



4 Axis Motion Controller DS2000A User's Manual





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1. Introduction

This manual explains the use of the PC application for the Suruga Seiki DS2000A motion controller ("SS Motion Controller" (SSM)). Before any use of the controller, please read this manual carefully and understand the functions of the software, fully, for the Suruga Seiki DS2000A.

Functions and use of the SSM is subject to change or upgrade without notice. The latest version is always posted on our website. Please be advised the latest version before use.



2. Software Installation

2.1 Software Download

Obtain an installation file from our WEB site.

Name	File Name	Down Load Location
Installation file	SSMotionControl-1.0.0-en.msi (English)	
	《U.S.A version and International version are only	Available on our website
	different in their license agreement》	

Run the installation file, "SSMotionControl-1.0.0-en.msi", and follow the procedures.

2.2 Installation procedures

The installation proceeds a device driver and then the SSM main components. The device driver installation screen appears during the installation of the software. Follow the on-screen instructions to complete the installation.

1. Setup wizard

SS Motion Control			
Welcome to the SS Me	otion Control	Setup Wizard	5
The installer will guide you through the	e steps required to inst	all SS Motion Control on	your computer.
WARNING: This computer program is Unauthorized duplication or distributio or criminal penalties, and will be prose	n of this program, or an	y portion of it, may resul	in severe civil
	Cancel	< Back	Next >

2. License agreement

SS Motion Control				
License Agreemen	ıt		[
Please take a moment to read t Agree", then "Next". Otherwise		you accept the term	s below, click	."1
END	USER LICENSE AG	REEMENT		
binding legal contract b and SURUGA SEIKI (accessing or using the a by the terms of this <i>A</i> Agreement, Suruga is a Software. In such even	This End User License etween you (either an ind) CO., LID. ("Suruga"). ccompanying software (th Agreement. If you do a not willing to grant you t, you may not download, t that you are lawfully abl	ividual or a legal e By downloadin ne "Software") you not agree to the any right to use install, access, us	entity) ("you g, installin will be bou terms of th or access t se or copy t	") ng, nd nis he
O I Do Not Agree	Agree			
	(I) T Agree			

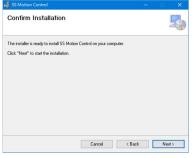
3. Installation folder selection

Select Installation Folder	5
he installer will install SS Motion Control to the following folder.	
o install in this folder, click "Next". To install to a different folder, er	ter it below or click "Browse".
Eolder: C#Program Files (x86)#Suruga#SS Motion Control#	Browse
	Disk Cost
	Din Con
Install SS Motion Control for yourself, or for anyone who use	
Install SS Motion Control for yourself, or for anyone who use	

4. Shortcut selection



5. Start the Installation



6. Device driver installation



7. Complete Driver Installation

Completing the Device Driver Installation Wizard The drivers mere successfully installed on this computer. You can now connect your dwice to this computer. If your come with instructions, please read them first.			
Driver Name	Status		
V Cypress(CYBSU2)US	Ready to Use		

8. Finish Installation

SS Motion Control ISEL	スインストールさ	1ました。		
終了するには、[閉じる]き	とうりゅうしてくだき	16		
Windows Update "C, NE"		States and states	Aug 17 Schuler with	h an China a



2.3 Uninstall the software

Select "Uninstall program" from the control panel and uninstall "SS Motion Control".

ŵ Home	Apps & features	
٩		
Apps		
IΞ Apps & features		
Er Default apps	SS Motion Control	11.8 MB 2019/11/13
띠 Offline maps		
Apps for websites	Mo	dify Uninstall
□ Video Playback		
☐ Start up		

As for the device driver, uninstall "Windows Driver Package – Cypress (CYUSB) USB" or "Windows Driver Package – Cypress (CYUSB3) USB".



3. Connections to Controller

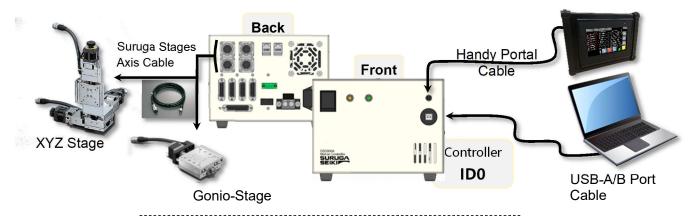
3.1 The operating environment

The initial setting method is different for a "single" controller and two "linked" controllers.

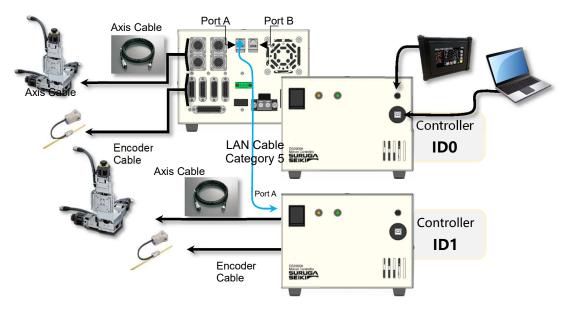
Name	Quantity	Remarks
(1) PC	1	Windows XP (32-bit), Windows 7 and 10
(2) USB cable	1	PC side: Type-A, Controller side: Type-B
(3) Controller	1	When a single controller is used, set the ID to "0".
	《2 nd controller》	A UTP cable (LAN cable) connection
<(4) Handy Portal >	1	Alternative to a PC-based data and instruction
(Sold separately)		interfacing, a handy portal (DT205) is available.
		(Please contact our sales agent for your further
		inquiries).

3.2 Connection methods

• Connection for the single-controller operation



• Connection for the 2 controllers linked operation





3.3 PC-Link by USB cable

Action buttons explained

Connect

To establish the PC-Link, click the "Connect" button on the upper right of the screen When successfully established, the other action buttons become available.

Note: If the USB communication cannot be started, refer to "Appendix A. Troubleshooting".



To terminate the PC-link, click the "Close" button on the upper right of the screen. This closes the software at the same time.

Note: A program sequence will not be halt, even though, the PC-link is terminated while driving stages. Before shutting down the software, please stop a program sequence properly while the SSM running.

