# Y2SD1-OPT

# Stepper Driver Hardware Manual

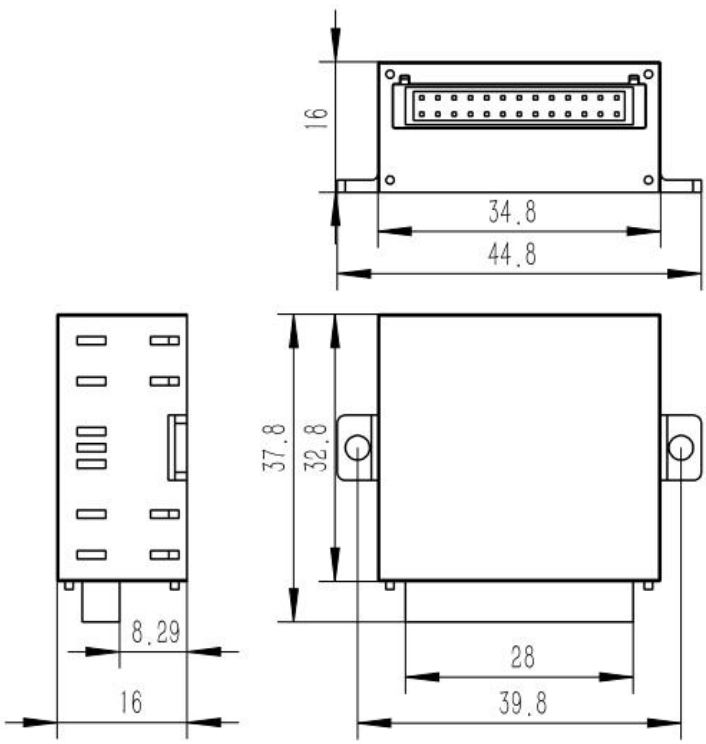
Guangdong Kaifull Electronics Technology Co., Ltd.

Version: V1.5
http://www.kaifull.net/

# 1. Technical Parameters

| | | |
|---|---|---|
| Driver model | | Y2SD1-OPT |
| Adaptive motor | | Adapting to two-phase hybrid stepper motor; Y2SD1-OPT can adapt to the current up to 2.5A |
| Power supply | | 15~24V DC |
| Output current | | Y2SD1-OPT:0.4A～2.5A/phase (peak) |
| Input signal | STEP (startup) signal | Input voltage 3.3-24V |
| | DIR (directional) signal | |
| | EN (enabling) signal | |
| Output signal: OUT (alarm output) | | Maximum withstand voltage 40VDC and maximum current 30mA |
| Dimensions | | 45× 33 ×16 mm |
| Service environment | Scenario | Avoid dust, oil mist, and corrosive gases |
| | Humidity | <85% RH, no condensation |
| | Temperature | -20°C - +40°C |
| | Heat dissipation | Installed in the ventilated environment |

# 2. Installation




**Mass: 0.12 kg**

## 2.1 Mechanical Dimensions

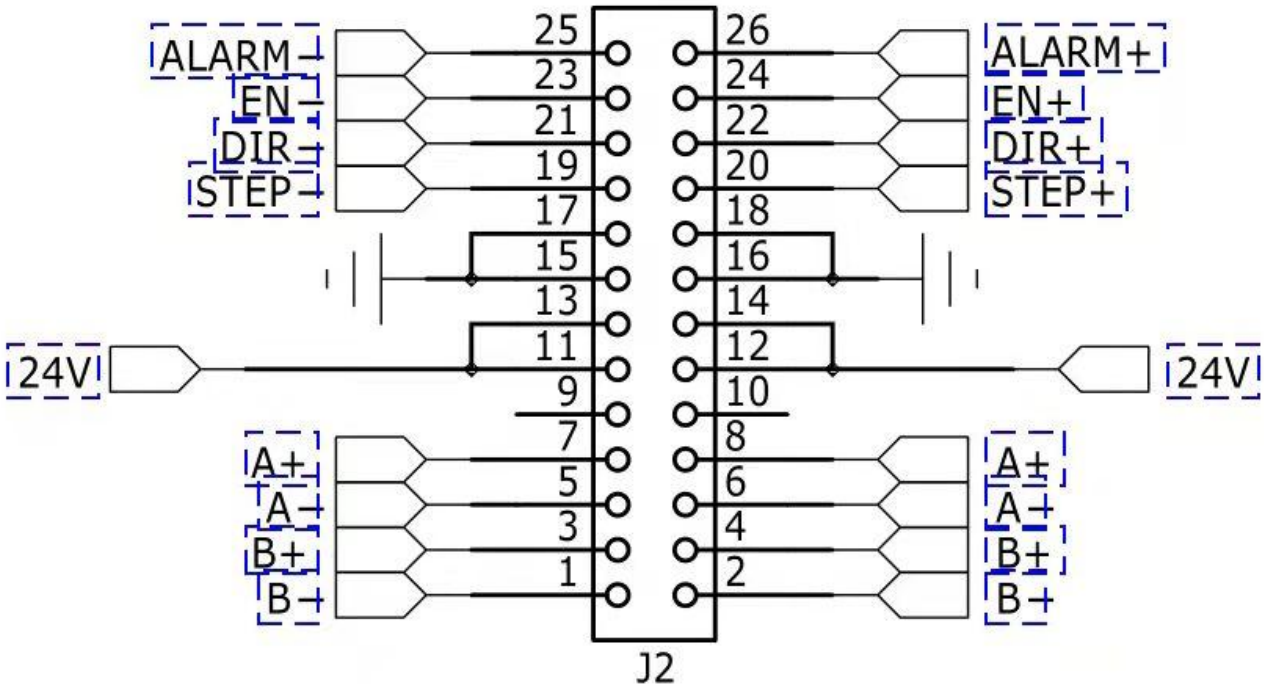
Driver installation:

Install with narrow edges and M3 screws through the holes on both sides. The power components of the driver will generate heat. If it operates continuously under high input voltage and high power conditions, the effective heat dissipation area should be expanded or forced cooling (installed on an aluminum plate or added with a fan for heat dissipation) should be applied. Do not use it in areas with poor air circulation or environments with temperatures exceeding 40 ℃; do not install the driver at a damp place or at a place with scrap metal.

# 3. Port Wiring

With reference to the interface relationship diagram, you need to prepare:

- 15~24VDC, DC power supply with appropriate rate of work
- Control signal source
- Matching Kaifull stepper motor



| Pin No. | Wiring method |
|---|---|
| 1、2 | Parallel connection to motor B- |
| 3、4 | Parallel connection to motor B+ |
| 5、6 | Parallel connection to motor A- |
| 7、8 | Parallel connection to motor A+ |
| 9、10、 | Suspended and not connected |
| 11、12、13、14 | Any pin connected to 15~24V |
| 15、16、17、18 | Any pin connected to GND |
| 19 | STEP- (pulse) |
| 20 | STEP+ (pulse) |
| 21 | DIR - (direction) |
| 22 | DIR+(direction) |
| 23 | EN - (enabling) |
| 24 | EN+(enabling) |
| 25 | ALARM- |
| 26 | ALARM- |

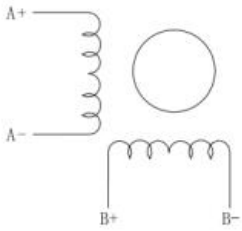
## 3.1 Power Connection

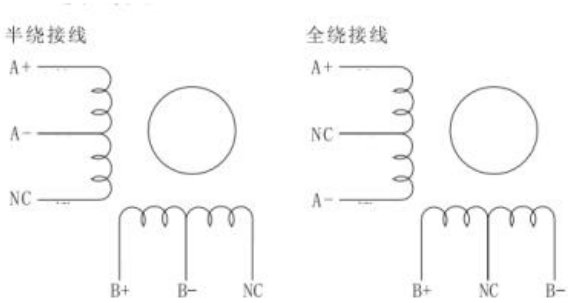
Connect the positive pole of the power supply to the V+of the driver and the negative pole of the power supply to the V - of the driver. Please be careful not to connect reversely, as the damage to the driver caused by reverse power connection cannot be covered by the warranty. Choose an appropriate power supply.

To make the motor provide better high-speed performance, you need to increase the supply voltage of the driver.

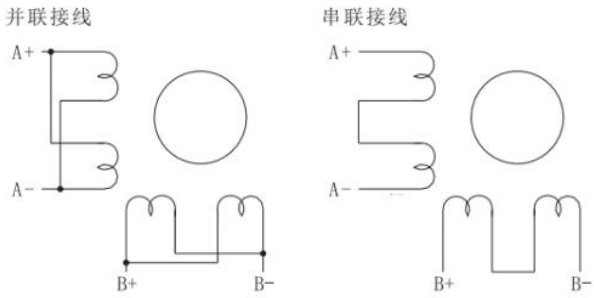
## 3.2 Motor Wiring

You can only use one method to connect the four-wire motor.




