Torque Sensor

Type 4501A...

Rotating Torque Sensor

Type 4501A... torque sensors operate on the strain gage principle and supplies an analog output signal in mV/V. The sensors are particularly suitable for screw driving assembly operations.

- Universal applications
- Strain gage full bridge system
- Shunt calibration
- Measurement of torque in either direction of rotation
- Short term speed peaks to 3,000 rpm
- Robust and reliable design
- Small and handy
- Long service life
- Resistant to high acceleration
- Optional rotational angle measurement
- Impulse wrench design on request

Version Q/QA

Version H/HA

Version R

Description

These sensors use strain gage technology. Power is supplied and the measurement signal transferred between the rotating shaft and the case via high-grade, durable slip rings. These torque sensors are predominantly employed as in-line torque sensors. They are robust and easy to use.

Together with a broad range of measuring and evaluation systems they are ideal instruments for precise and low-priced measurement of torque and torque angles.

Application

The Type 4501A... torque sensors were designed specifically for use in screw driving assembly applications. The versions with square or hexagonal shaft mount directly on the drives of the tools.

Typical applications include checking stationary screw spindles and torque measurement hand or power driven.

The universal versions with rounded shaft ends can be used wherever torque has to be measured intermittently or at low speed.

4501A_000-596a-11.07

Technical Data

Mechanical Basic Data		
Measuring range (nominal torque)	lbf-ft	1.5 ... 737.6
Overload capacity		
Service torque		1.5 x rated torque
Limiting torque		1.5 x rated torque
Rotational angle measurement	pulses/	2x360,
(Version QA)	revolut.	90° displaced, TTL
Nominal speed	rpm	≤3,000
Housing material		Anodizeded aluminum
Protection class		IP40
General Electrical Specifications		
Accuracy class		0.2
Linearity error		
related to rated value	% FSO	<±0.2
Relative hysteresis error	% FSO	<±0.1

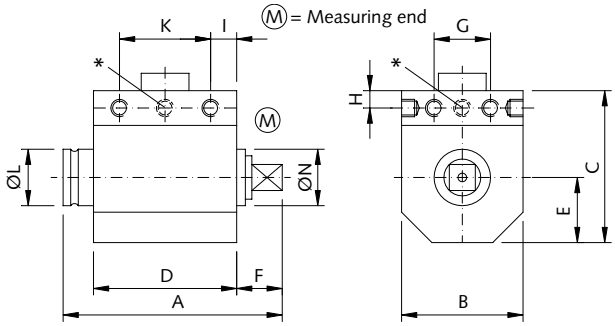
Temp. influence on the zero point	% FSO/°F	<±0.008
Temp. influence on the nominal value	% FSO/°F	<±0.008
Control signal	%	100±0.2
Bridge resist., strain gage full bridge	Ω	350 nominal
Output signal (rated value)		
<6 N·m rated torque	mV/V	1
≥6 N·m rated torque	mV/V	2
Operating temperature range	°F	41 ... 122
(Rated temperature range)		
Service temperature range	°F	14 ... 158
Storage temperaure range	°F	–13 ... 176
Electrical connection		6-pin or 12-pin built-in connector
Supply voltage strain gage	VDC/VAC	max. 12
Supply voltage angle	VDC/mA	5/35

Dimensions

Torque sensor with standard square socket connection
Version Q/QA

- With rotating shaft
- Drive - inside square socket
- Output - external square socket
- Rotational angle measurement (Version QA)

Dimensions Version Q



Threads for mounting: M4, 6 mm (0.24 in). depth

Type	Measuring range lbf-ft	Socket size	A	B	C	D	E	F	G	H	I	øL	øN	Axial force lbf max.
4501A6Q	4.4	1/4"	3.0	1.1	2.1	2.3	0.55	0.33	0.32	0.20	0.43	0.51	0.39	33.7
4501A12Q	8.9	1/4"	3.0	1.1	2.1	2.3	0.55	0.33	0.32	0.20	0.43	0.51	0.39	33.7
4501A25Q	18.4	3/8"	2.9	1.5	2.3	1.7	0.75	0.71	*	0.24	0.87	0.99	0.75	123.6
4501A63Q	46.5	3/8"	2.9	1.5	2.3	1.7	0.75	0.71	*	0.24	0.87	0.99	0.75	224.8
4501A160Q	118	1/2"	3.1	1.5	2.3	1.7	0.75	0.89	*	0.24	0.87	0.99	0.75	404.6
4501A500Q	368.8	3/4"	3.8	2.3	3.0	2.0	1.1	1.2	*	0.20	0.99	1.6	1.2	899.2
4501A1KQ	737.6	1"	4.4	2.9	3.6	2.3	1.4	1.4	*	0.20	1.1	2.0	1.6	1,348.8

