Data sheet

T40FH

Torque flange

Special features

- **Nominal (rated) torques: 100kNm, 125kNm, 150kNm, 200kNm, 250kNm, 300kNm**
- **Nominal (rated) rotational speed of 2000 rpm up to 3000 rpm**
- **Compact design**
- **Version for rotating and non-rotating applications**
- **No bearings or slip rings**
- **Digital transmission of measured values**
- **Large measurement frequency range up to 6 kHz (-3 dB)**
- **Optional: Magnetic rotational speed measuring system**

Specifications

Accuracy class		0.1					
Torque measuring system (rotating)							
Nominal (rated) torque M_{nom}	**kNm**	**100**	**125**	**150**	**200**	**250**	**300**
Nominal (rated) rotational speed	rpm	3000			2000		
Linearity deviation including hysteresis, related to nominal (rated) sensitivity Frequency output For a max. torque in the range:							
between 0% of M_{nom} and 20% of M_{nom}	%	≤±0.03					
> 20% of M_{nom} and 60% of M_{nom}	%	≤±0.065					
> 60% of M_{nom} and 100% of M_{nom}	%	≤±0.1					
Voltage output For a max. torque in the range:							
between 0% of M_{nom} and 20% of M_{nom}	%	≤±0.03					
> 20% of M_{nom} and 60% of M_{nom}	%	≤±0.065					
> 60% of M_{nom} and 100% of M_{nom}	%	≤±0.1					
Rel. standard deviation of repeatability, per DIN 1319, related to the variation of the output signal							
Frequency output	%	≤±0.02					
Voltage output	%	≤± 0.02					
Temperature effect per 10 K in the nominal (rated) temperature range on the output signal, related to the actual value of the signal span							
Frequency output	%	≤±0.1					
Voltage output	%	≤±0.1					
on the zero signal, related to the nominal sensitivity							
Frequency output	%	≤±0.07					
Voltage output	%	≤±0.07					
Nominal sensitivity (spread between torque = zero and nominal torque)							
Frequency output 10 kHz / 60 kHz / 240 kHz	kHz	5/30/120					
Voltage output	V	10					
Sensitivity tolerance (deviation of the actual output quantity at M_{nom} from the nominal (rated) sensitivity)							
Frequency output	%	±0.1					
Voltage output	%	±0.1					
Output signal at torque = zero							
Frequency output	kHz	10/60/240					
Voltage output	V	0					
Nominal (rated) output signal							
Frequency output							
at positive nominal (rated) torque	kHz	15 [1] / 90 [2] / 360 [3] (5 V balanced [4])					
at negative nominal (rated) torque	kHz	5 [1] / 30 [2] / 120 [3] (5 V balanced [4])					
Voltage output							
at positive nominal (rated) torque	V	+10					
at negative nominal (rated) torque	V	-10					
Load resistance							
Frequency output	kΩ	≥2					

Nominal (rated) torque M_{nom}	**kNm**	**100**	**125**	**150**	**200**	**250**	**300**
Voltage output	kΩ	≥10					
Long-term drift over 48 h at reference temperature							
Frequency output	%	≤±0.03					
Voltage output	%	≤±0.03					
Measurement frequency range, -3 dB	kHz	1[1] / 3[2] / 6[3]					
Group delay	µs	< 400[1] / < 220[2] / < 150[3]					
Residual ripple							
Voltage output [5]	mV	< 40					
Maximum modulation range [6]							
Frequency output	kHz	2.5 … 17.5 [1] / 15 … 105 [2] / 60 … 420 [3]					
Voltage output	V	-12 … +12					
Energy supply							
Nominal (rated) supply voltage (DC safety extra low voltage)	V	18 … 30					
Current consumption in measuring mode	A	< 1					
Current consumption in start-up mode	A	< 4 (typically 2) 50 µs					
Nominal (rated) power consumption	W	< 10					
Maximum cable length	m	50					
Shunt signal		approx. 50 % of M_{nom}					
Tolerance of the shunt signal, related to M_{nom}	%	≤± 0.05					
Nominal (rated) trigger voltage	V	5					
Trigger voltage limit	V	36					
Shunt signal ON	V	min. >2.5					
Shunt signal OFF	V	max. <0.7					
Torque measuring system (non-rotating)							
Accuracy class		0.1					
Nominal (rated) sensitivity (nominal (rated) signal range between torque = zero and nominal (rated) torque)	mV/V	0.63…..1.1 (the sensitivity is specified on the type plate)					
Linearity deviation including hysteresis, related to the nominal (rated) sensitivity (voltage output) For a max. torque in range:							
between 0% of Mnom and 20% of Mnom	%	≤± 0.03					
> 20% of Mnom and 60% of Mnom	%	≤± 0.065					
> 60% of Mnom and 100% of Mnom	%	≤± 0.1					
Temperature effect per 10 K in the nominal (rated) temperature range							
on the output signal, related to the actual value of the signal span	%	≤± 0.1					
on the zero signal, related to the nominal sensitivity	%	≤± 0.07					
Relative standard deviation of reproducibility (variability) per DIN 1319, related to the variation of the output signal.	%	≤± 0.02					
Input resistance at reference temperature	Ω	1560 ± 100					
Output resistance at reference temperature	Ω	1400 ± 100					
Reference excitation voltage	V	5					
Operating range of the excitation voltage		2.5 ... 12					
Transducer identification		TEDS as per IEEE 1451.4					
Rotational speed measuring system							
Rotational speed measuring system		Magnetic scanning and ring gear					
Output signals		2 square wave signals 90° phase shifted, 5V TTL/RS-422					
Number of pulses per revolution (number of teeth)		72			86		
Output signal level High	V	≥3.5					
Output signal level Low	V	≤0.8					
Maximum permissible output frequency	kHz	25					

