

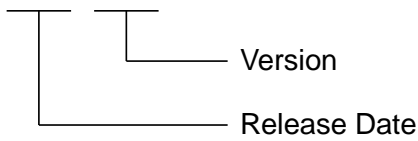
HIMC

iA Studio User Guide

Revision History

The version of the guide is also indicated on the bottom of the front cover.

MH01UE01-2206_V0.6



Release Date	Version	Applicable Software Version	Revision Contents
Jun. 30 th , 2022	0.6	iA Studio 2.0	<ol style="list-style-type: none"> Revise table 1.4.1.1. Add section 2.9 "Performance mode". Revise section 3.3.1, Step 7, Note 2. Revise table 4.2.4.1. Add section 4.5 "Analog IO". Revise table 4.10.2.1. Revise figure 4.13.1.2. Revise section 4.14.1, Step 5. Revise table 5.1.1.1, 5.1.3.2, 5.1.3.3 and 5.1.3.4.
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Nov. 29 th , 2019	0.3	iA Studio 1.2.4032.0	<p>Section 1.2 System requirements: iA Studio also supports Windows 10 (32-bit or 64-bit) operating system.</p>
Apr. 2 nd , 2019	0.2	iA Studio 1.1.3772.0	<ol style="list-style-type: none"> Update Configuration Wizard interface. Divide it into three steps, "Scan Network", "Configuration Setup", and "Save to HIMC". Optimize Save / Load project file operation interface. Optimize table operation interface of Motion Manager, Controller Parameter, and Status Manager. Add Group Status interface in Status Manager. Add 3D Scope function in Scope Manager. Amplify Time / Value Cursor function in Plot View. Add computation function and loading

Release Date	Version	Applicable Software Version	Revision Contents
			<p>different parameter data file function.</p> <p>7. Add password protection function in HMPL Editor.</p> <p>8. Add IP Setting window.</p>
Apr. 25 th , 2018	0.1	iA Studio 1.0.2461.0	First edition.

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1. iA Studio overview

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1.1 iA Studio introduction

industrial Automation Studio (iA Studio) is a Windows-based software package which supports multiple motion control products from HIWIN. With graphical user interface and powerful functions, iA Studio enables users to easily configure, operate and monitor controller.

1.2 System requirements

System requirements for running iA Studio on a Windows-based PC are as below.

Table 1.2.1 System requirements

Operating System	Windows 7 (32-bit, 64-bit) Windows 10 (32-bit, 64-bit)
CPU	Intel Core i3 3.5 GHz or higher
RAM	4 GB or more
Hard Disk Space	400 MB or more
Display	1366 x 768
Communication Type	Ethernet

1.3 iA Studio modules

iA Studio provides the following modules for users to configure, operate and monitor controller.

- Motion Manager
- Parameter Configuration
- Status Manager
- Digital IO
- Analog IO
- Message Window
- Error Message
- Controller Log
- Scope Manager
- HMPL Editor
- Table Viewer
- Modbus Configuration Manager
- IP Setting
- PDO Mapping Manager

1.4 Main screen

After iA Studio connects to the controller, the main screen will display. For connecting to the controller, please refer to section 2.1.1 **Connection setting**. iA Studio main screen is divided into six sections, menu bar, workspace, emergency stop, status bar, network configuration view and controller information box. The following will describe the function of each section.

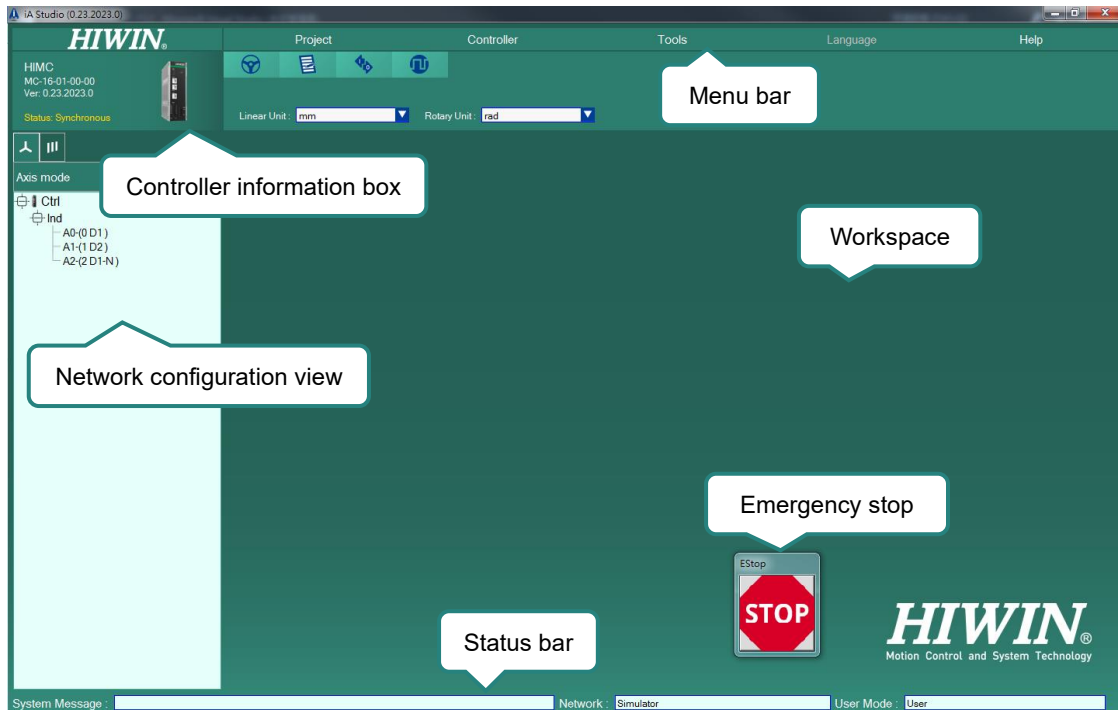


Figure 1.4.1 iA Studio main screen

1.4.1 Menu bar

Table 1.4.1.1 Menu bar

Menu Bar	Submenu	Function
Project	Configuration Wizard	Create / Modify project file.
	Load	Load project file from local disk.
	Save	Save project file to local disk.
Controller	Connection Setting	Connect to the controller or simulator.
	Firmware Manager	Manage controller firmware.
	Rescan Slaves	Rescan slaves. If configuration already exists, controller will try to switch to synchronous status.
	Store Configuration	Save current configuration to the controller.
	Reboot Controller	Reboot controller.
	Set to Factory Default	Set controller to factory default.

Table 1.4.1.1 Menu bar

Menu Bar	Submenu	Function
Tools	User Account	Change user mode.
	Turn Off/On Econ Mode	Modify performance mode.
	Parameter Configuration	View and set axis parameters.
	Motion Manager	Control single-axis motion and set motion parameters.
	Scope Manager	Monitor and collect parameter data.
	Digital IO	Monitor digital inputs and outputs.
	Analog IO	Monitor analog inputs and outputs.
	Status Manager	Monitor axis motion and fault status.
	HMPL Editor	Create and run HMPL task.
	Controller Log	View controller log.
	Message Window	Open command line window.
	Table Viewer	Set User Table. User Table can be used in HMPL, API library and Modbus communication.
	Modbus Configuration Manager	Set controller parameters and HMPL variables in order to be accessed via Modbus TCP.
	IP Setting	Modify controller's CN3 IP Address, Native ASCII Port and User ASCII Port.
PDO Mapping Manager	Setup communication PDO objects between controller and each slave.	
Language	N/A	Change to other languages.
Help	iA Studio User Guide	Open iA Studio user guide.
	About	Information on software and firmware version.

1.4.2 Controller information box

Controller information box shows controller model, firmware version, and controller status.

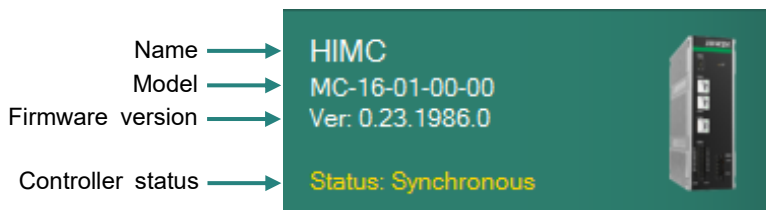


Figure 1.4.2.1 Controller information box

For controller status, please see below.

Table 1.4.2.1 Controller status

Controller Status	Description
Initializing	Controller is initializing.
Busy	Controller is busy.

Controller Status	Description
Synchronous	Controller is ready to control axis motion.
Asynchronous	Controller is not ready to control axis motion.
Error	An error occurs in the controller.
Reboot	Controller is rebooting.
Broken	Connection to the controller is broken.

1.4.3 Network configuration view

In network configuration view, users can inspect the relation among master (controller) and slaves (e.g. drives) in two different modes: slave mode and axis mode.

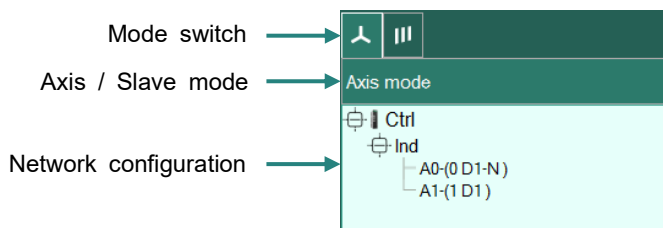


Figure 1.4.3.1 Network configuration view

(1) Slave mode

After iA Studio connects to the controller, users can see the physical address, model name and user-defined name of all slaves. (Note: The user-defined name of slave cannot be set via iA Studio, please refer to the user manual of the slave.) To switch to slave mode, please follow the steps below.

Step 1: Click on the icon below. Then the network configuration view will display in slave mode.

Step 2: The configuration tree displays as below.

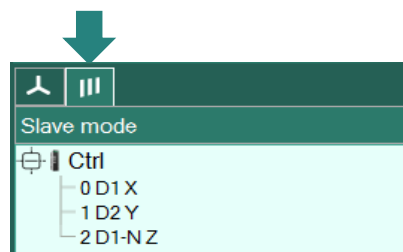


Figure 1.4.3.2 Network configuration view: slave mode

(2) Axis mode

If stages are set in Configuration Wizard, users can see stages, logical axes and physical slaves in axis mode. Axes can be listed in user-defined stage or in stage Ind.. See section 3.3 **Configuration setup** for more information. To switch to axis mode, please follow the steps below.

Step 1: Click on the icon below. Then the network configuration view will display in axis mode.

Step 2: The configuration tree displays as below.

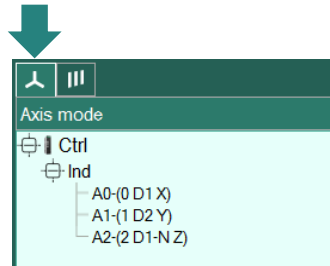


Figure 1.4.3.3 Network configuration view: axis mode

1.4.4 Workspace

Workspace is the area for displaying different modules at the same time. In workspace, users can freely drag, drop, re-size and re-arrange modules.

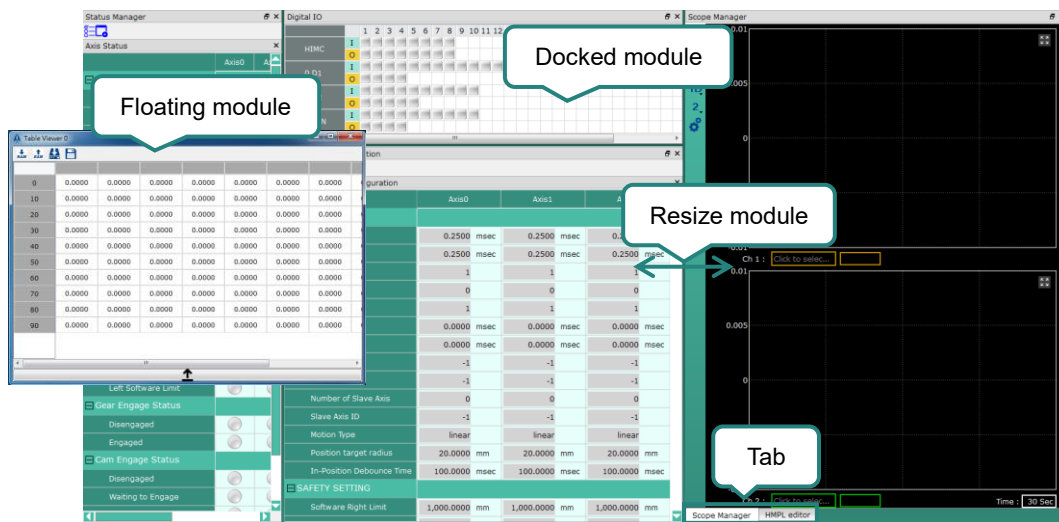


Figure 1.4.4.1 Workspace

Users can click on **Expand** button in the upper-left corner of the main screen to maximize workspace.

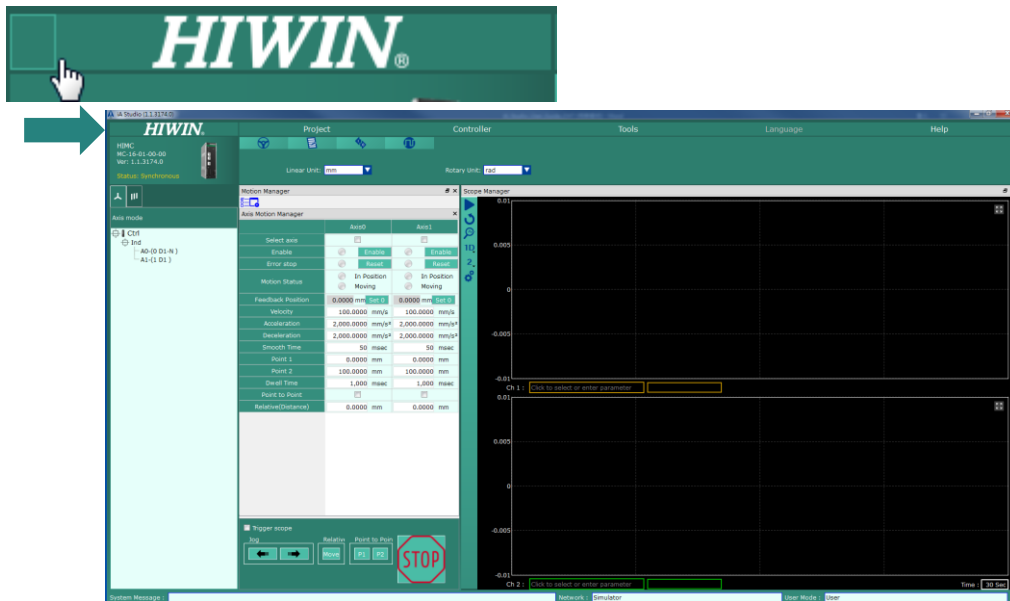


Figure 1.4.4.2 Maximize workspace

1.4.5 Status bar

Status bar shows system message, network type, and user mode.

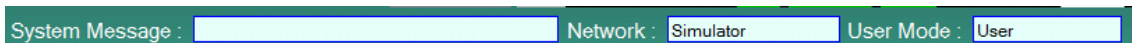


Figure 1.4.5.1 Status bar

1.4.6 Emergency stop

Click on **Emergency Stop** button to disable all axes. All HMPL tasks will be stopped at the same time. The button is always shown on the top of main screen when iA Studio and controller are connected. The button will disappear when iA Studio and controller are disconnected or iA Studio is closed.



Figure 1.4.6.1 Emergency Stop button

Note: Emergency stop can also be activated by keyboard function key **F12**.

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2. iA Studio basics

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2.1 Connecting to the controller

In Connection Setting, users can connect iA Studio to the controller via specified communication type.

2.1.1 Connection setting

Follow the steps below to open Connection Setting window.

Step 1: Click on **Controller** on the menu bar.

Step 2: Click on **Connection Setting**. Then the Connection Setting window will appear as figure 2.1.1.2.

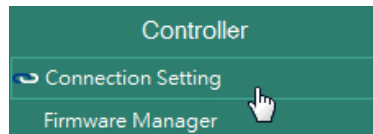


Figure 2.1.1.1 Connection Setting

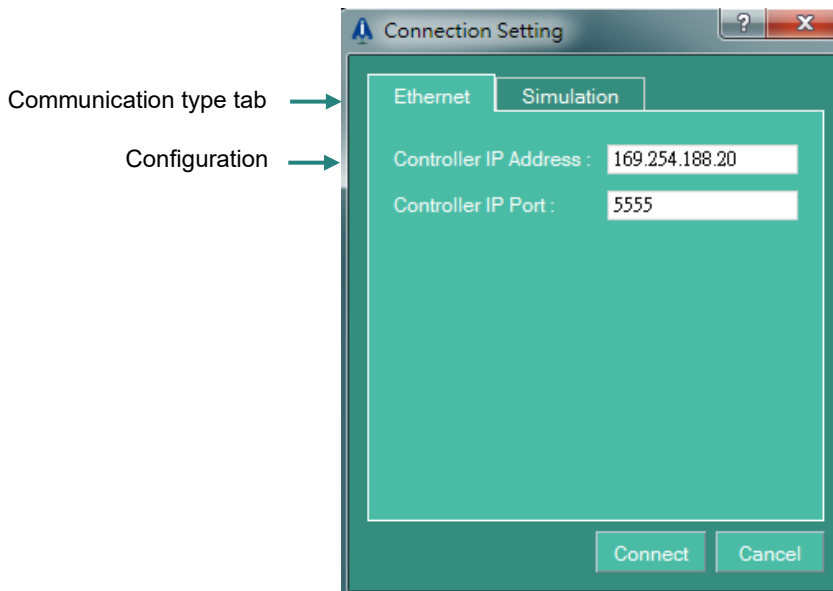


Figure 2.1.1.2 Connection Setting window: Ethernet

Table 2.1.1.1 Connection Setting window

Connection Type Tab	Description
Ethernet	Connect to controller via TCP / IP.
Simulation	Connect to virtual simulator.

2.1.2 Connecting to the controller via Ethernet

Controller can be connected via Ethernet. You may follow the steps below to establish connection.

Step 1: Select **Ethernet** tab in Connection Setting window.

Step 2: Enter controller IP address and IP port.

Step 3: Click on **Connect** button to initialize the connection. A pop-up window will appear to indicate the connecting progress.

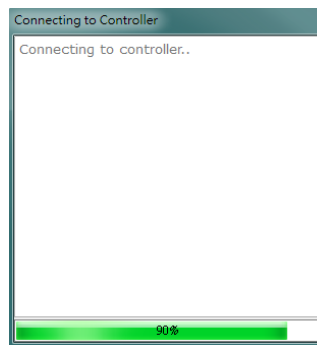


Figure 2.1.2.1 Connecting progress pop-up window

Connection Setting window and pop-up window will close automatically after connection is successfully established. If connection cannot be established, an error dialog will appear. When the error log appears, please check if the communication cable is properly connected to the controller.

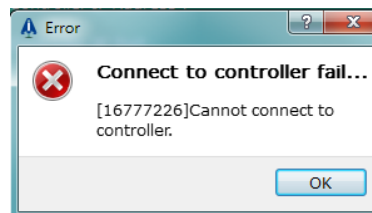


Figure 2.1.2.2 Fail to connect to the controller

2.1.3 Connecting to the simulator

To connect to the simulator, you may follow the steps below to establish connection.

Step 1: Select **Simulation** tab in Connection Setting window.

Step 2: Click on **Configure** button to open Slave Configuration Setting window.

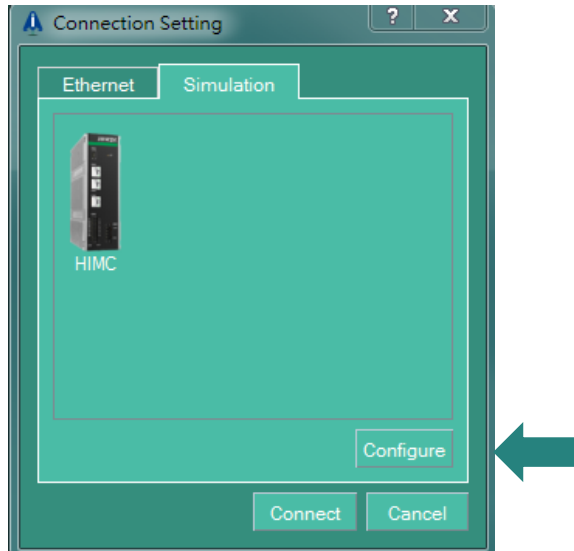


Figure 2.1.3.1 Connection Setting window: Simulation

Step 3: Set up slave configuration and click on **OK** button.

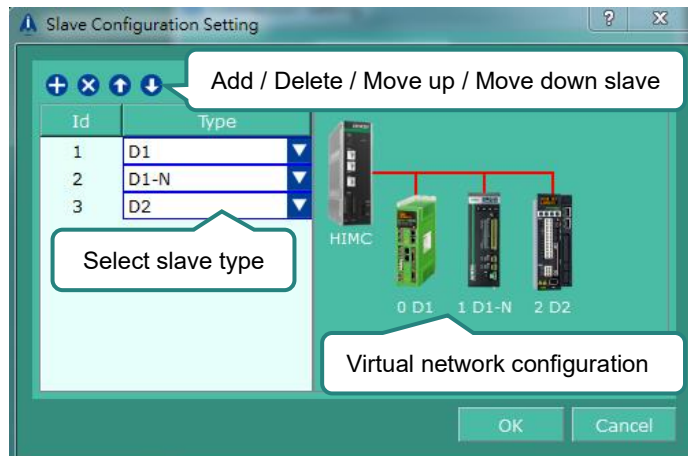


Figure 2.1.3.2 Slave Configuration Setting window

Step 4: Click on **Connect** button to initialize connection. A pop-up window will appear to indicate the connecting progress.

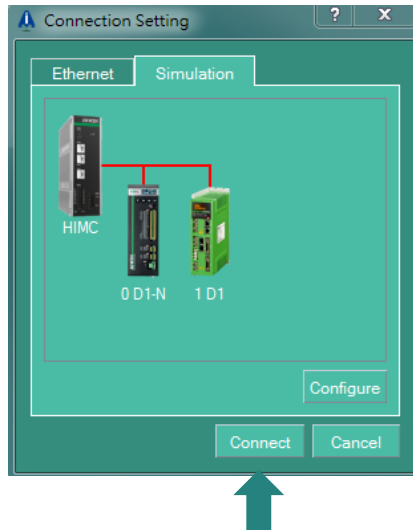


Figure 2.1.3.3 Connecting to the simulator

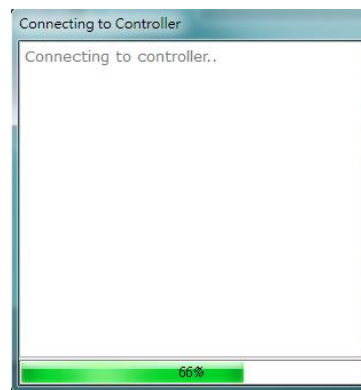


Figure 2.1.3.4 Connecting progress pop-up window

Connection Setting window and pop-up window will close automatically after connection is successfully established.

2.1.4 Access privilege

Although multiple iA Studios can support to connect to the controller at the same time, only the one with access privilege is permitted to write data to the controller. For the iA Studio without access privilege, the writing function is disabled. This is to avoid the safety issue caused by multi-connection and operation.

If a user connects to the controller by iA Studio without access privilege, a warning will pop up to remind the user that only value observation is allowed with this connection. In addition, the background color of the 'Network' field will turn to yellow and 'Access Restricted' will keep flashing.

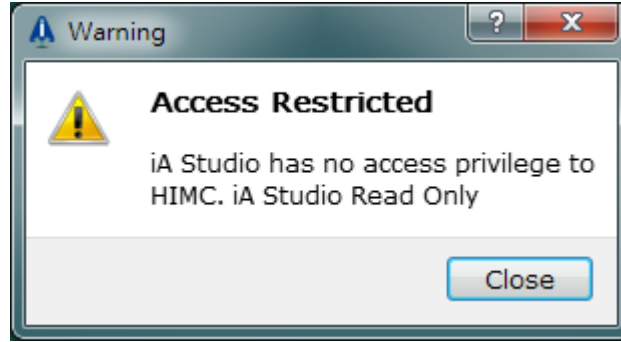


Figure 2.1.4.1 Warning to show the status of no access privilege

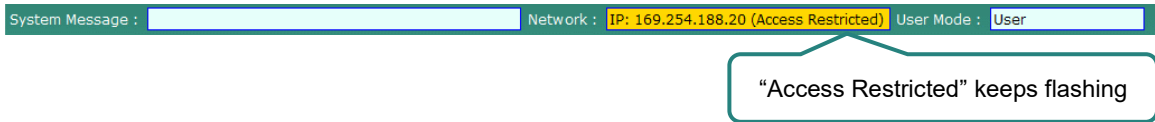


Figure 2.1.4.2 Status bar (no access privilege)

If the iA Studio you're using has no access privilege and you want to change the status, you have to stop the connection from all other iA Studios and HIMC API applications first. You can get access privilege for your current iA Studio in this way.



Figure 2.1.4.3 Status bar (with access privilege)

2.1.5 Connection version consistency

A user has to make sure the iA Studio version is consistent with the controller firmware version before using the iA Studio to manipulate the controller. When iA Studio connects to the controller, a warning will pop up if the iA Studio and controller firmware versions are not compatible with each other. The user may follow one of the following procedures to fix this problem.

1. Use the current iA Studio to upgrade the controller firmware to a consistent version.
2. Close the current iA Studio and use a consistent iA Studio version to manipulate the controller.

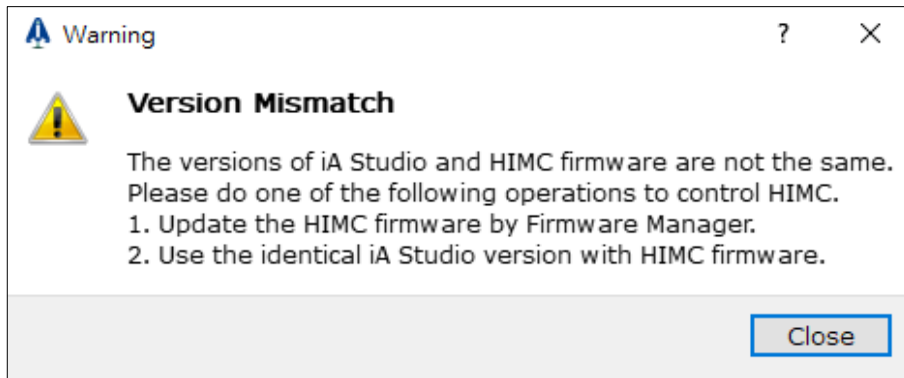


Figure 2.1.5.1 Warning to remind the inconsistency of versions

The iA Studio and the controller firmware version numbers can be seen in the information box. An user can check if they are consistent.

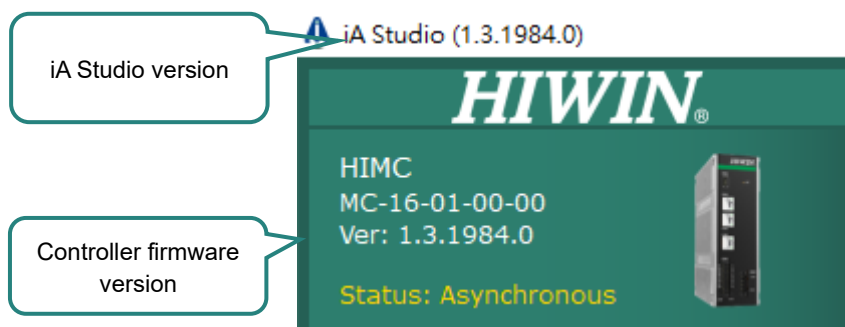


Figure 2.1.5.2 iA Studio and controller firmware version numbers

When the iA Studio and controller firmware versions are not consistent, the iA Studio can only be used to upgrade the firmware and disconnect the controller.

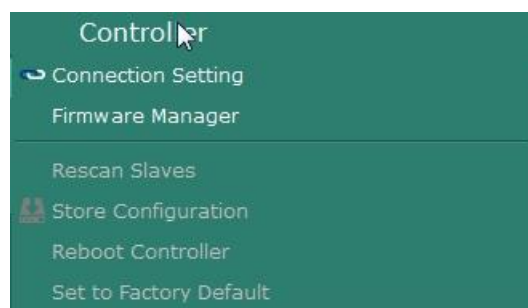


Figure 2.1.5.3 Permitted operation under inconsistency of iA Studio and controller firmware versions

2.2 Disconnecting from the controller

To discontinue the current connection with the controller or simulator, you may follow the steps below.

Step 1: Click on **Controller** on the menu bar. Click on **Connection Setting** to open Connection Setting window.

Step 2: Click on **Disconnect** button to discontinue current connection.

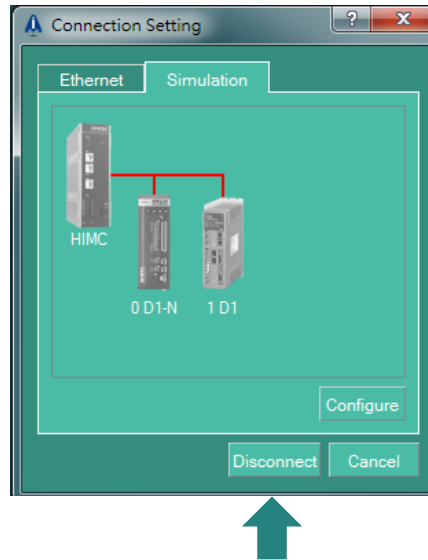


Figure 2.2.1 Connection Setting window when controller or simulator is connected

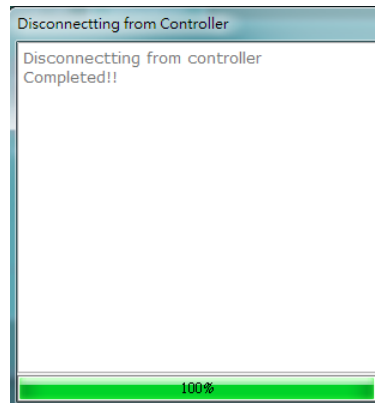


Figure 2.2.2 Disconnecting progress pop-up window

Pop-up window will automatically close after connection is successfully discontinued.

2.3 Store configuration

In iA Studio, there are two ways to save controller configuration.

- (1) Use save / load project file function to save controller configuration as project file to your local disk. (Note: The file extension of iA Studio project file is *.iasprj.) Project files can also be loaded from local disk to the controller. For further information, please refer to section 3.4 **Save / Load project file**.
- (2) Use Store Configuration function to save controller configuration to the hard disk in the controller. The saved configuration will still be accessible after reboot or power-off.

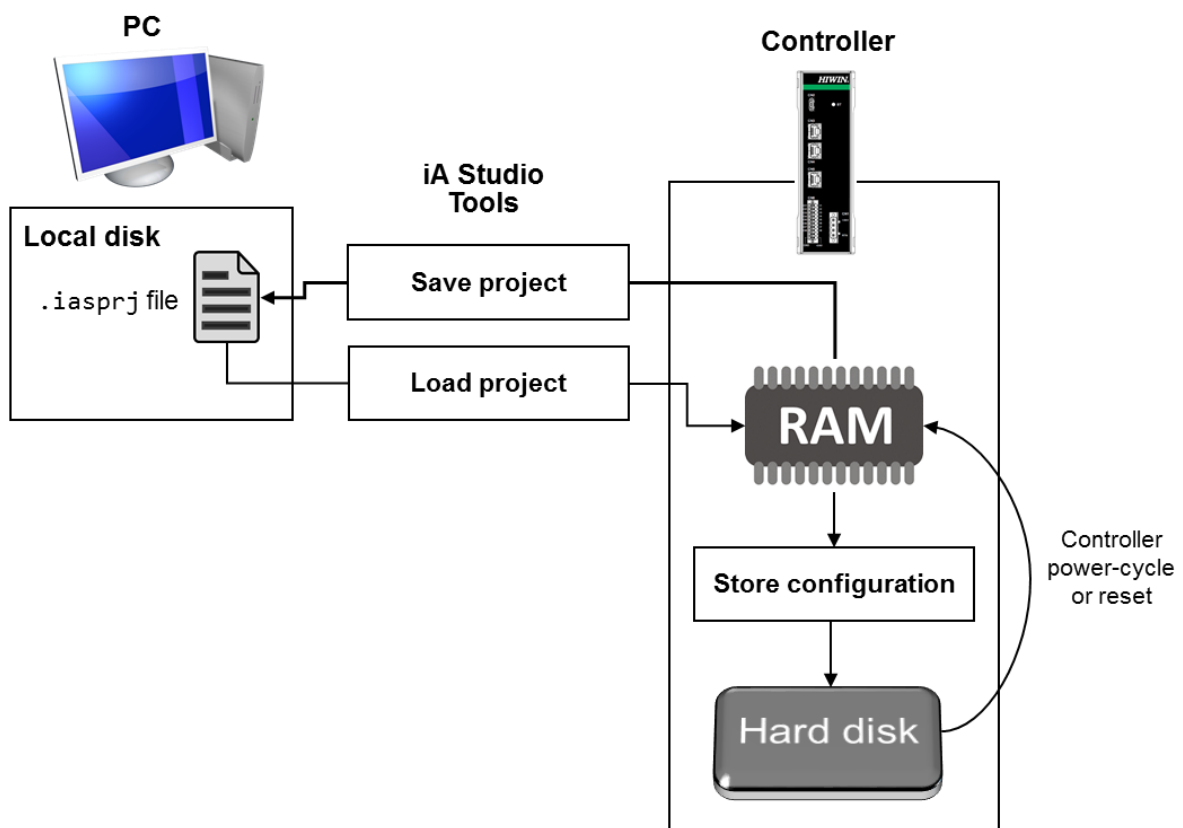


Figure 2.3.1 Save / Load project file and Store Configuration

After controller configuration is set in Configuration Wizard, you may follow the steps below to save the configuration to the controller.

Step 1: Click on **Controller** on the menu bar.

Step 2: Click on **Store Configuration**.

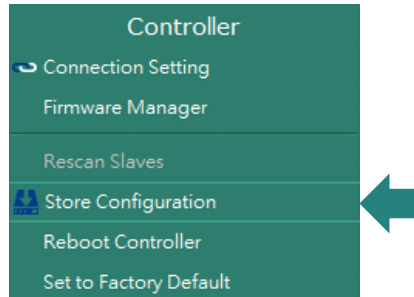


Figure 2.3.2 Store Configuration

Step 3: After **Store Configuration** is clicked on, a question dialog will appear. Click on **Yes** button to save controller configuration. A pop-up window will appear to indicate the saving progress.

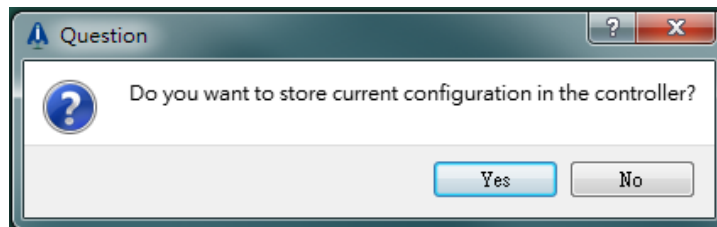


Figure 2.3.3 Save controller configuration warning dialog

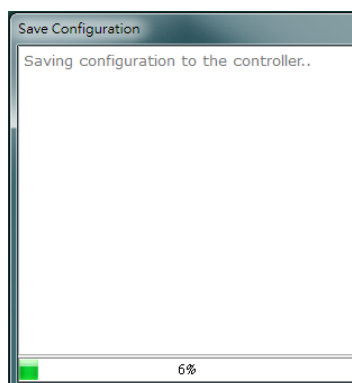


Figure 2.3.4 Pop-up window when saving controller configuration

Pop-up window will close automatically after controller configuration is successfully saved.

2.4 Reboot controller

Reboot Controller function enables users to restart and re-initialize controller. Settings which are not saved to the controller hard disk or local disk will be lost and cannot be recovered after reboot. To reboot controller, you may follow the steps below.

Step 1: Click on **Controller** on the menu bar.

Step 2: Click on **Reboot Controller**.

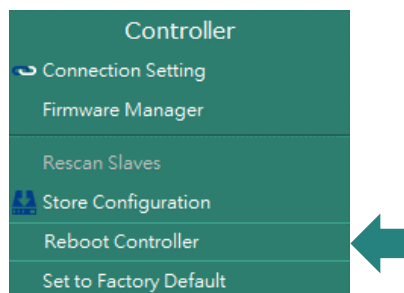


Figure 2.4.1 Reboot Controller

Step 3: After **Reboot Controller** is clicked on, a question dialog will appear. Click on **Yes** button to reboot controller. A pop-up window will appear to indicate the reboot progress.

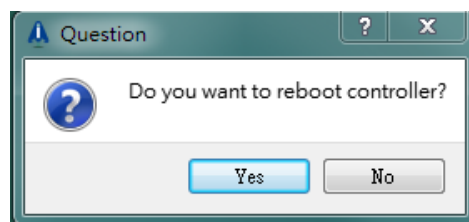


Figure 2.4.2 Reboot Controller question dialog

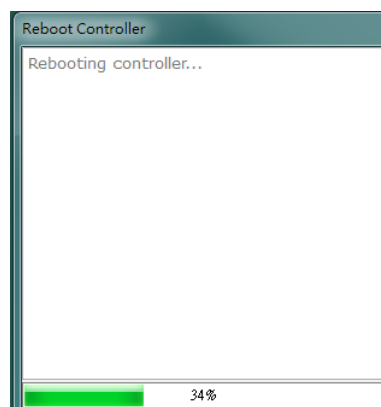


Figure 2.4.3 Pop-up window when rebooting controller

Pop-up window will close automatically after reboot finishes.

2.5 Set to factory default

This function can set controller settings and configuration to factory default. Before using this function, please make sure the controller settings and configuration are saved to local disk. To set to factory default, you may follow the steps below.

Step 1: Click on **Controller** on the menu bar.

Step 2: Click on **Set to Factory Default**.

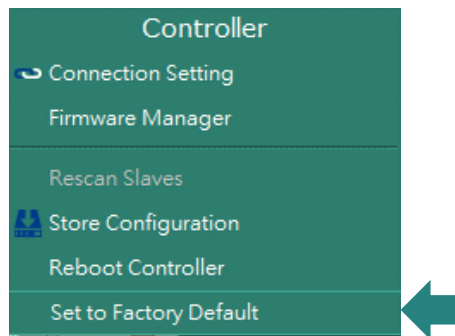


Figure 2.5.1 Set to Factory Default

Step 3: After **Set to Factory Default** is clicked on, a question dialog will appear. Click on **Yes** button to reset. A pop-up window will appear to indicate the reset progress.

