Johnson Electric PLG Motor

Basic Overview

Johnson Electric PLG Motor

Figure 1: PLG motor comparison

This PLG motor (Power Lift Gate) is used in automotive applications to open and close the lift gate in SUV's etc. In most applications the motor drives a lead screw that provides translational motion.

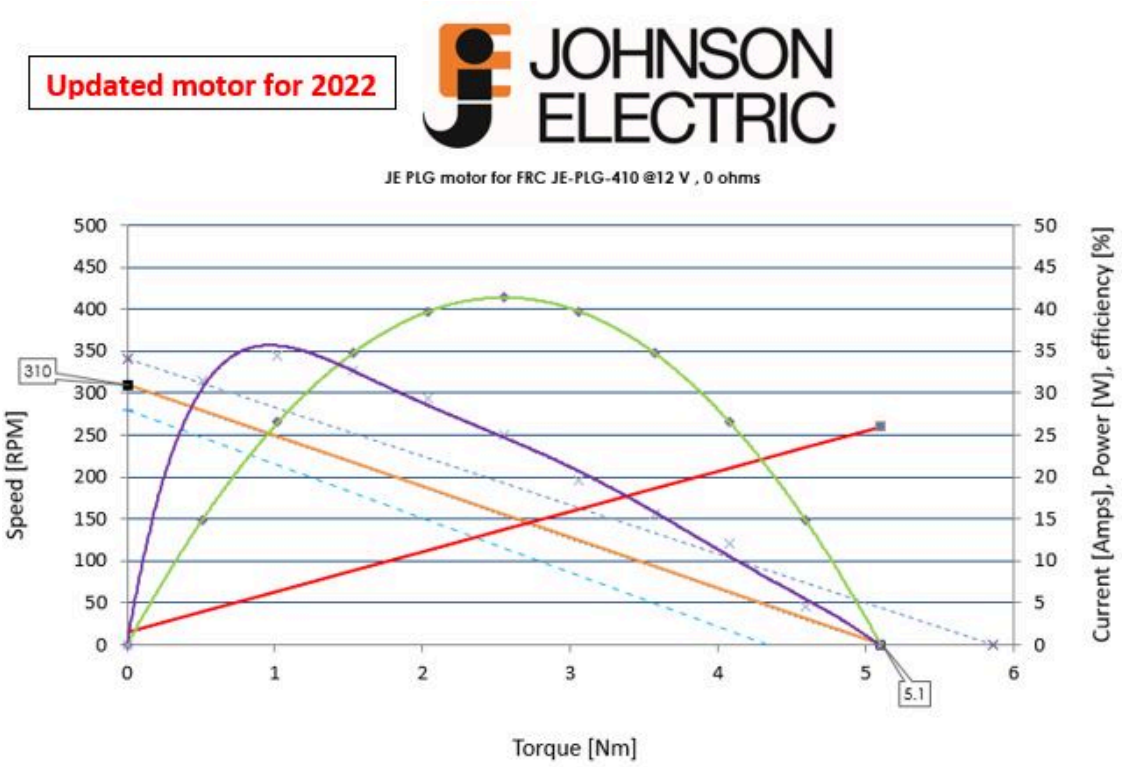
Note: Starting in January 2022 an updated motor will be provided to teams since the previous version will be discontinued. The new motor will be offered in FIRST Choice and for sale at AndyMark starting in January 2022. The old version (JE-PLG-149 / AM4233) will continue to be for sale at AndyMark until stock is depleted and then will no longer be available.

