

Y2SED1-S-F01

Stepper Driver Hardware Manual

Guangdong Kaifull Electronics Technology Co., Ltd.

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<http://www.kaifull.net/>

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1. Introduction

1.1 Overview

The Kaifull Y2SED1-S-F01 driver is a high-performance IO controlled stepper motor driver that relies on digital PID technology. It features superior performance, high-speed and large torque output, low noise, low vibration, and low heat generation. The operating current, speed segment and other parameters are set through switch to greatly facilitate customer's applications.

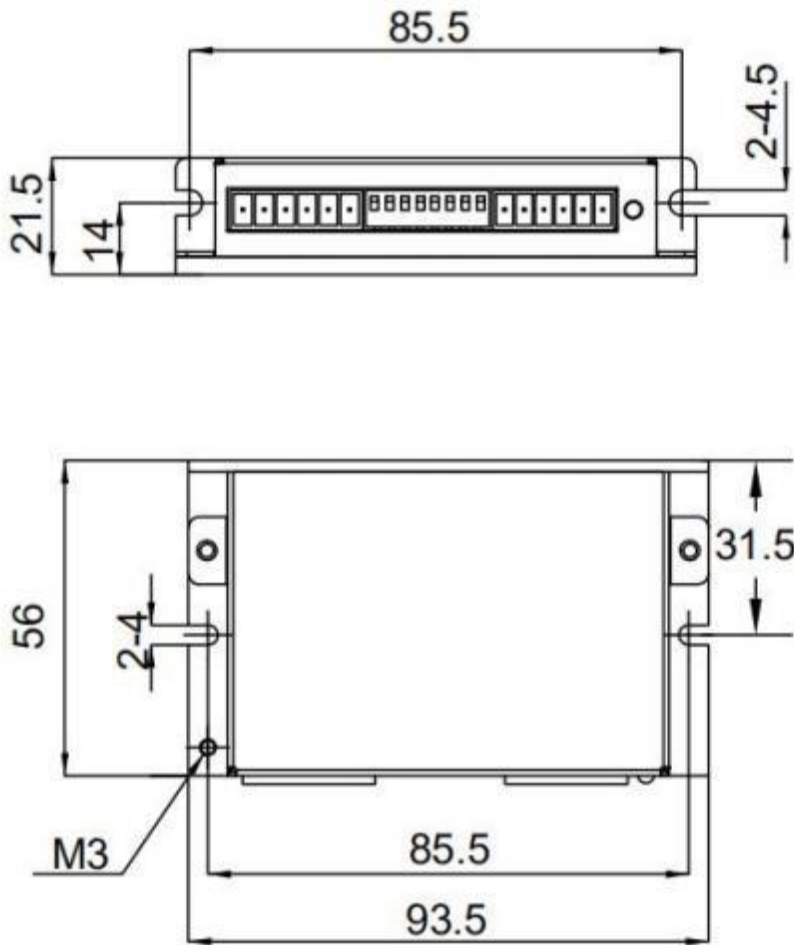
1.2 Functional Features:

- Power supply: 18-48V DC power supply
- Output current: Dial switch setting, 3-position switch selection, maximum 3A
- Input: 3 optoelectronic isolation digital inputs, compatible with 5-24V level
- Idle current: Select the dial switch, and the current will automatically decrease to 50% or 90% of the rated current within 1.0 second after the motor stops operating
- Subdivision setting: 4-position dial switch is used to set 16 tap positions of speeds: 10R/S, 9R/S, 8R/S, 7R/S, 6R/S, 5.5R/S, 5R/S, 4.5R/S, 4R/S, 3.5R/S, 3R/S, 2.5R/S, 2R/S, 1.5R/S, 1R/S, 0.5R/S
- Control mode: Spontaneous IO speed mode

1.3 Technical Parameters

Adaptive motor		Adapting to two-phase hybrid stepper motor; it can adapt to the current up to 3.0A
Power supply		15 - 48V DC
Output current		0.4A-3A/phase (peak)
Input signal	STEP (start) signal	Optocoupler input voltage H=3.5-26V, L=0-0.8V Conducting current 6-15mA
	DIR (direction) signal	
	EN (switching to the speed of the second segment) signal	
Dimensions		93.5× 56 × 21.5 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 M4 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 should be applied. Do not use it in areas with poor air circulation or environments with temperatures exceeding 40 °C; do not install the driver at a damp place or at a place with scrap metal.

