

SITRANS P measuring instruments for pressure

Transmitters for hydrostatic level

MPS series (submersible sensor)

Overview



SITRANS P pressure transmitters, MPS series (submersible sensor)

SITRANS P pressure transmitters, MPS series, are submersible sensors for hydrostatic level measurements.

The pressure transmitters of the MPS series 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 (0.3%)
- Degree of protection IP68

Application

SITRANS P pressure transmitters, MPS series, are used in the following branches for example:

- Oil and gas industries
- Shipbuilding
- Water supply

Design

SITRANS P pressure transmitters, MPS series, have a flush-mounted piezo-resistive sensor with stainless steel diaphragm.

These pressure transmitters are equipped with an electronic circuit fitted together with the sensor in a stainless steel housing. The cable also contains a strength cord and vent pipe.

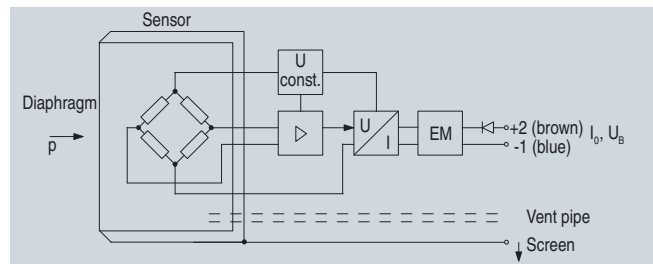
The diaphragm is protected against external influences by a protective cap.

The sensor, electronic circuit and cable are sealed in a common housing of small dimensions.

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

Function

SITRANS P pressure transmitters, MPS series, are for measuring the liquid levels in wells, tanks, channels and dams.



SITRANS P pressure transmitters, MPS series, mode of operation and wiring diagram

On one side of the sensor, the diaphragm 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 in the connection cable.

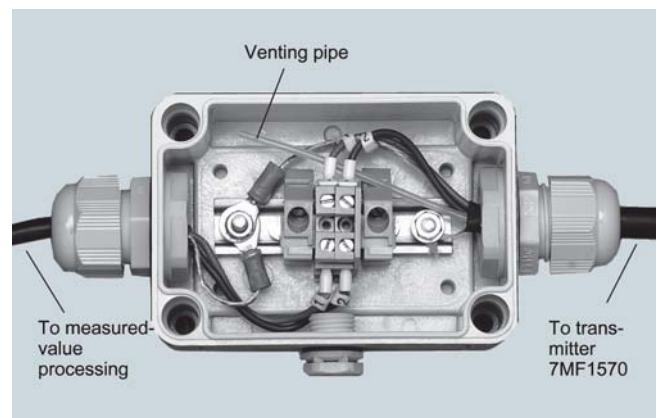
The hydrostatic pressure of the liquid column acts on the sensor diaphragm, and transmits the pressure to the piezo-resistive bridge in the sensor.

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 cable of the 7MF1570 transmitter must always be connected in the supplied junction box. The junction box has to be installed near the measuring point.

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

Integration



Junction box 7MF1570-8AA, opened

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Measuring point setup, in principle

Technical specifications

SITRANS P pressure transmitters, MPS series (submersible sensor)

Mode of operation

Measuring principle	Piezo-resistive
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Input

Measured variable	Hydrostatic level
Measuring range	Maximum working pressure
• 0 ... 2 mH ₂ O (0 ... 6 ftH ₂ O)	• 1.4 bar (20.3 psi) (corresponds to 14 mH ₂ O (42 ftH ₂ O))
• 0 ... 4 mH ₂ O (0 ... 12 ftH ₂ O)	• 1.4 bar (20.3 psi) (corresponds to 14 mH ₂ O (42 ftH ₂ O))
• 0 ... 5 mH ₂ O (0 ... 15 ftH ₂ O)	• 1.4 bar (20.3 psi) (corresponds to 14 mH ₂ O (42 ftH ₂ O))
• 0 ... 6 mH ₂ O (0 ... 18 ftH ₂ O)	• 3.0 bar (43.5 psi) (corresponds to 30 mH ₂ O (90 ftH ₂ O))
• 0 ... 10 mH ₂ O (0 ... 30 ftH ₂ O)	• 3.0 bar (43.5 psi) (corresponds to 30 mH ₂ O (90 ftH ₂ O))
• 0 ... 20 mH ₂ O (0 ... 60 ftH ₂ O)	• 6.0 bar (87.0 psi) (corresponds to 60 mH ₂ O (180 ftH ₂ O))

Output

Output signal	4 ... 20 mA
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Accuracy

