

Pressure Measurement

Pressure transmitters

Single-range transmitters for general applications

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SITRANS LH300 Transmitter for hydrostatic level

Overview



The pressure transmitter SITRANS LH300 is a submersible sensor for hydrostatic level measurement with cap made of PPE (left), stainless steel (mid) and ETFE (right).

The pressure transmitter measures the liquid levels in tanks, containers, channels and dams. The SITRANS LH300 pressure transmitters are available for various measuring ranges and with explosion protection as an option.

A junction box and a cable hanger are available as accessories for simple installation.

Benefits

- Compact design
- Simple installation
- Small error in measurement (0.15 % typical)
- Degree of protection IP68

Application

SITRANS LH300 pressure transmitters are used in the following branches, for example:

- Shipbuilding
- Water/waste water supply
- Drinking water facilities
- For use in unpressurized/open vessels and wells
- Desalination plants

Design

The pressure transmitter has a built-in ceramic sensor which is equipped with a Wheatstone resistance bridge.

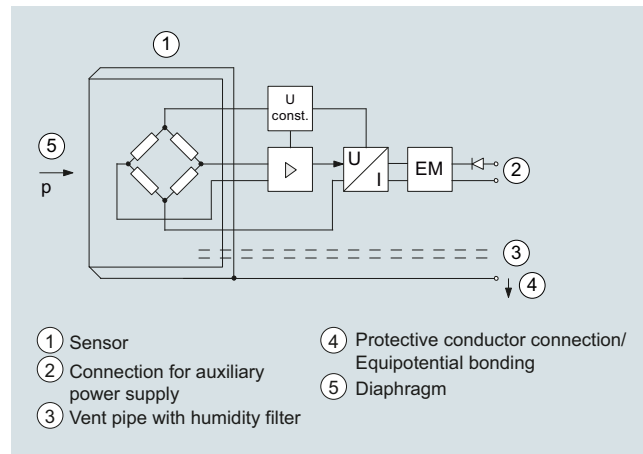
These pressure transmitters are equipped with an electronic circuit fitted together with the sensor in a stainless steel housing. In addition, the connecting cable contains a vent pipe which is equipped with a humidity filter to prevent the build-up of condensation.

The diaphragm is protected against external influences by a protective cap.

The sensor, the electronics and the connecting cable are housed in an enclosure with small dimensions.

The pressure transmitter is temperature-compensated for a wide temperature range.

Function



SITRANS LH300 pressure transmitter, mode of operation and connection diagram

On one side of the sensor (1), the diaphragm (5) is exposed to the hydrostatic pressure which is proportional to the submersion depth. This pressure is compared with atmospheric pressure. Pressure compensation is carried out using the vent pipe (3) in the connecting cable. The vent pipe is equipped with a humidity filter which prevents the build-up of condensation in the vent pipe.

The hydrostatic pressure of the liquid column acts on the diaphragm of the sensor and transmits the pressure to the Wheatstone resistance bridge in the sensor.

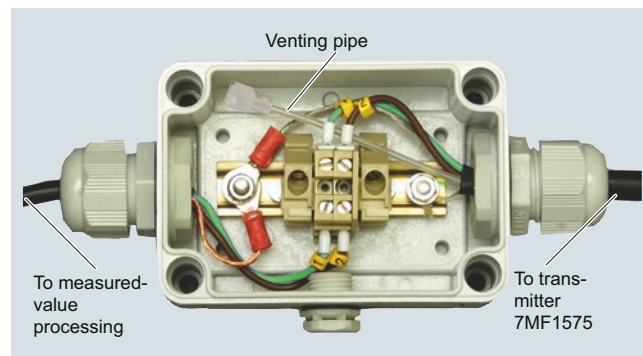
The output voltage of the sensor is applied to the electronic circuit where it is converted into an output current of 4 to 20 mA.

The protective conductor connection/equipotential bonding (4) is connected to the enclosure.

Integration

It is generally recommended that the connecting cable of the SITRANS LH300 transmitter is connected to the junction box, which can be ordered separately, and secured with the cable hanger, also available separately. The junction box has to be installed near the measuring point, but outside the media.

If the medium is anything other than water, it is also necessary to check compatibility with the specified materials of the transmitter, cable and gasket.



