CNCTOPBAOS 4AXISTB660

CNCTOPBAOS 4-Axis Nema23 Stepper Motor USB Mach3 CNC Kit Instruction Manual

Model: 4AXISTB660

1. Introduction

This instruction manual provides essential information for the setup, operation, and maintenance of your CNCTOPBAOS 4-Axis Nema23 Stepper Motor USB Mach3 CNC Kit. This kit is designed for use with CNC router, milling, and engraving machines, offering precise motion control for various applications. Please read this manual thoroughly before installation and operation to ensure safe and efficient use of the product.

2. Package Contents

Verify that all components listed below are present in your package:

- 4 × 23HS8430 Nema23 Stepper Motors (76mm, 270oz-in, 3A)
- 4 × TB6600 Stepper Motor Drivers
- 1 × 4-Axis USB Mach3 Control Board
- 1 × USB Cable
- 1 × 350W 24V DC Switching Power Supply
- 1 × CD Disc (containing Mach3 software and documentation)

Image: Overview of the CNCTOPBAOS 4-Axis Nema23 Stepper Motor USB Mach3 CNC Kit components.

3. Specifications

3.1. 23HS8430 Nema23 Stepper Motor

- **Model:** 23HS8430
- **Holding Torque:** 270oz-in (180N.cm)
- **Motor Size:** 57x57x76mm
- **Phase:** 2 phase
- **Step Angle:** 1.8°
- **Type:** Hybrid
- **Shaft:** Dia 8mm Single shaft
- **Wiring:** A+ : Red; A- : Green; B+ : Yellow; B- : Blue

Model	23HS8430
Phase	2 Phase
Step angle	1.8° ±5%
Motor length	76mm
Voltage	4.8V
Rated current	3A / Phase
Resistance	1.6Ω ±10% / Phase
Inductance	6.8mH ±20% / Phase
Holding torque	180N.cm / Min
Detent torque	6N.cm Max
Rotor inertia	440g.cm²
Insulation class	B
Leads cable	4 wires
Lead style	AWG22 UL1007
Motor weight	1050g

