

T40

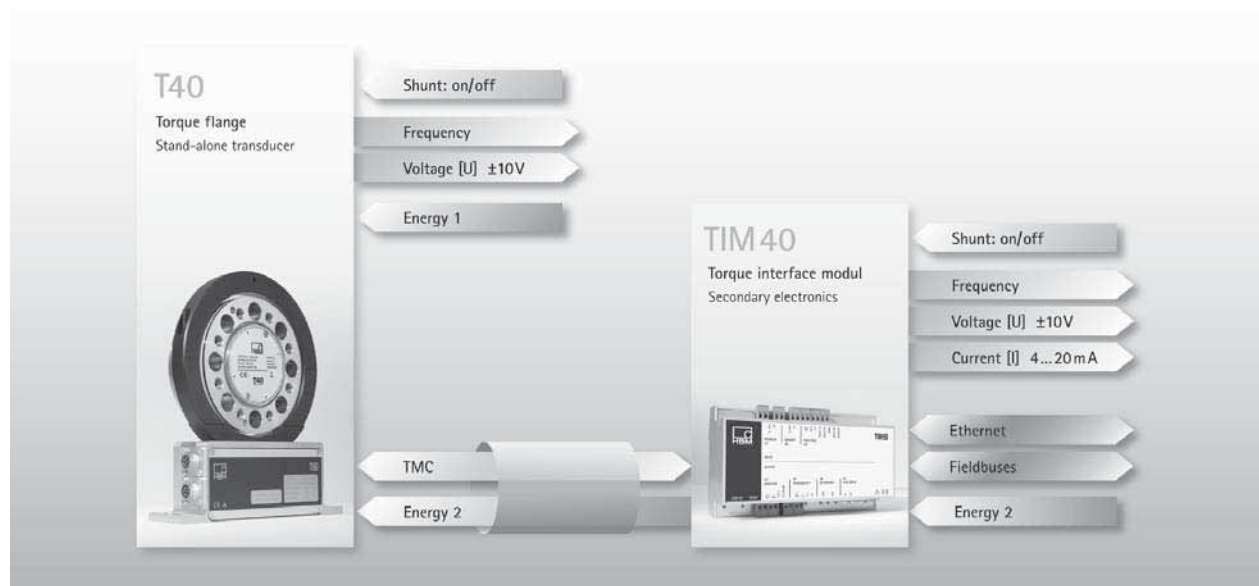
Torque Flange



Special features

- Nominal (rated) torques of 200 N·m, 500 N·m, 1 kN·m, 2 kN·m, 3 kN·m, 5 kN·m and 10 kN·m
- Nominal (rated) rotational speeds from 10,000 rpm to 20,000 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	200	500						
	kN·m			1	2	3	5	10	
Nominal (rated) sensitivity (spread between torque = zero and nominal (rated) torque) Frequency output 10 kHz/60 kHz/240 kHz Voltage output	kHz	5/30/120							
	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 Voltage output	kHz	240/60/10							
	V	0							
Nominal (rated) output signal Frequency output at positive nominal (rated) torque at negative nominal (rated) torque Voltage output at positive nominal (rated) torque at negative nominal (rated) torque	kHz	15 ¹⁾ /90 ²⁾ /360 ³⁾ (5 V symmetrical ⁴⁾)							
	kHz	5 ¹⁾ /30 ²⁾ /120 ³⁾ (5 V symmetrical ⁴⁾)							
	V	+10							
	V	-10							
	Load resistance Frequency output Voltage output	kΩ	≥ 2						
	kΩ	≥ 10							
Long term drift over 48 h Frequency output Voltage output	%	< ± 0.03							
	%	< ± 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 Voltage output on the zero signal, related to the nominal (rated) sensitivity Frequency output Voltage output	%	± 0.05							
	%	± 0.2							
	%	± 0.05							
	%	± 0.1							
	Maximum level control range⁵⁾ Frequency output Voltage output	kHz	2.5...17.5 ¹⁾ /15...105 ²⁾ /60...420 ³⁾						
	V	-12 ... +12							
Power supply Nominal (rated) supply voltage (separated extra low DC voltage) Current consumption in measuring mode Current consumption in startup mode Nominal (rated) power consumption Maximum cable length	V	18 ... 30							
	A	< 1 (typ. 0.5)							
	A	< 4 (typ. 4) 50 μs							
	W	< 10							
	m	50							

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, observe terminating resistance.