Junction box 7MF1575-8AA, open, schematic diagram

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Measuring point setup, generally with junction box 7MF1575-8AA and 7MF1575-8AB cable hanger

Technical specifications

Pressure transmitter SITRANS LH300 (submersible sensor)

Mode of operation

Measuring principle Piezo-resistive

Input

Measured variable	Hydrostatic level
Measuring range	Max. permissible operating pressure
<ul style="list-style-type: none"> 0 ... 1 mH₂O (0 ... 3 ftH₂O) 0 ... 2 mH₂O (0 ... 6 ftH₂O) 0 ... 3 mH₂O (0 ... 9 ftH₂O) 0 ... 4 mH₂O (0 ... 12 ftH₂O) 0 ... 5 mH₂O (0 ... 15 ftH₂O) 0 ... 6 mH₂O (0 ... 18 ftH₂O) 0 ... 10 mH₂O (0 ... 30 ftH₂O) 0 ... 20 mH₂O (0 ... 60 ftH₂O) 0 ... 40 mH₂O (0 ... 120 ftH₂O) 	<ul style="list-style-type: none"> 1.5 bar (21.8 psi) (corresponds to 15 mH₂O (45 ftH₂O)) 1.5 bar (21.8 psi) (corresponds to 15 mH₂O (45 ftH₂O)) 1.5 bar (21.8 psi) (corresponds to 15 mH₂O (45 ftH₂O)) 2 bar (29 psi) (corresponds to 20 mH₂O (60 ftH₂O)) 2 bar (29 psi) (corresponds to 20 mH₂O (60 ftH₂O)) 2 bar (29 psi) (corresponds to 20 mH₂O (60 ftH₂O)) 5 bar (72.5 psi) (corresponds to 50 mH₂O (150 ftH₂O)) 10 bar (145 psi) (corresponds to 100 mH₂O (300 ftH₂O)) 20 bar (290 psi) (corresponds to 200 mH₂O (600 ftH₂O))
Special measuring ranges	<ul style="list-style-type: none"> 20 bar (290 psi) (corresponds to 200 mH₂O (600 ftH₂O)) 24 bar (348 psi) (corresponds to 240 mH₂O (720 ftH₂O))
<ul style="list-style-type: none"> Up to 100 mH₂O (300 ftH₂O) Up to 160 mH₂O (480 ftH₂O) 	

Measuring range

<ul style="list-style-type: none"> 0 ... 0.1 bar 0 ... 0.2 bar 0 ... 0.3 bar 0 ... 0.4 bar 0 ... 0.5 bar 0 ... 0.6 bar 0 ... 1 bar 0 ... 2 bar 0 ... 4 bar 	<ul style="list-style-type: none"> 1.5 bar 1.5 bar 1.5 bar 2 bar 2 bar 2 bar 5 bar 10 bar 20 bar
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Special measuring range

<ul style="list-style-type: none"> Up to 10 bar Up to 16 bar 	<ul style="list-style-type: none"> 20 bar 24 bar
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Output

Output signal 4 ... 20 mA

Measuring accuracy

	According to IEC 60770-1
Error in measurement at limit setting including hysteresis and reproducibility	<ul style="list-style-type: none"> ≤ 0.15 % of full-scale value (typical) ≤ 0.3 % of full-scale value (maximum)
Influence of ambient temperature	≤ 0.05 %/10 K of full-scale value (zero and span)
Long-term stability	≤ 0.15 % of full-scale value/year (zero and span)

Rated conditions

Ambient conditions	
<ul style="list-style-type: none"> Process temperature Storage temperature 	<ul style="list-style-type: none"> -10 ... +80 °C (14 ... 176 °F) -20 ... +80 °C (-4 ... +176 °F)
Degree of protection according to IEC 60529	IP68

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Design

Weight	≈ 0.4 kg (≈ 0.88 lb)
<ul style="list-style-type: none"> • Pressure transmitter • Cable 	0.08 kg/m (≈ 0.059 lb/ft)
Maximal freely suspended length	300 m (990 ft)
Electrical connection	Cable with 2 conductors, vent pipe and integrated humidity filters
Material	
<ul style="list-style-type: none"> • Seal diaphragm • Enclosure 	Al ₂ O ₃ ceramic, 99.6 % Stainless steel, mat. no. 1.4404/316L and 1.4539/904L (sea water applications) respectively
<ul style="list-style-type: none"> • Gasket 	FPM (standard) EPDM (optional)
<ul style="list-style-type: none"> • Connecting cable 	PE (standard/drinking water applications)
<ul style="list-style-type: none"> • Cap 	FEP (for aggressive media) Stainless steel, PPE or ETFE

