

Torque Sensor

Rotating Torque Sensor

Type 4501A...

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

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.



Version Q/QA



Version H/HA



Version R

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 (Version QA)	pulses/ revolut.	2x360, 90° displaced, TTL
Nominal speed	rpm	≤3,000
Housing material		Anodized 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 (Rated temperature range)	°F	41 ... 122
Service temperature range	°F	14 ... 158
Storage temperature 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

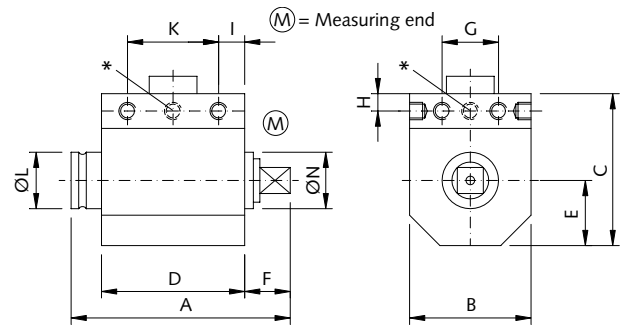
Torque sensor with standard square socket connection

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

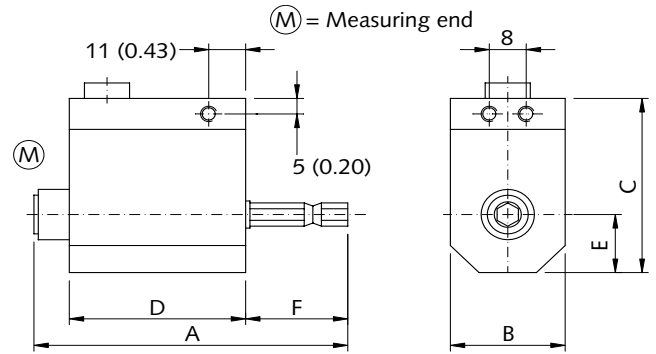
Page 2/5

This information corresponds to the current state of knowledge. Kistler reserves the right to make technical changes. Liability for consequential damage resulting from the use of Kistler products is excluded.

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

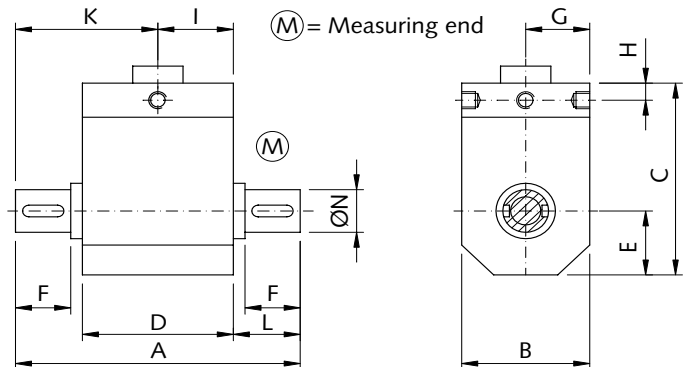
Dimensions Version H or HA (Rotational angle measurement)

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

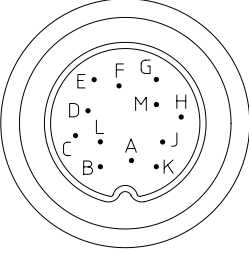
Type	Measuring range lbf-ft	Nominal value mV/V	A	B	C	D	E	F	G	H	I	K	L	øN g6	Axial force lbf max.
4501A10R	7.4	2	4.3	1.5	2.3	1.7	0.7	1.2	0.7	0.24	0.87	2.1	1.3	0.75	33.7
4501A20R	14.8	2	4.3	1.5	2.3	1.7	0.7	1.2	0.7	0.24	0.87	2.1	1.3	0.75	123.6
4501A50R	36.9	2	4.3	1.5	2.3	1.7	0.7	1.2	0.7	0.24	0.87	2.1	1.3	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

4501A_000-596a-11.07

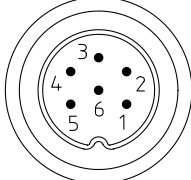
Electrical Connections

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

	Function	PIN	Description	
	-Supply	A	Strain gage full bridge	
	+Supply	B		
	+Measuring signal output	C		
	-Measuring signal output	D		
	0 VDC	E	Angle sensor: Supply 0 VDC	
	+5 VDC ±10 %	F		Supply +5 VDC
	Impuls l, leading*, TTL	G		Output 1
	Impuls r, lagging*, TTL	H		Output 2
	0 VDC	J	Reference	
	-Supply	K	100 % control electric	
	=Control voltage		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	1	Strain gage full bridge
	+Supply	2	
	+Measuring signal output	4	
	-Measuring signal output	5	
	-Supply	6	100 % control electric
	=Control voltage		100 % measuring signal
Shield	3	not connected	

On request available with "Bendix" connector

Included Accessories

- None

Optional Accessories

- 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