

DATA SHEET

T210

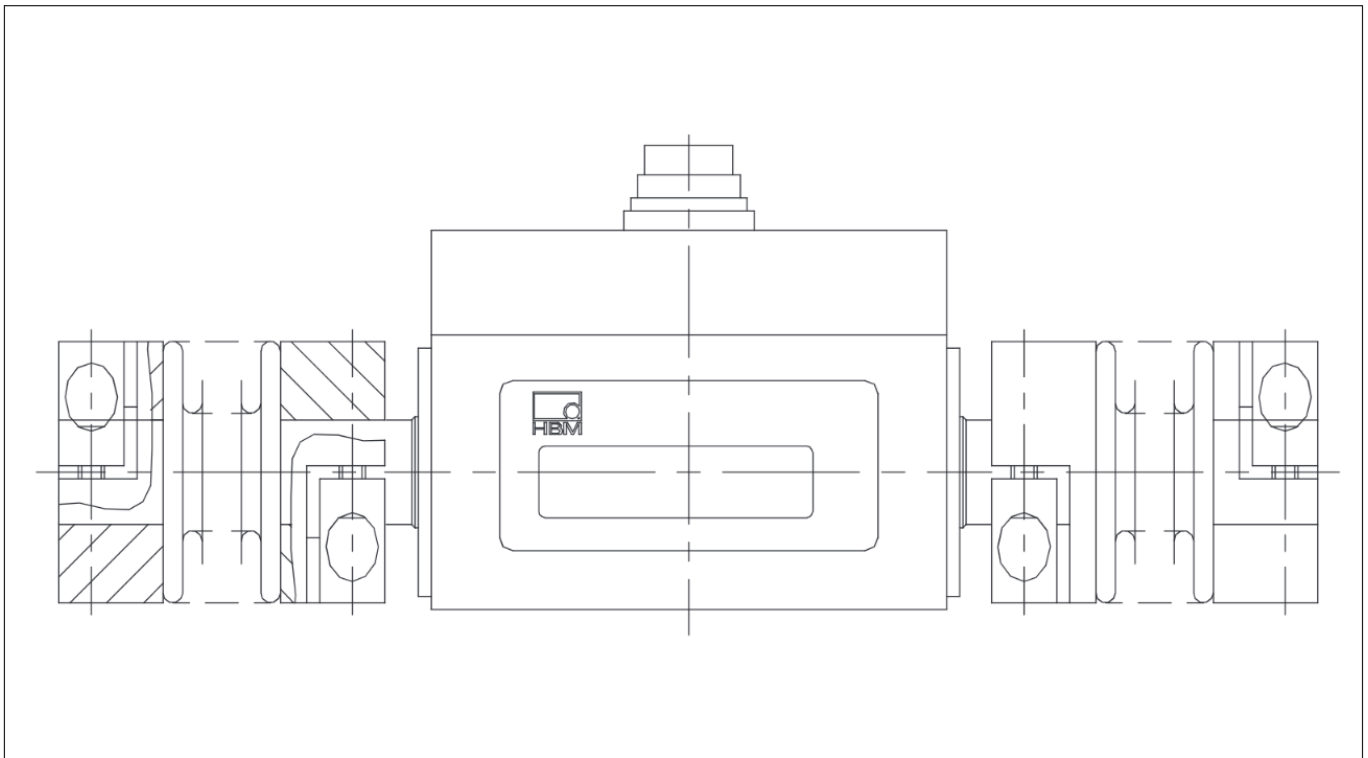
Torque transducers

SPECIAL FEATURES

- Linearity deviation, including hysteresis $\leq \pm 0.05\%$
- Nominal (rated) torque of 0.5 to 200 Nm
- High speeds of up to 30,000 rpm
- Rotational speed measurement with 512 pulses/revolution
- Output signals ± 10 V and 10 kHz ± 5 kHz
- Non-contacting transmission of measured values
- Cylindrical shaft ends for friction fits



