RMD-L Series Servo Actuator User Manual

contents

1 Product Introduction

RMD-L actuator is a highly integrated power-output module. Integrated with high performance FOC driver and high power density brushless motor .Break through the traditional distributed design, it makes the structure of the terminal product design easier, product internal wiring more convenient, the performance of the whole machine more stable.

Applicable for running in 20RPM-2500RPM situation .

Main application:

Robotic arm

Manipulator
Screw drive
3D printer
Gimbal
Turntable
Inspection robot

1.1 Naming Rules

```
RMD - X - 8 - 10 - 5 - C - C - B
 |    |   |    |   |   |   |   |
 |    |   |    |   |   |   |   ----8 Color     B:black  G:Gray
 |    |   |    |   |   |   --------7 Encoder   A:12bit  B:14bit C:16bit
 |    |   |    |   |   ------------6 Interface C: CAN   R: RS485
 |    |   |    |   ----------------5 Turn      5:5T     10:10T
 |    |   |    --------------------4 Length    10:10mm  15:15mm
 |    |   ------------------------3 Diameter  8: 80mm
 |    ----------------------------2 Features  X: Built in reducer
 |                                            H: Hollow shaft
 |                                            L: with current-control-loop and low power version
 |                                            S: no current-control-loop
 ---------------------------------1 Series    RMD: Reducer Motor Drive
```

1.2 Features

Programmable and integrated servo motor
Working voltage DC 12-24V

1.2.1 control mode

Torque control mode
Velocity control mode
Position control mode

1.2.2 Communication control mode

RS485 Bus communication for control optional
CAN Bus communication for control optional

1.2.3 Encoder feedback

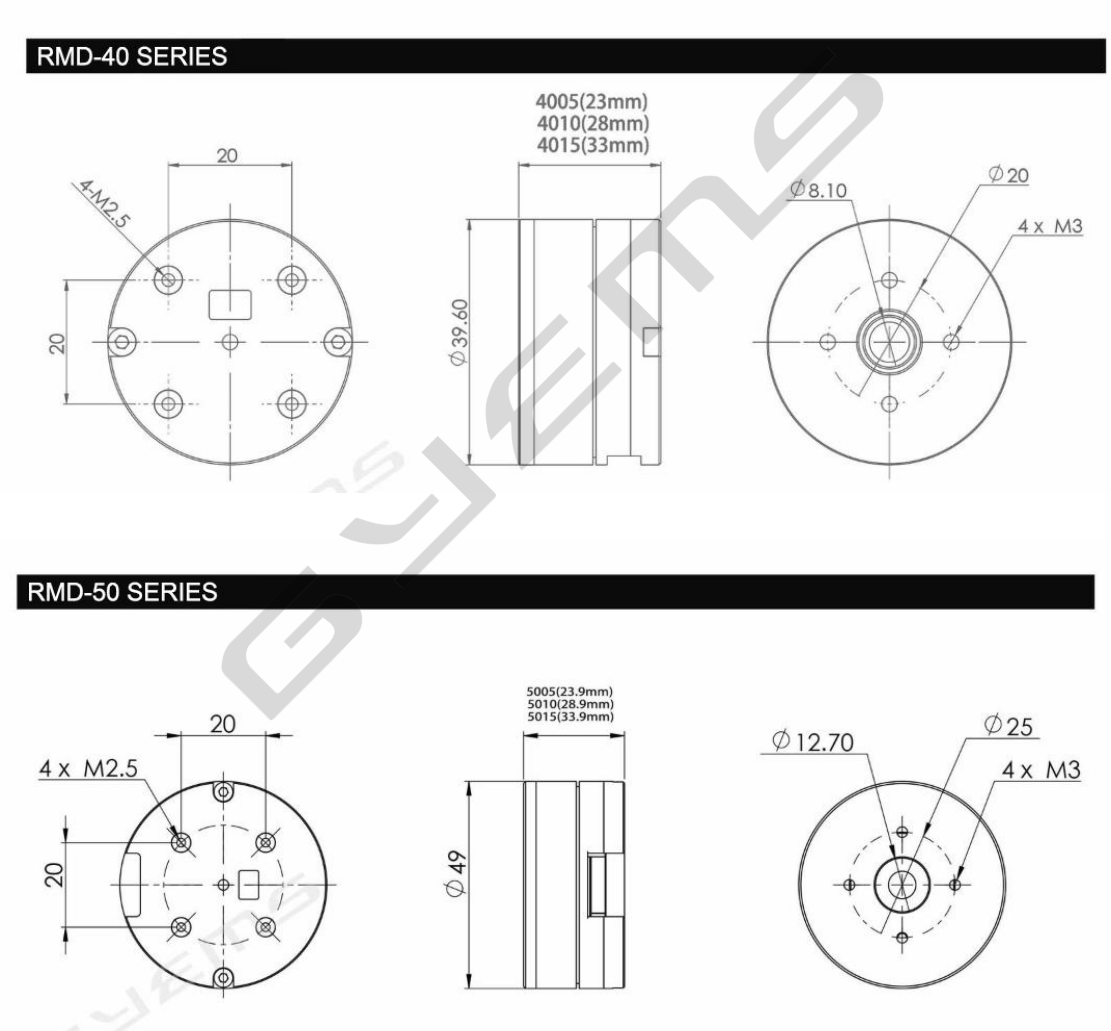
14 bit absolute value magnetic encoder optional
16 bit absolute value magnetic encoder optional

