FATEK®

SD3 Series Setup Support Software

# Servo Studio User's Guide

FATEK AUTOMATION CORP.

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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



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# 1 Introduction

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# 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.

| | |
|---|---|
| | Safety Precaution - **Prohibited** Action |
| | Safety Precaution - **Mandatory** Action |

Possible hazardous events are marked as follows.

| | |
|---|---|
| | **Cautions and Dangers**<br>Causes unexpected, unstable, or uncontrolled motions.<br>Compromises the performance.<br>Shortens the service life of the product. |
| | **Electric shock hazard** |
| | **Burn hazard** |
| | **Fire hazard** |
| | **Injury hazard** |
| | **Failure and damage hazard** |



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# 1. Safety Precautions



## CAUTION

| Sign | Precautionary Measures | If Not Observed |
|---|---|---|
| **Connections and Operations** | | |
| | Do not make drastic changes to parameters during tuning.<br>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.<br>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. | |



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# 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.
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- 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.



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# 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
- monitoring the state of amplifier, alarm, and input/output
- gain tuning and setting filters
- point-table operation, test operation and homing

## System Requirements

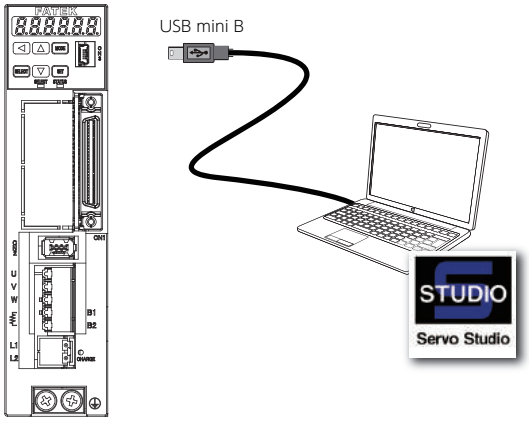
| | | |
|---|---|---|
| Computer | OS | Windows® XP SP3 (32-bit)　Windows® 7 (32-bit、64-bit)<br>Windows® 8 (64-bit)　Windows® 10 (64-bit) |
| | Language | Japanese, Chinese (Simplified), Chinese (Traditional), Korean, and English |
| | CPU | Pentium® III　512 MHz or higher |
| | RAM | 256 MB or more　(512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

Install "Servo Studio" on your Computer.
Connect a USB cable to CN3 at the front of the amplifier.



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# 4. Installing "Servo Studio"

## Installing

| Step | Operation |
|---|---|
| Step 1 | Turn on your computer to start Windows.<br>• Close any applications if they are opened.<br>• If your amplifier is connected to the computer, disconnect it before turning on the computer. |
| Step 2 | Unzip the "Servo Studio" installer zip file on your desktop.<br>• "Servo Studio" cannot be installed on network drives.<br>• The computer must have .net Framework installed. If not, Microsoft.NET Framework 3.5 SP1 installer will start when you try to install "Servo Studio".<br><br>For the first time installation : Servo Studio-FULL_Ver- "*Version No.*" .zip (Included ".net Framework")<br>For upgrading : Servo Studio_Ver- "*Version No.*" .zip (Does not included ".net Framework") |
| Step 3 | Double-click on setup.exe in the unzipped folder.<br>Do not turn off the computer until installation finishes. Do not start other programs during installation. |
| Step 4 | When installation finishes, a desktop shortcut icon will be created. |
| Step 5 | "Servo Studio" will be installed in the following folder.<br>C:\Program Files \FATEK Automation\Servo Studio (in 32-bit version)<br>C:\Program Files (x86)\FATEK 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**.



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# 2 Operations

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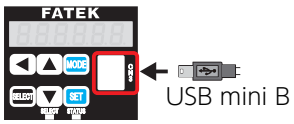
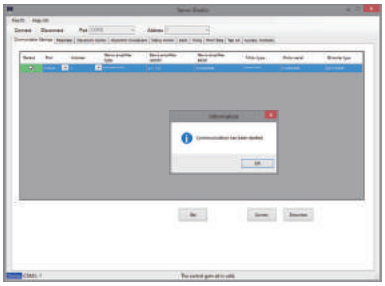
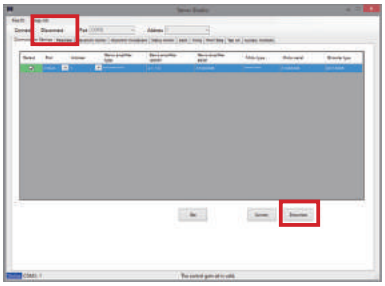
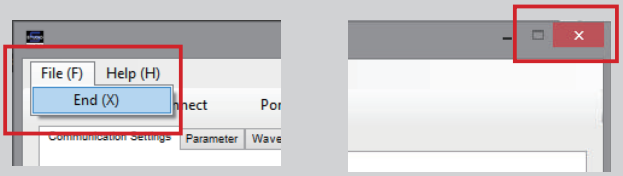
## Start "Servo Studio"

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

## Close "Servo Studio"

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



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## Using Keyboard

The following table explains key notations used in this document.

| Key/Symbol | Explanation |
|---|---|
| [ ↑ ] [ ← ]<br>[ ↓ ] [ → ] | Up, Down, Left, and Right Arrow keys.<br>Use these to toggle menu items. Selected items will be highlighted. |
| Numbers<br>(0 to 9) | Number keys.<br>Use them to type in a number. |
| [ESC] | Escape key (ESC or Esc).<br>Press to redo an entry. |
| [ENTER] | Enter key (ENTER, Enter, RETURN, or Return).<br>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.



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## 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<br>*For example, a parameter file or point table file |
| Save | Save the current settings to your Computer<br>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 Monitor<br>・Waveform 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).



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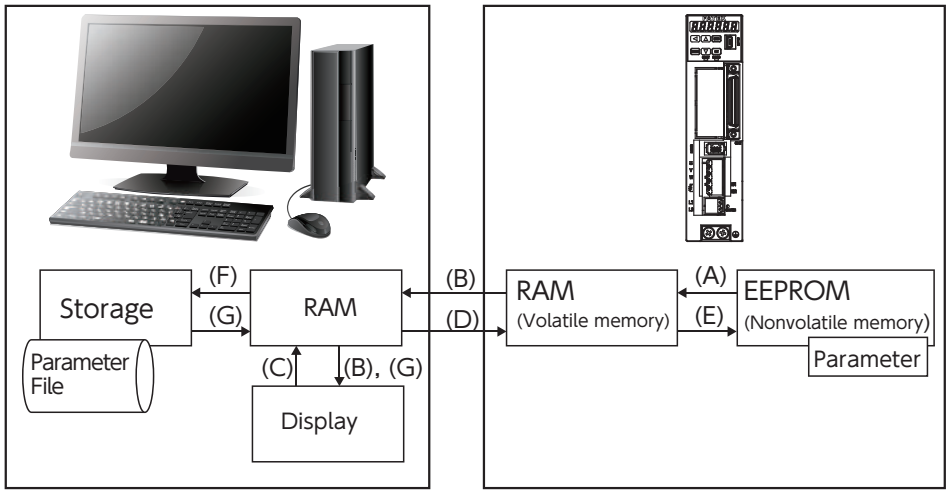
## Parameter Data Flow




| 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 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. |



