Data sheet

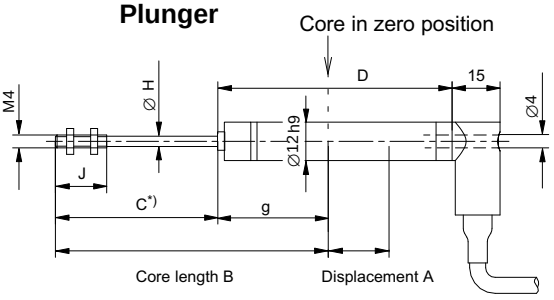
# WA

## Inductive Standard Displacement Transducers

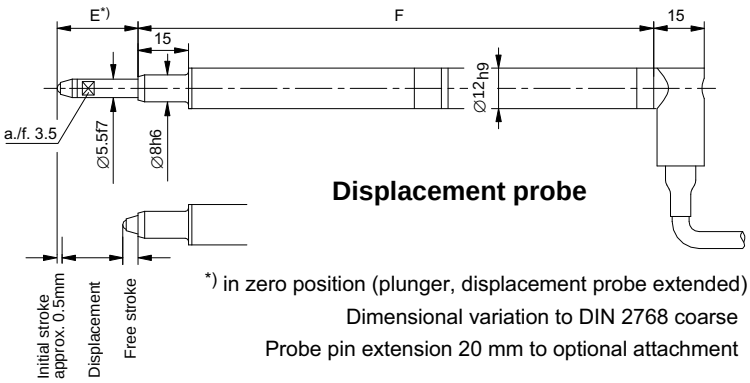
### Special features

- **Available as displacement probe or with detachable plunger**
- **Good thermal stability in the event of temperature gradients**
- **Space-saving, compact design**
- **Pressure-resistant transducer for measuring displacement in hydraulic cylinders**
- **Acceleration resistance ensures long service life**
- **Option: high temperature version up to 150°C, low temperature version up to -40°C**
- **Output signal of your choice: 80 mV/V, 0.5 - 10 V**

Dimensions (in mm; 1 mm= 0.0397 inches)




Fitted PVC cable, ∅6, optional length and termination




*) in zero position (plunger, displacement probe extended)
Dimensional variation to DIN 2768 coarse
Probe pin extension 20 mm to optional attachment

| | Plunger | | | | | | | Displacement probe | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Measuring range** | **A** | **B** | **C** | **D** | **G** | **∅H** | **J** | **A** | **E** | **F** |
| 0...2 mm | 2 | 75.5 | 40 | 69 | 35.5 | 1.2 | 15 | 2 | 14 | 130 |
| 0...10 mm | 10 | 66 | 40 | 69 | 26 ± 0.5 | 3.7 | 16 | 10 | 14 | 130 |
| 0...20 mm | 20 | 87 | 55 | 84 | 32 ± 0.5 | 3.7 | 16 | 20 | 24 | 170 |
| 0...50 mm | 50 | 117 | 85 | 114 | 32 ± 0.5 | 3.7 | 16 | 50 | 54 | 230 |
| 0...100 mm | 100 | 180 | 134 | 181.6 | 46 ± 1 | 3.7 | 16 | 100 | 104 | 372.6 |
| 0...200 mm | 200 | 280 | 234 | 281.6 | 46 ± 1 | 3.7 | 16 | | | |
| 0...300 mm | 300 | 380 | 334 | 381.6 | 46 ± 1 | 3.7 | 16 | | | |
| 0...500 mm | 500 | 580 | 534 | 581.8 | 46 ± 1 | 3.7 | 16 | | | |

