





# Gimbal Motor Driver Quick Operation Manual

## --For GL II

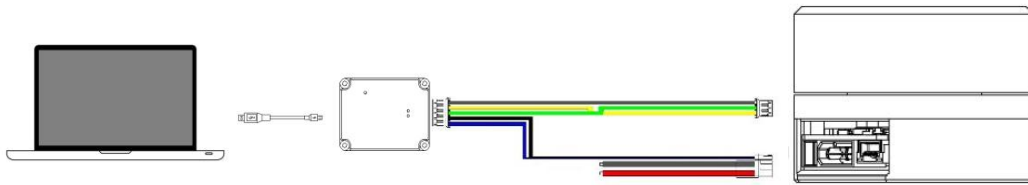
V1.0.0



## Precautions

1. Ensure that there are no short circuits in the circuit and that interfaces are connected correctly as required.
2.  The driver board will heat up during output; please use it carefully to avoid burns.
3.  Before use, please check if all parts are intact. If any parts are missing or aged, please stop using it and contact technical support in time.
4.  Multiple optional control methods cannot be switched while the driver board is running, and the communication protocols between different control methods are different. If you need to switch, please restart the power supply before changing. Using the wrong protocol to control may burn out the driver board!
5.  Please strictly follow the working voltage, current, temperature, and other parameters specified in this document; otherwise, it will cause permanent damage to the product!

## 1、 Connecting the Motor

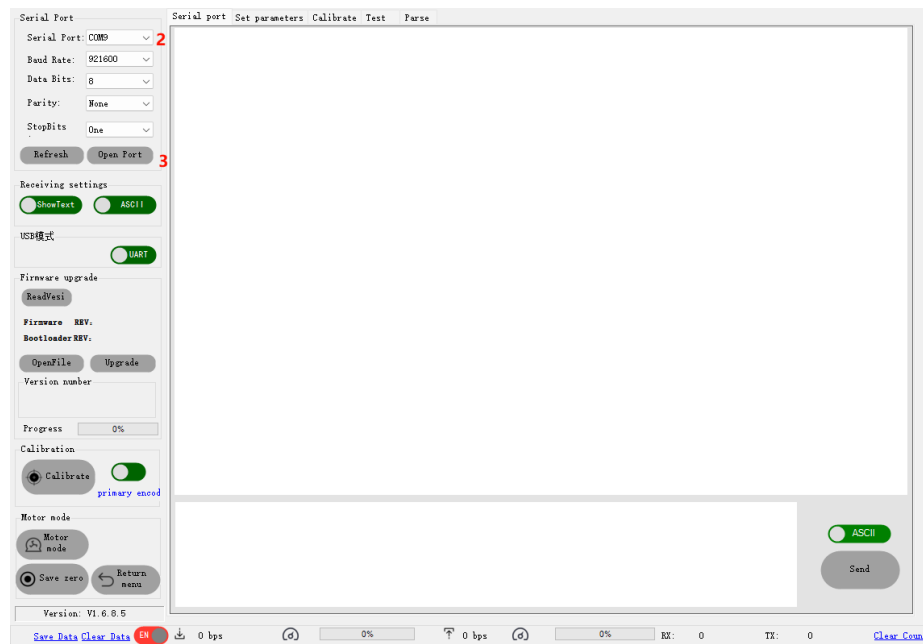


S-link USB cable --> PC end

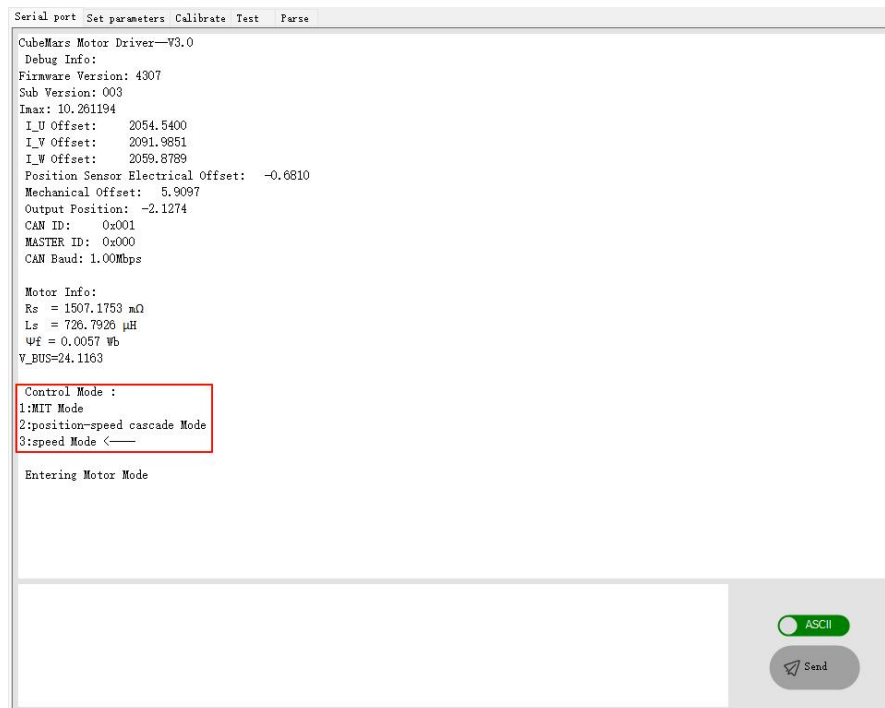
2+2Pin terminal (Power and CAN) --> Motor's 2+2Pin terminal (Power and CAN)

3Pin terminal (UART) --> Motor's 3Pin terminal (UART)

- 1、 Connect S-link to the computer and motor.
- 2、 Open the upper computer software



- 3、 Click on the "Serial Port" tab; and select the corresponding COM port for S-link.
- 4、 Click "Open Port".
- 5、 Turn on the motor power, the motor information will be displayed automatically, and the current control mode will be indicated.



