



Y2SD2-U

Intelligent Stepper Driver

User Manual



Guangdong Kaifull Electronics Technology Co., Ltd.

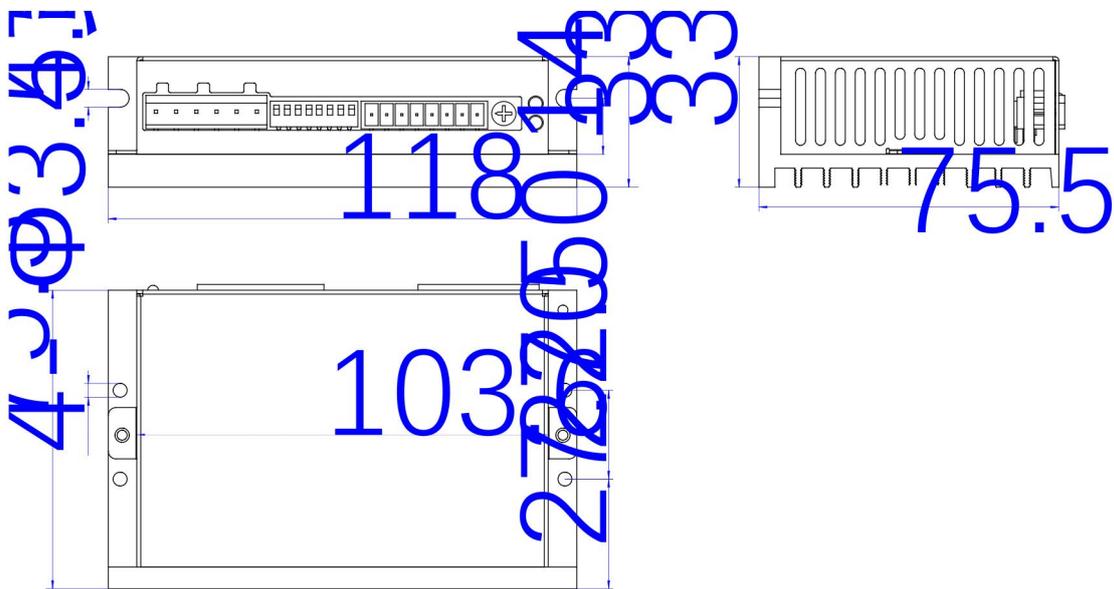
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1 Foreword

- Thank you for choosing Kaifull's product.
- This manual describes the use methods and safety precautions of the product.
- Please read this user manual carefully and use this product correctly and safely.
- After reading, please save it at a suitable place for easy access at any time.
- For technical support, please dial 400-960-1069 or +86-769-23033384.

2 Installation Dimensions

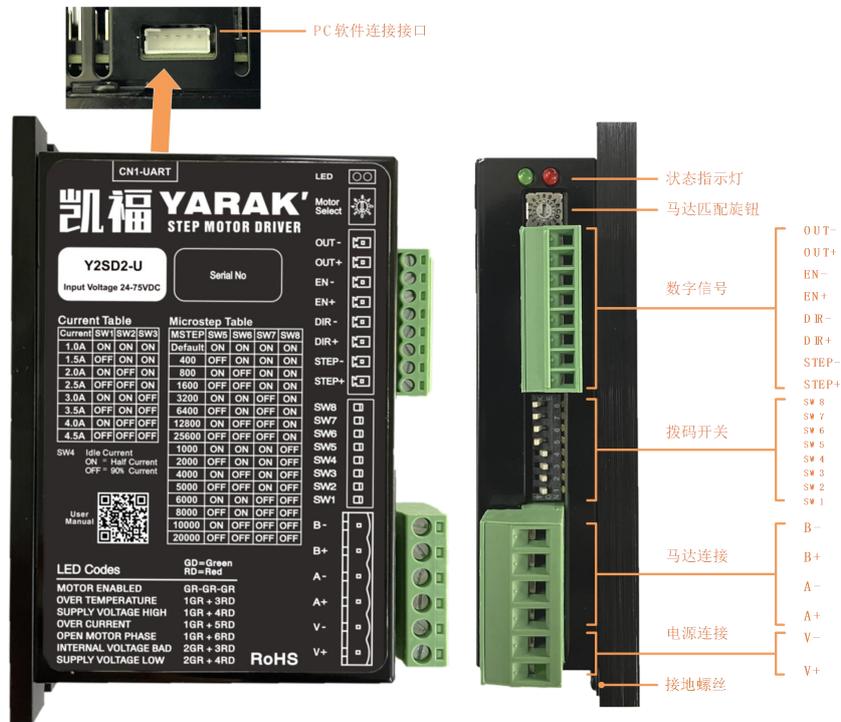


3 Technical Specifications

Technical Specifications		
Installation Dimensions	118 × 75.5 × 33 cm	
Input power	24 ~ 70V DC (±15%)	
Current output	0.1 ~ 7A (peak)	
Adaptive motor	Two-phase stepper motors of size 86 and below	
Control mode	Pulse + direction (default), dual pulse, single-segment speed and two-segment speed modes, which are switched through software	
Communication interface	TTL serial port	
Digital signal	Input signal	<u>Pulse, direction, enable signal</u> : differential; optocoupler isolation; common end supports 5~24VDC; maximum frequency 500Khz
	Output signal	<u>Alarm output</u> : collector open circuit; opto-isolator; maximum output 100mA@30V;
Current tap position	Dial setting	1.0、1.5、2.0、2.5、3.0、3.5、4.0、4.5 A
	Software setting	0.1~7.0 A
Subdivided tap position (Pulse mode)	Dial setting	400、800、1600、3200、6400、12800、25600、1000、2000、4000、5000、6000、8000、10000、20000
	Software setting	Any even number between 200 and 51200
Speed tap position (Speed mode)	Dial setting	0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 7.0, 8.0, 9.0, 10.0 rps
	Software setting	0.01~50.0 rps
Recommended service environment	Temperature	0 ~ +55 °C
	Humidity	0~ 90%RH below
	Altitude	1000 m below
	environment	No corrosive gases or dust. The product shall not come in contact with water and oil.
Dielectric strength	AC1.5KV between ground wires, capable of withstanding voltage for 1 minute	
Protection grade	IP20	
Weight	0.25KG	

