# Transmitter PM35

## Intelligent pressure transmitter
## With diaphragm seal for sanitary use

**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**

### *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*

#### *INPUT*

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

### *GAUGE PRESSURE*

| Cell | | Measuring limits | Min.span | Overload |
|---|---|---|---|---|
| Type | [bar] | [bar] | [bar] | [bar] |
| 3H | 1 | 0...1 | 0,1 | 4 |
| 3M | 4 | 0...4 | 0,4 | 16 |
| 3P | 10 | 0...10 | 1 | 40 |
| 3S | 40* | 0...40 | 4 | 160 |
| 3U | 100* | 0...100 | 10 | 400 |
| 3Z | 400* | 0...400 | 40 | 600 |
| 7H | ± 1 | -1...+1 | 0,2 | 4 |
| 7M | -1...4 | -1...+4 | 0,5 | 16 |
| 7P | -1...10 | -1...+10 | 1,0 | 40 |

*)Absolute pressure sensors

### *ABSOLUTE PRESSURE*

| Cell | | Measurig limits | Min. span | Overload |
|---|---|---|---|---|
| Type | [bar] | [bar] | [bar] | [bar] |
| 4H | 1 | 0...1 | 0,1 | 4 |
| 4M | 4 | 0...4 | 0,4 | 16 |
| 4P | 10 | 0...10 | 1 | 40 |
| 4S | 40 | 0...40 | 4 | 160 |
| 4U | 100 | 0...100 | 10 | 400 |
| 4Z | 400 | 0...400 | 40 | 600 |

***Minimum pressure:*** 10 mbar absolute

### *PROCESS MEDIA*

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

### *PROCESS TEMPERATURE*

Without isolator up to + 100 °C

*Fig. 1 Dimensions to DIN 11851*

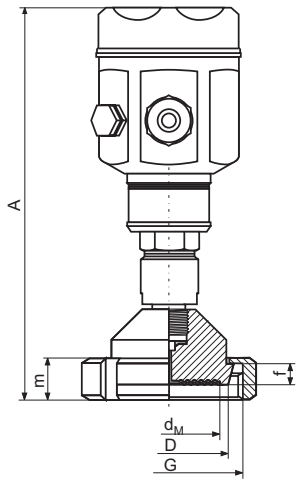



*Fig. 2 Dimensions SMS*

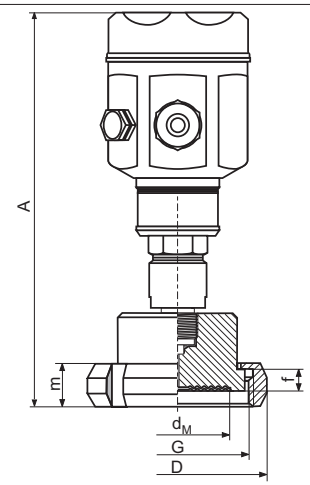
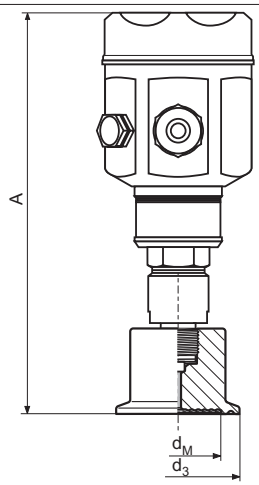



*Fig. 3 Dimensions Triclamp*




*Coupling dimensions DIN 11851 / SMS*

| DN | PN | D | f | G | m | $d_M$ | TC Silicone oil *) Ambient | Process | Smallest-range | Mounting effect | $A_{max}$ | Weight total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DIN | bar | mm | mm | Rd | mm | mm | mbar/10K | | bar | mbar | mm | kg |
| 32 | 40 | 50 | 10 | 58 x 1/6" | 21 | 32 | +8 | +8 | ≥ 2 | 9 | 252 | 1,4 |
| 40 | 40 | 56 | 10 | 65 x 1/6" | | 38 | +1 | +2 | ≥ 0,4 | 9 | 251 | 1,4 |
| 50 | 16 | 68 | 11 | 78 x 1/6" | 25 | 46 | +1 | +2 | ≥ 0,1 | 8 | 245 | 1,6 |
| SMS | | | | | | | | | | | | |
| 1 ½" | 40 | 74 | 4 | 60 - 1/6" | 25 | 34 | +4 | +4 | ≥ 0,4 | 8 | 255 | 1,4 |
| 2" | 40 | 84 | 4 | 70 - 1/6" | 26 | 46 | +2 | +2 | ≥ 0,1 | 9 | 260 | 1,6 |

