

MG servo motor manual V2.32

Disclaimer

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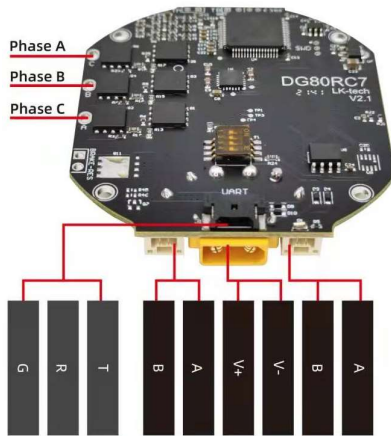
Introduction

The MG servo motor system used a 32-bit high-performance MCU 、 High bandwidth op amp 、 Low internal resistance flat MOSFET and combined with an optimized version of the FOC control technology, equipped with a high-performance brushless motor of the DG series, designed for high-precision, high-response, high-torque applications. The integrated design of the motor and the driver facilitates ,easily apply for system integration. The driver integrates a high-precision absolute encoder with an easy-to-use closed-loop control algorithm that greatly improves the accuracy of position ,speed feedback and torque output.

1. Driver parameters

Input voltage	DG80R/C7	12-60V
Normal current	DG80R/C7	10A
Maximum current	DG80R/C7	20A(10s).
Control frequency	Torque loop	32KHz
	Speed loop	8KHz
	Position loop	4KHz
PWM frequency	24KHz	
Torque Ring control bandwidth	0.4-2.8KHz(as determined by different motors and torques).	
Encoder	18 bit	
Bus type	RS485 OR CAN	
Baudrate (RS485)	9600, 19200, 38400,57600, 115200,230400,460800,1Mbps,2Mbps	
Baudrate (CAN)	1Mbps	