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# 2. Using Tabs in "Servo Studio"

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

## Communication Settings | Parameter

Page 8

- Connecting or disconnecting communications with the amplifier
- Obtaining the model information and the serial number from the amplifier and displaying on the screen

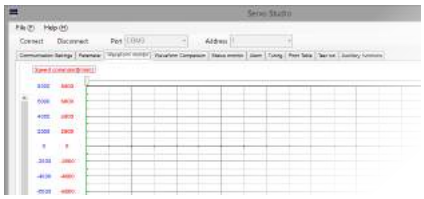
## Parameter | Waveform monitor

Page 9

- Setting all parameters included in the parameter list and checking them
- Saving parameter values in a file, or reading them from the file

## Waveform monitor | Waveform Comparison

Page 12



- Displaying waveforms of status variables
- Checking positioning time and vibration status, tuning parameters, and optimizing
- Saving waveform data in a file or reading it from the file
- Setting filters

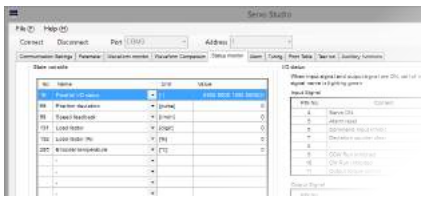
## Waveform Comparison | Status monitor

Page 22

- Displaying waveforms of status data obtained under the [Waveform monitor] tab, and comparing them on two windows

## Status monitor | Alarm

Page 24



- Monitoring status data of the amplifier
- Saving the status data in a file



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# 2. Using Tabs in "Servo Studio"



## Alarm | Tuning

☞ Page 26

- Displaying alarm status of the amplifier
- Checking cause and remedy of the alarm
- Checking how to reset the alarm signal of the amplifier
- Checking the information on the amplifier life expectancy
- Checking the alarm history

## Tuning | Point Table

☞ Page 27

- Automatically adjusting the tuning parameters
- Setting filters

## Point Table | Test run

☞ Page 31

- Setting motions by Positioner function
- Saving the point table data in a file, or reading it from the file

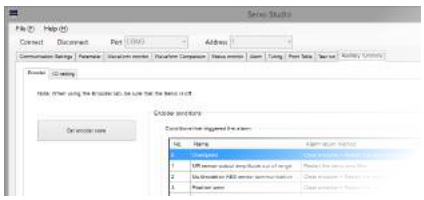
## Test run | Auxiliary functions

☞ Page 33

- Without connecting to the host controller, performing simulation of motor's repetitive motions for tuning

## Test run | Auxiliary functions

☞ Page 35



- Clearing multi-turn data after checking alarm status
- Setting or changing I/O settings for each control mode or command mode



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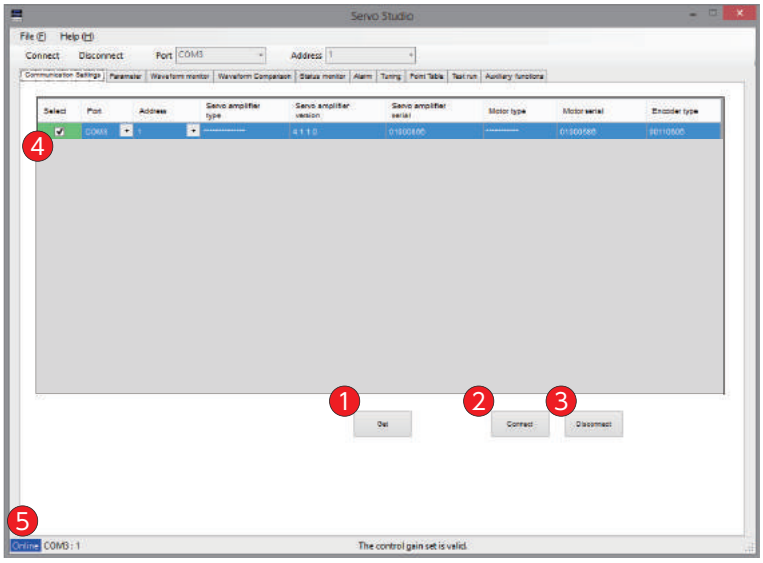
# 2. Using Tabs in "Servo Studio"

## 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.<br>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.<br>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.<br>Offline : Not connected<br>Online : Connected |



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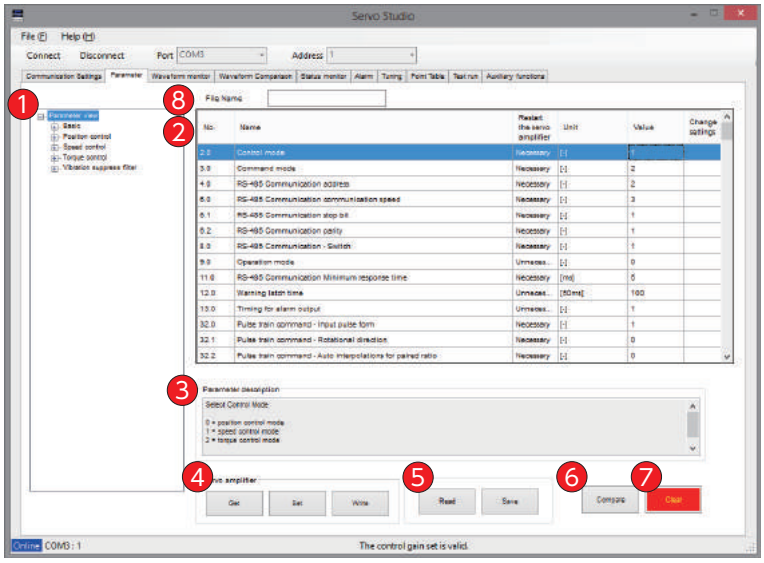
## 2. Parameters




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





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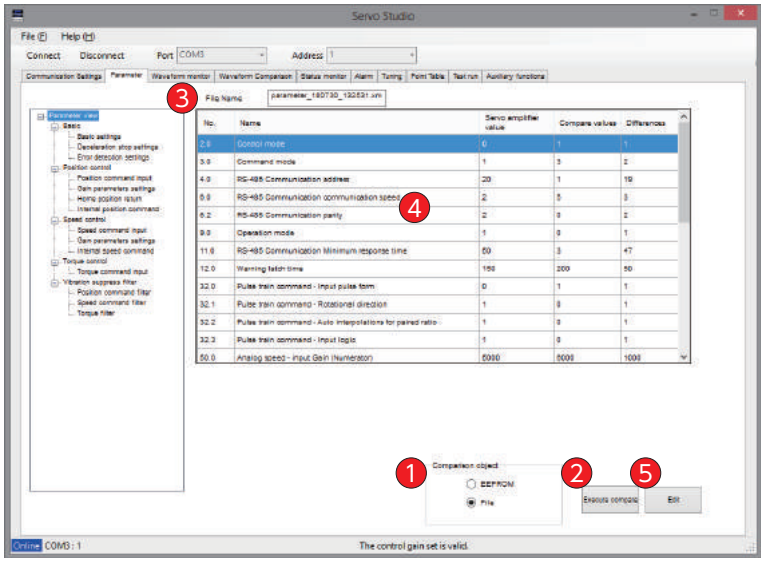
# 2. Using Tabs in "Servo Studio"

