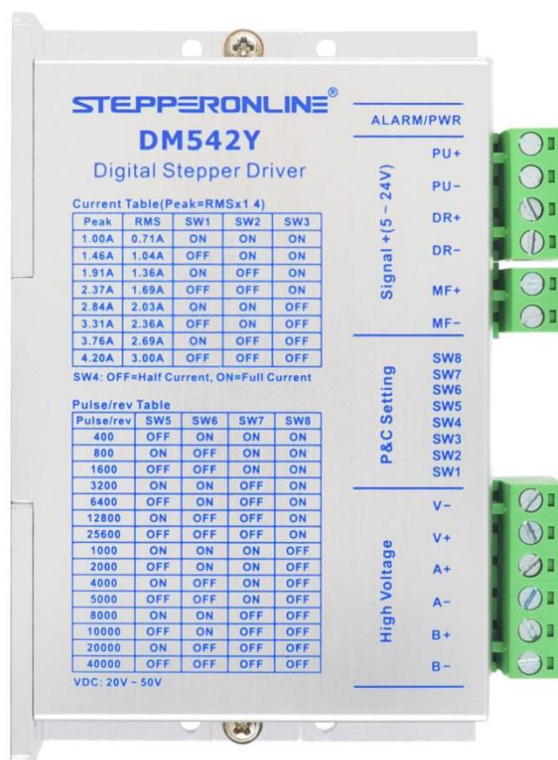




User Manual

# DM542Y

Open Loop Stepper Driver



Pulse type open loop stepper driver instruction manual

Version: V1.0

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## Revision history

| Version | Description           | Date       | Remark |
|---------|-----------------------|------------|--------|
| V1.0    | First edition release | 2024.11.30 |        |
|         |                       |            |        |
|         |                       |            |        |
|         |                       |            |        |
|         |                       |            |        |

## Introduction

Thank you for using this stepper drive.

Before using this product, be sure to read this manual carefully to understand the necessary safety information, precautions, and operation methods.

The wrong operation can lead to extremely serious consequences.

## Statement

The design and manufacture of this product does not have the ability to protect personal safety from the threat of mechanical systems. Users are requested to consider safety protection measures during the design and manufacture of mechanical systems to prevent accidents caused by improper operation or abnormal products.

Due to product improvements, the contents of the manual are subject to change without notice.

Our company will not be responsible for any modification of the product by the user.

When reading, please note the following marks in the manual:



Remind you to pay attention to the main points in the text.



Indicates that improper operations may result in personal injury or equipment damage.

## Chapter 1 Overview

### 1.1 Product introduction

DM542Y is a high-performance digital stepper driver based on a new generation of digital control technology, driving voltage DC20~50V. The adaptive current peak is below 4.2A, the outer diameter of 42mm, 57mm of various types of two-phase hybrid stepping motor.

The internal control principle of the driver is similar to the servo, unique circuit design, superior software algorithm processing, even under the condition of low subdivision can make the motor run smoothly at low speed, almost no vibration and noise; Smooth and precise current control technology greatly reduces motor heating; External 16-speed equal Angle constant torque subdivision, up to 40000 subdivision; Optocoupler isolation differential signal input, strong anti-interference ability; With over-voltage, under-voltage, over-current protection and other error protection functions; In the dispensing machine, laser engraving and other medium and low speed applications, its stability, low vibration, low noise advantages are obvious, can greatly improve the performance of the equipment.

### 1.2 Peculiarity

- A new generation of 32-bit DSP control technology, high cost performance, good stability, superior noise, vibration performance;
- optical coupling isolated differential signal input, compatible with 5V/24V signal, can adapt to the signal requirements of different controllers;
- new motor parameter identification function, can identify the motor and given control parameters, play its best performance;
- added single and double pulse function. Single and double pulse function can be switched according to whether the driver internal terminal is short-connected or not.
- adopts the latest resonance suppression algorithm, which has excellent stationarity in medium and low speed and low frequency subdivision;
- is equipped with 16 equal Angle constant torque subdivision, up to 40000 subdivision;
- The highest impulse response frequency up to 200KHz;When the stepping pulse stops more than 250ms, the motor current is halved;
- Voltage input range: DC20~50V;
- has the functions of over-voltage, under-voltage, over-current protection and detection;

## **1.3 Application field**

Mainly used in medical equipment, dispenser, engraving machine, laser equipment, labeling machine, electronic equipment, advertising equipment and other automation equipment. The application effect is especially good in the equipment that users expect low heat, small noise, low vibration, high stability and high precision.

