thin gap | INNOVATION IN MOTORS

HIGH TORQUE-TO-WEIGHT RATIO | LIGHT-WEIGHT AND LOW-INERTIA | HIGHLY EFFICIENT RING ARCHITECTURE | ZERO COGGING FOR PRECISION MOVEMENT | SCALABLE IN SIZE AND POWER

Data Sheet Model Number: LS-25-16

ThinGap's LS Line includes numerous high performance brushless permanent magnet motors. The LS line targets lower speed, high precision applications such as gimbals, optics, and precision robotics. The highest torque density with high power capability and low thermal resistance.

ThinGap's LS Line of Brushless Motors
For low speed, high precision applications such as gimbals, optics, and precision robotics. Highest torque density with high power capability. Available in sizes 25mm to 267mm.

Motor Parameter Table

Continuous Parameters	Units	Value
Continuous Torque @ Max Speed	mN-m	25.6
Maximum Shaft Power	W	22.5
Maximum Mechnical Speed	RPM	8400
Maximum Phase Current	$A_{Peak\text{-}Sine}$	3.07
Required Motor Voltage @ Max Speed	$V_{pkl\text{-}l}$	13.20
Maximum Coil Temperature	°C	130
Peak Parameters@Max Speed	**Units**	**Value**
Peak Torque (Duration 1)	N-m	0.0707 (1s)
Peak Torque (Duration 2)	N-m	0.0456 (3s)
Peak Phase Current (Duration 1)	$A_{Peak\text{-}Sine}$	7.85 (1s)
Peak Phase Current (Duration 2)	$A_{Peak\text{-}Sine}$	5.18 (3s)
Peak Power (Duration 1)	W	62 (1s)
Peak Power (Duration 2)	W	40 (3s)
Motor Constants	**Units**	**Value**
Voltage Constant	$V_{pkl\text{-}l}$/rad/s	0.011
Voltage Constant	$V_{pkl\text{-}l}$/kRPM	1.14220
Torque Constant	N-m/A_{RMS}	0.01336
Motor Constants	N-m/√W	0.00936
Electrical Parameters	**Units**	**Value**
Motor Resistance @ 20°C (Line to Line)	Ω	1.357
Motor Resistance @ Max Temperature (Line to Line)	Ω	1.904
Inductance (Line to Line)	µH	18.4 ± 22%
Number of Magnetic Poles	ea	6
Electrical Frequency @ Max Speed	Hz	420
Mechanical Parameters	**Units**	**Value**
Rotor Inertia	kg-m^2	7.786E-07
Outer Diameter	mm	25
Through Hole Diameter	mm	14.6
Axial Height	mm	15.7
Rotor Mass	kg	0.010
Stator Mass	kg	0.016
Part Set Mass	kg	0.026

Torque and Mechanical Speed:

Continuous rated torque of up to 25.6mNm and rated speed of up to 8400 RPM.

Motor controller recommendation:

Standard 3-Phase Controller
High frequency PWM recommended

Options available upon request:

Alternative winding design options

High temperature option

Higher speed options

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LS-25-16

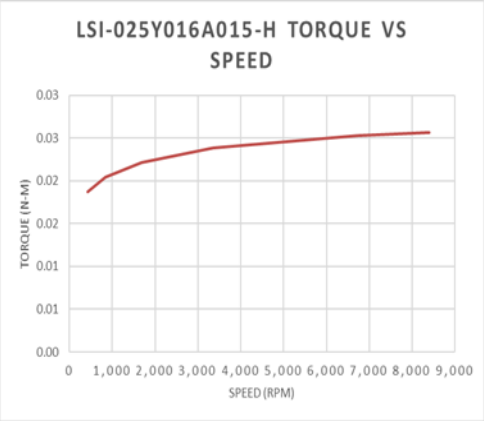
Motor Data Sheet Model Number: LS-25-16

ThinGap technology incorporates the latest electro-magnetic components where torque limits, both continuous and peak, are determined by available cooling. The charts presented develop these limits based on natural convection from the lamination stack surface with forced convection on the coil surface due to rotation of the rotor. Mounting of the laminations stack to a heat sink will further improve maximum continuous torque capacity. Contact ThinGap for application-specific requirements.