## Comparing Parameter Values




| No. | Button/Function | Explanation |
|---|---|---|
| 1 | What data to compare | Select which data you want to compare with the data in RAM.<br>Select EEPROM or File. |
| 2 | Execute compare | At first, click on the Set button.<br>(The parameter(s) is/are written in at the RAM of the amplifier.)<br>Execute compare Executes Compare and shows the result in the data display area.<br>If two sets of data are completely matching, the table will be blank. |
| 3 | File Name | Name of the parameter data file you selected for comparison.<br>parameter_YYMMDD.xml |
| 4 | Parameter settings comparison table | No. : Parameter number<br>Name : Parameter name<br>Servo amplifier value : Parameter value residing in the amplifier RAM.<br>Compare value : Value to compare with (in EEPROM or the file that you selected)<br>Difference : The difference between the value in RAM and the value compared. |
| 5 | Edit | Jump to the parameter edit window. |



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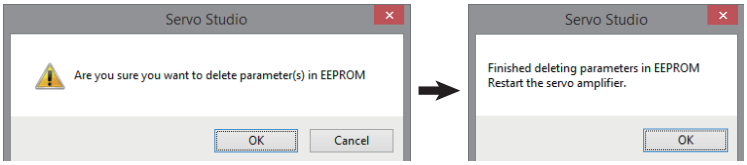
## Replacing with a Different Type of Motor

| | | |
|---|---|---|
| | Use a right pair of motor and amplifier.<br>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.<br>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 |  <br><br>Click OK : to clear parameter data,<br>Click Cancel : to cancel.<br>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.<br>The default parameter values for the new motor will be automatically set to EEPROM. |
| Step 5 | Verify that the alarm statuses are all normal. |



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# 2. Using Tabs in "Servo Studio"

## 3. Waveform Monitor

| DANGER | | |
|---|---|---|
| | Do not use an inappropriate value for any parameter.<br>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.

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| No. | Button/Function | Explanation |
|---|---|---|
| 1 | Chart Display Area | You can use the mouse in this area.<br>• Drag to zoom a rectangle area that you select.<br>• Right-click to capture the waveform.<br>• Wheel button<br>Use the Scroll wheel to change the max value to be included in the chart while the waveform is selected.<br>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 .<br>Cursor 1 (green) for T1, Cursor 2 (blue) for T2. |
| 3 | Fit | Click to fit the waveform chart to the chart display area such that the max value. |
| | 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.<br>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.<br>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.<br>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.<br>You can go back up to the fifth one.<br>Click Fit to clear the history of display changes. |
| 4 | X-axis scale | Enter a zoom percentage for x-axis. |
| | 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.<br>Use the vertical bar to change the y-axis display range. |



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| 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.<br>Those four items you selected will be saved in a file.<br>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.<br>Four I/O items selected here will be saved to a file. |
| ⑦ | Time | Time measured at the location of the cursor positions.<br>T1 : time at the green cursor<br>T2 : time at the blue cursor<br>△T : difference between T1 and T2 |
| ⑧ | Parameters Window | Displays parameters that can be set in the **Waveform monitor** tab and display-only parameters.<br>The rows highlighted in green are parameters grouped together in the control gain set.<br>Parameters with grayed out **Value** cells are display-only. |
| ⑨ | Servo amplifier<br>Click [Get] | : to read the parameters from the amplifier. |
| | Click [Set] | : to set the parameters to the amplifier RAM. |
| | Click [Write] | : to save the parameter to the amplifier EEPROM. |



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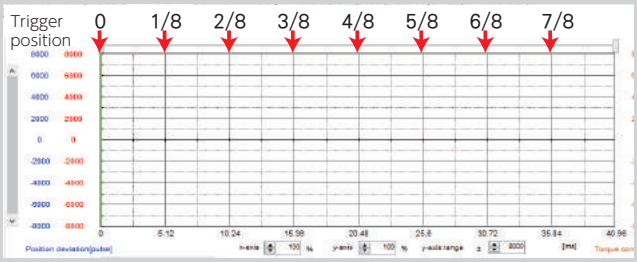
## Waveform Record

Set the waveform measurement conditions here.
Save the obtained waveforms and tuning parameters to a file.

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



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## 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<br>(i.e. Status variables) | Select items that you want to display in waveforms.<br>Eight waveforms including those from the sampled items 6 can be displayed.<br>Y-axis units are displayed for four items from the top selected in 6 . |
| I/O Item | I/O data from another waveform file.<br>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. (*) |
| 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 7 (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<br>(i.e. Status variables)<br>I/O items | Y values (at the cursors) of the items you selected are displayed. |



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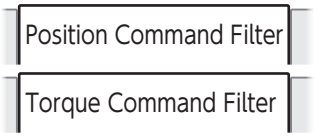


Use these tabs to check fluctuating position deviation values and torque command values in waveform chart and select the filters that you want to set. (*)

| Button/Function | Explanation |
|---|---|
| Frequency display | This item changes the chart units from time [ms] to frequency [Hz].<br>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.<br>In frequency charts, Cursor 2 position is determined to be at $2^n$ sampling point starting from the Cursor 1 position.<br>Read the peak value; use Position Command Filter Adjustment or Torque Command Filter Adjustment to jump to the Tuning tab to set filters. You can set to four levels of filters.<br>After setting filters, you can check the settings under Position Command Filer tab and the Torque Command Filter tab. |
| Time View | Click to switch the chart units from frequency [Hz] to time [ms].<br>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.<br>Unchecking the checkbox does not erase the filter setting. |

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



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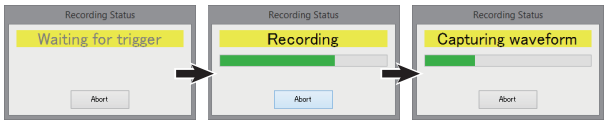
# 2. Using Tabs in "Servo Studio"

## Procedure 1 Waveform Display

| 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<br>  <br>・The popup dialog "Waiting for trigger" does not change to "Recording" until the enabled trigger source reaches the trigger specified level. In case that the dialog "Waiting for trigger" remains unchanged, select the "Force trigger" method instead or decrease the trigger level.<br>・If you click Abort in the middle of the process, the data will have been captured up to the point of abort. |
| Step 4 | Adjust the parameters.<br>☞ SD3 Series Instruction Manual 7 Tuning |
| Step 5 | Click Set 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. |



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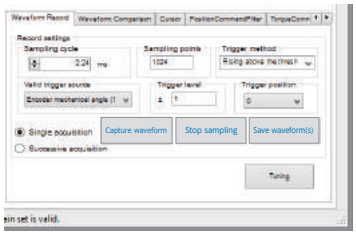
## Procedure 2 Saving waveform data

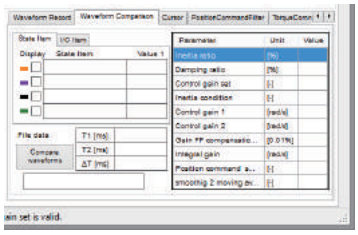



| Step | Description |
|---|---|
| Step 1 | Click on Save waveform(s) under the **Waveform Record** tab. |
| Step 2 | A dialog box will prompt you to select a waveform file name. |
| Step 3 | Select the name of a waveform file you want to save the waveform data to and click Save . |

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




| 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 .<br>(The file name that you selected appears in the box below the **Compare waveform** button.<br>For example, waveformYYMMDD_hhmmss.csv ) |

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.



