



# TORQUE SENSORS

 **PCB PIEZOTRONICS**  
AN AMPHENOL COMPANY

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## TORQUE SENSORS

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We make it our business to stay on top of emerging industry demands, so that the torque sensors we provide help you meet your ever changing test requirements. Our broad selection of competitively priced torque sensors will help you meet the most demanding test and measurement requirements. Used in automotive, aerospace & defense, R&D and process control applications, our drop-in replacement torque sensors are designed to provide years of dependable performance. Whether a flange, disc or shaft, PCB® torque sensors are robust, durable, dependable and have a high degree of accuracy.

### TORQUE SENSOR TECHNOLOGY

The technology behind PCB® torque sensors are resistive element strain gages configured into a Wheatstone bridge circuit. The strain gages that serve as the primary sensing elements on a rigid spring element, which convert the applied torque into an electrical signal that can be filtered, displayed and recorded for further processing. This highly accurate ratio-metric electrical signal is proportional to the applied mechanical over turning force.

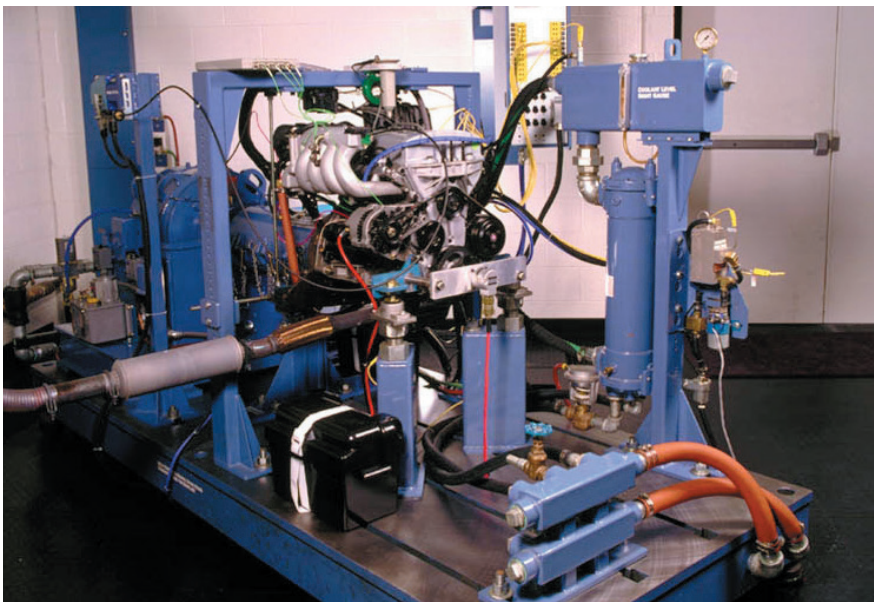
### GREAT MEASUREMENTS FOR 50 YEARS

With over five decades of success in the industry, we have developed a thorough understanding of industry demands and test requirements. Our vast industry knowledge has enabled us to design our torque sensors with increasing industry demands in mind — so our experienced staff of application engineers can provide appropriate product recommendations for your application, and you can be sure our products will help you meet your test requirements.



## EXCEPTIONAL SERVICE

We provide world-class customer service, provided 24 hours a day by live Customer Service Representatives, so when you call any time of the day or night, you can speak with a real person. As with all PCB® instrumentation, our torque sensors are complemented with toll-free applications assistance and backed by our no risk policy that guarantees your satisfaction or your money back. You can also bring your torque sensors to us for service and calibration. Our calibration lab is A2LA accredited up to 216Klb-in.



## HIGHLIGHTS

- Reaction and Rotation Models
- Variety of Drive Configurations
- Wide Capacity Range
- Broad Application Experience
- A2LA Accredited Calibration
- NIST Traceable Calibration

## APPLICATIONS

- Component Durability
- Powertrain Research and Development
- Dynamometer
- End-of-line NVH Quality
- Motor Performance
- Pump & Fan Efficiency

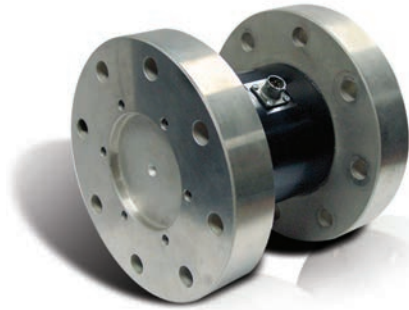
## TWO CATEGORIES OF MEASUREMENT

We offer two categories of torque measurement: reaction torque and rotational torque. Reaction torque is a non-rotational torque measurement, and rotating torque, as the name implies, is a torque sensor where the sensor elements rotate with between a prime mover and load. Reaction torque sensors are machined from a single piece of rigid material. They have no moving parts and are typically flange-mounted into a fixed position.

### REACTION TORQUE SENSORS

Reaction torque sensors are typically used in torsional test machines, motor dynamometers or in any application where rotation is limited to less than 360°. These sensors do not use bearings, slip rings or other rotating components, so they are cost-effective and easy to install.

We offer a comprehensive line of reaction torque sensors to meet a wide variety testing needs. Our capacity ranges are shown in the table (right).



Series 2300

REACTION TORQUE SENSORS	
Measurement Range	from 50 to 500K lbf-in
Overload Limit	150% FS
Sensitivity	2 mV/V
Linearity	≤ 0.1% FS
Hysteresis	≤ 0.1% FS
Repeatability	≤ 0.02% RO
General Dimensions (Diameter x Height)	Sizes range from 2 x 3 to 14 x 10.5 in

### ROTARY TORQUE SENSORS

Rotary torque sensors use a rotating shaft held in place with precision bearings within a fixed housing. We offer three types of rotational torque sensors: Rotary Slip Ring, Rotary Transformer Torque Transducers, and TORKDISC®.