The following is a comparison between both versions:

	JE PLG-149 (AM-4233)	JE PLG-410 (AM-4233a) **new for 2022**
No Load Speed	410 +/- 49 RPM	310 +/- 37.2 RPM
Stall Torque	4.4 +/- 0.6 Nm (3.2 +/- 0.4 ft-lbs)	5.1 +/- 0.8 Nm (3.8 +/- 0.6 ft-lbs)
Nominal Peak Power	47 Watts	42 Watts
Weight	270 g (0.6 lbs)	200 g (0.44 lbs)
Length	103.7 mm (4.1 inches)	103.1 mm (4.06 inches)
Gearbox Diameter	28 mm (1.10 inches)	29.4 mm (1.16 inches)
Gearbox material	metal	plastic
Hall Interface	dual hall - 44.4 pulses per output revolution (same interface for both)	
Gearbox ratio	22.2:1 (no difference)	
No Load and stall current	2A max no load 26A max stall (no difference)	
Motor Diameter	29.1 (no difference)	
Interface	DIN spline (no difference)	

Performance

Motor performance can vary from motor to motor. The limit line represents the range the motor could vary across the population. It is always best to plan for worst case performance when sizing the motor.



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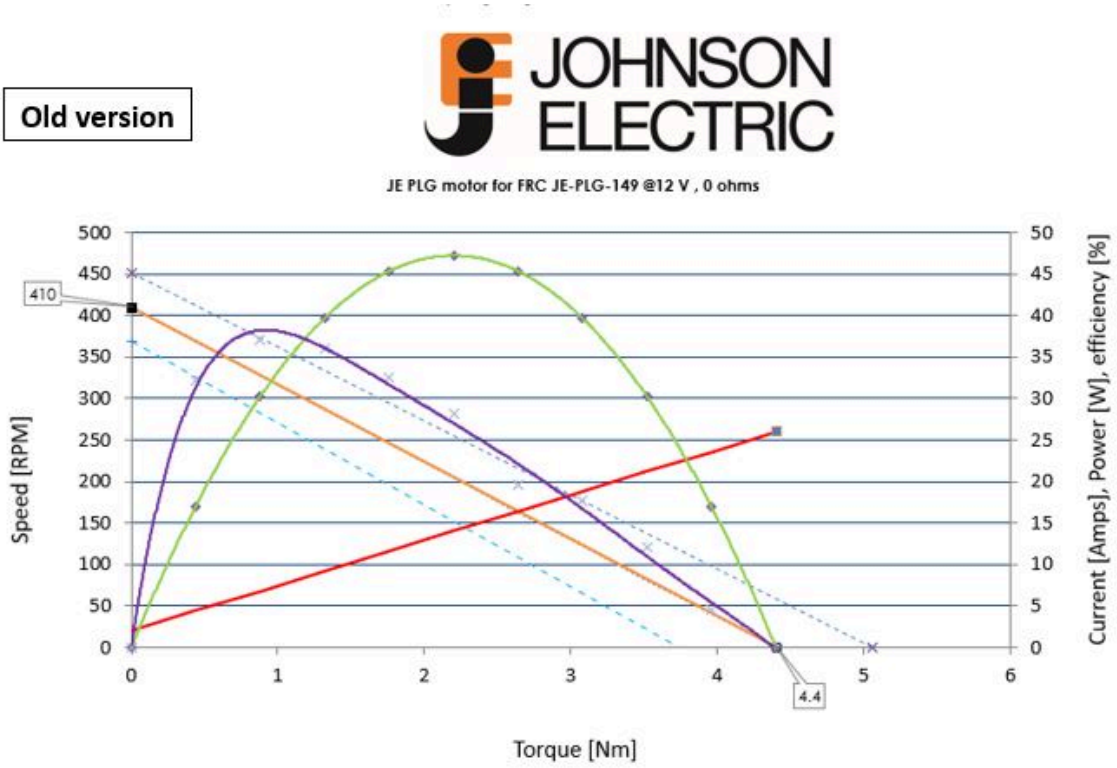
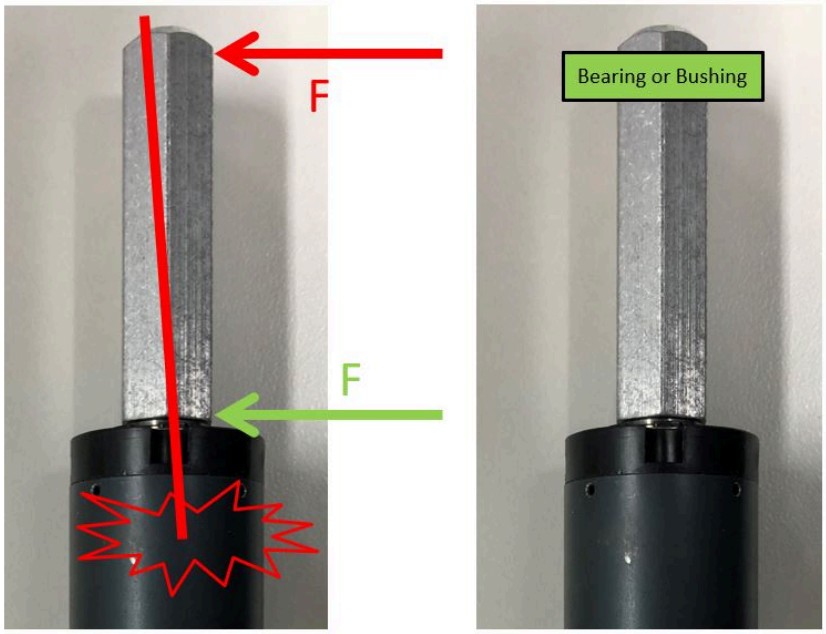