4 Driver Interface

4.1 Wiring diagram



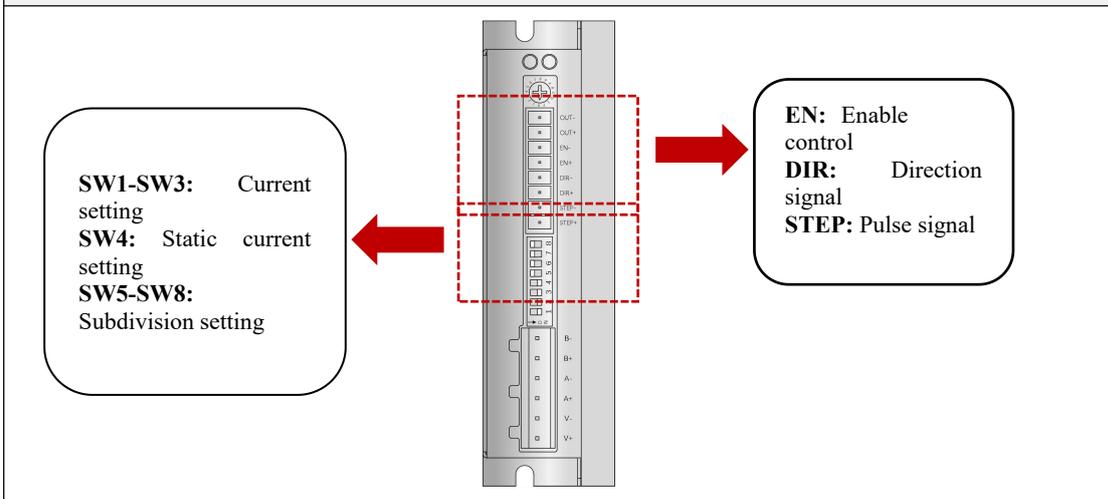
4.2 Control Mode and Description

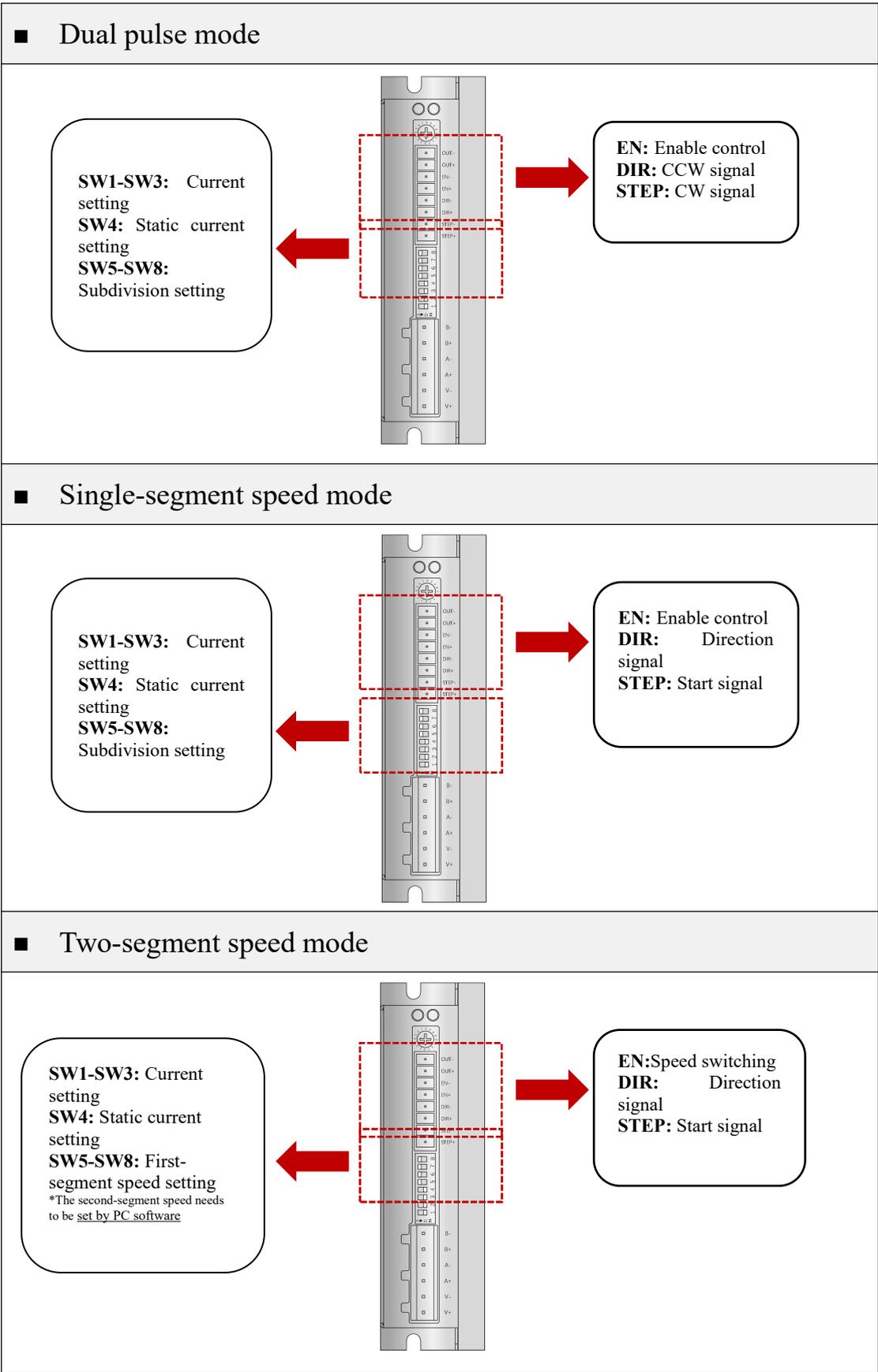
Y2SD2-U has four control modes: pulse + direction, double pulse, single-segment speed, and two-segment speed modes, which can be switched [by connecting to the Kaifull PC software](#).

The functions of the driver dial switches and control signals vary in different control modes.

