6-15V Gear Motor with Encoder (#28819)

High-quality DC motors with built-in quadrature encoders feature durable construction and 100% all-metal gears to ensure long life.

Features

- High-torque 6–15 VDC brushed motors
- 100% all-metal gears for durability
- Built-in quadrature encoders provide accurate motor speed and direction feedback
- 6 mm output shaft with notch accepts a wide variety of wheel hubs, gears, pulleys, etc.

Specifications

- Voltage Requirements: 6-15 VDC (82 RPM @ 6V)
- Current Consumption: No-load, 0.22 A @ 6V; Stall current: 3.5 A @ 6 V (>5 A @ 12 V)
- Max Motor Torque: 24.78 lbf-in (0.285 kgf-m)
- Operating temperature: +32 to +185 °F (0 to +85 °C)
- Mounting holes use M3 screws

Application Ideas

- Robots
- Halloween Props
- Animal Door Control

Resources and Downloads

Check for the latest version of this document or other information from the 6-15V Gear Motor with Encoder product page. Go to www.parallax.com and search 28819.

Communication Protocol (Encoders)

These motors have integrated hall-effect quadrature encoders which can provide position and speed feedback as well as direction. These encoders require 3.3-5 VDC to operate and should be powered at the same voltage as your microcontroller. The encoder A and B outputs are 90 degrees out of phase with one another and toggle between ENC_VSS and ENC_VDD with only one bit changing at a time (2-bit Gray code).

The encoders have a resolution of 64 pulses per revolution of the motor shaft, which translates to 1920 pulses per revolution of the output shaft. If you don't need directional information and want to simplify your encoder routines you can just use a single output (A or B). This will give you 32 pulses per revolution of the motor shaft, which translates to 960 pulses per revolution of the output shaft.

Quick-Start Circuit
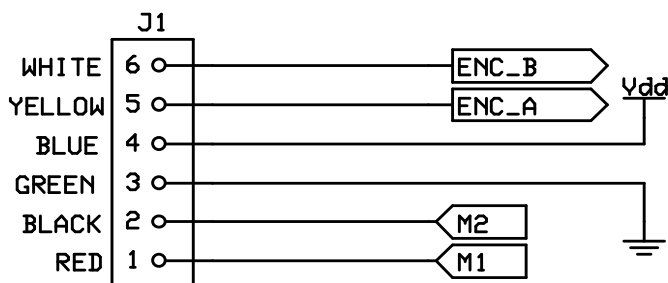
J1 is the motor wire harness connector which is a 6-pin SIP socket with 0.1" spacing. You may cut this connector off if your system requires screw terminal connections. M1 / M2 will connect to the output of your relay, motor switch, motor driver, H-Bridge or other motor controller. Do not connect to MCU I/O pins or you could damage them. The encoder outputs (A / B) should be connected to two inputs on your microcontroller and read like a typical quadrature encoder. Optionally you could connect a single input if you don't need directional feedback (see Communication Protocol). Pins 3 and 4 connect to GND and VDD (supply voltage) on your microcontroller. This is typically 3.3 V or 5 V.

Parallax carries motor drivers and motor controllers that can be used to drive these motors via your microcontroller. Please see the 6-15V Gear Motor with Encoder product page on our website for related product suggestions.

Pin Definitions and Ratings

Pin	Color	Signal	Type	Description
1	Red	M1	—	Motor Connection 1
2	Black	M2	—	Motor Connection 2
3	Green	ENC_VSS	G	Supply/Signal Ground for Encoder
4	Blue	ENC_VDD	P	Supply for Encoder
5	Yellow	ENC_A	O	Encoder A Output
6	White	ENC_B	O	Encoder B Output

Pin Type: P = Power, G = Ground, I = Input, O = Output

Symbol	Description	Minimum	Typical	Maximum	Units
M1	Connects to output of Motor Driver	6	—	15	V
M2	Connects to output of Motor Driver	6	—	15	V
ENC_VSS	Connects to microcontroller GND	—	0	—	V
ENC_VDD	Connects to microcontroller Supply Voltage	3.3	—	5	V
ENC_A	Connects to microcontroller Input	0	—	ENC_VDD	V
ENC_B	Connects to microcontroller Input	0	—	ENC_VDD	V

Motor Dimensions

Units are in inches.
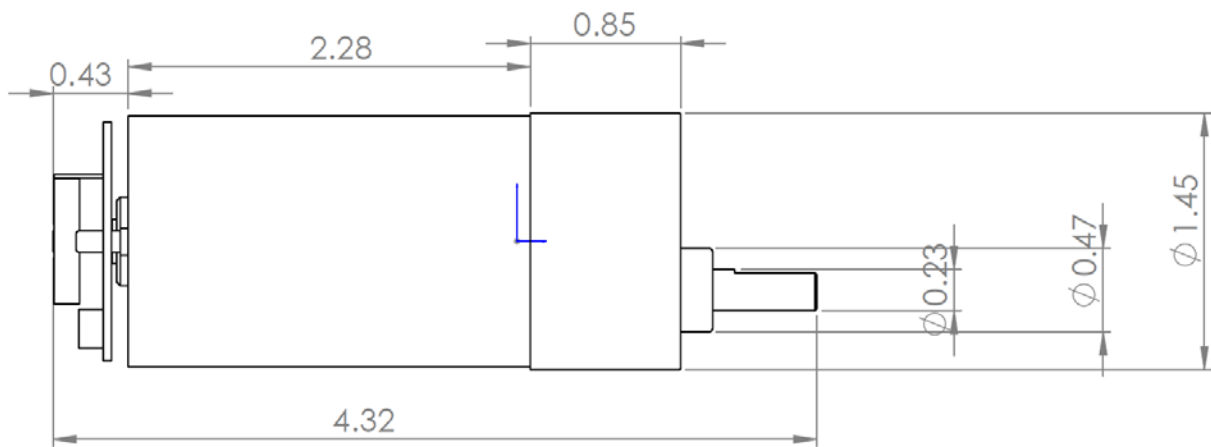
Revision History

Version 1.0: Original document.