Screen after software startup (before the USB connection)

nit configuration Demonster Settin	gs Motion Control Teaching Program drive Speed Table I/O Port	
	gs worden control reaching Program unver opeed rable 1/0 Port	Connec
-Controller ID Settings ID0 ID setting ID setting	Write Update	Close
ID setting ID setting ID setting	Select controller ID	Stop al
-Connection StatusConnection	Status-	Multi-Axis Operation
⊙None −1− ONone	-1-	Return t Origin
⊙ None −2− O None		Home Position
⊙ None −3− O None	-3-	Move to
⊙ None -4- ⊙ None	-4-	Target
		Acta N Acta N
		Emergency S DD DD
		Edit (Offli

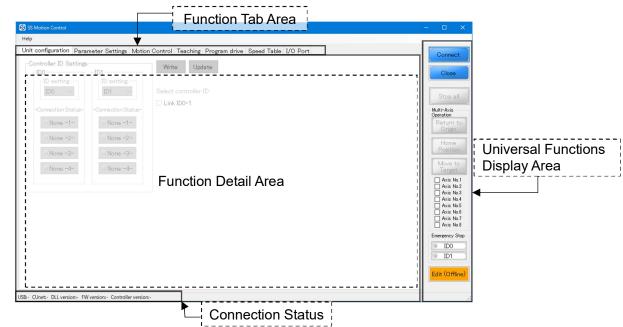
Screen after USB connection (two controllers linked)

felp		
Init configuration Para Controller ID Setting ID0 ID0 setting ID0 Conrection Status Avist -1- Avist -2- Avist -4-	 1 Control Teaching Program drive Speed Table I/O Port Write Update Select controller ID I Link IDO-1	Connect Close Stop al Muti-Auto Certain Certain Home Position Constitue Connect Constitue Connect Constitue Constitu
		Emergency S IDO ID1
		Edit (Offi



4. Main Application Screen

4.1 Basic screen configuration



Display Area in detail

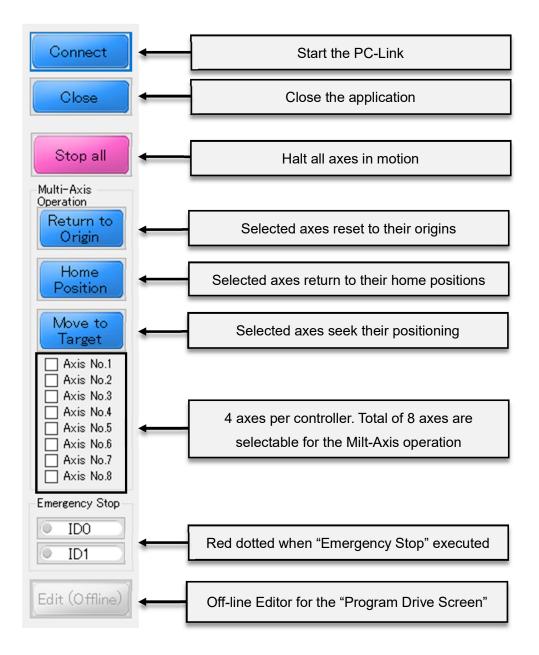
Display area	Name	Function					
	Connect	Start the PC-link Session					
	Close	Terminate the PC-link and closes the SSM.					
	Stop All	It halts all driven axes.					
	Returning to Origin	Return the all selected axes to their origins at once.					
Universal	Home Position	Move the selected axes to their home positions at once.					
	Move to Target	Move the selected axes to their destinations at once.					
	Axis No.	Check boxes to specify the single or butch execution.					
	Emergency Stop	On an emergency stop, the indicators turn into red dots.					
	Edit (offline)	Users may edit "Program drive" tab screen without the PC-link.					
	Unit Configuration	Display controller configuration statuses and assign ID numbers.					
	Parameter Settings	Set parameters for a connected individual motorized stage					
Function	Motion Control	Perform manual control (jogging/inching, etc.) for each axis.					
Tab screen	Teaching	Input the teaching point position information.					
	Program Drive	Perform program drive sequence.					
	Speed Table	Set the speed table common to all axes.					
	I/O Port	A graphical interface of the I/O port					
Connection Status		Progress bars and driver versions are displayed.					
Detail view		Display contents of the function tab.					

* The common operation/emergency stop display area remains resident even when the tab screen is switched.



4.2 Universal Operation/Emergency Stop Area

The function buttons in the universal function area are shown below. Colored operation buttons are enabled, and grayed-out buttons are disabled.





4.3 Screen after Connection

If the PC-Link is successful, the grayed out functions are colorized for enabling.

At the same time, "Successful" is displayed in the status bar at the bottom of the screen.

SS Motion Control		– 🗆 X
Help		
	Control Teaching Program drive Speed Table I/O Port Write Update Select controller ID Link ID0-1	Connect Close Stop all Multi-Axis Origin Return to Origin Home Position Move to Target Chose Position Axis No.1 Axis No.3 Axis No.5 Axis No.5 Axis No.6 Axis No.8 Axis No.8 Axis No.8 Emereency Stop DD DD D1
USB:Connected CUnet:Online DLL Ver.2005 FW Ver.2010 Cor	troller ID0 Ver:0.0.0 ID1 Ver:-	

* When the connection with the PC is successful, "USB open status: Successful" is displayed. USB:Connected CUnet:Online DLL Ver:2005 FW Ver:2010 Controller ID0 Ver:0.0.0.0 ID1 Ver:-

* When the connection with the PC fails, "USB open status: Not connected" is displayed.

ot connected CUnet:Online Faild DLL Ver:2005 FW Ver:0 Controller version:-

Note: If the PC communication fails, refer to "Appendix A. Troubleshooting".

4.4 Function Tabs Area

The categories in the function tabs are shown below.

Tab Category	Screen Contents			
Unit Configuration (Some restrictions)	 System configuration of the SSM Each controller, ID0 or ID1 can be assigned [ID0 = default]. When two are linked, ID0 and ID1 can be assigned to either controller. Note that the same ID number cannot be occupied in the two controllers, 			
Parameter Settings	Mange the parameters of a connected stage			
Motion Control	Manual operation can be performed for each drive axis. Operations such as enabling, specifying drive positioning, and starting/stopping movement can be obtained for each axis.			
Teaching	Manage teaching positions and assignments.			
Program Drive	Edit and run program sequences			
Speed Table	Set the speed table to control positioning speed for each axis.			
I/O Port	Display INPUT / OUTPUT status or manually manipulate output status.			



5. Unit Configuration

5.1 On screen, set the ID number for single or linked controllers.

<Action button display for the single controller (4-axis) configuration>

In default, the controller ID is set to "zero" (ID0).

