User Manual: NexBot Drives MD132-006 Dual-Axis Servo Drive

SKU: NXB-SRV-MD132-006 | 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: HIGH VOLTAGE. Risk of electric shock, severe burns, or death. Disconnect all power and wait at least 5 minutes for DC bus capacitors to discharge before servicing the MD132-006 drive.

WARNING: UNEXPECTED MOTION. The system may start unexpectedly. Ensure all personnel are clear of the machinery before enabling the drive or applying power after a fault reset.

WARNING: A protective earth (PE) connection is mandatory. Failure to properly ground the drive chassis can create a lethal shock hazard and compromise system performance.

CAUTION: The drive's heatsink can reach high temperatures during operation. Allow the unit to cool completely before handling to avoid risk of burns.

NOTICE: This device is sensitive to electrostatic discharge (ESD). Use proper ESD handling procedures, including a grounded wrist strap, when working with internal components or exposed connectors.

2. Product Overview

The NexBot Drives MD132-006 is a compact, high-performance dual-axis servo drive engineered for demanding industrial robotics applications requiring synchronized multi-axis motion. This drive integrates control for two separate servo axes into a single housing, significantly reducing cabinet space, wiring complexity, and overall system cost compared to using two individual drives. Its primary function is to precisely regulate the current and voltage supplied to servo motors, enabling accurate control over position, velocity, and torque for robotic joints. The drive's advanced processing capabilities support complex motion profiles and path interpolation, which is critical for smooth and accurate robot movement in applications like coordinated welding, material handling, and high-speed pick-and-place operations. With a continuous current rating of 6A per axis and compatibility with a 480VAC input, the MD132-006 provides ample power for a wide range of small to medium-sized robotic arms. Engineered for reliability, the MD132-006 includes integrated safety features such as Safe Torque Off (STO) to SIL 3 / PLe standards, ensuring machinery can be brought to a safe state without powering down the entire control cabinet. The robust anodized aluminum housing provides effective heat dissipation, maintaining performance under continuous industrial use. Installation is simplified with DIN rail mounting and pluggable connectors for power, motor, and communication lines, facilitating faster commissioning and easier maintenance. This servo drive is an ideal solution for system integrators and OEMs looking to optimize the performance and footprint of their robotic systems.

3. Getting Started

1. Software Installation

Install the NexBot MotionSuite software on a Windows-based PC. This software is required for configuring, tuning, and diagnosing the MD132-006 drive. Ensure you have administrator privileges during installation.

2. Establishing EtherCAT Communication

Connect the drive to your EtherCAT master and power on the system. The master will automatically scan the network and identify the MD132-006. Load the provided ESI (EtherCAT Slave Information) file into your master's engineering environment to configure the process data objects (PDOs).

3. Initial Parameter Setup

Using NexBot MotionSuite, connect to the drive and run the initial setup wizard. You will be prompted to select the motor model, encoder type, and define basic operational limits for each axis, such as maximum velocity and acceleration.

4. Operation

Operating Modes

The MD132-006 supports several standard CiA 402 operating modes, including Cyclic Synchronous Position (CSP), Cyclic Synchronous Velocity (CSV), and Profile Torque (PT). The desired mode is selected and commanded by the EtherCAT master controller based on the application's requirements.

Drive Tuning

Proper tuning of the position, velocity, and current control loops is critical for performance. Use the Auto-Tuning feature in MotionSuite for a quick baseline, then perform fine-tuning using the software oscilloscope to optimize response for the specific mechanical load.

> **Tip:** When manually tuning, start by increasing the proportional gain (Kp) until you see slight oscillation, then increase the integral gain (Ki) to reduce steady-state error.

Fault Diagnosis

When a fault occurs, the drive is disabled and a specific fault code is displayed on the 7-segment LED and reported to the master. Refer to the troubleshooting section of this manual or the software help file to diagnose the cause based on the code.

Monitoring Real-Time Status

The MotionSuite software provides a real-time monitoring dashboard. Key parameters such as motor current, DC bus voltage, drive temperature, and position error for both axes can be monitored and recorded for performance analysis.

5. Maintenance Schedule

Interval	Task	Notes
Weekly	Visually inspect the drive for any accumulation of dust or debris, particularly around ventilation slots and fans.	Do not use compressed air to clean as it can force contaminants inside the unit.
Monthly	Check the drive's cooling fans for proper operation. Listen for any unusual bearing noise and ensure they spin freely.	A failed fan can lead to overheating and premature drive failure.
Quarterly	Verify the tightness of all power and motor terminal connections using a calibrated torque screwdriver.	Vibration can cause connections to loosen over time, creating a fire hazard.
Annually	Perform a backup of the drive's parameter configuration file.	Store the backup file in a secure, version-controlled location.
Annually	Inspect all connected cables (power, motor, encoder, network) for signs of wear, abrasion, or damage to the insulation.	Replace any damaged cables immediately to prevent faults or safety hazards.
As Needed	Clean the exterior of the drive and heatsink fins using a soft, dry cloth.	If necessary, use a cloth lightly dampened with an isopropyl alcohol solution. Ensure power

Interval	Task	Notes
		is disconnected and the unit is dry before reapplying power.

6. Troubleshooting

Symptom	Possible Cause	Solution
Drive status LED is off; no power.	No incoming 480VAC power, blown internal fuse, or faulty control power supply.	Verify main power supply is active and check external circuit breakers. If power is present at terminals L1/L2/L3, contact NexBot technical support.
EtherCAT communication cannot be established.	Incorrect wiring, faulty cable, incorrect EtherCAT address, or ESI file mismatch.	Check EtherCAT cable connections at IN/OUT ports. Verify the master configuration is using the correct ESI file for the MD132-006. Ensure the network topology is correct.
Motor hums loudly but does not rotate when enabled.	Incorrect motor phasing (two phases swapped) or a seized motor/load.	Power down the system. Swap any two of the three motor leads (e.g., U and V) at the drive terminals. Disconnect the motor from the load to verify it can spin freely.
Drive reports an Overcurrent Fault immediately upon enable.	Short circuit in the motor or motor cable, or incorrect motor parameters.	Disconnect the motor cable from the drive and measure resistance between motor phases and to ground. Verify motor parameters in the software match the motor nameplate.
Drive reports a Following Error or Position Error Fault.	Poor tuning, excessive mechanical load or friction, encoder malfunction, or unrealistic acceleration commands.	Re-run the auto-tuning procedure. Check machine mechanics for any binding or obstructions. Verify encoder cable is secure and shielded. Reduce acceleration/deceleration values in the motion profile.
Drive reports an Overtemperature Fault.	Blocked ventilation, cooling fan failure, excessive ambient temperature, or sustained high load.	Ensure proper clearance around the drive. Check that cooling fans are operational. Verify ambient cabinet temperature is within the specified operating range. Consider reducing the duty cycle of the application.
	Regenerated energy from the motor	Decrease the deceleration rate in the motion controller.

Symptom	Possible Cause	Solution
Drive faults on DC Bus Overvoltage during deceleration.	exceeds the capacity of the internal braking circuit. Deceleration ramp is too aggressive.	If not possible, install an appropriately sized external braking resistor to the drive's resistor terminals.

7. Technical Specifications

Parameter	Value	Unit
Weight	3.5	kg
Material	Anodized Aluminum	
Voltage	480VAC	
IP Rating	IP20	
Country of Origin	US	
Protocol	EtherCAT	
Dimensions	255 x 85 x 210 mm	
Torque	6 Nm	