SERIES 5300D

TORKDISC®
IN-LINE ROTARY

- DC to 8500 Hz bandwidth
- AC coupled, 0 to ±10 volt analog output with 2-pole Butterworth high pass filter with user-selectable cutoff frequencies
- DC-coupled, 0 to ±10 volt analog output with 8-pole elliptical low pass filter with user-selectable cutoff frequencies
- Digital system alleviates noise and data corruption
- Full-scale capacities from 250 to 225k lbf-in (28 to 25.4k Nm)

TYPICAL APPLICATIONS

- Automotive engine, powertrain, chassis dynamometer testing for:
  - Performance
  - Emissions
  - Fuel economy
- Development of:
  - Transfer cases
  - Axles
  - Differentials
- Production line validation of powertrain components including:
  - Gear mesh
  - Cold engine signature analysis
  - Chassis dynamometer
- Rotational dynamics testing
- Torque studies on pumps, fans, electric motors
- Gearbox efficiency testing
PCB Load & Torque Division Series 5300D TORKDISC® In-line Rotary Torque Sensor System is a cost-effective solution for testing that requires a robust rotary torque transducer, and when axial space is at a premium. The TORKDISC® System consists of a short-coupled, flange-mounted rotating sensor, a stator assembly and a digital conditioning module. Onboard, the field-proven transmitter converts the torque signals into a high-speed digital representation. Once in digital form, this data is transmitted to a non-contacting pick-up loop, eliminating the risk of noise or data corruption. A remote receiver unit seamlessly converts the digital data to a high-level analog output voltage. The robust construction, high stiffness, and low rotating inertia of the TORKDISC® make it ideal for applications such as chassis and engine dynamometers.

Series 5300D incorporates dual high-level analog outputs, AC and DC coupled, providing both static and dynamic torque measurement capability that can be recorded separately and independently scaled — which is particularly beneficial when high DC levels are present and low levels of AC content is of particular interest.

Series 5300D TORKDISC® also features industry-leading DC bandwidth to 8500 Hz, increasing the system’s dynamic response characteristics. The DC-coupled output features an eight-pole low pass elliptic filter with user-selectable frequencies for minimal roll-off at each filter selection. Included with the AC coupled output is a two-pole Butterworth high-pass filter with a wide range of user-selectable cutoff frequencies.

### Features Comparison

| **Performance** | **Voltage Output A** | **AC Coupled, 0 to ±10 volt w/ independent coarse gain control (16 increments)**
| **Voltage Output B** | **DC Coupled, 0 to ±10 volt w/ independent fine and coarse gain control**
| **Digital Output:** | **QSPI**
| **Accuracy** | Overall, 0.1% FS, combined effect of Non-Linearity, Hysteresis, & Repeatability
| **Voltage Output A Filter (AC)** | 2-pole Butterworth high pass w/ selectable cutoff frequencies of 5, 10, 20, 200, 500, & 735 Hz & 8-pole low pass determined by the DC coupled output cutoff frequency selection
| **Voltage Output B Filter (DC)** | 8-pole elliptical low pass w/selectable cutoff frequencies of > 8500, 5000, 2500, 1250, 625, 313, 10, & 1 Hz
| **Bandwidth** | DC to 8500 Hz anti-alias
| **Digital resolution** | 16-bit
| **Analog Resolution** | 0.31 mV (± 10 volts/32768, 16-bit resolution)
| **Digital Sample Rate** | 26,484 samples/sec
| **Group Delay** | 110 microseconds at 10 kHz
| **Noise** | ≤10 mV at 10 kHz
| **Noise Spectral Density** | < 0.0005%FS per root Hz typical

| **Performance** | **Rotor Temp. Range Compensated** | +70 to +170 °F (+21 to +77 °C)
| **System Temp. Effect on Output¹** | ± 0.002% FS/°F (± 0.0036% FS/°C)
| **System Temp. Effect on Zero¹** | ± 0.002% FS/°F (± 0.0036% FS/°C)
| **Rotor/Stator Temp. Range Usable** | +32 to 185 °F (0 to +85 °C)
| **Receiver Temp. Range Usable** | 0 to +122 °F (-17 to +50 °C)
| **Permissible Radial Float, Rotor to Stator** | ± 0.25 in (± 6.35 mm)
| **Permissible Axial Float, Rotor to Stator** | ± 0.25 in (± 6.35 mm)
| **Dynamic Balance** | ISO G 2.5
| **Sensor Positional Sensitivity** | 0.1% FS (180° rotation)

