Data Sheet

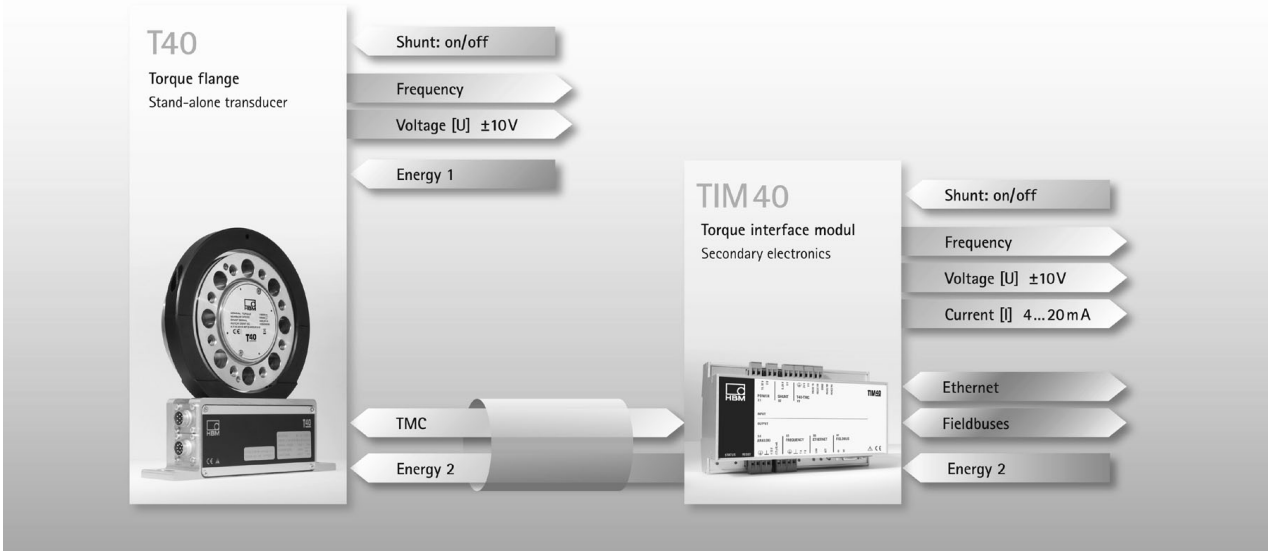
T40

Torque Flange

Special features

- **Nominal (rated) torques of 500 N·m, 1 kN·m, 2 kN·m and 3 kN·m**
- **Nominal (rated) rotational speeds from 20,000 rpm to 15,000 rpm**
- **Accuracy class 0.05**
- **Wide measurement frequency range up to 6 kHz (–3 dB)**
- **Digital transmission of measurement signals**
- **Short design**
- **Low rotor weight and mass moments of inertia**

Concept



Specifications

Type		**T40**			
Accuracy class		0.05			
Torque measuring system					
Nominal (rated) torque M_{nom}	N·m	500			
	kN·m		1	2	3
Nominal (rated) sensitivity (spread between torque = zero and nominal (rated) 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)					
Voltage output	%	±0.1			
Output signal at torque = zero					
Frequency output	kHz	240/60/10			
Voltage output	V	0			
Nominal (rated) output signal					
Frequency output					
at positive nominal (rated) torque	kHz	15[1)]/90[2)]/360[3)] (5 V symmetrical)			
at negative nominal (rated) torque	kHz	5[1)]/30[2)]/120[3)] (5 V symmetrical)			
Voltage output					
at positive nominal (rated) torque	V	+10			
at negative nominal (rated) torque	V	−10			
Load resistance					
Frequency output	kΩ	≥ 2			
Voltage output	kΩ	≥ 10			
Long term drift over 48 h					
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	mV	< 40			
Effect of temperature per 10 K in the nominal (rated) temperature range					
on the output signal, related to the actual value of the signal spread					
Frequency output	%	±0.05			
Voltage output	%	±0.2			
on the zero signal, related to the nominal (rated) sensitivity					
Frequency output	%	±0.05			
Voltage output	%	±0.1			
Maximum level control range[4)]					
Frequency output	kHz	2.5...17.5[1)]/15...105[2)]/60...420[3)]			
Voltage output	V	−12 ... +12			
Power supply					
Nominal (rated) supply voltage (separated extra low DC voltage)	V	18 ... 30			
Current consumption in measuring mode	A	< 1 (typ. 0.5)			
Current consumption in startup mode	A	< 4 (typ. 4) 50 µs			
Nominal (rated) power consumption	W	< 10			
Maximum cable length	m	50			

[1)] Option 5, 10 ± 5 kHz (Code SU2)
[2)] Option 5, 6 ± 30 kHz (Code DU2)
[3)] Option 5, 240 ± 120 kHz (Code HU2)
[4)] Output signal range in which there is a repeatable correlation between torque and output signal.

