PROFILE

The transmitter PM35 measures gauge- and absolute pressure in gases, vapours and liquids and can be used in nearly all areas of process engineering. The transmitter works on the two-wire principle and features a polysilicon-measuring element. Gauge and absolute pressures from 100 mbar up to 400 bar, respectively, are converted into a standard pressure proportional 4...20-mA signal. The BUS version uses digital communication for the signal. The digital version can be equipped with a local display comprising digital display and bargraph whereas the analogue version allows only a bargraph display. The applied technology ensures reliable and simple operation.

DESCRIPTION

The transmitter comprises the measuring cell, the process coupling with the diaphragm seal and the electronics housing. Connecting terminals are accessible in a separate compartment after opening the lid. The process pressure acts onto a metallic isolating diaphragm. Via the filling fluid (Silicone oil or Inert oil) the pressure is transferred to the Polysilicon-sensor with the piezo-resistive bridge. The output signal of the bridge is being processed. According to the process requirements the isolating diaphragm is either flush mounted or is located inside the process coupling. The analogue-electronic is an economic, fast and simple version of transmitter PM35. Zero and span can be adjusted locally by means of two potentiometers. With dip switches coarse setting of span with a spread of 1:1 up to 10:1 is possible. The required pressure signals must be provided as reference. The analogue electronics features adjustment of Zero with ± 10 % within the cell limits.

Digital-electronics provides widespread operating and adjustment facilities with the corresponding hand-held terminal or via PC engineering. It realises precise signal processing and monitors the transmitter function from sensor to output function. Local operation is performed by means of push buttons and the pluggable display. The required pressure signals must be provided as reference and will be stored via push button operation. Based upon the used measuring cell a turn down of 10:1 is possible.

The transmitter monitoring function generates an alarm if any fault is being detected. The alarm acts onto the analogue output signal and can be set in its function.

TECHNICAL DATA

GUAGE PRESSURE

<table>
<thead>
<tr>
<th>Cell</th>
<th>Measuring limits</th>
<th>Min. span</th>
<th>Overload</th>
</tr>
</thead>
<tbody>
<tr>
<td>3H</td>
<td>0...1.0</td>
<td>0.1</td>
<td>4</td>
</tr>
<tr>
<td>3M</td>
<td>0...4.0</td>
<td>0.4</td>
<td>16</td>
</tr>
<tr>
<td>3P</td>
<td>0...10</td>
<td>1</td>
<td>40</td>
</tr>
<tr>
<td>3S</td>
<td>0...40*</td>
<td>4</td>
<td>160</td>
</tr>
<tr>
<td>3U</td>
<td>0...100</td>
<td>10</td>
<td>400</td>
</tr>
<tr>
<td>3Z</td>
<td>0...400</td>
<td>40</td>
<td>400</td>
</tr>
<tr>
<td>7H</td>
<td>±1</td>
<td>±1</td>
<td>0.2</td>
</tr>
<tr>
<td>7M</td>
<td>±1.1</td>
<td>±1.1</td>
<td>0.5</td>
</tr>
<tr>
<td>7P</td>
<td>±1.10</td>
<td>±1.10</td>
<td>1.0</td>
</tr>
</tbody>
</table>

*)Absolute pressure sensors

ABSOLUTE PRESSURE

<table>
<thead>
<tr>
<th>Cell</th>
<th>Measuring limits</th>
<th>Min. span</th>
<th>Overload</th>
</tr>
</thead>
<tbody>
<tr>
<td>4H</td>
<td>0...1</td>
<td>0.1</td>
<td>4</td>
</tr>
<tr>
<td>4M</td>
<td>0...4</td>
<td>0.4</td>
<td>16</td>
</tr>
<tr>
<td>4P</td>
<td>0...10</td>
<td>1</td>
<td>40</td>
</tr>
<tr>
<td>4S</td>
<td>0...40</td>
<td>4</td>
<td>160</td>
</tr>
<tr>
<td>4U</td>
<td>0...100</td>
<td>10</td>
<td>400</td>
</tr>
<tr>
<td>4Z</td>
<td>0...400</td>
<td>40</td>
<td>600</td>
</tr>
</tbody>
</table>

Minimum pressure: 10 mbar absolute

PROCESS MEDIA

Liquids, gases, vapour (aggressive or corrosive with suitable material).

