Stepping Motor Controller
DS102 Series/DS112 Series Operation Manual

Ver 2.00

SURUGA SEIKI CO., LTD.

Index

1. INTRODUCTION

Thank you for purchasing this series Stepping Motor Controller.
The latest manual is distributed on our website.

1.1 For Your Safety

For Proper use, please read this operation manual thoroughly prior to using this product.
⃠ means the PROHIBITATION.

⚠ Cautions

Please look after instructions shown here by all means.
Failure to use controller, may be hurt or suffer material damage.

• Basic cautions

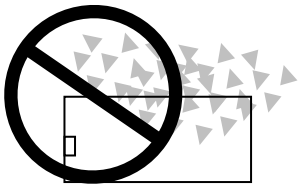
- Connect a power cable to a power outlet which comes with protective earth terminal, In case of using an extension cable without protective earth terminal, protective earth will be of no effect.

• Cable

- When you unplug a power cable, turn off a power switch.
- When it supplies DS112 Series with a power supply, please be careful not to make a mistake in polarity.

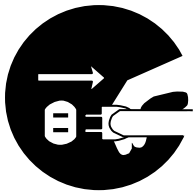
• Operating Environment

- To avoid as follows.:
  - —Areas that have much dust or metallic particles
  - —Directly under sunlight
  - —Near fire
  - —Much vibration
  - —Watery or oily place
  - —Wonky place
  - —Place with Corrosive Gas and Flammable Gas



• Storage

Please unplug a power from the outlet when
It doesn't use for a long time, and you move this product.
A fire and the accident of the electric shock etc. are prevented.



⚠ Caution

• Power Source

- Please DO NOT connect the DS102 series besides the power supply outlet of interchange 100～240V (AC100～240V 50/60Hz)
- Please supply direct 24V（DC24V±10%）power supply for DS112 series.
  In order to avoid damage to controller, DO NOT use any input voltage or frequency over the specifications.

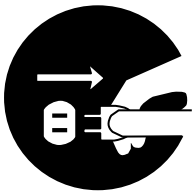
• Resolution of the product/Remodeling

- Please DO NOT perform the resolution of the product, remodeling, the unfair repair.
- Please contact us for correct information if needed.

• Repair Service

- In the case of the following, please disconnect the plug promptly and then contact our OVERSEAS SALES GROUP

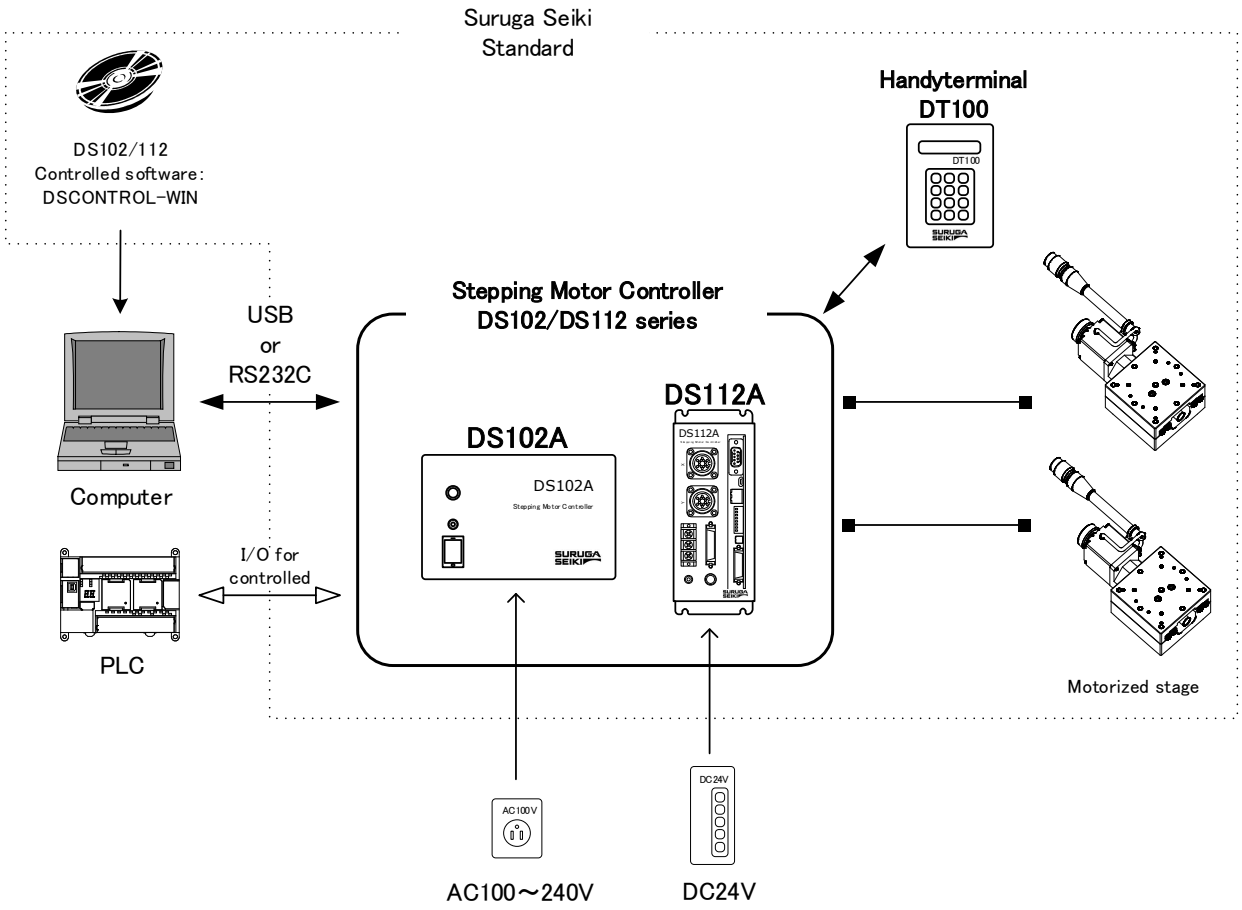
—When there are some strange sound, smelling and smoke.
—When a power supply cable damaged.
—When spilled water on the equipment and foreign materials entered inside.
—When dropped the equipment and was damaged with a cabinet.



1.2 Product Outline / Features

- Product Outline

DS102/DS112 series is stepping motor controller with 2 axes for not only R&D but also units and manufacturing you can use what you want.



- Features

1. Controlled
   - 5 phase stepping motor is controlled by 2 axes
   - Linear interpolation of 2 axes
   - 2 types motor driver with normal(FULL/HALF) and micro-step(16 levels)
     As a microstep type, it is possible to highly positioning control and low vibration with Smooth drive function.
   - It is possible to control 6 axes with link function.
     Up to 24 axes can be controlled with USB Hub.

2. Drive
   - Teaching point movement
   - Program Drive
   - Jog Drive
   - It is possible to memorize teaching point 64 points and 8 of programs.

3. Interface
   - Connected USB、RS232C
   - DS102/112 controlled software : DSCONTROL-WIN
   - Handy terminal : DT100
   - I/O for controlled
   - General I/O : Input16points、output12points (Option)
   - 2 types of PS/V AC100~240V、DC24V

【Line up products】

Type	Input PS	Type of Drive	General I/O
DS102ANR	AC100~240V ±10% 50/60Hz	Normal (FULL/HALF)	-
DS102ANR-IO			Input16 points, Output 12 points
DS102AMS		Microstep (16levels)	-
DS102AMS-IO			Input16 points, Output 12 points
DS112ANR	DC24V ±10%	Normal (FULL/HALF)	-
DS112ANR-IO			Input16 points, Output 12 points
DS112AMS		Microstep (16levels)	-
DS112AMS-IO			Input16 points, Output 12 points

【Option Cable】

Type	Cable length	Recital
DS100-LINK2-0.5	0.5m	For 2 links
DS100-LINK3-0.5	0.5m	For 3 links
DS100-CNT-2	2m	For control I/O(one end loose)
DS100-IO-2	2m	For general I/O(one end loose)
D100-R9-2	2m	RS232C cable
DS100-USB-1.8	1.8m	USB Cable

【Other Option】

Type	Article name
DT100	Handy Terminal
DSCONTROL-WIN	DS102/112 controlled software

1.3 System configuration example

1.3.1 Control with PLC

Stages can be controlled with I/O units of PLC.
No need positioning units.

・Move the teaching point/Switch the program drive.
・Teaching Point Number Selected.
・Program Number Selected
・Start
・Stop

PLC

DS112ANR

CPU Unit

Move the teaching point/Switch the program drive
Teaching point number selected
Program number selected
Start/Stop

DS112A

X Axis Stage

I/O Unit

Y Axis Stage

USB or RS232C

DT100

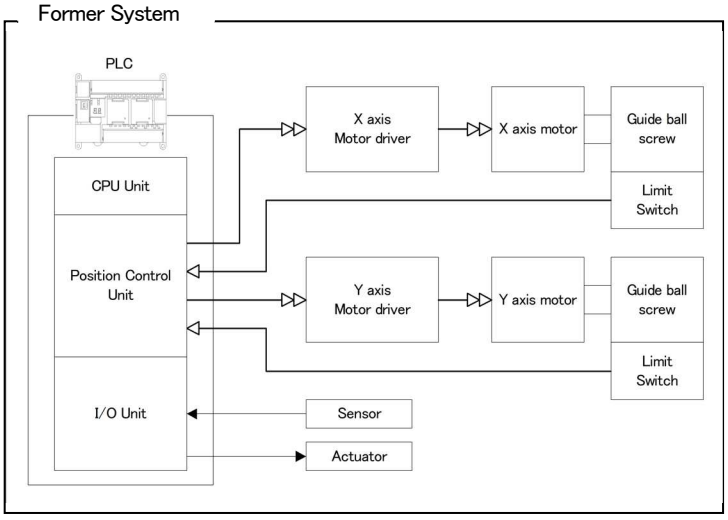
DS102/112
Controlled SoftWare:
DSCONTROL-WIN

PC

Handy Terminal
DT100

・Set up the system parametor
・Memorized teaching points
・Programming and editing
・Operation check
・Back up data

・Set up the system parametor
・Memorized teaching points
・Operation check



1.3.2 Controlled by PC

Easily controlled external machine by software.
No need motion control board and I/O board.

Original software

Use virtual COM port (Ex.:VB)
RS-232C communication application

```
MSComm1.Settings = "9600,N,8,1" ' Set up the port
MSComm1.CommPort = 1            ' Set up the port add.
MSComm1.PortOpen = True         ' Open the port
' Move to 100 X axies
MSComm1.Output = "Axis1:Selsp 0:Goabs 100"
```

・Cotrolled stage
・ControlI I/O

DS102ANR-IO

USB
or
RS-232C

DS102A
Stepping Motor Controller

X axis

Y axis

PC

General Input: 16points

General Output: 12points

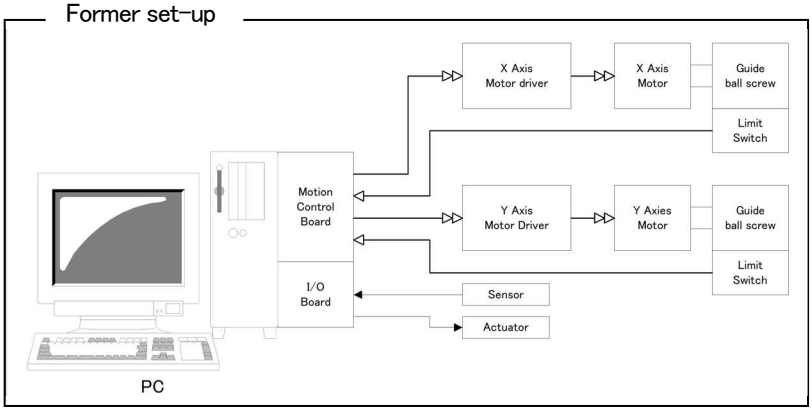
Sensor

Actuator

DS102/112
Control Software:
DSCONTROL-WIN

・Set up the system parametor
・Operation check

Former set-up



1.4 Accessories

This included following goods. Please check when you open. If some parts missing, please let us know.

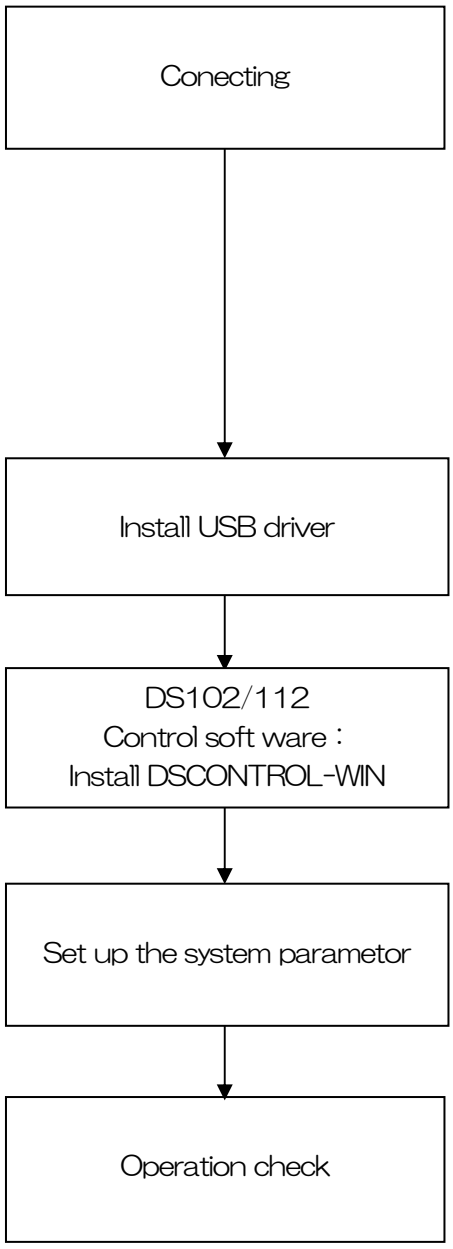
- DS102A/DS112A：1 PCS
- Power cable（2m）：1 PCS（Only case of DS102）
- CD-R（data of this Manual , USB Device driver）：1PCS
- Manual（this documents）：1PCS

⚠ <u>The power cable of DS102A attachment is exclusively for this machine.</u>
<u>Please use the AC code that are suitable for power supply specifications of your country.</u>

2. Set-up and example of use

2.1 Set up before use

Shows flow before use DS102A/DS112A.



- DS102A or DS112A
- X axis stage　• Y axis stage
- Motor cable
- RS232C cable：DS100-R9-2
- USB cable：DS100-USB-1.8
- Power cable
- PC

※You must have another power supply and power cable if you use DS112A.

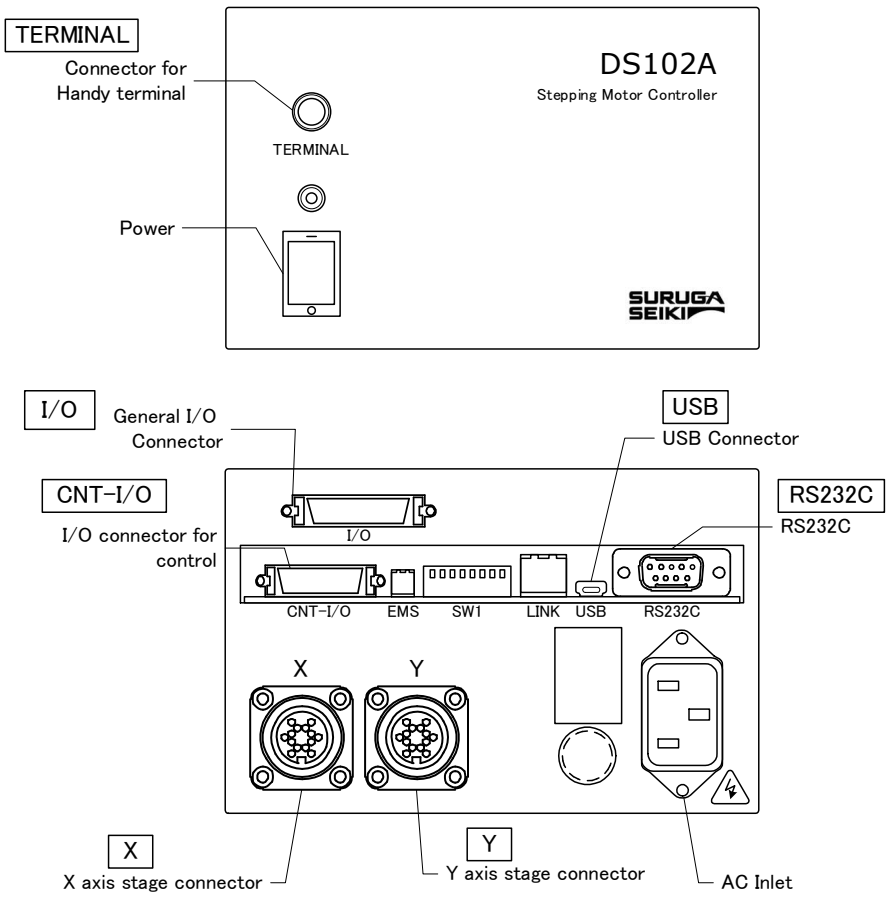
- USB driver CD-R

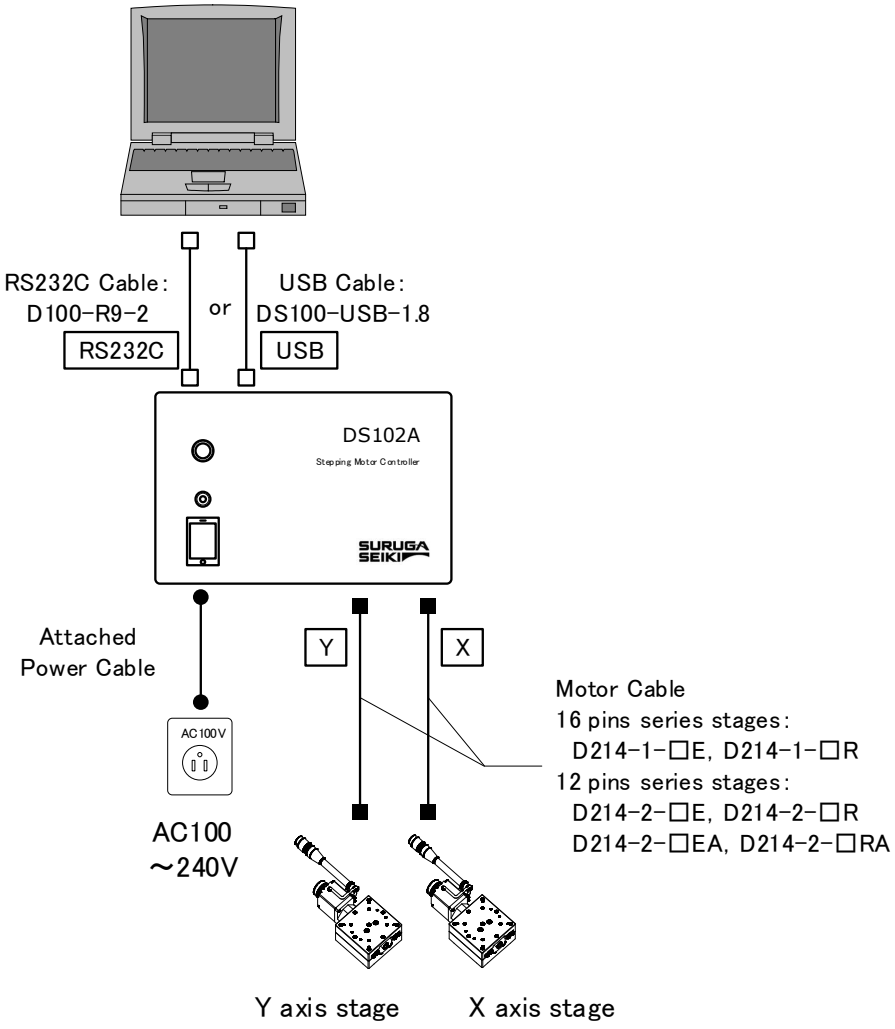
- DSCONTROL-WIN CD-R (Option)

2.1.1 Connecting

Shows how to connect DS102A/DS112A

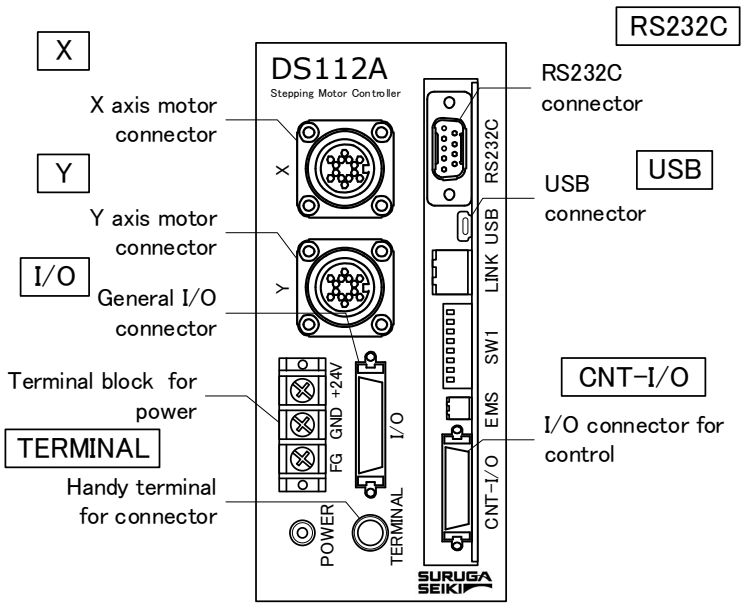
- DS102A

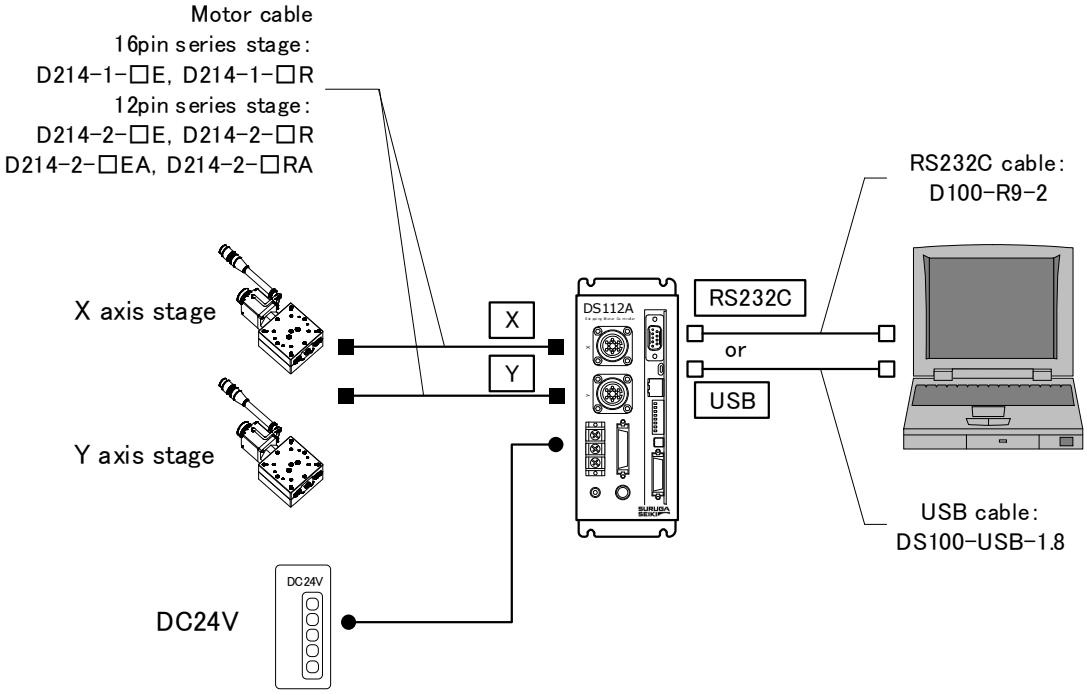




① Connect X axis motor connector to X axis stage.
② Connect Y axis motor connector to Y axis stage.
③ Connect AC inlet and AC100～240V.
④ Connect USB connector to USB port of PC.
(Connect RS232C connector to PC if use RS232C)

- Use DS112A



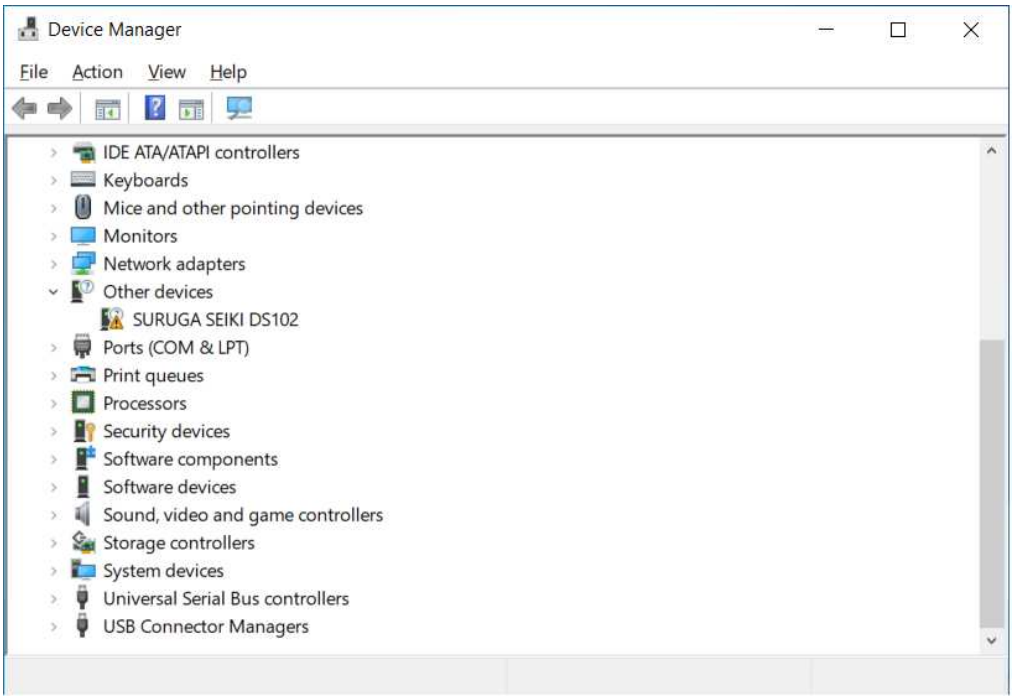


① Connect X axis motor connector to X axis stage.
② Connect Y axis motor connector to Y axis stage.
③ Connect terminal for power of DC24V to power supply(DC24V)
※ Must have DC24V power supply and cable
④ Connect USB connector to PC USB port.
(Connect RS232C connector to PC if use RS232C)

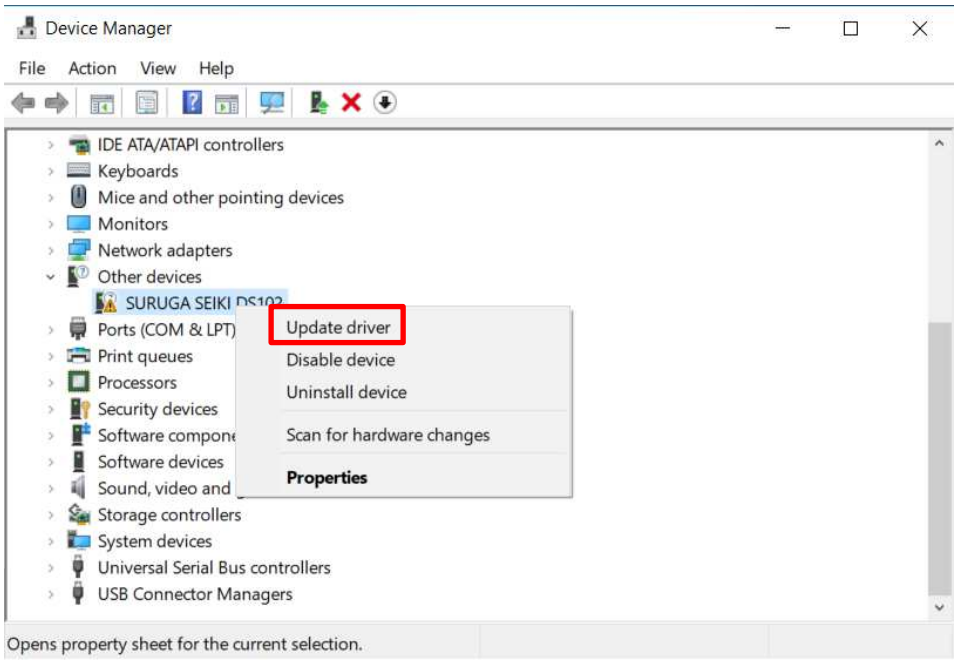
2.1.2 USB Driver Install

Shows how to install USB driver to PC(for Windows10).
(The latest USB driver can be downloaded from our HP.)

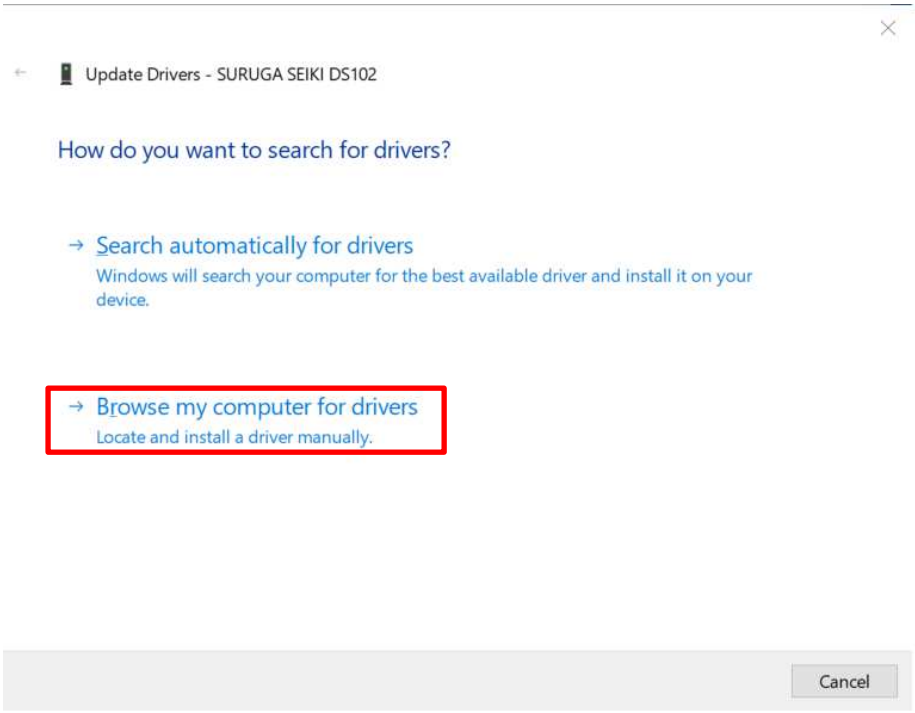
① Switch on a computer and start Windows.
② Save the USB driver downloaded from our website in any folder on your computer.
③ Connect computer USB port and DS102/112 USB connector.
④ Switch on DS102A/112A.
⑤ Open “Device Manager”.



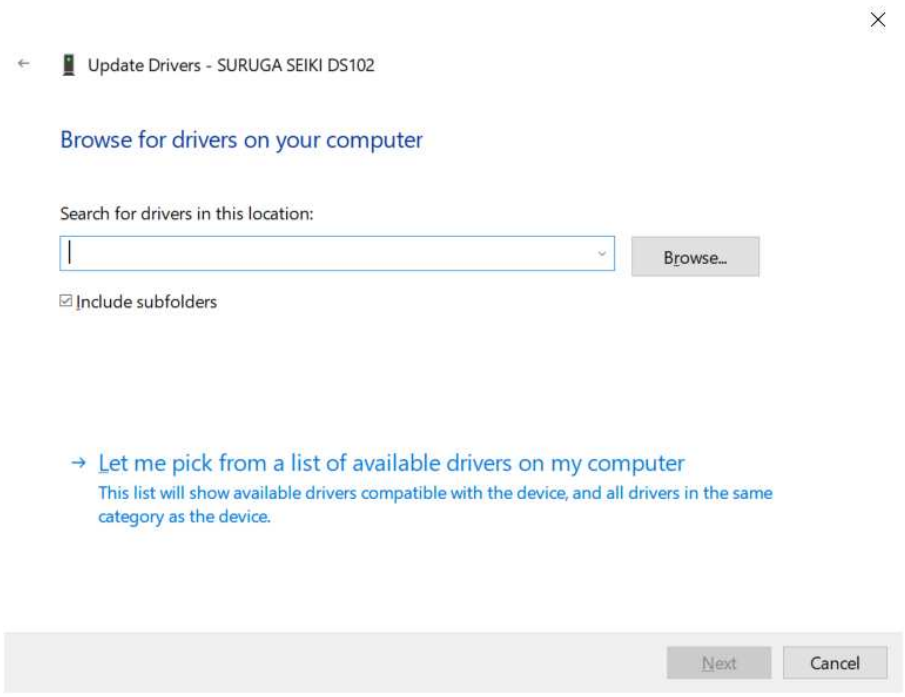
⑥ Select ″SURUGA SEIKI DS102″ from the hardware list, right-click and select [Update driver]. Select [Install from a list or specific location (Advanced)], and then click [Next]. Click the button.



⑦ Select [Browse my computer for drivers]

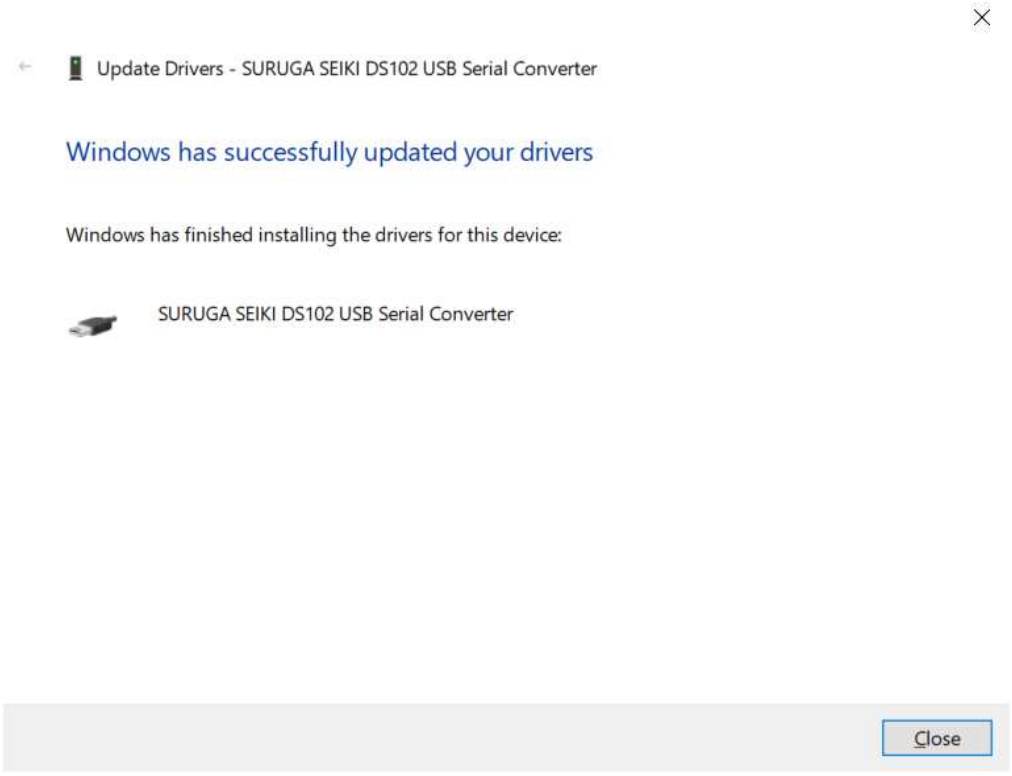


⑧ Click the [Browse] button.
Specify the folder "DS102-CDMv*****" where the USB driver is saved, and click the [Next] button.

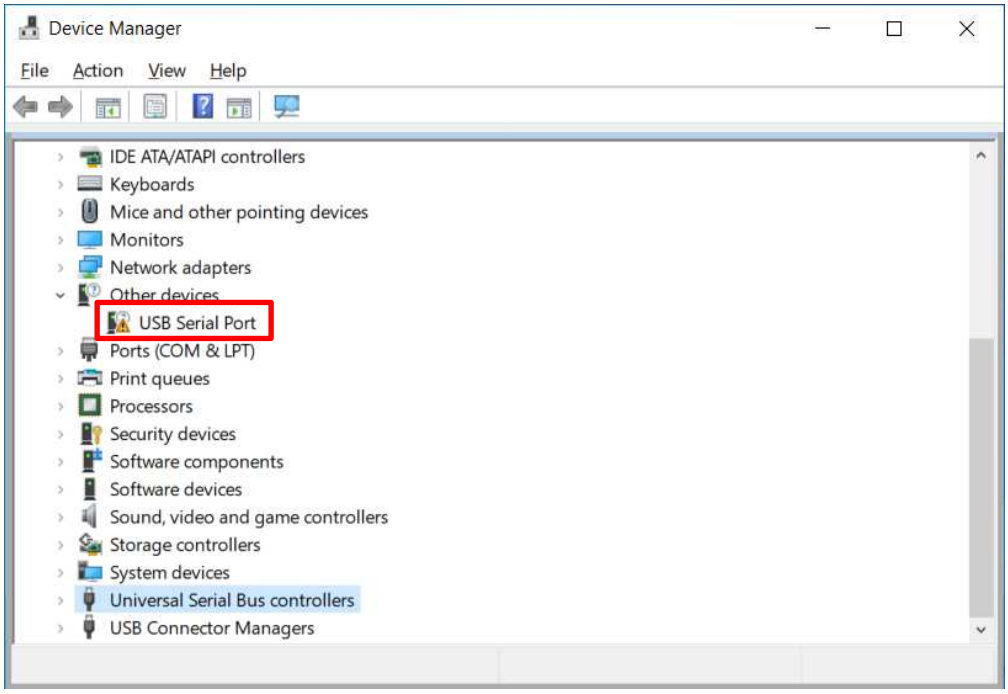


⑨ Start the driver install.

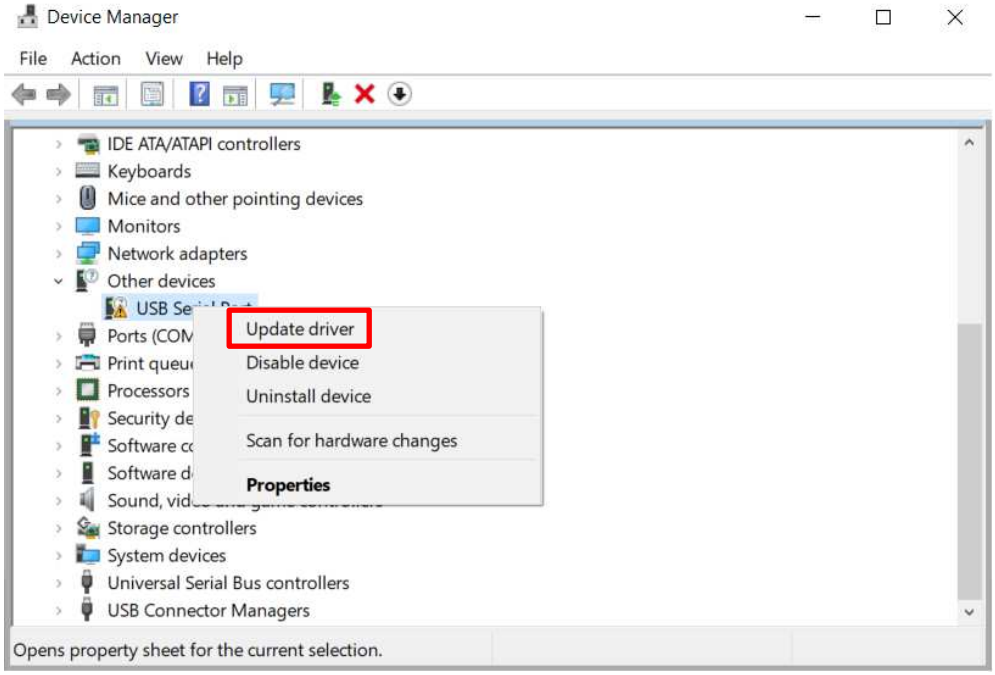
⑩ When the installation is complete, the following screen will be displayed.



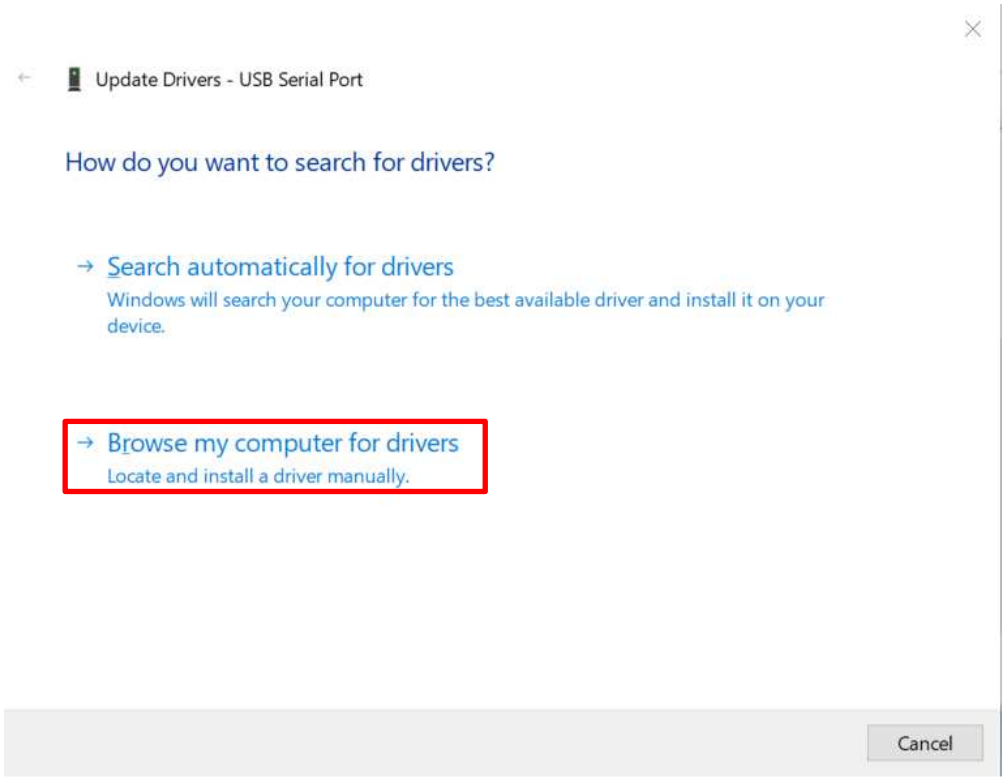
⑪ Continue to install the USB Serial Port.



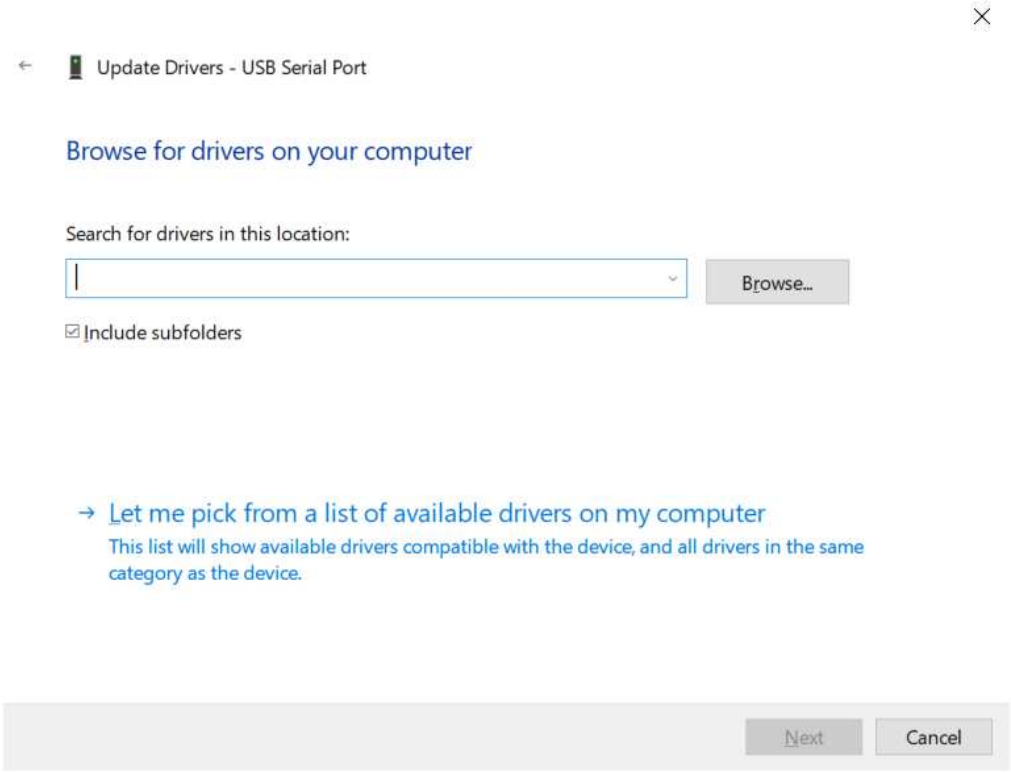
⑫ Select ″USB Serial Port″ from the hardware list, right-click and select [Update driver].
Select [Install from a list or specific location (Advanced)], and then click [Next]. Click the button.



⑬ Select [Browse my computer for drivers]

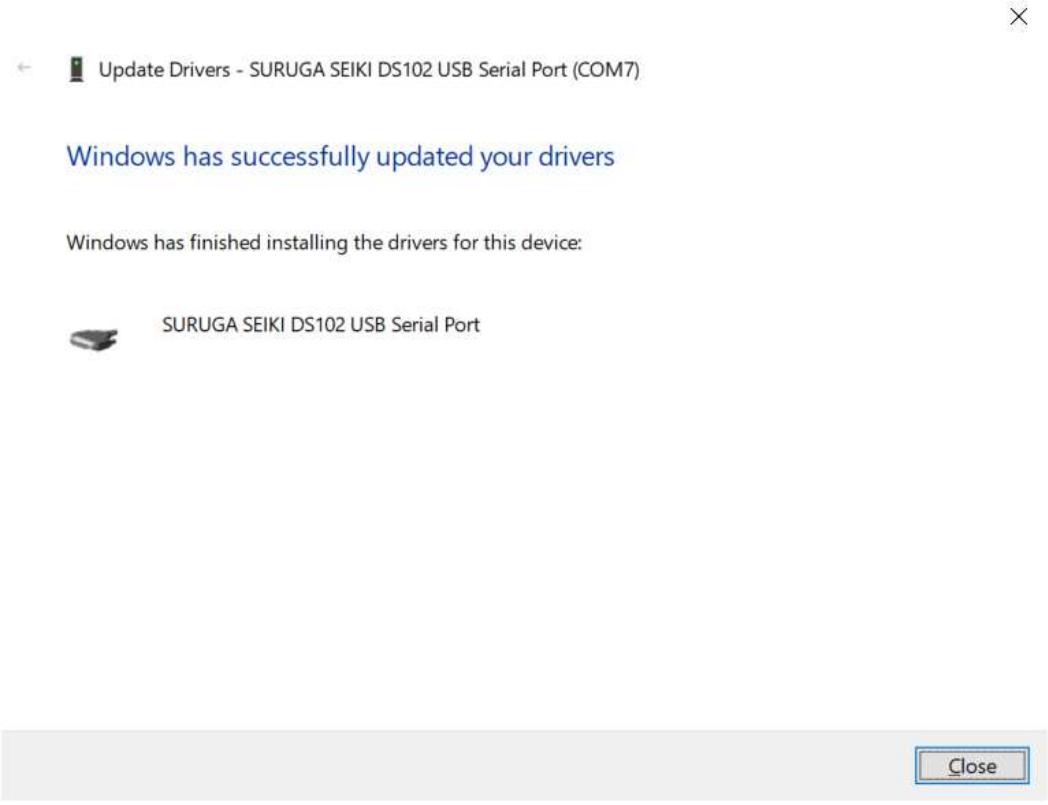


⑭ Click the [Browse] button.
Specify the folder ″DS102-CDMv*****″ where the USB driver is saved, and click the [Next] button.

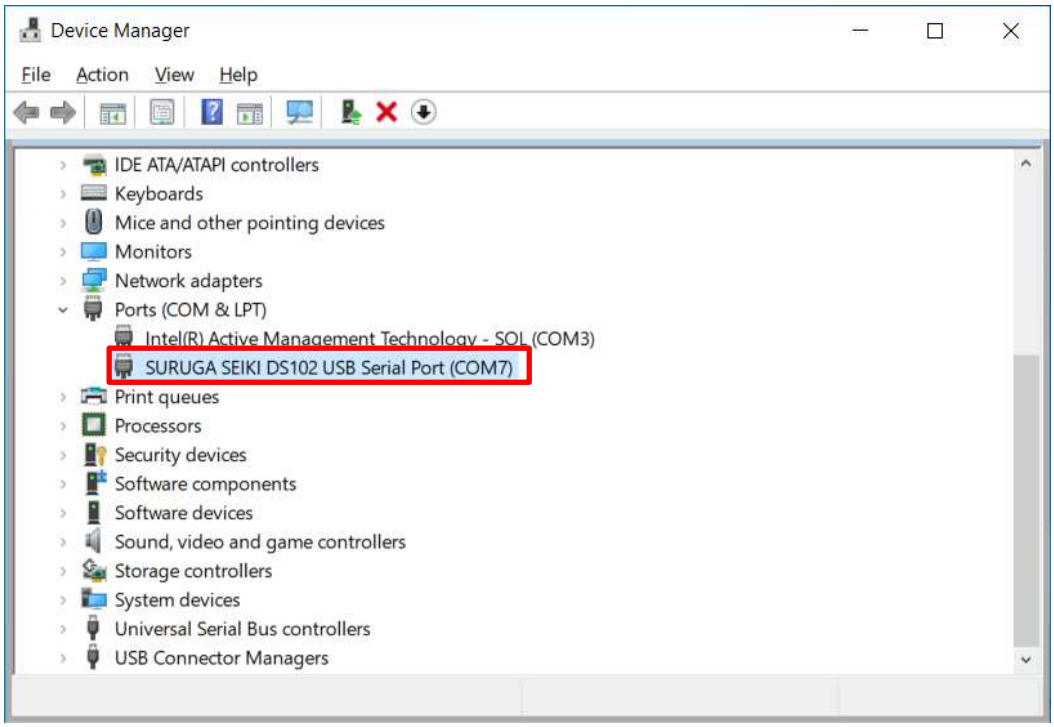


⑮ Start the driver install.

