

MISUMI

Linear motor actuator

E-RAM Series

DE30 Driver User Manual

Ver1.0

Thank you for purchasing our linear motor actuator.

This user manual is a supplement to the manufacturer's catalog, and its purpose is to provide users with more detailed and convenient usage instructions. We have attempted to ensure the accuracy and completeness of the content. Nevertheless, we recommend that users use the manufacturer's catalog as a guide.

Please take the time to read this manual carefully before use. Please keep it well so that you can view it whenever necessary.

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1. Driver overview

1.1 Manufacturer Information

Driver manufacturer: Servotronix

Manufacturer's official website:<https://www.servotronix.cn/en>

The manufacturer model number table is as follows.

| Misumi model number | Servotronix model number |
|---------------------|--------------------------|
| DE30 | CDHD-0032AEC2 |

1.2 Safety precautions

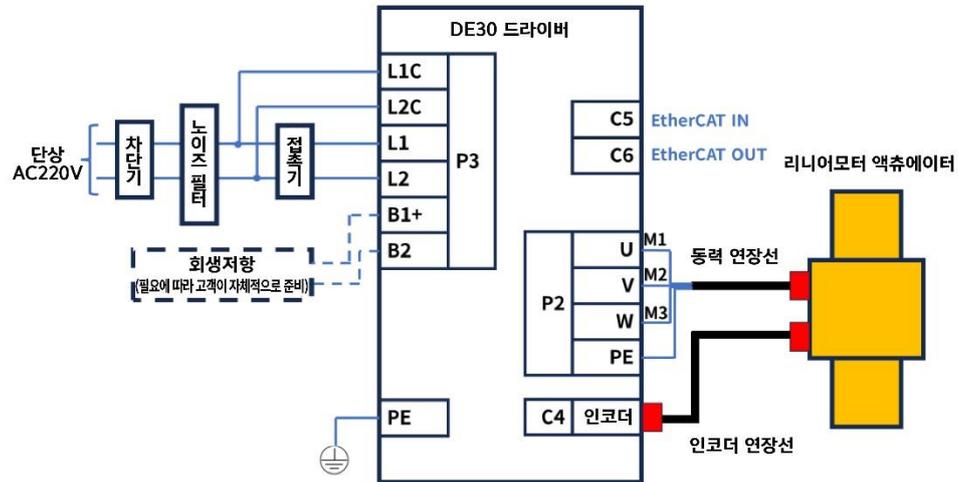
Before installation, please be sure to download and read all relevant materials from the manufacturer's website carefully, and use and operate the product exactly as required to ensure safety and accuracy.

Please use caution as improper handling may result in injury and/or equipment damage.

2. Finals

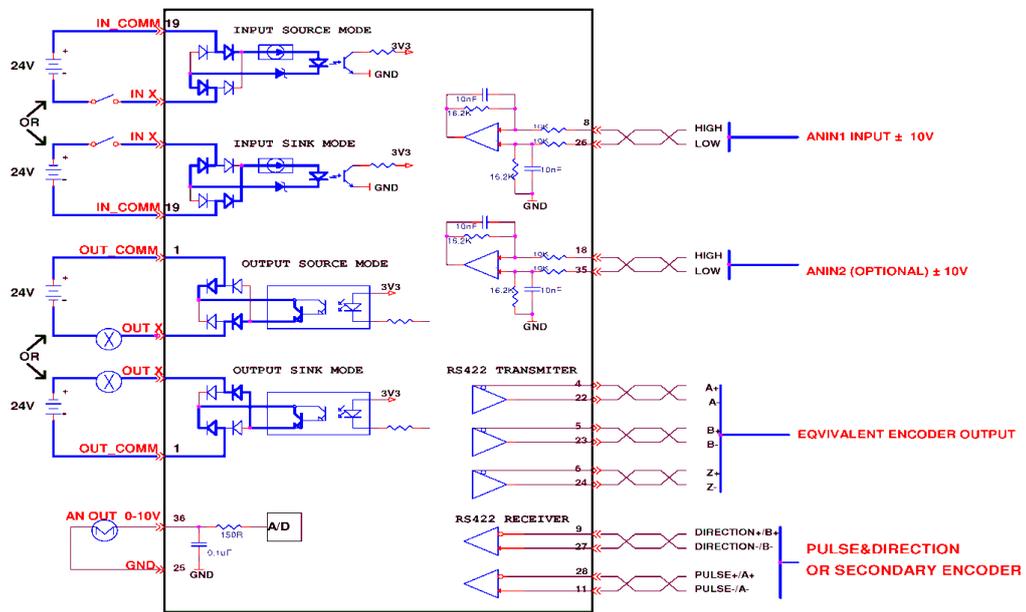
2.1 Main circuit

Driver rated input current 3A, maximum current 9A

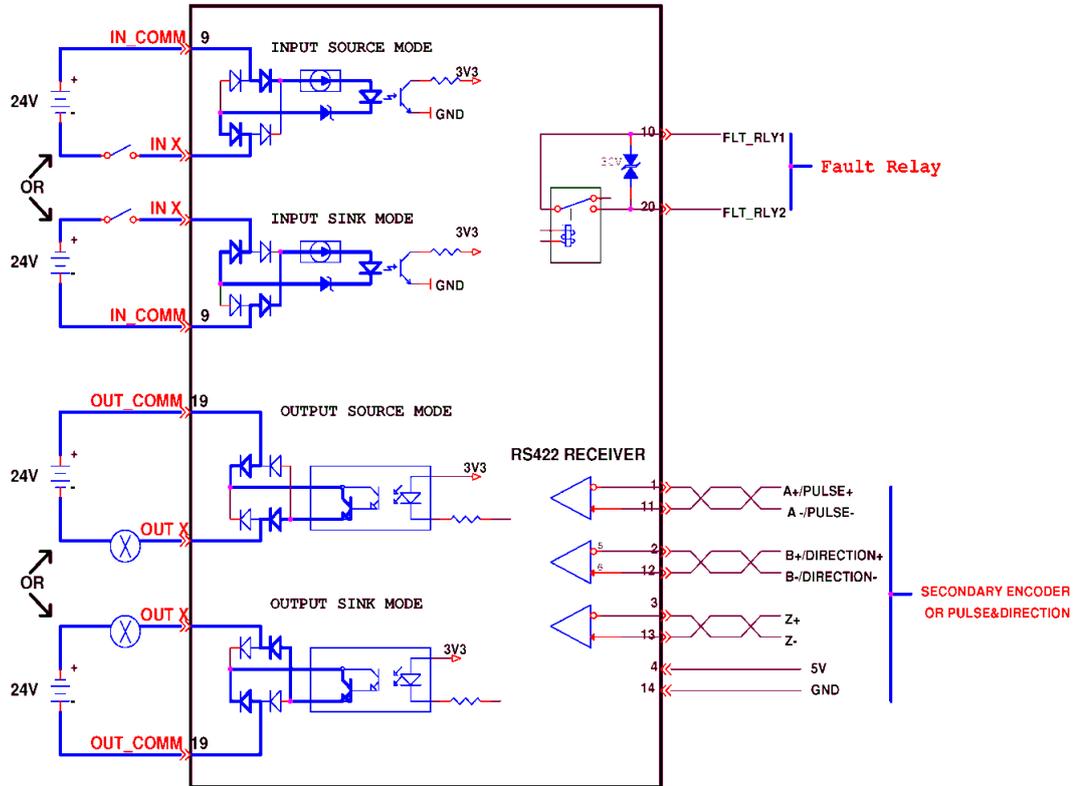


2.2 Control circuit

● C2 interface



● C3 interface



3. Debugging

3.1 Software download and installation

● software download

Download from the manufacturer's website.

