Instructions for using Studio

please go to the download center on the official website of www.robstride.com

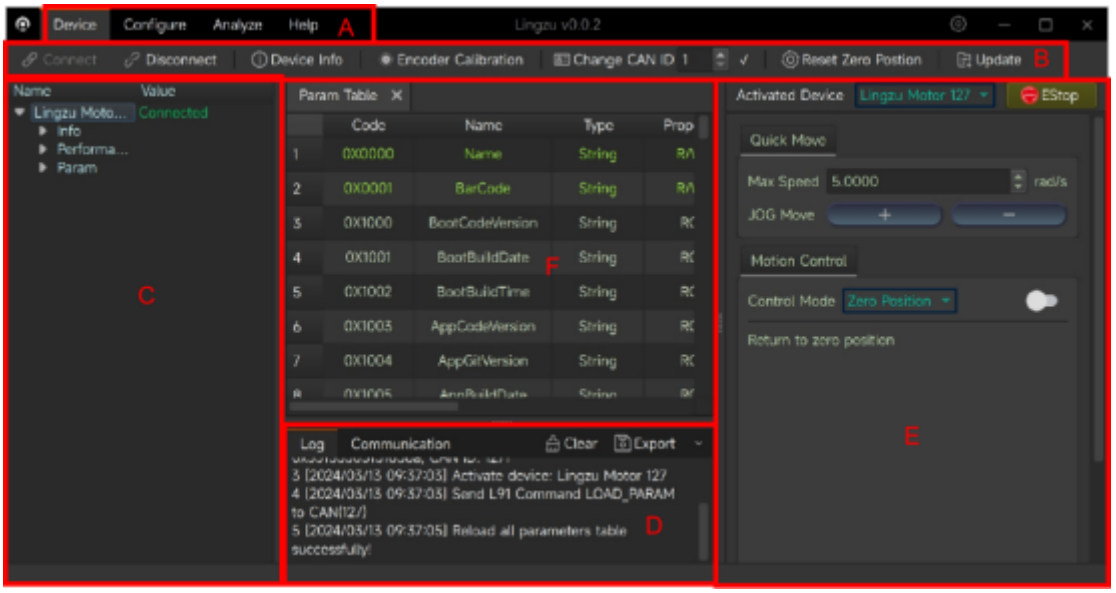
Hardware Configuration

The joint motor adopts CAN communication method, with two communication lines connected to the debugger through CAN to USB tool. The debugger needs to install ch340 driver in advance and works in AT mode by default.

It should be noted that we developed the debugger based on a specific CAN to USB tool, so we need to use the recommended serial port tool for debugging. If you want to port to other debugger platforms, you can refer to Chapter 3 of the manual for development.

It is recommended to use Robstride USB-CAN module for the CAN to USB tool, with a frame header of 41 54 and a frame tail of 0D 0A corresponding to the serial protocol.

Studio interface and instructions



Mainly including:

A. Module selection

- Equipment module
- Configuration module
- Analysis module
- Help module

B. Sub module selection

- Connecting or disconnecting motor equipment
- Motor equipment information
- Motor encoder calibration
- Modify the motor CAN ID
- Set the mechanical zero position of the motor
- Motor program upgrade

The configuration module includes:

- Parameter table, can view and modify motor parameters
- Upload parameters, you can upload the parameters in the motor to the parameter table
- Download parameters, you can download the data from the parameter table to the motor
- Export parameters and download the data from the parameter table to the local location
- Restore to factory settings by resetting the data in the parameter table to factory settings
- Clear warning to clear motor errors, such as excessive temperature

The analysis module includes:

- Oscilloscope, which can view the curve of parameter changes over time
- Frequency, can adjust the frequency of viewing data
- Channel, can be configured to view data
- Start and stop drawing
- Output waveform data to local

The help module includes:

- Instructions for use, which can be opened
- Regarding, you can view software information

