

Pressure Measurement

Pressure transmitters

Single-range transmitters for general applications

SITRANS LH300 Transmitter for hydrostatic level

1

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.

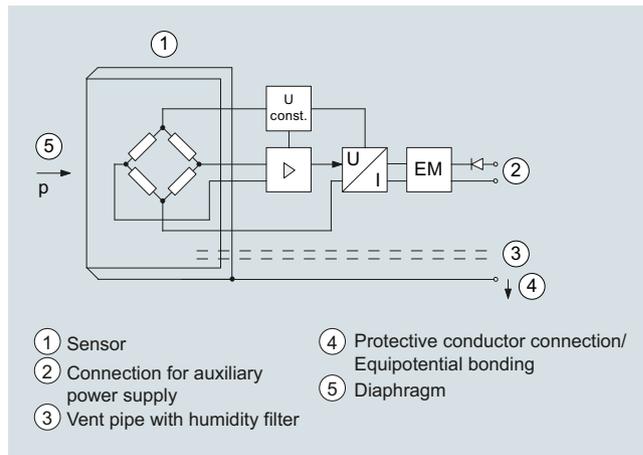
These pressure transmitters are equipped with an electronic circuit fitted together with the sensor in a stainless steel enclosure. In addition, the connecting cable contains a vent pipe which is equipped with a humidity filter to prevent the build-up of condensation.

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.

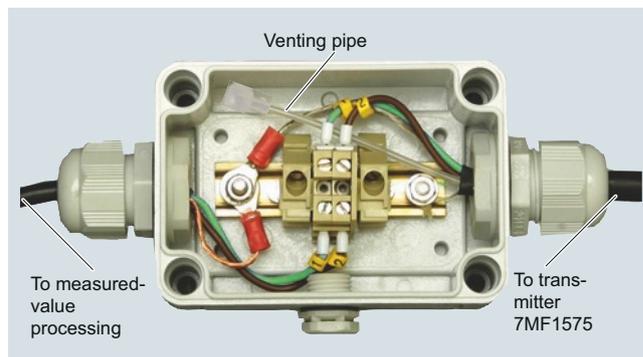
The output voltage of the sensor is applied to the electronic circuit where it is converted into an output current of 4 to 20 mA.

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 cable box, which can be ordered separately, and secured with an anchoring clamp, also available separately. The cable plug is to be installed near the measuring point, but outside the medium.

Likewise, in the case of media other than water the compatibility with the specified materials of the transmitter, cable and seal must be checked.



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



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
• 0 ... 1 mH ₂ O (0 ... 3 ftH ₂ O)	• 1.5 bar (21.8 psi) (corresponds to 15 mH ₂ O (45 ftH ₂ O))
• 0 ... 2 mH ₂ O (0 ... 6 ftH ₂ O)	• 1.5 bar (21.8 psi) (corresponds to 15 mH ₂ O (45 ftH ₂ O))
• 0 ... 3 mH ₂ O (0 ... 9 ftH ₂ O)	• 1.5 bar (21.8 psi) (corresponds to 15 mH ₂ O (45 ftH ₂ O))
• 0 ... 4 mH ₂ O (0 ... 12 ftH ₂ O)	• 2 bar (29 psi) (corresponds to 20 mH ₂ O (60 ftH ₂ O))
• 0 ... 5 mH ₂ O (0 ... 15 ftH ₂ O)	• 2 bar (29 psi) (corresponds to 20 mH ₂ O (60 ftH ₂ O))
• 0 ... 6 mH ₂ O (0 ... 18 ftH ₂ O)	• 2 bar (29 psi) (corresponds to 20 mH ₂ O (60 ftH ₂ O))
• 0 ... 10 mH ₂ O (0 ... 30 ftH ₂ O)	• 5 bar (72.5 psi) (corresponds to 50 mH ₂ O (150 ftH ₂ O))
• 0 ... 20 mH ₂ O (0 ... 60 ftH ₂ O)	• 10 bar (145 psi) (corresponds to 100 mH ₂ O (300 ftH ₂ O))
• 0 ... 40 mH ₂ O (0 ... 120 ftH ₂ O)	• 20 bar (290 psi) (corresponds to 200 mH ₂ O (600 ftH ₂ O))
Special measuring ranges	
• Up to 100 mH ₂ O (300 ftH ₂ O)	• 20 bar (290 psi) (corresponds to 200 mH ₂ O (600 ftH ₂ O))
• Up to 160 mH ₂ O (480 ftH ₂ O)	• 24 bar (348 psi) (corresponds to 240 mH ₂ O (720 ftH ₂ O))