Auxiliary power

Terminal voltage on pressure transmitter U_B	10 ... 33 V DC for transmitter without explosion protection 10 ... 30 V DC for transmitter with intrinsic safety explosion protection
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Certificates and approvals

Drinking water approval (ACS)	17 ACC NY 055
EAC	TC N RU Д-DE.ГА02.В.05092
Underwriters Laboratories (UL)	ML File No. E344532, issued 2017-08-17
Shipbuilding approval (LR)	LR_18/20074
Shipbuilding approval (DNV/GL)	TAA00000CE
Shipbuilding approval (BV)	56926/A0 BV
Shipbuilding approval (ABS)	HG1881314_P
Shipbuilding approval (RINA)	ELE067319XG
Pressure equipment directive	The transmitter is not subject to the pressure equipment directive (PED 2014/68/EU)
Explosion protection	
<ul style="list-style-type: none"> • ATEX • IEC Ex • EAC Ex • Intrinsic safety "i" 	SEV 16 ATEX 0121 IEC Ex SEV 16.0003 TC RU C-DE.AA87.B.00324
- Marking	II 1 G Ex ia IIC T4 Ga

Junction box

Application	For connecting the transmitter cable
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Design

Weight	0.2 kg (0.44 lb)
Electrical connection	2 x 3-way (28 to 18 AWG)
Cable entry	2 x PG 13.5
Enclosure material	Polycarbonate
Vent pipe for atmospheric pressure	

Rated conditions

Degree of protection according to IEC 60529	IP65
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Cable hanger

Application	For mounting the transmitter
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Design

Weight	0.16 kg (0.35 lb)
Material	Galvanized steel, polyamide
Terminal area	For cable with a diameter of 5.5 ... 9.5 mm

