

Pressure Measurement

Single-range transmitters for general applications

SITRANS LH300 Transmitter for hydrostatic level

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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.

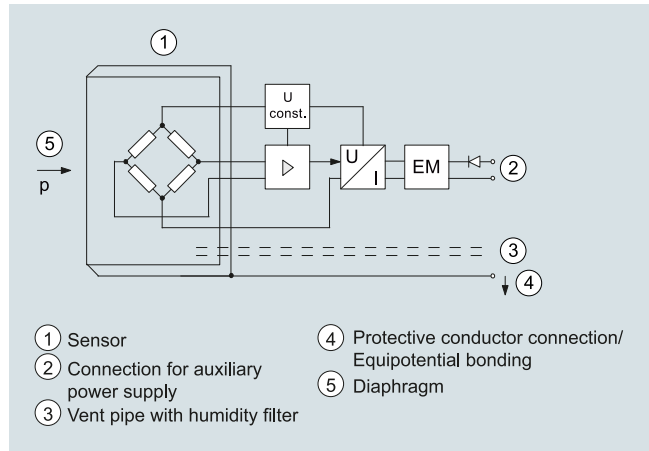
These pressure transmitters are equipped with an electronic circuit fitted together with the sensor in a stainless steel housing. In addition, the connecting cable contains a vent pipe which is equipped with a humidity filter to prevent the build-up of condensation.

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.

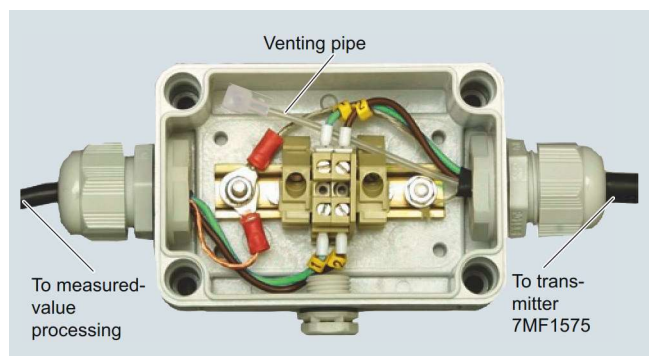
The output voltage of the sensor is applied to the electronic circuit where it is converted into an output current of 4 to 20 mA.

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"> Up to 100 mH₂O (300 ftH₂O) Up to 160 mH₂O (480 ftH₂O) 	<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))
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
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
Output	
Output signal	4 ... 20 mA
Measuring accuracy	
Error in measurement at limit setting including hysteresis and reproducibility	According to IEC 60770-1 ≤ 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 	-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)
• Pressure transmitter	0.08 kg/m (≈ 0.059 lb/ft)
• Cable	
Maximal freely suspended length	300 m (990 ft)
Electrical connection	Cable with 2 conductors, vent pipe and integrated humidity filters
Material	...
• Seal diaphragm	Al ₂ O ₃ ceramic, 99.6 %
• Enclosure	Stainless steel, mat. no. 1.4404/316L and 1.4539/904L (sea water applications) respectively
• Gasket	FPM (standard)
	EPDM (optional)
• Connecting cable	PE (standard/drinking water applications)
	FEP (for aggressive media)
• Cap	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
Certificates and approvals	
Drinking water approval (ACS)	17 ACC NY 055
Drinking water approval (WRAS)	Pending
Drinking water approval (DVGW/KTW W270)	Pending
EAC	TC N RU Д-DE.FA02.B.05092
Underwriters Laboratories (UL)	ML File No. E344532, issued 2017-08-17
Shipbuilding approval (LR)	Pending
Shipbuilding approval (DNV/GL)	Pending
Shipbuilding approval (BV)	Pending
Shipbuilding approval (ABS)	Pending
Pressure equipment directive	The transmitter is not subject to the pressure equipment directive (PED 2014/68/EU)
Explosion protection	
• ATEX	SEV 16 ATEX 0121
• IEC Ex	IEC Ex SEV 16.0003
• EAC Ex	TC RU C-DE.AA87.B.00324
• Intrinsic safety "i"	
- Marking	II 1 G Ex ia IIC T4 Ga

Junction box	
Application	For connecting the transmitter cable
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
Cable hanger	
Application	For mounting the transmitter
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