## Chapter 2 Performance Indicators

### 2.1 Electrical characteristic

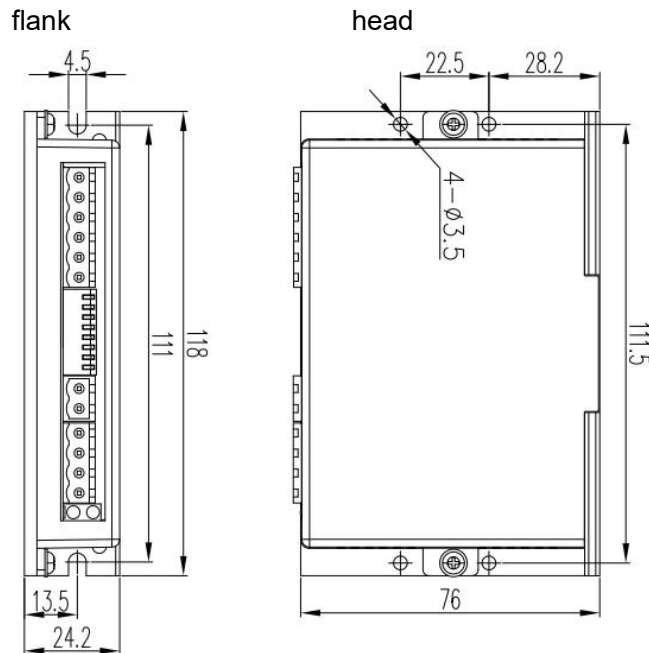
| Argument                  | DM542Y        |               |               |      |
|---------------------------|---------------|---------------|---------------|------|
|                           | Minimum value | Typical value | Maximum value | Unit |
| Continuous output current | 0             | -             | 4.2           | A    |
| Input supply voltage      | 20            | 24            | 50            | Vdc  |
| Logic input current       | 7             | 10            | 20            | mA   |
| Pulse frequency           | 0             | -             | 200           | kHz  |
| Insulation resistance     | 50            | -             | -             | MΩ   |

### 2.2 Using environment

| Cooling mode        | Natural cooling |                                                                                                                                                               |
|---------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Use environment     | Use occasion    | Try to stay away from other heating equipment, avoid dust, oil mist, corrosive gas, strong vibration places, flammable gas and conductive dust are prohibited |
|                     | Temperature     | 0℃~50℃                                                                                                                                                        |
|                     | Humidity        | 40—90%RH (non-condensation)                                                                                                                                   |
|                     | Vibration       | 10~55Hz/0.15mm                                                                                                                                                |
| Storage temperature | -20℃~+70℃       |                                                                                                                                                               |

## Chapter 3 Installation

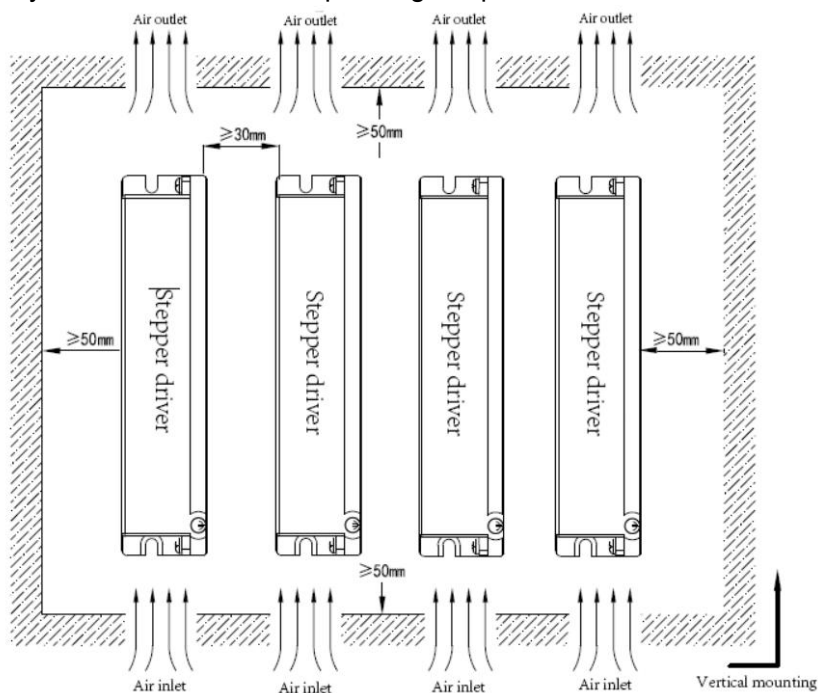
### 3.1 Mounting dimension



Installation size drawing (unit: mm)

