

Technical Information

Cerabar M

PMC51, PMP51, PMP55

Process pressure measurement

Pressure transmitter with ceramic and metal sensors



Application

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 measurement in liquids
- High process temperature
 - without diaphragm seals up to 130 °C (266 °F), for a maximum of 60 minutes 150 °C (302 °F)
 - with diaphragm seals up to 400 °C (752 °F)
- High pressure up to 400 bar (6 000 psi)
- International usage thanks to a wide range of approvals

Your benefits

- Very good reproducibility and long-term stability
- High reference accuracy up to ± 0.10 %
as PLATINUM version: ± 0.075 %
- Turn down up to 100:1
- Uniform platform for differential pressure, hydrostatics and pressure (Deltabar M – Deltapilot M – Cerabar M)
- Simple, fast commissioning through a user interface designed for real-world applications
- Used for process pressure monitoring up to SIL 2, certified to IEC 61508 Edition 2.0 and IEC 61511 by TÜV NORD
- The patented TempC Membrane for the diaphragm seal reduces measured errors caused by environmental and process temperature influences to a minimum
- ASME-BPE-compliant device versions

Table of contents

Document information	4	Performance characteristics for measuring devices with metal process isolating diaphragm . .	32
Document function	4	Response time	32
Symbols used	4	Reference operating conditions	32
Documentation	5	Maximum measured error (total performance)	32
Terms and abbreviations	6	Resolution	35
Turn down calculation	7	Total error	35
Function and system design	8	Long-term stability	36
Device selection	8	Response time T63 and T90	36
Measuring principle	10	Installation factors	38
Level measurement (level, volume and mass)	11	Installation	39
Electrical differential pressure measurement with gauge pressure sensors	11	General installation instructions	39
Communication protocol	12	Measuring arrangement for devices without diaphragm seal – PMC51, PMP51	39
Input	13	Measuring arrangement for devices with diaphragm seal – PMP55	39
Measured variable	13	Wall and pipe mounting, transmitter (optional)	40
Measuring range	13	Wall and pipe-mounting manifold (optional)	40
Output	15	"Separate housing" version	41
Output signal	15	Oxygen applications	42
Signal range 4 to 20 mA	15	PWIS cleaning	42
Signal on alarm	15	Ultrapure gas applications (PMC51 und PMP51)	42
Load - 4 to 20 mA Analog 4...20 mA HART	15	Applications with hydrogen	42
Damping	16	Environment	43
Firmware version	16	Ambient temperature range	43
Protocol-specific data HART	16	Storage temperature range	43
Wireless HART data	16	Climate class	43
Protocol-specific data PROFIBUS PA	16	Degree of protection	43
Protocol-specific data FOUNDATION Fieldbus	17	Vibration resistance	43
Power supply	20	Electromagnetic compatibility	44
Terminal assignment	20	Operation in very corrosive environment	44
Supply voltage	20	Process	45
Current consumption	21	Process temperature range PMC51	45
Electrical connection	21	Process temperature limits	45
Terminals	21	Process temperature limits of flexible capillary armoring: PMP55	46
Cable entry	21	Pressure specifications	47
Device plugs	22	Mechanical construction	48
Cable specification	23	Device height	48
Start-up current	24	F31 housing, aluminum	48
Residual ripple	24	F15 housing, stainless steel (hygienic)	49
Influence of power supply	24	PMC51: process connections with internal process isolating diaphragm	50
Overvoltage protection (optional)	24	PMC51: process connections with internal process isolating diaphragm	52
Performance characteristics for measuring devices with ceramic process isolating diaphragm	25	PMC51: process connections with internal process isolating diaphragm - height H	52
Response time	25	PMC51: process connections with flush-mounted process isolating diaphragm	53
Reference operating conditions	25	PMC51: process connections with flush-mounted process isolating diaphragm	54
Maximum measured error (total performance)	25	PMC51: process connections with flush-mounted process isolating diaphragm - height H	54
Resolution	27		
Total error	28		
Long-term stability	28		
Response time T63 and T90	29		
Installation factors	31		





PMC51: process connections with flush-mounted process isolating diaphragm	55	Diaphragm seal filling oils	115
PMC51: process connections with flush-mounted process isolating diaphragm	58	Operating temperature range	116
PMC51: process connections with flush-mounted process isolating diaphragm - height H	58	Cleaning instructions	116
PMC51: hygienic process connections with flush mount process isolating diaphragm	59	Installation instructions	116
PMP51: process connections with internal process isolating diaphragm	64	Vacuum applications	117
PMP51: process connections with internal process isolating diaphragm	65	Certificates and approvals	119
PMP51: process connections with flush-mounted process isolating diaphragm	66	CE mark	119
ANSI threaded connection	68	RoHS	119
PMP51: process connections with flush-mounted process isolating diaphragm	69	RCM-Tick marking	119
PMP51: process connections with flush-mounted process isolating diaphragm	70	Ex approvals	119
PMP51: process connections with flush-mounted process isolating diaphragm	71	EAC conformity	119
PMP51: hygienic process connections with flush mount process isolating diaphragm	72	Suitable for hygiene applications	119
Valve manifold DA63M- (optional)	76	Certificate of current Good Manufacturing Practices (cGMP)	120
PMP51: process connections	77	Certificate of Compliance ASME BPE 2012	120
PMP55 basic device - examples	78	Functional safety SIL	120
Process connections for PMP55 with flush-mounted process isolating diaphragm	79	CRN approvals	120
PMP55: process connections with flush-mounted process isolating diaphragm	80	Other standards and guidelines	120
PMP55: process connections with flush-mounted process isolating diaphragm	81	AD2000	120
PMP55: process connections with flush-mounted process isolating diaphragm	82	Pressure Equipment Directive 2014/68/EU (PED)	121
PMP55: hygienic process connections with flush-mounted process isolating diaphragm	83	Manufacturer declaration	121
PMP55: hygienic process connections with flush mount process isolating diaphragm	84	Marine approval	121
PMP55: process connections with flush-mounted process isolating diaphragm	90	Drinking water approval	122
PMP55: process connections with flush-mounted process isolating diaphragm	92	Classification of process sealing between electrical systems and (flammable or combustible) process fluids in accordance with ANSI/ ISA 12.27.01	122
PMP55 process connections	95	Inspection certificate	122
Wall and pipe mounting with "Separate housing" version	98	Calibration; unit	122
Reduction in installation height	99	Calibration	123
Weight	99	Service	123
Flushing rings	100	Ordering information	124
Materials not in contact with process	101	Special device versions	124
Materials in contact with the process	104	Scope of delivery	124
Seals	105	Measuring point (TAG)	124
Fill fluid	105	Configuration data sheet (HART, PROFIBUS PA, FOUNDATION Fieldbus electronics)	124
Operability	107	Configuration data sheet (Analog electronics)	127
Operating concept	107	Additional documentation	128
Local operation	107	Field of Activities	128
Operating languages	110	Technical Information	128
Remote operation	111	Special Documentation	128
System integration (Except analog electronics)	112	Operating Instructions	128
Planning instructions for diaphragm seal systems	113	Brief operating instruction	128
Applications	113	Functional safety manual (SIL)	128
Function and design	114	Safety instructions	128
		Accessories	131
		Manifolds	131
		Additional mechanical accessories	131
		Welding necks and weld-in adapters	131
		Mounting bracket for wall and pipe mounting	132
		M12 connector	132
		Service-specific accessories	132
		Registered trademarks	132
		HART®	132
		PROFIBUS®	132
		FOUNDATION™Fieldbus	132

Document information



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









Safety symbols

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

Electrical symbols

Symbol	Meaning	Symbol	Meaning
	Protective ground connection A terminal which 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

Symbol	Meaning
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections

Documentation

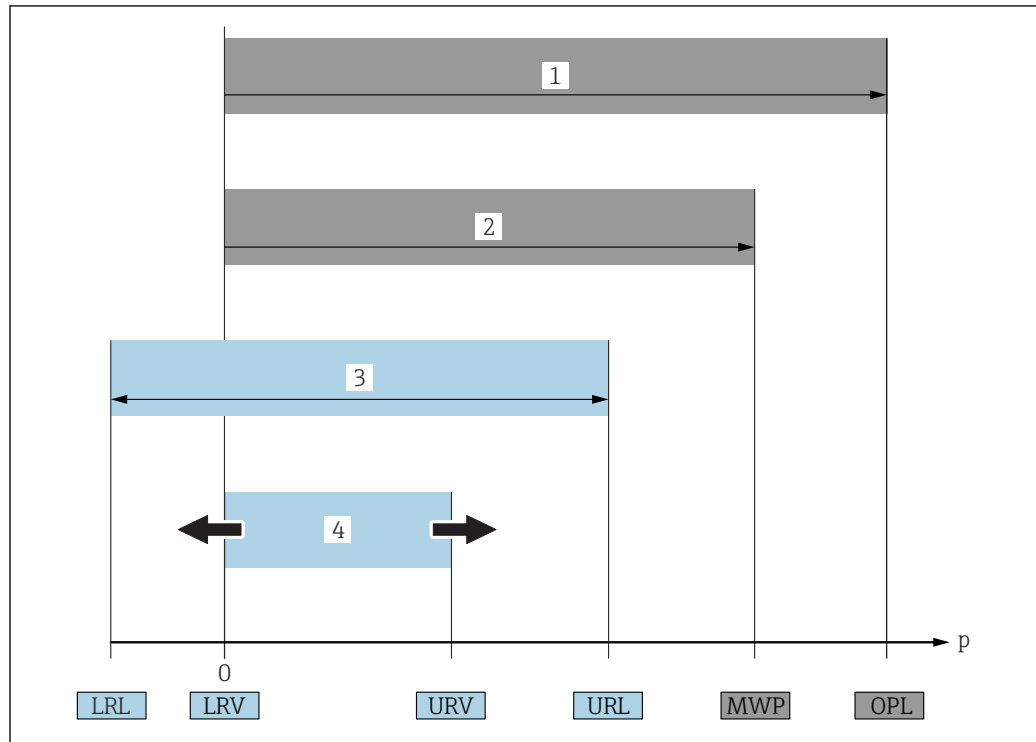
See chapter "Additional documentation" →  128



The document types listed are available:

In the Download Area of the Endress+Hauser Internet site: www.endress.com → Download

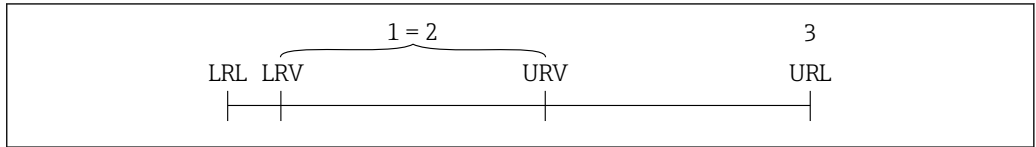
Terms and abbreviations



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Item	Term/abbreviation	Explanation
1	OPL	The OPL (over pressure limit = sensor overload limit) for the measuring device depends on the lowest-rated element, with regard to pressure, of the selected components, i.e. the process connection has to be taken into consideration in addition to the measuring cell. Also observe pressure-temperature dependency. For the relevant standards and additional notes see the → 47 section. The OPL may only be applied for a limited period of time.
2	MWP	The MWP (maximum working pressure) for the sensors depends on the lowest-rated element, with regard to pressure, of the selected components, i.e. the process connection has to be taken into consideration in addition to the measuring cell. Also observe pressure-temperature dependency. For the relevant standards and additional notes see the → 47 section. The MWP may be applied at the device for an unlimited period. The MWP can also be found on the nameplate.
3	Maximum sensor measuring range	Span between LRL and URL This sensor measuring range is equivalent to the maximum calibratable/adjustable span.
4	Calibrated/adjusted span	Span between LRV and URV Factory setting: 0 to URL Other calibrated spans can be ordered as customized spans.
p	-	Pressure
-	LRL	Lower range limit
-	URL	Upper range limit
-	LRV	Lower range value
-	URV	Upper range value
-	TD (Turn down)	Turn down Example - see the following section.

Turn down calculation



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

Example

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

Turn down (TD):

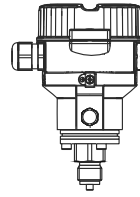
$$TD = \frac{URL}{|URV - LRV|}$$

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

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

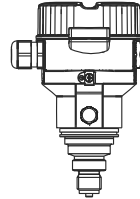
Function and system design

Device selection



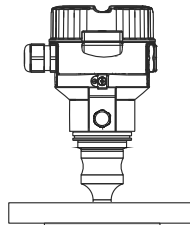
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PMC51 with capacitive measuring cell and ceramic process isolating diaphragm (Ceraphire®)



A0023675

PMP51 with piezoresistive measuring cell and metal welded process isolating diaphragm



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PMP55 with diaphragm seal

Field of application

- Gauge pressure and absolute pressure
- Level

Process connections

PMC51:

- Thread
- EN flanges DN 25 – DN 80
- ANSI flanges 1" – 4"
- JIS flanges 50 A – 100 A
- Flush mount hygienic connections

PMP51:

- Thread
- EN flanges DN 25 – DN 80
- ANSI flanges 1" – 4"
- Prepared for diaphragm seal mount
- Flush mount hygienic connections

PMP55:

Wide range of diaphragm seals

Measuring ranges

- PMC51: From –100/0 to 100 mbar (–1.5/0 to 1.5 psi) to –1/0 to 40 bar (–15/0 to 600 psi)
- PMP51: From –400/0 to 400 mbar (–6/0 to 6 psi) to –1/0 to 400 bar (–15/0 to 6000 psi)
- PMP55: From –400/0 to 400 mbar (–6/0 to 6 psi) to –1/0 to 400 bar (–15/0 to 6000 psi)

OPL

- PMC51: max. 60 bar (900 psi)
- PMP51: max. 600 bar (9 000 psi)
- PMP55: max. 600 bar (9 000 psi)

Process temperature range

- PMC51: -20 to +130 °C (-4 to +266 °F)
For a maximum of 60 minutes: +150 °C (+302 °F)
- PMP51: -40 to +130 °C (-40 to +266 °F)
For a maximum of 60 minutes: +150 °C (+302 °F)
- PMP55: -70 to +400 °C (-94 to +752 °F)
(depending on the filling oil)

Ambient temperature range

- Without LCD: -40 to +85 °C (-40 to +185 °F)
- With LCD display: -20 to +70 °C (-4 to +158 °F)
(extended temperature application range -40 to +85 °C (-40 to +185 °F) with limitations in optical properties, such as display speed and contrast)
- Separate housing: -20 to +60 °C (-4 to +140 °F)
- PMP55: Diaphragm seal systems depending on the version

Reference accuracy

- PMC51: up to ±0.10% of the set span
PLATINUM version: up to ±0.075% of the set span
- PMP51: up to ±0.10% of the set span
PLATINUM version: up to ±0.075% of the set span
- PMP55: up to ±0.10% of the set span

Supply voltage

- 11.5 to 45 V DC (versions with plug-in connection 35 V DC)
- For intrinsically safe device versions: 11.5 to 30 V DC

Output

4 to 20 mA, 4 to 20 mA with superimposed HART protocol, PROFIBUS PA or FOUNDATION Fieldbus

Options

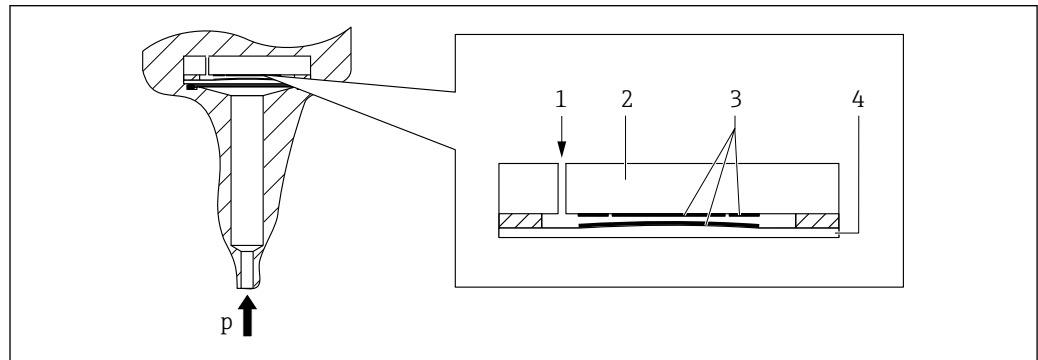
- Inspection certificate 2.2 or 3.1 or other certificates
- 3A approval and EHEDG approval
- Specific firmware versions
- Initial device settings
- Separate housing
- Broad range of accessories
- NACE-compliant materials

Specialties

- PMC51:
 - Metal-free measurement with PVDF connection
 - Special cleaning of the transmitter to remove paint-wetting impairment substances, for use in paint shops
- PMP51:
 - Process connections with minimum oil volume
 - Gas-tight, elastomer-free
- PMP55:
 - Wide range of diaphragm seals
 - For extreme medium temperatures
 - Process connections with minimum oil volume
 - Fully welded versions

Measuring principle

Ceramic process isolating diaphragm used in PMC51 (Ceraphire®)



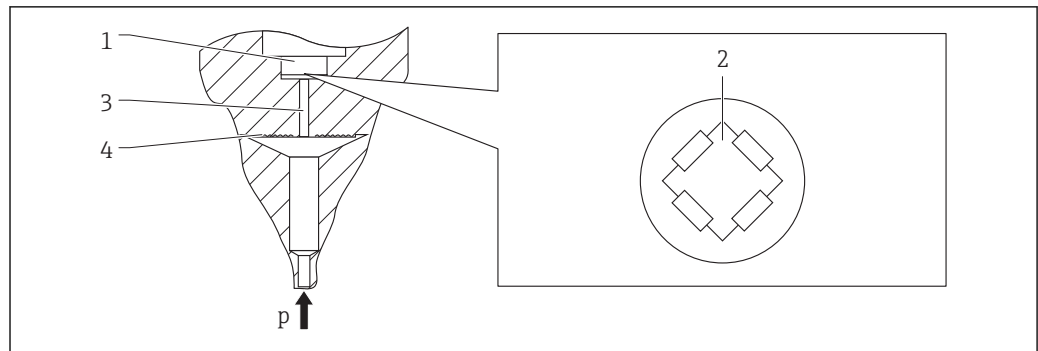
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- 1 Air pressure (gauge pressure sensors)
- 2 Ceramic substrate
- 3 Electrodes
- 4 Ceramic process isolating diaphragm

The ceramic sensor is a dry sensor, i.e. the process pressure acts directly on the robust ceramic process isolating diaphragm and deflects it. A pressure-dependent change in capacitance is measured at the electrodes of the ceramic substrate and the process isolating diaphragm. The measuring range is determined by the thickness of the ceramic process isolating diaphragm.

Advantages:

- Guaranteed overload resistance up to 40 times the nominal pressure
- Thanks to ultrapure 99.9% ceramic (Ceraphire®, see also "www.endress.com/ceraphire")
 - extremely high chemical stability, comparable with Alloy C
 - high mechanical stability
- Can be used in absolute vacuum

Metallic process isolating diaphragm used in PMP51 and PMP55

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

PMP51

The operating pressure deflects the process isolating diaphragm and a fill fluid transfers the pressure to a resistance 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 400 bar (6 000 psi)
- High long-term stability
- Guaranteed overload resistance up to 4 times the nominal pressure
- Significantly less thermal effect compared to diaphragm seal systems

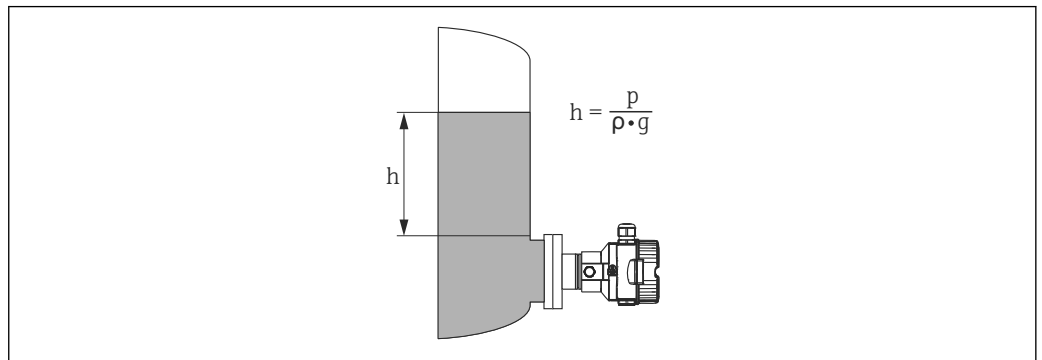
PMP55

The operating pressure acts on the process isolating diaphragm of the diaphragm seal and is transferred to the process isolating diaphragm of the sensor by a diaphragm seal fill fluid. The process isolating diaphragm 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 pressure up to 400 bar (6 000 psi) and simultaneous extreme process temperatures
- High long-term stability
- Guaranteed overload resistance up to 4 times the nominal pressure

Level measurement (level, volume and mass)



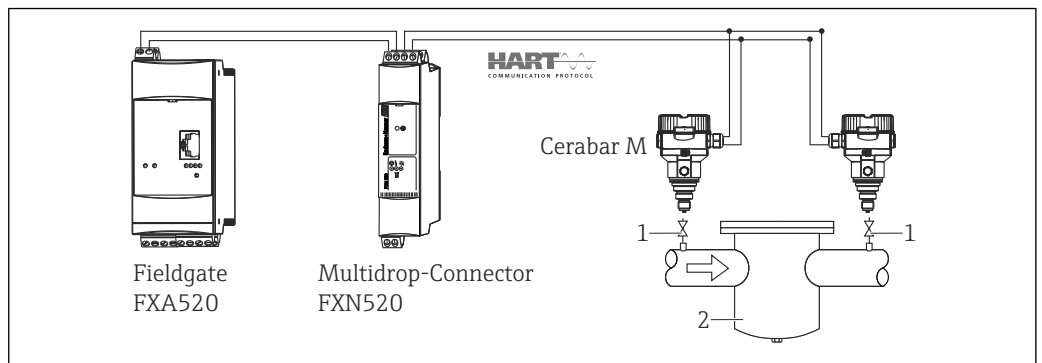
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- h* Height (level)
- p* Pressure
- ρ* Density of the medium
- g* Gravitation constant

Your benefits

- Choice of different level measuring modes in the device software
- Volume and mass measurements in any tank shapes by means of a freely programmable characteristic curve
- Choice of diverse level units
- Has a wide range of uses, even in the following cases:
 - in the event of foam formation
 - in tanks with agitators or screen fittings
 - in the event of liquid gases

Electrical differential pressure measurement with gauge pressure sensors



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- 1 Shut-off valves
- 2 e.g. filter

In the example given, two Cerabar M devices (each with a gauge pressure sensor) are interconnected. The pressure difference can thus be measured using two independent Cerabar M devices.

⚠ WARNING**Risk of explosion!**

- ▶ If using intrinsically safe devices, strict compliance with the rules for interconnecting intrinsically safe circuits as stipulated in IEC60079-14 (proof of intrinsic safety) is mandatory.

Communication protocol

- 4 to 20 mA without communication protocol (analog electronics)
- 4 to 20 mA with HART communication protocol
- PROFIBUS PA
 - The Endress+Hauser devices meet the requirements of the FISCO model.
 - Due to a low current consumption of $11 \text{ mA} \pm 1 \text{ mA}$, the following number of devices can be operated on one bus segment if installing as per FISCO: up to 8 devices for Ex ia, CSA IS and FM IS applications or up to 31 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
 - The Endress+Hauser devices meet the requirements of the FISCO model.
 - Due to a low current consumption of $16 \text{ mA} \pm 1 \text{ mA}$, 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 22 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

- Analog electronics: Absolute pressure and gauge pressure
- HART, PROFIBUS PA, FOUNDATION Fieldbus: Absolute pressure and gauge pressure, from which level (level, volume or mass) is derived

Measuring range

PMC51 – with ceramic process isolating diaphragm (Ceraphire®) for gauge pressure

Sensor	Maximum sensor measuring range		Smallest calibratable measuring span (preset at the factory) ¹⁾	MWP	OPL	Vacuum resistance	Option ²⁾
	lower (LRL)	upper (URL)					
	[bar (psi)]	[bar (psi)]					
100 mbar (1.5 psi)	-0.1 (-1.5)	+0.1 (+1.5)	0.01 (0.15)	2.7 (40.5)	4 (60)	0.7 (10.5)	1C
250 mbar (3.75 psi)	-0.25 (-3.75)	+0.25 (+3.75)	0.01 (0.15)	3.3 (49.5)	5 (75)	0.5 (7.5)	1E
400 mbar (6 psi)	-0.4 (-6)	+0.4 (+6)	0.02 (0.3)	5.3 (79.5)	8 (120)	0	1F
1 bar (15 psi)	-1 (-15)	+1 (+15)	0.05 (1)	6.7 (100.5)	10 (150)	0	1H
2 bar (30 psi)	-1 (-15)	+2 (+30)	0.1 (1.5)	12 (180)	18 (270)	0	1K
4 bar (60 psi)	-1 (-15)	+4 (+60)	0.2 (3)	16.7 (250.5)	25 (375)	0	1M
10 bar (150 psi)	-1 (-15)	+10 (+150)	0.5 (7.5)	26.7 (400.5)	40 (600)	0	1P
40 bar (600 psi)	-1 (-15)	+40 (+600)	2 (30)	40 (600)	60 (900)	0	1S

1) Factory calibration turn down: Max 20:1, higher on request or configurable in the device.