Nominal (rated) torque M_{nom}	**kNm**	**100**	**125**	**150**	**200**	**250**	**300**
Radial nominal distance between sensor head and teeth	mm	2.5					
Radial working range	mm	1.5 – 3.5					
Permissible axial displacement	mm	±2					
Permissible magnetic field strength for signal deviations	kA/m	<0.1					
General information							
EMC **Emission (EME)** (as per FCC 47, Part 15, Subsection C)							
Emission (EME)(as per EN 61326-1, Section 7)							
RFI field strength		Class B					
Immunity to interference (EN 61326-1, Table 2)							
Electromagnetic field (AM)	V/m	10					
Magnetic field	A/m	100					
Electrostatic discharge (ESD)							
Contact discharge	kV	4					
Air discharge	kV	8					
Fast transients (burst)	kV	1					
Impulse voltages (surge)	kV	1					
Conducted interference (AM)	V	10					
Degree of protection per EN 60 529		IP 54					
Reference temperature	°C	23					
Nominal temperature range	°C	+10 … +70					
Operating temperature range [8]	°C	-20 … +85					
Storage temperature range	°C	-40 … +85					
Mechanical shock per EN 60068-2-27 [9]							
Number	n	1000					
Duration	ms	3					
Acceleration (half sine)	m/s^2	650					
Vibrational stress in three directions per EN 60068-2-6 [9]							
Frequency range	Hz	10 … 2000					
Duration	h	2.5					
Acceleration (amplitude)	m/s^2	100					
Load limits [10]							
Torque limit, related to M_{nom} [11]	kNm	200			400		
Breaking torque, related to M_{nom} [11]	kNm	>300			>600		
Axial limit force [12]	kN	230			290		
Lateral limit force [12]	kN	110			240		
Bending moment limit [12]	kNm	22			35		
Oscillation width per DIN 50100 (peak-to-peak) [13]	kNm	200			400		
Upper maximum torque	kNm	150			300		
Lower maximum torque	kNm	-150			-300		
Mechanical values							
Size		BG1			BG2		
Torsional stiffness c_T	kN·m/rad	119310			228090		
Torsion angle at M_{nom}	degrees	0.072			0.075		
Stiffness in the axial direction c_a	kN/mm	1855			3900		
Stiffness in the radial direction c_r	kN/mm	3340			4910		
Stiffness during the bending moment round a radial axis c_b	kN·m/rad	25495			65900		
	kN·m/ degrees	445			1150		
Maximum deflection at axial limit force	mm	0.1					
Additional maximum radial deviation at lateral limit force	mm	0.1					

