

TM SERIES

IN-LINE TORQUE TRANSDUCERS

FEATURES

- Integrated torque and speed conditioning
- Torque Range: from 0.1 N·m to 10 kN·m (0.07 lb·ft to 7375 lb·ft)
- Accuracy: <0.1 %
- Overload Capacity: 200 %
- Breaking Limit: >400 %
- High Speed Applications: up to 50 000 rpm
- Non-Contact (no sliprings)
- No Electronic Components in Rotation
- High Electrical Noise Immunity
- Single DC Power Supply: 20 VDC to 32 VDC
- Immediate Speed Detection
- Adjustable Torque Signal Frequency Pass Band up to 5 kHz
- Built-In Test Function (B.I.T.E.)
- Stainless Steel Shaft
- EMC Susceptibility Conforms to European Standards



Fig. 1: TM312 & TM308 In-Line Torque Transducer with smooth shaft

DESCRIPTION

Magtrol's In-Line Torque Transducers provide extremely accurate torque and speed measurement over a very broad range. Each model has an integrated conditioning electronic module providing a 0VDC to ± 10 VDC torque output and an open collector speed output. Magtrol Torque Transducers are very reliable, providing high overload protection, excellent long term stability and high noise immunity.

All transducer models employ our unique non-contact differential transformer torque measuring technology. This measuring technology offers many benefits, most notably that no electronic components rotate during operation.

To provide customers with several price/performance options, Magtrol offers three torque transducer models: basic model (TMB Series), high accuracy (TM Series) and high speed with high accuracy (TMHS).

Each transducer consists of a hardened stainless steel shaft with smooth, splined or keyway shaft ends, an anodized aluminium housing containing the guide bearings and an electronic measurement conditioner.

The integrated electronic circuit, supplied by single DC voltage, provides torque and speed signals without any additional amplifier. The transducer is a stand-alone measuring chain. Connections are made by means of a 6-pole male connector mounted on the housing. A removable aluminium base (delivered as standard with TM and TMHS models, and as an option for TMB transducers) allows fixed mounting of the transducer.

OPERATING PRINCIPLES

The measuring system, based on the principle of a variable, torque proportional transformer coupling, consists of two concentric cylinders shrunk on the shaft on each side of the shaft's deformation zone, and two concentric coils attached to the housing.

Both cylinders have a circularly disposed coinciding row of slots and rotate with the shaft inside the coils. An alternating current with the frequency of 20 kHz flows through the primary coil. When no torque is applied, the slots on the two cylinders fail to overlap. When torque is applied, the deformation zone undergoes an angular deformation and the slots begin to overlap.

Thus a torque-proportional voltage is on the secondary coil. The conditioning electronic circuit incorporated in the transducer converts the voltage to a nominal torque signal of 0VDC to ±5VDC. A low-pass filter (Butterworth/2nd order), adjustable from 5kHz to 1Hz, allows tuning of the torque signal frequency limitation.

An optical sensor reads the speed on a toothed pattern machined directly on the measuring system. The electronic conditioner outputs a frequency signal proportional to the shaft rotational speed. An active circuit compensates the zero and sensitivity temperature drifts within a tolerance of 0.1% / 10K.

APPLICATIONS

TM, TMB and TMHS Series Torque Transducers provide dynamic torque and speed measurement of:

- Propellers - aerospace, marine and helicopter
- Windshield wipers, electrical windows, starters, generators and brakes in automobile industry
- Pumps - water and oil
- Reduction gears and gearboxes
- Clutches
- Motorized valves
- Drills, pneumatic tools and other machine tools

SYSTEM CONFIGURATION

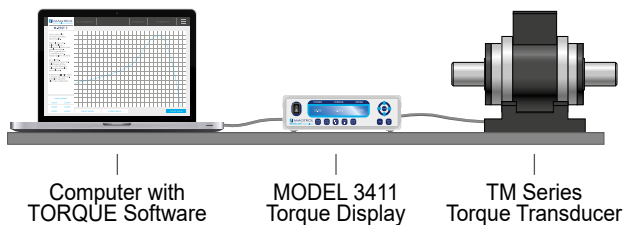


Fig. 2: TM connected with MODEL 3411 Torque Display and a computer with TORQUE Software

ELECTRICAL CONFIGURATION

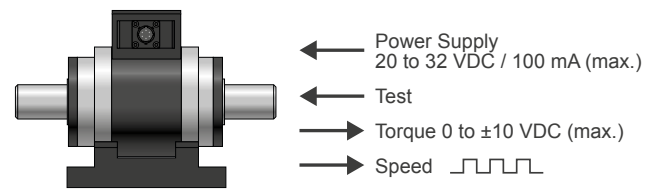


Fig. 3: TM's electrical input and output

SUPPORTED & SUSPENDED INSTALLATIONS

The TMB Series is dedicated for use in a basic configuration or for low speed applications. The TMB Series ranges from TMB304 (1 N·m) to TMB313 (500 N·m). Due to dedicated low speed usage, the TMB Series is **delivered without base mount** however, a base is available as an option.

The TM Series ranges from TM309 to TM317 and can also be installed without the base mount in a suspended configuration. This configuration is **only allowed for low speed measurement**. The benefit of this configuration is the use of a single element coupling, creating a shorter drive train.

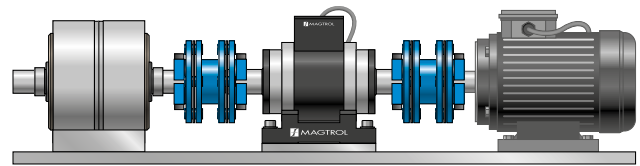


Fig. 4: Supported installation
Mandatory for standard and high speed applications

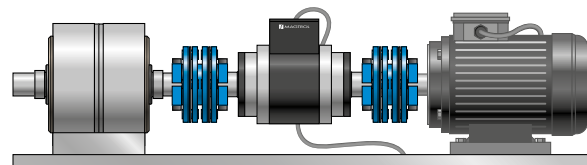


Fig. 5: Suspended installation for low speed application only.
Use single element coupling to create a shorter drive train.

