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JUMO MAERA S28

Level probe

Applications

Level and filling level measurement in¹

- Water and sewage water management
- Hydroelectric power stations
- Well and surface water

Brief description

The JUMO MAERA S28 level probe is used for the continuous hydrostatic level measurement of liquids. Filling heights between 2.50 mWS and 100 mWS (water column) can be achieved in ventilated tanks.

When the level probe is immersed into a liquid, a liquid column emerges above the probe. The liquid column increases as the probe is immersed deeper into the liquid and creates a hydrostatic pressure on the measuring system by the force of its weight. The measured pressure is transmitted as a standard signal. The signal is linearly proportional to the rising liquid column.

The surrounding pressure is realized using a special cable with an integrated pressure equalization hose. Any variations in air pressure are therefore automatically compensated for and the surrounding pressure is taken into account. The installation can be performed in both indoor and outdoor areas.

The level probe is equipped as standard with an integrated overvoltage protection, which protects the level probe against damage in the event of lightning strikes in surrounding water. With regard to the temperature-dependent density of a liquid, the medium temperature can be recorded with an integrated temperature sensor Pt100 during level measurement. This temperature value can then be used to compensate.

The level probe is approved for use in drinking water.

Further information on our level probes from the JUMO MAERA series can be found in the brochure "Limit Level Measurement and Level Measurement" in the documentation.

Customer benefits

- **Process-reliable**
The core of the level probe is a piezoresistive measuring cell, which features high overload resistance, and is particularly stable in the long term, reliable, and temperature-resistant. An integrated overvoltage protection prevents the effects of lightning that could lead to destruction of the level probe, thereby offering maximum process reliability. A reverse-polarity protection mechanism protects the measuring instrument against damage, ensuring maximum safety during startup.
- **Versatile**
The simultaneous measurement of level and temperature may be optionally achieved with a Pt100 temperature sensor. Costs are minimized as a result of very simple installation and startup. An optimized variant of the level probe is available for use in "deep wells".

¹ These recommendations are based on many years of experience; however, in individual cases they may not be fully applicable. We would be happy to provide further information, including regarding additional applications.

Approvals and approval marks (see technical data)



Type 404392/...
with process connection 658

Special features

- Measuring ranges: 0.25 bar to 10 bar (2.5 to 100 mWS)
- Medium temperature: 0 °C to 50 °C
- Piezoresistive silicon sensor
- Accuracy: 0.3% MSP² (linearity)
- Excellent long-term stability
- High overload resistance
- Integrated overvoltage protection
- Reverse-polarity protection mechanism
- Optionally available with integrated temperature sensor Pt100
- Suitable for indoor and outdoor installations

² MSP = measuring span

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Technical data

General Information

| | |
|-------------------------|--|
| Reference conditions | DIN 16086 and DIN EN 60770 |
| Measuring principle | Piezoresistive sensor with stainless steel separating membrane |
| Pressure transfer means | Synthetic oil |
| Admissible load changes | > 10 million, 0 to 100 % measuring range |
| Mounting position | Vertical/hanging from the cable |

Measuring range and accuracy

| Measuring range bar | Linearity ^a % MSP ^e | Accuracy at | | Long-term stability ^b % MSP per year | Overload capability bar | Burst pressure bar |
|---------------------------------|--|-----------------------------|----------------------------------|--|-------------------------------|--------------------------|
| | | 20 °C ^c % MSP | 0 to 50 °C ^d % MSP | | | |
| 0 to 0.25 bar relative pressure | 0.3 | 0.5 | 1.6 | ≤ 0.2 | 0.75 | 1 |
| 0 to 0.4 bar relative pressure | 0.3 | 0.5 | 1.6 | | 1.2 | 1.6 |
| 0 to 0.6 bar relative pressure | 0.3 | 0.5 | 1.3 | | 1.8 | 2.4 |
| 0 to 1 bar relative pressure | 0.3 | 0.5 | 1.1 | | 3 | 4 |
| 0 to 1.6 bar relative pressure | 0.3 | 0.5 | 1.1 | | 4.8 | 6.4 |
| 0 to 2.5 bar relative pressure | 0.3 | 0.5 | 1.1 | | 7.5 | 10 |
| 0 to 4 bar relative pressure | 0.2 | 0.3 | 0.8 | | 12 | 16 |
| 0 to 6 bar relative pressure | 0.2 | 0.3 | 0.8 | | 18 | 24 |
| 0 to 10 bar relative pressure | 0.2 | 0.3 | 0.8 | | 30 | 40 |