⑯ When the installation is complete, the following screen will be displayed.



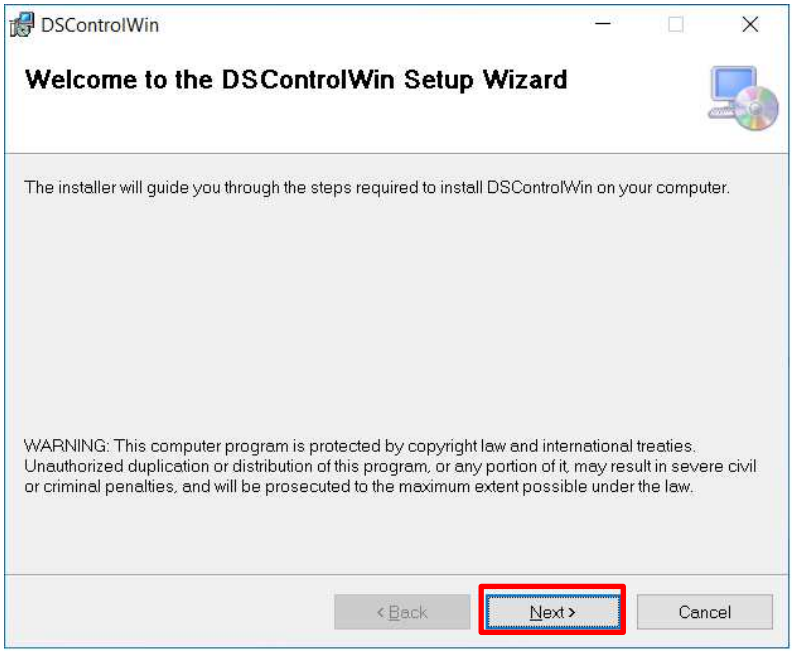
⑰ You can check the COM port number in the device manager (for example, COM7).



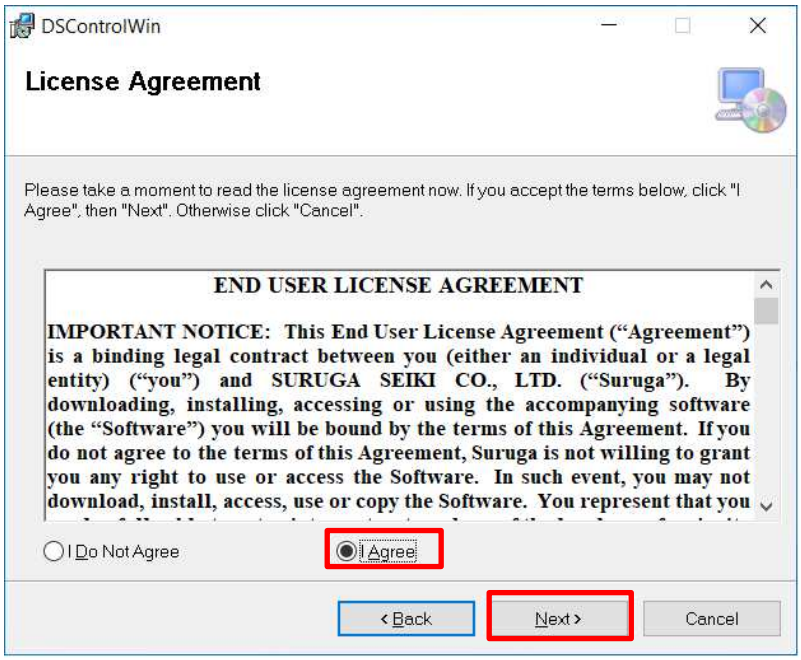
2.1.3 Installation for control software DS102/112(DSCONTROL-WIN)

Show how to install software (DS CONTROL-WIN) to control DS102/112 by PC.

① Insert CD-ROM of DSCONTROL-WIN inside PC drive.
② Double click on DSControlWin_en.msi in CD-ROM.
DSCONTROL-WIN installer starts.
③ Click [next]
The screen below appears on PC.

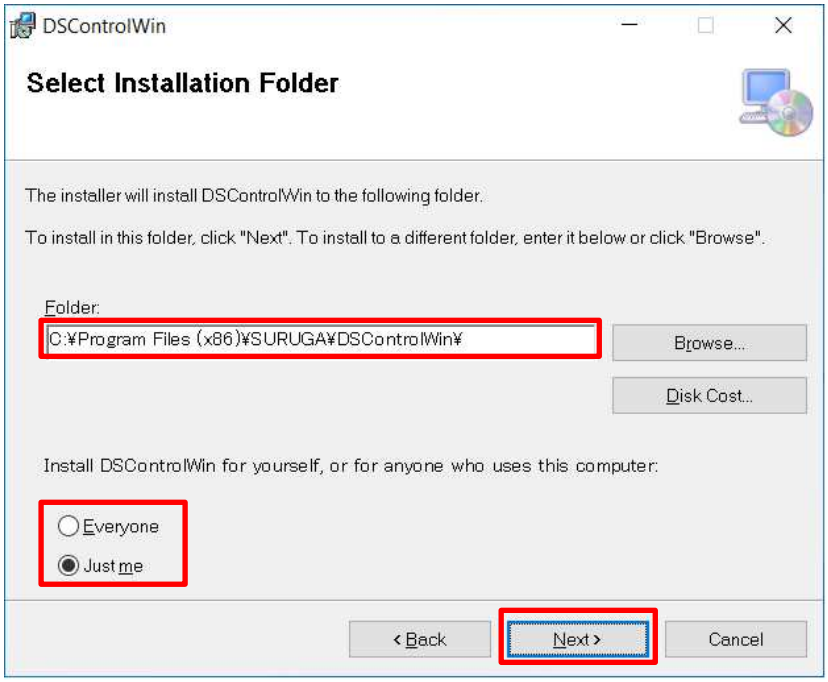


④ After reading the license terms, select [I Agree] and click the [Next] button.

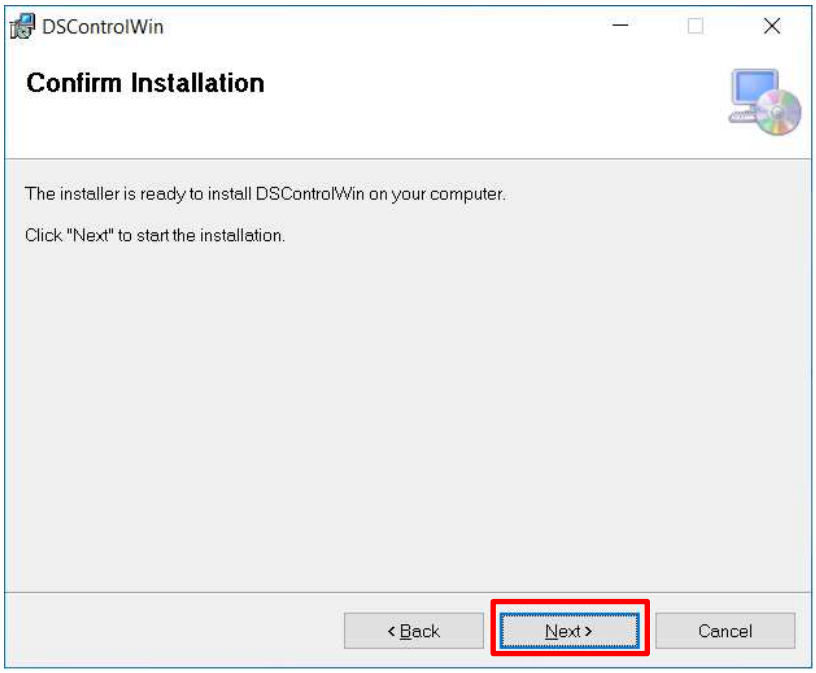


⑤ Select the installation destination folder and click the [Next] button.
The program folder and user selection screen will be displayed.
*The default installation folder is: C:¥Program Files (x86)¥SURUGA¥DSControlWin¥¥Program Files¥SURUGA¥DSControlWin.
Select the user who will use DSControlWin.

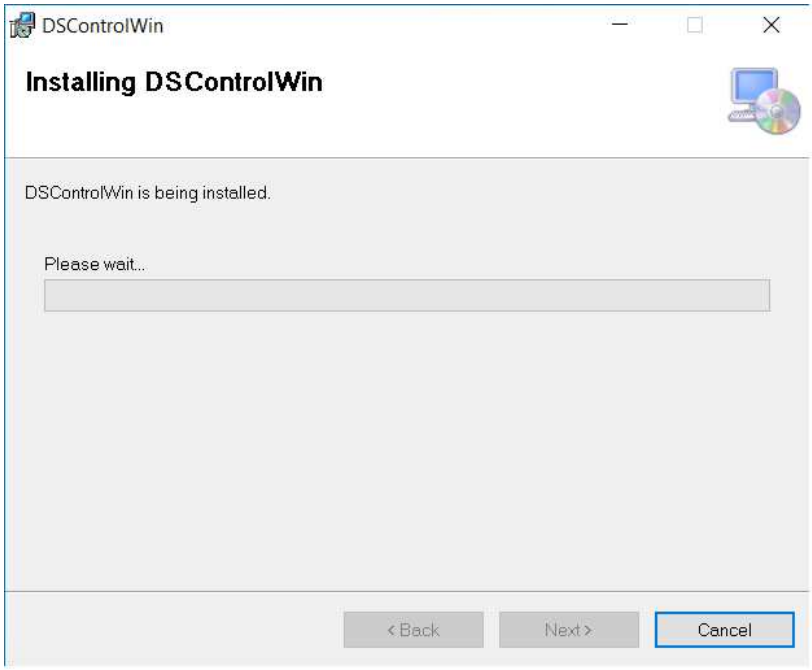
If no changes are necessary, click the [Next] button to proceed to the next step after selecting the folder and user.



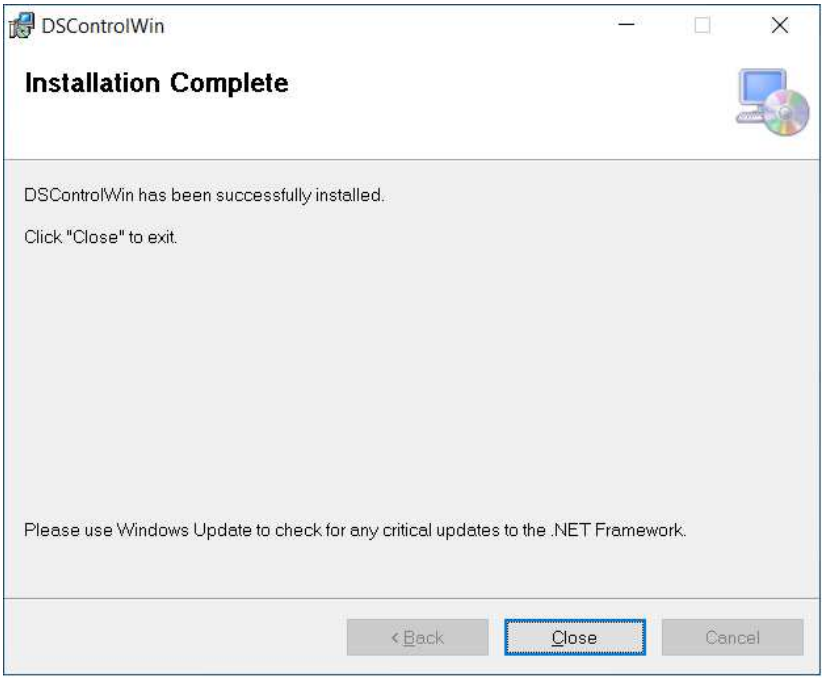
⑥ When the installation confirmation screen appears, click the [Next] button.



⑦ Start the driver install.



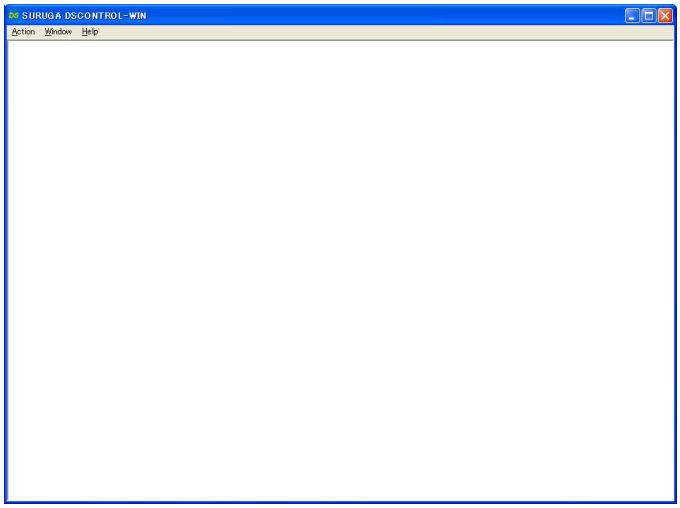
⑧ When the installation is complete, the following screen will be displayed.



2.1.4 Adjustment system parameter

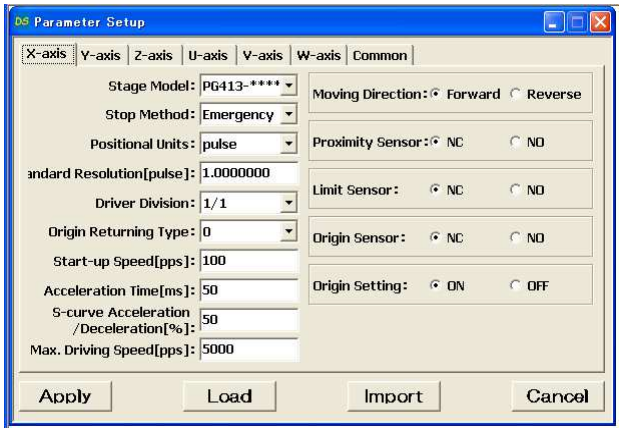
Shows how to set up system parameter by DSCONTROL-WIN

① Starts DSCONTROL-WIN

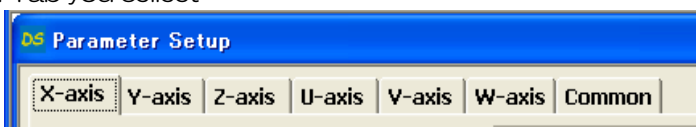


② Select [Parameter setting] in [Action]

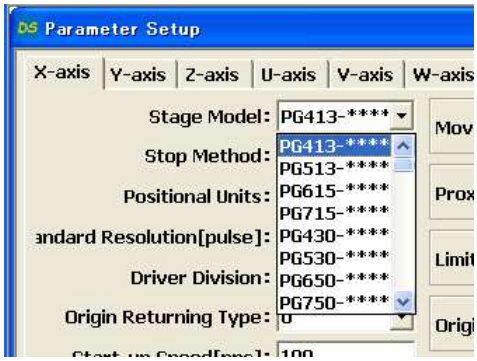
Parameter setting appears on screen



③ Click on Tab you sellect

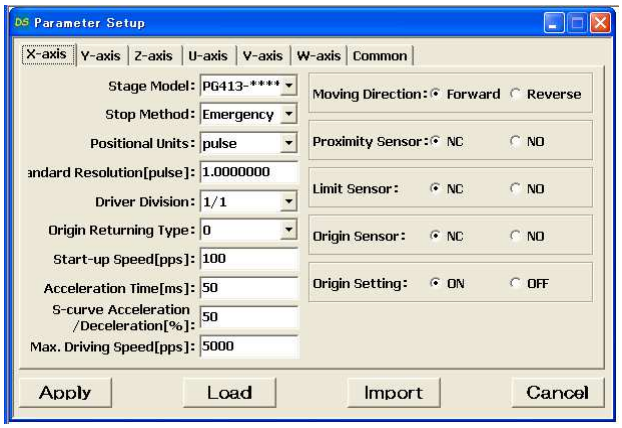


④ Select stage model you use from [Stage Model]
Initial value appears when you select stage model.
※ input direct value if we want to change initial value.

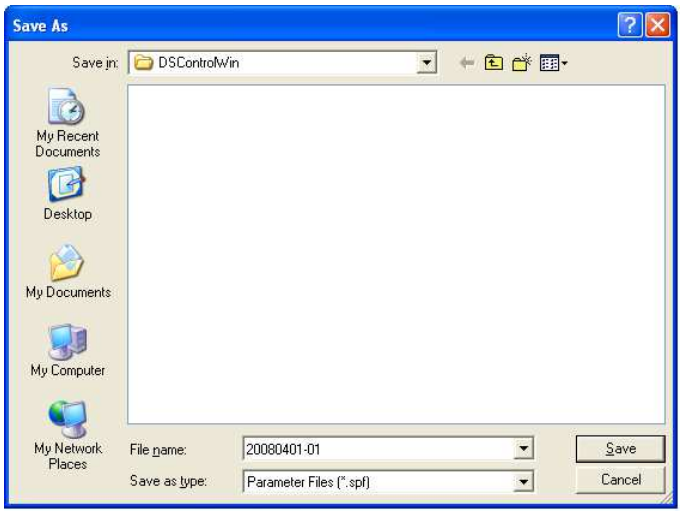


⑤ Select axis parameter by repeating ③~④ again.

⑥ Click [Apply].



Screen shows folder storing parameter.

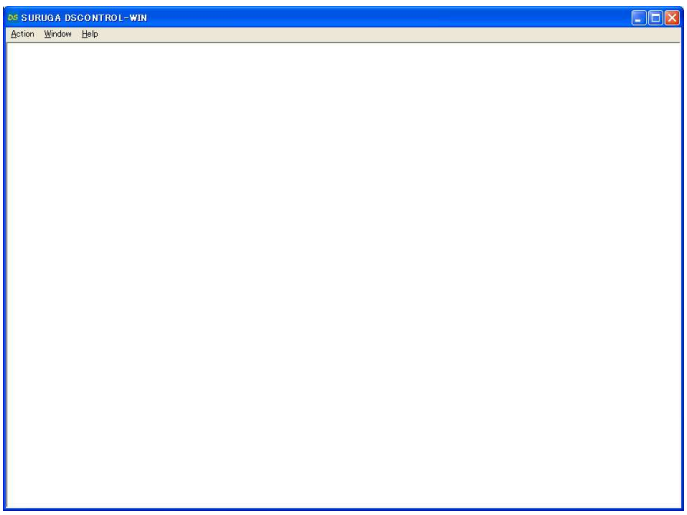


⑦ Select folder and input file name then click [Save].
Parameter values are saved PC then forward values toward DS102/112.
※ Spf is automatically added.

2.1.5 Operation check

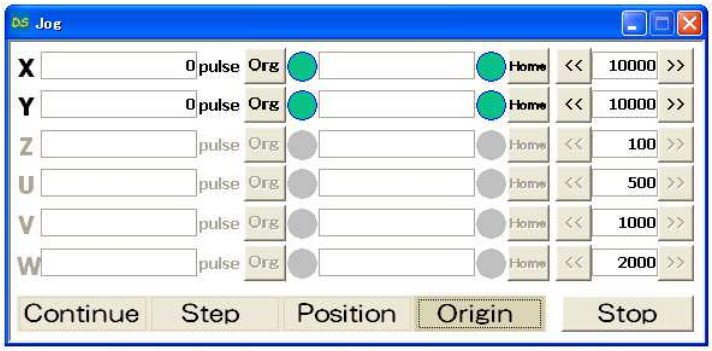
Shows how to check operation.

① Starts DSCONTROL-WIN.



② Click [JOG] in [Action] on main menu
JOG dialog appears on screen.

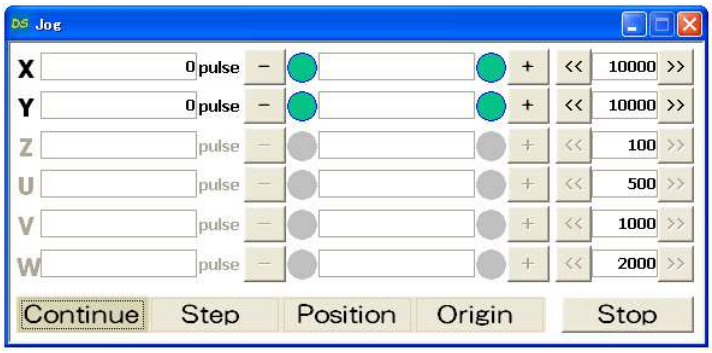
③ Click [Origin]
[Org],[Home] appears.



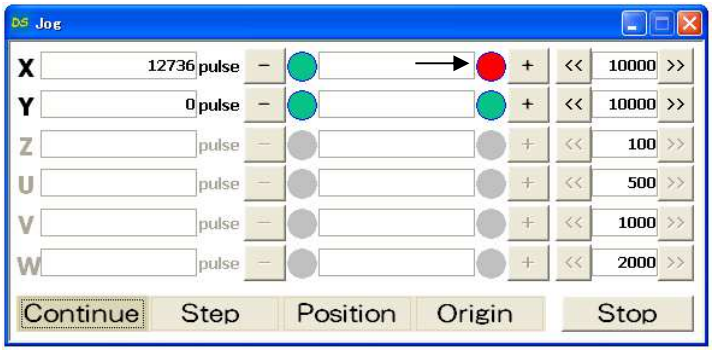
④ Click [Org] on X axis
X stage return origin position.
Make sure X stage moves origin position.

⑤ Repeat ③~④ again Y axis return to origin position.

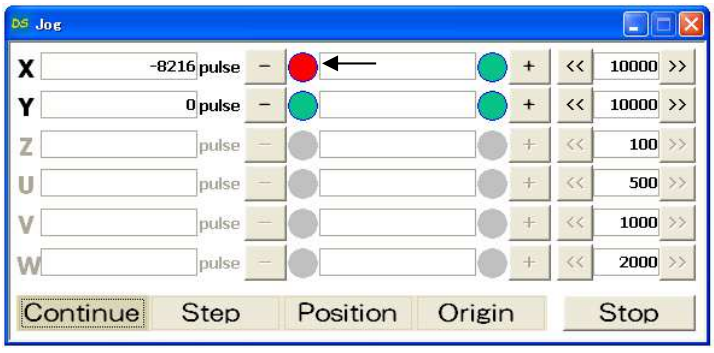
⑥ Click [Contiue]
[+],[-]appear on screen.



⑦ Keep clicking [+] on X axis
X stage moves toward CW direction.
Stage stops when it reachs to CWLS then indicator leftside [+] becomes RED.



⑧ Keep clicking [-] on X axis
X stage moves toward CCW direction.
Stage stops when it reachs to CCWLS then indicator rightside [-] becomes RED.

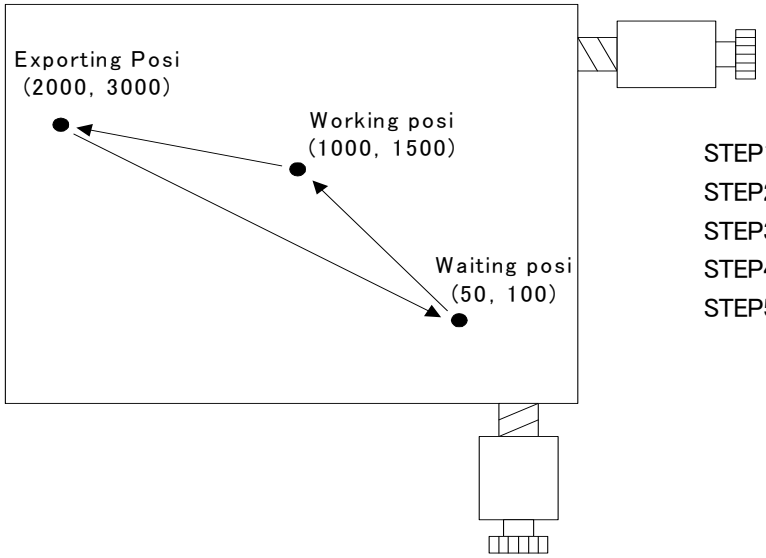


⑨ Repeat ⑦~⑧ on Y axis.

2.2 System architecture

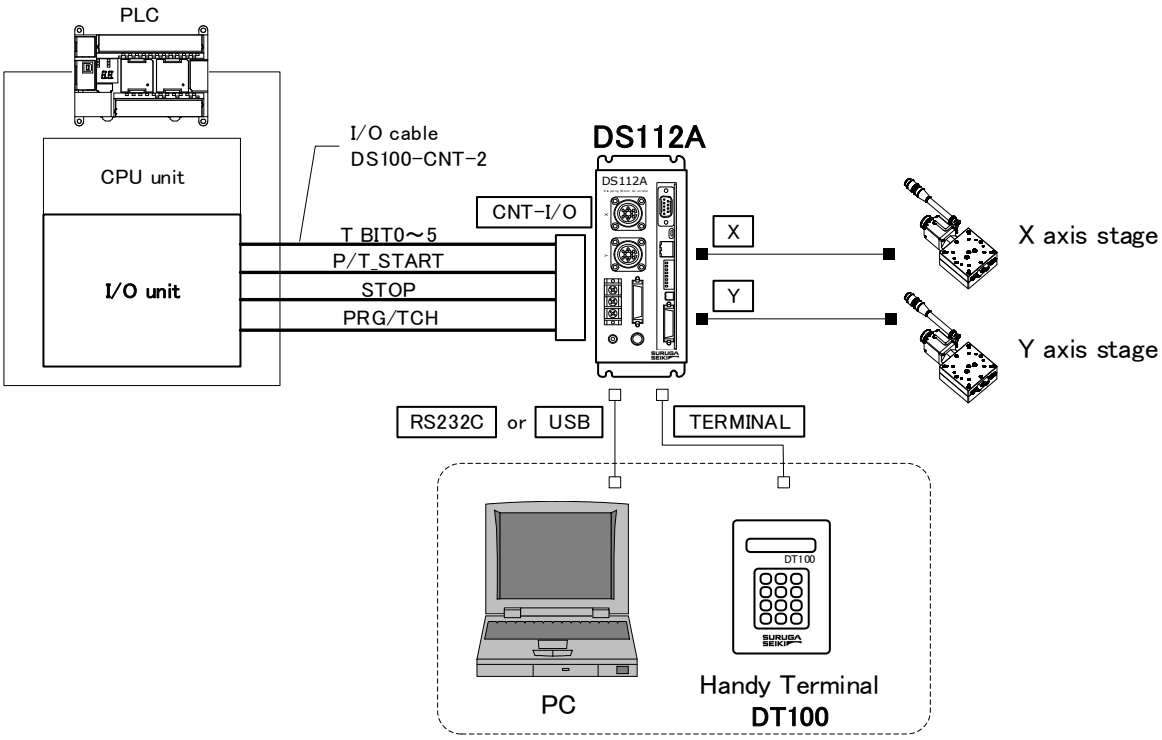
2.2.1 Movement between each teaching position

Show how to set up position inside memory of DS112A and move its position by PLC.



STEP1 : Moving to waiting position (50, 100)
STEP2 : Moving to working position (1000, 1500)
STEP3 : Processing on target
STEP4 : Moving to exporting position (2000, 3000)
STEP5 : Exporting processig

1) Configuration



※ CNT-I/O shows following signal. READY means Waiting condition of DS112 Aand X_DRIVE and Y_DRIVE means both working condition. P/T_RUN means Teaching working and Program working.

2) Movement summary

Waiting, working and exporting position memorized inside DS112A as teaching points, 00, 01, 02,PLC appoints each points then make state move to each points.

① Set up 00 among T_BIT0~5, press P/T_START <STEP1>
② Set up 01 among T_BIT0~5, press P/T_START <STEP2>
③ Wait unitl woring on target is done <STEP3>
④ Set up 02 among T_BIT0~5, press P/T_START <STEP4>
⑤ Wait until exporting is done <STEP5>

3) Connect

Connect to DS112A

PC is used when setting or editing teaching point

① Connect USB to PC USB port
(Connect RS232C to PC when using RS232C)
② Connect handy terminal to DS112
③ Connect X axis motor connector to X stage
④ Connect Y axia motor connector to Y stage
⑤ Connect control I/O connector to PLC I/O unit
On control I/O,
T_BIT0~5 : Appoint teaching point
P/T_START : Signal to move to teaching point
STOP : Stop signal for all axes
PRG/TCH : program mode / teaching point mode

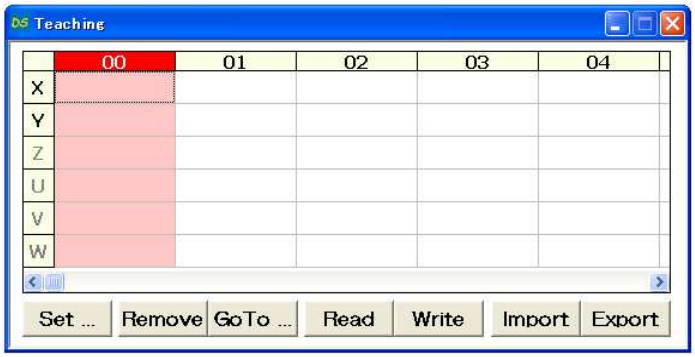
※ T_BIT0~2 : combined use for program selection

4) Memory of teaching point

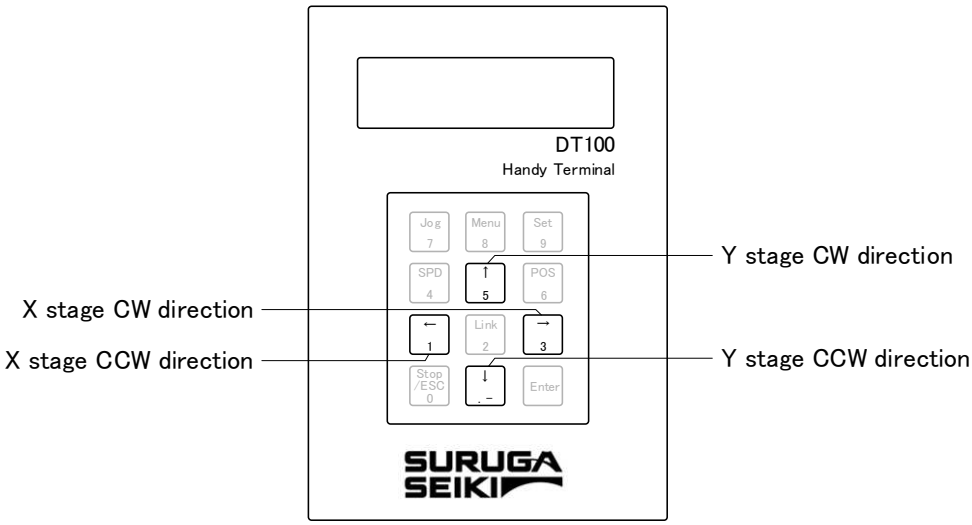
Memorizing teaching point inside DS112A

① Start DSCONTROL-WIN

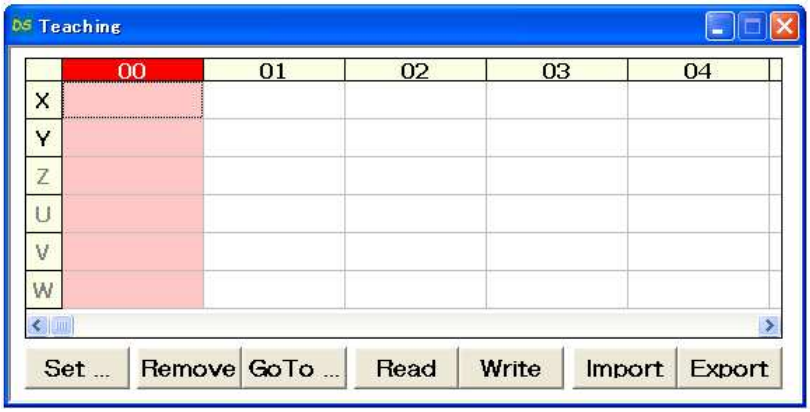
② Select [Teaching] on main menu in DSCONTROL-WIN.
Screen below appears.



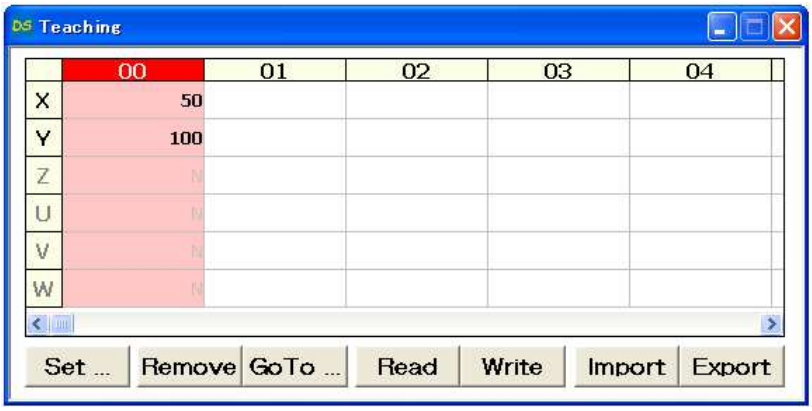
③ Push direction key on handy terminal unitl stage moves to specific positon.



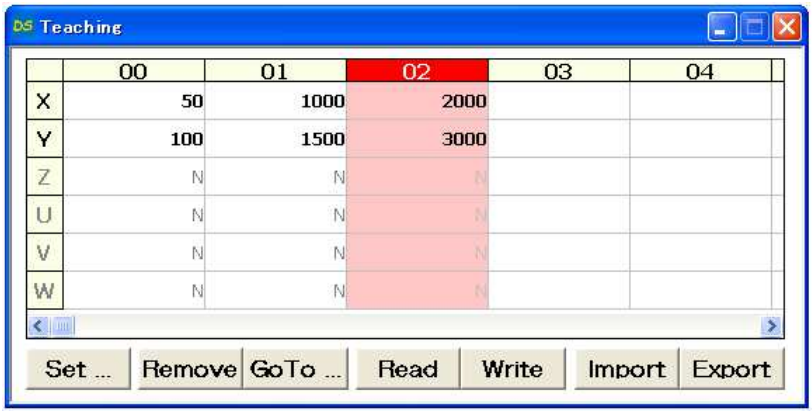
④ Click [00] CELL on the teacing screen
00 CELL gets to be Red.



⑤ Click [Set]
Current stage position as 00 is memorized to DS112A.



⑥ Repeat ③~⑤ so memorize 01 as working position and 02 as exporting position to DS112A.

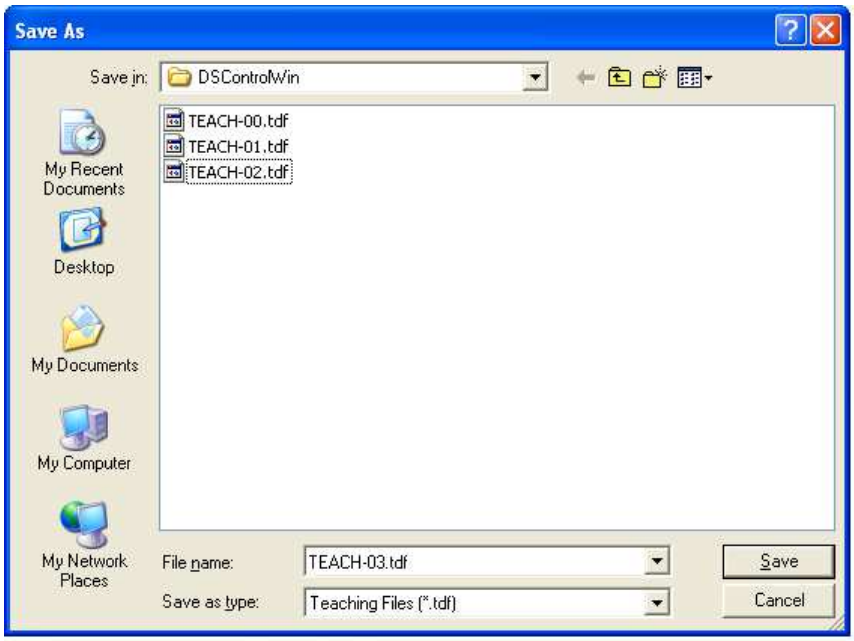


5) Save teaching file

Teaching points memorized are saved as teaching file in PC.

① Click [Save]

Save As appears on screen.



② Clcik [Save] after you determine [Save location] and [File name]

Teaching file is saved in PC.

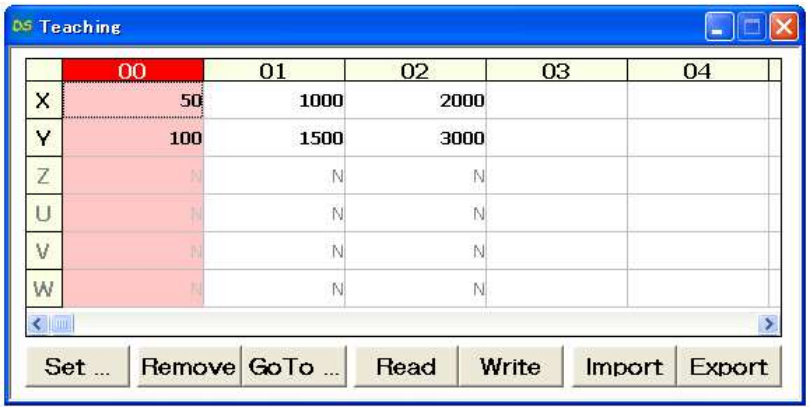
※ tdf is added to your file name as extension.

6) Operation check

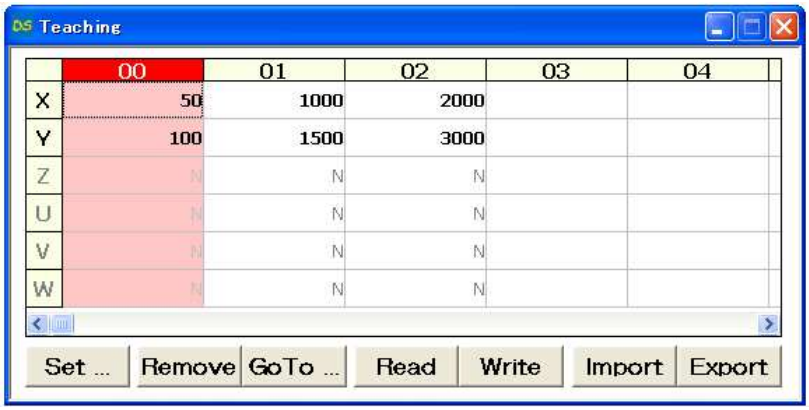
Checking movememt to the memorized position.

① No interference affects stage movement.

② Click [00] CELL on teaching screen.
00 CELL gets to be Red.



③ Click [Go to].
Stage moves to teaching point [00] (Waiting point).

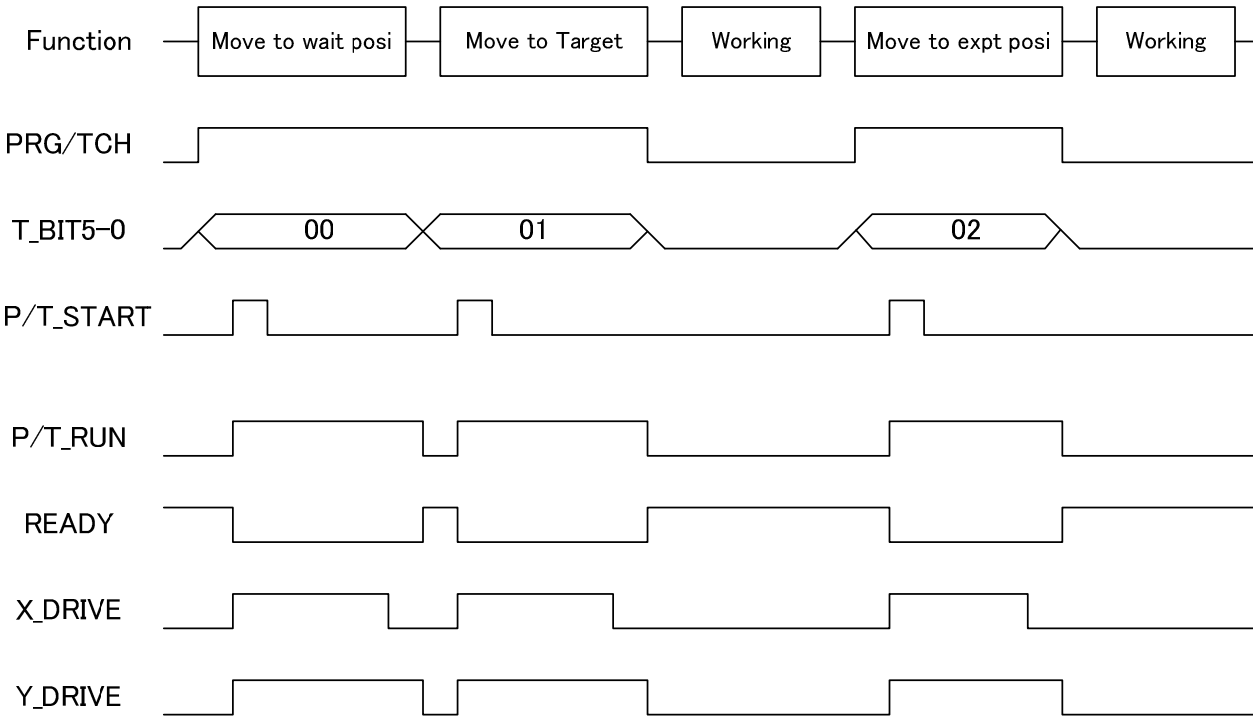


④ Repeat ②~③ and check same operation at teaching point [01] working position as well as [02] exporting position.

7) Execution of movement

Execute movement to teaching position by PLC.

Timing chart

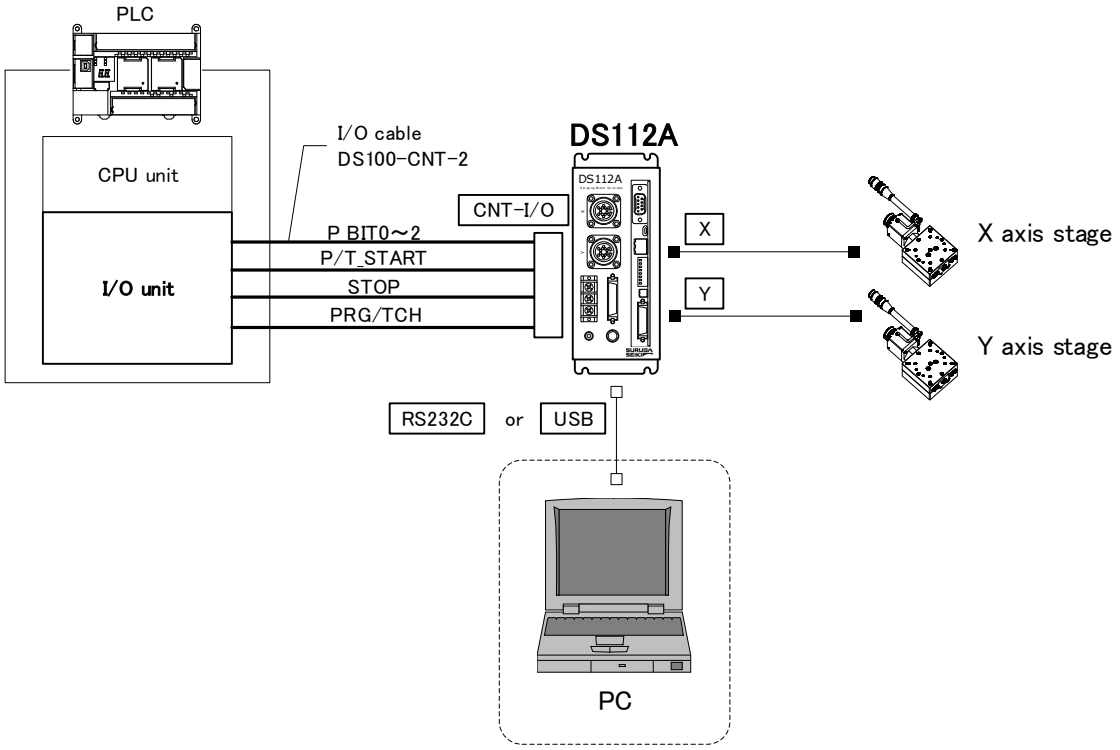


※ All stages stop when making signal [STOP] [ON]

2.2.2 Easy return to origin position

Shows how to set [Origin] program in DS112A and execute [Origin return] by PLC.

1) Configuration



※ CNT-I/O continuously output READY is stand-by condition of DS112A, X_DRIVE is X axis working condition, Y_DRIVE is Y axis working condition and P/T_RUN means teaching point and program are in action.

2) Movement summary

Setting up [Origin] program at program #0 in DS112A and [Origin] program starts by using PLC.

① Set 0 among P_BIT0～2 and make P/T_START ON (Program #0 starts).

Program #0
① Speed adjustment on X axis origin return movement
② [Origin] return on X axis
③ Speed adjustment on Y axis origin return movement
④ [Origin] return on Y axis
⑤ Speed adjustment on X axis movement
⑥ Speed adjustment on Y axis movement

3) Connection

Connection of DS112A

PC (DSCONTROL-WIN) is connected only when creating or editing program.

① Connect USB connector to USB port in PC
(Connect RS232C to PC when using RS232C)

② Connect X axis stage connector to X axis stage

③ Connect Y axis stage connector to Y axis stage

④ Connect control I/O connector to I/O unit in PLC
On control I/O,
P_BIT0~2 : Select program #
P/T_START : Signal of movement to teaching point
STOP : Stop signal for all axes
PRG/TCH : Select mode (Start program / movement to teaching point)

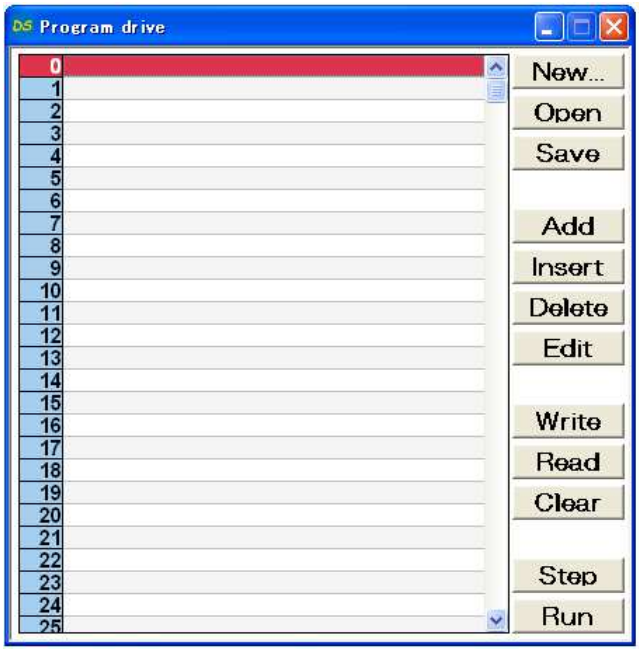
※ P_BIT0~2: combined use for teaching point selection

4) Creating program

Creating [Origin return] of two axes.

① Start DSCONTROL-WIN

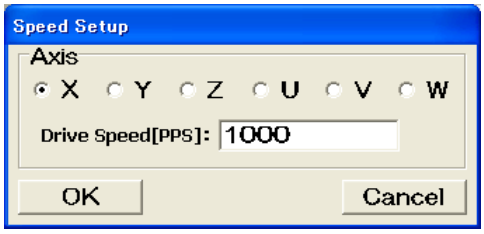
② Click [Action]→[Program drive] on main menu.



③ Click [Add]
The display below appears on display.

④ Click [Speed] on command menu
"Speed Setup" appears on display.

⑤ Check axis X and input speed value then click [OK].

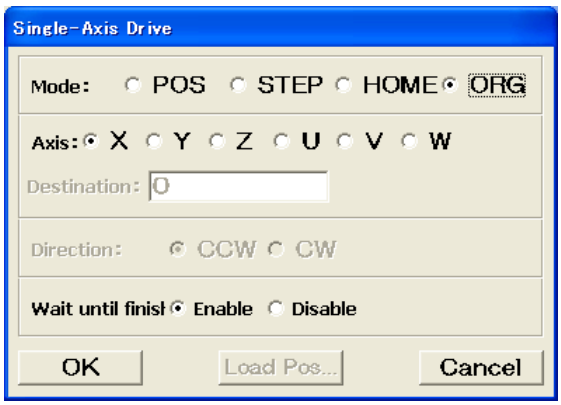


Command appears on the program drive screen.

