

The Manual for Debugging Software V3.0

CATALOG

1. Main Page Introduction	1
1.1 Open the Debugging Software V3.0	1
1.2 The Interface Area Introduction	3
2. Motor Running Interface Introduction	3
2.1 Servo Mode Control Panel	3
2.2 Motion Mode Control Panel	4
2.3 Real-time Waveform Status Panel	6
2.4 Waveform Display Panel	6
2.5 Status Bar	7
3. Introduction to the Basic Settings Interface	7
3.1 Enter the Interface	7
3.2 Operation Introduction	8
3.3 Parameter Description	8
3.3.1 Communication Parameters	8
3.3.2 PI Parameters	9
4. Introduction of Advanced Settings Interface	10
4.1 Enter the Interface	10
4.2 Operation Introduction	10
4.3 Parameter Description	11
4.3.1 Protection Parameters	11
4.3.2 Planning parameters	12
5. Introduction of Motor Calibration Interface	13
5.1 Enter the Interface	13
5.2 Operation Introduction	14
5.3 Parameter Description	14
6. Motor Upgrade Interface Introduction	15
6.1 Enter the Interface	15
6.2 Operation Introduction	15
6.2.1 Read Parameters	15
6.2.2 Reset	15
6.2.3 Update	16
6.2.4 Update Program Error Reasons and Solutions	17
6.3 Parameter Description	18
7. Error Message Description	19

