9.7:1 Metal Gearmotor 25Dx48L mm LP 6V with 48 CPR Encoder

This gearmotor consists of a **low-power, 6 V** brushed DC motor combined with a **9.68:1** metal spur gearbox, and it has an integrated 48 CPR quadrature encoder on the motor shaft, which provides **464.64 counts per revolution** of the gearbox's output shaft. The gearmotor is cylindrical, with a diameter just under 25 mm, and the D-shaped output shaft is 4 mm in diameter and extends 12.5 mm from the face plate of the gearbox.
Key specs at 6 V: 590 RPM and 250 mA free-run, 17 oz-in (1.2 kg-cm) and 2.4 A stall.

34:1 Metal Gearmotor 25Dx52L mm LP 6V with 48 CPR Encoder

This gearmotor consists of a **low-power, 6 V** brushed DC motor combined with a **34.014:1** metal spur gearbox, and it has an integrated 48 CPR quadrature encoder on the motor shaft, which provides **1632.67 counts per revolution** of the gearbox's output shaft. The gearmotor is cylindrical, with a diameter just under 25 mm, and the D-shaped output shaft is 4 mm in diameter and extends 12.5 mm from the face plate of the gearbox.
Key specs at 6 V: 170 RPM and 250 mA free-run, 50 oz-in (3.5 kg-cm) and 2.4 A stall.

4.4:1 Metal Gearmotor 25Dx48L mm LP 6V with 48 CPR Encoder

This gearmotor consists of a **low-power, 6 V** brushed DC motor combined with a **4.4:1** metal spur gearbox, and it has an integrated 48 CPR quadrature encoder on the motor shaft, which provides **211.2 counts per revolution** of the gearbox's output shaft. The gearmotor is cylindrical, with a diameter just under 25 mm, and the D-shaped output shaft is 4 mm in diameter and extends 12.5 mm from the face plate of the gearbox.
Key specs at 6 V: 1300 RPM and 250 mA free-run, 8 oz-in (0.6 kg-cm) and 2.4 A stall.

20.4:1 Metal Gearmotor 25Dx50L mm LP 6V with 48 CPR Encoder

This gearmotor consists of a **low-power, 6 V** brushed DC motor combined with a **20.4:1** metal spur gearbox, and it has an integrated 48 CPR quadrature encoder on the motor shaft, which provides **979.62 counts per revolution** of the gearbox's output shaft. The gearmotor is cylindrical, with a diameter just under 25 mm, and the D-shaped output shaft is 4 mm in diameter and extends 12.5 mm from the face plate of the gearbox.
Key specs at 6 V: 290 RPM and 250 mA free-run, 33 oz-in (2.4 kg-cm) and 2.4 A stall.

The electrical resistance of the motor can be approximated by dividing the rated voltage by the stall current (at the rated voltage). The electromotive force constant (Ke) can be approximated by dividing the rated voltage by the free-run speed (at the rated voltage). To approximate the motor torque constant (Kt), you can divide the stall torque by the stall current.

Using the encoder (if applicable)

25D mm metal gearmotor with 48 CPR encoder: close-up view of encoder.

The versions of these gearmotors with encoders use a A two-channel Hall effect sensor to detect 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:

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

See the Pololu web site for more information. https://www.pololu.com/

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:

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.

See the Pololu web site for more information. https://www.pololu.com/