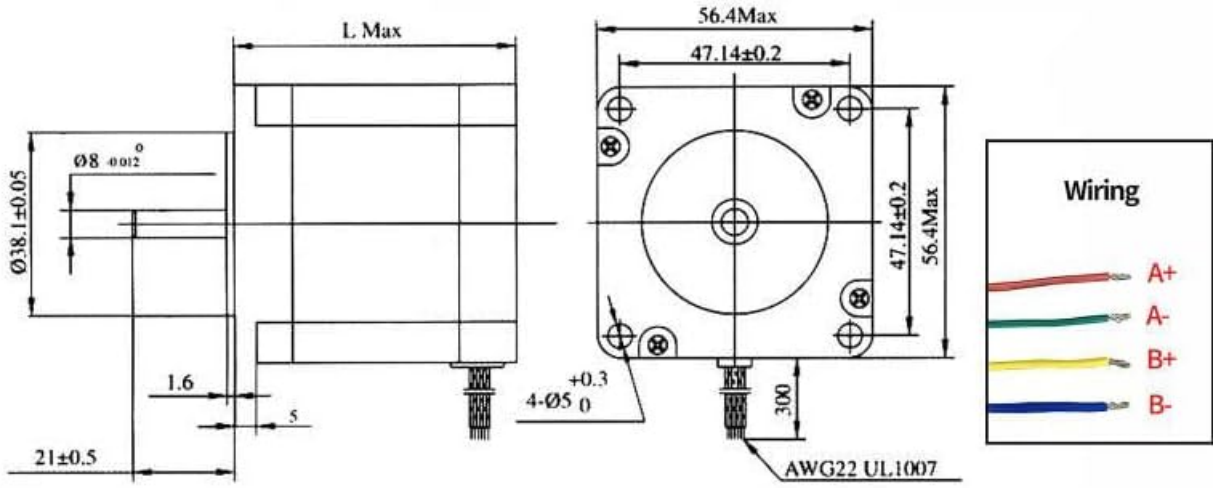
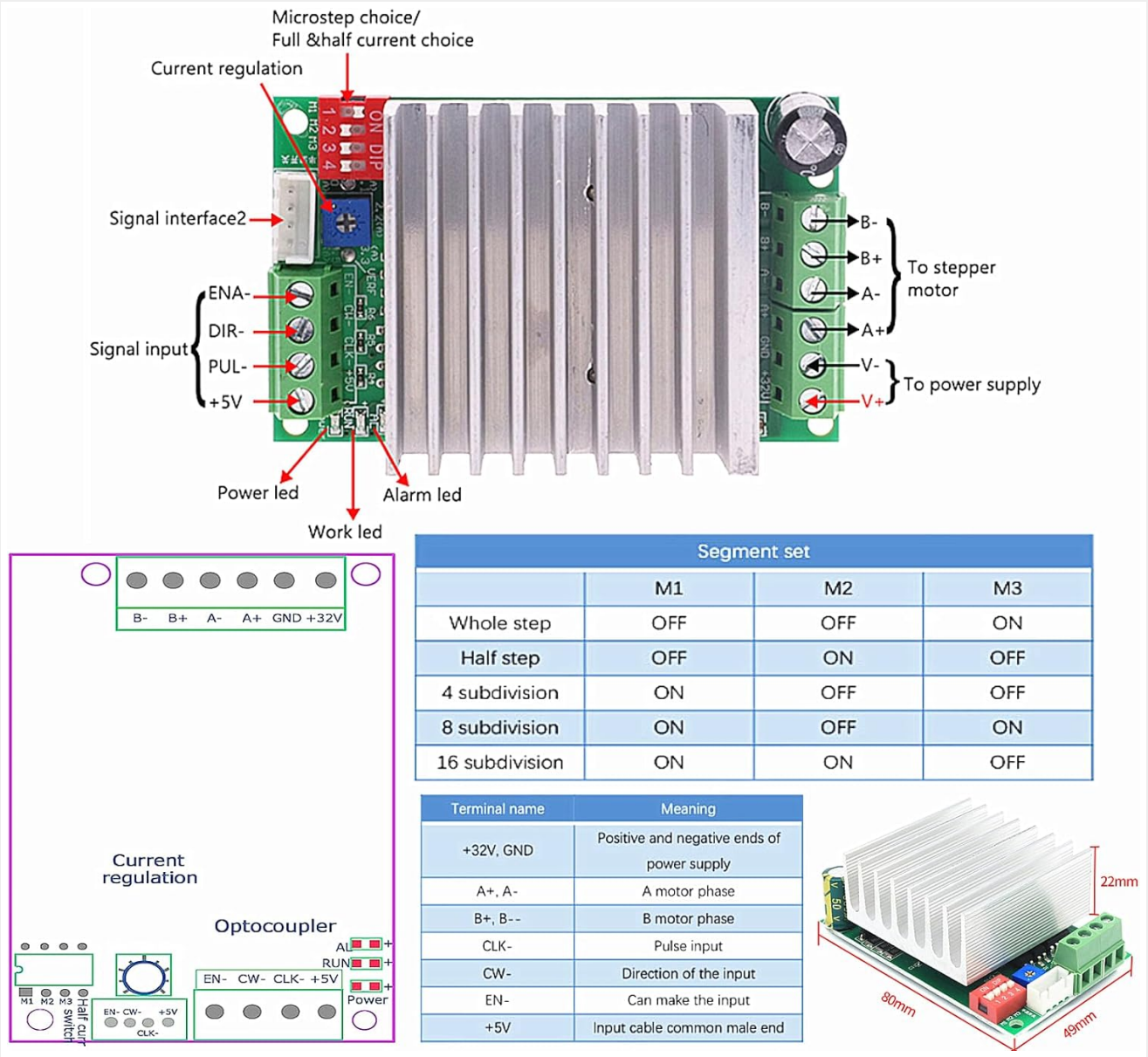


Image: Detailed specifications, dimensions, and wiring for the 23HS8430 Nema23 Stepper Motor.

