

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 1/min
- Robust and reliable design
- Small and handy
- Long service life
- Resistant to high acceleration
- Optional rotational angle measurement

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 control sample checking respectively counter-measurements stationary screw spindles 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	N·m	±2 ... 1 000
Rated torque M_{nom}	N·m	2 ... 1 000
Overload capacity		
Service torque		1,5 x M_{nom}
Limiting torque		1,5 x M_{nom}
Rotational angle measurement (Version QA)	pulses/ revolut.	2x360, 90 ° displaced, TTL
Nominal speed	1/min	3 000
Housing material		Anodized aluminum
Protection class		IP40

General Electrical Specifications

Accuracy class		0,2
Linearity error including hysteresis	% FSO	<±0,2

Relative hysteresis error	% FSO	<±0,1
Temp. influence on the zero point	% FSO/°C	<±0,015
Temp. influence on the nominal value	% FSO/°C	<±0,015
Control signal	%	100 ±0,2
Bridge resist., strain gage full bridge	Ω	350 nominal
Rated value		
<6 N·m rated torque	mV/V	1
≥6 N·m rated torque	mV/V	2
Operating temperature range (Rated temperature range)	°C	5 ... 50
Service temperature range	°C	-10 ... 70
Storage temperature range	°C	-25 ... 80
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

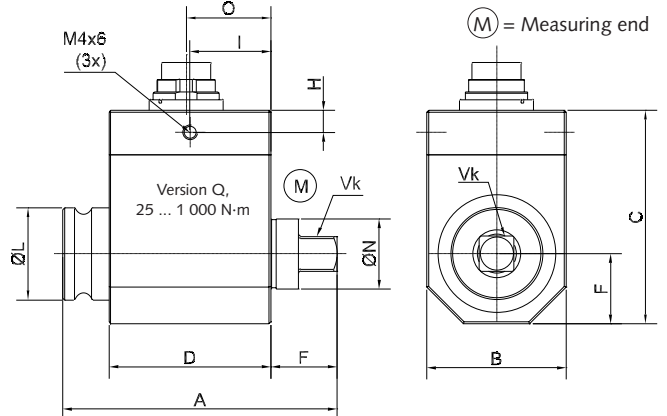
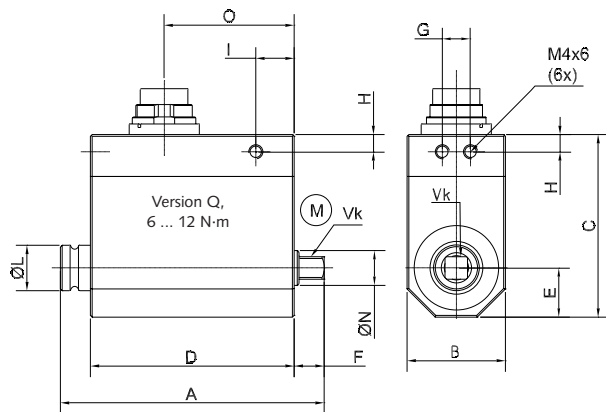
Dimensions



Torque sensor with standard square socket connection

Version Q

- With rotating shaft
- Drive - inside square socket
- Output - external square socket



Dimensions Version Q

Threads for mounting: M4, 6 mm depth

Type	Measuring range N·m	Socket size Vk	A	B	C	D	E	F	G	H	I	øL	øN	O	Axial force N max.
4501A006Q	6	1/4"	75	28	52	58	14	8,5	8	5	11	13	10	37	150
4501A012Q	12	1/4"	75	28	52	58	14	8,5	8	5	11	13	10	37	150
4501A025Q	25	3/8"	74,5	38	58	44	19	18	-	6	22	25	19	23	550
4501A063Q	63	3/8"	74,5	38	58	44	19	18	-	6	22	25	19	23	1 000
4501A160Q	160	1/2"	79	38	58	44	19	22,5	-	6	22	25	19	23	1 800
4501A500Q	500	3/4"	97	58	76	50	29	30	-	5	25	40	30	27	4 000
4501A1k0Q	1 000	1"	112	73	90	57	36,5	34,5	-	5	28,5	50	40	28,5	6 000