The Manual for Debugging Software V3.0

1. Main Page Introduction

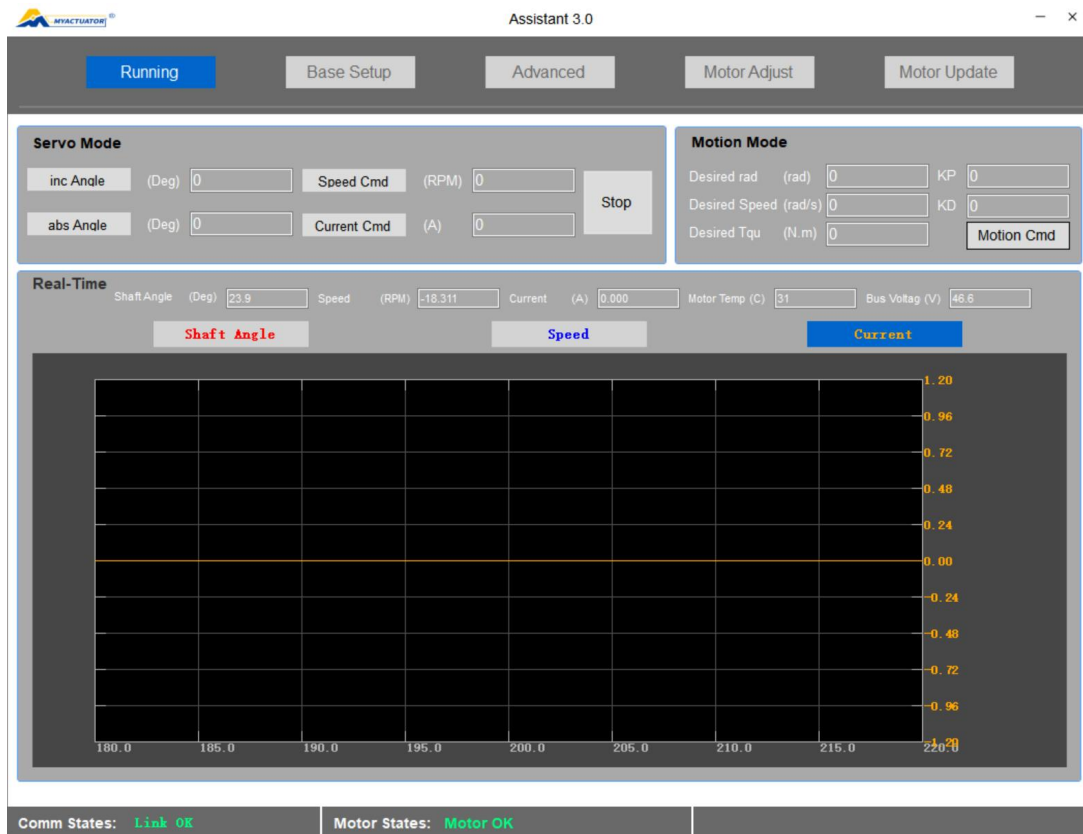
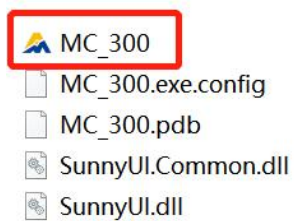
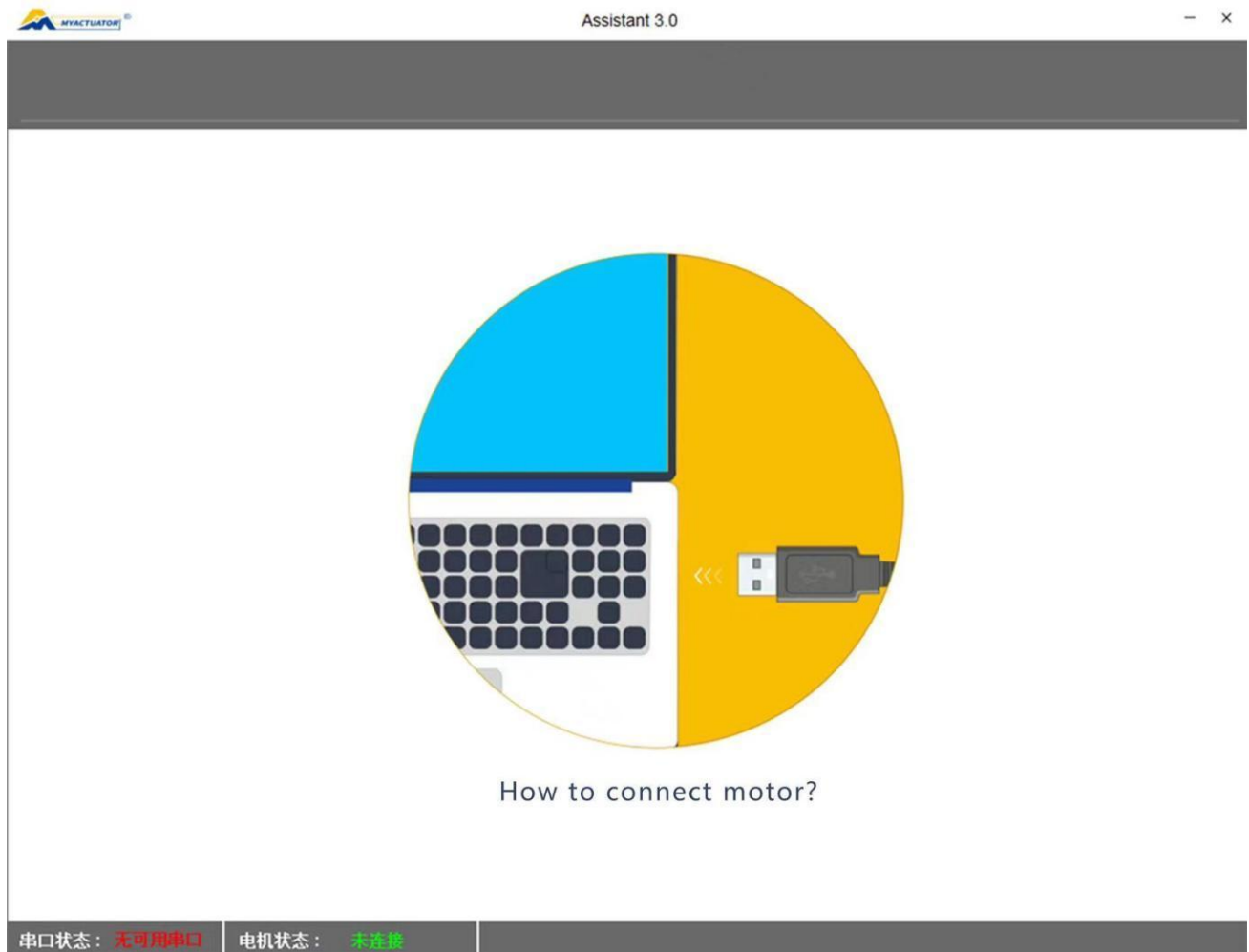


Figure 1: Interface Area

1.1 Open the Debugging Software V3.0



After the motor is powered on, double-click the EXE file named Assistant3.0, the software will automatically search for available serial ports and try to connect. The serial port status in the lower left corner of Figure 1 will display the serial port connection status. If the connection is successful, it will display that the serial port has been connected. If it fails, it will jump to the following interface.