Download link:<http://m.servotronix.com.cn/col.jsp?id=197>

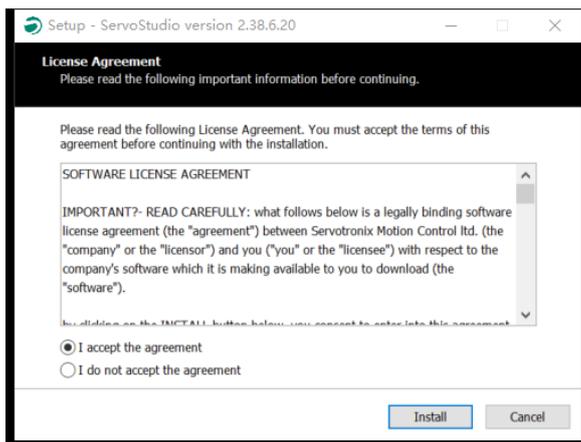
All software versions ServoStudioSetup_2_38_6_20 and higher are available.



● Software installation

 ServoStudioSetup_2_38_6_20.exe Double-click to complete the installation,

 ServoStudio.exe Double click to open the software and you are ready to use it.

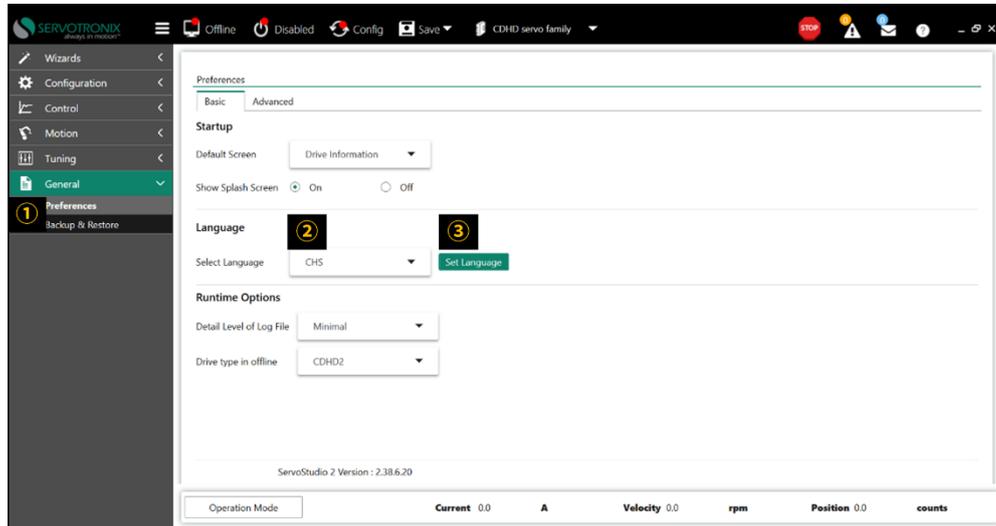


3.2 Language settings

①Click <Preferences>, ②You can change it to <ENG> or <CHS>. If you want to change the language, select the language you want to change , Click ③<Set Language>.

If you close the program and turn it back on, it will change to the set language.

! When selecting a language, CHS represents Chinese, ENG represents English,



3.3 Communication between computer and driver

● final

Connect the computer to driver①<C1 port> with a communication cable, then turn on the driver.

! Before turning on the power, be sure to check that all wiring is correct.

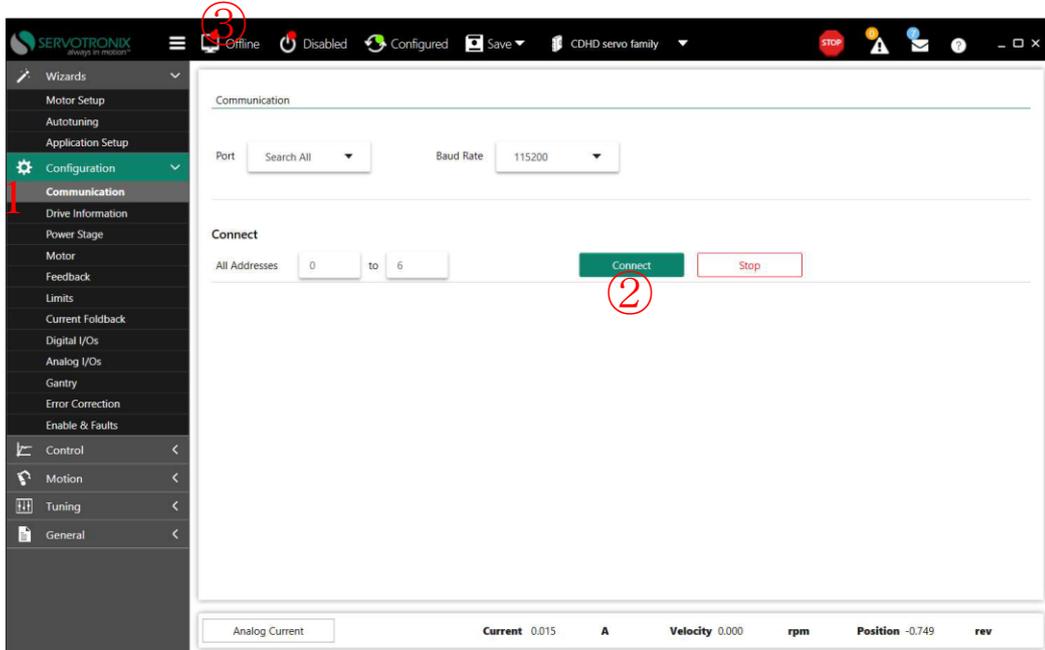
! Communication cables can be purchased from MISUMI, and the model number is USB-AM-MBM-2.



● communication

If communication is successful by clicking <Communication> and clicking ②<Connect>, ③<Disconnected> will appear.  changes to .

! If communication is not possible, reconnect the communication cable, reboot the computer, turn the driver power back on, and replace the communication cable.



3.4 Importing motor parameters

● Download parameter pack

You can download the parameter pack from the MISUMI website or request it from MISUMI customer service staff.

Select the parameter pack according to the model number of the actuator you purchased.

