

TMF 400

Bearingless torquemeter with optoelectric signal transmission and optional two measuring ranges

Features

- bearingless torquemeter with infrared (IR) signal transmission
- Stator installation optional on the ground of the or on the front plate of the dyno
- high overload capability
- active temperature-compensation of the zero point via μ -Controller
- Accuracy class 0,1
- electromagnetic compatibility according to European norms
- integrated speed detection and direction of rotation
- optionally available with two measuring ranges

Description

The torquemeter of the model TMF covers with 4 different dimensions nominal torque ranges from 50 to 13.500 Nm (37 to 9963 ft-lbs).

The chosen nominal rated torque is the value which leads to a linear limit value of the measuring system within specified accuracy. Torque amplitudes up to 1,5 of rated torque are also registered with high accuracy.

In addition to the nominal rated torque indicated to each measuring flange, any other special torque range can be produced within the specified area. As a further special feature, a second torque range is available. That allows to carry out highly precise measurements for small torque ranges without replacement of the torquesensor.

The bearingless system consists of an one-piece torque measuring body from stainless steel (17-4PH / DIN 1.4542) and a stator of aluminium. The mechanical installation of the system can be carried out either by bolting the stator on the ground of test bed (foot mounted) or by direct installation on the front plate at the driving machine.

Two speed sectors of a magnetic incremental encoder with a number of at least 90 impulses per turn and an phase shift of about 90° are available for the determination of the rotation speed.

By means of a separate signal box all relevant signals can be given out as pulse signals or as analog voltage signals. Alternative to this you can use an evaluation unit as 19"insertion case with integrated Touch Screen display.

Power supply and signal exchange occur via a 12-pole central plug.

As a mechanical coupling element standard torsional stiff couplings MODEL 920 from BSD fit directly to the flange.

The nominal rated torque of the proposed clutch type corresponds in a specified manner to the nominal rated torque of the torquemeter as in the technical data sheet. In case of higher torque values the standard coupling must be replaced by a stronger one or another connection element e.g. a cardan shaft has to be chosen.

Principle of operation

The torsion of the measuring body is registered by means of strain gages and converted into electrical voltage signals. In a next step these values are converted to frequency signals and transmitted as optoelectric (infrared) frequency signals to the stator. The master frequency is about 60 kHz and the span is ± 15 kHz for \pm rated torque.

The rotating measuring shaft is supplied with electricity via an inductive working coil system.

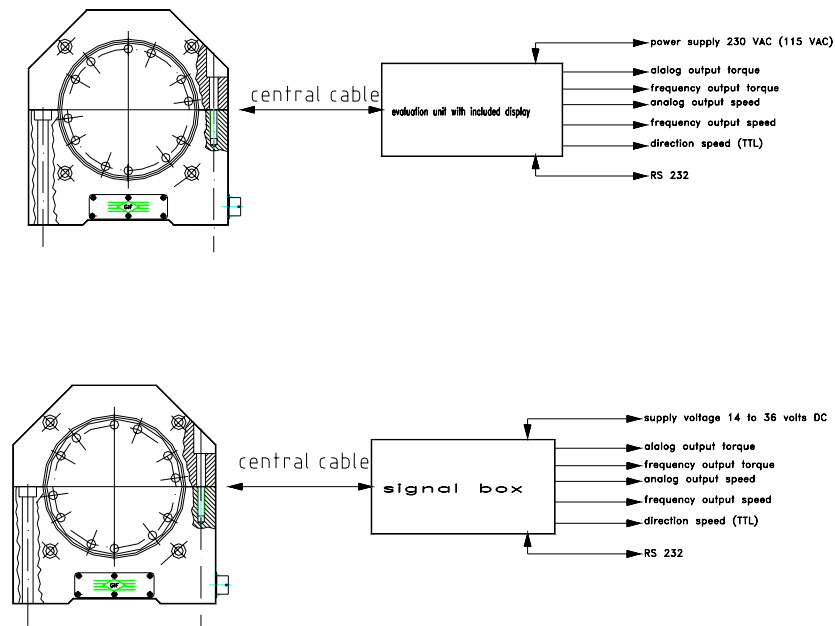
A special configured sensor which works according to the magnetoresistive principle is inserted for speed detection. The special magnetisation of the magnetic ring provides two speed tracks with 90 degrees phase shifted signals.

The signal box, integrated into pressure cast aluminium housing supplies all measurement variables as frequencies- and analogous voltage signals. The direction of rotation is provided as a logic signal.