SPECIFICATIONS
TORQUE TRANSDUCER RATINGS

MODEL	Nominal Rated Torque (RT)		TMB Series		TM Series		TMHS Series (High speed) ^{a)}							
	N·m	lb·ft	Accuracy class	Max. speed rpm	Accuracy class	Max. speed rpm	Accuracy class	Max. speed rpm						
TM301	0.1	0.07	N/A	N/A	<0.2%	20000	N/A	N/A						
TM302	0.2	0.15												
TM303	0.5	0.37												
TM304	1	0.70												
TM305	2	1.50												
TM306	5	3.70												
TM307	10	7.40												
TM308 ^{e)}	20	15												
TM309 ^{e)}	20	15												
TM310	50	37							<0.1%	6000	<0.1%	10000	<0.1%	40000
TM311	100	74												
TM312	200	148												
TM313	500	369												
TM314	1000	737												
TM315	2000	1475												
TM316	5000	3687												
TM317	10000	7375												
			N/A	4000	<0.1%	7000	<0.1%	50000						
TM318	100	74												
TM319	200	148												
TM320	500	369												
TM321	1000	737												
TM322	2000	1475												
TM323	5000	3687												
TM324	10000	7375												
									N/A	4000	<0.1%	5000	<0.1%	32000
TM325	100	74												
TM326	200	148												
TM327	500	369												
TM328	1000	737												
TM329	2000	1475												
TM330	5000	3687												
TM331	10000	7375												
			N/A	4000	<0.15%	5000	<0.15%	24000						
TM332	100	74												
TM333	200	148												
TM334	500	369												
TM335	1000	737												
TM336	2000	1475												
TM337	5000	3687												
TM338	10000	7375												
									N/A	4000	<0.15%	5000	<0.15%	16000
TM339	100	74												
TM340	200	148												
TM341	500	369												
TM342	1000	737												
TM343	2000	1475												
TM344	5000	3687												
TM345	10000	7375												
			N/A	4000	<0.15%	5000	<0.15%	12000						
TM346	100	74												
TM347	200	148												
TM348	500	369												
TM349	1000	737												
TM350	2000	1475												
TM351	5000	3687												
TM352	10000	7375												

MECHANICAL CHARACTERISTICS

MODEL	NOMINAL RATED TORQUE (RT)		TORSIONAL STIFFNESS		MOMENT OF INERTIA		WEIGHT ^{b)}		SHAFT ENDS			BASE MOUNT	
	N·m	lb·ft	N·m / rad	lb·ft	kg·m ²	lb·ft·s ²	kg	lb	Smooth	Splined	Keyway	TM/TMHS	TMB
TM301	0.1	0.07	29	21	2.50x10 ⁻⁵	1.84x10 ⁻⁵	1.1	2.43	X	-	-	integrated	
TM302	0.2	0.15	29	21	2.50x10 ⁻⁵	1.84x10 ⁻⁵	1.1	2.43	X	-	-		
TM303	0.5	0.37	66	48	2.55x10 ⁻⁵	1.88x10 ⁻⁵	1.1	2.43	X	-	-		
TM304	1	0.70	145	107	2.82x10 ⁻⁵	2.07x10 ⁻⁵	1.2	2.65	X	- ^{c)}	- ^{c)}		
TM305	2	1.50	290	214	2.91x10 ⁻⁵	2.14x10 ⁻⁵	1.2	2.65	X	- ^{c)}	- ^{c)}		
TM306	5	3.70	725	535	3.08x10 ⁻⁵	2.27x10 ⁻⁵	1.2	2.65	X	- ^{c)}	- ^{c)}		
TM307	10	7.40	1450	1069	2.63x10 ⁻⁵	1.94x10 ⁻⁵	1.2	2.65	X	- ^{c)}	- ^{c)}		
TM308 ^{e)}	20	15	2900	2139	2.66x10 ⁻⁵	1.96x10 ⁻⁵	1.2	2.65	X	- ^{c)}	- ^{c)}		
TM309 ^{e)}	20	15	2400	1770	1.49x10 ⁻⁴	1.03x10 ⁻⁴	2.5	5.51	X	- ^{c)}	- ^{c)}		
TM310	50	37	5700	4204	1.52x10 ⁻⁴	1.12x10 ⁻⁴	2.5	5.51	X	- ^{c)}	- ^{c)}		
TM311	100	74	11400	8408	1.55x10 ⁻⁴	1.14x10 ⁻⁴	2.5	5.51	X	- ^{c)}	- ^{c)}		
TM312	200	148	38200	28200	4.85x10 ⁻⁴	3.57x10 ⁻⁴	4.1	9.04	X	X ^{d)}	- ^{c)}		
TM313	500	369	95800	70700	5.16x10 ⁻⁴	3.80x10 ⁻⁴	4.4	9.70	X	X ^{d)}	- ^{c)}		
TM314	1000	737	3.28x10 ⁵	2.419x10 ⁶	3.01x10 ⁻³	2.21x10 ⁻³	9.9	21.80	-	X ^{d)}	X		
TM315	2000	1475	6.56x10 ⁵	4.838x10 ⁶	3.30x10 ⁻³	2.43x10 ⁻³	10.8	23.80	-	X ^{d)}	X		
TM316	5000	3687	1.94x10 ⁶	1.4x10 ⁷	9.95x10 ⁻³	7.32x10 ⁻³	20.0	44.10	-	X ^{d)}	- ^{c)}		
TM317	10000	7375	2.26x10 ⁶	1.7x10 ⁷	1.18x10 ⁻²	8.66x10 ⁻³	22.3	49.20	-	X ^{d)}	-		

a) Higher speed versions available for some models

b) The weight for the TM, TMHS or specifically TMB, ordered without the foot mount is slightly lower. Weight is given for the heavier version (shaft end) of TM. Effective weight depending on the model is available on request.

