JUMO MAERA S26

Level probe

Applications

Level and filling level measurement[1]

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

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 about our JUMO MAERA series level probes can be found in the the "Level Probes – Hydrostatic Level and Level Measurement" brochure under Documentation.

Type 402090/... with process connection 658

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.

Special features

- level probe for continuous level measurement in liquids
- measuring ranges: 0.25 bar to 2.5 bar (0.2 % MSP[2] 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

[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.

[2] MSP = measuring span

Approvals and approval marks

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 20 °C[c] % MSP	 0 to 50 °C[d] % MSP	Long-term stability[b] % MSP per year	Overload capacity bar	Burst pressure 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	0.5	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 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

Output

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

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 (pepple 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

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	Class B[a], according to EN 61326-1
Interference immunity	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.

Electrical data

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

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

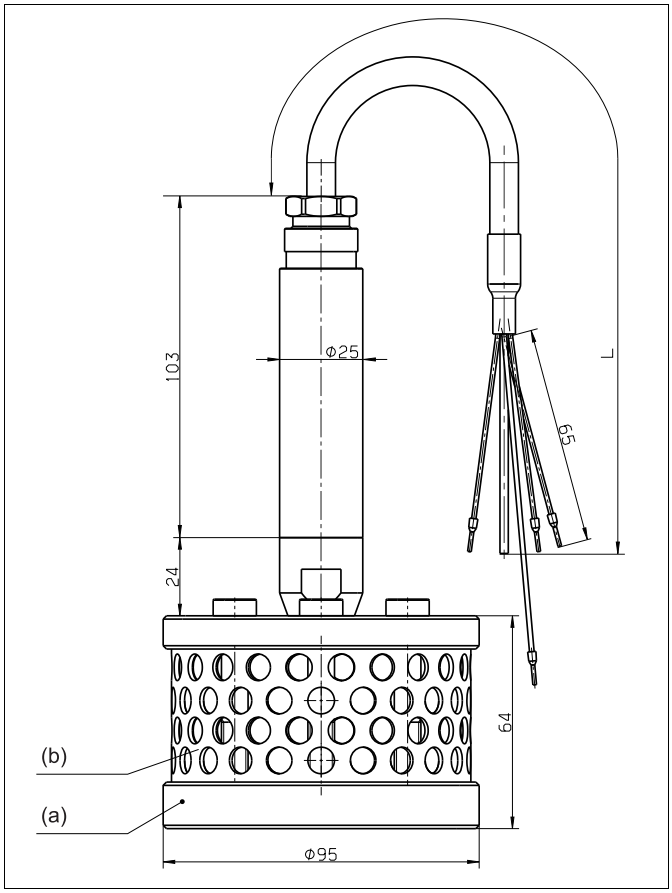
Outer diameter	Approx. 8.3 mm
Conductor cross section	1 mm^2
Bending radius	
Moving	40 mm
Fixed	30 mm
Tensile force	Up to 400 N
Admissible medium temperatures	-40 to +60 °C

Approvals and approval marks

CSA	
Testing agency	CSA Group
Certificates/certification numbers	70209471
Inspection basis	CAN/CSA-C22.2 No. 61010-1-12, UL Std. No. 61010-1 (3rd Edition)
Valid for	Extra code 067
ACS	
Testing agency	Eurofins Expertises Environnementales
Certificates/certification numbers	16 ACC NY 235
Inspection basis	DGS/SD7A No 2002-571
Valid for	Extra code 881

Dimensions

With mounted cage



L Cable length according to customer preference

(a) Protective cage

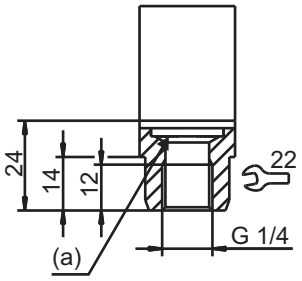
(b) Perforated metal grid Ø 8 mm

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.