Axial and radial force values apply for unsecured housing *For Q version sensors up from 18.4 lbf-ft only one thread aside and frontal (Measuring end)

Dimensions Version QA (with rotational angle measurement)

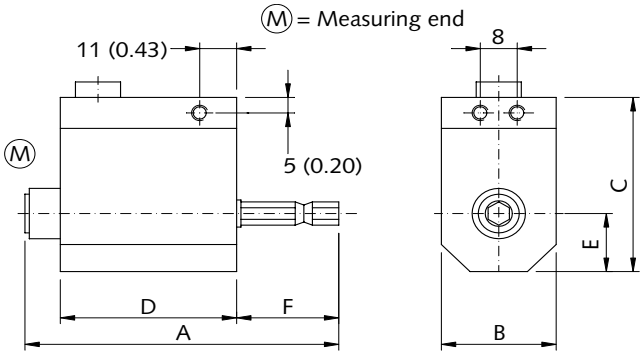
Type	Measuring range lbf-ft	Socket size	A	B	C	D	E	F	G	H	I	K	øL	øN	Axial force lbf max.
4501A6QA	4.4	1/4"	3.0	1.1	2.0	2.3	0.55	0.33	0.32	0.20	0.43	–	0.51	0.39	33.7
4501A12QA	8.9	1/4"	3.0	1.1	2.0	2.3	0.55	0.33	0.32	0.20	0.43	–	0.51	0.39	33.7
4501A25QA	18.4	3/8"	4.0	1.5	2.3	2.3	0.75	0.85	0.55	0.20	0.47	1.4	1.0	0.67	123.6
4501A63QA	46.5	3/8"	4.0	1.5	2.3	2.3	0.75	0.85	0.55	0.20	0.47	1.4	1.0	0.67	224.8
4501A160QA	118	1/2"	4.2	1.5	2.3	2.3	0.7	1.0	0.55	0.20	0.47	1.4	1.0	0.67	404.6
4501A500QA	368.8	3/4"	5.3	2.3	3.0	2.5	1.15	1.6	1.2	0.20	0.55	1.4	1.6	1.2	899.2
4501A1KQA	737.6	1"	7.0	2.9	3.5	2.9	1.4	2.3	1.8	0.20	0.55	1.8	2.0	1.6	1,348.8

Axial and radial force values apply for unsecured housing

Dimensions

Torque sensor with standard 1/4" hex
DIN3126 form E/F, Version H

- With rotating shaft
- Drive - external hex
- Output - inside hex
- Rotational angle measurement (HA)
- Quick action chuck



Threads for mounting: 6x M4, 6 mm (0.24 in.) depth

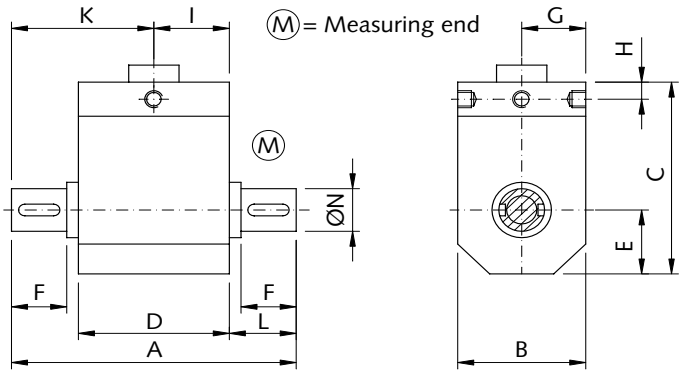
Dimensions Version H or HA (Rotational angle measurement)

Type	Measuring range lbf-ft	Nominal value mV/V	A	B	C	D	E	F	Axial force lbf max.
4501A2H, ...HA	1.5	1	4.0	1.1	2.0	2.3	0.55	1.1	4.5
4501A6H, ...HA	4.4	2	4.0	1.1	2.0	2.3	0.55	1.1	11.2
4501A12H, ...HA	8.9	2	4.0	1.1	2.0	2.3	0.55	1.1	11.2
4501A20H, ...HA	14.8	2	4.0	1.1	2.0	2.3	0.55	1.1	33.7