c) Versions available on request

d) Magtrol recommends using adaptation flanges (available on request)

e) For 20Nm, Model TM309 is recommended

SPECIFICATIONS

STANDARD VERSION	TM Series	TMHS Series	TMB Series
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TORQUE MEASUREMENT

Maximum Dynamic Torque Peak Value (Overload Capacity)	0 % to ±200 % of RT		
Maximum Dynamic Torque (Measuring Overload Limit with possible 0 deviation)	0 % to ±400 % of RT (±200 % for TM317)		
Combined Error of Linearity and Hysteresis to 100 % of RT	<±0.1 % of RT (<±0.15 % for TM317)	<±0.1 % of RT	
Combined Error of Linearity and Hysteresis from 100 % to 200 % of RT	<±0.15 % of RT (<±0.2 % for TM317)	<±0.15 % of measured value	
Influence of Speed on Zero Torque Signal	<±0.01 % of RT / 1000rpm	<±0.02 % of RT / 1000 rpm	

SPEED MEASUREMENT

Rated range of use	1 rpm to 50 000 rpm (see « Torque Transducer Ratings » section)		
Number of teeth	60 Z		
Minimum speed detection	1 rpm		

ENVIRONMENT & MECHANICAL CHARACTERISTICS

Operating Temperature	-40 °C to +85 °C		
Storage Temperature	-40 °C to +100 °C		
Temperature Influence on Zero / on Sensitivity:			
· In Compensated Range +10° C to +60° C	<±0.1 % of RT / 10K	<±0.2 % of RT / 10K	
· In Compensated Range -25° C to +80° C	<±0.2 % of RT / 10K	<±0.4 % of RT / 10K	
Long-term Stability of Sensitivity	<±0.05 % of RT / year	<±0.1 % of RT / year	
Mechanical Shock	according to IEC68.2.27 / Class D3		
Vibration	according to IEC68.2.6 / Class D3		
Protection class	IP44		
EMC / EMI compatibility	IEC61326-1 / IEC61321-2-3		
Balancing Quality	G1 according to ISO 1940	G2.5 according to ISO 1940	

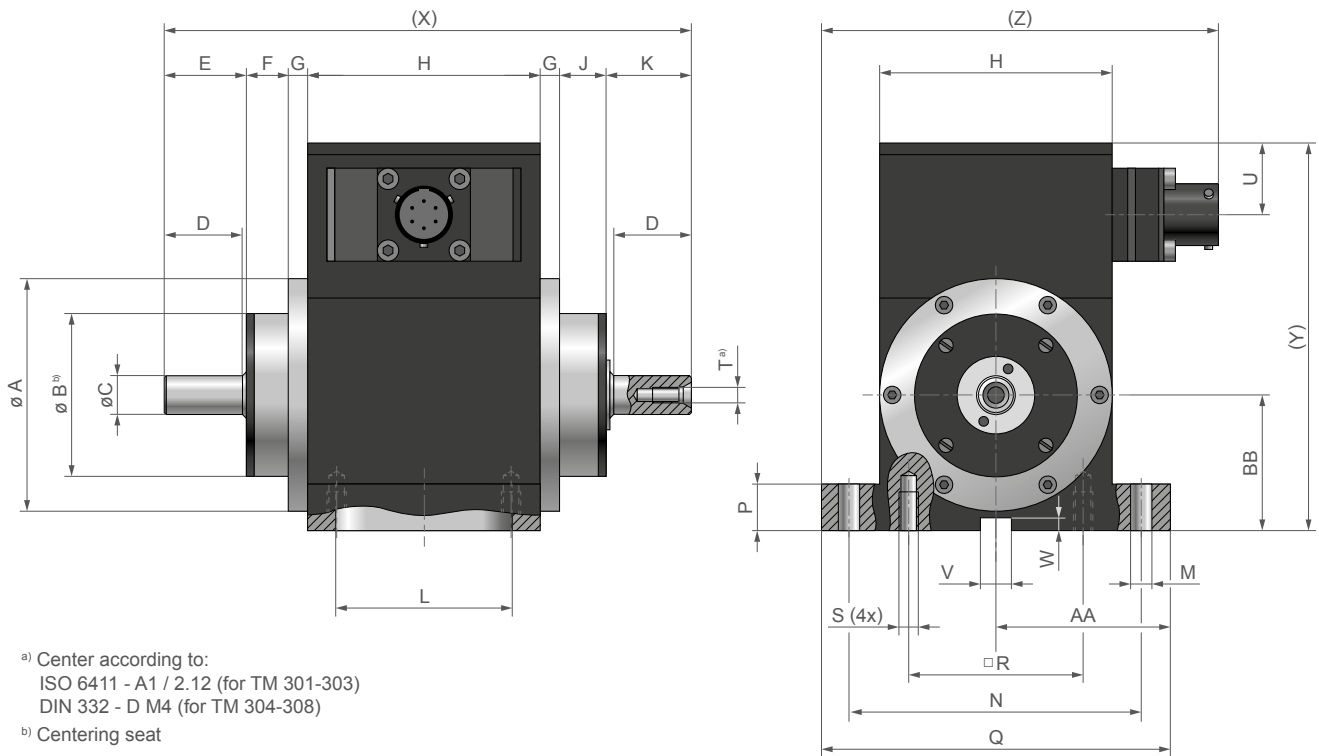
ELECTRICAL CHARACTERISTICS

Power supply (max. voltage / current)	20 VDC to 32 VDC / 100 mA		
Torque output (rated / max.)	±5 VDC / ±10 VDC		
Filter Cutoff (frequency)	5000, 2500, 1000, 500, 200, 100, 40, 20, 10 ,5, 2, 1 Hz		
Speed output (frequency)	open collector (15Ω in series), max. 30 VDC, protected against short circuits		

ELECTRICAL CONNECTION

Output connector	Axial connector Souriau 851 02 E 106P 50 29		
Connection cable assembly	Option		
Wiring diagram			
		A	Power Supply
	B	Torque signal	
	C	N/A	
	D	GND Ground	
	E	BITE (high impedance)	
	F	Speed signal (open collector)	
	Cable shield	Case / Shield	

TM 301-308 (SMOOTH SHAFT) DIMENSIONS



- a) Center according to:
ISO 6411 - A1 / 2.12 (for TM 301-303)
DIN 332 - D M4 (for TM 304-308)
- b) Centering seat

CAUTION: MAGTROL has redesigned the fixation for its small torque transducers (TM301-308). The new housing allows installation of the torque transducer from the bottom as before, but also allows installation from the top. It also integrates a centering key underneath its housing. The old fastening system (from the bottom only) is still available as an alternative option.

NOTE: Dimensions are the same for every series (TM, TMHS). Original dimensions are in metric units. Dimensions converted to imperial units have been rounded up to 3 or 4 decimal places.

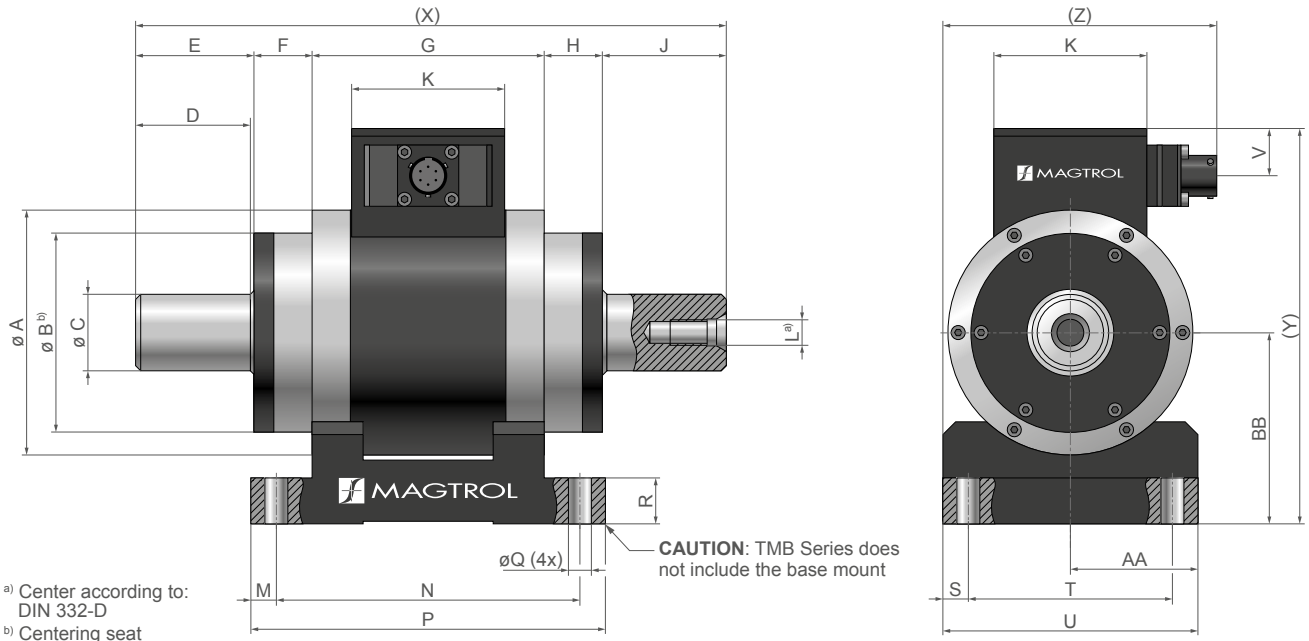
MODEL	Units	ø A	ø B	ø C	D	E	F	G	H	J	K	L	M	N
TM301 - 303	mm	60	42g6	6h6	12	13.2	7.8	5	60	9	14	45.5	5.5	75
	in	2.362	1.6533 1.6526	0.2362 0.2359	0.472	0.520	0.307	0.197	2.362	0.354	0.551	1.791	0.217	2.953
TM304 - 308	mm	60	42g6	10h6	20	21.2	10.8	5	60	12	22	45.5	5.5	75
	in	2.362	1.6533 1.6526	0.3937 0.3933	0.787	0.835	0.425	0.197	2.362	0.472	0.866	1.791	0.217	2.953

MODEL	Units	P	Q	□R	S	T ^{a)}	U	V	W	X	Y	Z	AA	BB
TM301 - 303	mm	12	90	45	M5x10	ø1	18.5	8H9	3.3	114	100	101	45 ^(0,1)	35 ^(0,1)
	in	0.472	3.543	1.772	M5x10	ø1	0.728	0.3164 0.3149	0.13	4.488	3.937	3.976	1.7717 1.7677	1.3780 1.3740
TM304 - 308	mm	12	90	45	M5x10	M4	18.5	8H9	3.3	136	100	101	45 ^(0,1)	35 ^(0,1)
	in	0.472	3.543	1.772	M5x10	M4	0.728	0.3164 0.3149	0.13	5.354	3.937	3.976	1.7717 1.7677	1.3780 1.3740

a) Center according to DIN 6411-A or DIN 332-D

NOTE: 3D STEP files of most of our products are available on our website: www.magtrol.com ; other files are available on request.

TM 309-313 (SMOOTH SHAFT) DIMENSIONS



NOTE: Dimensions are the same for every series (TM, TMHS and TMB). Original dimensions are in metric units. Dimensions converted to imperial units have been rounded up to 3 or 4 decimal places.