## Specifications

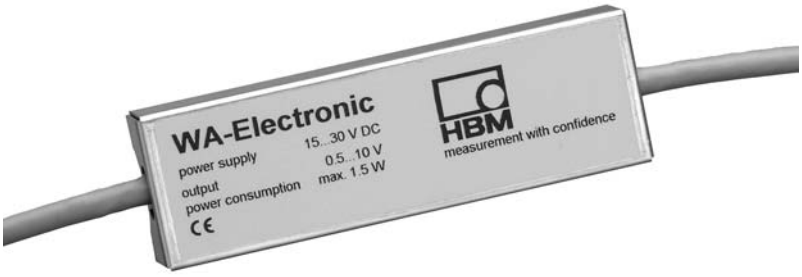
| Type | | WA2 | WA10 | WA20 | WA50 | WA100 | WA200 | WA300 | WA500 |
|---|---|---|---|---|---|---|---|---|---|
| **Nominal displacement** | mm | 0...2 | 0...10 | 0...20 | 0...50 | 0...100 | 0...200 | 0...300 | 0...500 |
| **Nominal sensitivity** | | | | | | | | | |
| Nominal output signal at nominal displacement with output unloaded | mV/V | 80 | | | | | | | |
| **Characteristic tolerance** | | | | | | | | | |
| Deviation of sensitivity from nominal sensitivity | % | ±1 | | | | | | | |
| **Zero point tolerance** | | | | | | | | | |
| with core in zero position | mV/V | ±1 | ±8 | | | | | | |
| **Linearity deviation** | | | | | | | | | |
| Greatest deviation between start and end point (including hysteresis by reference to nominal sensitivity) | % | ≤ ±0.2 to ≤ ±0.1 | | | | | | | |
| **Nominal temperature range** | °C [°F] | -20...+80 | | | | | | | |
| **Operating temperature range** | | | | | | | | | |
| Standard | °C [°F] | -25...+80 [-13...+176] | | | | | | | |
| Variant for high temperature | °C [°F] | -25...+150 [-13...+302] | | | | | | | |
| Variant for low temperature | °C [°F] | -40...+125 [-40...+257] | | | | | | | |
| **Effect of temperature** on zero signal in nominal temp. range per 10 K, by refer. to nominal sensitivity | % | < ±0.1 | | | | | | | |
| **Effect of temperature** on output signal in nominal temp. range per 10 K, by refer. to actual value | % | < ±0.1 | | | | | | | |
| **Input resistance** | Ω | 100 ± 10 % | 350 ± 10 % | | | | | | |
| **Output resistance** | Ω | 570 ± 10 % | 680 ± 10 % | | | | | | |
| **Nominal excitation voltage** | $V_{rms}$ | 2.5 | | | | | | | |
| **Operating range of the excitation voltage** | $V_{rms}$ | 0.5...10 | | | | | | | |
| **Carrier frequency,** | | | | | | | | | |
| Nominal range | kHz | 4.8 ± 1 % | | | | | | | |
| Operating range | kHz | 4.8 ± 8 % | | | | | | | |
| **Weight** | | | | | | | | | |
| of transducer body | g | 54 | 56 | 57 | 68 | 104 | 147 | 190 | 276 |
| of plunger | g | 4 | 6 | 7 | 9 | 13 | 20 | 28 | 42 |
| **Impact resistance,** test severity level to DIN IEC 68, Part 2-27; IEC 68-2-27-1987 | | | | | | | | | |
| Number of impacts (per direction) | - | 1000 | | | | | | | |
| Impact acceleration | $m/s^2$ | 650 | | | | | | | |
| Impact duration | ms | 3 | | | | | | | |
| Impact form | - | Half sine wave | | | | | | | |
| **Vibration resistance,** test severity level to DIN IEC 68, Part 2-6, IEC 68-2-6-1982 | | | | | | | | | |
| Frequency range | Hz | 5 to 65 | | | | | | | |
| Vibration acceleration | $m/s^2$ | 150 | | | | | | | |
| Stress duration (per direction) | h | 0.5 | | | | | | | |
| **Max. permissible plunger acceleration** | $m/s^2$ | 2500 | | | | | | | |
| | $m/s^2$ | **Probe version** | | | | | **Unfixed plunger version** | | |
| **Service life, typically** | | 10 million stress cycles | | | | | - | | |
| **Spring constant** | N/mm | 0.116 | | | | 0.063 | - | | |
| **Spring force in zero position (for 1mm initial stroke) approx.** | N | 2.4 | | | | 2 | - | | |
| **Spring force in final position (nom. displ.) apprx.** | N | 2.7 | 3.6 | 4.7 | 8.2 | 8.3 | - | | |
| **Max. permissible probe tip acceleration** | $m/s^2$ | 170 | | 140 | 95 | 45 | - | | |
| **Probe tip cut-off frequency for 1 mm stroke appr.** | Hz | 60 | | 55 | 45 | 30 | - | | |
| **Probe tip cut-off frequency at nominal displacement** | Hz | 18 | | 10 | 5 | 3 | - | | |
| **Degree of protection acc. to EN 60 529** | | | | | | | | | |
| for transducer duct and core channel | - | IP67 (depending on connection piece) | | | | | | | |
| **Max. permissible pressure** (increasing load) | bar | 350 | | | | | | | |
| **Overload limit** (to VDI/VDE 2600, Sheet 4) | bar | 450 | | | | | | | |
| **Destructive range** (to VDI/VDE 2600, Sheet 4) | bar | > 500 | | | | | | | |