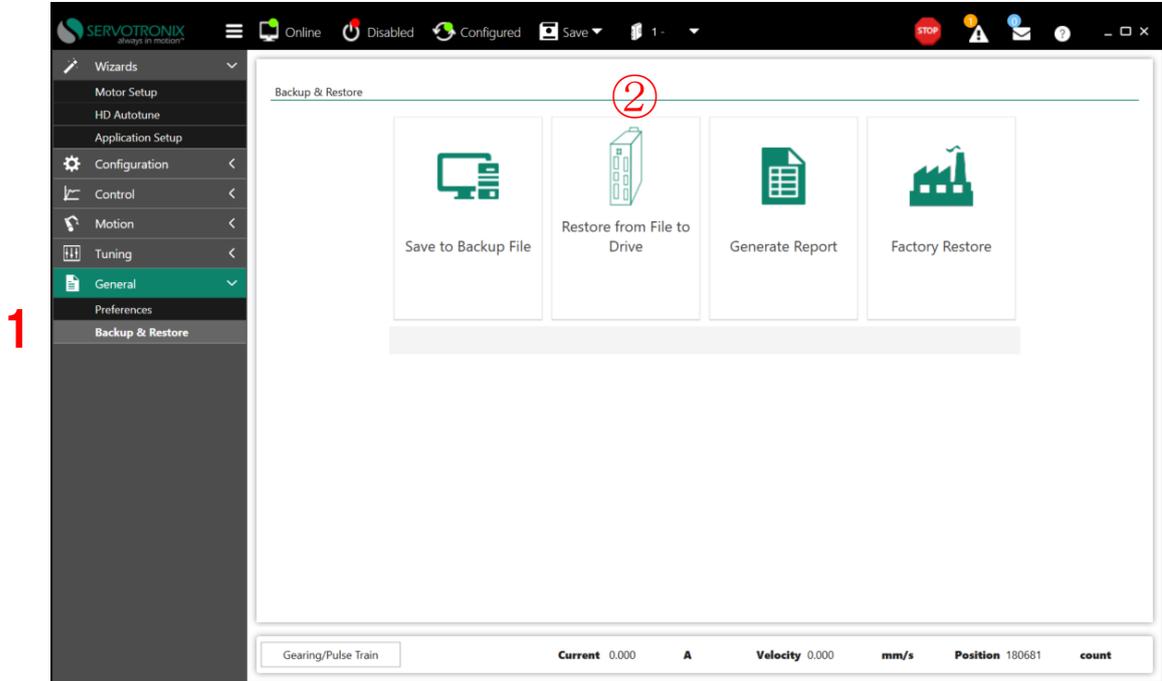
Example) If the model number of the linear motor actuator is E-RAM6-S-280-DE30-C3, the corresponding parameter pack is E-RAM6-S-DE30.



● Importing parameter packs

Operate in the following order:

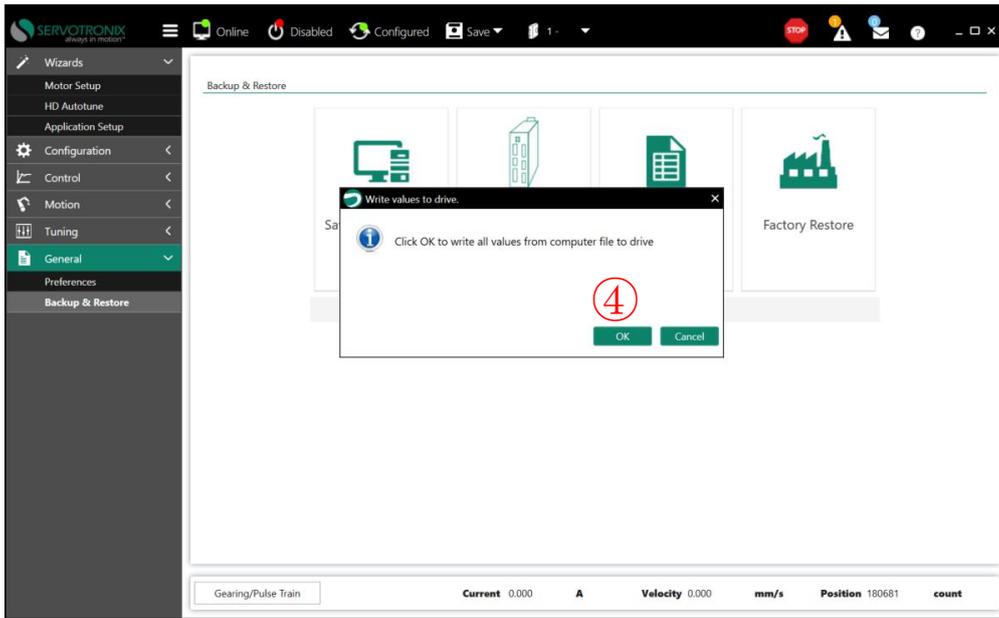
Click ①<Backup & Restore>, and click ②<Restore from File to Driver>.



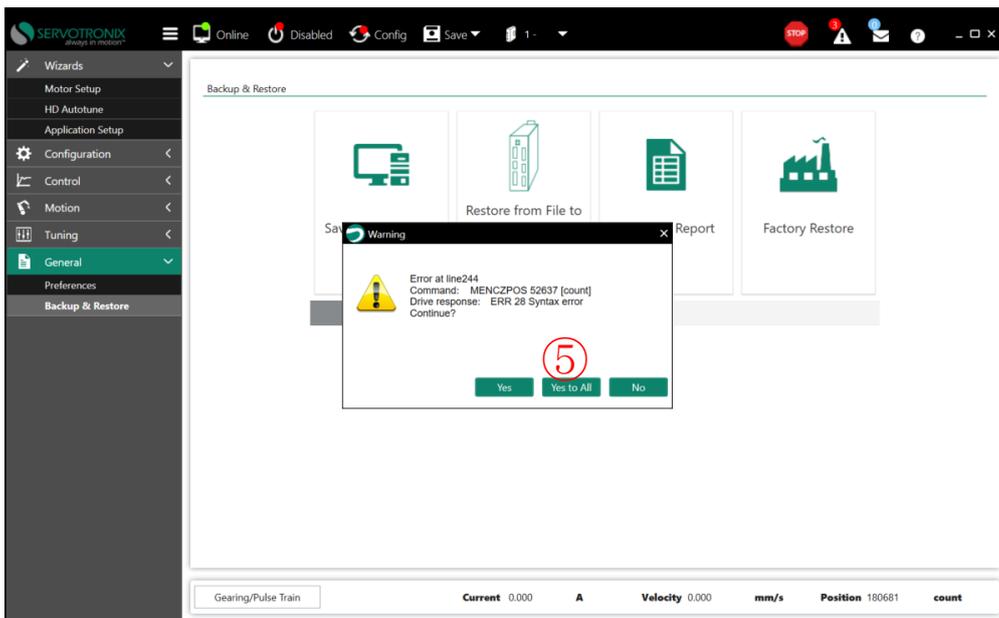
③ Double-click the parameter pack saved locally.

| 이름 | 수정한 날짜 | 유형 | 크기 |
|-------------------|--------------------|--------|------|
| E-RAM6-S-EA45.ssv | 2024-02-29 오후 7:30 | SSV 파일 | 10KB |

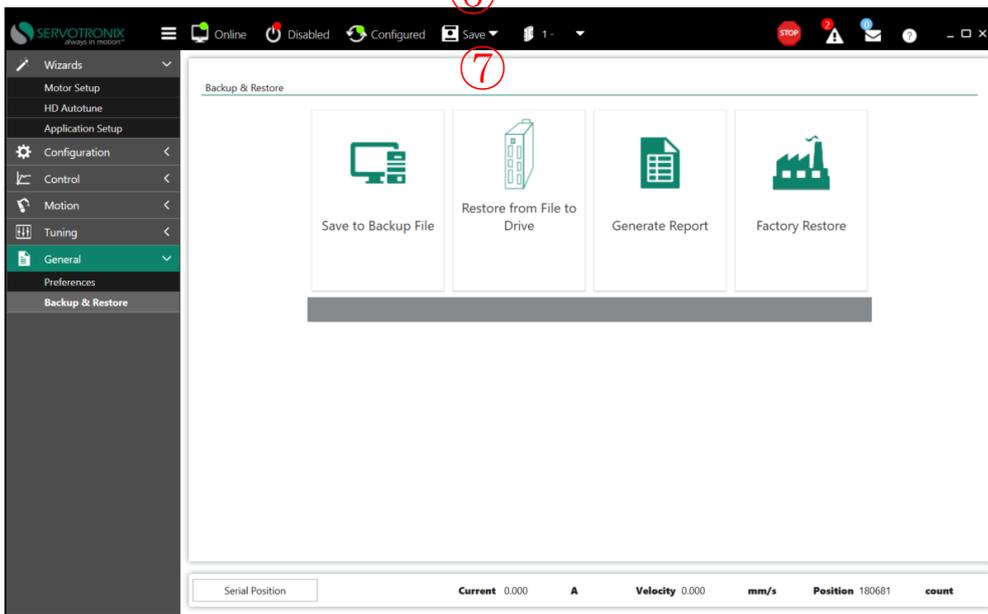
④ Click <Confirm>.



