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› Description

Farwide Drive Debugging Assistant is a Windows-based application developed by the product development team, and continues to improve and update, users can use this program for interactive debugging and maintenance of our drive products, the initial version of the program supports the main functions include:

- ☐ Drive parameter setting and online debugging
- ☐ Copy tabulation of system variable data
- ☐ Save and import waveform data
- ☐ On-line monitoring of system variable waveforms
- ☐ Drive firmware upgrade
- ☐ Parameter backup and download



› Operating environment requirements

Hardware Configure

PC Processors	Intel i5 and above
PC Memory Space	≥1 GB memory space
PC Hard Drive	≥4.5G hard disk space
PC network port	Standard Ethernet port
Network Cable	Standard RJ45 interface network cable

Software environment

Operating system version	Windows10 and above(32 bits or 64 bits)
.NET Framework version	.NET Framework 4.8 and above

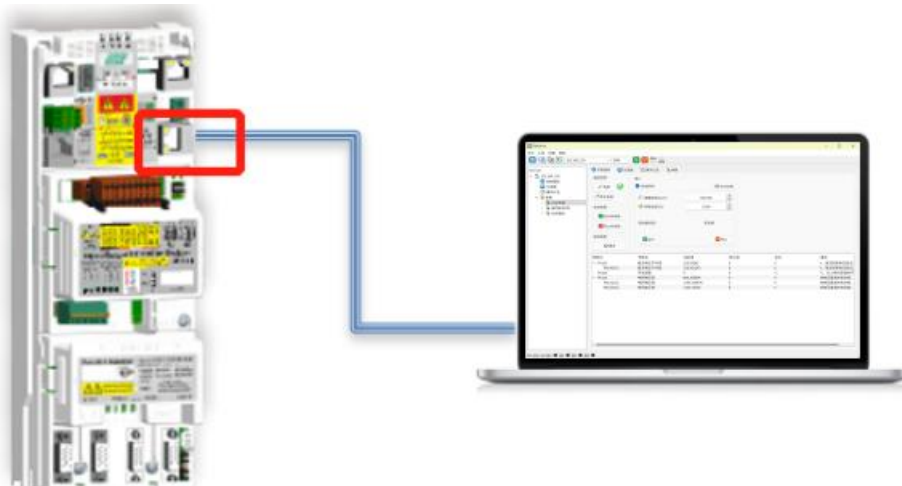
› Installation and uninstallation

Place the PC Debug Assistant folder in the installation path of the PC local disk, open it and double-click it to use it.

Delete the Farwide Debug Assistant folder on the PC local disk to complete the software uninstallation.

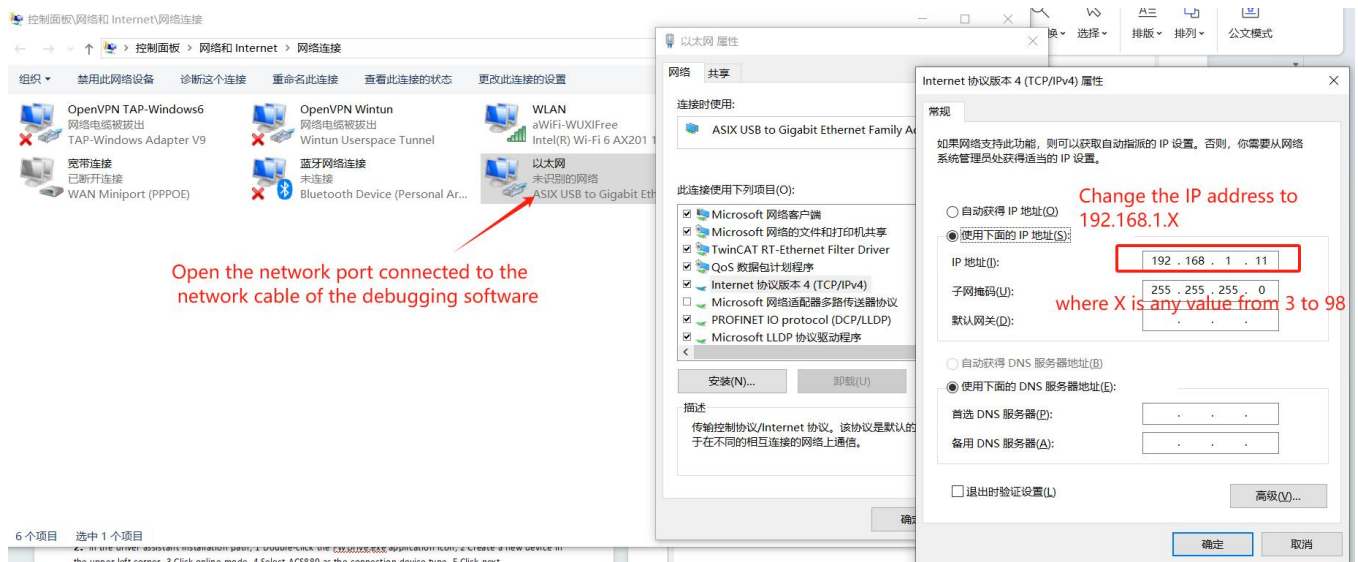
› Debug Assistant connection

1. Connect the Ethernet port on the PC to the X863 port on the driver through a network cable

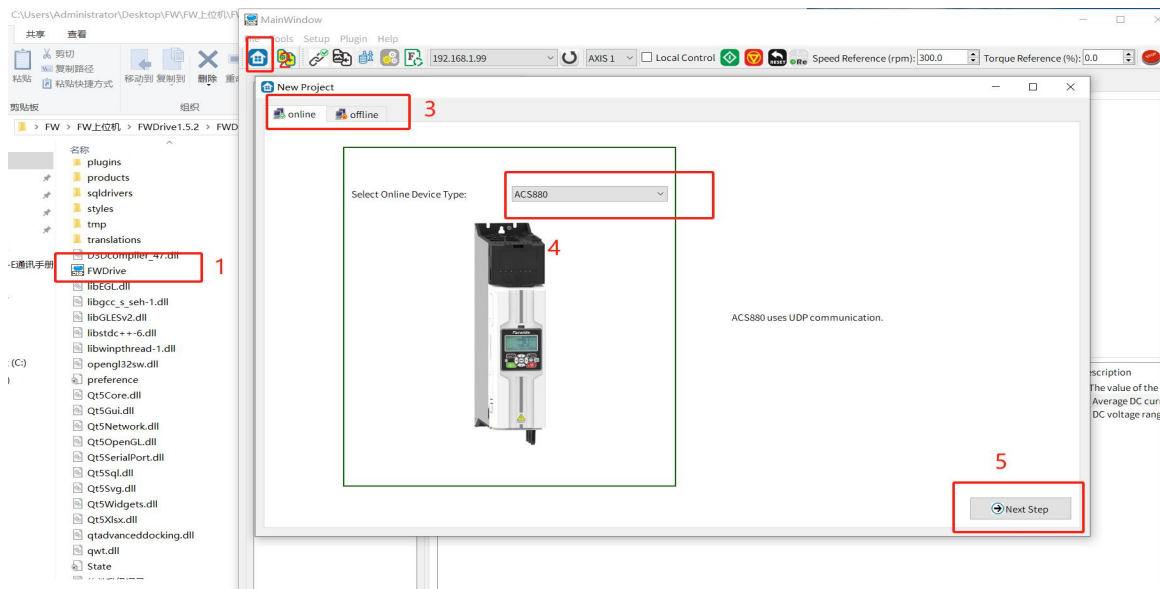




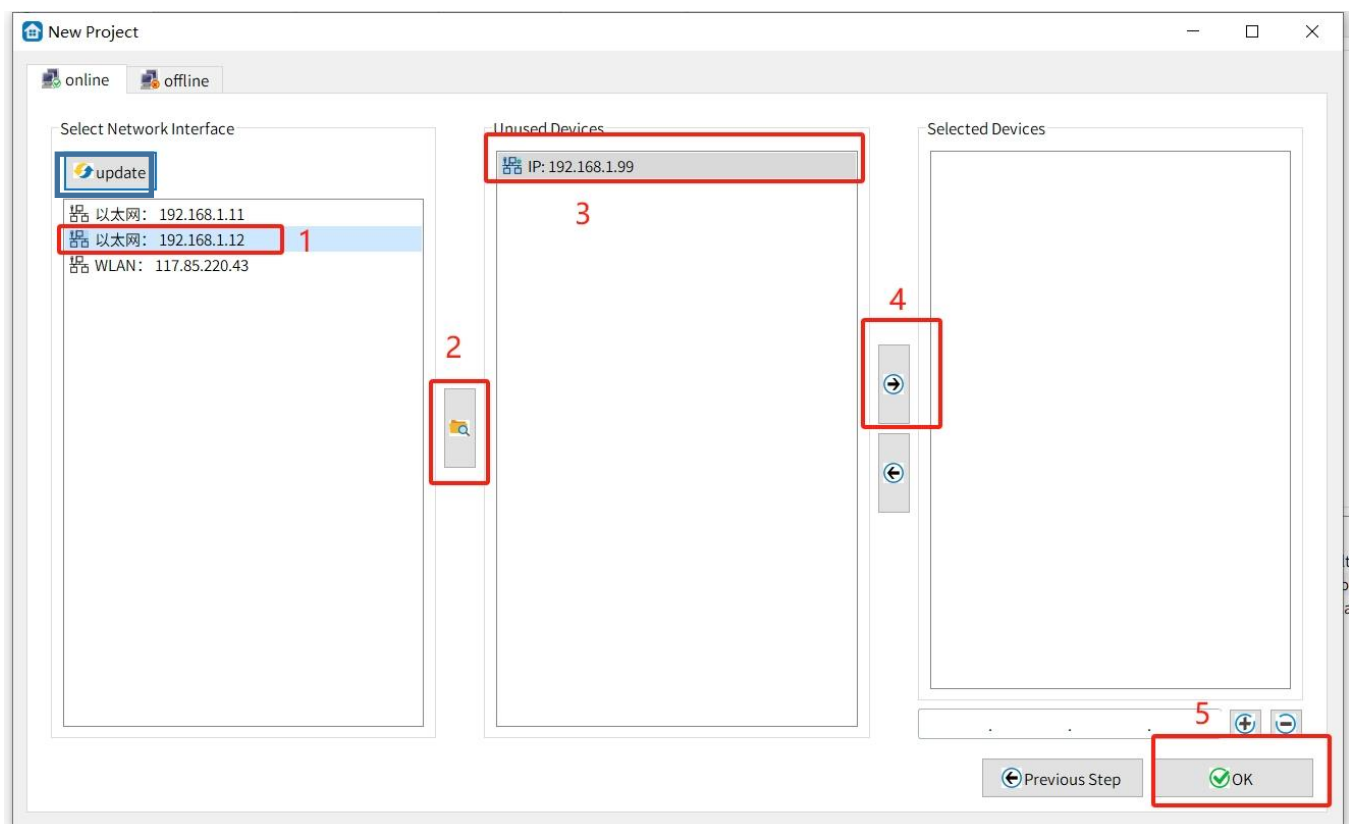
Set the computer Ethernet IP address, which must be in the same network segment: 192.168.1.X



2. In the driver assistant installation path, 1 Double-click the FWDrive.exe application icon, 2 Create a new device in the upper left corner, 3 Click online mode, 4 Select ACS880 as the connection device type, 5 Click next

