

MISUMI

Linear motor actuator

E-RAM Series

DE60 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 in a safe place so that you can view it whenever necessary.

List

One. Driver Overview	5
1.1 Manufacturer Information	5
1.2 Safety precautions	5
2. final	6
2.1 Main circuit	6
2.2 Control circuit	6
<input type="checkbox"/> C2 interface	6
<input type="checkbox"/> C3 interface	7
3. Debugging	8
3.1 Software download and installation	8
<input type="checkbox"/> software download	8
<input type="checkbox"/> Software installation	8
3.2 Language settings	9
3.3 Communication between computer and driver	9
<input type="checkbox"/> final	9
<input type="checkbox"/> communication	10
3.4 Importing motor parameters	10
<input type="checkbox"/> Download parameter pack	10
<input type="checkbox"/> Importing parameter packs	11
<input type="checkbox"/> motor inspection	14
3.5 Commissioning	15
<input type="checkbox"/> Automatic correction	
<input type="checkbox"/> Inching preparation	18
<input type="checkbox"/> Waveform acquisition	19
<input type="checkbox"/> Settlement time analysis	19
<input type="checkbox"/> Fine adjustment of rigidity	
<input type="checkbox"/> Check debugging results	21
3.6 Control	22
<input type="checkbox"/> Select mode	22
<input type="checkbox"/> Electronic gear ratio settings	22
<input type="checkbox"/> I/O settings	23
<input type="checkbox"/> Change of driving direction	24

- Top computer matching 25
- 3.7 Parameter backup & parameter recovery 25
 - Parameter backup 25
 - Parameter recovery 26

1. Driver Overview

1.1 Manufacturer Information

Driver manufacturer: Servotronicx

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

The manufacturer model number table is as follows.

Misumi model number	Servotronicx model number
DE60	CDHD-0062AEC2

1.2 Safety precautions

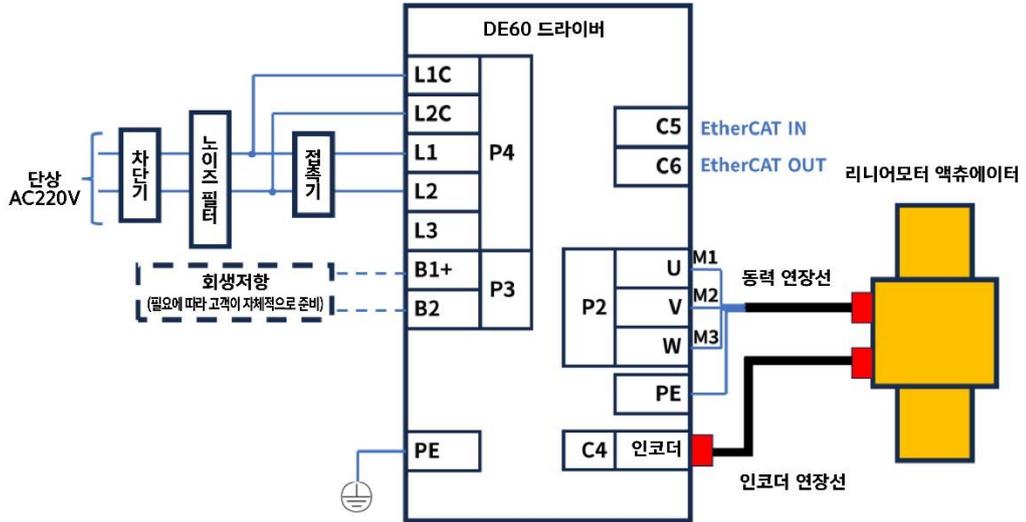
Before installation, please be sure to download all relevant materials from the manufacturer's website and read them carefully, and use and operate the product exactly as required to ensure safety and accuracy.

