1st axis coordinate value

c2 : 2nd axis coordinate value

c3 : 3rd axis coordinate value

\*) Fixed to 10digits including the Sign.

\*) Sign left justified, coordinates right justified.

e : Command error judgment

X   Command error or parameter error

K   Command accepted normally

s : status

1   1st axis L S stop

2   2nd axis L S stop

3   3rd axis L S stop

C   1st axis and 2nd axis L S Stop

D   1st axis and 3rd axis L S Stop

E   2nd axis and 3rd axis L S Stop

W   All axes LS stop

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

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

K   Normal stop

r : Axis positioning state R or B

R   controllable axes have been positioned (READY)

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

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

• Example

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

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

## 5) Q:S command (Get coordinate value and status 2 : Detailed information)

## • Description

Get the coordinate values and detailed status of each axis.

## • Command format

Send) Q:Suc

Reply) c1,c2,c3,s1,s2,s3,r1,r2,r3

## • Parameters

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

N nanometer designation

U micrometer designation

M mm designation

D degree designation

P Designation without unit (pulse)

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

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 Unit (P, N, U, M, D) and coordinate values

c2 : 2nd axis Unit (P, N, U, M, D) and coordinate values

c3 : 3rd axis Unit (P, N, U, M, D) and coordinate values

\*) Reply 0 if the axis is invalid. Unlike "Q:" command, it is right-justified.

s1 : 1st axis status 0 ~ 1FFFFFF (Hexadecimal number)

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

s3 : 3rd axis status 0 ~ 1FFFFFF (Hexadecimal number)

1bit Normal (S1 to S10 and emergency stop has not occurred)

2bit Command error

3bit Scale error (S1)

4bit Disconnection error (S2)

5bit Overflow error (S4)

6bit Emergency stop

7bit Hunting error (S3)

8bit Limit error (S5)

9bit Counter overflow (S6)

10bit Auto config error

11bit 24V IO overload warning (W1)

12bit 24V terminal block overload warning (W2)

13bit System error (S7)

14bit Motor driver overheat warning (W3)

15bit Motor driver overheat error (S10)

16bit Out of in-position range (after positioning is completed) (READY)

17bit Out of in-position range (During positioning operation) (BUSY)

18bit Logical origin return is in progress

19bit Mechanical origin return is in progress

20bit CW limit detection

21bit CCW limit detection

22bit CW software limit stop

23bit CCW software limit stop

24bit NEAR sensor detection

25bit ORG sensor detection

\*) ON when bit is 1. OFF when bit is 0. If the axis is invalid, reply 0 in hexadecimal.

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

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

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

R Positioning of all controllable axes is complete (READY)

B Designated axis has not been positioned (BUSY)

D Axis invalid

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

• Example

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

Send	Reply	Remarks
Q:SM	M-1,M+2,M+3,1,1,4,R,B,B	mm specification
Q:SUC	U-1000,U+2000,U+3000,1,1,4,R,B,B	um unit and command counter specification

6) SRQ: Command (Get status 1)

• Description

Get the status.

• Command format

Send) SRQ:

Reply) e,s,r

• Parameters

Reply) e : Command error judgment

X Command error or parameter error

K Command accepted normally

s : Status

1 1st axis LS stop

2 2nd axis LS stop

3 3rd axis LS stop

C 1st axis and 2nd axis LS Stop

D 1st axis and 3rd axis LS Stop

E 2nd axis and 3rd axis LS Stop

W All axes LS stop

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

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

K Normal stop

r : Axis positioning state R or B

R controllable axes have been positioned (READY)

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

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

• Example

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

## 7) SRQ:S command (Get status 2 : Detailed information)

## • Description

Get the detailed status of each axis.

## • Command format

Send) SRQ:aS

Reply) e1,e2,e3,s1,s2,s3,r1,r2,r3

## • Parameters

Send) a : Axis setting

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

Not specified Specify all controllable axes

- Reply) s1 : 1st axis status 0 ~ 1FFFFFFF (Hexadecimal number)
- s2 : 2nd axis status 0 ~ 1FFFFFFF (Hexadecimal number)
- s3 : 3rd axis status 0 ~ 1FFFFFFF (Hexadecimal number)
- 1bit Normal (S1 to S10 and emergency stop has not occurred)
  - 2bit Command error
  - 3bit Scale error (S1)
  - 4bit Disconnection error (S2)
  - 5bit Overflow error (S4)
  - 6bit Emergency stop
  - 7bit Hunting error (S3)
  - 8bit Limit error (S5)
  - 9bit Counter overflow (S6)
  - 10bit Auto config error
  - 11bit 24V IO overload warning (W1)
  - 12bit 24V terminal block overload warning (W2)
  - 13bit System error (S7)
  - 14bit Motor driver overheat warning (W3)
  - 15bit Motor driver overheat error (S10)
  - 16bit Out of in-position range  
(after positioning is completed) (READY)
  - 17bit Out of in-position range (During positioning operation) (BUSY)
  - 18bit Logical origin return is in progress
  - 19bit Mechanical origin return is in progress
  - 20bit CW limit detection
  - 21bit CCW limit detection
  - 22bit CW software limit stop
  - 23bit CCW software limit stop
  - 24bit NEAR sensor detection
  - 25bit ORG sensor detection

\*) ON when bit is 1. OFF when bit is 0.

If the axis is invalid, reply 0 in hexadecimal.

r1 : 1st axis positioning state R or B

r2 : 2nd axis positioning state R or B

r3 : 3rd axis positioning state R or B

R Positioning of all controllable axes is complete (READY)

B Designated axis has not been positioned (BUSY)

D Axis invalid

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

• Example

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

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

• Description

Get the firmware version.

• Command format

Send) ? :V

Reply) f

• Parameters

Reply) f : Firmware version

• Example

Send	Reply
?:V	V2.00.000

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

• Description

Gets the scale resolution.

• Command format

Send) ? :Ra

Reply) r

• Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

Reply) r : Scale resolution (Unit: nm)



## Example

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

## 10) ? :P command (Get setting 3 : Movement amount of 1 pulse)

## • Description

Get the movement amount of 1 pulse calculated from the memory switch "AXIS"-  
"BASE RATE" and "MOTOR DRIVER"-"DIVIDE".

## • a formula

1 pulse movement amount (nm) = (BASE RATE \* 10) / DIVIDE

Example: BASE RATE = 200, DIVIDE = 2000

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

## • Command format

Send) ? : Pa

Reply) p

## • Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

Reply) p : Movement amount of 1 pulse (Unit: nm)

## • Example

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

## 11) ? :S command (Get setting 4 : Motor driver division number)

## • Description

Gets the number of divisions of the motor driver.

## • Command format

Send) ? : Sa

Reply) m

- Parameters

Reply) a : Axis setting

- 1 1st axis designation
- 2 2nd axis designation
- 3 3rd axis designation
- A 1st axis and 2nd axis designation
- B 1st axis and 3rd axis designation
- C 2nd and 3rd axis designation
- D 1st axis, 2nd axis and 3rd axis designation
- W Specify all controllable axes
- Not specified Specify all controllable axes

Reply) m : Number of motor driver divisions

- Example

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

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

- Description

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

- Command format

Send) ? :ANa

Reply) n

- Parameters

Send) a : Axis setting

- 1 1st axis designation
- 2 2nd axis designation
- 3 3rd axis designation
- A 1st axis and 2nd axis designation
- B 1st axis and 3rd axis designation
- C 2nd and 3rd axis designation
- D 1st axis, 2nd axis and 3rd axis designation
- W Specify all controllable axes
- Not specified Specify all controllable axes

Reply) n : Axis names 1-9, A-Z

## • Example

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

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

## • Description

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

## • Command format

Send) ? :Da

Reply) d

## • Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

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

## • Example 1

Send	Reply	Contents
?:D	S100F1000R100, S200F2000R200, S300F3000R300	There are 3 controllable axes, <ul style="list-style-type: none"> <li>• The operating speed of the 1st axis is the minimum speed (S) 100 pls/s , the maximum speed (F) 1000 pls/s, and the acceleration / deceleration time (R) 100 ms .</li> <li>• The operating speed of the 2nd axis is the minimum speed (S) 200 pls/s , the maximum speed (F) 2000 pls/s, and the acceleration / deceleration time (R) 200 ms .</li> <li>• The operating speed of the 3rd axis is the minimum speed (S) 300 pls/s , the maximum speed (F) 3000 pls/s, and the acceleration / deceleration time (R) 200 ms .</li> </ul>
?:D	S100F1000R100, S200F2000R200	When the memory switch "GENERAL"-"AXIS" is "1 + 2", <ul style="list-style-type: none"> <li>• The operating speed of the 1st axis is the minimum speed (S) 100 pls/s , the maximum speed (F) 1000 pls/s, and the acceleration / deceleration time (R) 100 ms .</li> <li>• The operating speed of the 2nd axis is the minimum speed (S) 200 pls/s , the maximum speed (F) 2000 pls/s, and the acceleration / deceleration time (R) 200 ms .</li> </ul>

## • Example 2

Send	Reply	Contents
?:D1	S100F1000R100	<ul style="list-style-type: none"> <li>The operating speed of the 1st axis is the minimum speed (S) 100 pls/s , the maximum speed (F) 1000 pls/s, and the acceleration / deceleration time (R) 100 ms .</li> </ul>
?:DA	S100F1000R100, S200F2000R200	<ul style="list-style-type: none"> <li>The operating speed of the 1st axis is the minimum speed (S) 100 pls/s , the maximum speed (F) 1000 pls/s, and the acceleration / deceleration time (R) 100 ms .</li> <li>The operating speed of the 2nd axis is the minimum speed (S) 200 pls/s , the maximum speed (F) 2000 pls/s, and the acceleration / deceleration time (R) 200 ms .</li> </ul>

## 14) ? :DS command (Get setting 7 : Minimum speed)

## • Description

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

## • Command format

Send) ? :DSa,u

Reply) uspd

## • Parameters

Send) a : Axis setting

- 1 1st axis designation
- 2 2nd axis designation
- 3 3rd axis designation
- A 1st axis and 2nd axis designation
- B 1st axis and 3rd axis designation
- C 2nd and 3rd axis designation
- D 1st axis, 2nd axis and 3rd axis designation
- W Specify all controllable axes
- Not specified Specify all controllable axes

u: Unit setting

- F Designation without unit (pulse)
- N nanometer designation
- U micrometer designation
- M mm designation
- D degree designation

Reply) u : Unit setting

- F Designation without unit (pulse)
- N nanometer designation
- U micrometer designation
- M mm designation
- D degree designation

spd : Operating speed

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

N Setting range: pls/s converted to nm

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

U Setting range: pls/s converted to  $\mu\text{m}$

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

M Setting range: pls/s converted to mm

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

D Setting range: pls/s converted to an angle

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

• Example

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

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

• Description

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

• Command format

Send) ? :DFa,u

Reply) uspd

• Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

u : Unit setting

F Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

D degree designation

Reply) u : Unit setting

F Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

D degree designation

spd : Operating speed

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

N Setting range: pls/s converted to nm

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

U Setting range: pls/s converted to  $\mu\text{m}$

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

M Setting range: pls/s converted to mm

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

D Setting range: pls/s converted to an angl

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

• Example

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

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

• Description

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

• Command format

Send) ? :DRa

Reply) r

• Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

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

## • Example

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

## 17) ? :B command (Get setting 10 : Machine origin return speed setting value)

## • Description

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

## • Command format

Send) ? :Ba

Reply) d

## • Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

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

## • Example 1

Send	Reply	Contents
?:B	S100F1000R100, S200F2000R200, S300F3000R300	There are 3 controllable axes, <ul style="list-style-type: none"> <li>• The operating speed of the 1st axis is the minimum speed (S) 100 pls/s , the maximum speed (F) 1000 pls/s, and the acceleration / deceleration time (R) 100 ms .</li> <li>• The operating speed of the 2nd axis is the minimum speed (S) 200 pls/s , the maximum speed (F) 2000 pls/s, and the acceleration / deceleration time (R) 200 ms .</li> <li>• The operating speed of the 3rd axis is the minimum speed (S) 300 pls/s , the maximum speed (F) 3000 pls/s, and the acceleration / deceleration time (R) 200 ms .</li> </ul>
?:B	S100F1000R100, S200F2000R200	When the memory switch "GENERAL"-"AXIS" is "1 + 2", <ul style="list-style-type: none"> <li>• The operating speed of the 1st axis is the minimum speed (S) 100 pls/s , the maximum speed (F) 1000 pls/s, and the acceleration / deceleration time (R) 100 ms .</li> <li>• The operating speed of the 2nd axis is the minimum speed (S) 200 pls/s , the maximum speed (F) 2000 pls/s, and the acceleration / deceleration time (R) 200 ms .</li> </ul>

## • Example 2

Send	Reply	Contents
?:B1	S100F1000R100	<ul style="list-style-type: none"> <li>The operating speed of the 1st axis is the minimum speed (S) 100 pls/s , the maximum speed (F) 1000 pls/s, and the acceleration / deceleration time (R) 100 ms .</li> </ul>
?:BA	S100F1000R100, S200F2000R200	<ul style="list-style-type: none"> <li>The operating speed of the 1st axis is the minimum speed (S) 100 pls/s , the maximum speed (F) 1000 pls/s, and the acceleration / deceleration time (R) 100 ms .</li> <li>The operating speed of the 2nd axis is the minimum speed (S) 200 pls/s , the maximum speed (F) 2000 pls/s, and the acceleration / deceleration time (R) 200 ms .</li> </ul>

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

## • Description

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

## • Command format

Send) ? :Ma,u

Reply) m

## • Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

u : Unit setting

P Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

D degree designation

No designation Designation without unit (pulse)

Reply) m : Movement amount (Unit: pls)

## • Example 1

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



## • Example 2

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

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

## • Description

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

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

## • Command format

Send) ? : MPa, u

Reply) m

## • Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

u : Unit setting

P Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

D degree designation

No designation Designation without unit (pulse)

Reply) m : Movement amount (Unit: pls)

## • Example

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

## 20) ? :A command (Get setting 13 : Absolute movement [Execution buffer ] )

## • Description

Get the destination coordinate value set in "A: Command".

## • Command format

Send) ? :Aa,u

Reply) m

## • Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

u : Unit setting

P Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

D degree designation

No designation Designation without unit (pulse)

Reply) m : Movement amount (Unit: pls)

## • Example

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

## 21) ? :AP command (Get setting 14 : Absolute movement [Prebuffer ] )

## • Description

Get the destination coordinate value set in "AP: Command".

## • Command format

Send) ? :APa,u

Reply) m

- Parameters

Send) a : Axis setting

- 1 1st axis designation
- 2 2nd axis designation
- 3 3rd axis designation
- A 1st axis and 2nd axis designation
- B 1st axis and 3rd axis designation
- C 2nd and 3rd axis designation
- D 1st axis, 2nd axis and 3rd axis designation
- W Specify all controllable axes
- Not specified Specify all controllable axes

u : Unit setting

- P Designation without unit (pulse)
- N nanometer designation
- U micrometer designation
- M mm designation
- D degree designation
- No designation Designation without unit (pulse)

Reply) m : Movement amount (Unit: pls)

- Example

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

## 22) ? :E command (Get setting 15 : Arc interpolation [Execution buffer])

- Description

Get the arc interpolation setting value set by "E: Command". If it is not set, "NS" will be replied.