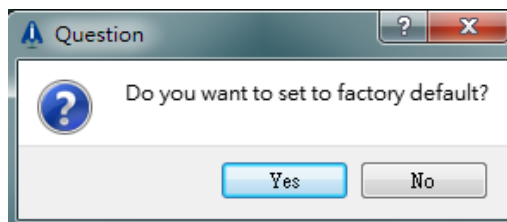


Figure 2.5.2 Set to Factory Default question dialog

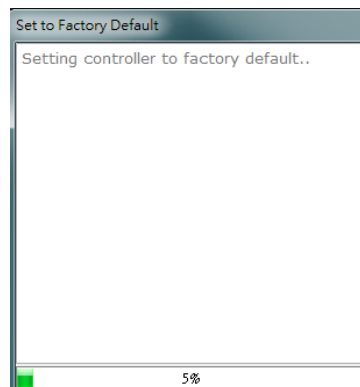


Figure 2.5.3 Pop-up window when setting controller to factory default

Pop-up window will close automatically after reset completes.

2.6 Firmware manager

In Firmware Manager, users can inspect the firmware information of controller and slave. The controller firmware is bundled with iA Studio and can only be updated to the controller via iA Studio.

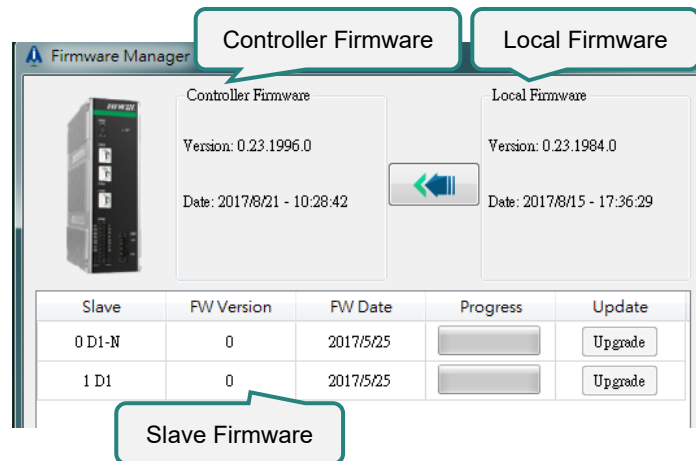


Figure 2.6.1 Firmware Manager

Note: Currently, iA Studio does not support the update of slave firmware.

■ Open Firmware Manager

To open Firmware Manager, you may follow the steps below.

Step 1: Click on **Controller** on the menu bar.

Step 2: Click on **Firmware Manager**.

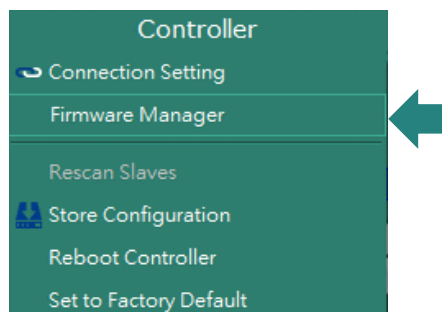


Figure 2.6.2 Firmware Manager

■ Update controller firmware

To update controller firmware, you may follow the steps below.

Step 1: Click on the button indicated in figure 2.6.3. After the button is clicked on, a question dialog will appear.

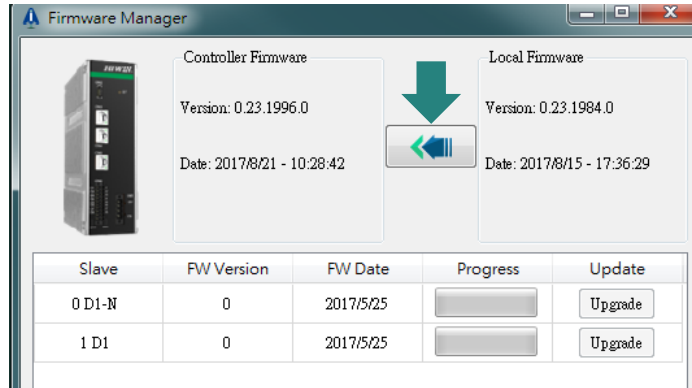


Figure 2.6.3 Firmware Manager

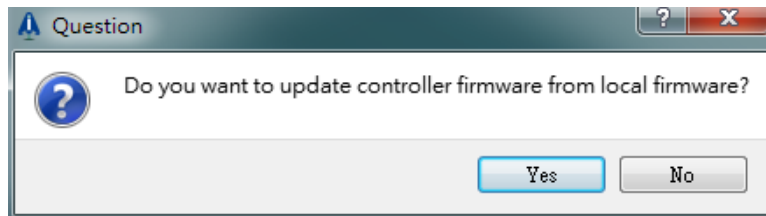


Figure 2.6.4 Question dialog when updating firmware

Step 2: Click on **Yes** button to update controller firmware. A pop-up window will appear to indicate the update progress.

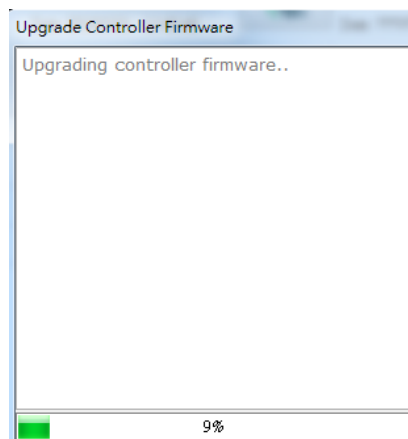


Figure 2.6.5 Pop-up window when updating controller firmware

Pop-up window will automatically close after update completes. Once the firmware update completes, please check if the controller firmware version is identical with the local firmware version.

2.7 User account

2.7.1 User mode

Three user modes are available in iA Studio. The table below describes what functions are supported in each user mode.

Table 2.7.1.1 User mode

User Mode	Description
User	Default mode. In this mode, users are only allowed to modify motion parameters.
Superuser	Users are allowed to modify motion and safety parameters. HIWIN is not responsible for any damage, accident or injury caused by incorrect setting.
Developer	Users are allowed to modify all types of parameters. This mode can only be selected by HIWIN engineers.

Users are allowed to change user mode in User Account window, please refer to section 2.7.2 **Change user mode**.

2.7.2 Change user mode

Click on **Tools** on the menu bar to open User Account window. In User Account window, users can change the user mode of iA Studio. To log in to the desired user mode, you may follow the steps below.

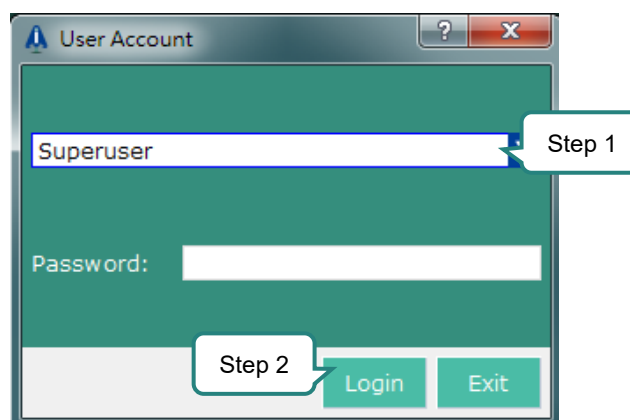


Figure 2.7.2.1 User Account window

Step 1: Select desired user mode. If Superuser is selected, key in software version number for password.

Step 2: Click on **Login** button.

After successful login, the selected user mode will be shown on the status bar.



Figure 2.7.2.2 User mode on the status bar

2.8 System motion unit

iA Studio provides two types of system motion units for users to select from according to their motor types.

Table 2.8.1 System motion unit

Unit for Linear Motor	
Nanometer	nm
Micrometer	um
Millimeter	mm
Centimeter	cm
Meter	m
Inch	inch
Mil	mil
Unit for Rotary Motor	
Radian	rad
Milliradian	mrad
Degree	deg
Revolution	rev
Arc Second	arcsec

Users can select desired unit in drop-down list.

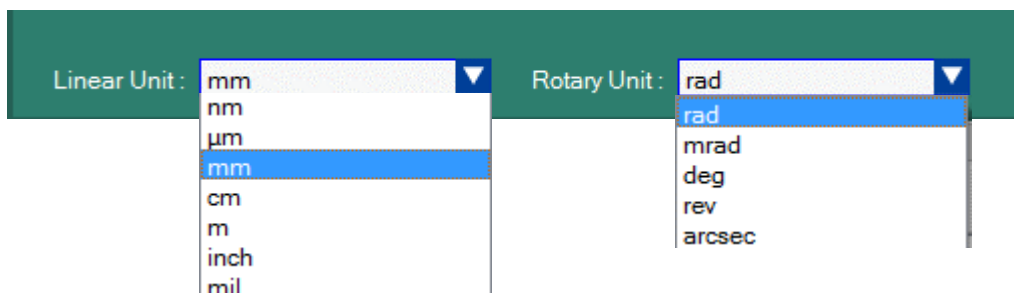


Figure 2.8.1 Select motion unit

2.9 Performance mode

iA Studio provides two types of performance modes for users to select from according to the requirements and applications.

Table 2.9.1 Performance mode

Type of Performance Mode	Display of Tools	Description
Econ Mode	Turn Off Econ Mode	This mode can reduce CPU usage, but it will increase HIMC API average response time. The influence level varies according to the computer specifications.
High Performance Mode (Default)	Turn On Econ Mode	This mode has faster HIMC API average response velocity, but its CPU usage is higher than that of Econ Mode. The influence level varies according to the computer specifications.

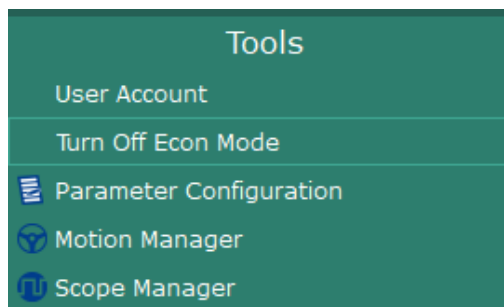


Figure 2.9.1 Click on it to switch to High Performance Mode from Econ Mode

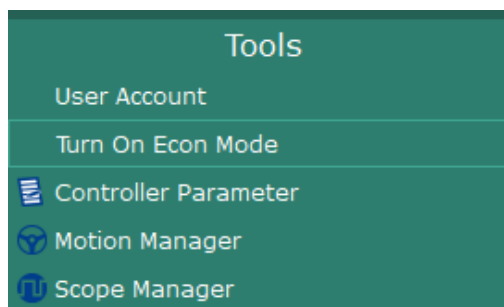


Figure 2.9.2 Click on it to switch to Econ Mode from High Performance Mode

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3. Controller configuration

3.	Controller configuration.....	3-1
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3.1 Configuration wizard

Configuration Wizard allows users to scan slave network status, apply slave network status, set up controller configuration, set axis parameters, and do axis motion test. Users should troubleshoot the error of slave network status and finish setting up controller configuration in Configuration Wizard before starting axis motion control.

3.1.1 Open configuration wizard

To open Configuration Wizard, click on **Project** on the menu bar. Then, click on **Configuration Wizard**.

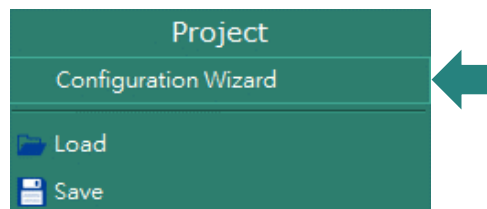


Figure 3.1.1.1 Configuration Wizard

Configuration Wizard window is as below.

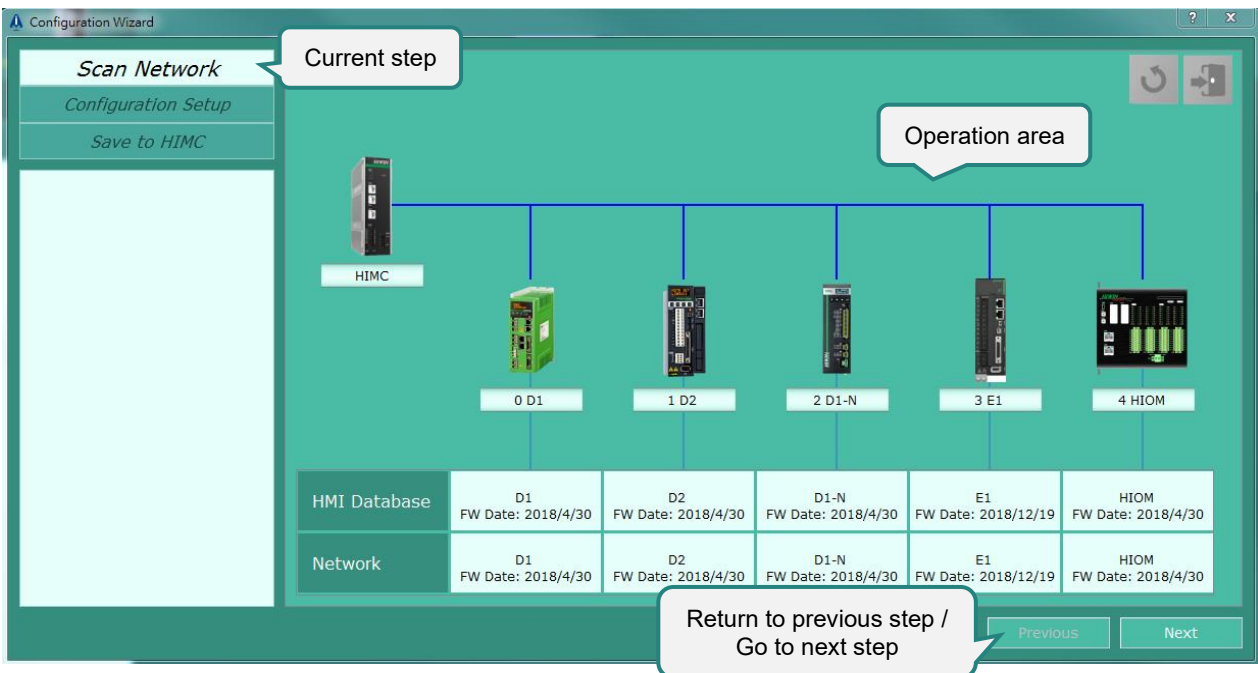


Figure 3.1.1.2 Configuration Wizard window

3.2 Scan network

Scan Network displays the current slave network status. If an error occurs in the current slave network status, users can troubleshoot it with the functions provided by this page.

Scan Network window is as below.

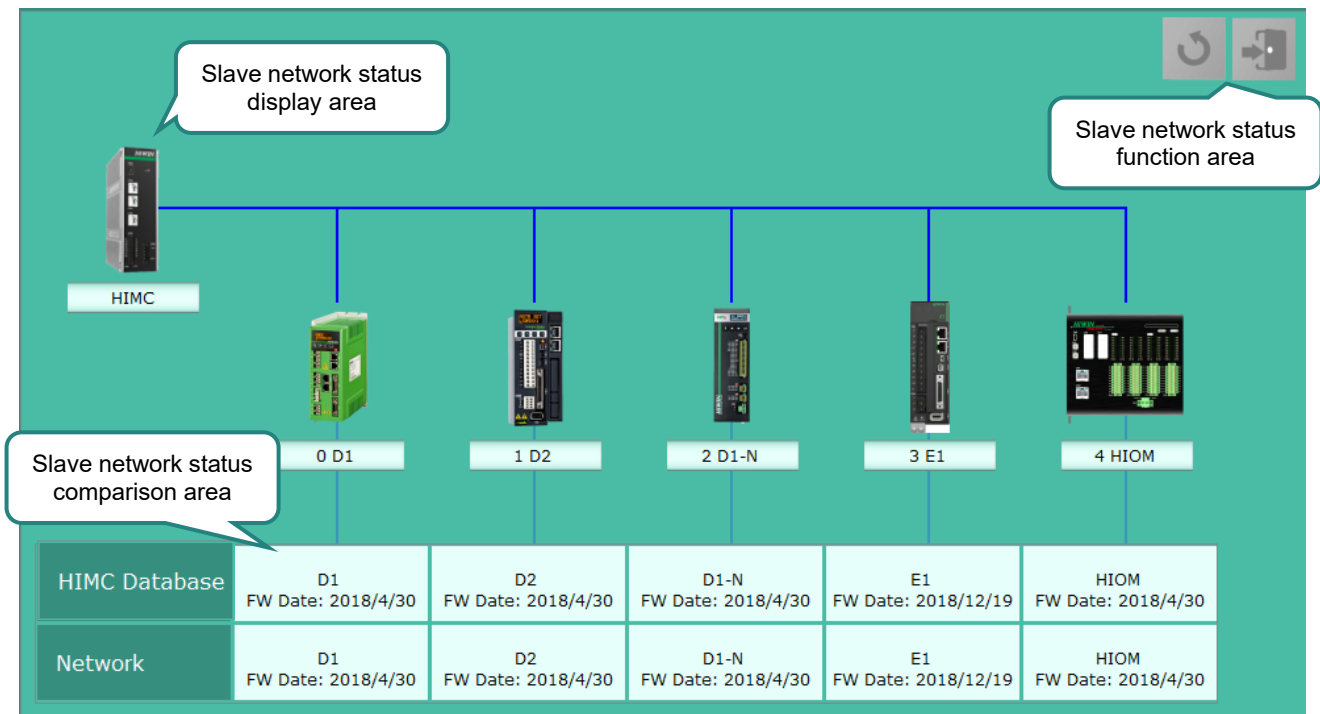


Figure 3.2.1 Scan Network window

Table 3.2.1 Functions in Scan Network window

Icon / Button	Function
	Scan slave network status.
	Apply slave network status.

3.2.1 Scan slave network status

When slave network status changes, will appear beside the controller icon, “Slave network error” will appear as users move the mouse cursor toward , and will become .

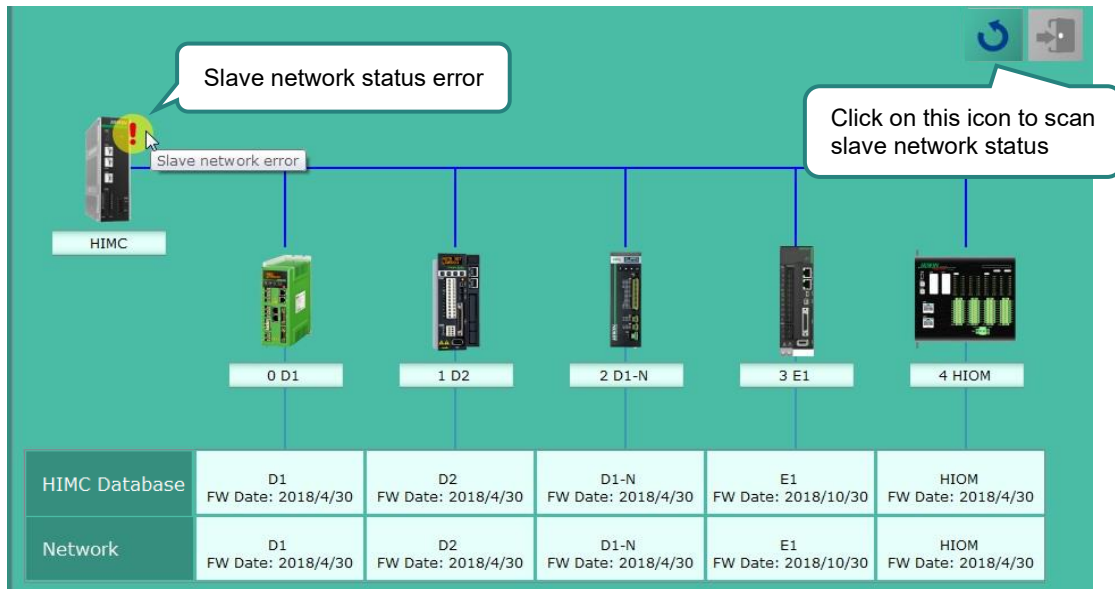



Figure 3.2.1.1 Slave network status changes

Take removing all the slaves after “1 D2” for example:

■ **No configuration exists in the controller**

After clicking on  to scan slave network status, slave network status of HIMC Database and Network will be updated to actual connection.

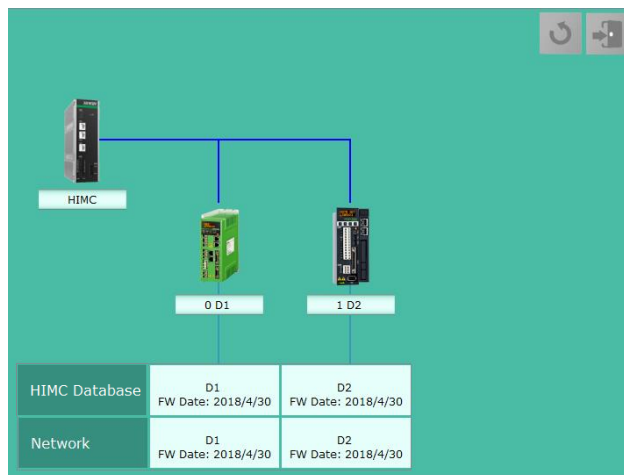




Figure 3.2.1.2 Slave network status is updated to actual connection

■ **Configuration exists in the controller**

After clicking on  to scan slave network status, slave network status of Network will be updated to actual connection and compared with that of HIMC Database. Inconsistency will be noted in red words, and  will appear beside the slave icon.

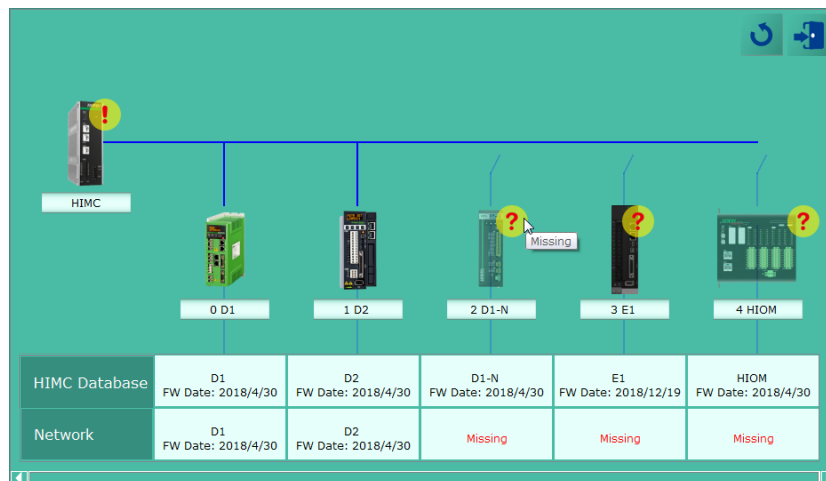





Figure 3.2.1.3 Slave network status of HIMC Database is different from that of Network

Note: If all the slaves after “1 D2” are reconnected, and  is clicked on to rescan slave network status, slave network status of HIMC Database and Network will be the same again.

3.2.2 Apply slave network status

When slave network status of HIMC Database is different from that of Network, click on  to give up current controller configuration and apply actual connection to HIMC Database and Network. The steps are given as below.

Step 1: Click on  and a question dialog will appear.

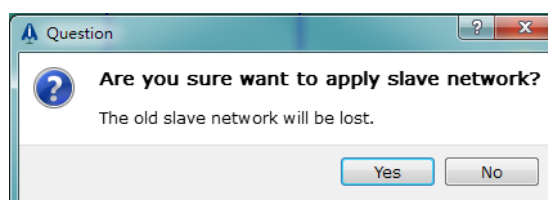


Figure 3.2.2.1 Question dialog for applying slave network status

Step 2: Click on **Yes** button to execute the procedure of applying slave network status.

3.3 Configuration setup

Configuration Setup allows users to set up controller configuration, set axis parameters, and do axis motion test. Users should set up controller configuration according to actual condition of stage.

Configuration Setup window is as below.

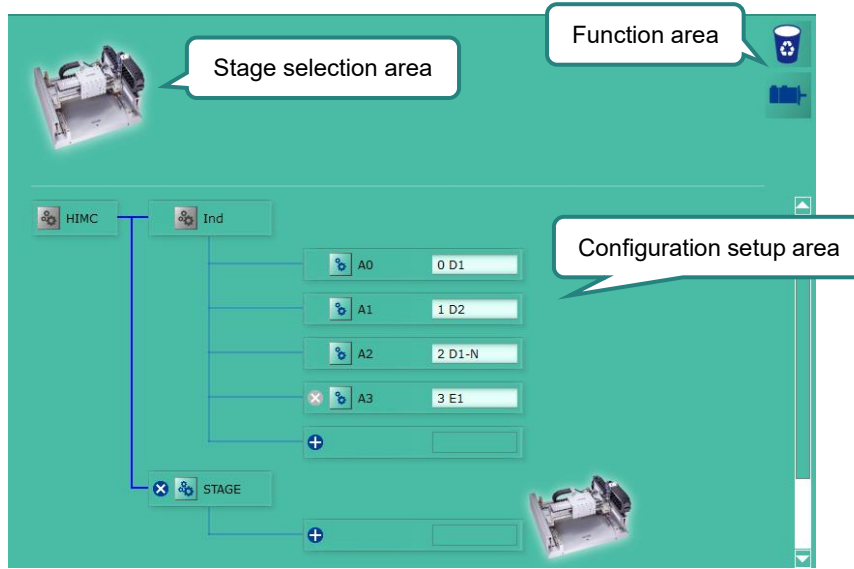









Figure 3.3.1 Configuration Setup window

Functions in Configuration Setup window are described as below.

Table 3.3.1 Functions in Configuration Setup window

Icon / Button	Function
	Add new stage.
	Modify stage name. The name of stage Ind. cannot be modified, so the icon is grey.
	Modify parameters of each axis.
	Add new axis.
	<ol style="list-style-type: none"> Delete stage. If the stage is still connected to axes, all the axes will be connected to stage Ind. after the stage is deleted. Delete axis. Users can only delete from the last axis. An axis can only be deleted when it is not connected to a slave.
	Open axis motion test window.
	Reset controller configuration.

3.3.1 Set up controller configuration

Follow the steps below to set up controller configuration.

Step 1: Click on  to add new stage.

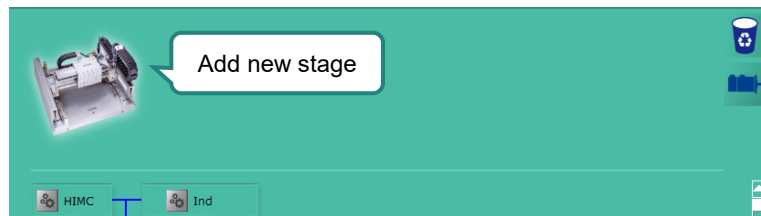




Figure 3.3.1.1 Add new stage

Step 2: Click on  in  to open Modify Machine Name window. Key in desired name, press **Enter** key to make input field turn white, and click on **OK** button.

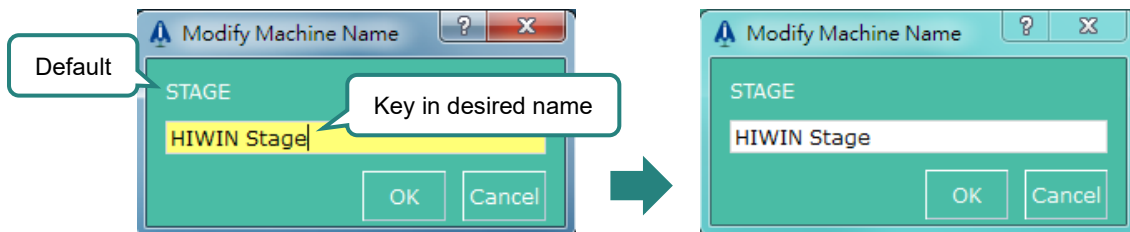


Figure 3.3.1.2 Modify Machine Name window

Step 3: Click on  to add new axis.

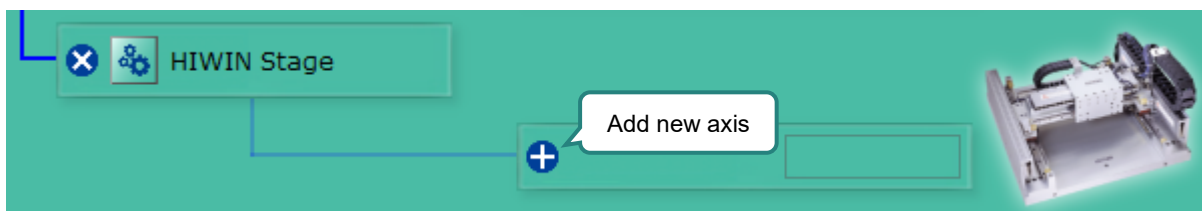


Figure 3.3.1.3 Add new axis

Step 4: Drag axis among stages. For example, users can drag A2 axis from stage Ind. to HIWIN Stage.

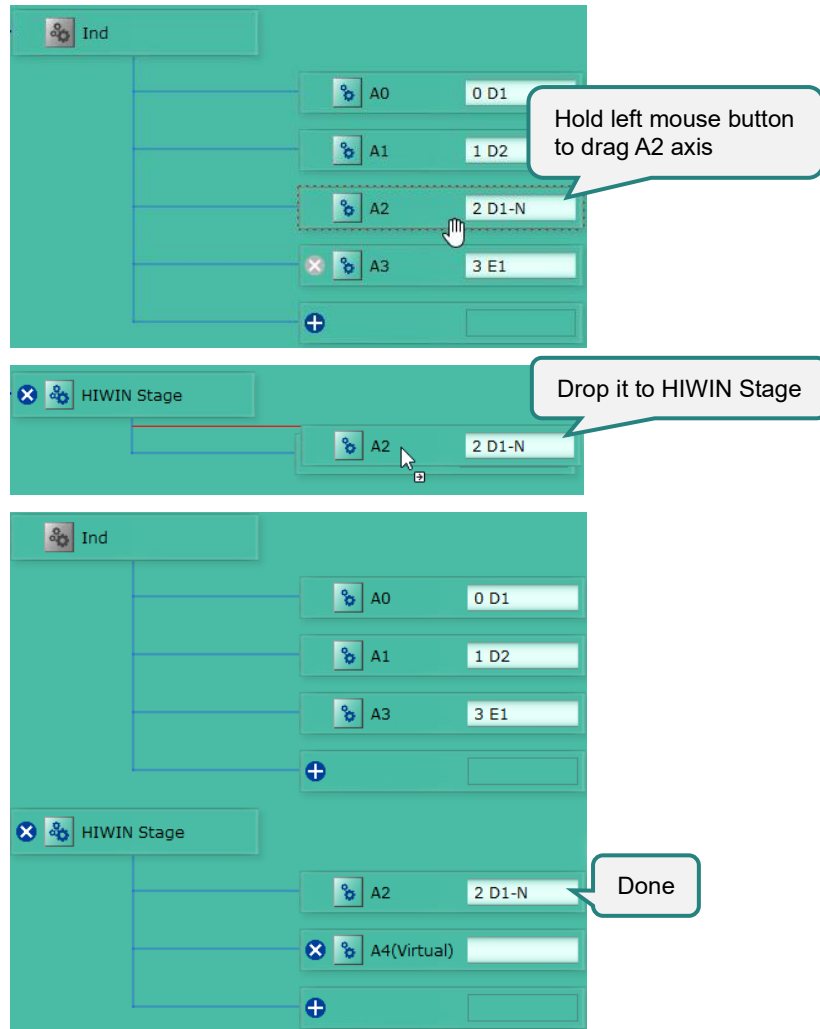


Figure 3.3.1.4 Drag axis to another stage

Step 5: Drag slave among axes. For example, users can drag 0 D1 slave to A4(Virtual) axis of HIWIN Stage.

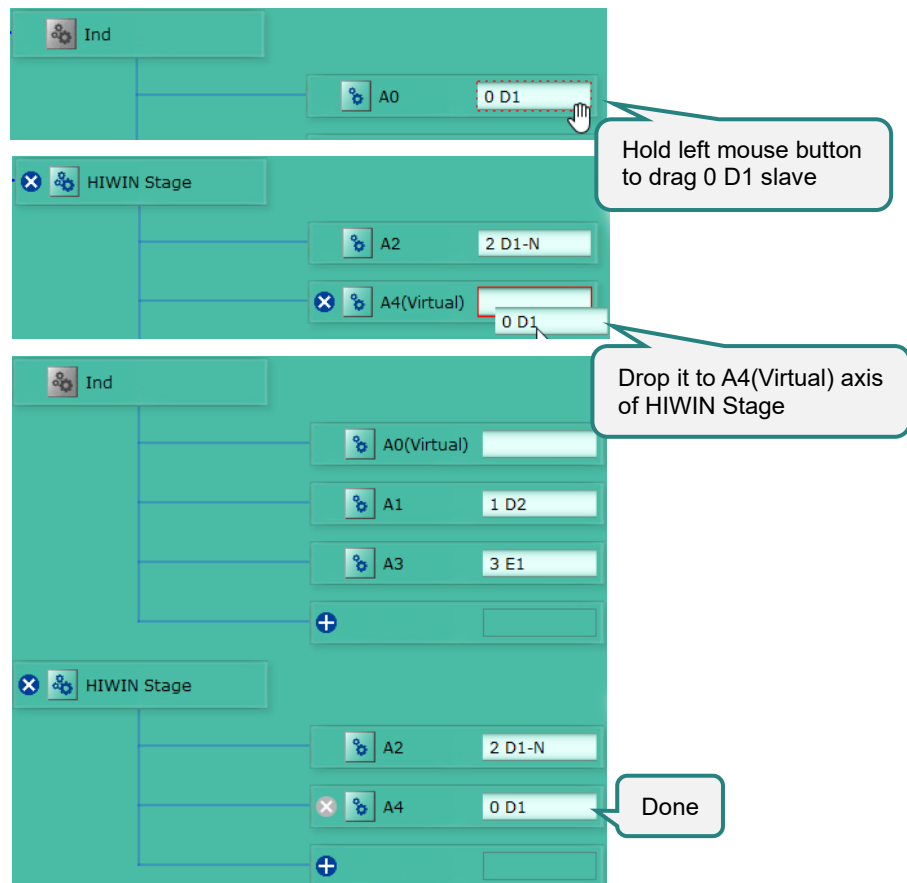




Figure 3.3.1.5 Drag slave to another axis

Step 6: Click on  in  to open Parameter Configuration window. Users can set axis motion type and parameters in this window.

Note: If axis is already combined with slave, Motion Type parameter and Drive Position Unit parameter will automatically refer to slave resolution and cannot be modified.

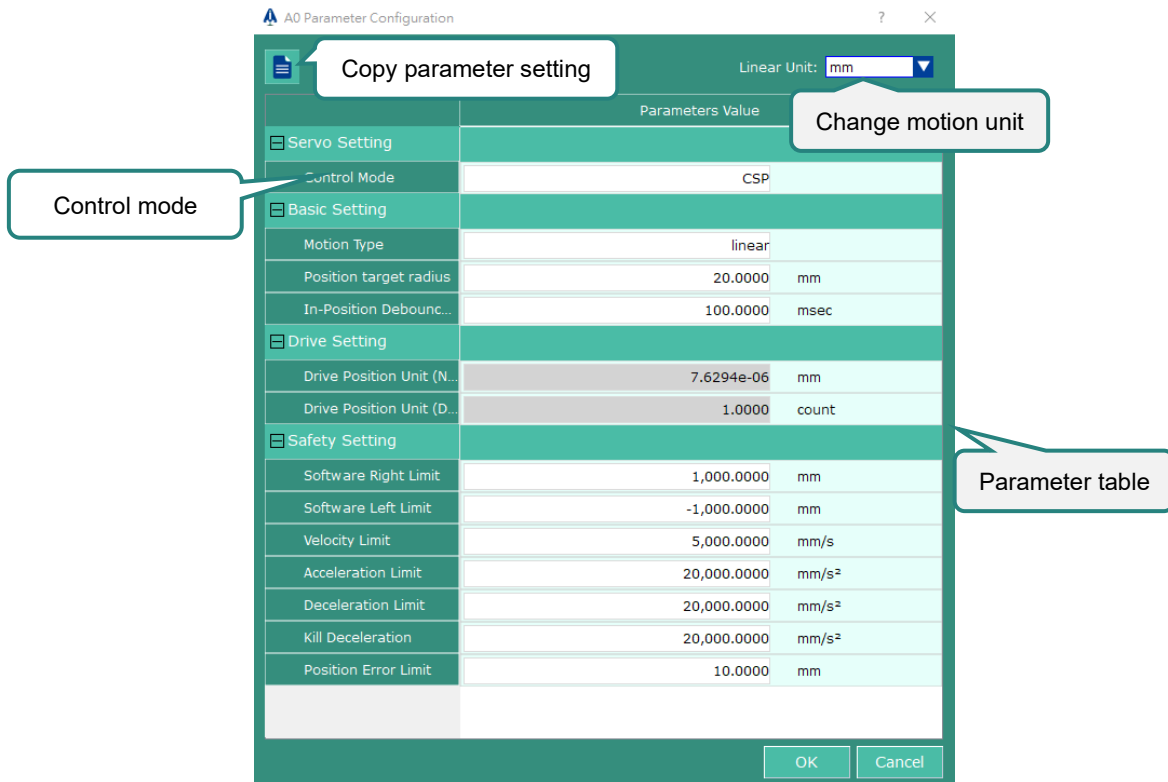





Figure 3.3.1.6 Parameter Configuration window

Step 7: Click on  to directly use the parameter setting of another axis. After selecting desired axis, click on  and .

Note 1: The parameters of Control Mode, Motion Type and Drive Position Unit are set according to the slave so they are marked as “Reserved” and cannot be copied from another axis.

Note 2: There are four options for Control Mode: **CSP (Cyclic Synchronous Position)**, **PP (Profile Position)**, **PV (Profile Velocity)** and **PT (Profile Torque)**. On CSP mode, the controller deals with the motion command planning and cyclically update the position command of drive. On PP, PV and PT mode, the drive deals with the command planning. Therefore, some of the functions of CSP mode cannot be used, such as group profile interpolation, gantry and vibration suppression.

