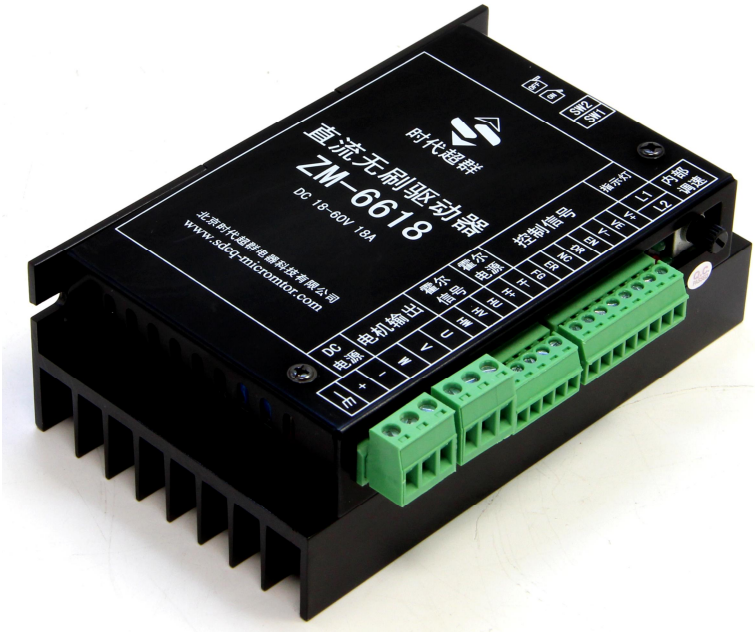
时代超群
Times Brilliant

Product Manuals

ZM-6618

High Performance DC Brushless Controller (Driver)



- Read this manual carefully before using this product
- Keep this manual safe for future reference
- The cover image in this booklet is for reference only. Please refer to the actual product.

Thank You for Purchasing Times Superb Products.

ZM-6618 is a high-performance DC brushless controller (driver) developed by our company using the latest BiCD process technology. It features compact size, low heat generation, high reliability, long service life, and user-friendly operation.

Before using this product, we strongly recommend that you read the following safety precautions and fully understand all the contents of the manual before starting to use it.

Safety Notes

- This product is a professional electrical device and should be installed, debugged, operated, and maintained by qualified technicians. Improper use may cause electric shock, fire, explosion, and other hazards.
- This product is powered by a DC power supply. Make sure the **positive and negative poles are correct** before powering it on
- The phase line and Hall line of the brushless motor must be **completely connected to the driver** before being powered on. Otherwise, the driver may be burned out due to excessive current
- Do not plug or unplug cables while powered on, and avoid cable short circuits during operation, as this may damage the product.
- If the motor needs to change direction during operation, it must first decelerate until the motor stops before changing direction.
- The drive is not sealed. Do not mix screws, metal shavings, or other conductive/ corrosive foreign objects inside. Protect against moisture and dust during storage and use.
- The drive is a power device. Keep the working environment well ventilated and cool.

Note: The 8 phase lines and Hall lines of the motor are clearly defined and must match the driver exactly. Using only a simple color-matching method is incorrect if the motor line definitions are not specified.

Catalogue

Product Fea

- Highly Integrated and Reliable Brushless DC Motor Controller
- PWM Square Wave Drive Control of Three-phase Full Bridge
- Overcurrent protection measures: immediately shut off the output during overload to protect the motor promptly
- Pure hardware design, high speed, and strong anti-interference capability
- Wide voltage compatibility: DC12-60V
- Low-grade fever, high power

Major Func

- Under-voltage (≤15V), over-voltage 60V
- Turn-off output automatically after 3 seconds of locked rotor
- Hall error protection
- Output 18A, overcurrent shutdown output
- Supports built-in potentiometer, external potentiometer, analog voltage, and PWM speed control
- Features enable, smooth directional switching, alarm output, and speed feedback, seamlessly compatible with normally open and normally closed control systems.
- With a slow-start function, it prevents current overshoot and effectively protects the motor.
- Customize the delay time (0S,1S,3S,10S) to 1S by default

