DEFINING PRECISION

Data sheet

Torque Transducer

Series M

(2 N·m – 10000 N·m)

Benefits/Application

- For static and dynamic moments
- Non-rotational construction
- Very high-cycle fatigue resistant up to 80 % of nominal load
- Extremely robust against side forces and bending moments
- Easy assembling, lots of possibilities

Options/Accessories

- Optional solid or plug-in connection
- Available from size 20 N · m with a redundant measuring circuit
- Tension-Torsion combination with Serie K

Technical data 2 - 500 N·m

Rated Torque	M_{nom}	N·m	2	5	10	20	50	100	200	500
Accuracy class			0,05							
Torque measurement range		%	1 - 100							
Linearity error	d_{lin}	%	0,05							
Interpolation error	f_c	%	0,4							
Hysteresis	h	%	0,05							
Reversibility error	v	%	0,2							
Repeatability (f.s.)		%	0,003							
Creep		%	0,025							
Temperature effect on characteristic value per 10 K	TK_C	%/10 K	0,04							
Temperature effect on zero signal per 10 K	TK_0	%/10 K	0,025							
Bending moment effect		%/N·m	$1 \cdot 10^{-2}$	$4 \cdot 10^{-3}$	$2 \cdot 10^{-3}$	$1 \cdot 10^{-3}$	$4 \cdot 10^{-4}$	$2 \cdot 10^{-4}$	$1 \cdot 10^{-4}$	$4 \cdot 10^{-5}$
Lateral force effect		%/kN	0,9	0,5	0,3	0,15	0,1	0,05	0,03	0,02
Axial force effect		%/kN	0,6	0,3	0,2	0,1	0,06	0,04	0,02	0,01
Characteristic value difference, anticlockwise/clockwise	d_{RL}	%	0,2							

Metrological Data

Rated characteristic value	C_{nom}	mV/V	1,8	1,6	2					
Characteristic value tolerance	d_c	%	[1]		0,2					
Zero signal deviation	$d_{S,0}$	%	0,5							
Input resistance	R_e	Ω	1100 - 1500							
Output resistance	R_a	Ω	800 - 1200							
Insulation resistance	R_{is}	Ω	$\rightarrow 10^9$							
Operating range of excitation voltage	$B_{U,G}$	V	5 - 15							
Protection (DIN EN 60529)			IP 54							

Electrical Data

2 - 500 N·m

Mechanical Data	Rated Torque	M_{nom}	N·m	2	5	10	20	50	100	200	500
	Rated torsion angle	j_{nom}	rad	0,01			0,018	0,013	0,011	0,009	0,007
	Torsional rigidity	c_T	N·m/rad	200	500	1000	1111	3846	9090	22220	71428
	Mass	m	kg	0,3			0,5		0,6	1,6	
	Fundamental resonant frequency	f_G	kHz	30				40	50	30	40
	Permissible oscillation stress		%	80							
Limits	Torque limit		%	150							
	Breaking torque		%	›300							
	Lateral force limit		kN	2		5	15	25	40	65	100
	Bending moment limit	$M_{b\,zul}$	%	100							
	Axial force limit	$F_{a\,zul}$	kN	5		10	20	40	60	90	160
	Rated temperature range	$B_{T,\,nom}$	°C	10 - 60							
	Operating temperature range	$B_{T,\,G}$	°C	-40 - +120							

1) The individual nominal value is specified on the name plate.

Technical data 1 - 10 kN·m

Rated Torque	M_{nom}	N·m	1000	1500	2000	4000	5000	6000	10000
Accuracy class			0,05						
Torque measurement range		%	1 - 100						
Linearity error	d_{lin}	%	0,05						
Interpolation error	f_c	%	0,4						
Hysteresis	h	%	0,05						
Reversibility error	v	%	0,2						
Repeatability (f.s.)		%	0,003						
Creep		%	0,025						
Temperature effect on characteristic value per 10 K	TK_C	%/10 K	0,04						
Temperature effect on zero signal per 10 K	TK_0	%/10 K	0,025						
Bending moment effect		%/N·m	$2 \cdot 10^{-5}$	$1 \cdot 10^{-5}$		$5 \cdot 10^{-6}$	$4 \cdot 10^{-6}$	$3 \cdot 10^{-6}$	$2 \cdot 10^{-6}$
Lateral force effect		%/kN	0,01	0,009	0,007	0,005	0,004	0,003	0,002
Axial force effect		%/kN	0,01	0,006	0,005	0,003	0,003	0,002	
Characteristic value difference, anticlockwise/clockwise	d_{RL}	%	0,2						

Metrological Data

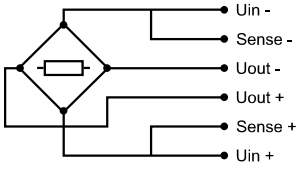
Rated characteristic value	C_{nom}	mV/V	2
Characteristic value tolerance	d_c	%	0,2
Zero signal deviation	$d_{S,0}$	%	0,5
Input resistance	R_e	Ω	1100 - 1500
Output resistance	R_a	Ω	800 - 1200
Insulation resistance	R_{is}	Ω	$\rangle 10^9$
Operating range of excitation voltage	$B_{U,G}$	V	5 - 15
Protection (DIN EN 60529)			IP 54