## Specifications WA electronics

| Type | | WA2 | WA10 | WA20 | WA50 | WA100 | WA200 | WA300 | WA500 |
|---|---|---|---|---|---|---|---|---|---|
| **Nominal displacement** | mm | 0...2 | 0...10 | 0...20 | 0...50 | 0...100 | 0...200 | 0...300 | 0...500 |
| **Nominal output span**[1)] | V | 9.5 (0.5...10) | | | | | | | |
| **Output span tolerance**[1)] | % | ±0.5 | | | | | | | |
| **Linearity deviation**[1)] Greatest deviation between start and end point (including hysteresis by reference to nominal sensitivity) | % | ±0.2 | | | | | | | |
| **Nominal temperature range** | °C | -20...+60 | | | | | | | |
| **Operating temperature range** | °C | -20...+70 | | | | | | | |
| **Effect of temperature**[1)] on zero signal in nominal temperature range per 10 K, by reference to nominal sensitivity | % | ≤ ±0.2; typically ≤ ±0.15 | | | | | | | |
| **Effect of temperature**[1)] on output signal in nominal temperature range per 10 K, by reference to actual value | % | ≤ ±0.15; typically < ±0.10 | | | | | | | |
| **Supply voltage** | V | 15...30 | | | | | | | |
| **Dependence of the nominal (rated) output range from the supply voltage, typically** (in the supply voltage range) | % | 0.03 | | | | | | | |
| **Burden in the output** | kΩ | ≥10 | | | | | | | |
| **Current consumption** | mA | 45 (typically 26) | | | | | | | |
| **Power consumption max.** | W | 1.5 | | | | | | | |
| **Cut-off frequency** | Hz | 520 filter 4th order, Butterworth | | | | | | | |
| **Cable length between the transducer and the electronics** | m | 3...20 | | | | | | | |
| **Cable length between the electronics and the evaluator** | m | 3...50 | | | | | | | |