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

2. final

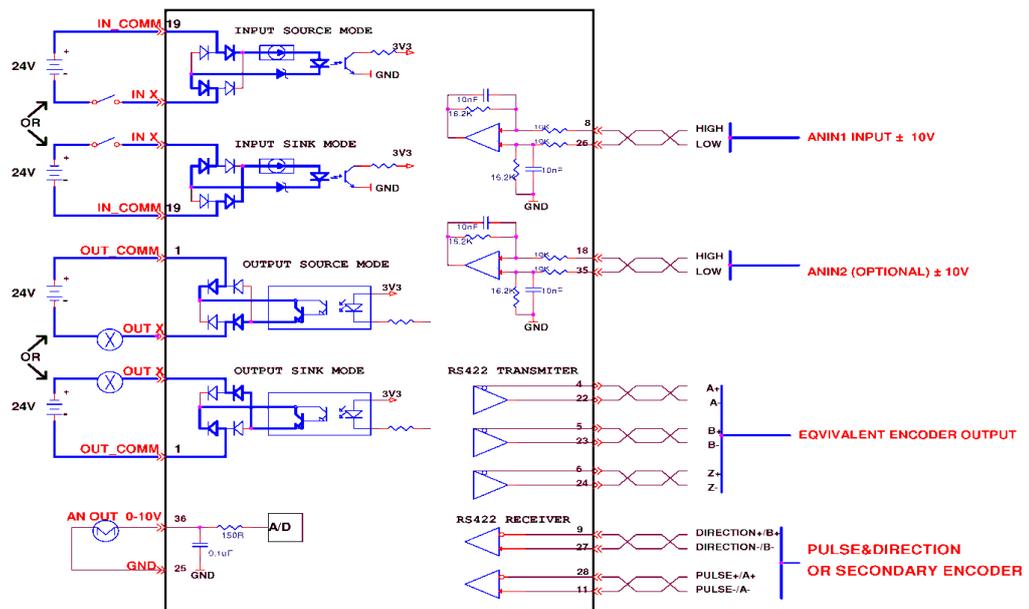
2.1 Main circuit

Driver rated input current 6A, maximum current 18A

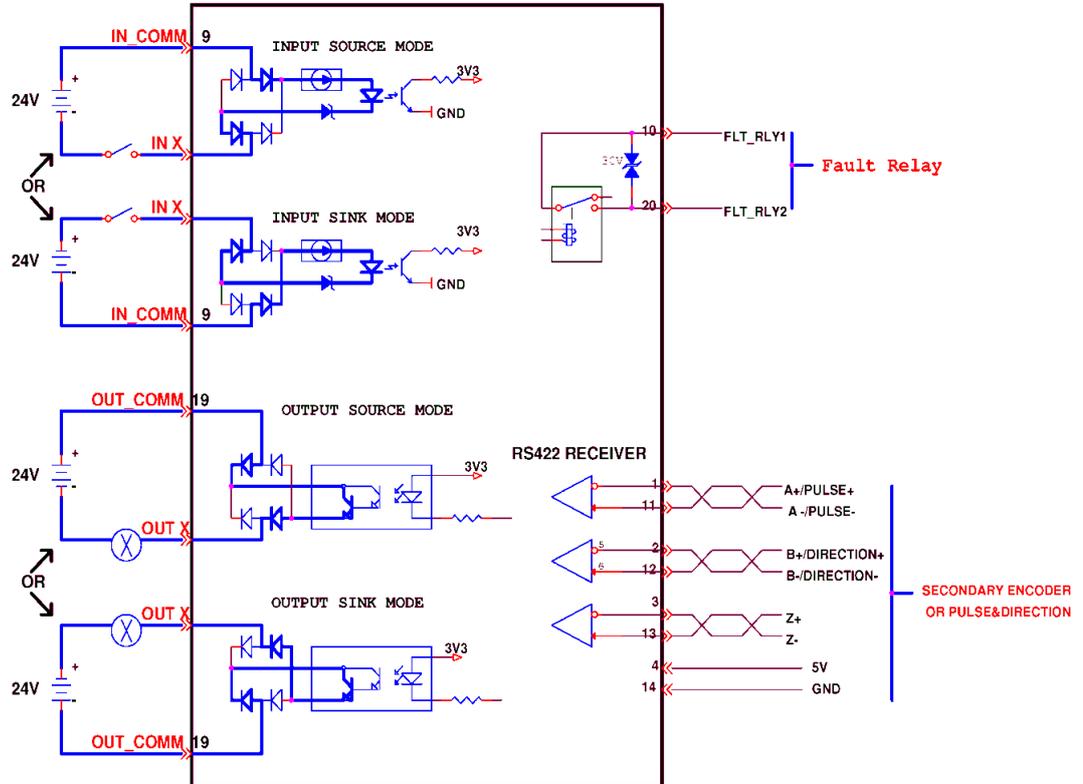


2.2 Control circuit

● C2 interface



● C3 interface



3. Debugging

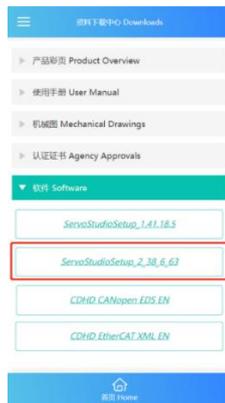
3.1 Software download and installation

● software download

Download from the manufacturer's website.

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

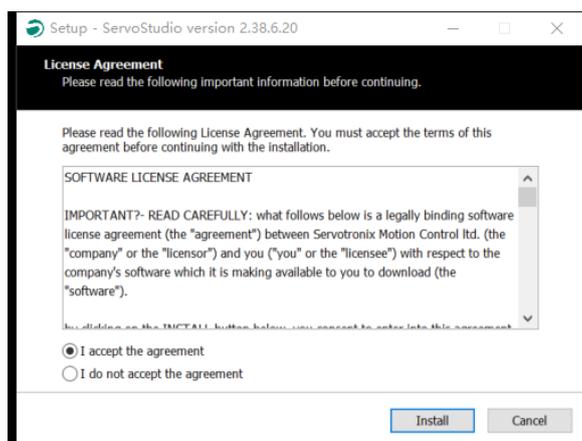
All software versions ServoStudioSetup_2_38_6_20 and higher are available.



● 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.

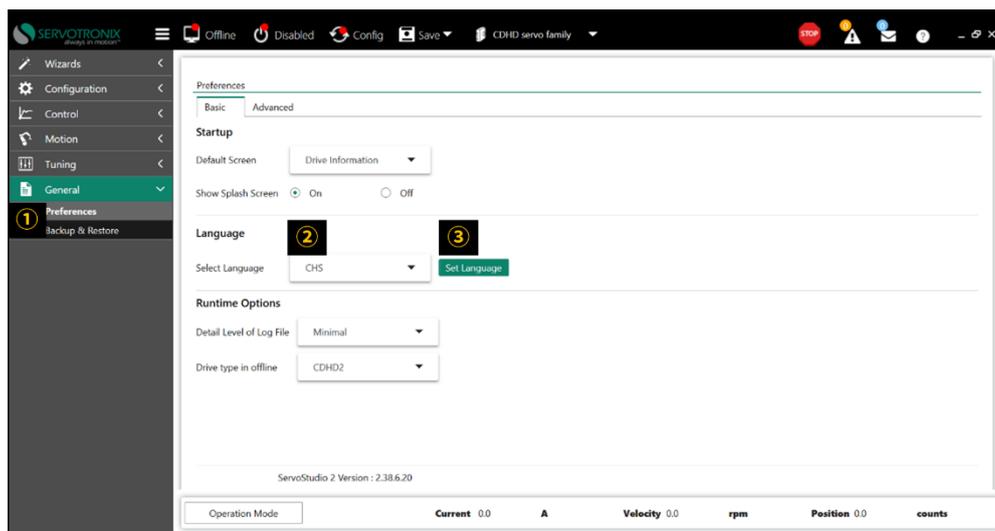


3.2 Language settings

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 and 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.

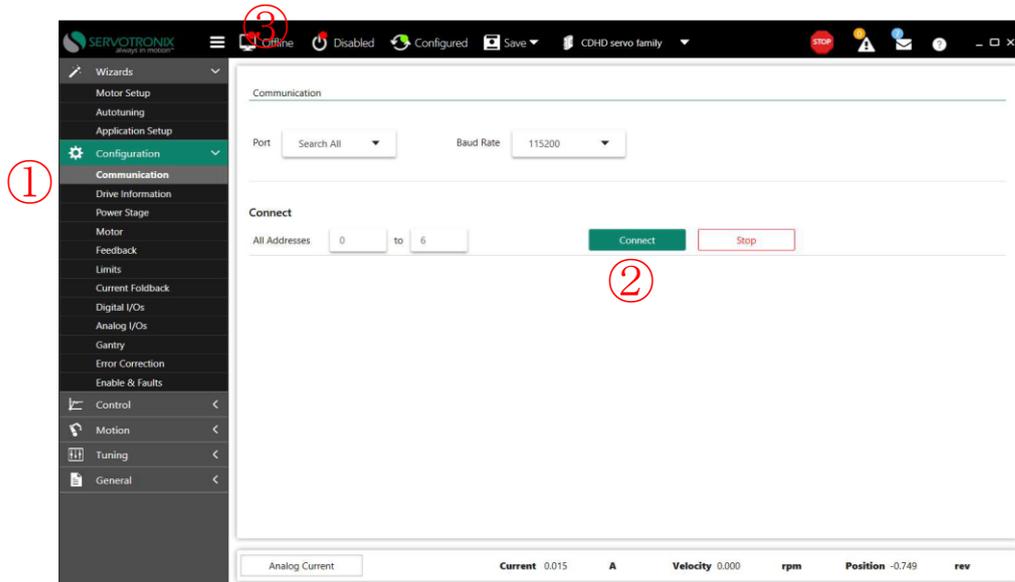


● communication

1 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.