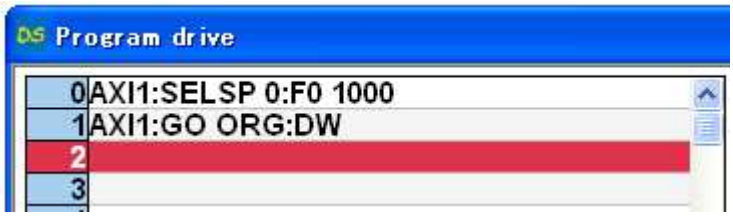
⑥ Click [Add] on Program drive
Drive menu appears on display.

⑦ Click [Single Axis Drive]
Single Axis Drive appears on display.

⑧ Single Axis Drive display
[Mode] = "ORG"
[Axis] = "X"
[Wait until finish] = "Enable"
Click [OK]



[Origin] of X axis command appears on the first line.

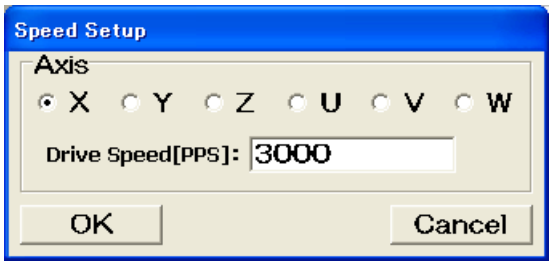


⑨ Repeat ③~⑧ for Y axis

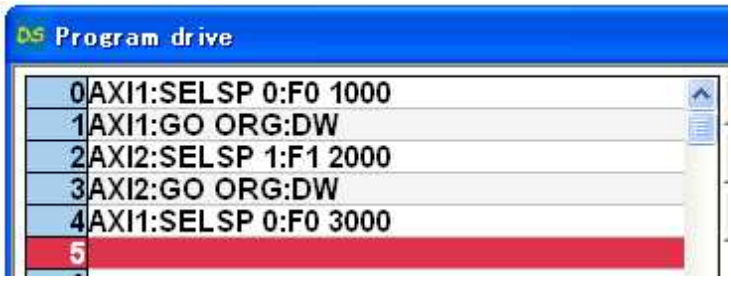
⑩ Click [Add]
Drive command menu appears on display.

⑪ Click [Speed]
Speed Setup display appears display.

⑫ Check [Axis] X and input drive speed value then click [OK].



Speed command appears on the fourth line.



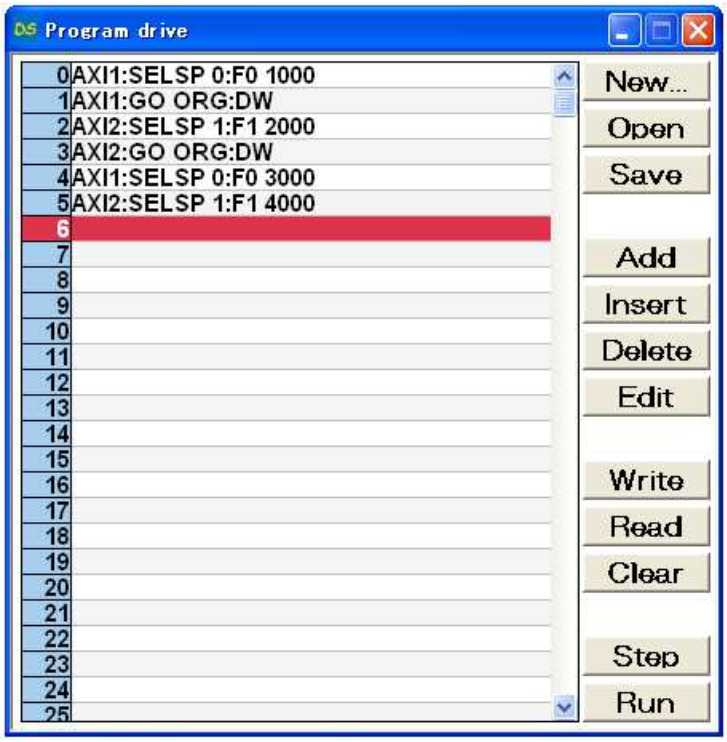
⑬ Repeat ⑩～⑫ to set up Y axis speed.

5) Writing program

Writing program to DS112A

① Click [Write]

Write Program appears on display.



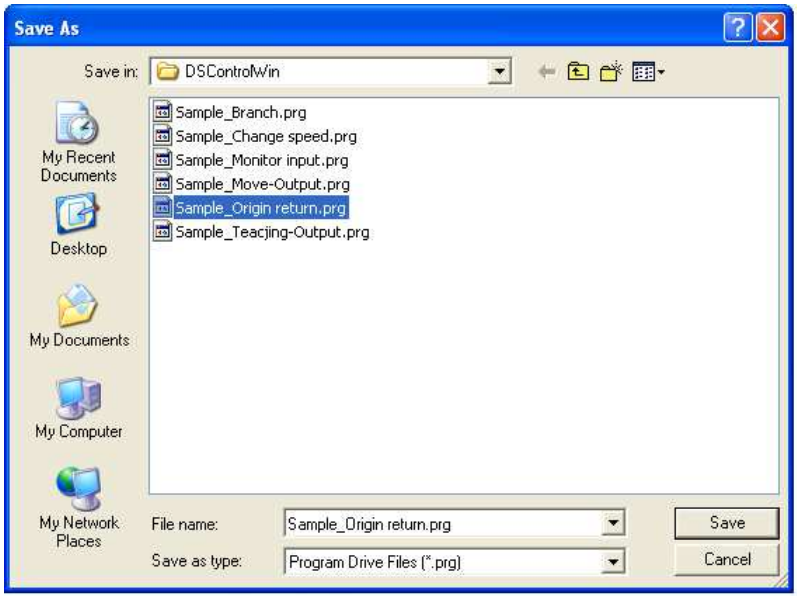
② Select [0] then click [Transfer]

Program is forwarded to Program#0.

6) Save program

Save program at PC program drive file.

① Click [Save] on program drive display
The display below appears on display.



② Select [location] and [file name] then click [Save].
Program is saved as Program drive file.
※ prg is automatically added as extension.

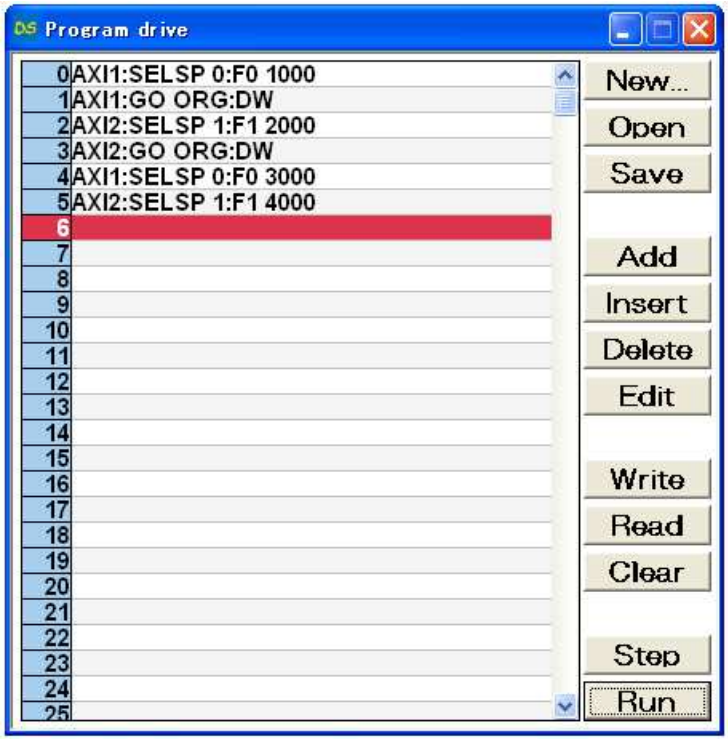
7) Operation check

Checking movement to origin return.

① No interference affects stage movement.

② Click [Start]

Start Program appears on display.

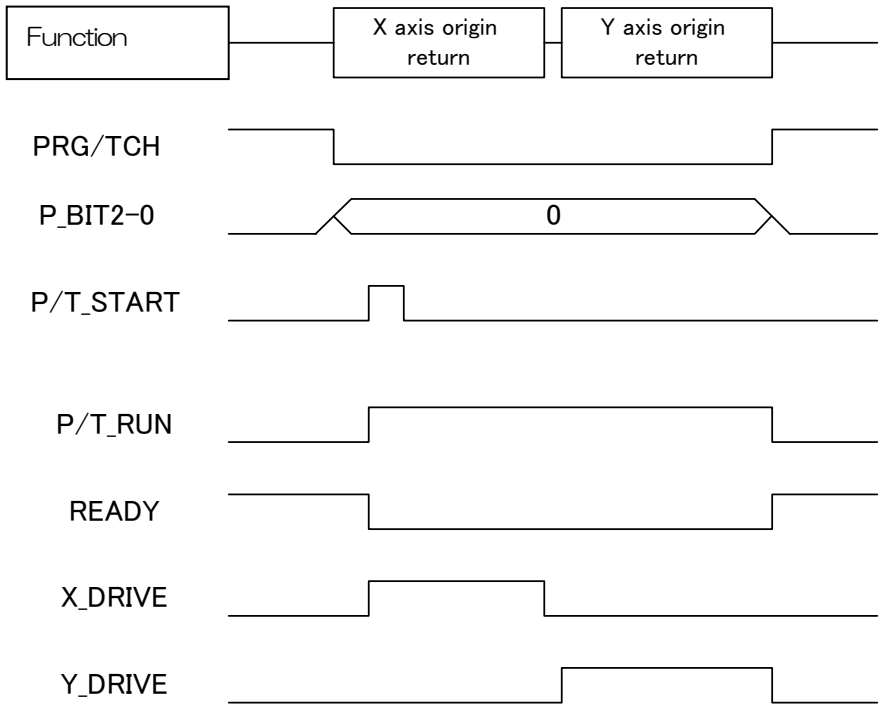


③ Select program [0] then click [Start].

8) Practice of movement

Movement to [Origin] position by PLC.

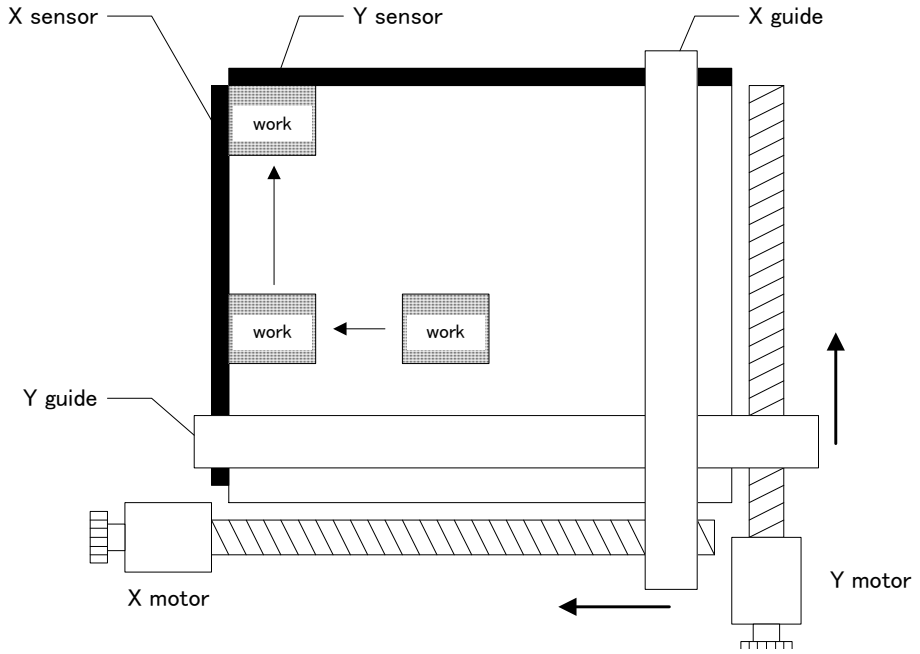
Timing chart



※ All stages stop when [STOP] button

2.2.3 Control by external signal

Shows how to stop stage by external signal that DS112A outputs.

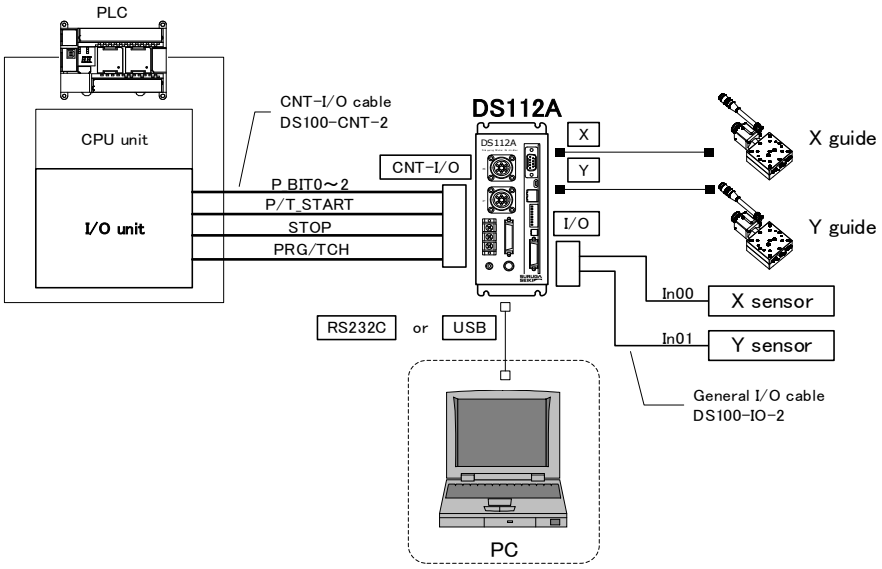


STEP1 : Set both X and Y stages at starting position (50, 100)

STEP2 : Move X stage by 10pulses then stop X stage when target reach X sensor

STEP3 : Move Y stage by 10pulses then stop Y stage when target reach Y sensor

1) Configuration



※CNT-I/O continuously output READY is stand-by condition of DS112A, X_DRIVE is X axis working condition, Y_DRIVE is Y axis working condition and P/T_RUN means teaching point and program are in action.

2) Operation summary

Setting up [Detecting sensor program] at program #1 in DS112A then executing movement by PLC addressing program #1.

① Settting up 1 among P_BIT0~2 then press [ON] on P/T_START (Executing program #1).

Program #1	
① Setting up address speed on both X and Y axes	
② Movement of X and Y axes to work starting point	<STEP1>
③ Move X axis to CW direction by 10 pulse	
④ Repeat ③~④ until target reaches X sensor	<STEP2>
⑤ Move Y axis to CW direction by 10 pulse	
⑥ Repeat ⑤~⑥ until target reaches Y sensor	<STEP3>

3) Connection

Connection of DS112A.

PC (DSCONTROL-WIN) is connected only when creating or editing program.

① Connect USB connector to USB port in PC
(Connect RS232C to PC when using RS232C)

② Connect X axis stage connector to X axis stage

③ Connect Y axis stage connector to Y axis stage

④ Connect control I/Oconnector to I/O unit in PLC
On control I/O,
P_BIT0~2 : Select program #
P/T_START : Signal of movement to program
STOP : Stop signal for all axes
PRG/TCH : Select mode (Start program / movement to teaching point)

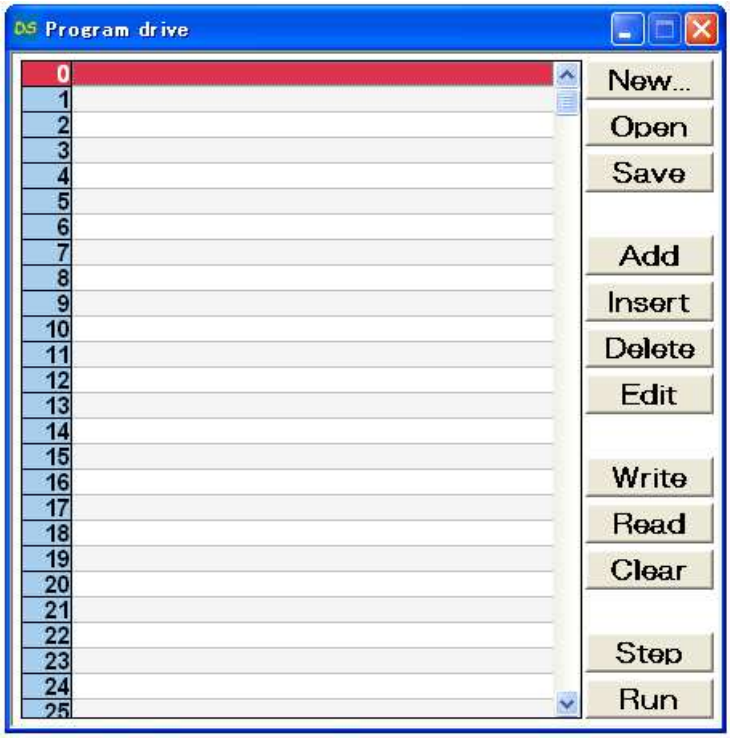
⑤ Connect X sensor and Y sensor to general I/O.
Assign X axis sensor output to In00, and Y axis sensor output to In01.

4) Creating program

Creating the program that stopping axis in response to external sensor.

① Starts DSCONTROL-WIN.

② Click [Action]→[Program drive] on main menu.

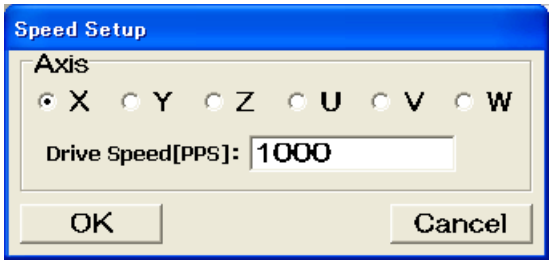


③ Click [Add]

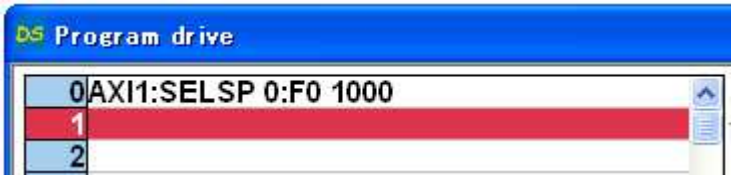
Command menu appears on display.

④ Click [Speed] on command menu.

⑤ Check Axis X and input speed value then click.



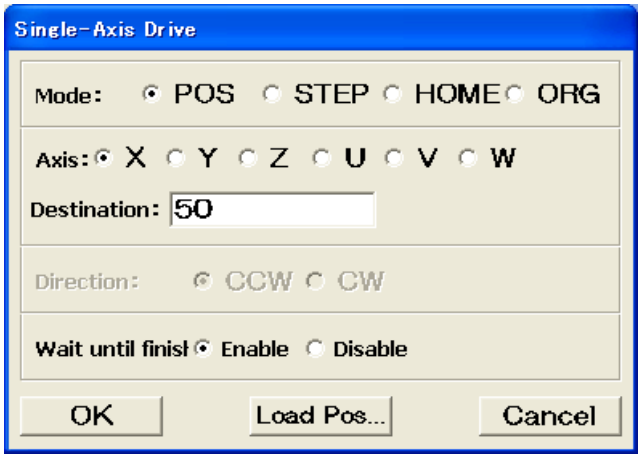
Drive speed value appears on the line [0] on program drive display.



⑥ Click [Add] on.
Command menu appears on display.

⑦ Click [Single Axis]
Single Axis Drive appears on display..

⑧ Single-Axis Drive.
[Mode] = “POS”
[Axis] = “X”
[Destination] = “50”
[Waiiting until finish] = “Enable”
Click [OK]



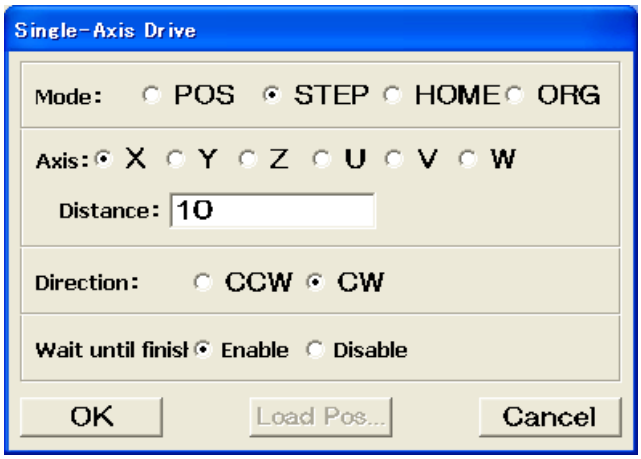
Movement command on X axis appears.

⑨ Repeat ③~⑧ then input speed drive and movement command on Y axis.

⑩ Click [Add] on Drive command menu.
Drive command menu appears.

⑪ Click [Single Axis].
Single-Axis Drive appears on screen.

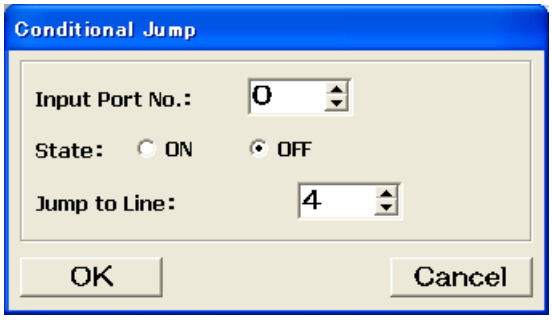
⑫ Single-Axis Drive
[Mode] = “STEP”
[Axis] = “X”
[Diistance] = “10”
[Direction] = “CW”
[Wait until finish] = “Enable”
Click [OK].



Program command on X axis appears on fourth line.

⑬ Click [Add] on Program drive
Drive command menu appears.

⑭ Click [Conditional Jump] on Drive command menu
Conditional Jump appears.



⑮ Input [0] at Input Port No, [OFF] at State and [4] at jump to Line then click [OK].

Repeat Command on fourth line while State of input0 is [OFF] .

Conditional Jump command appears on fifth line on Program Command display.

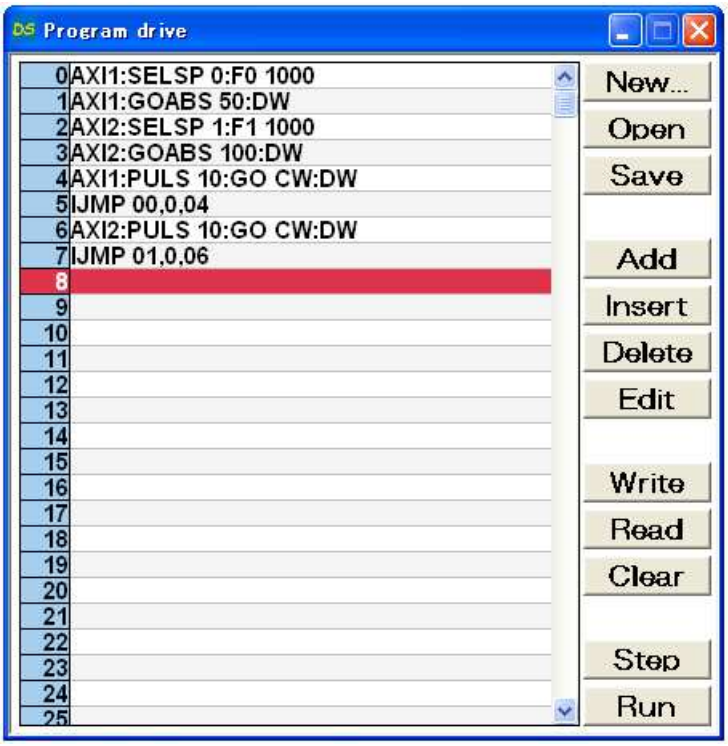
※ On Conditional jump is set up, Command on fourth line is repeated while State of input0 is [OFF].

⑯ Repeat ⑩~⑮ to input movement command and conditional jump command to Y axis.

5) Writing Program

Writing program in DS112A.

① Click [Write] on Program Drive.
Write Program appears on display.

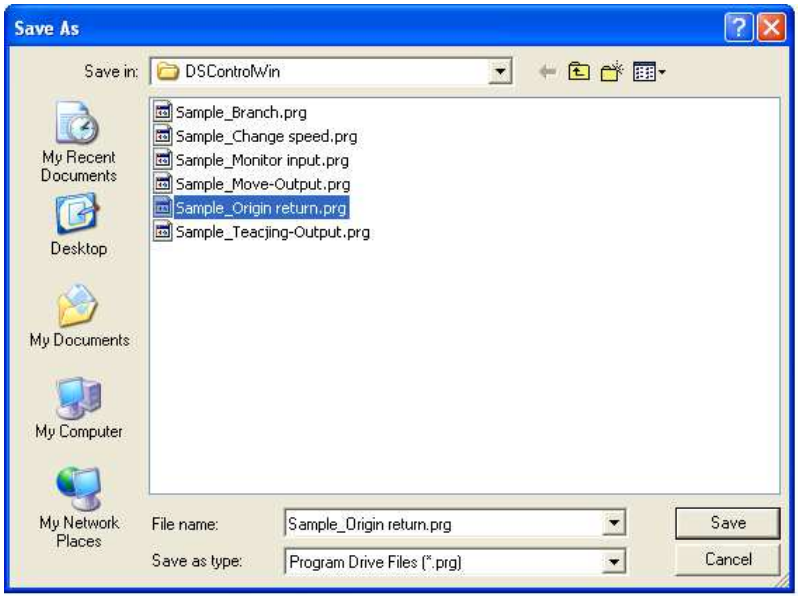


② Select Program #1 then click [Transfer].
Program is forwarded to Program #1.

6) Save Program

Save Program in Program drive file.

① Click [Save] on Program drive display.
Saving display of Program drive appears.



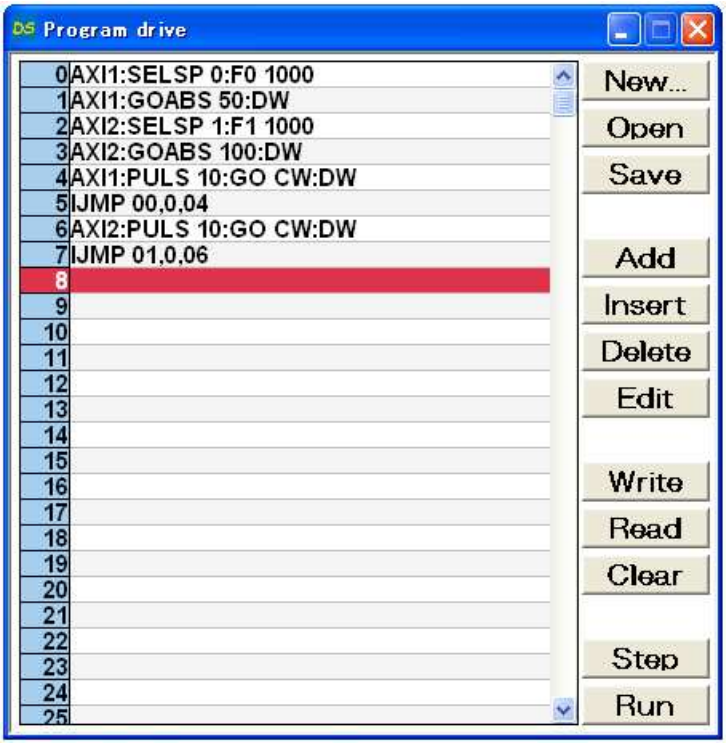
② Confirm save location and its name then click [Save].
Program is saved in Program drive.
※ .prg is automatically added as extension.

7) Operation check

Checking stage movement by external signal.

① No interference affects stage movement.

② Click [Start].
Start Program appears on display.

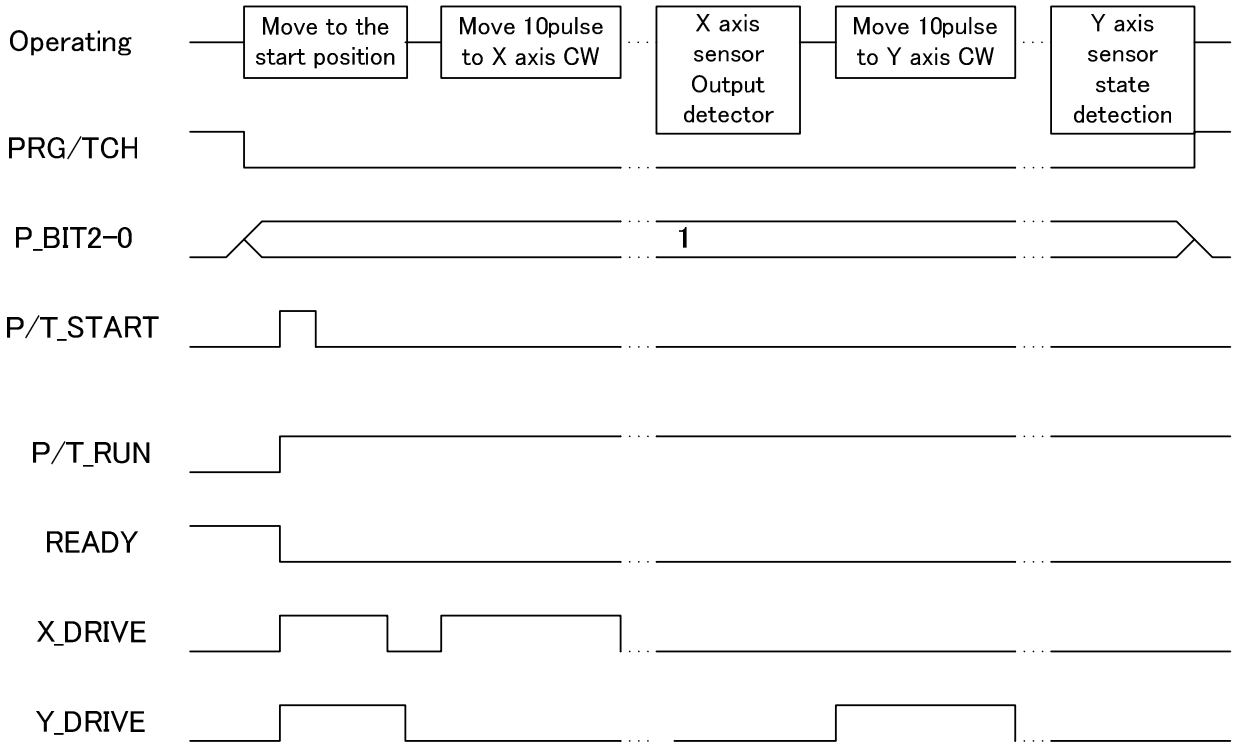


③ Select 1 at Program No.: then click [Start].

8) Operating

Stop the axes due to input external signal.

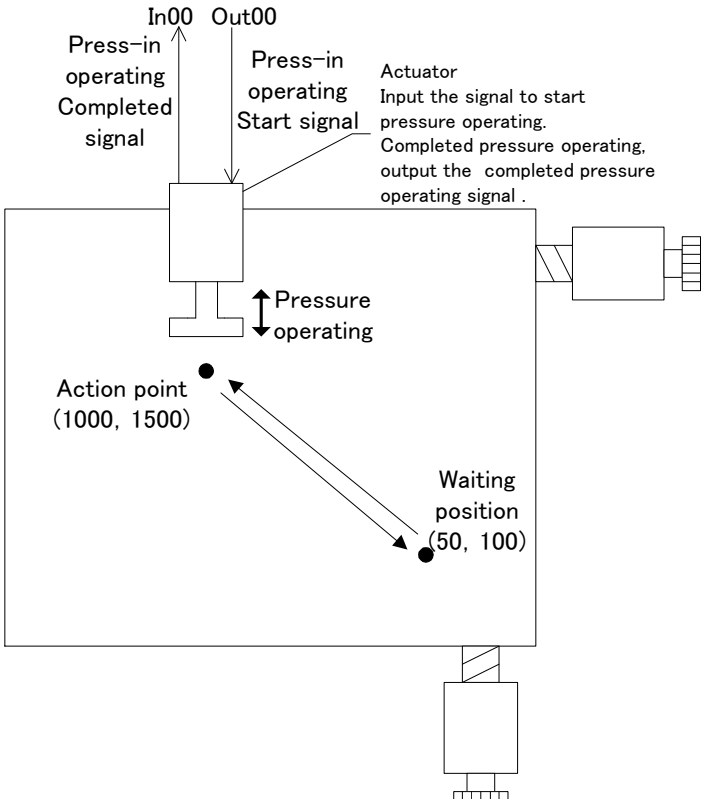
Timing chart



※ All stages will be stopped when input the "STOP" signal.

2.2.4 External device control with general I /O.

Shows to make a program that means to control general I/O and to control the external device.



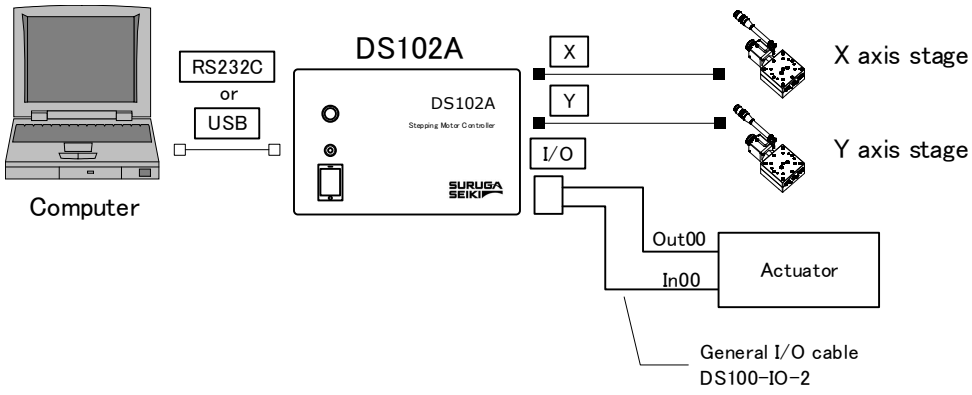
STEP1 : Move to Action point(1000, 1500)

STEP2 : Send to actuator the press-in start signal, then start the press-in.

STEP3 : Detect the completed press-in operating from actuator.

STEP4 : Move to waiting position(50, 100)

1) Configuration



2) Operation outline

Program for general input/output is controled to DS102A with the computer.

① Execute the computer program.

Programming	
① Set up driving speed of X, Y stages.	
② Move X, Y stages to operation position.	<STEP1>
③ Start actuator operation.	<STEP2>
④ Pick up operation completed signal of actuator.	<STEP3>
⑤ Move X,Y stages to waiting position.	<STEP4>

3) Connecting

DS102A connection

① Plug the USB connector into the computer USB port.
(In case of using RS232C, plug the connector into the computer)

② Connect X axis stage connector to X axis stage.

③ Connect Y axis stage connector to Y axis stage.

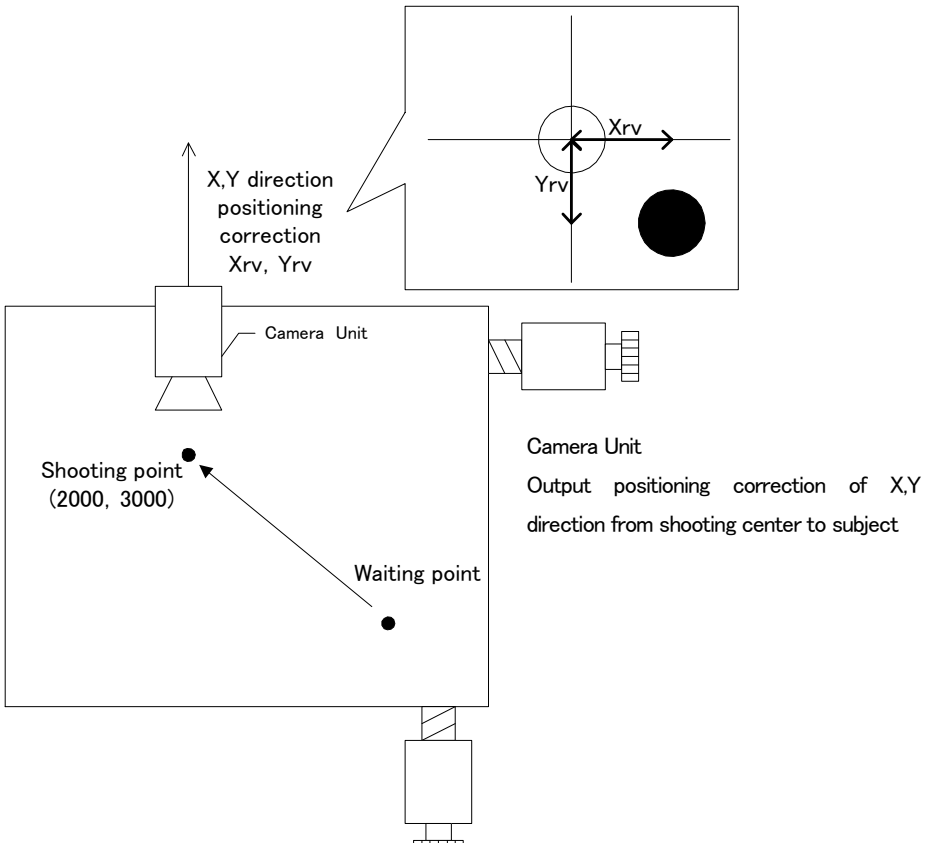
④ Connect general I/O connector to actuator.

4) Make and execute the program

```
MSComm1.Output = "AXI1:SELSP 0:F0 1000"          ' X stage set up speed
MSComm1.Output = "AXI2:SELSP 1:F1 1000"          ' Y stage set up speed
MSComm1.Output = "AXI1:GOABS 1000"           ' X stage move to operation point
MSComm1.Output = "AXI2:GOABS 1500"           ' Y stage move to operation point

MSComm1.Output = "Out00 1"               ' Turn on the start operation signal to the actuator

Do
        MSComm1.Output = "In00?"                 ' Pick the operation completed signal to the actuator
        intSens = MSComm1.Input
Loop Until [intSens = 1]

MSComm1.Output = "AXI1:GOABS 100"            ' X stage move to waiting point
MSComm1.Output = "AXI2:GOABS 200"            ' Y stage move to waiting point

MSComm1.Output = "Out00 0"               ' Turn off the start operation signal to the actuator
```

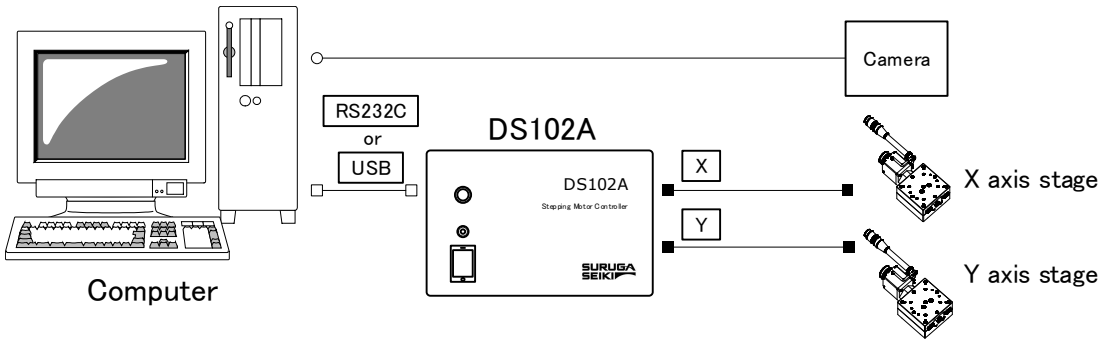
2.2.5 Move to arbitrary coordinate

Shows how to move the stage base on data, which is downloaded, from external.



STEP1 : Shooting position move to(2000, 3000)
STEP2 : Obtained positioning correction by camera unit
STEP3 : Move subject to the center based on positioning correction

1) Configuration



2) Operation Outline

Program for stage is moved to arbitrary position to DS102A with the computer.

① Run the program from the computer.

Program contents	
① Set up operation speed of X stage, Y stage.	
② Move X stage, Y stage to shooting point.	<STEP1>
③ Get positioning correction from camera units.	<STEP2>
④ Move X stage, Y stage to correction point.	<STEP3>

3) Connection

Connect DS102A

① Plug computer USB port into USB connector.
(In case of using RS232C, connect RS232C and computer)

② Connect X axis motor connector and X axis stage.

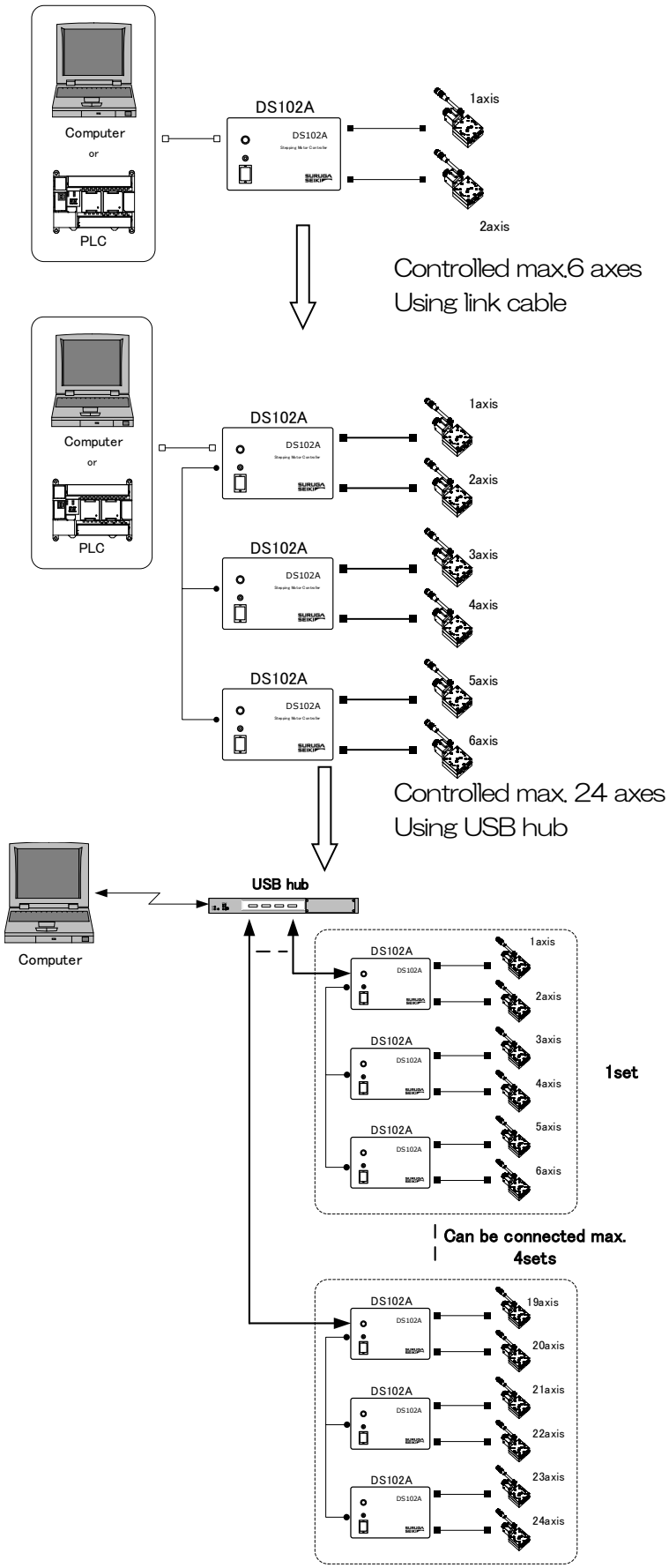
③ Connect Y axis motor connector and Y axis stage.

4) Programming

```
MSComm1.Output = "AXI1:SELSP 0:F0 1000"          ' X stage set up speed
MSComm1.Output = "AXI2:SELSP 1:F1 1000"          ' Y stage set up speed
MSComm1.Output = "AXI1:GOABS 2000"             ' X stage move to shooting point
MSComm1.Output = "AXI2:GOABS 3000"             ' Y stage move to shooting point

intXrv =   Obtain X direction correction position ( )
intYrv =   Obtain Y direction correction position ( )

MSComm1.Output = "AXI1:PULS  intXrv:GO CW"     ' X stage move to correction position
MSComm1.Output = "AXI2:PULS  intYrv:GO CW"     ' Y stage move to correction position
```

2.2.6 Controlled over 3 axes

Can be controlled max.6 axes using link cable, and max.24 axes using USB hub.