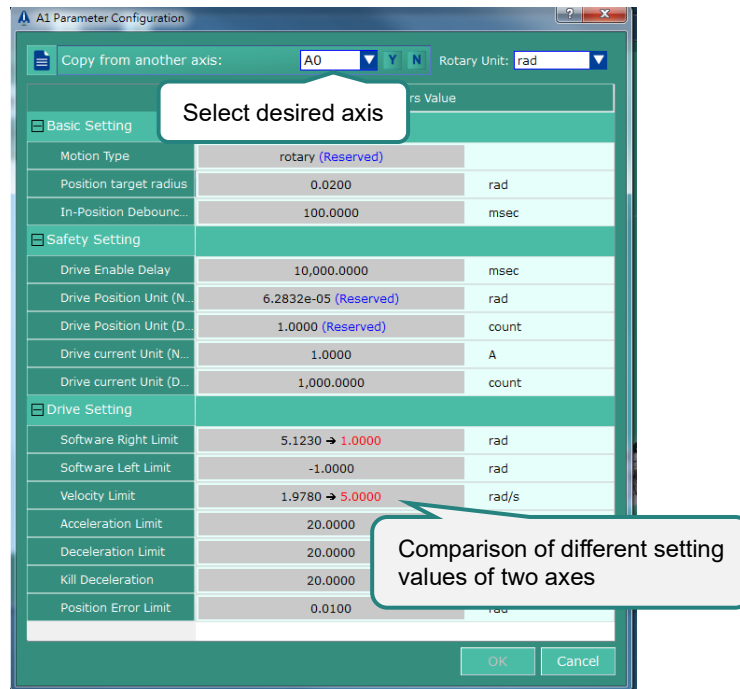



Figure 3.3.1.7 Copy from another axis window

Step 8: Click on  to open Axis Motion Test window. If the selected axis is not combined with slave, the description of “No combined slave!!” will appear, which indicates that users cannot do axis motion test.

Note 1: Axis Motion Test window can only be opened when there is no configuration in the controller.

Note 2: Axis Motion Test window is not applicable for HIWIN E1-series drive.

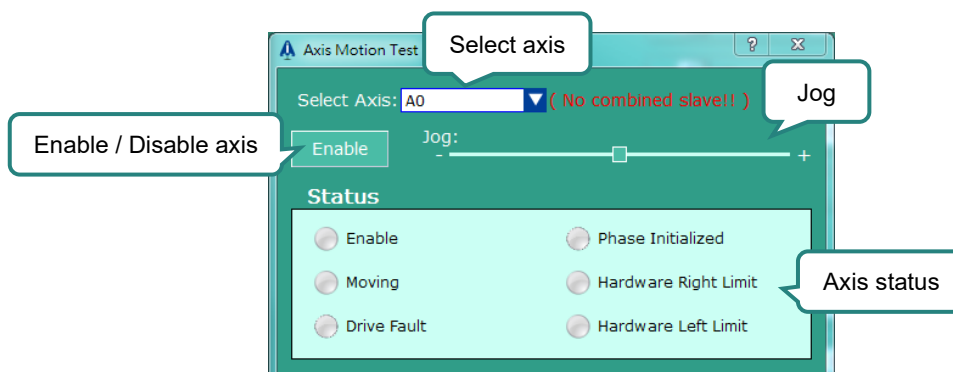



Figure 3.3.1.8 Axis Motion Test window

Step 9: To reset controller configuration, please click on . Only stage Ind. will be kept. It will present the corresponding axes according to the number of slaves.

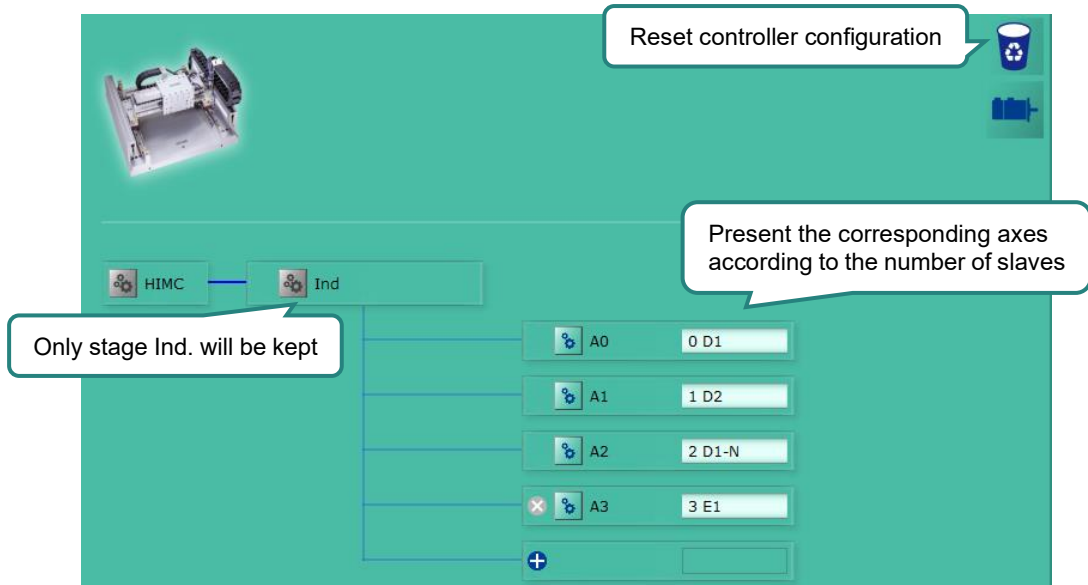


Figure 3.3.1.9 Reset controller configuration

Step 10: When configuration setup is done, click on **Next** button to move to Save to HIMC window. This window displays all the axes under each stage, the combination between axis and slave, and parameter setting of each axis. Please check if the parameter values are correctly set, and then click on **Save to HIMC** button.

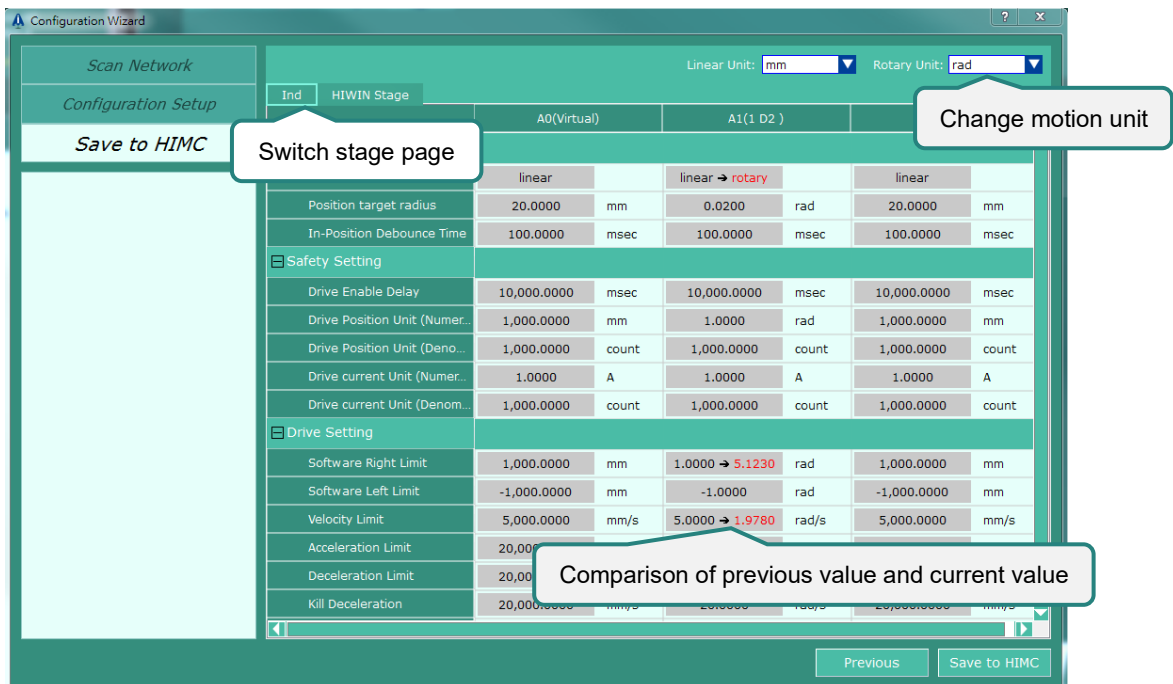


Figure 3.3.1.10 Save to HIMC window

Step 11: A question dialog will appear. Click on **Yes** button to save the parameter settings to the controller RAM. A pop-up window will appear to indicate the saving progress. It will close automatically after the parameter settings are successfully saved.

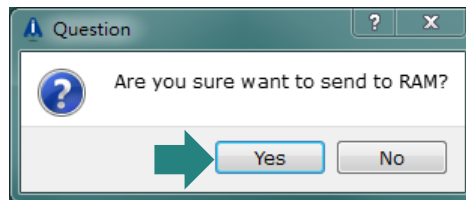


Figure 3.3.1.11 Send to RAM question dialog

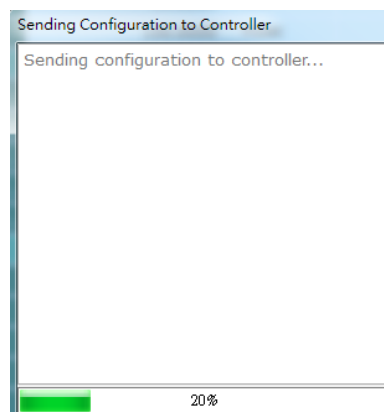


Figure 3.3.1.12 Pop-up window when sending parameter settings to the controller RAM

Step 12: Controller status has been changed to synchronous, and controller configuration has been changed to your setting.

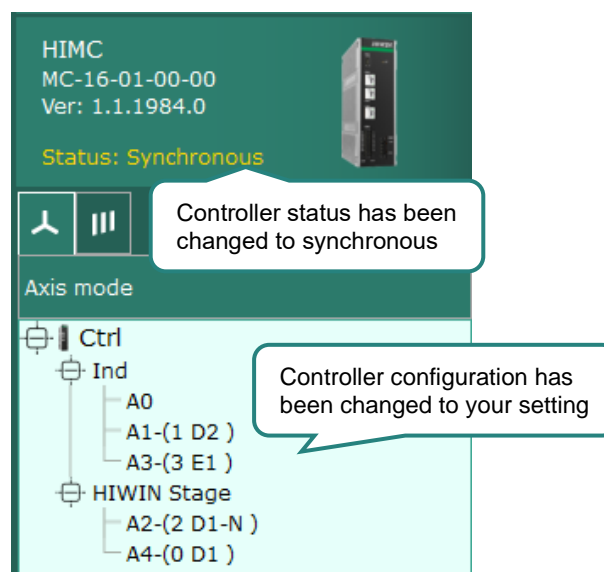


Figure 3.3.1.13 Controller status has been changed

3.3.2 Modify controller configuration

To modify controller configuration after the setting is saved to the controller RAM, please click on **Project** on the menu bar and open **Configuration Wizard** again. Then, follow the steps mentioned in previous section to reset controller configuration and execute Send to RAM.

3.4 Save / Load project file

iA Studio project file includes controller configuration, Modbus settings and HMPL tasks. (Note: The file extension of iA Studio project file is *.iasprj.)

3.4.1 Save project file

To open save project file window, click on **Project** on the menu bar. Then click on **Save**.

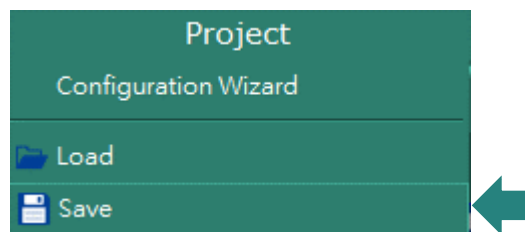


Figure 3.4.1.1 Save project file

The save project file window will appear.

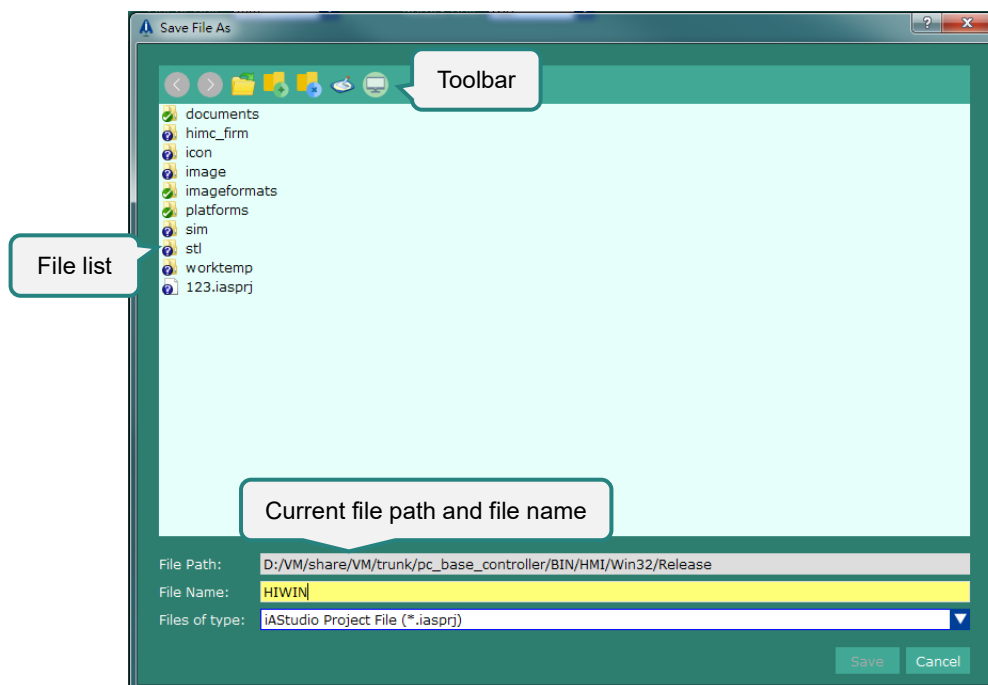











Figure 3.4.1.2 Save project file window

Functions in save project file window are described as below.

Table 3.4.1.1 Functions in save project file window

Icon / Button	Function
	Go to next file path. If no next file path exists, the icon will be grey.
	Return to previous file path. If no previous file path exists, the icon will be grey.
	Return to upper folder / path.
	Create new folder in the current file path.
	Delete selected file / folder.
	Save project file to my desktop.
	Save project file to my computer.
	Save project file.
	Exit and close the window. The project file will not be saved.

■ **How to save project file**

Step 1: Open save project file window.

Step 2: Select file path.

Step 3: Enter project file name.

Step 4: Click on **Save** button.

Step 5: Save HMPL task window appears.

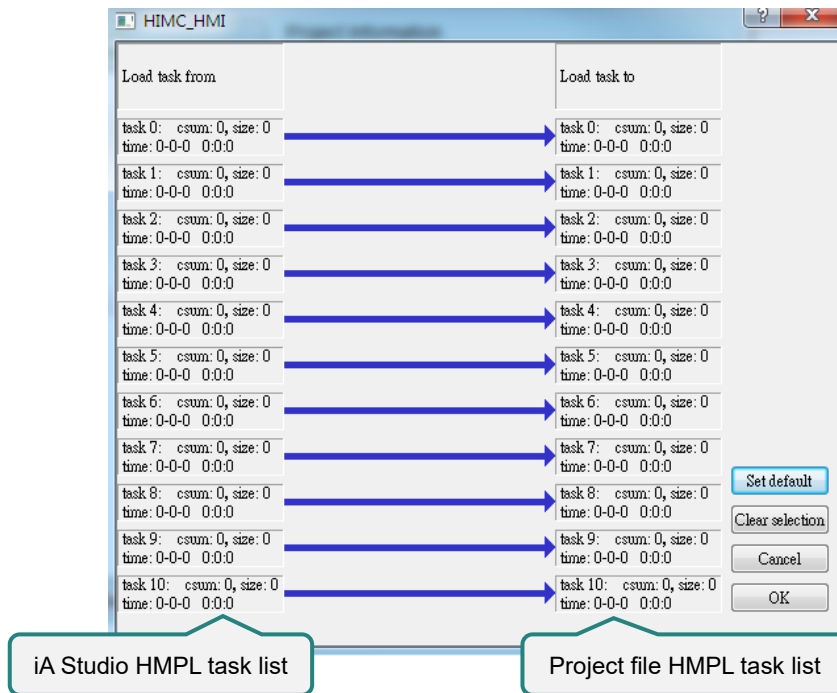


Figure 3.4.1.3 Save HMPL task window

Functions in save HMPL task window are described as below.

Table 3.4.1.2 Functions in save HMPL task window

Button	Description
Set default	Tasks in iA Studio will be saved to the corresponding tasks in project file. For instance, task 1 in iA Studio will be saved to task 1 in project file. (Note: Users can also drag the arrow to save a task in iA Studio to a desired task in project file. For instance, task 1 in iA Studio can be saved to task 2 in project file.)
Clear selection	Clear all selections.
Cancel	Do not save HMPL task to project file.
OK	Save HMPL task to project file.

Step 6: Click on **OK** button to save project file. A pop-up window will appear to indicate the progress of saving project file from the controller RAM. It will close automatically after the project file is successfully saved.

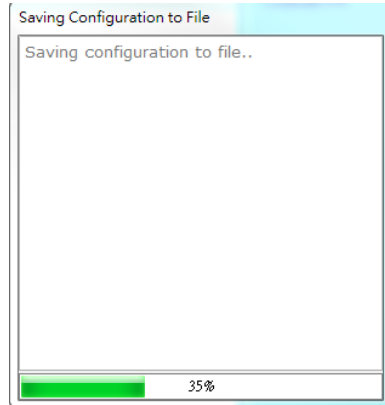


Figure 3.4.1.4 Pop-up window when saving project file from the controller RAM

3.4.2 Load project file

To open load project file window, click on **Project** on the menu bar. Then click on **Load**.

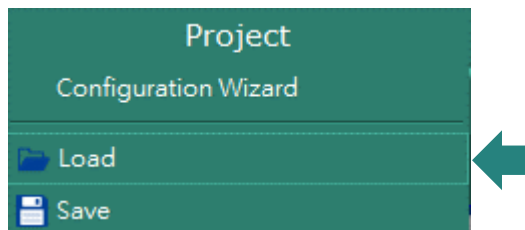


Figure 3.4.2.1 Load project file

The load project file window will appear.

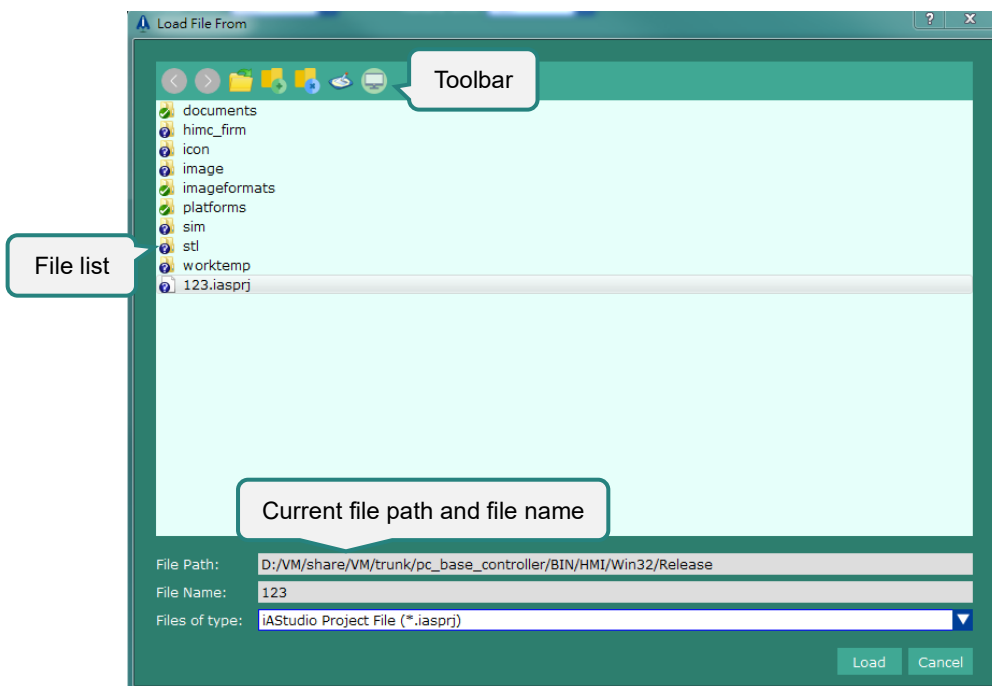











Figure 3.4.2.2 Load project file window

Table 3.4.2.1 Functions in load project file window

Icon / Button	Function
	Go to next file path. If no next file path exists, the icon will be grey.
	Return to previous file path. If no previous file path exists, the icon will be grey.
	Return to upper folder / path.
	Create new folder in the current file path.
	Delete selected file / folder.
	Load project file from my desktop.
	Load project file from my computer.
	Load project file.
	Exit and close the window. No project file will be loaded.

■ How to load project file

- Step 1: Open load project file window.
- Step 2: Select desired project file to be loaded.
- Step 3: Click on **Load** button.
- Step 4: Load HMPL task window appears.

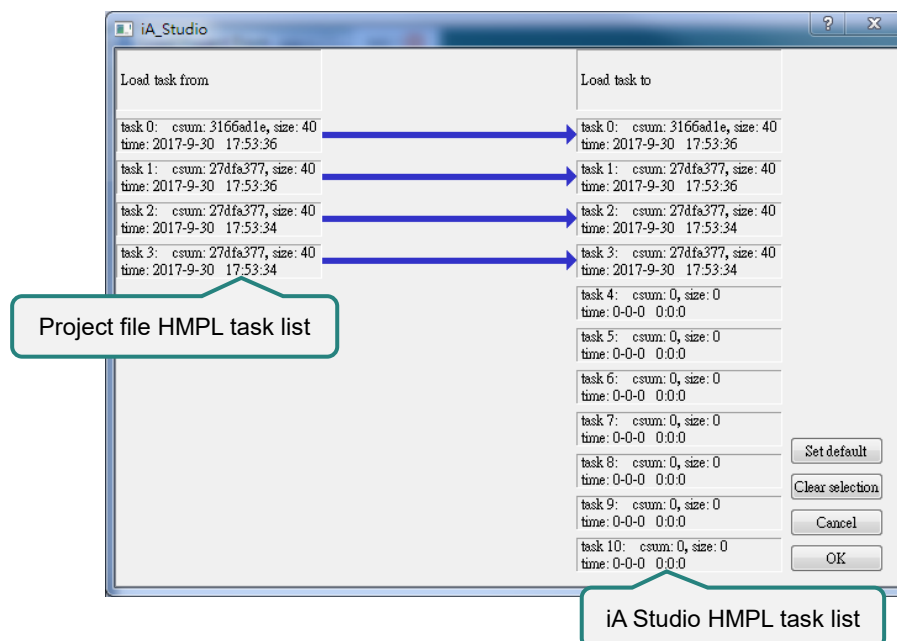

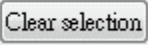
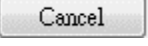



Figure 3.4.2.3 Load HMPL task window

Functions in load HMPL task window are described as below.

Table 3.4.2.2 Functions in load HMPL task window

Button	Description
	Tasks in project file will be loaded to the corresponding tasks in iA Studio. For instance, task 1 in project file will be loaded to task 1 in iA Studio. (Note: Users can also drag the arrow to load a task in project file to a desired task in iA Studio. For instance, task 1 in project file can be loaded to task 2 in iA Studio.)
	Clear all selections.
	Do not load HMPL task from project file.
	Load HMPL task from project file.

Step 5: Click on **OK** button to load project file. A pop-up window will appear to indicate the progress of loading project file to the controller RAM. It will close automatically after project file is successfully loaded to the controller RAM.

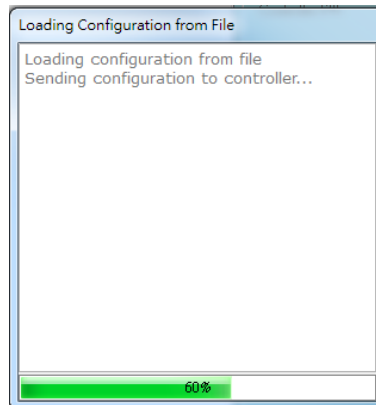


Figure 3.4.2.4 Pop-up window when loading project file to the controller RAM

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4.1 Motion manager

Motion Manager is used to configure, control and monitor individual axis motion and status. The following functions are provided in Motion Manager:

- Set motion parameters for each axis
- Monitor axis motion and fault status
- Enable / Disable axis and clear fault status
- Set current position to zero
- Jog
- Perform relative / absolute motion control
- Perform point-to-point (P2P) motion control

4.1.1 Open motion manager

To open Motion Manager, click on **Tools** on the menu bar. Then click on **Motion Manager**.

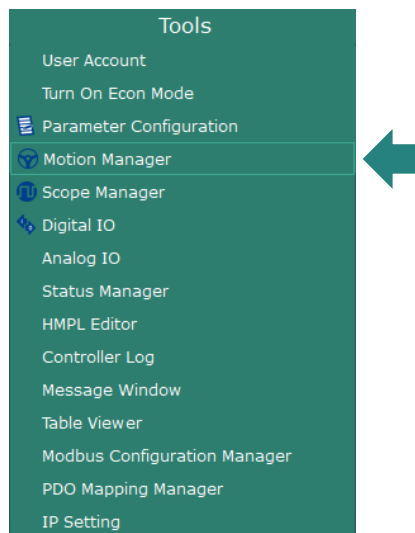


Figure 4.1.1.1 Motion Manager

Motion Manager window is as below.

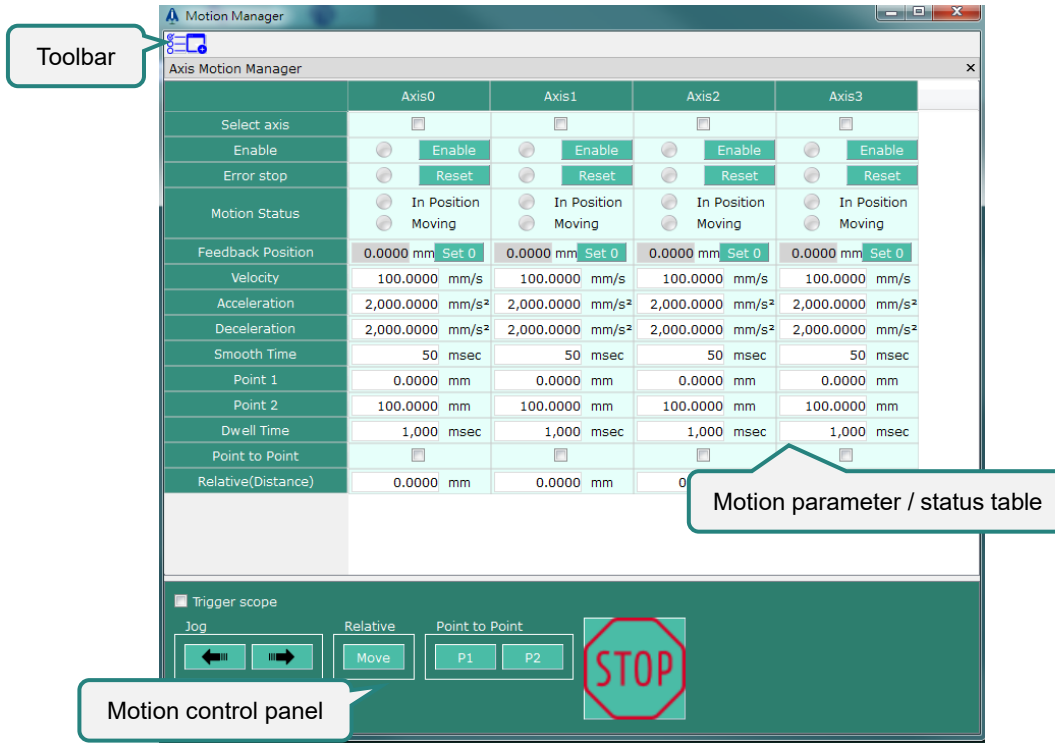


Figure 4.1.1.2 Motion Manager window



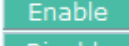





4.1.2 Motion manager toolbar

Table 4.1.2.1 Motion Manager toolbar

Icon	Function
	Open Select Axis window to show / hide axis.

4.1.3 Motion parameter / status table



Table 4.1.3.1 Motion parameter / status table in Motion Manager

Item	Description
Axis ID	ID of each axis.
Select axis	Select one or more axes to be controlled via motion control panel.
Enable	 : Axis is enabled.  : Axis is disabled.  : Click to enable axis.  : Click to disable axis.
Error stop	 : Axis stops due to an error.  : No error.  : Click to clear fault status.
Motion Status	The indicator shows whether the axis is in position or moving.
Feedback Position	The feedback (actual) position will be shown here. Click on  to set current position to zero.
Velocity	Maximum velocity of motion profile.
Acceleration	Maximum acceleration of motion profile.
Deceleration	Maximum deceleration of motion profile.
Smooth Time	Smooth time is used to have moderate acceleration and deceleration in motion profile.
Point 1	Point 1 of point-to-point (P2P) motion.
Point 2	Point 2 of point-to-point (P2P) motion.
Dwell Time	Dwell time between point-to-point (P2P) motion.
Point to Point	Select to start point-to-point (P2P) motion.
Relative (Distance)	Move by the specified distance.

4.1.4 Motion control panel

Users can perform desired motion control on one or more axes via motion control panel.

Table 4.1.4.1 Motion control panel in Motion Manager

Button	Description
Jog	Axis moves at the maximum velocity in negative / positive direction.
	 : Jog in negative direction.  : Jog in positive direction.
Relative	Click on Move button to start relative motion from the current reference position.
Point to Point	Click on P1 or P2 button to move to the absolute position P1 or P2 . If the check box in Point to Point field is checked, the axis will move repetitively between absolute position P1 and P2 with defined dwell time.
Stop	Click on Stop button to stop axis motion. (Note: This function cannot be used as emergency stop and only the selected axis will be stopped.)
Trigger scope	If the check box of trigger scope is checked, Scope Manager will record the motion as axis motion starts. (Note: Scope Manager needs to be opened first.)

4.2 Parameter configuration

Users can view and modify parameters of all axes in Parameter Configuration window.

4.2.1 Open parameter configuration

To open Parameter Configuration, click on **Tools** on the menu bar.

Then click on **Parameter Configuration**.

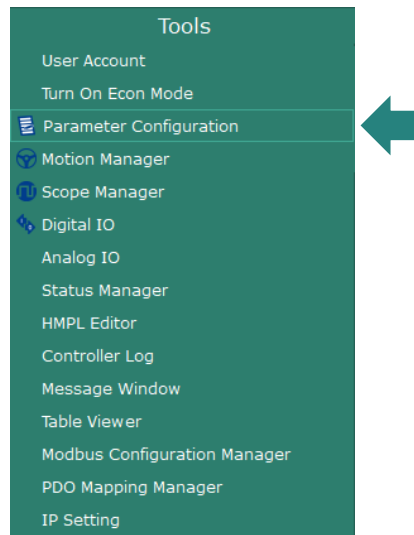


Figure 4.2.1.1 Parameter Configuration

Parameter Configuration window is as below.


The screenshot shows the 'Parameter Configuration' window. A callout box labeled 'Toolbar' points to the top-left corner. Another callout box labeled 'Axis parameter table' points to the main table area.

Parameter Configuration			
Axis Parameter Configuration			
	Axis0	Axis1	Axis2
BASIC SETTING			
Move Time	0.0000 msec	0.0000 msec	0.0000 msec
Setting Time	0.0000 msec	0.0000 msec	0.0000 msec
Axis group ID	-1	-1	-1
Master Axis ID	-1	-1	-1
Number of Slave Axis	0	0	0
Motion Type	linear	linear	linear
Position target radius	20.0000 mm	20.0000 mm	20.0000 mm
In-Position Debounce Time	100.0000 msec	100.0000 msec	100.0000 msec
SAFETY SETTING			
Software Right Limit	1,000.0000 mm	1,000.0000 mm	1,000.0000 mm
Software Left Limit	-1,000.0000 mm	-1,000.0000 mm	-1,000.0000 mm
Velocity Limit	5,000.0000 mm/s	5,000.0000 mm/s	5,000.0000 mm/s
Acceleration Limit	20,000.0000 mm/s²	20,000.0000 mm/s²	20,000.0000 mm/s²
Deceleration Limit	20,000.0000 mm/s²	20,000.0000 mm/s²	20,000.0000 mm/s²
Kill Deceleration	20,000.0000 mm/s²	20,000.0000 mm/s²	20,000.0000 mm/s²
Position Error Limit	10.0000 mm	10.0000 mm	10.0000 mm
Position Compensation L.	1.0000 mm	1.0000 mm	1.0000 mm
MOTION SETTING			
Max. Profile Velocity	100.0000 mm/s	100.0000 mm/s	100.0000 mm/s
Max. Profile Acceleration	2,000.0000 mm/s²	2,000.0000 mm/s²	2,000.0000 mm/s²
Max. Profile Deceleration	2,000.0000 mm/s²	2,000.0000 mm/s²	2,000.0000 mm/s²
Smooth Time	50.0000 msec	50.0000 msec	50.0000 msec
Max. Profile Acceleration T.	0.0000 msec	0.0000 msec	0.0000 msec
Max. Profile Deceleration	0.0000 msec	0.0000 msec	0.0000 msec

Figure 4.2.1.2 Parameter Configuration window

4.2.2 Parameter configuration toolbar

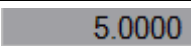
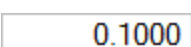

Table 4.2.2.1 Parameter Configuration toolbar

Icon	Function
	Open Select Axis window to show / hide axis.

4.2.3 Modify axis parameters

In Parameter Configuration window, the field will display in grey, white or yellow to indicate whether the parameter value can be modified or not.

Table 4.2.3.1 Modify axis parameters

Field Status	Description
	The parameter value cannot be modified.
	The parameter value can be modified. Left click on the field to edit the value.
	The parameter value is being modified. Press Enter key to confirm the modification or press Esc key to exit.

Note: The editable parameters will vary with different user mode.

4.2.4 Parameter descriptions

Parameter descriptions of Parameter Configuration window are listed as below.

Table 4.2.4.1 Parameter descriptions

Basic Setting		
Parameter	Status	Description
Move Time	R	The moving time of the axis
Settling Time	R	The settling time of the axis
Axis group ID	R	This parameter shows the ID of the group which the axis belongs to (Default value -1)
Master Axis ID	R	The ID of the master axis when gear function is enabled. (Default value -1)
Number of Slave Axis	R	The number of the slave axes under this axis when gear function is enabled
Motion Type	R	There are two options for motion types: linear and rotary (Please refer to section 3.3.1 Step 6)
Position target radius	R	The target radius to identify if the axis is in position
In-Position Debounce Time	R	The Debounce Time to identify if the axis is in position
Safety Setting		
Parameter	Status	Description

Software Right Limit	R	The limit of the maximum software right limit
Software Left Limit	R	The limit of the maximum software left limit
Velocity Limit	R	The limit of the maximum velocity
Acceleration Limit	R	The limit of the maximum acceleration
Deceleration Limit	R	The limit of the maximum deceleration
Kill Deceleration	R	The limit of the maximum deceleration when emergency stop is triggered
Position Error Limit	R	The limit of the maximum following position error
Position Compensation Limit	R	The limit of the maximum position compensation
Home Procedure Setting		
Parameter	Status	Description
Home Type	RW	The homing type of homing procedure
Home Method	RW	The homing method of homing procedure
Home Fast Speed	RW	The fast velocity for homing of homing procedure
Home Slow Speed	RW	The slow velocity for homing of homing procedure
Home Acceleration Time	RW	The acceleration time of homing procedure
Home Offset	RW	The home offset of homing procedure
Home Timeout	RW	The timeout of homing procedure
Motion Setting		
Parameter	Status	Description
Max. Profile Velocity	RW	The maximum velocity which could be reached by the axis
Max. Profile Acceleration	RW	The maximum acceleration which could be reached by the axis
Max. Profile Deceleration	RW	The maximum deceleration which could be reached by the axis
Smooth Time	RW	Increasing the value can reduce mechanical vibration during motion, but the total motion time will be affected.
Profile Acceleration Time	R	The time set for the axis to reach the maximum acceleration
Profile Deceleration Time	R	The time set for the axis to reach the maximum deceleration
Axis Rollover Value	R	The position rollover value for the axis
Servo Setting		
Parameter	Status	Description
Control Mode	R	There are four options for control mode: CSP , PP , PV and PT . (Please refer to section 3.3.1 Step 7, Note 2)
Drive Peak Current	R	Peak current for the drive
Drive Continuous Current	R	Continuous current for the drive
Motor Peak Current	R	Peak current for the motor
Motor Continuous Current	R	Continuous current for the motor
Gantry Setting		
Parameter	Status	Description
Gantry Pair Axis ID	R	The corresponding axis ID in a gantry pair
Drive Setting		
Parameter	Status	Description
Slave ID	R	The Slave ID of the axis
Drive Enable Time Out	R	The time allowed to enable the drive
Drive Position Unit (Numerator)	R	Servo drive position resolution. The unit can be linear unit or rotary unit (numerator), depending on the

		motion type chosen by the user
Drive Position Unit (Denominator)	R	Servo drive position resolution. The unit is count (denominator)
Drive Current Unit (Numerator)	R	Servo drive current resolution (numerator)
Drive Current Unit (Denominator)	R	Servo drive current resolution (denominator)
Filter Setting		
Parameter	Status	Description
Axis Shaping Frequency	R	The filter frequency of InShape (input shaping filter)
Axis Shaping Damping Ratio	R	The damping ratio of InShape (input shaping filter)
Axis Vibration Filter Frequency	R	The filter frequency of VSF (vibration suppression filter)
Axis Vibration Filter Damping Ratio	R	The damping ratio of VSF (vibration suppression filter)
Gear Setting		
Parameter	Status	Description
Gear Ratio	R	The gear ratio when gear function is enabled

4.3 Status manager

Status Manager is used to monitor axis / group motion and fault status.

4.3.1 Open status manager

To open Status Manager, click on **Tools** on the menu bar. Then click on **Status Manager**.

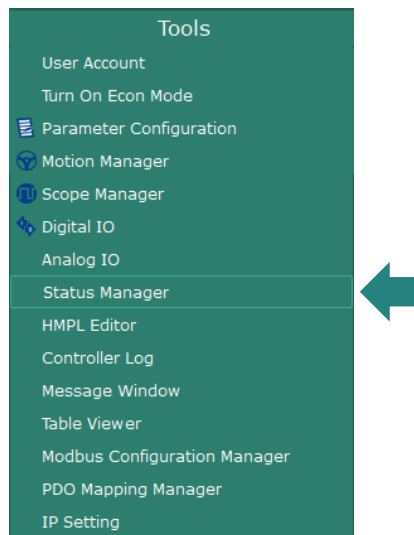


Figure 4.3.1.1 Status Manager

Status Manager window is as below.

