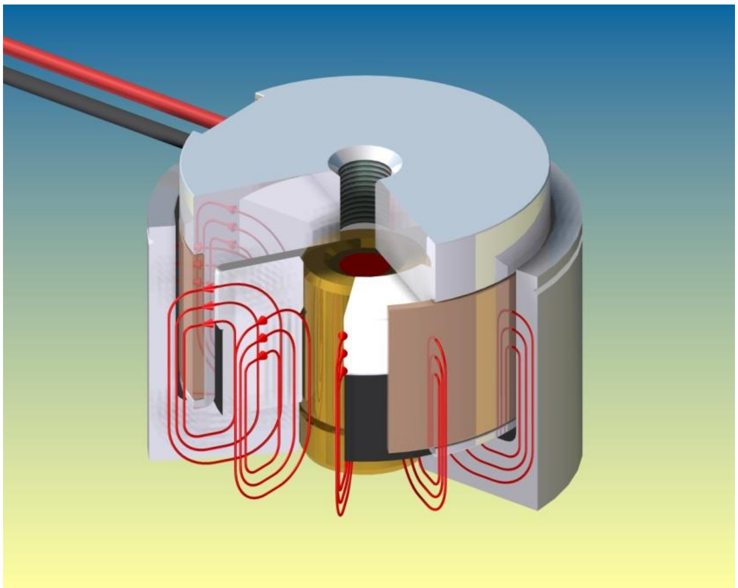
VOICE COIL MOTORS

Voice Coil Motor Characteristics

Voice Coil Motors are highly controllable electrical actuators suitable for applications needing only limited displacement. They offer the following features:

- Fast operation – Low electrical inductance, and low moving mass enable fast inflow of current and high acceleration. Acceleration of >500G is possible with custom devices
- Controllability – Force is proportional to applied current, and is uniform through a displacement that can be several 10's of mm or several 10's of degrees rotation
- Low hysteresis – The magnetic behaviour is free of hysteresis over typical operating areas, depending on the type of bearings used, very low hysteresis can be realised
- Reliability – side forces developed are negligible, so bearing loading can be very low to enable long life operation
- Simplicity – the voice coil motor is a single pole device requiring no commutation. Both the device itself, and the associated controller can be very simple and robust
- Flexible Configuration – the principle of operation lends itself to many different mechanical layouts allowing great flexibility in design of associated systems

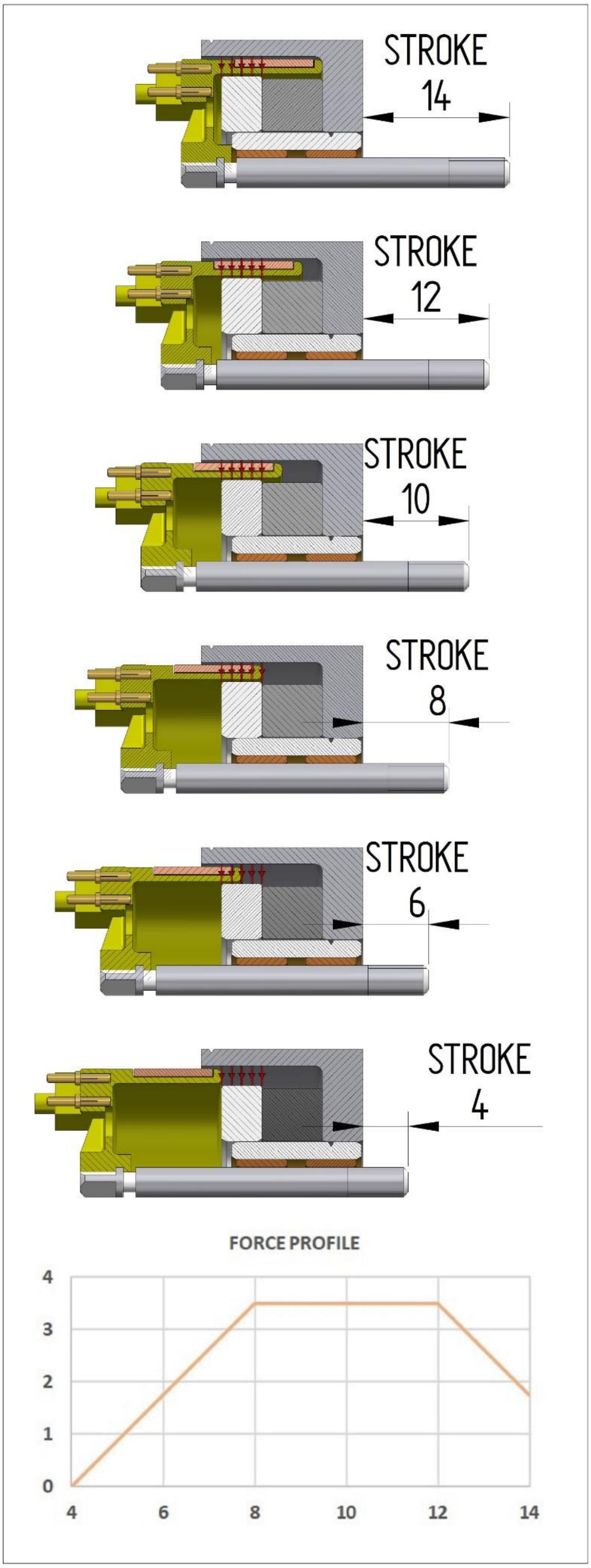


- Flexible Production – Most product configurations can be produced without requiring tooling for prototypes, or for limited production volumes – product design needs to allow for manufacturing methods appropriate to customer volume requirements

Force Characteristics

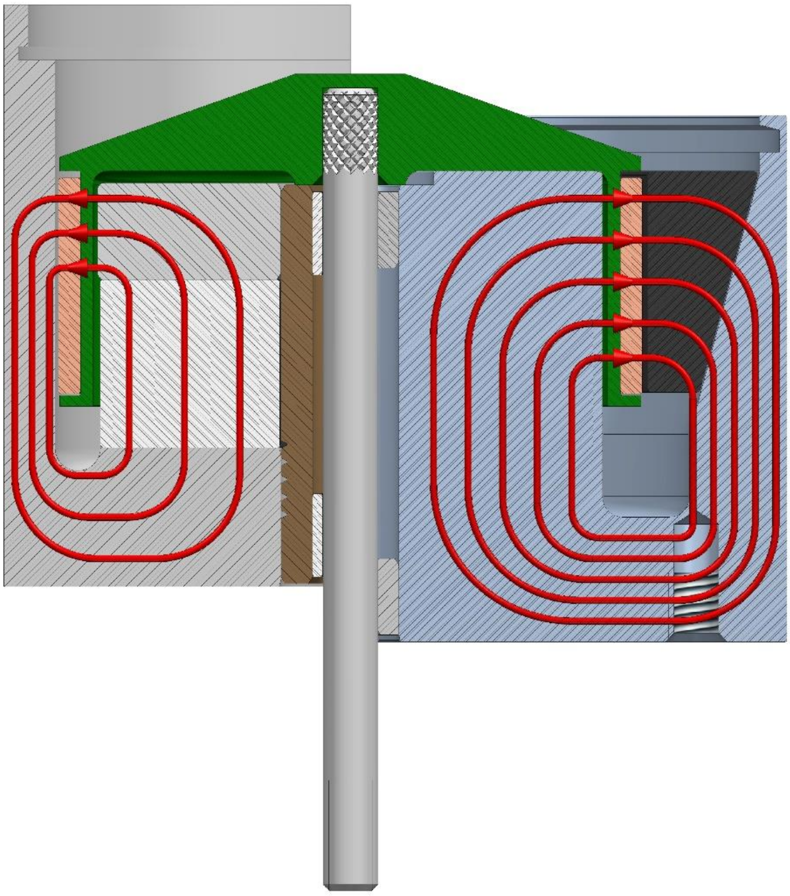
The typical force characteristic for a voice coil motor energised with constant excitation current is illustrated. In the bottom view (corresponding to stroke of 4 units), the coil of the device is outside the region of magnetic flux (denoted by the red arrows) and no force is developed. As the coil moves into the region of magnetic flux the force increases. When the coil is fully overlapped by the region of magnetic flux (Stroke between 8 and 12 units) the force is constant. The top picture (stroke of 14 units) shows a condition where the coil starts to move out of the region of magnetic flux again, and the force reduces again.

By modifying the geometry of the coil and of the magnetic flux assembly appropriately, it is possible to produce a device which develops a force characteristic which is flat over the operating stroke, or which increases, or decreases over the operating stroke.



Radial Magnet vs Sandwich Construction

Voice Coil Motors offered by Geeplus are manufactured with two different types of construction. The two alternatives are illustrated below for VM50 and VM6340 devices which both employ the same coil assembly.



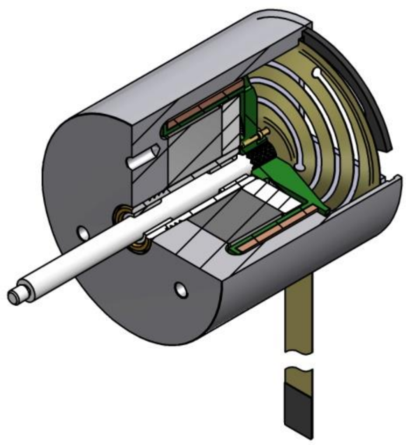
In both constructions the diameter and cross-section of the core of the device (inside the coil) is similar, in the sandwich construction used in the VM50 devices (LHS), an axially magnetised ring magnet is fitted in the steel pot, with a steel pole on top of this. A rare earth magnet will support a flux density a little more than 1 Tesla, this ultimately limits the total flux circulating in this device.

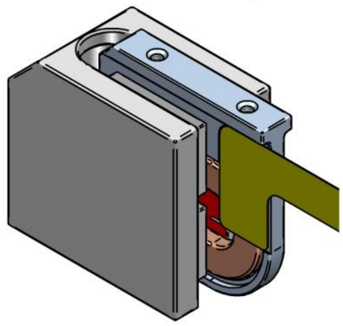
In the radial magnet construction used in the VM6340 (RHS), the core is made of magnetic steel which will support a magnetic flux density in the region of 1.6-1.8 Tesla, the higher flux allows a higher force to be developed with the same coil and excitation current. For a given force and displacement, the radial magnet construction enables a smaller and lighter coil assembly to be used with better dynamic performance.

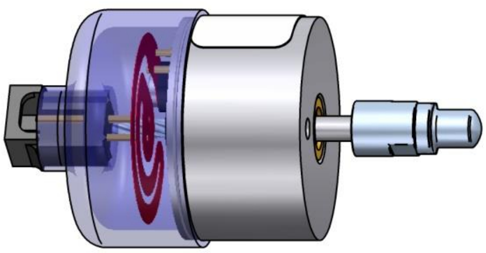
The rare earth magnets, and the layered coil winding are two of the biggest cost elements of a Voice Coil Motor, so the construction used and size of these parts have a big impact on cost and performance.

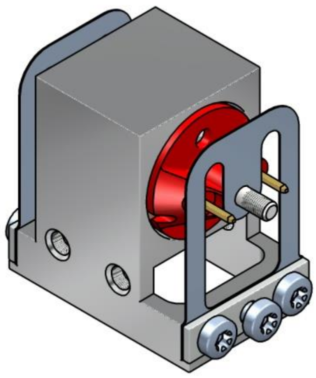
Custom Designs

Custom designs can incorporate many different features including the following :

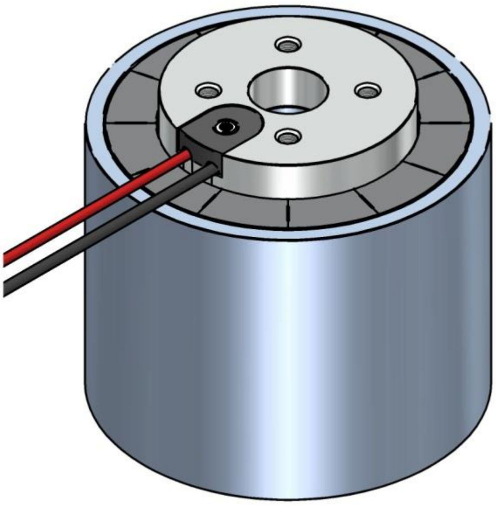


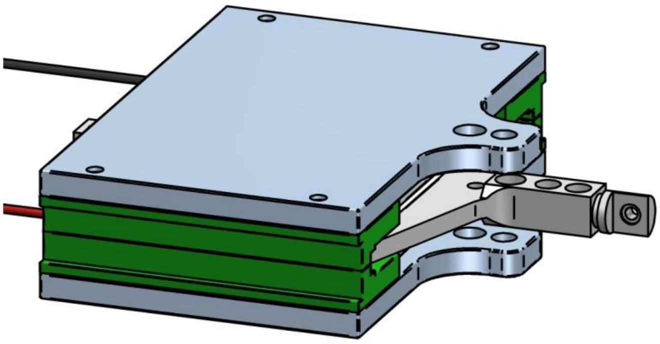


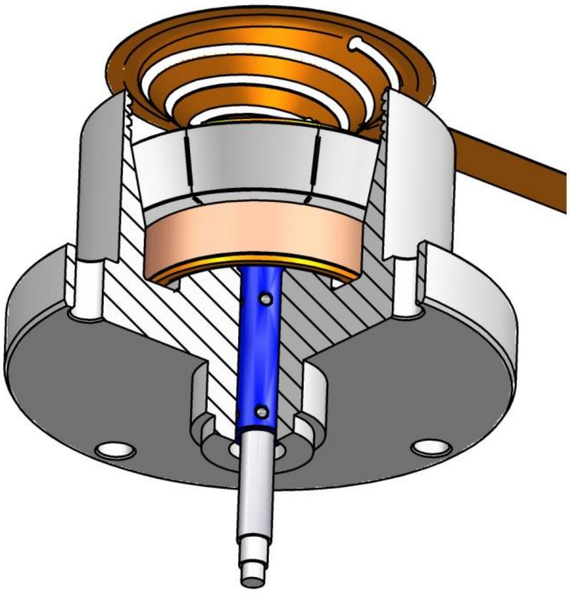




- Flexible circuit termination of the coil provides reliable electrical connection with repeatable low resistance to movement and low friction (hysteresis). Body is extended with end cover providing a sealed unit with easy electrical termination
- Flat coil design allows pivoting motion and tolerance to some variation in position of the coil relative to magnet assembly.
- Flex circuit is used for easy termination
- End cover and flex circuit allow sealed unit with reliable, low-friction electrical connection. Connector allows easy installation and replacement.
- Special tip fitted to shaft
- Steel flexure guidance provides repeatable, friction-free guidance of the shaft with unlimited life expectancy

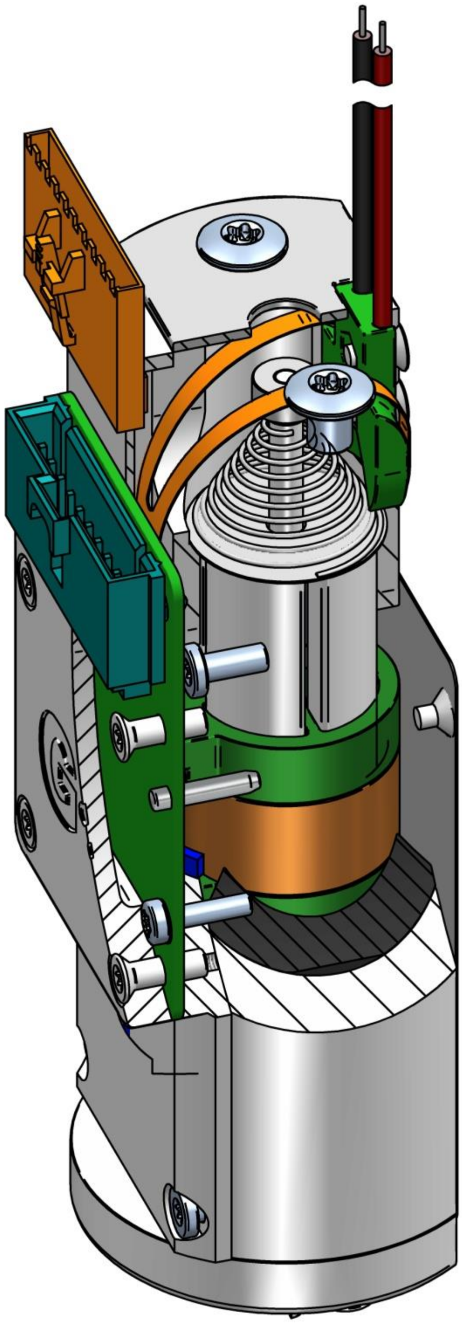






- Multiple poles for higher force and efficiency with reduced size and mass, use of multipole designs may be inappropriate to applications requiring large displacement
- Aluminium coil windings enable reduced moving mass for high acceleration, the flat design illustrated uses multiple poles and aluminium coil winding to achieve force capability >50N peak with coil mass <12g for acceleration capability >400G
- Rolling element bearings provide more precise guidance, and more repeatable friction behaviour when subjected to variable side loading, the part shown also employs flexible circuit termination and a focussed radial magnet assembly for higher force / mass and better dynamic performance

- Position encoder with resolution to <1µm for closed loop (servo) control
- Multiple coil and lightweight titanium shaft for high force / mass ratio
- Rolling element bearings for high precision, long life linear guidance
- Flex termination integrated within compact design



VM Series Description

Standard Voice Coil Motors of Geeplus VM series incorporate shafts and bearings to ensure accurate guidance of the coil assembly within the magnet assembly, and to facilitate easy installation in customer applications. For wear resistance and good surface finish along with required magnetic properties the shaft material is either stainless steel (hardenable stainless steel may be slightly magnetic and have a slight influence on the force characteristic, non-magnetic stainless steel is softer and more susceptible to damage) or titanium.

The magnet assembly of VM series is designed for good volumetric efficiency and useful linear stroke, these characteristics may be at the expense of some loss of linearity. High Energy Density magnets drive the material of the voice coil pot (housing) close to magnetic saturation to develop the strongest possible magnetic field. Custom designs can demonstrate better linearity at the expense of increased size / weight & cost.

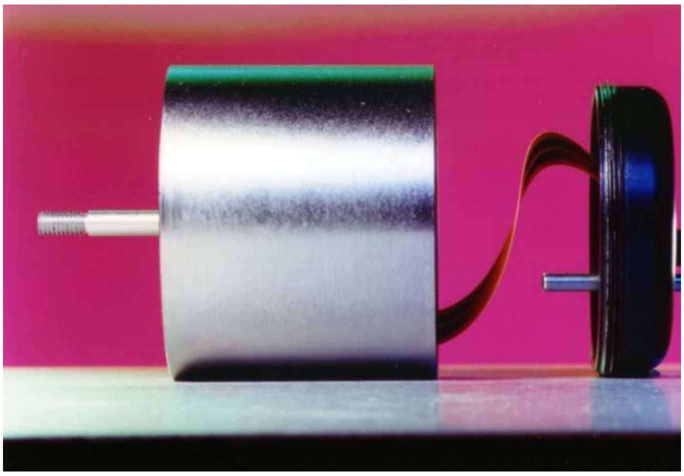
- Coils of standard VM series are normally designed to use the full depth of the pot assembly. This results in maximum mechanical work output capability, but may result in a force characteristic which is not ideally suited to a given application. The portion of the coil which lies outside the airgap field dissipates power (as heat) but develops no useful force.
- The linear range of a voice coil (the range within which developed force is >90% of peak force) will normally be roughly equal to the difference between the coil length, and the length of the pole.
- For maximum force, the coil length and pole length should be approximately equal in length, but the linear range with this configuration will be small.
- For best linearity, one of the coil and polepiece should be longer than the other by the linear range required. It is usually more cost effective to make the coil longer than the magnet assembly. Making the coil shorter than the polepiece can reduce moving mass and facilitate faster dynamic response, but this may require a more massive and expensive magnet assembly to produce a required force characteristic.

Mechanical Integrity

The design of VM series devices ensures good concentricity and mechanical integrity of the complete device. Accurate fixtures are used in assembly to control assembly dimensions, and coil assemblies are individually measured to ensure concentricity and clearance with the magnet assembly. All devices are designed to ensure that finite clearances are maintained throughout an operating range from 0ºC to 130ºC.

Electrical Termination

Connection to the moving coil of a voice coil motor must be implemented with care to ensure reliable operation. Flexible cable with many fine strands and Silicone Rubber insulation can provide reliable termination, care should be taken that the leads are mechanically secured to the moving assembly preferably at some distance from the soldered joints (solder fuses the strands together, and leads to large stresses being applied to the termination pins, or to fatigue adjacent to the fused portion of the wire). The leads should be carefully routed to minimise stress. A more consistent means of termination is to use a flexible circuit, this option is offered for several of the VM series devices (see picture).

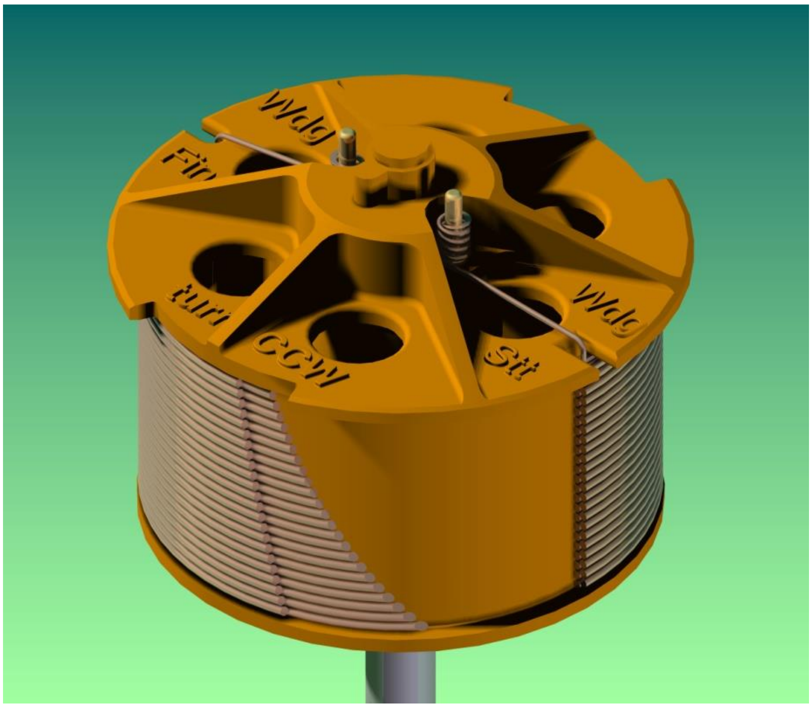


Performance Factors

Coil Packing - The coil of a voice coil motor needs to contain as much conductor material as possible within the available space in order to develop maximum force and efficiency. The goal is to achieve the maximum number of coil turns for a given space envelope and coil resistance.

Coil packing is defined as the cross sectional area of wire, divided by the total cross-sectional area of the winding space. It is determined by the shape of wire used for winding, and by the winding process itself.

The maximum possible utilisation is achieved where square or rectangular section wire is used, this can be packed with minimal voids between winding turns, and between winding turns and the coil former (if used).



If a coil is wound with round section wire, with good control of the winding process, an 'orthocyclic' winding can be produced, where each turn is packed tightly against the turns to either side, and turns on the subsequent layer are located in the groove formed by two turns of the layer below. Where the wires of one layer cross over the strands of the layer below, a 'high point' will be formed in the winding. This can be reduced by making the wall of the coil former thinner at this point. Production of a perfectly layered coil winding tends to be much slower, and more labour intensive / expensive than automated winding processes, and is a significant cost factor in the manufacture of voice coil motors. A tightly packed and perfectly layered winding produced using round section wire can achieve 95% of the packing density of a coil produced using square section wire.

Conductor Material

By default, coils are usually wound using copper wire, however there are cases where other conductor materials are used.

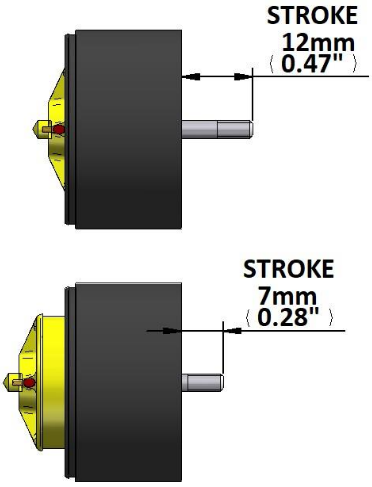
Silver wire can be used to obtain improved efficiency, the electrical conductivity of silver is approximately 3-4% higher than that of copper, so an efficiency improvement of 3-4% can be achieved. In most cases the cost penalty for using silver wire is prohibitive.

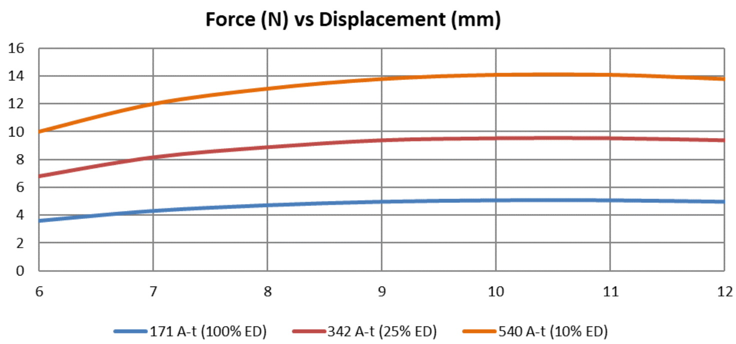
Aluminium wire can be used for highly dynamic applications where the load mass is very low, and where this permits higher acceleration. The electrical conductivity of aluminium is 60-70% of that of copper, so efficiency is reduced, but the reduction in mass is much greater than this. Aluminium wire can be difficult to solder due to the formation of an oxide layer on the surface of the material.

Copper Covered Aluminium (CCAL) wire – this is an aluminium wire in which the aluminium core is electroplated with a thin layer of copper, prior to application of the insulating enamel. This is usually described as 10%CCAL or 15%CCAL, where the percentage is the proportion of copper by weight. This material has many of the weight benefits of aluminium wire, with the additional benefit of easy soldering.

Force vs Displacement Graphs

The way in which we describe stroke has changed compared to previous catalogues & data. This is now labelled on drawings and shown on graphs in relation to the shaft extension (for parts with a shaft), or to the overall length of the device. Measurement is normally made with the device pushing against a force sensor.





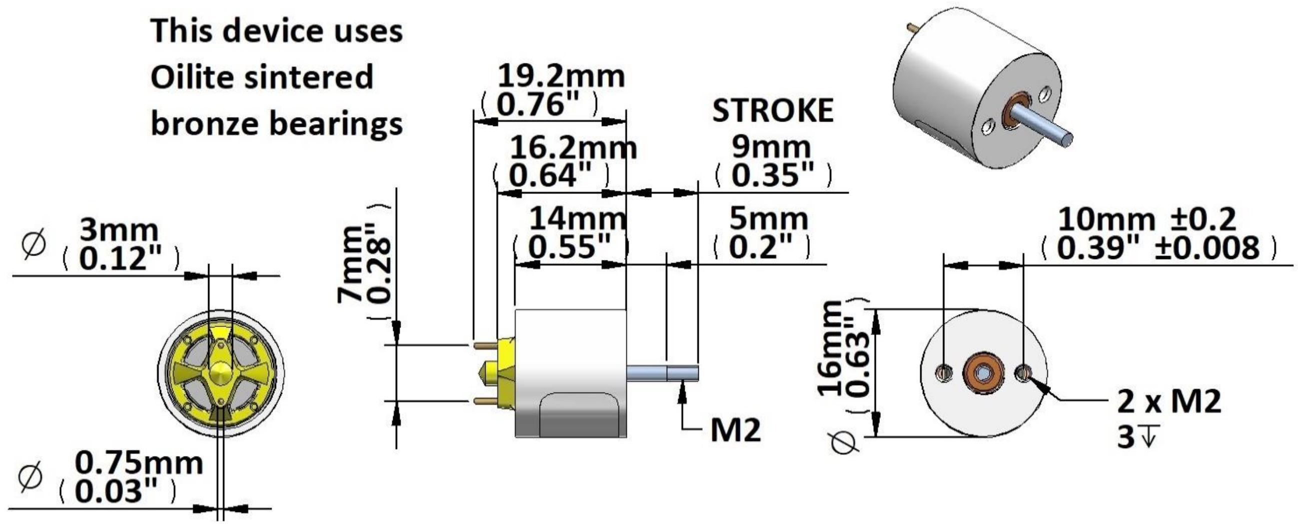
GEEPLUS VM1614

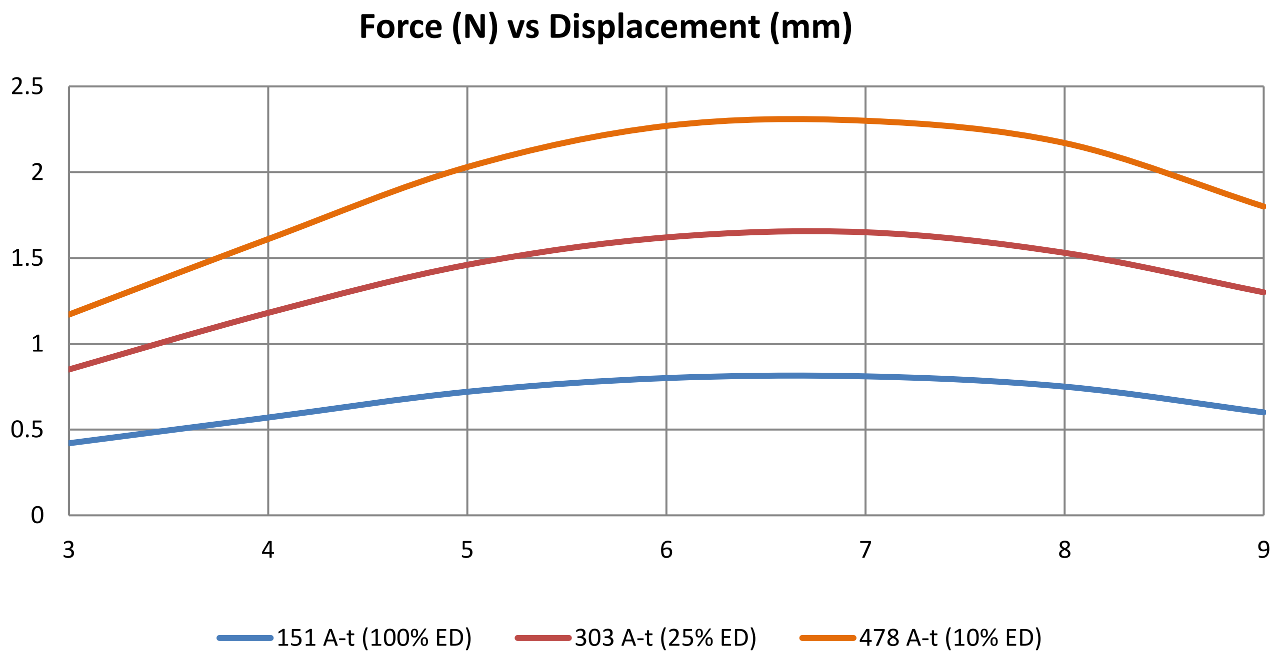
P_{100} is the continuous (100% ED) excitation power at which the coil attains temperature T_{max} with the part mounted to a massive heatsink at 20°C

P_{100}	5 W	Total Mass	15 g
T_{max}	130 °C	Coil Mass	3 g

Model No.	Resistance R_{20}	Inductance	Force Constant	Velocity Constant	Current I_{100}
VM1614-200	2.6 Ω	0.2 mH	0.7 N/A	0.7 Vs/m	1172 mA
VM1614-180	3.5 Ω	0.3 mH	0.7 N/A	0.7 Vs/m	1010 mA
VM1614-125	15.0 Ω	0.8 mH	1.5 N/A	1.5 Vs/m	488 mA
VM1614-100	39.0 Ω	4.0 mH	2.4 N/A	2.4 Vs/m	303 mA

Max 'ON' time		Peak Force
100% ED	∞	0.8 N
50% ED	22 s	1.1 N
25% ED	9 s	1.7 N
10% ED	3 s	2.3 N





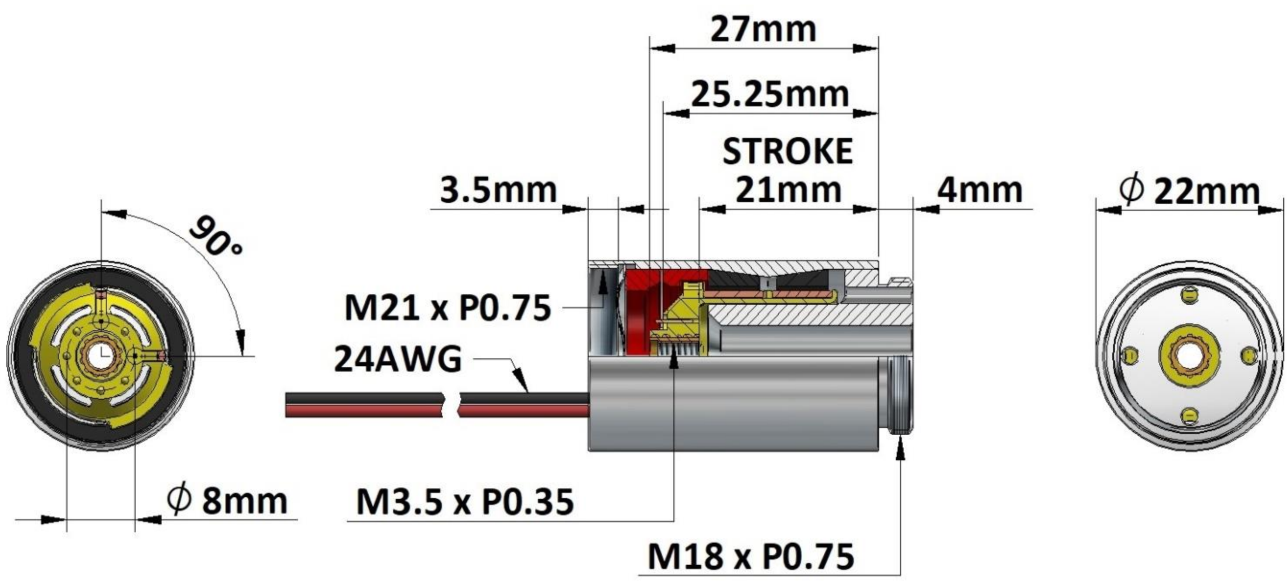
GEEPLUS VM22P2

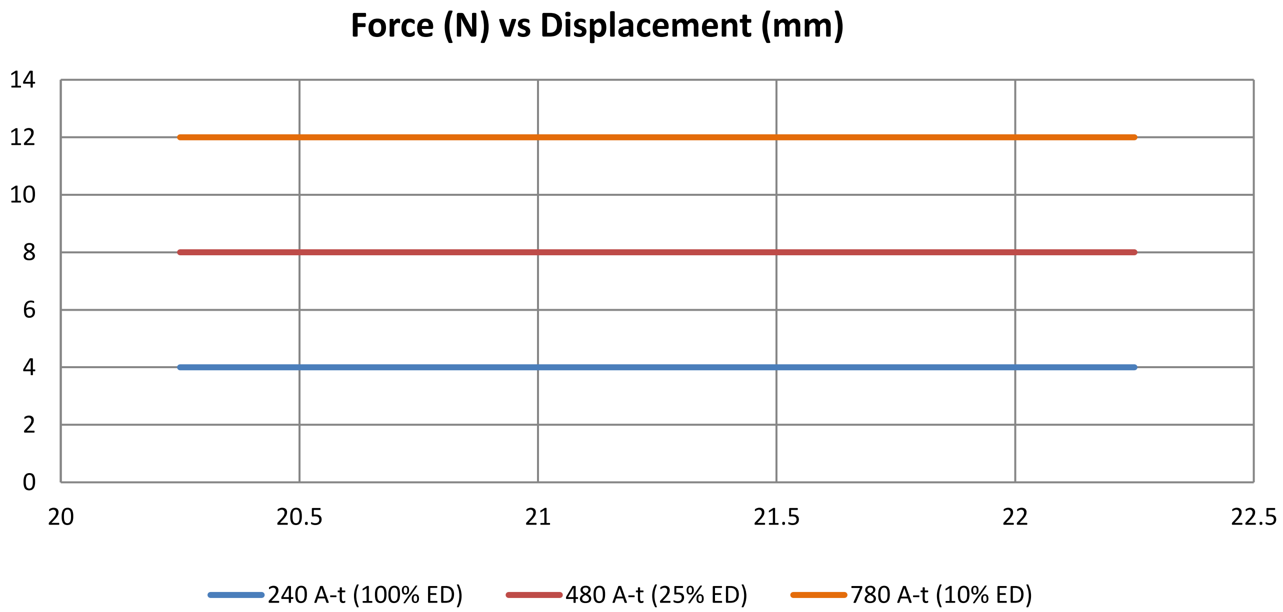
P_{100} is the continuous (100% ED) excitation power at which the coil attains temperature T_{max} with the part mounted to a massive heatsink at 20°C

P_{100}	8 W	Total Mass	15 g
T_{max}	130 °C	Coil Mass	3 g

Model No.	Resistance R_{20}	Inductance	Force Constant	Velocity Constant	Current I_{100}
VM22P2-200	6.0 Ω	0.2 mH	0.0 N/A	0.0 Vs/m	976 mA

Max 'ON' time		Peak Force
100% ED	∞	4.0 N
50% ED	0 s	5.6 N
25% ED	0 s	8.0 N
10% ED	0 s	12.6 N





GEEPLUS VM2436

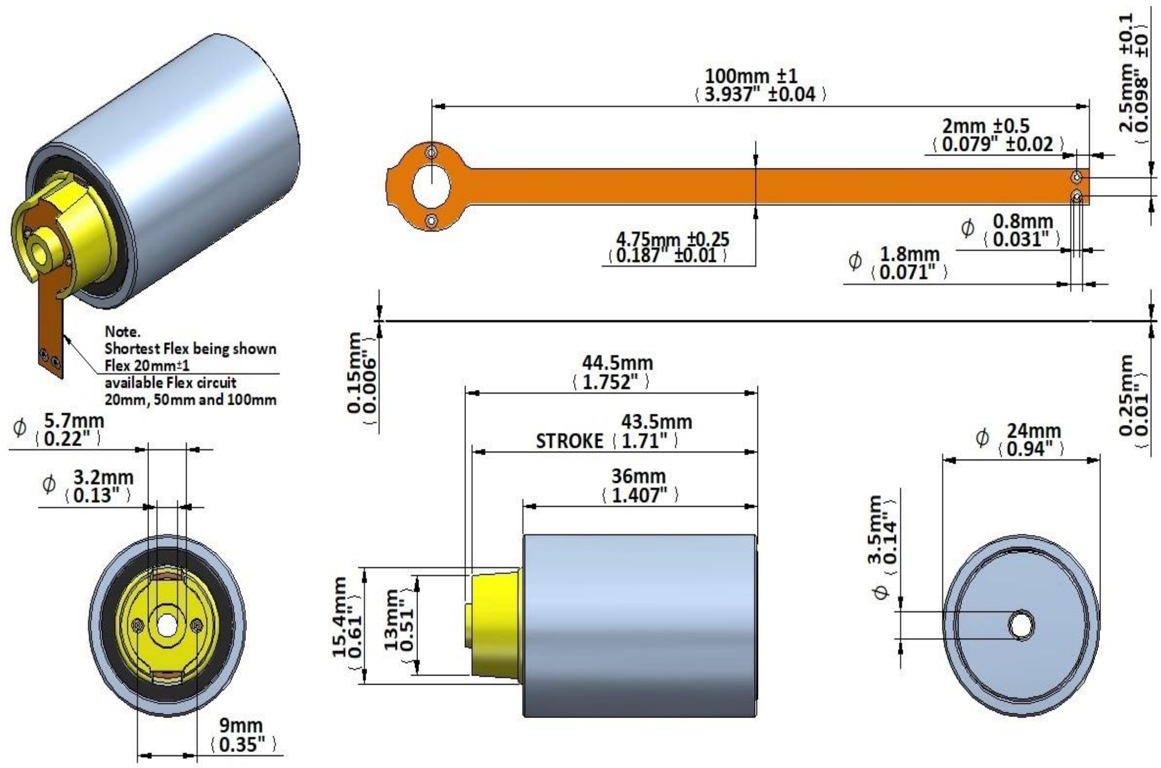
P_{100} is the continuous (100% ED) excitation power at which the coil attains temperature T_{max} with the part mounted to a massive heatsink at 20°C

P_{100}	12.5 W	Total Mass	95 g
T_{max}	130 °C	Coil Mass	9 g

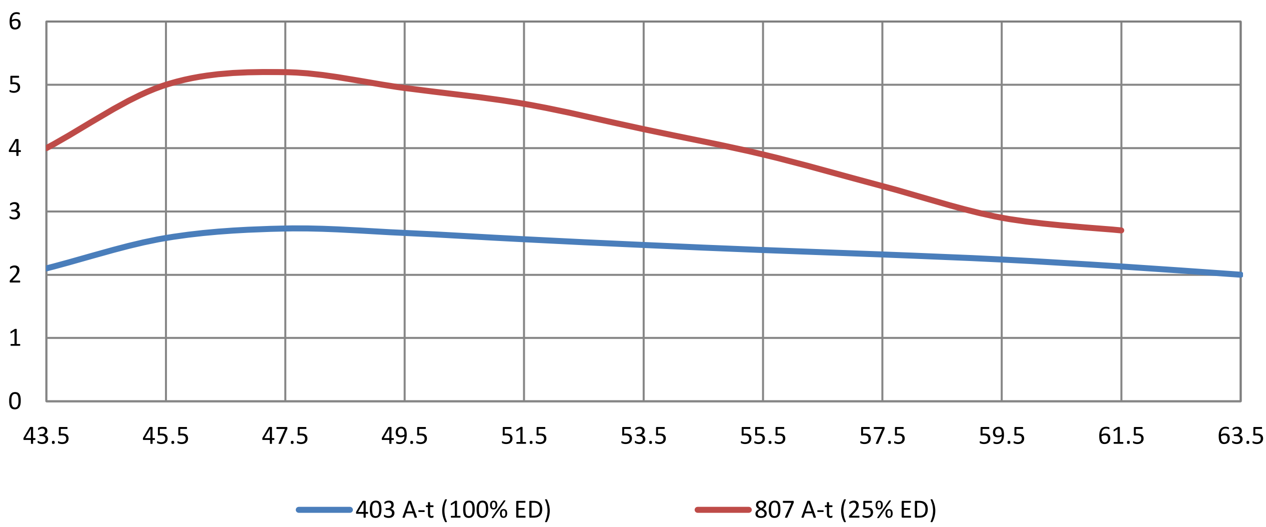
Model No.	Resistance R_{20}	Inductance	Force Constant	Velocity Constant	Current I_{100}
VM2436-375	1.0 Ω	0.2 mH	0.7 N/A	0.7 Vs/m	2.99 A
VM2436-180	17.8 Ω	3.6 mH	2.9 N/A	2.9 Vs/m	708 mA
VM2436-112	107.0 Ω	22.0 mH	6.7 N/A	6.7 Vs/m	289 mA

Max 'ON' time		Peak Force
100% ED	∞	2.7 N
50% ED	22 s	3.8 N
25% ED	9 s	5.2 N
10% ED	3 s	7.5 N

DOES NOT INCLUDE BEARINGS. GUIDANCE SHOULD BE IMPLEMENTED IN APPLICATION. FLEX CIRCUIT 40-1039 FOR THIS PART CAN BE QUOTED ON REQUEST.



Force (N) vs Displacement (mm) [outwards direction]



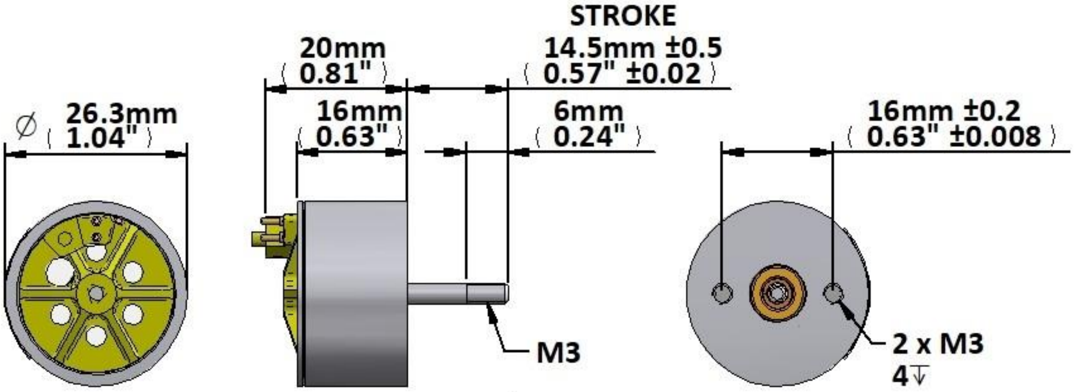
GEEPLUS VM2618 & VM2836

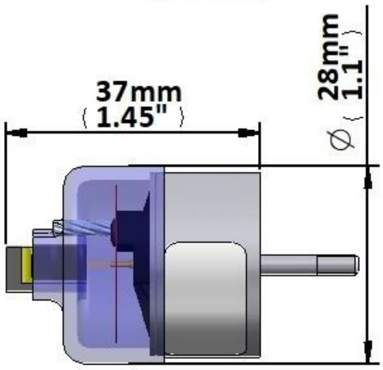
P_{100} is the continuous (100% ED) excitation power at which the coil attains temperature T_{max} with the part mounted to a massive heatsink at 20°C

P_{100}	8 W	Total Mass	60 g
T_{max}	130 °C	Coil Mass	6 g

Model No.	Resistance R_{20}	Inductance	Force Constant	Velocity Constant	Current I_{100}
VM2xxx-180	9.6 Ω	1.3 mH	4 N/A	4 Vs/m	771 mA
VM2xxx-132	34.4 Ω	5.3 mH	8 N/A	8 Vs/m	407 mA
VM2xxx-112	55.0 Ω	7.3 mH	9 N/A	9 Vs/m	322 mA
VM2xxx-080	286.0 Ω	40.0 mH	21 N/A	21 Vs/m	141 mA

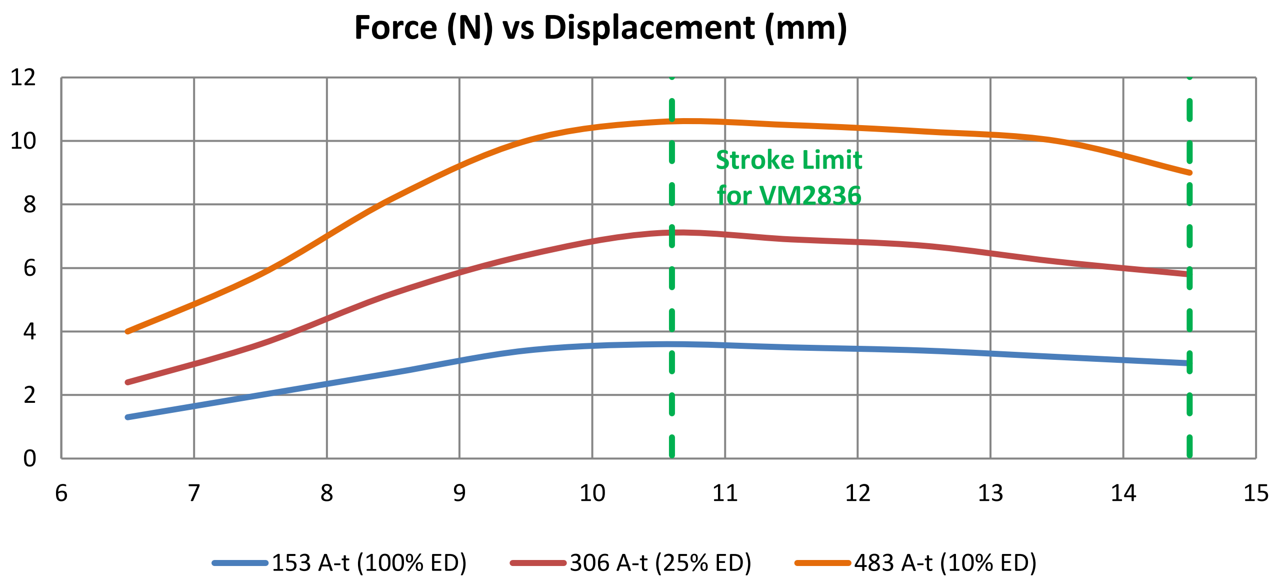
Max 'ON' time		Peak Force
100% ED	∞	3.4 N
50% ED	55 s	4.8 N
25% ED	12 s	7.0 N
10% ED	3 s	10.6 N





Mating connector is Molex type 70066 with crimps 70058 or equivalent

VM2836 incorporates cover & flex circuit termination, stroke must be limited to 4mm maximum.



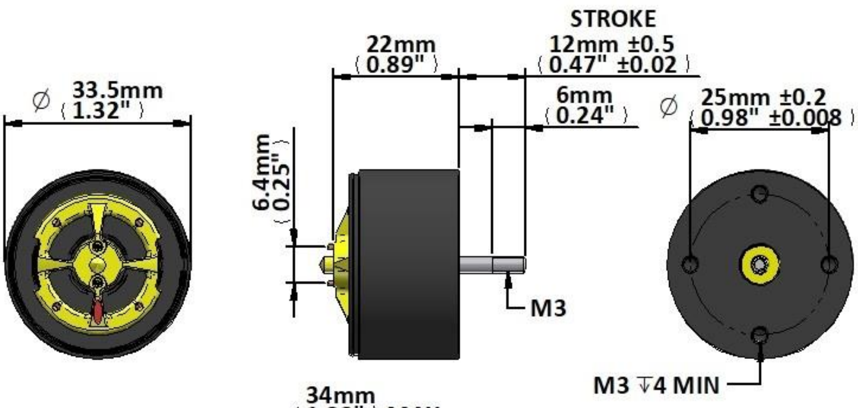
GEEPLUS VM3322 & VM3334

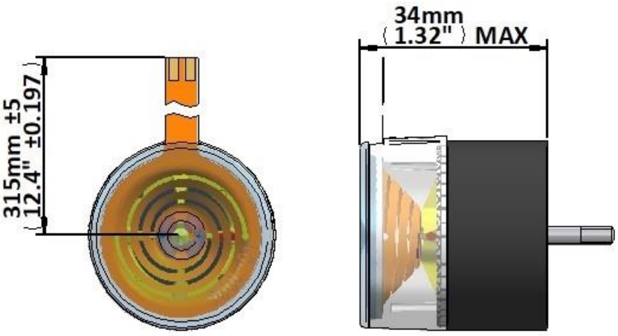
P_{100} is the continuous (100% ED) excitation power at which the coil attains temperature T_{max} with the part mounted to a massive heatsink at 20°C

P_{100}	8 W	Total Mass	140 g
T_{max}	130 °C	Coil Mass	7 g

Model No.	Resistance R_{20}	Inductance	Force Constant	Velocity Constant	Current I_{100}
VM33xx-315	1.0 Ω	0.2 mH	2 N/A	2 Vs/m	2.4 A
VM33xx-180	10.9 Ω	3.0 mH	6 N/A	6 Vs/m	724 mA
VM33xx-125	47.7 Ω	13.0 mH	13 N/A	13 Vs/m	346 mA
VM33xx-090	173.0 Ω	44.0 mH	24 N/A	24 Vs/m	182 mA

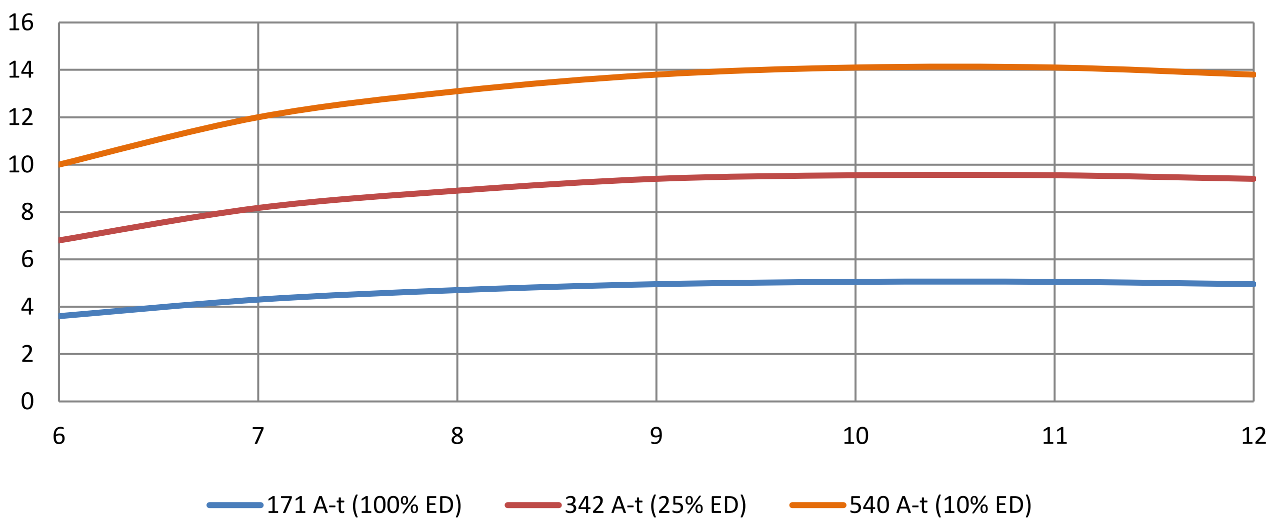
Max 'ON' time		Peak Force
100% ED	∞	5.0 N
50% ED	17 s	7.0 N
25% ED	6 s	9.5 N
10% ED	2 s	14.0 N





VM3334 incorporates flex termination to mate with 5-way FFC connector, Molex P/N 52207-0585 or similar
Centre pin is unused, 2 pins connect to each circuit of flex termination

Force (N) vs Displacement (mm)



GEEPLUS VM3850RB

P_{100} is the continuous (100% ED) excitation power at which the coil attains temperature T_{max} with the part mounted to a massive heatsink at 20°C

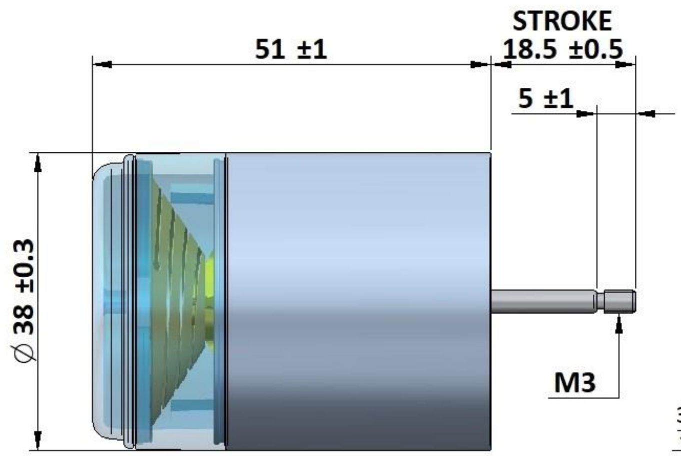
P_{100}	12.0 W	Total Mass	224 g
T_{max}	130 °C	Coil Mass	19 g

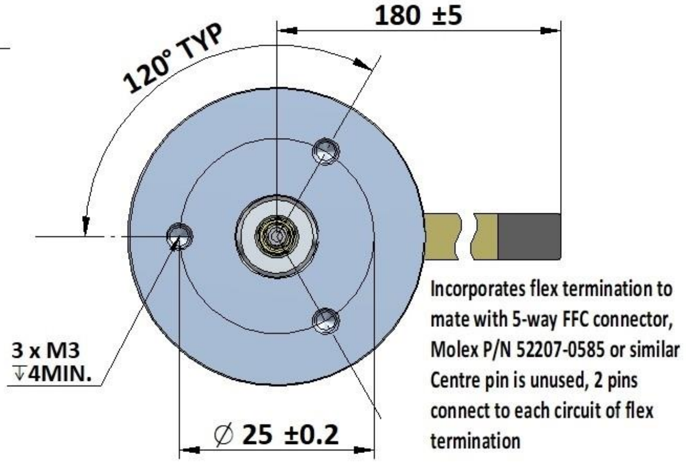
Model No.	Resistance R_{20}	Inductance	Force Constant	Velocity Constant	Current I_{100}
VM3850RB-200	25.4 Ω	14.8 mH*	15.6 N/A	15.6 Vs/m	0.58 A
VM3850RB-265	8.2 Ω	4.8 mH*	8.8 N/A	0.0 Vs/m	1.02 A
VM3850RB-400	1.6 Ω	0.9 mH*	3.9 N/A	0.0 Vs/m	2.31 A

Max 'ON' time		Peak Force
100% ED	∞	9.0 N
50% ED	60 s	13.0 N
25% ED	26 s	17.3 N
10% ED	11 s	28.1 N

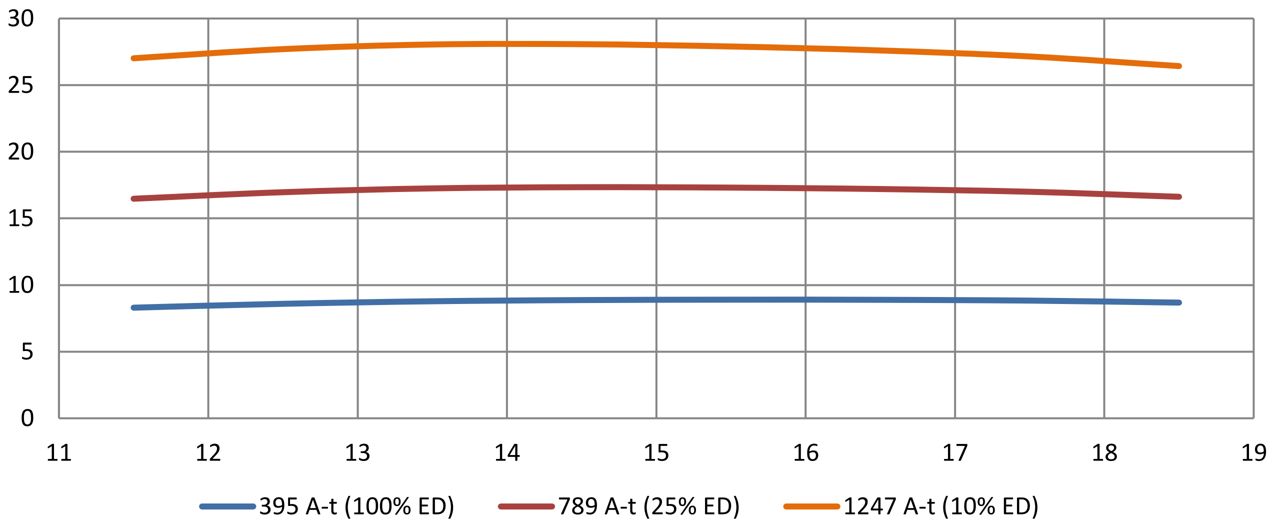
*Inductance is measured with the shaft fully extended at 1kHz and will reduce as the shaft moves in to the pot.

This device uses rolling bearings for lowest hysteresis





Force (N) vs Displacement (mm)

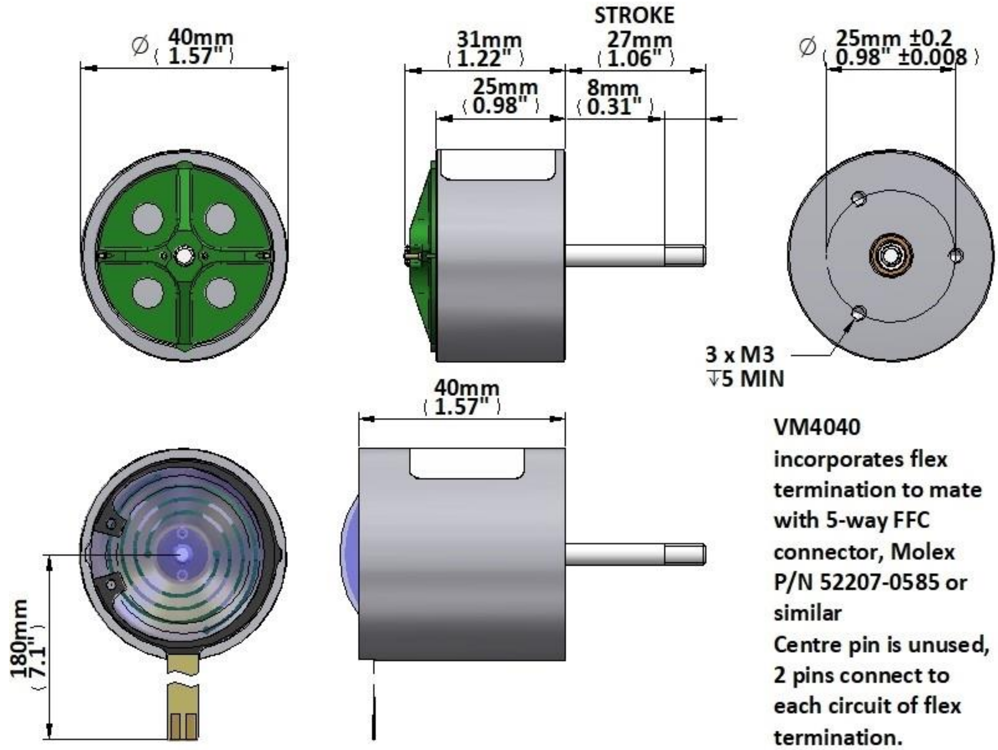


P_{100} is the continuous (100% ED) excitation power at which the coil attains temperature T_{max} with the part mounted to a massive heatsink at 20°C

P_{100}	16 W	Total Mass	230 g
T_{max}	130 °C	Coil Mass	25 g

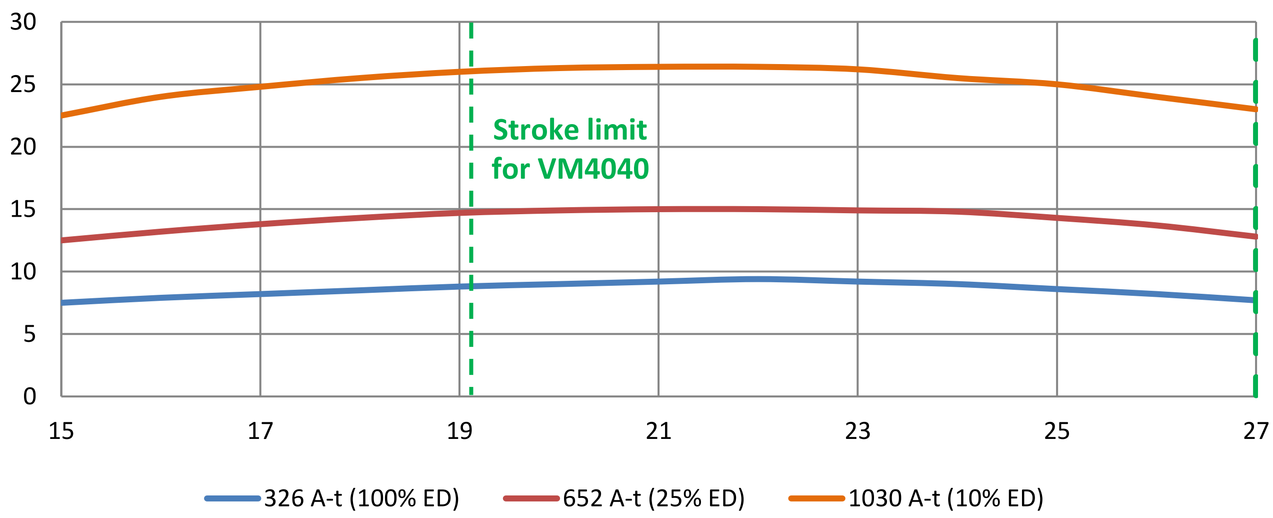
Model No.	Resistance R_{20}	Inductance	Force Constant	Velocity Constant	Current I_{100}
VM40xx-315	4.3 Ω	1.5 mH	5 N/A	5 Vs/m	1.6 A
VM40xx-250	12.8 Ω	5.2 mH	10 N/A	10 Vs/m	0.9 A
VM40xx-200	26.0 Ω	7.8 mH	12 N/A	12 Vs/m	0.7 A

Max 'ON' time		Peak Force
100% ED	∞	9.0 N
50% ED	90 s	12.0 N
25% ED	28 s	15.0 N
10% ED	8 s	26.0 N



VM4040 incorporates flex termination to mate with 5-way FFC connector, Molex P/N 52207-0585 or similar
Centre pin is unused, 2 pins connect to each circuit of flex termination.

Force (N) vs Displacement (mm)



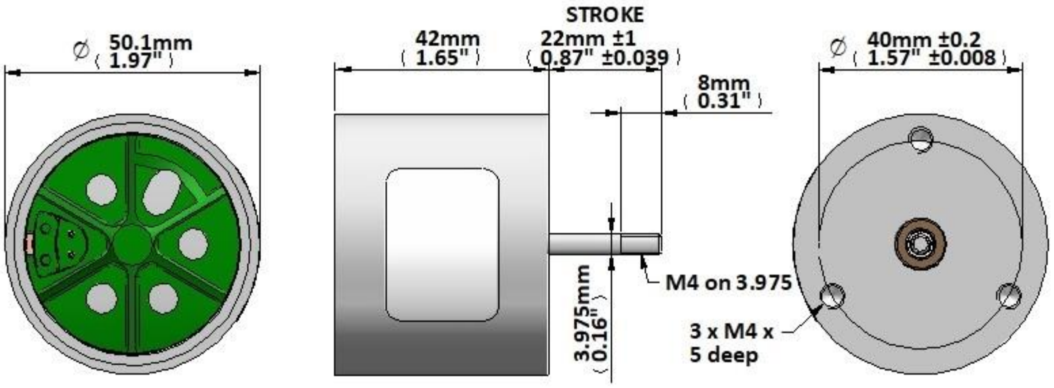
GEEPLUS VM5042 & VM5050

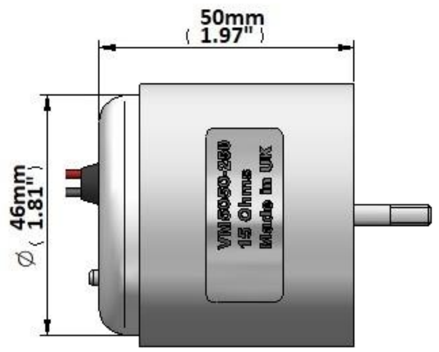
P_{100} is the continuous (100% ED) excitation power at which the coil attains temperature T_{max} with the part mounted to a massive heatsink at 20°C

P_{100}	24 W	Total Mass	480 g
T_{max}	130 °C	Coil Mass	35 g

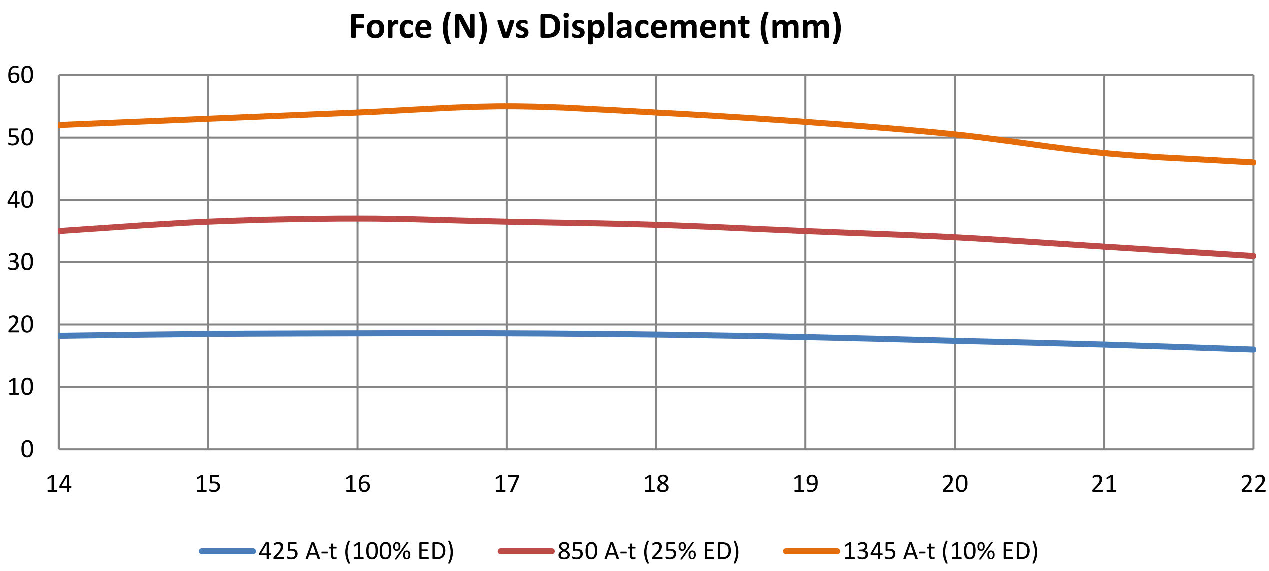
Model No.	Resistance R_{20}	Inductance	Force Constant	Velocity Constant	Current I_{100}
VM50xx-400	2.5 Ω	1.3 mH	7 N/A	7 Vs/m	2.6 A
VM50xx-250	15.0 Ω	5.6 mH	17 N/A	17 Vs/m	1.1 A
VM50xx-190	45.0 Ω	20.0 mH	30 N/A	30 Vs/m	0.6 A

Max 'ON' time		Peak Force
100% ED	∞	19.0 N
50% ED	65 s	27.0 N
25% ED	12 s	37.0 N
10% ED	3 s	54.0 N





VM5050 incorporates end cover and flex circuit termination to coil with leadwires 24AWG, UL????, 300mm (12") minimum length. Stroke is limited to 8mm.



GEEPLUS

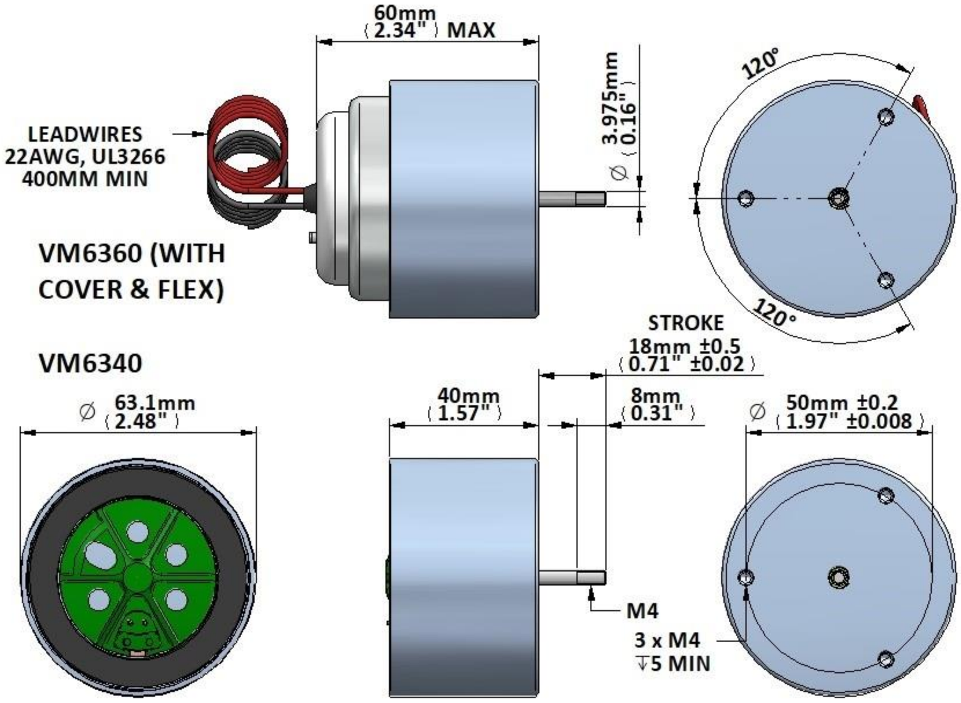
VM6340 & VM6360

P_{100} is the continuous (100% ED) excitation power at which the coil attains temperature T_{max} with the part mounted to a massive heatsink at 20°C

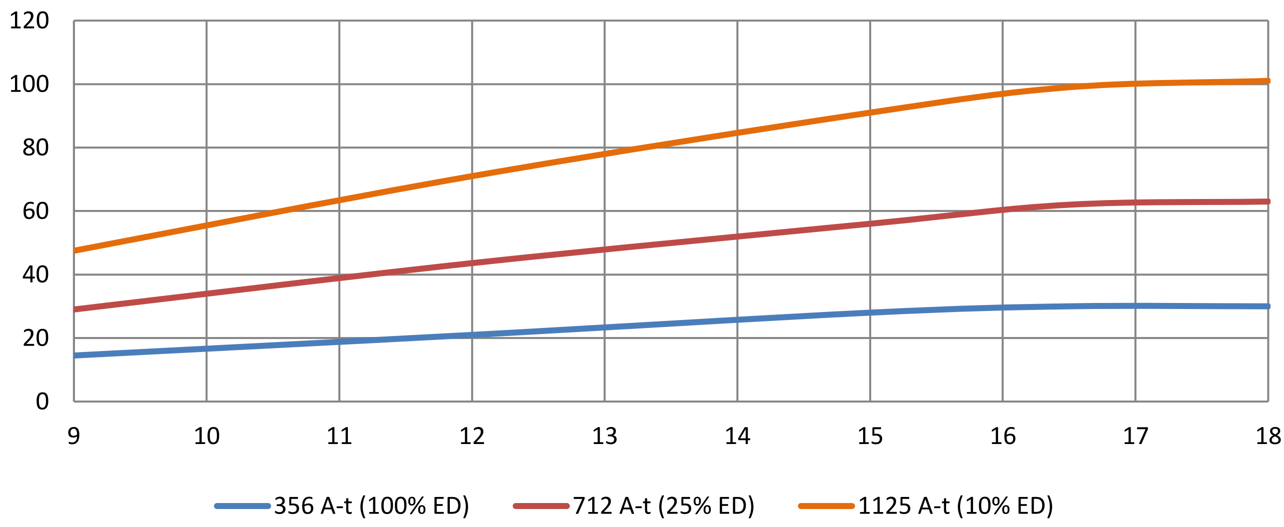
P_{100}	24 W	Total Mass	750 g
T_{max}	130 °C	Coil Mass	32 g

Model No.	Resistance R_{20}	Inductance	Force Constant	Velocity Constant	Current I_{100}
VM63xx-400	2.5 Ω	1.3 mH	11 N/A	11 Vs/m	2.6 A
VM63xx-250	15.3 Ω	7.8 mH	26 N/A	26 Vs/m	1.1 A
VM63xx-190	45.0 Ω	20.0 mH	47 N/A	47 Vs/m	0.6 A

Max 'ON' time		Peak Force
100% ED	∞	30.0 N
50% ED	65 s	45.0 N
25% ED	12 s	63.0 N
10% ED	3 s	101.0 N



Force (N) vs Displacement (mm)



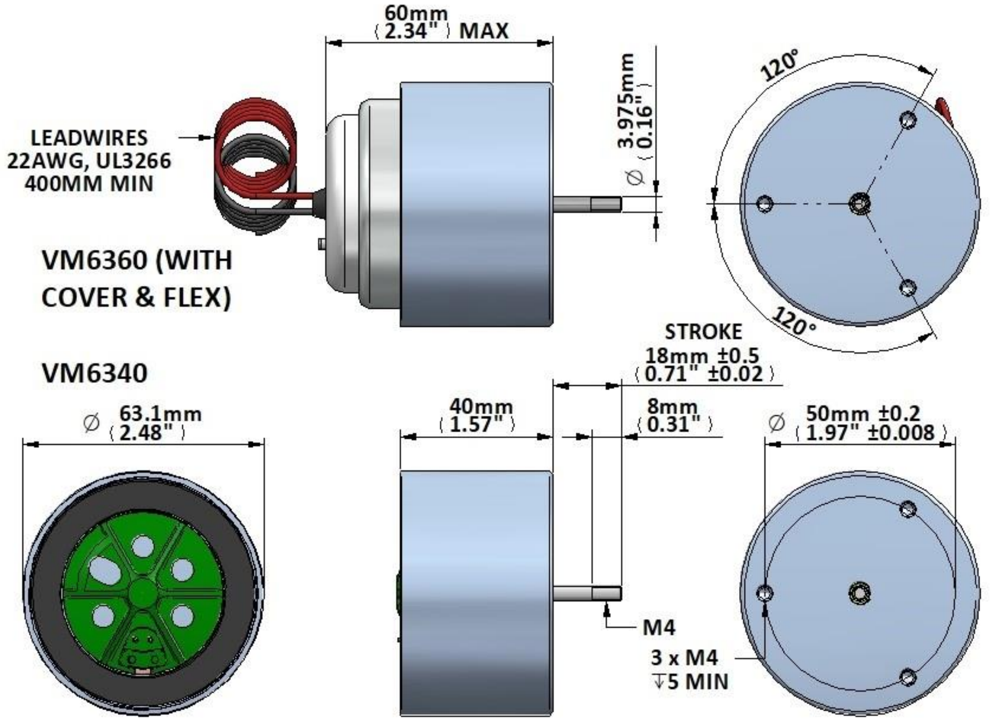
GEEPLUS VM6340L & VM6360L

P_{100} is the continuous (100% ED) excitation power at which the coil attains temperature T_{max} with the part mounted to a massive heatsink at 20°C

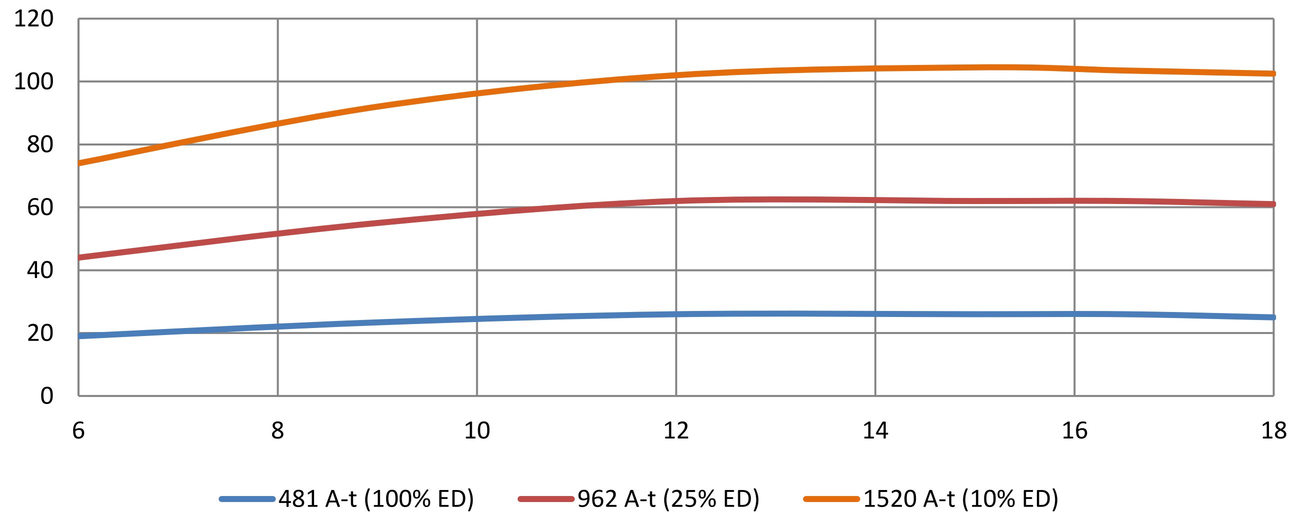
P_{100}	28 W	Total Mass	750 g
T_{max}	130 °C	Coil Mass	43 g

Model No.	Resistance R_{20}	Inductance	Force Constant	Velocity Constant	Current I_{100}
VM63xxL-400	3.7 Ω	1.8 mH	13 N/A	13 Vs/m	2.3 A
VM63xxL-250	22.0 Ω	10 mH	30 N/A	30 Vs/m	1.0 A
VM63xxL-190	67.0 Ω	31 mH	52 N/A	52 Vs/m	0.5 A

Max 'ON' time		Peak Force
100% ED	∞	29.0 N
50% ED	65 s	43.0 N
25% ED	12 s	62.0 N
10% ED	3 s	104.0 N



Force (N) vs Displacement (mm)

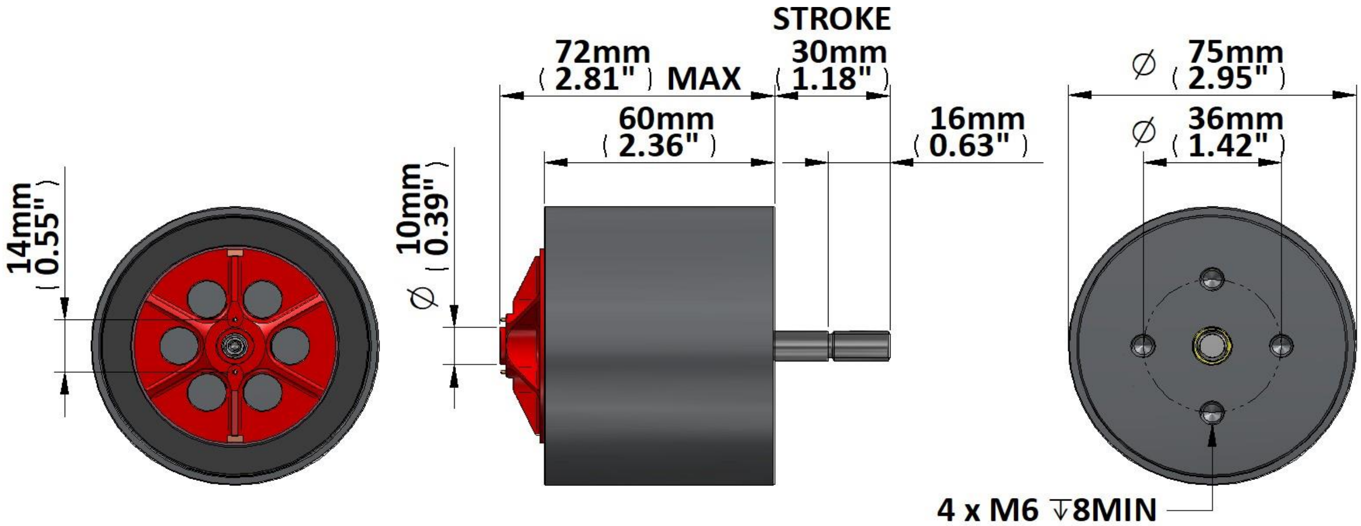


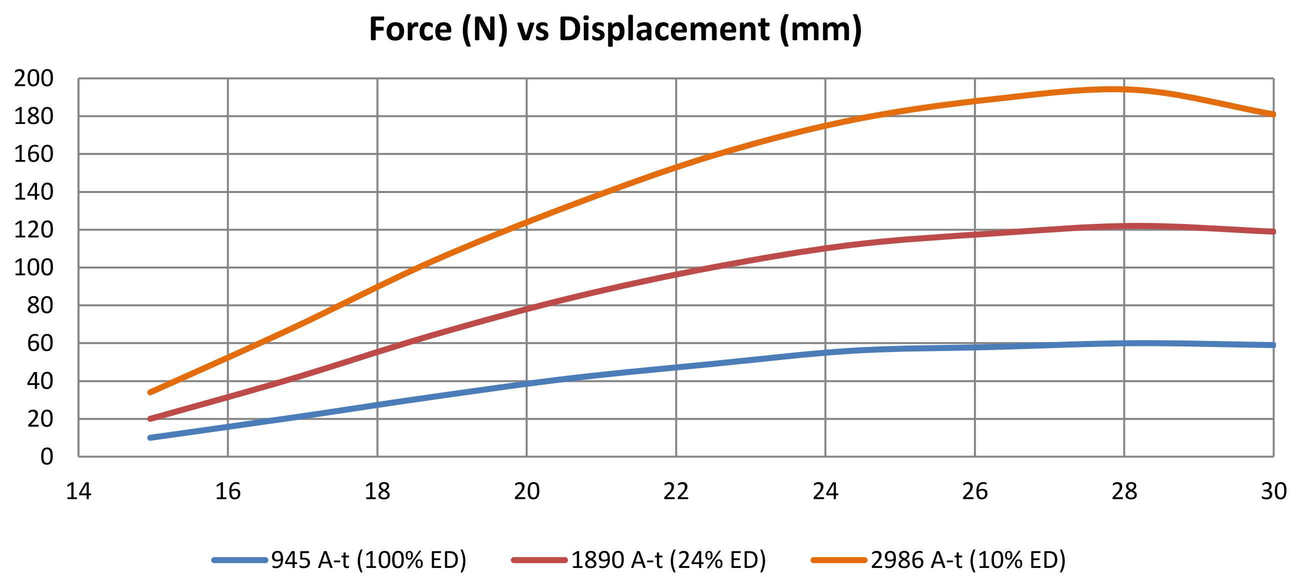
P_{100} is the continuous (100% ED) excitation power at which the coil attains temperature T_{max} with the part mounted to a massive heatsink at 20°C

P_{100}	42 W	Mass	1700 g
T_{max}	130 °C	Coil Mass	160 g

Model No.	Resistance R_{20}	Inductance	Force Constant	Velocity Constant	Current I_{100}
VM75P2-375	17.1 Ω	30.0 mH	44 N/A	44 Vs/m	1.3 A
VM75P2-560	3.5 Ω	6.2 mH	20 N/A	20 Vs/m	2.9 A

Max 'ON' time		Peak Force
100% ED	∞	60 N
50% ED	240 s	85 N
25% ED	75 s	122 N
10% ED	15 s	194 N



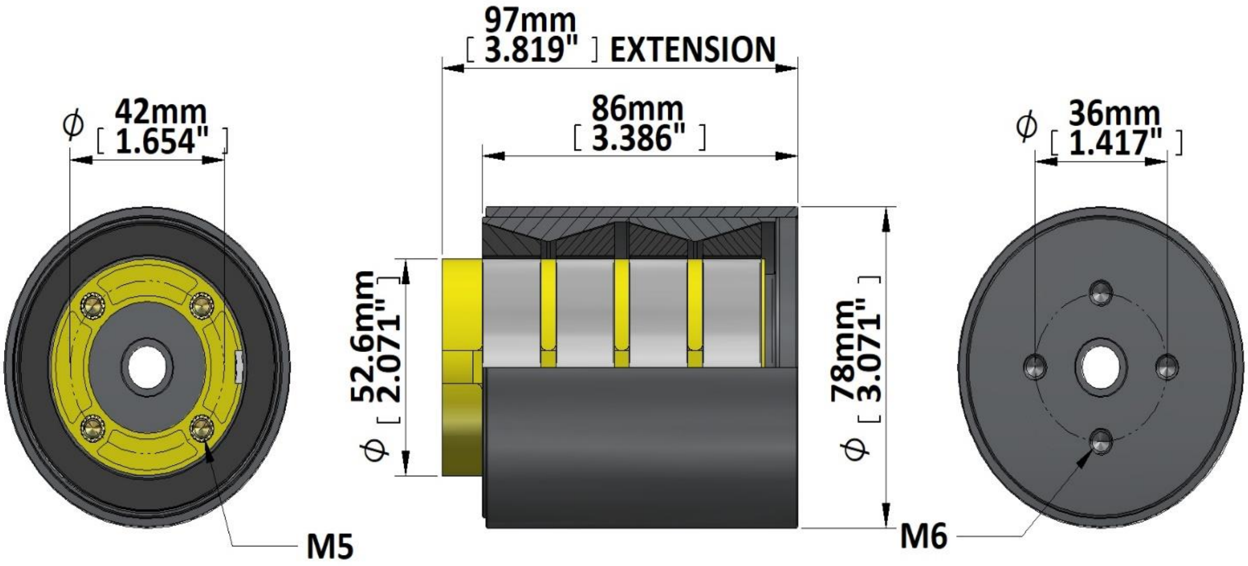


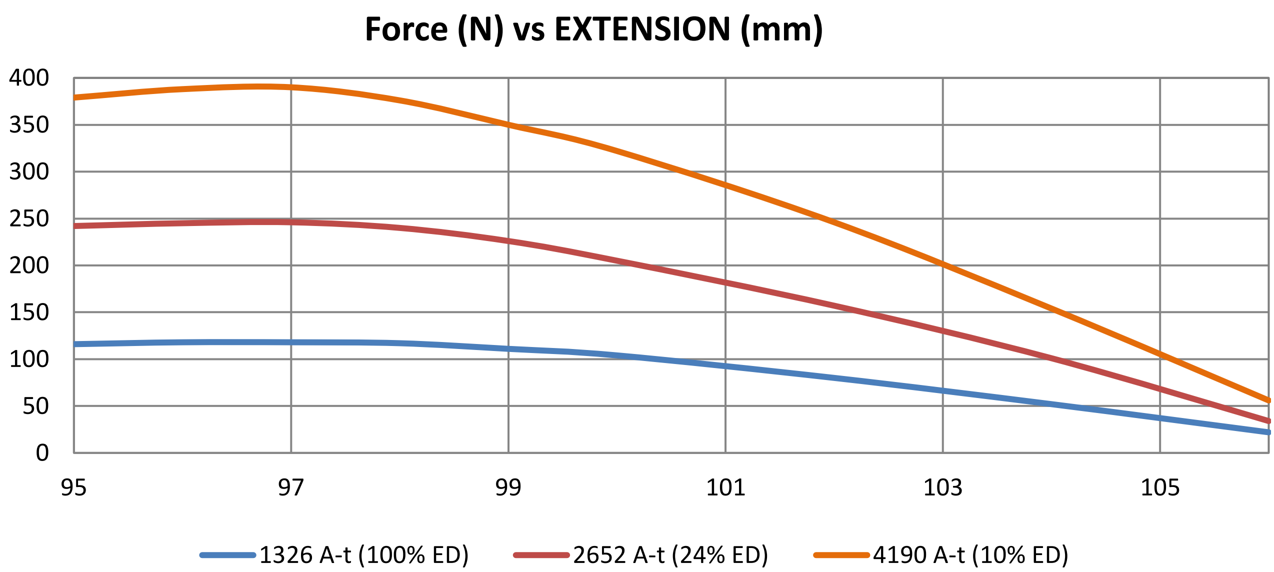
P_{100} is the continuous (100% ED) excitation power at which the coil attains temperature T_{max} with the part mounted to a massive heatsink at 20°C

P_{100}	75 W	Mass	2800 g
T_{max}	130 °C	Coil Mass	175 g

Model No.	Resistance R_{20}	Inductance	Force Constant	Velocity Constant	Current I_{100}
VM78P4-530	5.8 Ω	2.4 mH	42 N/A	42 Vs/m	3.1 A
VM78P4-A530	8.9 Ω	2.4 mH	42 N/A	42 Vs/m	2.5 A

Max 'ON' time		Peak Force
100% ED	∞	118 N
50% ED	12 s	180 N
25% ED	36 s	246 N
10% ED	120 s	390 N





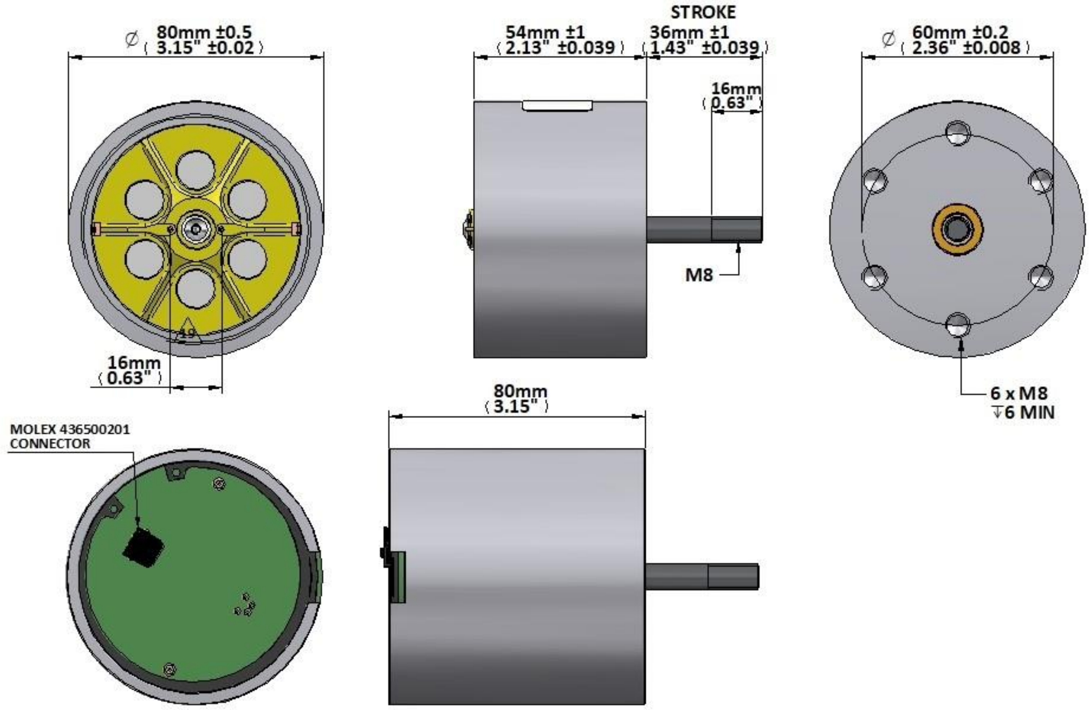
GEEPLUS VM8054 & VM8080

P_{100} is the continuous (100% ED) excitation power at which the coil attains temperature T_{max} with the part mounted to a massive heatsink at 20°C

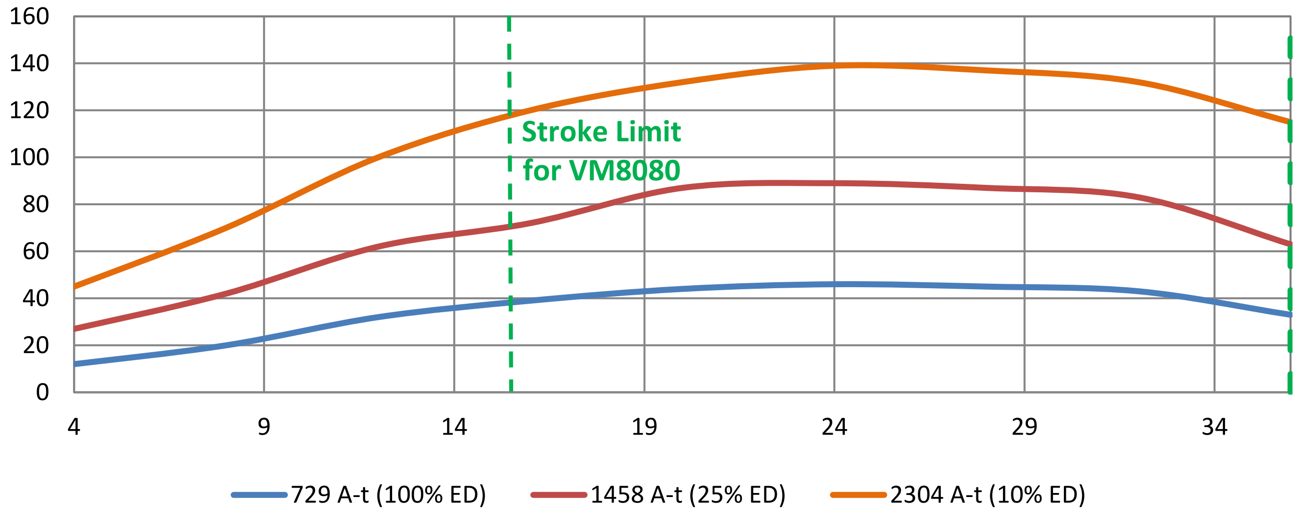
P_{100}	50 W		VM8054 1.7kg / VM8080 2kg	
T_{max}	130 °C		Coil Mass	150 g

Model No.	Resistance R_{20}	Inductance	Force Constant	Velocity Constant	Current I_{100}
VM80xx-630	2.3 Ω	1.8 mH	10 N/A	10 Vs/m	3.9 A
VM80xx-400	11.5 Ω	10.6 mH	24 N/A	24 Vs/m	1.8 A
VM80xx-250	85.0 Ω	77.0 mH	62 N/A	62 Vs/m	0.6 A

Max 'ON' time		Peak Force
100% ED	∞	43.0 N
50% ED	100 s	62.0 N
25% ED	100 s	85.0 N
10% ED	0 s	130.0 N



Force (N) vs Displacement (mm)