⑤ Click <All>.

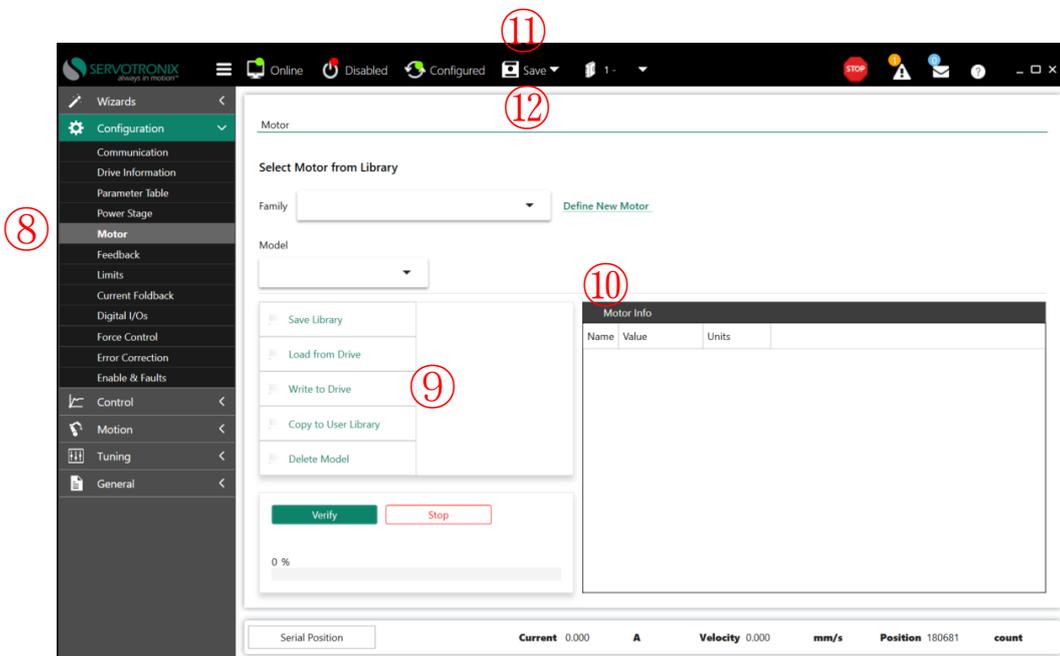


Click ⑥<Save>, and click ⑦<Save to Driver>.



Power off the driver, wait 5 seconds, and then power it back on to allow the computer to communicate with the driver.

Click ⑧<Motor>, click ⑨<Read from Driver>, check ⑩<Motor Information> to determine whether the parameters have been imported correctly, click ⑪<Save>, and click ⑫<Save as Driver>. do.



● motor inspection

First, push the slider on the actuator to the middle position.



Click ①<Motor>, and click ②<Inspect>.

1

Motor

Select Motor from Library

Family: User Motors [Define New Motor](#)

Model: Parker_R7_1S_D_H

Save Library Load from Drive Write to Drive Copy to User Library Delete Model

Verify Stop

Skip Motor ML/MR Estimation

0 %

| Name | Value | Units |
|-----------------------------------|------------------|----------------|
| Motor Type | 2 | |
| Motor Commutation Type | 0 | |
| Motor Name | Parker_R7_1S_D_1 | |
| Motor Peak Current | 29.698 | A |
| Motor Continuous Current | 6.505 | A |
| Motor Pitch | 40 | mm |
| Motor Maximum Speed | 1000 | mm/s |
| Motor Inductance | 6.1 | mH |
| Motor Resistance | 4 | Ohm |
| Motor Poles | 2 | poles |
| Force Constant for Linear Motor | 16.405 | N/A |
| Mass of Linear Motor Without Load | 2.000 | Kg |
| Motor Encoder Resolution | 10000 | Lines per pitc |
| Feedback Type | 2 | |
| Motor Encoder Type | 6 | |

Serial Current Current: 0.023 A Velocity: 0.000 mm/s Position: -2.000 counts

③ If you click <Confirm>, the actuator will move slightly and the inspection will be completed.

Motor

Select Motor from Library

Family: User Motors [Define New Motor](#) Motor library Ver 1.5

Model: Parker_Linear_D_H

Save Library Load from Drive Write to Drive Copy to User Library Delete Model

Verify Stop

Skip Motor ML/MR Estimation

0 %

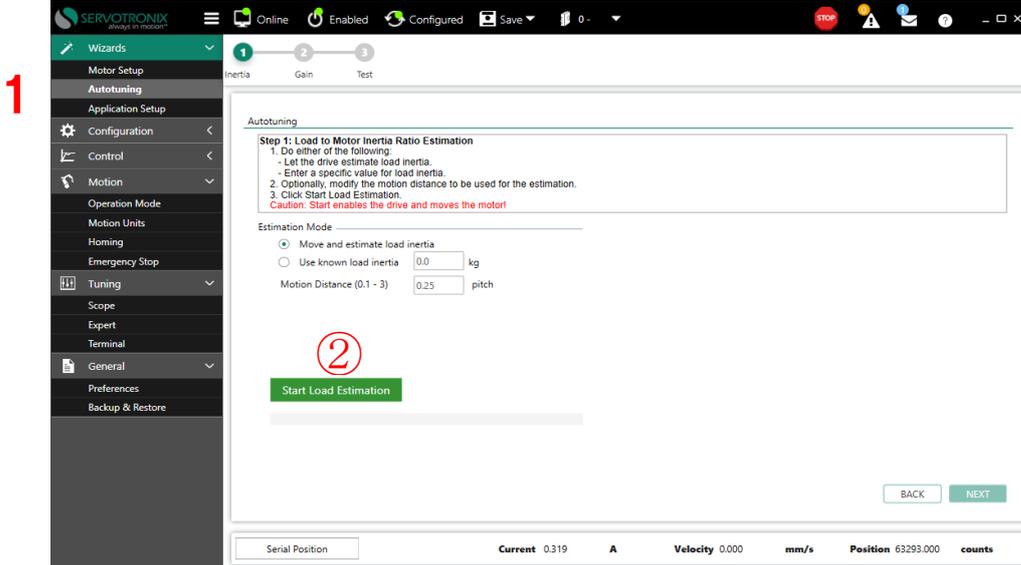
| Name | Value | Units |
|-----------------------------------|--------|----------------|
| Parker_Linear_D_1 | 2 | |
| Motor Peak Current | 29.698 | A |
| Motor Continuous Current | 6.505 | A |
| Motor Maximum Speed | 1000 | mm/s |
| Motor Inductance | 6.1 | mH |
| Motor Resistance | 4 | Ohm |
| Motor Poles | 2 | poles |
| Motor Over-Temperature Mode | 3 | |
| Feedback Type | 2 | |
| Motor Encoder Type | 6 | |
| Motor Encoder Resolution | 10000 | Lines per pitc |
| Force Constant for Linear Motor | 16.405 | N/A |
| Mass of Linear Motor Without Load | 2.000 | Kg |
| Motor Pitch | 40 | mm |