Nominal (rated) torque M_{nom}	N·m	500			
	kN·m		1	2	3
Linearity error including hysteresis, related to the nominal (rated) sensitivity					
Frequency output	%	< ± 0.05			
Voltage output	%	< ± 0.05			
Relative standard deviation of repeatability per DIN 1319, related to the variation of the output signal					
Frequency output	%	< ± 0.03			
Voltage output	%	< ± 0.03			
Shunt signal		approx. 50 % of M_{nom}			
Tolerance of the shunt signal, related to M_{nom}	%	± 0.03			
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			
General data					
EMC					
Emission (per EN61326-1, Section 7)					
RFI field strength	–	Class B			
Interference immunity (per EN61326-1, Table 2)					
Electromagnetic field (AM)	V/m	10			
Magnetic field	A/m	100			
Electrostatic discharge (ESD)					
Contact discharge	kV	8			
Air discharge	kV	4			
Rapid transients (burst)	kV	1			
Impulse voltages (surge)	kV	1			
Conducted interference (AM)	V	10			
Degree of protection per EN 60529		IP 54			
Weight, approx. Rotor	kg	2.0		4.0	4.1
Stator	kg	1.1			
Reference temperature	°C	23			
Nominal (rated) temperature range	°C	+10 ... +70			
Operating temperature range	°C	−20 ... +85			
Storage temperature range	°C	−40 ... +85			
Impact resistance, test severity level per DIN IEC 68; Part 2-27; IEC 68-2-27-1987					
Number	n	1000			
Duration	ms	3			
Acceleration (half sine)	m/s^2	650			
Vibration resistance, test severity level per DIN IEC 68, Part 2-6: IEC 68-2-6-1982					
Frequency range	Hz	5 ... 65			
Duration	h	1.5			
Acceleration (amplitude)	m/s^2	50			
Nominal (rated) rational speed	rpm	20,000		15,000	
Load limits (data applies to the nominal (rated) temperature range) [5]					
Limit torque, related to M_{nom}	%		200		160
Breaking torque, related to M_{nom}	%		> 400		> 320
Longitudinal limit force	kN	13	19	30	35
Lateral limit force	kN	4	5	9	10
Bending limit moment	N·m	200	220	560	600
Oscillation width per DIN 50100 (peak to peak) [6]	N·m	1000	2000	4000	4800