Measuring range

• 0 ... 0.1 bar	• 1.5 bar
• 0 ... 0.2 bar	• 1.5 bar
• 0 ... 0.3 bar	• 1.5 bar
• 0 ... 0.4 bar	• 2 bar
• 0 ... 0.5 bar	• 2 bar
• 0 ... 0.6 bar	• 2 bar
• 0 ... 1 bar	• 5 bar
• 0 ... 2 bar	• 10 bar
• 0 ... 4 bar	• 20 bar

Special measuring range

• Up to 10 bar	• 20 bar
• Up to 16 bar	• 24 bar

Output

Output signal 4 ... 20 mA

Measuring accuracy

	According to IEC 60770-1
Error in measurement at limit setting including hysteresis and reproducibility	≤ 0.15 % of upper range value (typical) ≤ 0.3 % of upper range value (maximum)
Influence of ambient temperature	≤ 0.05 %/10 K of upper range value (zero and span)
Long-term stability	≤ 0.15 % of upper range value/year (zero and span)

Operating conditions

Ambient conditions	
• Process temperature	-10 ... +80 °C (14 ... 176 °F)
• Storage temperature	-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.B.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
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 valve for atmospheric pressure	
Operating 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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For hydrostatic level measurement, submersible transmitter, two-wire connection, 4 ... 20 mA, enclosure 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																																																																																							
<p>Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p> <table border="1"> <thead> <tr> <th>Measuring range</th> <th>Cable length (PE cable)</th> <th></th> </tr> </thead> <tbody> <tr><td>0 ... 1 mH₂O</td><td>5 m</td><td>1 A</td></tr> <tr><td>0 ... 2 mH₂O</td><td>5 m</td><td>1 B</td></tr> <tr><td>0 ... 3 mH₂O</td><td>10 m</td><td>1 C</td></tr> <tr><td>0 ... 4 mH₂O</td><td>10 m</td><td>1 D</td></tr> <tr><td>0 ... 5 mH₂O</td><td>10 m</td><td>1 E</td></tr> <tr><td>0 ... 6 mH₂O</td><td>10 m</td><td>1 F</td></tr> <tr><td>0 ... 10 mH₂O</td><td>20 m</td><td>1 H</td></tr> <tr><td>0 ... 20 mH₂O</td><td>30 m</td><td>1 K</td></tr> <tr><td>0 ... 40 mH₂O</td><td>50 m</td><td>1 L</td></tr> <tr><td>0 ... 3 ftH₂O</td><td>5 m (≈ 15 ft)</td><td>2 A</td></tr> <tr><td>0 ... 6 ftH₂O</td><td>5 m (≈ 15 ft)</td><td>2 B</td></tr> <tr><td>0 ... 9 ftH₂O</td><td>10 m (≈ 30 ft)</td><td>2 C</td></tr> <tr><td>0 ... 12 ftH₂O</td><td>10 m (≈ 30 ft)</td><td>2 D</td></tr> <tr><td>0 ... 15 ftH₂O</td><td>10 m (≈ 30 ft)</td><td>2 E</td></tr> <tr><td>0 ... 18 ftH₂O</td><td>10 m (≈ 30 ft)</td><td>2 F</td></tr> <tr><td>0 ... 30 ftH₂O</td><td>20 m (≈ 60 ft)</td><td>2 H</td></tr> <tr><td>0 ... 60 ftH₂O</td><td>30 m (≈ 90 ft)</td><td>2 K</td></tr> <tr><td>0 ... 120 ftH₂O</td><td>50 m (≈ 150 ft)</td><td>2 L</td></tr> <tr><td>0 ... 0.1 bar</td><td>5 m</td><td>3 A</td></tr> <tr><td>0 ... 0.2 bar</td><td>5 m</td><td>3 B</td></tr> <tr><td>0 ... 0.3 bar</td><td>10 m</td><td>3 C</td></tr> <tr><td>0 ... 0.4 bar</td><td>10 m</td><td>3 D</td></tr> <tr><td>0 ... 0.5 bar</td><td>10 m</td><td>3 E</td></tr> <tr><td>0 ... 0.6 bar</td><td>10 m</td><td>3 F</td></tr> <tr><td>0 ... 1 bar</td><td>20 m</td><td>3 H</td></tr> <tr><td>0 ... 2 bar</td><td>30 m</td><td>3 K</td></tr> <tr><td>0 ... 4 bar</td><td>50 m</td><td>3 L</td></tr> </tbody> </table>		Measuring range	Cable length (PE cable)		0 ... 1 mH ₂ O	5 m	1 A	0 ... 2 mH ₂ O	5 m	1 B	0 ... 3 mH ₂ O	10 m	1 C	0 ... 4 mH ₂ O	10 m	1 D	0 ... 5 mH ₂ O	10 m	1 E	0 ... 6 mH ₂ O	10 m	1 F	0 ... 10 mH ₂ O	20 m	1 H	0 ... 20 mH ₂ O	30 m	1 K	0 ... 40 mH ₂ O	50 m	1 L	0 ... 3 ftH ₂ O	5 m (≈ 15 ft)	2 A	0 ... 6 ftH ₂ O	5 m (≈ 15 ft)	2 B	0 ... 9 ftH ₂ O	10 m (≈ 30 ft)	2 C	0 ... 12 ftH ₂ O	10 m (≈ 30 ft)	2 D	0 ... 15 ftH ₂ O	10 m (≈ 30 ft)	2 E	0 ... 18 ftH ₂ O	10 m (≈ 30 ft)	2 F	0 ... 30 ftH ₂ O	20 m (≈ 60 ft)	2 H	0 ... 60 ftH ₂ O	30 m (≈ 90 ft)	2 K	0 ... 120 ftH ₂ O	50 m (≈ 150 ft)	2 L	0 ... 0.1 bar	5 m	3 A	0 ... 0.2 bar	5 m	3 B	0 ... 0.3 bar	10 m	3 C	0 ... 0.4 bar	10 m	3 D	0 ... 0.5 bar	10 m	3 E	0 ... 0.6 bar	10 m	3 F	0 ... 1 bar	20 m	3 H	0 ... 2 bar	30 m	3 K	0 ... 4 bar	50 m	3 L			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
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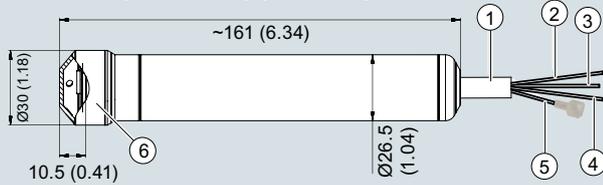
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SITRANS LH300 Transmitter for hydrostatic level

