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LENNTECH
WATER TREATMENT SOLUTIONS

Technical Information
Cerabar S
PMC71, PMP71, PMP75

Process pressure measurement
1-5 V DC, HART, PA, FF



Pressure transmitter with ceramic and metallic measuring cells

Applications

The device is used for the following measuring tasks:
- Absolute pressure and gauge pressure measurement in gases, steams or liquids in all areas of process engineering and process measurement technology
- Level, volume or mass measurements in liquids
- High process temperatures
  - up to 150 °C (302 °F)without diaphragm seal
  - up to 400 °C (752 °F)with typical diaphragm seals
- High pressures up to 700 bar (10 500 psi)
- Low-energy version with voltage output (1-5V DC), e.g. for operation on solar-operated control units (Remote Terminal Unit (RTU))

Your benefits

- Very good reproducibility and long-term stability
- High reference accuracy up to ±0.025 %
- Turn down up to 100:1, higher on request
- Used for process pressure monitoring up to SIL 3, certified to IEC 61508 by TÜV SÜD
- High level of safety during operation thanks to function monitoring from the measuring cell to the electronics
- Easy electronics replacement guaranteed with HistoROM®/M-DAT

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

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 may result in serious or fatal injury.
CAUTION	**CAUTION!** This symbol alerts you to a dangerous situation. Failure to avoid this situation may result in minor or moderate injury.
NOTICE	**NOTE!** This symbol contains information on procedures and other circumstances that do not result in personal injury.

Electrical symbols

Symbol	Meaning	Symbol	Meaning
	**Protective ground connection** A terminal that must be connected to ground prior to establishing any other connections.		**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.

Symbols for certain types of Information

Symbol	Meaning
	**Permitted** Procedures, processes or actions that are permitted.
	**Preferred** Procedures, processes or actions that are preferred.
	**Forbidden** Procedures, processes or actions that are forbidden.
	**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

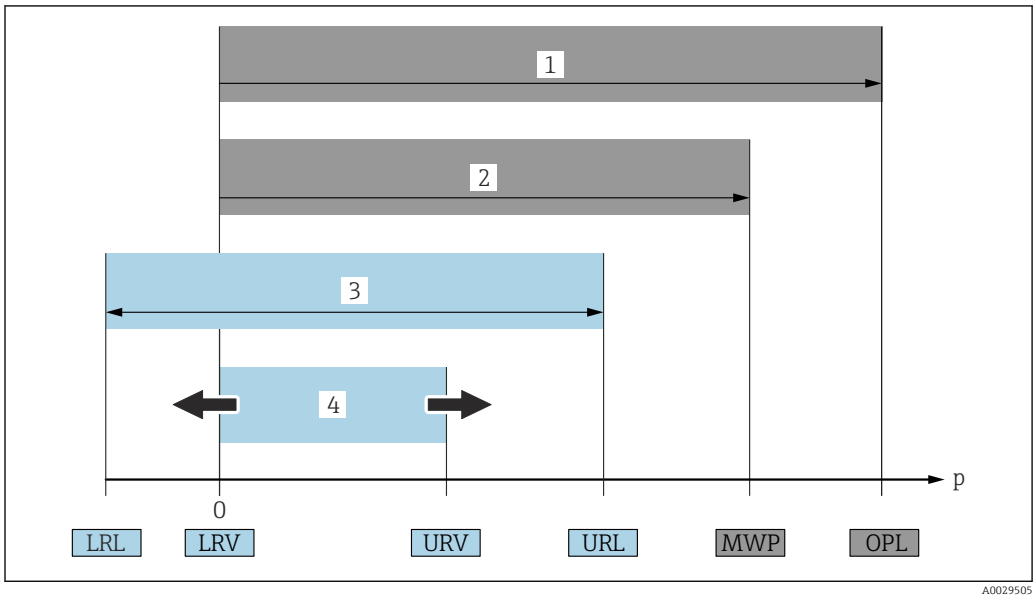
See the "Supplementary documentation" section → 128

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

Safety Instructions (XA)

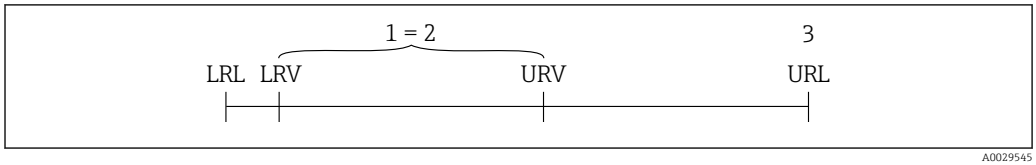
See the "Safety instructions" section

List of abbreviations



1 OPL: The OPL (overpressure limit = measuring cell overload limit) for the 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.
2 The MWP (maximum working pressure) for the measuring cells 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 of time. The MWP can be found on the nameplate.
3 The maximum measuring range corresponds to the span between the LRL and URL. This 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.

Turn down calculation



1 Calibrated/adjusted span
2 Zero point-based span
3 Upper range limit

Example:
- Measuring cell: 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)

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

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

Registered trademarks

HART®

Registered trademark of the FieldComm Group, Austin, USA

PROFIBUS®

Registered trademark of the PROFIBUS User Organization, Karlsruhe, Germany

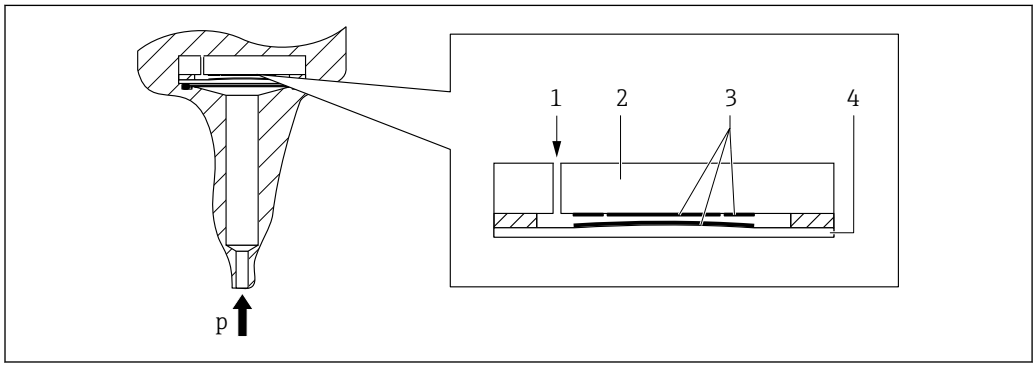
FOUNDATION™Fieldbus

Registered trademark of the FieldComm Group, Austin, Texas, USA

Function and system design

Measuring principle

Devices with ceramic process membrane (Ceraphire®)

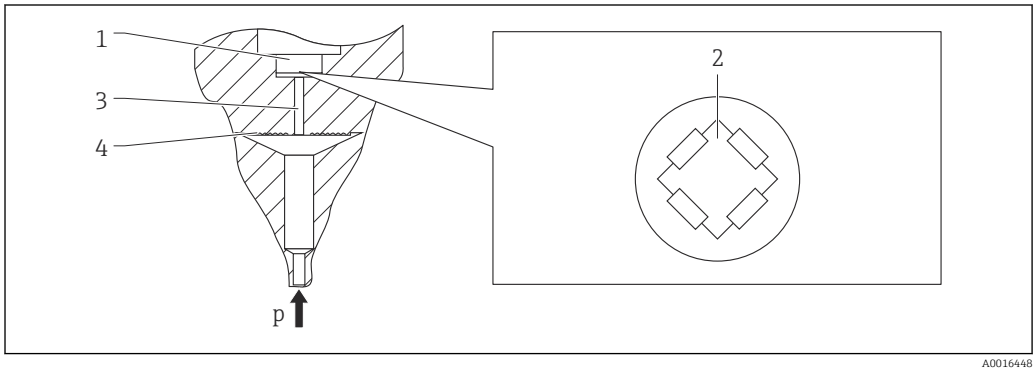


1 Atmospheric pressure (gauge pressure measuring cells)
2 Ceramic substrate
3 Electrodes
4 Ceramic process membrane

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

Advantages:
- Guaranteed overload resistance up to 40 times the nominal pressure (see "OPL" column in table) → 🖹 11)
- Thanks to ultrapure 99.9 % ceramic (Ceraphire®, see also "www.endress.com/ceraphire")
  - Extremely high chemical durability
  - High mechanical durability
- Suitable for vacuums
- Secondary containment for enhanced integrity
- Process temperatures up to 150 °C (302 °F)

Devices with metallic process membrane



1 Silicon measuring element, substrate
2 Wheatstone bridge
3 Channel with fill fluid
4 Metallic process membrane

PMP71

The process pressure deflects the metallic process membrane of the measuring cell 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 process pressure up to 700 bar (10 500 psi)
- High long-term stability
- Guaranteed overload resistance up to 4 times the nominal pressure
- Secondary containment for enhanced integrity
- Significantly reduced thermal effect e.g. compared to diaphragm seal systems with capillaries

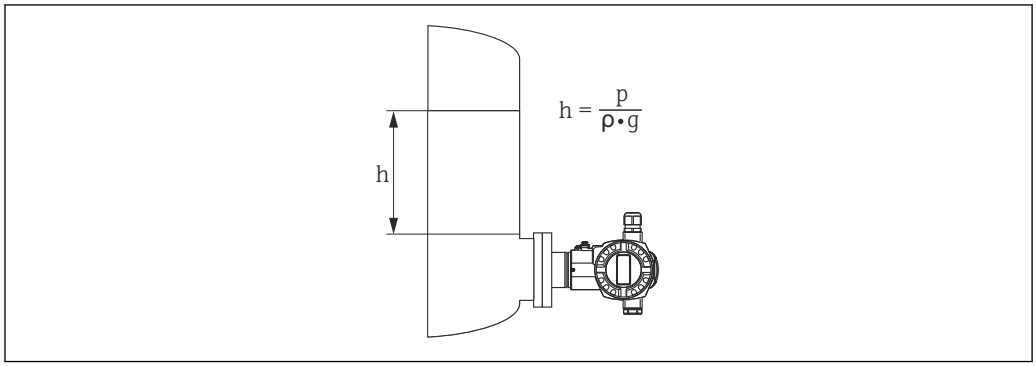
PMP75

The static pressure acts on the process membrane of the diaphragm seal and is transferred to the membrane of the measuring cell by a diaphragm seal fill fluid. The membrane is deflected and a fill fluid transfers the pressure to a resistance bridge. The pressure-dependent change in the bridge output voltage is measured and evaluated.

Advantages:
- Depending on the version, can be used for process pressures up to 400 bar (6 000 psi) and for extreme process temperatures
- High long-term stability
- Guaranteed overload resistance up to 4 times the nominal pressure
- Secondary containment for enhanced integrity

Product design

Level measurement (level, volume and mass):



A0020466

h *Height (level)*
p *Pressure*
ρ *Density of the medium*
g *Gravitation constant*

Your benefits

- Selection of the level operating mode which is optimum for your application in the device software
- Volume and mass measurements in any vessel shape by means of a freely programmable characteristic curve
- Choice of diverse level units with automatic unit conversion
- A customized unit can be specified.
- Has a wide range of uses, e.g.
  - for foam formation
  - in vessels with agitators of screen fittings
  - for liquid gases

Applications suitable for custody transfer measurement

The Parts Certificate is issued on the basis of the following standards:
- WELMEC guide 8.8 "General and Administrative Aspects of the Voluntary System of Modular Evaluation of Measuring instruments under the MID".
- OIML R117-1 Edition 2007 (E) "Dynamic measuring systems for liquids other than water".
- EN 12405-1/A1 Edition 2006 "Gas meters – Conversion devices – Part 1: Volume conversion".

Communication protocol

- 4 to 20 mA with HART communication protocol
- PROFIBUS PA
  - Endress+Hauser devices meet the requirements specified by the FISCO model.
  - Due to a low current consumption of 13 mA ± 1 mA, the following number of devices can be operated on one bus segment if installing as per FISCO: up to 7 devices for Ex ia, CSA IS and FM IS applications or up to 27 devices for all other applications e.g. in non-hazardous areas, Ex nA etc. Further information on PROFIBUS PA can be found in Operating Instructions BA00034S "PROFIBUS DP/PA: Guidelines for planning and commissioning" and in the PNO Guideline.
- FOUNDATION Fieldbus
  - Endress+Hauser devices meet the requirements specified by the FISCO model.
  - Due to a low current consumption of 15.5 mA ± 1 mA, the following number of devices can be operated on one bus segment if installing as per FISCO: up to 6 devices for Ex ia, CSA IS and FM IS applications or up to 24 devices for all other applications e.g. in non-hazardous areas, Ex nA etc. Further information on FOUNDATION Fieldbus, such as requirements for bus system components, can be found in Operating Instructions BA00013S "FOUNDATION Fieldbus Overview".

Input

Measured variable

Measured process variables

- Absolute pressure
- Gauge pressure

Measuring range

PMC71 - with ceramic process membrane (Ceraphire®) for gauge pressure

Measuring cell	Maximum measuring range		Smallest calibratable measuring span [1]	MWP	OPL	Vacuum resistance	Option [2]
	lower (LRL)	upper (URL)					
	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar_{abs} (psi_{abs})]	
100 mbar (1.5 psi)	−0.1 (−1.5)	+0.1 (+1.5)	0.005 (0.075)	2.7 (40.5)	4 (60)	0.7 (10.5)	1C
250 mbar (3.75 psi)	−0.25 (−3.75)	+0.25 (+3.75)	0.005 (0.075)	3.3 (49.5)	5 (75)	0.5 (7.5)	1E
400 mbar (6 psi)	−0.4 (−6)	+0.4 (+6)	0.005 (0.075)	5.3 (79.5)	8 (120)	0	1F
1 bar (15 psi)	−1 (−15)	+1 (+15)	0.01 (0.15)	6.7 (100.5)	10 (150)	0	1H
2 bar (30 psi)	−1 (−15)	+2 (+30)	0.02 (0.3)	12 (180)	18 (270)	0	1K
4 bar (60 psi)	−1 (−15)	+4 (+60)	0.04 (0.6)	16.7 (250.5)	25 (375)	0	1M
10 bar (150 psi)	−1 (−15)	+10 (+150)	0.1 (1.5)	26.7 (400.5)	40 (600)	0	1P
40 bar (600 psi)	−1 (−15)	+40 (+600)	0.4 (6)	40 (600)	60 (900)	0	1S

1) Turn down > 100:1 on request or can be set on device
2) Product Configurator, order code for "Sensor range; sensor over pressure limit"

PMC71 - with ceramic process membrane (Ceraphire®) for absolute pressure

Measuring cell	Maximum measuring range		Smallest calibratable measuring span [1]	MWP	OPL	Vacuum resistance	Option [2]
	lower (LRL)	upper (URL)					
	[bar_{abs} (psi_{abs})]	[bar_{abs} (psi_{abs})]	[bar (psi)]	[bar_{abs} (psi_{abs})]	[bar_{abs} (psi_{abs})]	[bar_{abs} (psi_{abs})]	
100 mbar (1.5 psi)	0	+0.1 (+1.5)	0.005 (0.075)	2.7 (40.5)	4 (60)	0	2C
250 mbar (3.75 psi)	0	+0.25 (+3.75)	0.005 (0.075)	3.3 (49.5)	5 (75)	0	2E
400 mbar (6 psi)	0	+0.4 (+6)	0.005 (0.075)	5.3 (79.5)	8 (120)	0	2F
1 bar (15 psi)	0	+1 (+15)	0.01 (0.15)	6.7 (100.5)	10 (150)	0	2H
2 bar (30 psi)	0	+2 (+30)	0.02 (0.3)	12 (180)	18 (270)	0	2K
4 bar (60 psi)	0	+4 (+60)	0.04 (0.6)	16.7 (250.5)	25 (375)	0	2M
10 bar (150 psi)	0	+10 (+150)	0.1 (1.5)	26.7 (400.5)	40 (600)	0	2P
40 bar (600 psi)	0	+40 (+600)	0.4 (6)	40 (600)	60 (900)	0	2S

1) Turn down > 100:1 on request or can be set on device
2) Product Configurator, order code for "Sensor range; sensor over pressure limit"

PMP71 and PMP75 – metallic process membrane for gauge pressure

Measuring cell	Maximum measuring range		Smallest calibratable measuring span [1]	MWP	OPL	Vacuum resistance [2]	Option [3]
	lower (LRL)	upper (URL)				Silicone oil/ Inert oil	
	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar_{abs} (psi_{abs})]	
400 mbar (6 psi)	−0.4 (−6)	+0.4 (+6)	0.005 (0.075)	4 (60)	6 (90)	0.01/0.04 (0.15/0.6)	1F
1 bar (15 psi)	−1 (−15)	+1 (+15)	0.01 (0.15)	6.7 (100)	10 (150)		1H
2 bar (30 psi)	−1 (−15)	+2 (+30)	0.02 (0.3)	13.3 (200)	20 (300)		1K
4 bar (60 psi)	−1 (−15)	+4 (+60)	0.04 (0.6)	18.7 (280.5)	28 (420)		1M
10 bar (150 psi)	−1 (−15)	+10 (+150)	0.1 (1.5)	26.7 (400.5)	40 (600)		1P
40 bar (600 psi)	−1 (−15)	+40 (+600)	0.4 (6)	100 (1500)	160 (2400)		1S
100 bar (1 500 psi)	−1 (−15)	+100 (+1500)	1.0 (15)	100 (1500)	400 (6000) [4]		1U
400 bar (6 000 psi)	−1 (−15)	+400 (+6000)	4.0 (60)	400 (6000)	600 (9000)		1W
700 bar (10 500 psi) [5]	−1 (−15)	+700 (+10500)	7.0 (105)	700 (10500)	1050 (15750)		1X

1) Turn down > 100:1 on request or can be set on device
2) The vacuum resistance applies for the measuring cell under reference operating conditions. A ceramic process membrane is recommended for applications in the limit range. The pressure and temperature application limits of the selected fill fluid must also be observed for the PMP75 → 🖹 115.
3) Product Configurator, order code for "Sensor range; sensor over pressure limit"
4) If the option "JN" is ordered in the order code for "Test, Certificate", then the OPL is 160 bar (2 400 psi).
5) PMP71 only, PMP75 on request

PMP71 and PMP75 – metallic process membrane for absolute pressure

Measuring cell	Maximum measuring range [1]		Smallest calibratable measuring span [2]	MWP	OPL	Vacuum resistance [3]	Option [4]
	lower (LRL)	upper (URL)				Silicone oil/ Inert oil	
	[bar_{abs} (psi_{abs})]	[bar_{abs} (psi_{abs})]	[bar (psi)]	[bar_{abs} (psi_{abs})]	[bar_{abs} (psi_{abs})]	[bar_{abs} (psi_{abs})]	
400 mbar (6 psi)	0	+0.4 (+6)	0.005 (0.075)	4 (60)	6 (90)	0.01/0.04 (0.15/0.6)	2F
1 bar (15 psi)	0	+1 (+15)	0.01 (0.15)	6.7 (100)	10 (150)		2H
2 bar (30 psi)	0	+2 (+30)	0.02 (0.3)	13.3 (200)	20 (300)		2K
4 bar (60 psi)	0	+4 (+60)	0.04 (0.6)	18.7 (280.5)	28 (420)		2M
10 bar (150 psi)	0	+10 (+150)	0.1 (1.5)	26.7 (400.5)	40 (600)		2P
40 bar (600 psi)	0	+40 (+600)	0.4 (6)	100 (1500)	160 (2400)		2S
100 bar (1 500 psi)	0	+100 (+1500)	1.0 (15)	100 (1500)	400 (6000) [5]		2U
400 bar (6 000 psi)	0	+400 (+6000)	4.0 (60)	400 (6000)	600 (9000)		2W
700 bar (10 500 psi) [6]	0	+700 (+10500)	7.0 (105)	700 (10500)	1050 (15750)		2X

1) PMP75: Within the measuring range, the minimum upper range value of 80 $mbar_{abs}$ (1.16 psi_{abs}) must be observed.
2) Turn down > 100:1 on request or can be set on device
3) The vacuum resistance applies for the measuring cell under reference operating conditions. A ceramic process membrane is recommended for applications in the limit range. The pressure and temperature application limits of the selected fill fluid must also be observed for the PMP75 → 🖹 115.
4) Product Configurator, order code for "Sensor range; sensor over pressure limit"
5) If the option "JN" is ordered in the order code for "Test, Certificate", then the OPL is 160 bar (2 400 psi).
6) PMP71 only, PMP75 on request

PMP71 - metallic process membrane for absolute pressure with MID parts certificate

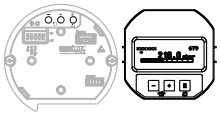
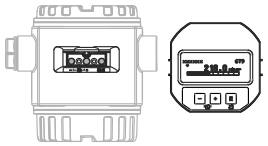
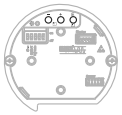
Measuring cell	Maximum measuring range		Min. WP for gas applications suitable for custody transfer measurement	Min. WP for liquid applications suitable for custody transfer measurement	MWP	OPL	Vacuum resistance [1]	Option [2]
	lower (LRL) [3]	upper (URL) [4]					Silicone oil/ Inert oil	
[bar (psi)]	[bar_{abs} (psi_{abs})]	[bar_{abs} (psi_{abs})]	[bar (psi)]	[bar (psi)]	[bar_{abs} (psi_{abs})]	[bar_{abs} (psi_{abs})]	[bar (psi)]	
10 (150)	0	+10 (150)	0.5 (7.5)	0.5 (7.5)	26.7 (400.5)	40 (600)	0.01/0.04 (0.15/1)	MP
50 (750)	0	+50 (750)	10 (150)	2.5 (37.5)	100 (1500)	400 (6000)	0.01/0.04 (0.15/1)	MT
100 (1500)	0	+100 (1500)	5 (75)	5 (75)	100 (1500)	400 (6000)	0.01/0.04 (0.15/1)	MU

1) The vacuum resistance applies to the measuring cell under reference operating conditions
2) Product Configurator, order code for "Sensor range; sensor over pressure limit"
3) By default, the device is set to a lower measuring range of 0 bar. Please specify when ordering if the lower measuring range is to be set to a different default value.
4) Max. WP (working pressure) for gas and liquid applications suitable for custody transfer measurement

Output

Output signal

- 4 to 20 mA with superimposed digital communication protocol HART, 2-wire
- 1-5V DC, 3-wire
- Digital communication signal PROFIBUS PA (Profile 3.0), 2-wire
  - Signal coding: Manchester Bus Powered (MBP): Manchester II
  - Transmission rate: 31.25 KBit/s voltage mode
- Digital communication signal FOUNDATION Fieldbus, 2-wire
  - Signal coding: Manchester Bus Powered (MBP): Manchester II
  - Transmission rate: 31.25 KBit/s voltage mode

Output	Internal + LCD	External + LCD	Internal
	   A0021280		
	Option [1]		
4 to 20mA HART	B	A	C
4 to 20mA HART, Li=0	E	D	F
1-5V DC	H	G	-
PROFIBUS PA	N	M	O
FOUNDATION Fieldbus	Q	P	R

1) Product Configurator, order code for "Display, operation: "

Signal range

4 to 20 mA

3.8 mA to 20.5 mA

1-5V DC

0.95 to 5.125 V

Signal on alarm

4 to 20 mA HART

As per NAMUR NE43.

- Max. alarm: can be set from 21 to 23 mA (factory setting: 22 mA)
- Hold measured value: last measured value is held
- Min. alarm: 3.6 mA

1-5V DC

- Max. alarm: can be set from 5.25 to 5.75 V
- Min. Alarm: 0.9 V

PROFIBUS PA

As per NAMUR NE43.

Can be set in the Analog Input Block.

Options:
- Last Valid Out Value (factory setting)
- Fail Safe Value
- Status bad

FOUNDATION Fieldbus

As per NAMUR NE43.

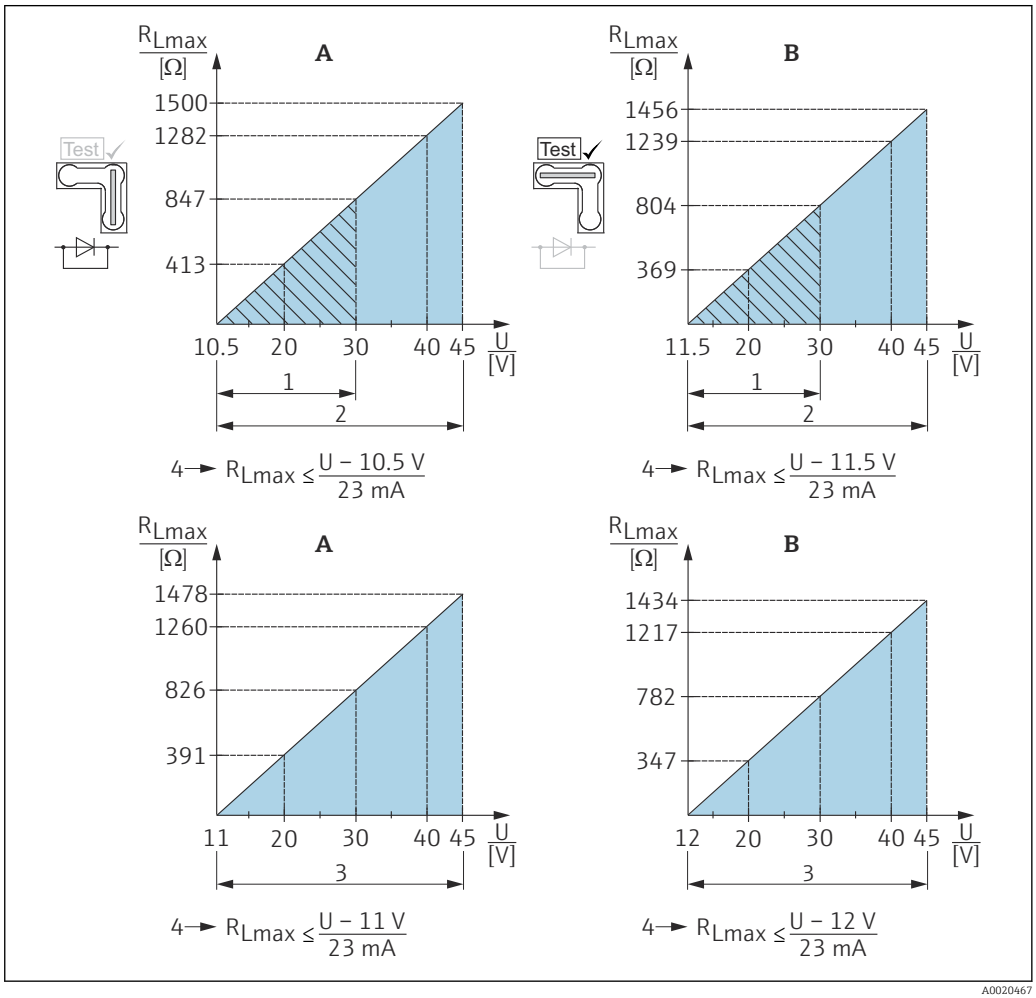
Can be set in the Analog Input Block.

Options:
- Last Good Value
- Fail Safe Value (factory setting)
- Wrong Value

Load

4 to 20 mA HART

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_0 of the supply unit. In the following load diagrams, observe the position of the jumper and the explosion protection:



A0020467

A Jumper for 4 to 20 mA test signal set to "Non-test" position
B Jumper for 4 to 20 mA test signal set to "Test" position
1 Power supply 10.5 (11.5) to 30 V DC for 1/2 G, 1 GD, 1/2 GD, FM IS, CSA IS, IECEx ia, NEPSI Ex ia
2 Power supply 10.5 (11.5) to 45 V DC for devices for non-hazardous areas, 1/2 D, 1/3 D, 2 G Ex d, 3 G Ex nA, FM XP, FM DIP, FM NI, CSA XP, CSA dust ignition-proof, NEPSI Ex d
3 Power supply 11 (12) to 45 V DC for PMC71, Ex d[ia], NEPSI Ex d[ia]
4 R_{Lmax} maximum load resistance
U Supply voltage

When operating via a handheld terminal or via a PC with an operating program, a minimum communication resistance of 250 Ω must be taken into account.

1-5V DC

The load must be at least 100 kΩ.

Damping

A damping affects all outputs (output signal, display):
- via local display, handheld terminal or PC (handheld terminal or PC not for 1-5V DC) with operating program, continuous from 0 to 999 s
- Also for HART and PROFIBUS PA: Via DIP switch on the electronic insert, switch position "on" = set value and "off"
- 1-5V DC: via DIP switch on electronic insert switch position "on" = set value and "off"
- Factory setting: 2 s

Alarm current

Designation	Option [1]
Min alarm current	J
HART burst mode PV	J
Min alarm current + HART burst mode PV	J

1) Product Configurator, order code for "Additional options 1" and "Additional options 2"

Firmware version

Designation	Option [1]
02.20.zz, HART 7, DevRev22	72
02.11.zz, HART 5, DevRev21	73
04.00.zz, FF, DevRev07	74
04.01.zz, PROFIBUS PA, DevRev03	75
02.10.zz, HART 5, DevRev21	76
03.00.zz, FF, DevRev06	77
04.00.zz, PROFIBUS PA	78
02.30.zz, HART 7	71

1) Product Configurator, order code for "Firmware version"

Protocol-specific data HART

Manufacturer ID	17 (11 hex)
Device type ID	24 (18 hex)
Device revision	▪ 21 (15 hex) - SW version 02.1y.zz - HART specification 5 ▪ 22 (16 hex) - SW version 02.2y.zz - HART specification 7
HART specification	▪ 5 ▪ 7
DD revision	▪ 4 (Russian in language selection) for device revision 21 ▪ 3 (Dutch in language selection) for device revision 21 ▪ 1 for device revision 22
Device description files (DTM, DD)	Information and files under: ▪ www.endress.com ▪ www.fieldcommgroup.org
HART load	Min. 250 Ω

HART device variables	The measured values are assigned to the device variables as follows: **Measured values for PV (primary variable)** ▪ Pressure ▪ Level ▪ Tank content **Measured values for SV, TV (second and third variable)** Pressure **Measured values for QV (fourth variable)** Temperature
Supported functions	▪ Burst mode ▪ Additional transmitter status ▪ Device locking ▪ Alternative measuring modes

Wireless HART data

Minimum starting voltage	11.5 V (default) or 10.5 V if jumper not set to "Test" position [1]
Start-up current	12 mA
Starting time	10 s
Minimum operating voltage	11.5 V (default) or 10.5 V if jumper not set to "Test" position [1]
Multidrop current	4 mA
Time for connection setup	1 s

1) Or higher if operating near the ambient temperature limits (−40 to +85 °C (−40 to +185))

Protocol-specific data PROFIBUS PA

Manufacturer ID	17 (11 hex)
Identification number	1541 hex
Profile version	3.0 ▪ SW version 03.00.zz ▪ SW version 04.00.zz 3.02 SW version 04.01.zz (device revision 3) Compatibility with SW version 03.00.zz and higher.
GSD revision	▪ 4 (SW version 3.00.zz and 4.00.zz) ▪ 5 (device revision 3)
DD revision	▪ 1 (SW version 3.00.zz and 4.00.zz) ▪ 1 (device revision 3)
GSD file	Information and files under:
DD files	▪ www.endress.com ▪ www.profibus.org
Output values	**Measured values for PV (via Analog Input Function Block)** ▪ Pressure ▪ Level ▪ Tank content **Measured values for SV** ▪ Pressure ▪ Temperature

Input values	Input value sent from PLC, can be shown on display

Supported functions	▪ Identification & maintenance, simplest device identifier on the control system and nameplate
	▪ Condensed status (only with Profile Version 3.02)
	▪ Automatic ID number adjustment and switchable to the following ID numbers (only with Profile Version 3.02):
	  ▪ 9700: Profile-specific transmitter identification number with the "Classic" or "Condensed" status.
	  ▪ 1501: Compatibility mode for the old Cerabar S generation (PMC731, PMP731, PMC631, PMP635).
	  ▪ 1541: Identification number of the new Cerabar S generation (PMC71, PMP71, PMP75).
	▪ Device locking: The device can be locked by hardware or software.

Protocol-specific data FOUNDATION Fieldbus

Manufacturer ID	452B48 hex
Device type	1007 hex
Device revision	▪ 6 - SW version 03.00.zz ▪ 7 - SW version 04.00.zz (FF-912)
DD revision	▪ 3 (device revision 6) ▪ 2 (device revision 7)
CFF revision	▪ 4 (device revision 6) ▪ 1 (device revision 7)
DD files	Information and files under: ▪ www.endress.com ▪ www.fieldcommgroup.org
CFF files	
Device tester version (ITK version)	▪ 5.0 (device revision 6) ▪ 6.01 (device revision 7)
Number of ITK test campaign	▪ IT054600 (Device Revision 6) ▪ IT085500 (Device Revision 7)
Link-Master (LAS) capable	Yes
Choice of "Link Master" and "Basic Device"	Yes; Factory setting: Basic Device
Node address	Factory setting: 247 (F7 hex)
Supported functions	Field diagnostics profile (only with FF912) The following methods are supported: ▪ Reboot ▪ Configure error as warning or alarm ▪ HistoROM ▪ Peakhold ▪ Alarm info ▪ Sensor trim
Number of VCRs	▪ 44 (device revision 6) ▪ 24 (device revision 7)
Number of Link Objects in VFD	50

Virtual communication references (VCRs)

	Device revision 6	Device revision 7
Permanent Entries	44	1
Client VCRs	0	0
Server VCRs	5	10
Source VCRs	8	43
Sink VCRs	0	0
Subscriber VCRs	12	43
Publisher VCRs	19	43

Link settings

	Device revision 6	Device revision 7
Slot time	4	4
Min. Inter PDU delay	12	10
Max. response delay	10	10

Transducer Blocks

Block	Contents	Output values
TRD1 Block	Contains all parameters related to the measurement	▪ Pressure or level (channel 1) ▪ Process temperature (channel 2)
Service Block	Contains service information	▪ Pressure after damping (channel 3) ▪ Pressure peakhold indicator (channel 4) ▪ Counter for max. pressure transgressions (channel 5)
Diagnostic block	Contains diagnostic information	Error code via DI channels (channel 0 to 16)
Display block	Contains parameters to configure the onsite display	No output values

Function blocks

Block	Contents	Number Blocks	Execution time		Functionality	
			Device Revision 6	Device Revision 7	Device Revision 6	Device Revision 7
Resource Block	The Resource Block contains all the data that uniquely identify the device. It is an electronic version of a nameplate of the device.	1			enhanced	enhanced
Analog Input Block 1 Analog Input Block 2	The AI Block receives the measuring data from the Sensor Block, (selectable via a channel number) and makes the data available to other function blocks at its output. Enhancement: Digital outputs for process alarms, fail safe mode	2	45 ms	45 ms (without trend and alarm reports)	enhanced	enhanced
Digital Input Block	This block contains the discrete data of the Diagnose Block (selectable via a channel number 0 to 16) and provides them for other blocks at the output.	1	40 ms	30 ms	standard	enhanced
Digital Output Block	This block converts the discrete input and thus initiates an action (selectable via a channel number) in the DP Flow Block or in the Service Block. Channel 1 resets the counter for max. pressure transgressions.	1	60 ms	40 ms	standard	enhanced
PID Block	This block is used as a proportional-integral-derivative controller and can be used universally for closed-loop-control in the field. It enables cascade mode and feedforward control. Input IN can be indicated on the display. The selection is performed in the Display Block (DISPLAY_MAIN_LINE_CONTENT).	1	120 ms	70 ms	standard	enhanced
Arithmetic Block	This block is designed to permit simple use of popular measurement math functions. The user does not have to know how to write equations. The math algorithm is selected by name, chosen by the user for the function to be performed.	1	50 ms	40 ms	standard	enhanced
Input Selector Block	The Input Selector Block facilitates the selection of up to four inputs and generates an output based on the configured action. This block normally receives its inputs from AI Blocks. The block enables the selection of maximum, minimum, average and 'first good' values. Inputs IN1 to IN4 can be shown on the display. The selection is performed in the Display Block (DISPLAY_MAIN_LINE_CONTENT).	1	35 ms	35 ms	standard	enhanced
Signal Characterizer Block	The Signal Characterizer Block has two sections, each with an output value that is a non-linear function of the input value. The non-linear function is generated by a single look-up table with 21 arbitrary x-y pairs.	1	30 ms	40 ms	standard	enhanced
Integrator Block	The Integrator Block integrates a variable as a function of the time or accumulates the counts from a Pulse Input Block. The block may be used as a totalizer that counts up until reset or as a batch totalizer that has a setpoint, where the integrated or accumulated value is compared to pre-trip and trip settings, generating a binary signal when the setpoint is reached.	1	35 ms	40 ms	standard	enhanced
Analog Alarm Block	This block contains all process alarm conditions (working like a comparator) and represents them at the output.	1	35 ms	35 ms	standard	enhanced

Additional function block information:

Instantiate Function Block	JA	JA
Number of additional instantiatable function blocks	11	5

Energy supply

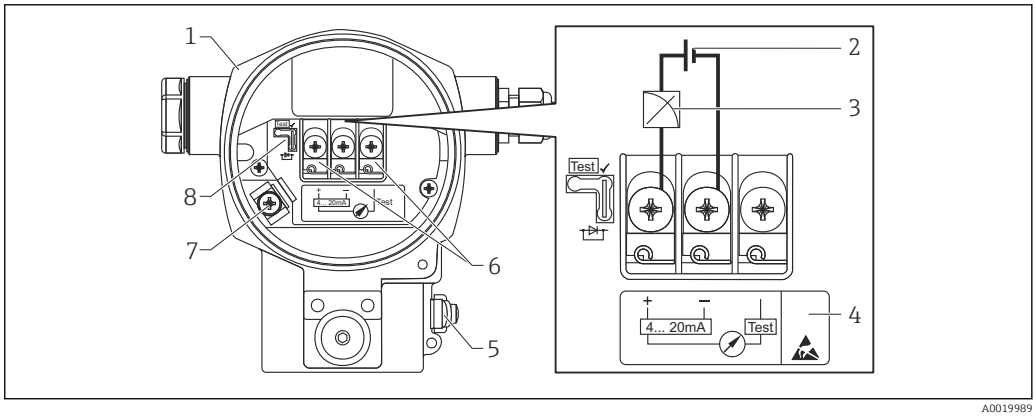
WARNING

An incorrect connection compromises electrical safety!

- When using the measuring instrument in hazardous areas, installation must also comply with the applicable national standards and regulations and the Safety Instructions or Installation or Control Drawings.
- All explosion protection data are provided in separate Ex documentation, which is available on request. The Ex documentation is supplied as standard with all devices approved for use in explosion hazardous areas.
- Devices with integrated overvoltage protection must be grounded → 26.
- Protective circuits against reverse polarity, HF influences and overvoltage peaks are installed.

