Technical Information
Cerabar PMP11, PMP21

Process pressure measurement

Pressure transducer with 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

Table of contents

Document information

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

Symbol	Meaning
DANGER	**DANGER!** This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
WARNING	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
CAUTION	**CAUTION!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE	**NOTE!** This symbol contains information on procedures and other facts which do not result in personal injury.

Electrical symbols

Symbol	Meaning	Symbol	Meaning
⎓	Direct current	~	Alternating current
⎓ ~	Direct current and alternating current	⏚	**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
⏚	**Protective ground connection** A terminal which must be connected to ground prior to establishing any other connections.	⏚	**Equipotential connection** A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of practice.

Symbols for certain types of information

Symbol	Meaning
✓	**Permitted** Procedures, processes or actions that are permitted.
✗	**Forbidden** Procedures, processes or actions that are forbidden.
i	**Tip** Indicates additional information.
	Reference to documentation
	Reference to page
	Reference to graphic
	Visual inspection

Symbols in graphics

Symbol	Meaning
1, 2, 3 ...	Item numbers
1. , 2. , 3. ...	Series of steps
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections

Documentation

The document types listed are available:
In the Downloads area of the Endress+Hauser website: www.endress.com → Downloads

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

The Brief Operating 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)

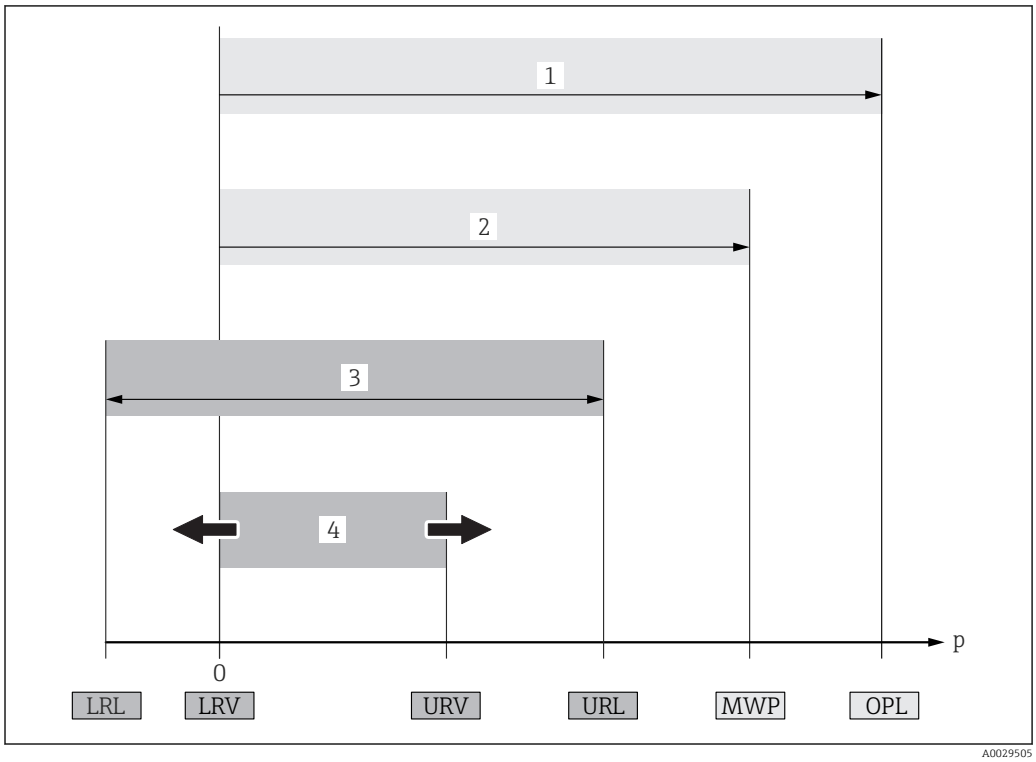
Safety Instructions (XA) are supplied with the device depending on the approval. These instructions are an integral part of the Operating Instructions.

Device	Directive	Documentation	Option [1]
PMP21	ATEX II 1/2G Ex ia IIC T4	XA01271P	BA
PMP21	ATEX II 3G Ex eC IIC T4	In preparation	BC
PMP21	FM IS Cl. I, Div.1 Gr. A-D	XA01321P	FA
PMP21	CSA C/US IS Cl. I Div. 1 Gr. A-D	XA01322P	CB
PMP21	CSA General Purpose	In preparation	CA
PMP21	GOST Ex ia IIC T4	Under development	GA
PMP21	IEC Ex ia IIC T4 Ga/Gb	XA01271P	IA
PMP21	NEPSI Ex ia IIC T4	XA01363P	NA
PMP21	TIIS Ex ia IIC T4	In preparation	TA

1) Product Configurator, order code for "Approval"

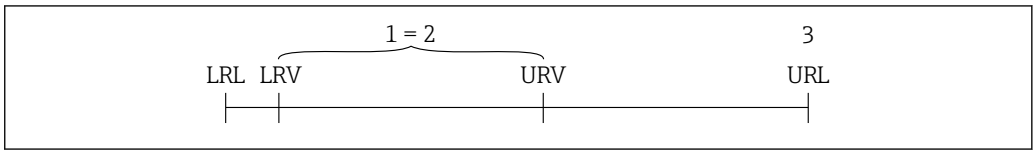
The nameplate provides information on the Safety Instructions (XA) that are relevant for the device.

Terms and abbreviations



Item	Term/ abbreviation	Explanation
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. Also observe pressure-temperature dependency. For the relevant standards and additional notes, see the "Pressure specifications" section → 🖹 22. The OPL may only be applied for a limited 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. Also observe pressure-temperature dependency. For the relevant standards and additional notes, see the "Pressure specifications" section → 🖹 22. The MWP may be applied at the device for an unlimited period. The MWP can also be found on the nameplate.
3	Maximum sensor measuring range	Span between LRL and URL This sensor measuring range is equivalent to the maximum calibratable/adjustable span.
4	Calibrated/ adjusted span	Span between 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)	Turn down The turn down is preset at the factory and cannot be changed. Example - see the following section.

Turn down calculation



1 Calibrated/adjusted span
2 Zero-based span
3 URL sensor

Example

- Sensor:10 bar (150 psi)
- Upper range value (URL) = 10 bar (150 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.