SITRANS LH300 Transmitter for hydrostatic level

Selection and ordering data		Article No.	Order code	Selection and ordering data		Article No.	Order code
Pressure transmitter SITRANS LH300 (submersible sensor)		7MF1575-		Pressure transmitter SITRANS LH300 (submersible sensor)		7MF1575-	
For hydrostatic level measurement, submersible transmitter, two-wire connection, 4 ... 20 mA, body material see Order option, measuring cell Al ₂ O ₃ ceramics (99.6 % purity), with fixed mounted cable, material of protective cap at PE cable: PPE (colour black) material of protective cap at FEP cable: PPE (colour white) Note: junction box and cable hanger have to be ordered separately.				PE cable for general purpose and drinking water applications Special cable length Please add „-Z“ to Article No. and specify Order code and plain text: Y01: Cable length			
Measuring range	Cable length (PE cable)					9 X	H . .
0 ... 1 mH ₂ O	5 m	1 A		3 m (≈ 10 ft)			+ Y 0 1
0 ... 2 mH ₂ O	5 m	1 B		5 m (≈ 16 ft)			H 1 A
0 ... 3 mH ₂ O	10 m	1 C		7 m (≈ 23 ft)			H 1 B
0 ... 4 mH ₂ O	10 m	1 D		10 m (≈ 33 ft)			H 1 C
0 ... 5 mH ₂ O	10 m	1 E		15 m (≈ 50 ft)			H 1 D
0 ... 6 mH ₂ O	10 m	1 F		20 m (≈ 65 ft)			H 1 E
0 ... 10 mH ₂ O	20 m	1 H		25 m (≈ 80 ft)			H 1 F
0 ... 20 mH ₂ O	30 m	1 K		30 m (≈ 100 ft)			H 1 G
0 ... 40 mH ₂ O	50 m	1 L		40 m (≈ 130 ft)			H 1 H
0 ... 3 ftH ₂ O	5 m (≈ 15 ft)	2 A		50 m (≈ 160 ft)			H 1 J
0 ... 6 ftH ₂ O	5 m (≈ 15 ft)	2 B		60 m (≈ 200 ft)			H 1 K
0 ... 9 ftH ₂ O	10 m (≈ 30 ft)	2 C		70 m (≈ 230 ft)			H 1 L
0 ... 12 ftH ₂ O	10 m (≈ 30 ft)	2 D		80 m (≈ 265 ft)			H 1 M
0 ... 15 ftH ₂ O	10 m (≈ 30 ft)	2 E		90 m (≈ 295 ft)			H 1 N
0 ... 18 ftH ₂ O	10 m (≈ 30 ft)	2 F		100 m (≈ 330 ft)			H 1 P
0 ... 30 ftH ₂ O	20 m (≈ 60 ft)	2 H		125 m (≈ 410 ft)			H 1 Q
0 ... 60 ftH ₂ O	30 m (≈ 90 ft)	2 K		150 m (≈ 495 ft)			H 1 R
0 ... 120 ftH ₂ O	50 m (≈ 150 ft)	2 L		175 m (≈ 575 ft)			H 1 S
0 ... 0.1 bar	5 m	3 A		200 m (≈ 650 ft)			H 1 T
0 ... 0.2 bar	5 m	3 B		225 m (≈ 740 ft)			H 1 U
0 ... 0.3 bar	10 m	3 C		250 m (≈ 820 ft)			H 1 V
0 ... 0.4 bar	10 m	3 D		275 m (≈ 900 ft)			H 1 W
0 ... 0.5 bar	10 m	3 E		300 m (≈ 990 ft)			H 1 X
0 ... 0.6 bar	10 m	3 F		350 m (≈ 1150 ft)			H 2 A
0 ... 1 bar	20 m	3 H		400 m (≈ 1320 ft)			H 2 B
0 ... 2 bar	30 m	3 K		450 m (≈ 1480 ft)			H 2 C
0 ... 4 bar	50 m	3 L		500 m (≈ 1650 ft)			H 2 D
Special versions:				550 m (≈ 1815 ft)			H 2 E
<u>Measuring ranges</u> for special versions between				600 m (≈ 1980 ft)			H 2 F
0 ... 1 mH ₂ O and 0 ... 160 mH ₂ O or				650 m (≈ 2145 ft)			H 2 G
0 ... 3 ftH ₂ O and 0 ... 530 ftH ₂ O or				700 m (≈ 2310 ft)			H 2 H
0 ... 0.1 bar and 0 ... 16 bar possible.				750 m (≈ 2475 ft)			H 2 J
				800 m (≈ 2640 ft)			H 2 K
				850 m (≈ 2800 ft)			H 2 L
				900 m (≈ 2970 ft)			H 2 M
				950 m (≈ 3135 ft)			H 2 N
				1000 m (≈ 3300 ft)			H 2 P
				Other special cable length		9 X	H 1 Y
				Please add „-Z“ to Article No. and specify			+ Y 0 1
				Order codes and plain text:			Y 0 1
				H1Y: Cable length			
				Y01: Measuring range			