### 3.2 Installation Methods

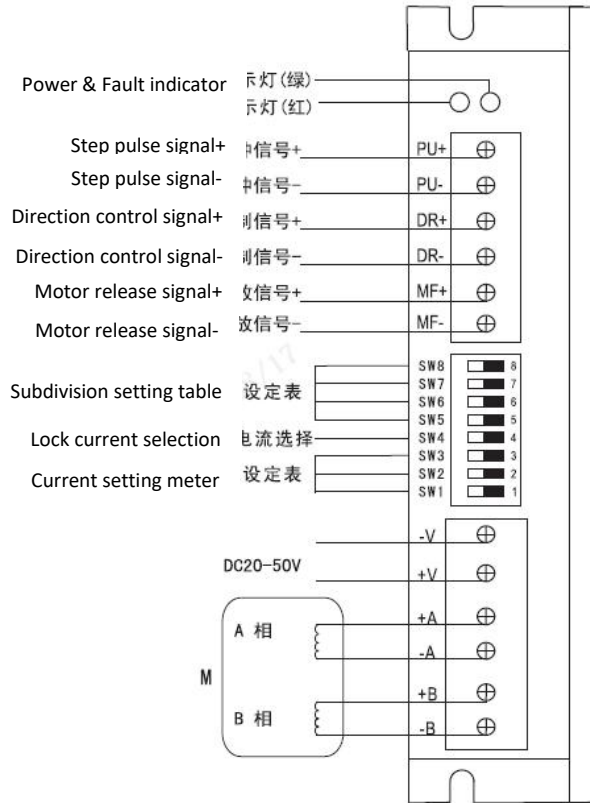
When installing the driver, please use the upright side installation to form strong air convection on the driver surface; If necessary, install a fan close to the driver to force the heat to dissipate to ensure that the driver works within the reliable operating temperature range (the reliable operating temperature of the driver is usually within 50°C, and the operating temperature of the motor is within 80°C).



## Chapter 4 Driver Ports and Wiring

### 4.1 Wiring diagram

Use the DM542Y drive according to the interface diagram:



#### Attention!

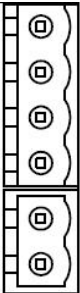
- The personnel involved in wiring must have professional ability.
- No live wiring.
- The wiring can only be carried out after the installation is firm.
- Do not connect the power supply wrong, the input voltage should not exceed 50V.

## 4.2 Port Definition

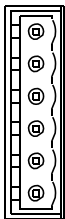
### 4.2.1 Status indicator light

| Color | Name                  | Features                                                                                                 |
|-------|-----------------------|----------------------------------------------------------------------------------------------------------|
| Green | Power indicator light | When the power is on, the green indicator lights up.                                                     |
| Red   | Fault indicator light | Drive overcurrent: Flash once<br>Drive overvoltage: Flash twice<br>Drive undervoltage: Flash three times |

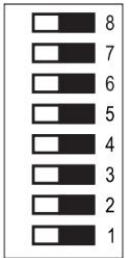
### 4.2.2 Control signal input port

| Port                                                                                | Lead | Symbol | Feature                                                 | Annotation                                                                                                             |
|-------------------------------------------------------------------------------------|------|--------|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
|  | 1    | PU+    | Pulse signal photoelectric isolation positive end       | Connect to signal power supply, +5~24V input, higher than 24V need to connect to current limiting resistance.          |
|                                                                                     | 2    | PU-    | Pulse signal photoelectric isolation negative end       | The falling edge is effective, and the motor starts to run when the pulse changes from high to low.                    |
|                                                                                     | 3    | DR+    | Directional signal photoelectric isolation positive end | Direction signal input positive end, +5~24V input, higher than 24V need to connect to the current limiting resistance. |
|                                                                                     | 4    | DR-    | Directional signal photoelectric isolation negative end | Used to change the direction of the motor.                                                                             |
|                                                                                     | 5    | MF+    | Release signal photoelectric isolation positive end     | Connect to signal power supply, +5~24V input, higher than 24V need to connect to current limiting resistance.          |
|                                                                                     | 6    | MF-    | Release signal photoelectric isolation negative end     | When effective, turn off the motor coil current, and the motor is in a free state.                                     |

