User Manual: NexBot Vision AC111-003 Ac Servo Motor 3.5 Nm

SKU: NXB-SRV-AC111-003 | 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: Risk of fatal electric shock. The motor operates at a lethal voltage of 480VAC. Disconnect and lock out all power sources before installation, service, or inspection.

WARNING: The motor surface can reach high temperatures during operation, posing a burn risk. Allow the motor to cool completely before handling.

WARNING: Unexpected machine motion can occur. Ensure all personnel are clear of the machine's range of motion before enabling the servo drive.

> **CAUTION:** The motor weighs 2.8 kg. Use proper lifting techniques to avoid personal injury or damage to the motor if dropped. Do not lift the motor by its cables or shaft.

> **NOTICE:** The encoder and communication ports are sensitive to electrostatic discharge (ESD). Use appropriate ESD protection measures when handling connectors.

2. Product Overview

The NexBot Vision AC111-003 is a brushless AC servo motor engineered for high-dynamic performance in industrial automation and robotics. This motor is specifically designed to provide precise, repeatable motion control for robot joints, positioning systems, and other automated machinery where accuracy and speed are critical. Its compact, power-dense design allows for integration into tight spaces without compromising on performance, making it an ideal component for sophisticated robotic systems. The core of the AC111-003 features high-energy neodymium magnets and an optimized winding configuration, which together deliver a continuous rated torque of 3.5 Nm and high peak torque for rapid acceleration and deceleration cycles. This high torque-to-inertia ratio enables faster settling times and reduced cycle times in applications such as high-speed pick-and-place, automated assembly, and material handling. The motor's smooth, cog-free rotation at low speeds ensures superior path accuracy for tasks like dispensing, welding, and inspection. Built for reliability in industrial environments, the motor housing is constructed from a durable aluminum alloy and sealed to an IP65 rating, protecting it from dust and low-pressure water jets from any direction. This ensures consistent operation in challenging factory conditions. The motor operates on a standard 480VAC three-phase supply, making it compatible with common industrial power systems. For position and velocity control, it includes an integrated high-resolution feedback system that provides accurate real-time data to the servo drive. Proper installation involves secure mounting to the machine frame and connection to a compatible servo drive and power source. Regular inspection of connections is recommended to ensure long-term operational integrity.

3. Getting Started

1. Product Overview

The NexBot Vision AC111-003 is a high-performance AC servo motor providing 3.5 Nm of continuous torque. It features an integrated PROFINET interface for seamless communication with modern PLC systems and is protected by an IP65-rated enclosure, making it suitable for demanding industrial environments.

2. Unpacking and Inspection

Upon receipt, carefully unpack the motor. Verify that the SKU on the motor nameplate is NXB-SRV-AC111-003. Inspect the aluminum alloy housing, shaft, and connectors for any signs of physical damage that may have occurred during transit.

3. System Requirements

Operation requires a compatible NexBot servo drive or a third-party drive capable of controlling brushless AC servo motors with equivalent feedback protocols. A stable 480VAC three-phase power source and a PROFINET IO controller (PLC) are necessary for full functionality.

4. Initial Configuration in Drive Software

Before operation, the motor parameters must be loaded into the connected servo drive. This typically involves selecting the NXB-SRV-AC111-003 motor profile from a library or manually entering its electrical specifications, such as torque constant, inertia, and encoder resolution.

4. Operation

Power-Up Sequence

Always apply 24VDC control power to the servo drive before applying the 480VAC main power to the motor. This ensures the drive's logic is active and can control the motor state safely upon main power application. Follow the reverse sequence for power-down.

> **Tip:** Check the servo drive's status display or software to confirm it is 'Ready' before issuing an 'Enable' command.

Motion Control via PROFINET

The motor is controlled by sending commands over the PROFINET network from a master controller. Standardized telegrams are used for position, velocity, or torque commands. The motor provides real-time feedback on its status, position, and any fault conditions.