CE



Series PC9000





## ROTARY SLIP RING

Slip ring torque sensors are cost-effective sensors that provide the power to excite the strain gage bridge and transfer the torque signal using slip rings. These sensors are used for engine dynamometers, electric motor testing, hydraulic pump testing and fan testing, to name a few. The sensor is mounted in-line between a driving source and an absorber.

Our comprehensive line of rotary slip ring torque transducers meets a wide variety testing needs. Our style and capacity ranges are show in the table (below).



**Series 3100**

ROTARY SLIP RING				
	Circular Keyed Shaft	Flat Keyed Shaft	Hex Shaft	Square Shaft
Measurement Range (FS Capacity)	from 100 to 10k lbf-in	from 8.85 to 88.5 lbf-in	from 32 ozf.-in. to 2,112 ozf.-in.	from 50 to 216k lbf.-in.
Overload Limit	150% FS	from 200 to 500% FS	150%	150%
Sensitivity	2 mV/V	2 mV/V	2 mV/V	2 mV/V
Linearity	≤ 0.1% FS	≤ 0.1% FS	≤ 0.25% FS	≤ 0.25%
Hysteresis	≤ 0.1% FS	≤ 0.1% FS	≤ 0.25% FS	≤ 0.25%
Repeatability	≤ 0.05% FS	≤ 0.05% FS	-	-
Speed Rating	7,900 RPM	10,000 RPM	up to 5,000 RPM	Up to 5,000 RPM
General Dimensions (shaft length x housing length x housing diameter)	Sizes range from 9.0 x 4.5 x 4.13 in to 11 x 5.25 x 4.5 in	6.5 x 3.40 x 3.5 in.	4.25 x 2.30 x 2.00 in.	Sizes range from 3.23 x 2.3 x 2.0 in. to 9.48 x 4.62 x 7.25 in,

## ROTARY TRANSFORMER (non-contact)

Our rotary transformer torque models are precision designed and manufactured with an aerospace grade rotary transformer, shaft and housing, which makes them well suited for higher speed operation in demanding test and measurement applications. They use a transformer to power the strain gage bridge and transfer the torque measurement over an air gap between the rotating shaft and the fixed housing. They come in a number of sizes and capacities and are available in keyed-shaft and flange-mount spline drive configurations. Advantages of the rotary torque approach include less maintenance and less signal noise than slip ring designs.

We offer a full line of rotary transformer torque sensors to meet a wide variety of testing needs. Our capacity ranges are shown in the table (right).

CE



Series 4115A & 4115K

CE



Series 4103

ROTARY TRANSFORMER	
Measurement Range	from 100 to 100K lbf-in
Overload Limit	from 150 to 200% FS
Sensitivity	1.5 mV/V to 2.5 mV/V
Linearity	≤ .05 to 0.1% FS
Hysteresis	≤ 0.05 to 0.1% FS
Repeatability	≤ 0.02% to 0.02% FS
Speed Rating	Up to 15,000 RPM
General Dimensions (Shaft length x housing length x housing diameter)	Sizes range from 10.0 x 6.0 x 4.0 in. to 19.0 x 8.75 x 6.5 in.

## TELEMETRY (bearing less, non-contact)

Our TORKDISC® In-line Rotary Torque Sensor System is an ideal solution for testing that requires a robust rotary torque transducer, and for applications in which axial space is at a premium. The robust construction, high stiffness and low rotating inertia of the TORKDISC® make it well suited for automotive powertrain development and in-plant quality control applications such as torque to turn, NVH and signature analysis..

CE



Series 5300

TELEMETRY	
Capacities	forces from 250 to 225K lbf-in FS
Overload Limit	300%
Combined Accuracy	0.1% FS
AC Coupled Output	0 ± 10 V
DC Coupled Output	0 to ± 10 V
Bandwidth	DC to 8500 Hz
Samples/sec	26k
General Dimensions (diameter x length)	Sizes range from 7.00 x 1.10 in. to 17.98 x 2.09 in

The system consists of a short-coupled, flange-mounted rotating sensor and a stator assembly, and uses a 16-bit digital telemetry transmitter rather than slip rings or rotary transformers. A circumferential antenna picks up digitized measurement signals and relays them to a receiver unit where they are conditioned to dual voltage output signals. Advantages include a smaller sensor size and a noise-free, digital signal transmission.



## SIGNAL CONDITIONERS AND ACCESSORIES

To complement our load cells, we offer a full line of signal conditioners to meet a wide range of test needs. They include:

- **Series 8120** provides AC bridge excitation,  $\pm 5$  Volt analog output, a selectable filter, shunt calibration and low noise.
- **Series 8159** provides 5 or 10 VDC strain gage bridge excitation which delivers  $\pm 10$  VDC and 4 to 20 mA output signals and operates from 115 or 230 VAC power.
- **Model 8162** includes an in-line, IP66 enclosure, operates from 12 to 18 VDC, provides 10 VDC sensor excitation, and delivers  $\pm 10$  V and 4 to 20 mA outputs.
- **Series 8161** provides 5 or 10 VDC bridge excitation, delivers  $\pm 5$  or  $\pm 10$  volts and 4-20 mA output signals, and operates from 12 to 28 VDC power. It also includes adjustable zero and span with built-in shunt calibration.
- **Series 920** provides a 5 VDC bridge excitation in a portable hand-held, battery operated, integral 5 digit display, external shunt calibration resistor, and RS232 computer interface.

### AVAILABLE ACCESSORIES INCLUDE:

- Cable assemblies
- Mounting base
- Load button
- Rod end
- Connectors
- Thread pre-tensioners





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