CNCTOPBAOS D-FDK-R

CNCTOPBAOS 4-Axis USB Mach3 Motion Control Card (Model D-FDK-R) User Manual

Comprehensive Instructions for Setup, Operation, and Maintenance

1. Introduction

This manual provides detailed instructions for the installation, operation, and maintenance of the CNCTOPBAOS 4-Axis USB Mach3 Motion Control Card, Model D-FDK-R. This control card is designed to interface with Mach3 software, enabling precise control over CNC routers, milling machines, engraving machines, and other automation devices.
The control card supports 4-axis linkage, features a maximum step-pulse frequency of 100KHz, and is compatible with Windows XP/7/8/10 operating systems. It offers versatile input and output signal ports for various peripheral connections.

2. Safety Information

Please read and understand all safety warnings and instructions before using this product to prevent injury or damage to equipment.

- It is highly recommended that limit switches and an emergency stop switch are installed and fully functional before operating any connected machinery.
- The electronic handwheel output signal must be 5V. Output signals exceeding 5V will damage the handwheel interface.
- The analog output interface can be configured for either 0-10V or 0-5V signals. Ensure correct configuration for your specific application.
- The USB interface is compatible with various PC types, including netbooks, notebooks, desktops, and tablets.
- This control board does not require specific driver installations; it functions once Mach3 software is operational.
- The control card supports frequency converters and PWM (Pulse Width Modulation).

3. Product Overview

The CNCTOPBAOS 4-Axis USB Mach3 Motion Control Card is a robust solution for CNC control, offering comprehensive features for various applications.