Product Workin

Project		Minimum	Specified	Maximum	Unit
Ambient temperature		-20	-	60	℃
Input voltage (DC)		15	-	60	V
Output		-	18	18	A
Applicable motor speed		0	-	20000	rpm
Hall signal voltage		4.5	5	5.5	V
Hall drive current		-	10	-	mA
External speed control potentiometer		1K	10K	200K	Ω
Simulated speed control voltage (Ve)		0	5	24	V
PWM speed control signal amplitude		4.5	5	24	V
PWM duty cycle		0	-	100	%
Control interface voltage	H	4.5	5	24	V
	L	0	0	0.5	V
Control interface identifies internal resistance		0	100	2k	Ω

Note 1: This maximum voltage is an absolute parameter, and overvoltage and overcurrent use will permanently damage the driver.

Note 2: The effective voltage range for Ve port (analog and PWM) speed control is 0.8V-4.6V. Beyond this range, the motor will not change speed.

Interface D

Name	Explain
Positive/negative electrode	DC power input, DC18-60V
U,V,W	Drive output, connect to the motor phase line
H+,H-	Hall power supply, connected to the motor's Hall power supply line (maximum output 100mA)
Hu,Hv,Hw	Hall signal, connected to the motor's Hall signal line
FG	Speed feedback signal (output 50% duty cycle square wave)
ER	Alarm output (connects to V-during alarm)
NC	Port retention is not available
DR	Direction: Positive rotation occurs when the signal is high, while negative rotation occurs when it is low.
EN	Enable: When SW2 is off, the high or floating state is normal, and the low state is standby. When SW2 is on, the high or floating state is standby, and the low state is normal.
V-	External speed control reference ground (COM port)
Ve	External speed control signal, potentiometer, analog voltage or PWM can be connected externally ①
V+	The external potentiometer's positive terminal for speed control should be left free when not in use. (Internal 5V output, maximum 200mA)
L1，L2	L1: Power indicator light (green), remains on when powered on; L2: Fault alarm light.
Internal speed regulation	Internal speed control potentiometer. Rotate clockwise to adjust motor speed from 0% to 100%.
SW1 Dial Code	Internal/external speed control switch: ON: Internal, OFF: External
SW2 Dial Code	Enable function switch: ON: High-level idle, OFF: Low-level idle

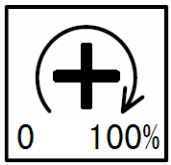
Note 1: When using this function, make sure the "SW1" dial on the side of the drive is OFF

Traffic Lim

The controller adopts the output current limiting mode, which can effectively avoid the abnormal operation caused by excessive current during the start-up or the increase of load.

Speed Control M

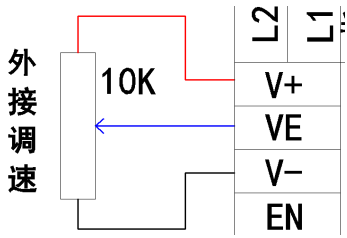
1. Internal Speed Regulation



To activate internal speed control, switch the rotary switch SW 1 to ON. Rotate the internal speed control potentiometer clockwise from low to high, adjusting the motor speed from 0% to 100%. The adjustment diagram is shown in the figure on the right.

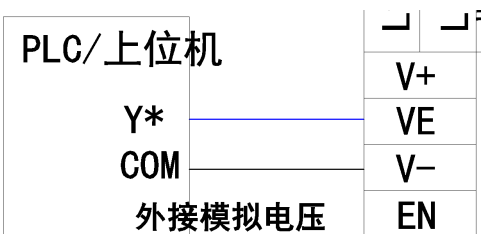
2. External Speed Regulation

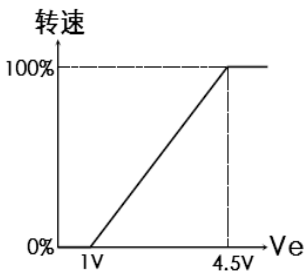
To use external speed control, switch the rotary switch SW1 to OFF.



