

SD3 Series Setup Support Software Servo Studio User's Guide



FATEK AUTOMATION CORP.

Thank you for your purchase of our products. This User's Guide includes precautions for the product use.

- Please study this Manual first and use the product properly and safely.
- Before using the product, be sure to carefully read the Safety Instructions.
- After reading this Guide, please keep it for future reference.
- Product specifications are subject to change without notice in the course of product improvement.

May. 2019

Contents

1. Introduction

1. Safety Precautions
2. Cautions for Proper Use4
3. Overview of "Servo Studio" (Setup Software)
4. Installing S-TUNE

2. Operations

MEMO

1 Introduction

1. Safety Precautions 2
2. Cautions for Proper Use 4
3. Overview of "Servo Studio" (Setup Software) 5
4. Installing "Servo Studio" 6

1. Safety Precautions

This manual uses signs below indicating two severity levels of injury or death, or damage to the product itself or other equipment that may be caused by misuse of the product.

DANGER	Identifies information about imminent hazards that will result in death or serious injury .
CAUTION	Identifies information about hazards that could cause injury or property damage .

Throughout this document, the safety precautions that users must follow are marked as follows.

\bigcirc	Safety Precaution - Prohibited Action
	Safety Precaution - Mandatory Action

Possible hazardous events are marked as follows.

A	Cautions and Dangers
	Causes unexpected, unstable, or uncontrolled motions. Compromises the performance.
	Shortens the service life of the product.
4	Electric shock hazard
	Burn hazard
	Fire hazard
Card and a second secon	Injury hazard
	Failure and damage hazard

1. Safety Precautions

	🛕 CAUTION	
Sign	Precautionary Measures	If Not Observed
Connectio	ns and Operations	1
\bigcirc	Do not make drastic changes to parameters during tuning. If this precaution is not followed, the motor motion will become unstable.	
	Before making parameter changes, carefully review the SD3 Series Instruction Manual and technical data.	
!	Before operating the motor for test run or homing, ensure the safety of its surrounding area.	
	For test runs, the motor must be securely fixed in place and detached from the machinery. Install the motor in the machinery after checking the motor motions.	
Additional	Precautions	
	Be sure to confirm safety of the equipment and its surrounding area after each earthquake.	
	To prevent a fire or personal injury during an earthquake, carry out installation work securely and properly.	
	Install an external emergency stop circuitry so that the operation can be stopped and the power shuts off immediately in case of emergency.	

1. Safety Precautions

2. Cautions for Proper Use



Using "Servo Studio", please read the SD3 Series Instruction Manual too. Please study this manual first and use the product properly and safety.

- FATEK AUTOMATION shall not be liable for any injuries or damages caused by any parameters or programs set by non-FATEK personnel, or by malfunctions or failures of "Servo Studio".
- This "Servo Studio" User's Guide, and any documentations related to "Servo Studio", including the trademarks, logos and copyrights in them, are all attributed to FATEK AUTOMATION CORP., regardless of whether they are registered or not.
- The law prohibits copying "Servo Studio" or the "Servo Studio" User's Guide, in whole or in part, to a hard drive, CD-R, DVD or other media, or distributing them to the network without our permission.
- FATEK AUTOMATION prohibits unauthorized reproduction or resale, such as lending, leasing, selling or distributing to the network, of this product.
- FATEK AUTOMATION strictly prohibits reverse engineering, decompiling, disassembling or any similar act on our product by users.
- The specifications or features of the product may change without notice because of further development of the product.
- We prepared the contents of this user's guide with extreme care. Please do not hesitate to contact us if you have any questions.
- We always strive to have up-to-date information in the user's guide; therefore, it is subject to change without prior notice.
- The illustrations and screenshot images of "Servo Studio" included in this document may be different from the actual "Servo Studio" views.
- No reproduction in any form of this manual, in whole or in part, may be made without written authorization from FATEK Automation Corporation.
- After reading this manual, always keep it handy for easy access.

Δ

3. Overview of "Servo Studio" (Setup Software)

Product Overview

"Servo Studio" is a dedicated setup software to be installed on a user-supplied computer connecting to a SD3 Series servo amplifier with a USB cable. It enables you to perform the following operations easily.

Features:

- setting, saving, and writing amplifier parameters
- measuring, saving, and comparing data, by using a graphical waveform monitor
- \cdot monitoring the state of amplifier, alarm, and input/output
- gain tuning and setting filters
- · point-table operation, test operation and homing

System Requirements

Computer	OS	Windows [®] XP SP3 (32-bit) Windows [®] 8 (64-bit)	Windows [®] 7 (32-bit、64-bit) Windows [®] 10 (64-bit)
	Language	Japanese, Chinese (Simplified), Chi English	nese (Traditional), Korean, and
	CPU	Pentium [®] III 512 MHz or higher	
	RAM	256 MB or more (512 MB is recommended)	
	Hard Disk	Free space of 512 MB or more	
	Serial Communications	USB port	
	Monitor	1024 × 768 Pixel or more Resolution 24-bit color (True Color) or higher	
Cable	USB A – USB mini B	For certain noise environment, a sign	al noise filter cable is recommended.

Microsoft, Windows is registered trademark of Microsoft Corporation in the United States and other countries. Other company's names, product's names and so on are each company's registered marks.

When "Servo Studio" is used with other programs at the same time, "Servo Studio" operation may become unstable. Use "Servo Studio" alone.

Connecting Amplifier and Computer. Connect a USB cable to CN3 at the front of the amplifier.

(A) (A) (A)

4. Installing "Servo Studio"

Installing

Step	Operat	ion	
Step 1	• C	n your computer to star lose any applications if your amplifier is connec	
	• "Se • The	rvo Studio" cannot be ir	ler zip file on your desktop. Istalled on network drives. et Framework installed. If not, Microsoft.NET Framework 3.5 SP1 installer Install "Servo Studio".
Step 2		For the first time installation :	Servo Studio-FULL_Ver- "Version No." .zip Included ".net Framework"
		For upgrading :	Servo Studio_Ver- "Version No." .zip Does not included ".net Framework"
Step 3		e-click on setup.exe in the computer	ne unzipped folder. until installation finishes. Do not start other programs during installation.
Step 4	When	installation finishes, a de	esktop shortcut icon will be created. Servo Studio
Step 5	C:\	Program Files \FATEK	in the following folder. Automation\Servo Studio (in 32-bit version) TEK Automation\Servo Studio (in 64-bit version)

What to Do If Installation Is Cancelled

To communicate with the amplifier, "Servo Studio" uses Windows system files (see below). "Servo Studio" installer automatically cancels installation if it cannot find those system files in your computer. If the installation is cancelled, be sure that the system files reside in the exact locations shown below.

C:\WINDOWS\system32\drivers\usbser.sys C:\WINDOWS\inf\mdmcpq.inf

Uninstalling "Servo Studio"

Go to Control Panel → Programs. Click on Uninstall a program. Select "Servo Studio" and click Uninstall.

2 Operations

1. Overview	
2. Using Tabs in "Servo Studio"	6
 Communications Setup Parameters Waveform Monitor Waveform Comparison Status Monitor Status Monitor Alarm Tuning Point Table Test Run Auxiliary Functions 	

1. Overview

Start "Servo Studio"

Step	Operation
Step 1	Turn on the control power to the amplifier and plug in the USB cable to CN3 firmly.
	Double-click on the desktop icon of "Servo Studio".
Step 2	STUDIO Servo Studio
	"Servo Studio" starts and the window under the communications setup tab opens.
Step 3	

Close "Servo Studio"

Step	Operation
	Click on Disconnect on the Quick Access Tool bar at the top or click on Disconnect in the Communication Settings view.
Step 1	
Step 2	In the "Servo Studio" view menu, select File> End (X). (Or click on the "Servo Studio" title bar.)

1. Overview

Using Keyboard

The following table explains key notations used in this document.

Key/Symbol	Explanation
[↑][←] [↓][→]	Up, Down, Left, and Right Arrow keys. Use these to toggle menu items. Selected items will be highlighted.
Numbers (0 to 9)	Number keys. Use them to type in a number.
[ESC]	Escape key (ESC or Esc). Press to redo an entry.
[ENTER]	Enter key (ENTER, Enter, RETURN, or Return). Use this key to execute the item you selected under a menu, or to finish entering a number.

Selecting Menu Items

Using the mouse, move the cursor to the menu item or the button you want, and left click to execute. Alternatively, you can use arrow keys to navigate to the menu you want and press Enter key to an item.

Entering Numbers

Type in using number keys.

Numeric data such as parameter values are decimal. Enter a number in a decimal format. Binary and hexadecimal numbers are not acceptable.

To cancel a number that you are typing, press the ESC key.

Common Buttons

The following are the common buttons you can use under "Servo Studio" tabs.

Button	Function
Get	Read information from the amplifier RAM
Set	Write the parameters to the amplifier RAM
Write	Write the parameters to the amplifier EEPROM
Read	Read a file* saved in your Computer and display on the screen *For example, a parameter file or point table file
Save	Save the current settings to your Computer Use this button, for example, when you want to copy the same information to another amplifier.
Waveform Monitor	Jump to the Waveform monitor tab

Files Used in "Servo Studio"

"Servo Studio" allows you to save the following data files in your Computer. Use these files to analyze motor motions or copy the same settings to another amplifier.

