1 YEAR
WARRANTY

OMEGA™

User's Guide

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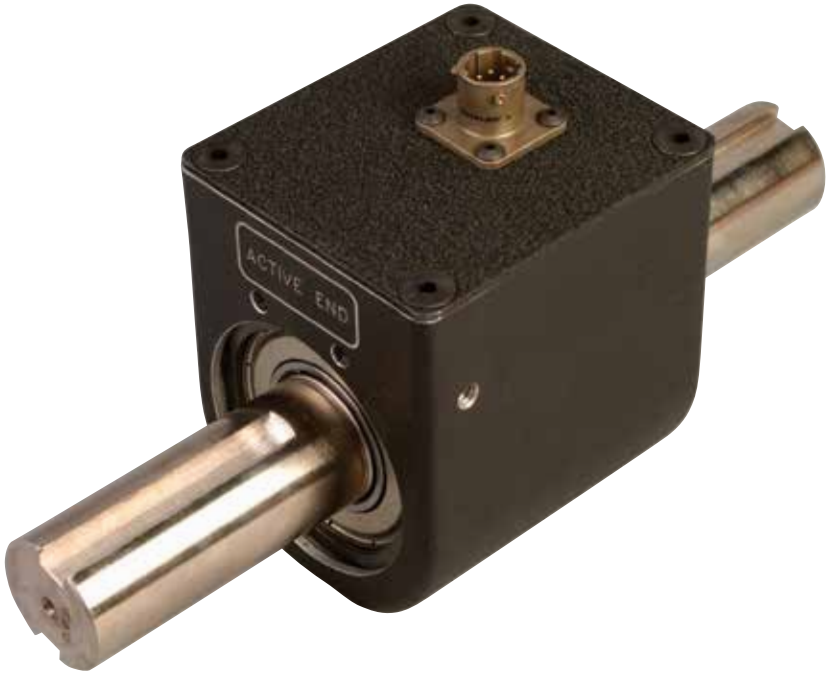

ISO 9001 CERTIFIED CORPORATE QUALITY
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NORWALK, CT MANCHESTER, UK

TQ513 Series

Rotating Torque Sensors
Shaft-to-Shaft Configuration

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Thank You
Thank you for purchasing one of Omega Engineering's slip ring based Rotary Torque Sensors. We know you will be satisfied with the performance and durability of our products.

Intended Use
Model TQ513 is a line of shaft-to-shaft rotary torque sensors for measuring the performance of electric drive motors, small DC motors, clutches, fans, etc.

This line of sensors incorporates a Full Wheatstone Bridge with a slip ring and a modular brush block assembly. Ball bearing supported shafts will provide long life and superior performance.

Certificate of Conformance and Calibration Traceability
OMEGA certifies that the products described herein meet the specifications and performance requirements described in their literature. Test reports and other pertinent information are on file and are available for inspection by your representative and/or the U.S. Government representative upon request.

Calibration was performed with a test system utilizing a reference load cell or deadweights and an electronic indicator. The system was within current calibration requirements at the time of the test and is traceable to the National Institute of Standards and Technology (NIST).

Omega Engineering calibration laboratory is accredited to ISO9001-2008.

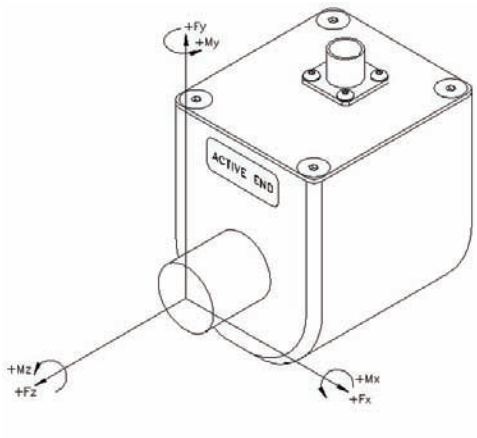
Installation
Install the sensor so that the label "Active End" is facing the place where torque is to be measured, i.e., to measure the torque applied by a wrench to a bolt, the "Active End" should face the bolt.

Important: The sensor's housing is NOT intended for use as a structural support. Do NOT place any loads on the housing.