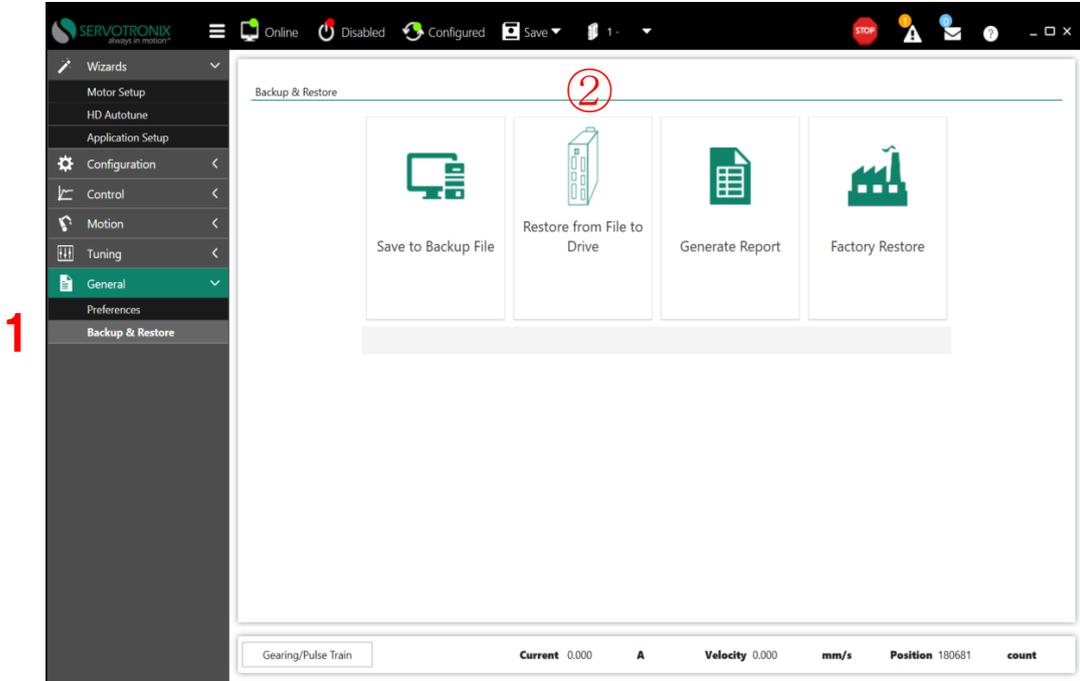
Example: If the model number of the linear motor actuator is E-RAM14-S-600-DE60-C3, the corresponding parameter pack is E-RAM14-S-DE60.



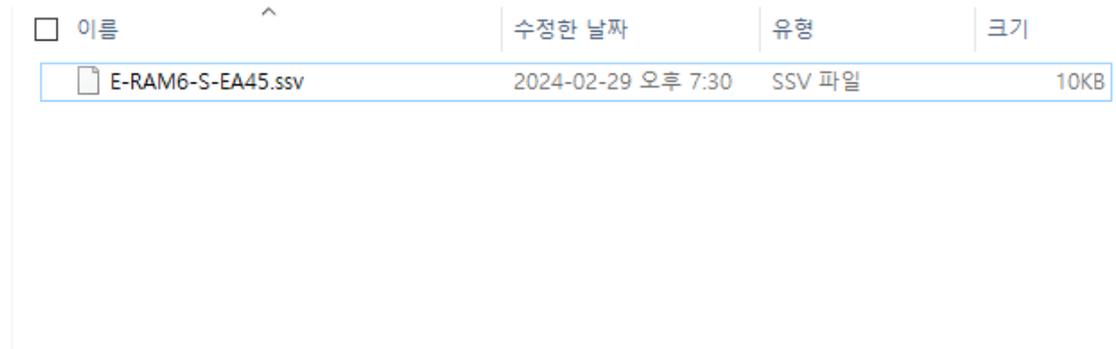
● Importing parameter packs

Operate in the following order:

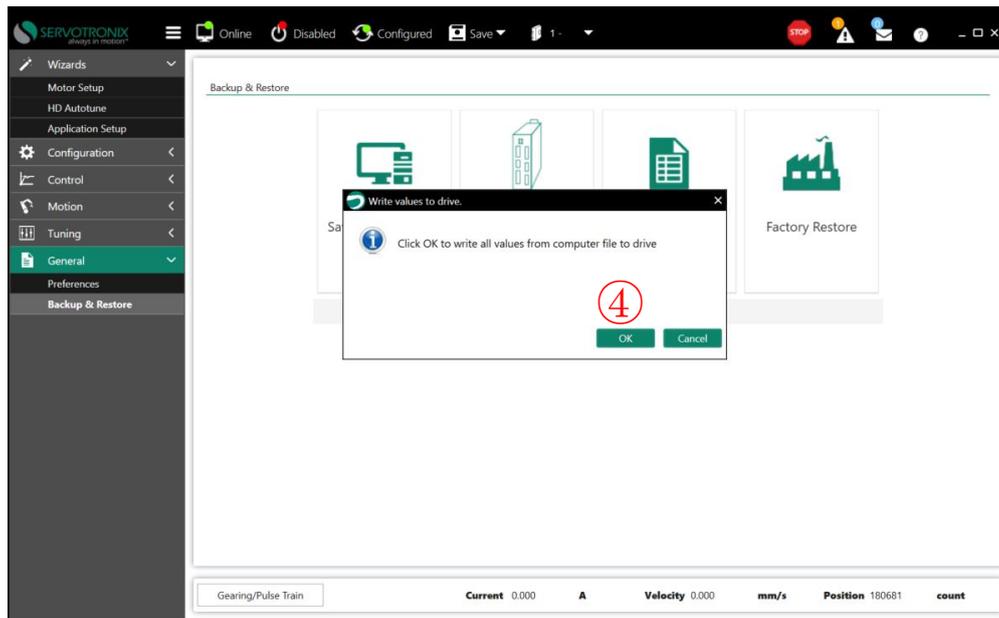
- 1 Click <Backup & Restore>, and click ②<Restore from File to Driver>.