- 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)

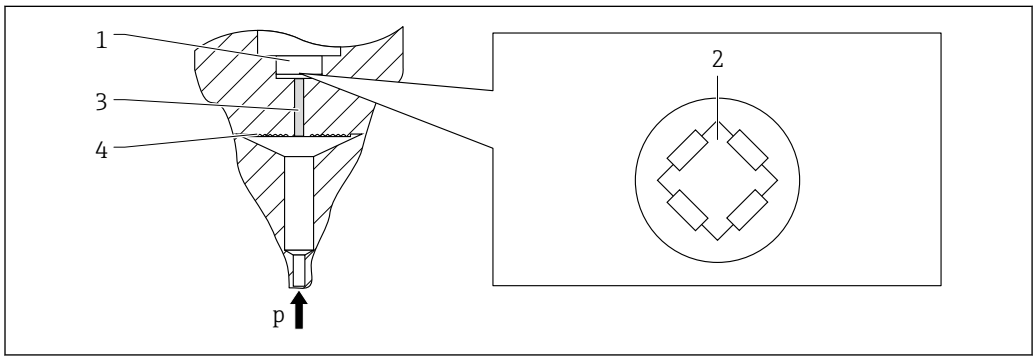
Function and system design

Measuring principle - process pressure measurement

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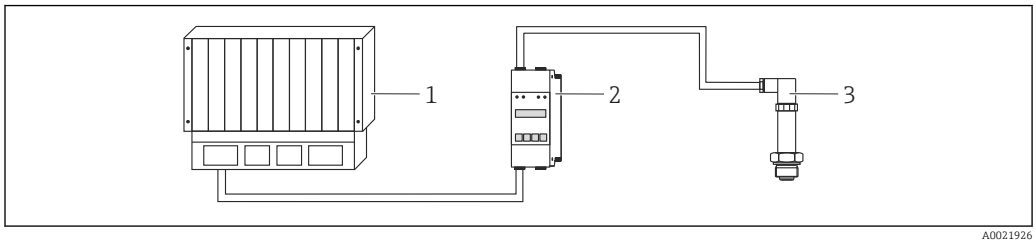
1 Silicon measuring element, substrate
2 Wheatstone bridge
3 Channel with fill fluid
4 Metal process isolating diaphragm

Measuring system

A complete measuring system comprises, for example:



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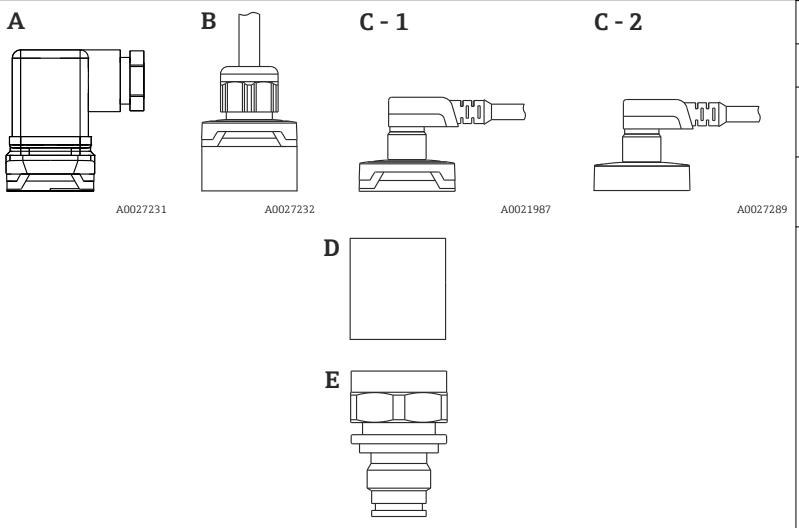
1 PLC (programmable logic control)
2 RN221N / RMA42
3 Pressure transducer

Device features

	PMP11
Field of application	Gauge pressure
Process connections	▪ Thread ISO 228, also flush-mount ▪ Thread ASME ▪ DIN 13
Measuring ranges	From −400 to +400 mbar (−6 to +6 psi) to −1 to +40 bar (−15 to +600 psi).
OPL (depends on the measuring range)	Max. 0 to +160 bar (0 to +2 400 psi)
Process temperature range	−25 to +85 °C (−13 to +185 °F)
Ambient temperature range	−40 to +85 °C (−40 to +185 °F)
Reference accuracy	Up to 0.5 %, TD 5:1, for details see the "Reference accuracy" section.
Supply voltage	▪ 4 to 20 mA output: 10 to 30V DC ▪ 0 to 10 V output: 12 to 30V DC
Output	▪ 4 to 20 mA ▪ 0 to 10 V
Material	▪ Housing made from 316L (1.4404) ▪ Process connections made from 316L (1.4404) ▪ Process isolating diaphragm made from 316L (1.4435)
Options	▪ Final inspection report ▪ Cleaned from oil+grease

	PMP21
Field of application	Gauge pressure and absolute pressure
Process connections	▪ Thread ISO 228, also flush-mount ▪ Thread DIN 13 ▪ Thread ASME ▪ Thread JIS
Measuring ranges	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)	Max. 0 to +600 bar (0 to +9 000 psi)
Process temperature range	−40 to +100 °C (−40 to +212 °F)
Ambient temperature range	−40 to +85 °C (−40 to +185 °F)
Reference accuracy	Up to 0.3 %, TD 5:1, for details see the "Reference accuracy" section.
Supply voltage	10 to 30 V DC
Output	4...20 mA
Material	▪ Housing made from 316L (1.4404) ▪ Process connections made from 316L (1.4404) ▪ Process isolating diaphragm made from 316L (1.4435)
Options	▪ Ex approvals ▪ Marine certificate ▪ Min. alarm current setting ▪ 3.1 Material certificates ▪ Final inspection report ▪ Cleaned from oil+grease

Product design

Overview	Item	Description
	A	Valve plug
	B	Cable
	C- 1	M12 plug Housing cap made of plastic
	C- 2	M12 plug For Ex eC: metal housing cap
	D E	Housing Process connection (sample illustration)

System integration

The device can be given a tag name (max. 8 alphanumeric characters).

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

1) Product Configurator, order code for "Identification"

Input

Measured variable

Measured process variable

- PMP11: gauge pressure
- PMP21: gauge pressure or absolute pressure

Calculated process variable

Pressure

Measuring range

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 (0.6)	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)	1 (15)	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 (0.6)	6.6 (99)	8 (120)	0 to 2 bar (0 to 30 psi)	1K
4 bar (60 psi) [4]	PMP11 PMP21	−1 (−15)	+4 (+60)	0.8 (1.2)	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 (30)	26.7 (400.5)	40 (600)	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)	40 (600)	60 (900)	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 (0.6)	1 (15)	1.6 (24)	0 to 400 mbar (0 to 6 psi)	2F
1 bar (15 psi) [4]	PMP21	0 (0)	1 (+15)	1 (15)	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 (0.6)	6.6 (99)	8 (120)	0 to 2 bar (0 to 30 psi)	2K
4 bar (60 psi) [4]	PMP21	0 (0)	4 (+60)	0.8 (1.2)	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)	4 (60)	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)

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

Device	Range	400 mbar (6 psi)	1 bar (15 psi)	2 bar (30 psi) 4 bar (60 psi) 10 bar (150 psi) 25 to 400 bar (375 to 6 000 psi)	6 bar (90 psi) 16 bar (240 psi)
PMP11	0.5%	TD 1:1	TD 1:1 to TD 2.5:1	TD 1:1 to TD 5:1	TD 2.5:1
PMP21	0.3%	TD 1:1	TD 1:1 to TD 2.5:1	TD 1:1 to TD 5:1	TD 2.5:1

Output

Output signal

Description	Option [1]
4 to 20 mA (two-wire)	1
PMP11: 0 to 10 V output (three-wire)	2

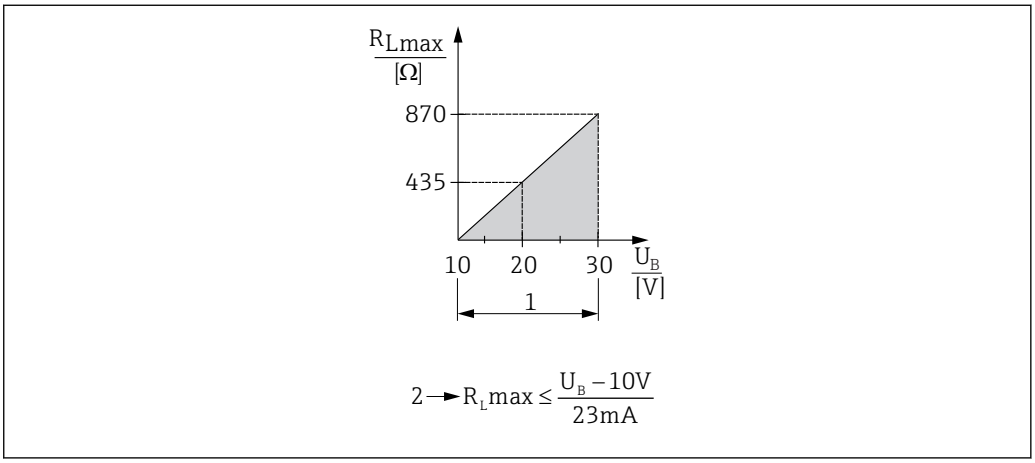
1) Product Configurator, order code for "Output"

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 (including line resistance) must not be exceeded depending on the supply voltage U_B of the supply unit.



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1 Power supply 10 to 30 V DC for intrinsically safe device versions
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

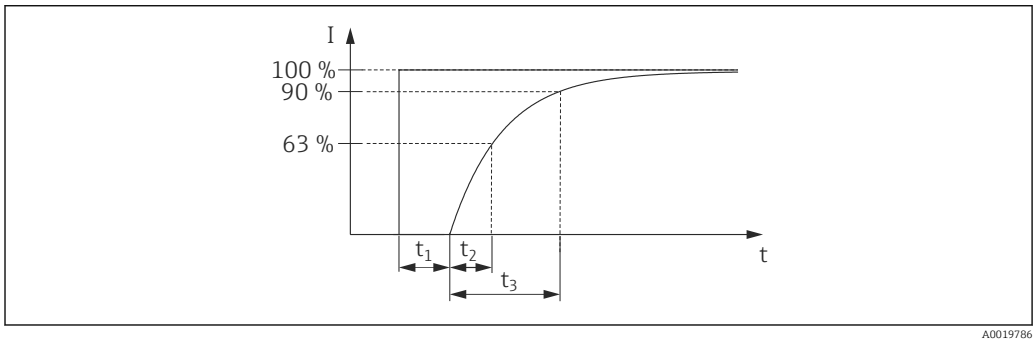
Alarm current

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

1) Product Configurator, order code for "Service"

Dead time, time constant

Presentation of the dead time and the time constant:



Dynamic behavior

Analog electronics

Dead time (t_1) [ms]	Time constant (T63), t_2 [ms]	Time constant (T90), t_3 [ms]
6 ms	10 ms	20 ms

Power supply

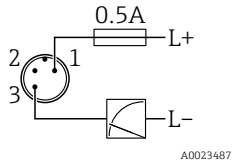
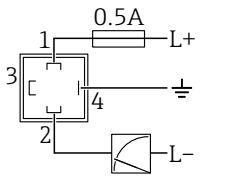
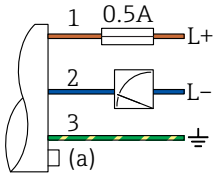
⚠ WARNING

Limitation of electrical safety due to incorrect connection!

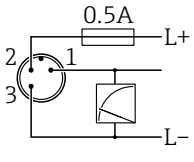
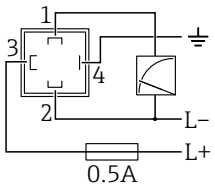
- In accordance with IEC/EN61010 a separate circuit breaker must be provided for the device .
- When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings.
- All 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.
- The device must be operated with a 500 mA fine-wire fuse (slow-blow).

Terminal assignment

4 to 20 mA output

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

0 to 10 V output

Device	M12 plug	Valve plug	Cable
PMP11			-

Supply voltage

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

Current consumption

Number of wires	Device	Normal operation	Alarm [1]
2	PMP11 PMP21	≤ 26 mA	> 21 mA
3	PMP11	In preparation	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 (status same as for no power supply).

Electrical connection

Degree of protection

Device	Connection	Climate class	Option [1]
PMP21	Cable5 m (16 ft)	IP66/68 [2] NEMA type 4X/6P enclosure	A
PMP21	Cable10 m (33 ft)	IP66/68 [2]NEMA type 4X/6P enclosure	B
PMP21	Cable25 m (82 ft)	IP66/68 [2]NEMA type 4X/6P enclosure	C
PMP11	M12 plug made of plastic	IP65 NEMA type 4X enclosure	L
PMP21	M12 plug made of plastic	IP65/67 NEMA type 4X enclosure	M
PMP11 PMP21	Valve plug ISO4400 M16	IP65 NEMA type 4X enclosure	U
PMP11 PMP21	Valve plug ISO4400 NPT ½	IP65 NEMA type 4X enclosure	V

1) Product Configurator, order code for "Electrical connection"
2) IP 68 (1.83 mH2O for 24 h)

Cable specification

For valve plug: < 1.5 mm^2 (16 AWG) and Ø3.5 to 6.5 mm (0.14 to 0.26 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 URL/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 metallic 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)
- Humidityφ= constant, in range: 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 → 🖹 18)
- Zero based span
- Process isolating diaphragm material: AISI 316L (1.4435)
- Filling oil: NSF-H1 synthetic oil in accordance with FDA 21 CFR 178.3570
- Supply voltage: 24 V DC ±3 V DC

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

→ 🖹 18

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	TD	% of the URV	Typical non-linearity	Typical non-repeatability
PMP11	TD 1:1 to TD 5:1	±0.5	Under development	Under development
PMP21	TD 1:1 to TD 5:1	±0.3	Under development	Under development

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

Measuring ranges	1 year	5 years	10 year
	% of URL		
400 mbar (6 psi)to 400 bar (6 000 psi)	±0.2	±0.4	±0.5

Switch-on time

≤2 s

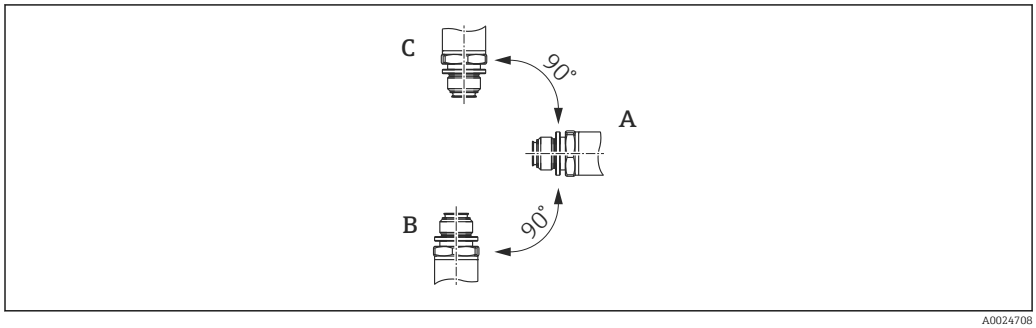
Installation

Installation conditions

- No moisture may enter the housing when installing or operating the device, or when establishing the electrical connection.
- 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.