C. Motor information inquiry

- Device information
- Parameter Table Information

D. Data bar

- log information
- Communication information

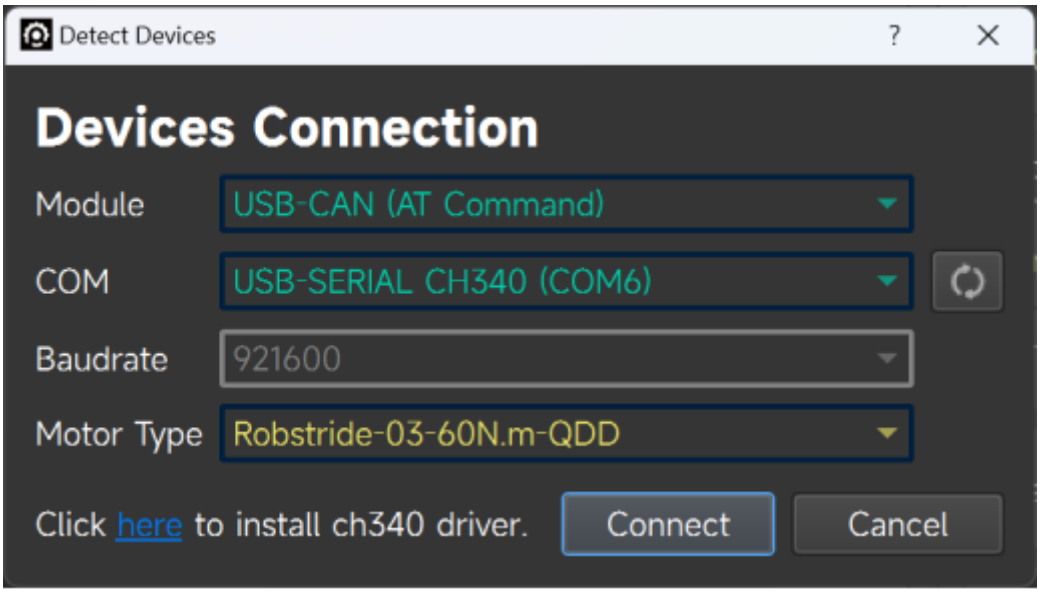
E. Run debugging area

- Select device
- Convenient operation area, which can quickly control the forward and reverse rotation of the motor
- Motion control area, which can control the motor to operate in various modes

F. Sub module display area

Motor settings

Motor connection settings



Connect the CAN to USB tool (install ch340 driver, default working in AT mode), click on the connection submodule in the device module, select the corresponding serial port connection and motor type, and click connect.

Basic Settings

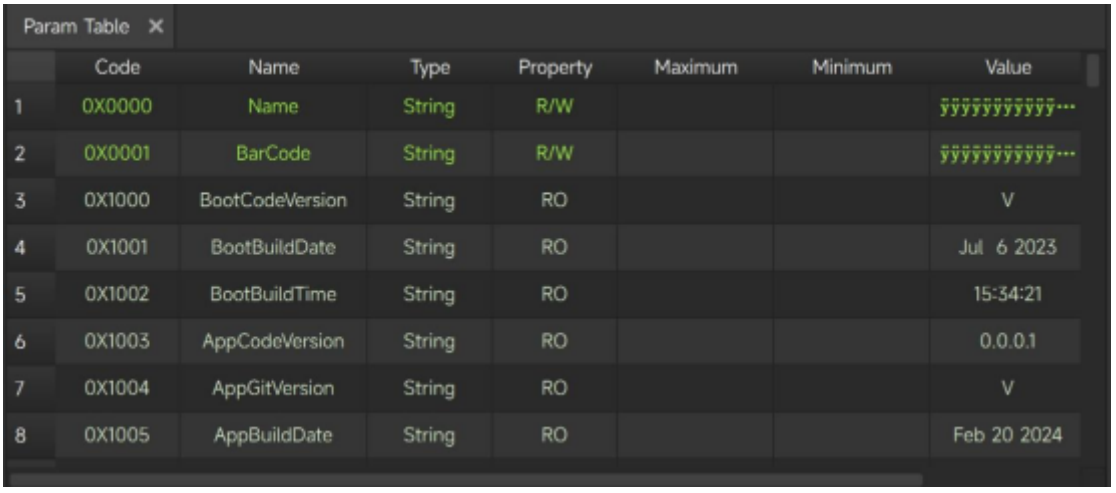
Modify the motor ID number.

Motor magnetic encoder calibration, reinstallation of the motor board and motor, or replacement of the motor's three-phase line sequence connection, etc., requires re magnetic encoder calibration.

Set the zero position (power loss) and set the current position to 0.

Motor program upgrade. When there is an update to the motor program, click the upgrade button and select the upgrade file to proceed with the upgrade.

Parameter Table



	Code	Name	Type	Property	Maximum	Minimum	Value
1	0X0000	Name	String	R/W			ÿÿÿÿÿÿÿÿÿÿ···
2	0X0001	BarCode	String	R/W			ÿÿÿÿÿÿÿÿÿÿ···
3	0X1000	BootCodeVersion	String	RO			V
4	0X1001	BootBuildDate	String	RO			Jul 6 2023
5	0X1002	BootBuildTime	String	RO			15:34:21
6	0X1003	AppCodeVersion	String	RO			0.0.0.1
7	0X1004	AppGitVersion	String	RO			V
8	0X1005	AppBuildDate	String	RO			Feb 20 2024

After successfully connecting the motor, click on the parameter table module in the configuration module. The log will display all parameters loaded successfully, indicating that the motor related parameters have been successfully read (note: the parameter table needs to be configured when the motor is in standby mode, and cannot be refreshed if the motor is in running mode). The interface will display the motor related parameters, and the blue parameters are the

stored parameters inside the motor, You can make modifications in the current value column after the corresponding parameters. Clicking on the download parameter will download the parameters from the debugger to the motor. Clicking on the upload parameter will upload the parameters from the motor to the debugger. The green parameter of the motor is the observation parameter, and the collected parameter can be observed in real time.

Note: The torque limit, protection temperature, and over temperature time of the motor should not be changed arbitrarily. Our company will not bear any legal responsibility for any harm caused to the human body or irreversible damage to joints due to improper operation of this product.