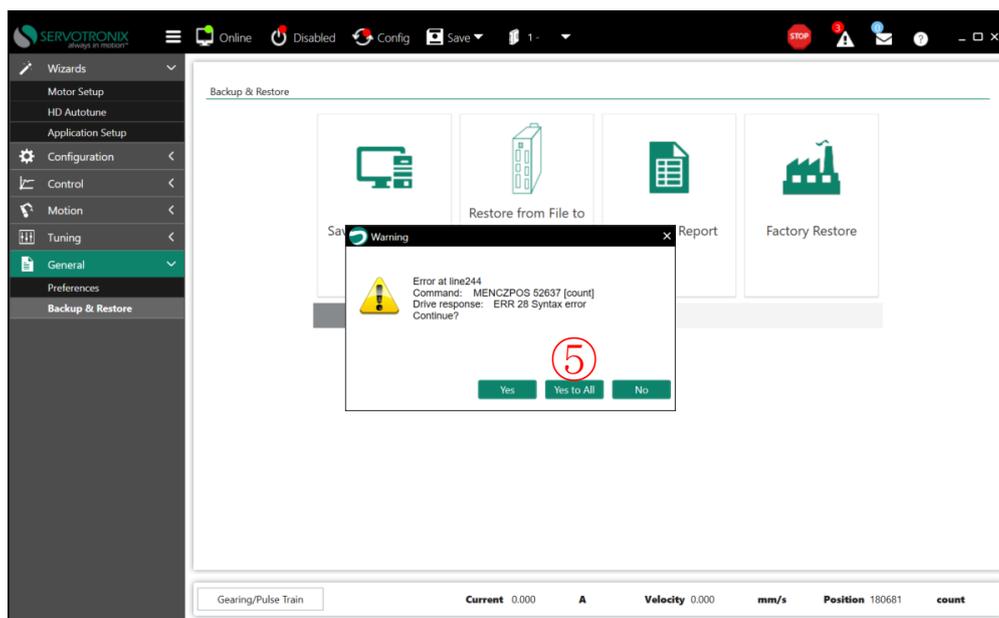
- ③ Double-click the parameter pack saved locally.



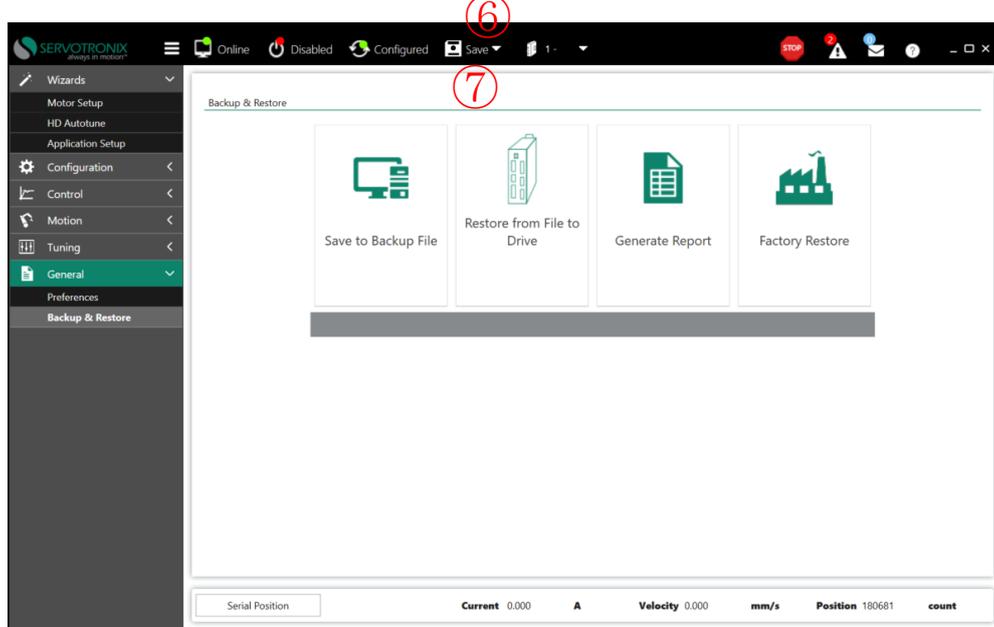
④ Click <Confirm>.



⑤ Click <All>.

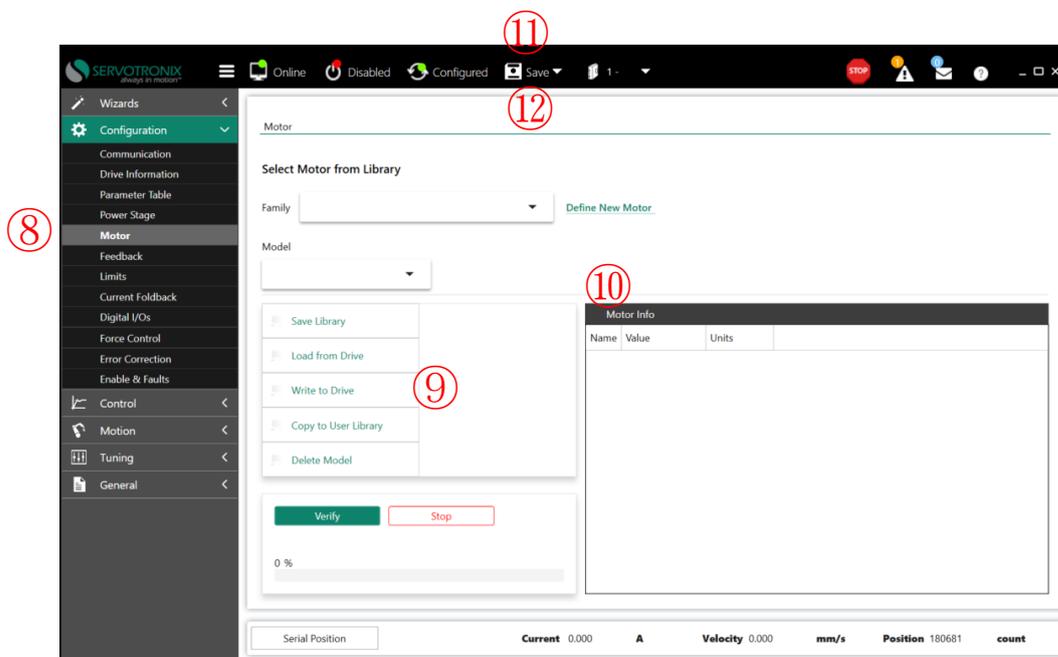


Click ⑥<Save>, and click ⑦<Save to Driver>.



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.



1 Click <Motor>, and click ②<Inspect>.

1

The screenshot shows the 'Motor' configuration window in the SERVOTRONIX software. The 'Verify' button is circled with a red '2'. The 'Motor Info' table is as follows:

Name	Value	Units
Motor Type	2	
Motor Commutation Type	0	
Motor Name	Parker_R7_1S_D_H	
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 pttc
Feedback Type	2	
Motor Encoder Type	6	

At the bottom, the status bar shows: Serial Current, Current 0.023 A, Velocity 0.000 mm/s, Position -2.000 counts.

