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Series 5300D

TORKDISC® In-line Rotary Torque Sensor System

For Powertrain Development

Highlights

- 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)

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



Robust and Competitively Priced

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.

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®.

 **PCB LOAD & TORQUE**
A PCB PIEZOTRONICS DIV.



TORKDISC® In-line Rotary Torque Sensor System

Static and Dynamic Measurements

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 elliptical 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.

More Than 40 Years of Experience

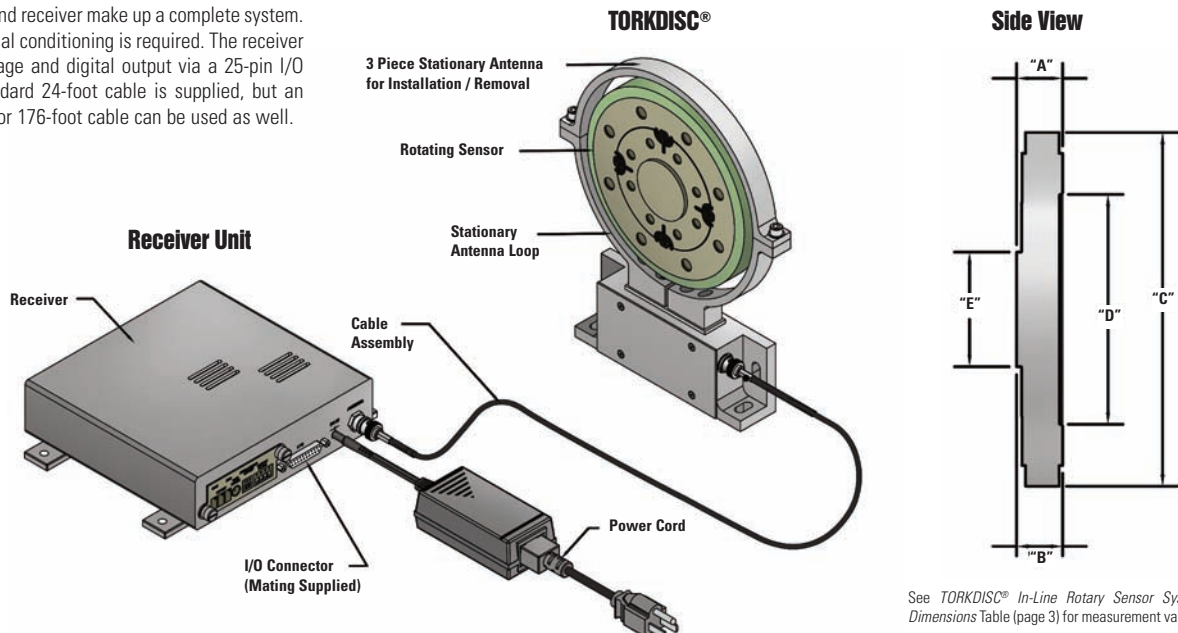
PCB Load & Torque is a wholly owned subsidiary of PCB Piezotronics, the industry leader in sensor technology for more than 40 years. PCB® is global supplier of a wide array of measurement products including load, torque, force, accelerometers, sound level meters, acoustic and MEMS sensors, to name a few. Our large staffs of experienced engineers understand test and measurement requirements and can recommend the best solution for your application. For more information and a complete list of PCB products, visit us at PCB.com.

Series 5300D Common Specifications

System Output		Temperature	
Voltage Output A	AC Coupled, 0 to ± 10 volt w/ independent coarse gain control (16 increments)	Rotor Temp. Range Compensated	+70 to +170 °F (+21 to +77 °C)
Voltage Output B	DC Coupled, 0 to ± 10 volt w/ independent fine and coarse gain control	System Temp. Effect on Output ¹	± 0.002% FS/°F (± 0.0036% FS/°C)
Digital Output:	QSPI	System Temp. Effect on Zero ¹	± 0.002% FS/°F (± 0.0036% FS/°C)
System Performance		Rotor/Stator Temp. Range Usable	+32 to +185 °F (0 to +85 °C)
Accuracy	Overall, 0.1% FS, combined effect of Non-Linearity, Hysteresis, & Repeatability	Rotor/Stator Optional Temp. Range Usable	+32 to +250 °F (0 to +121 °C)
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	Receiver Temp. Range Usable	0 to +122 °F (-17 to +50 °C)
Voltage Output B Filter (DC)	8-pole elliptical low pass w/selectable cutoff frequencies of > 8500, 5000, 2500, 1250, 625, 313, 10, & 1 Hz	Mechanical	
Bandwidth	DC to 8500 Hz anti-alias	Permissible Radial Float, Rotor to Stator	± 0.25 in (± 6.35 mm)
Digital resolution	16-bit	Permissible Axial Float, Rotor to Stator	± 0.25 in (± 6.35 mm)
Analog Resolution	0.31 mV (± 10 volts/32768, 16-bit resolution)	Dynamic Balance	ISO G 2.5
Digital Sample Rate	26,484 samples/sec	Sensor Positional Sensitivity	≅ 0.1% FS (180° rotation)
Group Delay	≅ 110 microseconds at 10 kHz	Power	
Noise	≤10 mV at 10 kHz	Power Requirements	9 to 18 VDC, 15 watts (90 to 240VAC 50-60 Hz, adaptor is supplied)
Noise Spectral Density	< 0.0005%FS per root Hz typical	Miscellaneous	
		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 58/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