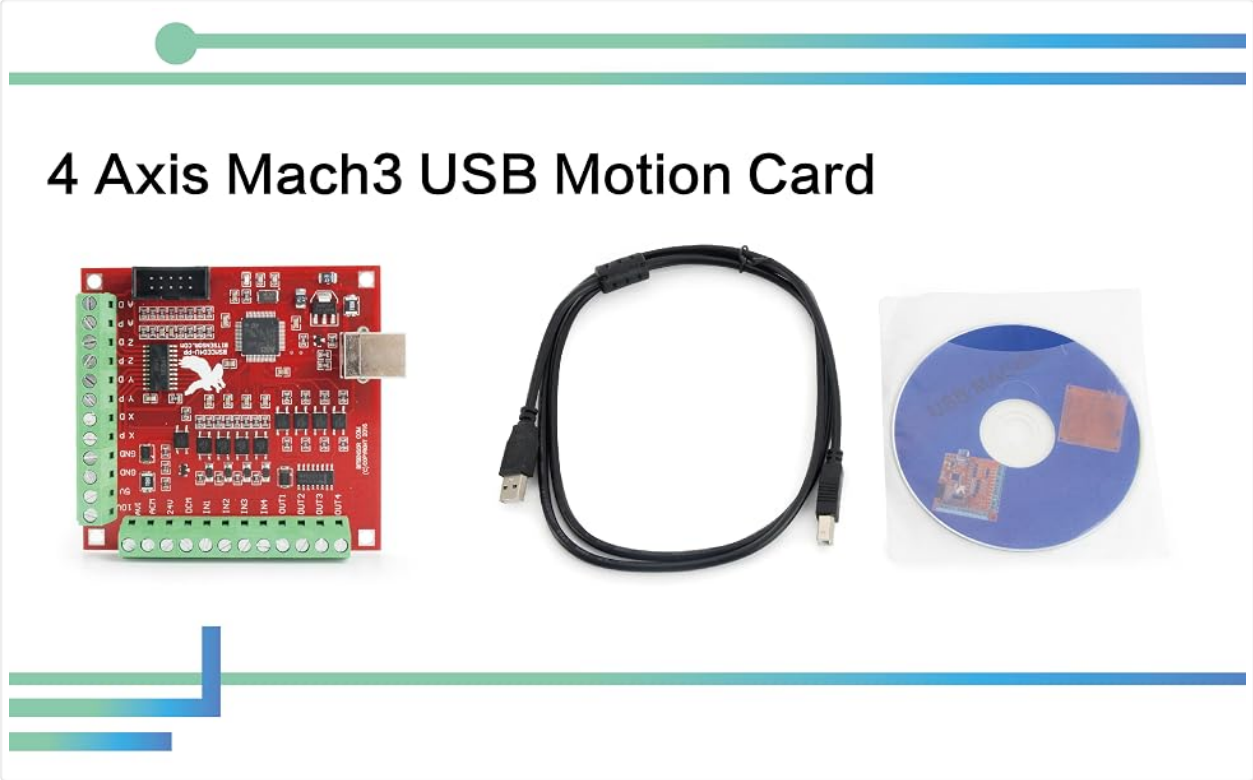

Figure 3.1: The CNCTOPBAOS 4-Axis USB Mach3 Motion Control Card, including the USB connection cable and a software CD.

Key Features:

- **4-Axis Linkage:** Supports simultaneous control of four axes, allowing connection to four stepper motor drives or servo drives.
- **High Pulse Frequency:** Maximum step-pulse frequency of 100KHz, suitable for high-performance servo or stepping motors.
- **USB Interface:** Connects to any PC compatible computer with a USB port (Windows XP/7/8/10).
- **Output Signal Ports:** Includes a 0-10V analog output for spindle motor speed control via Mach3. Features four general-purpose isolated relay drive output interfaces for controlling spindle start/stop, forward/reverse rotation, pumps, and other devices.
- **Input Signal Ports:** Four general-purpose inputs for connecting limit switches, E-stop switches, probes, and home switches.
- **Electronic Handwheel Support:** Dedicated interface for connecting an electronic handwheel.
- **Status LED:** An onboard LED indicates the connection status of the control card.

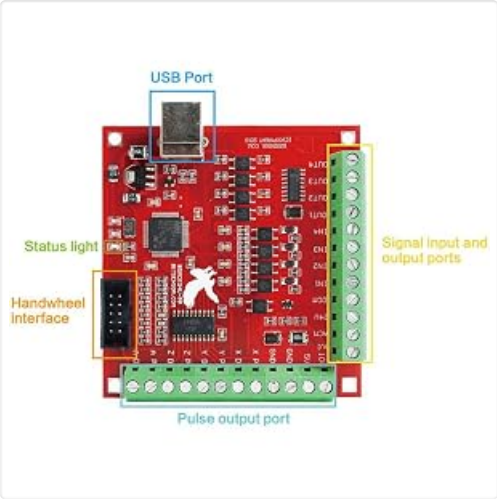

Figure 3.2: Key components and interfaces of the control card.

4. Setup and Installation

Follow these steps to properly set up and install your CNCTOPBAOS 4-Axis USB Mach3 Motion Control Card.

4.1. Power Supply Requirements

- An external 24V DC power supply is required to isolate the USB and external ports, ensuring system stability.
- Connect the 24V DC power supply to the designated terminals on the control card.

4.2. USB Connection

- Connect the control card to your computer using the provided USB cable.
- The control card does not require specific drivers; it should be recognized by your operating system once Mach3 is running.

4.3. Wiring Instructions

Refer to the wiring diagram below for connecting your stepper motor drivers, servo drives, limit switches, E-stop, probe, and other peripherals.

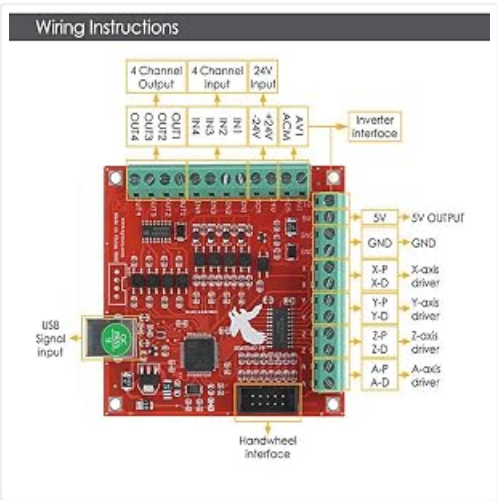

Figure 4.1: Detailed wiring diagram for the control card.