Image: Internal construction details of the Nema23 Stepper Motor, highlighting copper coils and bearings.

3.2. TB6600 Stepper Motor Driver

- **Voltage:** DC 10V-45V
- **Current:** Rated maximum output ±4.5A
- **Subdivision:** Full step, half step, 1/4 step, 1/8 step, 1/16 step (maximum 16 subdivisions)



Segment set			
	M1	M2	M3
Whole step	OFF	OFF	ON
Half step	OFF	ON	OFF
4 subdivision	ON	OFF	OFF
8 subdivision	ON	OFF	ON
16 subdivision	ON	ON	OFF

Terminal name	Meaning
+32V, GND	Positive and negative ends of power supply
A+, A-	A motor phase
B+, B-	B motor phase
CLK-	Pulse input
CW-	Direction of the input
EN-	Can make the input
+5V	Input cable common male end

Image: TB6600 Stepper Motor Driver showing input/output terminals and DIP switch settings for current and microstep selection.

Image: Table detailing the segment set (microstep) configurations for the TB6600 driver.

3.3. 4-Axis USB Mach3 Motion Control Board

- **USB Compatibility:** Applicable to any PC compatible computer with a USB interface (netbook, notebook, desktop, tablet).
- **Driver Requirement:** No specific drivers required; functions as long as Mach3 software runs.

- **Supported Operating Systems:** Windows 2000/XP/Windows 7/8/10.
- **Control Axes:** Supports up to 4-axis linkage control (X, Y, Z, A axis).
- **Max Step-Pulse Frequency:** 100KHz.
- **Features:** Support for probe tool, E-stop input, limit switches, electronic handwheel, and spindle control (PWM and relay mode).
- **Inverter Interface:** Isolated (AVI+, AVI-) for strong anti-interference capability.
- **PWM Support:** Yes.