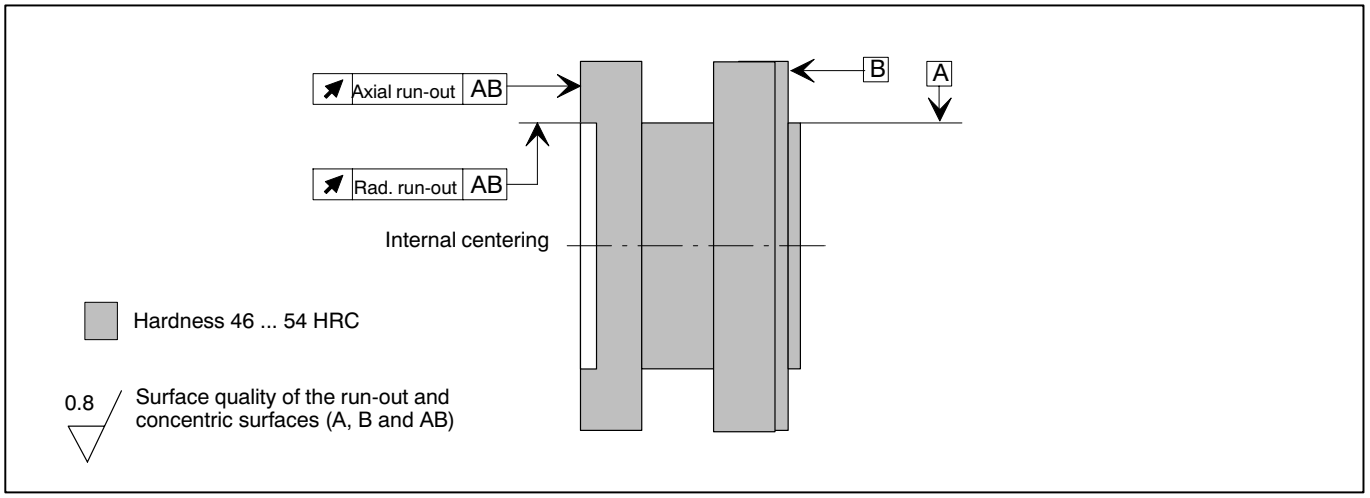
5) Each type of irregular stress (bending moment, lateral or longitudinal force, exceeding nominal (rated) torque) can only be permitted up to its specified static load limit provided none of the others can occur at the same time. If this condition is not met, the limit values must be reduced. If 30% of the bending limit moment and lateral limit force occur at the same time, only 40% of the longitudinal limit force is permissible and the nominal (rated) torque must not be exceeded. The permissible bending moments, longitudinal forces and lateral forces can affect the measurement result by approx. 0.3% of the nominal (rated) torque. The load limits apply only to the nominal temperature range. At temperatures < 10 C° load limits reduced by up to 30 % have to be allowed for because of increasingly reduced viscosity at decreasing temperatures.

6) The nominal (rated) torque must not be exceeded.

Nominal (rated) torque M_{nom}	N·m	500			
	kN·m		1	2	3
Mechanical values					
Torsional stiffness c_T	kN·m/rad	745	1165	2515	3210
Torsion angle at M_{nom}	Deg.	0.038	0.049	0.046	0.054
Stiffness in the axial direction c_a	kN/mm	450	580	540	570
Stiffness in the radial direction c_r	kN/mm	560	860	1365	1680
Stiffness during the bending moment round a radial axis c_b	kN·m/deg.	4.2	5.9	9	9.3
Maximum deflection at longitudinal force limit	mm	< 0.05		< 0.06	
Additional max. radial run-out deviation at lateral limit force	mm	< 0.02			
Additional plumb/parallel deviation at bending limit moment (at ∅ d_B)	mm	< 0.11	< 0.09	< 0.18	< 0.19
Balance quality level per DIN ISO 1940		G 2.5			
Max. limits for relative shaft vibration (peak to peak) [7] Wave oscillations in the area of the connection flanges acc. to ISO 7919-3					
Normal mode (continuous operation)	µm	$s_{(p-p)} = \frac{9000}{\sqrt{n}}$ (n in rpm)			
Start and Stop mode/resonance ranges (temporary)	µm	$s_{(p-p)} = \frac{13200}{\sqrt{n}}$ (n in rpm)			
Mass moment of inertia of the rotor					
I_V (around the rotary axis; does not take flange bolts into account)	kg·m²	0.0045		0.0139	0.0142
Proportional mass moment of inertia for the transmitter side (side of the flange with external centering)		51		50	49
Max. permissible static eccentricity of the rotor (radially) to the center point of the stator					
without the speed measuring system	mm	±2			
Max. permissible axial displacement of the rotor to the stator	mm	±2			

