

Pressure Transmitter

cerabar M PMC 41, PMC 45

cerabar M PMP 41, PMP 45

Overload resistant pressure transmitter with a ceramic or metal sensor
Optional: analogue, Smart or PROFIBUS-PA electronics



PMC 41
G 1/2 A



PMC 45
DIN 11851



PMP 45
Tri-Clamp

Applications

The Cerabar M transmitters measure the gauge and absolute pressure of gases, vapours, liquids and dusts and can be used in all areas of process engineering. The modular design of the Cerabar M enables it to be used in all industrial environments.

Features and Benefits

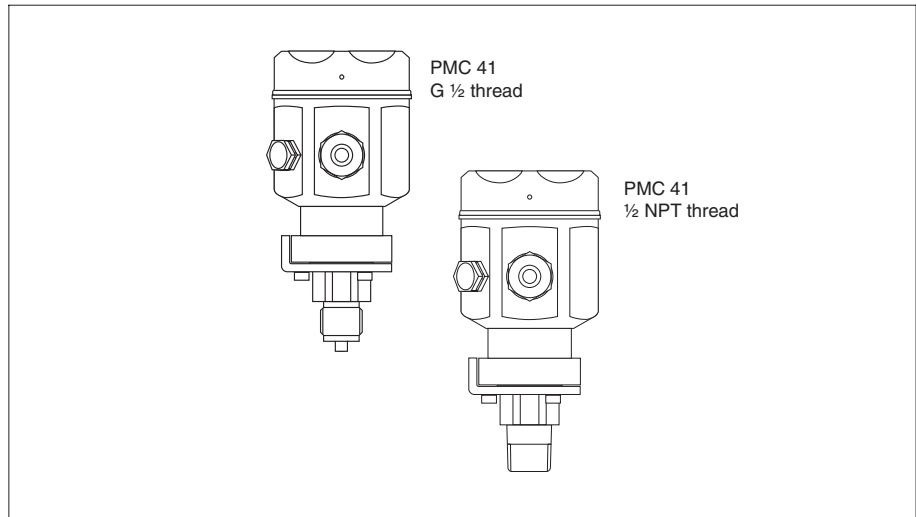
- Accuracy
 - Linearity better than 0.2% of set span
 - Adjustable measuring range with TD 10:1
 - Long-term stability better than 0.1%
- Sensors
 - Dry capacitive ceramic sensor up to 40 bar (600 psi) – corrosion and abrasion resistant with high overload protection and vacuum-tightness
 - Piezoresistive metal sensor for measuring ranges up to 400 bar (6000 psi)
- Electronics
 - Analogue: low-cost and accurate with short response time especially for rapid processes
 - Smart: intelligent with versatile operating procedures via HART protocol
 - PROFIBUS-PA: tried and tested for digital communications
- Housings
 - With its stainless steel housing without dead volume, the Cerabar M fulfils all the special hygienic requirements of the food and pharmaceutical industries. The polyester-epoxy coated aluminium housing has been field-proven in the process industry.
- Process connections
 - All customary thread versions, hygienic connections and flanges are available.

Endress + Hauser

The Power of Know How

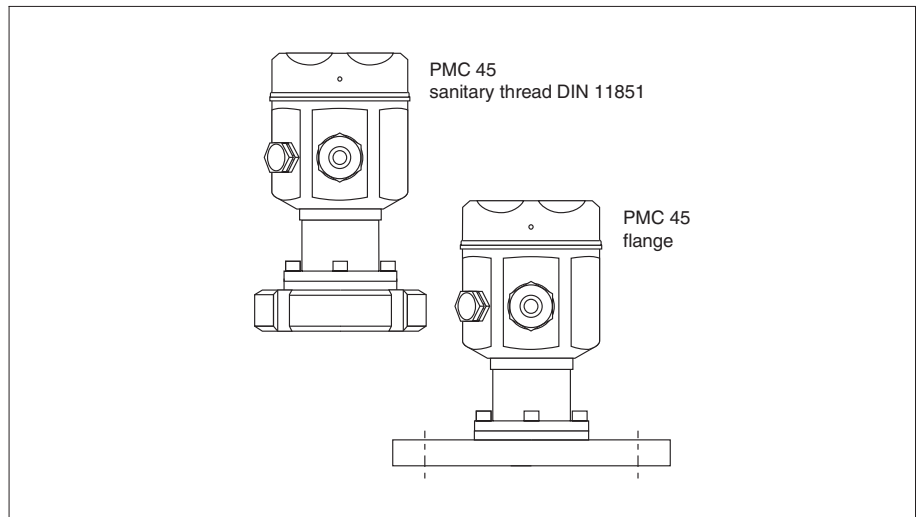


Instrument Versions



PMC 41

- Ceramic sensor, suitable for pressure measurement in all areas of process engineering
- Measuring ranges:
Gauge or absolute pressure from 10 mbar...40 bar (0.15 psi...600 psi)
- Process connections:
All common manometer connections
- Process temperature:
-40...+100°C (-40...+212°F)
- Stainless steel (AISI 316L) or aluminium housing

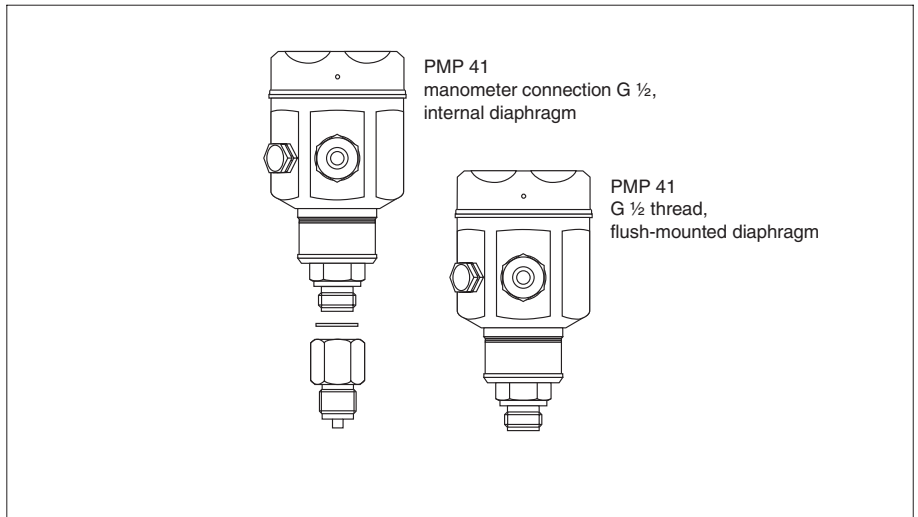


PMC 45

- Flush-mounted ceramic sensor made of high-purity (99.9 %) ceramic, particularly suitable for abrasive and viscous media. The ceramic material is generally recognized as safe (FDA 21CFR186.1256) and therefore suited to hygienic applications.
- Measuring ranges:
Gauge or absolute pressure: from 10 mbar...40 bar (0.15 psi...600 psi)
- Process connections:
 - Threaded connections
 - Hygienic connections
 - Flanges
- Process temperature:
-40...+125°C (-40...+257°F),
+150°C (+302°F) for max. 1 hour
- Stainless steel (AISI 316L) or aluminium housing
- 3A approval and EHEDG validation

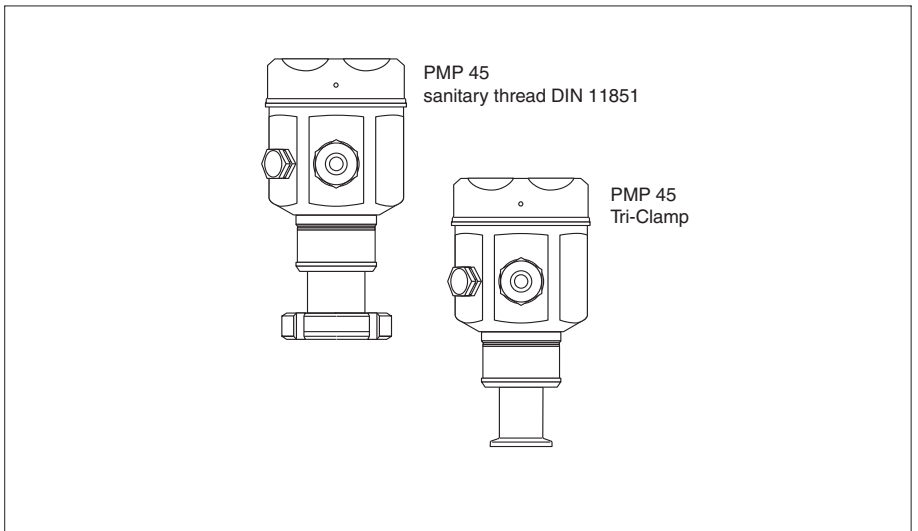


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PMP 41

- Metal sensor, suitable for pressure measurement in all areas of process engineering
- Measuring ranges:
Gauge or absolute pressure from 100 mbar...400 bar (1.5 psi...6000 psi)
- Process connections
 - Flush-mounted diaphragm G 1/2 external thread
 - With adapter (DIN 3852-E-G1/2) internal diaphragm and other manometer connections available
 - Adapter interchangeable with seal or elastomer-free gas-tight welding
- Process temperature:
–40...+100°C (–40...+212°F)
- Stainless steel (AISI 316L) or aluminium housing



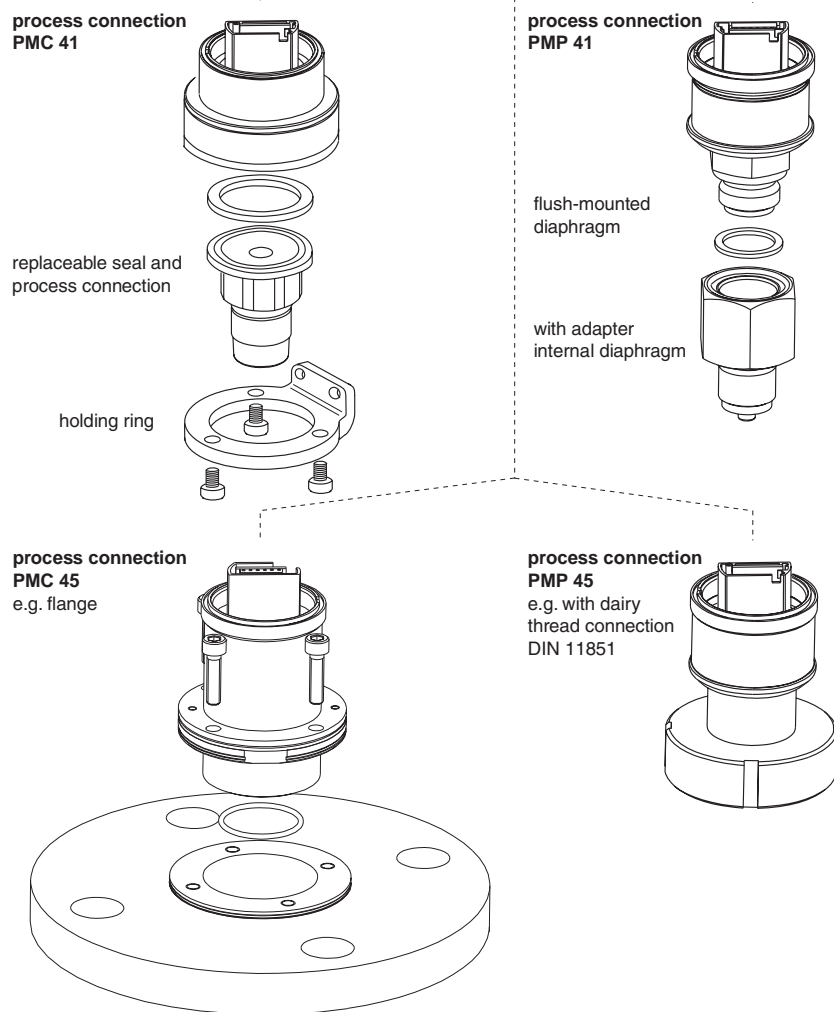
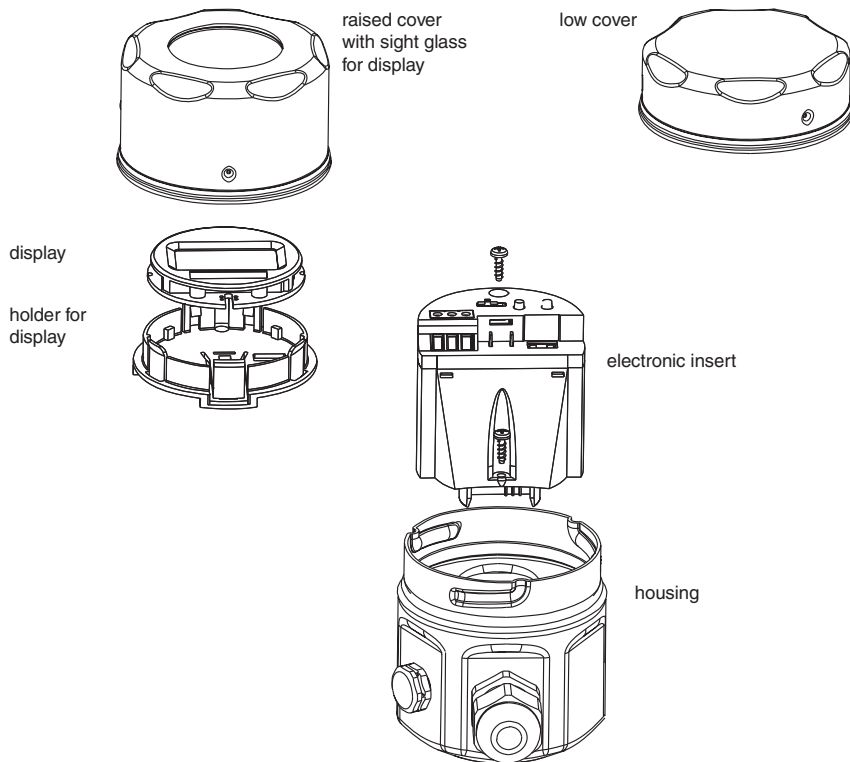
PMP 45

- Flush-mounted metal sensor, particularly suitable for hygienic applications
- Measuring range:
Gauge or absolute pressure from 100 mbar...400 bar (1.5 psi...6000 psi)
- Process connections:
 - Extra small hygienic connections
 - Thread connections
- Process temperature:
–40...+125°C (–40...+257°F),
+150°C (+302°F) for max. 1 hour
- Stainless steel (AISI 316L) or aluminium housing
- 3A approval



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Instrument Configuration of Cerabar M with Stainless Steel Housing



Housings

The stainless steel housing of Cerabar M is especially remarkable due to its chemical resistance and hygienic properties. Having no dead volume and being condensation-tight with a surface roughness of $Ra \leq 0,8 \mu m$, it is easy to clean and thereby ideal for the food and pharmaceutical industry.

The aluminium housing has proven its ruggedness and has become a standard in the many industries such as chemicals, papermaking, power generation, water and wastewater treatment.

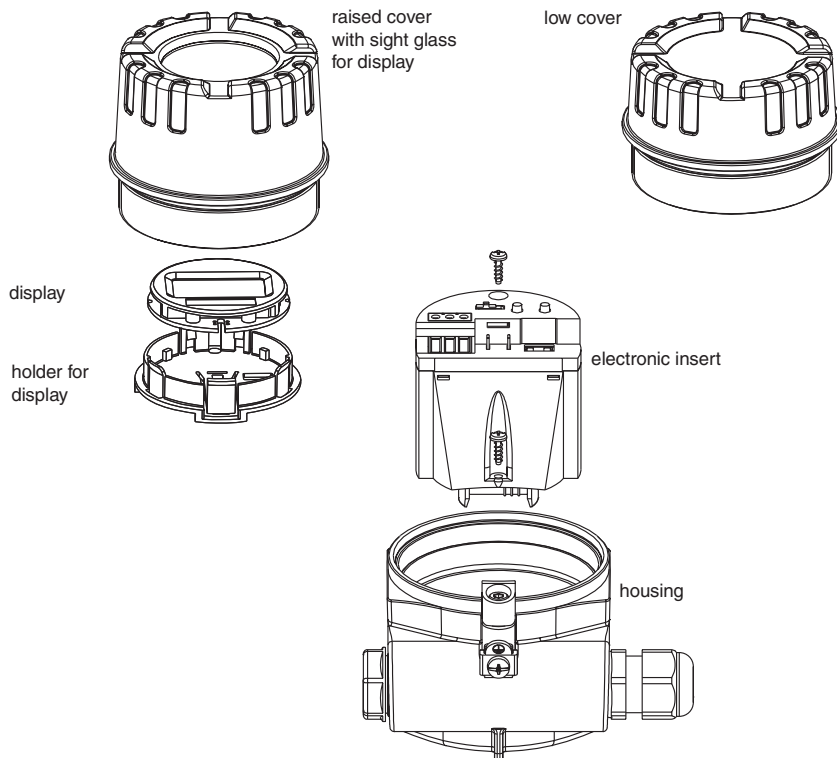
- Optional electrical connection with
 - cable gland M 20x1.5
 - cable entry $\frac{1}{2}$ NPT or G $\frac{1}{2}$,
 - Harting plug (Han7D) or plug M 12x1
 - with assembled cable
- Ingress protection up to IP 68/ NEMA 6P
- A raised cover with sight glass is provided when using a display. A low cover is available for versions without a local display.

Electronic Inserts

Cerabar M has three electronics versions

- Analogue: 4...20 mA
Operation directly at the measuring point with one potentiometer each for lower range-value and upper range-value and a three-step range switch as well as an on/off switch for damping.
- Smart: 4...20 mA with HART protocol
Operation:
 - at the measuring point via two push buttons for lower range-value and upper range-value as well as an on/off switch for damping, or
 - via the Universal HART Communicator DXR 275 handheld terminal at any point along the 4...20 mA line, or
 - via PC e.g. with the Endress+Hauser Commuwin II operating program.
- PROFIBUS-PA:
Operation:
 - Using a PC with an operating program, e.g. Commuwin II from Endress+Hauser, or
 - using two keys for lower range-value and upper range-value.