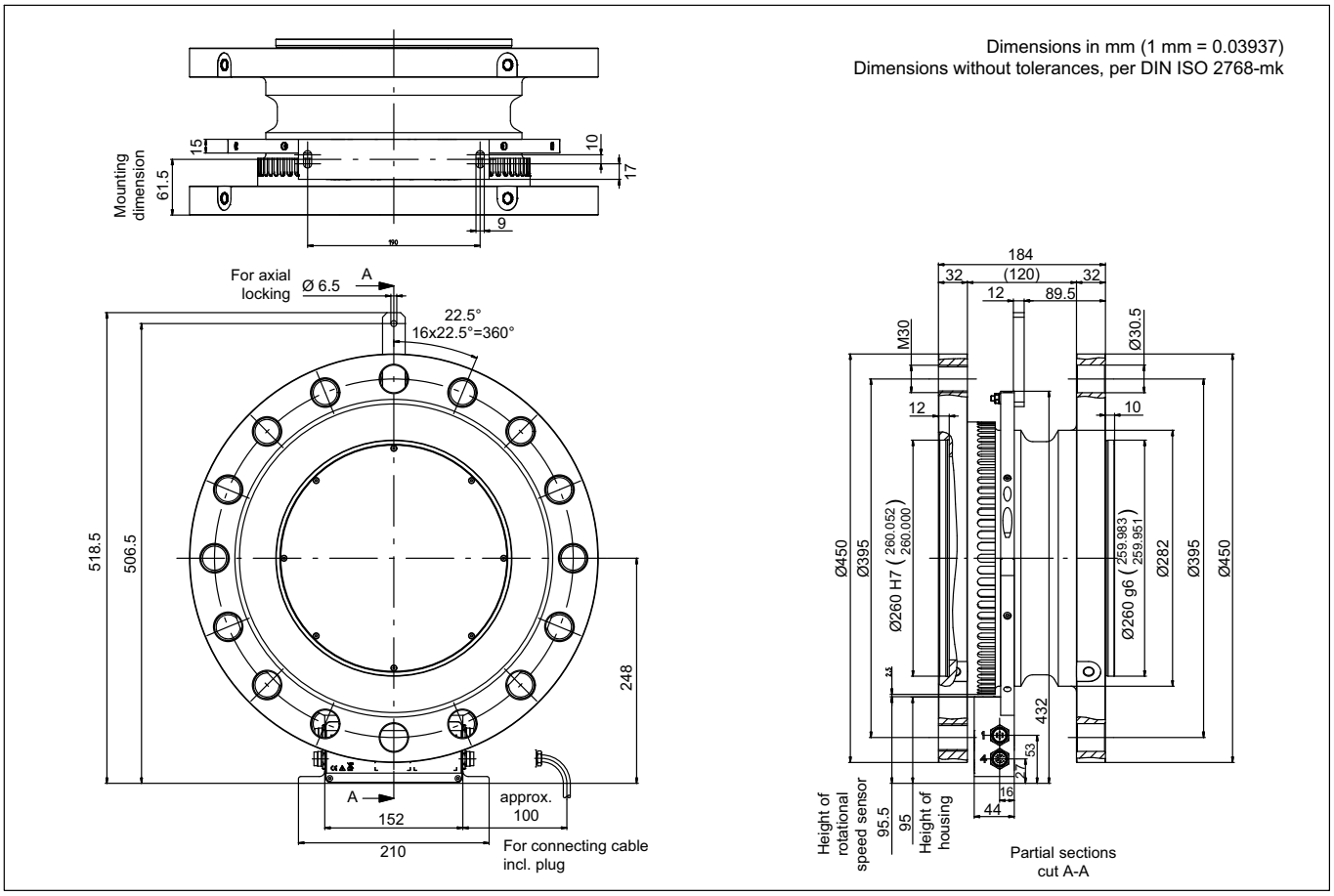
Nominal (rated) torque M_{nom}	**kNm**	**100**	**125**	**150**	**200**	**250**	**300**
Additional maximum deviation from plane parallelism at bending moment limit	mm	0.5					
Balance quality level per DIN ISO 1940		G 6.3					
Max. limits for relative shaft vibration[14] (peak-to-peak) Undulations in the connection flange area, based on ISO 7919-3							
Normal operation (continuous operation)	µm	$s_{(p-p)} = \frac{9000}{\sqrt{n}}$ (n in rpm)					
Start and stop operation/resonance ranges (temporary)	µm	$s_{(p-p)} = \frac{13200}{\sqrt{n}}$ (n in rpm)					
Mass moment of inertia of rotor J_v (around the rotary axis; does not take flange bolts into account)	kg·m²	2.0			5.15		
Proportional mass moment of inertia for the transmitter side (side of the flange with external centering)	% of I_v	45			47		
Max. permissible static eccentricity of the rotor (radially) to the center point of the stator							
without the speed module	mm	±2					
with rotational speed module	mm	±1					
Permissible axial displacement[15] between rotor and stator	mm	±2					
Weight							
Rotor	kg	78			142		
Stator	kg	2.1			2.3		