File	Default File Name	Extension	Tab to use
Parameters	parameter_YYMMDD_hhmmss	.xml	• Parameters
Waveforms	waveformYYMMDD_hhmmss	.CSV	Waveform MonitorWaveform Comparison
Status variable log	statevaluelog_YYMMDD_hhmmss	.CSV	Status Monitor
Point table parameters	pointtable_YYMMDD_hhmmss	.xml	• Point Table
I/O pinouts	IoSetting_YYMMDD_hhmmss	.xml	Auxiliary Functions

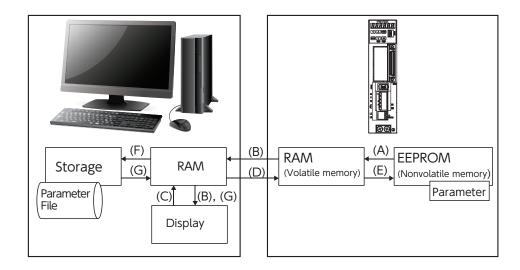
Do not edit any saved files or change their extension. If you do, "Servo Studio" will not be able to read the file. The default file names include time stamps (YYMMDD_hhmmss).

4

2. Operations

1. Overview

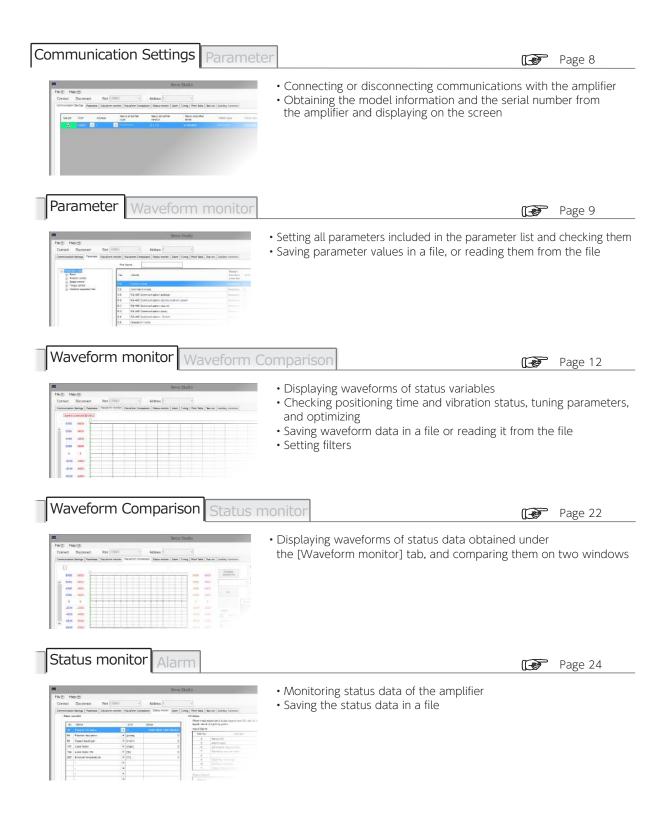
Parameter Data Flow



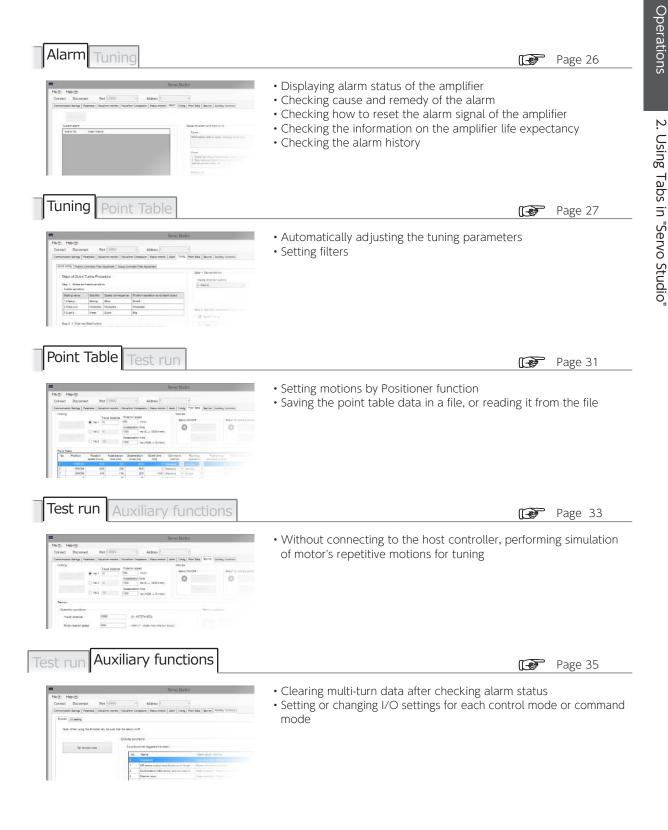
Tracer Arrow	Execution Timing		Operation
(A)	Turning on the control power		Read the parameters from the amplifier EEPROM to its RAM.
(B)	Completing communications connection between "Servo Studio" and the amplifier		Obtain the parameter data from the amplifier RAM to the computer and display on the screen.
(C)	Entering p	parameter values	Enter parameter values in the input fields on the screen and prepare to set them to the amplifier.
(D)	Clicking	Set	Set the parameters to the amplifier RAM.
(E)	Clicking	Write	Write the parameters to the amplifier EEPROM.
(F)	Clicking	Save	Save the parameter settings to the file.
(G)	Clicking	Read	Read the parameters from the file and display on the screen.

2. Using Tabs in "Servo Studio"

This section describes functions of the tabs in "Servo Studio". For details, refer to the pages listed below.



2. Operations 2. Using Tabs in "Servo Studio"

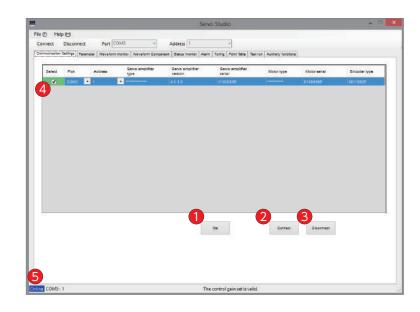


N

2. Operations

2. Using Tabs in "Servo Studio"

1. Communications Setup



No.	Button/Function	Explanation
1	Get	Click to obtain information about the amplifier.
2	Connect	Click to open the serial port to interface with the amplifier. When the connection is complete, 4 turns blue and 5 changes to Online .
3	Disconnect	Click to close the serial port and disconnect communications from the amplifier. When the communications are closed, 4 turns blue and 5 changes to Offline.
4	Connection confirmation 1	The checkbox (in the Select column) of the selected port is ticked. When the serial port becomes open, the color of checkbox cell changes from blue to green.
5	Connection confirmation 2	This box can be seen under any tabs and lets you check the connection status anytime. Offline : Not connected Online : Connected

2. Using Tabs in "Servo Studio"

2. Parameters

File (E) Help (H)			
Connect Disconnect Port	COM3 - Address 1 +		
Party and a second second second	im menter Waveforn Comparaton Status mentor Alarm Toring Point Table Teatron -		
		Autorary runceona	
	File Name		
Extension under	2 No. Narre	Restart the service Unit propidier	Value Change satings
 Speed control Torque sontrol 	2.8 Control mode	Residency [-]	1
E Vibration suppress filter	3.0 Command mode	Necessary [-]	3
	+.0 RS-465 Communication address	Necessary [-]	2
	6.0 RS-485 Communication communication speed	Necessary [-]	3
	6.1 #5-455 Communication step bill	Nucessary [-]	.*
	6.2 RS-465 Communication parity	Necessary [-]	1
	8.0 RS-405 Communication - Switch	Necessary [-]	1
	9.0 Operation mode	Unneces. [-]	0
	11.0 RS-495 Communication Minimum response time	Necessary [ma]	0
	12.0 Warning later time	Unneces. [50ms]	100
	13.0 Timing for elarm output	Urmetes. [-]	7
	32.0 Pulse train command - input pulse form	Necessary [-]	1
	32.1 Pulse train command - Rotational direction	Necessary [-]	0
	32.2 Pulse train command - Auto interpolations for paired ratio	Necessary [-]	0
	Barameter description		
	Select Control Mode		A
	0 = position control mode		
	1 * speed control mode 2 * tangue control mode		
			Ψ.
		6	
1	4 he amplifier		
	Get Set Witte Read	Bave Comp	Citate Citate

No.	Button/Function	Explanation
1	List of Parameter Groups	In this list, related parameters are grouped together according to their usages. Select a group to display the parameters of the group in \bigcirc
2	Parameter Table	Parameters are displayed in ascending order of the parameter numbers. Select the parameter number and double-click the value to edit. An asterisk appears on the rightmost cell when you make a value change or read a file. Click <u>Set</u> ; the asterisk disappears. If the Restart the servo amplifier column shows "necessary", you need cycle power for changes that you made to parameter settings to take effect. Click <u>Write</u> and cycle the control power of the amplifier.
3	Parameter Description	This box displays explanation for the parameter selected in 2 .
4	Servo amplifier	Get: Pull the values of selected parameters from the amplifier RAM.Set: Write new parameter settings to the amplifier RAM.Write: Write the new parameter settings to the amplifier EEPROM.
5	File	Read: Read the data you created before and display.Save: Save the parameter values you edited to a file. Use this to copy the same settings to another amplifier.
6	Compare	Compare : Jump to the parameter comparison screen. Comparing the parameter value in the RAM of the amplifier with the parameter value editing on the "Servo Studio". Execute compare : Compare the edited parameters with the data saved in EEPROM or a file. Edit : Return to the parameter table 2.
7	Clear	Delete the parameter data in EEPPROM. Use this for factory reset or when replacing the motor. Parameter settings of the motor model that you connect next will be automatically set. We recommend data backup before you start operations.
8	File Name	Name of the parameter data file that "Servo Studio" read. parameter_YYMMDD.xml

