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**JUMO Instrument Co. Ltd.**

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**JUMO Process Control, Inc.**

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# JUMO MAERA S26

## Level Probe

### Applications

#### Level and liquid level measurement<sup>1</sup>

- in rainwater cisterns
- for graywater recycling
- in heating oil and diesel oil tanks

### Brief description

The JUMO MAERA S26 level probe can be used for hydrostatic liquid level measurement in tanks.

Immersing the level probe in a liquid causes a liquid column to be produced above it. As the depth of immersion increases, so does this, and the force of its weight produces a hydrostatic pressure on the measuring system.

The stainless steel membrane of the level probe absorbs this pressure and transfers it to the sensor via filling oil. The level probe pressure sensor is based on tried and tested piezoresistive measurement technology (silicon semi-conductor SG).

The pressure measurements are converted into electronic output signals by the electronics integrated in the probe, with each signal value at a known density of liquid being a direct dimension for the level. Levels can be measured from 0 to 2.50 mWS to 0 to 25 mWS (water column).

Hydrostatic paradoxes, which imply that the hydrostatic pressure does not depend on the shape of the tank, bring an influence to bear on the measurement result. It is then possible to determine and visualize the levels of non-cylindrical containers with an integrated math function or with a customized linearization in compliant controllers, paperless recorders and indicators.

For additional, interesting information, see the "level probelevel probes - hydrostatic level and liquid level measurement" brochure.

### Customer benefits

#### • Process safety and diversity

The crucial element is a piezoresistive measuring cell, which is safe and reliable and has high overload resistance and long-term stability. The probe body and the pressure cell are made entirely from stainless steel, and are thus resistant to numerous media. In conjunction with the variety of cable materials and process connections that are available, maximum process safety can be ensured for virtually every application.



Type 402090/... with process connection 658

### Key features

- Measuring ranges from 0 to 250 mbar to 0 to 2,5 bar
- Temperature of measuring material 0 to 50 °C
- Extremely good long-term stability
- High overload resistance
- Sturdy level measurement probe for indoor application

<sup>1</sup> These recommendations are based on many years of experience. Deviations are possible in some cases. We would be happy to provide you with additional information or details of other applications.

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## Technical data

### General

Reference conditions	DIN 16086 and EN 60770
Principle of measurement	Piezoresistive sensor with stainless steel separating diaphragm
Pressure transfer medium	Synthetic oil
Permissible load change	> 10 million, 0 to 100 % measuring range
Mounting location	Vertical/suspended on the cable

### Measuring range

Relative pressure	The measuring ranges start at 0 bar.						
Measuring range	0.25	0.4	0.6	1	1.6	2.5	bar
Overload capacity	0.75	1.2	1.8	3	4.8	7.5	bar
Bursting pressure	1	1.6	2.4	4	6.4	10	bar

### Outputs

Analog output <sup>a</sup>	
Current	
Output 402	0 to 20 mA, 3-wires
Output 405	4 to 20 mA, 2-wires
Output 406	4 to 20 mA, 3-wires
Voltage	
Output 412	DC 0.5 to 4.5 V, 3-wires, ratiometric, 10 to 90 % of the voltage supply
Output 415	DC 0 to 10 V, 3-wires
Output 418	DC 1 to 5 V, 3-wires
Output 420	DC 1 to 6 V, 3-wires
Jump response	
T <sub>90</sub>	≤ 10 ms
Burden	
Current	
0 to 20 mA, 3-wires	$R_L \leq [(U_B \text{ to } 12 \text{ V}) \div 0.02 \text{ A}] (\Omega)$
4 to 20 mA, 2-wires	$R_L \leq [(U_B \text{ to } 10 \text{ V}) \div 0.02 \text{ A}] (\Omega)$
4 to 20 mA, 3-wires	$R_L \leq [(U_B \text{ to } 12 \text{ V}) \div 0.02 \text{ A}] (\Omega)$
Voltage	
DC 0.5 to 4.5 V, 3-wires	$R_L \geq 50 \text{ k}\Omega$
DC 0 to 10 V, 3-wires	$R_L \geq 10 \text{ k}\Omega$
DC 1 to 5 V, 3-wires	$R_L \geq 10 \text{ k}\Omega$
DC 1 to 6 V, 3-wires	$R_L \geq 10 \text{ k}\Omega$

<sup>a</sup> Other outputs are available on request.

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## Mechanical properties

It is vital to note the resistance of the materials to the medium!