It is also important that the **total stress on the shaft does NOT exceed $\sigma_{max.}$** To calculate the total stress, use the following equation:

$$\sigma = A*F_x + B*F_y + C*F_z + D*M_x + E*M_y + F*M_z$$

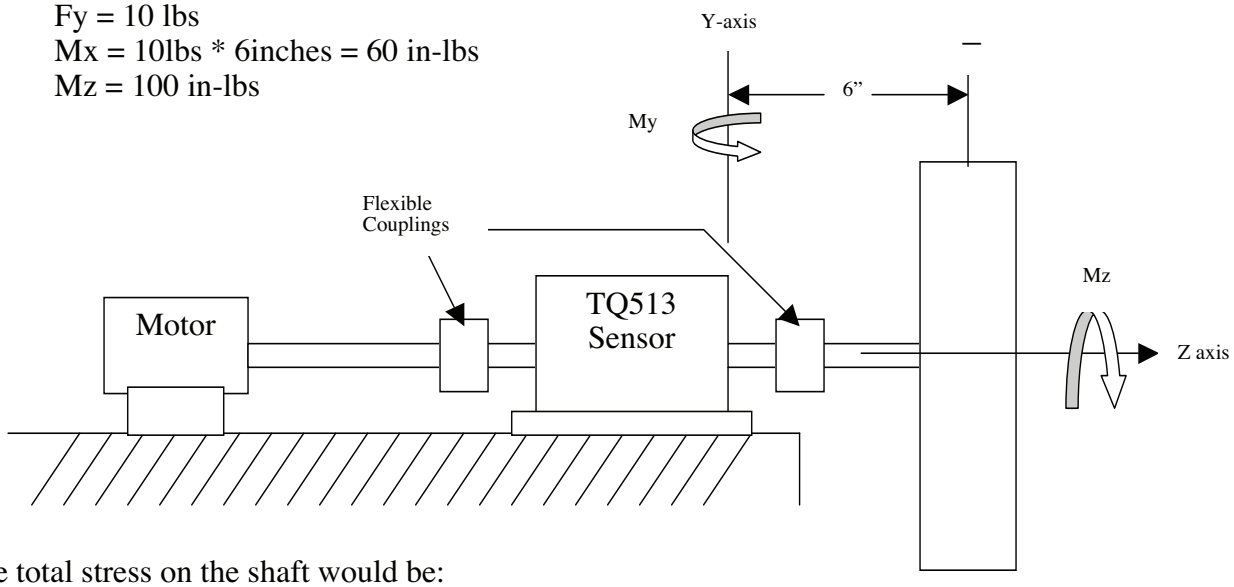
And:



Model #	Capacity	Extraneous Load Coefficients A & B	C	D & E	F	Torsional Spring Rate (in #/RAD)	Shaft dia (inches)	Key Width (inches)	σ_{max} (psi)
TQ513-003	50 in-oz	1030.0	56.7	223.0	4300.0	182	.375"	Flats	18000
TQ513-006	100 in-oz	678.0	26.1	102.0	2060.0	556			
TQ513-012	200 in-oz	435.0	18l0	70.5	997.0	1660			
TQ513-030	500 in-oz	214.0	10.9	42.7	380.0	7120			
TQ513-062	1000 in-oz	104.0	7.3	28.5	175.0	22900			
TQ513-100	100 in-lb	724.0	79.5	517.0	431.0	6900	.749"	.1875"	84000
TQ513-200	200 in-lb	363.0	31.6	259.0	216.0	17300			
TQ513-500	500 in-lb	145.0	9.3	103.0	86.1	59000	.999"	.25"	
TQ513-1K	1000 in-lb	72.3	3.8	51.7	43.1	149000			
TQ513-1.5K	1500 in-lb	55.1	2.8	37.4	33.6	281000			
TQ513-2K	2000 in-lb	35.9	2.4	25.7	21.4	378000			

For example:
If you are using a 200 in-lb. sensor to measure 100 in-lb. of torque applied by a 10 lb. fan six inches from the sensor,

Fx = Fz = My = 0,
Fy = 10 lbs
Mx = 10lbs * 6inches = 60 in-lbs
Mz = 100 in-lbs



The total stress on the shaft would be:

$\sigma = B*F_y + D*M_x + F*M_z$

$\sigma = 363*10 + 259*60 + 216*100 = 40{,}770$ psi
since σ_{max} for this model is 84,000 psi, this is acceptable.