Terminal assignment

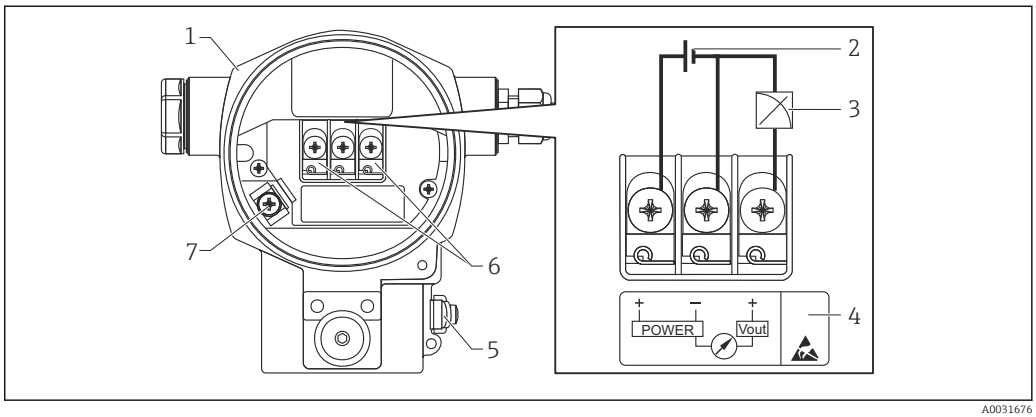
4 to 20 mA HART



A0019989

1 *Housing*
2 *Supply voltage*
3 *4 to 20 mA*
4 *Devices with integrated overvoltage protection are labeled "OVP" (overvoltage protection) here.*
5 *External ground terminal*
6 *4 to 20 mA test signal between positive and test terminal*
7 *Internal ground terminal*
8 *Jumper for 4 to 20 mA test signal → 22*

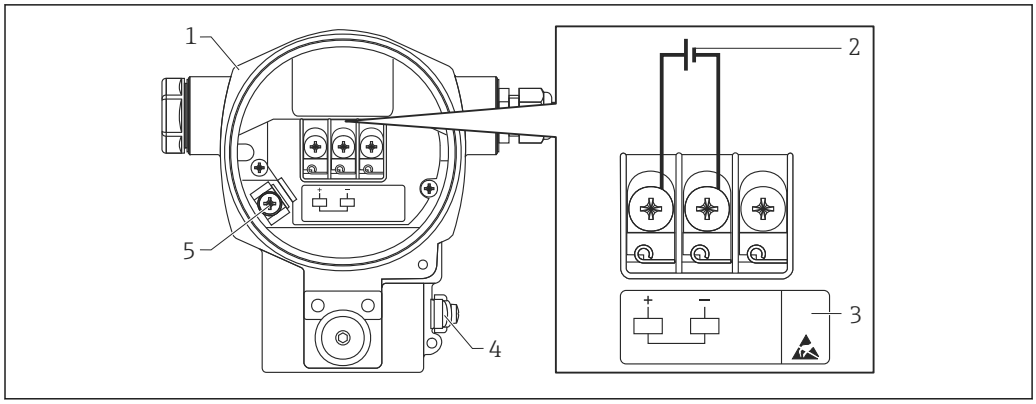
1-5V DC



A0031676

1 *Housing*
2 *Supply voltage*
3 *1-5V DC*
4 *Overvoltage protection (OVP) marking*
5 *External ground terminal*
6 *Terminals*
7 *Internal ground terminal*

PROFIBUS PA and FOUNDATION Fieldbus



A0020158

1 Housing
2 Supply voltage
3 Devices with integrated overvoltage protection are labeled "OVP" (overvoltage protection) here.
4 External ground terminal
5 Internal ground terminal

Supply voltage

4 to 20 mA HART

Electronic version	Jumper for 4 to 20 mA test signal in "Test" position (delivery status)	Jumper for 4 to 20 mA test signal in "Non-test" position
Version for non-hazardous area	11.5 to 45 V DC	10.5 to 45 V DC
Intrinsically safe	11.5 to 30 V DC	10.5 to 30 V DC
▪ Other types of protection ▪ Devices without a certificate	11.5 to 45 V DC (Versions with 35 V DC plug-in connector)	10.5 to 45 V DC (Versions with 35 V DC plug-in connector)

Measuring a 4 to 20 mA test signal

Jumper position for test signal	Description
 A0019992	▪ Measurement of 4 to 20 mA test signal via the positive and test terminal: possible. (Thus, the output current can be measured without interruption via the diode.) ▪ As-delivered state ▪ Minimum supply voltage: 11.5 V DC
 A0019993	▪ Measurement of 4 to 20 mA test signal via the positive and test terminal: not possible. ▪ Minimum supply voltage: 10.5 V DC

1-5V DC

- Non-hazardous area: 9 to 35 V DC
- Ex-d: 9 to 35 V DC

PROFIBUS PA

- Version for non-hazardous areas: 9 to 32 V DC
- Ex ia:
  - Installation in bus system according to FISCO model: Ui=17.5 V DC
  - Point-to-point installation: Ui = 24 V DC

FOUNDATION Fieldbus

- Version for non-hazardous areas: 9 to 32 V DC
- Ex ia:
  - Installation in bus system according to FISCO model: Ui=17.5 V DC
  - Point-to-point installation: Ui = 24 V DC

Current consumption

- 1-5V DC:
  9 V = 1.8 mA
  35 V = 0.8 mA
- PROFIBUS PA: 13 mA ±1 mA, switch-on current corresponds to IEC 61158-2, Clause 21
- FOUNDATION Fieldbus: 15.5 mA ±1 mA, switch-on current corresponds to IEC 61158-2, Clause 21

Electrical connection

PROFIBUS PA

The digital communication signal is transmitted to the bus via a two-wire connection. The bus also provides the power supply. For further information on the network structure and grounding and for further bus system components such as bus cables, see the relevant documentation, e.g. Operating Instructions BA00034S "PROFIBUS DP/PA: Guidelines for planning and commissioning" and the PNO Guideline.

FOUNDATION Fieldbus

The digital communication signal is transmitted to the bus via a two-wire connection. The bus also provides the power supply. For further information on the network structure and grounding and for further bus system components such as bus cables, see the relevant documentation, e.g. Operating Instructions BA00013S "FOUNDATION Fieldbus Overview" and the FOUNDATION Fieldbus Guideline.

Terminals

- Supply voltage and internal ground terminal: 0.5 to 2.5 mm^2 (20 to 14 AWG)
- External ground terminal: 0.5 to 4 mm^2 (20 to 12 AWG)

Cable entries

Approval	Cable gland	Clamping range
Standard, II 1/2 G Ex ia, IS	Plastic M20x1.5	5 to 10 mm (0.2 to 0.39 in)
ATEX II 1/2 D, II 1/3 D, II 1/2 GD Ex ia, II 1 GD Ex ia, II 3 G Ex nA	Metal M20x1.5 (Ex e)	7 to 10.5 mm (0.28 to 0.41 in)

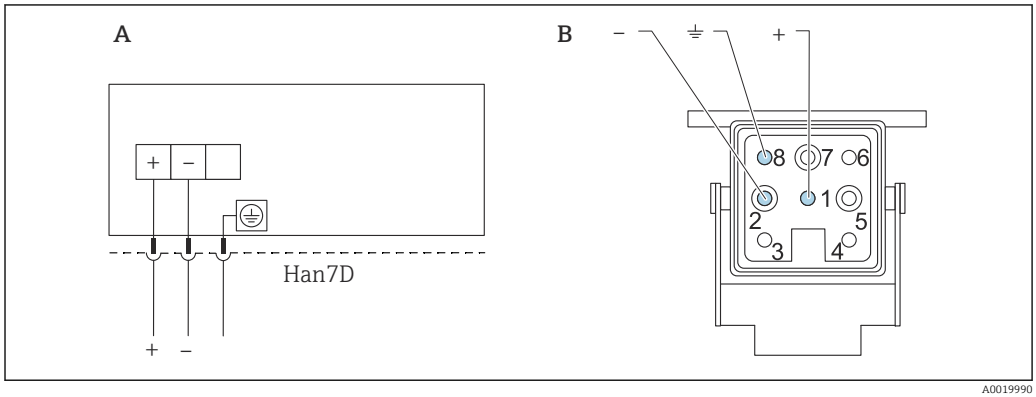
1-5V DC

The cable entries have a 1/2 FNPT thread. The connection on the customer's side is protected by a plastic connector. A cable gland is not envisaged.

For additional technical data, see section on housing → 51

Connectors

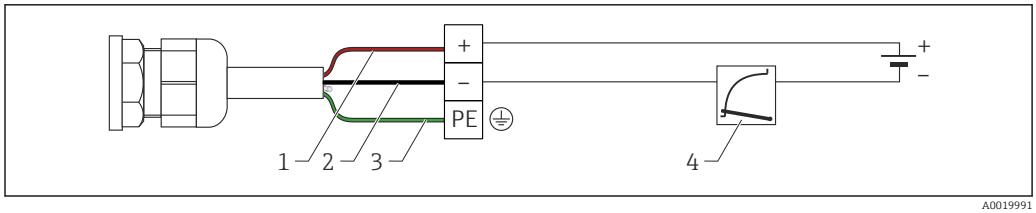
Connection of devices with Harting plug Han7D



A Electrical connection for devices with Harting plug Han7D
B View of the connection on the device
- Brown
⏚ Green/yellow
+ Blue

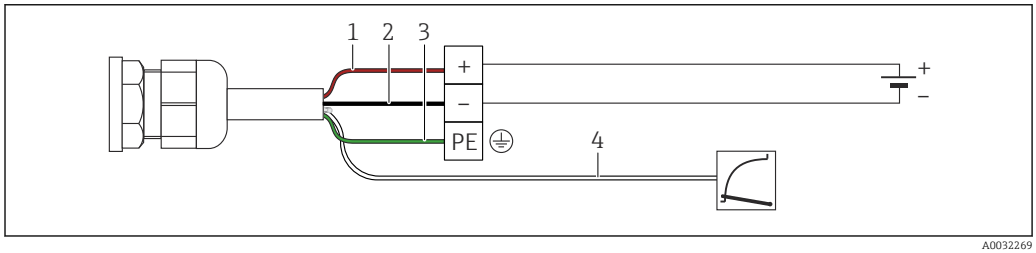
Material: CuZn, gold-plated contacts of the plug-in jack and plug

Connection of cable version



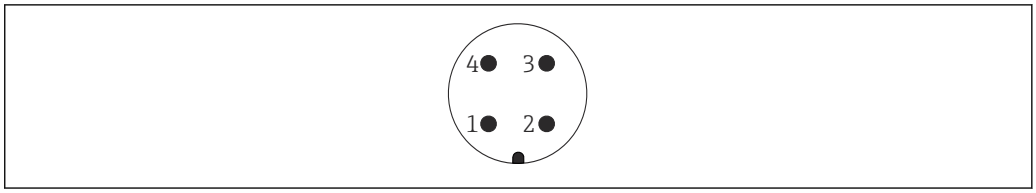
1 rd = red
2 bk = black
3 gnye = green
4 4 to 20 mA

Connection of cable version 1-5V DC



1 rd = red
2 bk = black
3 gnye = green
4 1-5V DC

Connection of devices with M12 plug



A0011175

1 Signal +
2 Not used
3 Signal –
4 Ground

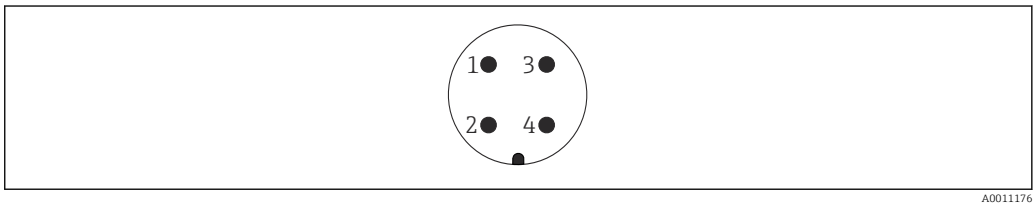
Endress+Hauser offers the following accessories for devices with an M12 plug:

Plug-in jack M 12x1, straight
- Material: body PA; coupling nut CuZn, nickel-plated
- Degree of protection (fully locked): IP67
- Order number: 52006263

Plug-in jack M 12x1, elbowed
- Material: body PBT/PA; coupling nut GD-Zn, nickel-plated
- Degree of protection (fully locked): IP67
- Order number: 71114212

Cable 4x0.34 mm^2 (20 AWG) with M12 elbowed socket, screw plug, length 5 m (16 ft)
- Material: body PUR; coupling nut CuSn/Ni; cable PVC
- Degree of protection (fully locked): IP67
- Order number: 52010285

Connection of devices with 7/8" plug



A0011176

1 Signal -
2 Signal +
3 Shield
4 Not used

Male thread: 7/8 - 16 UNC
- Material: 316L (1.4401)
- Degree of protection: IP68

Cable specification

HART

- Endress+Hauser recommends using shielded, twisted-pair two-wire cables.
- Cable outer diameter: 5 to 9 mm (0.2 to 0.35 in) depending on the cable entry used → 23

1-5V DC

- Endress+Hauser recommends using a shielded cable.
- Cable outer diameter: 5 to 9 mm (0.2 to 0.35 in) depending on the cable entry used → 23

Maximum cable length

The following table shows the tolerance of the voltage output for a representative cable with a length of up to 100 m (328 ft), a resistance of 18 Ohm/km and specification 18 AWG (cable cross-section 0.8 mm^2).

Tolerance of voltage output at cable end	Length
0.5 mV	25 m (82 ft)
1 mV	50 m (164 ft)
1.5 mV	75 m (246 ft)
2 mV	100 m (328 ft)

PROFIBUS PA

Use a twisted, shielded twin-core cable, preferably cable type A.

For further information on the cable specifications, see Operating Instructions BA00034S "PROFIBUS DP/PA: Guidelines for planning and commissioning", the PNO Guideline 2.092 PROFIBUS PA User and Installation Guideline" and IEC 61158-2 (MBP).

FOUNDATION Fieldbus

Use a twisted, shielded twin-core cable, preferably cable type A.

For further information on the cable specifications, see Operating Instructions BA00013S "FOUNDATION Fieldbus Overview", FOUNDATION Fieldbus Guideline and IEC 61158-2 (MBP).

Start-up current

12 mA

Residual ripple

Without influence on 4 to 20 mA signal up to ±5% residual ripple within the permitted voltage range [according to HART hardware specification HCF_SPEC-54 (DIN IEC 60381-1)].

Overvoltage protection (optionally for HART, PROFIBUS PA and FOUNDATION Fieldbus)

- Overvoltage protection:
  - Nominal functioning DC voltage: 600 V
  - Nominal discharge current: 10 kA
- Surge current check $\hat{i}$ = 20 kA satisfied as per DIN EN 60079-14: 8/20 µs
- Arrester AC current check I = 10 A satisfied

Ordering information: Product Configurator, order code for "Additional options 1" or Additional options 2", option "M"

NOTICE

Device could be destroyed!

► Devices with integrated overvoltage protection must be grounded.

Influence of power supply

≤0.0006 % of URL/1 V

Performance characteristics for measuring instruments with ceramic process membrane

Response time

HART

- Acyclic: min. 330 ms, typically 590 ms (depending on command # and number of preambles)
- Cyclic (burst): min. 160 ms, typically 350 ms (depending on command # and number of preambles)

PROFIBUS PA

- Acyclic: approx. 60 ms to 70 ms (depending on Min. Slave Interval)
- Cyclic: approx. 10 ms to 13 ms (depending on Min. Slave Interval)

FOUNDATION Fieldbus

- Acyclic: typically 100 ms (for standard bus parameter settings)
- Cyclic: max. 20 ms (for standard bus parameter settings)

Reference operating conditions

- As per IEC 62828-2 / IEC 60770
- Ambient temperature T_A = constant, in the range: +22 to +28 °C (+72 to +82 °F)
- Humidity φ = constant, in the range: 5 to 80 % RH ± 5 %
- Atmospheric pressure p_A = constant, in the range: 860 to 1 060 mbar (12.47 to 15.37 psi)
- Position of the measuring cell: horizontal ±1°
- Input of LOW SENSOR TRIM and HIGH SENSOR TRIM for lower range value and upper range value
- Zero-point based span
- Process membrane material: Al_2O_3 aluminum oxide ceramic FDA, ultrapure 99.9 %
- Supply voltage: 24 V DC ±3 V DC
- Load with HART: 250 Ω
- Turn down (TD) = URL/ | URV - LRV |

Total performance

The performance characteristics refer to the accuracy of the device. The factors that influence the accuracy can be divided into two groups

- Total performance of device
- Installation factors

All of the performance characteristics meet the requirement of ≥ ± 3 sigma.

The total performance of the device comprises the reference accuracy and the ambient temperature effect and is calculated using the following formula:

Total performance = $\pm \sqrt{((E1)^2 + (E2)^2)}$

E1 = Reference accuracy

E2 = Temperature effect

Calculation of E2:

Temperature effect per ±28 °C (50 °F)

(Corresponds to a range of −3 to +53 °C (+27 to +127 °F))

$E2 = E2_M + E2_E$

$E2_M$ = Main temperature error

$E2_E$ = Electronics error

The values refer to the calibrated span.

Calculation of the total performance with the Endress+Hauser Applicator

Detailed inaccuracies, e.g. for other temperature ranges or the high-temperature version of the device can be calculated with the Applicator "Sizing Pressure Performance".

A0038927

Reference accuracy [E1]

Reference accuracy comprises the non-linearity [IEC 62828-1/DIN EN 61298-2] including the hysteresis [IEC 62828-1/DIN EN 61298-2] and the non-repeatability [IEC 62828-1/DIN EN 61298-2] in accordance with the limit point method as per [IEC 62828-1/DIN EN 60770-2]. Reference accuracy for standard up to TD 100:1, for platinum up to TD 5:1.

100 mbar (1.5 psi) measuring cell
- Standard: TD ≤ 10:1 = ±0.075 %; TD > 10:1 = ±0.0075 % · TD
- Platinum: TD 1:1 = ±0.05 %; TD > 1:1 = ±0.075 %

250 mbar (3.75 psi) measuring cell
- Standard: TD ≤ 10:1 = ±0.075 %; TD > 10:1 = ±0.0075 % · TD
- Platinum: TD ≥ 1:1 = ±0.05 %

400 mbar (6 psi) and 1 bar (15 psi) measuring cell
- Standard: TD ≤ 10:1 = ±0.05 %; TD > 10:1 = ±0.005 % · TD
- Platinum: TD ≥ 1:1 = ±0.035 %

2 bar (30 psi) measuring cell
- Standard: TD ≤ 10:1 = ±0.05 %; TD > 10:1 = ±0.005 % · TD
- Platinum: TD 1:1 = ±0.025 %; TD ≥ 1:1 = ±0.035 %

4 bar (60 psi) measuring cell
- Standard: TD ≤ 10:1 = ±0.05 %; TD > 10:1 = ±0.005 % · TD
- Platinum: TD ≥ 1:1 = ±0.025%

10 bar (150 psi) and 40 bar (600 psi) measuring cell
- Standard: TD ≤ 10:1 = ±0.05 %; TD > 10:1 = ±0.005 % · TD
- Platinum: TD ≥ 1:1 = ±0.035 %

Measuring uncertainty for small absolute pressure measuring ranges

The smallest extended uncertainty of measurement that can delivered by our standards in the 0.001 to 35 mbar (0.0000145 to 0.5075 psi) range is 0.1 % of the reading + 0.004 mbar (0.000058 psi).

Temperature effect [E2]

$E2_M$ - Main temperature error

The output changes due to the effect of the ambient temperature [IEC 62828-1/IEC 61298-3] with respect to the reference temperature [IEC 62828-1/DIN 16086]. The values specify the maximum error due to min./max. ambient or process temperature conditions.

100 mbar (1.5 psi), 250 mbar (3.75 psi) and 400 mbar (6 psi) measuring cell
- Standard: ± (0.07 % · TD + 0.038 %)
- Platinum: ± (0.07 % · TD + 0.038 %)

1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi) and 40 bar (600 psi) measuring cell
- Standard: ± (0.065 % · TD + 0.02 %)
- Platinum: ± (0.065 % · TD + 0.02 %)

$E2_E$ - Electronics error

- Analog output (4 to 20 mA): 0.05 %
- Digital output (HART/PA/FF): 0 %

Resolution

Current output: 1 µA

Total error

The total error of the device comprises the total performance and the long-term stability effect and is calculated using the following formula:

Total error = total performance + long-term stability

Calculation of the total error with the Endress+Hauser Applicator

Detailed inaccuracies, e.g. for other temperature ranges or the high-temperature version of the device can be calculated with the Applicator "Sizing Pressure Performance".

A0038927

Calculation of the diaphragm seal error with the Endress+Hauser Applicator

Diaphragm seal errors are not taken into consideration. They are calculated separately in the Applicator "Sizing Diaphragm Seal".

A0038925

Long-term stability

The specifications refer to the upper range limit (URL).

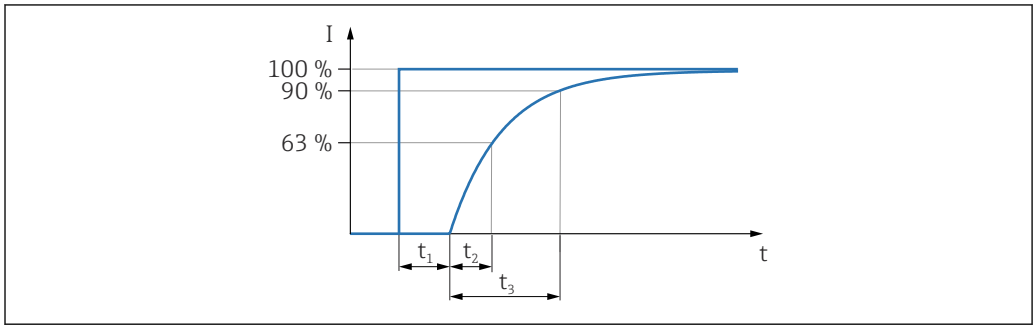
Gauge pressure measuring cells
- 1 year: ± 0.05 %
- 5 years: ± 0.08 %
- 10 years: ± 0.10 %

Absolute pressure measuring cells
- 1 year: ± 0.05 %
- 5 years: ± 0.15 %
- 10 years: ± 0.20 %

Response time T63 and T90

Dead time, time constant

Representation of dead time and time constant as per IEC62828-1:



Step response time = dead time (t_1) + time constant T90 (t_3) according to IEC62828-1

Dynamic behavior, current output

	Dead time (t_1)	Time constant T63 (t_2)	Time constant T90 (t_3)
Max.	90 ms	120 ms	276 ms

Dynamic behavior, digital output (HART electronics)

A typical burst rate of 300 ms results in the following behavior:

	Dead time (t_1)	Dead time (t_1) + Time constant T63 (t_2)	Dead time (t_1) + Time constant T90 (t_3)
Min.	250 ms	370 ms	436 ms
Max.	1050 ms	1170 ms	1236 ms

Read cycle
- Acyclic: max. 3/s, typically 1/s (depends on command # and number of preambles)
- Cyclic (burst): max. 3/s, typically 2/s

The device commands the BURST MODE function for cyclic value transmission via the HART communication protocol.

Cycle time (update time)

Cyclic (burst): min. 300 ms

Dynamic behavior, PROFIBUS PA

A typical PLC cycle time of 1 s results in the following behavior:

	Dead time (t_1)	Dead time (t_1) + Time constant T63 (t_2)	Dead time (t_1) + Time constant T90 (t_3)
Min.	125 ms	245 ms	311 ms
Max.	1325 ms	1445 ms	1511 ms

Read cycle (PLC)

- Acyclic: typically 25/s
- Cyclic: typically 30/s (depending on the number and type of function blocks used in the closed-control loop)

Cycle time (update time)

Min. 200 ms

The cycle time in a bus segment in cyclic data communication depends on the number of devices, on the segment coupler used and on the internal PLC cycle time. A new measured value can be determined up to five times a second.

Dynamic behavior, FOUNDATION Fieldbus

A typical configuration for the macro cycle time (host system) of 1 s results in the following behavior:

	Dead time (t_1)	Dead time (t_1) + Time constant T63 (t_2)	Dead time (t_1) + Time constant T90 (t_3)
Min.	135 ms	255 ms	321 ms
Max.	1135 ms	1255 ms	1321 ms

Read cycle

- Acyclic: typically 10/s
- Cyclic: max. 10/s (depending on the number and type of function blocks used in a closed-control loop)

Cycle time (update time)

Cyclic: min. 100 ms

Installation factors

Influence of installation position

≤ 0.18 mbar (0.003 psi). Device rotated 180°, process connection pointing upwards.

A position-dependent zero point shift can be corrected. Please refer to the "Commissioning → Position adjustment" section of the Operating Instructions.

Different tightening torques (e.g. for Clamp or Varivent connections) can merely cause a shift in the zero point. This effect is corrected by position adjustment during commissioning.

Warm-up period

- 4 to 20 mA HART: < 10 s
- PROFIBUS PA: 6 s
- FOUNDATION Fieldbus: 50 s

Performance characteristics for measuring instruments with metallic process membrane

Response time

HART

- Acyclic: min. 330 ms, typically 590 ms (depending on command # and number of preambles)
- Cyclic (burst): min. 160 ms, typically 350 ms (depending on command # and number of preambles)

PROFIBUS PA

- Acyclic: approx. 60 ms to 70 ms (depending on Min. Slave Interval)
- Cyclic: approx. 10 ms to 13 ms (depending on Min. Slave Interval)

FOUNDATION Fieldbus

- Acyclic: typically 100 ms (for standard bus parameter settings)
- Cyclic: max. 20 ms (for standard bus parameter settings)

Reference operating conditions

- As per IEC 62828-2 / IEC 60770
- Ambient temperature T_A = constant, in the range: +22 to +28 °C (+72 to +82 °F)
- Humidity φ = constant, in the range: 5 to 80 % RH ± 5 %
- Atmospheric pressure p_A = constant, in the range: 860 to 1060 mbar (12.47 to 15.37 psi)
- Position of the measuring cell: horizontal ±1°
- Input of LOW SENSOR TRIM and HIGH SENSOR TRIM for lower range value and upper range value
- Zero-point based span
- Process membrane material: AISI 316L (1.4435) or Alloy C
- Fill fluid PMP71/PMP75: silicone oil
- Supply voltage: 24 V DC ±3 V DC
- Load with HART: 250 Ω
- Turn down (TD) = URL/ | URV - LRV |

Total performance

The performance characteristics refer to the accuracy of the device. The factors that influence the accuracy can be divided into two groups

- Total performance of device
- Installation factors

All of the performance characteristics meet the requirement of ≥ ± 3 sigma.

The total performance of the device comprises the reference accuracy and the ambient temperature effect and is calculated using the following formula:

Total performance = $\pm \sqrt{((E1)^2 + (E2)^2)}$

E1 = Reference accuracy

E2 = Ambient temperature effect

Calculation of E2:

Ambient temperature effect per ±28 °C (50 °F)

(Corresponds to a range of −3 to +53 °C (+27 to +127 °F))

$E2 = E2_M + E2_E$

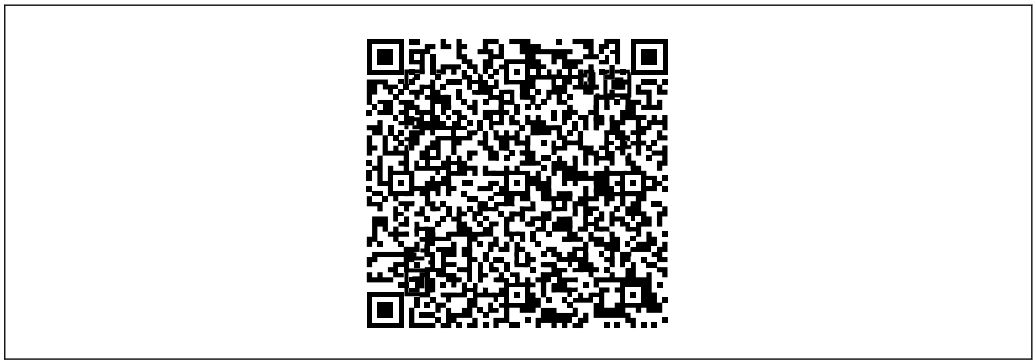
$E2_M$ = Main temperature error

$E2_E$ = Electronics error

- The values apply to process membranes made of 316L (1.4435)
- The values refer to the calibrated span.

Calculation of the total performance with the Endress+Hauser Applicator

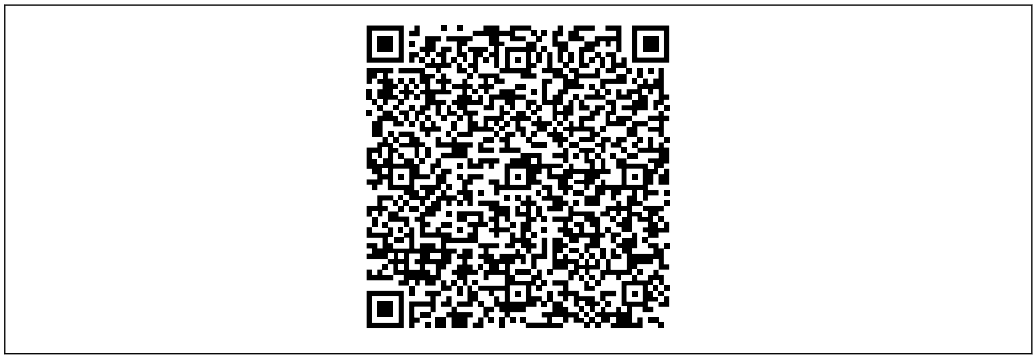
Detailed inaccuracies, e.g. for other temperature ranges, can be calculated with the Applicator "Sizing Pressure Performance".



A0038927

Calculation of the diaphragm seal error with the Endress+Hauser Applicator

Diaphragm seal errors are not taken into consideration. They are calculated separately in the Applicator "Sizing Diaphragm Seal".



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Reference accuracy [E1]

Reference accuracy comprises the non-linearity [IEC 62828-1/DIN EN 61298-2] including the hysteresis [IEC 62828-1/DIN EN 61298-2] and the non-repeatability [IEC 62828-1/DIN EN 61298-2] in accordance with the limit point method as per [IEC 62828-1/DIN EN 60770-2]. Reference accuracy for standard up to TD 100:1, for platinum up to TD 5:1.

PMP71

400 mbar (6 psi) measuring cell
- Standard: TD 1:1 = ±0.05 %; TD > 1:1 = ±0.05 % · TD
- Platinum: TD 1:1 = ±0.025 %; TD > 1:1 = ±0.04 %

1 bar (15 psi) measuring cell
- Standard: TD ≤ 2.5:1 = ±0.05 %; TD > 2.5:1 = ±0.02 % · TD
- Platinum: TD 1:1 = ±0.025 %; TD > 1:1 = ±0.03 %

2 bar (30 psi) measuring cell
- Standard: TD ≤ 5:1 = ±0.05 %; TD > 5:1 = ±0.01 % · TD
- Platinum: TD 1:1 = ±0.025 %; TD > 1:1 = ±0.03 %

4 bar (60 psi), 10 bar (150 psi) and 40 bar (600 psi) measuring cell
- Standard: TD ≤ 10:1 = ±0.05 %; TD > 10:1 = ±0.005 % · TD
- Platinum: TD 1:1 = ±0.025 %; TD > 1:1 = ±0.03 %

100 bar (1 500 psi) measuring cell
- Standard: TD ≤ 10:1 = ±0.05 %; TD > 10:1 = ±0.005 % · TD
- Platinum: TD 1:1 = ±0.035 %; TD > 1:1 = ±0.04 %

400 bar (6 000 psi) and 700 bar (10 500 psi) measuring cell
- Standard: TD ≤ 5:1 = ±0.1 %; TD > 5:1 = ±0.02 % · TD
- Platinum: TD 1:1 = ±0.065 %; TD > 1:1 = ±0.09 %

PMP71 with 1-5V DC:
- 400 mbar (6 psi) to 100 bar (1 500 psi) measuring cell, multiply values by a factor of 2
- 400 bar (6 000 psi) and 700 bar (10 500 psi) measuring cell, multiply values by a factor of 1.5

Platinum not for flush-mounted process connections G ½ and M20.

PMP75

400 mbar (6 psi) measuring cell
Standard: TD 1:1 = ±0.15 %; TD > 1:1 = ±0.15 % · TD

1 bar (15 psi) measuring cell
Standard: TD ≤ 2.5:1 = ±0.075 %; TD > 2.5:1 = ±0.03 % · TD

2 bar (30 psi) measuring cell
Standard: TD ≤ 5:1 = ±0.075 %; TD > 5:1 = ±0.015 % · TD

4 bar (60 psi), 10 bar (150 psi), 40 bar (600 psi) and 100 bar (1 500 psi) measuring cell
Standard: TD ≤ 10:1 = ±0.075 %; TD > 10:1 = ±0.0075 % · TD

400 bar (6 000 psi) measuring cell
Standard: TD ≤ 5:1 = ±0.15 %; TD > 5:1 = ±0.03 % · TD

Measuring uncertainty for small absolute pressure measuring ranges

The smallest extended uncertainty of measurement that can delivered by our standards in the 0.001 to 35 mbar (0.0000145 to 0.5075 psi) range is 0.1 % of the reading + 0.004 mbar (0.000058 psi).

Temperature effect [E2]

$E2_M$ - Main temperature error

The output changes due to the effect of the ambient temperature [IEC 62828-1/IEC 61298-3] with respect to the reference temperature [IEC 62828-1/DIN 16086]. The values specify the maximum error due to min./max. ambient or process temperature conditions.

400 mbar (6 psi), 1 bar (15 psi), 2 bar (30 psi) and 4 bar (60 psi) measuring cell
± (0.04 % · TD + 0.08 %)

10 bar (150 psi) and 40 bar (600 psi) measuring cell
± (0.03 % · TD + 0.03 %)

100 bar (1 500 psi), 400 bar (6 000 psi) and 700 bar (10 500 psi) measuring cell
± (0.015 % · TD + 0.06 %)

$E2_E$ - Electronics error

- Analog output (4 to 20 mA): 0.05 %
- Digital output (HART/PA/FF): 0 %
- PMP71 with 1-5V DC: 0.18 %

The additional electronics error that occurs in the temperature range −50 to −41 °C (−58 to −42 °F) is covered by $E2_{LT}$.

$E2_{LT}$ - low-temperature error

The specifications refer to the calibrated span.

- −40 to +85 °C (−40 to +185 °F): 0 %
- −50 to −41 °C (−58 to −42 °F): 1.5 %

Resolution

Current output: 1 µA

Voltage output: 1 mW

Total error

The total error of the device comprises the total performance and the long-term stability effect and is calculated using the following formula:

Total error = total performance + long-term stability

Calculation of the total error with the Endress+Hauser Applicator

Detailed inaccuracies, e.g. for other temperature ranges, can be calculated with the Applicator "Sizing Pressure Performance".

A0038927

Calculation of the diaphragm seal error with the Endress+Hauser Applicator

Diaphragm seal errors are not taken into consideration. They are calculated separately in the Applicator "Sizing Diaphragm Seal".

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Long-term stability

The specifications refer to the upper range limit (URL).

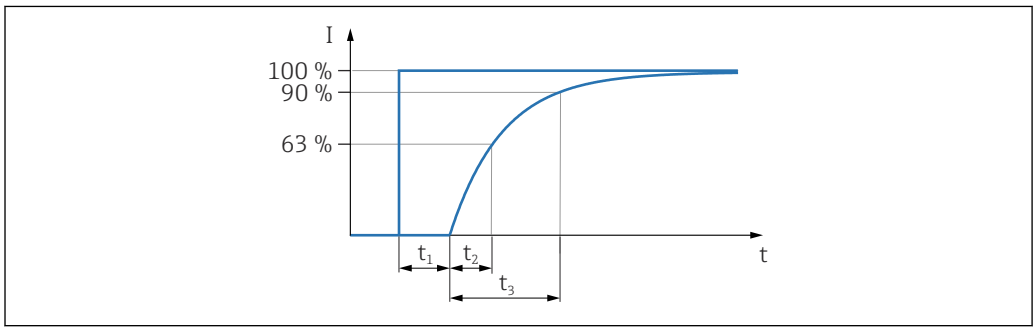
2 bar (30 psi) measuring cell
- 1 year: ± 0.07 %
- 5 years: ± 0.12 %
- 10 years: ± 0.15 %

All other measuring cells
- 1 year: ± 0.05 %
- 5 years: ± 0.07 %
- 10 years: ± 0.10 %

Response time T63 and T90

Dead time, time constant

Representation of dead time and time constant as per IEC62828-1:



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Step response time = dead time (t_1) + time constant T90 (t_3) according to IEC62828-1

Dynamic behavior, current output

Type		Measuring cell	Dead time (t_1)	Time constant T63 (t_2)	Time constant T90 (t_3)
PMP71	Max.	▪ 400 mbar (6 psi) ▪ ≥ 1 bar (15 psi)	45 ms	▪ 70 ms ▪ 35 ms	▪ 161 ms ▪ 81 ms
PMP75	Max.	PMP71 + influence of the diaphragm seal			

Dynamic behavior, digital output (HART electronics)

A typical burst rate of 300 ms results in the following behavior:

Type		Measuring cell	Dead time (t_1)	Dead time (t_1) + Time constant T63 (t_2)	Dead time (t_1) + Time constant T90 (t_3)
PMP71	Min.	▪ 400 mbar (6 psi) ▪ ≥ 1 bar (15 psi)	205 ms	▪ 275 ms ▪ 240 ms	▪ 321 ms ▪ 241 ms
	Max.	▪ 400 mbar (6 psi) ▪ ≥ 1 bar (15 psi)	1005 ms	▪ 1075 ms ▪ 1040 ms	▪ 1121 ms ▪ 1041 ms
PMP75	Max.	PMP71 + influence of the diaphragm seal			

Read cycle

- Acyclic: max. 3/s, typically 1/s (depends on command # and number of preambles)
- Cyclic (burst): max. 3/s, typically 2/s

The device commands the BURST MODE function for cyclic value transmission via the HART communication protocol.

Cycle time (update time)

Cyclic (burst): min. 300 ms

Dynamic behavior, 1-5V DC

Type		Measuring cell	Dead time (t_1)	Time constant T63 (t_2)	Time constant T90 (t_3)
PMP71	Max.	All	40 ms	70 ms	180 ms

Dynamic behavior, PROFIBUS PA

A typical PLC cycle time of 1 s results in the following behavior:

Type		Measuring cell	Dead time (t_1)	Dead time (t_1) + Time constant T63 (t_2)	Dead time (t_1) + Time constant T90 (t_3)
PMP71	Min.	▪ 400 mbar (6 psi) ▪ ≥ 1 bar (15 psi)	80 ms	▪ 150 ms ▪ 115 ms	▪ 196 ms ▪ 116 ms
	Max.	▪ 400 mbar (6 psi) ▪ ≥ 1 bar (15 psi)	1280 ms	▪ 1350 ms ▪ 1315 ms	▪ 1396 ms ▪ 1316 ms
PMP75	Max.	PMP71 + influence of the diaphragm seal			

Read cycle (PLC)

- Acyclic: typically 25/s
- Cyclic: typically 30/s (depending on the number and type of function blocks used in the closed-control loop)

Cycle time (update time)

Min. 200 ms

The cycle time in a bus segment in cyclic data communication depends on the number of devices, on the segment coupler used and on the internal PLC cycle time. A new measured value can be determined up to five times a second.