Comparing Parameter Values

		Aveform Comparison Status menitor Alarm Tuning Point Table 3 parameter 190730 122521 Jun	latrun Auxiliary functiona		
El Factoriese view	Fig.	Name	Servo emplifier	Compare values	Differences
- Dasio settings Deceleration stop settings	2.0	Control mote	0	1	1
- Entry detection sertings	3.0	Commend mode	1	3	2
Position command input	4.0	RS-405 Communication address	20	1	19
 Oain patemeters settings Home position return 	0.0	RS-485 Communication communication speed	2	5	4
Internal position command	0.2	#5-435 Communication parity	2	3	r
- Speed command input Gain parameters sattings	9.0	Operation mode	1	a	10
- Internal speed command	11.0	RS-485 Communication Minimum response time	60	3	47
Torque control	12.0	Warning later time	160	200	50
Whatleh suppress filter Popicion command filter	32.0	Pulse train command - input pulse form	0	1	te -
- Speed command filter	32.1	Pulse stain command - Rotational direction	1	a	1
Torque filter	32.2	Pulse train command - Auto interpolations for paired ratio		3	1
	32.3	Pulse train command - Input logic	1	a	10
	50.0	Analog speed - input Gain (Numerator)	6000	0000	1003 ~
	n.		nices object	2	5

No.	Button/Function	Explanation	
1	What data to compare	Select which dat Select EEPROM o	a you want to compare with the data in RAM. or File.
2	Execute compare	Execute compar	the <u>Set</u> button. s) is/are written in at the RAM of the amplifier.) e Executes Compare and shows the result in the data display area. ta are completely matching, the table will be blank.
3	File Name	Name of the para	ameter data file you selected for comparison.
		No.	: Parameter number
		Name	: Parameter name
4	Parameter settings comparison table	Servo amplifier value	: Parameter value residing in the amplifier RAM.
		Compare value	: Value to compare with (in EEPROM or the file that you selected)
		Difference	: The difference between the value in RAM and the value compared.
5	Edit	Jump to the para	ameter edit window.

Replacing with a Different Type of Motor



Use a right pair of motor and amplifier. If a wrong pair has been set accidentally, clear the parameter data in the amplifier EEPROM first, then use a right pair.



Procedure for Parameter Clear

Step	Description
Step 1	Connect the amplifier and the computer. Turn on the control power. (You don't need to turn on the primary circuit power.)
Step 2	Click on Clear under the Parameter tab.
Step 3	Servo Studio Servo Studio Servo Studio Finished deleting parameters in EEPROM OK Cancel Click OK : to clear parameter data, Click Cancel : to cancel. If Parameter Clear failed, repeat this procedure from the beginning.
	After clearing the parameter data in EEPROM, be sure to do the control power cycling according the following procedures.

Automatically Identifying Motor Model and Output Rating

Step	Description
Step 1	Clear the parameters.
Step 2	Disconnect the primary circuit power supply and the control power supply.
Step 3	Replace the motor and connect the encoder cable.
Step 4	Reapply the control power to the amplifier. The default parameter values for the new motor will be automatically set to EEPROM.
Step 5	Verify that the alarm statuses are all normal.

2 Operations

2. Using Tabs in "Servo Studio"

3. Waveform Monitor

🔔 DANGER						
\bigcirc	Do not use an inappropriate value for any parameter. Or the motor will become uncontrolled. Secure safety for the work area before gain tuning.					
!	Secure safety in surrounding areas and take safety measures such as emergency stop.					

To optimize gain tuning, observe not only waveforms, but also noise and vibrations, jerky or smooth movements in the motor and the equipment.



2. Operations2. Using Tabs in "Servo Studio"

No.	Button/Function	Explanation
1	Chart Display Area	 You can use the mouse in this area. Drag to zoom a rectangle area that you select. Right-click to capture the waveform. Wheel button Use the Scroll wheel to change the max value to be included in the chart while the waveform is selected. This can be done in the x-axis or y-axis zoom %, or y-axis range cell where the cursor is blinking. Scrolling without specifying the area moves the left green cursor on the chart.
2	Cursor icons	Move the cursor icons horizontally to display the time values in 7 . Cursor 1 (green) for T1, Cursor 2 (blue) for T2.
	Fit	Click to fit the waveform chart to the chart display area such that the max value.
3	Selective Fit	This icon adjusts the selected waveform display range such that the average of the max and min y-values of the data is centered in the chart display window. When y-value fluctuations are relatively small, the waveform you want to see might appear only at the upper side or lower side of the display window. Selective Fit can fix this problem. To select a variable for which you want to change the waveform display range, click on the variable label (i.e. a status name) in the chart area. The status variable selected will be shown with a black border (e.g., Speed command [r/min]).
	Return	Click Return to see the previous display view of the waveform. You can go back up to the fifth one. Click Fit to clear the history of display changes.
	X-axis scale	Enter a zoom percentage for x-axis.
4	Y-axis scale	Enter a zoom percentage for y-axis.
	Y-axis range	Specify the display range for y-axis.
5	Scroll bars	Use the horizontal bar to change the x-axis display range. Use the vertical bar to change the y-axis display range.

2. Operations2. Using Tabs in "Servo Studio"

No.	Button/Function	Explanation
6	State Item	Select up to four state items (i.e. status variables), from the pull-down menu, that you want to display in waveform. Those four items you selected will be saved in a file. In the case of 4-byte status data, only the lower 2-byte is displayed.
	I/O Item	The I/O items are also displayed in waveform. Four I/O items selected here will be saved to a file.
7	Time	 Time measured at the location of the cursor positions. T1 : time at the green cursor T2 : time at the blue cursor △ T : difference between T1 and T2
8	Parameters Window	Displays parameters that can be set in the Waveform monitor tab and display-only parameters. The rows highlighted in green are parameters grouped together in the control gain set. Parameters with grayed out Value cells are display-only.
	Servo amplifier	
	Click Get	: to read the parameters from the amplifier.
9	Click Set	: to set the parameters to the amplifier RAM.
	Click Write	: to save the parameter to the amplifier EEPROM.

Waveform Rec	Set the waveform measurement conditions here. Save the obtained waveforms and tuning parameters to a file.						
Button/Function	Explanation Default : 2.00 [ms]						
Sampling cycle	Motor Capacity Range [ms] Units [ms] 50 W to 750 W 0.04 to 2,621.44 0.04 1 kW to 2 kW 0.05 to 3,276.80 0.05						
Sampling Points	Sampling cycle = (Range of motor moving time) ÷ (Sampling Points)Enter the number of sampling points per measurement.Initial value: 1,000 points, Range: 1 to 4,096 points						
	Select the trigger method to obtain waveform data. At first, select rising edge to measure the series of motions from start to finish.						
	Setting Preferred when Recording starts when Recording ends when						
Trigger method	Rising above the threshold (i.e. Rising edge)• Checking statuses immediately after a motion starts. • Trying to get a general idea on the whole movement.The value of Valid trigger source has exceeded the Trigger Level setting.The number of points sampled has exceeded 						
	Checking a specific part of consecutive operations. Checking a specific part of consecutive operations.						
	* "Falling edge" option is not available.						
Valid trigger source	Select a state variable that will work as the trigger to start recording waveform data (state variables).						
Trigger level	Set the threshold value to start recording waveform data. When the selected variable exceeds the threshold, recording will start. Range: 0 to 32,767						
Trigger position	Set the trigger position. You can select up to eight positions starting from the left. 0: Left end of the chart, 1/8: Leftmost solid line, 7/8: Rightmost solid line Trigger 0 1/8 2/8 3/8 4/8 5/8 6/8 7/8 position 0 1/8 2/8 3/8 4/8 5/8 6/8 7/8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0						
Sampling method	Single acquisition: to obtain data only once for the specified number of sampling points. Successive acquisition: "Single acquisition" is repeated and waveform chart continues to update until <u>Stop sampling</u> is clicked.						
Capture waveform	Start obtaining waveform data.						
Stop sampling	Stop obtaining waveform data.						
Save waveform(s)	Save the obtained waveform data and the tuning parameter settings in a CSV file.						
Tuning	Jump to the Quick Tuning tab under the Tuning tab.						

Waveform Comparison	
---------------------	--

Use this tab to display and compare waveforms of the data read from the waveform file and waveforms of sampled data.

Button/Function	Explanation
State Item (i.e. Status variables)	Select items that you want to display in waveforms. Eight waveforms including those from the sampled items 6 can be displayed. Y-axis units are displayed for four items from the top selected in 6.
I/O Item	I/O data from another waveform file. Displays up to four when Parallel I/O Status is selected as status item.
Parameters	Parameter values of waveform that have been read from wave form the file.
Time	T1 and T2 are time figures indicated by the cursor positions. $^{\left(\ast \right) }$
Compare waveforms	Read the saved data.
waveformYYMMDD_hhmmss.csv	Name of the file that has been read from the computer.

*) Those do not necessarily match the time figures displayed in 🕜 (or what the current x-axis label suggests) if the sampling conditions such as intervals and sample points are not the same in the two sets of data that you are comparing.

Cursor	Enables numeric comparison of the waveforms displayed in the chart area. Up to eight waveforms can be displayed - your measured waveforms at the top and waveforms-read by the waveform comparison tab from the file- on the bottom. Value 1 at Cursor 1 (green), Value 2 at Cursor 2 (blue)
Button/Function	Explanation
State items (i.e. Status variables) I/O items	Y values (at the cursors) of the items you selected are displayed.