Instrument Configuration of Cerabar M with Aluminium Housing



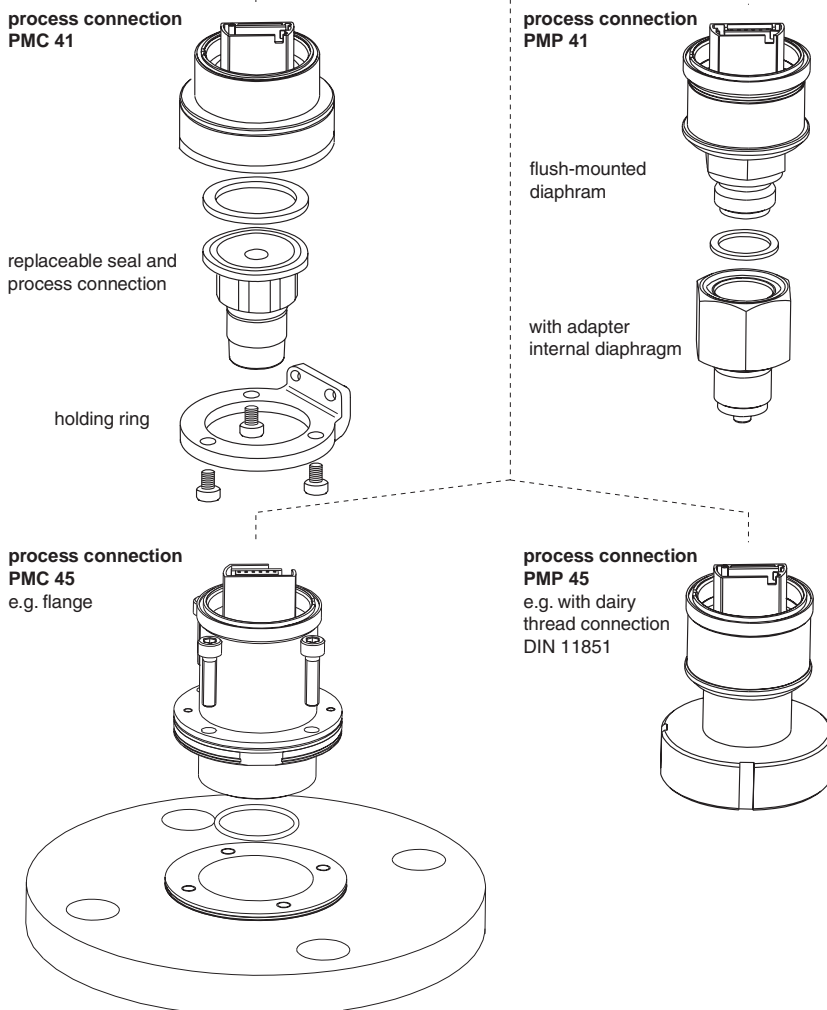
Displays

A display module can be used for showing measured values and for simplifying local operation. The display is plugged onto the electronic insert using a holder.

- Analogue display for Cerabar M with analogue electronics: The analogue display gives the current pressure value related to the measuring range in the form of a bar graph.
- Digital display for Cerabar M with Smart electronics: The digital display gives the pressure in the form of a four-digit number. The appropriate current value from 4...20 mA is shown as a bar graph underneath.
- Digital display for Cerabar M with PROFIBUS-PA electronics: The digital display gives the pressure in the form of a four-digit number. The bar graph depicts the current pressure value related to the measuring range.

Process Connections

Process connections are available with all common threads, flush-mounted hygienic connections and flanges.



Measuring System

System Components

The complete measuring system consists of:

- Cerabar M pressure transmitter with
 - analogue output 4...20 mA and
 - supply voltage, e.g. with the RN 221N transmitter power supply unit from Endress+Hauser

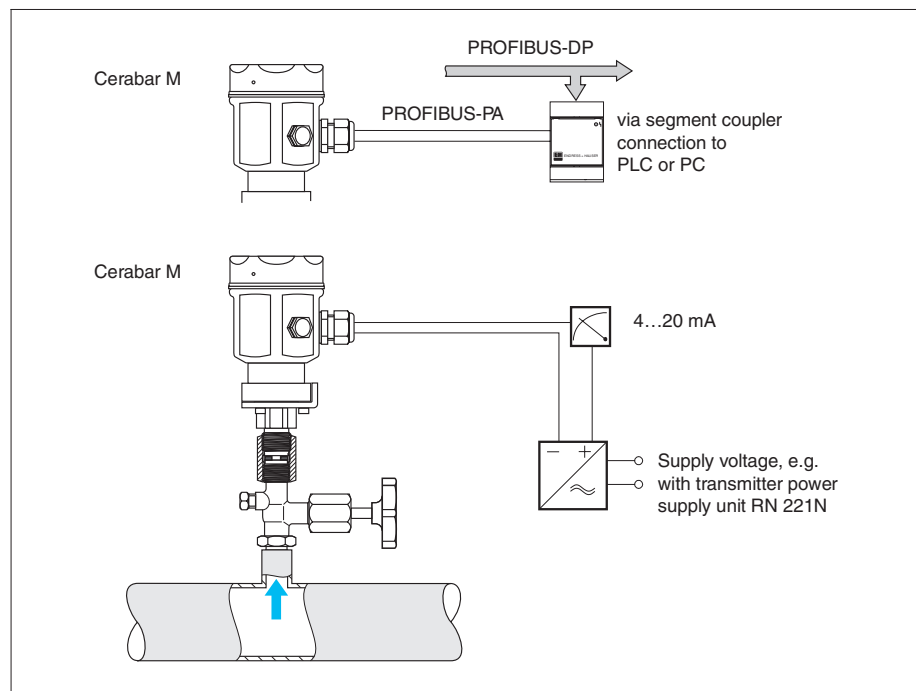
or

- Cerabar M pressure transmitter with
 - 4...20 mA signal output and HART communication signal and
 - supply voltage, e.g. RN 221N transmitter power supply unit from Endress+Hauser

or

- Cerabar M pressure transmitter with
 - digital PROFIBUS-PA communication signal
 - PLC or PC with PROFIBUS interface card and operating program, e.g. Endress+Hauser Commuwin II
 - segment coupler (DP/PA signal converter and bus power supply unit)
 - PROFIBUS-PA termination-resistor.

Complete measuring system Cerabar M
above:
 with PROFIBUS-PA electronics
below:
 with Smart electronics
 or
 with analogue electronics



Operating Principle

Ceramic Sensor (PMC 41/PMC 45)

The ceramic sensor is a dry sensor, i.e. its function does not require fill fluid. The process pressure acting directly on the rugged ceramic diaphragm and deflecting it a maximum of 0.025 mm. A pressure-proportional change in the capacitance is measured by the electrodes on the ceramic substrate and diaphragm. The measuring range is determined by the thickness of the ceramic diaphragm.

Advantages:

- Guaranteed resistance to overload up to 40-times nominal pressure (max. 60 bar/900 psi)
- Extremely high chemical resistance comparable to Alloy or tantalum
- For use with vacuum
- Ideal for hygienic processes as the Al_2O_3 ceramic material is generally recognized as safe (FDA 21CFR186.1256)

Metal Sensor (PMP 41/PMP 45)

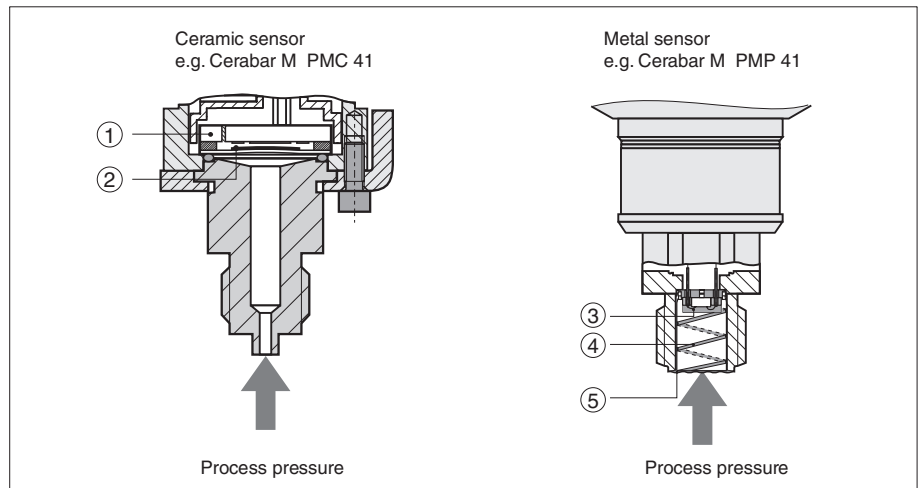
The process pressure deflects the separating diaphragm with a fill fluid transmitting the pressure to a resistance bridge (Polysilicon base). The bridge output voltage, which is proportional to pressure, is then measured and evaluated.

Advantages:

- For process pressures up to 400 bar (6000 psi)
- Excellent long-term stability
- Guaranteed resistance to overload up to 4-times nominal pressure (max. 600 bar/9000 psi)
- A compact solution for small hygienic connections

The sensors:

- ① ceramic substrate
- ② ceramic diaphragm
- ③ polysilicon measuring element
- ④ channel with fill fluid
- ⑤ flush-mounted metal diaphragm



Operation

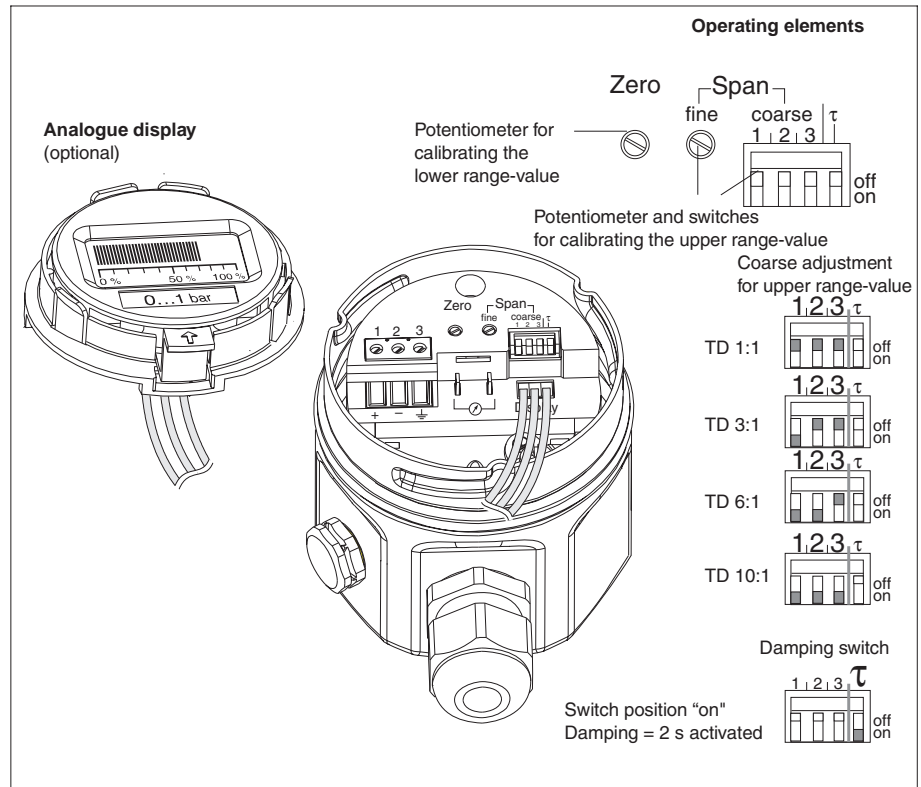
Three electronics versions are available for operating the Cerabar M.

- The analogue electronics is the simplest and most cost-effective method to operate the Cerabar M.
- Smart electronics opens up a wide range of operating and calibration routines. Operation can be carried out using a handheld terminal or an operating program, e.g. Endress+Hauser Commuwin II.
- The PROFIBUS-PA electronics provide direct connection to the PROFIBUS-PA field bus. The PROFIBUS-PA can be easily set up and many values are retrievable from the control room.

Analogue Electronics

For the Cerabar M with analogue electronics lower range-value (Zero) and upper range-value (Span) are directly calibrated at the measuring point via two potentiometers. The required lower and upper range-values must be applied as reference pressure.

- For coarse calibration of the measuring span, a spread between TD 1:1 and TD 10:1 can be selected using DIP switches.
- A 2 s damping of the measured value can be activated using a DIP switch.
- The analogue display shows the pressure on a bar graph as a ratio to the measuring range.
- Over- or under-run of the signal can be indicated by a flashing of the bar graph.

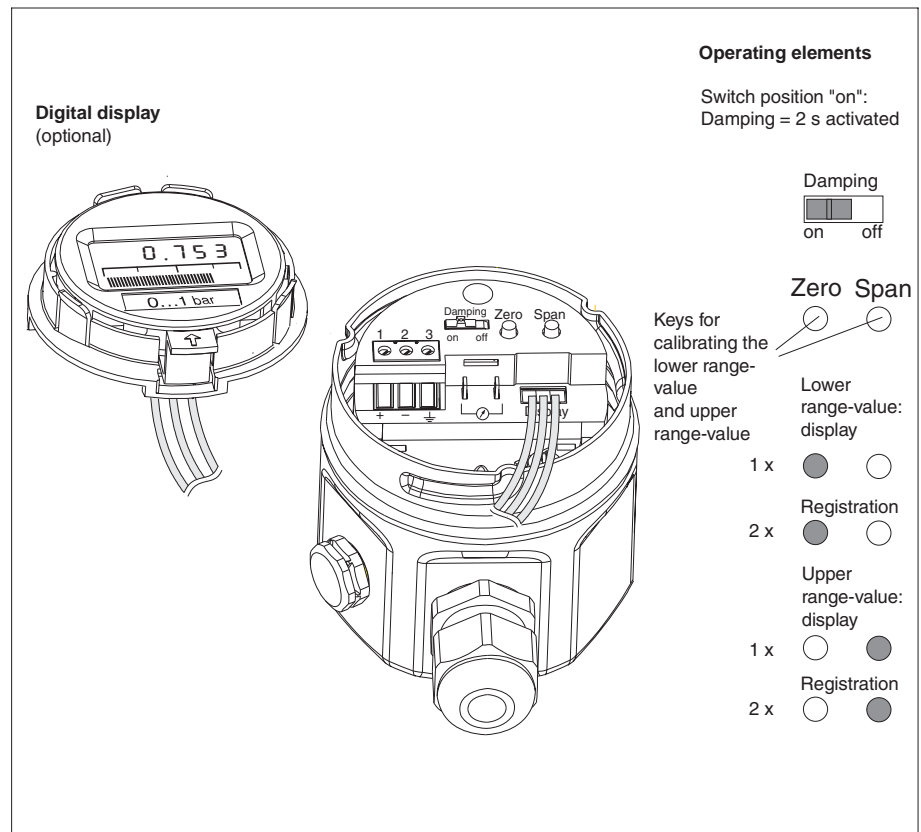


Smart Electronics

A Cerabar M with Smart electronics can be calibrated with or without reference pressure.

- When calibrating with reference pressure, the pressure for lower range-value and upper range-value must be entered and confirmed by pressing the Zero or Span key twice. Press these keys once to display saved values for lower range-value and upper range-value.
- If you calibrate without reference pressure, enter the measuring points using a handheld terminal or using the Commuwin II operating program.

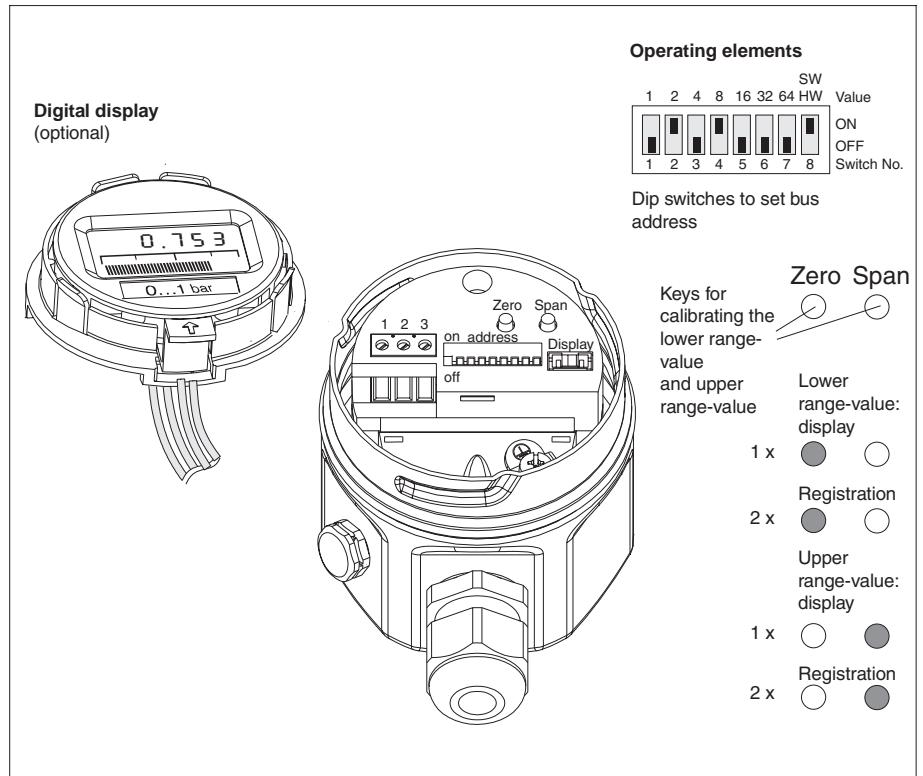
- A damping of 2 s can be set directly on the instrument. A damping value of 0...40 s can be selected using communication.
- The digital display shows the pressure as a four-character number. The appropriate 4...20 mA current is shown as a bar graph underneath.
- Error codes on the digital display and in Commuwin II simplify error diagnosis.



PROFIBUS-PA Electronics

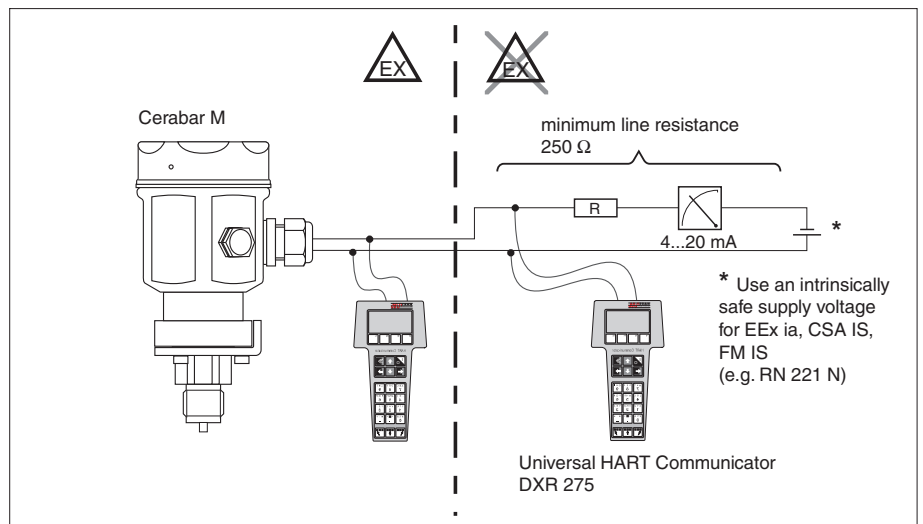
A Cerabar M with PROFIBUS-PA electronics has the following operating options.