- Command format

Send) ? :E,u

Reply) m

- Parameters

Send) u : Unit setting

- P Designation without unit (pulse)
- N nanometer designation
- U micrometer designation
- M mm designation
- D degree designation
- No designation Designation without unit (pulse)

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

• Example

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

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

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

• Description

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

• Command format

Send) ?:EP,u

Reply) m

• Parameters

Send) u : Unit setting

P Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

D degree designation

No designation Designation without unit (pulse)

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

• Example

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

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

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

• Description

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

- Command format

Send) ? :K,u

Reply) m

- Parameters

Send) u : Unit setting

P Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

D degree designation

No designation Designation without unit (pulse)

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

- Example

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

## 25) ? :KP command (Get setting 18 : Linear interpolation [Prebuffer])

- Description

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

- Command format

Send) ? :KP,u

Reply) m

- Parameters

Send) u : Unit setting

P Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

D degree designation

No designation Designation without unit (pulse)

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

- Example

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

## 26) ? :O command (Get setting 19 : General-purpose output status)

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

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

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

## 27) ? :W command (Get setting 20 : Wait time)

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

Send	Reply	Contents
? :W	255	25.5ms

## 28) ? :WT command (Get setting 21 : Wait time)

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

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

## • Example 2

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

## 29) ? :WI command (Get setting 22 : General-purpose input wait)

## • Description

Get the settings for waiting for general-purpose input.

## • Command format

Send) ? :Wla

Reply) i

## • Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

Reply) i : general-purpose input 0 ~ 63

## • Example

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

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

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

## 30) ? :N command (Get setting 23 : Model name)

## • Description

Get the model name of this controller.

## • Command format

Send) ? :N

Reply) n

## • Parameters

Reply) n : model name

## • Example

Send	Reply
?:N	SHRC-203

## 31) ?J command (Get setting 24 : Jog motion direction)

## • Description

Get the operation direction setting set by "J: command". If it is not set, "NS" will be replied.

## • Command format

Send) ?J:a

Reply) j

## • Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

Reply) j : Operating direction setting value + or -

## • Example

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

## 32) ?ACS command (Get setting 25 : Auto-config status)

## • Description

Get the current autoconfig status.

## • Command format

Send) ?:ACSa

Reply) j



- Parameters

Send) a : Axis setting

- 1 1st axis designation
- 2 2nd axis designation
- 3 3rd axis designation
- A 1st axis and 2nd axis designation
- B 1st axis and 3rd axis designation
- C 2nd axis and 3rd axis designation
- D 1st axis, 2nd axis and 3rd axis designation
- W Specify all controllable axes
- Not specified Specify all controllable axes

Reply) j : Autoconfig status

- 0 Memory switch "CONFIG" is OFF
- 1 Memory switch "CONFIG" is ON, and normal reading is completed
- E Memory switch "CONFIG" is ON, and read error
- D Memory switch "CONFIG" is ON, and device unconnected error

- Example

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

### 33) ? :C command (Get setting 26 : Motor excitation state)

- Description

Get the current motor excitation state.

- Command format

Send) ? :Ca

Reply) j

- Parameters

Send) a : Axis setting

- 1 1st axis designation
- 2 2nd axis designation
- 3 3rd axis designation
- A 1st axis and 2nd axis designation
- B 1st axis and 3rd axis designation
- C 2nd axis and 3rd axis designation
- D 1st axis, 2nd axis and 3rd axis designation
- W Specify all controllable axes
- Not specified Specify all controllable axes

Reply) j : Excitation of the motor

- 0 Excitation OFF
- 1 Excitation ON

## • Example

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

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

## • Description

Get the current stage control state.

## • Command format

Send) ? :Fa

Reply) j

## • Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

Reply) j : Stage control state

0 Close loop control state

1 Open loop control state

## • Example

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

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

## • Description

Get the sleep state.

## • Command format

Send) ? :SLEEP

Reply) s

## • Parameters

Reply) s : Sleep state 0 or 1

0 Wake from sleep

1 Sleeping

## • Example

Send	Reply
?:SLEEP	0

## 36) ? :BO command (Get setting 29 : The lighting status of the display)

## • Description

Get the lighting status of the backlight and LED of the display part.

## • Command format

Send) ? :BO

Reply) I

## • Parameters

Reply) I : Lights on and off      0 or 1  
    0 Off  
    1 Lights on

## • Example

Send	Reply
? :BO	0

## 37) ? :MODE command (Get setting 30 : Mode)

## • Description

Gets the current mode. The reply "HOST, PROGRAM" will be sent when the program mode is entered by the "P: R" command. "HOST, MS" will be returned when you switch to the memory switch edit mode with "MS: ON".

\*) Can be used in all operation modes (HOST, MANUAL, REMOTE, TEACH, EDIT, TEST).

## • Command format

Send) ? :MODE

Reply) m

## • Parameters

Reply) m : Mode

HOST	HOST mode
HOST,PROGRAM	Program mode (in HOST mode)
HOST,MS	Memory switch edit mode (in HOST mode)
MANUAL	MANUAL mode
REMOTE	REMOTE mode
TEACHING	TEACHING mode
EDIT	EDIT mode
TEST	TEST mode

## • Example

Send	Reply
? :MODE	REMOTE

## 38) ? :FMT command (Get setting 31 : Command format)

## • Description

Get the current command format mode.

## • Command format

Send) ? :FMT

Reply) f

- Parameters

Reply) f : Setting  
                     SHOT\_FC      SHOT\_FC mode  
                     HIT              HIT mode

- Example

Send	Reply
?:FMT	HIT

### 39)   ?:BEEP command (Get setting 32 : Beep sound setting status)

- Description

Get the beep sound setting status.

- Command format

Send)   ?:BEEP  
 Reply)   b

- Parameters

Reply)   b : Beep state      0 or 1  
                     0   Beep OFF  
                     1   Beep ON

- Example

Send	Reply
BEEP?	0

### 40)   ?:CMD command (Get setting 33 : Previous sendcommand)

- Description

Get the command sent to the controller before sending this command.

\*) Can be used in all operation modes (HOST, MANUAL, REMOTE, TEACH, EDIT, TEST).

- Command format

Send)   ?:CMD  
 Reply)   c

- Parameters

Reply)   c : Command sent before

- Example

Send	Reply
?:CMD	WI:W,C

### 41)   ?:L command (Get setting 34 : The program execution status)

- Description

Get the program execution status.

- Command format

Send)   ?:L  
 Reply)   pn,pr,pl,lc1, lc2, lc3, lc4, lc5, lc6, lc7, lc8, lc9,

- Parameters

Reply) pn : Program number 1 ~ 8  
 pr : Program execution status 0 ~ 8

- 0 Not executed
- 1 During execution
- 2 During PAUSE
- 3 During execution (one line)
- 4 Stop while processing  
(when controllable axis and program axis selection are different)
- 5 Stop while processing  
(If an error occurs)
- 6 Stop while processing  
(When an unexpected pattern is selected)
- 7 Stop while processing  
(When the motor excitation is OFF for the program-selected axis)
- 8 Stop while processing  
(When the program selection axis is BUSY)

pl : Program execution line number 1 ~ 4000  
 lc1 : Nest 1 Loop number 0 ~ 65535  
 lc2 : Nest 2 Loop number 0 ~ 65535  
 lc3 : Nest 3 Loop number 0 ~ 65535  
 lc4 : Nest 4 Loop number 0 ~ 65535  
 lc5 : Nest 5 Loop number 0 ~ 65535  
 lc6 : Nest 6 Loop number 0 ~ 65535  
 lc7 : Nest 7 Loop number 0 ~ 65535  
 lc8 : Nest 8 Loop number 0 ~ 65535  
 lc9 : Nest 9 Loop number 0 ~ 65535

- Example

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

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

#### 42) ? :T command (Get setting 35 : Trigger execution status)

- Description

Get the trigger execution status. If it is not set, "NS" will be replied.

- Command format

Send) ? :T

Reply1) m,a,v

Reply2) m,v

\*) If the trigger execution content is PULSE, SCALE PLUS, SCALE MINUS,  
 Reply 1), and if TIMER, Reply 2).

- Parameters

Reply) m : Trigger execution contents 0 ~ 3

- 0 PULSE(Drive pulse)
- 1 TIMER(Interval time)
- 2 SCALE PLUS(+ Directional scale pulse)
- 3 SCALE MINUS(- Directional scale pulse)

a : Axis setting 1 ~ 3

v1 : Setting value

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

## • Example

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

## 43) ? :SN command (Get setting 36: Serial number)

## • Description

Get the serial number.

## • Command format

Send) ? :SN

Reply) sn

## • Parameters

Reply) sn : Serial number

## • Example

Send	Reply
?:SN	2106001001

## 44) ? :AXIS command (Get setting 37: Controllable axis)

## • Description

Acquires the setting information of the controllable axis (memory switch "GENERAL"- "AXIS").

## • Command format

Send) ? :AXIS

Reply) a

## • Parameters

Reply) a : 0	Valid only for the 1st axis
1	Valid only for the 2nd axis
2	Valid only for the 3rd axis
3	1st and 2nd axis valid
4	1st and 3rd axis valid
5	2nd and 3rd axis valid
6	1st, 2nd and 3rd axis valid

## • Example

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

## 45) PSET: command (Coordinate value preset)

## • Description

Preset the coordinate values.

## • Command format

Send) PSET:amuc

- Parameters

Send) a : Axis setting

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

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

u : Unit setting N / U / M / D / P

- N nanometer designation
- U micrometer designation
- M mm designation
- D degree designation
- P Designation without unit (pulse)

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

- Example

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

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

#### 46) RESET: command (Reset execution)

- Description

Reboot the system.

- Command format

Send) RESET:

- Example

Send	Reply
RESET:	OK or NG

#### 47) SLEEP: command (Sleep execution)

- Description

Change the sleep state.

- Command format

Send) SLEEP:s

- Parameters

Send) s : Sleep state 0 or 1

0 Wake from sleep

1 Go to sleep state

- Example

Send	Reply
SLEEP:1	OK or NG

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

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

48) BO: command (Display lighting operation)

- Description  
Change the lighting status of the backlight and LED of the display.
- Command format  
Send) BO:l
- Parameters  
Send) l : Lights on and off                      0 or 1  
          0    Off  
          1    Lights on
- Example

Send	Reply
BO:1	OK or NG

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

49) MODE: command (Mode change)

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

Send	Reply
MODE:MANUAL	OK or NG

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

50) FMT: command (Command format change)

- Description
  - Change the command format.
- Command format
  - Send) FMT:f
- Parameters
  - Send) f : Setting
 

SHOT_FC	SHOT_FC mode
HIT	HIT mode

Send	Reply
FMT:HIT	OK or NG

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



## 51) F: command (Stage control method change)

## • Description

Change the stage control method.

## • Command format

Send) F:af

## • Parameters

Send) a : Axis setting

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

f : Control method 0 or 1

- 0 Close loop control
- 1 Open loop control

## • Example

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

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

## 52) C: command (Motor state change)

## • Description

Change the motor status.

## • Command format

Send) C:ac

## • Parameters

Send) a : Axis setting

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

c : Motor status 0 or 1

- 0 Excitation OFF
- 1 Excitation ON

## • Example

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

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

## 53) BEC: command (Positioning incomplete and error cancellation)

## • Description

Releases positioning incomplete state (BUSY) and error.

\*) Can be canceled: Limit error / Overflow error / Emergency stop

## • Command format

Send) BEC:a

## • Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

## • Example

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

## 54) BEEP: command (Beep operation)

## • Description

Select whether to make a beep sound.

## • Command format

Send) BEEP:b

## • Parameters

Send) b : Beep state 0 or 1

0 Beep OFF

1 Beep ON

## • Example

Send	Reply
BEEP:0	OK or NG

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

## 55) S: command (Number of divisions setting)

## • Description

Set the number of divisions of the motor driver.

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

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

## • Command format

Send) S:a,m

## • Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

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

W Specify all controllable axes

m : Number of motor driver divisions

1, 2, 3, 4, 5, 6, 8, 10, 12, 20, 25, 30, 40, 50, 60, 80, 100,

120,125, 200, 250, 300, 400, 600, 800, 1000, 2000, 4000, 8000

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

## • Example

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

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

## 56) W: command (Waiting time)

## • Description

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

## • Command format

Send) W:w

## • Parameters

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

## • Example

Send	Reply
W:255	OK or NG

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

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

## • Description

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

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

\*) This command can be used only when the double buffer function is enabled.

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

## • Command format

Send) WT:a,w

## • Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

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

W Specify all controllable axes

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

## • Example

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

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

## • Description

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

\*) This command can be used only when the double buffer function is enabled.

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

## • Command format

Send) WI:a,i

## • Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

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

W Specify all controllable axes

i : General purpose input 0 ~ 63 or C  
 0 ~ 63  
 C Cancel waiting

• Example

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

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

59) H: command (Mechanical origin return 1)

• Description

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

• Command format

Send) Hm:a

• Parameters

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

0 MARK

1 MINI

2 MIDDLE

3 ORGS

4 NORMAL

Not specified Follows memory switch setting

a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

• Example1

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

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

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

## • Description

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

## • Command format

Send) HRTm:a

Reply) r

## • Parameters

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

0 MARK

1 MINI

2 MIDDLE

3 ORGS

4 NORMAL

Not specified Follows memory switch setting

a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

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

## • Example

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

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

## 61) Z: command (Logical origin return 1)

## • Description

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

## • Command format

Send) Z:a

- Parameters

Send) a : Axis setting

- 1 1st axis designation
- 2 2nd axis designation
- 3 3rd axis designation
- A 1st axis and 2nd axis designation
- B 1st axis and 3rd axis designation
- C 2nd axis and 3rd axis designation
- D 1st axis, 2nd axis and 3rd axis designation
- W Specify all controllable axes
- Not specified Specify all controllable axes

- Example

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

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

## 62) ZRT: command (Logical origin return 2 : Completion reply)

- Description

Move to the position of the logical origin "0", and there is a reply for each axis after completion. The operating speed follows the setting of the "D:" command.

- Command format

Send) ZRT:a

Reply) r

- Parameters

Send) a : Axis setting

- 1 1st axis designation
- 2 2nd axis designation
- 3 3rd axis designation
- A 1st axis and 2nd axis designation
- B 1st axis and 3rd axis designation
- C 2nd axis and 3rd axis designation
- D 1st axis, 2nd axis and 3rd axis designation
- W Specify all controllable axes
- Not specified Specify all controllable axes

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

- Example 1

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

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

## • Example 2

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

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

## 63) R: command (Logical origin setting)

## • Description

Reset the coordinate value to "0".

## • Command format

Send) R:a

## • Parameters

Send) a : Axis setting

- 1 1st axis designation
- 2 2nd axis designation
- 3 3rd axis designation
- A 1st axis and 2nd axis designation
- B 1st axis and 3rd axis designation
- C 2nd axis and 3rd axis designation
- D 1st axis, 2nd axis and 3rd axis designation
- W Specify all controllable axes
- Not specified Specify all controllable axes

## • Example

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

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

## 64) RC: command (Initialization of logical origin setting)

## • Description

This command cancels the logical origin setting. For example, after setting zero with the "R: command" at the position of coordinate value +1000, and then moving to the position of coordinate value +500, executing this command the current coordinate value becomes 1500.

## • Command format

Send) RC:a



- Parameters

Send) a : Axis setting

- 1 1st axis designation
- 2 2nd axis designation
- 3 3rd axis designation
- A 1st axis and 2nd axis designation
- B 1st axis and 3rd axis designation
- C 2nd axis and 3rd axis designation
- D 1st axis, 2nd axis and 3rd axis designation
- W Specify all controllable axes
- Not specified Specify all controllable axes

- Example

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

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

#### 65) L: command (Stop operation 1)

- Description

Decelerate and stop the stage.