Operations Using Tabs in "Servo Studio"

Position Command Filter Torque Command Filter	Use these tabs to check fluctuating position deviation values and torque command values in waveform chart and select the filters that you want to set. (*)
Button/Function	Explanation
Frequency display	 This item changes the chart units from time [ms] to frequency [Hz]. When the display mode is changed to frequency, the cursor colors change to red and blue. Column A and Column B show frequencies at the red and blue cursors respectively. In frequency charts, Cursor 2 position is determined to be at 2ⁿ sampling point starting from the Cursor 1 position. Read the peak value; use Position Command Filter or Torque Command Filter to jump to the Tuning tab to set filters. You can set to four levels of filters. After setting filters, you can check the settings under Position Command Filter tab and the Torque Command Filter tab.
Time View	Click to switch the chart units from frequency [Hz] to time [ms]. In the time unit mode, the cursor colors are green and light blue, and Columns A and B are blank.
Position Command Filter Adjustment	Click to jump to Position Command Filter Adjustment under the Tuning tab.
Torque Command Filter Adjustment	Click to jump to Torque Command Filter Adjustment under the Tuning tab.
Get	Read filter parameters from the amplifier.
Set	Write the filter parameters to the amplifier RAM.
(Checkbox)	You can enable or disable the filter that you set by checking or unchecking the checkbox. Unchecking the checkbox does not erase the filter setting.

*) Under these tabs, the second cursor in the time unit mode is positioned at the 2ⁿ sampling point starting from the first cursor position. Conversion to frequency is applied to the range between the 1st and 2nd cursors

2. Operations2. Using Tabs in "Servo Studio"

Procedure 1 Waveform Display

Cor	inect	Discon	nect	Port C	ÖM3		1	Address 1			+								
Cart	munication	tatings	Parameter	Waveform	mainter	Waveform Co	nparlaot	diatus mente	a Alam	Tanna	Point Table	Ratinum	Authory	functional					
	Speed c	ommand	[rimin]														Speed	teedback()	minj
	8800	8800	0-										-				- 1	8005	1001
	0400	0400	-	-			- 6				1							1000	1001
î	6000	6400	- AS		1				S.A	1.1.1	diam.					-		0000	6001
	4900	4000	-				-							-				4003	4002
	2000	2000		-					1		-		-	_				2003	2002
			-	10	1.2	10	-		-	1	-		1		-	2	1 3		
	0	0	-	-			-		-						_			a	4
	-2900	-2100																-2000	-2000
	-4900	4100																-4000	-4000
	-0000	6900	-	1		1	-		1	1		-	-	_			-	-0000	-0000
						-	-		-		-				-	1000			
105	-8300	-0100		6	12	10.24	_	16.30	2	.48	-	-			30	84	40	-5000	-8000
	Ste	n '	1 44	н		*	avis 🔓	100 %	yanis	1	ັ່	tep	v 2	8000		(ma)	Tarque	-	0.1962
	JIC	Ρ				CL.		A -	7			co p	-						
1	ate Iterri				_	Ste	sb.	4 • 7	/	five Fit	Viereit	nn Racord	Waterto	int Compt	riege C	unter P	selfionCorr	mandFilter	ThroueCome
	aplay St			Val						OVA PR	Reto	d settings			-				100
	V Speed		a))	~		Petameter		. Unit	Value	Chang		npling eye				ling pair		igger nieth	
	Com	rand post	ion deviation	¥		herts tetls		[%]	380			9	2.00 m		100			and soors	ne thresh y
	1 2000	-	¢.	¥		Damping ratio		[94]	100		Vel	id trigger a	-		Te	ipper les	•1	Tegger	position
	Speed	d feedbac	e - 3	4		Control gain a Inertia conditi		H	15		Sp	ed comma	ind			1.1		0	
	.		_	-	-	Corect Asia		11 Degree			1.		- 6	_					
	Ste	n !	5 • 8	3 –	-	Control pair 2		tractal.	200		(B) 54	ngre accu	istion	Gapture	vaveform				
		r `			- 1	Gain FF come			10000	•	0.0		a sequebri	_					
			100		11	Integral gate		(text)	tep	•				St	er	53	• 6	5	
	no amplif					Position come	and s	- 10	26					-50	- C P	-2			Tunitg
	no ampili Cel			Vote .		emoothig 2 m													

Step	Description
Step 1	Select status items that you want to obtain waveforms for.
Step 2	Set measurement conditions.
Step 3	Click on Capture waveform Recording Status Recording Status Waiting for trigger Recording Status Nor Recording Status Capturing waveform Recording Status Nor Recording Status Image: Normal Status Recording Status Image: Normal Status Recording Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal Status Image: Normal
Step 4	Adjust the parameters. SD3 Series Instruction Manual 7 Tuning
Step 5	ClickSet to write the parameters to the amplifier RAM.
Step 6	Click Capture waveform to see the waveforms.
Step 7	Continue adjusting the parameters until you obtain desired waveforms.
Step 8	Click Write to write the parameters to EEPROM of the amplifier.

Procedure 2 Saving waveform data



ein set is valid.	
Step	Description
Step 1	Click on Save waveform(s) under the Waveform Record tab.
Step 2	A dialog box will prompt you to select a waveform file name.
Step 3	Select the name of a waveform file you want to save the waveform data to and click Save .

Use the saved file when you want to use the same measurement conditions next time.

File content	Data of waveforms displayed and parameters				
Default directory to save waveform files	C:\Users*****\Documents\FATEK_Automation\Servo_Studio\Waves				
Default file name	waveformYYMMDD_hhmmss.csv				

Procedure 3 Reading waveform data

	Image: Constraint of the second sec	
Image: Step 3 Select a file and click Open . Step 3 Click Image: Step 1 .	Control gain Nat 01 Institution addition 01 Control gain 1 (mah) Control gain 2 (mah) Control gain 3 (mah) Control gain 3 (mah) Control gain 4 (mah)	
Image: Step 3 Description Step 3 Click Compare under the Waveform Comparison tab.	Image: Constraint of the state of	
Step 1 Click Compare Waveforms under the Waveform Comparison tab. Step 2 A dialog box will prompt you to select a waveform file. Step 3 Select a file and click Open . (The file name that you selected appears in the box below the Compare waveform button.	Control gain 1 Sector In data T1 [m0] Sector Control gain 2 Sector Control gain 3 Sector Control gain 4 Sector	
Step 1 Click Compare waveforms under the Waveform Comparison tab. Step 2 A dialog box will prompt you to select a waveform file. Step 3 Select a file and click Open . (The file name that you selected appears in the box below the Compare waveform button.	Notation T1 (md) Dealer Compare T2 (md) Dealer Compare T2 (md) Dealer	
Step 1 Click Compare Waveforms under the Waveform Comparison tab. Step 2 A dialog box will prompt you to select a waveform file. Step 3 Select a file and click Open	Na cala T1 (196)	
Step 1 Click Compare under the Waveform Comparison tab. Step 2 A dialog box will prompt you to select a waveform file. Step 3 Select a file and click Open . (The file name that you selected appears in the box below the Compare waveform button.	Concese T1(me) (0.11%) (0.11%)	
At you Image and the image		
Image: Terring Training Tr		
Step Description Step 1 Click Compare waveform comparison tab. Step 2 A dialog box will prompt you to select a waveform file. Step 3 Select a file and click Open . (The file name that you selected appears in the box below the Compare waveform button.	Postan commans a ()	
Step Description Step 1 Click Compare waveforms under the Waveform Comparison tab. Step 2 A dialog box will prompt you to select a waveform file. Step 3 Select a file and click Open . (The file name that you selected appears in the box below the Compare waveform button.	amoothij 2 moving ex	
Step Description Step 1 Click Compare waveforms under the Waveform Comparison tab. Step 2 A dialog box will prompt you to select a waveform file. Step 3 Select a file and click Open . (The file name that you selected appears in the box below the Compare waveform button.		
Step 1 Click Compare waveforms under the Waveform Comparison tab. Step 2 A dialog box will prompt you to select a waveform file. Step 3 Select a file and click Open . (The file name that you selected appears in the box below the Compare waveform button.	et is velid.	
Step 1 Click Compare waveforms under the Waveform Comparison tab. Step 2 A dialog box will prompt you to select a waveform file. Select a file and click Open . (The file name that you selected appears in the box below the Compare waveform button.		
Step 1 Click Compare waveforms under the Waveform Comparison tab. Step 2 A dialog box will prompt you to select a waveform file. Step 3 Select a file and click Open . (The file name that you selected appears in the box below the Compare waveform button.	Stan Deservition	
Step 2 A dialog box will prompt you to select a waveform file. Step 3 Select a file and click Open . (The file name that you selected appears in the box below the Compare waveform button.		
Step 2 A dialog box will prompt you to select a waveform file. Step 3 Select a file and click Open . (The file name that you selected appears in the box below the Compare waveform button.		
Step 2 A dialog box will prompt you to select a waveform file. Step 3 Select a file and click Open . (The file name that you selected appears in the box below the Compare waveform button.	Step 1 Click Compare under the Wayeform Comparison tab	
Select a file and click Open Step 3 (The file name that you selected appears in the box below the Compare waveform button.	Click waveforms under the waveform Companson tab.	
Select a file and click Open . (The file name that you selected appears in the box below the Compare waveform button.		
Select a file and click Open . (The file name that you selected appears in the box below the Compare waveform button.		
Step 3 Select a file and click Open Open (The file name that you selected appears in the box below the Compare waveform button.	Step 2 A dialog box will prompt you to select a waveform file	
Step 3 (The file name that you selected appears in the box below the Compare waveform button.	A date box with prompt you to select a waveloin file.	
Step 3 (The file name that you selected appears in the box below the Compare waveform button.		
Step 3 (The file name that you selected appears in the box below the Compare waveform button.		
Step 3 (The file name that you selected appears in the box below the Compare waveform button.	Calcate Classical all de Constr	
(The file fiance that you selected appeals in the box below the compare wavelour button.	Select a file and click Open .	
(The file flame that you selected appeals in the box below the compare wavelour button.	Chair 2	
(The file flame that you selected appeals in the box below the compare wavelour button.	Step 3 (The file event that we call the decrement in the law had been the Common straight from the Common straight for the straight for straight for the straight for the straig	In solution of
	I I DE TILE DAME TOAT VOU SELECTED ADDEARS IN THE DOX DELOW/ THE COMPARE WAVEFORM	button.
	(The file finite that you selected appears in the box below the compare waveform	

NOTE

- The color of the waveform matches the color shown on the display check mark, not the one used when you saved the data.
- The data read from the file is displayed in the Value1 column.
- Under the Waveform monitor tab, waveforms of most recent data and data read from the file are both displayed in one chart.