Dynamic behavior, FOUNDATION Fieldbus

A typical configuration for the macro cycle time (host system) of 1 s results in the following behavior:

Type		Measuring cell	Dead time (t_1)	Dead time (t_1) + Time constant T63 (t_2)	Dead time (t_1) + Time constant T90 (t_3)
PMP71	Min.	▪ 400 mbar (6 psi) ▪ ≥ 1 bar (15 psi)	90	▪ 160 ▪ 125	▪ 206 ▪ 126
	Max.	▪ 400 mbar (6 psi) ▪ ≥ 1 bar (15 psi)	1090	▪ 1160 ▪ 1125	▪ 1206 ▪ 1126
PMP75	Max.	PMP71 + influence of the diaphragm seal			

Read cycle

- Acyclic: typically 10/s
- Cyclic: max. 10/s (depending on the number and type of function blocks used in a closed-control loop)

Cycle time (update time)

Cyclic: min. 100 ms

Installation factors

Influence of installation position

PMP71: Device rotated 180°, process connection pointing upwards. The value is doubled for devices with inert oil.
- Process connection thread G 1 A, G 1 ½, G 2, 1 ½ MNPT, 2 MNPT, M 44x1.25, EN/DIN, ASME and JIS flanges: ≤ 10 mbar (0.15 psi).
- Process connection thread: G ½, ½ MNPT, JIS G ½, JIS R ½, M20x1.5: ≤ 4 mbar (0.06 psi).

A position-dependent zero point shift can be corrected. Please refer to the "Commissioning → Position adjustment" section of the Operating Instructions.

Different tightening torques (e.g. for Clamp or Varivent connections) can merely cause a shift in the zero point. This effect is corrected by position adjustment during commissioning.

Warm-up period

- 4 to 20 mA HART: < 10 s
- PROFIBUS PA: 6 s
- FOUNDATION Fieldbus: 50 s

Mounting

General installation instructions

- For PMP75: → 🖹 115 "Installation instructions" section.
- A position-dependent zero point shift can be corrected directly at the device via operating keys, and also in hazardous areas in the case of devices with external operation.
  Depending on the installation location, diaphragm seals additionally shift the zero point by → 🖹 115.
- The device housing can be rotated up to 380° .
- Endress+Hauser offers a mounting bracket for installing the device on pipes or walls → 🖹 40.
- Use flushing rings for flange and cell diaphragm seals if buildup or clogging can be expected at the diaphragm seal connection. The flushing ring can be fitted between the process connection and diaphragm seal. Material buildup in front of the process membrane can be flushed away, and the pressure chamber vented, via the two lateral flushing holes.
- When measuring in media containing solids, such as dirty liquids, installing separators and drain valves is useful for capturing and removing sediment.
- Point the cable and plug downwards where possible to prevent moisture from entering (e.g. rain or condensation water).

Measuring arrangement for devices without diaphragm seals – PMC71, PMP71

Cerabar S devices without diaphragm seals are mounted in accordance with the same guidelines as a manometer (DIN EN 837-2). We recommend the use of shutoff devices and siphons. The orientation depends on the measuring application.

Pressure measurement in gases

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

Pressure measurement in vapors

Use siphons for pressure measurement in steam. The siphon reduces the temperature to almost ambient temperature. Fill the siphon with liquid before commissioning. Preferably mount the Cerabar S with the siphon below the tapping point.

Advantages:
- defined water column only causes minimal/negligible measured errors
- only minimal/negligible thermal effects on the device

Mounting above the tapping point is also possible. Observe the max. permitted ambient temperature of the transmitter!

Pressure measurement in liquids

Mount the Cerabar S with shutoff device below or at the same level as the tapping point.

Level measurement

- Mount the Cerabar S below the lowest measuring point.
- Do not install the device in the following positions: In the filling curtain, in the tank outlet or at a point in the vessel which could be affected by pressure pulses from an agitator or a pump.
- The calibration and functional test can be carried out more easily if you mount the device downstream from a shutoff device.

Measuring arrangement for devices with diaphragm seals – PMP75

→ 🖹 115

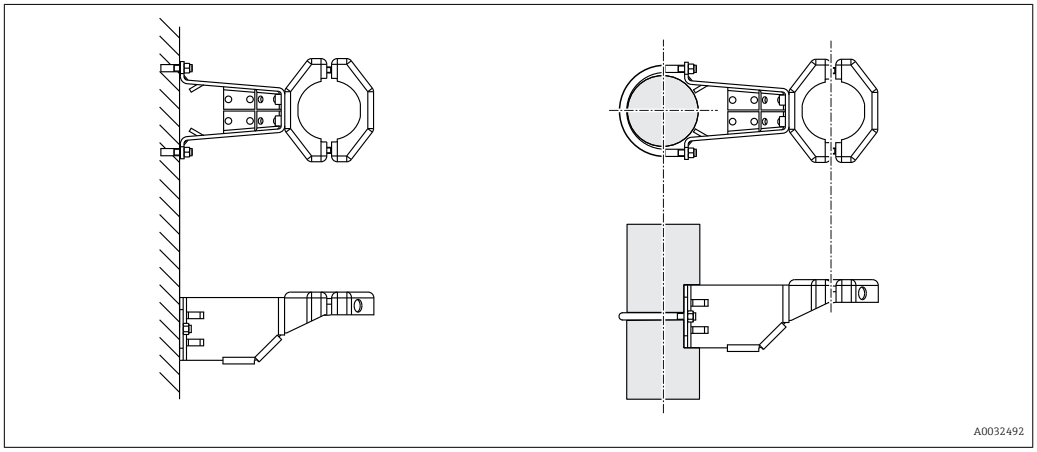
Orientation

The orientation may cause a zero point shift.

This position-dependent zero point shift can be corrected directly at the device via the operating key, and also in hazardous areas in the case of devices with external operation (position adjustment).

Wall and pipe mounting, transmitter (optional)

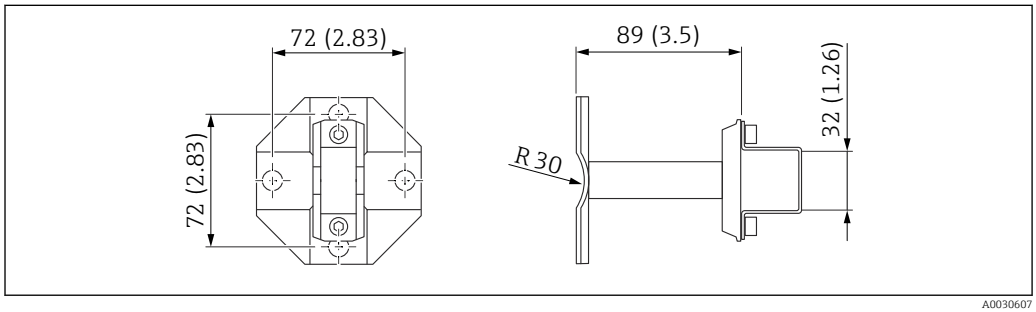
Endress+Hauser offers the following mounting bracket for installing the device on pipes or walls:



Ordering information:
- Product Configurator, order code for "Accessories enclosed", option "PA"
- For devices with separate housing (can be ordered using the order code for "Additional options 2") included in the scope of delivery
- Can be ordered as a separate accessory (part no.: 71102216).

For further details, see → 98.

Wall and pipe mounting, valve manifold (optional)



For the technical data (such as the dimensions or order numbers for screws), see the document SD01553P/00/EN.

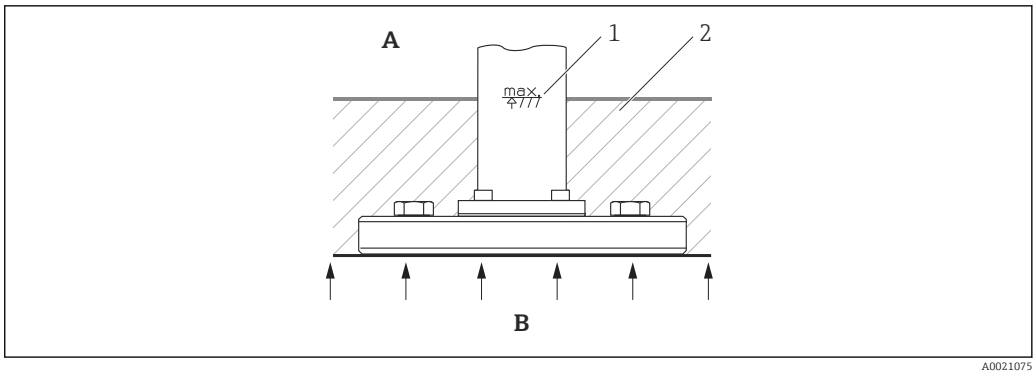
Ordering information:

Product Configurator, order code for "Accessories enclosed", option "PK"

Heat insulation – PMC71 high-temperature version

The PMC71 high-temperature version must only be insulated up to a certain height. The maximum permitted insulation height is indicated on the devices and applies to an insulation material with a heat conductivity ≤ 0.04 W/(m x K) and to the maximum permitted ambient and process temperature (see table below). The data were determined under the most critical application "quiescent air".

The data were determined under the most critical application "quiescent air".



A0021075

A Ambient temperature range
B Process temperature
1 Insulation height
2 Insulation material

	Temperature
Ambient temperature range	≤ 70 °C (158 °F)
Process temperature	≤ 150 °C (302 °F)

Mounting of PVDF screw-in fittings

⚠ WARNING

Risk of damage to process connection!
Risk of injury!
► PVDF threaded process connections must be mounted with the mounting bracket supplied!

The mounting bracket can be installed on pipes with a diameter of 1¼" to 2" or on walls.

Dimensions → 🖹 50.

"Separate housing" version

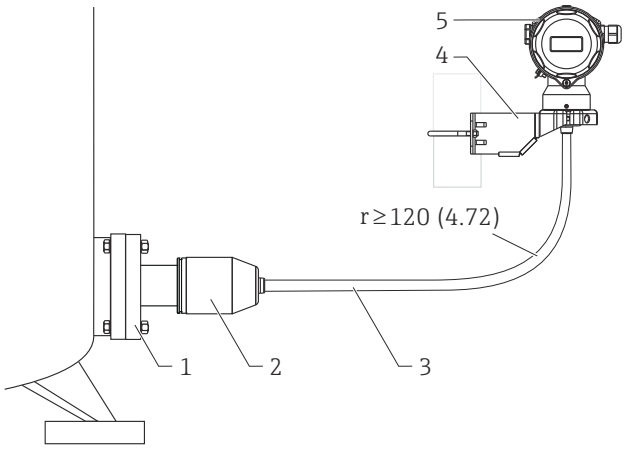
With the "separate housing" version, you are able to mount the housing with the electronics insert at a distance from the measuring point. This version facilitates trouble-free measurement
- Under particularly difficult measuring conditions (at installation locations that are cramped or difficult to access)
- If rapid cleaning of the measuring point is required and
- If the measuring point is exposed to vibrations.

You can choose between different cable versions:
- PE: 2 m (6.6 ft), 5 m (16 ft) and 10 m (33 ft)
- FEP: 5 m (16 ft).

Ordering information: Product Configurator, order code for "Additional options 2", version "G".

Dimensions → 🖹 98

In the case of the "separate housing" version, the sensor is delivered with the process connection and cable ready mounted. The housing and a mounting bracket are enclosed as separate units. The cable is provided with a socket at both ends. These sockets are simply connected to the housing and the sensor.



1 Process connection with sensor - For degrees of protection, see the following section
2 Process connection adapter (weight: 0.93 kg (2.05 lb))
3 Cable (weight: 0.05 kg/meter (0.11 lb)), both ends are fitted with a socket
4 Mounting bracket provided, suitable for pipe and wall mounting
5 Housing with electronic insert - degrees of protection → 🖹 51

Engineering unit mm (in)

Degree of protection for the process connection and sensor with the use of
- FEP cable:
  - IP 69 [1)]
  - IP 66 NEMA 4/6P
  - IP 68 (1.83 mH_2O for 24 h) NEMA 4/6P
- PE cable:
  - IP 66 NEMA 4/6P
  - IP 68 (1.83 mH_2O for 24 h) NEMA 4/6P

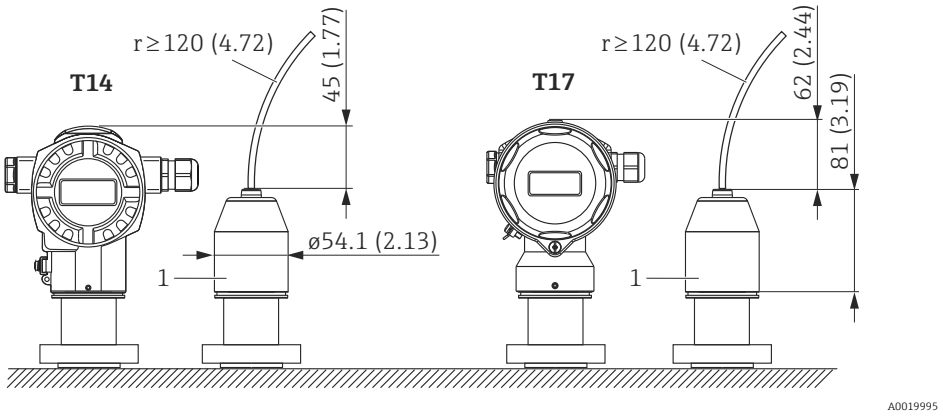
Technical data of the PE and FEP cable:
- Minimum bending radius: 120 mm (4.72 in)
- Cable extraction force: max. 450 N (101.16 lbf)
- Resistance to UV light

Use in hazardous area:
- Intrinsically safe installations (Ex ia/IS)
- FM/CSA IS: for Div. 1 installation only

1) Designation of the IP protection class according to DIN EN 60529. Previous designation "IP69K" according to DIN 40050 Part 9 is no longer valid (standard withdrawn on November 1, 2012). The tests required by both standards are identical.

Reduction of the installation height

If the separate housing is used, the installation height of the process connection is reduced compared to the dimensions of the standard version.



1 Process connection adapter

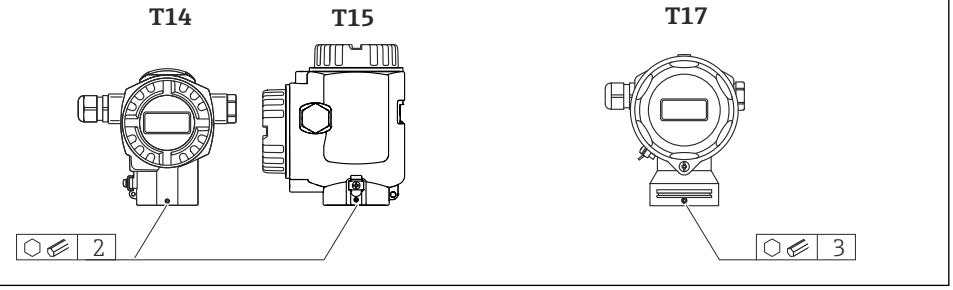
Engineering unit mm (in)

Turning the housing

The housing can be rotated up to 380° by loosening the Allen screw.

Your benefits

- Easy installation due to optimum alignment of housing
- Good, accessible device operation
- Optimum readability of the onsite display (optional).



Environment

Ambient temperature range

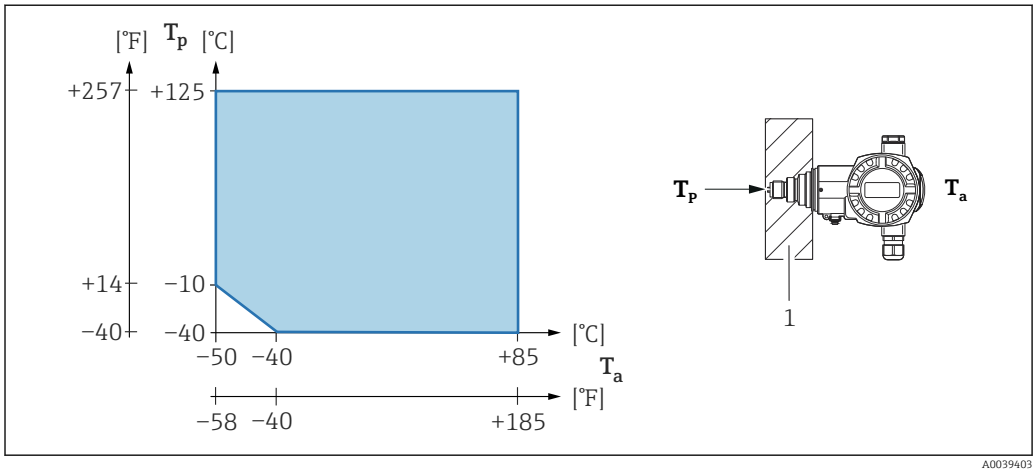
Version	PMC71 High-temperature version	PMC71	PMP71	PMP75
Without LCD display	−20 to +70 °C (−4 to +158 °F)	−40 to +85 °C (−40 to +185 °F)	−50 to +85 °C (−58 to +185 °F) [1] −60 to +85 °C (−76 to +185 °F) [2]	
With LCD display [3]		−20 to +70 °C (−4 to +158 °F)		
With M12 plug, elbowed		−25 to +85 °C (−13 to +185 °F)		
With separate housing	–	−20 to +60 °C (−4 to +140 °F)		–
Diaphragm seal systems [4]	–	–	–	→ 116
MID parts certificate	–	–	−25 to +55 °C (−13 to +131 °F)	–

1) If the temperature is below −40 °C (−40 °F), the chance of failure increases. Product Configurator, order code for "Test, Certificate" option "JN".
2) If the temperature is below −40 °C (−40 °F), the chance of failure increases. Product Configurator, order code for "Test, Certificate" option "JT".
3) Extended temperature application range (−50 to +85 °C (−58 to +185 °F)) with restrictions in optical properties, such as display speed and contrast
4) Ambient temperature range and process temperature range are mutually dependent - see "Heat insulation" section → 116

For high-temperature applications, either a PMP75 with a temperature isolator or with a capillary can be used. If vibrations also occur in the application, Endress+Hauser recommends using a PMP75 with a capillary. If a PMP75 with a temperature isolator or capillary is used, we recommend a suitable bracket for mounting (see "Wall and pipe mounting" section → 40).

PMP71: Ambient temperature T_a depending on the process temperature T_p

The process connection must be fully insulated for ambient temperatures below −40 °C (−40 °F).



1 Insulation material

Hazardous area

- For devices for use in hazardous areas, see Safety Instructions, Installation or Control Drawing.
- Pressure measuring instruments that have the usual explosion protection certificates (e.g. ATEX/CSA/FM/IEC Ex, etc) can be used in hazardous areas at ambient temperatures down to −50 °C (−58 °F) (order code for "Test, Certificate" option "JN"). The functionality of the explosion protection is also guaranteed for ambient temperatures down to −50 °C (−58 °F).
- Pressure measuring instruments that have the usual explosion protection certificates (e.g. ATEX-/ IEC Ex, etc.) can be used in hazardous areas at ambient temperatures down to −60 to +85 °C (−76 to +185 °F) (order code for "Test, Certificate" option "JT"). The functionality of the explosion protection is also guaranteed for ambient temperatures down to −50 °C (−58 °F). At temperatures ≤ −50 °C (−58 °F), explosion protection is guaranteed by the housing in the case of flameproof enclosure (Ex d) type of protection. The functionality of the transmitter cannot be fully guaranteed.

Storage temperature range

- −40 to +90 °C (−40 to +194 °F)
  Option −50 to +90 °C (−58 to +194 °F) order code 580 "Test, Certificate" option "JN". If the temperature is below −40 °C (−40 °F), the probability of a failure increases.
  Option −60 to +90 °C (−76 to +194 °F) order code 580 "Test, Certificate" option "JT". If the temperature is below −40 °C (−40 °F), the probability of a failure increases.
- Local display: −40 to +85 °C (−40 to +185 °F)
- Separate housing: −40 to +60 °C (−40 to +140 °F)
- Devices with PVC-armored capillary: −25 to +80 °C (−13 to +176 °F)

Degree of protection

Depends on the deployed
- housing: → 🖹 51
- separate housing: → 🖹 98

Climate class

Class 4K4H (air temperature: −20 to +55 °C (−4 to +131 °F), relative humidity: 4 to 100 %) fulfilled as per DIN EN 60721-3-4 (condensation possible. With PMC71, avoid condensate in the device.)

Electromagnetic compatibility

- Electromagnetic compatibility as per EN 61326 and NAMUR recommendation EMC (NE21).
- With enhanced immunity against electromagnetic fields as per EN 61000-4-3: 30 V/m with closed cover (for devices with T14 housing)
  Increased interference immunity with 30 V/m not available for 1-5V DC. EMC interference immunity for 1-5V DC: 10 V/m
- Maximum deviation: < 0.5 % of span
- All EMC measurements were performed with a turn down (TD) = 2:1.
- Class E3 as per OIML R75-2

For further details refer to the Declaration of Conformity.

Vibration resistance

Device/accessory	Test standard	Vibration resistance
PMC71 [1]	GL	Guaranteed for 3 to 25 Hz: ±1.6 mm (0.063 in); 25 to 100 Hz: 4 g in all 3 axes
PMP71		
PMP75 [2] [3]		
With mounting bracket	IEC 62828-1 / IEC 61298-3	Guaranteed for 10 to 60 Hz: ±0.15 mm (0.0059 in); 60 to 500 Hz: 2 g in all 3 axes
PMP71 with MID parts certificate	OIML R117-1	Class M3

1) Not for high-temperature version with Ex d[ia], CSA XP or FM XP
2) With aluminum T14 housing only
3) For applications with very high temperatures, a PMP75 with either a temperature isolator or a capillary can be used. If vibrations also occur in the application, Endress+Hauser recommends using a PMP75 with a capillary. If a PMP75 with a temperature isolator or capillary is used, it must be mounted with a mounting bracket

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 instruments, must be cleaned in accordance with the BAM requirements.
- Depending on the materials used, a certain maximum temperature and a maximum pressure must not be exceeded for oxygen applications.

The devices that are suitable for gaseous oxygen applications are indicated by p_{max} in the following table.

HB = Cleaned for oxygen service

Order code for devices [1], Cleaned for oxygen applications	p_{max} for oxygen applications	T_{max} for oxygen applications
PMC71 – * * * * * * ** 2 * * or PMC71 – * * * * * * ** A * * HB, Devices with measuring cells, nominal value < 10 bar (150 psi)	Over pressure limit (OPL) [2] [3] of the measuring cell	60 °C (140 °F)
PMC71 – * * * * * * ** 2 * *, PMC71 – * * * * * * ** A * * HB, Devices with measuring cells, nominal value ≥ 10 bar (150 psi)	40 bar (600 psi)	60 °C (140 °F)
PMP71 – * * * * * * * ** N * * or PMP71 – * * * * * * * ** F * * HB	Depends on the lowest-rated element, with regard to pressure, of the selected components: overpressure limit (OPL) of the sensor, process connection (1.5 x PN) or fill fluid (80 bar (1200 psi))	60 °C (140 °F)
PMP75 – * * * * * * * * ** N * * or PMP75 – * * * * * * * * ** F * * HB	Depends on the lowest-rated element, with regard to pressure, of the selected components: overpressure limit (OPL) of the measuring cell, process connection (1.5 x PN) or fill fluid (80 bar (1200 psi))	60 °C (140 °F)

1) Devices only, not accessories or enclosed accessories.
2) Product Configurator, order code for "Sensor range; sensor over pressure limit (= OPL)"
3) PMC71 with PVDF thread: Only mount with the enclosed mounting bracket. MWP 10 bar (150 psi), OPL max. 15 bar (225 psi). Process temperature range −10 to +60 °C (+14 to +140 °F)

PWIS-free applications

Special cleaning of the transmitter to remove paint-wetting substances, for use in paint shops, for instance.

Ordering information:

Product Configurator, order code for "Seal", option "L" or "M".

Ultrapure gas applications

Endress+Hauser also offers device for special applications, such as for ultrapure gas, which have been cleaned of oil and grease. No special restrictions regarding the process conditions apply to these devices.

Ordering information:
- Product Configurator, order code for "Seal" or
- Product Configurator, order code for "Fill fluid".

Hydrogen applications

A **ceramic** process membrane or a **gold-plated** metallic process membrane offers universal protection against hydrogen diffusion, both in gas applications and in applications with aqueous solutions.

Applications with hydrogen in aqueous solutions

A **gold/rhodium-coated** metallic process membrane (AU/Rh) offers effective protection against hydrogen diffusion.

Operation in very corrosive environment

PMP75:

For corrosive environments (e.g. maritime environment / coastal areas), Endress+Hauser recommends the use of a PVC or PTFE armor for the capillaries (→ 🖹 103).

Process

Process temperature limits

For oxygen applications → 46

PMC71 (with ceramic process membrane)

- −25 to +125 °C (−13 to +257 °F)
- High-temperature version: −25 to +150 °C (−13 to +302 °F); Product Configurator, order code for "Additional options 1", option "T".
- For saturated steam applications, use a device with a metallic process membrane, or provide a siphon for temperature isolation when installing.
- Observe the process temperature range of the seal in the following table.

Seal	Notes	Process temperature range	Option [1]
FKM	–	−25 to +125 °C (−13 to +257 °F)/ 150 °C (302 °F) [2]	A, L
EPDM 70	FDA 21CFR177.2600	−40 to +125 °C (−40 to +257 °F)/ 150 °C (302 °F) [2]	B
EPDM 331	FDA 21CFR177.2600; 3A Class II; USP Class VI DVGW (UBA "KTW", W270), NSF61	−20 to +125 °C (−4 to +257 °F)/ 150 °C (302 °F) [2]	B [3]
FFKM Perlast G75LT	–	−20 to +125 °C (−4 to +257 °F)/ 150 °C (302 °F) [2]	C
Kalrez, Compound 4079	–	+5 to +125 °C (+41 to +257 °F)/ 150 °C (302 °F) [2]	D, M
Chemraz, Compound 505	–	−10 to +125 °C (+14 to +257 °F)/ 150 °C (302 °F) [2]	E
HNBR	FDA 21CFR177.2600; 3A Class II; KTW; AFNOR; BAM	−25 to +125 °C (−13 to +257 °F)	F [4]
NBR	–	−10 to +100 °C (+14 to +212 °F)	F
FKM	FDA 21CFR177.2600	−5 to +125 °C (+23 to +257 °F)	G
FKM	Cleaned of oil and grease	−10 to +125 °C (+14 to +257 °F)/ 150 °C (302 °F) [2]	1
FKM	Cleaned for oxygen service	−10 to +60 °C (+14 to +140 °F)	2 or A [5]
The process temperature ranges specified here refer to permanent application of the PMC71. They may be exceeded for a short time (e.g. for cleaning).			

1) Product Configurator, order code for "Seal"
2) 150 °C (302 °F) for high-temperature version
3) In combination with order code for "Additional options 1" option "F" or with order code for "Process connection" option "MP", "MR", "TD", "TF", "TK" or "TR"
4) These seals are used for devices with 3A-approved process connections.
5) with option "HB", see Product Configurator, order code for "Service"

Applications with changes in temperature

Extreme changes in temperature can result in temporary measurement errors. Temperature compensation occurs after a few minutes. Internal temperature compensation occurs more quickly the smaller the change in temperature and the longer the time interval involved.

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

PMP71 (with metallic process membrane)

Designation	Limits
Process connections with internal process membrane	−40 to +125 °C (−40 to +257 °F) (150 °C (302 °F) for max. one hour)
Process connections with flush process membrane [1)]	−40 to +100 °C (−40 to +212 °F)
Process connections with flush process membrane, G ½ A, M20x1.5	−20 to +85 °C (−4 to +185 °F)

1) Process connection 1A, 1B, 1N, 1P: seal supplied up to −20 °C (−4 °F) process temperature

PMP71 (with metallic process membrane) with MID parts certificate

−25 to +55 °C (−13 to +131 °F)

PMP75 (with diaphragm seal)

- Depending on the design and depending on the diaphragm seal and fill fluid: −70 °C (−94 °F) up to +400 °C (+752 °F). Observe temperature application limits of diaphragm seal oil → 115.
- Please observe the maximum gauge pressure and maximum temperature.

Devices with PTFE-coated process membrane

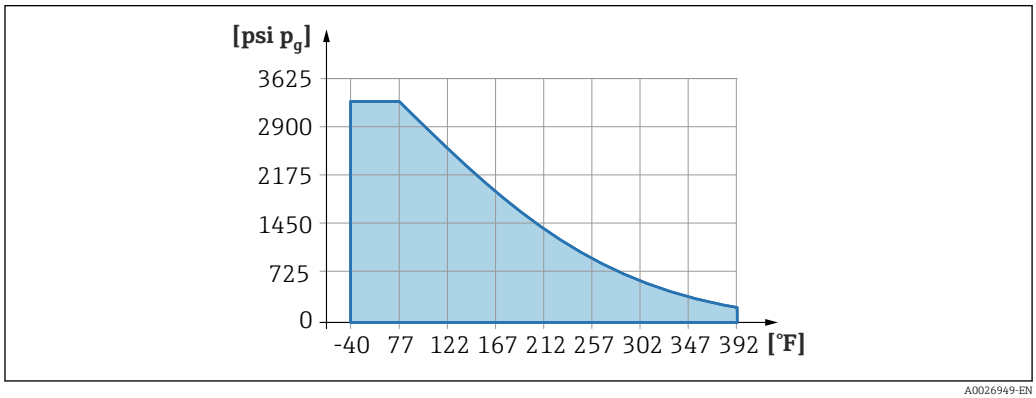
The non-stick coating has excellent gliding properties and is used to protect the process membrane against abrasive media.

NOTICE

The device can be damaged if the PTFE foil is used for anything other than the designated purpose!

▶ The PTFE foil used is designed to protect the unit against abrasion. It does not provide protection against corrosive media.

For the range of application of the 0.25 mm (0.01 in) PTFE foil on an AISI 316L (1.4404/1.4435) process membrane, see the following graphic:



A0026949-EN

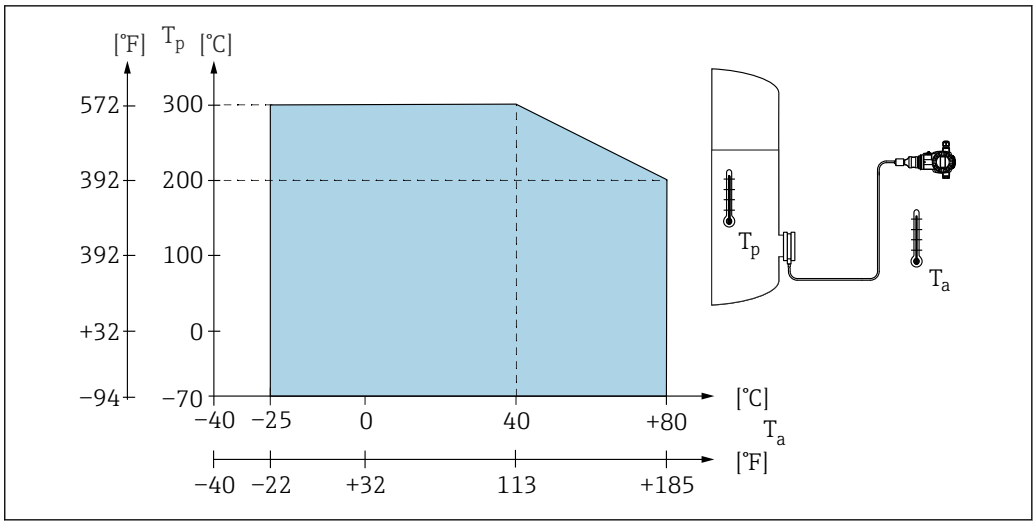
For vacuum applications: p_{abs} ≤ 1 bar (14.5 psi) to 0.05 bar (0.725 psi) up to max. +150 °C (302 °F).

Diaphragm seal with tantalum process membrane

−70 to +300 °C (−94 to +572 °F)

Process temperature limits of capillary armoring: PMP75

- 316L: No restrictions
- PTFE: No restrictions
- PVC: See the following diagram



Pressure specifications

WARNING

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

- For pressure specifications, see the "Measuring range" section and the "Mechanical construction" section.
- The measuring instrument must be operated only within the specified limits!
- MWP (maximum working pressure): The MWP (maximum working pressure) is specified on the nameplate. This value refers to a reference temperature of +20 °C (+68 °F) and may be applied to the device for an unlimited time. Observe the temperature dependency of the MWP. For the pressure values permitted at higher temperatures for flanges, please refer to standards EN 1092-1 (with regard to their stability-temperature property, the materials 1.4435 and 1.4404 are grouped together under EN 1092-1; the chemical composition of the two materials can be identical.), ASME B 16.5a, JIS B 2220 (the latest version of the standard applies in each case).
- The overload limit is the maximum pressure that a device may be subjected to during a test. It exceeds the maximum operating pressure by a certain factor. This value refers to a reference temperature of +20 °C (+68 °F).
- The Pressure Equipment Directive (2014/68/EU) uses the abbreviation "PS". The abbreviation "PS" corresponds to the MWP (maximum working pressure) of the measuring instrument.
- In the case of measuring cell range and process connection combinations where the overpressure limit (OPL) of the process connection is less than the nominal value of the measuring cell, the device is set at the factory, at the very maximum, to the OPL value of the process connection. If the entire measuring cell range must be used, select a process connection with a higher OPL value (1.5 x MWP; MWP = PN).
- In oxygen applications, the values for "p_{max} and T_{max} for oxygen applications must not be exceeded → 46.
- Devices with ceramic process membrane: Avoid steam hammering! Steam hammering can cause zero point drift. Recommendation: Residue (such as condensation or drops of water) can remain on the process membrane after SIP cleaning and lead to local steam hammering if steam cleaning is performed again. In practice, drying the process membrane (e.g. by blowing off excess moisture) has proven to be a successful way of avoiding steam hammering.

Burst pressure

Device	Measuring range	Burst pressure
PMP71 [1]	400 mbar (6 psi)...10 bar (150 psi)	100 bar (1 450 psi)
	40 bar (600 psi)	250 bar (3 625 psi)
	100 bar (1 500 psi)	1 000 bar (14 500 psi)
	400 bar (6 000 psi)	2 000 bar (29 000 psi)
	700 bar (10 500 psi)	2 800 bar (40 600 psi)

1) PMP75 with mounted diaphragm seal system, PMC71 with ceramic process membrane and the universal adapter process connection are exceptions.

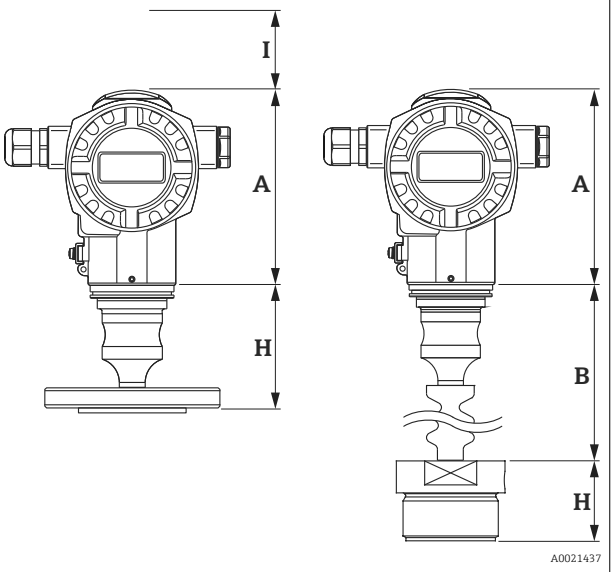
Mechanical construction

Device height

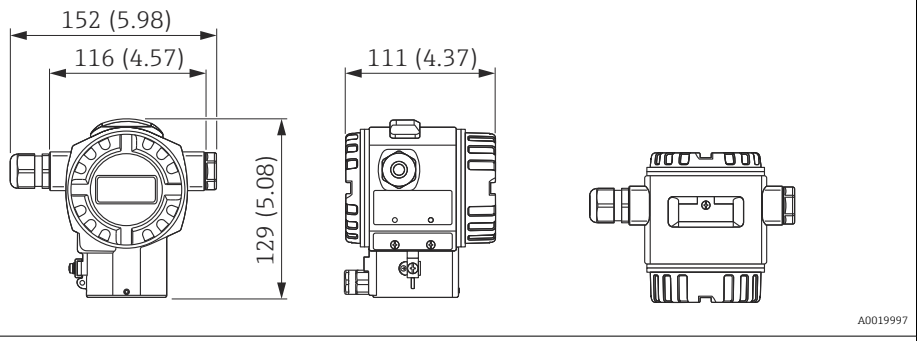
The device height is calculated from

- the height of the housing
- the height of optional mounted parts such as temperature isolators or capillaries
- the height of the relevant process connection.

