Design Features

TORQUEMASTER BNL 2300 Series servo motors are rated from 50 oz.-in. to 140 oz.-in. with speeds and torque stability up to 10,000 RPM— accommodating DC bus voltages up to 325 volts. They utilize the latest in high performance Neodymium, permanent magnet technology, and are available in several standard windings (as well as custom windings) to meet your most demanding applications.

Each servo motor in the TORQUE-MASTER 2300 Series is ruggedly designed and manufactured for reliable performance. To satisfy many different applications, TORQUEMASTER 2300 Series motors are manufactured to NEMA/IEC specifications.

Series 2300, 325 VDC brushless servo motor — provides fast response, accurate control and high torque-to-inertia ratios

- 8 pole brushless design
- Continuous torque ratings up to 140 oz.-in.—with speeds up to 10,000 RPM
- IP65 Sealing available
- NEMA 23 mounting features standard
- IEC 72 Metric specifications available
- Maximum torque per frame size with high performance Neodymium magnets
- Superior low speed performance
- Numerous custom options available

Performance Benefits

METTorque Systems specializes in the design of high performance brushless servo motors that provide efficiency, flexibility of application, and a long and trouble-free service life. Our TORQUEMASTER® 2300 series is no exception.

With fast response, accurate control and high torque-to-inertia ratios, you can count on the TORQUEMASTER 2300 Series of brushless servo motors to provide smooth operation throughout a full speed range. The 2300 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 brushless amplifiers, TORQUE-MASTER 2300 Series brushless 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.
BRUSHLESS SERVO MOTOR CHARACTERISTICS

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>MOTOR PARAMETER</th>
<th>UNITS</th>
<th>BNL230ST</th>
<th>BNL2310T</th>
<th>BNL2315T</th>
<th>BNL2320T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nm</td>
<td>Max Operating Speed</td>
<td>RPM</td>
<td>10,000</td>
<td>10,000</td>
<td>10,000</td>
<td>10,000</td>
</tr>
<tr>
<td>f0</td>
<td>Max Stall Torque</td>
<td>oz.-in. (Nm)</td>
<td>120 (.95)</td>
<td>160 (.119)</td>
<td>200 (.158)</td>
<td>240 (.197)</td>
</tr>
<tr>
<td>Ts</td>
<td>Peak Torque</td>
<td>oz.-in. (Nm)</td>
<td>250 (1.9)</td>
<td>300 (2.3)</td>
<td>400 (3.0)</td>
<td>500 (3.8)</td>
</tr>
<tr>
<td>Kn</td>
<td>Torque Sensitivity</td>
<td>oz.-in./AMP(Nm/Amp)</td>
<td>13.4 (0.95)</td>
<td>13.4 (0.95)</td>
<td>13.4 (0.95)</td>
<td>13.4 (0.95)</td>
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<tr>
<td>Rk</td>
<td>Back E.M.F.</td>
<td>Volts/Krpm</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Tk</td>
<td>Resistance Line to Line</td>
<td>Ohms</td>
<td>1.7</td>
<td>7.0</td>
<td>38</td>
<td>31</td>
</tr>
<tr>
<td>Lt</td>
<td>Inductance Line to Line</td>
<td>Millihenry</td>
<td>1.62</td>
<td>7.8</td>
<td>.45</td>
<td>.38</td>
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<tr>
<td>Jm</td>
<td>Rotor Inertia</td>
<td>oz.-in.-sec²</td>
<td>0.001586</td>
<td>0.002805</td>
<td>0.00380</td>
<td>0.004797</td>
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<tr>
<td>Tf</td>
<td>Static Friction</td>
<td>oz.-in. (Nm)</td>
<td>2.56 (.018)</td>
<td>2.56 (.018)</td>
<td>2.56 (.018)</td>
<td>2.56 (.018)</td>
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<tr>
<td>Wr</td>
<td>Motor Weight</td>
<td>Lbs(Kg)</td>
<td>1.25 (.57)</td>
<td>1.65</td>
<td>2.05</td>
<td>2.45</td>
</tr>
</tbody>
</table>

NOTE: Continuous torque specifications obtained with motor mounted to an 8.5"x12"x 0.25" aluminum plate at 25°C ambient. Typical values are within ±10% of rating.

Relationship Between Ke & KT

Torque Systems uses the following important motor performance parameters for the 3 phase square wave and 3 phase sine wave brushless motors in order to properly account for the British Imperial unit system currently used in the UK.

\[
Ke = \frac{\text{Line-to-line volts-peak}}{Krpm}
\]

\[
KT = \frac{\text{Pound-inches (lb-in) / peak phase amps}}{11.834} \text{ for 3 phase square wave driven amplifiers}
\]

\[
KT = \frac{\text{Pound-inches (lb-in) / peak phase amps}}{13.662} \text{ for 3 phase sinusoidal wave driven amplifiers}
\]

*Krpm = 1000 rpm

For "RMS" values, divide peak values by \(\sqrt{2}\).

STANDARD SPEED/ Torque CURVE DATA FOR SIZING A SERVO MOTOR

- \(N_m\) = Maximum speed, continuous operation
- \(T_s\) = Continuous stall torque

All specifications subject to change without notice.
MECHANICAL SPECIFICATIONS*

DIMENSION CHART* (Dimensions may change depending upon options)

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>AG</th>
<th>A</th>
<th>AK</th>
<th>BB</th>
<th>U</th>
<th>AH</th>
<th>XD</th>
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<tr>
<td>BNL2305</td>
<td>2.47</td>
<td>2.25</td>
<td>1.500</td>
<td>.06</td>
<td>.250 (D)</td>
<td>.81</td>
<td>.63 FLAT (D)</td>
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<td>2.25</td>
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<td>.06</td>
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<td>.81</td>
<td>.63 FLAT (D)</td>
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<td>2.25</td>
<td>1.500</td>
<td>.06</td>
<td>.250 (D)</td>
<td>.81</td>
<td>.63 FLAT (D)</td>
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<tr>
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<td>3.97</td>
<td>2.25</td>
<td>1.500</td>
<td>.06</td>
<td>.250 (D)</td>
<td>.81</td>
<td>.63 FLAT (D)</td>
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</table>

IEC72 (mm)

<table>
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<th>PART NUMBER</th>
<th>AG</th>
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<th>AK</th>
<th>BB</th>
<th>U</th>
<th>AH</th>
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<tr>
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<td>1.5</td>
<td>8j6</td>
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</tr>
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</table>

TORQUE PERFORMANCE CURVES

TORQUE SPEED CURVES OF OTHER WINDINGS AVAILABLE, CONSULT FACTORY.
Customize The 2300 Series To Your Exact Requirements

To satisfy various applications with cost-effective solutions, 2300 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 MTI-Torque Systems. For assistance, call your local distributor or Torque Systems direct. We look forward to meeting your custom requirements.

Note 1. Hall Sensor Specifications
Voltage = 5V to 24V
Current = 10 ma typical, 25 ma max.
Output = Open collector

Note 2. Com. Encoder
Current = 250 ma

CUSTOMIZE THE 2300 SERIES TO YOUR EXACT REQUIREMENTS

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TERMINATION CHART

MOTOR/CABLE CODE

Function Wire Color
Motor M1 White
Motor M2 Black
Motor M3 Red
G-round Green

HALL CONNECTIONS

+5-24V Red
Common Black
H1 Yellow
H2 Orange
H3 Green

Note: Separate drain wires for motor power and halls

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