^a Linearity according to limit point setting

^b Reference conditions EN 61298-1

^c Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value

^d Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value and measuring range end value, thermal effect on measuring range start and measuring span

^e MSP = measuring span

Output

| | |
|-------------------------------|--|
| Analog output Current | 4 to 20 mA, two-wire |
| Step response T ₉₀ | ≤ 10 ms |
| Burden Current | $R_L \leq (U_B - 10\text{ V}) \div 0.02\text{ A} (\Omega)$ |

Electrical data

| | |
|---|--|
| Voltage supply U _B ^a Nominal voltage | DC 10 V to 30 V DC 24 V |
| Reverse voltage protection | Yes |
| Max. current consumption | 30 mA |
| Electrical circuit Requirements | SELV The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits". |

^a Residual ripple: the voltage peaks must not exceed or fall below the specified voltage supply values!

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Electrical connection

for level probe (basic type 404392/000)

6-core, shielded cable with integrated pressure compensation hose, AWG 24 with ferrules

| | |
|--------------------------------|---|
| Outer diameter | Approx. 8.4 mm |
| Conductor cross section | 0.25 mm ² |
| Bending radius | |
| Moving | 160 mm |
| Fixed | 120 mm |
| | It is vital to take into account that if the protective hose is kinked or pinched, this will prevent ambient pressure compensation. |
| Tensile force | Up to 400 N |
| Admissible medium temperatures | -40 to +70 °C (depending on the medium) |

for level probe in the deep well version (basic type 404392/025)

2-core cable without pressure compensation with ferrules

| | |
|--------------------------------|-------------------|
| Outer diameter | Approx. 8.3 mm |
| Conductor cross section | 1 mm ² |
| Bending radius | |
| Moving | 40 mm |
| Fixed | 30 mm |
| Tensile force | Up to 400 N |
| Admissible medium temperatures | -40 to +60 °C |

Mechanical features

Ensure the medium durability of the materials!

| | |
|----------------------------|--|
| Materials | |
| Process connection | Stainless steel 316 Ti |
| Measuring membrane | Stainless steel 316 L |
| Case | Stainless steel 316 Ti |
| Seals | FPM, EPDM |
| Outer sheath | Basic type 404392/000: PE (black), PUR (pepple gray), FEP (black) Basic type 404392/025: EPR (blue) |
| Pressure compensation hose | Basic type 404392/000: PA |
| Weight | 400 g (without cable) plus 1500 g for process connection with mounted protective cage (without cable) |
| PE cable | Approx. 63 g/m, 115 g/m with additional temperature sensor (extra code 007) |
| PUR cable | Approx. 115 g/m |
| FEP cable | Approx. 90 g/m |
| EPR cable | Approx. 92 g/m |
| UV resistance | |
| PE, PUR cable | According to VDE 0207, test method EN 60811 part 2-1, section 8 |
| FEP cable | According to DIN ISO 4892-2 |
| Diameter | 25 mm |

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Environmental influences

| | |
|---|--|
| Admissible temperatures Medium, environment | 0 to 50 °C The device must not freeze in the medium! A restriction may be required depending on the medium. |
| Storage | -20 to +80 °C, dry |
| Electromagnetic compatibility (EC) Interference emission | Class B ^a , according to EN 61326-2-3 |
| Interference immunity | Industrial requirements, according to EN 61326-1 |
| Overvoltage protection | Integrated overvoltage protection according to 61000-4-5 |
| Rated leakage current | 1 kA |
| Protection type | IP68, according to EN 60529, submersible to 100 m |

^a The product is suitable for industrial use as well as for households and small businesses.

