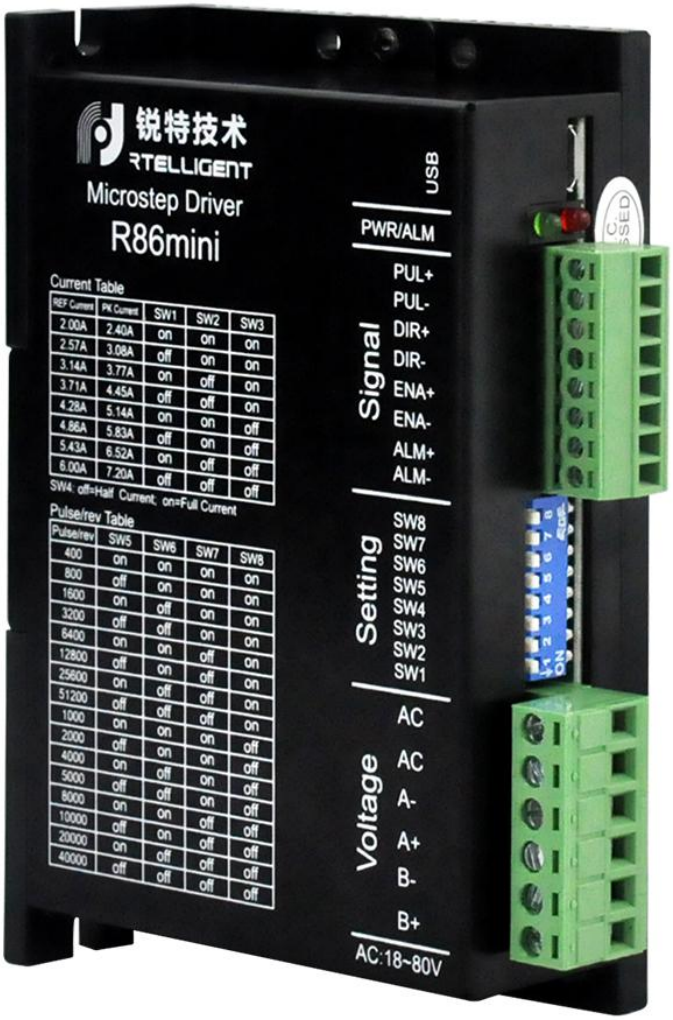
Digital Stepper Driver R86mini

User Manual



Shenzhen Rtelligent Mechanical Electrical Technology Co.,ltd

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1. Product overview

R86Mini is a digital two-phase stepper motor driver that supports AC18V~AC80V input. It integrates intelligent motion controller functions and built-in S-shaped acceleration and deceleration commands. Through the USB port, it is convenient to configure the driver and expand the application of the driver.

1.1 Characteristic

- Working Voltage :18~80VAC or 24~100VDC
- Communication: USB to COM
- Maximum Phase Current output: 7.2A/Phase (Sinusoidal Peak)
- PUL+DIR, CW+CCW pulse mode optional
- Phase loss alarm function
- Half-current function
- Digital IO port:

3 photoelectric isolation digital signal input, high level can directly receive 24V DC level;

1 photoelectric isolated digital signal output, maximum withstand voltage 30V, maximum input or pull-out current 50mA.