2) Product Configurator, "Sensor range" ordering feature

PMC51 – with ceramic process isolating diaphragm (Ceraphire®) for absolute pressure

Sensor	Maximum sensor measuring range		Smallest calibratable measuring span (preset at the factory) ¹⁾	MWP	OPL	Vacuum resistance	Option ²⁾
	lower (LRL)	upper (URL)					
	[bar _{abs} (psi _{abs})]	[bar _{abs} (psi _{abs})]					
100 mbar (1.5 psi)	0	+0.1 (+1.5)	0.01 (0.15)	2.7 (40.5)	4 (60)	0	2C
250 mbar (3.75 psi)	0	+0.25 (+3.75)	0.01 (0.15)	3.3 (49.5)	5 (75)	0	2E
400 mbar (6 psi)	0	+0.4 (+6)	0.02 (0.3)	5.3 (79.5)	8 (120)	0	2F
1 bar (15 psi)	0	+1 (+15)	0.05 (1)	6.7 (100.5)	10 (150)	0	2H
2 bar (30 psi)	0	+2 (+30)	0.1 (1.5)	12 (180)	18 (270)	0	2K
4 bar (60 psi)	0	+4 (+60)	0.2 (3)	16.7 (250.5)	25 (375)	0	2M
10 bar (150 psi)	0	+10 (+150)	0.5 (7.5)	26.7 (400.5)	40 (600)	0	2P
40 bar (600 psi)	0	+40 (+600)	2 (30)	40 (600)	60 (900)	0	2S

1) Factory calibration turn down: Max 20:1, higher on request or configurable in the device.

2) Product Configurator, "Sensor range" ordering feature

PMP51 and PMP55 – metallic process isolating diaphragm for gauge pressure

Sensor	Maximum sensor measuring range		Lowest calibratable span (preset at factory) ¹⁾	MWP	OPL	Vacuum resistance ²⁾	Option ³⁾
	lower (LRL)	upper (URL)				Silicone oil/ Inert oil/ Synthetic oil	
	[bar (psi)]	[bar (psi)]				[bar _{abs} (psi _{abs})]	
400 mbar (6 psi)	-0.4 (-6)	+0.4 (+6)	0.02 (0.3)	4 (60)	6 (90)	0.01/0.04/0.01 (0.15/0.6/0.15)	1F
1 bar (15 psi)	-1 (-15)	+1 (+15)	0.05 (1)	6.7 (100)	10 (150)		1H
2 bar (30 psi)	-1 (-15)	+2 (+30)	0.1 (1.5)	13.3 (200)	20 (300)		1K
4 bar (60 psi)	-1 (-15)	+4 (+60)	0.2 (3)	18.7 (280.5)	28 (420)		1M
10 bar (150 psi)	-1 (-15)	+10 (+150)	0.5 (7.5)	26.7 (400.5)	40 (600)		1P
40 bar (600 psi)	-1 (-15)	+40 (+600)	2 (30)	100 (1500)	160 (2400)		1S
100 bar (1500 psi)	-1 (-15)	+100 (+1500)	5 (75)	100 (1500)	400 (6000)		1U
400 bar (6000 psi)	-1 (-15)	+400 (+6000)	20 (300)	400 (6000)	600 (9000)		1W

- 1) Highest factory-configurable turn down: 20:1, higher available on request or can be set in device.
- 2) The vacuum resistance applies to the measuring cell at reference conditions. A ceramic process isolating diaphragm is recommended for applications in the limit range. The pressure and temperature application limits of the selected filling oil must also be observed for the PMP55 → 115.
- 3) Product Configurator, order code for "Sensor range"

PMP51 and PMP55 – metallic process isolating diaphragm for absolute pressure

Sensor	Maximum sensor measuring ¹⁾		Lowest calibratable span (preset at factory) ²⁾	MWP	OPL	Vacuum resistance ³⁾	Option ⁴⁾
	lower (LRL)	upper (URL)				Silicone oil/ Inert oil/ Synthetic oil	
	[bar _{abs} (psi _{abs})]	[bar _{abs} (psi _{abs})]				[bar (psi)]	
400 mbar (6 psi)	0	+0.4 (+6)	0.02 (0.3)	4 (60)	6 (90)	0.01/0.04/0.01 (0.15/0.6/0.15)	2F
1 bar (15 psi)	0	+1 (+15)	0.05 (1)	6.7 (100)	10 (150)		2H
2 bar (30 psi)	0	+2 (+30)	0.1 (1.5)	13.3 (200)	20 (300)		2K
4 bar (60 psi)	0	+4 (+60)	0.2 (3)	18.7 (280.5)	28 (420)		2M
10 bar (150 psi)	0	+10 (+150)	0.5 (7.5)	26.7 (400.5)	40 (600)		2P
40 bar (600 psi)	0	+40 (+600)	2 (30)	100 (1500)	160 (2400)		2S
100 bar (1500 psi)	0	+100 (+1500)	5 (75)	100 (1500)	400 (6000)		2U
400 bar (6000 psi)	0	+400 (+6000)	20 (300)	400 (6000)	600 (9000)		2W

- 1) PMP55: Within the sensor measuring range, the minimum upper range value of 80 mbar_{abs} (1.16 psi_{abs}) must be observed.
- 2) Highest factory-configurable turn down: 20:1, higher available on request or can be set in device.
- 3) The vacuum resistance applies to the measuring cell at reference conditions. A ceramic process isolating diaphragm is recommended for applications in the limit range. The pressure and temperature application limits of the selected filling oil must also be observed for the PMP55 → 115.
- 4) Product Configurator, order code for "Sensor range"

Output

Output signal

- 4 to 20 mA analog, 2-wire
- 4 to 20 mA with superimposed digital communication protocol HART 6.0, 2-wire
- Digital communication signal PROFIBUS PA (Profile 3.02)
- Digital communication signal FOUNDATION Fieldbus

Output	Option ¹⁾
4 to 20mA	1
4 to 20mA HART	2
PROFIBUS PA	3
FOUNDATION Fieldbus	4

1) Product Configurator, "Output" ordering feature

Signal range 4 to 20 mA

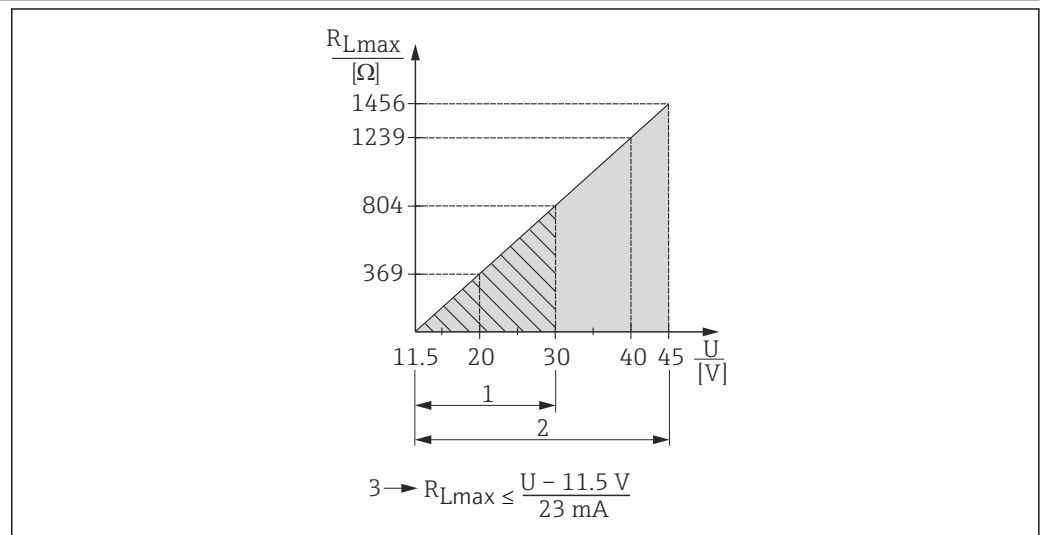
4 to 20 mA Analog, 4 to 20 mA HART: 3.8 to 20.5 mA

Signal on alarm

As per NAMUR NE 43

- 4 to 20 mA Analog:
 - Signal overshoot: > 20.5 mA
 - Signal undershoot: < 3.8 mA
 - Min Alarm (3.6 mA)
- 4 to 20 mA HART:
 - Options:
 - 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
- PROFIBUS PA: can be set in the Analog Input block
 - Options: Last Valid Out Value (factory setting), Fail-safe Value, Status Bad
- FOUNDATION Fieldbus: can be set in the Analog Input block
 - Options: Last Good Value, Fail-safe Value (factory setting), Wrong Value

Load - 4 to 20 mA Analog 4...20 mA HART



- 1 Supply voltage 11.5 to 30 V DC for intrinsically safe device versions (not for analog)
- 2 Supply voltage 11.5 to 45 V DC (versions with plug-in connector 35 V DC) for other types of protection and for uncertified device versions
- 3 R_{Lmax} Maximum load resistance
- U Supply voltage

i 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.

Damping

A damping affects all outputs (output signal, display):

- Via on-site display, handheld terminal or PC with operating program, continuous from 0...999 s
- Via DIP-switch on the electronic insert, switch position "on" (= set value) and "off" (= damping switched off)
- Factory setting: 2 s

Firmware version

Designation	Option ¹⁾
01.00.zz, FF, DevRev01	76
01.00.zz, PROFIBUS PA, DevRev01	77
01.00.zz, HART, DevRev01	78

1) Product Configurator, "Firmware version" ordering feature

Protocol-specific data HART

Manufacturer ID	17 (11 hex)
Device Type Code	25 (19 hex)
Device Revision	01 (01 hex) - SW version 01.00.zz
HART specification	6
DD Revision	<ul style="list-style-type: none"> ■ 01 (Dutch)) ■ 02 (Russian))
Device description files (DTM, DD)	Information and files can be found: <ul style="list-style-type: none"> ■ www.endress.com ■ www.fieldcommgroup.org
HART load	Min. 250 Ω
HART device variables	The measured values can be freely assigned to the device variables: <p>Measured values for PV (primary variable)</p> <ul style="list-style-type: none"> ■ Pressure ■ Level ■ Tank content <p>Measured values for SV, TV (second and third variable)</p> <ul style="list-style-type: none"> ■ Pressure ■ Level <p>Measured values for QV (fourth variable)</p> Temperature
Supported functions	<ul style="list-style-type: none"> ■ Burst mode ■ Additional Transmitter Status ■ Device Locking ■ Alternative operating modes

Wireless HART data

Minimum starting voltage	11.5 V ¹⁾
Start-up current	12 mA (default) or 22 mA (customer setting)
Starting time	5 s
Minimum operating voltage	11.5 V ¹⁾
Multidrop current	4 mA
Time for connection setup	1 s

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

Protocol-specific data PROFIBUS PA

Manufacturer ID	17 (11 hex)
Ident number	1554 hex
Profile Version	3.02 SW Version 01.00.zz
GSD Revision	5

DD Revision	1
GSD File	Information and files can be found:
DD Files	<ul style="list-style-type: none"> ▪ www.endress.com ▪ www.profibus.org
Output values	<p>Measured values for PV (via Analog Input Function Block)</p> <ul style="list-style-type: none"> ▪ Pressure ▪ Level ▪ Tank content <p>Measured values for SV</p> <ul style="list-style-type: none"> ▪ Pressure ▪ Temperature
Input values	Input value sent from PLC, can be shown on display
Supported functions	<ul style="list-style-type: none"> ▪ Identification & Maintenance Simple device identification via control system and nameplate ▪ Condensed status ▪ Automatic ident number adaptation and switchable to following ident numbers: <ul style="list-style-type: none"> ▪ 9700: Profile-specific transmitter identification number with the "Classic" or "Condensed" status. ▪ 151C: Compatibility mode for the old Cerabar M (PMC41, PMC45, PMP41, PMP45, PMP46, PMP48). ▪ 1553: Identification number for the new Cerabar M (PMC51, PMP51, PMP55). ▪ Device locking: The device can be locked by hardware or software.

**Protocol-specific data
FOUNDATION Fieldbus**

Device Type	0x1019
Device Revision	01 (hex)
DD Revision	0x01021
Device description files (DTM, DD)	Information and files can be found: <ul style="list-style-type: none"> ▪ www.endress.com ▪ www.fieldcommgroup.org
CFF Revision	0x000102
ITK Version	5.2.0
ITK-Certification Driver-No.	IT067700
Link-Master (LAS) capable	yes
Link Master / Basic Device selectable	Yes; Factory setting: Basic Device
Number of VCRs	44
Number of Link Objects in VFD	50
Number of FB-Schedule Objects	40

Virtual communication references (VCRs)

Permanent Entries	44
Client VCRs	0
Server VCRs	5
Source VCRs	8
Sink VCRs	0
Subscriber VCRs	12
Publisher VCRs	19

Link settings

Slot time	4
Min. Inter PDU delay	12
Max. response delay	40

Transducer Blocks

Block	Content	Output values
TRD1 Block	Contains all parameters related to the measurement	<ul style="list-style-type: none"> ▪ Pressure or level (channel 1) ▪ Process temperature (channel 2) ▪ Measured pressure value (channel 3) ▪ Max. pressure (channel 4) ▪ Level before linearization (channel 5)
Diagnostic Block	Contains diagnostic information	Error code via DI channels (channel 10 to 15)
Display Block	Contains parameters to configure the onsite display	No output values

Function blocks

Block	Content	Number of blocks	Execution time	Functionality
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
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	25 ms	enhanced
Digital Input Block	This block contains the discrete data of the Diagnose Block (selectable via a channel number 10 to 15) and provides them for other blocks at the output.	1	20 ms	standard
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 im TRD1 Block. Channel 20 resets the counter for max. pressure transgressions value.	1	20 ms	standard
PID Block	The PID Block serves as a proportional-integral-derivative controller and is used almost universally for closed-loop-control in the field including cascade and feedforward. Input IN can be indicated on the display. The selection is performed in the Display Block (DISPLAY_MAIN_LINE_CONTENT).	1	40 ms	standard
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	35 ms	standard
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 performs maximum, minimum, average and 'first good' signal selection. Inputs IN1 to IN4 can be indicated on the display. The selection is performed in the Display Block (DISPLAY_MAIN_LINE_1_CONTENT).	1	30 ms	standard
Signal Characterizer Block	The Signal Characterizer Block has two sections, each with an output that is a non-linear function of the respective input. The non-linear function is generated by a single look-up table with 21 arbitrary x-y pairs.	1	40 ms	standard
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	standard

Additional function block information:

Instantiate Function Block	YES
Number of additional instantiatable function blocks	20

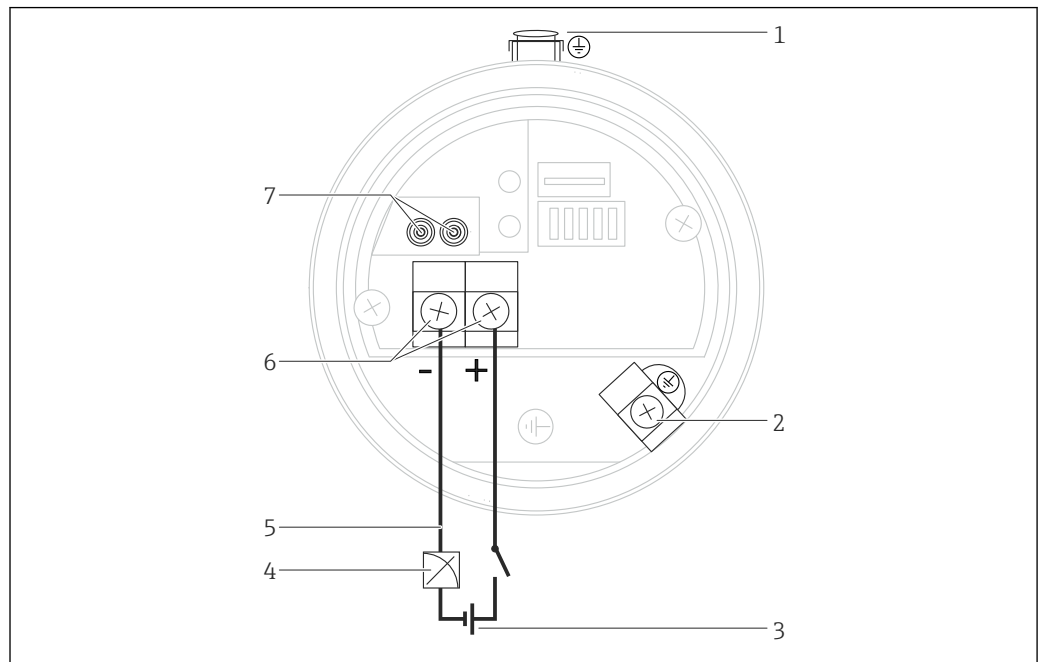
Power supply

⚠ WARNING

An incorrect connection compromises electrical safety!

- ▶ When using the measuring device in hazardous areas, the relevant national standards and regulations as well as the Safety Instructions or Installation or Control Drawings must be observed → [128](#).
- ▶ 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 → [128](#).
- ▶ In accordance with IEC/EN61010 a suitable circuit breaker must be provided for the device.
- ▶ HART: Overvoltage protection HAW569-DA2B for the non-hazardous area, ATEX II 2 (1) Ex ia IIC and IEC Ex ia can be ordered as an option (see the "Ordering information" section).
- ▶ Protective circuits against reverse polarity, HF influences and overvoltage peaks are installed.

Terminal assignment



A0023505

- 1 External grounding terminal (only for devices with certain approvals or if "Measuring point" (TAG) is ordered)
- 2 Internal grounding terminal
- 3 Supply voltage → [20](#)
- 4 4...20 mA for HART devices
- 5 For HART and FOUNDATION Fieldbus devices: With a handheld terminal, all the parameters can be configured anywhere along the bus line via menu operation.
- 6 Terminals
- 7 For HART devices: test terminals, see section "Taking 4 to 20 mA test signal" → [20](#)

Supply voltage

4 to 20 mA HART

Type of protection	Supply voltage
Intrinsically safe	11.5 to 30 V DC
<ul style="list-style-type: none"> ▪ Other types of protection ▪ Devices without certificate 	11.5 to 45 V DC (versions with plug-in connection 35 V DC)

Taking 4 to 20 mA test signal

A 4 to 20 mA test signal may be measured via the test terminals without interrupting the measurement.

PROFIBUS PA

Version for non-hazardous areas: 9 to 32 V DC

FOUNDATION Fieldbus

Version for non-hazardous areas: 9 to 32 V DC

Current consumption

- PROFIBUS PA: 11 mA ±1 mA, switch-on current corresponds to IEC 61158-2, Clause 2.1
- FOUNDATION Fieldbus: 16 mA ±1 mA, switch-on current corresponds to IEC 61158-2, Clause 2.1

Electrical connection

Cable entry	Degree of protection	Option ¹⁾
M20 gland	IP66/67 NEMA 4X/6P	A
G ½" thread	IP66/67 NEMA 4X/6P	C
NPT ½" thread	IP66/67 NEMA 4X/6P	D
M12 plug	IP66/67 NEMA 4X/6P	I
7/8" plug	IP66/67 NEMA 4X/6P	M
HAN7D plug 90 deg	IP65	P
PE cable 5m	IP66/68 NEMA4X/6P + pressure compensation via cable	S
M16 valve connector	IP64	V

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

PROFIBUS PA

The digital communication signal is transmitted over the bus via a 2-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 over the bus via a 2-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 mm² (20 to 14 AWG)
- External ground terminal: 0.5 to 4 mm² (20 to 12 AWG)

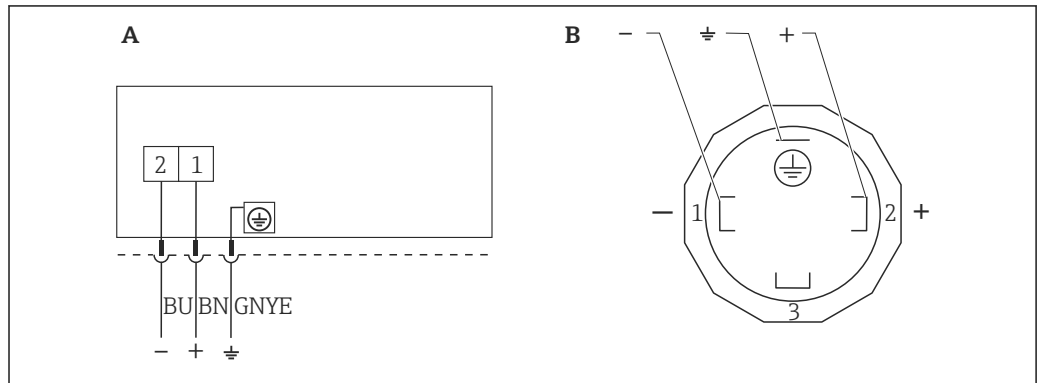
Cable entry

Approval	Type	Clamping area
Standard, CSA GP ATEX II1/2G or II2G Ex ia, IEC Ex ia Ga/Gb or Ex ia Gb, FM/ CSA IS	Plastic M20x1.5	5 to 10 mm (0.2 to 0.39 in)
ATEX II1/2D Ex t, II1/2GD Ex ia, II3G Ex nA, IEC Ex t Da/Db	Metal M20x1.5 (Ex e)	7 to 10.5 mm (0.28 to 0.41 in)

For other technical data, see the housing section →  48

Device plugs

Devices with valve connector (HART)



A0023097

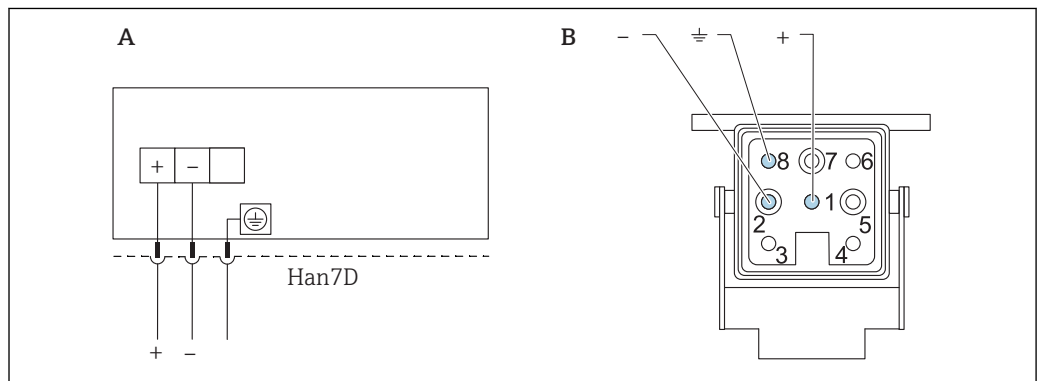
1 BN = brown, BU = blue, GNYE = green

A Electrical connection for devices with valve connector

B View of the plug connector at the device

Material: PA 6.6

Devices with Harting plug Han7D (HART)



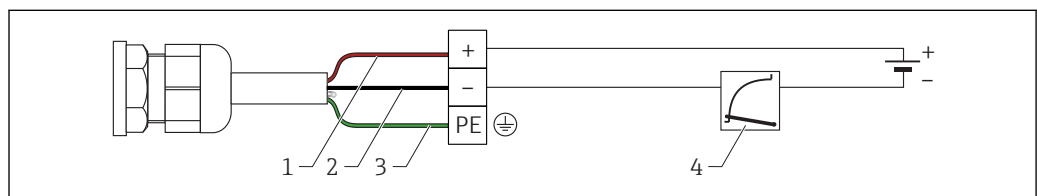
A0019990

A Electrical connection for devices with Harting plug Han7D

B View of the plug-in connector at the device

Material: CuZn, contacts for plug-in jack and connector are gold-plated

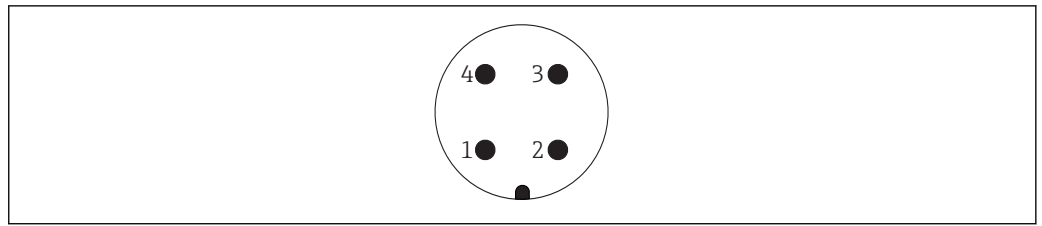
Connecting the cable version (all device versions)



A0019991

- 1 RD = red
- 2 BK = black
- 3 GNYE = green
- 4 4...20 mA

Devices with M12 plug(Analog, HART, PROFIBUS PA)



A0011175

- 1 *Signal +*
- 2 *Not assigned*
- 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): IP66/67
- Order number: 52006263

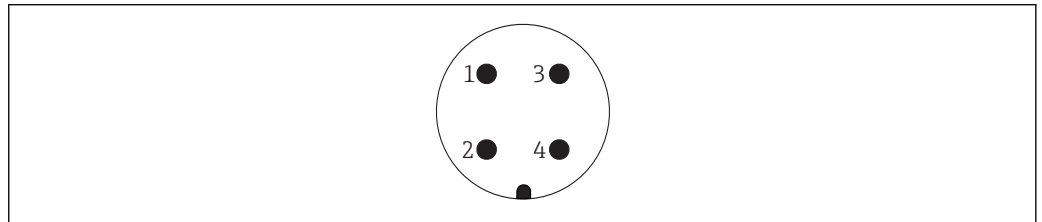
Plug-in jack M 12x1, elbowed

- Material: body PBT/PA; coupling nut GD-Zn, nickel-plated
- Degree of protection (fully locked): IP66/67
- Order number: 71114212

Cable 4x0.34 mm² (20 AWG) with M12 socket, elbowed, screw plug, length 5 m (16 ft)

- Material: body PUR; coupling nut CuSn/Ni; cable PVC
- Degree of protection (fully locked): IP66/67
- Order number: 52010285

Devices with 7/8" plug (Analog, HART, FOUNDATION Fieldbus)



A0011176

- 1 *Signal -*
- 2 *Signal +*
- 3 *Not assigned*
- 4 *Shield*

External thread: 7/8 - 16 UNC

- Material: 316L (1.4401)
- Protection: IP66/68

Cable specification

Analog

- Endress+Hauser recommends using twisted, shielded two-wire cables.
- The cable outer diameter depends on the cable entry used.