	To EN 60770-1
Error in measurement (including non-linearity, hysteresis and repeatability, at 25 °C (77 °F))	0.3% of full-scale value (typical)

Influence of ambient temperature

Zero and span	
• 1 ... 6 mH ₂ O (3 ... 18 ftH ₂ O)	0.45%/10 K of full-scale value
• ≥ 6 mH ₂ O (≥ 18 ftH ₂ O)	0.3%/10 K of full-scale value

Long-term stability

Zero and span

• 1 ... 6 mH ₂ O (3 ... 18 ftH ₂ O)	0.25% of full-scale value/year
• ≥ 6 mH ₂ O (≥ 18 ftH ₂ O)	0.2% of full-scale value/year

Rated operating conditions

Ambient conditions

• Process temperature	-10 ... +80 °C (+14 ... +176 °F)
• Storage temperature	-40 ... +100 °C (-40 ... +212 °F)
Degree of protection to DIN EN 60529	IP68

Design

Weight

• Pressure transmitters	≈ 0.4 kg (≈ 0.88 lb)
• Cable	0.08 kg/m (≈ 0.054 lb/ft)

Electrical connection

Cable with 2 conductors with screen and vent pipe, strength cord (max. 300 N (67.44 lbf))

Material

• Seal diaphragm	Stainless steel, mat. No. 1.4571/316 Ti
• Casing	Stainless steel, mat. No. 1.4571/316 Ti
• Gasket	Viton
• Connecting cable	Optionally PE/HFFR sheath (non-halogen) or FEP sheath

Power supply

Terminal voltage on pressure transmitter (U_B)	10 ... 36 V DC
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Certificate and approvals

The transmitter is not subject to the pressure equipment directive (DGRL 97/23/EC)

Explosion protection

• Intrinsic safety "i"	TÜV 03 ATEX 2004X
- Identification	Ex II 1 G EEx ia IIC T4

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 ... 18 AWG)
Cable entry	2 x M20x1.5
Enclosure material	Polycarbonate
Vent pipe for atmospheric pressure	
Screw for cable strength cord	

Rated operating conditions

Degree of protection to DIN EN 60529	IP54
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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

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Selection and Ordering data

Order No.

SITRANS P pressure transmitters for pressure, MPS series (submersible sensor)

C) 7MF1570 - A 0

2-wire system

Note: Junction box and cable hanger included in delivery

Cable material

PE

FEP

Measuring range Cable length L

0 ... 2 mH₂O 10 m0 ... 4 mH₂O 10 m0 ... 5 mH₂O 25 m0 ... 6 mH₂O 25 m0 ... 10 mH₂O 25 m0 ... 20 mH₂O 25 m0 ... 6 ftH₂O 32 ft0 ... 12 ftH₂O 32 ft0 ... 18 ftH₂O 82 ft0 ... 30 ftH₂O 82 ft0 ... 60 ftH₂O 82 ftSpecial measuring range/Special cable length¹⁾

Specify measuring range and cable length in plain text

Explosion protection

- without
- with, type of protection "Intrinsic safety" (Ex II 1 G EEx ia IIC T4)
- With approval for drinking water to WRAS and ACS

Further designs

Quality inspection certificate (Factory calibration) to IEC 60770-2, add "-Z" to Order No. and Order code.

Quality inspection certificate (Factory calibration) to IEC 60770-2 supplied later, specify factory no. of transmitter for this purpose.

Accessories (as spare parts)

Junction box

for connecting the transmitter cable

Cable hanger

for mounting the pressure transmitter

► Available ex stock

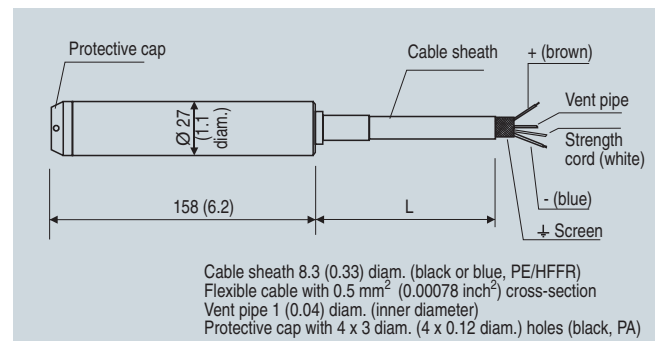
Power supply units see "SITRANS I power supply units and input isolators".

¹⁾ Special measuring ranges between 0 ... 1 mH₂O (0 ... 3 ftH₂O) and 0 ... 200 mH₂O (0 ... 656 ftH₂O) and special cable lengths up to 1000 m (3281 ft) are possible. With Ex versions the max. special cable length is 50 m (150 ft). The length of free-hanging cable should not exceed 375 m.

