Pressure Measurement
Single-range transmitters for general applications

SITRANS P220 for gauge pressure

Overview

The pressure transmitter SITRANS P220 measures the gauge pressure of liquids, gases and vapors.
- Stainless steel measuring cell, fully welded
- Measuring ranges 2.5 to 1000 bar (36.3 to 14500 psi) relative
- For high-pressure applications and refrigeration technology division

Benefits

- High measuring accuracy
- Rugged stainless steel enclosure
- High overload withstand capability
- For aggressive and non-aggressive media
- For measuring the pressure of liquids, gases and vapors
- Compact design
- Gasket-less

Application

The pressure transmitter SITRANS P220 for gauge pressure is used in the following industrial areas:
- Mechanical engineering
- Shipbuilding
- Power engineering
- Chemical industry
- Water supply

Design

Device structure without explosion protection

The pressure transmitter consists of a piezoresistive measuring cell with a diaphragm installed in a stainless steel enclosure. It can be used with a connector per EN 175301-803-A (IP65), a round plug M12 (IP67), a cable (IP67) or a Quickon cable quick screw connection (IP67) connected electrically. The output signal is between 4 and 20 mA or 0 and 10 V.

Device structure with explosion protection

The pressure transmitter consists of a piezoresistive measuring cell with a diaphragm installed in a stainless steel enclosure. It can be used with a connector per EN 175301-803-A (IP65) or a round plug M12 (IP67) connected electrically. The output signal is between 4 and 20 mA.

Function

The pressure transmitter measures the gauge pressure of liquids and gases as well as the level of liquids.

Mode of operation

SITRANS P220 pressure transmitters (7MF1567-...), functional diagram

The stainless steel measuring cell has a thick-film resistance bridge to which the operating pressure p is transmitted through a stainless steel diaphragm.

The voltage output from the measuring cell is converted by an amplifier into an output current of 4 to 20 mA or an output voltage of 0 to 10 V DC.

The output current and voltage are linearly proportional to the input pressure.
## Technical specifications

### Application
- **Gauge pressure measurement**
  - **Liquids, gases and vapors**

### Mode of operation
- **Piezoresistive measuring cell**
  - stainless steel diaphragm
- **Gauge pressure**

### Inputs
- **Measuring range**
  - Metric
    - 2.5 … 1000 bar (36 … 14500 psi)
  - US measuring range
    - 30 … 14500 psi

### Output
- **Current signal**
  - 4 ... 20 mA
  - Load: (UB - 10 V)/0.02 A
  - Auxiliary power UB: DC 7 ... 33 V (10 ... 30 V for Ex)
- **Voltage signal**
  - 0 ... 10 V DC
  - Load: ≳ 10 kΩ
  - Auxiliary power UB: 12 ... 33 V DC
- **Ratiometric output**
  - 0 ... 90 %
  - Load: ≳ 10 kΩ
  - Auxiliary power UB: 5 V DC ± 10 %
- **Characteristic curve**
  - Linear rising

### Measuring accuracy
- **Error in measurement at limit setting incl. hysteresis and reproducibility**
  - Typical: 0.25 % of full-scale value
  - Maximum: 0.5 % of full-scale value
- **Step response time T₉₉**
  - < 5 ms
- **Long-term stability**
  - 0.25 % of full-scale value/year
- **Influence of ambient temperature**
  - 0.25 %/10 K of full-scale value
- **Influence of power supply**
  - 0.005 %/V

### Conditions of use
- **Process temperature**
  - -30 ... +120 °C (-22 ... +248 °F)
- **Ambient temperature**
  - -25 ... +85 °C (-13 ... +185 °F)
- **Storage temperature**
  - -50 ... +100 °C (-58 ... +212 °F)
- **Degree of protection (to EN 60529)**
  - IP 65 with connector per EN 175301-803-A
  - IP 67 with M12 connector
  - IP 67 with cable
  - IP 67 with cable quick screw connection
- **Electromagnetic compatibility**
  - acc. IEC 61326-1/-2/-3
  - acc. NAMUR NE21, only for ATEX versions and with a max. measuring deviation ≤ 1 %