2.2 Power Supply Selection

The chopped mode driver continuously changes the magnitude and direction of the motor winding terminal voltage while detecting the current to obtain accurate phase current. If both high efficiency and low noise are to be ensured, the supply voltage of the driver should be at least 5 times the rated phase voltage of the motor (i.e. the rated phase current of the motor multiplied by the phase resistance). To make the motor provide better high-speed performance, you need to increase the supply voltage of the driver.

If a stabilized voltage supply is used, the voltage should not exceed 48V.

If a stabilized voltage supply is used, the voltage should not exceed 34V.

Because the rated current of a non-stabilized voltage supply is full-load current; when the load is light, e.g., the motor is not rotating, the actual voltage can reach 1.4 times the rated voltage of the power supply. If you want the motor to run smoothly and quietly, choose a low voltage.

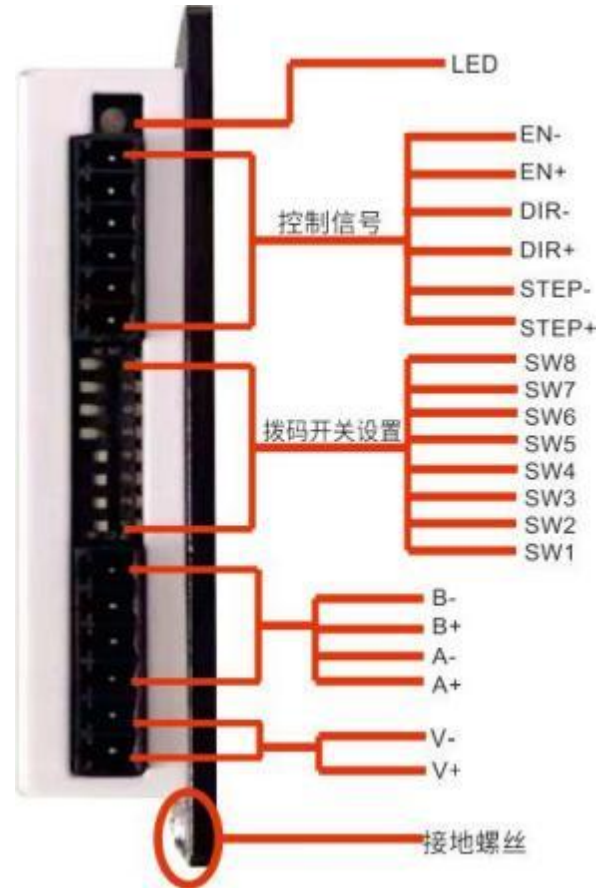
3. Port Wiring

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

15-48VDC, DC power supply with appropriate rate of work

Control signal source

Matching Kaifull stepper motor



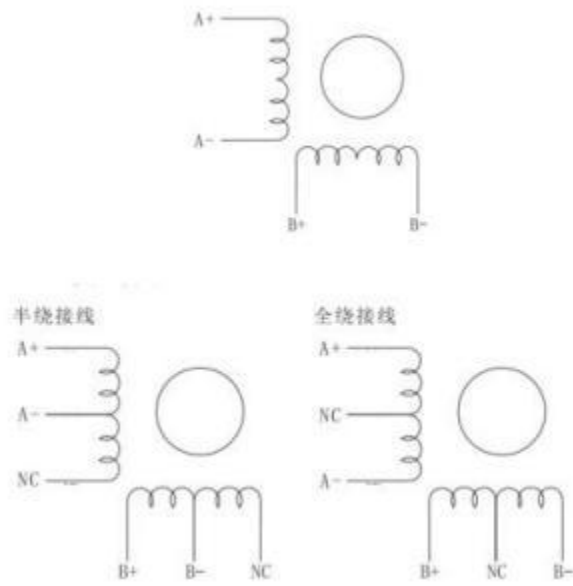
3.1 Power Connection

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.**

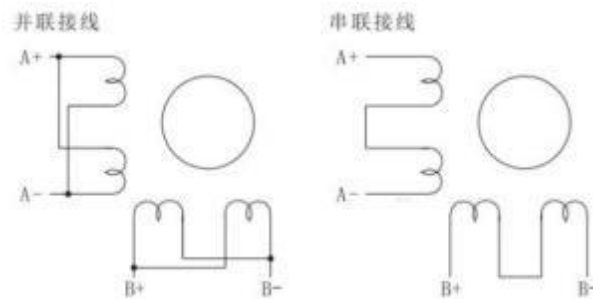