## 2、 Operation

**⚠:** After the motor is reinstalled with the driver board, or if the wiring sequence has been changed, or if the firmware has been updated, calibration must be performed. Refer to Section 4.3 of the "GL40 Module Driver User Manual" for driver board calibration.

## 2.1 MIT Mode

**Motor Parameters**

PhaseRes(R): 1507.175 mR  
PhaseInd(L): 726.7926 uH  
FluxLinkage( $\lambda$ ): 0.005669043 Wb  
Fri Coeff.: 0.0001607948  
Inertia: 1.972009E-05 kg\*m<sup>2</sup>

**Drive parameters**

NPP: 14 UV: 15 Acc: 2  
GR: 1 OV: 32 Dec: -2  
CAN ID: 0x01 OT: 100 SpeedLimit: 153.317%  
Master ID: 0x00 CAN Timeout: 0 Overcurrent 0.8

**Amplitude**

P<sub>MAX</sub>: 12.5  
V<sub>MAX</sub>: 30  
T<sub>MAX</sub>: 10  
KT\_OUT: 0  
Gear factor: 1  
Damping factor: 4

**Control settings**

ControlMode: 1: MIT (selected)  
CurrentBW: 2: Pos  
Speed KP: 0.618  
Speed KI: 0.003  
Position KP: 54  
Position KI: 0

**Feedback Data Table**

反馈报文	D[0]	D[1]	D[2]	D[3]	D[4]	D[5]	D[6]	D[7]
MST_ID	ID[ERR<4]	POS[15:8]	POS[7:0]	VEL[11:4]	VEL[3:0]	T[11:8]	T_MOS	T_Rotor

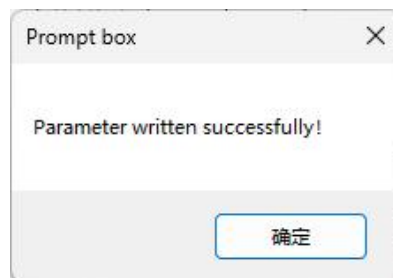
**Control Data Table**

控制报文	D[0]	D[1]	D[2]	D[3]	D[4]	D[5]	D[6]	D[7]
ID	p_des [15:8]	p_des [7:0]	v_des [11:4]	v_des [3:0]	Kp [11:8]	Kd [7:0]	Kd [3:0]	t_ff [11:8]

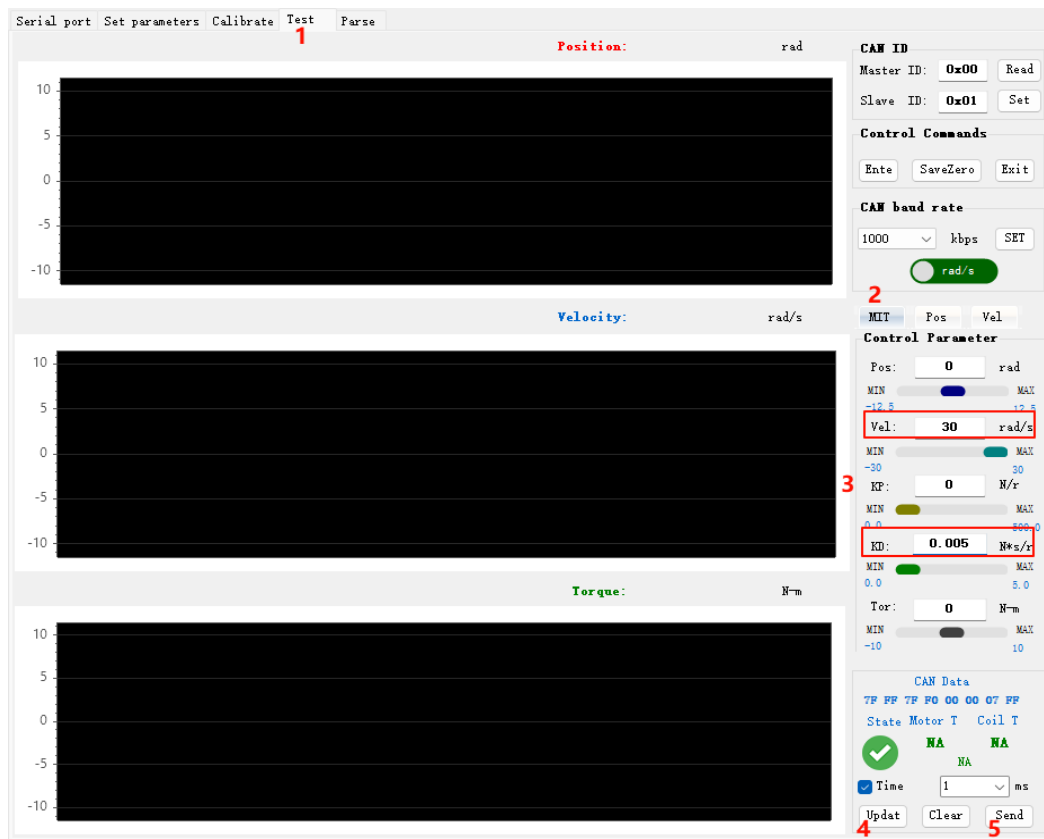
**Legend:**  
ID 表示控制器的 ID, 取 CAN\_ID 的低 8 位  
ERR 表示故障, 对应故障类型为:  
8——超压; C——电机线圈过温  
9——欠压; D——通讯丢失;  
A——过电流; E——过载;  
B——MOS 过温