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## 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 --- | | | | | | |
| Date | Sampling Period[msec] | | | | | |
| MM/DD/YYYY hh:mm:ss | 2 | | | | | |
| --- Gain Parameteters --- | | | | | | |
| Name | Item | Main No. | Sub No. | Unit | Value | |
| MP_RPP1_GRATE | Inertia ratio | 102 | 0 | [%] | 250 | |
| MP_RPP1_DRATE | Damping ratio | 103 | 0 | [%] | 100 | |
| PCL_RPP1_CONTROL_LEVEL_ALL | Control gain set | 113 | 0 | [-] | 15 | |
| PCL_RPP1_CONTROL_LEVEL_ALL | Inertia condition | 113 | 1 | [-] | 2 | |
| PCL_RPP1_W1 | Control gain 1 | 115 | 0 | [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 | |
| 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 | |
| | 0 | 297 | 0 | 0 | 75 | |
| | 1 | 693 | 0 | 0 | 84 | |
| | 2 | 1128 | 0 | 0 | 90 | |
| | 3 | 1596 | 0 | 0 | 97 | |
| | 4 | 2083 | 0 | 0 | 100 | |
| --- I/O Bit Assign --- | | | | | | |
| Bit Name List | SVON | RESET/PCLR | PCSTART1 | PCSEL1 | PCSEL2 | PCSEL3 |
| I/O State Value | 4097 | 6937 | 7452 | 5406 | 0 | 3081 |
| 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 | 0 | [-] | 3 | |
| PSCI_PRESCALER | Pulse train command - Paired ratio (Numerator) | 34 | 0 | [-] | 1000 | |
| PSCI_PRESCALER_DIV | Pulse train command - Paired ratio (Denominator) | 36 | 0 | [-] | 1000 | |
| PVCC_POS_IIR_NOTCH_1_FREQ | Position command filter 1 - Notch Frequency | 74 | 0 | [0.1Hz] | 10 | |
| PVCC_POS_IIR_NOTCH_1_WIDTH | Position command filter 1 - Width | 75 | 0 | [-] | 512 | |
| PVCC_POS_IIR_NOTCH_1_HF_GAIN | Position command filter 1 - High frequency gain constant | 76 | 0 | [-] | 100 | |
| PVCC_SPEED_FILTER_FIR_DIM_1 | Moving average time for Speed command smoothing filter | 78 | 0 | [ms] | 100 | |
| PVCC_POS_IIR_NOTCH_1_DEPTH | Position command filter 1 - Depth | 79 | 0 | [-] | 0 | |

| | | |
|---|---|---|
| **--- Condition ---** | | |
| 1 | Date | Data timestamp for saving a file |
| 2 | Sampling Period [msec] | Sampling cycle |
| **--- Gain Parameters ---** | | |
| 3 | Item | Tuning parameter names |
| 4 | Unit | Tuning parameter units |
| 5 | Value | Tuning parameter values |
| **--- Waveform 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 Bit Assign---** | | |
| 9 | I/O data | |
| **---I/O Bit Assign---** | | |
| 10 | Information of related parameters | |



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# 2. Using Tabs in "Servo Studio"

## 4. Waveform Comparison

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## Displaying Waveforms

| No. | Button/Function | Explanation |
|---|---|---|
| 1 | Scroll bars | Use the horizontal bar to scroll sideways.<br>Use the vertical bar to scroll up and down. |
| 2 | Cursor | Move the cursor horizontally to display the x coordinate in 10 (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.<br>Click Fit to reset the history. |
| 7 | x-axis zoom % | Enter a zoom percentage for x-axis. |
| | 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.<br><br>Drag to specify a rectangle area to zoom in.<br>Right-click to copy the waveform.<br>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.<br>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.<br>You can select up to four items. |
| 10 | Time | The measured value at the x-axis cursor position. |
| 11 | Parameter | Displays the parameter values at the time when waveform data was obtained. |



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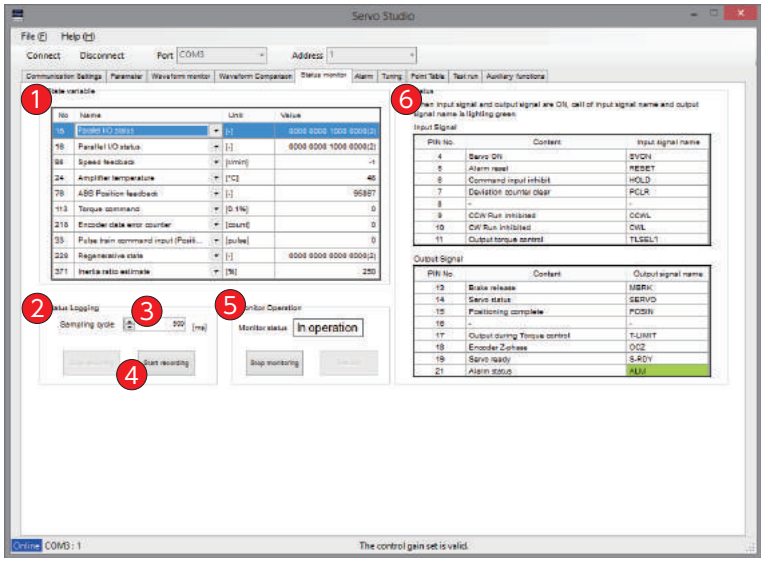
## 5. Status Monitor




| 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.<br>The following three status items are displayed in binary in the "Value" column.<br>Status No. 16 I/O Status<br>Status No. 64 Positioning Status<br>Status No.228 Regeneration Status<br>Display example: [0000 0000 0000 0000(2)] where (2) indicates binary.<br>Page 25 |
| 2 | Status Logging | Lets you obtain status log. |
| 3 | Sampling cycle | Range: 500 to 100,000 [ms]<br>Set in increments of: 500 [ms] |
| 4 | Stop recording<br>Start recording | Click Start recording after setting the sampling cycle.<br>Click Stop recording to stop logging. The data will be saved to a csv file.<br>Default file name: statevaluelog_YYMMDD_hhmmss.csv |
| 5 | Monitor Operation | Clicking the [Status monitor] tab starts monitoring.<br>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. |



