ISMC Servo PC software
User Guide

Version Records

Date	Version	Details
2018-10	V1.0	Release 1st edition
2019-04	V1.1	The zeroing method describes the change
2019-10	V1.2	Some features have been added
2020-04	V1.3	Product photo updates
2020-10	V1.61	Version 1.61 was released
2020-12	V1.63	Version 1.63 was released
2021-04	V1.64	Version 1.64 was released
2021-10	V1.66	Version 1.66 was released
2022-04	V1.66	Added some function descriptions, updated some screenshot descriptions
2022-10	V1.66	Added some function descriptions, updated some screenshot descriptions

Contents

Introduction

Purpose of writing

The purpose of this manual is to fully describe the functions that can be achieved by the servo Tuningsoftware ISMC, so that users can understand the correct use of the servo Tuningsoftware ISMC.

The users of this software are mainly installation and Tuningpersonnel and scientific researchers who use servo for motor control.

System Overview

Our auto-developed servo tuning software ISMC, through USB serial communication, can realize the user on the PC to monitor the servo drive lower computer system. The existing main functions include:

- Parameter configuration and modification
- Tuning of controller parameters
- Motion control
- Real-time system status monitoring
- Troubleshooting and Error Log
- Post-Upgrade Maintenance

Full-text overview

The content of this article is organized as follows:

Chapter 1 introduces the ISMC software, driver installation process;

Chapter 2 introduces the functions of each menu in the main interface of ISMC;

Chapter 3 describes how to connect the ISMC to the Servo Drive;

Chapter 4 describes the configuration of each parameter of the servo drive through ISMC;

Chapter 5 introduces the tools used for Tuning PID parameters, oscilloscope and function generator, as well as the tuning methods and steps for current loop, Speed loop and position loop PID parameters;

Chapter 6 introduces the way ISMC controls motor motion;

Chapter 7 introduces the handling methods and solutions for system failures;

Chapter 8 introduces ISMC software settings, including user permissions, window layout, and hotkey functions;

Chapter 9 introduces ISMC's upgrade and restore factory settings operations for the drive, as well as ISMC's copyright notice.

Chapter 1 Software installation

1.1 System Requirements

System environment requirements for installing and running ISMC;

- Memory: 2 GB or more (3.5 GB or more if running on a virtual machine)
- Display: 800x600 or more
- System type: 32-bit or 64-bit Windows 7/Windows 8/Windows 10
- Processor: 1.6GHZ or more

1.2 Software installation

1.2.1 Installation

The ISMC installation process is as follows:

①Download the program installation package from the official website.

②Double-click the .exe application file, open the ISMC ready to install interface, wait for the completion of decompression, pop-up installation

The installation screen is shown in Figure 1-1.

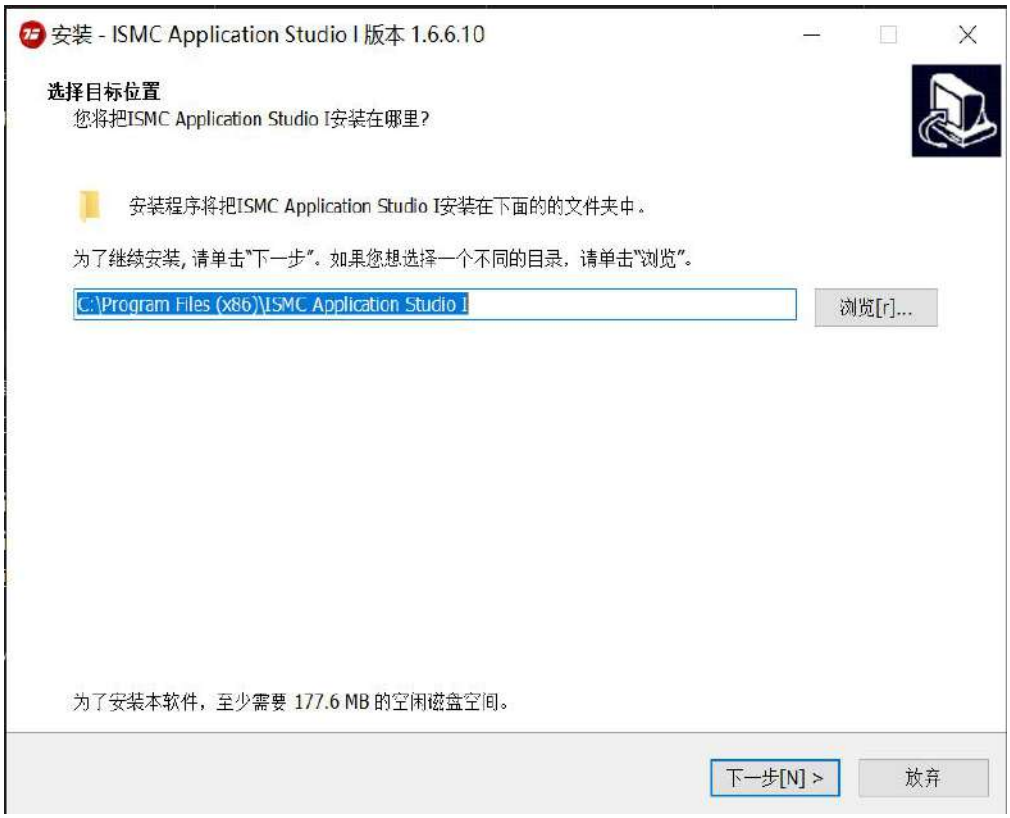

Figure 1-1 Install ISMC

③Click "**Next**" to bring up the additional task selection interface, as shown in Figure 1-2.

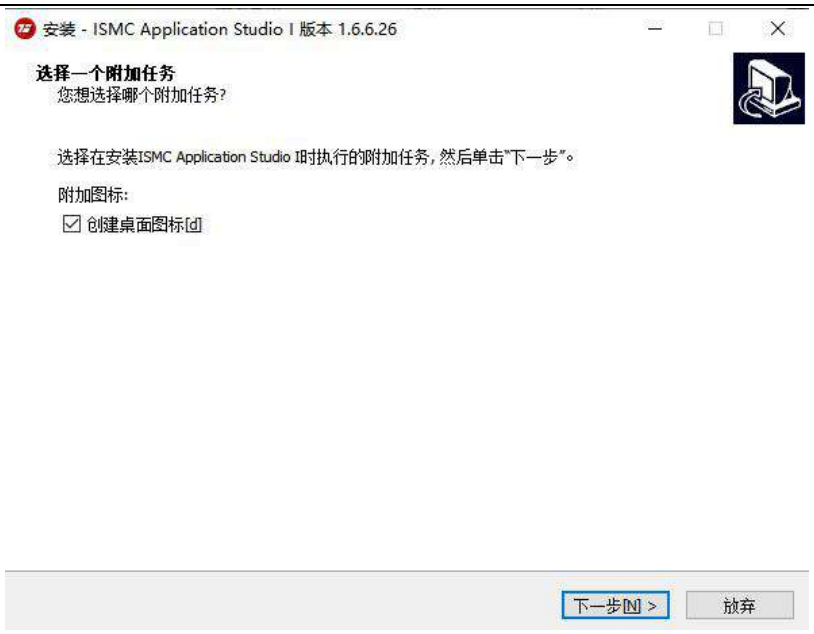

Figure 1-2 Start the installation

④Click "**Next**" to prepare to start the installation, as shown in Figure 1-3.

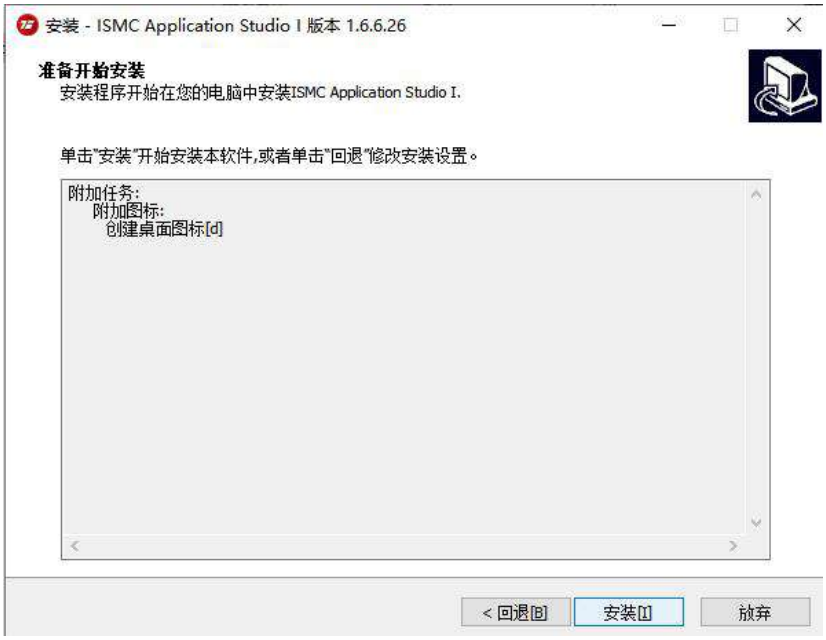

Figure 1-3 Start installation

⑥Click "**Install**" and the software will start to install, as shown in Figure 1-4. Wait for the installation to complete, the interface shown in Figure 1-5 will pop up, click "Finish" to exit the installation interface and complete the installation of ISMC.

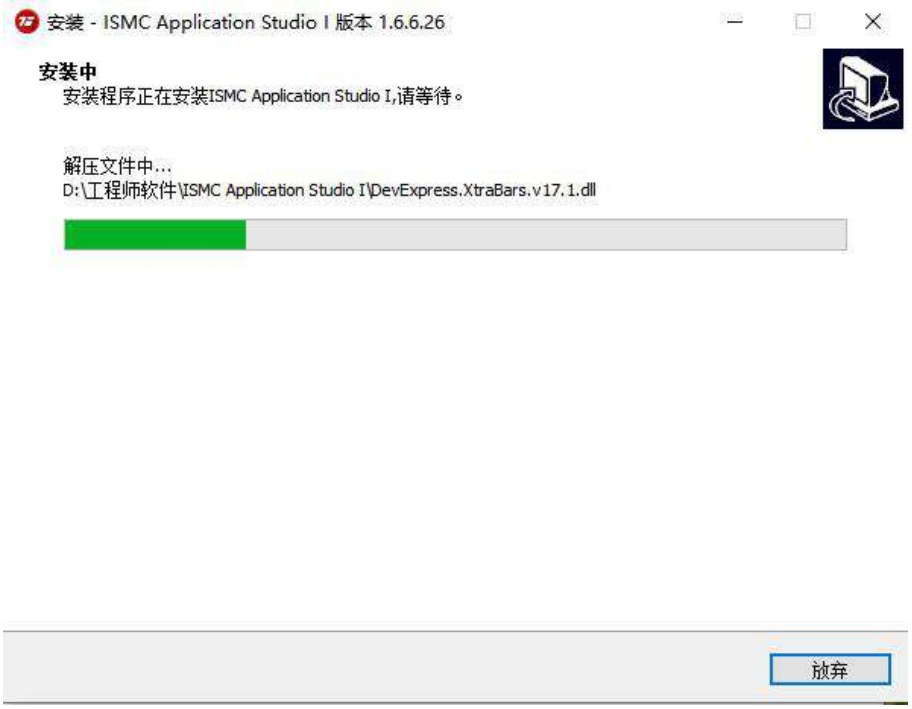

Figure 1-4 being installed

Figure 1-5 End of installation

⑦After installation, a shortcut to the ISMC software will be created in the "**Desktop**" "**Start**" "**All Programs**" menu of your computer.As shown in Figure 1-6.

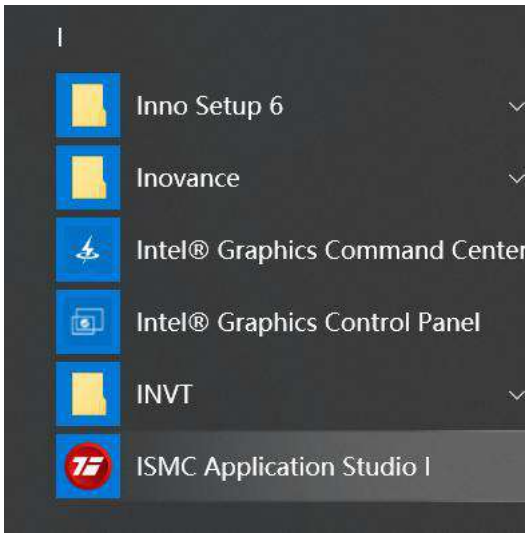

Figure 1-6 Start menu file

1.2.2 Uninstallation

The ISMC unloading process is as follows:

①Open the program management interface through "**My Computer**" "**Control Panel**" "**Programs**" "Programs and Features", as shown in Figure 1-7.

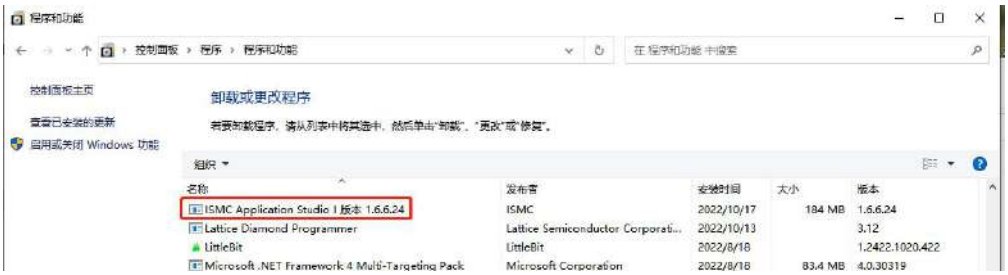

Figure 1-7 Open the program management interface

②Select the ISMC program and choose "**Uninstall**" to bring up the uninstallation interface, as shown in Figure 1-8.

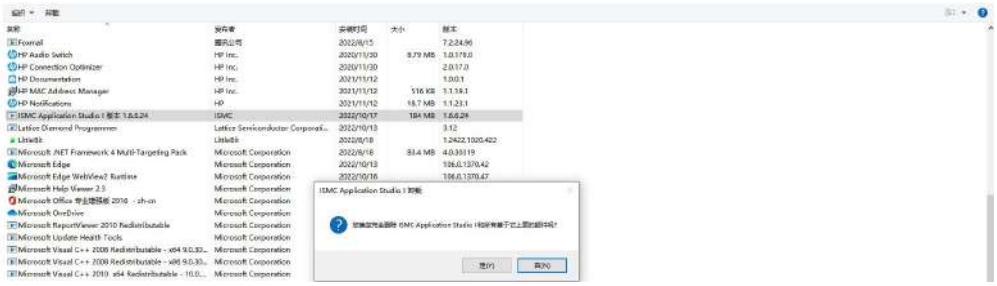

Figure 1-8 Confirm uninstallation

③ Click "**Yes**", wait for the uninstallation progress bar to complete, that is, the uninstallation is successful.

1.2.3 Upgrade

To upgrade ISMC software, you need to download from the official website or contact the technician to get the latest version of the application file, uninstall the old version of ISMC and then reinstall the latest version of ISMC.

1.3 Driver Installation

When using USB communication for the first time, you need to install the USB driver (Windows 10 system will automatically install the driver after connecting the USB cable). The following is an example of Windows 7 system to introduce the driver installation process:

①Connecting the host computer and the servo driver using the USB data cable shows that the driver has failed to be installed automatically. As shown in Figure 1-9.

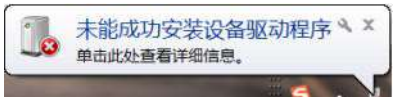

Figure 1-9 Unsuccessful driver installation

②Open the Windows main menu and right-click on "**Computer**".

Figure 1-10 Windows Main Menu

③Click "**Manage**" to open the Computer Management window.

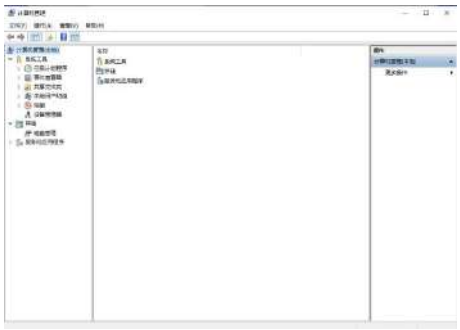

Figure 1-11 Computer Management Window

④Select "**Device Manager**" and find the unrecognized device Virtual COM Port in "**Other Devices**".

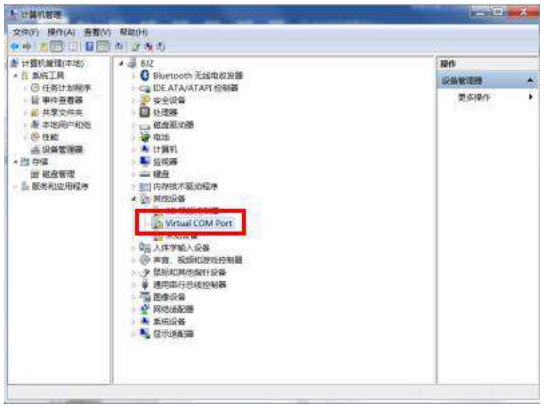

Figure 1-12 Device Manager

⑤Right-click Virtual COM Port and select "Update Driver Software".

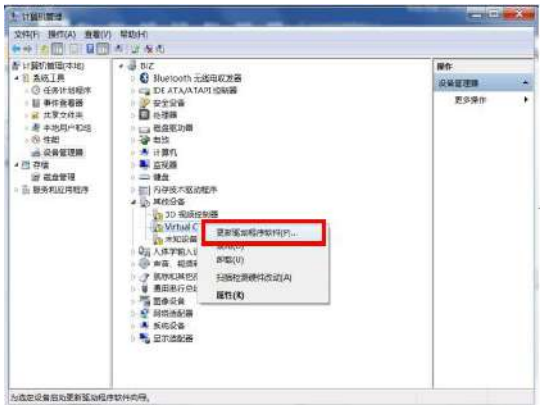

Figure 1-13 Update driver software

⑥Select "**Browse your computer for driver software**".

Figure 1-14 Find Driver Software

⑦Click "**Browse**", find and select the driver folder **windows_drivers** in the ISMC installation directory.

Default path:C:\Program Files(x86)\ ISMC Application Studio I\Files\windows_drivers.

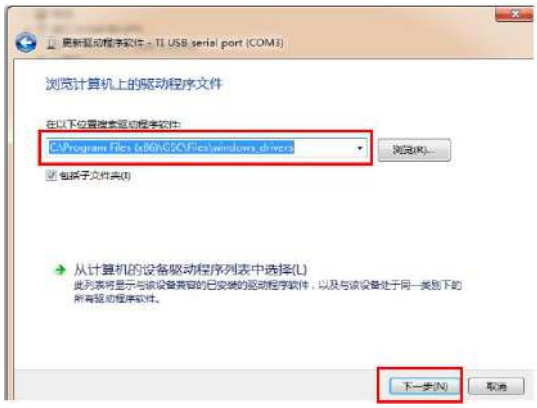

Figure 1-15 Browse the driver installation path

⑧Click "**Next**" to install, and in the security warning window that pops up, select "**Always install this driver software**".

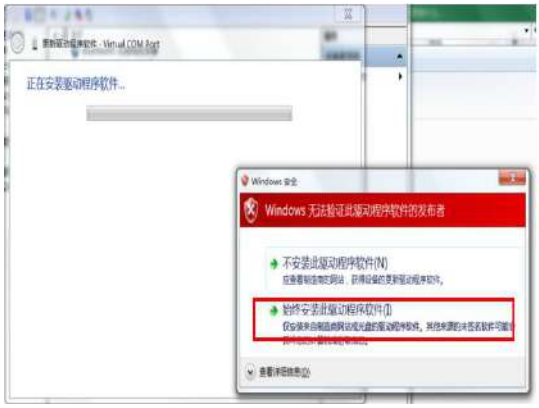

Figure 1-16 Security warning screen

⑨Driver installation is completed.