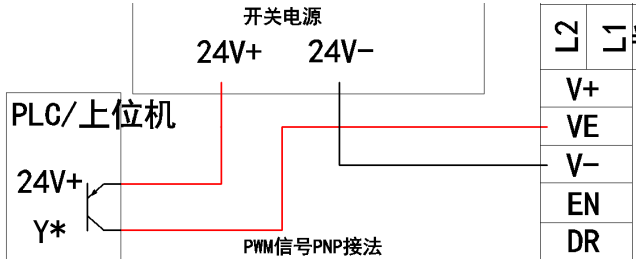
2.1 For external 10K potentiometer speed control, connect the potentiometer to the V+,Ve,V-interfaces of the driver. Adjust the motor speed by rotating the potentiometer (Ve connected to the middle pin of the potentiometer), as shown in the wiring diagram on the right:

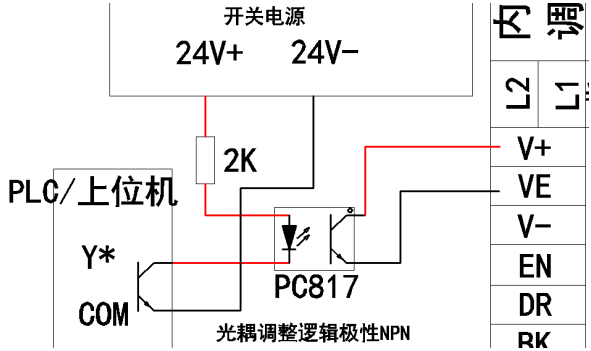
2.2 External analog voltage speed control, V- (COM) is the reference ground, Ve is connected to 0-5V voltage signal, in which the motor speed changes at 1-4.5V, the wiring diagram and *voltage-speed* correspondence diagram are as follows:



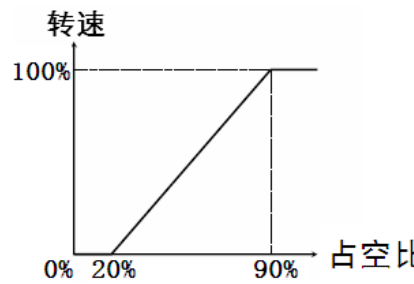


2.3 External PWM signal speed control, V-is the reference ground, Ve is connected to the PWM signal, the PWM voltage amplitude is 5V, the frequency is 1-10KHz, the wiring diagram and the corresponding duty cycle-output diagram are as follows:





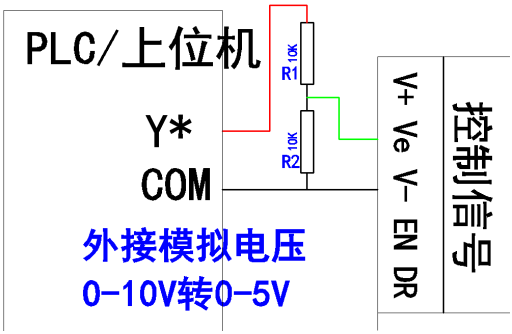
Important: The internal/external switching code SW1 only affects speed control signals. Whether the motor speed is regulated through an internal potentiometer or an external speed signal, both the control signal direction and enable signals are controlled. The Ve speed control signal operates at a maximum voltage of 24V with a speed range of 0.8V-4.6V, designed to accommodate PLC users who do not require current-limiting resistors.



2.4 How to convert 0-10V (24V, etc.) analog quantity to 0-5V analog quantity for some PLC users and host computer users. The reference wiring is as follows:

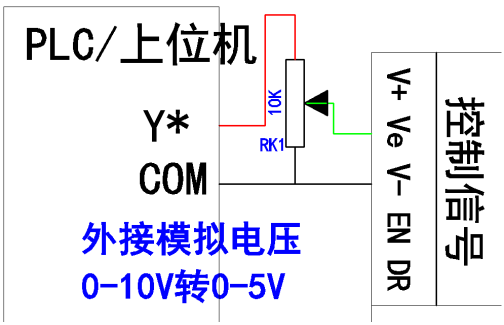
➢ Reference 1

If the output voltage of Y* is 0-10V, the voltage is divided by R1 and R2 in series, and the voltage of R2 is 0-5V.



➢ Reference 2

If the output voltage of Y* is 0-10V, the voltage is divided by potentiometer RK1, and the voltage of Ve is 0-5V. This method has the advantages of simple circuit wiring, convenient voltage adjustment, and flexible voltage adjustment.