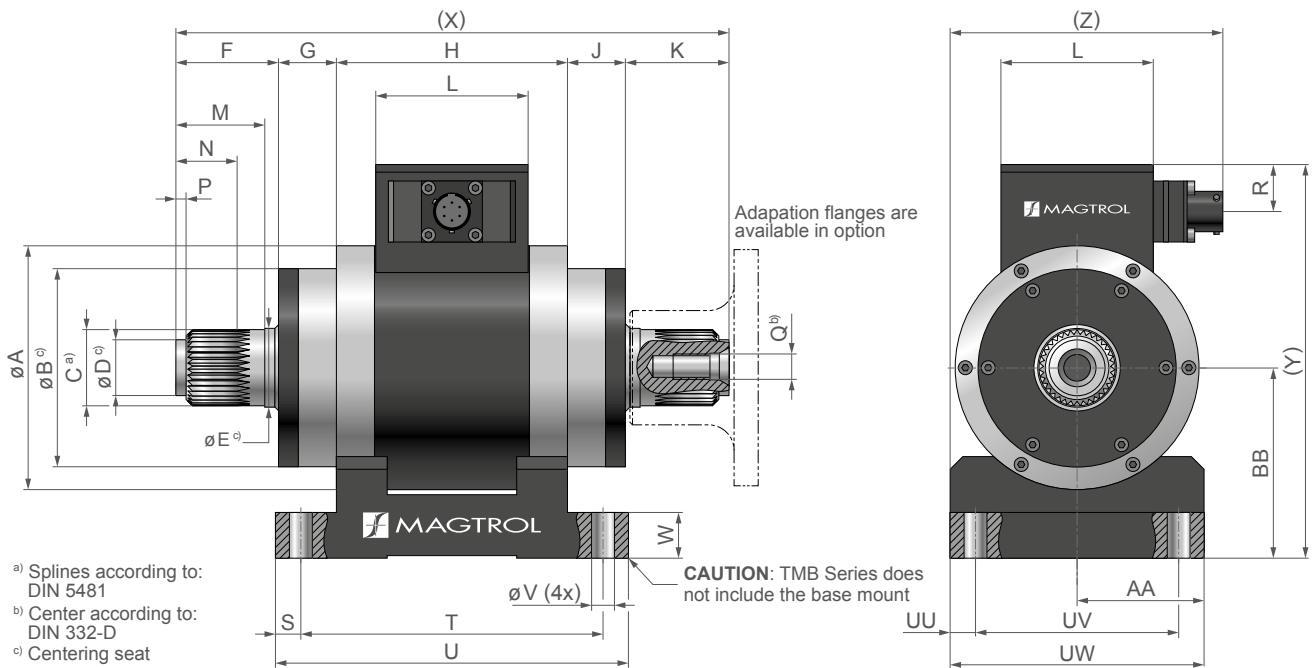
MODEL	Units	ø A	ø B	ø C	D	E	F	G	H	J	K	L ^{a)}	M	N
TM309	mm	82g6	64	20h6	25	26.2	16.8	86	15	26.4	60	M6	10	110
	in	3.2283 3.2270	2.52	0.7874 0.7869	0.984	1.031	0.661	3.386	0.591	1.039	2.362		0.394	4.331
TM310	mm	82g6	64	20h6	35	36.2	16.8	86	15	36.4	60		10	110
	in	3.2283 3.2270	2.52	0.7874 0.7869	1.378	1.425	0.661	3.386	0.591	1.433	2.362		0.394	4.331
TM311	mm	82g6	64	20h6	40	41.2	16.8	86	15	41.4	60		10	110
	in	3.2283 3.2270	2.52	0.7874 0.7869	1.575	1.662	0.661	3.386	0.591	1.630	2.362		0.394	4.331
TM312	mm	96g6	78	30h6	45	46.4	22.8	91	21	46.8	60	M10	10	119
	in	3.7791 3.7782	3.071	1.1811 1.1806	1.772	1.827	0.898	3.583	0.827	1.842	2.362		0.394	4.685
TM313	mm	96g6	78	30h6	55	56.4	22.8	91	21	56.8	60		10	119
	in	3.7791 3.7782	3.071	1.1811 1.1806	2.165	2.220	0.898	3.583	0.827	2.236	2.362		0.34	4.685

MODEL	Units	P	ø Q	R	S	T	U	V	X	Y	Z	AA	BB
TM309	mm	130	6.6	12	8	74	90	18.5	170.4	134	90	45	60 (0.05)
	in	5.118	0.260	0.472	0.315	2.913	3.543	0.728	6.709	5.276	3.543	1.772	2.3622 2.3603
TM310	mm	130	6.6	12	8	74	90	18.5	190.4	134	90	45	60 (0.05)
	in	5.118	0.260	0.472	0.315	2.913	3.543	0.728	7.496	5.276	3.543	1.772	2.3622 2.3603
TM311	mm	130	6.6	12	8	74	90	18.5	200.4	134	90	45	60 (0.05)
	in	5.118	0.260	0.472	0.315	2.913	3.543	0.728	7.890	5.276	3.543	1.722	2.3622 2.3603
TM312	mm	139	9	18	10	80	100	18.5	228.0	155	100	50	75 (0.05)
	in	5.472	0.354	0.709	0.394	3.150	3.937	0.728	8.976	6.102	3.937	1.967	2.9527 2.9508
TM313	mm	139	9	18	10	80	100	18.5	248.0	155	100	50	75 (0.05)
	in	5.472	0.354	0.709	0.394	3.150	3.937	0.728	9.764	6.102	3.937	1.967	2.9527 2.9508

a) Center according to DIN 332-D

NOTE: 3D STEP files of most of our products are available on our website: www.magtrol.com ; other files are available on request.

TM 312-313 (SPLINED SHAFT) DIMENSIONS



NOTE: Dimensions are the same for every series (TM, TMHS and TMB). Original dimensions are in metric units. Dimensions converted to imperial units have been rounded up to 3 or 4 decimal places.

