

ZS-X11H V1

ZS-X11H / ZS-X11H V1 BLDC Motor Controller Instruction Manual

Model: ZS-X11H, ZS-X11H V1

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1. PRODUCT OVERVIEW

The ZS-X11H and ZS-X11H V1 are DC6-60V 400W BLDC (Brushless DC) three-phase Hall motor controllers designed for efficient and precise motor drive applications. These modules support PWM signal input for speed control and offer robust performance with features like brake function and analog control.

Key Features:

- **Superior Efficiency & Longer Runtime:** Operates with significantly less energy loss compared to brushed motors, converting more power into motion and extending battery life in portable applications.
- **Enhanced Durability & Low Maintenance:** No physical brushes to wear out or replace. This eliminates sparking, reduces friction, and ensures a longer operational lifespan with minimal maintenance required.
- **High Performance with Precision Control:** Delivers exceptional torque for its size and provides smooth, consistent power delivery. Enables precise speed control for demanding applications.
- **Quiet, Cool, and Reliable Operation:** The brushless design results in smoother and quieter performance with reduced vibration. Generates less heat for improved reliability and safety.
- **Compact, Lightweight Powerhouse:** Engineered with a high power-to-size ratio, offering robust performance in a compact and lightweight form factor, ideal for space-conscious designs.

6-60 v wide voltage brushless drive plate

Have a hole

PWM speed regulation



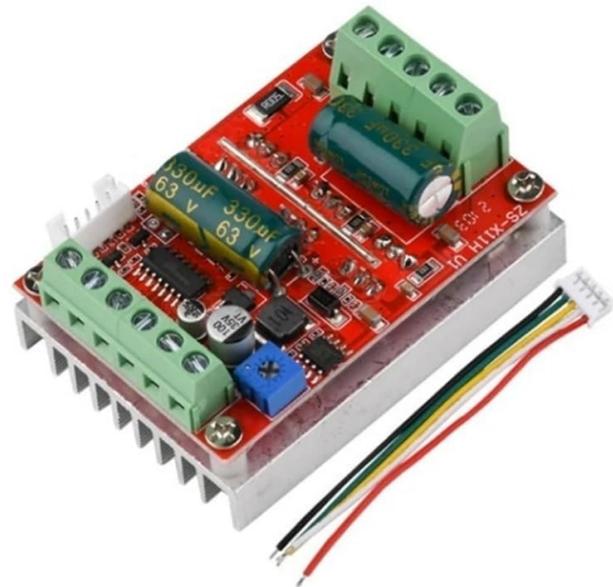
Support the brake function



0 - 5 v analog control



ZS-X11H
Dual capacitors



ZS-X11H V1
single capacitor

Figure 1: Comparison of ZS-X11H (dual capacitors) and ZS-X11H V1 (single capacitor) models. Both support 6-60V wide voltage, brake function, and 0-5V analog control, with PWM speed regulation.

2. SPECIFICATIONS

Product Parameters

Model: ZS-X11H

Working voltage: 6V-60V

Load capacity: 15A

Over-current protection: Yes

Maximum power: 400w

Operating Temperature: -40~85
degree Celsius

Working mode: open loop

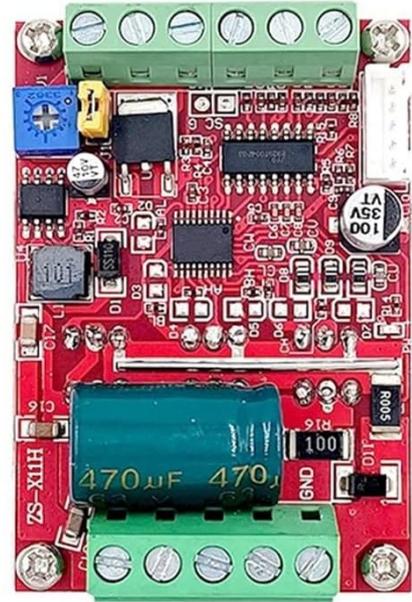


Figure 2: Detailed product parameters for the ZS-X11H model.

