

Installation Guide: NexBot Robotics STP113-004 NEMA 23 Stepper Motor 3.0 Nm

SKU: NXB-SRV-STP113-004 | Revision: 1.0 | Category: Drive Systems > Servo Motors > Stepper Motors

DANGER: Disconnect all power sources before beginning installation. Follow lockout/tagout (LOTO) procedures per OSHA 1910.147.

1. Required Tools & Materials

- M4 Hex Key / Allen Wrench Set
- Torque Wrench (0-5 Nm range) with M4 hex bit
- Digital Multimeter
- Wire Stripper and Cutter (22-18 AWG)
- Crimping Tool and appropriate terminals (e.g., ferrules)
- Precision Calipers or Ruler
- Safety Glasses
- Mounting Screws (M4, length appropriate for bracket)

2. Pre-Installation Checks

1. Verify the product SKU on the motor label matches NXB-SRV-STP113-004.
2. Inspect the motor body, shaft, and lead wires for any signs of shipping damage.
3. Manually rotate the motor shaft to feel for smooth rotation and consistent detent torque. There should be no grinding or binding.
4. Confirm your stepper motor driver's voltage and current output are compatible with the motor's 24-48VDC rating and phase current requirements.
5. Ensure the mounting surface is flat, rigid, and clean to provide proper alignment and heat dissipation.
6. Review the STP113-004 datasheet to identify the wire color coding for motor phases A+, A-, B+, and B-.

3. Installation Procedure

Step 1: Mechanical Mounting

Align the motor's NEMA 23 mounting face (57.2 x 57.2 mm) with the mounting bracket. Insert four M4 screws through the bracket into the motor's threaded holes and tighten them in a cross pattern to ensure even pressure.

Warning: Do not overtighten mounting screws. Use a torque wrench to tighten to the recommended specification (typically 1.5-2.0 Nm) to avoid distorting the motor frame.

Step 2: Shaft Coupling

Attach the mechanical load, such as a pulley or coupler, to the motor's shaft. Ensure the coupling is fully seated and secured according to its manufacturer's instructions to prevent slippage and vibration.

Warning: Never hammer a component onto the motor shaft. This can damage the bearings and lead to premature motor failure. Use a correctly sized coupling.

Step 3: Wire Preparation

Carefully strip approximately 6 mm of insulation from the end of each of the four motor lead wires. If using screw terminals on the driver, twist the strands tightly or use ferrules for a secure connection.

Step 4: Connecting Motor to Driver

Connect the motor's phase wires to the corresponding output terminals on the stepper driver (A+, A-, B+, B-). Mismatched wiring is a common cause of motor malfunction.

Warning: Ensure the driver is completely powered down before making or changing any wire connections. Connecting or disconnecting the motor with power applied can destroy the driver and motor.

Step 5: Grounding the Motor Frame

For electrical safety and to minimize electromagnetic interference (EMI), connect the motor's metallic body to the system's earth ground. This can be achieved via a dedicated ground wire or by ensuring the mounting bracket has a solid connection to a grounded chassis.

Warning: Improper grounding can create a safety hazard and introduce electrical noise that may affect control signals.

Step 6: Driver Configuration

Set the output current on your stepper driver to match the motor's rated phase current as specified in its datasheet. Configure the driver's microstepping setting (e.g., 1/8, 1/16) to achieve the desired balance of smoothness and resolution for your application.

Warning: Setting the driver current significantly higher than the motor's rating will cause it to overheat, drastically reducing its lifespan and potentially causing a fire hazard.

Step 7: Initial Power-Up Test

Before connecting the load, apply power (24-48VDC) to the stepper driver. The motor shaft should immediately become difficult to turn by hand, indicating that the windings are energized and holding torque is present.

4. Post-Installation Verification

1. Verify holding torque by gently trying to turn the shaft by hand while the motor is powered but stationary. It should strongly resist.
2. Issue a slow-speed jog command and confirm the motor rotates smoothly in both directions without stalling.
3. Run the motor under a typical load for 5-10 minutes and check its temperature. The case will get warm, but should not be too hot to touch for a few seconds.
4. Listen for any unusual grinding, rattling, or high-pitched whining noises that could indicate a mechanical or electrical issue.
5. Check that all electrical connections are still secure and have not loosened from initial vibration.

6. If using an encoder, verify that it is reporting position changes that correctly correspond to the motor's movement.

Note: For technical support, contact your authorized service provider or visit <https://robotics.barca.group/support>.