**Power Requirements**
9 to 18 VDC, 15 watts (90 to 240VAC 50-60 Hz, adaptor is supplied)

| **Symmetry Adjustment** | Factory and user adjustable ± 0.5% FS
| **Supplied Cable, Stator to Receiver** | 24 ft. (7.3 m), RG 58/U (BNC plug/stator side, TNC plug/receiver side)
| **Optional Cable, Stator to Receiver** | 80 ft. (24.4 m), RG 59/U (contact factory for longer lengths)
| **Output Interface** | DB-25 female connector (mating supplied w/backshell)
| **Calibration** | Unipolar shunt calibration, invoked from the receiver front panel
| **Stator Assembly** | Top half of loop is removable for easy installation over rotor
The TORKDISC® and receiver make up a complete system. No additional signal conditioning is required. The receiver box provides voltage and digital output via a 25-pin I/O connector. A standard 24-foot cable is supplied, but an 80-foot, 112-foot or 176-foot cable can be used as well.

### TORKDISC® In-Line Rotary Torque Sensor System Dimensions

<table>
<thead>
<tr>
<th>Series</th>
<th>O.D. - Outside Diameter (including telemetry/collar)</th>
<th>Overall Thickness</th>
<th>Pilot</th>
<th>Driven (inner) Bolt Circle</th>
<th>Load (outer) Bolt Circle</th>
</tr>
</thead>
<tbody>
<tr>
<td>5302D</td>
<td>7.0 in 177.8 mm</td>
<td>1.1 in 27.9 mm</td>
<td>2.0 in 50.8 mm</td>
<td>(8) 3/8-24 threaded holes, equally spaced on a 3.00 in (76.20 mm) B.C.</td>
<td>(8) 0.406 in (10.31 mm) dia. through holes equally spaced on a 5.00 in (127.0 mm) B.C.</td>
</tr>
<tr>
<td>5308D</td>
<td>8.5 in 215.5 mm</td>
<td>1.1 in 27.9 mm</td>
<td>2.7 in 69.9 mm</td>
<td>(8) 5/8-11 threaded holes, spaced on a 3.75 in (95.25 mm) B.C.</td>
<td>(8) 0.531 in (13.49 mm) dia. through holes equally spaced on a 6.5 in (165.0 mm) B.C.</td>
</tr>
<tr>
<td>5309D</td>
<td>10.5 in 241.0 mm</td>
<td>1.6 in 41.7 mm</td>
<td>4.0 in 101.5 mm</td>
<td>(12) 5/8-11 threaded holes, spaced on a 6.0 in (152.4 mm) B.C.</td>
<td>(16) 0.531 in (13.49 mm) dia. through holes equally spaced on a 8.5 in (215.9 mm) B.C.</td>
</tr>
<tr>
<td>5310D</td>
<td>18.0 in 456.7 mm</td>
<td>2.1 in 53.0 mm</td>
<td>5.5 in 139.7 mm</td>
<td>(12) 7/8-14 threaded holes, spaced on a 9.0 in (228.6 mm) B.C.</td>
<td>(16) 0.780 in (19.8 mm) dia. through holes equally spaced on a 13.0 in (330.2 mm) B.C.</td>
</tr>
</tbody>
</table>

See TORKDISC® In-Line Rotary Sensor System Dimensions Table (page 3) for measurement values.
Superior Customer Service
As with all PCB® instrumentation, the TORKDISC® is complemented with toll-free applications assistance, 24-hour technical service, and backed by a no-risk policy that guarantees total customer satisfaction or your money refunded. We can also calibrate and repair your TORKDISC®.

