Torque Systems specializes in the design of high performance brush servo motors that provide efficiency, flexibility of application, and a long and trouble-free service life. Our TORQUEMASTER® 3500 series is no exception.

With fast response, accurate control and high torque-to-inertia ratios, you can count on the TORQUEMASTER 3500 Series of brush servo motors to provide smooth operation throughout a full speed range. The 3500 Series delivers smooth and superior low speed performance, and maximum power ratings with low thermal resistance for high speed performance. In addition, with maximum torque in a smaller package, you can count on better pricing for a better overall value.

When integrated with high performance brush amplifiers, TORQUEMASTER 3500 Series brush servo motors provide effective and highly efficient motion control solutions for a wide range of applications—including factory automation, packaging, robotics, machine tools, medical instrumentation and more.

Design Features
TORQUEMASTER 3500 Series brush servo motors are rated from 2.63 lb.-in. to 10.60 lb.-in. with speeds and torque stability up to 4600 RPM. They utilize the latest in high performance permanent magnet technology, and are available in eight standard windings (as well as custom windings) to meet your most demanding applications.

Each brush servo motor in the TORQUEMASTER 3500 Series is ruggedly designed and manufactured for reliable performance.

Motors can be customized to fit your exact application with tachometers, encoders, brakes and other options.

Series 3500, is a high performance, permanent magnet brush servo motor for use in various industrial direct drive or geared servo systems

- Rugged industrial construction
- Continuous torque ratings up to 10.6 lb.-in.
  — with speeds up to 4600 RPM (no load)
- Peak torque ratings up to 94 lb.-in.
- IP65 Sealing available
- High torque-to-inertia ratio delivers maximum torque per frame size
- Superior low speed performance
- Numerous custom options available
### BRUSH SERVO MOTOR CHARACTERISTICS

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>UNITS</th>
<th>3505</th>
<th>3509</th>
<th>3515</th>
<th>3528</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_c$</td>
<td>Cont. Torque</td>
<td>Lb-In</td>
<td>2.63</td>
<td>4.25</td>
<td>6.44</td>
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<tr>
<td>$T_p$</td>
<td>Peak Torque</td>
<td>Lb-In</td>
<td>21.9</td>
<td>37.5</td>
<td>56.3</td>
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<tr>
<td>$T_s$</td>
<td>Static Friction</td>
<td>Lb-In</td>
<td>0.3</td>
<td>0.25</td>
<td>0.3</td>
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<tr>
<td>$F_r$</td>
<td>Viscous Friction</td>
<td>Lb-In/KRPM</td>
<td>0.07</td>
<td>0.08</td>
<td>0.09</td>
</tr>
<tr>
<td>$T_c$</td>
<td>Cogging Torque</td>
<td>Lb-In</td>
<td>0.09</td>
<td>0.06</td>
<td>0.07</td>
</tr>
<tr>
<td>$I_n$</td>
<td>Inertia</td>
<td>Lb-In/sec²</td>
<td>0.004</td>
<td>.0006</td>
<td>.0008</td>
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<tr>
<td>$R_{th}$</td>
<td>Thermal Res</td>
<td>Deg/C/watt</td>
<td>4.2</td>
<td>3.7</td>
<td>3.1</td>
</tr>
<tr>
<td>$T_{th}$</td>
<td>Thermal Time</td>
<td>Minute</td>
<td>15</td>
<td>15</td>
<td>20</td>
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<tr>
<td>$I_{mech}$</td>
<td>Mech Time</td>
<td>MSec</td>
<td>8.1</td>
<td>5.5</td>
<td>3.9</td>
</tr>
<tr>
<td>$I_{elec}$</td>
<td>Elect Time</td>
<td>MSec</td>
<td>1.5</td>
<td>1.5</td>
<td>1.7</td>
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<tr>
<td>$F_c$</td>
<td>Commutation</td>
<td>Watts x Lb-In/Amp</td>
<td>1475</td>
<td>2060</td>
<td>2990</td>
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</table>