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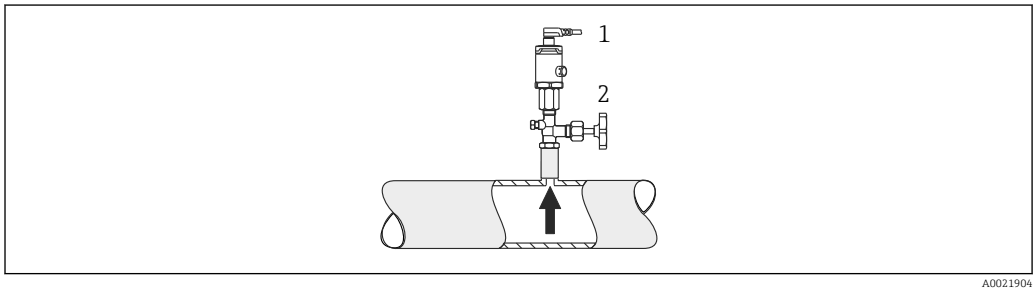
Process isolating diaphragm axis is horizontal (A)	Process isolating diaphragm pointing upwards (B)	Process isolating diaphragm pointing downwards (C)
Calibration position, no effect	Under development	Under development

Mounting location

Pressure measurement

Pressure measurement in gases

Mount the device (1) with the shutoff device (2) above the tapping point to ensure that any condensate can drain off into the process.



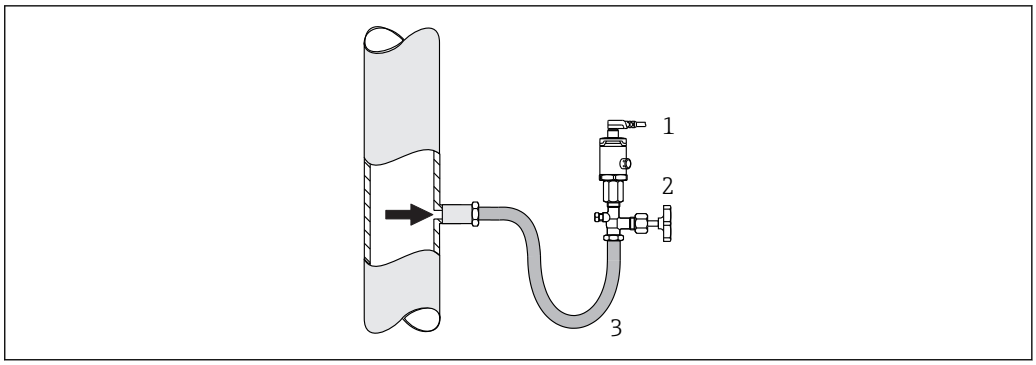
A0021904

Pressure measurement in vapors

For pressure measurement in vapors, use a siphon (3). The siphon reduces the temperature to almost ambient temperature.

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

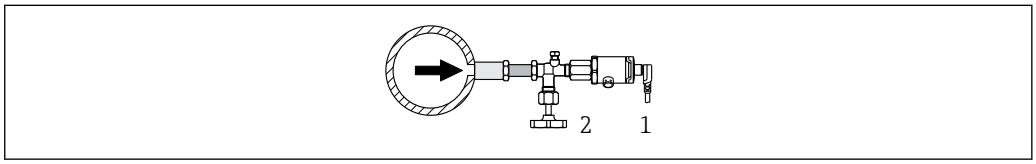
Note the max. permitted ambient temperature of the transmitter!



A0024395

Pressure measurement in liquids

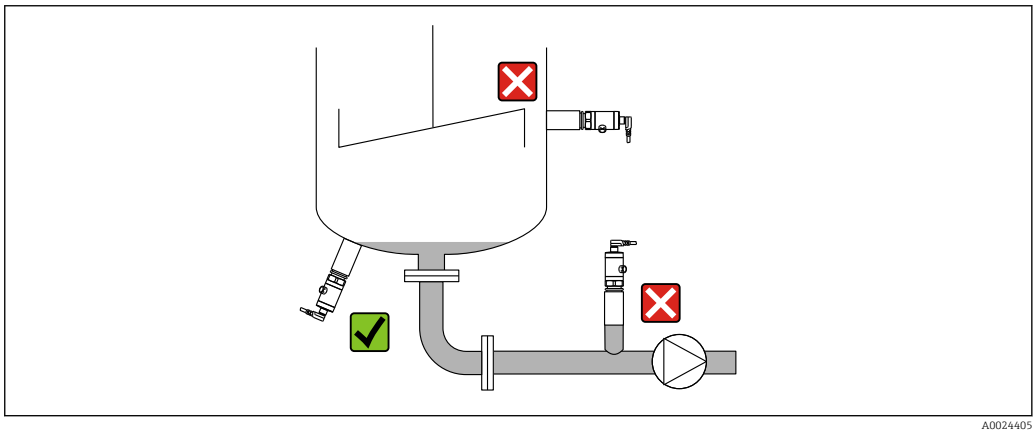
Mount the device (1) with a shutoff device (2) at the same height as the tapping point.



A0024399

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

Environment

Ambient temperature range

Device	Ambient temperature range
PMP11 PMP21	−40 to +85 °C (−40 to +185 °F)
PMP21	Devices for hazardous areas: −40 to +70 °C (−40 to +158 °F)
PMP11 PMP21	Devices with M12 plug: −25 to +70 °C (−13 to +158 °F)

Storage temperature range

−40 to +85 °C (−40 to +185 °F)

Climate class

Device	Climate class	Note
PMP11 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	Climate class	Option [1]
PMP21	Cable5 m (16 ft)	IP66/68 [2] NEMA type 4X/6P enclosure	A
PMP21	Cable10 m (33 ft)	IP66/68 [2]NEMA type 4X/6P enclosure	B
PMP21	Cable25 m (82 ft)	IP66/68 [2]NEMA type 4X/6P enclosure	C
PMP11	M12 plug made of plastic	IP65 NEMA type 4X enclosure	L
PMP21	M12 plug made of plastic	IP65/67 NEMA type 4X enclosure	M
PMP11 PMP21	Valve plug ISO4400 M16	IP65 NEMA type 4X enclosure	U
PMP11 PMP21	Valve plug ISO4400 NPT ½	IP65 NEMA type 4X enclosure	V

1) Product Configurator, order code for "Electrical connection"
2) IP 68 (1.83 mH2O for 24 h)

Vibration resistance

As per IEC61298-3 Environmental Category D, EMC 1

Test standard	Vibration resistance
In preparation	In preparation

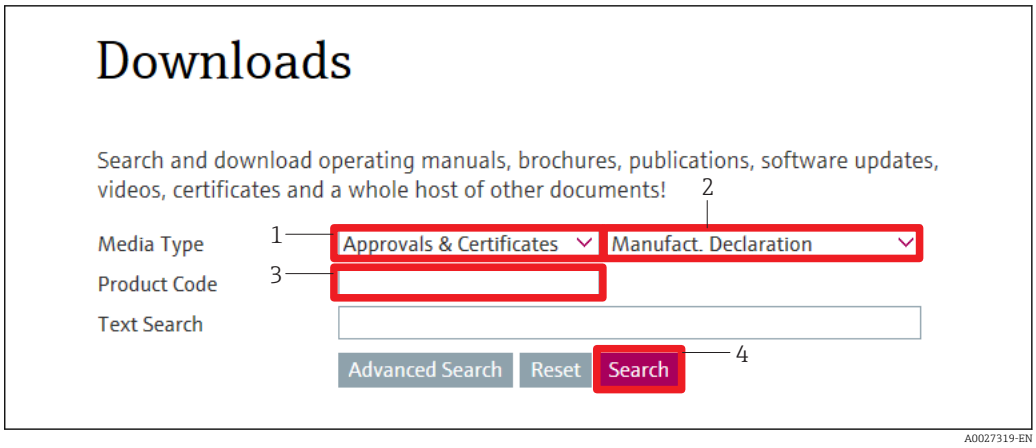
Electromagnetic compatibility

- Interference emission as per EN 61326 equipment B
- Interference immunity as per EN 61326 appendix A (industrial sector)
- NAMUR recommendation EMC (NE21)
- Maximum deviation: under development

For further details refer to the Declaration of Conformity. A description of how to download this document is provided in the next section.