INSTALLATION EXAMPLE WITH BELLOWS COUPLINGS



SPECIFICATIONS

Type		T210								
Accuracy class		0.1								
Size		BG1			BG2			BG3		
Nominal (rated) torque M _{nom}	Nm	0.5	1	2	5	10	20	50	100	200
Maximum speed n _{max}	rpm	30,000			20,000			14,000		
Torque measuring system										
Linearity deviation including hysteresis relating to the rated output (nominal)	%	≤ ±0.05								
Relative standard deviation of repeatability, as per DIN 1319 relating to the variation of the output signal	%	≤ ±0.05								
Temperature effect per 10 K in the nominal (rated) temperature range on the output signal, relating to the actual value of the signal spread										
Frequency output	%	≤ ±0.1								
Voltage output	%	≤ ±0.1								
on the zero signal relating to the rated output (nominal)										
Frequency output	%	≤ ±0.1								
Voltage output	%	≤ ±0.1								
Nominal (rated) sensitivity (nominal (rated) signal range between torque = zero and nominal (rated) torque)										
Frequency output 10 kHz	kHz	5								
Voltage output	V	10								
Rated output tolerance (deviation of the actual output quantity at M _{nom} from the nominal (rated) signal range)	%	≤ ±0.1								
nominal (rated) output signal										
Frequency output (RS422, 5V symmetrical)										
with positive nominal (rated) torque	kHz	15								
with negative nominal (rated) torque	kHz	5								
Voltage output										
with positive nominal (rated) torque	V	+10								
with negative nominal (rated) torque	V	-10								
Output signal at torque = zero										
Frequency output	kHz	10								
Voltage output	V	0								
Calibration signal	%vC	50								
Load resistance										
Frequency output (differential)	Ω	≥100								
Voltage output	kΩ	≥100								
Long-term drift over 48 h at reference temperature										
Frequency output	%	<005								
Voltage output	%	<0.5								
Measurement frequency range, -3 db	kHz	1								
Residual ripple (voltage output)	mV _{SS}	<100								
Group delay	ms	<1								
Maximum modulation range										
Frequency output	kHz	4.4 ... 15.6 (switch-on process: approx. 0)								
Voltage output	V	-11.2 ... +11.2 (switch-on process: approx. -14)								
Resolution										
Frequency output	Hz	0.5 at 10 kHz								
Voltage output	mV	0.5								

Type		T210								
Nominal (rated) torque M _{nom}	Nm	0.5	1	2	5	10	20	50	100	200
Energy supply										
Nominal (rated) supply voltage (safety extra low voltage (SELV))	V DC	10...30								
Calibration signal triggering	V	3 ... 30								
Current consumption in measuring mode	A	<0.2 (at U _{b12V})								
Nominal (rated) power consumption	W	<2.5 (in the range of the nominal (rated) supply voltage)								
Permissible residual ripple of supply voltage	mV _{SS}	400								
Measurement system for rotational speed/angle of rotation										
Measurement system		Optical								
Pulses per revolution	n	512								
Output signal	V	5 (asymmetrical), two square wave signals, shifted by approx. 90°								
Minimum rotational speed for sufficient pulse stability	rpm	0								
Load resistance	Ω	>200								
Group delay	µs	1.5								
General information										
EMC immunity to interference (as per EN 61326-1, Table A.1)										
Electromagnetic field	V/m	10								
Magnetic field	A/m	100								
Electrostatic discharge (ESD)										
Contact discharge	kV	4								
Air discharge	kV	4								
Fast transients (burst)	kV	1								
Emission (as per EN 61326-1, Table 3)										
RFI voltage		Class B								
RFI power		Class B								
RFI field strength		Class B								
Degree of protection as per EN 60529		IP40								
Weight, approx.	kg	0.2			0.6			1.3		
Nominal (rated) temperature range	°C	+10...+70								
Operating temperature range	°C	-20...+85								
Storage temperature range	°C	-40...+85								
Mechanical shock resistance according to EN 60068-2-27										
Number	n	1,000								
Duration	ms	3								
Acceleration (half sine)	m/s ²	650								
Vibration testing per EN 60068-2-6										
Frequency range	Hz	10...2,000								
Duration	h	1.5								
Acceleration	m/s ²	50								