1) Option 5, 10 ±5 kHz (code SU2)
2) Option 5, 60 ±30 kHz (code DU2)
3) Option 5, 240 ±120 kHz (code HU2)
4) RS-422 complementary signals, note line termination.
5) Signal frequency range 0.1 to 10 kHz
6) Output signal range in which there is a repeatable correlation between torque and output signal.
7) Applies only to the rotating version
8) Heat conductance via the stator base plate necessary over 70°C. The temperature of the base plate must not exceed 85°C.
9) The antenna ring and connector plug must be fixed.
10) Each type of irregular stress (bending moment, lateral or longitudinal force, exceeding nominal (rated) torque), can only be permitted up to its specified load limit, provided none of the others can occur at the same time. If this condition is not met, the limit values must be reduced. If 30% of the bending moment limit and the lateral limit force occur at the same time, only 40% of the axial limit force is permissible and the nominal (rated) torque must not be exceeded. The effects of permissible bending moments, axial and lateral forces on the measurement result are ≤±1% of the nominal (rated) torque. The load limits only apply for the nominal (rated) temperature range. At temperatures <10 °C, the load limits must be reduced by approx. 30% (strength reduction).
11) With static load.
12) Static and dynamic.
13) The nominal (rated) torque must not be exceeded.
14) The influence of radial run-out deviations, eccentricity, defects of form, notches, marks, local residual magnetism, structural inhomogeneity or material anomalies needs to be taken into account and isolated from the actual undulation.
15) Above the nominal (rated) temperature range: ±1.5 mm.