The Waveform Comparison tab lets you compare waveform charts of two data sources side by side vertically.

2. Operations2. Using Tabs in "Servo Studio"

Procedure 4	Reading Waveform	File

ServoStudio_WAVEFORM_DATA						
Data Format Version	amplifier version	Servo Studio version				
2.0	4.1.1.0	1.8000.3.0				
Condition	2					
Date	Sampling Period[msec]					
MM/DD/YYYY hh:mm:ss	2					
Gain Parameteters				4	5	
Name	Item	Main No.		Unit	Value	
MP_RPP1_GRATE	Inertia ratio	102		[%]	250	
MP_RPP1_DRATE	Damping ratio 3	103	0	[%]	100	
PCL_RPP1_CONTROL_LEVEL_ALL	Control gain set	113		[-]	15	
PCL_RPP1_CONTROL_LEVEL_ALL	Inertia condition	113	1	[-]	2	
PCL_RPP1_W1	Control gain 1	115		[rad/s]	50	
PCL_RPP1_W2	Control gain 2	116	0	[rad/s]	200	
PCL_RPP1_FF1	Gain FF compensation 1	117	0	[0.01%]	10000	
PCL_RPP1_WQ	Integral gain	119	0	[rad/s]	160	
PVCC_POS_FILTER_FIR_DIM_1	Position command smoothing filter 1 Moving average order	80	0	[-]	25	
PVCC POS FILTER FIR DIM 2	smoothig 2 moving average order	81	0	[-]	10	
Waveform Data						
Channel No.		CH0	CH1	CH2	CH3	-
		TRUE	TRUE	TRUE	TRUE	6
Unit		[pulse]	[pulse]	[0.1%]	[r/min]	
State Value Name	Sampling Number	EIO_ENC_MA	PCL_POS_ERROR	TCC_TORQUE_COMMAND	VCL_SPEED_FEEDBACK	
State Value Item	Sampling Number	Encoder mechanical angle (1 rotation)	Position deviation	Torque command	Speed feedback	
	(297	0	0	75	
	-	693	0	0	84	
		2 1128	0	0		8
		3 1596	0	0	97	-
		4 2083	0	0	100	
						•
I/O Bit Assign						
Bit Name List	SVON	RESET/PCLR	PCSTART1	PCSEL1	PCSEL2	PCSEL3
Bit Name List I/O State Value	409			5406		
Select Bit Name	SVON	RESET/PCLR	PCSTART1	PCSEL1		
Parameteters						
Name	Item	Main No.	Sub No.	Unit	Value	
SC CONTROL MODE	Control mode	2	0	[-]	0	
SC COMMAND MODE	Command mode	3		ř–1	3	
PSCI PRESCALER	Pulse train command - Paired ratio (Numerator)	34		[-]	1000	
PSCI PRESCALER DIV	Pulse train command - Paired ratio (Denominator)	36		[-]	1000	
PVCC POS IIR NOTCH 1 FREQ	Position command filter 1 - Notch Frequency	74		[0.1Hz]	10	
PVCC POS IR NOTCH 1 WIDTH	Position command filter 1 - Width	75		[-]	512	
PVCC POS IIR NOTCH 1 HF GAIN	Position command filter 1 - High frequency gain constant	76		[-]	100	
PVCC SPEED FILTER FIR DIM 1	Moving average time for Speed command smoothing filter	78		[ms]	100	
PVCC_POS_IIR_NOTCH_1_DEPTH	Position command filter 1 - Depth	70		[-]	0	
1 VOOL 00_III\IVOTON_I_DEPTH	r oardon command filter i - Deput	79	0		U	

Con	dition	
1	Date	Data timestamp for saving a file
2	Sampling Period [msec]	Sampling cycle
Gair	n Parameters	
3	Item	Tuning parameter names
4	Unit	Tuning parameter units
5	Value	Tuning parameter values
Wa	veform Data	
6	Unit	Measurement units of status items
7	State Value Item	Amplifier status variable names
8	Status data	Time series data of status variables
I/O E	Bit Assign	
9	I/O data	
I/O E	Bit Assign	
10	Information of related parameters	

2. Using Tabs in "Servo Studio"

MEMO

2 Operations

2. Using Tabs in "Servo Studio"

4. Waveform Comparison



2. Operations2. Using Tabs in "Servo Studio"

Displaying Waveforms

No.	Button/Function	Explanation
1	Scroll bars	Use the horizontal bar to scroll sideways. Use the vertical bar to scroll up and down.
2	Cursor	Move the cursor horizontally to display the x coordinate in $\textcircled{0}$ (Time [ms]).
3	Compare waveforms	Click to read the data created earlier.
4	waveformYYMMDD_hhmmss.csv	The name of the file that the data was read from.
5	Fit	Click to fit the waveform chart to the chart display area such that the max value of the selected waveform will be the max y-coordinate
6	Return	Click to go back to the previous waveform display (i.e. undo Fit.) You can go back up to the fifth one. Click Fit to reset the history.
	x-axis zoom %	Enter a zoom percentage for x-axis.
7	y-axis zoom %	Enter a zoom percentage for y-axis.
	y-axis range	Specify the display range of y-axis.
8	Chart Display Area	You can use the mouse in the Chart area. Drag to specify a rectangle area to zoom in. Right-click to copy the waveform. Use the scroll wheel in any input cell of x-axis zoom %, y-axis zoom %, or y-axis range where the cursor is blinking, to change the max value of the selected item to be included in the chart. Click on the cursor button 2 and then use the scroll wheel to move the green cursor.
9	State Item	Click the checkbox of the item that you want to see its waveform for. You can select up to four items.
10	Time	The measured value at the x-axis cursor position.
	Parameter	Displays the parameter values at the time when waveform data was obtained.

2 Operations

2. Using Tabs in "Servo Studio"

5. Status Monitor

	Parales I/O Status	• H	8008 8008 1008 6008(2)	Input Signal		
18	Parallel I/O status	· 11	6006 6006 1006 6006(2)	PIN No.	Content	Input signal nas
-	Speed Nectors	* jumini	-1	4	Barro ON	SVEN
24	Amplifier lemperature	+ rei	45		Alarm reset	HOLD
1		Co. 2023		7	Command input inhibit Deviation counter clear	PCLB
78		+ 11	96887		Deviation counter clear	FULL
412	Torque command	- [0.1%]	۵		CCW But Intibilities	CCW1.
218	Encoder data entri counter	· (munt)	0	10	CW Run inhibited	CWL
38	Pales their opmmand input (Posit	- Ipuleel	0	11	Output torque santral	TLSEL1
229		* 10	0000 0000 0000 0000(2)	Output Signa	2	hind some
371		7 [91]	250	PIN No	Contant	Output signal na
-		ATT 12.		12	Erste misses	MODY
	•			14	Serve status	SERVO
Inter 1		5 412	or Operation	15	Positioning complete	POSIN
	nating cycle	$\mathbf{}$	[h	10	r cancering correction	1 Coarr
100	uting date (E) and (ma)	Manh	In operation	17	Output during Torque control	T-LIMIT
				18	Encoder Zichase	002
	fun wording		op montaring	19	Serve ready	S-RDV
	4			21	Alarin statua	AUM

No.	Button/Function	Explanation
1	State variable	Select up to ten status variables that you want to monitor. The data is displayed at the same time. The following three status items are displayed in binary in the "Value" column. Status No. 16 I/O Status Status No. 64 Positioning Status Status No.228 Regeneration Status Display example: [0000 0000 0000 0000(2)] where (2) indicates binary.
2	Status Logging	Lets you obtain status log.
3	Sampling cycle	Range: 500 to 100,000 [ms] Set in increments of: 500 [ms]
4	Stop recording Start recording	Click <u>Start recording</u> after setting the sampling cycle. Click <u>Stop recording</u> to stop logging. The data will be saved to a csv file. Default file name: statevaluelog_YYMMDD_hhmmss.csv
5	Monitor Operation	Clicking the [Status monitor] tab starts monitoring. Use Stop monitoring or Restart to stop or resume monitoring.
6	I/O status	When an input or output signal turns on, its signal name cell turns green.