5) Output signal range in which there is a repeatable correlation between torque and output signal.

Specifications (continued)

Nominal (rated) torque M_{nom}	N·m	200	500					
	kN·m			1	2	3	5	10
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}	%	< ± 0.05						
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						
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	1.1	2.0	4.0	4.1	7.0	12.0	
Stator	kg		1.1			1.2	1.3	
Reference temperature	°C [°F]	23 [73.4]						
Nominal (rated) temperature range	°C [°F]	+10 ... +70 [+50 ... +70]						
Operating temperature range	°C [°F]	-20 ... +85 [-20 ... +85]						
Storage temperature range	°C [°F]	-40 ... +85 [-40 ... +85]						
Mechanical shock according to EN 60068-2-27⁶⁾								
Number	n	1000						
Duration	ms	3						
Acceleration (half sine)	m/s ²	650						
Vibration in 3 directions according to EN 60068-2-6⁶⁾								
Frequency range	Hz	10 ... 2000						
Duration	h	2.5						
Acceleration (amplitude)	m/s ²	200						
Nominal (rated) rational speed	rpm	20,000		15,000		12,000	10,000	
Load limits (data applies to the nominal (rated) temperature range) ⁷⁾								
Limit torque, related to M_{nom} ⁸⁾	%	200			160			
Breaking torque, related to M_{nom} ⁸⁾	%	> 400			> 320			
Longitudinal limit force ⁹⁾	kN	10	13	19	30	35	60	80
Lateral limit force ⁹⁾	kN	2	4	5	9	10	12	18
Bending limit moment ⁹⁾	N·m	100	200	220	560	600	800	1200
Oscillation width per DIN 50100 (peak to peak) ¹⁰⁾	N·m	400	1000	2000	4000	4800	8000	16000

⁶⁾ Antenna ring and connector need to be fastened.

⁷⁾ 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 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.

⁸⁾ With static load.

⁹⁾ Static and dynamic.

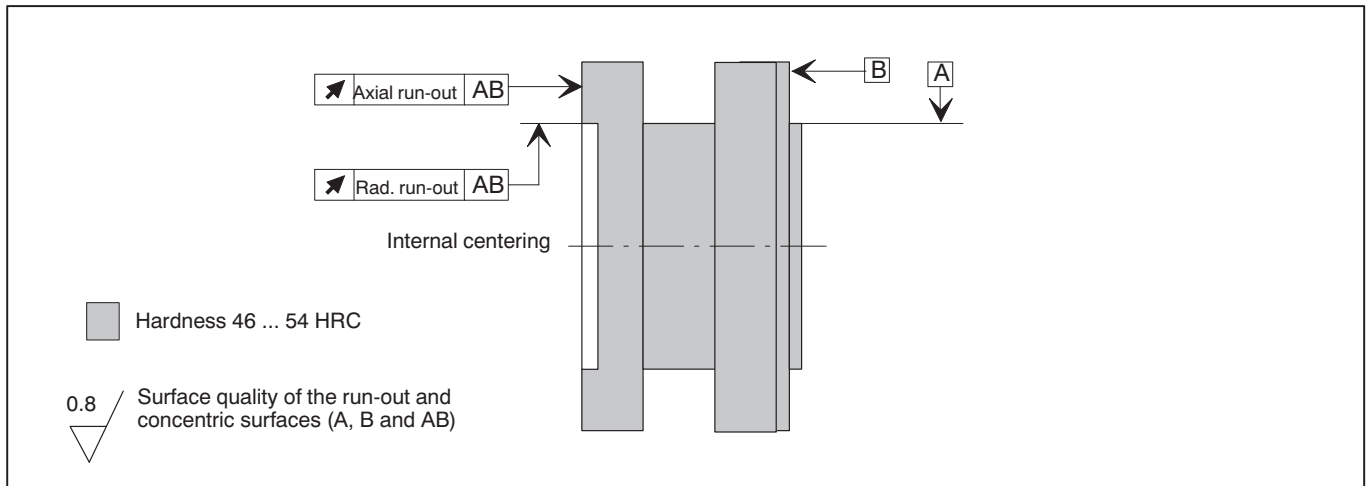
¹⁰⁾ The nominal (rated) torque must not be exceeded.