You can continue the motor picture and try to reconnect.

The possibility of connection failure are:

- 1) The motor is not successfully powered on, and the power supply and connectors need to be checked;
- 2) The communication connector is wired incorrectly;
- 3) The serial port of the computer is already occupied;
- 4) The debugger does not install a suitable driver;

1.2 The Interface Area Introduction

The interface area is divided into the following parts according Figure 1:

A: Main menu bar

B: Servo mode control panel

C: Torque and Position mode control panel

D: Real-time waveform status panel

E: Waveform display panel

F: Status bar

The main menu bar and status bar remain unchanged when the interface is switched, and other areas will change according to different menu bars.

2. Motor Running Interface Introduction

When open the debugging software v3.0, the motor running interface is entered by default, and real-time data update is enabled.

2.1 Servo Mode Control Panel

There are 5 control buttons and 4 data input boxes in the servo mode control panel. The data entry box is to the right of the control buttons. After inputting valid data, click the button on the left to execute the corresponding command.

1) Incremental Angle Control:



After entering the incremental target angle in the data input box, click the incremental angle button, and the motor will run the set incremental angle with the current position as the starting position.

2) Absolute Angle Control



After entering the absolute target angle in the data input box, click the absolute angle button, and the motor will run with the set absolute position as the target.

3) Speed Command



in the data input box, click the speed command button, and the motor will run at the set speed. The set speed is based on the speed of the motor end, that is, the input end of the reduction ratio.

4) Current Command



After entering the target current in the data input box, click the current command button, and the motor will run at the set current.

5) Stop Command



After the motor stop command, the motor will enter the standby state and there will be no output.

2.2 Motion Mode Control Panel

There are 5 parameter input boxes and 1 control button in the motion control mode panel.



Motion Mode Control Panel

1) Desired angle: p_des

Enter the desired angle in the input box, and the motor will run at this angle as the absolute target value. Only position mode is run when $KD=0$. Note that the unit is rad, and entering 6.28 is equivalent to setting the target angle to 360

degrees.

2) Desired speed: v_{des}

Enter the desired speed in the input box, and the motor will run at this target speed. Only the speed position is run when $KP=0$. The unit is rad/s, refer to the conversion unit formula: $1\text{rad/s} = 9.554\text{RPM}$. The speed is the speed of the motor end, that is, the speed of the input end of the reducer.

3) Desired torque: t_{ff}

Enter the desired torque in the input box, and the motor will run with this target torque.

4) KP :

Indicates the deviation coefficient between the target angle and the feedback angle.

5) KD :

Indicates the deviation coefficient between the target speed and the feedback speed.

6) Motion control command

After inputting the 5 parameters, click the operation control command, and the click will be calculated and output according to the expected value. Calculated as follows:

$$\text{TorqueRef} = (p_{des} - p_{fb}) * KP + (v_{des} - v_{fb}) * KD + t_{ff}; \text{TorqueRef:}$$

Indicates the final target torque output to the motor;

p_{fb} : actual angle feedback;

v_{fb} : actual speed feedback;

2.3 Real-time Waveform Status Panel



- 1) Shaft Angle:
Indicates the actual angle at the output of the motor reducer.
- 2) Speed:
Indicates the actual speed of the motor end, that is, the input end of the reducer.
- 3) Current:
Indicates the actual torque (Iq) current of the motor.
- 4) Motor Temperature:
Indicates the actual temperature of the motor.
- 5) Bus Voltage:
Indicates the actual voltage of the power supply terminal.

