Working with Motion Studio

AC Servo Drive

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Before we start

Please prepare the following items before we start to work with Motion Studio.

1. Leadshine AC Servo Drive (EL6/ELP/EL7 Series)
2. Leadshine AC Servo Motor (Recommended by Leadshine to be matched with driver)
3. Data cable
    a. Ethernet-to-DB9 female– For EL6 series AC servo drives
    b. Mini-USB – For ELP/EL7 series AC servo drives
    (Please mind that a charging cable might not be able to transfer data.)
4. Motor power cables (**Direct** or **Aviation** connector depending on motor models)
5. Encoder cables(**Direct** or **Aviation** connector depending on motor models)
6. Motion Studio. Can be downloaded on our website www.leadshine.com

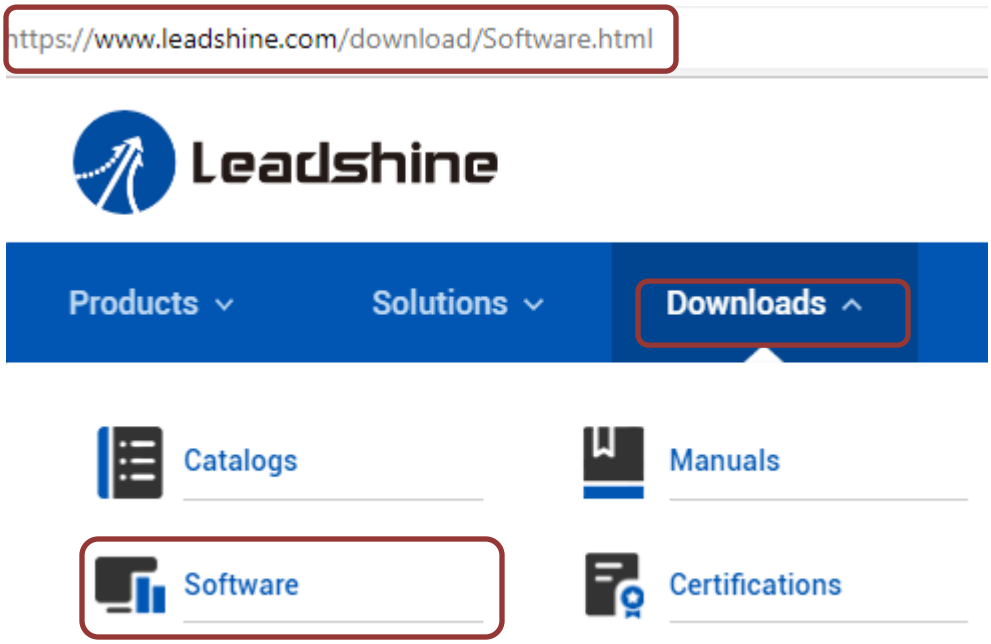
System requirement to run Motion Studio

Operating system: Windows XP or above
CPU: 1.5GHz or above
RAM: 256MB or above
Hard disk capacity: 10GB or above
Display: Resolution 1024*768, color 24 bit
Communication interface: USB Type-A series adapter

Introduction

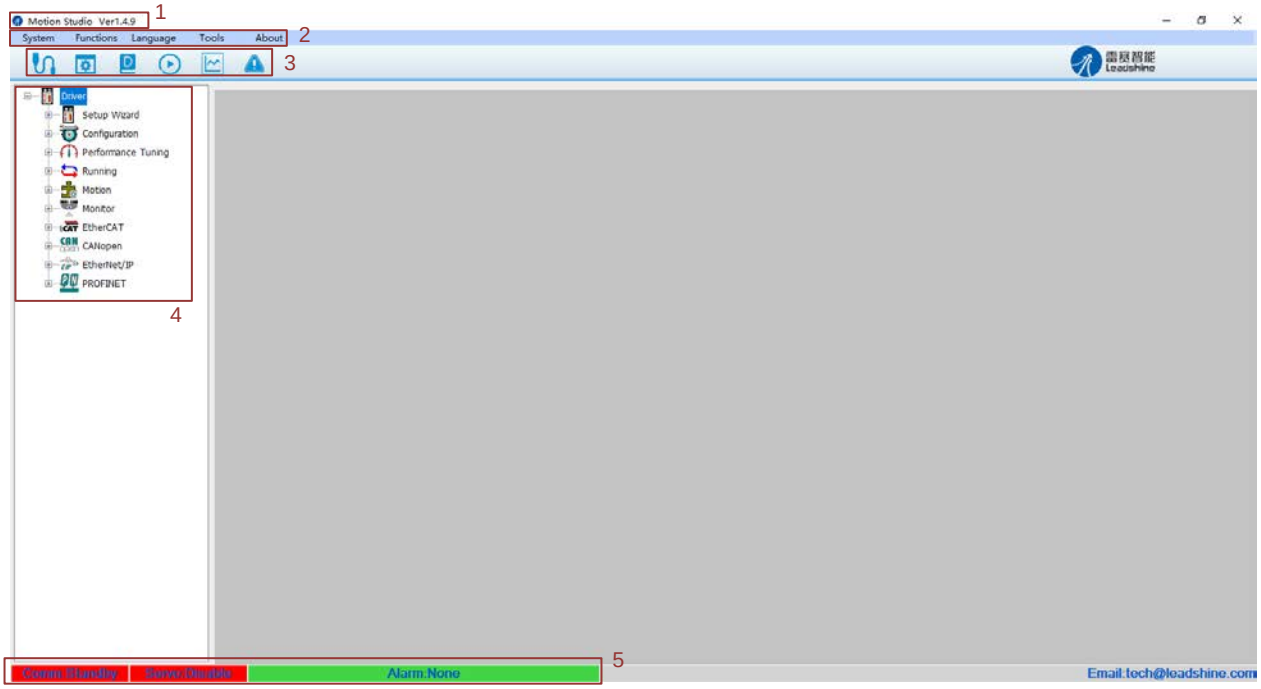
Motion Studio is a free-to-use software developed by Leadshine Technology Co., Ltd. for simple commissioning of Leadshine AC servo products. Through Motion Studio, users can connect the drivers to PC for parameters reading & writing, system performance tuning, trial run, driver status & data monitoring and much more. Most of the functions can be realized without connecting the driver to a main power supply.

There is no need to install Motion Studio. Download “MotionStudio_ACServo” for designated Leadshine products on our website and unzip the file. Click on MotionStudio.exe to start the software. User manual for Motion Studio can be found in Help folder. It is recommended to save Motion Studio in other disks than C: drive.



Getting started with Motion Studio

After unzipping "MotionStudio_ACServo", click on MotionStudio.exe *to start Motion Studio.*



Motion Studio Workspace

① Motion Studio software version

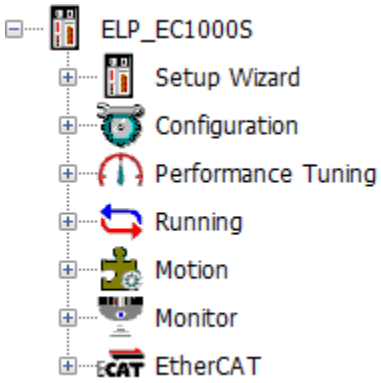
② Pull-down menu

System	▪ To connect to servo drives ▪ To exit software
Functions	▪ To save modified parameters ▪ To reset software ▪ To login to admin's rights
Languages	▪ To switch between Chinese and English display languages
Tools	▪ Serial Port Tool ▪ USB Tool ▪ Object Dict Tool ▪ Register Tool
About	▪ Platform info ▪ User manual

③ Quick Access buttons

	**Connect**	▪ To connect or disconnect servo drives in online or offline mode ▪ To check information of connected servo products
	**Parameters List**	▪ To read/write, modify, compare servo drive parameters ▪ To save parameters files as backup. ▪ To restore parameters back to factory default
	**Object Dictionary**	▪ To read/write, modify, compare servo drive objects. ▪ To save object dictionary as backup ▪ To configure PDO ▪ To restore objects back to factory default.
	**Trial Run**	▪ To test run servo products after connected to driver and motor (Need to connect to main power supply) ▪ To run inertia identification
	**Scope**	▪ To capture driver data waveforms ▪ To read captured driver's data
	**Alarm Info**	▪ To check current occurrence of error or alarm historical records ▪ To check the cause(s) of motor stops running

④ Navigation tree



Driver model no. will appear on top of the navigation tree. Branches of the navigation tree will adapt according to the communication protocol of the connected servo drive. For example, servo drives with EtherCAT communication protocol will only have EtherCAT appearing on the navigation tree.

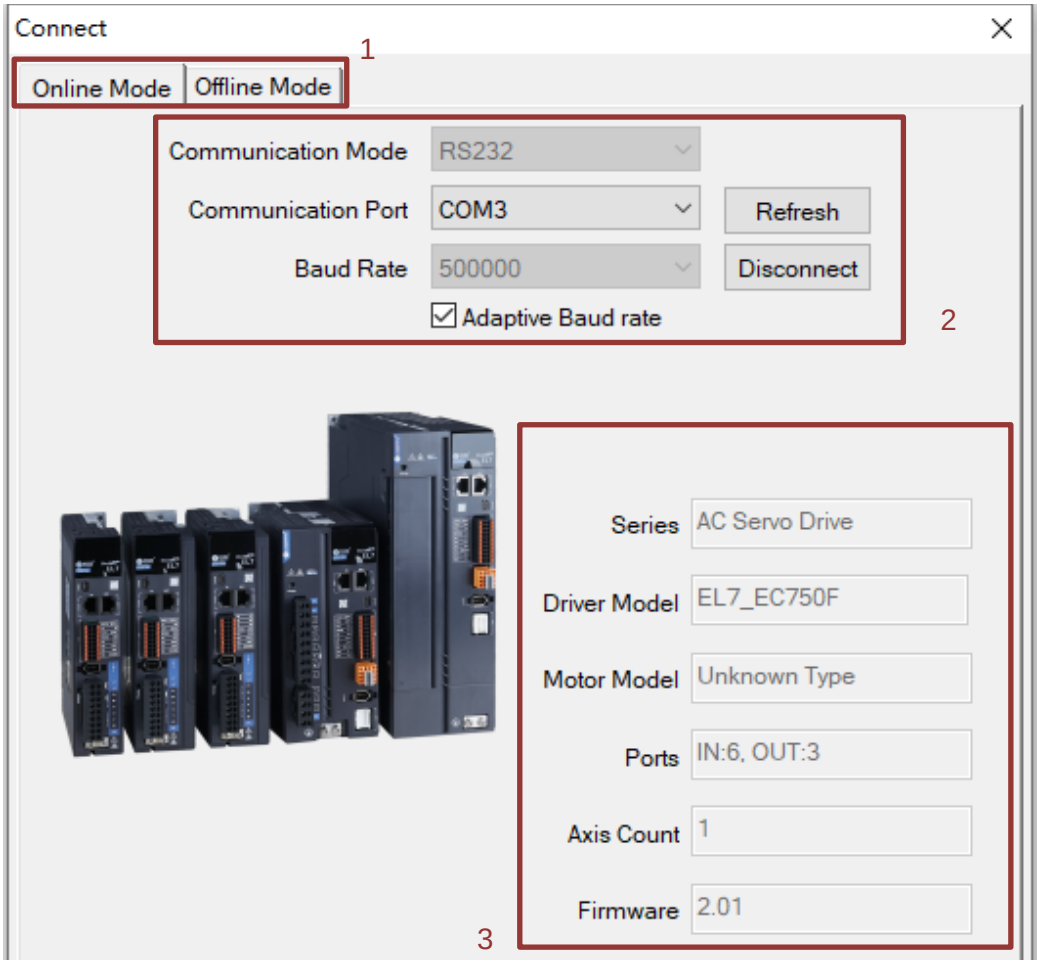
Branches and their extension functions will be explained in following chapters of the manual.

⑤ Status bar

Comm	To show connection status of the servo drive ▪ Standby (Red) – No driver connected yet ▪ Online (Green) – Driver successfully connected.
Servo	To show the status of the servo drive ▪ Disable (Red) – Servo drive is powered-off. ▪ Enable (Green) - Servo drive is powered-on.
Alarm	To show alarm status ▪ None (Green) – No alarm ▪ *Other* (Red) – Servo error occurs.

Connect to Servo Drive

1. Click on  .
2. "**Connect**" pop-up window will appear.



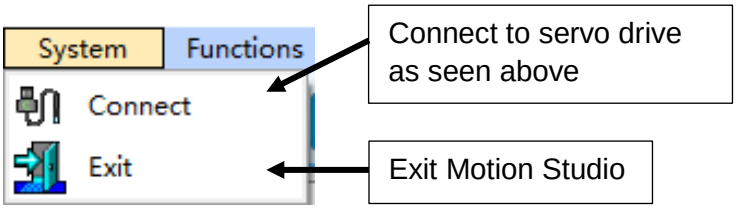
①	▪ Online mode: Driver and motor connecting to USB port automatically identified ▪ Offline mode: Use offline mode to read parameters saved in PC.
②	▪ Only RS232 communication mode is supported for the moment being. ▪ Communication Port can be automatically identified by clicking on "**Refresh**". If driver failed to connect, please verify data cable or change to another USB port. ▪ Check **"Adaptive Baud rate"** and click on **"Connect"** to connect to servo products. *Driver can be connected to PC without main power supply.*
③	▪ Servo products info such as series, model no., ports, axis count and firmware version can be found here.

3. When servo drive is connected to PC through data cable, USb will appear on the front panel of the servo drive. Err0D2 will appear due to no main power supply connected, it doesn't affect most tuning works of the servo drive.
4. Once successfully connected, Comm on status bar will turn green with "Comm: Online".

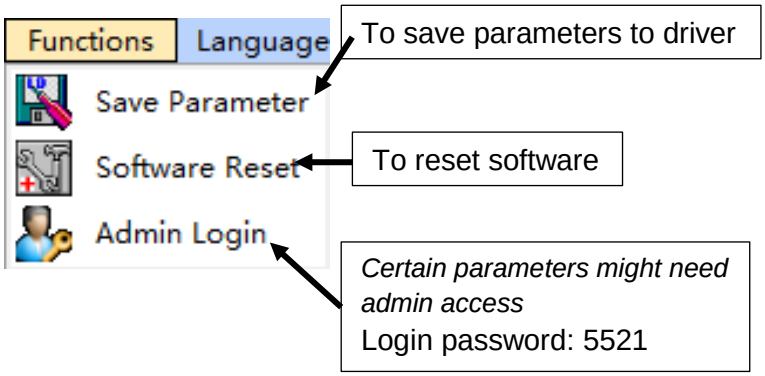
5. Connect window will close automatically in 3s after successfully connected.
6. If connection failed, please verify:
   a. Data cable. Charging cable might not be able to transfer data.
   b. Change another USB port.
   c. Any alarm error which needs to be reset.