Control Mode	Description
Single Mode Pulse	Position control mode; the pulse type is pulse+direction
Dual mode pulse	Position control mode; the pulse type is CW/CCW pulse
Single-speed mode	Speed mode: in this mode, a segment of operating speed can be set for the motor. The STEP interface of the driver is used for startup, the DIR interface is used for switching the operating direction, and the EN interface is used for motor enable control.
Two-segment speed mode	Speed mode: in this mode, two segments of operating speed can be set for the motor. The STEP interface of the driver is used for startup, the DIR interface is used for switching the operating direction, and the EN interface is used for switching to the second operating speed.

■ Pulse+direction mode



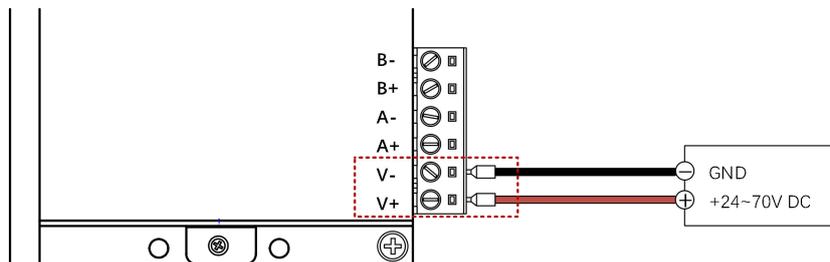


5 Wiring

5.1 Power Connection

The power supply specification of the Y2SD2-U driver is 24-70V DC. When you connect the power supply, connect the positive pole of the power supply to the V+ interface of the driver and the negative pole of the power supply to the V- interface.

- Applicable power supply wires: Wires with AWG20 (0.5mm²) above



- Select the appropriate power supply

The following are recommendations for selecting the power supply when using different motors:

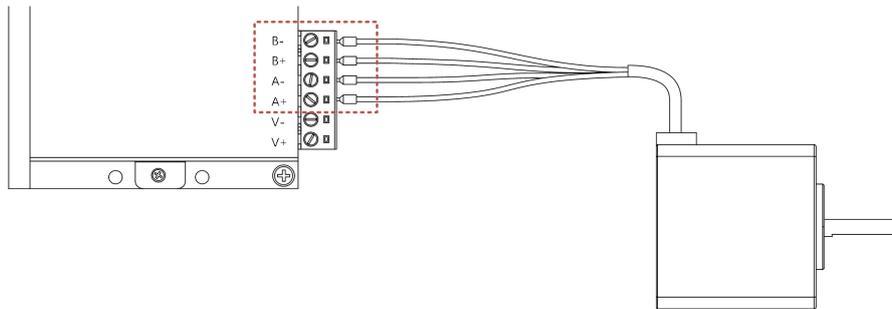
Motor flange (MM)	Supply voltage (DC)	Supply current
20/35	24V	≥1.0A
42	24V	≥2.0A
57/60	24-36V	≥4.5A
86	36-48V	≥6A



- Do not connect the positive and negative poles of the driver power supply reversely, as it may cause damage to the driver and will not be covered by warranty
- When the motor 57 and above is used and the motor is operating at a high speed, it will generate a large reverse electromotive force. At this time, use a higher-voltage power supply to improve the high-speed performance of the motor.

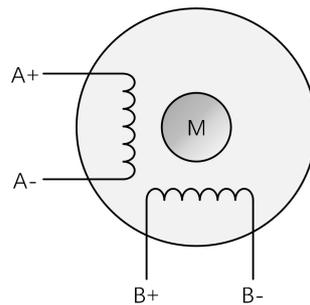
5.2 Motor Connection

The two-phase stepper motor can be divided into three types based on the wiring type: 4-wire system, 6-wire system, and 8-wire system. When connecting the motor, please follow the wiring instructions in the motor specification to connect the motor power wire to the drive motor connection ports A+, A-, B+ and B-.



Connecting the 4-wire motor

When a 4-wire motor is used, there is only one wiring method. You only need to connect the motor lead to the corresponding phase output on the driver one by one.

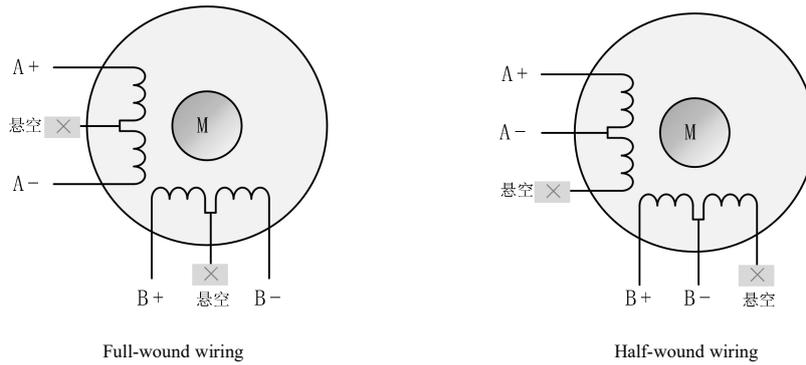


Connecting the 6-wire motor

A 6-wire stepper motor is equivalent to adding a center tap at the center of each winding on the winding basis of a 4-wire motor. When a central tap wiring is used, it is called half-wound wiring. On the contrary, it is called full-wound wiring.

The fully wound wiring method is suitable for scenarios where high torque is outputted at a low speed; if the motor needs to run at a high speed, it is recommended to use half-wound wiring.