*Coupling dimensions Triclamp / Varivent / DRD*

| DN | PN | Studd | Diaphragm | TC Silicone oil *) Ambient | Process | Smallest-range | Mounting effect | $A_{max}$ | Weight total |
|---|---|---|---|---|---|---|---|---|---|
| Inch | bar | D | dM | mbar/10K | | bar | mbar | mm | kg |
| 1 ½" | 40 | 50,5 | 36 | +3 | +4 | ≥ 0,4 | 8 | 251 | 1 |
| 2" | | 64 | 48 | +1 | +2 | ≥ 0,1 | 9 | 258 | 1,2 |
| 3" | | 91 | 71,5 | +1 | +2 | ≥ 0,1 | 9 | 259 | 1,4 |
| Varivent | | | | | | | | | |
| - | 40 | 68 | 46 | +2 | +2 | ≥ 0,1 | 10 | 253 | 1,3 |
| DRD | | | | | | | | | |
| - | 40 | 65 | 46 | +2 | +2 | ≥ 0,1 | 11 | 259 | 1,6 |

*Filling fluids*

| Filling fluid | Medium temp. at 50 mbar ≤ $p_{abs}$ ≤ 1 bar | Medium temperature at $p_{abs}$ ≥ 1 bar | Max. hight-difference at $p_{abs}$ ≥ 1 bar | $T_C$-correction-factor | Remarks |
|---|---|---|---|---|---|
| Silicone oil | -40 bis 180 °C | -40 bis +250 °C | max. 7m | 1 | Standard |
| Vegetable oil | -10 bis +120 °C | -40 bis +200°C | max. 7m | 1,05 | Food and beverages |
| Glycerine | - | +15 bis +200 °C | max. 4m | 0,64 | Food and beverages |
| High temperature oil | -10...+200 °C | -10...+350 °C | max. 7m | 0,72 | |

*Fig. 4 Dimensions Varivent*

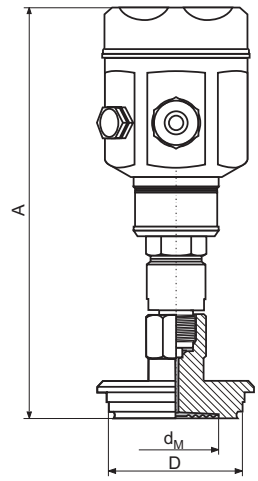
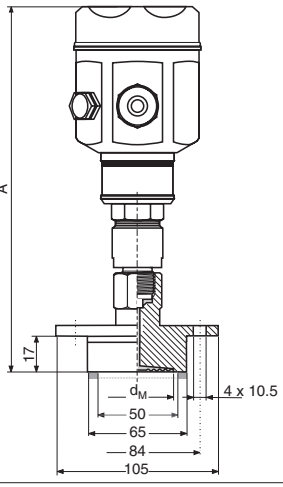



*Fig. 5 Dimensions DRD*




## *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 from 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:

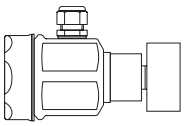
- The nominal width determes the diameter of the diaphragm.

- 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 permissable process temperature range.

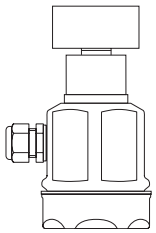
### *POSITION EFFECTS*

(See also diaphragm seal tabels)
The transmitter calibration is based upon the limit point methode 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.

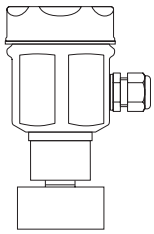
- neutral calibration position



- max. positive zero shift

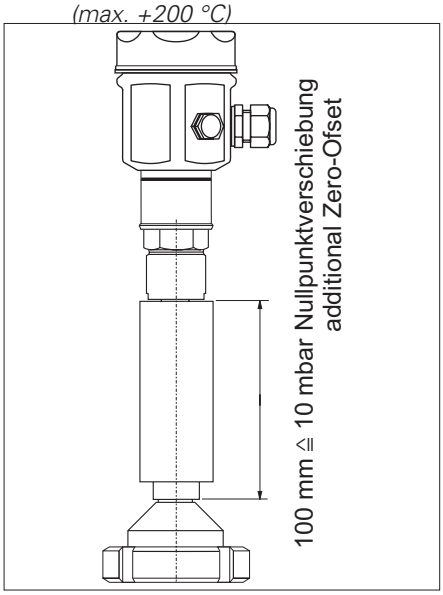


- max. negative zero shift



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.