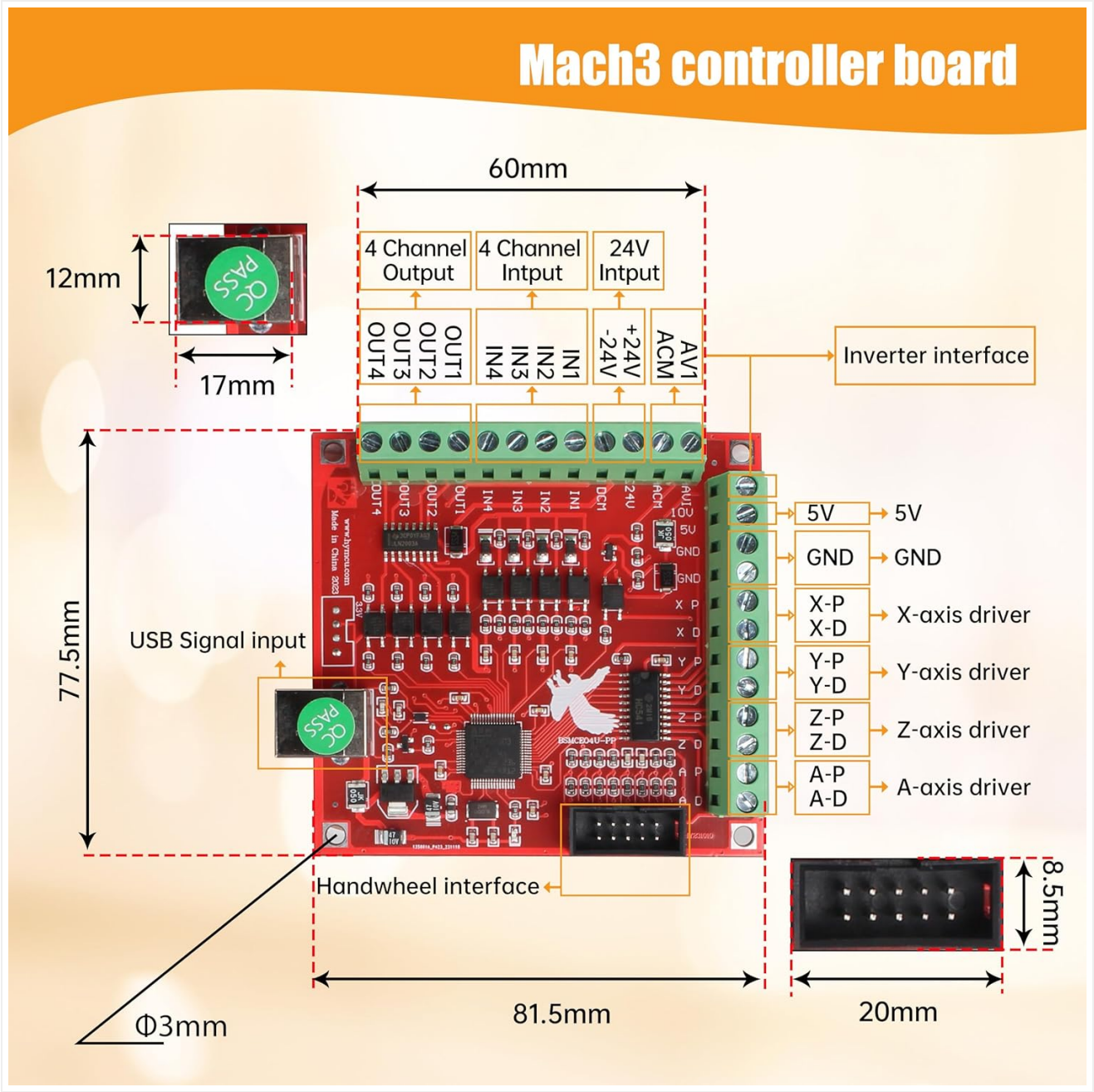


Image: Dimensional drawing and interface labeling for the 4-Axis USB Mach3 Motion Control Board.

3.4. 350W 24V DC Switching Power Supply

- **AC Input Voltage Range:** 110V-120V AC or 220V-240V AC (selectable via switch).
- **DC Output:** 24V, 14.6A

Image: Terminals and voltage selection switch on the 350W 24V DC Switching Power Supply.

Image: Dimensional drawings of the 350W 24V DC Switching Power Supply.

4. Safety Information

Adherence to safety guidelines is paramount when working with CNC machinery. Failure to follow these instructions may result in injury or damage to equipment.

- **Emergency Stop:** Always install and test an emergency stop (E-stop) switch. Ensure it is easily accessible and fully functional before operating any machinery.
- **Limit Switches:** Install limit switches on all axes to prevent over-travel and potential damage to the machine or workpiece.
- **Power Supply:** Ensure the power supply's input voltage switch is correctly set to your local AC voltage (110V-120V or 220V-240V) before connecting to mains power. Incorrect voltage selection can cause severe damage.
- **Electronic Handwheel:** If using an electronic handwheel, verify that its output signal is 5V. Higher voltage outputs can damage the handwheel interface on the control board.
- **Wiring:** Double-check all wiring connections before applying power. Incorrect wiring can lead to component failure or electrical hazards.
- **Work Area:** Maintain a clean and organized work area. Keep hands, loose clothing, and long hair away from moving parts.
- **Personal Protective Equipment (PPE):** Always wear appropriate PPE, such as safety glasses, when operating CNC equipment.

5. Setup and Installation

This section outlines the general steps for setting up your CNC kit. Refer to the detailed wiring diagrams for specific connections.