3. SPEC and FUNCTION

3.1 Basic SPEC

【Motor Controller DS102A/DS112A】

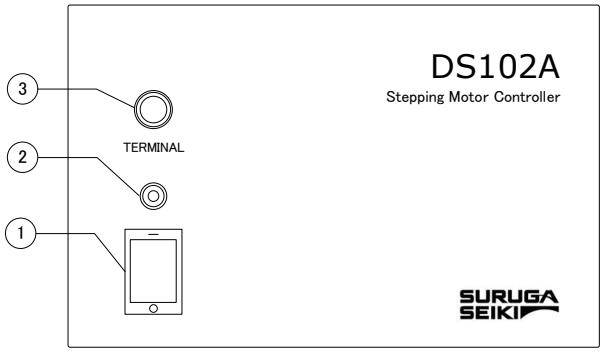
Type	DS102A□□	DS102A□□-IO	DS112A□□	DS112A□□-IO
Dimension (Projection such as connector no included)	140(W)×300(D)×90(H)mm		70(W)×165(D)×155(H)mm	
Weight	2.2kg		1.2kg	
Usage environment	0～40℃ 20～80%RH (No condensation)			
Storage environment	-20～60℃ 20～80%RH (No condensation)			
Power supply input	AC100-240V ±10% 50/60Hz		DC24V±10% (3.5A 以上)	
Maximum power consumption	Below 70W		Below 2.5A	
Driver type	DS102ANR/DS112ANR : Normal (FULL/HALF) DS102AMS/DS112AMS : Microstep(1/1～1/250)			
Driver current rating	0.75A			
Drive system	Bipolar Galvan static chopper pentagon drive system			
Excitation system	DS102ANR/DS112ANR : 4-5 excitation (FULL/HALF) DS102AMS/DS112AMS : 4 excitation (1/1～1/250)			
Number of controlled axis	2 axes			
Coordinate setting range	±99,999,999pulse			
Driving speed setting range	1～999,999pps			
Rate of rise speed setting range	1～9,999pps			
Addition-subtraction speed setting Range	1～9,999ms			
S additional-subtraction speed rate Setting range	0～100%			
Machine limit	2 places for each axis to CW,CCW (Possible logic change)			
Detected proximity origin	1 place for each axis (Possible logic change)			
Detected origin	1 place for each axis (Possible logic change)			
How to detect origin	12style			
Home position	1 place for each axis (Can be set up in effective area arbitrarily)			
External COM Interface	RS232C:4,800～38,400bps (Dsub9pin male) USB2.0:Full/Low Speed only (USB mini B terminal) Controlled I/O(CNT-I/O):Input9points (24Vphoto coupler)、Output11points (Open collector)			
Link function	RS485 (Can be connected link max. 3 controller 6 axes with DG chain)			
Program function	8Programs (100steps/1program) Can be controlled program number choice, start, stop with controlled I/O			
Teaching function	64 points (Can be controlled intended point, move, stop with controlled I/O)			
Interpolation function	6 axes linear interpolation (Easy linear interpolation on the link)			
Controlled I/O (CNT-I/O)	Input 9points (P/T START,STOP) (24V photo coupler) Output 12points (X DRIVE,XCWLS) (Open collector)			
General I/O (I/O) (Option)	—	Input16 points (24Vphoto coupler) Output12 points (Open collector)	—	Input16 points (24Vphoto coupler) Output12 points (Open collector)

【Handy terminal DT100】

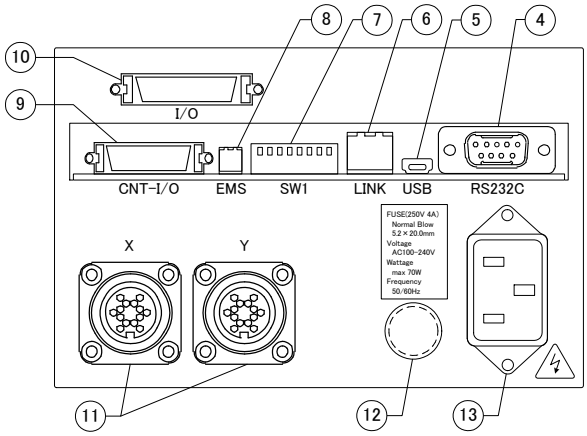
Item	SPEC	Remarks
Display	16 figures×2 lines	No backlight
Input	DC24V	Supply from DS102A／DS112A
Number of key	12keys	Click emboss12 keys
Cable length	1.5m	Can be extended till Max10m (Option)
Operation Mode	11mode	Continue/Step/Absolute/Origin/Home/ Parameter/Program/Teaching/Input/Output/Remote (Display time which receive a command from external controlled)
Outline	73(W)×130(D)×27(H)mm	Not included the screw and cable
Weight	280g	1.5m cable included

3.2 Part name and functions

【DS102A Front panel】

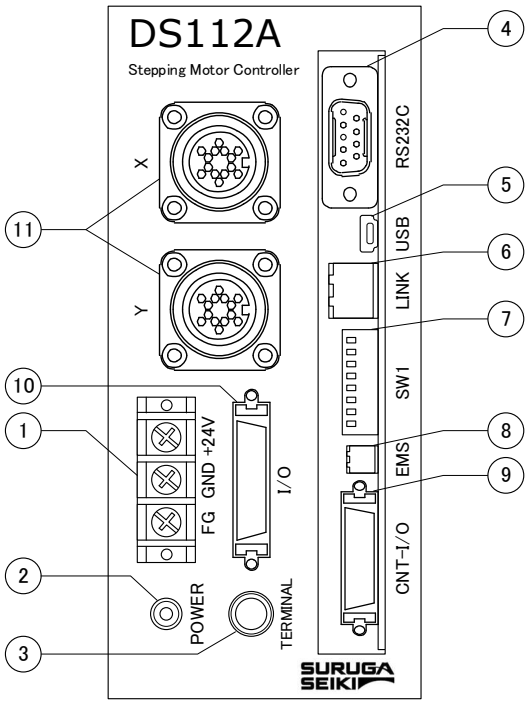


【DS102A Rear panel】



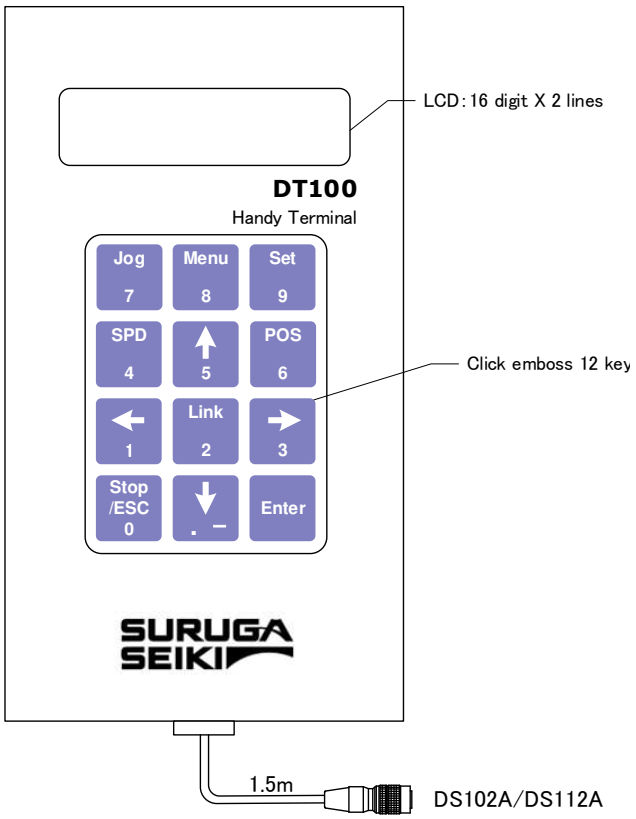
① Power	: Power switch
② LED	: LED lights up when switch on
③ TERMINAL	: Connector for handy terminal(DT100)
④ RS232C Connector	: Connector for RS232C communication(Dsub9P male)
⑤ USB Connector	: Connector for USB communication(Mini Btype)
⑥ Link Connector	: Connector for connecting Link to DS102(Max 3 units)
⑦ Dip Switch(8bit)	: RS232C Baud rate(2bit)、Link Number(2bit)、USB ID(2bit)、Command response (1bit) setting up
⑧ EMS Connector	: Connector for emergency stop input(Software interlock,B point) (Included connector for EMS cancel)
⑨ CNT-I/O Connector	: Check the each axis status, Select program operating number・Start・Stop, Select teaching position number・Start・Stop I/O connector (Bellows 26pin half pitch)
⑩ I/O Connector (Option)	: General I/O (In 16points,Out12 points) connector (Bellows 36pin half pitch)
⑪ Stage connector	: Connector for Motorized stage (X axis,Y axis) (Connector type : 09-0054-00-14 (Binder products))。
⑫ Fuse holder	: Use 250Ⅴ、4A Nomal blow glass fuse
⑬ AC inlet	: Input AC100～240V 50/60Hz Incase of AC100～120V, use attached electric cable In case of AC200V, use with the proper cable

【DS112A Front panel】



① Terminal block for power : For input(DC24V、M3 screw)
② POWER LED : LED lights up when power on
③ TERMINAL : Connector for handy terminal DT100
④ RS232C Connector : Connector for RS232C communications (Dsub9P male)
⑤ USB Connector : Connector for USB communications (Mini B type)。
⑥ Link Connector : Connector for link connection DS112(Max 3 units)
⑦ Dip SW(8bit) : Connector for RS232C baud rate(2bit),Link number(2bit),USB ID(2bit), Command response (1bit) setting up
⑧ EMS Connector : Connector for emergency stop(Normal close) (Included connector for EMS cancel)
⑨ CNT-I/O Connector : Check status each axis, select program operating number・Start・Stop select the number of teaching position・Start・for stop I/O connector (Bellows 26pin half pitch)
⑩ I/O connector (Option) : General I/O (In 16points,Out 12points) connector (Bellows 36pin half pitch)
⑪ Stage connector : Motorized stage (Xaxis,Yaxis) for connecting (Connector model : 09-0054-00-14 (Binder products))

【DT100】



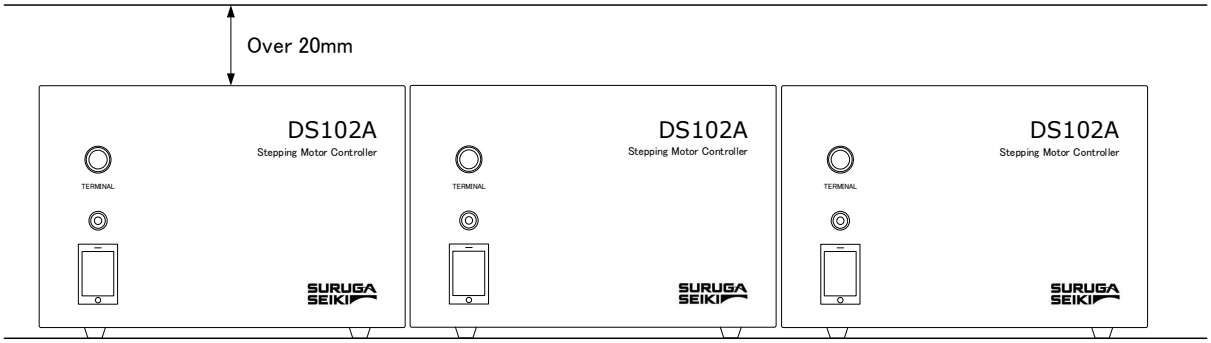
Key name	Function
Jog/7	Operation mode(CNT/STP/ABS/ORG/HOM) transit to selection screen/7-key
Menu/8	Menu(PRM/PRG/TCH/IN/OUT) transit to selection screen /8-key
Set/9	Jump to setting value switchable screen for each operation mode(STP/ABS/ORG/HOM)、Use at the teaching position registration /9-key
←/1	X axis to Cooperation, Select setting item /1-key
→/3	X axis to Cw operation, Select setting item /3-key
↑/5	Y axis to CW operation, Select setting item/5-key
↓/. -	Y axis to CCW operation, Select setting item/key ．(decimal) － (negative)
SPD/4	Select speed table number /4-key
POS/6	Set current position /6-key
Link/2	Controller (axes) switching (at the link connecting) /2-key
STOP/ESC/0	Stop operating axes, stop program operating、return to previous screen /0-key
Enter	Decision

3.3 Setting

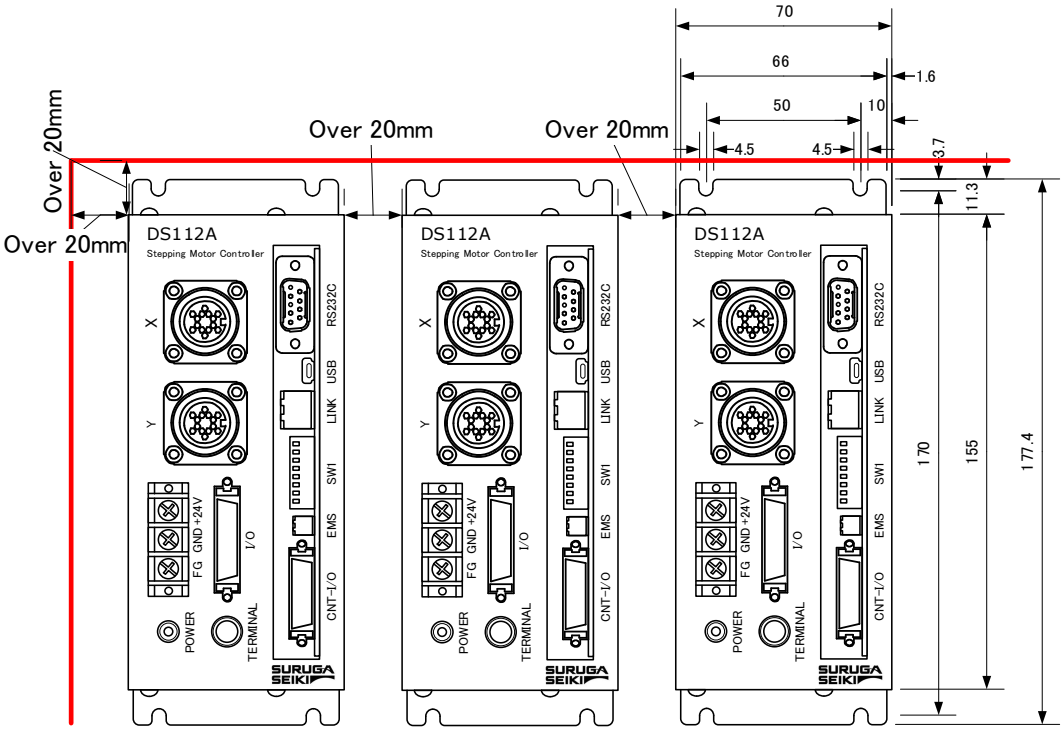
【DS102A series】

Please set DS102A on the level and vibration-free, and open the space over 20mm because of eradiation on top of this unit.

No need to open the space in between controllers when line up the few units in one row sideways.



⚠ <u>If cover the upper radiation space, it is to be a cause of a fire and damage because of heat up inside.</u>



【DS112A　series】

Should set up DS112A on the level with 4 mounted holes. In case of set up on the level, radiation hole should be comes to upper or left side of units, please open over 20mm spaces.

⚠ <u>If cover the upper radiation space, it is to be a cause of a fire and damage because of heat up inside.</u>

3.4 External Interface

3.4.1 Link connection (Link)

In case of controlled over 3 axes, can be operated max.6 axes operations connected with original link cable (DS100-LINK2-0.5 or DS100-LINK3-0.5) between 2 units or 3 units of DS102A/DS112A.

【Link connector】

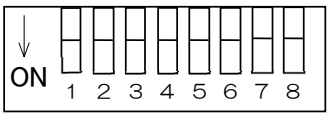
Connector type : S10B-PADSS-1(LF)(SN) (JST)
Matched plug : PADP-10V-1-S(LF)(SN) (JST)
Conformance contact : SPH-002T-P0.5L (JST)

Pin No.	Signal	I/O	Function
1	T (+)	I/O	Transmitted and received data (+)
2	T (-)	I/O	Transmitted and received data (-)
3	GND	-	Ground
4	NC	-	Non connected
5	T (+)	I/O	Transmitted and received data (+)
6	T (-)	I/O	Transmitted and received data (-)
7	GND	-	Ground
8	NC	-	Non connected
9	GND	-	Ground
10	FG	-	Frame ground

※If use link function, need to set the ID number with DIP switch.

【Set the DIP switch】

Set third bit and forth bit of SW1



SW1

● Set link number

3	4	Link number
OFF	OFF	0 (Default)
ON	OFF	1
OFF	ON	2
ON	ON	

※Factory-setting is OFF.

※ Please power on in the order Link number 2,→1→0
In case of can't be powered on in turn because of included system, please power on 3 units at the same time.

3.4.2 Control Input/Output (CNT-I/O)

Output the status of motorized stages that connected DS102A/DS112A. Also can operated teaching point number, specify program number, move teaching point, program operation start and stop.

By connecting I/O of PLC and CNT-I/O, can be controlled the motorized stages easily.

【CNT-I/O connector】

Connector type : 10226-52A2PL (3M)

Matched connector (ex.) : 10126-3000PE (3M)

【Option cable (2m)】

type : DS100-CNT-2

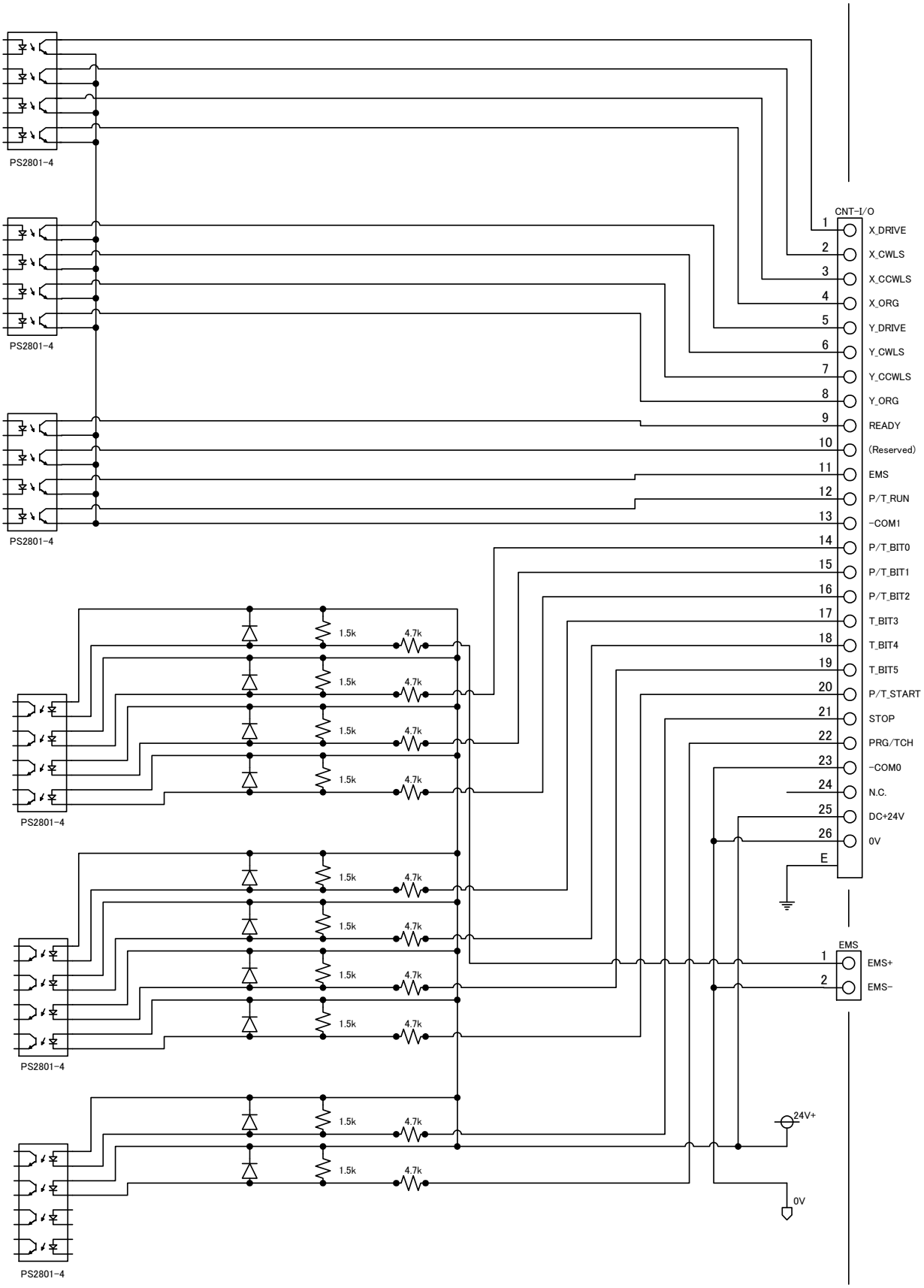
【CNT-I/O pin assign】

Pin number	Name of signal	I/O	Function
1	X_DRIVE	O	X axis now driving
2	X_CWLS	O	X axis CWLS now detecting
3	X_CCWLS	O	X axis CCWLS now detecting
4	X_ORG	O	X axis ORG now detecting
5	Y_DRIVE	O	Y axis now operating
6	Y_CWLS	O	Y axis CWLS now detecting
7	Y_CCWLS	O	Y axis CCWLS now detecting
8	Y_ORG	O	Y axis ORG now detecting
9	READY	O	Ready output
10	NC	-	Non-connected (System reserved)
11	EMS	O	EMS now detecting (OFF for EMS detecting ／ On for EMS non detecting)
12	P/T_RUN	O	Program now driving or teaching point now moving
13	-COM1	-	Common for output signal
14	P/T_BIT0	I	Select program numberBIT0 or teaching point specification BIT0
15	P/T_BIT1	I	Select program numberBIT1 or teaching point specification BIT1
16	P/T_BIT2	I	Select program numberBIT2 or teaching point specification BIT2
17	T_BIT3	I	Teaching point specification BIT3
18	T_BIT4	I	Teaching point specification BIT4
19	T_BIT5	I	Teaching point specification BIT5
20	P/T_START	I	Program driving start signal ／ Teaching point moving start signal
21	STOP	I	Program stop (All axes will be stopped)
22	PRG/TCH	I	Program driving mode／Switching teaching point moving signal (When OFF、program driving mode／When ON、teaching point moving mode)
23	-COM0	-	Common for input signal
24	NC	-	Non connected
25	DC+24V	O	Service power (DC24V, max 250mA)
26	0V	O	

⚠

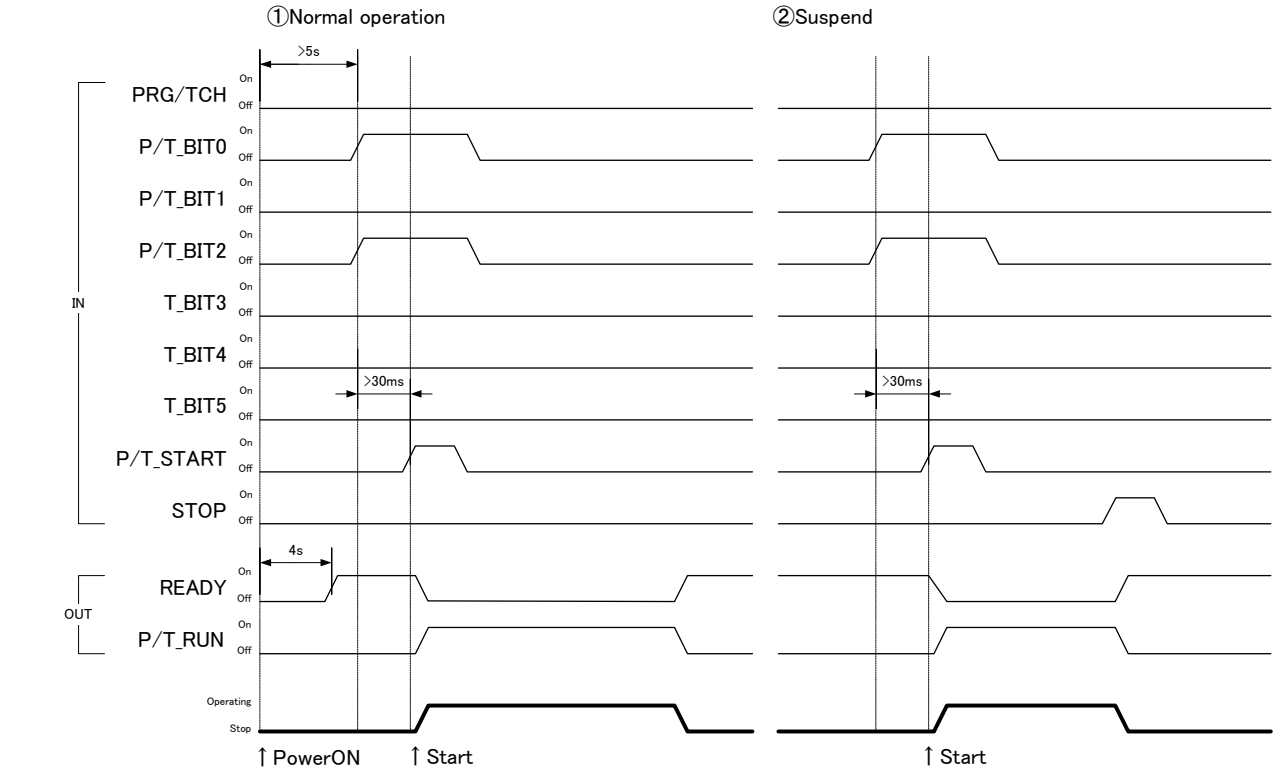
- **Driving current of output circuit is 20mA/points, ON current of input circuit is 5mA/points.**
- **-COM0 and -COM1 are insulated.**

【CNT-I/O Circuit】



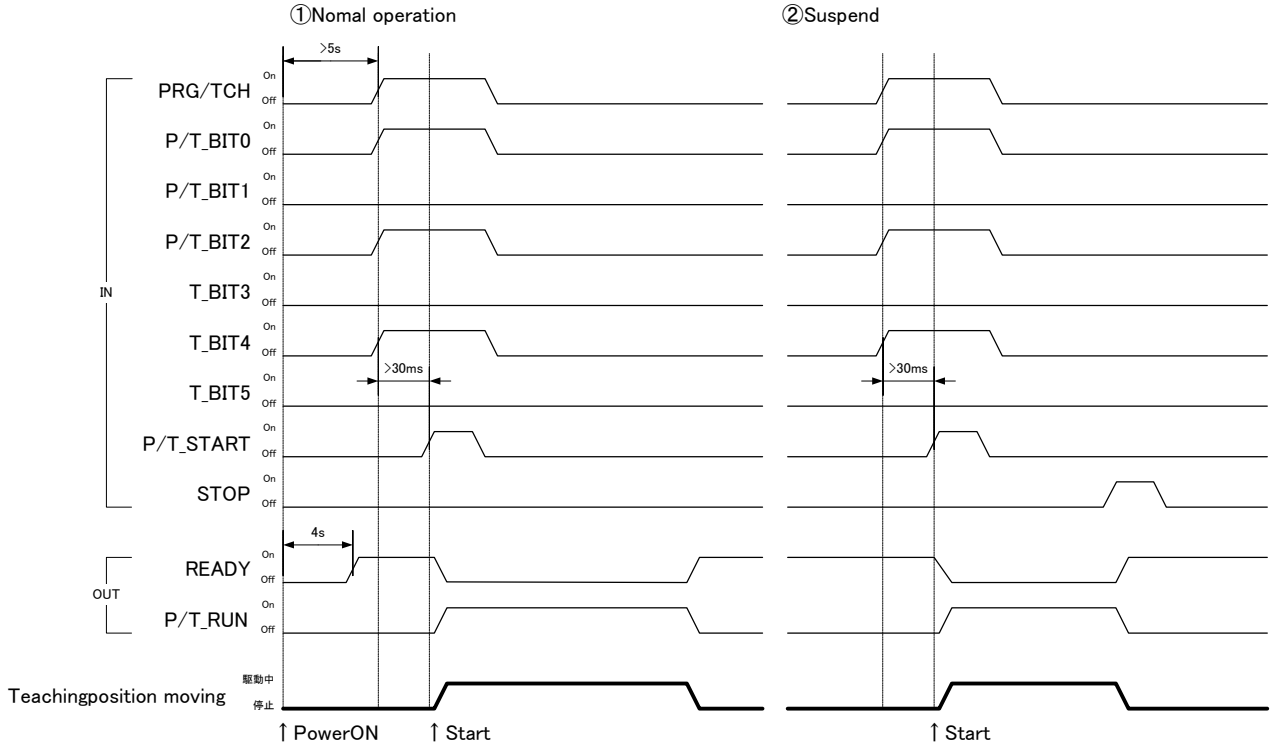
【Timing Chart】

①Program operated by CNT-I/O (Ex. : Program No.5)



※Documentation, transfer and delete of program (No.0~7) is started from computer.

②Teaching position moved by CNT-I/O(Ex. : Teaching No.21)



※ Registration of teaching position is started from computer or handy terminal DT100.

3.4.3 General I/O (I/O) (Option)

There's option for general I/O that is input 16 points and output 12 points due to control each sensors, switches, magnet valves and indicator lights.

【I/O connector】 General I/O (I/O) (Option)

Connector type : 10236-0200 (3M)

Adaptive connector (Ex.) : 10136-3000PE (3M)

【Option cable (2m)】

Type : DS100-IO-2

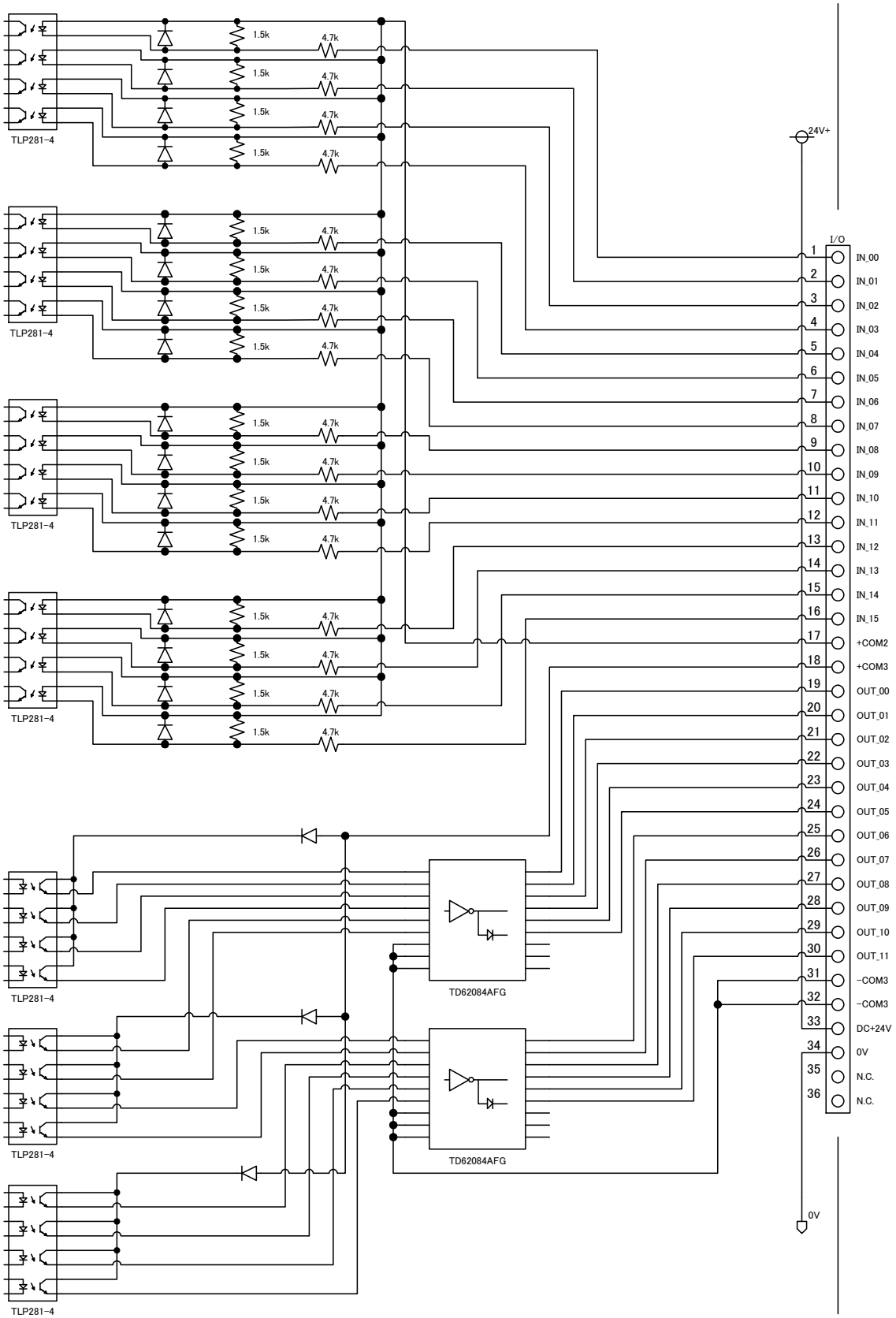
【I/O pin assign】

Pin No.	Signal name	I/O	Function
1	In_00	I	General input00
2	In_01	I	General input01
3	In_02	I	General input02
4	In_03	I	General input03
5	In_04	I	General input04
6	In_05	I	General input05
7	In_06	I	General input06
8	In_07	I	General input07
9	In_08	I	General input08
10	In_09	I	General input09
11	In_10	I	General input10
12	In_11	I	General input11
13	In_12	I	General input12
14	In_13	I	General input13
15	In_14	I	General input14
16	In_15	I	General input15
17	+COM2	I	In_00~In_15 for insulation power on
18	+COM3	I	OUT_00~OUT_11 for insulation power on
19	Out_00	O	General output00
20	Out_01	O	General output01
21	Out_02	O	General output02
22	Out_03	O	General output03
23	Out_04	O	General output04
24	Out_05	O	General output05
25	Out_06	O	General output06
26	Out_07	O	General output07
27	Out_08	O	General output08
28	Out_09	O	General output09
29	Out_10	O	General output10
30	Out_11	O	General output11
31	-COM3	-	Out_00~Out_11 for insulation power ground
32	-COM3	-	Out_00~Out_11 for insulation power ground
33	DC+24V	O	Service power (DC24V, max 400mA)
34	0V	O	
35	NC	-	Non-connected
36	NC	-	Non-connected

⚠

- Input ON current is 5mA/point、Output drive current is 60mA/point (Total under 500mA)
- DC+24V power, COM2 and COM are each insulated.

【I/O Circuit】


TLP281-4
1.5k
4.7k
24V+
I/O
1 IN_00
2 IN_01
3 IN_02
4 IN_03
5 IN_04
6 IN_05
7 IN_06
8 IN_07
9 IN_08
10 IN_09
11 IN_10
12 IN_11
13 IN_12
14 IN_13
15 IN_14
16 IN_15
17 +COM2
18 +COM3
19 OUT_00
20 OUT_01
21 OUT_02
22 OUT_03
23 OUT_04
24 OUT_05
25 OUT_06
26 OUT_07
27 OUT_08
28 OUT_09
29 OUT_10
30 OUT_11
31 -COM3
32 -COM3
33 DC+24V
34 0V
35 N.C.
36 N.C.
TD62084AFG
0V

3.4.4 Emergency stop input (EMS)

Can be emergency stopped all axes operating to open 1 pin and 2 pin of EMS connector.
(At the link connected, 3~6 axes that connected to Link No.1,2 is emergency stopped to open EMS signal of Link No.0)

※ In case of no use EMS signal, please attached release-connector always on.

【EMS connector】
Connector type : S02B-PASK-2(LF)(SN) (JST)
Mattched plug : PAP-02V-S(LF)(SN) (JST)
Mattched contact : SPHD-001T-P0.5 (JST)

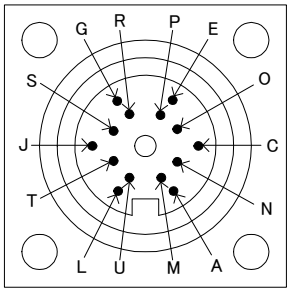
Pin No.	Signal name	I/O	Function
1	EMS (+)	I	Input emergency stop signal (Normal close) DC24V 5mA
2	EMS (-)	-	Common

⚠ As software's interlock function, please do not use as the last protect function of systems.

3.4.5 Stage interface

Connect the motorized stage connected cable to motor connector.

【Motorized stage connector】
Connector type : 09-0054-00-14 (Product of Binder: female)
Matched plug : 09-0341-02-14 (Product of Binder)



<Female insert(mating side)>

Pin No.	I/O	Terminal function
A	O	Motor lead (Blue)
C	O	Motor lead (Red)
E	O	Motor lead (Orange)
G	O	Motor lead (Green)
J	O	Motor lead (Black)
L	I	CWLS input
M	I	CCWLS input
N	I	Near origin sensor input
O	I	Origin sensor input
P	O	Sensor power (DC5V(+))
R	O	Sensor power (DC5V(-))
S	-	N.C.
T	-	N.C.
U	-	Frame ground

3.5 Driver division number setting

Different how to set the division number normal type and micro-step type.

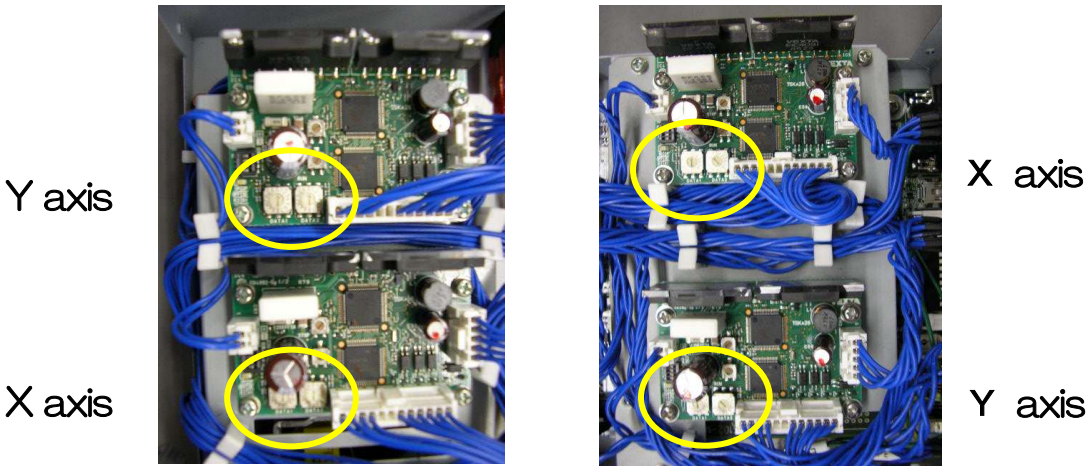
Driver type	Division number setting
Normal driver	Can be switched FULL/Half from handy terminal(DT100),control software (DSCONTROL-WIN), communication command.
Micro step driver	Need to open the cover and set the rotary switch of micro-step driver.

3.5.1 Open and shut

①In case of DS102A, take out 10 screws from side of cover, in case of DS112A, take out 6 screws from side of cover with cross screwdriver.

②See following picture, set the marked point with precision screwdriver.

<DS102AMS> <DS112AMS>

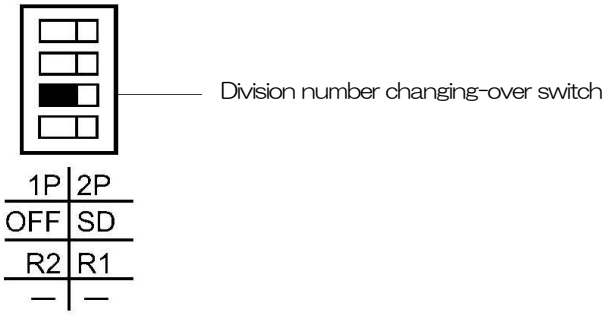


⚠
- **Please power off during the open and shut, cause fire, injury and device breakage.**
- **Please do not set up the driver with charged hands, cause breakage by static electricity.**

3.5.2 Setting division number

When set division number, please check driver's division changing-over switch to [R1].

Default setting : R1



There are 2 division number setting switch [DATA1] [DATA2] , use [DATA1]here.
Can be used [DATA2] at the only use communication command. Please refer to 4, 3, 5, 2 paragraph.
In case of change the division number, change [DATA1].

Default setting : [DATA1 : 0]
[DATA2 : 0]

Following chart shows basic step angle 0.72° /STEP.
Resolution = Basic step angle × Division number

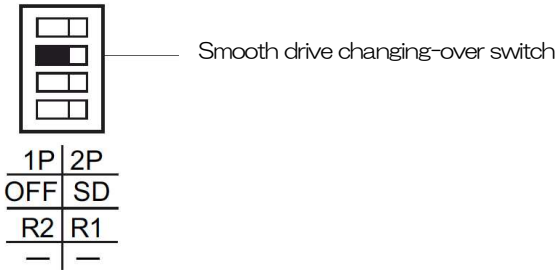
R1		
DATA1 (DATA2)	Division number	Motor step angle
0	1/1	0.72°
1	1/2	0.36°
2	1/2.5	0.288°
3	1/4	0.18°
4	1/5	0.144°
5	1/8	0.09°
6	1/10	0.072°
7	1/20	0.036°
8	1/25	0.0288°
9	1/40	0.018°
A	1/50	0.0144°
B	1/80	0.009°
C	1/100	0.0072°
D	1/125	0.00576°
E	1/200	0.0036°
F	1/250	0.00288°

⚠
- **Please set "PULSE" as unit setting, in case of using both DATA1 and DATA2.**
- **Division number are theoretical figure.**
- **Please do not change the division number switch during operation, motor might be stopped.**

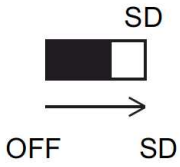
3.6 Smooth drive function (only MS type)

This function can get low vibration and low noise during slow operating without any change the division number setting. It divides automatically into 1/16 pulse signal.
No need pulse changing (speed and pulse) of upper controller side. Smooth drive function must be operated case of division number [R1], [DATA : 0] ～ [DATA : 6] ([R2] cannot be set)
([DATA] numeric shows 3. 5. 2 paragraph division number switch [DATA1])

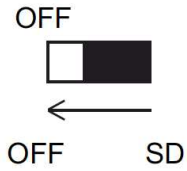
Default setting：[SD：Operate smooth drive]



・ When operate smooth drive function、set [SD] side.（Initialization）



・ When no operate smooth drive function, set [OFF] side.



⚠ • Smooth drive function will not work when set over 10 divide division number. Might be ignored to set [SD]. (Same as [OFF] operation)

3.7 Units setting function

No need difficulty change from pulse to actual displacement.
Units setting must be first for each setting parameter. Follow the below.

① Units setting（pulse, μm, mm, deg, mrad）
② Set 1 pulse displacement at the full step（Basic resolution）set.
③ Set the division number（1/1～1/250）
④ 1 pulse displacement（Automatically calculated from ①～③）

Example） In case of set the stage：KXC06020-G（1μm／pulse）to mm.
Units：mm
1 pulse displacement at the full step：0．001（mm）
Division number：1／20
1 pulse displacement：0．00005（mm）

※ After setting, can use operate the setting units for all position data (except speed table).
※ In case of Sine Motion Stage (KRB04017, KRB06011, KGB06, KGB07), can use only "PULSE" as unit setting.

3.8 Speed setting (Speed table)

This equipment memorized 10 speed table from 0 to 9. Each 2 axes (Max6 axes at Link) speed is selected from speed table 0 to 9.

How to set the speed as shown bellows.:

① Select speed table from 0 to 9 as needed.

② Fix the speed table and change the setting level.

Example)

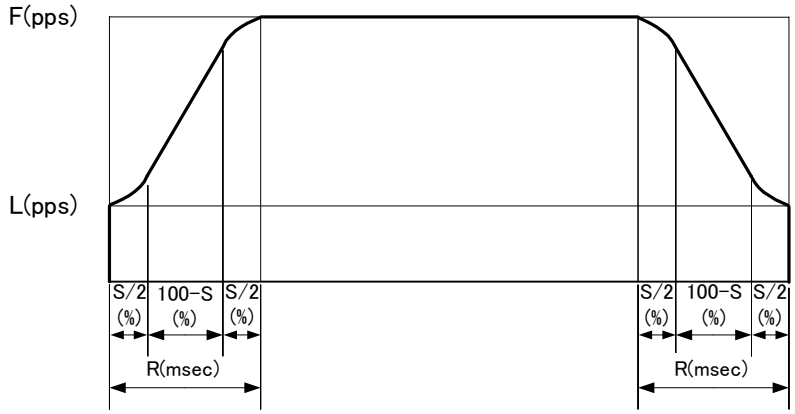
X axis・・・Speed table No.0 Fixed
Y axis・・・Speed table No.1 Fixed
Z axis・・・Speed table No.2 Fixed
U axis・・・Speed table No.3 Fixed
V axis・・・Speed table No.4 Fixed
W axis・・・Speed table No.5 Fixed

Set as above, and change the each speed table 0 to 5 setting level (L, F, R, S).

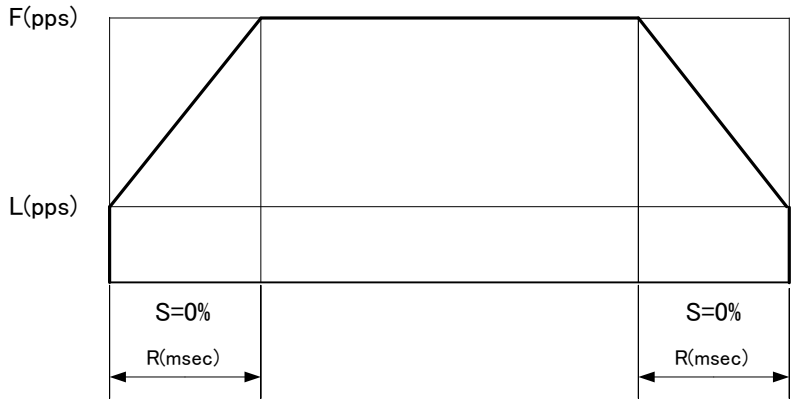
※ Control software (DSCONTROL-WIN) speed is set by ②

※ Can change speed in operation.

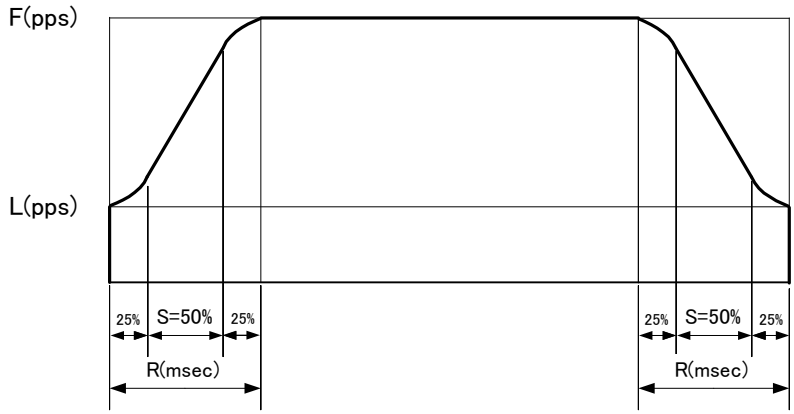
Start-up speed（Ｌ：ｐｐｓ)、Driving speed（Ｆ：ｐｐｓ)、Acceleration and deceleration rate（Ｒ：ｍｓｅｃ）and S acceleration and deceleration rate（Ｓ：%）are as follows.:



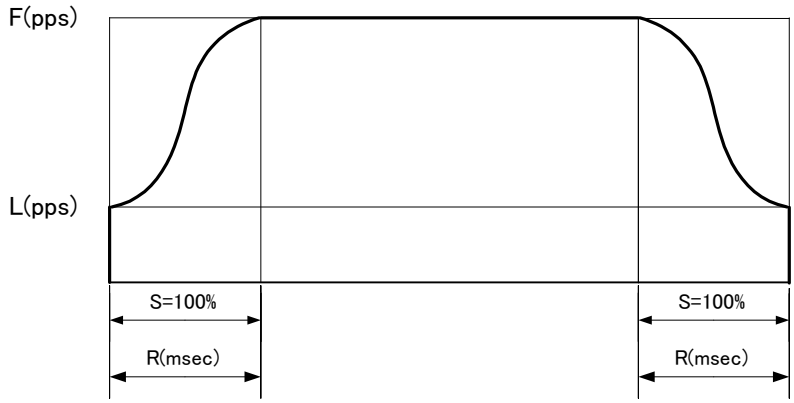
（S=0%：trapezoid driving）



（S=50%）



（S=100%）



In case of bellows, set S acceleration and deceleration rate over 0 which helps to lessen the impact and vibration for stages.

- In case of under heavy load on the stages
- In case of operating stages at the vertical (Z axis).
- Become triangle driving at the trapezoid driving due to small distance (Avoid triangle driving)

Speed table each level 0~9 as bellows.:

Contents		Setting range	Default
Speed table No. 0	Start-up speed (L)	1~9999pps	10pps
	Driving speed (F)	1~999999pps	10pps
	Acceleration and deceleration rate (R)	1~9999msec	1msec
	S Acceleration and deceleration rate (S)	0~100%	0%
Speed table No. 1	Start-up speed (L)	1~9999pps	50pps
	Driving speed (F)	1~999999pps	50pps
	Acceleration and deceleration rate (R)	1~9999msec	1msec
	S Acceleration and deceleration rate (S)	0~100%	0%
Speed table No. 2	Start-up speed (L)	1~9999pps	100pps
	Driving speed (F)	1~999999pps	100pps
	Acceleration and deceleration rate (R)	1~9999msec	1msec
	S Acceleration and deceleration rate (S)	0~100%	0%
Speed table No. 3	Start-up speed (L)	1~9999pps	100pps
	Driving speed (F)	1~999999pps	500pps
	Acceleration and deceleration rate (R)	1~9999msec	100msec
	S Acceleration and deceleration rate (S)	0~100%	0%
Speed table No. 4	Start-up speed (L)	1~9999pps	100pps
	Driving speed (F)	1~999999pps	1000pps
	Acceleration and deceleration rate (R)	1~9999msec	100msec
	S Acceleration and deceleration rate (S)	0~100%	0%
Speed table No. 5	Start-up speed (L)	1~9999pps	100pps
	Driving speed (F)	1~999999pps	2000pps
	Acceleration and deceleration rate (R)	1~9999msec	100msec
	S Acceleration and deceleration rate (S)	0~100%	0%
Speed table No. 6	Start-up speed (L)	1~9999pps	100pps
	Driving speed (F)	1~999999pps	5000pps
	Acceleration and deceleration rate (R)	1~9999msec	100msec
	S Acceleration and deceleration rate (S)	0~100%	0%
Speed table No. 7	Start-up speed (L)	1~9999pps	100pps
	Driving speed (F)	1~999999pps	10000pps
	Acceleration and deceleration rate (R)	1~9999msec	100msec
	S Acceleration and deceleration rate (S)	0~100%	0%
Speed table No. 8	Start-up speed (L)	1~9999pps	100pps
	Driving speed (F)	1~999999pps	20000pps
	Acceleration and deceleration rate (R)	1~9999msec	100msec
	S Acceleration and deceleration rate (S)	0~100%	0%
Speed table No. 9	Start-up speed (L)	1~9999pps	100pps
	Driving speed (F)	1~999999pps	**50000pps**
	Acceleration and deceleration rate (R)	1~9999msec	100msec
	S Acceleration and deceleration rate (S)	0~100%	0%

※ The value of speed table No.9 is max speed which can use at this equipment. Ex) If the value of over 50000pps is setting on speed table No.1, actual speed is 50000pps. If needed, please change the value of speed table No.9 (Ex: When setting F of No.0~8 to 100000, set F of No.9 to 100000.).

3.9 Function of origin return

This equipment has built-in 12 types origin return pattern. Please select origin returning type according to the part number of stage you use.

<List of origin return types>

TYPE	OPERATION	APPLIED SENSOR	PAGE
Type0	Origin return is not implemented (default)。	—	P. 78
Type1	Start to detect to the CCW Detect the CW side edge of NORG signal, then, Detect the CCW side edge of ORG signal	CWLS／NORG／ORG／CCWLS	P. 78
Type2	Start to detect to the CW Detect the CCW side edge of NORG signal, then Detect the CW side edge of ORG signal	CWLS／NORG／ORG／CCWLS	P. 79
Type3	Start to detect to the CCW Detect the CCW side edge of ORG signal	CWLS／ORG／CCWLS	P. 80
Type4	Start to detect to the CW Detect the CW side edge of ORG signal	CWLS／ORG／CCWLS	P. 80
Type5	Start to detect to the CCW Detect the CW side edge of CCWLS signal	CWLS／CCWLS	P. 81
Type6	Start to detect to the CW Detect the CCW side edge of CWLS signal	CWLS／CCWLS	P. 81
Type7	After operated type1, detect CCW side edge of TIMING signal	CWLS／NORG／ORG／CCWLS	P. 82
Type8	After operated type2, detect CW side edge of TIMING signal	CWLS／NORG／ORG／CCWLS	P. 82
Type9	After operated type3, detect CCW side edge of TIMING signal	CWLS／ORG／CCWLS	P. 82
Type10	After operated type4, detect CW side edge of TIMING signal	CWLS／ORG／CCWLS	P. 82
Type11	After operated type 5, detect CCW side edge of TIMING signal	CWLS／CCWLS	P. 82
Type12	After operated type 6, detect CW side edge of TIMING signal	CWLS／CCWLS	P. 82

※ Please refer motorized stages catalog, select pattern type of origin return with checking the usage sensor.

<Recommended origin return method>

Recommended origin return method with usage our stages as bellows.:

Recommended origin return method	Sensor specifications of stages			Number of stage connector pins
	Limit	ORG	NORG	
3, 4, 9, 10	-	1	-	12
5, 6, 11, 12	2	-	-	12
3, 4, 9, 10	2	1	-	12
1, 2, 7, 8	2	1	1	16・12 (※)

※About stages with 12-pin specifications and NORG

Type 1, 2, 7, 8 : Select the 4 sensor cable D214-2-□□A.

Type 3, 4, 9, 10 : Select the standard cable D214-2-□□.

※Please refer to our website or catalog for electrical specifications of our stages.