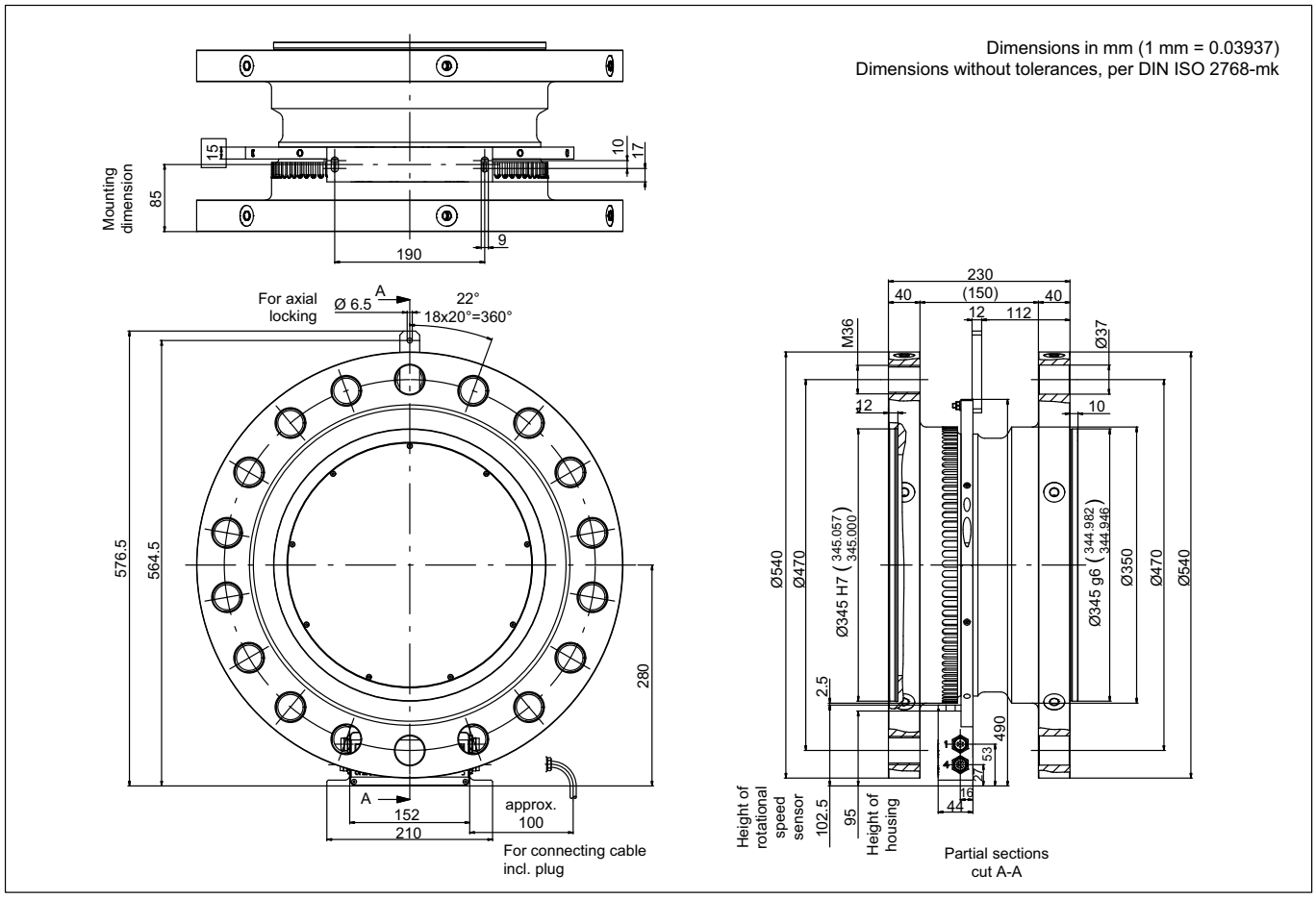
Dimensions

T40FH torque transducer with rotational speed measuring system, Option 4, Code SU2, DU2, HU2