During the production process, every flange is heated within its specified specification up to its maximum operating temperature. A μ -Controller integrated into the torque flange registers the temperature-related offset shift and stores automatically the relevant adjustment values into a Lock-Up-Table.

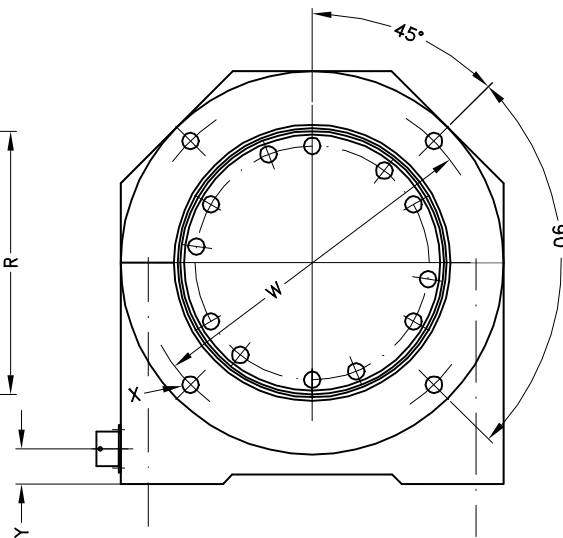
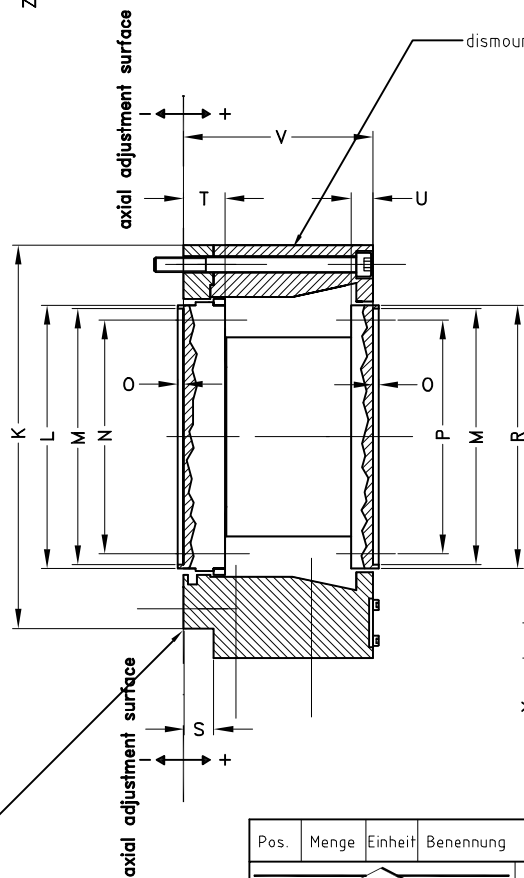
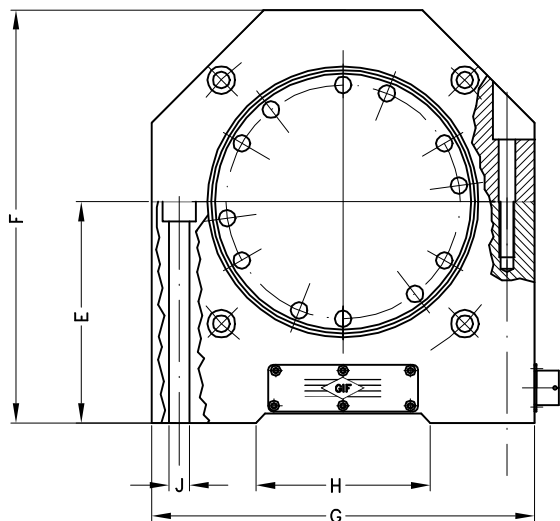
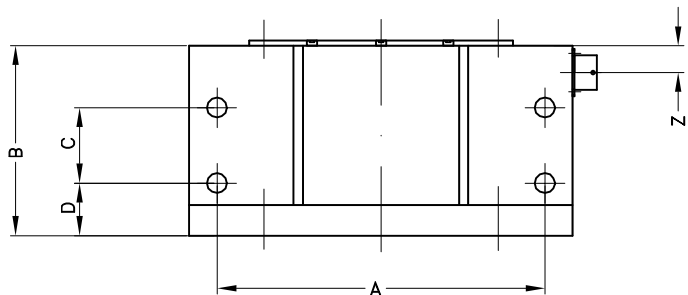
The optionally available second measuring range is separated completely by a second implemented amplifier and transmission electronics device. Both amplifiers access to the same strain gages with differently high gain factors. The active compensation of temperature influences guarantees that this measuring range also shows a high zero point stability.