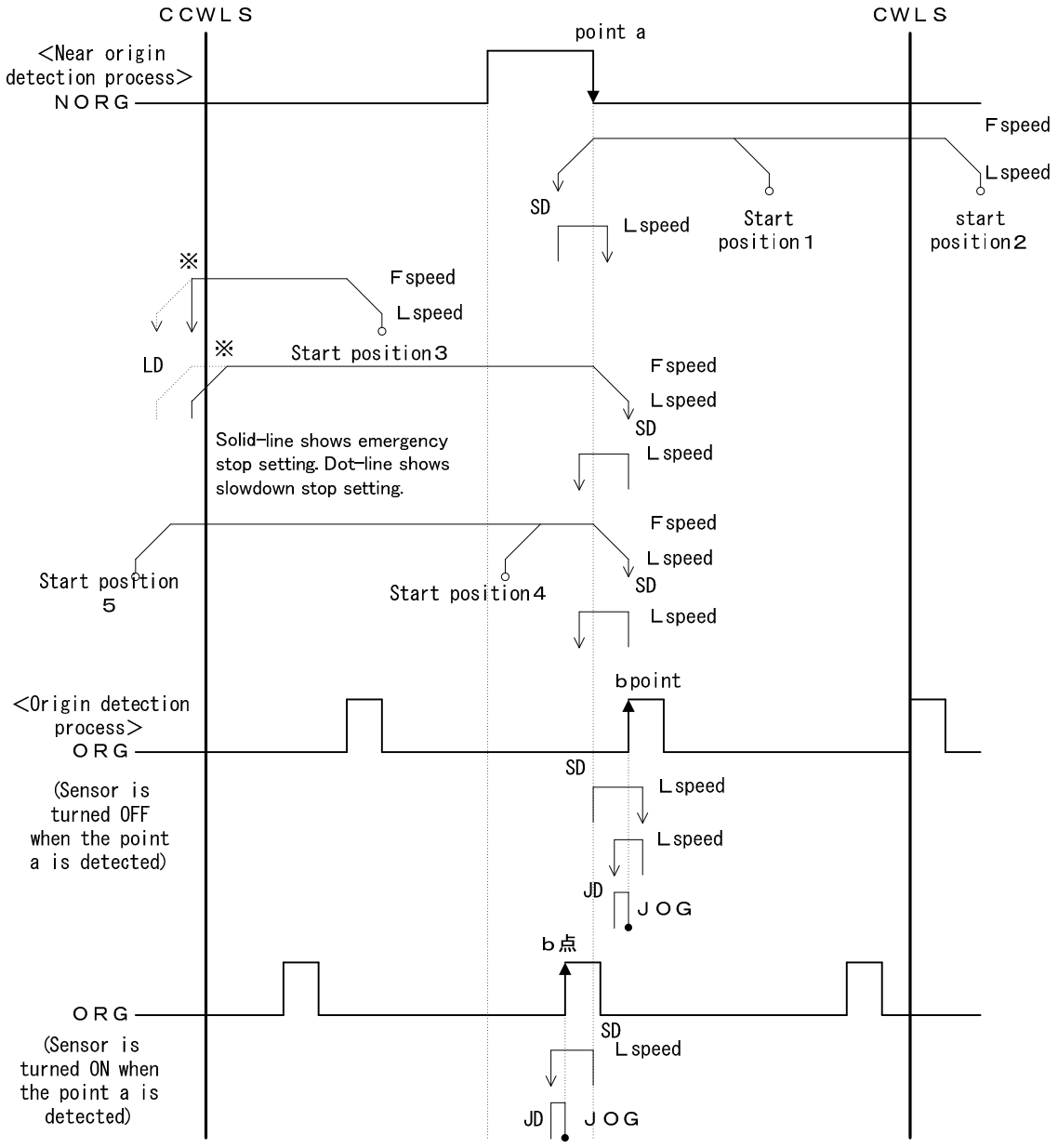
The Origin return sequence is shown as below.:

【Type 0】

No origin return (default)

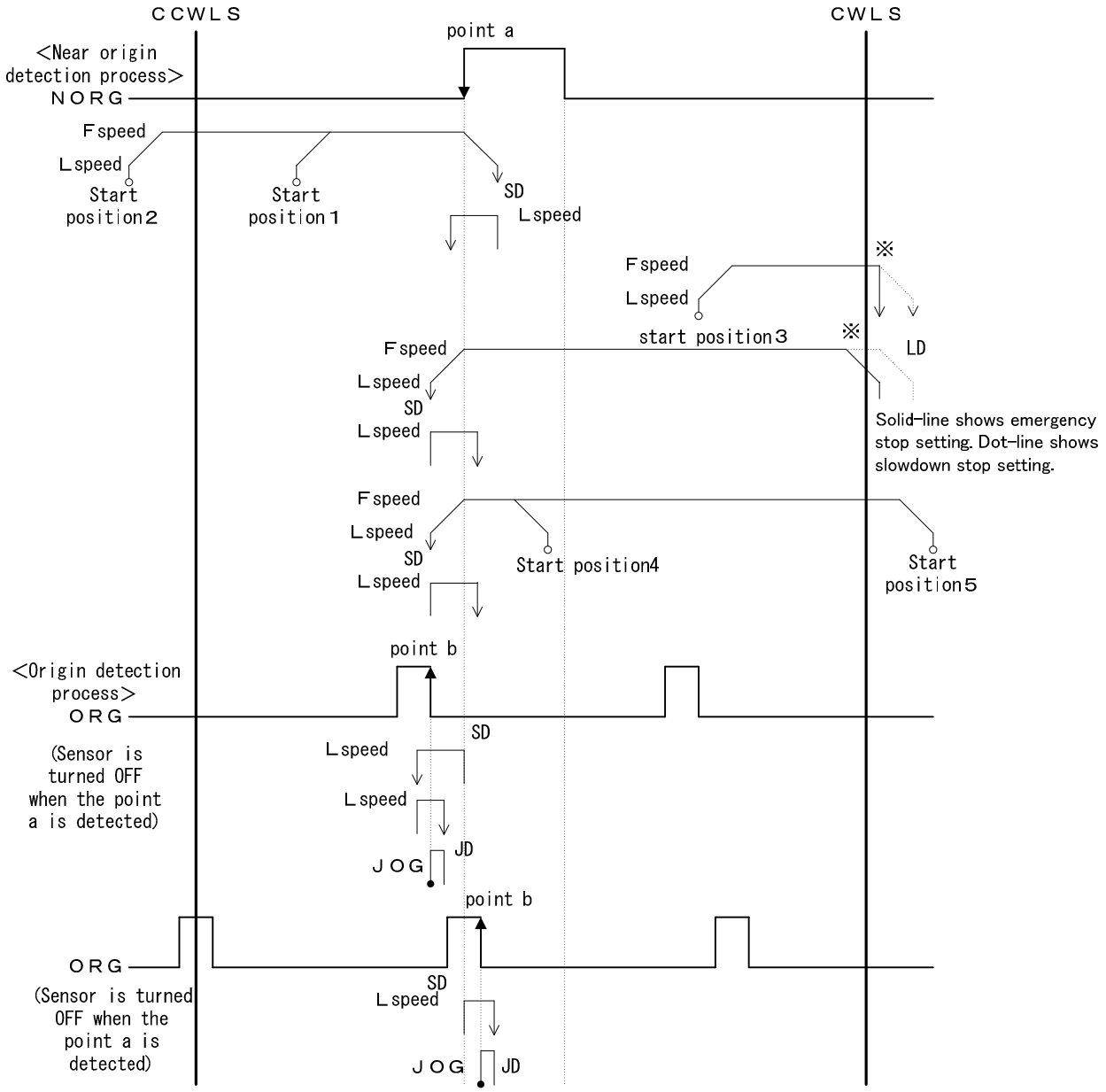
【Type 1】

CW side edge (a point) of NORG signal is detected in CCW direction, then CCW side edge (b point) of ORG signal.



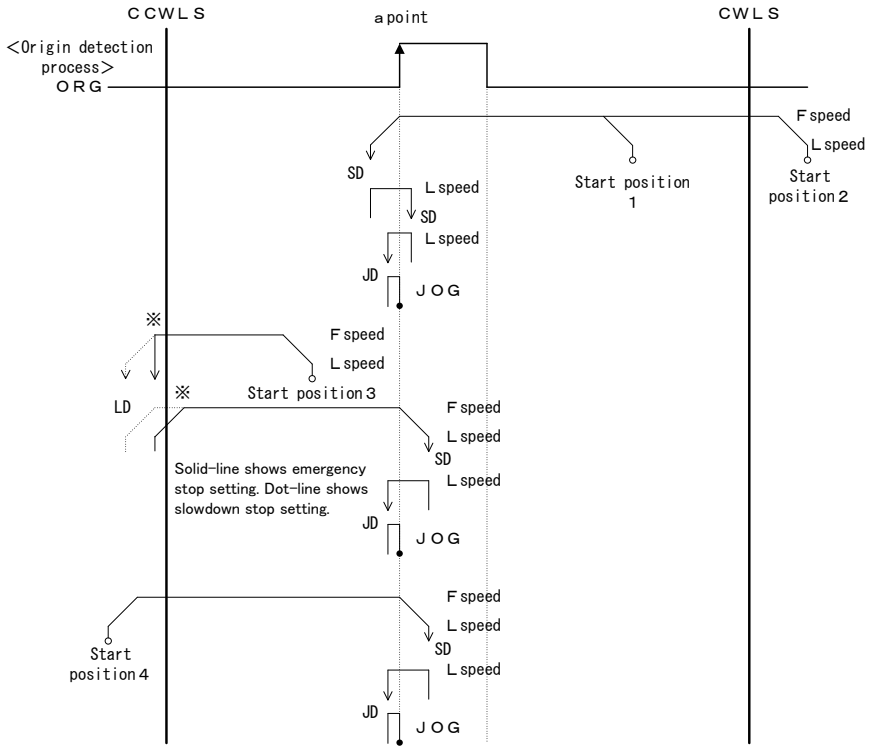
【Type２】

CCW side edge (a point) of NORG signal is detected in CW direction, then CW side edge (b point) of ORG signal is detected.



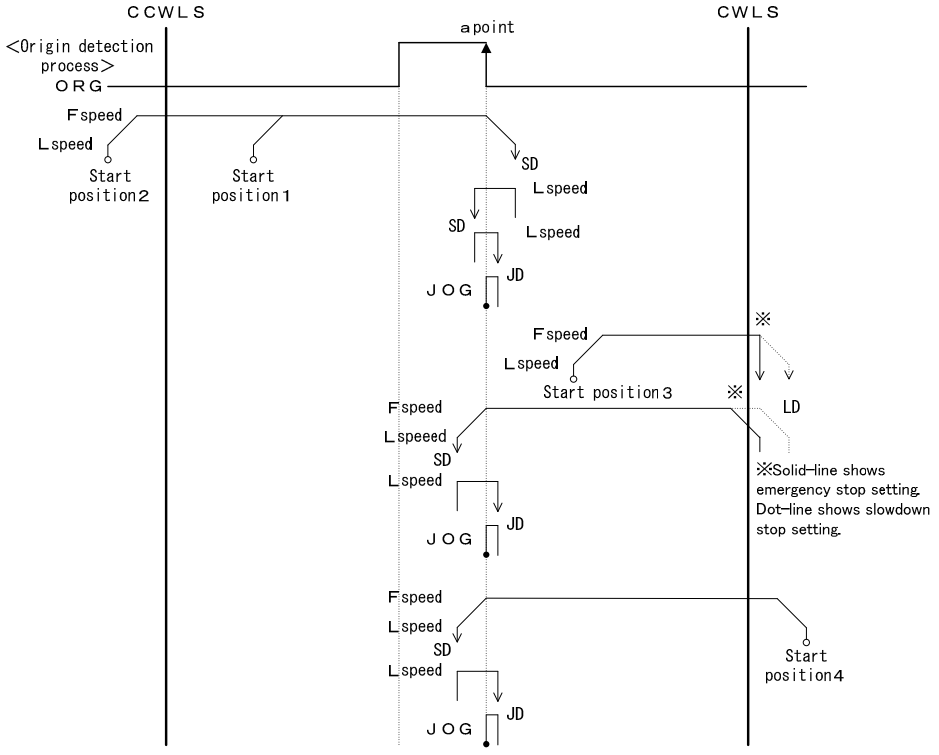
【Type３】

CCW side edge (a point) of ORG signal is detected in CCW direction



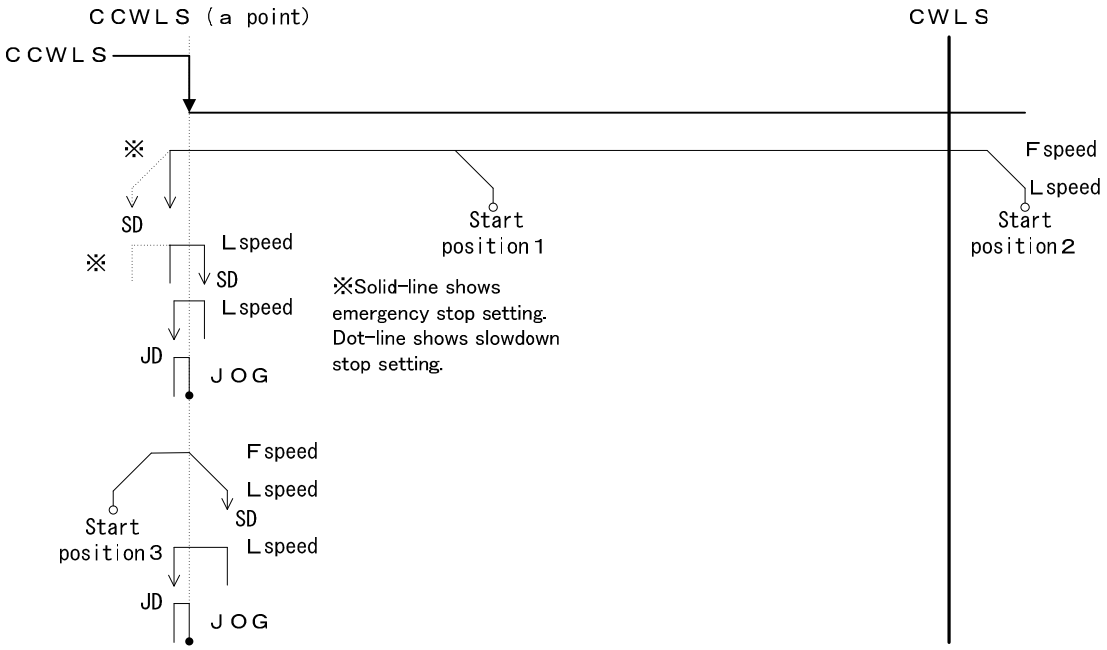
【Type４】

CW side edge (a point) of ORG signal is detected in CW direction.



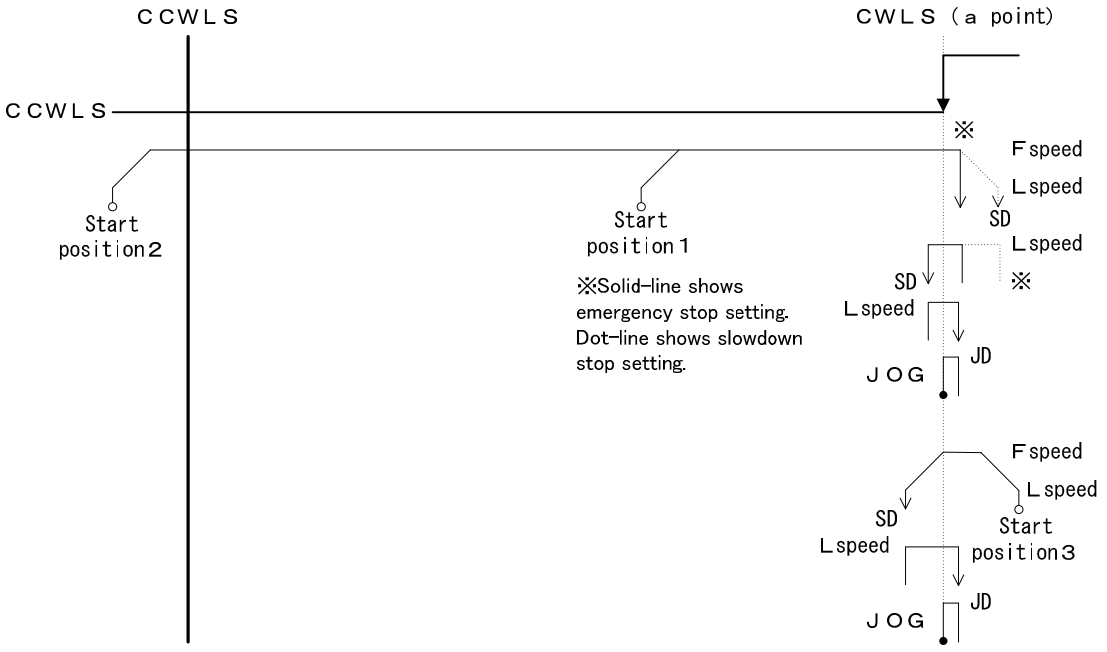
【Type５】

CW side edge (a point) of CCWLS signal is detected in CCW direction.



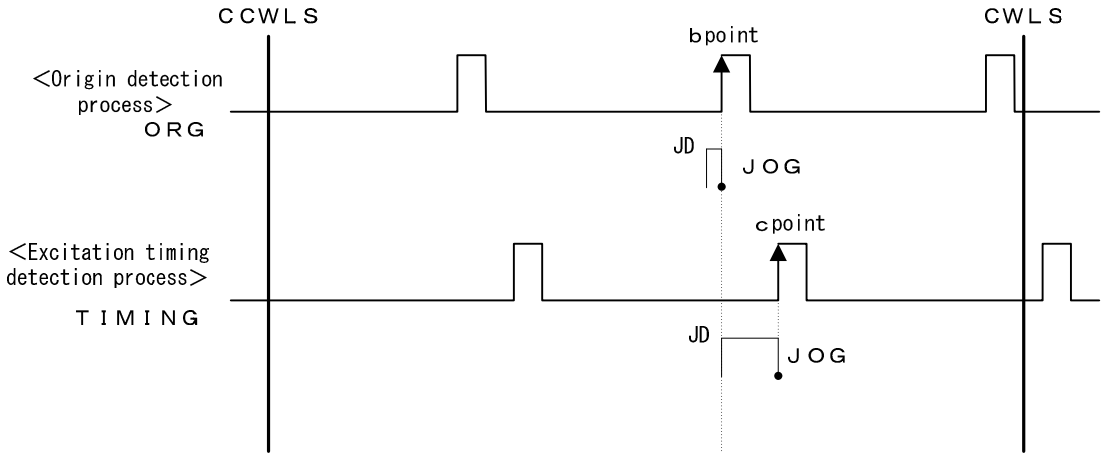
【Type６】

CCW side edge (a point) of CWLS signal is detected in CW direction.



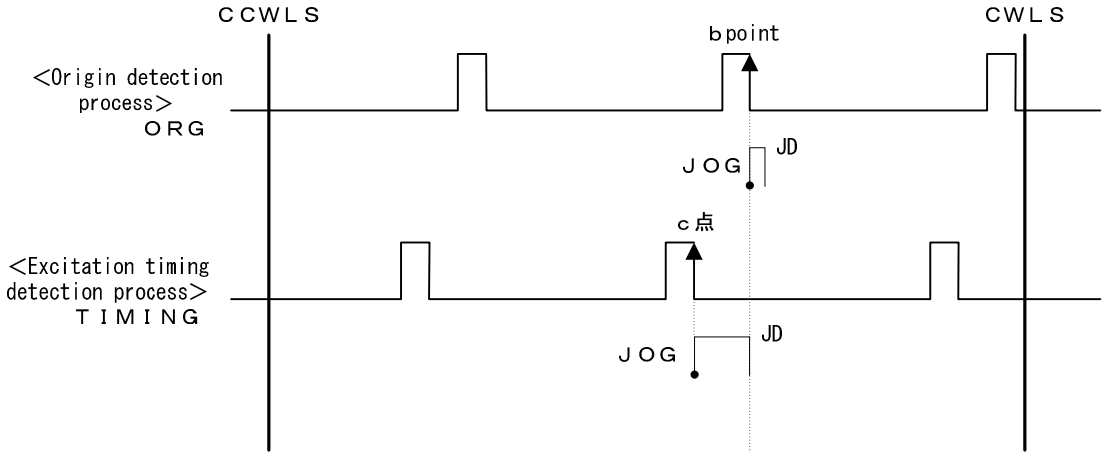
【Type7】

After the Type1 is performed, CCW side edge (c point) of TIMING signal is detected.



【Type8】

After the Type2 is performed, CW side edge (c point) of TIMING signal is detected.



【Type9】

After the Type3 is performed, CCW side edge of TIMING signal is detected.

【Type１０】

After the Type4 is performed, CW side edge of TIMING signal is detected.

【Type１１】

After the Type5 is performed, CCW side edge of TIMING signal is detected.

【Type１２】

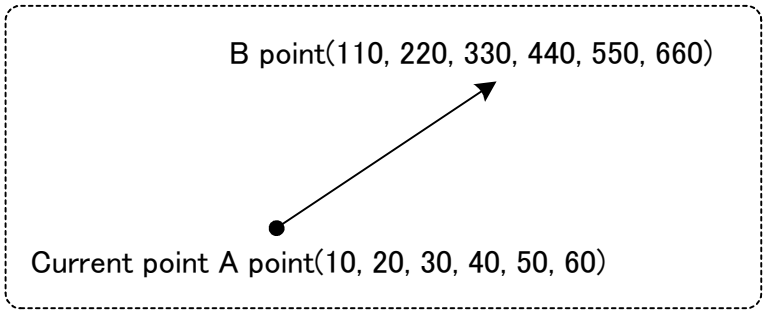
After the Type6 is performed, CW side edge of TIMING signal is detected.

○	Detection start position
●	Detection termination position
Ｆ Speed	Driving speed (Setting speed)
Ｌ Speed	Start-up speed (Setting speed)
ＪＤ（JOG）	Detection JOG interval（ＪＤ＝Lspeed）
ＬＤ	Limit detection stop time ３００ｍｓｅｃ
ＳＤ	Sensor detection stop time ３００ｍｓｅｃ

3.10 Linear interpolating function

Use linear interpolating function when want to move from current point to specified point as the shortest distance. Linear interpolation of Max. 6 axes are available at the link connecting. Linear interpolation is available with control software (DSCONTROL-WIN) or communication command usage.
However function of linear interpolating is unavailable from handy-terminal.

6axes linear interpolation －example



※Between links interpolating is inaccurate.(2nd and 3rd or 1st and 6th , etc)
That is inferior than same unit axes.(1st and 2nd or 3rd and 4th , etc)

3.10.1 Linear interpolating (Relative value)

Operate from current point to constantly away for each axes. (Relative driving)

【Communication command】

GOLinel _X□Y□Z□U□V□W□
□：+ or － (+：CW specified direction、－：CCW specified direction)
Distance："PULSe" setted (Unit is as case of current time)
※No driving axis is avoided. (example：GOLinel _X+Z-)。

【Communication command when operate the above example work】

AXIX:PULS_100
AXIY:PULS_200
AXIZ:PULS_300
AXIU:PULS_400
AXIV:PULS_500
AXIW:PULS_600
GOLinel_X+Y+Z+U+V+W+

3.10.2 Linear interpolating (Absolute value)

Operate from current point to point that want to move directly. (Absolute value driving)

【Communication command】

GOLineA_X□_Y□_Z□_U□_V□_W□
□：Specified point (Unit depends on setting unit at the time)
※No driving axes are avoided. (example：GOLineA_X1000_Z-2000)。

【Communication command when operate the above example work】

GOLineA_X110_Y220_Z330_U440_V550_W660

3.11 Teaching function

This equipment has built-in the teaching function for arbitrary coordinate registration of XY table, point control simply. The number of points has 64points（00~63）, 6 axes are registered on each points. Movement , registration, delete and edit to teaching point is available to use optional handy terminal, control software or user program with communication command. Also, specified point and movement are available for only PLC, I/O control by using controlled I/O (CNT-I/O).

	Movement	Registered	Delete	Edit
Controlled I/O(CNT-I/O)	○	×	×	×
Handy terminal DT100	○	○(Each 1 axis)	○（All axes）	○(Each 1 axis)
Controlled software DSCONTROL-WIN	○	○（All axes）	○（All axes）	△※1
Communication command	○	○	○	○

※1 Teaching data (tdf file) that is edited by text editor, display on DSCONTROL-WIN, then, transfer (writing).

Refer details as shown bellows:
Example teaching function ⇒2．2．1paragraph
Operated by controlled I/O(CNT-I/O) ⇒3．4．2paragraph
Operated by handy terminal ⇒4．1．4．3paragraph
Operated by controlled software DSCONTROL-WIN ⇒4．2．4paragraph
Operated by communication command ⇒4．3．5．2paragraph（14)、4．3．5．6paragraph（3）

3.12 Program function

This equipment is stand-alone and has built-in the program function that the number of step is each 100, total 8 for controlled general I/O and easy stage driving.

	Program edit	Program start	Program stop
Controlled I/O(CNT-I/O)	×	○	○
Handy terminal DT100	×	○	○
Controlled software DSCONTROL-WIN	○ (Recommended)	○	○
Communication command	○	○	○

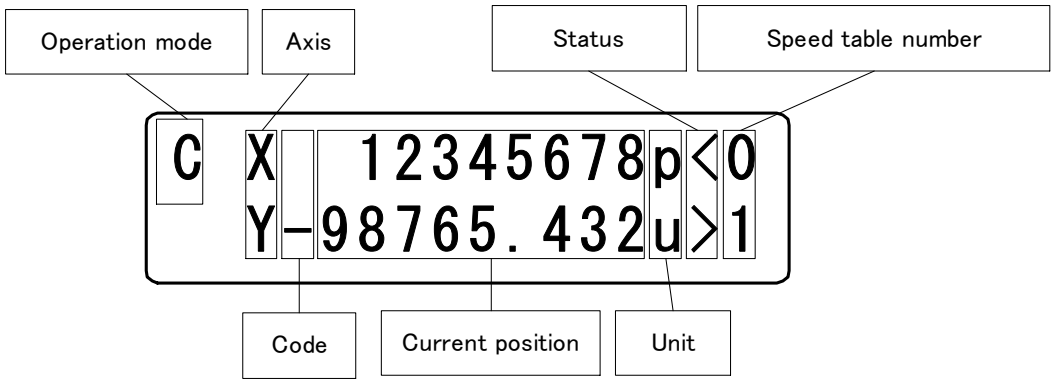
Refer details as bellows.:
Example teaching function ⇒2．2．2paragraph, 2．2．3paragraph
Operated by controlled I/O(CNT-I/O) ⇒3．4．2paragraph
Operated by handy terminal ⇒4．1．4．2paragraph
Operated by controlled software DSCONTROL-WIN ⇒4．2．5paragraph
Operated by communication command ⇒4．3．6paragraph

4. Operation and Control method

4.1 Operation by the handy terminal

4.1.1 Initial screen

Connect handy terminal and power on, display initial screen as below (Continue Mode) in 5 seconds.



※Current position of all axes might be 0 when power on.

<Display operation mode>
Display each operation mode
C (CNT): Continue Mode (Stage drives during press arrow key)
S (STP): Step Mode (Stage drives constantly by pressing arrow key)
A (ABS): Absolute Mode (Stage drives to specified point by pressing arrow key)
O (ORG): Origin Mode (Start to origin return by pressing arrow key)
H (HOM): Home Mode (Stage drives to home position by pressing arrow key)
R: Remote Mode
※" R" (Remote Mode) displays only receive the command from external interface. Only accept STOP key and JOG key.

<Axis>
Display axis that available controlled(No Link:XY、Link Connecting(2units):XY,ZU、Link Connecting (3units): XY,ZU,VW)。

<Code>
Display unit at the current point (No display " +" distance)

<Current point>
Display the current point (effective digit 8 digit, Except dot)

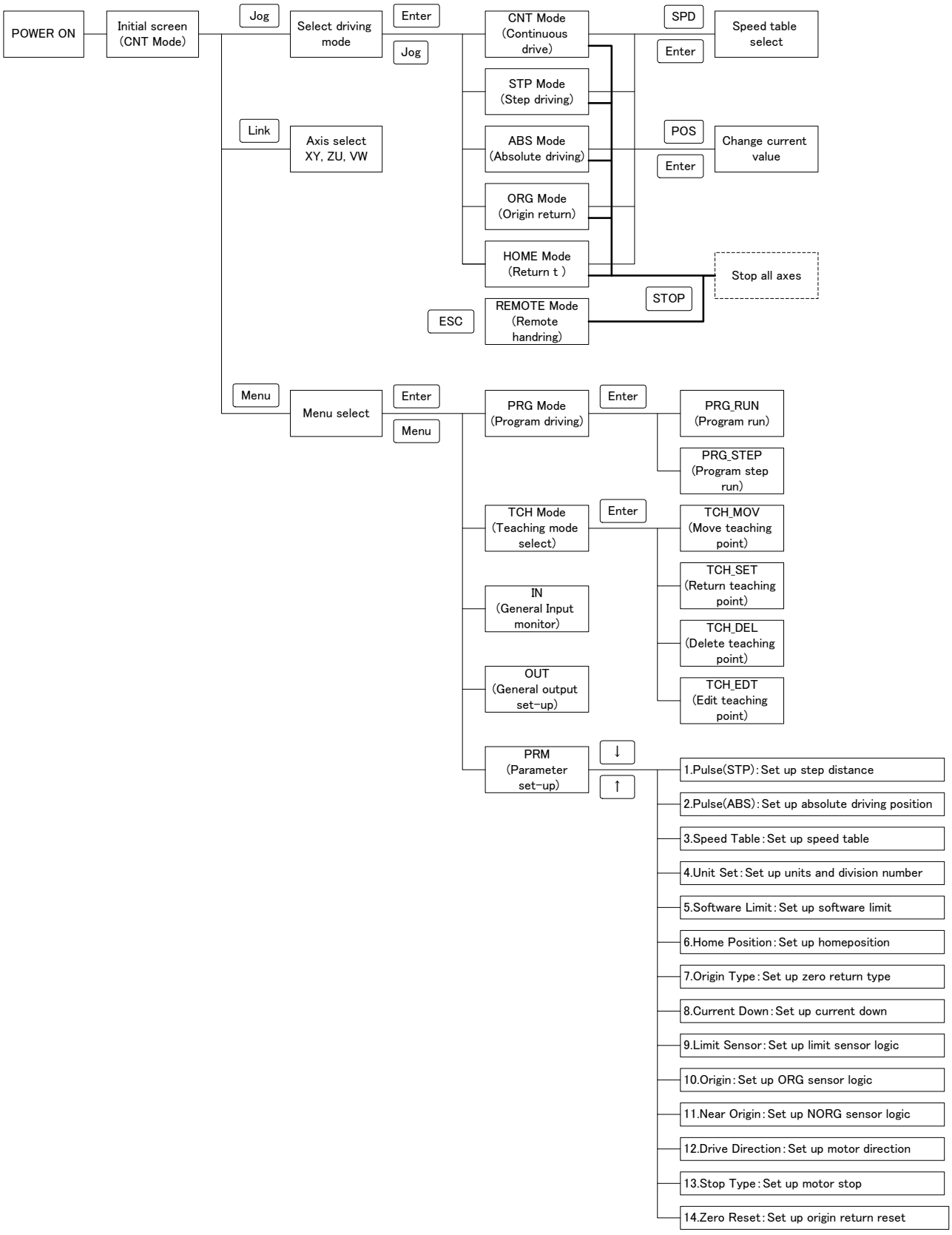
<Unit>
Set up by parameter. Display (p:pulse, u:μm, m:mm, d:deg, r:mrad)

<Status>
Display the axis condition
> : Machine limit + (CW) side is under detection
< : Machine limit − (CCW) side is under detection
■ : Machine limit both + (CW) and -(CCW)side are under detection (No connect to stage)
] : Software limit + (CW) side is under detection
[: Software limit − (CCW) side is under detection
＊ : Machine origin point is under stop by origin return
H : Move to position and under stop by home position return
note) Machine limit display is came first when machine limit and soft limit are detected.

<Speed table number>
Display speed table No (0~9)

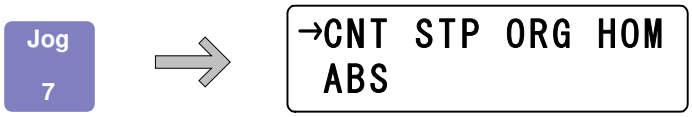
4.1.2 Transition mode

Handy terminal DT100 Transition mode as bellows.:



4.1.3 Driving mode select (JOG KEY)

Select each driving mode when each axis operation stop. Press Jog key, it start to display driving mode select. Select the function by using the arrow key and press ENTER key, then move to each driving mode.

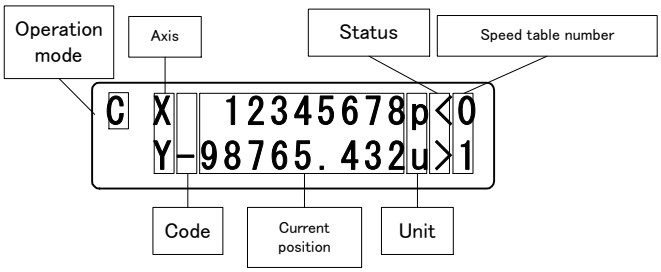


In each drive mode, when the EMS connector is opened, the drive mode display changes to "E" and all axes stop. If the EMS connector is short-circuited, it will return to the previous drive mode display. (Enable for DT100 Ver.1.03 or later.)

4.1.3.1 Continuous driving mode (CNT : Continue Mode)

Display as bellows by selected CNT.

CNT Mode



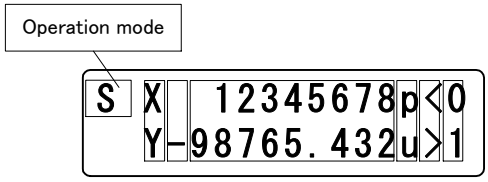
←、→、↑、↓ during press any key, drive with setting each parameter.

- ← key : X(Z,V) axis drive to -(CCW)
- → key : X(Z,V) axis drive to +(CW)
- ↑ key : Y(U,W) axis drive to +(CW)
- ↓ key : Y(U,W) axis drive to -(CCW)

4.1.3.2 Uniform pulse driving mode (STP : Step Mode)

Select STP, display as bellows.:

STP Mode



←、→、↑、↓ press any key, start to drive uniform pulse in each parameter.

- ← key : X(Z,V)axis drive to -(CCW)
- → key : X(Z,V)axis drive to +(CW)
- ↑ key : Y(U,W)axis drive to +(CW)
- ↓ key : Y(U,W)axis drive to -(CCW)

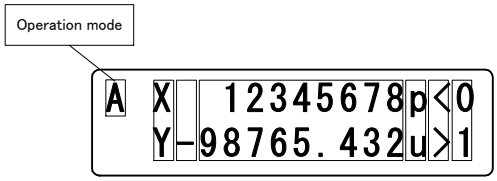
STOP key : Stop all axes

* Press shortcut key(Set key)at the step mode, display「Set up uniform pulse distance」.
(Return to step mode screen with Set key)

4.1.3.3 Absolute value driving mode (ABS： Absolute Mode)

Display as below when selects ABS.

ABS mode



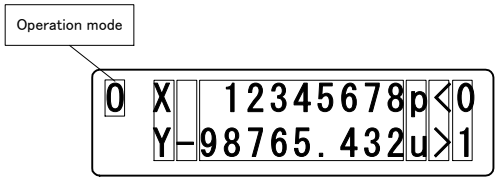
←、→、↑、↓ press any key, start to drive in each parameter
←、→ key： X(Z,V)axis drive to setting position
↑、↓ key： Y(U,W)axis drive to setting position
STOP key： Stop all axes

＊ Press shortcut key (Set key), display 「Set up absolute value driving position」
(Return to absolute driving mode screen with Set key)

4.1.3.4 Origin return mode (ORG： Origin Mode)

Display as below when selects ORG.

ORG mode



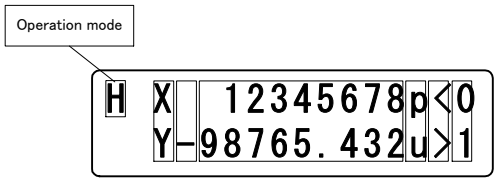
←、→、↑、↓ press any key, start origin return at "Origin Type" of parameter.
After origin return finished, display "＊" at "status" of main screen.
←、→ key： X(Z,V)axis return to origin
↑、↓ key： Y(U,W)axis return to origin
STOP key： Stop all axes

＊ Press shortcut key (Set key), display「Set up origin return type」
(Return to origin return mode screen with Set key)

4.1.3.5 Home position return mode (HOM：HOME)

Display as below when selects HOM.

HOM mode



Move the position that set by "Home Position" of parameter when press any key←、→、↑、↓
After home position return finished, display "H" at "status" of main screen.

←、→ key： X(Z,V)axis return to home position
↑、↓ key： Y(U,W)axis return to home position
STOP key ： Stop all axes

※ Press shortcut key, (Set key), display「Set up home position」
(Return to return mode screen with Set key)

4.1.4 Menu select (Menu key)

Select each menu at not <Remote Mode>. Press Menu key, display as bellows. Show each mode screen when press ENTER key after select mode with arrow key.

4.1.4.1 Parameter mode (PRM)

Allow parameter setting when select PRM.

① Pulse(STP) : Set up uniform pulse distance
② Pulse(ABS) : Set up absolute value driving position
③ Speed Table : Set up speed table
④ Unit Set : Unit(UT)、Pulse distance per 1 step(SD)、Set up division number of driver(DR) (Distance(RE) per 1 pulse automatically calculated)
⑤ Software Limit : Set up software limit
⑥ Home Position : Set up home position
⑦ Origin Type : Set up origin return type
⑧ Current Down : Set up current down
⑨ Limit Sensor : Set up limit sensor logic
⑩ Origin : Set up origin sensor logic
⑪ Near Origin : Set up nearby origin sensor logic
⑫ Drive Direction : Set up driving direction
⑬ Stop Type : Set up stopping
⑭ Zero Reset : Set up 0 reset at return to origin

14 parameter setting screen might be changed in order by ↑,↓ key. Press Enter key, display each parameter setting screen. Return to menu select screen with ESC key.

【List of Parameter selection】

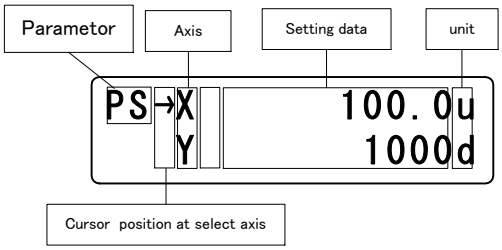
1. Pulse(STP)	8. Current Down
2. Pulse(ABS)	9. Limit Sensor
3. Speed Table	10. Origin
4. Unit Set	11. Near Origin
5. Software Limit	12. Drive Direction
6. Home Position	13. Stop Type
7. Origin Type	14. Zero Reset

①Pulse(STP) (Uniform pulse driving, Set up distance value)

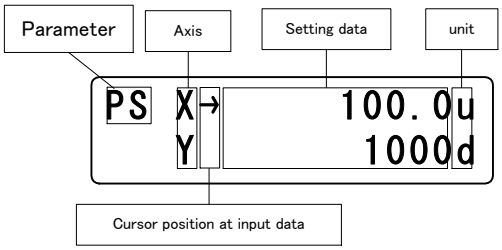
Set up distance at uniform pulse driving (Step Mode)

Select "Pulse(STP)", shows as below.: Press ↑,↓ key, select a setting axis.

Return to parameter select screen with ESC key.



After axis selected, press Enter key, display the cursor on left lateral of setting data. Can be input the setting data with numeric keypad.



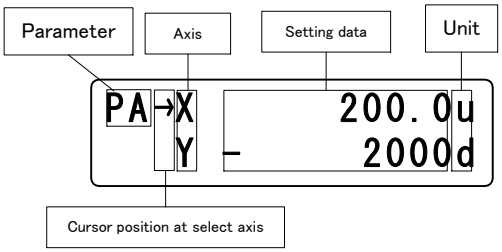
After setting finished, press Enter key, be moved the cursor on left lateral and input any other axis.

※During input the setting data, continue to press ESC key (1 sec.), might be return to select the setting axis without input setting data.

②Pulse(ABS) (Set up absolute position)

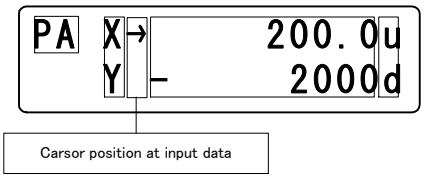
Select driving position at absolute position driving (ABS Mode)

Display as below with "Pulse(ABS)", Select setting axis with ↑,↓ key. Return to parameter select screen with ESC key.



After axis selected, press Enter key, display the cursor on left lateral. Can be input the setting data with numeric keypad.

※ "+" no displayed

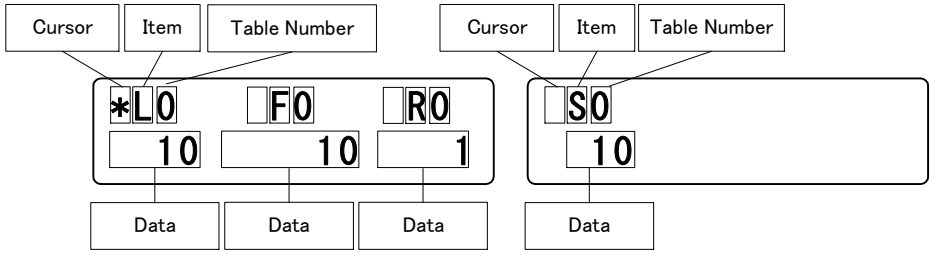


After setting finished, press Enter key, be moved the cursor on left-lateral and input any other axis

※During input the setting data, continue to press ESC key (1 sec.), might be return to select the setting axis without input setting data.

③Speed Table (Set up speed table)

Set up starting speed(L), driving speed(F), acceleration and deceleration rate(R) and S acceleration and deceleration rate(%). Display each (L)(R)(S) setting data and speed table number when select "Speed Table" shown as below.: At this time, "*" shows on left-lateral of setting item. Be moved "*" with ←、→ key , then select (R) or (S). Select speed table number with ↑、↓ key. Return to parameter select screen with ESC key



← key : Move the cursor(*)to the left. Case of cursor is in left-lateral S rate(S), change the screen and display the acceleration and deceleration rate.(See the above)

→ key : Move the cursor(*)to the right. Case of cursor is in left-lateral (R), change the screen and display the S acceleration and deceleration rate(S). (See the above)

↑ key : Speed Table Number change to order 9→8→…→1→0

↓ key : Speed Table Number change to order0→1→…→8→9

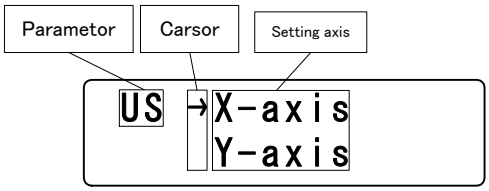
※ Return to parameter select screen if press ESC during select the Speed Table or setting item

After moved by arrow key, press Enter key and then change to →. Possible to input with numeric keypad. (* Displayed in continuous pressing ESC key). After input, press Enter key, be confirmed setting value and change → to "*".

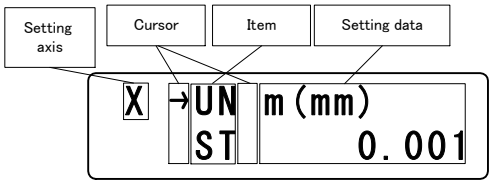
④Unit Set (Set up units and division number)

Set up the unit, the distance per pulse at full step and division number of driver.
This set up shows distance per pulse,
(Distance per pulse at the full step) ÷ (Division number of driver)
automatically calculated.

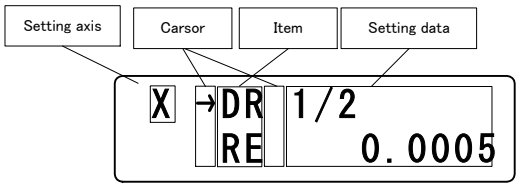
Display cursor when select "Unit Set", jump to setting screen that set units.
Move the cursor to left-lateral of axis that set with ↑、↓key.
Return to parameter select screen with ESC key.



After select the setting axis, press Enter key, "Unit(UN)" and "Distance per 1 pulse at the full step" (ST)of axis that selected as bellows.:



Move cursor to the side of setting item that want to be set with ↑、↓key.
Shows “distance per 1pulse (RE) and “Set up drivers division number (DR)” when press ↓key for 2 times.



＊RE
（Distance per 1 pulse at the full step）÷（Division number of driver）
Automatically calculated

Press Enterkey when move the cursor to setting item that want to be setting. Then, carsor move to left-lateral of setting data that selected, available to input the setting data.

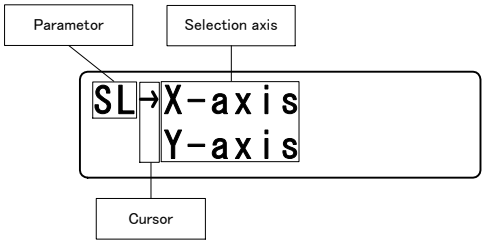
※Press ESC key at the setting item select screen, return to axis selecting screen.
※Press ESC key at the setting data input screen, return to setting item select screen.

<UN>
Set the units
Press ↑、↓ key, then select (p(pulse)/u(um)/m(mm)/d(deg)/r(mrad))
Press Enter key after finished input, return to setting item select screen.
<SD>
Set up the distance per 1 pulse at the full step of motorized stage.
Input setting data with numeric keypad.
After input finished, press Enter key, return to setting item select screen.
<DR>
Set up the division number of motorized driver with ↑、↓ key.
Normal driver → FULL／HALF
Micro step driver → 1／1～1／250

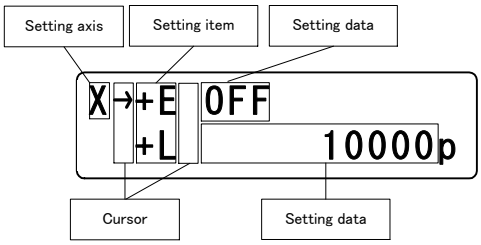
※If press ESC key during input the setting data, return to selection screen of setting item without setting data.(In case of ST entry screen, (Return to selection screen of setting item with ESC key continuation press（1 sec))

⑤Software Limit (Set up Software Limit)

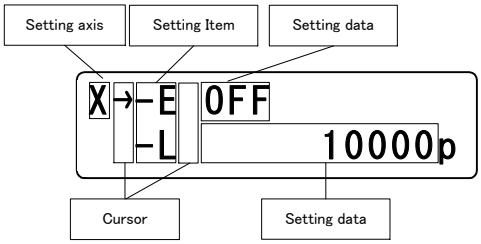
Set up valid/invalid and set the coodinate of software limit.
When select the “Software Limit”, display the cursor on left-lateral at the selection screen that setted software limit. Press ↑,↓ key, select the setting axis.
Return to parameter selection screen with ESC key.



Press Enter key after finished selection of axis. Move to Software Limit setting screen of +(CW) side of selection axis, then cursor shows on left-lateral



Move cursor to the left-lateral of setting item that set with ↑,↓ key.
Press ↓ key 2 times, display Software Limit setting screen of (CCW) side as bellows.:



Move cursor to the left-lateral of setting item that set with ↑,↓ key.

Press Enter key when move the cursor to setting item that want to be setting. Then, Cursor move to left-lateral of setting data that selected, available to input the setting data.

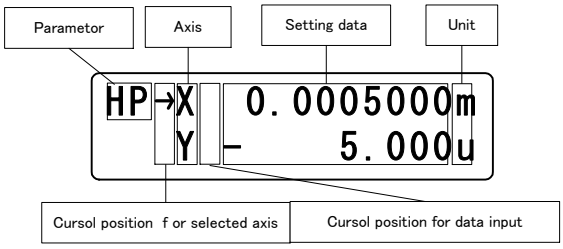
<+E,-E>
Set up Software Limit（CW,CCW distance）valid/invalid.
Select Software Limit valid/invalid with ↑、↓key.
After selection, be fixed with Enter key and return to selection screen. Return to selection screen with ESC key.

<+L,-L>
Set up the coodinate（CW,CCW direction）.
Can be changed with numeric keypad.

Press Enter key after finished input, return to setting item select screen.
Return to selection screen of setting item with ESC key continuation press（1 sec）.

⑥Home Position （Set up Home position）

Set up Home position for each axis.
When select the "Home Position", to be Home position setting screen. Display the cursor on left lateral of setting axis.



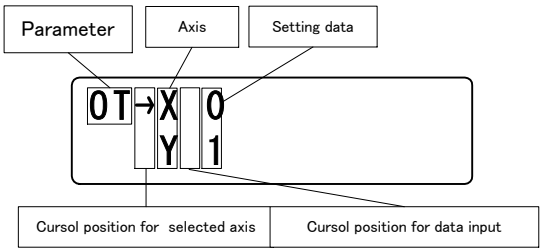
Move cursor to the left-lateral of axis that set with ↑,↓ key.
※Return to parameter selection screen with ESC key .

After axis selected, press Enter key, display the cursor on left lateral of setting data. Can be input the setting data with numeric keypad. Please input - key first when input the code.
※ "+" no displayed

After setting finished, press Enter key, be moved the cursor on left-lateral and input any other axis
※During input the setting data, continue to press ESC key (1 sec.), might be return to select the setting axis without input setting data.

⑦Origin Type (Set up Origin return type)

Set up each axis origin return type.
When select the "Origin Type", to be Origin Type setting screen. Display the cursor on left lateral of setting axis.

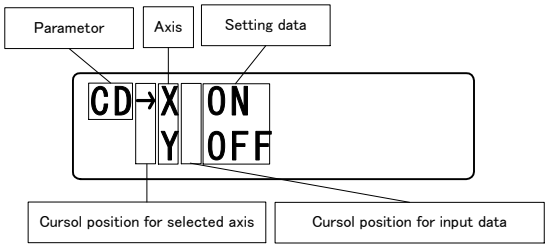


Move cursor to the left-lateral of axis that set with ↑,↓ key.
※Return to parameter selection screen with ESC key.
After axis selected, press Enter key, display the cursor on left-lateral of setting data, and then input the setting data with ↑、↓key.

After setting finished, press Enter key, be moved the cursor on left-lateral and input any other axis
※During input the setting data, press ESC key, might be return to select the setting axis without input setting data.

