

57STH56 NEMA 23 Bipolar Precision Gearless Stepper



This NEMA-23 motor generates 12 kg-cm of holding torque at 2.8 Amps. It comes with the rear shaft exposed, so you can mount an encoder or shaft coupler. See the “Compatible Products” tab for a complete list of attachments.

This motor is particularly suited for precision applications due to its 0.9° step angle.

When connected to a 1067 – PhidgetStepper Bipolar HC, the 3330 has a maximum speed of approximately 2250 RPM. See the “Compatible Products” tab for wiring details.

Connection

This motor must be controlled by a constant current or chopper drive controller. You can find a list of suitable controllers on the **Compatible Products** tab. There you will also find compatible attachments such as encoders, mounting hardware, and transmission hardware.

Warning

Connecting the motor directly to a power supply will destroy the motor and void the warranty. If you want to check your motor make sure it is connected to a constant current / chopper drive controller.

Product Specifications

Motor Properties

Motor Type	Bipolar Stepper
Manufacturer Part Number	57STH56-2804MB
Step Angle	0.9°
Step Accuracy	± 5 %
Holding Torque	12 kg·cm

Rated Torque	11.2 kg·cm
Maximum Speed (w/1067 Motor Controller)	2250 RPM
Acceleration at Max Speed (w/1067 Motor Controller)	800000 1/16 steps/sec ²

Electrical Properties

Recommended Voltage	12 V DC
Rated Current	2.8 A
Coil Resistance	900 mΩ
Phase Inductance	4.5 mH

Physical Properties

Shaft Diameter	1/4" ≈ 6.35 mm
Rear Shaft Diameter	3.9 mm
Mounting Plate Size	NEMA – 23
Weight	695 g
Number of Leads	4
Wire Length	300 mm

Documents

- [Stepper Motor and Controller Primer](#)
- [Mechanical Drawings](#)
- [Download 3D Step File](#)

Projects

- [Motor Music: Play MIDI Files using Phidget Stepper Motors \(June 1, 2015\)](#)
- [How To Avoid Resonance Issues in Stepper Motors \(July 28, 2014\)](#)
- [Steppers with Encoders: When Open-loop Control Is Not Enough \(May 13, 2014\)](#)

Motor Controllers

This motor must be controlled by a stepper motor controller. This diagram shows how to connect the motor wires to the controller to produce a clockwise rotation in the stepper motor when increasing position. To wire for counter-clockwise rotation when increasing position, reverse the red and blue wires.

Note: Make sure to unplug the power cord from the motor controller before switching wires around.

The following stepper controllers can be used to drive this motor:

Product		Controller Properties		Electrical Properties
Part Number	Motor Position Resolution	Stepper Velocity Resolution	Stepper Velocity Max	Available Current per Coil Max
1067_0B	$1\frac{1}{16}$ Step (40-Bit Signed)	1 $\frac{1}{16}$ steps/sec	250000 $\frac{1}{16}$ steps/sec	4 A
STC1000_0	$1\frac{1}{16}$ Step (40-Bit Signed)	1 $\frac{1}{16}$ steps/sec	115000 $\frac{1}{16}$ steps/sec	4 A

Encoders

The rear shaft of this motor can be equipped with an encoder for applications where you need to keep track of the exact position, velocity, or acceleration of the motor. The mounting holes on the back of this motor are compatible with the following encoders:

Product		Encoder Properties	
Part Number	Output Circuit Type	Encoder Resolution	Encoder Speed Max
3531_0	Push-Pull (Single-Ended)	300 CPR	6000 RPM

Shaft Couplers

If you need to connect the main shaft of this motor to the shaft of another device, you can use a shaft coupler:

Product		Physical Properties		
Part Number	Inner Diameter	Material	Coupling Rated Torque	Coupling Rated Speed
TRM4312_0	$\frac{1}{4}$ " Φ	Aluminum	35.7 kg $\cdot$ cm	12000 RPM

Pulleys and Sprockets

If you're using this motor to drive a rotary system that requires a lot of torque, you may be interested in pulleys and sprockets. By using a two pulleys or sprockets of different sizes, you can increase the gear ratio of the motor. Pulleys and sprockets can also be used to transmit the motor's rotation over a long distance. For more guidance on building a transmission system, visit our Rotary Motion Primer. Here is a list of our 1/4" bore pulleys and sprockets:

Product		Physical Properties
Part Number	Inner Diameter	Number of Teeth
TRM4101_0	$\frac{1}{4}$ " Φ	22
TRM4165_0	$\frac{1}{4}$ " Φ	12

Mounting Brackets

Mounting this motor to a flat surface is easy with these metal mounting brackets. The holes on the bracket match those on the back of the motor, as well as the ones on the front of the gearbox. The following brackets will fit the mounting holes on this motor:

Product		Physical Properties
Part Number	Mounting Plate Size	Material
3339_0	NEMA – 23	Mild Steel (Coated)