- You can set a damping of between 0 and 40 s using communication.
- You can set instrument bus address direct in the instrument using the address switch.
- The digital display gives the pressure as a four-digit number. The bar graph depicts the current pressure value related to the measuring range. The measuring range can be set either on site using the Zero and Span keys or remotely using an operating program, such as Commuwin II.
- Error codes on the digital display and in Commuwin II simplify error diagnosis.



Smart Electronics Operation Using a Handheld Terminal

Using the Universal HART Communicator DXR 275 handheld terminal, you can set the Cerabar M, make checks and use additional functions such as "Damping" and "Calibration without reference pressure" all along the 4...20 mA line.



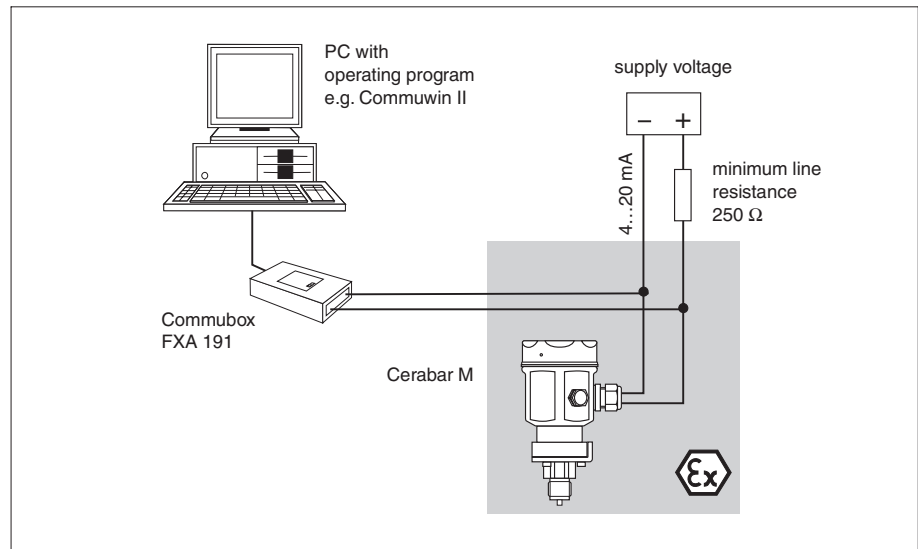
Cerabar M with Smart electronics operation using a handheld terminal

Operation (Continuation)

Smart Electronics Operation Using PC

The Commubox FXA 191 connects 4...20 mA Smart transmitters that have a HART protocol to the RS 232 C serial interface of a personal computer. This enables the transmitter to be remotely operated with the operating program, e.g. Endress+Hauser Commuwin II. You can connect the Commubox FXA 191 at any point along the 4...20 mA line. It is also suited for connection to intrinsically-safe signal circuits.

Cerabar M with Smart electronics operation using PC



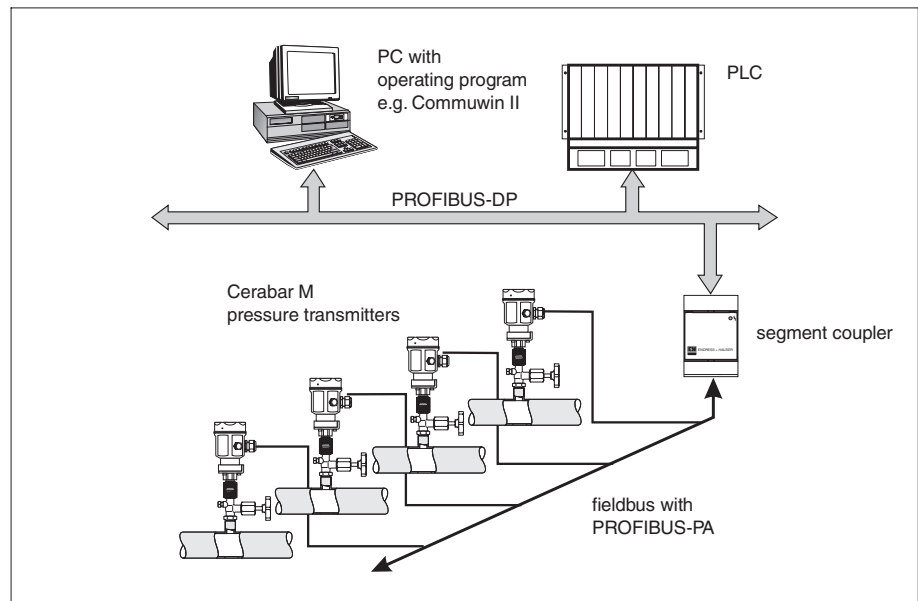
Connecting to PROFIBUS-PA

PROFIBUS-PA is an open fieldbus standard to enable several sensors and actuators, including those in explosion-hazardous areas, to be connected to bus line. With PROFIBUS-PA, two-wire looped instruments can be supplied by the sensor with power and digital process information.

The following can be powered on one bus segment:

- up to 10 instruments installed in accordance with FISCO for EEx ia, CSA IS and FM IS applications
- up to 32 instruments for all other applications (e.g. non-hazardous area, EEx nA).

Cerabar M with PROFIBUS-PA



Installation

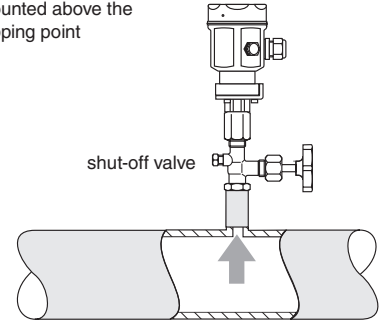
Mounting Instructions

The Cerabar M is mounted in the same way as a manometer. Its position depends upon the application.

- Gases: mount above the tapping point
- Liquids: mount below or at the same level as the tapping point
- Steam/vapours: mount with a pigtail below the tapping point

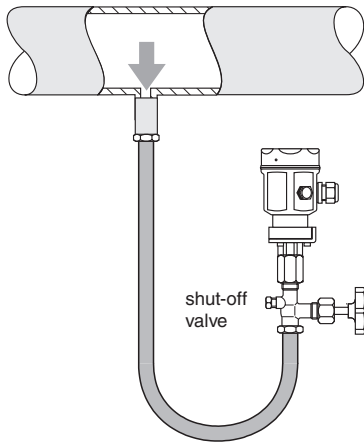
Gases:

Mounted above the tapping point



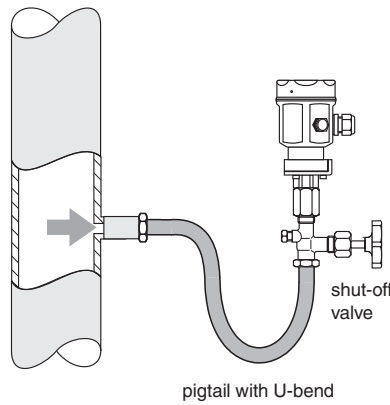
Liquids:

Mounted below the tapping point



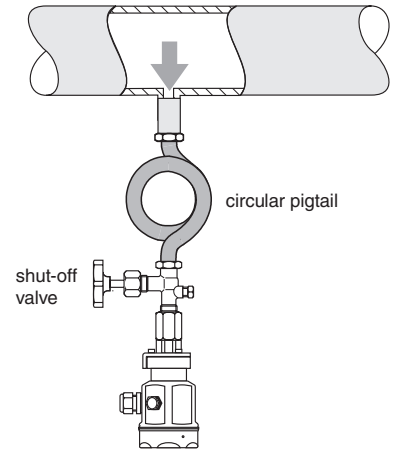
Steam/vapours:

Mounted with U-bend pigtail



Steam:

Mounted with circular pigtail



Cleaning

PMP 41 and PMP 45:

The metallic separating diaphragm seal must not be pressed or cleaned with pointed or hard objects.

Wall and Pipe Mounting

A mounting set is available for the PMP 41 and PMC 41 versions for wall mounting or mounting on vertical or horizontal pipes.

- PMC 41, Order No.: 919806-0000
- PMP 41, Order No.: 52001402

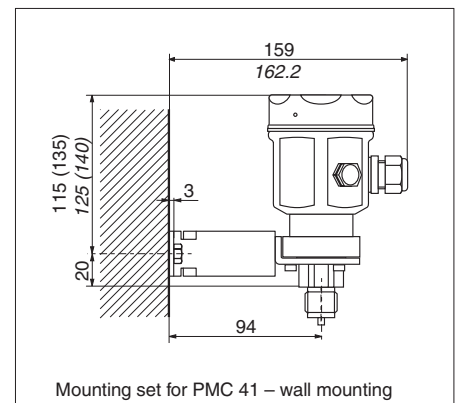
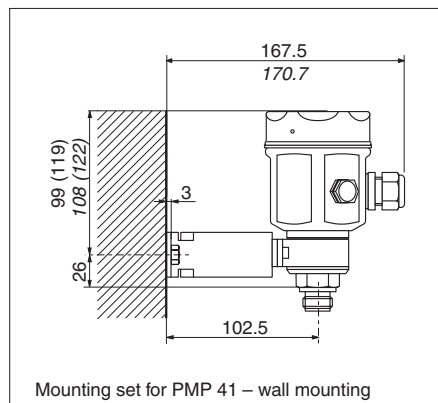
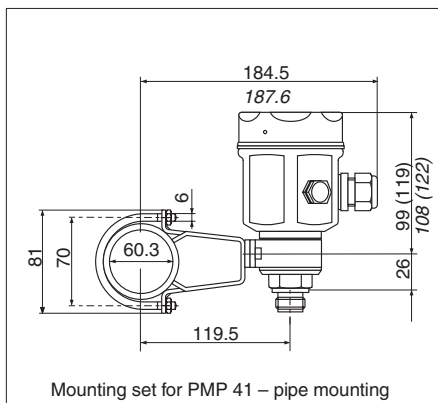
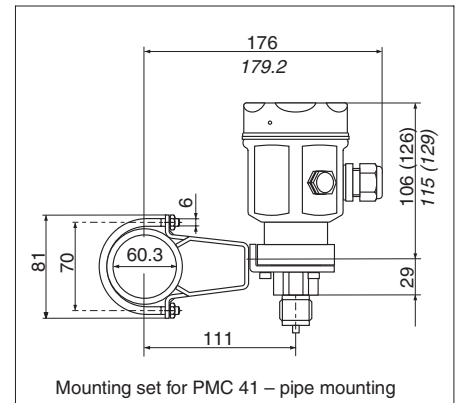
(Values in brackets apply to instruments with raised cover.)

Values in italics apply to instruments with an aluminium housing.)

Dimensions

- 1 mm = 0.039 in
- 1 in = 25.4 mm

All dimensions are in mm.



Installation (Continuation)

Oxygen and Ultra-Pure Gas Applications

Oxygen and other gases can react extremely explosively to oils and greases, so that, among others, the following precautions must be taken:

- All system components, such as measuring instruments, must be cleaned in accordance with BAM requirements (DIN 19247).

- Dependent on the materials used, a defined maximum temperature and a defined maximum pressure must not be exceeded.

In the following table, the instruments suitable for oxygen applications are listed with the T_{\max} and p_{\max} values according to the BAM list of non-metallic materials.

Order code for instruments, cleaned for oxygen application	p_{\max} at oxygen application	T_{\max} at oxygen application	Restrictive component
PMC 41 – □ □ □ □ □ □ □ □ 6	435 psi (30 bar)	60°C	Seal: FPM Viton V70G3
PMP 41 – □ □ □ □ □ □ □ □ C	1305 psi (90 bar)	60°C	Fill fluid: Votalef 1A

In addition, Endress+Hauser offers the following oil-free and grease-free instruments for special applications, such as for ultra-pure gas.

No particular restrictions with regard to the process conditions apply to these instruments.

Order code for degreased instruments
PMC 41 – □ □ □ □ □ □ □ □ 6
PMP 41 – □ □ □ □ □ □ □ □ C
PMP 41 – □ □ □ □ □ □ □ □ 4
PMP 41 – □ □ □ □ □ □ □ □ D

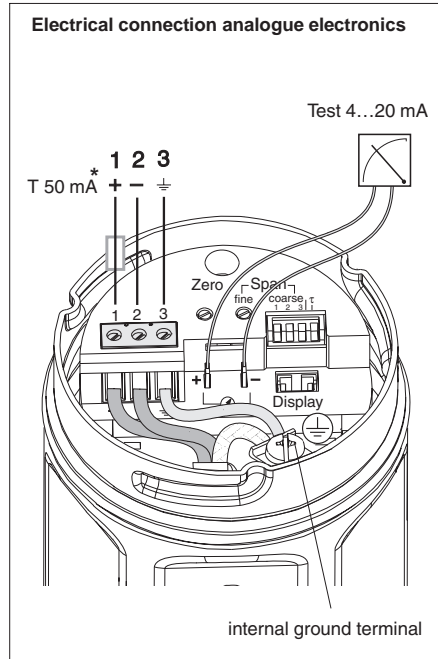
Electrical Connection

Wiring Analogue and Smart Electronics

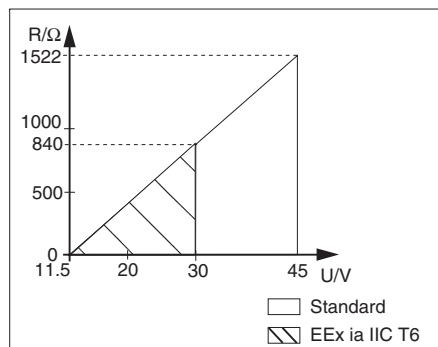
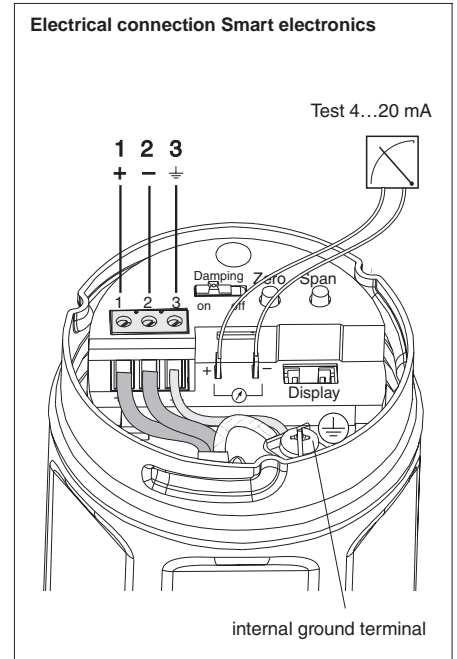
The two-wire cable is connected to screw terminals on the electronic insert.

- Supply voltage: see page 14, table 1 or table 2.
- Cable:
 - Analogue: two-wire instrumentation cable
 - Smart: We recommend using a twisted, screened two-wire cable for the connecting wire.
- Terminals: 0.14...2.5 mm² (AWG 25... 14)

- Internal protection circuits against reverse polarity, HF interference and overvoltage peaks.
- Test signal: The output current can be measured using the terminal plugs for this purpose on the electronic insert without interrupting the process measurement.
- Always connect the screening or ground cable (if present) to the internal ground terminal of the housing, not to terminal 3.



* For analogue electronics versions with certificate ATEX II 1/3 D (non Ex supply voltage) the instrument must always be protected by a 50 mA (slow-blow) fuse.



Load diagram for analogue and Smart electronics

Electrical Data for Analogue Electronics

Certificate	Order code	Supply voltage	Ex documentation
for non-hazardous area use	– PMC 4□ – R □□ □□ □ A □ □□ □ – PMC 4□ – R □□ □□ □ C □ □□ □	U = 11.5...45 V DC	none
ATEX II 1/3 D	– PMC 4□ – L □□ □□ □ A □ □□ □ – PMC 4□ – L □□ □□ □ C □ □□ □ not for PMC 45	U = 11.5...45 V DC	for further technical data and instructions, see Safety Instructions XA 040P
ATEX II 3 G EEx nA II T5	– PMC 4□ – N □□ □□ □ A □ □□ □ – PMC 4□ – N □□ □□ □ C □ □□ □	U = 11.5...45 V DC	for further technical data and instructions, see Safety Instructions XA 052P
CSA General Purpose	– PMC 4□ – C □□ □□ □ A □ □□ □ – PMC 4□ – C □□ □□ □ C □ □□ □	U = 11.5...30 V DC	none
CSA Class II, III, Div. 1, Groups E...G, Class I, Div. 2, Groups A...D	– PMC 4□ – T □□ □□ □ A □ □□ □ – PMC 4□ – T □□ □□ □ C □ □□ □ not for PMC 45	U = 11.5...30 V DC	none
FM DIP, Class II, III, Div. 1, Groups E...G	– PMC 4□ – M □□ □□ □ A □ □□ □ – PMC 4□ – M □□ □□ □ C □ □□ □ not for PMC 45	U = 11.5...45 V DC	none

Table 1: Analogue electronics, supply voltage and further documentation for instruments in explosion-hazardous areas

Electrical Data for Smart Electronics

Certificate	Order code	Supply voltage	Ex documentation
for non-hazardous area use	– PMC 4□ – R □□ □□ □ H □ □□ □ – PMC 4□ – R □□ □□ □ J □ □□ □	U = 11.5...45 V DC	none
ATEX II 1/2 G EEx ia IIC T4/T6	– PMC 4□ – G □□ □□ □ H □ □□ □ – PMC 4□ – G □□ □□ □ J □ □□ □	U = 11.5...30 V DC	for further technical data and instructions, see Safety Instructions XA 039P
ATEX II 1/2 D EEx ia IIC T4/T6	– PMC 4□ – K □□ □□ □ H □ □□ □ – PMC 4□ – K □□ □□ □ J □ □□ □ not for PMC 45	U = 11.5...30 V DC	for further technical data and instructions, see Safety Instructions XA 038P
ATEX II 1/3 D	– PMC 4□ – L □□ □□ □ H □ □□ □ – PMC 4□ – L □□ □□ □ J □ □□ □ not for PMC 45	U = 11.5...45 V DC	for further technical data and instructions, see Safety Instructions XA 040P
ATEX II 2 G EEx ia IIC T4/T6	– PMC 4□ – H □□ □□ □ H □ □□ □ – PMC 4□ – H □□ □□ □ J □ □□ □	U = 11.5...30 V DC	for further technical data and instructions, see Safety Instructions XA 039P
ATEX II 3 G EEx nA II T5	– PMC 4□ – N □□ □□ □ H □ □□ □ – PMC 4□ – N □□ □□ □ J □ □□ □	U = 11.5...45 V DC	for further technical data and instructions, see Safety Instructions XA 052P
CSA General Purpose	– PMC 4□ – C □□ □□ □ H □ □□ □ – PMC 4□ – C □□ □□ □ J □ □□ □	U = 11.5...30 V DC	none
CSA IS (suitable for Div. 2), Class I, II, III, Div. 1, Groups A...G	– PMC 4□ – S □□ □□ □ H □ □□ □ – PMC 4□ – S □□ □□ □ J □ □□ □	U = 11.5...30 V DC	for further technical data and instructions, see Control Drawing ZD 040P
CSA Class II, III, Div. 1, Groups E...G, Class I, Div. 2, Groups A...D	– PMC 4□ – T □□ □□ □ H □ □□ □ – PMC 4□ – T □□ □□ □ J □ □□ □ not for PMC 45	U = 11.5...30 V DC	none
FM IS (non-incendive), Class I, II, III, Div. 1, Groups A...G	– PMC 4□ – P □□ □□ □ H □ □□ □ – PMC 4□ – P □□ □□ □ J □ □□ □	U = 11.5...30 V DC	for further technical data and instructions, see Installation Drawing ZD 039P
FM DIP, Class II, III, Div. 1, Groups E...G	– PMC 4□ – M □□ □□ □ H □ □□ □ – PMC 4□ – M □□ □□ □ J □ □□ □ not for PMC 45	U = 11.5...45 V DC	none

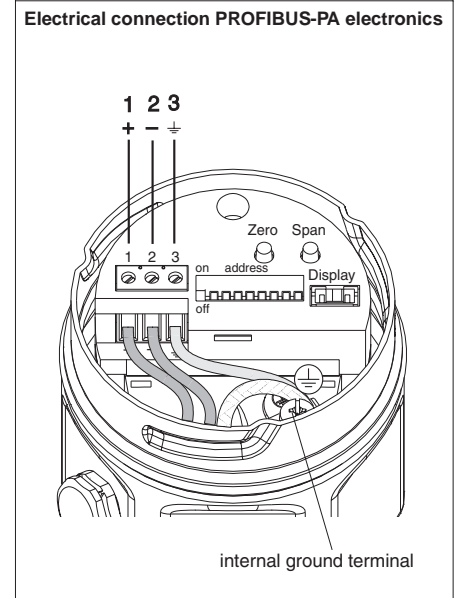
Table 2: Smart electronics, supply voltage and further documentation for instruments in explosion-hazardous areas

Wiring PROFIBUS-PA

The digital communication signal is transmitted to the bus using a two-wire connecting cable. The bus cable also carries the supply voltage.