Parameter	Value
Model	ZS-X11H / ZS-X11H V1
Working Voltage	DC 6V - 60V
Load Capacity	15A
Over-current Protection	Yes
Maximum Power	400W
Operating Temperature	-40°C to 85°C
Working Mode	Open Loop
Package Dimensions	0.39 x 0.39 x 0.39 inches (approximate)
Item Weight	3.53 ounces
Batteries Required	No

3. SETUP & WIRING

Careful wiring is essential for proper function and safety. Ensure all connections are secure and correct before applying power.

3.1 General Wiring Diagram

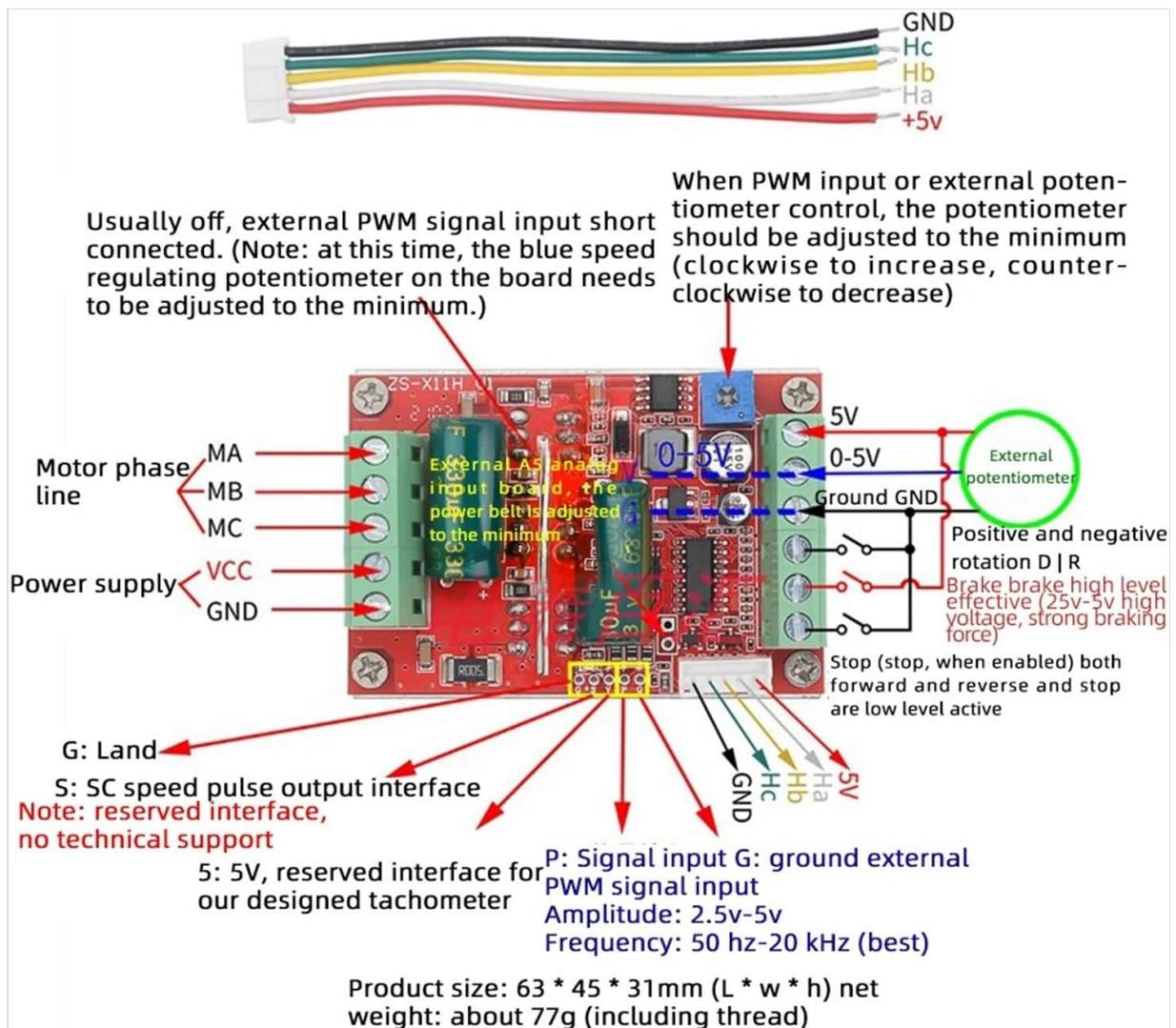


Figure 3: Detailed wiring diagram showing motor phase lines (MA, MB, MC), power supply (VCC, GND), 5V output, ground, PWM signal input (P), ground for external signal (G), speed pulse output (S), and Hall sensor connections (Hc, Hb, Ha, +5V, GND).

- **Motor Phase Lines:** Connect MA, MB, MC terminals to the corresponding phase wires of your three-phase BLDC motor.
- **Power Supply:** Connect DC 6-60V power to VCC (+) and GND (-) terminals.
- **Hall Sensor:** Connect the motor's Hall sensor wires to the dedicated 5-pin connector: GND, Hc, Hb, Ha, +5V.
- **PWM Signal Input (P):** For external PWM speed control.
- **Ground for External Signal (G):** Connect to the ground of your external control signal.
- **Speed Pulse Output (S):** Reserved interface for tachometer or speed feedback.

