GRM-1XXX Underwater Gearmotors

Features

- High-torque, low-speed gearmotors with planetary gearboxes
- Depth-rated to 400 meters
- Speeds up to 200 RPM
- 10 W to 63 W rated continuous power
- Redundant shaft seals
- Hard-anodized aluminum housing
- Brushed or brushless motor options
- Hall sensors available on brushless motors

Description

Blue Trail Engineering's GRM-1XXX underwater gearmotors offer high reliability and performance at a fraction of the cost of similar subsea motors. Their low speed, high torque, and optional position feedback make them suitable for applications such as crawler wheels, manipulators, drills, and brushes.

The GRM-1XXX gearmotors feature hard-anodized aluminum housings rated to 400 meters depth. Their stainless steel output shafts are sealed with redundant seals that permit speeds up to 200 RPM. The gearmotors can be mounted using the threaded holes on the output shaft end of the motor or by clamping to the outer diameter.

Similar to the Blue Trail Engineering underwater servos, these gearmotors are built using off-the-shelf motors installed in a custom enclosure. This architecture makes it possible to offer a wide variety of gearmotor types at a low cost and with quick lead times.

Brushed Versions

For simple and economical operation, brushed versions of the GRM-1XXX gearmotor are available in various rated torques and speeds. These come with a Cobalt 3-pin bulkhead connector, but only pins 1 and 2 are used (see Connector Pinouts below). To control a brushed gearmotor, connect an off-the-shelf brushed motor controller or simply supply a voltage to the gearmotor. The direction of rotation will depend on the polarity of the supplied voltage and the speed will depend on the magnitude of the supplied voltage.

Brushless Versions

Brushless versions of the GRM-1XXX offer greater efficiency and power. They include hall sensors for position feedback and come with a Cobalt 8-pin bulkhead connector. The user must connect a brushless motor controller (also called an "ESC") to the gearmotor. ESCs are available in "sensored" or "sensorless" versions.

A sensored ESC will drive the gearmotor using the hall sensors for position feedback, typically requiring all 8 pins on the connector (3 for the gearmotor windings and 5 for the hall sensor connections). Some types of sensored ESCs will provide an output pulse that can be used to count the rotations of the motor, which is useful for applications such as wheels where the user wants the gearmotor to move an exact number of rotations. Even if counting rotations is not required, a sensored ESC offers smoother control of the gearmotor at low speeds. Use caution and follow the ESC manufacturer's recommendations closely to ensure that the hall sensors are connected in the proper order.

A sensorless ESC, commonly used in hobby applications, can also be used to drive the brushless gearmotors. In this case, only pins 1-3 on the connector are used. Precise low-speed control is not as good with a sensorless ESC, and position feedback is typically not available, although there are some models of sensorless ESCs that output a pulse for every motor revolution.

Customization

Contact Blue Trail Engineering for custom gear ratios or options such as encoders.

General Specifications

Operational Limits	
Depth rating	400 meters
Maximum speed	200 RPM
Operating temperature	0° C to +50° C
Maximum radial load	250 N (applied to shaft 10 mm from face of motor)
Maximum axial load	100 N
Materials	
Housing	Hard-anodized aluminum
Shaft	316 stainless steel
Fasteners	316 stainless steel
Buoyancy	
Displacement	424 cm^3

Motor Specifications

Part Number	Motor Type	Motor Part Number	Gear Ratio	Rated Shaft Power (W)	Rated Voltage (V)	Rated Current (A)	Rated Torque (Nm)	Rated Speed* (RPM)	Mass (g)
GRM-1001-14	Brushed	Anaheim Automation BDPG-38-86-12V-3000-R14	14	10	12	1.3	0.5	172	1020
GRM-1001-19	Brushed	Anaheim Automation BDPG-38-86-12V-3000-R19	19	10	12	1.3	0.7	127	1020
GRM-1001-51	Brushed	Anaheim Automation BDPG-38-86-12V-3000-R51	51	10	12	1.3	1.8	47	1080
GRM-1001-139	Brushed	Anaheim Automation BDPG-38-86-12V-3000-R139	139	10	12	1.3	2.9	20	1080
GRM-1501-15	Brushless with hall sensors	Anaheim Automation BLWRPG173S-24V-4000-R15	15	63	24	4.1	2.3	267	1300
GRM-1501-19	Brushless with hall sensors	Anaheim Automation BLWRPG173S-24V-4000-R19	19	63	24	4.1	2.9	211	1300
GRM-1501-24	Brushless with hall sensors	Anaheim Automation BLWRPG173S-24V-4000-R24	24	63	24	4.1	3.6	167	1300