### 4.2.3 Power input and motor port

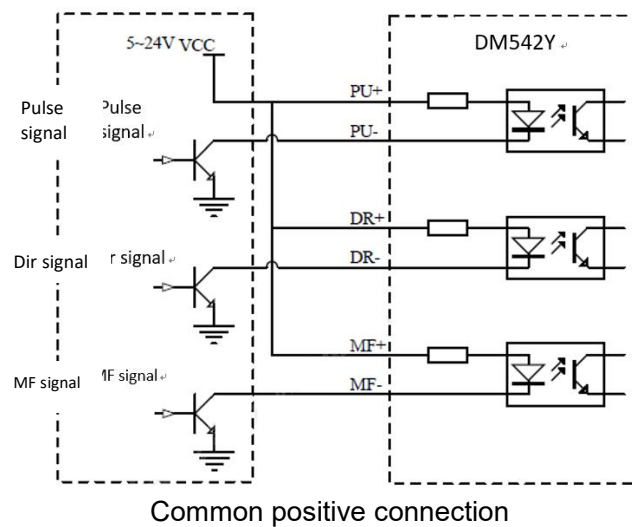
| Port                                                                                | Lead | Symbol | Name            | Function                          |
|-------------------------------------------------------------------------------------|------|--------|-----------------|-----------------------------------|
|  | 1    | V-     | Power interface | DC20-50V                          |
|                                                                                     | 2    | V+     |                 |                                   |
|                                                                                     | 3    | A+     | Motor interface | Two phase stepper motor connector |
|                                                                                     | 4    | A-     |                 |                                   |
|                                                                                     | 5    | B+     |                 |                                   |
|                                                                                     | 6    | B-     |                 |                                   |

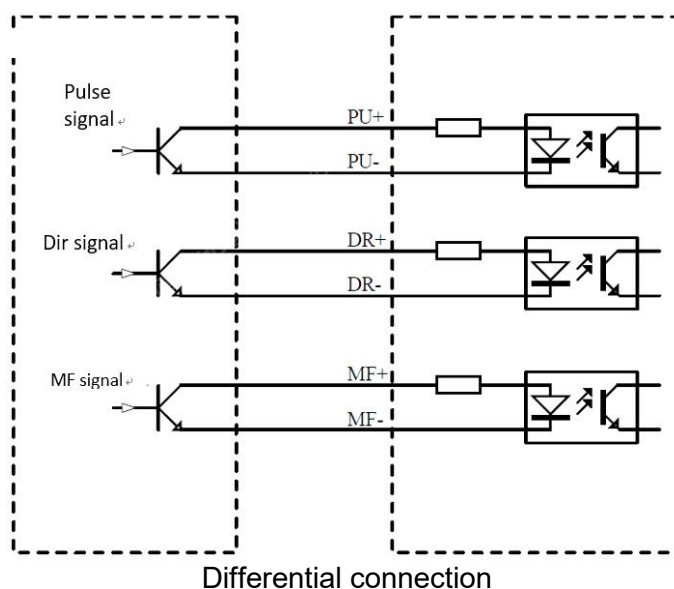
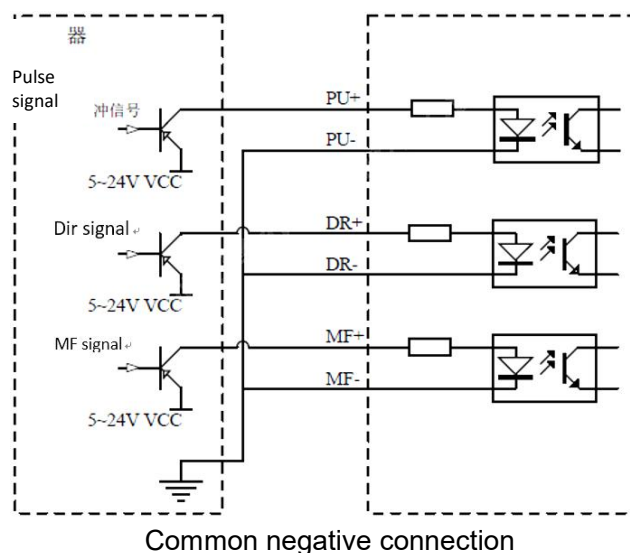
## 4.2.4 Dip switch