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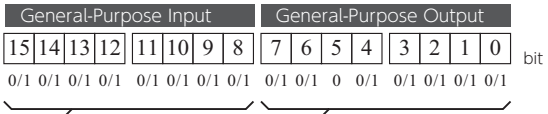
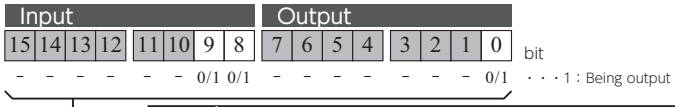
## I/O Bit Assignment



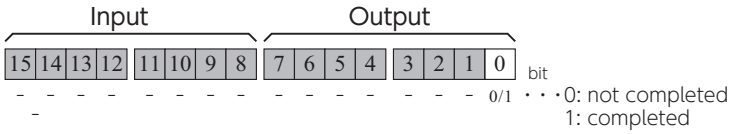

| | | Control/ Command Mode | Position | | | | | Velocity | | Torque |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Pulse Train | | | Internal | | Analog | Internal | Analog |
| | | Preset | Standard | Option 1 | Option 2 | Standard | Option | Standard | Standard | Standard |
| General-Purpose Output | 0 | | MRBK | | | | PM1 | MRBK | | |
| | 1 | | SERVO | | | | PM2 | SERVO | | |
| | 2 | | POSIN | | | MEND | PM3 | (Reserved) | | |
| | 3 | | (Reserved) | HEND | WARN1 | HEND | | (Reserved) | | |
| | 4 | | T-LIMIT | MEND/ T-LIMIT | T-LIMIT | | MEND/ T-LIMIT | T-LIMIT | | |
| | 5 | | OCZ (always fixed to 0) | | | | | | | |
| | 6 | | SRDY | | DBRK | SRDY | SERVO | SRDY | | |
| | 7 | | ALM | | | | | | | |
| General-Purpose Input | 8 | | SVON | | | | | | | |
| | 9 | | RESET | | | RESET/PCLR | | RESET | | |
| | 10 | | HOLD | | | RCSTART1 | | HOLD | VCRUN1 | HOLD |
| | 11 | | PCLR | | | PCSEL1 | | (Reserved) | VCRUN2 | (Reserved) |
| | 12 | | (Reserved) | HOME | E-STOP | PCSEL2 | | (Reserved) | VCSEL1 | (Reserved) |
| | 13 | | CCWL | | | PCSEL3 | | CCWL | VCSEL2 | CCWL |
| | 14 | | CWL | | | PCSEL4 | HOME | CWL | VCSEL3 | CWL |
| | 15 | | TLSEL1 | | | ORG | TLSEL1 | | | |

## Regeneration Status Bit Assignment




| bit | Name and Meaning | Decimal |
|---|---|---|
| 0 | Regeneration control output<br>Indicates the operation status of the regenerative power processing circuit. | 0 |
| 8 | Regeneration voltage warning<br>Indicates the primary circuit power voltage has reached the warning level.<br>You need to connect a regenerative resistor to the amplifier. | 256 |
| 9 | Regeneration voltage threshold<br>Indicates the primary circuit power voltage has reached the threshold.<br>A power error, Err 14 or Err 15, will occur if the regenerative resistor is not connected. | 512 |

## Positioning Complete Bit Assignment



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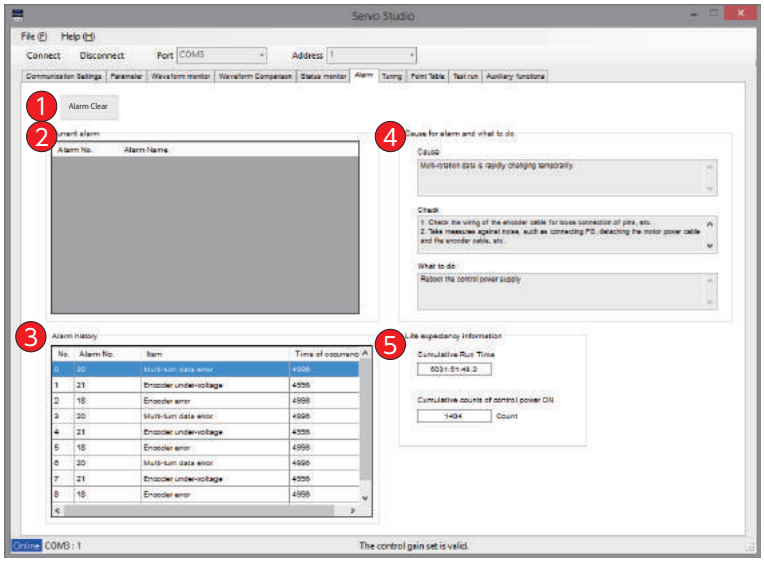
## 6. Alarm




| No. | Button/Function | Explanation |
|---|---|---|
| 1 | Alam Clear | Click to clear amplifier alarms.<br><br>Clearing alarms<br>1. Remove the cause of the alarm(s).<br>2. Under the **Parameters** tab, set Operation Mode (No.9.0) to 1 (communication).<br>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 information | Shows guidelines for regular maintenance and product life.<br>**Cumulative Run Time:**<br>This item indicates the total amplifier runtime (in [hhhhhh:mm:ss.s]) since the control power was supplied to it for the first time.<br>**Cumulative counts of control power ON:**<br>This item indicates how many times the control power was turned on to the amplifier since the first time |

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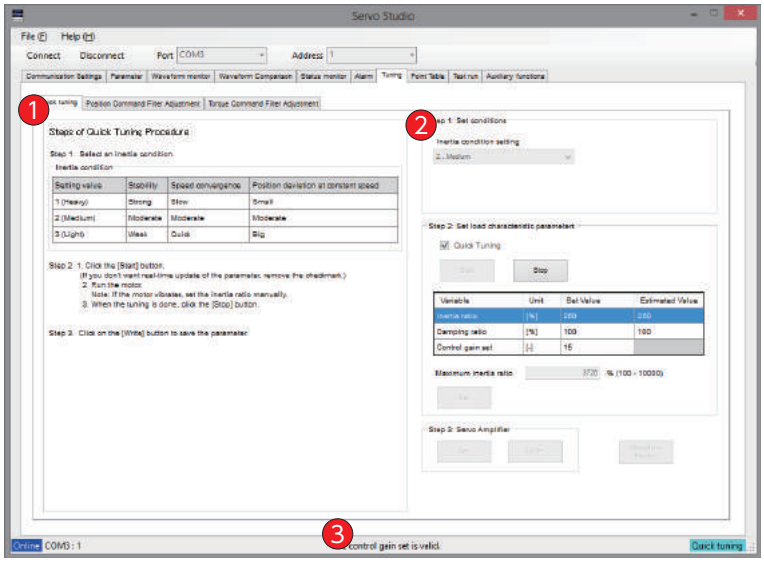
## 7. Tuning