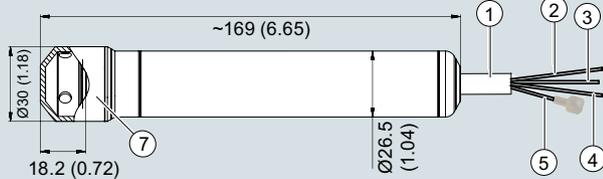
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Pressure transmitter SITRANS LH300 (submersible sensor)	7 MF 1 5 7 5 -		Pressure transmitter SITRANS LH300 (submersible sensor)	7 MF 1 5 7 5 -	
FEP cable for aggressive media			Enclosure material		
Special cable length Please add „-Z“ to Article No. and specify Order code and plain text: Y01: Cable length	9 X	H . . + Y 0 1	Material of protective cap		
3 m (≈ 10 ft)		H 5 A	Stainless steel 316L (1.4404)	A	
5 m (≈ 16 ft)		H 5 B	Stainless steel 316L (1.4404)	B	
7 m (≈ 23 ft)		H 5 C	Stainless steel 316L (1.4404)	C	
10 m (≈ 33 ft)		H 5 D	Stainless steel 904L (1.4539) for sea water applications	D	
15 m (≈ 50ft)		H 5 E	Stainless steel 904L (1.4539) for sea water applications	E	
20 m (≈ 65 ft)		H 5 F	Stainless steel 904L (1.4539) for seawater applications	F	
25 m (≈ 80 ft)		H 5 G	Sealing material between sensor and enclosure		
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 possible for cable length ≤ 300 m (990 ft))	1	
80 m (≈ 265 ft)		H 5 N	Additional versions		
90 m (≈ 295 ft)		H 5 P	Quality test certificate, 5-point factory calibration (IEC 60770-2)		Order code 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					