The individual heights of the components can be found in the following sections. To calculate the device height, simply add up the individual heights of the components. If necessary, the installation space (the space used to install the device) must also be taken into account. You can use the following table for this:

Section	Page	Elevation	Example
Height of housing	→ 51 ff.	(A)	
Optional mounted parts	→ 75	(B)	
Process connections	→ 54	(H)	
Installation space	-	(I)	
Device height			

T14 housing, optional display on the side

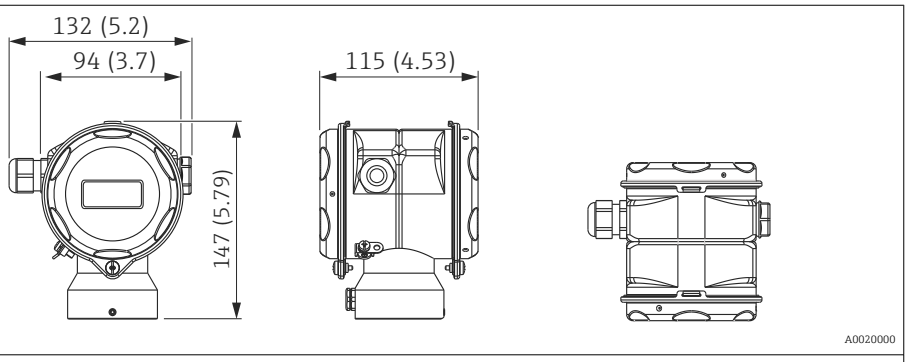


Unit mm (in). Front view, left-hand side view, top view

Material		Degree of protection	Cable entry	Weight kg (lb)		Option [1]
Housing	Cover seal			with display	without display	
Aluminum [2]	EPDM	IP66/67 NEMA 6P	M20 gland	1.2 (2.65)	1.1 (2.43)	A
		IP66/67 NEMA 6P	G ½" thread			B
		IP66/67 NEMA 6P	NPT ½" thread			C
		IP66/67 NEMA 6P	M12 plug			D
		IP66/67 NEMA 6P	7/8" plug			E
		IP65 NEMA 4	HAN7D plug 90 deg.			F
	FVMQ	IP66/67 NEMA 6P	M20 gland			G
	FVMQ	IP66/67 NEMA 6P	NPT ½" thread			H
316L	EPDM	IP66/67 NEMA 6P	M20 gland	2.1 (4.63)	2.0 (4.41)	1
		IP66/67 NEMA 6P	G ½" thread			2
		IP66/67 NEMA 6P	NPT ½" thread			3
		IP66/67 NEMA 6P	M12 plug			4
		IP66/67 NEMA 6P	7/8" plug			5
		IP65 NEMA 4	HAN7D plug 90 deg.			6
	FVMQ	IP66/67 NEMA 6P	M20 gland			7
	FVMQ	IP66/67 NEMA 6P	NPT ½" thread			8

1) Product Configurator, order code for "Housing, cover seal, cable entry, degree of protection"
2) Polyester powder coating on aluminum as per EN1706 AC43400 (reduced copper content ≤0.1 % to prevent corrosion)

T17 housing (hygienic), optional display on the side



Engineering unit mm (in). Front view, left-hand side view, top view

Material		Degree of protection [1]	Cable entry	Weight in kg (lb)		Option [2]
Housing	Cover seal			with display	without display	
316L	EPDM	IP66/68 NEMA 6P	M20 gland	1.2 (2.65)	1.1 (2.43)	R
		IP66/68 NEMA 6P	G ½" thread			S
		IP66/68 NEMA 6P	NPT ½" thread			T
		IP66/68 NEMA 6P	M12 plug			U
		IP66/68 NEMA 6P	7/8" plug			V

1) Degree of protection IP 68: 1.83 mH_2O for 24 h
2) Product Configurator, order code for "Housing, cover seal, cable entry, degree of protection"

PMC71: height H

Process connection	Height H	
	Standard	Ex d version
FNPT1/2 MNPT1/2 MNPT1/2 FNPT1/4 G1/2 M20x1.5 B0202 B0203	28 mm (1.1 in)	94 mm (3.7 in)
MNPT1-1/2 MNPT2 G1-1/2 G2 M44x1.25	59 mm (2.32 in)	125 mm (4.92 in)
Flanges	83 mm (3.27 in)	150 mm (5.91 in)
Hygienic process connections	90 mm (3.54 in)	156 mm (6.14 in)

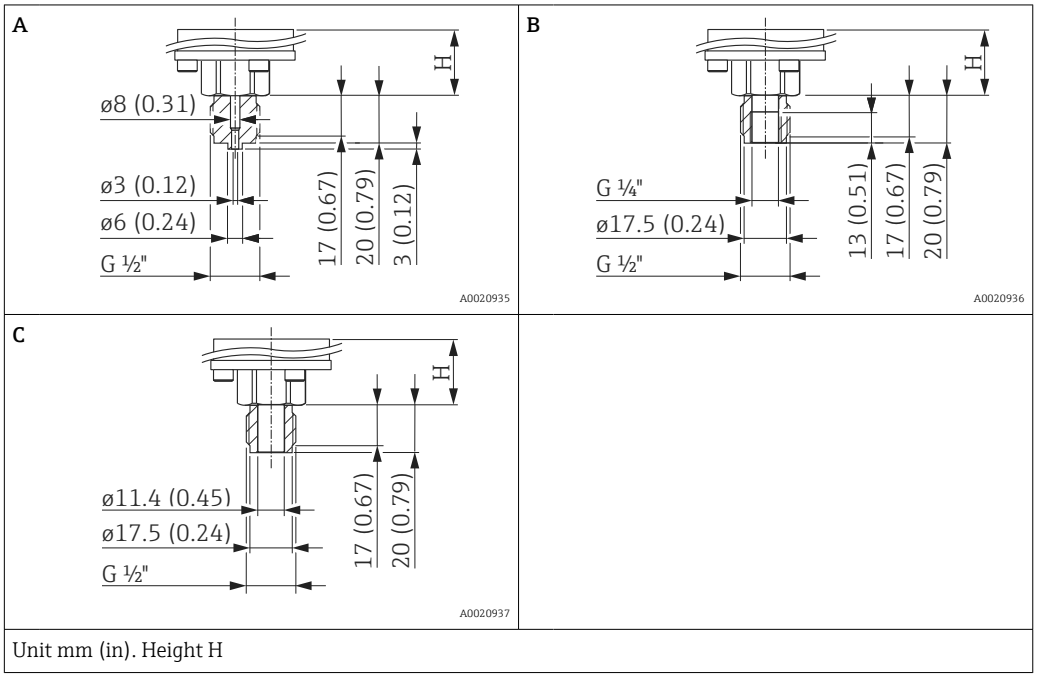
Process connection	Height H	
	High-temperature version	Ex d version including high-temperature version
FNPT1/2 MNPT1/2 MNPT1/2 FNPT1/4 G1/2 G1/2 M20x1.5 B02O2 B02O3	107 mm (4.21 in)	173 mm (6.81 in)
MNPT1-1/2 MNPT2 G1-1/2 G2 M44x1.25	59 mm (2.32 in)	125 mm (4.92 in)
Flanges	83 mm (3.27 in)	150 mm (5.91 in)
Hygienic process connections	90 mm (3.54 in)	156 mm (6.14 in)

Explanation of terms

- DN or NPS or A = alphanumeric designation of the flange size
- PN or Class or K = alphanumeric pressure rating of a component

Process connections PMC71, internal process membrane

ISO 228 G thread

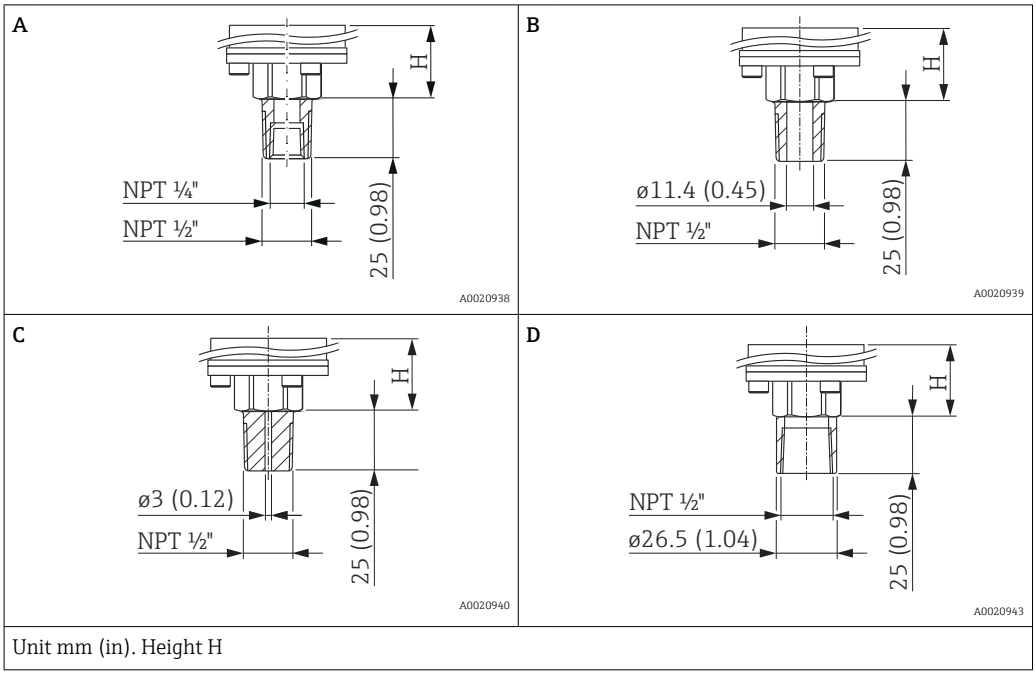


Unit mm (in). Height H

Item	Designation	Material	Weight [1]	Option [2]
			kg (lb)	
A	ISO 228 G ½" A EN 837 thread	AISI 316L	0.60 (1.32)	GA
		Alloy C276 (2.4819)		GB
		Monel (2.4360)		GC
		PVDF ▪ Only mount with a mounting bracket (included) ▪ MWP 10 bar (150 psi), OPL max. 15 bar (225 psi) ▪ Process temperature range: −10 to +60 °C (+14 to +140 °F)		GD
B	ISO 228 G ½" A thread, G ¼" (female)	AISI 316L		GE
		Alloy C276 (2.4819)		GF
		Monel (2.4360)		GG
C	ISO 228 G ½" A thread, Bore 11.4 mm (0.45 in)	AISI 316L		GH
		Alloy C276 (2.4819)		GJ
		Monel (2.4360)		GK

1) Total weight consisting of measuring cell assembly and process connection.
2) Product Configurator, order code for "Process connection"

ANSI thread



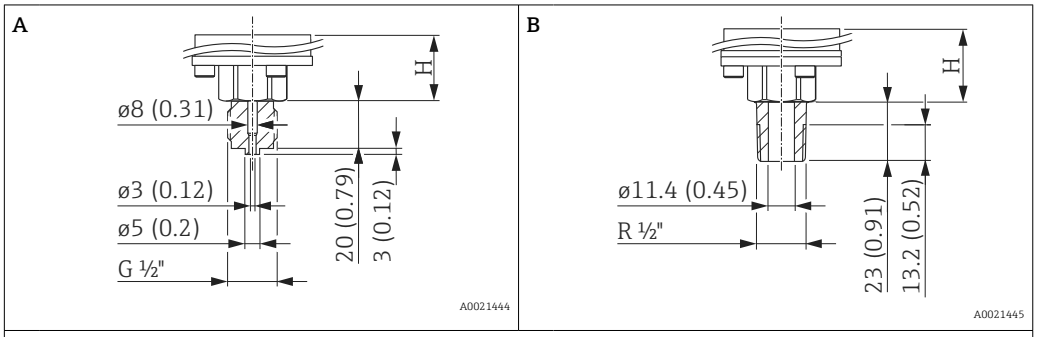
Unit mm (in). Height H

Item	Designation	Material	Weight [1] kg (lb)	Option [2]
A	ANSI ½" MNPT, ¼" FNPT	AISI 316L	0.60 (1.32)	RA
		Alloy C276 (2.4819)		RB
		Monel (2.4360)		RC
B	ANSI ½" MNPT, Bore 11.4 mm (0.45 in)	AISI 316L		RD
		Alloy C276 (2.4819)		RE
		Monel (2.4360)		RF
C	ANSI ½" MNPT, Bore 3 mm (0.12 in)	**PVDF** ▪ Only mount with a mounting bracket (included) ▪ MWP 10 bar (150 psi), OPL max. 15 bar (225 psi) ▪ Process temperature range: +10 to +60 °C (+14 to +140 °F)		RG
D	ANSI ½" FNPT Bore 11.4 mm (0.45 in)	AISI 316L		RH
		Alloy C276 (2.4819)		RJ
		Monel (2.4360)		RK

1) Total weight consisting of measuring cell assembly and process connection.
2) Product Configurator, order code for "Process connection"

Process connections PMC71, internal process membrane

JIS thread

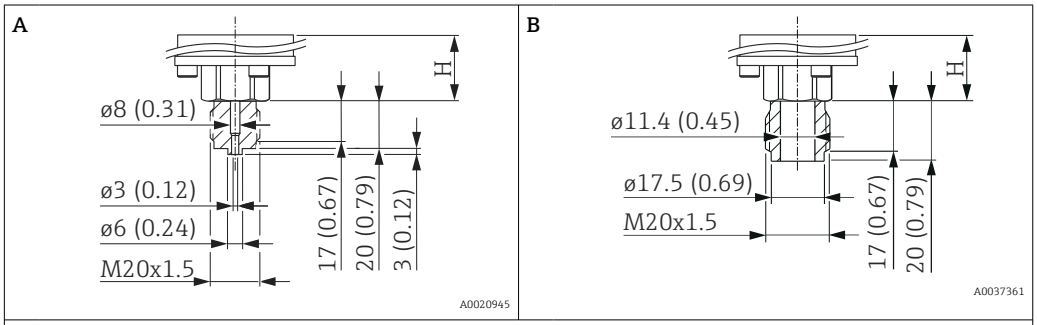


Unit mm (in). Height H

Item	Designation	Material	Weight [1]	Option [2]
			kg (lb)	
A	JIS B0202 G ½" (male)	AISI 316L	0.60 (1.32)	GL
B	JIS B0203 R ½" (male)			RL

1) Total weight consisting of measuring cell assembly and process connection.
2) Product Configurator, order code for "Process connection"

DIN 13 thread



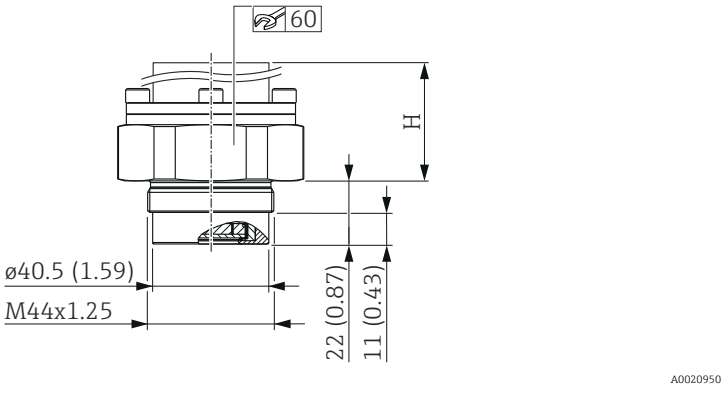
Unit mm (in). Height H

Item	Designation	Material	Weight [1]	Option [2]
			kg (lb)	
A	DIN 13 M20 x 1.5, EN 837 3 mm (0.12 in)	AISI 316L	0.60 (1.32)	GP
		Alloy C276 (2.4819)		GQ
B	DIN 13 M20 x 1.5 11.4 mm (0.45 in)	AISI 316L		GR

1) Total weight consisting of measuring cell assembly and process connection.
2) Product Configurator, order code for "Process connection"

Process connections PMC71, flush process membrane

DIN 13 thread

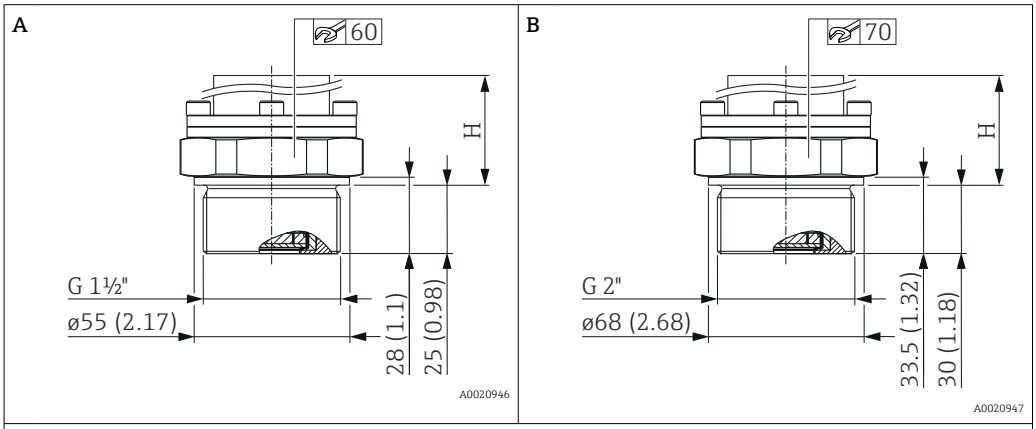


Unit mm (in). Height H

Designation	Material	Weight	Option [1]
		kg (lb)	
DIN 13 M44 x 1.25	AISI 316L	0.63 (1.39)	1R
	Alloy C276 (2.4819)		1S

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

ISO 228 G thread



Unit mm (in). Height H

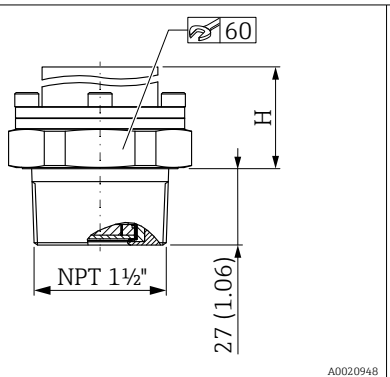
Item	Designation	Material	Weight	Option [1]
			kg (lb)	
A	ISO 228 G 1 ½" A thread	AISI 316L	0.8 (1.76)	1G
		Alloy C276 (2.4819)	0.9 (1.76)	1H
		Monel (2.4360)	0.8 (1.76)	1J
B	ISO 228 G 2" A thread	AISI 316L	1.2 (2.65)	1K
		Alloy C276 (2.4819)	1.2 (2.65)	1L
		Monel (2.4360)	1.1 (2.43)	1M

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

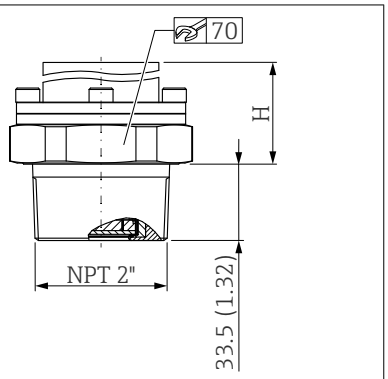
Process connections PMC71, flush process membrane

ANSI thread

A



B



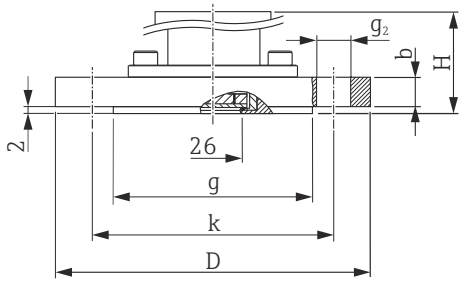
Unit mm (in). Height H

Item	Designation	Material	Weight [1]	Option [2]
			kg (lb)	
A	ANSI 1 ½" MNPT	AISI 316L	0.80 (1.76)	2D
		Alloy C276 (2.4819)		2E
		Monel (2.4360)		2F
B	ANSI 2" MNPT	AISI 316L	1.20 (2.65)	2G
		Alloy C276 (2.4819)		2H
		Monel (2.4360)		2J

1) Total weight consisting of measuring cell assembly and process connection.
2) Product Configurator, order code for "Process connection"

Process connections PMC71, flush process membrane

EN flanges, connection dimensions as per EN 1092-1



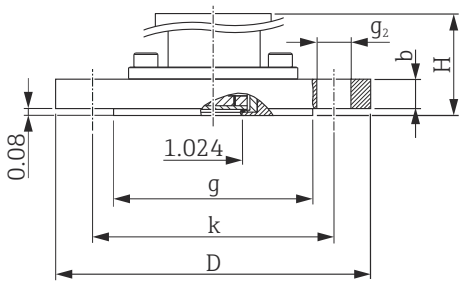
D *Diameter of flange*
b *Thickness*
g *Raised face*
k *Pitch diameter*
g_2 *Diameter of hole*

Unit mm.

Flange							Boltholes			Weight [1]	Option [2]
Material	DN	PN	Form	D	b	g	Quantity	g_2	k		
				mm	mm	mm		mm	mm	kg (lb)	
AISI 316L	25	10-40	B1	115	18	68	4	14	85	1.9 (4.19)	BA
AISI 316L	32	10-40	B1	140	18	78	4	18	100	2.5 (5.51)	CP
AISI 316L	40	10-40	B1	150	18	88	4	18	110	3.0 (6.62)	CQ
AISI 316L	50	10-40	B1	165	20	102	4	18	125	3.5 (7.72)	B3
PVDF [3]	50	10-16	B1	165	21.4	102	4	18	125	1.4 (3.09)	BR
AISI 316L	50	63	B2	180	26	102	4	22	135	4.6 (10.14)	C3
PVDF [3]	80	10-16	B1	200	21.4	138	8	18	160	1.9 (4.19)	BS
AISI 316L	80	10-40	B1	200	24	138	8	18	160	5.8 (12.79)	B4

1) Total weight consisting of measuring cell assembly and process connection.
2) Product Configurator, order code for "Process connection"
3) MWP 10 bar (150 psi), OPL max. 15 bar (225 psi); process temperature range: −10 to +60 °C (+14 to +140 °F)

ASME flanges, connection dimensions as per ASME B 16.5, raised face RF



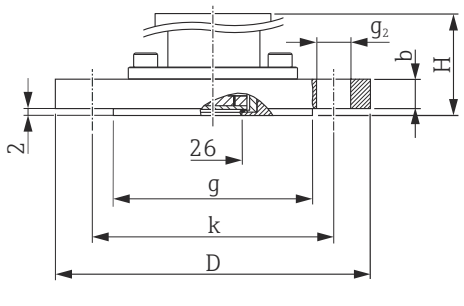
D *Diameter of flange*
b *Thickness*
g *Raised face*
k *Pitch diameter*
g_2 *Diameter of hole*

Unit in.

Flange						Boltholes			Weight [1]	Option [2]
Material	NPS	Class	D	b	g	Quantity	g_2	k		
	[in]	[lb./sq.in]	[in]	[in]	[in]		[in]	[in]	[kg (lb)]	
AISI 316/316L [3]	1	150	4.25	1.18	2	4	0.62	3.12	2.3 (5.07)	AA [4]
AISI 316/316L [3]	1	300	4.88	1.18	2	4	0.75	3.5	8.5 (18.74)	AB [4]
AISI 316/316L [3]	1 ½	150	5	0.69	2.88	4	0.62	3.88	2.1 (4.63)	AE
AISI 316/316L [3]	1 ½	300	6.12	0.81	2.88	4	0.88	4.5	3.3 (7.28)	AQ
AISI 316/316L [3]	2	150	6	0.75	3.62	4	0.75	4.75	3.1 (6.84)	AF
ECTFE [5]	2	150	6	0.75	3.62	4	0.75	4.75	3.1 (6.84)	JR
PVDF [6]	2	150	6	0.75	3.62	4	0.75	4.75	0.5 (1.1)	A3
AISI 316/316L [3]	2	300	6.5	0.88	3.62	8	0.75	5	4.0 (8.82)	AR
AISI 316/316L [3]	3	150	7.5	0.94	5	4	0.75	6	5.7 (12.57)	AG
ECTFE [5]	3	150	7.5	0.94	5	4	0.75	6	5.7 (12.57)	JS
PVDF [6]	3	150	7.5	0.94	5	4	0.75	6	1.6 (3.53)	A4
AISI 316/316L [3]	3	300	8.25	1.12	5	8	0.88	6.62	7.5 (16.54)	AS
AISI 316/316L [3]	4	150	9	0.94	6.19	8	0.75	7.5	7.6 (16.76)	AH
ECTFE [5]	4	150	9	0.94	6.19	8	0.75	7.5	7.8 (17.20)	JT
AISI 316/316L [3]	4	300	10	1.25	6.19	8	0.88	7.88	12.4 (27.34)	AT

1) Total weight consisting of measuring cell assembly and process connection.
2) Product Configurator, order code for "Process connection"
3) Combination of AISI 316 for required pressure resistance and AISI 316L for required chemical resistance (dual rated)
4) Screws must be 15 mm (0.59 in) longer than the standard flange screws
5) ECTFE coating on AISI 316/316L. When operating in hazardous areas, avoid electrostatic charging of the plastic surfaces.
6) MWP 10 bar (150 psi), OPL max. 15 bar (225 psi); process temperature range: −10 to +60 °C (+14 to +140 °F)

JIS flanges, connection dimensions in accordance with JIS B 2220 BL, raised face RF



D *Diameter of flange*
b *Thickness*
g *Raised face*
k *Pitch diameter*
g_2 *Diameter of hole*

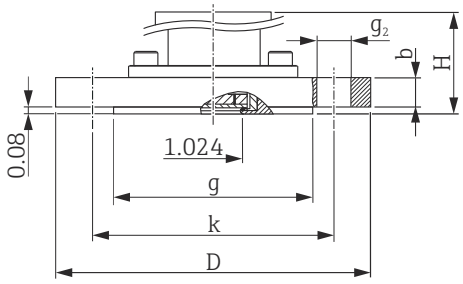
Unit mm.

Flange						Boltholes			Weight [1]	Option [2]
Material	A	K	D	b	g	Quantity	g_2	k		
			mm	mm	mm		mm	mm	kg (lb)	
AISI 316L (1.4435)	50	10	155	16	96	4	19	120	2.9 (6.39)	KF
	80	10	185	18	127	8	19	150	3.9 (8.60)	KL
	100	10	210	18	151	8	19	175	5.3 (11.69)	KH

1) Total weight consisting of measuring cell assembly and process connection.
2) Product Configurator, order code for "Process connection"

Process connections PMC71, flush process membrane

China standard flanges, connection dimensions HG/T 20592-2009 (DN-flanges) or HG/T 20615-2009 ("-flanges), raised face RF



D *Diameter of flange*
b *Thickness*
g *Raised face*
k *Pitch diameter*
g_2 *Diameter of hole*

Unit mm

Flange [1]						Boltholes			Weight	Option [2]
DN	PN	D	b	g	m	Quantity	g_2	k		
		[mm]	[mm]	[mm]	[mm]		[mm]	[mm]	[kg (lb)]	
50	40 bar	165	20	102	27.5	4	18	125	3 (6.6)	7H
80	40 bar	200	24	138	45.5	8	18	160	5.5 (12.13)	7K

1) Material: AISI 316L
2) Product Configurator, order code for "Process connection"

Flange [1]						Boltholes			Weight	Option [2]
NPS	Class	D	b	g	m	Quantity	g_2	k		
		[mm]	[mm]	[mm]	[mm]		[mm]	[mm]	[kg (lb)]	
2"	150lb./sq.in	150	17.5	92.1	22.55	4	18	120.7	2.2 (4.85)	7P
2"	300 lb./sq.in	165	20.7	92.1	22.55	8	18	127	3 (6.62)	7R
3"	150 lb./sq.in	190	22.3	127	40	4	18	152.4	4.7 (10.36)	7V
3"	300 lb./sq.in	210	27	127	40	8	22	168.3	6.6 (14.55)	7X

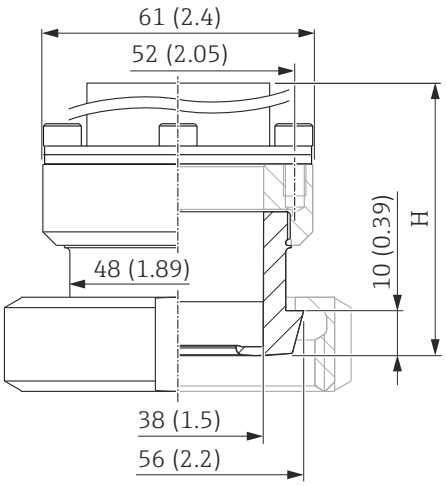
1) Material: AISI 316L
2) Product Configurator, order code for "Process connection"

PMC71 hygiene

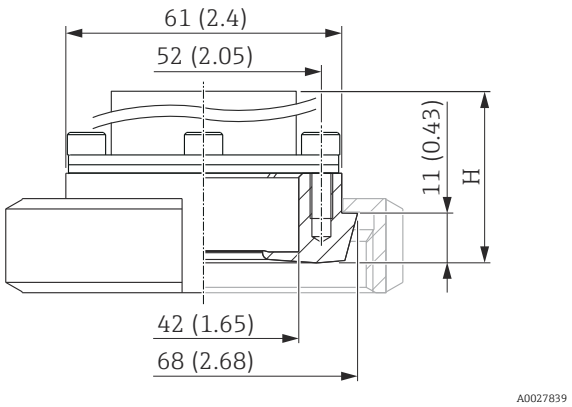
Hygienic process connections, flush process membrane

Many process connections with an EPDM or HNBR seal are approved for the PMC71 in accordance with the guidelines of the 3A Sanitary Standard. To ensure the 3A approval for the PMC71 version is valid, a 3A-approved process connection must be selected in combination with an EPDM or HNBR seal when ordering (Product Configurator, order code for "Seal", option B or F).

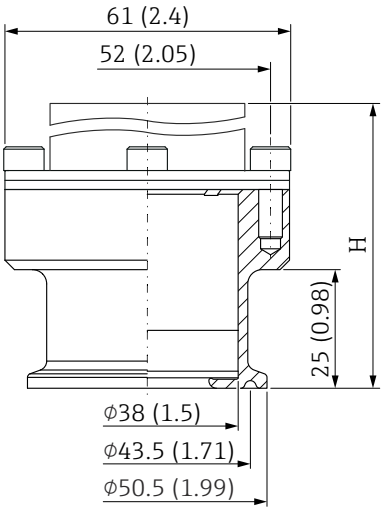
A



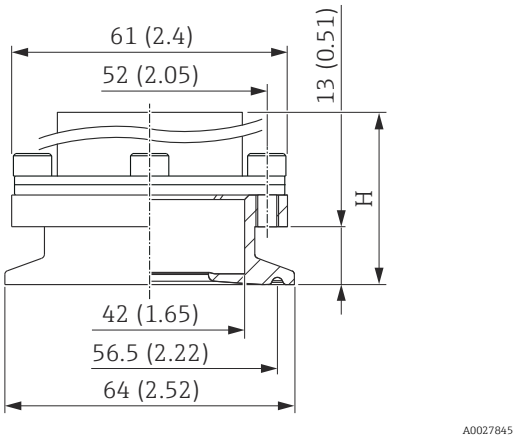
B



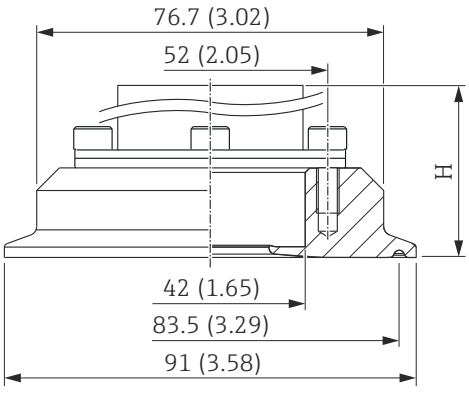
C



D



E

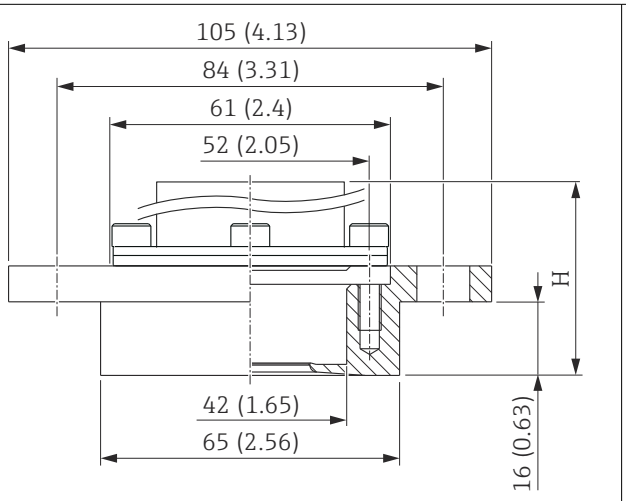


Unit mm (in)

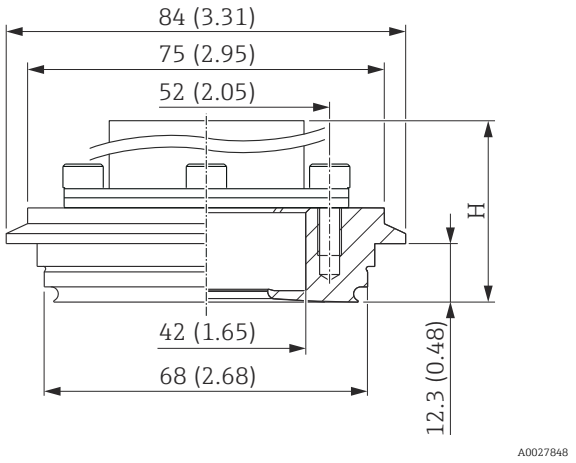
Item	Designation	DN	PN	Material [1]	Weight	Option [2]
					kg (lb) [3]	
A	DIN 11851, with HNBR or EPDM seal	40	25	AISI 316L (1.4435)	1.3(2.87)	MP [4]
B	DIN 11851, with HNBR or EPDM seal	50	25		1.27 (2.80)	MR [4]
C	Tri-Clamp ISO 2852, DIN32676	38 (1 1/2")	40 [5]		0.95 (2.09)	TJ
D	Tri-Clamp ISO 2852, with HNBR or EPDM seal	51 (2")	40 [5]		0.83 (1.83)	TD
E	Tri-Clamp ISO 2852, with NBR or EPDM seal	76.1 (3")	40 [5]		1.2 (2.65)	TF

1) Delta ferrite content < 1 %. Roughness of wetted surfaces R_a < 0.76 µm (29.9 µin) as standard. Lower surface roughness available on request.
2) Product Configurator, order code for "Process connection"
3) Total weight consisting of the measuring cell assembly and the process connection.
4) Endress+Hauser supplies these slotted nuts in stainless steel AISI 304 (DIN/EN material number 1.4301) or in AISI 304L (DIN/EN material number 1.4307).
5) Restricted nominal pressure (13.8 bar (200 psi)) for the following approvals: Product Configurator, order code for "Approval", option "E", "U" and "V".

F



G



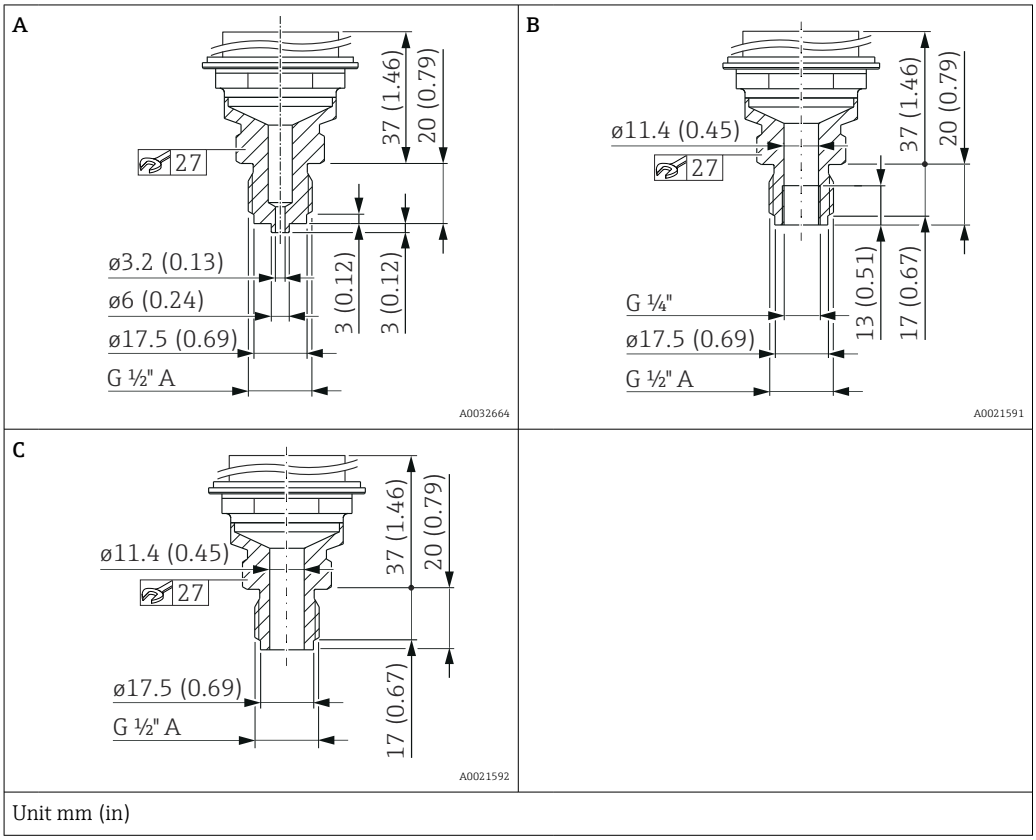
Unit mm (in)

Item	Designation	DN	PN	Material [1]	Weight	Option [2]
					kg (lb) [3]	
F	DRD Slip-on flange with HNBR or EPDM seal	50 (65 mm)	25	AISI 316L (1.4435)	1.28 (2.82)	TK
G	Varivent type N for pipes 40 – 162, with HNBR or EPDM seal	-	40		1.09 (2.40)	TR [4]

1) Delta ferrite content < 1 %. Roughness of wetted surfaces R_a < 0.76 µm (29.9 µin) as standard. Lower surface roughness available on request.
2) Product Configurator, order code for "Process connection"
3) Total weight consisting of the measuring cell assembly and the process connection.
4) Endress+Hauser supplies these slotted nuts in stainless steel AISI 304 (DIN/EN material number 1.4301) or in AISI 304L (DIN/EN material number 1.4307).