Specifications (continued)

Nominal (rated) torque M_{nom}	N·m	200	500					
	kN·m			1	2	3	5	10
Mechanical values								
Torsional stiffness c_T	kN·m/rad	360	745	1165	2515	3210	5565	14335
Torsion angle at M_{nom}	Deg.	0.032	0.038	0.049	0.046	0.054	0.051	0.040
Stiffness in the axial direction c_a	kN/mm	540	450	580	540	570	760	960
Stiffness in the radial direction c_r	kN/mm	315	560	860	1365	1680	2080	2940
Stiffness during the bending moment round a radial axis c_b	kN·m/deg.	3.6	4.2	5.9	9	9.3	20.2	45.5
Maximum deflection at longitudinal force limit	mm	< 0.04	< 0.05		< 0.06		< 0.08	< 0.09
Additional max. radial run-out deviation at lateral limit force	mm	< 0.02						
Additional plumb/parallel deviation at bending limit moment (at $\varnothing d_B$)	mm	< 0.06	< 0.11	< 0.09	< 0.18	< 0.19	< 0.14	< 0.12
Balance quality level per DIN ISO 1940		G 2.5						
Max. limits for relative shaft vibration (peak to peak) ¹¹⁾ 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·m ²	0.0017	0.0045	0.0139	0.0142	0.0341	0.0914	
Proportional mass moment of inertia for the transmitter side (side of the flange with external centering)		63	51	50	49	45		
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						