2.4 Waveform Display Panel

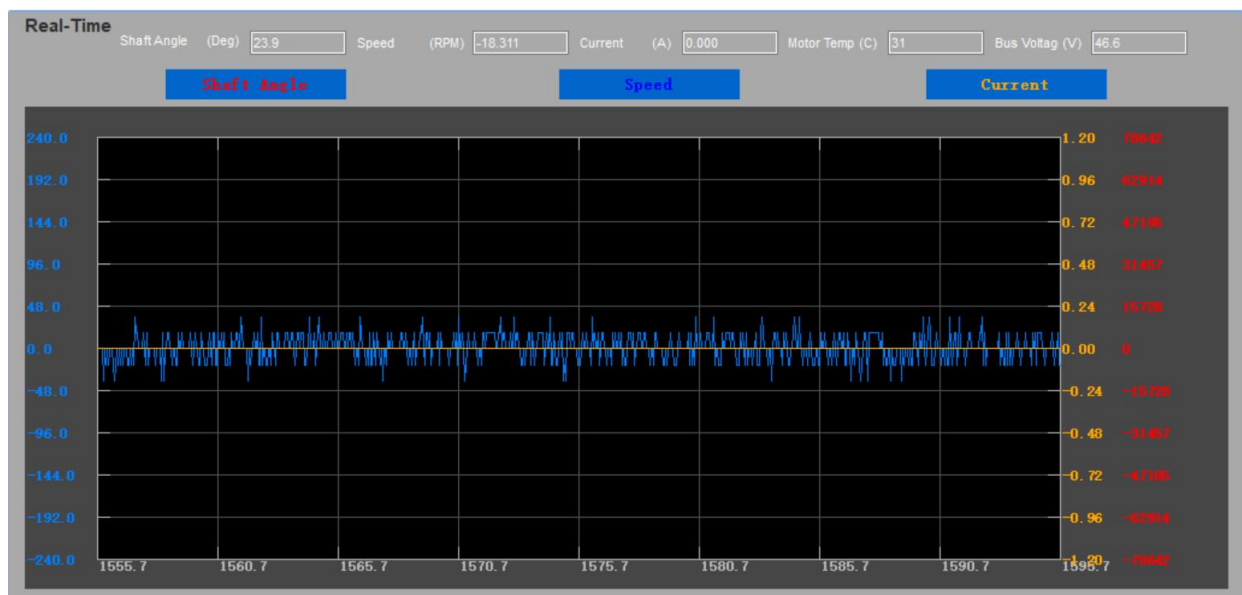


Figure 2: Waveform Display Interface

The waveform display interface can display 3 data waveforms individually or at the same time, namely IQ current, speed, and position. These three data are consistent

with the angle, speed, and current feedback data in the real-time status bar. The actual value of the data is displayed on the left and right sides, and its range is automatically adjusted according to the actual size.

2.5 Status Bar



The serial port status indicates the serial port connection status. The motor status will prompt related errors.

