

User Manual: NexBot Vision SD131-003 Single-Axis Servo Drive (30A)

SKU: NXB-SRV-SD131-003 | 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. This equipment contains high voltage (480VAC) and stored electrical energy. Disconnect and lock out all power sources before servicing. Wait at least 5 minutes for capacitors to discharge.

WARNING: Improper motor/drive pairing or parameter settings can lead to uncontrolled motion, causing severe injury or equipment damage. Always perform initial motion tests at low speed and without a load.

WARNING: The drive's heatsink can reach high temperatures during operation, posing a burn risk. Do not touch the drive housing or heatsink until the unit has had sufficient time to cool down.

CAUTION: This device is sensitive to electrostatic discharge (ESD). Use proper ESD protection measures, such as a grounded wrist strap, when handling the drive, especially when accessing its internal components or connectors.

NOTICE: The NexBot Vision SD131-003 drive is rated for IP20. It must be installed within a suitable enclosure (e.g., NEMA 12 or IP54) to protect it from moisture, dust, and other contaminants.

2. Product Overview

The NexBot Vision SD131-003 is a high-performance single-axis servo drive engineered to provide precise, dynamic control for individual robot joints and auxiliary motion axes in automated systems. This drive is optimized for applications requiring high-speed response and exceptional positioning accuracy, making it an ideal component for advanced manufacturing and material handling tasks. Key to its performance is a sophisticated control architecture featuring advanced auto-tuning algorithms and vibration suppression filters. This allows the drive to adapt to varying loads and mechanical resonances, significantly reducing settling times and improving overall machine throughput. With a continuous current rating of 30A and a peak output of up to 90A, the SD131-003 provides ample power to actuate a wide range of servo motors, enabling rapid acceleration and deceleration for heavy payloads. This capability is critical in applications such as robotic welding, high-speed pick-and-place, and CNC machining where both speed and precision are paramount. The drive operates on a 480VAC 3-phase power supply, making it suitable for standard industrial power systems. This high-speed fieldbus ensures synchronized multi-axis motion, which is essential for the coordinated movements of complex articulated robots. Safety is addressed with an integrated Safe Torque Off (STO) function (SIL 3, PLe), which allows for the safe shutdown of motor torque without requiring external power contactors, simplifying safety circuit design. Designed for integration into control cabinets, the SD131-003 has a compact, panel-mount form factor and an IP20 rating. Pluggable connectors for power, motor, and I/O signals facilitate straightforward installation and maintenance, minimizing downtime during system setup or component replacement.

3. Getting Started

1. Initial Power-Up Sequence

After completing all post-installation checks, apply power to the drive. The front panel status LEDs will cycle through a self-test sequence. A steady 'Ready' or 'Power' light indicates the drive has initialized successfully and is awaiting commands.

2. Connecting to NexBot Commissioning Software

To configure the SD131-003, connect a PC running the NexBot Commissioning Software to the EtherCAT network. The software will automatically scan the network and discover connected devices. Select the SD131-003 from the device list to begin configuration.

3. Basic Configuration Wizard

Use the built-in configuration wizard to set fundamental parameters. This includes selecting the connected motor model, defining encoder resolution, and configuring the drive's EtherCAT node address. Saving this configuration is required before enabling the drive for the first time.

4. Operation

Using the Auto-Tuning Function

The SD131-003 features an advanced auto-tuning algorithm to optimize performance for the connected load. Access this function through the

commissioning software to automatically set control loop gains for position, velocity, and torque. This process significantly reduces commissioning time and improves system responsiveness.

Tip: For best results, run the auto-tuning function with the final mechanical load attached to the motor.

Monitoring Drive Status

Real-time operational data can be monitored via the software dashboard or by reading specific objects over the EtherCAT network. Key parameters to monitor include motor velocity, bus voltage, drive temperature, and current output. This data is essential for system diagnostics and performance analysis.

Executing Motion Profiles

Motion commands are sent from the master controller (e.g., a PLC or robot controller) over the EtherCAT protocol. The drive supports various modes such as Cyclic Synchronous Position (CSP), Velocity (CSV), and Torque (CST). Ensure the correct mode is selected in both the master controller and the drive configuration.