5.2 How to link two controllers (8-axis drive) from a factory default

telp	
Juit configuration Parameter Settings Motion Control Teaching Program drive Speed Table I/O Port Controller ID Setting ID1 ID0 ID1 ID0 ID1 ID0 ID1 ID0 ID1 ID0 ID1 ID1 Disetting ID0 ID1 ID1 Connection Status- IOne Inik ID0-1	Connect Close Stop all Multi-Axis Operation Return to Origin Home Position Move to Target Axis No.1 Axis No.2 Axis No.3 Axis No.3 Axis No.8 Axis No.8 Axis No.8 Axis No.8 Axis No.8 Axis No.8 Connect

- 1. Connect the two controllers with a LAN cable into the "Port-A*" while powering off both controllers.
- 2. Connect the PC to the controller assigning ID1 and turn the power on while the other is off.
- 3. By the SSM, assign ID1 and press the "Write" button as the screen capture shown on the below.
- 4. Turn off the "ID1" controller, after 10 seconds, turn back on.
- 5. Click "Update" button and confirm the ID as ID1. Then, turn off the ID1 controller.
- 6. Connect the PC to the controller dedicating ID0. Turn on the both controllers, ID0 and ID1.Click "Update" of the SSM. Confirm the ID1

SS Motion Control			
Help			
Unit configuration Par	ameter Settings Motion	n Control Tead	ching Pro
Controller ID Setting ID0 ID etting ID0 -Confidence of the Axis1 -1- Axis3 -3- Axis4 -4-	ID1 ID setting ID1 Connection Status= None -1- None -2- None -3- None -4-	Write Select contr Link IDO-	

Help		
Controller ID Setting ID0	ID1	on Control Teaching Prop Write Update
ID setting ID0 ~	ID setting ID1 ~	Select controller ID
• Axis1 -1- • Axis2 -2-	• Axis5 -1- • Axis6 -2-	
 Axis3 -3- Axis4 -4- 	 Axis7 -3- Axis8 -4- 	

controller is now recognized through the controller ID0 as shown left.

- 7. Click the check box next to the "Link ID0-1." Then, click "Write"
- 8. Turn off the both controllers and turn back on after 10 seconds or so.
- 9. On the SSM, click "Update." Confirm the "Link ID0-1" is checked.

Now, the controller ID0 recognizes the ID1 controller for a data linkage.



6. Parameter Settings

6.1 The parameter settings in detail - Action Buttons

This screen tab manages selecting a preset model to its modifications for the connected stages

SS Motion Control	– 🗆 🗙
Help	
Unit configuration Parameter Settings Motion Control Teaching Program drive Speed Table I/O Port	Connect
Select Model Axis No. Image: Software Limit Home Position Not selected Image: Software Limit Home Position CWLS: 99999999 Image: Position pulse CWLS: -99999999 Image: Position Image: Position Advanced Setting Advanced Setting	Stop all Multi-Axis Operation Return to Origin
Select Model Axis No. Software Limit Home Position Not selected 2 CWLS: 99999999 (*) pulse pulse CCWLS: -99999999 (*) pulse Advanced Setting	Home Position Move to Target Axis No.1
Select Model Axis No. Software Limit Home Position Not selected 3 + CWLS: 999999999 + pulse CCWLS: -999999999 + pulse Advanced Setting	Axis No.3 Axis No.4 Axis No.5 Axis No.5 Axis No.6 Axis No.7 Axis No.8
Select Model Axis No. Software Limit Home Position Not selected 4 CWLS: 99999999 pulse pulse Not selected 4 CWLS: 99999999 pulse pulse VS8:Connected CUnct-Online DU Ver.2010 Controller ID0 Ver.00.00 Ver.2010	Emergency Stop

The chart shows the action buttons and screen area are described below;

Functions	Details
① Open	Open a file of the parameter settings previously saved in PC.
② Save	Save a file of the parameter settings to PC.
③ Read	Read the parameter settings registered in the controller.
④ Write	Register the confirmed parameter settings in the controller.
5 Select Model	Select a stage model connected to the controller.
6 Software Limit	Set software limits for each axis.
⑦ Home Position	Set a home position for each axis.
8 Advanced Setting	Set more specific parameters for a specific stage.

- Loading a parameter data set at the CVS format (extension, *.dat), previously, saved in PC.
 Note: Opening a parameter file does NOT register them into a controller. The "Write" procedure must be taken place in order to register them into the controller.
- ② Saving a parameter data set file to a PC.

Save

The saved file is in the CSV format. (Extension "*.dat" is automatically assigned.)



③ Reading the parameter data set from the controller

Read The read parameters are those stored in the controllers, previously.

④ Writing parameter data set to the controller

IMPORTANT: If any changes in the parameter settings, be sure to "Write" the changes to the controller. The controller does not recognize the software changes, automatically.

5 Selecting a motorized stage model and assign its axis number



Write

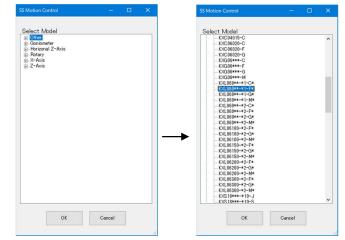
A stage type is unspecified in the beginning. Neither the controller nor the software does not recognize, automatically, which stage being connected to the controller. A user, therefore, select a matched stage model and the axis number, manually.

Selecting a stage model is also advantageous to save time because parameters which each stage uniquely possesses in advanced setting are concurrently loaded by just selecting a model from a menu.



6.2 How to select a Stage model.

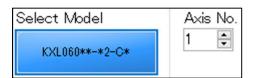
- 1. Press the "Not selected" button on the screen area (5).
- Expand the (+) node at an appropriate model category.
- After highlighting a selecting a specific model, press the "OK" to reflect the change.



For example of a horizontal linear stage,

expand "X-axis" tree. All Suruga motorized stage horizontal types are listed in the branch. Select the one with the model product code. Asterisks, "*", are used to generalize the model codes. They are often for stroke length or option codes; not necessary to identify a motorized model.

After the model selection being made, the button displays the matching model code as shown in below;



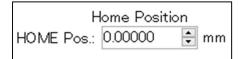
6 Software Limit

🗹 Software Limit							
CWLS: 10.00000 🗦							
-10.00000	•	mm					
	10.00000						

Set the Software Limit for each axis. CWLS => Software Limit on clock wise rotation. CCWLS => Software Limit on counter clock wise rotation Check the box to activate a set of Software Limit.

Note: The unit can be changed in the Advanced Setting. (Example: mm => μ m)

⑦ Home Position



Set a home position for each axis. A home position can be obtained anywhere within the hardware/software limits.

8 Advanced Setting

Each Stage model has unique parameters for precision drive; such as an origin return pattern or specifying a limit sensor type. The next section introduces the advanced setting in detail.



6.3 Advanced setting >> Driver settings

Depending on the selected model, the Advanced Settings are automatically preset.

SS Motion Control			×
Advanced Setting - Type : Normal(0) - Unit : mm(2) - Travel per pulse by fullstep : I - Motion radius : 0 [mm] - Step angle division (Microstep - Divider DATA1/2 :	is): 1/1(0	-	
OK	Cancel		

Туре
Normal: Linear axis and motorized Gonio stages
Rotary: Motorized rotary stages
Sine motion: Special stages such as KGB / KAB
Unit
Select the unit of movement amount for each axis.
Travel per pulse by fullstep
Set the travel distance per pulse at the full step.
The travel distance per pulse is automatically calculated
from the number of divisions based on this value.
It is highly recommended not to change the value.
Motion radius
Set the motion radius of sine motion.

Number of divisions (Micro-step)

Register the number of divisions for the driver in the controller.