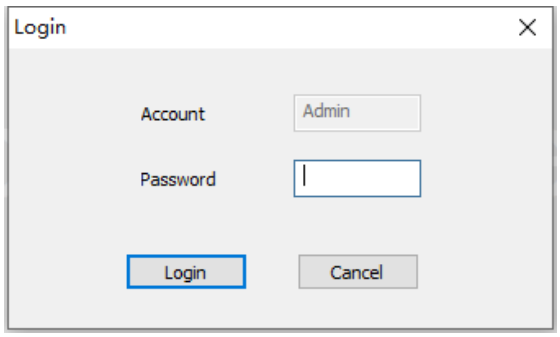
Pull-down Menu

System

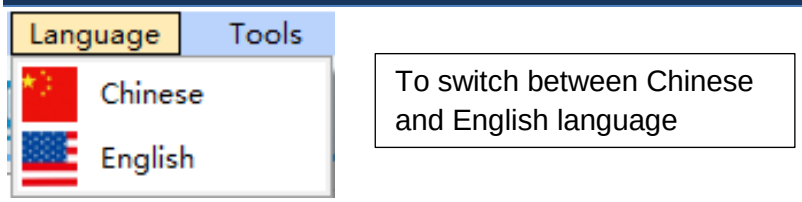


Functions

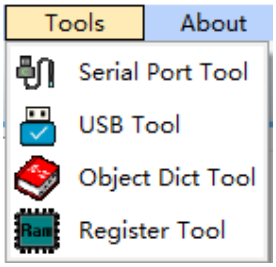


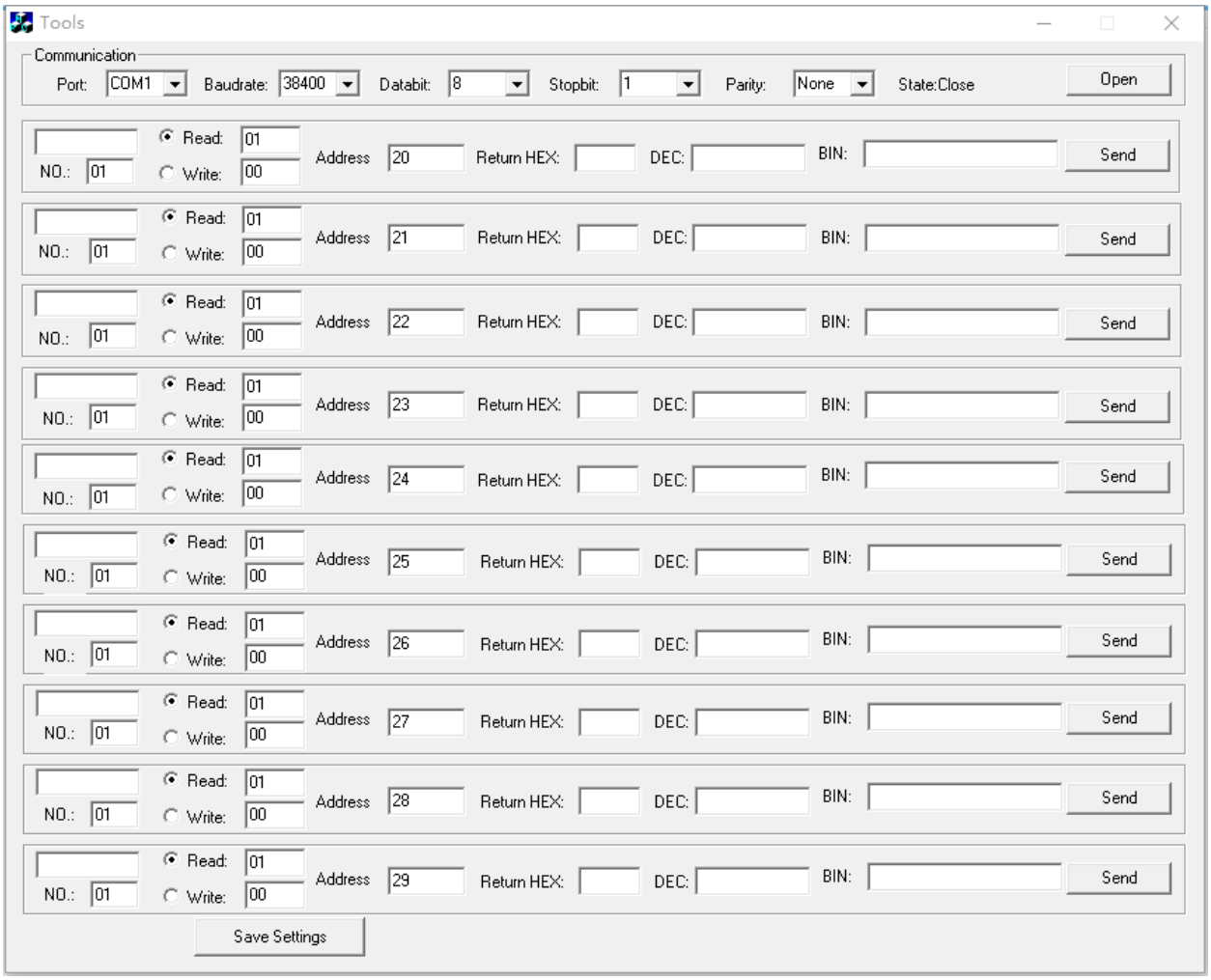


Language

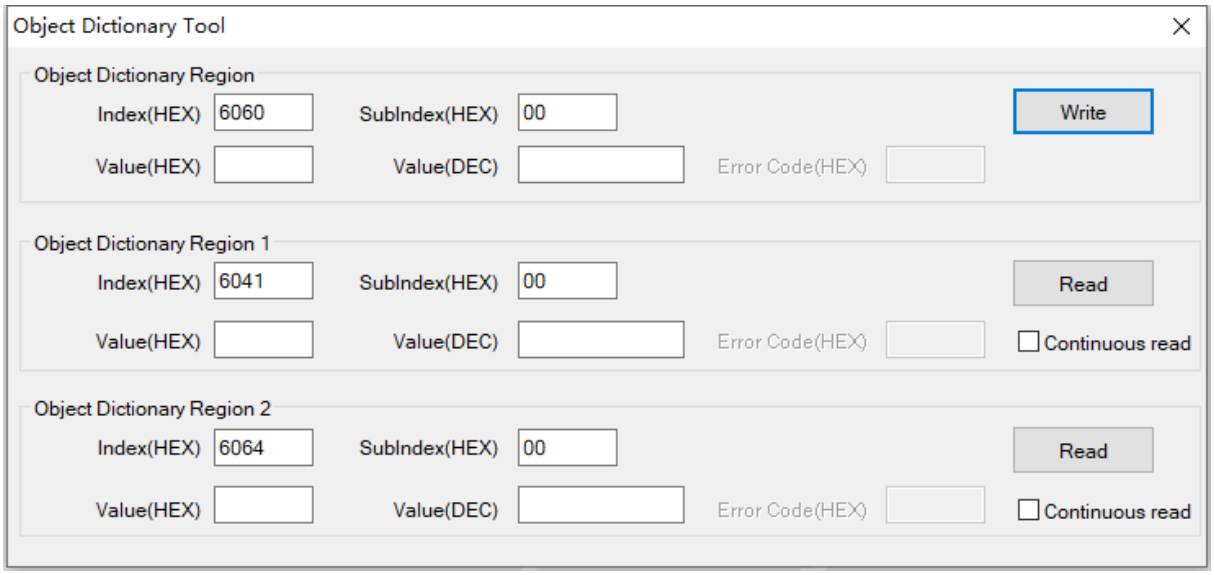


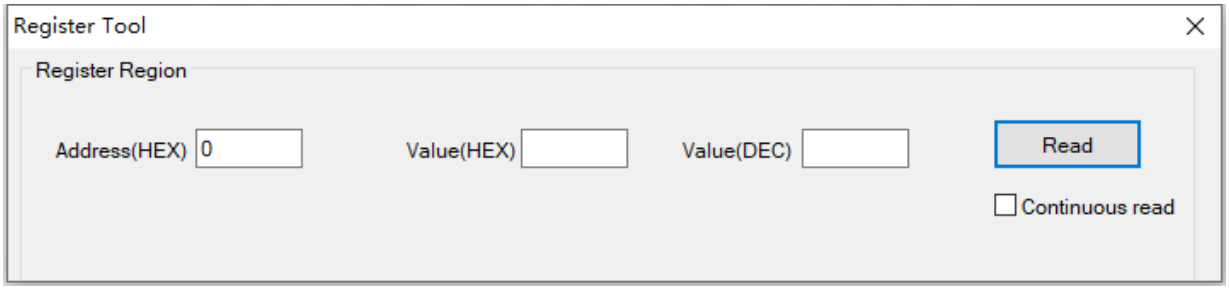
Tools


Tools
About
Serial Port Tool
USB Tool
Object Dict Tool
Register Tool

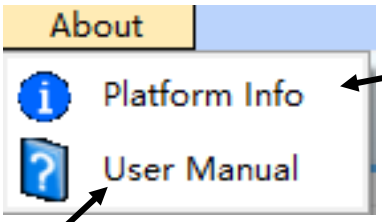

Tools
Communication
Port: COM1
Baudrate: 38400
Databit: 8
Stopbit: 1
Parity: None
State:Close
Open
NO.: 01
Read: 01
Write: 00
Address 20
Return HEX:
DEC:
BIN:
Send
Address 21
Address 22
Address 23
Address 24
Address 25
Address 26
Address 27
Address 28
Address 29
Save Settings


USB Debug Tool
Init
Driver No.:
63
Address(Dec):
00
Simple R/W
Return:
Read
Write:
Return:
Write
Batch Size R/W
len = 0
Read
(Hex)
len = 0
Write


Object Dictionary Tool
Object Dictionary Region
Index(HEX)
6060
SubIndex(HEX)
00
Write
Value(HEX)
Value(DEC)
Error Code(HEX)
Object Dictionary Region 1
Index(HEX)
6041
SubIndex(HEX)
00
Read
Value(HEX)
Value(DEC)
Error Code(HEX)
Continuous read
Object Dictionary Region 2
Index(HEX)
6064
SubIndex(HEX)
00
Read
Value(HEX)
Value(DEC)
Error Code(HEX)
Continuous read

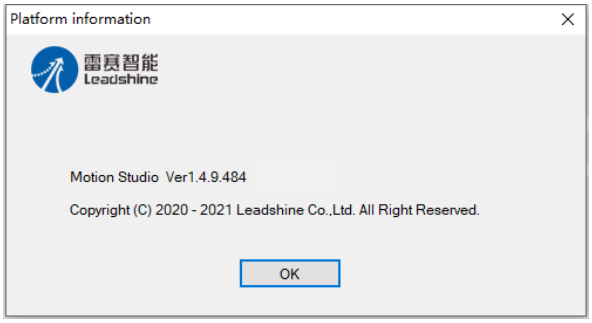

Register Tool
Register Region
Address(HEX)
0
Value(HEX)
Value(DEC)
Read
Continuous read

About



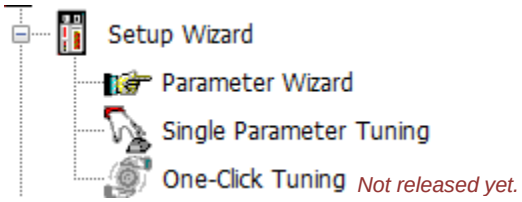
Access to Parameter descriptions and Motion Studio User Manual

Access to Parameter descriptions and Motion Studio User Manual



Navigation tree

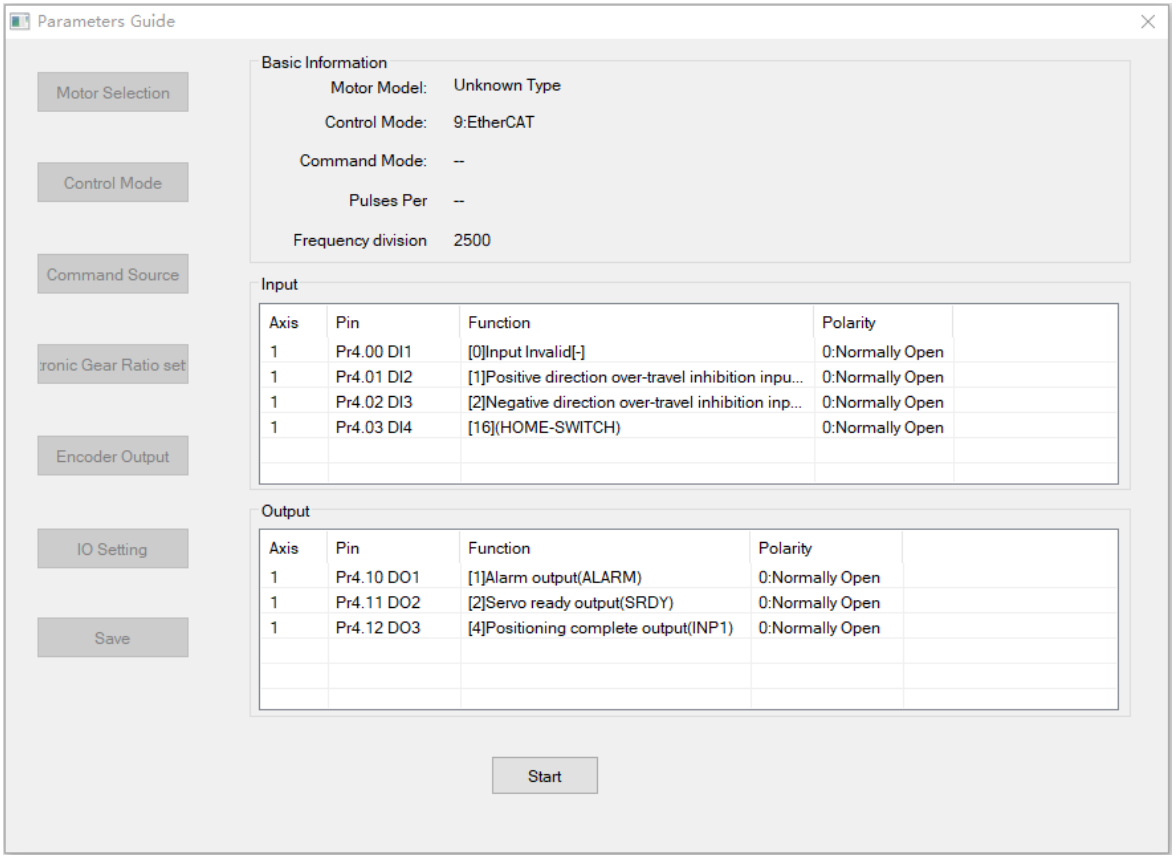
Setup Wizard



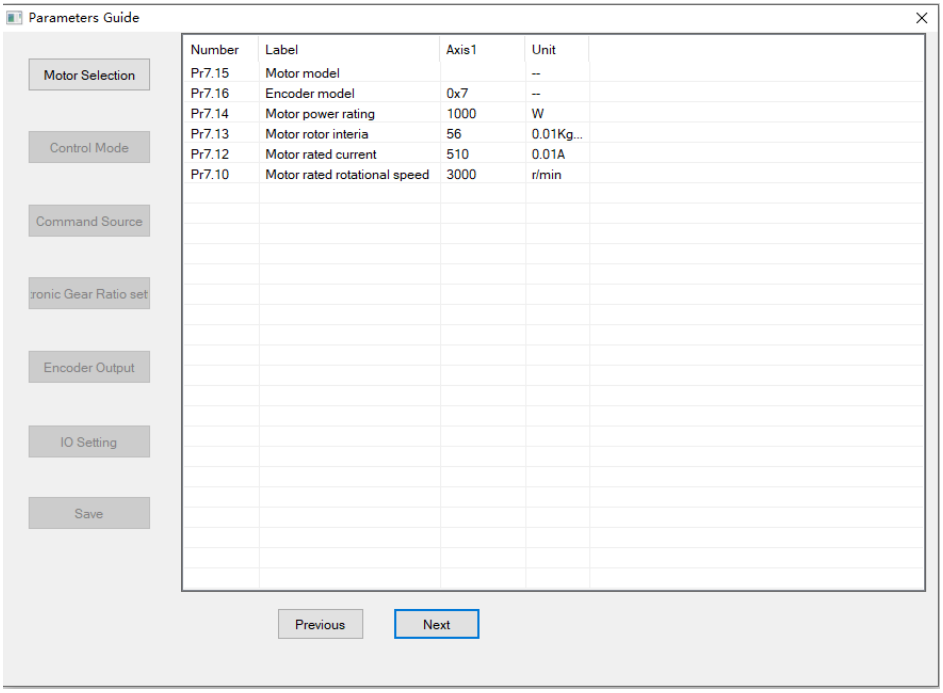
Parameter Wizard

Step-by-step guide to set up servo drives. Most of the parameters are automatically identified and set to default value once servo drive + motor is connected but users may need some customizations to servo parameters and settings.

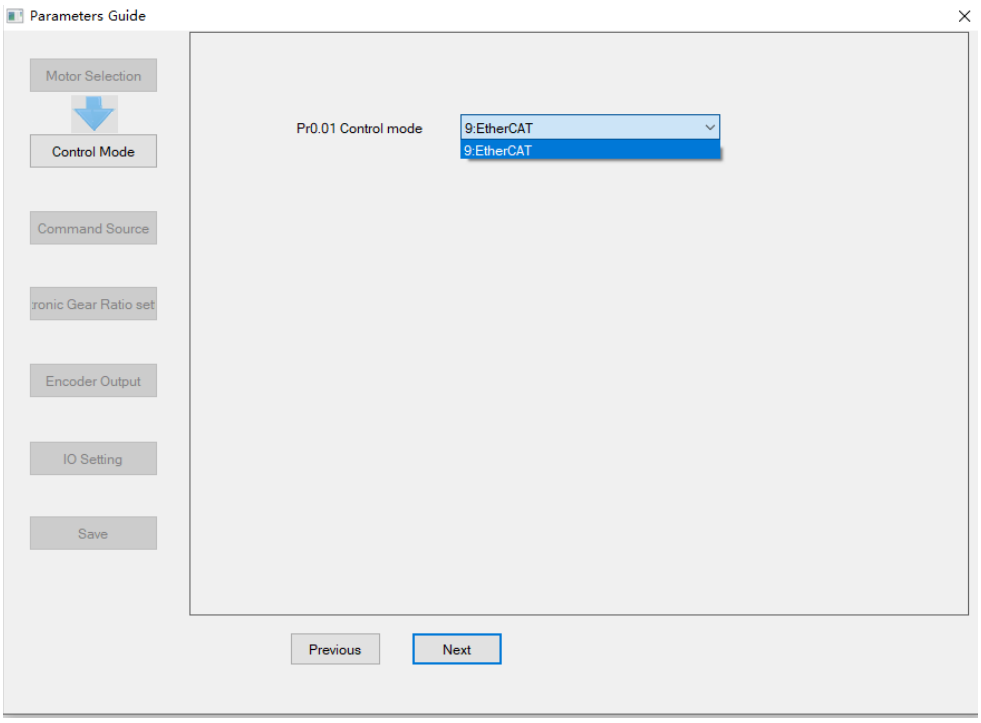
1. Start screen of Parameter wizard consists of basic information of the servo products, I/O interfaces and setup menu on the left. Click on “Start” to start servo parameters setup.