2. Drive interface



Driver: DG80R/C7



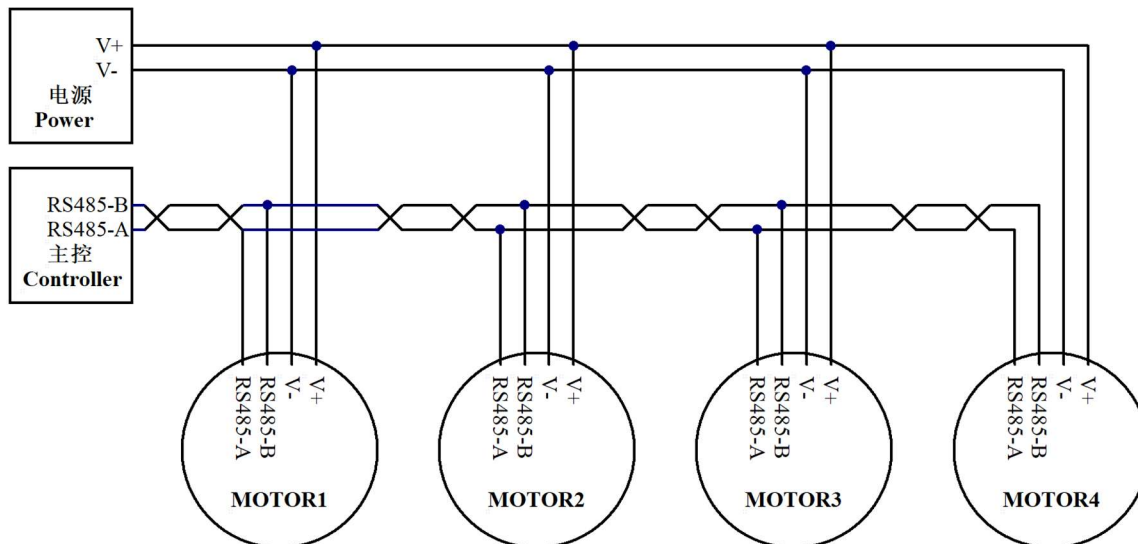
Motor :MG v2

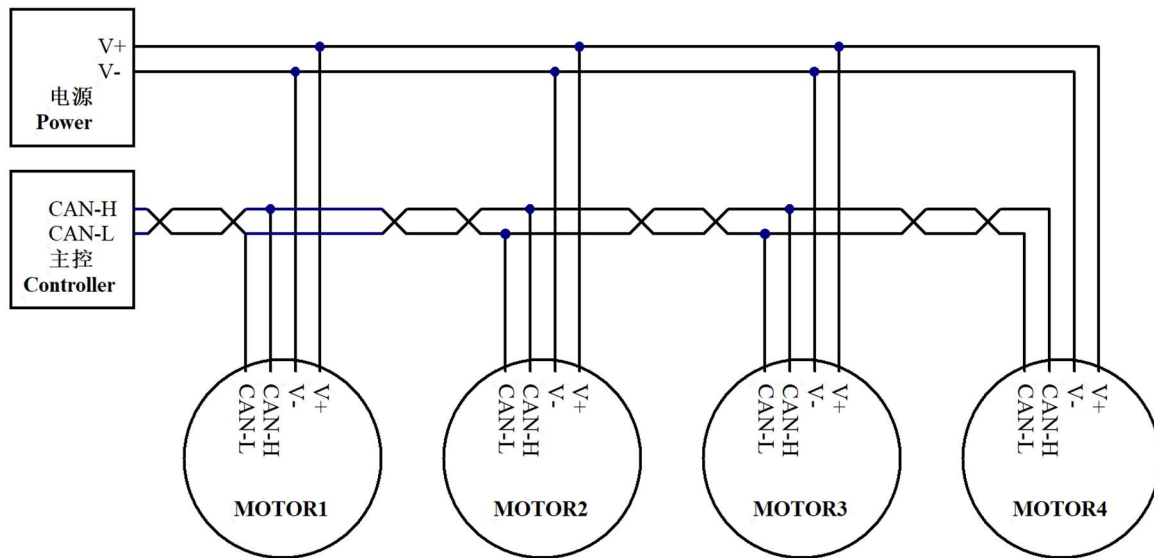
Interface	Note
A/H	RS485-A OR CAN-H
B/L	RS485-B OR CAM-L
V-	Power negative/Negative Power Supply
V+	Power positive/Positive Power Supply
A/H	RS485-A OR CAN-H
B/L	RS485-B OR CAM-L
T	UART Send/UART Transmitter
R	UART Receiver/UART Receiver
G	Signal ground/Signal GND

3. Line connection

The 120Ω resistor is connected at bothends of the bus.

The control circuit connection is shown in the following image:

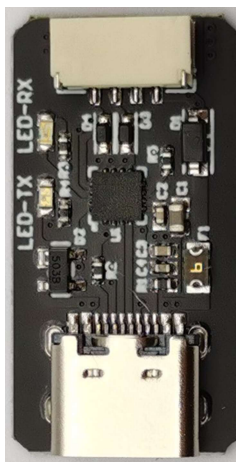




4. Setting

- **Connect with accessories**

The driver and the LK-Motor Tool can be connected via the USB serial module (optional) and the supporting wire (customizable length).



USB-UART



Power cord(XT30)



USB serial cable



Cable Com(GH1. 25)

- **Introduction to the LingKong Motor Tool V2.32.**

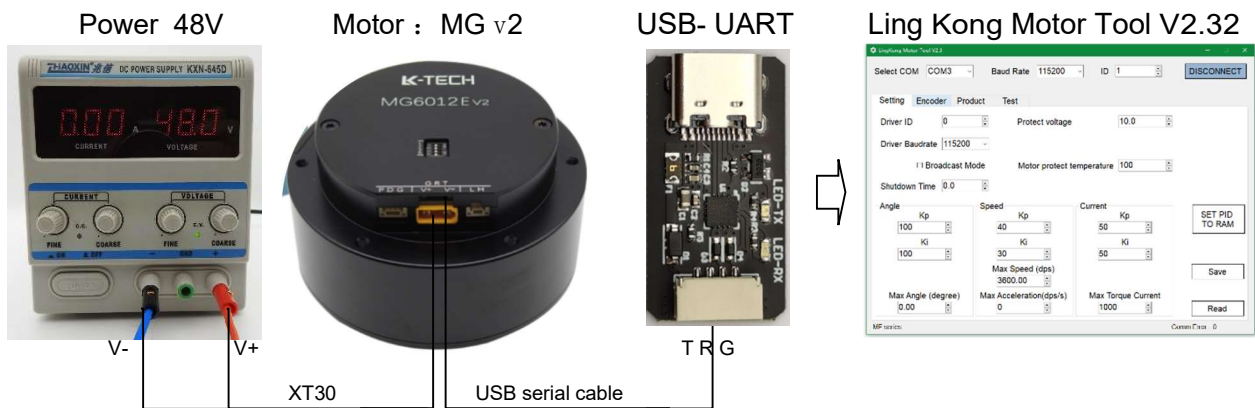
LingKong Motor Tool is a PC-side debug tool software developed by SCI for systems above win7, version number V2.32.