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

The screenshot shows the 'Motor' configuration window with a warning dialog box overlaid. The dialog box contains the following text: 'Warning: During motor setup there should be no load on motor. Verify will enable the drive and move the motor at 80% of motor continuous current. Click OK to continue.' The 'OK' button is circled with a red '3'. The 'Motor Info' table is as follows:

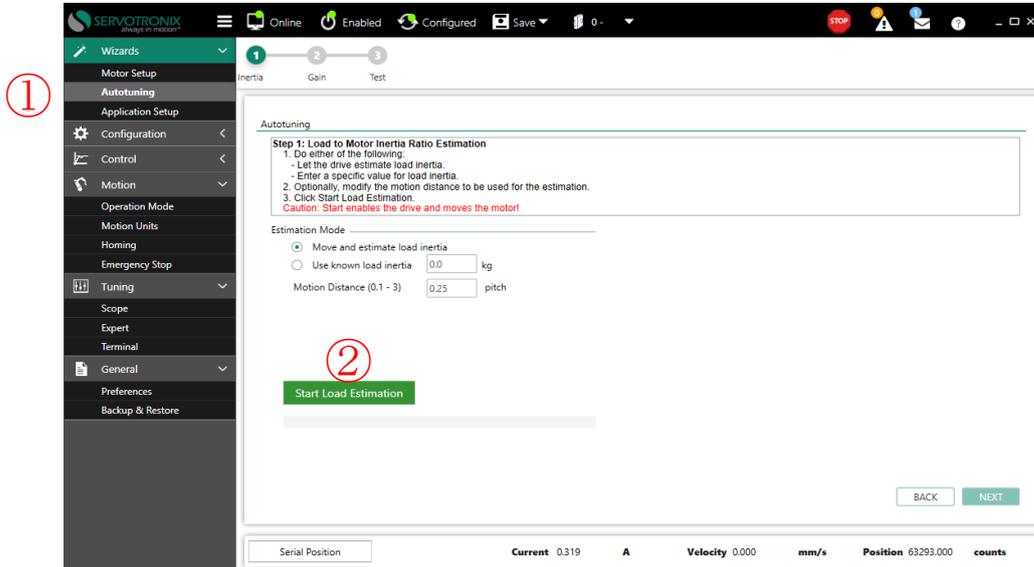
Name	Value	Units
Motor Type	2	
Motor Peak Current	29.698	A
Motor Continuous Current	6.505	A
Motor Maximum Speed	1000	mm/s
Motor Inductance	6.1	mH
Motor Resistance	4	Ohm
Motor Poles	2	poles
Motor Over-Temperature Mode	3	
Feedback Type	2	
Motor Encoder Type	6	
Motor Encoder Resolution	10000	Lines per pttc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

At the bottom, the status bar shows: Serial Current, Current 0.001 A, Velocity 0.000 mm/s, Position -88023.000 counts.

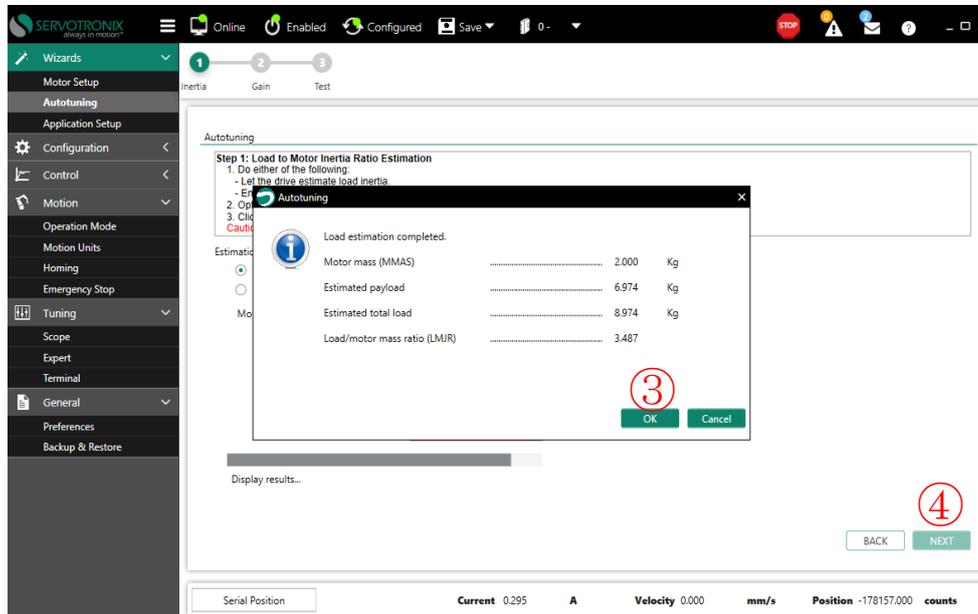
3.5 Commissioning

● auto tuning

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



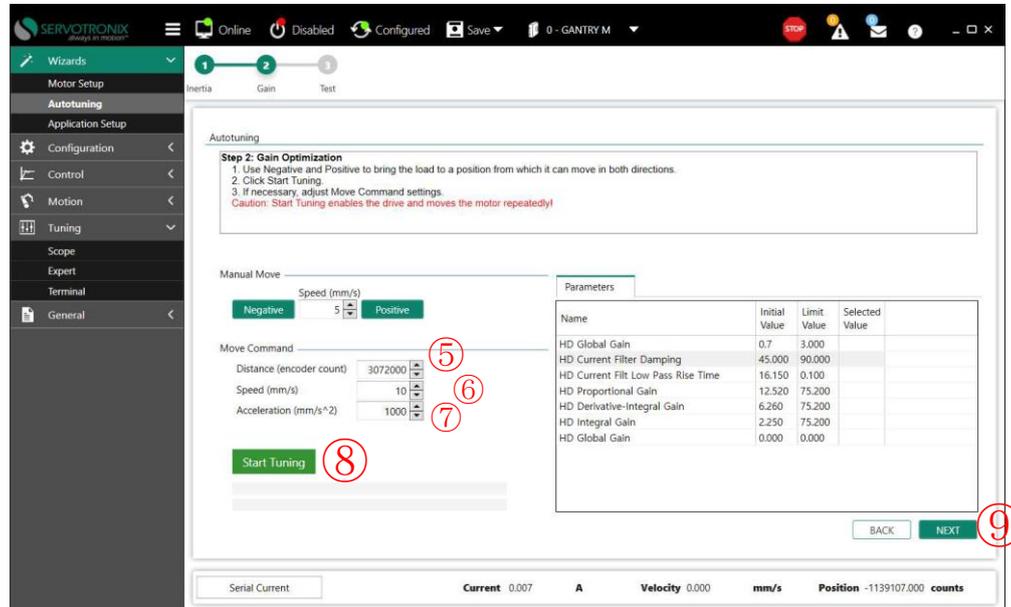
- 2 Click <OK>, and click ④<Next>.