HART

- Endress+Hauser recommends using twisted, shielded two-wire cables.
- The cable outer diameter depends on the cable entry used.

PROFIBUS PA

Use a twisted, shielded two-wire cable, preferably cable type A

i 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 two-wire cable, preferably cable type A

i 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

- Analog electronics:: 12 mA
- HART: 12 mA or 22 mA (selectable)

Residual ripple

No influence on 4 to 20 mA signal up to $\pm 5\%$ residual ripple within the permitted voltage range [according to HART hardware specification HCF_SPEC-54 (DIN IEC 60381-1)].

Influence of power supply

$\leq 0.001\%$ of URL/V

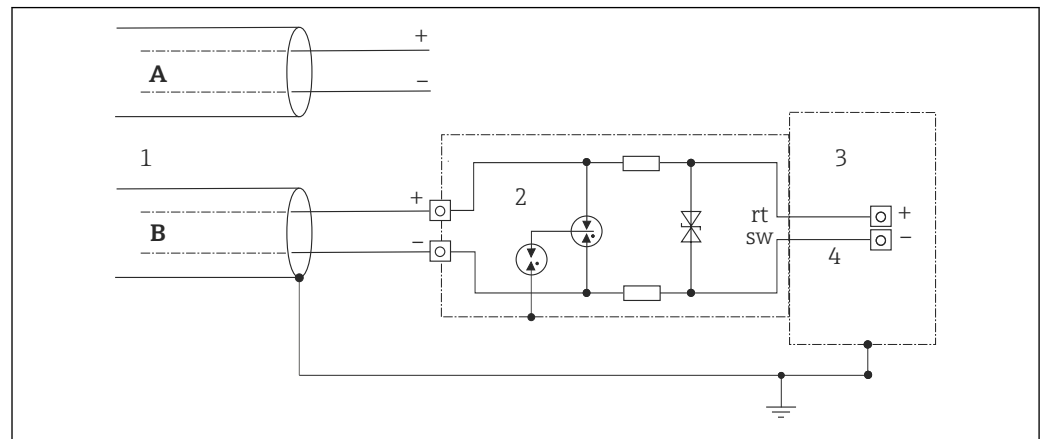
Overvoltage protection (optional)

The device can be fitted with overvoltage protection. The overvoltage protection is mounted at the factory on the housing thread (M20x1.5) for the cable gland and is approx. 70 mm (2.76 in) in length (take additional length into account when installing). The device is connected as illustrated in the following graphic.

For details refer to TI01013KDE, XA01003KA3 and BA00304KA2.

Ordering information:

Product Configurator, "Mounted accessories" ordering feature, option NA

Wiring

A0029111

- A Without direct shield grounding
- B With direct shield grounding
- 1 Incoming connection cable
- 2 HAW569-DA2B
- 3 Unit to be protected
- 4 Connection cable

Performance characteristics for measuring devices with ceramic process isolating diaphragm

Response time	<p>HART</p> <ul style="list-style-type: none"> ▪ 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) <p>PROFIBUS PA</p> <ul style="list-style-type: none"> ▪ Acyclic: approx. 23 ms to 35 ms (depending on Min. Slave Interval) ▪ Cyclic: approx. 8 ms to 13 ms (depending on Min. Slave Interval) <p>FOUNDATION Fieldbus</p> <ul style="list-style-type: none"> ▪ Acyclic: typically 70 ms (for standard bus parameter settings) ▪ Cyclic: max. 20 ms (for standard bus parameter settings)
Reference operating conditions	<ul style="list-style-type: none"> ▪ As per IEC 62828-2 / IEC 60770 ▪ Ambient temperature T_A = constant, in the range of +21 to +33 °C (+70 to +91 °F) ▪ Humidity ϕ = constant, in the range: 5 to 80 % RH \pm 5 % ▪ Ambient pressure p_A = constant, in the range: 860 to 1060 mbar (12.47 to 15.37 psi) ▪ Position of the measuring cell: horizontal \pm1° ▪ Input of LOW SENSOR TRIM and HIGH SENSOR TRIM for lower range value and upper range value ▪ Zero based span ▪ Material of the process isolating diaphragm: Al₂O₃ aluminum oxide ceramic FDA, ultrapure 99.9 % ▪ Supply voltage: 24 V DC \pm3 V DC ▪ Load with HART: 250 Ω ▪ Turn down (TD) = $URL / URV - LRV$
Maximum measured error (total performance)	<p>The performance characteristics refer to the accuracy of the measuring device. The factors influencing accuracy can be divided into two groups</p> <ul style="list-style-type: none"> ▪ Total performance of measuring device ▪ Installation factors <p>All performance characteristics are in conformance with $\geq \pm 3$ sigma.</p> <p>The total performance of the measuring device comprises the reference accuracy and the ambient temperature effect and is calculated using the following formula:</p> $\text{Total performance} = \pm \sqrt{(E1)^2 + (E2)^2}$ <p>E1 = Reference accuracy</p> <p>E2 = Temperature effect per ± 28 °C (50 °F)</p> <p>(corresponds to the range from -3 to +53 °C (+27 to +127 °F))</p> <p>Calculation of E2:</p> $E2 = E2_M + E2_E$ <p>E2_M = Main temperature error</p> <p>E2_E = Electronics error</p> <p>The values refer to the calibrated span</p>

Calculation of the total performance with the Endress+Hauser Applicator

Detailed measured errors, such as for other temperature ranges, for example, 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].

Gauge pressure sensors

100 mbar (1.5 psi) sensor

- Standard: TD 1:1 to 10:1 = ± 0.15 %; TD >10:1 to 20:1 = ± 0.2 %
- Platinum: TD 1:1 to 10:1 = ± 0.075 %; TD >10:1 to 20:1 = ± 0.0075 % · TD

250 mbar (3.75 psi), 400 mbar (6 psi), 1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi) and 10 bar (150 psi) sensor

- Standard: TD 1:1 to 10:1 = ± 0.1 %; TD >10:1 to 20:1 = ± 0.2 %
- Platinum: TD 1:1 to 10:1 = ± 0.075 %; TD >10:1 to 20:1 = ± 0.1 %

40 bar (600 psi) sensor

- Standard: TD 1:1 to 10:1 = ± 0.1 %; TD >10:1 to 20:1 = ± 0.2 %
- Platinum: TD 1:1 to 10:1 = ± 0.075 %; TD >10:1 to 20:1 = ± 0.0075 % · TD

Gauge pressure sensors with hygienic process connections

100 mbar (1.5 psi) sensor

- Standard: TD 1:1 to 10:1 = ± 0.10 %; TD >10:1 to 20:1 = ± 0.2 %
- Platinum: TD 1:1 to 10:1 = ± 0.075 %; TD >10:1 to 20:1 = ± 0.0075 % · TD

250 mbar (3.75 psi), 400 mbar (6 psi), 1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi) and 10 bar (150 psi) sensor

- Standard: TD 1:1 to 10:1 = ± 0.1 %; TD >10:1 to 20:1 = ± 0.2 %
- Platinum: TD 1:1 to 10:1 = ± 0.075 %; TD >10:1 to 20:1 = ± 0.1 %

40 bar (600 psi) sensor

- Standard: TD 1:1 to 10:1 = ± 0.1 %; TD >10:1 to 20:1 = ± 0.2 %
- Platinum: TD 1:1 to 10:1 = ± 0.075 %; TD >10:1 to 20:1 = ± 0.0075 % · TD

Absolute pressure sensors

100 mbar (1.5 psi) sensor

- Standard: TD 1:1 to 10:1 = ± 0.15 %; TD >10:1 to 20:1 = ± 0.015 % · TD
- Platinum: TD 1:1 to 10:1 = ± 0.075 %; TD >10:1 to 20:1 = ± 0.015 % · TD

250 mbar (3.75 psi), 400 mbar (6 psi), 1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi) and 10 bar (150 psi) sensor

- Standard: TD 1:1 to 10:1 = ± 0.1 %; TD >10:1 to 20:1 = ± 0.2 %
- Platinum: TD 1:1 to 10:1 = ± 0.075 %; TD >10:1 to 20:1 = ± 0.1 %

40 bar (600 psi) sensor

- Standard: TD 1:1 to 10:1 = ± 0.1 %; TD >10:1 to 20:1 = ± 0.2 %
- Platinum: TD 1:1 to 10:1 = ± 0.075 %; TD >10:1 to 20:1 = ± 0.0075 % · TD

Absolute pressure sensors with hygienic process connections

100 mbar (1.5 psi) sensor

- Standard: TD 1:1 to 10:1 = $\pm 0.1\%$; TD >10:1 to 20:1 = $\pm 0.15\% \cdot \text{TD}$
- Platinum: TD 1:1 to 10:1 = $\pm 0.075\%$; TD >10:1 to 20:1 = $\pm 0.015\% \cdot \text{TD}$

250 mbar (3.75 psi), 400 mbar (6 psi), 1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi) and 10 bar (150 psi) sensor

- Standard: TD 1:1 to 10:1 = $\pm 0.1\%$; TD >10:1 to 20:1 = $\pm 0.2\%$
- Platinum: TD 1:1 to 10:1 = $\pm 0.075\%$; TD >10:1 to 20:1 = $\pm 0.1\%$

40 bar (600 psi) sensor

- Standard: TD 1:1 to 10:1 = $\pm 0.1\%$; TD >10:1 to 20:1 = $\pm 0.2\%$
- Platinum: TD 1:1 to 10:1 = $\pm 0.075\%$; TD >10:1 to 20:1 = $\pm 0.0075\% \cdot \text{TD}$

Temperature effect [E2]

E_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) sensor

- Standard: $\pm(0.277\% \cdot \text{TD} + 0.275\%)$
- Platinum: $\pm(0.277\% \cdot \text{TD} + 0.275\%)$

1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi) and 40 bar (600 psi) sensor

- Standard: $\pm(0.157\% \cdot \text{TD} + 0.235\%)$
- Platinum: $\pm(0.157\% \cdot \text{TD} + 0.235\%)$

With hygienic process connections

100 mbar (1.5 psi), 250 mbar (3.75 psi) and 400 mbar (6 psi) sensor

- Standard: $\pm(0.277\% \cdot \text{TD} + 0.275\%)$
- Platinum: $\pm(0.277\% \cdot \text{TD} + 0.275\%)$

1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi) and 40 bar (600 psi) sensor

- Standard: $\pm(0.157\% \cdot \text{TD} + 0.235\%)$
- Platinum: $\pm(0.157\% \cdot \text{TD} + 0.235\%)$

E_E - Electronics error

- Analog output (4 to 20 mA): 0.2 %
- Digital output (HART/PA/FF): 0 %

Resolution

- Current output: 1 μA
- Display: can be set (factory setting: presentation of the maximum accuracy of the transmitter)

Total error

The total error of the measuring device comprises the total performance and the influence of long-term stability 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 measured errors, such as for other temperature ranges, for example, 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. Diaphragm seal errors are calculated separately in the Applicator "[Sizing Diaphragm Seal](#)".



A0038925

Long-term stability

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

400 mbar (6 psi) and 1 bar (15 psi) sensor

- 1 year: ± 0.20 %
- 5 years: ± 0.40 %
- 10 years: ± 0.50 %

2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi) and 40 bar (600 psi) sensor

- 1 year: ± 0.10 %
- 5 years: ± 0.25 %
- 10 years: ± 0.40 %

With hygienic process connections

400 mbar (6 psi) and 1 bar (15 psi) sensor

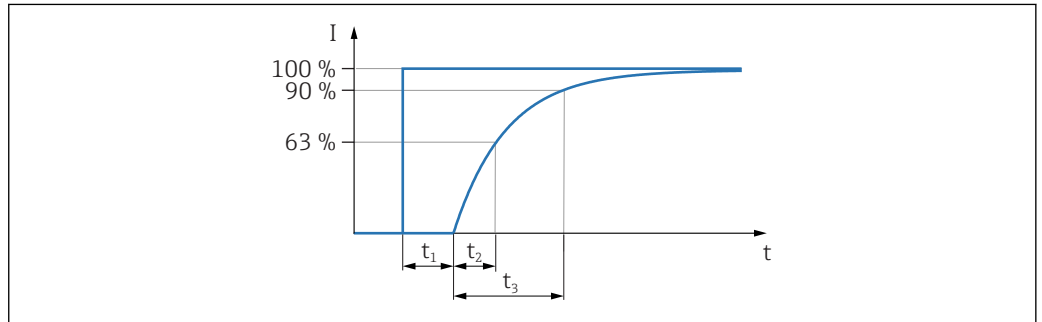
- 1 year: ± 0.35 %
- 5 years: ± 0.50 %
- 10 years: ± 0.60 %

2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi) and 40 bar (600 psi) sensor

- 1 year: ± 0.20 %
- 5 years: ± 0.35 %
- 10 years: ± 0.50 %

Response time T63 and T90 Dead time, time constant

Presentation of the dead time and the time constant as per DIN 16086:



A0019786

Dynamic behavior, current output (analog electronics)

	Dead time (t_1)	Time constant T63 (= t_2)	Time constant T90 (= t_3)
Max.	60 ms	40 ms	50 ms

Dynamic behavior, current output (HART electronics)

	Dead time (t_1)	Time constant T63 (= t_2)	Time constant T90 (= t_3)
Max.	50 ms	85 ms	200 ms

Dynamic behavior, digital output (HART electronics)

	Dead time (t_1)	Dead time (t_1) + Time constant T63 (= t_2)	Dead time (t_1) + Time constant T90 (= t_3)
min.	210 ms	295 ms	360 ms
Max.	1010 ms	1095 ms	1160 ms

Reading cycle

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

	Dead time (t_1)	Dead time (t_1) + Time constant T63 (= t_2)	Dead time (t_1) + Time constant T90 (= t_3)
min.	85 ms	170 ms	235 ms
Max.	1185 ms	1270 ms	1335 ms

Reading cycle (PLC)

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

Cycle time (update time)

min. 100 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.

Dynamic behavior, FOUNDATION Fieldbus

	Dead time (t_1)	Dead time (t_1) + Time constant T63 (= t_2)	Dead time (t_1) + Time constant T90 (= t_3)
min.	95 ms	180 ms	245 ms
Max.	1095 ms	1180 ms	1245 ms

Reading cycle

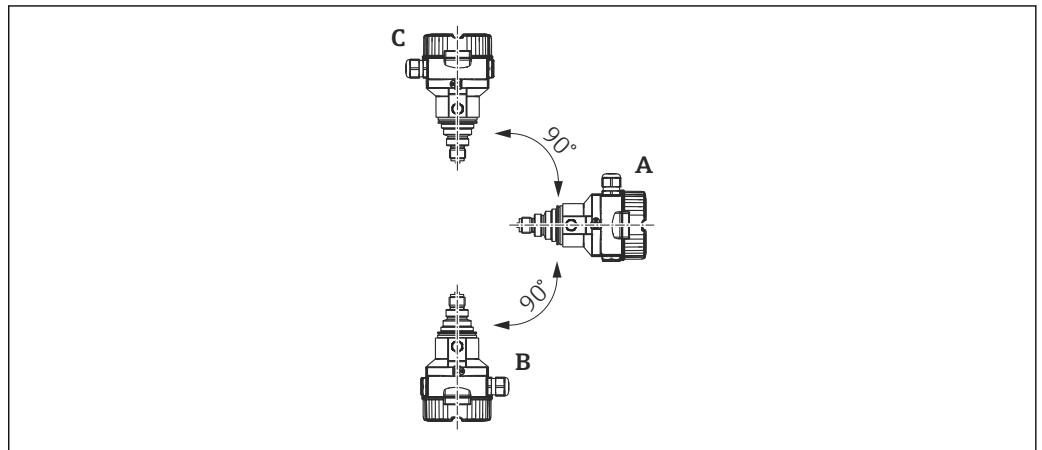
- Acyclic: typically 5/s
- Cyclic: max. 10/s (dependent on the number and type of function blocks used in a closed-control loop)

Cycle time (update time)

Cyclic: min. 100 ms

Installation factors

Influence of installation position



A0023697

Measuring error in mbar (psi)

Process isolating diaphragm axis is horizontal (A)	Process isolating diaphragm pointing upwards (B)	Process isolating diaphragm pointing downwards (C)
Calibration position, no measuring error	< +0.2 mbar (+0.003 psi)	< -0.2 mbar (-0.003 psi)

i A position-dependent zero point shift can be corrected on the device.

Warm-up period

- 4 to 20 mA analog: ≤1.5 s
- 4 to 20 mA HART: ≤5 s
- PROFIBUS PA: ≤8 s
- FOUNDATION Fieldbus: ≤20 s (after a TOTAL reset ≤45 s)

Performance characteristics for measuring devices with metal process isolating diaphragm

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. 23 ms to 35 ms (depending on Min. Slave Interval)
- Cyclic: approx. 8 ms to 13 ms (depending on Min. Slave Interval)

FOUNDATION Fieldbus

- Acyclic: typically 70 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 of +21 to +33 °C (+70 to +91 °F)
- Humidity ϕ = constant, in the range: 5 to 80 % RH
- Ambient pressure p_A = constant, in the range: 860 to 1 060 mbar (12.47 to 15.37 psi)
- Position of the measuring cell: constant, in range: $\pm 1^\circ$ horizontally
- Input of LOW SENSOR TRIM and HIGH SENSOR TRIM for lower range value and upper range value
- Zero based span
- Material of the process isolating diaphragm: AISI 316L
- Filling oil PMP51: synthetic oil as per FDA 21 CFR 178.3620 (b)(1) and NSF H-1
- Supply voltage: 24 V DC ± 3 V DC
- Load with HART: 250 Ω

Maximum measured error (total performance)

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

- Total performance of measuring device
- Installation factors

All performance characteristics are in conformance with $\geq \pm 3$ sigma.

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

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

$E1$ = Reference accuracy

$E2$ = Temperature effect per ± 28 °C (50 °F)

(corresponds to the range from -3 to +53 °C (+27 to +127 °F))

Calculation of $E2$:

$$E2 = E2_M + E2_E$$

$E2_M$ = Main temperature error

$E2_E$ = Electronics error

$E2_{LT}$ = Low temperature error

- The values apply for process isolating diaphragm made of 316L (1.4435)
- The values refer to the calibrated span

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].

PMP51

400 mbar (6 psi) sensor

- Standard: TD 1:1 = $\pm 0.1\%$; TD >1:1 to 20:1 = $\pm 0.15\% \cdot \text{TD}$
- Platinum: -

1 bar (15 psi) sensor

- Standard: TD 1:1 to 5:1 = $\pm 0.1\%$; TD >5:1 to 20:1 = $\pm 0.03\% \cdot \text{TD}$
- Platinum: TD 1:1 to 2.5:1 = $\pm 0.075\%$; TD >2.5:1 to 20:1 = $\pm 0.03\% \cdot \text{TD}$

2 bar (30 psi) sensor

- Standard: TD 1:1 to 10:1 = $\pm 0.1\%$; TD >10:1 to 20:1 = $\pm 0.015\% \cdot \text{TD}$
- Platinum: TD 1:1 to 5:1 = $\pm 0.075\%$; TD >5:1 to 20:1 = $\pm 0.015\% \cdot \text{TD}$

4 bar (60 psi) sensor

- Standard: TD 1:1 to 10:1 = $\pm 0.1\%$; TD >10:1 to 20:1 = $\pm 0.2\%$
- Platinum: TD 1:1 to 10:1 = $\pm 0.075\%$; TD >10:1 to 20:1 = $\pm 0.0075\% \cdot \text{TD}$

10 bar (150 psi) and 40 bar (600 psi) sensor

- Standard: TD 1:1 to 10:1 = $\pm 0.1\%$; TD >10:1 to 20:1 = $\pm 0.2\%$
- Platinum: TD 1:1 to 10:1 = $\pm 0.075\%$; TD >10:1 to 20:1 = $\pm 0.1\%$

100 bar (1 500 psi) sensor

- Standard: TD 1:1 to 10:1 = $\pm 0.1\%$; TD >10:1 to 20:1 = $\pm 0.2\%$
- Platinum: TD 1:1 to 10:1 = $\pm 0.075\%$; TD >10:1 to 20:1 = $\pm 0.15\%$

400 bar (6 000 psi) sensor

- Standard: TD 1:1 to 5:1 = $\pm 0.1\%$; TD >5:1 to 20:1 = $\pm 0.03\% \cdot \text{TD}$
- Platinum: TD 1:1 to 5:1 = $\pm 0.1\%$; TD >5:1 to 20:1 = $\pm 0.03\% \cdot \text{TD}$

PMP51 with hygienic process connections

400 mbar (6 psi) sensor

- Standard: TD 1:1 = $\pm 0.1\%$; TD >1:1 to 10:1 = $\pm 0.3\% \cdot \text{TD}$
- Platinum: -

1 bar (15 psi) sensor

- Standard: TD 1:1 = $\pm 0.1\%$; TD >1:1 to 10:1 = $\pm 0.3\% \cdot \text{TD}$
- Platinum: TD 1:1 = $\pm 0.1\%$; TD >1:1 to 10:1 = $\pm 0.2\% \cdot \text{TD}$

2 bar (30 psi) sensor

- Standard: TD 1:1 to 5:1 = $\pm 0.1\%$; TD >5:1 to 10:1 = $\pm 0.2\%$
- Platinum: TD 1:1 to 5:1 = $\pm 0.075\%$; TD >5:1 to 10:1 = $\pm 0.1\%$

4 bar (60 psi), 10 bar (150 psi) and 40 bar (600 psi) sensor

- Standard: TD 1:1 to 10:1 = $\pm 0.1\%$; TD >10:1 to 20:1 = $\pm 0.2\%$
- Platinum: TD 1:1 to 10:1 = $\pm 0.075\%$; TD >10:1 to 20:1 = $\pm 0.1\%$

PMP55

400 mbar (6 psi) sensor

- Standard: TD 1:1 = $\pm 0.15\%$; TD >1:1 to 20:1 = $\pm 0.15\% \cdot \text{TD}$
- Platinum: not available

1 bar (15 psi) sensor

- Standard: TD 1:1 to 5:1 = $\pm 0.15\%$; TD >5:1 to 20:1 = $\pm 0.03\% \cdot \text{TD}$
- Platinum: TD 1:1 to 2.5:1 = $\pm 0.075\%$; TD >2.5:1 to 20:1 = $\pm 0.03\% \cdot \text{TD}$

2 bar (30 psi) sensor

- Standard: TD 1:1 to 10:1 = $\pm 0.15\%$; TD >10:1 to 20:1 = $\pm 0.015\% \cdot \text{TD}$
- Platinum: TD 1:1 to 5:1 = $\pm 0.075\%$; TD >5:1 to 20:1 = $\pm 0.015\% \cdot \text{TD}$

4 bar (60 psi) sensor

- Standard: TD 1:1 to 10:1 = $\pm 0.15\%$; TD >10:1 to 20:1 = $\pm 0.2\%$
- Platinum: TD 1:1 to 10:1 = $\pm 0.075\%$; TD >10:1 to 20:1 = $\pm 0.0075\% \cdot \text{TD}$

10 bar (150 psi) and 40 bar (600 psi) sensor

- Standard: TD 1:1 to 10:1 = $\pm 0.15\%$; TD >10:1 to 20:1 = $\pm 0.2\%$
- Platinum: TD 1:1 to 10:1 = $\pm 0.075\%$; TD >10:1 to 20:1 = $\pm 0.1\%$

100 bar (1500 psi) sensor

- Standard: TD 1:1 to 10:1 = $\pm 0.15\%$; TD >10:1 to 20:1 = $\pm 0.2\%$
- Platinum: TD 1:1 to 10:1 = $\pm 0.075\%$; TD >10:1 to 20:1 = $\pm 0.15\%$

400 bar (6000 psi) sensor

- Standard: TD 1:1 to 5:1 = $\pm 0.15\%$; TD >5:1 to 20:1 = $\pm 0.03\% \cdot TD$
- Platinum: TD 1:1 to 5:1 = $\pm 0.15\%$; TD >5:1 to 20:1 = $\pm 0.03\% \cdot TD$



Platinum only for direct diaphragm seal mounting.