Approvals and approval marks

| | |
|------------------------------------|---------------------------------------|
| ACS Testing agency | Eurofins Expertises Environnementales |
| Certificates/certification numbers | 22 ACC NY 044 |
| Inspection basis | DGS/SD7A 2002 n° 571 |
| Valid for | Extra code 881 |
| EAC Testing agency | «Промтехконтроль» |
| Certificates/certification numbers | EAЭС N RU Д-DE.PA01.B.80830/21 |
| Inspection basis | TR TS 020/2011 |
| Valid for | Type 404392 |

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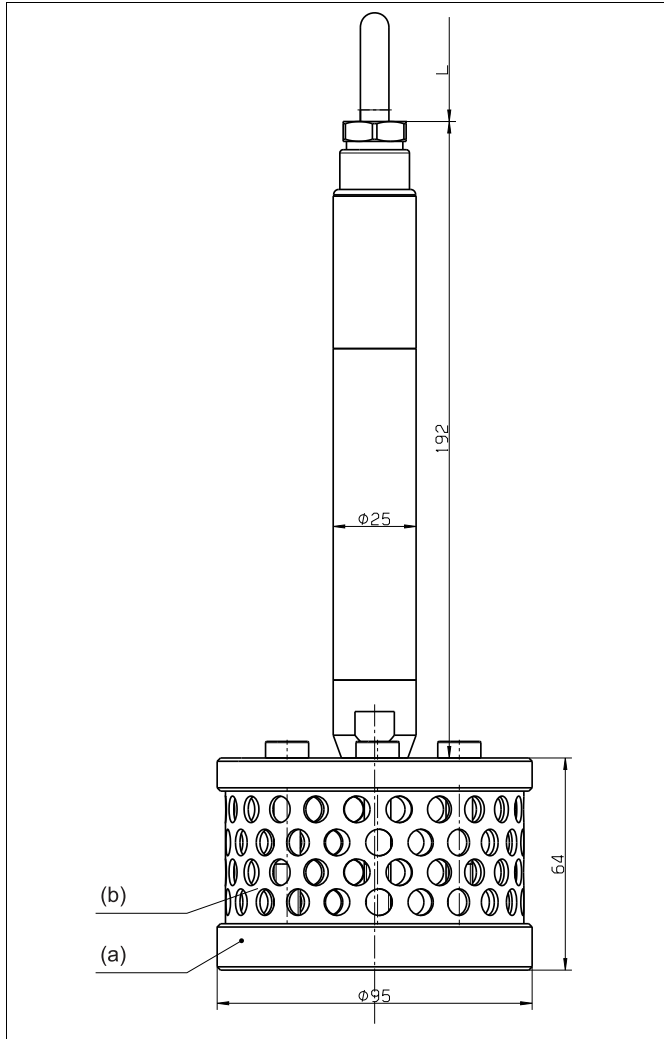
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Dimensions

With mounted cage



L Cable length according to customer preference

(a) Protective cage

(b) Perforated metal grid ϕ 8 mm

The stainless steel version with mounted protective cage is designed for difficult level measurements where sludge, turbulence or currents may be present (e.g. pumping stations, wastewater lifting stations).

The additional weight reduces effects on the output signal with strongly moving media.