### Design
- **Weight**
  - Approx. 0.090 kg (0.198 lb)
- **Process connections**
  - See dimension drawings
- **Electrical connections**
  - Connector per EN 175301-803-A Form A with cable inlet M16x1.5 or ½-14 NPT or Pg 11
  - M12 connector
  - 2 or 3-wire (0.5 mm²) cable (Ø ≥ 5.4 mm)
  - Quickon cable quick screw connection

### Wetted parts materials
- **Measuring cell**
  - Stainless steel, mat.-No. 1.4016
- **Process connection**
  - Stainless steel, mat. No. 1.4404 (SST 316 L)

### Non-wetted parts materials
- **Enclosure**
  - Stainless steel, mat. No. 1.4404 (SST 316 L)
- **Rack**
  - Plastic
- **Cables**
  - PVC

### Certificates and approvals
- **Classification according to pressure equipment directive (PED 2014/68/EU)**
  - For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 4, paragraph 3 (sound engineering practice)
- **Lloyd’s Register of Shipping (LR)**
  - 12/20010
- **Germanischer Lloyd (GL)**
  - GL19740 11 HH00
- **American Bureau of Shipping (ABS)**
  - ABS_11_HG 780392_PDA
- **Bureau Veritas (BV)**
  - BV 271007A0 BV
- **Det Norske Veritas (DNV)**
  - A 12553
- **Drinking water approval (ACS)**
  - ACS 15 ACC NY 360
- **Ne TC RU C-DE.ГБ05 В.00732 ОС НАНИО «ЦСВЗ»**
  - pending
- **Underwriters Laboratories (UL)**
  - UL 20110217 - E34453
  - UL 20110217 - E34453
- **EAC**
  - № TC RU C-DE.ГБ05 В.00732 ОС НАНИО «ЦСВЗ»
  - pending
- **Exlosion protection**
  - Intrinsic safety “i” (only with current output)
  - Connection to certified intrinsically-safe resistive circuits with maximum values:
    - Uᵢ ≤ 30 V DC; Iᵢ ≤ 100 mA;
    - Pᵢ ≤ 0.75 W
  - Effective internal inductance and capacity for versions with plugs per EN 175301-803-A and M12
  - Lᵢ = 0 nH; Cᵢ = 0 nF

1) For variants with output signal 0 ... 5 V and ratiometric output available soon.
### Pressure Measurement

**Single-range transmitters for general applications**

**SITRANS P220 for gauge pressure**

#### Selection and ordering data

<table>
<thead>
<tr>
<th>Article No.</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITRANS P220 pressure transmitters for gauge pressure, high-pressure and refrigeration applications, fully-welded version</td>
<td></td>
</tr>
</tbody>
</table>

- **Accuracy typ.** 0.25 %
- **Wetted parts materials:** stainless steel
- **Non-wetted parts materials:** stainless steel