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) sensor

$\pm(0.08\% \cdot TD + 0.16\%)$

1 bar (15 psi) sensor

$\pm(0.08\% \cdot TD + 0.16\%)$

2 bar (30 psi) sensor

$\pm(0.08\% \cdot TD + 0.16\%)$

4 bar (60 psi) sensor

$\pm(0.08\% \cdot TD + 0.16\%)$

10 bar (150 psi) and 40 bar (600 psi) sensor

$\pm(0.06\% \cdot TD + 0.06\%)$

100 bar (1500 psi) sensor

$\pm(0.03\% \cdot TD + 0.12\%)$

400 bar (6000 psi) sensor

$\pm(0.03\% \cdot TD + 0.12\%)$

PMP51 with hygienic process connections

400 mbar (6 psi) sensor with Clamp 1/2"

- Standard: $\pm(0.4\% \cdot TD + 0.1\%)$
- Platinum: -

400 mbar (6 psi) and 1 bar (15 psi) sensor

- Standard: $\pm(0.25\% \cdot TD + 0.1\%)$
- Platinum: $\pm(0.25\% \cdot TD + 0.1\%)$

2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi) and 40 bar (600 psi) sensor

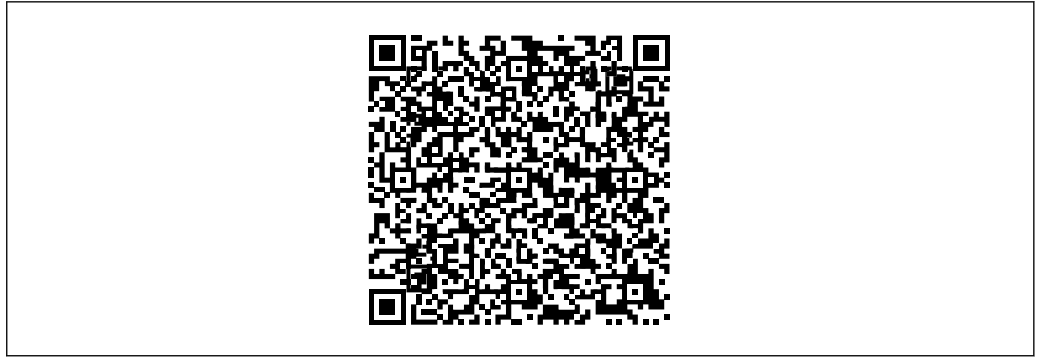
- Standard: $\pm(0.2\% \cdot TD + 0.1\%)$
- Platinum: $\pm(0.2\% \cdot TD + 0.1\%)$

$E2_E$ - Electronics error

- Analog output (4 to 20 mA): 0.2 %
- Digital output (HART/PA/FF): 0 %

Calculation of the total performance with the Endress+Hauser Applicator

Detailed measured errors, such as for other temperature ranges, for example, can be calculated with the Applicator "[Sizing Pressure Performance](#)".



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

Diaphragm seal errors are not taken into consideration. Diaphragm seal errors are calculated separately in the Applicator "[Sizing Diaphragm Seal](#)".



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Resolution

- Current output: 1 μ A
- Display: can be set (factory setting: presentation of the maximum accuracy of the transmitter)

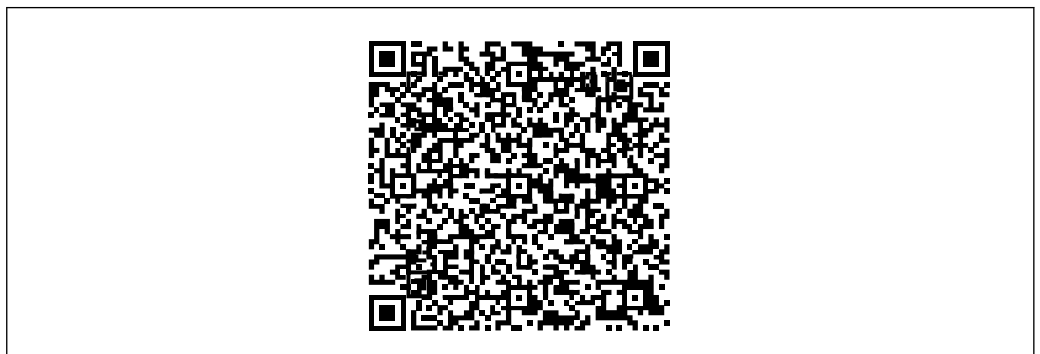
Total error

The total error of the measuring device comprises the total performance and the influence of long-term stability 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 measured errors, such as for other temperature ranges, for example, 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. Diaphragm seal errors are calculated separately in the Applicator "[Sizing Diaphragm Seal](#)".



A0038925

Long-term stability

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

- 1 year: ±0.10 %
- 5 years: ±0.20 %
- 10 years: ±0.25 %

PMP51 with hygienic process connections

400 mbar (6 psi) and 1 bar (15 psi) sensor

- 1 year: ±0.25 %
- 5 years: ±0.48 %
- 10 years: ±0.58 %

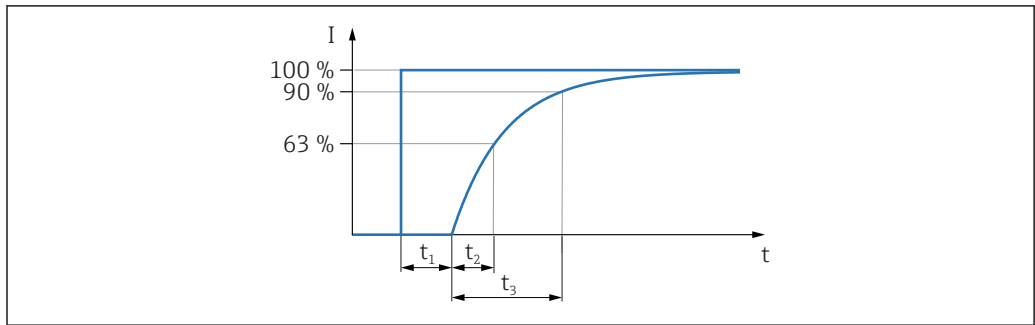
2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi) and 40 bar (600 psi) sensor

- 1 year: ±0.10 %
- 5 years: ±0.33 %
- 10 years: ±0.43 %

Response time T63 and T90

Dead time, time constant

Presentation of the dead time and the time constant as per DIN 16086:



A0019786

Dynamic behavior, current output (analog electronics)

	Device	Dead time (t_1)	Time constant T63 (= t_2)	Time constant T90 (= t_3)
Max.	PMP51	40 ms	40 ms	50 ms
Max.	PMP55	PMP51 + influence of the diaphragm seal		

Dynamic behavior, current output (HART electronics)

	Device	Dead time (t_1)	Time constant T63 (= t_2)	Time constant T90 (= t_3)
Max.	PMP51	70 ms	80 ms	185 ms
Max.	PMP55	PMP51 + influence of the diaphragm seal		

Dynamic behavior, digital output (HART electronics)

	Device	Dead time (t ₁)	Dead time (t ₁) + Time constant T63 (= t ₂)	Dead time (t ₁) + Time constant T90 (= t ₃)
min.	PMP51	210 ms	285 ms	345 ms
Max.		1010 ms	1085 ms	1145 ms
Max.	PMP55	PMP51 + influence of the diaphragm seal		

Reading cycle

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

	Device	Dead time (t ₁)	Dead time (t ₁) + Time constant T63 (= t ₂)	Dead time (t ₁) + Time constant T90 (= t ₃)
min.	PMP51	85 ms	160 ms	220 ms
Max.		1185 ms	1260 ms	1320 ms
Max.	PMP55	PMP51 + influence of the diaphragm seal		

Reading cycle (PLC)

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

Cycle time (update time)

min. 100 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.

Dynamic behavior, FOUNDATION Fieldbus

	Device	Dead time (t ₁)	Dead time (t ₁) + Time constant T63 (= t ₂)	Dead time (t ₁) + Time constant T90 (= t ₃)
min.	PMP51	95 ms	170 ms	230 ms
Max.		1095 ms	1170 ms	1230 ms
Max.	PMP55	PMP51 + influence of the diaphragm seal		

Reading cycle

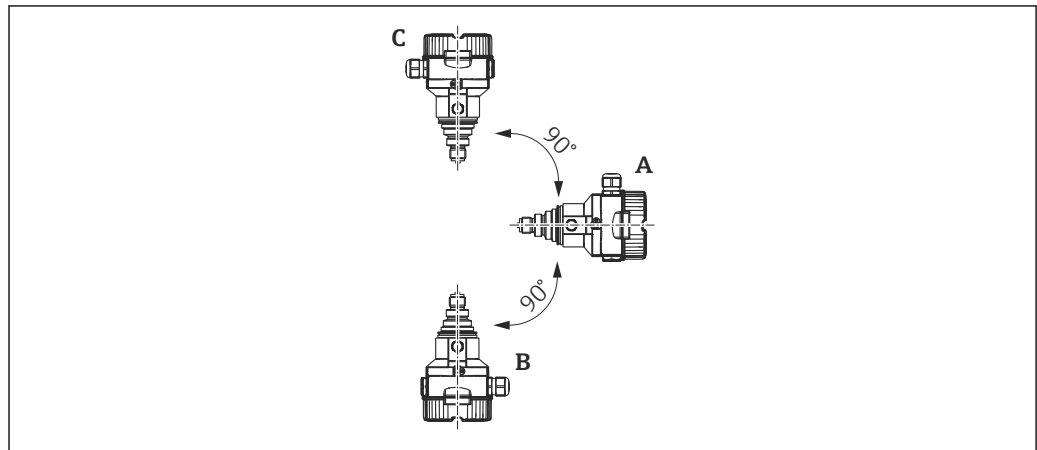
- Acyclic: typically 5/s
- Cyclic: max. 10/s (dependent on the number and type of function blocks used in a closed-control loop)

Cycle time (update time)

Cyclic: min. 100 ms

Installation factors

Influence of installation position



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Measuring error in mbar (psi)

	Process isolating diaphragm axis is horizontal (A)	Process isolating diaphragm pointing upwards (B)	Process isolating diaphragm pointing downwards (C)
PMP51 with 1/2" thread and silicone oil	Calibration position, no measuring error	< +4 mbar (+0.06 psi)	< -4 mbar (-0.06 psi)
PMP51 with thread > 1/2" and flanges		< +10 mbar (+0.145 psi) The value is doubled for inert oil.	< -10 mbar (-0.145 psi) The value is doubled for inert oil.

i A position-dependent zero point shift can be corrected on the device.

Warm-up period

- 4 to 20 mA analog: ≤1.5 s
- 4 to 20 mA HART: ≤5 s
- PROFIBUS PA: ≤8 s
- FOUNDATION Fieldbus: ≤20 s (after a TOTAL reset ≤45 s)

Installation

General installation instructions

The position-dependent zero point shift can be corrected:

- directly at the device via operating keys on the electronic insert
- directly at the device via operating keys on the display (except analog electronics)
- via digital communication if the cover is not open (except analog electronics).
- Endress+Hauser offers a mounting bracket for installing the device on pipes or walls.
- Use flushing rings for flange and cell diaphragm seals if medium buildup or clogging can be expected at the diaphragm seal connection. The flushing ring can be inserted between the process connection and the diaphragm seal. Thanks to the two lateral flushing bore holes, material buildup in front of the process isolating diaphragm can be rinsed away and the pressure chamber can be ventilated.
- To guarantee the leak-tightness of the transmitter, Endress+Hauser recommends that only genuine cable glands be used (also available as spare parts).

Measuring arrangement for devices without diaphragm seal – PMC51, PMP51

Cerabar M transmitters without diaphragm seals are mounted as per the norms for 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 Cerabar M with shutoff device above the tapping point so that any condensate can flow into the process.

Pressure measurement in steams

Use a siphon if measuring pressure in steams. The siphon reduces the temperature to almost the ambient temperature. Fill the siphon with liquid before commissioning. Preferably mount the Cerabar M with a siphon below the tapping point.

Advantages:

- Defined water column only causes minimal/negligible measured errors
- Only minimal/negligible thermal effects on the device
The device may also be mounted above the tapping point. Pay attention to the maximum permitted ambient temperature of the transmitter!
- Fill the siphon with liquid before commissioning.


Pressure measurement in liquids

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

Level measurement

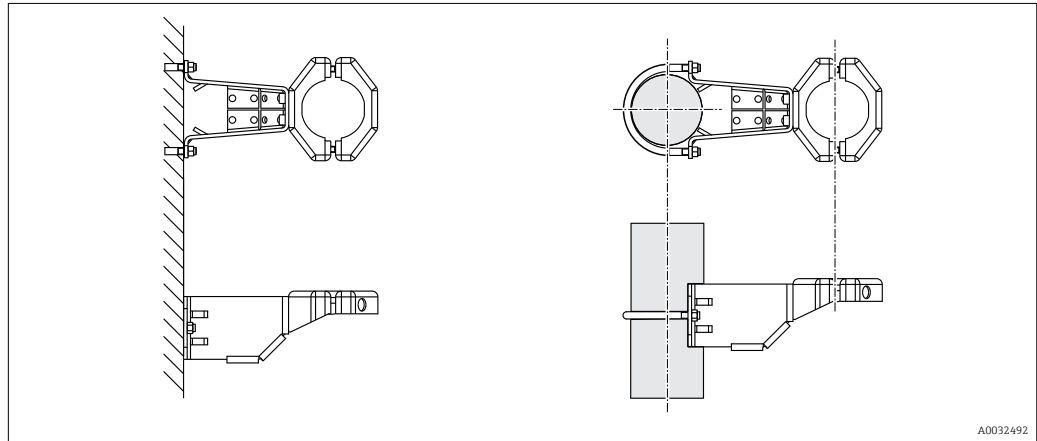
- Mount Cerabar M below the lowest measuring point (zero point of the measurement).
- Do not mount the device at the following positions: In the filling curtain, in the tank outlet or at a point in the vessel which could be affected by pressure pulses from an agitator or a pump.
- The calibration and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

Measuring arrangement for devices with diaphragm seal – PMP55

→  113

Wall and pipe mounting, transmitter (optional)

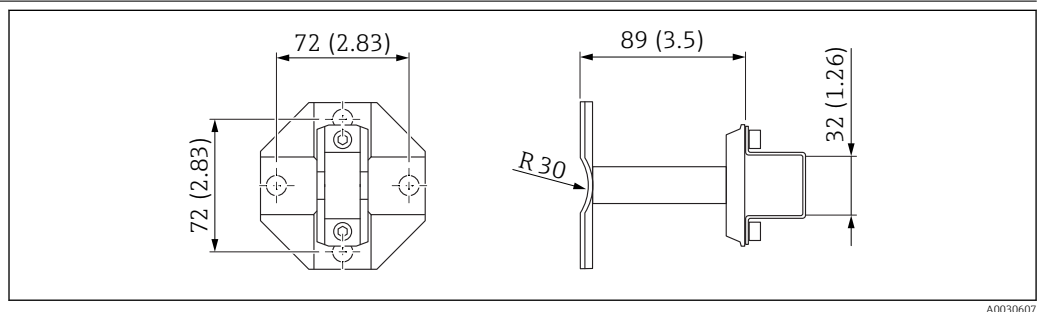
Endress+Hauser offers the following mounting bracket for installing the device on pipes or walls:



Ordering information:

- Product configurator "Accessory Enclosed" ordering feature, option PA.
- included in the delivery for devices with a separate housing (available for order via feature "Separate housing")
- available for order as a separate accessory (Part No.: 71102216).

Further details → 98.

Wall and pipe-mounting manifold (optional)

Technical data (e.g. dimensions or order numbers for screws) see accessory document SD01553P/00/EN.

Ordering information:

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

"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 allows for 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
- If the measuring point is exposed to vibrations

You can choose between different cable versions:

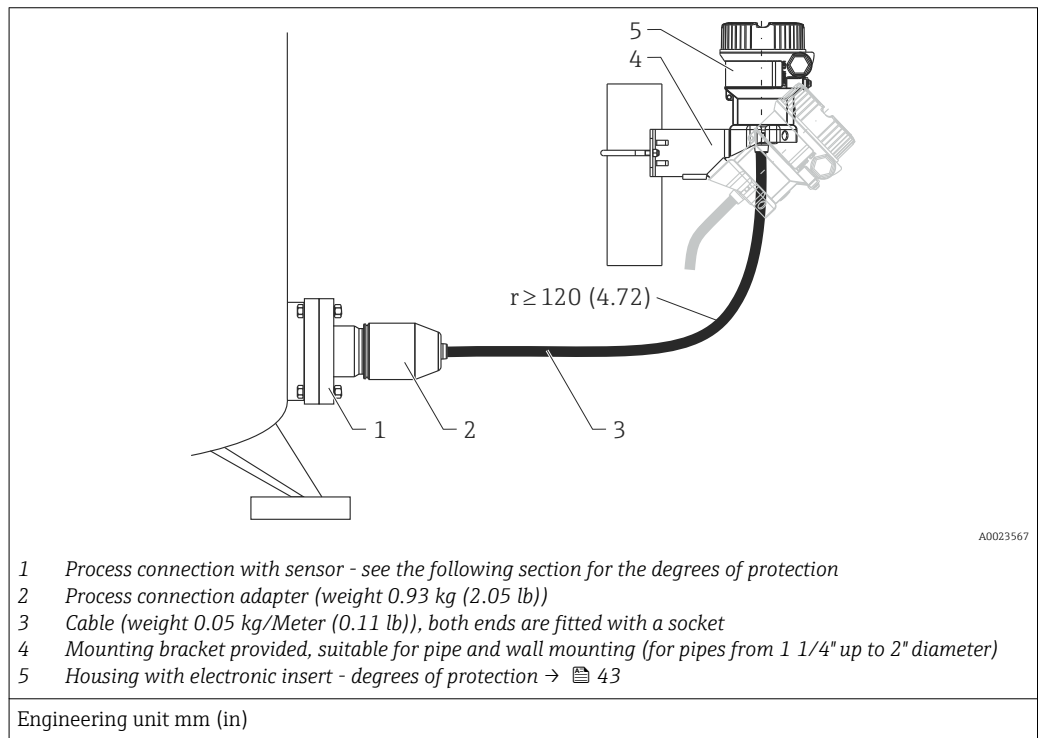
- PE: 2 m (6.6 ft), 5 m (16 ft) and 10 m (33 ft)
- FEP: 5 m (16 ft).

Ordering information:

- Product Configurator, "Separate housing" ordering feature
- Product Configurator, "Enclosed accessories" ordering feature, option PA

For the 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.



Degree of protection for the process connection and sensor with the use of

- FEP-cabel:
 - IP 69 ¹⁾
 - IP 66 NEMA 4/6P
 - IP 68 (1,83 mH₂O für 24 h) NEMA 4/6P
- PE-cabel:
 - IP 66 NEMA 4/6P
 - IP 68 (1,83 mH₂O für 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

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

Use in hazardous area:

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

Oxygen applications

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

- All components of the system, such as measuring devices, must be cleaned in accordance with the BAM (DIN 19247) requirements.
- Dependent on the materials used, a certain maximum temperature and a maximum pressure for oxygen applications must not be exceeded.

The devices suitable for gaseous oxygen applications are listed in the following table with the specification p_{\max} .

Order code for devices ¹⁾ , cleaned for oxygen applications	p_{\max} for oxygen applications	T_{\max} for oxygen applications
PMC51 ²⁾ – devices with sensors, nominal value < 10 bar (150 psi)	Over pressure limit (OPL) of the sensor ³⁾ ⁴⁾	60 °C (140 °F)
PMC51 ²⁾ – devices with sensors, nominal value ≥ 10 bar (150 psi)	40 bar (600 psi)	60 °C (140 °F)
PMP51 , PMP55 ⁵⁾	Depends on the lowest-rated element, with regard to pressure, of the selected components: over pressure limit (OPL) of the sensor ³⁾ , process connection (1.5 x PN) or fill fluid (80 bar (1 200 psi)	60 °C (140 °F)

- 1) Devices only, not accessories or enclosed accessories.
- 2) Product Configurator, order code for "Service" option "HB"
- 3) Product Configurator, order code for "Sensor range"
- 4) PMC51 with PVDF thread or PVDF flange $p_{\max} = 15 \text{ bar (225 psi)}$ 15 bar (225 psi)
- 5) Product Configurator, order code for "Service" option "HB"

PWIS cleaning

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

Ordering information:

Ordering information: Product Configurator, "Service" ordering feature, option HC

The stability of the materials used must be checked before using them in the medium.

Ultrapure gas applications (PMC51 und PMP51)

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

Ordering information:

Product Configurator, "Service" ordering feature, option "HA"

Applications with hydrogen

A **ceramic** process isolating diaphragm or a **gold-plated** metal process isolating diaphragm 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-plated** metal process isolating diaphragm (AU/Rh) offers effective protection against hydrogen diffusion.

Environment

Ambient temperature range	Version	PMC51	PMP51	PMP55
	Without LCD display	-40 to +85 °C (-40 to +185 °F)		
	With LCD display ¹⁾	-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) (installation without insulation)		–
	Diaphragm seal systems ²⁾	–	–	→ 113

- 1) Extended temperature application range (-40 to +85 °C (-40 to +185 °F)) with restrictions in optical properties such as display speed and contrast
- 2) Ambient temperature range and process temperature range are mutually dependent - see chapter "Thermal insulation" → 116

NOTICE

High temperatures or vibrations can destroy the device!

- ▶ For high-temperature applications, either a PMP55 with a temperature isolator or with a capillary can be used. If vibrations also occur in the application, Endress+Hauser recommends you use a PMP55 with a capillary. If a PMP55 with a temperature isolator or capillary is used, we recommend a suitable bracket for mounting (see "Wall and pipe mounting, transmitter (optional)" → 40).

Storage temperature range	Version	PMC51	PMP51	PMP55
	Without LCD display	-40 to +90 °C (-40 to +185 °F)		
	With LCD display	-40 to +85 °C (-40 to +185 °F)		
	With M12 plug , elbowed	-25 to +85 °C (-13 to +185 °F)		
	With separate housing	-40 to +60 °C (-40 to +140 °F)		–
	Diaphragm seal systems ¹⁾	–	–	→ 113

- 1) Devices with PVC-sheathed capillary: -25 to +90 °C (-13 to +194 °F)


Climate class Class 4K4H (air temperature: -20 to +55 °C (-4 to +131 °F), relative humidity: 4 to 100%) satisfied as per DIN EN 60721-3-4 (condensation possible)

Degree of protection

- Depending on the used electrical connection → 21
Ordering information:
Product Configurator, "Electrical connection" ordering feature
- Separate housing → 41

Vibration resistance	Device/accessory	Test standard	Vibration resistance
	Devices without mounting bracket	GL VI-7-2 ▪ Part 7: Guidelines for the Performance of Type Approvals ▪ Chapter 2: Test Requirements for Electrical / Electronic Equipment and Systems	Guaranteed for 5 to 25 Hz: ±1.6 mm (0.06 in); 25 to 100 Hz: 4 g in all 3 axes
		IEC 62828-1 / IEC 61298-3 IEC 60068-2-6	Guaranteed for 10 to 60 Hz: ±0.35 mm (0.01 in); 60 to 2000 Hz: 5 g in all 3 axes
	Devices with mounting bracket	IEC 62828-1 / IEC 61298-3 IEC 60068-2-6	Guaranteed for 10 to 60 Hz: ±0.15 mm (0.01 in); 60 to 500 Hz: 2 g in all 3 axes

NOTICE**Strong vibrations can destroy the device!**

- ▶ For applications with strong vibrations, use PMC51/ PMP51 with a separate housing.
- ▶ For applications with strong vibrations, use PMP55 with a capillary.
- ▶ We recommend the use of a suitable bracket for mounting (→  40).

Electromagnetic compatibility

- Electromagnetic compatibility as per all the relevant requirements of the EN 61326 series and NAMUR Recommendation EMC (NE21).
- Max. deviation : < 0.5 % of the span

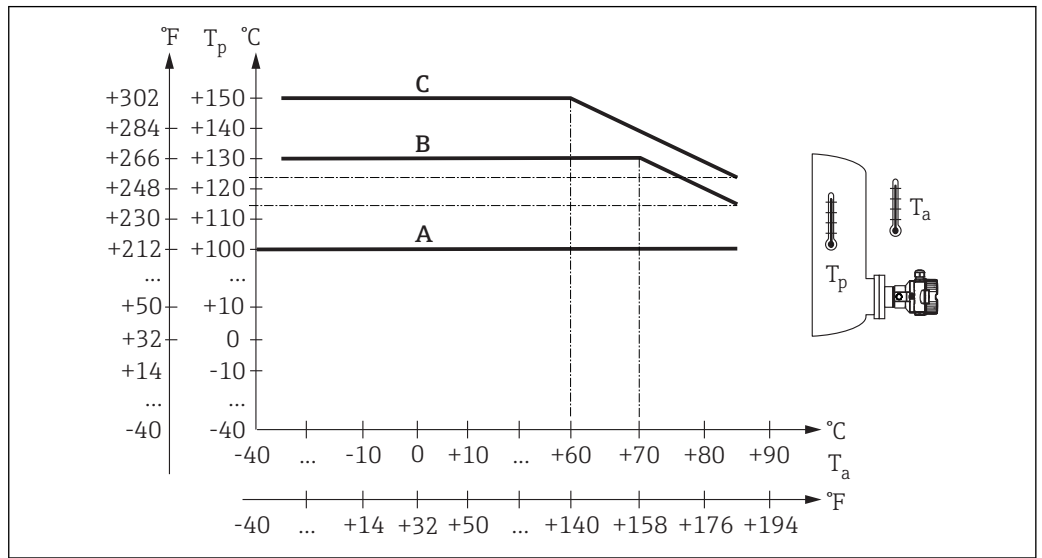
Further details can be found in the manufacturer declaration.

