User Manual: NexBot Drives STP113-002 Stepper Motor

SKU: NXB-SRV-STP113-002 | 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 electric shock. Disconnect and lock out all power sources before installation or maintenance. The connected drive can store a lethal charge even after power is removed.

WARNING: Unexpected machine motion can cause serious injury. Ensure the driven mechanism is in a safe state before applying power. The motor may move unexpectedly upon power-up.

WARNING: The motor's holding torque of 4.5 Nm can cause severe injury if fingers or limbs are caught in the driven mechanism. Keep hands and tools clear of moving parts during operation.

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

NOTICE: The STP113-002 has an IP54 rating. It is protected against dust ingress and water spray from any direction, but it is not submersible. Do not expose to high-pressure jets or submerge in liquid.

2. Product Overview

The NexBot Drives STP113-002 is a high-performance stepper motor engineered for demanding industrial automation and robotics applications requiring precise, repeatable positioning. This motor provides a robust solution for tasks where accuracy and reliability are critical, serving as a core component in custom end-of-arm tooling, auxiliary axes, and automated positioning systems. Key Features and Benefits: The standout feature of the STP113-002 is its high holding torque of 4.5 Nm, which ensures the motor can hold a load steady against external forces without power, a critical requirement for safety and process integrity. Its standard 1.8° step angle (200 steps per revolution) allows for fine positional control, translating into smoother and more accurate movements for your robotic system. The motor's design emphasizes low vibration and reduced resonance, which contributes to quieter operation and extends the mechanical life of the entire system by minimizing wear. Industrial Applications: This stepper motor is well-suited for a variety of robotic applications, including automated material handling, precise part orientation for assembly, driving conveyor systems, and positioning inspection equipment. It is frequently integrated with NexBot C-series and S-series robots to operate custom grippers, rotary indexers, or other peripheral devices that augment the robot's primary functions. The motor's torque and precision are ideal for pick-and-place operations where consistent component placement is essential for quality control. Construction and Installation: Built with a rugged anodized aluminum body, the STP113-002 is designed to withstand typical industrial environments and dissipate heat effectively. It features a standard NEMA 34 mounting flange, ensuring straightforward mechanical integration with existing designs and hardware. The motor operates on a flexible 24-48VDC power supply, making it compatible with common industrial power systems. Electrical connection is facilitated through an integrated connector for reliability and ease of maintenance.

3. Getting Started

1. Unpacking and Inspection

Carefully unpack the STP113-002 motor and inspect it for any signs of damage that may have occurred during transit. Verify that the product SKU on the motor label matches your order. Retain the original packaging for future transportation or storage.

2. Understanding the Nameplate

The motor nameplate contains critical information, including the model number (STP113-002), voltage range (24-48VDC), and wiring connections. Always refer to this information when configuring the compatible stepper drive controller.

3. Drive and Power Supply Selection

Select a stepper motor drive capable of supplying the required phase current for the STP113-002 and operating within the 24-48VDC range. The power supply should be rated to handle the current demands of the drive and motor combination under full load.

4. Operation

Configuring Drive Current

Set the output current on your stepper drive to match the motor's specifications. Setting the current too low will result in reduced torque, while setting it too high will cause the motor to overheat, potentially damaging the windings.

> **Tip:** For applications that do not require full torque, consider using the drive's automatic current reduction feature at standstill to minimize motor heating and energy consumption.

Microstepping Configuration

Configure the microstepping setting on your drive to achieve the desired motion smoothness and resolution. Higher microstepping values provide smoother, quieter operation, but may slightly reduce maximum torque at high speeds.

Understanding Torque Curves

The motor's available torque decreases as its speed increases. Refer to the STP113-002 performance curve to ensure your application's speed and torque requirements do not exceed the motor's capabilities. The 4.5 Nm rating is the holding torque at standstill.

> **Tip:** Operating the motor in the lower half of its speed range will provide more reserve torque for acceleration and unexpected load variations.

Thermal Management

The motor is designed to dissipate heat through its anodized aluminum casing. Ensure adequate airflow around the motor. In high-duty-cycle applications or warm environments, consider additional heat sinking or forced-air cooling to maintain optimal performance.

5. Maintenance Schedule

Interval	Task	Notes
Weekly	Visually inspect the motor for any buildup of dust or debris. Listen for any changes in operational noise, such as grinding or whining, which could indicate bearing wear.	A clean motor dissipates heat more effectively.

Interval	Task	Notes
Monthly	Check all electrical connections at the motor and the drive for tightness and signs of corrosion or overheating. Ensure cable insulation is intact.	Loose connections can cause intermittent faults and are a potential fire hazard.
Quarterly	Verify that the motor mounting bolts are secure and torqued to specification. Check the shaft coupling for any signs of slippage or wear.	Machine vibration can cause fasteners to loosen over time.
Annually	Clean the motor's exterior surfaces. Use a soft brush or compressed air to remove accumulated dust from cooling fins.	Do not use high-pressure solvents that could damage seals or windings.
As Needed	If the motor is operated in a harsh environment, increase the frequency of inspections. The IP54 rating provides protection, but does not eliminate the need for cleaning.	Environments with high levels of particulate matter or moisture require more frequent checks.

6. Troubleshooting

Symptom	Possible Cause	Solution
Motor is hot to the touch.	Drive current is set too high, or the duty cycle is 100% at full load. Inadequate cooling.	Reduce the drive current setting. Enable automatic current reduction if available. Improve airflow around the motor or add a heat sink.
Motor stalls or loses steps.	Load torque exceeds motor capability at the current speed. Acceleration/deceleration ramp is too aggressive. Drive voltage is too low.	Reduce the load, decrease the operating speed, or use a gearbox. Lengthen the acceleration ramp. Increase power supply voltage (within the 24-48VDC range).
Motor vibrates excessively or is very loud.	Mechanical resonance at the current operating speed. Misalignment between motor shaft and load. Incorrect microstepping setting.	Change the operating speed to avoid the resonant frequency. Re-align the shaft coupling. Increase the microstepping resolution on the drive.

Symptom	Possible Cause	Solution
Motor does not turn but may hum or lock in place.	One motor phase is disconnected. Motor is mechanically jammed. Incorrect wiring sequence.	Check all wiring between the drive and motor. Remove the load and check if the motor shaft can be turned by hand. Verify wiring (A+/A-, B+/B-) matches the drive manual.
Motor turns in the wrong direction.	Polarity of one motor phase winding is reversed. Direction signal from the controller is inverted.	Swap the connections for one phase (e.g., swap B+ and B-). Alternatively, invert the direction signal in the controller software.
Low or weak torque.	Drive current is set too low. Power supply voltage is sagging under load. Motor phases are wired incorrectly (e.g., in series instead of parallel if applicable).	Increase the drive current setting to match the motor specification. Use a larger power supply. Confirm the correct wiring configuration for the motor.

7. Technical Specifications

Parameter	Value	Unit
Weight	2.5	kg
Material	Anodized Aluminum	
Voltage	24-48VDC	
IP Rating	IP54	
Country of Origin	KR	
Dimensions	86 x 86 x 118 mm	
Torque	4.5 Nm	