User Manual: NexBot Drives MD132-002 Multi-Axis Servo Drive

SKU: NXB-SRV-MD132-002 | 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 up to 680VDC can be present at the DC bus terminals even after AC power is removed. Wait at least 10 minutes after disconnecting power before servicing.

WARNING: Unexpected motor movement can occur during commissioning or due to parameter changes. Ensure all personnel are clear of the machine's working area before enabling the drive.

WARNING: The drive's heat sink can reach high temperatures during operation, posing a burn risk. Do not touch the drive housing until it has had adequate time to cool.

CAUTION: This device is sensitive to electrostatic discharge (ESD). Use proper ESD protection, such as a wrist strap, when handling the drive with its covers removed or when connecting cables.

NOTICE: Do not perform high-voltage insulation (megohmmeter) tests on any wiring connected to the drive, as this may damage internal components. Disconnect all cables from the drive before testing.

2. Product Overview

The NexBot Drives MD132-002 is a high-performance, dual-axis servo drive designed to provide precise, dynamic control for multi-axis robotic systems. This drive integrates two independent drive channels into a single compact housing, significantly reducing cabinet space requirements and simplifying system wiring. Its primary use is in applications demanding synchronized, high-speed motion, such as coordinated path following, pick-and-place operations, and automated assembly. Key features include an integrated EtherCAT interface, which enables real-time communication with cycle times as low as 125 µs. This high-speed bus communication is critical for achieving the low latency and high determinism required for complex, interpolated movements in modern robotics. The MD132-002 supports a wide input voltage range up to 480VAC, making it compatible with standard industrial power systems globally. Each axis can deliver a continuous current of up to 12A, with a peak current capability of 25A to handle high acceleration and deceleration phases without compromising performance. Engineered for reliability, the drive incorporates advanced safety features, including Safe Torque Off (STO) functionality compliant with SIL 3 / PLe standards. This allows for safe machine states without removing power from the drive, enabling faster restarts. The drive's sophisticated control algorithms support advanced tuning and filtering, minimizing vibrations and improving settling times. This results in smoother motion profiles and higher overall machine throughput. Typical applications for the MD132-002 servo drive include powering the primary axes of SCARA robots, controlling wrist or auxiliary axes on larger articulated robots, or driving gantries and transfer systems. Installation is streamlined through a book-style form factor and front-facing connectors, allowing for high-density mounting within control cabinets. The drive is configured using the NexBot DriveSuite software, which provides intuitive tools for setup, tuning, and diagnostics.

3. Getting Started

1. Initial Power Up

Before the first power-up, ensure all connections are secure and the control cabinet is closed. Apply 400-480VAC 3-Phase power and observe the status LEDs. A solid green or orange light typically indicates the drive is ready and awaiting communication from the EtherCAT master.

2. Establishing EtherCAT Communication

Ensure the EtherCAT master controller is configured with the correct ESI file for the NexBot Drives MD132-002. Once the master is active, it

should automatically scan the network and establish a connection with the drive. The drive's network status LED will indicate a successful link.

3. Basic Parameter Configuration

Using the NexBot configuration software connected to your controller, load the correct motor profile for your application. At a minimum, you must configure the motor type, encoder resolution, and current limits for each axis before attempting to enable the drive.

4. Operation

Understanding Status LEDs

The front panel LEDs provide at-a-glance diagnostics. A solid green light indicates the drive is enabled and operational, while a flashing red light signifies a fault condition. Refer to the troubleshooting section for specific fault code interpretations based on the number of flashes.

> **Tip:** Keep a printed copy of the LED status codes inside the cabinet door for quick reference by maintenance staff.

Servo Tuning

The MD132-002 features an advanced auto-tuning function that simplifies initial setup for most applications. For highly dynamic or complex loads, manual tuning of the position and velocity loop gains may be required to optimize performance and minimize positioning error.