### WINDING

<table>
<thead>
<tr>
<th>SYMBOL</th>
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<th>3515</th>
<th>3528</th>
</tr>
</thead>
<tbody>
<tr>
<td>$K_t$</td>
<td>Torq. Sens.</td>
<td>Lb-In/Amp</td>
<td>0.24</td>
<td>0.39</td>
<td>0.59</td>
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<tr>
<td>$R_a$</td>
<td>Arm. Resis.</td>
<td>Ohms</td>
<td>0.13</td>
<td>0.16</td>
<td>0.2</td>
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<tr>
<td>$K_v$</td>
<td>Back E.M.F</td>
<td>Volts/KRPM</td>
<td>2.8</td>
<td>4.6</td>
<td>7.0</td>
</tr>
<tr>
<td>$F_{c/K_t}$</td>
<td>Watts</td>
<td></td>
<td>388</td>
<td>332</td>
<td>315</td>
</tr>
</tbody>
</table>

### Notes:
- Continuous torque specifications obtained with motor mounted to an 10" x 10" x 0.25" alum. plate at 25°C ambient. Typical values are within ±10% of rating.
- For custom designs please consult factory.
- All specifications subject to change without notice.
MECHANICAL SPECIFICATIONS*

Torque Speed Curves of other windings available, consult factory.

NOTE:
Continuous torque specifications obtained with motor mount-
ed to an 10"x10"x.25" aluminum plate at 25 C° ambient. Typical val-
ues are within ±10% of rating.

STANDARD WINDING SPEED/TORQUE CURVE DATA FOR
SIZING A SERVO MOTOR

Nm = Maximum speed, continuous operation
Np = Peak speed, acceleration/deceleration and intermittent
      duty
Tcs = Continuous stall torque
Tp = Peak torque

All specifications subject to change without notice.

DIMENSION CHART*

Motor Only
Motor Tach
Inches (Metric)  Inches (Metric)
STD NEMA STD NEMA STD NEMA STD NEMA
3505  2.49 (63.2)  4.00 (101.6) .5000/.4995  .3750/.3745  1.00  1.19  1.500  2.875  0.10  0.06
3509  3.24 (82.3)  4.75 (120.7) .5000/.4995  .3750/.3745  1.00  1.19  1.500  2.875  0.10  0.06
3515  3.99 (101.3)  5.50 (139.7) .5000/.4995  .3750/.3745  1.00  1.19  1.500  2.875  0.10  0.06
3528  5.24 (133.1)  6.75 (171.5) .5000/.4995  .3750/.3745  1.00  1.19  1.500  2.875  0.10  0.06

Note: Consult factory for AG length with cover option.

METRIC (mm): DIMENSIONS ALL FRAME SIZES

SHAFT: DIA  12.7 MOUNTING: FLAT  38
LENGTH  25.0  B.C.  63.5
HOLE SIZE  6.6

*All specifications are for reference only. Please consult the factory
for certified dimension drawings. Standard Direction of Rotation:
CCW rotation viewed from shaft end with red motor terminal
positive with respect to black motor terminal.

TORQUE PERFORMANCE CURVES

Torque Speed Curves of other windings available, consult factory.
Volts = KT x RPM + T x RA + VB

Where:
- KT = torque constant, oz.-in. per amp
- T = load torque plus motor friction torque, oz.-in.
- RA = armature resistance + brush resistance
- VB = brush voltage drop = 2 volts

Note: For armature resistance at maximum temperature, multiply catalog value of R by 1.5

Motor Torque Rating vs. Speed

Let A = total cycle time in seconds
- Thermal time constant of motors in seconds

Let B = “on” time in seconds per cycle
- Thermal time constant of motor in seconds

Then with TR = Rated torque for 100% duty

and

TMAX = Rated torque for intermittent duty

To Find: Higher Torque Rating for Intermittent Duty

CUSTOMIZE THE 3500 SERIES TO YOUR EXACT REQUIREMENTS

To satisfy various applications with cost-effective solutions, 3500 Series motors are readily available with a wide range of standard capabilities. Final designs are often the result of cooperative efforts between the customer’s engineering department and Torque Systems. For assistance, call your local distributor or Torque Systems direct. We look forward to meeting your custom requirements.

ORDERING INFORMATION (For Standard Options)

Ask About Other Motion Control Solutions & Capabilities from Torque Systems

- Brushless TorqueMaster® Servo Motors
- Shaft-mounted DataTorque™ Encoders
- Gearboxes/Brakes
- Expert application engineering
- Complete repair & refurbishing services

NOTE:
- Cover Option – consult factory for overall motor length.