- **Axis Drivers (X, Y, Z, A):** Connect your stepper or servo motor drivers to the corresponding X-P/X-D, Y-P/Y-D, Z-P/Z-D, and A-P/A-D terminals for pulse and direction signals.
- **Input Signals (IN1-IN4):** Connect limit switches, E-stop buttons, probes, and home switches to these general-purpose input terminals.
- **Output Signals (OUT1-OUT4):** These isolated relay drive outputs can control external devices such as spindle relays, coolant pumps, or other auxiliary functions.
- **Spindle Control (AVI, ACM):** Use the AVI (Analog Voltage Input) and ACM (Analog Common) terminals for 0-10V or 0-5V analog spindle speed control, typically connected to an inverter.
- **Handwheel Interface:** Connect your electronic handwheel to the dedicated 2x5P row needle interface. Ensure the handwheel output is 5V.

5. Operating Instructions

Once the control card is physically installed and wired, configure and operate it using Mach3 software.

5.1. Mach3 Software Configuration

- Launch Mach3 software on your computer.
- Navigate to the **Config** menu and select **Ports and Pins**.
- Configure the motor outputs, input signals (limit switches, E-stop), and output signals (relays) according to your wiring and desired functionality.
- Set up the spindle control for 0-10V or 0-5V analog output as per your inverter's requirements.

5.2. Spindle Speed Control

The control card provides a 0-10V analog output for spindle speed control. This signal is typically connected to a VFD (Variable Frequency Drive) or inverter that controls the spindle motor.

- In Mach3, configure the spindle settings under **Config > Spindle Pulleys** and **Motor Control**.
- The analog output voltage will vary proportionally with the commanded spindle speed in Mach3.

5.3. Using the Electronic Handwheel

Connect a compatible 5V electronic handwheel to the designated interface for manual control of machine axes.

- Ensure the handwheel is properly connected and configured in Mach3's **Config > Ports and Pins > Encoder/MPG's** settings.
- Use the handwheel for precise manual jogging and positioning of your CNC machine.

6. Maintenance

The CNCTOPBAOS 4-Axis USB Mach3 Motion Control Card is designed for durability and requires minimal maintenance. However, adhering to these guidelines can prolong its lifespan and ensure reliable operation:

- **Keep Clean:** Regularly inspect the board for dust and debris. Use compressed air or a soft brush to gently clean the surface.
- **Environmental Conditions:** Operate the card within its specified operating temperature range (20 Degrees Celsius) and avoid excessive humidity.

- **Cable Connections:** Periodically check all wiring connections to ensure they are secure and free from corrosion or damage. Loose connections can lead to intermittent operation or system errors.
- **Power Supply:** Ensure the 24V DC power supply is stable and within the specified voltage range. Fluctuations can affect performance.

7. Troubleshooting

If you encounter issues with your control card, consider the following troubleshooting steps:

- **No Connection Indication:** If the status LED on the board is not lit or Mach3 does not detect the card, check the USB cable connection to both the computer and the control card. Ensure the external 24V DC power supply is connected and providing power.
- **Axis Movement Issues:** Verify that stepper/servo motor drivers are correctly wired to the control card and have their own power supply. Check Mach3's **Ports and Pins** configuration for correct step and direction pin assignments and pulse settings.
- **Spindle Control Malfunction:** Ensure the 0-10V analog output is correctly wired to your inverter. Check Mach3's spindle configuration settings. Verify the inverter's input settings match the control card's output (0-10V or 0-5V).
- **Input Signal Problems (Limit Switches, E-Stop):** Confirm that all input devices are correctly wired to the IN1-IN4 terminals. Check Mach3's **Ports and Pins > Input Signals** for proper configuration and active low/high settings.
- **Electronic Handwheel Not Responding:** Ensure the handwheel is connected to the correct interface and its output is 5V. Verify Mach3's **Encoder/MPG's** settings.
- **System Instability:** Ensure the external 24V DC power supply is used to isolate the USB port. Check for proper grounding of all components.