1. **Mount Stepper Motors:** Securely mount the Nema23 stepper motors to your CNC machine's axes (X, Y, Z, A).
2. **Mount Motor Drivers:** Install the TB6600 stepper motor drivers in a location that allows for adequate cooling and easy access for wiring.
3. **Connect Motors to Drivers:** Connect each stepper motor to its corresponding TB6600 driver. Pay close attention to the wiring color codes (A+, A-, B+, B-).
4. **Connect Drivers to Control Board:** Connect the pulse (PUL), direction (DIR), and enable (ENA) signals from each TB6600 driver to the appropriate pins on the 4-Axis USB Mach3 Control Board.
5. **Connect Power Supply:**
    - Set the input voltage switch on the 350W 24V DC power supply to match your local AC voltage (110V or 220V).
    - Connect the AC input to the power supply.
    - Connect the 24V DC output from the power supply to the TB6600 drivers and the Mach3 control board as indicated in the wiring diagrams.
6. **Connect USB Cable:** Connect the USB cable from the Mach3 control board to your computer.
7. **Install Mach3 Software:** Install the Mach3 software from the provided CD or download the latest version from the official Mach3 website.
8. **Configure Mach3:** Configure the Mach3 software according to your machine's specifications and the control board's pin assignments. This includes motor tuning, input/output settings for limit switches, E-stop, and spindle control.

6. Wiring Diagrams

The following diagrams illustrate the connections between the various components of the CNC kit. Ensure all connections are secure and correctly matched.

