

# U10 M

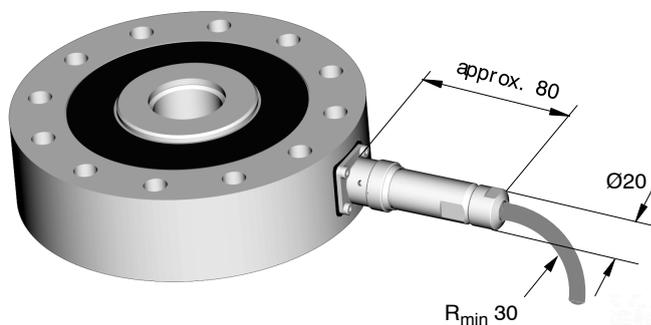
## Force transducers



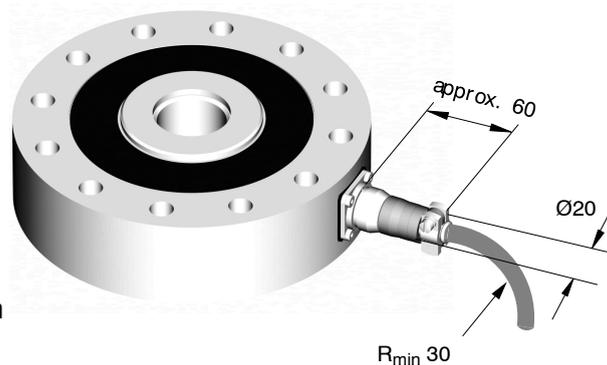
### Special features

- Tensile/compressive force transducer
- For dynamic and static applications
- Fatigue strength to full scale dynamic amplitude
- Electronic bending moment compensation
- Optional double bridge version
- Stainless material

### Mounting dimensions of connection variants

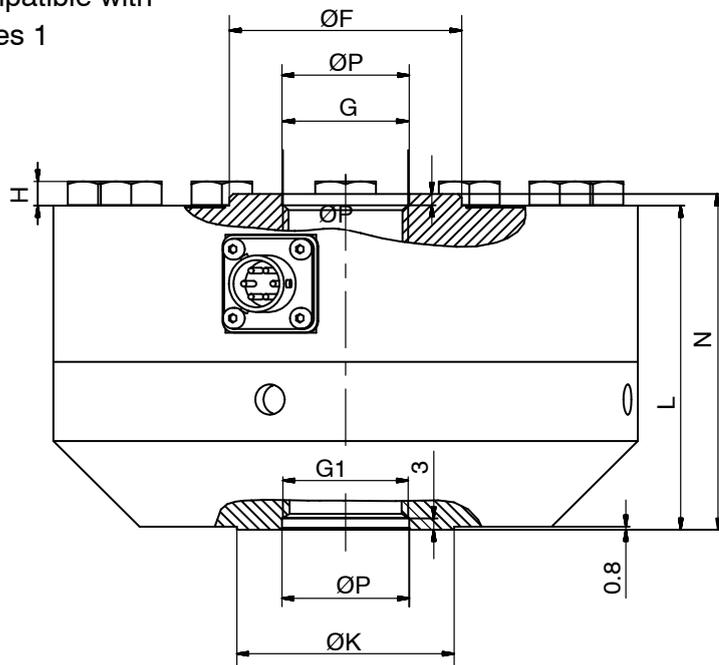
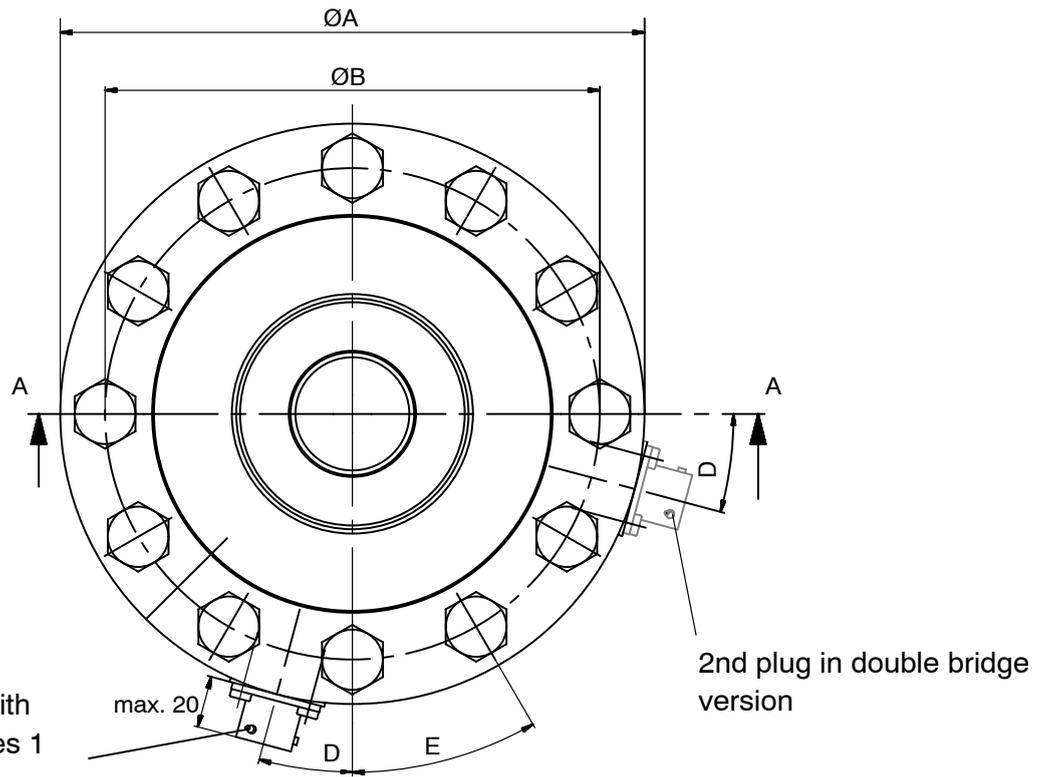


