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LENNTECH
WATER TREATMENT SOLUTIONS

Technical Information
Cerabar PMC11, PMC21, PMP11, PMP21

Process pressure measurement



Pressure transducer with ceramic and metal sensors

Application

The Cerabar is a pressure transducer for the measurement of absolute and gauge pressure in gases, vapors, liquids and dust. The Cerabar can be used internationally thanks to a wide range of approvals and process connections.

Your benefits

- High reproducibility and long-term stability
- Reference accuracy: up to 0.3%
- Customized measuring ranges
  - Turn down up to 5:1
  - Sensor for measuring ranges up to 400 bar (6 000 psi)
- Housing and process isolating diaphragm made of 316L

Endress+Hauser
People for Process Automation

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About this document

Document function

The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.

Symbols used

Safety symbols

DANGER

This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

WARNING

This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

CAUTION

This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE

This symbol contains information on procedures and other facts which do not result in personal injury.

Electrical symbols

Protective ground connection: ⏚

A terminal which must be connected to ground prior to establishing any other connections.

Ground connection: ⏚

Terminal for connection to the grounding system.

Symbols for certain types of information

Permitted: ✓

Procedures, processes or actions that are permitted.

Forbidden: ✗

Procedures, processes or actions that are forbidden.

Additional information: ℹ

Reference to documentation: 📖

Reference to page: 📄

Series of steps: 1., 2., 3.

Result of an individual step: ↳

Symbols in graphics

Item numbers: 1, 2, 3 ...

Series of steps: 1., 2., 3.

Views: A, B, C, ...

Documentation

The document types listed are available:
In the Download Area of the Endress+Hauser Internet site: www.endress.com → Download

Brief Operating Instructions (KA): getting the 1st measured value quickly

These instructions contain all the essential information from incoming acceptance to initial commissioning.

Operating Instructions (BA): your comprehensive reference

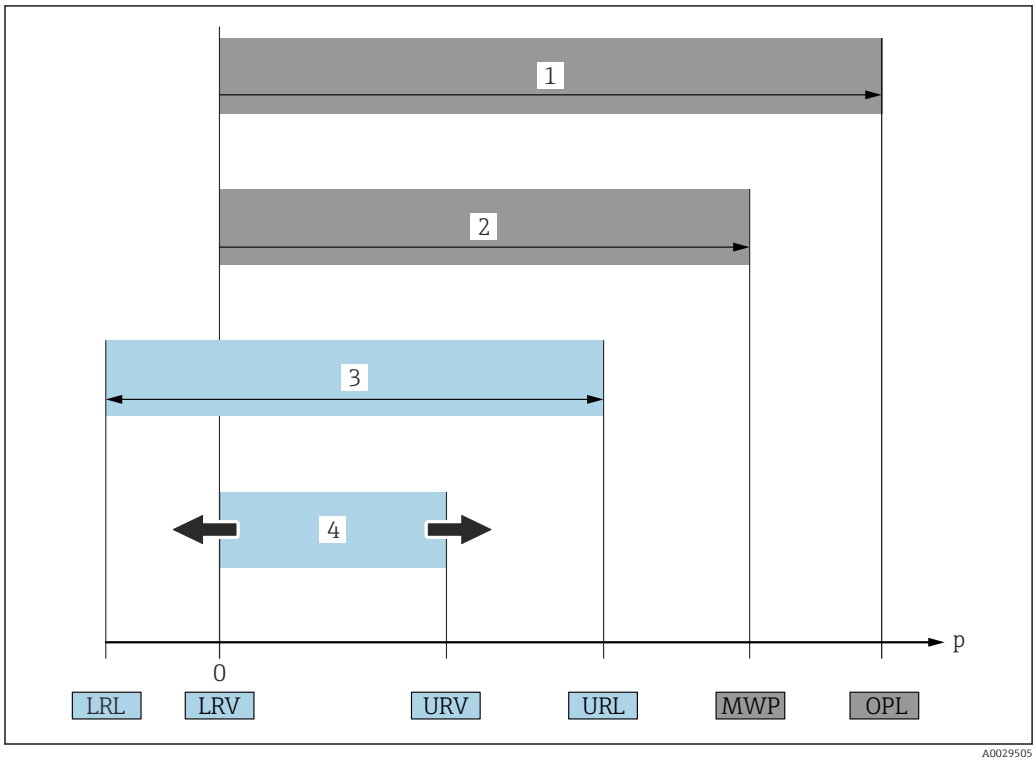
These Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.

Safety Instructions (XA)

Safety Instructions (XA) are supplied with the device depending on the approval. They are an integral part of the Operating Instructions.

The nameplate indicates the Safety Instructions (XA) that are relevant to the device.

Terms and abbreviations



1 OPL: The OPL (over pressure limit = sensor overload limit) for the measuring device depends on the lowest-rated element, with regard to pressure, of the selected components, i.e. the process connection has to be taken into consideration in addition to the measuring cell. Pay attention to the pressure/temperature dependency. The OPL may only be applied for a short period of time.

2 MWP: The MWP (maximum working pressure) for the sensors depends on the lowest-rated element, with regard to pressure, of the selected components, i.e. the process connection has to be taken into consideration in addition to the measuring cell. Pay attention to the pressure/temperature dependency. The MWP may be applied at the device for an unlimited period. The MWP can be found on the nameplate.

3 The maximum sensor measuring range corresponds to the span between the LRL and URL. This sensor measuring range is equivalent to the maximum calibratable/adjustable span.

4 The calibrated/adjusted span corresponds to the span between the LRV and URV. Factory setting: 0 to URL. Other calibrated spans can be ordered as customized spans.

p Pressure

LRL Lower range limit

URL Upper range limit

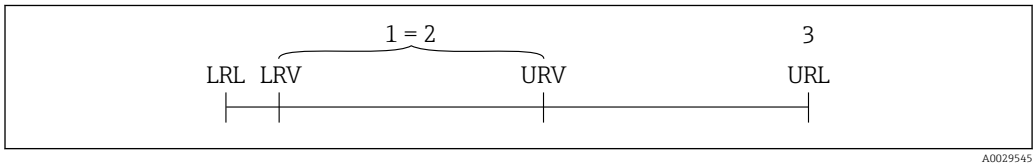
LRV Lower range value

URV Upper range value

TD Turn down. Example - see the following section.

The turn down is preset at the factory and cannot be changed.

Turn down calculation



1 Calibrated/adjusted span

2 Zero point-based span

3 Upper range limit

Example

- Sensor: 10 bar (150 psi)
- Upper range limit (URL) = 10 bar (150 psi)
- Calibrated/adjusted span: 0 to 5 bar (0 to 75 psi)
- Lower range value (LRV) = 0 bar (0 psi)
- Upper range value (URV) = 5 bar (75 psi)

Turn down (TD):

$$TD = \frac{URL}{|URV - LRV|}$$

$$TD = \frac{10 \text{ bar (150 psi)}}{|5 \text{ bar (75 psi)} - 0 \text{ bar (0 psi)}|} = 2$$

In this example, the TD is 2:1.
This span is based on the zero point.

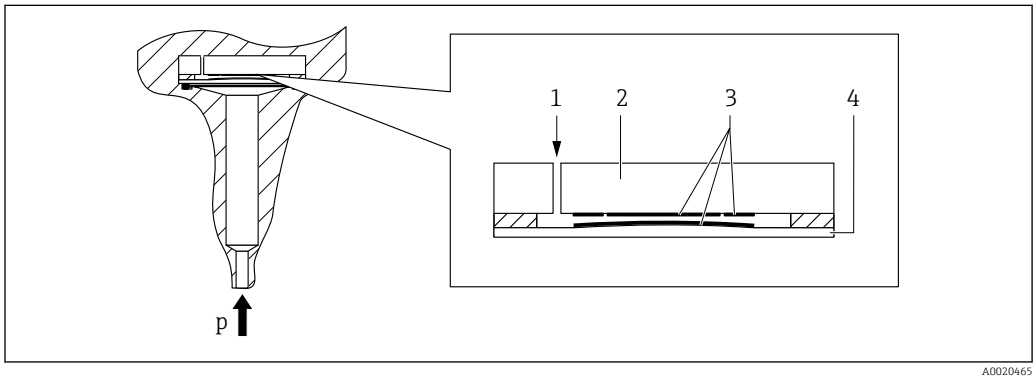
Function and system design

Measuring principle - process pressure measurement

Devices with ceramic process isolating diaphragm (Ceraphire®)

The ceramic sensor is an oil-free sensor, i.e. the process pressure acts directly on the robust ceramic process isolating diaphragm and causes it to deflect. A pressure-dependent change in capacitance is measured at the electrodes of the ceramic substrate and the process isolating diaphragm. The measuring range is determined by the thickness of the ceramic process isolating diaphragm.

Advantages:
- Guaranteed overload resistance up to 40 times the nominal pressure
- The ultrapure 99.9% ceramic (Ceraphire®, see also "www.endress.com/ceraphire") ensures:
  - Extremely high chemical durability
  - High mechanical durability
- Can be used in absolute vacuum
- Small measuring ranges



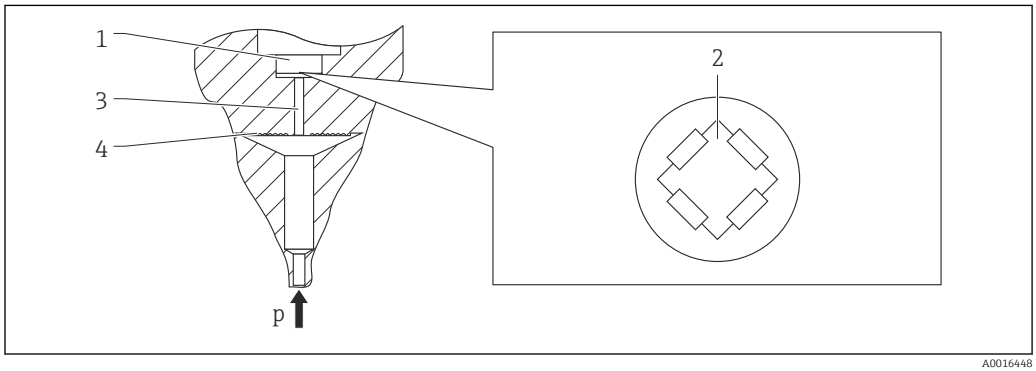
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1 Air pressure (gauge pressure sensors)
2 Ceramic substrate
3 Electrodes
4 Ceramic process isolating diaphragm

Devices with metallic process isolating diaphragm

The process pressure deflects the metal process isolating diaphragm of the sensor and a fill fluid transfers the pressure to a Wheatstone bridge (semiconductor technology). The pressure-dependent change in the bridge output voltage is measured and evaluated.

Advantages:
- Can be used for high process pressures
- Fully welded sensor
- Slim, flush-mounted process connections available

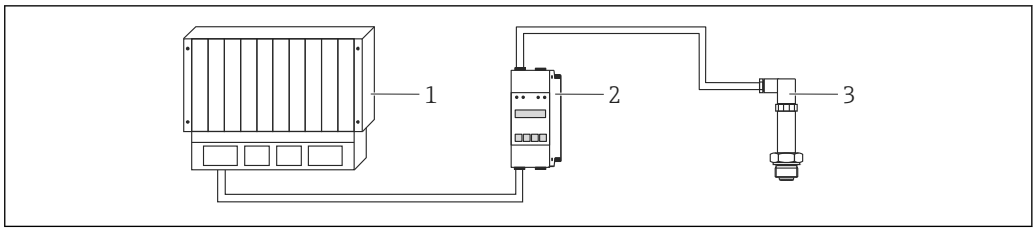


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1 Silicon measuring element, substrate
2 Wheatstone bridge
3 Channel with fill fluid
4 Metal process isolating diaphragm

Measuring system

A complete measuring system comprises:



A0021926

1 PLC (programmable logic controller)
2 e.g. RN221N / RMA42 (if required)
3 Pressure transducer

Device features

Field of application

- PMC11: Gauge pressure
- PMP11: Gauge pressure
- PMC21: Gauge and absolute pressure
- PMP21: Gauge and absolute pressure

Process connections

PMC11:
- Thread ISO 228
- Thread ASME
- DIN 13

PMP11:
- Thread ISO 228, also flush-mount
- Thread ASME
- DIN 13

PMC21:
- Thread ISO 228
- Thread DIN 13
- Thread ASME
- Thread JIS

PMP21:
- Thread ISO 228, also flush-mount
- Thread DIN 13
- Thread ASME
- Thread JIS

Measuring ranges

- PMC11: from −400 to +400 mbar (−6 to +6 psi) to −1 to +40 bar (−15 to +600 psi).
- PMP11: from −400 to +400 mbar (−6 to +6 psi) to −1 to +40 bar (−15 to +600 psi).
- PMC21: from −100 to +100 mbar (−1.5 to +1.5 psi) to −1 to +40 bar (−15 to +600 psi).
- PMP21: from −400 to +400 mbar (−6 to +6 psi) to −1 to +400 bar (−15 to +6 000 psi).