- Recommended wiring method: half winding

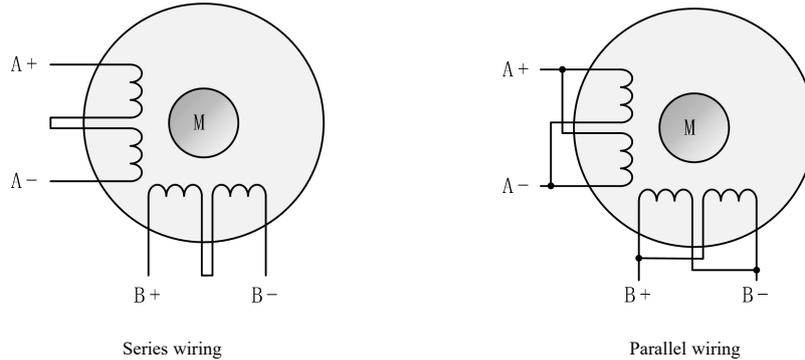


⚠ When the full-wound wiring is used, the motor needs to operate at a current which is lower than the rated current by 30% to avoid overheating

Connecting the 8-wire motor

The 8-wire stepper motor has 4 windings. Connect each two of the windings in series. At this point, the structure is similar to the full-wound wiring of the 6-wire motor, and suitable for scenarios where high torque is outputted at a low speed; when connected in parallel, the motor can achieve high-speed operation while requiring greater current.

- Recommended wiring method: parallel connection



⚠ When the series wiring is used, the motor needs to operate at a current which is lower than the rated current by 50% to avoid overheating

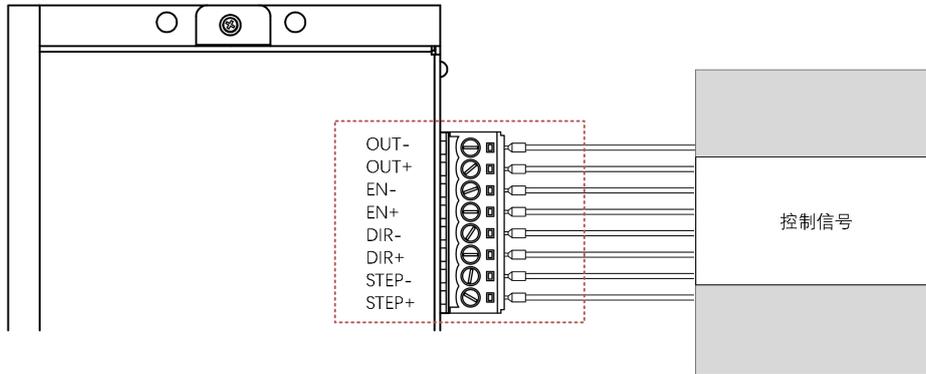


- The motor power wire should not be in the same conduit as the pulse control signal wire. Otherwise it may cause interference and lead to incorrect operation.
- To ensure the normal operation of the motor, please control the distance of the motor power wiring to be within 20 meters.

5.3 Control Signal Connection

Y2SD2-U has 3 circuits of input and 1 circuit of alarm output signal.

- Applicable wires: Wires with AWG24 (0.2mm²) above



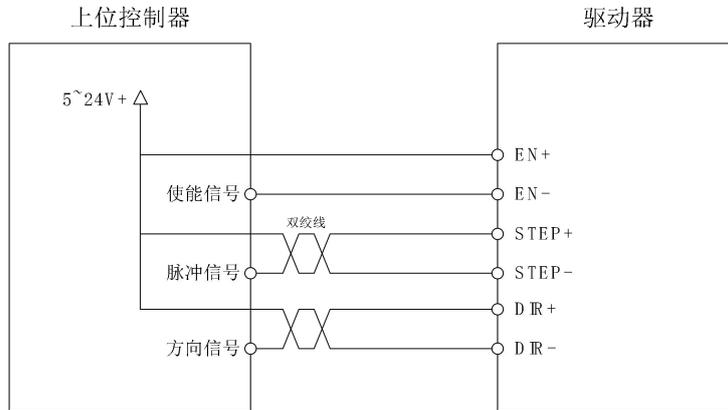
The functions of the Y2SD2-U control signals vary in different control modes.

Port	Pulse+direction mode	Dual pulse mode	Single-segment speed mode	Two-segment speed mode
EN	Enable control	Enable control	Enable control	Speed switching
DIR	Direction signal	CCW signal	Direction signal	Direction signal
STEP	Pulse signal	CW signal	Start/Stop	Start/Stop
OUT	Alarm output	Alarm output	Alarm output	Alarm output

