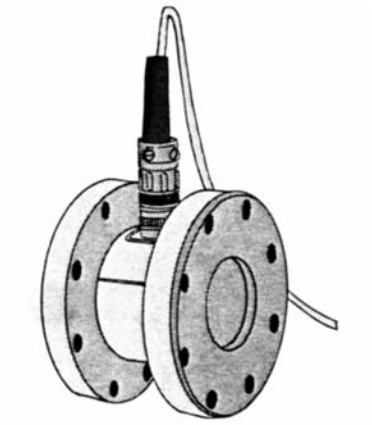
omega.com®
OMEGA®

TQ101

Reaction Torque Sensor



INSTRUCTION SHEET

M1461/0010

GENERAL DESCRIPTION

The OMEGA TQ101 Series Reaction Torque Sensors are ideal in measuring reaction or restraining torques such as found in motor mounts, pump mounts, machine mounts, etc. They can also be used in limited rotation applications such as the torque required to turn a nut or an actuator shaft. The sensor is designed with flanges enabling easy installation or adaption. The TQ101 torque sensor is rugged enough for the factory, yet accurate enough for the laboratory.

HOW TORQUE SENSORS WORK

Torque sensors have an output or sensitivity in mV/V. What this sensitivity/output represents is as follows:

Change in Millivolt output from zero load to the full scale capacity of the sensor (21.3 mV in this example)	=	Output/Sensitivity (example 2.13 mV/V)	x	Excitation (10.0 VDC)

Torque sensors rarely have exactly zero millivolts at no load. Most sensors have a small DC offset of a few millivolts, which is normal. To scale a system, the end-user simply scales the recorder/meter for a full scale range, then connects the torque sensor.

SPECIFICATIONS

RATED OUTPUT:	2.0 mV/V nominal
EXCITATION:	10 Vdc, 20 Vdc maximum
ACCURACY:	0.18% F.S.
LINEARITY:	0.10% F.S.
HYSTERESIS:	0.10% F.S.
REPEATABILITY:	0.10% F.S.
ZERO BALANCE:	1.0% F.S.
OPERATING TEMP. RANGE:	-65°F to 250°F
COMPENSATED TEMP. RANGE:	70°F to 170°F
THERMAL EFFECTS	
Zero:	0.002% F.S./°F
Span:	0.002% Rdg/°F
MAX. LOAD	
Safe:	150% F.S.
Ultimate:	300% F.S.
BRIDGE RESISTANCE:	350 ohms nominal
FULL SCALE ANGULAR DEFLECTION:	1.2 degrees
CONSTRUCTION:	
Sensing element:	Aluminum (up to 500 in-lb), nickel plated steel (above 500 in-lb)
Cover:	Aluminum (100, 200 and 500 in-lb) and nickel plated steel (all other ranges)
ELECTRICAL:	Mating connector supplied

INSTALLATION INSTRUCTIONS

While the TQ101 Rotary Torque Sensor is a very rugged device, it should not be subjected to torsional loads in excess of 150% of it's rated capacity. It is recommended to use grade 8 bolts or better to ensure a quality connection to the flanges. The sensor can be used to measure torque in both clockwise and counterclockwise directions. When alternating clockwise and counterclockwise torsional loads are applied to the sensor, there should be no play in either loading direction.