Downloading the Declaration of Conformity

http://www.endress.com/en/download



1. Select "Approvals & Certificates"
2. Select "Manufact. Declaration"
3. Enter the required product code
4. Click "Search"

The available downloads are displayed.

Process

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 (EC Directive 97/23/EC) 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.
- Steam hammering must be avoided. 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.

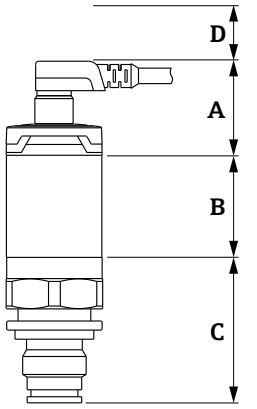
Mechanical construction

Design, dimensions

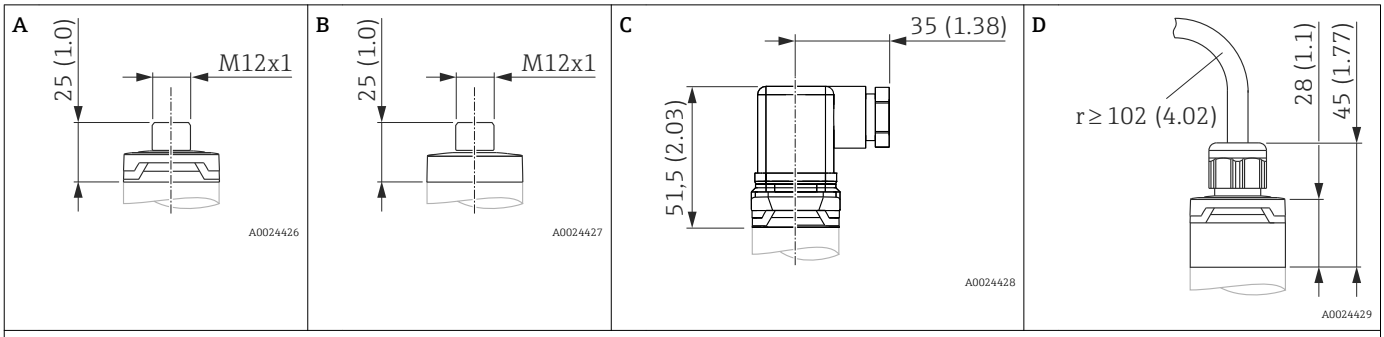
Device height

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	→ 📄 23	(A)	
Housing height	→ 📄 24	(B)	
Process connection height	→ 📄 25	(C)	
Installation distance	-	(D)	

Electrical connection



Engineering unit mm (in)

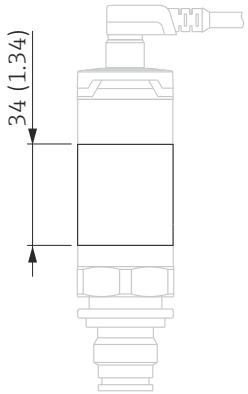
Item	Description	Material	Weight kg (lbs)	Device	Option [1]
A	M12 plug IP65	Housing cap made of plastic	0.012 (0.03)	PMP11	L
A	M12 plug IP65/67	Housing cap made of plastic	0.012 (0.03)	PMP21	M Plug connector with cable can be ordered as an accessory
B	M12 plug IP66/67/69K [2]	Housing cap made of metal	0.030 (0.07)	PMP21	In the case of Ex eC type of protection, the housing cap is made of metal.
C	M16 valve plug	Plastic PPSU	0.060 (0.14)	PMP11 PMP21	U
C	NPT ½ valve plug	Plastic PPSU	0.060 (0.14)	PMP11 PMP21	V
D	Cable5 m (16 ft)	PUR (UL94V0)	0.280 (0.62)	PMP21	A

Item	Description	Material	Weight kg (lbs)	Device	Option [1]
D	Cable10 m (33 ft)	PUR (UL94V0)	0.570 (1.26)	PMP21	B
D	Cable25 m (82 ft)	PUR (UL94V0)	1,400 (3.09)	PMP21	C

1) Product Configurator, order code for "Electrical connection"
2) The IP69K protection class is defined in accordance with DIN 40050 Part 9. This standard was withdrawn on November 1, 2012 and replaced by DIN EN 60529. The name of the IP protection class changed to IP69 as part of this.

Housing

B



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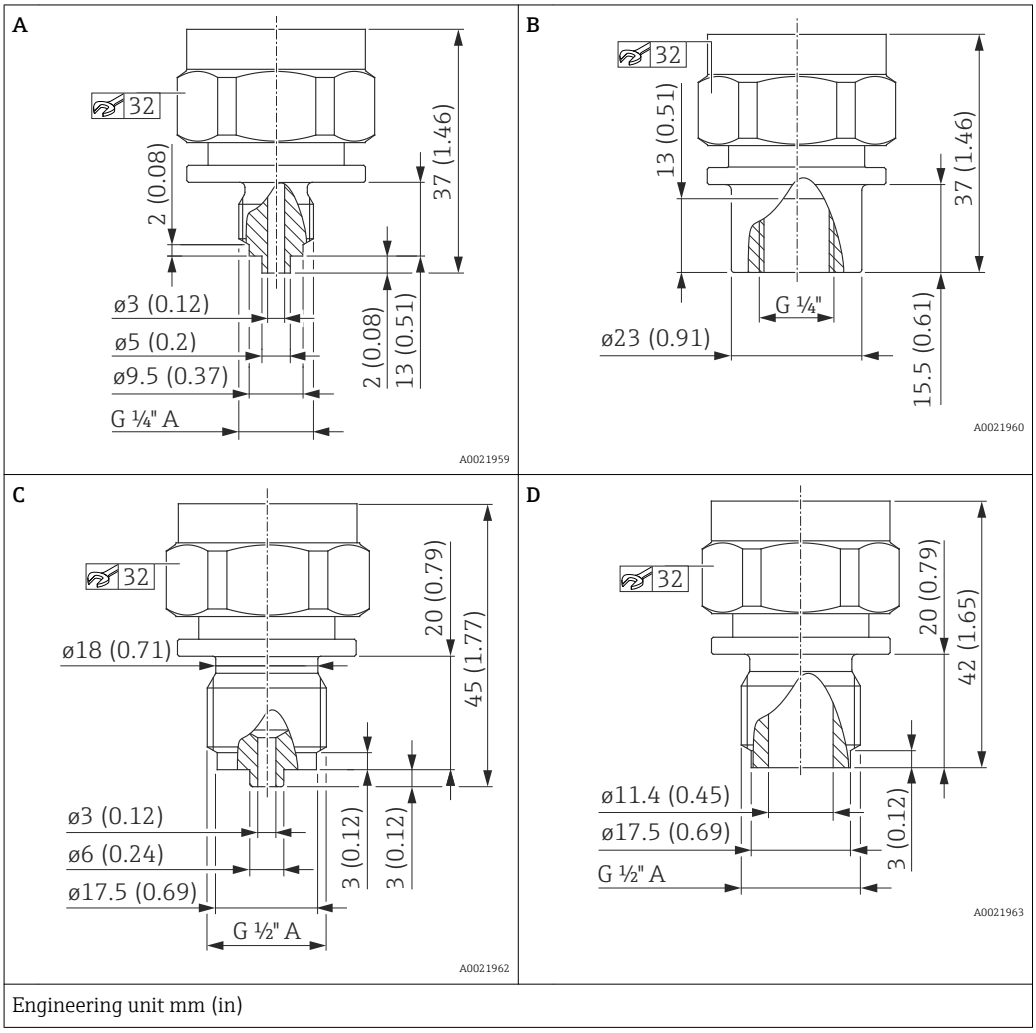
Engineering unit mm (in)