**Control Diagram:**  
The diagram shows a control loop where P<sub>des</sub> and V<sub>des</sub> are inputs. P<sub>des</sub> is integrated to get  $\theta_m$ , which is then multiplied by K<sub>p</sub>. V<sub>des</sub> is integrated to get  $d\theta_m$ , which is multiplied by K<sub>d</sub>. The outputs of K<sub>p</sub> and K<sub>d</sub> are summed to get T<sub>ref</sub>. T<sub>ref</sub> is then multiplied by 1/K<sub>T</sub> to get i<sub>qref</sub>. A feedforward path T<sub>ff</sub> is also shown.

1. Click on the "Set Parameters" tab.
2. Click "ReadParam".
3. Select "MIT Mode" in the control mode.
4. Click "WriteParam", and after the "Parameter Written Successfully" message pops up, repower the motor.

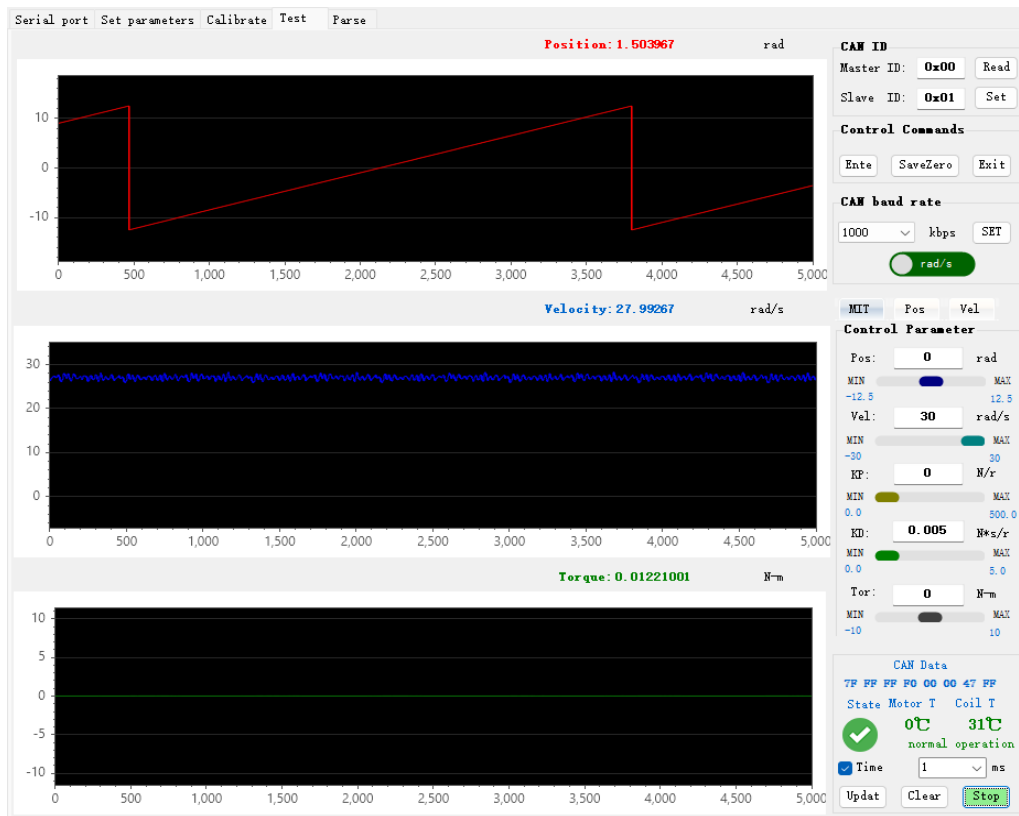


## 2.1 Velocity Control

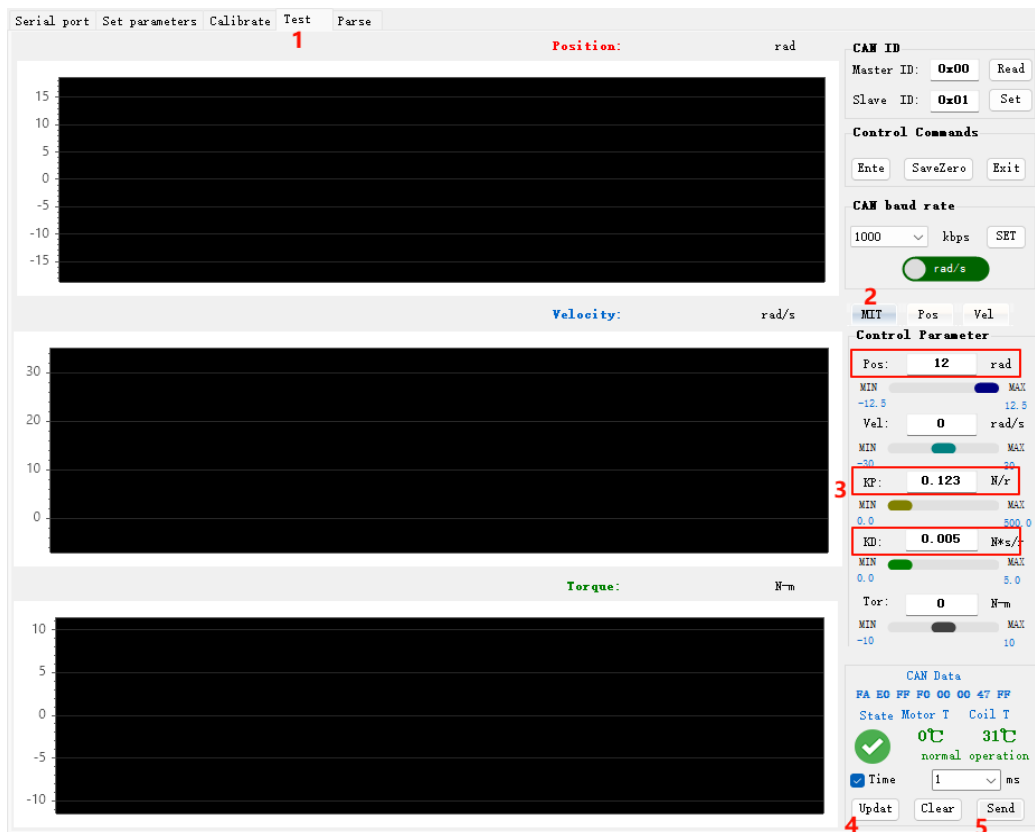


1. Click on the "Test" tab.
2. Click "MIT" above the control parameters.
3. Set the speed to 5rad/s and KD to 0.005N\*s/r.
4. Click "Updat".
5. Click "Send", and the motor starts to run.

⚠: Secure the motor in place.