- **Software installation**

Contact customer service or download the Ling Kong Motor Tool V2.32 package without installation, double-click the LK Motor Tool V2.32.exe application to get to the operator interface.

- **MG motor connection**

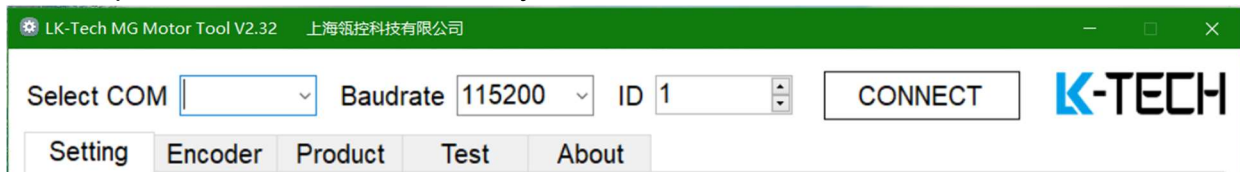
The MG motor is powered on with a supporting power cord (XT30) and connected to the PC side via the USB serial module for upper machine parameters, refer to the figure below.



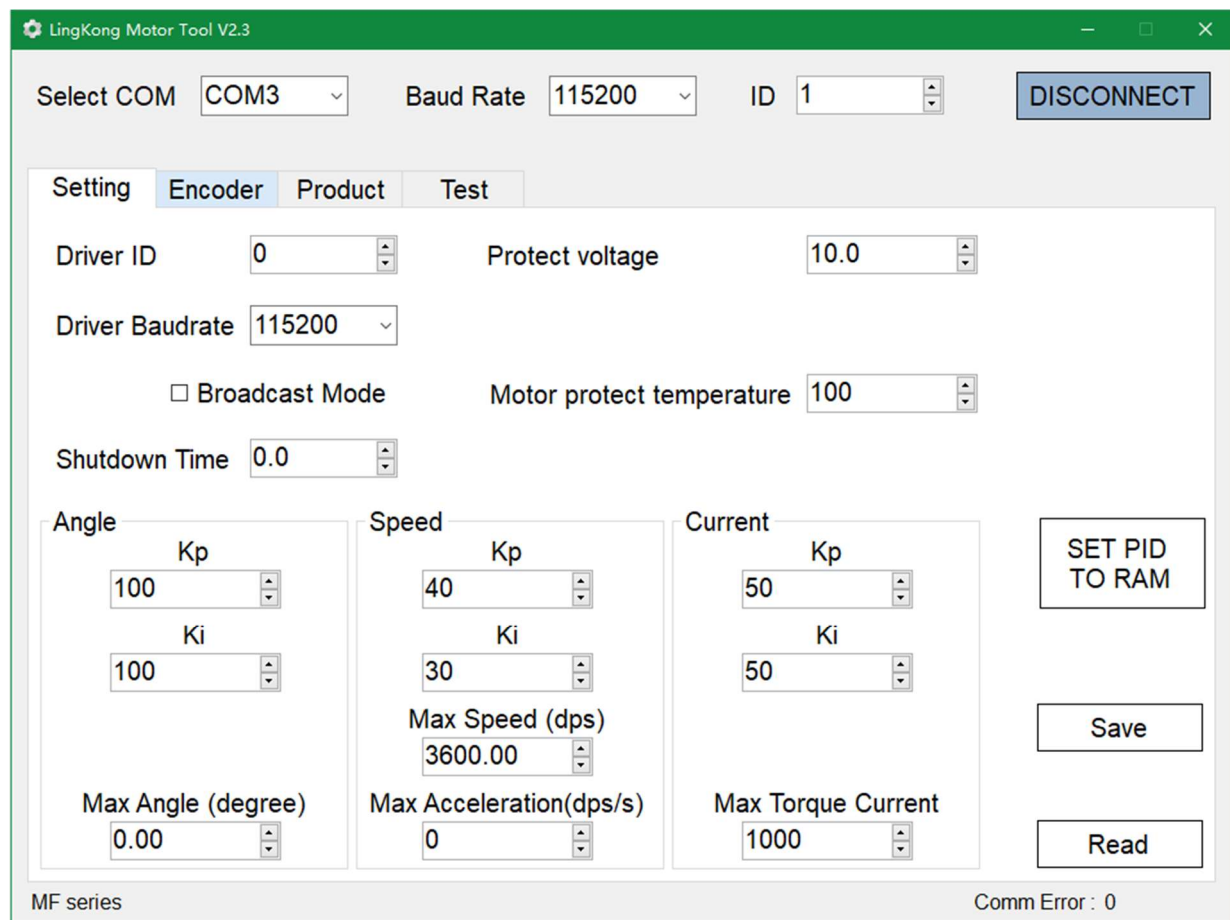
Note: Power supply positive and negative avoid backswing, select the appropriate supply voltage range and power output power.