Item	Device	Material	Weight kg (lbs)
B	PMP11 PMP21	Stainless steel 316L	0.090 (0.20)

Process connections with internal, metal process isolating diaphragm

Thread ISO 228 G



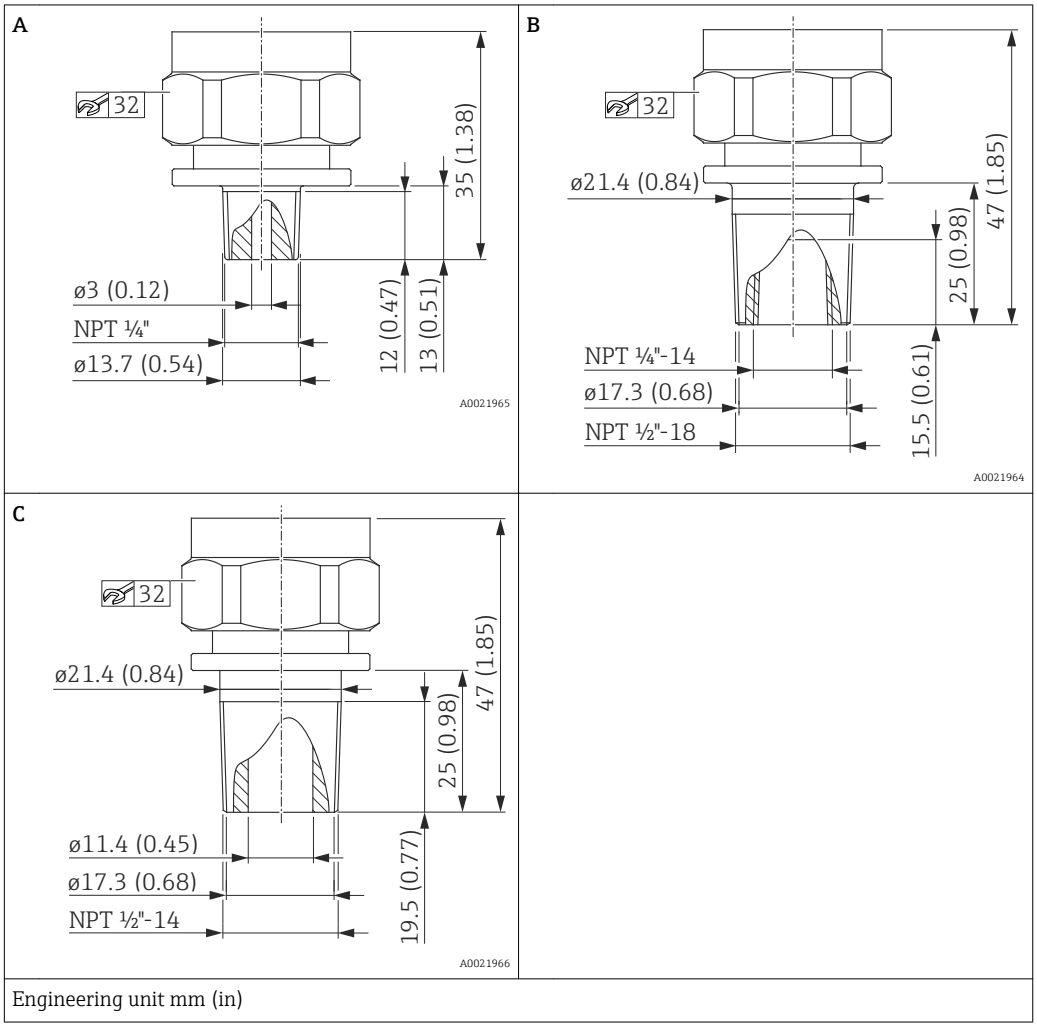
Engineering unit mm (in)

Item	Device	Description	Material	Weight kg (lbs)		Option [1]
				Nominal value to 100 bar (1 500 psi)	Nominal value 400 bar (6 000 psi)	
A	PMP11 PMP21	Thread ISO 228 G ¼" A, EN 837	316L	0.200 (0.44)	0.240 (0.53)	WTJ
B	PMP11 PMP21	Thread ISO 228 G ¼" (female)	316L	0.220 (0.49)	0.260 (0.57)	WAJ
C	PMP11 PMP21	Thread ISO 228 G ½" A, EN 837	316L	0.220 (0.49)	0.270 (0.60)	WBJ
D	PMP11 PMP21	Thread ISO 228 G ½" A, bore11.4 mm (0.45 in)	316L	0.220 (0.49)	0.260 (0.57)	WWJ

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

Process connections with internal, metal process isolating diaphragm

Thread ASME



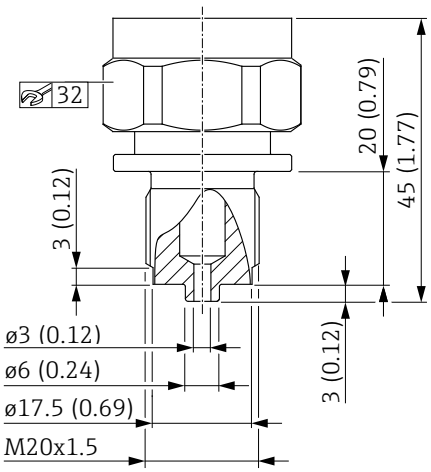
Engineering unit mm (in)

Item	Device	Description	Material	Weight kg (lbs)		Approval	Option [1]
				Nominal value to 100 bar (1 500 psi)	Nominal value 400 bar (6 000 psi)		
A	PMP11 PMP21	ASME ¼" MNPT, bore3 mm (0.12 in)	316L	0.200 (0.44)	0.240 (0.53)	CRN (under development)	VUJ
B	PMP11 PMP21	ASME ½" MNPT, ¼" FNPT (female)	316L	0.230 (0.51)	0.260 (0.57)	CRN (under development)	VXJ
C	PMP11 PMP21	ASME ½" MNPT, bore11.4 mm (0.45 in)	316L	0.230 (0.51)	0.270 (0.60)	CRN (under development)	VWJ