Figure 1-17 Driver installation completed

⑩If you are unable to successfully install the driver, please contact a technician for support.

Chapter 2 Software Interface

2.1 Software Window Introduction

After the software installation is completed, find the  (upper computer software program icon) on the desktop, double click to open it, and the main interface is shown in Figure 2-2-1.

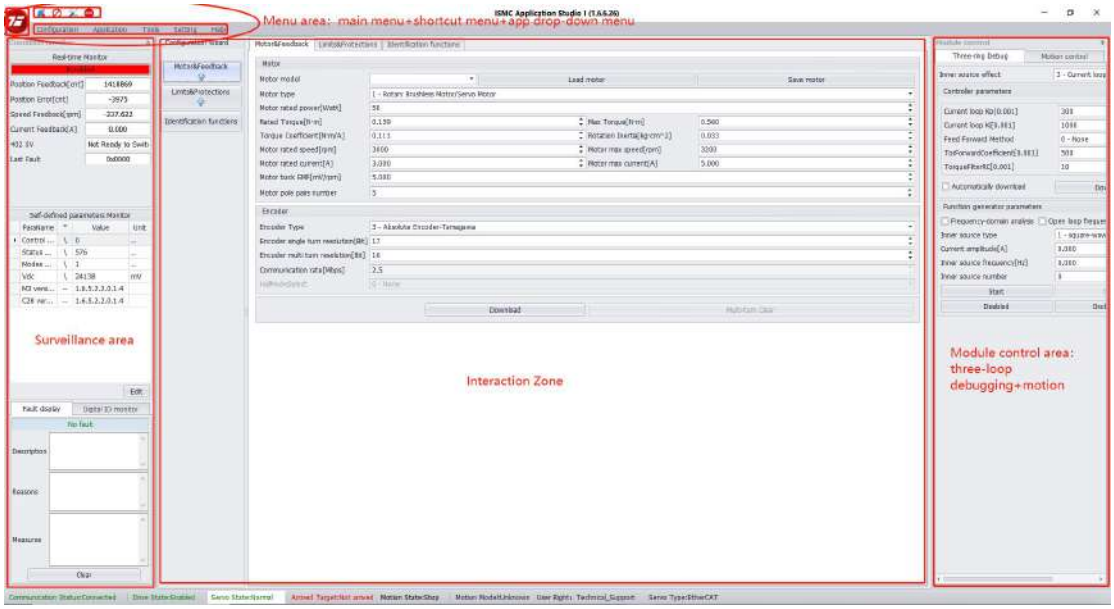

Figure 2-2-1 Software interface

The main interface is divided into 5 zones, namely menu zone, monitoring zone, status zone, interaction zone, and module control zone.

- Menu area: The user mainly selects the corresponding module function through the menu button to achieve different functions. Including the connection with the servo, configuration of parameters and some tools needed to be used are selected and called in the menu area. The detailed functions of the menu area are described in Table 2-1 Main Menu List.
- monitoring area: Users can monitor the motion monitoring window, digital IO monitoring window, parameter monitoring window, fault alarm window monitoring parameters, etc. in the monitoring area.
- Status area: real-time display of current status of communication, drive, servo, etc.
- Interaction area: After the user selects different function modules, the parameters are mainly configured and the motion commands are sent in the interaction area.
- Module control area: users can perform three-loop Tuning and four Models of motion control on the servo motor. Status area: real-time display of the current

communication, drive, servo and other status.

2.2 Main Menu List

Under the main menu, there are sub-menus of Configuration, Application, Tools, Settings, and Help in order, through which each window is called out to achieve different functions. The functions that users can achieve through the main menu are shown in Table 2-1 Main Menu List.

Table 2-1 Main Menu List

Main Menu	Submenu		Icons	Function Description
Configuration	Communication			Connections
				Disconnection
	Parameters Number Configuration Configuration	Parameter Configuration		Configuration motor parameters
		Limiting protection		Configure limit protection parameters
		User Units		Select motion control unit
Applications	Brake			Holding parameters to be configured after using the holding function in digital IO
	Digital IO			Digital input and output functions through configuration
	Soft Landing			Soft landing function through configuration
	Duty Cycle Input			Duty cycle Model through configuration
	Frequency output			Use Frequency output function by checking Use Frequency output and configuring parameters
	Fully closed loop			Full closed loop functionality by configuring encoder type
	Collision Detection			Collision detection function by configuring collision conditions

	Position comparison output		This function is achieved by checking the position comparison output enable and pulse width parameters, etc.
Tools	Oscilloscope		Acquisition of parameters and analysis of waveforms
	Parameter Editor		Edit all parameters of the servo
	Error Log		View historical failure logs
Settings	User permission settings		Set user rights and open different levels of functions
	Hotkey settings		Setting hotkey combinations
	Firmware Upgrade		Upgrade of C28, M3 files
	Restore factory settings		Restore the factory settings of the servo
	Language selection		Can switch between Chinese and English interface
Help	User Manuals		Open ISMC User Manual
	About		About the software and the company

2.3 Function button

The function buttons are divided into two parts, one is the parameter configuration operation, which reads and writes the overall parameters between PC, RAM and EEPROM; the other part is the use of quick commands during motion control, including enable, disable, restart servo, clear fault and emergency stop commands.

2.3.1 Parameter Operation

The path where the servo saves the parameters is divided into RAM and EEPROM.

■RAM：The parameters used by the servo currently displayed and running will disappear after power failure and will not be saved.

■EEPROM：Parameters saved inside the servo, which do not disappear after a power failure and take effect after a restart.

To facilitate the configuration of parameters, the ISMC has the ability to export the

generated .txt file from the RAM to a local folder and to import parameters from the local folder into the RAM. See Table 2-2 for details of the parameter operations.

Table 2-2 Parameter operation

Lcons	Function	Description
	Import	From the local folder, import the parameter file into the servo's RAM.
	Export	Export the parameters from the RAM and save the .txt file to a folder
	Communication Settings	USB communication port can be more selectable
	Upload	Uploading parameters from RAM to the servo's interactive area display
	Download	Download the modified parameters of the interactive area interface into RAM
	Exit	Closes this programafterprompting you to save unsaved data

2.3.2 Shortcut commands

Form 2-3 Shortcut commands

Lcons	Function	Description
	Enabled	The servo is enabled and motion control is only possible when it is enabled.
	Disabled	Disable the servo, motion control is not possible in the disabled state.
	Clear errors	After troubleshooting, clear the alarms from the upper unit software.
	Scram	In the event of an emergency during the movement of the motor, the movement can be stopped immediately.

2.4 Status monitoring and display

The status display on the upper computer software interface is divided into two main sections: the monitoring window in the monitoring area, which can be retrieved from the "**Tools**" submenu of the main menu, is used to monitor changes in various parameters; the status display bar at the bottom of the interface is fixed and shows the current status of the system.

2.4.1 Real-time monitoring

The motion monitoring window provides real-time feedback on the current motion status of the motor, including servo enable and disable, motion position feedback, speed feedback, current feedback, etc.position feedback, speed feedback, current feedback, etc., as shown in Figure 2-2.

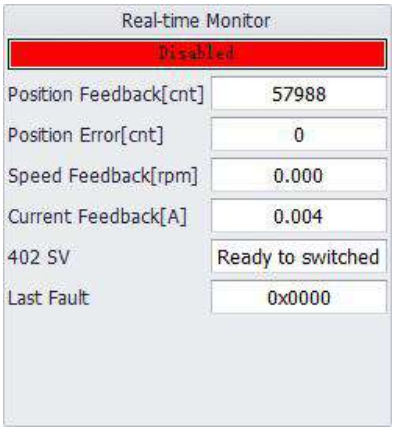

Figure 2-2 Motion monitoring

2.4.2 Digital IO monitoring

After the user has used the digital IO function, the digital IO monitoring window can be brought up to view the current input or output status of the IO function, as shown in Figure 2-3.

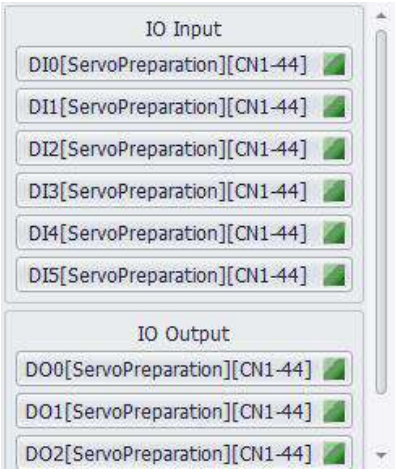

Figure 2-3 Digital IO monitoring

2.4.3 Self-defined paramenters monitor

Once you have opened the parameter monitoring window, you can set the parameter to be monitored and then view the real-time feedback on that parameter in the parameter monitoring window, as shown in Figure 2-4.

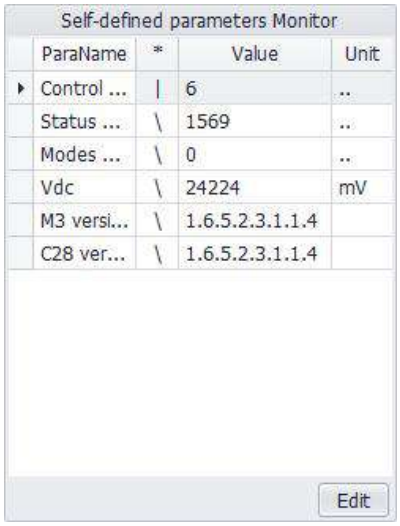

Figure 2-4 Parameter monitoring

The user can customise the parameters via the "**Edit**" button, as follows:

①Click on the "**Edit**" button to open the parameter monitoring window settings, as shown in Figure 2-5.

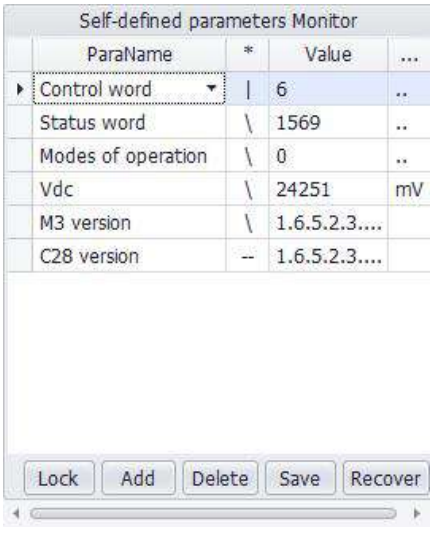

Figure 2-5 Parameter monitoring

②Click on "**Add**" to add a parameter to the list in the parameter monitoring window that is empty by default, as shown in Figure 2-6.

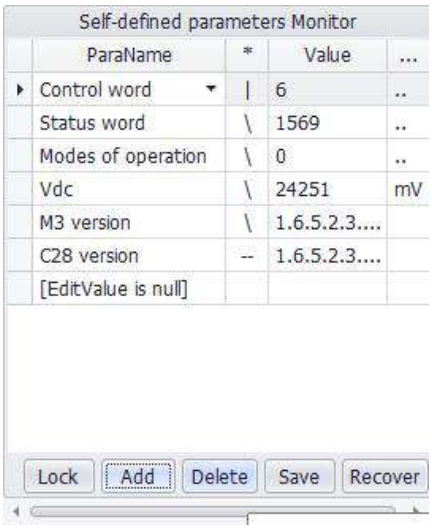

Figure 2-6 Adding monitoring parameters

③Click to select an empty parameter, open the parameter list, find and click on the parameter to be monitored through the drop-down slider or according to the parameter name and index value "**Find**", to complete the addition of the monitored parameter, as shown in Figure 2-7.

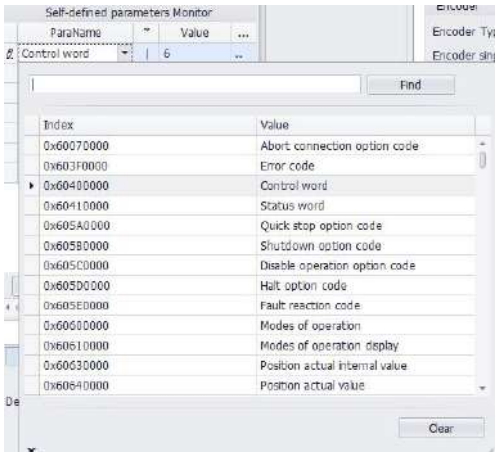

Figure 2-7 Selecting monitoring parameters

④If there is a parameter that you do not want to monitor, select it and click "**Delete**".

⑤Once you have added and deleted the monitored parameters, click on "**Save**" to save the settings of the current monitored parameters as the default monitored parameters. Restore the monitored parameters to their saved values by using "**Restore**".

⑥Click on "**Lock**" to exit the settings of the monitoring parameters window.

Chapter 3 Communication connections

Before the host computer control software can control the servo, a communication connection between the two needs to be established. The host computer is connected to the servo via a USB cable and then the communication connection is established through the configuration of the host computer software. Once the communication connection is complete, subsequent parameter configuration and motion control can be carried out. The software of the host computer establishes the communication connection in the following steps:

①Confirm that the USB driver has been installed, please refer to the chapter 1.3 Driver Installation for the driver installation tutorial.

②Connect the host computer to the drive using a USB cable (Micro type B).

③Select the "**Configuration**" submenu in the main menu, and tap to view the communication settings window, as shown in Figure 3-1.

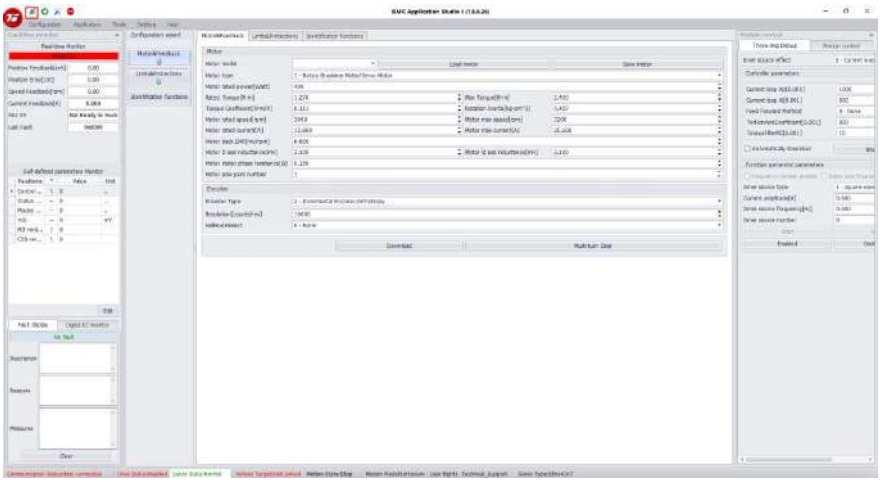

Figure 3-1 Communication settings window

④Click on the "**Refresh Port**" button and in the "**Port**" drop-down box, you can see the port number that has been connected, as shown in Figure 3-2. If the "**Port**" is not displayed, the reason may be that the USB driver is not installed or the USB cable is not connected correctly, please recheck whether the driver is installed correctly or the USB cable is connected properly.

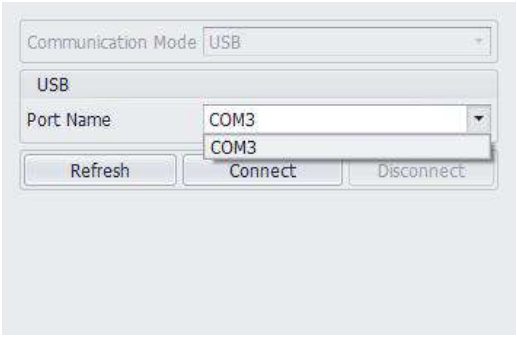

Figure 3-2 Refreshing the port

⑤Select the port number to connect to the drive.

⑥Click on the "**Connect**" button to complete the communication connection.

⑦After successful connection, you can see the status feedback of successful connection on the interface, as shown in Figure 3-3.

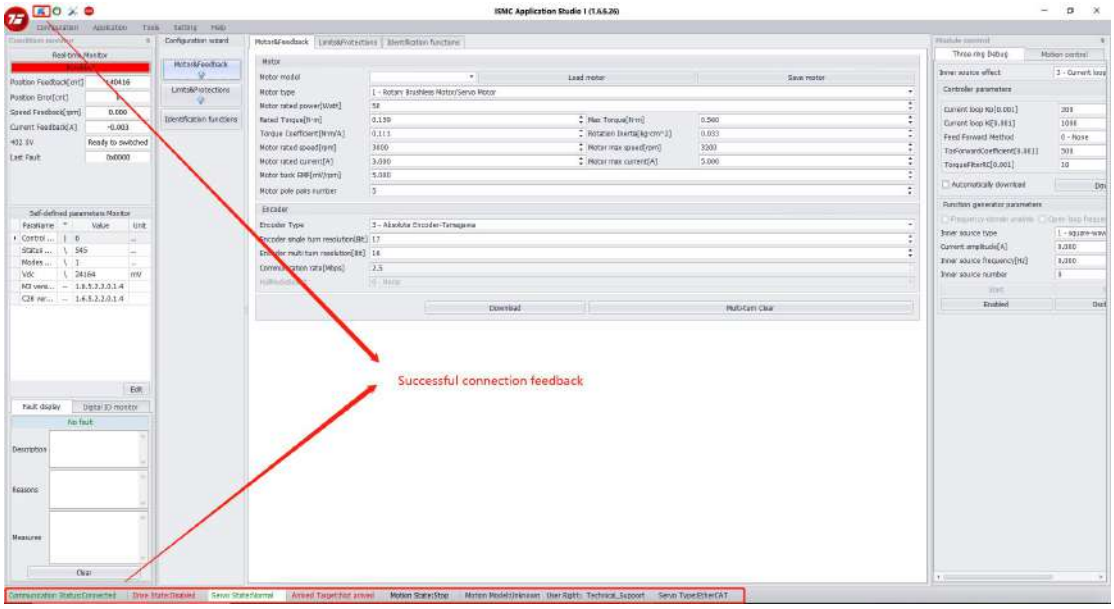

Figure 3-3 Successful connection

Note: Before the servo drive is powered on or restarted by power failure, the connection between the host software and the servo drive needs to be disconnected and the USB data cable unplugged, otherwise the host software will not recognise the connection port and the servo drive cannot be connected.

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Chapter 4 Parameter settings

After the communication connection is complete, the next step is to configure the parameters. The configuration of the parameters includes motor parameters, encoder parameters, limit parameters, IO parameters, PID parameters, etc.

The parameters can be configured in two ways, either by importing existing motor parameters from the local folder of the host computer, or by configuring a new motor parameter step by step according to the main menu configuration wizard.

4.1 Importing/Exporting existing motor parameters

Import from file.:

If the local folder of the host computer contains a file with the pre-controlled motor parameters, the parameter file can be imported directly into the servo via the ISMC. The specific steps are as follows:

①Verify that the servo drive and ISMC are communicating properly.

②Select the main menu  , in its submenu of "**Parameter Operations**", click "**Import**" to open the local folder, as shown in Figure 4-1.