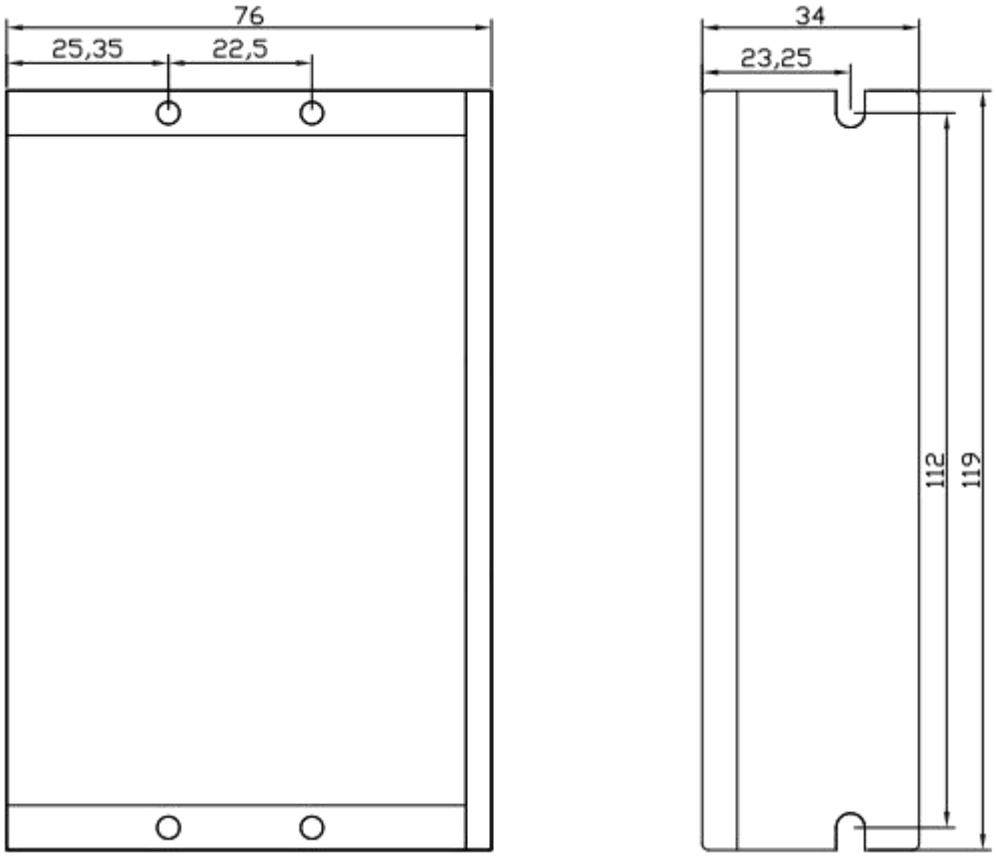
- 8 gears can be customized by users
- 16 gears can be subdivided by user-defined subdivision, supporting arbitrary resolution in the range of 200-65535
- IO control mode, support 16 speed customization
- Programmable input port and output port

2. Application environment and installation

2.1 Environmental requirement

Item	Rtelligent R86MINI
Installation environment	Avoid dust, oil and corrosive environment
Vibration	0.5G（4.9m/s2） Max
Operating temperature/humidity	0℃ ~ 45℃ / 90% RH or less (no condensation)
Storage and transportation temperature:	-10℃ ~ 70℃
Cooling	Natural cooling / away from the heat source
Waterproof grade	IP54

2.2 Driver installation dimensions



3. Driver port and connection

3.1 Power and motor port function description

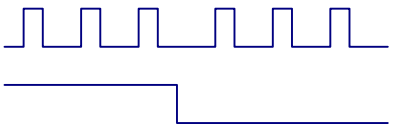
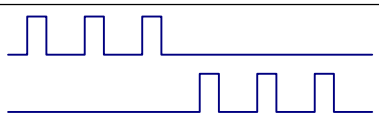
Function	Grade	Definition	Remarks
Power supply	AC	Power supply interface	AC 18~80V DC 24~100V
	AC		
Motor	B-	Two-phase stepper motor winding interface	
	B+		
	A-		
	A+		