PID Loop Tuning

To achieve optimal performance, the servo drive's control loops (Proportional, Integral, Derivative) must be tuned for the specific mechanical load attached to the motor. Use the auto-tuning function of the servo drive for a baseline, then manually fine-tune for the desired responsiveness and stability.

> **Tip:** Start with low P-gain values to avoid oscillation and increase them gradually until the system is responsive without overshoot.

Fault and Diagnostic Monitoring

Monitor the motor's status through the servo drive's software or HMI. Faults such as over-current, over-voltage, or excessive position error will be reported via PROFINET and can be used to trigger machine shutdowns or alarms.

Understanding IP65 Rating

The motor's IP65 rating signifies it is totally protected against dust ingress and protected against low-pressure water jets from any direction. This allows for operation in dusty or wet environments, but does not mean the motor is submersible or resistant to high-pressure washdowns.

> **Tip:** When cleaning, avoid using corrosive chemicals on the housing or connectors, as this can degrade the seals over time.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually inspect the motor for any accumulation of debris or fluid that could impede cooling.	Pay close attention to the cooling fins on the motor housing.
Weekly	Listen for any unusual noises (grinding, whining) or feel for excessive vibration during operation.	Changes in sound or vibration often indicate developing mechanical issues.
Monthly	Check the tightness of the motor's mounting bolts to ensure they have not loosened due to vibration.	Re-torque to specification if necessary.
Quarterly	Inspect power, encoder, and PROFINET cable jackets for signs of abrasion, cracking, or chemical damage.	Ensure cables are not being pinched or stretched by machine movement.
Annually	With power off, clean the motor's housing and cooling fins with a soft brush and compressed air or a damp cloth.	The motor's IP65 rating protects against water ingress, but do not use a high-pressure washer.
Annually	Verify the integrity of the shaft seal. Look for any signs of grease leakage or contamination ingress.	Contact NexBot support if the seal appears compromised.

6. Troubleshooting

Symptom	Possible Cause	Solution
Motor fails to enable or rotate.	No main 480VAC power; servo drive is not enabled; mechanical system is jammed.	Verify main power is supplied to the drive. Issue a 'servo on' command from the controller. Check the coupled load for any physical obstruction.
Motor is noisy or vibrates excessively.	Poor shaft alignment with the load; worn motor	Re-align the motor and load shafts. If noise persists, inspect bearings for wear. Re-run the drive's auto-

Symptom	Possible Cause	Solution
	bearings; incorrect PID tuning.	tuning sequence or manually adjust PID gains.
Motor overheats (drive reports over-temperature fault).	Load exceeds the motor's 3.5 Nm continuous torque rating; insufficient cooling/airflow; drive parameters are incorrect.	Reduce the operational load or duty cycle. Ensure motor housing is clean and has adequate space for air circulation. Verify motor parameters in the drive match the NXB-SRV-AC111-003 nameplate.
Inaccurate positioning or 'Following Error' faults.	Loose shaft coupling; encoder cable connection is intermittent; high electrical noise.	Check and tighten the set screws or clamps on the shaft coupling. Re-seat the encoder cable at both the motor and drive. Ensure all cable shields are properly grounded.
No PROFINET communication with the motor/ drive.	Incorrect IP address or device name; faulty network cable or switch port; network cable not shielded.	Verify the device's PROFINET settings match the PLC project configuration. Test the cable with a network tester or replace it. Ensure a shielded Ethernet cable is used and grounded correctly.
Drive trips on an overcurrent fault during acceleration.	Acceleration/ deceleration ramps are too aggressive; short circuit in the motor winding or cable.	Increase the acceleration time in the motion profile. Disconnect the motor from the drive and perform an insulation (megger) test on the motor windings and cable.

7. Technical Specifications

Parameter	Value	Unit
Weight	2.8	kg
Material	Aluminum Alloy	
Voltage	480VAC	
IP Rating	IP65	
Country of Origin	DE	

Parameter	Value	Unit
Protocol	PROFINET	
Dimensions	175 x 80 x 80 mm	
Torque	3.5 Nm	