Process connections PMP71, internal process membrane

ISO 228 G thread



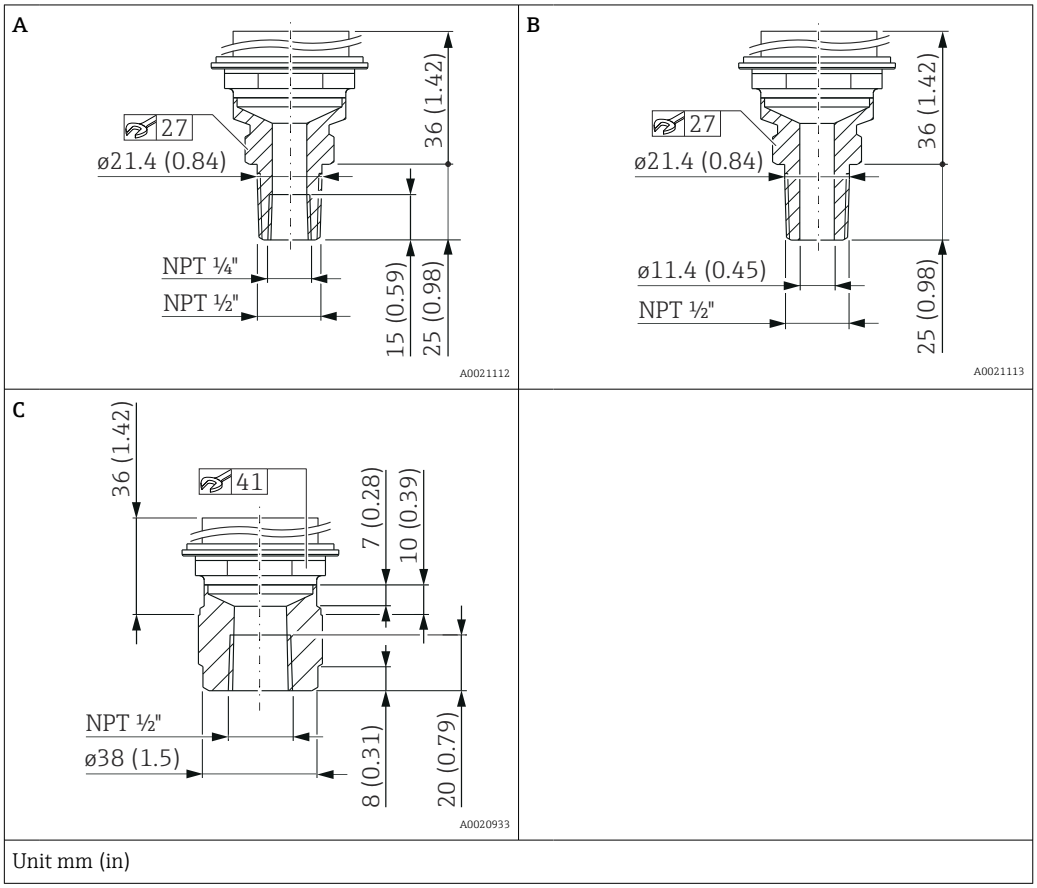
Unit mm (in)

Item	Designation	Material	Weight	Option [1]
			kg (lb)	
A	ISO 228 G ½" A EN 837 thread	AISI 316L	0.63 (1.39)	GA
		Alloy C276 (2.4819)		GB
B	ISO 228 G ½" A thread, G ¼" (female)	AISI 316L		GE
		Alloy C276 (2.4819)		GF
C	ISO 228 G ½" A thread, Bore 11.4 mm (0.45 in)	AISI 316L		GH
		Alloy C276 (2.4819)		GJ

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

Process connections PMP71, internal process membrane

ANSI thread



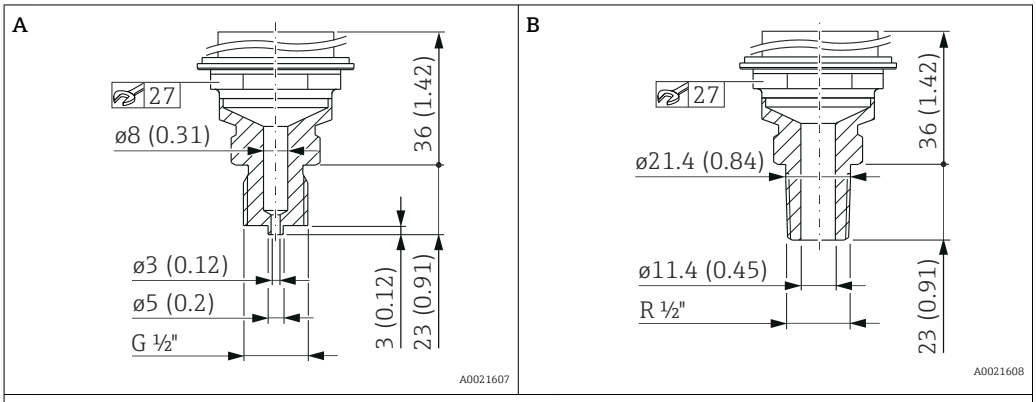
Unit mm (in)

Item	Designation	Material	Weight	Option [1]
			kg (lb)	
A	ANSI ½" MNPT, ¼" FNPT	AISI 316L	0.63 (1.39)	RA
		Alloy C276 (2.4819)		RB
B	ANSI ½" MNPT, Bore 11.4 mm (0.45 in) = 400 bar (6 000 psi) Bore 3.2 mm (0.13 in)= 700 bar (10 500 psi)	AISI 316L		RD
		Alloy C276 (2.4819)		RE
C	ANSI ½" FNPT	AISI 316L	0.7 (1.54)	RH
		Alloy C276 (2.4819)		RJ

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

Process connections PMP71, internal process membrane

JIS thread

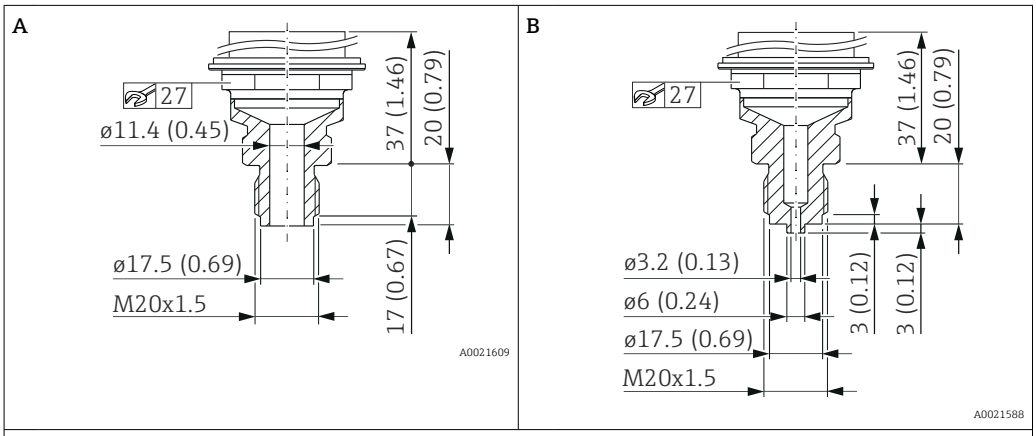


Unit mm (in)

Item	Designation	Material	Weight	Option [1]
			kg (lb)	
A	JIS B0202 G ½" (male)	AISI 316L	0.6 (1.32)	GL
B	JIS B0203 R ½" (male)			RL

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

DIN 13 thread



Unit mm (in)

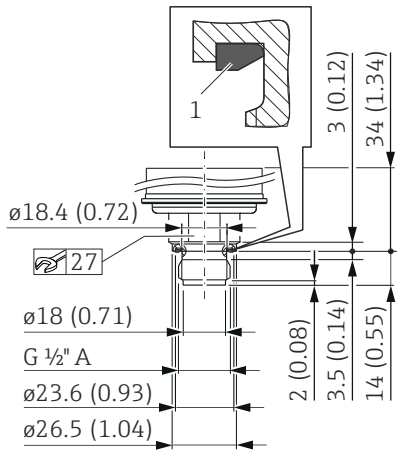
Item	Designation	Material	Weight	Option [1]
			kg (lb)	
A	DIN 13 M20 x 1.5 11.4 mm (0.45 in)	AISI 316L	0.6 (1.32)	GP
		Alloy C276 (2.4819)		GQ
B	DIN 13 M20 x 1.5, EN 837 3 mm (0.12 in)	AISI 316L		GR
		Alloy C276 (2.4819)		GS

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

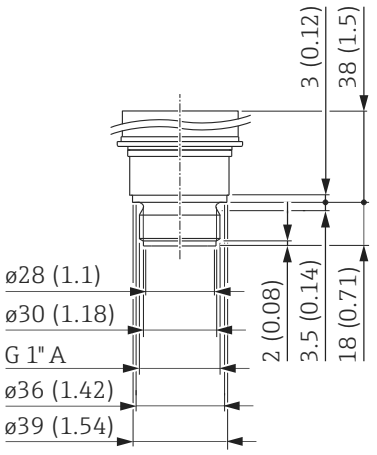
Process connections PMP71, flush process membrane

ISO 228 G thread

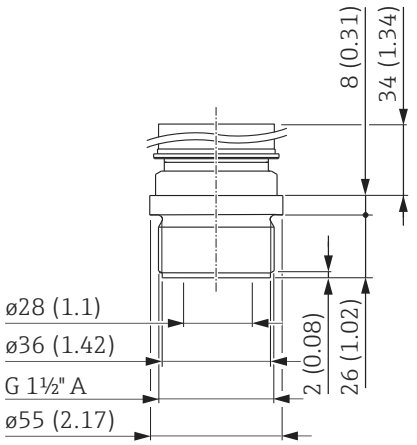
A



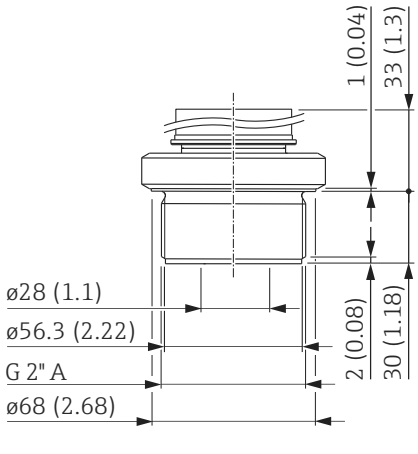
B



C



D

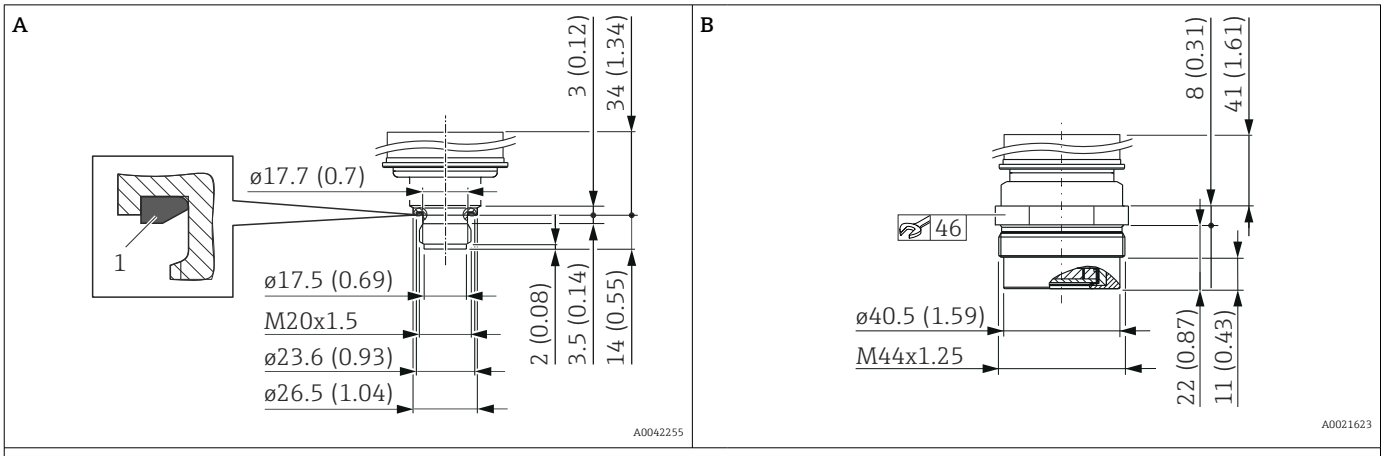


Unit mm (in)

Item	Designation	Material	Weight	Option [1]
			kg (lb)	
A	ISO 228 G ½" A thread, DIN 3852 FKM form seal (item 1) pre-installed	AISI 316L	0.4 (0.88)	1A
		Alloy C276 (2.4819)		1B
B	ISO 228 G 1" A thread	AISI 316L	0.7 (1.54)	1D
		Alloy C276 (2.4819)		1E
C	ISO 228 G 1 ½" A thread	AISI 316L	1.1 (2.43)	1G
		Alloy C276 (2.4819)		1H
D	ISO 228 G 2" A thread	AISI 316L	1.5 (3.31)	1K
		Alloy C276 (2.4819)		1L

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

DIN thread



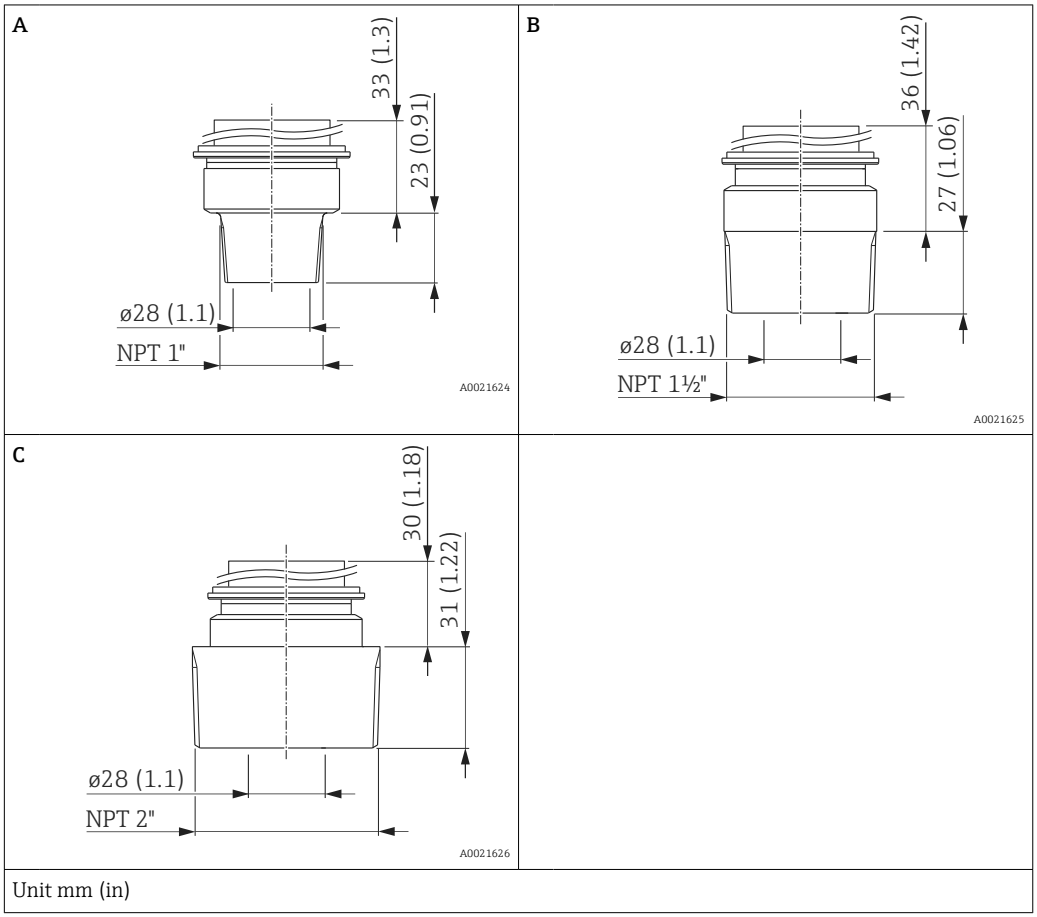
Unit mm (in)

Item	Designation	Material	Weight	Option [1]
			kg (lb)	
A	DIN 16288 M20 x 1.5 thread FKM 80 flat seal (item 1) pre-installed	AISI 316L	0.4 (0.88)	1N
		Alloy C276 (2.4819)		1P
B	DIN 13 M44 x 1.25 thread	AISI 316L	1.1 (2.43)	1R
		Alloy C276 (2.4819)		1S

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

Process connections PMP71, flush process membrane

ANSI thread



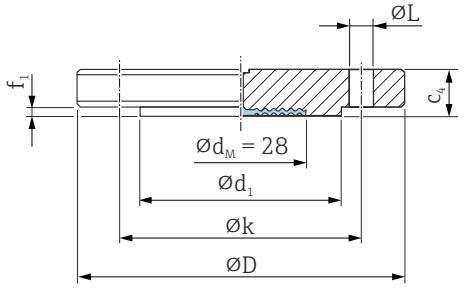
Unit mm (in)

Item	Designation	Material	Weight	Option [1]
			kg (lb)	
A	ANSI 1" MNPT	AISI 316L	0.7 (1.54)	2A
		Alloy C276 (2.4819)		2B
B	ANSI 1 ½" MNPT	AISI 316L	1 (2.21)	2D
		Alloy C276 (2.4819)		2E
C	ANSI 2" MNPT	AISI 316L	1.3 (2.87)	2G
		Alloy C276 (2.4819)		2H

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

Process connections PMP71, flush process membrane

EN flanges, connection dimensions as per EN 1092-1



A0045473

ØD Diameter of flange
c_4 Thickness
Ød$_1$ Raised face
f_1 Raised face
Øk Pitch diameter
ØL Diameter of hole
Ød$_M$ Max. diameter of process membrane

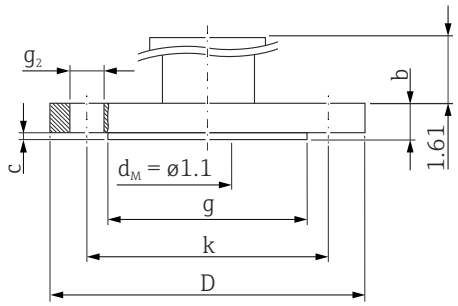
Unit mm

Flange [1]							Boltholes			Weight Flange	Option [2]
DN	PN	Form	ØD	c_4	Ød$_1$	f_1	Quantity	ØL	Øk		
			mm	mm	mm	mm		mm	mm	kg (lb)	
25	10-40	B1	115	18	68	2	4	14	85	1.38 (3.04)	CN
32	10-40	B1	140	18	78	2	4	18	100	2.03 (4.48)	CP
40	10-40	B1	150	18	88	3	4	18	110	2.35 (5.18)	CQ
50	10-40	B1	165	20	102	3	4	18	125	3.2 (7.06)	B3
80	10-40	B1	200	24	138	3	8	18	160	5.54 (12.22)	B4

1) Material: AISI 316L
2) Product Configurator, order code for "Process connection"

Process connections PMP71, flush process membrane

ASME flanges, connection dimensions as per ASME B 16.5, raised face RF



D *Diameter of flange*
b *Thickness*
g *Raised face*
c *Thickness of raised face*
k *Pitch diameter*
g_2 *Diameter of hole*
d_M *Max. diameter of process membrane*

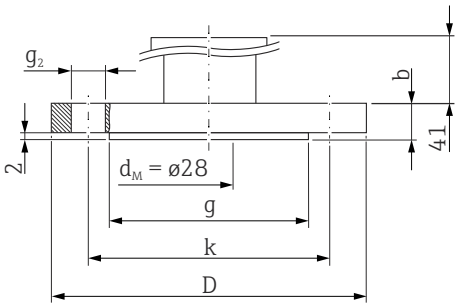
Unit in.

Flange [1]						Boltholes			Weight	Option [2]
NPS	Class	D	b	g	c	Quantity	g_2	k		
[in]	lb./sq.in	[in]	[in]	[in]	[in]		[in]	[in]	[kg]	
1	150	4.25	0.61	2.44	0.08	4	0.62	3.13	1.1 (2.43)	AA
1	300	4.88	0.69	2.70	0.06	4	0.75	3.5	1.3 (2.87)	AN
1 ½	150	5	0.69	2.88	0.08	4	0.62	3.88	1.5 (3.31)	AE
1 ½	300	6.12	0.81	2.88	0.08	4	0.88	4.5	2.6 (5.73)	AQ
2	150	6	0.75	3.62	0.08	4	0.75	4.75	2.4 (5.29)	AF
2	300	6.5	0.88	3.62	0.08	8	0.75	5	3.2 (7.06)	AR
3	150	7.5	0.94	5	0.08	4	0.75	6	4.9 (10.8)	AG
3	300	8.25	1.12	5	0.08	8	0.88	6.62	6.7 (14.77)	AS
4	150	9	0.94	6.19	0.08	8	0.75	7.5	7.1 (15.66)	AH
4	300	10	1.25	6.19	0.08	8	0.88	7.88	11.6 (25.88)	AT

1) Material: AISI 316/316L; Combination of AISI 316 for required pressure resistance and AISI 316L for required chemical resistance (dual rated)
2) Product Configurator, order code for "Process connection"

Process connections PMP71, flush process membrane

JIS flanges, connection dimensions in accordance with JIS B 2220 BL, raised face RF



D *Diameter of flange*
b *Thickness*
g *Raised face*
k *Pitch diameter*
g_2 *Diameter of hole*
$ød_M$ *Max. diameter of process membrane*

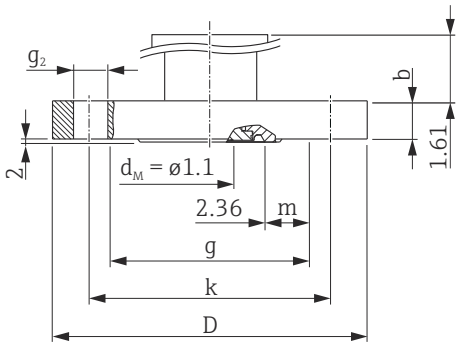
Unit mm

Flange						Boltholes			Weight Flange	Option [1]
Material	A	K	D	b	g	Quantity	g_2	k		
			[mm]	[mm]	[mm]		[mm]	[mm]	[kg]	
AISI 316L	25	20	125	16	67	4	19	90	1.5 (3.31)	KA
AISI 316L	50	10	155	16	96	4	19	120	2.0 (4.41)	KF
AISI 316L	80	10	185	18	127	8	19	150	3.3 (7.28)	KL
AISI 316L	100	10	210	18	151	8	19	175	4.4 (9.7)	KH

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

Process connections PMP71, flush process membrane

China standard flanges, connection dimensions HG/T 20592-2009 (DN-flanges) or HG/T 20615-2009 ("-flanges), raised face RF



D *Diameter of flange*
b *Thickness*
g *Raised face*
k *Pitch diameter*
g_2 *Diameter of hole*
d_M *Max. diameter of process membrane*

Unit mm

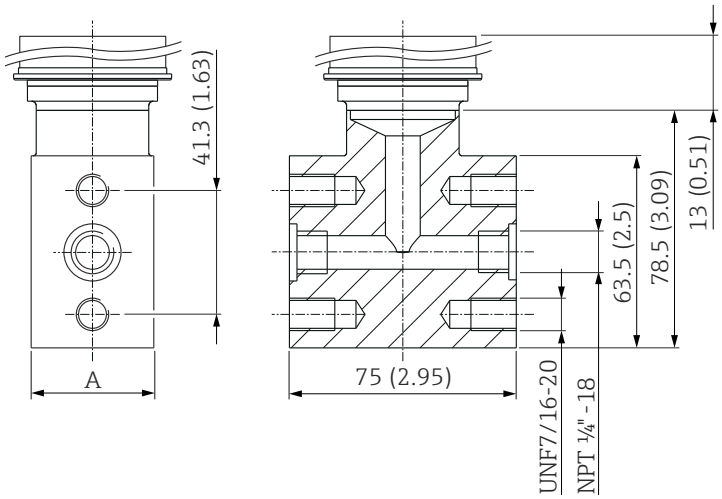
Flange [1]						Boltholes			Weight	Option [2]
DN	PN	D	b	g	m	Quantity	g_2	k		
		[mm]	[mm]	[mm]	[mm]		[mm]	[mm]	[kg (lb)]	
50	40 bar	165	20	102	27.5	4	18	125	3 (6.6)	7H
80	40 bar	200	24	138	45.5	8	18	160	5.5 (12.13)	7K

1) Material: AISI 316L
2) Product Configurator, order code for "Process connection"

Flange [1]						Boltholes			Weight	Option [2]
NPS	Class	D	b	g	m	Quantity	g_2	k		
		[mm]	[mm]	[mm]	[mm]		[mm]	[mm]	[kg (lb)]	
2"	150lb./sq.in	150	17.5	92.1	22.55	4	18	120.7	2.2 (4.85)	7P
2"	300 lb./sq.in	165	20.7	92.1	22.55	8	18	127	3 (6.62)	7R
3"	150 lb./sq.in	190	22.3	127	40	4	18	152.4	4.7 (10.36)	7V
3"	300 lb./sq.in	210	27	127	40	8	22	168.3	6.6 (14.55)	7X

1) Material: AISI 316L
2) Product Configurator, order code for "Process connection"

Process connections PMP71 — Oval flange



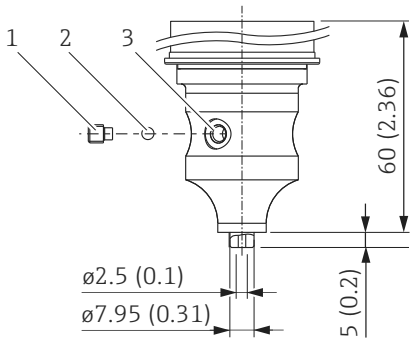
A Measuring cell <40 bar (600 psi): 40 mm (1.57 in); measuring cell ≥40 bar (600 psi): 45 mm (1.77 in)

Unit mm (in)

Material	Designation	Weight	Option [1]
		kg (lb)	
AISI 316L (1.4404)	Oval flange adapter 1/4-18 NPT as per IEC 61518 Mounting: 7/16-20 UNF	1.9 (4.19)	UR

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

Process connections PMP71 — Prepared for diaphragm seal mounting



1 Setscrew with hexagonal recess 4 mm (0.16 in), material A2-70
2 Bearing DIN 5401 (1.3505)
3 Hole for fill fluid

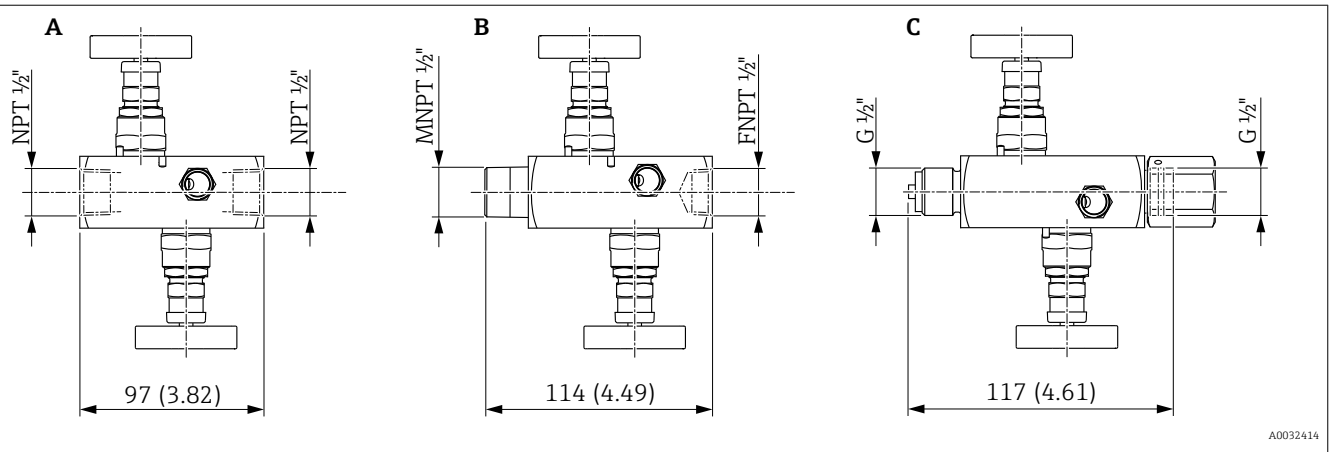
Unit mm (in)

Material	Designation	Weight kg (lb)	Option [1]
AISI 316L (1.4404)	Prepared for diaphragm seal mounting	1.9 (4.19)	U1

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

Valve manifold DA63M- (optional)

Endress+Hauser supplies milled valve manifolds via the transmitter's product structure in the following versions:



A 2-way valve manifold FNPT x FNPT
B 2-way valve manifold MNPT x FNPT
C 2-way valve manifold G ½" + adjusting nut

Engineering unit mm (in)

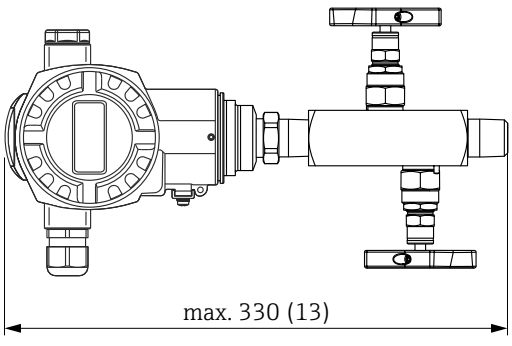
2-way valve manifolds in 316L or AlloyC can be
- ordered as an **enclosed** accessory (seal for mounting is enclosed)
- ordered as a **mounted** accessory (mounted valve manifolds are supplied with a documented leakage test).

Certificates ordered with the equipment (e.g. 3.1 material certificate and NACE) and tests (e.g. PMI and pressure test) apply to the transmitter and the valve manifold.

For other details (order option, dimension, weight, materials), see SD01553P/00/EN "Mechanical accessories for pressure measuring devices".

During the operating life of the valves, it may be necessary to re-tighten the packing.

Mounting on valve manifold

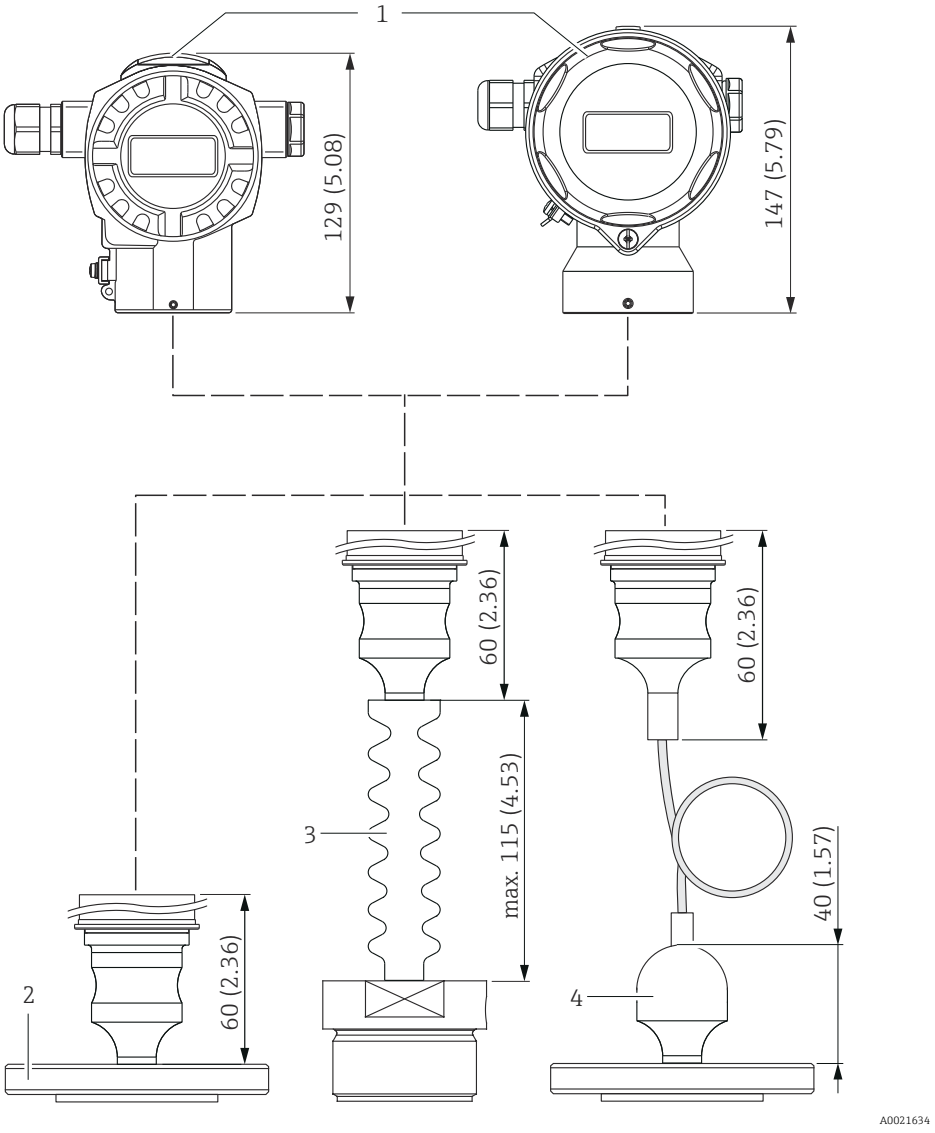


Engineering unit mm (in)

Ordering information:

Product Configurator, order code for "Accessories mounted"

PMP75 basic device



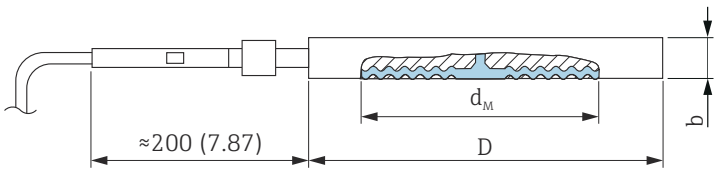
1 PMP75 basic device
2 Diaphragm seal, here, e.g. flange diaphragm seal
3 Diaphragm seal with temperature isolator
4 Process connections with capillary lines are 40 mm (1.57 in) higher than process connections without capillary lines

Engineering unit mm (in). PMP75 basic device with diaphragm seal.

Process connections PMP75, flush process membrane

- The weights of the diaphragm seals are given in the tables. For the weight of the housing, see → 51
- The following drawings illustrate how the system works in principle. In other words, the dimensions of a diaphragm seal supplied may deviate from the dimensions given in this document.
- Observe the information in the "Planning instructions for diaphragm seal systems" section → 112
- For further information please contact your local Endress+Hauser Sales Center.

Pancake seal



D Diameter
d_M Max. diameter of process membrane
b Thickness

Unit mm (in)

Flange					Diaphragm seal	Option [1]
Material	DN	PN	D	b	Weight	
			[mm]	[mm]	[kg (lb)]	
AISI 316L	50	16-400	102	20 - 22	1.3 (2.87)	UI [2]
	80	16-400	138	20 - 22	2.3 (5.07)	UJ [2]
	100	16-400	162	20 - 22	3.1 (6.84)	UK

1) Product Configurator, order code for "Process connection"
2) With TempC process membrane

Flange					Diaphragm seal	Option [1]
Material	NPS	Class	D	b	Weight	
			[in]	[in]	[kg (lb)]	
AISI 316L	2	150-2500	3.89	0.79 - 0.87	1.3 (2.87)	UL [2]
	3	150-2500	5.00	0.79 - 0.87	2.3 (5.07)	UM
	4	150-2500	6.22	0.79 - 0.87	3.1 (6.84)	UR

1) Product Configurator, order code for "Process connection"
2) With TempC process membrane

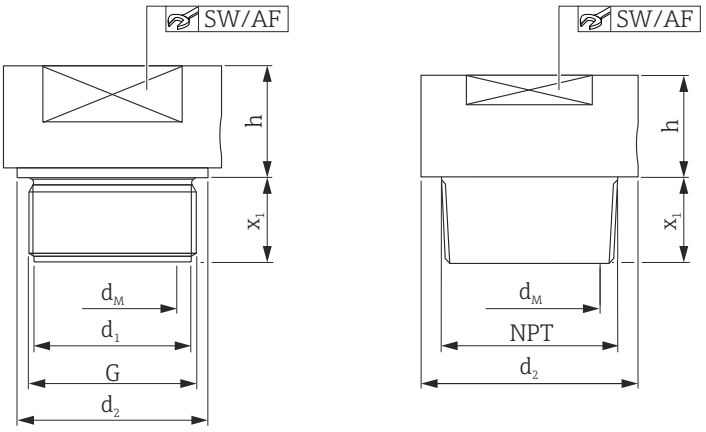
Maximum diameter of the process membrane Ød$_M$

DN	PN	Ød$_M$ (mm)					
		316L TempC	316L	Alloy C276	Tantalum	Monel (Alloy 400)	PTFE
50	16-400	61	58	62	60	59	52
80	16-400	89	89	90	92	89	80
100	16-400	-	89	90	92	89	-

NPS	Class	Ød$_M$ (in)					
in		316L TempC	316L	Alloy C276	Tantalum	Monel (Alloy 400)	PTFE
2	150-2500	2.40	2.05	2.32	2.36	2.32	2.05
3	150-2500	3.50	3.50	3.54	3.62	3.50	3.14
4	150-2500	-	3.14	3.50	3.62	3.50	-

Process connections PMP75, flush process membrane

ISO 228 and ANSI thread



d_1 Diameter
d_2 Diameter
G Thread
x_1 Screw-in length
SW/AF Width across flats
d_M Max. diameter of process membrane
h Height

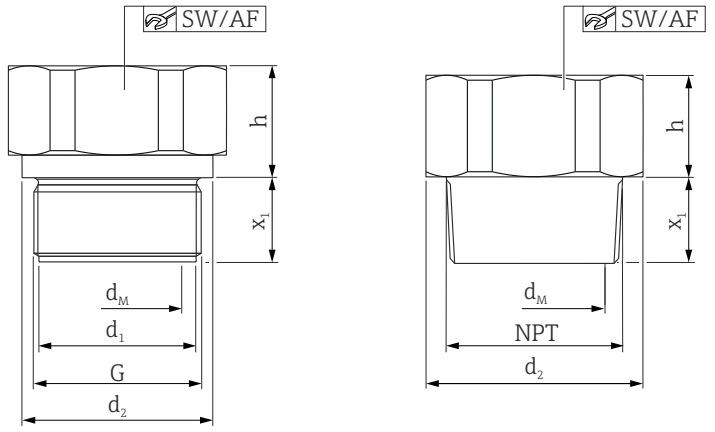
Unit mm (in). Left: ISO 228 thread, right: ANSI thread

Thread							Diaphragm seal			Option [1]
Material	G	PN	d_1	d_2	x_1	AF	d_M	h	Weight	
			[mm]	[mm]	[mm]		[mm]	[mm]	[kg (lb)]	
AISI 316L	G 1" A	400	30	39	21 [2]	32	30	19	0.4 (0.88)	1D
Alloy C276									0.5 (1.1)	1E
AISI 316L	G 1 ½" A	400	44	55	30	50	42	20	0.9 (1.98)	1G
Alloy C276									1.0 (2.21)	1H
AISI 316L	G 2"	400	56	68	30	65	50	20	1.9 (4.19)	1K
Alloy C276									2.1 (4.63)	1L
AISI 316L	1" MNPT	400	–	45	28	41	24	17	0.6 (1.32)	2A
Alloy C276									0.7 (1.54)	2B
AISI 316L	1 ½" MNPT	400	–	60	30	41	36	20	0.9 (1.98)	2D
Alloy C276				52	30	46	32	20	1.0 (2.21)	2E
AISI 316L	2" MNPT	400	–	78	30	65	38	25	1.8 (3.97)	2G
Alloy C276									2.0 (4.41)	2H

1) Product Configurator, order code for "Process connection"
2) 28 mm (1.1 in) in conjunction with high-temperature oil

Process connections PMP75, flush TempC process membrane

ISO228 and ASME thread, TempC



d_1 Diameter
d_2 Diameter
G Thread
x_1 Screw-in length
SW/AF Width across flats
d_M Max. diameter of process membrane
h Height

Unit mm (in). Left: thread ISO228, right: thread ASME
Schematic diagram, the design may differ.

Thread							Diaphragm seal			Option [1]
Material	G	PN	d_1	d_2	x_1	AF	d_M	h	Weight	
			[mm]	[mm]	[mm]		[mm]	[mm]	[kg (lb)]	
AISI 316L	G 1" A	400	30	39	21	41	28	19	0.35 (0.77)	1D
Alloy C276									0.38 (0.84)	1E
AISI 316L	G 1 ½" A	400	–	55	30	46	41	20	0.73 (1.61)	1G
Alloy C276									0.79 (1.74)	1H
AISI 316L	G 2"	400	–	68	30	60	48	20	1.20 (2.65)	1K
Alloy C276									1.30 (2.87)	1L

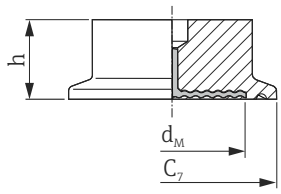
1) Product Configurator, order code for "Process connection"

Thread							Diaphragm seal			Option [1]
Material	MNPT	PN	d_1	d_2	x_1	AF	d_M	h	Weight	
			[mm]	[mm]	[mm]		[mm]	[mm]	[kg (lb)]	
AISI 316L	1" MNPT	400	–	45	23	41	28	16	0.38 (0.84)	2A
Alloy C276									0.41 (0.90)	2B
AISI 316L	1 ½" MNPT	400	–	60	30	46	41	20	0.70 (1.54)	2D
Alloy C276									0.76 (1.68)	2E
AISI 316L	2" MNPT	400	–	60	34	46	48	21	1.10 (2.43)	2G
Alloy C276									1.19 (2.62)	2H

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

Process connections PMP75, flush process membrane

Tri-Clamp ISO 2852



A0021644

C_7 Diameter of flange
h Height
d_M Max. diameter of process membrane

Unit mm (in)

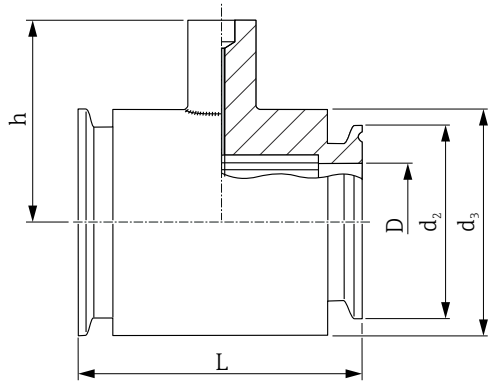
Material [1]	DN ISO 2852	DN DIN 32676	NPS	C_7	d_M		h	Weight	Option [2]
					Standard	TempC			
			[in]	[mm]	[mm]	[mm]	[mm]	[kg (lb)]	
AISI 316L	25 / 33.7	25	1	50.5	24	-	37	0.32 (0.71)	TB
	38	40	1 ½	50.5	36	36	30	1 (2.21)	TC [3] [4]
	51 / 40	50	2	64	48	41	30	1.1 (2.43)	TD [3] [4]
	63.5	50	2 ½	77.5	61	61	30	0.7 (1.54)	TE [5]
	76.1	–	3	91	73	61	30	1.2 (2.65)	TF [4]

1) Surface roughness of the surfaces in contact with the medium R_a < 0.76 µm (29.9 µin) as standard. Lower surface roughness available on request.
2) Product Configurator, order code for "Process connection"
3) Optionally available as an ASME BPE-compliant diaphragm seal version for use in biochemical processes, surfaces in contact with medium R_a < 0.38 µm (15 µin)), electropolished; order using order code for "Additional options", option "P".
4) Alternatively available with TempC process membrane.
5) With TempC process membrane

Max. PN = 40 bar (580 psi). The maximum PN depends on the clamp used.

Process connections PMP75, flush process membrane

Tri-Clamp ISO 2852 inline seal



h *Height*
D *Diameter*
d_2 *Diameter*
d_3 *Diameter*
L *Installed length*

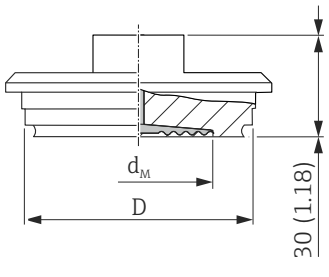
Unit mm (in)

Material [1]	DN ISO 2852	NPS	PN	D	d_2	d_3	h	L	Weight	Option [2]
		[in]		[mm]	[mm]	[mm]	[mm]	[mm]	[kg (lb)]	
AISI 316L	25	1	40	22.5	50.5	54	67	126	1.7 (3.75)	SB
	38	1 ½	40	35.5	50.5	69	67	126	1.0 (2.21)	SC [3]
	51	2	40	48.6	64	78	79	100	1.7 (3.75)	SD [3]

1) Surface roughness of the surfaces in contact with the medium R_a < 0.76 µm (29.9 µin) as standard.
2) Product Configurator, order code for "Process connection"
3) incl. 3.1 and pressure test according to Pressure Equipment Directive, Category II

Hygienic process connections PMP75, flush process membrane

Varivent for pipes



A0021672

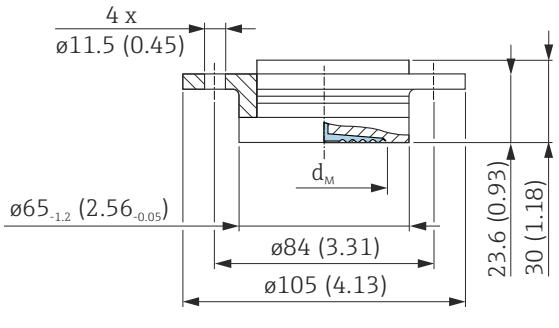
D Diameter
d_M Max. diameter of process membrane

Unit mm (in)

Material [1]	Designation	DN	PN	D	d_M		Weight	Option [2]
					Standard	TempC		
				[mm]	[mm]	[mm]	[kg (lb)]	
AISI 316L	Type F for pipes	25 - 32	40	50	34	36	0.4 (0.88)	TU [3]
AISI 316L	Type N for pipes	40 - 162	40	68	58	61	0.8 (1.76)	TR [4] [5]

1) Roughness of surfaces in contact with the medium R_a < 0.76 µm (29.9 µin) as standard.
2) Product Configurator, order code for "Process connection"
3) With TempC process membrane
4) Optionally available as an ASME BPE-compliant diaphragm seal version for use in biochemical processes, surfaces in contact with medium R_a < 0.38 µm (15 µin)), electropolished; order using order code for "Additional options", option "P". Lower surface roughness on request.
5) Alternatively available with TempC process membrane.

DRD DN50 (65 mm)



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d_M Max. diameter of process membrane

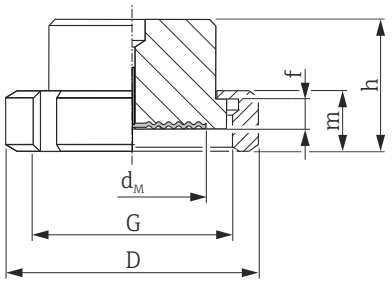
Unit mm (in)

Material [1]	PN	d_M		Weight	Option [2]
		Standard	TempC		
		[mm]	[mm]	[kg (lb)]	
AISI 316L	25	50	48	0.75 (1.65)	TK [3] [4]

1) Surface roughness of the surfaces in contact with the medium R_a < 0.76 µm (29.9 µin) as standard.
2) Product Configurator, order code for "Process connection"
3) Alternatively available with TempC process membrane.
4) Including slip-on flange.

Hygienic process connections PMP75, flush process membrane

SMS nozzle with coupling nut



D *Diameter*
f *Nozzle height*
G *Thread*
h *Height*
m *Height*
d_M *Max. diameter of process membrane*

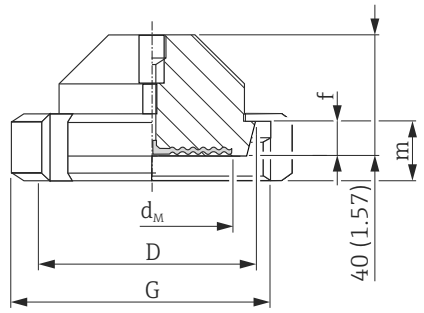
Unit mm (in)

Material [1]	NPS	PN	D	f	G	m	h	d_M	Weight	Option [2]
			[mm]	[mm]		[mm]	[mm]	[mm]	[kg (lb)]	
AISI 316L	1	25	54	3.5	Rd 40 – 1/6	20	42.5	24	0.25 (0.55)	TG
	1 ½	25	74	4	Rd 60 – 1/6	25	57	36	0.65 (1.43)	TH [3]
	2	25	84	4	Rd 70 – 1/6	26	62	48	1.05 (2.32)	TI [3]

1) Roughness of surfaces in contact with the medium R_a < 0.76 µm (29.9 µin) as standard.
2) Product Configurator, order code for "Process connection"
3) Alternatively available with TempC process membrane.

Hygienic process connections PMP75, flush process membrane

Taper adapter with grooved union nut, DIN 11851



A0021678

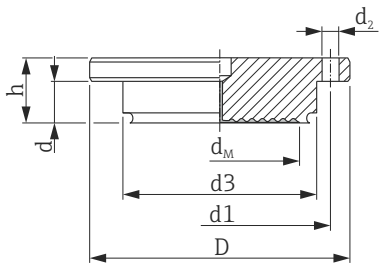
D *Diameter*
f *Nozzle height*
G *Thread*
m *Height*
d_M *Max. diameter of process membrane*

Unit mm (in)

Material [1]	Taper adapter				Slotted nut		Diaphragm seal			Option [2]
							d_M		Weight	
	DN	PN	D	f	G	m	Standard	TempC		
		[bar]	[mm]	[mm]		[mm]	[mm]	[mm]	[kg (lb)]	
AISI 316L	32	40	50	10	Rd 58 x 1/6"	21	32	28	0.45 (0.99)	MI [3]
	40	40	56	10	Rd 65 x 1/6"	21	38	36	0.45 (0.99)	MZ [3]
	50	25	68.5	11	Rd 78 x 1/6"	19	52	48	1.1 (2.43)	MR [4]
	65	25	86	12	Rd 95 x 1/6"	21	66	61	2.0 (4.41)	MS [4]
	80	25	100	12	Rd 110 x 1/4"	26	81	61	2.55 (5.62)	MT [4]

1) Roughness of wetted surfaces R_a < 0.76 µm (29.9 µin) as standard.
2) Product Configurator, order code for "Process connection"
3) With TempC process membrane
4) Alternatively available with TempC process membrane.

NEUMO BioControl



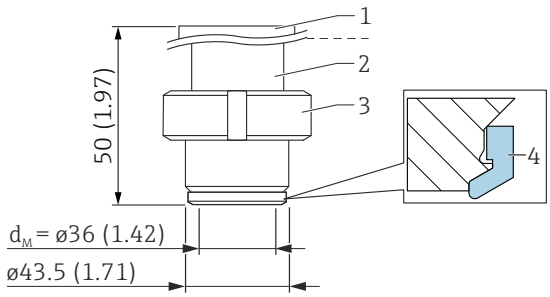
D Diameter
h/d Height
d1/ d3 diameter
d_2 Diameter of hole
d_M Max. diameter of process membrane

Unit mm (in)

Material [1]	NEUMO BioControl [2]								Diaphragm seal			Option [3]
									d_M		Weight	
	DN	PN	D	d	d_2	d_3	d_1	m	Standard	TempC		
		[bar]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg (lb)]	
AISI 316L	50	16	90	17	4 x Ø 9	50	70	27	40	36	1.1 (2.43)	S4 [4]
	80	16	140	25	4 x Ø 11	87.4	115	37	61	61	2.6 (5.73)	S6 [4]

1) Surface roughness of the surfaces in contact with the medium R_a < 0.76 µm (29.9 µin) as standard.
2) (Process temperature range: −10 to +200 °C (+14 to +392 °F))
3) Product Configurator, order code for "Process connection"
4) With TempC process membrane

Universal process adapter



1 Top section: AISI 316L (1.4404)
2 Bottom section: AISI 316L (1.4435)
3 Slotted nut: AISI 304 (1.4301) or AISI 304L (1.4307)
4 Molded seal: Silicone

Unit mm (in)

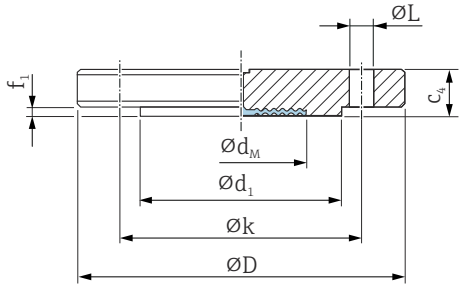
- The roughness of the surface in contact with the medium R_a < 0.76 µm (30 µin)
- Temperature operating range: −60 to +150 °C (−76 to +302 °F)
- Silicone form seal: FDA 21CFR177.2600/USP Class VI, order number: 52023572

Designation	PN	Weight	Option [1]
	bar (psi)	[kg (lb)]	
Universal process adapter Silicone form seal (4)	10	0.8 (1.76)	00 [2]

1) Product Configurator, order code for "Process connection"
2) Alternatively available with TempC process membrane.

Process connections PMP75, flush process membrane

EN flanges, connection dimensions as per EN 1092-1



ØD Diameter of flange
c_4 Thickness
Ød$_1$ Raised face
f_1 Raised face
Øk Pitch diameter
ØL Diameter of hole
Ød$_M$ Max. diameter of process membrane

Unit mm

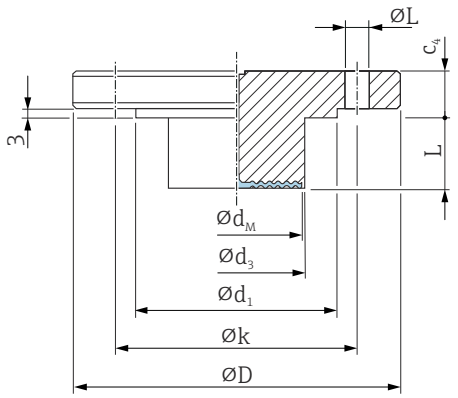
Flange [1) 2) 3)]							Boltholes			Diaphragm seal	Option [4)]
DN	PN	Form	ØD	c_4	Ød$_1$	f_1	Quantity	ØL	Øk	Weight	
			mm	mm	mm	mm		mm	mm	kg (lb)	
DN 25	PN 10-40	B1	115	18	68	2	4	14	85	1.38 (3.04)	CN [5) 6)]
DN 25	PN 63-160	B2	140	24	68	2	4	18	100	2.54 (5.60)	DN
DN 25	PN 250	B2	150	28	68	2	4	22	105	3.7 (8.16)	EN
DN 25	PN 400	B2	180	38	68	2	4	26	130	6.65 (14.66)	E1
DN 32	PN 10-40	B1	140	18	78	2	4	18	100	2.03 (4.48)	CP
DN 40	PN 10-40	B1	150	18	88	3	4	18	110	2.35 (5.18)	CQ
DN 50	PN 10-40	B1	165	20	102	3	4	18	125	3.2 (7.06)	B3 [5) 6)]
DN 50	PN 63	B2	180	26	102	3	4	22	135	4.52 (9.97)	C3
DN 50	PN 100-160	B2	195	30	102	3	4	26	145	6.07 (13.38)	EF
DN 50	PN 250	B2	200	38	102	3	8	26	150	7.7 (16.98)	ER
DN 50	PN 400	B2	235	52	102	3	8	30	180	14.7 (32.41)	E3
DN 80	PN 10-40	B1	200	24	138	3	8	18	160	5.54 (12.22)	B4 [5) 6)]
DN 80	PN 100	B2	230	32	138	3	8	26	180	8.85 (19.51)	C4
DN 100	PN 100	B2	265	36	162	3	8	30	210	13.3 (29.33)	C5

1) Material: AISI 316L
2) The roughness of the surface in contact with the medium including the raised face of the flanges (all standards) made of Alloy C276, Monel, tantalum, gold > 316L or PTFE is R_a< 0.8 µm (31.5 µin). Lower surface roughness available on request.
3) The flange raised face is made of the same material as the process membrane.
4) Product Configurator, order code for "Process connection"
5) Alternatively available with TempC process membrane. Change in diameter of process membrane in TempC version: DN25: 28 mm; DN50: 61 mm.
6) Alternatively available with gold-coated TempC process membrane (Product Configurator, order code for "Membrane material" option "G").

Maximum diameter of the process membrane $Ød_M$

DN	PN	$Ød_M$ (mm)					
		316L TempC	316L	Alloy C276	Tantalum	Monel (Alloy 400)	PTFE
DN 25	PN 10-40	28	29.6	33	33	33	28
DN 25	PN 63-160	-	28	28	28	28	-
DN 25	PN 250	-	28	28	28	28	-
DN 25	PN 400	-	28	28	28	28	-
DN 32	PN 10-40	-	34	42	42	34	-
DN 40	PN 10-40	-	38	48	51	42	-
50	PN 10-40	61	58	57	60	59	52
DN 50	PN 63	-	52	62	60	59	-
DN 50	PN 100-160	-	52	62	60	59	-
DN 50	PN 250	-	52	62	60	59	-
DN 50	PN 400	-	52	62	60	59	-
DN 80	PN 10-40	89	89	89	92	89	80
DN 80	PN 100	-	80	90	92	90	-
DN 100	PN 100	-	80	90	92	89	-

EN flanges with barrel, connection dimensions as per EN 1092-1



ØD Diameter of flange
c_4 Thickness
Ød_1 Raised face
Øk Pitch diameter
ØL_2 Diameter of hole
Ød_M Max. diameter of process membrane
Ød_3 Barrel diameter
L Barrel length

Unit mm

Flange [1) 2)]						Boltholes			Diaphragm seal		Option [3)]
DN	PN	Form	ØD	c_4	Ød_1	Quantity	ØL	Øk	d_M	Weight	
			mm	mm	mm		mm	mm	mm	kg (lb)	
50	10-40	B1	165	20	102	4	18	125	48	[4)]	D3 [4)]
80	10-40	B1	200	24	138	8	18	160	73	[4)]	D4 [4)]

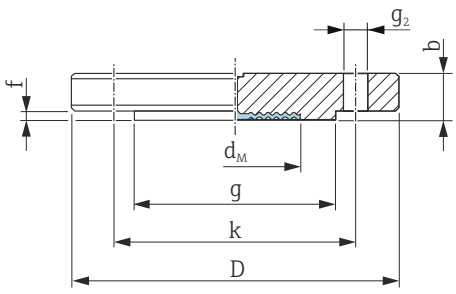
1) Material: AISI 316L
2) In the case of process membranes made of Alloy C276, Monel or tantalum, the raised face of the flange and the barrel pipe are made of 316L
3) Product Configurator, order code for "Process connection"
4) Available with 50 mm (1.97 in), 100 mm (3.94 in) and 200 mm (7.87 in) barrel (extended diaphragm seal), for barrel diameter and weight, see the following table

Option [1)]	DN	PN	L	d_3	Weight
			[mm]	[mm]	[kg (lb)]
D3	50	10-40	50 / 100 / 200	48.3	3.44 (7.59) / 3.8 (8.4) / 4.1 (9.04) / 4.4 (9.7)
D4	80	10-40	50 /100 / 200	76	6.2 (13.7) / 6.7 (14.8) / 7.27 (16.03) / 7.8 (17.2)

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

Process connections PMP75, flush process membrane

ASME flanges, connection dimensions as per ASME B 16.5, raised face RF



A0023913

D *Diameter of flange*
b *Thickness*
g *Raised face*
f *Raised face*
k *Pitch diameter*
g_2 *Diameter of hole*
d_M *Max. diameter of process membrane*

Unit in

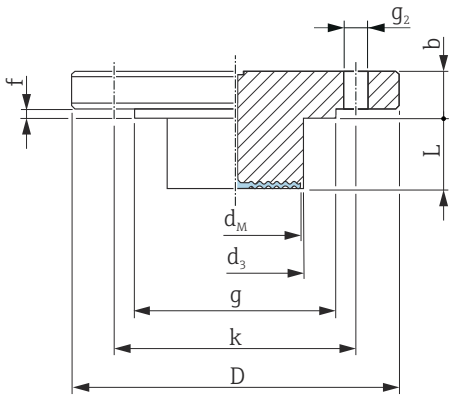
Flange [1) 2) 3)]						Boltholes			Diaphragm seal	Option [4)]
NPS	Class	D	b	g	f	Quantity	g_2	k	Weight	
[in]	[lb./sq.in]	[in]	[in]	[in]	[in]		[in]	[in]	[kg (lb)]	
1	150	4.25	0.56	2	0.08	4	0.62	3.12	1.2 (2.65)	AC [5) 6)]
1	300	4.88	0.69	2	0.08	4	0.75	3.5	1.3 (2.87)	AN [5) 6)]
1	400/600	4.88	0.69	2	0.25	4	0.75	3.5	1.4 (3.09)	HC
1	900/1500	5.88	1.12	2	0.25	4	1	4	3.2 (7.06)	HN
1	2500	6.25	1.38	2	0.25	4	1	4.25	4.6 (10.14)	HO
1 ½	150	5	0.69	2.88	0.06	4	0.62	3.88	1.5 (3.31)	AE
1 ½	300	6.12	0.81	2.88	0.06	4	0.88	4.5	2.6 (5.73)	AQ
2	150	6	0.75	3.62	0.06	4	0.75	4.75	2.2 (4.85)	AF [5) 6)]
2	300	6.5	0.88	3.62	0.06	8	0.75	5	3.4 (7.5)	AR [5) 6)]
2	400/600	6.5	1	3.62	0.25	8	0.75	5	4.3 (9.48)	HF
2	900/1500	8.5	1.5	3.62	0.25	8	1	6.5	10.3 (22.71)	HR
2	2500	9.25	2	3.62	0.25	8	1.12	6.75	15.8 (34.84)	H3
3	150	7.5	0.94	5	0.06	4	0.75	6	5.1 (11.25)	AG [5) 6)]
3	300	8.25	1.12	5	0.06	8	0.75	6	7.0 (15.44)	AS [5) 6)]
4	150	9	0.94	6.19	0.06	8	0.75	7.5	7.2 (15.88)	AH
4	300	10	1.25	6.19	0.06	8	0.88	7.88	11.7 (25.8)	AT

1) Material AISI 316/316L: Combination of AISI 316 for required pressure resistance and AISI 316L for required chemical resistance (dual-rated)
2) The roughness of the surface in contact with the medium, including the raised face of the flanges (all standards) made of Alloy C276, Monel, tantalum, gold or PTFE, is R_a< 0.8 µm (31.5 µin). Lower surface roughness available on request.
3) The flange raised face is made of the same material as the process membrane.
4) Product Configurator, order code for "Process connection"
5) Alternatively available with TempC process membrane. Change in diameter of process membrane in TempC version: nominal diameter 1": 1.1 in; 2": 2.40 in.
6) Alternatively available with gold-coated TempC process membrane (Product Configurator, order code for ""Membrane material" option "G").

Maximum diameter of the process membrane $Ød_M$

NPS	Class	$Ød_M$ (in)				
		316L TempC	316L	Alloy C276	Tantalum	Monel (Alloy 400)
1	150	1.10	-	1.30	1.34	1.30
1	300	1.10	-	1.30	1.34	1.30
1	400/600	-	1.10	1.30	1.34	1.30
1	900/1500	-	1.10	1.10	1.02	1.10
1	2500	-	1.10	1.30	1.34	1.30
1 ½	150	-	1.50	1.89	2.01	1.89
1 ½	300	-	1.50	1.89	2.01	1.89
2	150	2.40	-	2.44	2.44	2.44
2	300	2.40	-	2.44	2.44	2.44
2	400/600	-	2.05	2.44	2.44	2.44
2	900/1500	-	2.05	2.44	2.44	2.44
2	2500	-	2.05	2.44	2.44	2.44
3	150	3.50	-	3.62	3.62	3.62
3	300	3.50	-	3.62	3.62	3.62
4	150	-	3.15	3.62	3.62	3.62
4	300	-	3.15	3.62	3.62	3.62

ASME flanges with barrel (extended diaphragm seal), connection dimensions in accordance with ASME B 16.5, raised face RF



D *Diameter of flange*
b *Thickness*
g *Raised face*
k *Pitch diameter*
g_2 *Diameter of hole*
d_M *Max. diameter of process membrane*
d_3 *Barrel diameter*
L *Barrel length*

Unit in

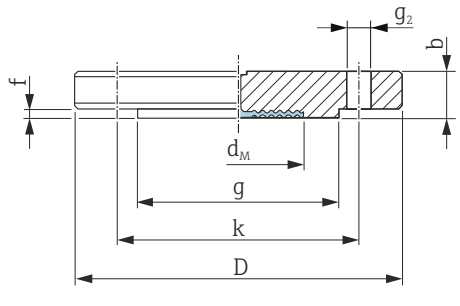
Flange [1) 2)]						Boltholes			Diaphragm seal		Option [3)]
NPS	Class	D	b	g	f	Quantity	g_2	k	d_M	Weight	
[in]	[lb./sq.in]	[in]	[in]	[in]	[in]		[in]	[in]	[in]	[kg (lb)]	
2	150	6	0.75	3.62	0.06	4	0.75	4.75	1.85	[4)]	J3 [4)]
3	150	7.5	0.94	5	0.06	4	0.75	6	2.83	[4)]	J4 [4)]
3	300	8.25	1.12	5	0.06	8	0.88	6.62	2.83	[4)]	J7 [4)]
4	150	9	0.94	6.19	0.06	8	0.75	7.5	3.5	[4)]	J5 [4)]
4	300	10	1.25	6.19	0.06	8	0.88	7.88	3.5	[4)]	J8 [4)]

1) Material: AISI 316/316L. Combination of AISI 316 for required pressure resistance and AISI 316L for required chemical resistance (dual rated)
2) In the case of process membranes made of Alloy C276, Monel or tantalum, the raised face of the flange and the barrel pipe are made of 316L.
3) Product Configurator, order code for "Process connection"
4) Choice of 2", 4", 6" or 8" barrel (extended diaphragm seal), for diameter and weight of barrel (extended diaphragm seal) see the following table

Option [1)]	NPS	Class	(L)	d_3	Weight
	[in]	[lb./sq.in]	in (mm)	in (mm)	[kg (lb)]
J3	2	150	2 (50.8) / 4 (101.6) / 6 (152.4) / 8 (203.2)	1.9 (48.3)	3.0 (6.6)/ 3.4 (7.5)/ 3.9 (8.6)/ 4.4 (9.7)
J4	3	150	2 (50.8) / 4 (101.6) / 6 (152.4) / 8 (203.2)	2.99 (76)	6.0 (13.2) / 6.6 (14.5) / 7.1 (15.7) / 7.8 (17.2)
J7	3	300	2 (50.8) / 4 (101.6) / 6 (152.4) / 8 (203.2)	2.99 (76)	7.9 (17.4) / 8.5 (18.7) / 9.0 (19.9) / 9.6 (21.2)
J5	4	150	2 (50.8) / 4 (101.6) / 6 (152.4) / 8 (203.2)	3.7 (94)	8.6 (19) / 9.9 (21.8) / 11.2 (24.7) / 12.4 (27.3)
J8	4	300	2 (50.8) / 4 (101.6) / 6 (152.4) / 8 (203.2)	3.7 (94)	13.1 (28.9)/ 14.4 (31.6)/ 15.7 (34.6)/ 16.9 (37.3)

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

JIS flanges, connection dimensions in accordance with JIS B 2220 BL, raised face RF



D *Diameter of flange*
b *Thickness*
g *Raised face*
f *Thickness of raised face*
k *Pitch diameter*
g_2 *Diameter of hole*

Unit mm

Flange [1) 2) 3)]						Boltholes			Diaphragm seal	Option [4)]
A	K	D	b	g	f	Quantity	g_2	k	Weight	
		[mm]	[mm]	[mm]	[mm]		[mm]	[mm]	[kg (lb)]	
25	10	125	14	67	1	4	19	90	1.5 (3.31)	KC
50	10	155	16	96	2	4	19	120	2.3 (5.07)	KF
80	10	185	18	127	2	8	19	150	3.3 (7.28)	KL
100	10	210	18	151	2	8	19	175	4.4 (9.7)	KH

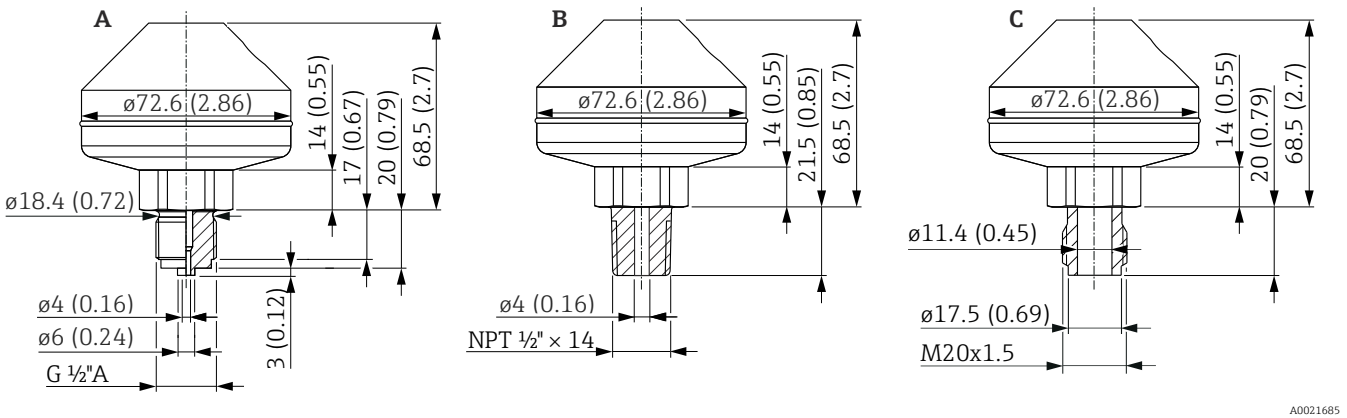
1) Material: AISI 316L
2) The roughness of the surface in contact with the medium, including the raised face of the flanges (all standards) made of Alloy C276, Monel, tantalum, gold or PTFE, is R_a< 0.8 µm (31.5 µin). Lower surface roughness available on request.
3) The flange raised face is made of the same material as the process membrane.
4) Product Configurator, order code for "Process connection"

Maximum diameter of the process membrane Ød$_M$

A [1)]	K [2)]	Ød$_M$ (mm)					
		316L TempC	316L	Alloy C276	Tantalum	Monel (Alloy 400)	PTFE
25	10	-	28	-	-	-	-
40	10	-	38	-	-	-	-
50	10	-	52	62	60	59	-
80	10	-	80	-	-	-	-
100	10	-	80	-	-	-	-

1) Alphanumeric designation of the flange size.
2) Alphanumeric pressure rating of a component.

Process connections PMP75 Welded separators

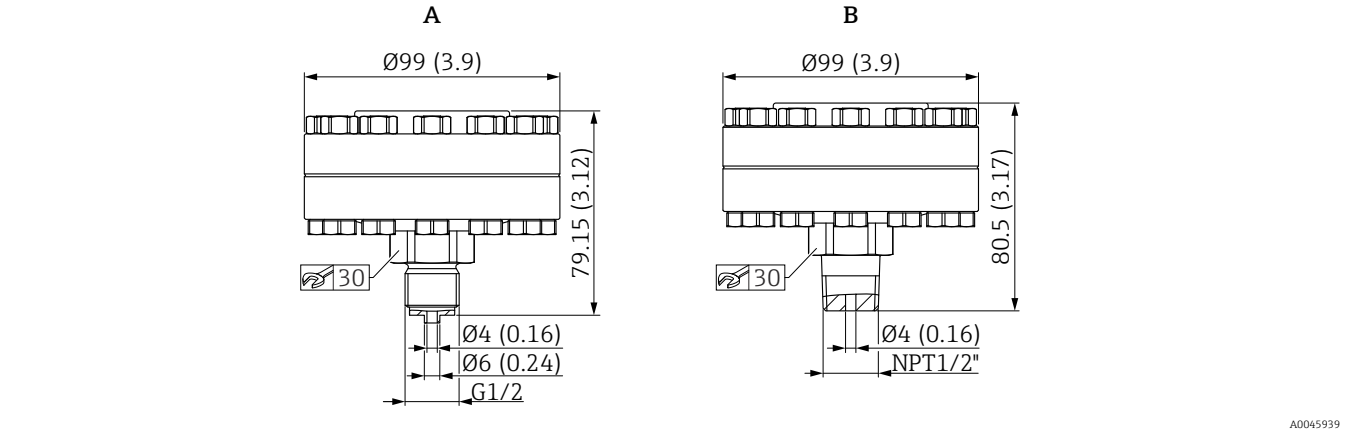


Unit mm (in)

Item	Designation	Material	Measuring range	PN	Weight	Option [1]
			[bar (psi)]		[kg (lb)]	
A	Welded, ISO 228 G ½ A EN 837	AISI 316L	≤ 160 (2320)	160	1.43 (3.15)	UA
B	Welded, ANSI ½ MNPT					UB
C	Welded, DIN 13 M20x1.5 thread					UF

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

Threaded separators, PN100, TempC

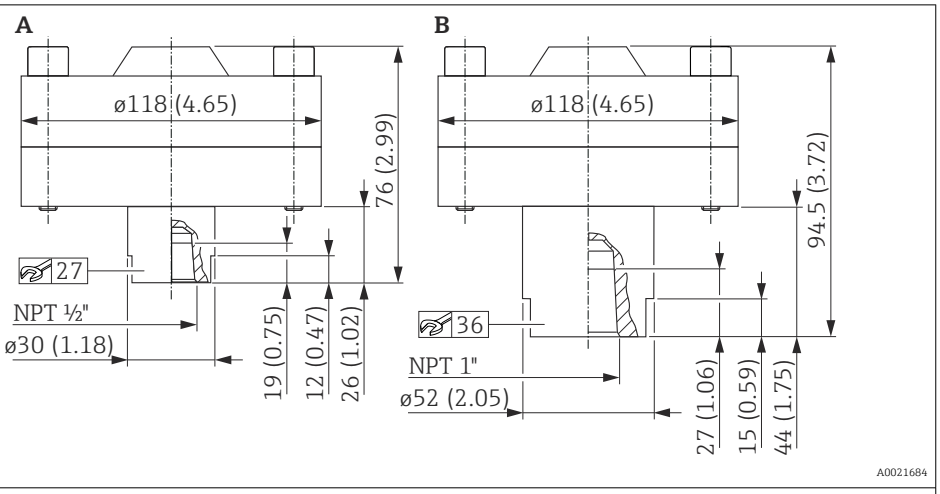


Unit mm (in)

Item	Designation	Material	Measuring range	PN	Weight	Option [1]
			bar (psi)		kg (lb)	
A	Threaded, ISO228 G½ EN837 with metal seal (silver-plated) −60 to +400 °C (−76 to +752 °F)	AISI 316L, screws made of A4	≤ 40 (580)	40	2.35 kg (5.18 lb)	UC
B	Threaded, ASME MNPT ½ with metal seal (silver-plated) −60 to +400 °C (−76 to +752 °F)				2.35 kg (5.18 lb)	UD

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

Threaded separators, PN250

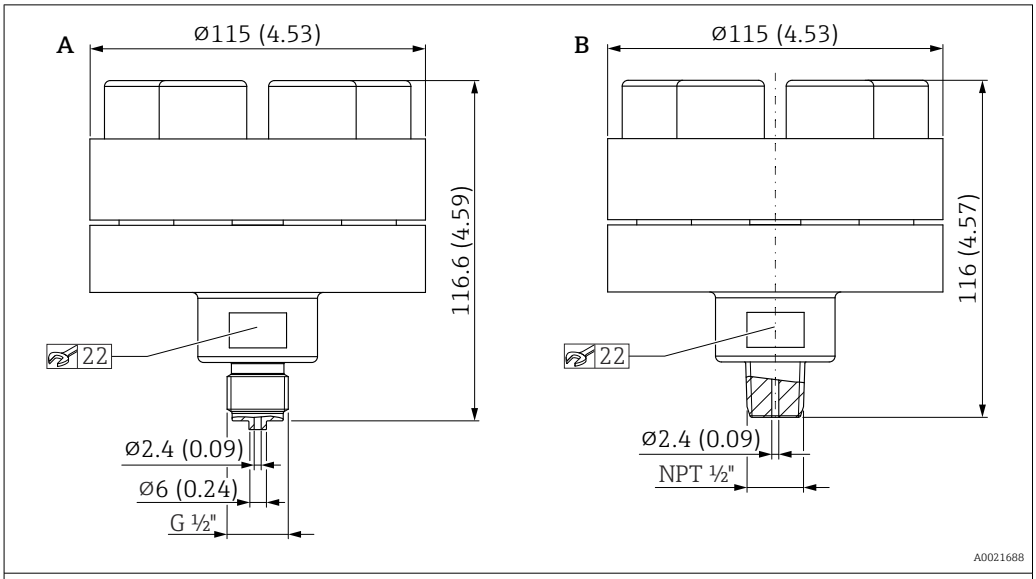


Unit mm (in)

Item	Designation	Material	Measuring range [bar (psi)]	PN	Weight [kg (lb)]	Option [1]
A	Threaded, ½" NPT with FKM seal −20 to +200 °C (−4 to +392 °F)	AISI 316L Screws made of A4	≤ 250 (3625)	250	4.75 (10.47)	UG
B	Threaded, 1" NPT with FKM seal −20 to +200 °C (−4 to +392 °F)				5.0 (11.03)	UH

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

Threaded separators, PN400

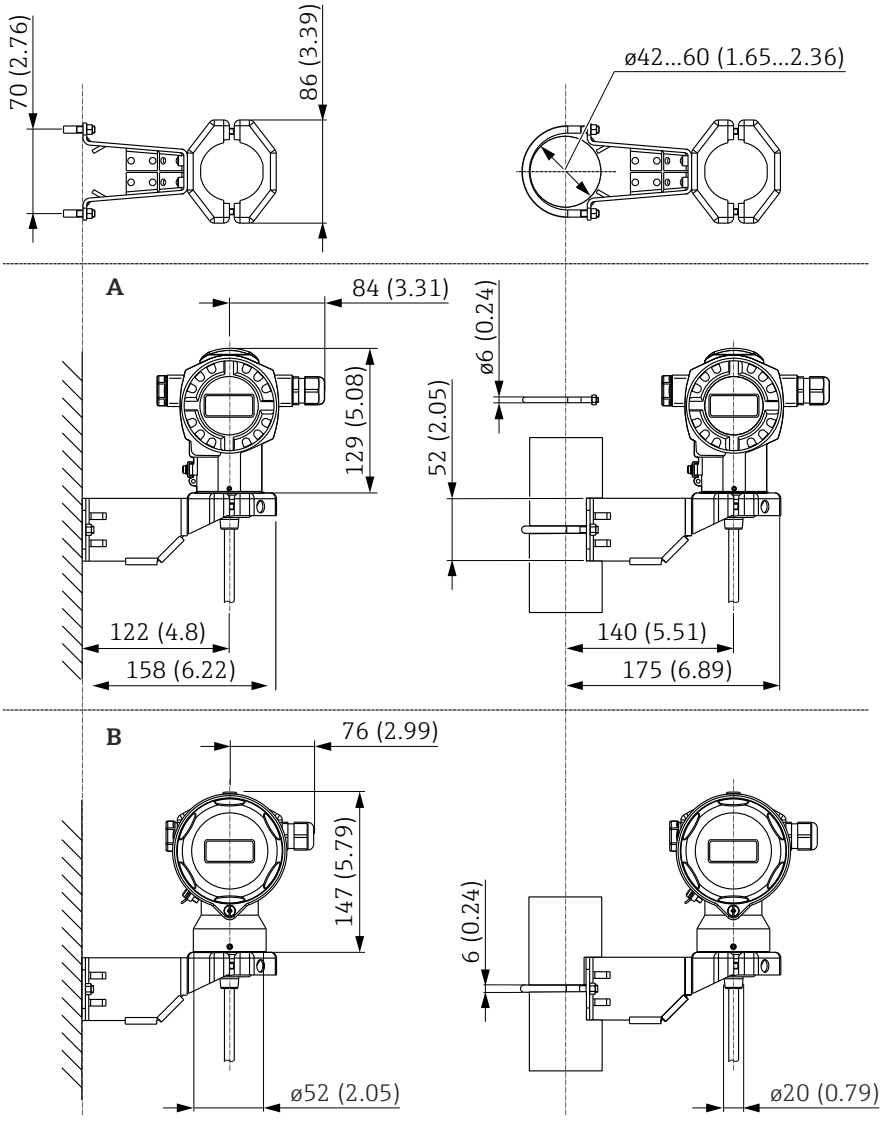


Unit mm (in)

Item	Designation	Material	Measuring range [bar (psi)]	PN [1]	Weight [kg (lb)]	Option [2]
A	Threaded, ISO 228 G ½ A EN837, with integrated seal lip −60 to +400 °C (−76 to +752 °F)	AISI 316L, screws made of A4	> 40 (580)	400	4.75 (10.47)	UC
B	Threaded, ANSI ½ MNPT, with integrated seal lip −60 to +400 °C (−76 to +752 °F)					UD

1) This separator is assembled prior to delivery and must not be disassembled!
2) Product Configurator, order code for "Process connection"

Separate housing: Wall and pipe mounting with mounting bracket



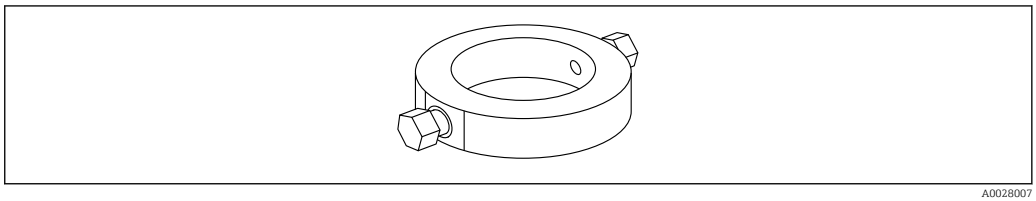
Engineering unit mm (in)

Item	Designation	Weight in kg (lb)		Option [1]
		Housing (T14 or T17)	Mounting bracket	
A	Dimensions with T14 housing, optional side display	→ 🖹 51	0.5 (1.10)	U
B	Dimensions with T17 housing, optional side display			

1) Product Configurator, order code for "Additional options 2", version "G"

Also available for order as a separate accessory: part number 71102216

Flushing rings



A0028007

Use flushing rings if there is a risk of medium buildup or clogging at the process connection. The flushing ring is fitted between the process connection and the process connection provided by the customer.