Function code	Name	Parameter type	Properties	Maximum value	Minimum value	Current value (for reference)	Remarks
0X0000	Name	String	Read/Write			ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ	
0X0001	BarCode	String	Read/Write			ÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿÿ	
0X1000	BootCodeVersion	String	Read Only			0.1.5	
0X1001	BootBuildDate	String	Read Only			Mar 16 2022	
0X1002	BootBuildTime	String	Read Only			20:22:09	
0X1003	AppCodeVersion	String	Read Only			0.0.0.1	Motor program version number
0X1004	AppGitVersion	String	Read Only			7b844b0fM	
0X1005	AppBuildDate	String	Read Only			Apr 14 2022	
0X1006	AppBuildTime	String	Read Only			20:30:22	
0X1007	AppCodeName	String	Read Only			Lingzu_motor	
0X2000	EchoPara1	Uint16	Configuration	74	5	5	
0X2001	EchoPara2		Configuration	74	5	5	
0X2002	EchoPara3	Uint16	Configuration	74	5	5	
0X2003	EchoPara4	Uint16	Configuration	74	5	5	
0X2004	EchoFreHz	Uint32	Read/Write	10000	1	500	
0X2005	MechOffset	Float	Read/Write	7	-7	4.619583	Low-speed end position offset value
0X2006	chasu_offset	Float	Read/Write	6.28	0	4.52	Differential offset value
0X2007	ElecOffset	Float	Read/Write	6.28	0	3.27	Electrical Angle Offset Value
0X2008	I_FW_MAX	float	Read/Write	33	0	0	Weak magnetic current value, default to 0
0X2009	CAN_ ID	Uint8	Setting	127	0	1	This node ID
0X200a	CAN_ MASTER	Uint8	Setting	127	0	0	Can host ID
0X200b	CAN_ TIMEOUT	Uint32	Read/Write	100000	0	0	Can timeout threshold, default to 0
0X200c	MotorOverTemp	Int16	Read/Write	2000	0	800	Motor protection temperature value, temp (degrees) * 10
0X200d	OverTempTime	Uint32	Read/Write	1000000	1000	20000	Over temperature time

Function code	Name	Parameter type	Properties	Maximum value	Minimum value	Current value (for reference)	Remarks
0X200e	GearRatio	Float	Read/Write	64	1	9	Transmission ratio
0X200f	Kt_Nm/Amp	float	Read/Write	1	1	0	0
0X2010	Tq_ CaliType	Uint8	Read/Write	1	0	1	Torque calibration method setting
0X2011	Cur_ Fit_ Gain	Float	Read/Write	1	0	0.6	Current filtering parameters
0X2012	Cur_ Kp	Float	Read/Write	200	0	0.05	Current kp
0X2013	Cur_ Ki	Float	Read/Write	200	0	0.05	Current ki
0X2014	Spd_ Kp	Float	Read/Write	200	0	2	Speed kp
0X2015	Spd_ Ki	Float	Read/Write	200	0	0.021	Speed ki
0X2016	Loc_ Kp	Float	Read/Write	200	0	30	Location kp
0X2017	Spd_ Fit_ Gain	Float	Read/Write	1	0	0.1	Speed filtering parameters
0X2018	Limit_ Spd	Float	Read/Write	200	0	2	Position mode speed limit
0X2019	Limit_ Cur	Float	Read/Write	43	0	43	Position and speed modes Current limitation
0X3000	TimeUse0	Uint16	Read Only			5	
0X3001	TimeUse1	Uint16	Read Only			0	
0X3002	TimeUse2	Uint16	Read Only			10	
0X3003	TimeUse3	Uint16	Read Only			0	
0X3004	EncoderRaw	Int16	Read Only			11396	Magnetic encoder sampling value
0X3005	McuTemps	Int16	Read Only			337	Internal temperature of MCU, * 10
0X3006	MotorTemps	Int16	Read Only			333	Motor NTC temperature, * 10
0X3007	VBus (mv)	Uint16	Read Only			24195	Bus voltage
0X3008	Adc1Offset	Int32	Read Only			2084	ADC sampling channel 1 zero current bias
0X3009	Adc2Offset	Int32	Read Only			2084	ADC sampling channel 2 zero current bias
0X300a	Adc1Raw	Uint16	Read Only			1232	ADC sampling value 1
0X300b	Adc2Raw	Uint16	Read Only			1212	ADC sampling value 2
0X300c	VBUS	Float	Read Only			24.195	Bus voltage V
0X300d	CmdId	Float	Read Only			0	ID Ring Instruction, A
0X300e	CmdIq	Float	Read Only			0	Iq ring instruction, A
0X300f	Cmdlocref	Float	Read Only			0	Position loop command, rad