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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)		7 MF 1 5 7 5 -		Pressure transmitter SITRANS LH300 (submersible sensor)		7 MF 1 5 7 5 -	
<p>For hydrostatic level measurement, submersible transmitter, two-wire connection, 4 ... 20 mA, body material see Order option, measuring cell Al₂O₃ 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)</p> <p>Note: junction box and cable hanger have to be ordered separately.</p> <p>➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p>				<p>PE cable for general purpose and drinking water applications</p> <p>Special cable length Please add „Z“ to Article No. and specify Order code and plain text: Y01: Cable length</p>			
Measuring range	Cable length (PE cable)						
0 ... 1 mH ₂ O	5 m	1 A		3 m (≈ 10 ft)		H 1 A	
0 ... 2 mH ₂ O	5 m	1 B		5 m (≈ 16 ft)		H 1 B	
0 ... 3 mH ₂ O	10 m	1 C		7 m (≈ 23 ft)		H 1 C	
0 ... 4 mH ₂ O	10 m	1 D		10 m (≈ 33 ft)		H 1 D	
0 ... 5 mH ₂ O	10 m	1 E		15 m (≈ 50 ft)		H 1 E	
0 ... 6 mH ₂ O	10 m	1 F		20 m (≈ 65 ft)		H 1 F	
0 ... 10 mH ₂ O	20 m	1 H		25 m (≈ 80 ft)		H 1 G	
0 ... 20 mH ₂ O	30 m	1 K		30 m (≈ 100 ft)		H 1 H	
0 ... 40 mH ₂ O	50 m	1 L		40 m (≈ 130 ft)		H 1 J	
0 ... 3 ftH ₂ O	5 m (≈ 15 ft)	2 A		50 m (≈ 160 ft)		H 1 K	
0 ... 6 ftH ₂ O	5 m (≈ 15 ft)	2 B		60 m (≈ 200 ft)		H 1 L	
0 ... 9 ftH ₂ O	10 m (≈ 30 ft)	2 C		70 m (≈ 230 ft)		H 1 M	
0 ... 12 ftH ₂ O	10 m (≈ 30 ft)	2 D		80 m (≈ 265 ft)		H 1 N	
0 ... 15 ftH ₂ O	10 m (≈ 30 ft)	2 E		90 m (≈ 295 ft)		H 1 P	
0 ... 18 ftH ₂ O	10 m (≈ 30 ft)	2 F		100 m (≈ 330 ft)		H 1 Q	
0 ... 30 ftH ₂ O	20 m (≈ 60 ft)	2 H		125 m (≈ 410 ft)		H 1 R	
0 ... 60 ftH ₂ O	30 m (≈ 90 ft)	2 K		150 m (≈ 495 ft)		H 1 S	
0 ... 120 ftH ₂ O	50 m (≈ 150 ft)	2 L		175 m (≈ 575 ft)		H 1 T	
0 ... 0.1 bar	5 m	3 A		200 m (≈ 650 ft)		H 1 U	
0 ... 0.2 bar	5 m	3 B		225 m (≈ 740 ft)		H 1 V	
0 ... 0.3 bar	10 m	3 C		250 m (≈ 820 ft)		H 1 W	
0 ... 0.4 bar	10 m	3 D		275 m (≈ 900 ft)		H 1 X	
0 ... 0.5 bar	10 m	3 E		300 m (≈ 990 ft)		H 2 A	
0 ... 0.6 bar	10 m	3 F		350 m (≈ 1150 ft)		H 2 B	
0 ... 1 bar	20 m	3 H		400 m (≈ 1320 ft)		H 2 C	
0 ... 2 bar	30 m	3 K		450 m (≈ 1480 ft)		H 2 D	
0 ... 4 bar	50 m	3 L		500 m (≈ 1650 ft)		H 2 E	
Special versions:				550 m (≈ 1815 ft)		H 2 F	
<u>Measuring ranges for special versions between</u>				600 m (≈ 1980 ft)		H 2 G	
0 ... 1 mH ₂ O and 0 ... 160 mH ₂ O or				650 m (≈ 2145 ft)		H 2 H	
0 ... 3 ftH ₂ O and 0 ... 530 ftH ₂ O or				700 m (≈ 2310 ft)		H 2 J	
0 ... 0.1 bar and 0 ... 16 bar possible.				750 m (≈ 2475 ft)		H 2 K	
				800 m (≈ 2640 ft)		H 2 L	
				850 m (≈ 2800 ft)		H 2 M	
				900 m (≈ 2970 ft)		H 2 N	
				950 m (≈ 3135 ft)		H 2 P	
				1000 m (≈ 3300 ft)		H 2 Q	
				Other special cable length		H 1 Y	
				Please add „Z“ to Article No. and specify	9 X	+	
				Order codes and plain text:		Y 0 1	
				H1Y: Cable length			
				Y01: Measuring range			