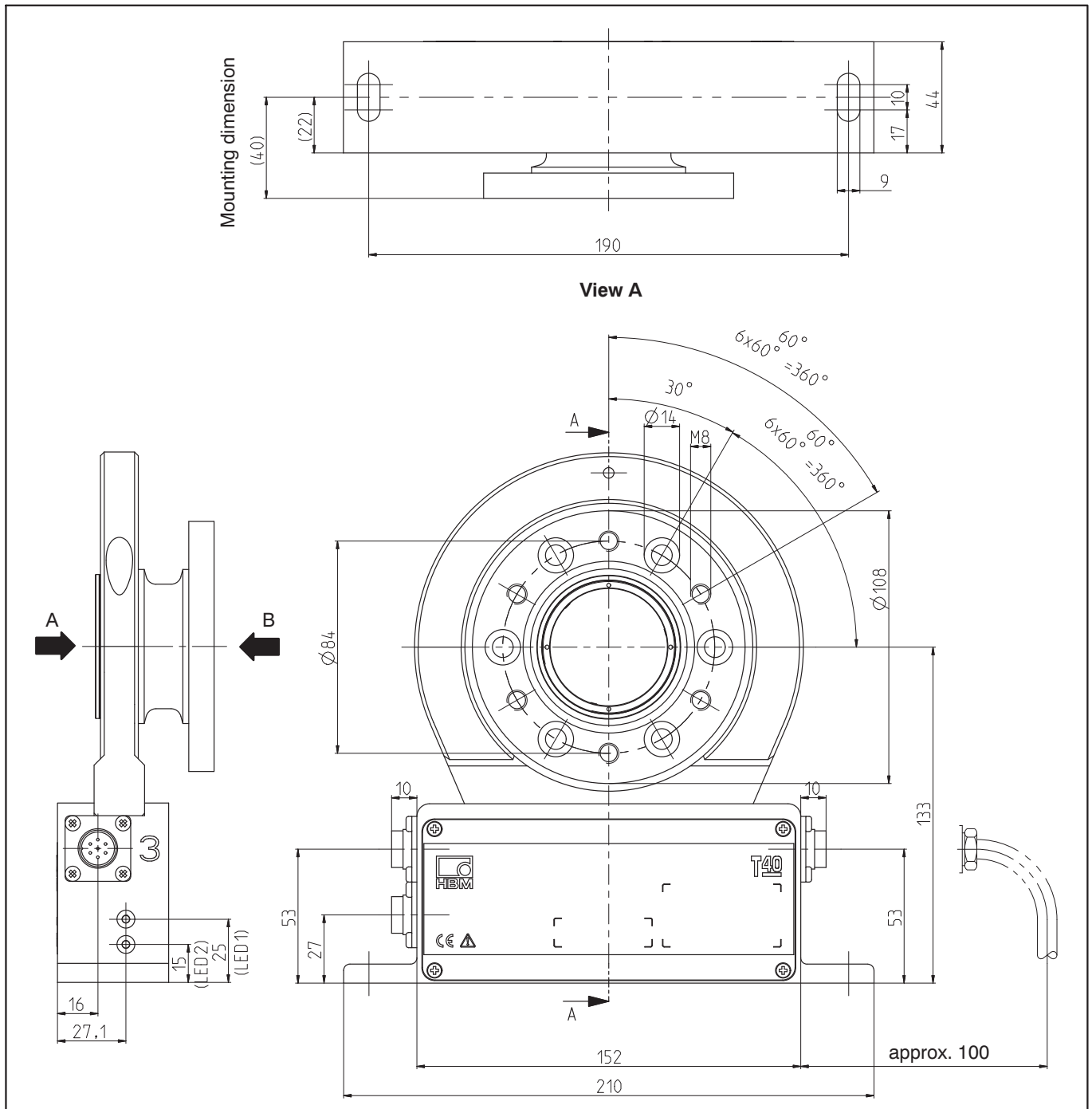
¹¹⁾ The impact of radial run-out deviations, eccentricity, defects of form, notches, marks, local residual magnetism, structural variations or material anomalies needs to be taken into account and isolated from the actual wave oscillation.