● The Ling Kong Motor Tool V2.32 setting

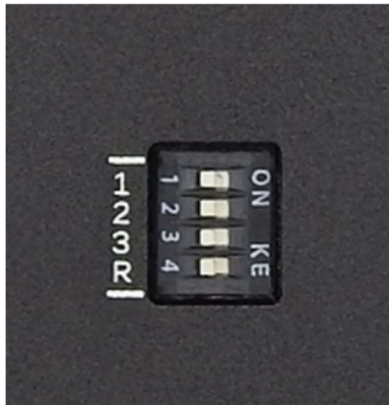
The upper machine connection setting, select **COM** (...CP210x USB to UART bridge), baud rate is 115200(default), default ID For 1(set by the DIP Switch), click the **CONNECT** button to complete the connection, led always lit.



● Basic settings, on the Settings page, click the **Read** button to read the motor and encoder information.



- ✓ **Driver ID:** Sets the ID number. When set to **0**, the ID is selected by the DIP Switch, and when set to **1 ~ 32**, the ID is determined by the setting item, and the corresponding relationship between the two is as follows:

	ID	Switch 3	Switch 2	Switch 1
	#1	OFF	OFF	OFF
	#2	OFF	OFF	ON
	#3	OFF	ON	OFF
	#4	OFF	ON	ON
	#5	ON	OFF	OFF
	#6	ON	OFF	ON
	#7	ON	ON	OFF
	#8	ON	ON	ON

The fourth **R** of the DIP Switch is on, indicating that the 120 Ω resistance in the bus is on.

Note: The new ID will be valid when power on again.

- ✓ **Protect voltage:** Sets the protection voltage and turn off the motor when the voltage is lower than this value.
- ✓ **Driver Baudrate:** Set the driven Baud Rate.
Note: After setting, new parameters will be valid when power on again.
- ✓ **Motor protection temperature:** Set the motor protection temperature, When the set temperature is reached, the motor turns off.
- ✓ **Shutdown Time:** Set the shutdown time for the motor(ms). No control command was received during that time and the electrical opportunity was turned off, when set to 0, the motor will never turn off.
Note: After setting, new parameters will be valid when power on again.
- ✓ **Angle:** Angle loop control parameters. Kp and Ki modify the PI parameter of the angle ring. Max Angle is used to limit the maximum rotation angle of the motor. For example, when set to 3600, the maximum rotation angle of the motor is $\pm 3600^\circ$, 10 turns.
- ✓ **Speed:** Speed loop control parameters. Kp and Ki modify the PI parameter of the speed loop.
Max Speed is used to limit the maximum rotation speed of the motor. For example, when set to 720, the maximum angular velocity of the motor is $\pm 720^\circ/\text{S}$, which is 2 turns per second.
Max Acceleration option does not take effect in the current version of the drive, the actual acceleration of the motor depends on the PI parameters, motor load and drive voltage.
- ✓ **Current:** Torque loop control parameters. Kp and Ki modify the PI parameter of the torque loop.
Max Power is used to limit the output power to motor.
Note: After the parameters are modified, click the **Save** button to save the parameters to the driver and need to be re-energized to survive effect.

- **Encoder settings**, on the Encoder page, click the **Read** button to read the motor and encoder information.