To make the motor provide better high-speed performance, you need to increase the supply voltage of the driver.

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 Start & Direction Signals

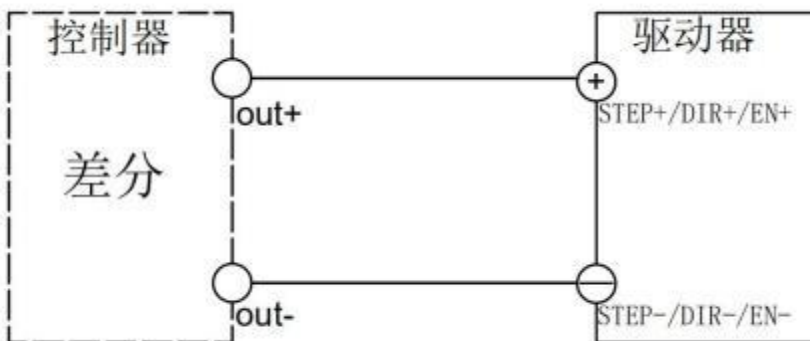
The Y2SED1-S-F01 driver has two high-speed input ports: STEP and DIR, is equipped with an opto-isolator, and can accept 5-24VDC single ended or differential signals. The maximum voltage can reach 28V, and the signal falling edge is effective. The direction of motor operation depends on the DIR level signal. When the STEP signal has an electric signal, the DIR is suspended or at a low level, the motor will run clockwise; when the DIR signal is at a high level, the motor will run counterclockwise.

4.2 Enable Signal

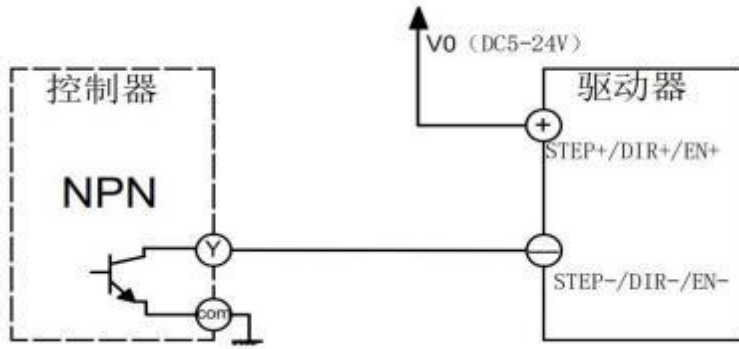
The EN input enables or switches off the power part of the driver, and the signal input is optoelectronic isolation. It can accept 5-24VDC single-end or differential signals, with a maximum signal of 28V. When the EN signal is suspended or at a low level (optocoupler is not conducting), the driver will be in an enabled status and the motor will run normally; when the EN signal is at a high level (optocoupler is conducting), the driver power 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 falling edge signal to the EN end. The driver can restart the power part and the motor will be excited to operate.

