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JUMO Process Control, Inc.
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JUMO MAERA S26

Level probe

Applications

Level and filling level measurement¹

- in storage tanks or reservoirs
- for gray water recycling
- in heating oil and diesel oil tanks
- in the water and wastewater sector

Brief description

The JUMO MAERA S26 level probe is used for the continuous hydrostatic level measurement of liquids. Filling heights between 2.5 mWS and 25 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.

The surrounding pressure is realized using a special cable with an integrated pressure equalization hose. Any variations in air pressure are thereby automatically compensated for and the surrounding pressure is therefore taken into account.

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. The level probes are manufactured entirely from stainless steel and are therefore resistant to many media. A reverse-polarity protection mechanism protects the measuring instrument against damage, ensuring maximum safety during startup.
- **versatile**
The level probe is available in numerous variants for several measuring ranges. The version with several cable materials and process connections provides maximum possible flexibility. A model with greater measuring accuracy is also available, which also meets the most stringent requirements.

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.

Approval marks and certificates



Type 402090/... with process connection
658

Special features

- measuring ranges: 0.25 bar to 2.5 bar (0.2 % MSP² also available) (2.50 mWS to 25 mWS)
- medium temperature: 0 °C to 50 °C
- piezoresistive silicon sensor
- accuracy: 0.3 % MSP (linearity) (0.2 % MSP also available)
- excellent long-term stability
- high overload resistance
- reverse polarity protection
- suitable for indoor mounting

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	Linearity ^a	Accuracy at		Long-term stability ^b	Overload capacity	Burst pressure
bar	% MSP ^e	20 °C ^c % MSP	0 to 50 °C ^d % MSP	% MSP per year	bar	bar
0 to 0.25 bar relative pressure	0.3	0.5	1.6	≤ 0.3	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	0.3/0.2 ^f	0.5	1.3		1.8	2.4
0 to 1 bar relative pressure	0.3/0.2 ^f	0.5	1.1		3	4
0 to 1.6 bar relative pressure	0.3/0.2 ^f	0.5	1.1		4.8	6.4
0 to 2.5 bar relative pressure	0.3/0.2 ^f	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 from measuring range start (offset), and measuring range end

^d Includes: linearity, hysteresis, repeatability, deviation from measuring range start (offset) and measuring range end, thermal influences on measuring range start (offset), and measuring span

^e MSP = measuring span

^f for basic type 023 with improved accuracy

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Output

Analog output Current Output 402 Output 405 Output 406 Voltage Output 412 Output 415 Output 418 Output 420	0 to 20 mA, three-wire 4 to 20 mA, two-wire 4 to 20 mA, three-wire DC 0.5 to 4.5 V, three-wire, ratiometric 10 to 90 % of the voltage supply DC 0 to 10 V, three-wire DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire
Step response T_{90}	≤ 10 ms
Burden Current 0 to 20 mA, three-wire 4 to 20 mA, two-wire 4 to 20 mA, three-wire Voltage DC 0.5 to 4.5 V, three-wire DC 0 to 10 V, three-wire DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire	$R_L \leq (U_B - 12 \text{ V}) \div 0.02 \text{ A } (\Omega)$ $R_L \leq (U_B - 10 \text{ V}) \div 0.02 \text{ A } (\Omega)$ $R_L \leq (U_B - 12 \text{ V}) \div 0.02 \text{ A } (\Omega)$ $R_L \geq 50 \text{ k}\Omega$ $R_L \geq 10 \text{ k}\Omega$ $R_L \geq 10 \text{ k}\Omega$ $R_L \geq 10 \text{ k}\Omega$

Electrical data

Voltage Supply U_B^a 0 mA to 20 mA, three-wire 4 mA to 20 mA, two-wire 4 mA to 20 mA, three-wire DC 0.5 V to 4.5 V, three-wire DC 0 V to 10 V, three-wire DC 1 V to 5 V, three-wire DC 1 V to 6 V, three-wire Nominal voltage	DC 11.5 V to 30 V DC 10 V to 30 V DC 11.5 V to 30 V DC 5 V DC 11.5 V to 30 V DC 10 V to 30 V DC 10 V to 30 V DC 24 V
Reverse voltage protection	Yes (except DC 0.5 to 4.5 V, three-wire)
Max. current consumption	≤ 25 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

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	-20 to +60 °C (depending on the medium)

for level probe with EPR cable (electrical connection 26)

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 material!