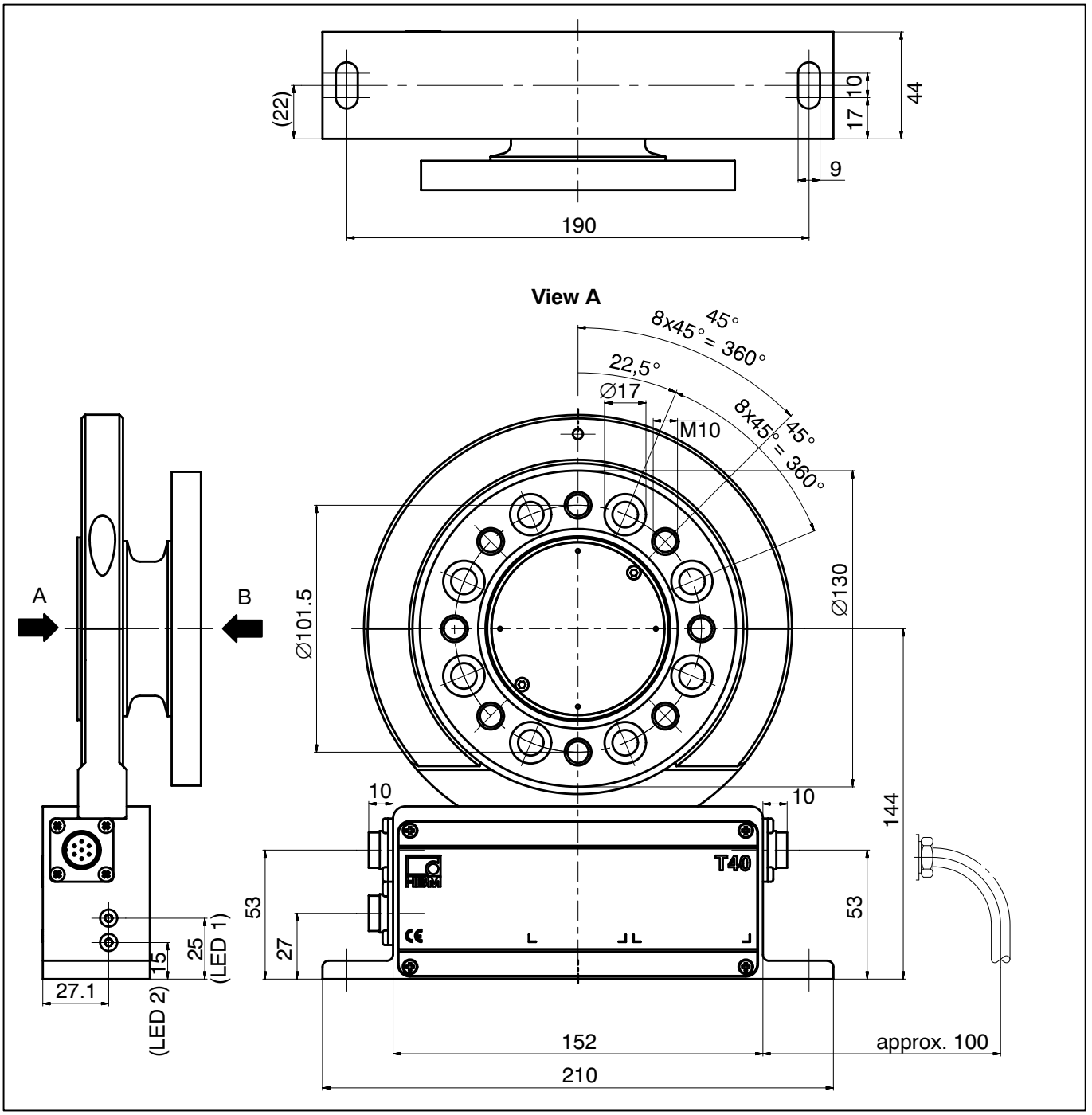
7) The impact of radial run-out deviations, eccentricity, defects of form, notches, marks, local residual magnetism, structural variations or material anomalies needs to be taken into account and isolated from the actual wave oscillation.