3.2 Hall Motor Connection

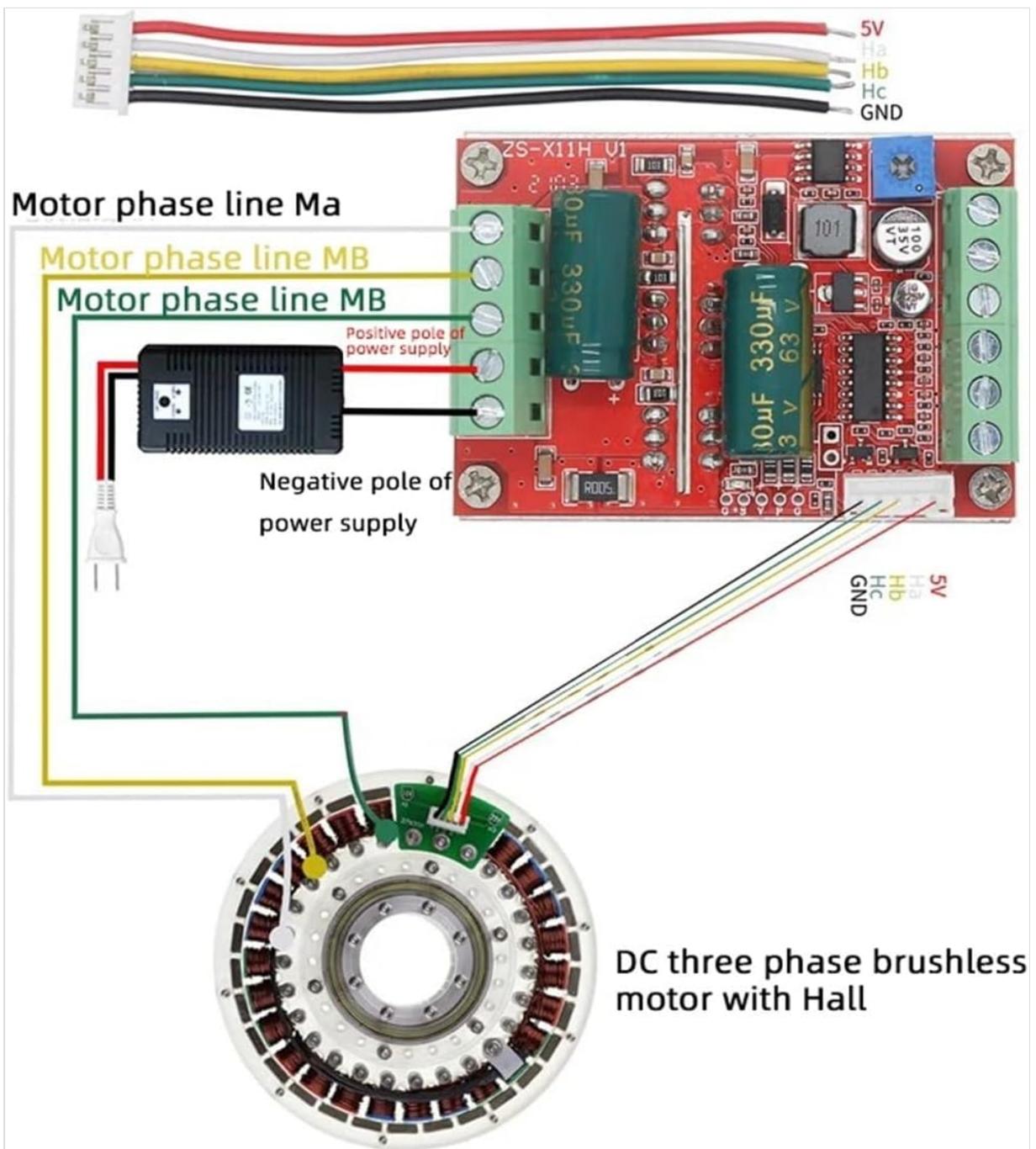


Figure 4: Illustrates connecting the motor phase lines (MA, MB, MC) and the Hall sensor wires (GND, Hc, Hb, Ha, +5V) from the controller to a DC three-phase brushless motor with Hall sensors.