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

Process connections with internal, metal process isolating diaphragm

Thread DIN13



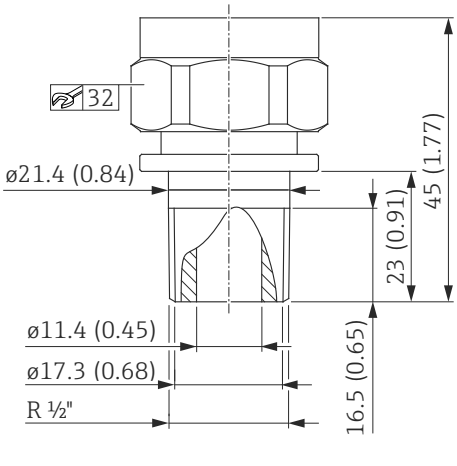
Engineering unit mm (in)

Description	Device	Material	Weight kg (lbs)		Option [1]
			Nominal value to 100 bar (1500 psi)	Nominal value 400 bar (6000 psi)	
DIN 13 M20 x 1.5, EN 837, bore 3 mm (0.12 in)	PMP11 PMP21	316L	0.220 (0.49)	0.260 (0.57)	X4J

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

Process connections with flush-mounted, metal process isolating diaphragm

Thread JIS B0203



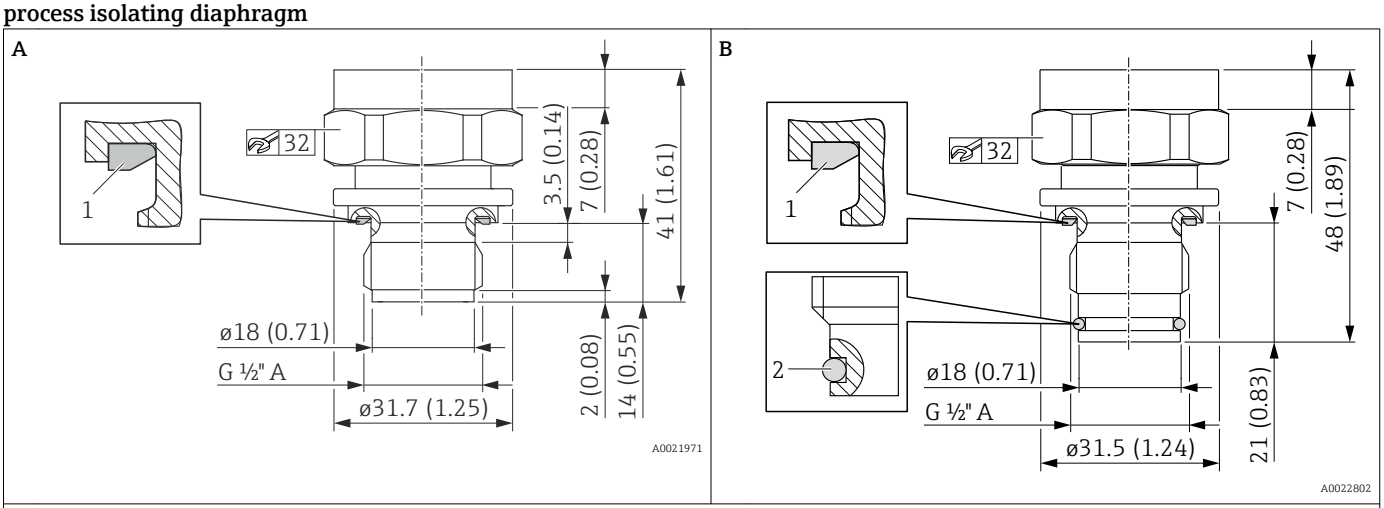
Engineering unit mm (in). Diameter of process isolating diaphragm: 17.2 mm (0.68 in)

Description	Device	Material	Weight kg (lbs)		Option [1]
			Nominal value to 100 bar (1 500 psi)	Nominal value 400 bar (6 000 psi)	
JIS B0203 R ½" (male)	PMP21	316L	0.230 (0.51)	0.260 (0.57)	ZJJ

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

Process connections with flush-mounted, metal process isolating diaphragm

Thread ISO 228 G



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

Item	Device	Description	Seal		Material	Weight	Approval	Option [1]
			Item			kg (lbs)		
A	PMP11 PMP21	Thread ISO 228 G ½" A DIN3852	1	1 FKM form seal, pre-mounted	316L	0.140 (0.31)		WJJ
B [2]	PMP11 PMP21	Thread ISO 228 G ½" A O-ring seal, flush-mounted	1	FKM form seal, pre-mounted	316L	0.150 (0.33)		WUJ
			2	FKM O-ring, pre-mounted				

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

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

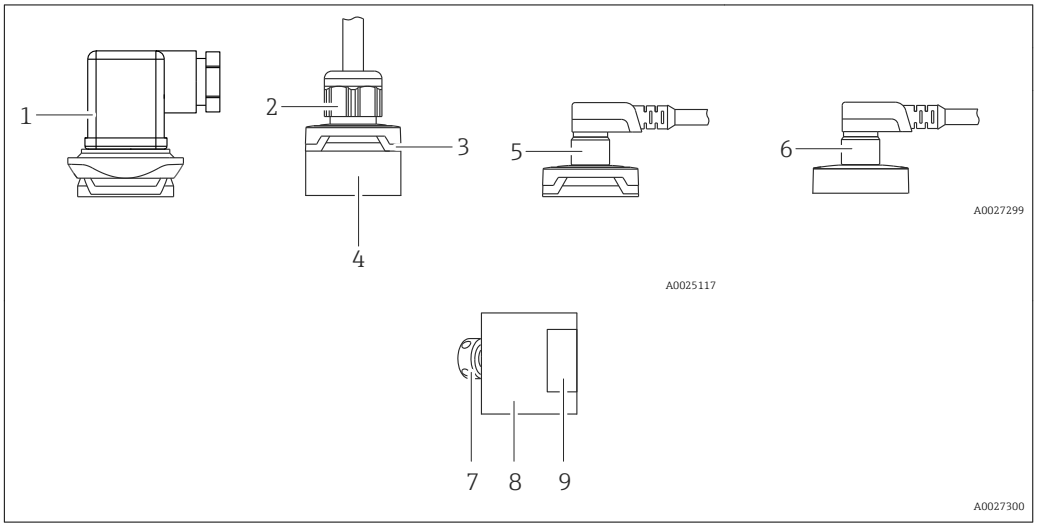
Description	Material
Metal process isolating diaphragm	AISI 316L (DIN/EN material number 1.4435)

Seals

See the specific process connection.

Materials not in contact with process

Housing



Item number	Component part	Material
1	Valve plug	Plastic PPSU
2	Cable pressure screw	PVDF
3	Design element	PBT/PC
4	Connection	PPSU
5	M12 plug	Plastic: PPSU
6	M12 plug	Metal 316L (1.4404) For Ex eC: metal housing cap
7	Pressure compensation element	1.4404 or PBT/PC
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	NSF-H1 synthetic oil in accordance with FDA 21 CFR 178.3570

Cleaning

Device	Description	Option [1]
PMP11 PMP21	Cleaned from oil+grease	HA

1) Product Configurator, order code for "Service"

Operability

Plug-on display PHX20 (optional)

No display or other operation facility is required to operate the device. However, devices with a valve plug can be fitted with the optional local display PHX20.