Run-out and concentric tolerances

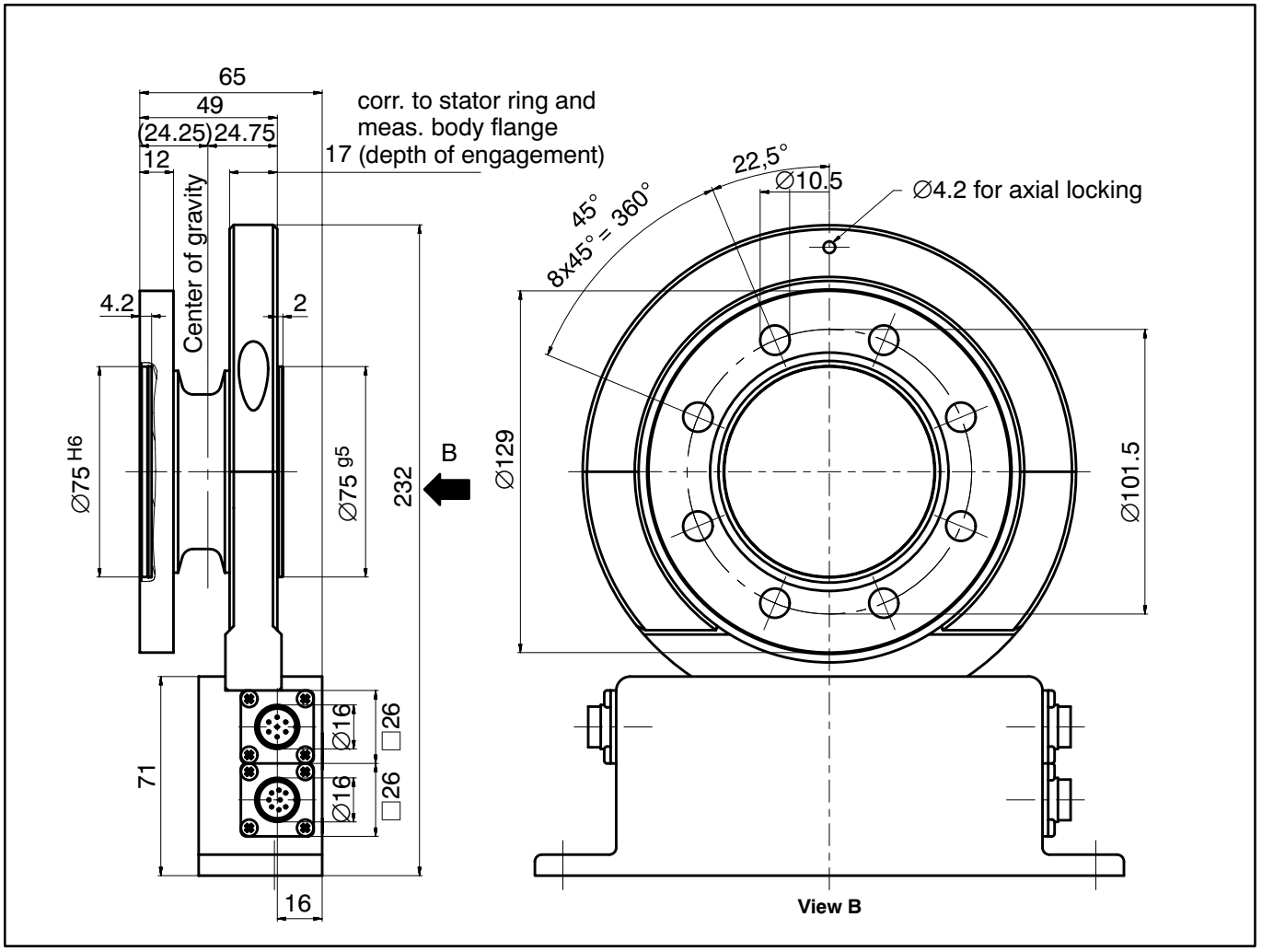


Measuring range (N·m)	Axial run-out tolerance (mm)	Radial run-out tolerance (mm)
500	0.01	0.01
1 k	0.01	0.01
2 k	0.02	0.02
3 k	0.02	0.02