3. Introduction to the Basic Settings Interface

3.1 Enter the Interface

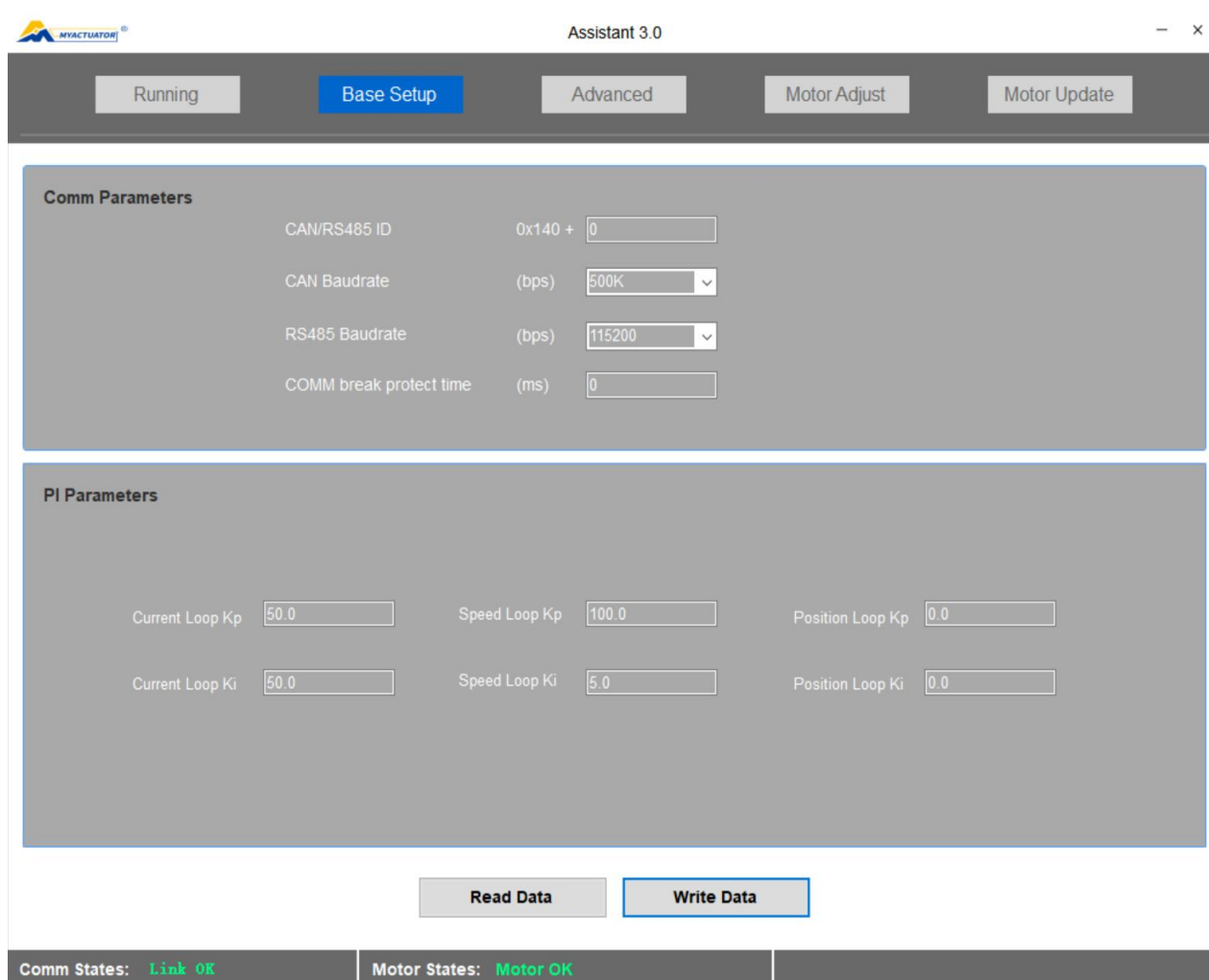


Figure 3: Basic settings interface

The basic setting of the main menu of the motor can enter the basic setting interface. The host computer has updated the parameters once after the connection, so the parameters displayed in the interface are the parameters read from the motor. The data can also be read again via the Read Data button.

3.2 Operation Introduction

- 1) Click to read data to update all parameters in the interface;
- 2) Modify the relevant data parameters, and then click Write Data to save;
- 3) If reading data or writing fails, you can click again to read data and write data to operate again.

3.3 Parameter Description

3.3.1 Communication Parameters

parameter name	Ranges	unit	Effective way	description
CAN/RS485ID	1-32	decimal	effective immediately	means to sendID, 0x140 + ID。
CAN Baudrate	optional	bps	effective immediately	Baud rate setting for CAN communication, providing

				optional baud rate.
RS485 Baudrate	optional	bps	effective immediately	The baud rate setting of RS485 communication provides optional baud rate.
Communication interruption protection time	$0 - 2^{32} - 1$	millisecond	effective immediately	During the communication process, if the motor does not receive a command within the set time, it will stop outputting. If there is a holding brake, the holding brake will be closed. 0 means this function is invalid.

3.3.2 PI Parameters

parameter name	Ranges	unit	Effective way	description
Current loop KP KP	0-255		effective immediately	The set value corresponds to the maximum range of KP inside the motor. If the maximum value of KP is 1, then 255 corresponds to 1. The maximum value is related to the motor model and cannot be modified by the user.
Current loop KI	0-255		effective immediately	Ditto
Speed loop KP	0-255		effective immediately	Ditto
Speed loop KI	0-255		effective immediately	Ditto
Position Ring KP	0-255		effective immediately	Ditto
Position Ring KI	0-255		effective immediately	Ditto

4. Introduction of Advanced Settings Interface

4.1 Enter the Interface

Assistant 3.0

Running Base Setup **Advanced** Motor Adjust Motor Update

Protect Parameters

Current Loop Kp Max		0.1
Current Loop Ki Max		0.05
Speed Loop Kp Max		0.1
Speed Loop Ki Max		0.001
Position Loop Kp Max		0.5
Position Loop Ki Max		0.005
Over Voltage	(V)	65
Low Voltage	(V)	22
Stall Time Limit	(ms)	0

Plan Parameters

Max Positive Position	(deg)	65535
Max Negative Position	(deg)	65535
Position Plan Max Acc	(dps/s)	5000
Position Plan Max Dec	(dps/s)	5000
Position Plan Max Speed	(RPM)	500
Speed Plan Max Acc	(dps/s)	1000
Speed Plan Max Dec	(dps/s)	0
Motor Position Zero	(Pulse)	0

Set the current position to zero of the motor **Setting**

Read Data **Write Data**

Comm States: **Link OK** Motor States: **Motor OK**

Figure 4: Advanced settings interface

4.2 Operation Introduction

- 1) Click to read data to update all parameters in the interface;
- 2) Modify the relevant data parameters, and then click Write Data to save;
- 3) If reading data or writing fails, you can click again to read data and write data to operate again.