Figure 2: PLG Motor performance curve



Planetary gearboxes can be easily damaged with side loads far from input

Suggest to add support

Electrical connection

An FRC approved motor controller is required to interface with this motor. Refer to the latest version of the rules for restrictions and requirements. Only the black and red wires are needed for motor operation. The 4 hall wires (Brown, Yellow, Green and Blue) are optional if teams would like motor feedback and are not required for motor operation.

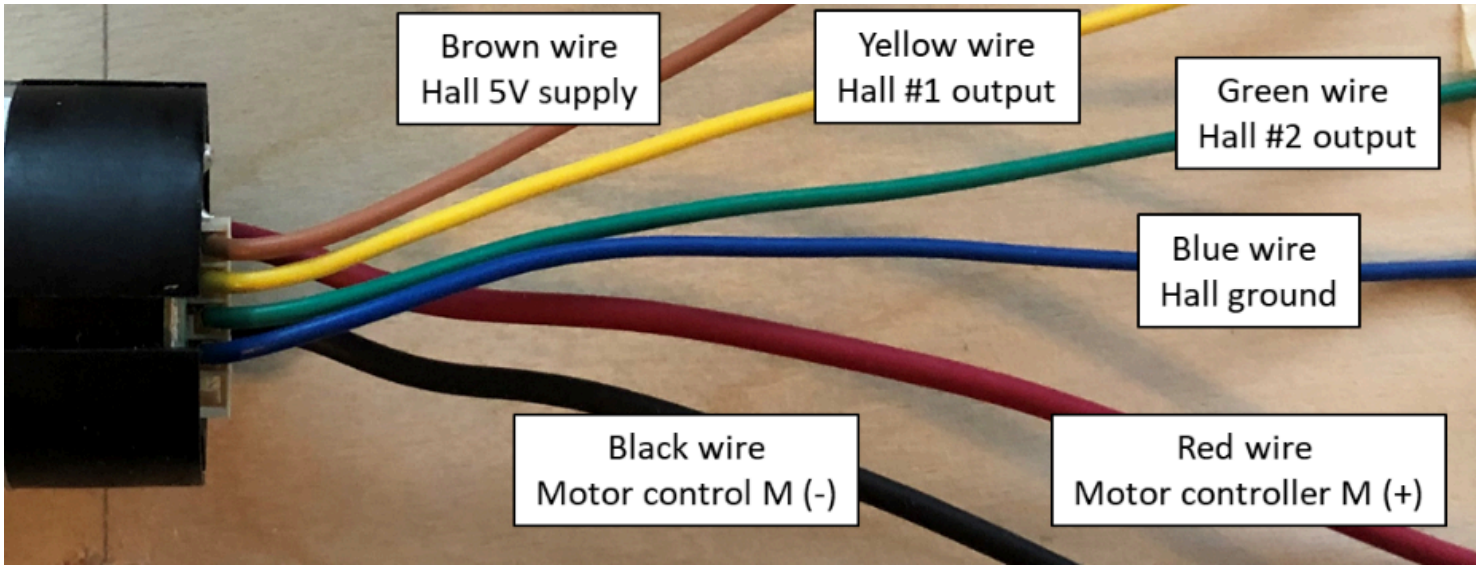


Figure 3: Wire labeling quick reference. The 4 hall wires are not required for motor operation.