Dimensions

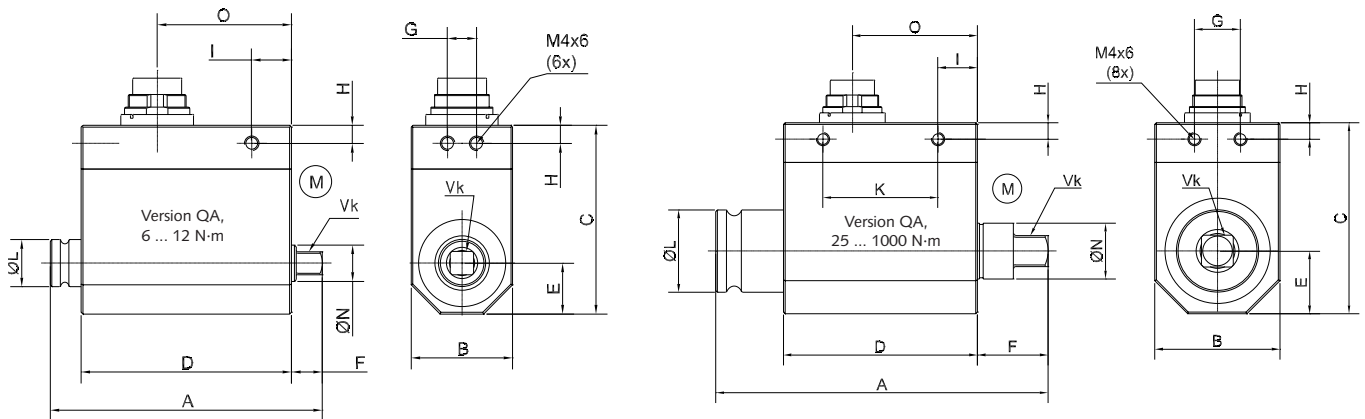


Torque sensor with standard square socket connection

Version QA

- With rotating shaft
- Drive - inside square socket
- Output - external square socket
- Rotational angle measurement

(M) = Measuring end



Type	Torsional rigidity N-m/rad	Angle of twist M_{nom}°	Weight kg
4501A006QA	480	0,6	0,18
4501A012QA	600	1,1	0,18
4501A025QA	3 060	0,47	0,42
4501A063QA	6 000	0,6	0,42
4501A160QA	11 450	0,8	0,42
4501A500QA	57 300	0,5	1,25
4501A1k0QA	127 200	0,45	2,5

Dimensions Version QA (with rotational angle measurement)

Type	Measuring range N-m	Socket size V _k	A	B	C	D	E	F	G	H	I	K	ØL	ØN	O	Axial force N max.
4501A006QA	6	1/4"	75	28	52	58	14	8,5	8	5	11	-	13	10	37	150
4501A012QA	12	1/4"	75	28	52	58	14	8,5	8	5	11	-	13	10	37	150
4501A025QA	25	3/8"	101	38	58	59	19	21,5	14	5	12	35	25	17	38	550
4501A063QA	63	3/8"	101	38	58	59	19	21,5	14	5	12	35	25	17	38	1 000
4501A160QA	160	1/2"	106	38	58	59	19	26	14	5	12	35	25	17	38	1 800
4501A500QA	500	3/4"	135	58	76	64	29	40	30	5	14	36	40	30	40	4 000
4501A1k0QA	1 000	1"	177	73	90	73	36,5	57,5	45	5	14	45	50	40	45	6 000

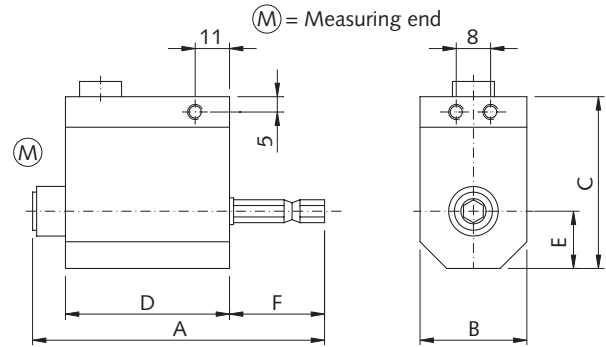
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Dimensions



Torque sensor with standard 1/4" hex
DIN 3126 form E/F, **Version H**

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



Type	Torsional rigidity N-m/rad	Torsion angle M_{nom} °	Weight kg
4501A002H, ...HA	260	0,45	0,19
4501A006H, ...HA	545	0,65	0,19
4501A012H, ...HA	570	1,2	0,19
4501A020H, ...HA	690	0,65	0,19

Dimensions Version H or HA (Rotational angle measurement)

Threads for mounting: 6x M4, 6 mm depth

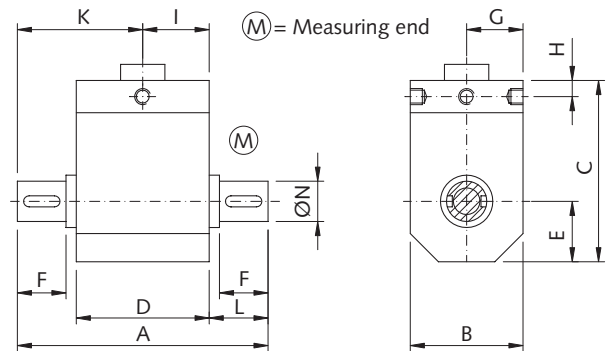
Type	Measuring range N-m	Nominal value mV/V	A	B	C	D	E	F	Axial force N max.
4501A002H, ...HA	2	1	101	28	52	58	14	28	20
4501A006H, ...HA	6	2	101	28	52	58	14	28	50
4501A012H, ...HA	12	2	101	28	52	58	14	28	50
4501A020H, ...HA	20	2	101	28	52	58	14	28	150