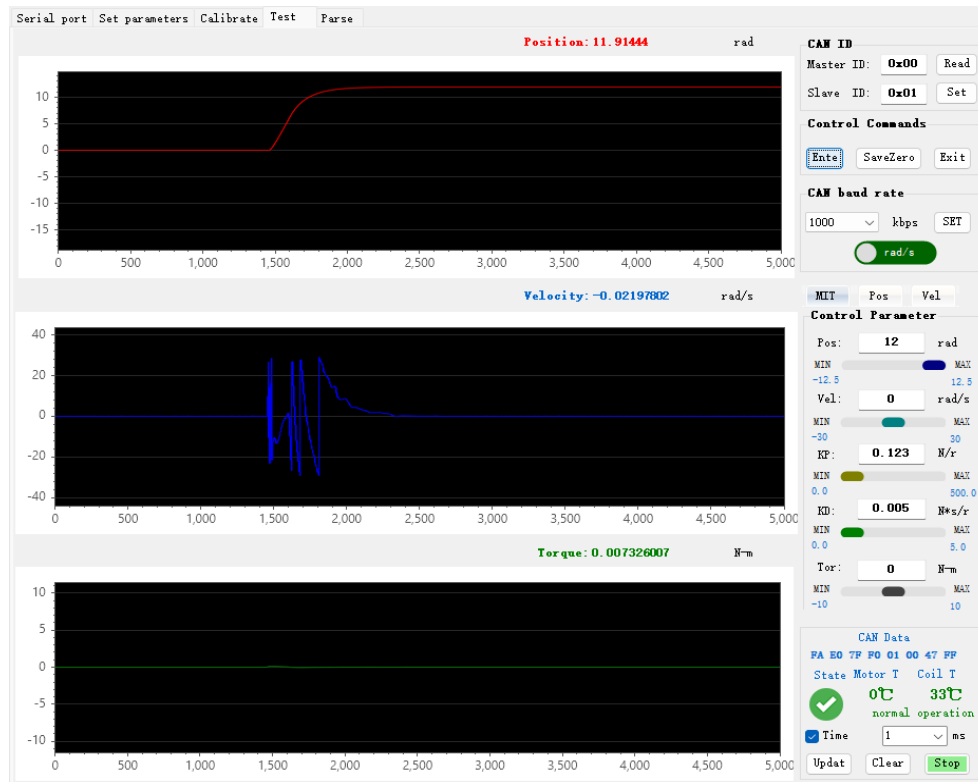
## 2.2 Position Control



1. Click on the "Test" tab.

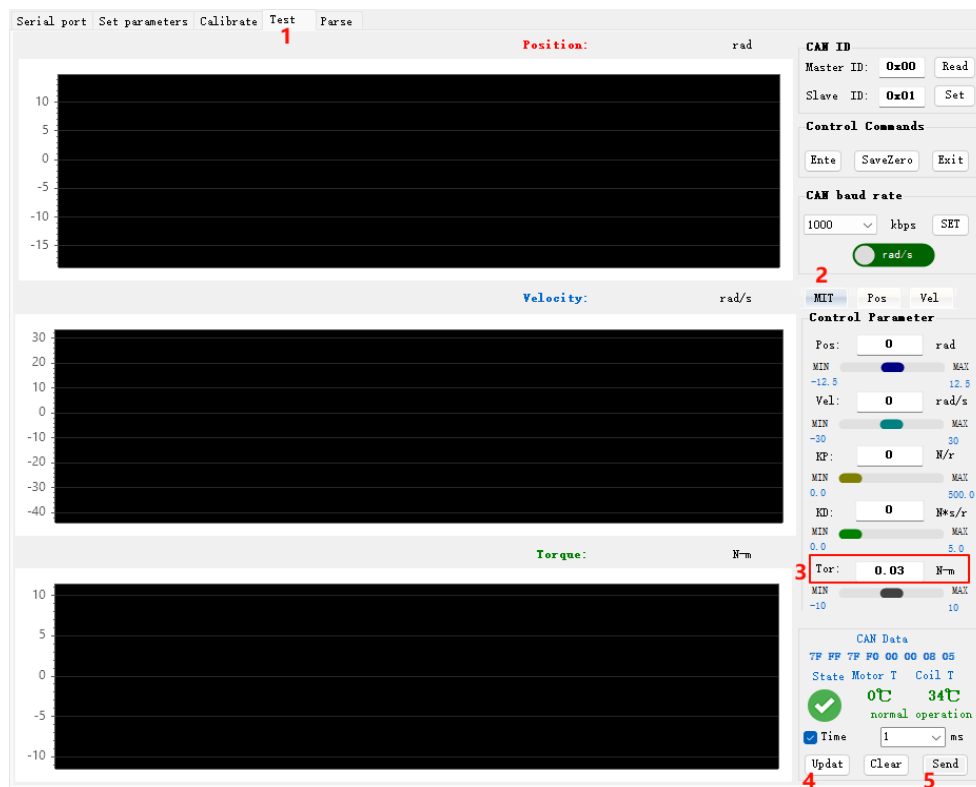
2. Click "MIT" above the control parameters.
3. Set the position to 12rad, KP to 0.123N/r, and KD to 0.005N\*s/r.
4. Click "Updat".
5. Click "Send", and the motor starts to run