Serial Current Current: 0.001 A Velocity: 0.000 mm/s Position: -88023.000 counts

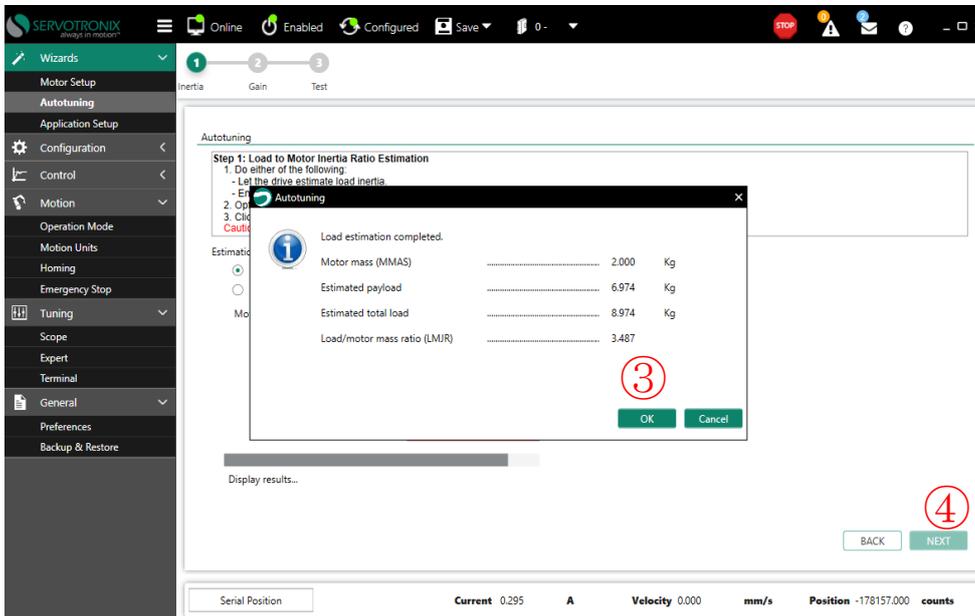
3.5 Commissioning

● auto tuning

Click ①<Auto Correction>, and click ②<Start Load Estimation>.



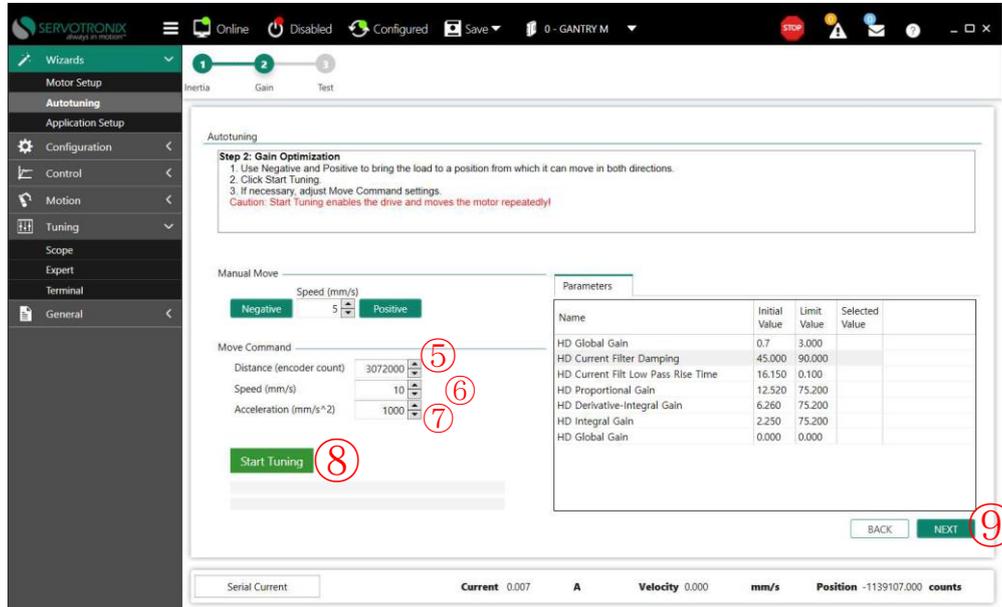
Click ③<OK>, ④Click <Next>.



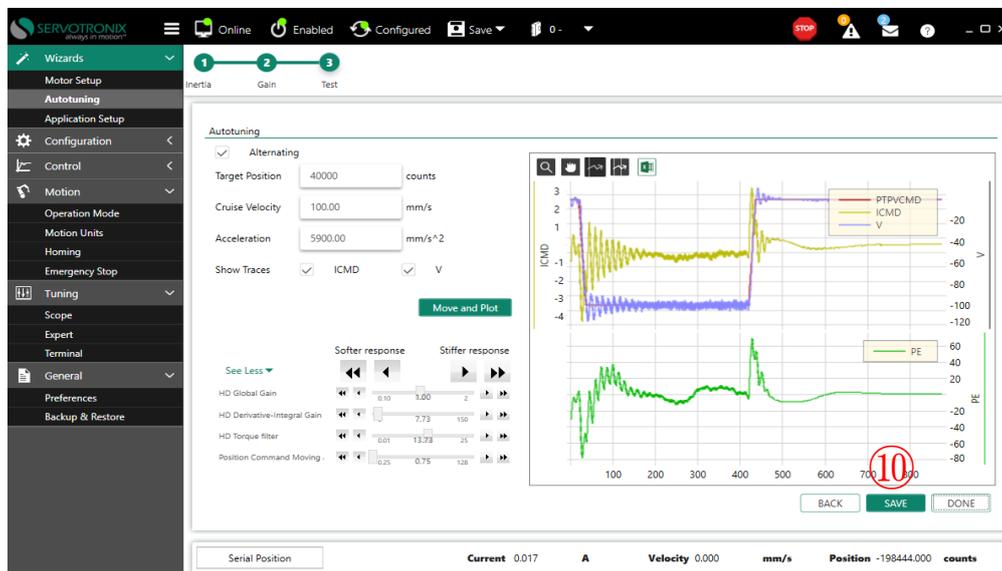
Depending on the actual usage situation, set ⑤<distance (encoder unit)>, ⑥<speed>, and ⑦<acceleration>.

Click ⑧<Start Debugging> to allow the actuator to continue operating for a few minutes. When the settings are complete, click ⑨<Next>.

! Distance unit 1=1 μ m, acceleration unit 10000=1G



⑩Click <Save>.



Click ⑪<SAVE>, and click ⑫<Complete>.

The screenshot displays the SERVOTRONIX software interface. At the top, the status bar shows 'Online', 'Enabled', 'Configured', and 'Save'. A sidebar on the left lists various configuration options. A central dialog box prompts the user to 'Save your work by selecting one of the options, and click SAVE'. The dialog offers three options: 'Save to Drive' (Save to Non-Volatile Drive Memory), 'Save to PC' (Save to Backup File), and 'Generate Report' (Create an Application Reference File). A red circle with the number 11 highlights the 'SAVE' button in the dialog. To the right, a graph shows three data series: PTPVCMD (red), ICMD (yellow), and V (blue). A second red circle with the number 12 highlights the 'SAVE' button in the graph's control area. The bottom status bar displays 'Serial Position', 'Current 0.017 A', 'Velocity 0.000 mm/s', and 'Position -198444.000 counts'.