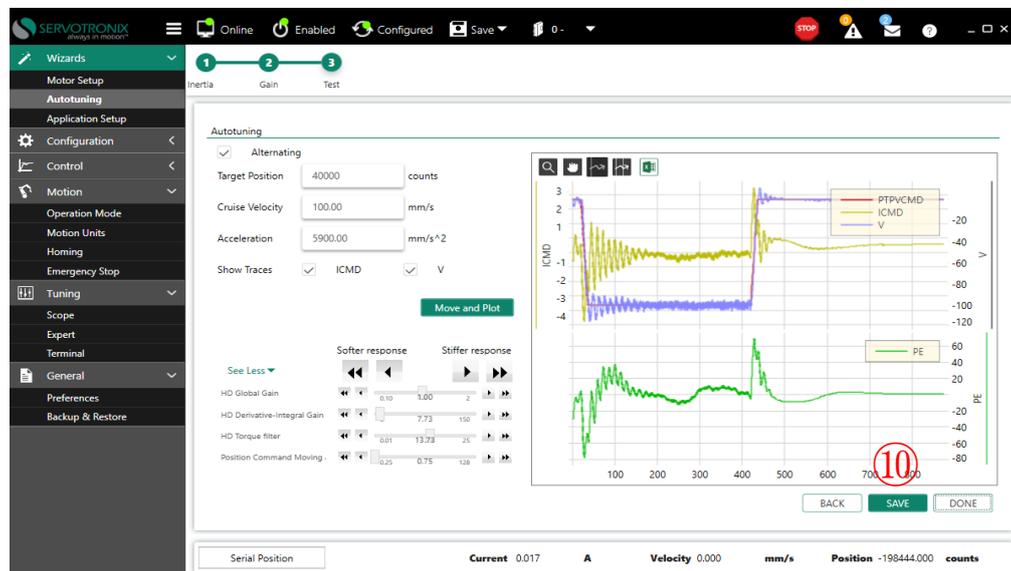
Depending on the actual usage situation, set ⑤<distance (encoder unit)>, ⑥<speed>, and ⑦<acceleration>.

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 shows the SERVOTRONIX software interface. At the top, there is a status bar with 'Online', 'Enabled', 'Configured', and 'Save' buttons. A left sidebar contains a 'Wizards' menu with options like 'Motor Setup', 'Autotuning', 'Application Setup', 'Configuration', 'Control', 'Motion', 'Operation Mode', 'Motion Units', 'Homing', 'Emergency Stop', 'Tuning', 'Scope', 'Expert', 'Terminal', 'General', 'Preferences', and 'Backup & Restore'. A central dialog box titled 'Save your work by selecting one of the options, and click SAVE' contains 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). Each option has a radio button. At the bottom of the dialog are 'CANCEL' and 'SAVE' buttons. The 'SAVE' button is circled in red with the number 11. Below the dialog, there are 'BACK', 'SAVE', and 'DONE' buttons. The 'SAVE' button is circled in red with the number 12. In the background, a graph shows three data series: PTPVCMD (red), IGMD (yellow), and V (blue). The y-axis ranges from -120 to 60. A green line labeled 'PE' is also visible. The x-axis has markers at 600, 700, and 800. At the bottom of the interface, there is a status bar with '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>.

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

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

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

! Whenever you change parameters, be sure to save them to prevent them from being lost due to external factors such as power outage.

! Position unit: 1 counts=1µm 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 with the following configuration details:

- Scope:** Scope menu is selected (1).
- Operation Mode:** Serial Position (2).
- Parameters:** Position: 30000 counts, Velocity: 100 mm/s, Acc: 3000.000 mm/s², Dec: 3000.000 mm/s² (3).
- Trigger Setup:** Name: V (4), Level: 10 (5), Pre-Points: 10 (6).
- Record Variables:**

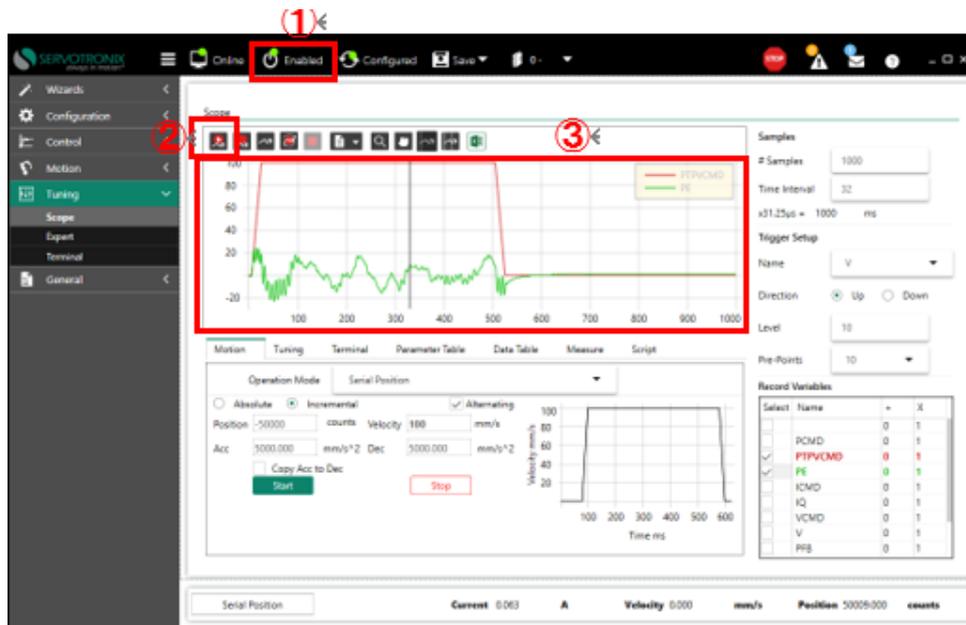
Select	Name	+	X
<input type="checkbox"/>	PCMD	0	1
<input checked="" type="checkbox"/>	PTPVCMD	0	1
<input checked="" type="checkbox"/>	PE	0	1
<input type="checkbox"/>	ICMD	0	1
<input type="checkbox"/>	IQ	0	1
<input type="checkbox"/>	VCMO	0	1
<input type="checkbox"/>	V	0	1
<input type="checkbox"/>	FFB	0	1

● 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.

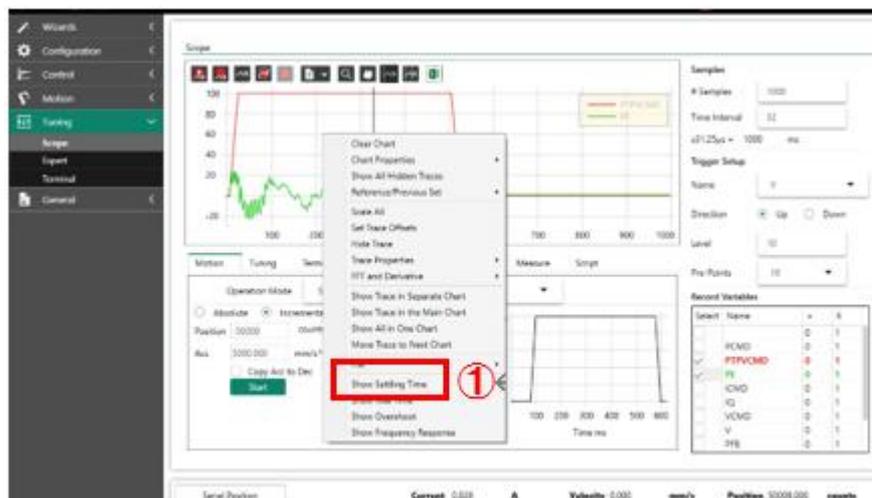
! It is normal for the actuator to emit an electromagnetic sound after activation.