Connection cable **KAB 157-3** with bayonet locking



Connection cable **KAB 158-3** with threaded locking

## Dimensions of U10M with fitted adapter

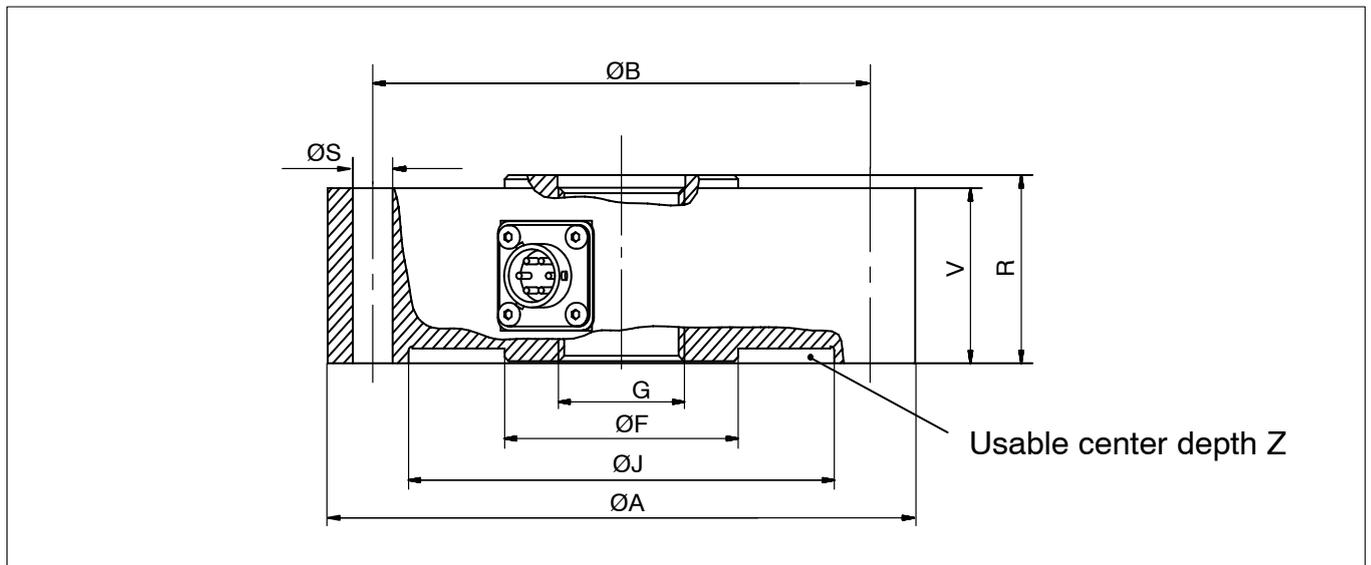


| Nom. (rated) force | ØA    | ØB    | D      | E     | ØF                 | G                  | G1                 | H   | ØK   | L     | N     | ØPH <sup>8</sup> |
|--------------------|-------|-------|--------|-------|--------------------|--------------------|--------------------|-----|------|-------|-------|------------------|
| 1.25-25kN          | 104.8 | 88.9  | 22.5°  | 45°   | 30.4 <sup>1)</sup> | M16x2-4H 28.4 deep | M16x2-4H 22.1 deep | 4   | 31.8 | 60.3  | 63.5  | 16.5             |
| 50-125kN           | 153.9 | 130.3 | 15°    | 30°   | 61.2 <sup>2)</sup> | M33x2-4H 35.6 deep | M33x2-4H 35.6 deep | 6.4 | 57.2 | 85.   | 89    | 33.5             |
| 250kN              | 203.2 | 165.1 | 11.25° | 22.5° | 95.5               | M42x2-4H 54.6 deep | M42x2-4H 44.5 deep | 7.5 | 76.2 | 108   | 114.3 | 43               |
| 500kN              | 279   | 229   | 11.25° | 22.5° | 122.2              | M72x2-4H 82.6 deep | M72x2-4H 69.8 deep | 10  | 114  | 152.4 | 165.1 | 73               |

<sup>1)</sup> 12.5 kN and 25 kN: 31.5;

