

[Manuals.plus](#) /

› [Automation Technology Inc.](#) /

› NEMA23 140oz/in 2.8A Stepper Motor 1/4" Single shaft (KL23H251-28-4A) User Manual

Automation Technology Inc. KL23H251-28-4A

NEMA23 Stepper Motor User Manual

Model: KL23H251-28-4A

1. INTRODUCTION

This manual provides essential information for the proper installation, operation, and maintenance of the Automation Technology Inc. NEMA23 Stepper Motor, model KL23H251-28-4A. This motor is a hybrid stepper motor designed for precision motion control applications, commonly found in 3D printers, CNC machines, and other automated systems.

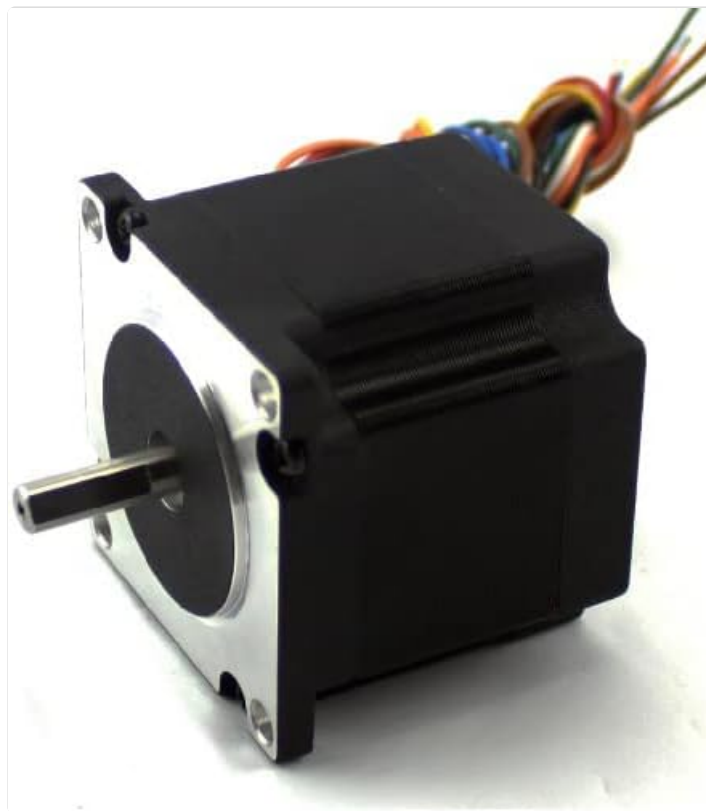


Figure 1: The NEMA23 Stepper Motor (KL23H251-28-4A) with its single shaft and wiring harness.

2. PRODUCT FEATURES

- **NEMA23 Frame Size:** Standardized mounting for broad compatibility.

- **High Holding Torque:** 140 oz-in (approximately 1.0 Nm) for robust performance.
- **Precision Step Angle:** 1.8 degrees per step, resulting in 200 steps per revolution for fine control.
- **Bipolar Parallel Wiring:** 4-wire configuration (Red A+, Blue A-, Green B+, Black B+) for simplified connection.
- **Low Inductance:** 2.2 mH inductance per phase, contributing to better high-speed performance.
- **Single Shaft Design:** ¼ inch (6.35mm) single shaft for direct drive applications.
- **Rated Current:** 2.8 Amps per phase.
- **Rated Voltage:** 2.3 Volts.

3. TECHNICAL SPECIFICATIONS

Parameter	Value
Model Number	KL23H251-28-4A
Frame Size	NEMA23
Step Angle	1.8° / 200 Steps Per Revolution
Rated Voltage	2.3V
Current Per Phase	2.8A (Bipolar Parallel)
Resistance Per Phase	0.83 Ω (at 20°C)
Inductance Per Phase	2.2 mH
Holding Torque	140 oz-in (approx. 1.0 Nm)
Rotor Inertia	220 g.cm²
Weight	0.62 Kg
Temperature Rise	80°C Max
Insulation Class	B
Dielectric Strength	500VDC
Insulation Resistance	100MΩ (500VDC)
Radial Play	0.025mm max. (450g load)

4. DIMENSIONS

The following diagram illustrates the mechanical dimensions of the KL23H251-28-4A stepper motor. All dimensions are in millimeters (mm) unless otherwise specified.