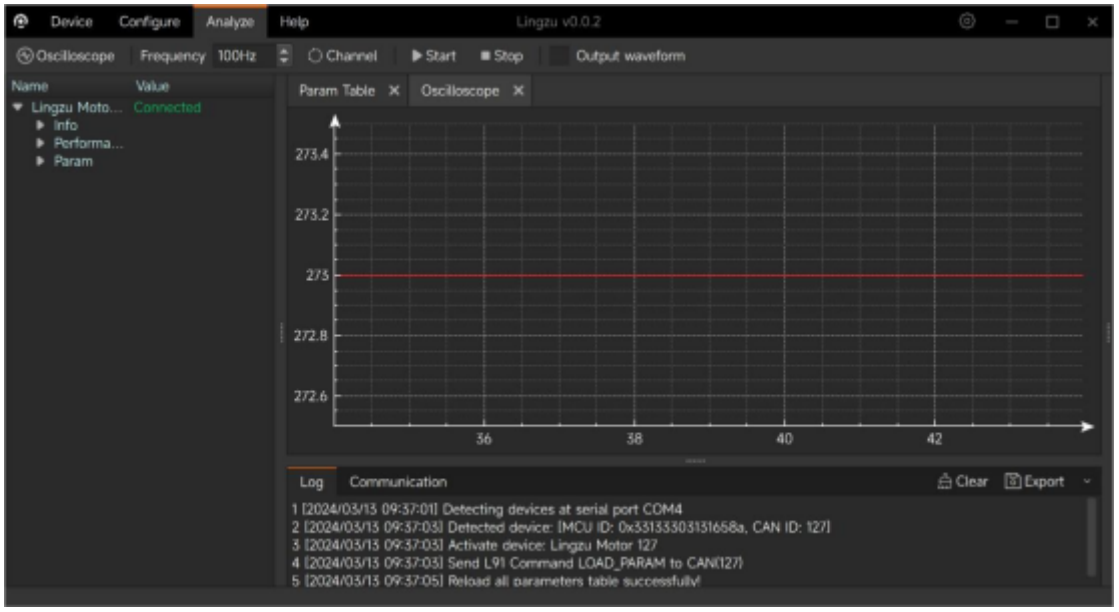
Function code	Name	Parameter type	Properties	Maximum value	Minimum value	Current value (for reference)	Remarks
0X3010	Cmdspdref	Float	Read Only			0	Speed loop command, rad/s
0X3011	CmdTorque	Float	Read Only			0	Torque command, nm
0X3012	CmdPos	Float	Read Only			0	Mit protocol angle instruction
0X3013	CmdVel	Float	Read Only			0	Mit protocol speed instruction
0X3014	Rotation	Int16	Read Only			1	Number of laps
0X3015	ModPos	Float	Read Only			4.363409	Motor uncounted mechanical angle, rad
0X3016	MechPos	Float	Read Only			0.777679	Mechanical angle of load end coil, rad
0X3017	MechVel	Float	Read Only			0.036618	Load end speed, rad/s
0X3018	ElecPos	Float	Read Only			4.714761	Electrical perspective
0X3019	Ia	Float	Read Only			0	U line current, A
0X301a	Ib	Float	Read Only			0	V-line current, A
0X301b	IC	Float	Read Only			0	W-line current, A
0X301c	Tick	Uint32	Read Only			31600	
0X301d	PhaseOrder	Uint8	Read Only			0	Calibration direction markings
0X301e	IQF	Float	Read Only			0	
0X301f	BoardTemps	Int16	Read Only			359	On board temperature, * 10
0X3020	Iq	Float	Read Only			0	Iq original value, A
0X3021	ID	Float	Read Only			0	ID original value, A
0X3022	FaultSta	Uint32	Read Only			0	Fault state value
0X3023	WarnSta	Uint32	Read Only			0	Warning status value
0X3024	DRV_ Fault	Uint16	Read Only			0	Driver chip fault value
0X3025	DRV_ Temp	Int16	Read Only			48	Driver chip temperature value, degrees
0X3026	Uq	Float	Read Only			0	Q-axis voltage
0X3027	Ud	Float	Read Only			0	D-axis voltage

Function code	Name	Parameter type	Properties	Maximum value	Minimum value	Current value (for reference)	Remarks
0X3028	DTC_ U	Float	Read Only			0	U-phase output duty cycle
0X3029	DTC_ V	Float	Read Only			0	V-phase output duty cycle
0X302a	DTC_ W	Float	Read Only			0	W-phase output duty cycle
0X302b	V_ Bus	Float	Read Only			24.195	Vbus in closed-loop
0X302c	V_ Ref	Float	Read Only			0	Closed loop vq, vd synthesis voltage
0X302d	Torque_ FDB	Float	Read Only			0	Torque feedback value, nm
0X302e	Rated_ I	Float	Read Only			8	Motor rated current
0X302f	Limit_ I	Float	Read Only			27	Motor limit maximum current

Oscilloscope

This interface supports viewing the graph generated by observing real-time data, including motor Id/Iq current, temperature, real-time output speed, rotor (encoder) position, output position, etc.