T40FH 100 kNm - 150 kNm

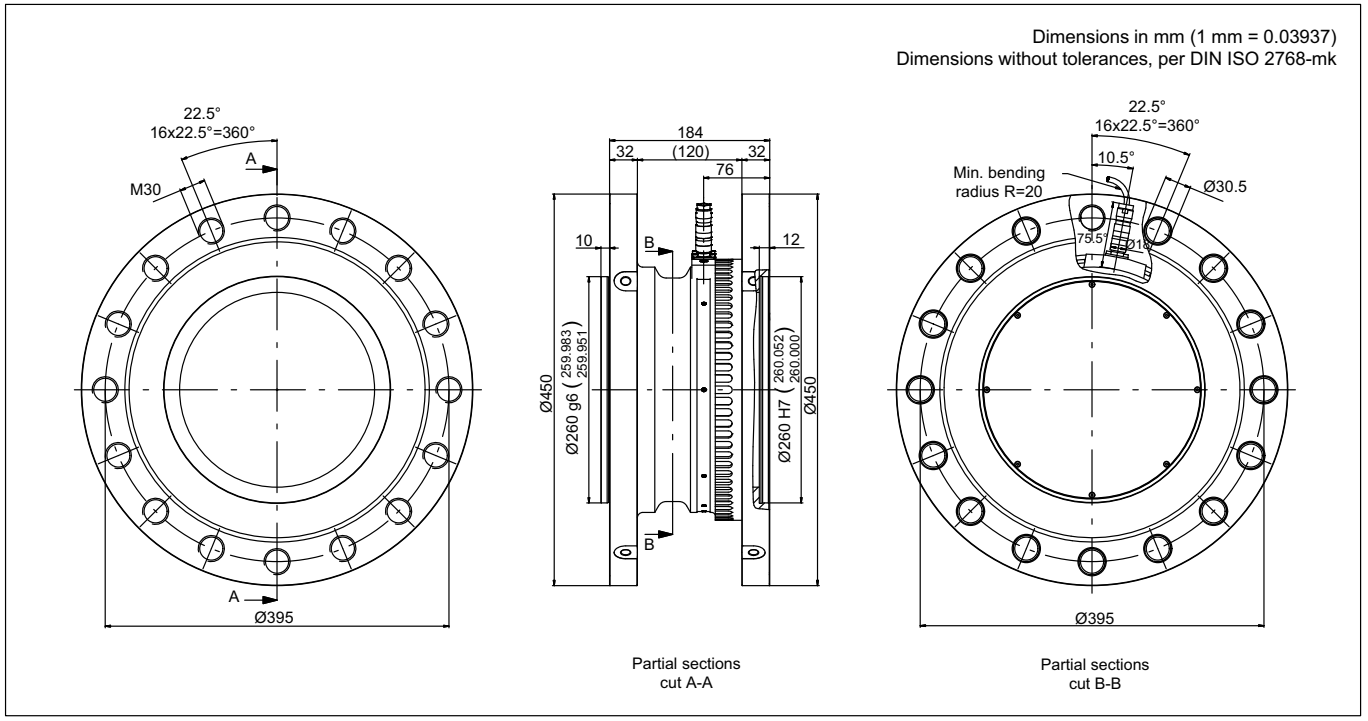


T40FH 200 kNm - 300 kNm

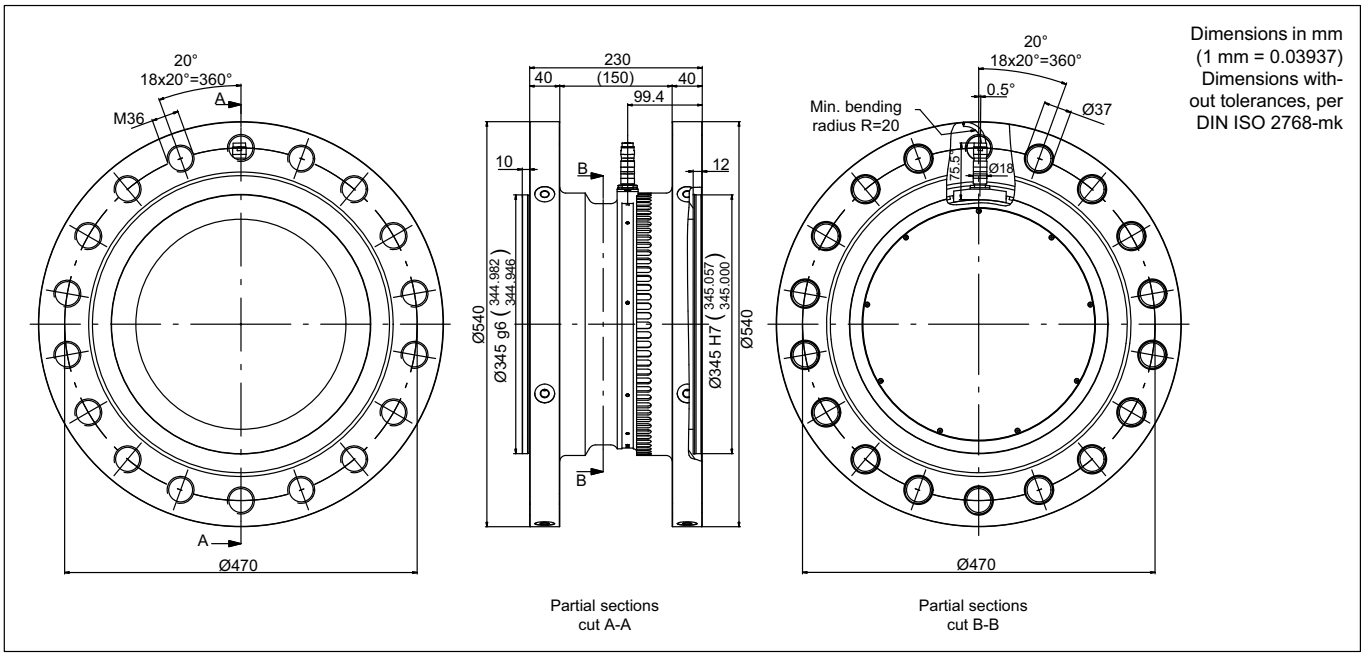


T40FH torque transducer (non-rotating), Option 4, Code PNJ

T40FH 100 kNm - 150 kNm



T40FH 200 kNm - 300 kNm



Ordering options

Ordering no.	
K-T40FH	**[only with Option 2 = MF/ST]**

Code	Option 1: Measuring range to	
100R	100 kN·m	**[only with Option 2 = MF/RO]**
125R	125 kN·m	**[only with Option 2 = MF/RO]**
150R	150 kN·m	**[only with Option 2 = MF/RO]**
200R	200 kN·m	**[only with Option 2 = MF/RO]**
250R	250 kN·m	**[only with Option 2 = MF/RO]**
300R	300 kN·m	**[only with Option 2 = MF/RO]**

Code	Option 2: Components
MF	Complete measurement flange
RO	Rotor
ST	Stator
N	Not rotating

Code	Option 3: Accuracy
S	Standard (linearity deviation including hysteresis ≤±0.1%)

Code	Option 4: Electrical configuration	
SU2	Out. sign. 10 kHz ±5 kHz and ±10 V, Supp. volt. 18…30 V DC	
DU2	Out. sign. 60 kHz ±30 kHz and ±10 V, Supp. volt. 18…30 V DC	
HU2	Out. sign. 240 kHz ±120 kHz and ±10 V, Supp. volt. 18…30 V DC	
PNJ	mV/V	

Code	Option 5: Rotational speed measuring system
0	Without the rotational speed measuring system
1	Magnetic rotational speed measuring system

Code	Option 6: Customized modification
S	No customer modification

= **PREFERRED TYPES**

K-T40FH - 1 0 0 R - M F - S - D U 2 - 0 - S