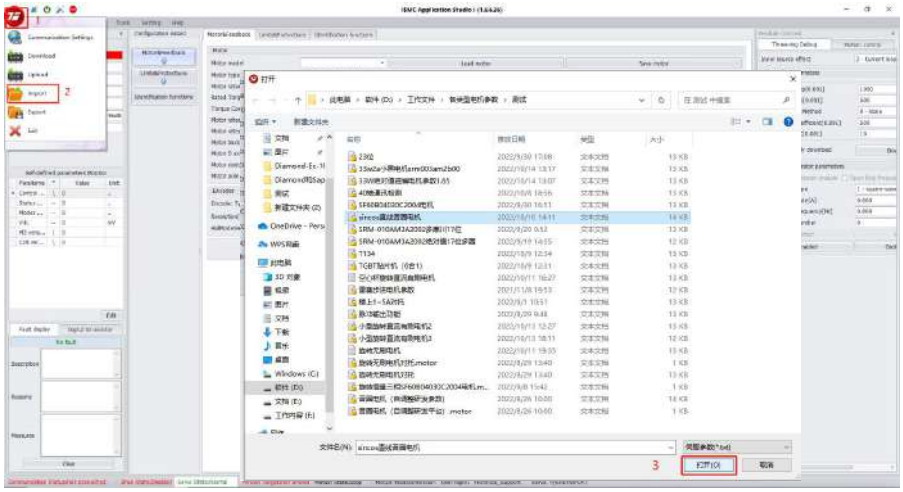


Figure 4-1 Import from file

③Find the parameter file to be imported from the local folder of the host computer, select it and "**Open**".

④When the operation is complete, a prompt box will pop up, as shown in Figure 4-2 .

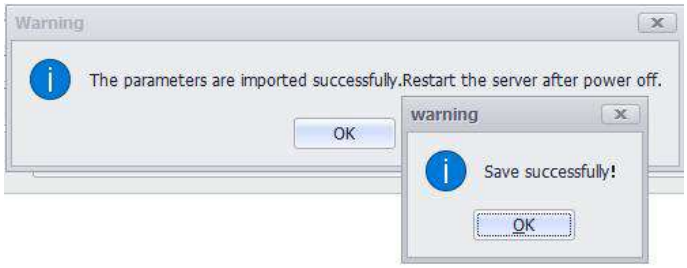


Figure 4-2 Save successfully

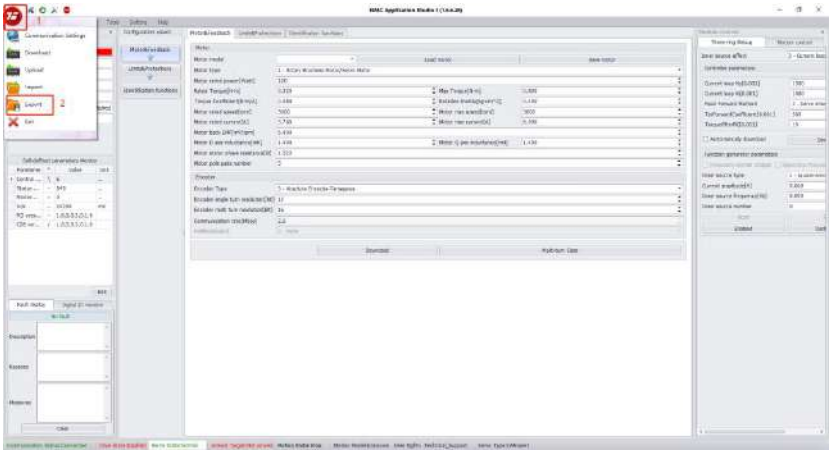
⑤**After successful download, remember to power down and restart the servo drive.**

⑥After the reboot, the communication connection is renewed and the parameters are imported.

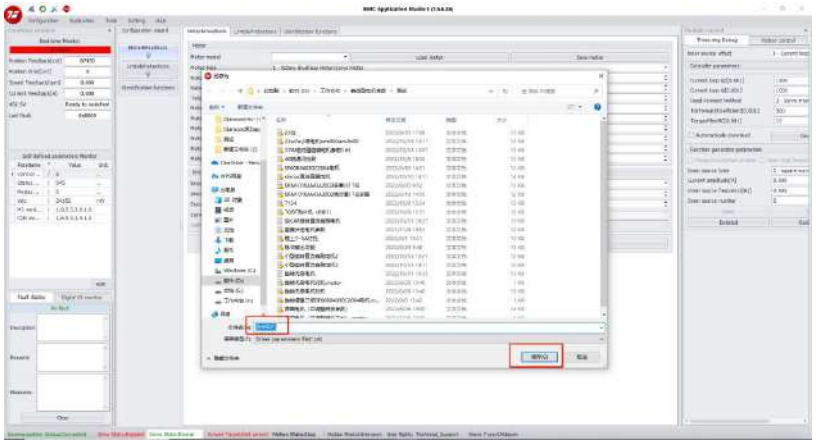
Export to file: The parameters to confirm tuning ok are exported for backup, as follows:

①Verify that the Servo Drive and ISMC are communicating properly.

②Click on the configuration screen -> Export:



③Name the parameter name and click "**Save**":



4.2 Configuration of new motor parameters

To drive a new motor, the user needs to complete the configuration of the new motor parameters, including motor and feedback, limiting protection, phase sequence commutation, etc,

in the "**Configuration Wizard**" in the main menu.

After configuring the parameters of a new motor, you can save the configured parameters in the "**Export**" folder on your PC, so that you can import the existing motor parameters in accordance with section 4.1 of this document for quick configuration of the parameters when you change the drive for the next commissioning.

Note:After completing the configuration of all parameters and after successful saving, you need to power off and restart the servo and reconnect the communication.

4.2.1 Parameter configuration

In the "**Configuration**" sub-menu, "**Configuration Wizard**", you can see the list of parameters to be configured in the ISMC interface, as shown in Figure 4-3. The motor feedback includes the motor parameters and the encoder parameters. Depending on the type of motor and the type of encoder, there may be some differences in the parameters that need to be configured, as shown in the following example for a rotary brushless motor and a Tamagawa absolute encoder.

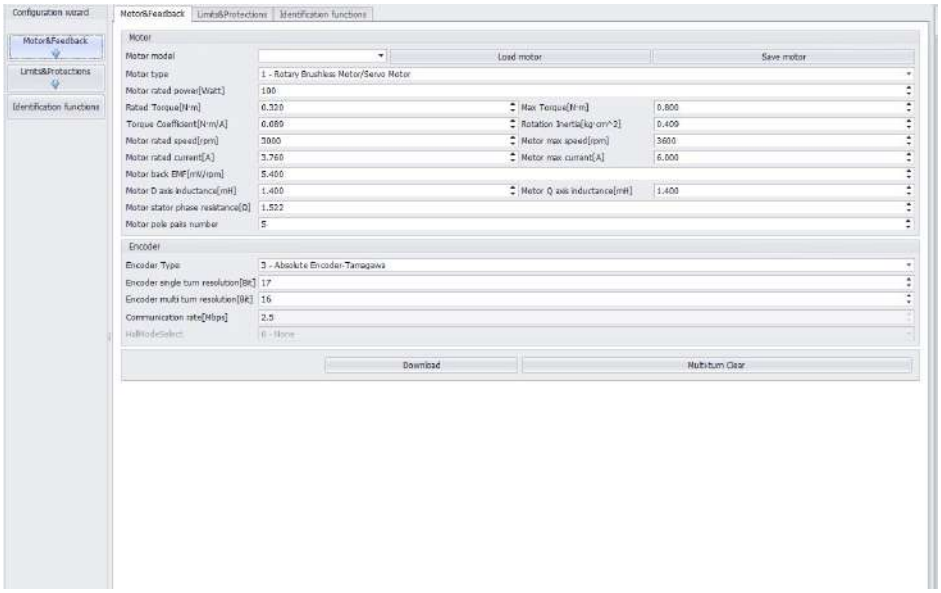


Figure 4-3 Motor feedback

Procedure for configuring motor feedback parameters:

①Motor configuration: motor type, rated motor parameters such as rated power, rated speed, rated torque and rated current are generally available on the motor's nameplate; the rest of the motor parameters are available in the motor instruction manual.

To facilitate the configuration of motor parameters, the ISMC provides a motor data backup function. It is possible to recall the locally stored parameters of a known Model of motor and also to save the parameters of a new Model of motor to a local file after it has been set up, as shown in

Figure 4-4. However, this function only saves and loads the parameters of the motor feedback, while import or export is to guide all the servo parameters.

Figure 4-4 Motor feedback parameter configuration

②Encoder parameter configuration. The configuration of the encoder parameters includes the selection of the encoder type and the setting of the encoder resolution. The encoder type will vary from one manufacturer's motor to another, and the resolution to be set will also vary. ISMC offers several common types of encoders on the market.

1） Encoder parameter type setting: Select the appropriate encoder type according to the instructions in the motor operating manual, as shown in Figure 4-5.

Figure 4-5 Encoder types

2）Encoder resolution setting

Table 4-1 Encoder resolution parameters

Name	Unit	Definition
Absolute single-turn resolution	Bit	The value of the pulse output for one rotation of the encoder is nth power of 2 for single-turn encoders
Absolute multi-turn resolution	Bit	The maximum number of turns recorded by the encoder, when this threshold is exceeded the multi-turn value jumps from the maximum value to the minimum value and counts again.
Zeroing of encoder multi-turn values		Zeroing out absolute encoder multi-turn values
Incremental single-turn resolution	counts/revolution	Pulse value output by one rotation of the encoder

Communication rate	Mbps	Clock frequency for sending or receiving data to or from the encoder, default is 2.5M clock frequency for sending data to or receiving data from the encoder.

③Click on the "**Download**" button to download all the parameters of the current page to the servo, and the software will have a window popping up with tips for changing the parameters, as shown in Figure 4-6.

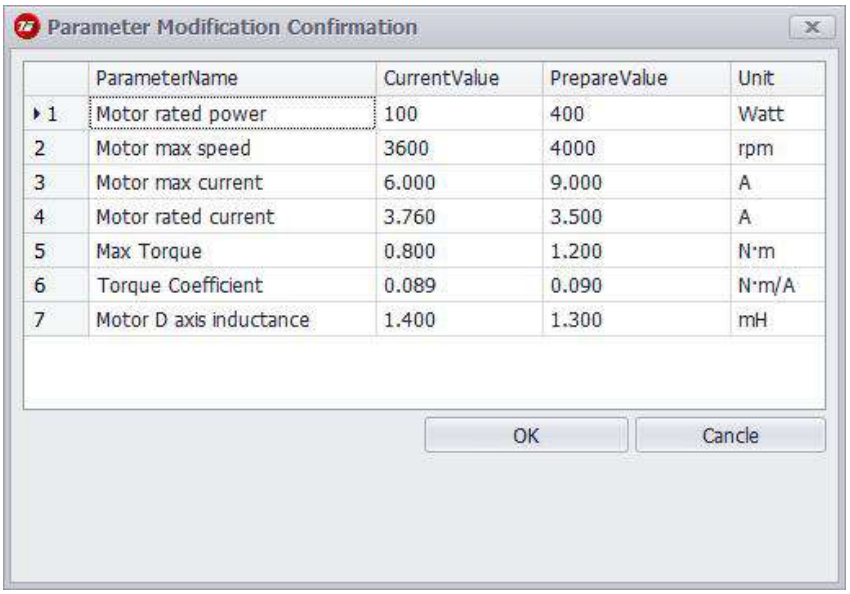


Figure 4-6 Confirmation of parameter modification

④After confirming the parameters are correct, click "**OK**" to jump to the next step, download the parameters to RAM and save them to EEPROM. The final prompt will indicate successful or failed saving.

3）Phase sequence commutation detection function, as shown in Figure 4-7-1-1

The "**phase sequence steering**" detection function is available only if the encoder type is not "absolute". The Hall detection function appears when the Hall sensor is not selected as "**0-Not Used**" on the interface, as shown in Figure 4-7-1-2. Hall detection and commutation bias detection button is also valid or not related to the motor type, such as motor type select the 3rd and 4th pull-down, Hall detection and commutation detection button becomes gray and invalid.

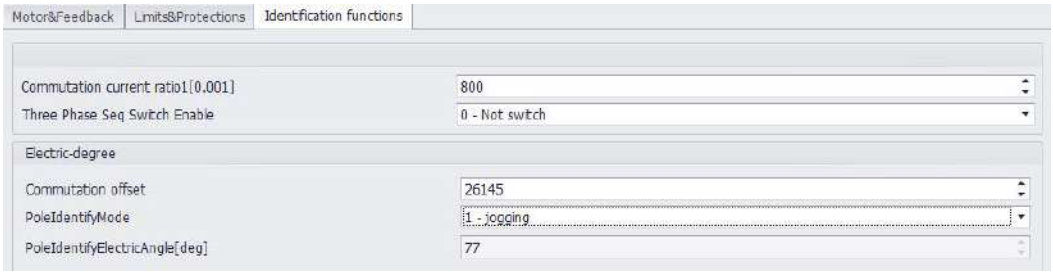


Figure 4-7-1-1

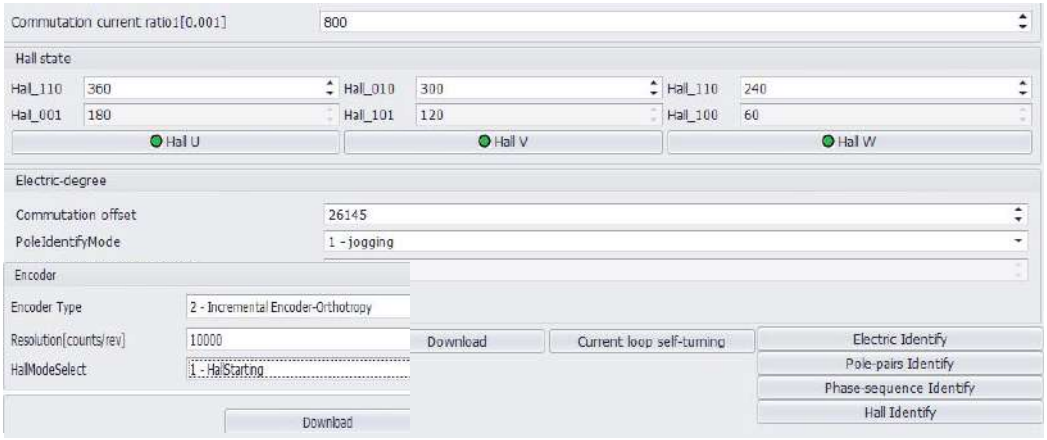


Figure 4-7-1-2

4.2.2 Limiting protection

The limit protection parameters are made to ensure the safety of the system during movement, including current, voltage, speed, position and temperature limit parameters, as shown in Figure 4-8. There are default limit protection parameters in the software of the upper computer, in general, the default limit protection parameters can be used, if you want to modify please strictly comply with the motor manual instructions.

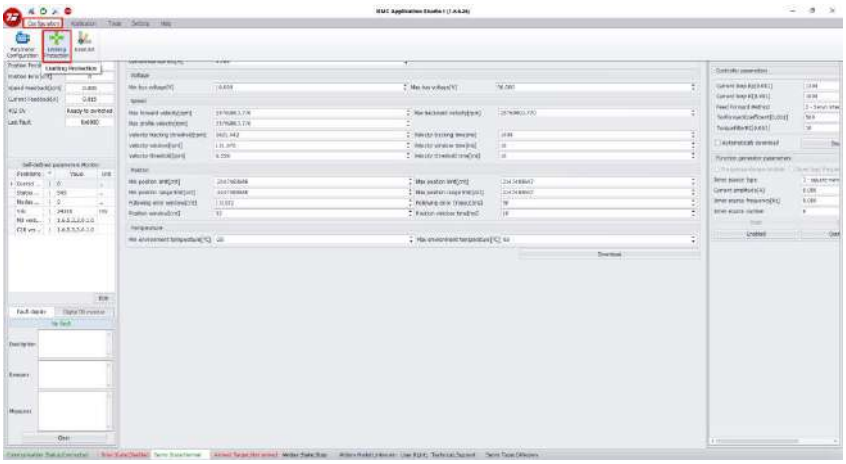


Figure 4-8 Limiting protection parameters

4.2.3 User Units

In the "**Configuration**" sub-menu, select "**User Units**" to set uniform units for the motion

control parameters, including position and speed units, and to configure the mechanical ratio parameters, as shown in Figure 4-9.

Figure 4-9 Control units

The units of motion that can be set are detailed in Table 4-2 Motion control units table

Table 4-2 Table of motion control units

Type of load / Movement units	Linear		Rotation	
Position Unit	cnt	Pulse count	cnt	Pulse count
	um	Micron	deg	Angle
	mm	Millimetres	rad	Curvature
	cm	centimetres	rev	Turn
	uu	Customization	uu	Customization
Speed units	cnt/s	Number of pulses/second	cnt/s	Number of pulses/sec
	um/s	micron/sec	deg/s	Angle/sec
	mm/s	micron/sec	rad/s	Radians/sec
	cm/s	centimetres/sec	rpm	Rev/min
	uu	Customization	rps	rev/sec
			uu	Customization

Where uu is a user-defined unit, the value of the custom unit uu can be determined by setting the ratio of uu to cnt or cnt/s, as shown in Figure 4-10.

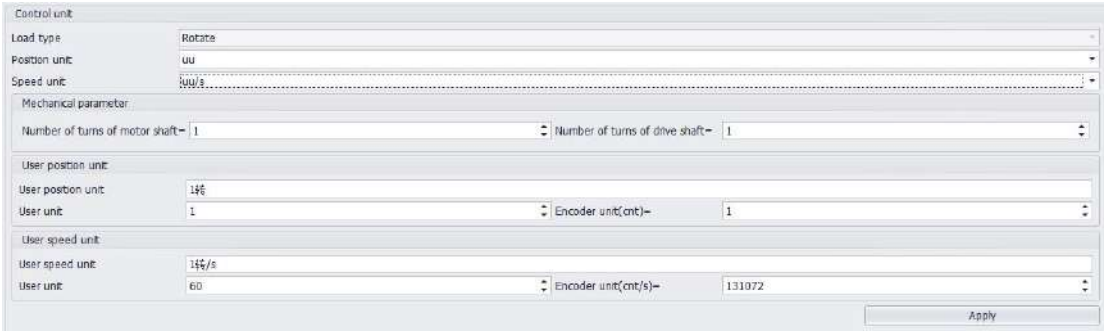


Figure 4-10 User unit settings

After selecting and configuring the user units according to the user's requirements, click on "**Apply**" and the unit conversion will take effect.

4.2.4 Digital IO

Digital IO can be used to meet the customer's requirements for digital input and output functions. The customer can configure the IO functions according to the required functions and then carry out the relevant wiring to achieve the servo IO control related functions, as shown in Figure 4-11. See "ISMC Servo User Manual" for specific IO terminal wiring definitions.