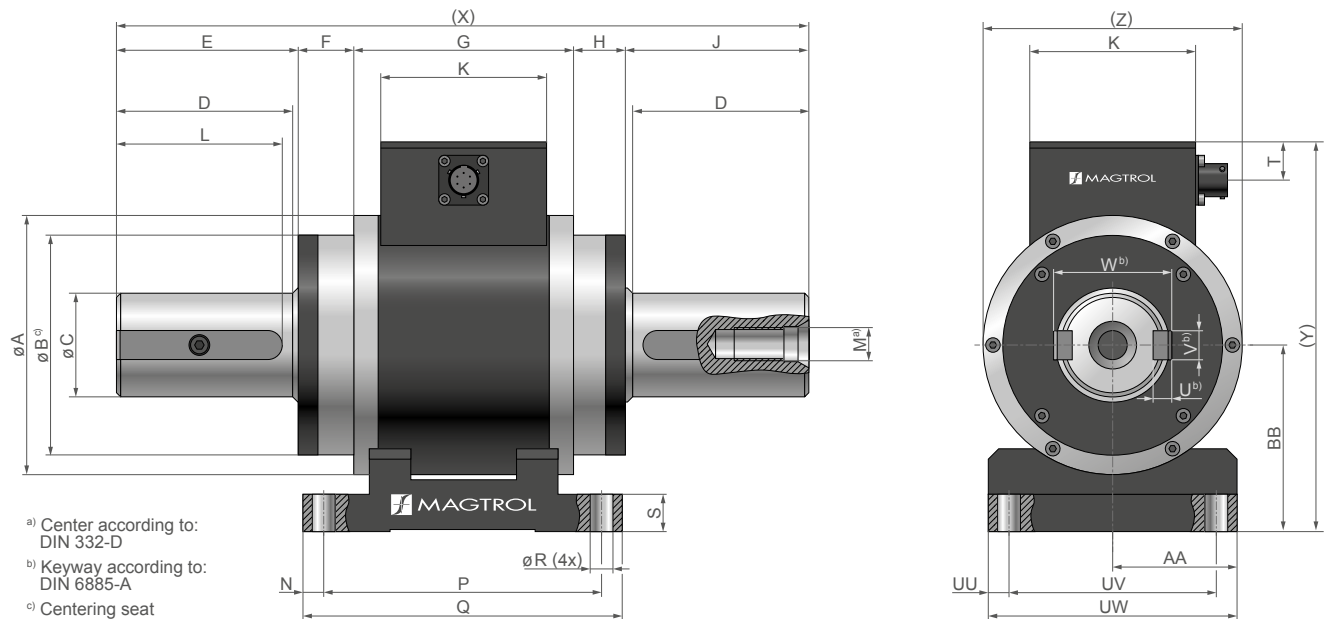
MODEL	Units	ø A	ø B	ø C ^{a)}	ø D	ø E	F	G	H	J	K	L	M	N	P	Q ^{b)}
TM312	mm	96g6	78	26x30	22h6	31h6	40.4	22.8	91	21	40.8	60	35	24	4	M10
	in	3.7791 3.7782	3.071	26x30	0.8661 0.8656	1.2205 1.2198	1.591	0.898	3.583	0.827	1.606	2.362	1.378	0.945	0.157	M10
TM313	mm	96g6	78	26x30	22h6	31h6	52.4	22.8	91	21	52.8	60	47	36	4	M10
	in	3.7791 3.7782	3.071	26x30	0.8661 0.8656	1.2205 1.2198	2.063	0.898	3.583	0.827	2.079	2.360	1.850	1.417	0.157	M10

MODEL	Units	R	S	T	U	ø V	W	UU	UV	UW	X	Y	Z	AA	BB
TM312	mm	18.5	10	119	139	9	18	10	80	100	216	155	107	50	75 ^(0/-0.05)
	in	0.728	0.394	4.685	5.472	0.354	0.709	0.394	3.15	3.937	8.504	6.102	4.213	1.969	2.9527 2.9508
TM313	mm	18.5	10	119	139	9	18	10	80	100	240	155	107	50	75 ^(0/-0.05)
	in	0.728	0.394	4.685	5.472	0.354	0.709	0.394	3.15	3.937	9.449	6.102	4.213	1.969	2.9527 2.9508

- a) Splines according to DIN 5481
- b) Center according to DIN 332-D

NOTE: 3D STEP files of most of our products are available on our website: www.magtrol.com ; other files are available on request.

TM 314-315 (KEYWAY SHAFT) DIMENSIONS



NOTE: Dimensions are the same for every series (TM and TMHS). Original dimensions are in metric units. Dimensions converted to imperial units have been rounded up to 3 or 4 decimal places.