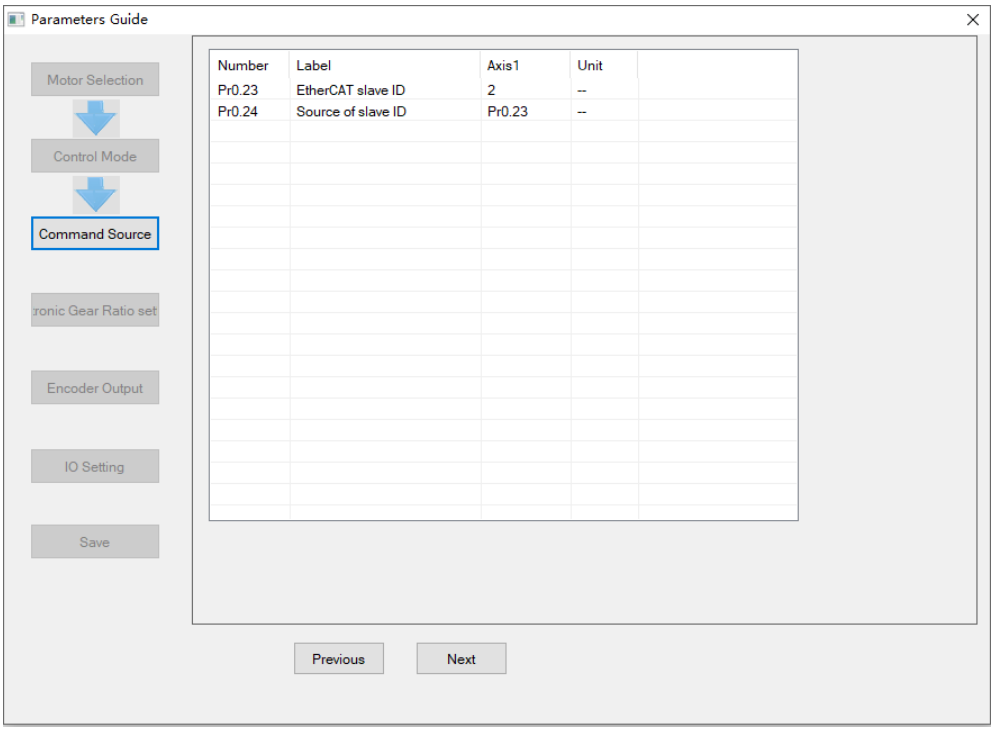
2. On motor selection page, user can find out more about motor and encoder specifications. Users are not recommended to modify any parameters on this page as it might cause abnormal behavior of the driver or motor. Click on “Next” to go to the next page or “Previous” to go back to previous page.



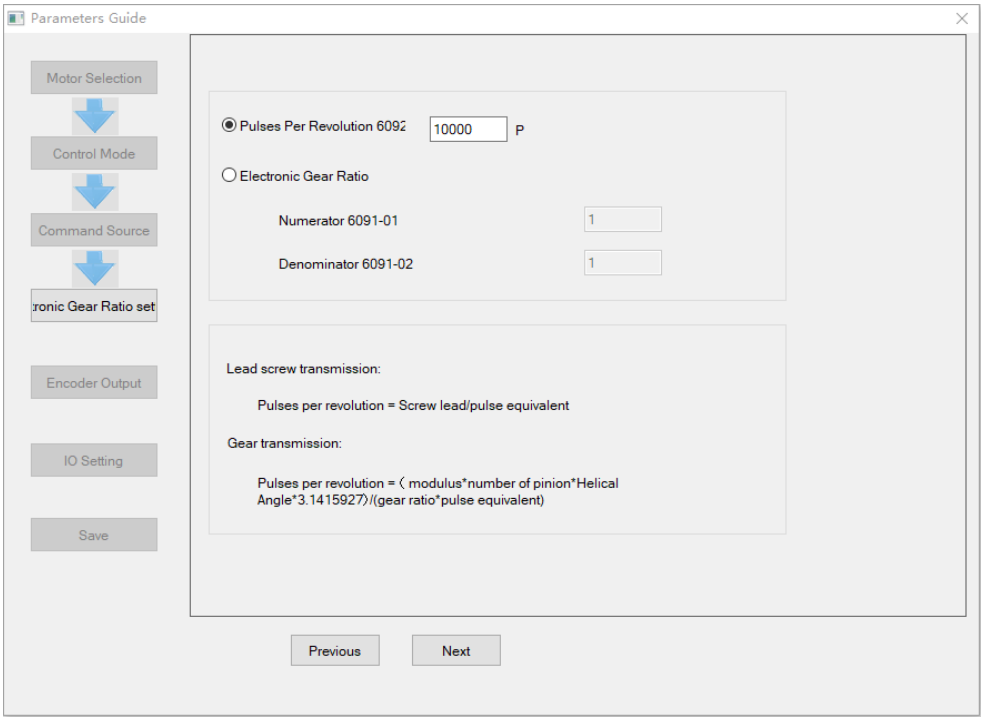
3. On control mode page, control mode of the driver is automatically identified. Click on “Next” to go to the next page or “Previous” to go back to previous page.



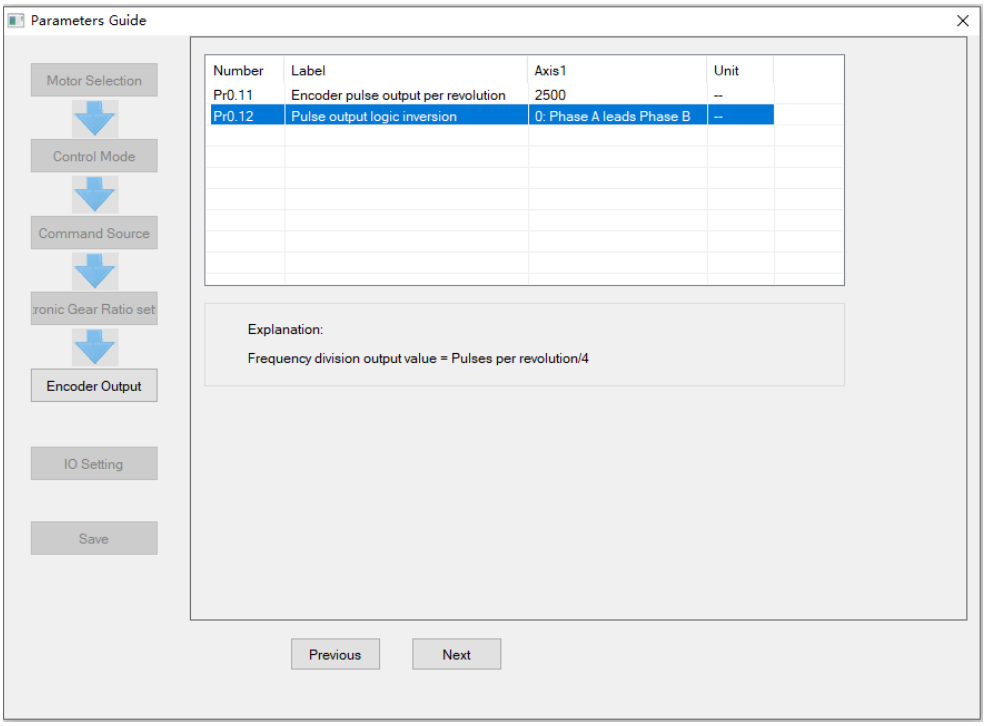
4. On command source page, set up slave ID source. Click on “Next” to go to the next page or “Previous” to go back to previous page.



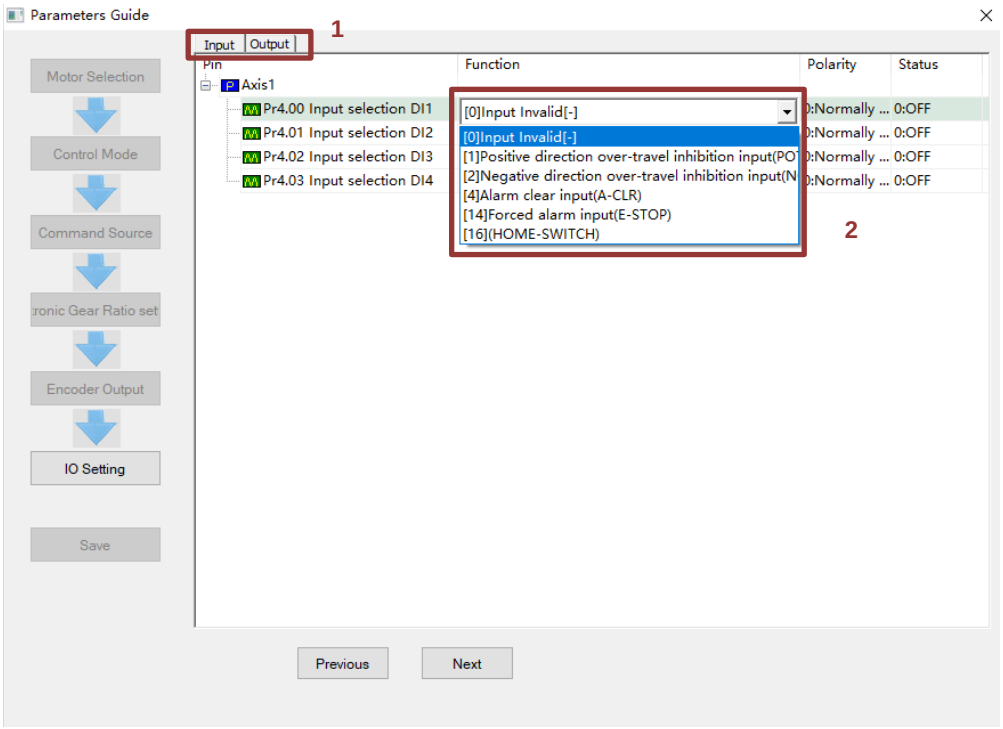
5. On Electronic Gear Ratio page, users can choose between setting pulses per revolution or electronic gear ratio. Calculation formulas are provided. Click on “Next” to go to the next page or “Previous” to go back to previous page.



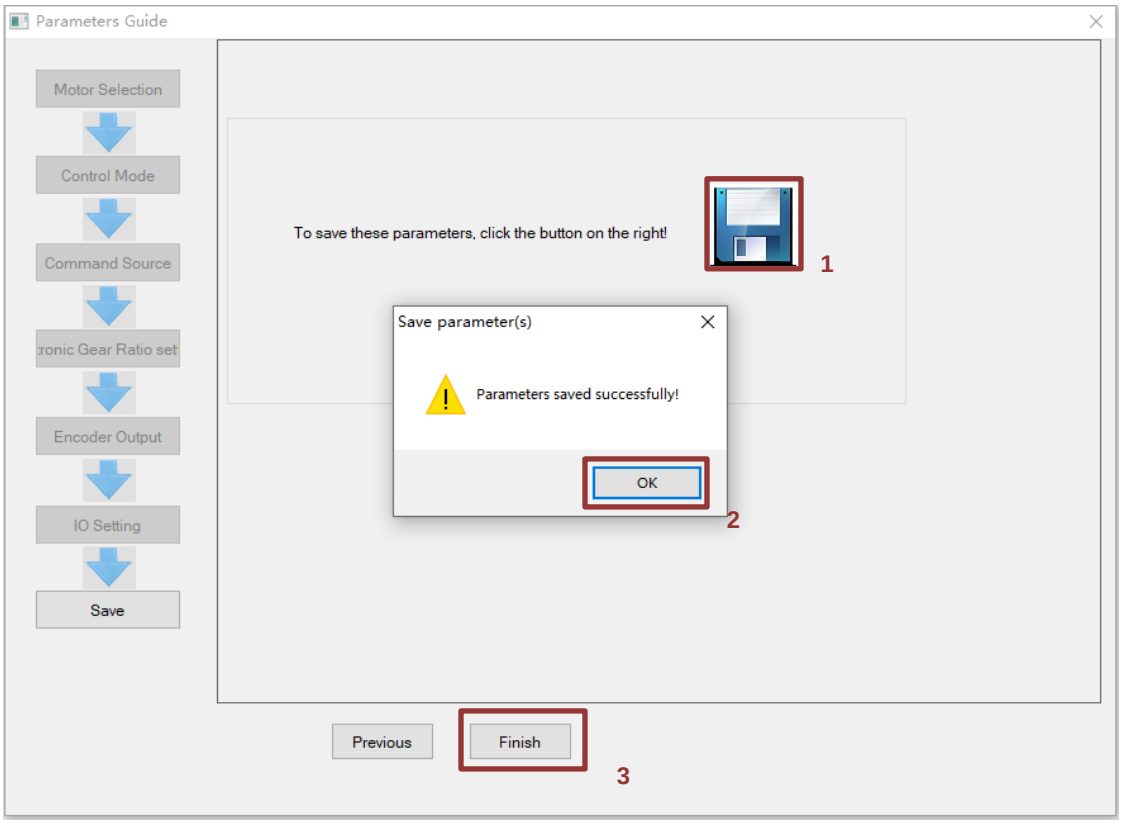
6. On Encoder Output page, users can set up encoder pulse output per revolution *(= Pulses per revolution/4)* and pulse logic. Click on “Next” to go to the next page or “Previous” to go back to previous page.



7. On IO settings page, users can allocate DI/DO signals to selected channels. Click on “Next” to go to the next page or “Previous” to go back to previous page.



8. On Save page, users can saved modified parameters. Click on “Next” to go to the next page or “Finish” to complete setup.



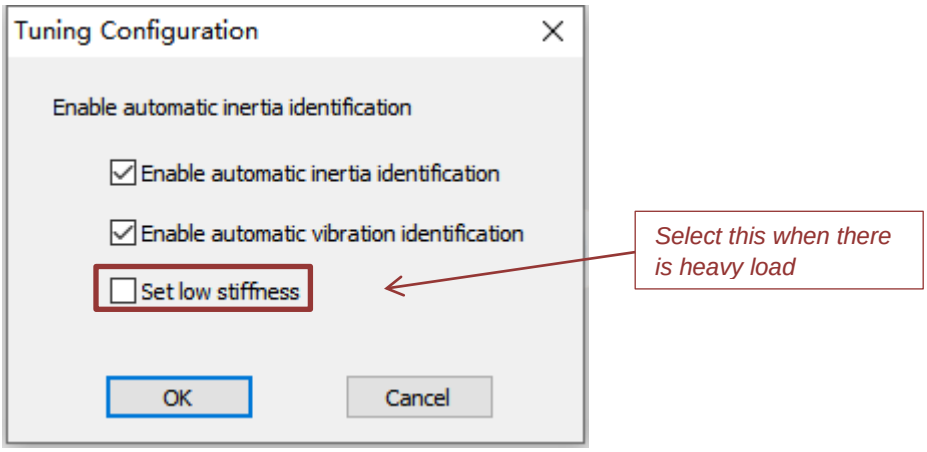
Single Parameter Tuning

Set a mechanical stiffness level and the driver will automatically tune the parameters accordingly, including inertia measuring and vibration suppression to fulfill responsiveness and stability needs. At same time, more advanced functions can be applied, for example: Command pulse filter, low frequency vibration suppression, etc.

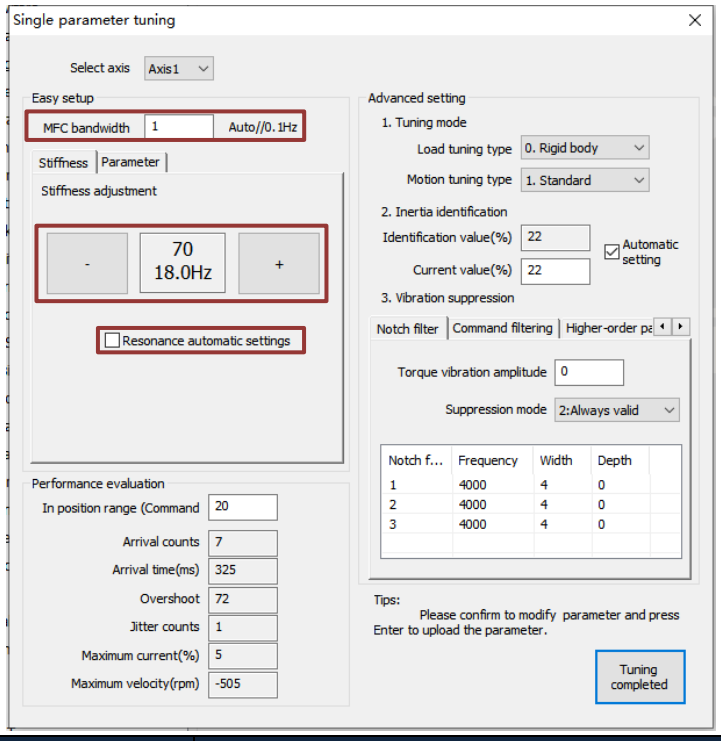
Recommended for applications where inertia changes is minute. Single parameter tuning is more complicated to set up compared to one-click tuning. Use single parameter tuning when one-click tuning doesn’t fulfill the needs.

Easy Mode

1. Click on “Single Parameter Tuning” under Setup Wizard. Choose “Enable automatic inertia identification” and “Enable automation vibration identification”. If the system is heavily loaded with Pr0.03 mechanical stiffness value lower than 70, by selecting “Set low stiffness”, initial Pr0.03 value in Single Parameter Tuning will start at 70.



2. Set the value of MFC bandwidth, stiffness as per the table below under Easy Setup.



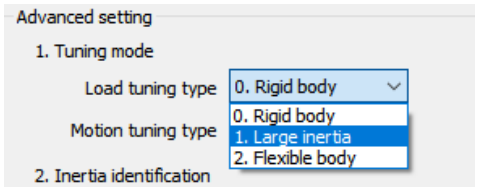
MFC bandwidth set value	Description
0	Deactivate model-following control function
【1】	Automatically adjust MFC bandwidth
2~9	Invalid
10~2000	Manually adjust MFC bandwidth; Recommended 30-100 for transportation belt applications

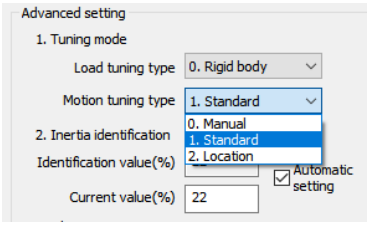
Stiffness level goes from 81-50 with 50 being highest stiffness level. Velocity response improves with higher stiffness level but vibration might occur. For flexible structures, decrease stiffness level and setup vibration suppression.

3. Resonance automatic settings: Automatically identified vibration under actual stiffness level settings. Default value is restored when no vibration is detected. If not selected, value will not be restored to default.

Advanced mode

4. Set Tuning mode.





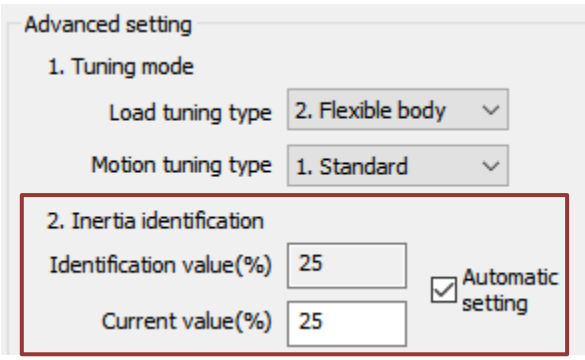
Load tuning type

Rigid body: Structure with low flexibility (i.e. screw leads)
High Inertia: 30-40 times higher than load inertia.
Flexible body: Low stiffness (i.e. belt)

Motion tuning type

Manual: Auto adjustment off. Parameters under Easy Setup available to be modified.
Standard: Prioritize stability. No switch gaining.
Location: Recommended for horizontal axis with variable load or ball screw structures.

5. Inertia identification is automatically enabled at the start.
Identification value (%): Inertia ratio will be automatically identified with yellow box blinking on every successful identification
Current value (%): If “Automatic setting” is selected, inertia ratio will be automatically synchronize to Pr0.04. If not selected, user can press Enter to set the value to Pr0.04.



6. Vibration suppression: Notch filter

Torque vibration amplitude: 0% - Max. sensitivity, 100% - Deactivated *(Adjust accordingly)*

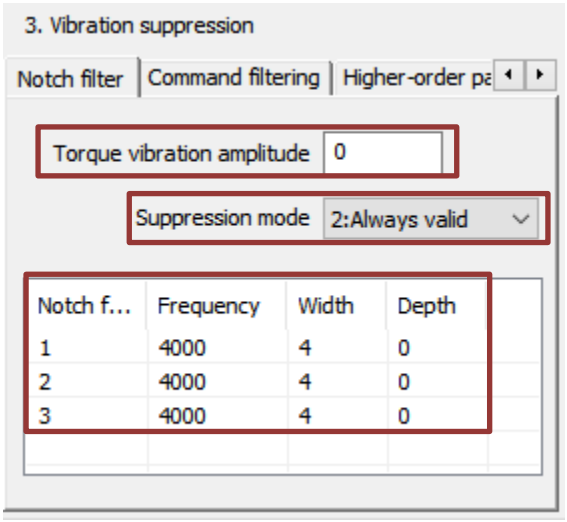
Suppression mode: 0 – Adaptive notch filter **deactivated**
1 – Adaptive notch filter **valid for once**
2 – Adaptive notch filter **always valid**

Notch filter: *1st, 2nd and 3rd notch filter*

Frequency(Hz): 50~2000

Width: 0~20

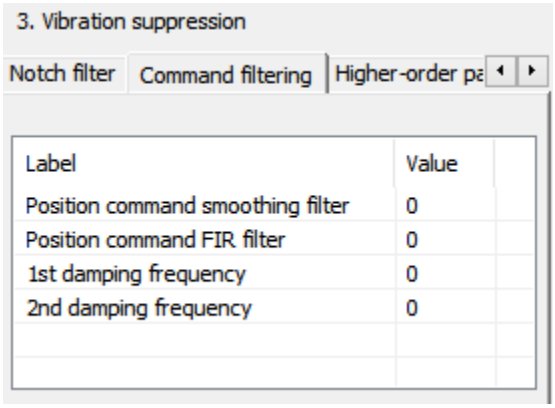
Depth: 0~99



*Right click on notch filter parameters to **cut, paste or reset** the parameters*

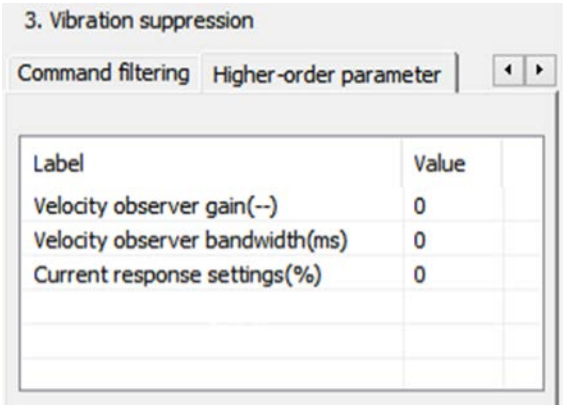
Vibration suppression： Command filtering

(These parameters are manually set, cannot be automatically identified.)



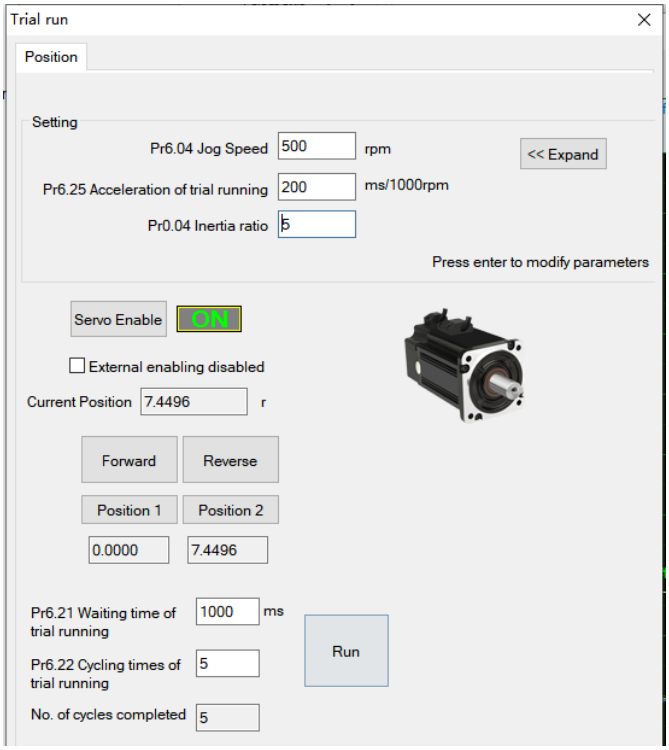
Parameter	Range(Unit)	Description
Position command smoothing filter	0~32767*(0.1ms)*	Large set value might elongate tuning time
Position command FIR filter	0~10000*(0.1ms)*	
1st damping frequency	10~2000*(0.1Hz)*	To suppress mechanical end vibration
2nd damping frequency	10~2000*(0.1Hz)*	

Vibration suppression: Higher-order Parameters



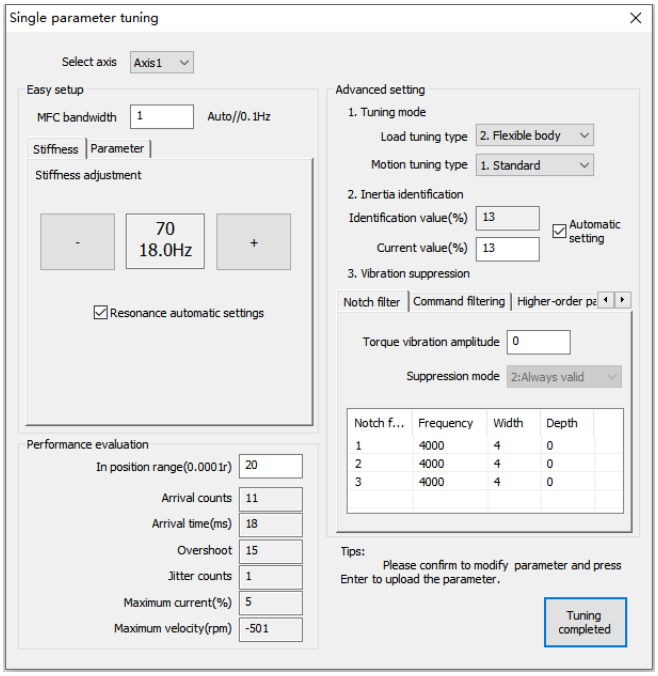
Parameter	Range(Unit)	Description
Velocity observer gain	0~32767	Defaulted to stable gain and bandwidth. Set = 1 to deactivate.
Velocity observer bandwidth	0~32767*(ms)*	
Current response settings	50~100*(%)*	Current loop related effective value ratio

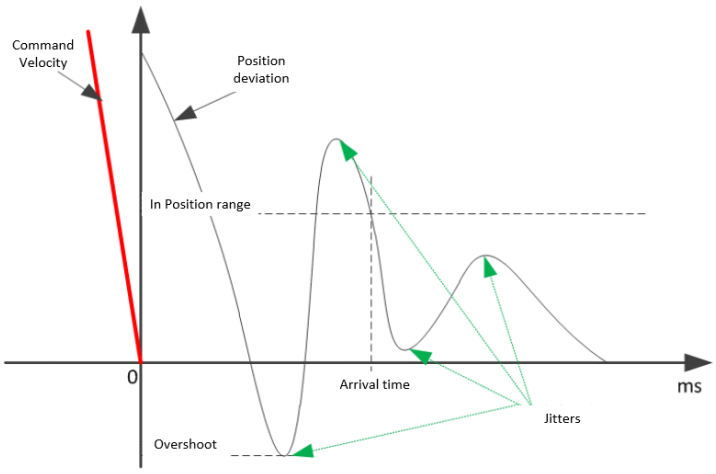
7. After the settings are done, use trial run to run the motor for at least 5 cycles.



Jog speed > 300rpm
Acceleration < 600ms
Position 1 and Position 2 should be around 5r
Interval waiting time between cycles should be < 500ms with at least 5 cycles

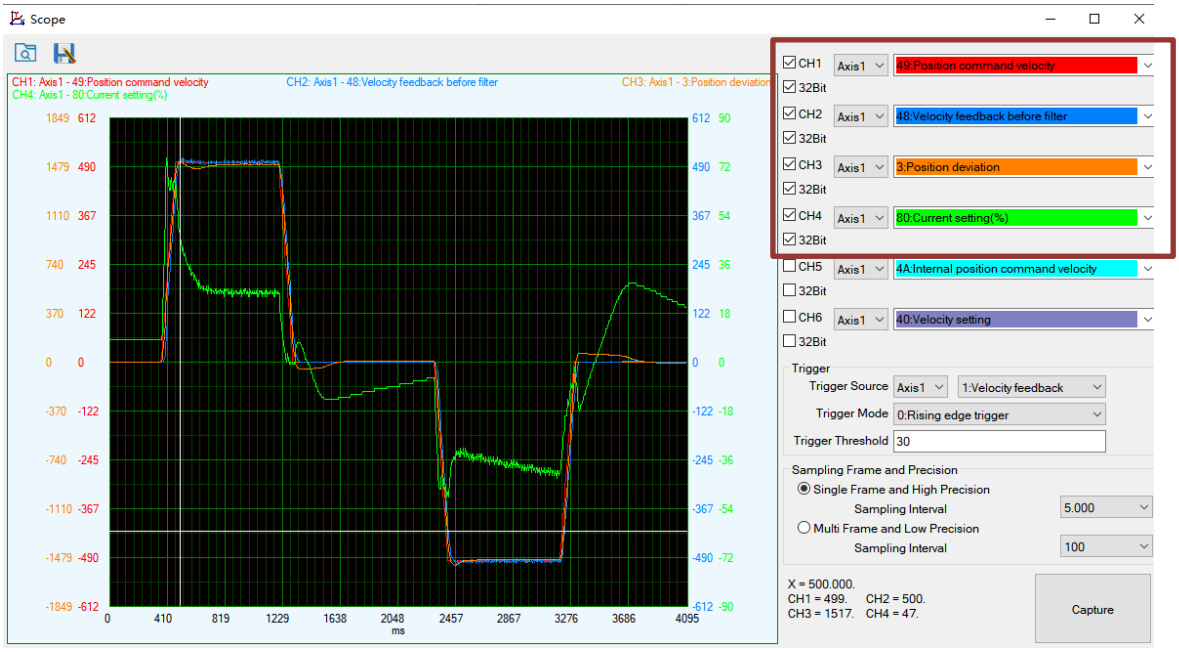
8. Performance evaluation



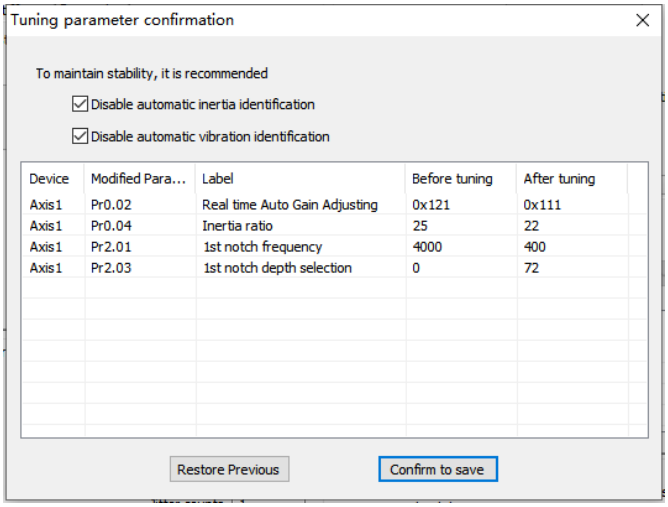


In position range	To set the velocity deviation between target velocity and actual velocity
Arrival counts	Number of times target value is arrived
Overshoot	The difference between target value and actual value. 10%(White) < Overshoot(Yellow) < 100% (Red)
Jitter counts	Detected jitters. Jitter count = 1(Yellow), more than 1(Red). Default(White)
Max. current	Percentage of max. current

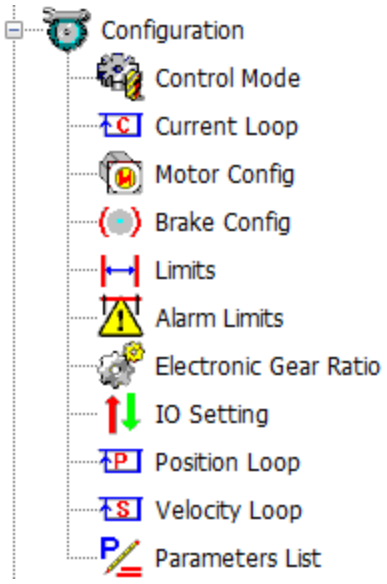
Use Scope to get desired waveform by decreasing stiffness value manually.



9. Disable automatic inertia and vibration identification. Confirm to save parameters or restore to previous settings if the tuning setup is not wanted.



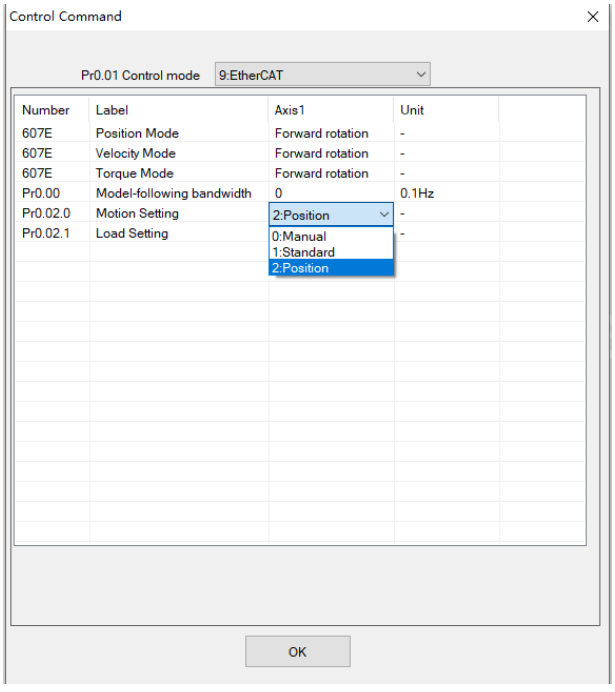
Configuration

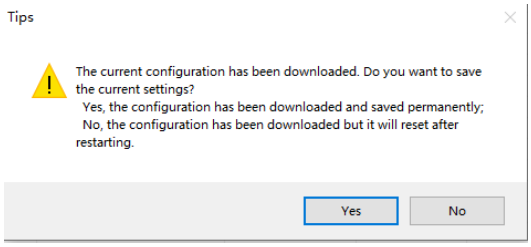


Most of the parameters settings can be set up in *Configuration.* Please refer to the parameters description chapter in the manual for explanation and further details on each parameter and their functions.