OPL (depends on the measuring range)

- PMC11: max. 0 to +60 bar (0 to +900 psi)
- PMP11: max. 0 to +160 bar (0 to +2 400 psi)
- PMC21: max. 0 to +60 bar (0 to +900 psi)
- PMP21: max. 0 to +600 bar (0 to +9 000 psi)

MWP

- PMC11: max. 0 to +40 bar (0 to +600 psi)
- PMP11: max. 0 to +100 bar (0 to +1 500 psi)
- PMP21: max. 0 to +400 bar (0 to +6 000 psi)
- PMC21: max. 0 to +40 bar (0 to +600 psi)

Process temperature range (temperature at process connection)

- PMC11: −25 to +85 °C (−13 to +185 °F)
- PMP11: −25 to +85 °C (−13 to +185 °F)
- PMC21: −25 to +100 °C (−13 to +212 °F)
- PMP21: −40 to +100 °C (−40 to +212 °F)

Ambient temperature range

PMC11: −40 to +70 °C (−40 to +158 °F)

PMP11: −40 to +70 °C (−40 to +158 °F)

PMC21:
- −40 to +85 °C (−40 to +185 °F)
- Devices for hazardous areas: −40 to +70 °C (−40 to +158 °F)

PMP21:
−40 to +85 °C (−40 to +185 °F)

Reference accuracy

- PMC11: up to 0.5 %, TD 5:1, for details, see "Reference accuracy" section.
- PMP11: up to 0.5 %, TD 5:1, for details, see "Reference accuracy" section.
- PMC21: up to 0.3 %, TD 5:1, for details, see "Reference accuracy" section.
- PMP21: up to 0.3 %, TD 5:1, for details, see "Reference accuracy" section.

Supply voltage

PMC11:
- 4 to 20 mA output: 10 to 30V DC
- 0 to 10 V output: 12 to 30V DC

PMP11:
- 4 to 20 mA output: 10 to 30V DC
- 0 to 10 V output: 12 to 30V DC

PMC21:
10 to 30 V DC

PMP21:
10 to 30 V DC

Output

PMC11:
- 4 to 20 mA
- 0 to 10 V

PMP11:
- 4 to 20 mA
- 0 to 10 V

PMC21:
4 to 20 mA

PMP21:
4 to 20 mA

Material

PMC11:
- Housing made from 316L (1.4404)
- Process connections made from 316L
- Process isolating diaphragm made from Al_2O_3 aluminum-oxide ceramic, (Ceraphire®), ultrapure 99.9 %

PMP11:
- Housing made from 316L (1.4404)
- Process connections made from 316L (1.4404)
- Process isolating diaphragm made from 316L (1.4435)

PMC21:
- Housing made from 316L (1.4404)
- Process connections made from 316L
- Process isolating diaphragm made from Al_2O_3 aluminum-oxide ceramic, (Ceraphire®), ultrapure 99.9 %

PMP21:
- Housing made from 316L (1.4404)
- Process connections made from 316L (1.4404)
- Process isolating diaphragm made from 316L (1.4435)

Options

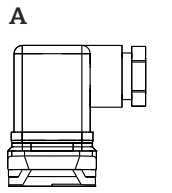
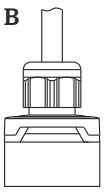
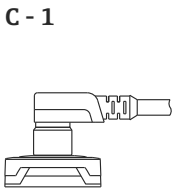
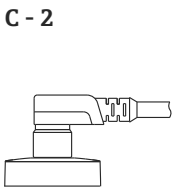
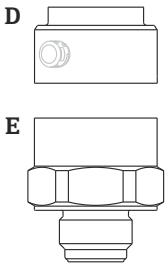
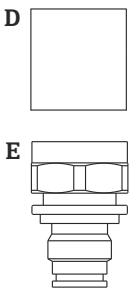
PMC11:
- Certificate of calibration
- Cleaned from oil+grease

PMP11:
- Certificate of calibration
- Cleaned from oil+grease

PMC21:
- Ex approvals
- Marine approvals
- Min. alarm current setting
- 3.1 Material certificates
- Certificate of calibration
- Cleaned from oil+grease
- Cleaned for O_2 service

PMP21:
- Ex approvals
- Marine approvals
- Min. alarm current setting
- 3.1 Material certificates
- Certificate of calibration
- Cleaned from oil+grease

Product design

Overview	Item	Description
 A0027231	A	Valve plug
 A0027232	B	Cable
 A0021987	C- 1	M12 plug Housing cap made of plastic
 A0027289	C- 2	M12 plug For Ex ec and IP69: metal housing cap
 A0027226  A0027215	D E	Housing Process connection (sample illustration)

System integration

The device can be given a tag name (max. 32 alphanumeric characters).

Designation	Option [1]
Measuring point (TAG), see additional specifications	Z1

1) Product Configurator, order code for "Marking"

Input

Measured variable

Measured process variable

- PMC11: Gauge pressure
- PMP11: Gauge pressure
- PMC21: Gauge pressure or absolute pressure
- PMP21: Gauge pressure or absolute pressure

Calculated process variable

Pressure

Measuring range

Ceramic process isolating diaphragm

Sensor	Device	Maximum Sensor measuring range		Lowest calibratable span [1]	MWP	OPL	Factory settings [2]	Option [3]
		lower (LRL)	upper (URL)					
		[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]		
Devices for gauge pressure measurement								
100 mbar (1.5 psi) [4]	PMC21	−0.1 (−1.5)	+0.1 (+1.5)	0.02 (0.3)	2.7 (40.5)	4 (60)	0 to 100 mbar (0 to 1.5 psi)	1C
250 mbar (4 psi) [5]	PMC21	−0.25 (−4)	+0.25 (+4)	0.05 (1)	3.3 (49.5)	5 (75)	0 to 250 mbar (0 to 4 psi)	1E
400 mbar (6 psi) [6]	PMC11 PMC21	−0.4 (−6)	+0.4 (+6)	0.08 (1.2)	5.3 (79.5)	8 (120)	0 to 400 mbar (0 to 6 psi)	1F
1 bar (15 psi) [6]	PMC11 PMC21	−1 (−15)	+1 (+15)	0.2 (3)	6.7 (100.5)	10 (150)	0 to 1 bar (0 to 15 psi)	1H
2 bar (30 psi) [6]	PMC11 PMC21	−1 (−15)	+2 (+30)	0.4 (6)	12 (180)	18 (270)	0 to 2 bar (0 to 30 psi)	1K
4 bar (60 psi) [6]	PMC11 PMC21	−1 (−15)	+4 (+60)	0.8 (12)	16.7 (250.5)	25 (375)	0 to 4 bar (0 to 60 psi)	1M
6 bar (90 psi) [6]	PMC11 PMC21	−1 (−15)	+6 (+90)	2.4 (36)	26.7 (400.5)	40 (600)	0 to 6 bar (0 to 90 psi)	1N
10 bar (150 psi) [6]	PMC11 PMC21	−1 (−15)	+10 (+150)	2 (30)	26.7 (400.5)	40 (600)	0 to 10 bar (0 to 150 psi)	1P
16 bar (240 psi) [6]	PMC11 PMC21	−1 (−15)	+16 (+240)	6.4 (96)	40 (600)	60 (900)	0 to 16 bar (0 to 240 psi)	1Q
25 bar (375 psi) [6]	PMC11 PMC21	−1 (−15)	+25 (+375)	10 (150)	40 (600)	60 (900)	0 to 25 bar (0 to 375 psi)	1R
40 bar (600 psi) [6]	PMC11 PMC21	−1 (−15)	+40 (+600)	8 (120)	40 (600)	60 (900)	0 to 40 bar (0 to 600 psi)	1S

Sensor	Device	Maximum Sensor measuring range		Lowest calibratable span [1]	MWP	OPL	Factory settings [2]	Option [3]
		lower (LRL)	upper (URL)					
		[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]		
Devices for absolute pressure measurement								
100 mbar (1.5 psi) [6]	PMC21	0	+0.1 (+1.5)	0.1 (1.5)	2.7 (40.5)	4 (60)	0 to 100 mbar (0 to 1.5 psi)	2C
250 mbar (4 psi) [6]	PMC21	0	+0.25 (+4)	0.25 (4)	3.3 (49.5)	5 (75)	0 to 250 mbar (0 to 4 psi)	2E
400 mbar (6 psi) [6]	PMC21	0	+0.4 (+6)	0.4 (6)	5.3 (79.5)	8 (120)	0 to 400 mbar (0 to 6 psi)	2F
1 bar (15 psi) [6]	PMC21	0	+1 (+15)	0.4 (6)	6.7 (100.5)	10 (150)	0 to 1 bar (0 to 15 psi)	2H
2 bar (30 psi) [6]	PMC21	0	+2 (+30)	0.4 (6)	12 (180)	18 (270)	0 to 2 bar (0 to 30 psi)	2K
4 bar (60 psi) [6]	PMC21	0	+4 (+60)	0.8 (12)	16.7 (250.5)	25 (375)	0 to 4 bar (0 to 60 psi)	2M
10 bar (150 psi) [6]	PMC21	0	+10 (+150)	2 (30)	26.7 (400.5)	40 (600)	0 to 10 bar (0 to 150 psi)	2P
40 bar (600 psi) [6]	PMC21	0	+40 (+600)	8 (120)	40 (600)	60 (900)	0 to 40 bar (0 to 600 psi)	2S

1) Highest turn down that can be set at the factory: 5:1. The turn down is preset and cannot be changed.
2) Other measuring ranges (e.g. −1 to +5 bar (−15 to 75 psi)) can be ordered with customer-specific settings (see the Product Configurator, order code for "Calibration; Unit" option "J"). It is possible to invert the output signal (LRV = 20 mA; URV = 4 mA). Prerequisite: URV < LRV
3) Product Configurator, order code for "Sensor range"
4) Vacuum resistance: 0.7 bar (10.5 psi) abs
5) Vacuum resistance: 0.5 bar (7.5 psi) abs
6) Vacuum resistance: 0 bar (0 psi) abs

Maximum turn down which can be ordered for absolute pressure and gauge pressure sensors

Devices for gauge pressure measurement
- 6 bar (90 psi), 16 bar (240 psi), 25 bar (375 psi): TD 1:1 to TD 2.5:1
- All other measuring ranges: TD 1:1 to TD 5:1

Devices for absolute pressure measurement
- 100 mbar (1.5 psi), 250 mbar (4 psi), 400 mbar (6 psi): TD 1:1
- 1 bar (15 psi): TD 1:1 to TD 2.5:1
- All other measuring ranges: TD 1:1 to TD 5:1

Metal process isolating diaphragm

Sensor	Device	Maximum Sensor measuring range		Lowest calibratable span [1]	MWP	OPL	Factory settings [2]	Option [3]
		lower (LRL)	upper (URL)					
		[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]		
Devices for gauge pressure measurement								
400 mbar (6 psi) [4]	PMP11 PMP21	−0.4 (−6)	+0.4 (+6)	0.4 (6)	1 (15)	1.6 (24)	0 to 400 mbar (0 to 6 psi)	1F
1 bar (15 psi) [4]	PMP11 PMP21	−1 (−15)	+1 (+15)	0.4 (6)	2.7 (40.5)	4 (60)	0 to 1 bar (0 to 15 psi)	1H
2 bar (30 psi) [4]	PMP11 PMP21	−1 (−15)	+2 (+30)	0.4 (6)	6.7 (100.5)	10 (150)	0 to 2 bar (0 to 30 psi)	1K
4 bar (60 psi) [4]	PMP11 PMP21	−1 (−15)	+4 (+60)	0.8 (12)	10.7 (160.5)	16 (240)	0 to 4 bar (0 to 60 psi)	1M
6 bar (90 psi) [4]	PMP11 PMP21	−1 (−15)	+6 (+90)	2.4 (36)	16 (240)	24 (360)	0 to 6 bar (0 to 90 psi)	1N
10 bar (150 psi) [4]	PMP11 PMP21	−1 (−15)	+10 (+150)	2 (30)	25 (375)	40 (600)	0 to 10 bar (0 to 150 psi)	1P
16 bar (240 psi) [4]	PMP11 PMP21	−1 (−15)	+16 (+240)	5 (75)	25 (375)	64 (960)	0 to 16 bar (0 to 240 psi)	1Q
25 bar (375 psi) [4]	PMP11 PMP21	−1 (−15)	+25 (+375)	5 (75)	25 (375)	100 (1500)	0 to 25 bar (0 to 375 psi)	1R
40 bar (600 psi) [4]	PMP11 PMP21	−1 (−15)	+40 (+600)	8 (120)	100 (1500)	160 (2400)	0 to 40 bar (0 to 600 psi)	1S
100 bar (1500 psi) [4]	PMP21	−1 (−15)	+100 (+1500)	20 (300)	100 (1500)	160 (2400)	0 to 100 bar (0 to 1500 psi)	1U
400 bar (6000 psi) [4]	PMP21	−1 (−15)	+400 (+6000)	80 (1200)	400 (6000)	600 (9000)	0 to 400 bar (0 to 6000 psi)	1W
Devices for absolute pressure measurement								
400 mbar (6 psi) [4]	PMP21	0 (0)	0.4 (+6)	0.4 (6)	1 (15)	1.6 (24)	0 to 400 mbar (0 to 6 psi)	2F
1 bar (15 psi) [4]	PMP21	0 (0)	1 (+15)	0.4 (6)	2.7 (40.5)	4 (60)	0 to 1 bar (0 to 15 psi)	2H
2 bar (30 psi) [4]	PMP21	0 (0)	2 (+30)	0.4 (6)	6.7 (100.5)	10 (150)	0 to 2 bar (0 to 30 psi)	2K
4 bar (60 psi) [4]	PMP21	0 (0)	4 (+60)	0.8 (12)	10.7 (160.5)	16 (240)	0 to 4 bar (0 to 60 psi)	2M
10 bar (150 psi) [4]	PMP21	0 (0)	10 (+150)	2 (30)	25 (375)	40 (600)	0 to 10 bar (0 to 150 psi)	2P
40 bar (600 psi) [4]	PMP21	0 (0)	+40 (+600)	8 (120)	100 (1500)	160 (2400)	0 to 40 bar (0 to 600 psi)	2S
100 bar (1500 psi) [4]	PMP21	0 (0)	+100 (+1500)	20 (300)	100 (1500)	160 (2400)	0 to 100 bar (0 to 1500 psi)	2U
400 bar (6000 psi) [4]	PMP21	0 (0)	+400 (+6000)	80 (1200)	400 (6000)	600 (9000)	0 to 400 bar (0 to 6000 psi)	2W