3.3 External Signal Speed Control Wiring

External signal speed control wiring diagram

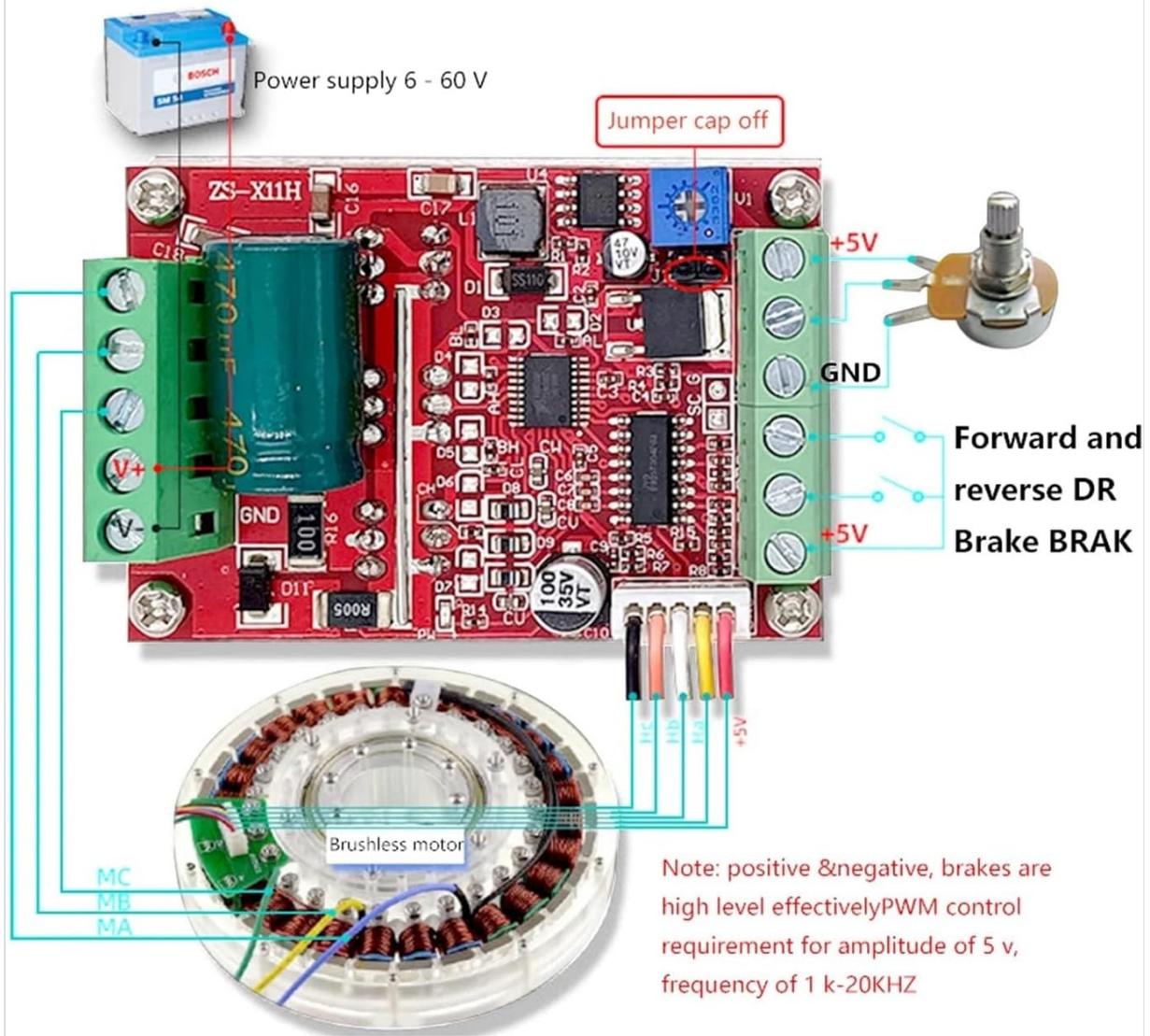


Figure 5: Shows wiring for external speed control using a potentiometer or PWM signal. Note the jumper cap position for selecting between onboard potentiometer and external control. Positive and negative brakes are high-level effective PWM control, requiring an amplitude of 5V and frequency of 1-20KHz.

- **PWM Input:** Connect your external PWM signal to the 'P' terminal and its ground to 'G'. The amplitude should be 5V, and frequency 1-20KHz for effective control.
- **External Potentiometer:** Connect the potentiometer as shown in Figure 5. The potentiometer should be adjusted to its minimum position (fully counter-clockwise) when using external PWM input.
- **Jumper Cap:** The jumper cap on the board allows selection between using the onboard potentiometer for speed control or an external PWM/voltage control. Remove the jumper cap for external control.