4.3 Parameter Description

4.3.1 Protection Parameters

parameter name	Ranges	Unit	Effective way	description
Current loop KP maximum value	none	none	none	read only

Current loop KI maximum value	none	none	none	read only
Speed loop KP maximum value	none	none	none	read only
Speed loop KI maximum value	none	none	none	read only
Position loop KP maximum value	none	none	none	read only
Position loop KI maximum value	none	none	none	read only
Overvoltage value	0-100	Volt	none	read only
Undervoltage value	0-100	Volt	none	read only
Stall time limit	$0 - 2^{32} - 1$	millisecond	effective immediately	Set how long to stop the output after entering the locked rotor state, and close the brake if there is a brake.

4.3.2 Planning parameters

parameter name	Ranges	Unit	Effective way	description
Maximum positive angle	10-65535	Spend	effective immediately	The maximum position that can be traveled to in the position loop
Maximum negative angle	10-65535	Spend	effective immediately	The minimum position that can be reached in the position loop, the program will treat it as a negative value
Position loop planning maximum	100-60000	dps/s	effective immediately	During position loop operation, the acceleration time from the

acceleration				current speed to the set speed
Position loop planning maximum deceleration	100-60000	dps/s	effective immediately	During position loop operation, the deceleration time from the current speed to the set speed
Position loop planning maximum speed	10- Motor rated speed	RPM	effective immediately	Maximum speed setting during position loop operation
Speed planning maximum acceleration	100-60000	dps/s	effective immediately	When the speed loop is running, the acceleration time from the current speed to the set speed
Speed planning maximum deceleration	100-60000	dps/s	effective immediately	When the speed loop is running, the deceleration time from the current speed to the set speed

Motor position zero	$-2^{31} - 2^{31}$	pulse	power cycle	Write the specified pulse as the zero point of the motor position. You can also read the zero pulse value of the current motor position.
Set the current position as the motor zero point	none	none	power cycle	After clicking the set button, the current motor position will be saved as the zero point position.

5. Introduction of Motor Calibration Interface

5.1 Enter the Interface

The screenshot displays the 'Motor Adjust' tab of the 'Assistant 3.0' software. The interface is divided into two main sections: 'Master Encoder' and 'Slaver Encoder'.

Master Encoder Section:

- Pole-Paris: Paris
- Single-Resolution Value (Pulses)
- Adjust Current (A)
- Change Motor Direction
- Encoder Adjusted Value
- Encoder Accuracy
- A green 'Adjusted' status indicator is shown.
- An 'Adjust Encoder' button is located at the bottom right of this section.

Slaver Encoder Section:

- Encoder Direction
- Encoder BCT
- Encoder Adjust
- Encoder Zero
- A '设置' (Settings) button is located at the bottom right of this section.

At the bottom of the interface, there are 'Read Data' and 'Write Data' buttons. The status bar at the very bottom shows 'Comm States: Link OK' and 'Motor States: Motor OK'.

Figure 5: Motor Calibration Screen

5.2 Operation Introduction

- 1) Click read data to update the parameters;
- 2) Modify the appropriate open-loop matching current value, generally no more than half of the rated current at no-load;
- 3) Click the “zero” calibration button and wait for the motor calibration;
- 4) If the calibration fails, you can click the zero calibration again;
- 5) Can increase the open-loop matching current to make the motor calibration successful.
- 6) After the calibration is successful, it will display that it has been calibrated and saved, and there is no need to calibrate again after powering on again;
- 7) Motor calibration is best to keep the motor in a no-load state.

5.3 Parameter Description

parameter name	Ranges	Unit	Effective way	description
Number of pole	none	none	none	Read-only, the motor parameters

pairs				cannot be modified by the user
Number of encoder lines	none	none	none	Read-only, the motor parameters cannot be modified by the user
Open loop matching current	0.1- Motor rated current	A	effective immediately	The running current during motor calibration, if the current is too small, the torque is not enough, and the motor calibration fails. Excessive current is also easy to cause current protection. Generally within the rated current range.
Change motor direction	none	none	none	Read-only, the motor parameters cannot be modified by the user

Encoder Zero Calibration	none	none	none	Read-only, the calibration result cannot be modified by the user
encoder accuracy	none	none	none	Read-only, the calibration result cannot be modified by the user