Run-out and concentric tolerances

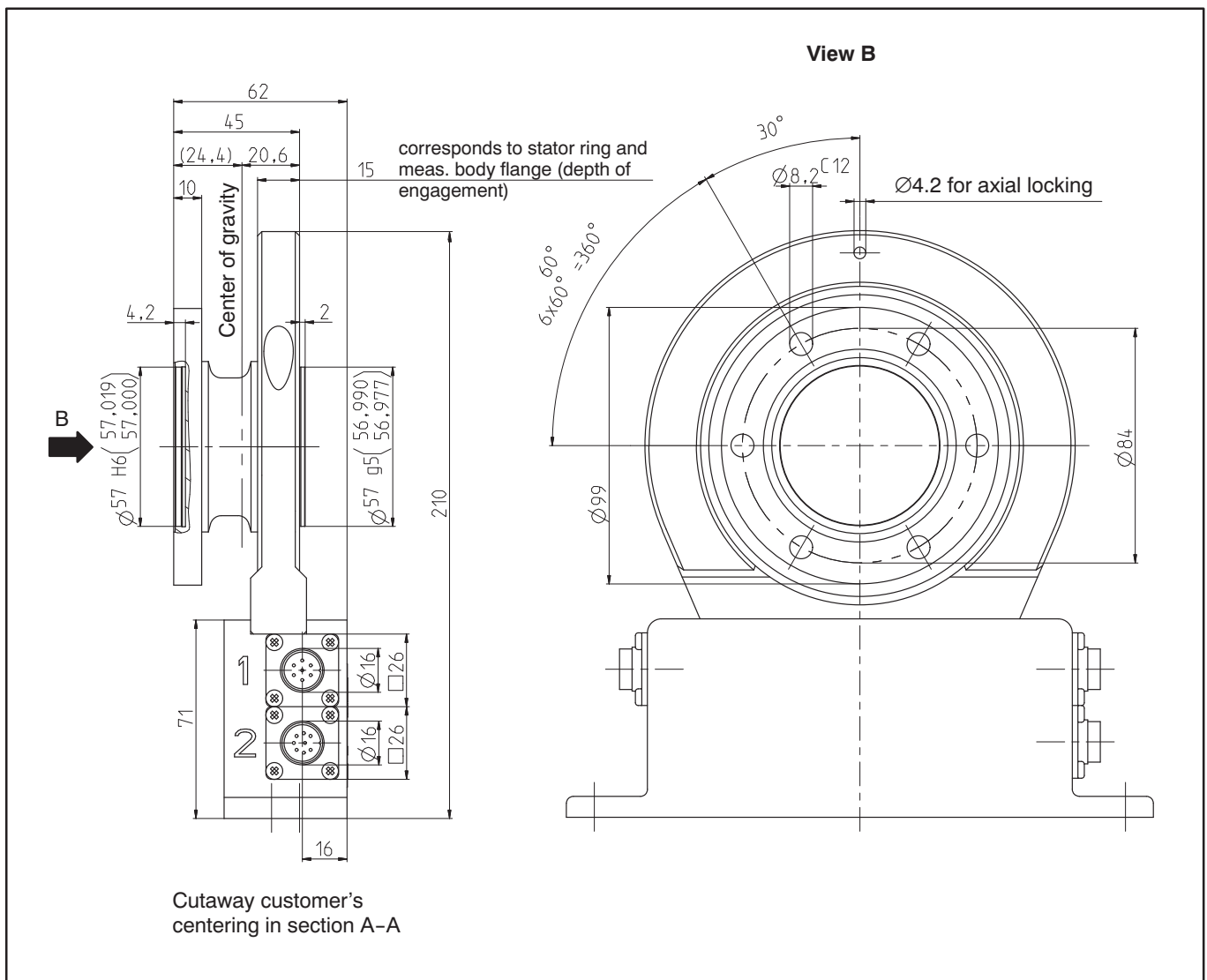


Measuring range (N·m)	Axial run-out tolerance (mm)	Radial run-out tolerance (mm)
200	0.01	0.01
500	0.01	0.01
1 k	0.01	0.01
2 k	0.02	0.02
3 k	0.02	0.02
5 k	0.02	0.02
10 k	0.02	0.02