⑧Current Down (Current Down Control Setting)

Set up each axis Current Down Control Setting.
When select the "Current Down", to be Current down setting screen. Display the cursor on left lateral of setting axis.



Move cursor to the left-lateral of axis that set with ↑,↓ key.
※Return to parameter selection screen with ESC key.

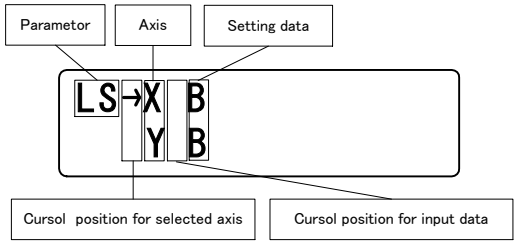
After axis selected, press Enter key, display the cursor on left-lateral of setting data, and then input the setting data with ↑、↓key.

After setting finished, press Enter key, be moved the cursor on left-lateral and input any other axis
※During input the setting data, press ESC key, might be return to select the setting axis without input setting data.

For normal driver type , the current down control is fixed to ON.
When DT100 of Ver.1.03 or later is connected, the arrow (→) is not displayed and it is fixed to ON.
If you connect DT100 of Ver.1.02 or earlier, it will be forcibly returned to ON even if you try to switch it to OFF. The MS type is unchanged in all versions.

⑨Limit Sensor（Limit Sensor Logic Setting）

Set up each axis Limit Sensor Logic Setting.
When select the "Limit Sensor", to be Limit Sensor Logic setting screen. Display the cursor on left lateral of setting axis
Move cursor to the left-lateral of axis that set with ↑、↓ key.



※Return to parameter selection screen with ESC key

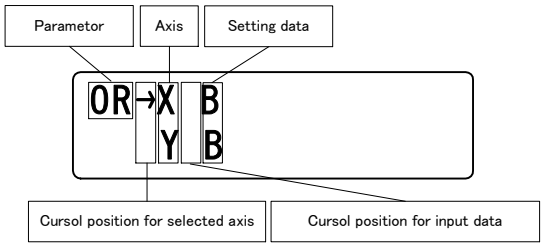
After axis selected, press Enter key, display the cursor on left-lateral, and then input the setting data with ↑、↓key.

After setting finished, press Enter key, be moved the cursor on left-lateral and input any other axis

※During input the setting data, press ESC key）, might be return to select the setting axis without input setting data.

⑩Origin（Origin Sensor Logic Setting）

Set up each axis Origin Sensor Logic Setting.
When select the "Origin", to be Origin Sensor Logic setting screen. Display the cursor on left lateral of setting axis.
Move cursor to the left-lateral of axis that set with ↑、↓ key.



※Return to parameter selection screen with ESC key.

After axis selected, press Enter key, display the cursor on left-lateral of setting data, and then input the setting data with ↑、↓key.

After setting finished, press Enter key, be moved the cursor on left-lateral of axis and input any other axis.

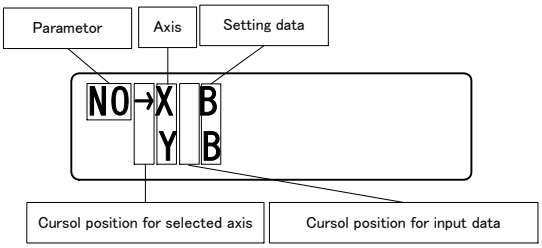
※During input the setting data, press ESC key, might be return to select the setting axis without input setting data.

⑪Near Origin (Near Origin Sensor Logic setting)

Set up each axis Near Origin Sensor Logic Setting

When select the "Near Origin", to be Near Origin Sensor Logic setting screen. Display the cursor on left lateral of setting axis.

Move cursor to the left-lateral of axis that set with ↑,↓ key.



※Return to parameter selection screen with ESC key.

After axis selected, press Enter key, display the cursor on left-lateral of setting data, and then input the setting data with ↑、↓key.

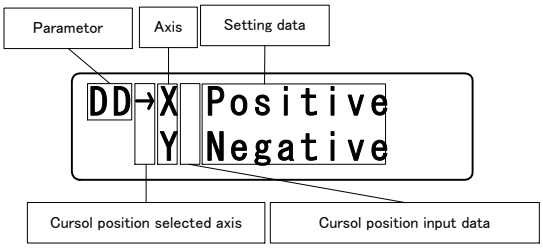
After setting finished, press Enter key, be moved the cursor on left-lateral of axis and input any other axis.

※During input the setting data, press ESC key, might be return to select the setting axis without input setting data.

⑫Drive Direction (Motor Driving Direction)

Set up each axis Motor Driving Direction Setting.

When select the "Driving Direction", to be Motor Driving Direction setting screen. Display the cursor on left lateral of setting axis.



Move cursor to the left-lateral of axis that set with ↑,↓ key.

※Return to parameter selection screen with ESC key.

After axis selected, press Enter key, display the cursor on left-lateral of setting data, and then input the setting data with ↑、↓key.

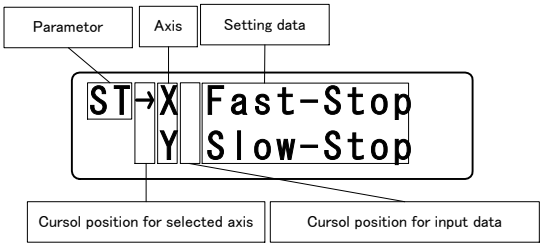
After setting finished, press Enter key, be moved the cursor on left-lateral and input any other axis

※During input the setting data, press ESC key, might be return to select the setting axis without input setting data.

⑬Stop Type (Motor Stop Setting)

Set up each axis Motor Stop Setting

When select the "Stop Type", to be Motor Stop setting screen. Display the cursor on left lateral of setting axis.



Move cursor to the left-lateral of axis that set with ↑,↓ key.

※Return to parameter selection screen with ESC key。

After axis selected, press Enter key, display the cursor on left-lateral of setting data, and then input the setting data with ↑、↓key

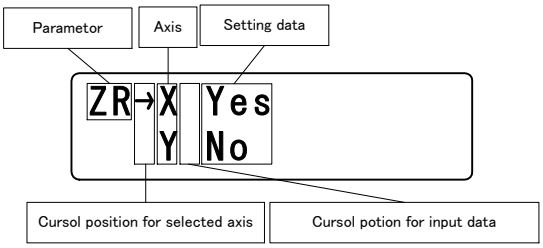
After setting finished, press Enter key, be moved the cursor on left-lateral of axis and input any other axis.

※During input the setting data, press ESC key, might be return to select the setting axis without input setteing data.

⑭Zero Reset (Count Zero Reset Setting at Origin Return)

Set up each axis Count Zero Reset Setting

When select the "Zero Reset", to be Count Zero Reset setting screen. Display the cursor on left lateral of setting axis.



Move cursor to the left-lateral of axis that set with ↑,↓ key

※Return to parameter selection screen with ESC key.

After axis selected, press Enter key, display the cursor on left-lateral of setting data, and then input the setting data with ↑、↓key.

After setting finished, press Enter key, be moved the cursor on left-lateral of axis and input any other axis.

※During input the setting data, press ESC key, might be return to select the setting axis without input setteing data.

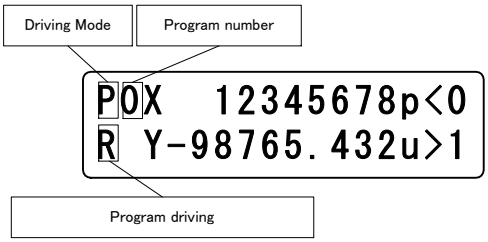
4.1.4.2 Program Driving Mode (PRG)

Downloaded from computer program (8Programs(0~7)、100Steps/1Program) is driven and stopped. If select "PRG", shows bellows screen and cursor is displayed on left-lateral. Return to Menu selection screen with ESC key.
Move cursor to the left-lateral that selected driving mode with ↑、↓key.

```
PRG →RUN
     STEP
```

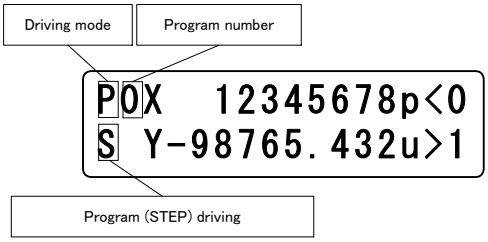
After select the program driving mode, press ENTER key jump to following each driving screen.

<Select RUN mode (a series of operations) >
Select "RUN", display the program number. Change the program number with ↑、↓key (Only display registered program number in 8 programs)



After selected program, press ENTER key display "R". If press STOP/ESC key during the drive Program might be stop. Return to program driving mode selection screen during press STOP/ESC key at off-line.

<STEP mode selection>
Select "STEP", display the program number. Change the program number with ↑、↓key.



After selected program number, each press ENTER key drive the selection program each 1 line. Display "S" during drive. Return to program driving mode selection screen during press STOP/ESC key at off-line.

<Registered, change and delete>
Please enter to registered, change and delete in the controlled software (DSCONTROL-WIN)
No work DT100.

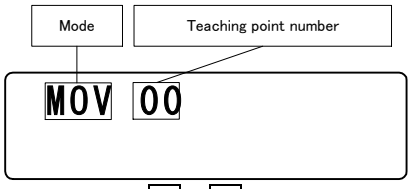
4.1.4.3 Teaching mode (TCH)

If select "TCH", shows bellows screen and cursor is displayed on left-lateral.
Move cursor to the left-lateral that selected teaching mode with ←、→key.

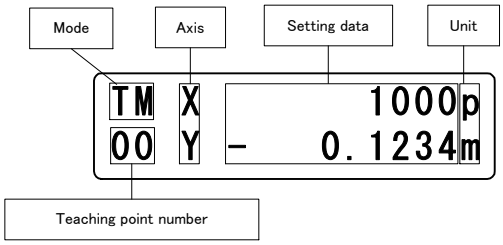
After select the teaching mode, press ENTER key, jump to following each driving screen.
Return to Menu selection screen with ESC key.

<MOV: Teaching Point Moving>

If select "MOV", shows bellows screen (Return to teaching mode selection screen with ESC key.)



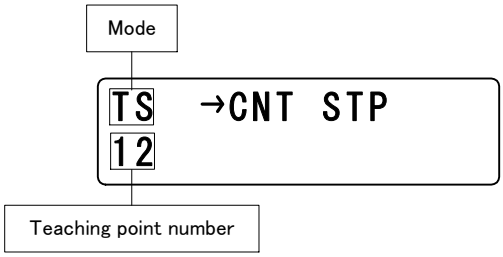
Change the program number with ↑、↓key. Display the teaching point what you want , press ENTER key .



Press ENTER key at this screen, start to move to teaching point. (Return to teaching point number selection screen during press STOP/ESC key at off-line.)

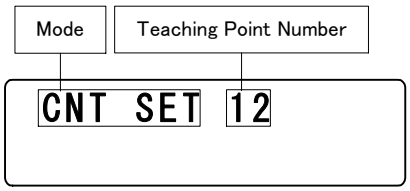
<SET: Teaching point setting>

If select "SET", shows bellows screen.
Return to teaching mode selection screen with ESC key.

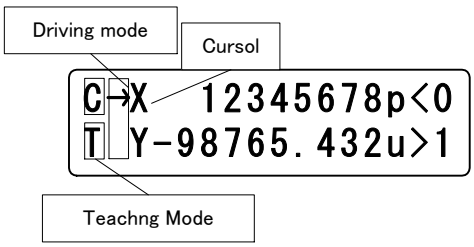


Move cursol to the left-lateral that selected driving mode with ←、→ key.
Press ENTER key, jump to following teaching point number selection screen of each mode.

(1) CNT

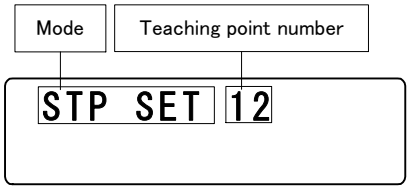


Use ↑、↓ key, and change the teaching number. (Counted up and down continuously-pressed over 1sec.) Press ENTER key with displaying teaching number, then jump to following screen.

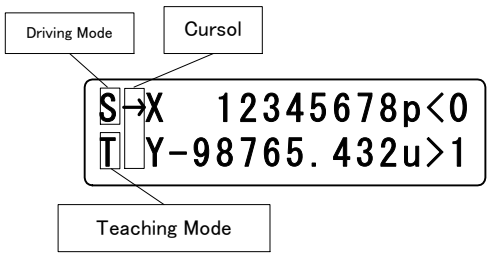


It is possible to drive Jog with arrow key. Press SET key at the registered position, display cursor. Select registered axis with ↑、↓ key, press ENTER key, then coordinate registration.
Press ESC key, return to teaching point selection screen.
※ Can be changed speed table during teaching mode.

(2) STP

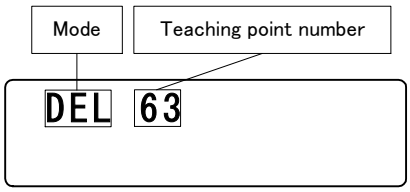


Change the teaching point with ↑、↓ key, (Counted up and down continuously-pressed over 1sec.) . Press ENTER key with displaying teaching number, then jump to following screen.

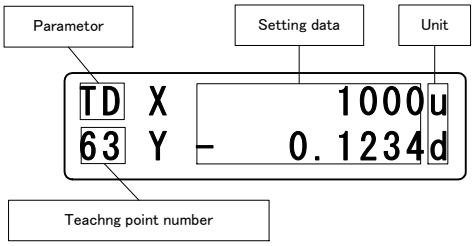


It is possible to drive STEP with arrow key. Press SET key at the registered position, display cursor. Select registered axis with ↑、↓ key, press ENTER key, then coordinate registration.
Press ESC key, return to teaching point selection screen.
※ Can be changed speed table during teaching mode.

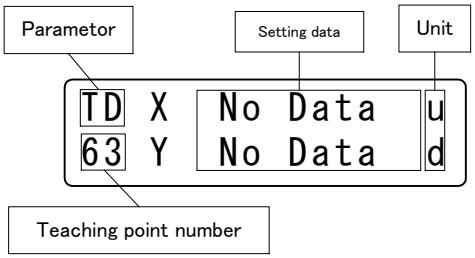
<DEL: Teaching point delete>
Select “DEL”, shows as bellows.: (Return to teaching mode selection screen when press ESC key).



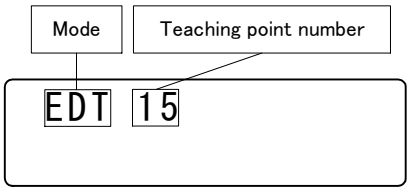
Use ↑、↓ key, and change the teaching number. (Counted up and down continuously-pressed over 1sec.) Press ENTER key with displaying teaching number, then jump to following screen.



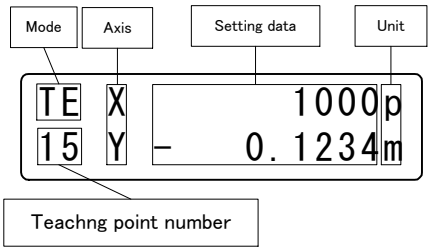
Press ENTER key at this screen, delete registered teaching position number (all of the 6 axes),then display ” No Data”. (Return to teaching mode selection screen when press ESC key).)



<EDT: Teaching point edit>
Select “EDT”, shows as bellows.: (Return to teaching mode selection screen when press ESC key).



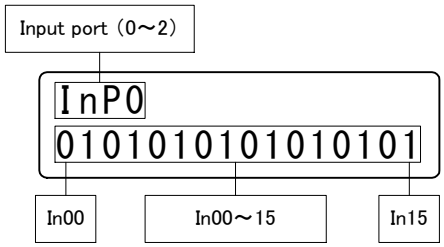
Use ↑、↓ key, and change the teaching number. (Counted up and down continuously-pressed over 1sec.) Press ENTER key with displaying teaching number, then jump to following screen.



After select axis with ↑、↓ key, press ENTER key, cursor will move to left-lateral of setting data. Can be edited teaching point directly. After complete, press ENTER key, edit is finished. Cursor will be return to left-lateral of axis. Cursor will be returned to left-lateral without edition if press ESC key over 1sec.

4.1.4.4 General Monitor (IN)

Monitoring general I/O (Option) input port (In00～47).
Select "IN" display as bellows.:

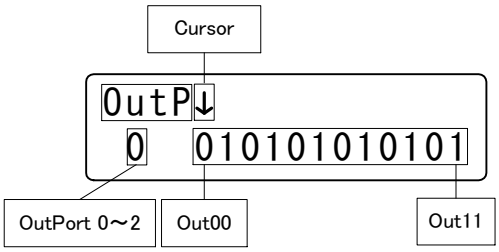


Each time one presses the Link key, can be monitoring I/O(Input) of Link No.1、Link No.2 that connected to the body. (Link No.1=InP1(In16～31)、Link No.2=InP2(In32～47))。

※ Press ESC key, return to menu selection screen.

4.1.4.5 General output control (OUT)

Control general I/O output port (Out00～35).
Select "OUT" display as bellows.:



Move cursor (↓) with ←,→ key, match the pit that wants controlled. Each time one presses the ↑,↓ key, shows to change the value like …→1→0→1→….After complete, press ENTER key, output the port that set at "1".

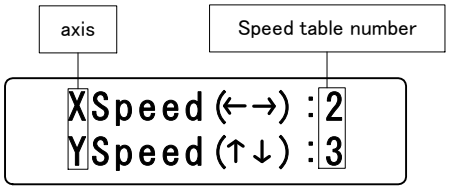
At this screen, each time one presses the Link key, can be controlled I/O(Output) connected to Link No.1, Link No.2. (Link No.1=OUTP1(OUT12～23)、Link No.2=OUTP2(OUT24～35))。

※ Press ESC key, return to menu selection screen.

4.1.5 Other function

4.1.5.1 Change the Speed Table (SPD Key)

Press SPD key at the driving mode, display as bellows.:

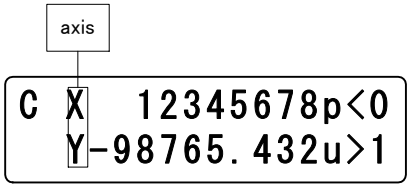


←: Count down the speed table number of X(Z,V) each time one presses the key
→: Count up the speed table number of X(Z,V) each time one presses the key
↑: Count up the speed table number of Y(U,W) each time one presses the key
↓: Count down the speed table number of Y(U,W) each time one presses the key
ENTER: Complete to change, return to driving mode screen
ESC: Return to driving mode screen without change

※ Can be changed speed table during driving.

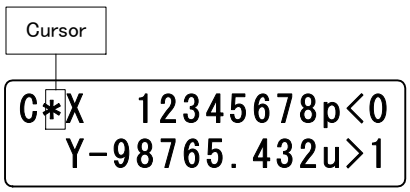
4.1.5.2 Change the axis (Link key)

Press Link key at the all axis display screen(included parameter setting screen), selection axis change XY→ZU→VW→XY…. Can be changed displaying axis during driving.



4.1.5.3 Changes current position (POS Key)

At the each axis is stopped , and displayed the driving mode(CNT/STP/ABS/ORG/HOM), press POS key, display " *" , selected axis with ↑、↓ key.



After selected axis, press Enter key, change "*"to"→" . Can be entering the arbitrary position with numeric keypad. Return to "*" if press ESC key over 1 sec. "→" will be disappeared.
When press ESC key over 1 sec., return to "*". After complete, press Enter key, " →" will be changed to " * " with coordinate setting. Press POS key, return to driving mode.

4.1.5.4 Version confirmation, Parameter reset

Can be confirmed version of controller and terminal under the each axis driving is off and no <Remote Mode>. Also return to before shipping condition each parameter setting.

Hold STOP key and press Enter key, the controller and terminal version displays as bellows.:

```
DS102Ver1.00
DT100Ver1.00
```

Hold STOP key and press Enter key for over 5 sec., shows “＊” as bellows.
Might be initialize power on again.

```
*DS102Ver1.00
*DT100Ver1.00
```

4.2 DS102/112 Controlled software (DSCONTROL-WIN)

Use DSCONTROL-WIN, can be parameter setting, JOG driving, registered and moved of teaching point and edited and started of program driving easily.

4.2.1 DSCONTROL-WIN start-up

According to routine 2. 1. 3, when install DSCONTROL-WIN, can be started DSCONTROL-WIN from Windows start menu.

Please check the power and communication cable when shows below message.

Start up DSCONTROL-WIN when function normally.

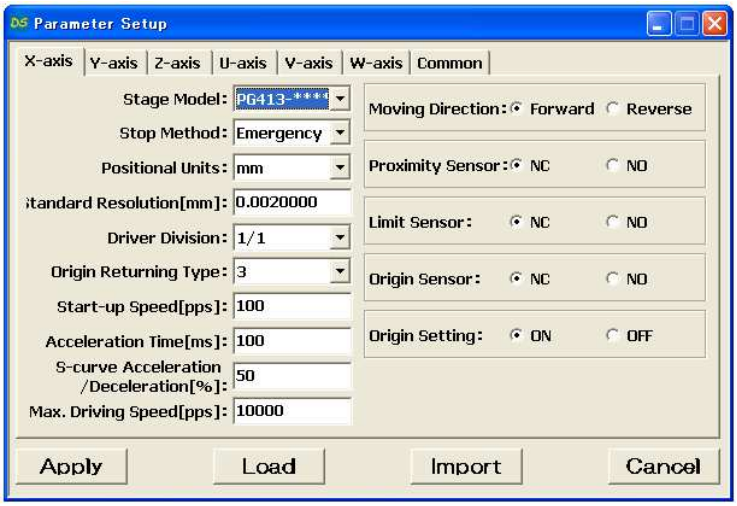
※ **Please power off this machine after DSCONTROL-WIN closed, because the setting data is written in the memory at the moment DSCONTROL-WIN closed.**

4.2.2 Parameter set-up

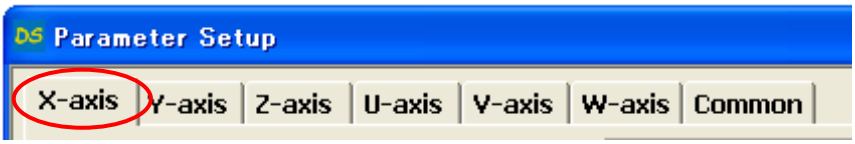
Please set up the parameter when use DSCONTROL-WIN at the first time.

<Basic operation>

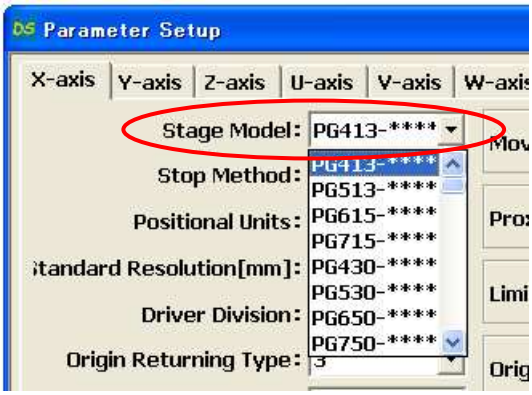
i. Parameter setting screen appears, when it be selected [Action]→[Parameter].



ii. Click any selection you want.



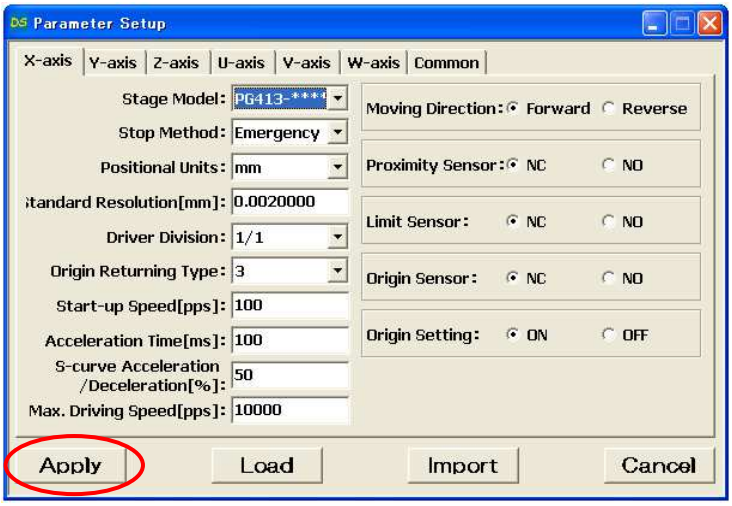
iii. Select stage model number you use among stage list.
Selecting stage model number, its Initial value of stage appears.



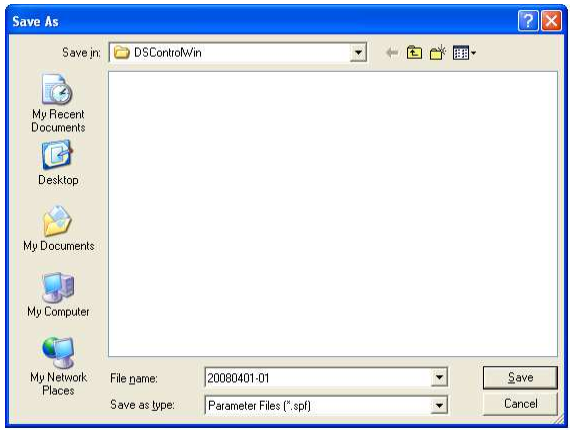
※ When need different value, input any value you want directly.

iv. Repeat ii～iii, select any axis and value.

v. Click [Apply].



Saving screen of parameter appears.



vi. Confirm Save location and its name then click [Save].

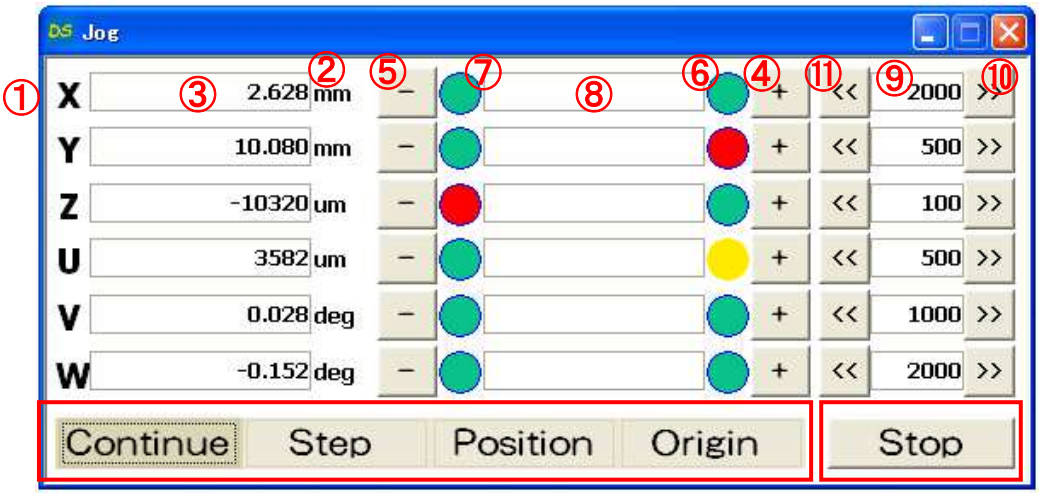
Parameter file is saved in PC and selected parameter is forwarded to DS102/112.
※ spf is automatically added as extension.

4.2.3 Jog driving

Move each stages to any optional location.

<Basic operation>

i. [Action]→[Jog] on main menu then screen below appears.

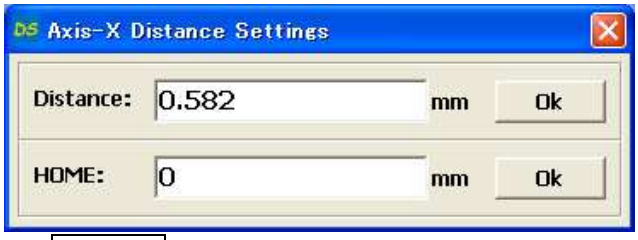


① Axis
② Unit
③ Current location
④ Move to ＋ (CW) direction
⑤ Move to － (CCW) direction
⑥ Limited detection of ＋ (CW) direction (Green : Non-detection, Red : Detection)
Double click sets up limit of software (Yellow : Detection)
⑦ Limited detection of － (CCW) direction (Green : Non-detection, Red : Detection)
Double click sets up limit of software (Yellow : Detection)
⑧ Display set value of step drive and position drive
⑨ Display speed (unit : pps fixed) (Direct input on double click)
⑩ Speed value up (Until max speed by parameter set up)
⑪ Speed value down

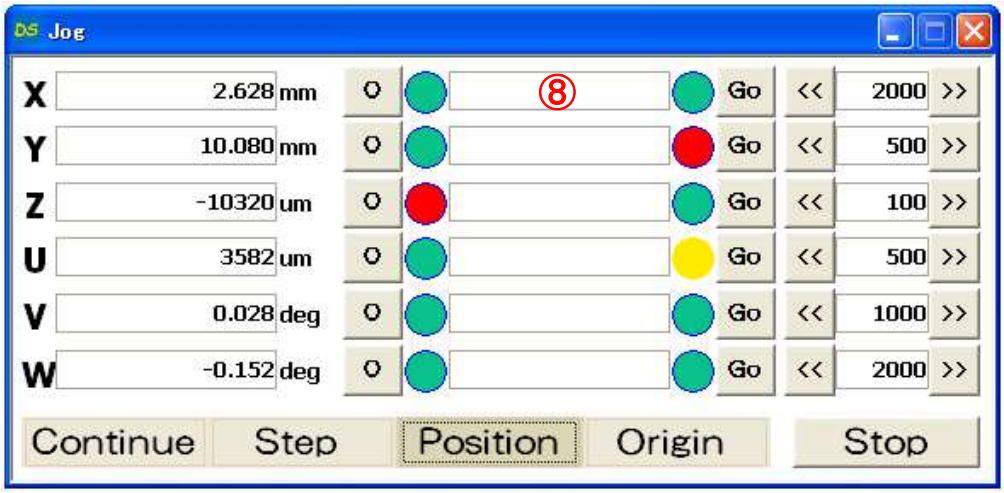
ii. Continue、Step、Position、Origin Select and click any key.

Continue : While pushing ＋, －, stage moves. Once released button, stage stops on parameters set up (Fast stop or Slow stop).

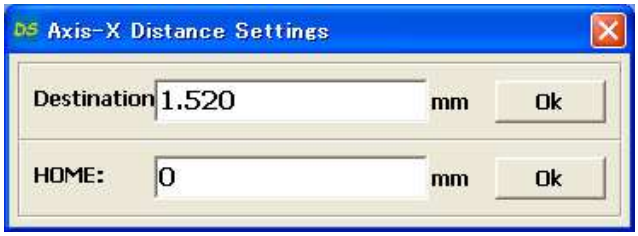
Step : Once pushing ＋, －, stage moves by setted movement value.
When you change movement value, double click ⑧, input movement value directly.



Position : Click Position so screen below appears.

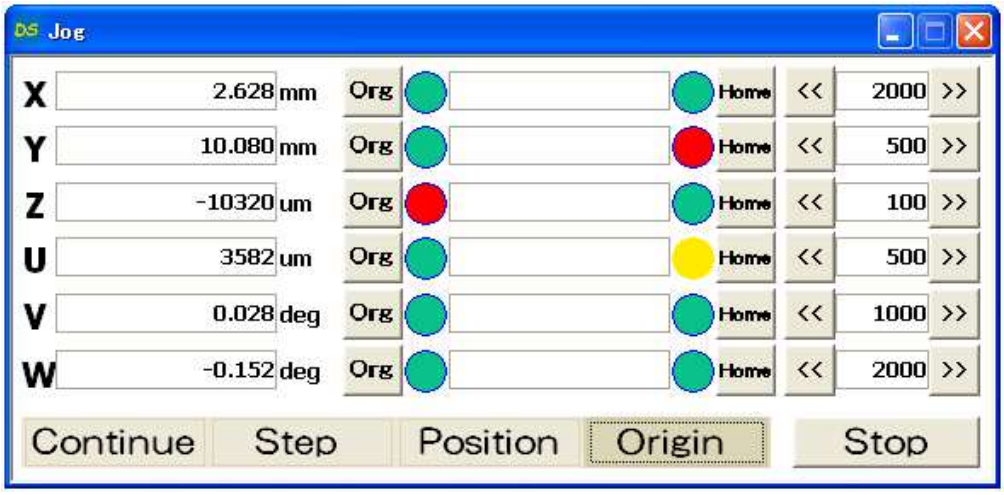


When you change movement position, double click ⑧, input movement position directly.



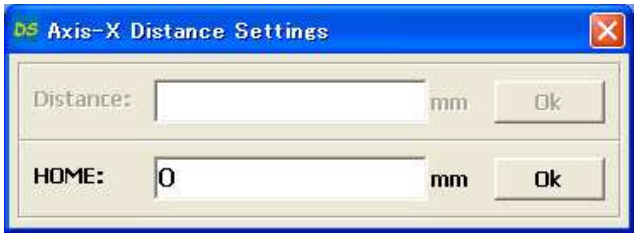
After set up any value and position, click GO so stage moves to position you set up.
Click 0, so stage move to "0 "position.

Origin : Click Orogin, so screen below appears.



Click Origin, so stage move to Origin position.

When you set or change Home position, double click ⑧.
Screen below appears and you can set up any optional position.



After setting, push Home, so stage moves to home position.

Stop : While stage moves, click Stop so stage stops (Fast stop or Slow stop).

<Direct speed input>

Double click ⑨ on speed display so screen below appears.
Input speed value you like then click [OK].

※ Speed value should be within Max speed parameter can set up

<To change current position value to optional value>

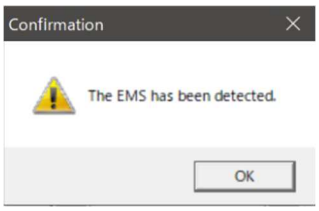
Double click ③ so screen below appears.
Input any optional value then click [OK].

<To set up soft limit>

Double click ⑥ so screen below appears. (If you double click ⑦, "—" (CCW) direction)

To click [OK] sets current position as soft limit valus. Detecting soft limit, display of soft limit turns yellow.
In case of Disable, double click limit display then click Disable.

In the combination of DSCONTROL-WIN Ver.1.06 or later, when the EMS connector is opened during JOG drive, teaching, program drive, and I/O monitor screen display, the following message box will appear.This message box disappears when the EMS connector is shorted.



4.2.4 Teaching

<Basic operation>

i. Main menu→[Action]→[Teaching].
Screen below appears.

Set : Selected teaching points 6 axes (Red cells) are forwarded to DS102 or 112. (PC→DS)
Once memoried, positions of 6 axes are displayed. (No stage connected, "N" is displayed)

Remove : Selected teaching points 6 axes are removed and forwarded to DS102 or112 (PC→DS) . Display of 6 axes gets to be "N"

Go To : Movement to selected teaching point 6 axes
During movement, even 1axis reaches mechanical or soft limit, all axis stop

Read : Read and display all of teaching point 64points memorized inside DS102 or 112 (DS→PC)

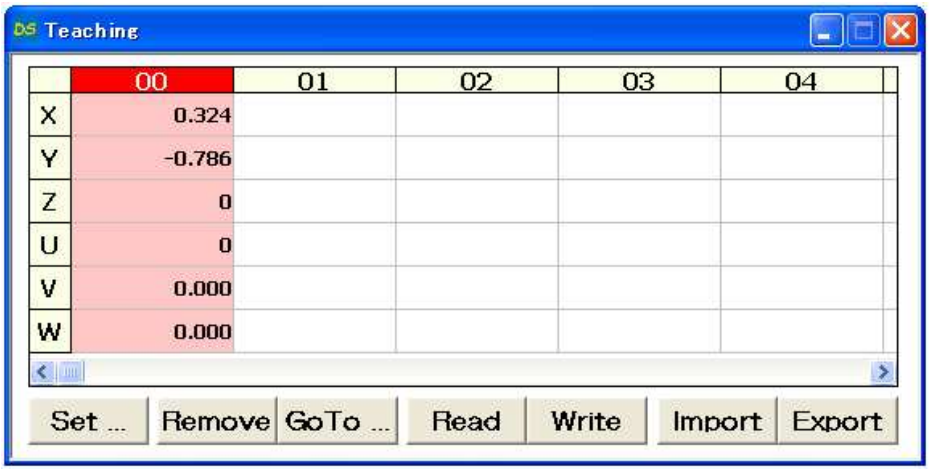
Write : Forward all of teaching point 64 points to DS102 or 112 (PC→DS)

Import : Open teaching points inside PC

Export : Save all teaching point 64 points inside PC
※Not forwarded to DS102 or 112

ii. Move stage to desired teaching position by JOG mode of handy terminal or JOG drive mode of Phrase 4. 2. 3 .
※ Not use handy terminal and JOG drive in PC together at the same time.

iii. Select Cell# you like to memory, click Set to memorize.



iv. Repeat ii～iii to memorize point you need.
v. Select memorized teaching Cell# then push Go to and make sure memorized position is correct.
vi. If memorized position is correct, click Set to save 64 teaching points in PC.

<How to back up teaching points memorized in DS102 or 112>

i. Click Read to read and display memorized 64 teaching points inside DS.
ii. Click Export to forward displayed 64 teaching points to PC.

<To forward Teching points memorized in PC to DS102 or 112>

i. Click Import to import and display teaching points memorized inside PC.
ii. Click Write to write 64 teaching points to DS102 or 112.

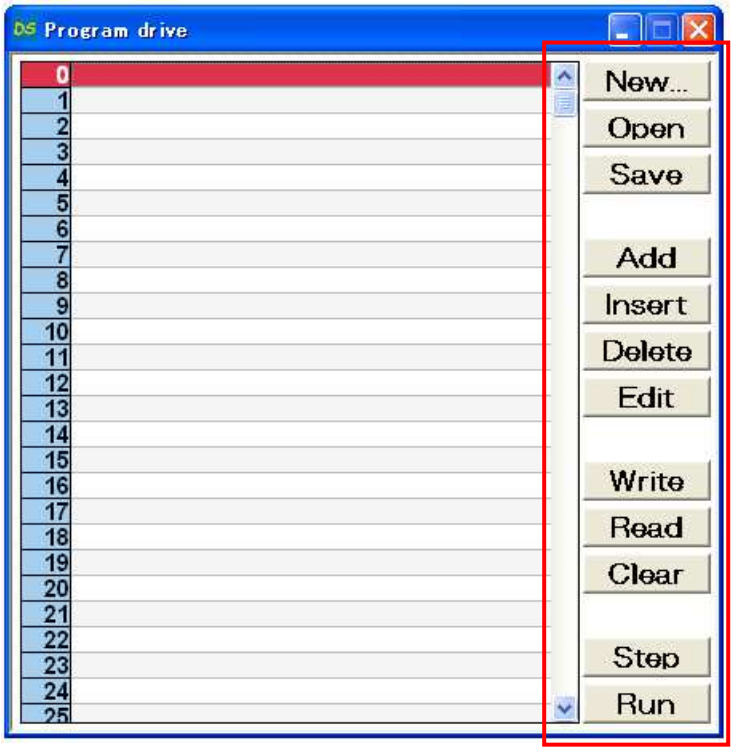
※ Convenient for forwarding all same teaching points to several DS.

4.2.5 Driving program

Making program by using DSCONTROL-WIN and forward it to DS102 or 112. DS can control stage movement by I/O control. Also I/O inside PLC can control stage movement easily.

<Basic Operation>

i. Main menu→[Action]→[Program drive]



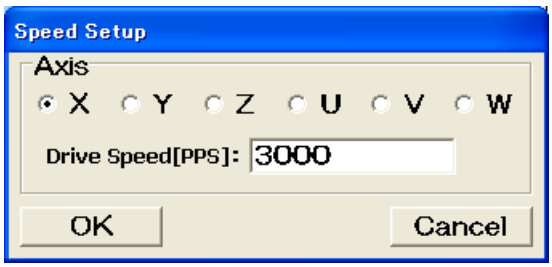
New : Making new program
Open : Open the saved program inside PC
Save : Save program displayed screen into PC
※Do not forward program to DS
Add : Add program drive command to last line in program
Insert : Insert program drive command into program
Delete : Delete 1line of program drive command
Edit : Edit 1line of program drive command
Write : Write program drive command displayed screen to DS (PC→DS)
Read : Read program drive command memorized inside DS and display it (DS→PC)。
Clear : Clear program inside DS (PC→DS)
Step : Drive selected 1line program drive (PC→DS)
Run : Drive selected programs (PC→DS)

ii. Click Add so display below appears on screen.

※Making program by programming following command.

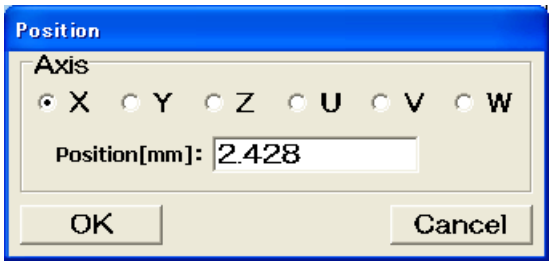
- Speed setup

  Setting up each axis speed. Speed should be within parameter maximum speed.



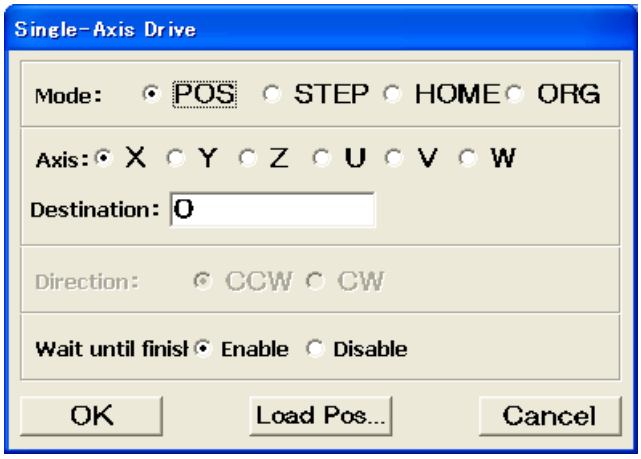
- Position setup

  Setting up or changing current position of each axis to optional position.



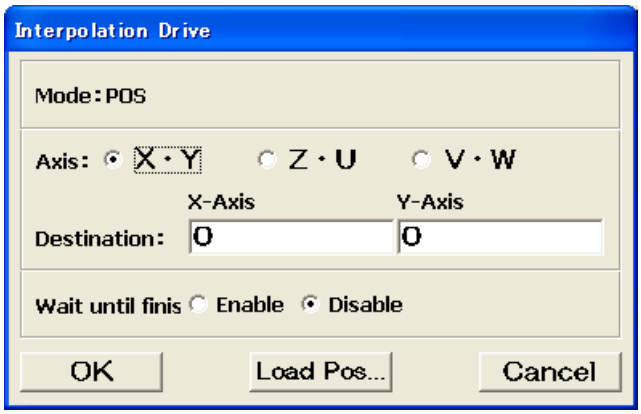
- Single axis drive

  Driving single axis. Set up Drive mode, axis and destination. If you can not go forward until drive is done, please select enable at wait until finish.



- Interpolation Drive

  Implement interpolation Drive (Absolute value) of double axes. Select axis, destination and click disable at wait until finish.

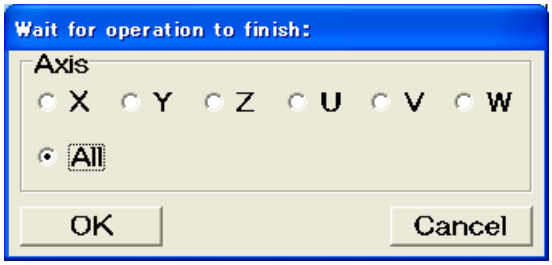


- Teaching position

  Move to teaching position.

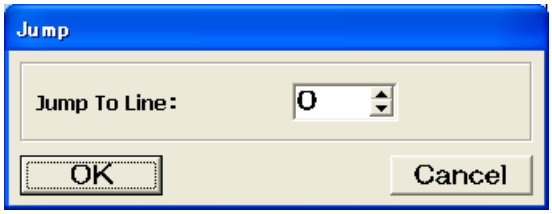
- Wait for operation to finish

  No go forward while axis is in motion.



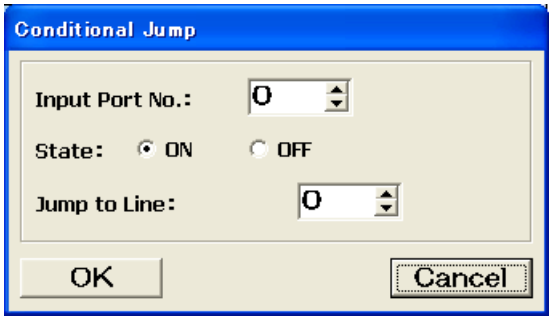
- Jump

  Jump to appointed line unconditionally.



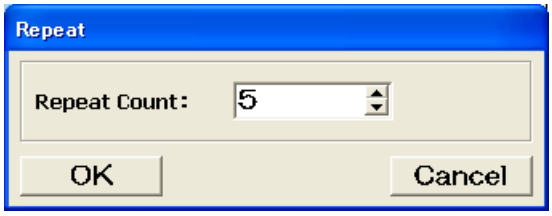
- Conditional jump

  With monitoring general input condition, jump to appointed line.



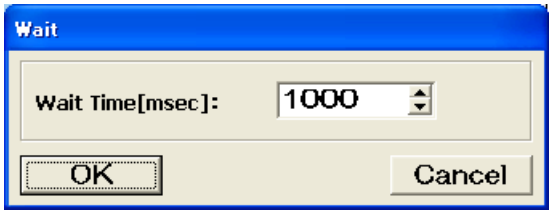
- Repeat

  Repeat same movement until 999,999 times.



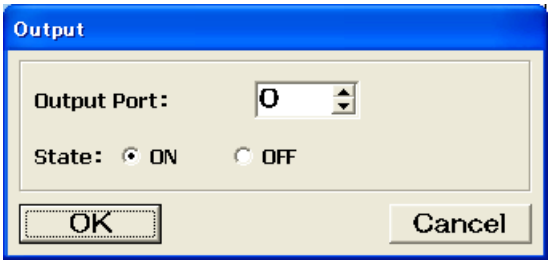
- Wair

  Do not go forward during time you set up. Maximum time is 999,999 ms.



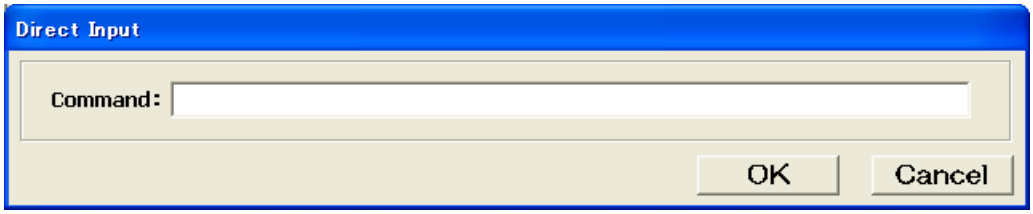
- Output

  Forced output of general output.

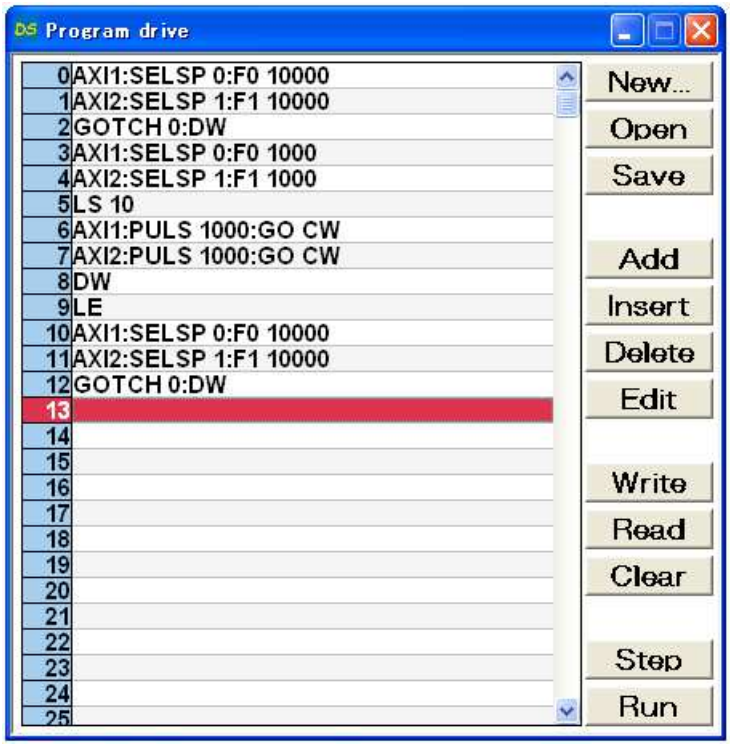


● Direct input

Input command directly without using command menu.



iii. After making commands, list of command appears on screen (Sample).



When program is done, click [Writing].

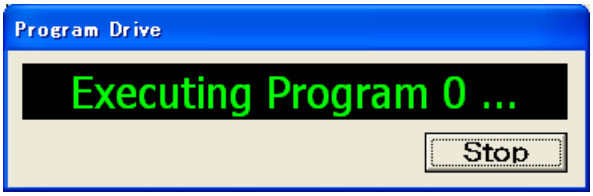
Select program# then click [Transfer] so program is forwarded to DS.

iv. Click Save to save program in PC (Recommended).

v. When program is done, check its operation.

Click [Start]

Select program No. then click [Start] so program starts. During operation, display in next page appears on screen.



<How to back up program in DS>

i. Click Read

Select program No. then click [Transfer] so selected program is forwarded to PC and display its program on screen.

ii. Click Save so displayed program is saved into PC.