6. Motor Upgrade Interface Introduction

6.1 Enter the Interface

Assistant 3.0

Running Base Setup Advanced Motor Adjust **Motor Update**

Motor

Version

Motor ID: 0
Motor Name: X10 S1
Firmware Version: 2022060302
Delivery Time: 0

Protect

Nominal Current (A): 50
Max Current (A): 80
Stall Current (A): 100.0
Shutdown Temp (C): 100.0
Resume Temp (C): 90.0

Motor

Max Speed (RPM): 5000.0
Nominal Speed (RPM): 3000.0
Enable Second Encoder: 0
Multi-turn Value: 0
Gear Ratio: 7.0

Read Data Restore Factory

Update

0% Load File Update File

Comm States: Link OK Motor States: Motor OK

6.2 Operation Introduction

6.2.1 Read Parameters

Click the read button to read the motor-related parameters;

6.2.2 Reset

Click the “Reset” button, select the HEX file corresponding to the motor, and then restore all the calibration parameters to the Reset;

名称	修改日期	类型	大小
 mc_300.hex	2022/4/4 21:50	HEX 文件	104 KB

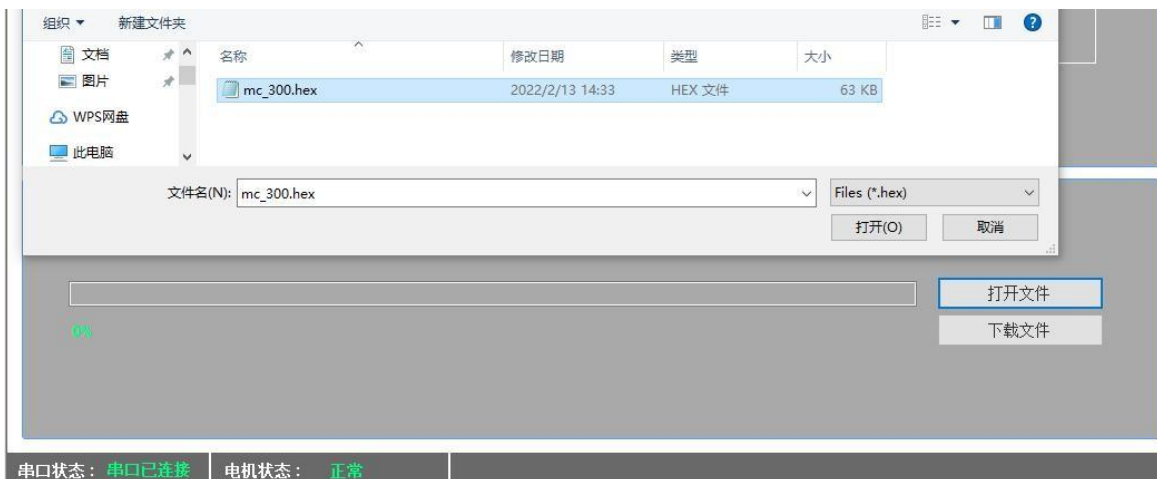


Figure 7: Select factory default hex file

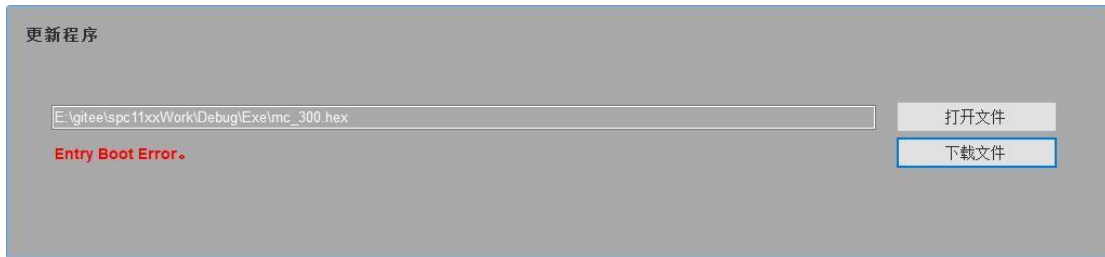
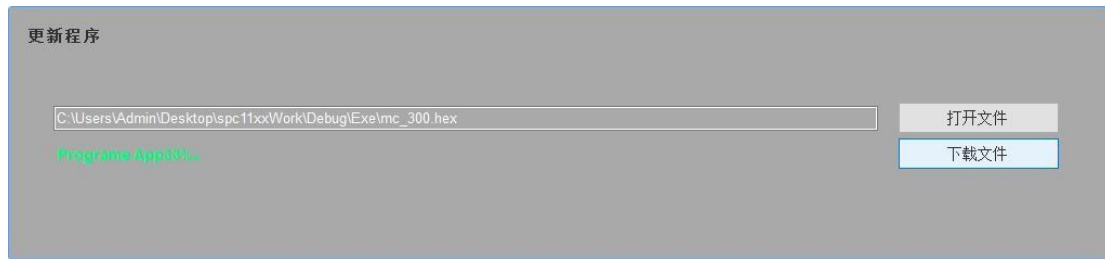
6.2.3 Update