Eight-wire motors can be connected in two methods: series and parallel connection. The motor has a greater torque at the low speed and smaller torque at the high speed during the series connection mode. When operating in series, the motor needs to operate at a current which is equivalent to 50% of the current in the parallel connection mode to avoid overheating.




**Warning: When connecting the motor to the driver, please confirm that the motor power has been turned off first. Confirm that the unused motor leads are not short-circuited to other objects. During the power-on period of the driver, the motor cannot be disconnected. Do not connect the motor leads to the ground or power supply.**

# 4. Control Signal Connection

## 4.1 Pulse& Directional Signals

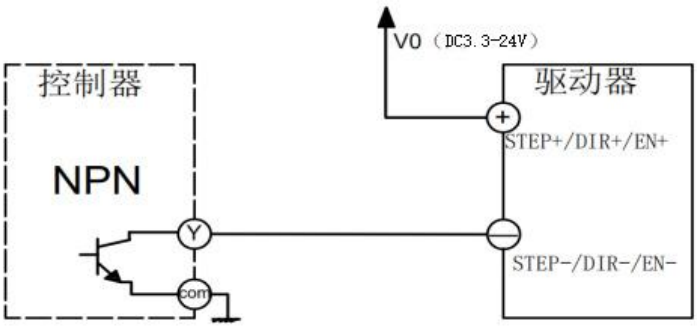
Y2SD1-OPT can accept 3.3-24VDC single-end signals. The direction of motor operation depends on the DIR signal. When the SETP signal has a pulse signal and the DIR is conducting, the motor will run clockwise; when the DIR signal is in an open circuit, the motor will run counterclockwise.

## 4.2 Enabling Signal

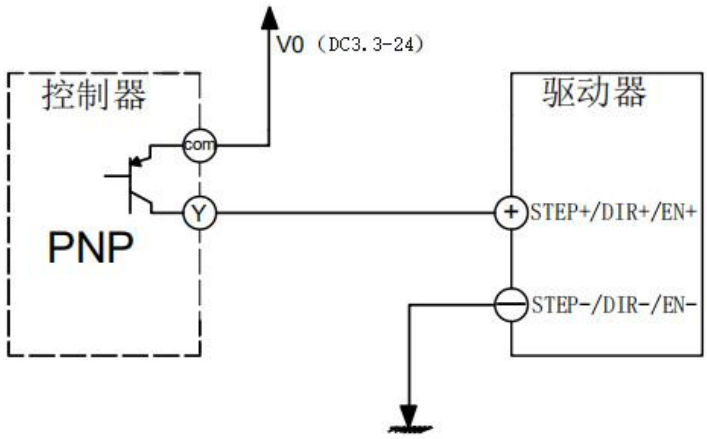
EN input enables or switches off the power part of the driver, and can accept 3.3-24VDC single-end signals. When the EN signal is in an open circuit, the driver will be enabled and the motor will operate normally; when the EN signal is conducting, the power of the driver will be partially turned off, and the motor will not be excited. When the motor is in an error state, the EN input can be used to restart the driver. Firstly, eliminate the existing faults from the application system, and then input a conduction signal at the EN end before opening the circuit. The driver can restart the power part and the motor will be excited to operate.