1) Highest turn down that can be set at the factory: 5:1. The turn down is preset and cannot be changed.
2) Other measuring ranges (e.g. −1 to +5 bar (−15 to 75 psi)) can be ordered with customer-specific settings (see the Product Configurator, order code for "Calibration; Unit" option "J"). It is possible to invert the output signal (LRV = 20 mA; URV = 4 mA). Prerequisite: URV < LRV
3) Product Configurator, order code for "Sensor range"
4) Vacuum resistance: 0.01 bar (0.145 psi) abs

Maximum turn down which can be ordered for absolute pressure and gauge pressure sensors

Device	Range	400 mbar (6 psi)	1 bar (15 psi) 6 bar (90 psi) 16 bar (240 psi)	2 bar (30 psi) 4 bar (60 psi) 10 bar (150 psi) 25 to 400 bar (375 to 6000 psi)
PMP11	0.5%	TD 1:1	TD 1:1 to TD 2.5:1	TD 1:1 to TD 5:1
PMP21	0.3%	TD 1:1	TD 1:1 to TD 2.5:1	TD 1:1 to TD 5:1

Output

Output signal

Designation	Option [1]
4 to 20 mA (2-wire)	1
PMC11: 0 to 10 V output (3-wire) PMP11: 0 to 10 V output (3-wire)	2

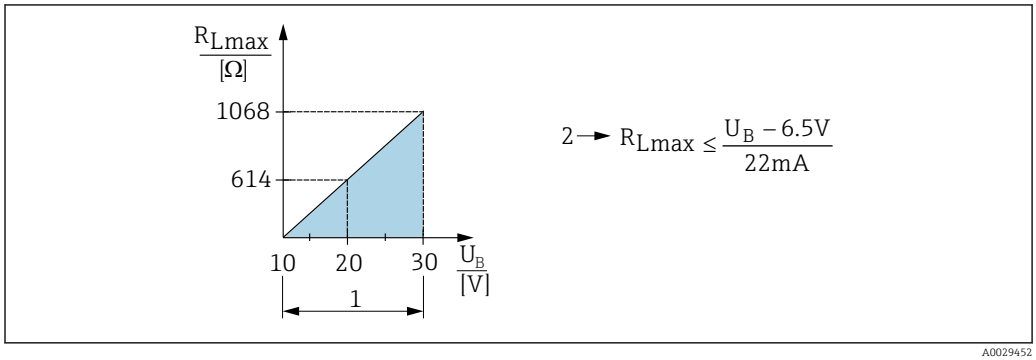
1) Product Configurator, order code for "Output"

Signal range 4 to 20 mA

3.8 mA to 20.5 mA

Load (for 4 to 20 mA devices)

In order to guarantee sufficient terminal voltage in two-wire devices, a maximum load resistance R_L (including line resistance) must not be exceeded depending on the supply voltage U_B of the supply unit.



1 Power supply 10 to 30 V DC
2 R_{Lmax} Maximum load resistance
U_B Supply voltage

Load resistance (for 0 to 10 V devices)

The load resistance must be ≥ 5 [kΩ].

Signal on alarm 4 to 20 mA

The response of the output to error is regulated in accordance with NAMUR NE43.

Factory setting MAX alarm: >21 mA

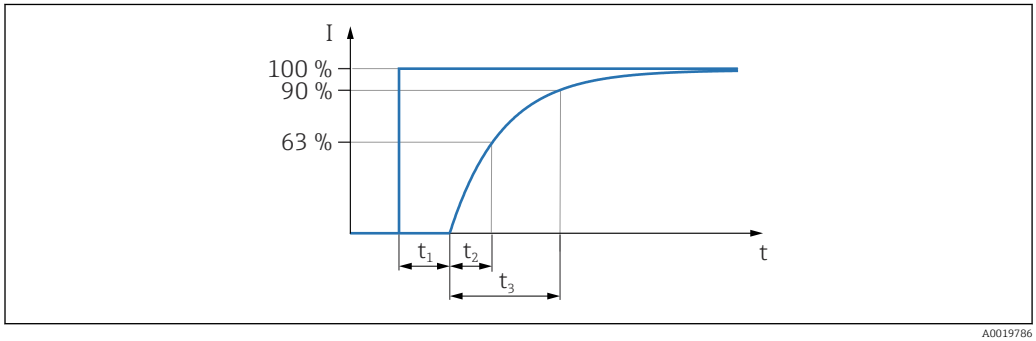
alarm current

Device	Description	Option
PMC21 PMP21	Adjusted min. alarm current	IA [1]

1) Product Configurator order code for "Service"

Dead time, time constant

Presentation of the dead time and the time constant:



Dynamic behavior

Dead time (t_1) [ms]	Time constant (T63), t_2 [ms]	Time constant (T90), t_3 [ms]
6 ms	10 ms	15 ms

Power supply

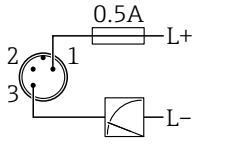
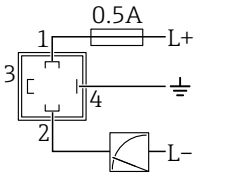
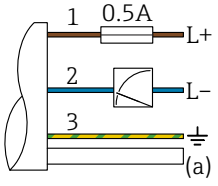
WARNING

Limitation of electrical safety due to incorrect connection!

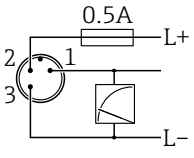
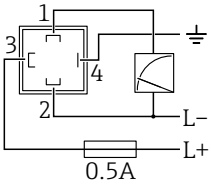
- In accordance with IEC/EN61010 a suitable circuit breaker must be provided for the device.
- When using the measuring device in hazardous areas, installation must also comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings.
- All explosion protection data are given in separate documentation which is available upon request. The Ex documentation is supplied as standard with all devices approved for use in explosion hazardous areas.
- Protective circuits against reverse polarity, HF influences, and overvoltage peaks are integrated.
- **Non-hazardous area:** To meet device safety specifications according to the IEC/EN61010 standard, the installation must ensure that the maximum current is limited to 500 mA.
- **Hazardous area:** The maximum current is restricted to Ii = 100 mA by the transmitter power supply unit when the device is used in an intrinsically safe circuit (Ex ia).

Terminal assignment

4 to 20 mA output

Device	M12 plug	Valve plug	Cable
PMC11 PMP11 PMC21 PMP21			 *1 brown = L+* *2 blue = L-* *3 green/yellow = ground connection* *(a) reference air hose*

0 to 10 V output (not for IO-Link)

Device	M12 plug	Valve plug	Cable
PMC11 PMP11			-

Supply voltage

Electronic version	Device	Supply voltage
4 to 20 mA output	PMC11 PMP11 PMC21 PMP21	10 to 30 V DC
0 to 10 V output	PMC11 PMP11	12 to 30 V DC

Current consumption and alarm signal

Electronic version	Device	Current consumption	Alarm signal [1]
4 to 20 mA output	PMC11 PMP11 PMC21 PMP21	≤ 26 mA	> 21 mA
0 to 10 V output	PMC11 PMP11	< 12 mA	11 V

1) For MAX alarm (factory setting)

Power supply fault

- Behavior in the event of overvoltage (>30 V):
  The device works continuously up to 34 V DC without damage. If the supply voltage is exceeded, the specified characteristics are no longer guaranteed.
- Behavior in the event of undervoltage:
  If the supply voltage falls below the minimum value, the device switches off in a defined manner.

Electrical connection

Degree of protection

Device	Connection	Degree of protection	Option [1]
PMC21 PMP21	Cable 5 m (16 ft)	IP66/68 [2] NEMA type 4X/6P enclosure	A
PMC21 PMP21	Cable 10 m (33 ft)	IP66/68 [2] NEMA type 4X/6P enclosure	B
PMC21 PMP21	Cable 25 m (82 ft)	IP66/68 [2] NEMA type 4X/6P enclosure	C
PMC11 PMP11	M12 plug	IP65 NEMA type 4X enclosure	L
PMC21 PMP21	M12 plug	IP65/67 NEMA type 4X enclosure	M
PMC11 PMP11 PMC21 PMP21	Valve plug ISO4400 M16	IP65 NEMA type 4X enclosure	U
PMC11 PMP11 PMC21 PMP21	Valve plug ISO4400 NPT ½	IP65 NEMA type 4X enclosure	V

1) Product Configurator, order code for "Electrical connection"
2) IP 68 (1.83m H2O for 24 h)

Cable specification

For valve plug: < 1.5 mm^2 (16 AWG) and Ø4.5 to 10 mm (0.18 to 0.39 in)

Residual ripple

The device operates within the reference accuracy up to ±5 % of the residual ripple of the supply voltage, within the permitted voltage range.

Influence of power supply

≤0.005 % of URV/1 V

Overvoltage protection

The device does not contain any special elements to protect against overvoltage ("wire to ground"). Nevertheless the requirements of the applicable EMC standard EN 61000-4-5 (testing voltage 1kV EMC wire/ground) are met.

Performance characteristics of ceramic process isolating diaphragm

Reference operating conditions

- As per IEC 60770
- Ambient temperature T_A = constant, in the range of:+21 to +33 °C (+70 to +91 °F)
- Humidity φ = constant, in the range of 5 to 80 % rH
- Ambient pressure p_A = constant, in the range of:860 to 1060 mbar (12.47 to 15.37 psi)
- Position of measuring cell = constant, in range: horizontal ±1° (see also "Influence of the installation position" section → 🖹 23)
- Zero based span
- Material of process isolating diaphragm: Al_2O_3 (aluminum-oxide ceramic, Ceraphire®)
- Supply voltage: 24 V DC ±3 V DC
- Load: 320 Ω (at 4 to 20 mA output)

Measuring uncertainty for small absolute pressure measuring ranges

The smallest extended uncertainty of measurement that can delivered by our standards is:

- in range 1 to 30 mbar (0.0145 to 0.435 psi): 0.4 % of reading
- in range < 1 mbar (0.0145 psi): 1 % of reading.

Influence of the installation position

→ 🖹 23

Resolution

Current output: min. 1.6 µA

Reference accuracy

The reference accuracy contains the non-linearity [DIN EN 61298-2 3.11] including the pressure hysteresis [DIN EN 61298-23.13] and non-repeatability [DIN EN 61298-2 3.11] in accordance with the limit point method as per [DIN EN 60770].

Device	% of the calibrated span to the maximum turn down		
	Reference accuracy	Non-linearity [1]	Non-repeatability
PMC11 [2]	±0.5	±0.1	±0.1
PMC21	±0.3	±0.1	±0.1

1) The non-linearity for the 40 bar (600 psi) sensor can be up to ± 0.15% of the calibrated span up to the maximum turn down.
2) For devices with 0 to 10 V output, a non-linearity of up to max. 0.3 V can occur for signal values below 0.03 V.

Overview of the turn down ranges → 🖹 14

Measuring ranges	Turn down	Device	% of URL
100 mbar (1.5 psi)to 40 bar (600 psi)	1:1 to TD 5:1	PMC11	±0.5
		PMC21	±0.3 [1]

1) For the 100 mbar (1.5 psi) and 250 mbar (4 psi) measuring ranges, the following applies: In the event of heat effects on the initial reference conditions, an additional deviation of max. 0.3 mbar (4.5 psi) from the zero point or the output span is possible.

Thermal change of the zero output and the output span

Measuring cell	−20 to +85 °C (−4 to +185 °F)	−40 to −20 °C (−40 to −4 °F) +85 to +100 °C (+185 to +212 °F)
	% of URL for TD 1:1	
<1 bar (15 psi)	<1	<1.2
≥ 1 bar (15 psi)	<0.8	<1

Long-term stability

1 year	5 years	8 years
% of URL		
±0.2	±0.4	±0.45

Switch-on time

≤2 s (For small measuring ranges, pay attention to the thermal compensation effects.)