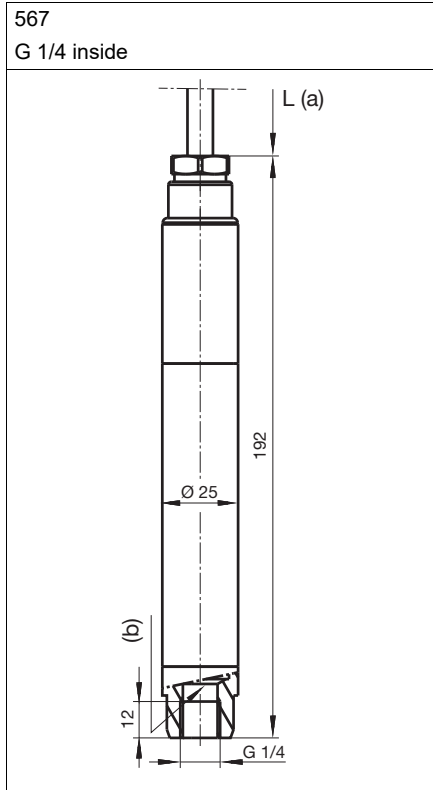
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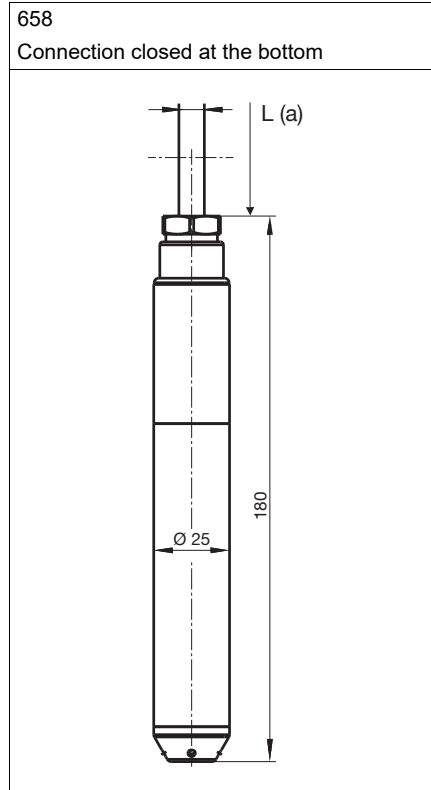
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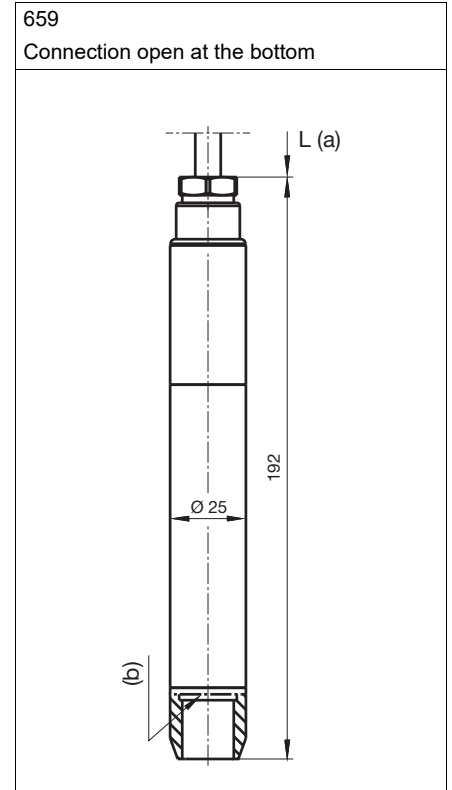
Process connection



- (a) Cable length according to customer preference
- (b) Sensitive membrane



- (a) Cable length according to customer preference
- (b) Sensitive membrane



- (a) Cable length according to customer preference
- (b) Sensitive membrane

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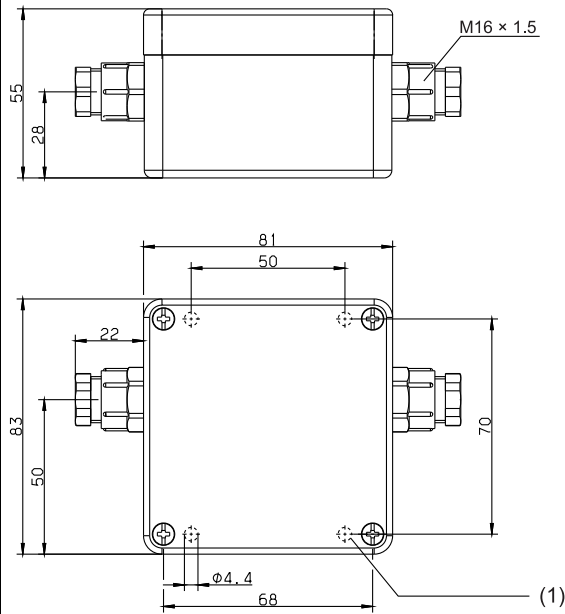
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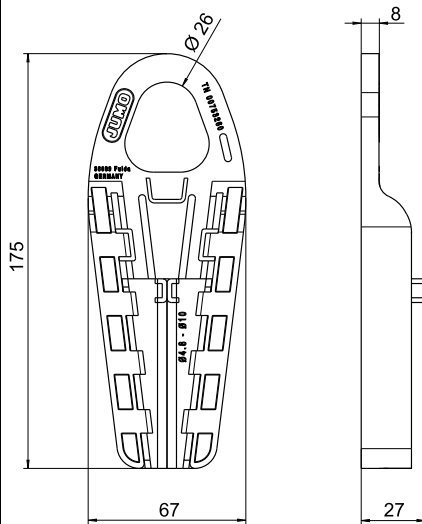
Accessories