Operation in very corrosive environment

PMP55: For corrosive environments (e.g. maritime environment / coastal areas), Endress+Hauser recommends the use of a PVC or PTFE armor for the capillaries. The transmitter can also be protected by a special coating (**T**echnical **S**pecial **P**roduct (TSP)).

Process

Process temperature range PMC51



A, B and C see next section. T_a = Ambient temperature. T_p = Process temperature

Process temperature limits

For oxygen applications → 42

PMC51 (with ceramic process isolating diaphragm)

- A: -40 to +100 °C (-40 to +212 °F) for process connections with threaded connection or flange
- B: -20 to +130 °C (-4 to +266 °F) for hygienic process connections
- C: For max. 60 minutes: +150 °C (+302 °F) for hygienic process connections
- With applications involving saturated steam, a device with a metal process isolating diaphragm must be used, or a siphon for temperature isolation should be provided during installation.
- Observe the process temperature range of the seal. See also the following table.

Seal	Notes	Process temperature range		Option ¹⁾
		Thread or flange	Hygienic process connections	
FKM Viton	-	-20 to +100 °C (-4 to +212 °F)	-	A
FKM Viton	cleaned for O2 application	-5 to +60 °C (+23 to +140 °F)	-	A ²⁾
FKM Viton	FDA , 3A Class I, USP Class VI	-5 to +100 °C (+23 to +212 °F)	-5 to +150 °C (+23 to +302 °F)	B
FFKM Perlast G75LT	-	-20 to +100 °C (-4 to +212 °F)	-20 to +150 °C (-4 to +302 °F)	C
NBR	FDA 21 CFR 177.2600	-10 to +100 °C (+14 to +212 °F)	-	F
NBR, low temperature	-	-40 to +100 °C (-40 to +212 °F)	-	H
HNBR	FDA 21 CFR 177.2600, 3A Class I, KTW, AFNOR, BAM	-25 to +100 °C (-13 to +212 °F)	-20 to +100 °C (-4 to +212 °F)	G
EPDM 70	FDA 21 CFR 177.2600	-40 to +100 °C (-40 to +212 °F)	-	J
EPDM 331	FDA 21 CFR 177.2600, 3A Class II, USP Class VI, DVGW (UBA "KTW", W270), NSF61	-20 to +100 °C (-4 to +212 °F)	-20 to +150 °C (-4 to +302 °F)	K
FFKM Kalrez 6375	-	+5 to +100 °C (+41 to +212 °F)	-	L
FFKM Kalrez 7075	-	+5 to +100 °C (+41 to +212 °F)	-	M
FFKM Kalrez 6221	FDA 21 CFR 177.2600, USP Class VI	-5 to +100 °C (+23 to +212 °F)	-5 to +150 °C (+23 to +302 °F)	N
Fluoroprene XP40	FDA 21 CFR 177.2600, USP Class VI, 3A Class I	+5 to +100 °C (+41 to +212 °F)	+5 to +150 °C (+41 to +302 °F)	P
VMQ silicone	FDA 21 CFR 177.2600	-35 to +85 °C (-31 to +185 °F)	-20 to +85 °C (-4 to +185 °F)	S

1) Product Configurator, order code for "Seal"

2) With "HB" option, see Product Configurator, order code for "Service"

Applications with jumps in temperature

Extreme jumps in temperature can result in temporary measuring errors. Temperature compensation takes effect after several minutes. Internal temperature compensation is faster the smaller the jump in temperature and the longer the time interval involved.

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

PMP51 (with metal process isolating diaphragm)

Designation	Temperature operating range
Process connections with internal process isolating diaphragm	-40 to +125 °C (-40 to +257 °F)
Process connections with flush mount process isolating diaphragm ¹⁾	-40 to +100 °C (-40 to +212 °F)
Hygienic process connections	-40 to +130 °C (-40 to +266 °F) For a maximum of 60 minutes: 150 °C (302 °F)

1) Process connection thread ISO 228 G ½" A, DIN 3852: supplied seal for process temperature to -20 °C (-4 °F)

PMP55 (with diaphragm seal)

Depends on diaphragm seal and filling oil: -70 °C (-94 °F) up to +400 °C (+752 °F). Observe the temperature application limits → 115.

Devices with PTFE coated process isolating diaphragm

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

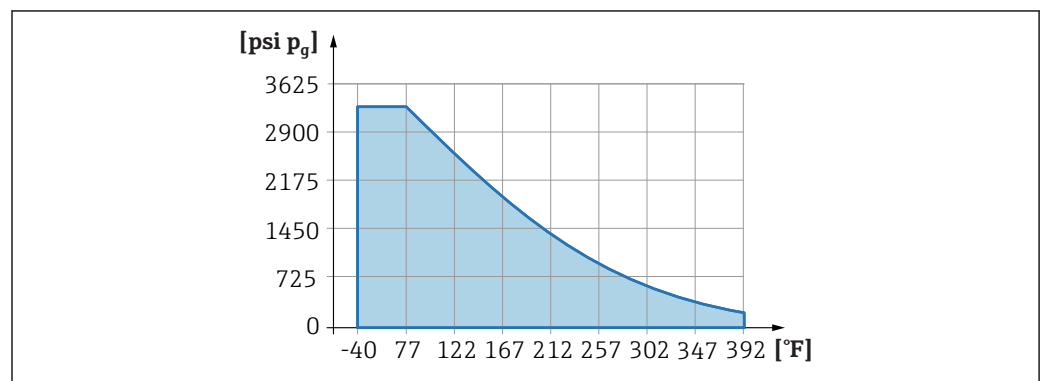
NOTICE

Destruction of the device due to incorrect use of PTFE foil!

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

Range of application of the PTFE foil

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

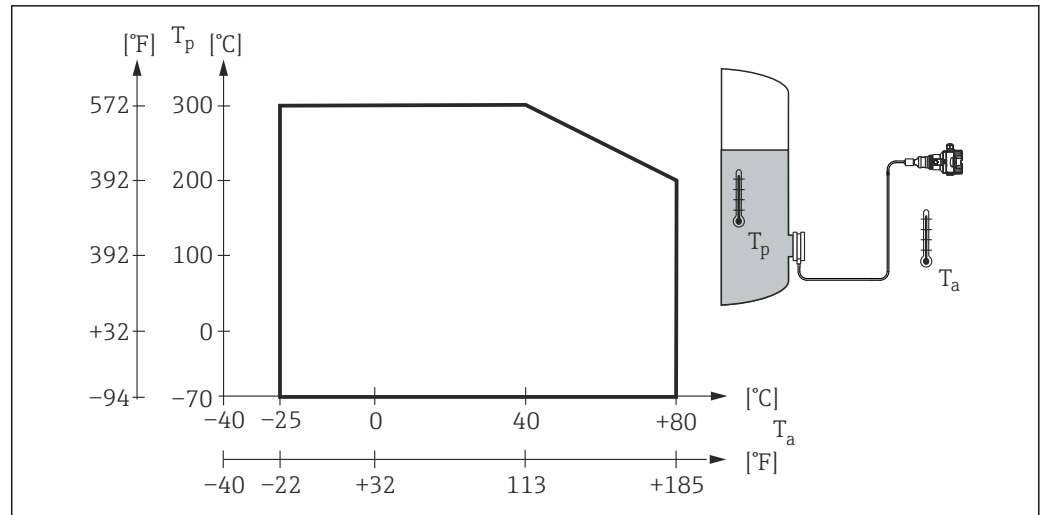


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i For vacuum applications: $p_{abs} \leq 1 \text{ bar (14.5 psi)}$ to 0.05 bar (0.725 psi) up to max. +150 °C (302 °F).

Process temperature limits of flexible capillary armoring: PMP55

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



A0028227

Pressure specifications

⚠ WARNING

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

- ▶ For pressure specifications, see the "Measuring range" section and the "Mechanical construction" section.
- ▶ Only operate the measuring device within the prescribed limits!
- ▶ The Pressure Equipment Directive (2014/68/EU) uses the abbreviation "PS". The abbreviation "PS" corresponds to the MWP (maximum working pressure) of the measuring device.
- ▶ MWP (Maximum Working Pressure): The MWP (maximum working pressure) is specified on the nameplate. This value 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).
- ▶ OPL (Over Pressure Limit = sensor overload limit): The test pressure corresponds to the over pressure limit of the sensor and may only be applied for a limited time period so that no permanent damage develops. In the case of sensor range and process connection combinations where the over pressure limit (OPL) of the process connection is smaller than the nominal value of the sensor, the device is set at the factory, at the very maximum, to the OPL value of the process connection. If you want to use the entire sensor range, select a process connection with a higher OPL value.
- ▶ Oxygen applications: In oxygen applications, the values for p_{max} and T_{max} for oxygen applications may not be exceeded → 42.
- ▶ Devices with ceramic process isolating diaphragm: Avoid steam hammering! Steam hammering can cause zero point drift. Recommendation: Residue (water droplets or condensation) may remain on the process isolating diaphragm following CIP cleaning and can result in local steam hammering the next time steam cleaning takes place. In practice, drying the process isolating diaphragm (e.g. by blowing off excess moisture) has proven to be a successful way of avoiding steam hammering.

Mechanical construction

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

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

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

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	Height	Example
Housing height	→ 48 ff.	(A)	
Optional mounted parts	→ 78	(B)	
Process connections	→ 50 → 64	(H)	
Installation space	-	(I)	
Installation space			

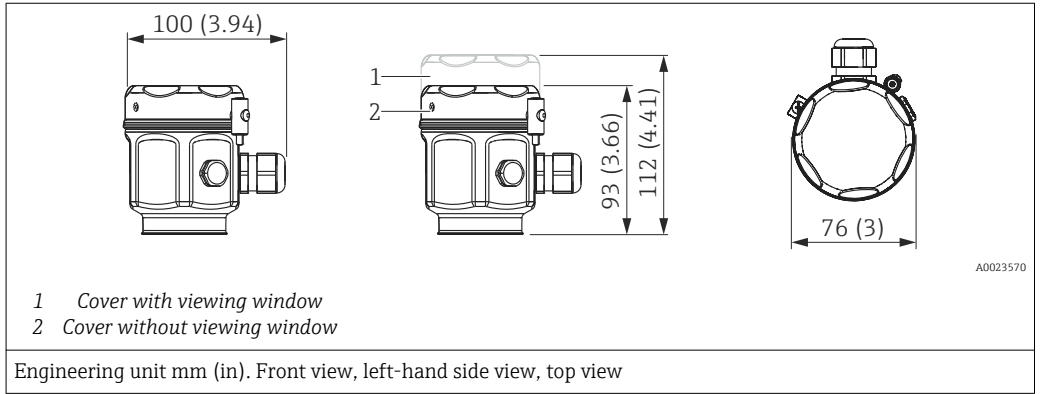
F31 housing, aluminum

	<p>1 Cover with viewing window 2 Cover without viewing window</p>
Engineering unit mm (in). Front view, left-hand side view, top view	

Material	Weight kg (lbs)		Option ¹⁾
	With display	Without display	
Aluminium ²⁾	1.1 (2.43)	1.0 (2.21)	I
Aluminum with glass viewing window ²⁾			J

- 1) Product Configurator, "Housing" ordering feature
 2) Degree of protection dependent on cable entry used → 43

F15 housing, stainless steel (hygienic)

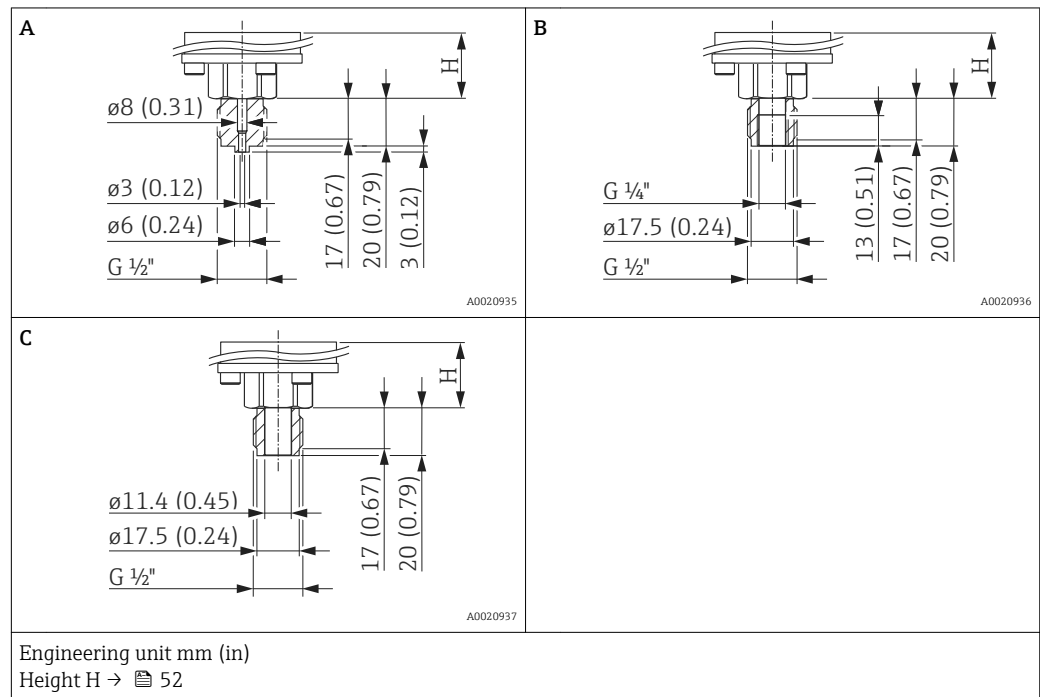


Material	Weight kg (lbs)		Option ¹⁾
	With display	Without display	
Stainless steel ²⁾	1.1 (2.43)	1.0 (2.21)	Q
Stainless steel with glass viewing window ²⁾			R
Stainless steel with plastic viewing window ²⁾			S

- 1) Product Configurator, "Housing" ordering feature
- 2) Product Configurator, "Housing" ordering feature → 43

PMC51: process connections
with internal process
isolating diaphragm

ISO 228 G threaded connection

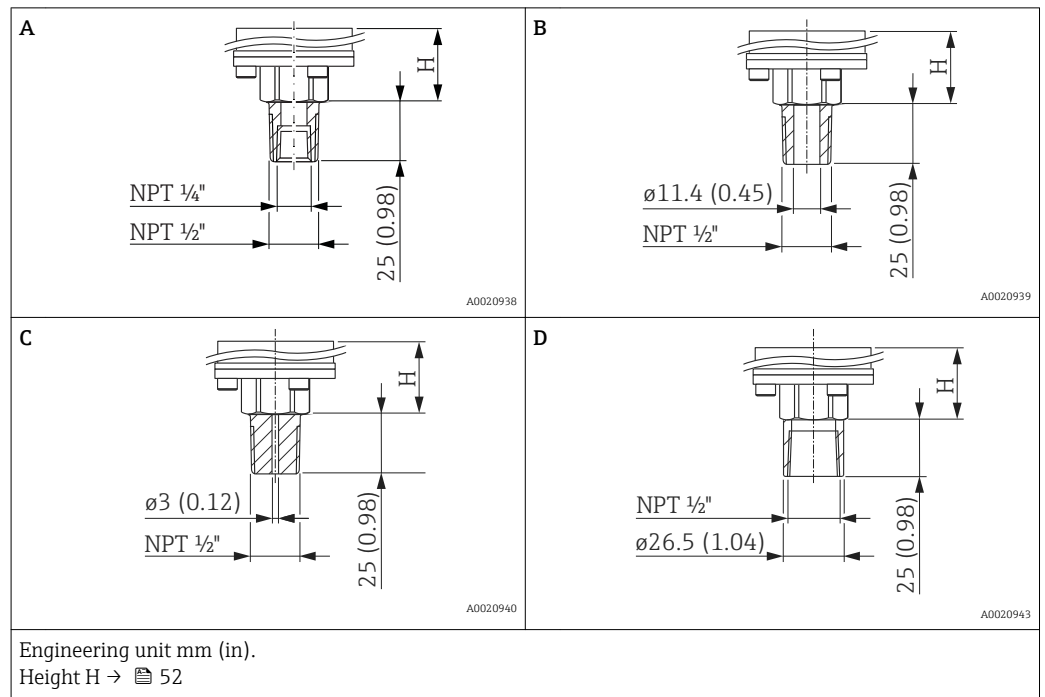


Item	Designation	Material	Weight	Approval ¹⁾	Option ²⁾
			kg (lb)		
A	Thread ISO 228 G 1/2" A EN 837	AISI 316L	0.63 (1.39)	CRN	GCJ
		Alloy C276 (2.4819)		CRN	GCC
		PVDF <ul style="list-style-type: none"> ■ Mount only with enclosed mounting bracket ■ MWP 10 bar (150 psi), OPL max. 15 bar (225 psi) ■ Process temperature range: -10 to +60 °C (+14 to +140 °F) 		-	GCF
B	Thread ISO 228 G 1/2" A, G 1/4" (female))	AISI 316L		CRN	GLJ
		Alloy C276 (2.4819)		CRN	GLC
C	Thread ISO 228 G 1/2" A, Bore 11.4 mm (0.45 in)	AISI 316L		CRN	GMJ
		Alloy C276 (2.4819)	CRN	GMC	

1) CSA approval: Product Configurator, "Approval" ordering feature

2) Product Configurator, "Process connection" ordering feature

ANSI threaded connection

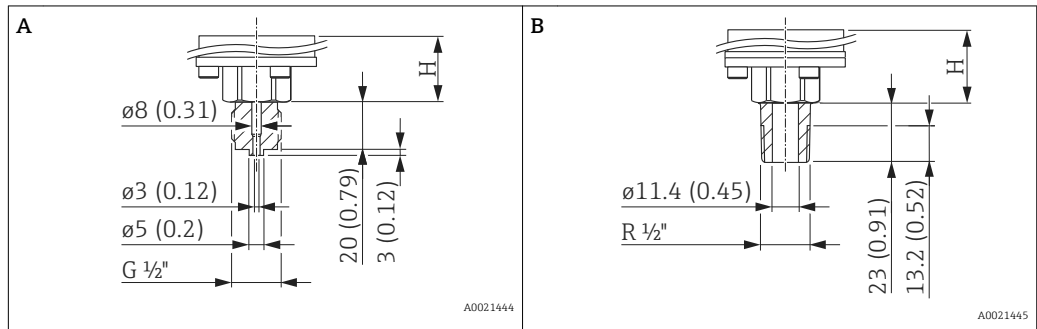


Item	Designation	Material	Weight	Approval ¹⁾	Option ²⁾
			kg (lb)		
A	ANSI 1/2" MNPT, 1/4" FNPT	AISI 316L	0.63 (1.39)	CRN	RLJ
		Alloy C276 (2.4819)		CRN	RLC
B	ANSI 1/2" MNPT, Bore 11.4 mm (0.45 in)	AISI 316L		CRN	RKJ
		Alloy C276 (2.4819)		CRN	RKC
C	ANSI 1/2" MNPT, Bore 3 mm (0.12 in)	PVDF <ul style="list-style-type: none"> ■ Mount only with 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) 		-	RJF
D	ANSI 1/2" FNPT Bore 11.4 mm (0.45 in)	AISI 316L		CRN	R1J
		Alloy C276 (2.4819)		CRN	R1C

1) CSA approval: Product Configurator, "Approval" ordering feature
 2) Product Configurator, "Process connection" ordering feature

PMC51: process connections with internal process isolating diaphragm

JIS threaded connection

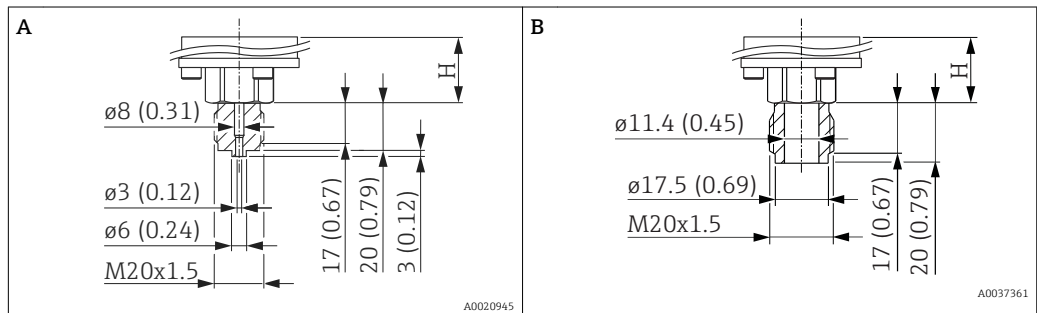


Engineering unit mm (in).
Height H → 52

Item	Designation	Material	Weight	Option ¹⁾
			kg (lb)	
A	JIS B0202 G 1/2" (male)	AISI 316L	0.63 (1.39)	GNJ
B	JIS B0203 R 1/2" (male)			GOJ

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

DIN 13 threaded connection



Engineering unit mm (in). Height H → 52

Item	Designation	Material	Weight	Option ¹⁾
			kg (lb)	
A	DIN 13 M20 x 1.5, EN 837 bore 3 mm (0.12 in)	AISI 316L	0.63 (1.39)	G5J
		Alloy C276 (2.4819)		G6J
B	DIN 13 M20 x 1.5 11.4 mm (0.45 in)	AISI 316L		G1J

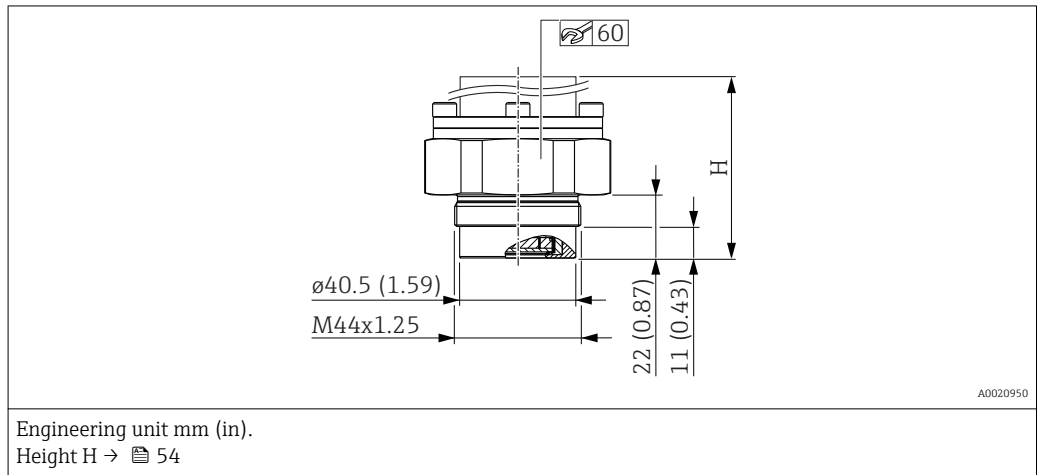
1) Product Configurator, order code for "Process connection"

PMC51: process connections with internal process isolating diaphragm - height H

F31 housing	F15 housing
27 mm (1.06 in)	34 mm (1.34 in)

PMC51: process connections with flush-mounted process isolating diaphragm

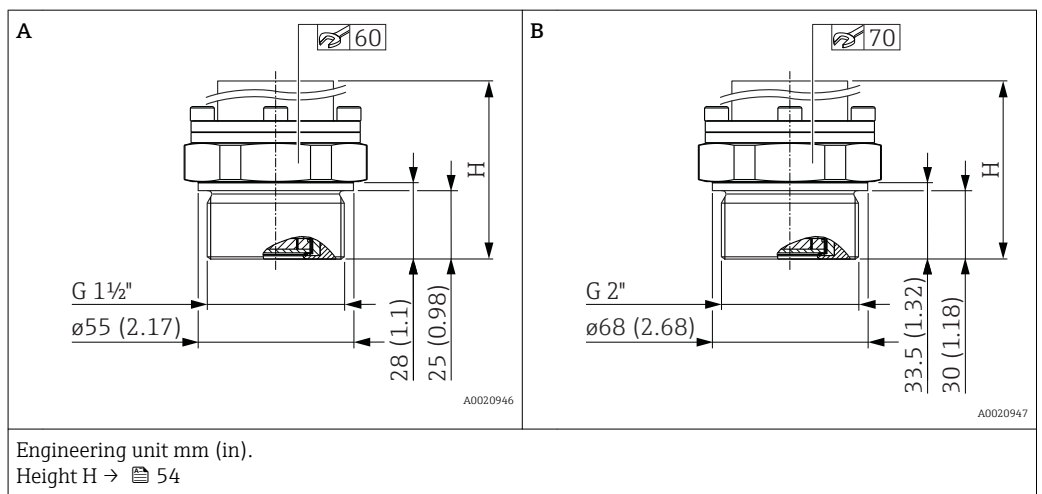
DIN 13 threaded connection



Designation	Material	Weight	Option ¹⁾
		kg (lb)	
DIN 13 M44 x 1.25	AISI 316L	0.63 (1.39)	G4J