1.2.4 Technical highlight

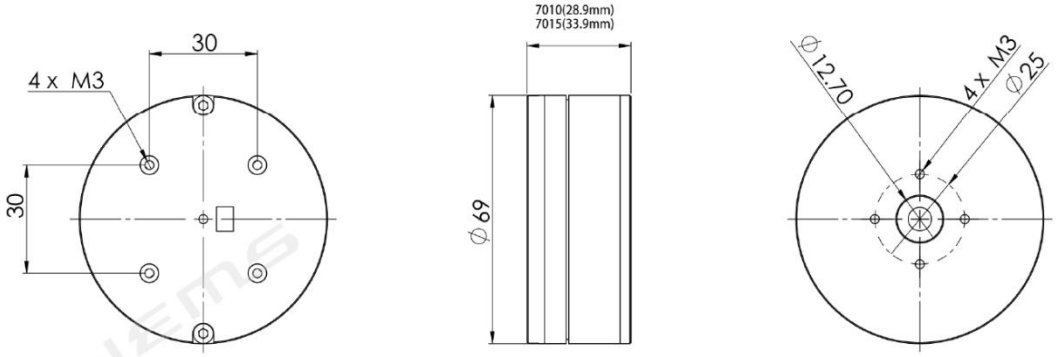
Fully servo control, high positioning accuracy, high response for speed, energy saving and high efficiency, multi control mode , smooth and low noise, compact structure

2 Installation and precaution attentions

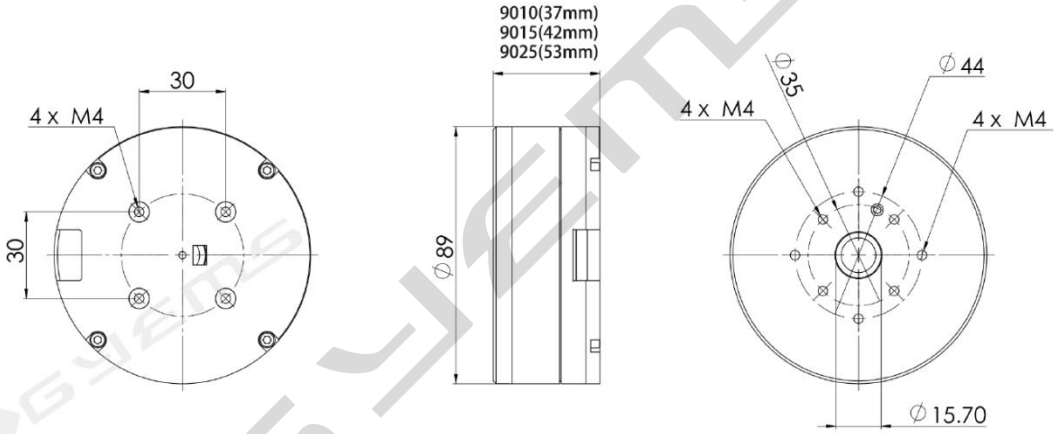
2.1 Mechanical installation dimension



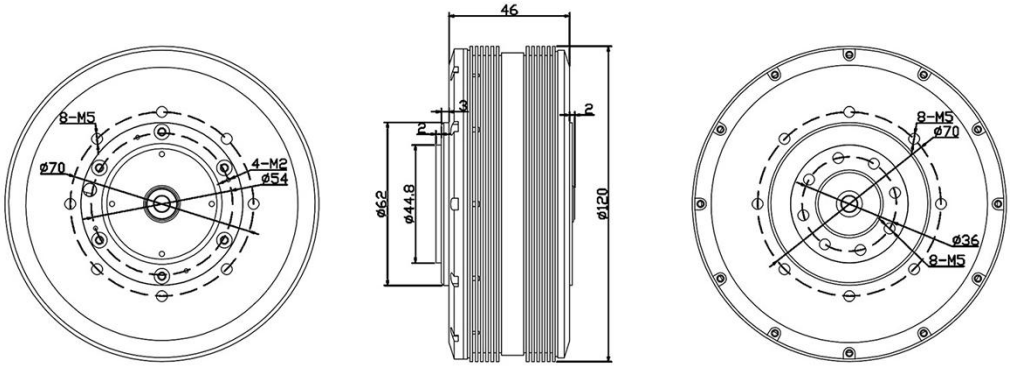
RMD-70 SERIES



RMD-90 SERIES



RMD-120 SERIES



Attentions：

Enough space shall be reserved for motor I / O interface. Suggestions: ＞20mm
The length of the installation screw shall meet the requirements of the drawings. If it is too long, the internal structure will be damaged, and if it is too short, there is a risk of loosening.

Warning:

Please carefully read and follow the requirements in this manual. It can help you set up and operate the driver correctly and achieve the best performance.
Please install it in the place without rain, and the surrounding area should be non combustible.
No grinding fluid, oil mist, iron powder, chips and other places.
A well ventilated, dry and dust-free place.
Place without vibration.
Do not use gasoline, diluent, alcohol, acid and alkaline detergent to avoid discoloration or damage of the shell.
Operation requirements of motion actuator
Please make sure that this document can be used by design engineer, installation personnel and personnel responsible for debugging the machine or system using this product.
Please ensure that the requirements of this document are adhered to at all times, taking into account the documentation of other components and modules.
Please consider the legal provisions applicable to the destination and:
Regulations and standards
Regulations of testing organization and insurance company
National specification

Transportation and storage conditions

Please ensure that products are not overloaded during transportation and storage, including:
Mechanical load
Temperature, moisture and corrosive gas are not allowed.
Please use the original packaging for storage and transportation. The original packaging provides enough protection to avoid the influence of conventional problems.

Technical requirement：

The general conditions for the correct and safe use of the product must always be observed:
Connection and environmental conditions specified in the product technical data and

technical requirements for all other connected components. Only when the product meets the requirements of the product specification, it is allowed to operate the product according to the relevant safety regulations.
Follow the instructions and warnings in this document.