● Preparing for commissioning

Click ① <Scope> and set ② to <Serial Position>,

③ Set <Position>, <Velocity>, <Acc>, and <Dec>,

④ Change the name in <Trigger Setup> to <V>, ⑤ Change <Level> to <10>, ⑥ Change <Pre-Points> to <10>.

⑦ Select the variables to record in <Record Variables>.

! Confirm that the interface mode is <Serial/Pulse>, and refer to 3.6 for instructions.

! Position unit: 1counts=1 μ m Example) To move 10mm, enter 10000 counts.

! Common variables include:

PTPVCMD position command speed

PE position error

ICMD current command

V actual speed

The screenshot shows the SERVOTRONIX software interface. The sidebar on the left has 'Scope' selected. The main workspace is divided into several sections:

- Scope:** A large empty area for data visualization.
- Trigger Setup:** Name is 'V', Level is '10', Pre-Points is '10'.
- Record Variables:** A table with the following data:

| Select | Name | + | X |
|-------------------------------------|---------|---|---|
| <input type="checkbox"/> | PCMD | 0 | 1 |
| <input checked="" type="checkbox"/> | PTPVCMD | 0 | 1 |
| <input checked="" type="checkbox"/> | PE | 0 | 1 |
| <input type="checkbox"/> | ICMD | 0 | 1 |
| <input type="checkbox"/> | IQ | 0 | 1 |
| <input type="checkbox"/> | VCMD | 0 | 1 |
| <input type="checkbox"/> | V | 0 | 1 |
| <input type="checkbox"/> | PFB | 0 | 1 |
- Operation Mode:** 'Serial Position' is selected. Below it, 'Incremental' is selected, and 'Alternating' is checked. Input fields show Position: 50000 counts, Velocity: 100 mm/s, Acc: 50000.000 mm/s², Dec: 50000.000 mm/s².
- Graph:** A velocity vs. time graph showing a trapezoidal profile.
- Status Bar:** Shows 'Serial Position', 'Current 0.000 A', 'Velocity 0.000 mm/s', and 'Position -3.000 counts'.

● Waveform acquisition

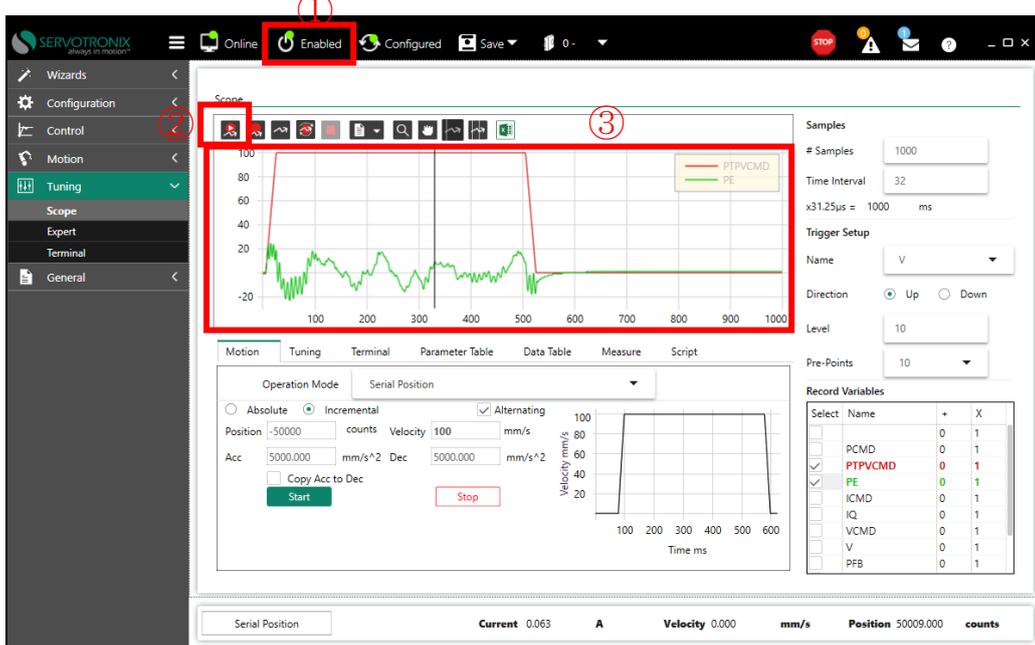
①  When you click , the button changes to <Start> and then the driver is activated.

②  When you click , the actuator starts operating, and when operation is completed,

③ <Waveform display> is displayed.

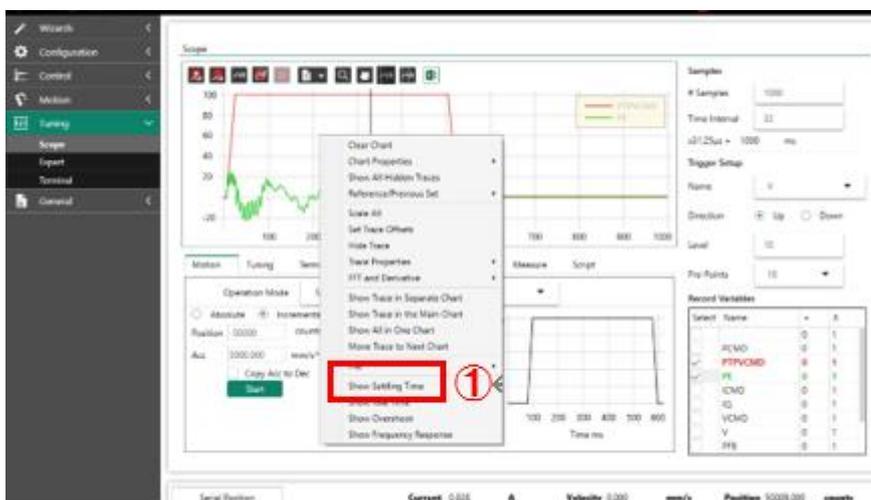
! It is normal for the actuator to emit an electromagnetic sound after activation.

! When you are finished driving, be sure to turn it off for safety reasons.



● Settling Time Analysis

Place the mouse at a random location on the oscillogram, right-click, and select ① <Show Settling Time>.



- ① Set <PVPVCMD> in <Command>, and select <PE> in ②<Response>.
- ③Set the position accuracy error (unit μm) in <Acceptable Range>, and click ④<Show>.
- ⑤The required settling time is displayed in <Setting Time>.

Example) If Acceptable Range is set to 5 and Setting Time is displayed as 95, it indicates that the position accuracy error is within $5\mu\text{m}$ and the required settling time is 0.095 seconds.



● Fine adjustment of rigidity

In principle, debugging can be completed with <Auto Correction>, and the stiffness can be fine-tuned to bring the actuator to the best condition.

! Debugging tips:

By adjusting the stiffness level, you can increase the responsiveness of the actuator or suppress module vibration and noise.

