

Front-mounted pressure and level transmitter Type TPF.../TCF... - 100 Series -



EXAMPLE OF OPERATION:
TPF 101 with G1K process connection, G1B sealing cone and ext. OPUS control panel

ADVANTAGES

- MICROPROCESSOR-CONTROLLED ELECTRONICS IN A 2-CONDUCTOR SYSTEM, 4 - 20 MA
- EASY CALIBRATION WITHOUT PRESSURE REQUIREMENT VIA 3 PUSHBUTTONS AT THE MEASURING LOCATION
- TURN-DOWN 1 : 10
- FAST CALIBRATION OF "ZERO" AND "SPAN"
- PRECISE AND LONG-TERM STABILITY
- OPTIMIZED HOUSING DESIGN WITH MINIMIZED AIR VOLUME
- EXTERNAL DISPLAY/CONTROL PANEL FOR EASE OF OPERATION

FEATURES

- FLUSH-MOUNTED HYGIENIC VERSIONS WITH DIRECTLY WELDED METAL SENSOR
- STAINLESS STEEL FIELD HOUSING: SMOOTH SURFACE, EASY TO CLEAN, HIGH PROTECTION CLASS
- USE OF FOOD-QUALITY AND PHARMACEUTICAL-COMPLIANT MATERIALS
- MEASURING RANGES FROM 100 MBAR
- COMPACT SOLUTIONS FOR SMALL CONNECTIONS
- ANY NUMBER OF PRESSURE CONNECTIONS FOR ALL APPLICATIONS
- WITH TEMPERATURE DISPLAY

DESCRIPTION

The digital **TCF/TPF 100 Series** process pressure and fill level transmitter in a reliable stainless steel field housing with piezo-resistive or thin-film DMS measuring principle can be programmed via three pushbuttons and a display/control panel without pressure requirement at the measuring location. The quick calibration of the zero point and measuring range via two buttons has proven to be a real advantage especially for applications in the field of fill level measurement. The digitized output signal is an imposed continuous current that is linearly proportional to the input pressure.

It is also possible to display various pressure units during operation as well as the display of the process (sensor) temperature as a secondary process parameter. The display and control panel is either integrated in the field device where it can be accessed by unscrewing the front ring (360° rotatable, removable) or is available as an external housing with plug connector. The transmitters are then delivered without graphic display (cost saving per measuring location).

The pressure sensor is isolated from the substance to be measured by a stainless steel membrane. The pressure transfer is made via a foodstuff-safe oil filling. All membrane contacting parts are welded. The sensor-specific values are stored in a characteristic data memory and are available to the microprocessor for analyses. All Hengesbach pressure transmitters are temperature compensated. An additional temperature sensor as a secondary measuring element is used to show the temperature measured on the sensor as additional information on the display.

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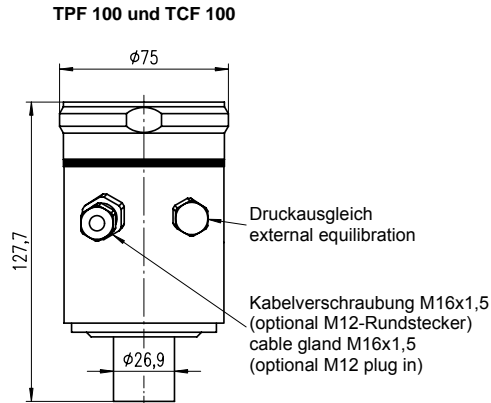
TECHNICAL DATA