Process connection	
Material	316 Ti stainless steel
Measurement diaphragm	
Material	316 L stainless steel
Housing	
Material	316 Ti stainless steel
Sealing cone	
Material	FPM
Weight	200 g (without cable)
Diameter	25 mm

## Ambient conditions

Permissible temperatures	
Medium/environment	0 to 50 °C The instrument must <b>not</b> be allowed to freeze in the medium! The medium may make it necessary to impose a restriction.
Storage	-20 to +80 °C, dry
Electromagnetic compatibility	
Interference emission <sup>a</sup>	Class B
Interference immunity <sup>b</sup>	Industrial requirements
Protection <sup>c</sup>	IP68, immersible to 60 m

<sup>a</sup> As defined by EN 61326-2-3

<sup>b</sup> As defined by EN 61326-1

<sup>c</sup> As defined by EN 60529

## Accuracy

Relative pressure	The measuring ranges start at 0 bar.						
Measuring range	0.25	0.4	0.6	1	1.6	2.5	bar
Linearity <sup>a</sup>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	% of FS
Accuracy at 20 °C <sup>b</sup>	0.5	0.5	0.5	0.5	0.5	0.5	% of FS
Accuracy at 0 to 50 °C <sup>c</sup>	1.6	1.6	1.3	1.1	1.1	1.1	% of FS
Long-term stability <sup>d</sup>	< 0.2 % of FS						

<sup>a</sup> Linearity based on limit point setting

<sup>b</sup> Includes: linearity, hysteresis, repeatability, deviation from initial (offset) and final values of measuring range

<sup>c</sup> Includes: linearity, hysteresis, repeatability, deviation from initial (offset) and final values of measuring range, thermal effect on initial value of measuring range and span

<sup>d</sup> As defined by EN 61298-1

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## Auxiliary power

Voltage supply $U_B^a$	
0 to 20 mA, 3-wires (output 402)	DC 11.5 to 30 V, nominal voltage DC 24 V
4 to 20 mA, 2-wires (output 405)	DC 10 to 30 V, nominal voltage DC 24 V
4 to 20 mA, 3-wires (output 406)	DC 11.5 to 30 V, nominal voltage DC 24 V
DC 0.5 to 4.5 V, 3-wires (output 412)	DC 5 V
DC 0 to 10 V, 3-wires (output 415)	DC 11.5 to 30 V, nominal voltage DC 24 V
DC 1 to 5 V, 3-wires (output 418)	DC 10 to 30 V, nominal voltage DC 24 V
DC 1 to 6 V, 3-wires (output 420)	DC 10 to 30 V, nominal voltage DC 24 V
Max. power consumption	≤ 25 mA
Circuit	SELV

<sup>a</sup> Residual ripple: Peak voltages must not exceed or fall below the values specified for the power supply!

## Electrical connection

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

Material	
Outer sheath	PE, PUR, FEP
Pressure compensation tube	PA
Color	
PE and C-PE cables	Black
PUR cable	Pebble-gray
External diameter	Approx. 8.4 mm
Conductor cross-section	0.25 mm <sup>2</sup>
Bending radius	
moveable	160 mm
fixed	120 mm
	Please note that a bend in the cable prevents ambient pressure compensation.
Tensile force	Up to 400 N
Weight	
PE and PUR cables	Approx. 115 g/m
FEP cable	Approx. 90 g/m
Permissible medium temperatures	-40 to +70 °C (subject to the medium)
UV resistance	PE and PUR cables as defined VDE 0207, test method EN 60811 part 2-1, section 8 FEP cable as defined by EN ISO 4892-2


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## Connection diagram

Connection		Pin assignment
		
		Cable
<b>0 to 20 mA, 3-wires (output 402)</b>		
Voltage supply DC 11.5 to 30 V Nominal voltage DC 24 V	U <sub>B</sub> <sup>a</sup> 0 V/S- S+	White Gray Yellow
<b>4 to 20 mA, 2-wires (output 405)</b>		
Voltage supply DC 10 to 30 V Nominal voltage DC 24 V	U <sub>B</sub> /S+ 0 V/S-	White Gray
<b>4 to 20 mA, 3-wires (output 406)</b>		
Voltage supply DC 11.5 to 30 V Nominal voltage DC 24 V	U <sub>B</sub> 0 V/S- S+	White Gray Yellow
<b>DC 0.5 to 4.5 V ratiometric (output 412)</b>		
Voltage supply DC 5 V Nominal voltage DC 5 V	U <sub>B</sub> 0 V/S- S+	White Gray Yellow
<b>DC 0 to 10 V, 3-wires (output 415)</b>		
Voltage supply DC 11.5 to 30 V Nominal voltage DC 24 V	U <sub>B</sub> 0 V/S- S+	White Gray Yellow
<b>DC 1 to 5 V, 3-wires (output 418)</b> <b>DC 1 to 6 V, 3-wires (output 420)</b>		
Voltage supply DC 10 to 30 V Nominal voltage DC 24 V	U <sub>B</sub> 0 V/S- S+	White Gray Yellow
<b>Screen</b>		
Caution: Ground the instrument! Ground all connected devices (e.g. pumps, valves) to the same potential!		Black

<sup>a</sup> The voltage spikes may not exceed or fall below the specified values of the voltage supply!