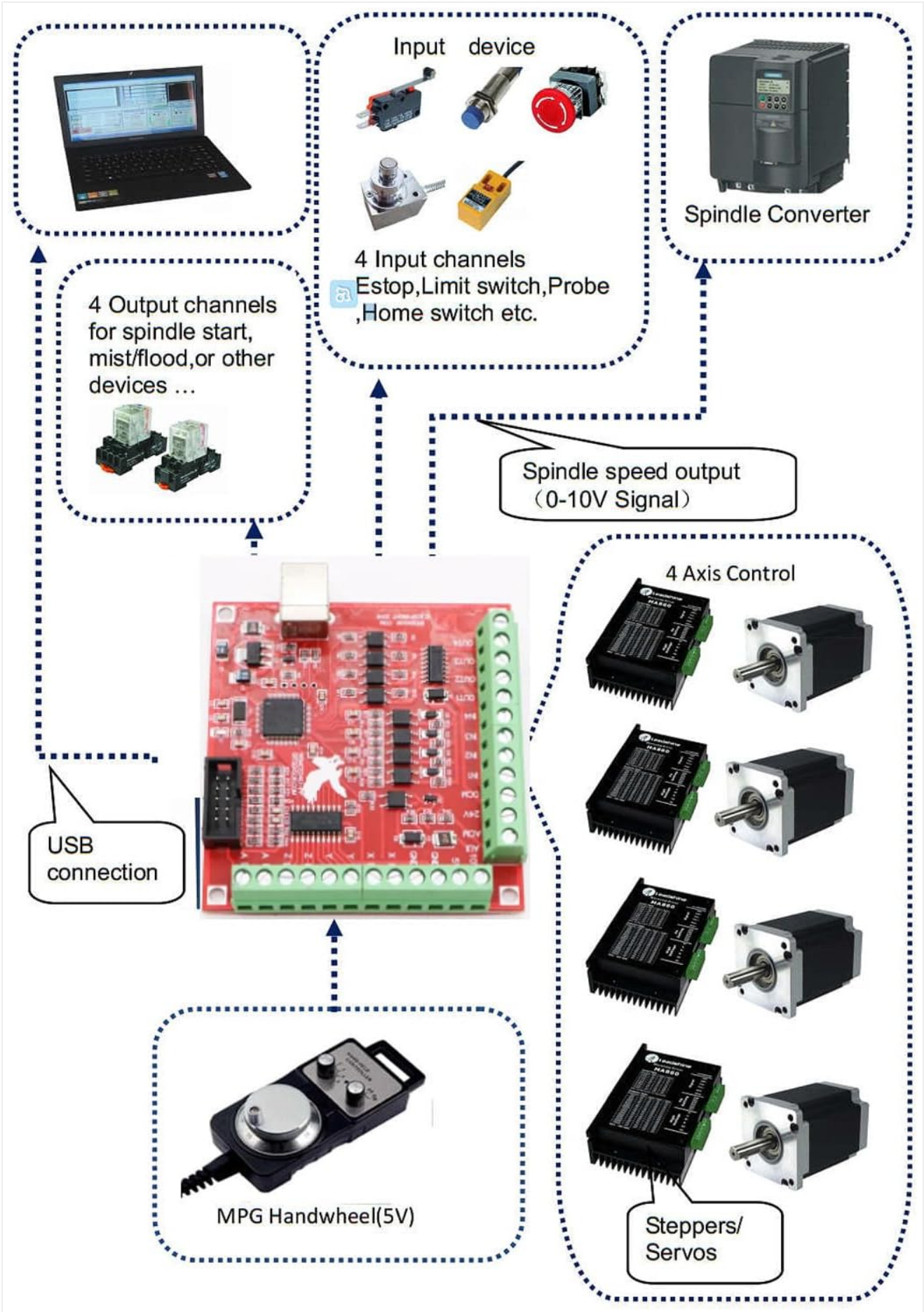


Image: Comprehensive system wiring diagram showing connections between the computer, Mach3 control board, stepper drivers, motors, power supply, and optional peripherals like spindle converter and handwheel.