Dimensions



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

- With rotating shaft



Type	Torsional rigidity N-m/rad	Angle of twist M_{nom} °	Weight kg
4501A010R	955	0,6	0,22
4501A020R	2 150	0,53	0,22
4501A050R	5 450	0,52	0,22
4501A100R	9 800	0,6	0,23
4501A200R	36 000	0,32	2,1
4501A500R	80 500	0,35	2,1
4501A1k0R	125 500	0,45	2,1

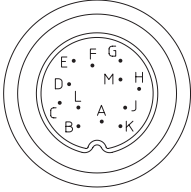
Dimensions Version R

Threads for mounting: 3x M4, 5 mm depth

Type	Measuring range N-m	Nominal value mV/V	A	B	C	D	E	F	G	H	I	K	L	øN g6	Axial force N max.
4501A010R	10	2	108	38	58	44	19	30	19	6	22	53	32	19	150
4501A020R	20	2	108	38	58	44	19	30	19	6	22	53	32	19	550
4501A050R	50	2	108	38	58	44	19	30	19	6	22	53	32	19	1 000
4501A100R	100	2	108	38	58	44	19	30	19	6	22	53	32	19	1 800
4501A200R	200	2	182	73	90	57	36,5	60	36,5	5	28,5	90,5	63	38	4 000
4501A500R	500	2	182	73	90	57	36,5	60	36,5	5	28,5	90,5	63	38	6 000
4501A1k0R	1 000	2	182	73	90	57	36,5	60	36,5	5	28,5	90,5	63	38	6 000

Electrical Connections

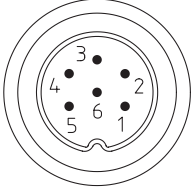
Pin Allocation of the 12 Pin Built-in Connector for Version QA

	Function	PIN		Description
	Torque strain gage measuring bridge	A	$-U_E$	Supply –
		B	$+U_E$	Supply +
		C	$+U_A$	Measuring signal output +
		D	$-U_A$	Measuring signal output –
Angle of rotation sensor Supply	Angle of rotation pulses	E	GND	Ground relating to $+U_B$
		F	$+U_B$	5 VDC $\pm 10\%$
		G	Track A	Open collector output
		H	Track B	Internal 1 k Ω resistance to 5 VDC (pull up), TTL-level
		J	DGND	As Track A, 90° displaced Ground relating to angle pulses
100 % control input	K	Control	Off: not connected On: connected with PIN A	
Shield	M			In sensor connected to housing

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
	Torque strain gage measuring bridge	1	$-U_E$	Supply –
		2	$+U_E$	Supply +
		4	$+U_A$	Measuring signal output +
		5	$-U_A$	Measuring signal output –
100 % control input	6	Control	Off: not connected On: connected with PIN 1	
Shield	3			In sensor connected to housing

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 | KSM071860-5 |
| • Connection cable, 5 m, 12 pin | KSM170690-5 |
| • Connection cable, 5 m, 6 pin – open ends | KSM103820-5 |
| • Connection cable, 5 m, 12 pin – open ends | KSM183150-5 |
| • Amplifier for strain gage sensors | 4701A... |
| • ControlMonitor CoMo Torque Evaluation instrument for torque sensors | 4700B... |
| • Connection cable, 2,5 m, 6 pin – CoMo Torque | KSM185350-2,5 |
| • Connection cable, 2,5 m, 12 pin – CoMo Torque | KSM185370-2,5 |

Application Example

Power tool control



Ordering Key

Type 4501A

Measuring Ranges in N·m/

Available Versions

2	-	-	H	HA	-		002
6	Q	QA	H	HA	-		006
10	-	-	-	-	R		010
12	Q	QA	H	HA	-		012
20	-	-	H	HA	R		020
25	Q	QA	-	-	-		025
50	-	-	-	-	R		050
63	Q	QA	-	-	-		063
100	-	-	-	-	R		100
160	Q	QA	-	-	-		160
200	-	-	-	-	R		200
500	Q	QA	-	-	R		500
1 000	Q	QA	-	-	R		1k0

Versions

(Note Dependence with Measuring Range)

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

Order Example:

Type 4501A012QA

Torque sensor: rated torque 12 N·m: **012**, Version **QA**: square socket with Rotational angle measurement