Control Mode

To set up control mode and Model Following Control (MFC) related parameters. Click on drop-down menu of each parameter for functions/selection assignments. Click “OK” after modification



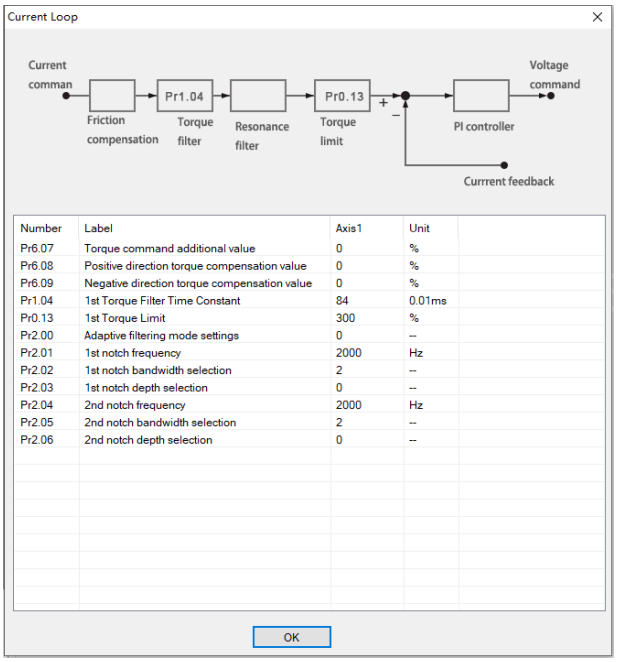


Click on “Yes” to save modification permanently. It is recommended to back up parameters before modifying crucial parameters.

Click on “No” and parameters will be restored after servo drive is restarted.

Current loop (Torque loop)

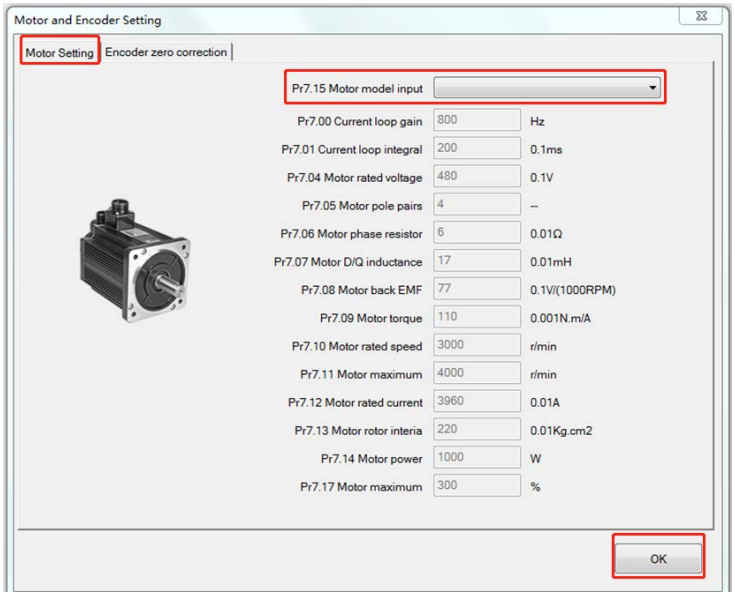
To set up current loop (Torque loop) related parameters. Notch filters can be activated if vibration suppression is required. Pr2.01 - Pr2.06 are valid if Pr2.00 adaptive filtering mode is disabled.



Number	Label	Axis1	Unit
Pr6.07	Torque command additional value	0	%
Pr6.08	Positive direction torque compensation value	0	%
Pr6.09	Negative direction torque compensation value	0	%
Pr1.04	1st Torque Filter Time Constant	84	0.01ms
Pr0.13	1st Torque Limit	300	%
Pr2.00	Adaptive filtering mode settings	0	--
Pr2.01	1st notch frequency	2000	Hz
Pr2.02	1st notch bandwidth selection	2	--
Pr2.03	1st notch depth selection	0	--
Pr2.04	2nd notch frequency	2000	Hz
Pr2.05	2nd notch bandwidth selection	2	--
Pr2.06	2nd notch depth selection	0	--

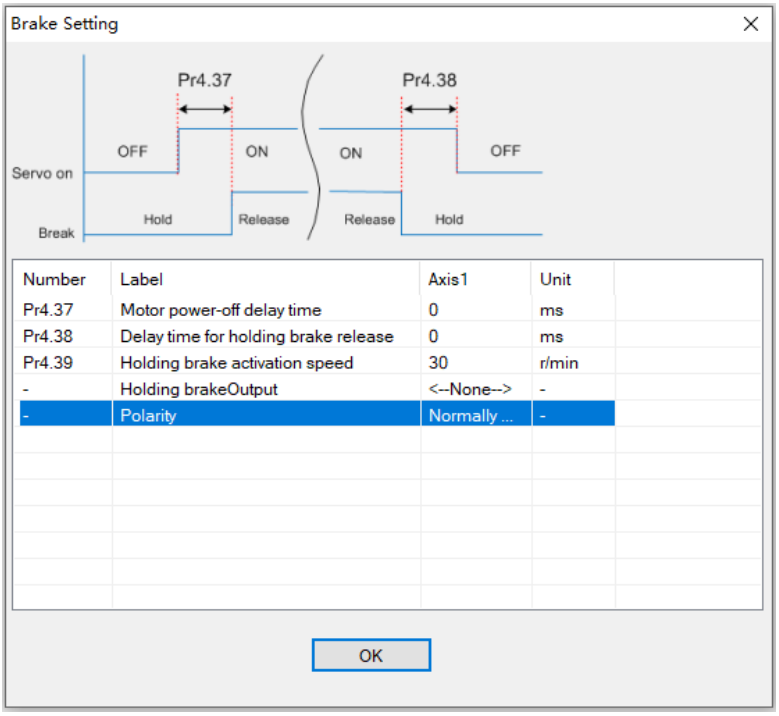
Motor Config.

Only for motor with incremental ABZ+Hall UVW encoder. Select motor model on Motor model input and click on “OK” to save motor parameter settings.



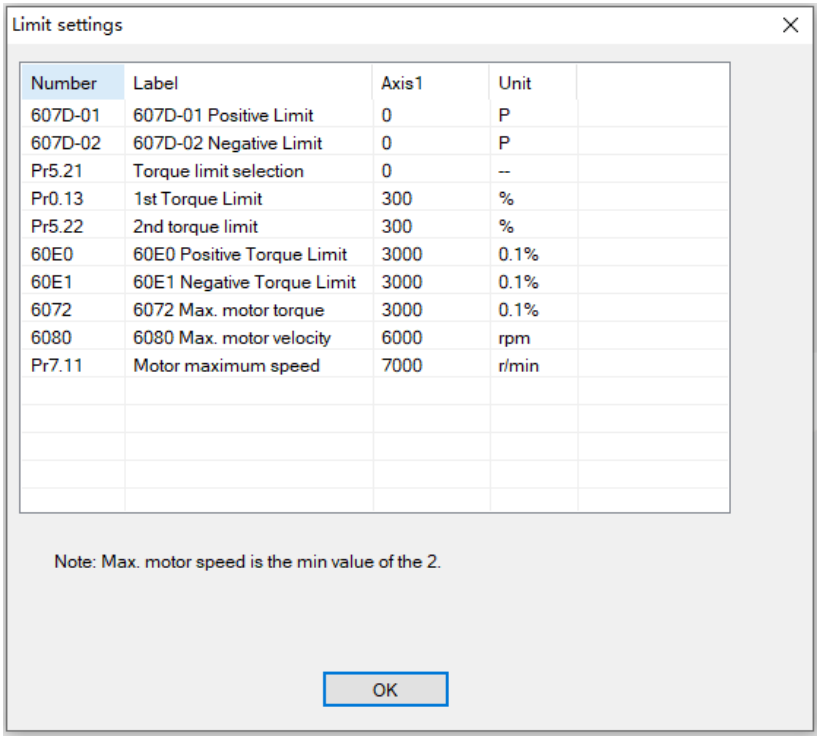
Brake Config.

To set up holding brake output signal, activation and delay time.



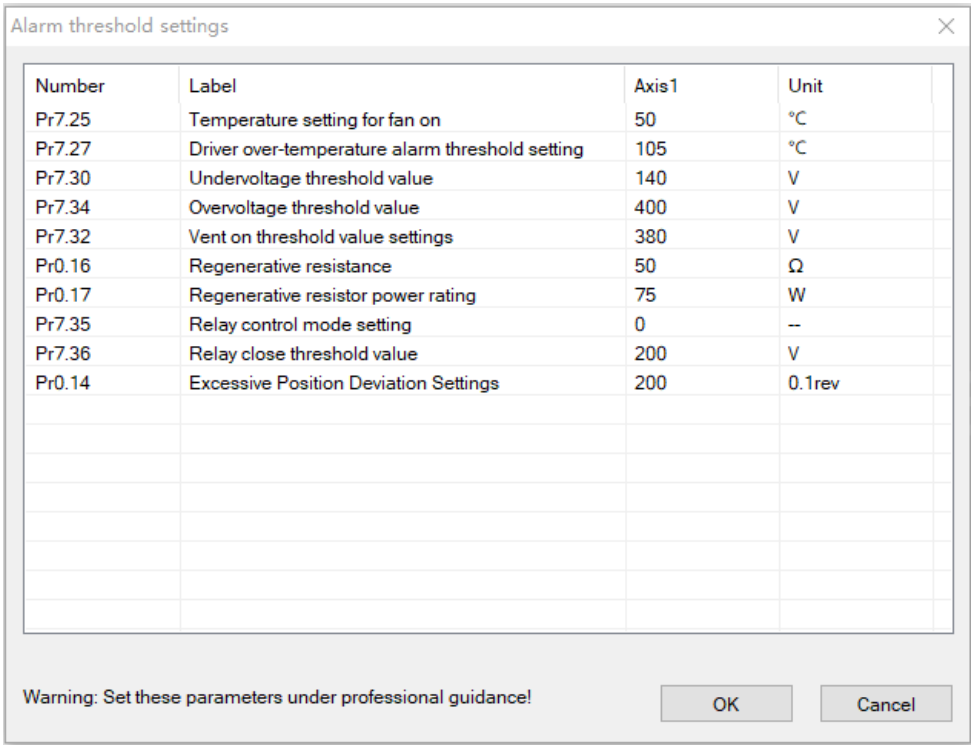
Limits

To set up positional, torque and velocity limits. Max. motor speed is the min. value of limit set in Pr7.11 and 6080h.



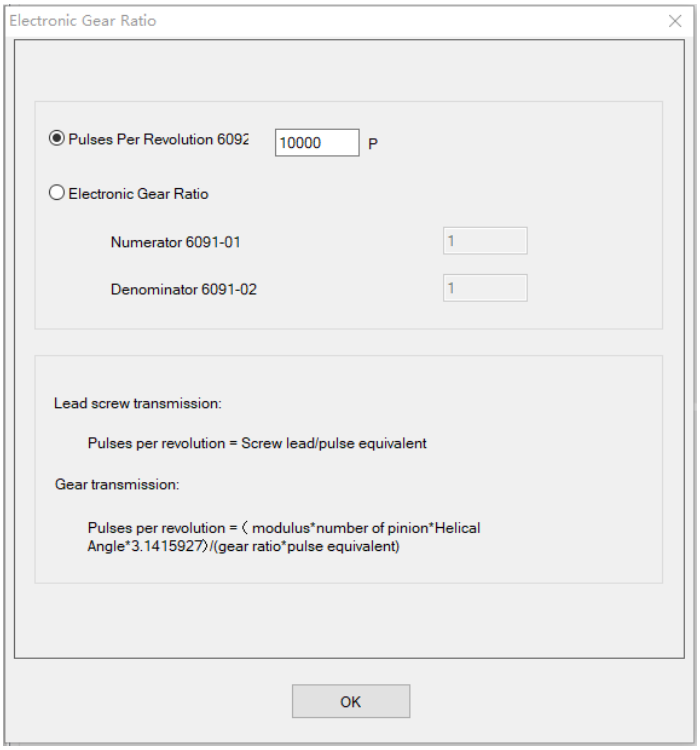
Alarm limits

To set alarm threshold value (value which alarm occurs once exceeded).



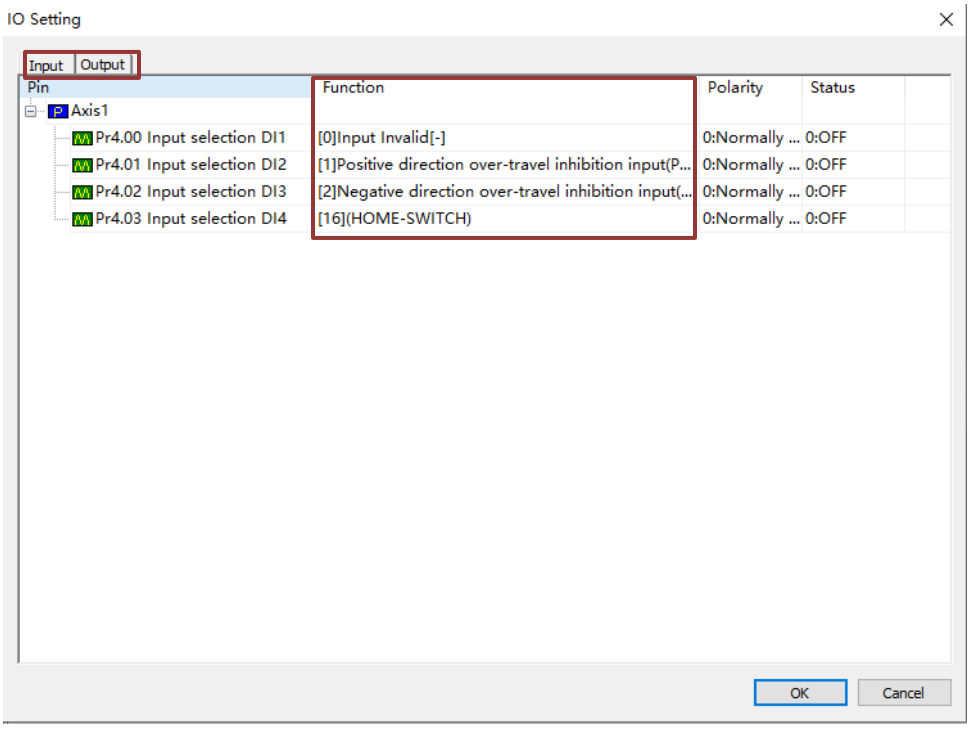
Electronic Gear Ratio

To set up Pulses per revolution or electronic gear ratio. Calculation formulas are provided.



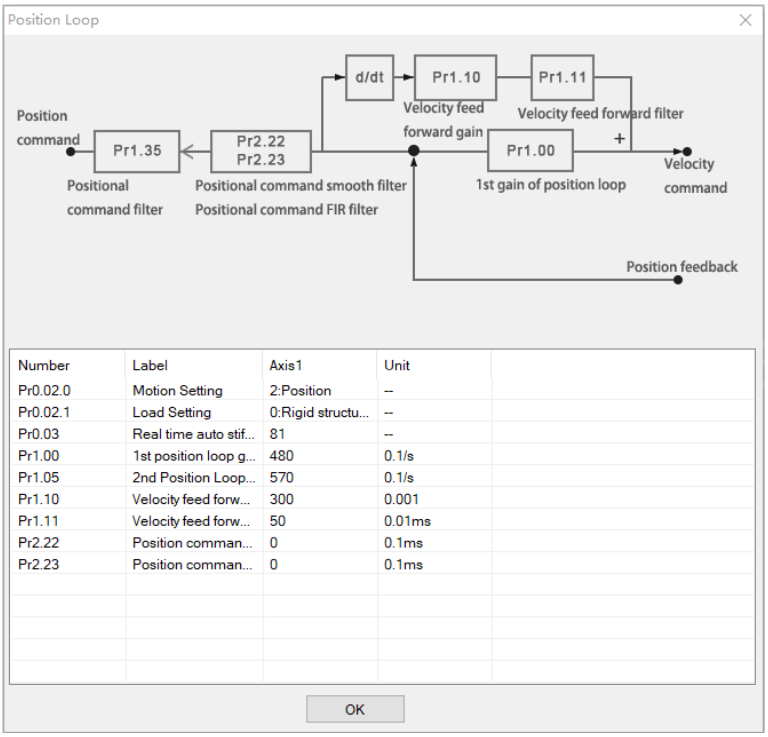
IO Settings

DI/DO signals can be switched on the tab above. DI/DO signals for each channel can be assigned using the drop-down menu on each channel.