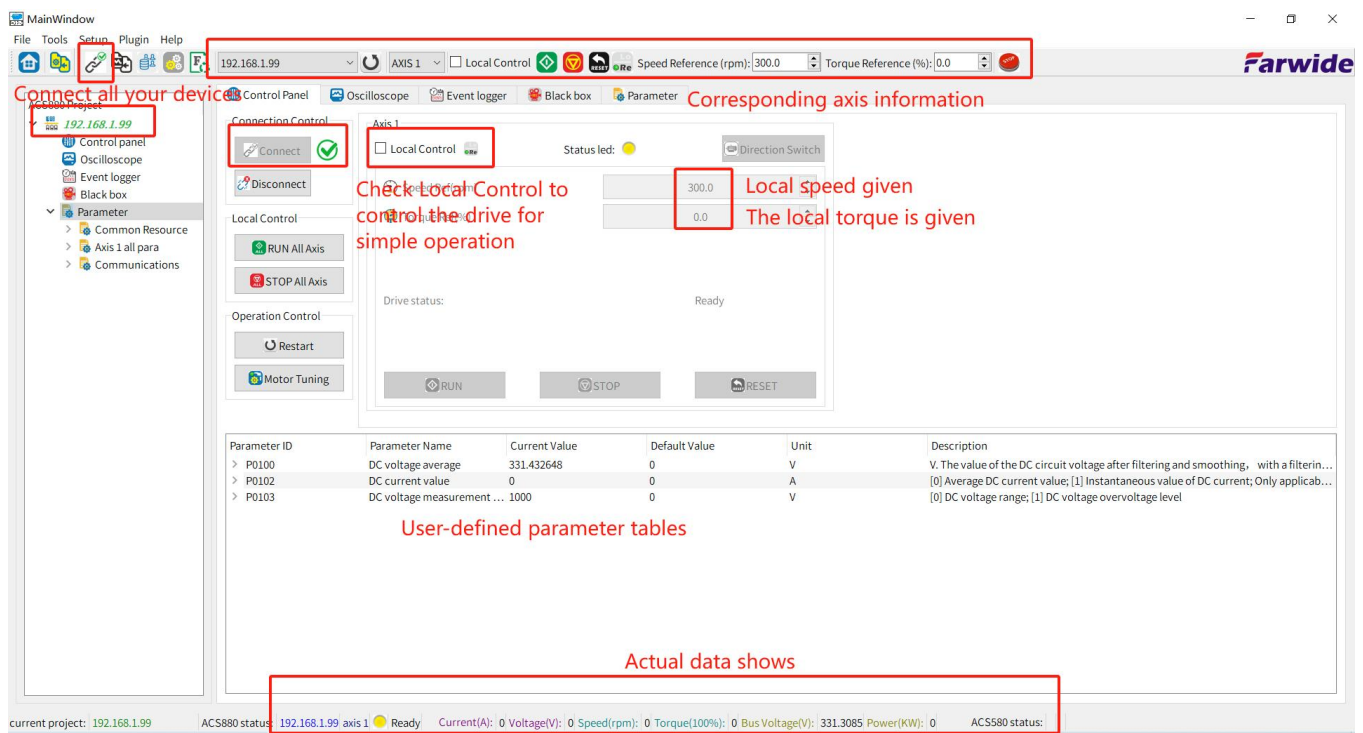


3. Online mode: The software will automatically scan the network card. If the corresponding network card is not detected, the user can click the "Refresh" button. Select the network card and then click the "Scan" button. The software will detect the online devices in the current network segment and select all by default. The user can select the device by himself (multiple selections: ctrl+left mouse button or hold down the left mouse button to slide) and click the "Move Right" button to move it to the list on the right. In addition, the user can select the device in the list on the right and click the "Move Left" button to move it to the middle list. In addition, "double-clicking" the left mouse button can also move a single device. It also supports users to manually add the IP address of the device. Finally, the user clicks the "OK" button to create the project.

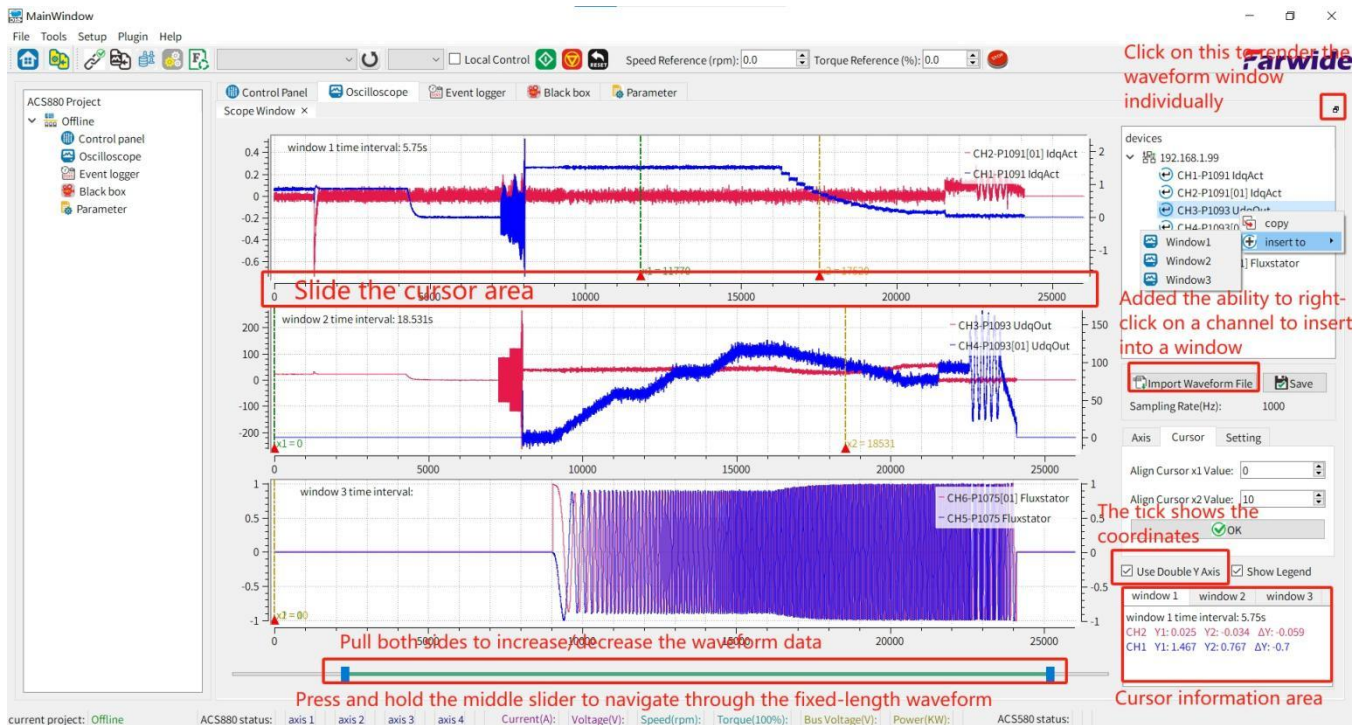


Offline mode: Users can import parameter files and waveform files. The status bar will display the current project name to help users identify it.

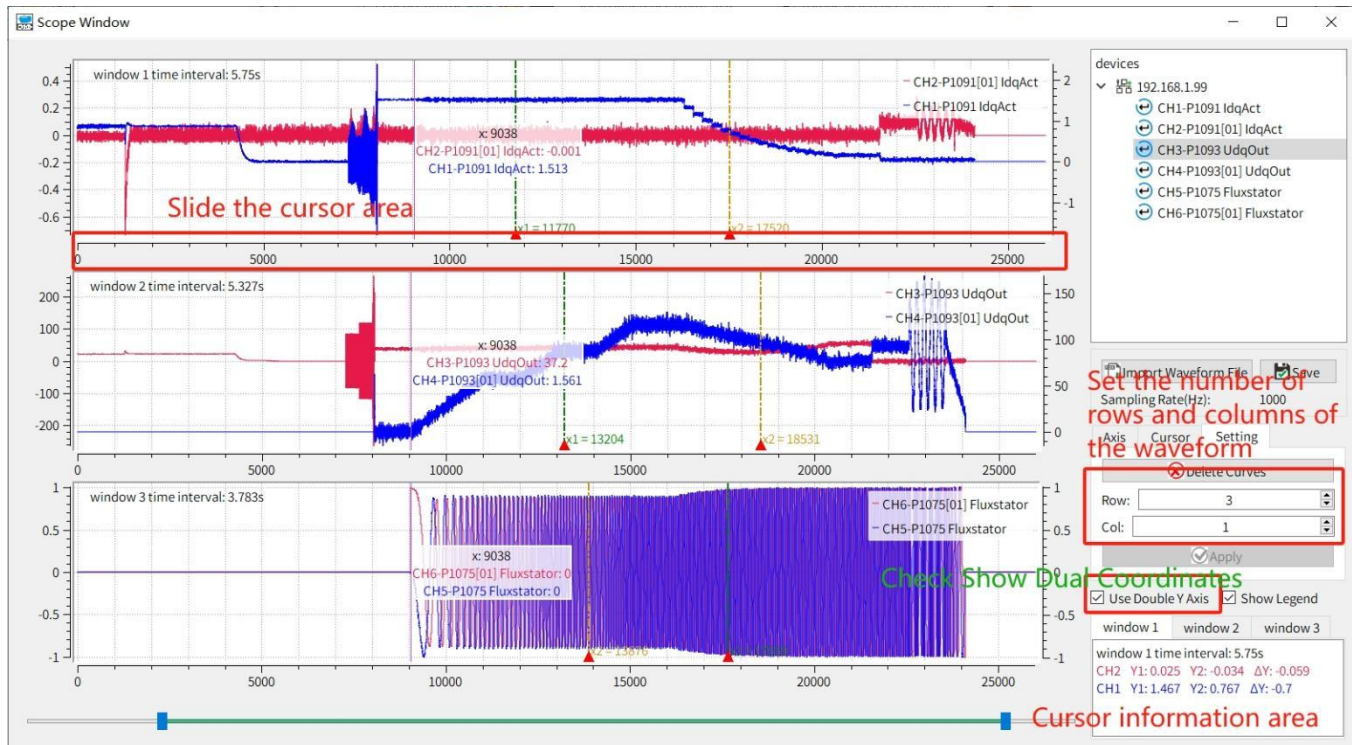
4. Control panel. The control panel is not available in offline mode. In online mode, the user first needs to select the network segment to be connected, and then click the "Connect" button. At this time, the interface will display the connected status and axis information. The toolbar will also update the axis information of the corresponding device. The user can select axis 1-axis 4 in the toolbar (if activated), and can select the run (shortcut key F5)/stop (shortcut key F6)/reset (space bar) button on the upper toolbar for control. When clicking the start/stop/reset button on the toolbar, if the IP in the drop-down box is different from the IP of the current project, a pop-up window will pop up to remind you; click the local control/remote control box to switch the local and remote states, and the switching state can be judged. At the same time, users can click the relevant buttons in the control panel interface to perform control operations. In addition, the control panel also includes functions such as restart, speed setting, torque setting, motor self-learning and user-defined parameter table. The user-defined parameter table requires the user to select parameter addition in the parameter page, and the software will automatically save the customized parameters so that they can be automatically displayed the next time the software is opened. Users can right-click in the customized parameter table to delete unnecessary parameters. The actual status of motor current, motor voltage, motor speed, motor torque, bus voltage and motor active power is displayed in real time in the toolbar below for easy viewing by users. If an emergency occurs and an emergency stop is required, click this button .



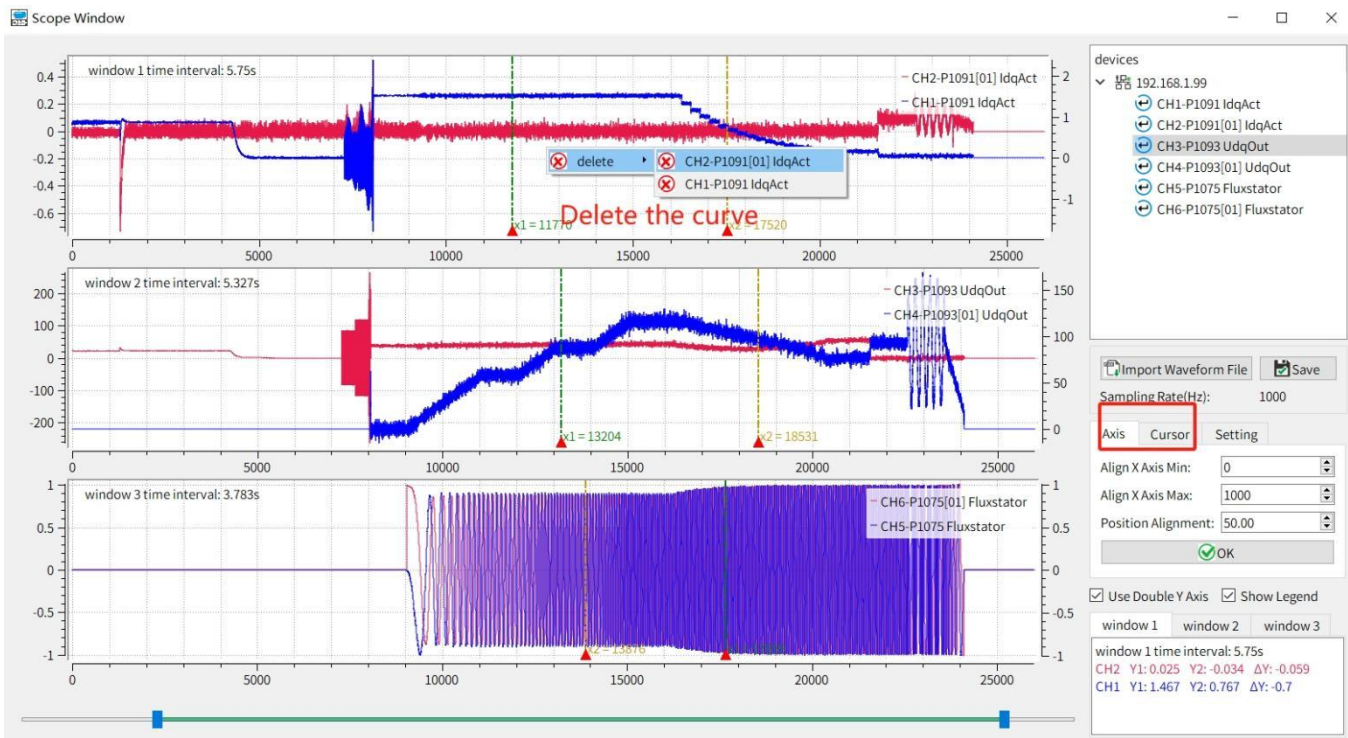
5. Oscilloscope. In offline mode, users can import waveform data (suffix .wf) for viewing. After importing the file, the waveform recording scene is restored by default. Users can also select channels as needed, hold down the left mouse button and drag the corresponding channel item in the device list, and release the mouse button in the drawing window. For some systems that do not support channel dragging in the waveform window, the function of right-clicking on the channel and inserting it into the window has been added. A drawing window supports the display of multiple curves. Users can set the number of windows displayed by changing the values of "rows" and "columns" in the interface and clicking the "Apply" button. The "Delete Curve" button can delete all curves in the current drawing window. The slider at the bottom of the drawing window can set the data range displayed in the window. Users can choose to hold down the left mouse button to slide, or press the left arrow "←" and right arrow "→" on the keyboard to control it.



