

JUMO GmbH & Co. KG

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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.

Further information on our level probes from the JUMO MAERA series can be found in the brochure "Level probes – Hydrostatic level and level measurement" under 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".



Type 404392/... with process connection
658

Special features

- Level probe for continuous level measurement in liquids
- Measuring ranges: 250 mbar to 10 bar (2.5 to 100 mWS)
- Medium temperature: 0 °C to 50 °C
- Piezoresistive silicon sensor
- Accuracy: 0.3% MSP (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

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.

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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

Relative pressure	The measuring ranges begin at 0 bar.									
Measuring range	0.25	0.4	0.6	1	1.6	2.5	4	6	10	bar
Overload capability	0.75	1.2	1.8	3	4.8	7.5	12	18	30	bar
Burst pressure	1	1.6	2.4	4	6.4	10	16	24	40	bar

Output

Analog output	
Current	
Output 405	4 to 20 mA, two-wire
Step response	
T ₉₀	≤ 10 ms
Burden	
Current	
4 to 20 mA, two-wire	$R_L \leq (U_B - 10 \text{ V}) + 0.02 \text{ A } (\Omega)$

Mechanical features

Ensure the medium durability of the material!

Process connection	
Material	Stainless steel 316 Ti
Measuring membrane	
Material	Stainless steel 316 L
Case	
Material	Stainless steel 316 Ti
Seals	
Material	FPM EPDM, NTS 917
Weight	400 g (without cable)
Diameter	25 mm

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Environmental conditions

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 Interference emission ^a Interference immunity ^b	Class B Industrial requirements
Overvoltage protection ^c	Integrated overvoltage protection Rated leakage current: 1 kA
Protection type ^d	IP68, submersible to 100 m

^a According to EN 61326-2-3

^b According to EN 61326-1

^c According to EN 61000-4-5

^d According to EN 60529

Accuracy

Relative pressure	The measuring ranges begin at 0 bar.									
Measuring range	0.25	0.4	0.6	1	1.6	2.5	4	6	10	bar
Linearity ^a	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	% MSP
Accuracy at 20 °C ^b	0.5	0.5	0.5	0.5	0.5	0.5	0.3	0.3	0.3	% MSP
Accuracy at 0 to 50 °C ^c	1.6	1.6	1.3	1.1	1.1	1.1	0.8	0.8	0.8	% MSP
Long-term stability ^d	≤ 0.2 % MSP									

^a Linearity according to limit point setting

^b Includes: linearity, hysteresis, repeatability, deviation from measuring range start (offset) and measuring range end

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

^d According to EN 61298-1

Auxiliary energy

Voltage supply U _B ^a	DC 10 V to 30 V, nominal voltage DC 24 V
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^a Residual ripple: the voltage peaks must not exceed or fall below the specified voltage supply values!

Reverse voltage protection	Yes
Max. current consumption	30 mA
Electrical circuit	SELV

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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

Material	
Outer sheath	PE, PUR, FEP ^a
Pressure compensation hose	PA
Color	
PE, FEP cable	Black
PUR cable	Pebble gray
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
Weight	
PE, PUR cable	Approx. 115 g/m
FEP cable	Approx. 90 g/m
Admissible medium temperatures	-40 to +70 °C (depending on the medium)
UV resistance	PE and PUR cable according to VDE 0207, test method EN 60811 part 2-1, section 8 FEP cable according to DIN ISO 4892-2

^a Depending on the version ordered

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

2-core cable without pressure compensation with ferrules

Material	
Outer sheath	EPR
Color	
EPR cable	Blue
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
Weight	
EPR cable	Approx. 92 g/m
Admissible medium temperatures	-40 to +60 °C