Type		T210								
Nominal (rated) torque M _{nom}	Nm	0.5	1	2	5	10	20	50	100	200
Load limits ¹⁾ Limit torque, relating to M _{nom} Breaking torque, relating to M _{nom} Axial limit force Lateral limit force ²⁾ Oscillation width as per DIN 50100 (peak-to-peak) ³⁾	% % N N %	200 ≥300 200 350 500 1,100 1,750 2,500 5,000 7,000 9,500 4 6 10 15 30 50 100 150 250 80								
Mechanical values										
Torsional stiffness c_T	Nm/rad	46	89	133	585	1,367	2,933	10,893	24,043	50,388
Torsion angle at M_{nom}	°	0.62	0.64	0.86	0.49	0.42	0.39	0.26	0.24	0.23
Max. permissible vibration displacement of the rotor (peak-to-peak) ⁴⁾ Undulations in the connection geometry, based on ISO 7919-3	µm	$s_{\max} = \frac{4500}{\sqrt{n}} \text{ (n in min}^{-1}\text{)}$								
Effective velocity in the vicinity of the housing, as per VDI 2056		$v_{\text{eff}} = \frac{\sqrt{n}}{3} \text{ (n in min}^{-1}\text{)}$								
Mass moment of inertia of the rotor (around the rotational axis)	g*cm ²	9.5	9.5	9.5	130	135	140	910	920	930
Balance quality level as per DIN ISO 1940		G6.3								

¹⁾ Each type of irregular stress (lateral or longitudinal force, exceeding nominal (rated) torque) can only be permitted up to its specified static load limit and provided none of the others can occur at the same time. If this condition is not met, the limit values must be reduced. If 50% of the lateral limit force occurs, only 50% of the axial limit force is permissible and the nominal (rated) torque must not be exceeded. In the measurement result, the permissible irregular stresses can have an effect of approx. 1% of the nominal (rated) torque.
The specified loads only apply to the measurement shaft and must not be routed or stabilized via the housing.

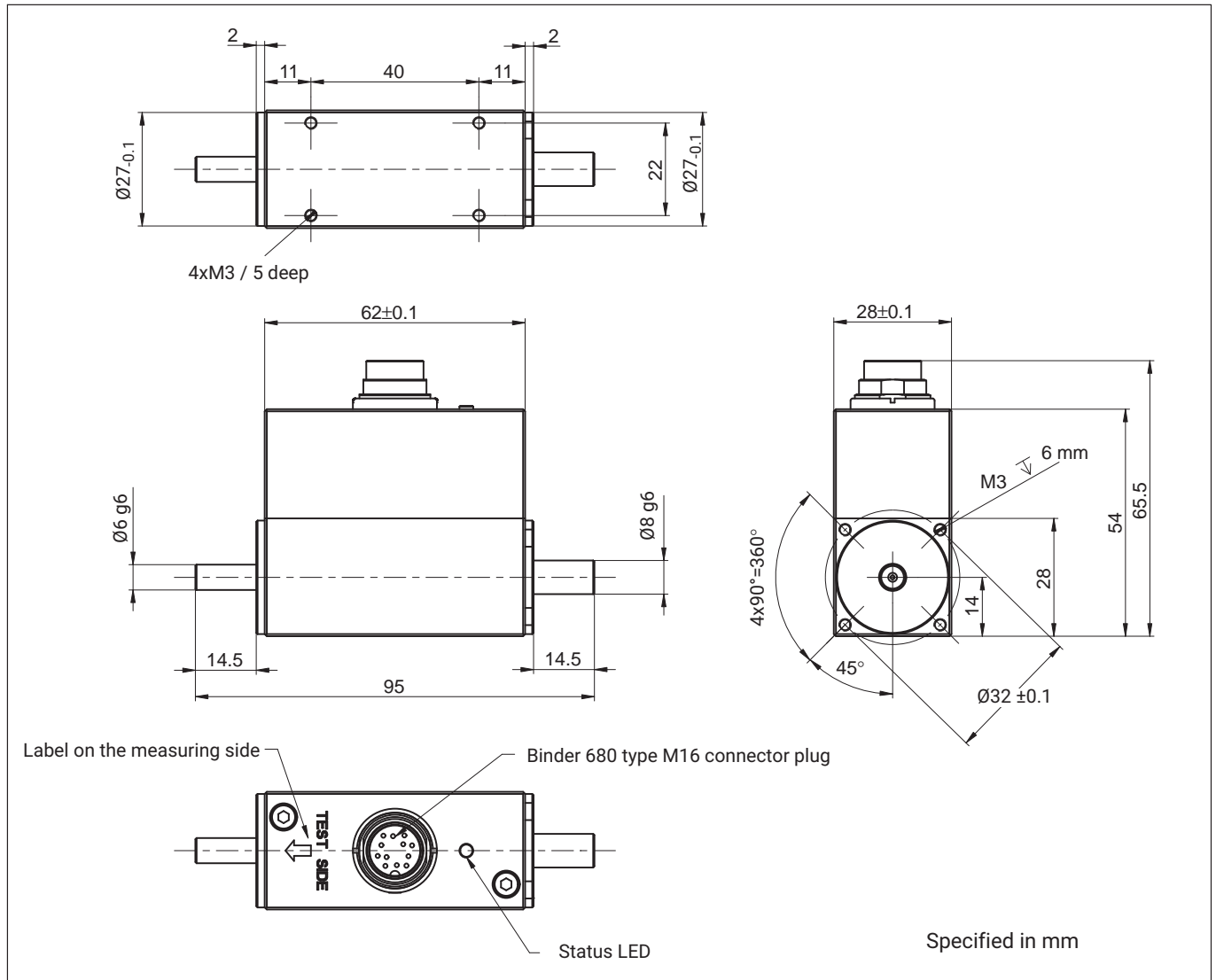
²⁾ Measured on the center of the shaft stub.

³⁾ The nominal (rated) torque must not be exceeded.

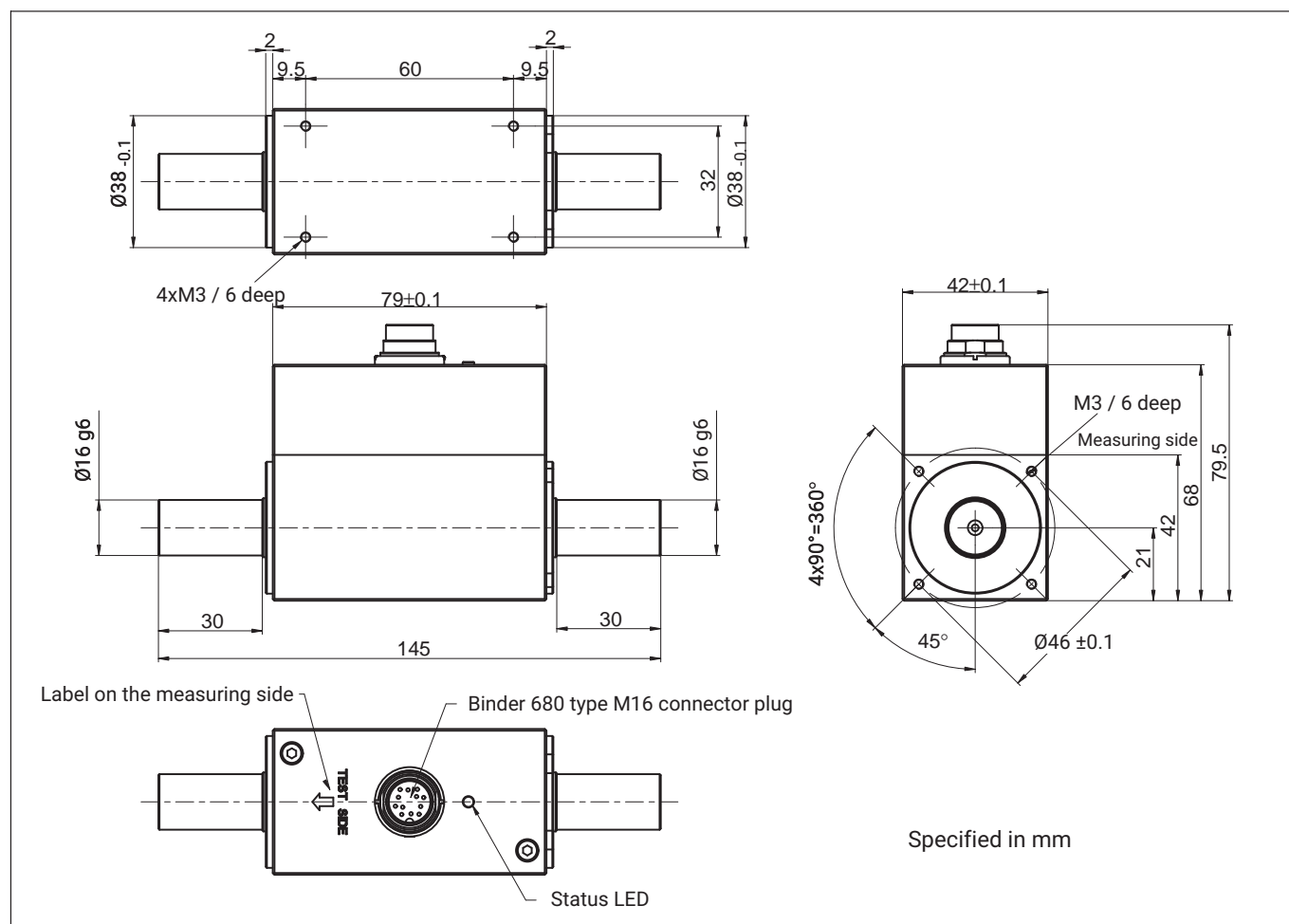
⁴⁾ The influence on the vibration measurements caused by radial run-out deviations, eccentricity, defects of form, notches, marks, local residual magnetism, structural inhomogeneity or material anomalies must be taken into account and isolated from the actual undulation.

DIMENSIONS

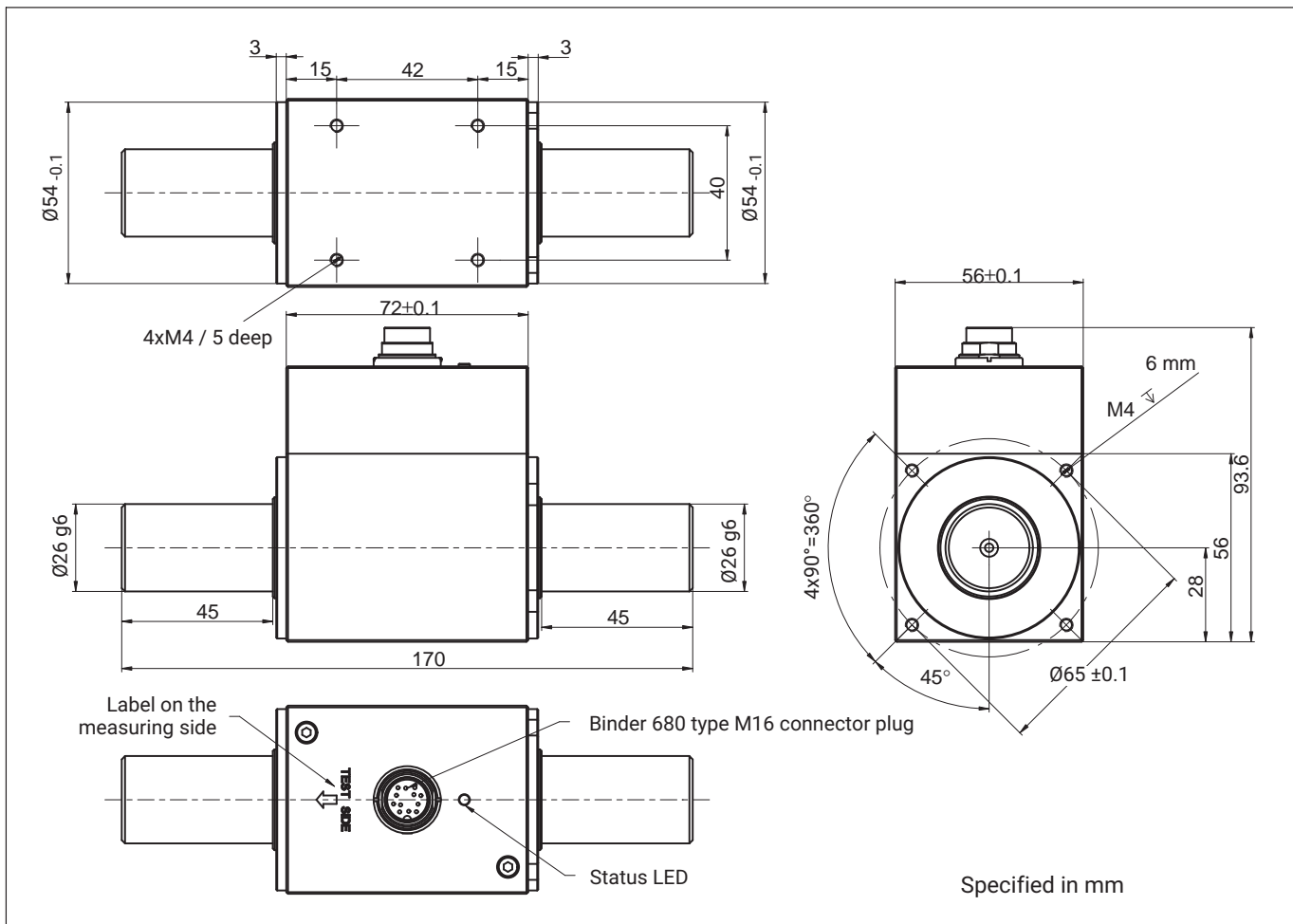
BG1 – 0.5 Nm, 1 Nm, 2 Nm



BG2 – 5 Nm, 10 Nm, 20 Nm



BG3 – 50 Nm, 100 Nm, 200 Nm



ORDERING NUMBERS

The following versions are available as standard products at short notice from the warehouse:

Material no.	Nominal (rated) torque (Nm)
1-T210/0.5NM	0.5
1-T210/1NM	1
1-T210/2NM	2
1-T210/5NM	5
1-T210/10NM	10
1-T210/20NM	20
1-T210/50NM	50
1-T210/100NM	100
1-T210/200NM	200

SCOPE OF SUPPLY

- T210 torque transducer
- Test report
- Mounting instructions

ACCESSORIES

To be purchased separately.

- Transducer connection cable, 5 m long, order no. 3-3301.0158
- Transducer connection cable, 10 m long, order no. 3-3301.0159
- Cable socket, 12-pin (binder), order no. 3-3312.0268
- Junction box, order no. 1-VK20A
- Bellows couplings, e.g. 1-4413.00xx

ACCESSORIES FOR JUNCTION BOX VK20A

To be purchased separately.

- Connection cable, 1.5 m long (D-Sub, 15-pin – free ends), order no. 1-KAB151A-1.5
- Connection cable, 1.5 m long (SUBCON5 – free ends), order no. 1-KAB152-1.5

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