1) specified for the complete measuring chain

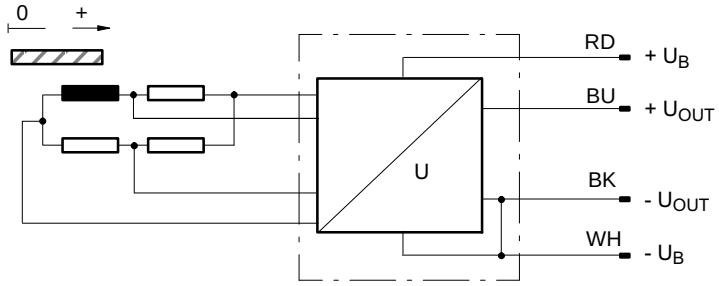
## WA electronics



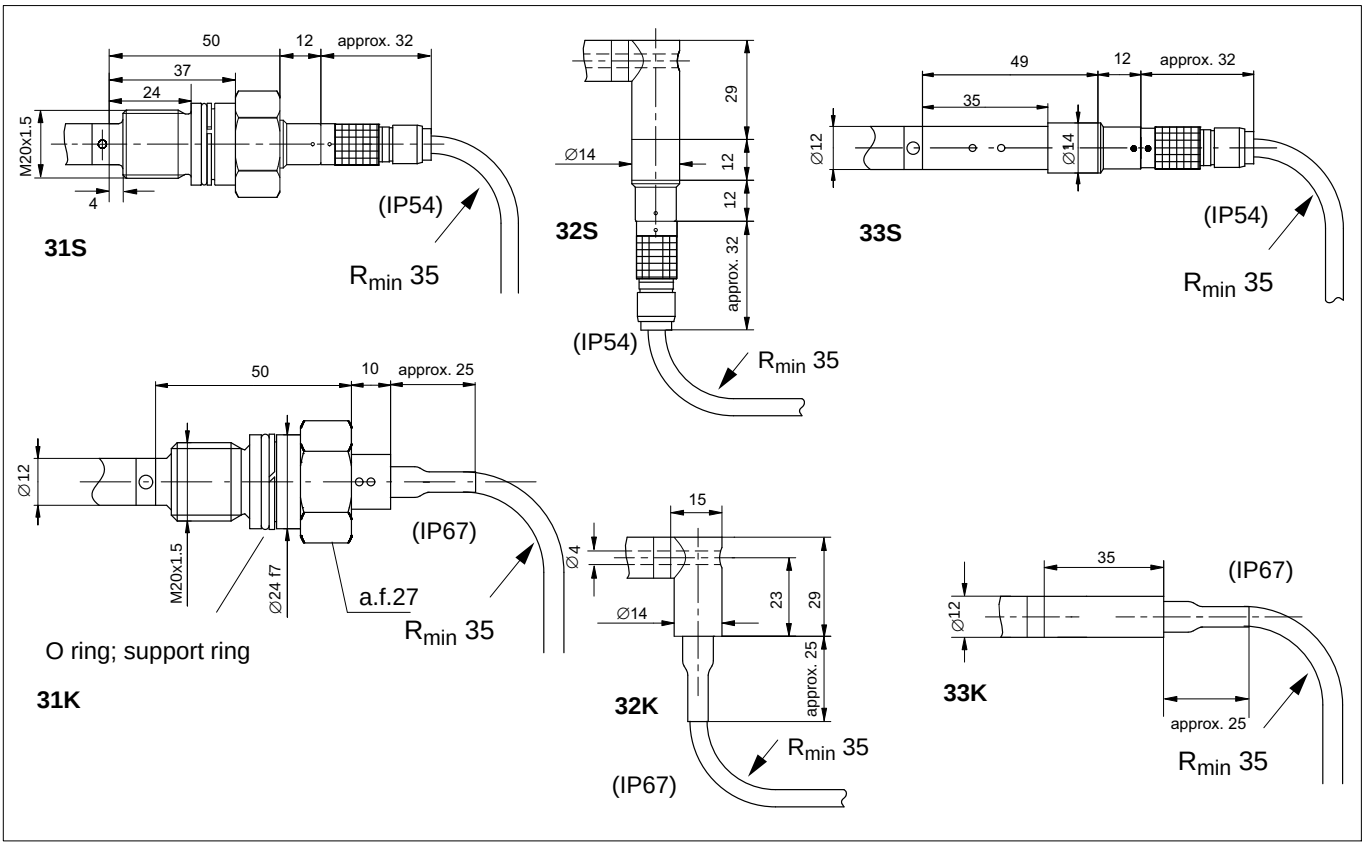

**Dimensions WA electronics**

Length: 102 mm
Width: 32 mm
Depth: 13.5 mm

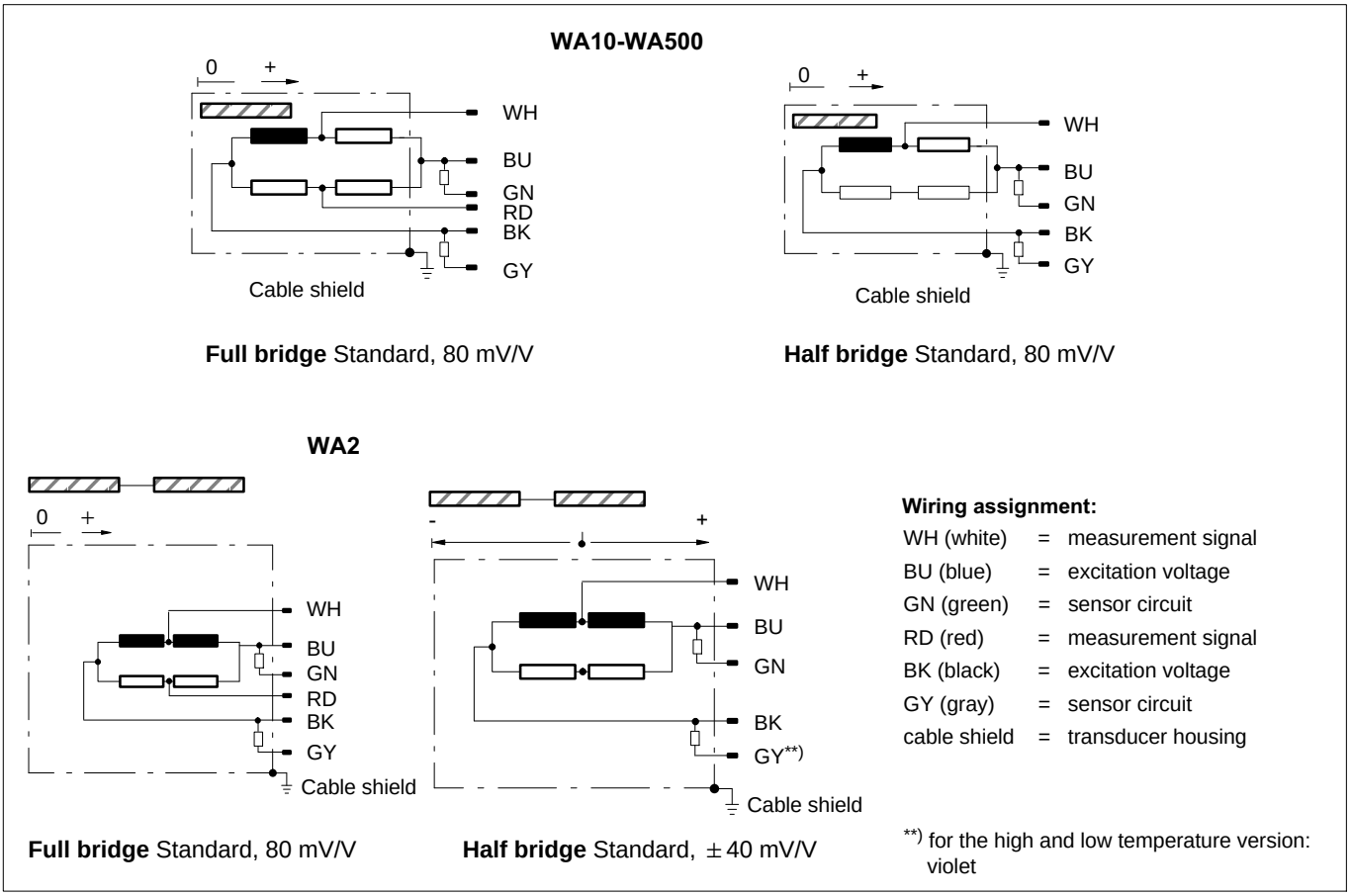
**WA electronics cable assignment**



## Types of connection




## Principle of measurement, wiring assignment



## Options for WA

| K-WA | Configurable displacement transducer WA |
|---|---|

| | Code | Option 1: Version |
|---|---|---|
| 1 | **L** | Detachable plunger, standard version |
| | **M** | Detachable plunger, high temperature version up to max. 150°C |
| | **T** | Displacement probe, standard version |
| | **U** | Displacement probe, high temperature version up to max. 150 °C |
| | **X**[1)] | Displacement probe, low temperature version for -40°C…125°C |

| | Code | Option 2: Measuring range | Option = 1 | |
|---|---|---|---|---|
| | | | T/U/X | L/M |
| 2 | **002W** | 2 mm | x | x |
| | **010W** | 10 mm | x | x |
| | **020W** | 20 mm | x | x |
| | **050W** | 50 mm | x | x |
| | **100W** | 100 mm | x | x |
| | **200W** | 200 mm | | x |