Materials	
Process connection	Stainless steel 316 Ti
Measuring membrane	Stainless steel 316 L
Case	Stainless steel 316 Ti
Sealing cone	FPM, EPDM
Outer sheath	Basic type: PE (black), PUR (pebble gray), FEP (black) Basic type with submersible motor cable: EPR (blue)
Pressure compensation hose	PA
Weight	200 g (without cable) plus 1500 g for process connection with mounted protective cage (without cable)
PE cable	Approx. 63 g/m
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

Inadmissible 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 Interference immunity	Class B ^a , according to EN 61326-1 Industrial requirements, according to EN 61326-2-3
Protection type	IP68, according to EN 60529, submersible to 60 m

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

Approval marks and certificates

UL Testing agency Certificates/certification numbers Inspection basis Valid for	UL Solutions E201387 UL 61010-1, CSA C22.2 No. 61010-1 Extra code 061
ACS Testing agency Certificates/certification numbers Inspection basis Valid for	Eurofins Expertises Environnementales 22 ACC NY 044 DGS/SD7A 2002 n° 571 Extra code 881
EAC Testing agency Certificates/certification numbers Inspection basis Valid for	«Промтехконтроль» EAЭC N RU Д-DE.PA01.B.80830/21 TR TS 020/2011 Type 402090

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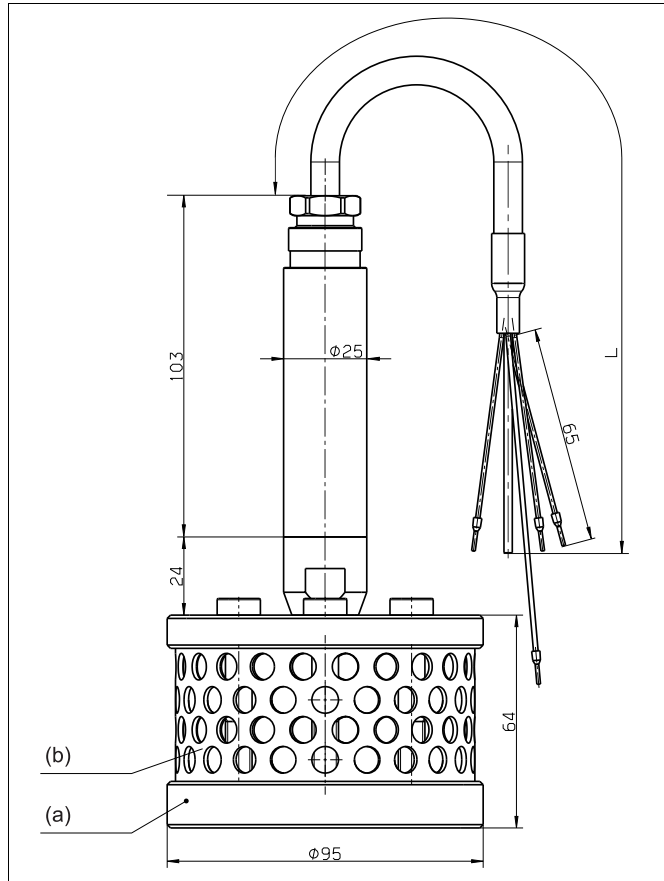
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Dimensions

With mounted cage



L Cable length according to customer preference

(a) Protective cage

(b) Perforated metal grid Ø 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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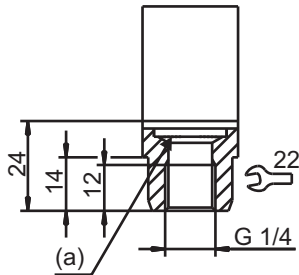
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**Process connections**