3.2 Control signal connection

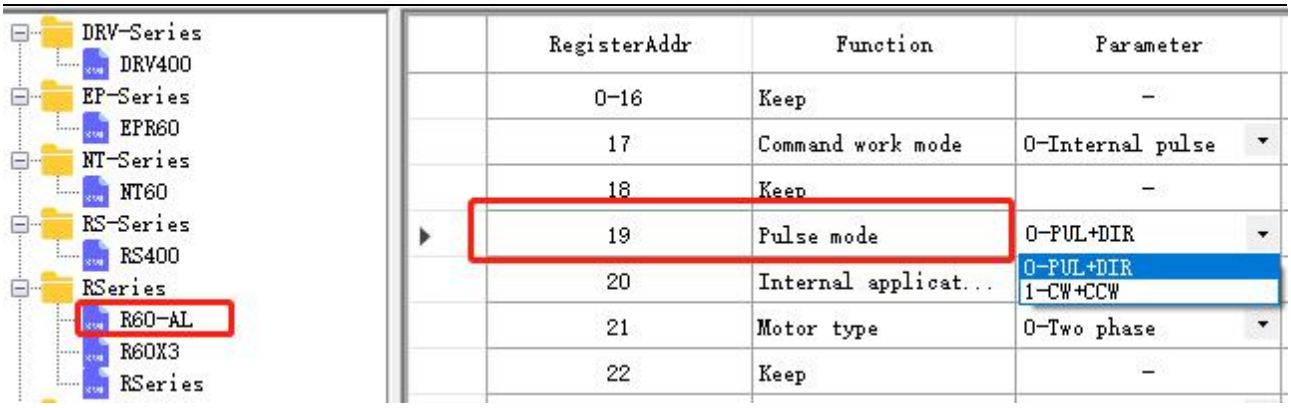
Function	Identification	Description
Pulse / IN1	PUL+	The control signal is 5~24V compatible. No additional current limiting resistor is required.
	PUL-	
Direction / IN2	DIR+	
	DIR-	
Enable /IN3	ENA+	
	ENA-	
Alarm /OUT1	ALM+	Optocoupler isolation, open collector output
	ALM-	

3.2.1 PUL、DIR(IN1，IN2)ports:

By default, when operating in external pulse command mode, the R60-AL can receive two pulse command signals: PUL+DIR, CW+CCW.

Pulse & Direction (PUL + DIR)	
Double pulse (CW + CCW)	

The command form of the external pulse is set by the debugging software:



3.2.2 ENA (IN3) port:

The default ENA port is the driver offline (enable) function:

When the internal optocoupler is off, the driver outputs current to the motor;

When the internal optocoupler is on, the driver will cut off the current of each phase of the motor to make the motor free, and the step pulse will not be responded.

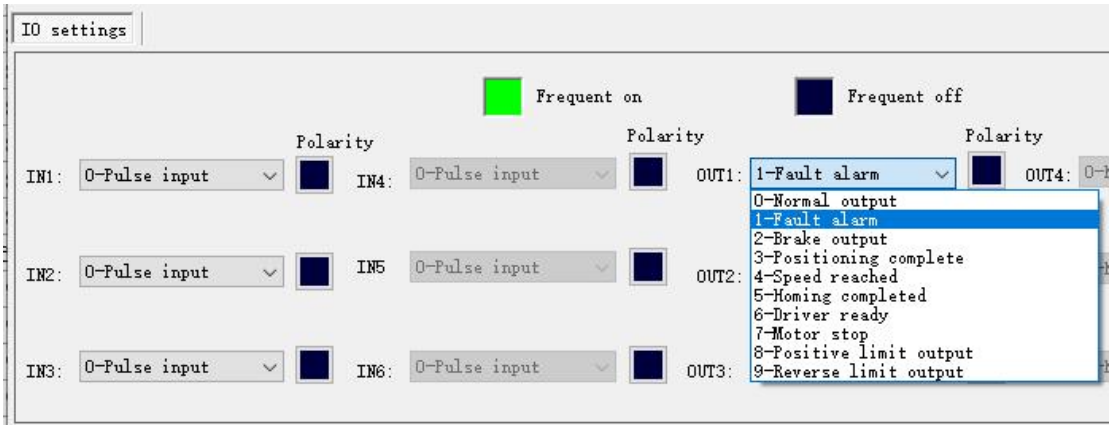
When the motor is in an error state, it is automatically turned off. The level logic of the enable signal can be set to the opposite.

At the same time, this port can be reused as other functions like IN1 and IN2.

3.2.3 ALM (OUT1) port:

The driver includes an optically isolated output port ALM. By default, the ALM port is an alarm output port. When the driver is in an error state and normal operation, the ALM port outputs different optocoupler levels.