Click on the oscilloscope module in the analysis module, select the appropriate parameters in the channel (parameter meanings can refer to 3.3.3), set the output frequency, and click start drawing to observe the data graph. Stop drawing to stop observing the graph.



xample of communication box command:

41 54 43 07 e8 0c 08 05 70 00 00 01 00 00 00 0d 0a

The meaning is as follows

41 54	**43 07 e8 0c**	**08**	**05 70 00 00 01 00 00 00**	**0d 0a**
Frame header	Extended frame	Number of data bits	Data frame	End of frame

Translating the extended CAN ID to the real CAN ID requires the following conversion:

43 07 e8 0c is converted to binary as 1001 0000 0000 0111 1110 1000 0000 1100. If the 100 on the right is removed, it becomes 1 0010 0000 1111 1101 0000 0001. Convert it to hexadecimal and it becomes 12 00 FD 01. Refer to the communication protocol description and the meaning is as follows:

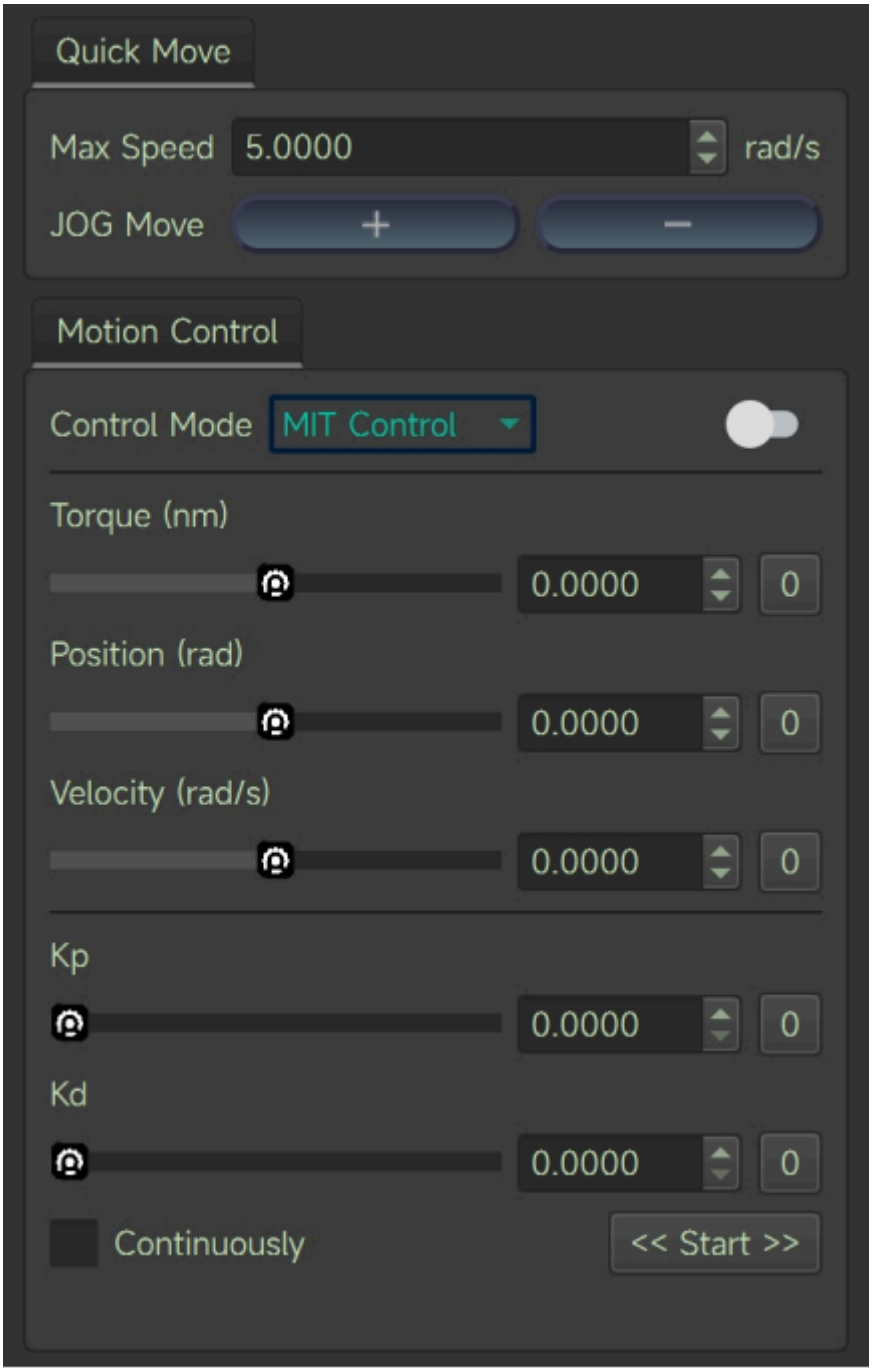
12 (hexadecimal)	**00**	**FD**	**01**
Communication type 18 (base 10)	Meaningless	Host ID	Motor CAN ID