The software-set number of division must be equal to attribute of the rotary encoder which resides in the motor driver inside. Open the adjustment window on the right side of the controller and find the motor driver that holds the rotary switches. This software does not automatically recognize hardware settings. Please refer to the table below for how the switch position corresponds the number of micro-step divisions



As shown in the illustration left, the position of the arrow attributes the number of micro-step divisions

Switch position	0	1	2	3	4	5	6	7	8	9
Number of divisions	1/1	1/2	1/4	1/5	1/6	1/10	1/20	1/40	1/80	1/16
Switch position	A(10)	B(11)	C(12)	D(13)	E(14)	F(15)				
Number of divisions	1/25	1/50	1/100	1/125	1/200	1/250				

IMPORTANT:

For all divisions, travel distance per pulse is automatically calculated as if it's at the full step. However, the maximum pulse speed in any number of divisions is limited to 500 kpps.

• Stage Drive Direction

Define the direction of stage movement during forward motor rotation. Regardless of linear motion, rotation, or Gonio, the forward direction is referred to as interlocked to the forward rotation of the motor.



6.4 Advanced setting >> Origin return setting

Set the return pattern, speed, and sensor input logic during origin return processing and such.

SS Motion Control – 🗆 🗙	 Origin return pattern 				
	Refer to the table below for the pattern details.				
Advanced Setting	Startup speed				
<mark>⊕-Driver settings</mark> ⊟-Origin return settings	Set initial speed of return origin				
Origin return pattern : 5 Startup Speed (Origin return) : 100 [pps]	Driving Speed				
Driving Speed (Origin return) : 2000 [pps] Acceleration Time (Origin return) : 100 [msec]	Set speed of return origin.				
	Acceleration time				
Origin sensor : Normal Closed(0) Proximity origin sensor : Normal Closed(0)	Set the accel/decel time for origin return.				
Encoder settings	• S-curve rate				
	Set the S-curve rate for acceleration/deceleration.				
	Limit sensor input theory				
	Set the ON/OFF judgment of the sensor mounted				
	on the automatic stage.				
	● Origin sensor				
	Set the ON/OFF judgment of the sensor mounted				
	on the automatic stage.				
	 Proximity origin sensor 				
OK Cancel	Set the ON/OFF judgment of the sensor mounted				
	on the automatic stage.				

Origin Return Type in detail

Туре 0	Do not perform origin return.
Type 1	Perform edge detection to the CCW direction. Firstly, perform the CW edge detection for the NORG
	signal, and then, the CCW edge detection for the ORG signal.
Type 2	Perform edge detection to the CW direction. Firstly, perform the CCW edge detection for the NORG
	signal, and then, perform the CW edge detection to the ORG signal.
Туре 3	Perform edge detection to the CCW direction, and then, the CCW edge detection for the ORG signal.
Type 4	Perform detection to the CW direction, and then, the CW edge detection to an ORG signal.
Туре 5	Perform detection to the CCW direction, and then, the CWW edge detection to a CCWLS signal.
Type 6	Perform detection to the CW direction, and then, then CW edge detection to a CWLS signal.



6.5 Advanced setting >> Encoder settings

Define the specifications of the encoder connected to the back panel port.

SS Motion Control -			×
Advanced Setting Driver settings Crigin return settings Encoder settings Multiplier : 1(0) Resolution (Numerator) : 1 Resolution (Denominator) : 1 Count direction : Standard(0) Z-phase : Active High(0) Number of positionig adjustment : 1	0		
OK Cano	cel]	

• Encoder

Set whether to read the signal from the encoder connected to the encoder port.

- Multiplication
 Set the multiplication number. Multiplication
 1, 2, or 4 can be set.
- Resolution ratio molecule
 Enter the drive axis resolution/pulse.
 (Example: Resolution per pulse = 1 µm/pulse)
- Resolution ratio denominator
 Enter the encoder resolution/pulse.
 (Example: Encoder count per pulse = 25/pulse)
- Encoder count direction Set the plus or minus direction of the encoder.
- Z-phase input logic

Set the positive or negative theoretical value of the linear or rotary encoder Z-phase input.

• Positioning count

When the number of command pulses to

the destination is completed, the destination may be different from the current position. If so, the system tries to match the current position with the destination by retracting or advancing the pulses (positioning).

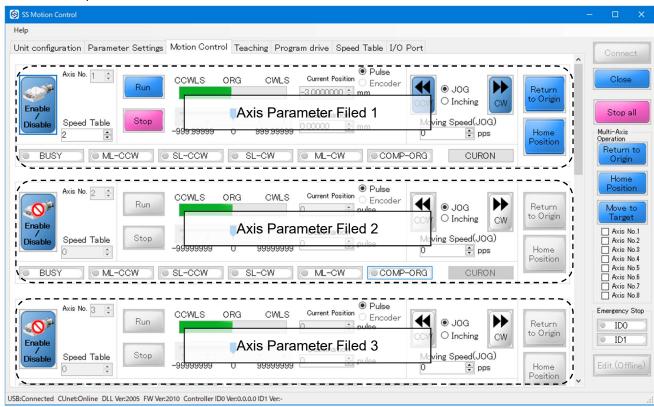


Motion Control 7.

Axis Field Activation 7.1

In the initial state, all axes for which parameter settings have been completed are disabled.

<Manual axis operation table in initial state>



Perform axis activation to enable these axis action buttons and indicators.

Axis Field Activation



Clicking the button can enable or disable automatic stage operation.

Disabled





7.2 Field Description

An example of axis parameter area is shown below;

Axis No. 1 ÷	Run	CCWLS	ORG	CWLS	© Pulse Current Position ○ Encoder -3.0000000 ‡ mm	K	• JOG O Inching	V	Return to Origin
Disable Speed Table 2	Stop	-999.99999	0	999.99999	Destination 0.00000 🗘 mm	Мох 0	ving Speed(JOG)		Home Position
BUSY ML-	CCW	SL-CCW		SL-CW	ML-CW COMP	-ORG	CURON		

Indicators in detail

Name	Description
BUSY	The axis in motion
Position progress bar	The moving distance is displayed graphically.
Current position	The current position of the axis is displayed. The unit is reflected from
	the Advanced Setting of parameters.
ML-CCW	Mechanical limit (CCW)
SL-CCW	Software limit (CCW)
ML-CW	Mechanical limit (CW)
SL-CW	Software limit (CW)
COMP-ORG	Origin Return completed

Action buttons and input parameters in detail

Name	Description				
Run	Start driving the axis to the Destination that has been set.				
Stop	Stop the axis being driven.				
Destination	Specify the Destination of the axis. The unit is chosen in the Advanced Setting of parameters.				
Pulse/encoder	Select the control method. Pulse => Open loop Encoder => Closed loop (encoder input required)				
JOG/Inching	Select JOG or inching for CCW/CW button operation. Set the movement speed in JOG mode. Set the Moving distance in inching mode.				
Movement speed (unit)	Specify the jog/inching speed.				
Speed Table	Specify the speed table number.				
Return to Origin	Perform origin return.				
Home Position	Move to the home position.				
CURON	Turn the motor on/off.				