Operator requirements：

This product can only be operated by engineers familiar with the following regulations:
Familiar with the installation and operation of electrical control system
Be familiar with applicable regulations of operating safety engineering system
Familiar with applicable regulations on accident protection and occupational safety
Familiar with product documentation

2.2 Environmental requirements environmental conditions

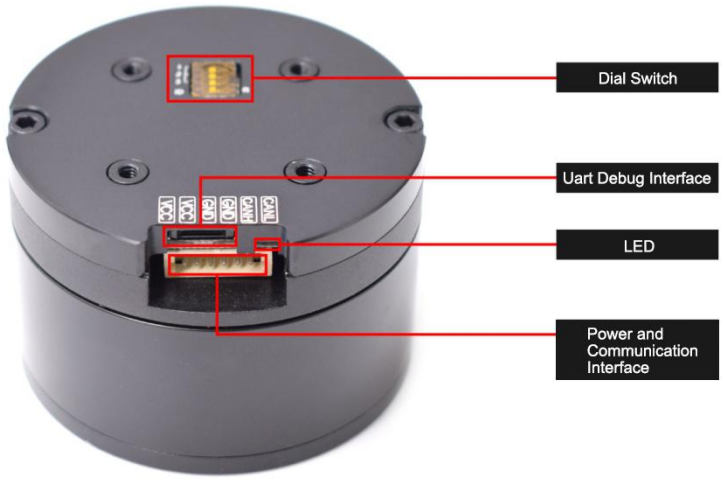
Ambient temperature - 40 ℃ ~ 50 ℃ (no ice)
Ambient humidity 5-95% RH (no condensation)
Storage temperature 10 ℃ ~ 70 ℃ (no ice)
Storage humidity 5-95% RH (no condensation)
Installation requirements: no sun, corrosive gas, fuel dust
Altitude below 1000M
Vibration under 5.9 m/s2 @10-60hz

Attentions：

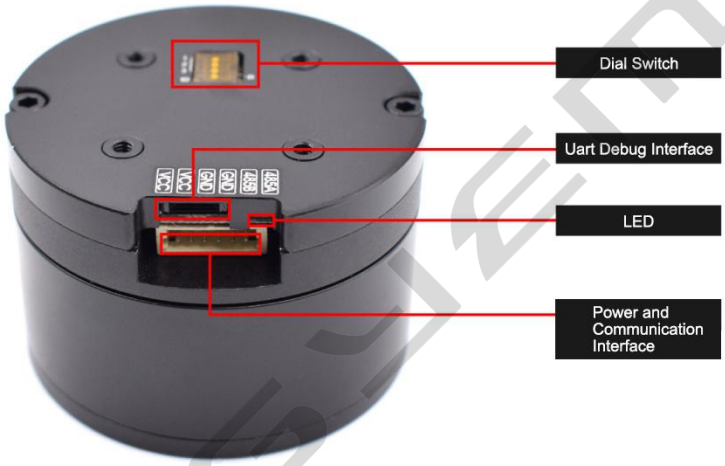
The fixing screws of the motor must be locked;
Cables shall not be over stretched;
The motor shaft and equipment shaft must be installed to ensure good centering;避
Avoid any foreign matter entering the servo drive, and conductive foreign matters such as screws, metal chips or combustible foreign matters entering the servo drive may cause fire and electric shock. For safety, please do not use the servo drive and servo motor with damage or parts.

3 Hardware connection

3.1 Interface explaining

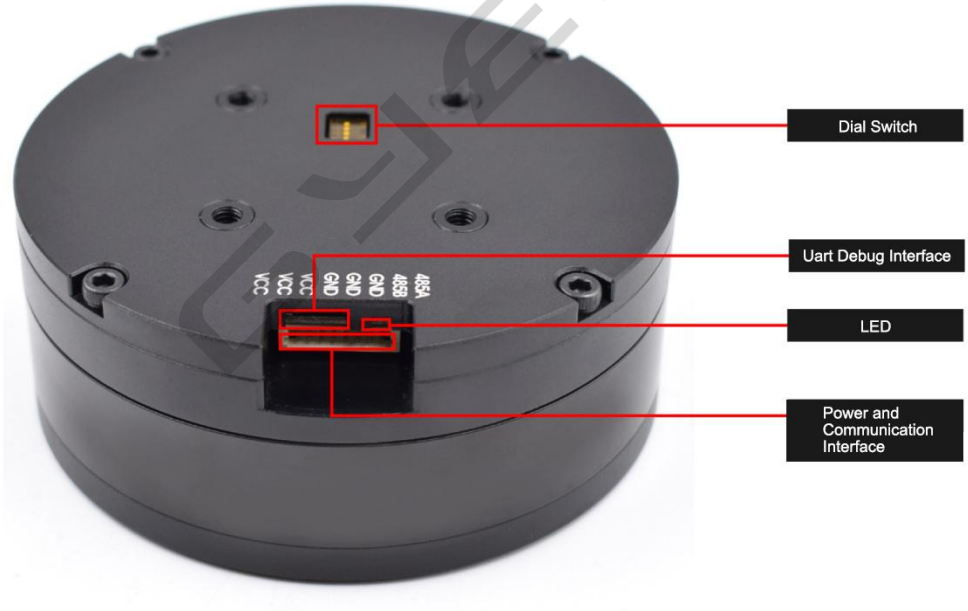


RMD-L 40&50(CAN版本)



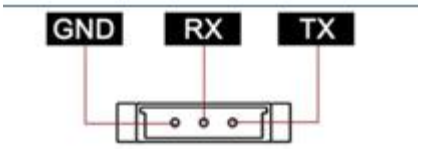
RMD-L 40&50(RS485版本)

RMD-L 70&90(CAN版本)



RMD-L 70&90(RS485版本)

3.2 Debug interface

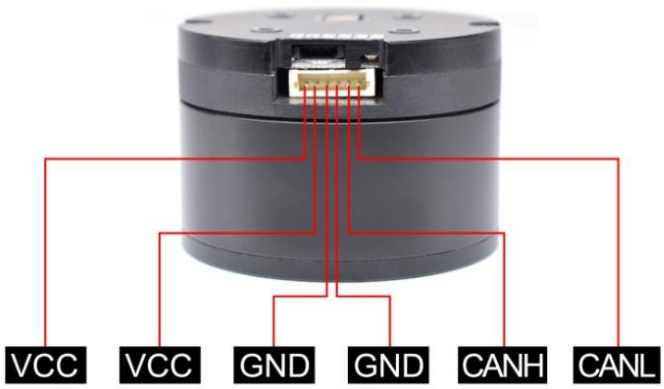


Debug interface connector type：51146-1.25mm-2p (Brand：molex)
Level range：Logic1，3.3V；Logic0，0V