### TORKDISC® ROTARY TORQUE SENSOR SYSTEM

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Unit</th>
<th>5302D-05A</th>
<th>5302D-01A</th>
<th>5302D-02A</th>
<th>5308D-01A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Rated Capacity</td>
<td>lbf-in (Nm)</td>
<td>250 (28)</td>
<td>2000 (226)</td>
<td>5000 (565)</td>
<td>10k (1130)</td>
</tr>
<tr>
<td>Bolt Joint Slip Torque</td>
<td>lbf-in (Nm)</td>
<td>3300 (373)</td>
<td>3300 (373)</td>
<td>10k (1130)</td>
<td>35k (4000)</td>
</tr>
<tr>
<td>Safe Overload</td>
<td>lbf-in (Nm)</td>
<td>750 (85)</td>
<td>6000 (678)</td>
<td>15k (1695)</td>
<td>30k (3400)</td>
</tr>
<tr>
<td>Failure Overload</td>
<td>lbf-in (Nm)</td>
<td>1000 (113)</td>
<td>8000 (904)</td>
<td>20k (2260)</td>
<td>40k (4500)</td>
</tr>
<tr>
<td>Torsional Stiffness</td>
<td>lbf-in/rad (Nm/rad)</td>
<td>300k (34k)</td>
<td>5800k (655k)</td>
<td>15M (1695)</td>
<td>34M (3800k)</td>
</tr>
<tr>
<td>Torsional Angle @ Capacity</td>
<td>degrees</td>
<td>0.125</td>
<td>0.020</td>
<td>0.020</td>
<td>0.017</td>
</tr>
<tr>
<td>Rotating Inertia</td>
<td>lbf-in sec² (Nm sec²)</td>
<td>0.030 (0.003)</td>
<td>0.056 (0.006)</td>
<td>0.117 (0.013)</td>
<td>0.240 (0.027)</td>
</tr>
<tr>
<td>Axial Load Limit [1]</td>
<td>lbf (N)</td>
<td>62.5 (278)</td>
<td>500 (2224)</td>
<td>1000 (4448)</td>
<td>1350 (6000)</td>
</tr>
<tr>
<td>Lateral Load Limit [1]</td>
<td>lbf (N)</td>
<td>62.5 (278)</td>
<td>500 (2224)</td>
<td>1000 (4448)</td>
<td>1650 (7300)</td>
</tr>
<tr>
<td>Bending Moment Limit [1]</td>
<td>lbf-in (Nm)</td>
<td>125 (14)</td>
<td>1500 (169)</td>
<td>3000 (339)</td>
<td>5000 (565)</td>
</tr>
<tr>
<td>Maximum Speed</td>
<td>RPM</td>
<td>15k</td>
<td>15k</td>
<td>15k</td>
<td>10k</td>
</tr>
<tr>
<td>Rotor Weight</td>
<td>lbf (kg)</td>
<td>2 (0.9)</td>
<td>3.5 (1.6)</td>
<td>9 (4.1)</td>
<td>10 (4.5)</td>
</tr>
<tr>
<td>Rotor Material</td>
<td>–</td>
<td>Aluminum</td>
<td>Aluminum</td>
<td>Steel</td>
<td>Steel</td>
</tr>
</tbody>
</table>

### Notes:
- Continuous Rated Capacity values are consistent across all models.
- Bolt Joint Slip Torque values vary slightly across models.
- Safe Overload values increase with model number.
- Failure Overload values represent significant increases with model number.
- Torsional Stiffness increases with model number.
- Rotating Inertia values show a consistent trend across models.
- Axial and Lateral Load Limits increase with model number.
- Bending Moment Limits increase with model number.
- Maximum Speed values decrease with model number.
- Rotor Weight values increase with model number.
- Rotor Material values transition from Aluminum to Steel.

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