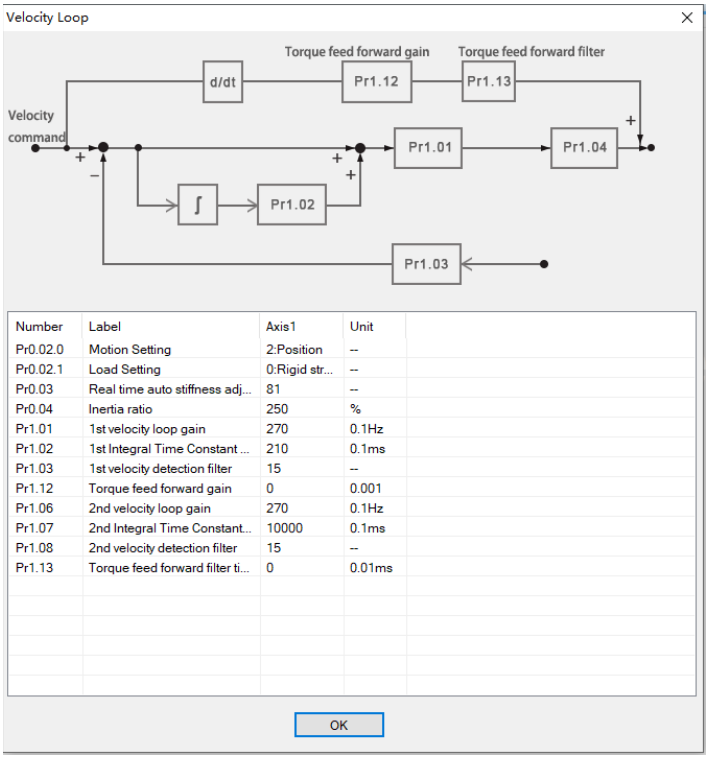
Position loop

To set up position loop control related parameters.



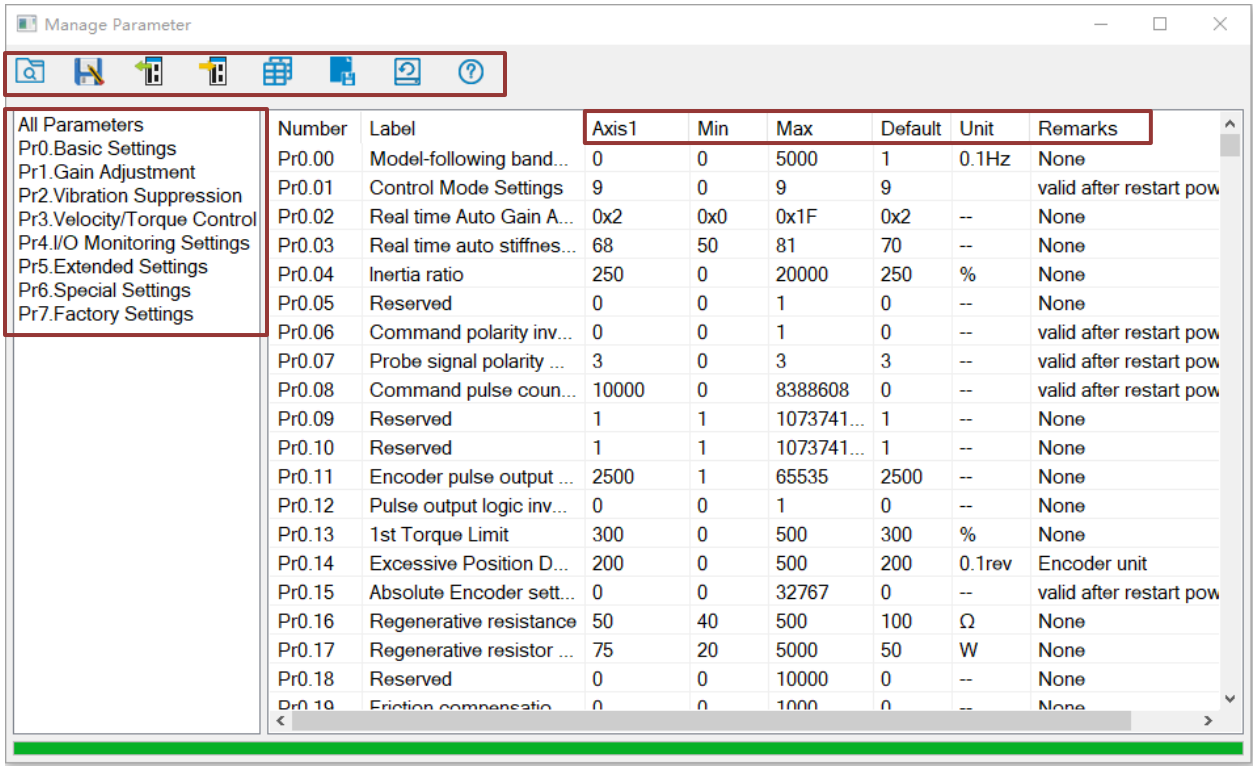
Velocity loop

To set up velocity loop control related parameters.



Parameters List

All servo drive parameters are listed in the parameters list. Parameters will be of default value at initial use. Parameters are classified into different categories on the left panel. Please be aware of **recommended range** when modifying the value on **Axis** column and **remarks** of the parameters as some parameter modifications may require servo drive restart to be valid. Admin right may be required for certain parameters.



Number	Label	Axis1	Min	Max	Default	Unit	Remarks
Pr0.00	Model-following band...	0	0	5000	1	0.1Hz	None
Pr0.01	Control Mode Settings	9	0	9	9		valid after restart pow
Pr0.02	Real time Auto Gain A...	0x2	0x0	0x1F	0x2	--	None
Pr0.03	Real time auto stiffnes...	68	50	81	70	--	None
Pr0.04	Inertia ratio	250	0	20000	250	%	None
Pr0.05	Reserved	0	0	1	0	--	None
Pr0.06	Command polarity inv...	0	0	1	0	--	valid after restart pow
Pr0.07	Probe signal polarity ...	3	0	3	3	--	valid after restart pow
Pr0.08	Command pulse coun...	10000	0	8388608	0	--	valid after restart pow
Pr0.09	Reserved	1	1	1073741...	1	--	None
Pr0.10	Reserved	1	1	1073741...	1	--	None
Pr0.11	Encoder pulse output ...	2500	1	65535	2500	--	None
Pr0.12	Pulse output logic inv...	0	0	1	0	--	None
Pr0.13	1st Torque Limit	300	0	500	300	%	None
Pr0.14	Excessive Position D...	200	0	500	200	0.1rev	Encoder unit
Pr0.15	Absolute Encoder sett...	0	0	32767	0	--	valid after restart pow
Pr0.16	Regenerative resistance	50	40	500	100	Ω	None
Pr0.17	Regenerative resistor ...	75	20	5000	50	W	None
Pr0.18	Reserved	0	0	10000	0	--	None
Pr0.19	Friction compensatio...	0	0	1000	0	--	None

	Read parameter files	Read parameter settings save on PC （.lsr files）
	Save parameters	Save current parameter files as .lsr files. Recommended to back up parameter settings before any modification.
	Read from driver	Read parameter settings from driver
	Write to driver	Write parameters to drivers.
	Compare parameters*	Parameters comparison can be made between current parameter settings, saved parameter files and parameter default values.
	Save to driver	Save parameters into drivers.
	Factory reset	Restore all parameters back to factory default
	Help	Parameters description can be found in Motion Studio User Manual

Compare parameter

Parameter values can be compared by clicking on  in Parameters List. “Compare Parameters” window will appear with option to set up parameter 1 and 2 for comparison. Parameters between different axes can also be compared.

Compare parameters

Parameter 1 Current Parame

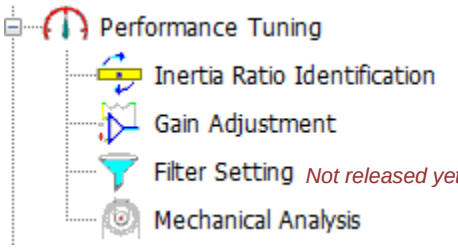
Parameter 2 Default

Show Axis1 Compare axis parameters

Compare

Axis	Parameter Type	Label	Parameter Value 1	Parameter Value 2
1	Pr0.00	Model-following bandwidth	0	1
1	Pr0.03	Real time auto stiffness ad...	68	70
1	Pr0.08	Command pulse counts p...	10000	0
1	Pr0.16	Regenerative resistance	50	100
1	Pr0.17	Regenerative resistor pow...	75	50
1	Pr1.00	1st position loop gain	480	320
1	Pr1.01	1st velocity loop gain	270	180
1	Pr1.02	1st Integral Time Constant ...	210	310
1	Pr1.04	1st Torque Filter Time Con...	84	126
1	Pr1.05	2nd Position Loop Gain	570	380
1	Pr1.06	2nd velocity loop gain	270	180
1	Pr1.09	2nd Torque Filter Time Co...	84	126
1	Pr2.01	1st notch frequency	2000	4000
1	Pr2.04	2nd notch frequency	2000	4000
1	Pr2.07	3rd notch frequency	2000	4000
1	Pr3.12	Acceleration time settings	100	0
1	Pr3.13	Deceleration time settings	100	0
1	Pr4.11	Output selection DO2	0x2	0x3

Performance Tuning

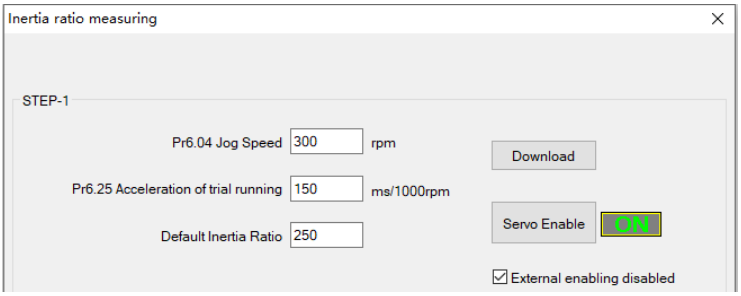


Not released yet. Filter settings are available in Gain Adjustment

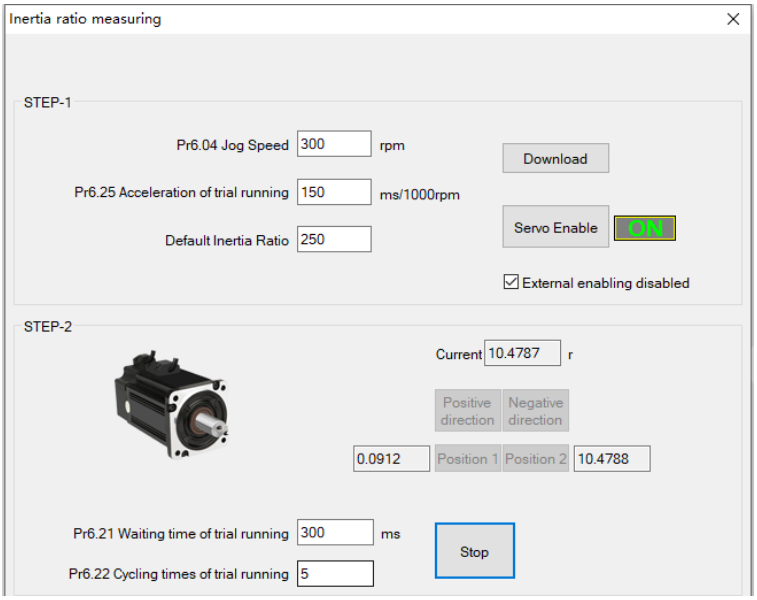
Inertia Ratio Identification

Inertia ratio of the servo product can be automatically identified using “Inertia Ratio Identification”. It is a step-by-step guided operation for performance tuning.

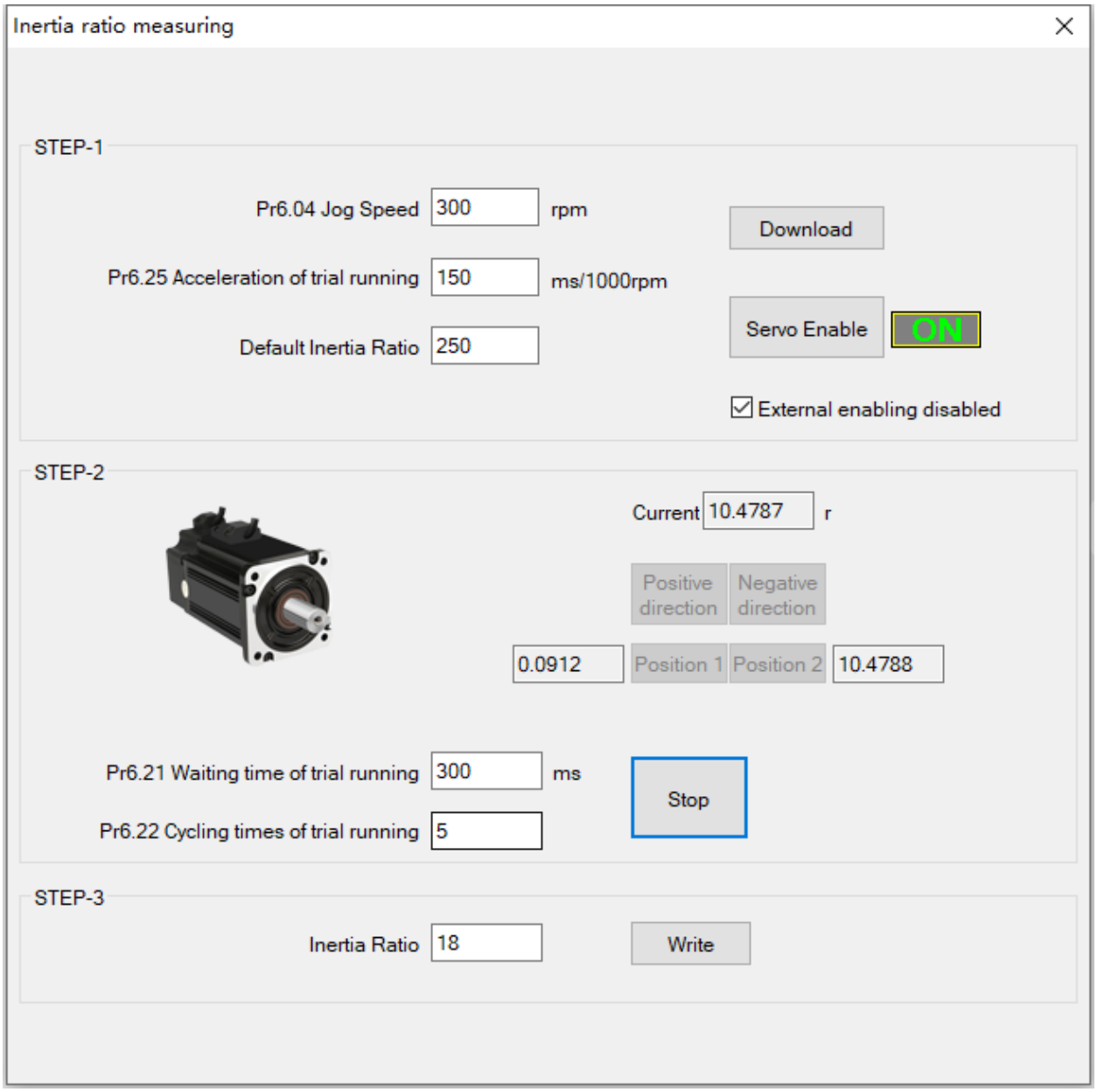
1. Set trial run velocity Pr6.04 and trial run acceleration Pr6.25, click on ‘Download’ to modify parameters. It is recommended to leave the parameters at default values. Then, Tick “External enabling disabled” and click on “Servo on” to enable the servo drive.



2. Click and hold “Positive direction” to start the motor. Current position will show motor position. Click on POS 1 to save current position as starting point. Click and hold “Negative direction” to start the motor again. Click on POS 2 to save current position as ending point. Then, Set the waiting time between each cycle in Pr6.21 and no. of cycles in Pr6.22. Click on‘Run’ and motor will run according to the parameters set.