Operations Using Tabs in "Servo Studio"

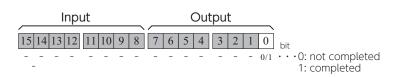
I/O Bit Assignment

15 1	General-Purpose Input General-Purpose Output 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 0/1									
	Contro	/	/		Decition	_			a citu	Torque
	Comm	and		Pulse Train	Position	Into	rnal	Velo Analog	Internal	Torque Analog
	Mod	-	Ctandard				1			
	Prese		Standard	Option 1	Option 2	Standard	Option	Standard	Standard	Standard
		0		MRE			PM1		MRBK	
	o Ge	1		SER'	VO		PM2		SERVO	
	Genera	2		POSIN		MEND	PM3		(Reserved)	
		3	(Reserved)	HEND	WARN1	HEND		(Reserved)		
	General-Purpose Output	4	T-LIMIT	MEND/ T-LIMIT	T-LI/	MIT	MEND/ T-LIMIT	T-LIMIT		
	ÓSE	5				OC		fixed to 0))	
		6	SRD	Υ	DBRK	SRDY	SERVO		SRDY	
		7				ALM				
		8				SVC	DN			
		9		RESET		RESET	/PCLR		RESET	
l	Gene Input	10		HOLD		RCSTA	ART1	HOLD	VCRUN1	HOLD
	N ut	11		PCLR		PCSEL	1	(Reserved)	VCRUN2	(Reserved)
	General-Purpose Input	12	(Reserved)	HOME	E-STOP	PCSEL	2	(Reserved)	VCSEL1	(Reserved)
	rpc	13		CCWL		PCSEL	3	CCWL	VCSEL2	CCWL
	ose	14		CWL		PCSEL4	HOME	CWL	VCSEL3	CWL
		15		TLSEL1		ORG		TLSE	EL1	

Regeneration Status Bit Assignment

Input Output 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 bit - - - - - - - 0/1 ····1 : Being output						
	bit	Name and Meaning	Decimal			
	0	Regeneration control output Indicates the operation status of the regenerative power processing circuit.	0			
	8	Regeneration voltage warning Indicates the primary circuit power voltage has reached the warning level. You need to connect a regenerative resistor to the amplifier.	256			
	9	Regeneration voltage threshold Indicates the primary circuit power voltage has reached the threshold. A power error, [Err. 19] or [Err. 15], will occur if the regenerative resistor is not connected.	512			

Positioning Complete Bit Assignment



2. Operations

2. Using Tabs in "Servo Studio"

6. Alarm

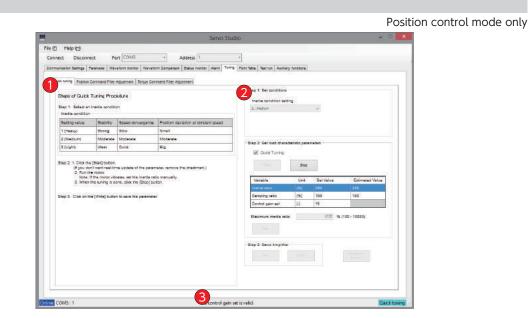
EH	telp (H)				
nnect	Disconnect	Port COMS	- Address 1	-	
		1 NOTO 1		The second secon	
rimum ica So	on Gatings Para	mater Waveform monitor Waveform C	Comparison Status monitor Alerm	Tunng PontTable Testrum Auxiliary functions	
	Alarm Clear				
	ruann cica				
2	ard alarm		1	A Cause for alarm and what to do	
Ala	ann No. 🛛 i	Alarm Name		Causa	
				Multi-instation data is repidly changing temporality	
				Check	
				1 Check the wiring of the encoder cable for score connection of pine, etc.	
				Take measures against noise, such as connecting PD, detecting the motor po and the encoder cable, at:.	
				What to do	
				Rabort the control power supply	
				Raboer the control power supply	
				Rabort the control bower supply	
Alam	ni niatoly			Raber INa control power subply	
/	ni nasovy • Alarm No.	lam	Time of occurrence A		
/	1000	Barn-	Time of occurrence A	C In suparancy information	
/	Alam No.		100	5 Life superstancy information Constative Run Time	
No.	Alam No.	Mattinum data aver	+926	5 Life superstancy information Constative Run Time	
No. 0 1	Alarm No.	Mattynen oata ever Encoder undervoltage	4006	5 In separang Hornatan Constation Rus Tina 0311074413	
No 0 1 2	Alarm No. 20 21 18	Encoder underviolage Encoder underviolage	4026 4535 4998	5 Ja Bergedanoy Information Constablish Rus Time 6031 57 48 2 Constablish courts of control (power ON	
No. 0 1 2 3	Alam tip. 20 21 18 20	Marti-tum data entor Encoder undervicitage Encoder arter Muti-tum data ettor	+926 4556 4998 +998	5 Ja Bergedanoy Information Constablish Rus Time 6031 57 48 2 Constablish courts of control (power ON	
Ne 0 1 2 3 4	Alarm No. 20 21 18 20 21	Matterium data error Encoder undervoltage Encoder arm Mett-sum data error Encoder undervoltage	+926 4935 4998 4998 4998 4998	5 Ja Bergedanoy Information Constablish Rus Time 6031 57 48 2 Constablish courts of control (power ON	
No 0 1 2 3 4 5	Alarm No. 20 21 18 20 21 21 18	Huth-sum sale ever Encoder underviolage Encoder ener Matt-sum data ever Encoder underviolage Encoder ener	4005 4555 4555 4555 4555 4555 4555 4555	5 Ja Bergedanoy Information Constablish Rus Time 6031 57 48 2 Constablish courts of control (power ON	
No 0 1 2 3 4 5 0	Alarm No. 20 21 18 20 21 18 20 21 18 30	Marth-Nam data enter Encoder undervoblage Encoder anno Marth-tum data enter Encoder anno Encoder enter Marth-tum data enter	4005 4555 4598 4556 4555 4598 4598	5 Ja Bergedanoy Information Constablish Rus Time 6031 57 48 2 Constablish courts of control (power ON	ļ
No 1 2 3 4 5 8 7	Alarm No. 20 21 18 20 21 18 20 21 18 20 21	Historius data envez Encoder undervoltage Encoder som Math-Lan data enco Encoder undervoltage Encoder eine Math-Lan data enco Encoder eine aus enco Encoder undervoltage	4335 4398 4888 4335 4335 4998 4980 4980 4555	5 Ja Bergedanoy Information Constablish Rus Time 6031 57 48 2 Constablish courts of control (power ON	

No.	Button/Function	Explanation
		Click to clear amplifier alarms.
1	Alam Clear	Clearing alarms1. Remove the cause of the alarm(s).2. Under the Parameters tab, set Operation Mode (No.9.0) to 1 (communication).3. Click Alarm Clear.
2	Current alarm	Displays a list of current alarms.
3	Alarm history	Displays up to ten most recent alarms.
4	Cause for alarm and what to do	Shows possible causes of the alarm selected in (2) and troubleshooting.
5	Life expectancy	Shows guidelines for regular maintenance and product life. Cumulative Run Time: This item indicates the total amplifier runtime (in [hhhhhh:mm:ss.s]) since the control power was supplied to it for the first time.
	mormation	Cumulative counts of control power ON: This item indicates how many times the control power was turned on to the amplifier since the first time

(SD3 Series Instruction Manual 8 Troubleshooting

7. Tuning

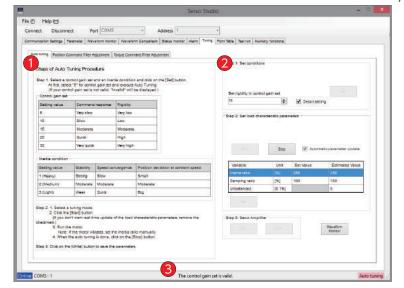
Quick tuning



No.	Procedure/Button	Explanation
1	Operating Procedure	This is a guidance of the "Quick Tuning".
	Conditions	Set a load related parameter of the motor.
	Step 1	Set the appropriate inertia condition : Choose a inertia condition to machine system connecting to your motor.
2	Step 2	 Setting of the load related parameters : ☑ : Quick Tuning If you check "Quick Tuning", the inertia ratio value is estimated automatically, and then the value is set to the amplifier RAM one by one. Uncheck the check box if you need the inertia ratio estimation only. Click Start : to start a Quick Tuning Click Stop : to stop a Quick Tuning Inertia ratio upper bound If you try to enter the inertia ratio by manually, enter a value in the "Set value" cell. Set : Write the new parameter settings to the amplifier RAM.
	Step 3	Get : Pull the values of the parameters from the amplifier RAM Write : Write the new parameter settings to the amplifier EEPROM.
	Waveform Monitor	Jump to the Wave Monitor window.
3	Tuning status indicator	This indicator shows a tuning condition.

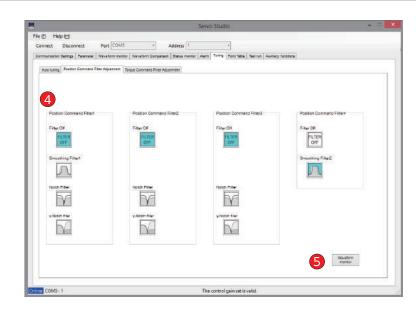
Auto tuning

Velocity Control Mode only



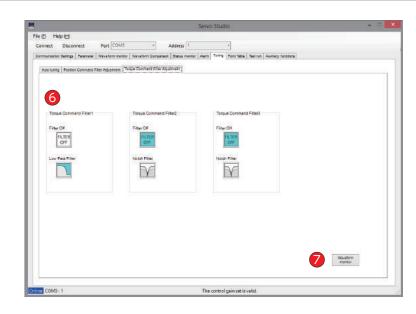
No.	Button/Function	Explanation
1	Step of Auto Tuning Procedure	Auto Tuning Operation
2	Conditions Step 1 Step 2	Adjust load characteristic parameters. Setting rigidity (Control Gain Set): Start with the lowest value 5, then gradually increase the value. Range Increment by Detail setting 5 to 30 Detail setting 1 to 46 Inertia ratio upper bound If you try to enter the inertia ratio by manually, enter a value in the "Set value" cell. Set : Write the new parameter settings to the amplifier RAM. Estimating the inertia ratio automatically: Click Start : to start Auto-tuning Click Stop : to end Auto-tuning Manually enter the inertia ratio: Enter a value in the "Set Value" column. Set : to set data to the amplifier RAM.
	Step 3	Click Get : to read data from the amplifier RAM. Click Write : to write data to the amplifier EEPROM.
	Waveform Monitor	Click this button to jump to the Waveform tab.
3	Status display	Tuning status is displayed here.