To prevent the interface from freezing due to excessive data volume, the default setting is to display a maximum of 1 million data points. When the range is exceeded, the user can pull the two sides of the slider to achieve the same function as pressing and sliding in the middle. Check "Use dual Y-axis" to display the second curve using the right Y-axis. Click the window pop-up button or double-click above the window to pop up the drawing window. Drag the drawing window into any of the small boxes shown in the figure below to insert the drawing window into the original position. Click the close button of the pop-up window to achieve the same function.

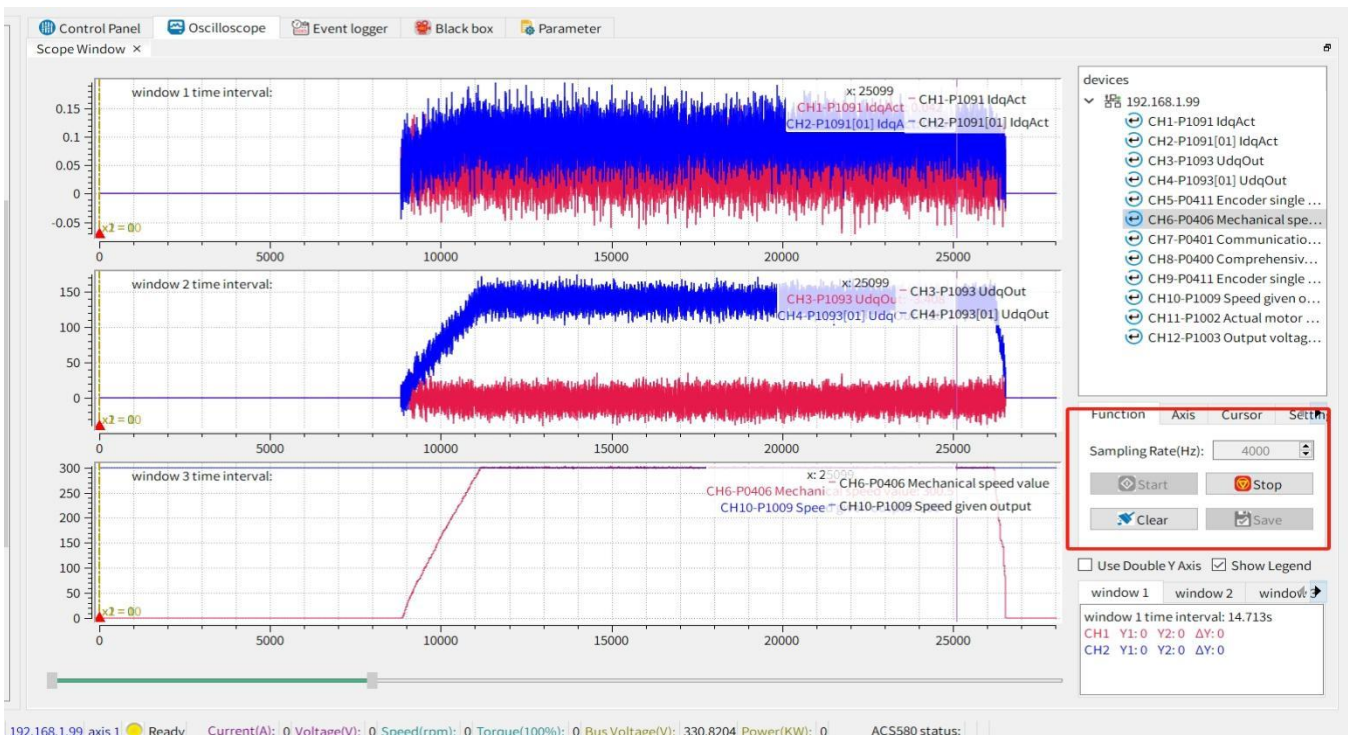


The "sliding cursor area" is the horizontal coordinate position of each drawing window. The user can click the left mouse button and slide left and right. The "cursor information area" displays the horizontal coordinate difference $x_1 - x_2$ and the corresponding vertical coordinate difference $y(x_1) - y(x_2)$ of each drawing window.

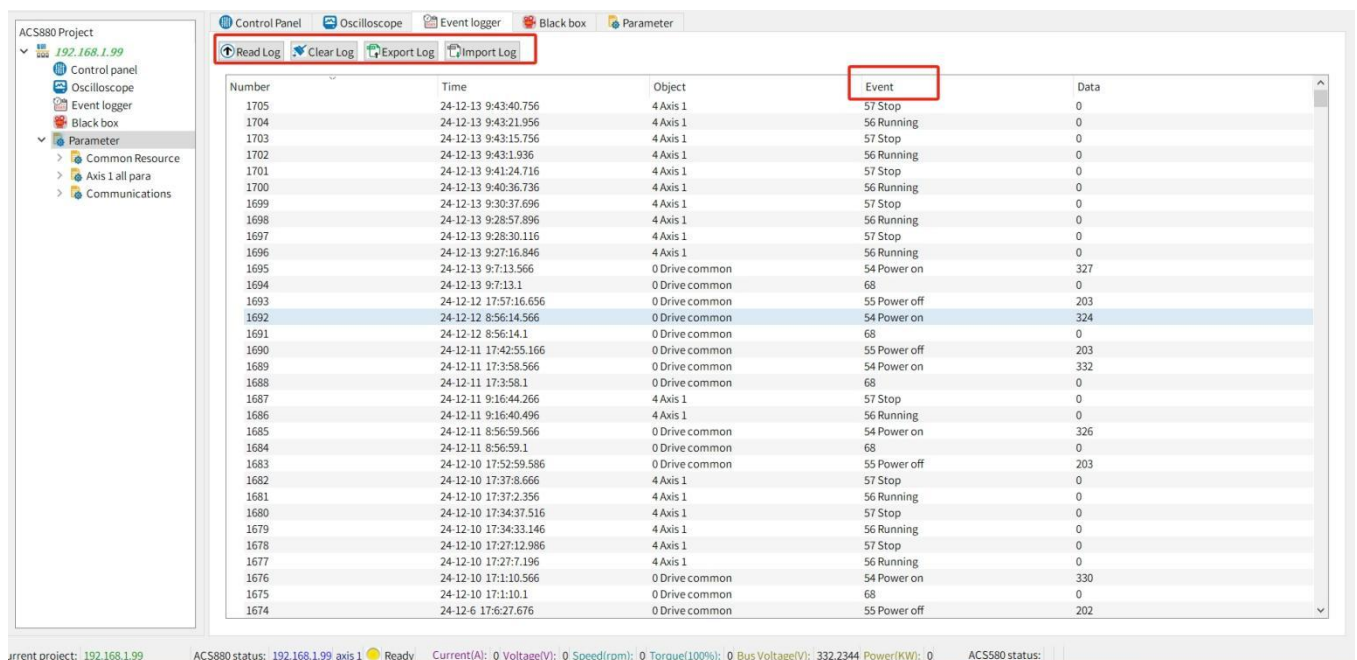


The user can also uniformly set the data range and cursor position displayed in the drawing window in the "Axis" and "Cursor" subwindows. For curves that the user does not want to display in the drawing window, the user can right-click in the window and select the curve to delete. After clicking delete, the data will not be lost, and the user can still display it by dragging.

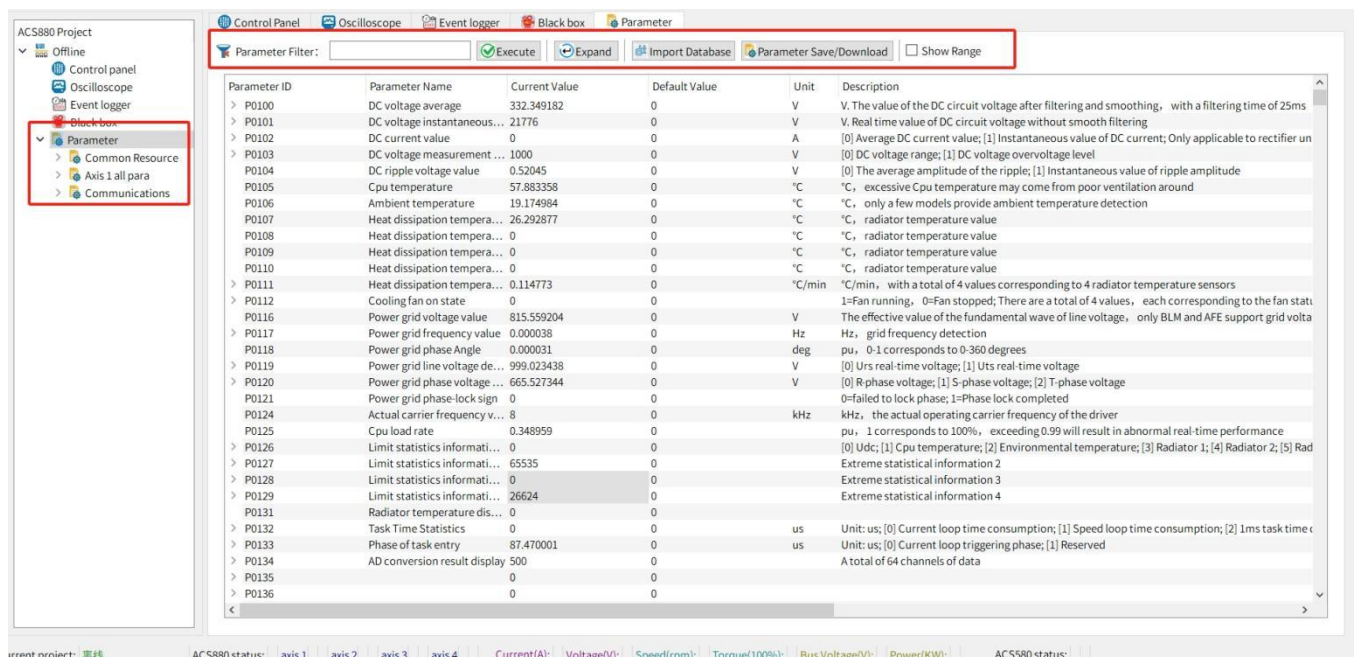
Most of the functions of online mode and offline mode are the same. Users need to drag the channel items in the device channel list to display them in the drawing window. Users click the "Start" button to start waveform recording and click the "Stop" button to stop waveform recording. Users can click the "Save" button to save the current data of the drawing window (users can use the slider to select it) to a specified location. In addition, users can use functions such as setting the sampling rate and clearing data. The software will automatically save the window settings, and the current number of windows and drawing channels in the window will be restored when the software is opened later.



6. Event log. In offline mode, the event log is not available. In online mode, users can read logs, clear logs, export logs, and import logs. Logs are arranged in serial number columns by default, and users can click on each header to sort. Clicking on an event only displays drive fault alarm information.