CAN communication fault protection

When CAN_ When the TIMEOUT value is 0, this function is not enabled

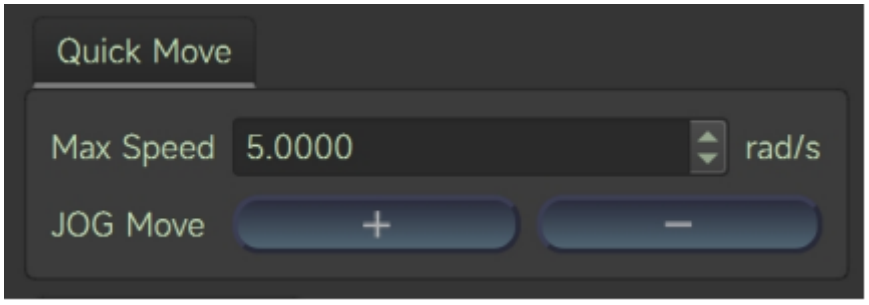
When CAN_ When the TIMEOUT value is non-0, when the motor does not receive a can command within a certain period of time, the motor enters reset mode, and 2000 is 1 second

Control demonstration



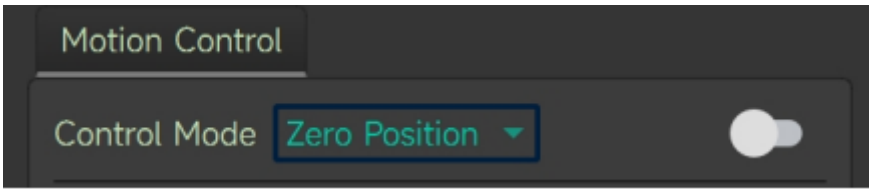
Jog Run:

Set the maximum speed, click run, then click JOG to run the motor in both forward

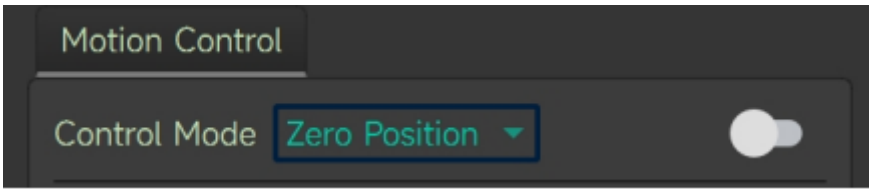


Control mode switching:

The motor control mode can be switched on the sports mode interface

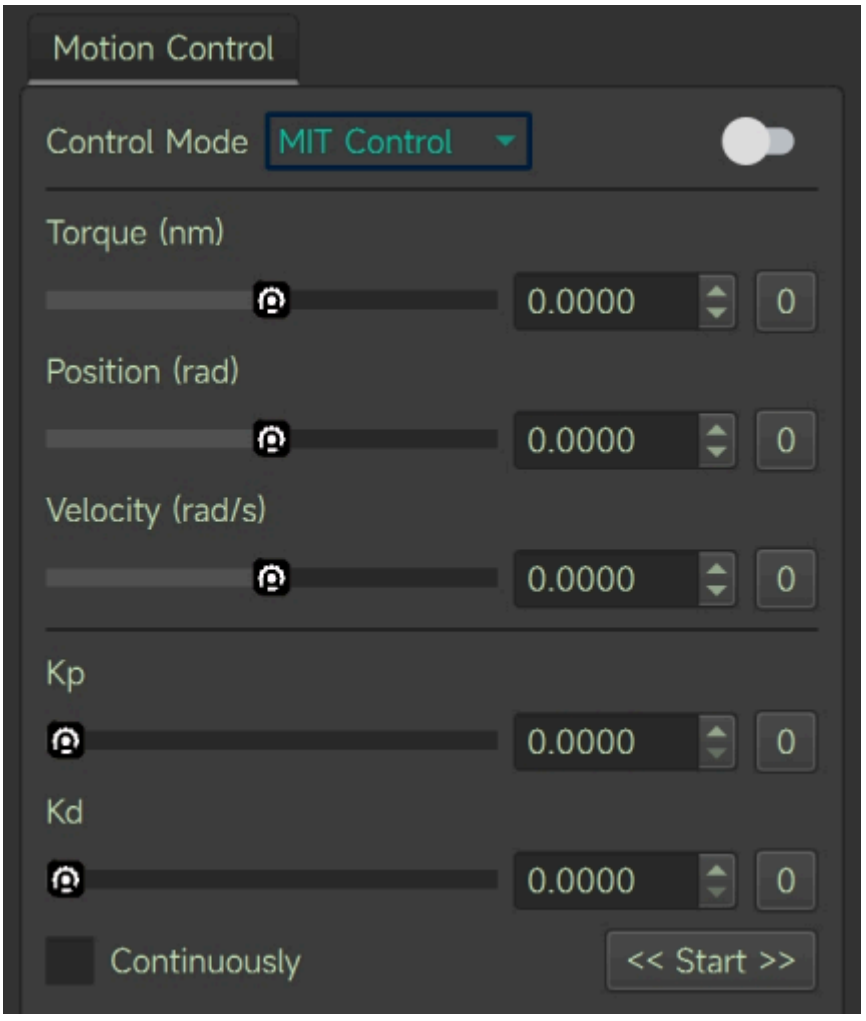


Zero point mode



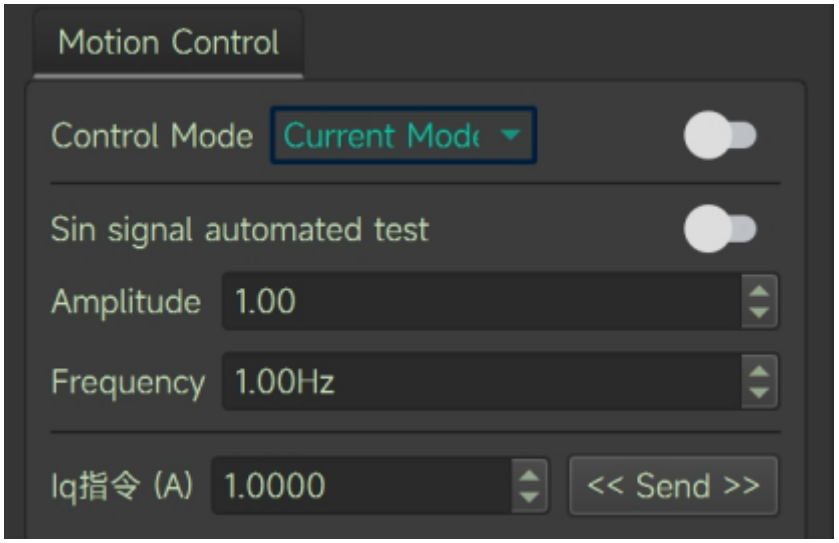
Click the switch button on the right side, and the motor will slowly return to the mechanical zero position

** Operation and control mode**



Click the switch button on the right side, then set five parameter values, click start or continue sending, the motor will return to the feedback frame and run according to the target command; Click the switch button on the right again, and the motor will stop.

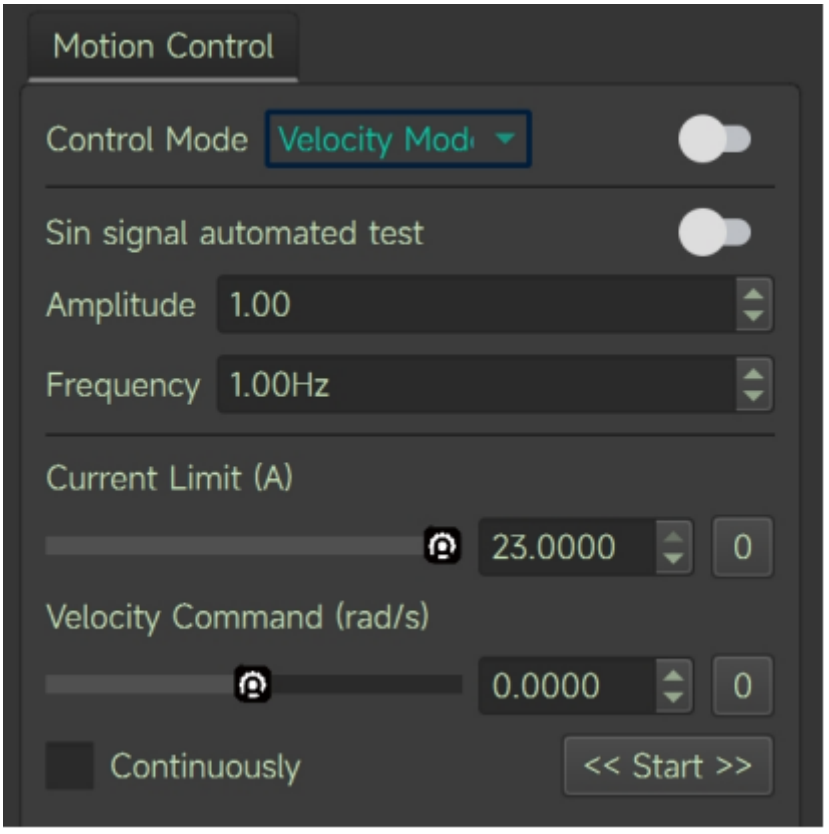
Current mode



Manually switch the current mode, click the right switch button, and then set the Iq current command value. Start or continue sending, and the motor will follow the current command. Click the right switch button again, and the motor will stop.

Click the switch button on the right side of the control mode, input the amplitude and frequency of the sine automatic test, and then click the switch button on the right side of the sine automatic test. The iq (A) of the motor will run according to the set amplitude and frequency.