Adjusting Position command filter



No.	Button/Function	Explanation
	Position Command Filter 1-4	For each filter, select whether use it or not. If selected, a pop-up box opens. Enter the specific value you want. The selected icon turns blue.
	Filter Off	Select this if you are not setting up any filters.
		Click the icon to toggle between disable $\frac{r_{\rm ILTER}}{orr}$ (no filter) and enable $\frac{r_{\rm ILTER}}{orr}$ (use filter).
4	Smoothing Filter	Set the moving average count. Click on the icon to toggle between enable \bigcap and disable \bigcap .
	Notch Filter	Set frequency [0.1 Hz], width, and depth. Click on the icon to toggle between enable \fbox and disable \checkmark .
	γ -Notch filter	Set frequency [0.1 Hz], gain, and depth. Click on the icon to toggle between enable $\overline{\begin{subarray}{c} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$
6	Waveform monitor	Click to jump to the Waveform Monitor tab.
		🕼 SD3 Series Instruction Manual 🗾 Tuning

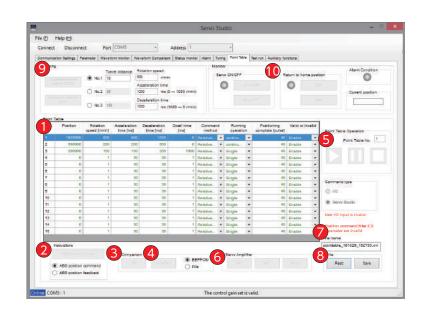
Adjusting Torque Command Filter



No.	Button/Function	Explanation
	Torque Command Filter 1-3	For each filter, select whether use it or not. If selected, a dialog box opens. Enter the specific value you want. The selected icon turns blue.
	Filter Off	Select this if you are not setting up any filters. Click the icon to toggle between disable $\frac{\text{FILTER}}{\text{OFF}}$ (no filter) or enable $\frac{\text{FILTER}}{\text{OFF}}$ (use filter).
6	Low Pass Filter	Set the time constant [0.01ms]. Click on the icon to toggle between enable $\boxed{}$ and disable $\boxed{}$.
	Notch Filter	Set frequency [Hz], width, and depth. Click on the icon to toggle between enable $\begin{tabular}{ c c } \hline \end{tabular}$ and disable $\begin{tabular}{ c c } \hline \end{tabular}$.
7	Waveform monitor	Click this button to jump to the Waveform Monitor tab.

SD3 Series Instruction Manual **Z** Tuning

8. Point Table



2. Operations2. Using Tabs in "Servo Studio"

No.	Button/Function	Explanation						
1	Point Table	Enter point table data for up to 16-point numbers.						
2	Instructions	Writes the current position to the cell in the [Position] column of the selected Point No.						
3	Comparison All	Click to compare the following two versions for all point numbers. a) data currently being edited in the table b) data from the EEPROM or File that you select. Wherever two versions are not identical, the cell in the table will turn red. Click Complete to return to the main window.						
4	Comparison Individual	Click to compare the two versions (a and b above) for the selected point numbers. Click Edit to return to the main window.						
5	Point Table Operation	Operate test-run according to the point table. Point table No. : Enter the point number you want to start with. Start : Pause : Stop						
6	Servo Amplifier	Click Get to read data from the amplifier RAM. Click Set to write data to the amplifier RAM. Click Write to write data to the amplifier EEPROM.						
7	File name	Name of the file read by pointtable_YYMMDD_hhmmss.xml .						
8	File	Click Read to open the point table parameter file created earlier. Click Save to save the point table parameters to a file.						
9	Inching	Fine tuning with specified parameter values. You can set three motion patterns (No.1 to 3). Range Travel distance (amount of movement): 0 to 1,073,741,823 [encoder puls Rotational speed: 0 to maximum rotational speed of motor [r/min] Acceleration/deceleration time: 0 to 5,000 [ms] Counterclockwise rotation (CCW) Clockwise rotation (CCW) Start The lamp to the left will turn green when homing is complete; the box below Current Position will show the post-homing position. Click Stop to stop homing						
10	Return to home position							
ocedu	Ire							
Step	Description							
Ste	Parameter Nar Control Mode Command Mo	2.0 0: Position Control Mode						
Ste	p 2 Create a point t	able; set and write it to the amplifier. (SD3 Series Instruction Manual 6 Operatic						

9. Test Run



Testing operation involves actual motor motion and could be dangerous. Secure safety in surrounding areas and take safety measures such as emergency stop.



Test run is a motion control feature of "Servo Studio" that you can use without the host controller. Use this feature to check motor motions or perform tuning.

, ins	Trevel distant	Rotation speed	6 Serve CN	065	Return to home positio	Alert conditor
A CONTRACTOR OF) No 2 10	Acceleration time	0	Serve ON	0	Current position
1 trans) No.3 100	Deceleration time 1000 ms (1000 0 rimin)		Senio OFF		90671
d sut				3		
Operation conditions				Test run op	eration .	
Travel distance	10900	(0-1073741823)				
Notor rotation speed	3090	Wmin (1 - motor max retailors spa	•a)			
Accelaration time	1000	ms (0 1000 simila) (0 - 5000)				
Deceleration time	1000.	ms (1000 - 0 nimin) (0 - 5000)		Repeat count		
Operation pattern	CC/V retailet	~	4	Repeat count	: Cauni	
Divel time	1000	ms (0 - 20000)				
Repeat count	9	Opunt (1 - 1000)				User VO is invalid
2 Aging functi						Position command littler 2.3 parameter are invalid

No.	Button/Function	Explanation
	Operation conditions Travel distance :	Range: 0 to 1,073,741,823 [encoder pulse]
	Motor rotation speed :	Range: 1 to Maximum rotational speed [r/min]
	Acceleration time :	Time for the rotational speed to change from 0 to 1,000 rpm. Range: 0 to 5,000 [ms]
	Deceleration time :	Time for the rotational speed to change from 1,000 to 0 rpm. Range: 0 to 5,000 [ms]
1	Motion pattern :	ClickCCW rotationImage: for a CCW motion only.ClickCCW rotation -> CW rotationImage: for a CCW motion and then a CW motion.ClickCW rotation -> CCW rotationImage: for a CW motion and then a CCW motion.ClickCW rotationImage: for a CW motion only.
	Dwell time :	Wait time between rotations. The wait time setting may not work when other applications are running on your computer.
	Repeat count:	Set how many times the specified motion pattern should be repeated. Range: 1 to 1,000 times

2 Operations

2. Operations2. Using Tabs in "Servo Studio"

No.	Button/Function	Explanation Check the checkbox to disable the repeat count setting so that the motor will keep running. Click III to pause, and III to stop.
3	Test run operation	Start : Pause : Stop
4	Repeat count	Displays how many times the specified motion was repeated.
5	Inching	Fine tuning with specified parameter values. You can set three motion patterns (No.1 to 3).
6	Return to home position	When Homing finishes, the indicator to the left of <u>Start</u> button will turn green and Current position cell will show the current position resulting from homing. Click <u>Stop</u> to stop homing

Procedure

Step	Operation							
	Set the following under the Paramet	er tab.						
	Parameter Name	No.	Setting	Description				
Step 1	Control Mode	2.0	-	Position Control Mode				
	Command Mode	3.0	-	Internal Command				
	Internal Position -Operation Mode	642.0	1:	Test Run				
Step 2	Set the Operating conditions in the	Fest run	area.					
Step 3	Click on the Start button below Test	run ope	ration.					
dditional	1. Inching (5) and Homing (6) can be performed as well.							
	2. Under the following operating cond of repetitions exceeds the Repeat			occur and test run will stop wh	nen the			
	The Motion pattern setting is \Box CCV (\square) is check-marked.	W rotation	or CW ro	and the aging function	ion che			
	If you want non-stop test runs, set	the follo	wing in add	dition to the above naramete	arc			
			-					
	Internal Position: Overflow detection (No.643.0) = 0 (disable)							
	3. If the communication with the am	plifier be	comes disc	onnected, the test run will st	op.			
	To resume, reconnect to the ampl	ifier and	restart the	test run.				
	To prevent fire and injuries in case	e of earth	nguake, ens	ure secure installation. After	earthq			
	be sure to confirm safety before re							

10. Auxiliary Functions

Encoder tab

Ŷ







				5	ervo Studio				-
(E)	telp (±)								
onnect	Disconnect	Port COMS		Address 1	+				
	or Sathas Paramata	Wavatarra manitar V	lavaform Con	sparlace Glatus menitor A	arm Tenna Paint 1	able Testrue Acoller	y functions		
	a topo harris								
Encoder	UC setting								
18nn	When using the En	orderich he sure that if	a Ganin is d	н					
		2							
1)			coder cond	isons					
	1414111111	224	Condition	is that triggered the elerm					
	CHE REPORTED IN		No.	Name		Alarm return method		Value	Select
			140.			Alarm recurs method		Value	Seleci
			•	Crespect MR sensor output emplit		Restort the serve empl	and the second second second		-
			2	Matti-rotation ARG senso		Clear ancoder + Renta			2
			3	Position error		Glear encoder + Resta			1
			4	Undervoltage error		Clear ancoder + Resta			1
				EEPROM error		Restart the serve ampl			100
			0	Excessive temperature w	California de la companya de la comp	Restart the veryo empl	CU111		
				-					
_				alarm developmental time der multi-rotation data	a of No.0, 2, 3, and 4	shipuld put a chadt ins	o the selection column	, and should clea	<i>E</i>
3			Had	hedk is put into one select	ion column, a check	vill go into all the colu	imme.		
9									
	Clear seconds		Angle da						
			Name		Unit	Verue	Select	f	
				ermechenical angle (1 rot		191.54	- and -		
				r Multi-turn data	Insund				
Sector [10 asthig] Rose: Whan using the Encoder lab, be One encoder size						124	ŧ.		

No.	Button/Function	Explanation
1	Get encoder state	Click this to obtain encoder status and display in the 2.
2	Encoder conditions	This area displays encoder status. If there is any abnormity (i.e. the Value column shows "abnormal"), fix the problem and clear the alarm.
3	Clear encoder	This clears encoder alarms and multi-turn data all at once. Click this button only after clicking on one of the box $\boxed{2}$ in $\boxed{2}$ or $\boxed{4}$.
4	Angle data	This area displays current encoder angle data. Click on <u>Clear encoder</u> to clear encoder multi-turn data.