➢ According to the voltage divider formula, the calculation is as follows:

$$Ve = VY^* \times R2/(R1+R2)$$

Control Signal A

1.1 Enable control

Set the enable signal to high level (EN high).

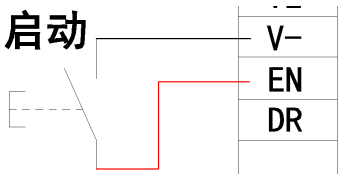
SW2 ON, the driver enters standby mode and the motor stops rotating.

SW2 is turned off, the driver activates, and the motor resumes operation.

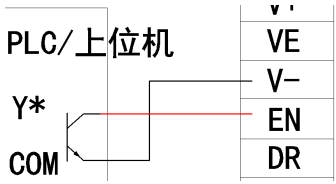
When the enable signal is low (EN short-circuited to V-),

SW2 activates the driver, and the motor resumes operation.

SW2 is off, the drive is in standby mode, and the motor stops rotating.



Switch button wiring



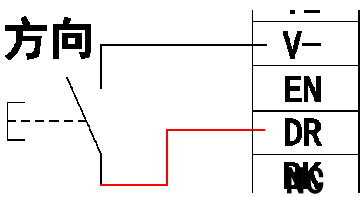
upper computer wiring

1.2 Directional control

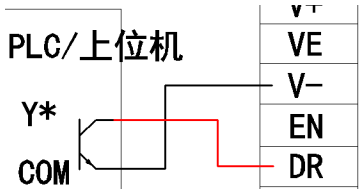
When the DR input is high (in floating state), the motor rotates forward.

When the DR input is low (DR is shorted to V), the motor rotates in reverse.

When the DR state changes, the driver will automatically execute the energy consumption braking for 0.5S.



Switch button wiring

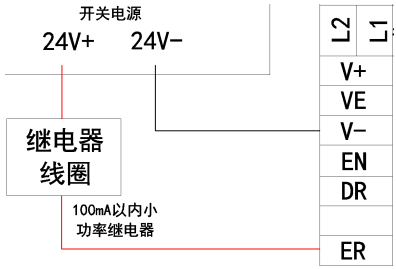


upper computer wiring

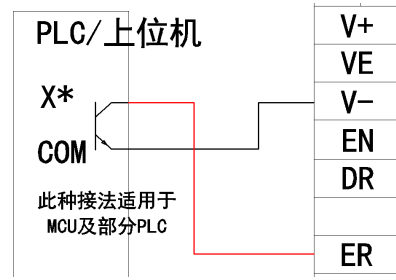
Note! The DR state can only be changed when the motor is low speed or stopped. Otherwise, the controller and motor may be damaged.

1.4 alarm output ports

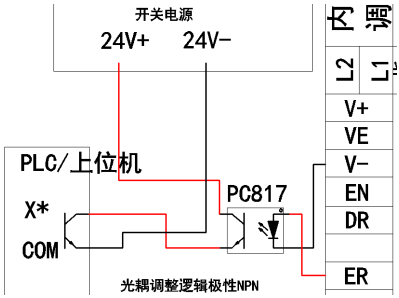
The ER alarm output port synchronizes with the L2 red light, normally delivering a 5V voltage. When an alarm occurs, the ER connects to V-, directly driving the relay with a maximum driving current of 100mA. The standard wiring configuration is as follows:



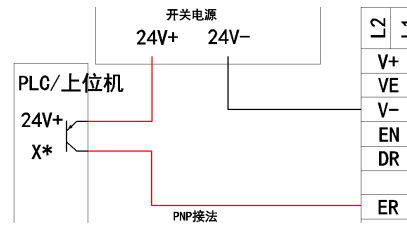
relay wiring



upper computer wiring



upper computer wiring



upper computer wiring

Note! The maximum blocking voltage of the ER port is 30V and the maximum output current is 100mA. Overvoltage and overcurrent will damage the driver.