### Quick tuning

Position control mode only




| No. | Procedure/Button | Explanation |
|---|---|---|
| 1 | Operating Procedure | This is a guidance of the "Quick Tuning". |
| 2 | Conditions | Set a load related parameter of the motor. |
| | Step 1 | Set the appropriate inertia condition :<br>Choose a inertia condition to machine system connecting to your motor. |
| | Step 2 | Setting of the load related parameters :<br>☑ : Quick Tuning<br>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.<br>Uncheck the check box if you need the inertia ratio estimation only.<br>Click [Start] : to start a Quick Tuning<br>Click [Stop] : to stop a Quick Tuning<br>Inertia ratio upper bound<br>If you try to enter the inertia ratio by manually, enter a value in the "Set value" cell.<br>[Set] : Write the new parameter settings to the amplifier RAM. |
| | Step 3 | [Get] : Pull the values of the parameters from the amplifier RAM<br>[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. |





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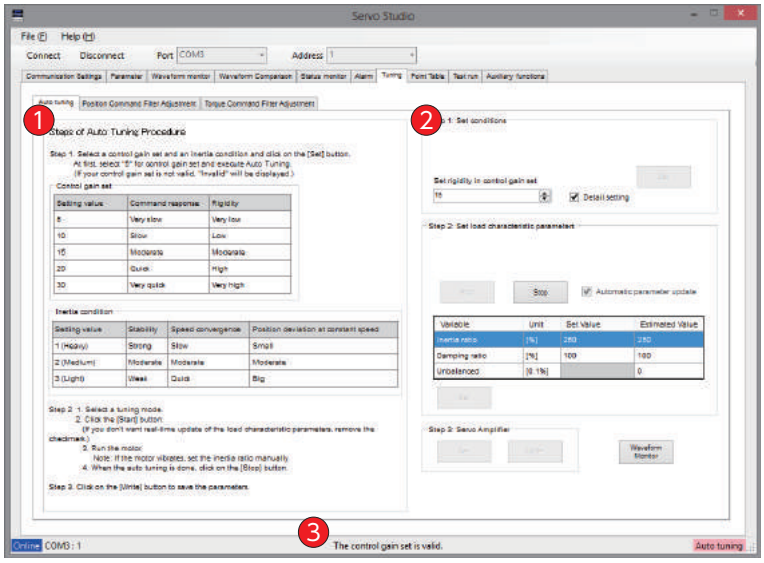
# 2. Using Tabs in "Servo Studio"

## Auto tuning

Velocity Control Mode only




| No. | Button/Function | Explanation |
|---|---|---|
| 1 | Step of Auto Tuning Procedure | Auto Tuning Operation |
| 2 | Conditions<br>**Step 1** | Adjust load characteristic parameters.<br>Setting rigidity (Control Gain Set):<br>Start with the lowest value 5, then gradually increase the value.<br>☐ Detail setting: Range 5 to 30, Increment by 5<br>☑ Detail setting: Range 1 to 46, Increment by 1<br>Inertia ratio upper bound<br>If you try to enter the inertia ratio by manually, enter a value in the "Set value" cell.<br>Set : Write the new parameter settings to the amplifier RAM. |
| | **Step 2** | **Estimating the inertia ratio automatically:**<br>Click Start : to start Auto-tuning<br>Click Stop : to end Auto-tuning<br>☑ : Automatic parameter update<br>The parameter value will be estimated and set to the amplifier RAM.<br>**Manually enter the inertia ratio:**<br>Enter a value in the "Set Value" column.<br>Set : to set data to the amplifier RAM. |
| | **Step 3** | Click Get : to read data from the amplifier RAM.<br>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. |



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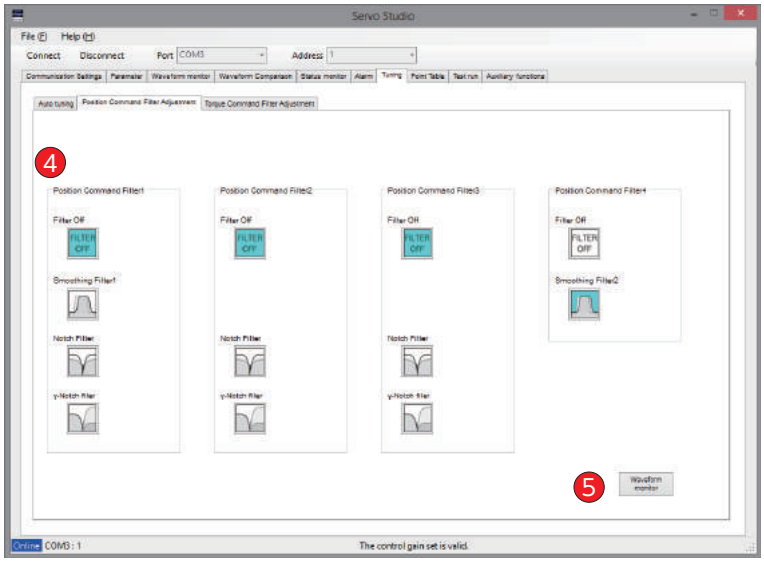
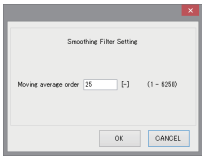
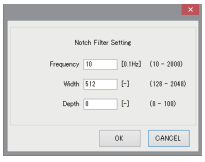
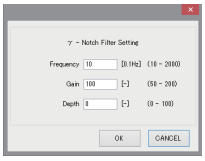
## Adjusting Position command filter




| No. | Button/Function | Explanation |
|---|---|---|
| 4 | Position Command Filter 1-4 | For each filter, select whether use it or not.<br>If selected, a pop-up box opens. Enter the specific value you want.<br>The selected icon turns blue. |
| | Filter Off | Select this if you are not setting up any filters.<br>Click the icon to toggle between disable FILTER OFF (no filter) and enable FILTER OFF (use filter). |
| | Smoothing Filter  | Set the moving average count.<br>Click on the icon to toggle between enable and disable . |
| | Notch Filter  | Set frequency [0.1 Hz], width, and depth.<br>Click on the icon to toggle between enable and disable . |
| | γ-Notch filter  | Set frequency [0.1 Hz], gain, and depth.<br>Click on the icon to toggle between enable and disable . |
| 5 | Waveform monitor | Click to jump to the **Waveform Monitor** tab. |