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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	Stainless steel 316L (1.4404)	Material of protective cap	A
3 m (≈ 10 ft)		H 5 A	Stainless steel 316L (1.4404)	Protective capability made of PPE (recom- mended for PE cable)	B
5 m (≈ 16 ft)		H 5 B	Stainless steel 316L (1.4404)	Protective cap made of ETFE (standard with FEP cable)	C
7 m (≈ 23 ft)		H 5 C	Stainless steel 316L (1.4404)	Stainless steel 316L (1.4404)	D
10 m (≈ 33 ft)		H 5 D	Stainless steel 904L (1.4539) for sea water applications	Protective cap PPE	E
15 m (≈ 50ft)		H 5 E	Stainless steel 904L (1.4539) for sea water applications	Protective cap ETFE	F
20 m (≈ 65 ft)		H 5 F	Stainless steel 904L (1.4539) for seawater applications	Stainless steel 904L (1.4539) for seawater applications	
25 m (≈ 80 ft)		H 5 G	Sealing material between sensor and housing		
30 m (≈ 100 ft)		H 5 H	FPM (Standard)	1	
40 m (≈ 130 ft)		H 5 J	EPDM (for drinking water)	2	
50 m (≈ 160 ft)		H 5 K	Explosion protection		
60 m (≈ 200 ft)		H 5 L	without	0	
70 m (≈ 230 ft)		H 5 M	With ATEX II1 G Ex ia IIC T4 Ga, IECEx Ex ia IIC T4 Ga and EAC Ex (only pos- sible for cable length ≤ 300 m (990 ft))	1	
80 m (≈ 265 ft)		H 5 N	Additional versions		Order code
90 m (≈ 295 ft)		H 5 P	Quality Inspection Certificate (factory calibra- tion) to IEC 60770-2 (6 points upward)		C11
100 m (≈ 330 ft)		H 5 Q	Accessories/spare parts		Article No.
125 m (≈ 410 ft)		H 5 R	Junction box		7MF1575-8AA
150 m (≈ 495 ft)		H 5 S	Cable hanger		7MF1575-8AB
175 m (≈ 575 ft)		H 5 T	Protective caps, PPE, as spare part (10-pack)		7MF1575-8AD
200 m (≈ 650 ft)		H 5 U	Protective caps, ETFE, as spare part (10-pack)		7MF1575-8AE
225 m (≈ 740 ft)		H 5 V	Humidity filters as spare part (10-pack)		7MF1575-8AF
250 m (≈ 820 ft)		H 5 W	Protective cap, stainless steel 316L (1.4404) for waste water applications		7MF1575-8AG
275 m (≈ 900 ft)		H 5 X	Protective cap, stainless steel 904L (1.4539) for sea water applications		7MF1575-8AH
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			
Y01: Measuring range					

