Motor with 48 CPR Encoder for 25D mm Metal Gearmotors (No Gearbox)

This is the motor and encoder portion of the low-power (non-HP) versions of our 25D mm metal gearmotors with 48 CPR encoders. It does not include a gearbox, but the pinion gear on the output shaft works with all of our 25D mm gearmotor gearboxes, so this can be used as a replacement motor or encoder for those gearboxes. It is intended for use at 6 V, though it should operate comfortably in the 3 V to 9 V range.

Key specs at 6 V: 5600 RPM and 80 mA free-run, 1 oz-in (0.07 kg-cm) and 2.2 A stall.

Overview

This motor with integrated 48 CPR (counts per revolution) quadrature encoder is intended as a replacement low-power (non-HP) motor and encoder for our 25D mm metal gearmotors. The output shaft has a non-removable pinion gear that works with all of our 25D mm gearmotor gearboxes. Note that we do not sell the 25D mm gearboxes separately, but if you have a gearmotor with a damaged motor or encoder (or if you want to effectively add an encoder to a version without an encoder), you can transfer the gearbox to this replacement motor.

The motor has a diameter of 24.2 mm (0.95 in) and a length of approximately 43 mm (1.7 in) from the top of the motor can to the bottom of the encoder. The top of the motor has two mounting holes threaded for M3 screws. These mounting holes are 17 mm apart and form a line with the motor shaft at the center. The mounting holes have a depth of approximately 6.5 mm.

A higher-power motor with encoder with identical dimensions and an identical pinion gear is also available.

Pinion Gear Specs

Metric with module m = 0.4
Number of teeth: 12
Face thickness: 2.5 mm
Pressure angle: 20°
Gear position: 4.5 mm from top of motor to top of gear

A two-channel Hall effect encoder is used to sense the rotation of a magnetic disk on a rear protrusion of the motor shaft. The quadrature encoder provides a resolution of 48 counts per revolution of the motor shaft when counting both edges of both channels. To compute the counts per revolution of the gearbox output, multiply the gear ratio by 48. The motor/encoder has six color-coded, 11" (28 cm) leads terminated by a 1×6 female header with a 0.1" pitch, as shown in the main product picture. This header works with standard 0.1" male headers and our male jumper and precrimped wires. If this header is not convenient for your application, you can pull the crimped wires out of the header or cut the header off. The following table describes the wire functions:

The Hall sensor requires an input voltage, Vcc, between 3.5 and 20 V and draws a maximum of 10 mA. The A and B outputs are square waves from 0 V to Vcc approximately 90° out of phase. The frequency of the transitions tells you the speed of the motor, and the order of the transitions tells you the direction. The following oscilloscope capture shows the A and B (yellow and white) encoder outputs using a motor voltage of 6 V and a Hall sensor Vcc of 5 V:

Color	Function
Red	motor power (connects to one motor terminal)
Black	motor power (connects to the other motor terminal)
Green	encoder GND
Blue	encoder Vcc (3.5 – 20 V)
Yellow	encoder A output
White	encoder B output
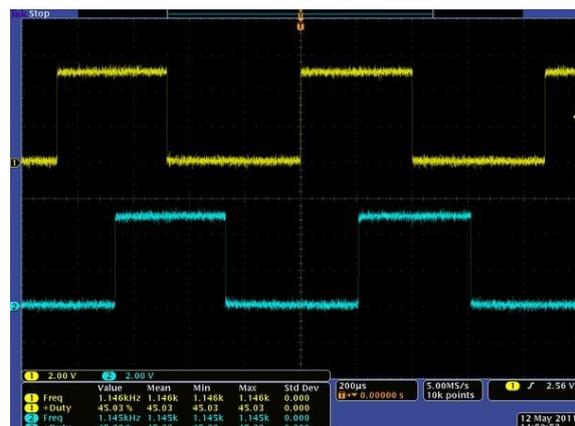
By counting both the rising and falling edges of both the A and B outputs, it is possible to get 48 counts per revolution of the motor shaft. Using just a single edge of one channel results in **12 counts per revolution** of the motor shaft, so the frequency of the A output in the above oscilloscope capture is 12 times the motor rotation frequency.