WIRING

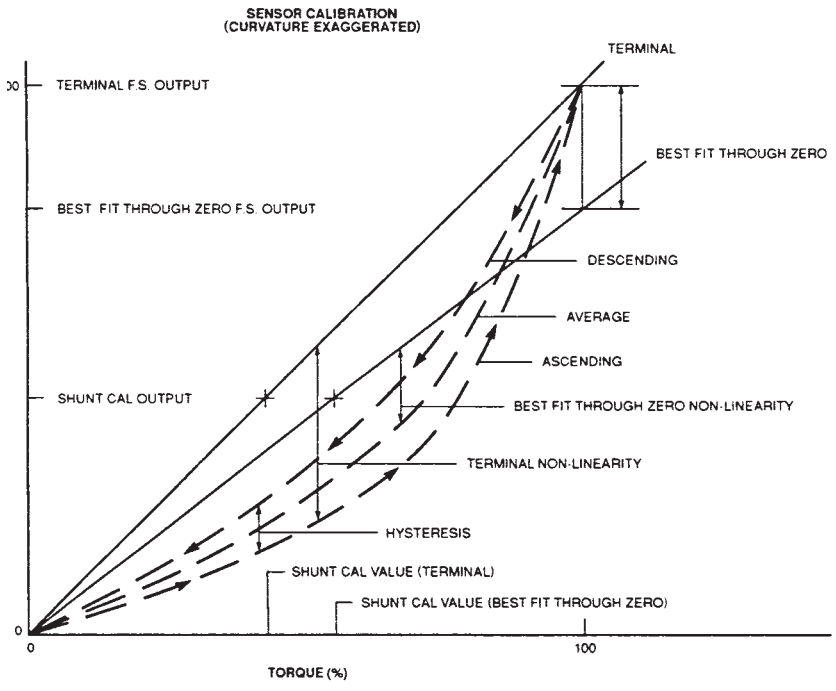
PIN A: + EXCITATION
PIN B: + SIGNAL
PIN C: - SIGNAL
PIN D: - EXCITATION

NIST TRACEABILITY

The TQ101 sensor is calibrated using a known load (applied to an NIST traceable load cell) through a known distance (measured by an NIST traceable lever arm). This set-up is considered a tertiary standard, traceable to NIST.

GENERAL CALIBRATION PROCEDURE

The sensor is cycled through the operating range to develop a stable hysteresis loop. Known loads are then applied to the sensor by means of dead weights or a reference load cell in ascending and descending increments. The data recorded is then best fit to second degree equations which describe ascending, descending, and average calibration curves. These equations are incrementally solved to generate theoretical sensor outputs at various loads. The calibration sheet supplies you with these data points and their meanings are defined in the following diagram:



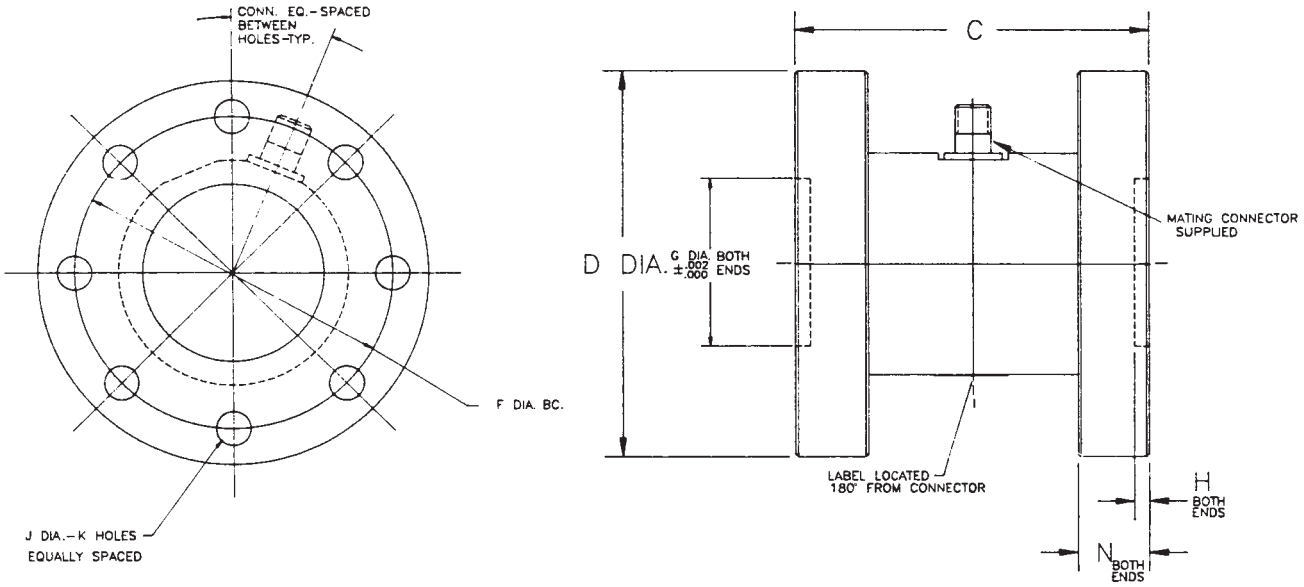
Terminal Non-linearity (N/L): computed from deviations of ascending theoretical data from a straight line connecting the zero and full scale points.

Terminal hysteresis (HYS): computed from the differences between descending and ascending theoretical data.