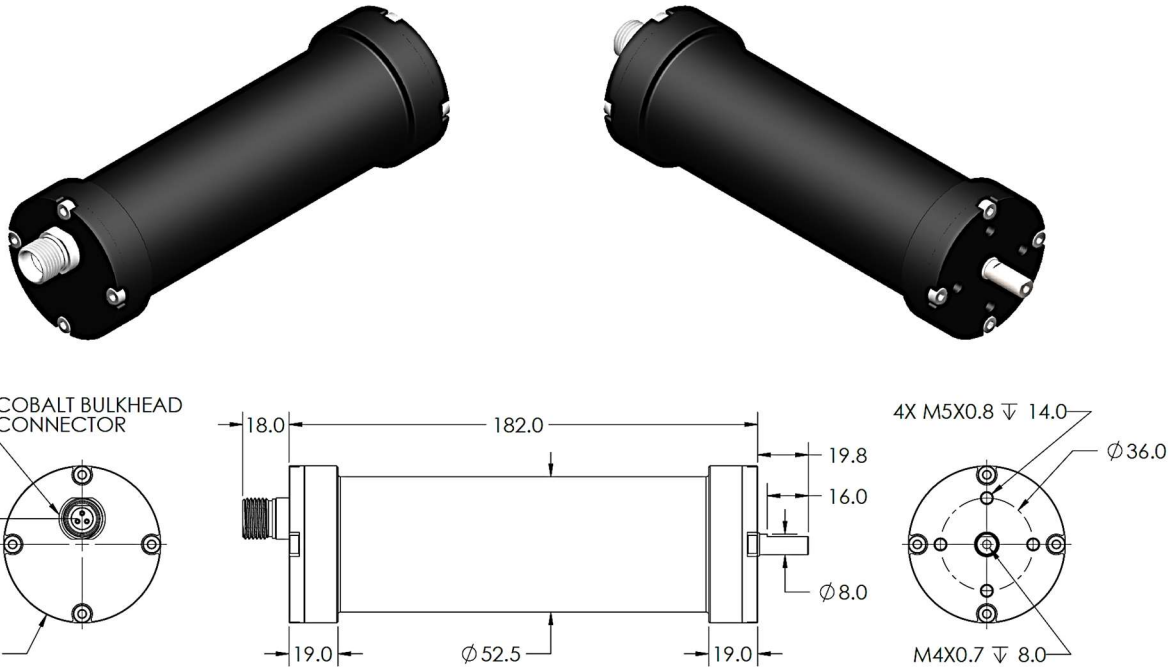
*RPM should not exceed 200 due to the shaft seals. Regardless of the motor's rated speed, it is the responsibility of the user to set input voltage and load such that the actual speed does not exceed 200 RPM.

Hall Sensor Specifications (brushless versions only)

Electrical Specifications	
Supply Voltage	4.5 V to 28 V
Current, I_{off}	10 mA max
Current, I_{on}	11.3 mA max
Rated Sinking Current	20 mA
Saturation Voltage	0.4 V max
Output Leakage Current	10 µA
Output Switching Time	Rise, 10% to 90% 1.5µs Fall, 90% to 10% 1.5µs
Output Type	Open Collector
Other	
Number of Motor Poles	8

Motor Dimensions

All dimensions are in mm.



Connector Pinouts

Brushed motors have a Cobalt 3-pin bulkhead connector. Brushless motors with hall sensors have a Cobalt 8-pin bulkhead connector. The diagrams below show the pinout as viewed looking at the mating face of the bulkhead connector.