User Manual: NexBot Robotics AC111-017 AC Servo Motor, 17 Nm

SKU: NXB-SRV-AC111-017 | 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: HIGH VOLTAGE. Risk of fatal electrical shock. Disconnect and lock out all power sources before installation, service, or maintenance. The motor operates at 480VAC.

WARNING: UNEXPECTED MOTION. The motor can start without warning. Ensure the machine's emergency stop circuit is fully functional and accessible before operation.

WARNING: HOT SURFACE. During operation, the motor housing can reach high temperatures that may cause severe burns. Allow the motor to cool completely before touching.

CAUTION: HEAVY OBJECT. The AC111-017 motor weighs 8.5 kg. Use proper lifting techniques or mechanical assistance to avoid personal injury or equipment 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 AC111-017 is a high-torque AC servo motor engineered for precision motion control in automated manufacturing and assembly applications. This motor is a core component for achieving the speed, accuracy, and reliability required in modern industrial automation. It is designed to integrate seamlessly with NexBot Robotics drive systems, providing a robust solution for robot joint actuation. Key features include a high-density winding design that enables it to deliver a continuous torque of 17 Nm from a compact frame. This high torque-to-inertia ratio allows for rapid acceleration and deceleration of robot joints, which directly contributes to reduced cycle times and increased throughput in production environments. The brushless design minimizes mechanical wear, significantly reducing maintenance requirements and extending the operational lifespan of the motor compared to brushed alternatives. This focus on durability translates to a lower total cost of ownership. Constructed with a rugged, black anodized aluminum housing and sealed connectors, the AC111-017 achieves an IP65 rating. This level of protection ensures the motor is safeguarded against dust ingress and low-pressure water jets from any direction, making it suitable for deployment in challenging industrial environments where particulates or fluids are present. Operating on a standard 480VAC three-phase supply, it integrates easily into existing industrial power systems without requiring specialized power conversion equipment. The integrated high-resolution feedback system provides accurate, real-time position and velocity data to the robot controller, ensuring exceptional path accuracy and repeatability for tasks like welding, material handling, and machine tending. Installation is streamlined with a standardized flange mount and pre-configured power and feedback connectors.

3. Getting Started

1. Product Overview

The NexBot Robotics AC111-017 is a brushless AC servo motor designed for high-performance motion control. It delivers a continuous torque of 17 Nm and is intended for direct integration with NexBot Robotics servo drives. Its robust aluminum alloy construction and IP65 rating make it suitable for demanding industrial environments.

2. System Integration

This motor is optimized for use with NexBot Robotics' 'NDS' series servo drives. The drive must be correctly parameterized to match the motor's electrical specifications, including voltage, current, and encoder type. Refer to the servo drive's user manual for detailed configuration instructions.

3. PROFINET Configuration

The integrated PROFINET interface allows for real-time control and diagnostics over an industrial Ethernet network. To configure the motor, you will need the GSDML file provided by NexBot Robotics. This file must be imported into your PLC engineering software to establish communication and map process data.

4. Operation

Normal Operation

During normal operation, the motor will respond to commands from the connected servo drive to control position, speed, or torque. The motor's status can be monitored via the PROFINET network. Ensure that the operating parameters, such as load and duty cycle, remain within the motor's specified performance curve.

> **Tip:** Monitor the motor's temperature via the drive parameters. Consistently high temperatures may indicate an overloaded condition or insufficient cooling.

Tuning for Performance

To achieve optimal performance, the servo control loops (proportional, integral, derivative) in the drive must be tuned for the specific mechanical load. Use the auto-tuning function in the NexBot drive software as a starting point, followed by manual fine-tuning for applications requiring high precision.

Understanding Motor Feedback

The high-resolution encoder provides precise feedback on the motor shaft's position and velocity. This data is critical for closed-loop control. Any faults reported by the encoder, such as a loss of signal, will typically trigger a safe stop condition in the servo drive.

> **Tip:** Regularly check the encoder's diagnostic status bits via the drive controller to proactively identify potential signal degradation.

Fault and Alarm Handling

The servo drive will report any faults detected from the motor, such as over-current, over-temperature, or encoder errors. Refer to the drive's manual for a detailed list of fault codes and their meanings. Always resolve the root cause of a fault before resetting the drive and resuming operation.

5. Maintenance Schedule

Interval	Task	Notes
Weekly	Visually inspect the motor for any accumulation of dirt, debris, or fluid. Check for any signs of physical damage to the housing or connectors.	Ensure the motor is de-energized before cleaning.
Monthly	Check all mounting bolts for proper tightness. Verify that power, encoder, and communication cable connections are secure and show no signs of vibration-induced loosening.	Power must be locked out before checking electrical connections.
Quarterly	Clean the motor's cooling fins to ensure proper heat dissipation. Use compressed air or a soft brush. Do not use high-pressure liquids.	Clogged fins can lead to overheating and reduced motor life.

Interval	Task	Notes
Annually	Listen to the motor bearings for any signs of unusual noise (grinding, whining) during operation. This can be an early indicator of bearing wear.	Requires a trained technician. The bearings are sealed and lubricated for life under normal operating conditions.
Annually	Inspect cable insulation for signs of cracking, abrasion, or chemical damage, especially in harsh environments or applications with repetitive motion.	Replace any damaged cables immediately to prevent short circuits or signal loss.

6. Troubleshooting

Symptom	Possible Cause	Solution
Motor does not rotate when commanded	No power to motor; drive is in a fault state; mechanical brake is engaged; motor is mechanically seized.	Verify 480VAC power at the drive. Check the drive's display for fault codes and reset if necessary. Ensure any external brake signal is released. Disconnect load to check for seizure.
Motor overheats	Excessive load or duty cycle; blocked cooling fins; high ambient temperature; incorrect drive parameters (e.g., overcurrent).	Reduce the load or duty cycle. Clean the motor's cooling fins. Improve ventilation around the motor. Verify drive parameters match the motor's nameplate data.
Excessive noise or vibration	Poor mechanical alignment; worn or damaged bearings; unbalanced load; loose mounting bolts; control loop instability (tuning issue).	Re-align motor and load coupling. Check mounting bolts. Inspect bearings for wear. Re-tune the servo drive control loops.
Inaccurate positioning or 'hunting'	Encoder signal noise; loose encoder coupling; incorrect tuning gains; high mechanical backlash in the driven system.	Check encoder cable shielding and routing away from power lines. Verify encoder connection is secure. Re-tune PID loops. Inspect mechanical system for backlash.
Drive reports an 'Encoder Fault'	Encoder cable is disconnected, damaged, or incorrectly wired; encoder hardware has failed.	Inspect the encoder cable and its connections at both the motor and drive. Replace the cable if damaged. If the problem persists, the motor may require service.
No PROFINET communication	Incorrect IP address or device name; faulty network cable; incorrect	Verify PROFINET device name and IP settings match the PLC project.

Symptom	Possible Cause	Solution
	GSDML file in PLC project; network switch issue.	Test the network cable. Ensure the correct GSDML file for the AC111-017 is being used.
Motor trips on over-current fault immediately	Short circuit in motor windings or power cable; incorrect motor phasing; severely overloaded or seized mechanics.	Perform an insulation resistance test on the motor and cable. Verify power wiring (U, V, W) is correct. Disconnect load to isolate the motor from the mechanics.

7. Technical Specifications

Parameter	Value	Unit
Weight	8.5	kg
Material	Aluminum Alloy	
Voltage	480VAC	
IP Rating	IP65	
Country of Origin	CH	
Protocol	PROFINET	
Dimensions	210 x 115 x 115 mm	
Torque	17 Nm	