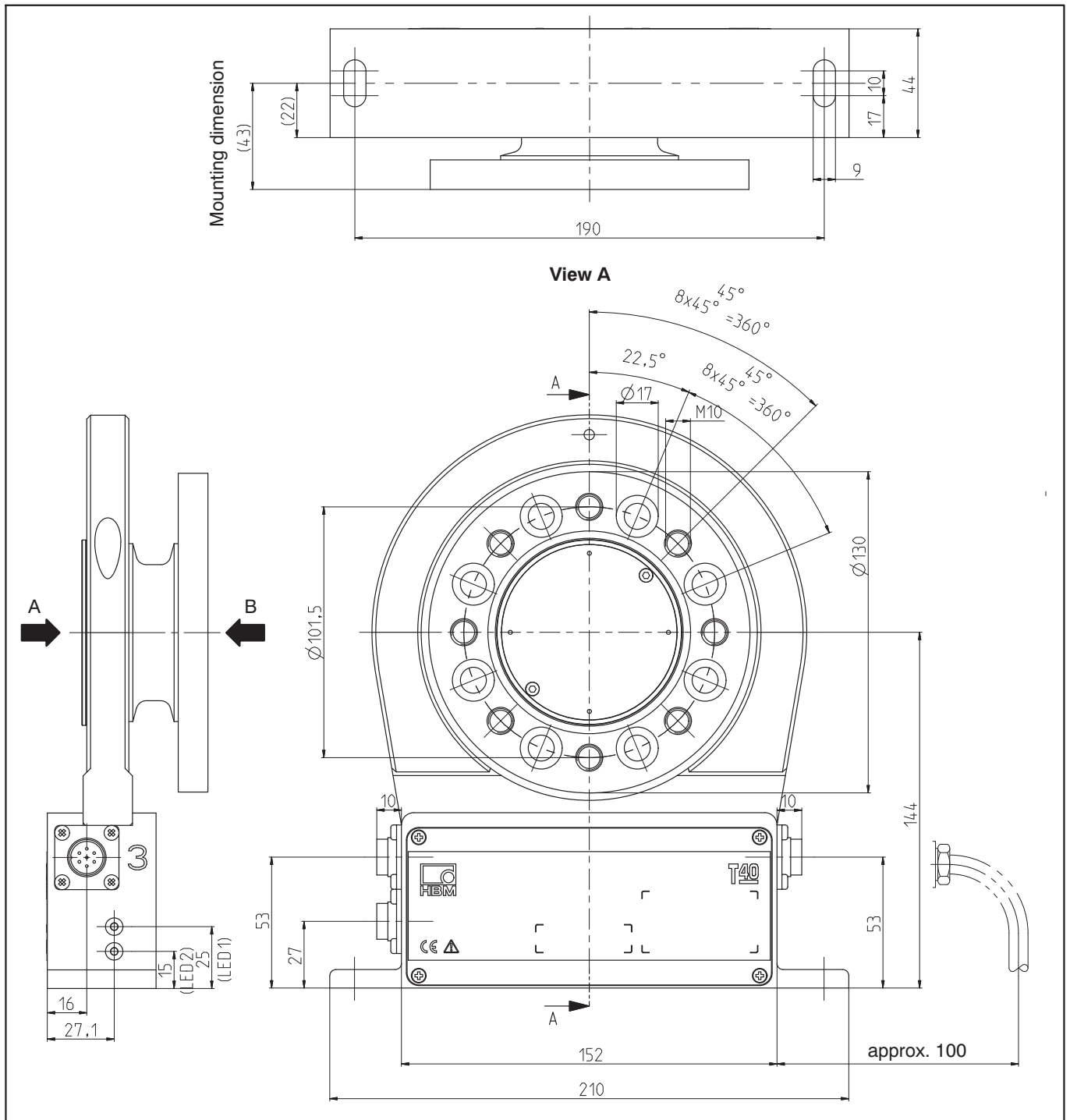
Dimensions T40/200 N · m (in mm; 1 mm=0.03937 inches)