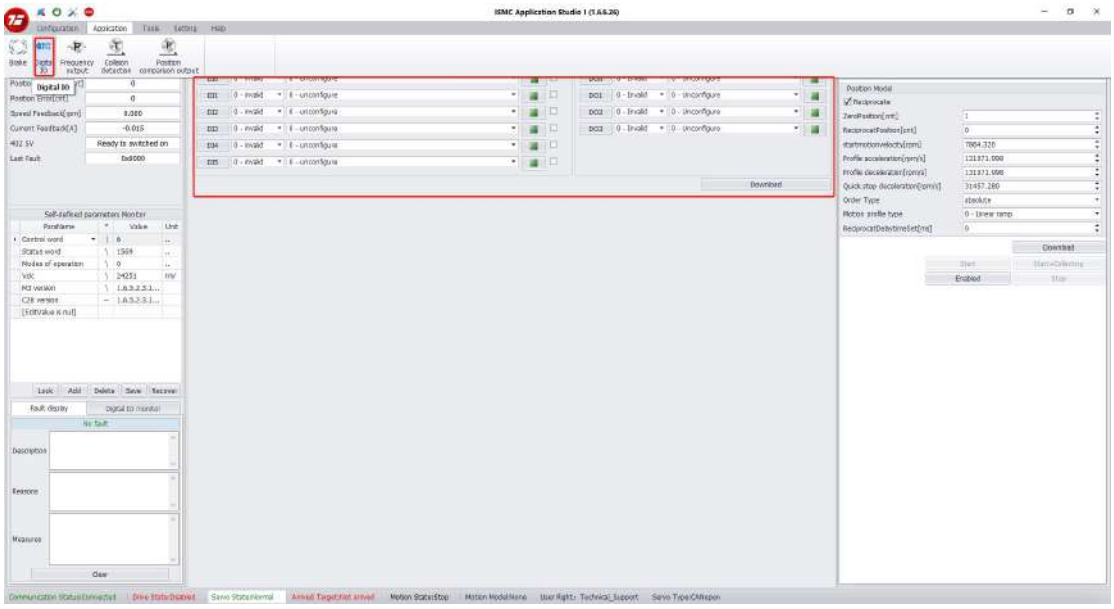


Figure 4-11 Digital IO parameters

①Introduction to the digital input function: The servo has six groups of input signals for customer configuration and use, as shown in Figure 4-12.

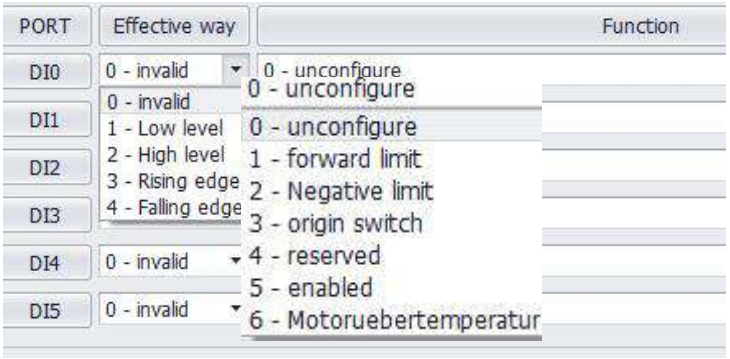


Figure 4-12 Digital input function

②Introduction to the digital output function: The servo has 4 groups of output signals for customer configuration, as shown in Figure 4-13.

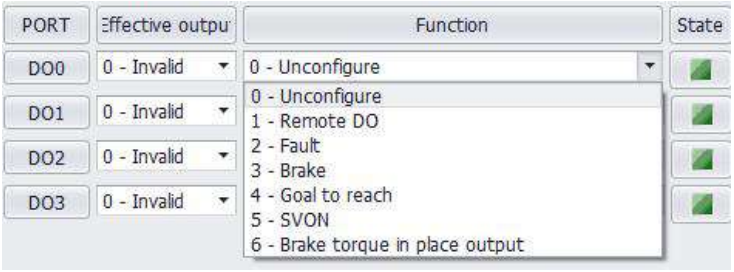


Figure 4-13 Digital output function

4.2.5 Brake

The "**Brake**" is configured through the digital IO of the upper computer software to achieve the servo holding function, therefore, the IO output must first be configured and configured to hold the function, and the parameters of the "Brake" must be configured according to the actual application requirements. This is shown in Figure 4-14.

Figure 4-14 Holding brake

The braking parameters of the brake are described in table 4-3

Table 4-3 Description of brake parameters for holding brakes

Braking parameters	Description
Brake enable	When the DO is configured for the holding brake function, the use of the holding brake is checked in the holding brake parameters to be effective
Brake activation delay time	Only output IO for holding control when the delay time threshold is reached in the event of a servo failure
Brake activation velocity	Only when the speed of the motor drops to the set speed threshold will the IO be output for holding control
Brake engage software delay time	Time between when the motor speed drops to the set threshold and when the output IO carries out the holding brake

Brake engage time	The servo determines that the brake delay time has been completed and the servo forbids energy.
Brake disengage software delay time	The time between the servo receiving the enable command and the control IO output.
Brake disengage time	The servo receives the enable command, the servo enables and at the same time outputs IO control to release the gate, while waiting for a delay time before the servo accepts the command for motion control.

4.3 Identification functions

4.3.1 Current loop auto-tuning

Click "**Current loop auto-tuning**" in the identification function, you can identify the electrical identification, pole pair identification, phase sequence steering identification, Hall identification, electrical angle identification and other functions in order to identify. Current loop self-adjustment can adjust the resistance inductance through electrical identification: phase sequence identification needs to confirm the direction of rotation of the motor to determine whether the motor is forward or reverse, and a dialog box will pop up whether the motor is forward or not. If you select "**Yes**", the phase sequence will remain unchanged; if you select "**No**", the phase sequence will be reversed.

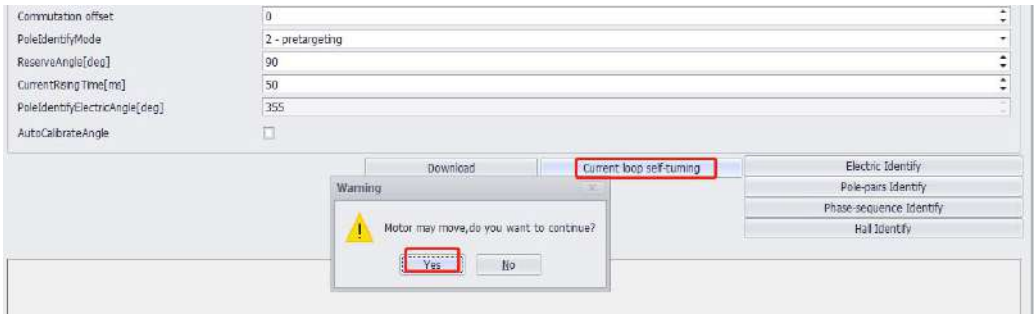


Figure 4-15 Current loop auto-tuning completion

When all items are identified, a pop-up message will appear indicating that the Current loop auto-tuning is complete, and a green stripe will appear accordingly. If the calibration fails, it will indicate that the Current loop auto-tuning has failed, and a red stripe will appear accordingly.

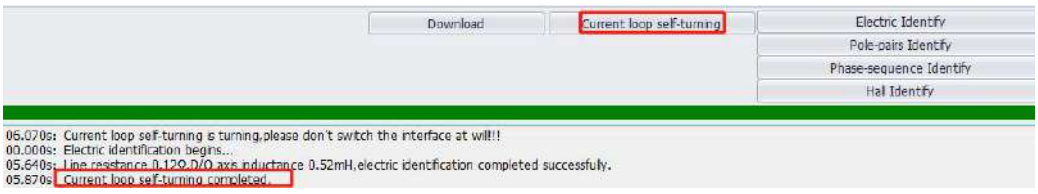


Figure 4-16 Current loop auto-tuning completion

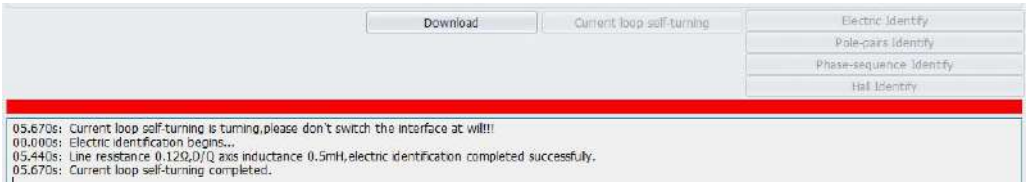


Figure 4-17 Current loop auto-tuning completion

Note: Identification failure needs to be modified for the problem item.

4.3.2 Identify type

①Electric Identify

Click "**Electric Identify**" in the identification function to adjust the resistance inductance. The figure below shows.

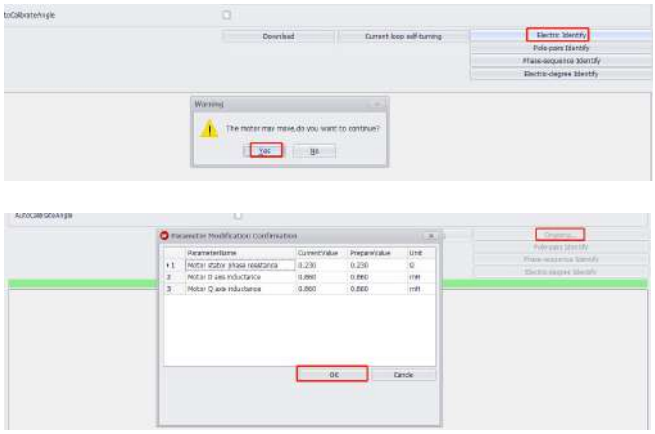


Figure 4-18 Identify items

②Pole- pairs Identify

You can correct the logarithm by clicking "**Pole- pairs Identify**".

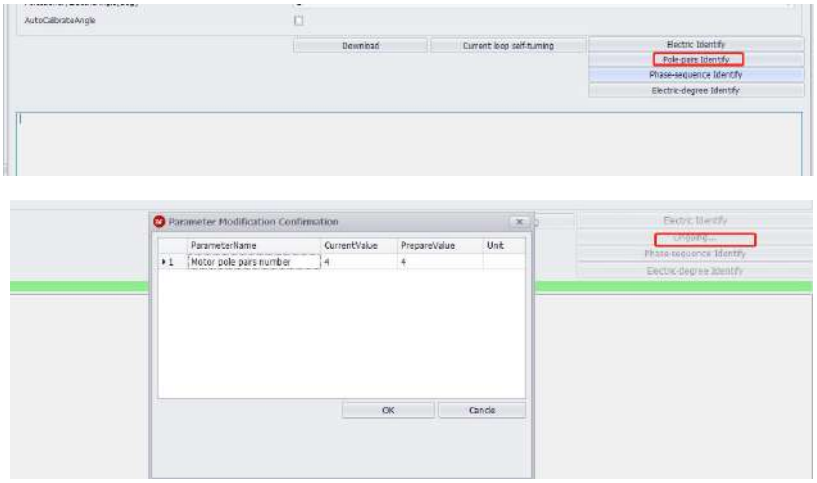


Figure 4-19 Pole- pairs Identify

③Phase-sequence Identify

Before the motion control, the motor needs to be tested and calibrated, calibration is

completed before the normal motion control, otherwise the motor will appear flying, at the same time before calibration need to confirm the motor UVW wiring phase sequence is correct, incorrect calibration will lead to calibration failure, when enabling or start the movement, motion monitoring to observe the current feedback value is very large, the motor blocking, may be the phase line is connected to the reverse, can be set in the "parameter editor - PID parameters" 2002 to 1 for phase sequence switching.

Parameter	Description
2002 Three Phase Seq Switch Enable	Three-phase sequence switching function, 0-no switching, 1-switching

Phase sequence identification can also be performed by selecting phase sequence steering identification in the identification function. during the identification process, the motor rotation is observed and the direction of rotation is selected according to the direction of rotation. When you click "**Phase sequence and steering identification**", you need to confirm the rotation direction of the motor to determine whether the motor is forward or reverse, and a dialog box will pop up whether the motor is forward or not. Select "**Yes**" to keep the phase sequence unchanged, select "**No**" to switch the phase sequence.

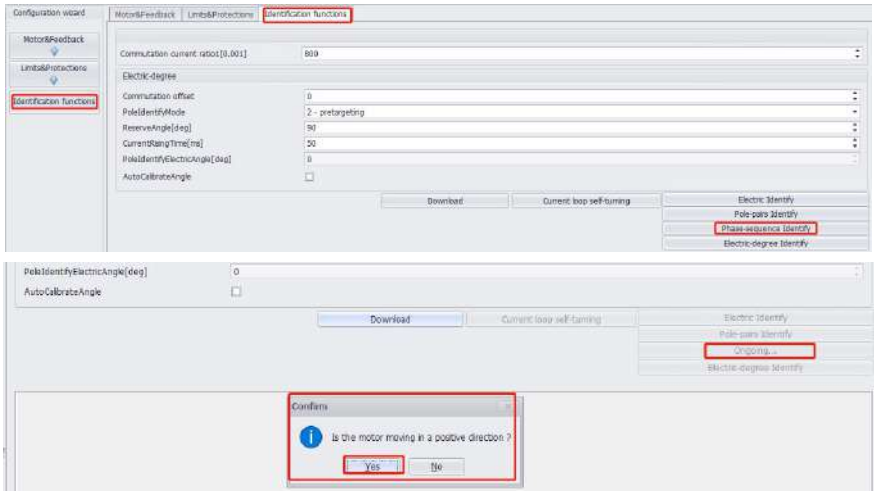


Figure 4-20 Phase-sequence Identify

④Hall Identify

1) Hall Identify steps are as follows: Hall sensor is not used to do commutation, other values when doing Hall detection. To turn on Hall recognition, you need to select the encoder in the motor and feedback to use Hall sensor. As shown in Figure 4-21.

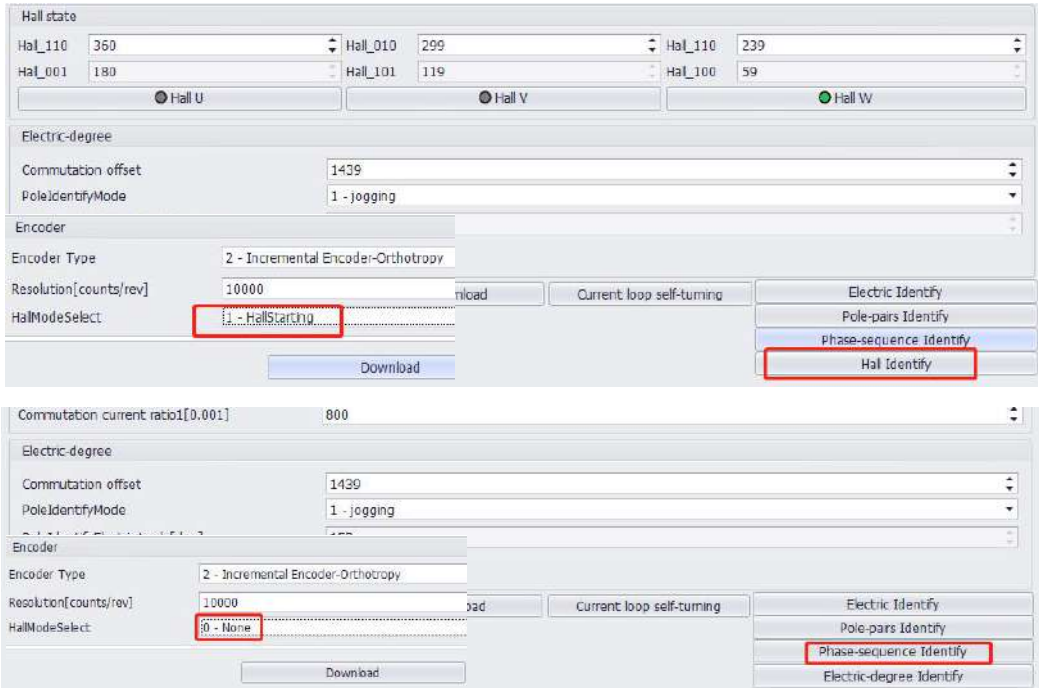


Figure 4-21 Hall identify

2） Wait about 5~15s after clicking the button for each test, and the corresponding operation status parameter will be shown in green, as shown in the figure below, then the test is completed.

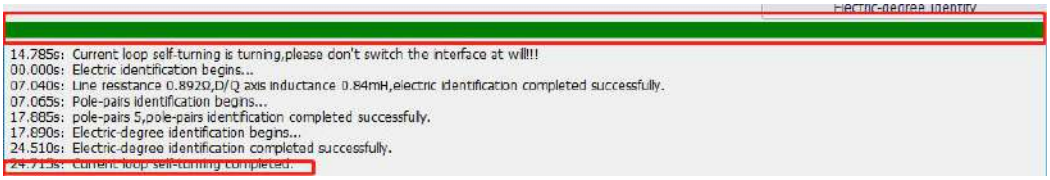


Figure 4-22 Detection completed

Note: 1. If the control motor encoder type is absolute encoder, the initial adaptation of the servo needs to be accurately calibrated once, the servo re-energized without the need for zero point calibration, the power can be directly on the motion control.

2.If the control motor encoder type is incremental encoder (without Hall signal), the servo needs to perform a magnetic pole calibration on the motor every time it is powered on in order to perform motor control, either by sending calibration and enable commands (see Note 4 for logic details) or manually clicking on the commutation bias automatic detection for calibration, do not perform other motion control related operations during calibration, the servo driver will report the corresponding error;At the same time, the servo comes with power-on automatic calibration function, if you open this function, you need to configure 0x2120 as 1, save and restart after power off, the servo will automatically calibrate every time the servo is powered off and re-powered, after the calibration is completed, the servo is disabled, and then output the calibration completion flag 0x2121 set to 1.

3.If the control motor encoder type is incremental encoder (with Hall signal), the first time to adapt servo need to configure Hall Model Select (0x2103 = 1), at the same time, input the HALL starting electrical angle

0x210F given by the motor factory, save to EEPROM, the subsequent power can be directly on the motion control.

4.Calibration current setting: calibration current default 800 (80% of rated current), if in the occasion of larger load can be appropriately increased current ratio for calibration.

Note:

1、No-load condition: motors with small inertia or small cogging torque only need to be calibrated in the 2105d axis calibration current Model;

2、Under load: large inertia motors or motors with high frictional resistance need to be calibrated in combination with 0x2402 calibration current2。

3、If the calibration current is not adjusted properly or the load of motor shaft is too large, the calibration will fail. For the error handling, please refer to **Chapter 5 Tuning and Motion**.

4、After 0x6060 (control Model) is set to 0, 0x2101 is written to 1, 0x6040 (control word) is executed according to the enable logic of 6 -> 7 -> 15, the servo enters calibration status. When 0x2101 turns to 0, it means the calibration process is completed.

Commutation bias-related parameters and description

parameter	Description
2101 Calibrate commutation offset	The sign of manual zero calibration enable.
2102 Commutation offset	The value of zero calibration.
2103 Hall Model Select	Hall Model selection. 0: disable Hall;1: enable Hall.
2105 Commutation current ratio_1	D-axis calibration current amplitude = 2105 / 1000 * Rate current. Frequency: constant value
213E Hall_Angle	Hall calibration angle.
2120 Auto Calibrate Angle	Automatic calibration after power-on. 0-OFF; 1-ON.
2121 Auto Calibrate Angle Finish	The sign whether automatic calibration after power-on is completed. 0-Incomplete; 1-Complete.
2402 Commutation current ratio_2	Q-axis calibration current amplitude = 2402 / 1000 * 2105 Frequency: high frequency

4.4 Parameter Editor

Open the "**Parameter Editor**" in the "**Tools**" section of the main menu. The Parameter Editor is a tool that summarises all the parameters in the servo and allows indexing, reading and writing, and exporting.The parameter editor also groups the parameters, some of which correspond to the groupings in the configuration list. The parameters in each grouping have read-write parameters as well as parameters with read-only attributes, along with index numbers for each parameter, and a separate description for each parameter, as shown in Figure 4-23.