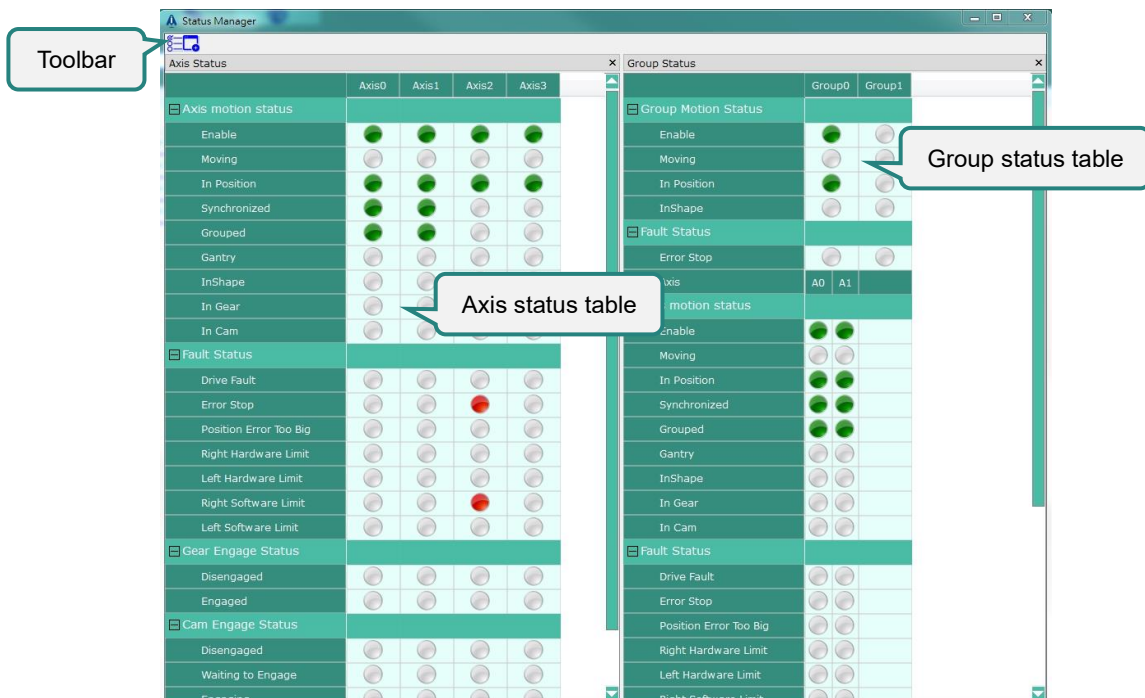




Figure 4.3.1.2 Status Manager window

4.3.2 Status manager toolbar

Table 4.3.2.1 Status Manager toolbar

Icon	Function
	Open Select Axis window to show / hide axis. Open Select Group window to show / hide axis group.
	Open / Close axis status table. <input checked="" type="checkbox"/> Axis Status Open / Close group status table. <input type="checkbox"/> Group Status

4.3.3 Axis status

The items in axis status table are described as below.

- Motion Status

Table 4.3.3.1 Description of axis motion status

Motion Status	Description
Enable	Axis is ready for motion control.
Moving	Axis is moving.
In Position	Axis reaches target position.
Synchronized	Axis is in synchronized motion state.
Grouped	Axis is grouped in an axis group.
Gantry	Axis is in gantry state.
InShape	Axis position command shaping function is activated.
In Gear	Axis is in gear state.
In Cam	Axis is in cam state.

- Fault Status

Table 4.3.3.2 Description of axis fault status

Fault Status	Description
Drive Fault	Drive has reported an error.
Error Stop	Axis stops due to an error.
Position Error Too Big	Position error exceeds the position error limit.
Right Hardware Limit	Axis reaches right hardware limit.
Left Hardware Limit	Axis reaches left hardware limit.
Right Software Limit	Axis reaches right software limit.
Left Software Limit	Axis reaches left software limit.

■ Gear Engage Status

Table 4.3.3.3 Description of gear engage status

Engage Status	Description
Disengaged	Axis gear clutch is in “disengaged” state.
Engaged	Axis gear clutch is in “engaged” state.

■ Cam Engage Status

Table 4.3.3.4 Description of cam engage status

Engage Status	Description
Disengaged	Axis cam clutch is in “disengaged” state.
Waiting to Engage	Axis cam clutch is in “waiting to engage” state.
Engaging	Axis cam clutch is in “engaging” state.
Engaged	Axis cam clutch is in “engaged” state.
Waiting to Disengage	Axis cam clutch is in “waiting to disengage” state.

4.3.4 Group status

The items in group status table are described as below.

■ Motion Status

Table 4.3.4.1 Description of group motion status

Motion Status	Description
Enable	Group is ready for motion control.
Moving	Group is moving.
In Position	Group reaches target position.
InShape	Group position command shaping function is activated.

■ Fault Status

Table 4.3.4.2 Description of group fault status

Fault Status	Description
Error Stop	Group stops due to an error.

4.4 Digital IO

Digital IO allows users to view the status of digital inputs and outputs of the controller and slaves.

4.4.1 Open digital IO window

To open Digital IO window, click on **Tools** on the menu bar. Then click on **Digital IO**.

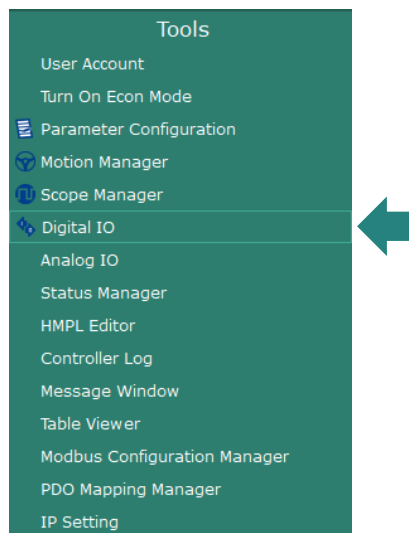


Figure 4.4.1.1 Digital IO

The Digital IO window is as below.

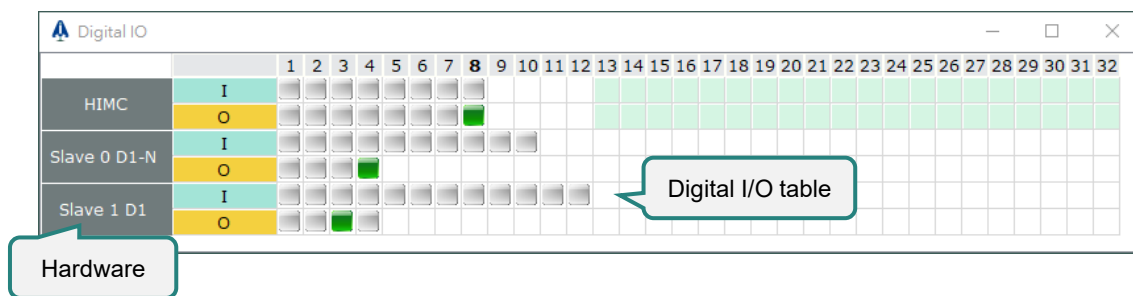




Figure 4.4.1.2 Digital IO window

4.4.2 Digital input / output status

The indicators in digital I/O table will display the status of each digital input and output.

Table 4.4.2.1 Digital input / output status

Indicator	Description
	The digital input or output is ON.
	The digital input or output is OFF.

4.4.3 Change output status

The status of digital output can be changed by clicking on the indicator.

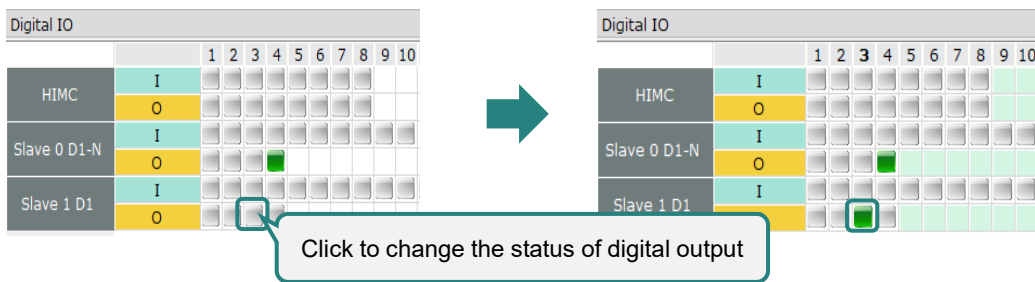


Figure 4.4.3.1 Change the status of digital output

4.5 Analog IO

Analog IO allows users to configure analog inputs and outputs of the slaves.

4.5.1 Open analog IO window

To open Analog IO window, click on **Tools** on the menu bar. Then click on **Analog IO**.

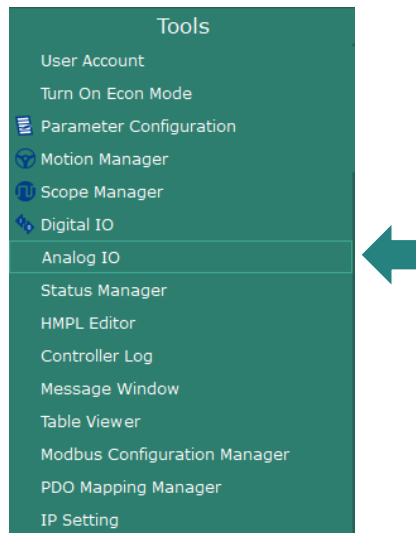


Figure 4.5.1.1 Analog IO

The Analog IO window is as below.

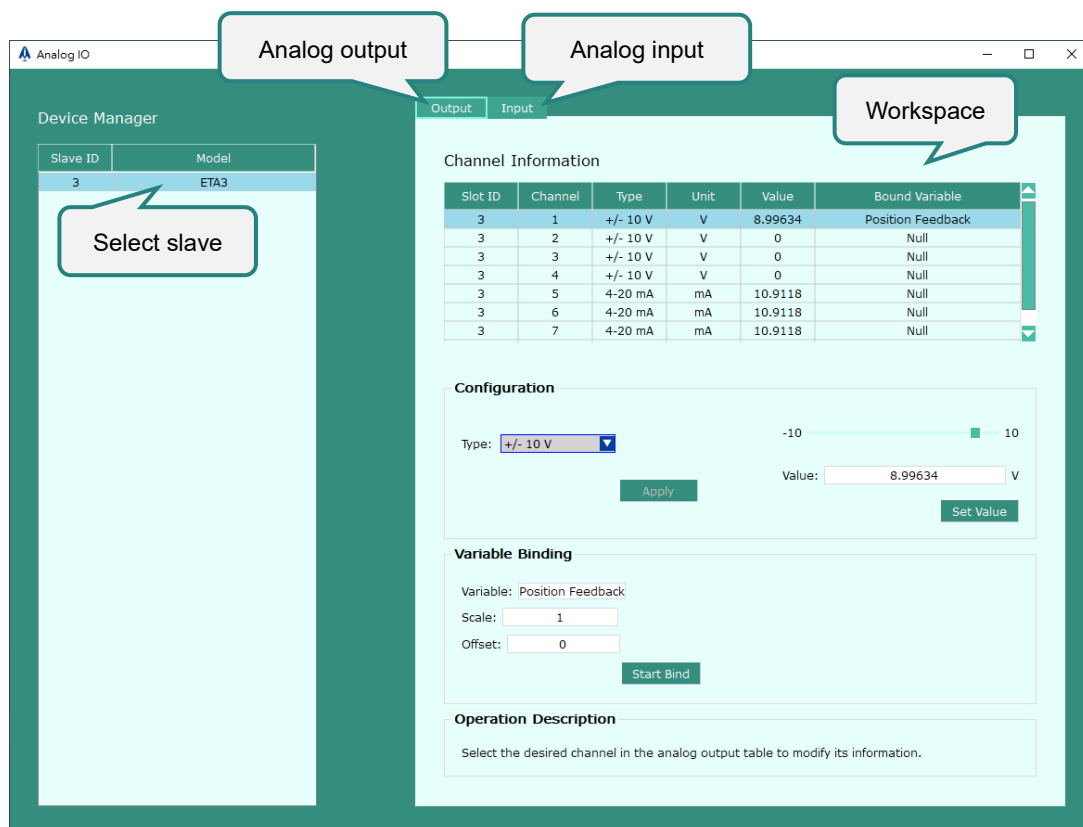


Figure 4.5.1.2 Analog IO window

4.5.2 Configuration and setting of analog output

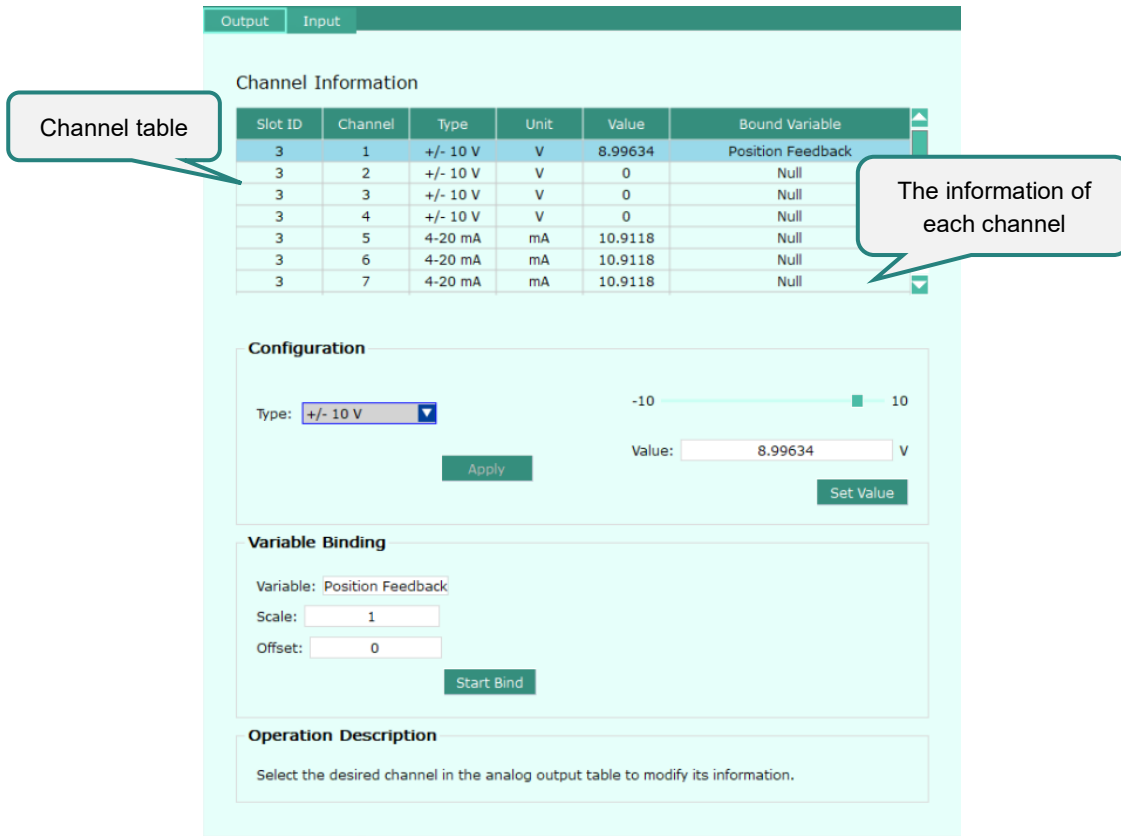


Figure 4.5.2.1 Configuration and setting page of analog output

■ Channel Table

Select the analog output channel of the device to perform parameter configuration and controller variable setting.

Table 4.5.2.1

Item	Description
Slot ID	The index of multi-module device's installation slot. If it is not a multi-module device, the value of this column is 0.
Channel	The channel on the module, such as channel 1, channel 2.
Type	The type of analog output.
Unit	The unit of analog output.
Value	The value of analog output.
Bound Variable	The bound controller variable. It is not necessary.

■ Configuration

(1) Type configuration

If the device provides various types, users can select the specific type via the drop-down list. Then, click on **Apply** to make it become effective.

(2) Value configuration

Set the output value of the specific type of the channel. Then, click on **Set Value** to make it become effective.

■ Variable Binding

(1) Variable

Select the controller variable to be bound to analog output. Then, click on **Start Bind** to make it become effective.

(2) Scale

Set the scale of analog output and controller variable. Then, click on **Start Bind** to make it become effective.

(3) Offset

Set the offset of analog output and controller variable. Then, click on **Start Bind** to make it become effective.

Note: If the variable “axis position feedback” is bound, the value of analog output (Value) will be “axis position feedback * scale + offset”.

■ Operation Description

When users click on the interface mentioned above, the display box will present the relevant instruction to help users understand the purpose of current operation.

4.5.3 Configuration of analog input

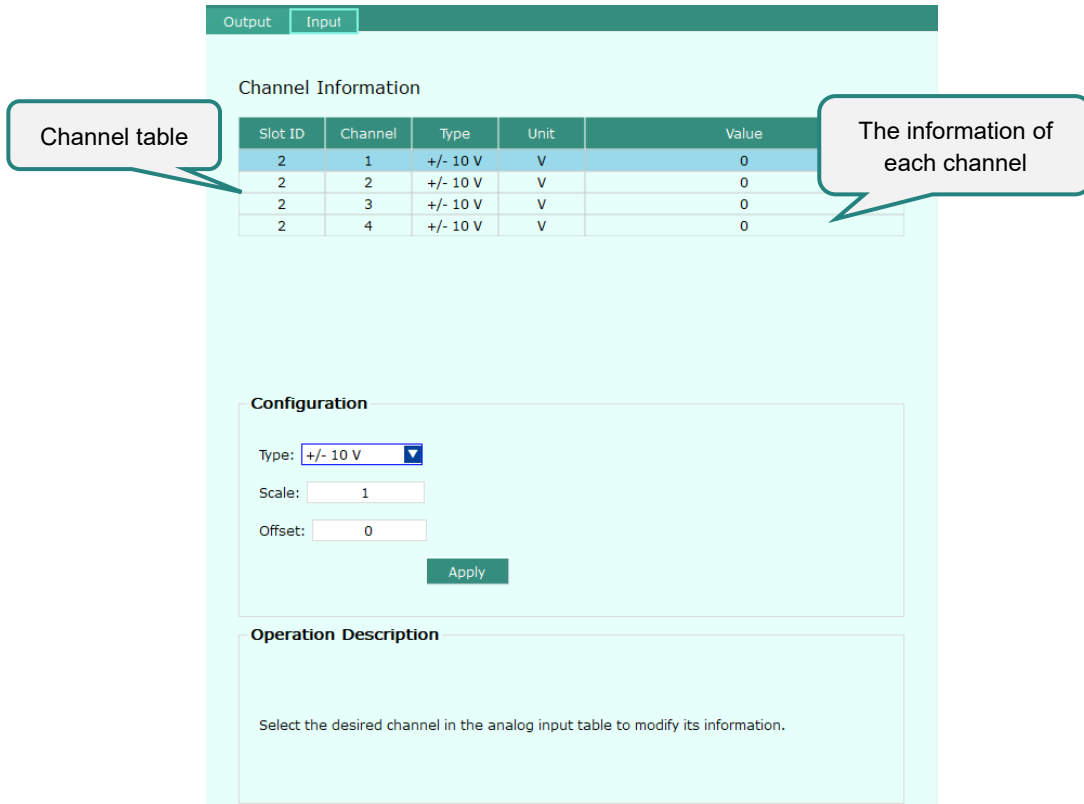


Figure 4.5.3.1 Configuration page of analog input

■ Channel Table

Select the analog input channel of the device to perform parameter configuration.

Table 4.5.3.1

Item	Description
Slot ID	The index of multi-module device's installation slot. If it is not a multi-module device, the value of this column is 0.
Channel	The channel on the module, such as channel 1, channel 2.
Type	The type of analog input.
Unit	The unit of analog input.
Value	The value of observed physical quantity.

■ Configuration**(1) Type configuration**

If the device provides various types, users can select the specific type via the drop-down list. Then, click on **Apply** to make it become effective.

(2) Scale

Set the scale of analog input and observed physical quantity. Then, click on **Apply** to make it become effective.

(3) Offset

Set the offset of analog input and observed physical quantity. Then, click on **Apply** to make it become effective.

Note: The value of observed physical quantity (Value) is “the value of analog input * scale + offset”.

■ Operation Description

When users click on the interface mentioned above, the display box will present the relevant instruction to help users understand the purpose of current operation.

4.6 Message window

Message Window enables users to enter command directly to the controller and view system message.

4.6.1 Open message window

To open Message Window, click on **Tools** on the menu bar. Then click on **Message Window**.

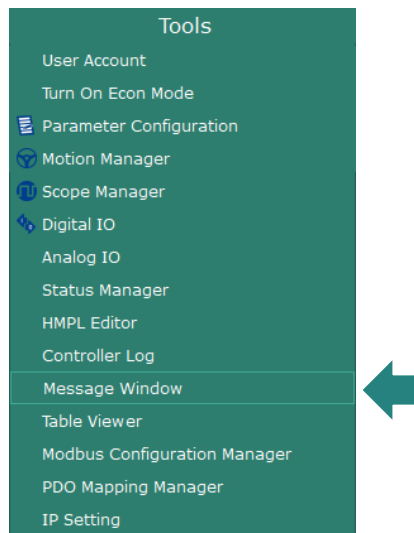


Figure 4.6.1.1 Message Window

Message Window is as below.

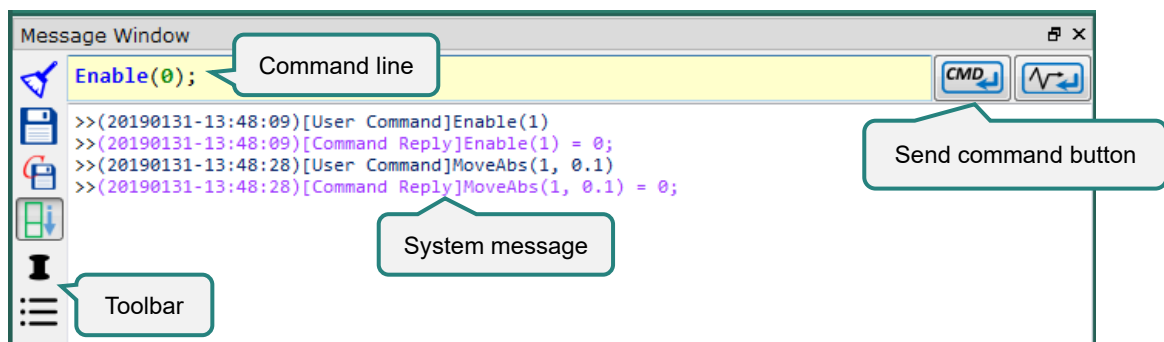












Figure 4.6.1.2 Message Window

Functions in Message Window are described as below.

Table 4.6.1.1 Functions in Message Window

Icon	Description
	Clear all messages.
	Save all messages to a file.
	Activate / Deactivate Continue Save function.
	Activate / Deactivate the function to display the latest message.
	<p> : Message Window can be covered by other windows.</p> <p> : Message Window will always display on top and cannot be covered by other windows.</p>
	<p>Select filter to catch the current desired message type.</p> <div data-bbox="783 837 963 969" style="border: 1px solid gray; padding: 5px; width: fit-content;"> <input checked="" type="checkbox"/> User Command <input checked="" type="checkbox"/> Command Reply <input checked="" type="checkbox"/> System Message <input checked="" type="checkbox"/> HMPL </div>
	Users can click on the icon or press Enter key to send command.
	Send command and start to record motion in Scope Manager. (Note: Scope Manager needs to be opened first.)

4.6.2 Command line

Message Window command line provides smart completion for users to easily enter command.

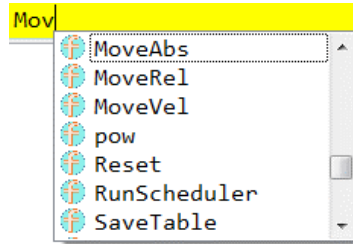


Figure 4.6.2.1 Command line

4.6.3 Continue save

Message Window provides Continue Save function to record all the messages displayed in Message Window. The maximum file size for storing the messages is 10 MB. If the messages are over 10 MB, a new file will be automatically created to continuously record the messages.

Step 1: Click on  to activate Continue Save function.

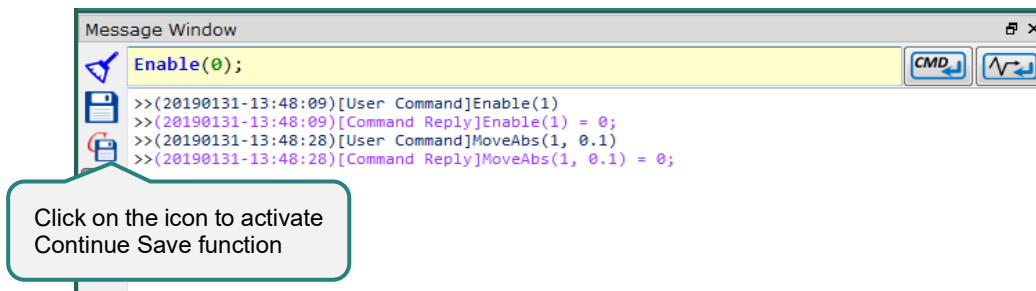


Figure 4.6.3.1 Activate Continue Save function

Step 2: A window will appear for users to select file path and input file name.

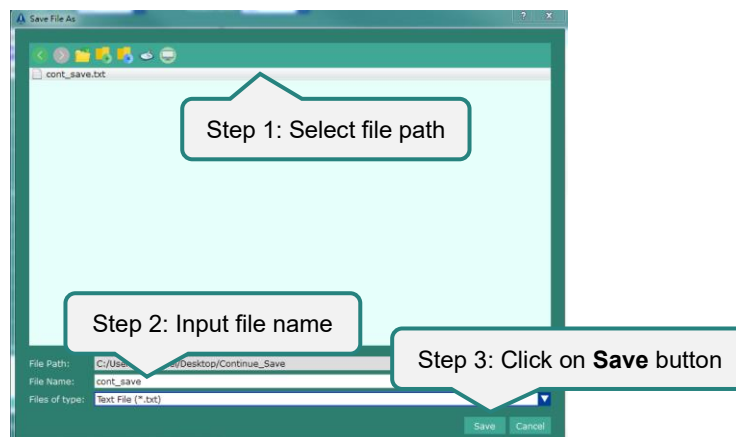


Figure 4.6.3.2 Select file path and input file name

Step 3: The maximum file size for storing the messages is 10 MB. If the messages are over 10 MB, a new file will be automatically created under the same path to continuously record the messages. The name of the automatically-created file will be “file name_yyyymmdd_hms.txt”.

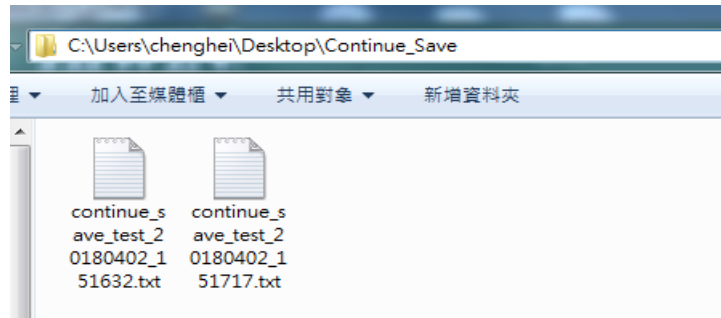



Figure 4.6.3.3 Files of Continue Save function

Step 4: Click on  again and a question dialog will appear, asking users if they would like to deactivate Continue Save function. Click on **Yes** button to deactivate this function.

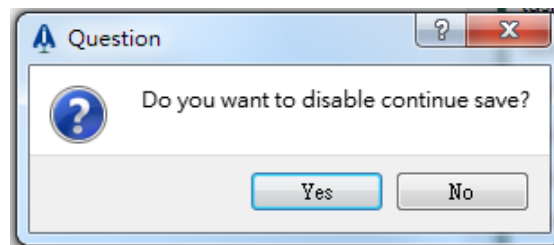


Figure 4.6.3.4 Question dialog for deactivating Continue Save function

4.7 Error message

Error message window allows user to know what error occurs in the controller. It will appear immediately as an error occurs.

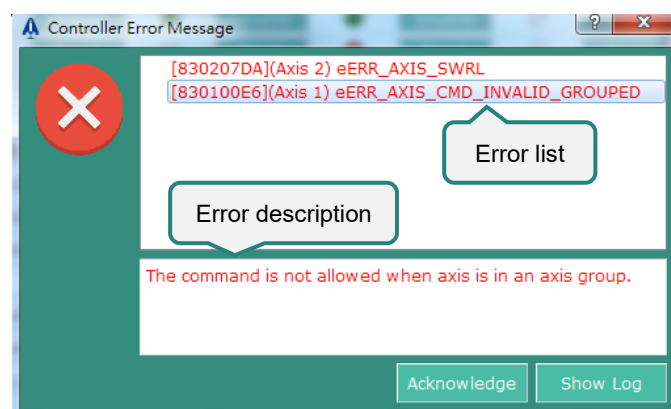




Figure 4.7.1 Error message

Note: Error description varies with selected error from the error list.

Table 4.7.1 Buttons in error message window

Button	Description
	Close the current error message window. (Note: By doing so, the error will not be cleared. Users need to check the description of each error to troubleshoot it.)
	Open Controller Log.

4.8 Controller log

Controller Log allows user to monitor and inspect all controller errors and system logs.

4.8.1 Open controller log

To open Controller Log, click on **Tools** on the menu bar. Then click on **Controller Log**.

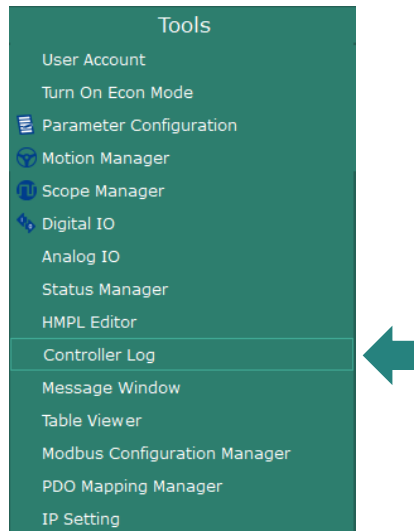


Figure 4.8.1.1 Controller Log

Controller Log window is as below.

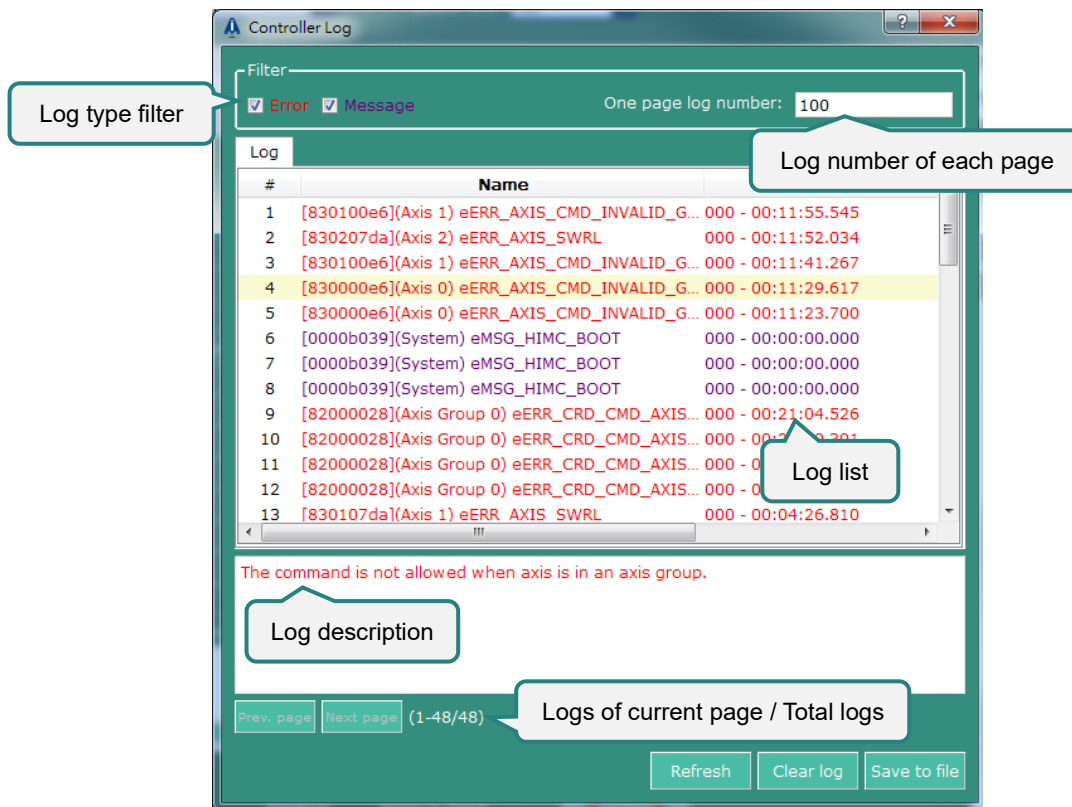


Figure 4.8.1.2 Controller Log window

Functions in Controller Log window are described as below.

Table 4.8.1.1 Functions in Controller Log window

Selection / Button	Description
<input checked="" type="checkbox"/> Error	Show error log. (<input checked="" type="checkbox"/> : Show log <input type="checkbox"/> : Hide log)
<input checked="" type="checkbox"/> Message	Show system log.
Refresh	Refresh controller log.
Clear log	Clear controller log.
Save to file	Save controller log to a file.
Prev. page	Go to previous page.
Next page	Go to next page.

Note: Log description varies with the selected log from the log list.

4.9 Scope manager

iA Studio provides a software scope for users to view real-time parameter data in graphic format.

4.9.1 Open scope manager

To open Scope Manager, users can click on **Tools** on the menu bar. Then click on **Scope Manager**.

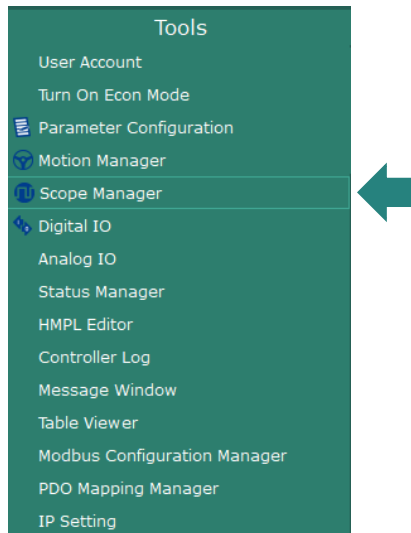


Figure 4.9.1.1 Scope Manager

Or users can click on the below icon to open Scope Manager.



Figure 4.9.1.2 Scope Manager

Scope Manager window is as below.



Figure 4.9.1.3 Scope Manager window

Functions in Scope Manager are described as below.

Table 4.9.1.1 Functions in Scope Manager window

Icon	Description
	Start to record and display parameter data.
	Stop recording and displaying parameter data.
	Restart to record and display parameter data.
	Open Plot View window. Display and analyze recorded parameter data.
	Open 1D scope. Click on the icon and select Y-Time Mode to open 1D scope. (Note: X axis is time. (Unit: sec))
	Open 2D scope. Click on the icon and select X-Y Mode to open 2D scope.
	Open 3D scope. Click on the icon and select X-Y-Z Mode to open 3D scope.
	Select the number of channels. 1D scope: 8 channels are available. Channel number: 1 to 8. 2D scope: 1, 2 and 4 channels are available. Channel number: 1, 2 and 4. 3D scope: 1 and 2 channels are available. Channel number: 1 and 2.
	Open Settings window. Set sampling rate and trace style.

4.9.1.1 Open plot view window

To open Plot View window, users can click on the icon below.



Figure 4.9.1.1.1 Open Plot View window

4.9.1.2 1D / 2D / 3D scope

To change between 1D, 2D and 3D scope, please click on the icon below. Select Y-Time Mode (1D scope), X-Y Mode (2D scope) or X-Y-Z Mode (3D scope) from the submenu.

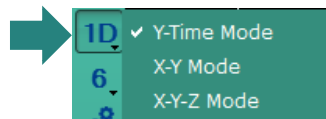


Figure 4.9.1.2.1 1D / 2D / 3D scope

4.9.1.3 Open settings window

Users can modify sampling rate and trace style in Settings window. To open Settings window, users can click on the below icon.



Figure 4.9.1.3.1 Open Settings window

Settings window is as below.

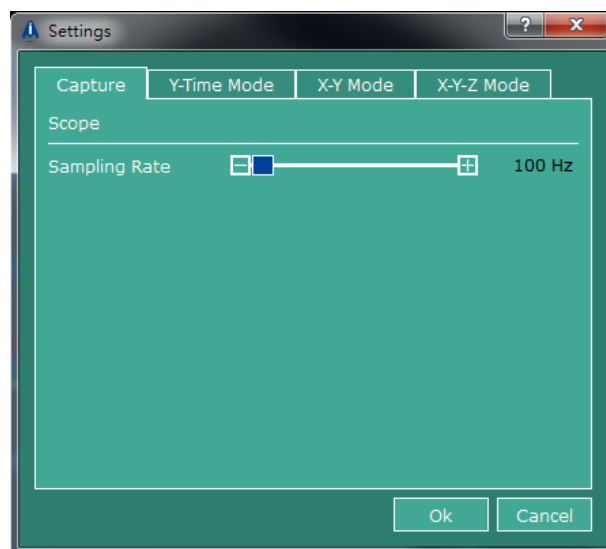


Figure 4.9.1.3.2 Settings window

Table 4.9.1.3.1 Tabs in Settings window

Tab	Description
Capture	Set sampling rate. (Sampling rate range: 100 Hz to 4000 Hz)
Y-Time Mode	Set trace style in 1D scope. Users can define trace color and width.
X-Y Mode	Set trace style in 2D scope. Users can define point color, point diameter and sample number.
X-Y-Z Mode	Set trace style in 3D scope. Users can define point color, point diameter and sample number.

Functions in each tab are described as below.

■ **Capture**

In this tab, users can set sampling rate.

Sampling rate range: 100 Hz to 4000 Hz

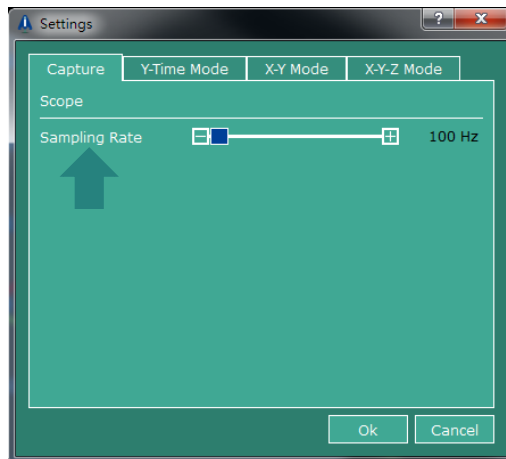


Figure 4.9.1.3.3 Capture tab

■ **Y-Time Mode**

In this tab, users can set trace color and width in 1D scope.