- Supply voltage: see this page, table 3
- Always connect the screening or ground cable (if present) to the internal ground terminal of the housing, not to terminal 3.

- Bus cable:
 - Non-hazardous-area, EEx nA-, CSA General Purpose, dust explosion proofed protection: Preferably, a twisted, screened two-wire cable should be used.
 - The instrument is suitable for connecting to a Fieldbus system in accordance with the FISCO model. Observe the installation instructions for the assembly and grounding of the network, for the instruments and for the other bus system components such as the bus cable. For this, see the corresponding literature, e.g. Operating Instructions BA 198F "PROFIBUS-DP/-PA: Guidelines for planning and commissioning" and the PNO guideline. See also internet: www.endress.com → Download.



Electrical Data for PROFIBUS-PA Electronics

Certificate	Order code	Supply voltage	Ex documentation
for non-hazardous area use	– PMC 4□ – R □□ □□ □ P □ □□ □ – PMC 4□ – R □□ □□ □ R □ □□ □	U = 9...32 V DC	none
ATEX II 1/2 G EEx ia IIC T4/T6	– PMC 4□ – G □□ □□ □ P □ □□ □ – PMC 4□ – G □□ □□ □ R □ □□ □	U = 9...24 V DC FISCO: U = 9...17.5 V DC ¹⁾	for further technical data and instructions, see Safety Instructions XA 096P
ATEX II 1/2 D EEx ia IIC T4/T6	– PMC 4□ – K □□ □□ □ P □ □□ □ – PMC 4□ – K □□ □□ □ R □ □□ □ not for PMC 45	U = 9...24 V DC FISCO: U = 9...17.5 V DC ¹⁾	for further technical data and instructions, see Safety Instructions XA 097P
ATEX II 1/3 D	– PMC 4□ – L □□ □□ □ P □ □□ □ – PMC 4□ – L □□ □□ □ R □ □□ □ not for PMC 45	U = 9...32 V DC	for further technical data and instructions, see Safety Instructions XA 098P
ATEX II 2 G EEx ia IIC T4/T6	– PMC 4□ – H □□ □□ □ P □ □□ □ – PMC 4□ – H □□ □□ □ R □ □□ □	U = 9...24 V DC FISCO: U = 9...17.5 V DC ¹⁾	for further technical data and instructions, see Safety Instructions XA 096P
ATEX II 3 G EEx nA II T5	– PMC 4□ – N □□ □□ □ P □ □□ □ – PMC 4□ – N □□ □□ □ R □ □□ □	U = 9...32 V DC	for further technical data and instructions, see Safety Instructions XA 052P
CSA General Purpose	– PMC 4□ – C □□ □□ □ P □ □□ □ – PMC 4□ – C □□ □□ □ R □ □□ □	U = 9...30 V DC	none
CSA IS (suitable for Div. 2), Class I, II, III, Div. 1, Groups A...G	– PMC 4□ – S □□ □□ □ P □ □□ □ – PMC 4□ – S □□ □□ □ R □ □□ □	FISCO: U = 9...17.5 V DC ¹⁾	for further technical data and instructions, see Control Drawings ZD 051P and ZD 021F (Grounding)
CSA Class II, III, Div. 1, Groups E...G, Class I, Div. 2, Groups A...D	– PMC 4□ – T □□ □□ □ P □ □□ □ – PMC 4□ – T □□ □□ □ R □ □□ □ not for PMC 45	U = 9...32 V DC	none
FM IS (non-incendive), Class I, II, III, Div. 1, Groups A...G	– PMC 4□ – P □□ □□ □ P □ □□ □ – PMC 4□ – P □□ □□ □ R □ □□ □	FISCO: U = 9...17.5 V DC ¹⁾	for further technical data and instructions, see Installation Drawing ZD 039P
FM DIP, Class II, III, Div. 1, Groups E...G	– PMC 4□ – M □□ □□ □ P □ □□ □ – PMC 4□ – M □□ □□ □ R □ □□ □ not for PMC 45	U = 9...32 V DC	none

Table 3: PROFIBUS-PA electronics, supply voltage and further documentation for instruments in explosion-hazardous areas

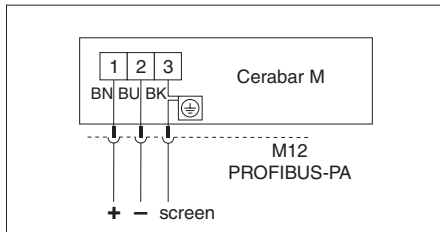
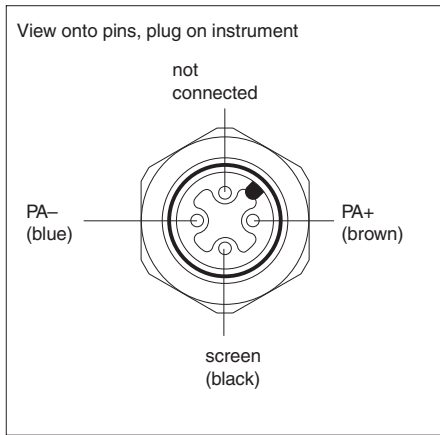
¹⁾ installation in accordance with FISCO

Connection M12 Plug (PROFIBUS-PA)

Endress+Hauser also offers a Cerabar M with a PROFIBUS M12 plug. This version can be easily connected to the PROFIBUS network using a preterminated cable.

Versions:

- PM □ 4□ - □ L1 □ □ □ P □ □ □ □
- PM □ 4□ - □ L1 □ □ □ R □ □ □ □
- PM □ 4□ - □ L2 □ □ □ P □ □ □ □
- PM □ 4□ - □ L2 □ □ □ R □ □ □ □

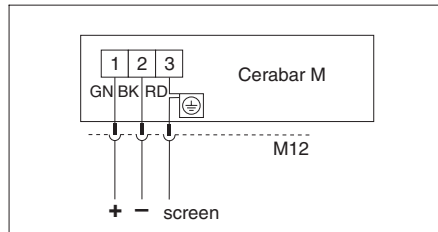
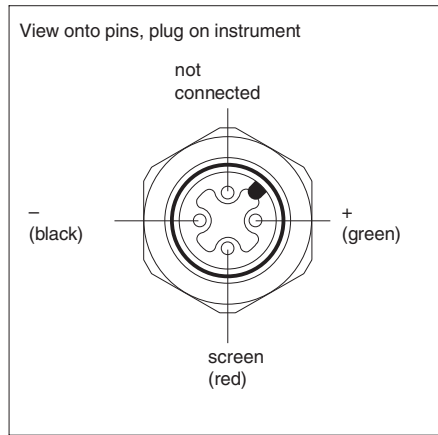


Connection M12 Plug

Endress+Hauser also offers the Cerabar M with a standard M12 plug. A socket for user-specific connection to this housing connector is available from Endress+Hauser, order no. 52006263.

Versions:

- PM □ 4□ - □ L1 □ □ □ H □ □ □ □
- PM □ 4□ - □ L1 □ □ □ J □ □ □ □
- PM □ 4□ - □ L2 □ □ □ H □ □ □ □
- PM □ 4□ - □ L2 □ □ □ J □ □ □ □
- PM □ 4□ - □ L1 □ □ □ A □ □ □ □
- PM □ 4□ - □ L1 □ □ □ C □ □ □ □
- PM □ 4□ - □ L2 □ □ □ A □ □ □ □
- PM □ 4□ - □ L2 □ □ □ C □ □ □ □

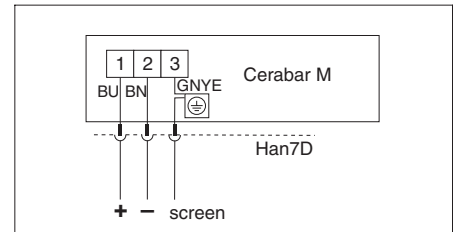
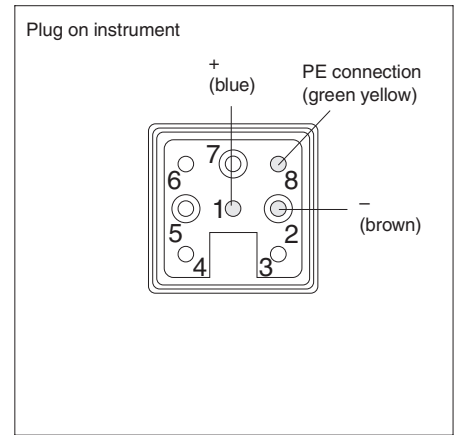


Connection Harting Plug

For applications in power stations, there is a Cerabar M with a Han7D Harting plug:

Versions:

- PM □ 4□ - □ H1 □ □ □ □ □ □ □ □
- PM □ 4□ - □ H2 □ □ □ □ □ □ □ □



- BN: Brown
- BU: Blue
- BK: Black
- RD: Red
- GN: Green
- GNYE: Green-Yellow

Technical Data

General Information

Manufacturer	Endress+Hauser
Instrument	Pressure transmitter
Designation	Cerabar M PMC 41, PMP 41, PMC 45, PMP 45
Technical documentation / Version / Technical data	TI321P/00/en / 03.05 / DIN 19259

Application

Measurement of absolute and gauge pressure in gases, vapours, liquids and dusts

Operation and System Design

Measuring principle

PMC 41 and PMC 45 with ceramic sensor	The pressure causes a slight deflection of the ceramic diaphragm of the sensor. The change in the capacitance is proportional to the pressure and is measured by the electrodes of the ceramic sensor. Volume of chamber: approx. 2 mm ³ (0.078 in ³)
PMP 41 and PMP 45 with metal sensor	The process pressure acting on the metallic separating diaphragm of the sensor is transmitted via a fill fluid to a resistance bridge. The change in the output voltage of the bridge is proportional to the pressure and is then measured. Volume of chamber: smaller than 1 mm ³ (0.039 in ³)

Measuring system

with analogue electronics (see page 8)	Cerabar M and supply voltage Calibration via potentiometers for lower range-value and upper range-value, optional analogue display for measured variable display
with Smart electronics (see pages 8...10)	Cerabar M and supply voltage Operation via: – two keys on the instrument – Universal HART Communicator DXR 275 handheld terminal – PC with operating program e.g. Commuwin II via Commubox FXA 191 Optional digital display for measured variable display
with PROFIBUS-PA electronics (see pages 9...10)	Connection via segment coupler to PLC or PC with an operating program e.g. Commuwin II, optional digital display for measured variable display
Construction	Stainless steel or aluminium housing, process connections according to European, American or Japanese standards and all common flush-mounted versions, see "Product Structure" and "Dimensions"
Signal transmission	Analogue Smart PROFIBUS-PA – 4...20 mA, 2-wire – 4...20 mA with superposed HART communication signal, 2-wire – digital communication signal, 2-wire

Input

Measured variables	Absolute or gauge pressure
--------------------	----------------------------

Measuring ranges

PMC 41, PMC 45				PMP 41, PMP 45			
Type of pressure	Measurement limits	Minimum span	Overload	Type of pressure	Measurement limits	Minimum span	Overload
	bar	bar	bar		bar	bar	bar
gauge	0...+0.1	0.01	4	gauge	0...+1	0.1	4
gauge	0...+0.4	0.04	7	gauge	0...+4	0.4	16
gauge	0...+1	0.1	10	gauge	0...+10	1	40
gauge	0...+4	0.4	25	gauge	0...+40 *	4	160
gauge	0...+10	1	40	gauge	0...+100 *	10	400
gauge	0...+40	4	60	gauge	0...+400 *	40	600
gauge	-0.1...+0.1	0.02	4	gauge	-1...+1	0.2	4
gauge	-0.4...+0.4	0.08	7	gauge	-1...+4	0.5	16
gauge	-1...+1	0.2	10	gauge	-1...+10	1.1	40
gauge	-1...+4	0.5	25				
gauge	-1...+10	1.1	40				
absolute	0...+0.4	0.04	6	absolute	0...+1	0.1	4
absolute	0...+1	0.1	9	absolute	0...+4	0.4	16
absolute	0...+4	0.4	25	absolute	0...+10	1	40
absolute	0...+10	1	40	absolute	0...+40	4	160
absolute	0...+40	4	60	absolute	0...+100	10	400
				absolute	0...+400	40	600

Conversion factors
1 bar = 14.5 psi
1 psi = 0.069 bar

* Absolute pressure sensors

**Input
(Continuation)**

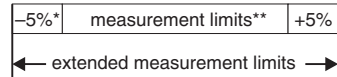
Resistance to low pressures (vacuum resistance)	PMC 41, PMC 45 PMP 41, PMC 45	– for sensors with nominal values 0.1 bar: to 0.7 bar _{absolute} for all other sensors: to 0 bar _{absolute} – to 10 mbar _{absolute}
Adjusting the span (turn down)		TD 10:1 (see also this page figure 2)
Zero point increase and decrease	Analogue Smart PROFIBUS-PA	– ±10% within extended measurement limits – any within extended measurement limits – any within extended measurement limits (see also this page figure 1)

Output

Analogue signal 4...20 mA (analogue electronics)

Output signal	4...20 mA
Max. current when the measuring range is exceeded	30 mA
Signal on alarm	Signal overrun (>20.5 mA) or underrun (<3.6 mA)
Integration time (damping)	Directly on instrument using Dip switches, switch position "off": 0 s; "on": 2 s

Figure 1: extended measurement limits



* not with absolute pressure sensors or with overpressure sensors with lower measurement limit of -1 bar
** measurement limits, see page 17

Examples:

0...4 bar overpressure sensor:
extended measurement limits:
-0.2...+4.2 bar
0...10 bar absolute pressure sensor:
extended measurement limits:
0...+10.5 bar_{abs}

4...20 mA with HART protocol (Smart electronics)

Output signal	4...20 mA with HART protocol
Resolution	1 µA
Signal on alarm	optional 3.6 mA, 22 mA or "continue" (last current value will be hold)
Integration time (damping)	Directly on instrument using Dip switches, switch position "off": 0 s; "on": 2 s or with Universal HART Communicator DXR 275 or using operating program e.g. Commuwin II: 0...40 s

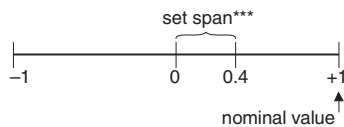
PROFIBUS-PA (PROFIBUS-PA electronics)

Output signal	Digital communication signal PROFIBUS-PA (Profile 3.0)
PA function	Slave
Transmission rate	31.25 kBit/s
Response time	Slave: approx. 20 ms PLC: 300...600 ms for approx. 30 transmitters (depending on segment coupler)
Integration time (damping)	0...40 s via communication
Communication resistance	none, PROFIBUS-PA termination-resistor
Physical layer	MBP (Manchester coded and Bus Powered)

Accuracy

Figure 2: Turn down

Explanation of terms:
Turn down (TD) =
nominal value / set span***



Example:
nominal value = 1 bar
set span*** = 0.4 bar
TD = 1 : 0.4

*** Calibrated span for instruments with PROFIBUS-PA electronics

Reference conditions		according to IEC 60770 T _U =25°C (77°F) Accuracy data adopted after entering "Low sensor calibration" and "High sensor calibration" for lower range-value and upper range-value.
Non-linearity including hysteresis and non-reproducibility (limit point method according to IEC 60770)		±0.2% of set span***
Linearity at low absolute pressure ranges (due to performance limits of currently available DKD calibration rigs)		for ≥40 mbar _{absolute} to <100 mbar _{absolute} : ±0.3% of set span***
For gauge pressure measurements using absolute pressure sensors with measuring ranges ≤ 10 bar		Accuracy can be exceeded by fluctuating ambient air pressure.
Warm-up time	Analogue Smart PROFIBUS-PA	– 200 ms – 1 s – 1 s
Rise time (T90 time)	Analogue Smart PROFIBUS-PA	– 60 ms – 220 ms – 220 ms
Settling time	Analogue Smart PROFIBUS-PA	– 180 ms – 600 ms – 600 ms
Long-term drift (with reference to nominal value)		±0.1% per year ±0.25% per 3 years
Thermal effects (with reference to the set span***)		Analogue electronics: – for -10...+60°C (+14...+140°F): ±(0.3% x TD + 0.3%) – for -40...-10°C (-40...+14°F) and +60...+85°C (+140...+185°F): ±(0.5% x TD + 0.5%) – PMC 45/PMP 45 in a medium temperature range +85...+125°C (+185...+257°F): ±(0.8% x TD + 0.8%) Smart and PROFIBUS-PA electronics: – for -10...+60°C (+14...+140°F): ±(0.2% x TD + 0.2%) – for -40...-10°C (-40...+14°F) and +60...+85°C (+140...+185°F): ±(0.4% x TD + 0.4%) – PMC 45/PMP 45 in a medium temperature range +85...+125°C (+185...+257°F): ±(0.6% x TD + 0.6%)

**Accuracy
(Continuation)**

Temperature coefficient (maximum TK) (If the temperature coefficient level exceeds the thermal change, then the thermal change automatically becomes valid.)	<p>Zero signal and span: Analogue electronics: – for –10...+60°C (+14...+140°F): ±0.15% of nominal value/10 K – for –40...–10°C (–40...+14°F) and +60...+85°C (+140...+185°F): ±0.2% of nominal value/10 K – PMC 45/PMP 45 in a medium temperature range +85...+125°C PMC 45/PMP 45 (+185...+257°F): ±0.25% of nominal value/10 K</p> <p>Smart and PROFIBUS-PA electronics: – for –10...+60°C (+14...+140°F): ±0.08% of nominal value/10 K – for –40...–10°C (–40...+14°F) and +60...+85°C (+140...+185°F): ±0.1% of nominal value/10 K – PMC 45/PMP 45 in a medium temperature range +85...+125°C (+185...+257°F): ±0.12% of nominal value/10 K</p>
Vibration effects	None (4 mm in path peak-to-peak 5...15 Hz 2 g: 15...150 Hz, 1g: 150 Hz...2000 Hz)

Application Conditions

Installation conditions	Any position, zero point shift due to position can be corrected, see page 18, "Zero-point increase and decrease"
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Ambient conditions

Ambient temperature	–40...+85°C (–40...+185°F) For instruments approved for use in hazardous areas, see Safety Instructions (XA...), Installation or Control Drawing (ZD...).
Ambient temperature range (temporary)	–40...+100°C (–40...+212°F)
Storage temperature	–40...+100°C (–40...+212°F)
Climatic class	4K4H to DIN EN 60721-3
Protection	– IP 68 (1m water over 24 h) or NEMA 6P (1.8 m water over 30 min): Instruments with assembled cable or instruments with M12-plug and absolute pressure sensors – IP 66/NEMA 4x: Instruments with cable gland, cable entry or instruments with M12-plug and overpressure sensors – IP 65: Instruments with Harting plug Han7D
Electromagnetic compatibility	Interference Emission to EN 61326, Electrical Equipment Class B, Interference Immunity to EN 61326, Annex A (Industrial) and NAMUR Recommendation EMC (NE 21), Influence to EMC: ≤ 0,5 %.