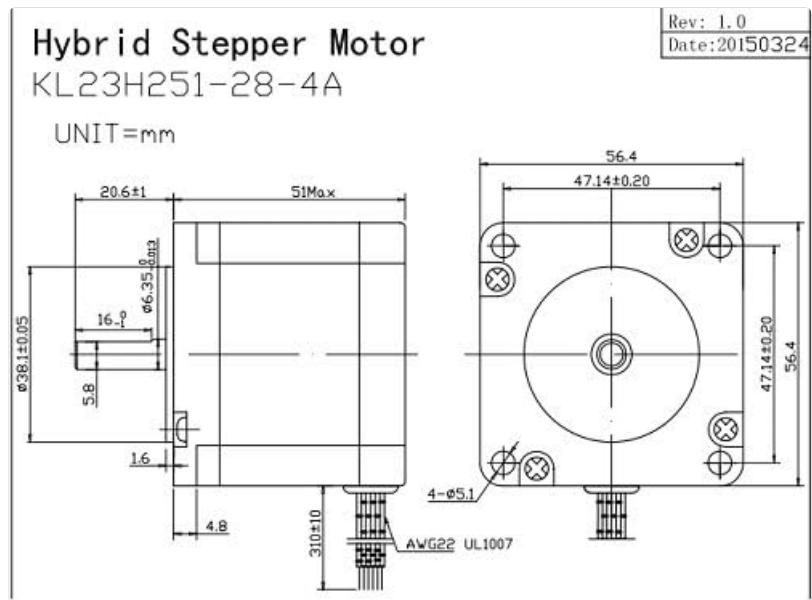


Figure 2: Dimensional drawing of the KL23H251-28-4A stepper motor, showing key measurements for mounting and integration.

- **Shaft Diameter:** ¼ inch (6.35 mm)
- **Shaft Length:** 20.6 mm
- **Mounting Hole Spacing:** 47.14 mm x 47.14 mm (NEMA23 standard)
- **Motor Body Length:** 51 mm (Max)

5. WIRING DIAGRAM

The KL23H251-28-4A is a 4-wire bipolar stepper motor. Proper wiring to a compatible stepper motor driver is crucial for correct operation. Refer to the diagram below for wire color assignments.

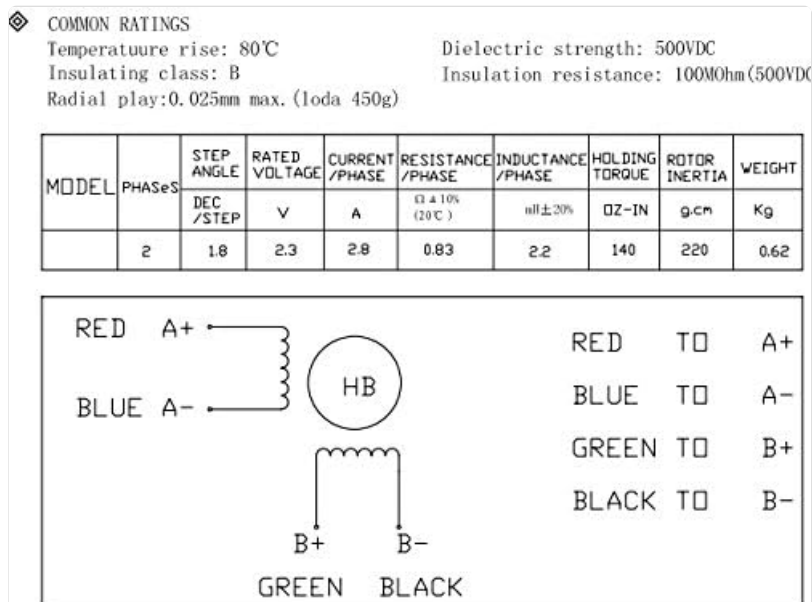


Figure 3: Wiring diagram for the KL23H251-28-4A stepper motor, showing coil connections and wire color assignments.

Wire Color Assignments:

- **Red:** A+
- **Blue:** A-
- **Green:** B+
- **Black:** B-

Ensure these connections are made correctly to your stepper motor driver. Incorrect wiring can lead to motor malfunction or damage to the driver.

6. PERFORMANCE CHARACTERISTICS (TORQUE-SPEED CURVE)

The torque-speed curve illustrates the motor's available torque at various speeds. This is a critical factor for selecting the appropriate motor for your application.