#### Measuring range

**For gauge pressure**

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Overload limit</th>
<th>Burst pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 2.5 bar (0 ... 36.3 psi)</td>
<td>-1 bar (-14.5 psi)</td>
<td>2.5 bar (363 psi)</td>
</tr>
<tr>
<td>0 ... 6 bar (0 ... 87 psi)</td>
<td>-1 bar (-14.5 psi)</td>
<td>10 bar (145 psi)</td>
</tr>
<tr>
<td>0 ... 10 bar (0 ... 145 psi)</td>
<td>-1 bar (-14.5 psi)</td>
<td>25 bar (362 psi)</td>
</tr>
<tr>
<td>0 ... 16 bar (0 ... 232 psi)</td>
<td>-1 bar (-14.5 psi)</td>
<td>40 bar (580 psi)</td>
</tr>
<tr>
<td>0 ... 25 bar (0 ... 363 psi)</td>
<td>-1 bar (-14.5 psi)</td>
<td>62.5 bar (906 psi)</td>
</tr>
<tr>
<td>0 ... 40 bar (0 ... 580 psi)</td>
<td>-1 bar (-14.5 psi)</td>
<td>100 bar (1450 psi)</td>
</tr>
<tr>
<td>0 ... 60 bar (0 ... 870 psi)</td>
<td>-1 bar (-14.5 psi)</td>
<td>150 bar (2175 psi)</td>
</tr>
<tr>
<td>0 ... 100 bar (0 ... 1450 psi)</td>
<td>-1 bar (-14.5 psi)</td>
<td>250 bar (3625 psi)</td>
</tr>
<tr>
<td>0 ... 160 bar (0 ... 2320 psi)</td>
<td>-1 bar (-14.5 psi)</td>
<td>400 bar (5801 psi)</td>
</tr>
<tr>
<td>0 ... 250 bar (0 ... 3625 psi)</td>
<td>-1 bar (-14.5 psi)</td>
<td>625 bar (9064 psi)</td>
</tr>
<tr>
<td>0 ... 400 bar (0 ... 5801 psi)</td>
<td>-1 bar (-14.5 psi)</td>
<td>1000 bar (14503 psi)</td>
</tr>
<tr>
<td>0 ... 600 bar (0 ... 8702 psi)</td>
<td>-1 bar (-14.5 psi)</td>
<td>1500 bar (21755 psi)</td>
</tr>
<tr>
<td>0 ... 1000 bar (0 ... 14500 psi)</td>
<td>-1 bar (-14.5 psi)</td>
<td>2500 bar (36250 psi)</td>
</tr>
</tbody>
</table>

#### Other version, add Order code and plain text:

- **Measuring range:** up to... bar (psi)

#### Measuring ranges for gauge pressure

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<tr>
<th>Measuring range</th>
<th>Overload limit</th>
<th>Burst pressure</th>
</tr>
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<tbody>
<tr>
<td>0 ... 30 psi</td>
<td>-14.5 psi</td>
<td>75 psi</td>
</tr>
<tr>
<td>0 ... 60 psi</td>
<td>-14.5 psi</td>
<td>150 psi</td>
</tr>
<tr>
<td>0 ... 100 psi</td>
<td>-14.5 psi</td>
<td>250 psi</td>
</tr>
<tr>
<td>0 ... 150 psi</td>
<td>-14.5 psi</td>
<td>375 psi</td>
</tr>
<tr>
<td>0 ... 200 psi</td>
<td>-14.5 psi</td>
<td>500 psi</td>
</tr>
<tr>
<td>0 ... 300 psi</td>
<td>-14.5 psi</td>
<td>750 psi</td>
</tr>
<tr>
<td>0 ... 500 psi</td>
<td>-14.5 psi</td>
<td>1250 psi</td>
</tr>
<tr>
<td>0 ... 750 psi</td>
<td>-14.5 psi</td>
<td>1875 psi</td>
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<tr>
<td>0 ... 1000 psi</td>
<td>-14.5 psi</td>
<td>2500 psi</td>
</tr>
<tr>
<td>0 ... 1500 psi</td>
<td>-14.5 psi</td>
<td>3750 psi</td>
</tr>
<tr>
<td>0 ... 2000 psi</td>
<td>-14.5 psi</td>
<td>5000 psi</td>
</tr>
<tr>
<td>0 ... 3000 psi</td>
<td>-14.5 psi</td>
<td>7500 psi</td>
</tr>
<tr>
<td>0 ... 5000 psi</td>
<td>-14.5 psi</td>
<td>12500 psi</td>
</tr>
<tr>
<td>0 ... 6000 psi</td>
<td>-14.5 psi</td>
<td>15000 psi</td>
</tr>
<tr>
<td>0 ... 8000 psi</td>
<td>-14.5 psi</td>
<td>21755 psi</td>
</tr>
<tr>
<td>0 ... 14500 psi</td>
<td>-14.5 psi</td>
<td>21755 psi</td>
</tr>
</tbody>
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#### Other version, add Order code and plain text:

- **Measuring range:** up to ... psi

#### Output signal

- 4 ... 20 mA; two-wire system; power supply 7 ... 33 V DC (10 ... 30 V DC for ATEX versions)
- 0 ... 10 V; three-wire system; power supply 12 ... 33 V DC
- 0 ... 5 V; 3-wire system; auxiliary power 7 ... 33 V DC
- Ratiometric 10 ... 90 %; 3-wire system; auxiliary power 5 V DC ± 10 %

#### Explosion protection (only 4 ... 20 mA)

None

With explosion protection Ex ia IIC T4

#### Electrical connection

- Connector per DIN EN 175301-803-A, stuffing box thread M16 (with coupling)
- Round connector M12 per IEC 61076-2-101
- Connection via fixed mounted cable, 2 m (not for type of protection "Intrinsic safety i")
- Quickon cable quick screw connection PG9 (not for type of protection "Intrinsic safety i")
- Connector per DIN EN 175301-803-A, stuffing box thread 1/2"-14 NPT (with coupling)
- Connector per DIN EN 175301-803-A, stuffing box thread PG11 (with coupling)
- Fixed mounted cable, length 5 m

1) Approvals pending.
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<td>Accuracy typ. 0.25%</td>
<td>7M F 1 6 6 7 -</td>
<td>A</td>
</tr>
<tr>
<td>Wetted parts materials: stainless steel</td>
<td></td>
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</tr>
<tr>
<td>Non-wetted parts materials: stainless steel</td>
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**Process connection**
- G¹⁄₂" male per EN 837-1 (¹⁄₂" BSP male) (standard for metric pressure ranges mbar, bar)
- G¹⁄₂" male thread and G1/8" female thread
- G¹⁄₄" male per EN 837-1 (¹⁄₄" BSP male)
- 7/16"-20 UNF male
- ¼"-18 NPT male (standard for pressure ranges inH₂O and psi)
- ¼"-18 NPT female (Only for measuring ranges ≤ 60 bar (870 psi))
- ½"-14 NPT male
- ½"-14 NPT female (Only for measuring ranges ≤ 60 bar (870 psi))
- 7/16"-20 UNF female
- M20x1.5 male
- Special version

**Version**
- Standard version

**Further designs**
- Supplement the Article No. with "-Z" and add Order code.
  - Quality Inspection Certificate (5-point characteristic curve test) according to IEC 60770-2: C11
  - Oxygen application, oil and grease-free cleaning (Not in conjunction with explosion protection version): E10
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### Dimensional drawings

**SITRANS P220, electrical connections, dimensions in mm (inch)**

- Cable gland: Quickon with or without cable
- M12x1/Fixcon
- M16x1.5 or 1/2-14 NPT
- 10.7 (0.42)
- 25.5 (1.0)
- 36 (1.42)
- 51 (2.0)

**SITRANS P220, process connections, dimensions in mm (inch)**

- **Gasket with flat sealing ring as on process connection**
  - M20 x 1.5: max. 30 Nm
  - G1/2: max. 20 Nm
  - G1/4: max. 20 Nm

- **Gasket with sealing ring on flange below hexagon**
  - G1/2: max. 30 Nm

- **Gasket with sealing tape in threading**
  - 1/2-14 NPT: max. 20 Nm

- **Gasket with sealing cone in process connection**
  - 7/16-20 UNF: max. 20 Nm

* Not included in product package

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Schematics

Connection with current output and connector per EN 175301

Connection with voltage output, ratiometric output and plug according to EN 175301

Connection with current output and connector M12x1

Connection with voltage output, ratiometric output and M12x1 plug

Connection with current output and cable

Connection with voltage output, ratiometric output and cable

Connection with current output and cable quick screw connection Quickon

Connection with voltage output, ratiometric output and Quickon fast cable termination

Version with explosion protection: 4 ... 20 mA

The grounding connection is conductively bonded to the transmitter enclosure

Connection with current output and connector per EN 175301 (Ex)

Connection with current output and connector M12x1 (Ex)