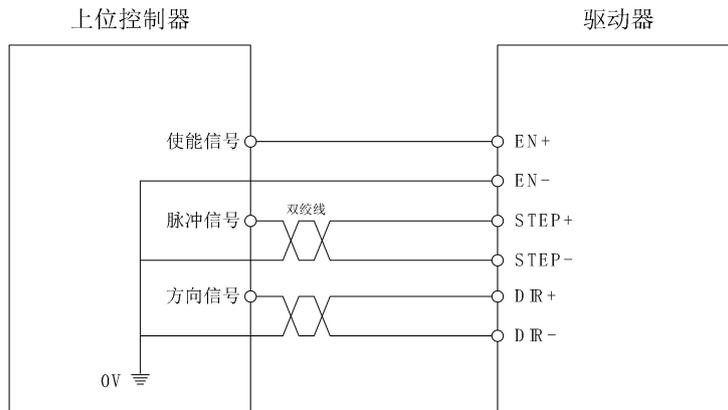
5.3.1 Input Signal Connection

■ Pulse+direction mode

- NPN type connection method

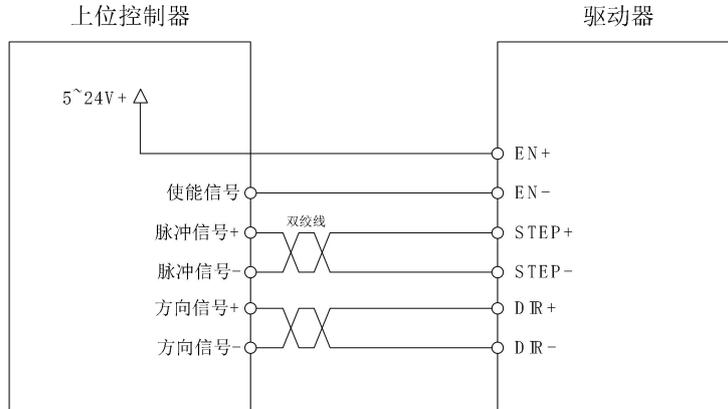


- PNP type connection method

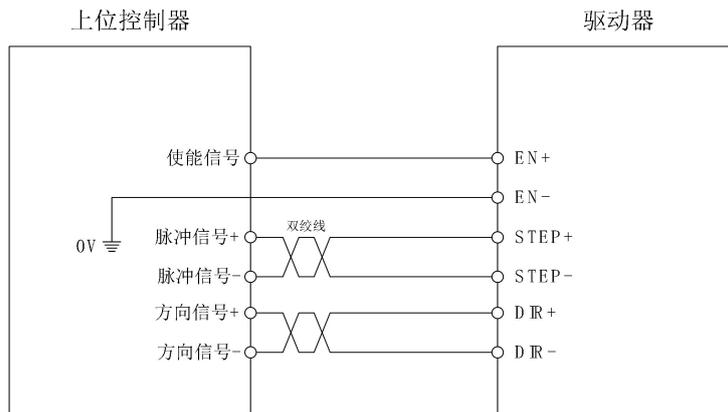


■ Dual pulse mode

- NPN type connection method

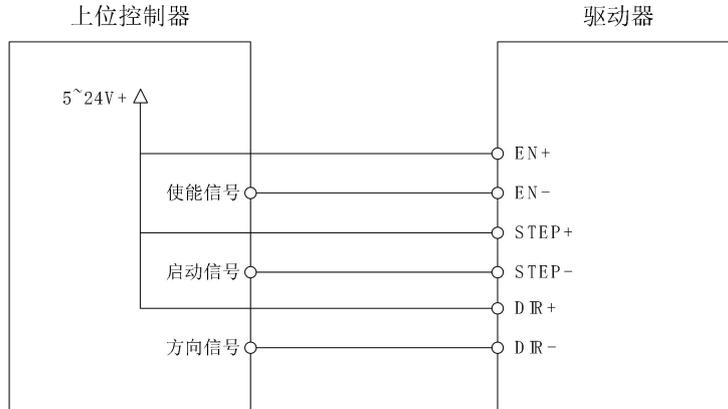


- PNP type connection method

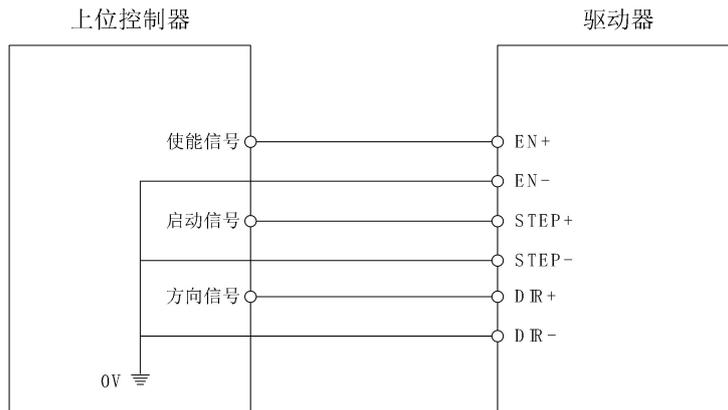


■ Single-segment speed mode

- NPN type connection method

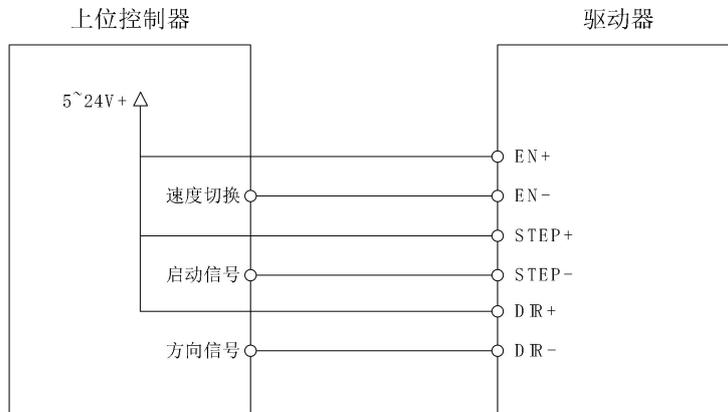


- PNP type connection method

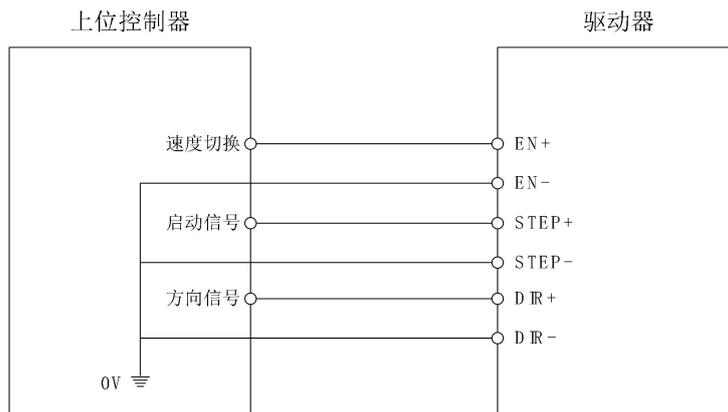


■ Two-segment speed mode

- NPN type connection method



- PNP type connection method



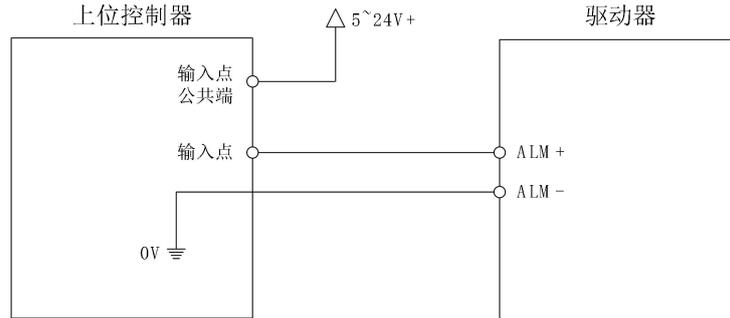
5.3.2 Alarm Output Connection

The alarm output interface of Y2SD2-U is an open drain output, and can output different levels according to different wiring methods.