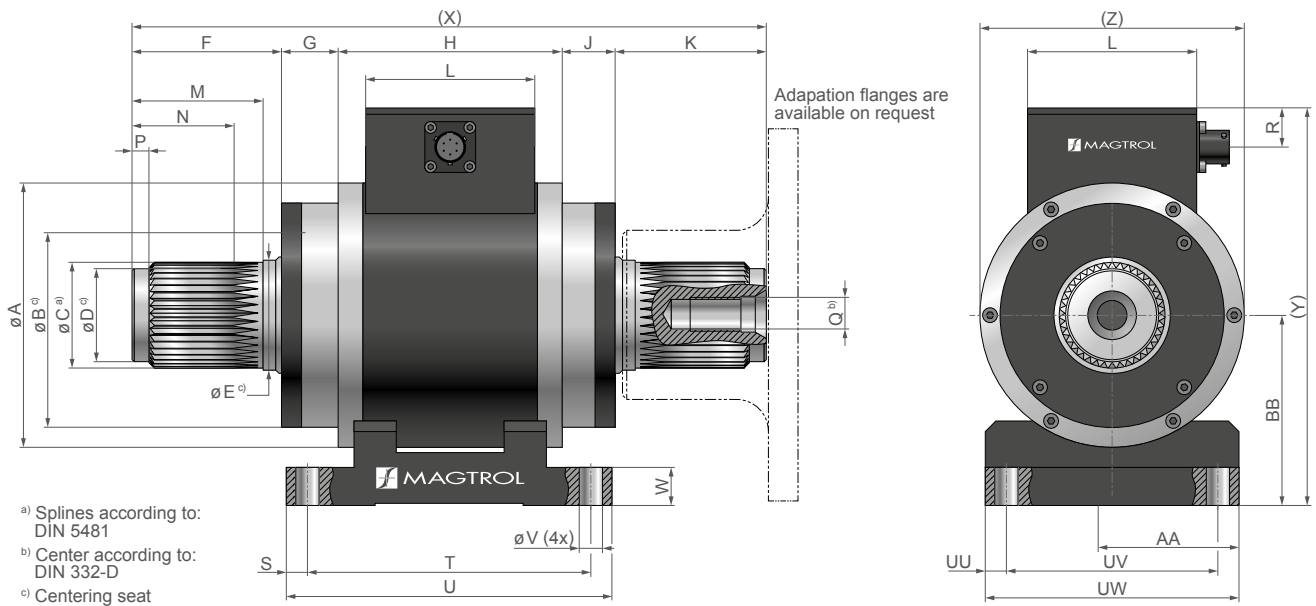
MODEL	Units	øA	øB	øC	D	E	F	G	H	J	K	L	M ^{a)}	N	P	Q
TM314	mm	125g6	106	50h6	65	67.7	26.8	106	25	68.5	80	60	M16	10	134	154
	in	4.9207 4.9197	4.173	1.9685 1.9679	2.559	2.665	1.055	4.173	0.984	2.697	3.150	2.362		0.394	5.276	6.063
TM315	mm	125g6	106	50h6	85	87.7	26.8	106	25	88.5	80	80		10	134	154
	in	4.9207 4.9197	4.173	1.9685 1.9679	3.346	3.453	1.055	4.173	0.984	3.484	3.150	3.150		0.394	5.276	6.063

MODEL	Units	øR	S	T	UU	UV	UW	U ^{b)}	V ^{b)}	W ^{b)}	X	Y	Z	AA	BB
TM314	mm	11	18	18.5	10	100	120	9h11	14h9	57	294	187.5	125	60	90 ^(0/-0.05)
	in	0.433	0.709	0.728	0.394	3.937	4.724	0.3543 0.3508	0.5512 0.5495	2.244	11.575	7.382	4.921	2.362	3.5433 3.5414
TM315	mm	11	18	18.5	10	100	120	9h11	14h9	57	334	187.5	125	60	90 ^(0/-0.05)
	in	0.433	0.709	0.728	0.394	3.937	4.724	0.3543 0.3508	0.5512 0.5495	2.244	13.150	7.382	4.921	2.362	3.5433 3.5414

a) Center according to DIN 332-D
 b) Keyway according to DIN 6885-A

NOTE: 3D STEP files of most of our products are available on our website: www.magtrol.com ; other files are available on request.

TM 314-317 (SPLINED SHAFT) DIMENSIONS



NOTE: Dimensions are the same for every series (TM and TMHS). Original dimensions are in metric units. Dimensions converted to imperial units have been rounded up to 3 or 4 decimal places.

MODEL	Units	øA	øB	øC ^{a)}	øD	øE	F	G	H	J	K	L	M	N	P	øQ ^{b)}
TM314	mm	125g6	106	45x50	44h6	52h6	50.7	26.8	106	25	51.5	80	42	28	8	M16
	in	4.9207 4.9197	4.173	45x50	1.7323 1.7317	2.0472 2.0465	1.996	1.055	4.173	0.984	2.028	3.150	1.654	1.102	0.315	
TM315	mm	125g6	106	45x50	44h6	52h6	70.7	26.8	106	25	71.5	80	62	48	8	M16
	in	4.9207 4.9197	4.173	45x50	1.7323 1.7317	2.0472 2.0465	2.784	1.055	4.173	0.984	2.815	3.150	2.441	1.890	0.315	
TM316	mm	155g6	135	60x65	55h6	70h6	82.7	25.8	124	24	83.5	80	70	50	8	M20
	in	6.1018 6.1008	5.315	60x65	2.1654 2.1646	2.7559 2.7552	3.256	1.016	4.882	0.945	3.287	3.150	2.756	1.968	0.315	
TM317	mm	155g6	135	65x70	60h6	72h6	107.7	25.8	124	24	108.5	80	95	80	8	M20
	in	6.1018 6.1008	5.315	65x70	2.3622 2.3615	2.8346 2.8339	4.240	1.016	4.882	0.945	4.272	3.150	3.740	3.150	0.315	

MODEL	Units	R	S	T	U	øV	W	UU	UV	UW	X	Y	Z	AA	BB
TM314	mm	18.5	10	134	154	11	18	10	100	120	260	187.5	125	60	90 ^(0/-0.05)
	in	0.728	0.394	5.276	6.063	0.433	0.709	0.394	3.937	4.724	10.236	7.382	4.921	2.362	3.5433 3.5414
TM315	mm	18.5	10	134	154	11	18	10	100	120	300	187.5	125	60	90 ^(0/-0.05)
	in	0.728	0.394	5.276	6.063	0.433	0.709	0.394	3.937	4.724	11.811	7.382	4.921	2.362	3.5433 3.5414
TM316	mm	18.5	10	150	170	11	18	10	140	160	340	217.5	160	80	105 ^(0/-0.05)
	in	0.728	0.394	5.905	6.693	0.433	0.709	0.394	5.512	6.299	13.386	8.563	6.299	3.149	4.1338 4.1319
TM317	mm	18.5	10	150	170	11	18	10	140	160	390	217.5	160	80	105 ^(0/-0.05)
	in	0.728	0.394	5.905	6.693	0.433	0.709	0.394	5.512	6.299	15.354	8.563	6.299	3.149	4.1338 4.1319

a) Splines according to DIN 5481
 b) Center according to DIN 332-D

NOTE: 3D STEP files of most of our products are available on our website: www.magtrol.com ; other files are available on request.