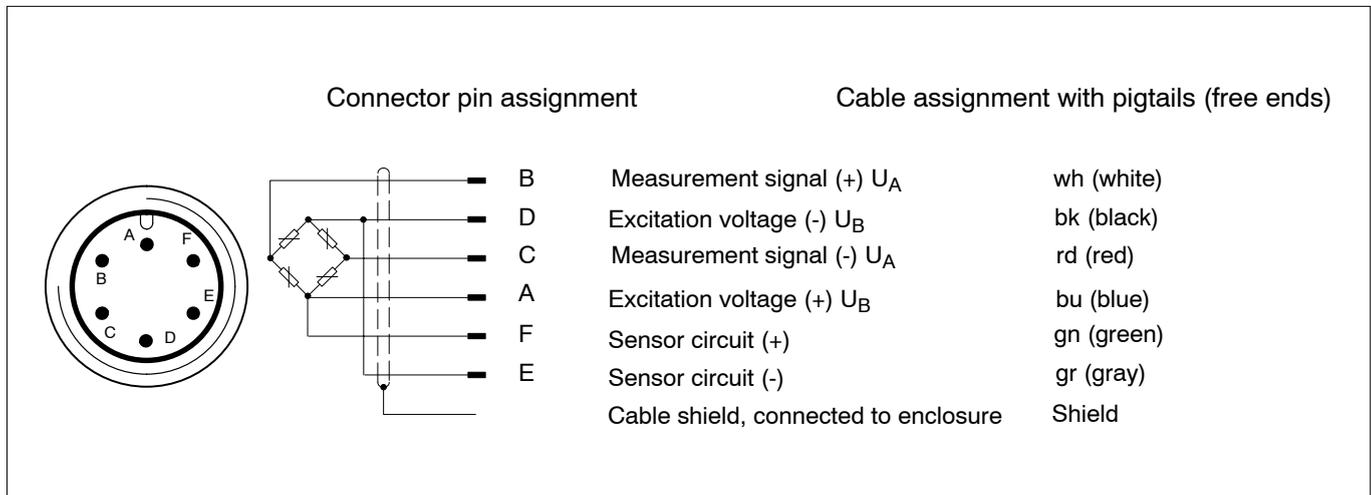
<sup>2)</sup> 125 kN: 67.3

## Dimensions of U10M without adapter



| Nominal (rated) force | ØA    | ØB    | ØS   | ØF    | ØJ       | G        | V    | R    | Z   |
|-----------------------|-------|-------|------|-------|----------|----------|------|------|-----|
| 1.25                  | 104.8 | 88.9  | 6.8  | 30.4  | 78 H8    | M16x2-4H | 31.7 | 34.9 | 2,5 |
| 2.5                   |       |       |      | 30.4  |          |          |      |      |     |
| 5                     |       |       |      | 30.4  |          |          |      |      |     |
| 12.5                  |       |       |      | 31.5  |          |          |      |      |     |
| 25                    |       |       |      | 31.5  |          |          |      |      |     |
| 50                    | 153.9 | 130.3 | 10.4 | 62.2  | 111.5 H8 | M33x2-4H | 41.4 | 44.5 | 3.5 |
| 125                   |       |       |      | 67.3  |          |          |      |      |     |
| 250                   | 203.2 | 165.1 | 13.5 | 95.5  | 143 H8   | M42x2-4H | 57.2 | 63.5 | 6   |
| 500                   | 279   | 229   | 16.8 | 122.2 | 175 H8   | M72x2-4H | 76.2 | 88.9 | 6   |