Terminal box with pressure compensation
 Part no. 00061206

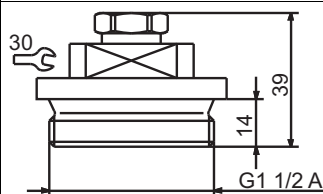


(1) Fastening hole

Cable clamp
 Part no. 00753260



Sealing screw
 Part no. 00333329



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Connection diagram

The connection diagram in the data sheet provides information on product selection.

For the electrical connection, only use the installation instructions or the operating manual.

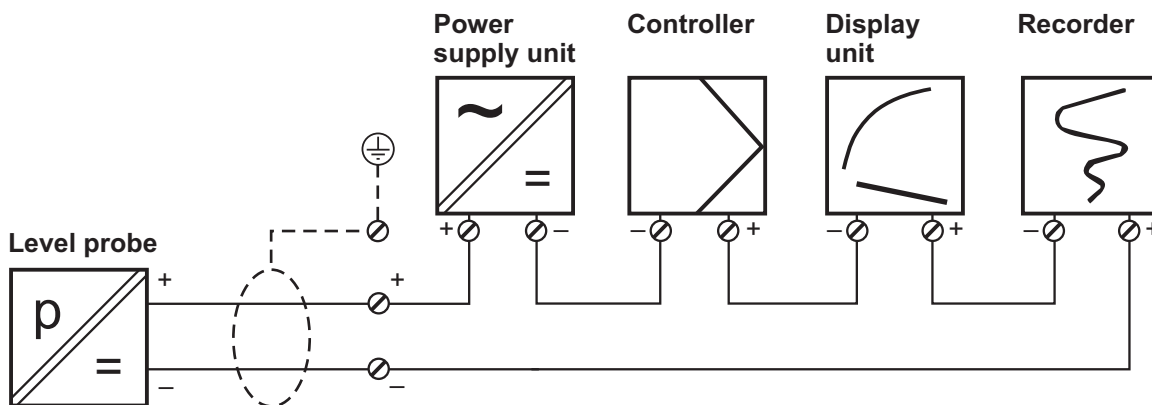
| Connection | | Terminal assignment |
|---|----------------------|--|
| | | |
| | | Cable ^a |
| 4 to 20 mA, two-wire (with basic type 404392/000) | | |
| Voltage supply DC 10 to 30 V Rated voltage supply DC 24 V | $U_B/S+^b$ 0 V/S- | White Gray |
| Shielding | | |
| Caution: Ground the device! Ground all connected devices (such as pumps and valves) to the same potential! | | Black |
| 4 to 20 mA, two-wire (with basic type 404392/025) | | |
| Voltage supply DC 10 to 30 V Rated voltage supply DC 24 V | $U_B/S+^b$ 0 V/S- | Brown Blue |
| Integrated temperature probe (with basic type extension 007) | | |
| | | Pink (pk) Brown (bn) Green (gn) Yellow (ye) |

^a For cable specifications, see installation instructions B 401015.4, chapter 6 "Installation and mounting".

^b The voltage peaks must not exceed or fall below the specified voltage supply values!

