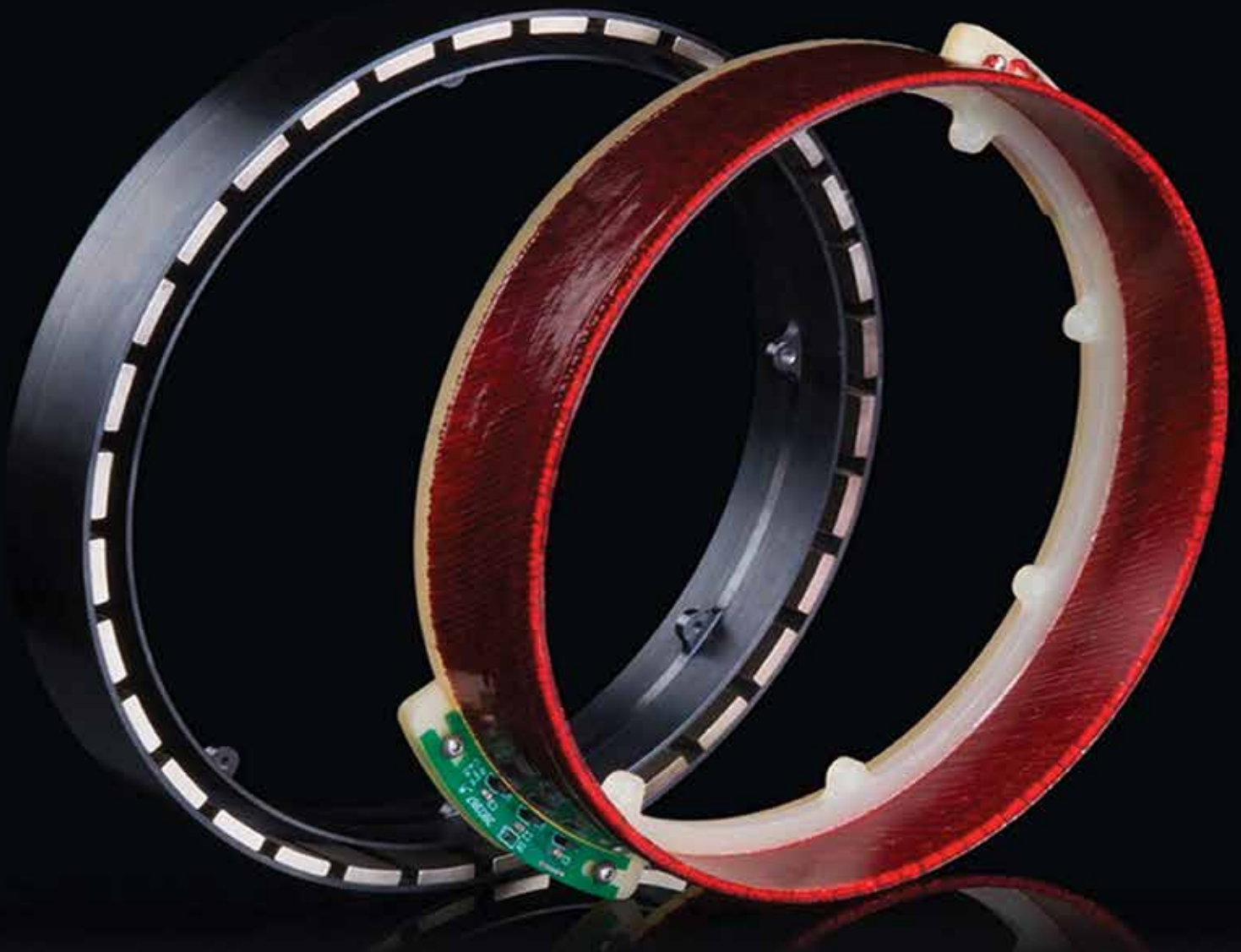




INNOVATION IN MOTORS

Summer 2014 Product Catalog



Direct Mounting - Save Space - Reduce Components



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INNOVATION IN MOTORS



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Motor Operation and Unique Advantages

ThinGap offers lightweight and efficient motors and generators ranging from turnkey systems to frameless part sets. They directly integrate with your mechanism to save space and parts count.

.....

- ▶ Very high power-to-weight and torque-to-weight ratios
- ▶ High system efficiency
- ▶ Excellent velocity smoothness with zero cogging torque
- ▶ Quiet operation
- ▶ Range of speed and position control regimes
- ▶ Frameless motors enable direct integration
- ▶ Large through hole offers space for components
- ▶ Innovative ironless composite stator
- ▶ High energy permanent magnet rotor
- ▶ Sinusoidal back-EMF
- ▶ Brushless DC or Synchronous AC operation



TG7140 Frameless
Stator-Rotor Part Set



TG7140 Motor
with Mount

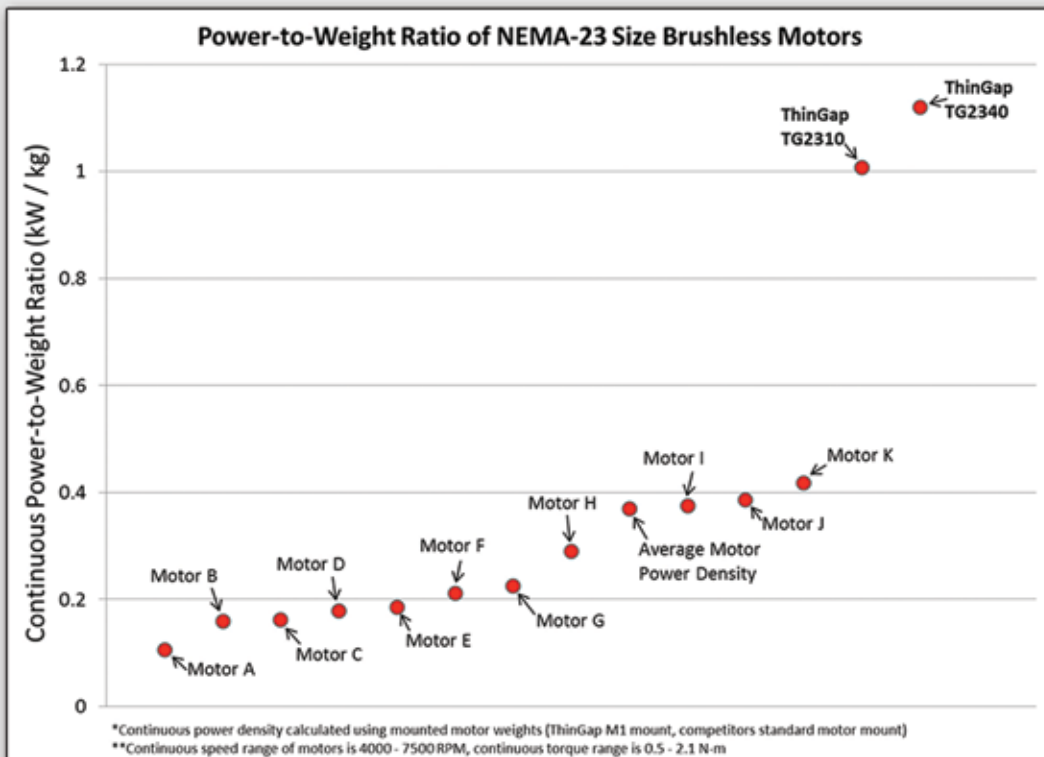
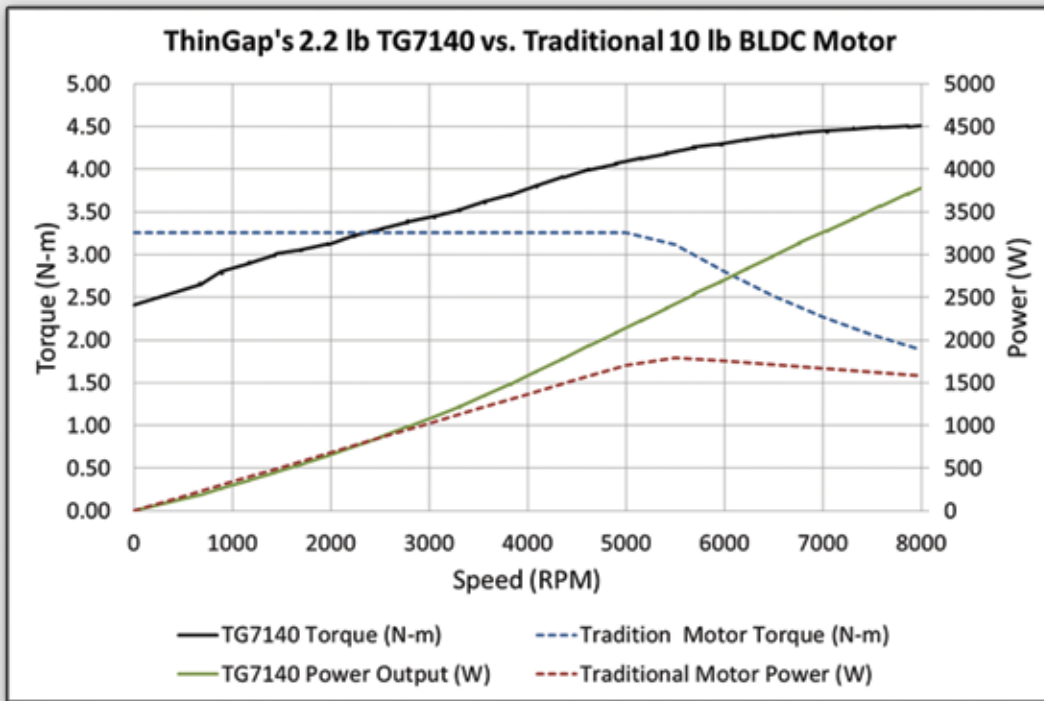


TG7140 Motor Integrated
with Pump System



Performance Relative to Conventional Motors

Superior torque production and at least twice the power-to-weight ratio of conventional brushless motors.





Industries Served



**MEDICAL DEVICES
AND TECHNOLOGY**



**AEROSPACE AND
DEFENSE**



UNMANNED SYSTEMS



ELECTRIC PROPULSION



**ROBOTICS AND
INDUSTRIAL AUTOMATION**



Applications and Features

SELECTED MOTOR AND GENERATOR APPLICATIONS	KEY PRODUCT FEATURES LEADING TO THE THINGAP - CUSTOMER RELATIONSHIP
Pump Motor for Portable Medical Oxygen Concentrators	Lightweight, high efficiency, high rotational inertia for pumping smoothness, direct mounting, medical grade, quiet operation
Camera Lens Control and Optical Scanning Systems	Lens integration into center of motor, lightweight, high accuracy position control, direct mounting, quiet operation
High Bandwidth, High Power Aerospace Actuator	High power and torque to weight ratio, low inertia inner rotor for efficient high bandwidth operation, liquid cooled housing for increased performance, robust fully housed assembly
Unmanned Aerial Vehicle (UAV) Engine Starter-Generator	Frameless motor integrates directly with engine to save weight and reduce parts, high efficiency power generation, lightweight robust construction, high torque starter motor
Automotive Racing Cooling Pump	High power and torque to weight, direct pump mounting, high efficiency over operational range, simple air cooled housing
Space Satellite Reaction Wheel	Motor design architecture facilitates novel reaction wheel design, standard product tailored to required voltage, lightweight
Electric Aircraft Propulsion	High power and torque to weight, ring motor facilitates novel motor – fan system design, high efficiency, quiet operation
Powered Medical Beds and Wheelchairs	High torque to weight and torque to volume, ring motor directly integrates with wheel assembly, high efficiency, quiet operation
Robotic Arm Actuator	High torque to weight and torque to volume, ring motor integrates with robotic arm gear assembly, high efficiency, quiet operation



TG7140 7" Rotor & Stator



TG13360 13" Rotor & Stator



TG23XX Series Motors

Model	TG2310	TG2311	TG2320	TG2321	TG2330	TG2331	TG2340	TG2341
Continuous Voltage (V)	56	37.5	72	48	110	72	72	48
Continuous Power (W)	550	530	560	530	1000	980	800	760
Speed (RPM)	7500	7500	15000	15000	15000	15000	7500	7500
Torque (N-m)	0.7	0.68	0.35	0.35	0.64	0.61	1.02	0.9
Current (A)	12.8	20.4	11.4	17.6	13.3	11.4	13.2	21
Rotor O.D. (in)	2.24	2.24	2.38	2.38	2.64	2.64	2.64	2.64
Rotor I.D. (in)	1.31	1.31	1.70	1.70	1.62	1.62	1.62	1.62
Axial Length (in)	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12
Frameless Motor Weight (lb)	0.96	0.96	0.64	0.64	1.21	1.21	1.34	1.34
Motor Mount Weight (lb)	0.23	0.23	0.26	0.26	0.26	0.26	0.30	0.30
Torque Constant Kt (Nm / Amp)	0.061	0.035	0.032	0.020	0.064	0.037	0.077	0.047
Voltage Constant Ke (RPM / Volt)	165	301	261	458	142	248	127	201

TG23XX Series Part Sets



TG2310/TG2311



TG2320/TG2321



TG2330/TG2331



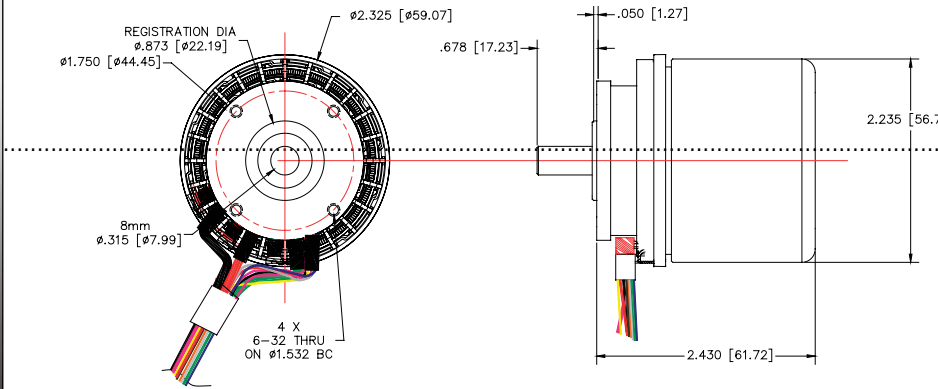
TG2340/TG2341



Mounting Options: TG23XX Motors

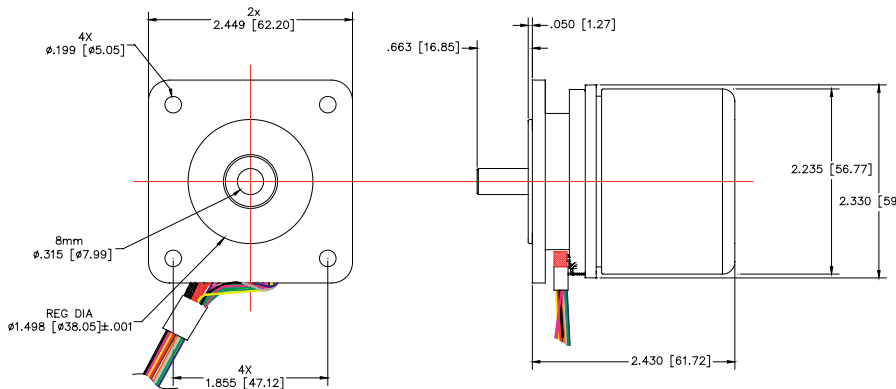
ThinGap's mounts can be customized to meet your needs. Shown below are standard mounts ThinGap offers.

M1 Mount - Small Round Face



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

M2 Mount - NEMA 23 Compatible



PHASE	WIRE COLOR	GAUGE
A	GRN	18
B	BLK	18
C	RED	18

	WIRE COLOR	GAUGE
+5v	YELLOW	24
GND	GREY	24
H1	BROWN	24
H2	ORANGE	24
H3	BLUE	24
CONNECTED TO THE THERMISTOR		
O	VIOLET	24
I	VIOLET	24



TG23XX Motors Shown with M1 and M2 Mounting Options



Off-The-Shelf Motors Continued

TG2950 MOTOR

Continuous Voltage (V)	63.6
Continuous Power (W)	128
Speed (RPM)	6,500
Torque (N-m)	0.19
Current (A)	3.97
Rotor OD (in)	2.95
Rotor ID (in)	2.40
Axial Length (in)	0.79
Frameless Motor Weight (lb)	0.22
Motor Mount Weight (lb)	NA
Torque Constant (Nm/Amp)	0.064
Voltage Constant (RPM/V)	175.2



TG3760 MOTOR

Continuous Voltage (V)	92
Continuous Power (W)	560
Speed (RPM)	5,000
Torque (N-m)	1.07
Current (A)	6.1
Rotor OD (in)	3.76
Rotor ID (in)	2.89
Axial Length (in)	1.13
Frameless Motor Weight (lb)	0.90
Motor Mount Weight (lb)	NA
Torque Constant (Nm/Amp)	0.176
Voltage Constant (RPM/V)	54.34



TG7140 MOTOR (Part-Set also shown on the front and back cover)

Continuous Voltage (V)	160
Continuous Power (W)	3,850
Speed (RPM)	8,141
Torque (N-m)	4.52
Current (A)	28
Rotor OD (in)	7.16
Rotor ID (in)	6.33
Axial Length (in)	1.72
Frameless Motor Weight (lb)	1.88
Motor Mount Weight (lb)	0.70
Torque Constant (Nm/Amp)	0.17
Voltage Constant (RPM/V)	52.18





Upcoming 2014 Motors

MODEL	TG17XX	TG5XXX	TG9XXX	TG13360
Rotor O.D. 9(in.)	1.75	5.0	9.0	13.3
Axial Length (in.)	1.0	1.5	1.8	5.5
Continuous Power Output (kW)	0.1	3	7	20
Speed (RPM)	8000	8000	8000	6000

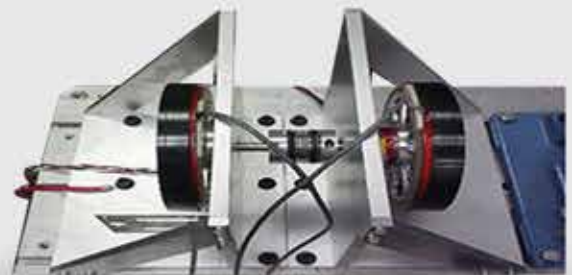
CUSTOM MOTOR SOLUTIONS

ThinGap offers custom motor and generator development. Our capabilities cover a wide range of specifications and markets. New motors are available in as little as 12 weeks. Existing ThinGap products can be modified in 4-8 weeks.

PARAMETER	SPECIFICATION RANGE
Rotor O.D. (in.)	0.75 to 44
Rotor I.D. (in.)	0.4 to 42
Axial Length (in.)	0.75 to 16
Power Output (kW)	0.01 to 500
Speed (RPM)	0 to 20,000
Torque (Nm)	0.01 to 500
Voltage (V)	0 to 800

ENGINEERING SERVICES OFFERED

- Electromechanical Machine Design and Systems Engineering
- Motor and Generator Testing, Data Acquisition, and Characterization up to 70kW
- Motor Controller Evaluation & Analysis



Tandem Motor Generator Testing



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DIRECT MOUNTING
SAVE SPACE
REDUCE COMPONENTS

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