Note: [1] Extraneous load limits reflect the maximum axial load, lateral load, and bending moment that may be applied singularly without electrical or mechanical damage to the sensor. Where combined extraneous loads are applied, decrease loads proportionally.

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.



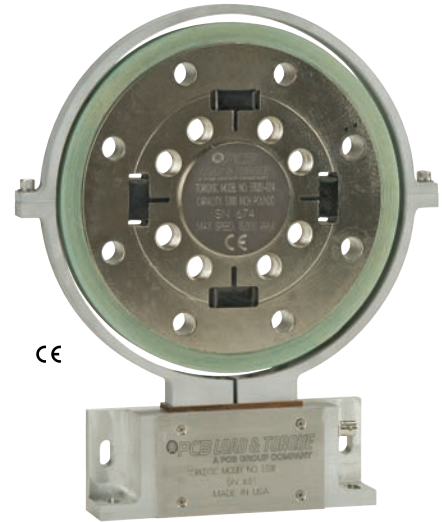
See TORKDISC® In-Line Rotary Sensor System Dimensions Table (page 3) for measurement values.



TORKDISC® Rotary Torque Sensor System

Model Number	Unit	5302D-05A	5302D-01A	5302D-02A	5308D-01A	5308D-02A
Continuous Rated Capacity	lbf-in Nm	250 28	2000 226	5000 565	10k 1130	20k 2260
Bolt Joint Slip Torque	lbf-in Nm	3300 373	3300 373	10k 1130	35k 4000	35K 4000
Safe Overload	lbf-in Nm	750 85	6000 678	15k 1695	30k 3400	60k 6775
Failure Overload	lbf-in Nm	1000 113	8000 904	20k 2260	40k 4500	80k 9040
Torsional Stiffness	lbf-in/rad Nm/rad	300k 34k	5800k 655k	15M 1600k	34M 3800k	67M 7600k
Torsional Angle @ Capacity	degrees	0.125	0.020	0.020	0.017	0.017
Rotating Inertia	lbf-in sec ² Nm sec ²	0.030 0.003	0.056 0.006	0.117 0.013	0.240 0.027	0.240 0.027
Axial Load Limit [1]	lbf N	62.5 278	500 2224	1000 4448	1350 6000	2700 12k
Lateral Load Limit [1]	lbf N	62.5 278	500 2224	1000 4448	1650 7300	3375 15k
Bending Moment Limit [1]	lbf-in Nm	125 14	1500 169	3000 339	5000 565	7500 850
Maximum Speed	RPM	15k	15k	15k	10k	10k
Rotor Weight	lbf kg	2 0.9	3.5 1.6	9 4.1	10 4.5	10 4.5
Rotor Material		Aluminum	Aluminum	Steel	Steel	Steel

Model Number	Unit	5308D-03A	5309D-01A	5309D-02A	5310D-02A	5310D-04A
Continuous Rated Capacity	lbf-in Nm	30k 3400	50k 5650	100k 11k	200k 23k	225k 25k
Bolt Joint Slip Torque	lbf-in Nm	35k 4000	85k 9600	110k 12k	268k 30k	268k 30k
Safe Overload	lbf-in Nm	75k 8475	100k 11k	200k 23k	600k 68k	675k 76k
Failure Overload	lbf-in Nm	100k 11k	125k 14k	250k 28k	800k 90k	900k 102k
Torsional Stiffness	lbf-in/rad Nm/rad	100M 11.3M	115M 13M	230M 26M	1200M 138M	1350M 152.5M
Torsional Angle @ Capacity	degrees	0.017	0.017	0.017	0.01	0.01
Rotating Inertia	lbf-in sec ² Nm sec ²	0.240 0.027	0.874 0.099	0.874 0.099	7.514 0.849	7.514 0.849
Axial Load Limit [1]	lbf N	4000 17.8k	5000 22.2k	10k 44.5k	14k 62k	15k 66.7k
Lateral Load Limit [1]	lbf N	5000 22.2k	5000 22.2k	10k 44.5k	14k 62k	15k 66.7k
Bending Moment Limit [1]	lbf-in Nm	10k 1130	25k 2825	50k 5650	95k 10.7k	100k 11.3k
Maximum Speed	RPM	10k	10k	10k	4500	4500
Rotor Weight	lbf kg	10 5	30 14	30 14	100 45	100 45
Rotor Material		Steel	Steel	Steel	Steel	Steel