3.3 Power and communication interface

Power and communication interface type：S6B-ZR-SM4A-TF

RMD-L 40&50(CAN版本)

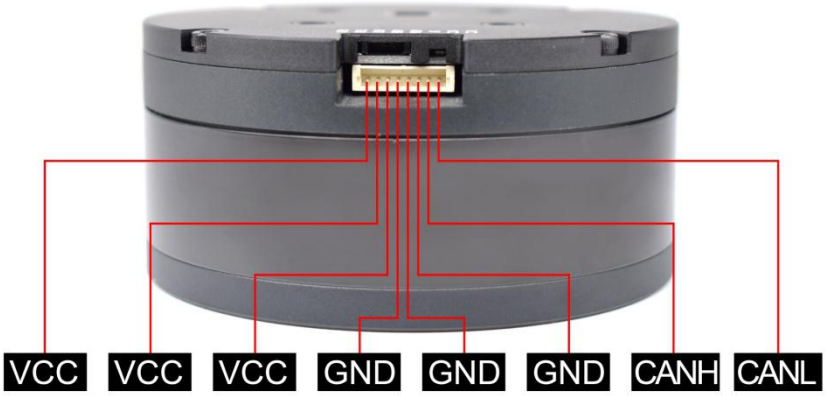


Power and communication interface type：S6B-ZR-SM4A-TF

RMD-L 70&90(RS485版本)

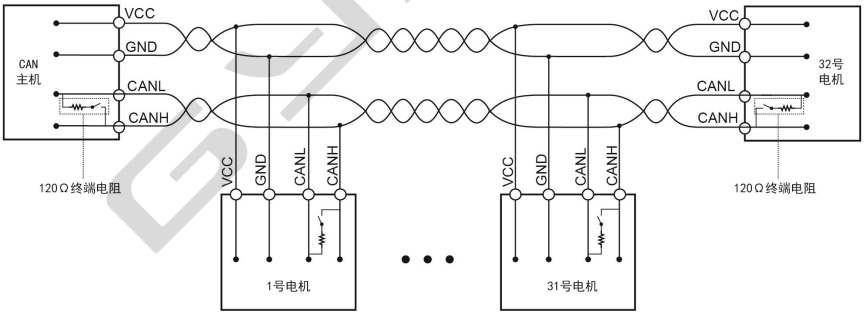
Power and communication interface type：S8B-ZR-SM4A-TF

RMD-L 70&90(CAN版本)

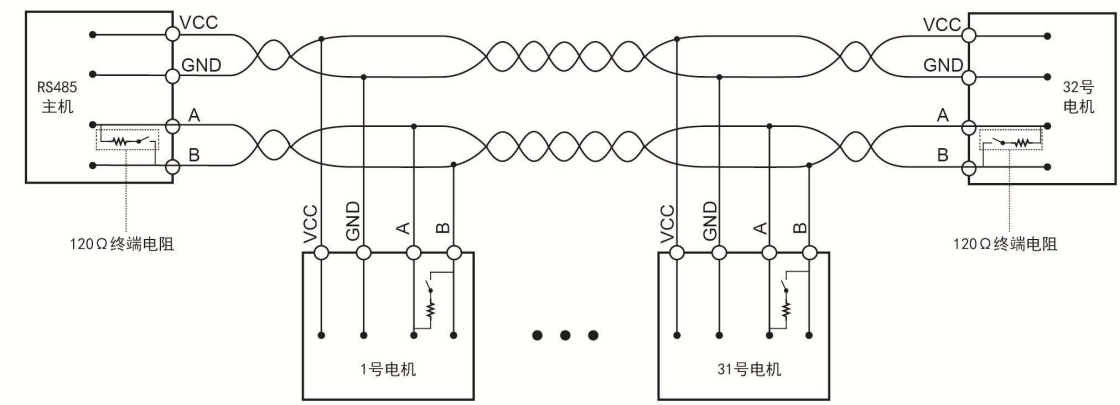


Power and communication interface type：S8B-ZR-SM4A-TF

3.4 Bus connection diagram



Can bus connection diagram



RS485 bus connection diagram 图

Note: up to 32 drivers can be mounted on the same bus (depending on the bus load). In order to prevent bus conflict, each driver needs to be set with a different ID. for details, please refer to the dial switch settings.