Description	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 to 9999
Accuracy:	0.2% of the span ±1 digit
Electrical connection:	To transmitter with 4 to 20 mA output and elbow plug DIN 43 650, reverse polarity protection
Display power supply:	Not required, powered automatically from the power loop
Voltage drop:	≤ 5 V (corresponds to load: max. 250 Ω)
Rate of conversion:	3 measurements per second
Damping:	0.3 to 20 s (configurable)
Data backup:	Non-volatile EEPROM
Error message:	▪ HI: overrange ▪ LO: below range
Programming:	Via 2 keys, menu-guided, display range scaling, decimal point, damping, error message
Degree of protection:	IP 65
Influence of temperature on the 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:	Pa6 GF30 plastic, blue Front screen made from red PMMA
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.

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

Safety Instructions (XA)

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

Device	Directive	Documentation	Option [1]
PMP21	ATEX II 1/2G Ex ia IIC T4	XA01271P	BA
PMP21	ATEX II 3G Ex eC IIC T4	In preparation	BC
PMP21	FM IS Cl. I, Div.1 Gr. A-D	XA01321P	FA
PMP21	CSA C/US IS Cl. I Div. 1 Gr. A-D	XA01322P	CB
PMP21	CSA General Purpose	In preparation	CA
PMP21	GOST Ex ia IIC T4	Under development	GA
PMP21	IEC Ex ia IIC T4 Ga/Gb	XA01271P	IA
PMP21	NEPSI Ex ia IIC T4	XA01363P	NA
PMP21	TIIS Ex ia IIC T4	In preparation	TA

1) Product Configurator, order code for "Approval"

The nameplate provides information on the Safety Instructions (XA) that are relevant for the device.

Marine approval (pending)

Device	Description	Option [1]
PMP21	GL	LE
PMP21	ABS	LF
PMP21	LR	LG
PMP21	BV	LH
PMP21	DNV	LI

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

Pressure Equipment Directive (PED)

The device corresponds to Article 3 (3) of the EC directive 97/23/EC (Pressure Equipment Directive) and has been designed and manufactured in accordance with good engineering practice or complies with Category I or II, SEP.

Other standards and guidelines

The applicable European guidelines and standards can be found in the relevant EU Declarations of Conformity. The following 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 a registration number.

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

Calibration unit

Description	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"

Inspection certificates

Device	Description	Option [1]
PMP21	3.1 Material documentation, wetted metal parts, EN10204-3.1 inspection certificate	JA
PMP11 PMP21	Final inspection report	KH

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

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 (with 3.1 inspection certificate)	QB	52010172
PMP21	Weld-in tool adapter G½, brass	QC	52005082

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.

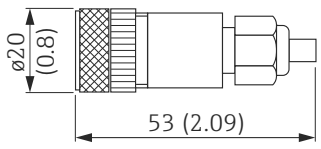
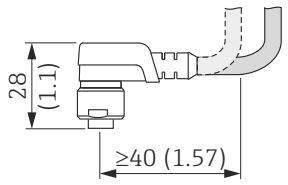
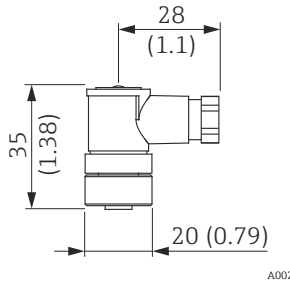
Process adapter M24

In preparation

Plug-on display PHX20

→ 🖹 31

M12 plug connectors

Connector	Degree of protection	Material	Option [1]	Order number
M12 (self-terminated connection at M12 plug) 	IP67	▪ Slotted nut: Cu Sn/Ni ▪ Body: PBT ▪ Seal: NBR	R1	52006263
M12 90 degrees with 5m (16 ft) cable 	IP67	▪ Slotted nut: Cu Sn/Ni ▪ Body: PUR ▪ Cable: PVC	RZ	52010285
M12 90 degrees (self-terminated connection at M12 connector) 	IP67	▪ Slotted nut: GD Zn/Ni ▪ Body: PBT ▪ Seal: NBR	RM	71114212

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

Documentation

Field of Activities

Pressure measurement, powerful instruments for process pressure, differential pressure, level and flow:

FA00004P/00/EN

Technical Information

- TI00241F/00/DE: EMV test procedures
- TI00426F/00/DE: Weld-in adapters, process adapters and flanges (overview)

Operating Instructions

BA01271P/00/EN

Brief Operating Instructions

KA01164P/00/EN

Safety Instructions (XA)

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

Device	Directive	Documentation	Option [1]
PMP21	ATEX II 1/2G Ex ia IIC T4	XA01271P	BA
PMP21	ATEX II 3G Ex eC IIC T4	In preparation	BC
PMP21	FM IS Cl. I, Div.1 Gr. A-D	XA01321P	FA
PMP21	CSA C/US IS Cl. I Div. 1 Gr. A-D	XA01322P	CB
PMP21	CSA General Purpose	In preparation	CA
PMP21	GOST Ex ia IIC T4	Under development	GA
PMP21	IEC Ex ia IIC T4 Ga/Gb	XA01271P	IA
PMP21	NEPSI Ex ia IIC T4	XA01363P	NA
PMP21	TIIS Ex ia IIC T4	In preparation	TA

1) Product Configurator, order code for "Approval"

The nameplate provides information on the Safety Instructions (XA) that are relevant for the device.

Patents

This product is protected by at least one of the following patents. Further patents are pending.

DE patents	US patents	EP patents
Under development	Under development	Under development

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PMP23-AA1A1HF3EJ PMP23-CA1A1KF3CJ PMP23-AA1U1RBWSJ PMP23-AAAM1PF3EJ PMP23-AA1M1MB3CJ
PMP23-AA1V1PB3CJ PMP23-AA7M1MB3CJ PMP23-AA1A1PF3EJ PMP23-AA7M1PBWSJ PMP23-CA1M1PF3CJ
PMP23-AA1M1HF3EJ PMP23-AA1N1FAWSJ PMP23-AA1U1PB3AJ PMP23-AA1V1FF3CJ PMP23-AA1U2PBWSJ
PMP23-AA1M2SF3EJ PMP23-AA1U1NB3EJ PMP23-AA1N1QF3CJ PMP23-AA7M1KF3CJ PMP23-AA1N1FF3CJ
PMP23-AA1V1QF3CJ PMP23-AA7N1NF3CJ PMP23-CA1M1PF3EJ PMP23-AA1V1PF3AJ PMP23-CA7M1FF3EJ
PMP23-AA7M1PF3CJ PMP23-AA1N1PF3CJ PMP23-AA7N1MB3EJ PMP23-AA1M1PF3EJ PMP23-AA7N1RF3CJ
PMP23-AA1M1MF3CJ PMP23-AA1U1SA3CJ PMP23-AA7N1SF3CJ PMP23-BA1A1RB3CJ PMP23-AA1M1HA3EJ
PMP23-CA1V1PF3EJ PMP23-AA1M1QF3CJ PMP23-AA7N1QF3CJ PMP23-CA1A1SF3EJ PMP23-AA1M1HB3CJ