| | **300W** | 300 mm | | x |
| | **500W** | 500 mm | | x |

| | Code | Option 3: Type of connection at the transducer |
|---|---|---|
| 3 | **31K** | Pressure-resistant, M20x1.5 + fixed cable, IP67 |
| | **32K** | 90°, fixed cable, IP67 |
| | **33K** | 0°, fixed cable, IP67 |
| | **31S** | Pressure-resistant, M20x1.5 + LEMO plug connection |
| | **32S** | 90°, LEMO male connector |
| | **33S** | 0°, LEMO male connector |

| | Code | Option 4: Cable type; for option 1 = L / T | Option 3 = | |
|---|---|---|---|---|
| | | | __K | __S |
| 4 | **K1** | Non-detachable PVC cable, length 3m | x | |
| | **K2**[2)] | Non-detachable PVC cable, length 3 m…300 m | x | |
| | **S1** | LEMO plug, PVC cable 3 m | | x |
| | **S2**[2)] | LEMO plug, PVC cable 3 m…300 m | | x |
| | | **Option 4: Cable type; for option 1 = M / U / X** | **Option 3 =** | |
| | | | **__K** | **__S** |
| | **K3** | Non-detachable PTFE cable, max. 150 °C, length 3m | x | |
| | **K4** | Non-detachable PTFE cable, max. 150 °C, length 3 m … 300 m | x | |
| | **S3** | LEMO plug, PTFE cable, max. 150 °C, 3 m | | x |
| | **S4** | LEMO plug, PTFE cable, max. 150 °C, 3 m … 300 m | | x |