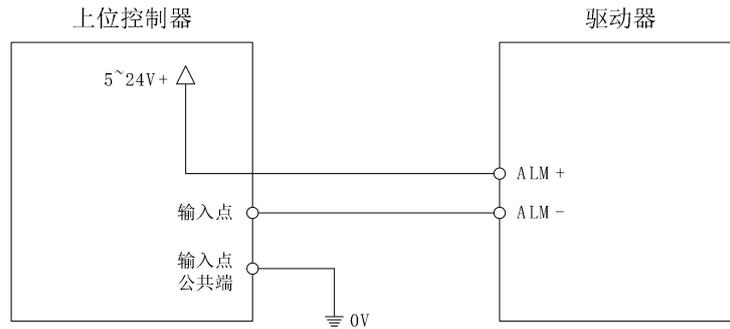
Status of the driver output port during operation:

ALM	When the drive is normal, it is OFF; when an alarm occurs, it is ON
-----	---

- NPN output

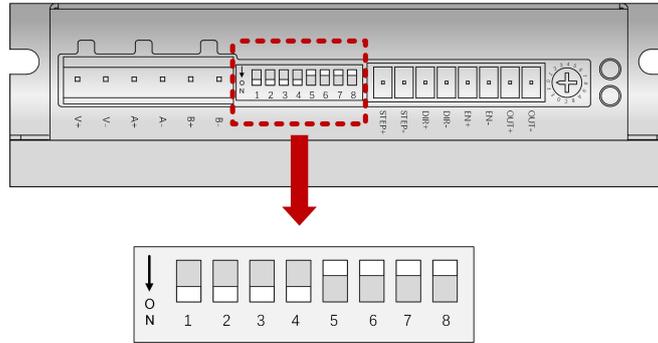


- PNP output



6 Parameter Setting

The dial switches SW1-SW8 on the side of Y2SD2-U are used to set the current and subdivision/speed. The functions of the dial switches vary in different control modes.

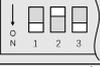
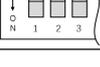


Dial switch	Pulse + direction	Dual pulse	Single-segment speed mode	Two-segment speed mode
SW1	Operating Current Setting	Operating Current Setting	Operating Current Setting	Operating Current Setting
SW2				
SW3				
SW4	Idle Current Setting	Idle Current Setting	Idle Current Setting	Idle Current Setting
SW5	Subdivision setting	Subdivision setting	Speed setting	Speed setting
SW6				
SW7				
SW8				

6.1 Operating Current Setting

Y2SD2-U sets the peak output current through the SW1, SW2, and SW3 dial switches, and users need to set it according to the rated current on the motor specification sheet. (The set current value should be set to be similar to the rated current of the motor.)

**If the current tap position in the table below is not suitable for the motor you are using, [you can set the current through software](#), and the current range is 0.1~7.0A.

Operating current	SW1	SW2	SW3	Dial diagram
1.0 A (default)	ON	ON	ON	
1.5 A	OFF	ON	ON	
2.0 A	ON	OFF	ON	
2.5 A	OFF	OFF	ON	
3.0 A	ON	ON	OFF	
3.5 A	OFF	ON	OFF	
4.0 A	ON	OFF	OFF	
4.5 A	OFF	OFF	OFF	



- Generally, setting a larger current can increase the torque output of the motor, while also generating greater heat and noise.
- The set current should not exceed 1.5 times the rated current of the motor. Otherwise it may cause the motor to burn out.

6.2 Idle Current Setting

The Y2SD2-U driver sets the idle current through SW4 dialing to 50% or 90% of the operating current. When the motor enters standby mode, the output current of the driver will automatically decrease to the set value.

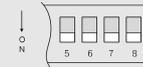
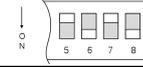
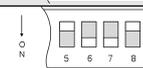
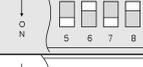
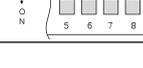
When the idle current is set to 90%, the motor can output a larger holding torque, and the heat generated by the motor will also increase. It is recommended to set the idle current to 50% in a safe situation to reduce motor heating.

Idle current	SW4	Dial diagram
50% (default)	ON	
90%	OFF	

6.3 Position Mode - Subdivision Setting

When the control mode is pulse + direction or double-pulse mode, the Y2SD2-U driver sets the subdivision number through SW5, SW6, SW7, and SW8 dialing.

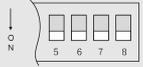
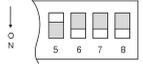
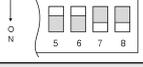
**If the sub-divided tap positions in the table below cannot meet your application requirements, you can set SW5~SW8 to ON. At this time, you can set any even sub-divided tap position to be 200~51200 [through software](#)

Subdivision (Pulse/revolution)	SW5	SW6	SW7	SW8	Dial diagram
400 Can be set by software	ON	ON	ON	ON	
800	OFF	ON	ON	ON	
1600	ON	OFF	ON	ON	
3200	OFF	OFF	ON	ON	
6400	ON	ON	OFF	ON	
12800	OFF	ON	OFF	ON	
25600	ON	OFF	OFF	ON	
51200	OFF	OFF	OFF	ON	
1000	ON	ON	ON	OFF	
2000	OFF	ON	ON	OFF	
4000	ON	OFF	ON	OFF	
5000	OFF	OFF	ON	OFF	
8000	ON	ON	OFF	OFF	
10000	OFF	ON	OFF	OFF	
20000	ON	OFF	OFF	OFF	
25000	OFF	OFF	OFF	OFF	

6.4 Speed Mode - Speed Setting

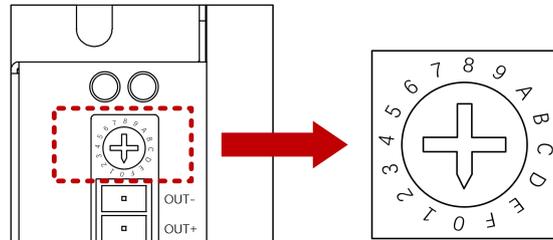
The Y2SD2-U driver sets the motor operating speed in single-segment speed mode and the first-segment operating speed of the motor in two-segment speed mode through SW5, SW6, SW7 and SW8 dialing; the second-segment speed of the motor in two-segment speed mode is set by software.