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

ISO 228 G threaded connection

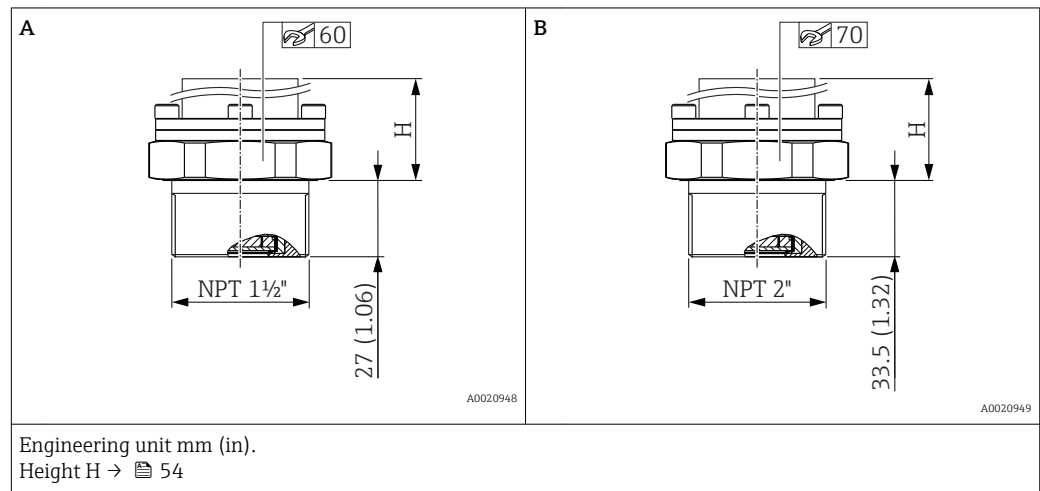


Item	Designation	Material	Weight	Option ¹⁾
			kg (lb)	
A	Thread ISO 228 G 1 1/2" A	AISI 316L	0.63 (1.39)	GVJ
B	Thread ISO 228 G 2" A	AISI 316L		GWJ

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

PMC51: process connections with flush-mounted process isolating diaphragm

ANSI threaded connection



Item	Designation	Material	Weight	Approval ¹⁾	Option ²⁾
			kg (lb)		
A	Thread ANSI 1 1/2" MNPT	AISI 316L	0.63 (1.39)	CRN	U7J
B	Thread ANSI 2" MNPT	AISI 316L		CRN	U8J

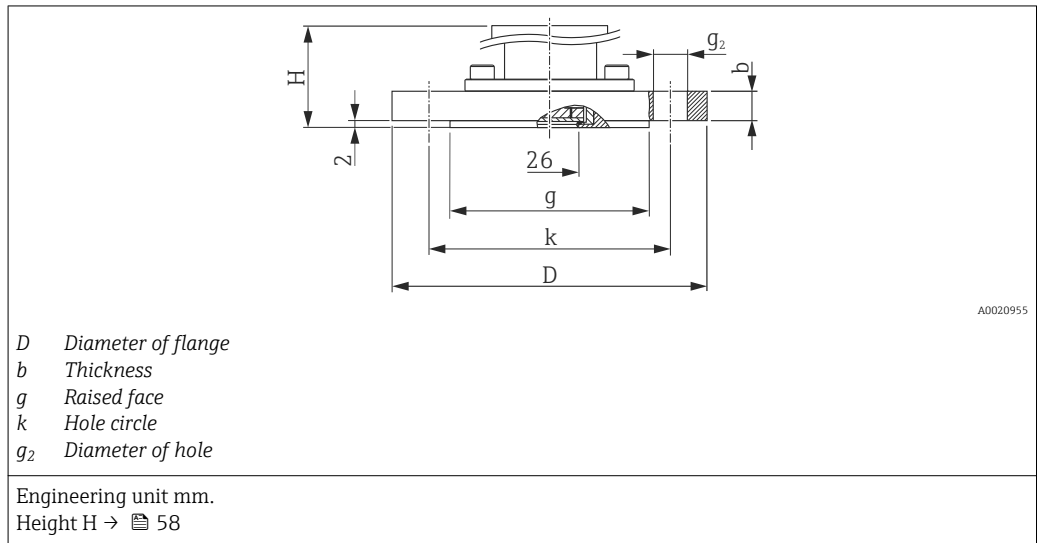
- 1) CSA approval: Product Configurator, order code for "Approval"
- 2) Product Configurator, order code for "Process connection"

PMC51: process connections with flush-mounted process isolating diaphragm - height H

Process connection	F31 housing	F15 housing
DIN 13 M44 x 1.25	53 mm (2.09 in)	60 mm (2.36 in)
Thread ISO 228 G 1 1/2" A	50 mm (1.97 in)	57 mm (2.24 in)
Thread ISO 228 G 2" A	45 mm (1.77 in)	52 mm (2.05 in)
Thread ANSI 1 1/2" MNPT	48 mm (1.89 in)	55 mm (2.17 in)
Thread ANSI 2" MNPT	45 mm (1.77 in)	52 mm (2.05 in)

PMC51: process connections with flush-mounted process isolating diaphragm

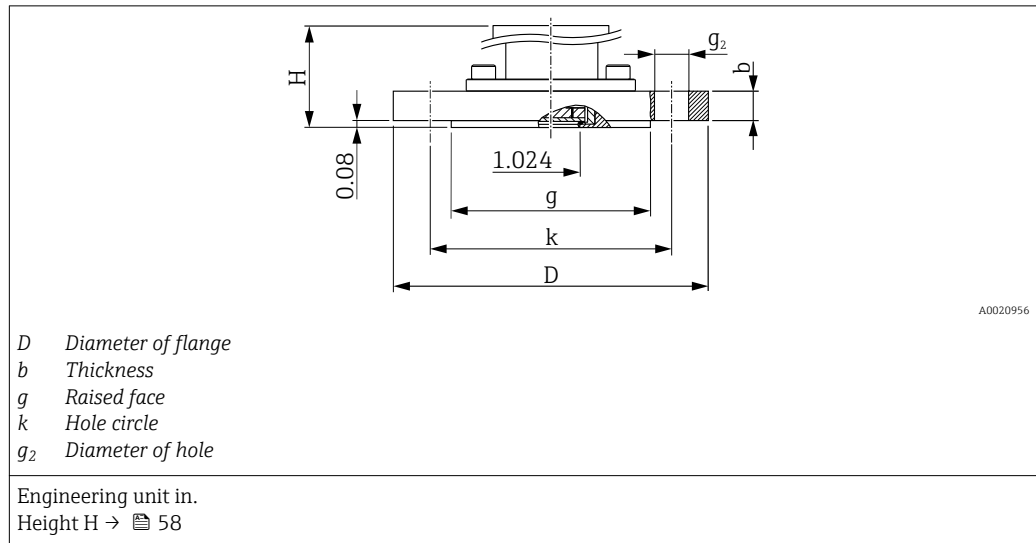
EN/DIN flanges, connection dimensions as per EN 1092-1/DIN 2527



Flange				Boltholes						Weight	Option ¹⁾
Material	Nominal diameter	Nominal pressure	Shape ²⁾	D	b	g	Number	g ₂	k	kg (lb)	
				mm	mm	mm		mm	mm		
AISI 316L	DN 25	PN 10-40	B1 (D)	115	18	68	4	14	85	1.4 (3.09)	CNJ
AISI 316L	DN 32	PN 10-40	B1 (D)	140	18	78	4	18	100	2.0 (4.41)	CPJ
AISI 316L	DN 40	PN 10-40	B1 (D)	150	18	88	4	18	110	2.4 (5.29)	CQJ
ECTFE ³⁾	DN 40	PN 10-40	B2 (E)	150	21	88	4	18	110	2.6 (5.73)	CQP
AISI 316L	DN 50	PN 10-40	B1 (D)	165	20	102	4	18	125	3.2 (7.06)	CXJ
PVDF ⁴⁾	DN 50	PN 10-16	B2 (E)	165	21.4	102	4	18	125	0.6 (1.32)	CFF
ECTFE ³⁾	DN 50	PN 25-40	B2 (E)	165	20	102	4	18	125	3.2 (7.06)	CRP
AISI 316L	DN 80	PN 10-40	B1 (D)	200	24	138	8	18	160	5.4 (11.91)	CZJ
ECTFE ³⁾	DN 80	PN 25-40	B2 (E)	200	24	138	8	18	160	5.5 (12.13)	CSP

- 1) Product Configurator, order code for "Process connection"
- 2) Description as per DIN 2527 provided in brackets
- 3) ECTFE coating on AISI 316L (1.4404). When using in hazardous areas, avoid electrostatic charging of the plastic surfaces.
- 4) 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 ANSI B 16.5, raised face RF



Flange						Boltholes			Weight	Approval ¹⁾	Option ²⁾
Material	Nominal diameter	Class	D	b	g	Number	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	0.9 (1.98)	-	ACJ ⁴⁾
AISI 316/316L ³⁾	1	300	4.88	1.18	2	4	0.75	3.5	1.4 (3.09)	-	ANJ ⁴⁾
AISI 316/316L ³⁾	1 ½	150	5	0.69	2.88	4	0.62	3.88	1.0 (2.21)	CRN	AEJ
AISI 316/316L ³⁾	1 ½	300	6.12	0.81	2.88	4	0.88	4.5	2.6 (5.73)	CRN	AQJ
AISI 316/316L ³⁾	2	150	6	0.75	3.62	4	0.75	4.75	2.4 (5.29)	CRN	AFJ
ECTFE ⁵⁾	2	150	6	0.75	3.62	4	0.75	4.75	2.4 (5.29)	-	AFN
PVDF ⁶⁾	2	150	6	0.75	3.62	4	0.75	4.75	0.5 (1.1)	-	AFF
AISI 316/316L ³⁾	2	300	6.5	0.88	3.62	8	0.75	5	3.2 (7.06)	CRN	ARJ
AISI 316/316L ³⁾	3	150	7.5	0.94	5	4	0.75	6	4.9 (10.8)	CRN	AGJ
ECTFE ⁵⁾	3	150	7.5	0.94	5	4	0.75	6	4.9 (10.8)	-	AGN
PVDF ⁶⁾	3	150	7.5	0.94	5	4	0.75	6	0.9 (1.98)	-	AGF
AISI 316/316L ³⁾	3	300	8.25	1.12	5	8	0.88	6.62	6.8 (14.99)	CRN	ASJ
AISI 316/316L ³⁾	4	150	9	0.94	6.19	8	0.75	7.5	7.1 (15.66)	CRN	AHJ
ECTFE ⁵⁾	4	150	9	0.94	6.19	8	0.75	7.5	7.1 (15.66)	-	AHN
AISI 316/316L ³⁾	4	300	10	1.25	6.19	8	0.88	7.88	11.6 (25.58)	CRN	ATJ

1) CSA approval: Product Configurator, order code for "Approval"

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

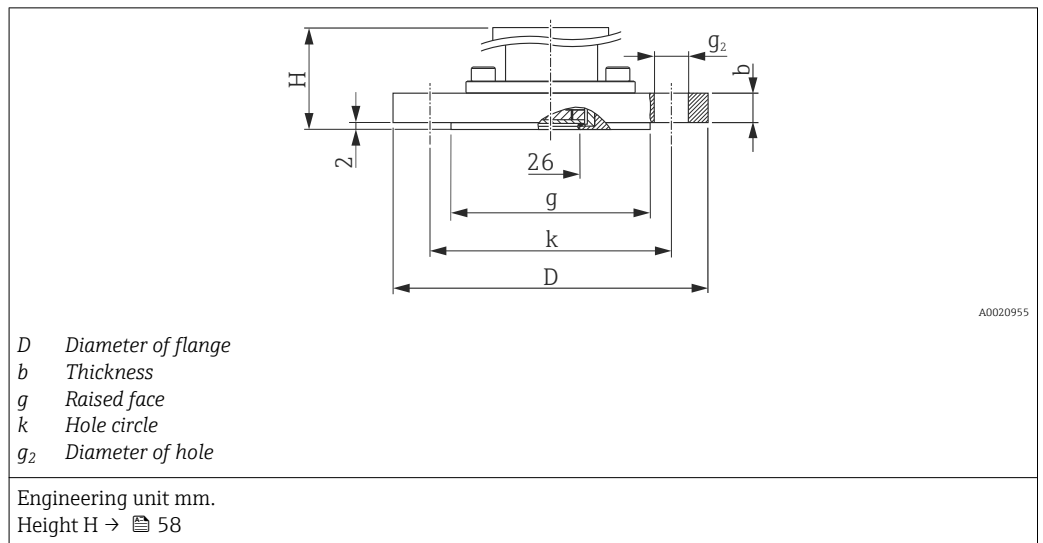
3) Combination of AISI 316 for required pressure resistance and AISI 316L for required chemical resistance (dual rated)

4) Screws must be 15 mm (0.59 in) longer than the standard flange screws.

5) ECTFE coating on AISI 316/316L. When using 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 as per JIS B 2220 BL, raised face RF

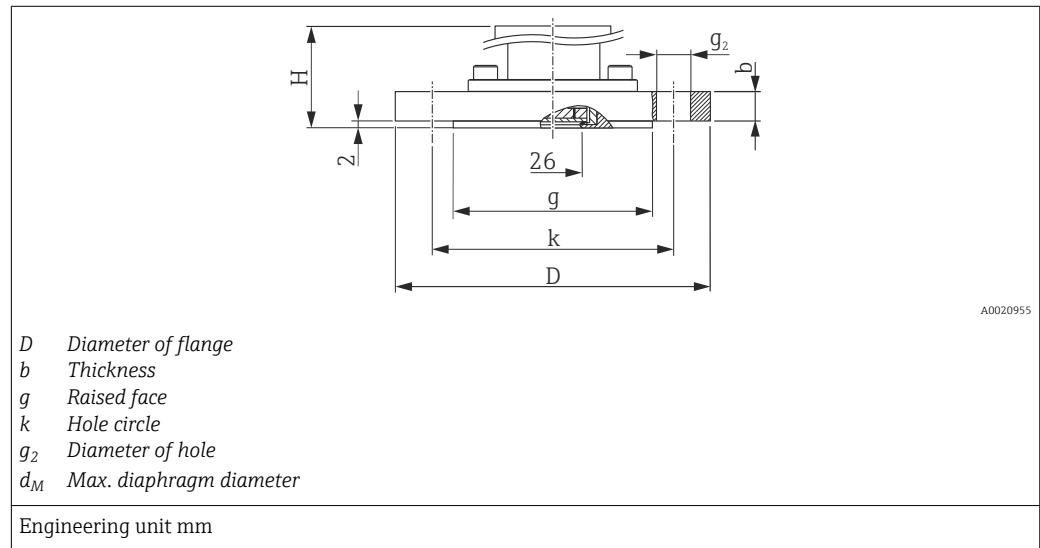


Flange						Boltholes			Weight	Option ¹⁾
Material	Nominal diameter	Nominal pressure	D	b	g	Number	g ₂	k		
			mm	mm	mm		mm	mm	kg (lb)	
AISI 316L (1.4435)	50 A	10 K	155	16	96	4	19	120	2.0 (4.41)	KFJ
	80 A	10 K	185	18	127	8	19	150	3.3 (7.28)	KGJ
	100 A	10 K	210	18	151	8	19	175	4.4 (9.7)	KHJ

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

PMC51: process connections with flush-mounted process isolating diaphragm

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



Flange ¹⁾						Boltholes			Weight	Option ²⁾
Nominal diameter	Class/nominal pressure	D	b	g	m	Number	g ₂	k		
		[mm]	[mm]	[mm]	[mm]		[mm]	[mm]		
DN										
DN50	40 bar	165	20	102	27.5	4	18	125	3 (6.6)	7HJ
DN80	40 bar	200	24	138	45.5	8	18	160	5.5 (12.13)	7KJ
[in]										
2"	150lb./sq.in	150	17.5	92.1	22.55	4	18	120.7	2.2 (4.85)	7PJ
2"	300 lb./sq.in	165	20.7	92.1	22.55	8	18	127	3 (6.62)	7RJ
3"	150 lb./sq.in	190	22.3	127	40	4	18	152.4	4.7 (10.36)	7VJ
3"	300 lb./sq.in	210	27	127	40	8	22	168.3	6.6 (14.55)	7XJ

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

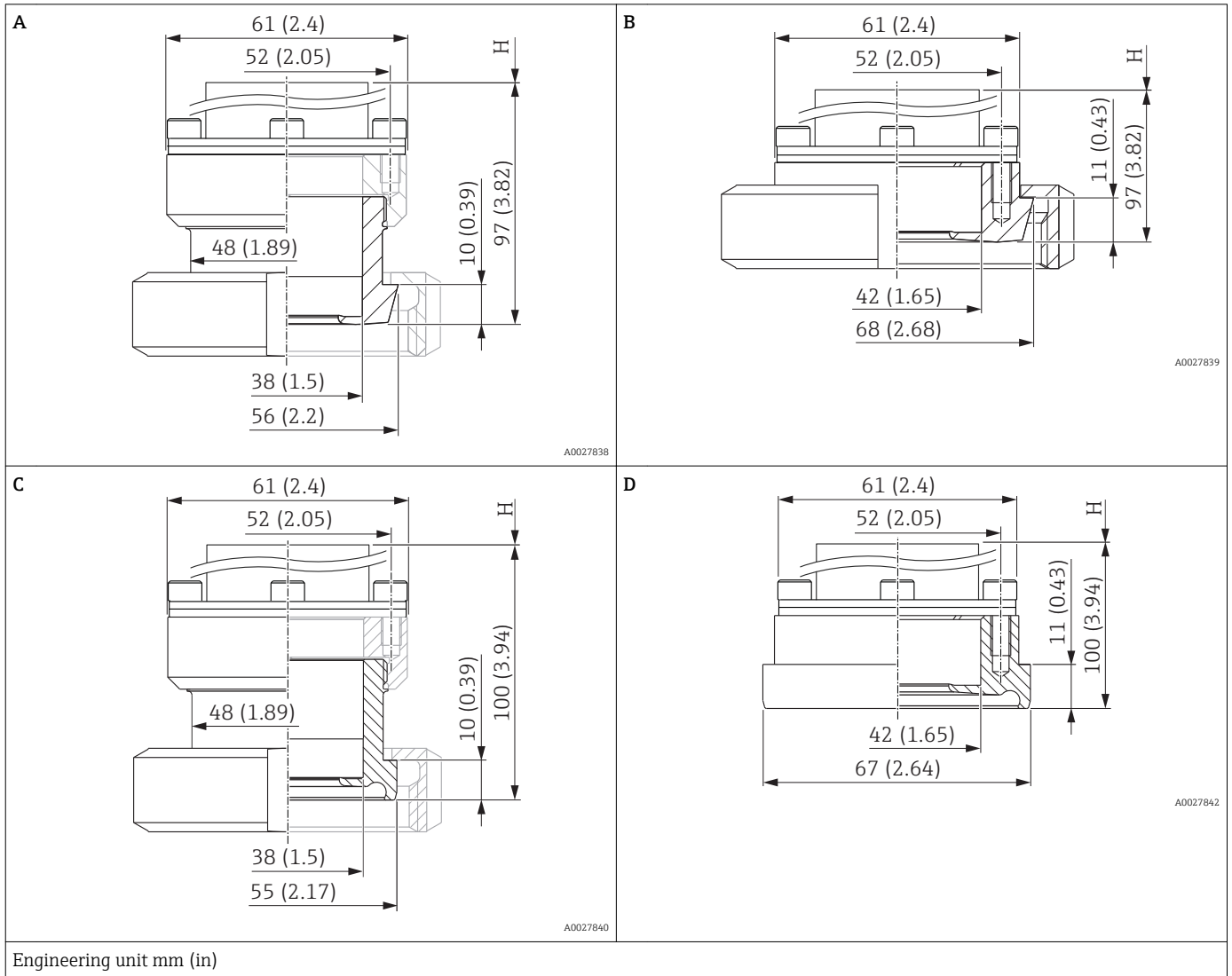
PMC51: process connections with flush-mounted process isolating diaphragm - height H

F31 housing	F15 housing
94 mm (3.7 in)	98 mm (3.86 in)

PMC51: hygienic process connections with flush mount process isolating diaphragm

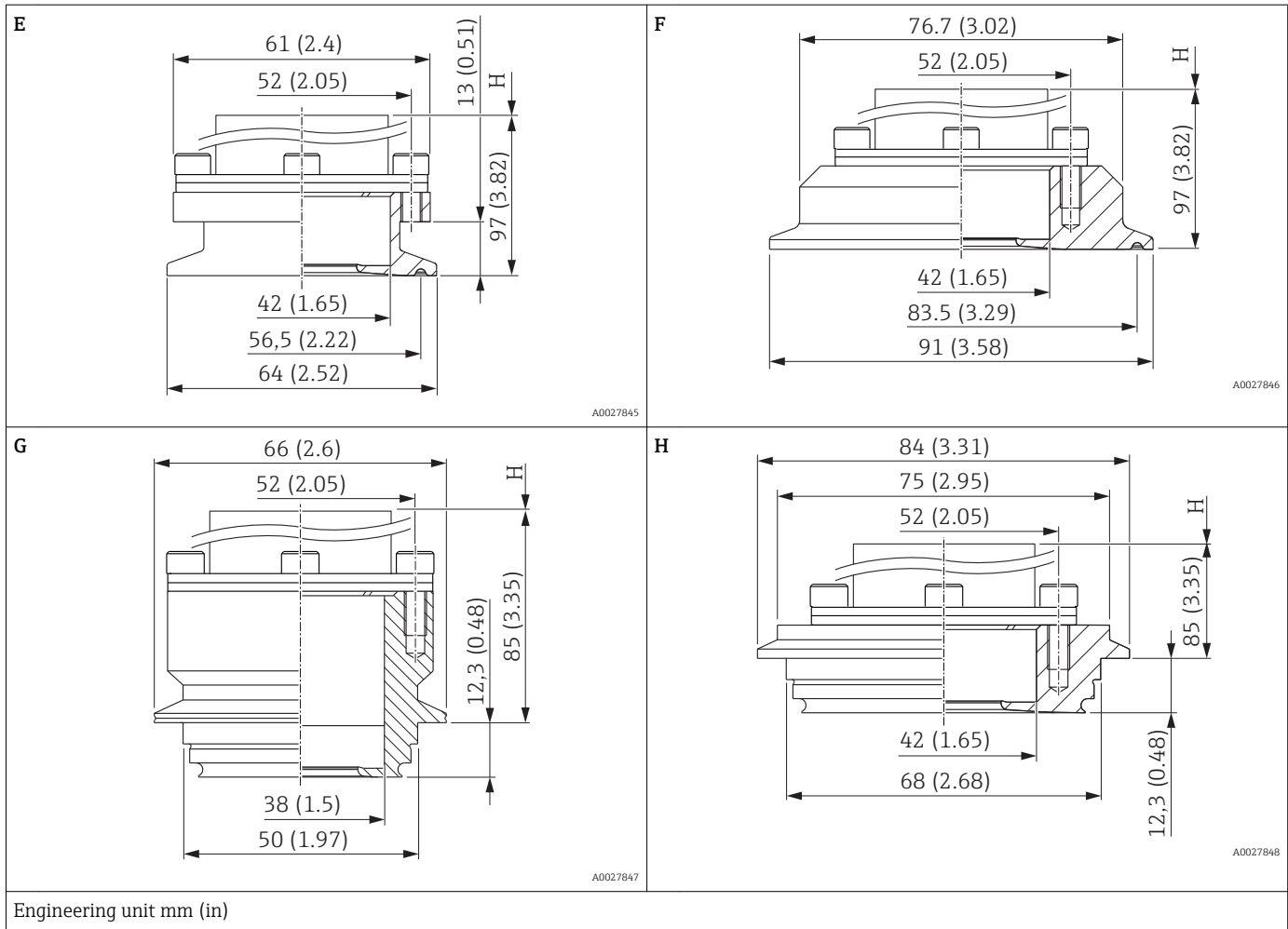
In order to guarantee a hygiene approval, a seal with appropriate approval must be selected for the hygienic process connection:

- For 3A approval, you require a seal made of EPDM or HNBR → 45
- For EHEDG approval, you require a seal made of VMQ silicone, FFKM Kalrez → 45



Item	Designation	Nominal pressure	Material ¹⁾	Weight	Approval ²⁾	Option ³⁾
				kg (lb)		
A	DIN 11851 DN40	PN 25	AISI 316L (1.4435)	0.7 (1.54)	EHEDG, 3A with seal FDA, ASME-BPE, CRN	MZJ ⁴⁾
B	DIN 11851 DN50	PN 25		0.9 (1.98)		MRJ ⁴⁾
C	DIN 11864 DN40, Pipe DIN 11866-A	PN 16		0.66 (1.46)	EHEDG, 3A with seal FDA, ASME-BPE	NCJ ⁴⁾
D	DIN 11864 DN50, Pipe DIN 11866-A	PN 16		0.29 (0.64)		NDJ ⁴⁾

- 1) Delta-ferrite content < 1 %. The roughness of the surface in contact with the medium is $R_a < 0.76 \mu\text{m}$ (30 μin).
- 2) CSA approval: Product Configurator, order code for "Approval"
- 3) Product Configurator, order code for "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).