3.5 Dial switch settings

3.5.1 Bus device address setting (1-3 bits of dial switch)

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

3.5.2 Bus terminal resistance setting (4th bit of DIP switch)

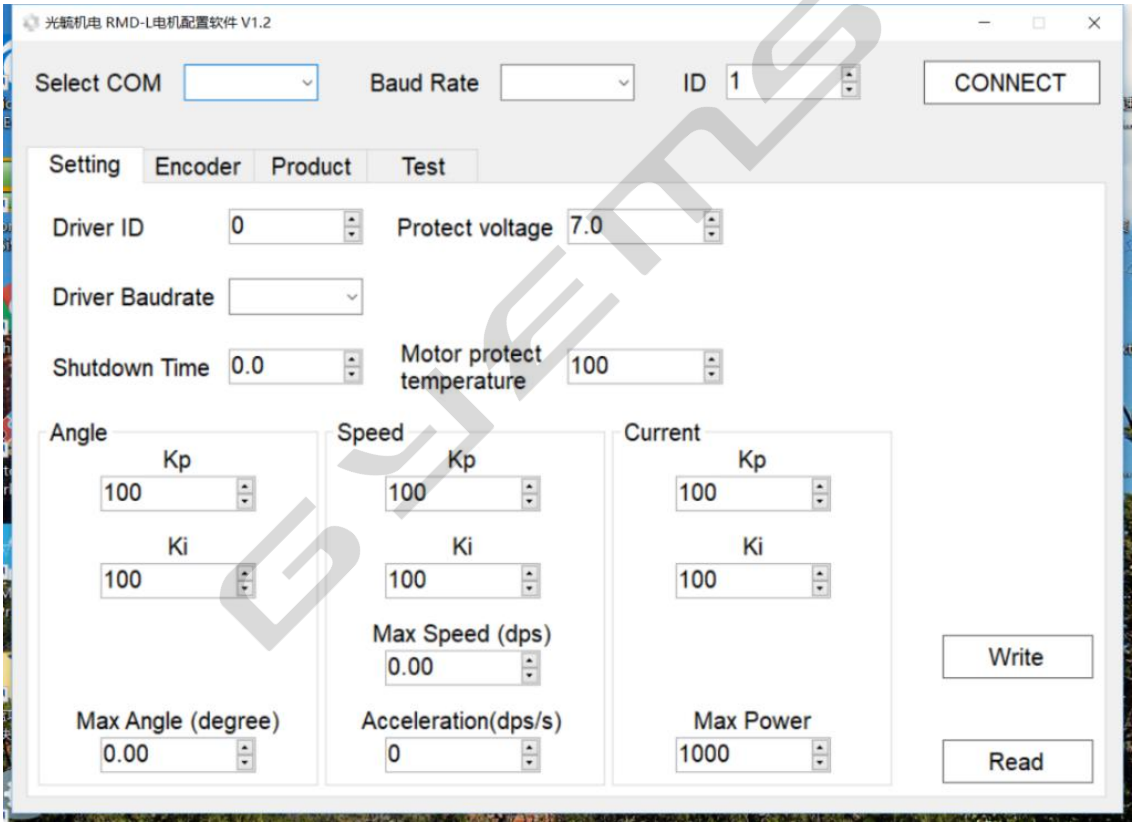
The 4th bit ON indicates that the bus terminal resistance (120 Ω) is ON,

*Generally, the last node of CAN bus needs to be connected with terminal resistance (the 4th bit is set to ON position)

4 RMD-L config Installation and parameter setting

4.1 RMD-L config Brief Introduction

RMD-L config is a PC debugging tool developed by Guangyu mechanical and Electrical Co., Ltd., which can be used on computers above win7. The operation interface is as follows:



4.1.1 RMD-L config Installation

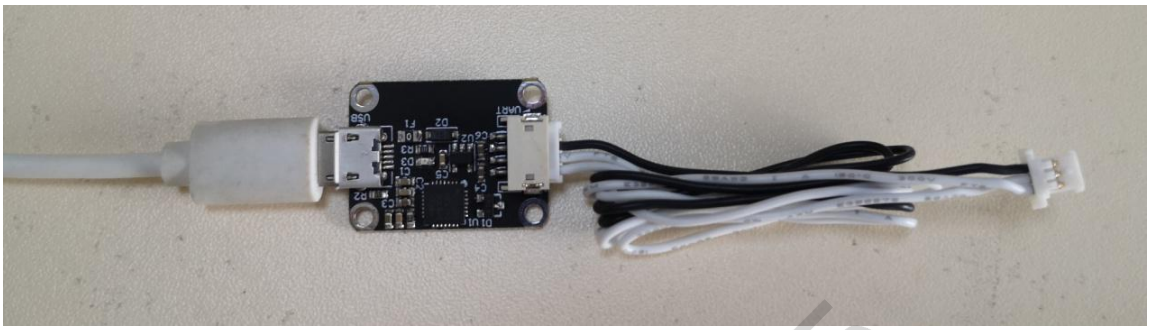
RMD-L Config installation is the same as windows general application，Just double click RMD-L config Setup.msi the icon to start，Install path select default path。

RMD-L config Installation file download address：http://www.gyems.cn/support/download

RMD config V1.6.zip

4.1.2 Connection tool and drive installation

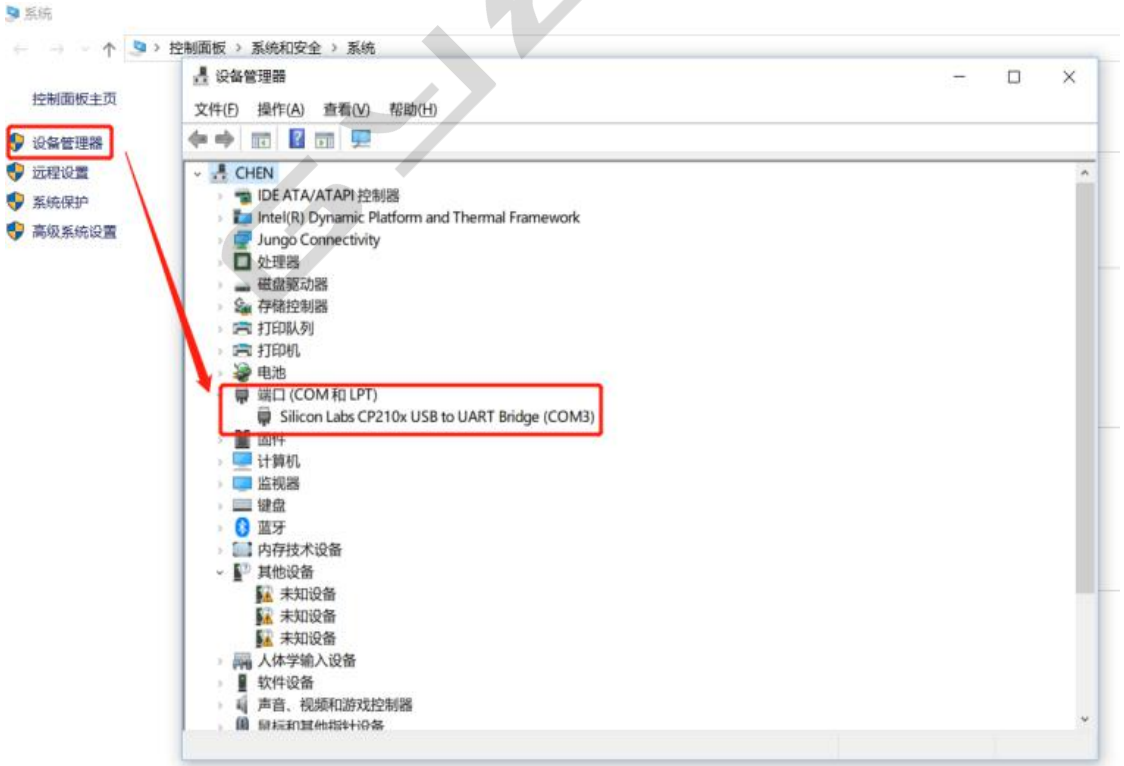
RMD-L have a debugging interface (UART interface), which usually requires a USB to UART tool (as shown in the figure below) to connect. Before using, install the driver of the tool first.