| Port                                                                              | Lead | Symbol | Function                    |
|-----------------------------------------------------------------------------------|------|--------|-----------------------------|
|  | 1    | SW1    | Current value setting       |
|                                                                                   | 2    | SW2    |                             |
|                                                                                   | 3    | SW3    |                             |
|                                                                                   | 4    | SW4    | Lock motor current Settings |
|                                                                                   | 5    | SW5    | Subdivision setting         |
|                                                                                   | 6    | SW6    |                             |
|                                                                                   | 7    | SW7    |                             |
|                                                                                   | 8    | SW8    |                             |

## 4.3 Input/output port operation

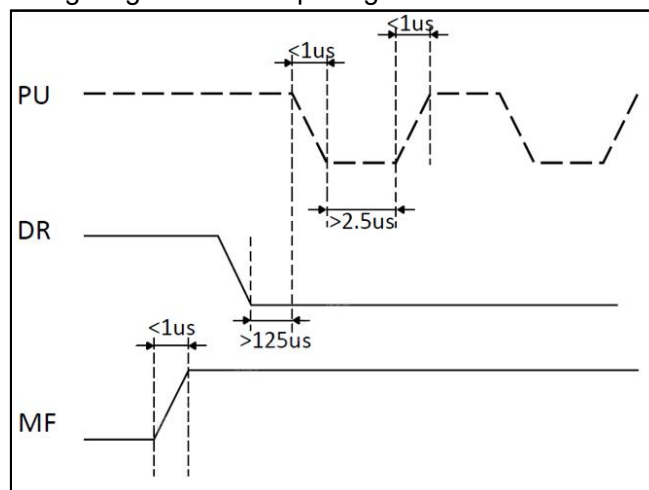
The DM542Y driver has three digital inputs, photoelectric isolation, and the signal supports 5V-24V input. When the input signal is higher than 24V, the series current limiting resistance is required at the signal input end. The specific wiring diagram is as follows:  
input:





## 4.4 Signal input timing diagram

DM542Y driver In order to avoid abnormal operation of the driver control motor, please refer to the following diagram for the timing diagram of the input signal:



## Chapter 5 Drive operation parameter Settings

The DM542Y stepper motor driver uses a 6-bit dip switch to set the driver current and subdivision. The specific Settings are as follows:

### 5.1 Driver current setting

The DM542Y driver sets the peak output current or RMS value through SW1, SW2, SW3 dip switches.

Normally, the current is set to the rated current of the motor. If your system has high heating requirements, you can appropriately reduce the current to reduce the heat of the motor, but the output torque of the motor will be reduced at the same time. If you do not require continuous operation of the motor, you can appropriately increase the running current to obtain greater torque.

DM542Y Ammeter of current: (unit:A)

| Current RMS | Current PEAK | SW1 | SW2 | SW3 |
|-------------|--------------|-----|-----|-----|
| 0.71        | 1.0          | ON  | ON  | ON  |
| 1.04        | 1.46         | OFF | ON  | ON  |
| 1.36        | 1.91         | ON  | OFF | ON  |
| 1.69        | 2.37         | OFF | OFF | ON  |
| 2.03        | 2.84         | ON  | ON  | OFF |
| 2.36        | 3.31         | OFF | ON  | OFF |
| 2.69        | 3.76         | ON  | OFF | OFF |
| 3.00        | 4.20         | OFF | OFF | OFF |

Remark: Current RMS is the effective value, current Peak is the peak value of current