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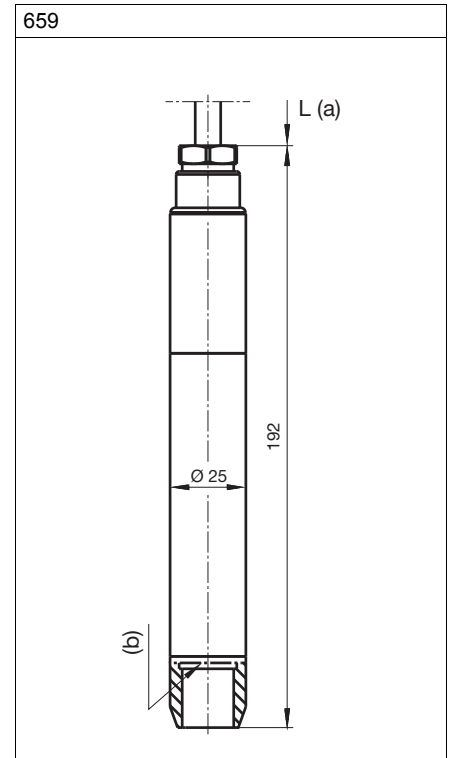
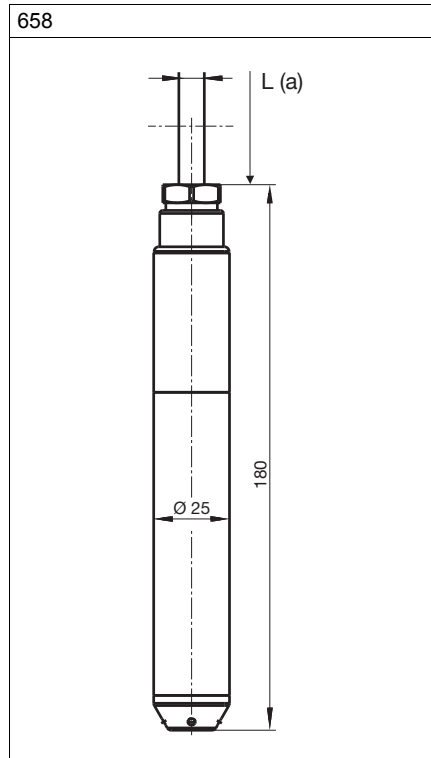
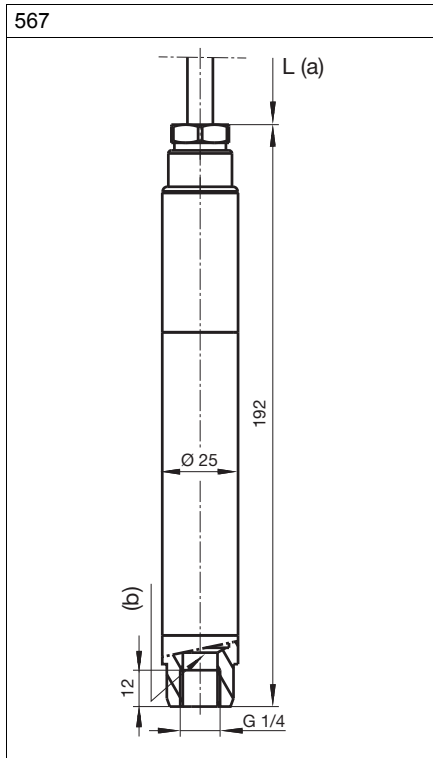
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Dimensions

Process connection



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

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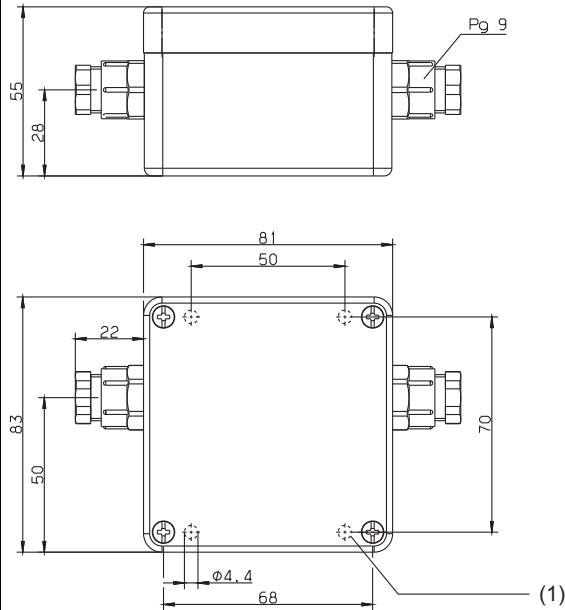
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Accessory dimensions