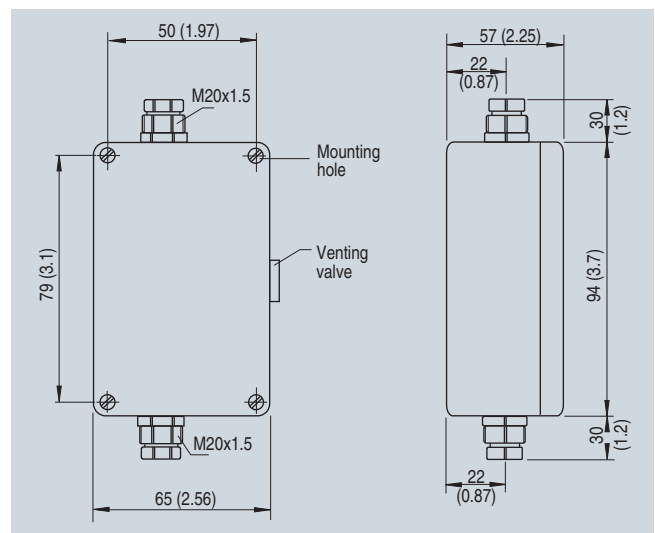
C) Subject to export regulations AL: N, ECCN: EAR99.

D) Subject to export regulations AL: N, ECCN: EAR99H.

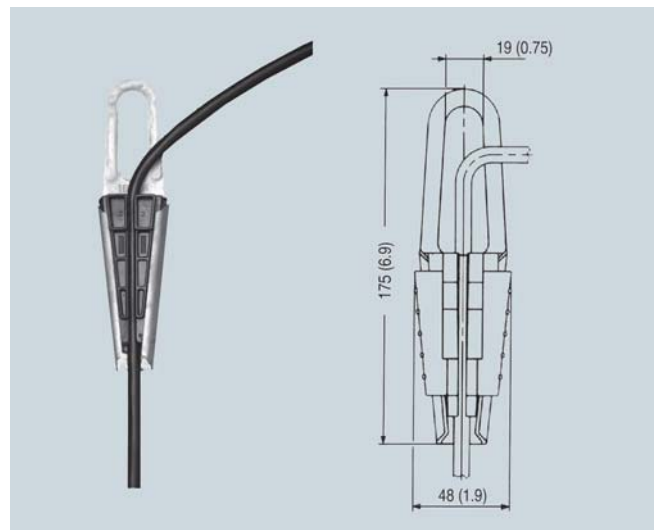
Dimensional drawings



SITRANS P pressure transmitters, MPS series, dimensions in mm (inch)



Junction box, dimensions in mm (inch)



Cable hanger, dimensions in mm (inch)

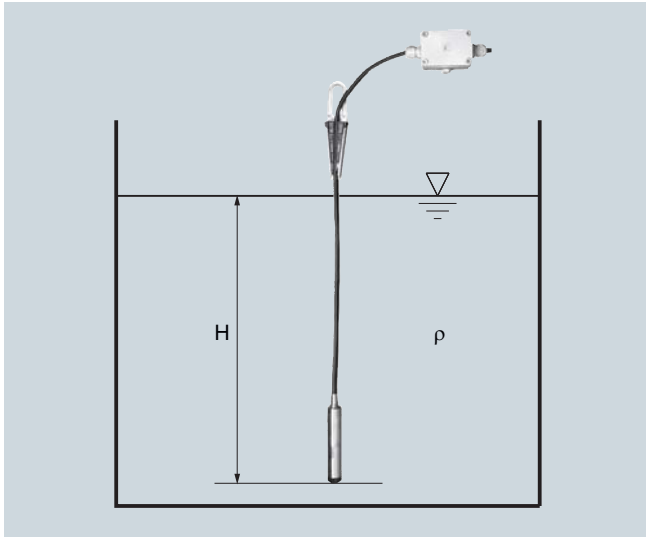
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More information

Determination of the measuring range in case of media with a density $\neq 1000 \text{ kg/m}^3$ (medium \neq 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: Diesel fuel = 850 kg/m^3

Acceleration due to gravity: 9.81 m/s^2

Start-of-scale : 0 m

Maximum level: 6,2 m

Calculation:

$$p = 850 \text{ kg/m}^3 \times 9.81 \text{ m/s}^2 \times 6.2 \text{ m}$$

$$p = 51698.7 \text{ N/m}^2$$

$$p = 517 \text{ mbar}$$

Transmitter to be ordered:

7MF1570-5ZA02-Z

J1Y: 0 ... 517 mbar; cable length e.g. 8 m