MYACTUATOR will optimize the driver functions and customers can update them remotely.

Click the Open File button, select the firmware, and load the firmware data.



Click “download file” to update the program, the update process will display the update progress in real time, prompt any red Error message, you need to find the cause of the problem and click 'download file' again to re-update the program.



After the update process is completed, the BOOT mode is launched to display the following information.



6.2.4 Update Program Error Reasons and Solutions

- 1) During the flashing process, the communication is interfered and the flashing fails. Try to avoid the interference and restart the flashing.
- 2) In the process of flashing, if the power is suddenly lost or the computer fails, you need to restart the flashing under stable conditions.
- 3) If the re-flash is unsuccessful for many times, contact the manufacturer for processing or return to the factory for repair.

6.3 Parameter Description

parameter name	Ranges	unit	Effective way	description
Motor number	none	none	none	Read only, factory parameters
Motor name	none	none	none	Read only, factory parameters
Firmware version	none	none	none	Read only, factory parameters
Rated current	none	A	none	Read only, the current the motor can run continuously.
Maximum phase current limit	none	A	none	Read-only, motor phase current protection point, which will trigger protection in case of short circuit, phase loss, or runaway.
Stall Current Limit	none	A	none	Read only, peak current that can be run for a short time.
Over temperature protection temperature	0-150	Spend	none	Read-only, when the motor temperature reaches the protection point, it will stop outputting and reporting an error.
Over temperature recovery temperature	0-150	Spend	none	Read only, normal operation will resume when the motor temperature reaches the recovery point.
maximum speed	none	RPM	none	Read-only, the motor will stop outputting an error when it reaches the maximum speed.

Rated speed	none	RPM	none	Read only, the maximum speed the motor can achieve at rated voltage.
Start the second encoder	none	none	none	Read-only, indicating whether the motor has dual encoder function.
Position multi-turn value	0-65535	lock up	none	Read only, the saved motor position multi-turn value before the last power failure.
Reduction ratio	none	none	none	Read only, the size of the motor reduction ratio.

7. Error Message Description

Error message	description	Solution
hardware overcurrent	If the motor current exceeds the limit value, there may be short circuit, phase loss, loss of control, motor damage,	Check the power supply and motor wiring for short circuit, phase loss, or parameter error.
Stall error	After the current reaches the locked-rotor current, the speed is very low and continues for a period of time. Indicates that the motor load is too large.	The load may exceed the operating range of the motor.
undervoltage error	The power input is lower than the set undervoltage value	Check whether the input voltage of the power supply is too low and can be increased to an appropriate value.
Overvoltage error	The power input is higher than value the set overvoltage	Check whether the input voltage of the power supply is too high and can be reduced to an appropriate value.

Phase current overcurrent	The software detects that the motor current exceeds the limit value, and there may be short circuit, phase loss, loss of control, motor damage, etc.	Check the power supply and motor wiring for short circuit, phase loss, or parameter error.
Power overrun error	If the input current of the power supply exceeds the limit value, there may be a situation where the load is too large or the speed is too high.	Reduce the load or reduce the motor running speed.
Calibration parameter read error	Failed to write parameters causing parameters losing.	Updating parameters via reset.
overspeed error	The motor running speed exceeds the limit value, there may be overpressure and drag use.	Check whether the input power is over-voltage, and whether there is a possibility of forcibly dragging the motor.
Motor overtemperature error	If the motor temperature exceeds the set value, there may be short circuit, parameter error, and long-term overload use.	Check whether the motor parameters are correct, whether there is a short circuit, and whether the load is too large.
Encoder calibration error	The encoder calibration result deviates too much from the standard value.	Check whether the motor load is too large, you can remove the load or reduce the load, increase the