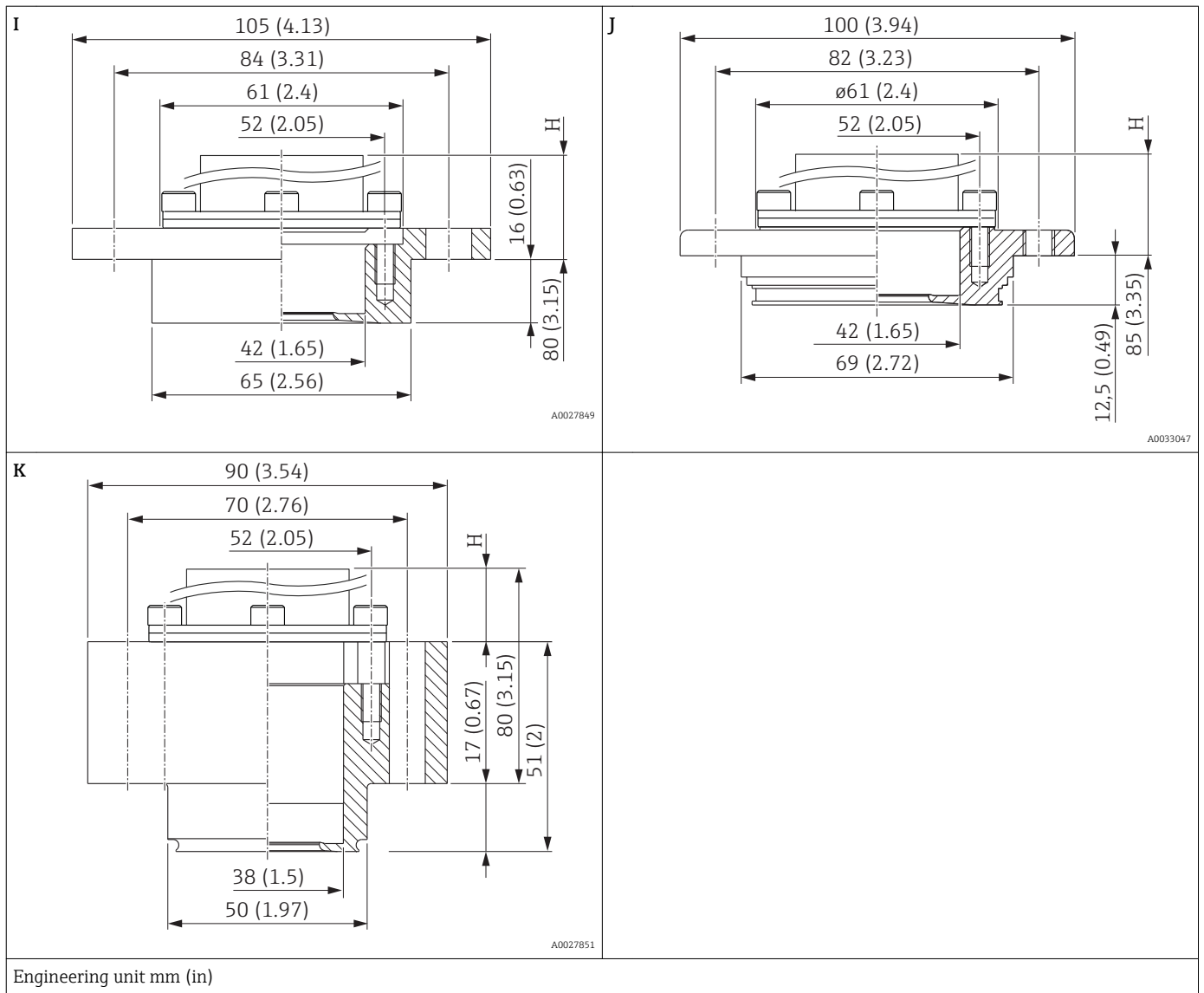
Item	Designation	Nominal pressure	Material ¹⁾	Weight	Approval ²⁾	Option ³⁾
				kg (lb)		
E	Tri-Clamp ISO 2852, DN40-DN51 (2")	PN 40	AISI 316L (1.4435)	0.65 (1.44)	EHEDG, 3A with seal FDA, CRN, ASME-BPE	TDJ ⁴⁾
F	Tri-Clamp ISO 2852, DN76.1 (3")	PN 40		0.9 (1.98)	EHEDG, 3A with seal FDA, CRN, ASME-BPE	TFJ
G	Varivent F pipe, DN25-32	PN 40		0.46 (1)	EHEDG, 3A with seal FDA, ASME-BPE	TQJ
H	Varivent N pipe, DN40-162	PN 40		1 (2.21)	EHEDG, 3A with seal FDA, ASME-BPE	TRJ

1) Delta ferrite content < 1 %. The roughness of the surface in contact with the medium is $R_a < 0.76 \mu\text{m}$ (30 μin).

2) CSA approval: Product Configurator, order code for "Approval"

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

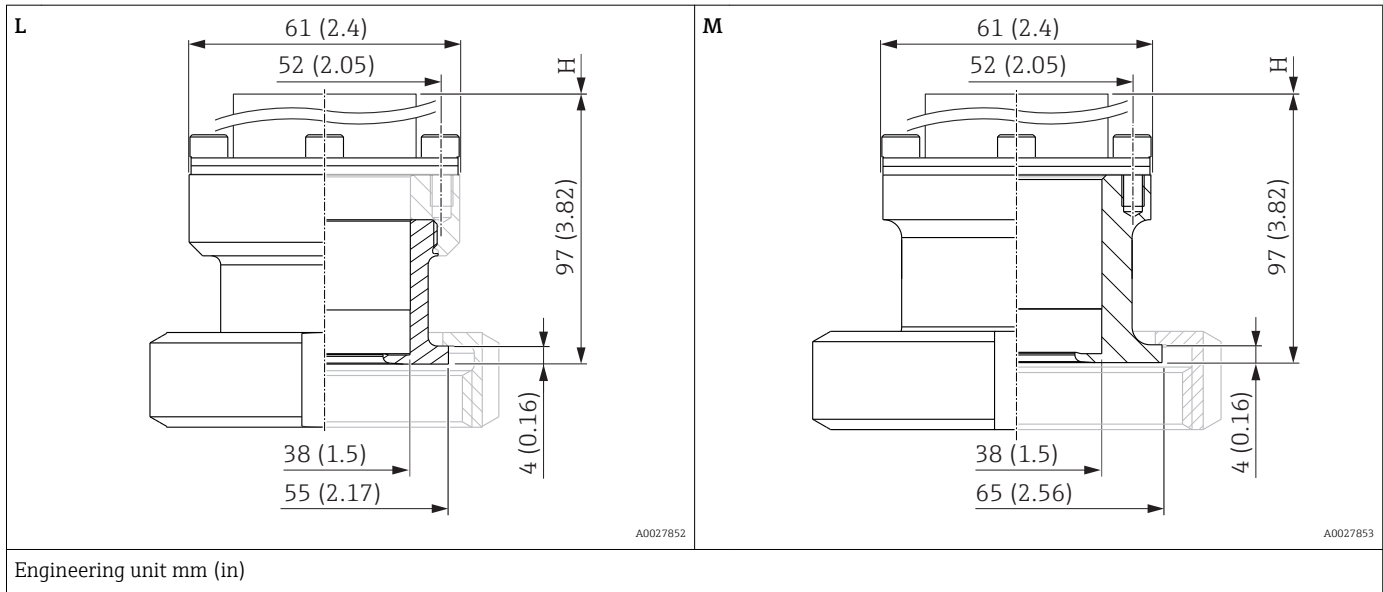
4) Endress+Hauser supplies these slotted-nuts in stainless steel AISI 304 (DIN/EN material number 1.4301) or in AISI 304L (DIN/EN material number 1.4307).



Engineering unit mm (in)

Item	Designation	Nominal pressure	Material ¹⁾	Weight	Approval ²⁾	Option ³⁾
				kg (lb)		
I	DRD, DN50 (65 mm)	PN 25	AISI 316L (1.4435)	0.9 (1.98)	FDA	TIJ ⁴⁾
J	APV Inline, DN50	PN 40		0.52 (1.15)	3A with seal FDA, CRN, ASME-BPE	TMJ
K	NEUMO BioControl, DN50	PN 16		1.34 (2.6)	3A with seal FDA, ASME-BPE	S4J ⁵⁾

- 1) Delta ferrite content < 1 %. The roughness of the surface in contact with the medium is $R_a < 0.76 \mu\text{m}$ (30 μin).
- 2) CSA approval: Product Configurator, order code for "Approval"
- 3) Product Configurator, order code for "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) 4 screws DIN912 M8 x 45 are enclosed (material A4-80)



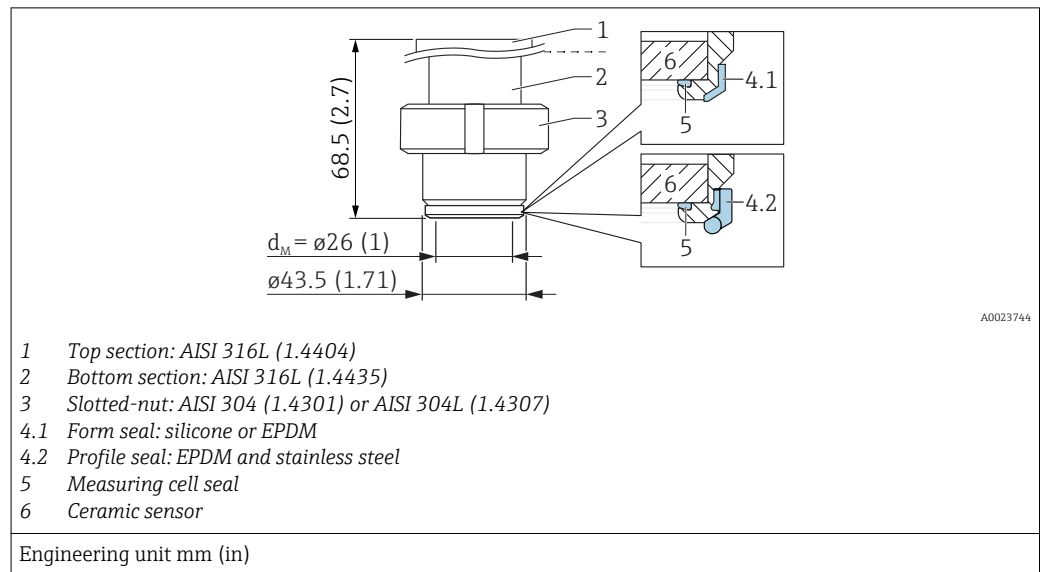
Item	Designation	Nominal pressure	Material ¹⁾	Weight	Approval ²⁾	Option ³⁾
				kg (lb)		
L	SMS 1 1/2"	PN 25	AISI 316L (1.4435)	0.65 (1.43)	3A, ASME-BPE	TXJ ⁴⁾
M	SMS 2"	PN 25		0.65 (1.43)		T7J ⁴⁾

- 1) Delta ferrite content < 1 %. The roughness of the surface in contact with the medium is $R_a < 0.76 \mu\text{m}$ (30 μin).
- 2) CSA approval: Product Configurator, order code for "Approval"
- 3) Product Configurator, order code for "Process connection"
- 4) Endress+Hauser supplies the slotted-nuts in stainless steel AISI 304 (DIN/EN material number 1.4301) or in AISI 304L (DIN/EN material number 1.4307).

Height H

Item	Process connection	F31 housing	F15 housing
A	DIN 11851 DN40	48 mm (1.89 in)	54 mm (2.13 in)
B	DIN 11851 DN50	70 mm (2.76 in)	77 mm (3.03 in)
C	DIN 11864 DN40, pipe DIN 11866-A	48 mm (1.89 in)	54 mm (2.13 in)
D	DIN 11864 DN50, pipe DIN 11866-A	70 mm (2.76 in)	77 mm (3.03 in)
E	Tri-Clamp ISO 2852, DN40-DN51 (2")	70 mm (2.76 in)	77 mm (3.03 in)
F	Tri-Clamp ISO 2852, DN76.1 (3")	70 mm (2.76 in)	77 mm (3.03 in)
G	Varivent F pipe, DN25-32	48 mm (1.89 in)	54 mm (2.13 in)
H	Varivent N pipe, DN40-162	70 mm (2.76 in)	77 mm (3.03 in)
I	DRD, DN50 (65 mm)	70 mm (2.76 in)	77 mm (3.03 in)
J	APV Inline, DN50	70 mm (2.76 in)	77 mm (3.03 in)
K	NEUMO BioControl, DN50	48 mm (1.89 in)	54 mm (2.13 in)
L	SMS 1 1/2"	48 mm (1.89 in)	54 mm (2.13 in)
M	SMS 2"	48 mm (1.89 in)	54 mm (2.13 in)

Universal process adapter



The roughness of the surface in contact with the medium is $R_a < 0.76 \mu\text{m}$ (30 μin).

Silicone form seal: FDA 21CFR177.2600/USP Class VI, order number: 52023572

EPDM form seal: FDA, USP Class VI; 5 pcs, order number: 71100719

EPDM and stainless steel profile seal: FDA, USP Class VI; 1 pc, order number: 71431380

Designation	Nominal pressure bar (psi)	Weight	Process connection approval	Option ¹⁾
		[kg (lb)]		
Universal process adapter Form seal made of silicone (4.1)	10 (145)	0.74 (1.63)	ASME-BPE For more, see Product Configurator	UPJ
Universal process adapter Form seal made of <ul style="list-style-type: none"> ■ EPDM (4.1) or ■ EPDM and stainless steel (4.2) 			ASME-BPE For more, see Product Configurator	UNJ

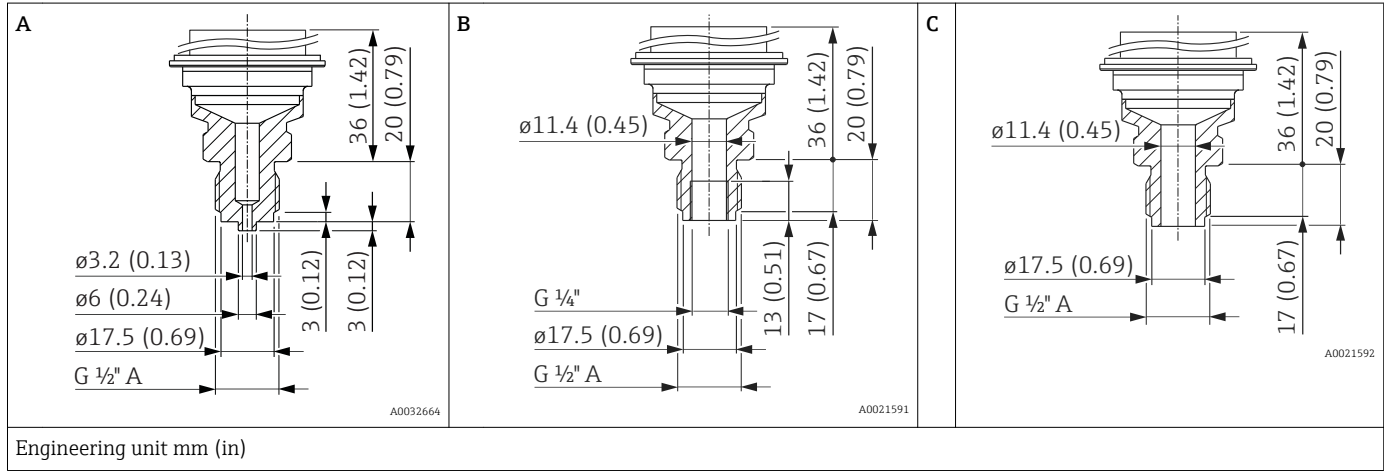
1) Product Configurator, order code for "Process connection"

Material of the form seal (exchangeable seal)	Material of the measuring cell seal on ceramic sensor (seal not exchangeable)	Approval of measuring cell seal	Option ¹⁾
Silicone	EPDM	FDA ²⁾ 3A Class II, USP Class VI. DVGW, KTW, W270, WRAS, ACS, NSF61	K
EPDM or EPDM and stainless steel	EPDM	FDA ²⁾	J

1) Product Configurator, order code for "Seal"

2) Food-safe FDA 21 CFR 177.2600

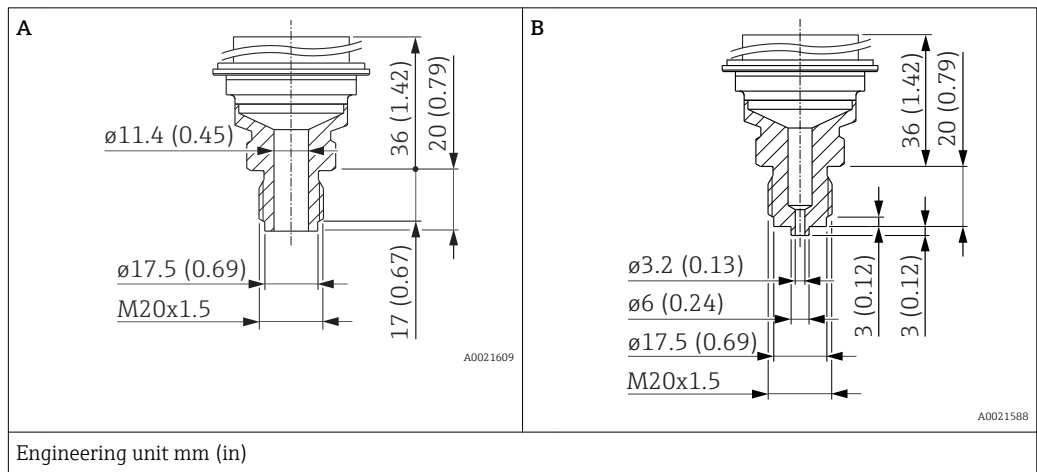
PMP51: process connections ISO 228 G threaded connection with internal process isolating diaphragm



Item	Designation	Material	Weight kg (lb)	Option ¹⁾
A	Thread ISO 228 G 1/2" A EN 837	AISI 316L	0.63 (1.39)	G CJ
		Alloy C276 (2.4819)		G CC
B	Thread ISO 228 G 1/2" A, G 1/4" (female)	AISI 316L		GL J
		Alloy C276 (2.4819)		GL C
C	Thread ISO 228 G 1/2" A, Bore 11.4 mm (0.45 in)	AISI 316L		GM J
		Alloy C276 (2.4819)		GM C

1) Product Configurator, "Process connection" ordering feature

DIN 13 threaded connection

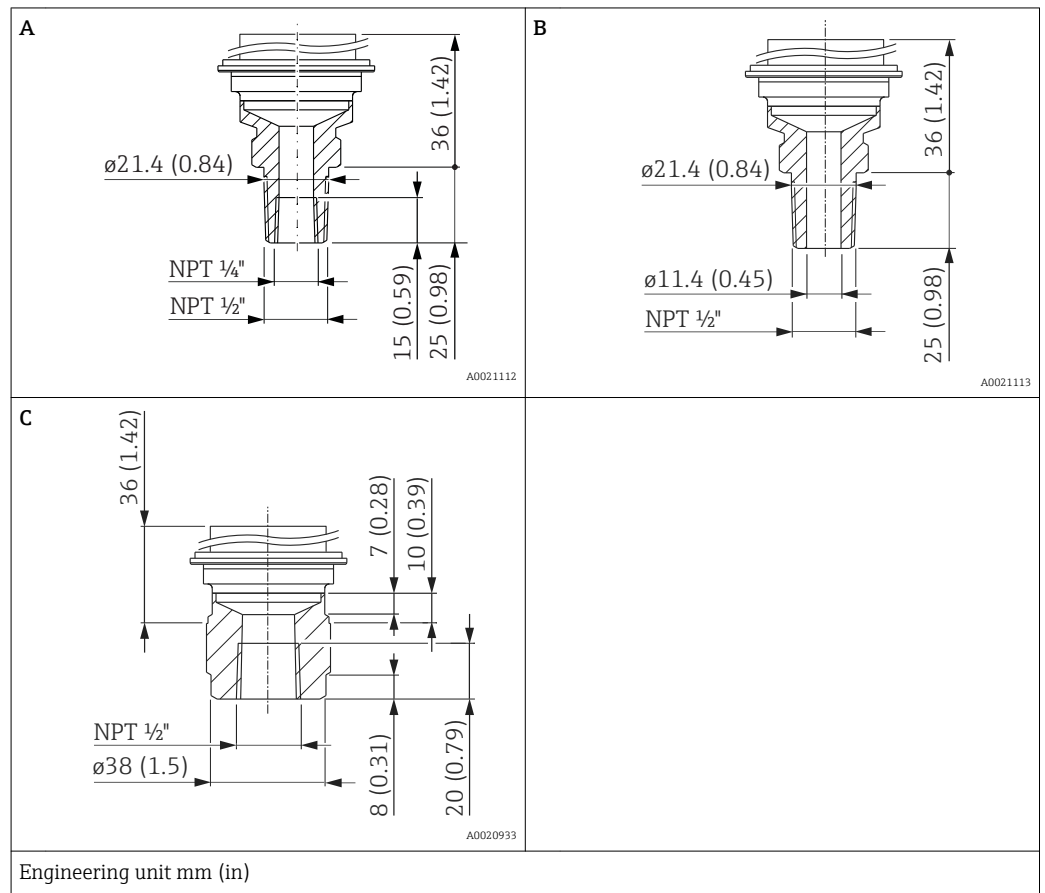


Item	Designation	Material	Weight kg (lb)	Option ¹⁾
A	DIN 13 M20 x 1,5 Bore 11.4 mm (0.45 in)	AISI 316L	0.6 (1.32)	G 1 J
		Alloy C276 (2.4819)		G 2 J
B	DIN 13 M20 x 1,5, EN 837, Bore 3 mm (0.12 in)	AISI 316L		G 5 J
		Alloy C276 (2.4819)		G 6 J

1) Product Configurator, "Process connection" ordering feature

PMP51: process connections with internal process isolating diaphragm

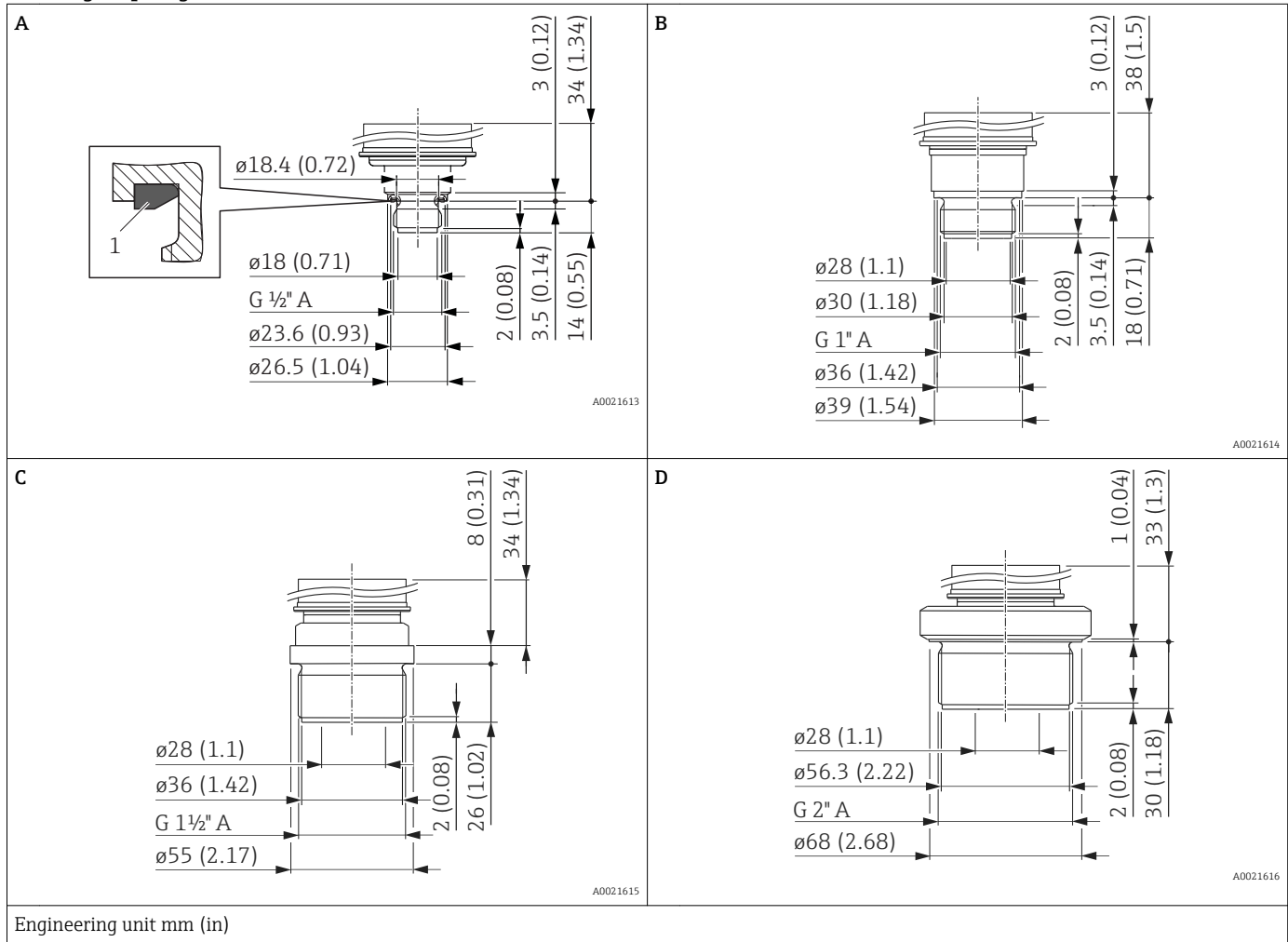
ANSI threaded connection



Item	Designation	Material	Weight	Approval ¹⁾	Option ²⁾
			kg (lb)		
A	ANSI 1/2" MNPT, 1/4" FNPT	AISI 316L	0.63 (1.39)	CRN	RLJ
		Alloy C276 (2.4819)			RLC
B	ANSI 1/2" MNPT, Bore 11.4 mm (0.45 in) = 400 bar (6 000 psi)	AISI 316L	0.63 (1.39)	CRN	RKJ
		Alloy C276 (2.4819)			RKC
C	ANSI 1/2" FNPT	AISI 316L	0.7 (1.54)	CRN	R1J
		Alloy C276 (2.4819)			R1C