Performance characteristics of metal process isolating diaphragm

Reference operating conditions

- As per IEC 60770
- Ambient temperature T_A = constant, in the range: +21 to +33 °C (+70 to +91 °F)
- Humidity φ = constant, in the range: 5 to 80 % rH
- Ambient pressure p_A = constant, in the range: 860 to 1060 mbar (12.47 to 15.37 psi)
- Position of measuring cell = constant, in the range: horizontal ±1° (see also "Influence of the installation position" section → 🖹 23)
- Zero based span
- Process isolating diaphragm material: AISI 316L (1.4435)
- Filling oil: synthetic oil polyalphaolefin FDA 21 CFR 178.3620, NSF H1
- Supply voltage: 24 V DC ±3 V DC
- Load: 320 Ω (at 4 to 20 mA output)

Measuring uncertainty for small absolute pressure measuring ranges

The smallest extended uncertainty of measurement that can be delivered by our standards is:
- in the range 1 to 30 mbar (0.0145 to 0.435 psi): 0.4 % of reading
- in the range < 1 mbar (0.0145 psi): 1 % of reading.

Influence of the installation position

→ 🖹 23

Resolution

Current output: min. 1.6 µA

Reference accuracy

The reference accuracy contains the non-linearity [DIN EN 61298-2 3.11] including the pressure hysteresis [DIN EN 61298-23.13] and non-repeatability [DIN EN 61298-2 3.11] in accordance with the limit point method as per [DIN EN 60770].

Device	% of the calibrated span to the maximum turn down		
	Reference accuracy	Non-linearity	Non-repeatability
PMP11 [1)]	±0.5	±0.1	±0.1
PMP21	±0.3	±0.1	±0.1

1) For devices with 0 to 10 V output, a non-linearity of up to max. 0.3 V can occur for signal values below 0.015 V.

Overview of the turn down ranges → 🖹 15

Thermal change of the zero output and the output span

Measuring cell	−20 to +85 °C (−4 to +185 °F)	−40 to −20 °C (−40 to −4 °F) +85 to +100 °C (+185 to +212 °F)
	% of the calibrated span for TD 1:1	
<1 bar (15 psi)	<1	<1.2
≥1 bar (15 psi)	<0.8	<1

Long-term stability

Device	1 year	5 years	8 years
	% of URL		
PMP11 PMP21	±0.2	±0.4	±0.45

Switch-on time

≤2 s

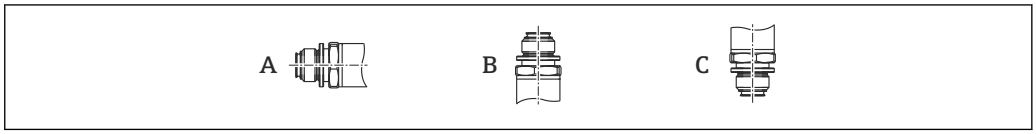
Installation

Installation conditions

- Moisture must not penetrate the housing when mounting the device, establishing the electrical connection and during operation.
- Point the cable and connector downwards where possible to prevent moisture from entering (e.g. rain or condensation water).

Influence of the installation position

Any orientation is possible. However, the orientation may cause a zero point shift i.e. the measured value does not show zero when the vessel is empty or partially full.



A0024708

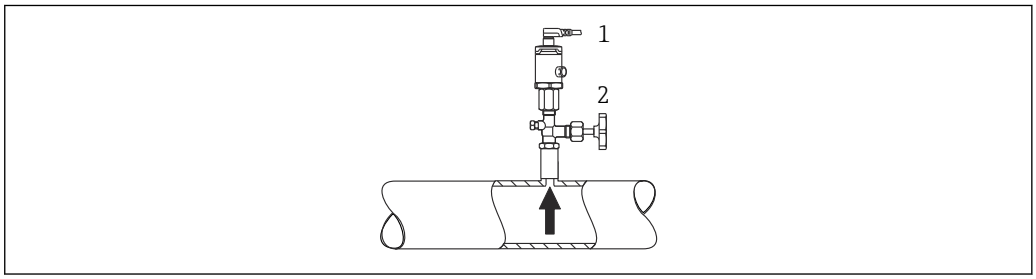
Type	Process isolating diaphragm axis is horizontal (A)	Process isolating diaphragm pointing upwards (B)	Process isolating diaphragm pointing downwards (C)
PMP11 PMP21	Calibration position, no effect	Up to +4 mbar (+0.058 psi)	Up to −4 mbar (−0.058 psi)
PMC11, PMC21 < 1 bar (15 psi)	Calibration position, no effect	Up to +0.3 mbar (+0.0044 psi)	Up to −0.3 mbar (−0.0044 psi)
PMC11, PMC21 ≥1 bar (15 psi)	Calibration position, no effect	Up to +3 mbar (+0.0435 psi)	Up to −3 mbar (−0.0435 psi)

Mounting location

Pressure measurement

Pressure measurement in gases

Mount the device with shutoff device above the tapping point so that any condensate can flow into the process.



A0021904

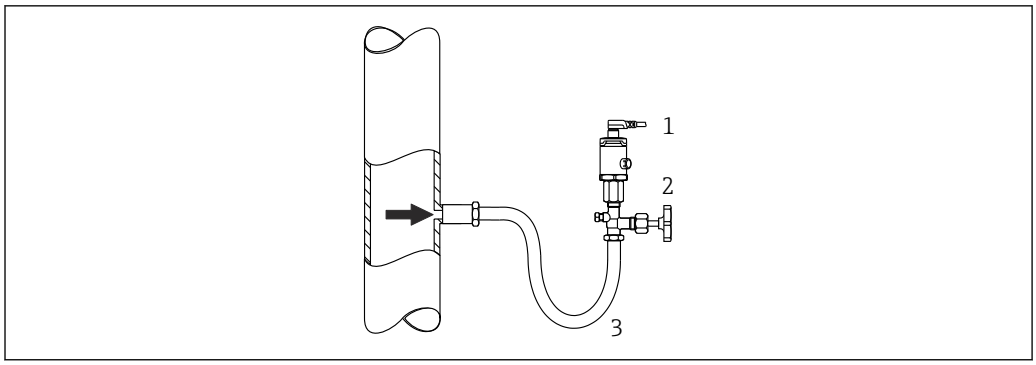
1 Device
2 Shutoff device

Pressure measurement in vapors

For pressure measurement in vapors, use a siphon. The siphon reduces the temperature to almost ambient temperature. Mount the device with a shutoff device at the same height as the tapping point.

Advantage:
only minor/negligible heat effects on the device.

Note the max. permitted ambient temperature of the transmitter!

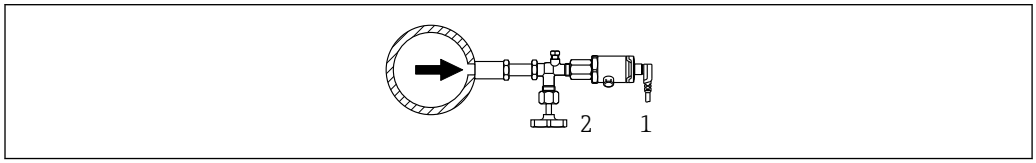


A0024395

1 *Device*
2 *Shutoff device*
3 *Siphon*

Pressure measurement in liquids

Mount the device with a shutoff device at the same height as the tapping point.

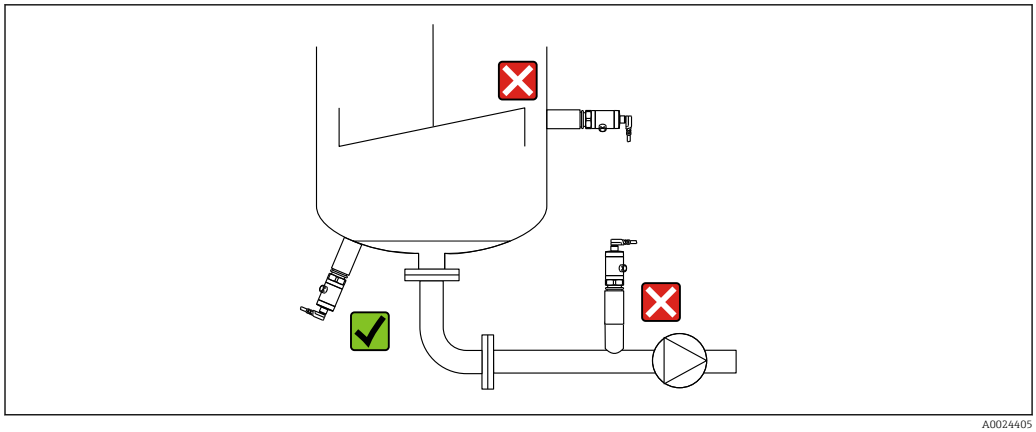


A0024399

1 *Device*
2 *Shutoff device*

Level measurement

- Always install the device below the lowest measuring point.
- Do not install the device at the following positions:
  - In the filling curtain
  - In the tank outlet
  - in the suction area of a pump
  - Or at a point in the tank which could be affected by pressure pulses from the agitator.



A0024405

Mounting instructions for oxygen applications

Oxygen and other gases can react explosively to oils, grease and plastics, such that, among other things, the following precautions must be taken:

- All components of the system, such as measuring devices, must be cleaned in accordance with the BAM requirements.
- Dependent on the materials used, a certain maximum temperature and a maximum pressure for oxygen applications must not be exceeded.
- The following table lists devices (devices only, not accessories or enclosed accessories), which are suitable for gaseous oxygen applications.

Device	p_{max} for oxygen applications	T_{max} for oxygen applications	Option [1]
PMC21	40 bar (600 psi)	−10 to +60 °C (+14 to +140 °F)	HB

1) Product Configurator, order code for "Service"

Environment

Ambient temperature range

Device	Ambient temperature range [1]
PMC11 PMP11	−40 to +70 °C (−40 to +158 °F)
PMC21 PMP21	−40 to +85 °C (−40 to +185 °F)
PMC21 PMP21	Devices for hazardous areas: −40 to +70 °C (−40 to +158 °F)

1) Exception: the following cable is designed for an ambient temperature range of −25 to +70 °C (−13 to +158 °F): Product Configurator order code for "Accessory enclosed" option "RZ".

Storage temperature range

−40 to +85 °C (−40 to +185 °F)

Climate class

Device	Climate class	Note
PMC11 PMP11 PMC21 PMP21	Class 3K5	Air temperature: −5 to +45 °C (+23 to +113 °F), relative humidity: 4 to 95 % satisfied according to IEC 721-3-3 (condensation not possible)

Degree of protection

Device	Connection	Degree of protection	Option [1]
PMC21 PMP21	Cable 5 m (16 ft)	IP66/68 [2] NEMA type 4X/6P enclosure	A
PMC21 PMP21	Cable 10 m (33 ft)	IP66/68 [2] NEMA type 4X/6P enclosure	B
PMC21 PMP21	Cable 25 m (82 ft)	IP66/68 [2] NEMA type 4X/6P enclosure	C
PMC11 PMP11	M12 plug	IP65 NEMA type 4X enclosure	L
PMC21 PMP21	M12 plug	IP65/67 NEMA type 4X enclosure	M
PMC11 PMP11 PMC21 PMP21	Valve plug ISO4400 M16	IP65 NEMA type 4X enclosure	U
PMC11 PMP11 PMC21 PMP21	Valve plug ISO4400 NPT ½	IP65 NEMA type 4X enclosure	V

1) Product Configurator, order code for "Electrical connection"
2) IP 68 (1.83m H2O for 24 h)

Vibration resistance

Test standard	Vibration resistance
IEC 60068-2-64:2008	Guaranteed for 5 to 2000Hz: 0.05 g^2/Hz

Electromagnetic compatibility

- Interference emission as per EN 61326-1 equipment B
- Interference immunity as per EN 61326-1 (industrial environment)
- NAMUR recommendation EMC (NE21)
- Maximum deviation: 1.5% with TD 1:1

For more details please refer to the Declaration of Conformity.

Process

Process temperature range for devices with ceramic process isolating diaphragm

Device	Process temperature range
PMC11	−25 to +85 °C (−13 to +185 °F)
PMC21	−25 to +100 °C (−13 to +212 °F)
PMC21 for oxygen applications	−10 to +60 °C (+14 to +140 °F)

- For saturated steam applications, use a device with a metal process isolating diaphragm, or provide a siphon for temperature isolation when installing.
- Pay attention to the process temperature range of the seal. See also the following table.

Seal	Notes	Process temperature range	Option
FKM	-	−20 to +100 °C (−4 to +212 °F)	A [1]
FKM	Cleaned for oxygen service	−10 to +60 °C (+14 to +140 °F)	A [1] and HB [2]
EPDM 70	-	−25 to +100 °C (−13 to +212 °F)	J [1]

1) Product Configurator, order code for "Seal"
2) Product Configurator, order code for "Service"

Applications with changes in temperature

Frequent extreme changes in temperatures can temporarily cause measuring errors. Temperature compensation takes place after a few minutes. Internal temperature compensation is faster the smaller the change in temperature and the longer the time interval.

For further information please contact your local Endress+Hauser Sales Center.

Process temperature range for devices with metallic process isolating diaphragm

Device	Process temperature range
PMP11	−25 to +85 °C (−13 to +185 °F)
PMP21	−40 to +100 °C (−40 to +212 °F)

Applications with changes in temperature

Frequent extreme changes in temperatures can temporarily cause measuring errors. Internal temperature compensation is faster the smaller the change in temperature and the longer the time interval.

For further information please contact your local Endress+Hauser Sales Center.

Pressure specifications

⚠ WARNING

The maximum pressure for the measuring device depends on the lowest-rated element with regard to pressure.