## Connector and cable assignment



### Accessories (to be ordered separately):

#### Cables / plugs

Connection cable with bayonet locking; IP67

3 m long; TPE outer sheath; 6 x 0.25 mm<sup>2</sup>; pigtails, shielded

Connection cable with threaded locking; IP54

3 m long; TPE outer sheath; 6 x 0.25 mm<sup>2</sup>; pigtails, shielded

Loose connector socket, bayonet locking

Loose connector socket, threaded terminal end

#### Ordering number:

1-KAB157-3

1-KAB158-3

3-3312.0350

3-3312.0354

## Specifications (VDI/VDE 2638)

| Nominal (rated) force  | $F_{nom}$   | kN              | 1.25                          | 2.5 | 5       | 12.5                   | 25                 | 50   | 125                | 250  | 500   |      |
|--|-------------|-----------------|-------------------------------|-----|---------|------------------------|--------------------|------|--------------------|------|-------|------|
| Nominal (rated) sensitivity  | $C_{nom}$   | mV/V            | 1 to 1.5 <sup>1)</sup>        |     |         | 2 to 2.5 <sup>1)</sup> |                    |      |                    |      |       |      |
| Relative deviation from zero   | $d_{s,o}$   | %               | 1                             |     |         |                        |                    |      |                    |      |       |      |
| Relative reversibility error ( $0.4F_{nom}$ )                        | $u_{0,4}$   | % <sub>vl</sub> | < 0.075                       |     | 0.1     |                        | 0.125              |      | 0.15               |      |       |      |
|  |             | % <sub>vc</sub> | 0.03                          |     | 0.04    |                        | 0.05               |      | 0.06               |      |       |      |
| Relative repeatability error without rotation                        |             | %               | 0.025                         |     |         |                        |                    |      |                    |      |       |      |
| Linearity deviation  | $d_{lin}$   | %               | < 0.03                        |     | < 0.04  |                        | < 0.04             |      | < 0.06             |      |       |      |
| Temperature influence on sensitivity/10K relative to the sensitivity | $TK_C$      | %               | < 0.015                       |     |         |                        |                    |      |                    |      |       |      |
| Temperature influence on zero signal/10K relative to the sensitivity | $TK_0$      | %               | < 0.015                       |     |         |                        |                    |      |                    |      |       |      |
| Bending moment influence (at 10 % x $F_{nom}$ x 10 mm)               | $d_Q$       | %               | 0.01                          |     |         |                        |                    |      |                    |      |       |      |
| Relative creep over 30 min   | $d_{crF+E}$ | %               | < 0.04                        |     | < 0.025 |                        |                    |      |                    |      |       |      |
| Input resistance   | $R_i$       | $\Omega$        | > 345                         |     |         |                        |                    |      |                    |      |       |      |
| Output resistance  | $R_o$       | $\Omega$        | 300 to 360                    |     |         |                        |                    |      |                    |      |       |      |
| Insulation resistance  | $R_{is}$    | $\Omega$        | > $5 \times 10^9$             |     |         |                        |                    |      |                    |      |       |      |
| Reference excitation voltage   | $U_{ref}$   | V               | 5                             |     |         |                        |                    |      |                    |      |       |      |
| Operating range of the excitation voltage                            | $B_{U,G T}$ | V               | 0.5 to 12                     |     |         |                        |                    |      |                    |      |       |      |
| Nominal (rated) temperature range                                    | $B_{t,nom}$ | $^{\circ}C$     | -10 to +45                    |     |         |                        |                    |      |                    |      |       |      |