Process conditions

Process temperature	– PMC 41, PMP 41: –40...+100°C (–40...+212°F), – PMC 45, PMP 45: –40...+125°C (–40...+257°F) (+150°C (302°F) for max. 1 hour) Observe the temperature application limits of the corresponding seal and fill fluid. For instruments approved for use in hazardous areas, see Safety Instructions (XA...), Installation or Control Drawing (ZD...). For instruments for oxygen applications, see page 12.																								
Temperature application limits Seal	<table border="1"> <thead> <tr> <th>Seal</th> <th>Temperature application limits</th> </tr> </thead> <tbody> <tr> <td>EPDM</td> <td>–20°C (–4°F) ¹⁾</td> </tr> <tr> <td>EPDM (FDA 21CFR177.2600)</td> <td>–20°C (–4°F) ¹⁾</td> </tr> <tr> <td>FFKM Chemraz</td> <td>–10°C (14°F) ¹⁾</td> </tr> <tr> <td>FFKM Kalrez, Compound 4079</td> <td>+5°C (+41°F) ¹⁾</td> </tr> <tr> <td>FKM Viton</td> <td>–20°C (–4°F) ¹⁾</td> </tr> <tr> <td>FKM Viton degreased, Compound V70G3</td> <td>–10°C (14°F) ¹⁾</td> </tr> <tr> <td>FKM Viton cleaned for oxygen application ²⁾, Compound V70G3</td> <td>–10...+60°C (+14...+140°F)</td> </tr> <tr> <td>HNBR (FDA 21CFR177.2600)</td> <td>–20...+80°C (–4...+176°F)</td> </tr> <tr> <td>NBR</td> <td>–20...+80°C (–4...+176°F)</td> </tr> <tr> <td>PTFE + Alloy C</td> <td>–40°C (–40°F) ¹⁾</td> </tr> <tr> <td>Silicone (FDA 21CFR177.2600) must be ordered as a special version</td> <td>–40°C (–40°F) ¹⁾</td> </tr> </tbody> </table> <p>1) For the upper temperature application limit, see this page, "Process temperature". 2) Observe application limits for oxygen applications, see page 12.</p>	Seal	Temperature application limits	EPDM	–20°C (–4°F) ¹⁾	EPDM (FDA 21CFR177.2600)	–20°C (–4°F) ¹⁾	FFKM Chemraz	–10°C (14°F) ¹⁾	FFKM Kalrez, Compound 4079	+5°C (+41°F) ¹⁾	FKM Viton	–20°C (–4°F) ¹⁾	FKM Viton degreased, Compound V70G3	–10°C (14°F) ¹⁾	FKM Viton cleaned for oxygen application ²⁾ , Compound V70G3	–10...+60°C (+14...+140°F)	HNBR (FDA 21CFR177.2600)	–20...+80°C (–4...+176°F)	NBR	–20...+80°C (–4...+176°F)	PTFE + Alloy C	–40°C (–40°F) ¹⁾	Silicone (FDA 21CFR177.2600) must be ordered as a special version	–40°C (–40°F) ¹⁾
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**Application Conditions
(Continuation)**

Temperature application limits fill fluid	Fill fluid PMP 41, PMP 45	Temperature application limits
	Mineral oil (Sera 8 – 320)	–40°C (–40°F) ¹⁾
	Vegetable oil (Neobee M-20)	–10°C (+14°C) ¹⁾
	Inert oil (Vultalef 1A)	–40°C (–40°F) ¹⁾
1) See page 19, "Process Temperature", for upper temperature application limit.		
<p>Pressure specifications</p> <p>The MWP (maximum working pressure) is specified on the nameplate. The value refers to a reference temperature of 20°C (68°F) or 100°F for ANSI flanges.</p> <ul style="list-style-type: none"> – Test pressure (over pressure limit OPL) = MWP (nameplate) x 1.5 – The pressure values permitted at higher temperatures can be found in the following standards: EN 1092-1: 2001 Tab. 18; ASME B 16.5a – 1998 Tab. 2-2.2 F316; ASME B 16.5a – 1998 Tab. 2.3.8 N10276; JIS B2201 <p>The maximum pressure for the measuring device is dependent on the lowest-rated element with respect to pressure, see following sections for this:</p> <ul style="list-style-type: none"> – permitted overload of the sensor, page 17, table "Measuring range" – for process connections "Product structure" and "Dimensions", from page 22 onwards – "Oxygen and Ultra Pure Gas Applications", page 12 		

Mechanical Construction

Design

Housing	Stainless steel (type F 15) or aluminium (type F 18) Optional electrical connection via – cable gland M 20x1.5 – cable entry G ½, ½ NPT – Harting plug (Han7D) or M 12 x 1 plug – assembled cable with reference air feed
Process connections	All common thread versions, flush-mounted connections and flanges

Materials

Housing	– Stainless steel AISI 316L (1.4404/14435) with a surface roughness Ra ≤ 0,8 µm or – Cast aluminium housing with protective polyester based powder coating
Nameplate	Stainless steel housing Aluminum housing – Engraved on housing with laser – AISI 304 (1.4301)
Process connections	PMP 41 PMC 41 PMC 45, PMP 45 – AISI 316L (1.4404/1.4435), Adapter AISI 316L (1.4404/1.4435) – AISI 316L (1.4404/1.4435) or Alloy C276 (2.4819) – AISI 316L (1.4404/1.4435)
Union nuts	AISI 304L (1.4307)
Process diaphragm	PMC 41, PMC 45 PMP 41, PMP 45 – Al ₂ O ₃ Aluminium oxide ceramic (FDA 21CFR186.1256) (PMC 41: 96%, PMC 45: high-purity 99.9%) – AISI 316L (1.4404/1.4435)
Seals	PMC 41 PMC 45 PMP 41 – FKM Viton, NBR, EPDM, FFKM Chemraz, FFKM Kalrez, FKM Viton degreased, FKM cleaned for oxygen application – FKM Viton, HNBR (FDA 21CFR177.2600), EPDM (FDA 21CFR177.26000), FFKM Chemraz, FFKM Kalrez, FKM degreased – FKM Viton, PTFE + Alloy C, NBR
O-Ring for cover sealing	Stainless steel housing Aluminium housing – Silicone – NBR
Mounting accessories	Bracket for pipe and wall mounting AISI 304 (1.4301)

Measuring cell

PMC 41 and PMC 45 PMP 41 PMP 45	– without fill fluid, dry sensor – fill fluid: – mineral oil (Sera 8-320) – inert oil (Vultalef 1A) – vegetable oil (Neobee M-20, FDA 21CFR172.856) – fill fluid: – mineral oil (Sera 8-320) – vegetable oil (Neobee M-20, FDA 21CFR172.856)
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Display and Operating Interface

Display and Operation

Display (optional)	Analogue Smart and PROFIBUS-PA	– Pluggable analogue display with bar graph (30 segments) (Pressure display related to set measuring range as bar graph) – Pluggable digital display with bar graph (28 segments) (Pressure display as four-digit number and also in relating to set measuring range as bar graph)
Display resolution	Analogue display digital display	– Bar graph: 1 segment equals 3.33% of the set measuring range – Digital display: 0.1% Bar graph: 1 segment equals 3.57% of the set measuring range

Display and Operating Interface (Continuation)

Operation	Analogue Smart PROFIBUS-PA	<ul style="list-style-type: none"> – Lower range-value and upper range-value calibration using two potentiometers and DIP switches on the instrument – Lower range-value and upper range-value calibration using two keys on the instrument – Lower range-value and upper range-value calibration for the bar graph using two keys on instrument For further setting options, refer to pages 8...10
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Communication Interfaces

Handheld terminal	HART protocol: Universal HART Communicator DXR 275, The HART Communicator can be connected anywhere along the 4...20 mA cable, minimum line resistance: 250 Ω
PC	Connection via Commubox FXA 191 to a serial interface of a PC. The Commubox can be connected anywhere along the 4...20 mA cable, minimum line resistance: 250 Ω, operating e.g. via Commuwin II operating program.
PROFIBUS-PA	Connection via segment coupler to PLC or PC with an operating program e.g. Commuwin II

Supply Voltage

Analogue and Smart Electronics

Supply voltage	<ul style="list-style-type: none"> – Standard: 11.5...45 V DC – CSA General Purpose: 11.5...30 V DC – For instruments in explosion-hazardous areas, see page 14.
Overtoltage category	II to DIN EN 61 010-1
Ripple	No effect for 4...20 mA signal up to ±5% residual ripple within permissible range with HART Communicator and Commubox: max. ripple (measured on 500 Ω) 47...125 Hz: U _{pp} =200 mV max. noise (measured on 500 Ω) 500 Hz...10 kHz: U _{eff} =2.2 mV

PROFIBUS-PA Electronics

Supply voltage	<ul style="list-style-type: none"> – Standard: 9...32 V DC – CSA General Purpose: 9...30 V DC – For instruments in explosion-hazardous areas, see page 15.
Current consumption	11 mA ± 1 mA
Power up current	Corresponds to table 4, IEC 61158-2

Certificates and Approvals

Ignition protection	see "Product Structure, Certificates"
CE Mark	By attaching the CE Mark, Endress+Hauser confirms that the instrument fulfils all the requirements of the relevant EC directives.
Pressure equipment directive	<ul style="list-style-type: none"> – This instrument conforms to Article 3(3) of EC Directive 97/23/EG (Pressure Equipment Directive) and is developed and produced in sound engineering practice. – PMP 41 with threaded connection, PN > 200 bar: suitable for stable gases in fluid group 1

Order Code

see "Product Structure"

Supplementary Documentation

<ul style="list-style-type: none"> – Cerabar M System Information: SI 038P/00/en – Cerabar M with diaphragm seal PMP 46, PMP 48 Technical Information: TI 322P/00/en – Cerabar M analogue electronics Operating Instructions: BA 200P/00/en – Cerabar M Smart electronics Operating Instructions: BA 201P/00/en – Cerabar M PROFIBUS-PA electronics Operating Instructions: BA 222P/00/en – PROFIBUS-DP/PA, Guidelines for planning and comissioning: BA 198F/00/en – ATEX II 1/2 D or 2 D T 50 °C/T 82 °C, EEx ia IIC T4/T6 (Smart) Safety Instructions: XA 038P/00/a3 – ATEX II 1/2 G or 2 G EEx ia IIC T4/T6 (Smart) Safety Instructions: XA 039P/00/a3 – ATEX II 1/3 D IP 66 T 110 °C (Analog, Smart) Safety Instructions: XA 040P/00/a3 – ATEX II 3 G EEx nA II T5 (Analog, Smart, PROFIBUS-PA) Safety Instructions: XA 052P/00/a3 – ATEX II 1/2 G or 2 G EEx ia IIC T4/T6 (PROFIBUS-PA) Safety Instructions: XA 096P/00/a3 – ATEX II 1/2 D or 2 D T 50 °C/T 85 °C EEx ia IIC T4/T6 (PROFIBUS-PA) Safety Instructions: XA 097P/00/a3 – ATEX II 1/3 D IP 66 T 110 °C (PROFIBUS-PA) Safety Instructions: XA 098P/00/a3 – FM (Smart) Control Drawing: ZD 039P/00/en – CSA (Smart) Control Drawing: ZD 040P/00/en – FM (PROFIBUS-PA) Control Drawing: ZD 052P/00/en + ZD 021F/00/en (Grounding) – CSA (PROFIBUS-PA) Control Drawing: ZD 051P/00/en + ZD 021F/00/en (Grounding) – Declaration to Pressure Equipment Directive, Pressure Transmitter with Threaded Connections, PN > 200 bar: SD 141P/00/a3 – EMC Guidelines Technical Information: TI 241F/00/en see also internet www.endress.com → Download
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Product Structure PMC 41

Cerabar M PMC 41

Certificate

R For non-hazardous area use
 G ATEX II 1/2 G EEx ia IIC T4/T6
 H ATEX II 2 G EEx ia IIC T4/T6
 N ATEX II 3 G EEx nA II T5 (Zone 2)
 K ATEX II 1/2 D EEx ia IIC T4/T6
 L ATEX II 1/3 D (non-Ex supply voltage)
 C CSA General Purpose
 S CSA IS (suitable for Div. 2) Class I, II, III, Div. 1, Groups A...G
 T CSA Class II, III, Div. 1, Groups E...G (dust-Ex); Class I, Div. 2, Groups A...D
 P FM IS (non-incendive) Class I, II, III, Div. 1, Groups A...G
 M FM DIP Class II, III, Div. 1, Groups E...G
 V TIIS IS Ex ia IIC T6

Housing

Stainless steel AISI 316L

E1 Cable gland M 20x1.5
 G1 Cable entry G ½
 C1 Cable entry ½ NPT
 H1 Harting plug (Han7D)
 L1 Plug M 12x1
 K1 5 m cable (with pressure compensation)

Aluminium

E2 Cable gland M 20x1.5
 G2 Cable entry G ½
 C2 Cable entry ½ NPT
 H2 Harting plug (Han7D)
 L2 Plug M 12x1
 K2 5 m cable (with pressure compensation)

Ceramic Sensor: Nominal Value (Maximum Overload)

Gauge pressure

1C 0...100 mbar	(4 bar)	10 kPa	(400 kPa)	1.5 psig	(60 psig)
1F 0...400 mbar	(7 bar)	40 kPa	(700 kPa)	6 psig	(100 psig)
1H 0...1 bar	(10 bar)	100 kPa	(1 MPa)	15 psig	(150 psig)
1M 0...4 bar	(25 bar)	400 kPa	(2.5 MPa)	60 psig	(360 psig)
1P 0...10 bar	(40 bar)	1 MPa	(4 MPa)	150 psig	(600 psig)
1S 0...40 bar	(60 bar)	4 MPa	(6 MPa)	600 psig	(850 psig)

Absolute pressure

2F 0...400 mbar	(7 bar)	40 kPa	(700 kPa)	6 psia	(100 psig)
2H 0...1 bar	(10 bar)	100 kPa	(1 MPa)	15 psia	(150 psig)
2M 0...4 bar	(25 bar)	400 kPa	(2.5 MPa)	60 psia	(360 psig)
2P 0...10 bar	(40 bar)	1 MPa	(4 MPa)	150 psia	(600 psig)
2S 0...40 bar	(60 bar)	4 MPa	(6 MPa)	600 psia	(850 psig)

Negative gauge pressure

5C -100...+100 mbar	(4 bar)	-10...+10 kPa	(400 kPa)	-1.5...+1.5 inch H ₂ O	(60 psig)
5F -400...+400 mbar	(7 bar)	-40...+40 kPa	(700 kPa)	-6...+6 psig	(100 psig)
5H -1...+1 bar	(10 bar)	-100...+100 kPa	(1 MPa)	-15...+15 psig	(150 psig)
5M -1...+4 bar	(25 bar)	-100...+400 kPa	(2.5 MPa)	-15...+60 psig	(360 psig)
5P -1...+10 bar	(40 bar)	-0.1...1 MPa	(4 MPa)	-15...150 psig	(600 psig)

Calibration and Technical Units

1 Calibration nominal value: mbar/bar	4 Calibration nominal value: inch H ₂ O
2 Calibration nominal value: kPa/MPa	5 Calibration nominal value: kgf/cm ²
3 Calibration nominal value: mm H ₂ O/m H ₂ O	6 Calibration nominal value: psi

B Calibrated from ... to ... technical unit ... (bar, kPa, psi, ...)

Electronics, Display

A Analogue 4...20 mA, without display	C Analogue 4...20 mA, with analogue display
H HART 4...20 mA, without display	J HART 4...20 mA, with digital display
P PROFIBUS-PA, without display	R PROFIBUS-PA, with digital display

Additional Options

1 Additional option not selected
 2 Bracket for pipe and wall mounting
 C 3.1.B Inspection certificate according to EN 10204 for process connection
 S GL (German Lloyd) marine certificate

Process Connection: Thread, Material

1M ISO 228, G ½ (external), AISI 316L
 2M ISO 228, G ½ (external), Alloy C276
 1R ISO 228 G, ½ (external), Ø 11.4 mm (internal), AISI 316L
 1P ISO 228, G ½ (external), G ¼, AISI 316L
 1A ANSI, ½ MNPT, Ø 11.4 mm (internal), AISI 316L
 1N ANSI, ½ MNPT, ¼ FNPT, AISI 316L
 2N ANSI, ½ MNPT, ¼ FNPT, Alloy C276
 1S JIS B020, PF ½ (external), AISI 316L
 1K JIS B020, PT ½ (external), Ø 11.4 mm (internal), AISI 316L
 1T DIN 13, M 20x1.5 (external), AISI 316L

Material of Seal (Wetted)

1 FKM Viton	7 FFKM Kalrez
2 NBR	A FFKM Viton, degreased
4 EPDM	6 FFKM Viton, cleaned for oxygen application ¹⁾
C FFKM Chemraz	
9 Special version, e.g. Silicone (FDA 21CFR177.2600)	

1) Observe application limits for oxygen applications, see page 12.