### 5.2 Drive subdivision Settings

DM542Y driver through SW4, SW5, SW6 dial switches to set the corresponding subdivision, as shown in the table below:

| Subdivision | PU/rve | SW5 | SW6 | SW7 | SW8 |
|-------------|--------|-----|-----|-----|-----|
| 1           | 200    | ON  | ON  | ON  | ON  |
| 2           | 400    | OFF | ON  | ON  | ON  |
| 4           | 800    | ON  | OFF | ON  | ON  |
| 8           | 1600   | OFF | OFF | ON  | ON  |
| 16          | 3200   | ON  | ON  | OFF | ON  |
| 32          | 6400   | OFF | ON  | OFF | ON  |
| 64          | 12800  | ON  | OFF | OFF | ON  |
| 128         | 25600  | OFF | OFF | OFF | ON  |
| 5           | 1000   | ON  | ON  | ON  | OFF |
| 10          | 2000   | OFF | ON  | ON  | OFF |
| 20          | 4000   | ON  | OFF | ON  | OFF |
| 25          | 5000   | OFF | OFF | ON  | OFF |
| 40          | 8000   | ON  | ON  | OFF | OFF |
| 50          | 10000  | OFF | ON  | OFF | OFF |
| 100         | 20000  | ON  | OFF | OFF | OFF |
| 200         | 40000  | OFF | OFF | OFF | OFF |

## 5.3 Lock current

The DM542Y driver uses the SW4 dip switch to set the percentage of lock current when the motor is stationary, as follows:

| SW4 | Percentage of lock current |
|-----|----------------------------|
| OFF | Half flow lock             |
| ON  | Full flow lock             |

## 5.4 MF motor release signal

| MF signal | Running state        |
|-----------|----------------------|
| effective | Machine without lock |
| Invalid   | Locking machine      |

## Chapter 6 Driver Status Indicators

The DM542Y driver has an alarm prompt. After the driver alarms, the alarm indicator state indicates the alarm information of the driver. The specific alarm information is shown in the following table.

| Fault information                       | ALM light         | Resetting                                 |
|-----------------------------------------|-------------------|-------------------------------------------|
| Overcurrent or interphase short circuit | Flash once        | Power-off reset                           |
| Overvoltage of supply                   | Flash twice       | Automatic restoration of standard voltage |
| The power supply voltage is too low.    | Flash Three times | Automatic restoration of standard voltage |

## Chapter 7 General Troubleshooting methods

| Phenome non                       | Possible situation                                     | Solution measure                                                                         |
|-----------------------------------|--------------------------------------------------------|------------------------------------------------------------------------------------------|
| Motor failure                     | The power light is off                                 | Check the power supply circuit. The power supply is normal                               |
|                                   | The motor locks the shaft but does not turn            | The IO signal is weak and the signal current is increased                                |
|                                   | Too little speed                                       | Selection speed                                                                          |
|                                   | Whether the release signal MF is connected             | Disconnect the MF signal                                                                 |
|                                   | Instruction input error                                | Check whether the upper computer has a switch output                                     |
| Motor direction error             | Motor reversal                                         | Replace motor wiring sequence or adjust instruction direction                            |
|                                   | The motor line has a break                             | Check whether the cable is in poor contact                                               |
|                                   | The motor has only one direction                       | Input port damage                                                                        |
| The alarm indicator light is on   | The motor wire is connected incorrectly                | Check the wiring                                                                         |
|                                   | The voltage is too high or low                         | Check power supply                                                                       |
|                                   | The motor or drive is damaged                          | Replace the motor or drive                                                               |
| Wrong position or speed           | Signal interference                                    | Eliminate interference, reliable grounding                                               |
|                                   | Instruction input error                                | Check the upper computer instructions to ensure correct output                           |
|                                   | Speed setting error                                    | Check the DIP switch status and connect it correctly                                     |
|                                   | Motor tripping                                         | Check whether the command speed is too large and the motor selection is small            |
| The driver terminal is burned out | Short-circuit between terminals                        | Check the power polarity or external short circuit                                       |
|                                   | The internal resistance between terminals is too large | Check whether excess solder is added to the wire and wire connection to form tin pellets |
| Motor stalling                    | The acceleration and deceleration time is too short    | Reduce the command acceleration or increase the driver filter parameter                  |
|                                   | Motor torque too small                                 | Select high torque motor                                                                 |
|                                   | Heavy load                                             | Check the load weight and quality, adjust the mechanical structure                       |
|                                   | Too little current                                     | Check dip switches to increase the output current of the driver                          |