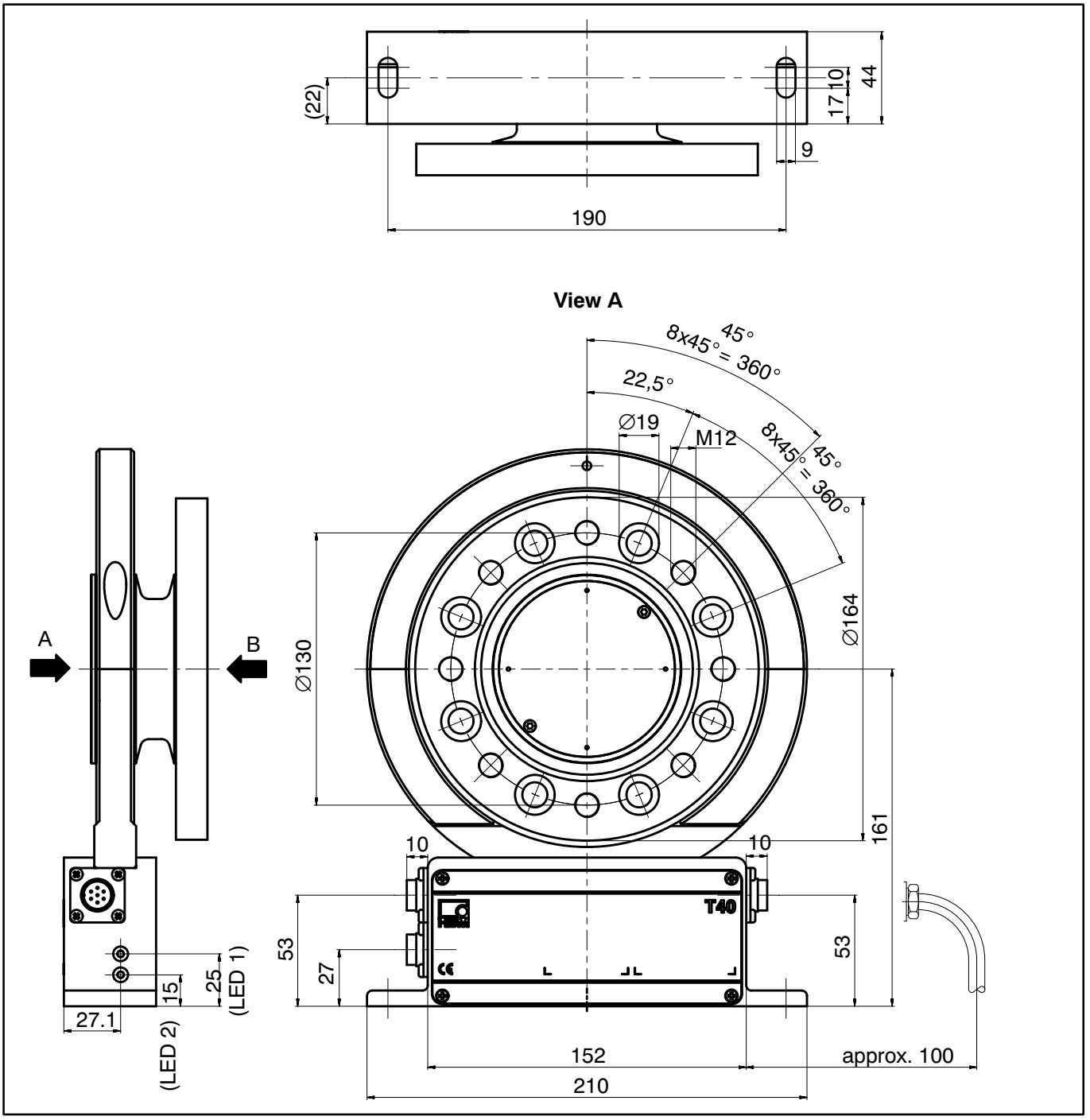
Dimensions T40/500 N · m and 1 kN · m (in mm; 1 mm=0.03937 inches)