1.5 speed feedback port

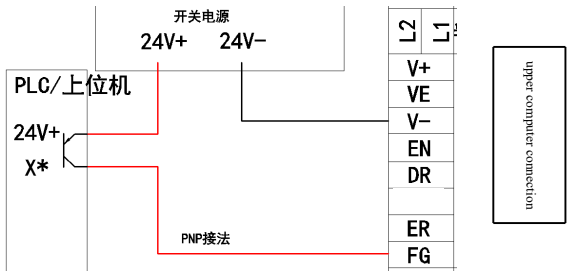
The FG speed feedback port outputs a 50% duty cycle, 5V pulse square wave. The motor speed calculation formula is:

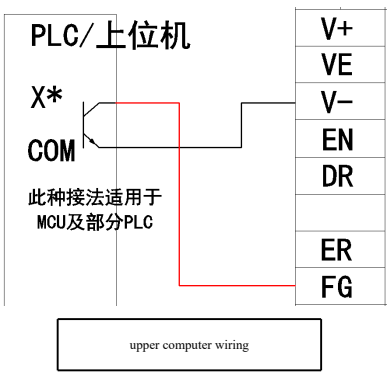
Motor speed = (FG frequency / motor pole pairs) × 60

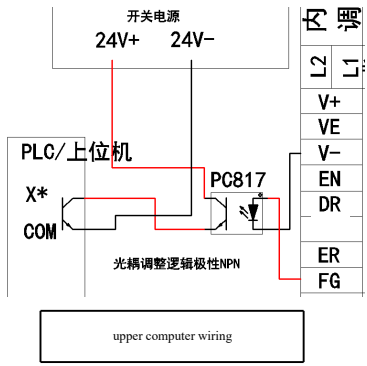
Example: Measure the frequency of the field-generating (FG) component at 100Hz with 2 motor pole pairs.

100/2*60=3000（r/min）

Apply reference:

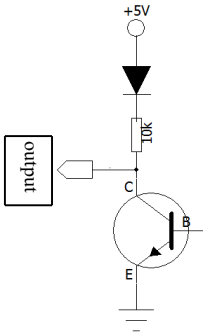




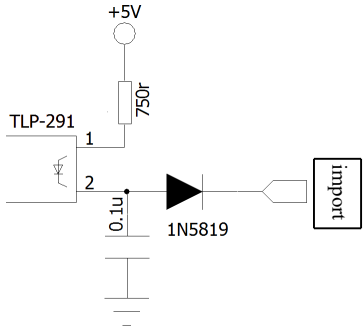


Important: The ER port has a maximum blocking voltage of 30V. Overvoltage usage may damage the driver. The FG signal is derived from the Hall sensor. Due to the random nature of the motor's Hall stop position, the FG signal may randomly remain at high or low levels after motor shutdown. This characteristic does not affect speed sampling. For motor pole pair information, please consult the motor supplier.