4.3 Control Signal Wiring Method

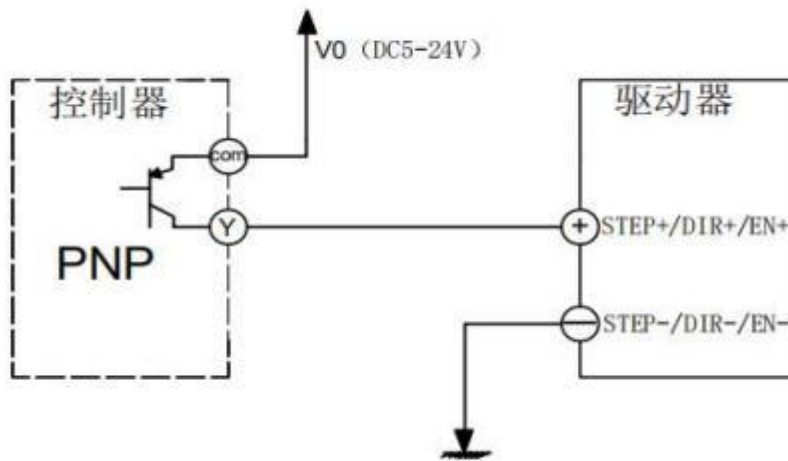
4.3.1 Differential Signal



4.3.2 NPN Connection Method



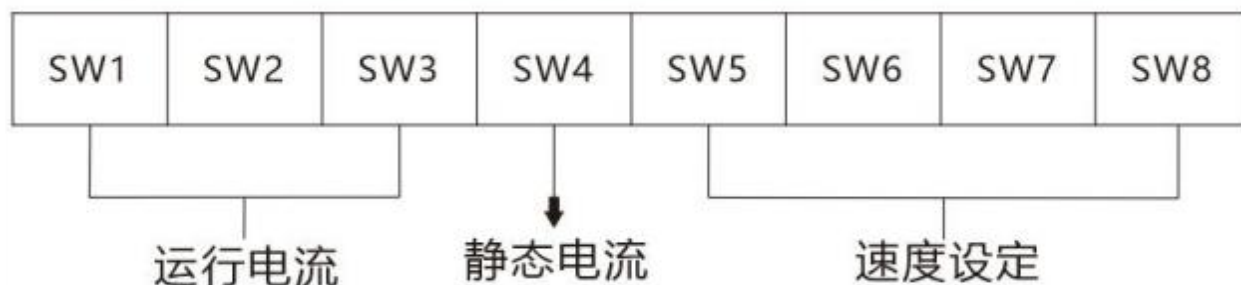
4.3.3 PNP Connection Method



4.4 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	The EN port has a high-level input
3 red lights and 1 green light	Driver overtemperature	The heat dissipation needs to be strengthened
4 red lights and 1 green light	Drive power input overvoltage	The supply voltage is greater than 48VDC
5 red lights and 1 green light	Driver overcurrent	Motor wiring error or poor contact
6 red lights and 1 green light	Motor winding open circuit	The motor is not connected properly
3 red lights and 2 green lights	Internal voltage error in the driver	Too small power
4 red lights and 2 green lights	Drive power input undervoltage	The supply voltage is less than 18VDC

5. Operating Parameters Setting of Driver



5.1 Current Setting

The Y2SED1-S-F01 driver sets the peak output current through the SW1, SW2, and SW3 dial switches.

Generally, the current is set to the rate 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 rated current of the motor.

*Factory setting: minimum current

Operating current (peak)	SW1	SW2	SW3
3.0A	OFF	OFF	OFF
2.7A	ON	OFF	OFF
2.4A	OFF	ON	OFF
2.0A	ON	ON	OFF
1.6A	OFF	OFF	ON
1.2A	ON	OFF	ON
0.8A	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 Speed Setting

The Y2SED1-S-F01 driver sets subdivision values through SW5, SW6, SW7, and SW8 dial switches, with 16 options available.

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

6. Related Precautions:

Current

The maximum supply current should be the sum of the two-phase current. Generally, the current you need depends on the motor model, voltage, speed and load conditions. The actual power supply current value is significantly lower than this maximum current value because the driver uses a switching amplifier to convert high voltage and low current into low voltage and high current. The more the power supply voltage exceeds the motor voltage, the less supply current is required. When the motor is connected to a 48V power supply for operation, the output current of the power supply will be half of the output current of the 24V power supply.

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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