3.4 Hall Driven Plate Function Overview

Hall driven plate function is introduced

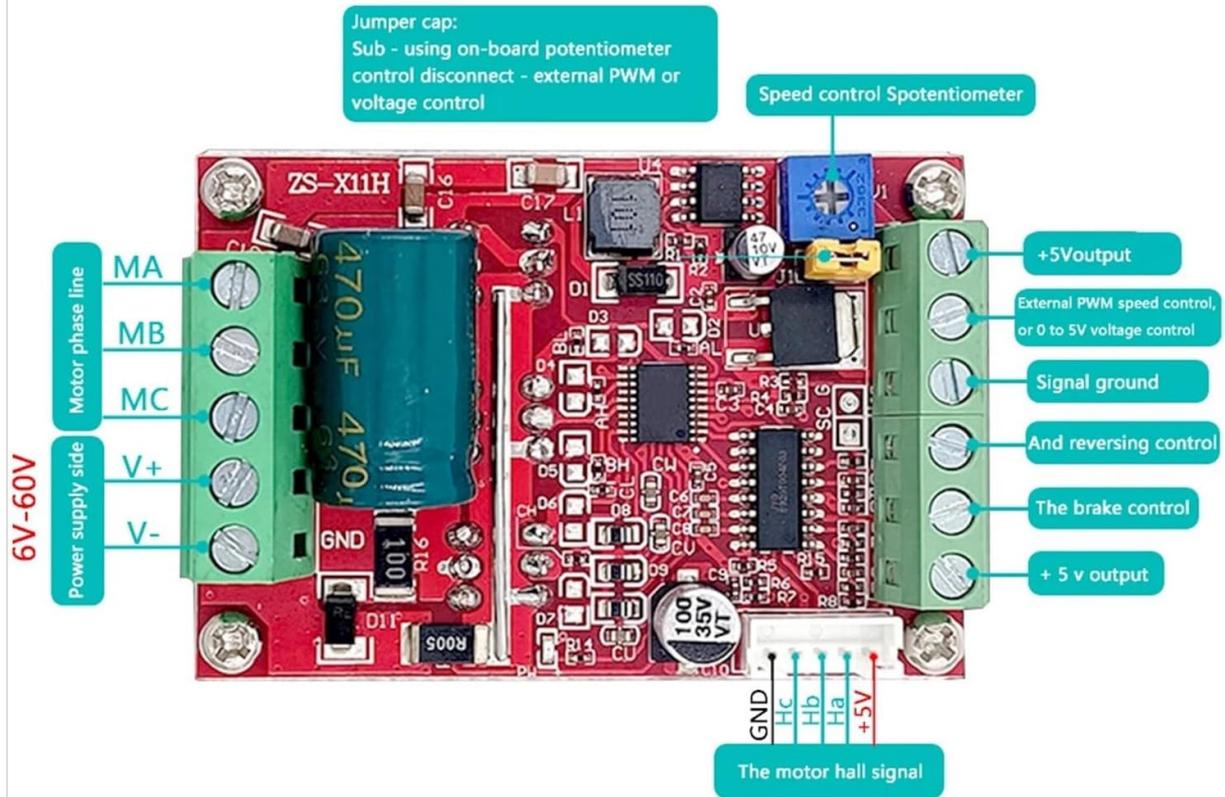


Figure 6: Overview of the Hall driven plate functions, including connections for power supply, motor phases, Hall signals, 5V output, external PWM/voltage control, signal ground, reversing control, and brake control.

4. OPERATION

4.1 Speed Control

- **Onboard Potentiometer:** If the jumper cap is in place, use the blue speed regulating potentiometer on the board to adjust motor speed. Turn clockwise to increase speed, counter-clockwise to decrease.
- **External PWM/Analog Control:** If the jumper cap is removed, connect an external PWM signal (5V amplitude, 1-20KHz frequency) or a 0-5V analog voltage to the 'P' terminal for speed control. Ensure the onboard potentiometer is set to its minimum position when using external control.

4.2 Direction Control

The controller supports forward and reverse operation. Connect a switch or control signal to the 'DR' terminal for direction control. Typically, a high or low signal will determine the direction.

4.3 Brake Function

The brake function is supported. Connect a control signal to the 'BRAK' terminal. A high-level signal (2.5V-5V) activates the brake, providing strong braking force.

5. MAINTENANCE

- **Cleaning:** Keep the module clean and free from dust and debris. Use a soft, dry cloth for cleaning. Avoid liquids.
- **Inspection:** Periodically inspect all wiring connections for looseness or damage. Ensure proper ventilation around the module to prevent overheating.
- **Storage:** Store the module in a dry, cool environment when not in use.

6. TROUBLESHOOTING

- **Motor Not Spinning:** Check power supply connections, motor phase connections, and Hall sensor wiring. Verify that the speed control input (PWM or potentiometer) is active and correctly configured.
- **Erratic Motor Behavior:** Ensure Hall sensor wires are correctly connected and not swapped. Check for stable power supply. Verify PWM signal quality if using external control.
- **Overheating:** Ensure the module is not overloaded beyond its 400W/15A capacity. Provide adequate ventilation.
- **No Speed Control:** If using external PWM, ensure the jumper cap is removed and the onboard potentiometer is at its minimum. Check the external PWM signal amplitude (5V) and frequency (1-20KHz).

7. WARRANTY AND SUPPORT

For warranty information, technical support, or service inquiries, please contact the manufacturer or your point of purchase. Keep your purchase receipt for warranty claims.