⚠: Pay attention to the initial position of the motor and secure the motor to avoid a large gap from the initial position, causing the motor to impact.



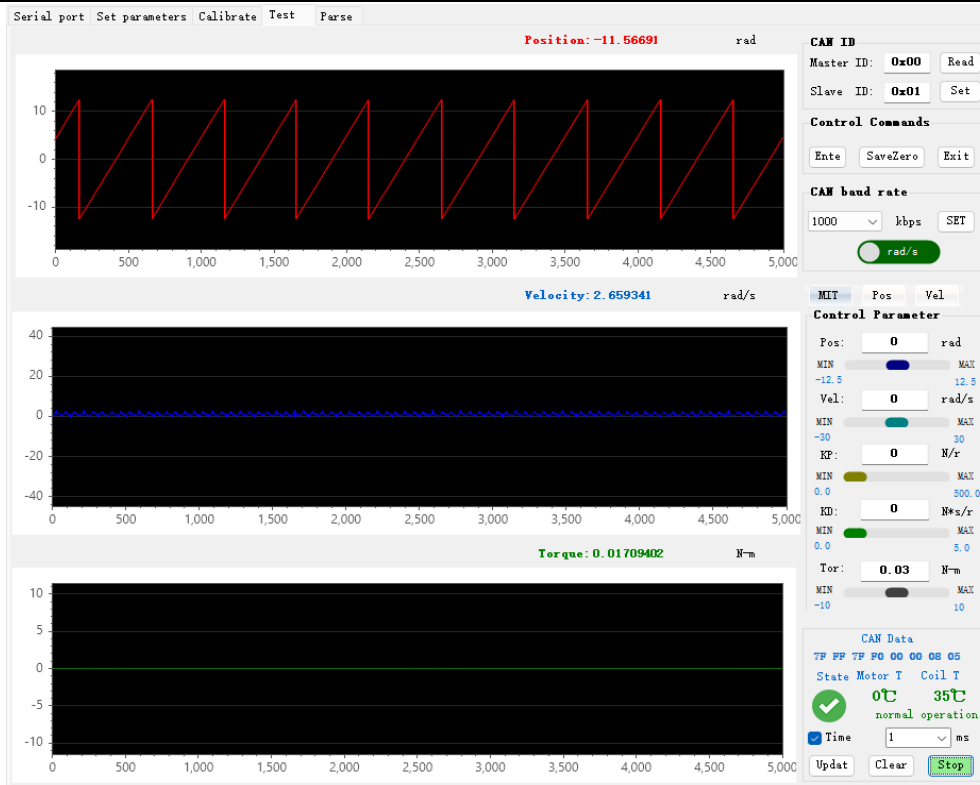


## 2.3 Torque Control



1. Click on the "Test" tab.
2. Click "MIT" above the control parameters.
3. Set the torque to 0.03N-m.
4. Click "Updat".
5. Click "Send", and the motor starts to run.