| Operating temperature range  | $B_{t,G}$   | $^{\circ}C$     | -30 to +85                    |     |         |                        |                    |      |                    |      |       |      |
| Storage temperature range  | $B_{t,S}$   | $^{\circ}C$     | -30 to +85                    |     |         |                        |                    |      |                    |      |       |      |
| Reference temperature  | $t_{ref}$   | $^{\circ}C$     | +23                           |     |         |                        |                    |      |                    |      |       |      |
| Maximum operating force  | $(F_G)$     | %               | 230                           |     |         |                        |                    |      |                    |      |       |      |
| Breaking force   | $(F_B)$     | %               | > 400                         |     |         |                        |                    |      |                    |      |       |      |
| Static lateral limit force (transducer with adapter) <sup>2)</sup>   | $(F_Q)$     | %               | 100                           |     |         |                        |                    |      |                    |      |       |      |
| Maximum permissible torque   |             | Nm              | 31                            | 63  | 127     | 317                    | 635 <sup>3)</sup>  | 1270 | 3175 <sup>3)</sup> | 5715 | 11430 |      |
| Maximum permissible bending moment                                   |             | Nm              | 30                            | 60  | 125     | 315                    | 635                | 1270 | 3175               | 5715 | 11430 |      |
| Material measuring body  |             |                 | high-strength aluminium alloy |     |         |                        | stainless material |      |                    |      |       |      |
| Weight with adapter without adapter                                  |             | kg              | 1.2                           |     | 3       |                        | 10                 |      | 23                 |      | 60    |      |
|  |             | kg              | 0.5                           |     | 1.3     |                        | 5                  |      | 11                 |      | 28    |      |
| Rel. permissible vibrational stress to DIN 50100                     | $F_{rb}$    | %               | 200                           |     |         |                        |                    |      |                    |      |       |      |
| Degree of protection to DIN 60529                                    |             |                 | IP67 <sup>5)</sup>            |     |         |                        |                    |      |                    |      |       |      |
| Natural frequency  | $f_g$       | kHz             | 4.5                           | 5.9 | 9.3     | 6.6                    | 9.2                | 6.5  | 8.1                | 6.6  | 6.1   |      |
| Nominal (rated) displacement   | $s_{nom}$   | mm              | 0.02                          |     | 0.03    |                        | 0.03               |      | 0.04               |      | 0.05  | 0.06 |

1) Option: Adjustment of sensitivity to 2 mV/V (or 1 mV/V)

2) Specifications at 200 % typically corresponds to those at nominal (rated) force

3) Pure lateral force related to half the measuring body height ( $0.5 \times V$ , see drawing on page 3)

4) Transducer with 25 kN adapter: 370 Nm; 125 kN: 2640 Nm

5) For plug-in bayonet connector version

## Versions and order numbers

| Code | Measuring range | Order number            |
|------|-----------------|-------------------------|
| 1k25 | 1.25 kN         | <b>1-U10M / 1.25 kN</b> |
| 2k50 | 2.5 kN          | <b>1-U10M / 2.5 kN</b>  |
| 5k00 | 5 kN            | <b>1-U10M / 5 kN</b>    |
| 12k5 | 12.5 kN         | <b>1-U10M / 12.5 kN</b> |
| 25k0 | 25 kN           | <b>1-U10M / 25 kN</b>   |
| 50k0 | 50 kN           | <b>1-U10M / 50 kN</b>   |
| 125k | 125 kN          | <b>1-U10M / 125 kN</b>  |
| 250k | 250 kN          | <b>1-U10M / 250 kN</b>  |
| 500k | 500 kN          | <b>1-U10M / 500 kN</b>  |