8. Teaching

Teaching Table - Enter the teaching position of each axis at the row of a point number.

			-							
t configura	tion Parameter	⁻ Settings Mot	ion Control Te	aching Progra	am drive Spee	d Table I/O Po	ort			Connec
Open	Save	et Delete	e GoTo	Read	Write					
Point	Axis No.1	Axis No.2	Axis No.3	Axis No.4	Axis No.5	Axis No.6	Axis No.7	Axis No.8	^	Close
	N	N	N	N	N	N	N	N		1
1	N	N	N	N	N	N	N	N		Stop a
2	N	N	N	N	N	N	N	N		
3	N	N	N	N	N	N	N	N		Multi-Axis Operation
4	N	N	N	N	N	N	N	N		Return
5	N	N	N	N	N	N	N	N		Origin
6	N	N	N	N	N	N	N	N		1
7	N	N	N	N	N	N	N	N		Home Positic
8	N	N	N	N	N	N	N	N		(I OSICIO
9	N	N	N	N	N	N	N	N		Move t
10	N	N	N	N	N	N	N	N		Targe
11	N	N	N	N	N	N	N	N		Axis N
12	N	N	N	N	N	N	N	N		Axis M
13	N	N	N	N	N	N	N	N		Axis N
14	N	N	N	N	N	N	N	N		Axis N
15	N	N	N	N	N	N	N	N		Axis N
16	N	N	N	N	N	N	N	N		Axis N
17	N	N	N	N	N	N	N	N		
18	N	N	N	N	N	N	N	N		Emergency
19	N	N	N	N	N	N	N	N		ID0
20	N	N	N	N	N	N	N	N		ID1
21	N	N	N	N	N	N	N	N		
22	N	N	N	N	N	N	N	N		Edit (Off
23	N	N	N	N	N	N	N	N	~	

USB:Connected CUnet:Online DLL Ver:2005 FW Ver:2010 Controller ID0 Ver:0.0.0.0 ID1 Ver:-

Action Button in detail

Name	Description
Open	Retrieve a file saved on the PC.
Save	Save a teaching data set to the PC.
Set	Register teaching positions on the software table.
Delete	Deletes teaching points.
Go To	Move the axis to the specified teaching point.
Read	Read the teaching position data set registered in the controller, DS2000A.
Write	Register teaching position data set in the controller, DS2000A.



9. Program Drive

9.1 Drive Command Selection and Program Sequence

lelp									
Jnit configuration Parameter Se	ettin	gs Motio	n Control Teach	ning	Program drive Spe	ed Table I/O Port			Connect
Program No. 0 🔹 New	С	pen	Save Inse	ert	Delete	Run Stop	Step	Read Write	
• IDO-1 LINK				Bo	ot settings	Boot mode Nor	rmal v P	rogram No. 0 📮	Close
Command	^	No.	Command		Axis1/Parameter1	Axis2/Parameter2	Axis3/Parameter3	Axis4/Paramete ^	Stop all
🖻 Drive		0	GOW_ORG		1		1		
-Origin Return		1	GOW_HOME		1	1	1		Multi-Axis Operation
Home Position Drive		2	GOW_ABS		1.111	2.222	3.333	4.444	Return to
- Target Position Drive - Relative Position Drive		▶ 3	GOW CIRCW	•	1.111	2.3333			Origin
-2 axis linear interpolation		4	GOW ABS	:	3.333	2.3333			
-3 axis linear interpolation		5	WAIT MOVE		1	1	1		Home
-2 axis circular interpolatio		6	SEL SPEED	:	2		6		Position
- Teaching position Drive		7	IFJUMP)	1	10		Move to
Waiting for operation to fi	~	8	OUTP	2	2	1			Target
 Snood and Decition 		9	OUTP ALL		168	0	0		Axis No.
lome Position Drive	_	10	GOW ABS		5	5	-		Axis No.
xis: 12345678		11	GOW_TCH		3	-			Axis No.
		12	GOW_TCH		3				Axis No.
		13	WAIT MOVE		1	1	1		Axis No.
		14	GOW HOME		1	1	1		Axis No.
		15	de l'interne						Axis No.
		16							Emergency St
		17							ID0
		18		-					ID1
		19							
		20						<u> </u>	
aiting for Enable Disable Apply finish:		<						× >	Edit (Offlin

Action Button in Detail

Name	Description
Program No.	Select program bank No., (two program banks with 800 lines per program).
New	Clear the program sequence on the software screen.
Open	Open a program file saved on the PC.
Save	Save a program file to the PC.
Insert	Insert a new line between the program lines.
Delete	Delete a program line.
Run	Run an entire program sequence from the beginning.
Stop	Stop a running program sequence.
Step	Single line execution and automatically step forward.
Read	Read a program bank registered in the controller, DS2000A.
Write	Register a program bank to the controller. Note: the software does NOT register sequential command lines, promptly. "Write" must be executed to register a program bank in the controller.
Start mode	Set the program start mode after turning on the power. Normal start => Start the program on PC software or handy portal. => Automatic program start after power on



Indicators in detail

Name	Description
ID0-1 linkage	Light green when two units are linked.

9.2 Program-driven command list

Command		Comma	nds	
	Functions	NOT waiting for other	Waiting for other	
Category		operations to finish	operations to finish	
	Return to Origin	GO_ORG	GOW_ORG	
	Home Position	GO_HOME	GOW_HOME	
	Move to Target	GO_ABS	GOW_ABS	
	Relative Position Drive	GO_CW、	GOW_CW、	
		GO_CCW	GOW_CCW	
Drive	2 axis linear interpolation Drive	GO_LIN2	GOW_LIN2	
	3 axis linear interpolation Drive	GO_LIN3	GOW_LIN3	
	2 exis eizeuler interpolation Drive	GO_CIRCW、	GOW_CIRCW、	
	2 axis circular interpolation Drive	GO_CIRCCW	GOW_CIRCCW	
	Teaching position Drive	GO_TCH	GOW_TCH	
	Waiting for operation to finish	WAIT_MOVE		
	Speed Setting	SEL_SPEED		
Speed and	Position Setting	SET_TGPOS		
Position	Relative Position Drive amount setting	SET_RELLENGTH		
Stop	Specified Axis Stop	STOP		
Stop	Stop All Axes	STOP_ALL		
	Jump	JUMP		
Branch	Conditional jump	IFJUMP		
Branch	Leen	LOOP_START		
	Loop	LOOP_END		
Output	Specified Port Operation	OUTP		
Output	Bulk Operation of All Ports	OUTP_ALL		
Timer	Wait time	WAIT_TIME		



10. Commands and parameters in detail

The programing area consists of the three sub sets as shown below.

Command selection - Select a command according to the purpose of the sequence.

Parameter input - Enter the parameters required for the selected command. For details, refer to "Drive

Command" in the next section.

Program sequence - The entered commands with parameters are displayed.

