User Manual: NexBot Robotics MD132-001 Multi-Axis Servo Drive 400V

SKU: NXB-SRV-MD132-001 | Version: 1.0 | Brand: NexBot Robotics

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1. Safety Information

READ ALL SAFETY INSTRUCTIONS BEFORE OPERATION. Failure to follow safety procedures may result in serious injury or equipment damage.

DANGER: Hazardous voltage is present at the power terminals. Contact can cause severe injury or death. Always disconnect and lock out power before servicing.

WARNING: The internal DC bus capacitors remain charged for several minutes after power is removed. Wait at least 5 minutes before touching terminals or internal components.

WARNING: Incorrect motor parameter settings can cause sudden, high-speed movements. Ensure the mechanical system is secured before enabling the drive for the first time.

CAUTION: The Anodized Aluminum heat sink can reach high temperatures during operation. Avoid direct contact to prevent skin burns.

NOTICE: The MD132-001 is an IP20 rated device and must be installed within a protective enclosure (e.g., NEMA 1 or higher) to prevent damage from dust and debris.

2. Product Overview

The NexBot Robotics MD132-001 is a compact, high-performance multi-axis servo drive designed to provide precise, synchronized control for up to two servo motors in complex industrial robotics systems. This dual-axis drive consolidates the functionality of two independent drives into a single, space-saving unit, significantly reducing cabinet footprint, wiring complexity, and overall system cost. Engineered for dynamic performance, the MD132-001 servo drive supports a wide range of NexBot Robotics servo motors. Its core architecture is built around a powerful digital signal processor (DSP) that executes complex motion profiles with high fidelity. The drive features high-resolution feedback interfaces compatible with 24-bit absolute encoders, ensuring exceptional positioning accuracy and repeatability for tasks requiring micro-level precision. This capability is critical for applications like intricate assembly, semiconductor handling, and precision dispensing. Communication is handled via a built-in EtherCAT interface, a real-time industrial Ethernet protocol. The high bandwidth of EtherCAT also facilitates advanced diagnostics and real-time parameter adjustments, minimizing downtime and simplifying troubleshooting. The drive operates on a standard 400VAC three-phase supply, delivering a continuous output current of up to 5A per axis, making it suitable for a variety of medium-payload robotic applications. Safety is a primary design consideration. The MD132-001 integrates Safe Torque Off (STO) functionality certified to SIL3 and PLe standards. This safety feature allows the drive to be brought to a no-torque state without removing main power, enabling faster machine restarts after a safety event. Installation is streamlined through its book-style form factor and DIN rail mounting capability. Pluggable connectors for power, motor, and I/O signals simplify initial wiring and facilitate rapid component replacement during maintenance, maximizing machine uptime. The MD132-001 servo drive is an ideal solution for OEMs and system integrators looking to build compact, responsive, and reliable robotic automation systems.

3. Getting Started

1. Software Installation

Download and install the NexBot DriveSuite software from the official NexBot Robotics support portal. This software provides an integrated environment for configuring, tuning, and diagnosing the MD132-001 servo drive.

2. Establishing Communication

Connect the drive to the EtherCAT master controller. Ensure the correct ESI (EtherCAT Slave Information) file for the NXB-SRV-MD132-001 is

installed in your master's engineering environment to enable proper device recognition and configuration.

3. Initial Configuration Wizard

Use the DriveSuite's startup wizard to guide you through the initial setup process. This includes selecting the motor model, configuring feedback devices, setting operating limits, and defining basic I/O for both axes.

4. First Motion Test

After completing the initial configuration, use the manual jog function within the software to perform a first motion test. Verify that each motor responds correctly to commands and rotates in the intended direction.

4. Operation

Control Mode Selection

The MD132-001 supports multiple control modes, including cyclic synchronous position (CSP), velocity (CSV), and torque (CST). The appropriate mode for each axis can be selected via the EtherCAT master based on the application's real-time requirements.