It can also be reused for other functions, as shown below:

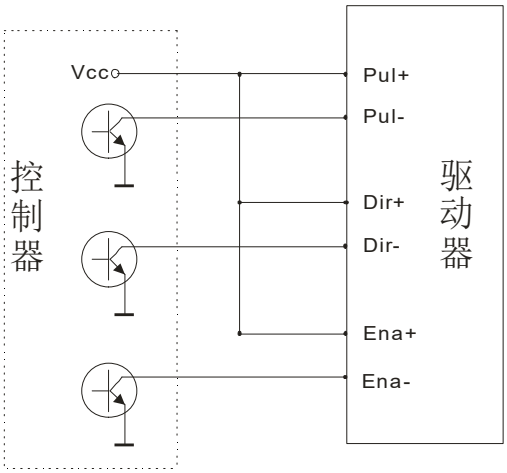


3.3 USB port

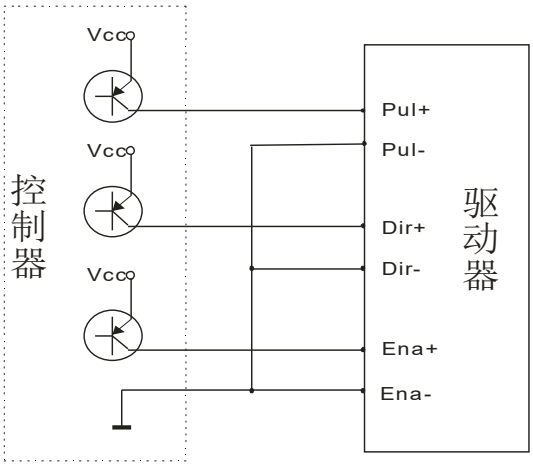
The USB is a micro usb connection port, and a USB driver needs to be installed.

3.4 Pulse control wiring diagram

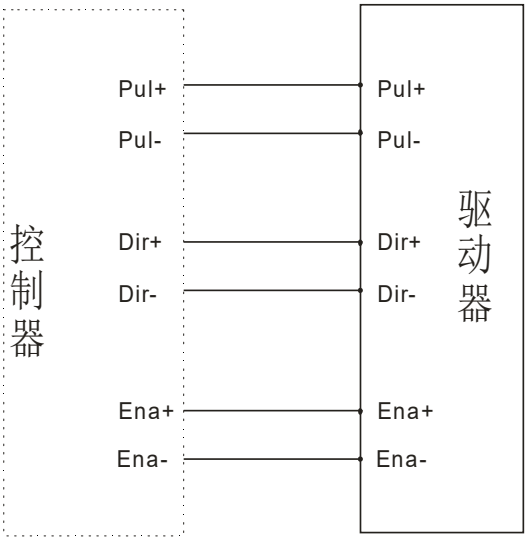
Common Anode



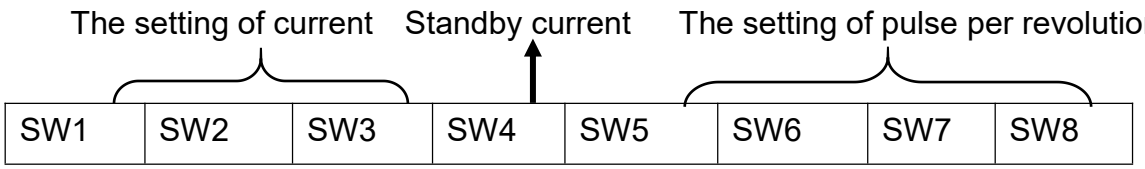
Common Cathode



Difference



4. The setting of DIP switches and operating parameters



4.1 The setting of current

Peak Current	Average Current	SW1	SW2	SW3	Remarks
2.40A	2.00A	on	on	on	Other Current can be custom-made.
3.08A	2.57A	off	on	on	
3.77A	3.14A	on	off	on	
4.45A	3.71A	off	off	on	
5.14A	4.28A	on	on	off	
5.83A	4.86A	off	on	off	
6.52A	5.43A	on	off	off	
7.20A	6.00A	off	off	off	

4.2 Standby current

SW4 is used to set the percentage of current when the driver is in standby.

SW4 = ON, the current is kept at the set current as long as the driver is enabled.

SW4 = OFF, the driver stops receiving pulses for a certain period of time, enters the standby state, and the current drops to a certain percentage of the set current.

The default setting is: After stopping the receiving pulse for 1 second, the motor winding current will be 50%.