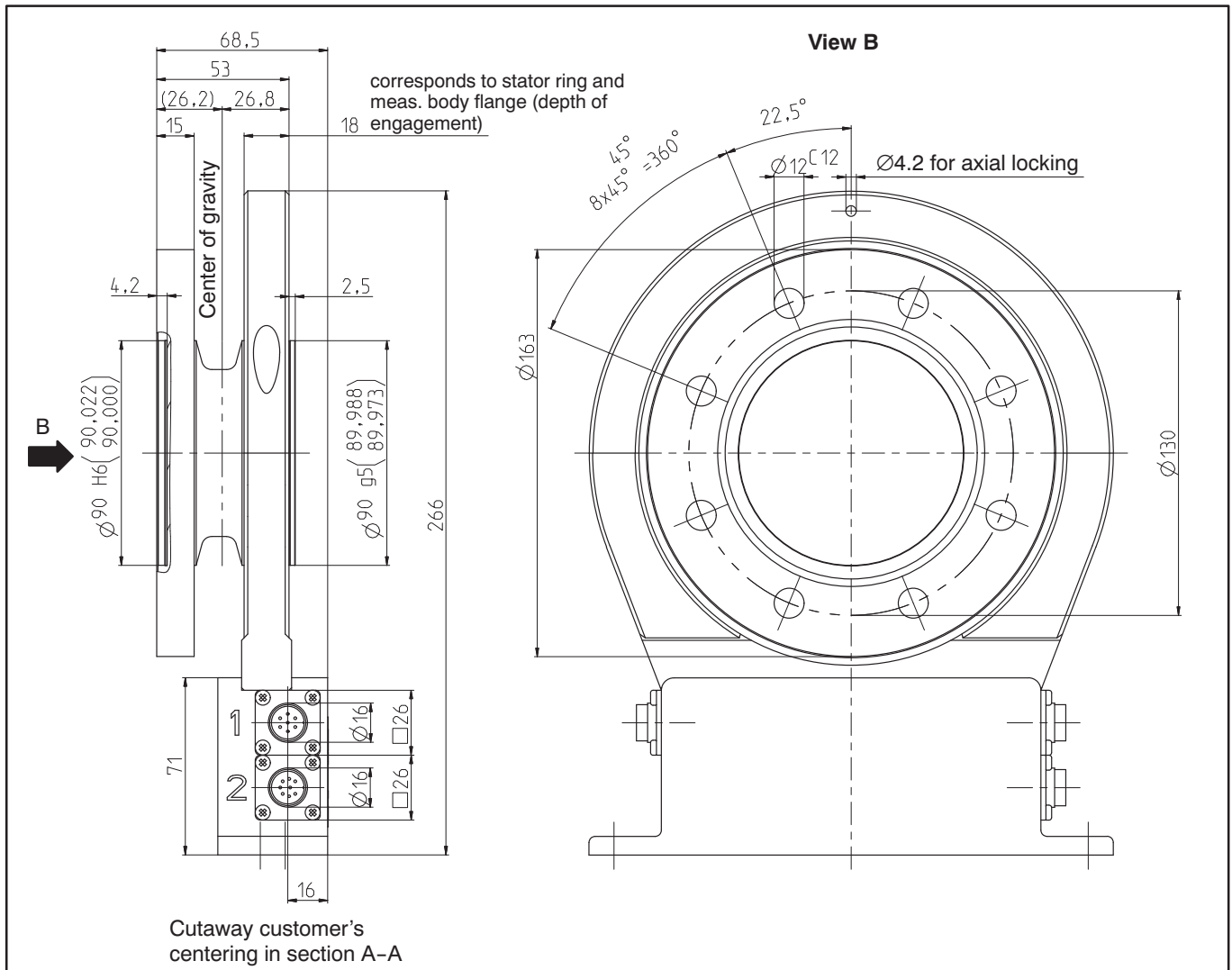
Dimensions T40/200 N · m (in mm; 1 mm=0.03937 inches), continued