| General specifications | | | | | | | | |
|---|--|-----|----------|-----|------------------|-----|--------------|-----|
| Manufacturer/Device | Hengesbach / Pressure transmitter | | | | | | | |
| Device type | TPF... for level measurements TCF... for process pressure measurements from 0/2 bar | | | | | | | |
| Applications | Absolute and relative pressure measurement in gases, vapors and liquids | | | | | | | |
| Measurement principle | The process pressure acts on the metallic insulating membrane of the sensor and is transferred via the filling liquid to the resistance measurement bridge. The change of output voltage proportional to the pressure is measured. | | | | | | | |
| Input | | | | | | | | |
| Measuring ranges (depending on the device type) | - TPF - | | | | - TCF - | | | |
| Nominal measuring ranges (bar) | relative | OPS | absolute | OPS | relative | OPS | absolute | OPS |
| | 0.35 bar | 1 | 0.35 bar | 1 | 0... +1 bar | 3 | 0... 1 bar | 3 |
| | 1 bar | 3 | 1 bar | 3 | -1/0... +2 bar | 25 | 0... 2 bar | 5 |
| | 2.5 bar | 8 | 2.5 bar | 8 | -1/0... +5 bar | 5 | 0... 5 bar | 12 |
| | 5 bar | 15 | 5 bar | 15 | -1/0... +10 bar | 12 | 0... 10 bar | 25 |
| | 10 bar | 30 | 10 bar | 30 | -1/0... +20 bar* | 50 | 0... 20 bar* | 50 |
| | 30 bar | 90 | 30 bar | 90 | -1/0...+100 bar* | 250 | 0...100 bar* | 250 |
| | 100 bar | 250 | 100 bar | 250 | | | 0...400 bar* | 600 |
| *) also G ½ FRO | | | | | | | | |
| Setting the measuring range | with the display/control panel keyboard | | | | | | | |
| Setting ranges | Measuring start zero 0... 90% of the nominal range, continuously adjustable Measuring range span 10...100% of the nominal measuring range, continuously adjustable - (TD:10) | | | | | | | |
| Overload pressure safety DIN 16086 | see Table (OPS) | | | | | | | |
| Burst pressure to DIN 16086 | 10-fold full scale value | | | | | | | |
| Output | | | | | | | | |
| Output signal | Digital 4...20 mA signal, 2-conductor | | | | | | | |
| Fault signal | optionally 3.6 mA, 22 mA, hold (last current value is held) | | | | | | | |
| Current limitation | 3.85 mA; 21.5 mA (normal operation) | | | | | | | |
| Integration time | (0,1,2,4,8,16,32,64,128 sec) 0 - 128 sec, selectable in stages (setting time after pressure jump) | | | | | | | |
| Measuring accuracy | | | | | | | | |
| Reference conditions | acc. to EN 60751, Class A (standard), DIN 16086 and DIN IEC 770 | | | | | | | |
| Linearity incl. hysteresis and reproducibility based on the limit point method to DIN IEC 770 | < ± 0.3% of full scale value of nominal range, optional < ± 0.2% * special specifications are required for linearity with small absolute measuring ranges. | | | | | | | |
| Heating time | 1 sec. | | | | | | | |
| Setting time (without damping) | 320 ms (50 Hz line frequency selected) or 266 ms (60 Hz line frequency selected) | | | | | | | |
| Long-term drift | 0.1% FS per year | | | | | | | |
| Thermal hysteresis | Zero point and measuring range ≤ ± 0.2% of nominal value / 10 K (-20... + 80°C) for nominal measuring range from 4 bar ≤ ± 0.5% of nominal value / 10 K (-20... + 80°C) for measuring ranges up to 0.6 bar | | | | | | | |
| Mounting position | Any | | | | | | | |
| Conditions of operation | | | | | | | | |
| Medium temperature | -40°C... + 125°C, 140°C max. for 1 hour (Type HT for temperatures up to 200°C)* | | | | | | | |
| Ambient temperature | -40°C... + 80°C | | | | | | | |
| Storage temperature | -40°C... + 80°C | | | | | | | |
| Protection class to EN 60529 | - IP 67 (with pressure compensation via FPG) - IP 67 with hard-wired reference cable with air compensation - IP 69K (a.A.) | | | | | | | |
| Electromagnetic compatibility | EMC guidelines are fulfilled, CE-marking | | | | | | | |
| Design | | | | | | | | |
| Electrical connection | - Cable gland M16 x 1.5 terminal strip (standard) - optional: with hard-wired reference cable (can be connected by the user) - optional: circular connector M12 x 1 with FPG (limited protection class) | | | | | | | |
| Process connections | All standard and manufacturer-typical thread types and flush-mounted front connections | | | | | | | |
| Materials | Field housing CrNiSt 1.4301, transparent display cover with safety glass (Type 100) or plexiglass, process connection 1.4571, process membrane 1.4435 / 1.4404 | | | | | | | |
| Filling liquid | Silicone fluid (food-safe, FDA), white oil (FDA) | | | | | | | |
| Display and control panel | | | | | | | | |
| Display | LCD display, four-digit numeric value display, five-digit alphanumeric display with additional information | | | | | | | |
| Displayable units | mbar, bar, psi, kpa, mH2O and % | | | | | | | |
| Additional displays | Display of the output current in mA Display of the sensor temperature Display of range violation | | | | | | | |
| Operation | Setting of all parameters in the Parameter menu with the aid of the digital display and the three buttons beneath the display. Adjustment of zero and span via two buttons | | | | | | | |
| Auxiliary power | | | | | | | | |
| Supply voltage/Apparent ohmic resistance | 9-36 VDC, max. perm. ripple 1 V _{ss} /RB = VB-9V:22 mA | | | | | | | |
| Supply voltage influence | < ± 3 µA supply voltage change | | | | | | | |
| Accessories for Types 100 and 101 (process connector adapter/weld-in accessories) | | | | | | | | |
| ZEM/G1/2 FRO | Weld-in sleeve G ½ for TCF/G1/2 FRO | | | | | | | |
| ZEM/MG 25 | Connection adapter conical coupling with slotted cap nut DN 25, DIN 11851 for TCF/G1/2 FRO | | | | | | | |
| ZEM/VA | Connection adapter VARIVENT d=68 mm for TCF/G1/2FRO | | | | | | | |
| ZEM/G1K | Weld-in sleeve with G1B sealing cone | | | | | | | |
| Accessories for Type 101 | | | | | | | | |
| OPUS display module | External control panel, CrNiSt IP 67, 41 x 70 mm, with 0.5 m connection cable and | | | | | | | |