I/O Setting tab

Select one of I/O setup types: "Standard", "Option" or "User setting".

To use "Option", you need "Servo Studio" to make changes in the settings.

"Option" can be used in Position Control-Pulse Train Command mode and Internal Position Command mode.

Piele Piele Context Port Context Port Context Port Context Port Port Port <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>Servo Si</th> <th>naio</th> <th></th> <th></th> <th></th>							Servo Si	naio			
Deminantine Stating Neuronal Workstom motifier Neuronal Workstom motifier Neuronal Workstom motifier Neuronal Workstom Automation Automation <th< th=""><th>ie E) H</th><th>elp (H)</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>_</th></th<>	ie E) H	elp (H)									_
Series Nextern metale Nextern Cargange Series Nextern Metale Nextern Cargange Series Nextern Metale		Thereas		Per (C01/2				1			
Printer 10 series Seting Control Line III Surving Control Line III Surving Foreiter Print Saration and Moles Total III Surving Foreiter Saration and Moles Foreiter Print Saration and Moles Total III Surving Foreiter Saration and Moles Foreiter Sarati				Sector -				1			
Parts Dirmit 1 Corrised Command Mode Foldson / Public Foldson / Public Pink Starts Corrised Command Mode Foldson / Public Pink Starts Corrised Command Mode Foldson / Public Pink Starts Starts In Starts Stare Stare	Communicatio	on Battings	Paramater	Waveform monitor Wavefor	m Compension	diatus men	tar Alarm Ta	ning Point1	Table Testrum Apoli	ey functions	
Parts Dirmit 1 Corrised Command Mode Foldson / Public Foldson / Public Pink Starts Corrised Command Mode Foldson / Public Pink Starts Corrised Command Mode Foldson / Public Pink Starts Starts In Starts Stare Stare	1 and the second	-									
Pinte Image: State of the s											
Total Total Destination Partice Destinatin Partin											
Prite Prite <t< td=""><td>5</td><td>Contraction of the local division of the loc</td><td>1</td><td>70</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	5	Contraction of the local division of the loc	1	70							
Posten / Pute Print User 10 Starel facer Lapte 1 10 Starel facer Lapte 2 10 Starel facer Postine 3 10 Starel facer Postine 4 00 Starel facer Postine 10 Starel facer N Postine 10 Starel facer N Postine 14 00 Starel facer Postine 16 Postine Postine 17 Starel facer Postine 18 00 Starel facer Postine 19 07 SAU 19 08 A.M. Mageine 19 08 A.M. Mageine											
The state The TO State face Lagts 0 The State Lagts 0 The TO State face Lagts 0 The TO State face Lagts 10 TO CO Positive 3 TO CO Positive 3 TO COVE Positive 3 TO COVE Positive 3 TO COVE Positive 4 TO COVE Positive 4 TO COVE Positive 4 TO COVE Positive 40 OS Positive 40 OS Positive 40 OS Positive		Control Co	mmand Mo	de							
Name Saget Lagt 4 1 NEST Lagt 5 13 NEST Politic 7 14 FCLA Politic 8 1-016 Politic - 9 18 1-016 Politic - 9 10 17 Conk Negative - 10 17 Conk Negative - - 10 00 B50/0 Politik - - 16 00 B50/0 Politik - - 17 06 MEMD/TLAMT Politik - - 19 07 S-80/0 Politik - - 19 09 - - - <td></td> <td>Positie</td> <td>on (Palse</td> <td>8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		Positie	on (Palse	8							
Name Saget Lagt 4 1 NEST Lagt 5 13 NEST Politic 7 14 FCLA Politic 8 1-016 Politic - 9 18 1-016 Politic - 9 10 17 Conk Negative - 10 17 Conk Negative - - 10 00 B50/0 Politik - - 16 00 B50/0 Politik - - 17 06 MEMD/TLAMT Politik - - 19 07 S-80/0 Politik - - 19 09 - - - <td>6</td> <td>Chieferen</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	6	Chieferen									
Number Notation Pactive 8 1 Accol Pactive 7 14 Pacto Pactive 8 12 Col Pactive 8 12 Col Pacto 9 16 Col Pacto 10 07 Col Pacto 10 07 Col Heighte 10 01 NERK N 14 00 EEPO Pacto 16 00 Pacto N 16 00 EEPO Pacto 16 00 Eable N 17 06 Acto Nagato 19 07 SADV Pacto 1 19 07 SADV Pacto 1 19 07 SADV Pacto 1 17 06 Act Nagato 1 17 08 Act Nagato 1				The second second second	. Louis						
9 42 P6927 9 13 HOLO 7 H PCLA 8 HOLE 9 8 10 17 10 17 10 17 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 11 10 12 11 13 10 14 10 15 10 16 10 17 06 18 07 19 07 19 07 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 <td></td>											
8 10 102.0 Feedbre 8 10 17 Feedbre 10 17 Core Hegeline 10 17 Core Hegeline 10 10 10 Feedbre 10 10 10 Feedbre 10 10 10 Feedbre 10 10 Feedbre Feedbre 10 10 Feedbre Feedbre 10 10 Response Feedbre 11 02 BENO Feedbre 12 04 HEIO Feedbre 13 07 BROV Feedbre 14 06 OCZ Feedbre 15 07 BROV Feedbre 15 06 ALM Hegeline 12 06 ALM Feedbre											
7 H PCLA Poston 8 Horis Foston Headerine 9 8 COVL Headerine 10 17 CovL Headerine 4 Tov S S 11 D1 MBRM Headerine 12 D1 MBRM Foston 14 D0 BSFOV Poston 15 D0 PORIM Poston 16 D0 BSFOV Poston 17 D6 MEMD/TLAINT Poston 18 D7 B-RDV Poston 19 D7 B-RDV Poston 19 D7 B-RDV Poston 48 O9 - -											
9 8 10000 Pestitie 10 17 could Negatine 10 17 could Negatine 10 10 MBRV Pestitie 11 01 MBRV Pestitie 12 02 BBRV Pestitie 14 02 BBRV Pestitie 15 09 POSIN Pestitie 16 00 BORN Pestitie 16 00 BORN Pestitie 16 00 BORN Pestitie 17 06 MENDTLAMT Pestitie 18 07 S-ROV Pestitie 19 07 S-ROV Pestitie 49 09 - -											
9 8 DOTA Negative 9 8 DOTA Negative 4 9 0 Negative Negative 9 10 10 Negative Negative 9 10 10 Negative Negative 9 0 10 Negative Negative 16 00 POBIN Positive Negative 17 06 NEMDO TLAMIT Positive Positive 19 07 8-80 V Positive Positive 19 07 8-80 V Positive Positive 40 08											
10 17 00% Heighte x 7 10 01 MBHX Paulton + 14 00 BERVO Paulton + + 16 00 BERVO Paulton + + 16 00 BERVO Paulton + + 17 06 MERIOTAMIT Paulton + + 19 07 8-ROY Paulton + <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>											
1000000000000000000000000000000000000											
C > 14 00 BERVO Peables (*) 16 00 POBN Peables (*) 19 04 Hello Peables (*) 19 04 Hello Peables (*) 19 06 OC2 Peables (*) 19 07 S-80Y Peables (*) 19 07 S-80Y Peables (*) 19 07 S-80Y Peables (*) 21 08 ALM Negatise (*) 49 09 - *		.10	17		Negetive						
14 00 867/0 Patha ** 15 00 POBIN Patha * 16 04 HEND * * 17 06 MEND/LAMT Patha * 16 06 002 Patha * 19 07 8-80 /r Patha * 27 06 ALM Nagata * 48 09 * * *		5			>						
14 00 867/0 Patha ** 15 00 POBIN Patha * 16 04 HEND * * 17 06 MEND/LAMT Patha * 16 06 002 Patha * 19 07 8-80 /r Patha * 27 06 ALM Nagata * 48 09 * * *	(7)										
15 00 PODH Pasha 16 04 HEUD Pasha 17 05 MENDTLAMT Pasha 18 06 OC2 Pasha 19 07 8-80 /r Pasha 19 07 8-80 /r Pasha 19 07 8-80 /r Pasha 19 08 ALM Nagata 19 09						10.00					
10 04 HEI00 Pusition + 17 06 MEIN07LAMIT Pusition + 18 06 0622 Pusition + 19 07 S-ROV Pusition + 12 06 ALM Negative + 48 09 - - *											
17 09 MENDIAMIT Patha - 18 09 002 Patha - 19 07 8-807 Patha - 21 08 ALM Nagata - 49 09 -											
18 06 002 Pathe + 19 07 SRDV Pathe + 21 06 AAM Negate + 48 09 -											
19 07 8-807 Paulte - 21 06 ALM Nagene - 49 09 -											
21 08 ALM Magazine + 48 08 + 9 File						1000					
48 08 9 File						142					
8 With	1	+0	-08	+		- 5	File				
10 10 10 madd 2 38/4		1.0000				_	Trank.	The second			
		10.00					Head	1.18			

No.	Button/Function	Explanation
5	Preset	Check the box under Control/Command Mode . Select "Standard" , "Option" , or "User setting" from the Preset pull down menu.
6	Pinout - Input signals	Verify I/O input settings. When the presetting is changed, a changed signal name will be green indication.
7	Pinout - Output signals	Verify I/O output settings. When the presetting is changed, a changed signal name will be green indication.
8	Write	Click to write the parameters to the amplifier EEPROM
9	File	Read: Click to read and display the saved I/O pinout data.

SD3 Series Instruction Manual 4 Connections

MEMO