Windows Driver download address：http://www.gyems.cn/support/download

CP210x_Windows_Drivers

After the download is completed, unzip, double-click to start the installation until it is finished. After completion, insert the USB data cable to check whether the installation is successful in the windows device manager. As shown in the figure below, find the corresponding COM port to indicate that the installation is successful.



4.2 Hardware connection

Adjust the power voltage to 12V (it is better to have a fixed 12V output power supply), turn off the power button before connecting the motor, and connect as shown in the figure below:

Pay attention to:

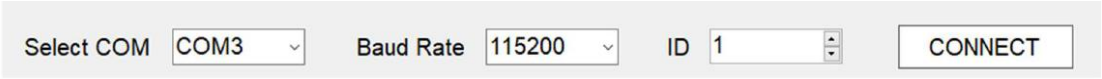
Connect and then turn on the power, do not plug and unplug the terminal with power. RS485 The RS485 interface also supports the communication protocol of debugging software. A USB to 485 converter is needed to communicate with PC.

4.3 Parameter setting

4.3.1 PC software connection

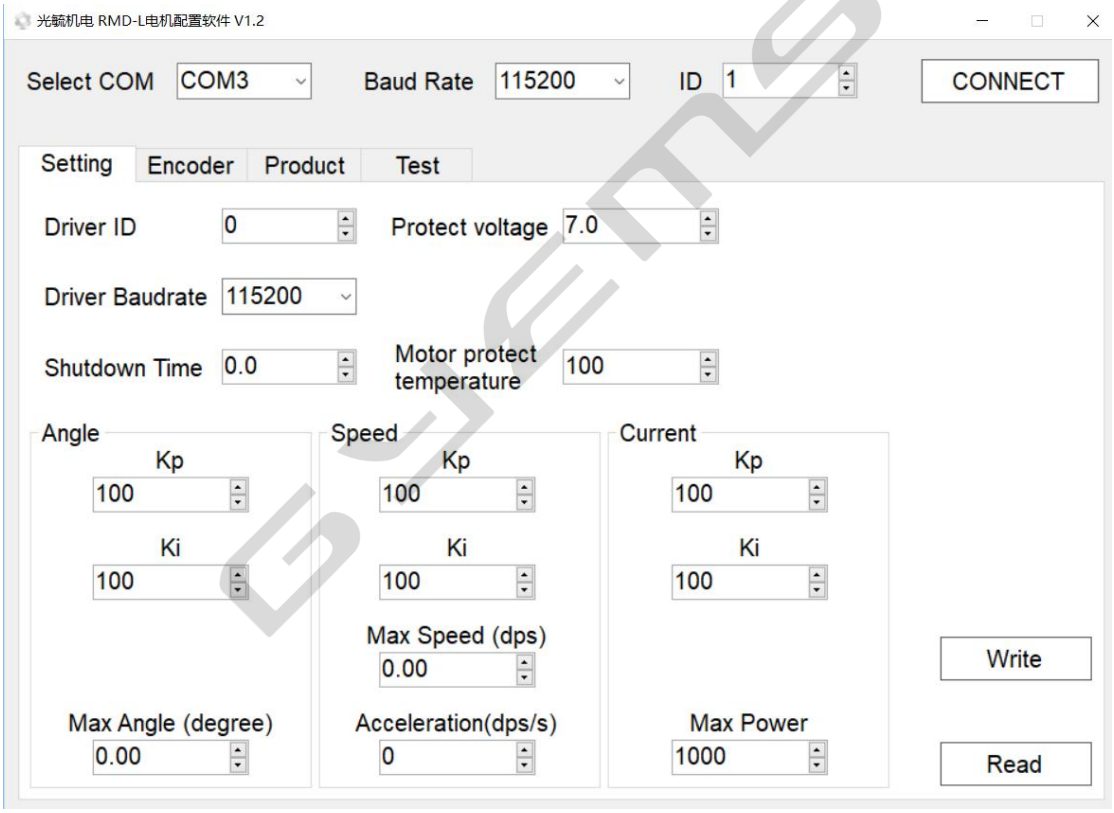
The motor drive and the upper computer can be connected through the USB to UART

module.
The default baud rate of the motor drive is 115200 when it leaves the factory, and the default ID is set by the dial switch, generally 1. Therefore, the settings before connecting the upper computer are as follows (COM is selected according to the actual situation). Click the connect button to connect the
equipment.



4.3.2 Basic Setting

In the Setting page, click the Read button to get the motor information.



Driver ID:
Set the address number of the motor. When the value is 0, the address code of the dial switch takes effect;
When it is not 0, the value set is the motor address number

Driver Baudrate：
Set the baud rate of the driver.

Shutdown Time：

Set the shutdown time of the motor. If no control order is received during this time, the power will be shut down; When set to 0, the motor will never be turned off.

Angle：
Angle loop control parameters. Kp and Ki modify the PI parameters of the Angle loop, and Max Angle is used to limit the maximum rotation angle of the motor.