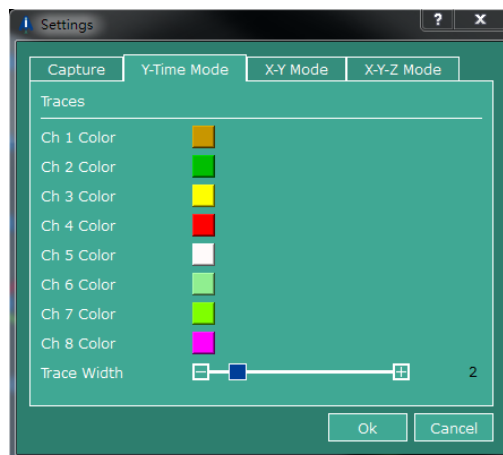


Figure 4.9.1.3.4 Y-Time Mode tab

(1) Trace color

Click on color icon to open color table. Select desired color and click on **OK** button.



Figure 4.9.1.3.5 Trace color

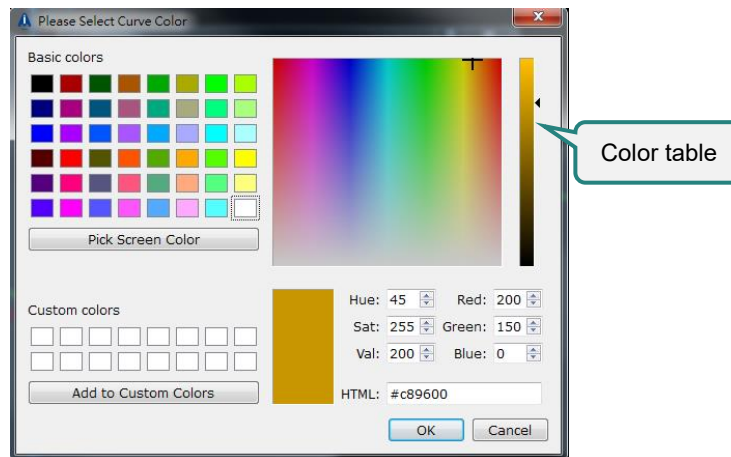


Figure 4.9.1.3.6 Color table

(2) Trace width

Set desired width.

Width range: 1 to 10. (Unit: pixel)



Figure 4.9.1.3.7 Trace width

■ X-Y Mode

In this tab, users can set point color, point diameter and sample number in 2D scope.

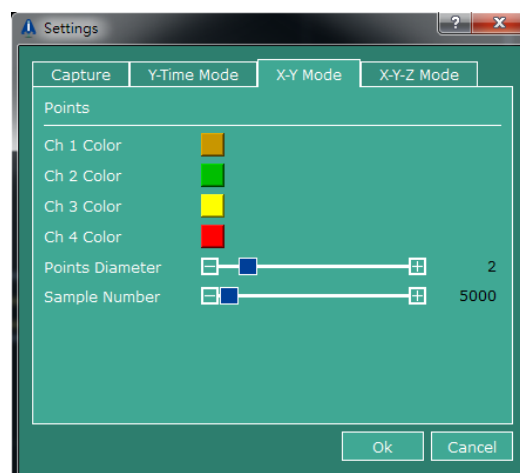


Figure 4.9.1.3.8 X-Y Mode tab

(1) Point color

Click on color icon to open color table. Select desired color and click on **OK** button.



Figure 4.9.1.3.9 Point color

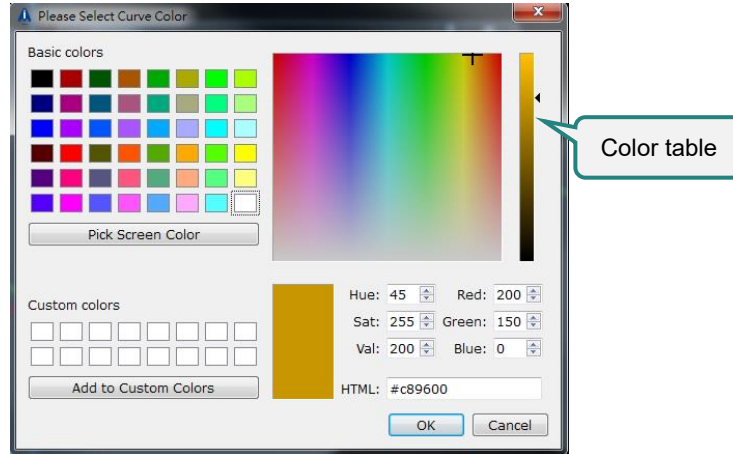


Figure 4.9.1.3.10 Color table

(2) Point diameter

Set point diameter.

Size range: 1 to 10. (Unit: pixel)



Figure 4.9.1.3.11 Point diameter

(3) Sample number

Set sample number. Available setting range: 5000 to 10000.

In 2D scope, the trace is plotted by points. If the sample number is set to be 5000, then 2D scope will only display trace which can be plotted by 5000 points in real time.



Figure 4.9.1.3.12 Sample number

■ X-Y-Z Mode

In this tab, users can set point color, point diameter and sample number in 3D scope.

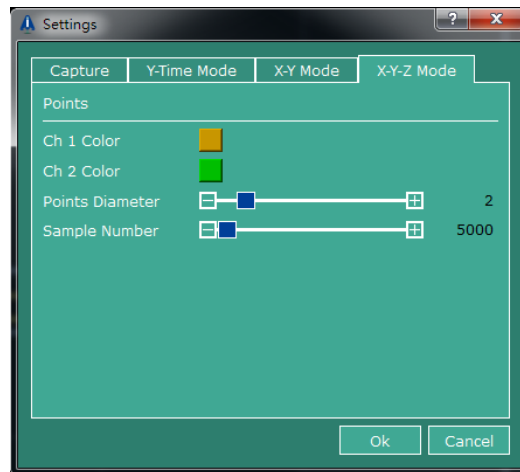


Figure 4.9.1.3.13 X-Y-Z Mode tab

(1) Point color

Click on color icon to open color table. Select desired color and click on **OK** button.



Figure 4.9.1.3.14 Point color

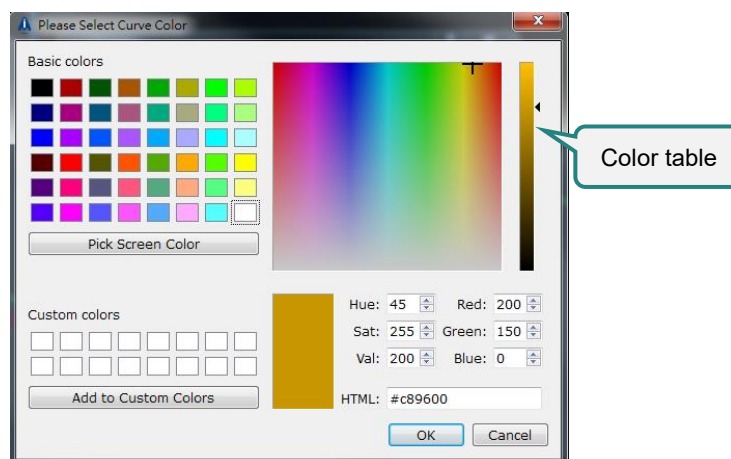


Figure 4.9.1.3.15 Color table

(2) Point diameter

Set point diameter.

Size range: 1 to 10. (Unit: pixel)



Figure 4.9.1.3.16 Point diameter

(3) Sample number

Set sample number. Available setting range: 5000 to 10000.

In 3D scope, the trace is plotted by points. If the sample number is set to be 5000, then 3D scope will only display trace which can be plotted by 5000 points in real time.



Figure 4.9.1.3.17 Sample number

4.9.2 1D scope

1D scope displays the real-time relation between a certain parameter and time in graphic format. 1D scope window is as below.

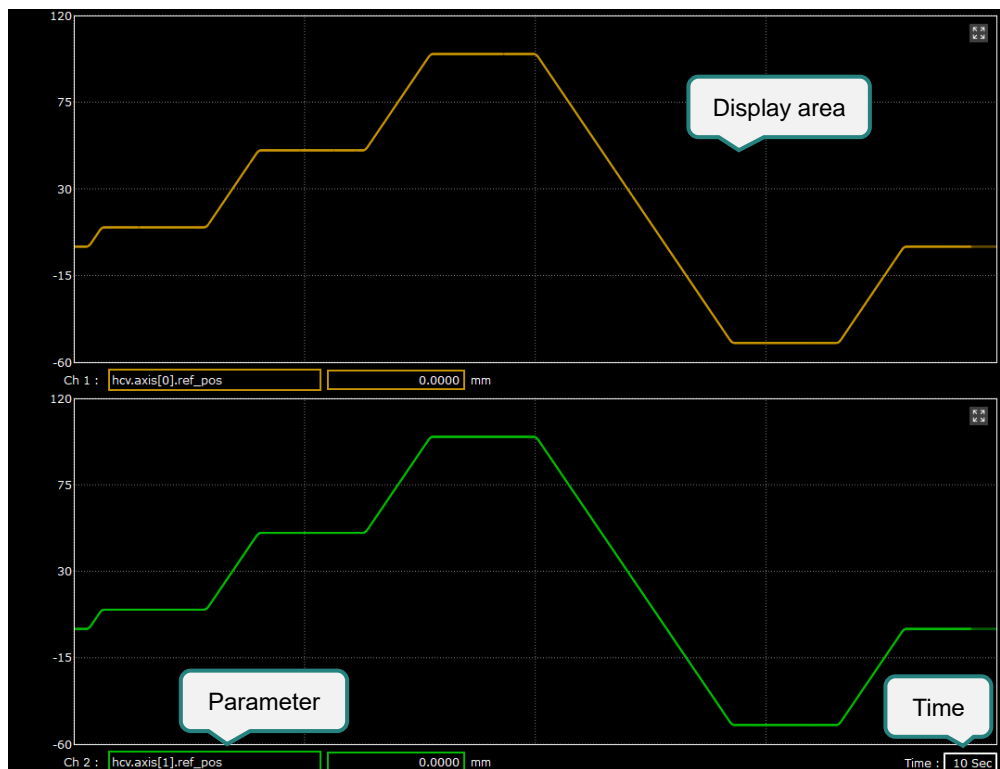


Figure 4.9.2.1 1D scope window

4.9.2.1 1D scope

1D scope can display both the current parameter data and the previous one in display area. The X axis of 1D scope is time, which can be set by the field in the lower-right corner.

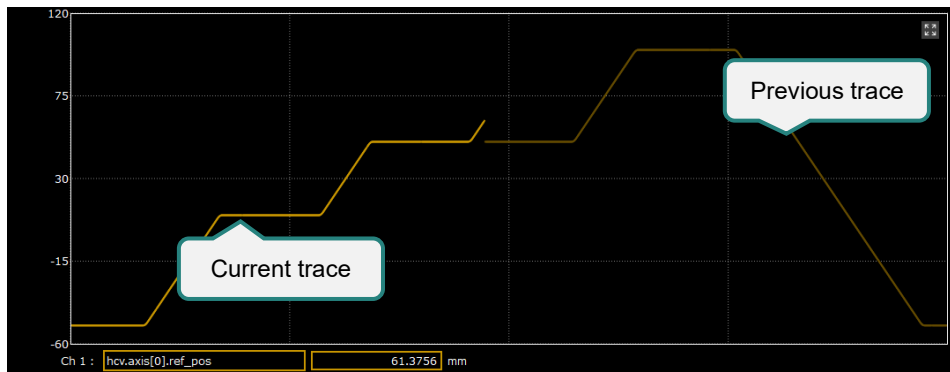


Figure 4.9.2.1.1 1D scope

4.9.2.2 Parameter input area

There are two fields in the parameter input area of 1D scope: parameter list field and parameter data field. Users can set the parameter to be monitored in parameter list field. The parameter data will be displayed in parameter data field.



Figure 4.9.2.2.1 Parameter input area

■ Parameter list field

Click on parameter list field to open parameter list.

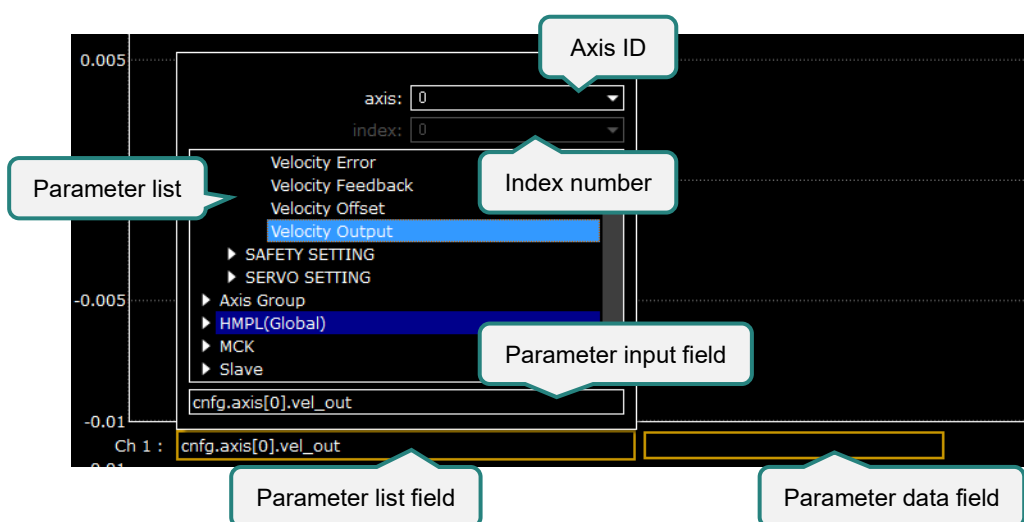


Figure 4.9.2.2.2 Parameter list field

Parameter list includes the following items:

(1) Axis ID

Select axis ID from the drop-down list or directly input axis ID in the field.

(2) Index number

Select index number from the drop-down list or directly input index number in the field.

(3) Parameter list

Select desired parameter from the list.

(4) Parameter input field

Users can directly input parameter in the field. Parameter input field provides smart completion, so users can search for parameters by using keywords.

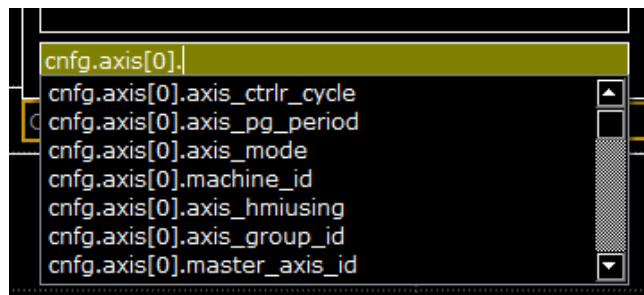


Figure 4.9.2.2.3 Parameter input field

Parameter input field will display in different colors to remind users to check parameter.

Table 4.9.2.2.1 Parameter input field

Status	Description
<code>cnfg.axis[0].pos_fb</code>	Correct parameter.
<code>cnfg.axis[0].pos_f</code>	Inputting parameter.
<code>cnfg.axis[0].pos_f</code>	Incorrect parameter.

■ **Parameter data field**

Display the parameter data of current position.

4.9.2.3 Time range

The X axis of 1D scope is time. Users can set the time range in the field below. The setting value ranges from 1 to 300 seconds. (Note: The setting value needs to be an integer.)



Figure 4.9.2.3.1 Time range

4.9.3 2D scope

2D scope displays the real-time relation between two parameters in graphic format. 2D scope window is as below.

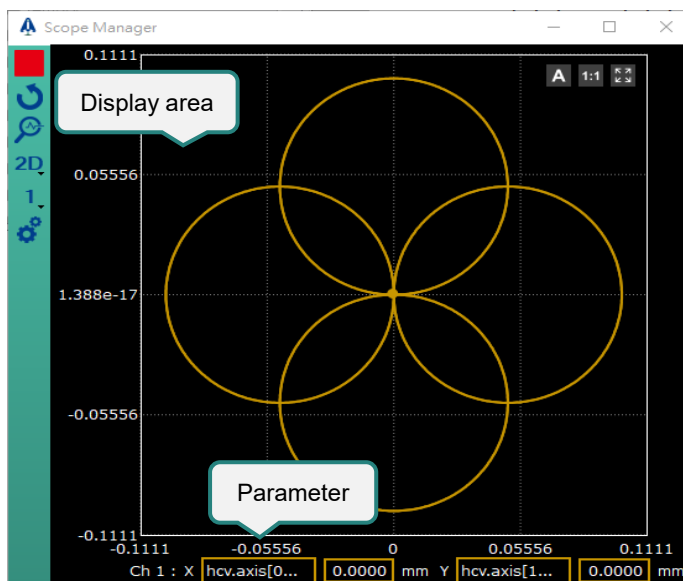


Figure 4.9.3.1 2D scope window

4.9.3.1 2D scope

In display area, the point means the current value of the selected parameters. In 2D scope, the trace is plotted by points. Users can define the sample number of the trace. For setting the sample number, please refer to section 4.9.1.3.

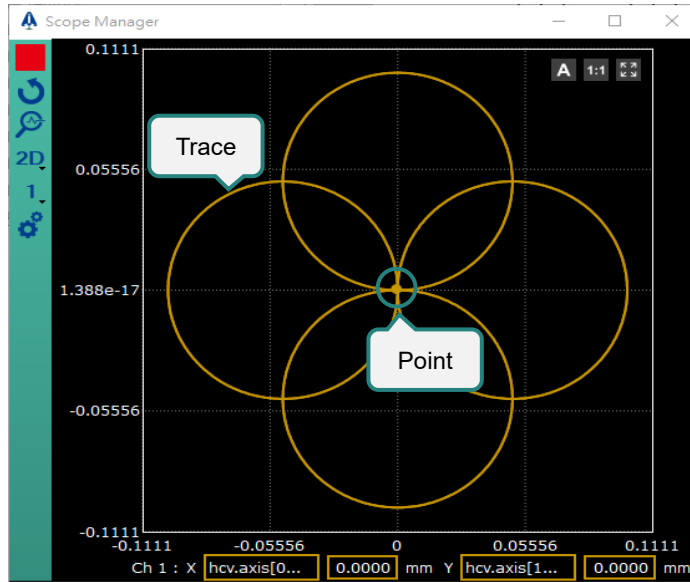


Figure 4.9.3.1.1 2D scope

4.9.3.2 Parameter input area

There are two fields in the parameter input area of 2D scope: parameter list field and parameter data field. Users can set the parameter to be monitored in parameter list field. The parameter data will be displayed in parameter data field.



Figure 4.9.3.2.1 Parameter input area

(1) Parameter list field

Click on parameter list field to open parameter list.

(2) Parameter data field

Display the parameter data of current position.

4.9.3.3 Scale function

While using 2D scope, users can decide how the coordinate system is scaled by using the scale function.

■ Automatic mode / Manual mode



Figure 4.9.3.3.1 Automatic mode / Manual mode

Table 4.9.3.3.1 Automatic mode / Manual mode

Icon	Mode	Description
	Automatic mode	Coordinate system is automatically created according to the trace.
	Manual mode	Coordinate system is scaled manually. Double click on the text on X axis or Y axis to set the scale.

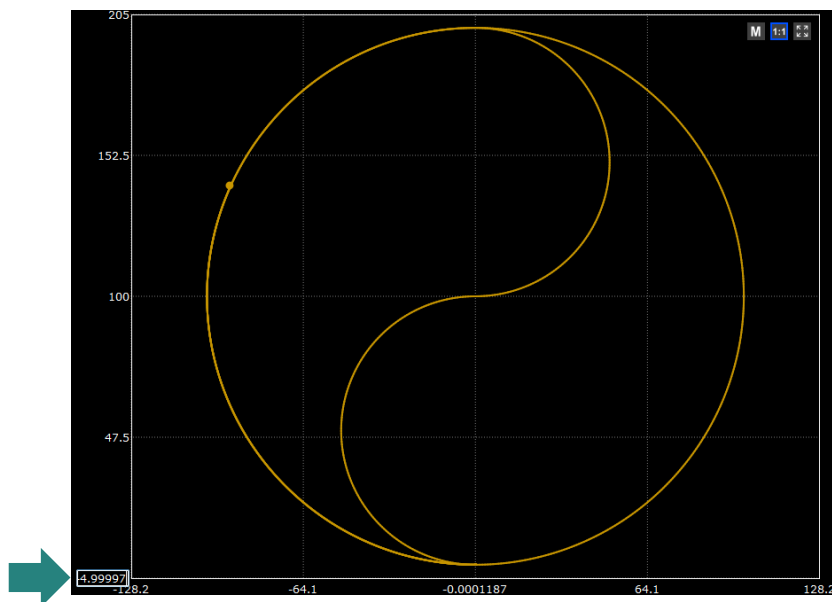


Figure 4.9.3.3.2 Automatic mode / Manual mode

■ Fixed aspect ratio



Figure 4.9.3.3.3 Fixed aspect ratio

This function is only available in automatic mode. The aspect ratio of the trace will be fixed in automatic mode. Click on the icon to turn on / turn off this function.

■ Update to fit the trace



Figure 4.9.3.3.4 Update to fit the trace

Click on the icon to update the coordinate system to fit the trace.

4.9.4 3D scope

3D scope displays the real-time relation among three parameters in graphic format. 3D scope window is as below.

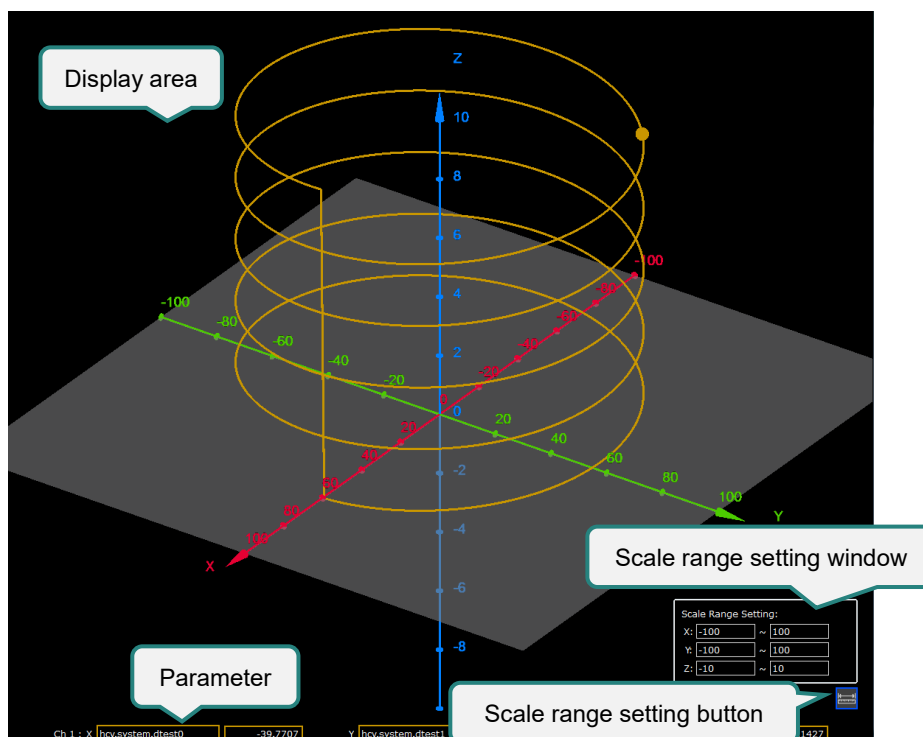


Figure 4.9.4.1 3D scope window

4.9.4.1 3D scope

In display area, the point means the current value of the selected parameters. In 3D scope, the trace is plotted by points. Users can define the sample number of the trace. For setting the sample number, please refer to section 4.9.1.3.

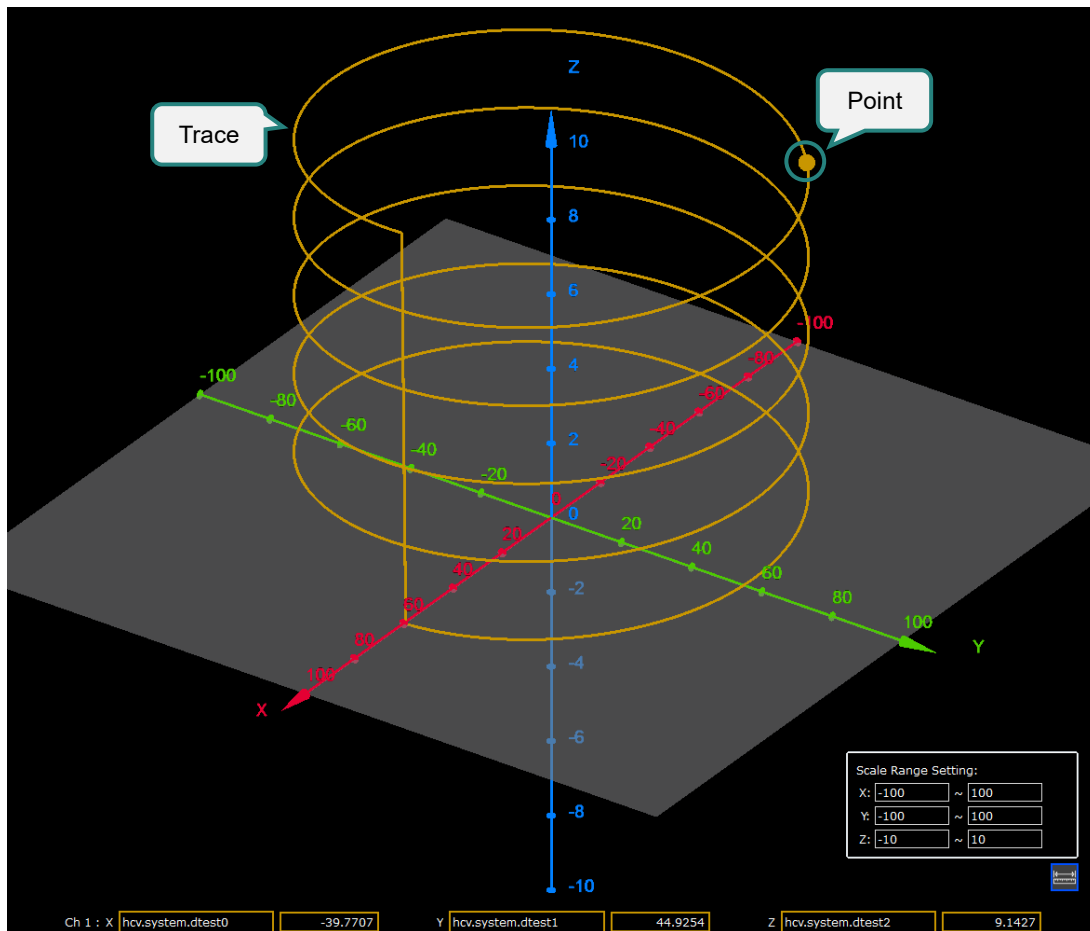


Figure 4.9.3.1.1 3D scope

4.9.4.2 Parameter input area

There are two fields in the parameter input area of 3D scope: parameter list field and parameter data field. Users can set the parameter to be monitored in parameter list field. The parameter data will be displayed in parameter data field.



Figure 4.9.4.2.1 Parameter input area

(3) Parameter list field

Click on parameter list field to open parameter list.

(4) Parameter data field



Display the parameter data of current position.

4.9.4.3 Scale range setting

While using 3D scope, users can decide the display range of the scale in the display area by scale range setting.

■ **Scale range setting button**

Table 4.9.4.3.1 Scale range setting button

Icon	Status	Description
	Close	Open scale range setting window.
	Open	Close scale range setting window.

■ **Scale range setting window**

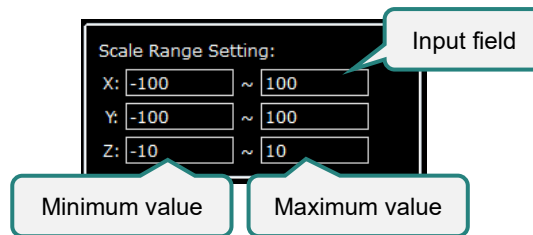


Figure 4.9.4.3.1 Scale range setting window

After users modify the value in input field and press **Enter** key, 3D scope display area will be immediately updated. Scale range of each axis is updated to the value users input, and small scale of each axis changes based on the minimum value and the maximum value.

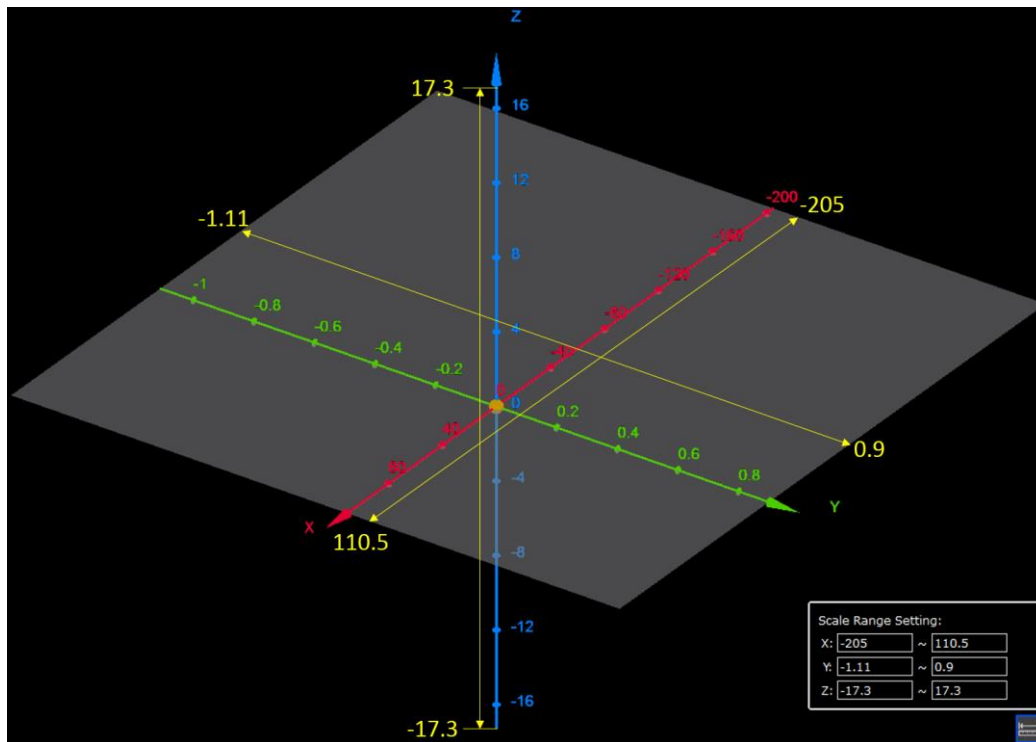


Figure 4.9.4.3.2 Scale range setting of each axis

■ **Switching angle**

(1) Zoom in / Zoom out 3D scope

Hold **Ctrl** key and scroll the wheel.

(2) Rotate 3D scope

Hold left mouse button and move the mouse.

(3) Translate 3D scope

Hold **Ctrl** key and the wheel. Then, move the mouse.

4.9.5 Plot view

In Plot View window, users can see the recorded parameter data from 1D / 2D / 3D scope.

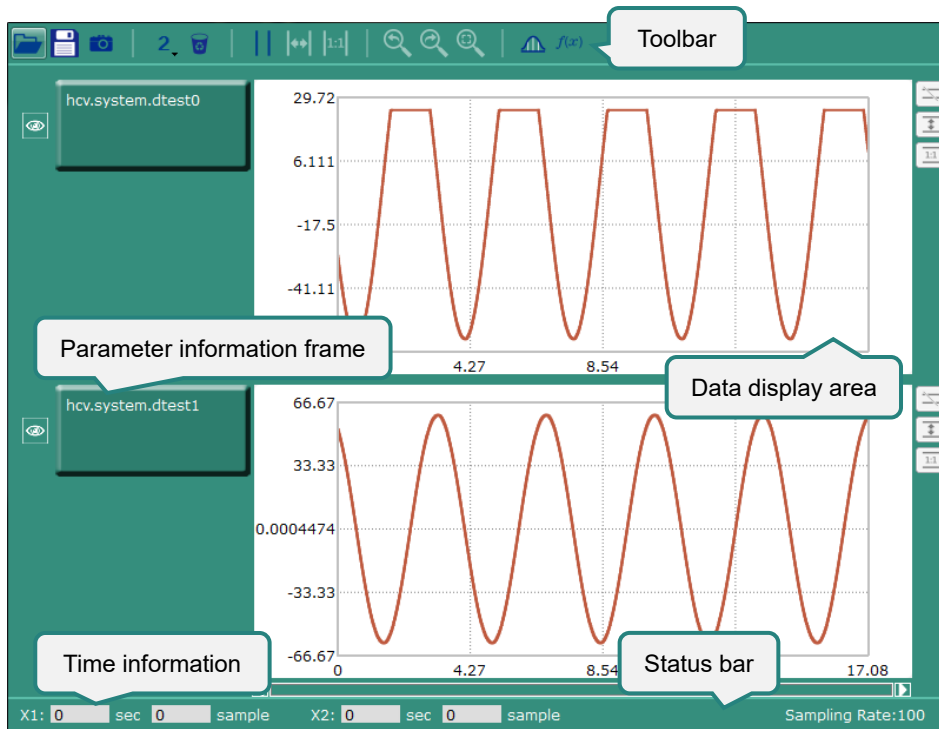


Figure 4.9.5.1 Plot View window

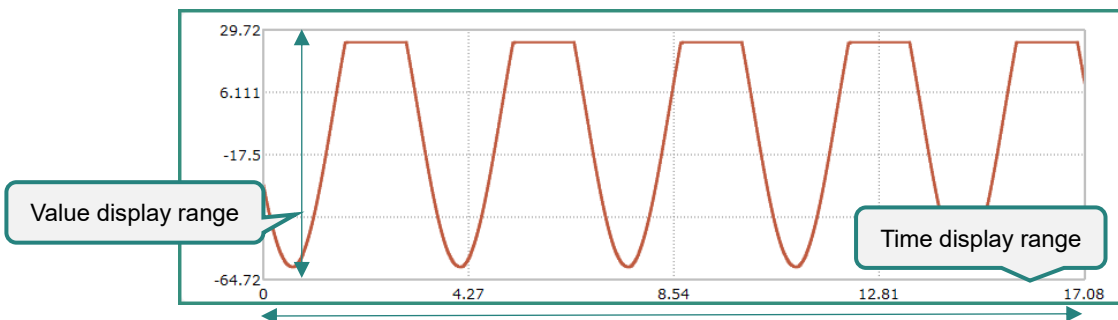

















Figure 4.9.5.2 Data display area

Functions in Plot View window are described as below.

Table 4.9.5.1 Functions in Plot View window

Icon / Button	Description
	Open / Insert plot view data file.
	Save parameter data as iA Studio plot view data file (.iaspvd), text file (.txt) or Excel file (.xls).
	Save plot view window as image file (.bmp).
	Clear all the data in plot view window.
	Show / Hide X1 and X2 time cursors.
	Zoom in on the segment between X1 and X2 time cursors.
	Revert to the original time display range.
	Return to previous setting of time display range and value display range. If no previous setting exists, the icon will be grey.
	Go to next setting of time display range and value display range. If no next setting exists, the icon will be grey.
	Revert to the original graph.
	Open Statistics Table.
	Open computation window.
	Hide Y1 and Y2 value cursors.
	Zoom in on the segment between Y1 and Y2 value cursors.
	Revert to the original value display range.

4.9.5.1 Set time cursor and value cursor

Users can use cursors to select a certain segment of the graph to be inspected.

■ Set X1 / X2 time cursor

Left click on the graph to show X1. Right click on the graph to show X2. (Note: Refer to figure 4.9.5.1.1, click on the icon on the toolbar to show or hide X1 and X2.)

■ Move X1 / X2 time cursor

(1) Move by mouse

To move X1 or X2, hold left or right mouse button in data display area, and move the mouse.

(2) Move by keyboard

To move X1 or X2, left click or right click on data display area, and press ← or → key.

(3) Set in status bar

To move X1 or X2, left click or right click on data display area, and modify time information or sample index in the input field of status bar.

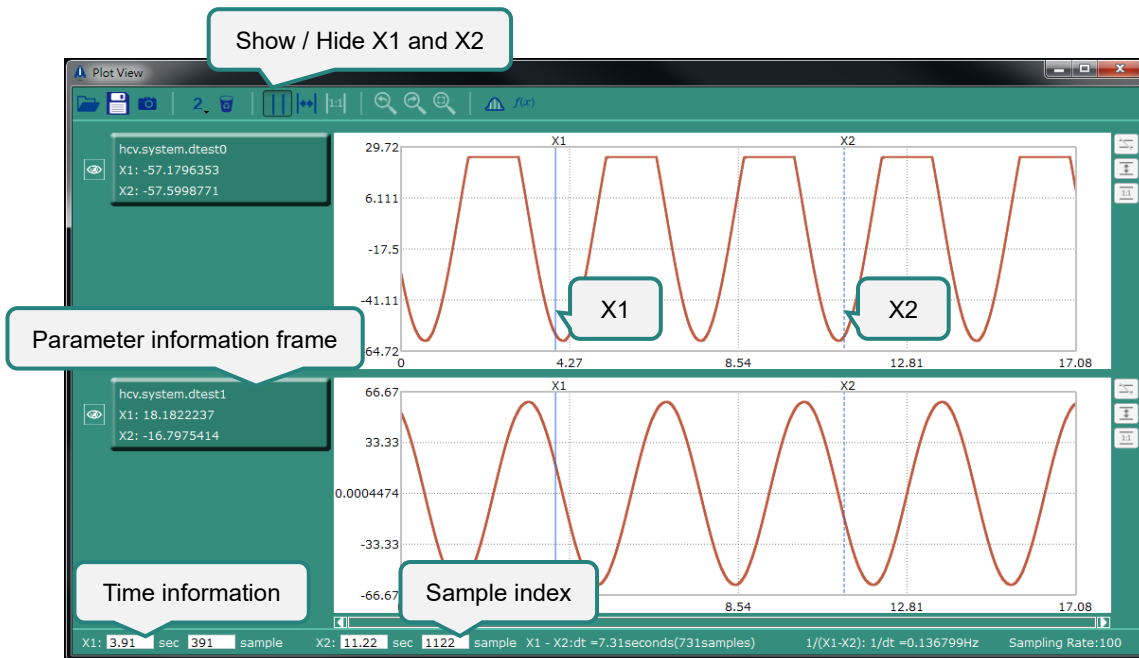


Figure 4.9.5.1.1 X1 and X2 time cursors

Parameter information at X1 and X2 will be shown on the left. Time information at X1 and X2 will be shown on the bottom.