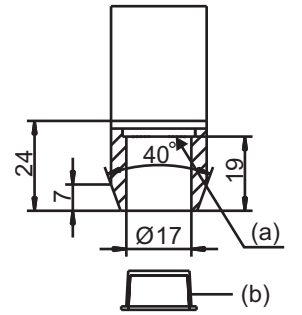
Process connections

567
G 1/4 inside



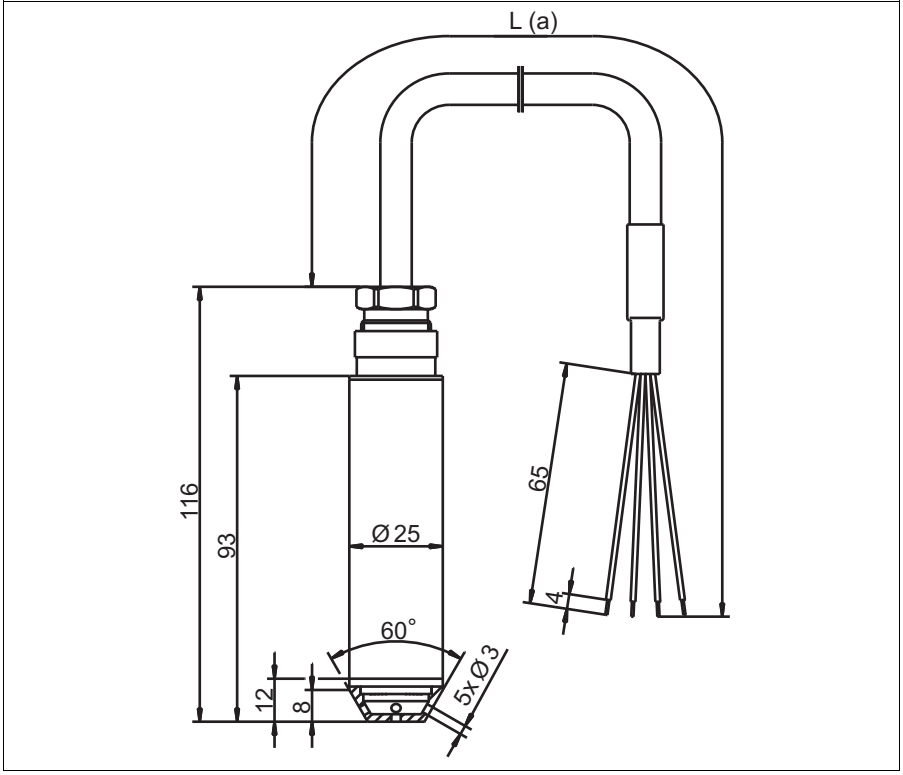
(a) Sensitive membrane

659
Connection open at the bottom



(a) Sensitive membrane
(b) Protective cap

658
Connection closed at the bottom

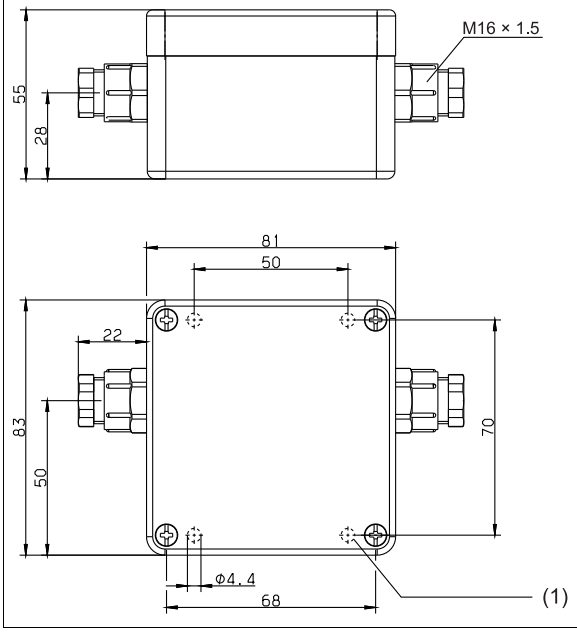


L (a) Cable length according to customer preference

Accessories

Terminal box with pressure compensation

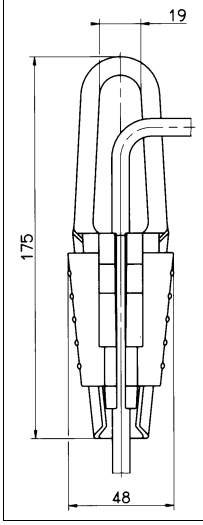
Part no. 00061206



(1) Fastening hole

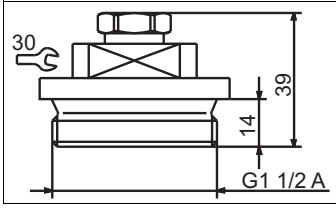
Cable clamp

Part no. 00061389



Sealing screw

Part no. 00333329



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 compliance with the safety information and warnings contained in these documents are mandatory for mounting, electrical connection, and startup as well as for safety during operation.