Series 5300D

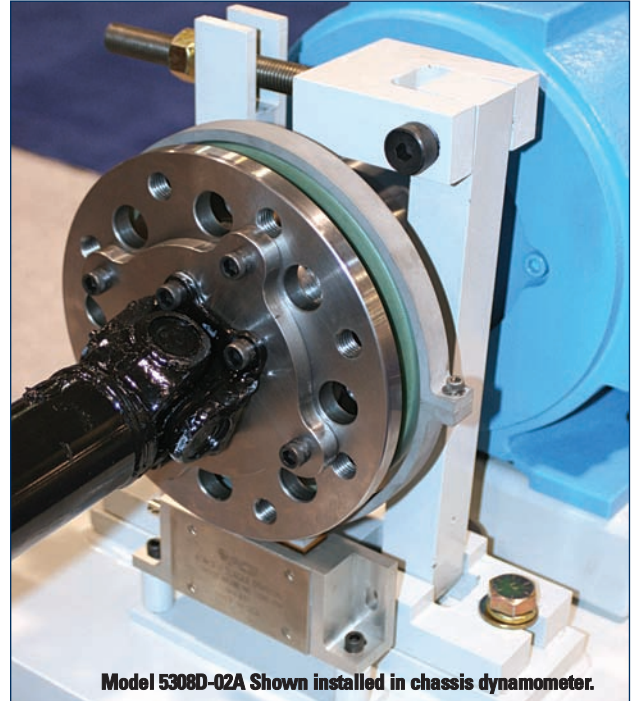


TORKDISC® In-line Rotary Torque Sensor System Dimensions

	A	B	C	D	E	F
Series	O.D. - Outside Diameter (including telemetry collar)	Overall Thickness	Pilot	Pilot	Driven (inner) Bolt Circle	Load (outer) Bolt Circle
5302D	7.0 in 177.8 mm	1.1 in 27.9 mm	2.0 in 50.8 mm	4.4 in 111.1 mm	(8) 3/8-24 threaded holes, equally spaced on a 3.00 in (76.20 mm) B.C.	(8) 0.406 in (10.31 mm) dia. through holes equally spaced on a 5.00 in (127.0 mm) B.C.
5308D	8.5 in 215.5 mm	1.1 in 27.9 mm	2.7 in 69.9 mm	5.5 in 140.0 mm	(8) 5/8-11 threaded holes, spaced on a 3.75 in (95.25 mm) B.C.	(8) 0.531 in (13.49 mm) dia. through holes equally spaced on a 6.5 in (165.0 mm) B.C.
5309D	10.5 in 241.0 mm	1.6 in 41.7 mm	4.0 in 101.5 mm	7.5 in 190.5 mm	(12) 5/8-11 threaded holes, spaced on a 6.0 in (152.4 mm) B.C.	(16) 0.531 in (13.49 mm) dia. through holes equally spaced on a 8.5 in (215.9 mm) B.C.
5310D	18.0 in 456.7 mm	2.1 in 53.0 mm	5.5 in 139.7 mm	11.0 in 279.4 mm	(12) 7/8-14 threaded holes, spaced on a 9.0 in (228.6 mm) B.C.	(16) 0.780 in (19.8 mm) dia. through holes equally spaced on a 13.0 in (330.2 mm) B.C.



TORKDISC® In-line Rotary Torque Sensor System



The robust construction, high stiffness, and low rotating inertia of the TORKDISC® make it ideal for applications such as chassis, powertrain, and engine dynamometers.

PCB Load & Torque Division, is a manufacturer of high quality, precision load cells, torque transducers, and telemetry systems, located in Farmington Hills, Michigan, USA. In addition to the quality products produced, the division offers many services including: A2LA Accredited Calibration for torque, force, and related instrumentation; an A2LA Accredited Threaded Fastener Testing Laboratory; and complete and reliable custom stain gaging. PCB Load & Torque products and services fulfill the test and measurement needs of numerous industries including: Aerospace & Defense, Automotive, Medical Rehabilitation, Material Testing, Textile, Process Control, Robotics & Automation, and more. PCB's RS Technologies product line includes test systems and threaded fastener torque/angle/tension systems ideal for use in the Automotive, Aerospace & Defense, Power Generation industries, and for product assembly by manufacturers or processors of threaded fasteners or other companies that use threaded fasteners to assemble their products. The expert team of Design, Engineering, Sales, and Customer Service individuals draw upon vast in-house manufacturing resources to continually provide new, more beneficial sensing solutions. From ready-to-ship stock products, to custom-made specials, PCB proudly stands behind all products with services customers value most, including 24-hour technical support, a global distribution network, and the industry's only commitment to Total Customer Satisfaction. For more information please visit www.pcb.com.



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