User Manual: NexBot Robotics AC111-013 Ac Servo Motor 1.3kW 4.1 Nm

SKU: NXB-SRV-AC111-013 | 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 (480VAC) is present during operation. Disconnect and lock out all power before installation or servicing to prevent severe injury or death from electric shock.

WARNING: The motor surface can reach temperatures exceeding 80°C (176°F) during normal operation. Allow the unit to cool completely before touching to avoid severe burns.

WARNING: Unexpected rapid motor movement can occur, causing crushing or entanglement hazards. Keep personnel and foreign objects clear of the operating area at all times.

CAUTION: Do not exceed the specified radial and axial shaft load ratings. Overloading the shaft will cause premature bearing failure and potential mechanical damage.

NOTICE: This equipment is sensitive to electrostatic discharge (ESD). Use proper ESD protection procedures when handling connectors and internal components.

2. Product Overview

The NexBot Robotics AC111-013 is a high-precision AC servo motor engineered to provide reliable, dynamic motion control for industrial robotic systems. This motor is specifically designed for applications requiring rapid and precise positioning, such as automated assembly, material handling, and robotic welding. Its core design focuses on delivering high torque output from a compact and lightweight frame, making it an ideal component for multi-axis robot arms where space and weight are critical design constraints. Key features include a high-energy neodymium magnet rotor and optimized winding configuration, which together provide a continuous torque rating of 4.1 Nm and a peak torque significantly higher for short-duration movements. This high torque density allows for powerful joint actuation without adding excessive weight or bulk to the robot arm, improving overall payload capacity and dynamic performance. The low rotor inertia design enables exceptional acceleration and deceleration, reducing cycle times in fast-paced production environments. The motor operates on a standard 480VAC three-phase supply, simplifying integration into common industrial power systems. Housed in a rugged anodized aluminum casing and sealed to an IP65 rating, this servo motor is protected against dust ingress and low-pressure water jets from any direction. This durability ensures dependable operation in challenging industrial environments where contaminants or wash-down procedures are common. Designed for direct integration with NexBot Robotics actuation systems, the AC111-013 features standardized mounting flanges and connectors for simplified installation and maintenance, minimizing downtime and ensuring a secure mechanical and electrical connection.

3. Getting Started

1. Product Overview

The NexBot Robotics AC111-013 is a high-performance AC servo motor delivering 4.1 Nm of torque from a compact frame. It features an integrated high-resolution encoder for precision feedback and communicates via the PROFINET industrial Ethernet protocol, making it ideal for demanding robotic and automation applications.

2. System Requirements

This motor requires a compatible servo drive capable of supplying 480VAC three-phase power and interpreting its encoder signal. For network control, a PROFINET IO controller (such as a PLC) and the corresponding GSDML device description file are necessary for integration.

3. Initial Configuration

Before operation, the paired servo drive must be configured with the specific parameters for the NXB-SRV-AC111-013. These parameters, including motor poles, inertia, and current limits, are available in the motor's technical datasheet and must be entered into the drive's software.

4. Operation

Servo Tuning

Proper tuning of the control loops (position, velocity, and current) is essential for optimal performance. Utilize the servo drive's auto-tuning feature for a baseline configuration, then manually adjust gains to minimize positioning error and settling time for your specific load inertia.

> **Tip:** When tuning, record initial parameters before making changes. A slightly overdamped response is often safer and more stable than a critically damped or underdamped one.

Operating Modes

The motor's operation is dictated by the servo drive's control mode. Common modes include Position Control for point-to-point moves, Velocity Control for maintaining a constant speed, and Torque Control for applying a specific force.

Thermal Protection

The motor is equipped with internal thermal sensors that communicate with the drive to prevent overheating. If the motor temperature exceeds its safe operating limit, the drive will trigger a fault and disable the motor to prevent damage.

> **Tip:** Ensure adequate airflow around the motor's 110 x 110 mm body, especially when operating continuously at high torque levels, to maximize performance.

Fault Diagnostics

The system monitors for various faults, such as overcurrent, overvoltage, and feedback errors. These faults are reported by the drive over the PROFINET network. Refer to the servo drive's documentation for a detailed list of diagnostic codes and their meanings.

5. Maintenance Schedule

Interval	Task	Notes
Weekly	Perform a visual inspection of the motor housing and cables for any signs of damage, wear, or fluid contamination. Listen for any abnormal operating sounds such as grinding or high-pitched whining.	Changes in operational noise can be an early indicator of bearing wear.
Monthly	Check the tightness of the motor's mounting bolts. Mechanical vibration, especially during rapid acceleration and deceleration cycles, can cause fasteners to loosen over time.	Do not overtighten; re-torque to the original specification if found to be loose.
Quarterly	Inspect all cable connections, including power, encoder, and	

Interval	Task	Notes
	PROFINET, to ensure they are secure and free of corrosion. Verify that cable jackets are intact, especially at points of flex or strain.	A secure connection is critical for maintaining the IP65 rating.
Annually	Clean the exterior surfaces of the motor to remove any accumulated dust or grime. A clean housing is essential for effective passive heat dissipation.	Use a soft cloth and a mild, non-conductive cleaner. Do not use compressed air, which can force contaminants into seals.
Every 20,000 Hours	The motor bearings are lubricated for life under normal operating conditions. However, in high-duty cycle or extreme temperature applications, consider a professional evaluation of bearing condition.	Bearing replacement should only be performed by qualified technicians.

6. Troubleshooting

Symptom	Possible Cause	Solution
Motor fails to enable; drive shows no faults.	A disconnected power phase, incorrect wiring, or a faulty power cable.	Power down and lock out the system. Verify continuity of all three power phases (U, V, W) between the drive and the motor. Check for secure connections.
Motor is excessively hot and trips on over-temperature fault.	Mechanical load exceeds the motor's 4.1 Nm continuous torque rating, insufficient cooling, or ambient temperature is too high.	Reduce the load or duty cycle. Ensure there is adequate airflow around the motor and that the housing is clean. Verify the ambient temperature is within the specified operating range.
Excessive audible noise or vibration during operation.	Misalignment with the driven load, an unbalanced load, loose mounting bolts, or worn internal bearings.	Power down and check mechanical alignment using a dial indicator. Verify load balance and re-torque mounting bolts. If noise persists, the bearings may need replacement.
Inaccurate or erratic positioning.	Poor servo tuning (PID gains), electrical noise on the encoder signal, or a loose shaft coupling.	Re-run the servo drive's auto-tuning procedure. Check that the encoder cable is shielded and grounded properly. Inspect the shaft coupling for any slippage or looseness.
Drive reports an encoder or feedback fault.	The encoder cable is damaged or not fully connected, or the	Inspect the full length of the encoder cable for damage. Disconnect and reconnect the cable at both the motor and

Symptom	Possible Cause	Solution
	internal encoder has failed.	drive ends. If the fault continues, the motor likely requires service.
Motor does not appear on the PROFINET network.	Incorrect device name or IP address set, faulty network cable, or GSDML file not loaded in the PLC project.	Use a PROFINET configuration tool to set the correct device name and IP address. Test the cable with a certified network tester. Ensure the correct GSDML file for the AC111-013 is installed in your engineering software.

7. Technical Specifications

Parameter	Value	Unit
Weight	4.2	kg
Material	Anodized Aluminum Alloy	
Voltage	480VAC	
IP Rating	IP65	
Country of Origin	KR	
Protocol	PROFINET	
Dimensions	110 x 110 x 215 mm	
Torque	4.1 Nm	