

User Manual: NexBot Robotics MD132-016 Multi-Axis Servo Drive

SKU: NXB-SRV-MD132-016 | 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: The MD132-016 contains a DC bus that operates at high voltage. This voltage can remain for several minutes after 480VAC power is removed. Wait at least 5 minutes after power-down before servicing to prevent electric shock.

WARNING: Incorrect motor parameters or tuning can cause violent and unexpected motion. Always secure the mechanical system and ensure all personnel are clear of the area before enabling the drive for the first time.

CAUTION: The drive's anodized aluminum heatsink can reach high temperatures during operation. Avoid direct contact to prevent skin burns. Allow the unit to cool before handling.

NOTICE: The MD132-016 has an IP20 rating. It must be installed within a suitable control cabinet that protects it from dust, moisture, and conductive contaminants to prevent damage.

NOTICE: This drive's electronics are sensitive to electrostatic discharge (ESD). Always use proper ESD protection, such as a grounded wrist strap, when handling the drive or connecting control cables.

2. Product Overview

The NexBot Robotics MD132-016 is a compact, high-performance multi-axis servo drive engineered to deliver precise, synchronized motion control for up to two robotic axes from a single unit. This drive is designed for dynamic applications where space in the control cabinet is at a premium and high-speed, coordinated movement is critical. Its advanced processing capabilities and fast control loops ensure superior tracking accuracy and reduced settling times, leading to shorter cycle times and increased production throughput. Key features include a robust power stage capable of delivering 16A of continuous current and up to 32A peak current per axis, making it suitable for a range of small to medium-sized servo motors. The MD132-016 also incorporates essential safety features, including Safe Torque Off (STO) certified to SIL 3 / PLe, which helps protect personnel and equipment without requiring external contactors. This servo drive is commonly deployed in applications such as automated assembly, pick-and-place, CNC machining, and high-speed packaging. The dual-axis design significantly simplifies system architecture and wiring, reducing installation time and potential points of failure. The drive operates on a standard 480VAC three-phase input and is configured using our intuitive NexBot DriveSuite software, which provides tools for tuning, diagnostics, and parameter management. Its compact form factor (245 x 75 x 190 mm) allows for high-density mounting, optimizing valuable cabinet real estate.

3. Getting Started

1. Software Installation

Install the NexBot DriveSuite configuration software on a PC connected to the EtherCAT master. Ensure you have the correct Electronic Data Sheet (EDS/XML) file for the NXB-SRV-MD132-016 to allow the master to recognize and configure the drive.

2. Initial Parameter Setup

After establishing communication, use the setup wizard in DriveSuite to configure the basic parameters for each axis. This includes entering the motor's nameplate data, setting the encoder resolution, and defining the operational current and voltage limits.

3. First Motion Test

Before running a program, use the manual jog function in the software to test each axis independently. Verify that the motor moves smoothly and in the correct direction relative to the command. This confirms correct phasing of both the power and feedback wiring.

4. Servo Loop Tuning

Run the built-in auto-tuning function to establish baseline gain values for the position and velocity control loops. This routine analyzes the connected motor and load characteristics to provide stable initial performance, which can be manually fine-tuned later for optimal cycle times.

4. Operation

EtherCAT Control Modes

The MD132-016 is controlled via EtherCAT using CiA 402 drive profile modes. The most common modes for synchronized motion are Cyclic Synchronous Position (CSP), Cyclic Synchronous Velocity (CSV), and Cyclic Synchronous Torque (CST), which are selected and commanded by the master controller.

Tip: For high-precision coordinated motion, use CSP mode as it provides the tightest synchronization between the master's trajectory planner and the drive's position loop.

Monitoring Drive Health

Use the diagnostic tools in DriveSuite or map key parameters to the PLC to monitor real-time data. Key indicators of system health include motor current, DC bus voltage, drive internal temperature, and following error.