PROCESS TEMPERATURE

Without isolator up to + 100 °C

INPUT

Absolute and gauge pressure in gases, vapours, liquids. Polysilicon cell for ranges up to 400 bar

Dairy (DIN), Triclamp, SMS, DRD, Varivent from 100 mbar up to 400 bar
Self monitoring
Local display and adjustment
Multiple overload
Explosion protection ATEX 100
Analogue, Smart or BUS- function
**WETTED MATERIALS**

**Diaphragm**
- Stainless Steel 316 L (1.4435)

**Flanges**
- Stainless Steel 316 L (1.4435)

**Filling fluids for sealing diaphragm**
Selection of the filling liquid for the isolating diaphragm depends on pressure and temperature conditions of the process. Second criteria is the immunity of the filling liquid with the process. Details see list above.

**Smallest span**
Based upon the thermal expansion of the filling liquid, isolating diaphragms cause an additional temperature effect with the measurement. Following points should be considered for selection:
- The nominal width determines the diameter of the diaphragm.

---

**Table: Filling Fluids**

<table>
<thead>
<tr>
<th>Filling fluid</th>
<th>Medium temp. at 50 mbar ≤ pabs ≤ 1 bar</th>
<th>Medium temperature at pabs ≥ 1 bar</th>
<th>Max. height-difference at pabs ≥ 1 bar</th>
<th>T&lt;sub&gt;C&lt;/sub&gt;-correction factor</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicone oil</td>
<td>-40 bis 180 °C</td>
<td>-40 bis +250 °C</td>
<td>max. 7m</td>
<td>1</td>
<td>Standard</td>
</tr>
<tr>
<td>Vegetable oil</td>
<td>-10 bis +120 °C</td>
<td>-40 bis +200 °C</td>
<td>max. 7m</td>
<td>1,05</td>
<td>Food and beverages</td>
</tr>
<tr>
<td>Glycerine</td>
<td>+15 bis +200 °C</td>
<td>+15 bis +200 °C</td>
<td>max. 4m</td>
<td>0,64</td>
<td>Food and beverages</td>
</tr>
<tr>
<td>High temperature oil</td>
<td>-10...+350 °C</td>
<td>-10...+350 °C</td>
<td>max. 7m</td>
<td>0,72</td>
<td></td>
</tr>
</tbody>
</table>

---

**Table: Coupling dimensions**

<table>
<thead>
<tr>
<th>DN bar</th>
<th>PN</th>
<th>D</th>
<th>f</th>
<th>G</th>
<th>m</th>
<th>d&lt;sub&gt;M&lt;/sub&gt;</th>
<th>Ceramic oil</th>
<th>Smallest-range</th>
<th>Mounting effect</th>
<th>A&lt;sub&gt;max&lt;/sub&gt;</th>
<th>Weight total</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>40</td>
<td>50</td>
<td>10</td>
<td>50 x 1/6&quot;</td>
<td>32</td>
<td>+8</td>
<td>+8</td>
<td>≥ 2</td>
<td>9</td>
<td>252</td>
<td>1,4</td>
</tr>
<tr>
<td>40</td>
<td>40</td>
<td>56</td>
<td>10</td>
<td>65 x 1/6&quot;</td>
<td>38</td>
<td>+1</td>
<td>+2</td>
<td>≥ 0,4</td>
<td>9</td>
<td>251</td>
<td>1,4</td>
</tr>
<tr>
<td>50</td>
<td>16</td>
<td>68</td>
<td>11</td>
<td>78 x 1/6&quot;</td>
<td>25</td>
<td>+1</td>
<td>+2</td>
<td>≥ 0,1</td>
<td>9</td>
<td>245</td>
<td>1,6</td>
</tr>
</tbody>
</table>