Speed：
Speed loop control parameter.Kp and Ki modify the PI parameters 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 speed of the motor is±720°/s, that is 2 cycles persecond.

Acceleration
The maximum acceleration of the motor is limited. When the value is 0, it is not limited

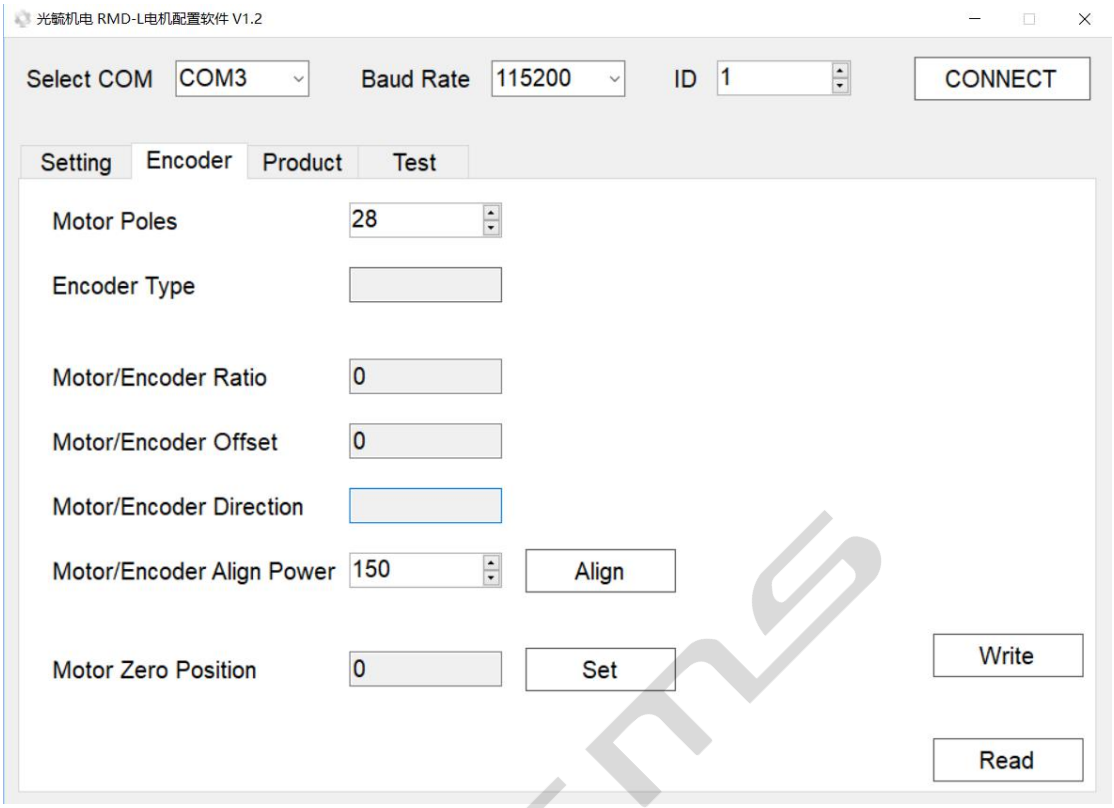
Current：
Torque loop control parameters. KP and Ki modify the PI parameters of the moment ring

Max Power :
Limits the final power output to the motor.

Note：
1. The actual acceleration of the motor depends on PI parameters, motor load, driving voltage, etc.
2. After the parameter is modified, click write to save the parameter to the driver.
3. After setting, the new parameters need to be powered on again to take effect.

4.3.3 Encoder setting

On the encoder page, click the read button to read the motor and encoder information



Motor Poles：
Set the pole number of the motor, which is usually set before delivery.

Encoder Type：
Encoder model, which is read-only.

Motor/Encoder Ratio：
The ratio of motor and encoder calibration, which is a read-only parameter, generally around 1000, the closer to 1000, the better the calibration effect.

Motor/Encoder Offset：
The zero deviation of motor and encoder calibration, which is read-only parameter, generally has no effect on motor drive performance.

Motor/Encoder Direction：
The direction of motor and encoder calibration, which is read-only parameter, generally has no impact on motor drive performance.

Motor/Encoder Align Power：
The motor and encoder calibration power, generally using the default parameters, can be appropriately increased when the load is large to improve the calibration effect.

Align ：

Encoder calibration . Before this step, it is necessary 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 carry out the calibration, and the LED light will flash at the same time. After the calibration, the LED light will always be on, and the parameters will be automatically saved in the drive。

Motor Zero Position：

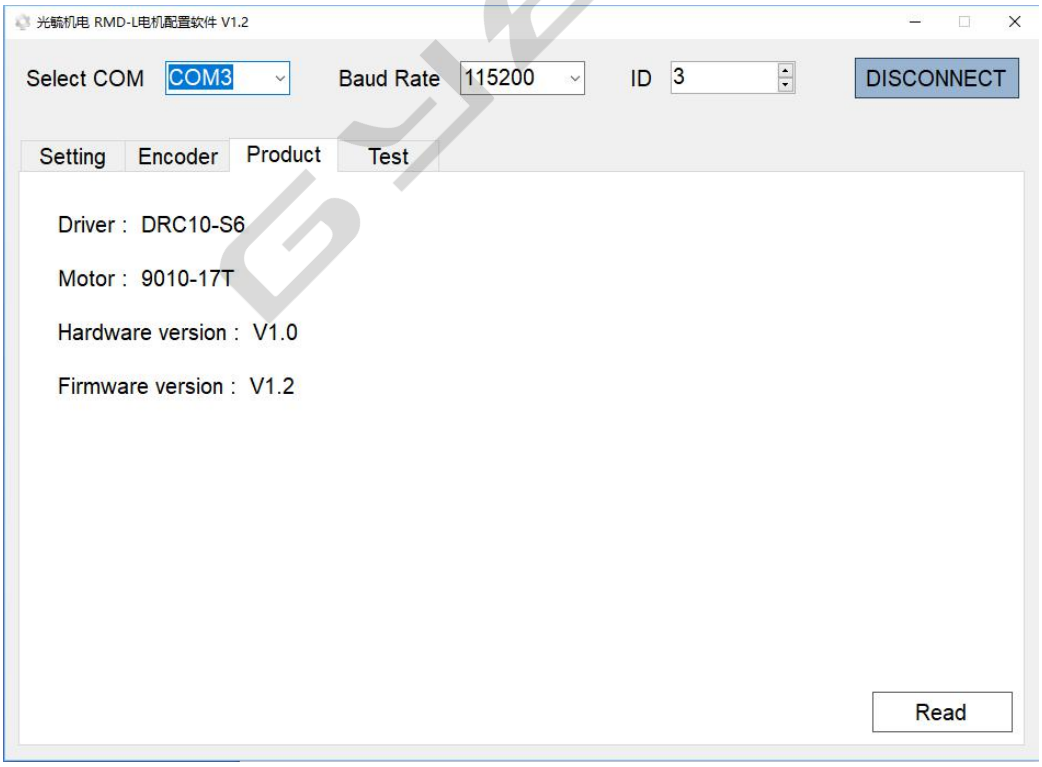
The starting position of the motor. Click the set button and the drive will save the current position as the starting zero position of the motor.