The following figure represents a minimum hookup configuration for motor operation. If directional control is not required it is an option to use an FRC approved relay module instead of a motor controller. It is best to connect M+ and M- as shown in order to assure expected motor direction based on drawing.

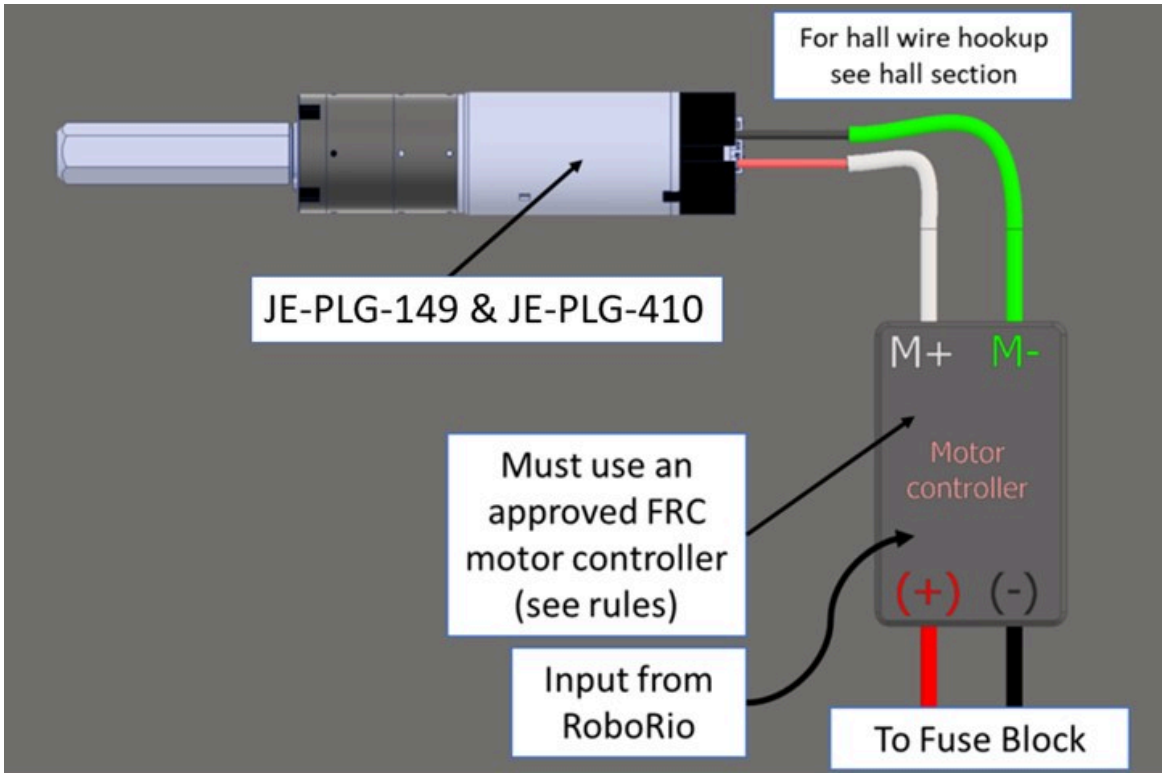


Figure 4: Electrical hookup - See FRC manual

Hall interface

Two hall sensors are available to provide feedback on direction of rotation. If the signal for the hall sensor 1 rises before hall sensor 2 then direction is Clockwise.