Help							
Jnit configuration Parameter Se	ettings Motio	n Control Teaching	g Program drive Spe	eed Table I/O Port			Connect
Program No. 0 🔹 New	Open	Save Insert	Delete	Run Stop	Step	Read Write	
IDO-1 LINK		E	Boot settings	Boot mode No	rmal v F	Program No. 0 후	Close
Command	^ No.	Command	Axis1/Parameter1	Axis2/Parameter2	Axis3/Parameter3	Axis4/Paramete ^	Stop all
🖻 Drive	0	GOW_ORG	1		1		
-Origin Return	1	GOW_HOME	1	1	1		Multi-Axis Operation
-Home Position Drive	2	GOW_ABS	1.111	2.222	3.333	4.444	Return to
Common d	► 3	GOW_CIRCW	1 1 1 1	2 3333			Origin
Command	4	GOW_ABS					
Selection	1 5	WAIT_MOVE					Home Position
Selection tio	1	SEL_SPEED	EED				
Waiting for operation to fi	7		IFJUMP OUTP				Move to
B. Snand and Davitian	× <u> </u>					Target	
<>	9	OUTP_ALL	Program Sequence		、		Axis No.
Home Position Drive	10	GOW_ABS	FIOyia	in Sequence	·		Axis No.
Axis: 12345678	11	GOW_TCH					Axis No.
	12	GOW_TCH					Axis No.
	13	WAIT_MOVE GOW HOME					Axis No.
	14						Axis No.
Parameter Input	16						Emergency St
	17				_		ID0
	18						ID1
	19						
aiting for Enable Disable	20						Edit (Offlin
/aiting for Enable Disable Apply peration				-		×	Eait (Offilin



10.1 Drive commands in detail

10.1.1. Origin Return

Origin Return Axis: 12345678 IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	<i>Axis</i> : Check the box to select a target axis.								
	Waiting for operation to finish: Specify whether reached axes wait for other								
	axes to finish their operations. If disable, a specified axis executes a next								
	command ahead.								
	Example of "Origin Return"								
Waiting for Enable Disable Apply	No. Command Axis1/Parameter1 Axis2/Parameter2 Axis3/Parameter3 Axis4/Parameter4								
to finish:	▶ 0 GOW_ORG 1 1								

10.1.2. Home Position Drive

Origin Re Axis:	eturn 123456 1000		Axis: Check the box to select a target axis.							
			<i>Waiting for operation to finish</i> : Specify whether reached axes wait for other axes to finish their operations. If disable, a specified axis executes a next							
			command ahead. Example of "Origin Return"							
Waiting for	Enable Disable			Command		Axis2/Parameter2	Axis3/Parameter3	Axis4/Parameter4		
operation to finish:		Apply	► 0	GOW_ORG	1	, ouse, r arameterz	1	, the ly renameder r		

10.1.3. Target Position Drive

Target Po	sition	Drive	
Absolute	Axis1	5	mm
position:	Axis2	5	
	Axis3		
	Axis4		
	Axis5		
	Axis6		
	Axis7		
	Axis8		
Waiting for operation to finish:	Enab ()	ole Disable	Apply

Absolute position: Specify an absolute coordinate position respect to the origin. A blank or enter "0" means no command execution on the line of sequence.

Waiting for operation to finish: Specify whether reached axes wait for other axes to finish their operations. If disable, a specified axis executes a next command ahead.

Example of "Origin Return"

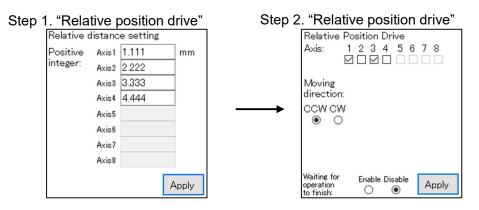
 No.
 Command
 Axis1/Parameter1
 Axis2/Parameter2
 Axis3/Parameter3
 Axis4/Parameter4

 >
 0
 GOW_ABS
 5
 5



10.1.4. Relative Position Drive

Specify the amount of relative movement from a stop position. Relative Position Drive is performed in two steps as follows.



Positive integer: Specify the amount of relative distance from their current stop position. Only a positive integer value is applicable because a direction is specified in the step 2.

Axis: Check the box to select a target axis.

Moving direction: Specify the movement direction which is either CCW or CW.

Waiting for operation to finish: Specify whether reached axes wait for other axes to finish their

operations. If disable, a specified axis executes a next command ahead.

Example of "Relative Position Drive" command

If the rotation direction of the relative position drive differs depending on the axis, specify it in two lines.

No.	Command	Axis1/Parameter1	Axis2/Parameter2	Axis3/Parameter3	
0	SET_RELLENGTH	1.111	2.222	3.333	⇐
▶ 1	GO_CCW	1		1	
2	GOW_CW	1		1	

Step 1. Relative position drive amount setting

Step 2. Relative position drive axis specification/Drive direction

10.1.5. Axis Linear Interpolation Drive

Set the linear interpolation drive with specified 2 axes.

Absolute position: Specify the absolute coordinate positions respect to the origins. A blank is not applicable.

Waiting for operation to finish: Specify whether reached axes wait for other axes to finish their operations. If disable, a specified axis executes a next command ahead.

Example of "2 axis Interpolation Drive" command

	No.	Command	Axis1/Parameter1	Axis2/Parameter2	
Apply	▶ 0	GO_LIN2	1.111	2.222	





10.1.6. Axis Linear Interpolation Drive

3 axis line	ar inte	erpolation	Drive
Absolute	Axis 1	1.111	
position:	Axis2	2.222	
	Axis3	3.333	
	Axis4		
	Axis5		
	Axis6		
	Axis7		
	Axis8		
Waiting for operation to finish:	Enab ()	le Disable	Apply

Absolute position: Specify the absolute coordinate positions respect to the origins. A blank is not applicable.

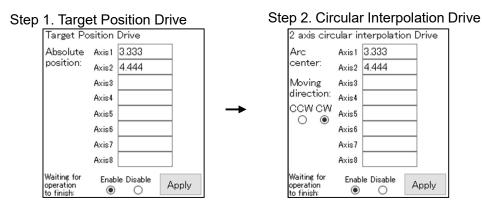
Waiting for operation to finish: Specify whether reached axes wait for other axes to finish their operations. If disable, a specified axis executes a next command ahead.

Example of "3 axis Interpolation Drive" command

ı.		No.	Command	Axis1/Parameter1	Axis2/Parameter2	Axis3/Parameter3
	⊳	0	GOW_LIN3	1.111	2.222	3.333

10.1.7.2-axis Circular Interpolation Drive

2-axis circular interpolation drive setting is performed in 2 steps.



Absolute position: Specify the absolute coordinate positions respect to their origins. A blank is not applicable.

Arc center: Specify the center coordinates of the arc. The number of axes specified at this time is two. *Movement direction*: Specify the movement direction.