**Table: Smallest range, Mounting effect, A<sub>max</sub>, Weight total**

<table>
<thead>
<tr>
<th>DN bar</th>
<th>PN</th>
<th>D</th>
<th>f</th>
<th>G</th>
<th>m</th>
<th>d&lt;sub&gt;M&lt;/sub&gt;</th>
<th>Ceramic oil</th>
<th>Smallest-range</th>
<th>Mounting effect</th>
<th>A&lt;sub&gt;max&lt;/sub&gt;</th>
<th>Weight total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ½&quot;</td>
<td>40</td>
<td>74</td>
<td>4</td>
<td>60 - 1/6&quot;</td>
<td>25</td>
<td>+4</td>
<td>+4</td>
<td>≥ 0,4</td>
<td>9</td>
<td>255</td>
<td>1,4</td>
</tr>
<tr>
<td>2&quot;</td>
<td>40</td>
<td>84</td>
<td>4</td>
<td>70 - 1/6&quot;</td>
<td>26</td>
<td>+2</td>
<td>+2</td>
<td>≥ 0,1</td>
<td>9</td>
<td>260</td>
<td>1,6</td>
</tr>
</tbody>
</table>

**Table: Smallest span**

- The nominal width determines the diameter of the diaphragm.

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**Fig. 1 Dimensions to DIN 11851**

**Fig. 2 Dimensions SMS**

**Fig. 3 Dimensions Triclamp**

**Fig. 4 Dimensions Varivent**

**Fig. 5 Dimensions DRD**

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**Fig. 6 Dimensions PM35**
• Large diameter of diaphragm results in a smaller temperature effect.
• Small spans require large diameter to minimize temperature effects.
• The larger the diameter of the diaphragm, the larger permissible process temperature range.

**POSITION EFFECTS**
(See also diaphragm seal tables)
The transmitter calibration is based upon the limit point method according to DIN 16086. Depending on the orientation of the device, there might be a slight shift in the measuring value. Diaphragm seals do have also a zero shift depending on the orientation of the transmitter.

- neutral calibration position
- max. positive zero shift
- max. negative zero shift

This zero shift due to the position can be compensated for up to +/- 10 %. (Not possible with negative span start and analogue electronics) The max. effect of mounting position is given in the tables for all diaphragms on the page before. The values given are for silicone oil. For other oils it varies according to the density of the oil in use.

**TEMPERATURE EFFECTS**
Main temperature effect depends mainly from the process temperature adjacent to the sealing diaphragm.

- The temperature coefficient TC given in the technical specification applies to Silicone oil calibrated at 20 °C.
- For other filling fluids these values are to be multiplied with the correction factor given in the table.

The total temperature coefficient TC is the result of adding TC of the single coefficients (transmitter, diaphragm seal as possibly capillary).

The TC of the capillary is effected by the ambient temperature. TC per meter for Silicone oil filling fluid: 0.5 mbar/10 K

**GUIDELINES FOR MOUNTING WITH CAPILLARY**
The transmitter generally should be mounted below the tapping point. A maximum difference in height between the tapping point and the transmitter should not be exceeded, to avoid interruption in the fluid column in the capillary which leads to substantial damage of the diaphragm seal.

- Minimum bending radius of capillary tubing: 100 mm (4 in)
- In case of vacuum application the transmitter must be mounted below the pressure tapping point.
- For temperature effects see separate section.

**OUTPUT**
Output BUS: Profibus PA

**MAX. LOAD**

\[
R_{\text{Load}} = \frac{U_{\text{Supply}} - 1.15[V]}{0.023[V]} - R_{\text{Lead}} \quad \Omega
\]

Fig. 6 Temperature isolator 100 mm (max. +200 °C)

Fig. 7 Mounting with capillary (max. +350 °C)

\(^1\) Inverse output signal possible, specification of span start and span end in clear text xxx9x
DISPLAY
Analogue signal via 28 segment LCD bargraph 0...100 %; with smart additionally 4 digit 7 segment display.