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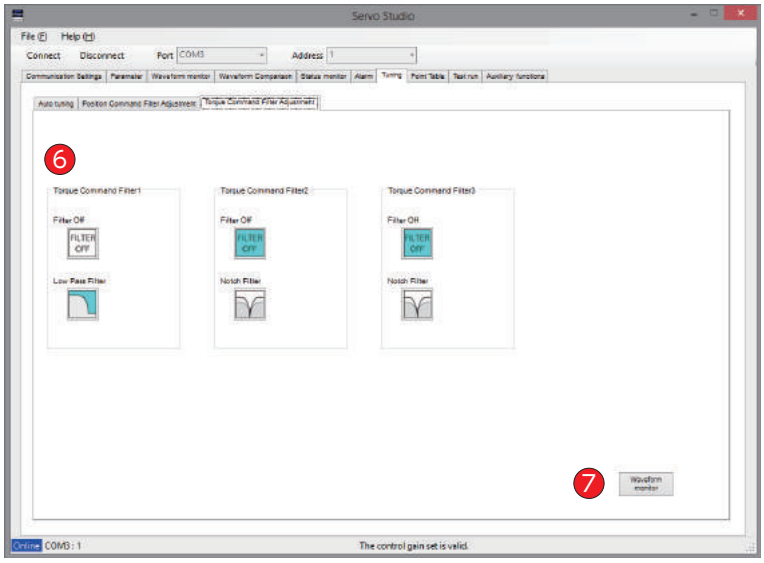
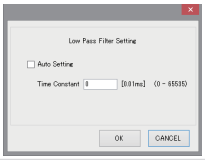
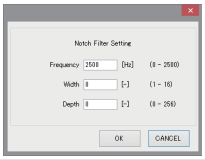
# 2. Using Tabs in "Servo Studio"

## Adjusting Torque Command Filter




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





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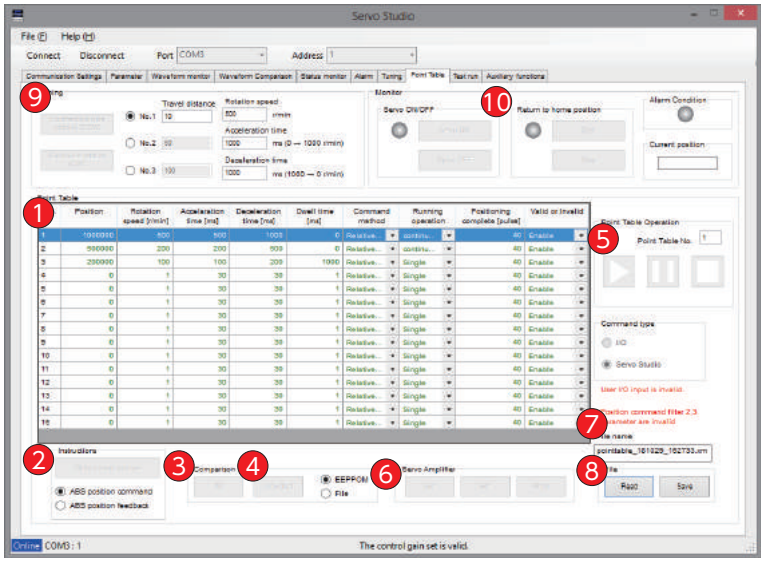
## 8. Point Table





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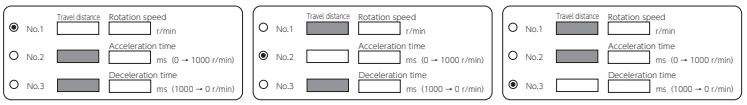
# 2. Using Tabs in "Servo Studio"

| No. | Button/Function | Explanation |
|---|---|---|
| ❶ | Point Table | Enter point table data for up to 16-point numbers. |
| ❷ | Instructions | Writes the current position to the cell in the [Position] column of the selected Point No. |
| ❸ | Comparison<br>All | Click to compare the following two versions for all point numbers.<br>a) data currently being edited in the table<br>b) data from the **EEPROM** or **File** that you select.<br>Wherever two versions are not identical, the cell in the table will turn red.<br>Click Complete to return to the main window. |
| ❹ | Comparison<br>Individual | Click to compare the two versions (a and b above) for the selected point numbers.<br>Click Edit to return to the main window. |
| ❺ | Point Table Operation | Operate test-run according to the point table.<br>Point table No. [ ] : Enter the point number you want to start with.<br>▶ : Start ❚❚ : Pause ■ : Stop |
| ❻ | Servo Amplifier | Click Get to read data from the amplifier RAM.<br>Click Set to write data to the amplifier RAM.<br>Click Write to write data to the amplifier EEPROM. |
| ❼ | File name | Name of the file read by pointtable_YYMMDD_hhmmss.xml . |
| ❽ | File | Click Read to open the point table parameter file created earlier.<br>Click Save to save the point table parameters to a file. |
| ❾ | Inching | Fine tuning with specified parameter values.<br>You can set three motion patterns (No.1 to 3).<br>Range Travel distance (amount of movement): 0 to 1,073,741,823 [encoder pulse]<br>Rotational speed: 0 to maximum rotational speed of motor [r/min]<br>Acceleration/deceleration time: 0 to 5,000 [ms]<br>Counterclockwise rotation (CCW) Clockwise rotation (CW) : One clicking per one pattern motion<br>  |
| ❿ | Return to home position | Start : The lamp to the left will turn green when homing is complete; the box below Current Position will show the post-homing position.<br>Click Stop to stop homing |

## Procedure

| Step | Description |
|---|---|
| Step 1 | Set the following under the **Parameter** tab. |

| Parameter Name | No. | Setting | Description |
|---|---|---|---|
| Control Mode | 2.0 | 0 : | Position Control Mode |
| Command Mode | 3.0 | 3 : | Internal Command |
| Internal Position -Operation Mode | 642.0 | 0 : | Point Table |

| Step | Description |
|---|---|
| Step 2 | Create a point table; set and write it to the amplifier.<br>☞ SD3 Series Instruction Manual 6 Operations |
| Step 3 | Work with the point table operation buttons ( ❺ ). |

Additional ; Inching ( ❾ ) and Homing ( ❿ ) can be done under the **Point Table** tab.



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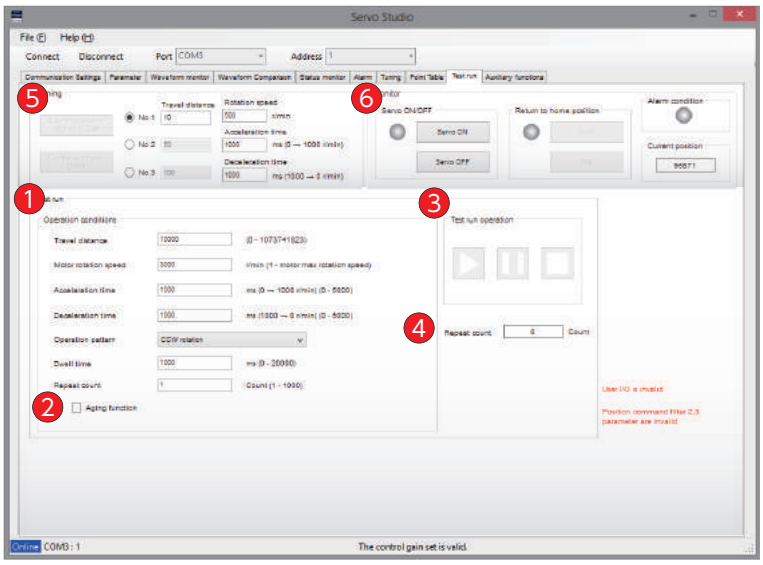
## 9. Test Run