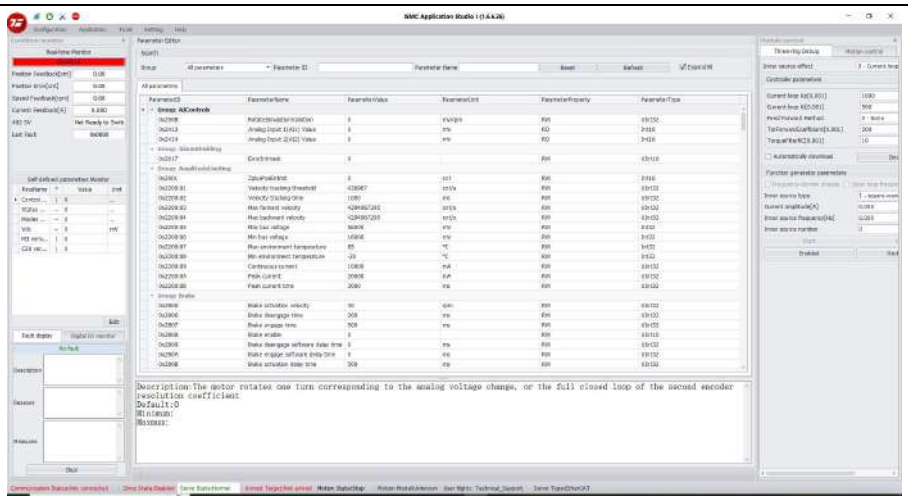


Figure 4-23 Parameter Editor

The parameters can also be configured by the parameter editor as follows:

①According to the grouping and index of the parameter, as well as the parameter name and description, determine the parameter that needs to be changed, double-click the parameter value to modify it, click Enter to finish the modification, and you can see the feedback of successful parameter modification in the lower left corner of the parameter editor, as shown in Figure 4-24.

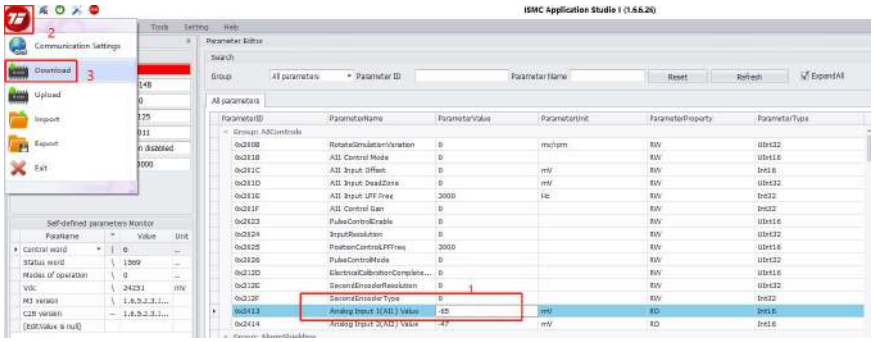


Figure 4-24 Parameter modification

②Modify the parameters to be configured and click "**enter**", click on the icon in the upper left corner, click "**download**", save the parameters to EEPROM, and finally "restart" the servo drive, restart and re-connect the communication.

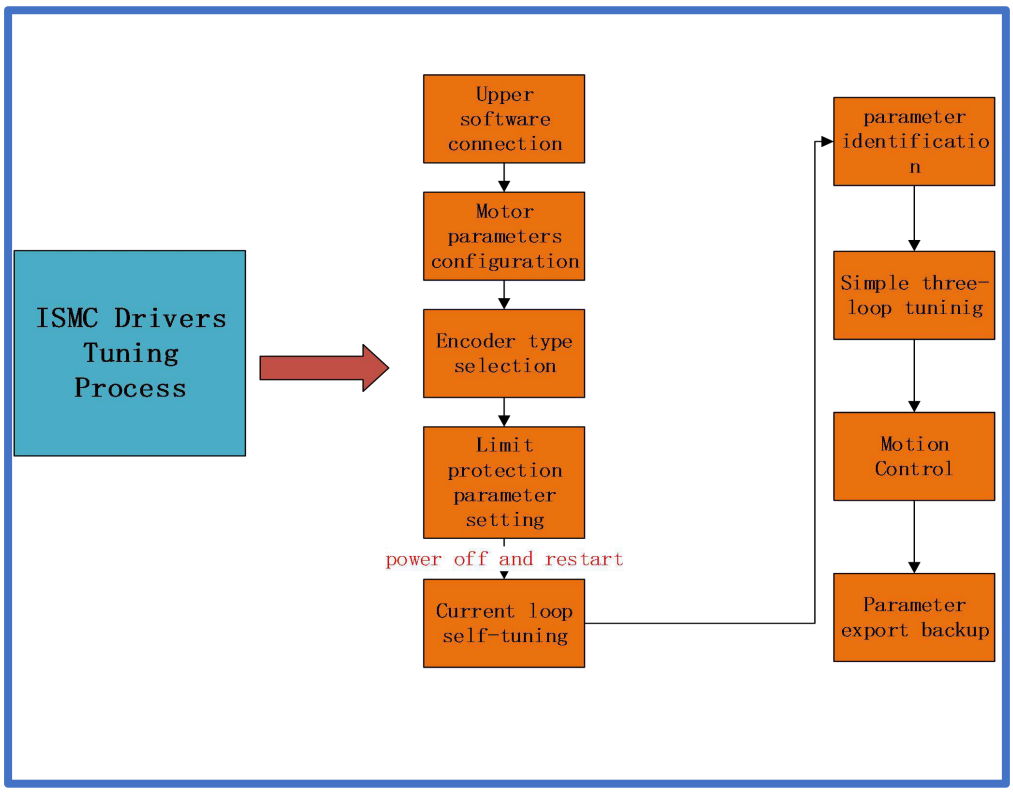
Chapter 5 Tuning and Motion

Tuning PID parameters is to achieve motion control, you need to Tune the PID parameters of the three loops of motion control in turn.the tuning of PID parameters is a comprehensive process in which the parameters affect each other, and multiple attempts in the actual tuning process are very important and necessary.Select "Tune" in the main menu to Tune the PID parameters of current loop, speed loop and position loop in order.In the process of tuning PID, the function generator needs to output the given Model and waveform signal, while using an oscilloscope to capture the given waveform and feedback waveform for response analysis.After completing the parameter configuration and PID tuning, you can carry out the motion control of the system.Select "Motion Control" in the right sidebar of the main interface. There are four main motion Models for ISMC control servo drive motors, including Speed Model, position Model, torque Model, etc.

Note: When configuring the motion parameters, the units of the motion parameters correspond to the "user units" in the "configuration".if you want to change the motion units, please enter the configuration interface to modify.

The following is an introduction to function generators and oscilloscopes, as well as a brief description of the three-loop Tuning process and motion control.

Tuning steps for the use of the drive：



5.1 Oscilloscope

The oscilloscope is a tool for acquiring data wave forms in real time and can be opened in the main menu under "**Tools**", as shown in Figure 5-2. The oscilloscope can be used to acquire and display different wave forms by setting the sampling target parameters, sampling time and sampling period.

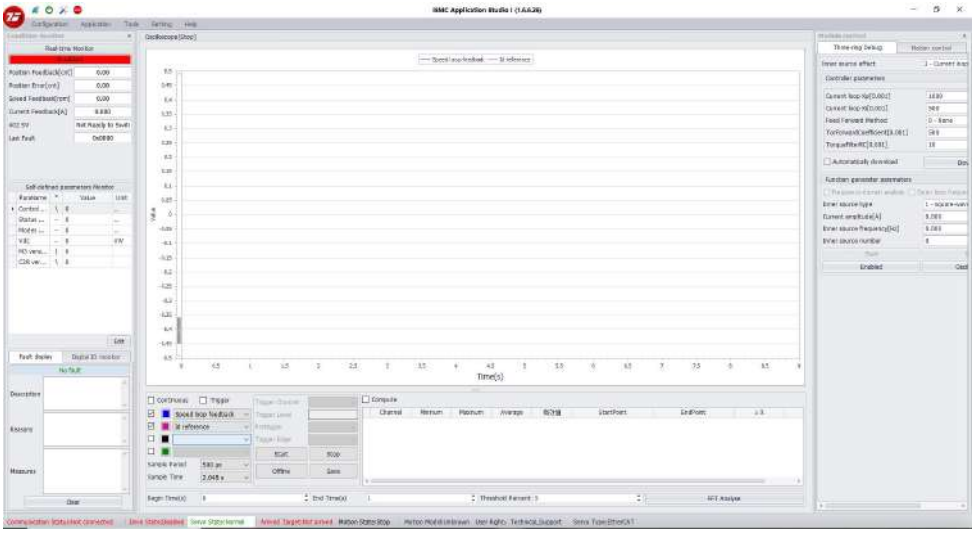


Figure 5-2 Oscilloscope

Oscilloscope usage procedures:

①Passage selection.The oscilloscope supports a maximum of 4 channels for acquisition, with the channel serial number colour matching the colour of the acquired waveform. The parameters available for acquisition are speed, position, encoder, current, voltage, temperature and other related parameters， as shown in Figure 5-3;

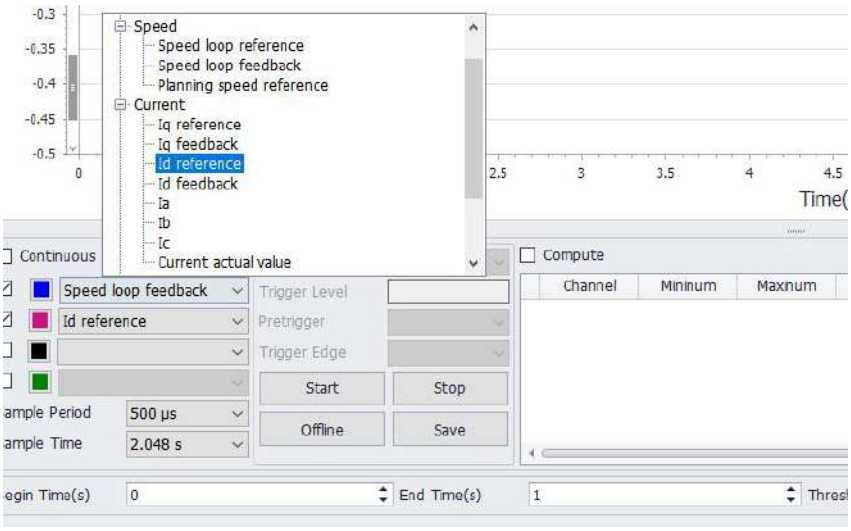


Figure 5-3 Channel selection

②Sampling period setting. The minimum value of the sampling period is 50 µs for single or two channels and 100 µs for more than two channels.Sampling time varies according to the range

of sampling periods selected;

③Sampling method.The default sampling method is single acquisition, you can check "continuous acquisition" and "manual trigger".

■ After **"Start ", "Continuous Acquisition"** continuously performs the single acquisition operation and sends it to the interface to refresh and display the waveform after the acquisition is completed, as shown in Figure 5-4.

Figure 5-4 Continuous Acquisition

■ Trigger acquisition refers to the operation of starting to execute a single acquisition after the acquisition conditions are met. The set trigger conditions include "**trigger channel**", "**trigger edge**" and "**trigger level**".After "**start** ", the oscilloscope will judge whether the trigger conditions are met, and when the sampling value of the trigger channel meets the trigger edge and trigger level, the acquisition will start, and the trigger conditions will be lagged accordingly according to the "**pre-trigger**" setting， As shown in Figure 5-5;

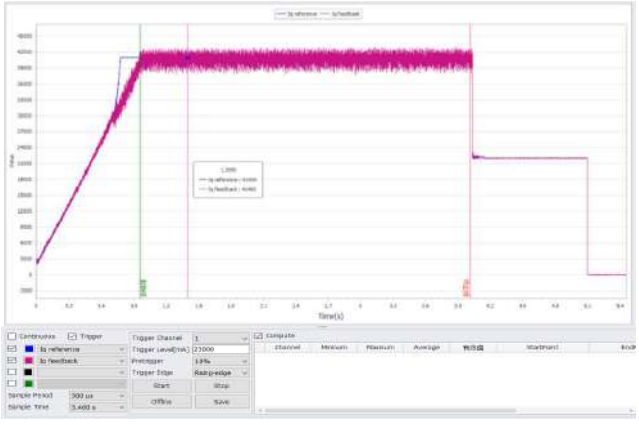


Figure 5-5 Trigger acquisition

■ Start the acquisition:The oscilloscope performs sampling operation according to the settings, and displays the waveform on the oscilloscope interface in real time after acquiring

parameters;

- Stop the acquisition:Perform operations such as amplifying, measuring, calculating and saving the acquired waveform. On the acquisition interface of the oscilloscope, you can see the same acquisition area divided into two parts, among which, the upper part of the area is fixed, and the operations of amplification, measurement and calculation are mainly carried out in the lower part.

1) Waveform magnification observation. By holding down the keyboard shift key and pulling through the mouse box, you can zoom in on the selected part of the waveform, as shown in Figure 5-6. If you want to cancel the zooming, click the right mouse button to undo the zooming function.

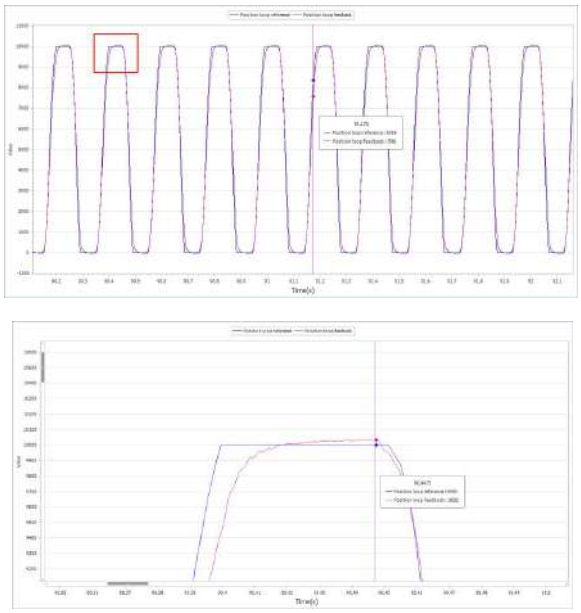


Figure 5-6 Waveform Zoom

2) Waveform calculation. Check "**Calculate**" in the oscilloscope, and the area below "**Calculate**" will display the maximum, minimum, average, and peak-to-peak values of the current sampled waveform, as shown in Figure 5-7.

Figure 5-7 Waveform calculation

3) Waveform saving. In the oscilloscope, click "**Save Data**" to save the waveform currently displayed in the oscilloscope interface to a local folder in the form of .txt, as shown in Figure 5-8.To browse the waveform file saved in the local folder, click "**Offline Data**" in the oscilloscope, open the file, and you can see the waveform of the saved file on the oscilloscope.

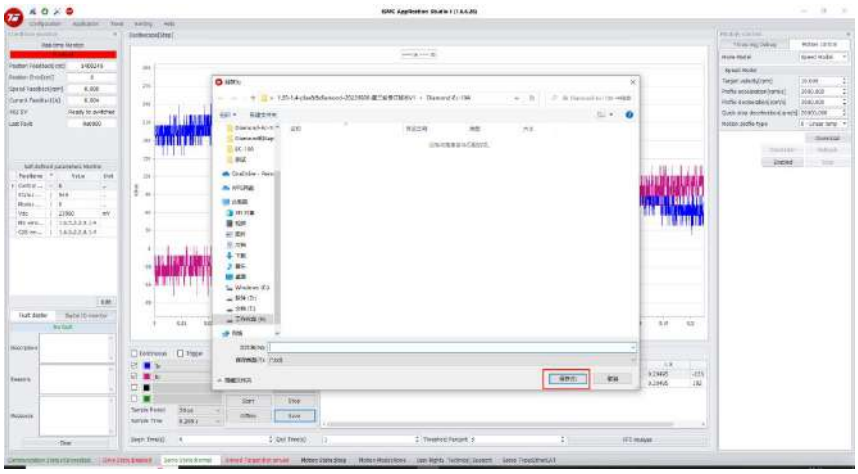


Figure 5-8 Save waveform

Note:When using the oscilloscope, when "**start acquisition**", other ISMC interface functions will be temporarily disabled, and you can only perform other operations and use other functions when you stop acquisition.

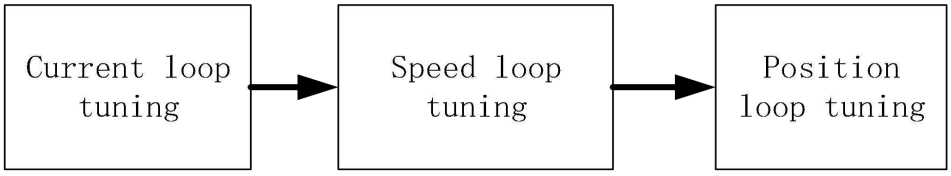
5.2 Three loop Commissioning

If the PID parameters are not set properly, it may lead to jitter and noise in the motor. In order to achieve better control effect, the PID parameters of the system need to be Tuneged before controlling the motor. To Tune PID, the upper software ISMC provides "function generator",

which can output the given Model, waveform and step signal, and use the oscilloscope to capture the given waveform and feedback waveform for response analysis. If the application is special, please make appropriate adjustments, or contact technical support to help Tune.

Note: Because the process of PID parameter tuning requires motor control, so before tuning PID parameters, make sure that the motor and drive wiring is connected correctly, motor parameters, encoder parameters and motor magnetic declination are correct, and ensure that the servo can be enabled normally without fault.

Three-Loop tuning steps:



5.2.1 Current loop

The first loop of three-loop tuning is current loop, click "**Three-loop tuning**" in the main menu, select "**Current Loop**", and the tuning interface of current loop appears, as shown in Figure 5-9.

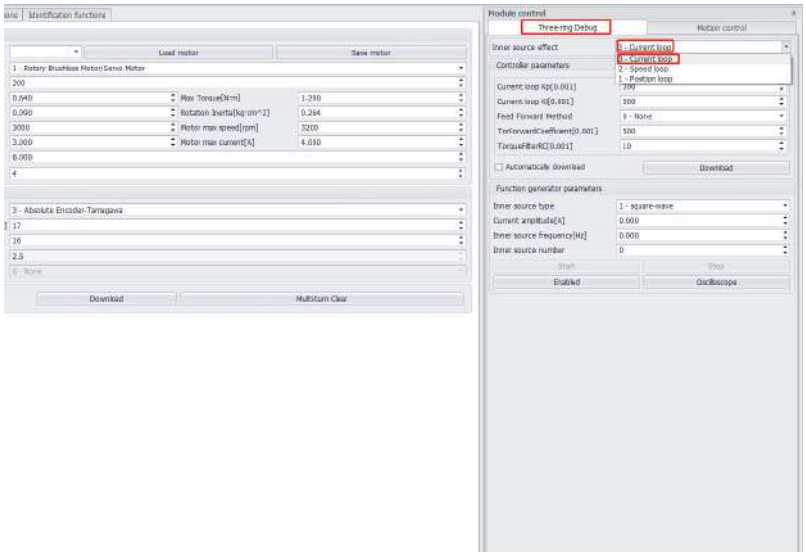


Figure 5-9 Current loop tuning interface

The current loop Tuning steps are as follows:

1、Kp Tuning

①First, given Ki is 0, Kp is 100, click "**Download**" (generally only need to be near the factory default value of the servo for fine-tuning).