- For pressure specifications, see the "Measuring range" section and the "Mechanical construction" section.
- The Pressure Equipment Directive (2014/68/EU) uses the abbreviation "PS". The abbreviation "PS" corresponds to the MWP (maximum working pressure) of the measuring device.
- MWP (maximum working pressure): The MWP (maximum working pressure) is specified on the nameplate. This value is based on a reference temperature of +20 °C (+68 °F) and may be applied to the device for an unlimited period of time. Observe the temperature dependency of the MWP.
- OPL (over pressure limit): The test pressure corresponds to the over pressure limit of the sensor and may only be applied temporarily to ensure that the measurement is within the specifications and no permanent damage develops. In the case of sensor range and process connections where the over pressure limit (OPL) of the process connection is smaller than the nominal value of the sensor, the device is set at the factory, at the very maximum, to the OPL value of the process connection. If you want to use the entire sensor range, select a process connection with a higher OPL value.
- Oxygen applications: In oxygen applications, the values for "p_{max} and T_{max} for oxygen applications may not be exceeded .
- Devices with ceramic process isolating diaphragm: avoid steam hammering! Steam hammering can cause zero point drifts. Recommendation: Residue (water droplets or condensation) may remain on the process isolating diaphragm following CIP cleaning and can result in local steam hammering the next time steam cleaning takes place. In practice, drying the process isolating diaphragm (e.g. by blowing) has proved to prevent steam hammering.

Mechanical construction

For the dimensions, see the Product Configurator: www.endress.com

Search for product → click "Configuration" to the right of the product image → after configuration click "CAD"

The following dimensions are rounded values. For this reason, they may deviate slightly from the dimensions given on www.endress.com.

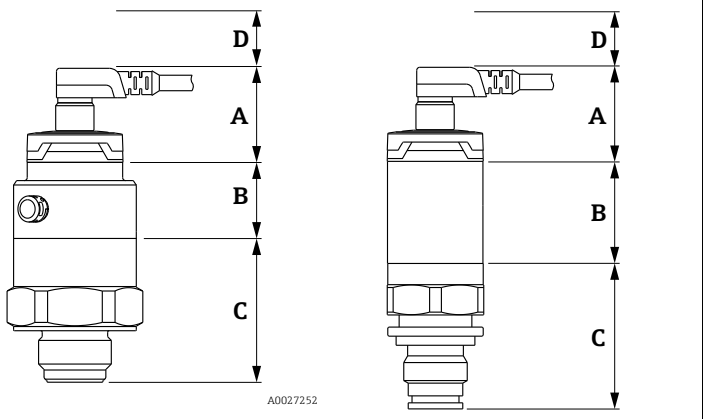
Design, dimensions

Device height

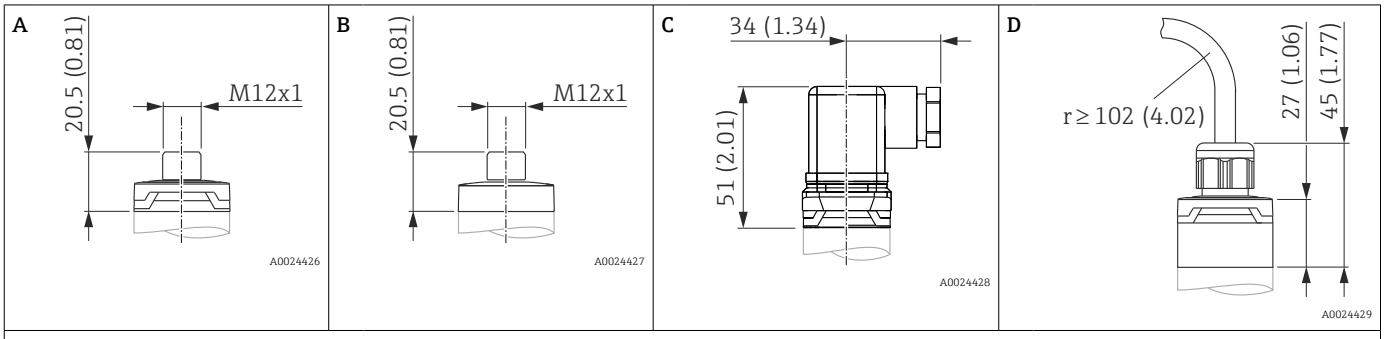
The device height is calculated from

- the height of the electrical connection
- the height of the housing and
- the height of the individual process connection.

The individual heights of the components are listed in the following sections. To calculate the device height simply add up the individual heights of the components. Where applicable also take into consideration the installation distance (space that is used to install the device). You can use the following table for this purpose:

Section	Page	Height	Example
Electrical connection	→ 29	(A)	
Housing height	→ 30	(B)	
Process connection height	→ 32 → 35	(C)	
Installation distance	-	(D)	

Electrical connection



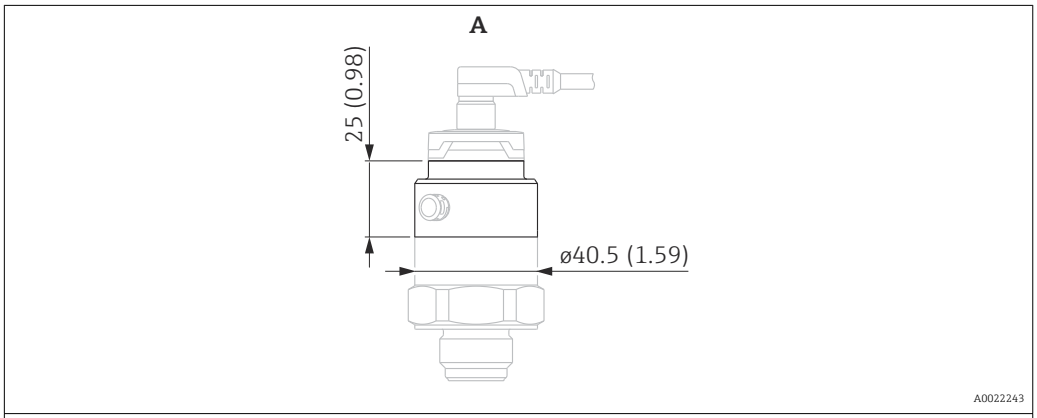
Engineering unit mm (in)

Item	Designation	Material	Weight kg (lbs)	Device	Option [1]
A	M12 plug IP65 (Additional dimensions → 47)	Housing cap made of plastic	0.012 (0.03)	PMC11 PMP11	L
A	M12 plug IP65/67 (Additional dimensions → 47)	Housing cap made of plastic	0.012 (0.03)	PMC21 PMP21	M Plug connector with cable can be ordered as an accessory → 47
B	M12 plug IP66/67	Housing cap made of metal	0.030 (0.07)	PMC21 PMP21	In the case of Ex ec type of protection, the housing cap is made of metal.

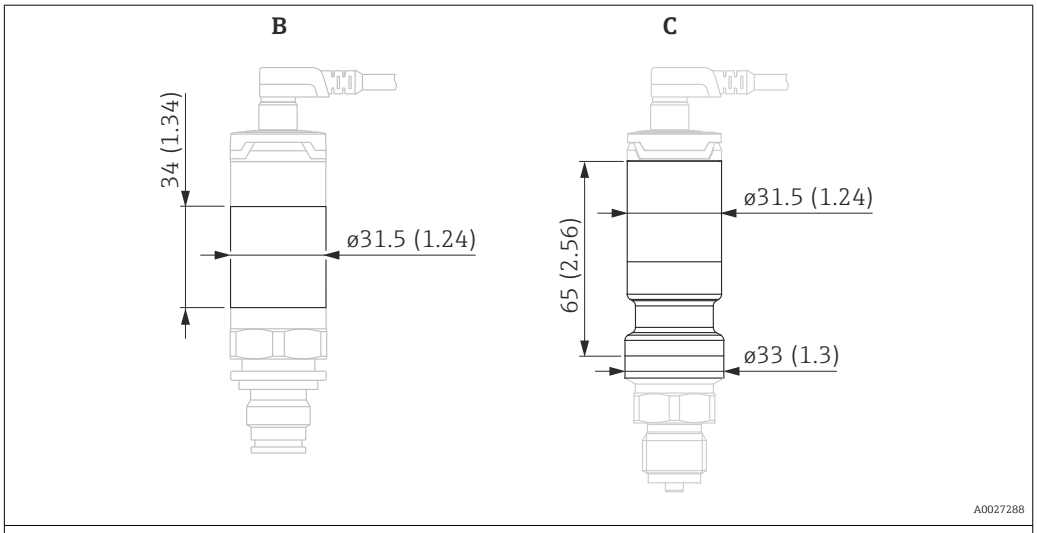
Item	Designation	Material	Weight kg (lbs)	Device	Option [1]
C	M16 valve plug	Plastic PPSU	0.060 (0.14)	PMC11 PMP11 PMC21 PMP21	U
C	NPT ½ valve plug	Plastic PPSU	0.060 (0.14)	PMC11 PMP11 PMC21 PMP21	V
D	Cable 5 m (16 ft)	PUR (UL94V0)	0.280 (0.62)	PMC21 PMP21	A
D	Cable 10 m (33 ft)	PUR (UL94V0)	0.570 (1.26)	PMC21 PMP21	B
D	Cable 25 m (82 ft)	PUR (UL94V0)	1.400 (3.09)	PMC21 PMP21	C

1) Product Configurator, order code for "Electrical connection"

Housing



Engineering unit mm (in)

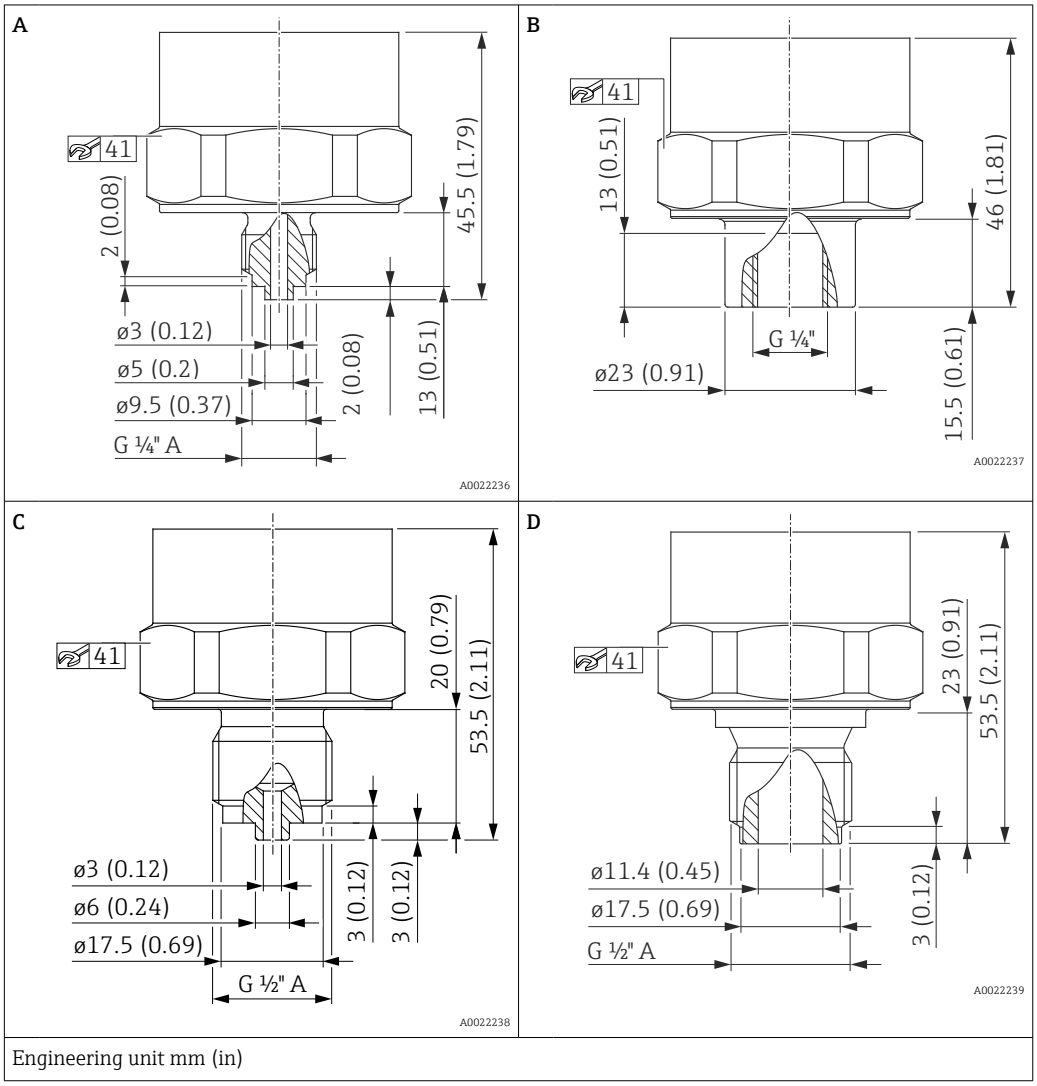


Engineering unit mm (in)

Position	Device	Material	Weight kg (lbs)
A	PMC11 PMC21	Stainless steel 316L	0.150 (0.33)
B (up to 100 bar (1 500 psi))	PMP11 PMP21	Stainless steel 316L	0.090 (0.20)
C (400 bar (6 000 psi))	PMP11 PMP21	Stainless steel 316L	0.090 (0.20)