PMC 41

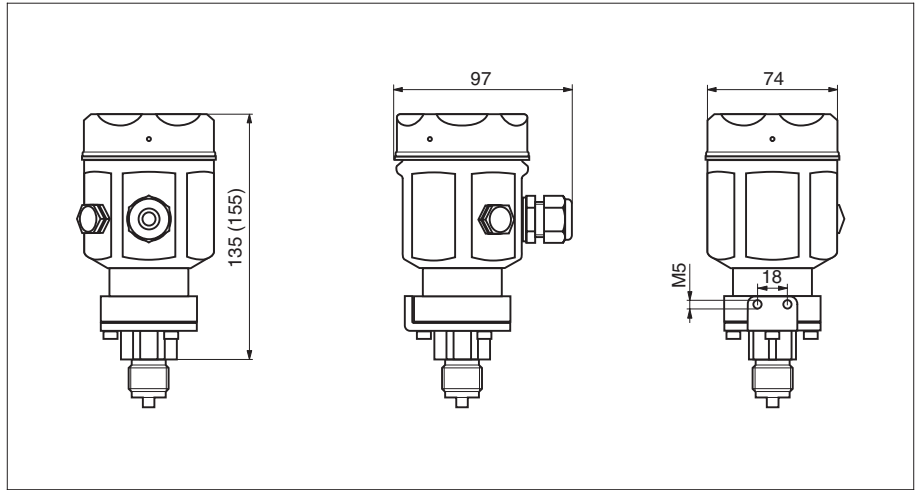
Product designation

Dimensions PMC 41

Conversion factors

- 1 mm = 0.039 in
- 1 in = 25.4 mm
- 1 kg = 2.2 lbs

Dimensions are in mm.

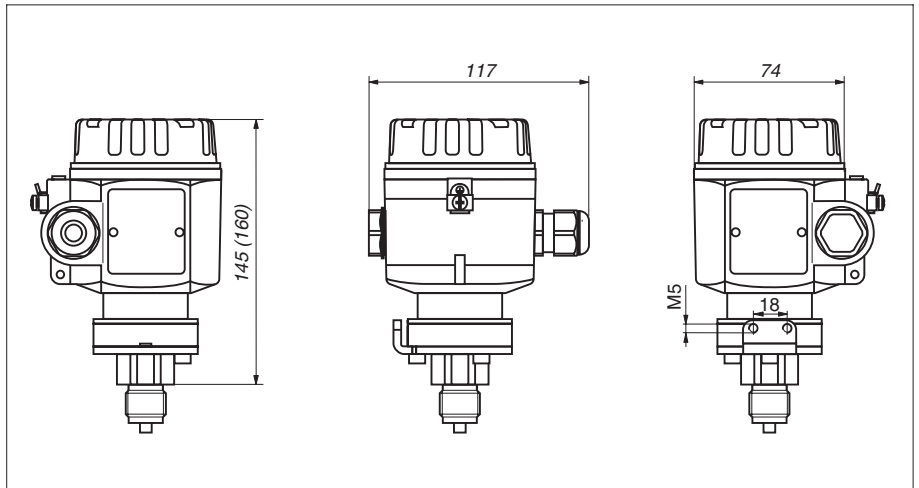


Housing

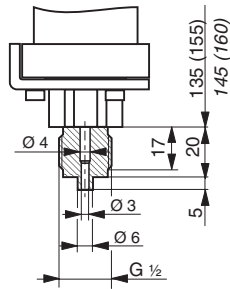
- *above*: Stainless steel
AISI 316L
max. weight: 1.4 kg
- *below*: Aluminium
max. weight: 1.6 kg
- optional cover raised (with display) or low

Values in brackets apply to instruments with raised cover.

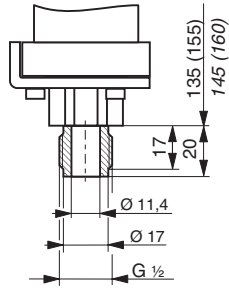
Values in *italics* apply to instruments with an aluminium housing.



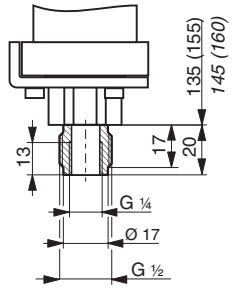
ISO 228, G 1/2 external
Versions 1M, 2M



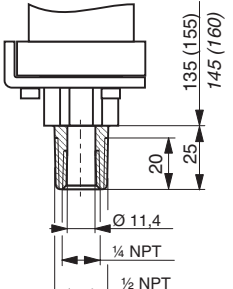
ISO 228,
G 1/2 external, Ø 11.4 mm internal
Version 1R



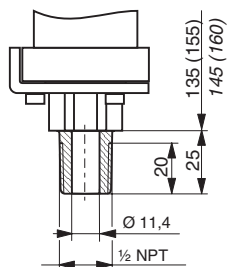
ISO 228,
G 1/2 external, G 1/4 internal
Version 1P



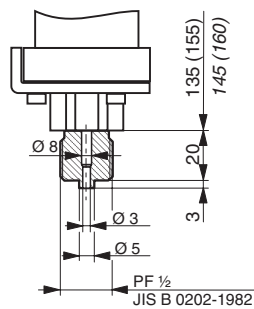
ANSI 1/2 NPT external,
1/4 NPT internal
Versions 1N, 2N



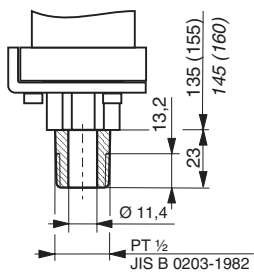
ANSI 1/2 MNPT, Ø 11.4 mm internal
Version 1A



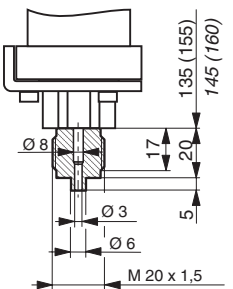
JIS B0202, PF 1/2 external
Version 1S



JIS B0202,
PT 1/2 external, Ø 11.4 mm internal
Version 1K



DIN 13, M 20x1.5 (external)
Version 1T



Process connections

- Stainless steel
AISI 316L or versions
2M and 2N made of
Alloy C276
- Optional seal
materials, refer to
Product Structure

Certificates

- R For non-hazardous area use
- G ATEX II 1/2 G EEx ia IIC T6
- H ATEX II 2 G EEx ia IIC T6
- N ATEX II 3 G, EEx nA II T5 (Zone 2)
- C CSA General Purpose
- S CSA IS (suitable for Div. 2) Class I, II, III, Div. 1, Groups A...D, G + Coal Dust
- P FM IS (non-incendive) Class I, II, III, Div. 1, Groups A...G
- V TIIS IS Ex ia IIC T6

Housing

Stainless steel AISI 316L

- E1 Cable gland M 20x1.5
- G1 Cable entry G 1/2
- C1 Cable entry 1/2 NPT
- H1 Harting plug (Han7D)
- L1 Plug M 12x1
- K1 5 m cable (with pressure compensation)

Aluminium

- E2 Cable gland M 20x1.5
- G2 Cable entry G 1/2
- C2 Cable entry 1/2 NPT
- H2 Harting plug (Han7D)
- L2 Plug M 12x1
- K2 5 m cable (with pressure compensation)

Ceramic Sensor: Nominal Value (Maximum Overload)

Gauge pressure

1C	0...100 mbar (4 bar)	10 kPa (400 kPa)	1.5 psig (60 psig)
1F	0...400 mbar (7 bar)	40 kPa (700 kPa)	6 psig (100 psig)
1H	0...1 bar (10 bar)	100 kPa (1 MPa)	15 psig (150 psig)
1M	0...4 bar (25 bar)	400 kPa (2.5 MPa)	60 psig (360 psig)
1P	0...10 bar (40 bar)	1 MPa (4 MPa)	150 psig (600 psig)
1S	0...40 bar (60 bar)	4 MPa (6 MPa)	600 psig (850 psig)

Absolute pressure

2F	0...400 mbar (7 bar)	40 kPa (700 kPa)	6 psia (100 psig)
2H	0...1 bar (10 bar)	100 kPa (1 MPa)	15 psia (150 psig)
2M	0...4 bar (25 bar)	400 kPa (2.5 MPa)	60 psia (360 psig)
2P	0...10 bar (40 bar)	1 MPa (4 MPa)	150 psia (600 psig)
2S	0...40 bar (60 bar)	4 MPa (6 MPa)	600 psia (850 psig)

Negative gauge pressure

5C	-100...+100 mbar (4 bar)	-10...+10 kPa (400 kPa)	-1.5...+1.5 psig (15 psig)
5F	-400...+400 mbar (7 bar)	-40...+40 kPa (700 kPa)	-6...+6 psig (100 psig)
5H	-1...+1 bar (10 bar)	-100...+100 kPa (1 MPa)	-15...+15 psig (150 psig)
5M	-1...+4 bar (25 bar)	-100...+400 kPa (2,5 MPa)	-15...+60 psig (360 psig)
5P	-1...+10 bar (40 bar)	-0,1...1 MPa (4 MPa)	-15...150 psig (600 psig)
9Y	Others		

Calibration and Technical Units

- 1 Calibration nominal value: mbar/bar
- 2 Calibration nominal value: kPa/MPa
- 3 Calibration nominal value: mm H₂O/m H₂O
- 4 Calibration nominal value: inch H₂O
- 5 Calibration nominal value: kgf/cm²
- 6 Calibration nominal value: psi
- B Calibrated from ... to ... technical unit ... (bar, kPa, psi, ...)

Electronics, Display

- A Analogue 4...20 mA, 2-wire, without display
- H HART 4...20 mA, 2-wire, without display
- P PROFIBUS-PA, 2-wire, without display
- C Analogue 4...20 mA, 2-wire, with analogue display
- J HART 4...20 mA, 2-wire, with digital display
- R PROFIBUS-PA, 2-wire, with digital display

Additional options

- 1 Additional option not selected
- C 3.1.B Inspection certificate according to EN 10204 for process connection
- S GL (German Lloyd) marine certificate

Code for Process Connection See Following Page

Material of Seal (wetted)

- 1 FKM Viton
- 2 HNBR (FDA 21CFR177.2600)
- 4 EPDM (FDA 21CFR177.2600)
- C FFKM Chemraz
- 7 FFKM Kalrez
- A FKM Viton, degreased
- 9 Special version, e.g. silicone (FDA 21CFR177.2600)

PMC 45										
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Product designation

Product Structure Process Connections PMC 45



Note!

To meet the requirements of the EHEDG, these instruments should be installed in accordance with Hygienic Equipment Design Criteria.



74 - 01

**Process Connection
Threaded Boss**

Seal not replaceable, material AISI 316L

- AG ISO 228, G 1½ external
- BF ANSI, 1½ MNPT
- XK DIN 13, M 44x1.25

Seal replaceable, material AISI 316L

- AR ISO 228, G 2 external
- BR ANSI, 2 MNPT

Hygienic Connections

Seal replaceable, material AISI 316L

Tri-Clamp connections

- DL ISO 2852 DN 40-51 (2")/DIN 32676 DN 50, 3A

Hygienic connections

- EG SMS 1½" PN 40, 3A
- EL SMS 2" PN 40, 3A
- HL APV Inline DN 50 PN 40, EHEDG
- LB Varivent type F for tubes DN 25 – DN 32, PN 40, EHEDG and 3A
- LL Varivent type N for tubes DN 40 – DN 162, PN 40, EHEDG and 3A
- KL DRD flange, D = 65 mm

Dairy tube seals

- AH DIN 11851, DN 40 PN 40, EHEDG and 3A
- AL DIN 11851, DN 50 PN 40, EHEDG and 3A

Aseptic couplings

- AS DIN 11841-1 A, DN 40 PN 40 for tubes according to DIN 11850, EHEDG
- AL DIN 11841-1 A, DN 50 PN 40 for tubes according to DIN 11850, EHEDG

Flanges

Dimensions to DIN 2527, material AISI 316L

- EK DN 50 PN 25/PN 40
- EU DN 80 PN 25/PN 40

Dimensions to ANSI B 16.5 with raised face, material AISI 316L

- K1 1½" 150 lbs
- K2 1½" 300 lbs
- KJ 2" 150 lbs
- KK 2" 300 lbs
- KU 3" 150 lbs
- KV 3" 300 lbs
- KW 4" 150 lbs
- KX 4" 300 lbs

Dimensions to JIS B 2210 with raised face, material AISI 316L

- RI JIS 10K 50A

Flanges, ECTFE coated

Material AISI 316L, ECTFE (Halar®) coated with raised face

- VJ ANSI B 16.5, 2" 150 lbs
- VU ANSI B 16.5, 3" 150 lbs
- VN ANSI B 16.5, 4" 150 lbs
- VK DIN 2527, DN 50 PN 25/PN 40
- WU DIN 2527, DN 80 PN 25/PN 40

Flanges, PVDF

Dimensions to ANSI B 16.5, material PVDF

- VJ 2" 150 lbs
- VU 3" 150 lbs

Miscellaneous

- XU Weld spud 75 mm, AISI 316L



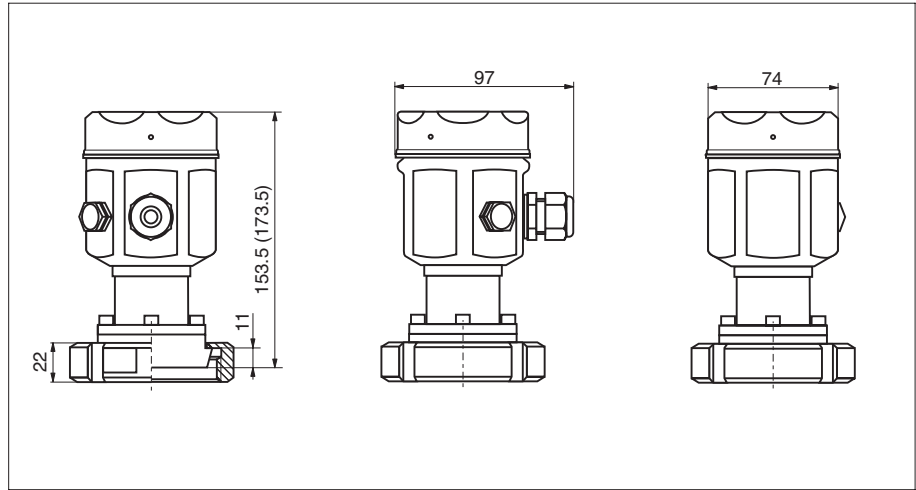
Code for process connection

Dimensions PMC 45

Conversion factors

- 1 mm = 0.039 in
- 1 in = 25.4 mm
- 1 kg = 2.2 lbs

Dimensions are in mm.

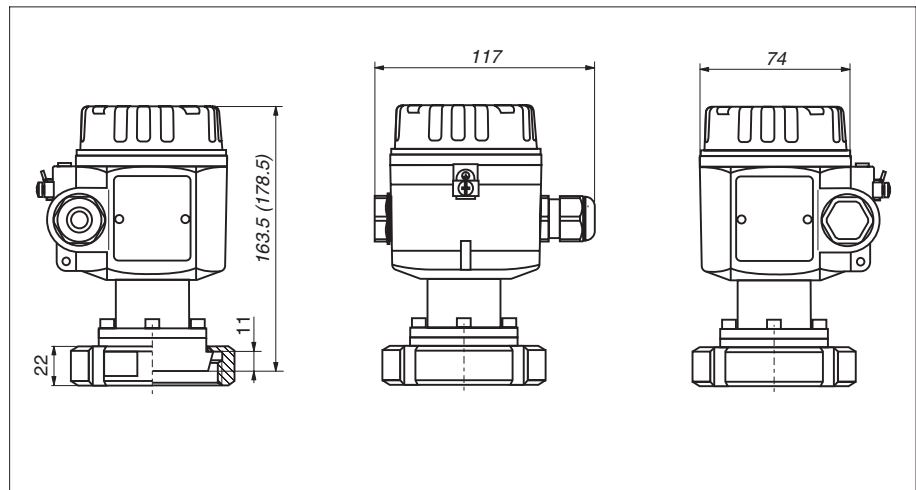


Housing

- *above*: Stainless steel
AISI 316L
max. weight 1.5 kg
- *below*: Aluminium
max. weight 1.7 kg
- optional cover raised
(with display) or low

Values in brackets apply to instruments with raised cover.

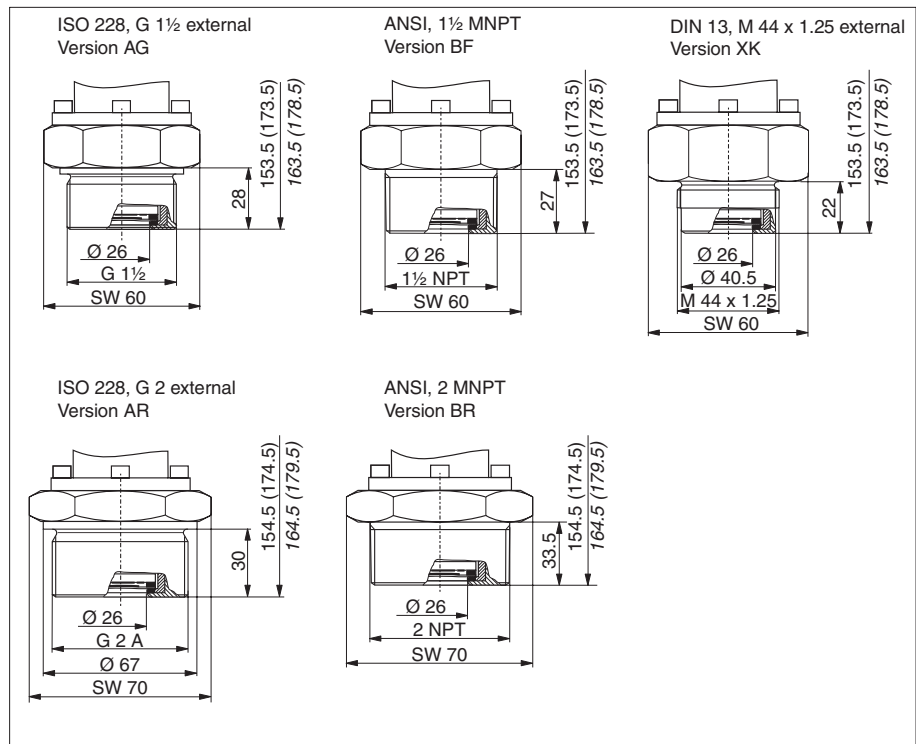
Values in italics apply to instruments with an aluminium housing.