## 4.3 Control Signal Wiring Method

Collector connection method NPN

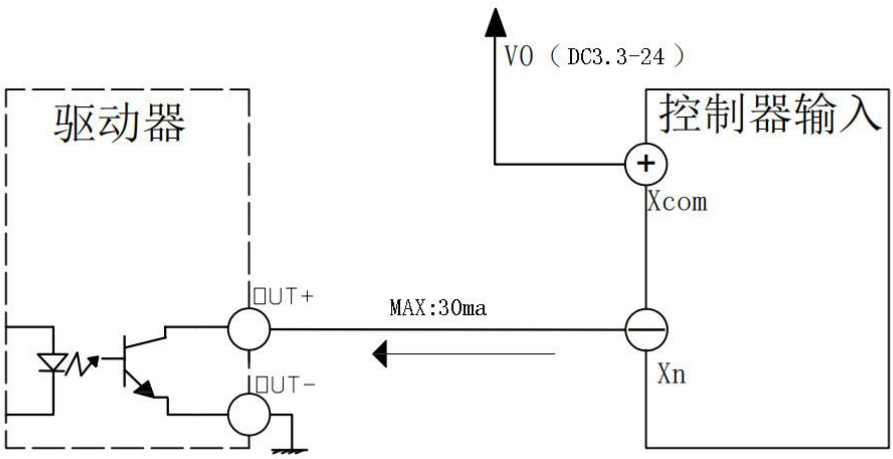


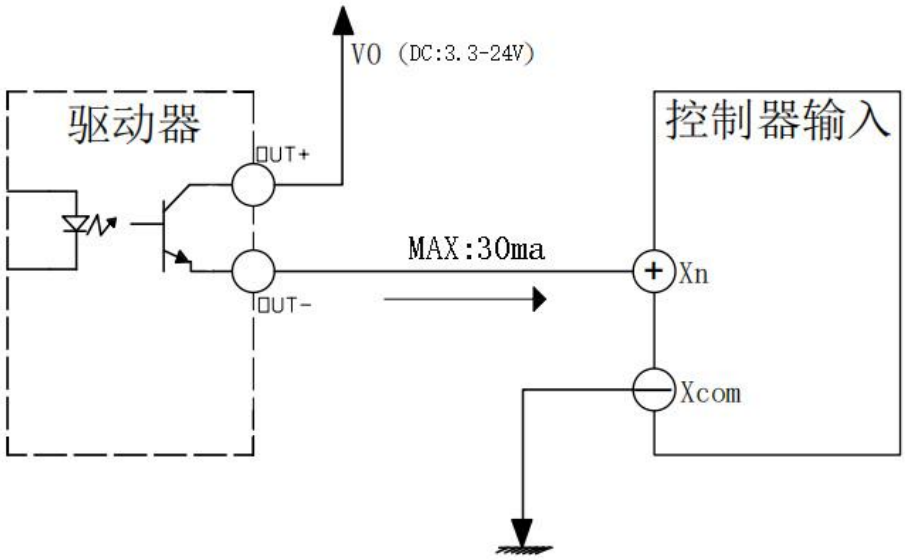
Collector connection method PNP




## 4.5 Alarm Output Signal

The alarm OUT port can withstand a maximum voltage of 40VDC and a maximum saturation current of 30mA. There are two wiring methods available.

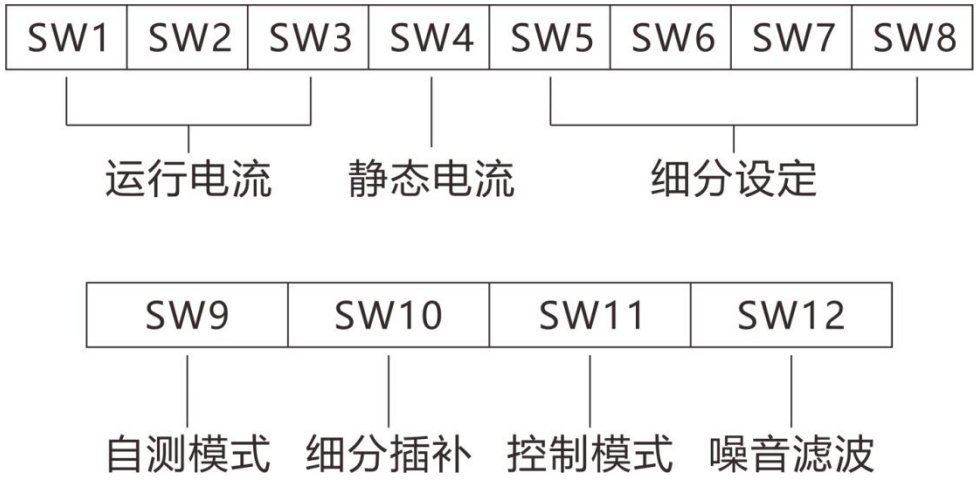





## 4.6 Driver Status Indicator Light

| Indicator light status | Status | Description |
|---|---|---|
| Green light flashing | The driver operates normally | |
| Green light normally on | The driver is not enabled | EN port conducting |
| 3 red lights +1 green light | Driver overtemperature | The heat dissipation needs to be strengthened |
| 4 red lights and 1 green light | Drive power input overvoltage | |
| 5 red lights +1 green light | Driver overcurrent | Motor wiring error or poor contact |
| 6 red lights +1 green light | Motor winding open circuit | The motor is not connected properly |
| 3 red lights +2 green lights | Internal voltage error in the driver | Too small power |
| 4 red LED lights and 2 green LED lights | Drive power input undervoltage | |

## 5. Operating Parameters Setting of Driver




### 5.1 Current Setting

The Y2SD1-OPT driver sets the peak output current through the SW1, SW2, and SW3 dial switches.