Wiring

These sensors use a Full Wheatstone Bridge which is accessed through a 4 or 10 pin connector according to the following diagram:

Function	Connector Pin Style 4-Pin	10-pin
+EXC	A	A
-EXC	B	B
+SIG	C	C
-SIG	D	D
GND		E
+5V		F
CW LEAD		G
CW TRAIL		H
GND		J
SIG		K

Calibration
These sensors can come equipped with our Auto-ID system. If so equipped, the sensor will have a 10-pin connector and an EPROM that stores the calibration data for the sensor (i.e., the Full Scale Value, the mV/V output and the unit of measure). Whenever the sensor is connected to a compatible instrument, such as our PMAC 2000 or PTI, the instrument automatically reads the data and calibrates itself to the sensor.

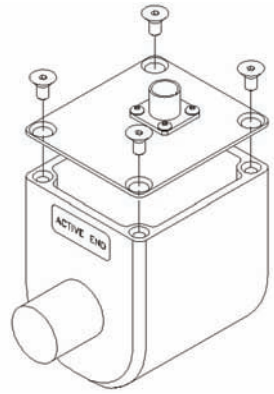
If you do not have an auto-id compatible instrument, you may still calibrate your instrument manually by following the instrument's calibration instructions.

For more information about Auto-ID, see our Website at http://sendev.com/.

Cleaning:

The brushes are designed for continuous wear to maintain contact with the slip ring. To maintain signal integrity, the slip ring must be cleaned periodically. To clean the slip ring:

1. Open the housing.
2. Dampen a soft cloth with any cleaning solvent.
3. Wipe the slip ring with the cloth.
4. Reassemble the housing, making sure the brush block assembly is aligned with the slip rings below it.

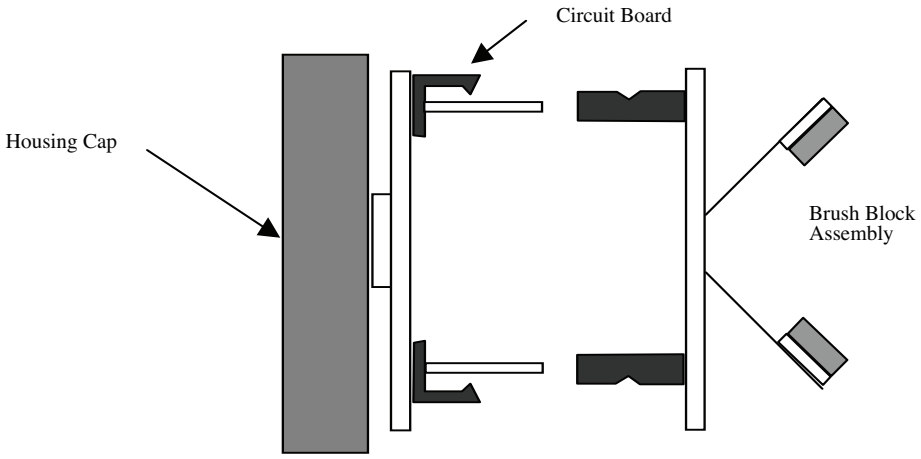


Do NOT immerse the assembly in the solvent. This may damage the strain gages inside the slip ring. Also, do NOT clean the brushes with the solvent.

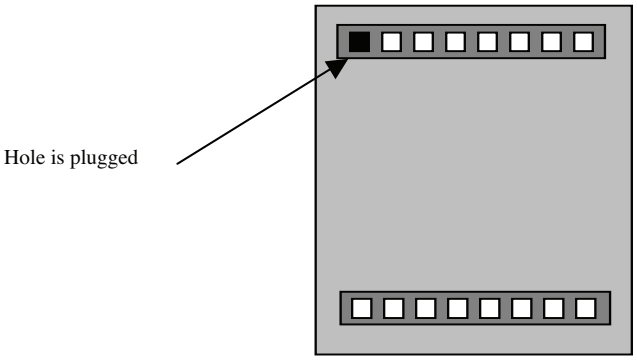
Recalibration:
To guarantee accuracy, all sensors should be recalibrated on an annual basis.

Replacing the Brush Block Assembly:
When the brushes are worn away, replace the brush block assembly.

The brush block assembly slides onto the circuit board and clips into place.



The brush block assembly is keyed to only fit on the circuit board one way.



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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