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




### *TEMPERATURE EFFECTS*

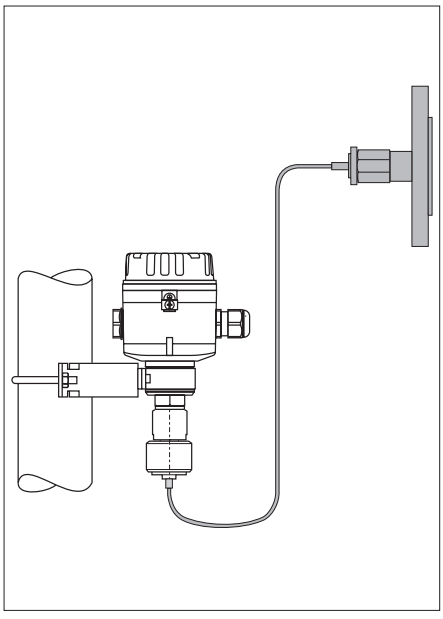
Main temperature effect depends mainly from the process temperature adjacent to the sealing diaphragm.

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

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

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



### *GUDELINES 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 vaccum application the transmitter must be mounted below the pressure tapping point.
- For temperature effects see separate section.

## *OUTPUT*

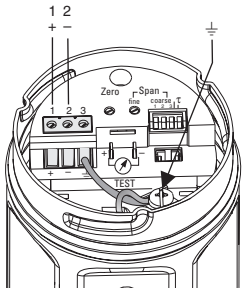
***Output BUS:*** Profibus PA

### *MAX. LOAD*

$$R_{Load} = \frac{U_{Supply} - 11.5[V]}{0.023[V]} - R_{Lead}[\Omega]$$

[1)] Inverse output signal possible, specification of span start and span end in clear text xxx9x

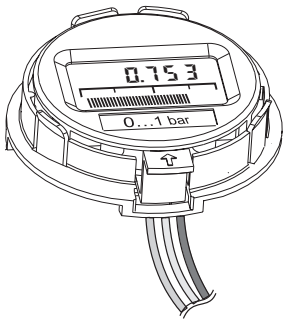
*Fig. 7 Electrical connections analogue*




## DISPLAY

Analogue signal via 28 segment LCD bargraph ≙ 0...100 %; with smart additionally 4 digit 7 segment display.

*Fig. 8 Display module, smart*




## 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 ofAddress. Remote operation via digital protocol |

## SUPPLY

### DIRECT CURRENT

11.5 ... 45 VDC
11.5 ... 30 VDC with EEx

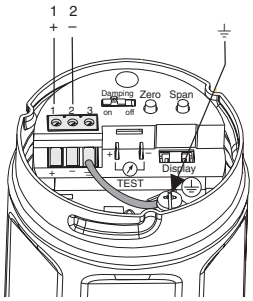
***Ripple of supply voltage***

No effect for $U_{RMS} \leq \pm 5$ % within permissible range

***Overvoltage category***

II to DIN EN 61 010-1

*Fig. 10 Electrical connections digital*




## 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[1)]
***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

$$\pm(X\% \times TD + 0.3\%)$$

(TD = nominal value/set span)

| Analogue | | Smart | |
|---|---|---|---|
| -10...+60°C | -40...10 < > +60...85°C | -10...+60 °C | -40...10 < > +60...85°C |
| X = 0.3 | X = 0.5 | X = 0.2 | X = 0.4 |

***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 housingl

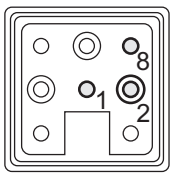
### MODE OF PROTECTION

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 $mm^2$.
selectable via
Cable gland M20 x 1.5
Cable conduit for ½ NPT
or
Harting plug HAN 7

*Fig. 9 Connection Harting plug*




1 = + (bl)
2 = - (bn)
8 = ⏚ (gn/ye)

or
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**

*Fig. 12 Mounting bracket*

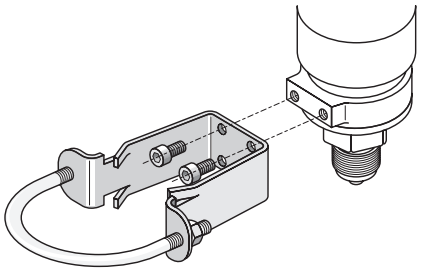


*Fig.13 Pipe mounting with capillary*

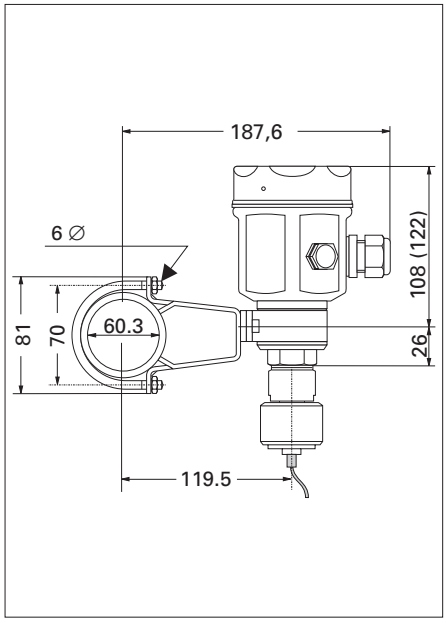
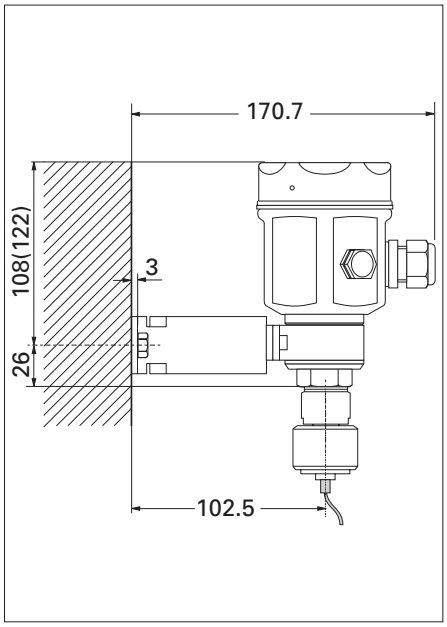
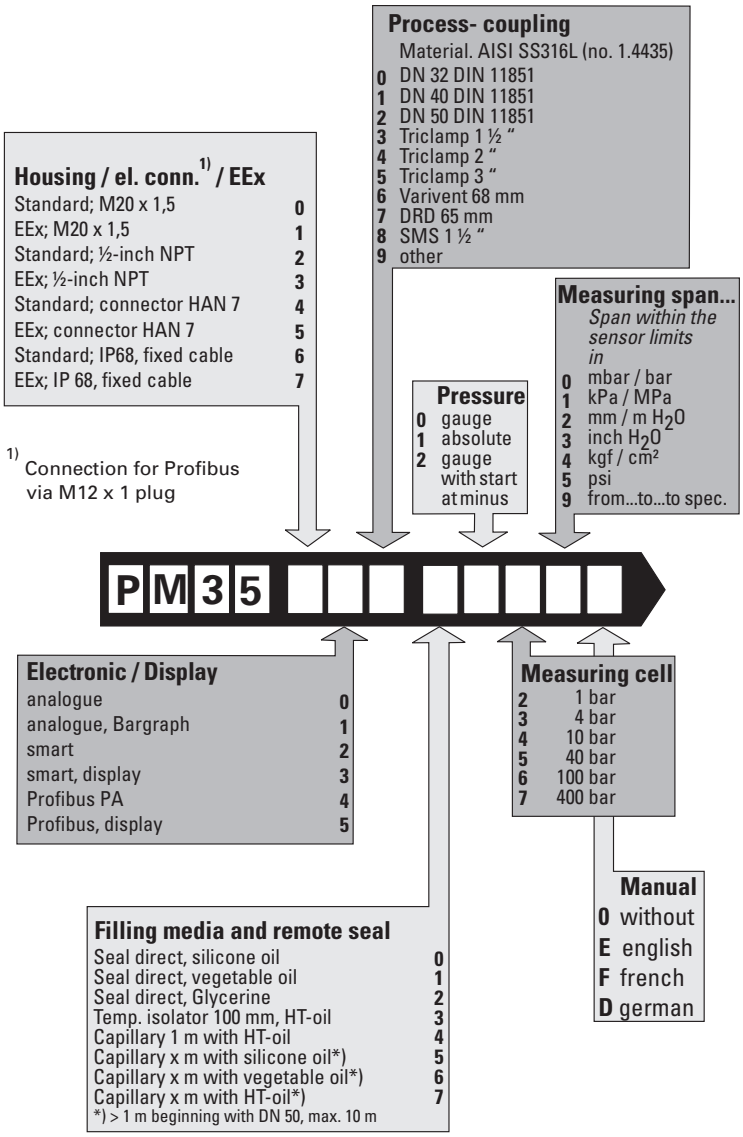



*Fig.14 Wall mounting with capillary Wand*



## *ORDERING STRUCTURE*





**Deutschland**
PMA Prozeß- und Maschinen- Automation GmbH
Miramstraße 87, D-34123 Kassel

Tel./Fax: (0561) 505 - 1307/-1710
E-mail: mailbox@pma-online.de
Internet: http://www.pma-online.de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