Waiting for operation to finish: Specify whether reached axes wait for other axes to finish their

operations. If disable, a specified axis executes a next command ahead.

Example of "2-axis Circular Interpolation Drive" command

	No.	Command	Axis1/Parameter1	Axis2/Parameter2	
	0	GOW_ABS	1.111	2.222	Step 1. Target Position Drive
⊳	1	GOW_CIRCW	3.333	4.444	Step 2. Circular interpolation drive



10.1.8. Teaching Position Drive

Teaching po Teaching point No.:	osition Drive	×
Waiting for operation to finish:	Enable Disable	Apply

Teaching point No. : Specify a teaching point number preset on the "Teaching point" table (see the section 8).

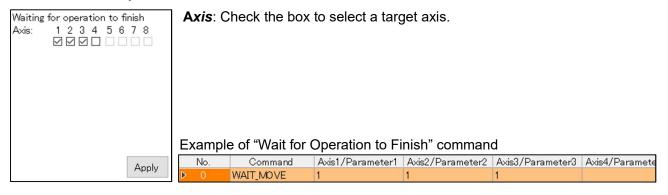
Waiting for operation to finish: Specify whether reached axes wait for other axes to finish their operations. If disable, a specified axis executes a next command ahead.

Example of "Teaching Position Drive" command

	I	5						
	No.	Command	Axis1/Parameter1	Axis2/Parameter	2 Axis3/Paran	mete		
⊳	0	GOW_TCH	1					
_								
				Correspondin	g teaching	point in teac	h table	
				Point	Axis No.1	Axis No.2	Axis No.3	Axis No.4
				0	1.112	2.224	0	0
				▶ 1	3.332	4.44	0	0

The axis 1 and 2 read the absolute position value for their positioning.

10.1.9. Wait for Operation to Finish

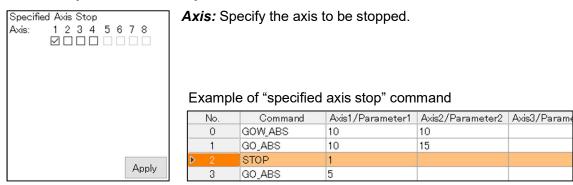


10.1.10. Speed Specification

Speed Sett	-		Speed	Setting: Spe	ecify the speed	I table number	in which is in	the "Speed
Speed Table No.: Axis1 4 ~			table".	table". Any blank axis reflects no change to the speed of an axis or the				
Axis2	4 ~		default	default speed.				
Axis3	~							
Axis4	6 ~							
Axis5								
Axis6	~							
Axis7			Example	e of "Wait for	Operation to F	inish" commar	nd	
Axis8		Apply	No.	Command	Axis1/Parameter1	Axis2/Parameter2	Axis3/Parameter3	Axis4/Parameter4
		Арру	D O	SEL_SPEED	4	4		6



10.1.11. Specified Axis Stop



10.1.12. All Axis Stop

All Axis Stop	
, and otop	
	America
	Apply

All axes are stopped at once.

Note: If "No" is specified for "Waiting for operation to finish" in the command execution on the previous line, all axes are stopped immediately after the previous line is executed.

Example of "All Axis Stop" command

			-		
	No.	Command	Axis1/Parameter1	Axis2/Parameter2	Axis3/Parameter3
	0	GOW_HOME	1	1	1
	1	GOW_ABS	1.111	2.222	3.333
D	2	STOP_ALL			

10.1.13. Jump

Jump to Line: Specify the jump destination line number. Jump Example of "Jump" command (jump from line 4 to line 1) * 1 Jump to Line: Axis1/Parameter1 Axis2/Parameter2 No. Command 0 GO_HOME 1 1 GO_ABS 2.222 ▶1 1.111 2 GO_ABS 3.333 4.444 Apply JUMP 1



10.1.14. Conditional Jump

An input state triggers the conditional jump to change the course of the sequential command executions.

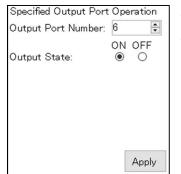
Conditional Jump Input Port Number:	3 ON OFF	Input s	tate : Jump to	•	l line number	if the state of	ly. the specified	
Input State: Jump to Line:	• •	• •		atches the sp cify a line num	•			
oump to Eine.		-	e of "Conditic				Input of 3 rd bit is ON.	1 0
		No.	Command	Axis1/Parameter1	Axis2/Parameter2	Axis3/Parameter3		
	Apply	0	GO_HOME GOW ABS	1.111	1 2.222	3.333		
_		2	GO_ABS	4.444	5.555	6.666		
		' <mark>● 3</mark>	IFJUMP	3	1	0		

10.1.15. Loop

Loop		Loc	op Coun	t : The commar	nds from LOOP_S	TART to LOOP_I	END repeatedly
		run	the spec	cified number o	f times.		
		E	Example	of "Loop" comm	and (repeat the same cor	nmand 3 times)	
Loop repeat count:	3		No.	Command	Axis1/Parameter1	Axis2/Parameter2	
Loop repeat count.	-		0	GO_HOME	1	1	
		; Þ	> 1	LOOP_START	3		
		x3	2	GO_ABS	1.111	2.222	
		x3	3	GO_ABS	3.333	4.444	
	Apply	¦	4	LOOP_END			

♠

10.1.16. Specified Output Port Operation



*Output port numbe*r: Specify the target port number. *Output state*: Specify the output state (ON:1 / OFF:0)

Example of "Specified Output Port Operation"

	No.	Command	Axis1/Parameter1	Axis2/Parameter2
⊳	0	OUTP	6	1



10.1.17. All Output Port Operation

Bulk Operation of All Output Ports Output Port Number: 7 6 5 4 3 2 1 0 ID0 Ø Ø Ø Ø Ø Ø Ø Ø ID1 Ø Ø Ø Ø Ø Ø Ø	Check	mark : ON / No	: Specify the sta on-check mark: (I Output Port Op	OFF	nultiple output po	orts.
Apply	No. ▶ 0	Command OUTP ALL	Axis1/Parameter1 164	Axis2/Parameter2 255	Axis3/Parameter3 0	

10.1.18. Timer

Specify the waiting time until the next command execution in milliseconds.

Wait Time			ne : Set the wai	iting time. The ne	ext command ex	ecution can be s	stopped
Wait[msec]:	20	-					
		Examp	le of "Specified	d Output Port Op	peration"		
	Apply	No. ▶ 0	Command WAIT_TIME	Axis1/Parameter1	Axis2/Parameter2	Axis3/Parameter3	A



11. Speed Table

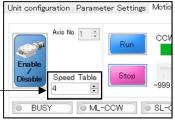
A total of 15 speed definitions can be defined in the speed table as shown blow. The items of each table include parameters such as the initial speed, and the speed and acceleration/deceleration settings for each axis can be selected from the table.