Best fit through zero Non-linearity (BF/0): computed from deviations of average theoretical data from a straight line through zero with a slope which produces minimum deviations with average theoretical data.

Best fit through zero outputs and best fit through zero shunt cal values should be used when the sensor is assumed to be linear. If the instrumentation is capable of correcting second order non-linearity, the average outputs and shunt cal output values should be used.

DIMENSIONS



MODEL NO.	CAPACITY	DIMENSIONS (INCHES)						
	IN-IBF	C	D	F	G	H	N	J
TQ101-10	10	1.75	1.75	1.38	.75	.125	.31	.21
TQ101-20	20	1.75	1.75	1.38	.75	.125	.31	.21
TQ101-50	50	1.75	1.75	1.38	.75	.125	.31	.21
TQ101-100	100	2.25	3.00	2.50	1.25	.125	.38	.27
TQ101-200	200	2.25	3.00	2.50	1.25	.125	.38	.27
TQ101-500	500	2.25	3.00	2.50	1.25	.125	.38	.27
TQ101-1K	1,000	3.00	4.00	3.25	1.50	.125	.50	.33
TQ101-2K	2,000	3.00	4.00	3.25	1.50	.125	.50	.33
TQ101-5K	5,000	3.50	5.00	4.25	2.00	.25	.75	.39
TQ101-10K	10,000	3.50	5.00	4.25	2.00	.25	.75	.39
TQ101-15K	15,000	7.38	8.00	6.50	3.50	.31	1.50	.64
TQ101-20K	20,000	7.38	8.00	6.50	3.50	.31	1.50	.64
TQ101-50K	50,000	7.38	8.00	6.50	3.50	.31	1.50	.64
TQ101-100K	100,000	8.50	9.75	8.00	4.00	.31	1.50	.77

omega.com®
ΩOMEGA®

OMEGAnet® Online Service omega.com	Internet e-mail info@omega.com

Servicing North America:

U.S.A.: ISO 9001 Certified
Omega Engineering, Inc., One Omega Drive, P.O. Box 4047
Stamford, CT 06907-0047
Toll-Free: 1-800-826-6342 Tel: (203) 359-1660
FAX: (203) 359-7700 e-mail: info@omega.com

Canada:
976 Bergar
Laval (Quebec), H7L 5A1 Canada
Toll-Free: 1-800-826-6342 TEL: (514) 856-6928
FAX: (514) 856-6886 e-mail: info@omega.ca

For immediate technical or application assistance:

U.S.A. and Canada: Sales Service: 1-800-826-6342/1-800-TC-OMEGA®
Customer Service: 1-800-622-2378/1-800-622-BEST®
Engineering Service: 1-800-872-9436/1-800-USA-WHEN®

Mexico/ Latin America En Español: 001 (203) 359-7803 FAX: 000 (203) 359-7807
info@omega.com.mx e-mail:espanol@omega.com

Servicing Europe:

Benelux:
Managed by the United Kingdom Office
Toll-Free: 0800 099 3344 TEL: +31 20 347 21 21
FAX: +31 20 643 46 43 e-mail: sales@omegaeng.nl

Czech Republic:
Frystatska 184
733 01 Karviná, Czech Republic
Toll-Free: 0800-1-66342 TEL: +420-59-6311899
FAX: +420-59-6311114 e-mail: info@omegashop.cz

France:
Managed by the United Kingdom Office
Toll-Free: 0800 466 342 TEL: +33 (0) 161 37 29 00
FAX: +33 (0) 130 57 54 27 e-mail: sales@omega.fr

Germany/Austria: Daimlerstrasse 26, D-75392 Deckenpfronn, Germany
Toll-Free: 0800 6397678 TEL: +49 (0) 7056 9398-0
FAX: +49 (0) 7056 9398-29 e-mail: info@omega.de

United Kingdom: ISO 9001 Certified
OMEGA Engineering Ltd.
One Omega Drive, River Bend Technology Centre, Northbank
Irlam, Manchester M44 5BD United Kingdom
Toll-Free: 0800-488-488 TEL: +44 (0) 161 777-6611
FAX: +44 (0) 161 777-6622 e-mail: sales@omega.co.uk

It is the policy of OMEGA Engineering, Inc. to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.
WARNING: These products are not designed for use in, and should not be used for, human applications.

MADE IN USA

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. OMEGA is a registered trademark of OMEGA ENGINEERING, INC.