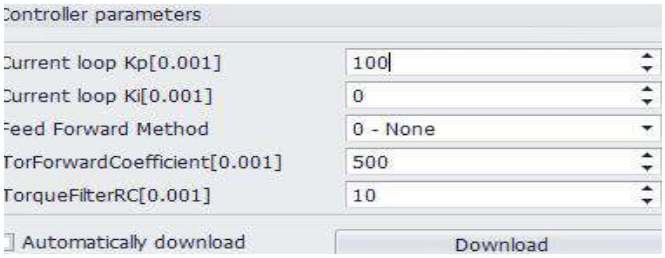


Figure 5-10 Current loop control parameters

②Then set the function generator function type for the sine wave signal, the current amplitude is 25% of the rated motor current (under the 1A for example), the frequency is 1500Hz.

Figure 5-11 Current loop function generator parameters

③Then open the oscilloscope, set the sampling channel for Id reference (current given value) and Id feedback (current feedback value), select the sampling period of 50us, check the continuous acquisition.

Figure 5-12 Current loop oscilloscope sampling parameters settings

④Put the servo "**enable**", then "start" the function generator, and then click the oscilloscope "**start acquisition**".

⑤Keep increasing Kp until the amplitude of Id feedback is between (0.707~1) of Id reference amplitude and the phase lag does not exceed 90°. The following figure shows the tuning ok:

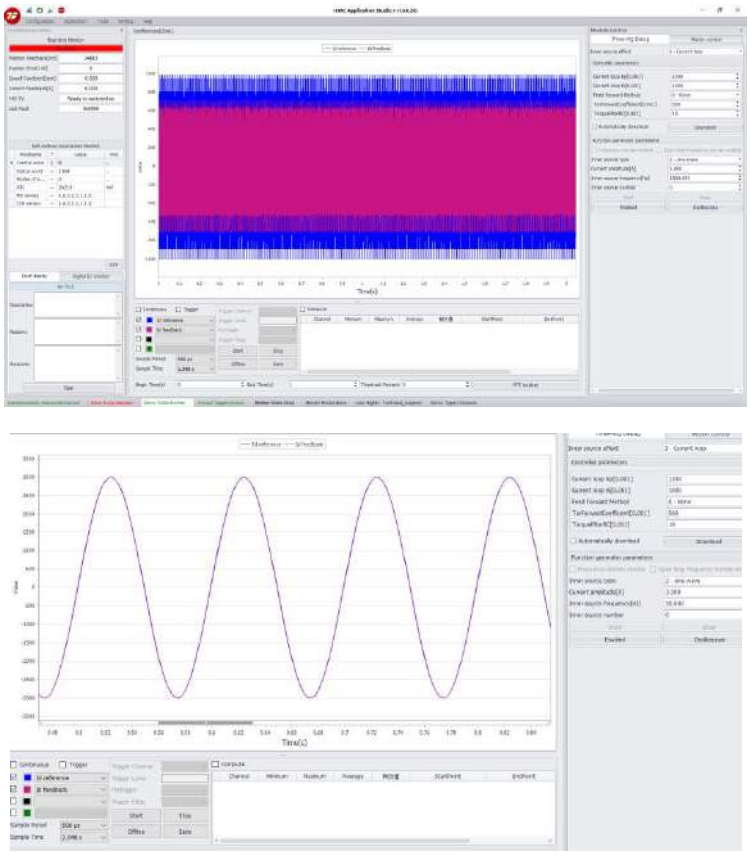


Figure 5-13 Adjusting Kp to complete the current sampling waveformc

Current loop Kp main role： It is the bandwidth that increases with the increase of Kp. If Kp is too large, the motor whistles, if Kp is too small, the bandwidth decreases.

2、Ki Tuning

①The function generator will be selected as a square wave, the current amplitude is 25% of the rated motor current (under 1A for example), the frequency is 10Hz.

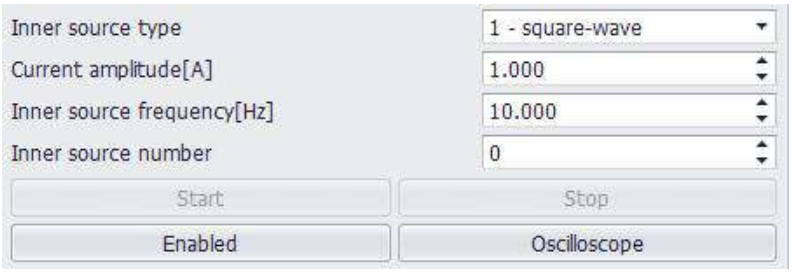


Figure 5-14 Current loop function generator parameters

②Current loop Ki tuning: gradually increase the ki, generally by 100 orders of magnitude, while selecting the oscilloscope settings as in steps ③ and ④ above. Until the steady-state error is eliminated, the waveform of Id feedback and Id reference waveform basically coincide, and overshoot within 5%, the current is Tuneged OK, as shown below：

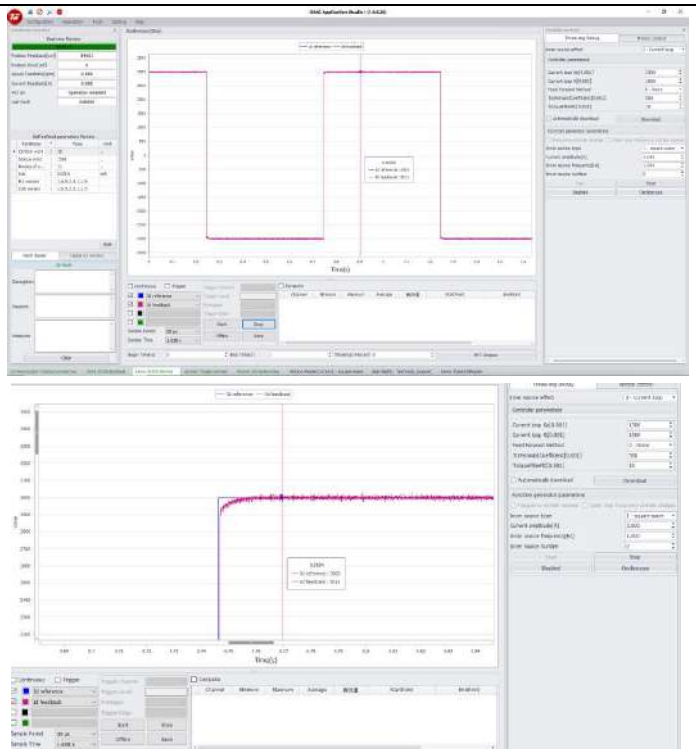


Figure 5-15 Adjusting Ki to complete the current sampling waveform

Current loop Ki main role： Eliminates steady-state errors, which can lead to overshoot and motor whine when too large.

5.2.2 Speed loop

The second loop of the three-loop tuning is the speed loop, select "**speed loop**", and the tuning interface of the speed loop appears, as shown in Figure 5-17.

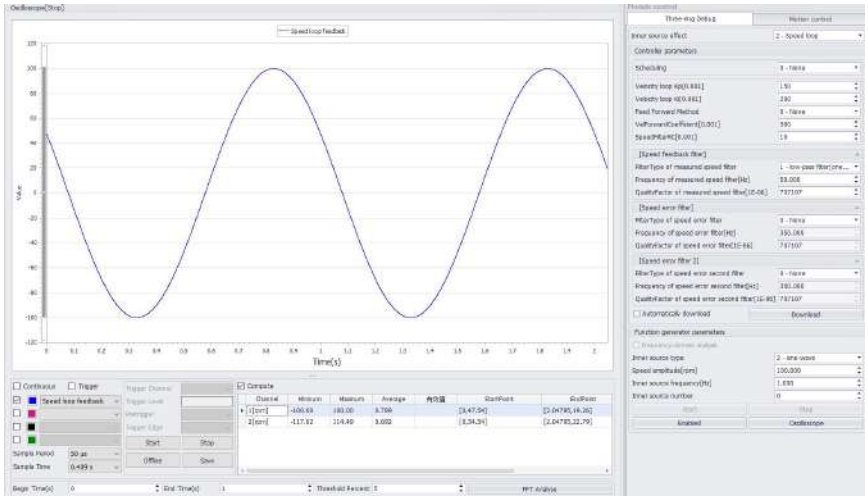


Figure 5-16 Speed loop tuning interface

Speed loop Tuningsteps：

①Preparation：

1）Set the correct inertia ratio 0X2422.

2）0x2020:01Filter Type of measured speed, 0x2021:01 Filter Type of speed error filterSet

to 0 ， 2022:01 Filter Type of speed error second filterSet to 0， Set 2006 Feed Forward Method to 0.

First, given Ki is 0 and Kp is 10, click "**Download**".

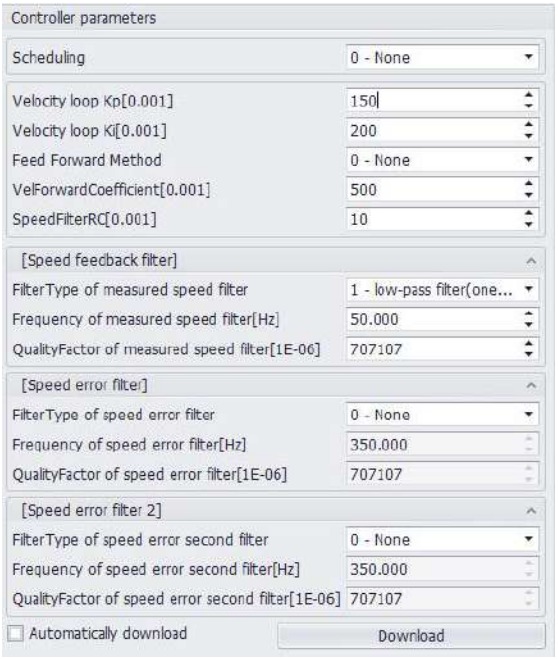


Figure 5-17 Speed loop control parameters

②Then set the function generator function type as step signal, for example, the speed amplitude is 300rpm, and set the duration according to the equipment limit running distance, for example, set 500ms.

Figure 5-18 Speed loop function generator parameters

③Open the oscilloscope again, set the sampling channel to speed loop reference and speed loop feedback, select the appropriate sampling period of 200us, check the trigger acquisition, set the trigger edge to rising edge, select the speed loop reference for the trigger channel, and set the trigger level to 10rpm. The trigger level is 10rpm, and the pre-trigger setting is 20%.

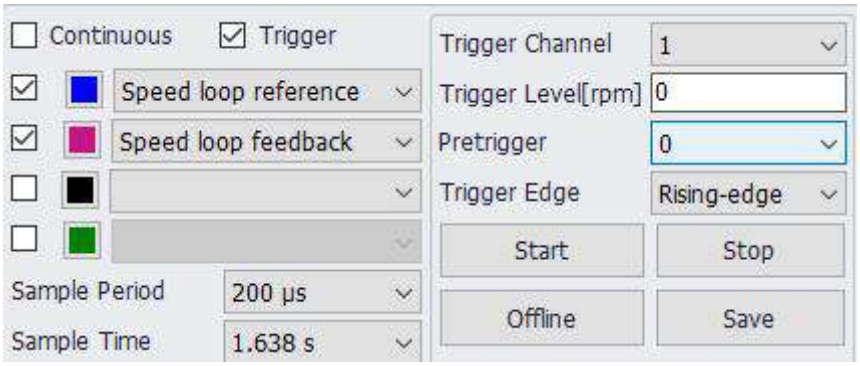


Figure 5-19 Speed loop oscilloscope sampling parameters settings

④Put the servo "**enable**", "**start**" the function generator, and then click the oscilloscope to "**start acquisition**". When the function type is step signal, there will be a delay time of 4~5s after clicking Start to ensure that there is enough time for the oscilloscope to start acquisition.

⑤Gradually increase Kp (generally by 10-bit order of magnitude) and observe the waveforms displayed on the oscilloscope for speed loop reference and speed loop feedback until a critical oscillation in the speed waveform occurs:

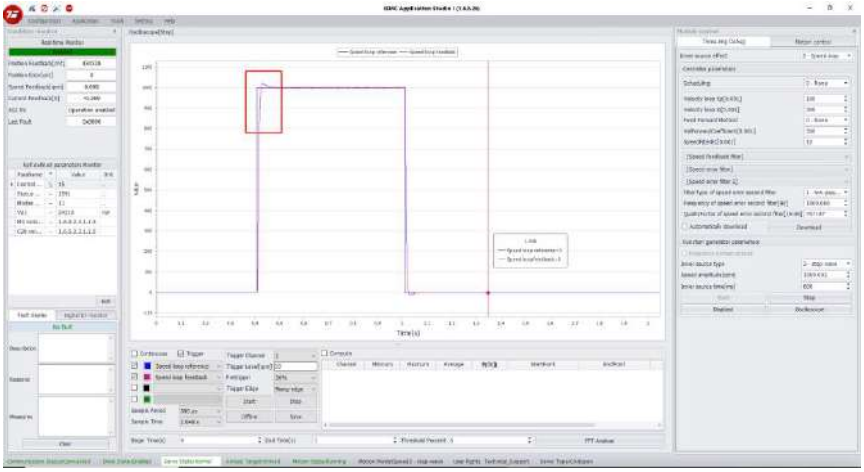


Figure 5-20 Adjusting Kp to the critical oscillation speed sampling waveform

⑥Then take 70%~80% of Kp value at this time, stop the oscilloscope acquisition, and stop the function generator. Gradually increase Ki, and repeat steps 3 and 4, wait until the speed loop feedback (speed feedback value) of the following steady-state error is all eliminated, and the overshoot does not exceed 30% speed loop tuning is completed.

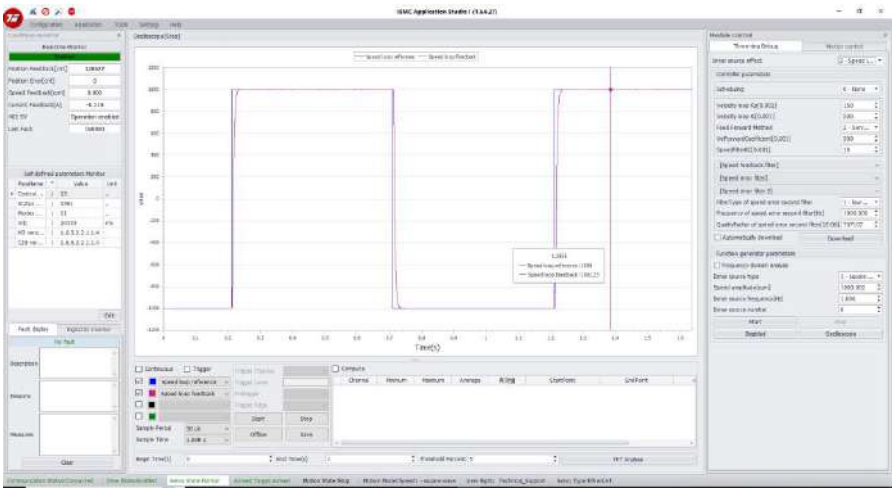


Figure 5-21 Speed sampling waveform after Ki adjustment is completed

To reduce the speed deviation value during acceleration, torque feedforward can be tuned by setting 0x2006 to 2 and turning on the feedforward function. When adjusting, set 0x2019 torque feedforward time constant as a fixed value, and then increase 0x2016 speed feedforward coefficient continuously until the speed feedforward achieves effect under a certain setting value. When commissioning, 0x2019 and 0x2016 values should be adjusted repeatedly to find a well-balanced setting, improper Tuning will lead to system oscillation (generally not recommended to add).

If oscillation or mechanical resonance occurs during the Tuning process, you can set the speed trap filter 0x2021/0x2022 to eliminate the oscillation frequency:

Parameters	Description
200C:01 Measured speed filter	Feedback speed filter value
200F:01 Speed error filter	Speed deviation filter value
2010:01 Speed error second filter	Speed deviation filter value2
2020:01 FilterType of measured speed filter	Feedback speed Filtering type
2020:02 Frequency of measured speed filter	Feedback speed filter frequency
2020:03 QualityFactor of measured speed filter	Feedback speed filter quality factor
2021:01 FilterType of speed error filter	Feedback speed Filtering type 1
2021:02 Frequency of speed errror filter	Feedback speed filter frequency 1
2021:03 QualityFactor of speed errror second filter	Feedback speed filter quality factor 1
2022:01 FilterType of speed error filter	Feedrate Filtering type 2
2022:02 Frequency of speed errror filter	Feedback speed filter frequency 2
2022:03 QualityFactor of speed errror second filter	Feedback speed filter quality factor 2

2421 Velocity Average Filtering	Speed-averaged Filtering, internally using

5.2.3 Position Loop

The third loop of the three-loop Tuning is the position loop, select "position loop", the Tuning interface of the position loop appears, as shown in Figure 5-22.

Figure 5-22 Position loop Tuning interface

Compared with the current and position loops, the parameters only need to determine a Kp scale factor, and the position loop Tuning steps:

①It is recommended to follow the default parameter 10 when tuning other loops, and revise Kp according to the situation after capturing the position curve.

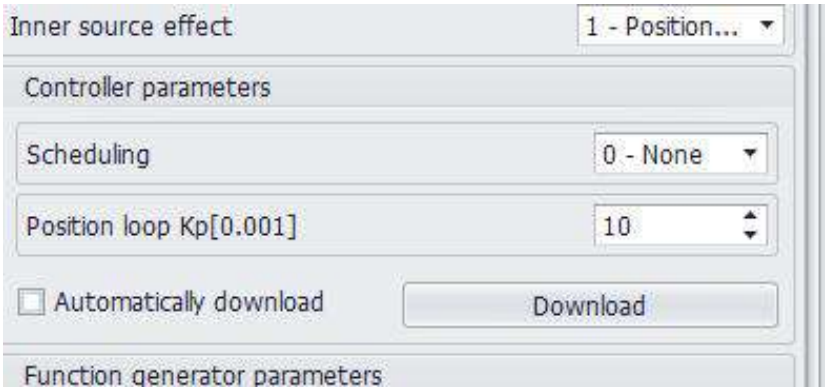


Figure 5-23 Position loop control parameters

②Set the function generator function type for the square wave signal, position amplitude of 1000cnt (with the current position as the zero point, the movement amplitude of 1000cnt, position loop tuning pay attention to the mechanical end stroke), the signal frequency of 5Hz.

Figure 5-24 Position loop function generator parameters

③Open the oscilloscope, set the sampling channel to position loop reference and position loop feedback, select the appropriate sampling period and sampling time, and check the continuous acquisition..

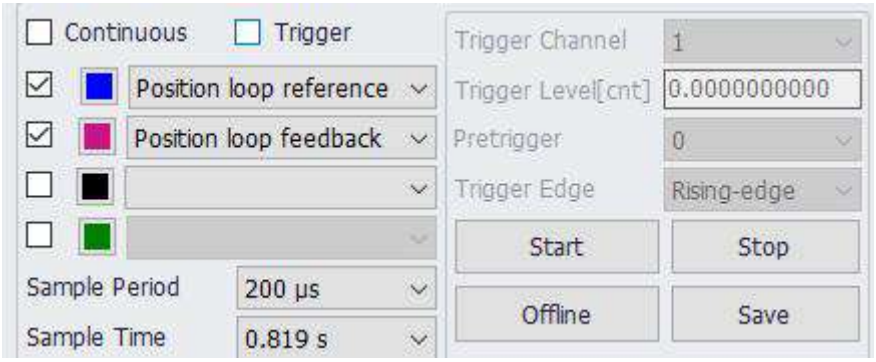


Figure 5-25 Position loop oscilloscope sampling parameters settings

④Adjust the position Kp and observe the wave forms displayed on the oscilloscope for position loop reference and position loop feedback.

⑤When the position following error is large or slow response can increase Kp, when the position overshoot or jitter reduce Kp, until the waveform follows well, while ensuring that the current does not saturate, the position loop Tuning is complete.