| | Code | Option 5: Cable ends | |
|---|---|---|---|
| 5 | **D1** | DB-15P male connector | with option 7 = 8 only |
| | **D2** | DB-15P male connector with TEDS | with option 7 = 8 only |
| | **F1** | Free ends | |
| | **M1** | MS 3106PEMV male connector | with option 7 = 8 only |
| | **M2** | MS male connector with TEDS | with option 7 = 8 only |
| | **Q1** | Sub-HD male connector | with option 7 = 8 only |
| | **Q2** | Sub-HD male connector with TEDS | with option 7 = 8 only |

| | Code | Option 6. Non-linearity | |
|---|---|---|---|
| 6 | **2** | 0.2% | |
| | **1** | 0.1% | not with option 2 = 010W / not with option 7 = 2 |

| | Code | Option 7: Rated output | |
|---|---|---|---|
| 7 | 8 | 80mV/V full bridge circuit | for option 2 = 002W : can be connected as a full bridge or half bridge circuit ±40mV/V |
| | 2 | Output 0.5…10V<br>0.5 ... 10V WA electronics<br>PVC cable to the evaluator, length 3 m<br>(special cable length between the WA electronics and the evaluator: 3…50 m) | with option 5 = F1<br>+ option 6 = 2 |

**Ordering number**

K-WA - [ ] - [ ][ ][ ][ ] - [ ][ ][ ] - [ ][ ] - [ ][ ] - [ ] - [ ] [ ]m [ ]m

1 2 3 4 5 6 7

**Example:**

K-WA - [T] - [1][0][0][W] - [3][3][K] - [K][2] - [F][1] - [2] - [2] **-100** [3] m **-20** [4] m

1 2 3 4 5 6 7

1) A reduced load-cycling capability is to be expected.
2) For option 7 = 2, the max. cable length at the transducer is 20 m
3) Special cable length at the transducer
4) Special cable length between the WA electronics and the evaluator

Devices can be supplied in the standard version from stock at short notice.

Scope of supply: displacement transducer, test record, 20 mm probe pin extension, operating manual

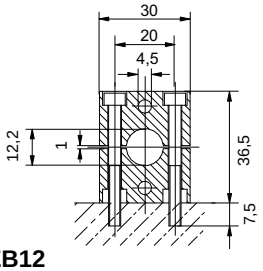
## Standard displacement transducer WA

| Version | Probe version | Plunger |
|---|---|---|
| Measuring range | Order no. | Order no. |
| 0 ... 2 mm | 1−WA/2MM−T | 1−WA/2MM−L |
| 0 ... 10 mm | 1−WA/10MM−T | 1−WA/10MM−L |
| 0 ... 20 mm | 1−WA/20MM−T | 1−WA/20MM−L |
| 0 ... 50 mm | 1−WA/50MM−T | 1−WA/50MM−L |
| 0 ... 100 mm | 1−WA/100MM−T | 1−WA/100MM−L |
| 0 ... 200 mm | | 1−WA/200MM−L |
| 0 ... 300 mm | | 1−WA/300MM−L |
| 0 ... 500 mm | | 1−WA/500MM−L |

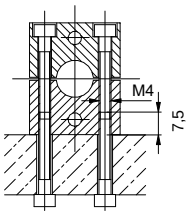
## Accessories

Mounting set WS/ZB12

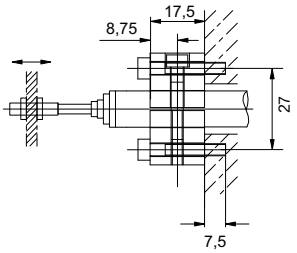
**1. Fitting suggestion**




**2. Fitting suggestion**




**3. Fitting suggestion**




**WS/ZB12**

2 mounting blocks with countersink Km4 DIN 74
1 mounting block with thread M4

4 fillister-head screws M4x25, DIN 912
2 fillister-head screws M4x40, DIN 912

1 hexagonal-head bolt spanner a.f. 3

Operating temperature range from -40 °C...+80 °C

## Replacement parts

- PVC cable as cable type S1, 3 m, with Lemo connector (male) (2-9268.0675 for 80 mV/V)
- PVC cable as cable type S2, any length (max. 300 m, 2-9268.0676 for 80 mV/V; max. 20 m with Option 7, Code 2)
- PTFE cable as cable type S3, 3 m; with Lemo connector (male) (2-9268.0766 for 80 mV/V)
- PTFE cable such as cable type S4, any length (max. 20 m, 2-9268.0767 for 80 mV/V)
- Lemo connector, detachable (6-pin, 3-3312.0126 for 80 mV/V)
- Lemo jack, detachable (6-pin, 3-3312.0235 for 80 mV/V)
- Measurement insert with carbide ball (3-6061.0003)

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