 Preferential version, available soon

| Number of measuring bridges | Sensitivity              | Calibration              | Transducer identification | mechanical version          | Plug protection                     | Plug version bridge A          | Plug version bridge B          |
|-----------------------------|--------------------------|--------------------------|---------------------------|-----------------------------|-------------------------------------|--------------------------------|--------------------------------|
| Single bridge<br><b>SB</b>  | not adjusted<br><b>N</b> | 100% (dyn.)<br><b>1</b>  | without TEDS<br><b>S</b>  | with adapter<br><b>W</b>    | without plug protection<br><b>U</b> | Bayonet connector<br><b>B</b>  | Bayonet connector<br><b>B</b>  |
| Double bridge<br><b>DB</b>  | adjusted<br><b>J</b>     | 200% (stat.)<br><b>2</b> | with TEDS<br><b>T</b>     | without adapter<br><b>N</b> | with plug protection<br><b>P</b>    | Threaded connector<br><b>G</b> | Threaded connector<br><b>G</b> |

|               |             |           |          |          |          |          |          |          |          |
|---------------|-------------|-----------|----------|----------|----------|----------|----------|----------|----------|
| <b>K-U10-</b> | <b>12k5</b> | <b>DB</b> | <b>J</b> | <b>2</b> | <b>T</b> | <b>W</b> | <b>P</b> | <b>B</b> | <b>G</b> |
|---------------|-------------|-----------|----------|----------|----------|----------|----------|----------|----------|

|                                    |   |
|------------------------------------|---|
| <b>Number of measuring bridges</b> | For reasons of redundancy, in devices relevant to safety it is necessary to check the plausibility of the measurement signal with a second measuring bridge (applied on the measuring element). The signals are independently conditioned and evaluated using two separate measuring amplifiers.  |
| <b>Sensitivity</b>                 | The exact nominal (rated) sensitivity is specified on the identification plate. The transducer can also be adjusted to a linear, adjusted sensitivity of 1 mV/V or 2 mV/V (when 200% calibration is selected: 2 mV/V or 4 mV/V). The rel. sensitivity deviation is then 0.1% of the nominal (rated) sensitivity. The sensitivity range of a non-adjusted transducer is between 1 and 1.3 or 2 and 2.3 mV/V. |
| <b>Calibration</b>                 | In the standard version, the transducer is designed for dynamic application up to a vibration bandwidth of $\pm 100\% F_{nom}$ . For quasistatic applications, the transducer can be used up to $200\% F_{nom}$ . The option is available to calibrate accordingly to $200\% F_{nom}$ .   |
| <b>Transducer identification</b>   | TEDS integration (integrated electronic data sheet) in accordance with IEEE1451.4   |
| <b>mechanical version</b>          | The sensitivity is determined at the factory with the bolted-on adapter. The bolted-on adapter ensures the best-possible screw-fastening conditions and allows the transmission of axial force through a central internal thread. If this is not used, a sensitivity deviation of $< 1\%$ must be taken into account.   |
| <b>Plug protection</b>             | Mechanical protection through the installation of an additional square profile around the connector.<br>Approximate dimensions: width x height x depth: 30x30x20  |
| <b>Plug version bridge A</b>       | The standard version is the male device connector with bayonet locking (PT02E10-6P-compatible). The option is also available to install a screw-fitting male device connector (PC02E10-6P-compatible).  |
| <b>Plug version bridge B</b>       | The standard version is the male device connector with bayonet locking (PT02E10-6P-compatible). The option is also available to install a screw-fitting male device connector (PC02E10-6P-compatible). Both these connection variants are often used for differentiation in the double-bridge version.  |

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