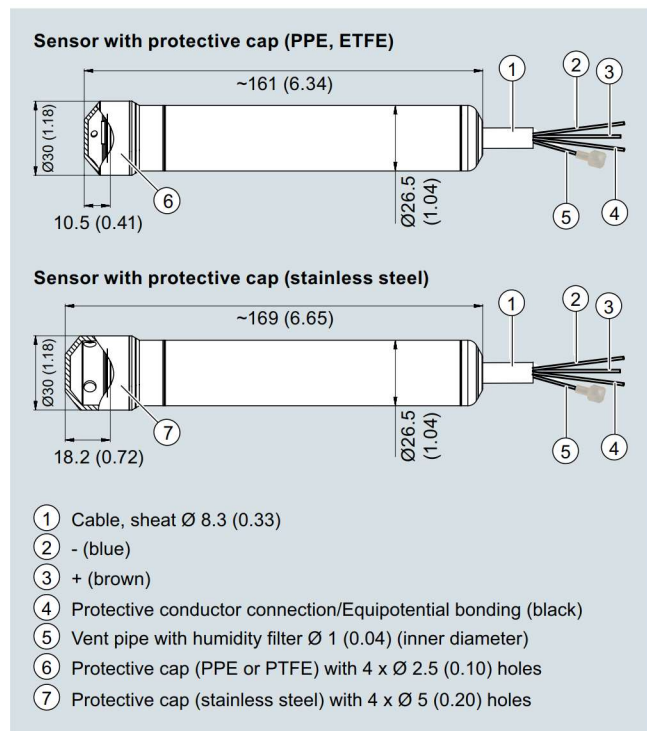
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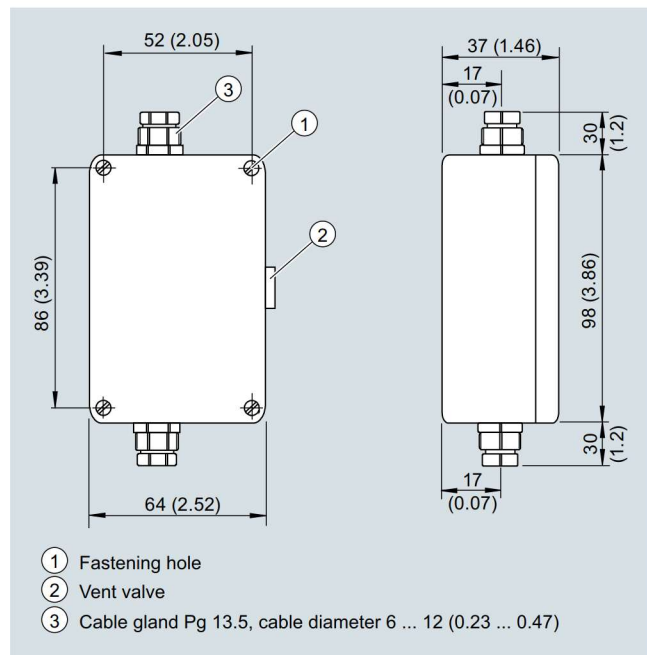
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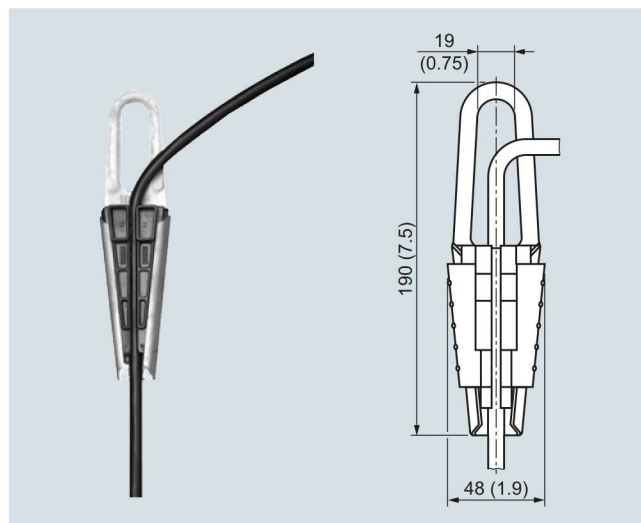
Dimensional drawings



SITRANS LH300 pressure transmitter, dimensions in mm (inch)



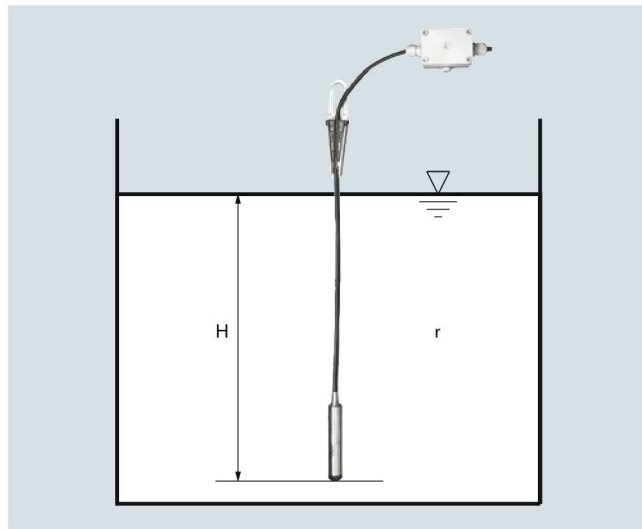
Junction box, dimensions in mm (inch)



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