Threaded Connections

Threaded connections

- Stainless steel
AISI 316L
- Optional seal materials, refer to Product Structure



Dimensions PMC 45

Hygienic Connections

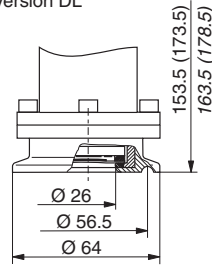
Dimensions

- 1 mm = 0.039 in
- 1 in = 25.4 mm

Dimensions are in mm.

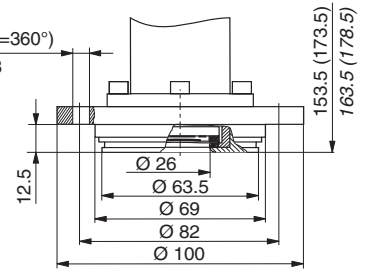
- Stainless steel AISI 316L
- Optional seal materials, refer to Product Structure
- High-purity (99.9%), dry ceramic measuring cell (without fill fluid)
- Ceramic material FDA 21CFR 186.1256
- Standard surface roughness of parts in contact with the medium $Ra \leq 0.8 \mu\text{m}$. Reduced surface roughness on request.

Tri-Clamp ISO 2852 DN 40-51 (2")/
DIN 32676 DN 50, 3A
Version DL

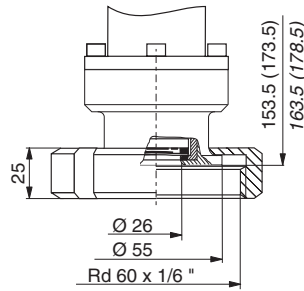


8 drill holes x 45° (=360°)
6 x Ø 8.6 + 2 x M8

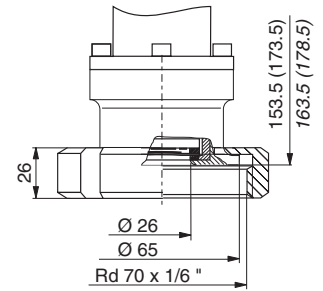
APV Inline DN 50 PN 40, EHEDG
Version HL



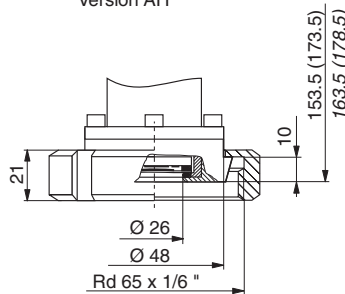
SMS 1½" PN 40, 3A
Version EG



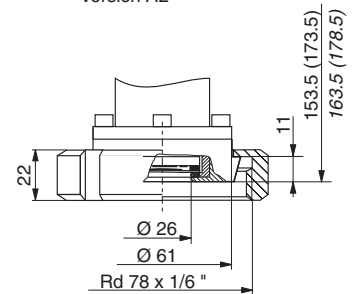
SMS 2" PN 40, 3A
Version EL



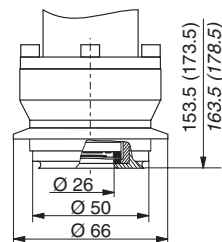
Diary tube seals
DIN 11851, DN 40 PN 40,
EHEDG and 3A
Version AH



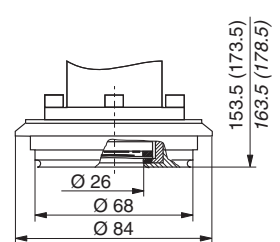
Diary tube seals
DIN 11851, DN 50 PN 40,
EHEDG and 3A
Version AL



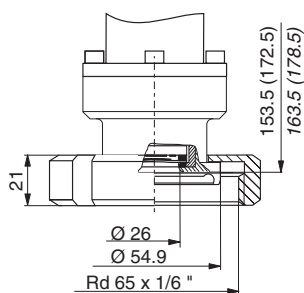
Varivent type N for tubes
DN 25 – DN 32 PN 40,
EHEDG and 3A
Version LB



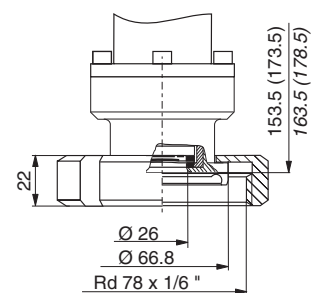
Varivent type F for tubes
DN 40 – DN 162 PN 40
EHEDG and 3A
Version LL



Aseptic DIN 11864-1-A,
DN 40 PN 40 for tubes
according to DIN 11850, EHEDG
Version AS

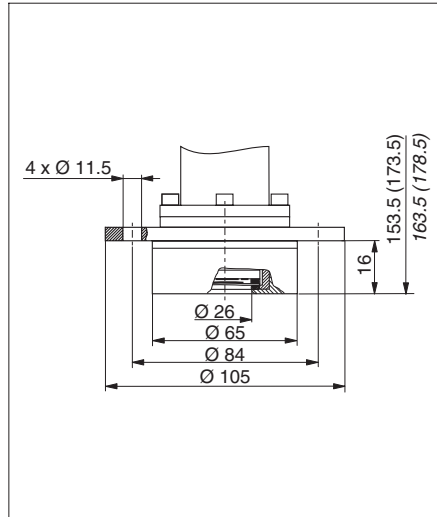


Aseptic DIN 11864-1-A,
DN 50 PN 40 for tubes
according to DIN 11850, EHEDG
Version AT



**DRD flange/
Welding flange**

- *left:*
DRD flange,
D = 65 mm
Version KL
- *right:*
Welding flange for
DRD flange

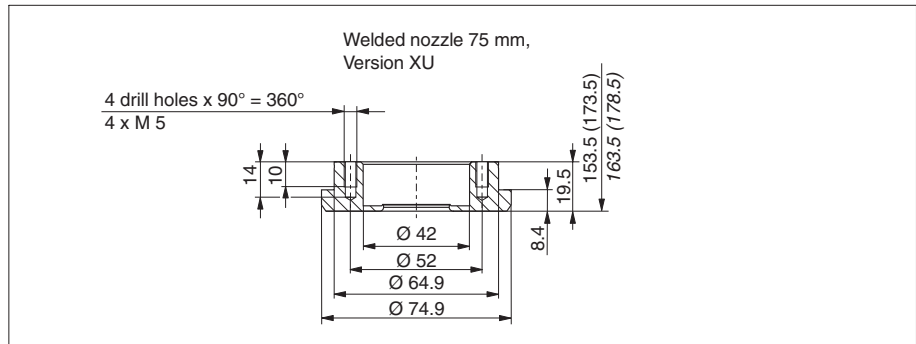


Endress+Hauser offers a welding flange with PTFE flat seal for the flush-mounted installation of the DRD flange.

- Order No.: 52002041
Material: AISI 316L
- Order No. with 3.1.B: 52011899
Material: AISI 316 L
- only PTFE flat seal:
Order No.: 916783-0000

Welded nozzle

- **Welded nozzle**
- Stainless steel 316 L



Dimensions PMC 45

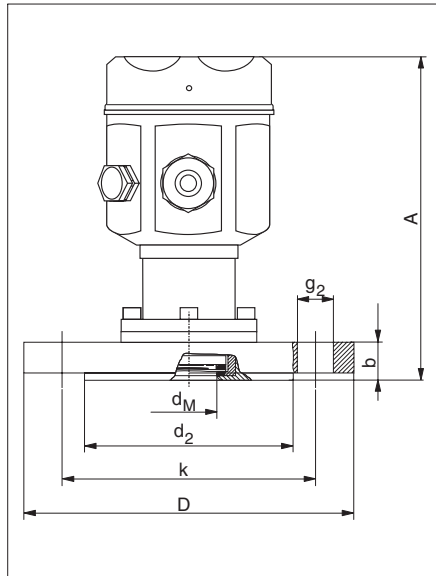
ANSI Flanges

Conversion factors

- 1 mm = 0.039 in
- 1 in = 25.4 mm
- 1 kg = 2.2 lbs

Flange

- Stainless steel
AISI 316L,
optionally with PVDF
or ECTFE (Halar®)
coating



Flanges, dimensions to ANSI 16.5, with raised face

Instrum.	Code	Material	Pipe						Flange			Bolt holes			Stainless steel housing		Aluminium housing	
			Nominal diameter	Nominal pressure	Diameter	Thickness	Raised face	Diaphragm diameter	Number	Diameter	Pitch diameter	Installation height	Total weight	Installation height	Total weight			
			DN	PN	D	b	d ₂	d _M		g ₂	k	max. A	max. G	max. A	max. G			
			lb/sq.in	inch	inch	inch	inch		inch	inch	mm	kg	mm	kg				
PMC 45	K1	316L	1½"	150	5.00	0.69	2.88	1.024	4	0.62	3.88	173.5	3.0	178.5	3.3			
PMC 45	K2	316L	1½"	300	6.12	0.81	2.88	1.024	4	0.88	4.50	173.5	3.0	178.5	3.3			
PMC 45	KJ	316L	2"	150	6.00	0.75	3.62	1.024	4	0.75	4.75	173.5	3.0	178.5	3.3			
PMC 45	VJ	316L ^{1), 2)}										173.5	3.0	178.5	3.3			
PMC 45	ZJ	PVDF ^{2), 3)}										173.5	3.0	178.5	3.3			
PMC 45	KK	316L	2"	300	6.50	0.88	3.62	1.024	8	0.75	5.00	173.5	3.8	178.5	4.1			
PMC 45	KU	316L	3"	150	7.50	0.94	5.00	1.024	4	0.75	6.00	173.5	5.5	178.5	5.8			
PMC 45	VU	316L ^{1), 2)}										173.5	5.5	178.5	5.5			
PMC 45	ZU	PVDF ^{2), 3)}										173.5	5.5	178.5	5.5			
PMC 45	KV	316L	3"	300	8.25	1.12	5.00	1.024	8	0.88	6.62	173.5	5.5	178.5	7.9			
PMC 45	KW	316L	4"	150	9.00	0.94	6.19	1.024	8	0.75	7.50	173.5	7.6	178.5	7.9			
PMC 45	VN	316L ^{1), 2)}										173.5	7.6	178.5	7.9			
PMC 45	KX	316L										173.5	7.6	178.5	7.9			

1) ECTFE coating on AISI 316L

2) When operating in explosion-hazardous areas: prevent plastic surfaces becoming electrostatically charged.

3) p_B = 10 bar (150 lb/sq.in), T_{max} = 60°C

Dimensions PMC 45

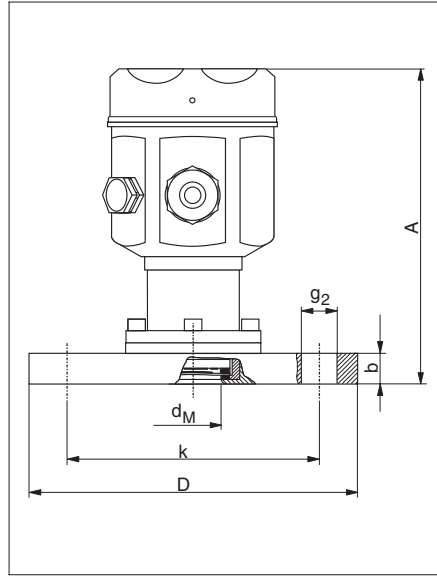
DIN Flanges and JIS Flange

Conversion factors

- 1 mm = 0.039 in
- 1 in = 25.4 mm
- 1 kg = 2.2 lbs

Flange

- Stainless steel
AISI 316L,
optionally with PVDF
or ECTFE (Halar[®])
coating



Flanges, dimensions to DIN 2527

Instrum.	Code	Material	Pipe		Flange			Bolt holes			Stainless Steel housing		Aluminium housing	
			Nominal diameter	Nominal pressure	Diameter	Thickness	Diaphragm diameter	Number	Diameter	Pitch diameter	Installation height	Total weight	Installation height	Total weight
			DN	PN	D	b	d _M		g ₂	k	max. A	max. G	max. A	max. G
				bar	mm	mm	mm		mm	mm	mm	kg	mm	kg
PMC 45	EK	316L	50	40	165	20	26	4	18	125	173.5	3.0	178.5	3.3
PMC 45	WK	316L ^{1), 2)}									173.5	3.0	178.5	3.3
PMC 45	EU	316L	80	40	200	24	26	8	18	160	173.5	5.5	178.5	5.8
PMC 45	WU	316L ^{1), 2)}									173.5	5.5	178.5	5.8

1) ECTFE coating on AISI 316 L

2) When operating in explosion-hazardous areas: prevent plastic surfaces becoming electrostatically charged.

Flanges, dimensions such as JIS B 2210

Instrum.	Code	Material	Pipe		Flange			Bolt holes			Stainless steel housing		Aluminium housing	
			Nominal diameter	Nominal pressure	Diameter	Thickness	Diaphragm diameter	Number	Diameter	Pitch diameter	Installation height	Total weight	Installation height	Total weight
			DN	PN	D	b	d _M		g ₂	k	max. A	max. G	max. A	max. G
			mm		mm	mm	mm		mm	mm	mm	kg	mm	kg
PMC 45	RI	316L	50	10 K	155	16	26	4	19	120	173.5	3.0	178.5	3.3

Certificates

- R For non-hazardous area use
- G ATEX II 1/2 G EEx ia IIC T4/T6
- H ATEX II 2 G EEx ia IIC T4/T6
- N ATEX II 3 G EEx nA II T5 (Zone 2)
- K ATEX II 1/2 D EEx ia IIC T4/T6
- L ATEX II 1/3 D (non-Ex supply voltage)
- C CSA General Purpose
- S CSA IS (suitable for Div. 2) Class I, II, III, Div. 1, Groups A...G
- T CSA Class II, III, Div. 1, Groups E...G (dust-Ex), Class I, Div. 2, Groups A...D
- P FM IS (non-incendive) Class I, II, III, Div. 1, Groups A...G
- M FM DIP, Class II, III, Div. 1, Groups E...G
- V TIIS IS Ex ia IIC T6

Housing

Stainless steel AISI 316L

- E1 Cable gland M 20x1.5
- G1 Cable entry G ½
- C1 Cable entry ½ NPT
- H1 Harting plug (Han7D)
- L1 Plug M 12x1
- K1 5 m cable (with pressure compensation)

Aluminium

- E2 Cable gland M 20x1.5
- G2 Cable entry G ½
- C2 Cable entry ½ NPT
- H2 Harting plug (Han7D)
- L2 Plug M 12x1
- K2 5 m cable (with pressure compensation)

Metal Sensor: Nominal value (Maximum Overload)

Gauge pressure

3H 0...1 bar (4 bar)	100 kPa (400 kPa)	15 psig (60 psig)
3M 0...4 bar (16 bar)	400 kPa (1.6 MPa)	60 psig (240 psig)
3P 0...10 bar (40 bar)	1 MPa (4 MPa)	150 psig (600 psig)
3S 0...40 bar (160 bar)	4 MPa (16 MPa)	600 psig (2400 psig)
3U 0...100 bar (400 bar)	10 MPa (40 MPa)	1500 psig (6000 psig)
3Z 0...400 bar (600 bar)	40 MPa (60 MPa)	6000 psig (9000 psig)

Absolute pressure

4H 0...1 bar (4 bar)	100 kPa (400 kPa)	15 psia (60 psig)
4M 0...4 bar (16 bar)	400 kPa (1.6 MPa)	60 psia (240 psig)
4P 0...10 bar (40 bar)	1 MPa (4 MPa)	150 psia (600 psig)
4S 0...40 bar (160 bar)	4 MPa (16 MPa)	600 psia (2400 psig)
4U 0...100 bar (400 bar)	10 MPa (40 MPa)	1500 psia (6000 psig)
4Z 0...400 bar (600 bar)	40 mPa (60 MPa)	6000 psia (9000 psig)

Negative gauge pressure

7H -1...+1 bar (4 bar)	-100...100 kPa (400 kPa)	-15...15 psig (60 psig)
7M -1...+4 bar (16 bar)	-100...400 kPa (1,6 MPa)	-15...60 psig (240 psig)
7P -1...+10 bar (40 bar)	-0.1...1 MPa (4 MPa)	-15...150 psig (600 psig)

Calibration and Technical Units

- 1 Calibration nominal value: mbar/bar
- 2 Calibration nominal value: kPa/MPa
- 3 Calibration nominal value: mm H₂O/m H₂O
- B Calibrated from ... to ... technical units ... (bar, kPa, psi ...)
- 4 Calibrated nominal value: inch H₂O
- 5 Calibrated nominal value: kgf/cm²
- 6 Calibrated nominal value: psi

Electronics, Display

- A Analogue 4...20 mA, without display
- H HART 4...20 mA, without display
- P PROFIBUS-PA, without display
- C Analogue 4...20 mA, with analogue display
- J HART 4...20 mA, with digital display
- R PROFIBUS-PA, with digital display

Additional options

- 1 Additional option not selected
- 2 Bracket for pipe and wall mounting
- C 3.1.B Inspection certificate according to EN 10204 for process connection
- S GL (German Lloyd) marine certificate

Process Connection

Flush-mounted diaphragm, material AISI 316L

- 1D Thread ISO 228 G ½ A with O-ring, for weld-in adapter Order No.: 52002643 or 52010172
- 1F Thread ISO 228 G ½ A, Screw-in adapter as per DIN 3652-11, Form E with seal for tapped hole as per DIN 3852-11, Form X

Internal diaphragm (with adapter), material AISI 316L

- 1M ISO 228, G ½ (external)
- 1G ANSI, ½ MNPT
- 1X ANSI, ½ FNPT
- 1S JIS B0202, PF ½ (external)
- 1K JIS B0202, PT ½ (external) ¹⁾
- 1T DIN 13, M 20x1.5 (external)

Seal, Fill Fluid

- 1 FKM Viton, mineral oil
- P PTFE and Alloy C276, mineral oil
- 4 FKM Viton, inert oil, degreased
- F NBR, vegetable oil ³⁾
- H FKM Viton, vegetable oil ³⁾
- A Welded (without seal), mineral oil
- C Welded (without seal), inert oil for oxygen application ²⁾
- D Welded (without seal), inert oil, degreased

- 1) not with sensors "3Z": 0...400 bar
"4Z": 0...400 bar
- 2) Observe application limits for oxygen applications, see page 12.
- 3) only available with process connection 1D.