■ **Set Y1 / Y2 value cursor**

Hold **Ctrl** key and left click on the graph to show Y1. Hold **Ctrl** key and right click on the graph to show Y2. (Note: Refer to figure 4.9.5.1.2, click on the icon on the toolbar to hide Y1 and Y2.)

■ **Move Y1 / Y2 value cursor**

(1) Move by mouse

To move Y1 or Y2, hold **Ctrl** key and left or right mouse button in data display area, and move the mouse.

(2) Move by keyboard

To move Y1 or Y2, hold **Ctrl** key, left click or right click on data display area, and press \uparrow or \downarrow key.

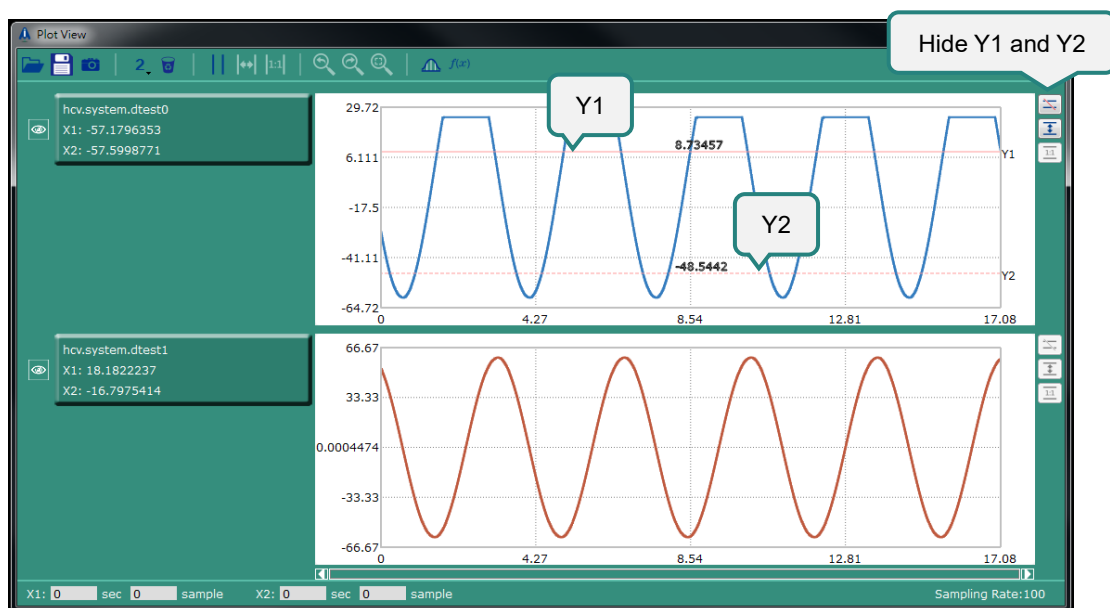


Figure 4.9.5.1.2 Y1 and Y2 value cursors

4.9.5.2 Zoom in / Revert to the original display range

■ X1 and X2 time cursors

(1) Zoom in

Zoom in function is used to enlarge a certain segment defined by time cursors. Refer to figure 4.9.5.2.1, click on the icon on the toolbar to zoom in.

(2) Revert to the original time display range

Refer to figure 4.9.5.2.1, click on the icon on the toolbar to revert to the original time display range.

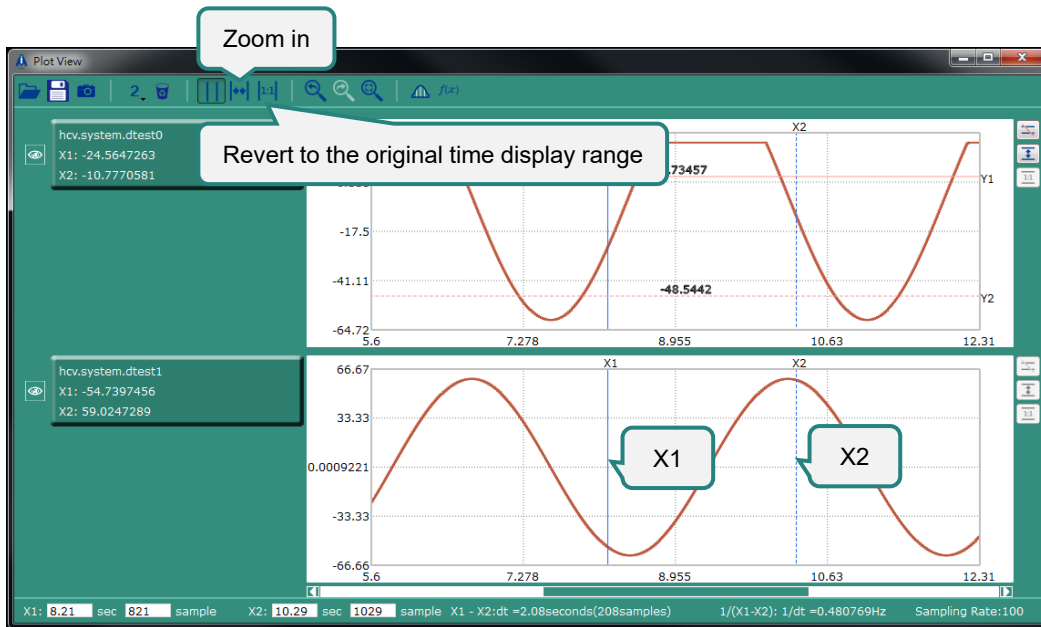


Figure 4.9.5.2.1 Zoom in / Revert to the original time display range

■ **Y1 and Y2 value cursors**

(1) Zoom in

Zoom in function is used to enlarge a certain segment defined by value cursors. Refer to figure 4.9.5.2.2, click on the icon on the toolbar to zoom in.

(2) Revert to the original value display range

Refer to figure 4.9.5.2.2, click on the icon on the toolbar to revert to the original value display range.

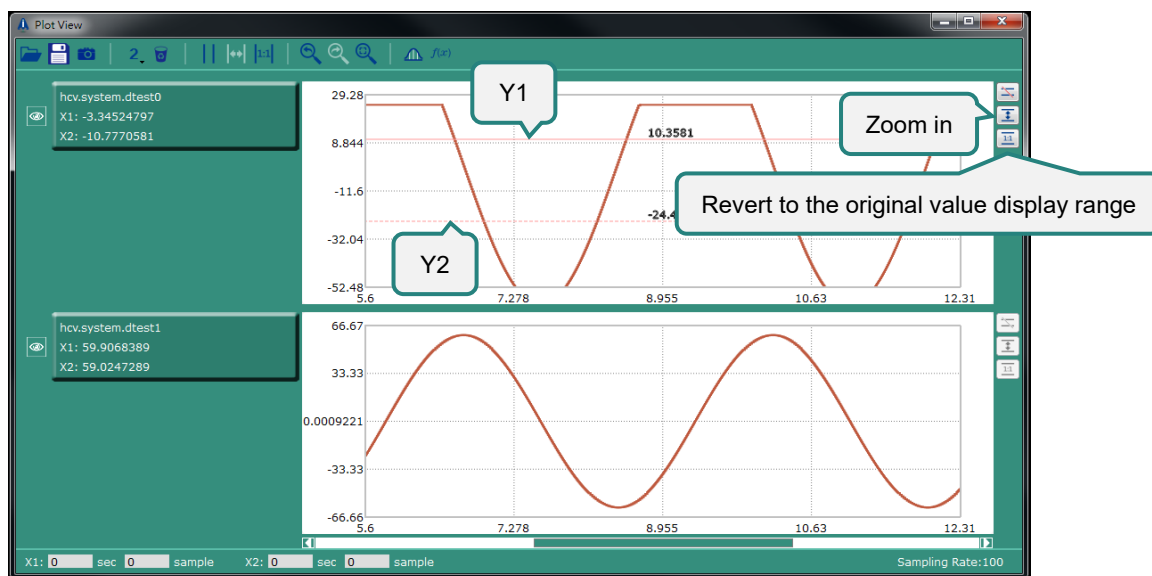


Figure 4.9.5.2.2 Zoom in / Revert to the original value display range

4.9.5.3 Merge graphs

Users can merge two graphs into one, please see the example below.

Left click and hold parameter information frame 2, and drag it to parameter information placement area 1.

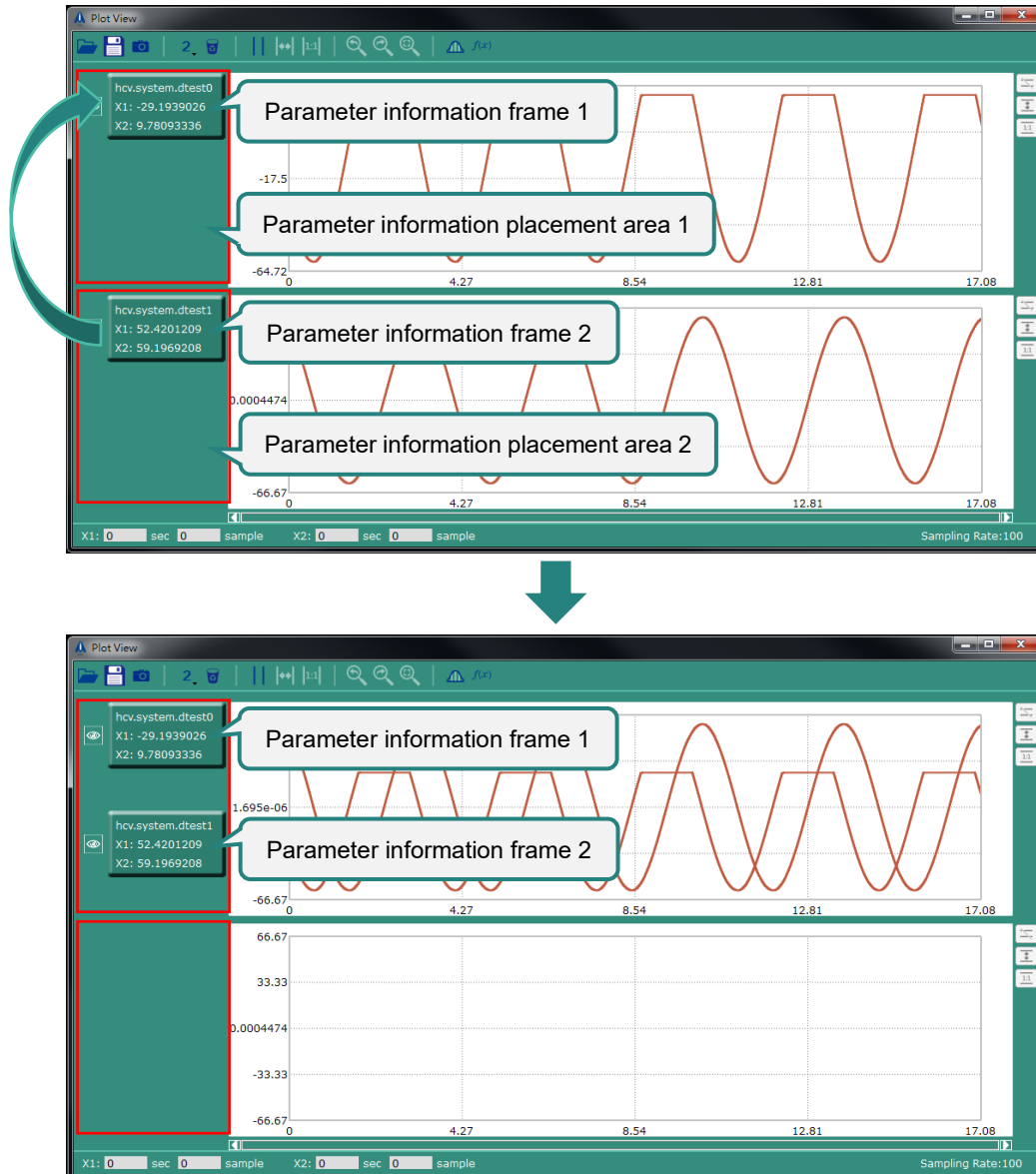


Figure 4.9.5.3.1 Merge graphs

4.9.5.4 Modify width of parameter information placement area

Users can modify width of parameter information placement area, please see the example below.

Move the mouse to the position of splitter. After the icon to be dragged appears, press and hold left mouse button, and then move left or right.

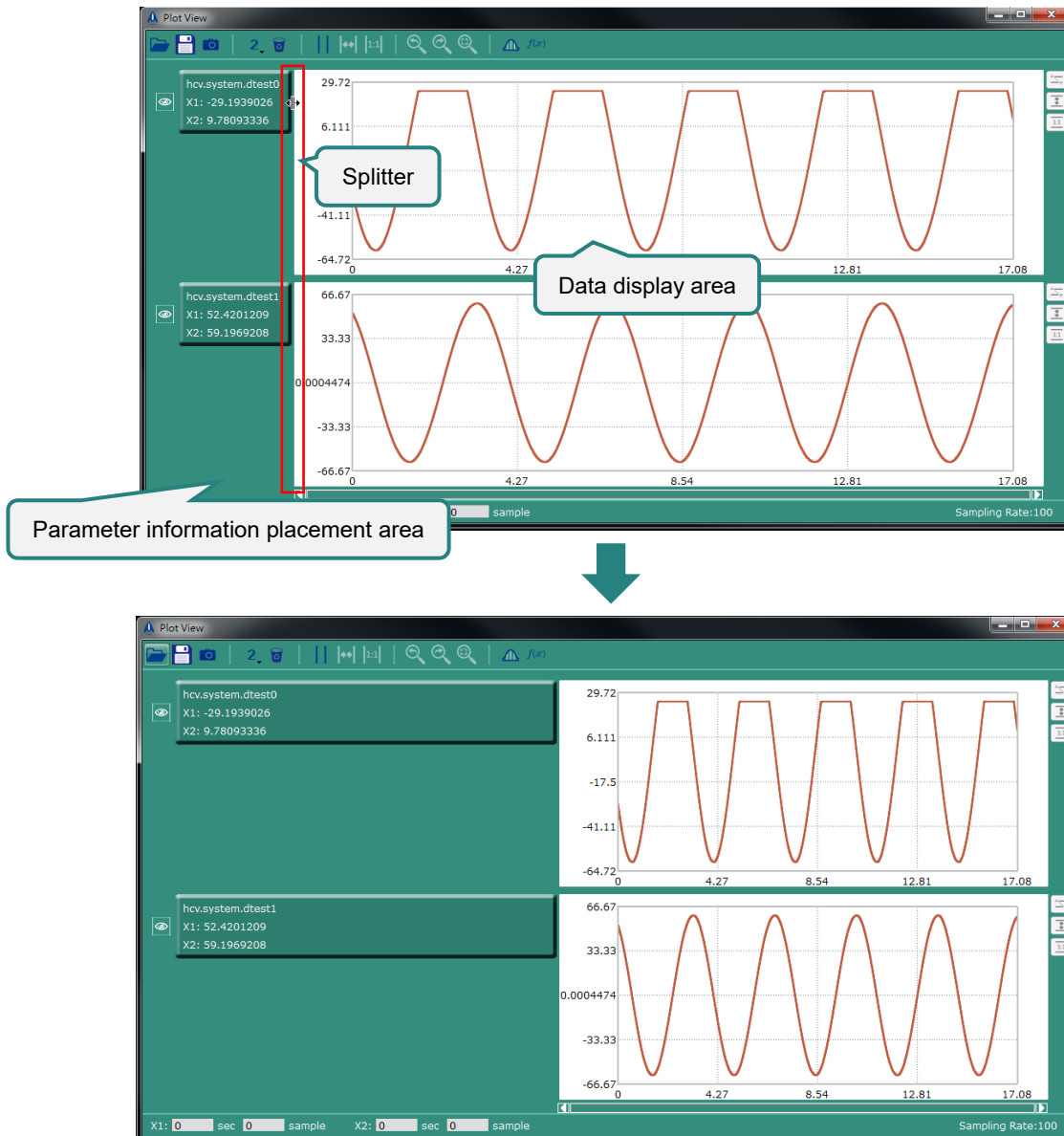


Figure 4.9.5.4.1 Modify width of parameter information placement area

4.9.5.5 Data display setting window

Users can modify parameter data color, line width, display name and original file placement via data display setting window. Click on parameter information frame to open data display setting window.

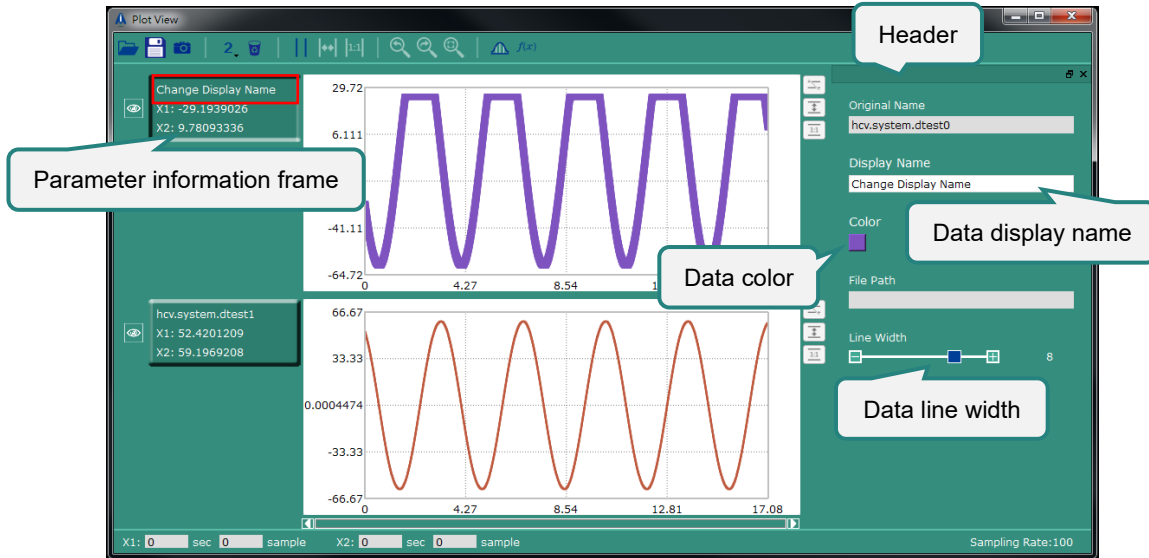


Figure 4.9.5.5.1 Data display setting window

By holding header and moving the mouse, users can drag data display setting window out of plot view main window, and put it back to the right side of plot view main window.

4.9.5.6 Statistics table

Statistics Table shows the value (maximum and minimum), mean and standard deviation of parameter data. For instance, you can zoom in on a segment defined by X1 and X2 and check its parameter data in Statistics Table.

Parameter	N	Maximum		Minimum		Mean	Std. Deviation
		Data	Time	Data	Time		
hcv.system.dtest0	1709	25	1.71	59.9999876	0.59	-8.24314127	33.2977899
hcv.system.dtest1	1709	59.999991	10.19	59.9990961	1.46	-1.23430075	42.0238677

Figure 4.9.5.6.1 Statistics Table

To open Statistics Table, refer to figure 4.9.5.6.2, click on the icon on the toolbar.

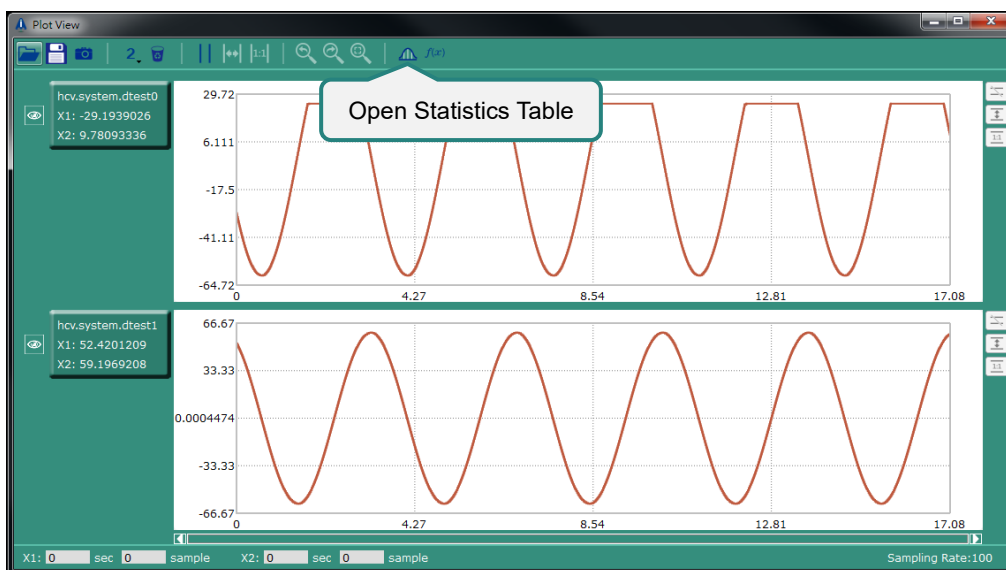



Figure 4.9.5.6.2 Open Statistics Table

4.9.5.7 Computation window

Click on  to open computation window.

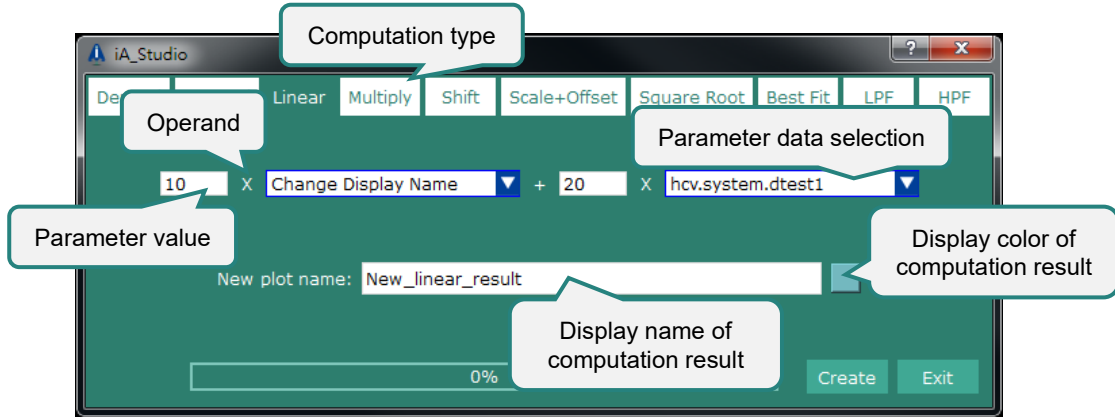


Figure 4.9.5.7.1 Computation window

Step 1: Select computation type.

Step 2: Select parameter data from the drop-down list, and modify parameter value.

Step 3: Input display name of computation result, and select display color.

Step 4: Click on **Create** button to start computation.

When computation is done, the window close automatically. New parameter data will be shown in the last data display area.

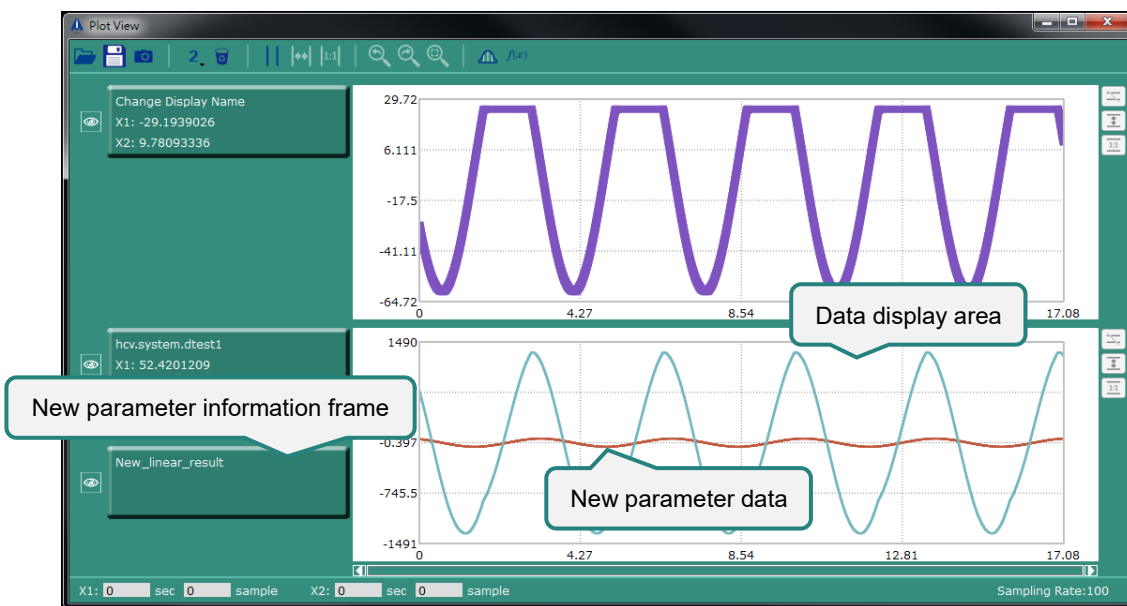


Figure 4.9.5.7.2 New parameter data generated by computation

4.10 HMPL editor

HIWIN Motion Programming Language (HMPL) is a programming language which is similar to C language. It is used to create HMPL tasks for controller motion control. HMPL Editor allows users to edit HMPL task. HMPL Editor supports functions below:

- Edit HMPL task and save HMPL task to controller hard disk.
- Import / Export HMPL task from / to local disk.
- Run / Stop HMPL task.
- Debug HMPL task.

4.10.1 Open HMPL editor

To open HMPL Editor, click on **Tools** on the menu bar. Then click on **HMPL Editor**.

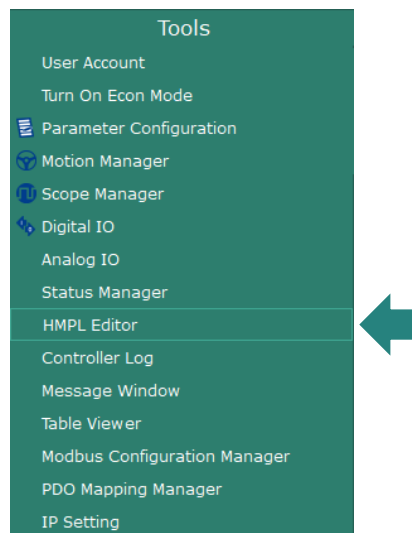


Figure 4.10.1.1 HMPL Editor

HMPL Editor window is as below.

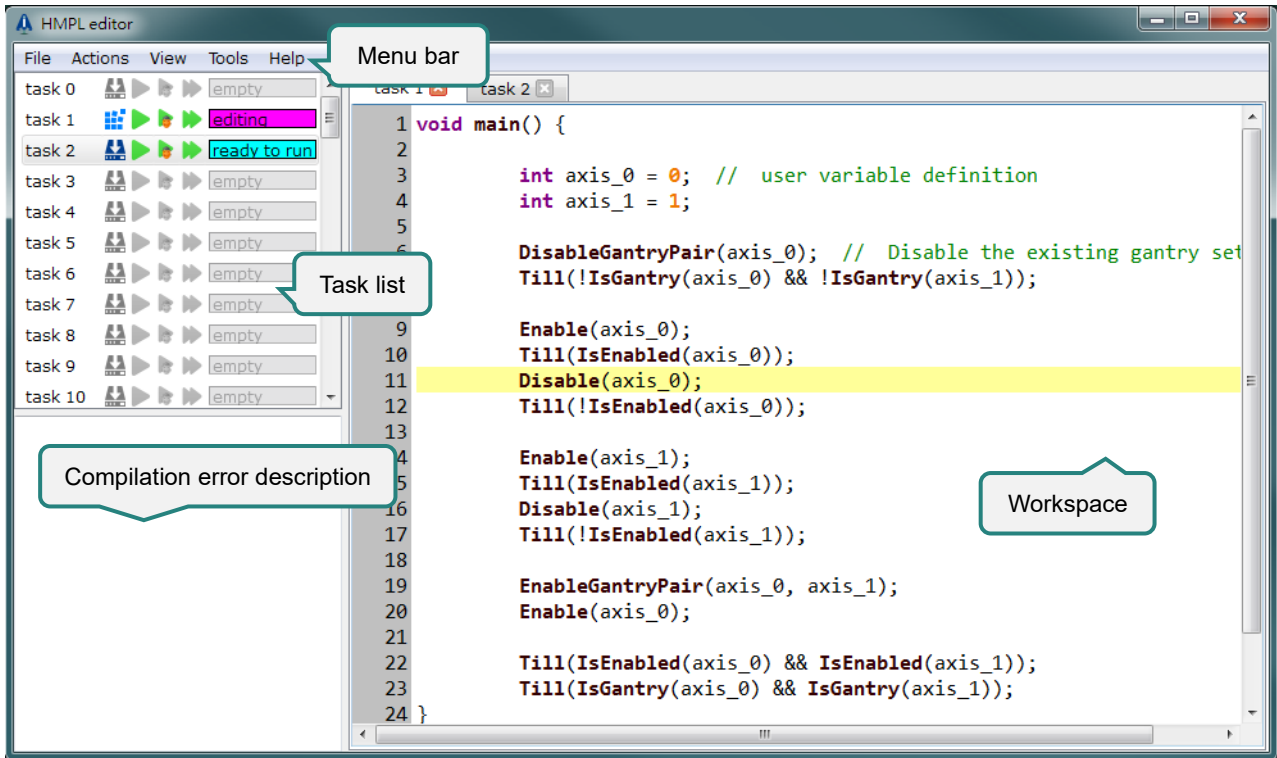


Figure 4.10.1.2 HMPL Editor window

4.10.2 Menu bar

Table 4.10.2.1 Menu bar in HMPL Editor

Menu bar	Submenu	Description
File	Export	Save tasks as a HMPL package file to local disk.
	Save as text file	Save tasks as a text file (.txt).
	Import	Load a HMPL package file from local disk.
Actions	Select All	Select all tasks.
	Compile Selected	Compile selected task.
	Save Selected	Save selected task.
	Run Selected	Run selected task.
	Stop Selected	Stop selected task.
Tools	Set/Modify HMPL password	Set or modify HMPL password.
Help	HMPL document	Open HMPL user manual.
	HMPL example	Open HMPL example code folder.

4.10.3 Task list

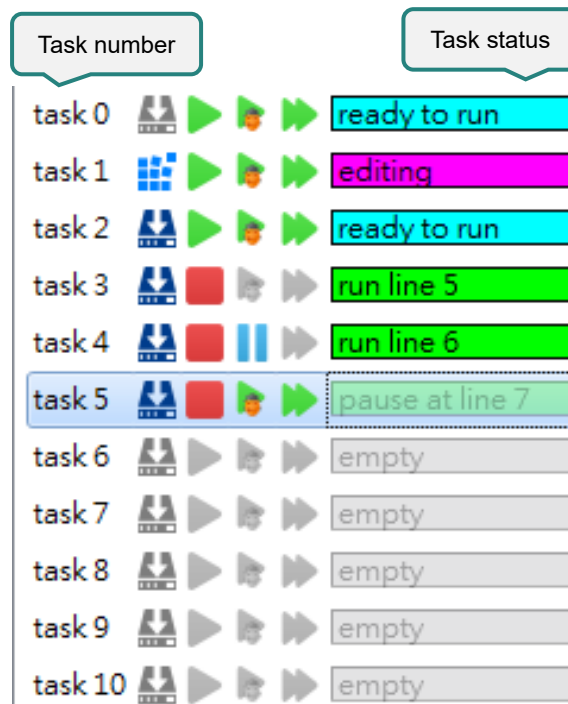


Figure 4.10.3.1 Task list

Double click on the task number or task status filed to open workspace and edit task. Functions in Task list are described as below.

Table 4.10.3.1 Functions in Task list

Icon	Description
	Compile task.
	Save task to controller hard disk.
	Run task.
	Stop task.
	Run task in debug mode.
	Pause task. The pause function is only available when task is running in debug mode.
	Run one line at a time.

4.10.4 Workspace

Users are allowed to use shortcut keys when editing HMPL task in workspace.

Table 4.10.4.1 Shortcut keys

Shortcut Key	Function
Ctrl + C	Copy selected code.
Ctrl + V	Paste the copied code to workspace.
Ctrl + F	Open find and replace bar.
Ctrl + I	Auto-format selected code.
F1	Open HMPL user manual.
F3	Find string.

■ Find and replace bar

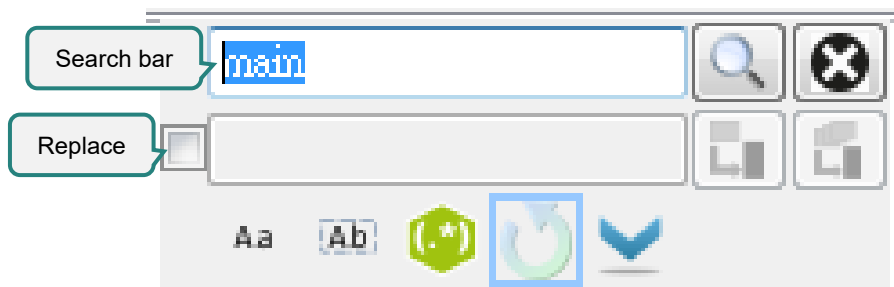


Figure 4.10.4.1 Find and replace bar

Table 4.10.4.2 Functions in find and replace bar

Icon	Description
Aa	Match case.
Ab	Find whole words only.
	Regular expression.
	Continue to find from the start after reaching the end.
	Find in forward direction.
	Find in backward direction.
	Replace next.
	Replace all.
	Close find and replace bar.

4.10.5 HMPL password protection

■ **Set password**

Step 1: Click on **Tools** on the menu bar. Then click on **Set\Modify HMPL password**.

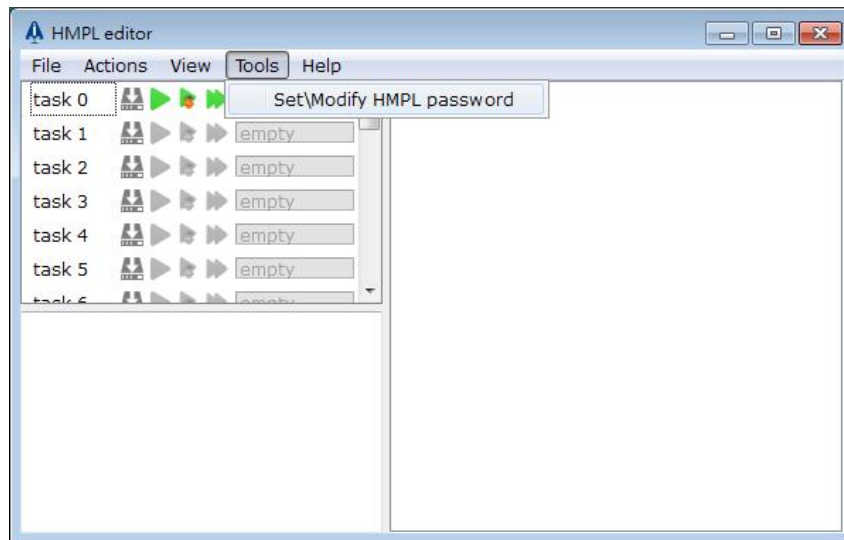


Figure 4.10.5.1 Open Set\Modify HMPL password

Step 2: Set password.

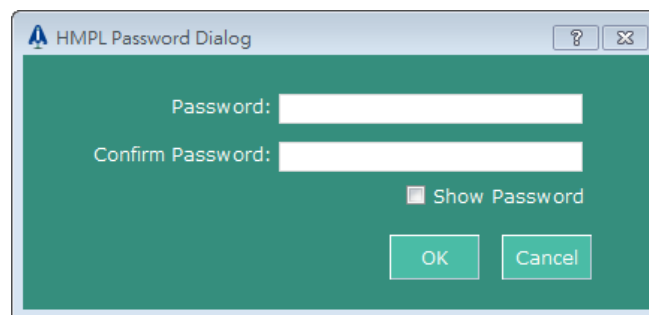


Figure 4.10.5.2 Set password

Step 3: To apply password, click on **Controller** on the menu bar in main screen to execute **Store Configuration**, and click on **Reboot Controller** to reboot controller.

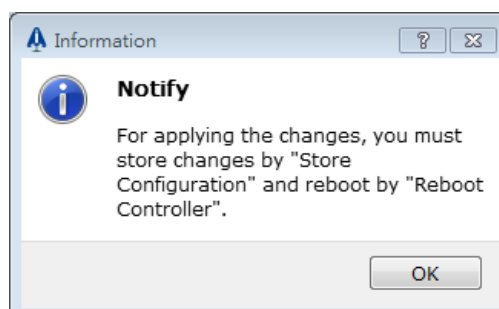


Figure 4.10.5.3 Store password for application

■ **Verify password**

If there is HMPL password protection, users must key in the correct password first before using HMPL Editor.

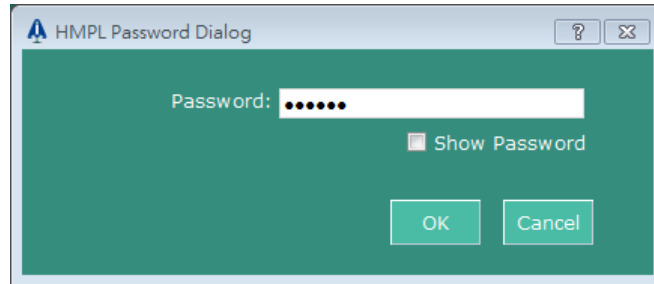


Figure 4.10.5.4 Verify password

■ **Modify password**

Step 1: Click on **Tools** on the menu bar. Then click on **Set/Modify HMPL password**.

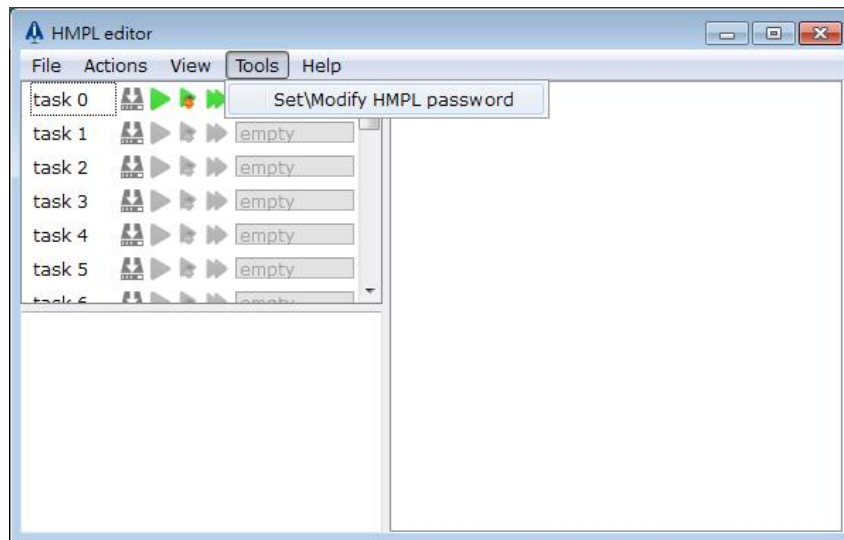


Figure 4.10.5.5 Open Set/Modify HMPL password

Step 2: Key in old password and new password. (Note: If **New Password** and **Confirm Password** are blank, HMPL password protection will be removed.)