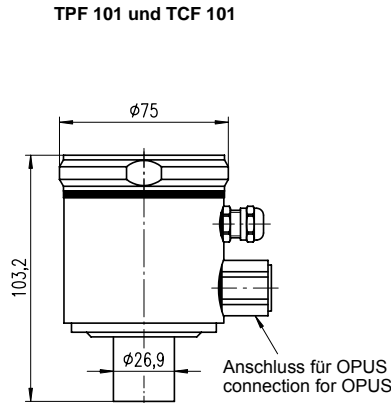
PN/TPF-TCF100/D-e-08-1/2

Front-mounted pressure and level transmitter Type TPF.../TCF... - 100 Series -

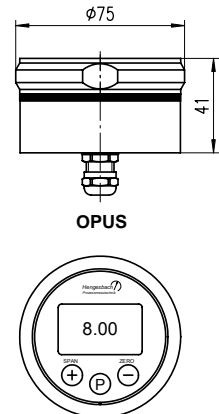
DIMENSIONAL DRAWINGS



Feldgehäuse mit integrierter Anzeige
(Edelstahl, IP67 EN 60529)
field-housing with integrated display
(stainless steel, IP67 EN 60529)



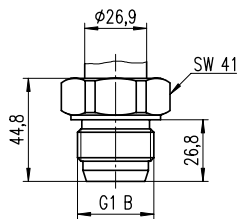
Feldgehäuse für OPUS
(Edelstahl, IP67 EN 60529)
field-housing for OPUS
(stainless steel, IP67 EN 60529)



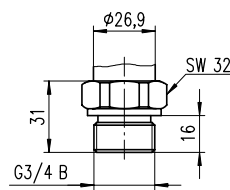
Grafikdisplay mit drei Drucktasten
display with three keys

Prozessanschlussadapter: (weitere Ausführungen auf Anfrage)
adapters for process-connection: (other constructions on request)

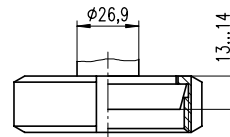
- Baureihe TPF / series TPF



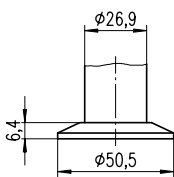
Einschraubgewinde ISO 228
G1K, metallisch dichtend
thread ISO 228 G1K
metallic sealed



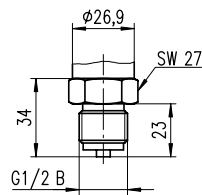
Aussengewinde G3/4B
thread external G3/4B