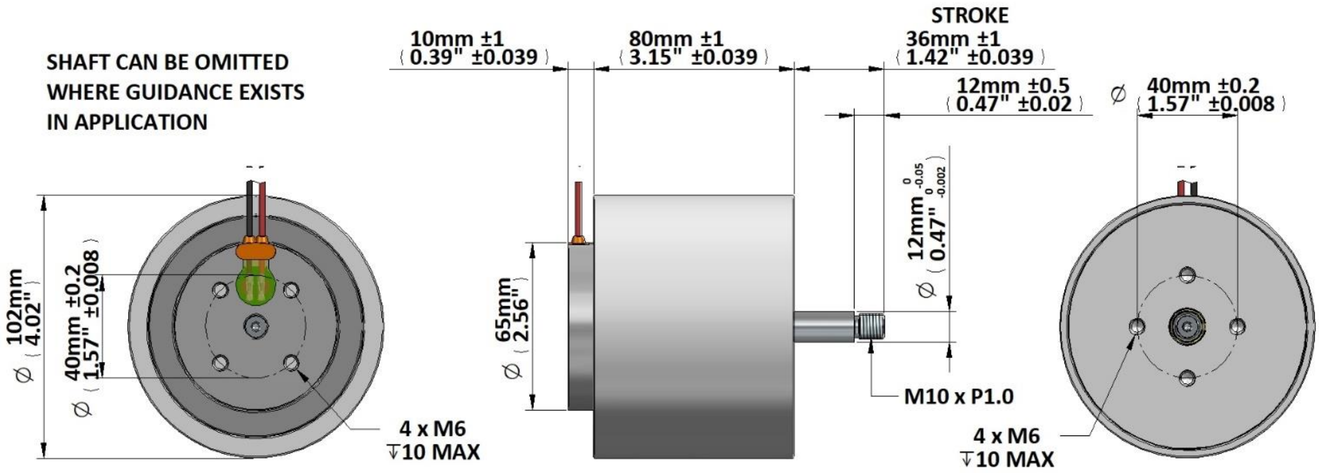
GEEPLUS VM102P2

P_{100} is the continuous (100% ED) excitation power at which the coil attains temperature T_{max} with the part mounted to a massive heatsink at 20°C

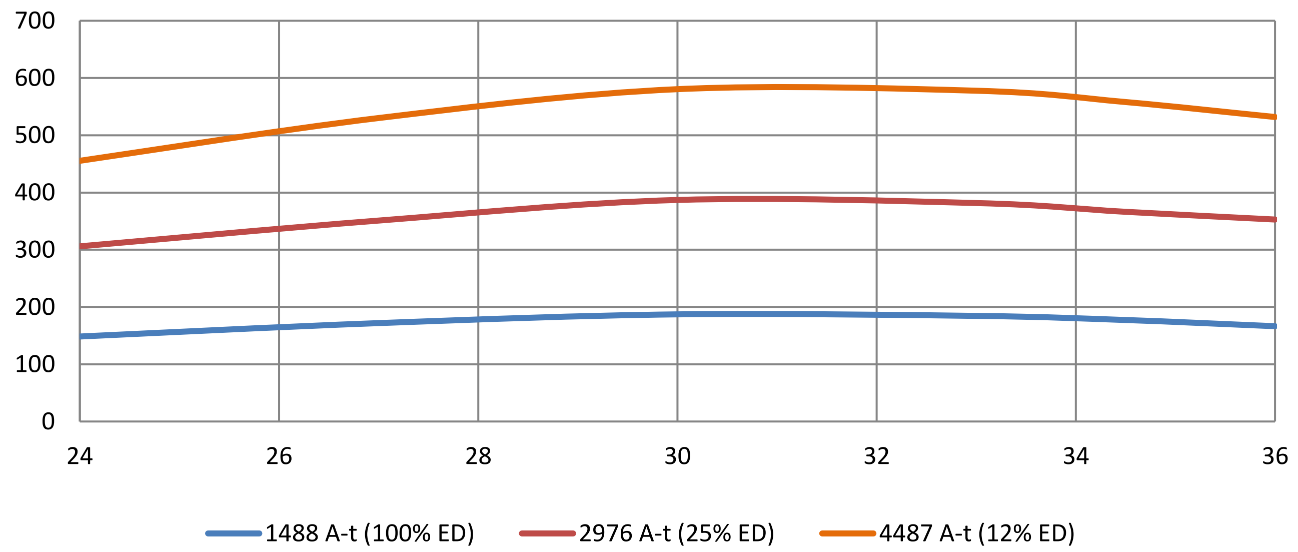
P_{100}	105 W	Total Mass	4200 g
T_{max}	130 °C	Coil Mass	430 g

Model No.	Resistance R_{20}	Inductance	Force Constant	Velocity Constant	Current I_{100}
VM102P2-710	2.1 Ω	0.6 mH	31 N/A	31 Vs/m	6.0 A
VM102P2-475	10.5 Ω	3.0 mH	70 N/A	70 Vs/m	2.7 A
VM102P2-355	33.4 Ω	9.5 mH	124 N/A	124 Vs/m	1.5 A

Max 'ON' time		Peak Force
100% ED	∞	187.2 N
50% ED	100 s	267.3 N
25% ED	35 s	387.0 N
10% ED	12 s	580.5 N



Force (N) vs Displacement (mm)



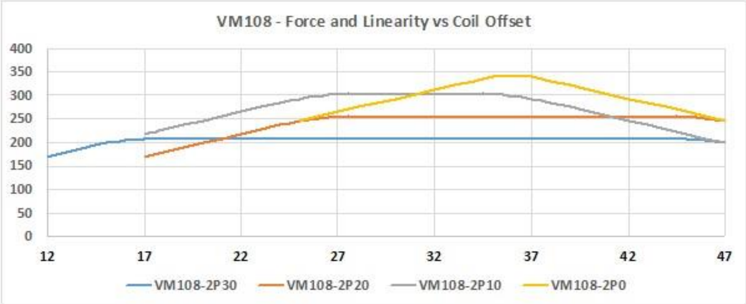
GEEPLUS VM108-2P30

P_{100} is the continuous (100% ED) excitation power at which the coil attains temperature T_{max} with the part mounted to a massive heatsink at 20°C

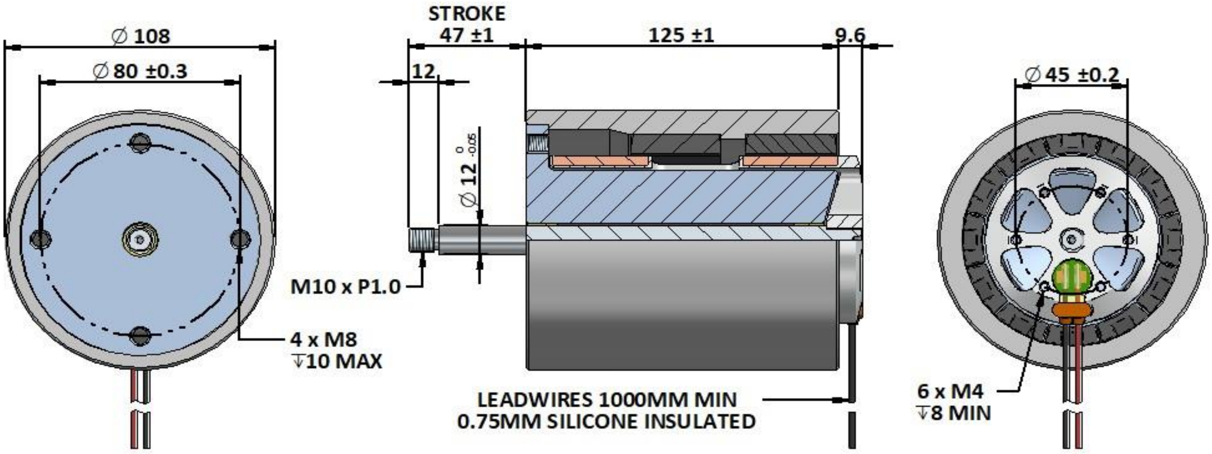
P_{100}	108 W	Total Mass	8 kg
T_{max}	120 °C	Coil Mass	750 g

Model No.	Resistance R_{20}	Inductance	Force Constant	Velocity Constant	Current I_{100}
VM108-2P30-1000	1.3 Ω	0.0 mH	25 N/A	25 Vs/m	7.7 A
VM108-2P30-670	6.4 Ω	0.0 mH	56 N/A	56 Vs/m	3.5 A
VM108-2P30-500	20.2 Ω	0.0 mH	99 N/A	99 Vs/m	2.0 A

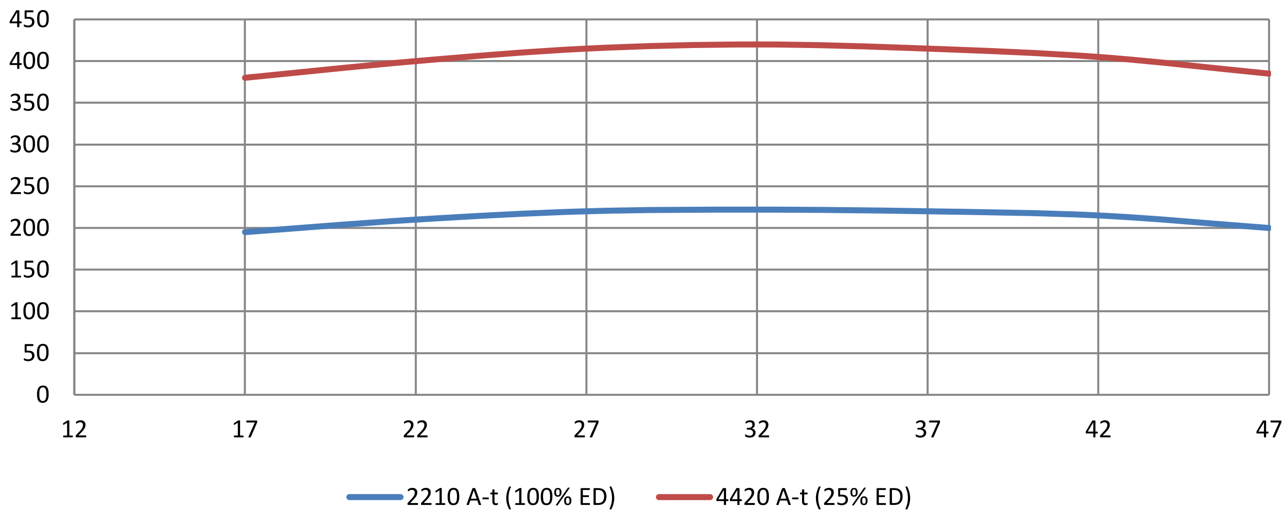
Max 'ON' time		Peak Force
100% ED	∞	230.0 N
50% ED	100 s	300.0 N
25% ED	35 s	440.0 N
10% ED	11 s	700.0 N



The VM108-2P voice coil motor can be configured with different coil geometry to provide more force over a shorter linear range. The graph gives an approximate indication of what is possible. Call Geeplus if other configuration is of interest



Force (N) vs Displacement (mm)



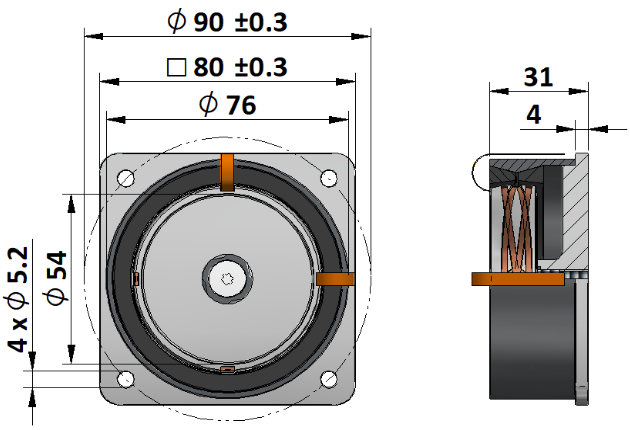
GEEPLUS VMXY80 TILTING MOTOR

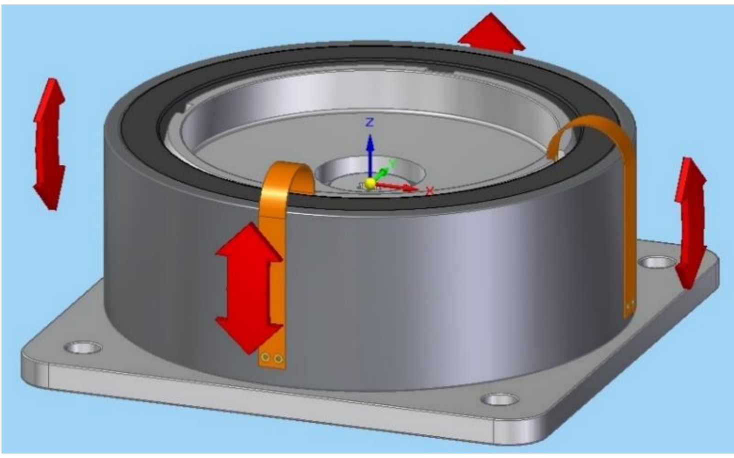
P_{100} is the continuous (100% ED) excitation power per coil at which the coil attains temperature T_{max} with the part mounted to a massive heatsink at 20°C with both coils energised at equal power.

P_{100}	5 W	Total Mass	400 g
T_{max}	130 °C	Coil Mass	40 g

Model No.	Resistance R_{20}	Inductance	Torque Constant	Deflection Constant	Current I_{100}
VMXY80-400-200	3.5 Ω	0.2 mH	0.020 Nm/A	1.31 °/A	1.0 A
VMXY80-400-250	2.6 Ω	0.3 mH	0.016 Nm/A	1.06 °/A	1.2 A

Max 'ON' time		
100% ED	∞	0.02 Nm
50% ED	22 s	0.03 Nm
25% ED	9 s	0.04 Nm
10% ED	3 s	0.06 Nm





The VMXY80 voice coil actuator provides rotational deflection about 2 axes, intended for steering of optical beams or other application.
The moving element is supported on a steel flexure for frictionless movement.
The device has two coil pairs which develop torque about either the X or Y axis when energised.
Torque is proportional to the excitation current, and results in a deflection proportional to the excitation current.
The design of the device is scalable - smaller or larger devices with similar construction are possible subject to quantities being economically viable, however it should be noted that the 80mm diameter device is approaching the upper size limit for which radial magnets are available. Larger devices can be realised using segmented magnets, and may be more readily manufactured with square format.
The Part Number has the format VMXY80-XXX-YYY where the numbers XXX represent thickness of the supporting flexure in microns, and the numbers YYY represent core diameter of the coil wire in microns (so P/N VMXY80-400-250 has a flexure 0.400mm thick, and a coil wound with 0.250mm wire).