- Command format

Send) L:a

- Parameters

Send) a : Axis setting

- 1 1st axis designation
- 2 2nd axis designation
- 3 3rd axis designation
- A 1st axis and 2nd axis designation
- B 1st axis and 3rd axis designation
- C 2nd axis and 3rd axis designation
- D 1st axis, 2nd axis and 3rd axis designation
- W Specify all controllable axes
- Not specified Specify all controllable axes

- Example

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

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

## 66) L:E command (Stop operation 2 : Emergency stop)

## • Description

Immediately stop the stages of all axes and put them in an emergency stop state.

The excitation of the motor in case of emergency stop depends on the memory switch "AXIS"- "EMG MT EXCT \*".

To cancel, send the "BEC:" command.

## • Command format

Send) L:E

## • Example

Send	Reply
L:E	OK or NG

## 67) M: command (Relative movement amount setting 1 : [Execution buffer])

## • Description

command sets the movement axis, movement direction, and relative movement amount. The operation start command "G" or "G:" is always required after executing this command. Operation is acceleration / deceleration drive.

The operating speed follows the setting of the "D:" command.

## • Command format

Send) M:amuy

## • Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

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

W Specify all controllable axes

m : Sign + or –

u : Unit setting

P Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

D degree designation

y : Moving distance

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

N Setting range : Value converted from pls to nm

Example):

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

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

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

M Setting range : Value converted from pls to mm

Example):

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

D Setting range : Value converted from pls to angle

Example):

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

• Example

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

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

68) MP: command (Relative movement amount setting 2 : [Prebuffer] )

• Description

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

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

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

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

• Command format

Send) MP:amuy,SspdsFspdfRr

## • Parameters

Send) a : Axis setting

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

m : Sign + or -

u : Unit setting

- P Designation without unit  
(movement amount pls and operating speed pls/s)
- N nanometer designation  
(Movement amount nm and operating speed nm/s)
- U micrometer designation  
(Movement amount  $\mu\text{m}$  and operating speed  $\mu\text{m/s}$ )
- M mm designation  
(Movement amount mm and operating speed mm/s)
- D Degree designation  
(Movement amount  $^{\circ}$ (degree) and operating speed  $^{\circ}$ (degree)/s)

y : Moving distance

- P Setting range : 0 ~ 999,999,999 (Unit: pls)
- N Setting range : Value converted from pls to nm  
Example):  
If the scale resolution is 1 nm at 1,000 pls, it will be N1000.
- U Setting range : Value converted from pls to  $\mu\text{m}$   
Example): If the scale resolution is 1 nm at 1,000 pls, it will be U1
- M Setting range : Value converted from pls to mm  
Example):  
If the scale resolution is 1 nm at 1,000 pls, it will be M0.001)
- D Setting range : Value converted from pls to angle  
Example):  
If the scale resolution is  $0.000001^{\circ}$  at 1,000 pls, it will be D0.001)

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

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

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

r : Acceleration / deceleration time (R) setting

Setting range : 1 ~ 1,000 ms

## • Example

Send	Reply	Contents
MP:1+P1000	OK or OK_D or NG	1000 pulse movement setting in the 1st axis + direction, the operating speed is the setting value with the memory switch "SPEED" or the setting value with the already set "D:" command.
MP:1+P1000, S100F1000R50	OK or OK_D or NG	1000 pulse movement setting in the 1st axis + direction, the operating speed is minimum speed (S) 100pls / s, maximum speed (F) 1000pls / s, acceleration / deceleration time (R) 50ms.
MP:A+P1000+P2000, S100F1000R50 S200F2000R100	OK or OK_D or NG	<ul style="list-style-type: none"> <li>1000 pulse movement setting in the 1st axis + direction, the operating speed is minimum speed (S) 100pls / s, maximum speed (F) 1000pls / s, acceleration / deceleration time (R) 50ms.</li> <li>2000 pulse movement setting in the 2nd axis + direction, the operating speed is minimum speed (S) 200pls / s, maximum speed (F) 2000pls / s, acceleration / deceleration time (R) 100ms.</li> </ul>
MP:W+U10+N200+M0.03, S100F1000R50 S200F2000R100 S0.03F0.3R150	OK or OK_D or NG	<ul style="list-style-type: none"> <li>10 <math>\mu</math>m movement setting in the 1st axis + direction, the operating speed is minimum speed (S) 100pls / s, maximum speed (F) 1000pls / s, acceleration / deceleration time (R) 50ms.</li> <li>200nm movement setting in the 2nd axis + direction, the operating speed is minimum speed (S) 200nm / s, maximum speed (F) 2000nm / s, acceleration / deceleration time (R) 100ms.</li> <li>0.03mm movement setting in the 3rd axis + direction, the operating speed is minimum speed (S) 0.03mm / s, maximum speed (F) 0.3mm / s, acceleration / deceleration time (R) 150ms.</li> </ul>

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

## 69) A: command (Absolute coordinate value setting 1 : [Execution buffer])

## • Description

This command sets the axis of movement, direction of movement, and position of movement. The operation start command "G" or "G:" is always required after executing this command. Operation is acceleration / deceleration drive. This command also allows the stage to be moved to the logical origin.

The operating speed follows the setting of the "D:" command.

- Command format

Send) A:amuy

- Parameters

Send) a : Axis setting

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

m : Sign + or -

u : Unit setting

- P Designation without unit (pulse)
- N nanometer designation
- U micrometer designation
- M mm designation
- D degree designation

y : Moving distance

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

N Setting range : Value converted from pls to nm

Example):

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

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

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

M Setting range : Value converted from pls to mm

Example):

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

D Setting range : Value converted from pls to angle

Example):

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

- Example 1

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

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

## • Example 2

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

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

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

## • Description

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

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

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

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

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

## • Command format

Send) AP:amuy,SspdsFspdfRr

## • Parameters

Send) a : Axis setting

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

m : Sign + or -

u : Unit setting

- P Designation without unit  
(movement amount pls and operating speed pls/s)
- N nanometer designation  
(Movement amount nm and operating speed nm/s)
- U micrometer designation  
(Movement amount  $\mu$ m and operating speed  $\mu$ m/s)
- M mm designation  
(Movement amount mm and operating speed mm/s)
- D degree designation  
(Movement amount  $^{\circ}$ (degree) and operating speed  $^{\circ}$ (degree)/s)

y : Moving distance

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

N Setting range : Value converted from pls to nm

Example):

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

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

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

M Setting range : Value converted from pls to mm

Example):

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

D Setting range : Value converted from pls to angle

Example):

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

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

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

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

r : Acceleration / deceleration time (R) setting

Setting range : 1 ~ 1,000 ms

• Example 1

Send	Reply	Contents
AP:1+P1000	OK or OK_D or NG	Set to move the 1st axis to the +1000 pulse position. The movement speed is the value set by the memory switch "SPEED" or by the already set "D:" command.
AP:1+P1000, S100F1000R50	OK or OK_D or NG	Set to move the 1st axis to the +1000 pulse position. The moving speed is a minimum speed (S) 100pls / s, a maximum speed (F) 1000pls / s, and an acceleration / deceleration time (R) 50ms.
AP:A+P1000+P2000, S100F1000R50 S200F2000R100	OK or OK_D or NG	<ul style="list-style-type: none"> <li>• Set to move the 1st axis to the +1000 pulse position.</li> <li>The moving speed is a minimum speed (S) 100pls / s, a maximum speed (F) 1000pls / s, and an acceleration / deceleration time (R) 50ms.</li> <li>• Set to move the 2nd axis to the +2000 pulse position.</li> <li>The moving speed is a minimum speed (S) 200pls / s, a maximum speed (F) 2000pls / s, and an acceleration / deceleration time (R) 100ms.</li> </ul>

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



## • Example 2

Send	Reply	Contents
AP:W+U10+N200+M 0.03, S100F1000R50 S200F2000R100 S0.03F3R150	OK or OK_D or NG	<ul style="list-style-type: none"> <li>• Set to move the 1st axis to the +10 <math>\mu\text{m}</math> position. The moving speed is 100 <math>\mu\text{m} / \text{s}</math> for the minimum speed (S), 1000 <math>\mu\text{m} / \text{s}</math> for the maximum speed (F), and 50 ms for the acceleration / deceleration time (R).</li> <li>• Set to move the 2nd axis to the +200 nm position. The moving speed is 200 nm / s for the minimum speed (S), 2000 nm / s for the maximum speed (F), and 100 ms for the acceleration / deceleration time (R).</li> <li>• Set to move the 3rd axis to the +0.03 mm position. The moving speed is 0.03 mm / s for the minimum speed (S), 3 mm / s for the maximum speed (F), and 150 ms for the acceleration / deceleration time (R).</li> </ul>

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

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

## • Description

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

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

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

## • Command format

Send) E:0admuc1muc2

## • Parameters

Send) a : Axis setting

A 1st and 2nd axis designation

B 1st and 3rd axis designation

C 2nd and 3rd axis designation

d : Rotation direction setting

0 CW rotation (Clockwise)

1 CCW rotation (Counterclockwise)

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

u : Unit setting

P Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

c1,c2 : Center coordinate setting (relative position from the current position)  
 (c1 : Set value of the axis with a small axis number (X axis))  
 (c2 : Set value of the axis with a large axis number (Y axis))

Setting range

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

N Setting range : Value converted from pls to nm

Example):

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

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

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

M Setting range : Value converted from pls to mm

Example):

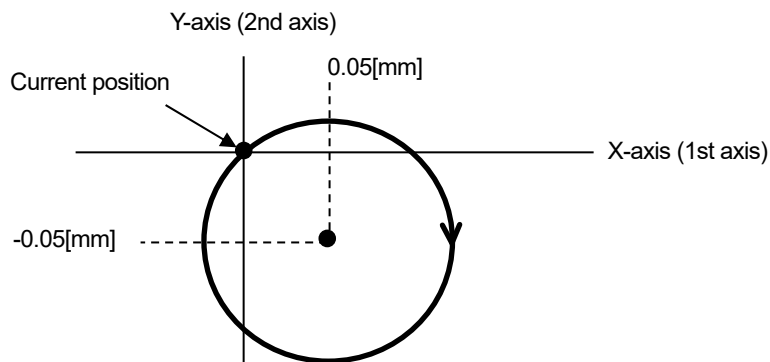
If the scale resolution is 1 nm at 1,000 pls, it will be M0.001

• Example

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

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

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



## 72) E:1 command (Arc interpolation 2 : Angle [Execution buffer])

• Description

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

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

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

\*) The distance traveled per pulse must be the same between the interpolation axes.

If they are different, the correct interpolation operation will not be performed.

• Command format

Send) E:1admuc1muc2Dae

• Parameters

Send) a : Axis setting

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

d : Rotation direction setting

- 0 CW rotation (Clockwise)
- 1 CCW rotation (Counterclockwise)

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

u : Unit setting

- P Designation without unit (pulse)
- N nanometer designation
- U micrometer designation
- M mm designation

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

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

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

Center coordinates Setting range

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

N Setting range : Value converted from pls to nm

Example):

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

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

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

M Setting range : Value converted from pls to mm

Example):

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

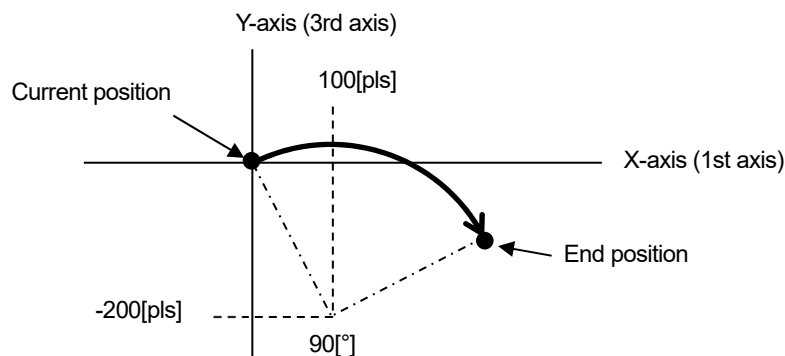
ae : End point angle (deg) setting Setting range :  $0^\circ < ae \leq 360^\circ$

• 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:1B0+P100-P200D90	OK or NG

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



## 73) E:2 command (Arc interpolation 3 : Passing point [Execution buffer])

## • Description

This command sets the axis of movement, pass point coordinates, and end point coordinates for a circular interpolation move. After executing this command, the operation start command "G" or "G:" is always required.

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

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

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

## • Command format

Send) E:2admup1mup2mue1mue2

## • Parameters

Send) a : Axis setting

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

d : Rotation direction setting

- 0 CW rotation (Clockwise)
- 1 CCW rotation (Counterclockwise)

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

u : Unit setting

- P Designation without unit (pulse)
- N nanometer designation
- U micrometer designation
- M mm designation

p1,p2 : Passing point coordinate setting

(relative position from the current position)

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

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

e1,e2 : End point coordinate setting

(relative position from the current position)

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

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

Passing point coordinates, end point coordinates Setting range

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

N Setting range : Value converted from pls to nm

Example):

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

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

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

M Setting range : Value converted from pls to mm

Example):

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

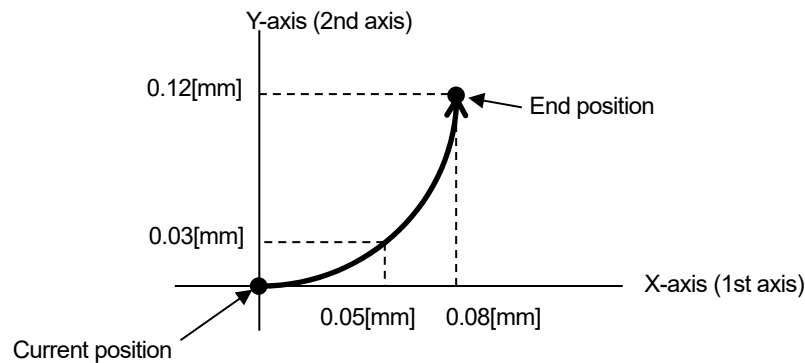
\*) If the current position is on a straight line with Passing point coordinates and end point coordinates, an arc cannot be specified, so "NG" is replied.

• Example

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

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

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



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

• Description

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

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

\*) The distance traveled per pulse must be the same between the interpolation axes.

If they are different, the correct interpolation operation will not be performed.

• Command format

Send) E:3adNnmue1mue2muz

• Parameters

Send) a : Arc axis setting

A 1st axis and 2nd axis designation

d : Rotation direction setting

0 CW rotation (Clockwise)

1 CCW rotation (Counterclockwise)

n : Number of rotations 1 ~ 1000

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

u : Unit setting

P Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

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

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

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

**z : Linear movement amount setting**

(movement amount per rotation from the current position)

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

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

Center coordinates, Linear destination coordinates    Setting range

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

N    Setting range : Value converted from pls to nm

Example):

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

U    Setting range : Value converted from pls to  $\mu$ m

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

M    Setting range : Value converted from pls to mm

Example):

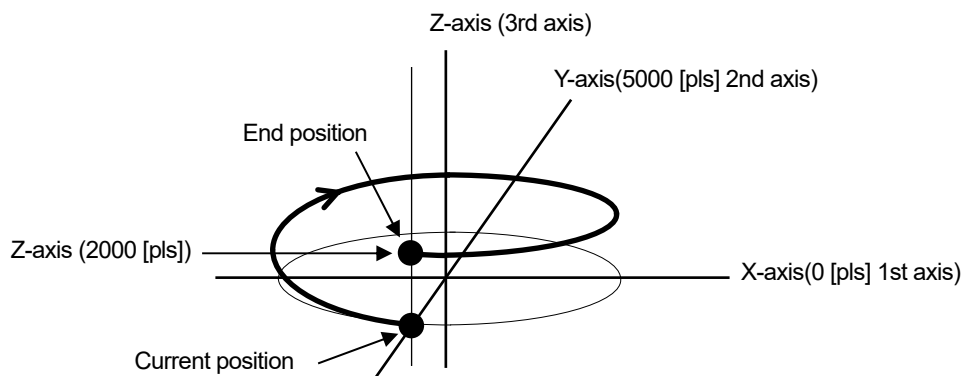
If the scale resolution is 1 nm at 1,000 pls, it will be M0.001

• Example

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

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

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



## 75) E:4 command (Arc interpolation 5 : Angle helical [Execution buffer])

## • Description

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

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

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

\*) The distance traveled per pulse must be the same between the interpolation axes.