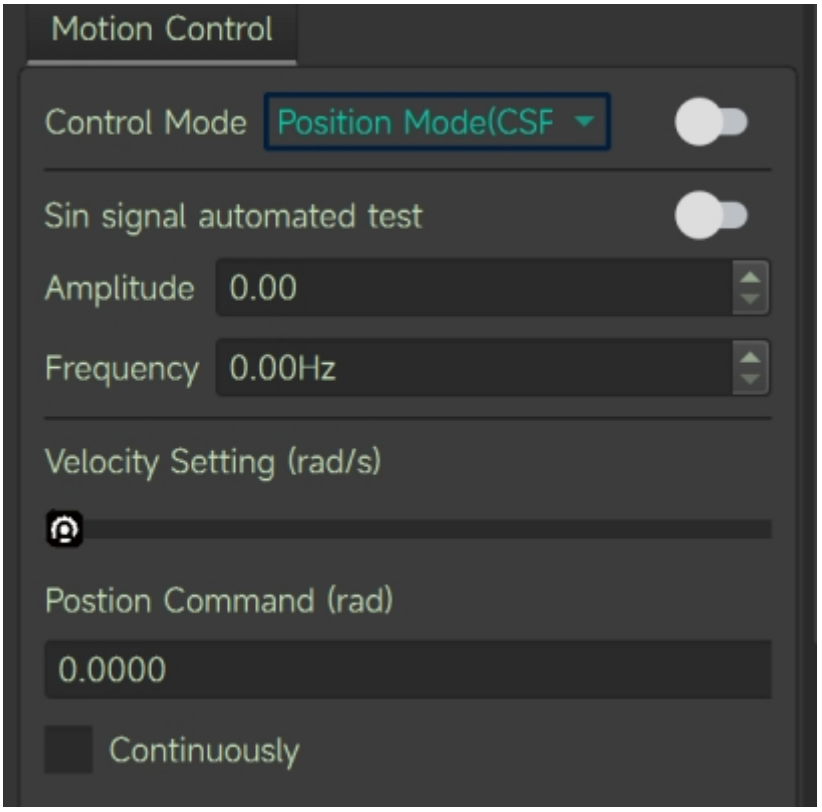
Speed mode



Manually switch speed mode, click the right switch button, then set the speed command value, start or continuously send, the motor will follow the speed command to run, click the right switch button again, the motor will stop.

Click the switch button on the right side of the control mode, input the amplitude and frequency of the sine automatic test, and then click the switch button on the right side of the sine automatic test. The motor speed (rad/s) will run according to the set amplitude and frequency.

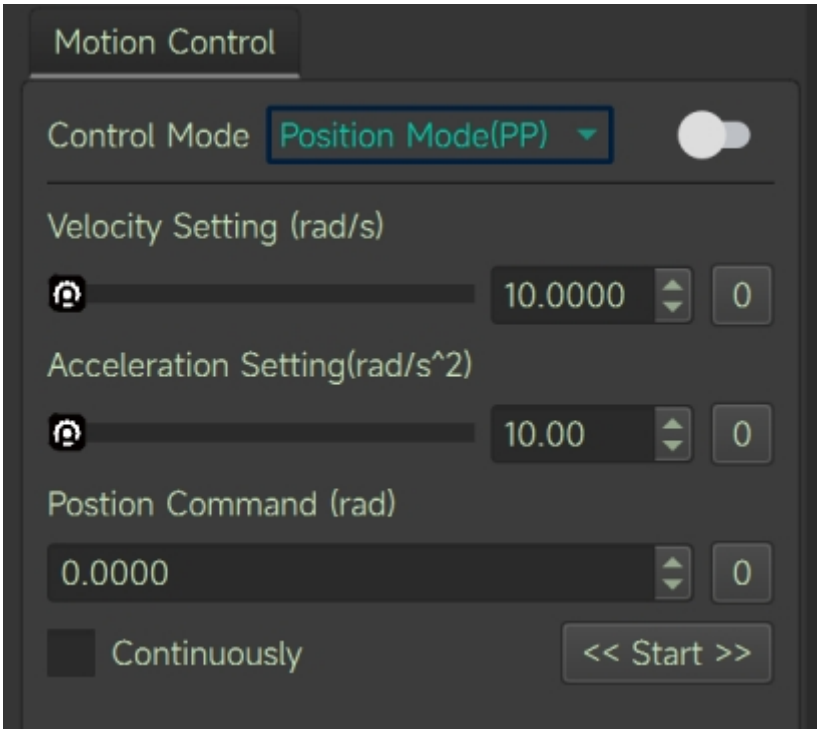
Position mode (CSP)



Manually switch position mode, click the right switch button, then set the position command value (rad), start or continuously send, the motor will follow the target position command to run, click the right switch button again, the motor will stop. The maximum speed followed by the position can be modified by setting the speed.

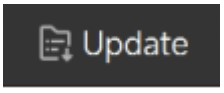
Click the switch button on the right side of the control mode, input the amplitude and frequency of the sine automatic test, and then click the switch button on the right side of the sine automatic test. The position (rad) of the motor will run according to the set amplitude and frequency.

Position mode (PP)



Switch to Position Mode (PP) manually by clicking the switch button on the right, then set the position command value (rad), the speed setting command value (rad/s), and the acceleration setting (rad/s) to start or continuously send commands. The motor will follow the target position commands to operate. Click the switch button on the right again, and the motor will stop. You can adjust the maximum speed and acceleration for position following by setting the speed parameters.

Firmware updates



The first step is to click on the upgrade of the device module and select the bin file to be burned; The second step is to confirm the upgrade and start updating the firmware of the motor. After the progress is completed, the motor update is completed and automatically restarts.