Kegelstützen und Nutmutter
conical sleeve and nut
DIN 11851 DN25 ... DN50

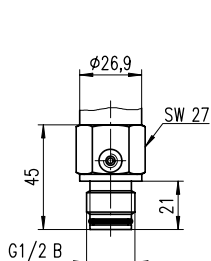


Triclamp - Flansch
Triclamp - flange
ISO 2852 11/2"
DIN 32676 DN40

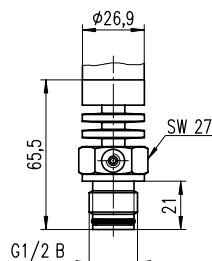


Aussengewinde G1/2B EN 837
thread external G1/2B EN 837

- Baureihe TCF / series TCF

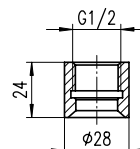


Aussengewinde G1/2B
thread external G1/2B

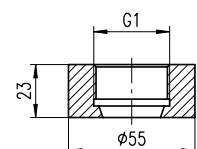


Aussengewinde G1/2B - HT-Version
thread external G1/2B - HT-version

Einschweiß-Zubehör / accessories for welding



Einschweißmuffe G1/2
welding socket G1/2



Einschweißmuffe G1K
welding socket G1K

PN/TPF-TCF100/D-e-08-1/3

CALIBRATION/SETTINGS

Versions

The **Type 100** is equipped as standard with a local display/operating module and three pushbuttons so that the measurement and setting values can be read directly in-situ. The overall configuration is carried out with the three pushbuttons. The front ring is transparent and, optionally, closed.

The **Type 101** without graphic display with closed cover is configured via the display/operating module accommodated in an external housing.

Operating modes of the display and operating module

- | | |
|-----------------------|---------------------------------------|
| 1) Display | Measured value |
| 2) Configuration menu | Display of the parameters |
| 3) Display | Error code (in the event of an error) |

Factory setting

Both device versions (Type 100, Type 101) are programmed as standard at the factory as follows:

| | |
|----------------------------|---|
| Measuring range calibrated | nominal range for 4...20 mA or acc. to order data |
| Damping programmed | 1 s |
| Signal output upon fault | hold (last value is held) |
| Physical unit | bar |

Other basic settings can be supplied as a special calibration and must be specified in the order.



Display and control panel
(example of operation: TPF 100)

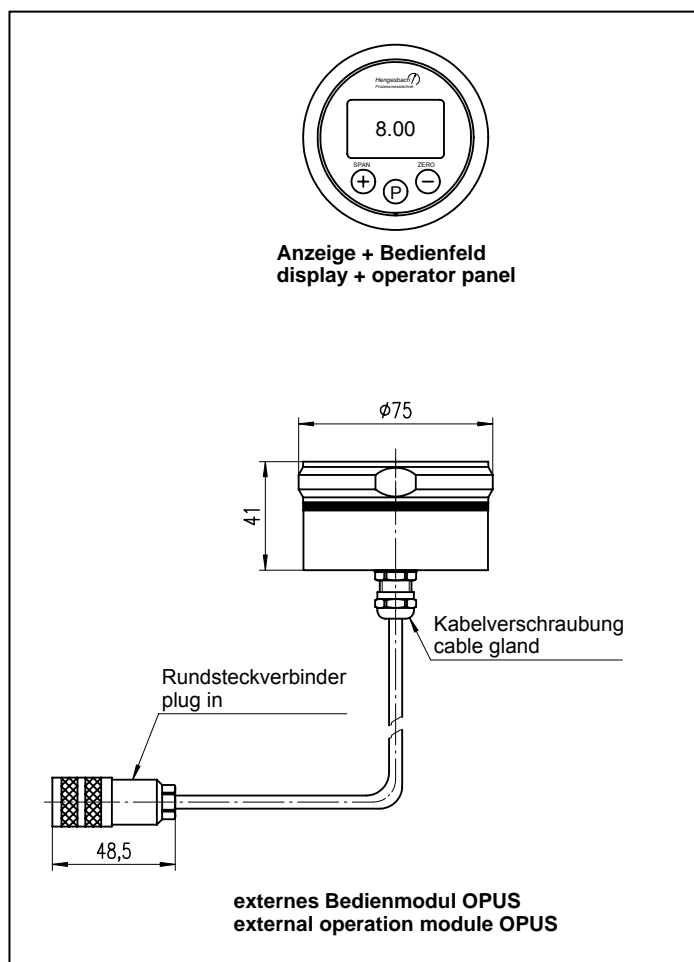
Configuration menu/Parameter list

| Parameter | No. | Function |
|----------------------|-----|---|
| Start of measurement | 0 | Specify start of measurement with or without pressure requirement |
| Measuring range | 1 | Specify measuring range with or without pressure requirement |
| Output current | 2 | 4...20 mA or inverted 20...4 mA |
| Damping | 3 | Choice of signal damping |
| Line frequency | 4 | Choice of 50/60 Hz line frequency suppression |
| Unit of measurement | 5 | Choice of physical unit |
| Display mode | 6 | Pressure, mA output current, percent, temperature |
| Display correction | 7 | Compensation of bias pressure |
| Min-Max value | 8 | Minimum value and maximum value for pressure (memory pointer function) |
| Parameter backup | 9 | Protection against undesired parameter modification |
| Current upon error | 10 | Determining the output current upon error |
| Display version | 11 | Display of hardware and software version, measuring cell type and measuring range |