Dimensional drawings

Sensor with protective cap (PPE, ETFE)

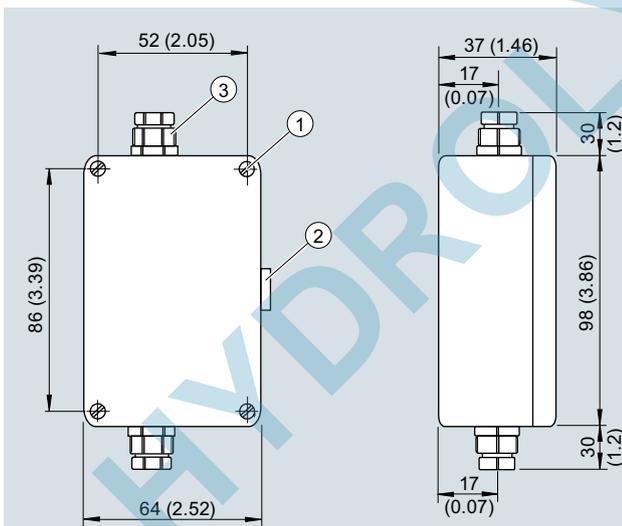


Sensor with protective cap (stainless steel)



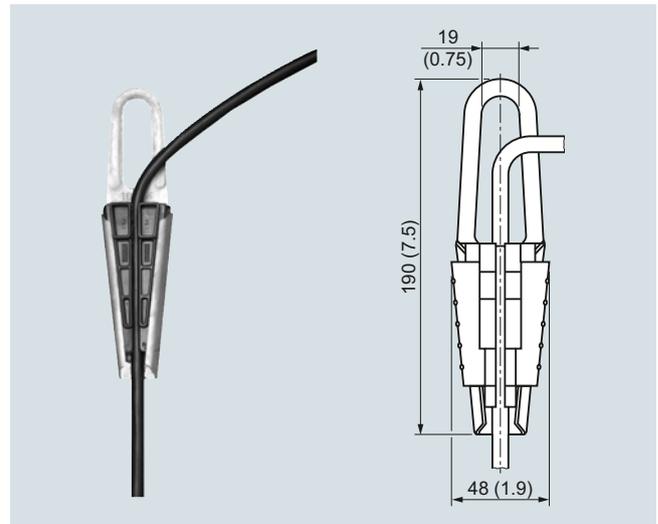
- ① Cable, sheath \varnothing 8.3 (0.33)
- ② - (blue)
- ③ + (brown)
- ④ Protective conductor connection/Equipotential bonding (black)
- ⑤ Vent pipe with humidity filter \varnothing 1 (0.04) (inner diameter)
- ⑥ Protective cap (PPE or PTFE) with 4 x \varnothing 2.5 (0.10) holes
- ⑦ Protective cap (stainless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

SITRANS LH300 pressure transmitter, dimensions in mm (inch)



- ① Fastening hole
- ② Vent valve
- ③ Cable gland Pg 13.5, cable diameter 6 ... 12 (0.23 ... 0.47)

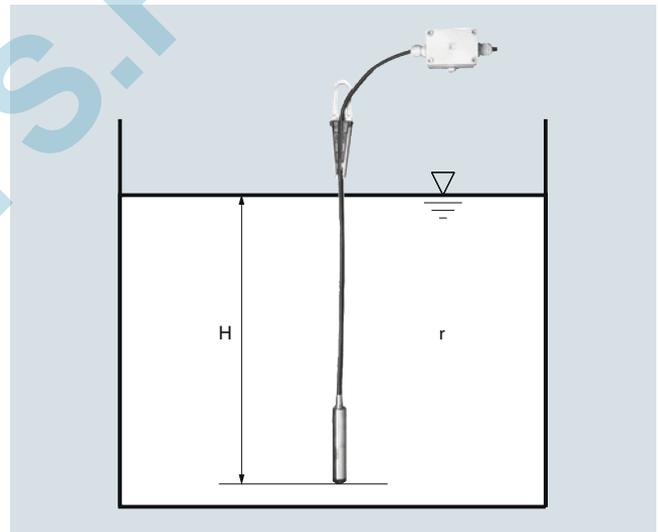
Junction box, dimensions in mm (inch)



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

Lower range value: 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