Understanding Fault Codes

When a fault occurs, the drive will be disabled, and a specific fault code will be displayed on the drive's LED display and reported to the master controller. Refer to the troubleshooting section of this manual to diagnose the cause based on the code, such as over-voltage, over-current, or encoder loss.

Tip: Keep a log of fault codes as they occur to identify recurring issues that may indicate a systemic problem.

5. Maintenance Schedule

Interval	Task	Notes
Weekly	Check the drive's status indicators for any fault or warning lights. Listen for any unusual noises from the cooling fan.	This is a quick operational check that can be done without opening the cabinet.
Monthly	Visually inspect the drive for any accumulation of dust or debris, particularly on the heatsink and fan vents.	Power down the system before cleaning. Use compressed, dry air to clear debris.
Quarterly	Inspect the cooling fan for proper operation. Ensure it spins freely and quietly when the drive is under load.	Fan failure can lead to overheating and thermal shutdown.
Annually	With power de-energized and locked out, check the tightness of all power (L1, L2, L3, U, V, W) and ground (PE) terminal screws.	Vibration can cause screw terminals to loosen over time, creating a potential fire or failure hazard.
Annually	Verify the integrity of all connected cables, looking for	

Interval	Task	Notes
	signs of abrasion, cracking, or strain at the connection points.	Pay close attention to cables that are subject to movement.
As Needed	Create a backup of the drive's parameter configuration file using the NexBot Commissioning Software.	Always perform a backup after any tuning or configuration changes are made.

6. Troubleshooting

Symptom	Possible Cause	Solution
Drive does not power on; no LEDs are lit.	No incoming AC power, incorrect voltage, or a blown internal fuse.	Verify 480VAC is present at terminals L1, L2, L3 using a multimeter. Check upstream breakers and fuses. If power is confirmed, contact NexBot support.
Motor hums but does not rotate when enabled.	Incorrect motor phasing, a disconnected motor phase, or a seized mechanical system.	Power down and verify wiring to U, V, and W terminals. Ensure the motor shaft can be turned by hand (with power off). Check for mechanical binds.
Drive faults on 'Over-Current' during acceleration.	Acceleration/ deceleration ramps are too aggressive, motor is undersized for the load, or a short in the motor wiring.	Reduce the acceleration parameter values in the configuration. Verify motor and load calculations. Inspect motor cables for damage or shorts.
Drive faults on 'Over-Voltage' during deceleration.	Regenerated energy is too high for the DC bus capacity. External braking resistor is missing, disconnected, or has failed.	Decrease the deceleration ramp. Verify the braking resistor is correctly sized and connected to the RB+ and RB- terminals. Test resistor for continuity.
Positioning is inaccurate or motor 'hunts' around the setpoint.	Poorly tuned PID control loops, high mechanical backlash, or encoder feedback noise.	Perform the auto-tuning procedure. Check the mechanical system for looseness or backlash. Ensure the encoder cable shield is properly grounded at the drive end.
Drive is not visible on the EtherCAT network.	Incorrect wiring, duplicate node address, or a faulty EtherCAT cable.	Check EtherCAT cable connections at IN/OUT ports. Ensure the drive has a unique node address on the network. Try swapping

Symptom	Possible Cause	Solution
		the cable with a known good one.
Drive faults on 'Heatsink Overtemperature'.	Blocked ventilation, cooling fan failure, high ambient temperature, or excessive and sustained load.	Ensure drive ventilation clearances are met. Clean heatsink and fan of any debris. Verify fan is operational. Check if the ambient temperature inside the cabinet is within the specified operating range.

7. Technical Specifications

Parameter	Value	Unit
Weight	2.8	kg
Material	Anodized Aluminum	
Voltage	480VAC	
IP Rating	IP20	
Country of Origin	SE	
Protocol	EtherCAT	
Dimensions	225 x 85 x 190 mm	
Torque	3 Nm	