If they are different, the correct interpolation operation will not be performed.

## • Command format

Send) E:4admuc1muc2Daemuz

## • Parameters

Send) a : Arc axis setting

A 1st axis and 2nd axis designation

d : Rotation direction setting

0 CW rotation (Clockwise)

1 CCW rotation (Counterclockwise)

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

u : Unit setting

P Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

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

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

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

z: Linear movement amount setting

(Amount of movement from the current position)

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

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

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

N Setting range : Value converted from pls to nm

Example):

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

U Setting range : Value converted from pls to μm

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

M Setting range : Value converted from pls to mm

Example):

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

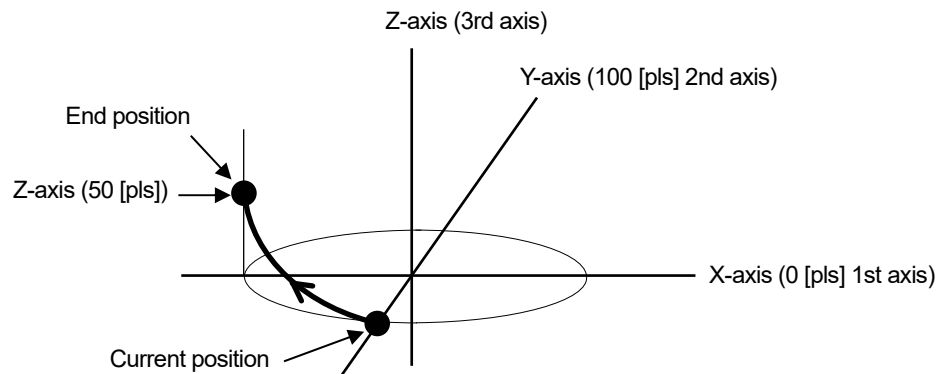
ae : End point angle (deg) setting Setting range : 0° < ae ≤ 360000°

• 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). A linear operation with the relative coordinates (3rd axis 50pls) synchronized with this as the destination.

Send	Reply
E:4A0+P0+P100D90+P50	OK or NG

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



76) E:5 command (Arc interpolation 6 : Passing point helical [Execution buffer])

• Description

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

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

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

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

• Command format

Send) E:5admup1mup2mue1mue2muz

• Parameters

Send) a : Arc axis setting

A 1st axis and 2nd axis designation

d : Rotation direction setting

0 CW rotation (Clockwise)

1 CCW rotation (Counterclockwise)

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

u : Unit setting

P Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation



p1,p2 : Passing point coordinate setting  
 (relative position from the current position)  
 (p1 : Set value of the axis with a small axis number (X axis))  
 (p2 : Set value of the axis with a large axis number (Y axis))

e1,e2 : End point coordinate setting  
 (relative position from the current position)  
 (e1 : Set value of the axis with a small axis number (X axis))  
 (e2 : Set value of the axis with a large axis number (Y axis))

z : Linear movement destination coordinate setting  
 (relative position from the current position)

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

Passing point coordinates, End point coordinates and  
 Linear destination coordinates Setting range

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

N Setting range : Value converted from pls to nm

Example):

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

U Setting range : Value converted from pls to  $\mu$ m

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

M Setting range : Value converted from pls to mm

Example):

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

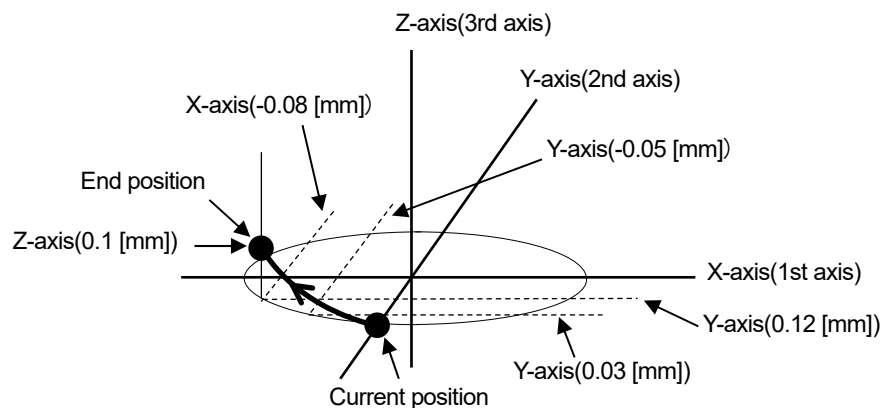
\*) If the current position is on a straight line with Passing point coordinates and end point coordinates, an arc cannot be specified, so "NG" is replied.

#### • Example

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

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

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



## 77) EP:0 command (Arc interpolation 1 : Perfect circle [Prebuffer])

## • Description

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

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

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

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

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

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

## • Command format

Send) EP:0admuc1muc2,SspdsFspdfRr

## • Parameters

Send) a : Arc axis setting

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

d : Rotation direction setting

0 CW rotation (Clockwise)

1 CCW rotation (Counterclockwise)

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

u : Unit setting

P Designation without unit

(movement amount pls and operating speed pls/s)

N nanometer designation

(Movement amount nm and operating speed nm/s)

U micrometer designation

(Movement amount  $\mu\text{m}$  and operating speed  $\mu\text{m/s}$ )

M mm designation

(Movement amount mm and operating speed mm/s)

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

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

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

Center coordinates Setting range

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

N Setting range : Value converted from pls to nm

Example):

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

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

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

M Setting range : Value converted from pls to mm

Example):

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

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

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

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

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

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

r : Acceleration / deceleration time (R) setting

Setting range : 1 ~ 1,000 ms

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

spds : Minimum speed (S) setting

spdf : Maximum speed (F) setting

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

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

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

Unit specification U Setting range: Value obtained by converting pls / s to  $\mu\text{m}$

(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)

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

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

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

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

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

r : Acceleration / deceleration time setting

Setting range : 1 ~ 1,000 ms

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

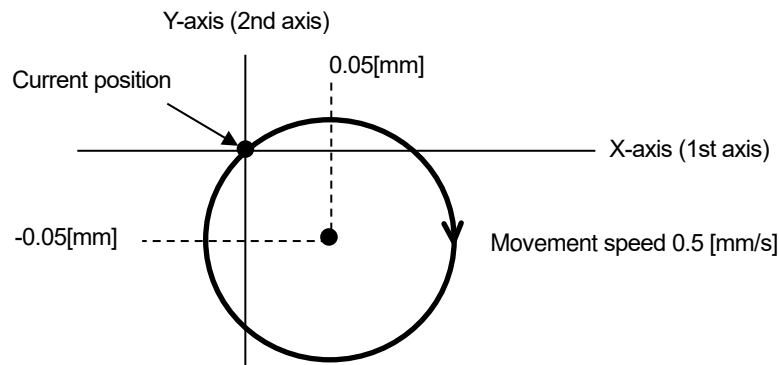
• Example

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

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

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

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



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

• Description

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

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

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

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

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

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

\*) The distance traveled per pulse must be the same between the interpolation axes.

If they are different, the correct interpolation operation will not be performed.

• Command format

Send) EP:1admuc1muc2Dae,SspdsFspdfRr

• Parameters

Send) a : Arc axis setting

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

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

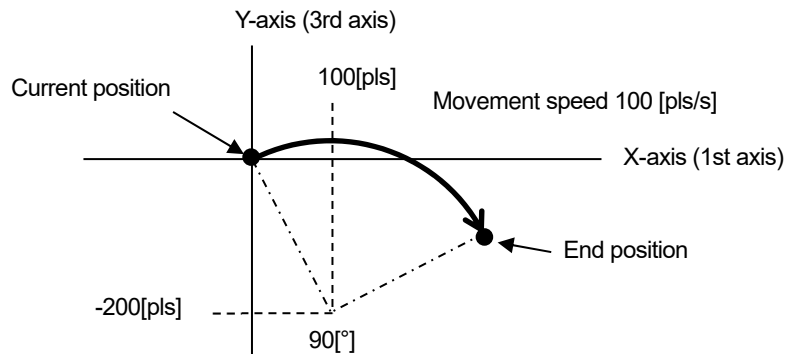
• Example

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

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

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

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



79) EP:2 command (Arc interpolation 9 : Passing point indication [Prebuffer])

• Description

This is a pre-buffer command that sets the move axis, passing point coordinates, end point coordinates, and move speed for a circular interpolation move. If the operation is set up with this command, a reply will be sent when the operation is completed. The operation start command "G" or "G:" is always required after executing this command.

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

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

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

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

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

\*) The distance traveled per pulse must be the same between the interpolation axes.

If they are different, the correct interpolation operation will not be performed.

• Command format

Send) EP:2admup1mup2mue1mue2,SspdsFspdfRr

• Parameters

Send) a : Arc axis setting

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

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

r : Acceleration / deceleration time setting

Setting range : 1 ~ 1,000 ms

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

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

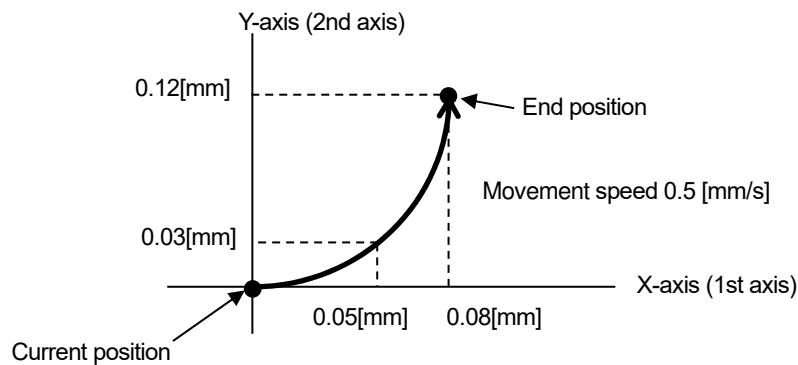
• Example

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

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

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

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



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

• Description

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

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

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

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

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

• Command format

Send) EP:3adNnmuc1muc2muz,SspdsFspdfRr



• Parameters

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

spds : Minimum speed (S) setting

spdf : Maximum speed (F) setting

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

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

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

Unit specification U Setting range: Value obtained by converting pls / s to  $\mu\text{m}$

(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)

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

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

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

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

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

r : Acceleration / deceleration time setting

Setting range : 1 ~ 1,000 ms

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

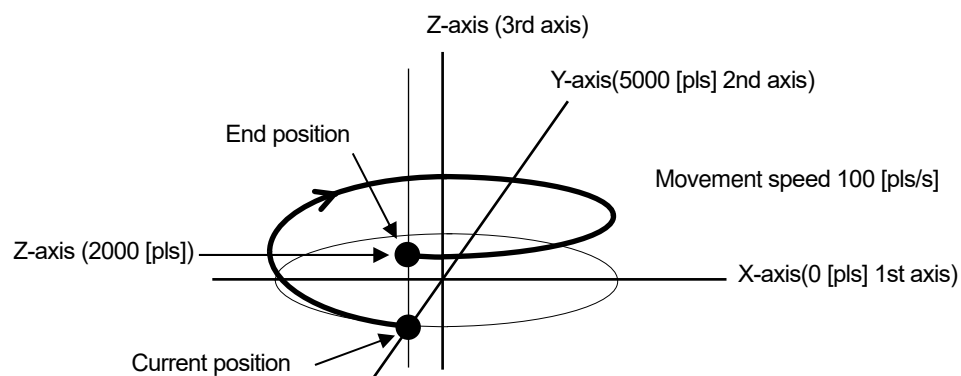
#### • Example

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

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

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

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



## 81) EP:4 command (Arc interpolation 11 : Angular helical [Prebuffer])

## • Description

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

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

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

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

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

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

\*) The distance traveled per pulse must be the same between the interpolation axes.

If they are different, the correct interpolation operation will not be performed.

## • Command format

Send) EP:4admuc1muc2Daemuz ,SspdsFspdfRr

## • Parameters

Send) a : Arc axis setting

A 1st axis and 2nd axis designation

d : Rotation direction setting

0 CW rotation (Clockwise)

1 CCW rotation (Counterclockwise)

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

u : Unit setting

P Designation without unit

(movement amount pls and operating speed pls/s)

N nanometer designation

(Movement amount nm and operating speed nm/s)

U micrometer designation

(Movement amount  $\mu\text{m}$  and operating speed  $\mu\text{m/s}$ )

M mm designation

(Movement amount mm and operating speed mm/s)

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

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

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

## z: Linear movement amount setting

(Amount of movement from the current position)

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

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

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

N Setting range : Value converted from pls to nm

Example):

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

U Setting range : Value converted from pls to μm

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

M Setting range : Value converted from pls to mm

Example):

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

ae : End point angle (deg) setting      Setting range :  $0^\circ < ae \leq 360000^\circ$

spds : Minimum speed (S) setting

spdf : Maximum speed (F) setting

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

Unit specification N Setting range: Value obtained by converting pls / s to nm  
(Example: N1000 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification U Setting range: Value obtained by converting pls / s to μm  
(Example: U1 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification M Setting range: Value obtained by converting pls / s to mm  
(Example: M0.001 when the scale resolution is 1 nm at 1,000 pls / s)

Unit specification D Setting range: Value obtained by converting pls / s to an angle  
(Example: D0.001 when the scale resolution is 0.000001° at 1,000 pls / s)

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

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

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

## r : Acceleration / deceleration time setting

Setting range : 1 ~ 1,000 ms

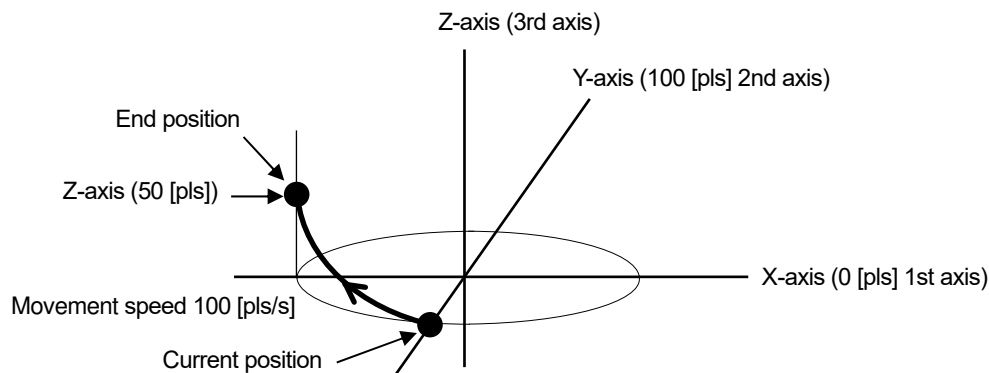
\*) Set only for axes with a small axis number.

• Example

On the 1st and 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). A linear operation with the relative coordinates (3rd axis 50pls) synchronized with this as the destination. Set the minimum speed (S) to 100 pls / s, the maximum speed (F) to 1000 pls / s, and the acceleration / deceleration time (R) to 50 ms.