567

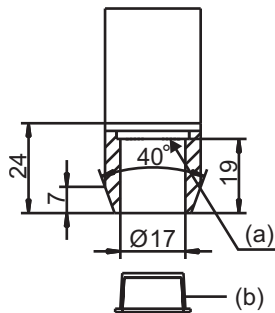
G 1/4 inside



(a) Sensitive membrane

659

Connection open at the bottom

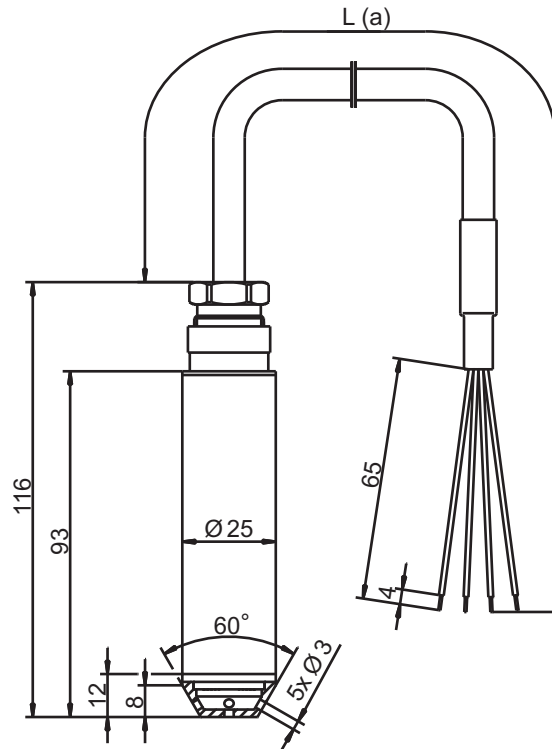


(a) Sensitive membrane

(b) Protective cap

658

Connection closed at the bottom



L (a) Cable length according to customer preference

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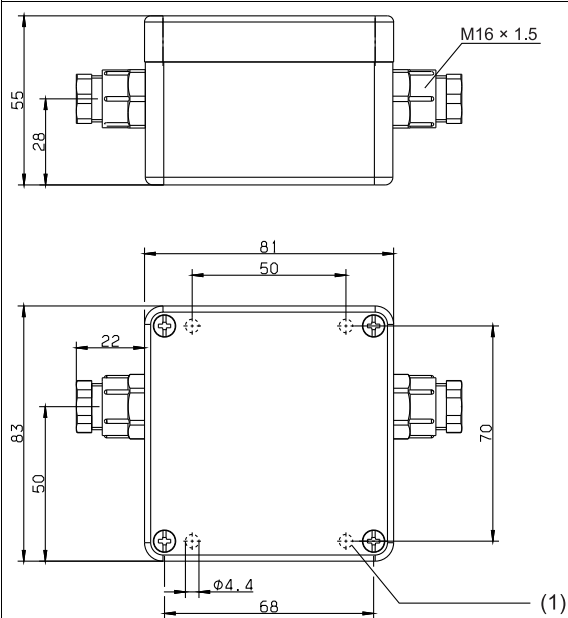
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**Accessories**

Terminal box with pressure compensation

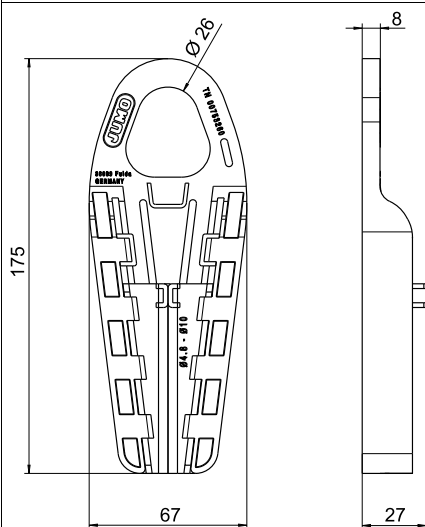
Part no. 00061206



(1) Fastening hole

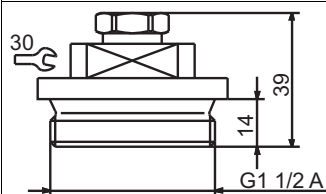
Cable clamp

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
0 to 20 mA, three-wire		
Voltage supply DC 11.5 to 30 V Rated voltage supply DC 24 V	U_B 0 V/S- S+	White Gray Yellow
4 to 20 mA, two-wire		
Voltage supply DC 10 to 30 V Rated voltage supply DC 24 V	$U_{B/S+}$ 0 V/S-	White Gray
4 to 20 mA, two-wire		
Voltage supply DC 10 to 30 V Rated voltage supply DC 24 V	$U_{B/S+}$ 0 V/S-	Brown Blue
4 to 20 mA, three-wire		
Voltage supply DC 11.5 to 30 V Rated voltage supply DC 24 V	U_B 0 V/S- S+	White Gray Yellow
DC 0.5 to 4.5 V, ratiometric		
Voltage supply DC 5 V Rated voltage supply DC 5 V	U_B 0 V/S- S+	White Gray Yellow
DC 0 to 10 V, three-wire		
Voltage supply DC 11.5 to 30 V Rated voltage supply DC 24 V	U_B 0 V/S- S+	White Gray Yellow
DC 1 to 5 V, three-wire DC 1 to 6 V, three-wire		
Voltage supply DC 10 to 30 V Rated voltage supply DC 24 V	U_B 0 V/S- S+	White Gray Yellow
Shielding		
Caution: Ground the device! Ground all connected devices (such as pumps and valves) to the same potential!		Black

^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!