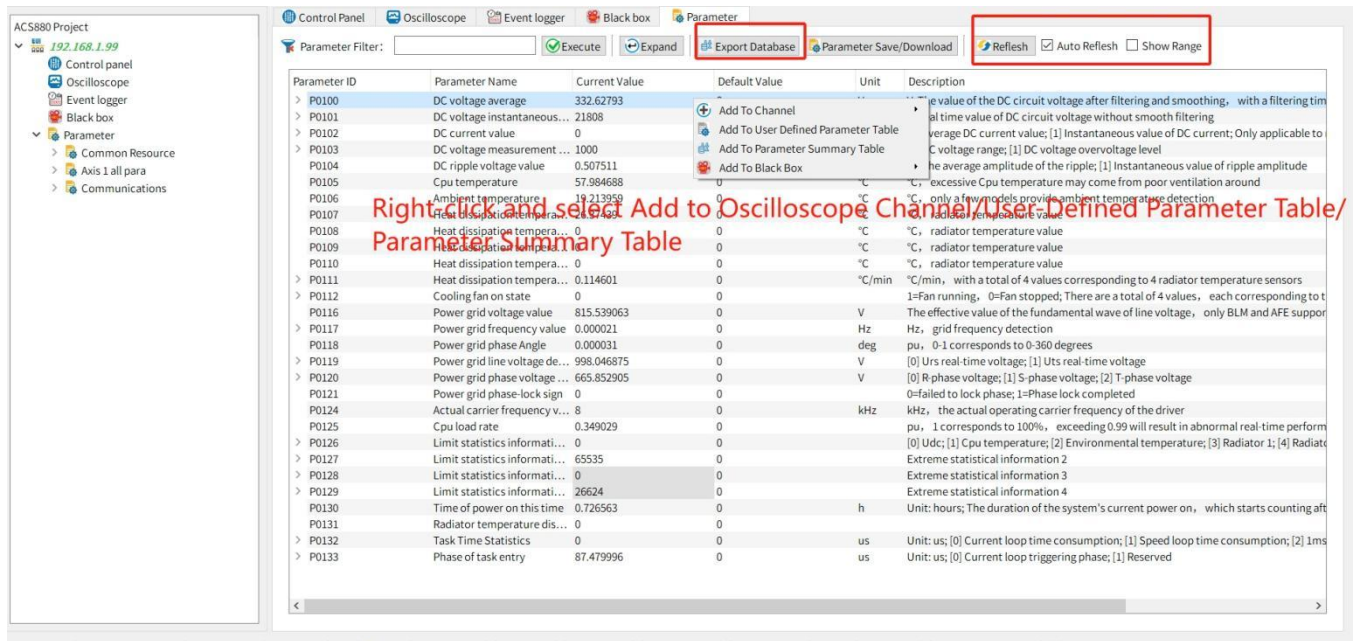


7. Parameters. Different types of parameters are marked with different colors to facilitate the user to read and write parameters. In offline mode, users can import database files (suffix .db), and click the parameter directory to display related parameters. Parameter filtering will filter parameters according to the values entered by the user. Click to expand the parameters with sub-indexes to display all parameters.

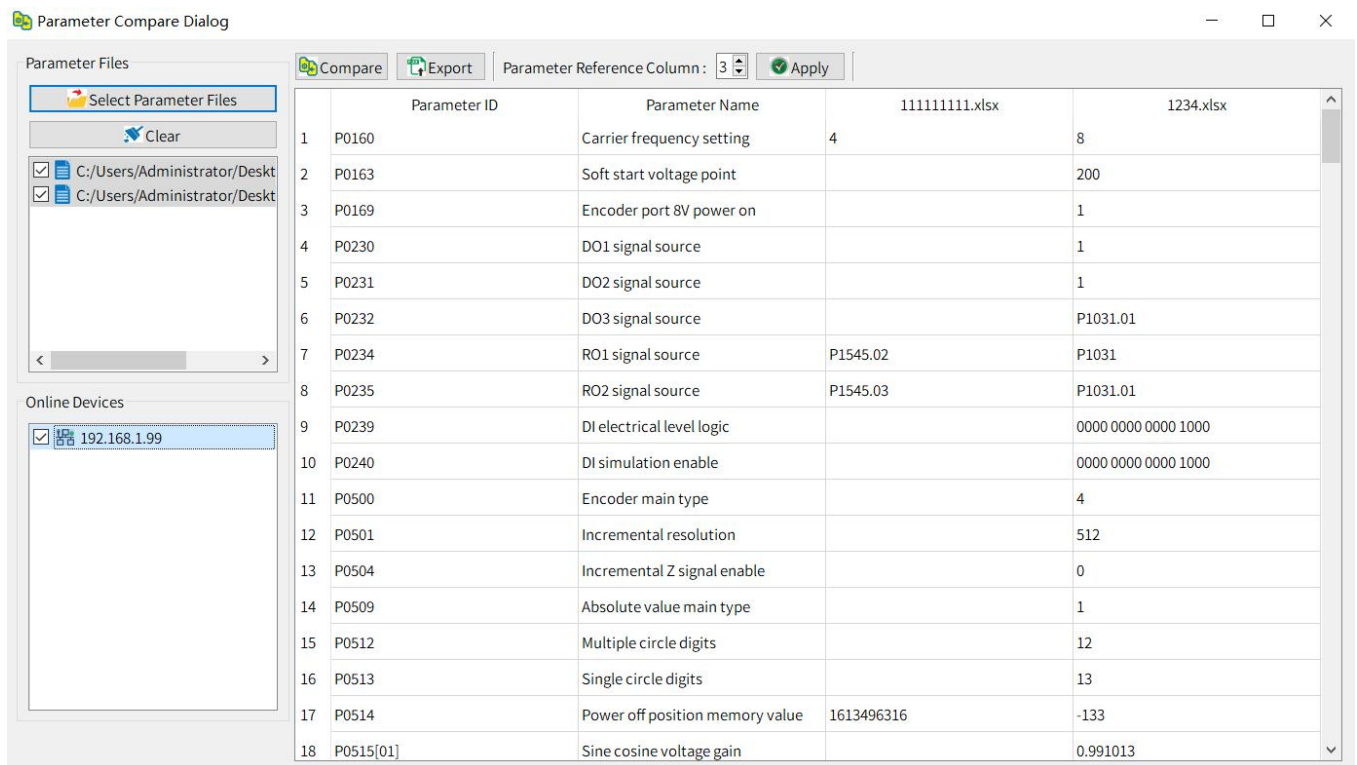


8. In online mode, users can refresh the parameters in real time by clicking the "Auto Refresh" button. Click the "Refresh" button to refresh only once. Users can export the current parameter database (suffix .db) by clicking the "Export Database" button. Right-click on the parameter line and select Add to Channel x to add the parameter to the oscilloscope channel. Or choose to add to the user-defined parameter table or parameter summary table. Users can view the range of the maximum and minimum values of the parameter by clicking the "Range Display"

button.

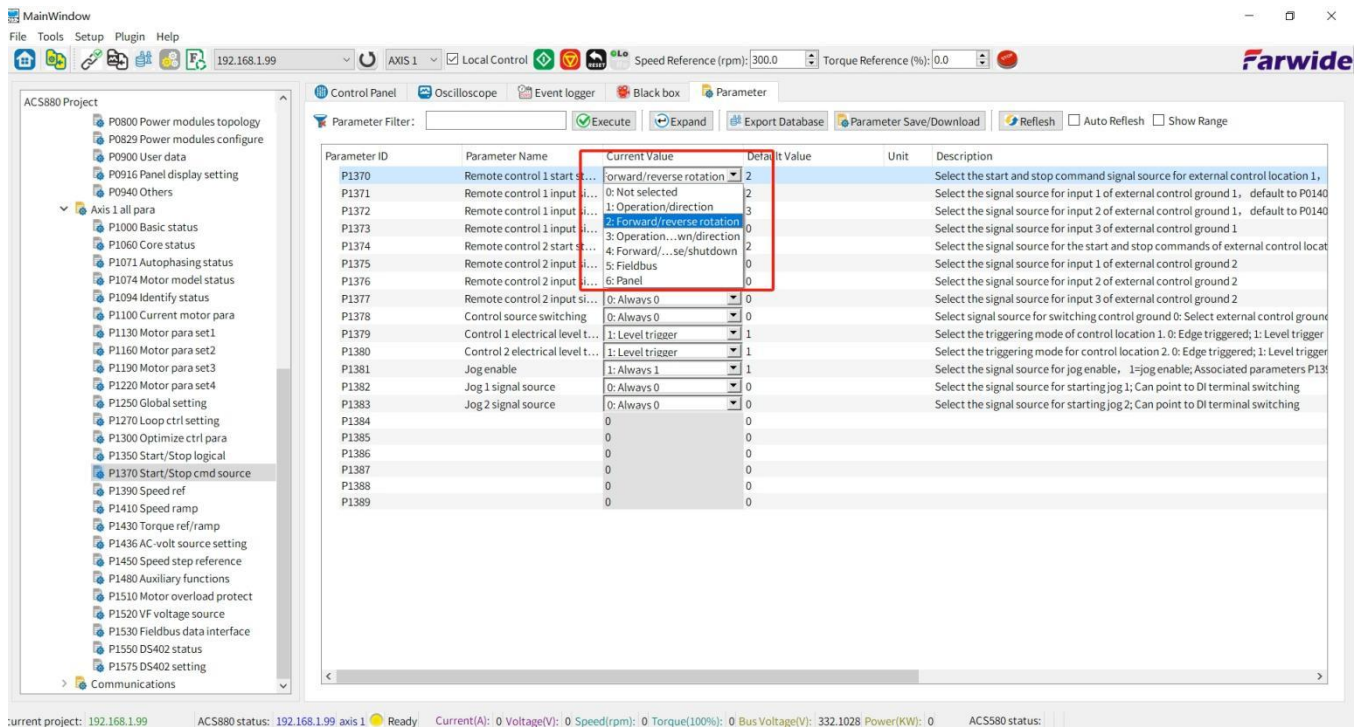


Parameter comparison. The parameter comparison function supports comparison between multiple files-files, files-online devices, and online devices-online devices. Users can import multiple parameter files by clicking the "Select parameter files" button, and clear the parameter file list by clicking the "Clear" button. Users can start the comparison by clicking the "Compare" button, and save the comparison results by clicking the "Export" button. Modify the parameter reference column to present different parameters. Users can double-click to modify the parameters of the online device.



9.Parameter writing. For the parameters that can be written in the debugging software, users can set them through the drop-down box or in a customized way.

- (1) Drop-down box options (2) Custom input



10. Waveform comparison. The waveform comparison function supports waveform comparison between multiple online devices. Its interface operation is similar to the oscilloscope section above. The user first needs to click the "Connect" button to update the channel data, and then drag the corresponding channel in the device list to the drawing window for display.



11. Parameter summary. The parameter summary function is in the menu bar on the upper left corner. It is used to display the parameters of multiple online devices in real time. The parameters need to be added to the parameter summary table by right-clicking in the corresponding device parameter table. Users can also right-click to delete the corresponding parameters of the device.

Parameter Summary

Expand Collapse

Parameter ID	Parameter Name	Current Value	Default Value	Unit	Description
192.168.1.99					
P0104	DC ripple voltage value	0.521024	0	V	[0] The average amplitude...
P0108	Heat dissipation tempera...	0	0	°C	°C, radiator temperatur...
P0106	Ambient temperature	20.0	0	°C	°C, only a few models pr...
P0116	Power grid voltage value	815.000000	0	V	The effective value of the ...
P0105	Cpu temperature	60.210857	0	°C	°C, excessive Cpu tempe...
P0121	Power grid phase-lock sign	0	0		0=failed to lock phase; 1=...

12. Multi-machine joint control. The multi-machine joint control function can realize the simultaneous operation, stop and local control of all axes of multiple drives/single drive, and supports the speed setting and torque setting control of a single axis of a single drive. At the same time, the interface will display the operation and control status of all axes in real time.