1.6 Internal Port Equivalent Diagram



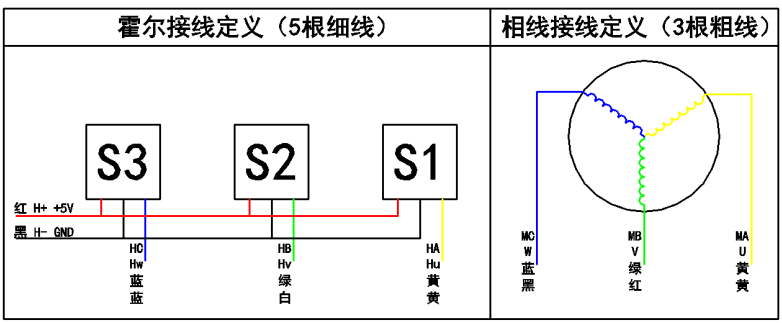
FG, ER port equivalent diagram



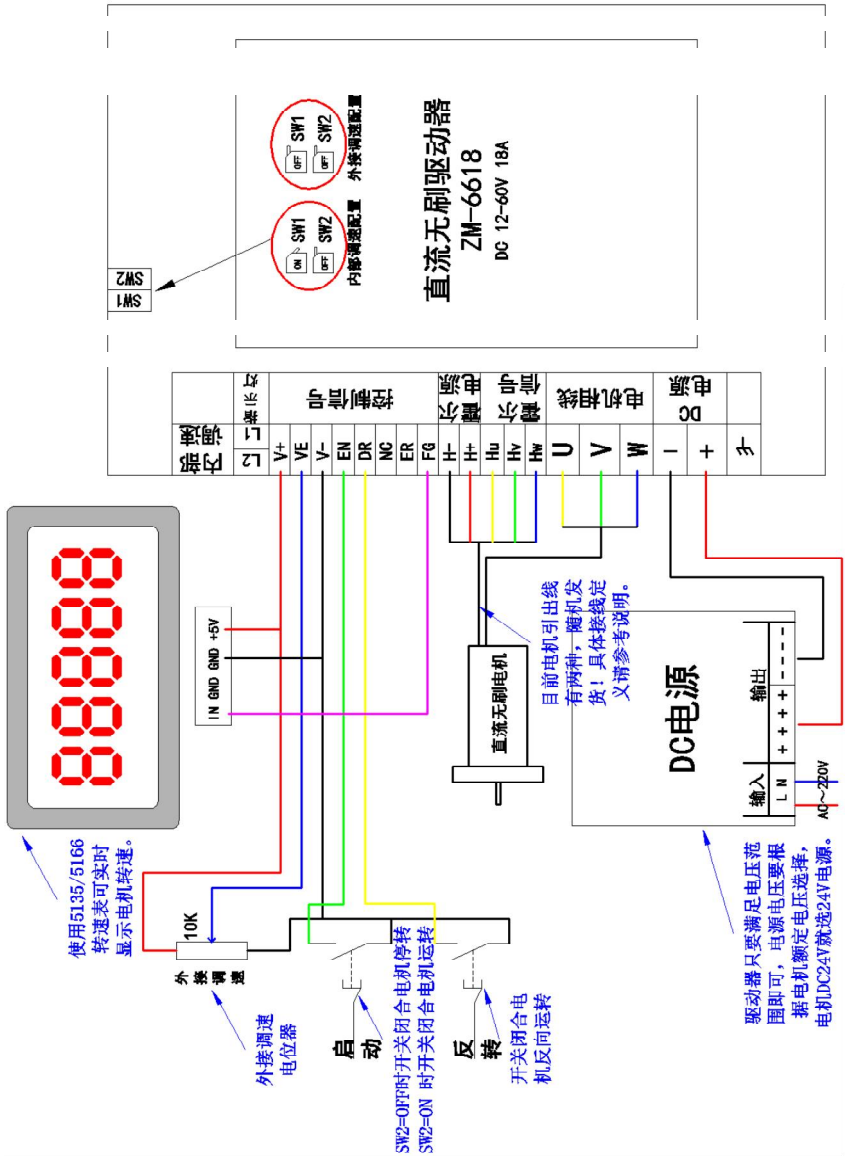
EN, DR, and internal equivalent diagrams

System Refer

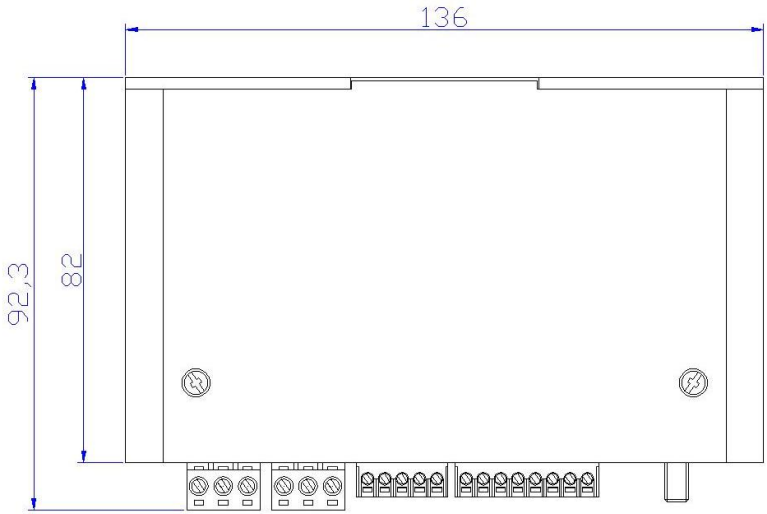
1. Brushless Series Product Line Sequence Reference Diagram