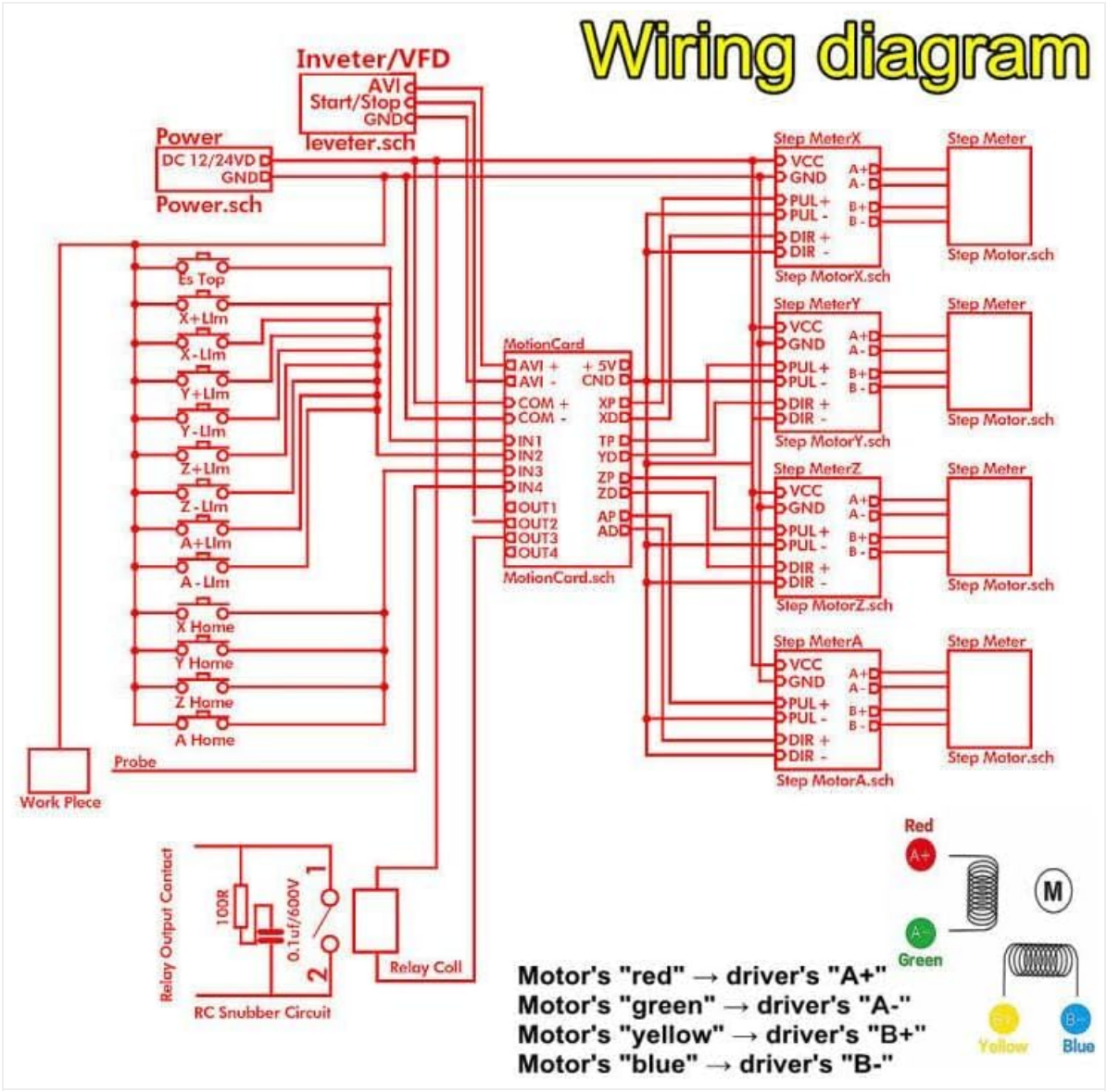


Image: Detailed wiring schematic focusing on the Mach3 control board, stepper drivers, and stepper motors, including motor phase connections (Red A+, Green A-, Yellow B+, Blue B-).