ELECTRICAL CONNECTION

The electrical connection is made via screw terminals after removal of the screw cap. The cable inlet is carried out as standard via M16 x 1.5 screw joint; optionally with M12 x 1 circular connector. The test circuit connection is used for uninterrupted output current measurement. We recommend using the cable with air compensation tube, especially in environments with high air humidity.

| | Cable connection M16 x 1.5 4-20 mA (2-conductor) | M16 x 1.5 4-20 mA (2-conductor) | M 12 connector 4-20 mA (2-conductor) |
|-----------------------|---|--|---|
| GND | weiß/white | GND | |
| + Versorgung/+ supply | rot/red | 1 | 1 |
| - Versorgung/- supply | schwarz/black | 2 | 3 |



Front-mounted pressure and level transmitter Type TPF.../TCF... - 100 Series -



ORDER INFORMATION (Type TPF with piezo-resistive measuring cell)

| Electronics | |
|-------------|---|
| 100 | 4-20 mA, programmable, LCD display installed, TD 1:10 |
| 101 | 4-20 mA, programmable, can be operated with Opus display, TD 1:10 |

| Process connection (material 1.4404, 316 L) | |
|---|--|
| K1 | Screw-in thread ISO 228 G1K, metallic packing, front flush-mounted |
| G1 | Screw-in thread ISO 228 G1, front flush-mounted |
| G3 | Screw-in thread ISO 228 G¾, front flush-mounted |
| M2 | DIN 11851, DN 25 / PN 40, front flush-mounted (conical coupling with slotted nut) |
| M5 | DIN 11851, DN 50 / PN 25, front flush-mounted (conical coupling with slotted nut) |
| C4 | Tricomp ISO 2852, DN 25-40 / 1½", front flush-mounted |
| F5 | Flange DIN 2527 DN 50 PN 25/40, front flush-mounted |
| F8 | Flange DIN 2527 DN 80 PN 25/40, front flush-mounted |
| L5 | Flange DIN 2501 Form C, DN 50 PN 40, front flush-mounted |
| L8 | Flange DIN 2501 Form C, DN 80 PN 40, front flush-mounted |
| U2 | Front flush-mounted process connection UP00, with slotted nut DN 25, front flush-mounted |
| G2 | Screw-in thread EN 837 G½ B, internal sensor (manometer connection) |
| S9 | Other process connection |
| 99 | Special material process connection |

| Pressure type/Measuring range (R = Relative pressure or A = Absolute pressure) | | |
|--|--|-----------------------|
| - all vacuum ranges are also possible - | | |
| 0,35 | bar R | max. overload 1 bar |
| 1 | bar R | max. overload 3 bar |
| 2,5 | bar R | max. overload 8 bar |
| 5 | bar R | max. overload 15 bar |
| 10 | bar R | max. overload 30 bar |
| 30 | bar R | max. overload 90 bar |
| 100 | bar R | max. overload 250 bar |
| 0,35 | bar A | max. overload 1 bar |
| 1 | bar A | max. overload 3 bar |
| 2,5 | bar A | max. overload 8 bar |
| 5 | bar A | max. overload 15 bar |
| 10 | bar A | max. overload 30 bar |
| 30 | bar A | max. overload 90 bar |
| 100 | bar A | max. overload 250 bar |
| CC | set measuring range (if different from the nominal measuring range, please state clearly in bar) | |

| Electrical connection | |
|-----------------------|--|
| K | Cable gland M 16 x 1.5 |
| M | Circular connector M 12 x 1 |
| W | Angle plug connector EN 175301-803 (not in 100) |
| R | Reference cable, 1 m hard-wired, specify other lengths in plain text (max. 80 m) |

| Auxiliary equipment | |
|---------------------|--------------------------------------|
| T1 | Normal temperature version |
| T2 | High temperature version up to 200°C |