<To transfer program data saved inside PC to DS>

i. Click Open to display program data inside PC.

ii. Click Write

Select program No. and click [Transfer] so program is transferred to DS.

※Convenient for transferring same program to several DS.

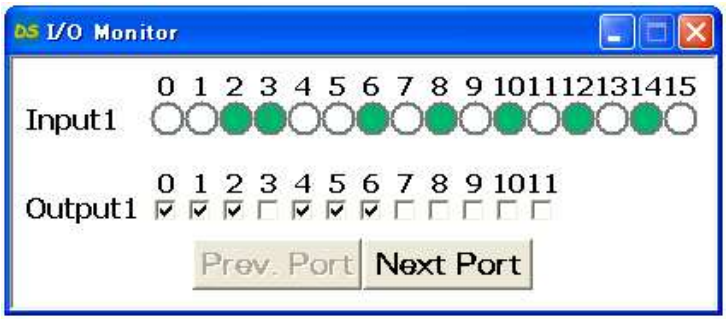
<Remove program memoried inside DS>

i. Click Clear

Select program No. then click [Remove] to delete program.

4.2.6 I／O monitor

The monitor of general input and forced output of general output can be performed.

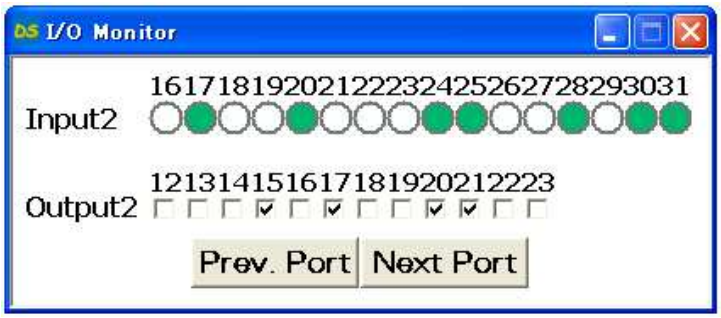


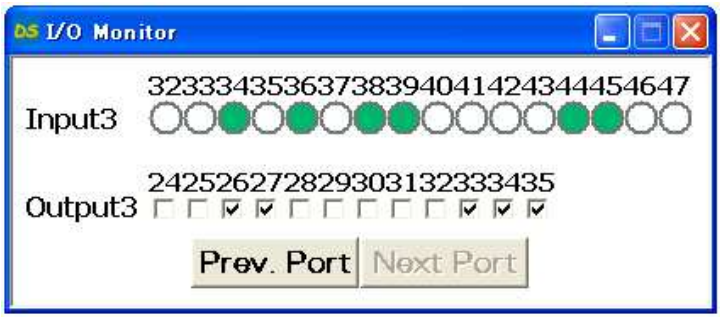
i. Main menu→[Action]→[I／O monitor], then I／O monitor display appears.

●Input : White→OFF, Green→ON

●Output : Check to output

ii. On linked, click Next Port to see another linked monitor (General I／O is not optional setting, Input value is uncertainly)





4.3 User program Processing

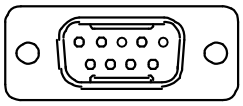
Can be controlled free motorized stage or general I/O by sent/received PC and communication command with RS232C or USB.

4.3.1 RS232C

Set-up the baud rate with dip switch on rear side, and connect RS232C interface and RS232C of computer interface connector with RS232C cross cable (D100-R9-2).

⚠
- **Dipswitch must be set up before power on.**
  No effect to change dipswitch after power on.
- **Please confirm to power off before connect the cable.**
  Never connect to cable in case of power on. Must be risk of breakage

【RS232C Connector】
XM2C-0942-132L （Omron products : Dsub9P male）

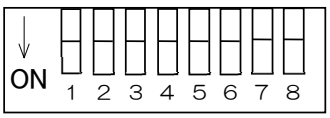


Pin Number	Name	Function
1	－	Not connected
2	ＲｘＤ（ＲＤ）	Received data（input）
3	ＴｘＤ（ＳＤ）	Send data（output）
4	ＤＴＲ（ＥＲ）	Data terminal ready（output）
5	ＧＮＤ（ＳＧ）	Siignal ground
6	ＤＳＲ（ＤＲ）	Data set ready（input）
7	－	Not connected
8	－	Not connected
9	－	Not connected

【Communication parameter】

How to send	Asynchronous
Baud rate	4,800、9,600、19,200、38,400bps
Data	８ bits
Parity	None
Stop bit	１ bit
Ｘ parameter	None
Handshake	For controlled line
Delimiter	ＣＲ

【DIP switch set-up】



SW1

● RS232C

1	2	Baud rate
OFF	OFF	4,800bps
ON	OFF	9,600bps
OFF	ON	19,200bps
ON	ON	38,400bps（default）

※Set at 38,400bps at the before shipping.

4.3.2 USB

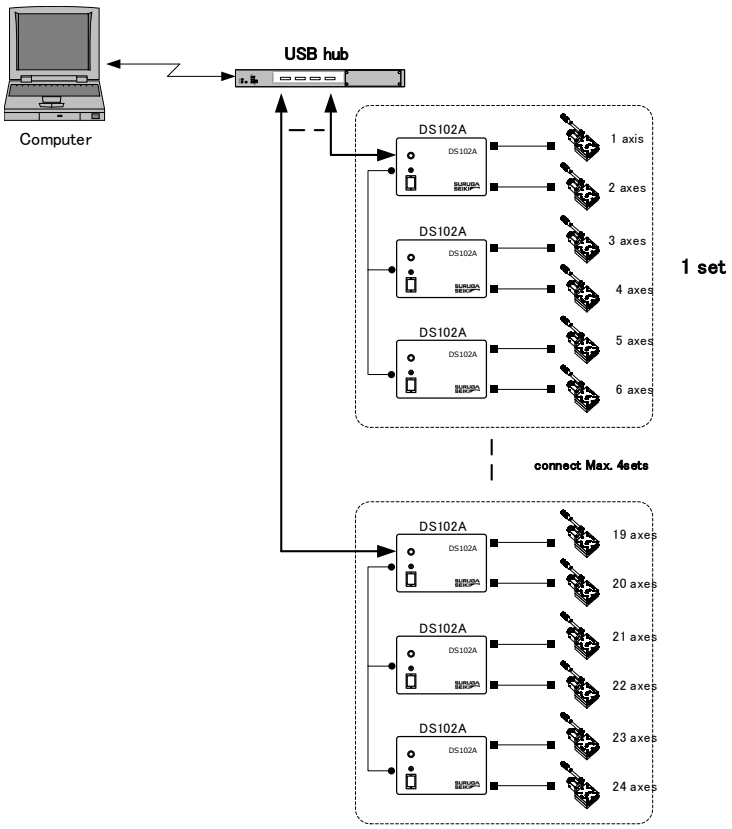
In case of control from PC, it is easy to use USB. Install attached USB device driver, then connect to PC and recognized as COM port.
Recommend using our original USB cable (DS100-USB-1.8).
※See 2．1．2 paragraph how to install USB device driver.

【USB Connector】
Mini B Plug 1734035-2 (TE)

Pin Number	Function
1	Vbus
2	D−
3	D+
4	-
5	GND

【Vendor ID, Product ID】
Vendor ID is for each vendor.
Memorized vendor ID（ｄｅｃｉｍａｌ ３５８１ ｈｅｘ ０ＤＦＤ）on ROM.
Product ID is control number ＩＤ. Memorized product ID（ｈｅｘ ０００２）on ROM.
USB driver works with plug and play after recognized vendor ID and product ID.

【USB hub connected (Controlled multi axis)】
In case of controlled stage that have over 3 axes , increase the controller to accommodate under 6 axes by connected to Link. In case of controlled stage of that have over 7 axes by using 1 PC, or controlled separately, connect with USB hub.



Hub connected	Max. 4
USB ID	0~3 (Set up due to DIP switch)

Set up separately USB ID , then connect USB Hub and USB cable. Be assigned a number from 0 order to power on.

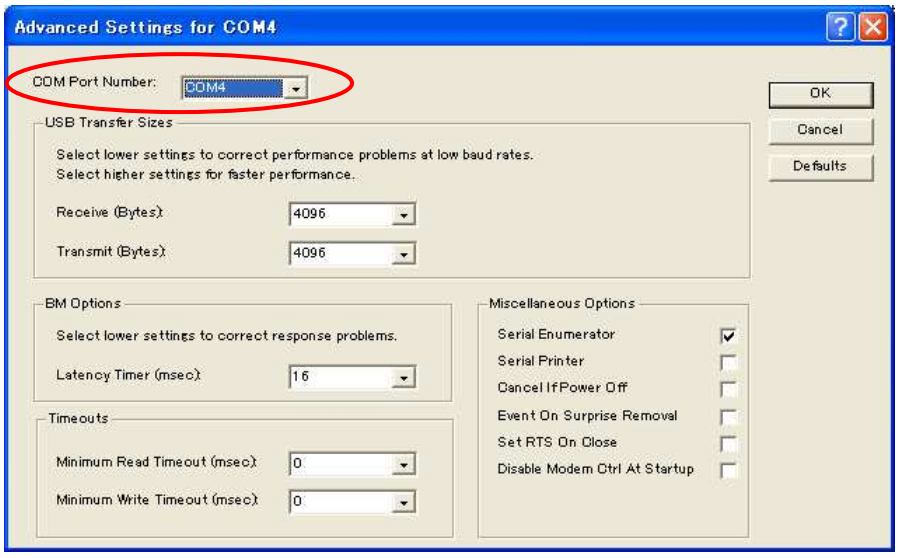
<Relative COM port number and USB ID>

To confirm the relationship between the COM port number and the USB ID, send the communication command "USBID?" to each port assigned as 「SURUGA SEIKI DS102 USB Serial Port (COM?)」, then return USB ID each " 0 "~" 3 ", can be confirmed COM port number and USB ID relation. Continuing to fix until delete the driver or change the COM port number as bellows.:

<In case of change the COM port>

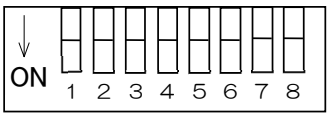
Open 「SURUGA SEIKI DS102 USB Serial Port(COM□)」 under 「Port (COM と LPD)」, display as bellows.:

Press Advanced, show as bellows. Can be change to blank COM port number.



【Set-up DIP switch】

Set-up 5th bit and 6th bit of SW1.



SW1

● Set-up USB ID

5	6	USB ID
OFF	OFF	0 (default)
ON	OFF	1
OFF	ON	2
ON	ON	3

※Setting OFF before shipping.

4.3.3 Delimiter

Delimiter comes to the end of the communication command and response data.

Interface	Delimiter
RS232C	CR (Hex 0D) fixed
USB	

※In operation of command response , return to PC error code (E21) if no delimiter in receiving data from PC or error.

4.3.4 Types of communication command

Command	Description
Motion control command	Command to control motion; Driving command, Stop command etc.
Data Setting command	Command to set parameter, Memory SW setting etc. *When the selected axis is in motion, the command is no effect.
Inquiry Command	Command to read setting data or status of controller. *This command is effective in any condition.
Writing Command	Write in all parameter to the flash memory (See 4. 3. 5. 5paragraph)
Reset Command	Reset of all parameter (See 4. 3. 5. 5paragraph)

- □ in a command shows setting data
- __ in a command shows space
- : is added when link command(max 100 character)
- It is possible to use capital and lower-case (Possible mixed up)
- It is possible to skip command lower-case

<Write command, Reset command, Motion control command, Data setting command>

Type	Command	Function	Data	Default	Remarks	Program driving
	WRITE	Write in flash memory			Wait over 130ms after send	×
	*RST	Reset of all parameter			Wait over 5s after send	×
Axis	AXIs□ (AXI□)	Axis setting 1(or X)⇒ X-axis setting 2(or Y)⇒ Y-axis setting 3(or Z)⇒ Z-axis setting 4(or U)⇒ U-axis setting 5(or V)⇒ V-axis setting 6(or W)⇒ W-axis setting ALL⇒ All of axis setting	1~6 or, X、Y、Z、U、V、W or, ALL	1	・2axis =1～2 (or, X,Y,ALL) ・1st that linked is X/Y axis, 2nd is Z/U axis, 3rd is V/W axis.	○
Parameter setting	:CWSoftLimitEnable_□ (:CWSLE_□)	CW soft limit setting 0 ⇒ No effect/1 ⇒ Effective	0～1	0		×
	:CWSoftLimitPoint_□ (:CWSLP_□)	CW soft limit setting	-99999999～99999999、 -9.9999999～9.9999999	99999999	Data range must be changed due to point position	×
	:CCWSoftLimitEnable_□ (:CCWSLE_□)	CCW soft limit setting 0⇒ No effect／ 1⇒ Effective	0～1	0		×
	:CCWSoftLimitPoint_□ (:CCWSLP_□)	CCW soft limit setting	-99999999～99999999、 -9.9999999～9.9999999	-99999999	Data range must be changed due to point position	×

Type	Command	Function	Data	Default	Remarks	Program driving
	:DRiverDIVision_□ (:DRDIV_□)	Driver division number setting 0⇒1/1(Full) division 1⇒1/2(Half) division 2⇒1/2.5 division 3⇒1/4 division 4⇒1/5 division 5⇒1/8 division 6⇒1/10 division 7⇒1/20 division 8⇒1/25 division 9⇒1/40 division 10⇒1/50 division 11⇒1/80 division 12⇒1/100 division 13⇒1/125 division 14⇒1/200 division 15⇒1/250 division	Normal : 0, 1 Microstep : 0～15	0	Data range must be changed due to driver	○
	:DATA_□	1⇒DATA1 selection 2⇒DATA2 selection	1～2	1	DATA1,2 selection (with MS driver)	×
	:HOMEPosition_□ (:HOMEP_□)	Home position setting	-99999999～99999999、 -9.9999999～9.9999999	0	Data range must be changed due to driver	○
	:POSition_□ (:POS_□)	Current position setting	-99999999～99999999、 -9.9999999～9.9999999	0	Data range must be changed due to driver	○
	:PULSe_□ (:PULS_□)	Stable pulse distance setting	0～99999999	1	Data range must be changed due to driver	○
	:PULSeA_□ (:PULSA_□)	Absolute driving coordinate value setting	-99999999～99999999、 -9.9999999～9.9999999	0	Data range must be changed due to driver	○
	:SELectSPeed_□ (:SELSP_□)	Speed table setting 0⇒speed table 0 1⇒speed table 1 2⇒speed table 2 3⇒speed table 3 4⇒speed table 4 5⇒speed table 5 6⇒speed table 6 7⇒speed table 7 8⇒speed table 8 9⇒speed table 9	0～9	0		○
	:STANDARDresolution_□ (:STANDARD_□)	Setting 1 pulse distance at full step	0～99999999	1	Data range must be changed due to unit setting	×
	:UNIT_□	Setting indicated units 0(or PULSe(PULS)) ⇒ pulse 1(or UM)⇒μm 2(or MM)⇒mm 3(or DEG)⇒deg 4(or MRAD)⇒mrad	0～4 or PULSe(PULS),UM,MM,DEG,MRAD	0		×
	TeaCH00_□/□/□/□/□/□ (TCH00_□/□/□/□/□/□) ～ TeaCH63_□/□/□/□/□/□ (TCH63_□/□/□/□/□/□)	Teaching point setting N : No data (No driving) S:Teaching at the current position	-99999999～99999999、 -9.9999999～9.9999999 or N or S	N/N/N/N/N /N	Data range must be changed due to unit setting □/□/□/□/□/□is in order to X/Y/Z/U/V/W	○

Type	Command	Function	Data	Default	Remarks	Program driving
Memory SW Setting	:MEMorySWitch0_□ (:MEMSW0_□)	Memory switch 0 setting (Origin return setting) 0⇒Pattern of ORG return 0 1⇒Pattern of ORG return 1 2⇒Pattern of ORG return 2 3⇒Pattern of ORG return 3 4⇒Pattern of ORG return 4 5⇒Pattern of ORG return 5 6⇒Pattern of ORG return 6 7⇒Pattern of ORG return 7 8⇒Pattern of ORG return 8 9⇒Pattern of ORG return 9 10⇒Pattern of ORG return 10 11⇒Pattern of ORG return 11 12⇒Pattern of ORG return 12	0～12	0		×
	:MEMorySWitch1_□ (:MEMSW1_□)	Memory switch 1 setting (Limit sensor input logic setting) 0⇒B (N.C.) 1⇒A (N.O.)	0～1	0		×
	:MEMorySWitch2_□ (:MEMSW2_□)	Memory switch 2 setting (Origin sensor input logic setting) 0⇒B (N.C.) 1⇒A (N.O.)	0～1	0		×
	:MEMorySWitch3_□ (:MEMSW3_□)	Memory switch 3 setting (Near origin input logic setting) 0⇒B (N.C.) 1⇒A (N.O.)	0～1	0		×
	:MEMorySWitch4_□ (:MEMSW4_□)	Memory switch 4 setting (Countdown setting) 0⇒Countdown controlled 1⇒Canceled count down control	0～1	0	NR type is fixed to 0 (1 cannot be set)	×
	:MEMorySWitch5_□ (:MEMSW5_□)	Memory switch 5 setting (Motion distance changed setting) 0⇒forward 1⇒opposite	0～1	0		×
	:MEMorySWitch6_□ (:MEMSW6_□)	Memory switch 6 setting(Stop setting) 0⇒fast stop 1⇒slowdown stop	0～1	0		×
	:MEMorySWitch7_□ (:MEMSW7_□)	Memory switch 7 setting (Reset after ORG return) 0⇒Yes／1⇒No	0～1	0		×
Speed Table Setting	:Lspeed0_□ (:L0_□)	Start up speed(Lspeed0) setting Unit⇒pps	1～9999	10		○
	:Fspeed0_□ (:F0_□)	Drive speed (Fspeed0) setting Unit⇒pps	1～999999	10		○
	:Rate0_□ (:R0_□)	Acceleratin and deceleration (Rate0) setting Unit⇒msec	1～9999	1		○
	:Srate0_□ (:S0_□)	S rate(Srate0) setting Unit⇒%	0～100	0		○
	:Lspeed1_□ (:L1_□)	Start up speed(Lspeed1) setting Unit⇒pps	1～9999	50		○
	:Fspeed1_□ (:F1_□)	Drive speed (Fspeed1) setting Unit⇒pps	1～999999	50		○
	:Rate1_□ (:R1_□)	Acceleratin and deceleration (Rate1) setting Unit⇒msec	1～9999	1		○
	:Srate1_□ (:S1_□)	S rate (Srate1) setting Unit⇒%	0～100	0		○

Type	Command	Function	Data	Default	Remarks	Program driving
	:Lspeed2_□ (:L2_□)	Start up speed(Lspeed2) setting Unit⇒pps	1～9999	100		○
	:Fspeed2_□ (:F2_□)	Drive speed (Fspeed2) setting Unit⇒pps	1～999999	100		○
	:Rate2_□ (:R2_□)	Acceleratin and deceleration (Rate2) setting Unit⇒msec	1～9999	1		○
	:Srate2_□ (:S2_□)	S rate (Srate2) setting Unit⇒%	0～100	0		○
	:Lspeed3_□ (:L3_□)	Start up speed(Lspeed3) setting Unit⇒pps	1～9999	100		○
	:Fspeed3_□ (:F3_□)	Drive speed (Fspeed3) setting Unit⇒pps	1～999999	500		○
	:Rate3_□ (:R3_□)	Acceleratin and deceleration (Rate3) setting Unit⇒msec	1～9999	100		○
	:Srate3_□ (:S3_□)	S rate (Srate3) setting Unit⇒%	0～100	0		○
	:Lspeed4_□ (:L4_□)	Start up speed(Lspeed4) setting Unit⇒pps	1～9999	100		○
	:Fspeed4_□ (:F4_□)	Drive speed (Fspeed4) setting Unit⇒pps	1～999999	1000		○
	:Rate4_□ (:R4_□)	Acceleratin and deceleration (Rate4) setting Unit⇒msec	1～9999	100		○
	:Srate4_□ (:S4_□)	S rate (Srate4) setting Unit⇒%	0～100	0		○
	:Lspeed5_□ (:L5_□)	Start up speed(Lspeed5) setting Unit⇒pps	1～9999	100		○
	:Fspeed5_□ (:F5_□)	Drive speed (Fspeed5) setting Unit⇒pps	1～999999	2000		○
	:Rate5_□ (:R5_□)	Acceleratin and deceleration (Rate5) setting Unit⇒msec	1～9999	100		○
	:Srate5_□ (:S5_□)	S rate (Srate5) setting Unit⇒%	0～100	0		○
	:Lspeed6_□ (:L6_□)	Start up speed(Lspeed6) setting Unit⇒pps	1～9999	100		○
	:Fspeed6_□ (:F6_□)	Drive speed (Fspeed6) setting Unit⇒pps	1～999999	5000		○
	:Rate6_□ (:R6_□)	Acceleratin and deceleration (Rate6) setting Unit⇒msec	1～9999	100		○
	:Srate6_□ (:S6_□)	S rate (Srate6) setting Unit⇒%	0～100	0		○
	:Lspeed7_□ (:L7_□)	Start up speed(Lspeed7) setting Unit⇒pps	1～9999	100		○
	:Fspeed7_□ (:F7_□)	Drive speed (Fspeed7) setting Unit⇒pps	1～999999	10000		○
	:Rate7_□ (:R7_□)	Acceleratin and deceleration (Rate7) setting Unit⇒msec	1～9999	100		○
	:Srate7_□ (:S7_□)	S rate (Srate7) setting Unit⇒%	0～100	0		○
	:Lspeed8_□ (:L8_□)	Start up speed (Lspeed8) setting Unit⇒pps	1～9999	100		○
	:Fspeed8_□ (:F8_□)	Drive speed (Fspeed8) setting Unit⇒pps	1～999999	20000		○
	:Rate8_□ (:R8_□)	Acceleratin and deceleration (Rate8) setting Unit⇒msec	1～9999	100		○
	:Srate8_□ (:S8_□)	Srate (Srate8) setting Unit⇒%	0～100	0		○

Type	Command	Function	Data	Default	Remarks	Program driving
	:Lspeed9_□ (:L9_□)	Start up speed(Lspeed9) setting Unit⇒pps	1～9999	100		○
	:Fspeed9_□ (:F9_□)	Drive speed (Fspeed9) setting Unit⇒pps	1～999999	50000		○
	:Rate9_□ (:R9_□)	Acceleratin and deceleration (Rate9) setting Unit⇒msec	1～9999	100		○
	:Srate9_□ (:S9_□)	S rate (Srate9) setting Unit⇒%	0～100	0		○
Driving	:GO_□	Drive 0(or CW)⇒ CW direction 1(or CCW)⇒ CCW direction 2(or OriGin(ORG)) ⇒Origin return 3(or HOME) ⇒Home position drive 4(or ABS) ⇒Absolute position drive 5(or CWJ) ⇒Jog drive to CW 6(or CCWJ) ⇒Jog drive to CCW	0～6 or CW, CCW, OriGin(ORG), HOME, ABS, CWJ, CCWJ)			○
	:GOABSolute_□ (:GOABS_□)	Absolute position drive	-99999999～99999999、 -9.9999999～9.9999999		Data range must be changed due to point position	○
	GOTeaCH_□ (GOTCH_□)	Move teaching point 0～63 ⇒ Teaching point number	0～63			○
Stop	:STOP_□	Stop axis 0(or Emergency(E)) ⇒ Emergency stop 1(or Reduction(R)) ⇒ Slowdown stop	0～1 or Emergency(E), Reduction(R)		Emergency stop in case of ":STOP"	○
	STOP_□	All axes stop Programing stop 0(or Emergency(E)) ⇒ Emergency stop 1(or Reduction(R)) ⇒ Slowdown stop	0～1 or Emergency(E), Reduction(R)		Emergency stop in case of "STOP"	○
Program Driving	SELPRG_□	Select program number 0～7⇒ Program number	0～7	0		×
	PRG_□	Program driving 0⇒ RUN (Drive) 1⇒ STEP (Step drive)	0～1 or RUN、STEP			×
I/O	OUT00_□～OUT35_□	I/O output (1bit) 0⇒ OFF／1⇒ ON	0～1	0		○
	OUTP0_□～OUTP2_□	I/O output (12bit) 0⇒ All bits OFF 4095⇒ All bits ON	0～4095	0		○

Type	Command	Function	Data	Default	Remarks	Program driving
Straight complementary setting/driving	GOLineI_□ (GOLI_□)	Relative position driving (GOLineI_X+Y-Z+U-V+W-) X+ ⇒ X axis specified to plus X- ⇒ X axis specified to minus Y+ ⇒ Y axis specified to plus Y- ⇒ Y axis specified to minus Z+ ⇒ Z axis specified to plus Z- ⇒ Z axis specified to minus U+ ⇒ U axis specified to plus U- ⇒ U axis specified to minus V+ ⇒ V axis specified to plus V- ⇒ V axis specified to minus W+ ⇒ W axis specified to plus W- ⇒ W axis specified to minus	X+、X-、Y+、Y-、Z+、Z-、U+、U-、V+、V-、W+、W-		Relative distance is to be specified on :PULSe_□	○
	GOLineA_□ (GOLA□)	Absolute position driving (GOLineA_X10_Y-20_Z30_U-40_V50_W-60) X + cordinate ⇒ X axis Y + cordinate ⇒ Y axis Z + cordinate ⇒ Z axis U + cordinate ⇒ U axis V + cordinate ⇒ V axis W + cordinate ⇒ W axis	-99999999～99999999、-9.9999999～9.9999999		Data range must be changed due to point position	○

<Inquiry Command>

Type	Command	Function	Range of response	Remarks
Parameter setting request	:CWSoftLimitEnable? (:CWSLE?)	Request softlimit setting value on CW 0⇒No effect／1⇒Effective	0～1	
	:CWSoftLimitPoint? (:CWSLP?)	Request softlimt value on CW	-99999999～99999999、 -9.9999999～9.9999999	Data range must be changed due to point position
	:CCWSoftLimitEnable? (:CCWSLE?)	Request softlimit setting value on CCW 0⇒No effect／1⇒Effective	0～1	
	:CCWSoftLimitPoint? (:CCWSLP?)	Request softlimit value on CCW	-99999999～99999999、 -9.9999999～9.9999999	Data range must be changed due to point position
	:DRiverDIVision? (:DRDIV?)	Request motor driver deviding setting value 0⇒1/1(Full) dividing 1⇒1/2(Half) dividing 2⇒1/2.5 dividing 3⇒1/4 dividing 4⇒1/5 dividing 5⇒1/8 dividing 6⇒1/10 dividing 7⇒1/20 dividing 8⇒1/25 dividing 9⇒1/40 dividing 10⇒1/50 dividing 11⇒1/80 dividing 12⇒1/100 dividing 13⇒1/125 dividing 14⇒1/200 dividing 15⇒1/250 dividing	Normal： 0, 1 Microstep： 0～15	Response data range must be changed due to driver
	:DATA?	1⇒DATA1 selecting 2⇒DATA2 selecting	1～2	Only MS driver effective
	:HOMEPosition? (:HOMEP?)	Home position request	-99999999～99999999、 -9.9999999～9.9999999	Data range must be changed due to point position
	:POSition? (:POS?)	Current position request	-99999999～99999999、 -9.9999999～9.9999999	Data range must be changed due to point position
	:PULSe? (:PULS?)	Constant step pulse request	0～99999999	Data range must be changed due to point position
	:PULSeA? (:PULSA?)	Absolute drive cordinate request	-99999999～99999999、 -9.9999999～9.9999999	Data range must be changed due to point position
	:RESOLUTion？ (:RESOLUT?)	1 pulse distance request	0～99999999	Data range must be changed due to point position
	:SELectSPeed? (:SELSP?)	Request speed table 0⇒Speed table 0 1⇒Speed table 1 2⇒Speed table 2 3⇒Speed table 3 4⇒Speed table 4 5⇒Speed table 5 6⇒Speed table 6 7⇒Speed table 7 8⇒Speed table 8 9⇒Speed table 9	0～9	
	:STANDARDresolution? (:STANDARD?)	1pulse distance setting at full step	0～99999999	Data range must be changed due to point position
	:UNIT?	Request unit display 0⇒pulse 1⇒um 2⇒mm 3⇒deg 4⇒mrad	0～4	
	TeaCH00? ～TeaCH63? (TCH00?) (TCH63?)	Request teaching point setting value N： No teaching point	□/□/□/□/□/□ -99999999～99999999、 -9.9999999～9.9999999 or N	Data range must be changed due to point position □/□/□/□/□/□is in order to X/Y/Z/U/V/W

Type	Command	Function	Range of response	Remarks
Memory SW Setting Request	:MEMorySWitch0? (:MEMSW0?)	Request Memory switch 0 (Origin return pattern setting) 0⇒ Origin return 0 1⇒ Origin return 1 2⇒ Origin return 2 3⇒ Origin return 3 4⇒ Origin return 4 5⇒ Origin return 5 6⇒ Origin return 6 7⇒ Origin return 7 8⇒ Origin return 8 9⇒ Origin return 9 10⇒ Origin return 10 11⇒ Origin return 11 12⇒ Origin return 12	0～12	
	:MEMorySWitch1? (:MEMSW1?)	Request Memory switch 1 (Limit sensor input logic setting) 0⇒B point (N.C.) 1⇒A point (N.O.)	0～1	
	:MEMorySWitch2? (:MEMSW2?)	Request Memory switch 2 (Origin sensor input logic setting) 0⇒B point(N.C.) 1⇒A point(N.O.)	0～1	
	:MEMorySWitch3? (:MEMSW3?)	Request Memoryswitch 3 (Near origin input logic setting) 0⇒B point(N.C.) 1⇒A point(N.O.)	0～1	
	:MEMorySWitch4? (:MEMSW4?)	Request Memorized switch 4 setting (Current down control setting) 0⇒Current down controlled 1⇒Canceled current down	0～1	NR type is fixed to 0.
	:MEMorySWitch5? (:MEMSW5?)	Request Memorized switch 5 setting (Motion direction changed setting) 0⇒forward／1⇒opposite	0～1	
	:MEMorySWitch6? (:MEMSW6?)	Request Memorized switch 6 setting (Stop setting) 0⇒emergency／1⇒slowdown	0～1	
	:MEMorySWitch7? (:MEMSW7?)	Request Memorized switch 7 setting (Origin return zero setting) 0⇒Yes／1⇒No	0～1	

Type	Command	Function	Range of response	Remarks
Speed table setting Request	:Lspeed0? (:L0?)	Request start up (Lspeed0) setting Unit⇒pps	1～9999	
	:Fspeed0? (:F0?)	Request drive speed (Fspeed0) setting Unit⇒pps	1～999999	
	:Rate0? (:R0?)	Request acceleration and deceleration (Rate0) setting Unit⇒msec	1～9999	
	:Srate0? (:S0?)	Request Srate (Srate0) setting Unit⇒%	0～100	
	:Lspeed1? (:L1?)	Request start up (Lspeed1) setting Unit⇒pps	1～9999	
	:Fspeed1? (:F1?)	Request drive speed (Fspeed1) setting Unit⇒pps	1～999999	
	:Rate1? (:R1?)	Request acceleration and deceleration (Rate1) setting Unit⇒msec	1～9999	
	:Srate1? (:S1?)	Request S rate (Srate1) setting Unit⇒%	0～100	
	:Lspeed2? (:L2?)	Request start up (Lspeed2) setting Unit⇒pps	1～9999	
	:Fspeed2? (:F2?)	Request drive speed (Fspeed2) setting Unit⇒pps	1～999999	
	:Rate2? (:R2?)	Request acceleration and deceleration (Rate2) setting Unit⇒msec	1～9999	
	:Srate2? (:S2?)	Request Srate (Srate2) setting Unit⇒%	0～100	
	:Lspeed3? (:L3?)	Request start up (Lspeed3) setting Unit⇒pps	1～9999	
	:Fspeed3? (:F3?)	Request drive speed (Fspeed3) setting Unit⇒pps	1～999999	
	:Rate3? (:R3?)	Request acceleration and deceleration (Rate3) setting Unit⇒msec	1～9999	
	:Srate3? (:S3?)	Request S rate (Srate3) setting Unit⇒%	0～100	
	:Lspeed4? (:L4?)	Request start up (Lspeed4) setting Unit⇒pps	1～9999	
	:Fspeed4? (:F4?)	Request drive speed (Fspeed4) setting Unit⇒pps	1～999999	
	:Rate4? (:R4?)	Request acceleration and deceleration (Rate4) setting Unit⇒msec	1～9999	
	:Srate4? (:S4?)	Request S rate (Srate4) setting Unit⇒%	0～100	
	:Lspeed5? (:L5?)	Request start up (Lspeed5) setting Unit⇒pps	1～9999	
	:Fspeed5? (:F5?)	Request drive speed (Fspeed5) setting Unit⇒pps	1～999999	
	:Rate5? (:R5?)	Request acceleration and deceleration (Rate5) setting Unit⇒msec	1～9999	
	:Srate5? (:S5?)	Request S rate (Srate5) setting Unit⇒%	0～100	
	:Lspeed6? (:L6?)	Request start up (Lspeed6) setting Unit⇒pps	1～9999	
	:Fspeed6? (:F6?)	Request drive speed (Fspeed6) setting Unit⇒pps	1～999999	
	:Rate6? (:R6?)	Request acceleration and deceleration (Rate6) setting Unit⇒msec	1～9999	
	:Srate6? (:S6?)	Request S rate (Srate6) setting Unit⇒%	0～100	
	:Lspeed7? (:L7?)	Request start up (Lspeed7) setting Unit⇒pps	1～9999	

Type	Command	Function	Range of response	Remarks
	:Fspeed7? (:F7?)	Request drive speed (Fspeed7) setting Unit⇒pps	1～999999	
	:Rate7? (:R7?)	Request acceleration and deceleration (Rate7) setting Unit⇒msec	1～9999	
	:Srate7? (:S7?)	Request S rate (Srate7) setting Unit⇒%	0～100	
	:Lspeed8? (:L8?)	Request start up (Lspeed8) setting Unit⇒pps	1～9999	
	:Fspeed8? (:F8?)	Request drive speed (Fspeed8) setting Unit⇒pps	1～999999	
	:Rate8? (:R8?)	Request acceleration and deceleration (Rate8) setting Unit⇒msec	1～9999	
	:Srate8? (:S8?)	Request S rate (Srate8) setting Unit⇒%	0～100	
	:Lspeed9? (:L9?)	Request start up (Lspeed9) setting Unit⇒pps	1～9999	
	:Fspeed9? (:F9?)	Request drive speed (Fspeed9) setting Unit⇒pps	1～999999	
	:Rate9? (:R9?)	Request acceleration and deceleration (Rate9) setting Unit⇒msec	1～9999	
	:Srate9? (:S9?)	Request S rate (Srate9) setting Unit⇒%	0～100	
Status request	:COURSE?	Motion direction status 0⇒Motion(stop) to CW 1⇒Motion(stop) to CCW	0～1	
	:CWSoftLimitSET? (:CWSLSET?)	Soft limit status on CW 0⇒No effect／1⇒effective	0～1	
	:CCWSoftLimitSET? (:CCWSLSET?)	Soft limit status on CCW 0⇒No effect 1⇒effective	0～1	
	:DISCONtinue? (:DISCON?)	Suspend status 0⇒Yes 1⇒No	0～1	
	:DRiverTYPE? (:DRTYPE?)	Driver type status 0⇒Normal 1⇒Microstep	0～1	
	:HOME?	Home position detection 0⇒Undetected 1⇒Detected	0～1	
	:LIMIT?	Machine limit sensor 0⇒Undetected 1⇒Detected (CW) 2⇒Detected (CCW) 3⇒Detected (CW/CCW)	0～3	
	:MOTION?	In-Motion status 0⇒No motion／1⇒Moution	0～1	
	:ORiGin? (:ORG?)	Origin detecting status 0⇒No detected 1⇒Stop after detected	0～1	
	:READY?	Axis selection reqdy 0⇒Impossible 1⇒Possible	0～1	
	:SoftLIMIT? (:SLIMIT?)	Soft limit detecting status 0⇒Undetected 1⇒Detected (CW) 2⇒Detected (CCW) 3⇒Detected (CW/CCW)	0～3	

Type	Command	Function	Range of response	Remarks
	:StatusBinary1? (:SB1?)	Status 1 request Bit1⇒Motion direction Bit2⇒Detected machine limit Bit3⇒Detected soft limit Bit4⇒Suspended Bit5⇒Detected origin Bit6⇒Detected home position Bit7⇒In motion Bit8⇒Driving program	0～255	
	:StatusBinary2? (:SB2?)	Status 2 request Bit1⇒Detected CW limit Bit2⇒Detected CCWl limit Bit3⇒Detected CW soft limit Bit4⇒Detected CCW soft limit Bit5⇒Effected CW soft limit Bit6⇒Effected CCW soft limit Bit7⇒reserved Bit8⇒reserved	0～63	
	:StatusBinary3? (:SB3?)	Status 3 request Bit1⇒Possible select axis Bit2⇒Driver type Bit3⇒reserved Bit4⇒Driver type Bit5⇒reserved Bit6⇒reserved Bit7⇒reserved Bit8⇒reserved	0～11	
	CONTrolAxis? (CONTA?)	Number of controlling axis status 2⇒2 axes 4⇒4 axes 6⇒6 axes	2, 4, 6	
	MOTIONAll? (MOTIONA?)	All axes in-motion status Bit1⇒X axis Bit2⇒Y axis Bit3⇒Z axis Bit4⇒U axis Bit5⇒V axis Bit6⇒W axis Bit7⇒reserved Bit8⇒reserved	0～63	
	EMS?	0⇒Undetected EMS 1⇒detected EMS (All axes stop)	0～1	The status of the EMS connector with link numbers 1 and 2 cannot be confirmed.
Program drive	SELPRG?	Request program number 0～7⇒Program number	0～7	
	PRG?	Program drive status 0⇒RUN (Driving) 1⇒STEP (Driving step) 2⇒STOP(Under suspension)	0～2	
Request I/O	IN00?～IN47?	I/O input status(1bit) 0⇒Undetected 1⇒Detected	0～1	
	INP0?～INP2?	I/O input status(16bit) 0⇒All bits undetected 65535⇒All bit detected	0～65535	Request each board (ID0～2) , In16 points at the 1 command
	OUTP0?～OUTP2?	I/O output status(12bit) 0⇒ All bits no output 4095⇒ all bits output	0～4095	Request each board (ID0～2) Out 12 points at the 1 command

Type	Command	Function	Range of response	Remarks
Version request	DS102VER?	Controller version request command DS102_0.00⇒Version 0.00 DS102_9.99⇒Version 9.99	DS102_0.00～DS102_9.99	
	*IDN?	Request ID	SURUGA,DS102,0,VER0.00～ SURUGA,DS102,9,VER9.99	

4.3.5 Details of Communication Command

4.3.5.1 Axis Specification command

(1) AXIs<Data>

Request set up, driving, stopping and setting value of each axis parameter/memory switch.

Command	Content	<Data>
AXIs□ (or AXI□)	Axis selection	1～6 or X、Y、Z、U、V、W or ALL

※ Need no space between command and setting data

※ Contents shown as bellows.:

<Data>	Contents
1 (or X)	X axis specification
2 (or Y)	Y axis specification
3 (or Z)	Z axis specification
4 (or U)	U axis specification
5 (or V)	V axis specification
6 (or W)	W axis specification
ALL	All axes specification (Only motion command)

<NOTE>Command that needed axis specification, please specify every single time.

4.3.5.2 Parameter setting command

Set up soft limit on CW・CCW side, dividing motor driver, home position value, current position, constant pulse distance, speed table, unit and distance per pulse at full step.

※ Connect to axis specification command, parameter setting command and driving command

※ : (colon) is necessary when connect(max 100 letter)

※ Orders of connection have to begin with Axis Specification Command : Parameter Setting Command : Driving Command.

※ Please select an axis at the every setting.

Parameter setting command is built up as shown below.:

- In case of only setting parameter with axis specification
  Axis specification command<Data> : Parameter setting command__<Data>
- In case of setting parameter plurals in the same time with axis specification
  Axis specification command<Data> : Parameter setting command__<Data> : ・・・ :
  Parameter setting command__<Data>
- In case of setting and driving parameter with axis specification
  Axis specification command<Data> : Parameter setting command__<Data> :
  Driving command__<Data>
- In case of setting 2 axes at the same time
  Axis specification command<Data> : Parameter setting command__<Data> :
  Axis specification command<Data> : Parameter setting command__<Data>

(1) CWSoftLimitEnable__<Data>

This is setting command of soft limit effective/no effect CW side for each axis.

<Data>	Contents
0	CW soft limit no effect
1	CW soft limit effective

(2) CWSoftLimitPoint_<Data>

Command to set CW side Software Limit of each axis.
Setting data is －99999999～99999999、－9．9999999～9．9999999.
*In case of continuing 0 after the decimal point, can be skippable. (Ex.：1．2300000＝1．23)
*In case of data is not a multiple of the travel distance per pulse, corrects it as shown below.

1) Multiple=Data／Travel distance per pulse
2) Omit the figures after the decimal point of Multiple
3) Data=Travel distance per pulse×Multiple

(Travel distance per pulse=Standard resolution of motorized stage÷Dividing number of driver)

(3) CCWSoftLimitEnable_<Data>

This is setting command of soft limit effective/no effect CCW side for each axis.

<Data>	Content
0	Disable CCW Software Limit
1	Enable CCW Software Limit

(4) CCWSoftLimitPoint_<Data>

Command to set CCW side Software Limit of each axis.
Setting data is －99999999～99999999、－9．9999999～9．9999999.
*In case of continuing 0 after the decimal point, can be skippable. (Ex.：1．2300000＝1．23)
*In case of data is not a multiple of the travel distance per pulse, corrects it as shown below.

1) Multiple=Data／Travel distance per pulse
2) Omit the figures after the decimal point of Multiple
3) Data=Travel distance per pulse×Multiple

(Travel distance per pulse=Standard resolution of motorized stage÷Dividing number of driver)

(5) DRiverDIVision_<Data>

Command to set a dividing number of drivers of each axis.

<Data>	<Number of Division/Steps>
0	1／1
1	1／2
2	1／2．5
3	1／4
4	1／5
5	1／8
6	1／10
7	1／20
8	1／25
9	1／40
10	1／50
11	1／80
12	1／100
13	1／125
14	1／200
15	1／250

※ <Data> has only 0, 1 when the normal driver.
※ When a display unit is except a pulse, if the number of driver division is changed, the travel distance per pulse will change, and there is a case where the following parameters are no longer a multiple of travel distance per pulse.

- Setting of Constant Step Pulse
- Setting of Soft Limit
- Setting of Home Position
- Current Position

In this case, adjust those parameters with the following process.:

1）Multiple=Data／Travel distance per pulse
2）Omit the figures after the decimal point of Multiple
3）Data=Travel distance per pulse×Multiple

（Travel distance per pulse=Standard resolution of motorized stage÷Dividing number of driver）

Note：Comply a setting of Micro-step driver with a setting of DRiverDIVision Data. If setting Is different, travel distance does not match an actual travel distance of motorized stage. (See 3.5.2 for setting information of Micro-step driver for controller)

(6) DATA_<Data>

Change the dividing number at the having microstep driver （Disable at the having normal driver）

<Data>	Contents
1	Setting dividing number to DATA1
2	Setting dividing number to DATA2

※ See 3.5 for setting dividing number

(7) HOMEＰｏｓｉｔｉｏｎ_<Data>

Command to set Home Position of each axis.

Setting data is －９９９９９９９９～９９９９９９９９、－９．９９９９９９～９．９９９９９９.

1）Multiple=Data／Travel distance per pulse
2）Omit the figures after the decimal point of Multiple
3）Data=Travel distance per pulse×Multiple

（Travel distance per pulse=Standard resolution of motorized stage÷Dividing number of driver）

(8) POＳｉｔｉｏｎ_<Data>

Command to set Current Position of each axis.

Setting data is －９９９９９９９９～９９９９９９９９、－９．９９９９９９～９．９９９９９９.

*In case of continuing 0 after the decimal point, can be skippable.（Ex.：１．２３００００＝１．２３）

*In case of data is not a multiple of the travel distance per pulse, corrects it as shown below.

1）Multiple=Data／Travel distance per pulse
2）Omit the figures after the decimal point of Multiple
3）Data=Travel distance per pulse×Multiple

（Travel distance per pulse=Standard resolution of motorized stage÷Dividing number of driver）

(9) PULＳe_<Data>

Command to set Constant Step Pulse of each axis.

Setting data is ０．０００００１～９９９９９９９.

※ In case of 0 after the decimal point., can be skippable.（Ex.：１．２３００００＝１．２３）

※ In case of data is not a multiple of the travel distance per pulse, corrects it as shown below.

1）Multiple=Data／Travel distance per pulse
2）Omit the figures after the decimal point of Multiple
3）Data=Travel distance per pulse×Multiple

（Travel distance per pulse=Standard resolution of motorized stage÷Dividing number of driver）

（10） ＰＵＬＳｅＡ_<Data>

Command to set Absolute Position Driving of each axis.

Data is －９９９９９９９～９９９９９９９、－９．９９９９９９～９．９９９９９９.

*In case of continuing 0 after the decimal point, can be skippable.（Ex.：１．２３００００＝１．２３）

*In case of data is not a multiple of the travel distance per pulse, corrects it as shown below.

1）Multiple=Data／Travel distance per pulse

2）Omit the figures after the decimal point of Multiple

3）Data=Travel distance per pulse×Multiple

（Travel distance per pulse=Standard resolution of motorized stage÷Dividing number of driver）

（11） ＳＥＬｅｃｔＳＰｅｅｄ_<Data>

Command to set Speed Table of each axis.

<Data>	Content
0～9	Number of Speed Table

（12） ＳＴＡＮＤＡＲＤｒｅｓｏｌｕｔｉｏｎ_<Data>

Command to set Standard Resolution of motorized stage (travel distance per pulse at full step) for each axis.

Data is ０．００００００１～９９９９９９９.

※ When Display Unit is other than PULSe, a change on the dividing number of Driver correspondingly change travel distance per pulse, which may become not a multiple of the following parameters.

- Setting of Constant Step Pulse
- Setting of Soft Limit
- Setting of Home Position
- Current Position

In this case, adjust those parameters with the following process.:

1）Multiple=Data／Travel distance per pulse

2）Omit the figures after the decimal point of Multiple

3）Data=Travel distance per pulse×Multiple

（Travel distance per pulse=Standard resolution of motorized stage÷Dividing number of driver）

（13） ＵＮＩＴ_<Data>

Command to set Display Unit of each axis.

<Data>	Content
０ （or ＰＵＬＳｅ）	Setting a unit of pulse
１ （or UM）	Setting a unit of μm
２ （or MM）	Setting a unit of mm
３ （or ＤＥＧ）	Setting a unit of ｄｅｇ
４ （or MRAD）	Setting a unit of ｍｒａｄ

（14） ＴｅａＣＨ<Data>_□／□／□／□／□／□

Command to set Teaching Point of each axis.

<Data>	□ (First of left side、6th of right side)
Teaching point ：００～６３	Edit a coordinate ： -99999999~99999999、-9.9999999~9.9999999 No setting coordinate： N Setting current position ： S

Ex.1） ＴＣＨ００_１００/２００/３００/４.５６７/５００/０.００６

Ex.2） ＴＣＨ６３_Ｓ/Ｓ/Ｎ/Ｎ/５００/０.００６

4.3.5.3 Memory SW Setting Command

This command sets Memory SW 0(Origin Return type), 1(Mechanical Limit Sensor Input Logic), 2(Origin Sensor Input Logic), 3(Near Origin Sensor Input Logic), 4(Current Down), 5(Motion Direction Switching), 6(Stop processing) and 7(Origin Return 0 Reset).

※ Connecting Axis Selection command is available.
※ Use: (colon) to connect commands.
※ Axis selection command : Memory SW setting command in that order when connect to command.

Memory SW setting Command is configured as shown below.:

- In case of select the axis, set only MemorySW
  Axis Selection Command<Data> : Memory SW setting Command_<Data>
- In case of select the axis, set several Memory SW.
  Axis Selection Command<Data> : Memory SW setting command_<Data> : ・・・
  : Memory SW setting command_<Data>

(1) MEMorySWitch0_<Data>

Command to set Memory SW 0(Origin Return Type) for each axis

<Data>	Content	<Data>	Content
0	Origin Return Type 0	7	Origin Return Type 7
1	Origin Return Type 1	8	Origin Return Type 8
2	Origin Return Type 2	9	Origin Return Type 9
3	Origin Return Type 3	10	Origin Return Type 10
4	Origin Return Type 4	11	Origin Return Type 11
5	Origin Return Type 5	12	Origin Return Type 12
6	Origin Return Type 6		

※ Regarding types of origin returns, refer to Table of Origin Return Type(See 3.9).

(2) MEMorySWitch1_<Data>

Command to set Memory SW 1(Mechanical Limit Sensor Input Logic)

<Data>	Content
0	Select B of Mechanical Limit Sensor Input Logic (Normal Close) ※ Use this setting for connecting with Suruga Seiki's motorized stage(except for KRE).
1	Select A of Mechanical Limit Sensor Input Logic(Normal Open)

(3) MEMorySWitch2_<Data>

Command to set Memory SW2 (Origin Sensor Input Logic) for each axis

<Data>	Content
0	Select B of Origin Sensor Input Logic (Norma Close)
1	Select A of Origin Sensor Input Logic (Normal Open)

(4) MEMorySWitch3_<Data>

Command to set Memory SW3 (Near Origin Sensor Input Logic) for each axis

<Data>	Content
0	Select B of Near Origin Sensor Input Logic (Normal Close)
1	Select A of Near Origin Sensor Input Logic (Normal Open)

(5) MEMory SWitch4_<Data>

Command to set Memory SW4 (Current Down Control)

<Data>	Content
0	Control Current Down (Motor current value at stop) ※Control heat up when current value will be 0.75A/Phase during motor driving, will be 0.375A/Phase(-50%) at the stop. ※NR type is fixed to 0.(1 cannot be set)
1	No Current Down Control (MS Type)。

(6) MEMory SWitch5_<Data>

Command to set Memory SW5 (Driving Direction Switching) for each axis.