Monitoring Drive Performance

Through the EtherCAT network, the master controller can access real-time diagnostic data from the drive. Key parameters to monitor include motor current, DC bus voltage, drive temperature, and following error for each axis.

> **Tip:** Set up alarms in your HMI or controller to trigger warnings when key diagnostic values exceed their normal operating range.

Fault Reset Procedure

When a fault occurs, the drive will safely disable the motor outputs. After identifying and correcting the root cause, a fault reset can be issued via a digital input signal or an EtherCAT command from the master controller to restore normal operation.

5. Maintenance Schedule

Interval	Task	Notes
Weekly	Visually inspect the drive's status LEDs to ensure normal operation. Check for any new alarms or	This is a quick check that can be part of a standard operator pre-start checklist.

Interval	Task	Notes
	warnings on the system HMI.	
Monthly	Inspect the drive's ventilation slots and any internal cabinet fans for dust and debris buildup. Clean with compressed air if necessary.	The IP20 rating means the drive relies on the cabinet's environment. A clean cabinet is essential for long drive life.
Quarterly	With the power de-energized and locked out, check the tightness of all power (L1/L2/L3) and motor (U/V/W) terminal connections.	Vibration can cause screw terminals to loosen over time, leading to poor connections and potential failures.
Annually	Create a full backup of the drive's parameter set using the configuration software.	Store the backup file in a secure, version-controlled location. This is critical for rapid recovery after a drive replacement.
Annually	Verify the integrity of the protective earth (PE) ground connection using a multimeter to measure resistance between the drive chassis and the main cabinet ground.	A low-resistance ground path is critical for operator safety.
Every 3-5 Years	Inspect the internal cooling fan for signs of wear or failure. Replace if it is noisy or not spinning freely.	Fan lifetime is dependent on operating temperature and environmental conditions.

6. Troubleshooting

Symptom	Possible Cause	Solution
Drive does not power on, no LEDs are lit.	No 3-phase input power, incorrect voltage, or a blown external fuse/breaker.	Verify 400-480VAC is present at terminals L1, L2, L3. Check upstream circuit breakers and fuses. Ensure proper phase rotation.
Motor 'hums' but does not rotate when enabled.	One motor phase is disconnected, or the motor is mechanically seized.	Power down and check continuity of all three motor phases between the drive and motor. Attempt to rotate the motor shaft by hand (with power

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		off) to check for binding.
EtherCAT communication link cannot be established.	Defective or disconnected cable, incorrect ESI file on the master, or incorrect node address setting.	Check physical cables and connections. Ensure the EtherCAT master configuration uses the correct ESI file for the MD132-002 and that the drive's intended address is correct.
Drive faults on 'Overcurrent' during rapid acceleration.	Acceleration ramp is too aggressive for the load, or current limit parameter is set too low.	Decrease the acceleration rate in the motion controller's profile. Verify the drive's current limit parameters are appropriate for the motor and application.
Drive faults on 'Encoder Error'.	Encoder cable is damaged, disconnected, or has electrical noise interference.	Inspect the encoder cable for physical damage. Reseat the connector at both the drive and motor ends. Ensure the cable shield is properly grounded at the drive end only.
Motor is unstable, vibrates, or makes audible noise when enabled.	Incorrect servo gain tuning parameters for the connected mechanical load.	Execute the auto-tuning procedure. If the problem persists, manually adjust the position and velocity loop PID gains to stabilize the system.
Drive faults on 'Overtemperature'.	Ambient temperature in the cabinet is too high, ventilation is blocked, or the drive is overloaded.	Ensure cabinet cooling systems are functional and that air can flow freely around the drive. Verify the application is not consistently demanding current above the drive's continuous rating.

7. Technical Specifications

Parameter	Value	Unit
Weight	5.2	kg
Material	Anodized Aluminum Housing	
Voltage	400-480VAC 3-Phase	
IP Rating	IP20	
Country of Origin	CH	
Protocol	EtherCAT	
Dimensions	255 x 85 x 180 mm	
Torque	2 Nm	

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