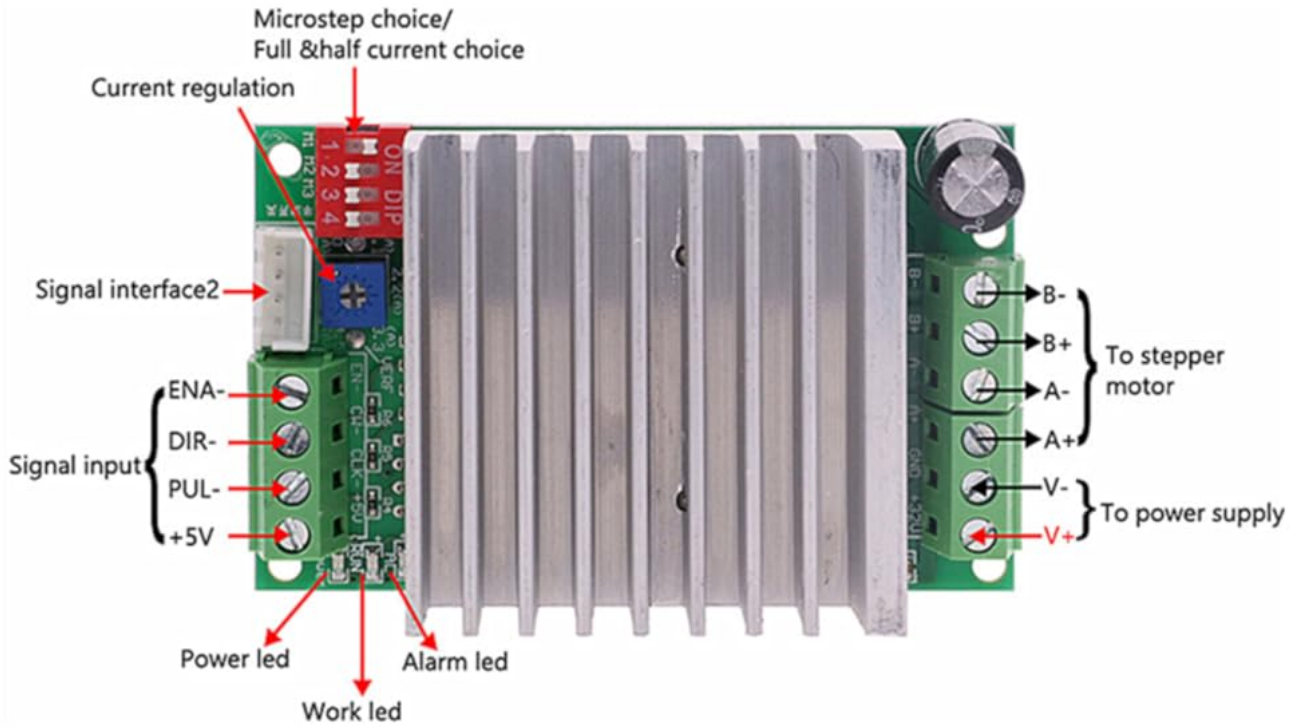


Image: Wiring instructions for the Mach3 control board, detailing input and output channels, USB signal input, and handwheel interface.

7. Operating Instructions

Once the hardware is correctly installed and Mach3 software is configured, you can begin operating your CNC machine.

1. **Power On:** Turn on the 24V DC power supply. The indicator lights on the drivers and control board should illuminate.
2. **Launch Mach3:** Open the Mach3 software on your computer.
3. **Home Machine:** Perform a homing sequence to establish the machine's absolute zero position. This is crucial for accurate machining.
4. **Load G-Code:** Load your desired G-code file into Mach3.
5. **Set Workpiece Zero:** Manually or automatically set the workpiece zero point (X, Y, Z) using the probe tool or jogging controls.
6. **Start Job:** Initiate the machining process. Monitor the machine closely during operation.
7. **Emergency Stop:** Be prepared to press the E-stop button immediately if any unexpected behavior occurs.

For detailed operation of Mach3 software, refer to the Mach3 user manual provided on the CD or available online. The control board supports various functions such as electronic handwheel input and spindle control, which can be configured within Mach3.

8. Maintenance

Regular maintenance ensures the longevity and optimal performance of your CNC kit.

- **Keep Clean:** Regularly clean dust and debris from the stepper motors, drivers, and control board. Dust accumulation can lead to overheating.
- **Check Connections:** Periodically inspect all wiring connections for looseness or damage. Tighten any loose terminals.
- **Cooling:** Ensure adequate airflow around the stepper motor drivers and power supply to prevent overheating. The power supply features a double ball cooling fan for heat dissipation.
- **Software Updates:** Keep your Mach3 software updated to the latest stable version.

- **Motor Shafts:** Ensure motor shafts are free from obstructions and rotate smoothly.

9. Troubleshooting

This section addresses common issues you might encounter. For more complex problems, consult online resources or contact technical support.

Problem	Possible Cause	Solution
Motors not moving or erratic movement	◦ Incorrect wiring (motor phases, PUL/DIR signals). ◦ Insufficient power supply voltage or current. ◦ Incorrect Mach3 configuration (motor tuning, pin assignments). ◦ Driver microstep/current settings incorrect.	◦ Verify all motor and signal wiring against diagrams. ◦ Check power supply output and ensure it meets driver requirements. ◦ Review Mach3 motor tuning and I/O settings. ◦ Adjust DIP switches on TB6600 drivers for appropriate current and microstep.
Mach3 software not detecting control board	◦ USB cable issue. ◦ Mach3 plugin not installed or enabled. ◦ Operating system compatibility issue.	◦ Try a different USB cable or port. ◦ Ensure the correct Mach3 plugin for the USB control board is installed and active. ◦ Verify your Windows OS version is supported (Windows 2000/XP/7/8/10).
Motors overheating	◦ Driver current set too high. ◦ Insufficient cooling for motors or drivers. ◦ Mechanical binding on axes.	◦ Reduce the current setting on the TB6600 drivers. ◦ Ensure proper ventilation and consider adding heatsinks or fans if necessary. ◦ Check for smooth movement of mechanical components.

10. Warranty and Support

For warranty information or technical assistance, please contact CNCTOPBAOS customer support through their official channels or visit their brand store:
CNCTOPBAOS Amazon Store
When contacting support, please have your product model number (4AXISTB660) and a detailed description of your issue ready.