There will be 44.4 pulses per 1 revolution of the output.

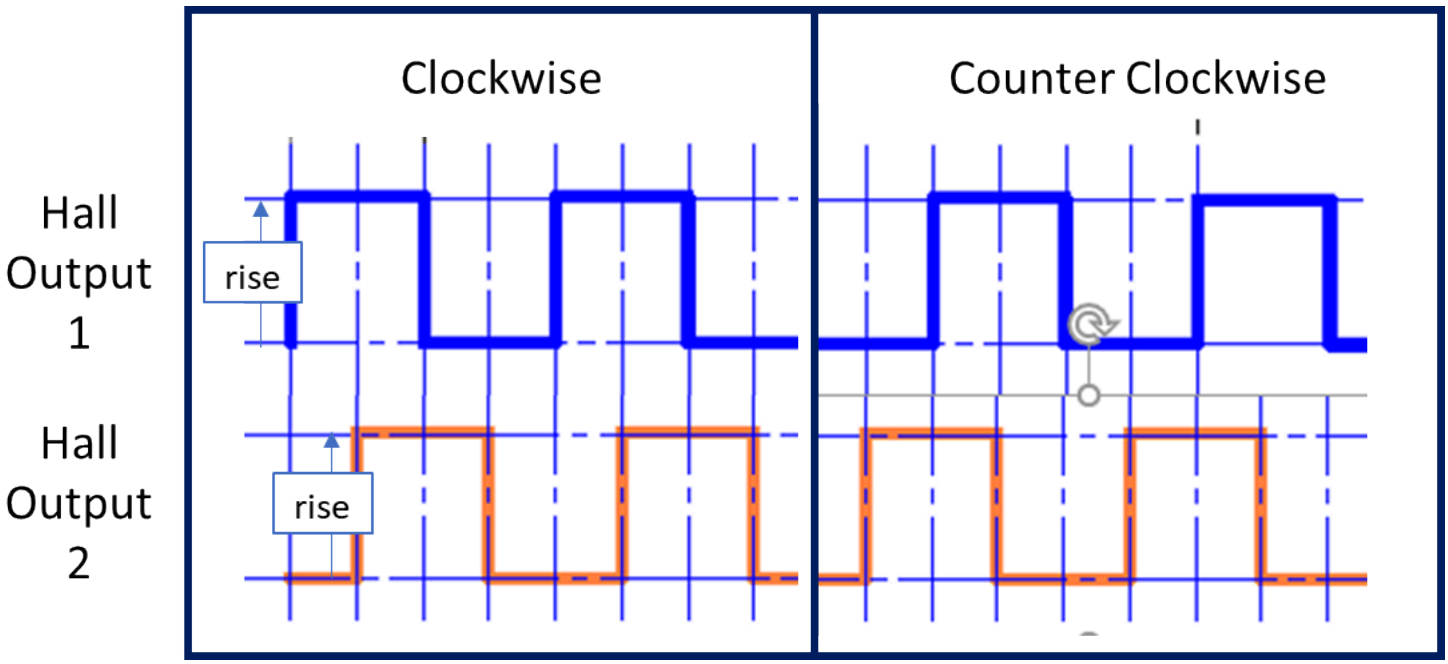
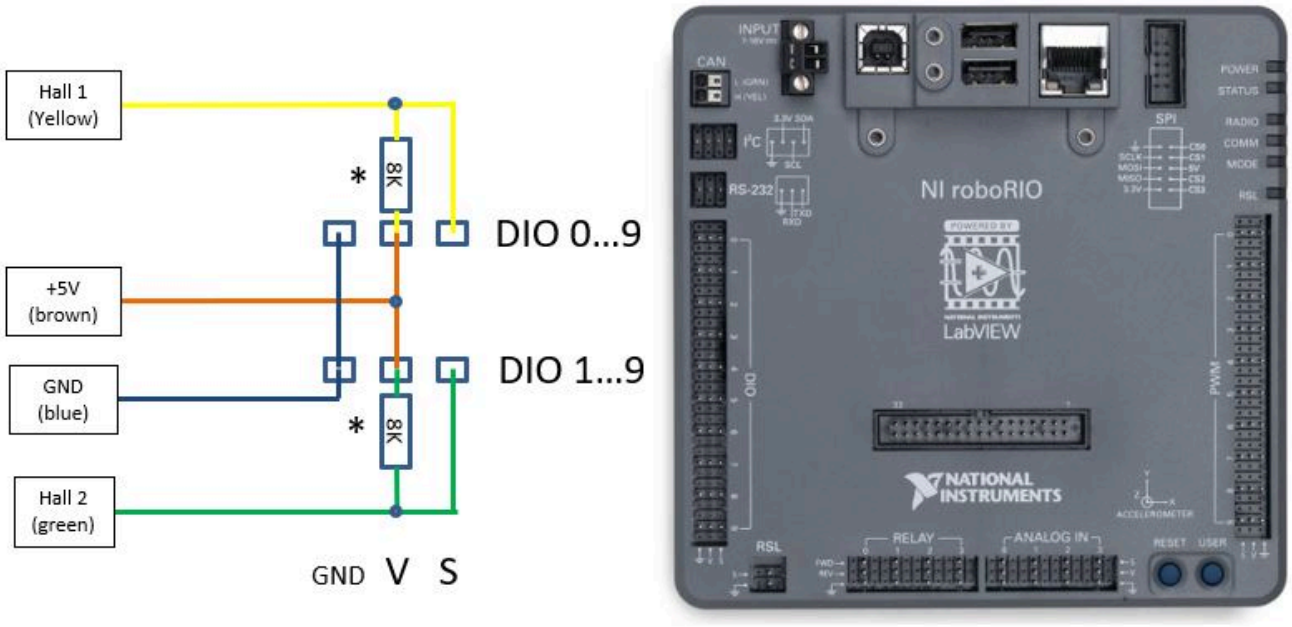