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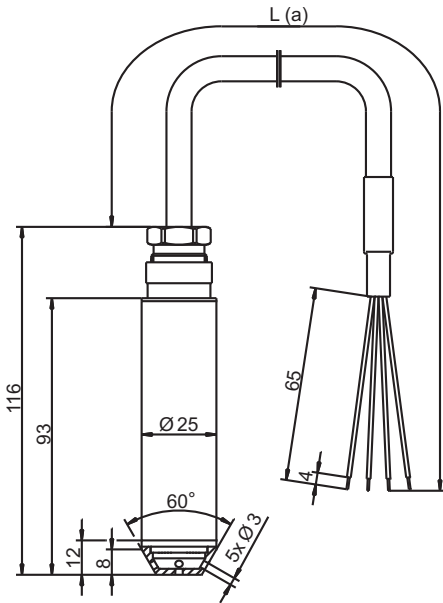
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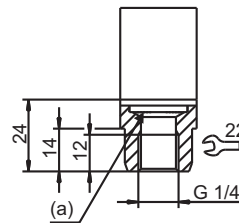
## Dimensions

### Process connection 658

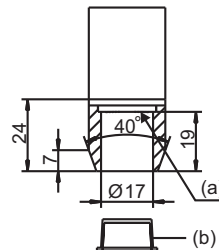


(a) Cable length as required by customer

### Process connection 567



### Process connection 659

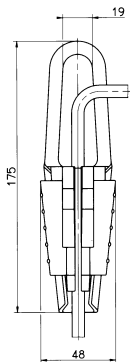


(a) Sensitive membrane  
 (b) Protective cap

## Dimensions of accessories

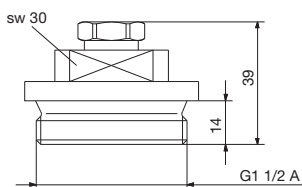
### Cable clamp assembly

Part no. 00061389



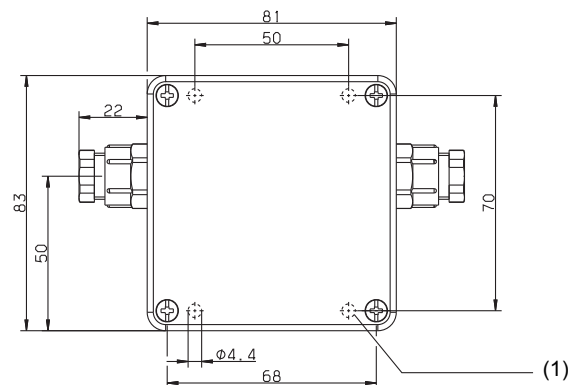
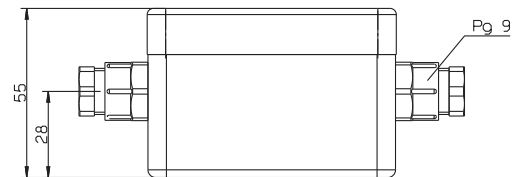
### Screw plug (cover mounting)

Part no. 00333329



### Terminal box with pressure compensation

Part no. 00061206



(1) Mounting hole

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## Order details

<b>(1) Basic type</b>	
402090/000	JUMO MAERA S26 - Level probe
402090/023	JUMO MAERA S26 - Level probe with improved accuracy <sup>a</sup>
402090/999	JUMO MAERA S26 - Level probe, special version
<b>(2) Input</b>	
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
999	Special measuring range relative pressure
<b>(3) Output</b>	
402	0 to 20 mA, 3-wire
405	4 to 20 mA, 2-wire
406	4 to 20 mA, 3-wire
412	0,5 to 4.5 V, 3-wire
415	0 to 10 V, 3-wire
418	1 to 5 V, 3-wire
420	1 to 6 V, 3-wire
<b>(4) Process connection</b>	
567	G 1/4 female
658	Connection closed at bottom
659	Connection open at bottom
<b>(5) Material of process connection</b>	
20	CrNi (stainless steel)
<b>(6) Electrical connection</b>	
14	PUR cable, grey, screened, e.g. suitable for use in water (seawater, well water, brine), as well as in coolant and lubricant (UV-resistant)
15	PE-LD cable, black, screened, e.g. suitable for use in water (seawater, well water, brine, UV-resistant)
25	FEP cable, black, screened, e.g. suitable for use in water (seawater, saltwater, well water, and mine water) as well as in different oils, fuels, and solvents (UV-resistant)
<b>(7) Cable length</b>	
005	5 m
010	10 m
...	...
100	100 m
<b>(8) Extra codes</b>	
000	None
593	Fitting with cutting rings (preparation for protection tube)
631	Higher humidity and vibration protect

<sup>a</sup> Devices with reduced characteristic deviation can be supplied only with output 405 and only for spans from 600 mbar up to 6 bar.

	<b>(1)</b>	-	<b>(2)</b>	-	<b>(3)</b>	-	<b>(4)</b>	-	<b>(5)</b>	-	<b>(6)</b>	-	<b>(7)</b>	/	<b>(8)</b>
<b>Order code</b>	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>
<b>Order example</b>	402090/000	-	454	-	405	-	659	-	20	-	15	-	010	/	000

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## Accessories

Article	Part no.
Terminal box with pressure compensation	00061206
Cable clamp assembly <sup>a</sup>	00061389
Screw plug	00333329
Pressure equalization filter for cable	00382632

<sup>a</sup> The hot-dip galvanized housing is made of sheet steel. The clamping jaws and guide chambers are made of fiberglass-reinforced PA molding compound.