Figure 5-26 Position sampling waveform after adjusting Kp

If the position following error is not satisfied in the actual application, the feed forward function can be turned on for torque and speed feed forward tuning by setting 0x2006 to 2 and turning on the feed forward function.When adjusting, set 0x2019 torque feedforward time constant as a fixed value, and then increase the 2016 speed feed forward coefficient until the speed feed forward achieves effect at a certain setting value.When tuning, the 0x2019 and 0x2016 values should be adjusted repeatedly to find the setting with good balance.

After adjusting the position loop gain, the motor emits low-frequency audible noise in the enable state without starting the running state, which can reduce the speed loop Kp or current loop Kp. if the position loop Kp is set too low, the rigidity is weaker.

5.3 Grouping Gain

When a group of gain can not meet the performance requirements, group gain settings can be made.In the speed loop set zero speed, low speed, high speed and their Kp and Ki grouping gain parameters, in the current loop, position loop grouping gain can choose 0: off, 1: according to the given speed scheduling, 2: according to the actual speed scheduling.

The grouping gain is selected to be scheduled at the given speed, which means that the corresponding speed loop Kp, Ki is scheduled at the set speed, and the actual speed is selected to be scheduled at the actual speed, which means that the corresponding speed loop Kp, Ki is scheduled at the actual speed.The scheduling principle is that when the given or actual speed is in the range of 0-zero speed, the speed loop Kp, Ki is the zero speed speed loop Kp, Ki.The Speed loops Kp, Ki vary linearly in the zero-speed-low-speed range and in the low-speed-high-speed range, respectively.Greater than the high speed, the speed loop Kp, Ki for high-speed speed loop Kp, Ki. as Figure 5-27.

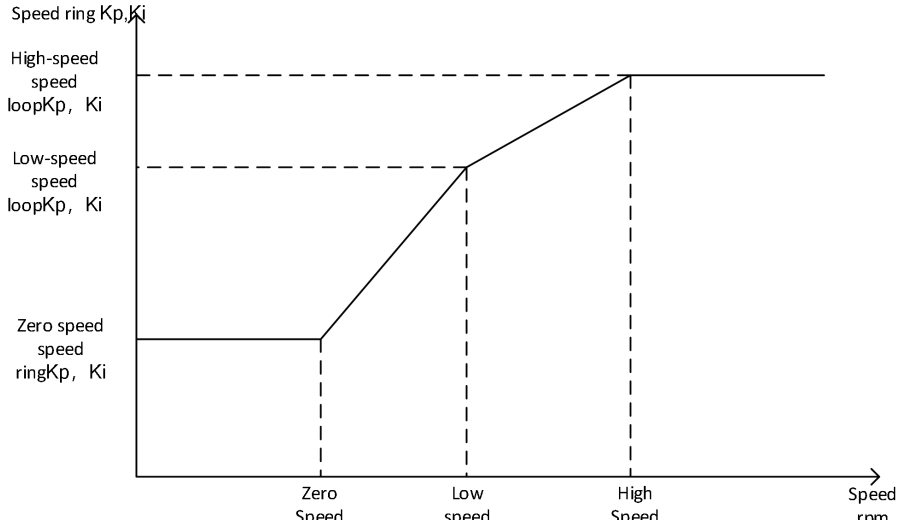


Figure 5-27 Relationship between speed and speed loop Kp, Ki

5.4 Motion Control

5.4.1 Position Model

Select "**Motion Control**" in the main menu, click "**Position Model**" to open the position Model motion control interface, as shown in Figure 4-31.

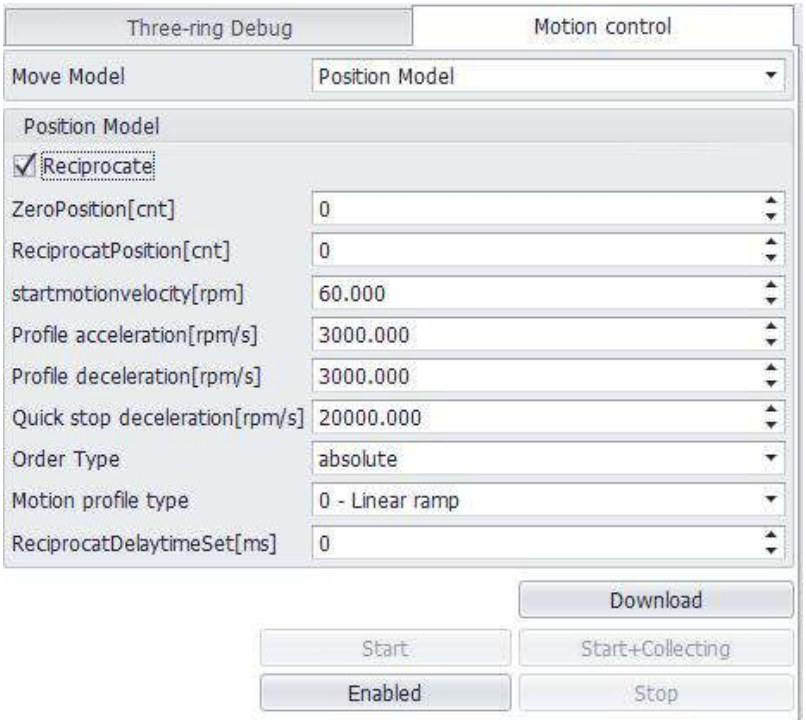


Figure 4-31 Position Model motion control interface

The position Model motion control steps are as follows:

①Configure position Model motion parameters.

- Reciprocating motion: configure the position motion as a one-way motion or reciprocating motion.
- Target position: control the distance of motor movement, when configured as reciprocating motion, the default motion is infinite cycle, and need to set two target positions.
- Speed: The speed of motor movement.
- Acceleration: Acceleration of the motor starting motion.
- Deceleration: the deceleration of the motor stop motion.
- Fast stop deceleration: the deceleration of the motor stop when the energy is directly prohibited.
- Command type: Absolute, movement from the encoder zero point; Relative, movement from the encoder's current position as the zero point. Reciprocal motion can only be "absolute".

- Curve types: There are two types of curve planning: Linear ramp (straight line) and Jerk-limited ramp (S-curve).
- Waiting time: When configured for reciprocal motion, you can configure the target position arrival waiting delay time.

②Enable the servo driver. Click "**Enable**" to switch the servo driver to the enable state.

③**"Start"** to begin position Model motion control**.**

④**"Start + Start Acquisition"** to start position Model motion control, then start acquiring the oscilloscope.

5.4.2 Speed Model

Select "**Motion Control**" in the main menu, click "**Speed Model**" to open the Speed Model motion control interface, as shown in Figure 6-2.

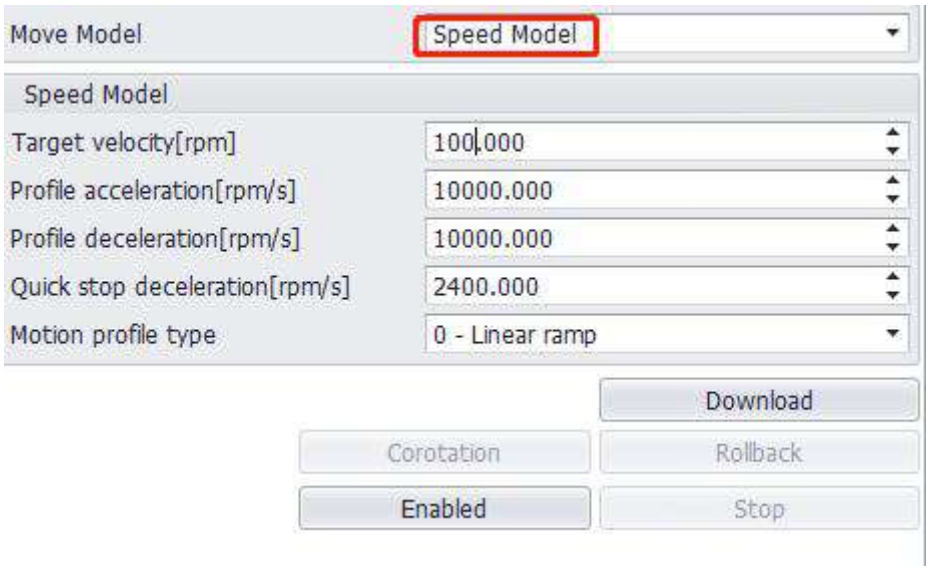


Figure 6-2 Speed Model tuning interface

The Speed Model motion control steps are as follows:

①Configure Speed Model motion parameters.

- Target speed: the speed of motor movement.
- Acceleration: Acceleration of the motor starting motion
- Deceleration: the deceleration of the motor stop motion.
- Fast stop deceleration: the deceleration of the motor stop when the energy is directly prohibited.

②Enable the servo driver. Click "**Enable**", and the motion monitoring window will switch to "**Servo Enable**" after successful enablement.

③Forward/reverse rotation. Forward rotation, control the motor to move in the positive

direction; reverse rotation, control the motor to move in the opposite direction.

5.4.3 Homing Model

Select "**Motion Control**" in the main menu, click "**Homing Model**" to open the Homing Model motion control interface, as shown in Figure 6-3.

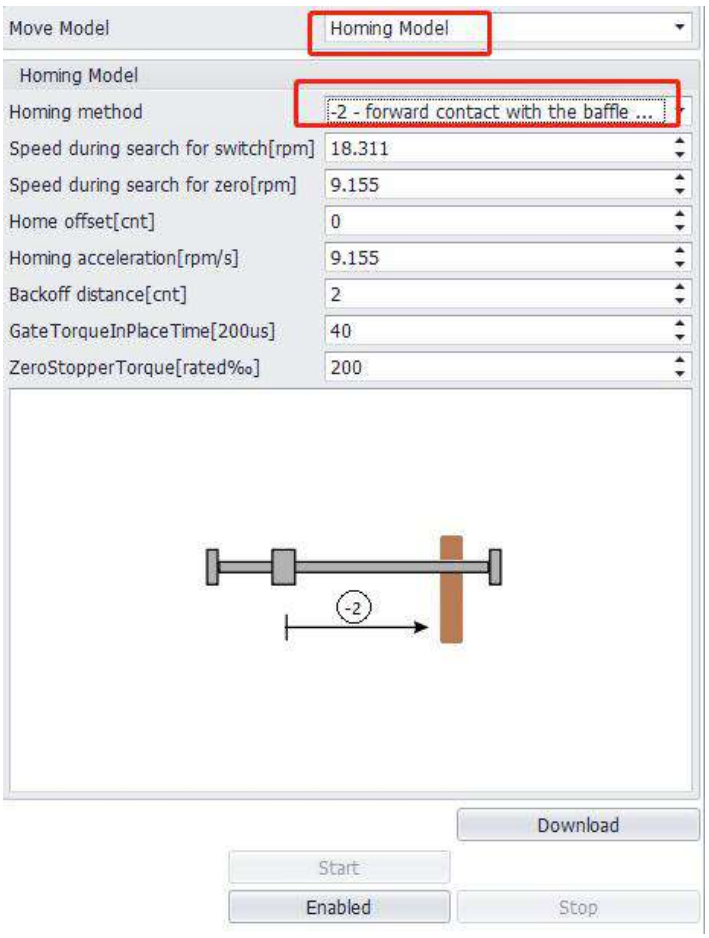


Figure 6-3 Homing Model

The steps of the Homing Model motion control are as follows:

①Configure Homing Model movement parameters。

- Zeroing method: There are 35 types of zero-seeking methods, when starting, the motor moves according to the selected zero-seeking method.
- Zero Search Highway: When starting, the motor starts to find the zero point at high speed
- Zero-seeking low speed: When starting, the motor finds the zero point and then moves to the zero point at low speed.
- Zero Offset: After setting the zero offset, the motor finally stops at the position after the offset.
- Zero-seeking plus or minus speed: At startup, finding zero and finding zero plus or

minus speed

②Servo Drive Enable: Click "**Enable**", and the motion monitoring window will be switched to "**Servo Enable**" state after successful enablement.

③Start/Stop： Tap the "**Start**" button, the motor will move according to the set Homing Model; tap the "**Stop**" button, the motor will stop.

5.4.4 Torque Model

Select "**Motion Control**" in the main menu and click "**Torque Model**" to open the torque Model motion control interface, as shown in Figure 6-4.

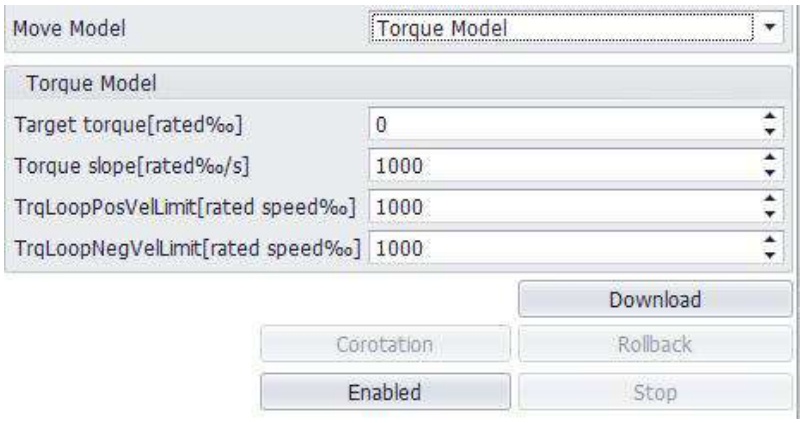


Figure 6-4 Torque Model

Torque Model is generally used for servo loading, torque Model motion control steps are as follows：

①Configure torque Model motion parameters.

- Target torque: The amount of torque output by the motor. (The target torque unit is the rated torque in thousandths)
- Torque ramp: The acceleration at which the motor starts to output torque. (Torque ramp unit is rated torque in thousandths of a second)
- Forward speed limit value: Maximum forward speed limit value under torque control (unit: thousandths of rated speed)
- Reverse speed limit value: Maximum negative speed limit value under torque control (unit: thousandths of rated speed)

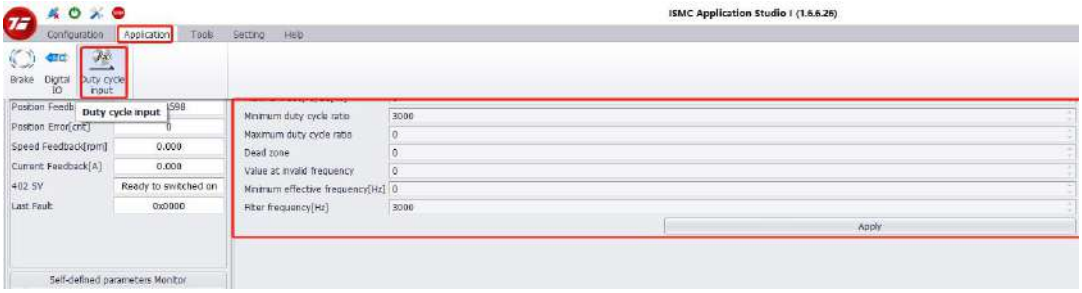
②Servo Drive Enable: Click "**Enable**", and the motion monitoring window will be switched to "**Servo Enable**" state after successful enablement.

③Forward/reverse: forward, control the motor to move with positive given torque; reverse, control the motor to move with negative torque

Chapter 6 Special Function Applications

6.1Duty cycle PWM control

Click "**Apply**" - "**Duty Cycle Input**":



6.1.1、Test control Model is divided into ±50% unidirectional control

Current Model:

6.2.1、Test duty cycle pulse width input + directional control Model

Speed Model:

Function Introduction: Suppose the value of input pulse duty cycle is PDCV, frequency is PDCF, and the reference command value of output is RCO, then the function and output of PDCM are as follows:

1) Under frequency protection: If PDCF < MinVF, RCO = VIF;

2) Linear interpolation with saturation limit: If PDCV < MinDC, RCO= MinDCV, if PDCV > MaxDC, RCO= MaxDCV, otherwise RCO = (PDCV-MinDC) * (MaxDCV-MinDCV)/(MaxDC-MinDC) + MinDCV;

3) Deadband: If RCO is positive, RCO=0 if RCO<DB, otherwise RCO = RCO-DB, and so on when RCO is negative;

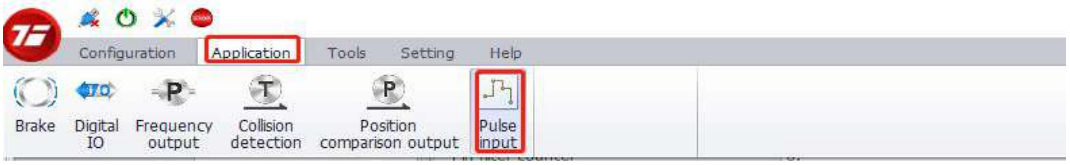
4) Low-pass Filtering: RCO = LPF(RCO), which acts as an output buffer and does not affect the final value;

5) RCO = RCO when the pulse direction input signal is high (5V), i.e., the direction remains unchanged, and RCO = -RCO when the pulse direction input signal is low (0V), i.e., the direction is reversed;

Note: Refer to the corresponding product instruction manual for specific wiring instructions.

6.2 Pulse input

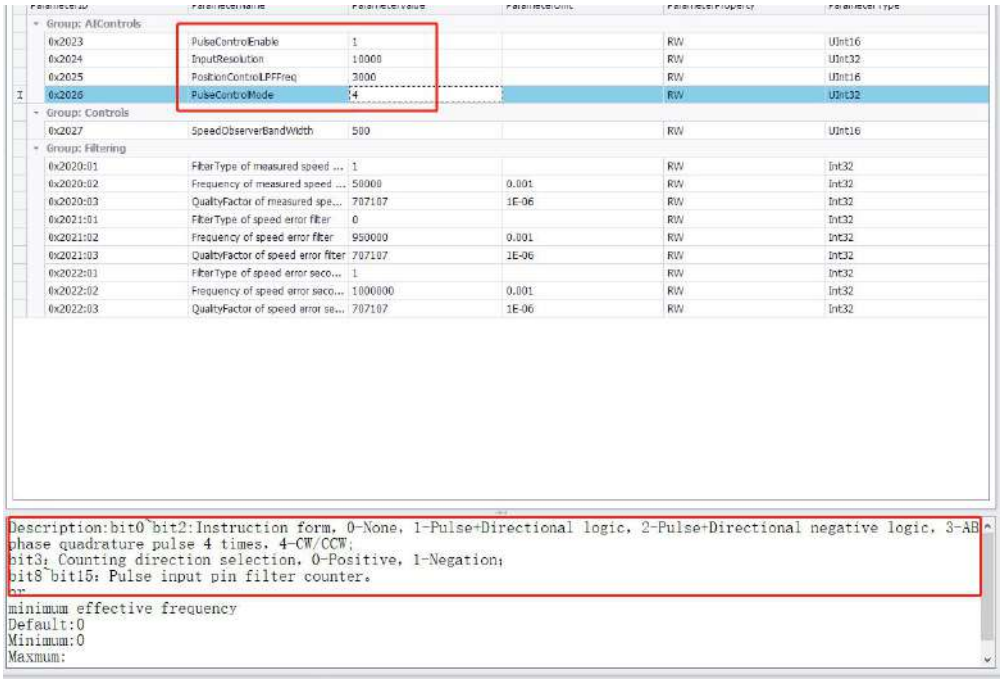
Click "**Application**" in the menu bar, and then click "**Pulse Input**" to bring up the pulse input screen. By modifying the pulse input method, you can select different pulse input methods. And you can switch the pulse direction by "**Counter direction**".



Notes.