Servo Loop Tuning

Achieving optimal performance requires tuning the servo loops for your specific mechanics and load. Use the auto-tuning function for a stable baseline, then utilize the software's real-time trace tool to manually fine-tune the gains for faster response and minimal error.

> **Tip:** When tuning, document your baseline parameters before making changes. This allows you to easily revert if a change results in instability.

Diagnostics and Fault Handling

The drive continuously monitors its status and will report any faults or warnings. Use the diagnostic log in the DriveSuite software to view a history of events with detailed error codes, which is crucial for rapid troubleshooting.

Synchronized Motion

Leverage the dual-axis architecture to implement tightly synchronized motion profiles. Electronic gearing and camming functions can be configured to link the motion of Axis 1 and Axis 2, ideal for gantry systems, electronic line-shafting, and other coordinated tasks.

Parameter Management

All drive parameters can be saved to a file from the DriveSuite software. Regularly backing up the configuration is recommended, especially after commissioning or tuning, to facilitate quick recovery or replication on other machines.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually check the drive status indicators. A solid green light indicates normal operation.	Any red or blinking amber lights should be investigated by connecting with the diagnostic software.
Quarterly	Inspect and clean the heat sink fins and ventilation slots on the drive and in the cabinet.	Use low-pressure, dry compressed air. Ensure the system is powered down before cleaning.
Annually	Verify the tightness of all power, motor, and ground terminal connections.	This task must be performed with the main power locked out. Do not over-torque terminals.
Annually	Check the condition of control and communication cables for signs of wear, abrasion, or loose connections.	Pay close attention to cables that are subject to movement or vibration.
Annually	Create a complete backup of the drive's parameter set using the NexBot DriveSuite software.	Store the backup file in a secure, version-controlled location.
As Needed	Update drive firmware to the latest version released by NexBot Robotics.	Always read the firmware release notes to understand changes and potential impacts before updating a production system.

6. Troubleshooting

Symptom	Possible Cause	Solution
Drive does not power on (no status LEDs)	Missing 400VAC input power, tripped upstream breaker, or blown internal fuse.	Verify input voltage at terminals L1, L2, L3 with a multimeter. Check all upstream circuit breakers and fuses. If power is present, the drive may require service.
Motor hums loudly but does not turn	Incorrect motor phase wiring (U, V, W) or a seized mechanical load.	Power down the system. Swap any two of the three motor phase wires. Disconnect the motor from the load to

Symptom	Possible Cause	Solution
		confirm it can spin freely.
Drive faults with 'Following Error'	The actual motor position cannot keep up with the commanded position, often due to high load, mechanical binding, or aggressive acceleration settings.	Inspect the mechanical system for obstructions or binding. Reduce acceleration/deceleration rates in the motion profile. Increase the following error limit if the application allows.
EtherCAT communication is not established	Disconnected or faulty EtherCAT cable, incorrect ESI file in the master, or incorrect network topology.	Check the integrity and connection of all EtherCAT cables. Verify the link/activity lights on the RJ45 ports are active. Ensure the correct ESI file for the MD132-001 is loaded in the master configuration.
Motor vibrates or oscillates when stationary	Servo loop gains are set too high, causing instability.	Connect with the DriveSuite software and use the tuning interface to reduce the proportional (P) gain for the position or velocity loop until the oscillation stops.
Drive faults on 'Over-temperature'	Ambient temperature is too high, cabinet ventilation is inadequate, or the drive's heat sink is blocked.	Ensure the ambient temperature is within the specified operating range. Check that cabinet fans are working and that the required clearance around the drive is maintained.
STO (Safe Torque Off) function does not engage	Incorrect wiring to the STO terminals or a fault in the external safety circuit.	Power down the system and verify the STO wiring against the circuit diagram. Test the external safety relay or controller that is providing the STO signal.

7. Technical Specifications

Parameter	Value	Unit
Weight	2.5	kg
Material	Anodized Aluminum	
Voltage	400VAC	
IP Rating	IP20	
Country of Origin	CH	
Protocol	EtherCAT	
Dimensions	220 x 75 x 180 mm	
Torque	1 Nm	