Using the two lateral flushing holes, medium buildup or clogging in front of the process membrane can be rinsed away and the pressure chamber vented.

Various nominal widths and forms allow adaption to the respective process flange.

For other details (dimension, weight, materials), see SD01553P/00/EN "Mechanical accessories for pressure measuring instruments".

Order options

Flushing rings can be ordered as a separate accessory or as an order option for the device.

Material	Nominal diameter	Accessory [1] Part number	Order option [2] [3]
			PMP75
AISI 316L	EN1092-1		
	DN25	71377379	PO
	DN50	71377380	PP
	DN80	71377383	PQ
	ASME B16.5		
	NPS 1"	71377369	PK
	NPS 2"	71377370	PL
	NPS 3"	71377371	PM

1) Inspection certification according to EN10204-3.1 material
2) Product Configurator, order code for "Accessories enclosed"
3) Certificates ordered with the equipment (3.1 Material certificate and NACE Declaration of Conformity and PMI tests) apply to the transmitters and flushing rings listed in the table.

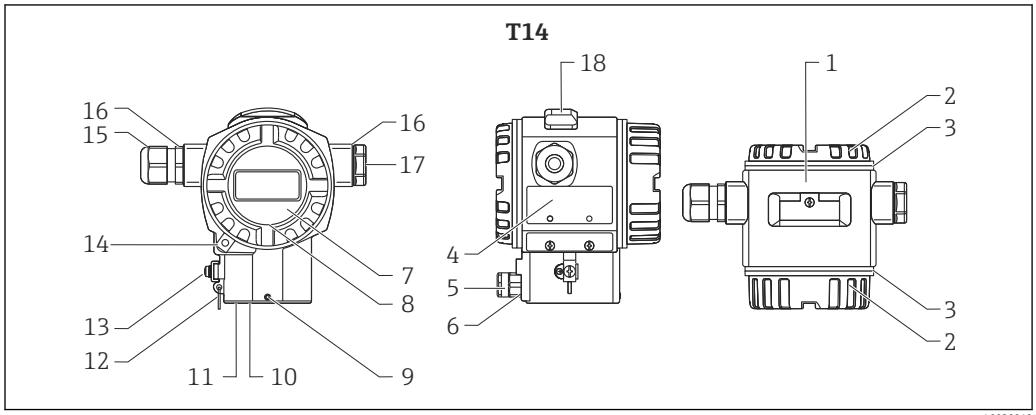
Endress+Hauser offers additional flushing rings as **T**echnical **S**pecial **P**roducts (TSP).

Weight

Component	Weight
Housing	See "Housing" section
Process connection	See "Process connections" section
Temperature isolator	0.34 kg (0.75 lb)
Capillary with armoring made of AISI 316L (1.4404)	0.16 kg/m (0.35 lb/m) + 0.35 kg (0.77 lb)
Capillary with armoring made of AISI 316L (PVC)	0.21 kg/m (0.46 lb/m) + 0.35 kg (0.77 lb)
Capillary with armoring made of AISI 316L (PTFE)	0.29 kg/m (0.64 lb/m) + 0.35 kg (0.77 lb)

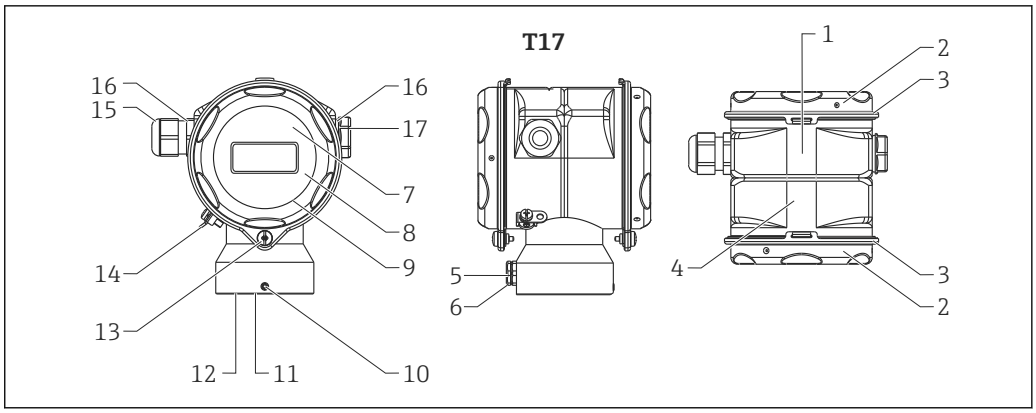
Materials not in contact with process

Transmitter housing



A0020019

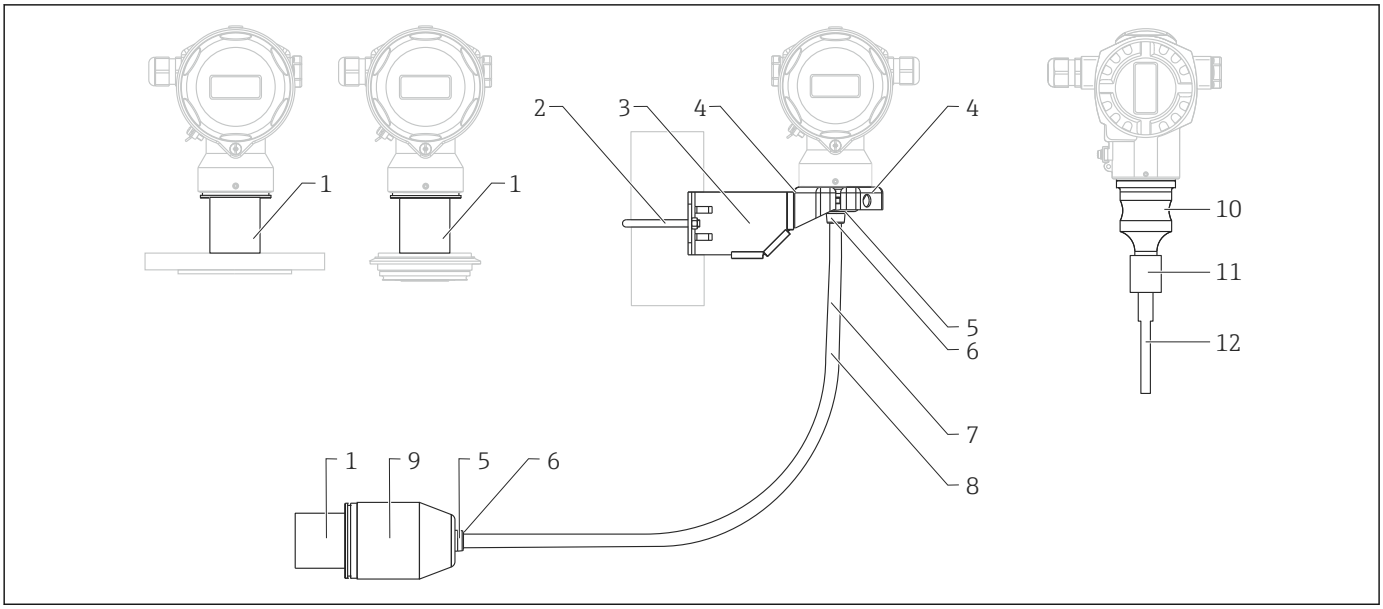
Item number	Component	Material
1	T14 housing, RAL 5012 (blue)	▪ Die-cast aluminum with protective powder-coating on polyester base ▪ Coating on thread: Heat-curing lubricant varnish
1	T14 housing	▪ Precision casting AISI 316L (1.4435) ▪ Coating on thread: Heat-curing lubricant varnish
2	Cover, RAL 7035 (gray)	Die-cast aluminum with protective powder-coating on polyester base
		Precision cast AISI 316L (1.4435) (cover made of 316L if T14 housing made of 316L)
4	Nameplates	▪ AISI 316L (1.4404), if T14 housing is precision-cast ▪ Anodized aluminum, if housing T14/T15 of die-cast aluminum
5	Pressure compensation filter	AISI 316L (1.4404) and PBT-FR
6	Pressure compensation filter, O-ring	VMQ or EPDM
7	Sight glass	Mineral glass
8	Sight glass seal	Silicone (VMQ)
9	Screw	A4
10	Sealing ring	EPDM
11	Snap ring	PA66-GF25
12	Rope for nameplates	AISI 316 (1.4401)
13	External ground terminal	AISI 316L (1.4404)
14	Cover clamp	AISI 316L (1.4435) clamp, A4 screw
15	Cable entry	Polyamide (PA) or CuZn nickel-plated
16	Seal of cable entry and plug	Silicone (VMQ)
17	Plug	PBT-GF30 FR, for dust ignition-proof and Exd: AISI 316L (1.4435)
18	External operation (keys and key cover), RAL 7035 (gray)	Polycarbonate PC-FR, screw A4
Devices with MID parts certificate	Seal wire	DIN 1367-0 St/Zn (soft galvanized steel)
Devices with MID parts certificate	Seals	Pb (lead)



A0020021

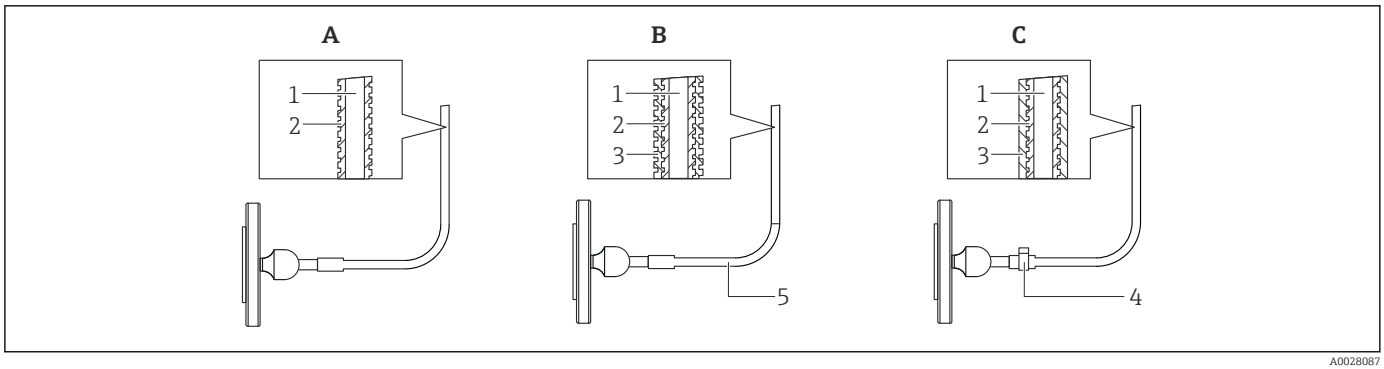
Item number	Component	Material
1	T17 housing	AISI 316L (1.4404)
2	Cover	
3	Cover seal	EPDM
4	Nameplates	Lasered on
5	Pressure compensation filter	AISI 316L (1.4404) and PBT-FR
6	Pressure compensation filter, O-ring	VMQ or EPDM
7	Sight glass for non-hazardous area, ATEX Ex ia, NEPSI Zone 0/1 Ex ia, IECEx Zone 0/1 Ex ia, FM NI, FM IS, CSA IS	Polycarbonate (PC)
8	Sight glass for ATEX 1/2 D, ATEX 1/3 D, ATEX 1 GD, ATEX 1/2 GD, ATEX 3 G, FM DIP, CSA dust ignition-proof	Mineral glass
9	Sight glass seal	EPDM
10	Screw	A2-70
11	Sealing ring	EPDM
12	Snap ring	PA6
13	Screw	A4-50 Coating on thread: Heat-curing lubricant varnish
14	External ground terminal	AISI 316L (1.4404)
15	Cable entry	Polyamide PA, for dust ignition-proof: CuZn nickel-plated
16	Seal of cable entry and plug	Silicone (VMQ)
17	Plug	PBT-GF30 FR, for dust ignition-proof: AISI 316L (1.4435)
Devices with MID parts certificate	Seal wire	DIN 1367-0 St/Zn (soft galvanized steel)
Devices with MID parts certificate	Seals	Pb (lead)

Connecting parts



A0028222

Item number	Component	Material
1	Connection between the housing and process connection	AISI 316L (1.4404)
2	Mounting bracket	Bracket AISI 316L (1.4404)
3		Screw and nuts A4-70
4		Half-shells: AISI 316L (1.4404)
5	Seal for cable of separate housing	EPDM
6	Gland for cable from separate housing	AISI 316L (1.4404)
7	PE cable for separate housing	Abrasion-resistant cable with Dynema strain-relief members; shielded with aluminum-coated film; insulated with polyethylene (PE-LD), black; copper wires, twisted, UV-resistant
8	FEP cable for separate housing	Abrasion-resistant cable; shielded with galvanized steel wire netting; insulated with fluorinated ethylene propylene (FEP), black; copper wires, twisted, UV-resistant
9	Process connection adapter for separate housing	AISI 316L (1.4404)
10	Cell body	AISI 316L (1.4404)
11	Connection between body of measuring cell and capillary	AISI 316L (1.4404)
12	Heat-shrink tube (available only if capillary has PTFE or PVC sheath)	Polyolefin



A0028087

Item	Component	A Standard [1] Armor for capillary	B PVC-coated Armor for capillary	C PTFE hose Armor for capillary
1	Capillary	AISI 316 Ti (1.4571)	AISI 316 Ti (1.4571)	AISI 316 Ti (1.4571)
2	Flexible armor for capillary	AISI 316L (1.4404) [2]	AISI 316L (1.4404)	AISI 316L (1.4404)
3	Coating/armor	-	PVC [3]	PTFE [4]
4	Single-ear clamp	-	-	1.4301
5	Shrink tubing at capillary junction	-	Polyolefin	-

1) If no option is specified when ordering, order option "SA" is supplied.
2) Product Configurator, order code for "Armor for capillary:" option "SA"
3) Product Configurator, order code for "Armor for capillary:" option "SB"
4) Product Configurator, order code for "Armor for capillary:" option "SC"

Materials in contact with process

NOTICE

- Device components in contact with the process are listed in the "Mechanical construction" → 50 and "Ordering information" → 124 sections.

Delta ferrite content

A delta ferrite content of ≤ 3% can be guaranteed and certified for the wetted parts if option "8" is selected in the "Additional options 1" or "Additional options 2" order code in the Product Configurator.

If the PMC71 with hygienic process connections is selected, a delta ferrite content of ≤ 1% can be guaranteed and certified if option "8" is selected in the "Additional options 1" or "Additional options 2" order code in the Product Configurator.

TSE Certificate of Suitability (Transmissible Spongiform Encephalopathy)

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

- "Clamp connections" and "Hygienic process connections": AISI 316L (DIN/EN material number 1.4435)
- Endress+Hauser supplies threaded process connections and DIN/EN flanges in stainless steel according to 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.
- Some process connections are also available in Alloy C276 (DIN/EN material number 2.4819). For this purpose see the information in the "Mechanical construction" section.

Process membrane

Measuring cell	Designation	Option [1]
PMC71	Al_2O_3 aluminum oxide ceramic FDA, ultrapure 99.9 % [2] Ceraphire® (see also www.endress.com/ceraphire)	Standard
PMP71	AISI 316L	1
	AISI 316L with gold-rhodium coating	6
	Alloy C276 (2.4819)	2
PMP75	AISI 316L with gold coating (25 µm), TempC [3]	G
	AISI 316L	1
	AISI 316L, TempC [3]	E
	AISI 316L with gold-rhodium coating	6
	AISI 316L with 0.25 mm (0.01 in) PTFE coating	8
	Alloy C276 (2.4819)	2 [4]
	Monel (2.4360)	3 [4]
	AISI 316L with gold coating	4
	Tantalum (UNS R05200)	5 [4]

1) Product Configurator, order code for "Membrane material"
2) 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
3) The TempC gold-plated membrane does not offer corrosion protection!
4) The material of the flange raised face is the same as that used for the process membrane. For devices with a barrel (extended diaphragm seal), the raised face of the flange and the barrel pipe are made from 316L.

Seals

Device	Designation	Option [1]
PMC71	FKM	A
	FKM, FDA	G
	EPDM	B
	FFKM Perlast G75LT	C
	Kalrez	D
	Chemraz	E
	NBR (FDA)/3A: HNBR (FDA)	F
	FKM, cleaned for PWIS-free applications	L
	Kalrez, cleaned for PWIS-free applications	M
	FKM, cleaned of oil+grease	1
	FKM, cleaned for oxygen service, note pressure and temperature application limits	2

1) Product Configurator, order code for "Seal"

Fill fluid

PMP71

Designation	Option [1]
Silicone oil	A
Inert oil	F
Inert oil, cleaned from oil and grease	K
Inert oil, cleaned for oxygen service (observe application limits pressure/temperature)	N

1) Product Configurator, order code for "Fill fluid"

PMP75

Designation	Option [1] [2]!
Silicone oil (food-safe FDA 21 CFR 175.105)	A
...m capillary, inert oil	B
...ft capillary, inert oil	C
Vegetable oil (food-safe FDA 21 CFR 172.856)	D
Inert oil	F
High-temperature oil, temperature isolator	G
Silicone oil, temperature isolator (food-safe FDA 21 CFR 175.105)	H
Vegetable oil, temperature isolator	J
Inert oil, cleaned from oil and grease	K
Inert oil, cleaned for oxygen service	N
...m capillary, silicone oil (food-safe FDA 21 CFR 175.105)	1
...ft capillary, silicone oil (food-safe FDA 21 CFR 175.105)	2
...m capillary, high-temperature oil	3
...ft capillary, high-temperature oil	4
...m capillary, vegetable oil (food-safe FDA 21 CFR 172.856)	5
...ft capillary, vegetable oil (food-safe FDA 21 CFR 172.856)	6
...m capillary, low-temperature oil	7
...ft capillary, low-temperature oil	8

1) Product Configurator, order code for "Fill fluid"
2) For diaphragm seal devices with 3-A and EHEDG certificates, only select fill fluid with FDA approval

Operability

Operating concept

Operator-oriented menu structure for user-specific tasks

- Commissioning
- Operation
- Diagnosis

Quick and safe commissioning

Guided menus for applications

Reliable operation

- Local operation possible in several languages
- Standardized operation at the device and in the operating tools
- Parameters relating to measured values can be locked/unlocked using the device's write protection switch, using the device software or via remote operation

Efficient diagnostics increase measurement availability

- Remedial measures are integrated in plain text
- Diverse simulation options

Local operation

Functions

Function	External operation (operating keys, optional, not T17 housing)	Internal operation (electronic insert)	Onsite display (optional)
Position adjustment (zero point correction)	✔	✔	✔
Setting lower range value and upper range value - reference pressure present at the device	✔ (HART only)	✔ (HART only)	✔
Device reset	✔	✔	✔
Locking and unlocking parameters relevant to the measured value	—	✔	✔
Value acceptance indicated by the green LED	✔	✔	✔
Switching damping on and off	✔ (only if display is connected)	✔ (HART and PA only)	✔
Configuring the bus address of the device (PA)	—	✔	✔
Switching simulation mode on and off (FOUNDATION Fieldbus)	—	✔	✔

Operating the device using onsite display (optional)

A 4-line liquid crystal display (LCD) is used for display and operation. The onsite display shows measured values, dialog text as well as fault and notice messages in plain text, thereby supporting the user in every stage of operation.

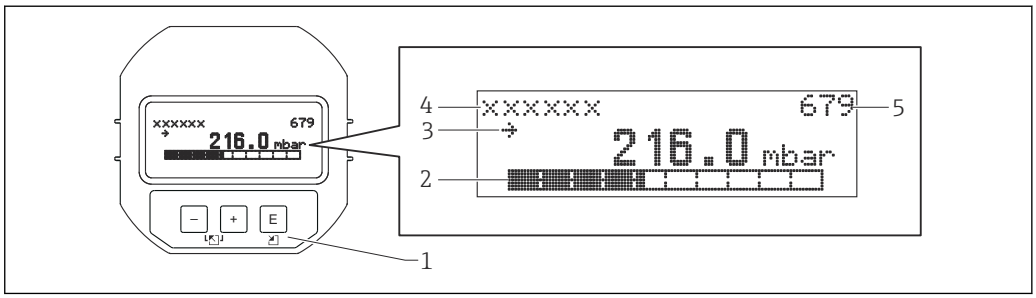
The display can be removed for easy operation.

The device display can be turned in 90° steps.

Depending on the installation position of the device, this makes it easy to operate the device and read the measured value.

Functions:
- 8-digit measured value display including sign and decimal point and bar graph for
  - 4 to 20 mA HART (bar graph from 4 to 20 mA)
  - 1-5V DC (bar graph from 1 to 5 volt)
  - PROFIBUS PA (bar graph as graphic display of standardized value of AI block)
  - FOUNDATION Fieldbus (bar graph as graphic display of transducer output).
-
- Simple and complete menu guidance due to breakdown of parameters into several levels and groups.
- Menu guidance in up to 8 languages
- Each parameter is given a 3-digit ID number for easy navigation.
- Option for configuring the display according to individual requirements and preferences, such as language, alternating display, display of other measured values such as sensor temperature, contrast setting.
- Comprehensive diagnostic functions (fault and warning message, peak-hold indicators, etc.).
- Rapid and safe commissioning with the Quick Setup menus

Overview

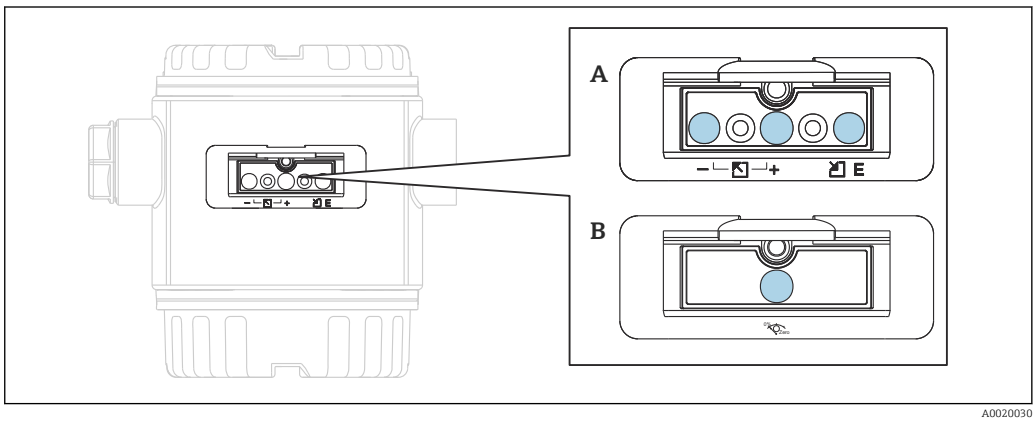


A0016498

1 Operating keys
2 Bargraph
3 Symbol
4 Header
5 Parameter ID number

Operating keys on the exterior of the device

With the aluminum housing (T14), the operating keys are located either outside on the housing, under the protection cap or inside on the electronic insert. With the stainless steel housing (T17), the operating keys are always located inside the housing on the electronic insert.



A0020030

A 1-5V DC and 4 to 20 mA HART
B PROFIBUS PA and FOUNDATION Fieldbus

The operating keys located externally on the device work on the Hall sensor principle. As a result, no additional openings are required in the device. This guarantees:

- Complete protection against environmental influences such as moisture and contamination.
- Simple operation without any tools.
- No wear.

Ordering information:

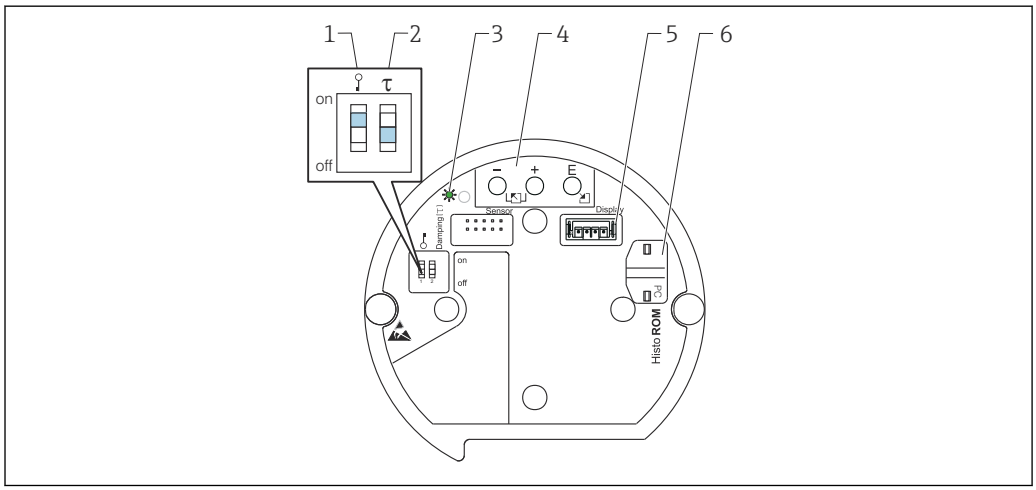
Product Configurator, order code for "Output, operation"

Operating keys and elements located internally on the electronic insert

Ordering information:

Product Configurator, order code for "Output, operation"

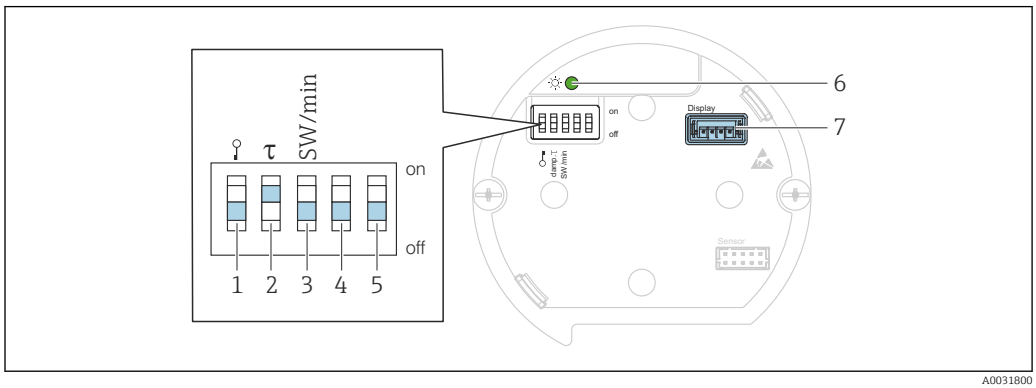
HART



A0020031

1 DIP switch for locking/unlocking parameters relevant to the measured value
2 DIP switch for switching damping on/off
3 Green LED to indicate value being accepted
4 Operating keys
5 Slot for optional display
6 Slot for optional HistoROM®/M-DAT

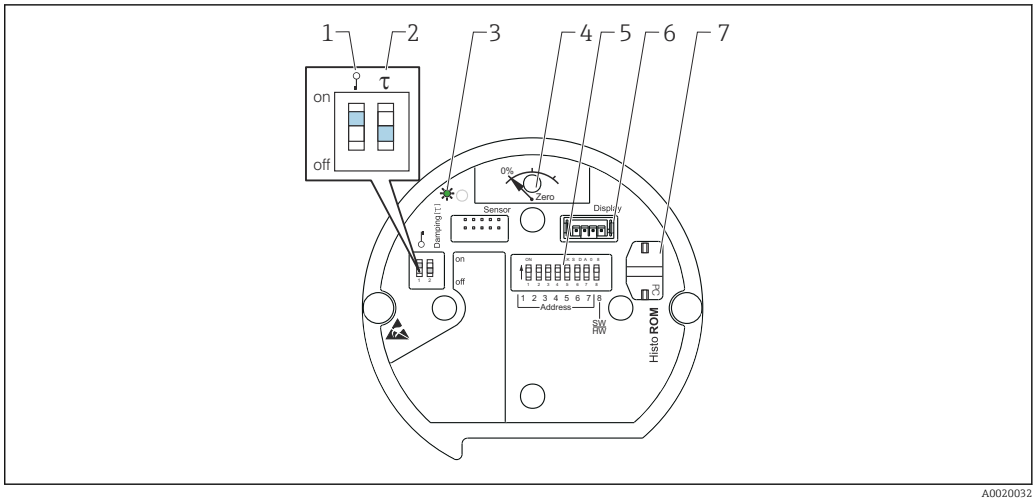
1-5V DC



A0031800

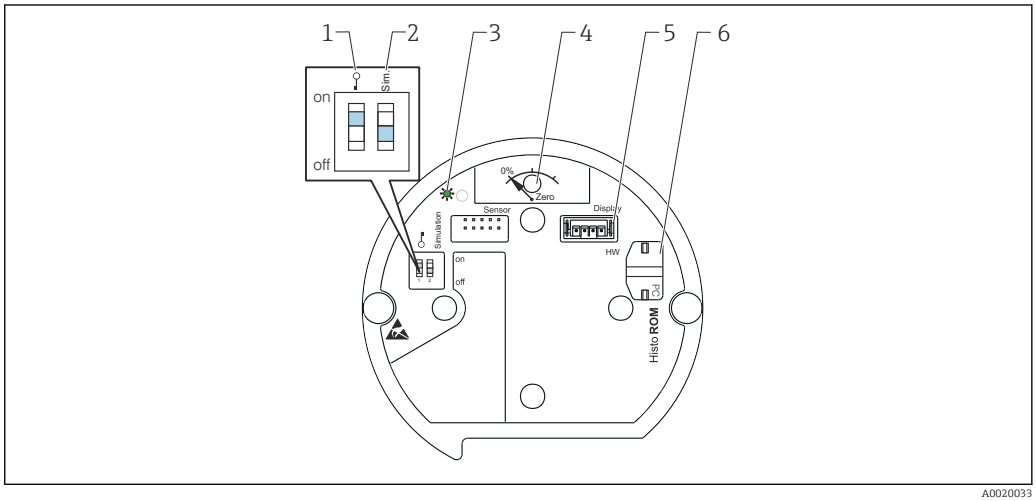
1 DIP switch for locking/unlocking parameters relevant to the measured value
2 DIP switch for switching damping on/off
3 DIP switch for alarm voltage/alarm current SW / alarm min (0.9 V/~3.6 mA)
4...5 Not assigned
6 Green LED to indicate value being accepted
7 Slot for display

PROFIBUS PA



1 *DIP switch for locking/unlocking parameters relevant to the measured value*
2 *DIP switch for switching damping on/off*
3 *Green LED to indicate value being accepted*
4 *Key for position adjustment and device reset*
5 *DIP switch for bus address*
6 *Slot for optional display*
7 *Slot for optional HistoROM®/M-DAT*

FOUNDATION Fieldbus



1 *DIP switch for locking/unlocking parameters relevant to the measured value*
2 *DIP switch for simulation mode on/off*
3 *Green LED to indicate value being accepted*
4 *Key for position adjustment and device reset*
5 *Slot for optional display*
6 *Slot for optional HistoROM®/M-DAT*

Remote operation

All software parameters are accessible depending on the position of the write protection switch on the device.

Hardware and software for remote operation [1]	HART	PROFIBUS PA	FOUNDATION Fieldbus
FieldCare	✔	✔	✔
FieldXpert SFX100	✔	–	✔

Hardware and software for remote operation [1]	HART	PROFIBUS PA	FOUNDATION Fieldbus
NI-FBUS Configurator	–	–	✔
HistoROM®/M-DAT	✔	✔	✔

1) Not for 1-5V DC

FieldCare

FieldCare is an Endress+Hauser asset management tool based on FDT technology. With FieldCare, you can configure all Endress+Hauser devices as well as devices from other manufacturers that support the FDT standard.

FieldCare supports the following functions:
- Configuration of transmitters in offline and online mode
- Device data upload/download (not for 1-5V DC)
- HistoROM®/M-DAT analysis
- Documentation of the measuring point

Connection options:
- HART via Commubox FXA195 and USB interface of a computer
- PROFIBUS PA via segment coupler and PROFIBUS interface card
- Service interface with Commubox FXA291 and ToF adapter FXA291 (USB).

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

Field Xpert SFX100

Field Xpert is an industrial PDA with integrated 3.5" touchscreen from Endress+Hauser based on Windows Mobile. It offers wireless communication via the optional VIATOR Bluetooth modem from Endress+Hauser. Field Xpert also works as a stand-alone device for asset management applications. For details, refer to BA00060S/04/EN.

Commubox FXA195

For intrinsically safe HART communication with FieldCare via the USB interface. For details refer to TI00404F/00/EN.

Commubox FXA291

The Commubox FXA291 connects Endress+Hauser field devices with a CDI interface (=Endress +Hauser Common Data Interface) to the USB interface of a personal computer or a notebook. For details refer to TI00405C/07/EN.

For the following Endress+Hauser devices you need the "ToF adapter FXA291" as an additional accessory:
- Cerabar S PMC71, PMP7x
- Deltabar S PMD7x, FMD7x
- Deltapilot S FMB70

ToF Adapter FXA291

The ToF adapter FXA291 connects the Commubox FXA291 with devices of the ToF platform, pressure equipment and Gammapilot via the USB interface of a personal computer or a notebook. For details refer to KA00271F.

Profiboard

For connecting a PC to the PROFIBUS.

Proficard

For connecting a laptop to the PROFIBUS.

FF configuration program

FF configuration program, such as NI-FBUS Configurator, to
- connect devices with "FOUNDATION Fieldbus signal" into an FF-network
- set FF-specific parameters

Operation with NI-FBUS Configurator:

The NI-FBUS Configurator is an easy-to-use graphical environment for creating linkages, loops, and a schedule based on the fieldbus concepts.

You can use the NI-FBUS Configurator to configure a fieldbus network as follows:
- Set block and device tags
- Set device addresses
- Create and edit function block control strategies (function block applications)
- Configure vendor-defined function and transducer blocks
- Create and edit schedules
- Read and write to function block control strategies (function block applications)
- Invoke methods specified in the manufacturer-specific DD (e.g. basic device settings)
- Display DD menus (e.g. tab for calibration data)
- Download a configuration
- Verify a configuration and compare it to a saved configuration
- Monitor a downloaded configuration
- Replace devices
- Save and print a configuration

HistoROM®/M-DAT (optional)

The HistoROM®/M-DAT is a memory module that can be attached to any electronic insert (not for 1-5V DC). HistoROM®/M-DAT can be retrofitted at any stage (order number: 52027785).

Your benefits
- Quick and safe commissioning of the same measuring points by copying the configuration data of one transmitter to another transmitter.
- Reliable process monitoring thanks to cyclical recording of pressure and sensor temperature measured values
- Simple diagnosis by recording diverse events such as alarms, configuration changes, counters for measuring range undershoot and overshoot for pressure and temperature as well as user limit overshoot and undershoot for pressure and temperature etc.
- Analysis and graphic evaluation of the events and process parameters via software (contained in scope of supply).

You can copy data from one transmitter to another transmitter when operating a FOUNDATION Fieldbus device via an FF configuration program. You need the Endress+Hauser FieldCare operating program, the Commubox FXA291 service interface and the ToF adapter FXA291 to be able to access the data and events saved in the HistoROM®/M-DAT.

Ordering information:

Product Configurator, order code for "Additional options:", version "N" or

Product Configurator, order code for "Application package:", option "EN" or

as a separate accessory (part no.: 52027785).

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

System integration

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

Designation	Option [1]
Measuring point (TAG), see additional specifications	Z1
Bus address, see additional spec.	Z2

1) Product Configurator, order code for "Identification"

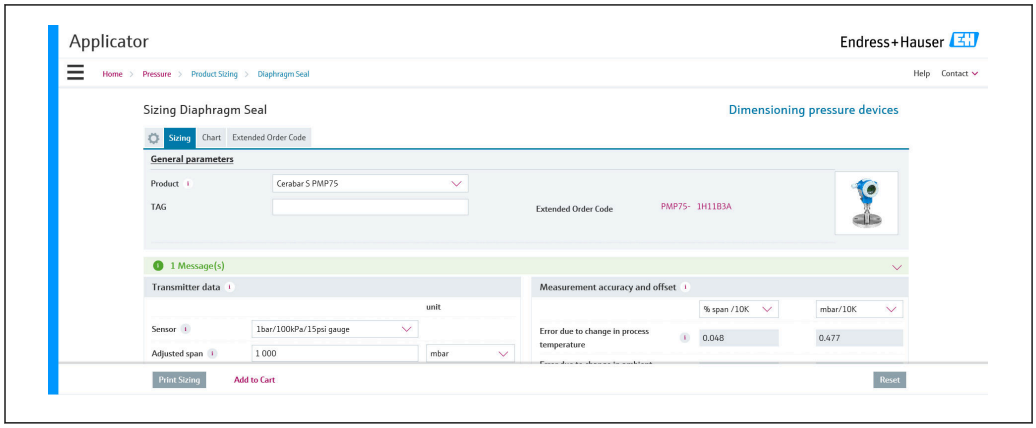
Planning instructions for diaphragm seal systems

NOTICE

Diaphragm seal systems sized/ordered incorrectly

The performance and permitted area of application of a diaphragm seal system depend on the process membrane used, the fill fluid, the connection, the design and the prevailing process and ambient conditions.