Terminal box with pressure compensation

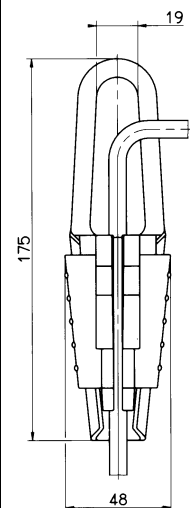
Part no. 00061206



(1) Fastening hole

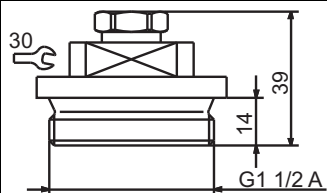
Cable clamp

Part no. 00061389



Sealing screw

Part no. 00333329



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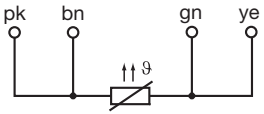
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Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection only use the installation instructions or the operating manual. The knowledge and the correct technical execution of the safety information/instructions contained in these documents are mandatory for installation, electrical connection, startup, and for safety during operation.

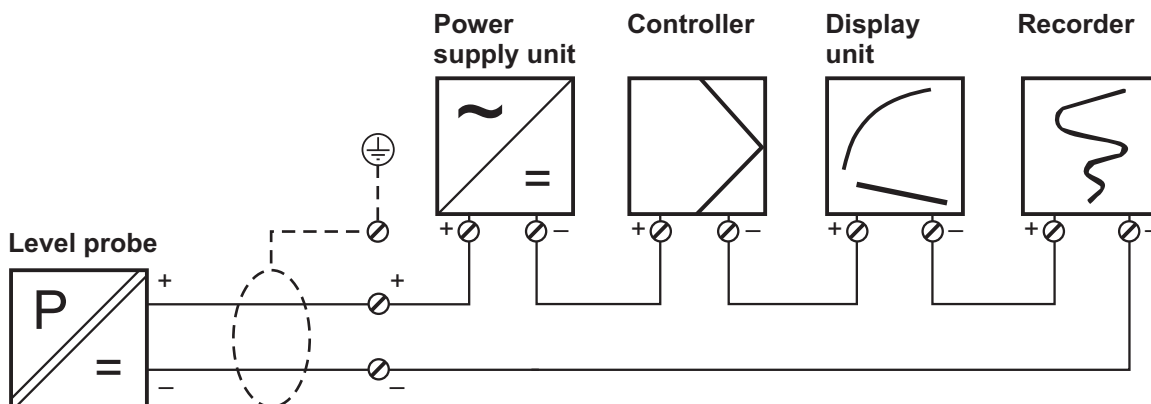
Connection		Terminal assignment
		
		Cable ^a
4 to 20 mA, two-wire (output 405 and basic type 404392/000)		
Voltage supply DC 10 to 30 V Rated voltage supply DC 24 V	U_B/S^{+b} 0 V/S-	White Gray
Shielding		
Caution: Ground the device! Ground all connected devices (such as pumps and valves) to the same potential!		Black
4 to 20 mA, two-wire (output 405 and 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	JUMO MAERA S28 - Level probe
(2) Basic type extension	
000	None
025	Deep well version ^a
999	Special version
(3) Input	
451	0 to 250 mbar relative pressure
452	0 to 400 mbar relative pressure
453	0 to 600 mbar 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
(4) Output	
405	4 to 20 mA, two-wire
(5) Process connection	
567	G 1/4 inside
658	Connection closed at the bottom
659	Connection open at the bottom
(6) Process connection material	
20	CrNi (stainless steel)
(7) Electrical connection	
14	PUR cable, 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
99	Special version
(8) Cable length of the connecting cable	
005	5 m
010	10 m
...	...
100	100 m
(9) Extra codes	
000	None
007	Integrated temperature probe Pt100
593	Cutting ring fitting (preparation for protection tube)
631	Improved moisture and vibration protection
917	With 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.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)
Order code	<input type="text"/>	/	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>
Order example	404392	/	000	-	454	-	405	-	659	-	20	-	15	-	020	/	007, 631




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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 5.5 mm to 10.5 mm. The maximum tensile strength is 2.5 kN. The case is made of hot-dip galvanized steel sheet. The clamping jaws and guide clips are made of glass fiber reinforced polyamide. A stainless steel variant is also available upon request.</p>	00061389
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