Generally, the current is set to the peak current of the motor. If your system has high requirements for heating, you can reduce the current appropriately to reduce the motor heating, but the output torque of the motor will also decrease. If you do not require the motor to run continuously, you may increase the operating current appropriately to obtain greater torque, but be careful not to exceed 1.5 times the peak current of the motor.

*Factory setting: 0.4A

| Operating current (peak) | SW1 | SW2 | SW3 |
|---|---|---|---|
| 2.5A | OFF | OFF | OFF |
| 2.2A | ON | OFF | OFF |
| 1.9A | OFF | ON | OFF |
| 1.6A | ON | ON | OFF |
| 1.3A | OFF | OFF | ON |
| 1.0A | ON | OFF | ON |
| 0.7A | OFF | ON | ON |
| 0.4A | ON | ON | ON |

## 5.2 Idle Current

The operating current of the driver can automatically decrease when the motor stops running, and SW4 sets the idle current as a percentage relationship of the operating current. When a high torque needs to be outputted, a 90% setting is the most effective. To reduce the heat generated by the motor and driver, it is recommended to minimize idle current as far as possible when allowed.

## 5.3 Subdivision Setting

The Y2SD1-OPT driver sets subdivision values through the dial switches SW5, SW6, SW7, and SW8, with 16 options available.

| Subdivision (pulse/revolution) | SW5 | SW6 | SW7 | SW8 |
|---|---|---|---|---|
| 20000 | OFF | OFF | OFF | OFF |
| 10000 | ON | OFF | OFF | OFF |
| 8000 | OFF | ON | OFF | OFF |
| 6000 | ON | ON | OFF | OFF |
| 5000 | OFF | OFF | ON | OFF |
| 4000 | ON | OFF | ON | OFF |
| 2000 | OFF | ON | ON | OFF |
| 1000 | ON | ON | ON | OFF |
| 25600 | OFF | OFF | OFF | ON |
| 12800 | ON | OFF | OFF | ON |
| 6400 | OFF | ON | OFF | ON |
| 3200 | ON | ON | OFF | ON |
| 1600 | OFF | OFF | ON | ON |
| 800 | ON | OFF | ON | ON |
| 400 | OFF | ON | ON | ON |
| 200 | ON | ON | ON | ON |

## 5.4 Self-test Mode

When you set the dial switch SW9 to ON, the motor will perform forward and reverse reciprocating motion for two cycles at a speed of 1 rpm.

## 5.6 Subdivision Interpolation

Select the smooth filtering function using the subdivision interpolation technology to set the dial switch SW10. Click "ON" to enable it and "OFF" to disable it. Smooth filtering of control signal makes the action of immediately changing the speed and direction of motor control smoother, and can reduce the wear of mechanical components in the system to prolong the service life of the equipment. This function will cause a delay in the control signal. Please choose or disable this function according to the application situation.

## 5.7 Control Mode

Select a control mode for dial switch SW11; ON: pulse plus direction mode, OFF: dual pulse mode; you may select it according to the control method of the controller.

## 5.8 Stepping Noise Filtering

Select the digital signal filtering to set the dial switch SW12; ON: 150KHz (suitable for low-division drive), OFF: 2MHz (suitable for high division drive)

## 6. Related Precautions:

### Wiring requirements

(1)To prevent interference with the driver, it is recommended to use shielded cables for control signals, and the shielding layer should be short circuited to the ground wire. Unless otherwise specified, the shielded wire of the control signal cable should be grounded at one end: the upper computer end of the shielded wire should be grounded, and the driver end of the shielded wire should be suspended. Grounding is only allowed at the same point within the same machine. If it is not a true grounding wire, it may cause serious interference, and the shielding layer is not connected at this time.

(2) Pulse and direction signal lines are not allowed to be tied side by side with motor lines. It is best to separate them at least 10cm. Otherwise, the motor noise can easily interfere with pulse direction signals, causing motor positioning errors, system instability and other faults.

(3) If a power supply supplies multiple drivers, parallel connection should be adopted at the power supply, and chain connection from one to another is not allowed.

(4) It is strictly prohibited to plug and unplug the strong electric (motor and power) terminals of the driver with electricity. When the charged motor stops, there is still a large current flowing through the coil. You may cause a huge instantaneous induced electric potential to burn out the driver by plugging and unplugging the strong electric (motor and power) terminals.

(5) It is strictly prohibited to solder the wire head and connect it to the wiring terminal. Otherwise, it may overheat and damage the terminal due to increased contact resistance.

The wiring terminal should not be exposed outside the terminal to prevent accidental short circuit and damage to the driver

## 7. Contact Kaifull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