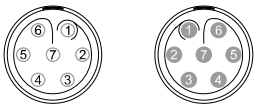
Electrical Data

Mechanical Data	Rated Torque	M_{nom}	N·m	1000	1500	2000	4000	5000	6000	10000
	Rated torsion angle	j_{nom}	rad	0,006	0,0055	0,005	0,004			*)
	Torsional rigidity	c_T	N·m/rad	$1{,}7 \cdot 10^5$	$2{,}7 \cdot 10^5$	$4 \cdot 10^5$	$1 \cdot 10^6$	$1{,}25 \cdot 10^6$	$1{,}5 \cdot 10^6$	*)
	Mass	m	kg	4,8			7,7	7,8	7,9	28
	Fundamental resonant frequency	f_G	kHz	27	30	34	30	32	33	*)
	Permissible oscillation stress		%	80						
Limits	Torque limit		%	150						
	Breaking torque		%	300						
	Lateral force limit		kN	180	200	300	500	650	800	1000
	Bending moment limit	$M_{b\,zul}$	%	100						
	Axial force limit	$F_{a\,zul}$	kN	250	300	400	700	850	1000	1500
	Rated temperature range	$B_{T,\,nom}$	°C	10 - 60						
	Operating temperature range	$B_{T,\,G}$	°C	-40 - +120						

*) Data on request

Cable connection pluggable



	Permanent connection end connected[1)3)4)]	Connection pluggable[1)2)5)]
	7-pin LEMO Series 1 Female	7-pin LEMO Series 0 Female: - Male:
		

Connection		Pin
Supply voltage (+)	U_{in+}	3
Supply voltage (-)	U_{in-}	2
Measurement signal (+)	U_{out+}	1
Measurement signal (-)	U_{out-}	4
Sense (+)	Sense+	5
Sense (-)	Sense-	6
Shielding		Housing

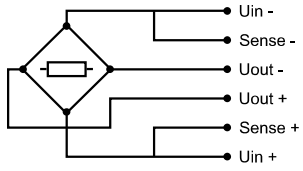
1) View too weldingside
2) Female LEMO S.A. Typ: EGG.1B.307.CLL; Male: FGG.1B.307.CLA.D72
3) Up to size 10 N·m.
4) Cable lenght 0,5 m.
5) Available from size 20 N·m.

Permanent connection end connected (up to size 10 N·m)

Connection pluggable

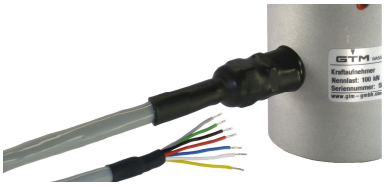
- More cable types and lengths on request
- Available types of connectors for the cable:
  D-Sub 9 pol ;D-Sub 15pol ;M-S 7pol ;LEMO Series1 7pol
- Configuration with customer defined connection is possible

Cable connection permanet

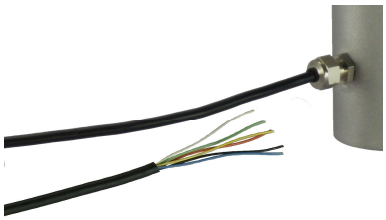


		Permanent connection end not connected[1]	
		Grey cable [2] Ø 6,5 mm 6 x 0,25 mm² Temperature range: -35 °C to +90 °C	Black cable 6-pin [3] Ø 2,9 mm vibration-proof, 6 x 0,04 mm² Temperature range: -50 °C to +105 °C
Connection		Color	
Supply voltage (+)	U_{in+}	blue	
Supply voltage (-)	U_{in-}	black	
Measurement signal (+)	U_{out+}	white	
Measurement signal (-)	U_{out-}	red	
Sense (+)	Sense+	green	
Sense (-)	Sense-	grey	yellow
Shielding		yellow	grey

1) Cable lenght 5 m.
2) Available from size 20 N·m
3) Up to size 10 N·m



Permanent connection end not connected (Ø 6,5 mm)



Permanent connection end not connected (Ø 2,9 mm)