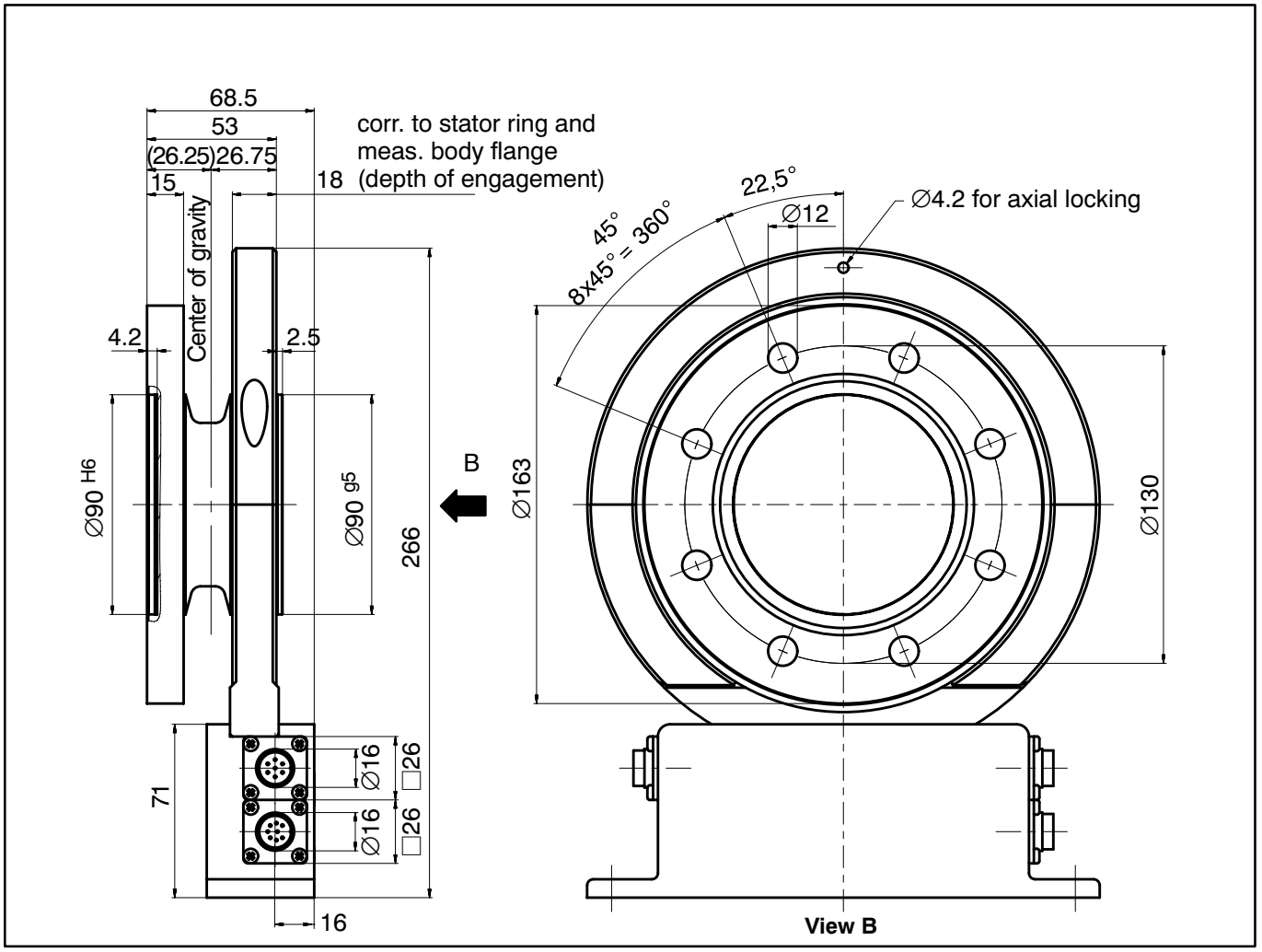
Dimensions T40/500 N·m and 1 kN·m, View B (in mm; 1 mm=0.03937 inches)



Dimensions T40/2 kN · m and 3 kN · m (in mm; 1 mm=0.03937 inches)



Dimensions T40/2 kN · m and 3 kN · m, View B (in mm; 1 mm=0.03937 inches)



Order numbers

Order no.	
K-T40	

Code	Option 1: Measuring range up to
500Q	500 N·m
001R	1 kN·m
002R	2 kN·m
003R	3 kN·m

Code	Option 2: Component
MF	Measurement flange, complete
RO	Rotor
ST	Stator

Code	Option 3: Accuracy
S	Standard

Code	Option 4: Adjustment
M	Metric (N·m)

Code	Option 5: Electrical configuration
SU2	10 kHz ±5 kHz and ±10 V output signal, 18...30 V DC supply voltage
DU2	60 kHz ±30 kHz and ±10 V output signal, 18...30 V DC supply voltage
HU2	240 kHz ±120 kHz and ±10 V output signal, 18...30 V DC supply voltage

Code	Option 6: Rot. speed measuring system
0	Without rot. speed measuring system

Code	Option 7: Customised modification
S	No customer-specific modification

K-T40- [ ][ ][ ][ ] - [ ][ ] - [S] - [M] - [ ][ ][ ] - [0] - [S]

= **PREFERENCE Types**

Accessories, to be ordered separately

Item	**Order-No.**
Ready made connecting cables	
Torque connection cable, 423 – D-Sub 15P, 6 m	1-KAB149-6
Torque connection cable, 423 – free ends, 6 m	1-KAB153-6
Cable sockets	
423G-7S, 7-pin (straight)	3-3101.0247
423W-7S, 7-pin (angular)	3-3312.0281
423G-8S, 7-pin (straight)	3-3312.0120
423W-8S, 7-pin (angular)	3-3312.0282
Connecting cable by the meter (minimum order quantity: 10 m, price)	
Kab8/00-2/2/2	4-3301.0071

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