Send	Reply
EP:4A0+P0+P100D90+P50,S100F1000R50	OK or OK_D or NG

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



82) EP:5 command (Arc interpolation 12 : Passing point indication helical [Prebuffer])

• Description

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

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

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

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

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

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

• Command format

Send) EP:5ad<sub>mup1</sub>m<sub>up2</sub>m<sub>ue1</sub>m<sub>ue2</sub>m<sub>uz</sub>,SspdsFspdfRr

• Parameters

Send) a : Arc axis setting

A 1st axis and 2nd axis designation

d : Rotation direction setting

0 CW rotation (Clockwise)

1 CCW rotation (Counterclockwise)

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

u : Unit setting

P Designation without unit

(movement amount pls and operating speed pls/s)

N nanometer designation

(Movement amount nm and operating speed nm/s)

U micrometer designation

(Movement amount  $\mu\text{m}$  and operating speed  $\mu\text{m/s}$ )

M mm designation

(Movement amount mm and operating speed mm/s)

p1,p2 : Passing point coordinate setting

(relative position from the current position)

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

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

e1,e2 : End point coordinate setting

(relative position from the current position)

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

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

z : Linear movement destination coordinate setting

(relative position from the current position)

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

Passing point coordinates, end point coordinates, and

Linear destination coordinates Setting range

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

N Setting range : Value converted from pls to nm

Example):

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

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

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

M Setting range : Value converted from pls to mm

Example):

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

spds : Minimum speed (S) setting

spdf : Maximum speed (F) setting

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

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

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

Unit specification U Setting range: Value obtained by converting pls / s to  $\mu\text{m}$

(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)

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

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

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

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

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

r : Acceleration / deceleration time setting

Setting range : 1 ~ 1,000 ms

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

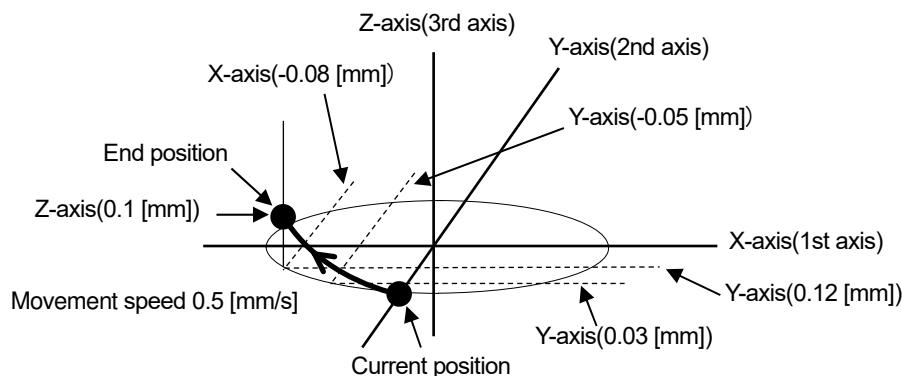
\*) If the current position is on a straight line with Passing point coordinates and end point coordinates, an arc cannot be specified, so "NG" is replied.

#### • Example

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

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

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



## 83) K: command (Linear interpolation 1 : [Execution buffer])

## • Description

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

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

\*) The distance traveled per pulse must be the same between the interpolation axes.

If they are different, the correct interpolation operation will not be performed.

## • Command format

Send) K:amuy

## • Parameters

Send) a : Axis setting

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

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

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

u : Unit setting

P Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

y : Moving distance

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

N Setting range : Value converted from pls to nm

Example):

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

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

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

M Setting range : Value converted from pls to mm

Example):

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

## • Example

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

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



## 84) KP: command (Linear Interpolation 2 : [Prebuffer])

## • Description

This is a pre-buffer command that sets the move axis, move direction, and relative move amount for a linear interpolation move. If the operation is set up with this command, a reply will be sent when the operation is completed.

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

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

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

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

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

\*) The distance traveled per pulse must be the same between the interpolation axes.

If they are different, the correct interpolation operation will not be performed.

## • Command format

Send) KP:amuy, spds,spdf,r

## • Parameters

Send) a : Axis setting

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

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

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

u : Unit setting

P Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

D degree designation

y : Moving distance

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

N Setting range : Value converted from pls to nm

Example):

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

U Setting range : Value converted from pls to  $\mu$ m

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

M Setting range : Value converted from pls to mm

Example):

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

spds : Minimum speed (S) setting

spdf : Maximum speed (F) setting

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

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

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

Unit specification U Setting range: Value obtained by converting pls / s to  $\mu$ 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)

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

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

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

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

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

r : Acceleration / deceleration time setting

Setting range : 1 ~ 1,000 ms

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

• Example

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

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

## 85) G command (Start operation 1)

• Description

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

• Command format

Send) G

• Example

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

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

## 86) G: command (Start operation 2)

## • Description

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

## • Command format

Send) G:a

## • Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

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

W Specify all controllable axes

Not specified Specify all controllable axes

## • Example

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

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

## 87) GC: command (Delete operation setting value)

## • Description

Deletes the values set by the "M:", "A:", "E:", and "K:" commands.

## • Command format

Send) GC:a

- Parameters

Send) a : Axis setting

- 1 1st axis designation
- 2 2nd axis designation
- 3 3rd axis designation
- A 1st axis and 2nd axis designation
- B 1st axis and 3rd axis designation
- C 2nd axis and 3rd axis designation
- D 1st axis, 2nd axis and 3rd axis designation
- W Specify all controllable axes
- Not specified Specify all controllable axes

- Example

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

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

## 88) J: command (Jog driving operation 1)

- Description

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

To stop, send the stop command "L:". It also stops when the limit sensor is detected.

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

- Command format

Send) J:am

- Parameters

Send) a : Axis setting

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

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

## • Example

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

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

## 89) D: command (Speed setting)

## • Description

Sets the stage operating speed. When the power is turned on, the minimum speed (S), maximum speed (F), and acceleration/deceleration time (R) are initially set according to the speed number set by the memory switch "SPEED"- "SPEED SEL" setting.

## • Command format

Send) D:aSspdsFspdfRr

## • Parameters

Send) a : Axis setting

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

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

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

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

r : Acceleration / deceleration time (R) setting

Setting range : 1 ~ 1,000 ms

## • Example 1

Send	Reply	Contents
D:1S100F1000R100	OK or NG	The operating speed of the first axis is the minimum speed (S) 100pls / s, the maximum speed (F) 1000pls / s, acceleration / deceleration time (R) 100ms.
D:AS100F1000R100 S200F2000R200	OK or NG	<ul style="list-style-type: none"> <li>• The operating speed of the first axis is minimum speed (S) 100pls / s, maximum speed (F) 1000pls / s, acceleration / deceleration time (R) 100ms.</li> <li>• The operating speed of the second axis is minimum speed (S) 200pls / s, maximum speed (F) 2000pls / s, acceleration / deceleration time (R) 200ms.</li> </ul>

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

## • Example 2

Send	Reply	Contents
D:WS100F1000R100 S200F2000R200 S300F3000R200	OK or NG	here are 3 controllable axes, <ul style="list-style-type: none"> <li>• The operating speed of the first axis is minimum speed (S) 100pls / s, maximum speed (F) 1000pls / s, acceleration / deceleration time (R) 100ms.</li> <li>• The operating speed of the second axis is minimum speed (S) 200pls / s, maximum speed (F) 2000pls / s, acceleration / deceleration time (R) 200ms.</li> <li>• The operating speed of the 3rd axis is minimum speed (S) 300pls / s, maximum speed (F) 3000pls / s, acceleration / deceleration time (R) 200ms.</li> </ul>

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

## 90) DS: command (Minimum speed setting)

## • Description

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

## • Command format

Send) DS:auspd

## • Parameters

Send) a : Axis setting

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

u : Unit setting

- F Designation without unit (pulse)
- N nanometer designation
- U micrometer designation
- M mm designation
- D degree designation

spd : Operating speed

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

N Setting range : Value converted from pls to nm

Example):

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

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

Example):

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

M Setting range : Value converted from pls to mm

Example):

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

D Setting range : Value converted from pls to angle

Example):

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

• Example

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

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

91) DF: command (Maximum speed setting)

• Description

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

• Command format

Send) DF:auspd

• Parameters

Send) a : Axis setting

1 1st axis designation

2 2nd axis designation

3 3rd axis designation

A 1st axis and 2nd axis designation

B 1st axis and 3rd axis designation

C 2nd axis and 3rd axis designation

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

W Specify all controllable axes

u : Unit setting

F Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

D degree designation

spd : Operating speed

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

N Setting range : Value converted from pls to nm

Example):

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

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

Example):

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

M Setting range : Value converted from pls to mm

Example):

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

D Setting range : Value converted from pls to angle

Example):

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

• Example

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

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

92) DR: command (Acceleration / deceleration setting)

• Description

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



- Command format

Send) DR:a r

- Parameters

Send) a : Axis setting

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

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

- Example

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

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

### 93) JD: command (Setting for speed override during jog operation)

- Description

Change the operating speed while operating with the "J:" command.

\*) At the end of the "J:" command operation, the maximum speed set by the "D:" command is overwritten.

- Command format

Send) JD:auspd

- Parameters

Send) a : Axis setting

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

u : Unit setting

F Designation without unit (pulse)

N nanometer designation

U micrometer designation

M mm designation

D degree designation

spd : Operating speed

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

N Setting range : Value converted from pls to nm

Example):

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

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

Example):

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

M Setting range : Value converted from pls to mm

Example):

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

D Setting range : Value converted from pls to angle

Example):

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

• Example

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

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

94) B: command (Origin return speed setting)

• Description

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

• Command format

Send) B:aSspdsFspdfRr

• Parameters

Send) a : Axis setting

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

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

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

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

r : Acceleration / deceleration time (R) setting

Setting range : 1 ~ 1,000 ms

• Example 1

Send	Reply	Contents
B:1S100F1000R100	OK or NG	The origin return speed of the 1st axis is the minimum speed (S) 100pls / s, the maximum speed (F) 1000pls / s, and the acceleration / deceleration time (R) 100ms.
B:AS100F1000R100 S200F2000R200	OK or NG	<ul style="list-style-type: none"> <li>• The origin return speed of the 1st axis is the minimum speed (S) 100pls / s, the maximum speed (F) 1000pls / s, and the acceleration / deceleration time (R) 100ms.</li> <li>• The origin return speed of the 2nd axis is the minimum speed (S) 200pls / s, the maximum speed (F) 2000pls / s, and the acceleration / deceleration time (R) 200ms.</li> </ul>
B:BS100F1000R100 S300F3000R200	OK or NG	<ul style="list-style-type: none"> <li>• The origin return speed of the 1st axis is the minimum speed (S) 100pls / s, the maximum speed (F) 1000pls / s, and the acceleration / deceleration time (R) 100ms.</li> <li>• The origin return speed of the 3rd axis is the minimum speed (S) 300pls / s, the maximum speed (F) 3000pls / s, and the acceleration / deceleration time (R) 200ms.</li> </ul>

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

## • Example 2

Send	Reply	Contents
B:WS100F1000R100 S200F2000R200 S300F3000R200	OK or NG	<p>The controllable axis is 3 axes,</p> <ul style="list-style-type: none"> <li>• The origin return speed of the 1st axis is the minimum speed (S) 100pls / s, the maximum speed (F) 1000pls / s, and the acceleration / deceleration time (R) 100ms.</li> <li>• The origin return speed of the 2nd axis is the minimum speed (S) 200pls / s, the maximum speed (F) 2000pls / s, and the acceleration / deceleration time (R) 200ms.</li> <li>• The origin return speed of the 3rd axis is the minimum speed (S) 300pls / s, the maximum speed (F) 3000pls / s, and the acceleration / deceleration time (R) 200ms.</li> </ul>

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

## 95) I: command (General-purpose IO input confirmation)

## • Description

Check the input status of general-purpose input.

## • Command format

Send) I:

Reply) i

## • Parameters

Reply) i : General-purpose input signal state 0 ~ 63

## • General-purpose input signal status (Blanks are OFF)

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

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

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

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

• Example

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

96) O: command (General-purpose IO output command)

• Description

Set the general-purpose output status.

• Command format

Send) O:s

• Parameters

Send) s : General purpose output signal state 0 ~ 63

• General-purpose output status (Blanks are OFF)

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

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

Set value	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
OUT1		ON		ON		ON		ON		ON		ON			ON	
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

97) T:T command (Trigger output 1 : Timer value specified)

• Description

Specifies the trigger time interval to output the trigger.

• Command format

Send) T:Ta

• Parameters

Send) a : Timer value      Setting range : 1 ~ 10000  
(0.01 ~ 100.00 sec)

## • Example

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

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

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

## • Description

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

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

## • Command format

Send) T:PaPb

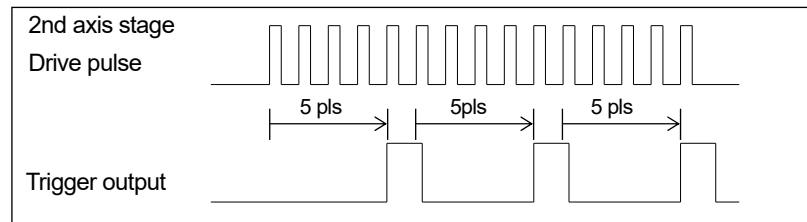
## • Parameters

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

## • Example

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

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



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

## • Description

Prohibits trigger output.

## • Command format

Send) T:S

## • Example

Send	Reply
T:S	OK or NG

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

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

## • Description

Outputs a one-shot trigger.

## • Command format

Send) T:M

## • Example

Send	Reply
T:M	OK or NG

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

## 101) T:E command (Trigger output 5: Scale pulse value specified)

## • Description

Specifies the target axis for trigger output and the trigger pulse interval for scale pulses.

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

## • Command format

Send) T:EaPmb

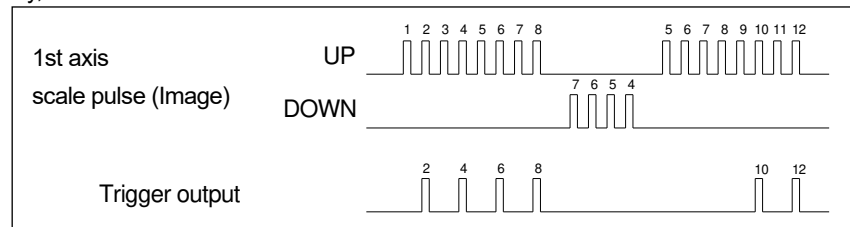
## • Parameters

Send) a : Axis setting 1 or 2 or 3  
m : Sign setting + or- (Sign cannot be omitted)  
b : Pulse value 2 ~ 30000

## • Example

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

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



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

## 102) P:R command (Program 1 : Program mode transition)

## • Description

Moves to program mode.

## • Command format

Send) P:R

## • Example

Send	Reply
P:R	OK or NG

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

## • Commands available in program mode

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

## 103) P:H command (Program 2 : Transition to host mode)

## • Description

Return to host mode.

## • Command format

Send) P:H



- Example

Send	Reply
P:H	OK or NG

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

#### 104) P:P command (Program 3 : Program number designation)

- Description

Specify the program number.

- Command format

Send) P:Pp

- Parameters

Send) p : Program number      Setting range : 1 ~ 8

- Example

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

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

#### 105) P:S command (Program 4 : Program operation : Operation start)

- Description

The program operation will start.

- Command format

Send) P:S

- Example

Send	Reply
P:S	OK or NG

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

#### 106) P:O command (Program 5 : Program operation : One-line execution operation start)

- Description

The one-line execution operation is started by the program operation.

It can be used during pause with the "P: U" command.

- Command format

Send) P:O

- Example

Send	Reply
P:O	OK or NG

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

#### 107) P:E command (Program 6 : Program operation : Stop operation)

- Description

Stops the program operation.