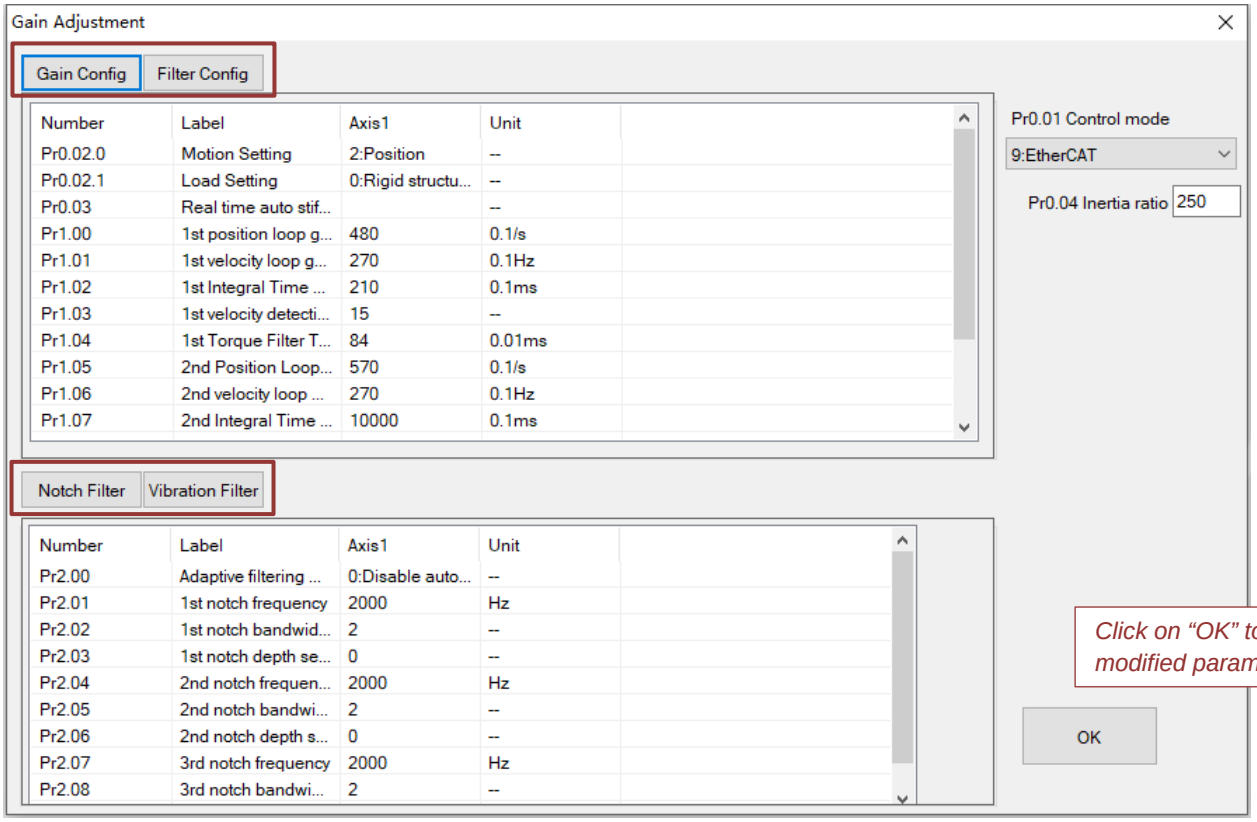
3. After the calculation is done, inertia ratio will be calculated automatically and click on 'Write' to enter the calculated value into Pr0.04. Click on "  " to enter Parameters List to check or modify Pr0.04. Then, click on "  " to save parameters to driver.



Please take note:
1. Trial run velocity and distance should be optimal to prevent any axis from bumping into objects.
2. It is recommended to move only in 1 direction for vertically mounted axis. Take precaution before moving the axis.
3. For applications with higher frictional drag, please set a minimal travel distance.

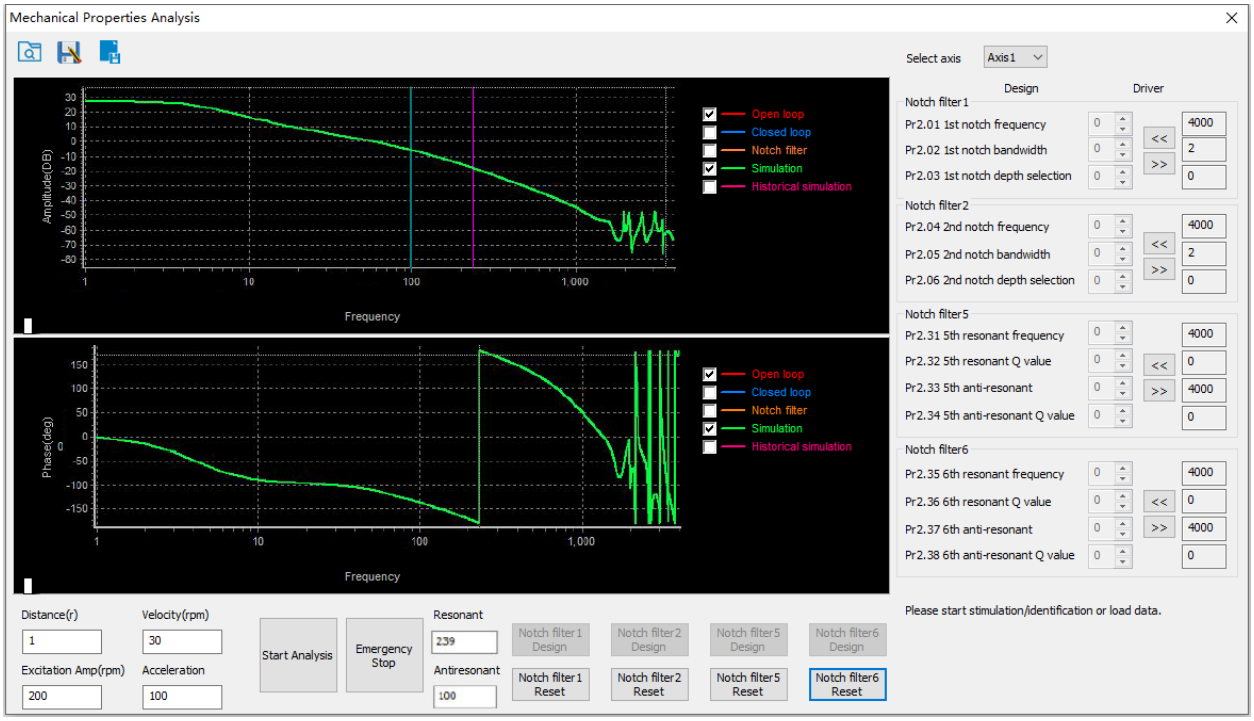
Gain Adjustment

Gain adjustment can be done automatically or manually. There are options for easy adjustments such as Single Parameter Tuning or One-click Tuning. Please refer to related AC servo drive series user manual for details on gain adjustment. Step-by-step guide to gain adjustment of different modes are available in product user manual. This section is only for introduction to gain and filter parameters tuning interface. Parameters descriptions are available in Help.



Mechanical Analysis

To determine mechanical and set up notch filter parameters to suppress vibration caused by resonance.

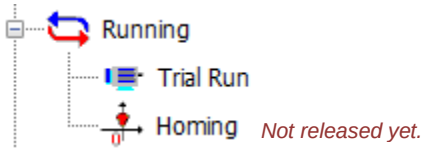


To avoid strong vibration, please first set lower excitation amplitude. However, if the set value is too low, data waveform will include some degree of distortion.

If vibration occurs during tests which can't be reduce through lowering electrical current excitation, it might be due to excessive gain. Please lower velocity gain and set notch filter as accordance from the mechanical properties analysis. Or might be due to inertia settings (Pr0.04) is too large, please use optimal inertia ratio value.

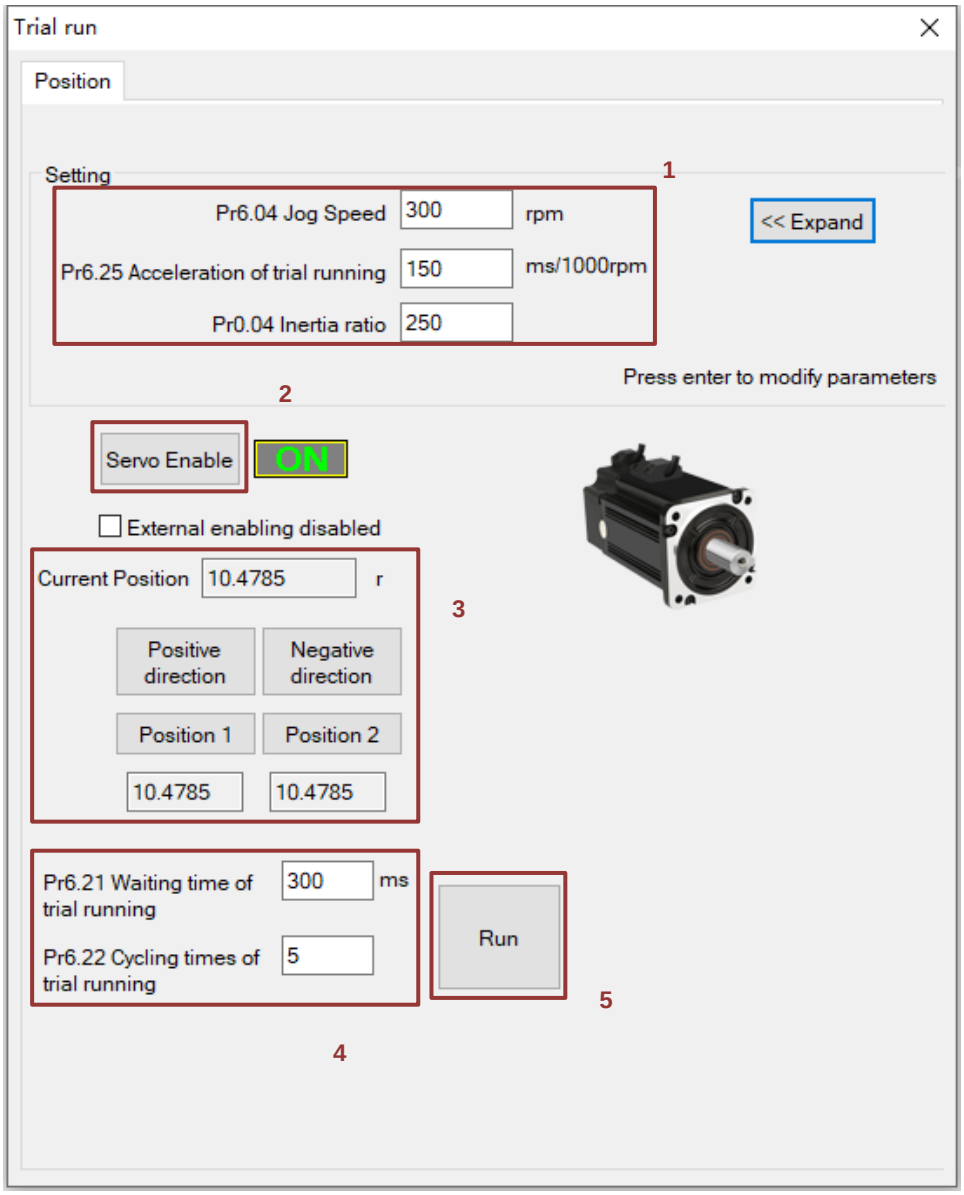
Click on "Start" to start mechanical properties analysis. Click on Notch Filter Design to get the identified notch filter settings. Use the arrow keys on the right panel to save the parameters to driver. Notch filter 1 and 2 is available on all servo drive models while notch filter 5 and 6 is model dependent. All analysis can be saved and read as .mch files.

Running



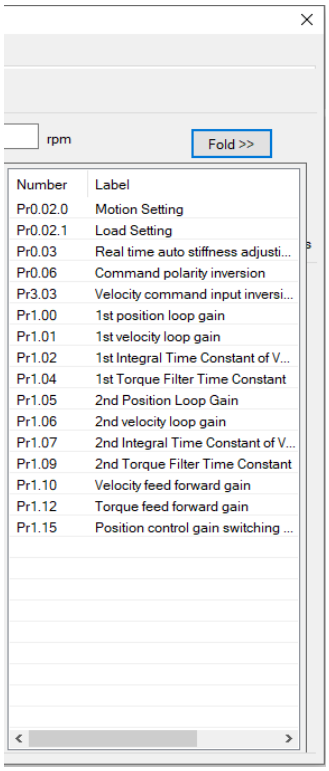
Trial Run

To test run servo products after successfully connected to Motion Studio and initial setup is done. Main power supply and motor/encoder cable need to be connected to use this function.

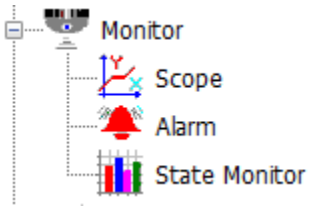


1. Set jog velocity and acceleration. If unsure, leave both at default value. Press enter for modification of parameters to be valid.
2. Enable servo drive by clicking Servo Enable. ON indicates servo drive and motor are enabled.
3. Click and hold “Positive Direction” or “Negative Direction” for motor to rotate in desired direction. Click on Position 1 and Position 2 to set current point as starting and ending point of trial run. It is recommended to have at least 10r (*10 revolutions*) between Position 1 and 2
4. Set Pr6.21 for the time interval between each cycle and no. of cycles of the trial run.
5. Click on “Run” to start the motor. Click on “Stop” to stop the motor or motor will stop after completing the no. of cycles set.

Other related parameters can be found on the right after clicking on “Expand”. Servo drive needs to be enabled. Click on “Fold” to retract these parameters when not needed.

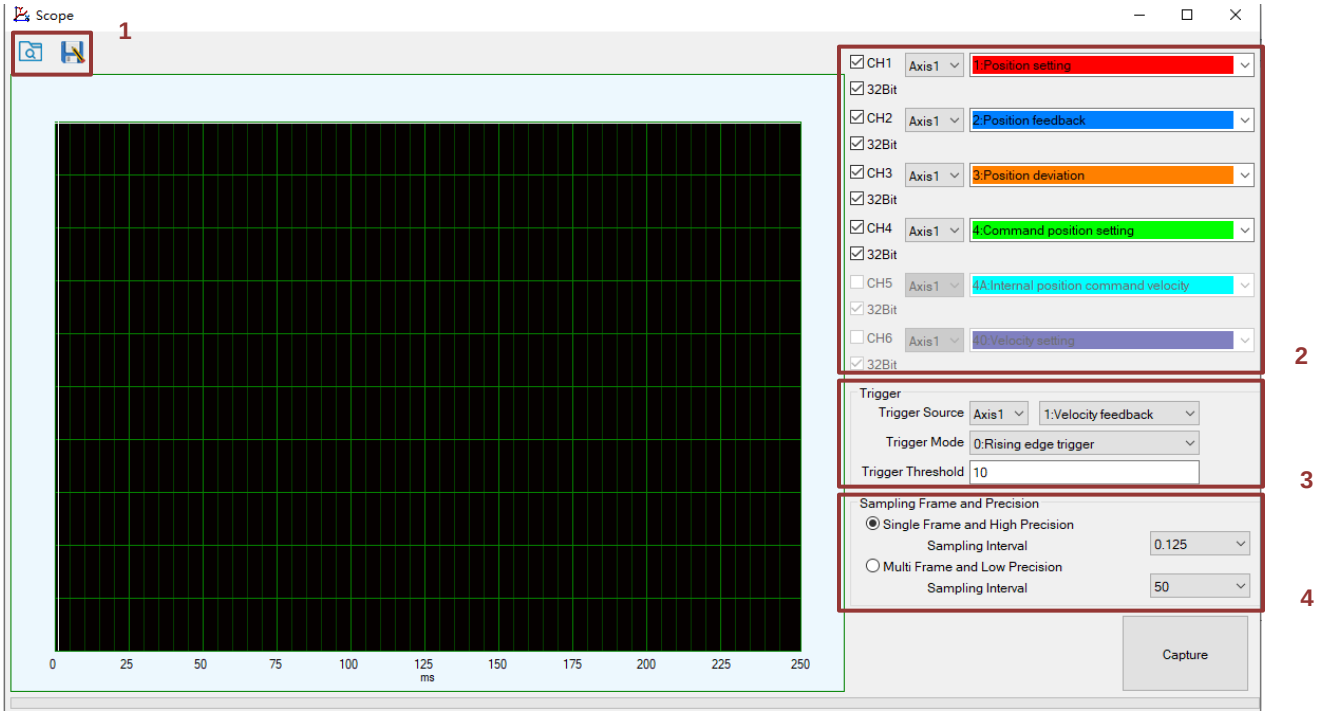


Monitor



Scope

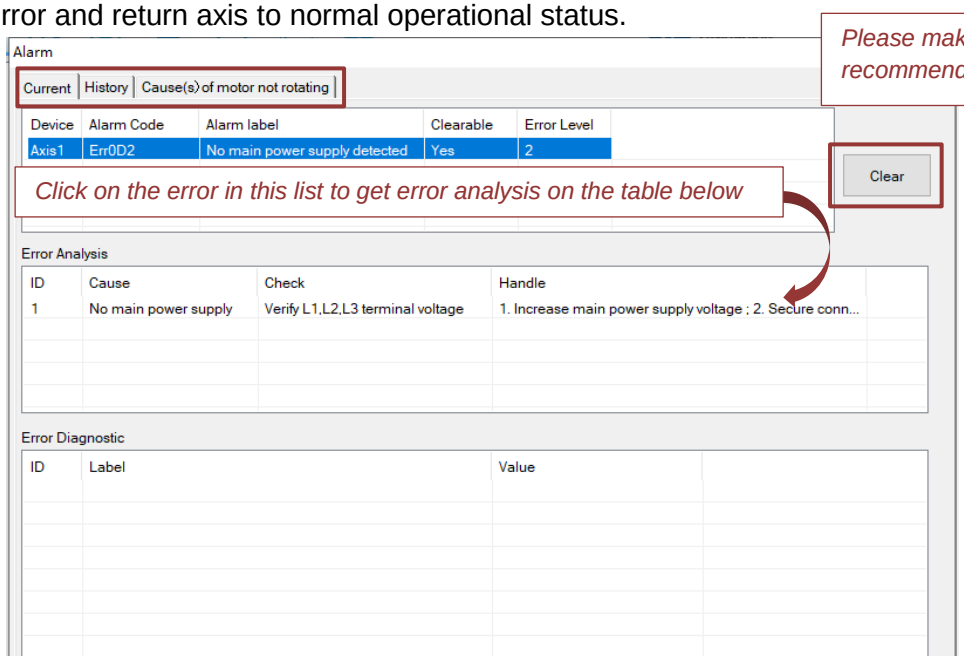
To read or save captured data in waveform. Multiple different data of servo drives can be monitored using scope.