LK-Tech MG Motor Tool V2.32 上海领控科技有限公司

Select COM Baudrate ID **K-TECH**

Setting **Encoder** Product Test About

Motor Poles Reduction Ratio

Encoder Type Reducer Align Value

Encoder Position

Motor/Encoder Ratio Motor Zero Postion

Motor/Encoder Offset Reducer Zero Position

Motor/Encoder Direction

Motor/Encoder Align Power

MG series Comm Error : 1

- ✓ **Motor Poles**: Set the number of magnetic poles in the motor, usually before the factory.
- ✓ **Encoder Type**: Encoder type and resolution, which is read-only.
- ✓ **Encoder Position**: Read encoder location information, which is read-only
- ✓ **Motor/Encoder Ratio**: The ratio of motor and encoder calibration, which is read-only, generally around 1000, the closer to 1000, the better the calibration effect.
- ✓ **Motor/Encoder Offset**: Read-only parameter.
- ✓ **Motor/Encoder Direction**: The direction of motor and encoder calibration, which is read-only and generally has no effect on motor drive performance.
- ✓ **Motor/Encoder Align Power**: Generally use the default parameters, when the load is large, you can increase the calibration to improve the calibration effect.

Align button: Start calibration of the motor and encoder. Before this step, you need to ensure that the number of poles of the motor is set correctly and select the appropriate calibration power. After clicking the **Align** button, the motor will rotate back and forth to perform calibration. After the calibration is completed, the parameters will be automatically saved to the drive.

- ✓ **Motor Zero Position**: After clicking the **Set** button, the drive will save the current position as the starting position of the motor.

✓

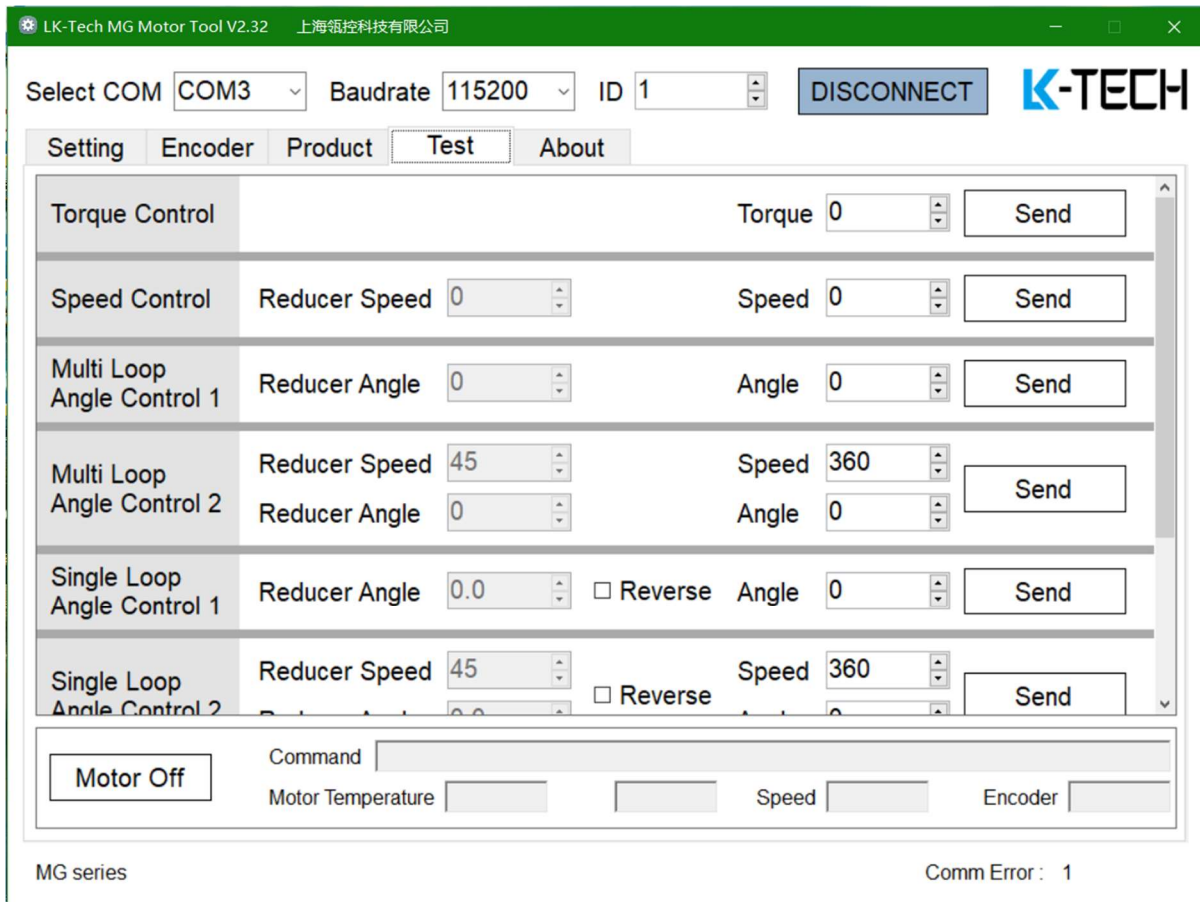
Note:

1. Suggest calibrating the motor and encoder under no-load conditions. If the motor does not rotate smoothly during the calibration rotation, check the motor fault or mechanical friction.
2. After the parameters are modified, click the **Save** button to save the parameters to the driver

- **Product information**, on the Product page, click the **Read** button to read the hardware and software version of the product.

The screenshot shows the 'LK-Tech MG Motor Tool V2.32' software window. The title bar includes the company name '上海翎控科技有限公司'. The interface has a green header bar with the 'K-TECH' logo. Below the header, there are configuration fields: 'Select COM' (set to COM3), 'Baudrate' (set to 115200), and 'ID' (set to 1). A 'DISCONNECT' button is located to the right of these fields. Below the configuration fields is a tabbed menu with 'Setting', 'Encoder', 'Product' (selected), 'Test', and 'About'. The 'Product' tab displays the following information: Motor : MG8016E, Motor version : V2.0, Driver : DG80R7E, Hardware version : V2.0, and Firmware version : V2.31. Below this information are two empty text input fields. To the right of the first input field is an 'Open File' button, and to the right of the second is a 'Download' button. At the bottom left, the 'Chip ID' is displayed as '373238200A50325230002000'. To the right of the Chip ID is a 'Read' button. At the bottom left of the window, it says 'MG series', and at the bottom right, it says 'Comm Error : 1'.

- **Test information**, on the Test page, is available in a variety of control modes to meet the different needs of users.



- ✓ **Torque Control:** Torque Loop mode. Clockwise rotation is positive, counterclockwise rotation is negative, and the effective adjustment range is ± 2000 . After setting, the motor sends a command with the **Send** button.
- ✓ **Speed Control:** Speed Loop mode. Clockwise rotation is positive, counterclockwise rotation is negative, and the effective adjustment range is ± 18000 (dps). After setting, the motor sends a command with the **Send** button.
- ✓ **Multi Loop Angle Control 1:** Clockwise rotation is positive, counterclockwise rotation is negative.
For example, when set to 3600, click the **Send** button, the motor rotates clockwise at the maximum speed of $3600 / i$ °. (i reduction ratio).
- ✓ **Multi Loop Angle Control 2:** The mode adds the speed limit function.
For example, when the Speed set to 360, the maximum angular velocity of the motor is $360^\circ/\text{S}$, which is 1 turns per second.
- ✓ **Single Loop Angle Control 1:** Rotate clockwise to the specified position, effective range 0-359 °, **Reverse** rotation.
For example, when the angle input value is 90 °, click the **Send** button, the motor rotates clockwise to $90/i^\circ$ at the maximum speed. (i reduction ratio)
- ✓ **Single Loop Angle Control 2:** The mode adds the speed(dps) limit function.

Note:

1. In position mode, the motor needs to return to zero first.
 2. When the power is maintained, the motor returns to the zero point position according to the original path direction.
 3. When re powered on, the motor returns to the zero point position in the direction of the shortest path.
- ✓ **Increment Angle Control 1:** Clockwise rotation is positive, counterclockwise rotation is negative, and the effective adjustment range is ± 360 . After setting the parameters, continuously click the **Send** button to increase with the same angle value.
 - ✓ **Increment Angle Control 2:** The mode adds the speed(dps) limit function.
 - ✓ **Motor Off:** Turn off the motor.
 - ✓ **Command:** Click the **Send** button to read the current state command.
 - ✓ **Temperature Motor:** Click the **Send** button to read the current motor temperature.
 - ✓ **Iq:** Motor quadrature-axis current (torque current).
 - ✓ **Speed:** Click the **Send** button to read the current motor speed (dps).
 - ✓ **Encoder:** Read the current encoder single turn position value in real time (repeatedly click the **Send** button to read).

- Products application:

Legged Robot



Industrial Robot



Inspection Robot



Medical Robot

