

28STH32 NEMA-11 Bipolar Stepper with 100:1 Gearbox



This NEMA-11 motor has a Planetary gearbox with a $99^{1044}/_{2057}$:1 ratio. 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.

When connected to a [1067 – PhidgetStepper Bipolar HC](#), the 3322 has a maximum speed 35 RPM. At the output of the gearbox, the step angle is approximately 0.018° . When using the step angle in calculations, you should derive the exact step angle by dividing 1.8° by the gearbox reduction ratio. See the “Compatible Products” tab for wiring details.

At 0.67 Amps, this stepper motor can produce a maximum torque of 60 kg-cm. However, the gearbox is only rated for 32 kg-cm of continuous torque. Loading this gearbox stepper beyond the torque rating of the gearbox will shorten its useful life.

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	28STH32-0674B / 28JXS40K100
Step Angle	0.018°
Step Accuracy	± 5 %
Holding Torque	32 kg·cm
Rated Torque	32 kg·cm
Maximum Speed (w/1067 Motor Controller)	35 RPM
Acceleration at Max Speed (w/1067 Motor Controller)	1.5E+06 1/16 steps/sec ²

Electrical Properties

Recommended Voltage	12 V DC
Rated Current	670 mA
Coil Resistance	5.6
Phase Inductance	3.4 mH

Physical Properties

Shaft Diameter	6 mm
Rear Shaft Diameter	3.9 mm
Mounting Plate Size	NEMA – 11
Weight	243.6 g
Number of Leads	4
Wire Length	300 mm

Gearbox Properties

Gearbox Type	Planetary
Gear Ratio	$99 \frac{1044}{2057} : 1$
Backlash Error	$1 \frac{1}{2}^{\circ}$
Maximum Strength of Gears	32 kg·cm
Shaft Maximum Axial Load	25 N
Shaft Maximum Radial Load	35 N

Documents

- [Stepper Motor and Controller Primer](#)
- [Mechanical Drawings](#)

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 / ₁₆ Step (40-Bit Signed)	1 ¹ / ₁₆ steps/sec	250000 ¹ / ₁₆ steps/sec	4 A
STC1000_0	¹ / ₁₆ Step (40-Bit Signed)	1 ¹ / ₁₆ steps/sec	115000 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	Torsional Stiffness
3422_0	6 mm	Aluminium	4.1 kg?·cm	10000 RPM	100 N?·m/rad
3426_0	6 mm	Aluminium	60.7 kg?·cm	16000 RPM	63 N?·m/rad

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 6mm bore pulleys and sprockets:

Product		Physical Properties	
Part Number	Inner Diameter	Number of Teeth	
TRM4162_0	6 mm	22	