**If the speed tap positions in the table below cannot meet your application requirements, you can set SW5~SW8 to ON. At this time, you can set the speed through software within 0.01~50.00 rps

Speed (rpm)	SW5	SW6	SW7	SW8	Dial diagram
10.0	ON	ON	ON	ON	
9.0	OFF	ON	ON	ON	
8.0	ON	OFF	ON	ON	
7.0	OFF	OFF	ON	ON	
6.0	ON	ON	OFF	ON	
5.5	OFF	ON	OFF	ON	
5.0	ON	OFF	OFF	ON	
4.5	OFF	OFF	OFF	ON	
4.0	ON	ON	ON	OFF	
3.5	OFF	ON	ON	OFF	
3.0	ON	OFF	ON	OFF	
2.5	OFF	OFF	ON	OFF	
2.0	ON	ON	OFF	OFF	
1.5	OFF	ON	OFF	OFF	
1.0	ON	OFF	OFF	OFF	
0.5	OFF	OFF	OFF	OFF	

6.5 Knob setting

The Y2SD2-U driver selects the appropriate motor specifications through the knob to be used with the internal current control algorithm of the driver, in order to achieve the optimal performance during operation of the motor. Users can set the knob to the corresponding tap position according to the rated current of the motor or the size of the motor flange.



Knob setting		Motor current specification	Appropriate motor size
0 or 8		1.0 A	Flange 20mm and below
1 or 9		1.0 A	Flange 28mm and below
2 or A		1.5 A	Flange 35mm and below
3 or B		2.0 A	Flange 42mm and below
4 or C		2.5 A	Flange 42mm and below
5 or D		3.0 A	Flange 57mm and below
6 or E		4.0 A	Flange 57mm and below
7 or F		4.5A and above	Flange above 57mm



- Be sure to adjust this knob when using; otherwise, the torque may be insufficient during motor operation, and cause loss of synchronization or stalling.

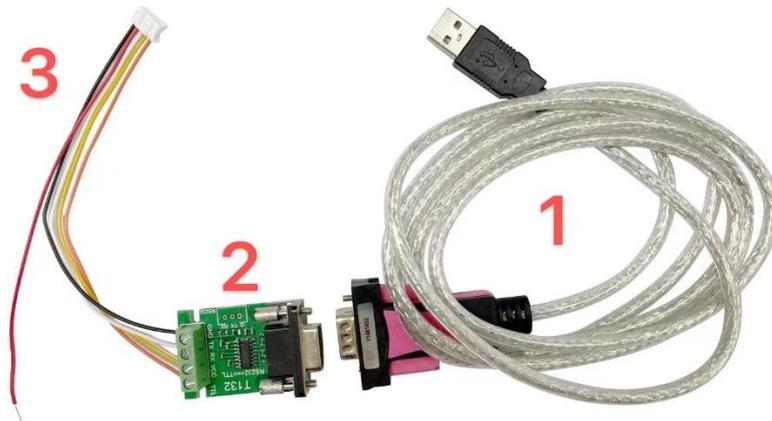
7 Software Setting

The Y2SD2-U driver can be configured through the KF Step Drive Configuration software to set multiple internal parameters such as current, speed and control mode.

7.1 Driver Connection

7.1.1 Connecting Wire Preparation

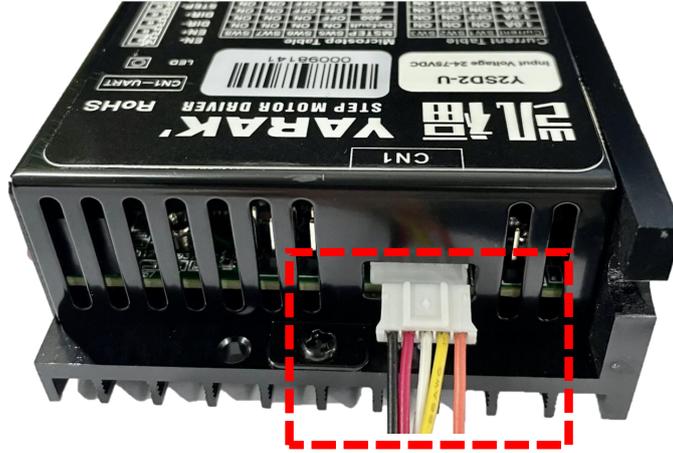
1. USB to 232 connection wire
2. 232-to-TTL connector
3. 5PIN connecting wire



	5pin connecting wire	232-to-TTL
	Orange	VCC
	Yellow	RX
	White	TX
	Black	GND
	Red	Suspended

7.1.2 Driver Connection

1. Insert the 5-pin wire into the driver communication port CN1 in the direction as shown in the following diagram



2. Start the Kaifull software



Software interface:



3. Select the correct COM port

Select the corresponding COM port connection on the Kaifu software by viewing the computer device administrator





4. Select the driver & upload the parameters

Click "Connect"



You may upload the parameters after successful connection



7.2 Driver Parameters Modification

7.2.1 Control Mode

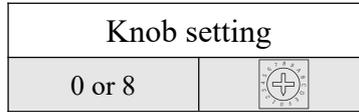
Y2SD2-U is compatible with multiple control modes. Please choose the appropriate mode according to your specific application requirements.

The screenshot displays the configuration interface for the Y2SD2-U driver. It is divided into several sections:

- Top Bar:** Includes communication settings such as Baud Rate (57600), Stop Bits (1), Port (COM11), and RS485 Address (1). A green '断开' (Disconnect) button and '驱动器在线' (Driver Online) indicator are present.
- Step 1: 参数配置 (Parameter Configuration):**
 - 1. 电机配置 (Motor Configuration):** Fields for Motor Model (28系列), Motor ID (0), Fine Resolution (F), and Address Resolution (0). Default direction is set to '正向' (Forward). Pulse mode is set to '单脉冲' (Single Pulse).
 - 2. 控制模式设置 (Control Mode Settings):** Includes Continuous Current (1), Peak Current (1.49), and Start Scan Current (1.49).
- Step 2: 电机控制整定 (Motor Control Tuning):**
 - 2. 控制设置 (Control Settings):** Contains various parameters like Encoder Gear Ratio (4000), Fine Gear Ratio (400), Filter (100), and Control Mode. The '控制模式' (Control Mode) dropdown menu is highlighted with a red box, showing options: '单脉冲模式' (Single Pulse Mode), '双脉冲模式' (Double Pulse Mode), '自测模式' (Self-test Mode), '两段转速模式' (Two-speed Mode), and '单转速模式' (Single-speed Mode).
 - Other parameters include Error Control Gain (22), Position Output Min Error (40), Control Mode (闭环), and Acceleration/Deceleration (2.25).