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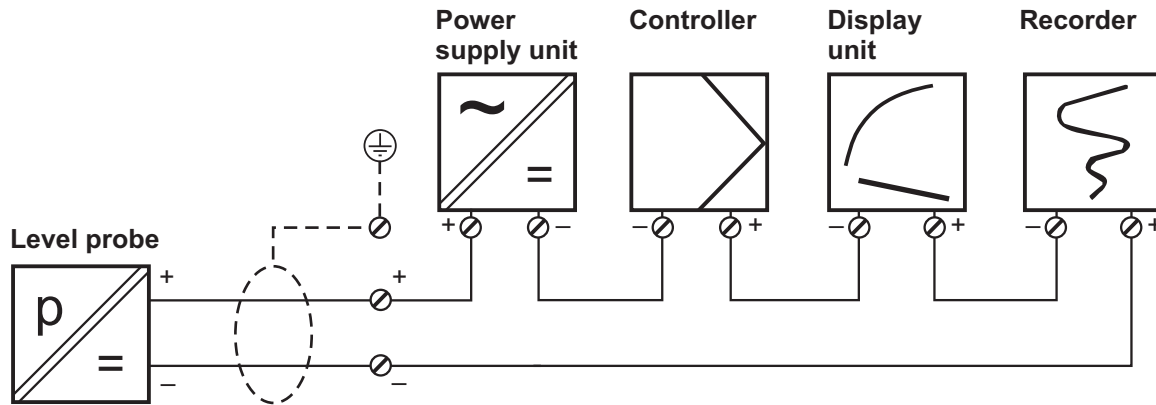
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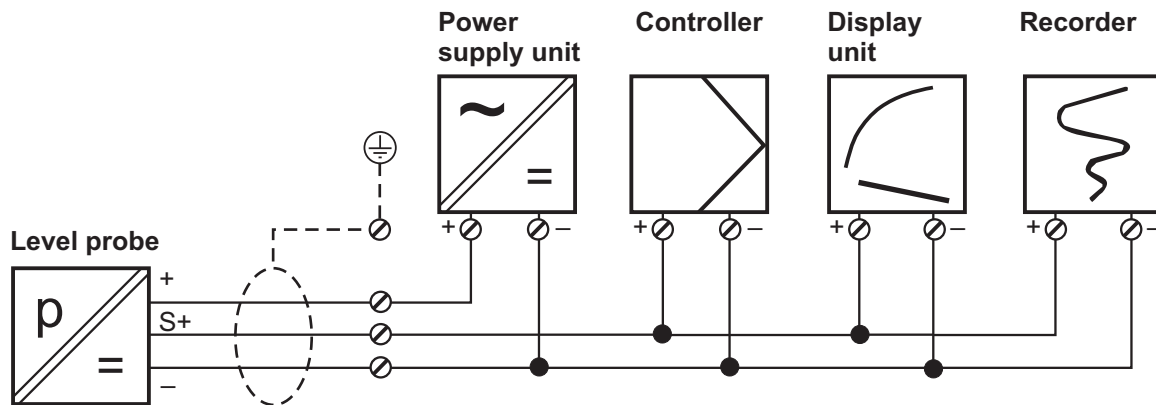


Connection example

Current output



Voltage output



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Order details

(1) Basic type	
402090/000	JUMO MAERA S26 – Level probe
402090/023	JUMO MAERA S26 – Level probe with improved accuracy
(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 relative pressure
458	0 to 6 bar relative pressure
459	0 to 10 bar relative pressure
999	Special measuring range for relative pressure
(3) Output	
402	0 to 20 mA, three-wire
405	4 to 20 mA, two-wire
406	4 to 20 mA, three-wire
412	0.5 to 4.5 V, three-wire
415	0 to 10 V, three-wire
418	1 to 5 V, three-wire
420	1 to 6 V, three-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 type	
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 ^a
(7) Cable length of the connecting cable	
005	5 m
010	10 m
...	...
100	100 m

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(8) Extra codes	
000	None
061	UL approval ^b
593	Cutting ring fitting (preparation for protection tube)
631	Improved moisture and vibration protection
881	Drinking water approval ^c
917	EPDM seal

^a Only available with 4 to 20 mA, two-wire.

^b Only available with PUR cable.

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

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Order code								
Order example	402090/000	- 454	- 405	- 659	- 20	- 15	- 010	/ 000

Accessories

Item	Description	Part no.
Terminal box with pressure compensation element 	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. 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.	00061206
Cable clamp 	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. The cable clamp is compatible with all JUMO level probes. 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.	00753260
Sealing screw 	For closed containers or water wells with a well head, the cable should be guided through and fastened by a sealing screw. The sealing screw is made up of a G 1 1/2" thread and is used to route the cable.	00333329
Pressure compensation filter for cable	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.	00382632