Axial and radial force values apply for unsecured housing

Torque sensor with feather keyways (2x180°)
DIN 6885, Version R

- With rotating shaft



Threads for mounting: 3x M4. 6 mm (0.24 in.) depth

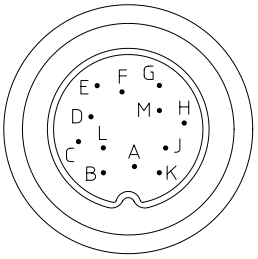
Dimensions Version R

Type	Measuring range lbf-ft	Nominal value mV/V	A	B	C	D	E	F	G	H	I	K	L	øN g6	Axial force lbf max.
4501A10R	7.4	2	4.3	1.5	2.3	1.7	0.7	1.2	0.7	0.24	0.87	2.1	1.3	0.75	33.7
4501A20R	14.8	2	4.3	1.5	2.3	1.7	0.7	1.2	0.7	0.24	0.87	2.1	1.3	0.75	123.6
4501A50R	36.9	2	4.3	1.5	2.3	1.7	0.7	1.2	0.7	0.24	0.87	2.1	1.3	0.75	224.8
4501A100R	73.8	2	4.3	1.5	2.3	1.7	0.7	1.2	0.7	0.24	0.87	2.1	1.3	0.75	404.6
4501A200R	147.5	2	7.2	2.9	3.5	2.2	1.4	2.4	1.4	0.20	1.1	3.6	2.5	1.5	899.2
4501A500R	368.8	2	7.2	2.9	3.5	2.2	1.4	2.4	1.4	0.20	1.1	3.6	2.5	1.5	1,348.8
4501A1KR	737.6	2	7.2	2.9	3.5	2.2	1.4	2.4	1.4	0.20	1.1	3.6	2.5	1.5	1,348.8

Axial and radial force values apply for unsecured housing

Electrical Connections

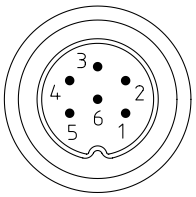
Pin Allocation of the 12 Pin Built-in Connector for Version QA, HA



Function	PIN	Description
–Supply +Supply +Measuring signal output –Measuring signal output	A B C D	Strain gage full bridge
0 VDC +5 VDC ±10 % Impuls l, leading*, TTL Impuls r, lagging*, TTL 0 VDC	 E F G H J	Angle sensor: Supply 0 VDC Supply +5 VDC Output 1 Output 2 Reference
–Supply =Control voltage	K	100 % control electric 100 % measuring signal
Shield	M	not connected

On request available with "Bendix" connector
*At clockwise rotation (view on drive end)

Pin Allocation of the 6 Pin Built-in Connector for Version Q, R, H



Function	PIN	Description
–Supply +Supply +Measuring signal output –Measuring signal output	1 2 4 5	Strain gage full bridge
–Supply =Control voltage	6	100 % control electric 100 % measuring signal
Shield	3	not connected

On request available with "Bendix" connector

Included Accessories

- None

Optional Accessories

	Type/Art. No.
• Female connector with solder eye 6 pin	KSM000822
• Female connector with solder eye 12 pin	KSM000703
• Connection cable, 5 m, 6-pin	KSM007186
• Connection cable, 5 m, 12-pin	KSM017069
• Connection cable, 5 m, 6-pin – open ends	KSM010382
• Connection cable, 5 m, 12-pin – open ends	KSM018315
• Amplifier for strain gage sensors	4701A...
• Supply and evaluation UMV 3000	4700A...
• Connection cable, 2.5 m, 6 pin – UMV 3000	KSM018535
• Connection cable, 2.5 m, 12-pin – UMV 3000	KSM018537

Application Example

Power tool control

Ordering Key

Type 4501A □□

Measuring Ranges in lbf-ft/ Available Versions

1.5	H	–	–	–	HA		**2**
4.4	H	Q	QA	–	HA		**6**
7.4	–	–	–	R	–		**10**
8.9	H	Q	QA	–	HA		**12**
14.8	H	–	–	R	HA		**20**
18.4	–	Q	QA	–	–		**25**
36.9	–	–	–	R	–		**50**
46.5	–	Q	QA	–	–		**63**
73.8	–	–	–	R	–		**100**
118.0	–	Q	QA	–	–		**160**
147.5	–	–	–	R	–		**200**
368.8	–	Q	QA	R	–		**500**
737.6	–	Q	QA	R	–		**1K**

Versions
(Note Dependence with Measuring Range)

Square socket	**Q**
Square socket with rotational angle meas.	**QA**
Feather keyways	**R**
1/4" hex	**H**
1/4" hex with rotational angle meas.	**HA**

Order example: **Type 4501A12QA**

Torque sensor: rated torque **8.6** lbf-ft,
Version **QA**: square socket with
Rotational angle measurement

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