7.2.2 Current Setting

When using software to modify the output current of the driver, turn the knob to 0 or 8 first.



Current setting method:

Default parameters setting of motor	<input type="checkbox"/> Enabling: The current is set by dialing; <input checked="" type="checkbox"/> disabling: current is set by software
Continuous current	The idle current of the motor is recommended to be set to 50% of the rated current of the motor
Peak current	The peak current for normal operation of the motor is recommended to be set to the rated current of the motor
Startup scanning current	It is the current used for phase finding when the motor is enabled. It is recommended to set it to the rated current of the motor

Example: Setting the current parameters of a motor with a rated current of 6A through software



7.2.3 Subdivision setting (applicable to pulse + direction, and double-pulse modes)

In pulse mode, when the subdivided tap positions provided by the dials SW5-SW8 in the driver do not meet the actual application requirements, the subdivision can be set through software. At this time, all dials SW5-SW8 need to be set to ON. Otherwise, the subdivision will be set by the dials.

SW5	SW6	SW7	SW8	Dial diagram
ON	ON	ON	ON	

Subdivided electronic gear ratio: You can input any even value between 200 and 51200, in pulse/revolution.



7.2.4 First-segment speed setting (applicable to the speed in single-segment speed mode and the first-segment speed in two-segment speed mode)

In speed mode, when the speed tap positions provided by the dials SW5-SW8 in the driver do not meet the actual application requirements, the speed can be set through software. At this time, all dials SW5-SW8 need to be set to ON. Otherwise, the speed will be set by the dials.

SW5	SW6	SW7	SW8	Dial diagram
ON	ON	ON	ON	

It can be set to 0.01-50.00, in rps



7.2.5 Second-segment speed setting (applicable to the second-segment speed in two-segment speed mode)

In the two-segment speed mode, the second-segment speed of the motor is set by software

It can be set to 0.01-50.00, in rps

误差控制增益	<input type="text" value="22"/>	(1-100)	载入	读取
到位输出最小误差	<input type="text" value="40"/>	(2-100)	载入	读取
控制方式	<input type="text" value="闭环"/>		载入	读取
控制模式	<input type="text" value="两段转速模式"/>		载入	读取
给定第1段转速	<input type="text" value="0.01"/>	(rps)	载入	读取
给定第2段转速	<input type="text" value="2"/>	(rps)	载入	读取
加速度	<input type="text" value="2.25"/>	(rps/s/s)	载入	读取
减速度	<input type="text" value="2.25"/>	(rps/s/s)	载入	读取

7.2.6 Acceleration and deceleration setting (applicable to the single-segment speed mode and two-segment speed mode)

The acceleration and deceleration settings shall not be greater than 10 times the speed value;

otherwise, the motor will be easy to stall. Acceleration and deceleration unit: revolutions/second²

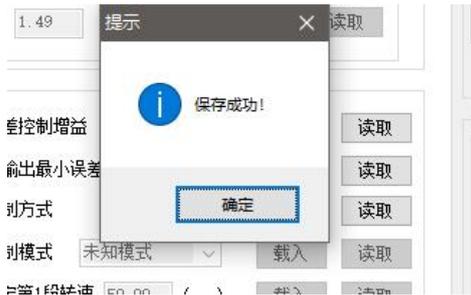
误差控制增益	<input type="text" value="22"/>	(1-100)	载入	读取
到位输出最小误差	<input type="text" value="40"/>	(2-100)	载入	读取
控制方式	<input type="text" value="闭环"/>		载入	读取
控制模式	<input type="text" value="两段转速模式"/>		载入	读取
给定第1段转速	<input type="text" value="0.01"/>	(rps)	载入	读取
给定第2段转速	<input type="text" value="2"/>	(rps)	载入	读取
加速度	<input type="text" value="2.25"/>	(rps/s/s)	载入	读取
减速度	<input type="text" value="2.25"/>	(rps/s/s)	载入	读取

7.3 Parameters Saving

After setting all parameters, click "One button download" to power off and save all parameters



Successful save prompt:



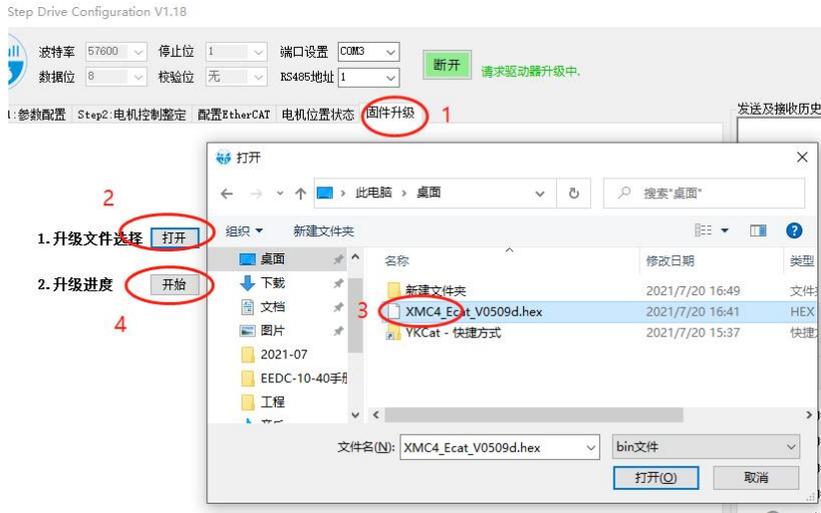
7.4 Saving/Opening Parameter File

Users can save the current parameters as a file for easy downloading to other drivers



7.5 Firmware Update

Select the files to be upgraded and click "Start"



Waiting until the progress bar reaches 100%, which indicates that the update has been completed



8 Contact Kaifull



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