Figure 4: Torque-speed curve for the KL23H251-28-4A stepper motor, showing performance with a KL-4030 driver at 24V (green) and 36V (blue).

The graph shows the relationship between torque (Nm) and speed (RPM) when driven by a KL-4030 stepper driver. Note that higher supply voltage (e.g., 36V vs. 24V) generally allows the motor to maintain higher torque at higher speeds.

7. SETUP AND INSTALLATION

7.1 Mounting

The NEMA23 frame provides standard mounting holes. Secure the motor firmly to a stable surface using appropriate screws. Ensure there is no excessive vibration or misalignment during mounting, as this can affect motor performance and lifespan.

7.2 Driver Connection

Connect the motor to a compatible bipolar stepper motor driver. Refer to Section 5 for the correct wire color assignments. Ensure the driver's current settings are configured to match the motor's rated current (2.8A per phase) to prevent overheating or underperformance. Use shielded cables for longer runs to minimize electrical noise.

7.3 Power Supply

Select a power supply that can provide sufficient voltage and current for your stepper motor driver and motor combination. While the motor is rated for 2.3V, stepper drivers typically operate with higher supply voltages (e.g., 24V, 36V, 48V) to achieve better high-speed performance. Consult your driver's manual for recommended voltage ranges.

8. OPERATING PRINCIPLES

Stepper motors operate by converting digital pulses into precise mechanical rotational movements. Each pulse from the driver causes the motor to rotate a specific step angle (1.8° for this motor). By controlling the sequence and frequency of these pulses, the motor's position and speed can be accurately controlled. This motor is a hybrid stepper, combining features of permanent magnet and variable reluctance motors for improved performance.

9. MAINTENANCE

Stepper motors are generally low-maintenance devices. However, adhering to the following guidelines can prolong their lifespan and ensure optimal performance:

- **Keep Clean:** Regularly clean the motor's exterior to prevent dust and debris buildup, which can impede heat dissipation.
- **Check Connections:** Periodically inspect all electrical connections for tightness and signs of wear or corrosion.
- **Monitor Temperature:** Ensure the motor operates within its specified temperature limits (max 80°C temperature rise). Excessive heat can degrade insulation and reduce lifespan.
- **Avoid Overloading:** Do not exceed the motor's rated torque or speed limits, as this can lead to stalling, overheating, and damage.
- **Shaft Alignment:** Ensure the motor shaft is properly aligned with any coupled loads to prevent undue stress on the bearings.

10. TROUBLESHOOTING

Problem	Possible Cause	Solution
Motor not moving or vibrating	Incorrect wiring; insufficient current; driver fault; motor stalled due to overload.	Verify wiring against Section 5. Check driver current settings. Reduce load or increase driver current (within motor limits). Inspect driver for errors.
Motor overheating	Excessive current; insufficient cooling; continuous high load.	Reduce driver current if too high. Ensure adequate ventilation. Consider a heatsink or fan if operating in high ambient temperatures or under heavy load.
Loss of steps / Inaccurate positioning	Motor stalling; excessive speed; mechanical binding; electrical noise.	Reduce acceleration/deceleration rates. Lower maximum speed. Check for mechanical obstructions. Use shielded cables and proper grounding.
Excessive noise or vibration	Improper microstepping settings; mechanical resonance; loose mounting.	Adjust microstepping settings on driver. Ensure motor is securely mounted. Consider anti-vibration mounts.

11. WARRANTY AND SUPPORT

For warranty information and technical support, please contact Automation Technology Inc. directly. Keep your purchase receipt as proof of purchase. Detailed warranty terms and conditions may be available on the manufacturer's official website or included with your product packaging.

Manufacturer: Automation Technology Inc.

For further assistance, visit: [Automation Technology Inc. Official Website](#)

ASK A QUESTION ABOUT THIS MANUAL

Ask about setup, troubleshooting, compatibility, parts, safety, or missing instructions. Manuals+ will review the question and use this page's manual context to help answer it.

Name

Anonymous

Email

you@example.com

After a successful submission, we securely hash the supplied account or form email before sending it to Microsoft Advertising for conversion attribution. [Privacy details](#).

Question

Example: How do I reset this device or fix this error?

Details

Model number, symptoms, what you tried, or the section of the manual you are using.

Submit question