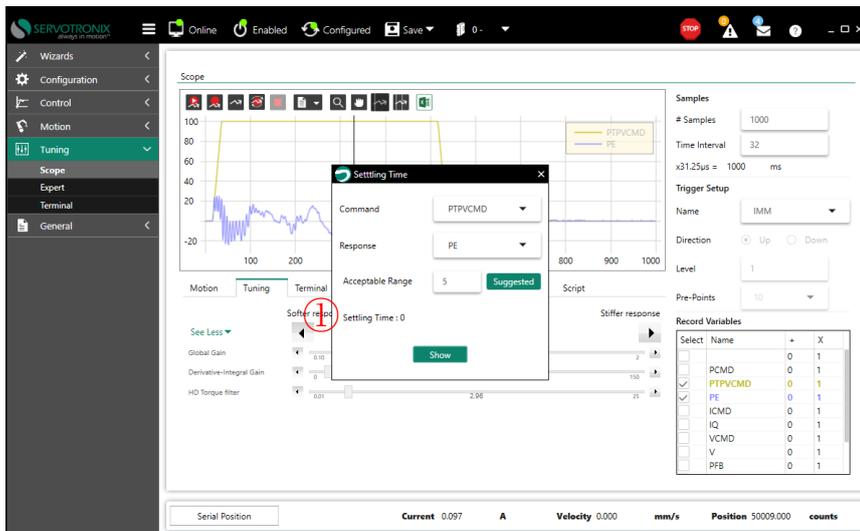
1 Click <Tuning> to set ②<Gain Level>.



● Check debugging results

After collecting the waveform again, the settling time is analyzed.

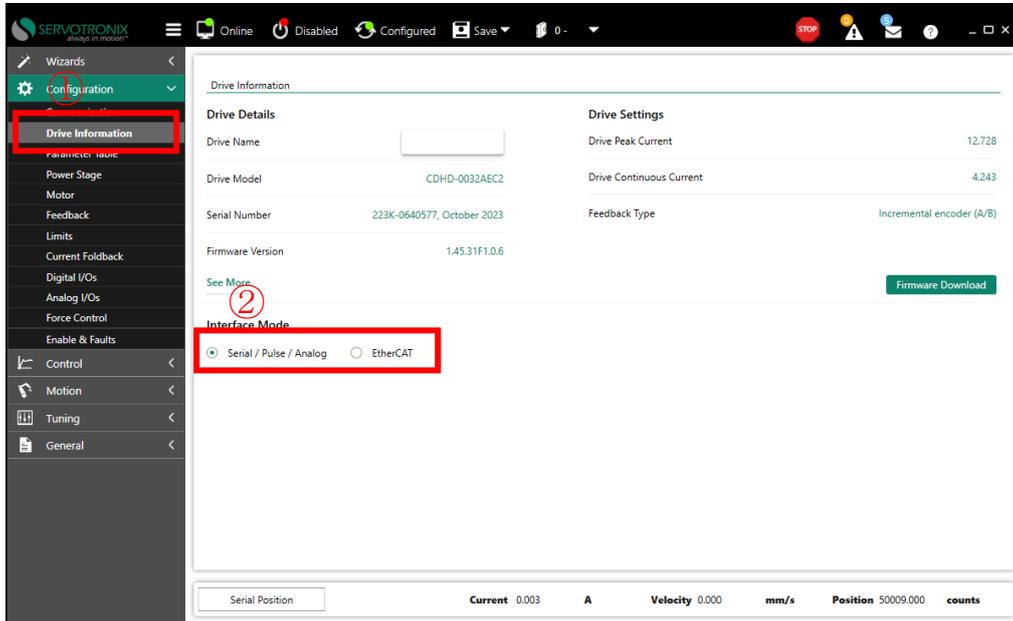
Example) After increasing the rigidity level, the positioning accuracy error is within 5 μm , and the required correction time has been changed from 0.095 seconds to 0 seconds.



3.6 Control

● Select mode

- 1 Click <Drive Information> and select ②<Interface Mode> as <EtherCAT>.! For commissioning, change to <Serial/Pulse>.

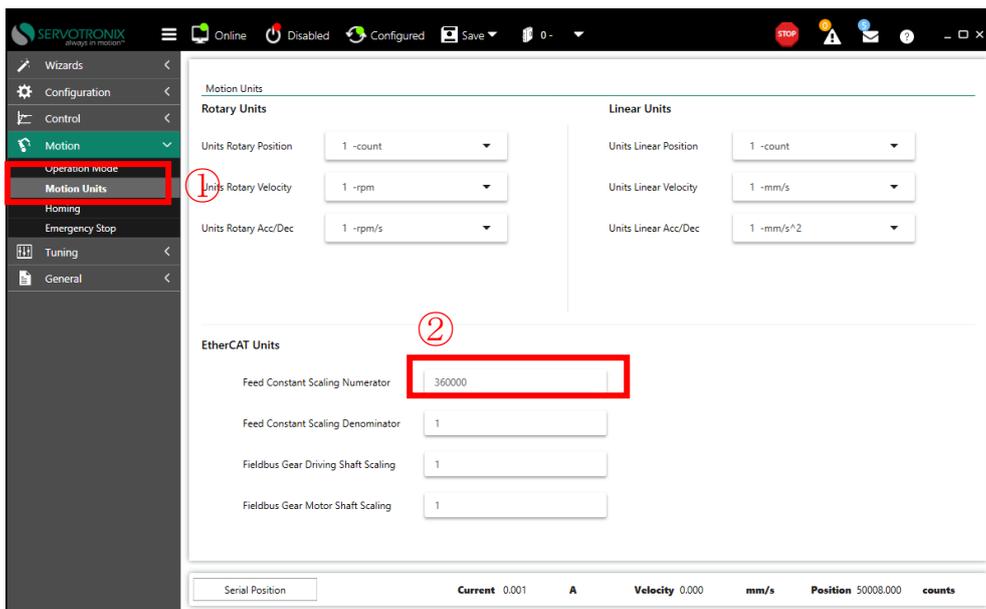


● Electronic gear ratio settings

- ①Click <Motion>, and set ②<Feed Constant Scaling Numerator>.

Formula: Actual travel distance = command pulse x (unit conversion numerator/20000) x 0.001mm

! Be sure to press the Enter key after setting the parameters.



● I/O settings

1 Click < Digital I/O> to set ②<Mode> and ③<Polarity>

! Polarity <High level valid> is NPN mode.

The screenshot displays the SERVOTRONIX software interface for configuring digital I/Os. The left sidebar shows the 'Digital I/Os' menu item highlighted with a red box and a circled '1'. The main window is titled 'Digital I/Os' and contains two sections: 'Digital Inputs' and 'Digital Outputs'. In the 'Digital Inputs' section, the 'Mode' column (circled '2') shows all inputs set to '-Idle', and the 'Polarity' column (circled '3') shows all inputs set to 'Active High'. In the 'Digital Outputs' section, the 'Mode' column shows 'Output 1' set to '-Brake Release Signal', 'Output 2' set to '-Stopped', and 'Output 3-6' set to '-Idle'. The 'Polarity' column shows 'Output 1-2' set to 'Active High' and 'Output 3-6' set to 'Active High'. The status bar at the bottom shows 'Current 0.003 A', 'Velocity 0.000 mm/s', and 'Position 50008.000 counts'.

● Change direction of travel

① Click <Tuning>, enter dir in ②<Terminal>, then press Enter to check ③<Result>.

③If <Result> is 0, enter dir 1 in ②<Terminal>.

③If <Result> is 1, enter dir 0 in ②<Terminal>.

②Enter mphase in <Terminal>, then press the Enter key to check ④<Result>.

④If <result> is less than 180, add 180 to this result,

④If <result> is greater than or equal to 180, subtract 180 from this result.