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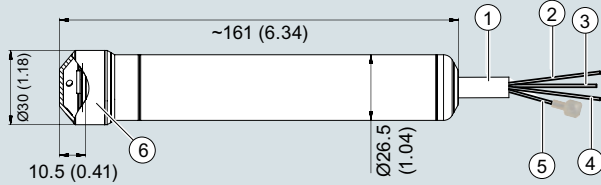
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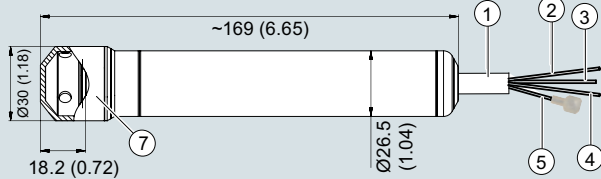
Selection and ordering data	Article No.	Order code	Selection and ordering data	Article No.	Order code
Pressure transmitter SITRANS LH300 (submersible sensor)	7MF1575-		Pressure transmitter SITRANS LH300 (submersible sensor)	7MF1575-	
FEP cable for aggressive media			Material of housing		
Special cable length Please add „-Z“ to Article No. and specify Order code and plain text: Y01: Cable length	9 X	H . . + Y 0 1	Material of protective cap	A	
3 m (≈ 10 ft)		H 5 A	Stainless steel 316L (1.4404)	B	
5 m (≈ 16 ft)		H 5 B	Stainless steel 316L (1.4404)	C	
7 m (≈ 23 ft)		H 5 C	Stainless steel 316L (1.4404)	D	
10 m (≈ 33 ft)		H 5 D	Stainless steel 904L (1.4539) for sea water applications	E	
15 m (≈ 50ft)		H 5 E	Stainless steel 904L (1.4539) for sea water applications	F	
20 m (≈ 65 ft)		H 5 F	Stainless steel 904L (1.4539) for seawater applications		
25 m (≈ 80 ft)		H 5 G			
30 m (≈ 100 ft)		H 5 H			
40 m (≈ 130 ft)		H 5 J			
50 m (≈ 160 ft)		H 5 K			
60 m (≈ 200 ft)		H 5 L			
70 m (≈ 230 ft)		H 5 M			
80 m (≈ 265 ft)		H 5 N			
90 m (≈ 295 ft)		H 5 P			
100 m (≈ 330 ft)		H 5 Q			
125 m (≈ 410 ft)		H 5 R			
150 m (≈ 495 ft)		H 5 S			
175 m (≈ 575 ft)		H 5 T			
200 m (≈ 650 ft)		H 5 U			
225 m (≈ 740 ft)		H 5 V			
250 m (≈ 820 ft)		H 5 W			
275 m (≈ 900 ft)		H 5 X			
300 m (≈ 990 ft)		H 6 A			
350 m (≈ 1150 ft)		H 6 B			
400 m (≈ 1320 ft)		H 6 C			
450 m (≈ 1480 ft)		H 6 D			
500 m (≈ 1650 ft)		H 6 E			
550 m (≈ 1815 ft)		H 6 F			
600 m (≈ 1980 ft)		H 6 G			
650 m (≈ 2145 ft)		H 6 H			
700 m (≈ 2310 ft)		H 6 J			
750 m (≈ 2475 ft)		H 6 K			
800 m (≈ 2640 ft)		H 6 L			
850 m (≈ 2800 ft)		H 6 M			
900 m (≈ 2970 ft)		H 6 N			
950 m (≈ 3135 ft)		H 6 P			
1000 m (≈ 3300 ft)		H 6 Q			
Other special cable length Please add „-Z“ to Article No. and specify Order codes and plain text: H1Y: Cable length	9 X	H 5 Y + Y 0 1	Sealing material between sensor and housing		
Y01: Measuring range			FPM (Standard)	1	
			EPDM (for drinking water)	2	
			Explosion protection		
			without	0	
			With ATEX II1 G Ex ia IIC T4 Ga, IECEx Ex ia IIC T4 Ga and EAC Ex (only possible for cable length ≤ 300 m (990 ft))	1	
			Additional versions		Order code
			Quality Inspection Certificate (factory calibration) to IEC 60770-2 (6 points upward)		C11
			Accessories/spare parts		Article No.
			Junction box		7MF1575-8AA
			Cable hanger		7MF1575-8AB
			Protective caps, PPE, as spare part (10-pack)		7MF1575-8AD
			Protective caps, ETFE, as spare part (10-pack)		7MF1575-8AE
			Humidity filters as spare part (10-pack)		7MF1575-8AF
			Protective cap, stainless steel 316L (1.4404) for waste water applications		7MF1575-8AG
			Protective cap, stainless steel 904L (1.4539) for sea water applications		7MF1575-8AH

Dimensional drawings

Sensor with protective cap (PPE, ETFE)

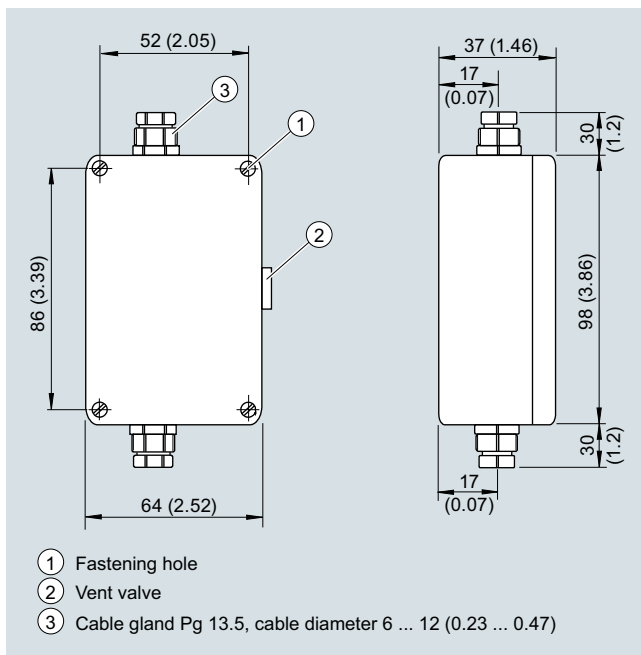


Sensor with protective cap (stainless steel)