⚠: Secure the motor in place. Under no-load conditions, even a small torque will cause the motor to accelerate to the maximum speed rotation.



## 2.2 Position Velocity Mode

Serial port Set parameters **1** Calibrate Test Parse

**Motor Parameters** ParamCalou

PhaseRes(R): 1507.175 mR  
PhaseInd(L): 726.7926 uH  
FluxLinkage( $\lambda$ ): 0.005669043 Wb  
Fri Coeff.: 0.0001607948  
Inertia: 1.972009E-05 kg·m²

**Drive parameters**

NPP: 14 UV: 15 Acc: 2  
GR: 1 OV: 32 Dec: -2  
CAN ID: 0x01 OT: 100 SpeedLimit: 153.3176  
Master ID: 0x00 CAN Timeout: 0 Overcurrent: 0.8

**Amplitude**

PMAX: 12.5  
VMAX: 30  
TMAX: 10  
KT\_OUT: 0  
Gear factor: 1  
Damping factor: 4

**Control settings**

Read TempWrite ?

ControlMode: 2: Pos **3**  
1: MIT  
2: Pos  
3: Vel  
CurrentBW: 0.618  
Speed KP: 0.003  
Speed KI: 0.003  
Position KP: 54  
Position KI: 0 Calculate kp

**Feedback Data**

反馈报文	D[0]	D[1]	D[2]	D[3]	D[4]	D[5]	D[6]	D[7]
MST_ID	IDERR<<4	POS[15:8]	POS[7:0]	VEL[11:4]	VEL[3:0][T[11:8]	T[7:0]	T_MOS	T_Rotor

**Control Data**

控制报文	D[0]	D[1]	D[2]	D[3]	D[4]	D[5]	D[6]	D[7]
0x100+ID	p_des			v_des				

ID 表示控制器的 ID, 取 CAN\_ID 的低 8 位  
ERR 表示故障, 对应故障类型为:  
8——超压; C——电机线圈过热  
9——欠压; D——通讯丢失; T——表示电机的温度信息  
A——过电流; E——过速; T\_MOS 表示驱动上 MOS 的平均温度, 单位°C  
T\_Rotor 表示电机内部线圈的平均温度, 单位°C  
位置、速度和扭矩采用线性映射的关系将浮点型数据转换成有符号的定点数据, 其中位置采用 16 位数据, 速度和扭矩均使用 12 位。

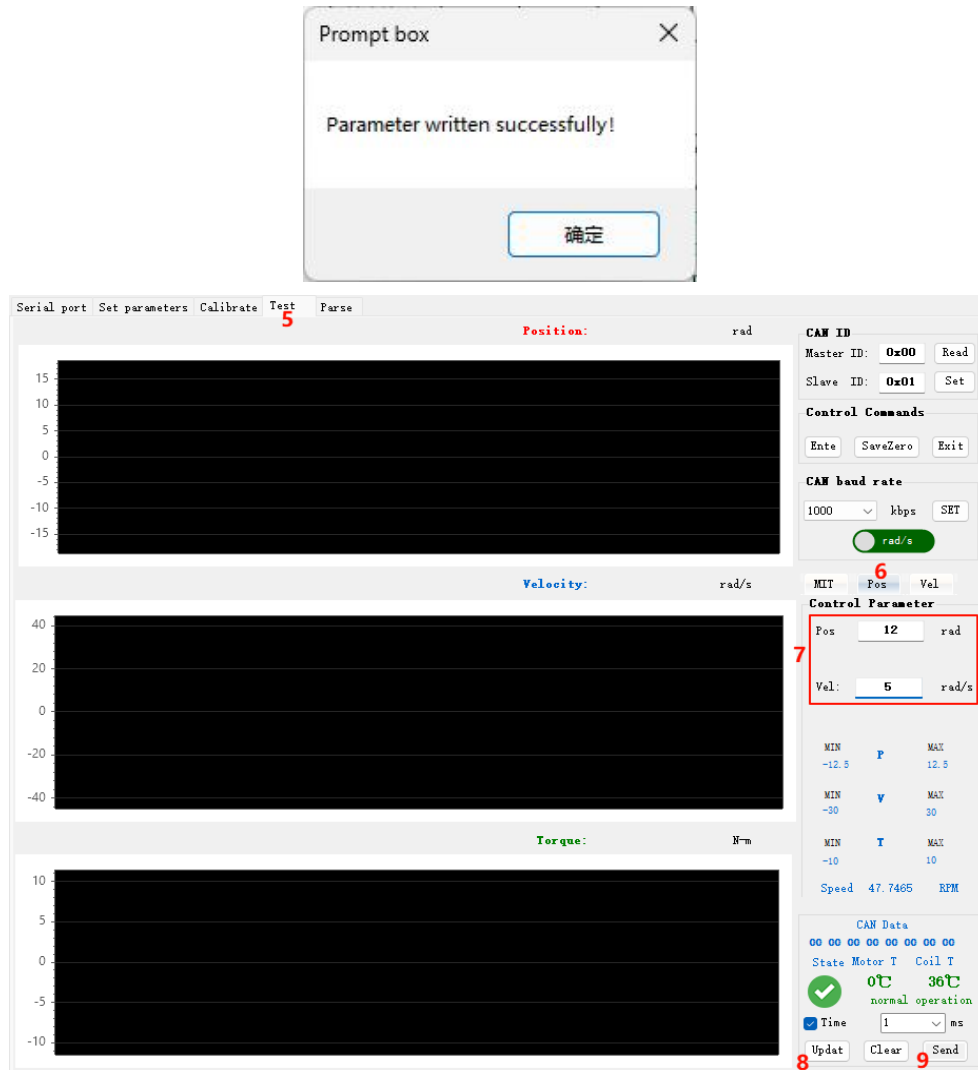
**Control Diagram**

```

graph LR
    Pdes --> Sum1((+))
    Sum1 --> PI1[PI]
    PI1 --> Vdes
    Vdes --> Sum2((+))
    Sum2 --> PI2[PI]
    PI2 --> iqref
    Idref[0] --> Idref
    
```