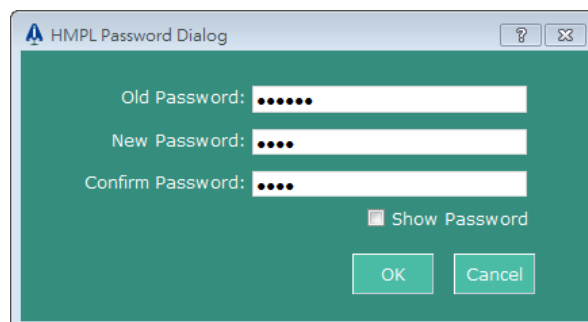


Figure 4.10.5.6 Modify password

Step 3: To apply new password, click on **Controller** on the menu bar in main screen to execute **Store Configuration**, and click on **Reboot Controller** to reboot controller.

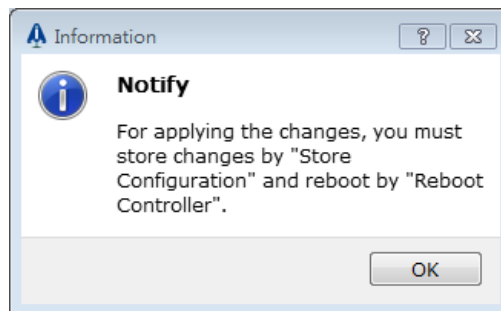


Figure 4.10.5.7 Store new password for application

4.10.6 Example

The following is a simple example of how to create a HMPL task.

Step 1: Open HMPL Editor and Message Window.

Step 2: Double click on task 1 to open workspace.



Figure 4.10.6.1 Open task 1

Step 3: In workspace, enter the below code to show “hello world” in Message Window.

```
void main() {
    Print("hello world");
}
```

Step 4: Click on below icon to compile task 1.

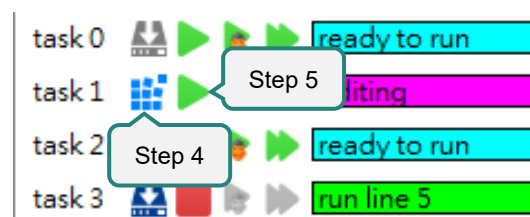


Figure 4.10.6.2 Compile and run task 1

Step 5: Then click on above icon to run task 1. Message Window will show the message “hello world”.

4.11 Modbus configuration manager

Default parameters will be loaded from HIMC RAM after Modbus Configuration Manager is opened. Users can also set the desired controller parameters and HMPL global variables to be accessed via Modbus TCP. Functions in Modbus Configuration Manager are as below:

- Add, delete, arrange and clear user-defined parameters
- Load / Save user-defined parameters

4.11.1 Open Modbus configuration manager

Click on **Tools** on the menu bar. Then click on **Modbus Configuration Manager**.

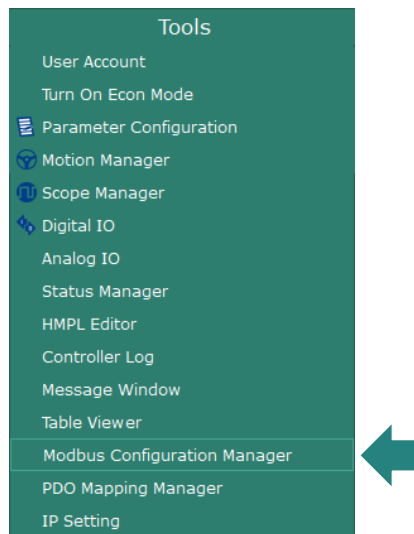


Figure 4.11.1.1 Modbus Configuration Manager

After Modbus Configuration Manager is opened, parameter list will be automatically loaded from HIMC RAM.

Modbus Configuration Manager window is as below.

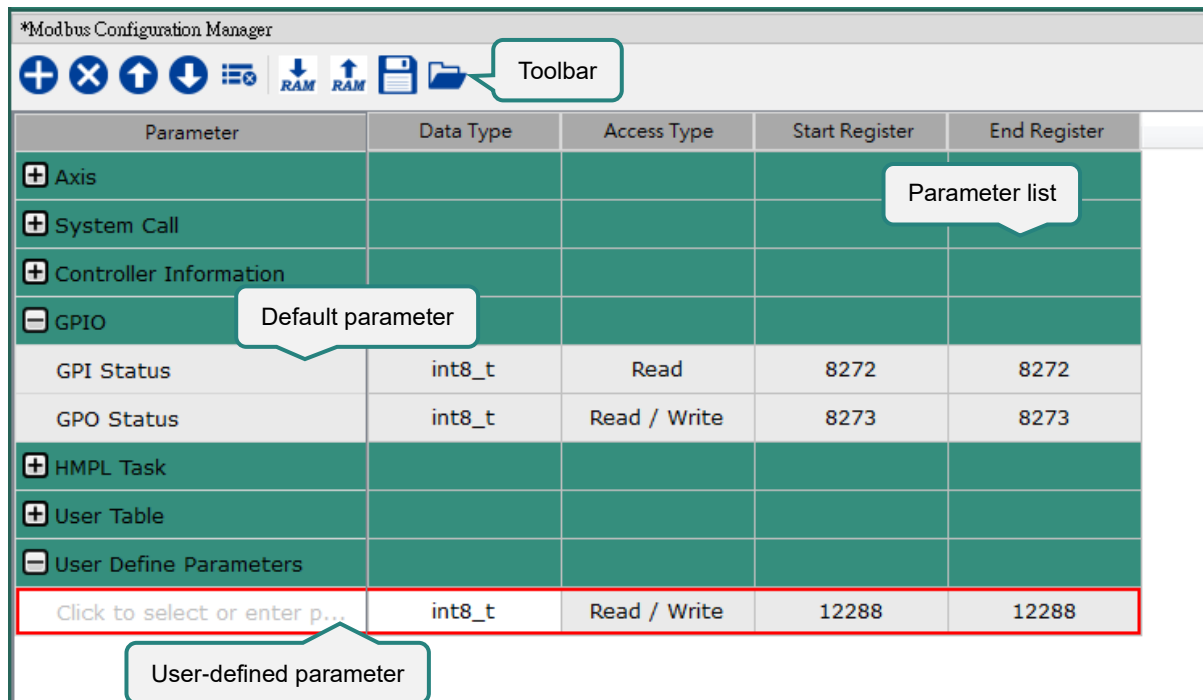


Figure 4.11.1.2 Modbus Configuration Manager window

4.11.2 Toolbar

Table 4.11.2.1 Modbus Configuration Manager toolbar

Icon	Description
	Add user-defined parameter.
	Delete user-defined parameter.
	The selected user-defined parameter moves upward.
	The selected user-defined parameter moves downward.
	Clear all user-defined parameters.
	Save all user-defined parameters to HIMC RAM.
	Load parameter list from HIMC RAM.
	Save all user-defined parameters as iA Studio Modbus data file (.iasmbd).
	Open iA Studio Modbus data file (.iasmbd).

Note: User-defined parameters can only be accessed via Modbus TCP after being saved to HIMC RAM.

4.11.3 Parameter list

Parameter list includes default parameters and user-defined parameters. According to their functions, they can be categorized into the following groups:

- Axis (Default)
- System Call (Default)
- Controller Information (Default)
- GPIO (Default)
- HMPL Task (Default)
- User Table (Default)
- User-defined Parameters

4.11.4 Parameter

Parameter list includes default parameters and user-defined parameters. Parameter information will be displayed as below.

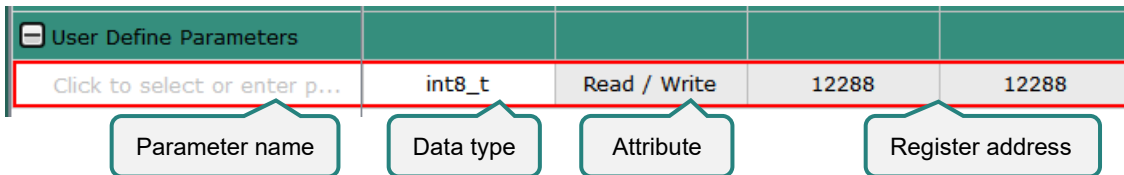


Figure 4.11.4.1 Parameter information

Default parameters are fixed and cannot be modified.

■ Parameter name

Users can click on parameter name field to select desired parameter.

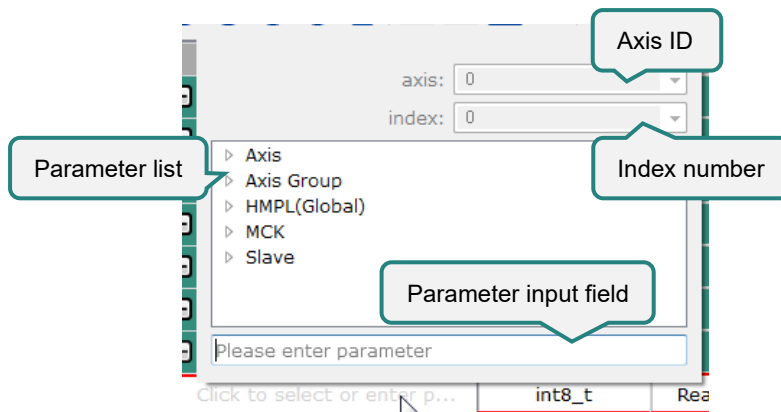


Figure 4.11.4.2 Select desired parameter

Set parameter by using axis ID, index number and parameter list, or directly input parameter in parameter input field.

Note: Parameter name can be cleared after parameter input field is cleared.

■ **Data Type**

Data type will be automatically set according to the selected parameter. Only when no parameter is selected, users are allowed to select data type from the drop-down list.

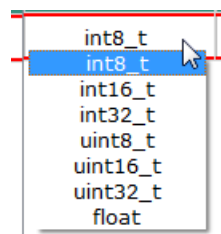


Figure 4.11.4.3 Data type selection

■ **Attribute**

Attribute will be automatically set according to the selected parameter.

Attribute: read / write and read-only

■ **Register address**

Register address will be automatically allocated according to the data type of the selected parameter.

4.11.5 Search for user-defined parameters

When using Modbus Configuration Manager, the user may use shortcut keys **Ctrl+F** to search for the user-defined parameters quickly.

Table 4.11.5.1 Shortcut keys

Shortcut key	Function
Ctrl + F	Open find and replace bar.
F3	Find next matched result

■ Find and replace bar



Figure 4.11.5.1 Find and replace bar

Table 4.11.5.2 Functions in find and replace bar

Icon	Description
Aa	Match case.
Ab	Find whole words only.
(*)	Regular expression.
↻	Continue to find from the start after reaching the end.
↓	Find in forward direction.
↑	Find in backward direction.
✕	Close find and replace bar.

4.11.6 Example

This example will show how to read the feedback position of axis 0 via Modbus TCP.

Step 1: Open Modbus Configuration Manager.

Step 2: Click on the icon indicated in figure 4.11.6.1 to add user-defined parameter.

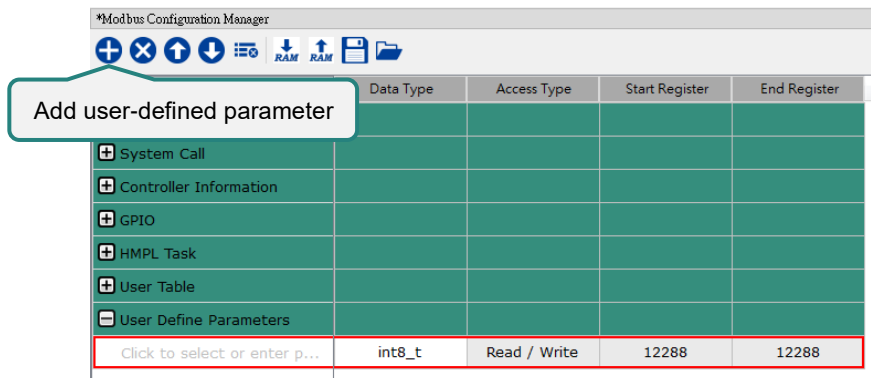


Figure 4.11.6.1 Add user-defined parameter

Step 3: Click on parameter name field to open parameter list. Select **Position Feedback** from parameter list and set **0** in axis field.

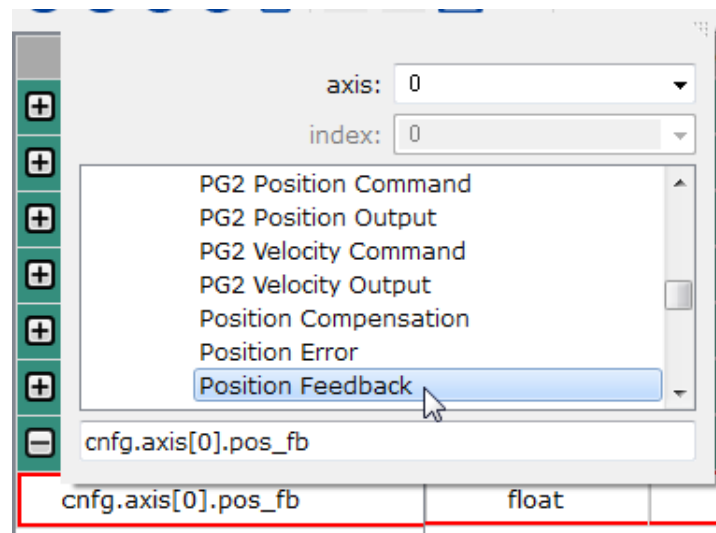


Figure 4.11.6.2 Parameter settings

Step 4: After parameter is set, click anywhere to close parameter list. The data type, attribute and register address of the selected parameter will be automatically set.

User Define Parameters				
cnfg.axis[0].pos_fb	float	Read	12288	12289

Figure 4.11.6.3 Parameter information

Step 6: Click on the icon indicated in figure 4.11.6.4 to save user-defined parameter to HIMC RAM. Read the specified register address via Modbus TCP to get the feedback position of axis 0.

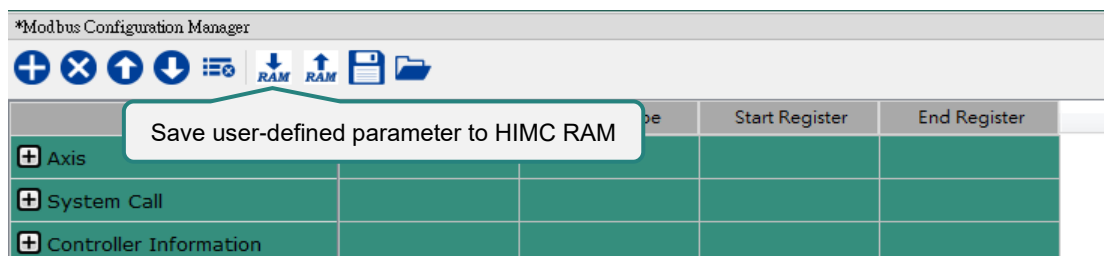


Figure 4.11.6.4 Save user-defined parameter to HIMC RAM

4.12 Table viewer

In Table Viewer, users can edit the User Table stored in controller RAM. User Table is used in HMPL, API library and Modbus communication. Functions in Table Viewer are as below:

- Read / Set the User Table stored in controller RAM
- Open / Save User Table data file (*.iasutd / *.txt)

4.12.1 Open table viewer

Step 1: Click on **Tools** on the menu bar. Then click on **Table Viewer**.

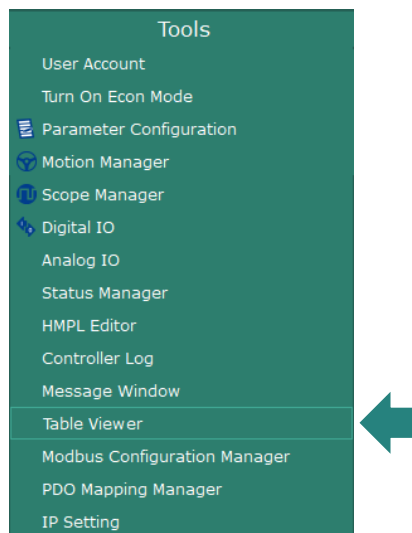


Figure 4.12.1.1 Table Viewer

Step 2: After **Table Viewer** is clicked on, a question dialog will appear, asking users if they would like to load the User Table from controller RAM or open User Table data file (*.iasutd).



Figure 4.12.1.2 Load the User Table from controller RAM or open User Table data file (*.iasutd)

(1) Click on **From controller RAM** button

Users can select to load the User Table from controller RAM in 1D or 2D table.

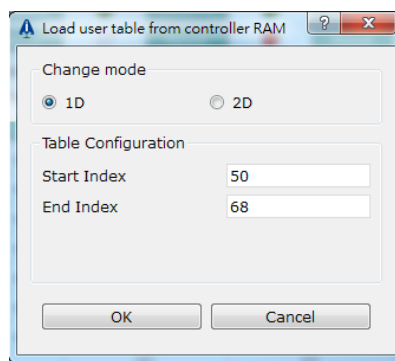


Figure 4.12.1.3 Load the User Table from controller RAM

(2) Click on **From file** button

Users can follow the steps below to open User Table data file (*.iasutd).

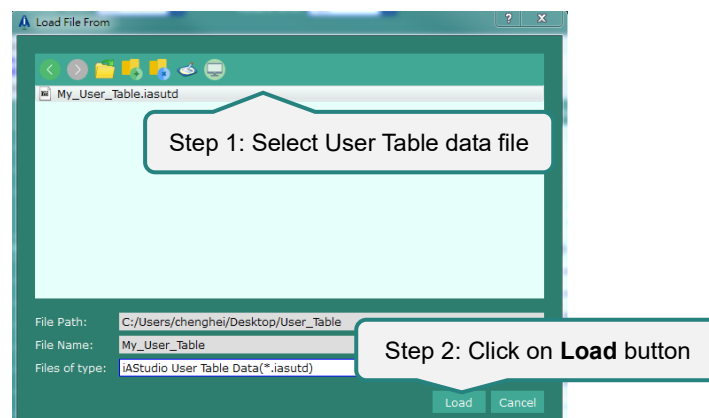


Figure 4.12.1.4 Open User Table data file

■ 1D Table Viewer window

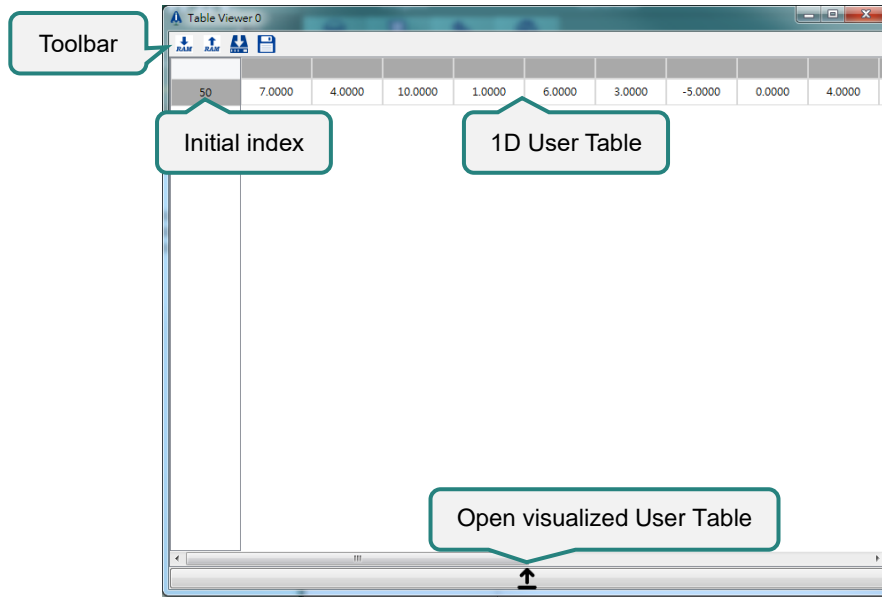


Figure 4.12.1.5 1D Table Viewer window

■ 2D Table Viewer window

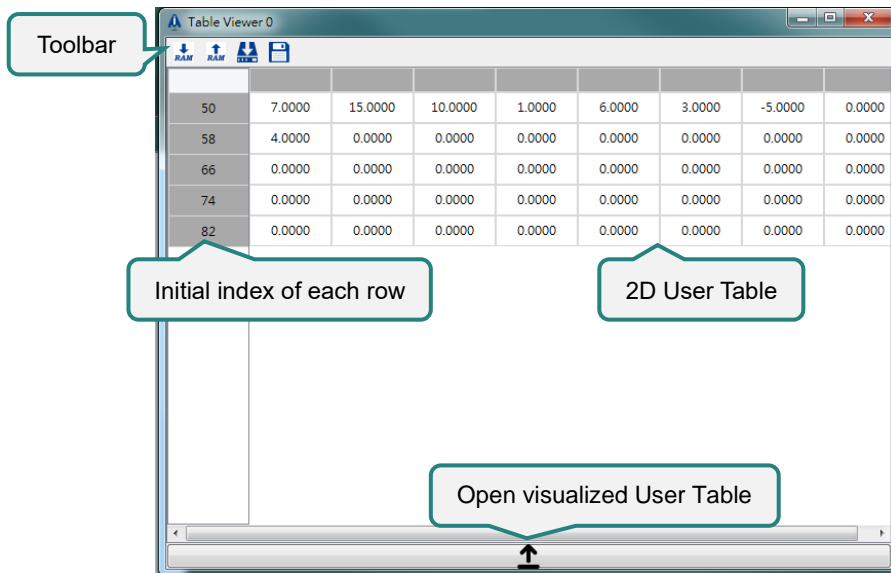







Figure 4.12.1.6 2D Table Viewer window

■ **Toolbar**

Table 4.12.1.1 Table Viewer toolbar

Icon	Description
	Save current User Table to controller RAM.
	Load the User Table from controller RAM.
	Save the User Table in controller RAM to controller SSD. When the User Table in Table Viewer is not identical with the User Table in controller RAM, this icon will be grey and cannot be used.
	Save current User Table as User Table data file or text file (*.iasutd or *.txt).
	Open visualized User Table. Press Space key to open or close visualized User Table.

4.12.2 Edit user table

■ **Modify the User Table in controller RAM**

Step 1: Load the User Table from controller RAM in 1D or 2D table. For how to load the User Table from controller RAM, please refer to step 2 in section 4.12.1.

Step 2: Click on the field to edit index in Table Viewer. When the field is yellow, it means it is editable.

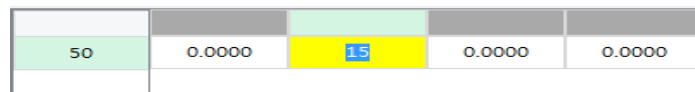



Figure 4.12.2.1 Click on the field to edit index

Step 3: Press **Enter** key to save the modified contents. At this time, the User Table in Table Viewer is not identical with the one in controller RAM. An asterisk will appear next to the window title. Icon  will be grey and cannot be used.

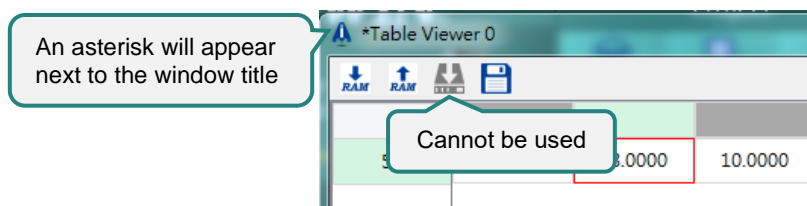



Figure 4.12.2.2 The User Table in Table Viewer is not identical with the one in controller RAM

Step 4: Click on  and a question dialog will appear, asking users if they would like to save current User Table to controller RAM. Click on **Yes** button to save current User Table to controller RAM.

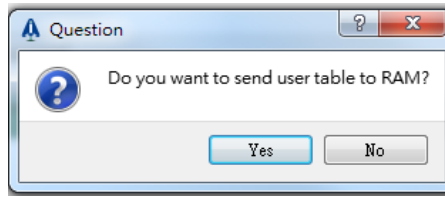



Figure 4.12.2.3 Save current User Table to controller RAM

Step 5: When the User Table in Table Viewer is identical with the one in controller RAM, the asterisk next to the window title will disappear and  becomes normal.

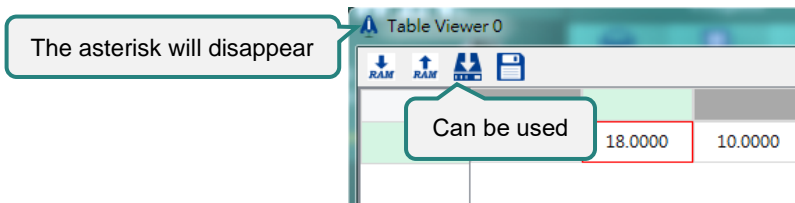



Figure 4.12.2.4 After User Table is saved to controller RAM

■ **Read the User Table in controller RAM**

Step 1: Click on , a question dialog will appear, asking users if they would like to load the User Table from controller RAM.

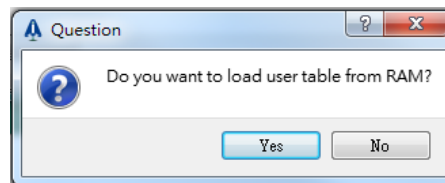


Figure 4.12.2.5 Load the User Table from controller RAM

Step 2: Click on **Yes** button to load the User Table from controller RAM.

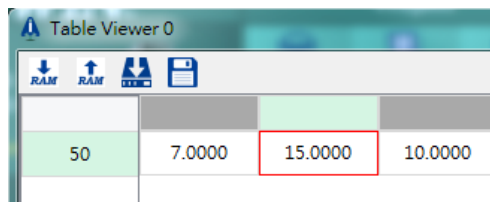



Figure 4.12.2.6 Load the User Table from controller RAM

■ **Save the User Table in controller RAM to controller SSD**

Click on  to save the User Table in controller RAM to controller SSD. The progress window will appear as below.

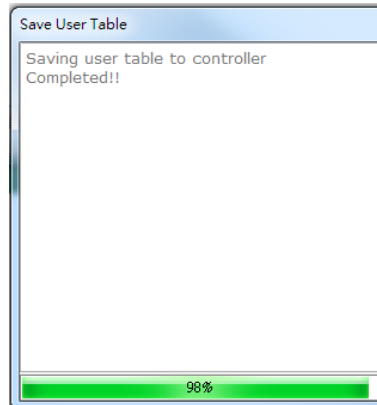



Figure 4.12.2.7 Save the User Table in controller RAM to controller SSD

■ **Save current User Table as User Table data file**

Click on  to save current User Table as User Table data file or text file. The saving window will appear as below.

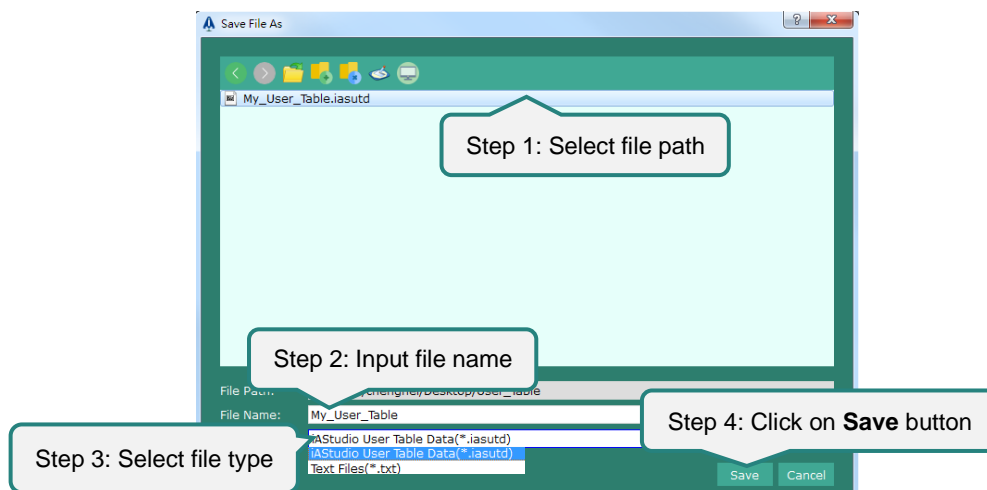


Figure 4.12.2.8 Save current User Table as User Table data file or text file

Note: Only User Table data file (*.iasutd) can be opened in Table Viewer.

■ Open visualized 1D / 2D User Table

Step 1: Click on  or press **Enter** key to open visualized User Table.

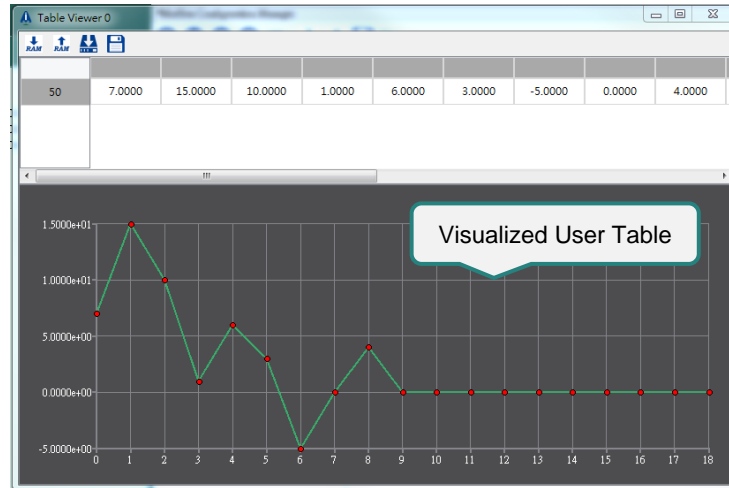


Figure 4.12.2.9 Open visualized User Table

Step 2: When index is modified, the visualized User Table will change accordingly.

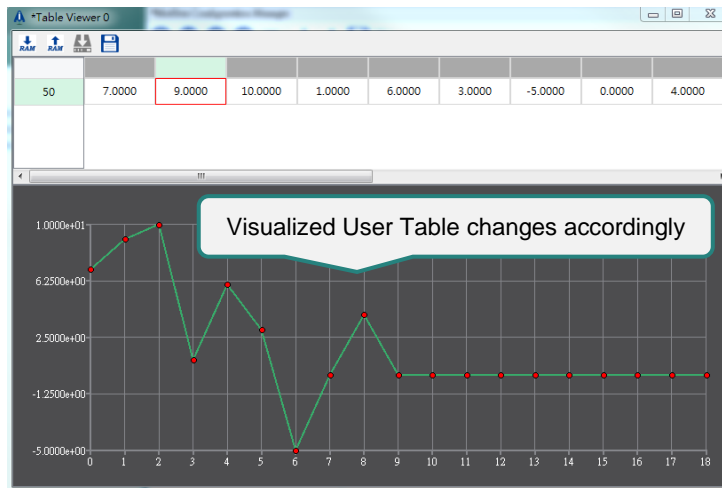


Figure 4.12.2.10 Visualized User Table changes accordingly

Step 3: When the cursor is moved to a red dot, the data of that red dot will be displayed.

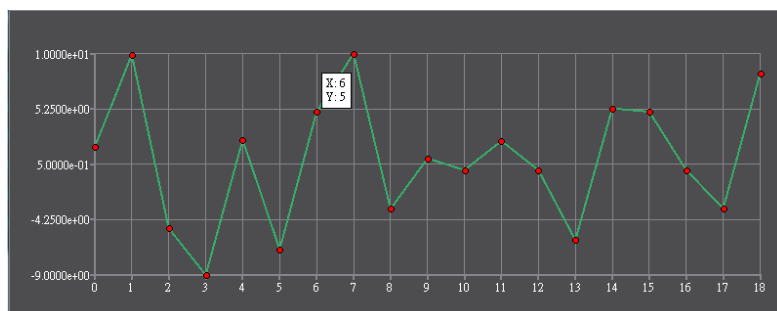


Figure 4.12.2.11 The data of the red dot is displayed

Step 4: Press and hold **Alt** key to display the data of all the red dots. Release **Alt** key to hide the data of all the red dots.

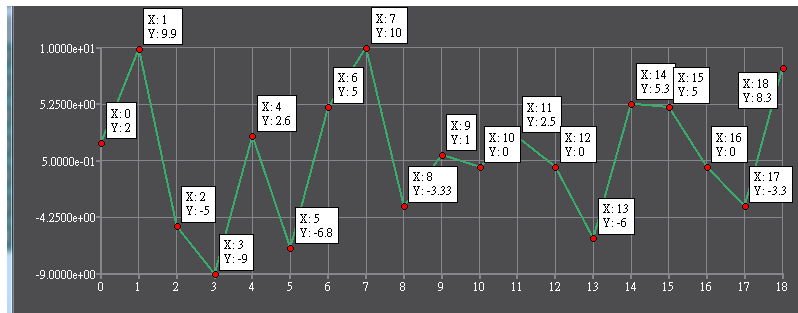


Figure 4.12.2.12 Press and hold **Alt** key to display the data of all the red dots

Step 5: Left click on a red dot to always display its data.

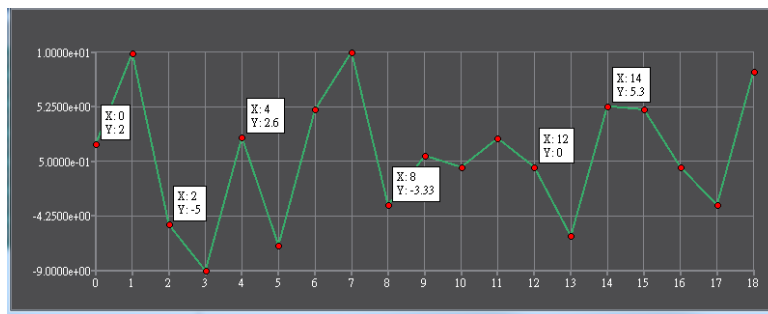


Figure 4.12.2.13 Left click on a red dot to always display its data

Step 6: Left click on the red dot again to hide its data or press **Esc** key to hide the data of all the red dots.

4.13 IP setting

In IP Setting, users can modify controller's CN3 IP Address, Native ASCII Port and User ASCII Port.

4.13.1 Open IP setting

To open IP Setting, click on **Tools** on the menu bar. Then click on **IP Setting**.

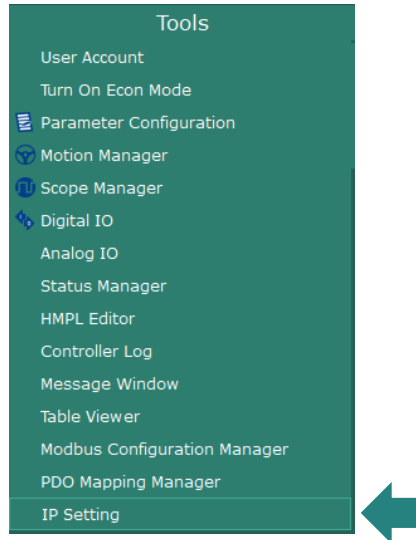


Figure 4.13.1.1 IP Setting

IP Setting window is as below.

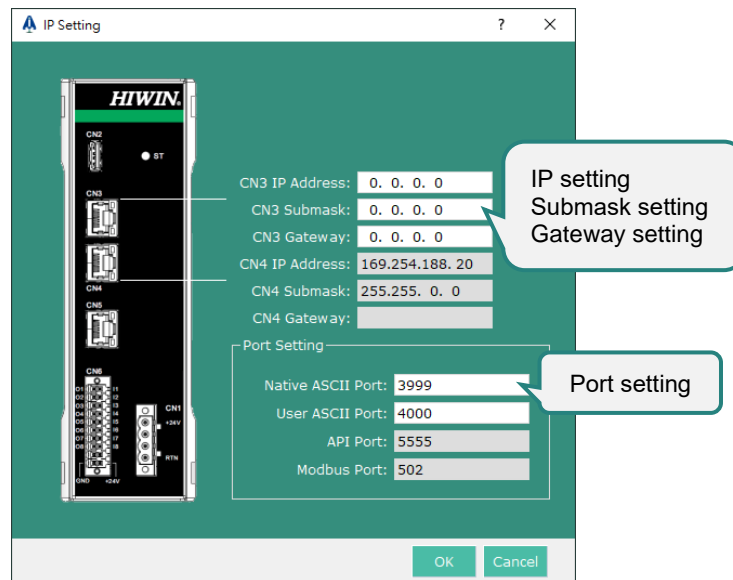


Figure 4.13.1.2 IP Setting window

Users can modify IP, Submask, Gateway setting and Port setting in IP Setting window. The fields display in grey cannot be modified. To apply the setting, click on **Controller** on the menu bar in main screen to execute **Store Configuration**, and click on **Reboot Controller** to reboot controller.

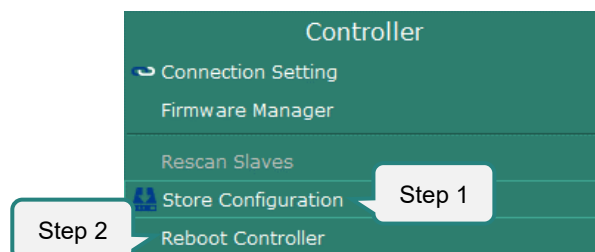


Figure 4.13.1.3 Store setting for application

4.14 PDO mapping manager

When developing a machine motion system, a user usually needs to read various drive physical parameters to fulfill requirements of motion. Therefore, iA Studio provides PDO mapping manager to allow the user to choose PDO objects to read or revise different drive physical parameters. PDO mapping manager makes it easier to develop a motion system.

4.14.1 PDO mapping manager

Step 1: Click on **Tools** on the menu bar. Then click on **PDO Mapping Manager**.