Connection example

Current output



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Order details

| | |
|---|--|
| (1) Basic type | |
| 404392/000 | JUMO MAERA S28 – Level probe |
| 404392/025 | JUMO MAERA S28 – Level probe, deep well version ^a |
| (2) Input | |
| 451 | 0 to 0.25 bar relative pressure |
| 452 | 0 to 0.4 bar relative pressure |
| 453 | 0 to 0.6 bar relative pressure |
| 454 | 0 to 1 bar relative pressure |
| 455 | 0 to 1.6 bar relative pressure |
| 456 | 0 to 2.5 bar relative pressure |
| 457 | 0 to 4 bar sealed gauge |
| 458 | 0 to 6 bar sealed gauge |
| 459 | 0 to 10 bar sealed gauge |
| 999 | Special measuring range for relative pressure |
| (3) Output | |
| 405 | 4 to 20 mA, two-wire |
| (4) Process connection | |
| 567 | G 1/4" inside |
| 658 | Connection closed at the bottom |
| 659 | Connection open at the bottom |
| 759 | Mounted protective cage Ø 95 mm |
| (5) Process connection material | |
| 20 | CrNi (stainless steel) |
| (6) Electrical connection | |
| 14 | PUR cable, pebble gray, shielded, UV-resistant |
| 15 | PE-LD cable, black, shielded, UV-resistant |
| 25 | FEP cable, black, shielded, UV-resistant |
| 26 | Submersible motor cable, EPR cable, blue |
| (7) Cable length of the connecting cable | |
| 005 | 5 m |
| 010 | 10 m |
| ... | ... |
| 100 | 100 m |
| (8) Extra codes | |
| 000 | None |
| 007 | Integrated temperature probe Pt100 |
| 593 | Cutting ring fitting (preparation for protection tube) |
| 631 | Improved moisture and vibration protection |
| 881 | Drinking water approval ^b |
| 917 | EPDM seal |

^a The deep-well version was designed for use in measuring ranges from 0 to 4 bar up to 0 to 10 bar with a free-hanging cable length of up to 100 m. With regard to the area of application, the version is only available with a closed process connection, and an EPR cable without pressure compensation and without a temperature probe. Another benefit is the improved moisture and vibration protection. The user must always bear in mind that a stainless-steel version is not suitable for use in media containing chlorine, such as seawater.

^b Only available with EPDM seal, PE-LED cable, or submersible motor cable, EPR cable.

| | | | | | | | | |
|----------------------|------------|-------|-------|-------|------|------|-------|------------|
| Order code | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Order example | 404392/000 | - 454 | - 405 | - 659 | - 20 | - 15 | - 020 | / 007, 631 |

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Stock versions

| Order code | Part no. |
|--------------------------------------|----------|
| 404392/000-453-405-658-20-15-010/000 | 00558887 |

Accessories

| Item | Description | Part no. |
|---|---|----------|
| Terminal box with pressure compensation element  | <p>The terminal box is used for secure installation of the level probe cable. The end of the pressure equalization hose is always protected from precipitate and condensation (IP65). The remaining distribution can be performed with a cable without a pressure equalization hose.</p> <p>The terminal case should be mounted as close as possible to the medium surface while still outside the medium to ensure the system is implemented cost-effectively and in the best possible way.</p> | 00061206 |
| Cable clamp  | <p>The cable clamp holds the probe in the liquid at a defined depth and provides strain relief. Use of the cable clamp ensures that the cable is not deformed in an unacceptable manner.</p> <p>The cable clamp is compatible with all JUMO level probes.</p> <p>The clamping range is 4.8 mm to 10 mm. The maximum tensile strength is 390 N. The cable clamp is made of UV-resistant, corrosion-free and fiberglass-reinforced polyamide. The central elongated holes are provided for optional, application-dependent fixing of the cable to prevent the clamping jaws from sliding upwards. The side elongated hole is provided for fixing additional cable length.</p> | 00753260 |
| Sealing screw  | <p>For closed containers or water wells with a well head, the cable should be guided through and fastened by a sealing screw.</p> <p>The sealing screw is made up of a G 1 1/2" thread and is used to route the cable.</p> | 00333329 |
| Pressure compensation filter for cable | <p>The pressure compensation filter is a breathable filter that ensures aeration and exhaust-air ventilation without moisture penetrating. It is fitted at the end of the special cable.</p> | 00382632 |