**DANGER**

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.




| No. | Button/Function | Explanation |
|---|---|---|
| | Operation conditions<br>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.<br>Range: 0 to 5,000 [ms] |
| | Deceleration time : | Time for the rotational speed to change from 1,000 to 0 rpm.<br>Range: 0 to 5,000 [ms] |
| 1 | Motion pattern : | Click CCW rotation for a CCW motion only.<br>Click CCW rotation -> CW rotation for a CCW motion and then a CW motion.<br>Click CW rotation -> CCW rotation for a CW motion and then a CCW motion.<br>Click CW rotation for a CW motion only. |
| | Dwell time : | Wait time between rotations.<br>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.<br>Range: 1 to 1,000 times |





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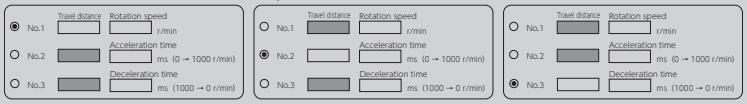
# 2. Using Tabs in "Servo Studio"

| No. | Button/Function | Explanation |
|---|---|---|
| 2 | ☑ Aging function | Check the checkbox to disable the repeat count setting so that the motor will keep running.<br>Click ⏸ to pause, and ■ 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.<br>You can set three motion patterns (No.1 to 3).<br>  <br>Range Travel amount: 0 to 1,073,741,823 [encoder pulse]<br>Rotational speed: 0 to Maximum rotational speed [r/min]<br>Acceleration/deceleration time: 0 to 5,000 [ms]<br>Counterclockwise rotation (CCW) Clockwise rotation (CW): one clicking per one pattern motion |
| 6 | Return to home position | When Homing finishes, the indicator to the left of Start button will turn green and Current position cell will show the current position resulting from homing.<br>Click Stop to stop homing |

## Procedure

| Step | Operation |
|---|---|
| Step 1 | Set the following under the **Parameter** tab. |
| Step 2 | Set the **Operating conditions** in the **Test run** area. |
| Step 3 | Click on the **Start** button below **Test run** operation. |

| Parameter Name | No. | Setting | Description |
|---|---|---|---|
| Control Mode | 2.0 | 0 : | Position Control Mode |
| Command Mode | 3.0 | 3 : | Internal Command |
| Internal Position -Operation Mode | 642.0 | 1 : | Test Run |

Additional

1. Inching ( 5 ) and Homing ( 6 ) can be performed as well.

2. Under the following operating conditions, an alarm will occur and test run will stop when the number of repetitions exceeds the Repeat count setting.

   The **Motion pattern** setting is CCW rotation or CW rotation and the aging function checkbox (☑) is check-marked.

   If you want non-stop test runs, set the following in addition to the above parameters.

   Internal Position: Overflow detection (No.643.0) = 0 (disable)

3. If the communication with the amplifier becomes disconnected, the test run will stop.

   To resume, reconnect to the amplifier and restart the test run.

   To prevent fire and injuries in case of earthquake, ensure secure installation. After earthquake, be sure to confirm safety before resuming operation.



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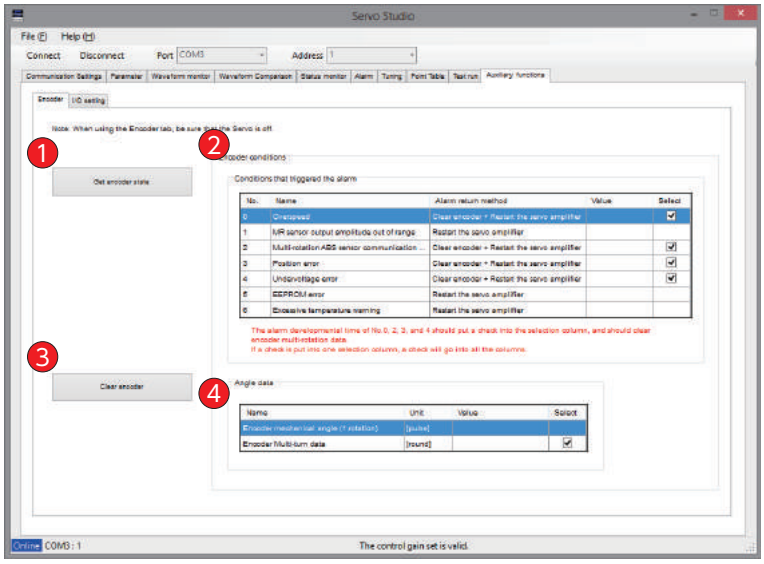
## 10. Auxiliary Functions

### Encoder tab

**CAUTION**

Use the Encoder tab only in a Servo OFF state.




| 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.<br>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.<br>Click this button only after clicking on one of the box ☑ in 2 or 4. |
| 4 | Angle data | This area displays current encoder angle data.<br>Click on Clear encoder to clear encoder multi-turn data. |





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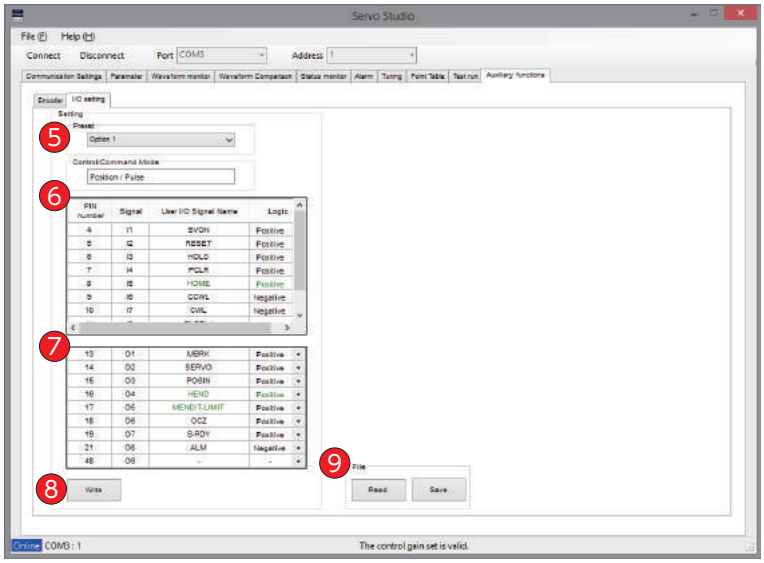
# 2. Using Tabs in "Servo Studio"

## 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.




| No. | Button/Function | Explanation |
|---|---|---|
| 5 | Preset | Check the box under **Control/Command Mode**.<br>Select "Standard" , "Option" , or "User setting" from the **Preset** pull down menu. |
| 6 | Pinout - Input signals | Verify I/O input settings.<br>When the presetting is changed, a changed signal name will be green indication. |
| 7 | Pinout - Output signals | Verify I/O output settings.<br>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.<br>Save : Click to save I/O pinout data in the XML format. |

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