Control Multi Drive

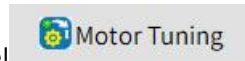
All Drive: Run Stop Local Control Speed Reference (rpm): 0.00 Torque Reference (%): 0.00 Direction Switch Collapse

Drive	Run Status	Led	Control Status	Speed Reference (rp	Torque Reference (%)	Run	Reset	Stop	Local Control	Direction Switch
192.168.1.99	Run All Axis	Run All Axis	Local Control All A	0.00	0.00	Direction Switch	Reset	Stop	Local Control	Direction Switch
Axis 1	Ready			300.00	0.00	Run	Reset	Stop	Local Control	Switch

› Drive Debugging

After the debugging assistant is successfully connected to the drive, the drive can be debugged and run in local mode. The typical debugging steps are as follows:

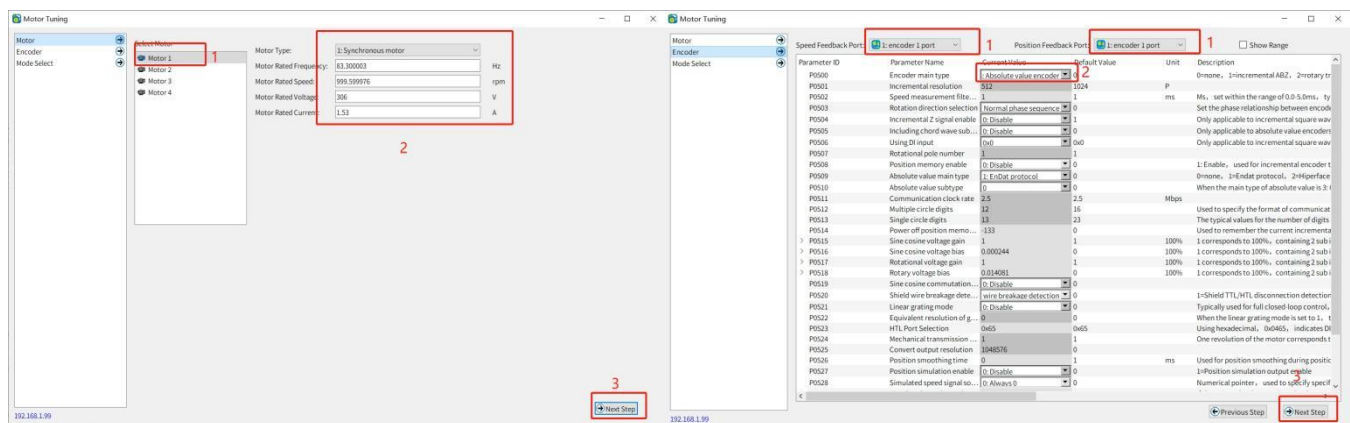
1. Find the motor self-learning window in the control panel



Take the standard motor drive application "Motor 1" as an example.

1) Enter the basic information of the motor nameplate data -> 2) Enter the basic information of the motor nameplate data and click "Next" in the lower right corner ->

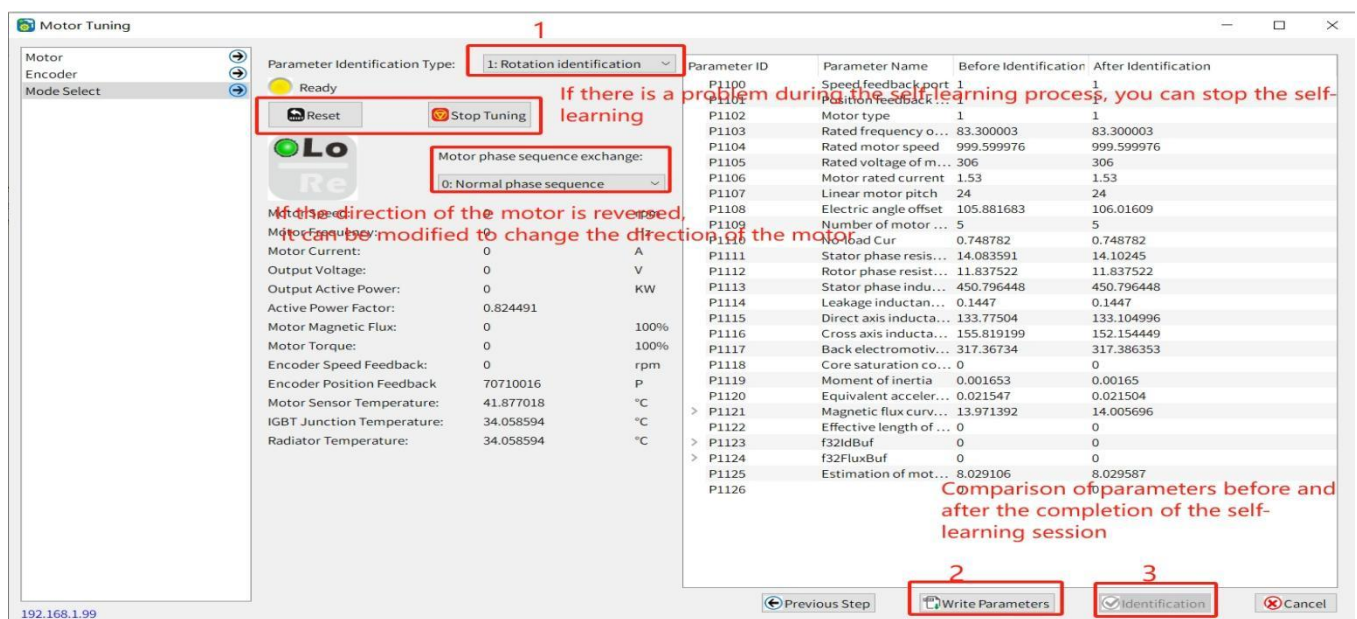
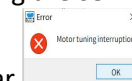
3) Select the corresponding "Speed Feedback Port" and "Position Feedback Port" above, select the encoder type to be used, and click "Next" in the lower right corner. If there is no motor encoder, skip this step directly.



2. Drive control parameter Settings

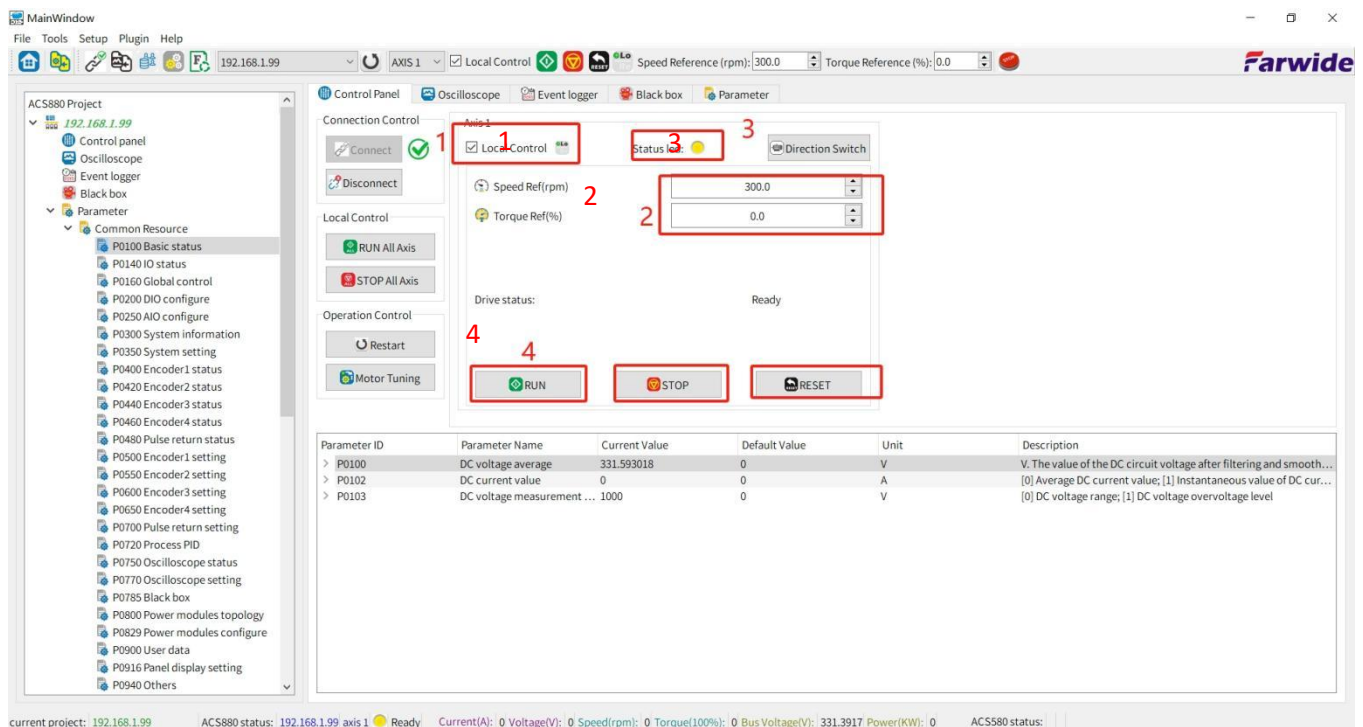
4) Select "Parameter Identification Type" and click "Write Parameters" in the lower right corner. Click and select "Identification". If the motor rotation method is reversed, you can modify "Motor Phase Sequence Exchange" and then perform self-learning. If there are problems such as the need to stop during the self-learning process,

click "Stop Self-learning" and a self-learning interruption pop-up window will appear. If a fault alarm occurs during self-learning, click the "Reset" button to clear the fault alarm.

