DC Geared Motor With Encoder (1.1 W)

Manual

DC Motor Specifications

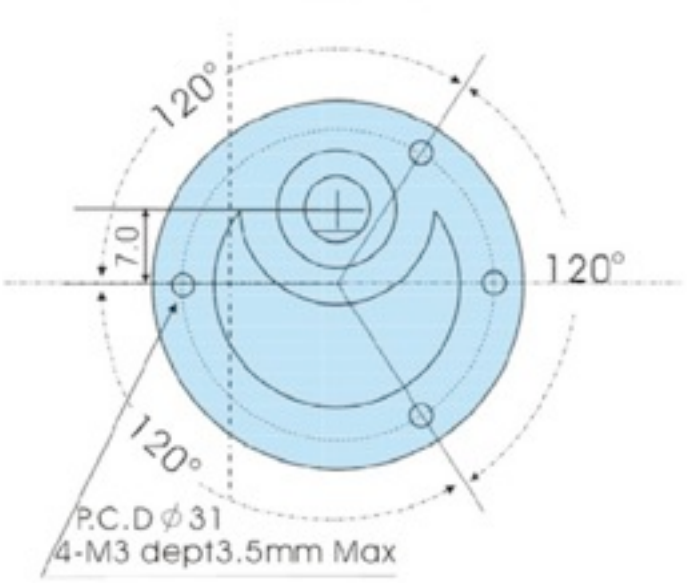
Voltage: 12 VDC
Output Power: 1.1 W
Gear Ratio: 1:20 or 1:60

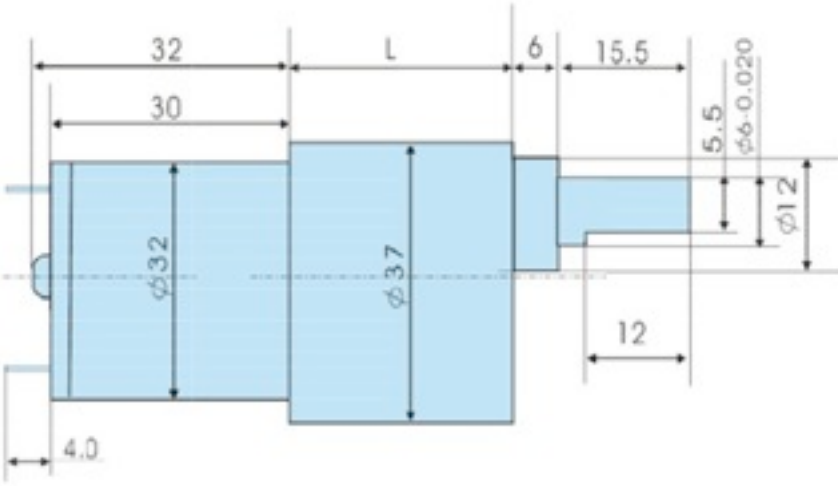
For Gear Ration
Rated Speed: 185 RPM (for gear ratio 1:20)
58 RPM (for gear ratio 1:60)
Rated Torque: 7.84 N.cm (for gear ratio 1:20)
25.4 N.cm (for gear ratio 1:60)

Rated Current: 0.41 A

Encoder Type: Hall effect quadrature encoder 5v (monitor position and direction of rotation)
Encoder Resolution: 60 counts per revolution

Weight: 160 g
Diameter: 37 mm
Shaft diameter: 5.5 mm





Encoder Specifications and How to use

Features of Quadrature Hall Effect Encoder:

- Operating voltage : 4.5 V to 5.5 V
- Can detect both speed and direction of rotation
- Two digital outputs (Quadrature waveform)
- 60 counts per main shaft revolution for gear ratio 1:20
- 90 counts per main shaft revolution for gear ratio 1:30
- 180 counts per main shaft revolution for gear ratio 1:60

A quadrature hall effect encoder board which is designed to fit on the rear shaft of the Geared Motor. Two hall effect sensor are placed 90 degree apart to sense and produce two output A and B which is 90 degree out of phase and allowing the direction of rotation to be determined.

There are two shafts in geared motor. The motor shaft and the gearbox shaft (output shaft). For gear ratio 1:20, when the motor shaft rotate at 600, then the gear box shaft (output shaft) rotates at 30 RPM.

Since the encoder is mounted to the motor shaft, and we want to measure the gear box shaft (output shaft) rotation, then the resolution of the encoder depend on the gearbox ratio.

For our motor here, if the gear ratio is 20 and the encoder measures 3 counts per revolution of the motor shaft (rear shaft). This means that the when your microcontroller counts 60 times, we have 1 revolution.

If the gear ratio is 60, then the encoder resolution is 180 count per revolution.

Pin Connection

Pin	Name	Description
1	Motor -	Output of motor driver
2	Motor +	Output of motor driver
3	Hall effect sensor VCC	Supply voltage for sensor circuit (4.5V-5.5V)
4	Hall effect sensor GND	Ground
5	Channel A	Output of the encoder
6	Channel B	Output of the encoder

Encoders have 2 signals channel A and Channel B, which must be connected to 2 pins. There are three options.