- Command format

Send) P:E

- Example

Send	Reply
P:E	OK or NG

## 108) P:U command (Program 7: Program operation : Pause)

- Description  
Pauses program operation.
- Command format  
Send) P:Uu
- Parameters  
Send) u : Pause 0 or 1  
0 Pause  
1 Unpause
- Example

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

## 109) P:C command (Program 8 : Program operation : Send completion signal)

- Description  
When the program operation is completed, the "COMP" character string is replied to the PC.
- Command format  
Send) P:Cc
- Parameters  
Send) c : Signal transmission 0 or 1  
0 Signal transmission prohibited  
1 Signal transmission enabled
- Example

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

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

## 110) P:T command (Program 9 : Program operation : Send trigger signal)

- Description  
When the trigger is output during program operation, the "TRIG" character string is sent to the PC.
- Command format  
Send) P:Tt
- Parameters  
Send) t : Trigger signal transmission 0 or 1  
0 Prohibition of trigger signal transmission  
1 Trigger signal transmission controllable
- Example

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

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

## 111) P:ON command (Program 10 : Shift to edit mode)

## • Description

It shifts from the state where it is in the program mode to the program edit mode.

\*) The program number can be edited with the number set by the "P: P" command.

## • Command format

Send) P:ON

## • Example

Send	Reply
P:ON	OK or NG

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

## • Commands available in program mode

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

## 112) P:OFF command (Program 11 : Program mode transition)

## • Description

From the program edit mode, if there is no "END" in all registered lines, "END" is automatically added, the set content is saved, and the program mode is entered.

\*) If up to the 4000th line is registered, "END" will not be added automatically.

## • Command format

Send) P:OFF

## • Example

Send	Reply
P:OFF	OK or NG

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

## 113) P:DEL command (Program 12 : Delete program line designation)

## • Description

Delete the program contents by specifying a line in the program edit mode.

## • Command format

Send) P:DEL,n

## • Parameters

Send) n : Program number 1 ~ 4000

## • Example

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

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

## 114) P:SET command (Program 13 : Program line designation setting)

## • Description

Set the program contents by specifying the line in the program edit mode.

\*) Setting items differ depending on the operation pattern.

\*) As for the program number, the number set by the "P: P" command will be edited.

- (1) Operation pattern : Relative value operation M, absolute value operation A,  
linear interpolation K

Performs relative, absolute, and linear interpolation.

• Command format

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

Send2) P:SET,n,p,as1,as2,as3,ap1,ap2,ap3,o,s,w,tm

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

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

• Parameters

Send) n : Program number 1 ~ 000

p : Driving pattern M or A or K

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

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

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

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

ap1 : 1st axis coordinate value -999,999,999 ~ 999,999,999 pls

ap2 : 2nd axis coordinate value -999,999,999 ~ 999,999,999 pls

ap3 : 3rd axis coordinate value -999,999,999 ~ 999,999,999 pls

o : General-purpose output instruction 0 ~ 63

s : Operating speed 1 ~ 4

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

tm : Trigger mode 0 Drive pulse designation

1 Specify a certain time

2 + Scale pulse designation

3 - Scale pulse designation

4 One-shot trigger designation

\*) Output after positioning of all effective axes

5 Trigger issuance prohibited

6 Take over the previous trigger setting

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

ta : Trigger target axis 1 ~ 3

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

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

Trigger mode 2,3 :  $\pm 2$  ~ 30000 pls

• Example

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

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

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

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

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

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

• Command format

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

• Parameters

Send) n : Program number 1 ~ 4000  
 p : Driving pattern CM or CA  
 as1 : 1st axis state 0 (axis invalid) or 1 (axis controllable)  
 as2 : 2nd axis state 0 (axis invalid) or 1 (axis controllable)  
 as3 : 3rd axis state 0 (axis invalid) or 1 (axis controllable)  
 \*) Only one axis can be enabled. If multiple axes are enabled, a command error will occur.  
 ap1 : 1st axis coordinate value -999,999,999 ~ 999,999,999 pls  
 ap2 : 2nd axis coordinate value -999,999,999 ~ 999,999,999 pls  
 ap3 : 3rd axis coordinate value -999,999,999 ~ 999,999,999 pls  
 o : General-purpose output instruction 0 ~ 63  
 s : Operating speed 1 ~ 4  
 w : Wait time 0 ~ 2560 (0.1 sec unit)  
 tm : Trigger mode 0 Drive pulse designation  
 2 Scale pulse designation

• Example

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

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

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

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

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

• Command format

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

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

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

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

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

## • Parameters

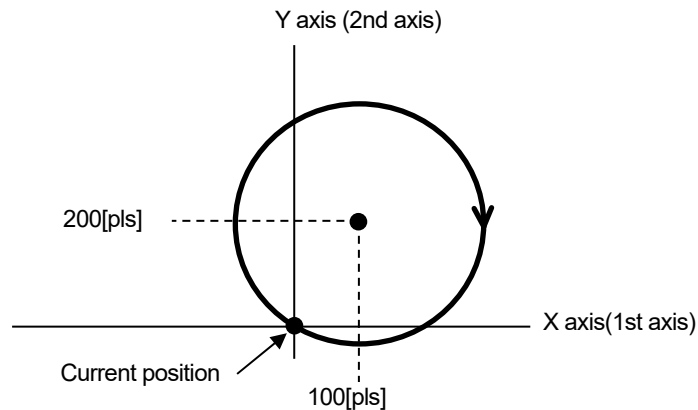
Send)	n : Program number	1 ~ 4000
	p : Driving pattern	E
	as1 : 1st axis state	0 (axis invalid) or 1 (axis controllable)
	as2 : 2nd axis state	0 (axis invalid) or 1 (axis controllable)
	as3 : 3rd axis state	0 (axis invalid) or 1 (axis controllable)
	*) Two axes can be enabled. If all are enabled, a command error will occur.	
	cm : Circle mode	0 Perfect circle designation CW rotation direction
		1 Perfect circle designation CCW rotation direction
	c1 : Center point coordinate value	-999,999,999 ~ 999,999,999 pls
	*) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in as1 to 3 and the axis number is small, and is the relative position from the current position.	
	c2 : Center point coordinate value	-999,999,999 ~ 999,999,999 pls
	*) It is the center point coordinate value of the axis (Y axis) with the larger axis number on the 2 axes enabled in as1 ~ 3, and is the relative position from the current position.	
	o : General-purpose output instruction	0 ~ 63
	s : Operating speed	1 ~ 4 (Minimum velocity of c1 axis (S))
	w : Wait time	0 ~ 2560 (0.1 sec unit)
	tm : Trigger mode	0 Drive pulse designation
		1 Specify a certain time
		2 + Scale pulse designation
		3 - Scale pulse designation
		4 One-shot trigger designation
	*) Output after positioning of all effective axes	
		5 Trigger issuance prohibited
		6 Take over the previous trigger setting
	*) When specifying the drive pulse, + scale pulse, and- scale pulse, set the set speed to 56 kpps or less.	
	ta : Trigger target axis	1 ~ 3
	tv : Trigger output interval	Trigger mode 0 : 2 ~ 30000 pls
		Trigger mode 1 : 1 ~ 10000 (0.01sec uint)
		Trigger mode 2,3 : $\pm 2$ ~ 30000 pls

• Example

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

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

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



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

Performs circle interpolation operation (angle specification).

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

• Command format

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

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

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

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

• Parameters

Send) n : Program number 1 ~ 4000

p : Driving pattern E

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

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

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

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

cm : Circle mode  
 2 Angle specification  
 CW rotation direction  
 3 Angle specification  
 CCW rotation direction

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

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

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

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

al : Degree 0 ~ 360 (Degree)

o : General-purpose output instruction 0 ~ 63

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

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

tm : Trigger mode 0 Drive pulse designation

1 Specify a certain time

2 + Scale pulse designation

3 - Scale pulse designation

4 One-shot trigger designation

\*) Output after positioning of all effective axes

5 Trigger issuance prohibited

6 Take over the previous trigger setting

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

ta : Trigger target axis 1 ~ 3

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

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

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

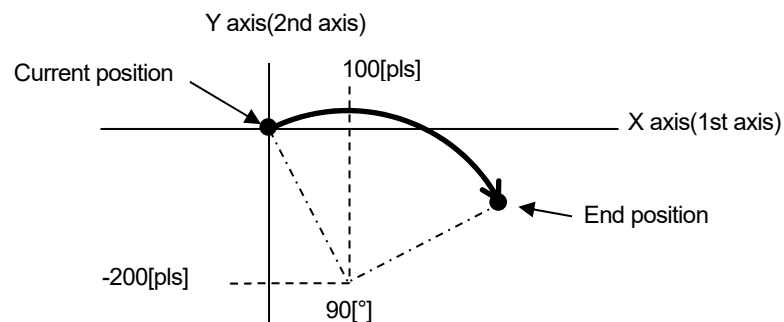
\*) An error will occur because the center coordinates are calculated. Please use it after confirming it with the actual machine.

#### • 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).

#### • Command format

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



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

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

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

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

#### • Parameters

Send) n : Program number 1 ~ 4000

p : Driving pattern E

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

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

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

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

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

5 Specifying a passing point  
CW rotation direction

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

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

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

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

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

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

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

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

o : General-purpose output instruction 0 ~ 63

s : Operating speed 1 ~ 4 (Minimum velocity of p1, e1 axis (S))

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

tm : Trigger mode 0 Drive pulse designation

1 Specify a certain time

2 + Scale pulse designation

3 - Scale pulse designation

4 One-shot trigger designation

\*) Output after positioning of all effective axes

5 Trigger issuance prohibited

6 Take over the previous trigger setting

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

ta : Trigger target axis 1 ~ 3

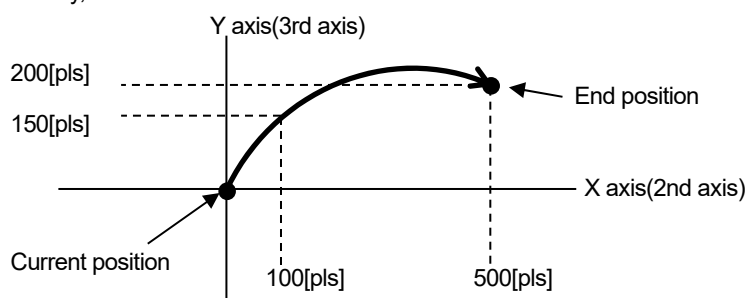
tv : Trigger output interval	Trigger mode 0 : 2 ~ 30000 pls
	Trigger mode 1 : 1 ~ 10000 (0.01sec uint)
	Trigger mode 2,3 : $\pm 2 \sim 30000$ pls

- 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 : Circle mode	0	Perfect circle designation CW rotation direction
	1	Perfect circle designation CCW rotation direction

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

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

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

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

hl : Linear movement amount setting -999,999,999 ~ 999,999,999 pls

\*) The amount of linear movement of the axis (Z axis) disabled in as1 to 3, and the amount of movement per rotation from the current position. For example, if the number of rotations is specified as 2 rotations and the linear movement amount setting is 100pls, the total linear movement amount will be 200pls.

r : Rotation value 1 ~ 1000

o : General-purpose output instruction 0 ~ 63

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

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

tm : Trigger mode 0 Drive pulse designation

1 Specify a certain time

2 + Scale pulse designation

3 - Scale pulse designation

4 One-shot trigger designation

\*) Output after positioning of all effective axes

5 Trigger issuance prohibited

6 Take over the previous trigger setting

\*) 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)

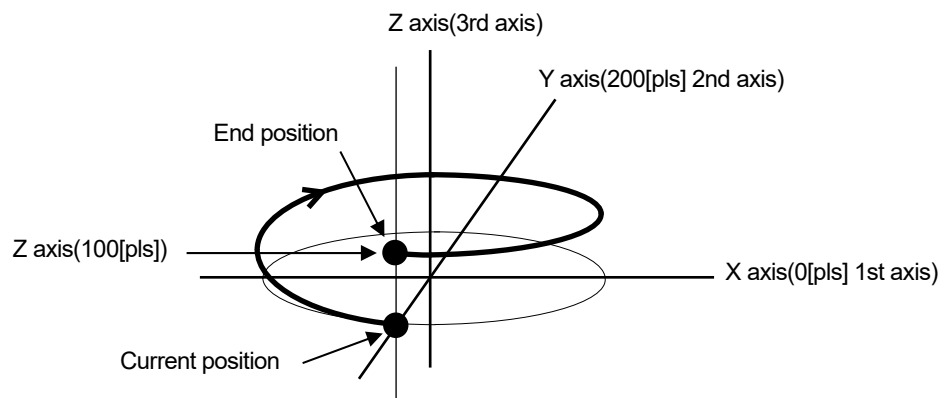
Trigger mode 2,3 :  $\pm 2 \sim 30000$  pls

#### • Example

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).

• Command format

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

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

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

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

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

• Parameters

Send) n : Program number 1 ~ 4000

p : Driving pattern EH

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

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

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

\*) Enable 2 axes of circle interpolation axis. If all are enabled, a command error will occur.

cm : Circle mode 2 Angle specification  
CW rotation direction  
3 Angle specification  
CCW rotation direction

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

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

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

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

al : Angle 0 ~ 360000 (Degree)

hl : Linear movement amount setting -999,999,999 ~ 999,999,999 pls

\*) If the linear movement destination coordinate value of the axis (Z axis) disabled in as1 to 3 and the angle is less than 360 °, the amount of movement until moving that angle is 360 ° or more, per rotation. It will be the amount of movement. For example, if the linear movement amount is set to 100pls at 540 ° (one and a half rotations), the total linear movement amount will be 150pls.