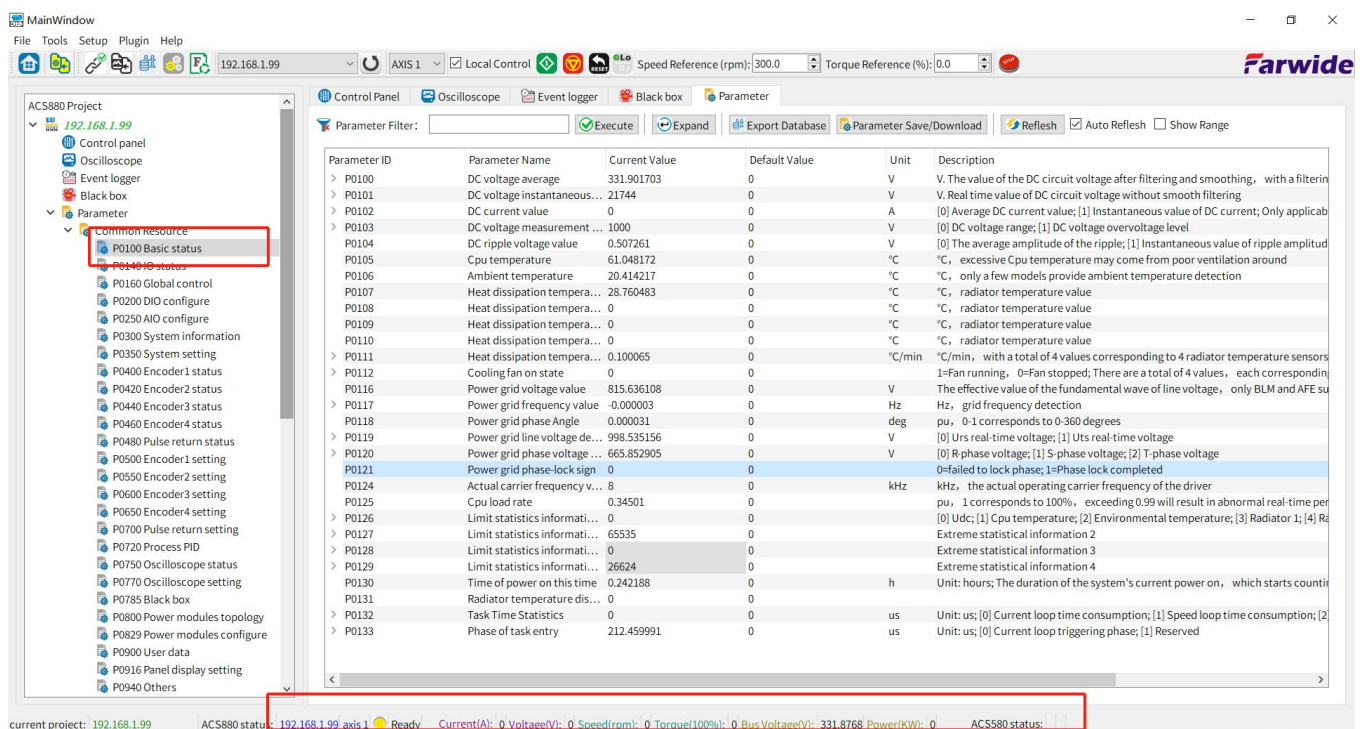


3. Drive Running

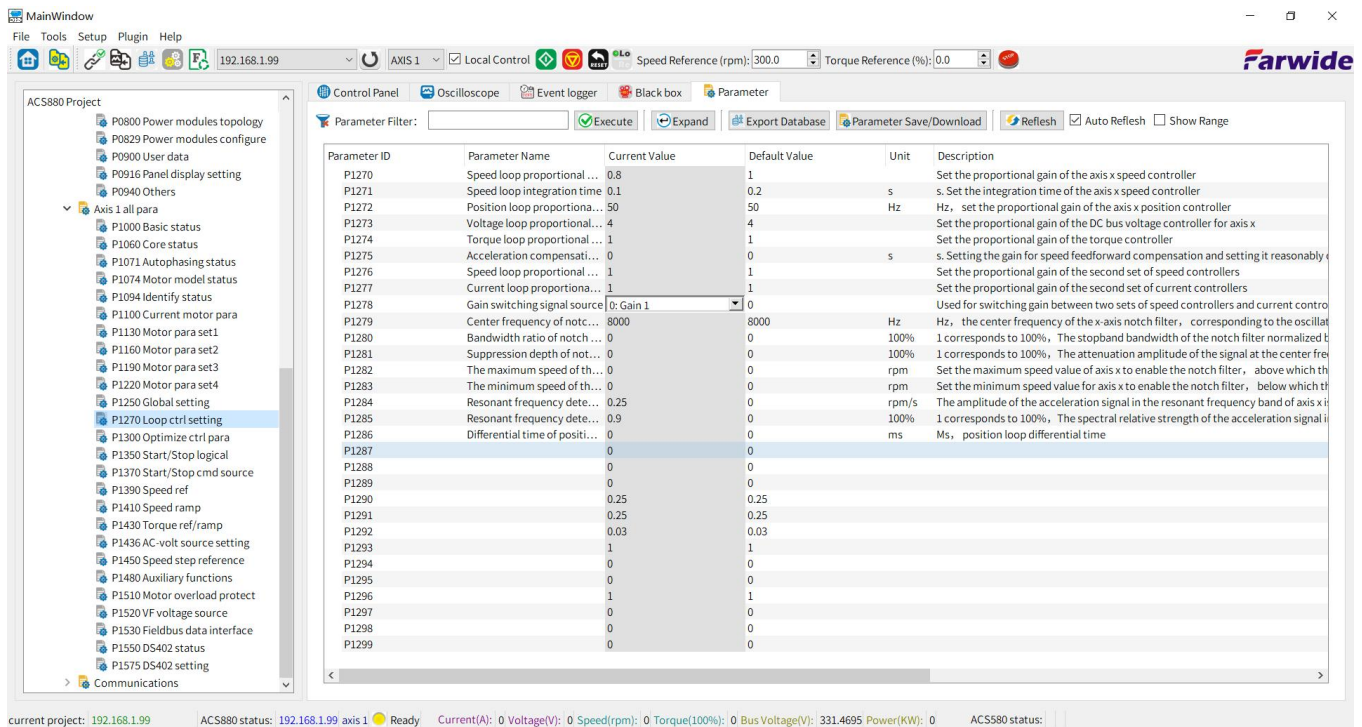
1) Check the local control mode of the enabled drive axis -> 2) Input the given signal value -> 3) When the drive status shows Ready, press the Start/Stop button to start/stop the drive.



The real-time status (including faults) of the drive shaft during drive operation can be viewed through the basic status group of the drive shaft parameter set, or by viewing the real-time data on the bar below.



During operation, the motor control effect can be optimized by adjusting the loop control parameters and performance control parameters.

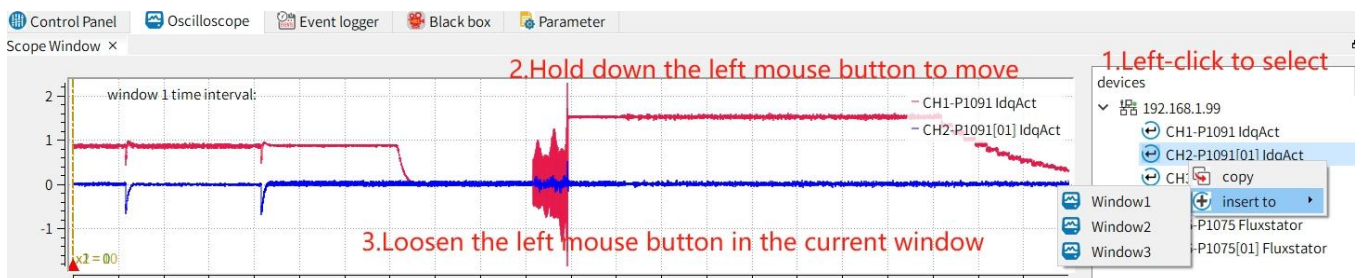


4. Signal waveform recording of driving and controlling various values

1) Click the Start Recording button to start recording the waveform scroll refresh -> 2) Click the Stop Recording button to stop recording

1. One drawing window supports drawing multiple curves. Users can drag the corresponding channels into the drawing window as needed.

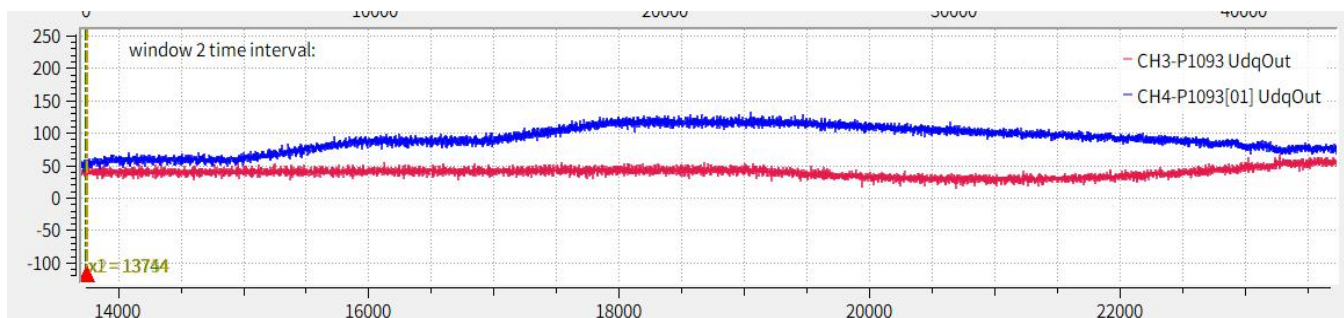
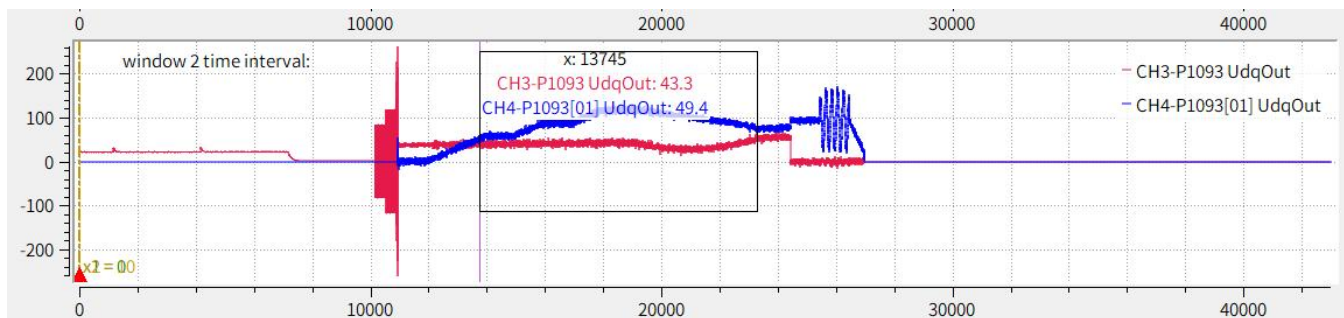
2. For some systems that do not support channel dragging, the function of right-clicking on the channel and inserting it into the window has been added



5. Waveform display adjustment and local zoom

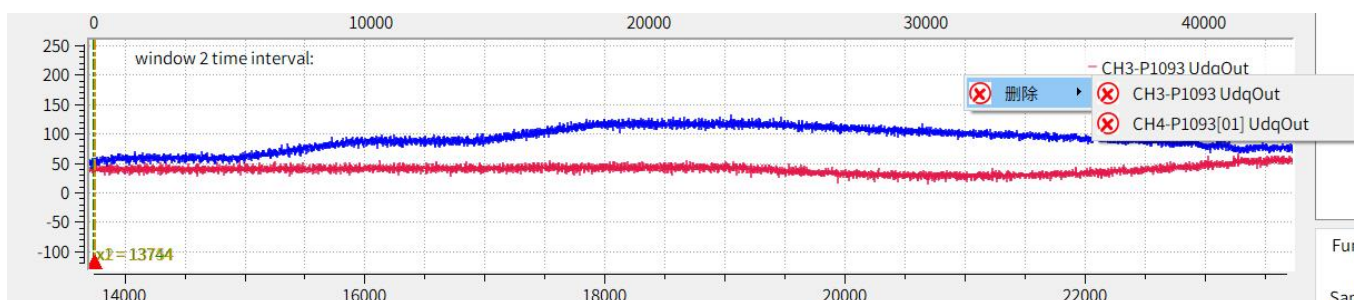
After the waveform is recorded, the waveform display can be adjusted as needed to facilitate further observation of the waveform details.

1) Press the left mouse button to select the target area and drag from left to right to zoom in on the target area.



2) Double-click the left mouse button in the drawing window to cancel or restore the partial zoom.

3) Right click to delete the curve

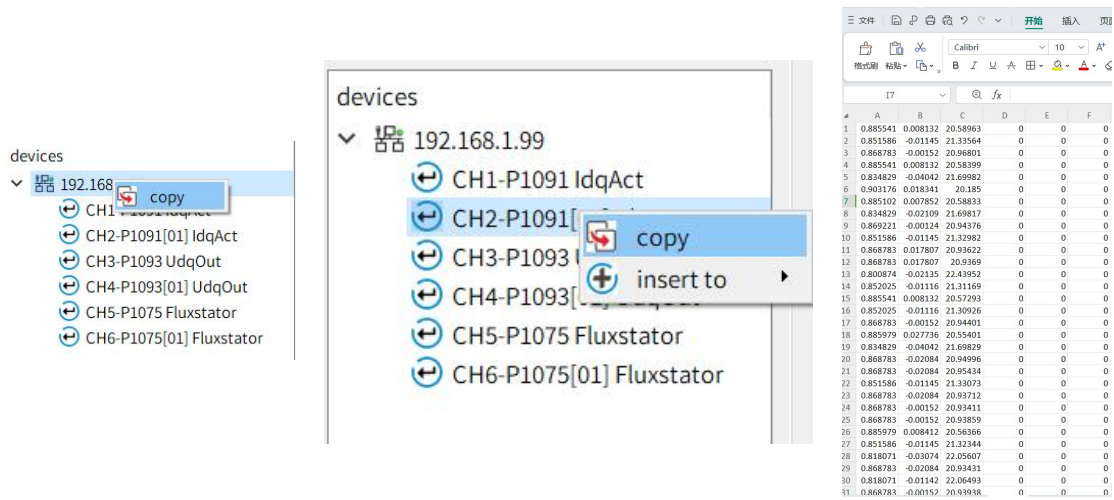


4) Use the mouse wheel to zoom in/out the graphics

5) Press and hold the middle mouse button to move the graphic

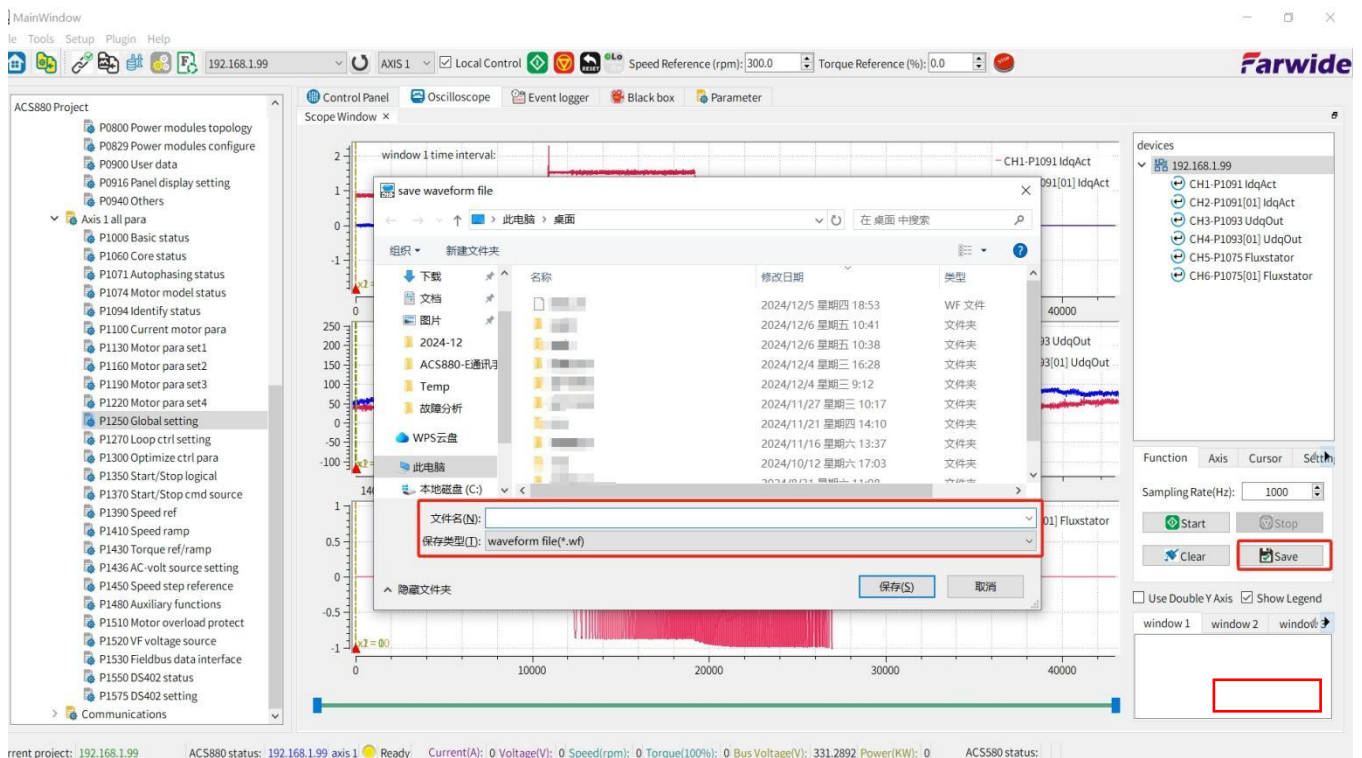
6. Subsequent quantitative analysis of waveform data

