User Manual: NexBot Drives DC112-006 Dc Servo Motor

SKU: NXB-SRV-DC112-006 | 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 severe injury or death from electric shock. Disconnect and lock out all power sources before servicing the NexBot Drives DC112-006 motor.

WARNING: UNEXPECTED MOTION. The motor can move unexpectedly during operation or when power is applied. Keep all body parts and foreign objects clear of the motor's range of motion.

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

CAUTION: HEAVY OBJECT. The motor weighs 2.1 kg. Use proper lifting techniques to avoid injury during handling and installation.

NOTICE: Electrostatic discharge (ESD) can damage internal electronics. Use proper ESD-safe procedures when handling the motor's connectors and cables.

2. Product Overview

The NexBot Drives DC112-006 is a high-performance brushed DC servo motor designed for reliable and precise motion control in demanding industrial automation environments. This component is engineered to provide dynamic response and accurate positioning, making it an ideal choice for robotic applications requiring agile and repeatable movements. The core of the DC112-006 is its high-energy magnet design, which enables a high torque-to-inertia ratio. This feature allows for rapid acceleration and deceleration, critical for reducing cycle times in pick-and-place, assembly, and material handling tasks. It delivers a continuous rated torque of 1.2 Nm, providing sufficient power for smaller joint actuation and end-of-arm tooling manipulation. The motor's construction emphasizes durability, with a rugged anodized aluminum housing and an IP65 rating, ensuring protection against dust ingress and low-pressure water jets from any direction. Operating on a standard 48VDC power supply, this servo motor integrates seamlessly into common industrial power systems. Its design prioritizes smooth, low-cogging operation across its entire speed range up to a rated speed of 3000 RPM. This results in superior path accuracy and finer control over the robot's movements, which is essential for tasks like dispensing, welding, or inspection. Installation involves mounting the motor to the designated robot joint or fixture and connecting it to a compatible motion control system. Regular inspection of electrical connections is recommended to ensure long-term performance and reliability. The DC112-006 serves as a direct replacement part for specified NexBot robot models, ensuring minimal downtime during maintenance cycles.

3. Getting Started

1. Product Overview

The NexBot Drives DC112-006 is a 48VDC brushed servo motor designed for high-performance industrial applications. It features an IP65-rated anodized aluminum housing, integrated feedback, and a PROFINET communication interface for direct network integration with compatible controllers.

2. Connecting to a Servo Drive

The DC112-006 must be operated with a compatible servo drive capable of supplying 48VDC and interpreting its feedback signals. Connect the power, feedback, and PROFINET cables as detailed in the installation guide. Refer to your servo drive's documentation for specific terminal assignments and configuration.

3. Initial PROFINET Configuration

To configure the motor, import the provided GSDML file into your PLC engineering software. Assign a unique device name and IP address to the motor on the PROFINET network. Once configured and downloaded, the motor will be accessible for control and diagnostics.

4. Operation

Normal Operating Parameters

The DC112-006 is designed to operate continuously at its rated voltage of 48VDC and can provide a continuous torque of 1.2 Nm. Exceeding these parameters for extended periods may cause overheating and reduce the motor's lifespan. Peak

torque values can be achieved for short durations during acceleration and deceleration.

> **Tip:** Monitor motor temperature via the drive parameters. A reading consistently above the recommended maximum indicates an overloaded condition.

Motion Profiles

Utilize your servo drive's programming software to create motion profiles (e.g., trapezoidal or S-curve) to control the motor's position, velocity, and acceleration. The high torque-to-inertia ratio of the DC112-006 allows for highly dynamic and responsive profiles.

Tuning for Performance

Properly tuning the servo loops (proportional, integral, derivative gains) in the drive is critical for optimal performance. An untuned system may exhibit overshoot, oscillation, or sluggish response. Use the auto-tuning feature of your drive first, then manually adjust if necessary to meet specific application requirements.

> **Tip:** Start with low gain values and increase them gradually to avoid instability during the tuning process.

Fault Diagnostics via PROFINET

The DC112-006 reports its status and any fault conditions over the PROFINET network. Monitor the diagnostic data in your PLC to detect issues such as over-current, over-temperature, or feedback errors. Refer to the GSDML file documentation for a complete list of diagnostic codes.

5. Maintenance Schedule

Interval	Task	Notes
Daily	Visually inspect the motor for any signs of physical damage, loose connections, or fluid leaks.	Listen for any changes in operating noise, such as grinding or whining.
Weekly	Clean the exterior of the motor housing. Remove any buildup of dust or debris that could impede heat dissipation.	Use a dry or slightly damp cloth. Do not use harsh solvents.
Monthly	Check that all mounting bolts and electrical connectors are secure and have not loosened due to vibration.	Power must be locked out before checking electrical connectors.
Quarterly	Inspect motor brushes for wear by removing the inspection caps. Check for sparking during operation.	Excessive sparking may indicate worn brushes. Replace brushes if they are worn to the service limit line.
Annually	Inspect power and communication cables for	Replace any damaged cables immediately to prevent

Interval	Task	Notes
	signs of wear, abrasion, or cracking.	electrical hazards or communication loss.
As Needed	Check shaft seal integrity, especially in environments with high exposure to dust or liquids.	A compromised seal can lead to internal contamination and bearing failure.

6. Troubleshooting

Symptom	Possible Cause	Solution
Motor does not rotate when commanded	No power to motor/ drive, incorrect wiring, drive in fault state, or mechanical seizure.	Verify 48VDC power at the drive and motor. Check all wiring against the schematic. Reset drive faults. Disconnect the load to check for a seized bearing or gearbox.
Motor overheats	Excessive mechanical load, incorrect drive parameters (e.g., current limit too high), or insufficient cooling.	Verify the application load is within the 1.2 Nm continuous torque rating. Reduce the current limit in the drive. Ensure adequate airflow around the motor.
Excessive noise or vibration	Shaft misalignment, worn bearings, loose mounting bolts, or unstable servo tuning.	Re-align the motor and load coupling. Check for shaft play indicating worn bearings. Torque all mounting bolts. Re-tune the servo gains in the drive.
Inaccurate or lost positioning	Loose coupling, encoder/feedback cable damage, electrical noise, or mechanical backlash.	Inspect and tighten the shaft coupling. Check the feedback cable for damage and ensure it is securely connected. Verify proper grounding and shielding. Check the mechanical system for backlash.
PROFINET communication failure	Incorrect IP address, faulty cable, network switch issue, or incorrect GSDML file.	Verify the motor's IP address and device name are correct and unique. Test the cable with a network tester. Ensure the GSDML file in the project matches the motor's firmware version.
Motor jitters or oscillates at standstill	Servo loop gains are too high (instability), electrical noise on the feedback signal, or mechanical resonance.	Lower the proportional (P) and derivative (D) gains in the servo drive. Ensure feedback cable shielding is properly grounded. Add a notch filter in the drive parameters if resonance is the cause.

Symptom	Possible Cause	Solution
Drive reports an 'Over-Current' fault	Shorted motor winding, sudden mechanical blockage, or acceleration/ deceleration rates are too aggressive.	Measure winding resistance with a multimeter (with power off). Check for any obstructions in the mechanical system. Reduce the acceleration/deceleration values in the motion profile.

7. Technical Specifications

Parameter	Value	Unit
Weight	2.1	kg
Material	Anodized Aluminum 6061-T6	
Voltage	48VDC	
IP Rating	IP65	
Country of Origin	KR	
Protocol	PROFINET	
Dimensions	185 x 60 x 60 mm	
Torque	1.2 Nm	

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