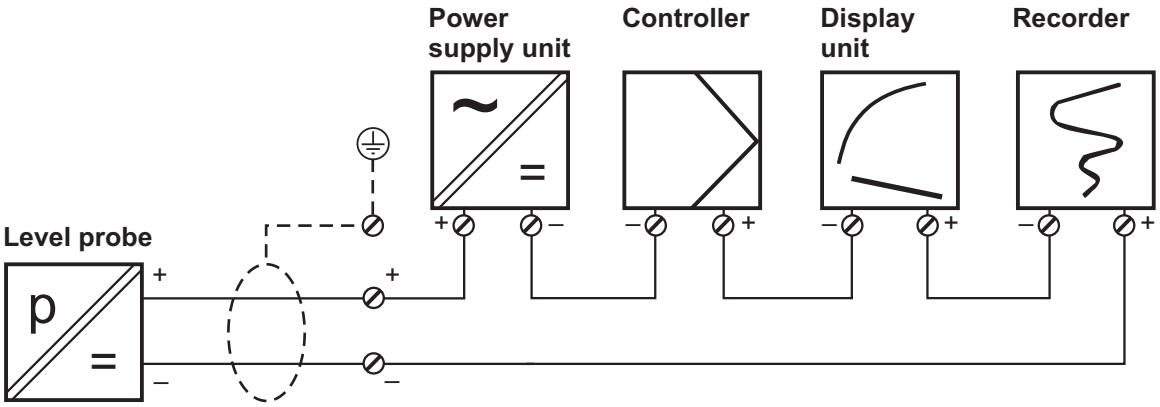
Connection		Terminal assignment
		
		Cable[a]
0 to 20 mA, three-wire (output 402)		
Voltage supply DC 11.5 to 30 V Rated voltage supply DC 24 V	U_B[b] 0 V/S- S+	White Gray Yellow
4 to 20 mA, two-wire (output 405)		
Voltage supply DC 10 to 30 V Rated voltage supply DC 24 V	$U_{B/S}$+ 0 V/S-	White Gray
4 to 20 mA, two-wire (output 405 and EPR cable [electrical connection 26])		
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 (output 406)		
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 (output 412)		
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 (output 415)		
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 (output 418) **DC 1 to 6 V, three-wire (output 420)**		
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".

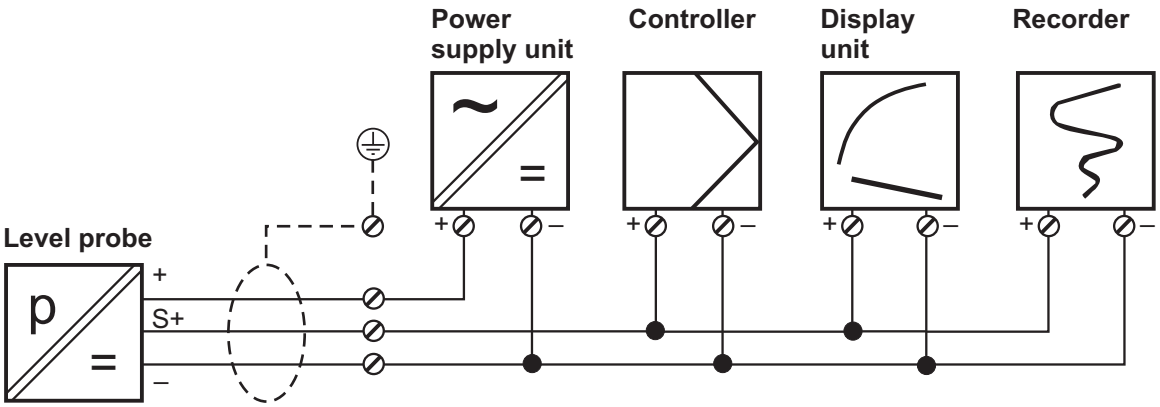
[b] The voltage peaks must not exceed or fall below the specified voltage supply values!

Connection example

Current output



Voltage output



Order details

	(1)	**Basic type**
402090/000		JUMO MAERA S26 – Level probe
402090/023		JUMO MAERA S26 – Level probe with improved accuracy[a]
402090/999		JUMO MAERA S26 – Level probe, special version[b]
	(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[c]
	(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, pepple 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[d]
	(7)	**Cable length of the connecting cable**
005		5 m
010		10 m
...		...
100		100 m

(8)	Extra codes
000	None
067	CSA approval
593	Cutting ring fitting (preparation for protection tube)
631	Improved moisture and vibration protection
881	Drinking water approval[e]
917	EPDM seal

[a] Measuring devices with improved accuracy can only be supplied with output 4 to 20 mA, two-wire, **and** measuring ranges from 0 to 0.6 bar.
[b] Without CSA approval
[c] Measuring ranges up to 10 bar (100 mWS) are available with CSA approval.
[d] Only available with 4 to 20 mA, two-wire.
[e] Only available with EPDM seal, PE-LED cable, and 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 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.	00061389
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