The debugging assistant provides a copy function for recorded waveform data. This function can be used to copy specific waveform data values to an EXCEL table in the form of a row and column matrix. Right-click on the assignment point to copy all channel data. Right-click on a subnode to copy only the corresponding channel data. Based on the copied waveform data table, users can use EXCEL or other data analysis software to make more complex quantitative analysis. This function supports both offline and online modes.

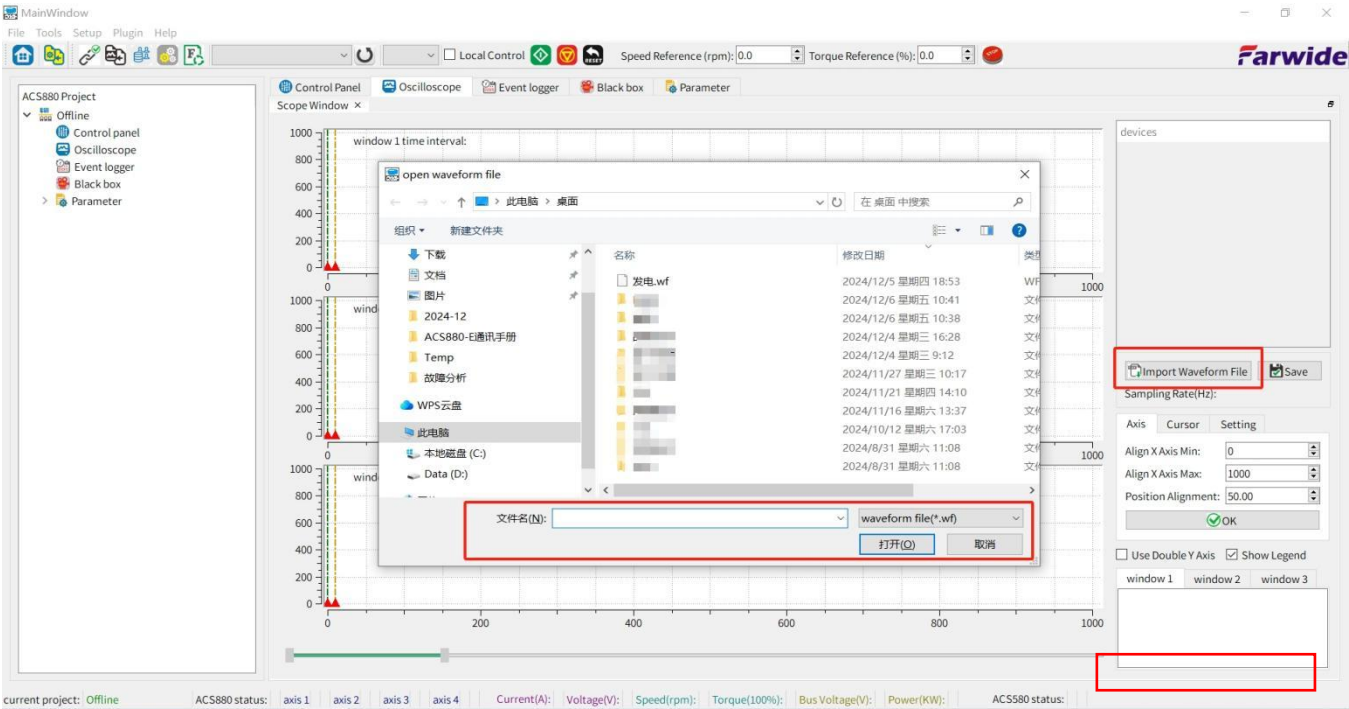


Waveform data saving and importing

- The user can check "Save Data" to save the monitored variable data, which is convenient for subsequent waveform data analysis in offline state.



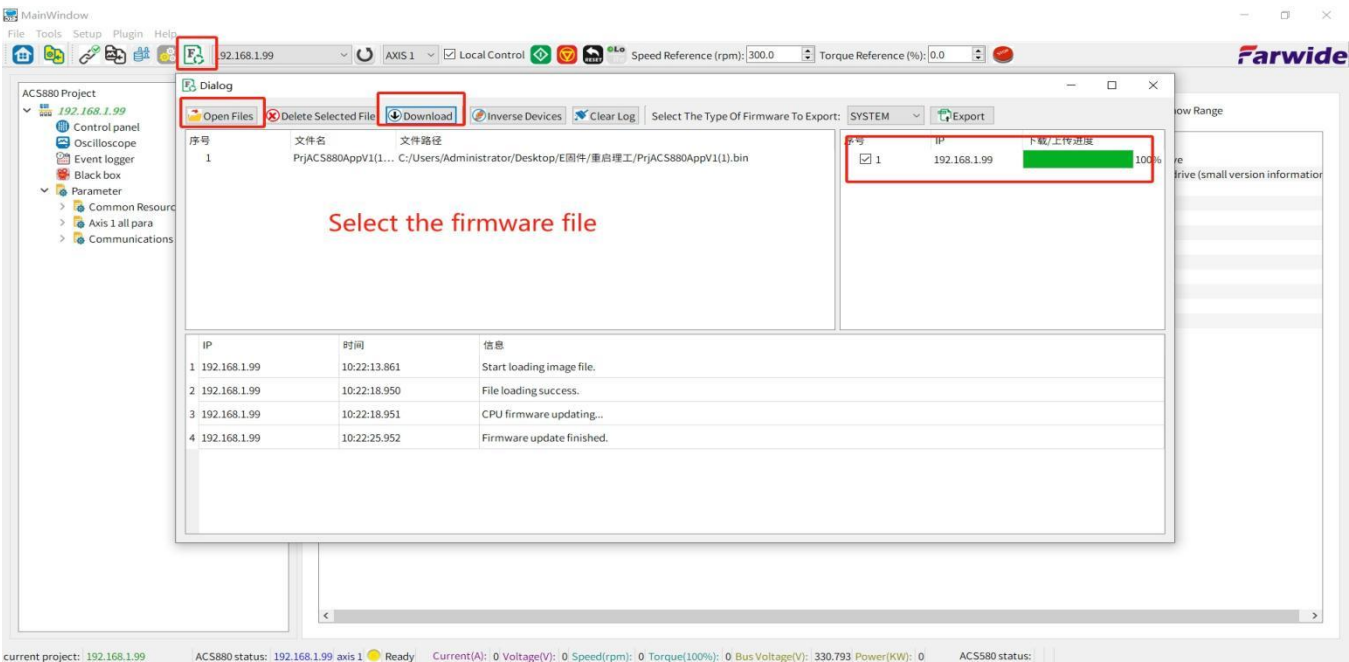
2. Correspondingly, the saved recorded waveforms can be analyzed offline through the data import function.



› Firmware Upgrade

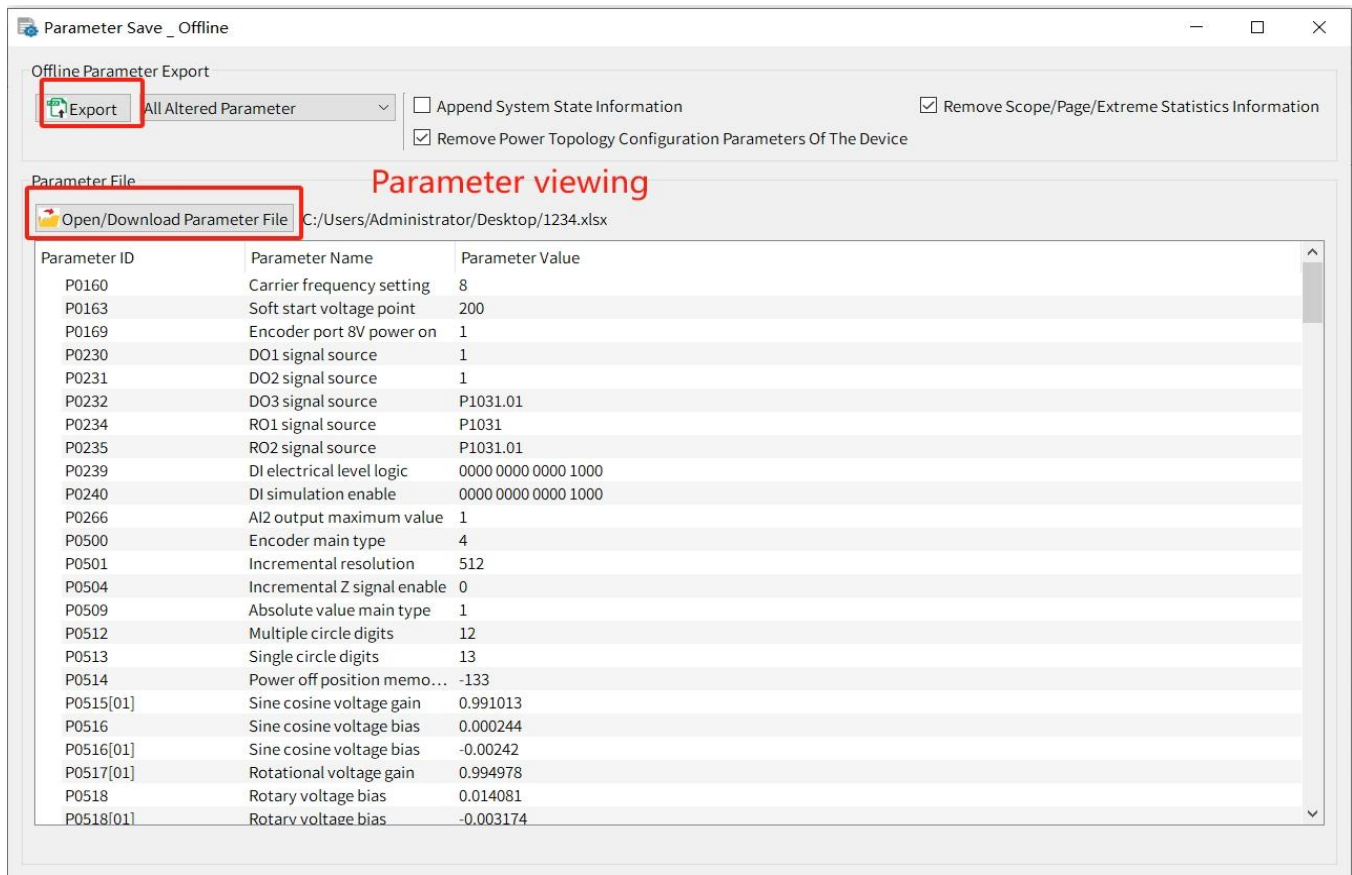
The Farwide drive debugging assistant supports fast firmware upgrade based on Ethernet communication. The upgrade steps are as follows:

- 1. Connect the PC to the target drive by referring to the debugging Assistant connection instructions
- 2. Click the "Open File" button, select the firmware burning file (.hex, .bin) on the local PC, and then click the "Download" button.