NOTE：

1. The calibration of motor and encoder should be carried out under no-load condition. If the motor does not rotate smoothly during the calibration, please check whether the motor has fault or the mechanical friction is too large.
2. After the parameter is modified, click write to save the parameter to the driver.

4.4 Product information

On the product page, click the read button to read the drive model, motor model and the hardware and software version of the drive.



Driver ：

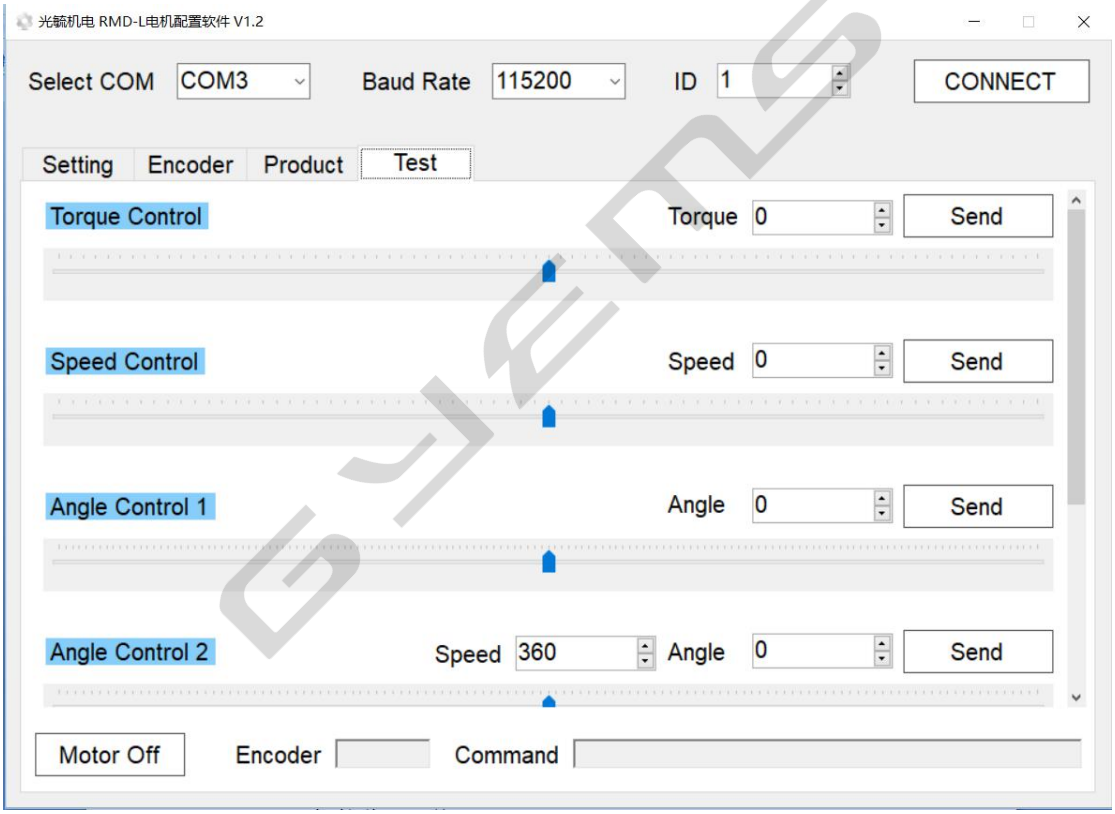
Driver board type for motor installation

Motor ：
Motor type

Hardware version ：
Driver board type hardware version

Firmware version ：
Software version of the driver

4.5 TEST function



Test page is used for simple operation and debugging of single motor

Torque control:
Adjust the torque, the symbol represents the direction of rotation

Speed control:
Speed control mode, running at the specified speed, the symbol represents the direction of rotation

Angle control1:
Position control mode 1, rotate to the specified angle according to the default speed, and the symbol represents the rotation direction

Angle control2:
Position control mode 2, rotate to the set angle according to the speed set speed, and the symbol represents the rotation direction

Angle control3:
Position control mode 3, rotate to the specified angle at the specified speed, and reverse to change the rotation direction

Angle control4:
Position control mode 4, rotate to the set angle according to the setting speed, and reverse to change the rotation direction

Motor off:
Motor off

Encoder:
Returns the current encoder value of the motor

Command:
Display data sent by serial port

5. Communication protocol

5.1 Can communication protocol

Refer to protocol document RMD servo motor control protocol (can485) v1.xx.

5.2 RS485 communication protocol

Refer to protocol document <<RMD servo motor control protocol (RS485) v1.xx>>.

Exemption from declaration
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