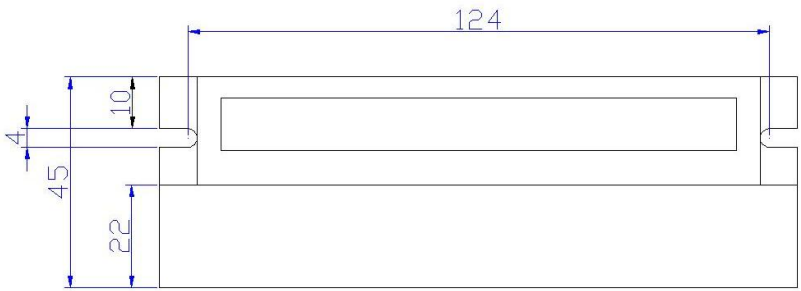


2. Basic System Reference Diagram



Outline Dir





Restore Prc

The control has multiple protection functions, and the correct method can be used to remove the protection after the protection function is activated.

1. Undervoltage protection: The driver enters protection mode when the supply voltage drops below 13V. To disable this protection, first power off, then increase the voltage to 18V before powering on again.

2. Overvoltage protection: The driver enters protection mode when the supply voltage exceeds 60V. To disable this protection, first power off, then reduce the voltage to 50V before powering on again.

3. Stall protection: If the motor stalls for 6 seconds, the driver will shut off the output and enter protection mode. In this case, you should immediately disable the enable setting or cut off the power supply. Power can be restored once the motor stall issue is resolved.

4. Hall error protection: When the driver detects a Hall error, it will turn off the output and enter a protection state. In this case, you should quickly set the enable to low or turn off the power supply, resolve the Hall error, and then power it up again.

Note! **To prevent unprotected operation, set the enable to low or reduce the speed to minimum when the motor is not needed (turn the potentiometer to the lowest, reduce the analog voltage to 0V, and reduce the PWM to 0%).**

FAQ

1. Q: How can I get started with this controller quickly?

Answer: After properly connecting the power cord, motor phase wire, and Hall line, ensure the motor is unloaded with all other interfaces disconnected. Use the internal speed control to gradually accelerate. Once the motor rotates correctly, sequentially test the enable, direction, and external speed control functions. If unfamiliar with this product, perform thorough testing before installation in actual use.

2. Q: What happens if the power supply is connected in reverse? A: It will immediately burn out the drive.

3. Q: What is the maximum voltage for the upper control signal?

A: The maximum voltage of the speed control signal is 5+0.2V, and the maximum voltage of the enable and direction control interface is 24V. Exceeding this voltage will cause the driver to burn out.

4. Q: Is it normal for the casing to get hot after the actuator has been working for a long time?

A: Normal, at room temperature, long-term working shell reaches 90 degrees will not affect performance.

5. Q: The power indicator is on, but the motor is not rotating and is shaking. What could be the cause?

Answer: It may be that the phase line and the Hall line are wrong, so the motor manual is correct wiring and power on the test.

6. Q: Can this controller set my motor speed to 6000?

A: The maximum speed of a brushless motor is determined by its technical specifications, while the controller regulates its operation within a range from zero to the maximum speed.

7. Q: I already have a motor. How should I connect it after purchasing this driver?

Answer: The phase and Hall lines of the motor must be defined before wiring. If uncertain, consult the motor manufacturer. Incorrect wiring may damage the driver.

8. Q: Can we add features or develop new products for this drive? A: Yes, please contact our company.

Warranty Regulations

This Product Offers a Free Warranty for up to 15 Months, Followed by 2 Years of Cost-Reimbursement Repairs. The Details Are as Follows:

1. No reason for returns or exchanges within 7 days after receiving the product-ensure the product is in good condition with no signs of use.
2. Free replacement of major components (excluding the casing) within six months, starting from the purchase date or three months after the factory date (based on the warranty signature).
3. Free repairs for one year — from the date of purchase or three months after the factory date (as per the warranty certificate).
4. Free warranty is valid for 2 years after the warranty period.

The above warranty shall not apply under any of the following circumstances:

1. Use without following the "Safety Precautions" or "Product Operating Conditions", resulting in product damage;
2. The warranty is void if the fragile label is damaged or if there are signs of disassembly.
3. Product damage caused by irresistible factors such as lightning, earthquake, tsunami, or war;
4. Other human-caused damage.

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