Process connections with internal, ceramic process isolating diaphragm

Thread ISO 228 G



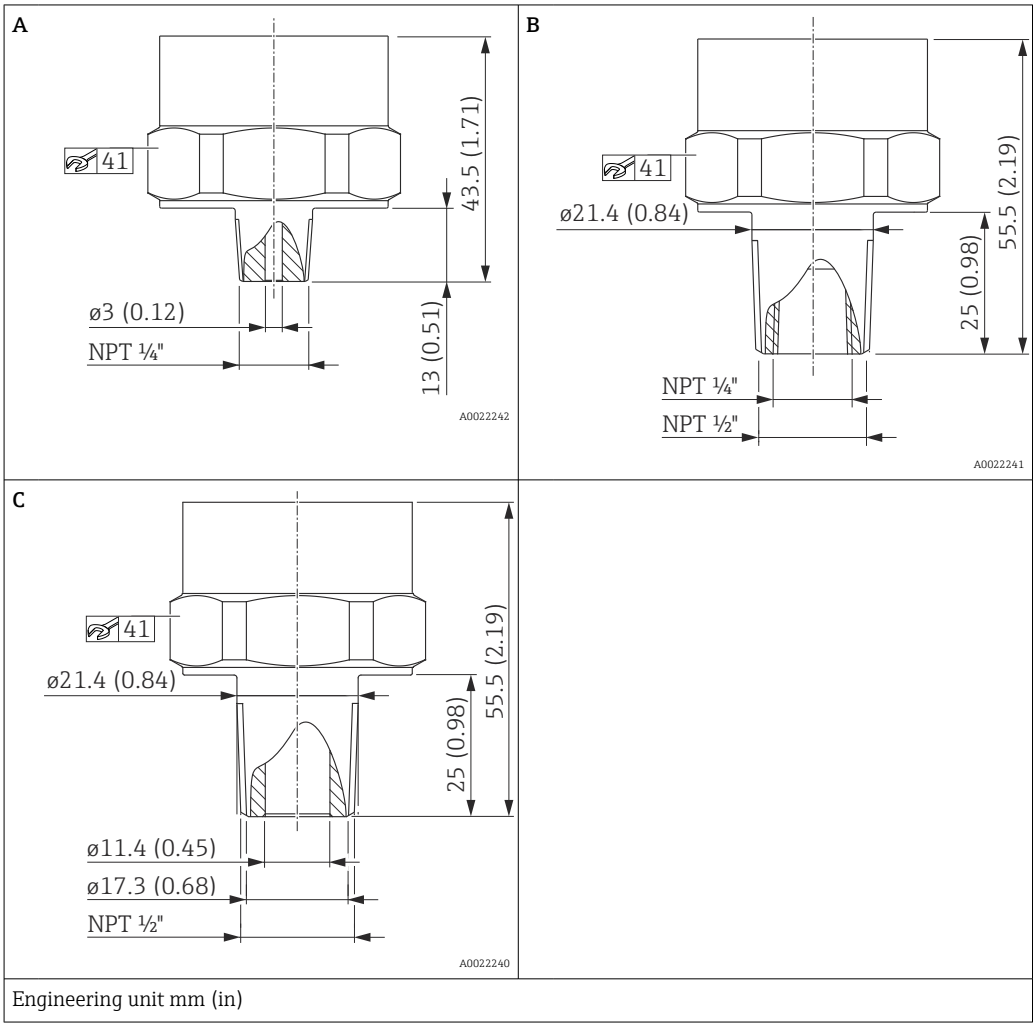
Engineering unit mm (in)

Device	Position	Designation	Material	Weight	Option [1]
				kg (lbs)	
▪ PMC11 ▪ PMC21	A	Thread ISO 228 G ¼" A, EN 837	316L	0.160 (0.35)	WTJ
▪ PMC11 ▪ PMC21	B	Thread ISO 228 G ¼" (female)	316L	0.180 (0.40)	WAJ
▪ PMC11 ▪ PMC21	C	Thread ISO 228 G ½" A, EN 837	316L	0.180 (0.40)	WBJ
▪ PMC11 ▪ PMC21	D	Thread ISO 228 G ½" A, bore11.4 mm (0.45 in)	316L	0.180 (0.40)	WWJ

1) Product Configurator, order code for "Process connection"

Process connections with internal, ceramic process isolating diaphragm

Thread ASME



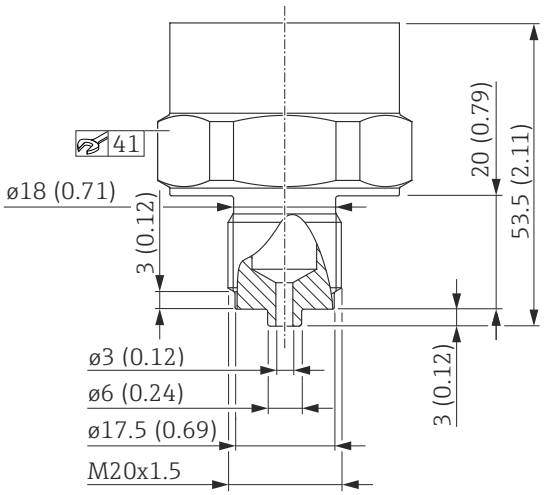
Engineering unit mm (in)

Device	Item	Designation	Material	Weight	Approval	Option [1]
				kg (lbs)		
▪ PMC11 ▪ PMC21	A	ASME ¼" MNPT, bore 3 mm (0.12 in)	316L	0.160 (0.35)	CRN	VUJ
▪ PMC11 ▪ PMC21	B	ASME ½" MNPT, ¼" FNPT (female)	316L	0.190 (0.42)	CRN	VXJ
▪ PMC11 ▪ PMC21	C	ASME ½" MNPT, bore 11.4 mm (0.45 in)	316L	0.190 (0.42)	CRN	VWJ

1) Product Configurator, order code for "Process connection"

Process connections with internal, ceramic process isolating diaphragm

Thread DIN13



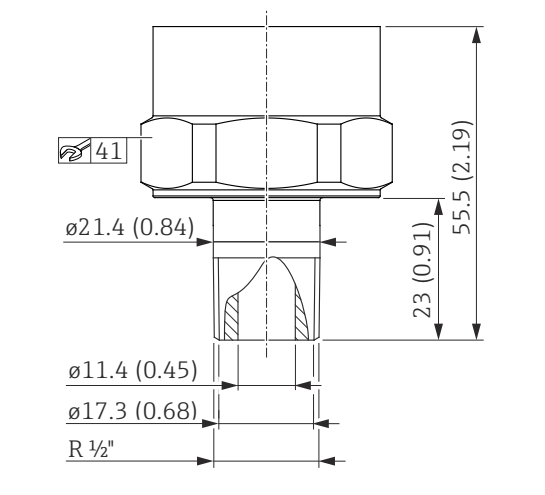
Engineering unit mm (in)

Device	Designation	Material	Weight	Option [1]
			kg (lbs)	
▪ PMC11 ▪ PMC21	DIN 13 M20 x 1.5, EN 837, bore 3 mm (0.12 in)	316L	0.180 (0.40)	X4J

1) Product Configurator, order code for "Process connection"

Process connections with internal, ceramic process isolating diaphragm

Thread JIS B0203



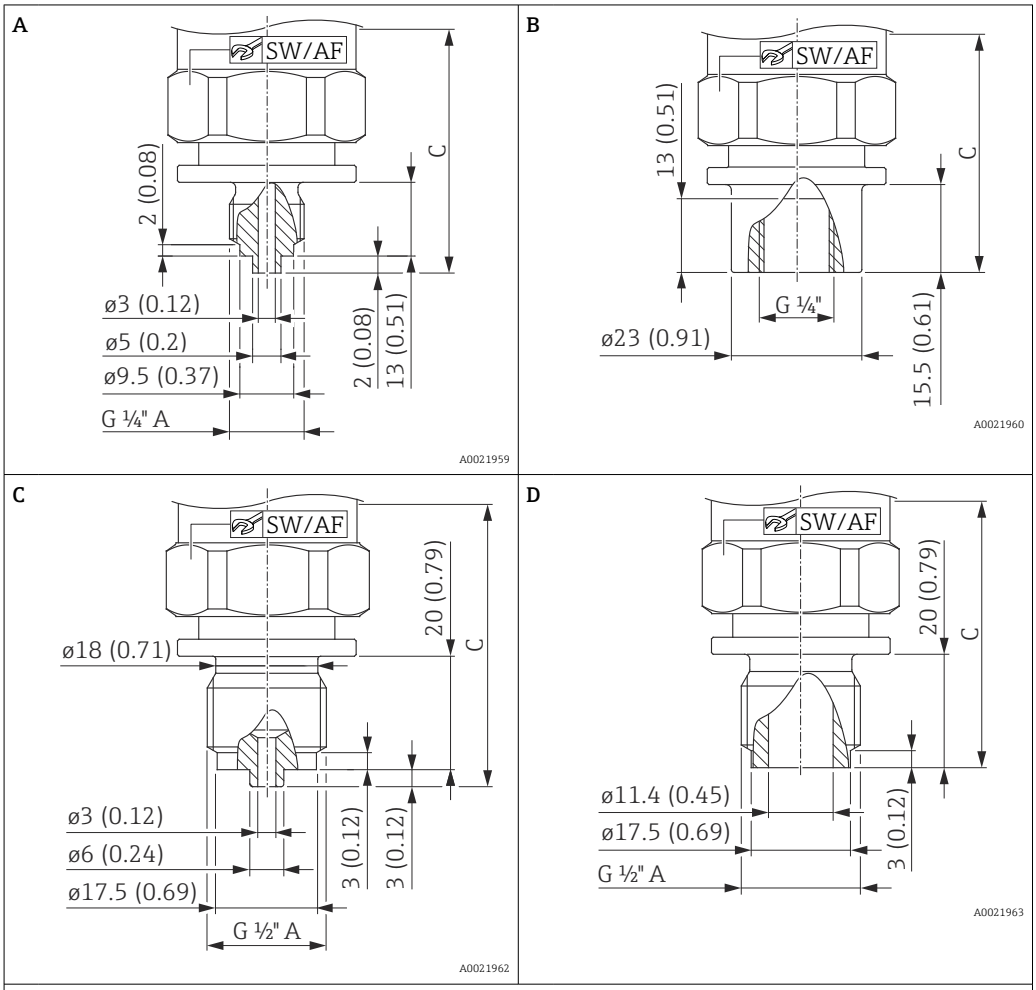
Engineering unit mm (in)

Device	Designation	Material	Weight	Option [1]
			kg (lbs)	
PMC21	JIS B0203 R 1/2 (male)	316L	0.180 (0.40)	ZJJ

1) Product Configurator, order code for "Process connection"

Process connections with internal, metal process isolating diaphragm

Thread ISO 228 G



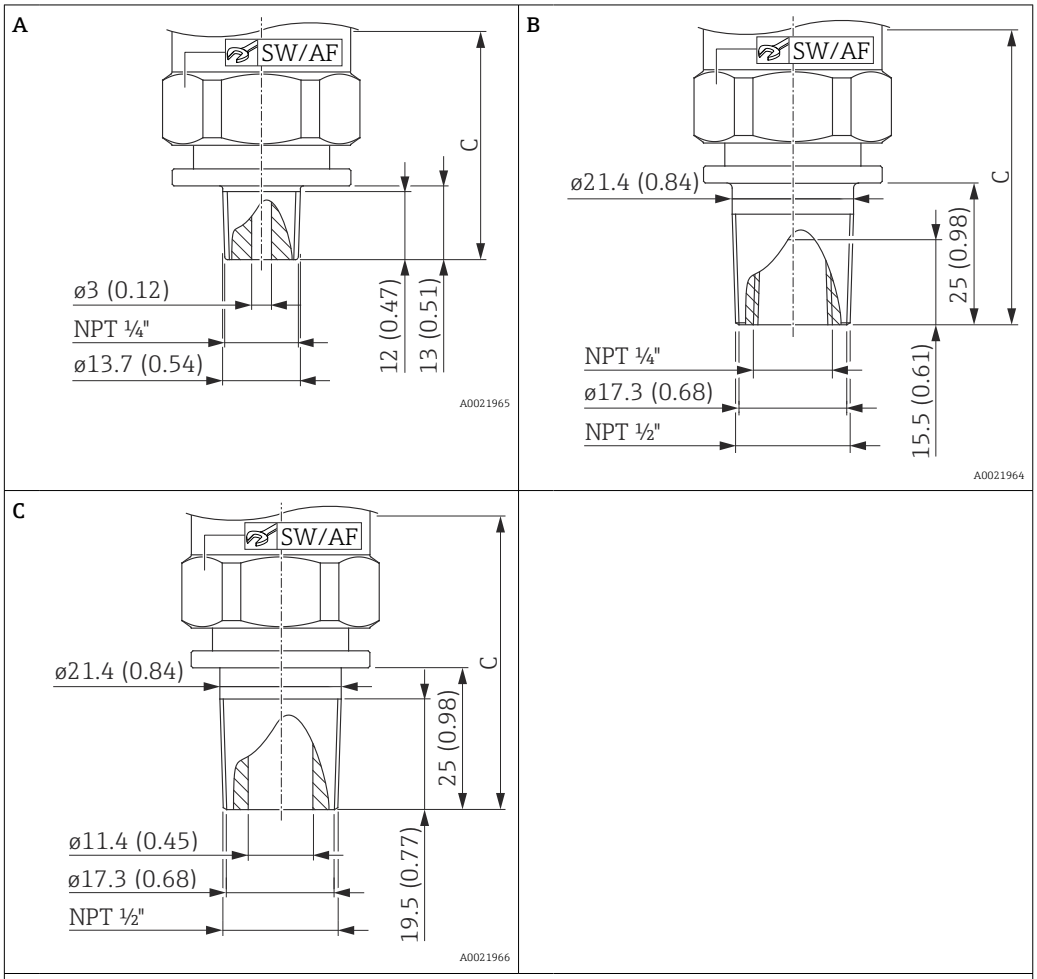
Engineering unit mm (in)

