

HIGH PERFORMANCE, ZERO COGGING SLOTLESS MOTOR KITS

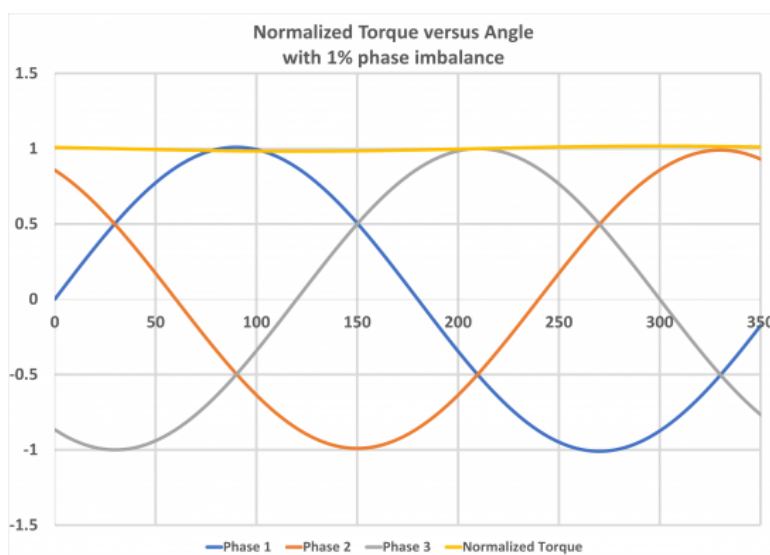
***Smooth motion, precision
 actuation and deep integration***



Olsen Actuators introduces ThinGap, a leading provider of high performance, zero cogging slotless motor kits for use in applications that require smooth motion, precision actuation and deep integration. With an emphasis on thin stator-coils, optimised rotor-magnets, proprietary modelling and process capabilities, ThinGap cogless motors offer a high torque-to-weight ratio coupled with a large aperture and low profile. With two standard product lines, the TG and LS Series of motor kits, along with modified-standard and custom, application-specific designs, ThinGap offers a wide range of sizes, powers and form-factors for demanding applications across aerospace, defense, medical and precision industrial markets.

Aerospace, Defence & Space - ThinGap's USA-made three-phase, permanent-magnet, Brushless DC (BLDC) motor kits are zero cogging and high-efficiency, making them ideal for mission-critical Aerospace and Defence programs. Applications such as Gimbals, Satcom, and LEO satellites' Attitude Control systems define motor performance by smooth motion, a lack of jitter, a highly linear output, a wide range of speeds, in addition to being lightweight, efficient, and reliable.

ThinGap's highly-engineered, patented motor technology is the basis for its TG Series' high-speed, high-efficiency performance as used in Reaction Wheel Assemblies, and the LS Series' high-torque, lower-speed precision movement is perfect for multi-axis Gimbals. To serve the Aerospace & Defence market, components must utilise low-outgassing materials, have a Space-flight heritage, and able to support stringent program requirements. Since 2015, ThinGap has shipped thousands of Space-grade or MIL-STD capable motor parts for use in commercial satellites, military and commercial aircraft, defence systems and flight-grade NASA programs.



	Max OD Range (mm)	Max Cont. Torque Range (Nm)	Max Cont. Speed Range (RPM)
TG Series	57 - 190	0.74 - 9.46	6,000 - 30,600
LS Series	25 - 267	0.016 - 11.5	1,530 - 6,370

Zero Cogging

The most defining feature of ThinGap's proprietary motor technologies is the smooth, cogless motion made possible by the slotless architecture, meaning there are no iron teeth in the stator. This approach results in a constant reluctance in the motor with respect to the angular position of the rotor, providing a complete absence of cogging during operation.

Low Torque Ripple

ThinGap motor kits produce no cogging, have good phase balance, and a back-EMF total harmonic distortion of less than 1%. This means that the a ThinGap motor kit when matched with the proper driver that can produce a perfect sine wave, with the resulting motion profile will have near zero torque ripple.

Linear Torque Constant

Another benefit of slotless motor architecture is the highly linear torque constant, since the stator does not saturate during operation. This means that the motor acts as a static torque converter, taking any input current and outputting torque based on the provided torque constant with the only limiting factor being generated heat.

Large Through Hole

The thin nature of ThinGap's wave-wound stators and use of Halbach array rotors allows for a large through hole relative to the overall diameter of the motor, in many cases as much as 70% of the kits outer diameter.

Custom Products & Modifications

ThinGap offers a wide range of modified-standard, full custom, and application-specific motor designs as a compliment to more than 50 standard products, as part of the TG and LS Series of motor kits. In addition, we have the ability to design and manufacture framed or housed motor assemblies as a pre-integrated solution. Finally, options like position sensors, carbon fibre components and enhanced process steps are available for programs with demanding requirements.

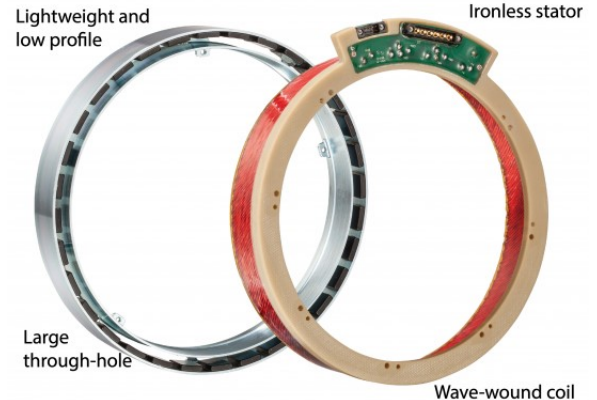
Modified and custom motor designs address the need for very specific performance specifications, operational requirements, cost optimized solutions and unique form factors that may be required for a project. Housed and framed assemblies enable more cost-effective, turnkey solution desired by projects with tight schedules which need to be able to rapidly integrate a motor into a system.

ThinGap regularly provides customers with custom motors or where possible, modified variants of its standard products. Additional information about each type of motor or generator design is provide below.

Custom & Optional Features

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|---------------------------------------|---|
| ✓ Space rating | ✓ Redundant stator windings |
| ✓ Application specific designs | ✓ Direct-drive assemblies with encoder |
| ✓ Hall-effect position sensors | ✓ Optimized generator designs |
| ✓ Carbon fibre components | ✓ Extreme high powers (100kW+) |
| ✓ Fibre wrapping for magnet retention | ✓ Water resistant, submersible kits |
| ✓ Weight and cost optimized designs | ✓ Requirements for M&P lists, onsite source inspection, and burn-in testing |
| ✓ Environmental enhancements | |

TG Series



LS Series