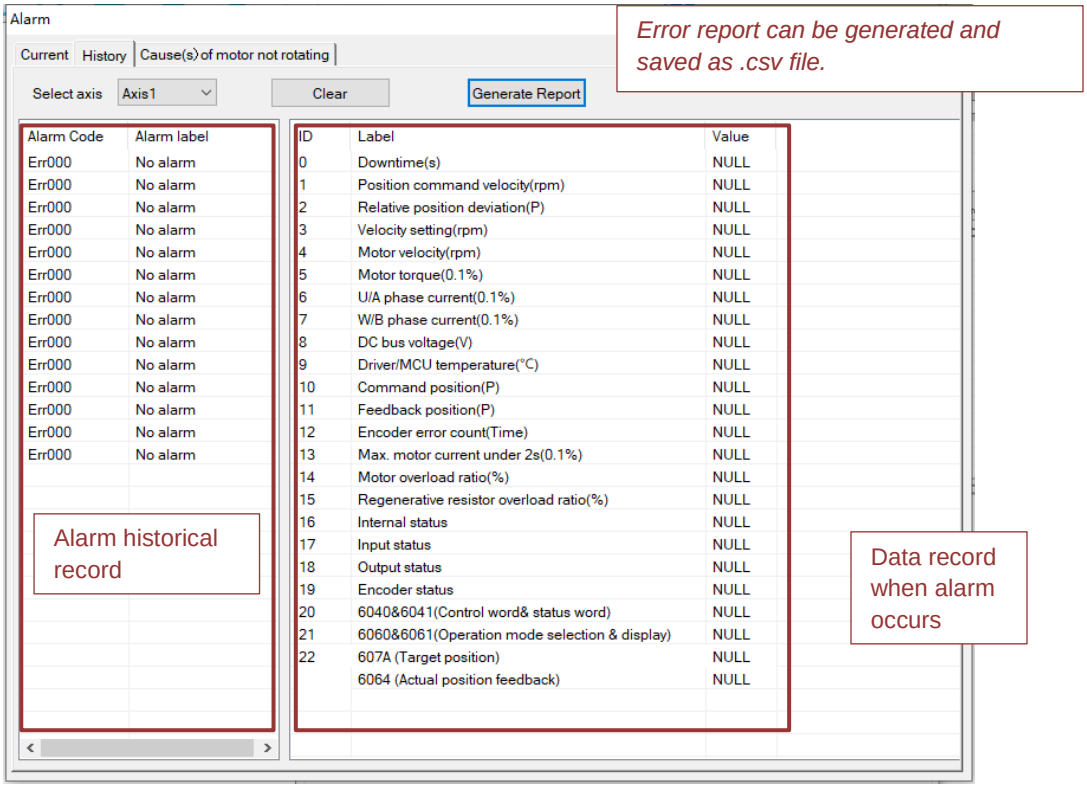


①	To read saved waveform files (.csv) To save captured waveform as .csv file.
②	Can monitor up to 6 variables at the same time (Servo drive model dependent)
③	Set trigger source, mode and conditions for waveform capturing to start
④	Set sampling size and its precision according to user's needs.

Alarm

To check error messages, causes and recommended solutions. Clear alarm after handling the error successfully. Historical records of alarms can also be found in this function. Alarms related to motor stops rotating is highlighted in different for users to easy detect the cause of error(s), solve the error and return axis to normal operational status.

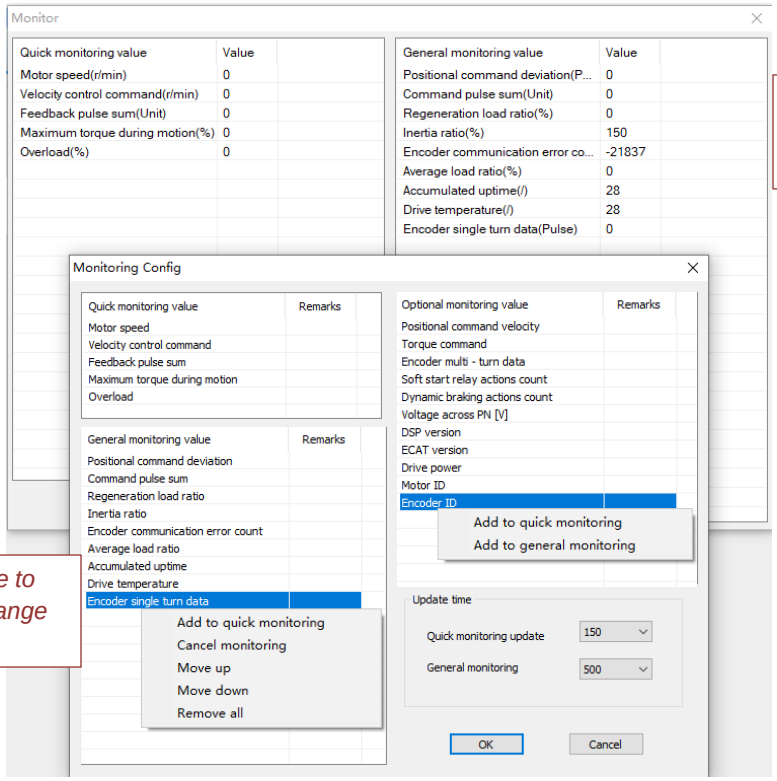




State Monitor

The difference between short interval monitoring and general monitoring is the data sampling time interval. All data/variables can be added or removed from each monitoring list and the time intervals can be modified according to users' needs.

Short Interval monitoring: Sampling time interval of 50-200ms per cycle.
General monitoring: Sampling time interval 300ms up to 5000ms per cycle.

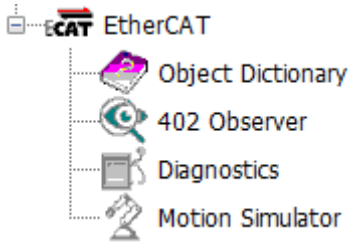


Add variables to required monitoring mode

Right click on variable to add, remove or rearrange variables in the list

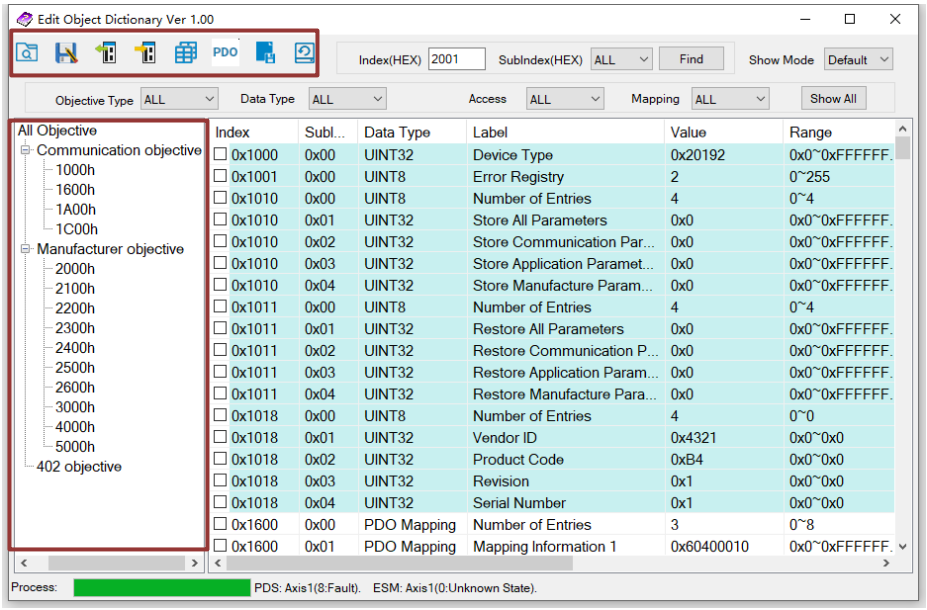
Set sampling time interval for 2 different modes

EtherCAT



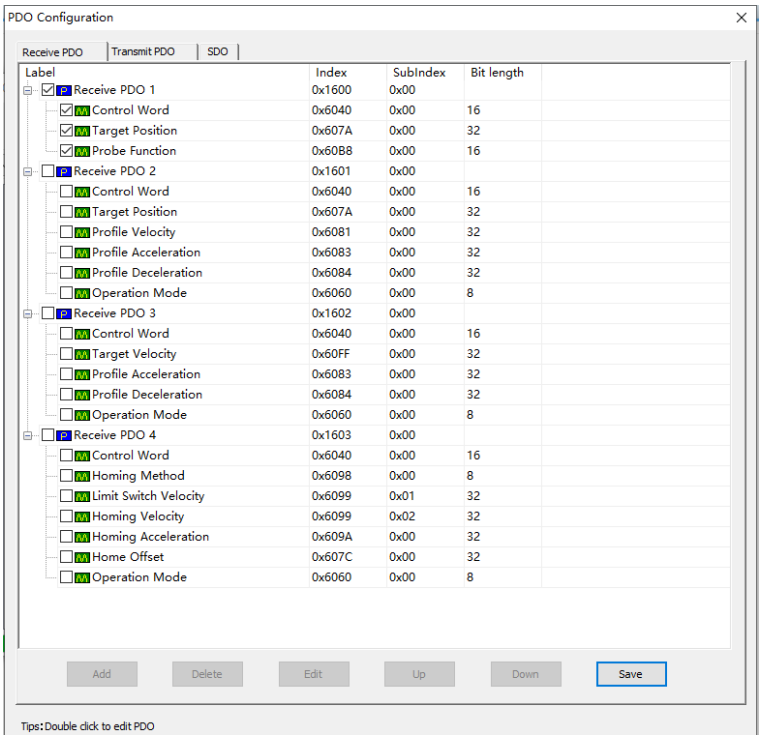
Object Dictionary

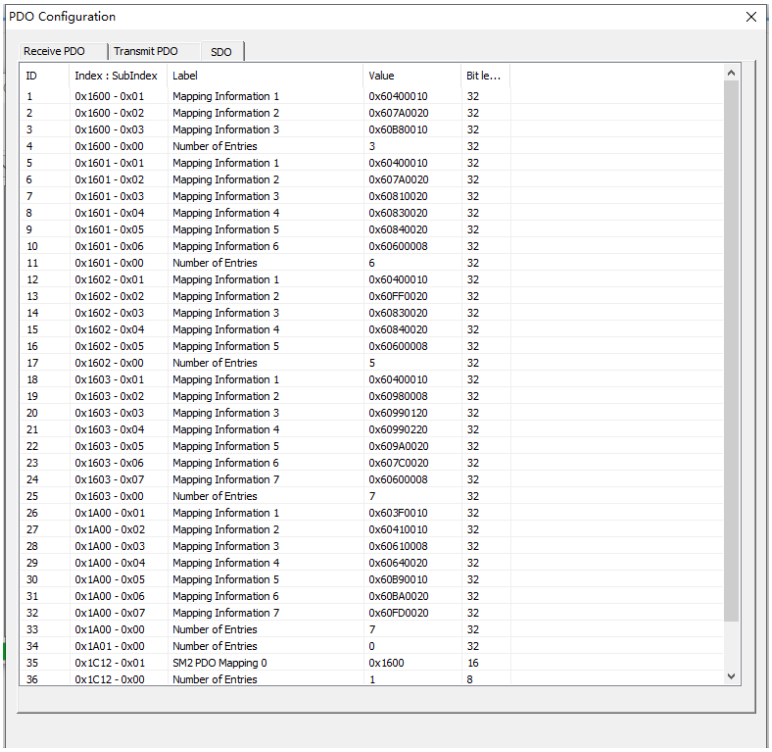
To edit Object Dictionary. Descriptions can be found in Parameters Guide. Object categories can be found on the left panel. Objects can be filtered to make locating specific object easier.



	Read object files	Read object settings save on PC （.obd files）
	Save objects	Save current object files as .obd files. Recommended to back up object settings before any modification.
	Read from driver	Read object settings from driver
	Write to driver	Write objects to drivers.
	Compare objects	Objects comparison can be made between current object settings, saved object files and object default values.
PDO	**PDO configuration***	To modify Process Data Objects
	Save to driver	Save objects into drivers.
	Factory reset	Restore all objects back to factory default

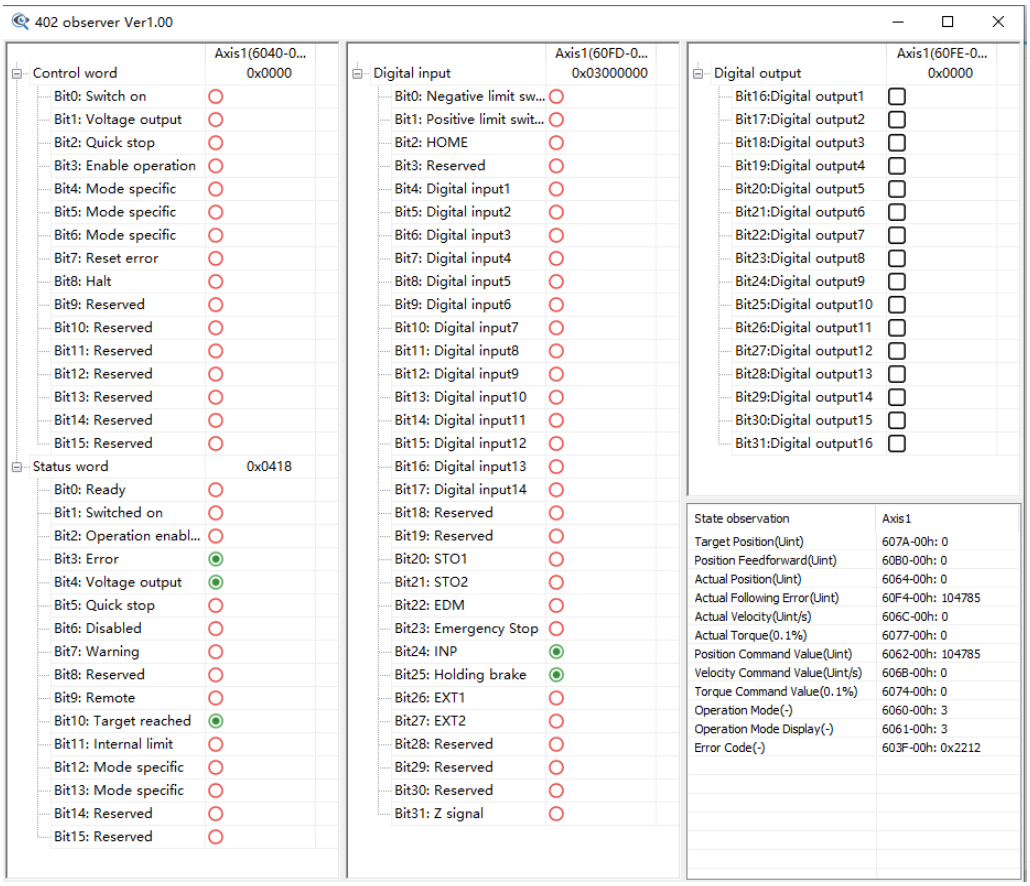
PDO configuration





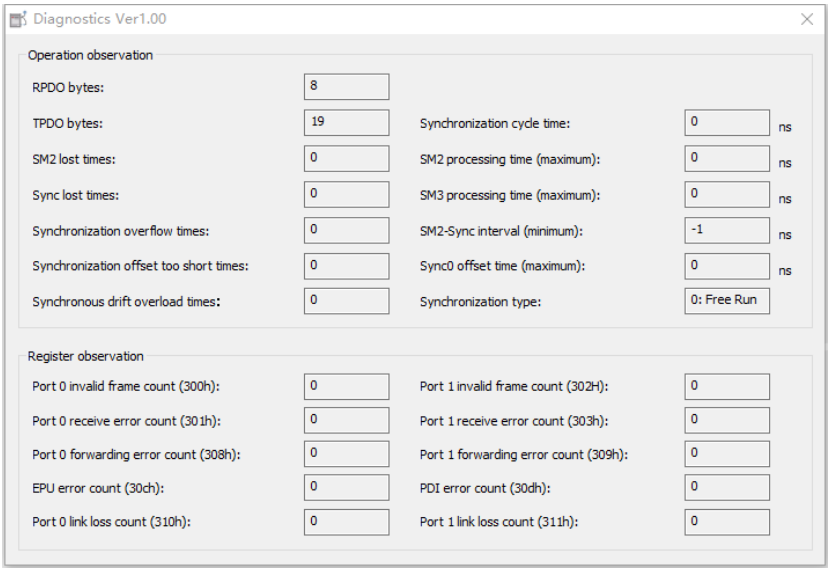
402 observer

To monitor control/status word and DI/DO state



Diagnostics

Operation and Register Operation can be found here



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