1. 0x2023, 0x2024, 0x2025, 0x2026 need to be set when using the pulse input function.

2. Usually pulse input and Frequency output are used at the same time.



6.3 Frequency output

Note:

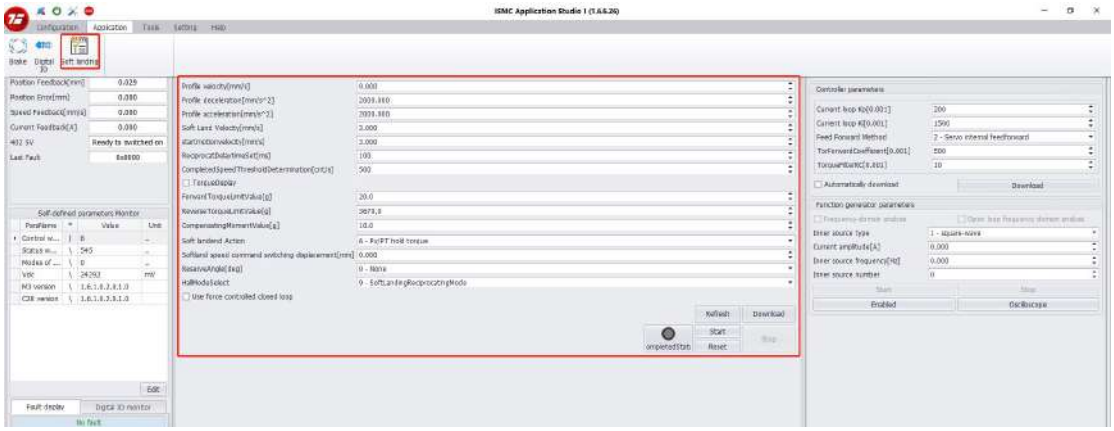
1) Currently incremental only supports 1:1 Frequency output, the maximum absolute value

supports 2500cnt/rev (before 4x frequency), does not support any ratio Frequency;

2）Refer to the corresponding product instruction manual for specific wiring instructions

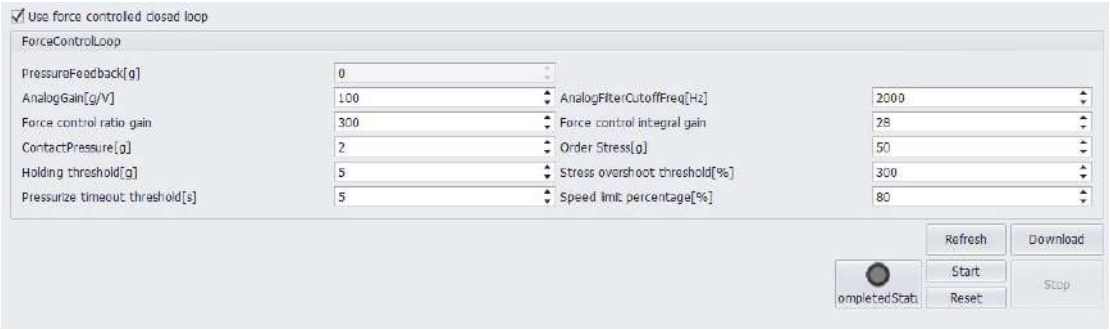
6.4 Soft Landing

Click "**Application**" - "**Soft Landing**":



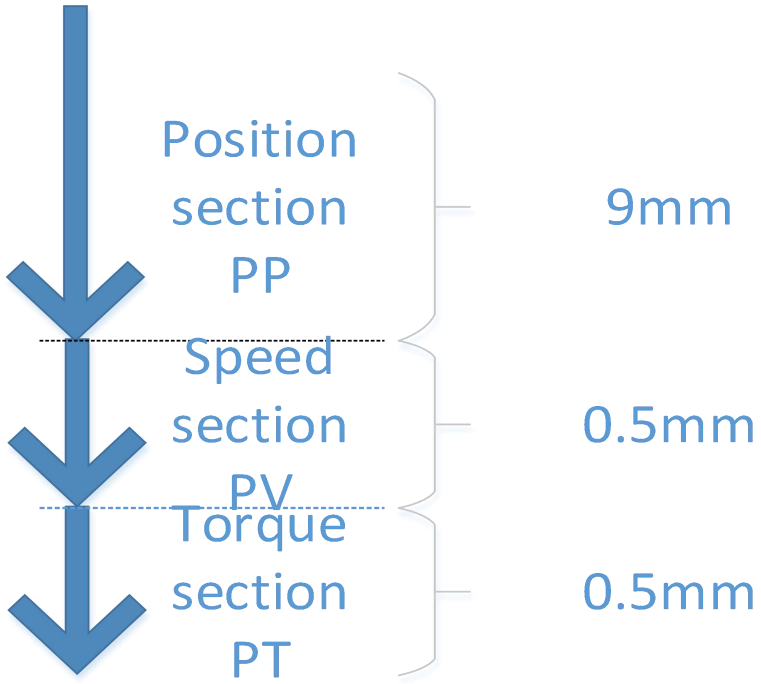
6.4.1）Soft landing open loop Model：

6.4.2）Soft landing closed loop Model parameters：



6.4.3）Soft landing function description：

1）Workflow Description：



Schematic

a) Motor running at high speed in PP Model to position 1 (PP Model forward position, which is generally close to the landing point position);

b) After reaching the first set position, the Model is then quickly switched to PV low speed (two low speed sections can be configured) operation;

Next, in open-loop Model：

c) **PV section while the servo starts to limit the motor torque, when the set torque is reached, the servo cuts to the torque Model to control the motor torque to achieve landing;**

Next, in the case of closed-loop Model：

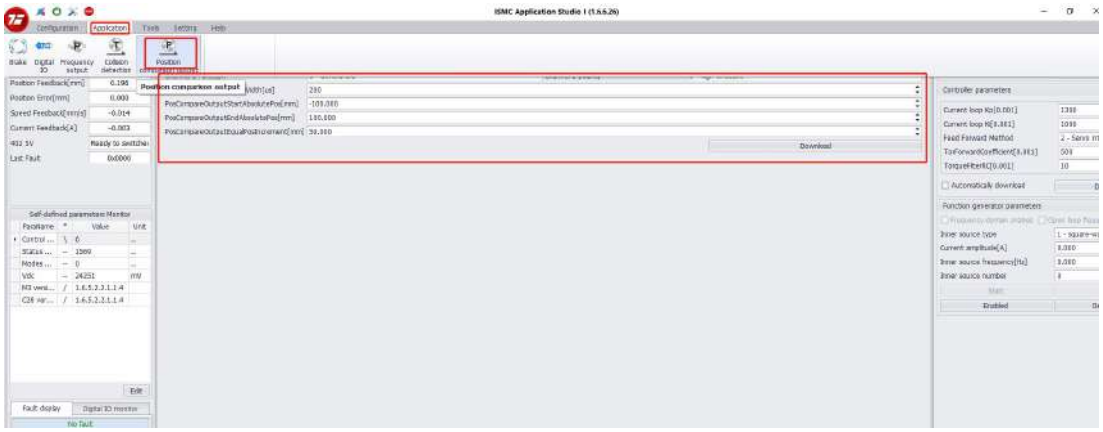
d) **Servo monitoring pressure sensor feedback pressure, when the monitored pressure exceeds the contact pressure, servo into force control closed-loop Model, servo control the set command pressure for closed-loop force control;**

e) Output DO in place signal after force control in place;

f) The servo receives the return command and can execute the return of a set position point 2.

6.5 Position comparison output (flying beat)

Click on "**Compare Outputs**" in "**Applications**".



2、**Parameter operation step-by-step instructions：**

Step 1: First configure the position comparison output function to enable 0x2907 (0: off 1 on this function)

Step 2: Configure the position comparison output configuration 0x290A (2: incremental encoder etc. position incremental Model)

Step 3: Configure position comparison output start absolute position 0x290B, position comparison output end absolute position 0x2909, position comparison output pulse width configuration 0x2908, position comparison output equal position increment 0x290C, silent configuration high active.

Step 4: When the position runs to the starting absolute position, the pulses are output, then the pulses are output at equal intervals until the end of the ending absolute position.,

Step 5: On return, reconfigure the start absolute position and the end absolute position if you want to output.

Note：

1、 The motion start point must be outside the set start and end positions;

2、 For the time being, only the Channel 1 function is supported for online configuration of parameters;

3、 Currently only equally spaced trigger Model is supported, non-equally spaced position trigger Model is not supported at this time;

4、 Refer to the corresponding product instruction manual for specific wiring instruction

Chapter 7 Fault Handling

7.1 Fault alarms

When the system malfunctions, the servo status will automatically jump to disabled, while the interface monitoring area "**real-time monitoring**" and "**fault display**" will display alarm information, and the status bar at the bottom of the software interface will appear alarms.

Switch to "**Fault Display**" at the bottom of the status monitoring window in the main interface to view current faults and warnings. The Fault Alarm window displays information such as the cause of the fault, confirmation methods, and handling measures, as shown in Figure 7-1.

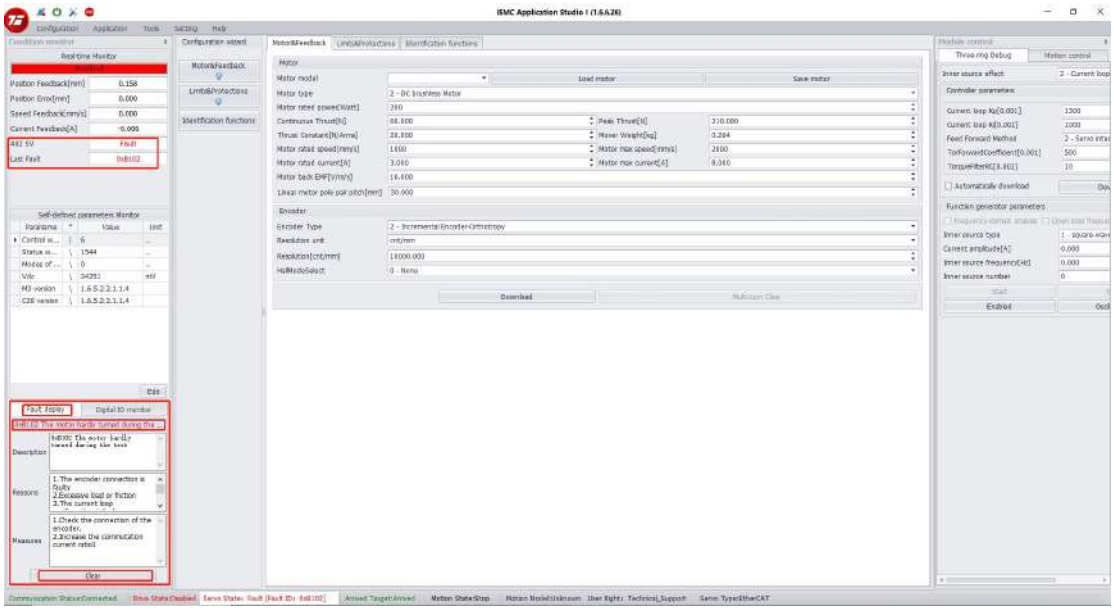


Figure 7-1 Fault Alarm

After taking measures to solve the fault according to the "**Fault Alarm**" prompt, you need to use the "**Clear Fault**" button in the "**Quick Command**" to clear the alarm and the servo will run normally after successful clearing.

Note:If the fault is not cleared, the measures to clear the fault may be ineffective or a non-clearable fault may have occurred, the latter requiring a restart of the servo to clear the fault.

7.2 Error Log

Click on "**Tools**" in the main menu, select "**Error Log**" and click on "**Read Error Log**" to view the error log of the servo, which records the faults that occurred after the servo was started and shows the cause and time of the faults, as shown in Figure 7-2.

7.3Fault clearance

When the servo fault state is released, the fault can be cleared out by clicking  on the

interface.

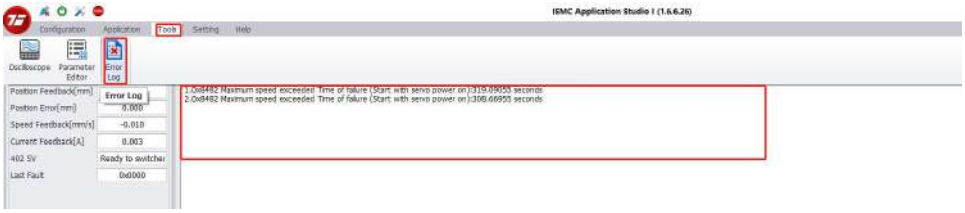


Figure 7-2 Error Log

The fault time is counted in seconds since the servo was started, with the higher number indicating the more recent the fault (e.g. Figure 7-2, the fault with number 1 is the most recent fault, occurloop 947 seconds after the servo was started).

The error log will not be cleared by a power-down restart of the servo, and the user will need to clear the error log manually. Click on "Clear Error Log" in the error log to clear the error log as shown in Figure 7-3.

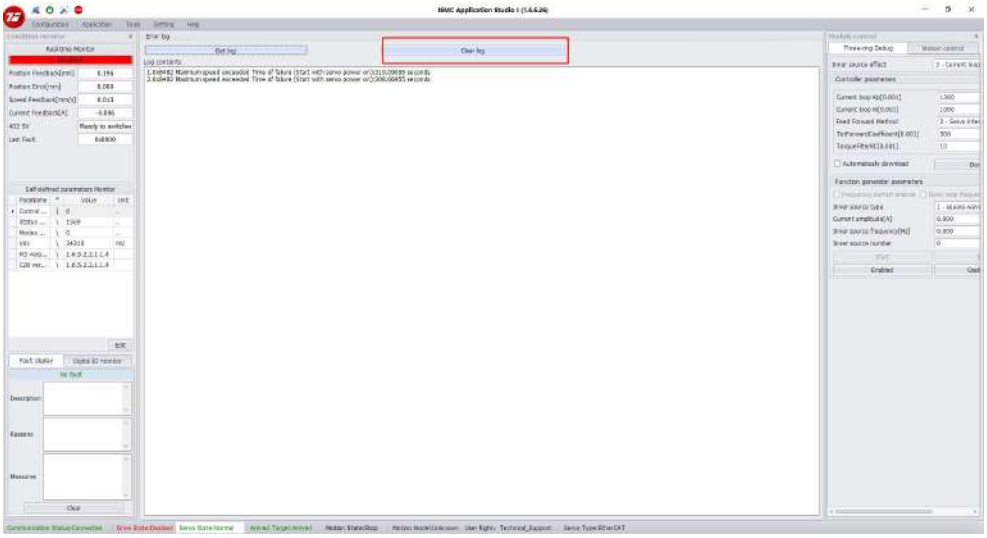


Figure7-3 Clear the error log

Chapter 8 Settings

8.1 User rights settings

There are two levels of access to the ISMC, from low to high, namely "normal user" and "technical support staff", with different levels of access to different functions.

In the main menu "Settings", click on "User Permissions", enter the user name and password to complete the user login, as shown in Figure 8-1 (the current default developer parameter permissions).

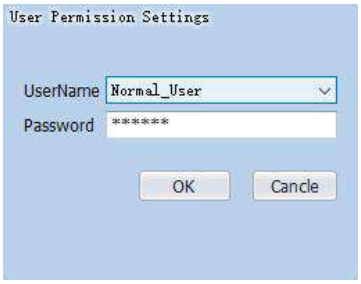


Figure 8-1 User login screen

8.2 Hotkey settings

In the main menu of "**Settings**" click on the hotkey settings, you can set the buttons in the main menu "**Quick Command**" as keyboard input hotkeys F1~F10, as shown in Figure 8-3.

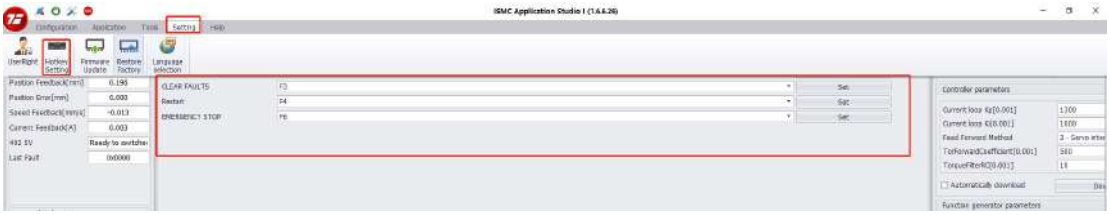


Figure 8-3 Hotkey settings

8.3Restore factory

Click on "**Restore factory**" in the main menu under "**Settings**" to restore all parameters in the servo drive to the factory values of the servo drive.

Note：After restoring the factory settings, it is necessary to reconfigure the motor parameters, save the configuration parameters to EEPROM and restart the servo.

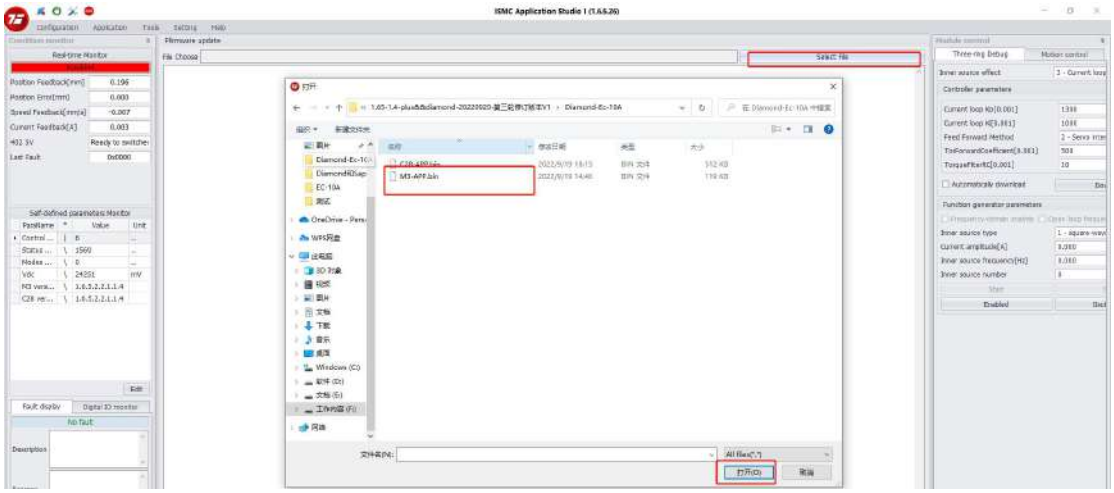
8.4 Firmware upgrades

In the main menu, under "**Settings**", click on "**Firmware Upgrade**" to upgrade the firmware of the servo drive, the process is as follows;

①Select "**Help**" in the main menu and click on "**Firmware Upgrade**" to open the firmware upgrade screen, as shown in Figure 9-1 above.

Figure 9-1 Firmware upgrade

②Click on "**Select File**" to open the folder and select the M3 or C28 file to be upgraded:



③Click "**Upgrade**" to start the upgrade process. After the upgrade is successful, the software will be disconnected from the servo as the servo will restart; after reconnecting, repeat the above steps to upgrade the next program and the firmware upgrade will be completed.

Note: 1.For firmware upgrades, please contact a servo technician.

2.The upgraded file names are in the fixed format C28-APP.bin and M3-APP.bin;

3.First time to flush M3-APP.bin first, then C28-APP.bin;

4.It is important to ensure that the drive is not powered down and that the USB communication is not disconnected during the upgrade proces

Chapter 9 Help

9.1 User manual

In the main menu, click on "**User manual**" to open the "**ISMC Servo TuningSoftware ISMC User Manual**".

9.2 About

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