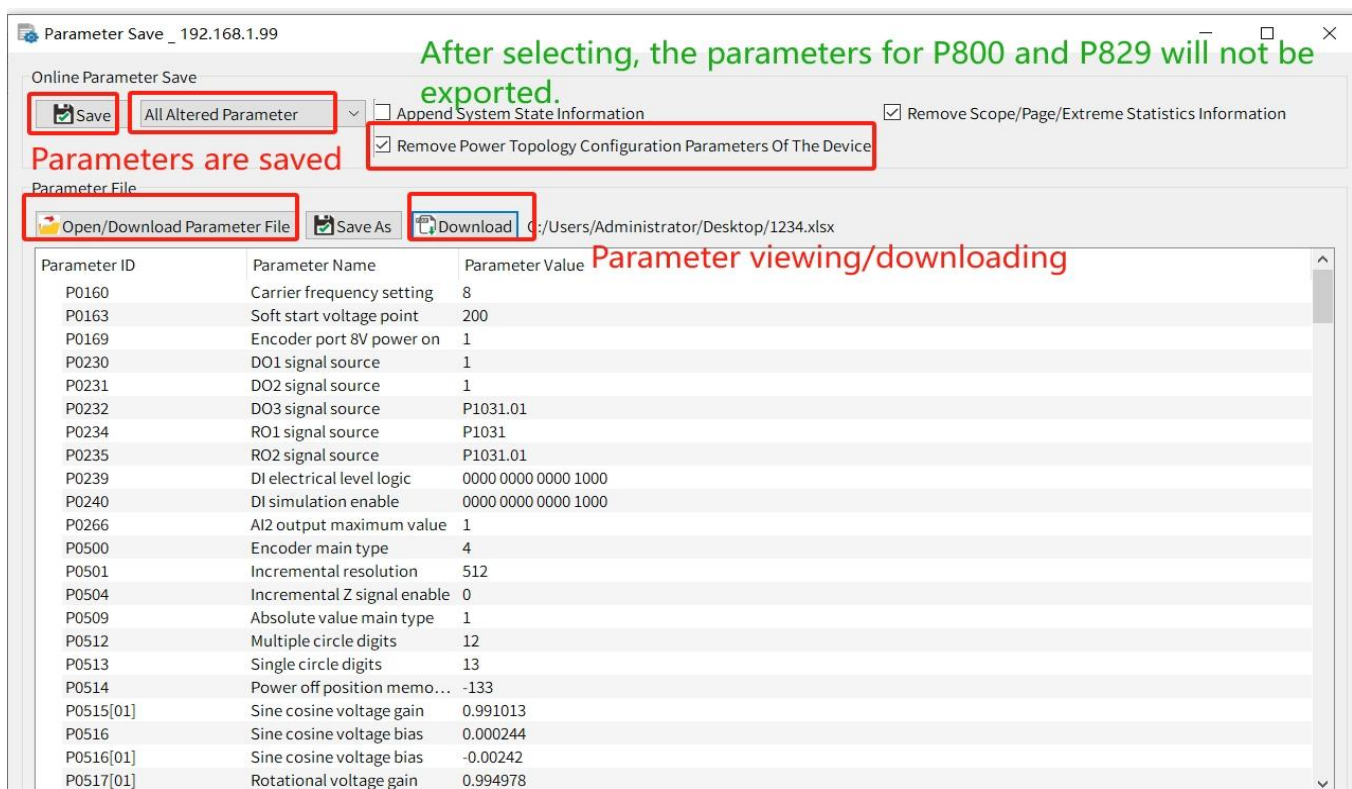


› Parameter Upload Download and function description

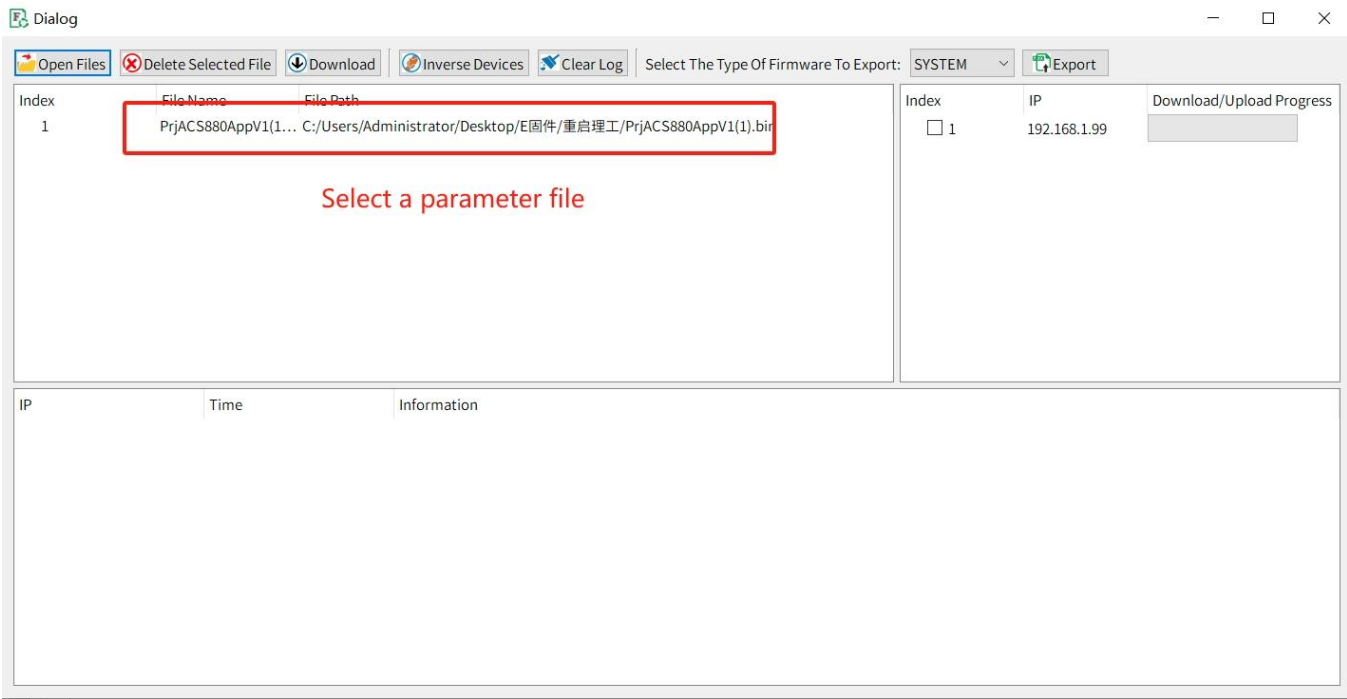
In offline mode, users can import parameter database (suffix .db). Click the "Parameter Setting" button to save and view related parameters. When viewing parameters, users can directly modify and save parameters.



In online mode, users can click the "Parameter Setting" button in the parameter page to save, view and download parameters. When viewing parameters, users can directly modify and save parameters.



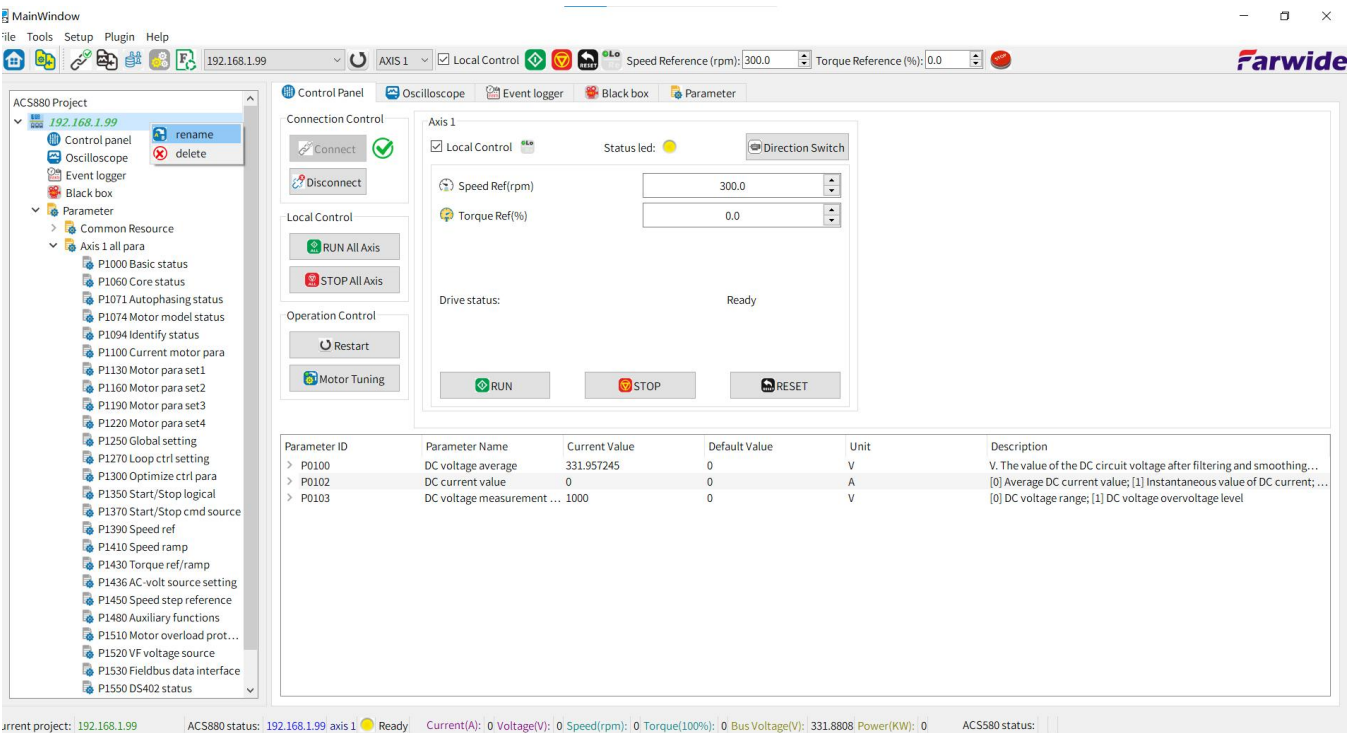
In addition, users can download parameters for multiple devices at the same time. The file formats supported by parameter download include .csv and .db.



System restart: Restart and refresh the drive DSP.

> Project Deletion and Renaming

In offline mode, only renaming of project names is supported, and deletion of projects is not supported. Deleting projects is supported in online mode. Select the IP address of the project, right-click and select Rename, and enter the name you want in the pop-up window. In online mode, select the IP address of the project, right-click and select Delete, and select "Yes" in the pop-up window.



> Black Box Application

Tools used: Firmware version: 2401014 1.4.3 version host computer file and exe program file.

In online mode, the black box function parameters can currently only be set through the host computer. The associated parameters are: P0785\P0786\P0787\0788\0789\0790\0791 and other 7 parameters, whose functions are:

Parameter Code	Parameter name	Parameter Description
P785	Enable control	0 = Disable, 1 = Enable
P786	Number of channels	1~12
P787	Sampling frequency	1000Hz means collecting 1000 points per second
P788[0..2]	Trigger event list	A total of 3 event trigger codes are supported, 0 = undefined
P789[0..11]	Waveform signal source	Supports 12 waveform signal sources in total
P790[0..11]	Additional Data Sources	Supports 12 in total, automatically stores additional data when triggered
P791	Storage sector address	Internal data, auto-increment

You need to configure P786~P790 data first, and then enable P785=1. If P785 is enabled first, the configured P786~P790 is not actually written. You need to disconnect and then enable the black box function to take effect normally. You can record data within 0.5S before the alarm occurs. You can test negative values, floating point numbers, and large data and record waveforms normally. No abnormal situation occurred during the test, and P791 data does not need to be processed

The screenshot shows the Farwide software interface with the 'Black box' configuration window open. The window displays a table of parameters with their current and default values. Red boxes and text annotations highlight specific settings:

- Black box enabled:** P785 (Enable control) is set to 1.
- Recording waveform number of channels setting:** P786 (Number of channels) is set to 6.
- Waveform sampling rate:** P787 (Sampling frequency) is set to 4000.
- Fault trigger code:** P788 (Trigger event list) is set to 30.
- Parameter waveform data source:** P789 (Waveform signal source) is set to P1000.
- Package the waveform along with the attached data:** P790 (Additional Data Sources) is set to 0.
- Storage sector address:** P791 (Storage sector address) is set to 256.

Generate a black box log, the code is 76, and the additional data is the sector address, so that the host computer can be located in the log display window when viewing the log. When the event code of the log is 76, you can

jump to the black box window by pressing a button or right-clicking the menu. You can also enter the black box window directly. The black box window will display all black box records, and can display the waveform, additional data, etc. of each black box. The waveform channel operation is consistent with the above-mentioned oscilloscope usage.