Position	Device	Description	Material	Nominal value to 100 bar (1 500 psi)			Nominal value 400 bar (6 000 psi)			Option [1]
				Weight kg (lbs)	Height C	SW/ AF	Weight kg (lbs)	Height C	SW/ AF	
A	PMP11 PMP21	Thread ISO 228 G ¼" A, EN 837	316L	0.200 (0.44)	57 (2.24)	32	0.240 (0.53)	69 (2.72)	27	WTJ
B	PMP11 PMP21	Thread ISO 228 G ¼" (female)	316L	0.220 (0.49)	57 (2.24)	32	0.260 (0.57)	69 (2.72)	27	WAJ
C	PMP11 PMP21	Thread ISO 228 G ½" A, EN 837	316L	0.220 (0.49)	65 (2.56)	32	0.270 (0.60)	77 (3.03)	27	WBJ
D	PMP11 PMP21	Thread ISO 228 G ½" A, bore11.4 mm (0.45 in)	316L	0.220 (0.49)	62 (2.44)	32	0.260 (0.57)	74 (2.91)	27	WWJ

1) Product Configurator, order code for "Process connection"

Process connections with internal, metal process isolating diaphragm

Thread ASME



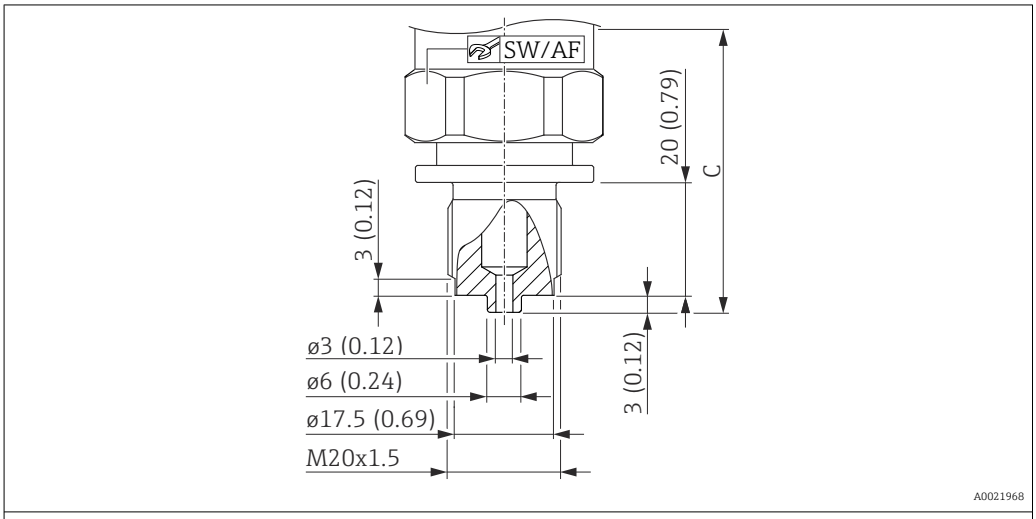
Engineering unit mm (in)

Item	Device	Designation	Material	Nominal value Up to 100 bar (1500 psi)			Nominal value 400 bar (6000 psi)			Approval	Option [1]
				Weight kg (lbs)	Height C	SW/ AF	Weight kg (lbs)	Height C	SW/ AF		
A	PMP11 PMP21	ASME ¼" MNPT, bore 3 mm (0.12 in)	316L	0.200 (0.44)	55 (2.17)	32	0.240 (0.53)	67 (2.64)	27	CRN	VUJ
B	PMP11 PMP21	ASME ½" MNPT, ¼" FNPT (female)	316L	0.230 (0.51)	67 (2.64)	32	0.260 (0.57)	79 (3.11)	27	CRN	VXJ
C	PMP11 PMP21	ASME ½" MNPT, bore 11.4 mm (0.45 in)	316L	0.230 (0.51)	67 (2.67)	32	0.270 (0.60)	79 (3.11)	27	CRN	VWJ

1) Product Configurator, order code for "Process connection"

Process connections with internal, metal process isolating diaphragm

Thread DIN13



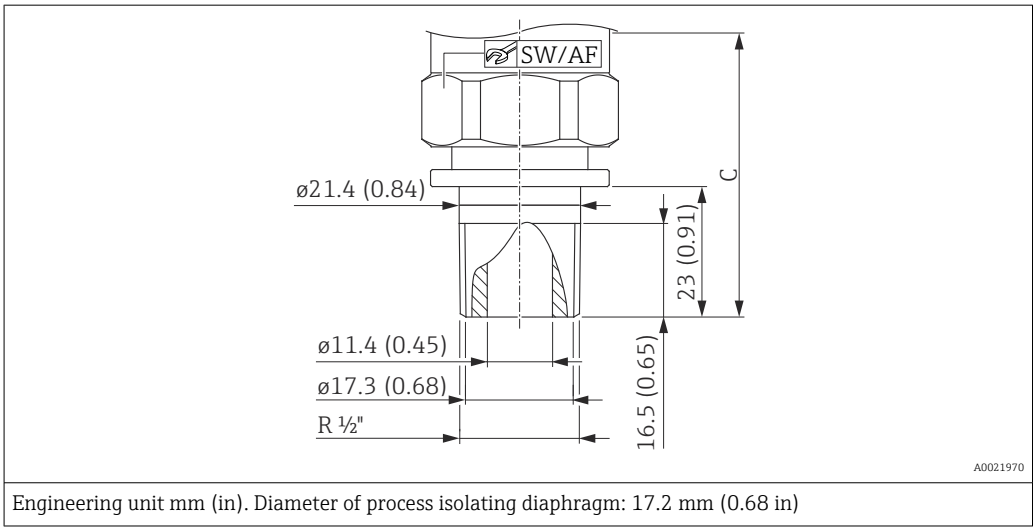
Engineering unit mm (in)

Description	Device	Material	Nominal value to 100 bar (1500 psi)			Nominal value 400 bar (6000 psi)			Option [1]
			Weight kg (lbs)	Height C	SW/ AF	Weight kg (lbs)	Height C	SW/ AF	
DIN 13 M20 x 1.5, EN 837, bore 3 mm (0.12 in)	PMP11 PMP21	316L	0.220 (0.49)	65 (2.56)	32	0.260 (0.57)	77 (3.03)	27	X4J

1) Product Configurator, order code for "Process connection"

Process connections with internal, metal process isolating diaphragm

Thread JIS B0203



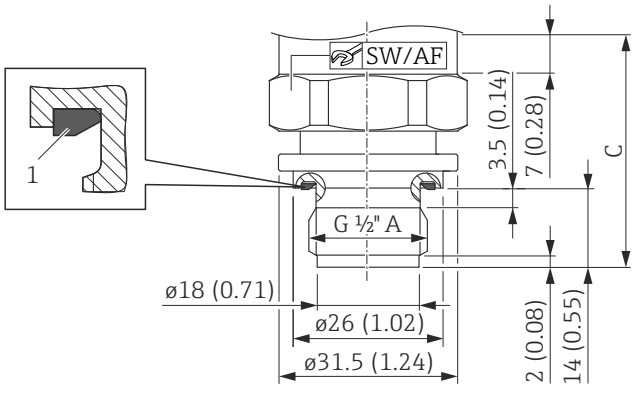
Engineering unit mm (in). Diameter of process isolating diaphragm: 17.2 mm (0.68 in)

Description	Device	Material	Nominal value to 100 bar (1500 psi)			Nominal value 400 bar (6000 psi)			Option [1]
			Weight kg (lbs)	Height C	SW/ AF	Weight kg (lbs)	Height C	SW/ AF	
JIS B0203 R ½" (male)	PMP21	316L	0.230 (0.51)	65 (2.56)	32	0.260 (0.57)	77 (3.03)	27	ZJJ

1) Product Configurator, order code for "Process connection"

Process connections with flush mount, metal process isolating diaphragm

Thread ISO 228 G

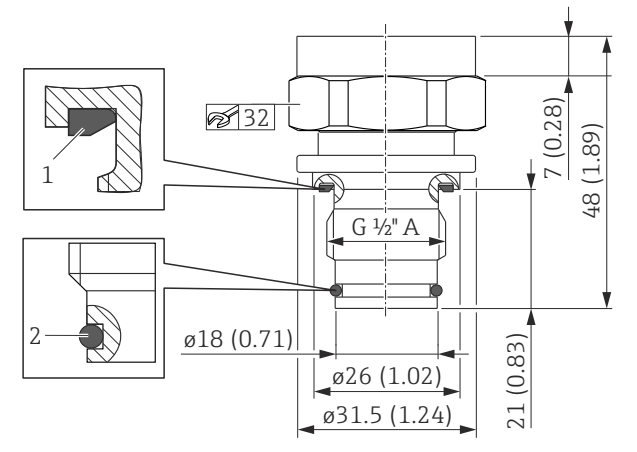


1 FKM form seal, pre-mounted

Engineering unit mm (in). Diameter of process isolating diaphragm: 17.2 mm (0.68 in)

Device	Designation	Material	Nominal value to 100 bar (1500 psi)			Nominal value 400 bar (6000 psi)			Option [1]
			Weight kg (lbs)	Height C	SW/ AF	Weight kg (lbs)	Height C	SW/ AF	
PMP11 PMP21	Thread ISO 228 G ½" A DIN3852, shape E	316L	0.140 (0.31)	41 (1.61)	32	0.120 (0.26)	35 (1.38)	32	WJJ

1) Product Configurator, order code for "Process connection"



1 FKM form seal, pre-mounted
2 FKM O-ring, pre-mounted

Engineering unit mm (in). Diameter of process isolating diaphragm: 17.2 mm (0.68 in)

Device [1]	Designation	Material	Weight kg (lbs)	Option [2]
PMP11 PMP21	Thread ISO 228 G ½" A O-ring seal, flush-mounted	316L	0.150 (0.33)	WUJ

1) Suitable for weld-in adapter 52002643 and 52010172
2) Product Configurator, order code for "Process connection"

Materials in contact with process

NOTICE

- Device components in contact with the process are listed in the "Mechanical construction" and "Ordering information" sections.

TSE Certificate of Suitability

The following applies to all device components in contact with the process:

- They do not contain any materials derived from animals.
- No additives or operating materials derived from animals are used in production or processing.

Process connections

Endress+Hauser supplies a threaded connection made of stainless steel in accordance with AISI 316L (DIN/ EN material number 1.4404 or 1.4435). With regard to their stability-temperature property, the materials 1.4404 and 1.4435 are grouped together under 13E0 in EN 1092-1: 2001 Tab. 18. The chemical composition of the two materials can be identical.

Process isolating diaphragm

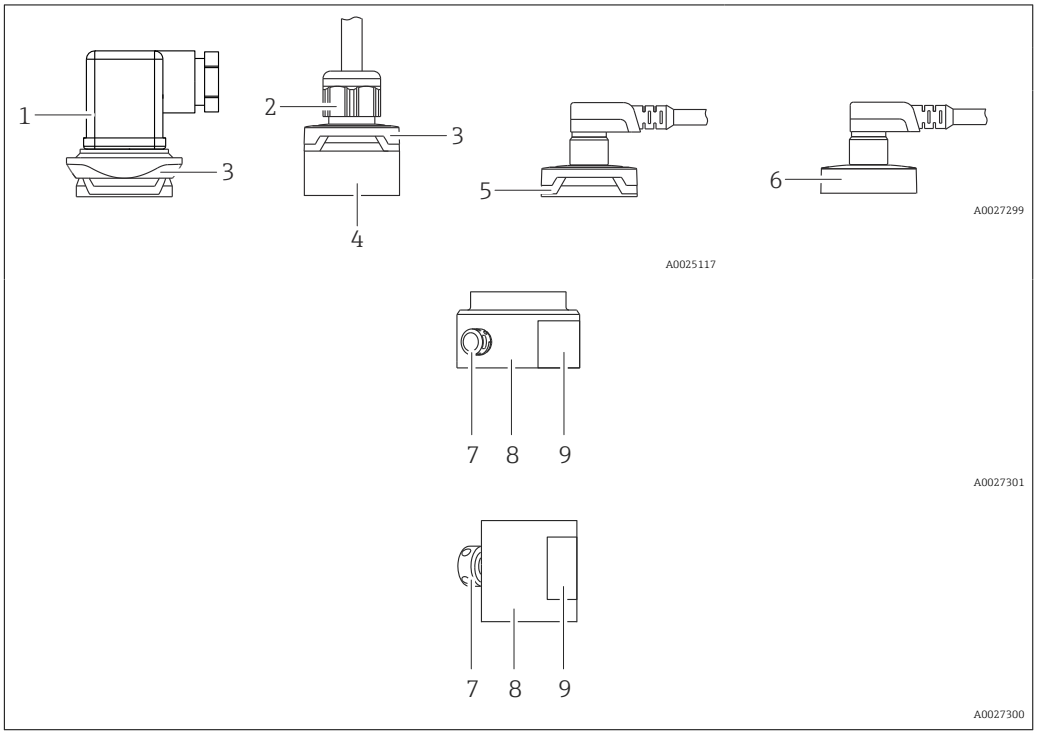
Description	Material
Ceramic process isolating diaphragm	Al_2O_3 aluminum-oxide ceramic, Ceraphire® FDA, ultrapure 99.9 % (see also www.endress.com/ceraphire) The US Food & Drug Administration (FDA) has no objections to the use of ceramics made from aluminum oxide as a surface material in contact with foodstuffs. This declaration is based on the FDA certificates of our ceramic suppliers.
Metal process isolating diaphragm	AISI 316L (DIN/EN material number 1.4435)

Seals

See the specific process connection.