OPERATION
Analogue Adjustment of zero and span via DIP switches and two potentiometer direct. Selection of damping.
Smart Adjustment of zero and span by means of two push buttons direct. Setting of damping. Remote operation via HART protocol
BUS Adjustment of zero and span by means of two push buttons direct. Setting of Address. Remote operation via digital protocol

SUPPLY
DIRECT CURRENT
11.5 ... 45 VDC
11.5 ... 30 VDC with EEx
Ripple of supply voltage
No effect for U_{RMS} ≤ 5 % within permissible range
Overvoltage category
II to DIN EN 61 010-1

EXPLOSION PROTECTION
Mode: ATEX 100, II 1 / 2 G, EEx ia IIC T6
Certificate of conformity applied for
Mounting
Transmitter in hazarded area zone 1

ENVIRONMENTAL CONDITIONS
AMBIENT TEMPERATURES
For operation: -40... + 85 °C
For storage: -40... +100 °C (with display +85 °C)
Temperature effect T C for span start and span (Referred to nominal value of cell)
* But not exceeding error due to thermal effects.
Thermal effect Referred to set span
(TD = nominal value/set span)
((X% × TD + 0.3 %)
Climatic class
4K4H to DIN EN 60721-3

Vibrations
No effects with 4 mm stroke at 5...15 Hz, or 2g at 15...150 Hz, or 1 g at 150...2000 Hz

ELECTROMAGNETIC COMPATIBILITY
Complies with EN 50 081-1 and EN 50 082-2 as also NAMUR recommendation NE21: effect < 0.5 %

GENERAL
ELECTRONIC HOUSING
Stainless steel AISI 304 (no. 1.4301)
Cover seal: Silicone rubber
Type label: engraved with LASER in housing!
MODE OF PROTECTION
IP 66 / Nema 4 with cable gland
IP 68 / Nema 6P with fixed cable (1m WG for 24 h, respectively 1.8 m WG for 30 minutes).

ELECTRICAL CONNECTION
Screw terminals for 0.5...2.5 mm
 selectable via
Cable gland M20 x 1.5
Cable conduit for ½ NPT or
Harting plug HAN 7

MODE OF PROTECTION
Fixed cable 5m with reference air feed
Profibus connection via screw plug M12x1

1) protect against thermal radiation!
**INSTALLATION CONDITIONS**

Orientation as required, orientation-dependent zero offset must be adjusted.

**WEIGHT**

approximately 1.2 kg plus capillary respective isolator (see corresponding tables).

**ACCESSORY**

Instructions
Analogue electronics 9499-040-64511
Smart-electronics 9499-040-64311

**ADDITIONAL ACCESSORIES**

Bracket for wall or pipe mounting
9407-290-00051

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Fig. 12 Mounting bracket

Fig. 13 Pipe mounting with capillary

Fig. 14 Wall mounting with capillary Wand
### Ordering Structure

#### Housing / el. conn. 1) / EEx
- Standard; M20 x 1,5
- EEx; M20 x 1,5
- Standard; ½-inch NPT
- EEx; ½-inch NPT
- Standard; connector HAN 7
- EEx; connector HAN 7
- Standard; IP68, fixed cable
- EEx; IP68, fixed cable

#### Pressure
- Gauge
  - absolute
  - with start at minus

#### Measuring span...
- Span within the sensor limits in:
  - mbar / bar
  - kPa / MPa
  - m m/mH2O
  - inch H2O
  - kgf / cm²
  - psi
  - from...to...to spec.

#### Process- coupling
- Material, AISI SS316L (no. 1.4435)
- DN 32 DIN 11851
- DN 40 DIN 11851
- DN 50 DIN 11851
- Triclamp 1 ½ ∗
- Triclamp 2 ∗
- Triclamp 3 ∗
- Varivent 68 mm
- OR 65 mm
- SMS 1 ½ ∗
- other

#### Measuring cell
- 1 bar
- 4 bar
- 10 bar
- 40 bar
- 100 bar
- 400 bar

#### Electronic / Display
- analogue
- analogue, Bargraph
- smart
- smart, display
- Profibus PA
- Profibus, display

#### Filling media and remote seal
- Seal direct, silicone oil
- Seal direct, vegetable oil
- Seal direct, Dycerine
- Temp. isolator 100 mm, HT-oil
- Capillary 1 m with HT-oil
- Capillary x m with silicone oil ∗
- Capillary x m with vegetable oil ∗
- Capillary x m with HT-oil ∗

1) Connection for Profibus via M12 x 1 plug

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