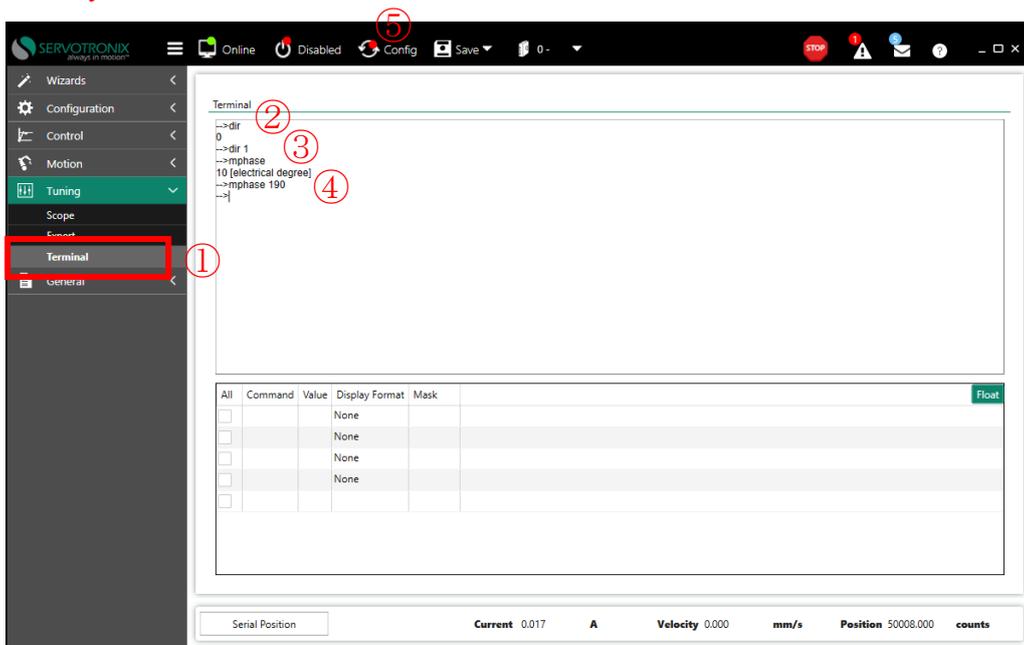
Example) If ④<result> is 0, enter mphase 180 in ②<dialog window>.

④If <result> is 210, enter mphase 30 in ②<dialog window>.

⑤Click <config>.

! Type dir or mphase, followed by a space, then 3 or 0 or some other number. Otherwise, an error will occur.

! These two variables, dir and mphase, must be changed at the same time. Otherwise, motor runaway will occur.



The screenshot shows the SERVOTRONIX software interface. The 'Terminal' window is active, displaying the following commands and results:

```
-->dir 0
-->dir 1
-->mphase 10 [electrical degree]
-->mphase 190
```

Red circles 1 through 5 are overlaid on the image to indicate the steps: 1 points to the Terminal tab in the left sidebar, 2 points to the 'dir' command, 3 points to the result '0', 4 points to the 'mphase' command, and 5 points to the 'Config' button in the top toolbar.

| All | Command | Value | Display Format | Mask | Float |
|--------------------------|---------|-------|----------------|------|-------|
| <input type="checkbox"/> | | | None | | |
| <input type="checkbox"/> | | | None | | |
| <input type="checkbox"/> | | | None | | |
| <input type="checkbox"/> | | | None | | |

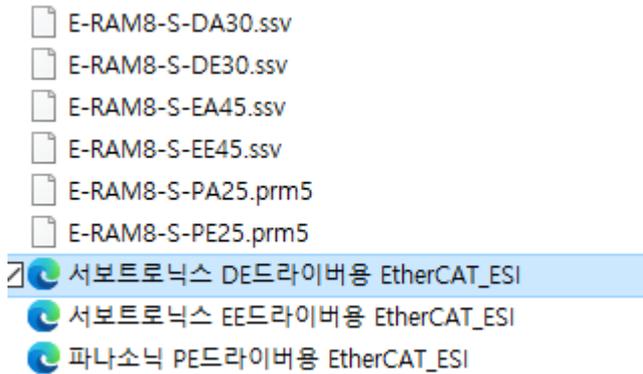
At the bottom of the interface, the status bar shows: Serial Position, Current 0.017 A, Velocity 0.000 mm/s, Position 50008.000 counts.

● Top computer matching

Please download and use the file matching the parent computer from the following address.

Download link: https://www.misumi.com.cn/guide/doc/Motor_Data.zip

Select the adaptive file according to the model number of the actuator you purchased.

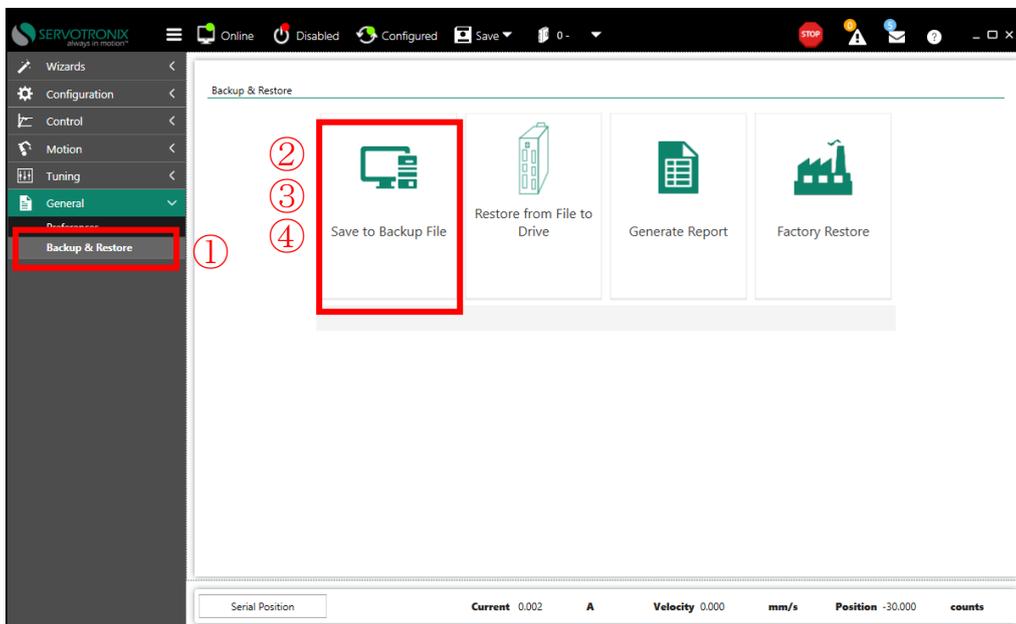


3.7 Parameter backup & parameter recovery

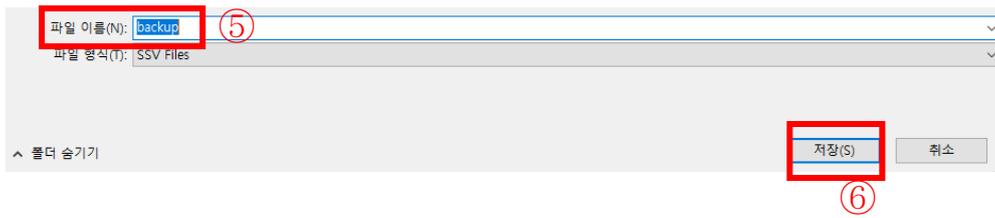
● Parameter backup

Click ①<Backup & Restore>, click ②<Save>, then click ③<Save to Driver>,

④Click <Save to backup file>.



Enter the file name in ⑤ and click ⑥<Save>.



● Parameter recovery

For recovery method, please refer to <3.4 Importing Motor Parameters>.

The differences are as follows:

1. The parameter pack is changed to the saved parameter pack.
2. No need to do motor inspection.