! When you are finished driving, be sure to disable it for safety.



● Settling Time Analysis

Place the mouse at a random location on the scope, 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.



● Gain Tuning

In principle, debugging can be completed through <Auto Tuning>, 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.

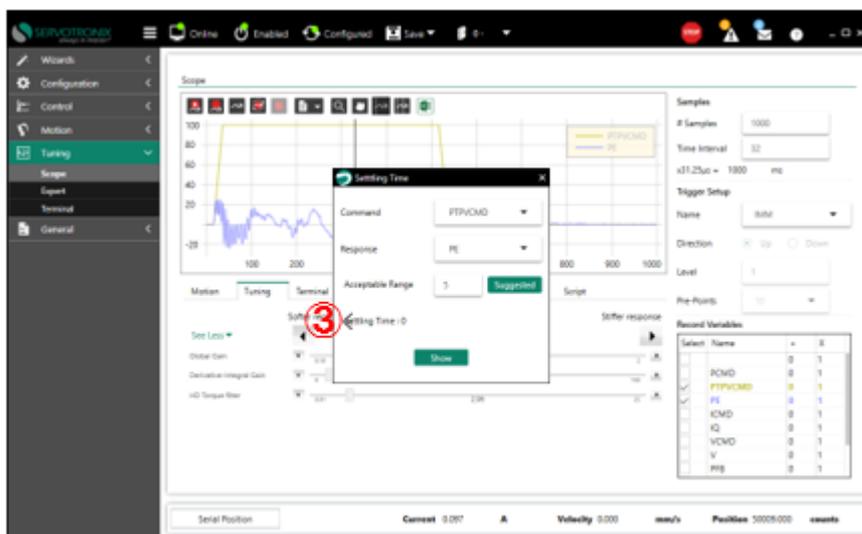
- 1 Click <Tuning> to set ②<Gain Level>.



● Check debugging results

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

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

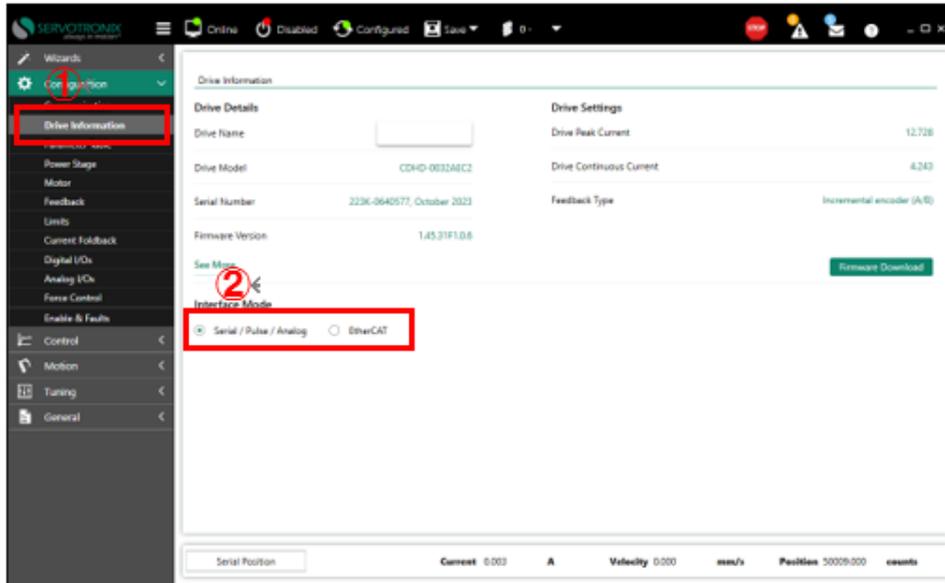


3.6 Control

● Select mode

1 Click <Drive Information> and select ②<Interface Mode> as <EtherCAT>.

! For commissioning, change to <Serial/Pulse>.

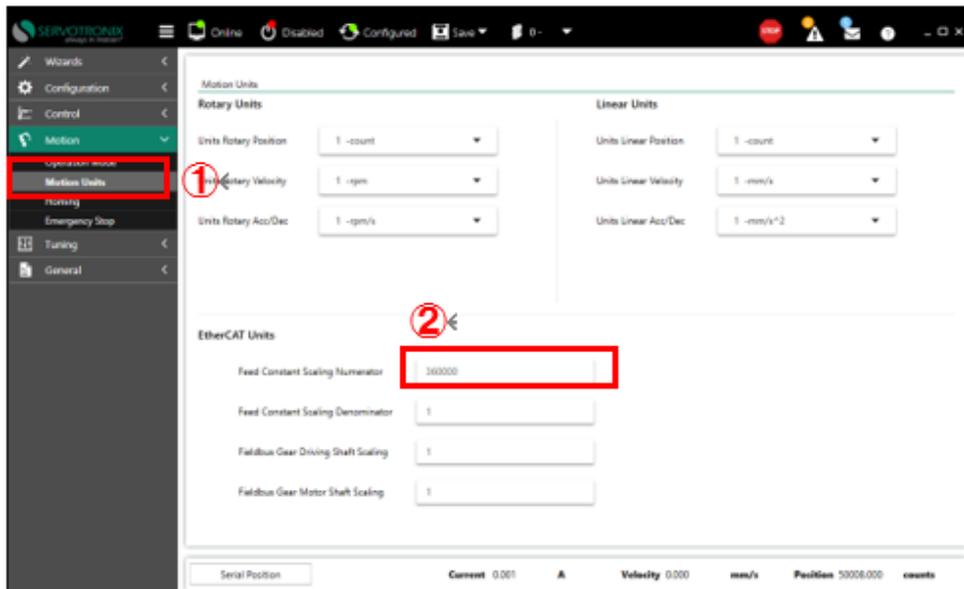


● Electronic gear ratio settings

1 Click <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

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

! Polarity <High level valid> is NPN mode.

The screenshot displays the SERVOTRONIX configuration interface. The left sidebar shows the 'Digital I/Os' menu item highlighted with a red box and a circled '1'. The main window shows the 'Digital I/Os' configuration page with two tables: 'Digital Inputs' and 'Digital Outputs'. The 'Mode' column (labeled with a circled '2') and the 'Polarity' column (labeled with a circled '3') are highlighted with red boxes. The 'Polarity' column shows 'Active High' for all entries.