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

o : General-purpose output instruction 0 ~ 63

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

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

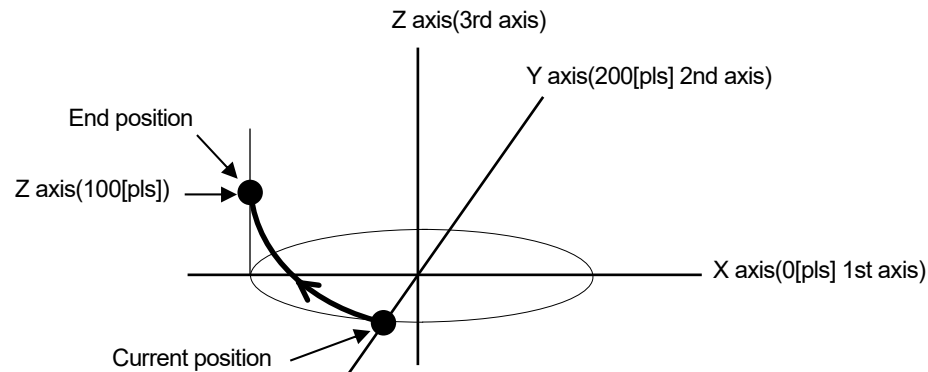
- tm : Trigger mode
- 0 Drive pulse designation
  - 1 Specify a certain time
  - 2 + Scale pulse designation
  - 3 - Scale pulse designation
  - 4 One-shot trigger designation
  - \*) Output after positioning of all effective axes
  - 5 Trigger issuance prohibited
  - 6 Take over the previous trigger setting
  - \*) When specifying the drive pulse, + scale pulse, and- scale pulse, set the set speed to 56 kpps or less.
- ta : Trigger target axis 1 ~ 3
- tv : Trigger output interval
- Trigger mode 0 : 2 ~ 30000 pls
  - Trigger mode 1 : 1 ~ 10000 (0.01sec uint)
  - Trigger mode 2,3 :  $\pm 2 \sim 30000$  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

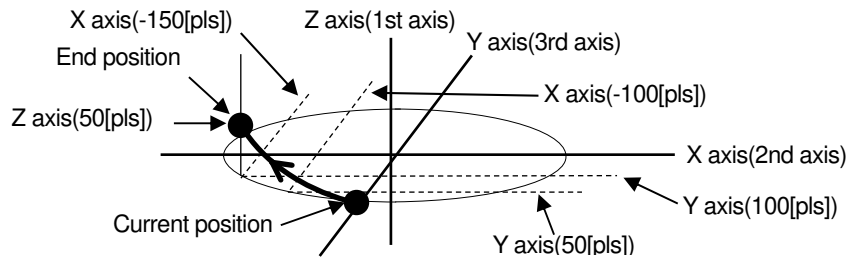
Send)	n : Program number	1 ~ 4000
	p : Driving pattern	EH
	as1 : 1st axis state	0 (axis invalid) or 1 (axis controllable)
	as2 : 2nd axis state	0 (axis invalid) or 1 (axis controllable)
	as3 : 3rd axis state	0 (axis invalid) or 1 (axis controllable)
	*) Enable 2 axes of circle interpolation axis. If all are enabled, a command error will occur.	
	cm : Circle mode	4 Specifying a passing point CW rotation direction
		5 Specifying a passing point CCW rotation direction
	p1 : Passing point coordinate value	-999,999,999 ~ 999,999,999 pls
	*) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in as1 to 3 and the axis number is small, and is the relative position from the current position.	
	p2 : Passing point coordinate value	-999,999,999 ~ 999,999,999 pls
	*) It is the center point coordinate value of the axis (Y axis) with the larger axis number on the 2 axes enabled in as1 ~ 3, and is the relative position from the current position.	
	e1 : End point coordinate value	-999,999,999 ~ 999,999,999 pls
	*) It is the center point coordinate value of the axis (X axis) with 2 axes enabled in as1 to 3 and the axis number is small, and is the relative position from the current position.	
	e2 : End point coordinate value	-999,999,999 ~ 999,999,999 pls
	*) It is the center point coordinate value of the axis (Y axis) with the larger axis number on the 2 axes enabled in as1 ~ 3, and is the relative position from the current position.	
	hl : Linear destination coordinate value	-999,999,999 ~ 999,999,999 pls
	*) The linear movement destination coordinate value of the axis (Z axis) disabled in as1 to 3, which is the relative position from the current position.	
	o : General-purpose output instruction	0 ~ 63
	s : Operating speed	1 ~ 4 (Minimum velocity of p1, e1 axis (S))
	w : Wait time	0 ~ 2560 (0.1 sec unit)
	tm : Trigger mode	0 Drive pulse designation
		1 Specify a certain time
		2 + Scale pulse designation
		3 - Scale pulse designation
		4 One-shot trigger designation
	*) Output after positioning of all effective axes	
		5 Trigger issuance prohibited
		6 Take over the previous trigger setting
	*) When specifying the drive pulse, + scale pulse, and- scale pulse, set the set speed to 56 kpps or less.	
	ta : Trigger target axis	1 ~ 3
	tv : Trigger output interval	Trigger mode 0 : 2 ~ 30000 pls
		Trigger mode 1 : 1 ~ 10000 (0.01sec uint)
		Trigger mode 2,3 : $\pm 2$ ~ 30000 pls

• Example

On the 1500th line, arc interpolation operation, 2nd and 3rd axis controllable, arc mode: passing point specification CW rotation direction, 2nd axis passing point coordinate value: -100pls, 3rd axis passing point coordinate value: 50pls, 2nd axis End point coordinate value: -150pls, 3rd axis end point coordinate value: 50pls, general-purpose output instruction: 0, movement speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis: 2nd axis, trigger output interval 10pls set

Send	Reply
P:SET,1500,EH,0,1,1,4,-100,50,-150,100,50,0,1,0,0,2,10	OK or NG

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



(9) operation pattern : Registered coordinate operation PAV

Executes the operation to the coordinate value registered by the "PAV:" command.

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

• Command format

Send1) P:SET,n,p,as1,as2,as3,m,o,s,w,tm,ta,tv

Send2) P:SET,n,p,as1,as2,as3,m,o,s,w,tm

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

• Parameters

Send) n : Program number 1 ~ 4000  
p : Driving pattern PAV  
as1 : 1st axis state 0 (axis invalid) or 1 (axis controllable)  
as2 : 2nd axis state 0 (axis invalid) or 1 (axis controllable)  
as3 : 3rd axis state 0 (axis invalid) or 1 (axis controllable)  
m : Coordinate value information registration number 1 ~ 20  
o : General-purpose output instruction 0 ~ 63  
s : Operating speed 1 ~ 4  
w : Wait time 0 ~ 2560 (0.1 sec unit)  
tm : Trigger mode  
0 Drive pulse designation  
1 Specify a certain time  
2 + Scale pulse designation  
3 - Scale pulse designation  
4 One-shot trigger designation  
\*) Output after positioning of all effective axes  
5 Trigger issuance prohibited  
6 Take over the previous trigger setting  
\*) When specifying the drive pulse, + scale pulse, and- scale pulse, set the set speed to 56 kpps or less.

ta : Trigger target axis 1 ~ 3  
 tv : Trigger output interval Trigger mode 0 : 2 ~ 30000 pls  
 Trigger mode 1 : 1 ~ 10000 (0.01sec 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.

## 115) P:GET command (Program 13 : Get program line designation)

- Description

Get the program contents by specifying a line in the program edit mode.

(1) Operation pattern : Relative value operation M, Absolute value operation A,  
Linear interpolation K

- Command format

Send) P:GEL,n  
Reply1) p,as1,as2,as3,ap1,ap2,ap3,o,s,w,tm,ta,tv  
Reply2) p,as1,as2,as3,ap1,ap2,ap3,o,s,w,tm

\*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is 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 :  $\pm 2$  ~ 30000 pls

- Example

Line 1500 is relative value operation, 1st, 2nd, 3rd axis controllable, 1st axis movement amount: 100pls, 2nd axis movement amount: 200pls, 3rd axis movement amount: 300pls, general-purpose output instruction: 0, movement speed 1, Wait time: 0 seconds, Trigger mode: Drive pulse, Trigger target axis: 1st axis, Trigger output interval: Registered at 100pls

Send	Reply
P:GET,1500	M,1,1,1,100,200,300,0,1,0,0,1,100

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

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

- Command format

Send) P:GEL,n

Reply) p,as1,as2,as3,ap1,ap2,ap3,o,s,w,tm

- Parameters

Send) n : Program number 1 ~ 4000

Reply) p : Driving pattern CM or CA

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

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

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

ap1 : 1st axis coordinate value -999,999,999 ~ 999,999,999 pls

ap2 : 2nd axis coordinate value -999,999,999 ~ 999,999,999 pls

ap3 : 3rd axis coordinate value -999,999,999 ~ 999,999,999 pls

o : General-purpose output instruction 0 ~ 63

s : Operating speed 1 ~ 4

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

tm : Trigger mode 0 Drive pulse designation

2 Scale pulse designation

- Example

Line 1500 is relative continuous operation, controllable only for 1st axis, 1st axis movement amount: 100pls, 2nd axis movement amount: 0pls, 3rd axis movement amount: 0pls, general-purpose output instruction: 0, movement speed: 1, Wait time: 0 seconds, Trigger mode: Register with drive pulse

Send	Reply
P:GET,1500	CM,1,0,0,100,0,0,0,1,0,0

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

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

- Command format

Send) P:GEL,n

Reply1) p,as1,as2, as3,cm,c1,c2,o,s,w,tm,ta,tv

Reply2) p,as1,as2, as3,cm,c1,c2,o,s,w,tm

\*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Reply1), and if the trigger mode is other than that, Reply2).

- Parameters

Send) n : Program number 1 ~ 4000

Reply) p : Driving pattern E

as1 : 1st axis state            0 (axis invalid) or 1 (axis controllable)  
 as2 : 2nd axis state           0 (axis invalid) or 1 (axis controllable)  
 as3 : 3rd axis state           0 (axis invalid) or 1 (axis controllable)  
 cm : Circle mode               0 Perfect circle designation  
    CW rotation direction  
    1 Perfect circle designation  
    CCW rotation direction  
 c1 : Center point coordinate value   -999,999,999 ~ 999,999,999 pls  
 c2 : Center point coordinate value   -999,999,999 ~ 999,999,999 pls  
 o : General-purpose output instruction   0 ~ 63  
 s : Operating speed               1 ~ 4  
 w : Wait time                   0 ~ 2560 (0.1 sec unit)  
 tm : Trigger mode               0 Drive pulse designation  
    1 Specify a certain time  
    2 + Scale pulse designation  
    3 - Scale pulse designation  
    4 One-shot trigger designation  
    \*) Output after positioning of all effective axes  
    5 Trigger issuance prohibited  
    6 Take over the previous trigger setting  
 ta : Trigger target axis        1 ~ 3  
 tv : Trigger output interval   Trigger mode 0 : 2 ~ 30000 pls  
    Trigger mode 1 : 1 ~ 10000 (0.01sec 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

Reply1) p,as1,as2, as3,cm,c1,c2,al,o,s,w,tm,ta,tv

Reply2) p,as1,as2, as3,cm,c1,c2,al,o,s,w,tm

\*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Reply1), and if the trigger mode is other than that, Reply2).

• Parameters

Send) n : Program number       1 ~ 4000

Reply) p : Driving pattern       E

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

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

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

cm : Circle mode                      2 Angle specification  
    CW rotation direction  
    3 Angle specification  
    CCW rotation direction  
 c1 : Center point coordinate value    -999,999,999 ~ 999,999,999 pls  
 c2 : Center point coordinate value    -999,999,999 ~ 999,999,999 pls  
 al : Angle                                0 ~ 360(Degree)  
 o : General-purpose output instruction   0 ~ 63  
 s : Operating speed                    1 ~ 4  
 w : Wait time                          0 ~ 2560 (0.1 sec unit)

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

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

Reply1) p,as1,as2, as3,cm,p1,p2,e1,e2,o,s,w,tm,ta,tv

Reply2) p,as1,as2, as3,cm,p1,p2,e1,e2,o,s,w,tm

\*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Reply1), and if the trigger mode is other than that, Reply2).

• Parameters

Send) n : Program number            1 ~ 4000

Reply) p : Driving pattern            E

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

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

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

cm : Circle mode

4 Specifying a passing point  
CW rotation direction

5 Specifying a passing point  
CCW rotation direction

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

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

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

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

o : General-purpose output instruction 0 ~ 63

s : Operating speed 1 ~ 4

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

tm : Trigger mode

0 Drive pulse designation

1 Specify a certain time

2 + Scale pulse designation

3 - Scale pulse designation

4 One-shot trigger designation

\*) Output after positioning of all effective axes

5 Trigger issuance prohibited

6 Take over the previous trigger setting

ta : Trigger target axis 1 ~ 3

tv : Trigger output interval

Trigger mode 0 : 2 ~ 30000 pls

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

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

• Example

Line 1500 is arc interpolation operation, 2nd and 3rd axis controllable, arc mode: passing point specification CW rotation direction, 2nd axis passing point coordinate value: 100pls, 3rd axis passing point coordinate value: 150pls, 2nd axis end point Coordinate value: 500pls, 3rd axis end point coordinate value: 200pls, general-purpose output instruction: 0, movement speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis: 2nd axis, trigger output interval: Register at 100pls

Send	Reply
P:GET,1500	E,0,1,1,4,100,150,500,200,0,1,0,0,2,100

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

(6) Operation pattern : Helical interpolation EH (Perfect circle)

• Command format

Send) P:GEL,n

Reply1) p,as1,as2, as3,cm,c1,c2,hl,r,o,s,w,tm,ta,tv

Reply2) p,as1,as2, as3,cm,c1,c2,hl,r,o,s,w,tm

\*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Reply1), and if the trigger mode is other than that, Reply2).

• Parameters

Send) n : Program number 1 ~ 4000

Reply) p : Driving pattern EH

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

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

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

cm : Circle mode	0	Perfect circle designation CW rotation direction
	1	Perfect circle designation CCW rotation direction
c1 : Center point coordinate value		-999,999,999 ~ 999,999,999 pls
c2 : Center point coordinate value		-999,999,999 ~ 999,999,999 pls
hl : Linear destination coordinate value		-999,999,999 ~ 999,999,999 pls
r : Rotation value	1 ~ 1000	
o : General-purpose output instruction	0 ~ 63	
s : Operating speed	1 ~ 4	
w : Wait time	0 ~ 2560 (0.1 sec unit)	
tm : Trigger mode	0	Drive pulse designation
	1	Specify a certain time
	2	+ Scale pulse designation
	3	- Scale pulse designation
	4	One-shot trigger designation
		*) Output after positioning of all effective axes
	5	Trigger issuance prohibited
	6	Take over the previous trigger setting
ta : Trigger target axis	1 ~ 3	
tv : Trigger output interval	Trigger mode 0	2 ~ 30000 pls
	Trigger mode 1	1 ~ 10000 (0.01sec uint)
	Trigger mode 2,3	±2 ~ 30000 pls

- Example

Line 1500 is helical interpolation operation, 1st and 2nd axis controllible, 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,<sub>n</sub>

Reply1) p,as1,as2, as3,cm,c1,c2,al,hl,o,s,w,tm,ta,tv

Reply2) p,as1,as2, as3,cm,c1,c2,al,hl,o,s,w,tm

\*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Reply1), and if the trigger mode is other than that, Reply2).

- Parameters

Send)    n : Program number            1 ~ 4000

Reply) p : Driving pattern EH

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

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

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



cm : Circle mode                      2 Angle specification  
    CW rotation direction  
    3 Angle specification  
    CCW rotation direction

c1 : Center point coordinate value    -999,999,999 ~ 999,999,999 pls  
 c2 : Center point coordinate value    -999,999,999 ~ 999,999,999 pls  
 al : Angle                                0 ~ 360000(Degree)  
 hl : Linear destination coordinate value -999,999,999 ~ 999,999,999 pls  
 o : General-purpose output instruction 0 ~ 63  
 s : Operating speed                    1 ~ 4  
 w : Wait time                          0 ~ 2560 (0.1 sec unit)  
 tm : Trigger mode                    0 Drive pulse designation  
    1 Specify a certain time  
    2 + Scale pulse designation  
    3 - Scale pulse designation  
    4 One-shot trigger designation  
    \*) Output after positioning of all effective axes  
    5 Trigger issuance prohibited  
    6 Take over the previous trigger setting

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

Reply1) p,as1,as2, as3,cm,p1,p2,e1,e2,hl,o,s,w,tm,ta,tv

Reply2) p,as1,as2, as3,cm,p1,p2,e1,e2,hl,o,s,w,tm

\*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is Reply1), and if the trigger mode is other than that, Reply2).

