User Manual: NexBot Robotics AC111-004 AC Servo Motor 400W 1.27 Nm

SKU: NXB-SRV-AC111-004 | 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. Contact with 220VAC electrical terminals can cause severe injury or death. Disconnect and lock out all power before installation or servicing.

WARNING: Hot surfaces. During operation, the motor housing can reach temperatures that may cause burns. Allow the motor to cool completely before handling.

WARNING: Risk of unexpected motion. The motor can start, stop, or change direction unexpectedly due to program commands. Keep personnel and foreign objects clear of the operating area.

CAUTION: Do not connect or disconnect cables while power is applied to the servo drive. This can cause electrical arcing and damage to the motor's sensitive encoder electronics.

NOTICE: The IP65 rating requires the use of correctly installed, IP65-rated connectors and cables. Failure to use appropriate hardware will void the ingress protection rating.

2. Product Overview

The NexBot Robotics AC111-004 is a compact, high-performance AC servo motor engineered for demanding industrial automation and robotics applications. This motor provides the power and precision required for tasks that demand high speed and accuracy, such as assembly, pick-and-place, and automated inspection. Its core design focuses on delivering consistent torque and dynamic response to execute complex motion profiles with minimal error. Key features include a power rating of 400W and a continuous torque output of 1.27 Nm, which provides the necessary force for rapid acceleration and deceleration of robot joints without sacrificing stability. The motor is capable of reaching a rated speed of 3000 RPM, enabling fast cycle times and increasing overall system throughput. An integrated high-resolution position feedback system ensures that the robot controller receives accurate, real-time data on joint position, which is critical for achieving high repeatability in automated tasks. Constructed with a durable anodized aluminum housing and sealed to an IP65 rating, the AC111-004 is built to withstand the rigors of industrial environments, offering protection against dust ingress and low-pressure water jets from any direction. This robust construction ensures long-term reliability and reduces downtime for maintenance. The motor's low-inertia design contributes to its exceptional responsiveness and energy efficiency, reducing operational costs. Standardized mounting flanges and connectors facilitate straightforward integration into new systems or as a replacement part for existing NexBot Robotics equipment, simplifying installation and maintenance procedures.

3. Getting Started

1. Product Overview

The NexBot Robotics AC111-004 is a 400W AC servo motor designed for high-precision motion control. It delivers a continuous torque of 1.27 Nm and features an integrated high-resolution encoder and PROFINET communication for seamless integration into modern automation systems.

2. Understanding the Nameplate

The nameplate on the motor body contains critical information. This includes the SKU (NXB-SRV-AC111-004), serial number for traceability, voltage rating (220VAC), rated power (400W), and ingress protection rating (IP65).

3. Required Servo Drive

This motor must be operated with a compatible NexBot servo drive. The drive must be configured specifically for the AC111-004 to ensure stable operation and to protect the motor from overcurrent or overvoltage conditions.

4. Operation

Performance Tuning

Use the servo drive's auto-tuning function for initial setup with the mechanical load attached. For highly dynamic applications, manual adjustment of the position, speed, and torque loop gains may be required to optimize response and minimize settling time.

> **Tip:** Start with lower gain values and increase them gradually to find the optimal balance between responsiveness and stability, avoiding oscillation.

PROFINET Communication

The AC111-004 communicates its status and receives commands via the PROFINET protocol. Configure the PLC or motion controller to establish a connection using the device's assigned name. The GSDML file for the motor provides the data mapping for control words, status words, and position setpoints.

Operating Modes

The motor can be operated in various control modes as dictated by the servo drive, including position, velocity, and torque control. Select the mode that best suits your application's requirements, such as precise point-to-point positioning or constant force application.

> **Tip:** For applications like capping or pressing, torque mode provides direct control over the force exerted by the motor.

Fault Diagnostics

The motor's internal sensors report status back to the servo drive. If a fault such as over-temperature, over-speed, or encoder error occurs, the drive will trigger an alarm. Refer to the servo drive's manual for a detailed list of fault codes and their meanings.

5. Maintenance Schedule

Interval	Task	Notes
Weekly	Visually inspect the motor for any signs of physical damage, fluid leaks, or loose mounting bolts.	Listen for any changes in operating noise, such as new clicks or whining sounds.
Monthly	Clean the exterior of the motor housing. Use a soft cloth, lightly dampened with a mild cleaning agent if necessary.	Keeping the housing clean ensures optimal heat dissipation. The IP65 rating protects against dust and low-pressure water jets.
Quarterly	Inspect all power, encoder, and communication cables for signs of abrasion, cracking, or damage to the connectors.	Pay close attention to cables in motion systems (e.g., cable tracks) as they are most susceptible to wear.
Annually	Verify the torque of the main mounting bolts to ensure the motor has not loosened due to vibration.	Refer to your machine's documentation for the correct torque specification.
Every 10,000 Operating Hours	Inspect the motor's front shaft seal for any signs of wear, cracking, or leakage.	A compromised seal can allow contaminants to enter the motor bearings.

Interval	Task	Notes
Every 20,000 Operating Hours	Contact NexBot Robotics Technical Support to schedule a preventative maintenance service for bearing replacement.	Proactive bearing replacement is recommended for mission-critical applications to prevent unplanned downtime.

6. Troubleshooting

Symptom	Possible Cause	Solution
Motor does not rotate when commanded	No power to drive; drive in fault state; incorrect wiring; mechanical seizure.	Check drive power and status. Verify U, V, W phase wiring. Disconnect load to see if motor turns freely.
Excessive motor vibration or audible noise	Poor shaft alignment; unbalanced load; incorrect tuning gains (oscillation).	Re-align the motor and load coupling. Balance the attached mechanical components. Run the drive's auto-tuning sequence or reduce P-gain values.
Motor overheats (over-temperature fault)	Continuous load exceeds the 1.27 Nm rating; poor ventilation; high ambient temperature; incorrect drive parameters.	Reduce the load or duty cycle. Ensure adequate airflow around the motor. Verify the correct motor profile is loaded in the drive.
Positioning errors or 'Following Error' fault	Loose coupling; high mechanical backlash; encoder cable noise; incorrect tuning.	Check the shaft coupling for slippage. Inspect the mechanical system for backlash. Ensure encoder cable is shielded and routed away from power lines. Increase position loop gain.
PROFINET communication is lost	Faulty or disconnected cable; incorrect IP address or device name; network switch issue.	Check the PROFINET cable connections at both ends. Verify network settings in the PLC/controller match the device configuration. Test with a different cable or switch port.
Motor rotation is jerky at low speeds	Poor tuning (velocity loop instability); encoder resolution mismatch in drive; 'cogging' torque.	Adjust velocity loop gains and integral time. Confirm the encoder lines-per-revolution setting in the drive matches the motor's specification. Use a drive feature to compensate for cogging if available.
Drive reports an 'Encoder Fault'	Encoder cable is damaged or disconnected; severe electrical noise;	Inspect the full length of the encoder cable and its connectors. Ensure proper grounding and shielding. If

Symptom	Possible Cause	Solution
	internal encoder failure.	the issue persists, the motor may require service.

7. Technical Specifications

Parameter	Value	Unit
Weight	1.8	kg
Material	Anodized Aluminum	
Voltage	220VAC	
IP Rating	IP65	
Country of Origin	CH	
Protocol	PROFINET	
Dimensions	155 x 60 x 60 mm	
Torque	1.27 Nm	