State	Name	Mode	Polarity	Connector
●	Input1	0 -Idle	Active High	C,3
●	Input2	0 -Idle	Active High	C,30
●	Input3	0 -Idle	Active High	C,31
●	Input4	0 -Idle	Active High	C,14
●	Input5	0 -Idle	Active High	C,15,F,7
●	Input6	0 -Idle	Active High	C,15,F,7
●	Input7	0 -Idle	Active High	M,3
●	Input8	0 -Idle	Active High	M,5
●	Input9	0 -Idle	Active High	M,8
●	Input10	0 -Idle	Active High	M,16
●	Input11	0 -Idle	Active High	M,7,F

State	Name	Mode	Polarity	Connector
●	Output1	2 -Brake Release Signal	Active High	C,3
●	Output2	5 -Stopped	Active High	C,33
●	Output3	0 -Idle	Active High	C,16,F
●	Output4	0 -Idle	Active High	M,7
●	Output5	0 -Idle	Active High	M,8
●	Output6	0 -Idle	Active High	M,16,F
●	Fault Relay Mode	0 -Close when no faults	Active High	

● Change of driving direction

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.

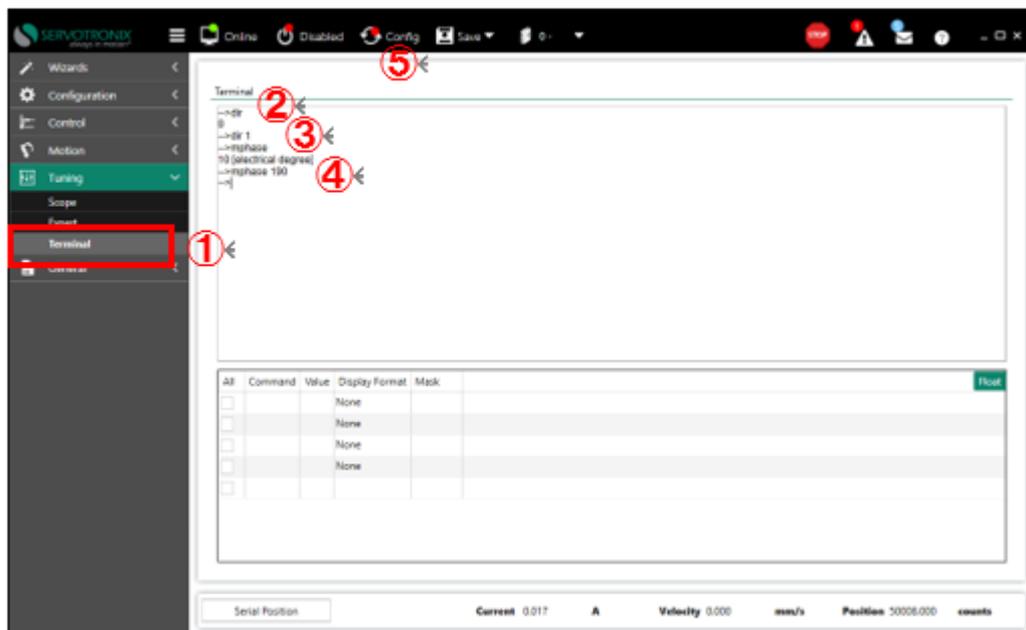
Example) If ④<result> is 0, enter mphase 180 in ②<dialog window>.

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

⑤Click <config>.

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

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



● 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.

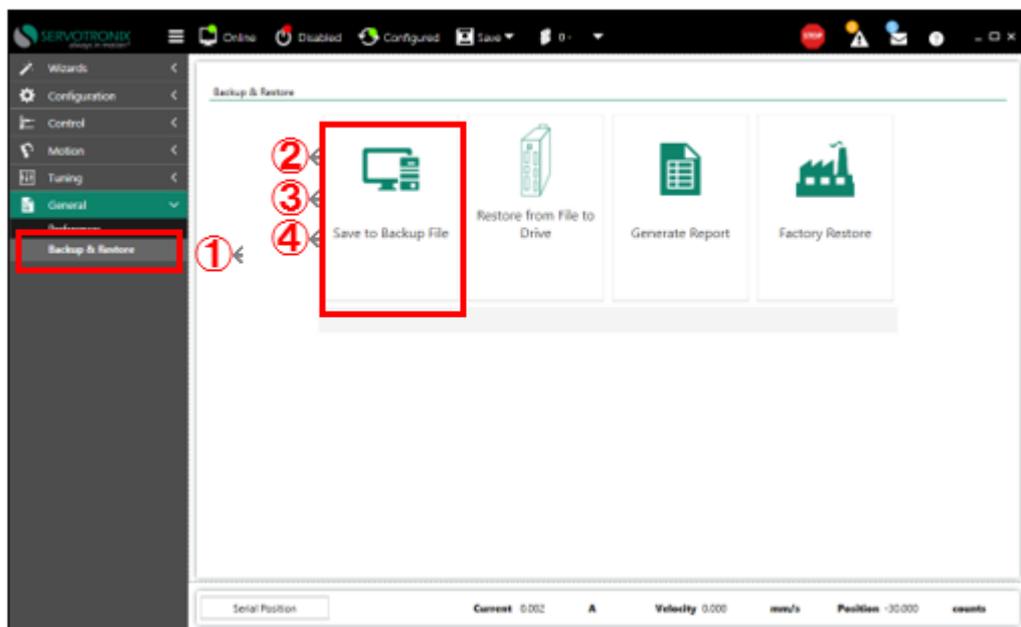
-  E-RAM8-S-DA30.ssv
-  E-RAM8-S-DE30.ssv
-  E-RAM8-S-EA45.ssv
-  E-RAM8-S-EE45.ssv
-  E-RAM8-S-PA25.prm5
-  E-RAM8-S-PE25.prm5
-  서보트로닉스 DE드라이버용 EtherCAT_ESI
-  서보트로닉스 EE드라이버용 EtherCAT_ESI
-  파나소닉 PE드라이버용 EtherCAT_ESI

3.7 Parameter backup & parameter recovery

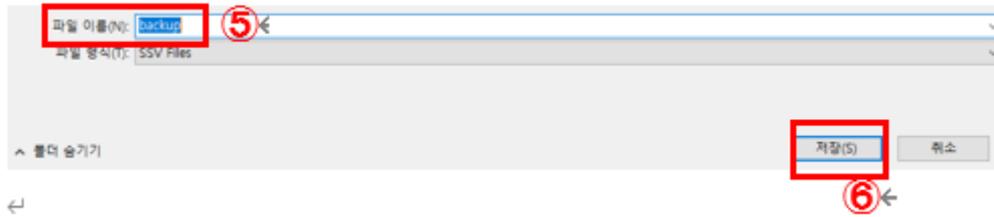
● Parameter backup

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

3 Click <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.