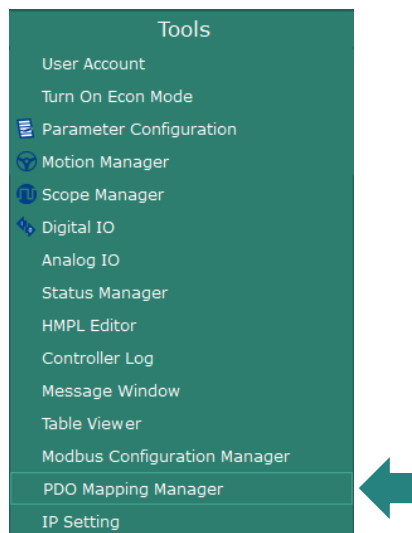


Figure 4.14.1.1 PDO Mapping Manager

Step 2: The PDO Mapping Manager window appears, as in figure 4.14.1.3.

If the firmware version is too old, an error message will appear to remind the user to upgrade the firmware to no less than version 1.3.

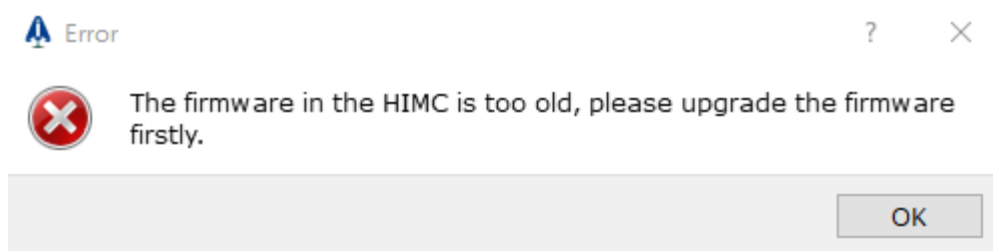


Figure 4.14.1.2 Error message reminds the firmware needs to be upgraded

PDO Mapping Manager window is opened successfully.

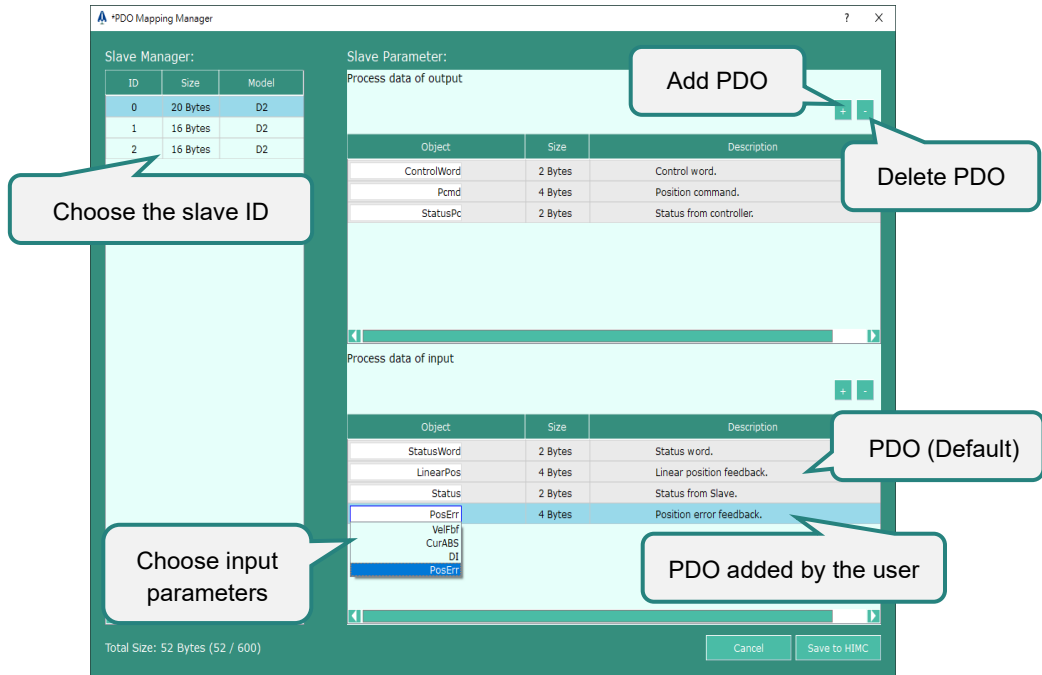


Figure 4.14.1.3 PDO Mapping Manager window

Step 3: You can choose the slave ID in the slave manager to show its PDO object setting, as can be seen in figure 4.14.1.4 and 4.14.1.5. Figure 4.14.1.4 shows the PDO object setting of **salve ID1** and 4.14.1.5 shows those of **slave ID2**.

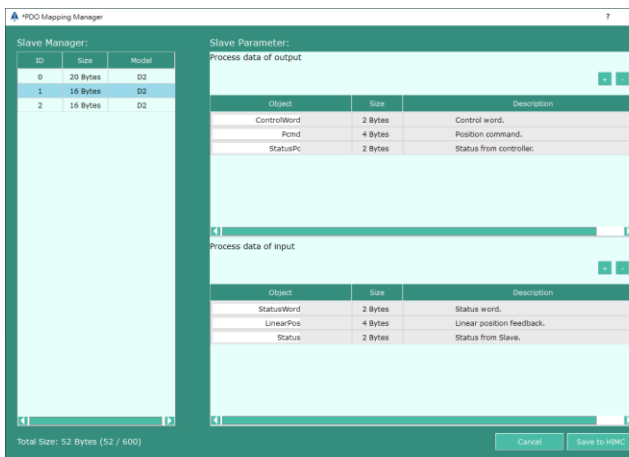


Figure 4.14.1.4 PDO setting of salve ID1

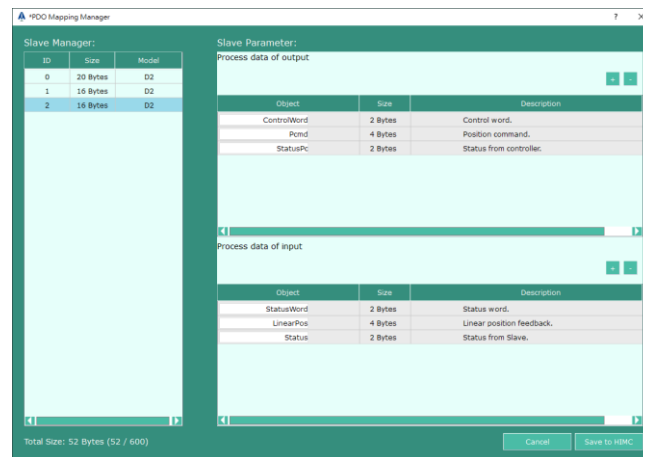


Figure 4.14.1.5 PDO setting of salve ID2

Step 4: Add or delete the PDO objects in the Process data of input, as shown in Figure 4.14.1.6.

First, choose the slave ID. By clicking on **+** above Process data of input, you can add a new PDO object. On the contrary, you can delete the PDO object by clicking on **-**. You can choose PDO objects from the drop-down menu in the **Object** column.

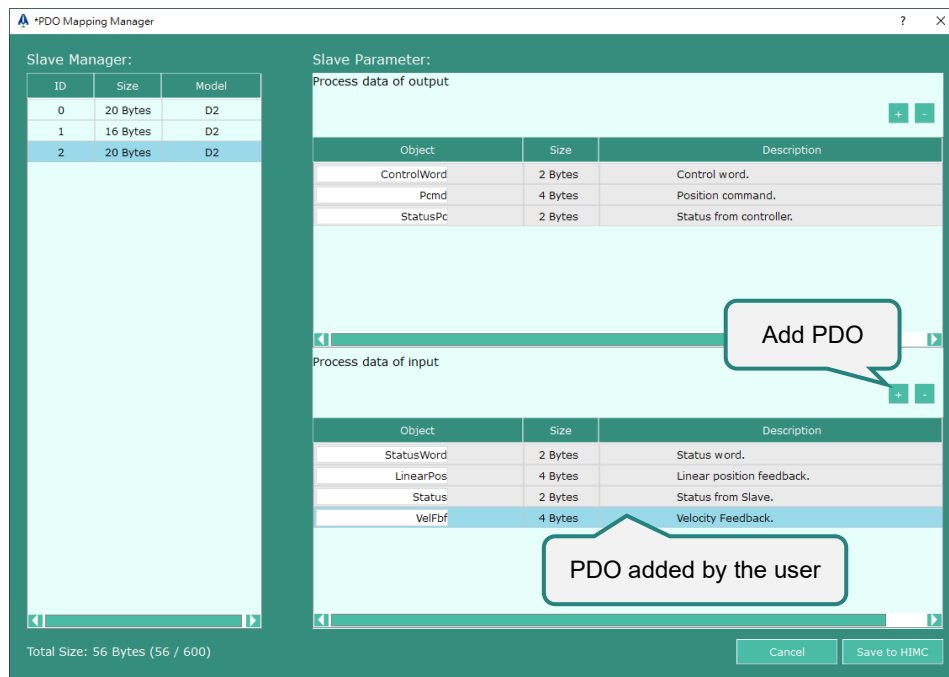


Figure 4.14.1.6 Add user-defined PDO objects

Step 5: After the PDO objects are added, deleted or revised, the following operations can be performed.

- (1) When **Cancel** is clicked, a warning will appear. The warning is to confirm with the user if the change needs to be saved. If you choose **Yes**, the Mapping Manager will be closed without saving. If you choose **No**, the warning will close and the user can continue previous editing.

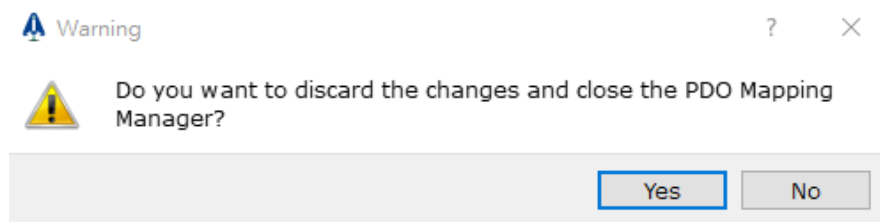


Figure 4.14.1.7 A warning appears when cancel is clicked

- (2) Click on **Save to HIMC** to save the change. If you choose **Yes**, the PDO new settings are confirmed and the connection will be synchronized with the new settings. If you choose **No**, setting changes will not be saved and the user can continue previous editing.

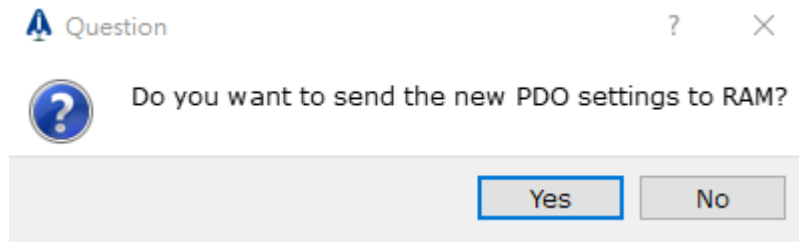


Figure 4.14.1.8 The message to confirm the PDO saving with the user

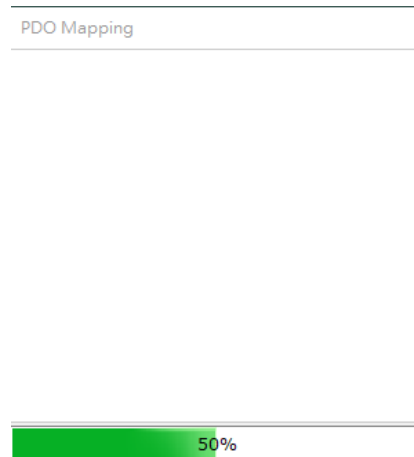


Figure 4.14.1.9 Synchronization of the connection with the new PDO setting

If the total size of PDO exceeds 600 Bytes, an error window will appear. At this time, delete some PDO objects and click on **Save to HIMC** again to make the connection be synchronized.

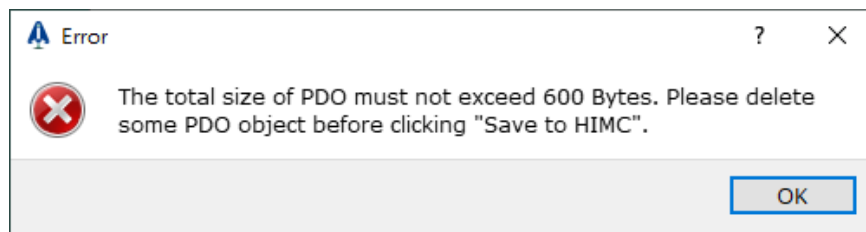



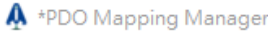




Figure 4.14.1.10 The total size of PDO exceeds 600 Bytes

4.14.2 Descriptions of operation and function

Table 4.14.2.1 Descriptions of operation and function

Icon	Description
	Add PDO objects in Process data of input. (No objects are allowed to be added in Process data of output)
	Delete PDO objects in Process data of input. (No objects are allowed to be deleted in Process data of output)
	In Process data of input and output, you can change the PDO objects from the drop-down menu. (Default PDO objects in gray background cannot be changed)
	An asterisk will appear on the title bar if PDO objects are revised.
	Click Cancel and choose Yes , the new PDO setting will not be saved and PDO Manager will be closed.
	Click Save to HIMC and choose Yes , the new PDO setting will be saved and will be synchronized with the connection.

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5. Appendix

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5.1 iA Studio error codes

This section lists all the error codes that may appear when using iA Studio, HIWIN controller, API and HMPL.

5.1.1 Controller error codes

The following error codes appear when an error occurs in the controller.

Table 5.1.1.1 Controller error codes

System Error Codes		
Error Code	Error Name	Description
0x00000001	eERR_HCV_ID_NOT_FOUND	The variable ID was not found.
0x00000002	eERR_DATA_EXCEEDED	The requested data is out of range.
0x00000003	eERR_HCV_IS_READ_ONLY	Read-only parameter.
0x00000004	eERR_HCV_VALUE_OUT_OF_RANGE	The input value is out of range.
0x00000064	eERR_EMERGENCY_STOP	Emergency stop activated. Disable all axes and stop all tasks.
0x000000ff	eERR_MOE_NOT_READY	MoE is not ready.
0x00000100	eERR_MAIL_BOX_BUSY	The mailbox between controller and slave is busy.
0x00000101	eERR_VAR_NOT_IN_SLV_DB	The slave variable was not found.
0x00000102	eERR_VAR_NOT_REGYET	The slave variable cannot be read.
0x00000103	eERR_READ_VAR_NO_RECV	There was no response from slave.
0x00000104	eERR_PREV_SLV_CMD_NOT_FIN	The previous command to slave is not finished.
0x00000105	eERR_SLV_ID_INVALID	The slave ID is invalid.
0x00000106	eERR_PDO_NUM_EXCEED	The number of PDO is out of range.
0x00000107	eERR_NOT_VALID_TASKID	The task ID is invalid.
0x00000108	eERR_TASK_IS_RUNNING	The task is already running.
0x00000109	eERR_FUNC_NOT_IN_TASK	The function was not found in task.
0x0000010a	eERR_TASK_EMPTY	The task is empty.
0x0000010b	eERR_TASK_NOT_RUNNING	The task is not running.
0x0000012c	eERR_NIC_INIT_TOUT	The network port of mega-ulink is not ready.
0x0000012d	eERR_HARDWARE_MISMATCH	The hardware is unrecognized.
0x0000012e	eERR_SLAVE_NUM_MISMATCH	The number of slaves is different from configuration.
0x0000012f	eERR_INVALID_PDO	The PDO is invalid.
0x00000130	eERR_INVALID_MCK_CNFG	The configuration of motion kernel is invalid.
0x00000136	eERR_MOE_SEND_FAIL	Fail to send mega-ulink packet.
0x00000137	eERR_MOE_RECV_FAIL	Fail to receive mega-ulink packet.
0x00000138	eERR_HIMC_LOAD_CONFIG_FAIL	Load configuration from SSD failed. Please save it again.
0x00000139	eERR_HIMC_SAVE_CONFIG_FAIL	Store configuration to HIMC failed. Please save it again.
0x0000013a	eERR_HIMC_SAVE_CONFIG_COPY_FAIL	Store configuration to HIMC failed. Cannot

System Error Codes		
Error Code	Error Name	Description
		save file into SAVE folder.
0x0000013b	eERR_HIMC_SAVE_UPDATE_PRM_TIMEOUT	Store configuration to HIMC failed. Update Prm values timeout.
0x000001f4	eERR_ISR_NOT_STABLE	The period of interrupt is not stable.
0x000001f5	eERR_MCK_OVERLOAD	The motion kernel is overloaded.
0x000001f6	eERR_ISR_OVERLOAD	The CPU is overloaded.
0x000001f7	eERR_MOE_ISR_NOT_STABLE	The period of interrupt is not stable in MoE.
0x000003e8	eERR_PP_MODE_NOT_SUPPORTED	The function is not supported in PP mode.
0x00001388	eERR_HMPL_INVALID_ARG	The arguments are invalid in HMPL.
0x00001389	eERR_HMPL_INVALID_PTR	The pointer is invalid in HMPL.
0x0000138a	eERR_HMPL_STACK_OVERFLOW	Stack overflow in HMPL.
0x0000138b	eERR_HMPL_ILLEGAL_MEM_OP	The operation of memory is illegal in HMPL.
0x0000138c	eERR_HMPL_MOTION_NOT_READY	Motion function should be called in synchronized state.
0x0000138d	eERR_HMPL_STR_TOO_LONG	String length is out of range.
0x0000138e	eERR_HMPL_INVALID_STR_FORMAT	String format is invalid.
0x0000138f	eERR_HMPL_ARG_OUT_OF_RANGE	The argument is out of range.
0x00001392	eERR_HMPL_ASCII_AGENT_RUNNING	ASCII agent is already running. Multiple ASCII agents can not be run at the same time.
0x0000139c	eERR_HMPL_CANNOT_RUN_IN_DEBUG	The function cannot run in debug mode.
0x000013a6	eERR_HMPL_TOO_MANY_BRK_POINT	There are too many break points in the task.
0x000013ec	eERR_HMPL_MUTEX_LOCK_TWICE	Cannot lock the same mutex twice in the same task.
0x00001450	eERR_HMPL_INVALID_SYS_TIME_MEMORY	Buffer too small, minimum size must be 30 Byte.
0x00001451	eERR_HMPL_NOT_SUPPORTED	This HMPL function not supported for this platform.
0x00001452	eERR_HMPL_CLIENT_NOT_CONNECTED	Cannot send as client disconnected.
0x0000176f	eERR_HMPL_INTERNAL_ERROR	HMPL internal error.
0x00001770	eERR_HMPL_EXEC_FAILED	HMPL function execution failed.
0x00001771	eERR_HMPL_ASM_LOAD_FAILED	HMPL compilation failed, assembly file empty or not generated.
0x00001772	eERR_HMPL_STARTTASK_TIMEOUT	HMPL StartTask function timeout.
0x00001773	eERR_HMPL_STOPTASK_TIMEOUT	HMPL StopTask function timeout.
0x000017d4	eERR_ASCII_CONNECT_TIMEOUT	ASCII client connection timeout.
0x000017d5	eERR_ASCII_CONNECT_FAILED	ASCII client connection failed. Please check ip and port.
0x000017d6	eERR_ASCII_MULTI_CONNECTING	Multiple ASCII clients connecting in the same time.
0x000017d7	eERR_ASCII_MULTI_DISCONNECTING	Multiple ASCII clients disconnecting in the same time.
0x000017d8	eERR_ASCII_DISCONNECT_TIMEOUT	ASCII client disconnection timeout.
0x000017de	eERR_ASCII_RECV_TIMEOUT	ASCII client receive timeout. Please try again later.
0x000017df	eERR_ASCII_RECV_FAIL	ASCII client receive failed. Please check if the connection is still alive.
0x000017e0	eERR_ASCII_MULTI_RECVING	Multiple ASCII clients receiving in the same time.
0x000017e8	eERR_ASCII_SEND_TIMEOUT	ASCII client send timeout. Please try again

System Error Codes		
Error Code	Error Name	Description
		later.
0x000017e9	eERR_ASCII_SEND_FAIL	ASCII client send failed. Please check if the connection is still alive.
0x000017ea	eERR_ASCII_MULTI_SENDING	Multiple ASCII clients sending in the same time.
0x00001838	eERR_MODBUS_CONNECT_TIMEOUT	Modbus client connection timeout.
0x00001839	eERR_MODBUS_CONNECT_FAILED	Modbus client connection failed. Please check ip.
0x0000183a	eERR_MODBUS_MULTI_CONNECTING	Multiple Modbus clients connecting in the same time.
0x0000183b	eERR_MODBUS_MULTI_DISCONNECTING	Multiple Modbus clients disconnecting in the same time.
0x0000183c	eERR_MODBUS_DISCONNECT_TIMEOUT	Modbus client disconnection timeout.
0x0000183d	eERR_MODBUS_DATALENGTH_ERR	Modbus client's read/write data number exceeds the limitation.
0x0000183e	eERR_MODBUS_SOCKET_BUSY	Modbus client deals with two or more commands in the same time.
0x0000183f	eERR_MODBUS_JOB_TIMEOUT	Modbus client job execution timeout. Please try again later.
0x00001840	eERR_MODBUS_JOB_FAIL	Modbus client job execution failed. Please check if the connection is still alive.

Note: "MoE" is the abbreviation for "mega-ulink over EtherCAT".

5.1.2 API error codes

The following error codes appear when accessing the controller by API.

Table 5.1.2.1 API error codes

API Error Codes		
Error Code	Error Name	Description
0x01000000	eERR_API_COMM_ERR	An error occurred when communicating with the controller.
0x0100000a	eERR_API_CONNECT_FAIL	Cannot connect to controller.
0x01000014	eERR_API_TOUT	This operation returned because the time-out period expired.
0x0100001e	eERR_API_ACCESS_REJECT	The request was rejected.
0x01000028	eERR_API_FIFO_MISMATCH	Fatal API error.
0x01000032	eERR_API_FIFO_FULL	The network is busy.
0x0100003c	eERR_API_HIMC_NOT_READY	The himc is not ready.
0x01000046	eERR_API_PROTOCOL_MISMATCH	Fatal API error.
0x01000050	eERR_API_INPUT_ARG_ERR	The arguments are invalid.
0x0100005a	eERR_API_NOT_SUPPORT	The API is not supported for this version.
0x01000064	eERR_API_BUSY	The API is busy.
0x0100006e	eERR_API_FILE_TRANS_FAIL	The file transmission failed.
0x01000078	eERR_API_ID_NOT_FOUND	The connection ID was not found, maybe not connected yet.
0x01000082	eERR_API_SLV_DB_NOT_READY	The slaves are not ready.
0x0100008c	eERR_API_SLV_ID_INVALID	The slave ID is invalid.
0x01000096	eERR_API_INVALID_VAR_ID	The variable ID is invalid.
0x010000a0	eERR_API_VAR_VAL_OUT_OF_RANGE	The value is out of range.
0x010000aa	eERR_API_FS_ACCESS_DENIED	Unable to access file system, please check your permission.
0x010000b4	eERR_API_TASK_ID_INVALID	The task ID is invalid.
0x010000be	eERR_API_TASK_EMPTY	The task is empty.
0x010000c3	eERR_API_TASK_FUNC_NOT_FOUND	Cannot find the function.
0x010000c8	eERR_API_TASK_NOT_RUNNING	The task is not running.
0x010000d2	eERR_API_TASK_IS_RUNNING	The task is already running.
0x010000d7	eERR_API_TOO_MANY_BRK_POINT	There are too many break points in the task.
0x010000dc	eERR_API_INVALID_ERROR_ID	The error ID is invalid.
0x010000e6	eERR_API_INSUFFICIENT_BUFFER	Insufficient buffer.
0x010000f0	eERR_API_STR_TOO_LONG	String length is out of range.
0x000000fa	eERR_API_HIMC_VERSION_MISMATCH	The API is not compatible with this controller version.
0x010003e8	eERR_API_MOTION_ERROR	Motion control error. Please check error log.
0x0100270f	eERR_API_FATAL	Fatal API error.

5.1.3 Motion control error codes

■ General

The following error codes appear for invalid motion command or controller fails to execute motion command.

Table 5.1.3.1 Motion control error codes: general

General		
Error Code	Error Name	Description
0x8000006e	eERR_MCK_UNKNOWN_CMD	Unknown command name.
0x80000078	eERR_MCK_INVALID_CMD	The command is invalid in current context.
0x80000082	eERR_MCK_INVALID_AXIS_ID	Axis ID is out of allowable range.
0x8000008c	eERR_MCK_INVALID_AXIS_GRP_ID	Axis group ID is out of allowable range.

■ Axis Group

The following error codes appear due to an error or invalid operation in an axis group. Symbols □□ will be the axis group ID in hexadecimal format. e.g.: 01: axis group 1, 0f: axis group 15.

Table 5.1.3.2 Motion control error codes: axis group

Axis Group Error Codes		
Error Code	Error Name	Description
0x82□□000a	eERR_CRD_CMD_UNKNOWN	The axis group command is unknown.
0x82□□0028	eERR_CRD_CMD_AXIS_DUPLICATED	Could not add the axis since it's already in the group.
0x82□□0032	eERR_CRD_CMD_GRP_SIZE_EMPTY	The axis group is empty.
0x82□□003c	eERR_CRD_CMD_GRP_SIZE_FULL	The axis group is full and can't hold any more axis.
0x82□□0046	eERR_CRD_CMD_INVALID_MOVING	The command is invalid while the axis group is moving.
0x82□□0050	eERR_CRD_CMD_INVALID_DISABLED	The command is invalid while the axis group is disabled.
0x82□□005a	eERR_CRD_CMD_INVALID_INPUTSHAPING_PARAMETER_INCOMPLETE	The parameters of axis group inshape function is incomplete.
0x82□□001e	eERR_CRD_CMD_INVALID_KIN_SETTING	The kinematics type setting is invalid.
0x82□□001f	eERR_CRD_CMD_INVALID_SPECIFIC_KIN	The command is invalid when axis group is in specific kinematics type.
0x82□□006e	eERR_CRD_CMD_INVALID_STATE	The axis group is unable to execute the command in current motion state.
0x82□□0078	eERR_CRD_CMD_QUEUE_FULL	Please wait till the last command is done.
0x82□□00d2	eERR_CRD_CMD_INVALID_POS	The axis group target position or orientation is out of allowable range.
0x82□□00dc	eERR_CRD_CMD_INVALID_LIN_VEL	The linear velocity setting of axis group is out of allowable range.
0x82□□00e6	eERR_CRD_CMD_INVALID_LIN_ACC	The linear acceleration setting of axis group is out of allowable range.
0x82□□00f0	eERR_CRD_CMD_INVALID_LIN_DEC	The linear deceleration setting of axis group is out of allowable range.

Axis Group Error Codes		
Error Code	Error Name	Description
0x82□□00fa	eERR_CRD_CMD_INVALID_LIN_JERK	The linear jerk setting of axis group is out of allowable range.
0x82□□0104	eERR_CRD_CMD_INVALID_LIN_SM_TIME	The linear smooth time setting of axis group is out of allowable range.
0x82□□010e	eERR_CRD_CMD_INVALID_DAMPINGRATIO	The damping ratio setting of axis group is out of allowable range.
0x82□□0118	eERR_CRD_CMD_INVALID_FREQUENCY	The frequency setting of axis group is out of allowable range.
0x82□□0140	eERR_CRD_CMD_INVALID_ANG_VEL	The angular velocity setting of axis group is out of allowable range.
0x82□□014a	eERR_CRD_CMD_INVALID_ANG_ACC	The angular acceleration setting of axis group is out of allowable range.
0x82□□0154	eERR_CRD_CMD_INVALID_ANG_DEC	The angular deceleration setting of axis group is out of allowable range.
0x82□□015e	eERR_CRD_CMD_INVALID_ANG_JERK	The angular jerk setting of axis group is out of allowable range.
0x82□□0168	eERR_CRD_CMD_INVALID_ANG_SM_TIME	The angular smooth time setting of axis group is out of allowable range.
0x82□□0190	eERR_CRD_CMD_INVALID_VEL_SCALE	The velocity scale of axis group is out of allowable range.
0x82□□019a	eERR_CRD_CMD_INVALID_TRANS_VEL	The transition velocity of axis group is invalid.
0x82□□01a4	eERR_CRD_CMD_INVALID_TRANS_DIS	The transition distance of axis group is invalid.
0x82□□01b8	eERR_CRD_CMD_TRANS_MODE_UNKNOWN	The path transition mode name is unknown.
0x82□□01c2	eERR_CRD_CMD_COORD_SYS_UNKNOWN	The coordinate system is unknown.
0x82□□01cc	eERR_CRD_CMD_BLEND_MODE_UNKNOWN	The path blending mode name is unknown.
0x82□□01fe	eERR_CRD_CMD_LIN_INVALID_PARAM	The parameters are invalid for linear path planning.
0x82□□0262	eERR_CRD_CMD_CIRC_INVALID_PARAM	The parameters are invalid for circular path planning.
0x82□□026c	eERR_CRD_CMD_CIRC_INVALID_CENTER	The center position of circular path is too close to start / end point.
0x82□□0276	eERR_CRD_CMD_CIRC_ANGLE_SMALL	The central angle of circular path is too small.
0x82□□0280	eERR_CRD_CMD_CIRC_INVALID_RADIUS	The radius of circular path is invalid.
0x82□□028a	eERR_CRD_CMD_CIRC_INVALID_COORD	The coordinate system of circular path is invalid.
0x82□□02c6	eERR_CRD_CMD_BEZIER_INVALID_PARAM	The parameters are invalid for Bezier curve path planning.
0x82□□02d0	eERR_CRD_CMD_BSPLINE_INVALID_PARAM	The parameters are invalid for BSpline curve path planning.
0x82□□02da	eERR_CRD_CMD_CURVE_INVALID_START_POS	The start position is invalid for curve path planning.
0x82□□03f2	eERR_CRD_AXIS_ABNORMALLY_DISABLED	One or more axes in the axis group are abnormally disabled.
0x82□□03fc	eERR_CRD_AXIS_SWL	One of the axis in axis group touches software limit.

■ Axis

The following error codes appear due to an error or invalid operation in an axis. Symbols □□ will be the axis ID in hexadecimal format. e.g.: 01: axis 1, 0f: axis 15.

Table 5.1.3.3 Motion control error codes: axis

Axis Error Codes		
Error Code	Error Name	Description
0x83□□000a	eERR_AXIS_CMD_UNKOWN	The command name is unknown.
0x83□□001e	eERR_AXIS_CMD_QUEUE_FULL	Axis command queue is full.
0x83□□0064	eERR_AXIS_CMD_INVALID_STATE	The axis is unable to execute the command in current motion state.
0x83□□006e	eERR_AXIS_CMD_INVALID_ENABLED	The command is not allowed while enabled.
0x83□□0078	eERR_AXIS_CMD_INVALID_DISABLED	The command is not allowed while disabled.
0x83□□0082	eERR_AXIS_CMD_INVALID_MOVING	The axis is unable to execute the command while moving.
0x83□□008c	eERR_AXIS_CMD_INVALID_STOPPING	The command is invalid when axis stops moving.
0x83□□0096	eERR_AXIS_CMD_INVALID_ERROR_STATE	The command is invalid when axis is in ErrorStop state.
0x83□□00a0	eERR_AXIS_CMD_INVALID_IN_SYNC	The command is invalid when axis is in synchronized motion state.
0x83□□00aa	eERR_AXIS_CMD_INVALID_GEAR_MASTER	The command is invalid when axis is the gear master axis.
0x83□□00b4	eERR_AXIS_CMD_INVALID_PP_MODE	The command is invalid when axis is in PP mode.
0x83□□00c8	eERR_AXIS_CMD_INVALID_INPUTSHAPING_ENABLED	The axis is unable to execute the command when position command shaping function is activated.
0x83□□00d2	eERR_AXIS_CMD_INVALID_COMP_ENABLED	The axis is unable to execute the command when dynamic compensation is enabled.
0x83□□00dc	eERR_AXIS_CMD_INVALID_GANTRY_MODE	The axis is unable to execute the command in gantry mode.
0x83□□00e6	eERR_AXIS_CMD_INVALID_GROUPED	The command is not allowed when axis is in an axis group.
0x83□□012c	eERR_AXIS_CMD_INVALID_PARAMETER	The parameter of axis command is invalid.
0x83□□0136	eERR_AXIS_CMD_INVALID_POS	Axis target position is out of allowable range.
0x83□□0140	eERR_AXIS_CMD_INVALID_VEL	Axis velocity setting is out of allowable range.
0x83□□014a	eERR_AXIS_CMD_INVALID_ACC	Axis acceleration setting is out of allowable range.
0x83□□0154	eERR_AXIS_CMD_INVALID_DEC	Axis deceleration setting is out of allowable range.
0x83□□015e	eERR_AXIS_CMD_INVALID_JERK	Axis jerk setting is out of allowable range.
0x83□□0168	eERR_AXIS_CMD_INVALID_SM_TIME	Axis smooth time setting is out of allowable range.
0x83□□0172	eERR_AXIS_CMD_INVALID_KILL_DEC	Axis kill deceleration setting is out of allowable range.
0x83□□017c	eERR_AXIS_CMD_INVALID_VEL_SCALE	Axis velocity scale setting is out of allowable range.
0x83□□0190	eERR_AXIS_COMP_NOT_CNFG	Axis dynamic compensation settings have not been configured properly.
0x83□□01c2	eERR_AXIS_CMD_INVALID_MASTER_SLAVE_CONNECTION	Master-slave relationship setting is invalid.
0x83□□01cc	eERR_AXIS_CMD_INVALID_SLAVE_ID	Slave ID setting is invalid.

Axis Error Codes		
Error Code	Error Name	Description
0x83□□01d6	eERR_AXIS_CMD_INVALID_GEAR_RATIO	The gear ratio setting of slave axis is out of allowable range.
0x83□□01f4	eERR_AXIS_CMD_INVALID_ROLLOVER_POS	Invalid axis rollover position, should be a positive value.
0x83□□03f2	eERR_AXIS_DRIVE_FAULT	The drive has reported a fault. Please check the corresponding error message in the drive.
0x83□□03fc	eERR_AXIS_DRIVE_ABNORMAL_DISABLE	The drive is abnormally disabled.
0x83□□0406	eERR_AXIS_DRIVE_ENABLE_TOUT	It took too long to enable the drive.
0x83□□0410	eERR_AXIS_DRIVE_CLEAR_ERROR_TOUT	It took too long to clear drive error.
0x83□□041a	eERR_AXIS_DRIVE_DISABLE_TOUT	It took too long to disable the drive.
0x83□□0456	eERR_AXIS_VEL_LIMIT	The reference velocity has exceeded the velocity limit.
0x83□□0460	eERR_AXIS_ACC_LIMIT	The reference acceleration has exceeded the acceleration limit.
0x83□□046a	eERR_AXIS_CURR_LIMIT	The current command has exceeded the current limit.
0x83□□0474	eERR_AXIS_DAMPINGRATIO_LIMIT	The damping ratio setting of axis is out of allowable range.
0x83□□047e	eERR_AXIS_FREQUENCY_LIMIT	The frequency setting of axis is out of allowable range.
0x83□□07da	eERR_AXIS_SWRL	Axis reference position reached right software limit.
0x83□□07e4	eERR_AXIS_SWLL	Axis reference position reached left software limit.
0x83□□07ee	eERR_AXIS_HWRL	Axis right hardware limit signal triggered.
0x83□□07f8	eERR_AXIS_HWLL	Axis left hardware limit signal triggered.
0x83□□0802	eERR_AXIS_COMP_LIMIT	Axis compensation position has exceeded maximum compensation limit.
0x83□□083e	eERR_AXIS_PERR	Axis position error has exceeded the protection limit. Please first check if there is any mechanical interference for motor motion.
0x83□□0848	eERR_AXIS_VERR	Axis velocity error has exceeded the protection limit. Please first check if there is any mechanical interference for motor motion.
0x83□□08a2	eERR_AXIS_PVT_MOTION_VEL_LIMIT	Velocity of axis PVT motion has exceeded the protection limit. Please first check if the given parameters are valid.
0x83□□08ac	eERR_AXIS_PVT_MOTION_ACC_LIMIT	Acceleration of axis PVT motion has exceeded the protection limit. Please first check if the given parameters are valid.
0x83□□08b6	eERR_AXIS_PVT_MOTION_INVALID_TIME	Time sequence of axis PVT motion is invalid. Please first check if the given parameters are valid.
0x83□□0bb8	eERR_AXIS_CTRL_ERR	Axis internal control error.
0x83□□0fa0	eERR_AXIS_CMD_GEAR_DISABLED	Gear command is not allowed while gear is disabled.

■ Master-slave communication

The following error codes appear due to a communication error between controller and slave. Symbols □□ will be the slave ID in hexadecimal format. e.g.: 01: slave 1, 0f: slave 15.

Table 5.1.3.4 Motion control error codes: master-slave communication

Master-slave Communication		
Error Code	Error Name	Description
0x84□□000a	eERR_SLAVE_MAILBOX_NO_RES	The mailbox is not responding.
0x84□□0014	eERR_SLAVE_DB_INIT_FAIL	The initialization of slave database has failed.
0x84□□001e	eERR_SLAVE_PRM_MISMATCH	The configuration in slave has been modified.
0x84□□0028	eERR_SLAVE_FIRM_MISMATCH	The type or firmware of slave is different from original configuration.
0x84□□0032	eERR_SLAVE_VAR_INVALID	The slave variable is invalid.
0x84□□003c	eERR_SLAVE_PDO_INVALID	The PDO setting is invalid.
0x84□□0046	eERR_SLAVE_PDO_NUM_EXCEED	The number of PDO is out of range.
0x84□□0050	eERR_SLAVE_MAIL_BOX_BUSY	The mailbox is busy.
0x84□□005a	eERR_ETA3_PRM_MISMATCH	ETA3 Axis/DIO/AIO count mismatch during rescan.
0x84□□0064	eERR_ETA3_AO_BIND_PHY_VAR	ETA3 analog output is bound to controller variable.
0x84□□006e	eERR_ETA3_SLOT_INDEX_INVALID	ETA3 slot index is out of range.
0x84□□0078	eERR_ETA3_AO_INDEX_INVALID	ETA3 analog output channel is out of range.
0x84□□0082	eERR_ETA3_AI_INDEX_INVALID	ETA3 analog input channel is out of range.
0x84□□008c	eERR_ETA3_AI_TYPE_INVALID	ETA3 analog input type is invalid.
0x84□□0096	eERR_ETA3_GPI_MODULE_NOT_EXIST	ETA3 digital input module does not exist on the slot.
0x84□□00a0	eERR_ETA3_GPO_MODULE_NOT_EXIST	ETA3 digital output module does not exist on the slot.
0x84□□00aa	eERR_ETA3_AI_MODULE_NOT_EXIST	ETA3 analog input module does not exist on the slot.
0x84□□00b4	eERR_ETA3_AO_MODULE_NOT_EXIST	ETA3 analog output module does not exist on the slot.