SYSTEM OPTIONS AND ACCESSORIES

COUPLINGS

When Magtrol TMB, TM and TMHS Series Torque Transducers are to be mounted in a drive train, double-element miniature couplings are the ideal complement, although single-element couplings can be used for low speed applications. The criteria for selecting appropriate couplings for torque measurement is as follows:

- High torsional spring rate: Ensures a high torsional stiffness and angular precision
- Clamping quality (should be self-centering and of adequate strength)
- Speed range
- Balancing quality (according to speed range)
- Alignment capability

The higher the speed of the application, the more care is required in selecting the coupling and assembling (alignment and balancing) the drive train configuration. Magtrol provides a wide range of couplings suitable for torque measurement applications and can assist you in choosing the right coupling for your transducer.



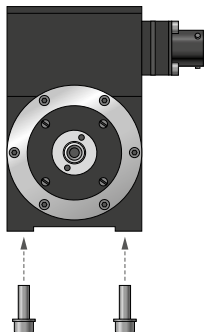
Fig. 6: BKC Series Metal Bellows Coupling



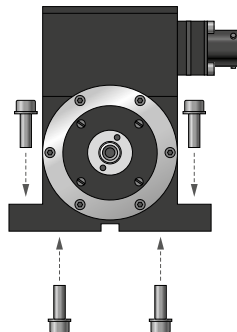
Fig. 7: MIC Series Miniature coupling

FIXATION FOR TM 301-308

MAGTROL has redesigned the mounting system for its small torque transducers (TM301-308). The new mounting base allows not only installation of the torque transducers from below as before, but also installation from the top. It also integrates a centering key underneath its housing. The old fastening system (from below only) is still available as an alternative.



Old housing (fastening from bottom only)



New housing (fastening from top and bottom)

TORQUE SPEED BOX

Magtrol's TSB Torque Speed Box allows data acquisition from two torque transducers simultaneously and provides the torque's analog signal output and speed's TTL signal output.



Fig. 8: TSB «Torque Speed Box»

TORQUE TRANSDUCER DISPLAYS

Magtrol offers the MODEL3411 Torque Display which supplies the power to any TM/TMHS/TMB Transducer and displays torque, speed and mechanical power. Features include:

- Adjustable English, metric and SI torque units
- Large, easy-to-read vacuum fluorescent display
- Built-in self-diagnostic tests (B.I.T.E.)
- Overload indication
- Tare function
- USB & Ethernet interface
- Torque and speed outputs
- Closed-box calibration
- Includes Magtrol's Torque 7 Software



Fig. 9: MODEL3411 Torque Display

«TORQUE» SOFTWARE

Magtrol's TORQUE Software is an easy-to-use LabVIEW™ executable program, used to automatically collect torque, speed and mechanical power data. The data can be printed, displayed graphically or quickly saved as a Microsoft® Excel spreadsheet. Standard features of TORQUE include: peak torque capture, multi-axes graphing, measured parameter vs. time, adjustable sampling rates and polynomial curve fitting.

SYSTEM OPTIONS AND ACCESSORIES

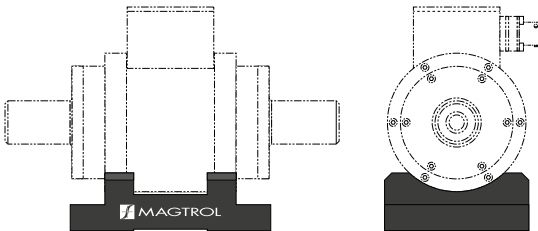
CABLE ASSEMBLY

ORDERING NUMBER	ER 1	--	/ 0	--
07 : Pigtail wires 13 : 14 Pin connector ^{a)}				
1 : Cable length 5 m 2 : Cable length 10 m 3 : Cable length 20 m				

a) For use with MODEL3411 Torque Display or DSP7000 Dynamometer Controller

BASE MOUNT OPTION (for TMB Series)

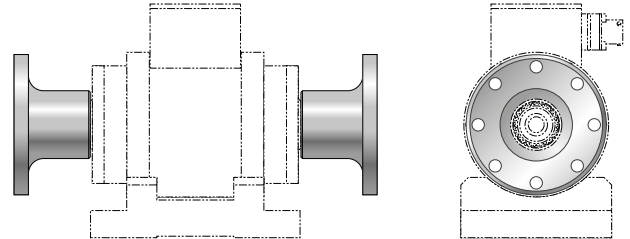
TMB Series Transducers are delivered without base mount.



TMB309 - 311	PTM310
TMB312 - 313	PTM312

FLANGES OPTION (for splined shaft)

Adaptation flanges are optional for torque transducers with splined shaft ends. Magtrol flanges are recommended because they are specially designed for Magtrol Torque Transducers.



ORDERING NUMBER	FTM 2	--
12, 13, ... , 17 : according to TM model		

COUNTER CONNECTOR

Axial connector	Souriau 851 06 JC 10 6S 5029
90° connector	Souriau 851 08 EC 10 6S 50

ORDERING INFORMATION

ORDERING NUMBER	TM	--	3	--	/ X	--	X
HS : high-speed version (TM303 - TM317) B : basic version (TM304 - TM313)							
01, 02, ... , 17 : Model TM							
1 : Smooth shaft (TM309 - 313) 2 : Splined shaft (TM312 - 317) 3 : Keyway shaft (TM314 - 315) 5 : Smooth shaft (TM301 - 308) ^{a)}							

a) This model is still available with narrow body (fixation from bottom only). (please see options and accessories section)

Example: TM312 In-line Torque Transducer high speed version with splined shaft would be ordered as : **TMHS312/X2X**.