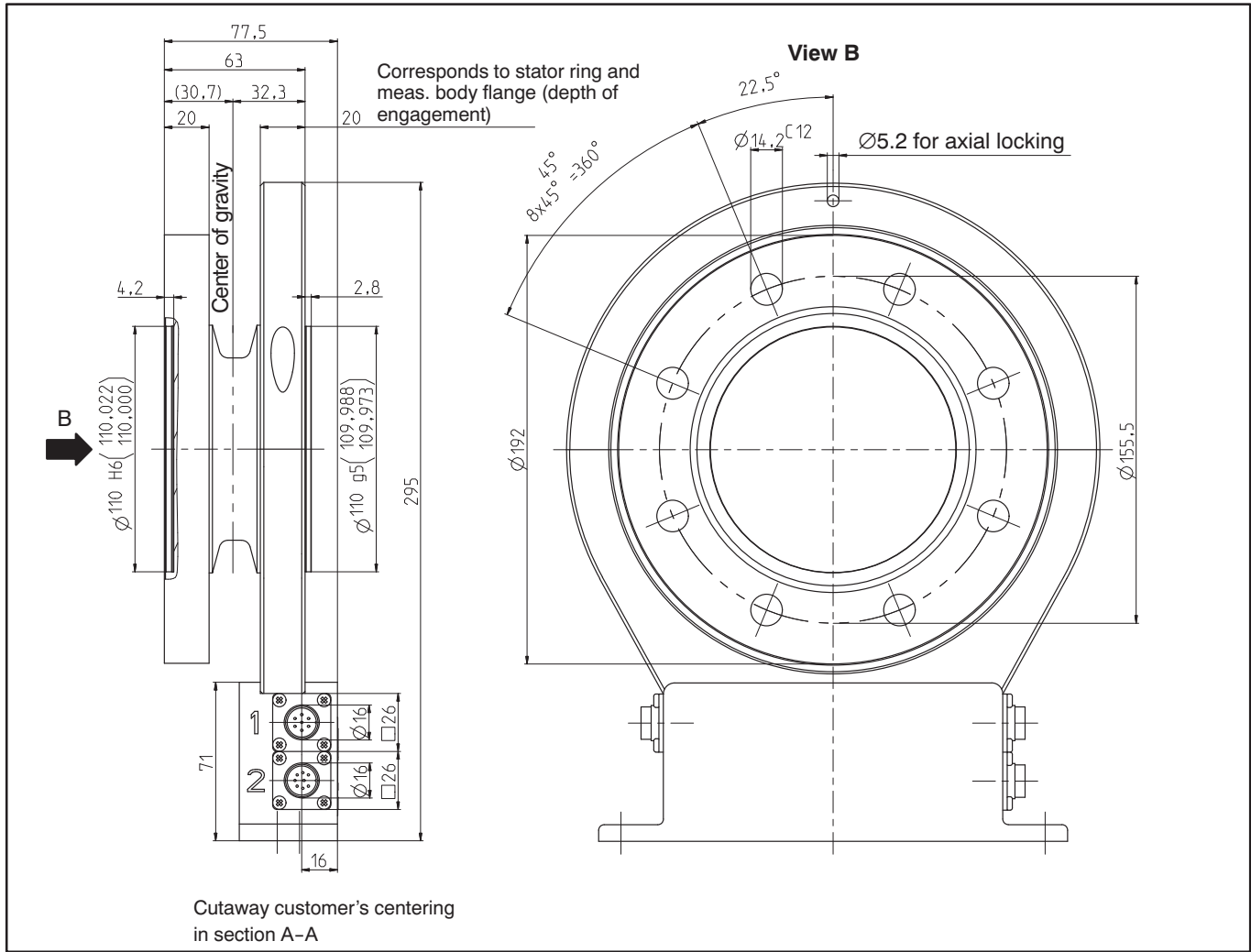
Dimensions T40/500 N · m and 1 kN · m (in mm; 1 mm=0.03937 inches)



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



Dimensions T40/5 kN·m (in mm; 1 mm=0.03937 inches), continued



Order numbers

Order no.		
K-T40		
Code	Option 1: Measuring range up to	
200Q	200 N·m	
500Q	500 N·m	
001R	1 kN·m	
002R	2 kN·m	
003R	3 kN·m	
005R	5 kN·m	
010R	10 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 [only with Option 2 = MF / ST]	
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	
<p>K-T40- <input type="text"/> - <input type="text"/> - <input type="text" value="S"/> - <input type="text" value="M"/> - <input type="text"/> - <input type="text" value="0"/> - <input type="text" value="S"/></p>		

= 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

Regional Distributor



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