► To help you select the right diaphragm seal systems for your particular applications, Endress +Hauser provides its customers with the "Applicator Sizing Diaphragm Seal" selection tool, which is available free of charge at "www.endress.com/applicator" or as a download.



A0034616

For further details, or for information on an optimum diaphragm seal solution, your local Endress+Hauser Sales Center is also always happy to help.

Applications

Diaphragm seal systems should be used if the process and the device need to be separated. Diaphragm seal systems offer clear advantages in the following instances:

- In the case of extreme process temperatures
- For aggressive media
- In the case of process media that crystallize
- In the case of corrosive or highly various process media or process media with solids content
- In the case of heterogeneous and fibrous process media
- If extreme measuring point cleaning is necessary, or in the event of very damp mounting locations
- If the measuring point is exposed to severe vibrations
- For mounting locations that are difficult to access

Design and operation mode

Diaphragm seals are separating equipment between the measuring system and the process.

A diaphragm seal system consists of:
- A diaphragm seal
- A capillary tube or temperature isolator where applicable
- Fill fluid and
- a pressure transmitter.

The process pressure acts via the process membrane of the diaphragm seal on the liquid-filled system, which transfers the process pressure onto the sensor of the pressure transmitter.

Endress+Hauser delivers all diaphragm seal systems as welded versions. The system is hermetically sealed, which ensures the highest reliability.

The diaphragm seal determines the application range of the system by:
- The diameter of the process membrane
- The process membrane stiffness and material
- The design (oil volume)

Diameter of process membrane

The greater the diameter of the process membrane (less stiff), the smaller the temperature effect on the measurement result.

Stiffness of process membrane

The stiffness depends on the diameter of the process membrane, the material, any existing coating, the thickness and shape of the process membrane. The process membrane thickness and the shape are determined by the design. The stiffness of a process membrane of a diaphragm seal influences the temperature application range and the measurement error caused by temperature effects.

The Endress+Hauser TempC process membrane: maximum accuracy and process safety during pressure and differential pressure measurement with diaphragm seals

To measure with even greater accuracy in these applications and increase process safety, Endress +Hauser has developed the TempC process membrane which is based on a completely revolutionary technology. This process membrane guarantees the utmost level of accuracy and process safety in diaphragm seal applications.
- The very low temperature effect minimizes the effect of process temperature and ambient temperature fluctuations, thereby guaranteeing accurate and reliable measurements. Measurement inaccuracies caused by temperature are reduced to a minimum.
- The TempC process membrane can be used at temperatures between −70 °C (−94 °F) and +400 °C (+752 °F). This guarantees maximum process safety even in the event of very long sterilization and cleaning cycles (SIP/CIP) in tanks and pipes at high temperatures.
- Smaller instrumentation dimensions are possible thanks to the TempC process membrane. With a smaller process connection, the new process membrane measures at least as accurately as a conventional membrane with a larger diameter.
- Due to the geometry of the process membrane, an overshoot occurs initially immediately following a temperature shock. This results in a transient response, the duration and deviation of which are significantly less compared to traditional membrane types. In the case of batch processes, these shorter recovery times mean a far higher level of availability of the production facilities. The effect of the overshoot on the output signal can be reduced by setting a damping in the case of TempC process membranes.

Ordering information:

See the Product Configurator for the individual process connection and the choice of process membrane.

Selection in the Applicator:

Under "Transmitter data" in the "Membrane material" field.

Capillary

As standard, capillaries with an internal diameter of 1 mm (0.04 in) are used.

The capillary tube influences the thermal change, the ambient temperature operating range and the response time of a diaphragm seal system as a result of its length and internal diameter.

Fill fluid

When selecting the fill fluid, the medium temperature and ambient temperature, as well as the process pressure, are of crucial importance. Observe the temperatures and pressures during commissioning and cleaning. A further selection criterion is the compatibility of the fill fluid with the requirements of the medium. For example, only fill fluids that do not present a health hazard may be used in the food industry, e.g. vegetable oil or silicone oil (see also the following section "Diaphragm seal fill fluids").

The fill fluid used affects the thermal change, the temperature application range of a diaphragm seal system and the response time. A change in the temperature causes a volume change of the fill fluid. The volume change is dependent on the expansion coefficient and on the volume of the fill fluid at calibration temperature (constant in the range: +21 to +33 °C (+70 to +91 °F)). The application range can be extended by a fill fluid with a lower expansion coefficient and a shorter capillary.

For example, the fill fluid expands in the event of a temperature increase. The additional volume presses against the process membrane of a diaphragm seal. The stiffer a process membrane is, the greater its return force, which counteracts a volume change and acts on the measuring cell together with the process pressure, thus shifting the zero point.

Pressure transmitter

The pressure transmitter influences the temperature operating range, the TC zero point and the response time as a result of its volume change. The volume change is the volume that has to be shifted to pass through the complete measuring range.

Pressure transmitters from Endress+Hauser are optimized with regard to minimum volume change.

Diaphragm seal fill fluid

Medium	P_{abs} = 0.05 bar (0.725 psi) [1]	P_{abs} = ≥1 bar (14.5 psi) [2]
Silicone oil	−40 to +180 °C (−40 to +356 °F)	−40 to +250 °C (−40 to +482 °F)
High-temperature oil	−20 to +200 °C (−4 to +392 °F)	−20 to +400 °C (−4 to +752 °F) [3] [4] [5]
Low-temperature oil	−70 to +120 °C (−94 to +248 °F)	−70 to +180 °C (−94 to +356 °F)
Vegetable oil	−10 to +160 °C (+14 to +320 °F)	−10 to +220 °C (+14 to +428 °F)
Inert oil	−40 to +100 °C (−40 to +212 °F)	−40 to +175 °C (−40 to +347 °F) [6] [7]

1) Permitted temperature range at p_{abs} = 0.05 bar (0.725 psi) (observe temperature limits of the device and the system!)
2) Permitted temperature range at p_{abs} ≥1 bar (14.5 psi) (observe temperature limits of the device and the system!)
3) 325 °C (617 °F) at ≥1 bar (14.5 psi) absolute pressure.
4) 350 °C (662 °F) at ≥1 bar (14.5 psi) absolute pressure (max. 200 hours).
5) 400 °C (752 °F) at ≥1 bar (14.5 psi) absolute pressure (max. 10 hours).
6) 150 °C (302 °F) at ≥1 bar (14.5 psi) absolute pressure.
7) 175 °C (347 °F) at ≥1 bar (14.5 psi) absolute pressure (max. 200 hours).

The calculation of the operating temperature range of a diaphragm seal system depends on the fill fluid, capillary length and capillary internal diameter, process temperature and oil volume of the diaphragm seal. Detailed calculations, e.g. for temperature ranges, vacuum pressure and temperature ranges, are done separately in the Applicator "Sizing Diaphragm Seal".

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Information on cleaning

Endress+Hauser provides flushing rings as an accessory to enable cleaning of the process membrane without removing the transmitter from the process.

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

We recommend you perform CIP (cleaning in place (hot water)) before SIP (sterilization in place (steam)) for inline seals. Frequent use of SIP cleaning increases the stress and strain on the process membrane. Under unfavorable conditions, frequent changes of temperature can lead to process membrane material fatigue and potentially leaks over the long term.

Installation instructions

Diaphragm seal systems

- A diaphragm seal together with the transmitter form a closed, calibrated system, which has been filled through openings in the diaphragm seal and in the transmitter's measurement system. These openings are sealed and must not be opened.
- For devices with a temperature isolator or capillary, a suitable fastening device (mounting bracket) is recommended.
- When mounting, sufficient strain relief must be provided for the capillary line to prevent the capillary from bending (capillary bending radius ≥ 100 mm (3.94 in))
- For more detailed installation instructions, Endress+Hauser provides its customers with the free "Applicator Sizing Diaphragm Seal" selection tool, which is available online at "www.endress.com/applicator" or as a download.

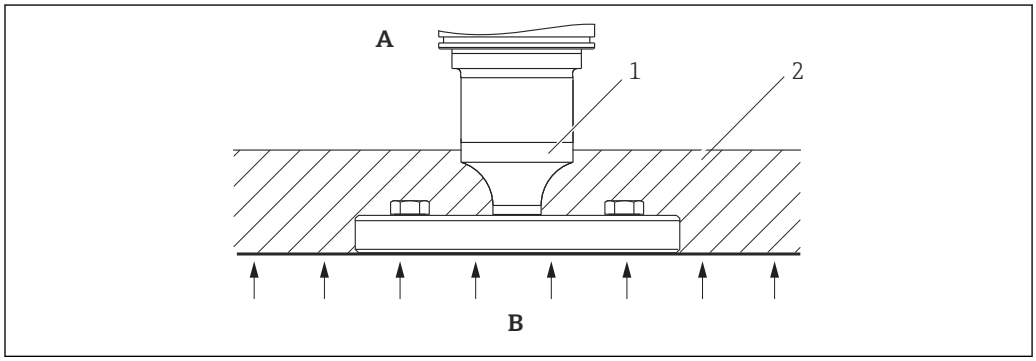
Capillary

In order to obtain more precise measurement results and to avoid a defect in the device, mount the capillaries as follows:
- Vibration-free (in order to avoid additional pressure fluctuations)
- Not in the vicinity of heating or cooling lines
- Insulate the capillaries if the ambient temperature is below or above the reference temperature
- With a bending radius ≥ 100 mm (3.94 in)
- When using diaphragm seal systems with a capillary, sufficient strain relief must be provided to prevent the capillary from bending (capillary bending radius ≥ 100 mm (3.94 in)).
- In the case of devices with capillaries, the zero point shift caused by the hydrostatic pressure of the fill fluid column in the capillaries must be taken into account when selecting the measuring cell. If a measuring cell with a small measuring range is selected, a position adjustment can cause range violation.

Thermal insulation

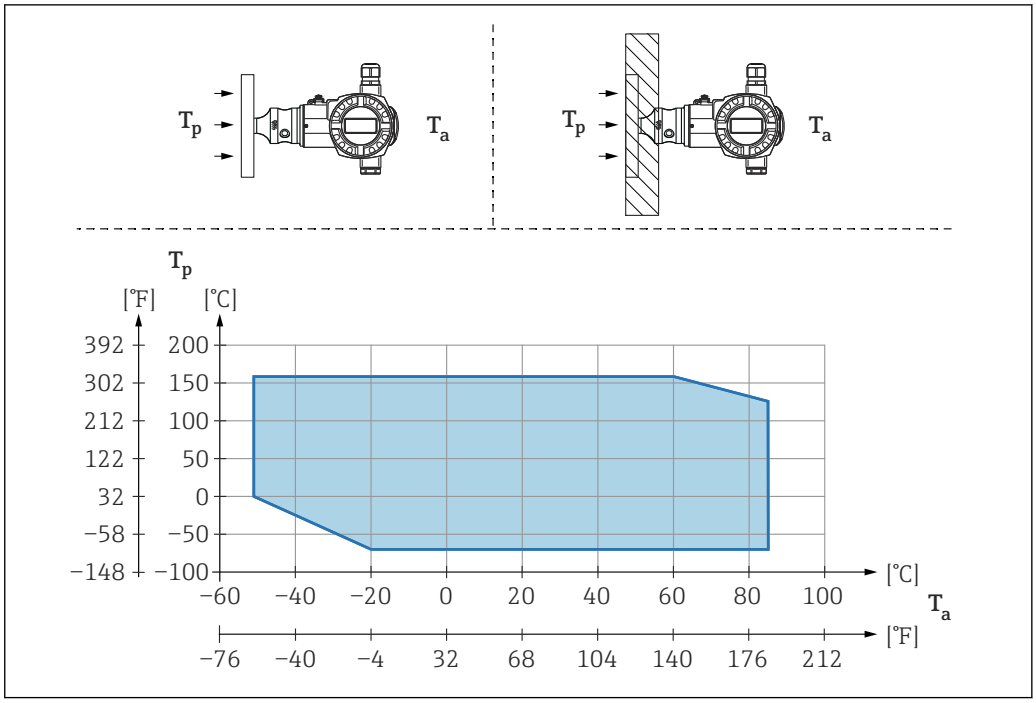
Thermal insulation with diaphragm seal directly mounted

The PMP75 must only be insulated up to a certain height. The maximum permitted insulation height is indicated on the devices and applies to an insulation material with a heat conductivity ≤ 0.04 W/(m x K) and to the maximum permitted ambient and process temperature. The data were determined under the most critical application "quiescent air". Maximum permitted insulation height, here indicated on a PMP75 with a flange:



A Ambient temperature
B Process temperature
1 Maximum permitted insulation height
2 Insulation material

Installation with direct mounting



T_a *Ambient temperature at transmitter*
T_p *Maximum process temperature*

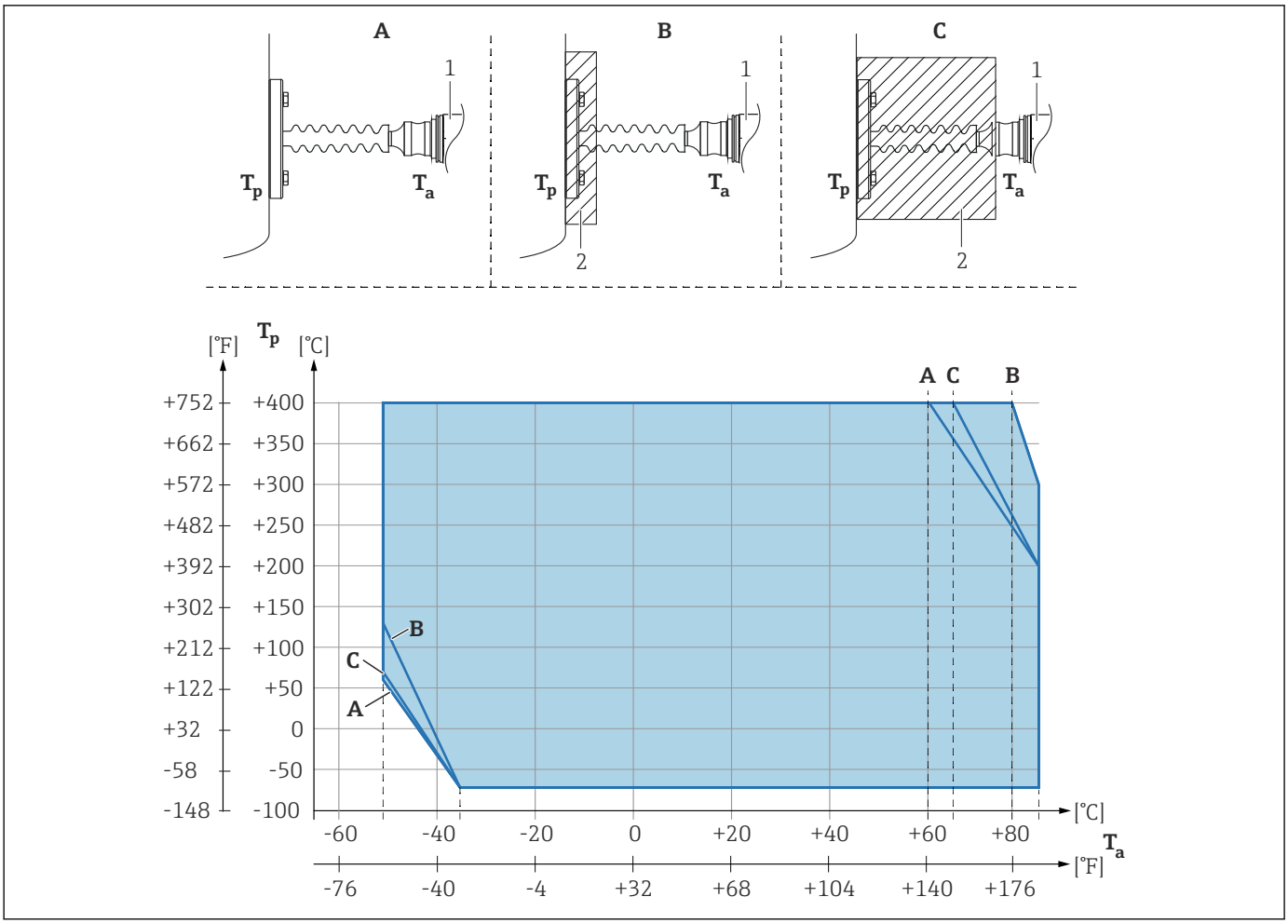
T_a	T_p
+85 °C (+185 °F)	−70 to +120 °C (−94 to +248 °F)
+60 °C (+140 °F)	−70 to +160 °C (−94 to +320 °F)
−20 °C (−4 °F)	−70 to +160 °C (−94 to +320 °F)
−50 °C (−58 °F)	0 to +160 °C (+32 to +320 °F)

Mounting with temperature isolator

Use of temperature isolators in the event of constant extreme medium temperatures which cause the maximum permissible electronics temperature of +85 °C (+185 °F) to be exceeded. Diaphragm seal systems with temperature isolators can be used up to a maximum temperature of +400 °C (+752 °F) depending on the fill fluid used. . To minimize the influence of rising heat, mount the device horizontally or with the housing pointing downwards. The additional installation height causes a zero point shift of maximum 21 mbar (0.315 psi) due to the hydrostatic column in the temperature isolator. This zero point shift can be corrected on the device.

The maximum ambient temperature T_a at the transmitter depends on the maximum process temperature T_p.

The maximum process temperature depends on the diaphragm seal fill fluid used.



A No insulation
B Insulation 30 mm (1.18 in)
C Maximum insulation
1 Transmitter
2 Insulation material

Item	T_a [1]	T_p [2]
A	60 °C (140 °F)	400 °C (752 °F) [3]
	85 °C (185 °F)	200 °C (392 °F)
	−50 °C (−58 °F)	60 °C (140 °F)
	−35 °C (−31 °F)	−70 °C (−94 °F)
B	80 °C (176 °F)	400 °C (752 °F) [3]
	85 °C (185 °F)	300 °C (572 °F)
	−50 °C (−58 °F)	130 °C (266 °F)
	−35 °C (−31 °F)	−70 °C (−94 °F)
C	67 °C (153 °F)	400 °C (752 °F) [3]
	85 °C (185 °F)	200 °C (392 °F)
	−50 °C (−58 °F)	70 °C (158 °F)
	−35 °C (−31 °F)	−70 °C (−94 °F)

1) Maximum ambient temperature at transmitter
2) Maximum process temperature
3) Process temperature: +400 °C (+752 °F) max. depending on the diaphragm seal fill fluid used

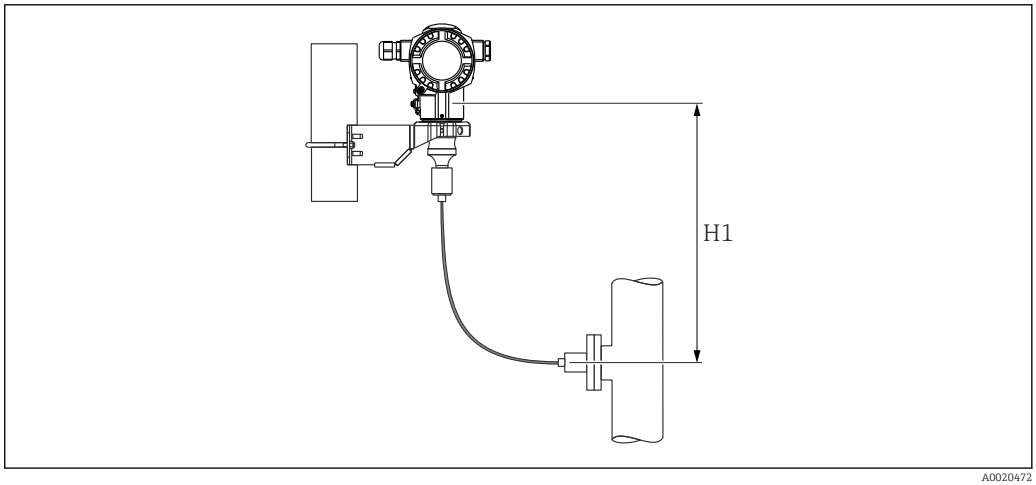
Vacuum applications

Mounting instructions

For vacuum applications, pressure transmitters with a ceramic process membrane (oil-free) are preferable.

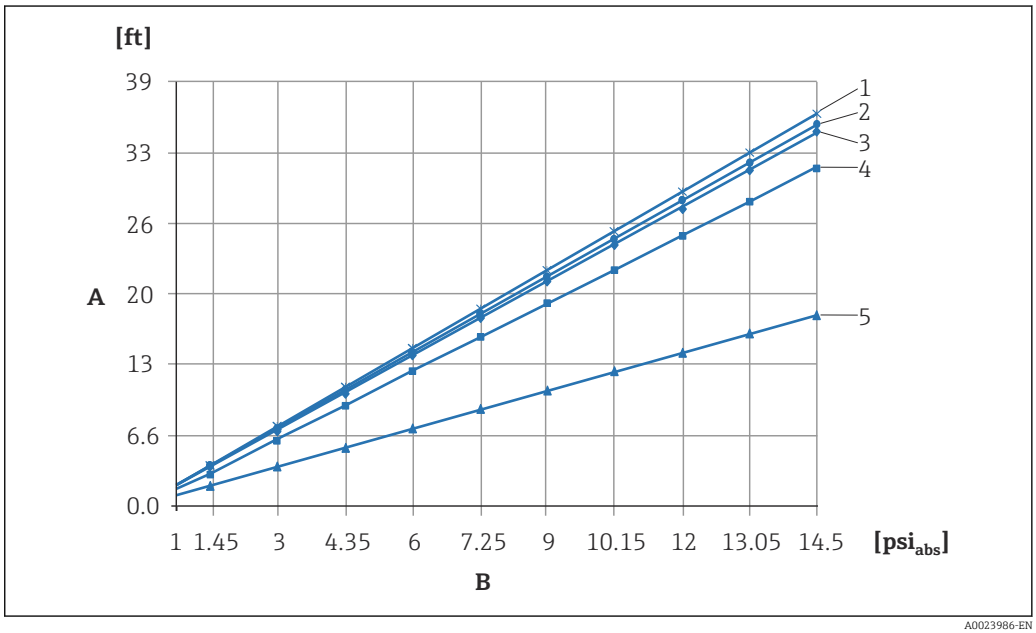
For applications under vacuum, Endress+Hauser recommends mounting the pressure transmitter below the diaphragm seal. This prevents vacuum loading of the diaphragm seal caused by the presence of fill fluid in the capillary.

When the pressure transmitter is mounted above the diaphragm seal, the maximum height difference H1 in accordance with the diagrams below must not be exceeded. The following graphic describes installation above the lower diaphragm seal:



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The maximum height difference depends on the density of the fill fluid and the smallest ever pressure that is permitted to occur at the diaphragm seal (empty vessel), see the diagram below. The following diagram depicts the maximum installation height above the diaphragm seal for vacuum applications.



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A Height difference H1
B Pressure at diaphragm seal
1 Low-temperature oil
2 Vegetable oil
3 Silicone oil
4 High-temperature oil
5 Inert oil

Certificates and approvals

Current certificates and approvals for the product are available at www.endress.com on the relevant product page:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Downloads**.

CE mark

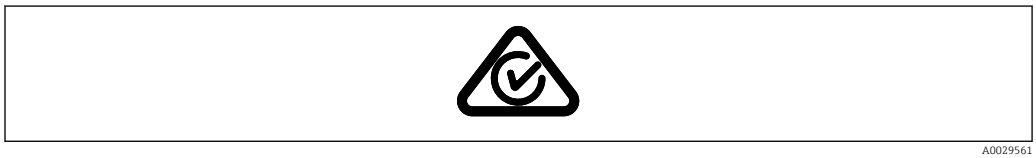
The device meets the legal requirements of the relevant EC directives. Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.

RoHS

The measuring system complies with European Directive 2002/96/EC.

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 bear the RCM-Tick marking on the nameplate.



A0029561

TSE (BSE) compliance (ADI free - Animal Derived Ingredients)

As the manufacturer, Endress+Hauser states:
- That the parts of this product in contact with the process are not made from materials derived from animals **or**
- at least comply with the requirements of guidelines outlined in EMA/410/01 rev. 3 (TSE (BSE) compliance).

Ex approvals

- ATEX
- FM
- CSA
- NEPSI
- IECEx
- TIIS
- Also combinations of different approvals

All explosion protection data are given in separate documentation which is available upon request. The Ex documentation is supplied as standard with all Ex-systems .

Corrosion test

Standards and test methods:
- 316L: ASTM A262 Practice E and ISO 3651-2 Method A
- Alloy C22 and Alloy C276: ASTM G28 Practice A and ISO 3651-2 Method C
- 22Cr duplex, 25Cr duplex: ASTM G48 Practice A or ISO 17781 and ISO 3651-2 Method C

The corrosion test is confirmed for all wetted and pressure-bearing parts.

A 3.1 material certificate must be ordered as confirmation of the test.

EAC conformity

The measuring system meets the legal requirements of the applicable EAC guidelines. 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.

Suitable for hygiene applications

For information on installation and approvals, see documentation SD02503F "Hygiene approvals".

For information on 3-A and EHEDG-tested adapters, see documentation TI00426F "Weld-in adapter, process adapter and flanges".

Certificate of current Good Manufacturing Practices (cGMP)

Product Configurator, order code for "Test, Certificate" option "JG"

- The certificate is only available in English
- Materials of construction of product wetted parts
- TSE compliance
- Polishing and surface finish
- Material/ compound compliance table (USP Class VI, FDA conformity)

Functional safety SIL/ IEC 61508 Declaration of Conformity (optional)

The Cerabar S with 4 to 20 mA output signal has been developed in accordance with the IEC 61508 standard. These devices can be used to monitor the process level and pressure up to SIL 3. For a detailed description of safety functions with the Cerabar S, settings and functional safety data, see the "Functional safety manual - Cerabar S" SD00190P/00.

For devices up to SIL 3 / IEC 61508 Declarations of Conformity see:

Ordering information:

Product Configurator, order code for "Additional options 1" and "Additional options 2", version "E".

CRN approval

- PMC71: Some device versions have CRN approval. These devices are fitted with a separate plate bearing the registration number CRN 0F23358.5C.
- PMP71: Some device versions have CRN approval. These devices are fitted with a separate plate bearing the registration number CRN 0F22502.5C.
- PMP75 devices with a capillary are not CRN-approved.

A CRN-approved process connection can be obtained in one of the following ways:
- CRN-approved process connection must be ordered with a CSA approval
- CRN-approved process connection must be ordered with the "CRN" option in the order code for "Additional approval"

Pressure Equipment Directive 2014/68/EU (PED)

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

Pressure equipment (maximum allowable pressure (MWP) 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 (see 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 maximum allowable pressure PS > 200 bar (2 900 psi) shall 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 categories in accordance with Annex II. Taking into account the low volume specified above, the pressure instruments can be categorized as category I pressure equipment. They must then bear a CE mark.

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:

- PMP71 with thread and internal process membrane PN > 200 and oval flange adapter PN > 200:
  Suitable for stable gases in group 1, category I, module A
- PMP75 with inline seal ≥ 1.5"/PN40:
  Suitable for stable gases in group 1, category II, module A2
- PMP75 with separators PN > 200 ≥ 1.5"/PN40:
  Suitable for stable gases in group 1, category I, module A
- PMP75 with thread PN > 200:
  Suitable for stable gases in group 1, category I, module A

MID Parts Certificate

TC7975

Classification of process sealing between electrical systems and (flammable or combustible) process fluids in accordance with ANSI/ISA 12.27.01

Endress+Hauser devices are designed in accordance with ANSI/ISA 12.27.01, allowing the user to waive the use of - and save the cost of installing - external secondary process seals in the conduit as required by the process sealing sections of ANSI/NFPA 70 (NEC) and CSA 22.1 (CEC). These instruments comply with the North-American installation practice and provide a very safe and cost-saving installation for pressurized applications with hazardous fluids. Please refer to the following table for the seal class assigned (single seal or dual seal):

Device	Approval	Remark	Single seal MWP	Dual seal MWP
PMC71	CSA C/US IS, XP	W/o separate housing	-	60 bar (900 psi)
	CSA C/US IS	With separate housing	40 bar (600 psi)	-
PMP71	CSA C/US XP, XP+IS	W/o separate housing	400 bar (6 000 psi)	-
	CSA C/US IS	W/o separate housing	>200 to 400 bar (3 000 to 6 000 psi)	≤200 bar (3 000 psi)
	CSA C/US IS	With separate housing	400 bar (6 000 psi)	-
PMP75	XP, XP+IS	W/o separate housing	400 bar (6 000 psi)	-
	CSA C/US IS	W/o separate housing	>200 to 400 bar (3 000 to 6 000 psi)	≤200 bar (3 000 psi)
	CSA C/US IS	With separate housing	400 bar (6 000 psi)	-

Further information can be found in the control drawings of the relevant devices.

Inspection certificate

Designation	PMC71	PMP71	PMP75	Option
3.1 Material documentation, wetted metal parts, EN10204-3.1 inspection certificate	✔	✔	✔	B [1) 3)]
Declaration of Conformity NACE MR0175, wetted metal parts	—	✔	✔	C [1) 3)]
EN10204-3.1 material, NACE MR0175, wetted metal parts, inspection certificate	—	✔	✔	D [1) 3)]
Individual test, test report	✔	✔	✔	3 [1)]
Pressure test, internal procedure, test report	✔	✔	✔	4 [1)]
Helium leak test, internal procedure, test report	✔	✔	—	5 [1)]
EN10204-3.1 material wetted parts +Ra, Ra= surface roughness, dimensional check, inspection certificate	✔	—	—	6 [1)]
Delta ferrite measurement, internal procedure, wetted metal parts, inspection certificate	✔	—	—	8 [1)]
3.1 Material documentation, wetted metal parts, EN10204-3.1 inspection certificate	✔	✔	✔	JA [2) 3)]
Declaration of Conformity NACE MR0175, wetted metal parts	✔	✔	✔	JB [2) 3)]
Declaration of Conformity NACE MR0103, wetted metal parts	✔	✔	✔	JE [2) 3)]
Surface finish measurement ISO4287/Ra, wetted metal parts, inspection certificate	✔	—	✔	KB [2)]
Helium leak test, internal procedure, inspection certificate	✔	✔	✔	KD [2)]
Pressure test, internal procedure, inspection certificate	✔	✔	✔	KE [2)]

Designation	PMC71	PMP71	PMP75	Option
Delta ferrite measurement, internal procedure, wetted metal parts, inspection certificate	✔	—	✔	KF [2]
PMI test (XRF), internal procedure, metal parts in contact with the medium	✔	✔	✔	KG [2]
Welding documentation, wetted/pressurized seams	—	✔	—	KS [2]

1) Product Configurator, order code for "Additional options 1" and "Additional options 2"
2) Product Configurator, order code for "Test, Certificate"
3) The choice of this feature for coated process membranes/process connections refers to the metal base material.

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

Special device versions

Endress+Hauser offers special device versions as **T**echnical **S**pecial **P**roducts (TSP).

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

Scope of delivery

- Measuring device
- Optional accessories
- Brief Operating Instructions
- Calibration certificates
- Optional certificates

Measuring point (TAG)

Order code	895: Marking
Option	Z1: Tagging (TAG), see additional spec.
Position of the measuring point marking	To be selected in the additional specifications: ▪ Tag plate Stainless Steel ▪ Self-adhesive paper label ▪ Supplied label/plate ▪ RFID TAG ▪ RFID TAG + Tag plate Stainless Steel ▪ RFID TAG + Self-adhesive paper label ▪ RFID TAG + Supplied label/plate
Definition of the measuring point designation	To be defined in the additional specifications: 3 lines containing up to 18 characters each The measuring point designation appears on the selected label and/or the RFID TAG.
Identification on electronic nameplate (ENP)	32 characters

Configuration data sheet

Pressure

The following configuration data sheet must be completed and included with the order if the option "E" or "H" has been selected in the Product Configurator, order code for "Calibration; Unit".

Pressure unit

❑ mbar	❑ mmH_2O [1]	❑ mmHg [2]	❑ Pascal	❑ torr
❑ bar	❑ mH_2O [1]	❑ inHg [2]	❑ hPa	❑ g/cm^2
❑ psi	❑ ftH_2O [1]	❑ gf/cm^2	❑ kPa	❑ kg/cm^2
	❑ inH_2O [1]	❑ kgf/cm^2	❑ MPa	❑ lb/ft^2
				❑ atm

1) The conversion factor for the pressure unit is based on a reference temperature of 4 °C (39.2 °F).
2) The conversion factor of the pressure unit refers to a reference temperature of 0 °C (32 °F).

Calibration Range / Output

Low range value (LRV): _____ [Pressure engineering unit]
Upper range value (URV): _____ [Pressure engineering unit]

Display

Display of the content of the main line (option depends on sensor and communication variant)

- ❑ Primary value [PV] (default)
- ❑ Main Value [%]
- ❑ Pressure
- ❑ Current [mA] (HART only)
- ❑ Temperature
- ❑ Error number
- ❑ Alternating display

Damping

Damping: _____ sec (Default 2 sec)

Smallest calibratable span (preset at factory) → 🖹 11

Level

The following configuration data sheet must be completed and included with the order if the option "F" or "T" has been selected in the Product Configurator, order code for "Calibration; Unit".

Pressure unit

- ❑ mbar
- ❑ bar
- ❑ psi
- ❑ mmH_2O [1)]
- ❑ mH_2O [1)]
- ❑ ftH_2O [1)]
- ❑ inH_2O [1)]
- ❑ mmHg [2)]
- ❑ inHg [2)]
- ❑ gf/cm^2
- ❑ kgf/cm^2
- ❑ Pascal
- ❑ hPa
- ❑ kPa
- ❑ MPa
- ❑ torr
- ❑ g/cm^2
- ❑ kg/cm^2
- ❑ lb/ft^2
- ❑ atm

Output unit (scaled unit)

Mass	Lengths	Volume	Volume	Percent
❑ kg	❑ m	❑ l	❑ USgal	❑ %
❑ t	❑ dm	❑ hl	❑ impgal	
❑ lb	❑ cm	❑ m^3	❑ USbblPE TR	
	❑ mm	❑ ft^3		
	❑ ft			
	❑ inch			

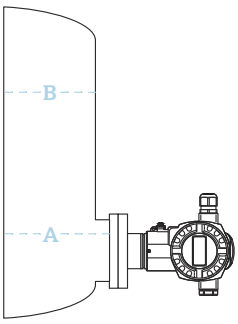
Empty calibration [a]: Low pressure value (empty) _____ [Pressure engineering unit]

Full calibration [b]: High pressure value (full) _____ [Pressure engineering unit]

Empty calibration [a]: Low level value (empty) _____ [Scaled Unit]

Full calibration [b]: High level value (full) _____ [Scaled Unit]

Example



A 0 mbar / 0m
B 300 mbar (4.5 psi) / 3 m (9.8 ft)

1) The conversion factor for the pressure unit is based on a reference temperature of 4 °C (39.2 °F).
2) The conversion factor of the pressure unit refers to a reference temperature of 0 °C (32 °F).

Display

Display of the content of the main line (option depends on sensor and communication variant)

- ❑ Primary value [PV] (default)
- ❑ Main Value [%]
- ❑ Pressure
- ❑ Current [mA] (HART only)
- ❑ Temperature
- ❑ Level before Lin.
- ❑ Tank content
- ❑ Error number
- ❑ Alternating display

Damping

Damping: _____ sec (Default 2 sec)

Accessories

HistoROM®/M-DAT

The HistoROM®/M-DAT is a memory module that can be attached to any electronic insert (not for 1-5V DC).

Ordering information:

Product Configurator, order code for "Additional options 1" or Additional options 2", version "N" or

as a separate accessory (part no.: 52027785).

Welding flanges and weld-in adapters

For details, refer to TI00426F/00/EN "Weld-in adapters, process adapters and flanges".

Manifolds

See the → 76.

For further details, see SD01553P/00/EN "Mechanical accessories for pressure measuring devices".

Additional mechanical accessories

Oval flange adapters, pressure gauge valves, shutoff valves, siphons, condensate pots, cable shortening kits, test adapters, mounting brackets, flushing rings, block&bleed valves and protective roofs.

For details see SD01553P/00/EN "Mechanical accessories for pressure measuring devices".

Service-specific accessories

Accessories	Description
DeviceCare SFE100	Configuration tool for HART, PROFIBUS and FOUNDATION Fieldbus field devices Technical Information TI01134S DeviceCare is available for download at www.software-products.endress.com. You need to register in the Endress+Hauser software portal to download the application.
FieldCare SFE500	FDT-based plant asset management tool FieldCare can configure all smart field units in your plant and helps you manage them. By using the status information, FieldCare is also a simple but effective way of checking the status and condition of the field devices. Technical Information TI00028S
Field Xpert SMT70, SMT77	The Field Xpert SMT70 tablet PC for device configuration enables mobile plant asset management in hazardous (Ex Zone 2) and non-hazardous areas. It is suitable for commissioning and maintenance staff. It manages Endress+Hauser and third-party field instruments with a digital communication interface and documents the progress of the work. The SMT70 is designed as a complete solution. It comes with a pre-installed driver library and is an easy-to-use, touch-enabled tool for managing field devices throughout their entire life cycle. The Field Xpert SMT77 for device configuration enables mobile plant asset management in areas categorized as Ex Zone 1. It is suitable for commissioning and maintenance staff for easy management of field instruments with a digital communication interface. The touch-enabled tablet PC is designed as a complete solution. It comes with comprehensive pre-installed driver libraries and offers users a modern software user interface to manage field instruments throughout the entire life cycle.

Documentation

For an overview of the scope of the associated Technical Documentation, refer to the following:
- *Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from the nameplate
- *Endress+Hauser Operations app*: Enter serial number from nameplate or scan matrix code on nameplate.

Standard documentation

Document type: Operating Instructions (BA)
Installation and initial commissioning – contains all the functions in the operating menu that are needed for a routine measuring task. Functions beyond this scope are not included.

Document type: Brief Operating Instructions (KA)
Quick guide to the first measured value – includes all essential information from incoming acceptance to electrical connection.

Document type: Safety Instructions, certificates
Depending on the approval, safety instructions are supplied with the device, e.g. XA. This documentation is an integral part of the Operating Instructions.
Information on the Safety Instructions (XA) that are relevant for the device is provided on the nameplate.

Supplementary device-dependent documentation

Additional documents are supplied depending on the device version ordered: Always comply strictly with the instructions in the supplementary documentation. The supplementary documentation is an integral part of the device documentation.

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Endress+Hauser
People for Process Automation