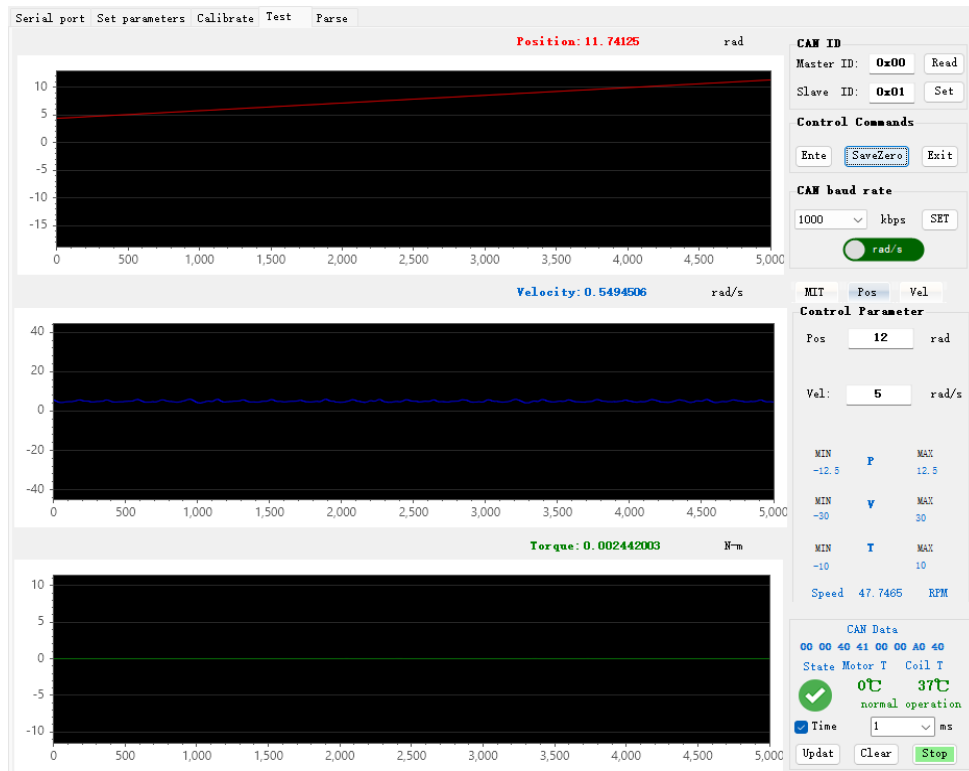
1. Click on the "Set Parameters" tab.
2. Click "ReadParam".

- 3、Select "Pos" ;
- 4、Click "Write Param", and after the "Parameter Written Successfully" message pops up, repower the motor.



5. Click on the "Test" .
6. Click "Pos" above the control parameters.
7. Set the position to 12rad and the speed to 5rad/s.
8. Click "Updat".
9. Click "Send", and the motor starts to run.

⚠: Secure the motor in place.



## 2.3 Velocity Mode

Serial Port

Serial Port: COM37

Baud Rate: 921600

Data Bits: 8

Parity: None

Stop Bits: One

Refresh ClosePort

Receiving settings

ShowText ASCII

Firmware upgrade

ReadVersion UART

Firmware REV.

Bootloader REV.