PMP 41

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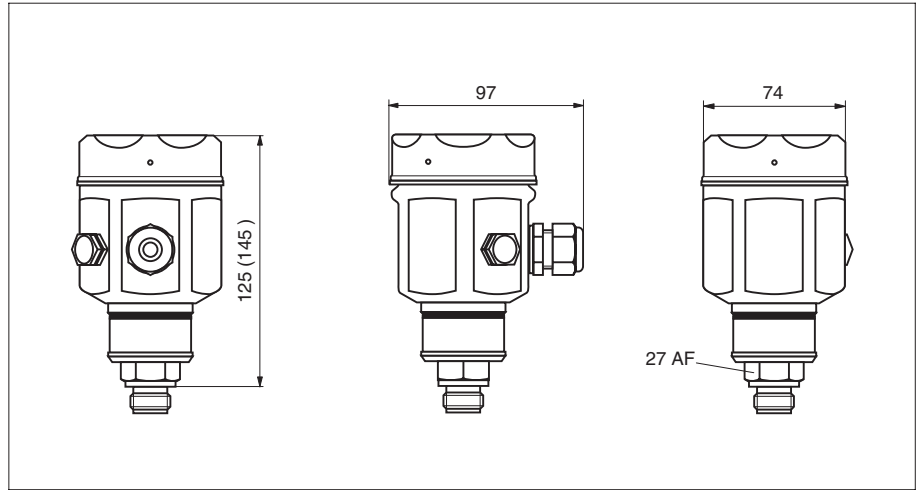
Product designation

Dimensions PMP 41

Conversion factors

- 1 mm = 0.039 in
- 1 in = 25.4 mm
- 1 kg = 2.2 lbs

Dimensions are in mm.

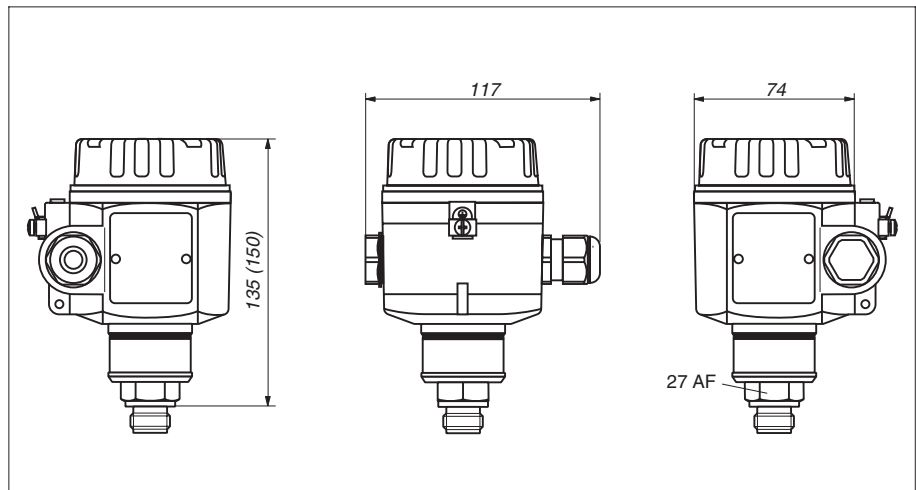


Housing

- *above*: Stainless steel
AISI 316L
max. weight: 0.9 kg
- *below*: Aluminium
max. weight: 1.2 kg
- optional cover raised
(with display) or low

Values in brackets apply to instruments with raised cover.

Values in italics apply to instruments with an aluminium housing.



Threaded Process Connections Internal Diaphragm

with adapter and seal

(see page 31, Section "Seal, Fill fluid", Versions 1, P, 4)

process connection
flush-mounted diaphragm
Version 1F

seal supplied
Viton or
PTFE+Alloy C276-ring

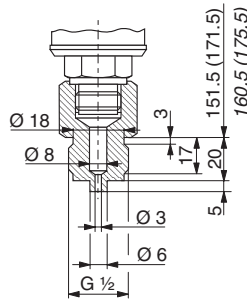
The membrane is on
the inside when the
adapter is screwed on.
Max. torque adapter: 80 Nm

welded versions

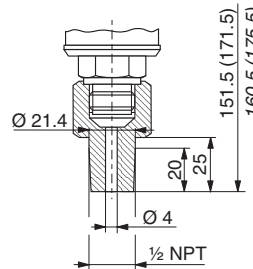
(see page 31, Section "Seal, Fill fluid", Versions A, C, D)

welded
(without seal)

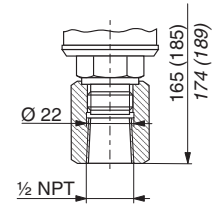
ISO 228, G 1/2 external
Version 1M



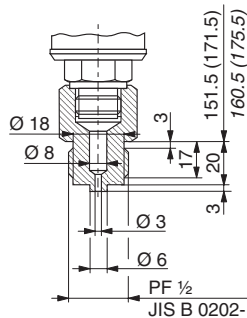
ANSI, 1/2 MNPT
Version 1G



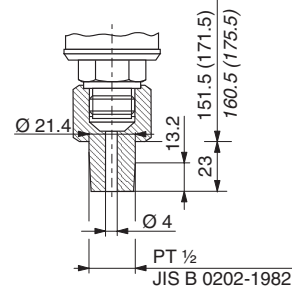
ANSI, 1/2 FNPT
Version 1X



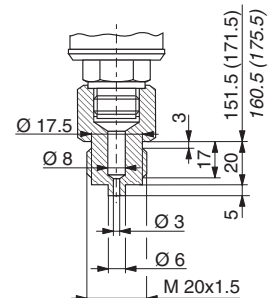
JIS B0202, PF 1/2 external
Version 1S



JIS B0202, PT 1/2 external
Version 1K



DIN 13, M 20 x 1.5
Version 1T



Dimensions PMP 41

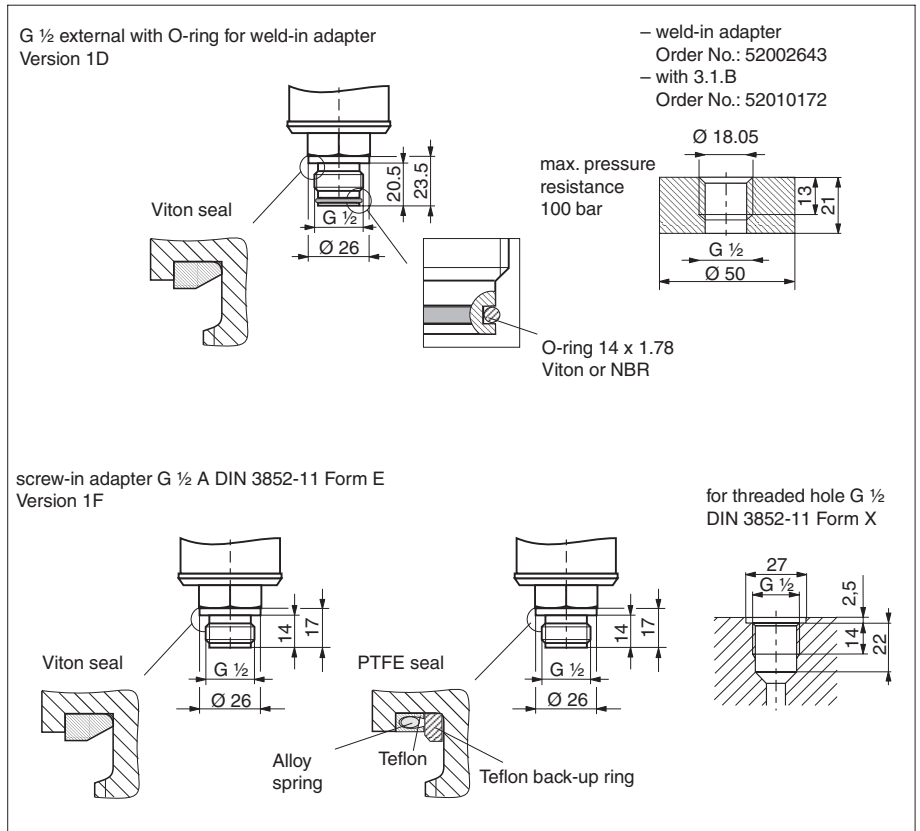
Threaded Process Connections Flush-Mounted Diaphragm

Conversion factors
 1 mm = 0.039 in
 1 in = 25.4 mm

Dimensions are in mm.

Process connection and adapter

- Stainless steel
 AISI 316L



Pressure Sensor Dummy

Endress+Hauser offers a pressure sensor dummy for the welded nozzle, Order No. 52002643 or 52010172. This aids heat removal during welding and prevents nozzle warping during welding.

- Order No.: 52005082

Certificates

- R For non-hazardous are use
- G ATEX II 1/2 G EEx ia IIC T4/T6
- H ATEX II 2 G EEx ia IIC T4/T6
- N ATEX II 3 G EEx nA II T5 (Zone 2)
- K ATEX II 1/2 D EEx ia IIC T4/T6
- L ATEX II 1/3 D (non-Ex supply voltage)
- C CSA General Purpose
- S CSA IS (suitable for Div. 2) Class I, II, III, Div. 1, Groups A...G
- T CSA Class II, III, Div. 1, Groups E...G (dust-Ex), Class I, Div. 2, Groups A...D
- P FM IS (non-incendive) Class I, II, III, Div. 1, Groups A...G
- M FM DIP, Class II, III, Div. 1, Groups E...G
- V TIIS IS Ex ia IIC T6

Housing

Stainless steel AISI 316L

- E1 Cable gland M 20x1.5
- G1 Cable entry G ½
- C1 Cable entry ½ NPT
- H1 Harting plug (Han7D)
- L1 Plug M 12x1
- K1 5 m cable (with pressure compensation)

Aluminium

- E2 Cable gland M 20x1.5
- G2 Cable entry G ½
- C2 Cable entry ½ NPT
- H2 Harting plug (Han7D)
- L2 Plug M 12x1
- K2 5 m cable (with pressure compensation)

Metal Sensor: Nominal Value (Maximum Overload)

Gauge pressure

3H 0...1 bar	(4 bar)	100 kPa	(400 kPa)	15 psig	(60 psig)
3M 0...4 bar	(16 bar)	400 kPa	(1.6 MPa)	60 psig	(240 psig)
3P 0...10 bar	(40 bar)	1 MPa	(4 MPa)	150 psig	(600 psig)
3S 0...40 bar	(160 bar)	4 MPa	(16 MPa)	600 psig	(2400 psig)
3U 0...100 bar	(400 bar)	10 MPa	(40 MPa)	1500 psig	(6000 psig)
3Z 0...400 bar	(600 bar)	40 MPa	(60 MPa)	6000 psig	(9000 psig)

Absolute pressure

4H 0...1 bar	(4 bar)	100 kPa	(400 kPa)	15 psia	(60 psig)
4M 0...4 bar	(16 bar)	400 kPa	(1.6 MPa)	60 psia	(240 psig)
4P 0...10 bar	(40 bar)	1 MPa	(4 MPa)	150 psia	(600 psig)
4S 0...40 bar	(160 bar)	4 MPa	(16 MPa)	600 psia	(2400 psig)
4U 0...100 bar	(400 bar)	10 MPa	(40 MPa)	1500 psia	(6000 psig)
4Z 0...400 bar	(600 bar)	40 mPa	(60 MPa)	6000 psia	(9000 psig)

Negative gauge pressure

7H -1...+1 bar	(4 bar)	-100...100 kPa	(400 kPa)	-15...15 psig	(60 psig)
7M -1...+4 bar	(16 bar)	-100...400 kPa	(1.6 MPa)	-15...60 psig	(240 psig)
7P -1...+10 bar	(40 bar)	-0.1...1 MPa	(4 MPa)	-15...150 psig	(600 psig)

Calibration and Technical Units

- 1 Calibration nominal value: mbar/bar
- 2 Calibration nominal value: kPa/MPa
- 3 Calibration nominal value: mm H₂O/m H₂O
- 4 Calibration nominal value: inch H₂O
- 5 Calibration nominal value: kgf/cm²
- 6 Calibration nominal value: psi
- B Calibrated from ... to ... technical units ... (bar, kPa, psi ...)

Electronics, Display

- A Analogue 4...20 mA, without display
- H HART 4...20 mA, without display
- P PROFIBUS-PA, without display
- C Analogue 4...20 mA, with analogue display
- J HART 4...20 mA, with digital display
- R PROFIBUS-PA, with digital display

Additional option

- 1 Additional option not selected
- C 3.1.B Inspection certificate according to EN 10204 for wetted parts
- S GL (German Lloyd) marine certificates

Code for Process Connection See Following Page

Material of Diaphragm, Seal, Fill Fluid

- A Diaphragm AISI 316L, mineral oil (only available with process connection BB)
- F Diaphragm AISI 316L, vegetable oil



Product Structure Process Connections PMP 45

Process Connection

Threaded Boss

Material AISI 316L, flush-mounted diaphragm

BB ANSI, ¼ MNPT for welded nozzle

CD ISO 228, G 1 (external) with metal conical seal for welded nozzle Order No.: 52005807¹⁾

Hygienic Connections

Dairy tube seals, material AISI 316L

AB DIN 11851, DN 25 PN 40, 3A

Tri-Clamp connections, material AISI 316L

DA ISO 2852 DN 12 - DN 21.3 (½" - ¾") / DIN 32676 DN 10 - DN 20, 3A

DB ISO 2852 DN 25 - DN 38 (1" - 1½") / DIN 32676 DN 25 - DN 40, 3A

Hygienic connections, material AISI 316L

EB SMS 1" PN 40, 3A

LG Varivent type B for tubes DN 10 - DN 20, PN 40, 3A

LB Varivent type F for tubes DN 25 - DN 32, PN 40, 3A



Code for process connection

1) not with sensors "3Z": 0...400 bar
"4Z": 0...400 bar

Hygienic Connections



74 - 01

Housing

- optional: Stainless steel AISI 316L, max. weight 1.1 kg or aluminium, max. weight 0.8 kg
- optional cover raised (with display) or low

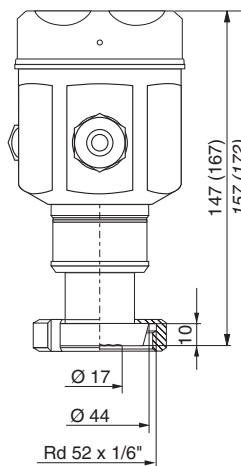
Values in brackets apply to instruments with raised cover.

Values in italics apply to instruments with an aluminium housing.

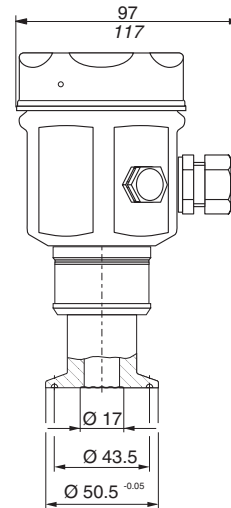
Process connection

- Stainless steel AISI 316L
- Standard surface roughness of parts in contact with the medium $Ra \leq 0.8 \mu\text{m}$. Reduced surface roughness on request.
- Fill fluid: vegetable oil

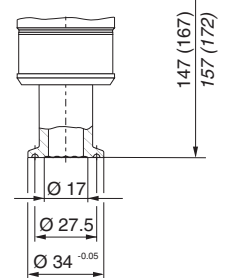
Dairy tube seals DIN 11851, DN 25 PN 40, 3A
Version AB



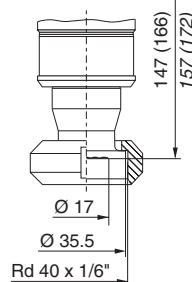
Tri-Clamp ISO 2852 DN 25 - DN 38 (1" - 1½")/
DIN 32676, DN 25 - DN 40, 3A
Version DB



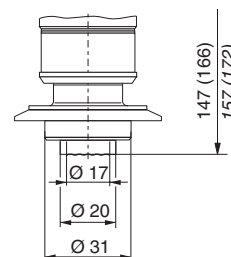
Tri-Clamp ISO 2852
DN 12 - DN 21.3 (½" - ¾")/
DIN 32676 DN 10 - DN 20, 3A
Version DA



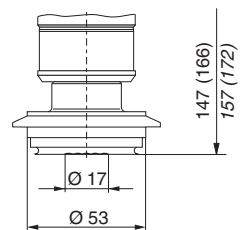
SMS 1" PN 40, 3A
Version EB



Varivent type B
for tubes DN 10 - DN 15
PN 40, 3A
Version LG



Varivent type F
for tubes DN 25 - DN 32
PN 40, 3A
Version LB



Conversion factors

- 1 mm = 0.039 in
- 1 in = 25.4 mm
- 1 kg = 2.2 lbs

Dimensions are in mm.

Dimensions PMP 45

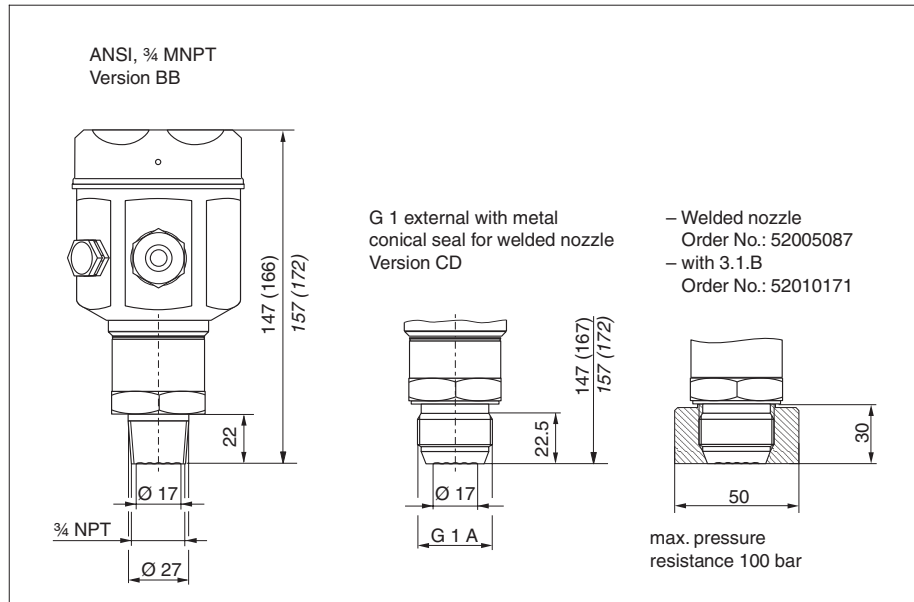
Threaded Connections

Housing

- optional stainless steel AISI 316L or aluminium
- optional cover raised (with display) or low

Process connection

- Stainless steel AISI 316L
- Fill fluid:
 - Version BB: mineral oil
 - Version CD: vegetable oil



Pressure Sensor Dummy

Endress+Hauser offers a pressure sensor dummy for the welded nozzle, Order No. 52005087 or 52010171. This aids heat removal during welding and prevents nozzle warping during welding.

- Order No.: 52005272

Conversion factors

1 mm = 0.039 in
1 in = 25.4 mm

Dimensions are in mm.

Endress+Hauser
GmbH+Co. KG
Instruments International
P.O. Box 2222
D-79574 Weil am Rhein
Germany
Tel. (07621) 975-02
Fax (07621) 975-345
<http://www.endress.com>
info@ii.endress.com

Endress + Hauser
The Power of Know How