Materials not in contact with process

Housing



Item number	Component	Material
1	Valve plug	▪ Seal: NBR ▪ Plug: PA ▪ Screw: V2A
2	Cable	▪ Pressure screw: PVDF ▪ Seal: TPE-V ▪ Cable: PUR (UL 94 V0)
3	Design element	PBT/PC
4	Connection	PPSU
5	M12 plug	Plastic: PPSU
6	M12 plug	316L (1.4404) For Ex ec: metal housing cap
7	Pressure compensation element	PMP11: PBT/PC PMP21 standard: PBT/PC PMP21 with Ex ec approval: 316L (1.4404)
8	Housing	316L (1.4404)
9	Nameplates	Plastic foil (attached to housing) or directly lasered onto the housing

Filling oil

Device	Filling oil
PMP11 PMP21	Synthetic oil polyalphaolefin FDA 21 CFR 178.3620, NSF H1

Cleaning

Device	Description	Option [1]
PMC11 PMP11 PMC21 PMP21	Cleaned from oil+grease	HA
PMC21	Cleaned for oxygen service	HB

1) Product Configurator, order code for "Service"

Operability

Plug-on display PHX20 (optional)

Devices with valve plug can be fitted with the optional local display PHX20.

Designation	Option [1]
Plug-on display PHX20, IP65	RU

1) Product Configurator, order code for "Accessories"

A 1-line liquid crystal display (LCD) is used. The local display shows measured values, fault messages and information messages. The device display can be turned in 90° steps. Depending on the orientation of the device, it is therefore easy to read the measured values.

Technical data

Display:	4-digit, red LED display
Digit height:	7.62 mm; programmable decimal point setting
Display range:	-1999...9999
Accuracy:	0.2% of span ±1 digit
Electrical connection:	to transmitter with 4 to 20 mA output and elbow plug DIN 43 650, with reverse polarity protection
Power supply for display:	not required, self-powered by the current loop
Voltage drop:	≤ 5 V (corresponds to load: max. 250 Ω)
Conversion rate:	3 measurements per second
Damping:	0.3 to 20 s (configurable)
Data backup:	non-volatile EEPROM
Error message:	▪ HI: Overranging ▪ LO: Underranging
Programming:	via 2 buttons, menu-guided, scaling of display range, decimal point, damping, error message
Degree of protection:	IP 65
Effect of temperature on display:	0.1% / 10 K
Electromagnetic compatibility (EMC):	Interference emission as per EN 50081, interference immunity as per EN 50082
Permitted current load:	max. 60 mA
Ambient temperature:	0 to +60 °C (+32 to +140 °F)
Housing material:	Plastic Pa6 GF30, blue Front screen made of PMMA, red
Order number:	52022914

Certificates and approvals

CE mark

The device meets the legal requirements of the relevant EC directives. Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.

RoHS

The measuring system complies with the substance restrictions of the Restriction on Hazardous Substances Directive 2011/65/EU (RoHS 2).

RCM-Tick marking

The supplied product or measuring system meets the ACMA (Australian Communications and Media Authority) requirements for network integrity, interoperability, performance characteristics as well as health and safety regulations. Here, especially the regulatory arrangements for electromagnetic compatibility are met. The products are labelled with the RCM- Tick marking on the name plate.



A0029561

EAC conformity

The PMC21, PMP21 and PMP23 devices meet the legal requirements of the applicable EAC directives. These are listed in the corresponding EAC Declaration of Conformity along with the standards applied.

Endress+Hauser confirms successful testing of the device by affixing to it the EAC mark.

Approval

CSA C/US General Purpose

Safety Instructions (XA)

Safety Instructions (XA) are supplied with the device depending on the approval. They are an integral part of the Operating Instructions.

The nameplate indicates the Safety Instructions (XA) that are relevant to the device.

Marine approval (pending)

Device	Designation	Option [1]
PMC21 PMP21	DNV GL	LE
PMC21 PMP21	ABS	LF
PMC21 PMP21	RINA	LV

1) Product Configurator, order code for "Additional approval"

Pressure Equipment Directive 2014/68/EU (PED)

Pressure equipment with allowable pressure ≤ 200 bar (2 900 psi)

Pressure equipment (with a maximum allowable pressure PS ≤ 200 bar (2 900 psi)) can be classified as pressure accessories in accordance with Pressure Equipment Directive 2014/68/EU. If the maximum allowable pressure is ≤ 200 bar (2 900 psi) and the pressurized volume of the pressure equipment is ≤ 0.1 l, the pressure equipment is subject to the Pressure Equipment Directive (cf. Pressure Equipment Directive 2014/68/EU, Article 4, point 3). The Pressure Equipment Directive only requires that the pressure equipment shall be designed and manufactured in accordance with the "sound engineering practice of a Member State".

Reasons:

- Pressure Equipment Directive (PED) 2014/68/EU Article 4, point 3
- Pressure equipment directive 2014/68/EU, Commission's Working Group "Pressure", Guideline A-05 + A-06

Note:

A partial examination shall be performed for pressure instruments that are part of safety equipment for the protection of a pipe or vessel from exceeding allowable limits (safety accessory in accordance with Pressure Equipment Directive 2014/68/EU, Article 2, point 4).

Pressure equipment with allowable pressure > 200 bar (2 900 psi)

Pressure equipment designated for application in every process fluid having a pressurized volume of <0.1 l and a max. allowable pressure PS > 200 bar (2 900 psi) must satisfy the essential safety requirements set out in Annex I of the Pressure Equipment Directive 2014/68/EU. According to Article 13 pressure equipment shall be classified by category in accordance with Annex II. Taking into account the low pressurized volume discussed above, the pressure devices are classed as category I pressure equipment. These devices must then bear the CE marking.

Reasons:

- Pressure Equipment Directive 2014/68/EU, Article 13, Annex II
- Pressure equipment directive 2014/68/EU, Commission's Working Group "Pressure", Guideline A-05

Note:

A partial examination shall be performed for pressure instruments that are part of safety equipment for the protection of a pipe or vessel from exceeding allowable limits (safety accessory in accordance with Pressure Equipment Directive 2014/68/EU, Article 2, point 4).

The following also applies:

PMP21 with threaded connection and internal process isolating diaphragm PN > 200 :

Suitable for stable gases in group 1, category I, module A

Other standards and guidelines

The applicable European guidelines and standards can be found in the relevant EU Declarations of Conformity. The following standards were also applied:

DIN EN 60770 (IEC 60770):

Transmitters for use in industrial process control systems Part 1: Methods for performance evaluation

Methods for evaluating the performance of transmitters for control and regulation in industrial process control systems.

DIN 16086:

Electrical pressure measuring instruments, pressure sensors, pressure transmitters, pressure measuring instruments, concepts, specifications on data sheets

Procedure for writing specifications in data sheets for electrical pressure measuring instruments, pressure sensors and pressure transmitters.

EN 61326-X:

EMC product family standard for electrical equipment for measurement, control and laboratory use.

EN 60529:

Degrees of protection provided by enclosures (IP code)

NAMUR - User association of automation technology in process industries.

NE21 - Electromagnetic Compatibility (EMC) of Industrial Process and Laboratory Control Equipment.

NE43 - Standardization of the Signal Level for the Failure Information of Digital Transmitters.

NE44 - Standardization of Status Indicators on PCT Instruments with the Help of Light Emitting Diodes

NE53 - Software of Field Devices and Signal-processing Devices with Digital Electronics

CRN approval

A CRN approval is available for some device versions. A CRN-approved process connection with a CSA approval must be ordered for a CRN-approved device. The CRN-approved devices are assigned the registration number 0F18141.5C.

Ordering information: Product Configurator, order code for "Process connection" (the CRN process connections are indicated appropriately in the "Mechanical construction" section.)

Calibration unit

Designation	Option [1]
Sensor range; %	A
Sensor range; mbar/bar	B
Sensor range; kPa/MPa	C
Sensor range; psi	F
Customer-specific; see additional spec.	J

1) Product Configurator, order code for "Calibration; unit"

Calibration

Designation	Option [1]
3-point calibration certificate [2]	F3

1) Product Configurator, order code for "Calibration"
2) No final test report for PNP outputs.

Inspection certificates

Device	Designation	Option [1]
PMC21 PMP21	3.1 Material documentation, wetted metal parts, EN10204-3.1 inspection certificate	JA

1) Product Configurator, order code for "Test, Certificate"

The documentation currently available can be found on the Endress+Hauser website: www.endress.com → Downloads or using the serial number of the device under Online Tools in the Device Viewer.

Service

- Cleaned of oil+grease (wetted)
- Checked, cleaned for O2 service
- Configured min alarm current

Product documentation on paper

Test reports, declarations and inspection certificates in hard copy can optionally be ordered via order code 570 "Service", option I7 "Product documentation on paper". The documents are then provided with the device upon delivery.

Ordering information

Detailed ordering information is available from the following sources:
- In the Product Configurator on the Endress+Hauser website: www.endress.com -> Click "Corporate" -> Select your country -> Click "Products" -> Select the product using the filters and search field -> Open product page -> The "Configure" button to the right of the product image opens the Product Configurator.
- From your Endress+Hauser Sales Center: www.addresses.endress.com

Product Configurator - the tool for individual product configuration
- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

Scope of delivery
- Measuring device
- Optional accessories
- Brief Operating Instructions
- Certificates

Accessories

Weld-in adapter

Various weld-in adapters are available for installation in vessels or pipes.

Device	Description	Option [1]	Order number
PMP21	Weld-in adapter G½, 316L	QA	52002643
PMP21	Weld-in adapter G½, 316L 3.1 EN10204-3.1 material, inspection certificate	QB	52010172
PMP21	Weld-in tool adapter G½, brass	QC	52005082
PMP21	Weld-in adapter G1/2, 316L, for G1/2 A DIN 3852	QM	71389241
PMP21	Weld-in adapter G1/2, 316L, 3.1, for G1/2 A DIN 3852, EN10204-3.1 material, inspection certificate	QN	71389243

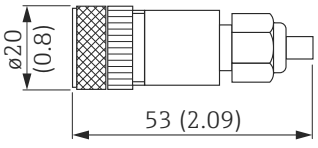
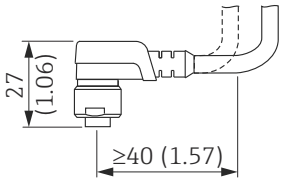
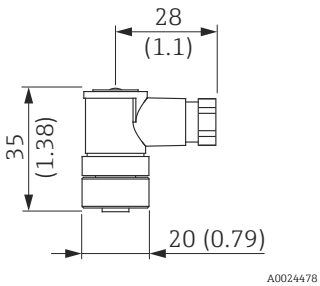
1) Product Configurator, order code for "Enclosed accessories"

If installed horizontally and weld-in adapters with a leakage hole are used, ensure that the leakage hole is pointing down. This allows leaks to be detected as quickly as possible.

Plug-on display PHX20

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M12 plug connectors

Connector	Degree of protection	Material	Option [1]	Order number
M12 (self-terminated connection at M12 plug) 	IP67	▪ Union nut: Cu Sn/Ni ▪ Body: PBT ▪ Seal: NBR	R1	52006263
M12 90 degrees with 5m (16 ft) cable 	IP67	▪ Union nut: GD Zn/Ni ▪ Body: PUR ▪ Cable: PVC Cable colors ▪ 1 = BN = brown ▪ 2 = WT = white ▪ 3 = BU = blue ▪ 4 = BK = black	RZ	52010285
M12 90 degrees (self-terminated connection at M12 plug) 	IP67	▪ Union nut: GD Zn/Ni ▪ Body: PBT ▪ Seal: NBR	RM	71114212

1) Product Configurator, order code for "Enclosed accessories"

Supplementary documentation

Field of Activities	Pressure measurement, powerful instruments for process pressure, differential pressure, level and flow: FA00004P
Technical Information	▪ TI00241F: EMC Test Procedures ▪ TI00426F: Weld-in adapters, process adapters and flanges (overview)
Operating Instructions	BA01271P
Brief Operating Instructions	KA01164P
Safety Instructions (XA)	Safety Instructions (XA) are supplied with the device depending on the approval. They are an integral part of the Operating Instructions. The nameplate indicates the Safety Instructions (XA) that are relevant to the device.

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