| | | | | | |
|-----|--|--|--|--|--|
| TPF | | | | | |
|-----|--|--|--|--|--|

ORDER INFORMATION (Type TCF with ceramic measuring cell)

| Electronics | |
|-------------|---|
| 100 | 4-20 mA, LCD display installed, TD 1:10 |
| 101 | 4-20 mA, can be operated with Opus display, TD 1:10 |

| Process connection (material 1.4404, 316 L) | |
|---|---|
| G2 | Screw-in thread EN 837, G½ B, internal sensor (manometer connection) |
| G6 | Screw-in thread ISO 228 G½ B, front flush-mounted, with O-ring |
| G7 | Screw-in thread ISO 228 G½ B, front flush-mounted, high temperature version up to 200°C |
| M8 | Screw-in thread M 22 x 1.5, front flush-mounted with O-ring |
| M9 | Screw-in thread M 22 x 1.5, front flush-mounted, high temperature version up to 200°C |

| Pressure type/Measuring range (R = Relative pressure or A = Absolute pressure) - all vacuum ranges are also possible - | | |
|---|--|-----------------------|
| 2 | bar R | max. overload 5 bar |
| 5 | bar R | max. overload 12 bar |
| 10 | bar R | max. overload 25 bar |
| 20 | bar R | max. overload 50 bar |
| 50 | bar R | max. overload 120 bar |
| 100 | bar R | max. overload 250 bar |
| 200 | bar R | max. overload 500 bar |
| 2 | bar A | max. overload 5 bar |
| 5 | bar A | max. overload 12 bar |
| 10 | bar A | max. overload 25 bar |
| 20 | bar A | max. overload 50 bar |
| 50 | bar A | max. overload 120 bar |
| 100 | bar A | max. overload 250 bar |
| 200 | bar A | max. overload 500 bar |
| CC | set measuring range (if different from the nominal measuring range, please state clearly in bar) | |

| Electrical connection | |
|-----------------------|--|
| K | Cable gland M 16 x 1.5 |
| M | Circular connector M 12 x 1 |
| W | Angle plug connector EN 175301-803 |
| R | Reference cable, 1 m hard-wired with M 16 x 1.5, specify other lengths in plain text (max. 80 m) |

| | | | | |
|-----|--|--|--|--|
| TCF | | | | |
|-----|--|--|--|--|

ORDER INFORMATION for ACCESSORIES/ASSEMBLY COMPONENTS

| Accessories/Assembly components for Type TPF | (order code) |
|--|---------------------|
| OPUS external operating module for 101 electronics | OPUS |
| Weld-in sleeve G1K for process connection K1, 1.4404 (316 L) | ZEK |
| Weld-in sleeve G¾ for process connection G3, 1.4404 (316 L) | ZED |
| Seal plug for G1K, 1.4404 (316 L) | ZVK |
| Weld-in dummy for G1K, Ms 58 | ZDK |
| Top LED display, red-lighting, installed in field housing (4-20 mA only) | FAM |
| Reference cable with pressure compensation capillary per started m made of PUR | ZKP |
| Pressure compensation housing with ventilation filter - wall-mounting, can be used for all pressure measuring transducers - | ZDA |
| Acceptance test certificate acc. to EN 10204 for weld-in accessories - per order - | WZ 31 (3.1B) |

| Accessories/Assembly components for Type TCF | (order code) |
|--|---------------------|
| OPUS external operating module for 101 electronics | OPUS |
| Weld-in sleeve for screw-in thread ISO 228 G½ B, front flush-mounted, 1.4404 (316 L) | ZTE |
| Connection adapter DIN 11851, DN 25 conical coupling with slotted cap nut | ZTM |
| O-ring made of EPDM for screw-in thread ISO 228 G½ B, front flush-mounted | ZTO |
| O-ring made of Viton for screw-in thread ISO 228 G½ B, front flush-mounted | ZTV |
| O-ring made of EPDM for screw-in thread M 22 x 1.5, front flush-mounted | ZTX |
| O-ring made of Viton for screw-in thread M 22 x 1.5, front flush-mounted | ZTW |
| Top LED display, red-lighting, installed in field housing (4-20 mA only) | FAM |
| Acceptance test certificate acc. to EN 10204 for weld-in accessories - per order - | WZ 31 (3.1B) |

Our products are constantly in further development, therefore subjects to modifications.