Fault and Alarm Handling

If the drive detects an issue, it will enter a fault state to protect the equipment and signal the error code to the master. The fault must be acknowledged and cleared in the controller after the root cause has been addressed. A log of the last 10 faults is stored in the drive's memory.

Parameter Management

All drive parameters can be saved to a file from the DriveSuite software. It is critical to save a known-good parameter set after commissioning is complete. This file can be used to quickly configure a replacement drive, minimizing machine downtime.

Tip: Store the parameter backup file with the machine's electrical schematics for easy access during maintenance.

5. Maintenance Schedule

Interval	Task	Notes
Weekly	Visually inspect the drive's status indicators to confirm normal operation (e.g., green 'RUN' LED) and absence of any fault codes.	No tools or downtime required.
Quarterly	With power off, inspect the drive's heatsink and internal fan for dust or debris accumulation. Clean gently with low-pressure, dry compressed air.	Obstructed airflow is a leading cause of overheating faults.
Annually	Perform a parameter backup. Save the complete drive configuration file to a secure network location or external drive.	This is crucial for disaster recovery.
Annually	Re-torque all power terminals (input 480VAC, motor outputs, and PE) to the values specified in the installation	Requires a calibrated torque wrench and a

Interval	Task	Notes
	manual. Thermal cycling can cause connections to loosen over time.	scheduled machine shutdown.
Every 2 Years	Inspect all external cabling connected to the drive for signs of insulation cracking, abrasion, or discoloration from heat. Replace any damaged cables.	Pay close attention to cables in high-flex areas.
Every 5 Years	Replace the internal cooling fan. Fans are mechanical components with a finite lifespan and their failure can lead to drive overheating.	Use only the official NexBot Robotics replacement fan kit.

6. Troubleshooting

Symptom	Possible Cause	Solution
Drive fault: 'Overcurrent'	Acceleration rate is too high, there is a mechanical bind, or a short circuit in the motor or cable.	Reduce the commanded acceleration. Check the mechanical system for obstructions. Disconnect the motor and measure phase-to-phase and phase-to-ground resistance.
Drive fault: 'Following Error'	The commanded position is too far from the actual position. This can be caused by excessive load, poor tuning, or mechanical slippage.	Verify the load does not exceed the motor's 16 Nm torque capability. Check for loose mechanical couplings. Re-run the auto-tuning procedure.
No EtherCAT communication with the drive	Faulty or disconnected cable, incorrect node address, or an error in the network configuration file.	Check physical cable connections and status LEDs on the RJ45 ports. Verify the drive's address and ensure the correct ESI file is being used by the master.
Motor oscillates or is noisy when enabled	Incorrect servo gain tuning; typically the velocity or position loop gains are too high.	Reduce the proportional gains (Kp) for the velocity and position loops. If the issue persists, run the auto-tuning routine again.
Drive fault: 'DC Bus Overvoltage'	The motor is regenerating too much energy back to the drive during rapid deceleration, and there is no or an insufficient braking resistor.	Increase the deceleration time in the motion profile. If not possible, install an appropriately sized external braking resistor.
	The external safety circuit (e.g., E-Stop,	Reset the machine's safety system. Verify

Symptom	Possible Cause	Solution
Drive does not enable; STO status is active	safety gate) is open, or there is a wiring fault in the STO circuit.	24VDC is present on both STO input terminals. Check wiring for continuity.
Drive fault: 'Overtemperature'	Ambient temperature is too high, cooling fan has failed, or heatsink is blocked with dust.	Ensure cabinet temperature is within operating limits. Verify the drive's fan is spinning. Power down and clean the heatsink.

7. Technical Specifications

Parameter	Value	Unit
Weight	4.2	kg
Material	Anodized Aluminum	
Voltage	480VAC	
IP Rating	IP20	
Country of Origin	CH	
Protocol	EtherCAT	
Dimensions	245 x 75 x 190 mm	
Torque	16 Nm	