Configurable Speed Table

SS Motion Control																	-	
Help																		
Unit configuration Parameter S	Settings	Motion C	ontrol	Teaching	Progra	m drive	Speed	Table I/	'O Port								. [Connect
Open Save	F	Read	Write															Close
Table No.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
 Initial Speed[pps] 	10	50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	1	
Final Speed[pps]	10	50	100	500	1000	2000	5000	10000	20000	50000	75000	75000	90000	90000	100000	100000		Stop all
Acceleration Time[msec]	1	1	1	100	100	100	100	100	100	100	100	200	100	200	100	200		Aulti-Axis
S-curve Rate[%]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		peration
																		Return to Origin

Individual Speed Setting The speed table reflecting the Motion Control

The "Motion Control" tab



11.1 How to change the speed of each axis:

Method 1. Specify individually on the speed table section of the "Motion Control" tab.

Method 2. Make settings for a single axis or multiple axes on the "Program Drive" screen shown below;

SS Motion Control								
Help								
Unit configuration Parameter Settir	igs Motion Contro	I Teaching	Program drive Spe	ed Table I/O Port				Connect
Program No. 0 🐳 New C	pen Save	Insert	Delete	Run Stop	Step	Read Write		Connect
	oave Gave	Insert	Delete	Stop	Otep	veau vinte		Close
● IDO-1 LINK		Bo	ot settings	Boot mode No	rmal ~ P	rogram No. 0 🛊		
-3 axis linear interpolation 🔺			Axis1/Parameter1	Axis2/Parameter2	Axis3/Parameter3	Axis4/Parameter4	Axis5/Pars ^	Stop all
	▶ 0 SEL_S	PEED	4	5	6	7		
-Teaching position Drive Waiting for operation to fi	1		.	A	A	A		Multi-Axis Operation
- Speed and Position	2		1					Return t
- Speed Setting	3			1	1	i		Origin
-Position Setting	4			1		1		(
Relative distance setting	5		1					Home Position
Stop	6			1		1		Crosition
- Specified Axis Stop - All Axis Stop	7			1		1		Move to
- Rmnch Y	8		1			1		Target
< >	9			1	1	1		Axis No
Speed Setting	10		1			1		Axis No
peed Table No.:	11				1	i		
Axis1 4 ~	12		i	1		1		Axis No
Axis2 5 ∨ ◀	13					1		Axis No
Axis3 6 ~	14				_!	i		
Axis4 7 ~	15					<u> </u>		Emergency S
	16							-
Axis5	17							ID0
Axis6	18							ID1
Axis7	19							
Axis8	20						~	Edit (Offlin
Axiso Apply	<	1				1	>	1
3:Connected CUnet:Online DLL Ver:2005 FW								

The speed table numbers are referred to the speed table.



11.2 Cautions on a model change and the speed table

The speed table is a software wide setting for all motorized stages connecting to the controller. Thus, a user should be advised to pay a particular attention to which speed table number is used for which type of stage. For example, a speed suitable for a liner stage may be hazardous on a goniometer stage.

A user should also be cautious on the changes made in the speed table. It is a good example that the SSM software holds its own default speed table and read it every time being started. Thus, it seems that the software did not reflect a change made previously. A user should be accustomed to read actual configurations in the controller at the software start-up.



12. I/O Port

On this tab screen, the user can check the status of the I/O port on the back panel. The output signal can also be operated on this tab screen in the same way as in "Program Drive".

SS Motion	Contro	ol													-		×
Help																	
Unit config	urati	on I	Para	mete	er Se	tting	зN	Notion C	ontrol	Teaching	Program driv	re	Speed Table	I/O Port	. [Conne	et
INPUT	7	6	5	4	3	2	1	0									
100		0	J	-	0	2		_								Close	
IDO	0	0	0		0	0	0								6		
ID1	\bigcirc	0	\bigcirc	\bigcirc	\bigcirc	\odot	0	0								Stop a	ill
																Multi-Axis Operation	
																Return	
OUTPUT	7	6	5	4	3	2	1	0								Origir	
IDO			\checkmark				\checkmark									Home Positio	
ID1															1	Move	to
A bur 1																Targe	t
																Axis N	
																Axis M	
																Axis M	lo.5
																Axis N	lo.7
															F	Axis N	
																ID0	
																ID1	
															E	Edit (Off	line)
						-											
USB:Connected	CUne	t:Onl	ine D	LL Ven	:2005	FW Ve	er:20	10 Contro	ller ID0 V	er:0.0.0.0 ID1	Ver:-						



13. Appendix

Appendix A. Troubleshooting

When this h	appens	Check here
	Connection fails after operating the	 Is the USB cable between the PC and master
	connect button.	controller properly connected?
		Is the USB driver set up correctly on the PC?
Connect	The connected stage is not	 Is the LAN cable between the controllers
	displayed on the unit configuration	properly connected?
	screen.	 Is the axis number set correctly on the rotary
		switch of the controller?
	Tab selection and parameter	Is the USB connected?
	settings screen operations are	 Is the USB communication successful?
	disabled.	Refer to: Successful/Failed in Section 4-4
Operation	The Destination specification and	 Is the stage of the corresponding axis number
restrictions	start operation are disabled on the	enabled? (It is disabled if the prohibition mark is
	motion control screen.	displayed on the enable/disable button.)
		Refer to: Motion control axis enable/disable
		button in Section 5-1

Software Updates

SS Motion Software Update History

Version	Date	What's News
1.0.0.0	2019.06.30	First published
1.0.0.0	2019.08.30	WEB download service starts
1.0.0.1	2019.11.15	Issues fixed:
		\checkmark Data exchange troubles between DS2000A and DT205
		\checkmark Rarely interpolation cannot be executed form a point of origin.
1.0.1.1	2019.12.04	Issues fixed:
		\checkmark The conditional jump with I/O causes unexpected result.
		✓ New model presets are patched: Gonio-KGB06 series and
		KRE103560

English Software User's Manual Updates

Version	Date	What's News
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Contacts

contact

Email e-ost@suruga-g.co.jp URL https://eng.surugaseiki.com/

SURUGA SEIKI CO.,LTD. a MISUMI Group Company

Head Quarters & Main Factory

505, Nanatsushinya, Shimizu-ku, Shizuoka City, Shizuoka 424-8566, Japan Tel: +81-54-344-0332 Fax: +81-54-346-1196 ■Tokyo Office

Shiba Park building B-6F, 2-4-1, Shiba-Koen, Minato-ku, Tokyo, 105-0011 ,Japan Tel: +81-3-6403-4513 Fax: +81-3-6403-4514 ■ San Jose Office

2890 Zanker Road Suite 204 San Jose CA 95134,USA Tel: +1-408-435-2974

SURUGA SEIKI SALES&TRADING(SHANGHAI)Co.,Ltd.

Headquarters

Room 1208, No.555 Nanjing West Road, Shanghai,China

Shenzhen Office Room 2508, Baoli Building, Chuangye Road, Nanshan District, Shenzhen City, China