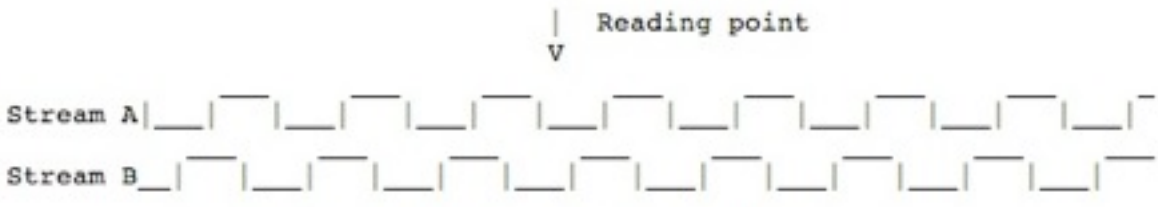
1. **Best Performance:** Both signals connect to interrupt pins. (In Arduino uno interrupt pins are 2, 3 and for Arduino Mega 2,3,18,19,20,21.
2. **Good Performance:** First signal connects to an interrupt pin, second to a non-interrupt pin.
3. **Low Performance:** Both signals connect to non-interrupt pins,

Measuring Position and RPM

Obtaining the position is a matter of reading the number of pulses. The resolution of the pulses is given by the number of cycles the encoder can read during each revolution. as explained above

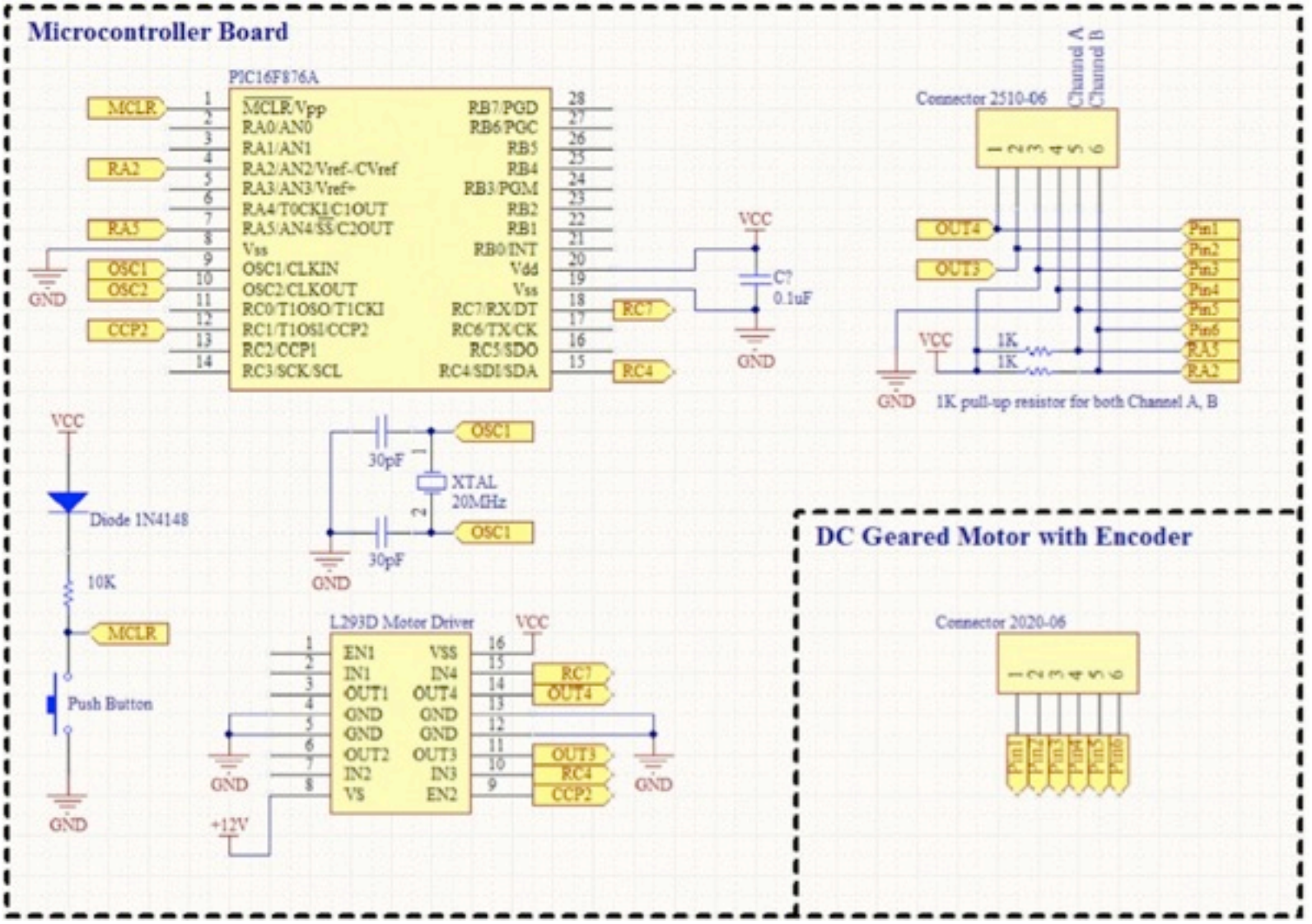
Detecting Direction of Rotation

This is simply done by comparing old reading from pin A and Pin B to the new reading from Pin A and Pin B according to the following table:



Previous Output	Current Output (0;0)	(0;1)	(1;0)	(1;1)
(0;0)	No Change	Clockwise	Counter Clockwise	Ignore (error)
(0;1)	Counter	Clockwise	No Change	Ignore (error) Clockwise
(1;0)	Clockwise	Ignore (error)	No Change	Counter Clockwise
(1;1)	Ignore (error)	Counter Clockwise	Clockwise	No Change

Connecting to PIC Microcontroller Example



Schematic above is an example with respect to the sample source code provided. RC4, RC7, RA2, and RA5 can be replaced by any other digital I/O pins.

Besides, for PWM control, user can also use CCP1 instead of CCP2. For Channel A and channel B, this sample (schematic and source code) shows continuous monitoring of quadrature signals which can be done by any digital I/O pin.

Users are encouraged to modify the schematic and source code to allow use of external interrupt to count the rising or falling edge of either channel to reduce the processing power used by monitoring both channel A and B.

For PIC 16F876A Code for dc motor with decoder, please click here