Figure 5: Reading motor direction from hall output

Speed and location can be obtained from output from either hall sensor. There will be 44.4 pulses per 1 revolution of the output. A pullup resistor of 1Kohm is required at each hall output (See drawing)



* Note: Due to integrated pullup resistance in RoboRio an 8K resistor in parallel (as shown) is recommended. If not connecting to the RoboRio a 1K pullup should be used.

Motor Mounting option 1

A design optimized for 3D printing with the FDM process can be downloaded for those that have this capability. There are also many online resources for getting 3D printed parts made. Printing with PETG is recommended. The figure below shows best orientation during printing to optimize strength and avoid supports.

3D print in this orientation. No supports are needed. Print same part for both halves

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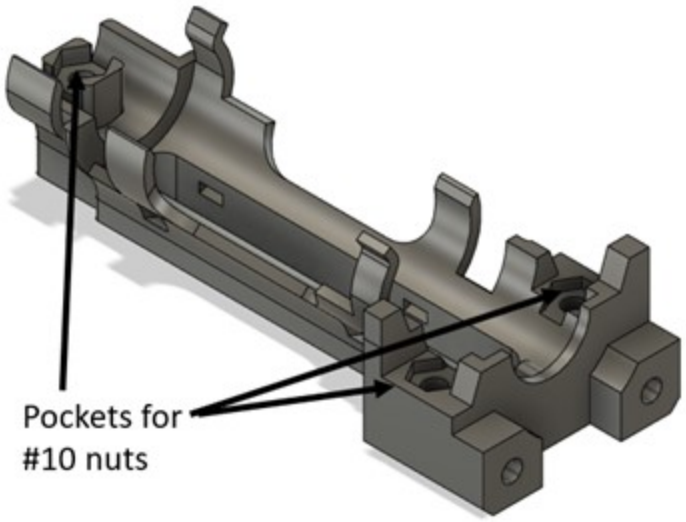