System configuration:




Technical data

TORQUEMETER TYPE		TMF 401	TMF 402	TMF 403	
a) Torque Measurement					
Nominal rated torque Mdn	Nm	±450	±1100	±2800	
maximum measurable torque	% of Mdn	± 150			
torque limit of torque shaft	% of Mdn	± 750			
optionally selectable nominal torque up to M _{d_{hopt}}	Nm	±600	±1.400	±3.800	
ratio of optional selectable second torque range		1 : 10			
accuracy inclusive hysteresis referring to the nominal rated torque Mdn	% of F.S..	< ± 0,1			
accuracy inclusive hysteresis referring to ± 150% of the nominal rated torque Mdn	% of F.S.	< ± 0,15			
Temperature effect on zero	% of F.S./10K	< ± 0,1			
Nominal temperature range	°C	+10 ... +70			
operating temperature range	°C	-10 ... +80			
Rated speed	rpm	12000	10000	8000	
b) Speed detection and direction of rotation					
nominal impulses per revolution		90	120	150	
Output signal (RS422)		2 tracks / 90 degree phase shifted			
Least rotation speed for sufficient impulse quality	rpm	> 0			
c) Environment					
Storage temperature field	°C	-20 ... + 80			
Operating temperature range	°C	-10 ... +70			
shock load		in accordance with IEC 68.2.27-class D3			
vibration load		in accordance with IEC 68.2.6 - class D3			
Type of protection		IP 44			
d) Mechanical specifications					
torsional stiffness	kNm/rad	400	880	2300	
weight of the rotor	kg	1,5	5		
inertia of the rotor	gm ²	1,3	9,7		
e) Input and output signals					
Supply voltage	VDC	14 ... 36 8 ... optional 30			
Current consumption	A	ca. 3			
Torque					
Frequency output torque (RS422/ TTL)	kHz	60 ± 15			
Analog output torque for Mdn	VDC	± 5 / 0 ... 5 / 0 ... 10 / ± 5			
Dynamics of the frequency exit	kHz	> 1,5			
Dynamics of analog output	MW/s	max. 800			
Filter - corner frequency (variable)		8 - steps			
Speed					
Frequency output speed (RS422/ TTL/ (OPEN Collector))	kHz	0 ... 20			
Analog output speed	VDC	± 5 / 0 ... 5 / 0 ... 10 / ± 5			
Dynamics of the speed output	MW/s	max. 800			
Direction of speed signal (TTL)	high / low				
Serial interface	RS232	9600 baud			



disconnect under no circumstances statorring with lower part of the housing

Pos.	Menge	Einheit	Benennung	Sachnummer / Norm-Kurzbezeichnung	Bemerkung
			Maße ohne Toleranzangabe nach DIN 7168-f	Oberfläche ISO 1302 DIN 4768	Maßstab Position - Menge -
			Datum Name		
			Bearb. 21.03.00 Meuter		composite drawing TMF40x
			Gepr.		
			Norm		
				GF2103002-a	Blatt
					Bl.
Zust.	Änderung	Datum	Name	EDV Nr. TMF400	

DIMENSIONS TMF 401 ... 404

	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	S	T	U	V	W	X	Y	Z
TMF 401	121	74	23	27	90	160	140	94	∅9	∅140h6	∅92	∅88H6	Lkr. 77 8x∅8,5 je 45°	2	Lkr. 77 8x∅8,5 je 45° 8xM8 je 45°	∅91,5	17	22,5	10	74	∅126	∅6,6	19	14,5
TMF 402	178	103	41	26,5	120	224	208	97	∅11	∅208h6	∅143	∅139H6	Lkr. 127 12 x ∅9 abwechseld 38° u. 22°	3	Lkr. 127 12 x ∅9 abwechselnd 38° u. 22°	∅142,9	16,5	22,5	12	103	∅187	∅9	19	14,5
TMF 403	226	122	65	35	135	260	250	115	∅11	∅250h6	∅180	∅170H6	Lkr. 154 16x∅11 abwechselnd 27° u. 18°	3	Lkr. 154 16x∅11 abwechselnd 27° u. 18°	∅173,5	19	26	14	122	∅226	∅11	22	14,5
TMF 404	*	*	*	*	*	*	*	*	*	*	*	∅ 222	Lkr. 200 16x∅17 abwechselnd 30° u. 15°	3	Lkr. 200 16x∅17 abwechselnd 30° u. 15°	*	*	*	*	*	*	*	*	*

* still in work