ThinGap's frameless motor part set allows it to be completely integrated resulting in the highest ratio of torque-to-volume. In this configuration, the motor's rotor and stator can be housed within the customer's assembly utilizing a common shaft and bearing system, resulting in increased coupling efficiencies, smaller system size and lower weight. **Note:** stator and rotor assembly requires tooling due the high magnetic strength of ThinGap's rotor designs.

Basic Frame Sizes Available:	
Motor Model (mm)	**Cont. Torque Range (N-m)**
LSI-25-10, LSI-25-16 & LSI-25-25	0.0163 to 0.0664
LSI-51-13	0.14
LSI-59-13	0.2
LSI-75-12 & LSI-75-20	0.29 to 0.66
LSI-105-33	1.5 to 1.9
LSI-130-23	1.9 to 2.2
LSI-152-29	3.6
LSI-267-32	11.5

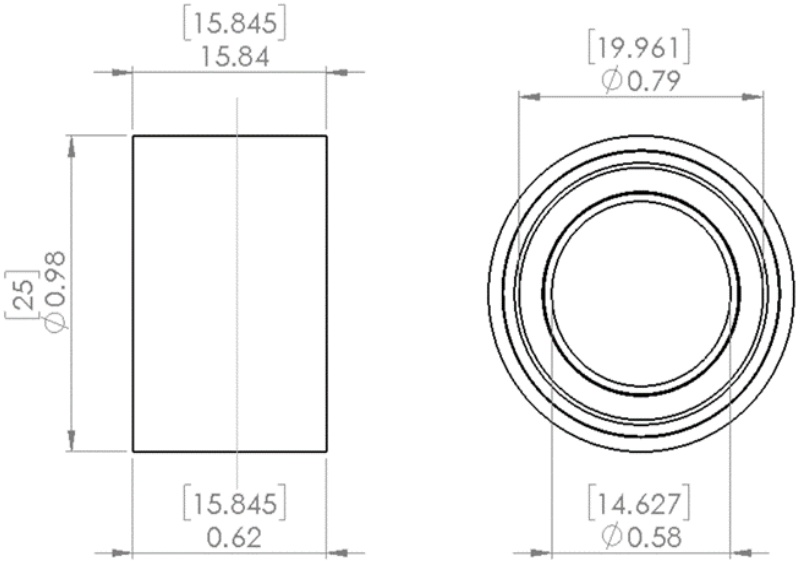
(Custom sizes also available)

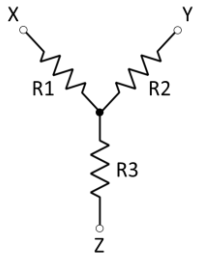


Example of typical use motor speed curve

Higher speeds possible and is dependent on the applied voltage. Top speed may be limited mechanically. Please consult factory if higher speeds are required.

Dimensions: LS-25-16





MOTOR PHASE	EXCITATION STEP						
	1	2	3	4	5	6	1
A	+		-	-		+	+
B		+	+		-	-	
C	-	-		+	+		-
HALL SENSORS							
H1	1	1	0	0	0	1	1
H2	0	1	1	1	0	0	0
H3	0	0	0	1	1	1	0

Dimensions in [mm] inches

ThinGap is a leading designer and producer of US-made standard and custom motors and generators. In addition to the LS Line (presented above) for lower speed, high precision applications, the TG Line offers the highest power density motor design with high torque and inherent high-speed capability in sizes 25mm to 1 meter, and powers from mW to MW. ThinGap also develops custom and application-specific motors, such as carbon fiber-based designs and large clean output starter generators. ThinGap's high performance, zero cogging motors and generators are widely used in aerospace propulsion, hybrid power, space, medical and high-end industrial applications.

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