4.3 The setting of pulse per revolution

Steps/revolution	SW5	SW6	SW7	SW8	Remarks
400	on	on	on	on	Other subdivisions can be custom-made.
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	
40000	off	off	off	off	

DIP SW5, SW6, SW7, and SW8 are used to set the pulse per revolution required by the motor.

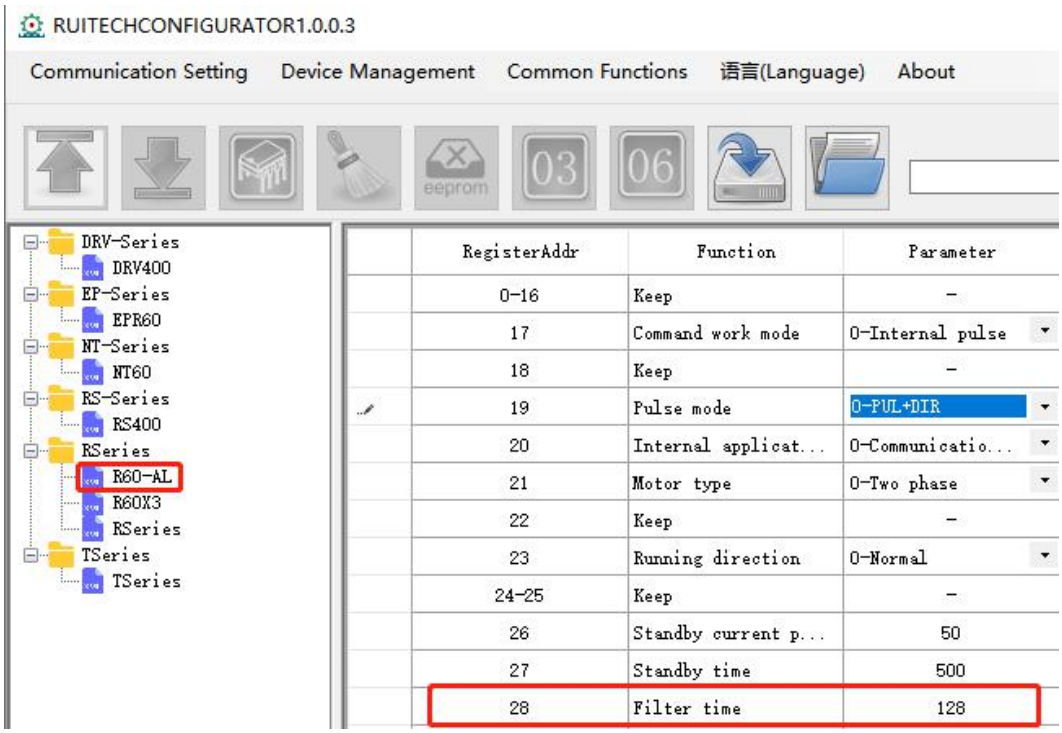
Due to the digital control, the subdivision can be set to any number between 200 and 65535.

4.4 Pulse command filtering

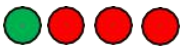
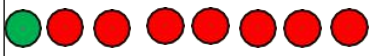
The driver has built-in pulse command smoothing function, which can make the motor start more smoothly.

Command filtering can smooth the motor movement, but also introduces lag. Users need to choose whether to enable the function according to the actual situation.

The filter time can be set by the debugging software:



5. Driver working status LED indication

LED Status		Driver Status
	Green indicator is on for long time	Driver not enabled
	Green indicator is flickering	Driver working normally
	One green indicator and one red indicator	Driver overcurrent
	One green indicator and two red indicators	Driver input power overvoltage
	One green indicator and three red indicators	The internal voltage of the driver is wrong
	One green indicator and seven red indicators	Motor phase loss

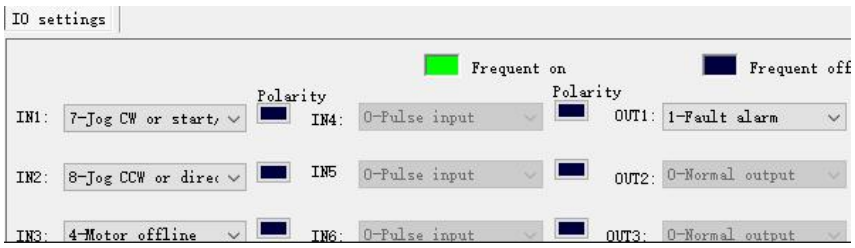
6. Phase loss alarm

The driver has a motor phase loss alarm function, which can detect the phase loss state of the motor during stationary and movement. During the operation of the stepper motor, due to mechanical reasons, the winding wire of the motor may be loosened and disconnected. At this time, the driver will output an alarm signal to prevent the device from making an erroneous action.