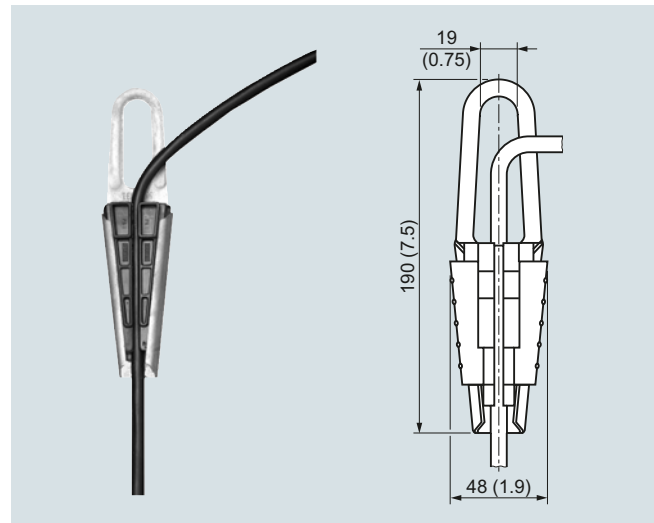


- ① Cable, sheath \varnothing 8.3 (0.33)
- ② - (blue)
- ③ + (brown)
- ④ Protective conductor connection/Equipotential bonding (black)
- ⑤ Vent pipe with humidity filter \varnothing 1 (0.04) (inner diameter)
- ⑥ Protective cap (PPE or PTFE) with 4 x \varnothing 2.5 (0.10) holes
- ⑦ Protective cap (stainless steel) with 4 x \varnothing 5 (0.20) holes

SITRANS LH300 pressure transmitter, dimensions in mm (inch)

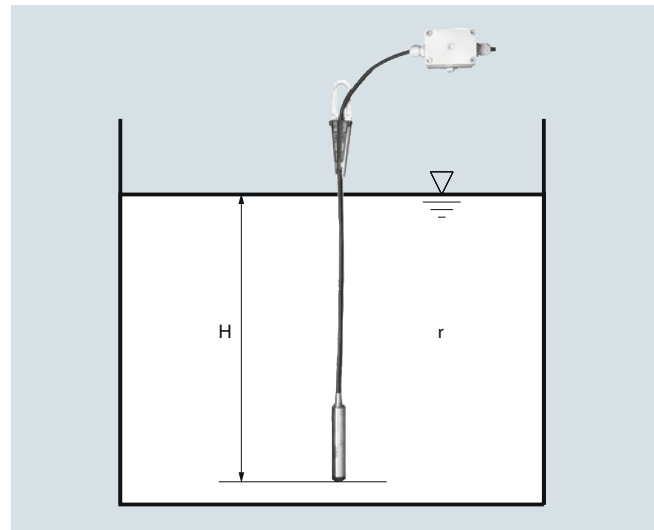


Junction box, dimensions in mm (inch)



Cable hanger, dimensions in mm (inch)

More information

Determination of the measuring range for medium water

Calculation of the measuring range:

$$p = \rho \times g \times H$$

with:

 ρ = density of medium g = local acceleration due to gravity H = maximum level

Example:

Medium: Water, $\rho = 1\,000 \text{ kg/m}^3$ Acceleration due to gravity: 9.81 m/s^2

Start-of-scale: 0 m

Maximum level: 6.0 m

Cable length: 10 m

Calculation:

$$p = 1\,000 \text{ kg/m}^3 \times 9.81 \text{ m/s}^2 \times 6.0 \text{ m}$$

$$p = 58\,860 \text{ N/m}^2$$

$$p = 589 \text{ mbar}$$

Transmitter to be ordered:

7MF1575-1FA10

Plus, if required, junction box 7MF1575-8AA and cable hanger 7MF1575-8AB