For persistent issues, consult the Mach3 software documentation or seek assistance from a qualified technician.

8. Specifications

Detailed technical specifications for the CNCTOPBAOS 4-Axis USB Mach3 Motion Control Card (Model D-FDK-R).

Dimensional Drawings

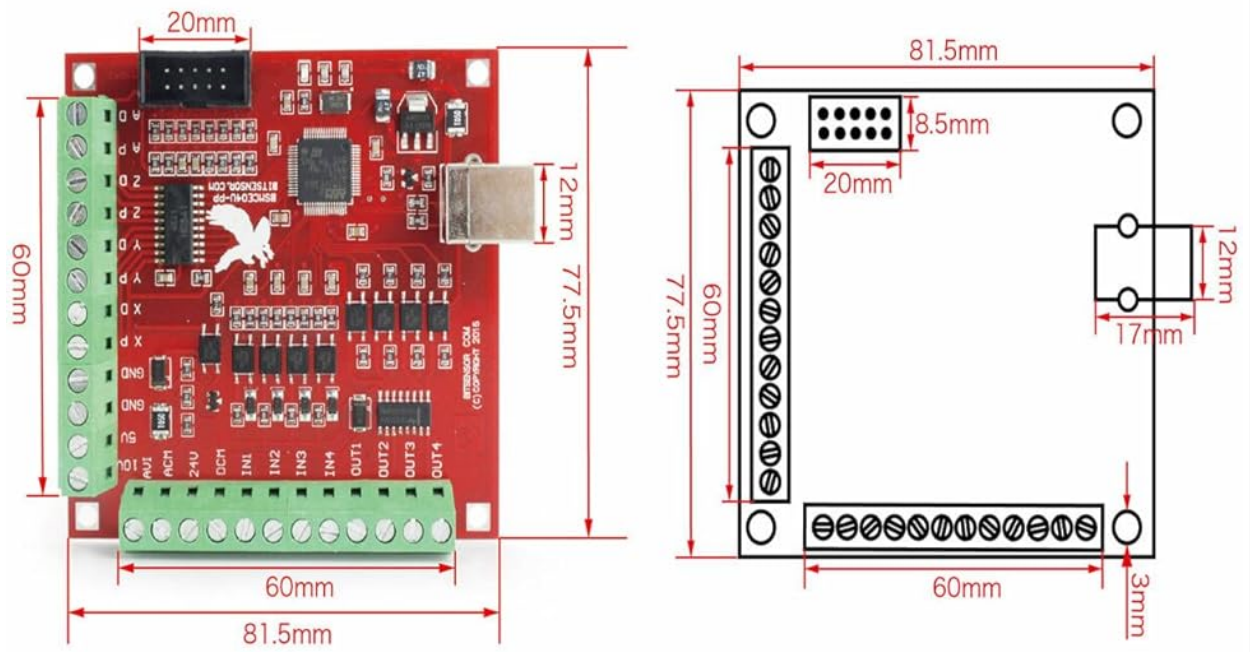

Figure 8.1: Dimensional drawings of the control card.

Feature	Specification
Model Number	D-FDK-R
Brand	CNCTOPBAOS
Axis Support	4-Axis Linkage
Max Step-Pulse Frequency	100KHz
USB Interface Compatibility	Windows XP/7/8/10
Input Signal Ports	4 general-purpose inputs (e.g., limit switch, E-stop, probe)
Output Signal Ports	4 general-purpose isolated relay drive outputs
Analog Output	0-10V (configurable to 0-5V)
Handwheel Interface	2x5P row needle (5V output required)
External Power Supply	24V DC (for isolation and stability)
Display Type	LED (Status Indicator)
Operating Temperature	20 Degrees Celsius
Material	Copper
Item Weight	7.4 ounces (0.21 Kilograms)
Package Dimensions	7.99 x 5.94 x 3.23 inches
Included Components	Board & Cable

9. Warranty and Support

For warranty information and technical support, please refer to the documentation provided with your purchase or contact CNCTOPBAOS customer service through their official channels. Keep your purchase receipt as proof of purchase for any warranty claims.