OpenFile Upgrade

Progress 0%

Calibration

Calibrate primary encod

Motor mode

Motor mode

Save zero

Return menu

Version: V1.6.3.1

Serial port Set parameters Calibrate Test Parse

Motor Parameters

ParamCalcu

PhaseRes(R): 1507.175 mR

PhaseInd(L): 726.7926 uH

FluxLinkage(λ): 0.005669043 Wb

Fri Coeff.: 0.0001607948

Inertia: 1.972009E-05 kg\*m²

Amplitude

PMAI: 12.5

VMAI: 30

TMAI: 10

KI\_OUT: 0

Gear factor: 1

Damping factor: 4

Control settings

Read TempWrite

ControlMode: 3:Vel

CurrentBW: 3:Vel

Speed KP: 0.618

Speed KI: 0.003

Position KP: 54

Position KI: 0

Drive parameters

NPP: 14 UV: 15 Acc: 2

GR: 1 OV: 32 Dec: -2

CAN ID: 0x01 OT: 100 SpeedLimit: 153.3176

Master ID: 0x00 CAN Timeout: 0 Overcurrent 0.8

ReadParam WriteParam

反馈报文	D[0]	D[1]	D[2]	D[3]	D[4]	D[5]	D[6]	D[7]
MST_ID	IDERR<4	POS[15:8]	POS[7:0]	VEL[11:4]	VEL[3:0]	T[11:8]	T[7:0]	T_MOS

控制报文	D[0]	D[1]	D[2]	D[3]
0x200+ID	v_des			

ID 表示控制器的 ID，取 CAN\_ID 的低 8 位  
ERR 表示故障，对应故障类型为：  
S——过压； C——电机线圈过温  
A——过电流； D——通讯丢失；  
B——MOS 过温 E——过流；

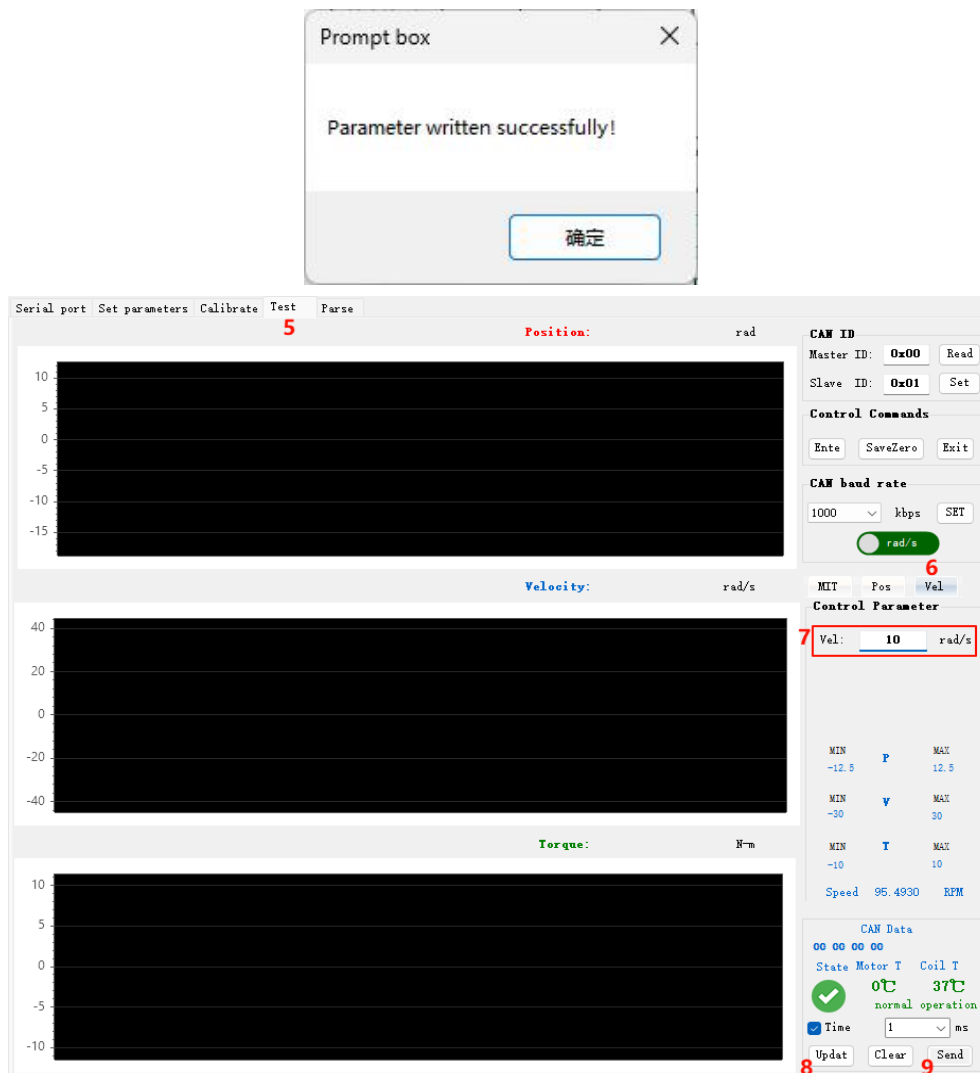
POS 表示电机的位置信息  
VEL 表示电机的速度信息  
T 表示电机的扭矩信息  
T\_MOS 表示驱动上 MOS 的平均温度，单位℃  
T\_Rotor 表示电机内部线圈的平均温度，单位℃  
位置、速度和扭矩采用线性映射的关系将浮点型数据转换成有符号的定点数据，其中位置采用 16 位数据，速度和扭矩均使用 12 位。

Vdes → dθm → PI → iqref → 0 → idref

Save Data Clear Data 0 bps 0% 0 bps 0% RX: 4323 TX: 0 Clear Count

1. Click on the "Set Parameters" tab.
2. Click "ReadParam".
3. Select "Vel" ;

4. Click "Write Param", and after the "Parameter Written Successfully" message pops up, repower the motor.



5. Click on the "Test" tab.
6. Click "Vel" above the control parameters.
7. Set the speed to 10rad/s.
8. Click "Updat".
9. Click "Send", and the motor starts to run.

⚠: Secure the motor