Since this function relies on the current detection of the motor windings, this function has a false alarm when the motor current is too small (less than 300 mA). At this point, the user can turn off this function. In the parameter management and setting interface of the debugging software, set parameter No. 188(phase loss detection enable) to 0.

7. Internal motion control function

When operating in the internal pulse command mode, the PUL and DIR ports are used as IO input signals. The function of the IO needs to be set by the debugging software. As shown below:



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7.1 Communication control mode

In this mode, the user can make the motor run the specified pulse stroke or jog operation by communicating the given operation command. Used by the user to test the motor using the debugging software.

7.2 IO Control: start and stop + direction

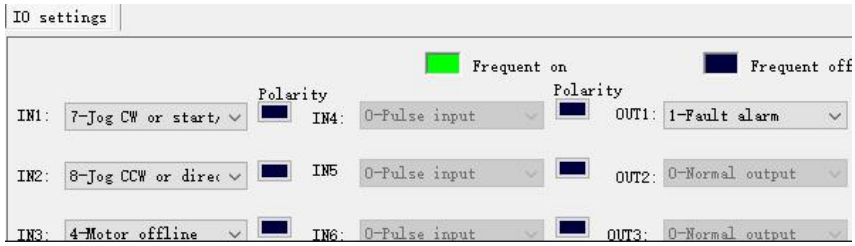
With this mode, two IN terminals are used to control the operation of the motor. One of the IN terminals is used to control the start/stop of the motor, and one IN terminal is used to control the running direction of the motor.

7.2.1 Software settings

(1) Command mode: 0 - internal pulse mode

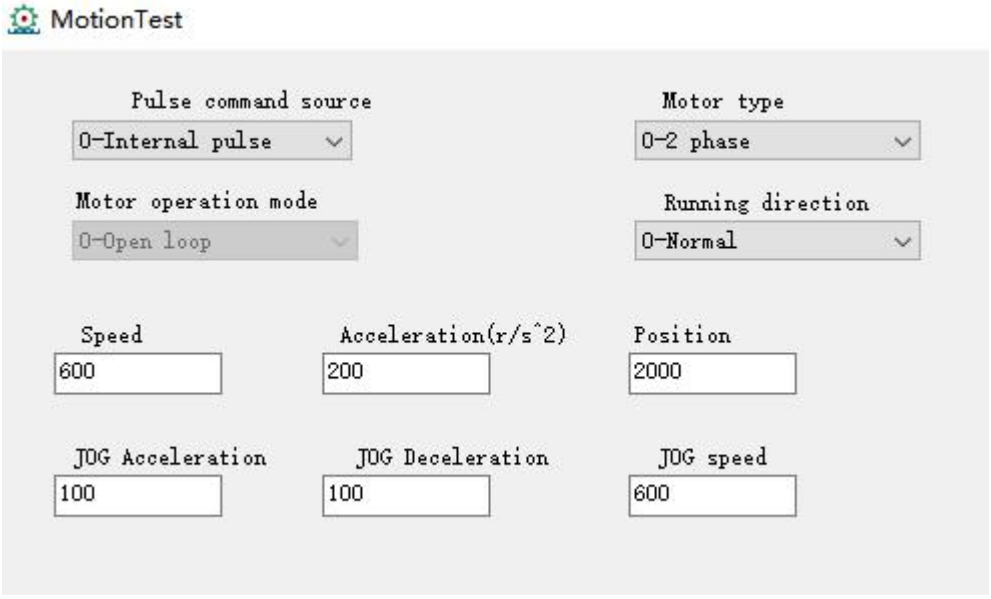
(2) Internal application mode: 2 – IO speed control: start and stop + direction

(3) IO settings:

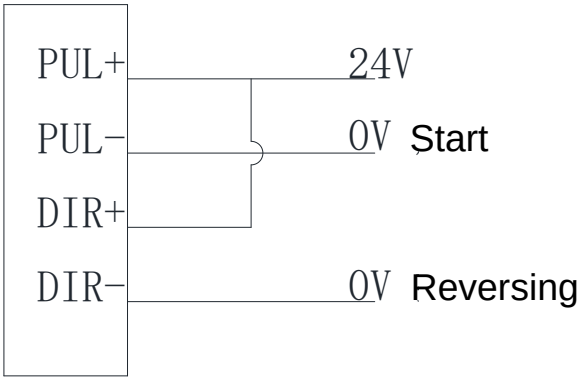


(4) This mode is for the speed defined by the speed table, selected by SW5, 6, 7, 8.

(5) Set the motion parameters, you can modify the acceleration, deceleration



7.2.2 Wiring diagram

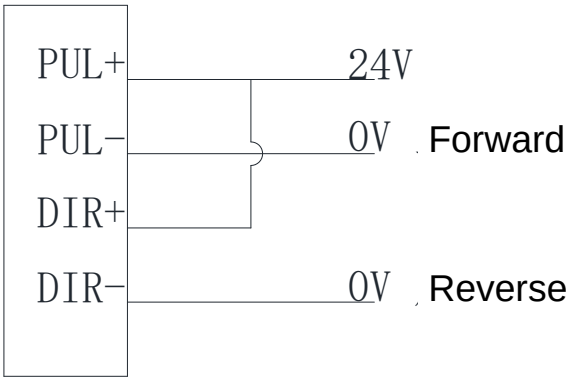


7.3 IO Control: forward + reverse

7.3.1 Software settings

Same as 7.2.1, only need to change (2) to: 3 – IO speed control: forward + reverse.

7.3.2 Wiring diagram



8. Common faults and troubleshooting

Phenomenon	Possible situations	Solutions
Motor does not work	Power indicator is off	Check the power supply circuit for normal power supply
	The motor rotor is locked but the motor does not work	Pulse signal is weak; increase the signal current to 7-16mA
	The speed is too slow	Select the right micro-stepping
	Driver is protected	Solve the alarm and re-power
	Enable signal problem	Pull up or disconnect the enable signal
	Command pulse is incorrect	Check whether the upper computer has pulse output

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The steering of motor is wrong	The rotary direction of motor is reverse	Adjust the DIP SW5
	The motor cable is disconnected	Check the connection
	The motor has only one direction	Pulse mode error or DIR port damaged
Alarm indicator is on	The motor connection is wrong	Check the motor connection
	The motor connection and encoder connection are wrong	Check the sequence of encoder connection
	The voltage is too high or too low	Check the power supply
The position or speed is wrong	The signal is disturbed	Eliminate interference for reliable grounding
	The command input is incorrect	Check the upper computer instructions to ensure the output is correct
	The setting of Pulse per revolution is wrong	Check the DIP switch status and correctly connect the switches
	Encoder signal is abnormal	Replace the motor and contact the manufacturer
The Driver terminal burned up	Short circuit between terminals	Check power polarity or external short circuit
	Internal resistance between terminals is too large	Check whether there is any solder ball due to excessive addition of solder on the wire connections
The motor is out of tolerance	Acceleration and deceleration time is too short	Reduce command acceleration or increase Driver filtering parameters
	Motor torque is too low	Select the motor with high torque
	The load is too heavy	Check the load weight and quality and adjust the mechanical structure
	The current of power supply is too low	Replace the appropriate power supply

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Appendix A. Guarantee Clause

A.1 Warranty period: 12 months

We provide quality assurance for one year from the date of delivery and free maintenance service for our products during the warranty period.

A.2 Exclude the following:

Improper connection, such as the polarity of the power supply is reversed and insert/pull the motor connection when the power supply is connected.

Beyond electrical and environmental requirements.

Change the internal device without permission.

A.3 Maintenance process

For maintenance of products, please follow the procedures shown below:

(1) Contact our customer service staff to get the rework permission.

(2) The written document of the driver failure phenomenon is attached to the goods, as well as the contact information and mailing methods of the sender.

Mailing address:

Post code: