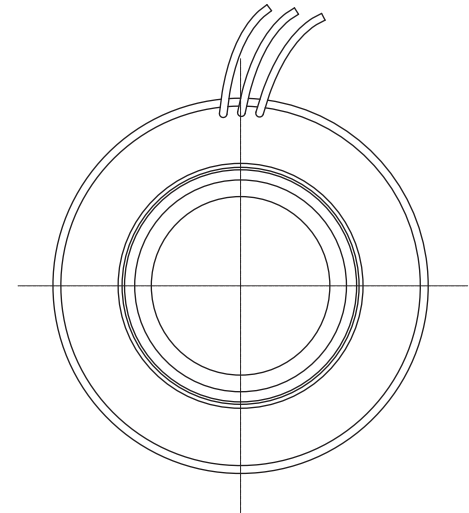
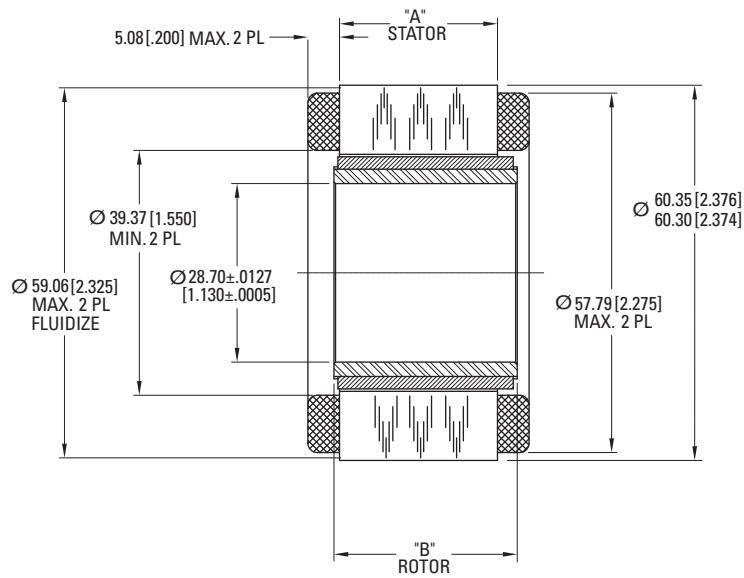
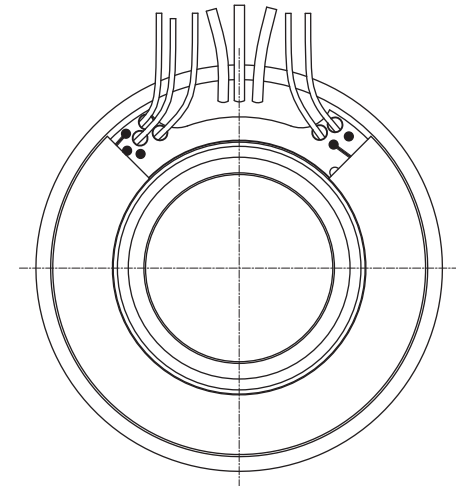
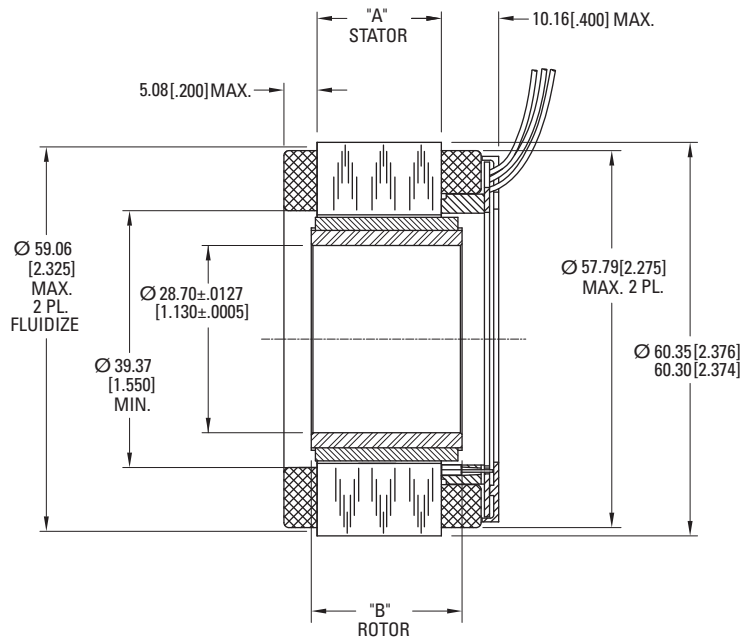


TBM 60 Series Outline Drawings

TBM 60



TBMS 60



MOTOR LEADS:

#18 AWG, TEFLON COATED, PER MIL-W-22759/11
 3 LEADS - 6 INCHES MIN. LONG EACH
 1-RED, 1-WHITE, & 1-BLACK

SENSOR LEADS:

#26 AWG, TYPE "ET", TEFLON COATED, PER MIL-W-16878
 5 LEADS 6 INCHES MIN. LONG EACH
 1-BLUE, 1-BROWN, 1-GREEN, 1-ORANGE, & 1-YELLOW

| MODEL NUMBER | "A" mm [inch] | "B" mm [inch] |
|--------------|---------------|---------------|
| TBM(S)-6013 | 12.70 [0.500] | 16.76 [0.660] |
| TBM(S)-6025 | 25.40 [1.000] | 29.46 [1.160] |
| TBM(S)-6051 | 50.80 [2.000] | 54.86 [2.160] |

TBM 60 Series Performance Data

TBM(S) 60 Series Performance Data and Motor Parameters

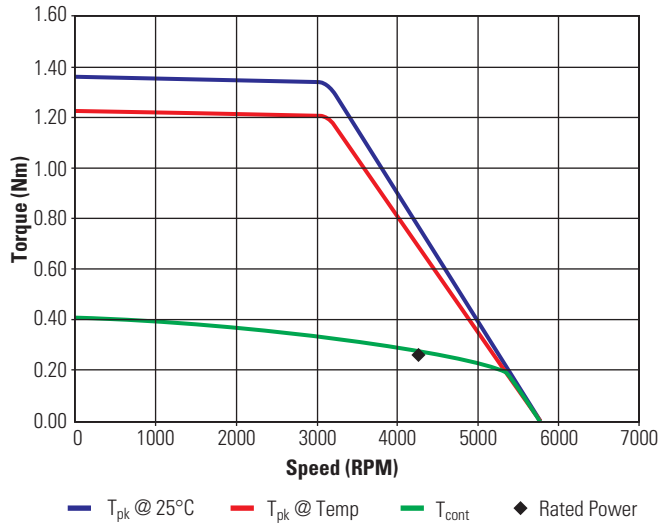
| Motor Parameter | Symbol | Units | TOL | TBM(S)-6013-X | | TBM(S)-6025-X | | TBM(S)-6051-X | |
|---|-----------|----------------------|---------|---------------|-------|---------------|-------|---------------|-------|
| | | | | A | B | A | B | A | B |
| Continuous Stall Torque* | Tc | N-m | NOM | 0.413 | 0.413 | 0.706 | 0.706 | 1.16 | 1.13 |
| | | oz-in | | 58.5 | 58.5 | 100 | 100 | 164 | 160 |
| Continuous Current | Ic | Adc | NOM | 5.70 | 9.00 | 5.70 | 10.1 | 7.00 | 11.2 |
| | | Arms | | 4.65 | 7.35 | 4.65 | 8.25 | 5.72 | 9.14 |
| Peak Stall Torque* (25°C winding temp) | Tp | N-m | NOM | 1.37 | 1.37 | 2.56 | 2.56 | 4.53 | 3.88 |
| | | oz-in | | 194 | 194 | 363 | 363 | 642 | 550 |
| Peak Current | Ip | Adc | NOM | 19.0 | 30.1 | 21.3 | 38.0 | 30.0 | 36.0 |
| | | Arms | | 15.5 | 24.6 | 17.4 | 31.0 | 24.5 | 29.4 |
| Rated Cont Power* | P Rated | Watts | NOM | 117 | 115 | 146 | 139 | 176 | 166 |
| Speed at Rated Power | N Rated | RPM | NOM | 4300 | 3850 | 2900 | 2450 | 2130 | 1700 |
| Design Voltage | Vbus | Vdc | NOM | 48.0 | 24.0 | 48.0 | 24.0 | 48.0 | 24.0 |
| | Vac | Vrms | NOM | 33.9 | 17.0 | 33.9 | 17.0 | 33.9 | 17.0 |
| Torque Sensitivity at Temp* | Kt (hot) | N-m / Adc | +/-10% | 0.078 | 0.049 | 0.130 | 0.074 | 0.180 | 0.108 |
| | | oz-in / Adc | | 11.0 | 6.88 | 18.5 | 10.5 | 25.5 | 15.3 |
| | | N-m / Arms | +/-10% | 0.095 | 0.060 | 0.160 | 0.091 | 0.220 | 0.132 |
| | | oz-in / Arms | | 13.5 | 8.42 | 22.6 | 12.9 | 31.2 | 18.7 |
| Back EMF at Temp* | Kb (hot) | Vpk / kRPM | +/-10% | 8.12 | 5.08 | 13.7 | 7.79 | 18.9 | 11.3 |
| | | Vrms / kRPM | | 5.74 | 3.59 | 9.65 | 5.51 | 13.3 | 8.00 |
| Torque Sensitivity at 25°C | Kt (cold) | N-m / Adc | +/-10% | 0.085 | 0.053 | 0.143 | 0.081 | 0.198 | 0.119 |
| | | oz-in / Adc | | 12.1 | 7.57 | 20.3 | 11.6 | 28.0 | 16.8 |
| | | N-m / Arms | +/-10% | 0.105 | 0.065 | 0.176 | 0.100 | 0.242 | 0.145 |
| | | oz-in / Arms | | 14.8 | 9.27 | 24.9 | 14.2 | 34.3 | 20.6 |
| Back EMF | Kb (cold) | Vpk / kRPM | +/-10% | 8.93 | 5.59 | 15.0 | 8.57 | 20.7 | 12.4 |
| | | Vrms/kRPM | | 6.32 | 3.95 | 10.6 | 6.06 | 14.7 | 8.80 |
| Motor Constant | Km | N-m/√watt | +/-10% | 0.097 | 0.097 | 0.155 | 0.156 | 0.240 | 0.248 |
| | | oz-in/√watt | | 13.8 | 13.7 | 22.0 | 22.2 | 34.0 | 35.2 |
| Resistance at 25°C | Rm | Ohms | +/- 10% | 0.771 | 0.303 | 0.850 | 0.272 | 0.680 | 0.229 |
| Inductance | Lm | mH | +/- 30% | 0.36 | 0.14 | 0.56 | 0.18 | 0.57 | 0.20 |
| Inertia* | Jm | Kg-m ² | | 1.41E-05 | | 2.52E-05 | | 4.75E-05 | |
| | | oz-in-s ² | | 2.00E-03 | | 3.57E-03 | | 6.72E-03 | |
| Weight* | Wt | grams | | 213 | | 377 | | 550 | |
| | | oz | | 7.49 | | 13.3 | | 19.4 | |
| Max Static Friction | Tf | N-m | | 0.021 | | 0.033 | | 0.056 | |
| | | oz-in | | 2.93 | | 4.62 | | 8.00 | |
| Cogging Friction (Peak-to-Peak) | Tcog | N-m | | 0.009 | | 0.012 | | 0.019 | |
| | | oz-in | | 1.22 | | 1.71 | | 2.70 | |
| Viscous Damping | Fi | N-m/ kRPM | | 2.04E-03 | | 5.22E-03 | | 1.25E-02 | |
| | | oz-in / kRPM | | 2.89E-01 | | 7.42E-01 | | 1.77E+00 | |
| Thermal Resistance* | TPR | °C / watt | | 3.55 | | 3.13 | | 2.72 | |
| Number of Poles | P | - | | 12 | | 12 | | 12 | |

***Notes**

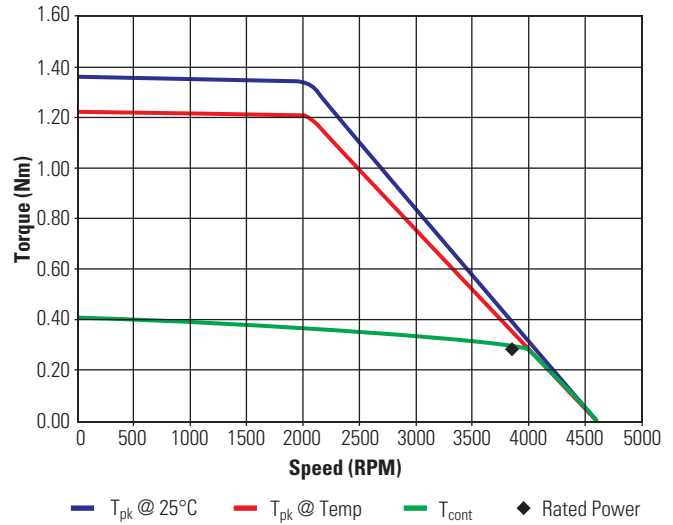
- 1) Continuous Stall Torque and Rated Power assume ambient temperature of 25°C
- 2) Winding temp = 155°C for Kt and Kb hot
- 3) Inertia and weight assume max thru-bore
- 4) TPR assumes motor is housed and mounted to a 3.5" x 3.5" x 0.25" heat sink or equivalent
- 5) Some Peak Torques may be limited by lead wire gauge

TBM 60 Series Performance Curves

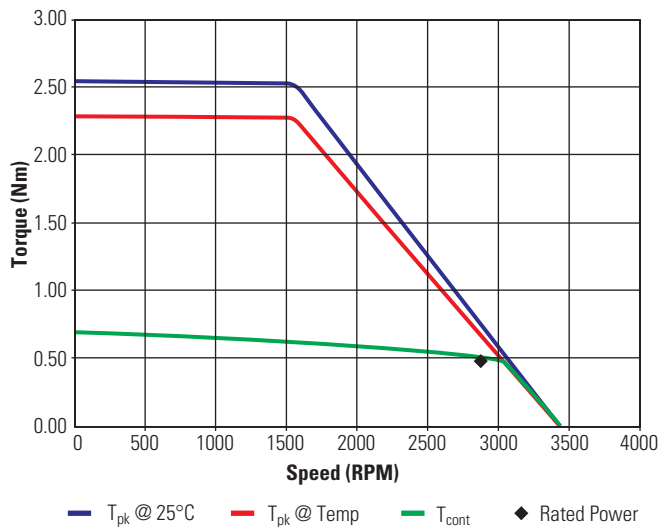
TBM(S)-6013-A
48 Vdc – 6 step



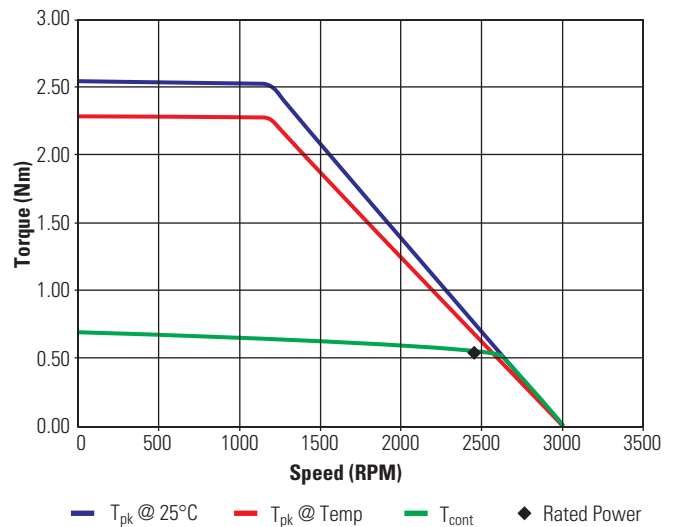
TBM(S)-6013-B
24 Vdc – 6 step



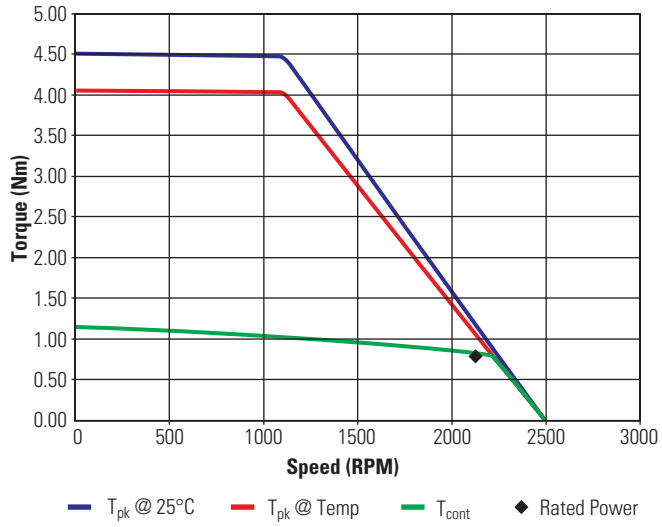
TBM(S)-6025-A
48 Vdc – 6 step



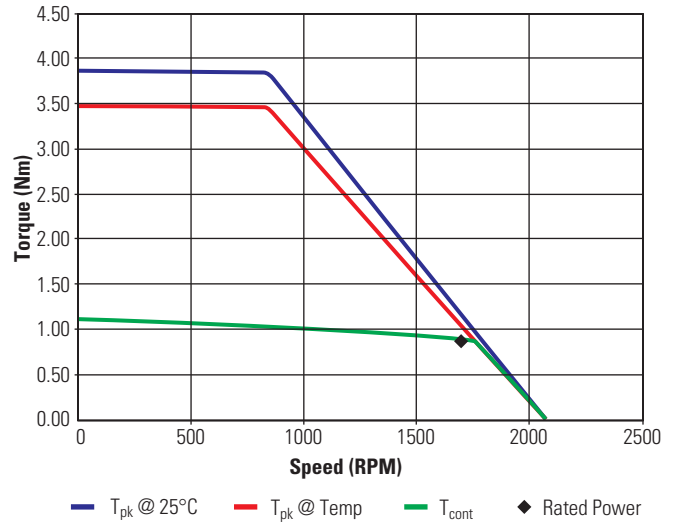
TBM(S)-6025-B
24 Vdc – 6 step



TBM(S)-6051-A
48 Vdc – 6 step



TBM(S)-6051-B
24 Vdc – 6 step



Notes:

