

# TB1A

## Reference Torque Measuring Discs

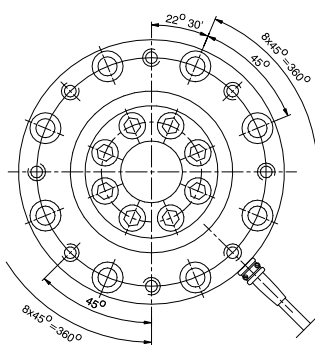


### Special features

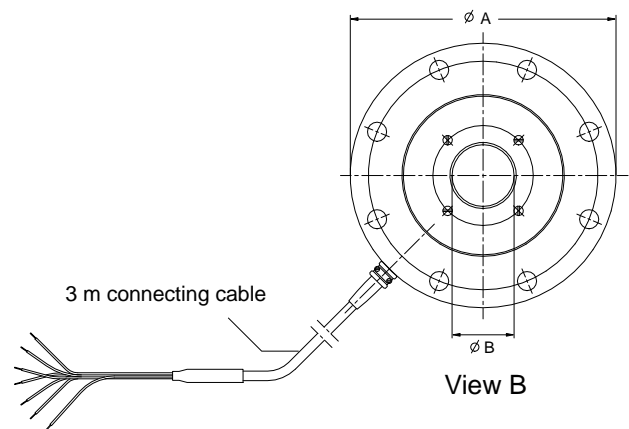
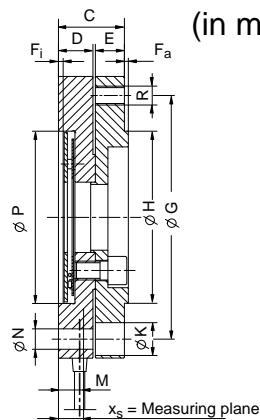
- Accuracy class 0.05
- Nominal torques from 100 N·m to 10 kN·m
- Little space required due to low profile
- Extremely insensitive to lateral and axial forces and to bending moments
- High permissible oscillation amplitude

### Dimensions

(in mm; 1 mm= 0.03937 inches)



View A



View B

| Nominal torque | ∅A  | ∅B <sub>±0.1</sub> | C    | D    | E    | F <sub>i</sub> | F <sub>a</sub> | ∅G <sub>±0.1</sub> | ∅H <sub>G6</sub> | ∅K | M   | ∅N  | ∅PH7 | R     | x <sub>s</sub> |
|----------------|-----|--------------------|------|------|------|----------------|----------------|--------------------|------------------|----|-----|-----|------|-------|----------------|
| 100 N·m        | 100 | 40.2               | 25   | 15.5 | 7.5  | 2.5            | 3.0            | 87                 | 75               | 11 | 7.8 | 6.4 | 75   | 8xM6  | 13             |
| 200 N·m        | 121 | 40.2               | 30.5 | 17.5 | 11   | 2.5            | 3.0            | 105                | 90               | 14 | 8.8 | 8.4 | 90   | 8xM8  | 14             |
| 500 N·m        | 156 | 41                 | 40.5 | 20.5 | 18   | 2.5            | 3.0            | 133                | 110              | 20 | 9   | 13  | 110  | 8xM12 | 15.5           |
| 1 kN·m         | 156 | 41                 | 40.5 | 20.5 | 18   | 2.5            | 3.0            | 133                | 110              | 20 | 9   | 13  | 110  | 8xM12 | 15.5           |
| 2 kN·m         | 191 | 69                 | 42.5 | 22.5 | 18   | 2.5            | 3.0            | 165                | 140              | 24 | 9   | 15  | 140  | 8xM14 | 16.5           |
| 5 kN·m         | 238 | 79                 | 64   | 28.5 | 33.5 | 2.5            | 3.0            | 206                | 174              | 30 | 9   | 19  | 174  | 8xM18 | 19.5           |
| 10 kN·m        | 238 | 79                 | 69   | 33.5 | 33.5 | 2.5            | 3.0            | 206                | 174              | 30 | 9   | 19  | 174  | 8xM18 | 22.5           |

# Specifications

| Type  | TB1A              |                            |       |       |       |       |       |       |
|---|-------------------|----------------------------|-------|-------|-------|-------|-------|-------|
| Accuracy class  | 0.05              |                            |       |       |       |       |       |       |
| Torque measuring system   |                   |                            |       |       |       |       |       |       |
| Nominal torque $M_N$  | N·m               | 100                        | 200   | 500   | 1 k   | 2 k   | 5 k   | 10 k  |
| <b>Nominal sensitivity</b> (nominal signal span between torque = zero and nominal torque)                         | mV/V              | 1.5                        |       |       |       |       |       |       |
| <b>Sensitivity tolerance</b> (deviation of the actual output quantity at $M_N$ from the nominal signal span)      | %                 | < ±0.1                     |       |       |       |       |       |       |
| <b>Temperature effect per 10 K in the nominal temperature range</b>   |                   |                            |       |       |       |       |       |       |
| On output signal (related to actual value)  | %                 | < ±0.05                    |       |       |       |       |       |       |
| On zero signal (related to nominal sensitivity)   | %                 | < ±0.05                    |       |       |       |       |       |       |
| <b>Linearity deviation, including hysteresis</b> (related to nominal sensitivity)                                 | %                 | < ±0.03                    |       |       |       |       |       |       |
| <b>Relative standard deviation of repeatability according to DIN 1319</b> (related to variation of output signal) | %                 | < ±0.01                    |       |       |       |       |       |       |
| <b>Input resistance at reference temperature</b>  | Ω                 | 1750 ± 200                 |       |       |       |       |       |       |
| <b>Output resistance at reference temperature</b>   | Ω                 | 1400 ± 30                  |       |       |       |       |       |       |
| <b>Reference excitation voltage</b>   | V                 | 5                          |       |       |       |       |       |       |
| <b>Maximum permissible excitation voltage</b>   | V                 | 20                         |       |       |       |       |       |       |
| <b>Operating range of the excitation voltage</b>  | V                 | 2.5...12                   |       |       |       |       |       |       |
| <b>Reference temperature</b>  | °C [°F]           | +23 [+73.4]                |       |       |       |       |       |       |
| <b>Nominal temperature range</b>  | °C [°F]           | +10 ... +60 [+50 ... +140] |       |       |       |       |       |       |
| <b>Operating temperature range</b>  | °C [°F]           | -10 ... +60 [+14 ... +140] |       |       |       |       |       |       |
| <b>Storage temperature range</b>  | °C [°F]           | -20 ... +70 [-13 ... +158] |       |       |       |       |       |       |
| <b>Load limits<sup>1)</sup></b>   |                   |                            |       |       |       |       |       |       |
| <b>Limit torque</b> , related to $M_N$  | %                 | 200                        |       |       |       |       |       |       |
| <b>Breaking torque</b> , related to $M_N$   | %                 | >400                       |       |       |       |       |       |       |
| <b>Axial limit force</b>  | kN                | 2                          | 4     | 7     | 7     | 12    | 22    | 31    |
| <b>Lateral limit force</b>  | kN                | 1                          | 3     | 6     | 8     | 15    | 30    | 40    |
| <b>Bending limit moment</b>   | N·m               | 70                         | 140   | 500   | 500   | 1000  | 2500  | 4000  |
| <b>Oscillation bandwidth according to DIN 50100</b> (peak-to-peak) <sup>2)</sup>                                  | kN·m              | 0.16                       | 0.32  | 0.8   | 1.6   | 3.2   | 8.0   | 12.0  |
| <b>Mechanical data</b>  |                   |                            |       |       |       |       |       |       |
| <b>Torsional stiffness</b>  | kN·m/rad          | 160                        | 430   | 1000  | 1800  | 3300  | 9900  | 15000 |
| <b>Rotation angle</b>   | degree            | 0.036                      | 0.027 | 0.028 | 0.032 | 0.034 | 0.029 | 0.038 |
| <b>Max. deflexion at axial limit force</b>  | mm                | <0.03                      |       |       |       |       |       |       |
| <b>Additional max. concentricity error at lateral limit force</b>   | mm                | <0.01                      |       | <0.02 |       | <0.03 |       |       |
| <b>Additional plumb parallel deviation at bending limit moment</b>  | mm                | <0.2                       |       |       |       |       |       |       |
| <b>Mass moment of inertia of the rotor (around the axis of rotation) x 10<sup>-3</sup></b>                        | kg·m <sup>2</sup> | 1.3                        | 3.4   | 13.2  | 13.2  | 29.6  | 110   | 120   |
| <b>Pro rata mass moment of inertia (measurement side)</b>   | %                 | 51                         | 44    | 39    | 39    | 38    | 31    | 33    |

<sup>1)</sup> Each type of irregular stress can only be permitted with its given limit value (bending moment, lateral force or axial force, exceeding the nominal torque) if none of the others can occur. Otherwise the limit values must be reduced. If for instance 30 % of the bending limit moment and also 30 % of the lateral limit force are present, only 40 % of the axial limit force are permitted, provided that the nominal torque is not exceeded. With maximum additional loading, measuring errors of the order of approx. 1 % of the nominal torque can occur.

<sup>2)</sup> The nominal torque must not then be exceeded.

## Specifications (continued)

|   |                  |      |     |     |        |     |      |      |
|---|------------------|------|-----|-----|--------|-----|------|------|
| <b>Nominal torque <math>M_N</math></b>  | N·m              | 100  | 200 | 500 | 1 k    | 2 k | 5 k  | 10 k |
| <b>Additional reliability data</b>  |                  |      |     |     |        |     |      |      |
| <b>Impact resistance, test severity level to IEC 68; part 2-27; IEC 68-2-27-1987</b>  |                  |      |     |     |        |     |      |      |
| Number of impacts   | n                |      |     |     | 1000   |     |      |      |
| Duration  | ms               |      |     |     | 3      |     |      |      |
| Acceleration (half-sine)  | m/s <sup>2</sup> |      |     |     | 650    |     |      |      |
| <b>Vibration resistance, test severity level to IEC 68; part 2-6; IEC 68-2-6-1987</b> |                  |      |     |     |        |     |      |      |
| Frequency range   | Hz               |      |     |     | 5...65 |     |      |      |
| Duration  | h                |      |     |     | 1.5    |     |      |      |
| Acceleration (amplitude)  | m/s <sup>2</sup> |      |     |     | 50     |     |      |      |
| <b>Degree of protection</b> according to EN 60 529                                    |                  |      |     |     | IP 54  |     |      |      |
| <b>Weight, approx.</b>  | kg               | 0.95 | 1.8 | 3.5 | 3.5    | 5.8 | 14.0 | 15.2 |

## Complementary data for classification using DKD measurement according to DIN 51309.

|   |     |                                 |     |     |                            |     |     |      |
|---|-----|---------------------------------|-----|-----|----------------------------|-----|-----|------|
| <b>Type</b>   |     | <b>TB1A</b>                     |     |     |                            |     |     |      |
| <b>Class</b>  |     | 0.1 (typically 0.05)            |     |     |                            |     |     |      |
| <b>Nominal torque <math>M_N</math></b>  | N·m | 100                             | 200 | 500 | 1 k                        | 2 k | 5 k | 10 k |
| <b>Rel. error of the zero signal <math>f_0</math></b> (zero point return), related to the full scale                  | %   | < ± 0.025 (typically < ± 0.012) |     |     |                            |     |     |      |
| <b>Rel. repeatability and reproducibility errors (0.2<math>M_N</math> to <math>M_N</math>)</b> , rel. to actual value |     |                                 |     |     |                            |     |     |      |
| in unchanged mounting position b'   | %   |                                 |     |     | < 0.025 (typically < 0.01) |     |     |      |
| in different mounting positions b   | %   |                                 |     |     | < 0.05 (typically < 0.02)  |     |     |      |
| <b>Rel. reversibility error (0.2<math>M_N</math> to <math>M_N</math>) h</b> , related to the actual value             | %   |                                 |     |     | < 0.12 (typically < 0.06)  |     |     |      |

## Accessories, to be ordered separately:

Connector mounting

Factory-made cable extension 1-Kab0304A-10

Cable extension Kab8/00-2/2/2, length from 10 m

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measure and predict with confidence