All holes and pockets for #10 bolts and nuts

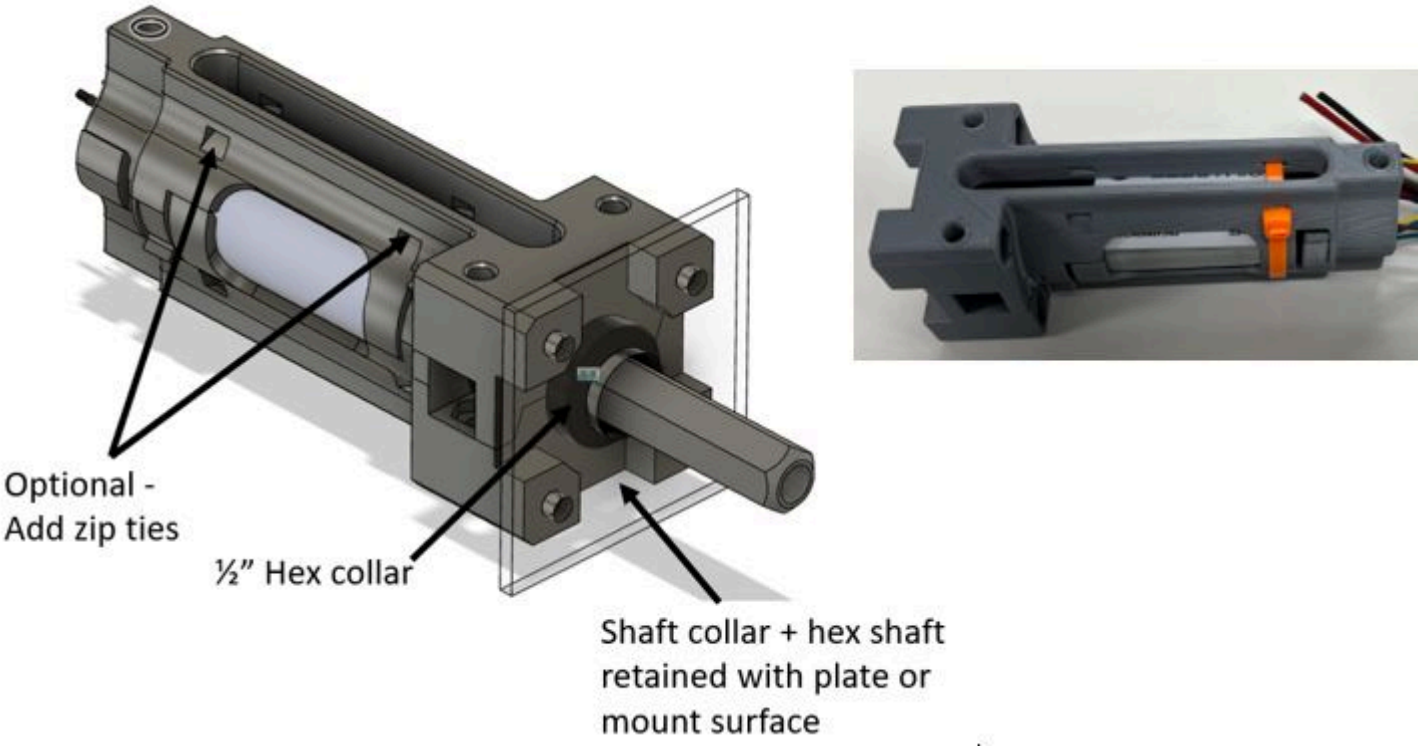


Figure 14: Mounting options

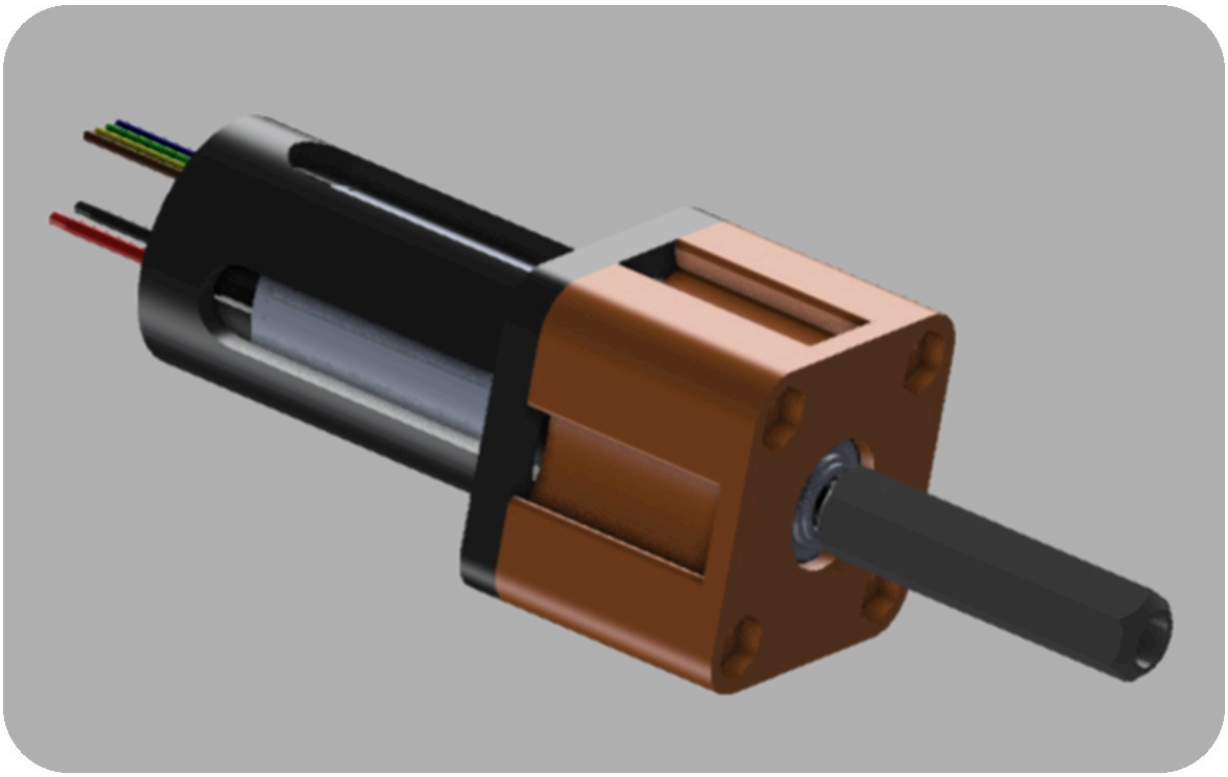
3D Printed Mount 1

2021_3D_printed_JE_PLG_motor_mount.stp

Link to Download: https://a360.co/34Naa2s

Motor Mounting option 2

A design for 3D printing in 2 pieces. The parts are assembled to cage the motor with #10-32 bolts. This mount works with either the JE-PLG-410 or the JE-PLG-149 motors. Printing with PETG is recommended. Instructions and files can be found below.



JE PLG Mount Kit Manual R1.pdf

2023 JE PLG MNT base only.stp

2023 JE PLG MNT cage only.stp

2023 JE PLG MNT ASY with JE-PLG-410 motor and hex adapter.stp

Files

JE-PLG-ADPTR-2.PDF

JE-PLG-410

JE-PLG-410_R1.PDF

JE-PLG-410-and-hex-adapter.STEP

Alternate download here: JE-PLG-410 and hex adapter

JE-PLG-149

2020-02-12_JE-PLG-149_R2.PDF

2019-12-30_JE-PLG-149_with_adapter_R1.stp

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Adapters

2019-12-20_JE-PLG-ADPTR-1_R1.PDF