• Parameters

Send) n : Program number            1 ~ 4000

Reply) p : Driving pattern            EH

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

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

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

cm : Circle mode	4	Specifying a passing point CW rotation direction
	5	Specifying a passing point CW rotation direction
p1 : Passing point coordinate value	-999,999,999 ~ 999,999,999	pls
p2 : Passing point coordinate value	-999,999,999 ~ 999,999,999	pls
e1 : End point coordinate value	-999,999,999 ~ 999,999,999	pls
e2 : End point coordinate value	-999,999,999 ~ 999,999,999	pls
hl : Linear destination coordinate value	-999,999,999 ~ 999,999,999	pls
o : General-purpose output instruction	0 ~ 63	
s : Operating speed	1 ~ 4	
w : Wait time	0 ~ 2560 (0.1 sec unit)	
tm : Trigger mode	0	Drive pulse designation
	1	Specify a certain time
	2	+ Scale pulse designation
	3	- Scale pulse designation
	4	One-shot trigger designation
	*) Output after positioning of all effective axes	
	5	Trigger issuance prohibited
	6	Take over the previous trigger setting
ta : Trigger target axis	1 ~ 3	
tv : Trigger output interval	Trigger mode 0 : 2 ~ 30000	pls
	Trigger mode 1 : 1 ~ 10000 (0.01sec unit)	
	Trigger mode 2,3 : ±2 ~ 30000	pls

- Example

Line 1500 is arc interpolation operation, 2nd and 3rd axis controllable, arc mode: passing point specification CW rotation direction, 2nd axis passing point coordinate value: -100pls, 3rd axis passing point coordinate value: 50pls, 2nd axis End point coordinate value: -150pls, 3rd axis end point coordinate value: 50pls, general-purpose output instruction: 0, movement speed: 1, standby time: 0 seconds, trigger mode: drive pulse, trigger target axis: 2nd axis, trigger output interval Register at 10pls

Send	Reply
P:GET,1500	EH,0,1,1,4,-100,50,-150,100,50,0,1,0,0,2,10

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

(9) Operation pattern : Registered coordinate operation PAV

- Command format

Send) P:GEL,n  
Reply1) p,as1,as2,as3,o,s,w,tm,ta,tv  
Reply2) p,as1,as2,as3,o,s,w,tm

\*) If the trigger mode is drive pulse, fixed time, or scale pulse, the command format is 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 :  $\pm 2$  ~ 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, input status: 1 (only IN1 is ON)

Send	Reply
P:GET,1500	INPUT,1

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

(14) Operation pattern : Loop start F

- Command format

Send) P:GEL,n

Reply) p,ll,lv

- Parameters

Send) n : Program number 1 ~ 4000

Reply) p : Driving pattern F

ll : Loop nest 1 ~ 9

lv : Loop value 1 ~ 65535

- Example

"Loop start", "Loop hierarchy: 1", "Loop count: 100" are registered in the 1500th line.

Send	Reply
P:GET,1500	F,1,100

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

(15) Operation pattern : Loop end N

- Command format

Send) P:GEL,n

Reply) p,ll

- Parameters

Send) n : Program number 1 ~ 4000

Reply) p : Driving pattern N

ll : Loop nest 1 ~ 9

- Example

The 1500th line is registered with " loop end " and "loop hierarchy: 1".

Send	Reply
P:GET,1500	N,1

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

(16) Operation pattern : End of execution END

- Command format

Send) P:GEL,n

Reply) p

- Parameters

Send) n : Program number 1 ~ 4000

Reply) p : Driving pattern END

- Example

Line 1500 is registered at the end of execution

Send	Reply
P:GET,1500	END

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

## (17) Operation pattern : Unregistered NONE

## • Command format

Send) P:GEL,n

Reply) p

## • Parameters

Send) n : Program number 1 ~ 4000

Reply) p : Driving pattern NONE

## • Example

Line 1500 is unregistered

Send	Reply
P:GET,1500	NONE

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

## 116) P: INIT command (Program 15 : Delete all lines of the program)

## • Description

Delete all the program contents in the program edit mode.

## • Command format

Send) P:INIT

## • Example

Send	Reply
P:INIT	OK or NG

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

## 117) MS:ON command (Memory switch operation 1 : Edit mode transition)

## • Description

Moves from host mode to memory switch edit mode. The commands that can be used in the memory switch edit mode are "MS: OFF", "MS: SET", "MS: GET", "MS: DEF", and "MS: DEFR".

## • Command format

Send) MS:ON

## • Example

Send	Reply
MS:ON	OK or NG

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

## • Commands available in memory switch edit mode

*IDN?	?:	MS:OFF	MS:SET	MS:GET	MS:DEF
MS:DEFR	MS:SETK	MS:GETK	MS:DEFK	MS:DEFRK	

## 118) MS:OFF command (Memory switch operation 2 : Host mode transition)

## • Description

Saves the settings and returns from memory switch edit mode to host mode.

## • Command format

Send) MS:OFF

## • Example

Send	Reply
MS:OFF	OK or NG

## 119) MS:SET command (Memory switch operation 3 : Setting)

## • Description

Memory switch Set the contents of the memory switch in the edit mode.

## • Command format

Send) MS:SET,k,n,s

## • Parameters

Send) k : Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

n : Memory switch content number

s : Memory switch setting number

\*) For details on each memory switch item, content number, and setting number, refer to the separate "Preparation and Operation".

## • Example 1

Set "MODE SEL (1)" of "GENERAL (0)" to "MANUAL mode (1)".

Send	Reply
MS:SET,0,1,1	OK or NG

## • Example 2

Set "SPEED12 (S)" (4) of "SPEED" (5) to "1000pps".

Send	Reply
MS:SET,5,4,1000	OK or NG

## 120) MS:GET command (Memory switch operation 4 : Get)

## • Description

Get the contents of the memory switch in the memory switch edit mode.

## • Command format

Send) MS:GET,k,n

Reply) s

## • Parameters

Send) k : Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

n : Memory switch content number

Reply) s : Memory switch setting number

\*) For details on each memory switch item, content number, and setting number, refer to the separate "Preparation and Operation".

• Example

"MODE SEL (1)" setting of "GENERAL (0)" is "MANUAL mode (1)"

Send	Reply
MS:GET,0,1	1

121) MS:DEF command (Memory switch operation 5 : Initialization)

• Description

Initialize the contents of the memory switch in the memory switch edit mode.

• Command format

Send) MS:DEF,k,n

• Parameters

Send) k : Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

n : Memory switch content number

\*) For details on each memory switch item, and content number, refer to the separate "Preparation and Operation".

• Example

Initialize "MODE SEL (1)" of "GENERAL (0)" (HOST mode).

Send	Reply
MS:DEF,0,1	OK or NG



## 122) MS:DEFR command (Memory switch operation 6 : Get the initial value)

## • Description

Get the initial value of the memory switch contents in the memory switch edit mode.

## • Command format

Send) MS:DEFR,k,n

Reply) s

## • Parameters

Send) k : Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

n : Memory switch content number

Reply) s : Default setting number of memory switch contents

\*) For details on each memory switch item, content number, and default setting number, refer to the separate "Preparation and Operation".

## • Example

Gets the default setting for "AXIS (0)" for "GENERAL (0)".

Send	Reply	Memo
MS:DEFR,0,0	6	The default setting for "AXIS (0)" is "1 + 2 + 3 (6)"

## 123) MS:SETK command (Memory switch operation command 3 : Setting command)

## • Description

Set all the contents of the memory switch item in the memory switch edit mode.

## • Command format

Send) MS:SETK,k,s1,s2,...,sn

## • Parameters

Send) k : Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

s1 ~ sn : Setting number

\*) The number of settings varies depending on the memory switch item.

\*) For details on each memory switch item, content number, and setting number, refer to the separate "Preparation and Operation".

- Example

Set the "GENERAL (0)" setting as follows.

- |                              |                                     |
|------------------------------|-------------------------------------|
| No.1 AXIS: 1 + 2 + 3 (6)     | No.6 JOG Y SEL: 2nd axis (1)        |
| No.2 MODE SEL: HOST mode (0) | No.7 CMD FORMAT: SHOT / FC mode (0) |
| No.3 SLEEP SEL: ON (1)       | No.8 TRG / LEV: Positive logic (0)  |
| No.4 BEEP SEL: ON (1)        | No.9 TRG WIDTH: 10 $\mu$ sec (0)    |
| No.5 JOG X SEL: 1st axis (0) |                                     |

Send	Reply
MS:SETK,0,6,0,1,1,0,1,0,0,0	OK or NG

#### 124) MS:GETK command (Memory switch operation 4 : Get)

- Description

Get all the contents of the memory switch item in the memory switch edit mode.

- Command format

Send) MS:GETK,k

Reply) s1,s2,...sn

- Parameters

Send) k : Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

Reply) s1 ~ sn : Setting number

\*) The number of settings varies depending on the memory switch item.

\*) For details on each memory switch item, and setting number, refer to the separate "Preparation and Operation".

- Example

Gets the "GENERAL (0)" setting.

- |                              |                                     |
|------------------------------|-------------------------------------|
| No.1 AXIS: 1 + 2 + 3 (6)     | No.6 JOG Y SEL: 2nd axis (1)        |
| No.2 MODE SEL: HOST mode (0) | No.7 CMD FORMAT: SHOT / FC mode (0) |
| No.3 SLEEP SEL: ON (1)       | No.8 TRG / LEV: Positive logic (0)  |
| No.4 BEEP SEL: ON (1)        | No.9 TRG WIDTH: 10 $\mu$ sec (0)    |
| No.5 JOG X SEL: 1st axis (0) |                                     |

Send	Reply
MS:GETK,0	6,0,1,1,0,1,0,0,0

#### 125) MS:DEFK command (Memory switch operation 5 : Initialization)

- Description

Initialize all the contents of the memory switch item in the memory switch edit mode.

- Command format

Send) MS:DEFK,k

- Parameters

Send) k : Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

\*) For details on each memory switch item, refer to the separate "Preparation and Operation".

- Example

Send	Reply	Contents
MS:DEFK,0	OK or NG	Initialize GENERAL (0)

## 126) MS:DEFRK command (Memory switch operation 6 : Get the initial value)

- Description

Get the initial value of all the contents of the memory switch item in the memory switch edit mode.

- Command format

Send) MS:DEFRK,k

Reply) s1 ~ sn

- Parameters

Send) k : Memory switch item

0	GENERAL	General settings
1	INTERFACE	Communication settings
2	SENSOR	Sensor settings
3	AXIS	Axis settings
4	MOTOR DRIVER	Motor driver settings
5	SPEED	Speed settings
6	ORG	Origin settings
7	FEEDBACK	Feedback control settings
8	SOFT LIMIT	Soft limit settings

Reply) s1 ~ sn : Default setting number of memory switch contents

\*) The number of settings varies depending on the memory switch item.

\*) For details on each memory switch item, and default setting number, refer to the separate "Preparation and Operation".

- Example

Gets the default setting for "GENERAL (0)".

Send	Reply
MS:DEFRK,0	6,0,1,1,0,1,0,0,0

No.1 AXIS: 1 + 2 + 3 (6)

No.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)

## 127) PIT:DEL command (Position registration 1 : Delete)

- Description  
Delete the registered location information contents.
- Command format  
Send) PIT:DEL,n
- Parameters  
Send) n : Location information registration number 1 ~ 20
- Example  
Delete the registration details of registration number 1.

Send	Reply
PIT:DEL,1	OK or NG

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

## 128) PIT:SET command (Position registration 2 : Registration)

- Description  
Registers the current position with the specified registration number.  
\*) If the power of this device is turned off, reset, or the memory switch that automatically restarts is changed, the registered position will be discarded.
- Command format  
Send) PIT:SET,n
- Parameters  
Send) n : Location information registration number 1 ~ 20
- Example  
Registers the current position as registration number 1.

Send	Reply
PIT:SET,1	OK or NG

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

## 129) PIT:GET command (Position registration 3 : Get)

- Description  
Get the registered location information content.  
\*) If the counter is set to zero after registering with the "PIT\_SET:" command, the coordinate value obtained by this command will be the calculation result of the registered position and the coordinate value immediately before zero setting.
- Command format  
Send) PIT:GET,n  
Reply) c1,c2,c3
- Parameters  
Send) n : Location information registration number 1 ~ 20  
Reply) c1 : 1st axis coordinate value (unit: pls)  
c2 : 2nd axis coordinate value (unit: pls)  
c3 : 3rd axis coordinate value (unit: pls)

- Example

Get the location of registration number 3.

Send	Reply	Contents
PIT:GET,3	10000,5000,10	Coordinate values are registered as + 10000pls for the 1st axis, +5000pls for the 2nd axis, and +10pls for the 3rd axis.

### 130) PIT:G command (Position registration 4 : Operation 1)

- Description

Moves to the position registered in the specified location information registration number.

\*) Since the position is not based on the zero of the coordinate value, the registered position does not change even if the counter is set to zero.

\*) If the power of this device is turned off, reset, or the memory switch that automatically restarts is changed, the registered position will be discarded.

- Command format

Send) PIT:G,n

- Parameters

Send) n : Location information registration number 1 ~ 20

- Example

Moves to the coordinate value registered in registration number 5.

Send	Reply
PIT:G,5	OK or NG

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

### 131) PIT:GRT command (Position registration 5 : Operation order 2 : Completion reply)

- Description

It moves to the location registered in the specified location information registration number and replies to each axis after completion.

\*) Since the position is not based on the zero of the coordinate value, the registered position does not change even if the counter is set to zero.

\*) If the power of this device is turned off, reset, or the memory switch that automatically restarts is changed, the registered position will be discarded.

- Command format

Send) PIT:GRT,n

Reply) r

- Parameters

Send) n : Location information registration number 1 ~ 20

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

- Example

Move to the position registered in registration number 5, and the operation is completed in the order of the 2nd axis and the 1st axis.

Send	Reply	Reply after the operation is completed
PIT:GRT,5	OK or NG	2 1

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

## 132) PAV:DEL command (Coordinate value registration 1 : Delete)

## • Description

The registered coordinate value information content is deleted from the main memory of the controller.

## • Command format

Send) PAV:DEL,n

## • Parameters

Send) n : Coordinate value information registration number 1 ~ 20

## • Example

Delete the registration details of registration number 1.

Send	Reply
PAV:DEL,1	OK or NG

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

## 133) PAV:SET command (Coordinate value registration 2 : Registration)

## • Description

Registers the current coordinate values in the controller's main memory to the specified registration number.

## • Command format

Send) PAV:SET,n

## • Parameters

Send) n : Coordinate value information registration number 1 ~ 20

## • Example

Register the current coordinate value in registration number 1.

Send	Reply
PAV:SET,1	OK or NG

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

## 134) PAV:GET command (Coordinate value registration 3 : Get)

## • Description

Get the registered coordinate value information contents from the main memory of the controller.

## • Command format

Send) PAV:GET,n

Reply) c1,c2,c3

## • Parameters

Send) n : Coordinate value information registration number 1 ~ 20

Reply) c1 : 1st axis coordinate value (unit: pls)

c2 : 2nd axis coordinate value (unit: pls)

c3 : 3rd axis coordinate value (unit: pls)

## • Example

Get the coordinate value of registration number 3.

Send	Reply	Contents
PAV:GET,3	10000,5000,10	Coordinate values are registered as + 10000pls for the 1st axis, +5000pls for the 2nd axis, and +10pls for the 3rd axis.

## 135) PAV:G command(Coordinate value registration 4 : Operation 1)

- Description  
Moves to the position registered in the specified coordinate value information registration number.
- Command format  
Send) PAV:G,n
- Parameters  
Send) n : Coordinate value information registration number 1 ~ 20
- Example  
Moves to the coordinate value registered in registration number 5.

Send	Reply
PAV: G,5	OK or NG

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

## 136) PAV:GRT command (Coordinate value registration 5 : Operation 2 : Completion reply)

- Description  
It moves to the position registered in the specified coordinate value information registration number, and replies for each axis after completion.
- Command format  
Send) PAV:GRT,n  
Reply) r
- Parameters  
Send) n : Coordinate value information registration number 1 ~ 20  
Reply) r : Positioning complete axis 1 or 2 or 3
- Example  
Move to the coordinate value registered in registration number 5, and the operation is completed in the order of the 2nd axis and the 1st axis.

Send	Reply	Reply after the operation is completed
PAV:GRT,5	OK or NG	2 1

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

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