<Data>	Content
0	Normal Direction （POSITIVE）
1	Reversed Direction （NEGATIVE）

(7) MEMory SWitch6_<Data>

Command to set Memory SW6 (Stop processing) for each axis.

<Data>	Content
0	Emergency (at Limit detection)
1	Reduction (at Limit detection)

(8) MEMory SWitch7_<Data>

Command to set Memory SW7 (Origin Return 0 Reset) for each axis.

<Data>	Content
0	After finished Origin Return, 0 reset.
1	After finished Origin Return, No 0 reset.

4.3.5.4 Speed Table Setting Command

This command conducts setting of Start-up Velocity (L), Driving Speed (F), and Acceleration & Deceleration Rate (R), S Acceleration & Deceleration Rate (S) of Speed Table No. 0~9.

- ※ Connecting different Speed Table Setting Commands is available.
- ※ Use (colon) to connect commands.
- ※ Refer to 3.8 for relationship among Start-up Velocity (L), Driving Speed (F), Acceleration & Deceleration rate (R) and S Acceleration & Deceleration Rate (S).
- ※ Start up Velocity (L) and Driving Speed (F) is in unit of pps. Acceleration & Deceleration rate (R) is in unit of msec. S Acceleration & Deceleration Rate (S) is in unit of %.

(Caution) When an input driving speed (F) is more than MAX speed of motorized stage, a motor may be stepping out. When an input start up Velocity (L) is more than Driving Speed (F), the Driving Speed (F) becomes actual start up Velocity (L).

Speed Table Setting Command is configured as shown bellows.:

- When setting multiple Speed Tables at one.
  Speed Table Setting Command_<Data>：……：Speed Table Setting Command_<Data>

(1) Lspeed□_<Data>

Command to set Start Up Velocity (L)
□ is a choice of 0~9 (Speed Table No. 0~9)
<Data> is 1~9999. Unit is pps.

(2) Fspeed□_<Data>

Command to set Driving Speed (F)
□ is a choice of 0~9 (Speed Table No. 0~9)
<Data> is 1~999999. Unit is pps.

(3) Rate□_<Data>

Command to set Acceleration and Deceleration Rate (R)
□ is a choice of 0~9 (Speed Table No. 0~9)
<Data> is 1~9999. Unit is msec.

(4) Srate□_<Data>

Command to set S Acceleration and Deceleration Rate (S)
□ is a choice of 0~9 (Speed Table No. 0~9)
<Data> is 0~100. Unit is %.

4.3.5.5 Write Command

(1) WRITE

Parameter that be configured by this machine is kept in built in flash memory. We will not adopt the system that keeps flashing memory everytime because there is a limit to flash memory rewrite for million times.

(Note)

- Can not keep Parameter Setting if power off without sending write command.
- Do not power off for over 130 msec. after send write command.
- Can keep setting value from Handy Terminal and Control Software (DSCONTROL-WIN).

(2) *RST

Command to reset the all parameter. Do not power off for 5sec after sending the reset command.

4.3.5.6 Driving Command

This commands conducts various driving of a stage: Constant Step Pulse driving to CW/CCW directions, Origin Return driving, driving to Home Position, and Absolute Position Driving.

※ Connecting Axis Selection command, Parameter Setting command and driving command is available.
※ Use (colon) to connect commands.
※ Order of connection has to begin with Axis Selection Command: Driving Command.
※ Command has to select an axis if needed.

Driving Command is configured as shown bellows.:

- When selecting axis and driving
  Axis Selection Command<Data> : Driving Command_<Data>
- When selecting axis, setting parameter and having it driven
  Axis Selection Command<Data> : Parameter Setting Command_<Data> :
  Driving Command_<Data>

(1) GO_<Data>

Driving Commands for each axis.

<Data>	Content
0 (or CW)	Drive Parameter's Constant Step Pulse distance in the CW direction
1 (or CCW)	Drive Parameter's Constant Step Pulse distance in the CCW direction
2 (or ORiGin)	Conducted Origin Return by following a type of Origin Return set of Memory SW
3 (or HOME)	Move to Home Position of Parameter (HOMEP).
4 (or ABS)	Move to Absolute Position of Parameter (PULSeA)
5 (or CWJ)	Continuous Driving in the CW direction.
6 (or CCWJ)	Continuous Driving in the CCW direction.

(2) GOABSolute_<Data>

Go Absolute Position Command for each axis.

<Data>is －99999999～99999999、－9．9999999～9．9999999.

*In case of continuing 0 after the decimal point., can be skippable. (Ex.：1．2300000＝1．23)

*In case of data is not a multiple of the travel distance per pulse, corrects it as shown below.

1) Multiple=Data／Travel distance per pulse

2) Omit the figures after the decimal point of Multiple

3) Data=Travel distance per pulse×Multiple

(Travel distance per pulse=Standard resolution of motorized stage÷Dividing number of driver)

(3) GOTeaCH_<Data>

Go Teaching Point Move-Command

<Data>is００～６３(Teaching point Number).

(4) GOLinel_<Data>

Straight complementary setting driving command (Incremental).

GOLinel _X□Y□Z□U□V□W□

□：+ or － (+：Selected in the CW direction, -：Selected in the CCW direction)

Travel Distance：Set "PULSe" Value. (Unit depends on the setting unit)

※Skip no driving axis. (Ex：GOLinel _X+Z-)。

(5) GOLineA_<Data>

Straight complementary setting driving command (Absolute)

GOLineA_X□_Y□_Z□_U□_V□_W□

□：Selected position (Unit depends on the setting unit)

※Skip no driving axis. (Ex：GOLineA_X1000_Z-2000)。

4.3.5.7 Stop Command

(1) STOP_<Data>

This Command conducts emergency-stop or slowdown-stop

- ※ Connecting with Axis Selection command is available.
- ※ Use：(colon) to connect commands.
- ※ Orders of connection have to begin with Axis Selection Command：Stop Command.
- ※ When there is no Axis Selection command, it conducts emergency-stop on a driving axis.

Stop Command is configured as shown below.:

- When selecting axis and stopped it.
  Axis Selection Command<Data> : Stop Command_<Data>
- When stop axis during drive
  Stop Command_<Data>

<Data>	Content
0 (or Emergency)	Emergency stop
1 (or Reduction)	Slow down stop

※When <Data>is omitted, it automatically selects "0"

4.3.5.8 Parameter Setting Request Command

This command requests settings of CW & CCW side's Soft Limit, Dividing Number of driver, Home Position, Current Position, Travel Distance of Constant Step Pulse, Travel Distance per pulse, Speed Table, Travel Distance per pulse at full-step, and Display Unit.

No sooner was request command received, than it send response value to the requirement.

※ Connecting with Axis Selection command is available.
※ Use : (colon) to connect commands.
※ Orders of connection have to begin with Axis Selection Command : Parameter Setting Request Command.

Parameter Setting Request Command is configured as shown below.

- When selecting axis and requesting parameter setting data.
  Axis Selection Command<Data> : Parameter Setting Command?

(1) CWSoftLimitEnable?

Command to request for setting: enable/disable CW side Soft Limit of each axis.

<Response Data>	Content
0	In process to disable CW Software Limit
1	In process to enable CW Software Limit

(2) CWSoftLimitPoint?

Command to request for setting point of CW side Software Limit of each axis.
<Response Data> is −99999999~99999999、−9.9999999~9.9999999.

(3) CCWSoftLimitEnable?

Command to request for setting: enable/disable CCW side Soft Limit of each axis.

<Response Data>	Content
0	In process to disable CCW Software Limit
1	In process to enable CCW Software Limit

(4) CCWSoftLimitPoint?

Command to request for setting point of CCW side Software Limit of each axis.
<Response Data> is −99999999~99999999、−9.9999999~9.9999999.

(5) DRiverDIVision?

Command to request for setting of a dividing number of drivers for each axis.

<Response Data>	Content
0	In the process of setting “1／1”
1	In the process of setting “1／2”
2	In the process of setting “1／2．5”
3	In the process of setting “1／4”
4	In the process of setting “1／5”
5	In the process of setting “1／8”
6	In the process of setting “1／10”
7	In the process of setting “1／20”
8	In the process of setting “1／25”
9	In the process of setting “1／40”
10	In the process of setting “1／50”
11	In the process of setting “1／80”
12	In the process of setting “1／100”
13	In the process of setting “1／125”
14	In the process of setting “1／200”
15	In the process of setting “1／250”

(6) DATA?

Command to request for setting to dividing number switching with Microstep driver (No work at Normal driver).

<Response Data>	Content
1	In the process of setting DATA1
2	In the process of setting DATA2

(7) HOMEPosition?

Command to request for setting of Home Position of each axis.

<Response Data> is －99999999～99999999、－9．9999999～9．9999999.

(8) POSition?

Command to request for setting of Current position of each axis.

<Response Data> is －99999999～99999999、－9．9999999～9．9999999.

(9) PULSe?

Command to request for setting of Constant Step Pulse of each axis.

<Response Data> is －99999999～99999999、－9．9999999～9．9999999.

(10) RESOLUTion?

Command to request for setting of travel distance per pulse of each axis (=resolution of motorized stage/dividing number of driver).

<Response Data> is －99999999～99999999、－9．9999999～9．9999999.

（11） ＳＥＬｅｃｔＳＰｅｅｄ？

Command to request for setting of Speed Table of each axis.

<Response Data>	Content
0～9	Number of Speed Table in selection process

（12） ＳＴＡＮＤＡＲＤｒｅｓｏｌｕｔｉｏｎ？

Command to request for standard resolution of motorized stage (travel distance per pulse at full step) for each axis.

<Response Data> is ０．０００００００１～９９９９９９９９.

（13） ＵＮＩＴ？

Command to request for setting of Display Unit of each axis.

<Response Data>	Content
0	Setting a unit of pulse
1	Setting a unit of μm
2	Setting a unit of mm
3	Setting a unit of ｄｅｇ
4	Setting a unit of ｍｒａｄ

（14） ＴｅａＣＨ００？ ～ ＴｅａＣＨ６３？

Command to request for teaching point. Return 6 axes data

<Response Data format> □1／□2／□3／□4／□5／□6

<Response Data>	Content
□1	Xaxis data ： -99999999~99999999、-9.9999999~9.9999999 Xaxis data unset ： N
□2	Yaxis data ： -99999999~99999999、-9.9999999~9.9999999 Yaxis data unset ： N
□3	Zaxis data ： -99999999~99999999、-9.9999999~9.9999999 Zaxis data unset ： N
□4	Uaxis data ： -99999999~99999999、-9.9999999~9.9999999 Uaxis data unset ： N
□5	Vaxis data ： -99999999~99999999、-9.9999999~9.9999999 Vaxis data unset ： N
□6	Waxis data ： -99999999~99999999、-9.9999999~9.9999999 Waxis data unset ： N

4.3.5.9 Memory SW Setting Request Command

This command requests for setting of Memory SW 0 (Origin Return type), 1 (Mechanical Limit Sensor Input Logic), 2 (Origin Sensor Input Logic), 3 (Near Origin Sensor Input Logic), 4 (Current Down Control), 5 (Motion Direction Switching), 6(Stop processing) and 7(Origin Return 0 Reset).

No sooner was request command received, than it send response value to the requirement.

- ※ Connecting Axis Selection command is available.
- ※ Use : (colon) to connect commands.
- ※ Orders of connection have to begin with Axis Selection Command: Memory SW setting Request Command.

Memory SW Setting Request Command is configured as shown below:

- When selecting axis and requesting Memory SW setting.
  Axis Selection Command <Data>:Memory SW Setting Request Command?

(1) MEMorySWitch0?

Command to request for setting of Memory SW 0 (Origin Return Type) for each axis.

<Response Data>	Content	<Response Data>	Content
0	Selecting Origin Return Type 0	7	Selecting Type 7
1	Selecting Origin Return Type 1	8	Selecting Type 8
2	Selecting Origin Return Type 2	9	Selecting Type 9
3	Selecting Origin Return Type 3	10	Selecting Type 10
4	Selecting Origin Return Type 4	11	Selecting Type 11
5	Selecting Origin Return Type 5	12	Selecting Type 12
6	Selecting Origin Return Type 6		

※ Regarding types of origin returns, refer to Table of Origin Return Type (See 3.9)

(2) MEMorySWitch1?

Command to request for setting of Memory SW 1 (Mechanical Limit Sensor Input Logic) for each axis.

<Response Data>	Content
0	Selecting B of Mechanical Limit Sensor Input Logic (Normal Close)
1	Selecting A of Mechanical Limit Sensor Input Logic (Normal Open)

(3) MEMorySWitch2?

Command to request for setting of Memory SW 2 (Origin Sensor Input Logic) for each axis.

<Response Data>	Content
0	Selecting B of Origin Sensor Input Logic (Normal Close)
1	Selecting A of Origin Sensor Input Logic (Normal Open)

(4) MEMorySWitch3?

Command to request for setting of Memory SW 3 (Near Origin Sensor Input Logic) for each axis.

<Response Data>	Content
0	Selecting B of Near Origin Sensor Input Logic (Normal Close)
1	Selecting A of Near Origin Sensor Input Logic (Normal Open)

(5) MEMorySWitch4?

Command to request for setting of Memory SW 4 (Current Down Control) for each axis.

<Response Data>	Content
0	Selecting Control Current Down ※NR type is fixed to 0.(1 cannot be set)
1	Selecting No Control Current Down

(6) MEMorySWitch5?

Command to request for setting of Memory SW 5 (Driving Direction Switching) for each axis.

<Response Data>	Content
0	Normal Direction (POSITIVE)
1	Reversed Direction (NEGATIVE)

※ See 3.2.4.5 for directions of motion.

(7) MEMorySWitch6?

Command to request for setting of Memory SW 6 (Stop Processing) for each axis.

<Response Data>	Content
0	Selecting Emergency stop
1	Selecting Slowdown stop

(8) MEMorySWitch7?

Command to request for setting of Memory SW 7 (0 reset at Origin Return)

<Response Data>	Content
0	Reset the setting 0
1	Not reset the setting 0

4.3.5.10 Speed Table Setting Request Command

This command requests for settings of Speed Table.

On receipt of request command, controller sends response back to the requester.

(1) Lspeed□?

Command to request for setting of Start-up Velocity (L)

□ is a choice of 0～9 (the number of requested Speed Table will be in □)

<Response Data> is 1～9999. UNIT is pps.

(2) Fspeed□?

Command to request for setting of Driving Speed (F)

□is a choice of 0～9 (the number of requested Speed Table will be in □)

<Response Data> is 1～999999. UNIT is pps.

(3) Rate□?

Command to request for setting of Acceleration and Deceleration Rate (R)

□ is a choice of 0～9 (the number of requested Speed Table will be in □)

<Response Data> is 1～9999. UNIT is msec.

(4) Srate□?

Command to request for setting of S Acceleration and Deceleration Rate (S)

□ is a choice of 0～9 (the number of requested Speed Table will be in □)

<Response Data> is 0～100. UNIT is %

4.3.5.11 Status Request Command

This command request for status on motion direction of each axis, CW & CCW side's Soft Limit (Effective/Non-effective), Discontinuation, type of driver, detection of Home Position, detection of Mechanical Limit Sensor, In-motion, availability of Axis Selection, detection of Origin, detection of Soft Limit, Status 1/2/3, the number of controlling axis, and motion status of all axes.

※ Connecting Axis Selection Command and Status Request Command is available. (However, CONTrolAxis? And MOTIONAll? Command cannot be connected with Axis Selection Command).

※ Use : (colon) to connect commands.

※ Orders of connection have to begin with Axis Selection Command: Status Request Command.

※ Must be selecting axis if needed.

Status Request Command is configured as shown below:

- When requesting status without selecting axis
  Status Request Command?
- When selecting axis and requesting status
  Axis Selection Command <Data>: Status Request Command?

(1) COURSE?

Status Request Command for Motion Direction for each axis.

<Response Data>	Content
0	In motion in the CW direction or at halt after driving
1	In motion in the CCW direction or at halt after driving

※ This is the same as Bit 1 of StatusBinary1? (See (12)) (The logic is oppsite.).

(2) CWSoftLimitSET?

Status Request Command for Software Limit Effective/Non-effective in the CW direction.

<Response Data>	Content
0	Setting of Software Limit in the CW direction is Non-effective
1	Setting of Software Limit in the CW direction is Effective

※ This is the same as Bit5 of StatusBinary2? (See (13))

(3) CCWSoftLimitSET?

Status Request Command for Software Limit Effective/Non-effective in the CCW direction.

<Response Data>	Content
0	Setting of Software Limit in the CCW direction is Non-effective
1	Setting of Software Limit in the CCW direction is Effective.

※ This is the same as Bit6 of StatusBinary2? (See (13))

(4) DISCONtinue?

Status Request Command for Discontinuation for each axis.

<Response Data>	Content
0	Complete a motion without discontinuing motion.
1	Discontinued without completing motion due to Stop Command or STOP button of DT100 Handy Terminal

※ This is the same as Bit4 of StatusBinary2? (See (12))

(5) DRiverTYPE?

Status Request Command for Driver Type

<Response Data>	Content
0	Loaded with Normal Type Driver
1	Loaded with Micro-Step Driver

※ This is the same as Bit 2 of Status Binary3? (See (14))

(6) HOME?

Status Request Command for Home Detection for each axis.

<Response Data>	Content
0	Home Position is not detected.
1	Detecting Home Position

※ This is the same as Bit 6 of Status Binary1? (See (12))

(7) LIMIT?

Status Request Command for Mechanical Limit Detection for each axis.

<Response Data>	Content
0	Mechanical Limit is not detected
1	Detecting Mechanical Limit in the CW direction
2	Detecting Mechanical Limit in the CCW direction
3	Detecting Mechanical Limit in the CW & CCW direction

(8) MOTION?

Status Request Command for axis in motion.

<Response Data>	Content
0	At Halt
1	In Motion

※ This is the same as Bit7 of Status Binary1? (See (12))

(9) ORiGin?

Status Request Command for Origin Detection of each axis.

<Response Data>	Content
0	Origin Return is not in process
1	Origin Return has been completed and Mechanical Origin has been detected. At halt

※ This is the same as Bit5 of Status Binary1? (See (12))

(10) READY?

Status Request Command for availability of Axis Selection

<Response Data>	Content
0	Axis NOT loaded with driver.
1	Axis loaded with driver

※ This is the same as Bit1 of Status Binary3? (See (14))

(11) SoftLIMIT?

Status Request Command for Software Limit of each axis

<Response Data>	Content
0	Software Limit is not detected
1	Detecting Software Limit in the CW direction
2	Detecting Software Limit in the CCW direction

(12) StatusBinary1?

Status Request Command for One byte Binary Code for each axis.

※ This binary code is output as ASCII code which is converted from the numbers between 0 ~255)

<Response Data>

	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
1	Program in Driving	In Motion	Home position Detected	Origin Detected	Dis-continuation	Soft Limit Detected	Mechanical Limit Detected	CW
0	At Halt	At Halt						CCW

Bit 1	CW / CCW	1	In motion in the CW direction or at halt after driving
		0	In motion in the CCW direction or at halt after driving
Bit 2	Machine Limit Direction	1	Detecting Mechanical Limit in the CW or CCW direction.
		0	Not-yet detecting machanical Limit in the CW or CCW Direction
Bit 3	Soft Limit Detection	1	Detection g Soft Limit in the CW or CCW direction
		0	Not-yet detecting Soft Limit in the CW or CCW direction
Bit 4	Dis-Continuation	1	In case of motion is suspended without completing a motion by entered stop common or EMS input or detected Mechanical Limit
		0	In case of complete a motion without suspending at next motion
Bit 5	Origin Detection	1	Origin Return is completed and Mechanical Origin is detected:At Halt
		0	Not-yet detecting Origin
Bit 6	Home Position Detection	1	Detecting Home Position
		0	Not-yet detecting Home Position
Bit 7	In Motion/At Halt	1	In Motion
		0	At Halt
Bit 8	Program Driving ／Stopping	1	Program driving
		0	Program under suspension

(13) StatusBinary2?

Status Request Command for One byte Binary code for each axis.

*This binary code is output as ASCII code which is converted from the numbers between 0~63

<Response Data>

	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
1			CCW Soft Limit Effective	CW Soft Limit Effective	CCW Soft Limit Detected	CW Soft Limit Detected	CCW Mechanical Limit Detected	CW Mechanical Limit Detected
0	O	O	Non-effective	Non-effective				

Bit 1	CW Mechanical Limit Detected	1	Detecting CW mechanical Limit
		0	Not-yet detecting CW mechanical Limit
Bit 2	CCW Mechanical Limit Detected	1	Detecting CCW Mechanical Limit
		0	Not-yet detecting CCW Mechanical Limit
Bit 3	CW Soft Limit Detected	1	Detecting CW Soft Limit
		0	Not-yet detecting CW Soft Limit
Bit 4	CCW Soft Limit Detected	1	Detecting CCW Soft Limit
		0	Not-yet detecting CCW Soft Limit
Bit 5	CW Soft Limit Effective/Non-effective	1	In process of Enabling CW Soft Limit
		0	In process of disabling CW Soft Limit
Bit 6	CCW Soft Limit Effective/Non-effective	1	In process of Enabling CCW Soft Limit
		0	In process of disabling CCW Soft Limit

(14) StatusBinary3?

Status Request Command for One byte Binary Code for each axis.

*This binary code is output as ASCII code which is converted from the numbers between 0~33.

<Response Data>

	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
1			Driver Type		Driver Type		Driver Type	Axis Selection Available
0	0	0		0		0		

Bit 1	Axis Selection Available	1	Axis loaded with driver
		0	Axis without driver
Bit 2, 4	Driver Type	1	Micro-step driver
		0	Normal type driver
Bit 6	Driver Type	1	Normal type driver
		0	Micro-step driver

(15) CONTrolAxis?

Request Command for the number of controlling axis.

<Response Data> is 1~6.

(16) MOTIONAll?

Status Request Command for all axes in motion.

<Response Data> is 0~63.

<Response Data>

	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
1			W axis in motion	V axis in motion	U axis in motion	Z axis in motion	Y axis in motion	X axis in motion
0	0	0	W axis at Halt	V axis at Halt	U axis at Halt	Z axis at Halt	Y axis at Halt	X axis at Halt

Bit 1	X axis	1	In Motion
		0	At Halt
Bit 2	Y axis	1	In Motion
		0	At Halt
Bit 3	Z axis	1	In Motion
		0	At Halt
Bit 4	U axis	1	In Motion
		0	At Halt
Bit 5	V axis	1	In Motion
		0	At Halt
Bit 6	W axis	1	In Motion
		0	At Halt

(17) EMS?

This is the EMS status request command for link number 0 (the status of the EMS for link number 1 and 2 cannot be confirmed).

<Response Data>	Content
0	EMS undetected (input signal ON : closed)
1	EMS detected (input signal OFF : opened) ※All axes stop.

(18) ＊IDN?

Request Command of ID

<Response Data>

<Field1>, <Field2>, <Field3>, <Field4>

- Field1…Manufacturer（SURUGA）
- Field2… Type（DS102）
- Field3… Serial Number（0）
- Field4… Firmware Version

<Ex.: Response Data>

SURUGA, DS102, 0, VER1.00

※In case of DS112A, "DS102" is returned too.

4.3.5.12 General I/O Command

(1) IN00?~IN47?

Status Request Command for General I/O Request 1/bit

<Response Data>	Content
0	Input OFF
1	Input ON

(2) INP0?~INP2?

Status Request Command for General Input. Request Input 16points of each controller(LinkID0～2) all at once.

<Response Data> is 0~65535.

<Response Data>	Contents
0	All of 16 points OFF
65535	All of 16 points ON

(3) OUT□_<Data>

Control Command of General Output.（0～35） Set 1/bit

□ : 00~35.

<Setting Data>	Content
0	Output OFF
1	Output ON

(4) OUTP□_<Data>

Control Command of General Output. Request Output 12points of each controller (LinkID0～2)all at once.

□ : 0~2、<Response Data> is 0~4095.

<Response Data>	Content
0	All of 12 points output OFF
4095	All of 12 points output ON

(5) OUTP0?~OUTP2?

Status Request Command for General Output. Request Output 12points of each controller (LinkID 0～2) all at once. <Response Data> is 0~4095.

<Response Data>	Content
0	All of 12 points during output OFF
4095	All of 12 points during output ON

4.3.6 Program Driving Dedicated Command

This program driving can use main command without request command. Also control any types of sequence with following for program driving command.

<Program Driving Customized Command List>

Command	Content
Wait_□	Wait Time Command (premature ending of a program) Wait_[1~999,999] (ms)
:DWait	Drive Wait Command (premature ending of program till selection axis stop AXI[Selection Axis]:[Driving Command] :DWait
DWait	Drive Wait Command (premature ending of program till all axis stop) DWait
JMP_□	Jump Command (Jump to selection point) JMP_[0~99]
IJMP_□,□	Parameter Jump Command (Jump to selection point when match the Input Port Status) IJMP_[00~47], [0 or 1] , [0~99] Ex.) IJMP_05, 1 ,28 →When Input Port No.05 is ON, jump to 28 th. Line. If OFF, jump to next line.
LoopS_□	Loop Start Command (1~999,999 times repeat till LoopE) LoopS_[1~999,999] (Times)
LoopE	Loop End Command LoopE

※ "_" means space

※ Lower-case omissible.

<Program Upload, Download Command>

Type	Command	Function	Remarks
Program Delete	DEL_PRG_□	Program Delete 0~7 : Program Number	Delete program range (Step0~99) of selection number
Program Setting	SETPRG_P, S, D	Program Setting P: Program No.(0~7) S: Step No. (0~99) D: Command Data	Store selection program-compliant command to program, step that selected number. Linked command data is Max 12
Getting Program	GETPRG_P, S	Getting Program P: Program No. (0~7) S: Step No. (0~99)	Get the Program of selection number
End the Program	END	End the Program	Program shutdown Command Set the last step of Program

<Procedure example of Program Download>

PC		DS102/DS112
DELPRG 0	⇒	Delete range ofProgram No.0
	←	＞ (after 500ms)
SETPRG 0, 0, AXI1:PULS_1000	⇒	Store to step 0 of Program No.0
	←	＞ (after 30ms)
SETPRG 0, 1, LoopS_10	⇒	Store to step 1 of Program No.0
	←	＞ (after 30ms)
SETPRG 0, 2, AXI1:GO_CW:DW	⇒	Store to step 2 of Program No.0
	←	＞ (after 30ms)
SETPRG 0, 3, LoopE	⇒	Store to step 3 of Program No.0
	←	＞ (after 30ms)
SETPRG 0, 4, END	⇒	Store to step 4 of Program No.0
		Write in flash memory
	←	＞ (after 500ms)

In order to download a program, first, the DELPRG command is sent and all the specified memory areas of a program number are deleted. Since ″>″ will be replied if deletion is completed, please send the SETPRG command after receiving this. Since ″>″ is returned also after SETPRG command reception, please send the following SETPRG command after receiving this. If END is finally received, the program will be automatically written in a flash memory.
″>″ is answered that writing is completed.
※ A part of program cannot be changed.

<Procedure example of Program Upload>

PC		DS102/DS112
GETPRG_0, 0	⇒	
	←	AXI1:PULS_1000
GETPRG_0, 1	⇒	
	←	LoopS_10
GETPRG_0, 2	⇒	
	←	AXI1:GO_ CW:DW
GETPRG_0, 3	⇒	
	←	LoopE
GETPRG_0, 4	⇒	
	←	END

<Program Number Selection Command>
Select a Program that driven

SELPRG_<Data>

<Data> is 0~7.

<Program Start Command>
Start a Program that selected

PRG_<Data>

<Data>	Content
0 (or RUN)	Start a selection program (sequence motion)
1 (or STEP)	Start a selection program (step driving)

<Program Number Request Command>
Request a Program Number during selecting

SELPRG?

<Response Data> is 0~7.

<Program Number Start Command>
Request Program Driving Status

PRG?

<Data>	Content
0	Program Driving (sequence motion)
1	Program Driving (Step driving)
2	Program during stop

<Program Stop Command>
Stop the driving program

STOP

4.3.7 Error Code

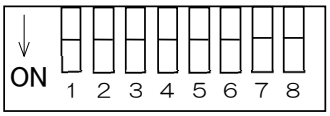
In case of command response function is effect, if communication command doesn't match, send back the following code by ASCII.

Code	Function	Cause
E00	Stage is not connected Sensor logic setting error	Driving Command starts to stage is unconnected axis.
E01	In Motion	Send a driving type command to motor in motion, or start the command during program driving, teaching or setting handy terminal
E02	Limit detecting	Already had a limit detecting at the start
E03	Emergency detecting	Start Driving Command when input the emergency signal.
E20	Command rule error	Error of command documents
E21	Error of unsent delimiter	No delimiter(CR) or incorrect
E22	Setting Range Error	Over setting range of coordinate or setting value
E40	Communication Error	Abnormal communication line (included Link)
E41	Error of write in flash memory	Can't store due to flash memory trouble or lifetime

※ <u>When Command Response function is no effect, nothing return eventhough communication command is unmatched.</u>

【Setting DIP switch】

Set 7th. of SW1



SW1

● Setting Command Response

7	Command response Enable /Disable
OFF	Disable (Default)
ON	Enable

※ OFF setting at the before shipping.

5. Checkout

We recommend to checkout constantly after driving. If something abnormal signal showed, please stop the work and call us immediately.

(Checkout Item)

- Is there some damaged, stress or loosing on cable?
- Is there some dust or clogging on controller airflow?
- Is there some abnormal smell or sound?
- Is there any other abnormal things on the equipment?

6. Fault diagnosis and solution

Driver will not work normally during motorized stage driving due to mistaking of speed setting or connecting. Please follow the following direction as needed.

Trouble	Possible Cause	Solution
A motor is not excited. Can turn a motor by hand easily.	Poorly fitting motorized stage connecting cable or power cable.	Recheck connecting is correct.
A motor is not spin.	On emergency	Recheck emergency stop is ON.
	Current down function is [OFF] for NR type	Switch [ON] current down function for NR type.
No match between motor distance and setting.	Incorrect [STANDARD]value	See catalogue and reset correct [STANDARD] value.
No down current power at stop the motor	Currentdown function is [OFF])	Switch [ON] currentdown function.
Loss of synchronism during acceleration or driving	Load or load change	Check the load change during motor driving. It is no problem at arrange the torque driving., recheck as needed.
	Starting pulse speed is so high	Recheck at the slowdown.
	Acceleration time is short	Recheck the acceleration level.
Motor violation	Motorized stage motors resonance	Change the driving pulse speed.
Motor heat up	Long driving	Check the driving time
	Currentdown function [OFF]	Switch currentdown function [ON]

7. Warranty & Customer Service

●Warranty

At time of contacting Suruga Seiki or our distributor in your area, please refer to the serial number of product that is indicated on the side of product or enclosed warranty or quality assurance cetificate. Suruga Seiki will refer to the date of purchase and registration according to the serial number. The warranty period is one year from the time of purchase.

The following conditions are not covered by the warranty.

—Failure to use the product properly as explained in the instruction manual, damage or injury caused by repair or modification made by a person other than a qualified personnel of Suruga Seiki.

—Damage caused by breakage during shipping or transportation or faulty handling.

—Damage due to fire, gas, sea and sea wind, wrong electrical or battery voltage, earthquake, thunder, flood and wind, and any other acts of nature.

—Damage or injury due to not following the proper procedures as indicated in the instruction manuals, not adhering to the caution warnings as indicated in the instruction manuals.

●Repair Service

Please contact your local Suruga Seiki distributor for service if the problem will persists.

《During Warranty Period》

Suruga Seiki will repair breakage caused under proper use following operation manuals for free of charge. Those repairs except mentioned above will be charged.

《After Warranty Period》

When repairing may maintain functions of a product, we can repair the product as charged service.

●Repairable Period

Repairable Period and Repair Parts

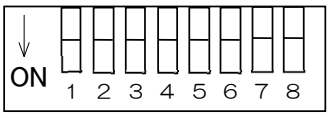
Replacement and repair parts of controller are guaranteed for one year after closing of production. This period is the repairable period. However, please contact your local Suruga Seiki distributor for repairs and replacement parts even after the repairable period in case that repair may be still available.

〈Regarding controller's breakage, Suruga Seiki will not be responsible for anything but free repair service based on this warranty.〉

● Appendix

■ DIP Switch Set

RS232C Baud rate (2bit)、Link Number(2bit)、USB ID(2bit)、Command response(1bit) set



SW1

● RS232C Baud rate

1	2	Baud rate
OFF	OFF	4,800bps
ON	OFF	9,600bps
OFF	ON	19,200bps
ON	ON	38,400bps (Default)

● Link Number

3	4	Link Number
OFF	OFF	0 (Default)
ON	OFF	1
OFF	ON	2
ON	ON	

● USB ID

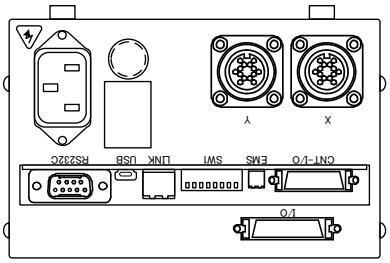
5	6	USB ID
OFF	OFF	0 (Default)
ON	OFF	1
OFF	ON	2
ON	ON	3

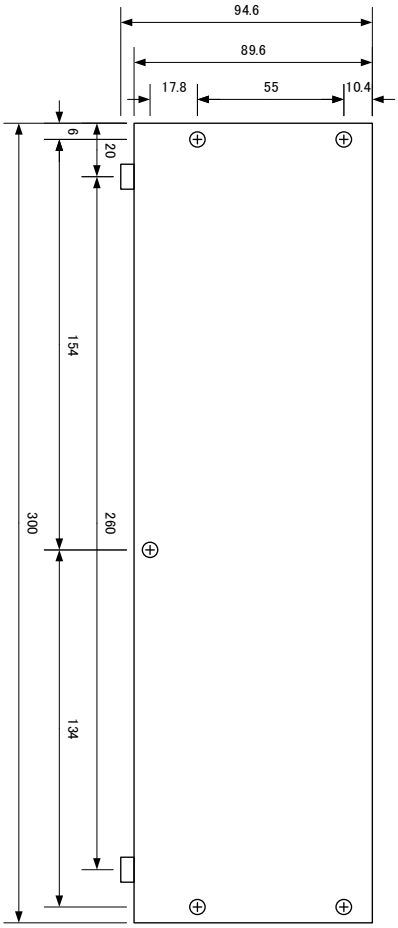
● Command response

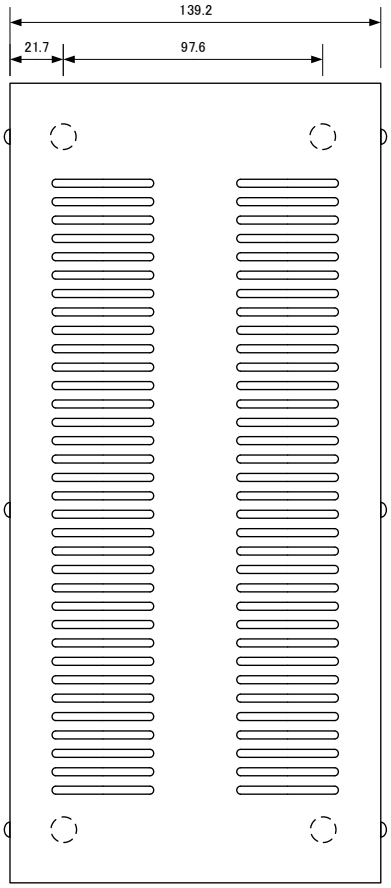
7	Command response Enable /Disable
OFF	Disable (Default)
ON	Enable

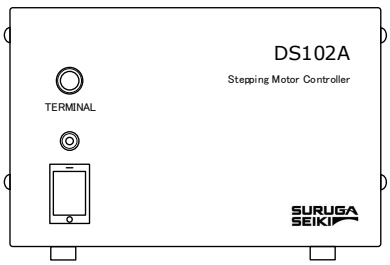
※Default is 1,2ON, other OFF.
※8bit is not used. (Use it like off)

■ DS102A Externals

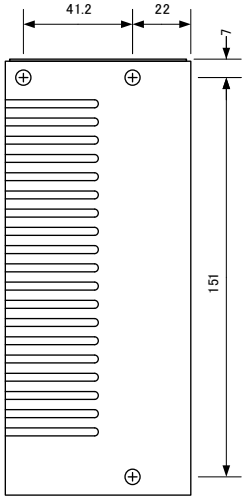


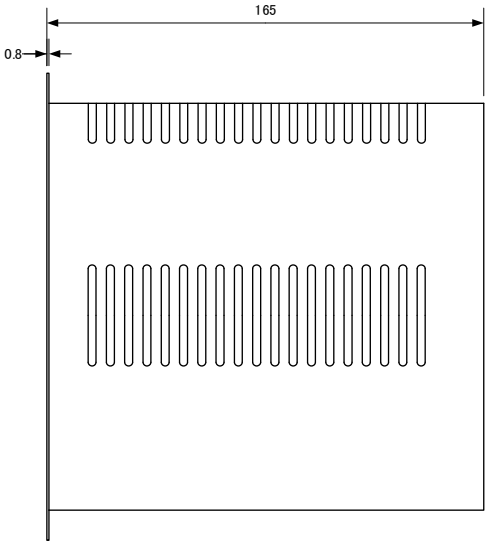


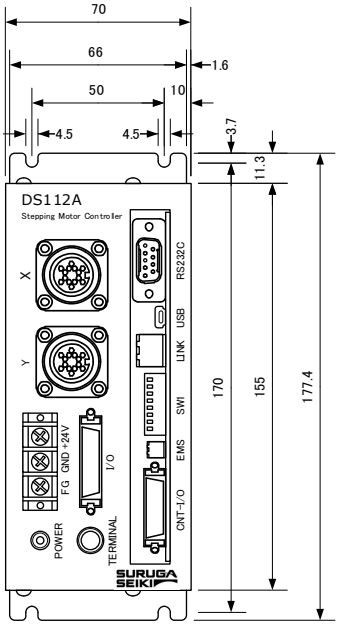




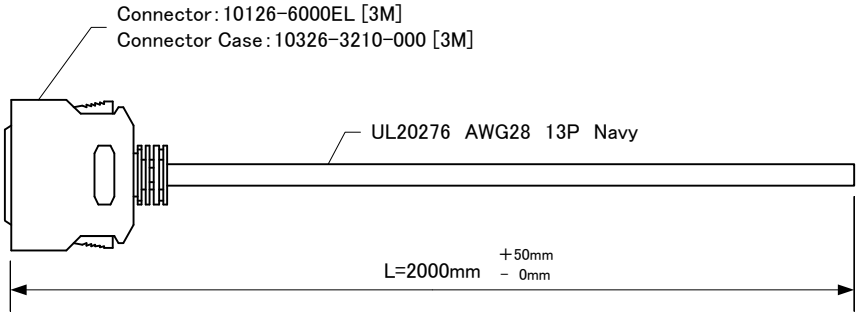
■ DS112A Externals

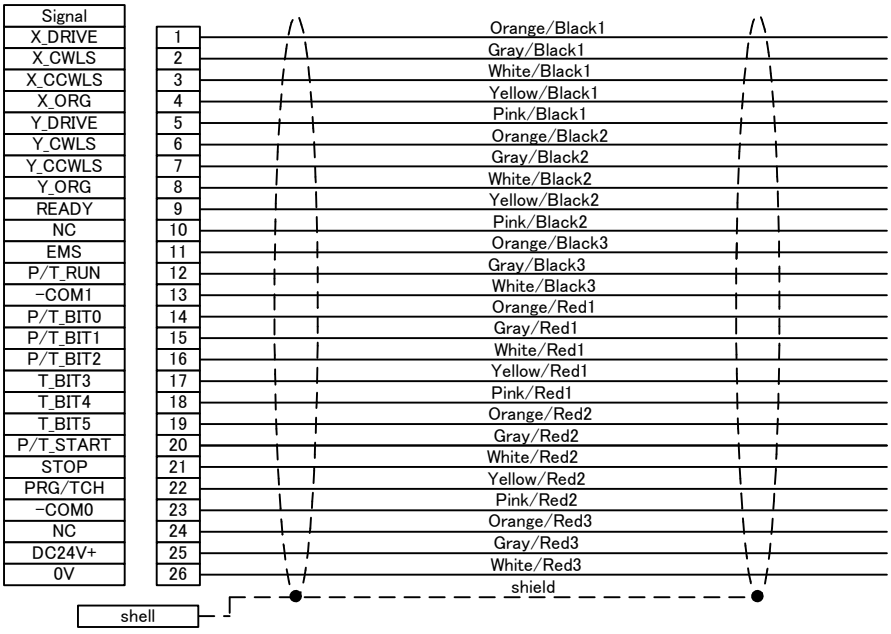


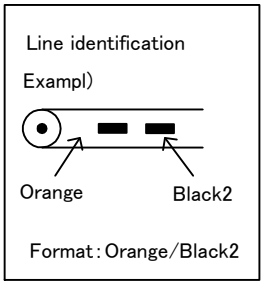




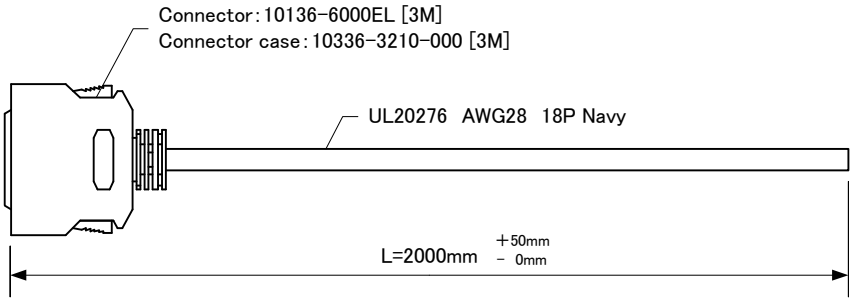
■ Control I/O cable (Model : DS100-CNT-2)

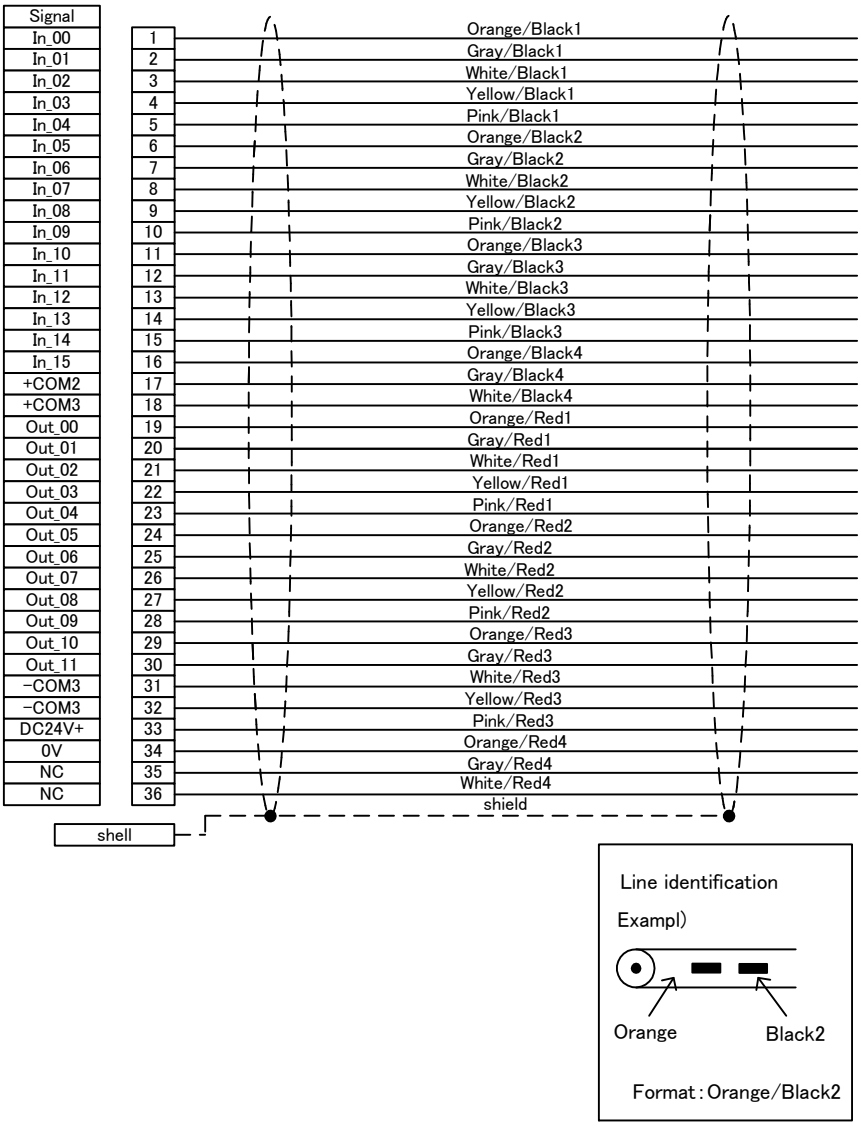






■ General I/O cable (Model : DS100-IO-2)





■ Selection of a program number by CNT-IO

PRG/TCH : OFF

program number / CNT-IO	0	1	2	3	4	5	6	7
P/T_BIT0 $2^0 = 1$	OFF	ON	OFF	ON	OFF	ON	OFF	ON
P/T_BIT1 $2^1 = 2$	OFF	OFF	ON	ON	OFF	OFF	ON	ON
P/T_BIT2 $2^2 = 4$	OFF	OFF	OFF	OFF	ON	ON	ON	ON

■ Selection of a teaching number by CNT-IO

PRG/TCH : ON

teaching number / CNT-IO	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
P/T_BIT0 $2^0 = 1$	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
P/T_BIT1 $2^1 = 2$	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
P/T_BIT2 $2^2 = 4$	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
P/T_BIT3 $2^3 = 8$	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
P/T_BIT4 $2^4 = 16$	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
P/T_BIT5 $2^5 = 32$	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

teaching number / CNT-IO	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
P/T_BIT0 $2^0 = 1$	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
P/T_BIT1 $2^1 = 2$	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
P/T_BIT2 $2^2 = 4$	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
P/T_BIT3 $2^3 = 8$	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
P/T_BIT4 $2^4 = 16$	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
P/T_BIT5 $2^5 = 32$	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

teaching number / CNT-IO	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
P/T_BIT0 $2^0 = 1$	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
P/T_BIT1 $2^1 = 2$	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
P/T_BIT2 $2^2 = 4$	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
P/T_BIT3 $2^3 = 8$	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
P/T_BIT4 $2^4 = 16$	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
P/T_BIT5 $2^5 = 32$	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON

teaching number / CNT-IO	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
P/T_BIT0 $2^0 = 1$	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
P/T_BIT1 $2^1 = 2$	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
P/T_BIT2 $2^2 = 4$	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
P/T_BIT3 $2^3 = 8$	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
P/T_BIT4 $2^4 = 16$	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
P/T_BIT5 $2^5 = 32$	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON

<Revision history>

Version	Date	Revised contents	DS102/112	DT100	DScontrol-Win
Ver1.00	04.10.2009	First edition	Ver1.00～1.05	Ver1.01	Ver1.01～1.03
Ver1.01	05.06.2010	Change of contact information	Ver1.00～1.07	Ver1.01	Ver1.01～1.04
Ver1.02	08.20.2012	P59 Correction of DT100 outside dimension P74 Correction of S rate P77 Addition of ORG type(KXT,KRE,KHE) P81 Correction of stop procedure for ORG5, 6 P154 Addition of download procedure P166 Change of contact information	Ver1.00～1.08 Ver2.00	Ver1.01	Ver1.01～1.04
Ver1.03	06.03.2015	P8 Addition of other options P166 Change of contact information Others: Minor changes	Ver1.00～1.08 Ver2.00～2.05	Ver1.01	Ver1.01～1.05
Ver1.04	02.13.2020	P73 KGB06 added to sine motion model P76 Correction(L7,8,9 initial value 1,000→100) P77 Stage model added to origin return type, KXS(Q,W) deleted P121 Correction (USBID→USBID?) P133,151 Correction (Bit4 added) P166 Contact information Update	Ver1.00～1.08 Ver2.00～2.05 Ver3.00～3.01	Ver1.01～1.02	Ver1.01～1.05
Ver1.05	12.10.2020	P77 Updated list of recommended ORG type P95,125,130,140,146 Deleted current down release function (NR type Ver.3.02 or later) P87,110,133,151 Added EMS status confirmation command (Ver.3.02 or later) P151 Updated "SB3?" (Ver.3.02 or later)	Ver1.00～1.08 Ver2.00～2.05 Ver3.00～3.02	Ver1.01～1.03	Ver1.01～1.06
Ver2.00	11.02.2023	Type name change by changing parts Change the type name and company logo printed on the product P8 Type name change in product lineup P62 Type name change in basic spec P63 Change of DS102A front panel appearance P64 Change of DS112A front panel appearance P123 Change of USB connector model number P163 DS102A Externals Change the type name and company logo printed on front panel P164 DS112A Externals Change the type name and company logo printed on front panel P170 Contact information Update	Ver4.00	Ver1.01～1.03	Ver1.01～1.06

~*~ Memo ~*~

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