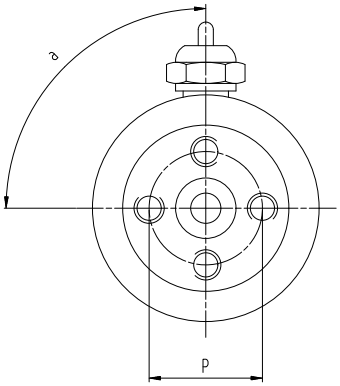
Option: 2.Measuring circuit

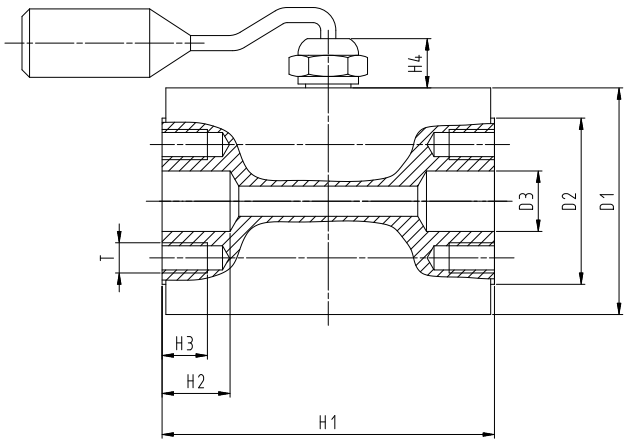
- In case of two circuits the technical data are similarly valid for both circuits
- From size 20 N·m available
- The location of the cable outlet can be chosen on request

Mating dimensions

up to 10 N·m

Typ: 2 N·m - 10 N·m



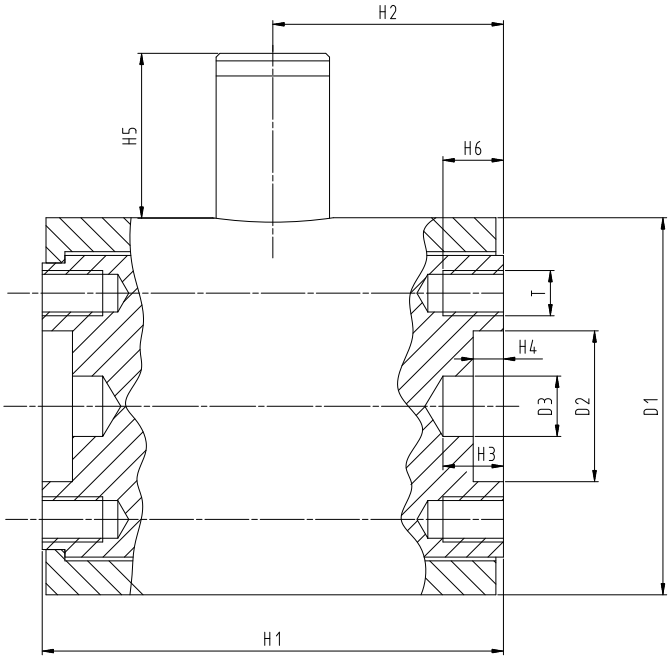


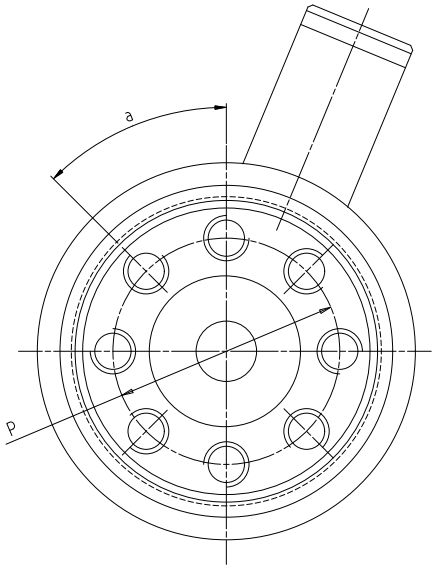
Rated Torque	M_{nom}	N·m	2 ; 5 ; 10
Diameter	$ØD_1$	mm	30
Diameter	$ØD_2$	mm	22
Diameter	$ØD_3$	mm	8H7
Pitch circle diameter	$ØP$	mm	15
Thread	T_1		M4
Height	H_1	mm	44
Height	H_2	mm	9
Height	H_3	mm	6
Height	H_4	mm	ca. 7
Angle	a		90°

Mating dimensions

from 20 N·m

Typ: 20 N·m - 10000 N·m





Rated Torque	M_{nom}	N·m	20 50 100	200 500	1000 1500 2000	4000 6000	10000
Diameter	$ØD_1$	mm	50	73	107	141	205
Diameter	$ØD_2$	mm	20H7	30H7	45H7	60H7	120H7
Diameter	$ØD_3$	mm	8H8	10H8			
Pitch circle diameter	$ØP$	mm	30±0,1	45±0,1	71±0,1	95±0,1	155±0,1
Thread	T_1		M6	M10	M16	M20	M24
Height	H_1	mm	61-0,1	82-0,1	107-0,1	130	170
Height	H_2	mm	30,5	41	54	65	85
Height	H_3	mm	8				12
Height	H_4	mm	4				8
Height	H_5	mm	22				
Height	H_6	mm	8	15	22	25	35
Angle	a		45°				

DEFINING PRECISION

GTM Testing and Metrology GmbH
Philipp-Reis-Straße 4-6, 64404 Bickenbach, Germany
www.gtm-gmbh.com
Phone +49(0)6257-9720-0, Fax +49(0)6257-9720-77
contact@gtm-gmbh.com