



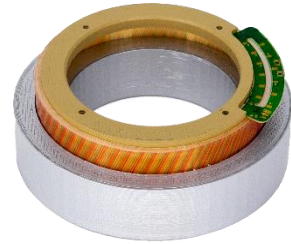
# thin gap | TGR SERIES MOTOR KIT

ZERO COGGING | HIGHLY EFFICIENT ARCHITECTURE | OPTIMIZED ROTOR INERTIA  
SPACE HERITAGE | LIGHTWEIGHT COMPOSITE STATOR | SCALABLE SIZE AND POWER

Data Sheet Model Number:

TGR 45-20

ThinGap's TGR Series includes numerous high performance brushless permanent magnet motors. The TGR Series targets reaction wheel applications where a high efficiency, weight optimized solution with dynamic response capabilities is desired.



Motor Parameter Table

| Continuous Parameters                    | Units            | Atmosphere    | Vacuum |
|--|------------------|---------------|--------|
| Continuous Torque @ Max Speed            | N-m              | 0.080         | 0.019  |
| Max Continuous Speed                     | RPM              | 33000         | 25000  |
| Max Continuous Power                     | W                | 179.7         | 36.8   |
| Required Motor Voltage @ Max Speed       | $V_{pk-I}$       | 13.5          | 10.0   |
| Max Continuous Phase Current @ Max Speed | $A_{RMS}$        | 18.3          | 5.0    |
| Peak Parameters@Max Speed                | Units            | Atmosphere    | Vacuum |
| Peak Torque (1 sec)*                     | N-m              | 0.308         | 0.295  |
| Peak Phase Current (1 sec)               | $A_{RMS}$        | 69.1          | 66.0   |
| Peak Power (1 sec)*                      | W                | 1064          | 772    |
| Peak Torque (3 sec)*                     | N-m              | 0.194         | 0.171  |
| Peak Phase Current (3 sec)               | $A_{RMS}$        | 43.4          | 38.3   |
| Peak Power (3 sec)*                      | W                | 670           | 448    |
| Motor Constants                          | Units            | Common Value  |        |
| Voltage Constant (I-I)                   | $V_{pk-I}/rad/s$ | 0.0037        |        |
| Voltage Constant (I-I)                   | $V_{pk-I}/kRPM$  | 0.3860        |        |
| Torque Constant                          | N-m/ $A_{RMS}$   | 0.0045        |        |
| Motor Constant                           | N-m/VV           | 0.0197        |        |
| Electrical Parameters                    | Units            | Common Value  |        |
| Motor Resistance @ 20°C                  | $\Omega$         | 0.035         |        |
| Motor Resistance @ Max Temperature       | $\Omega$         | 0.050         |        |
| Inductance                               | $\mu H$          | 1.2 $\pm$ 20% |        |
| Number of Magnetic Poles                 | ea               | 6             |        |
| Electrical Frequency @ Max Speed         | Hz               | 1650          |        |
| Mechanical Parameters                    | Units            | Common Value  |        |
| Rotor Inertia                            | $kg \cdot m^2$   | 2.05E-05      |        |
| Outer Diameter                           | mm               | 45.1          |        |
| Through Hole Diameter                    | mm               | 16            |        |
| Axial Height                             | mm               | 20.4          |        |
| Rotor Mass                               | kg               | 0.082         |        |
| Stator Mass                              | kg               | 0.034         |        |
| Part Set Mass                            | kg               | 0.115         |        |
| Temperature Parameters                   | Units            | Common Value  |        |
| Max Stator Temperature                   | °C               | 130           |        |
| Max Rotor Temperature                    | °C               | 85            |        |

ThinGap's TGR Line of Brushless motor kits designed for use in reaction wheel applications; both in atmosphere and vacuum. These motor kits are available in sizes ranging from 29mm to 79 mm

#### Derated Specifications for Vacuum

Continuous torque of up to 0.019 N-m and a rated speed of up to 25000 RPM.

#### Motor Controller Recommendation

3-Phase Controller  
High Frequency PWM power input

\* Current value takes into account temperature losses during operation.