- 1) CSA approval: Product Configurator, "Approval" ordering feature
- 2) Product Configurator, "Process connection" ordering feature

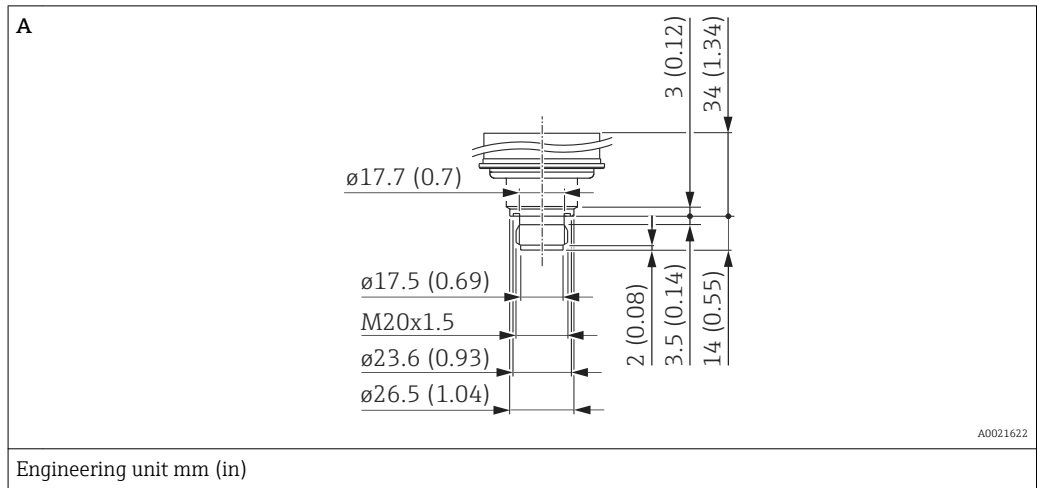
**PMP51: process connections
with flush-mounted process
isolating diaphragm** **ISO 228 G threaded connection**



Item	Designation	Material	Weight	Option ¹⁾
			kg (lb)	
A	Thread ISO 228 G 1/2" A DIN 3852 FKM form seal (item 1) pre-installed	AISI 316L	0.4 (0.88)	GRJ
		Alloy C276 (2.4819)		GRC
B	Thread ISO 228 G 1" A	AISI 316L	0.7 (1.54)	GTJ
C	Thread ISO 228 G 1 1/2" A	AISI 316L	1.1 (2.43)	GVJ
D	Thread ISO 228 G 2" A	AISI 316L	1.5 (3.31)	GWJ

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

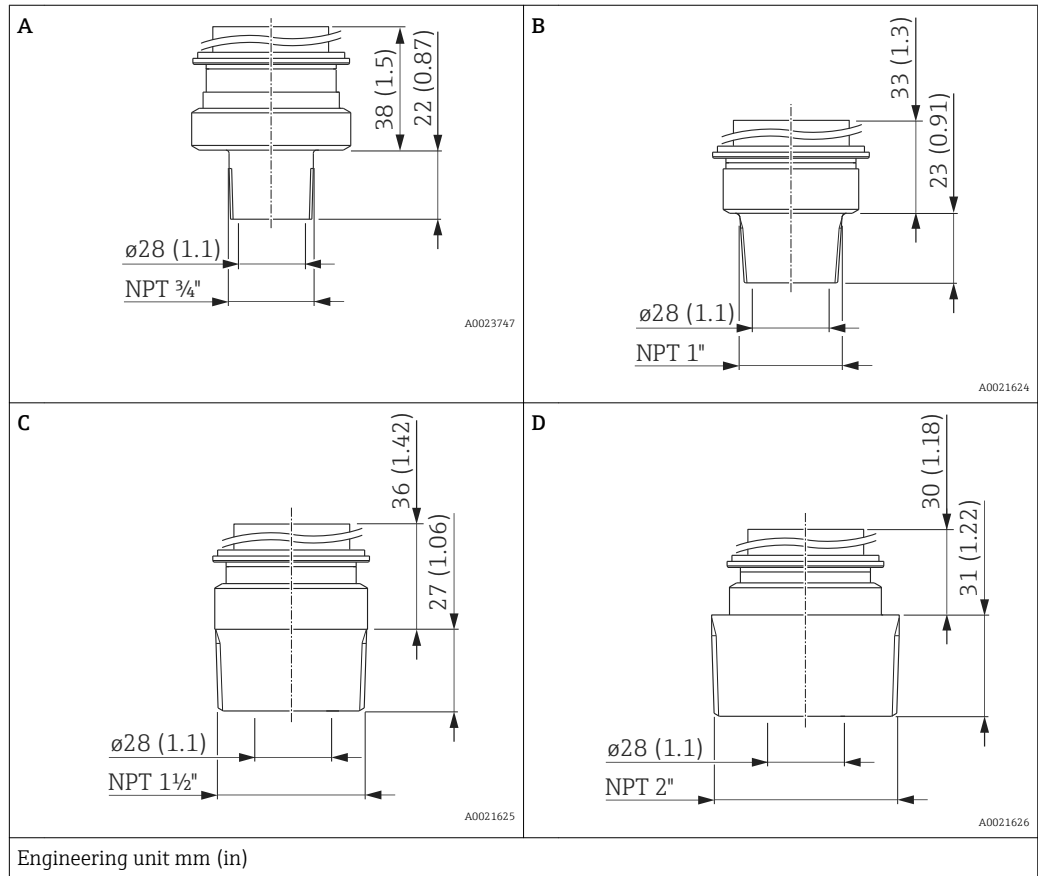
DIN 13 threaded connection



Designation	Material	Weight	Option ¹⁾
		kg (lb)	
DIN 13 M20 x 1.5	AISI 316L	0.6 (1.32)	G7J
	Alloy C276 (2.4819)		G8J

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

ANSI threaded connection

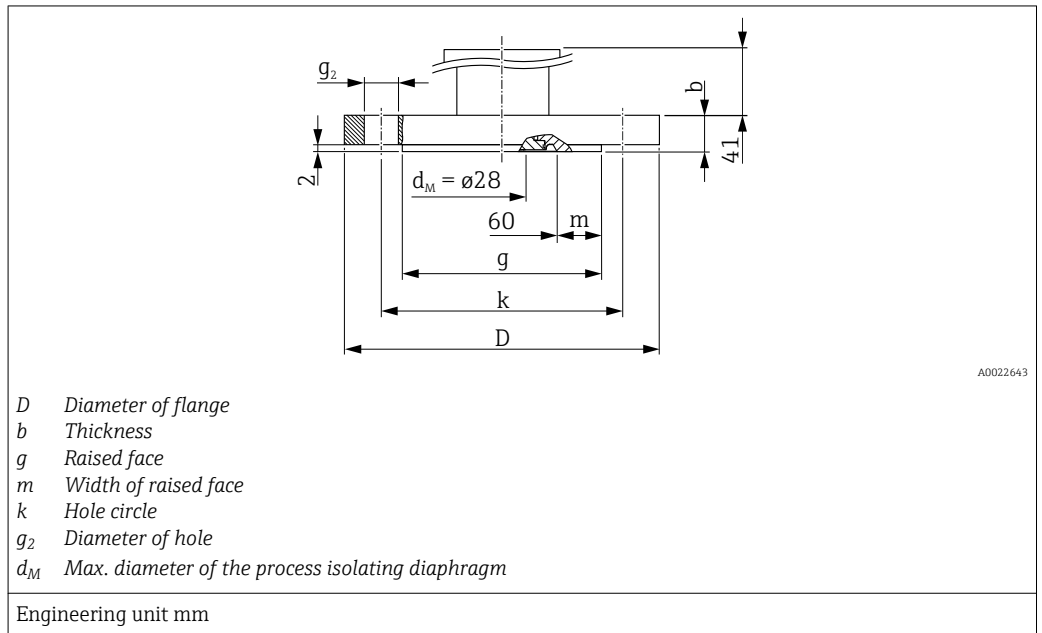


Position	Designation	Material	Weight	Approval ¹⁾	Option ²⁾
			kg (lb)		
A	ANSI 3/4" MNPT	AISI 316L	0.6 (1.32)	-	U4J
B	ANSI 1" MNPT		0.7 (1.54)	CRN	U5J
C	ANSI 1 1/2" MNPT		1 (2.21)	CRN	U7J
D	ANSI 2" MNPT		1.3 (2.87)	CRN	U8J

- 1) CSA approval: Product Configurator, order code for "Approval"
- 2) Product Configurator, "Process connection" section

PMP51: process connections with flush-mounted process isolating diaphragm

EN/DIN flanges, connection dimensions as per EN 1092-1/DIN 2527

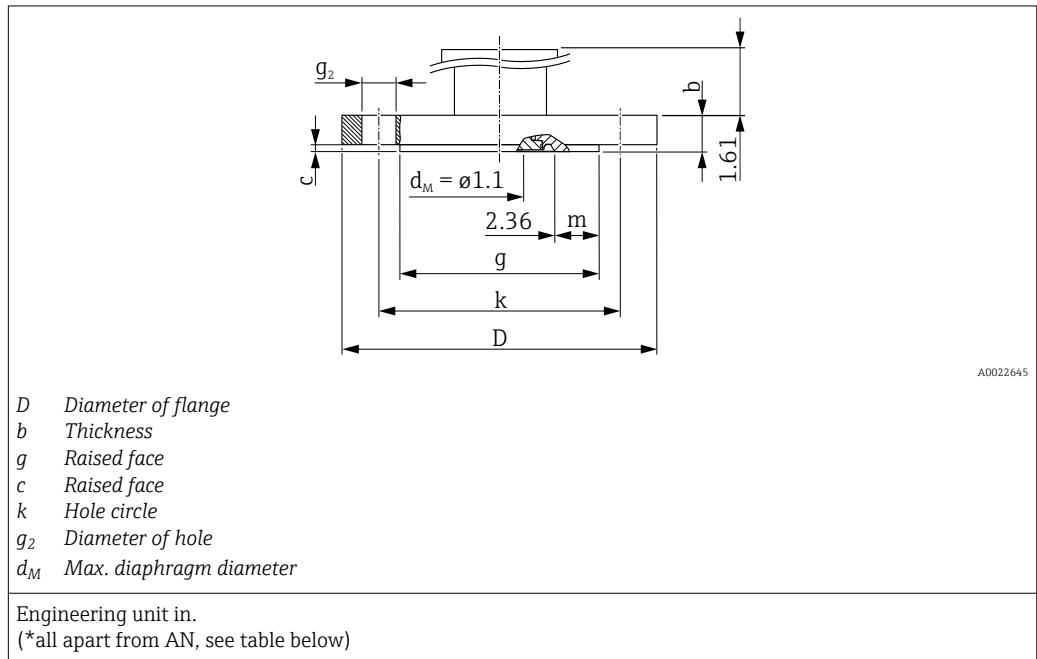


Flange ¹⁾			Boltholes							Weight Flange	Option ²⁾
Nominal diameter	Nominal pressure	Shape ³⁾	D	b	g	m	Quantity	g ₂	k		
			[mm]	[mm]	[mm]	[mm]		[mm]	[mm]	[kg (lb)]	
DN 25	PN 10-40	B1 (D)	115	18	68 ⁴⁾	4	4	14	85	1.2 (2.65)	CNJ
DN 32	PN 10-40	B1 (D)	140	18	78 ⁴⁾	9	4	18	100	1.9 (4.19)	CPJ
DN 40	PN 10-40	B1 (D)	150	18	88 ⁴⁾	14	4	18	110	2.2 (4.85)	CQJ
DN 50	PN 10-40	B1 (D)	165	20	102	-	4	18	125	3.0 (6.62)	CXJ
DN 80	PN 10-40	B1 (D)	200	24	138	-	8	18	160	5.3 (11.69)	CZJ

- 1) Material: AISI 316L
- 2) Product Configurator, "Process connection" section
- 3) Description as per DIN 2527 provided in brackets
- 4) With these process connections the raised face is smaller than described in the standard. Due to the smaller raised face, a special seal must be used.

PMP51: process connections with flush-mounted process isolating diaphragm

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

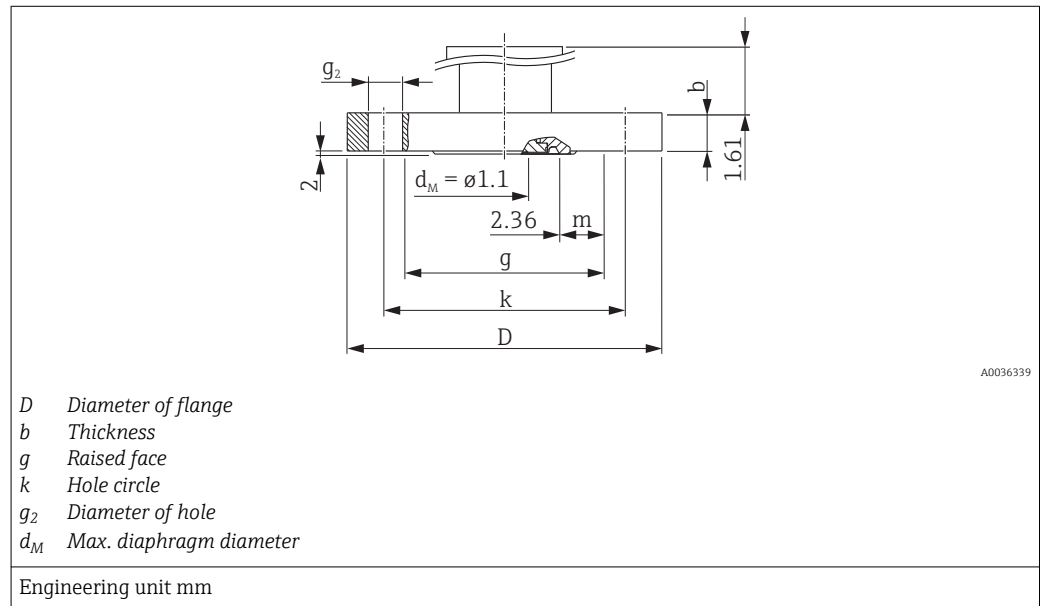


Flange ¹⁾							Boltholes			Weight	Approval ²⁾	Option ³⁾
Nominal diameter	Class/nominal pressure	D	b	g	c	m	Quantity	<i>g₂</i>	k			
[in]	lb./sq.in	[in]	[in]	[in]	[in]	[in]		[in]	[in]	[kg (lb)]		
1	300	4.88	0.69	2 ⁴⁾	0.06	0.2	4	0.75	3.5	1.3 (2.87)	CRN	ANJ
1 ½	150	5	0.69	2.88 ⁴⁾	0.08	0.52	4	0.62	3.88	1.5 (3.31)	CRN	AEJ
1 ½	300	6.12	0.81	2.88 ⁴⁾	0.08	0.52	4	0.88	4.5	2.6 (5.73)	CRN	AQJ
2	150	6	0.75	3.62	0.08	-	4	0.75	4.75	2.4 (5.29)	CRN	AFJ
2	300	6.5	0.88	3.62	0.08	-	8	0.75	5	3.2 (7.06)	CRN	ARJ
3	150	7.5	0.94	5	0.08	-	4	0.75	6	4.9 (10.8)	CRN	AGJ
3	300	8.25	1.12	5	0.08	-	8	0.88	6.62	6.7 (14.77)	CRN	ASJ
4	150	9	0.94	6.19	0.08	-	8	0.75	7.5	7.1 (15.66)	CRN	AHJ
4	300	10	1.25	6.19	0.08	-	8	0.88	7.88	11.6 (25.88)	CRN	ATJ

- 1) Material: AISI 316/316L; Combination of AISI 316 for required pressure resistance and AISI 316L for required chemical resistance (dual rated)
- 2) CSA approval: Product Configurator, "Approval" ordering feature
- 3) Product Configurator, "Process connection" section
- 4) With these process connections the raised face is smaller than described in the standard. Due to the smaller raised face, a special seal must be used.

PMP51: process connections with flush-mounted process isolating diaphragm

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

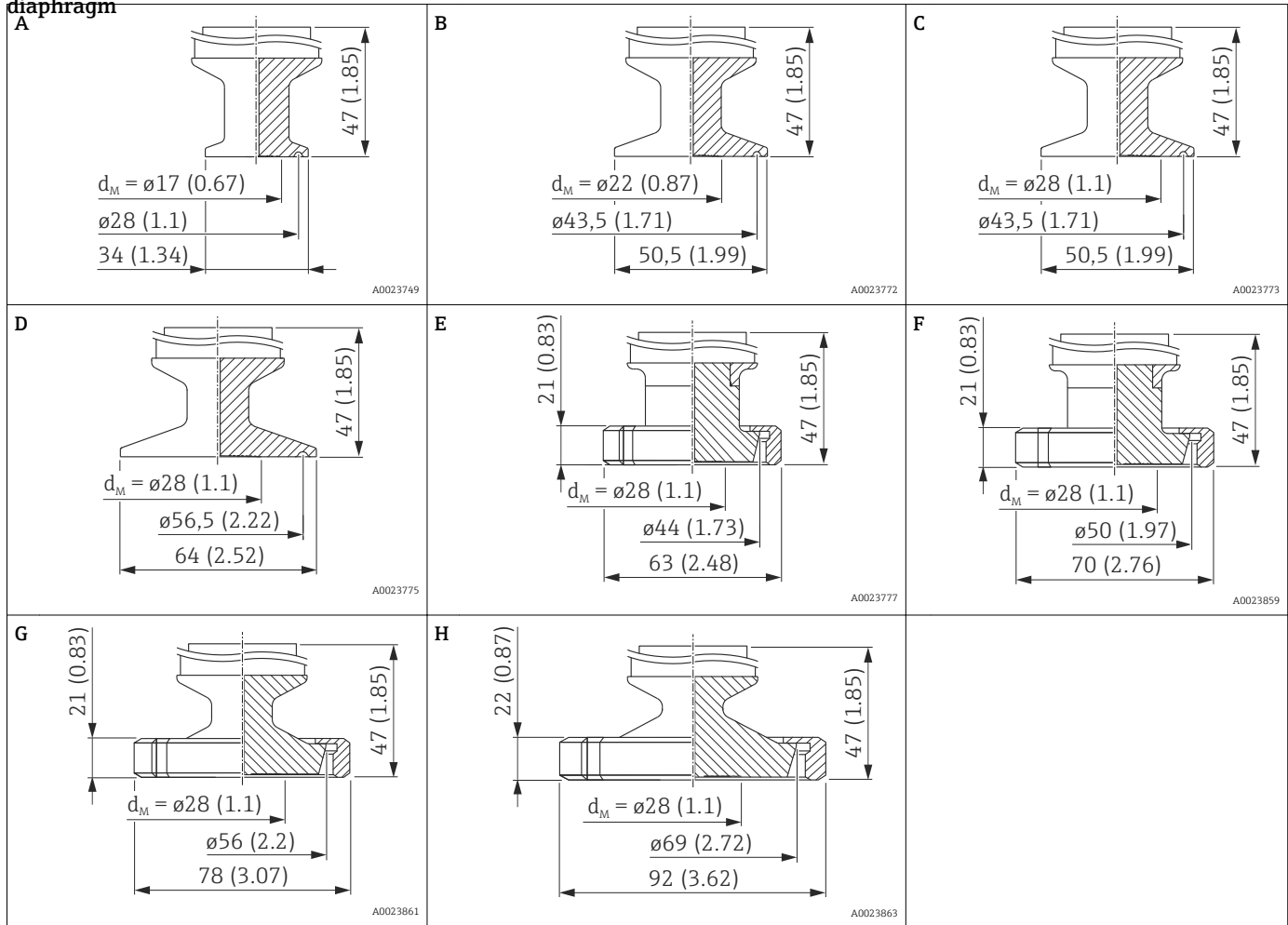


Flange ¹⁾						Boltholes			Weight	Option ²⁾
Nominal diameter	Class/nominal pressure	D	b	g	m	Number	g ₂	k		
		[mm]	[mm]	[mm]	[mm]		[mm]	[mm]	[kg (lb)]	
DN										
DN50	40 bar	165	20	102	27.5	4	18	125	3 (6.6)	7HJ
DN80	40 bar	200	24	138	45.5	8	18	160	5.5 (12.13)	7KJ
[in]										
2"	150lb./sq.in	150	17.5	92.1	22.55	4	18	120.7	2.2 (4.85)	7PJ
2"	300 lb./sq.in	165	20.7	92.1	22.55	8	18	127	3 (6.62)	7RJ
3"	150 lb./sq.in	190	22.3	127	40	4	18	152.4	4.7 (10.36)	7VJ
3"	300 lb./sq.in	210	27	127	40	8	22	168.3	6.6 (14.55)	7XJ

1) Material: AISI 316L

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

PMP51: hygienic process connections with flush mount process isolating diaphragm



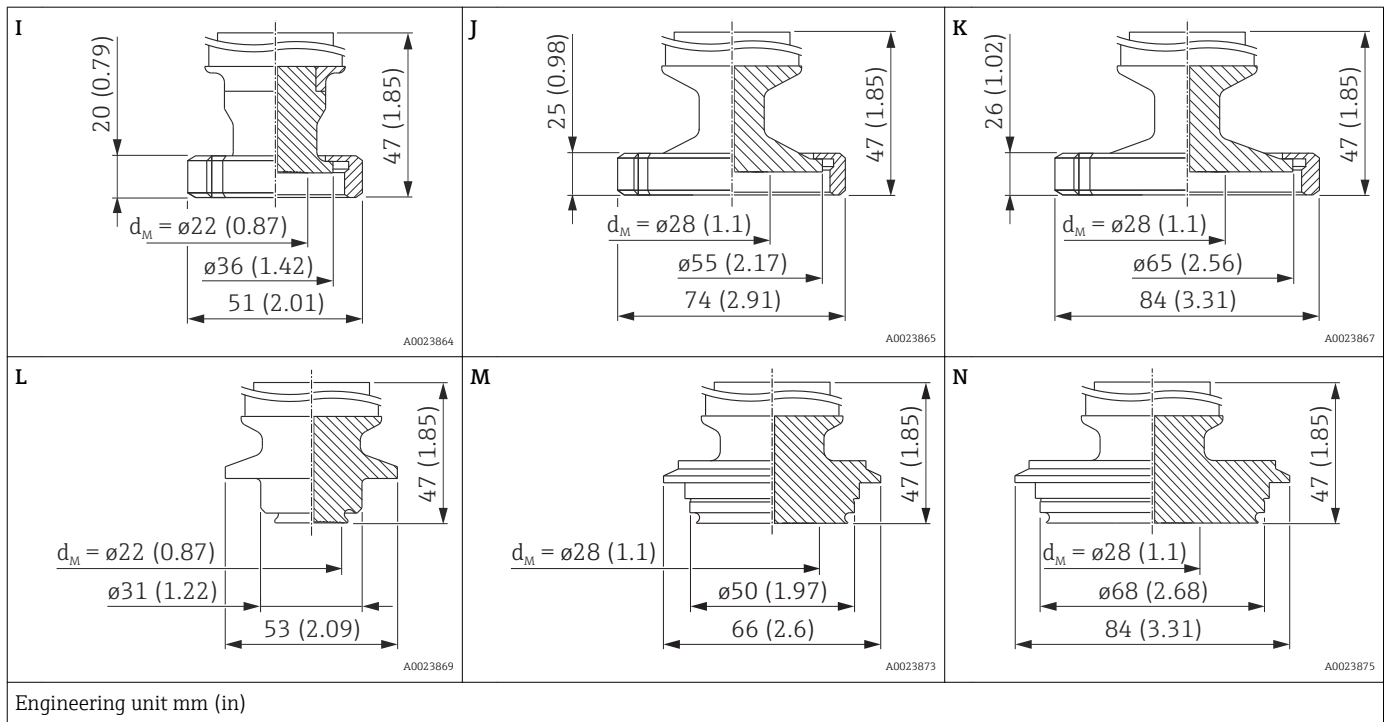
Engineering unit mm (in)

Item ^{1) 2)}	Designation	Nominal pressure	Weight	Approval	Option ³⁾
			kg (lb)		
A	Clamp ISO2852, DN 18-22, DIN 32676 DN 15-20	PN 40	0.5 (1.10)	EHEDG, 3A, ASME-BPE	TBJ
B	Tri-Clamp ISO2852 DN 25 (1"), DIN 32676 DN 25	PN 40	0.6 (1.32)	EHEDG, 3A, ASME-BPE	TCJ
C	Tri-Clamp ISO2852 DN 38 (1½"), DIN 32676 DN 40	PN 40	0.6 (1.32)	EHEDG, 3A, ASME-BPE	TJJ
D	Tri-Clamp ISO2852 DN 40-51 (2"), DIN 32676 DN 50	PN 40	0.7 (1.54)	EHEDG, 3A, ASME-BPE	TDJ
E	DIN 11851 DN 25	PN 40	0.7 (1.54)	EHEDG, 3A, ASME-BPE	MXJ
F	DIN 11851 DN 32	PN 40	0.8 (1.76)	EHEDG, 3A, ASME-BPE	MIJ
G	DIN 11851 DN 40	PN 40	0.9 (1.98)	EHEDG, 3A, ASME-BPE	MZJ
H	DIN 11851 DN 50	PN 25	1.1 (2.43)	EHEDG, 3A, ASME-BPE	MRJ

1) Material: AISI 316L (1.4435)

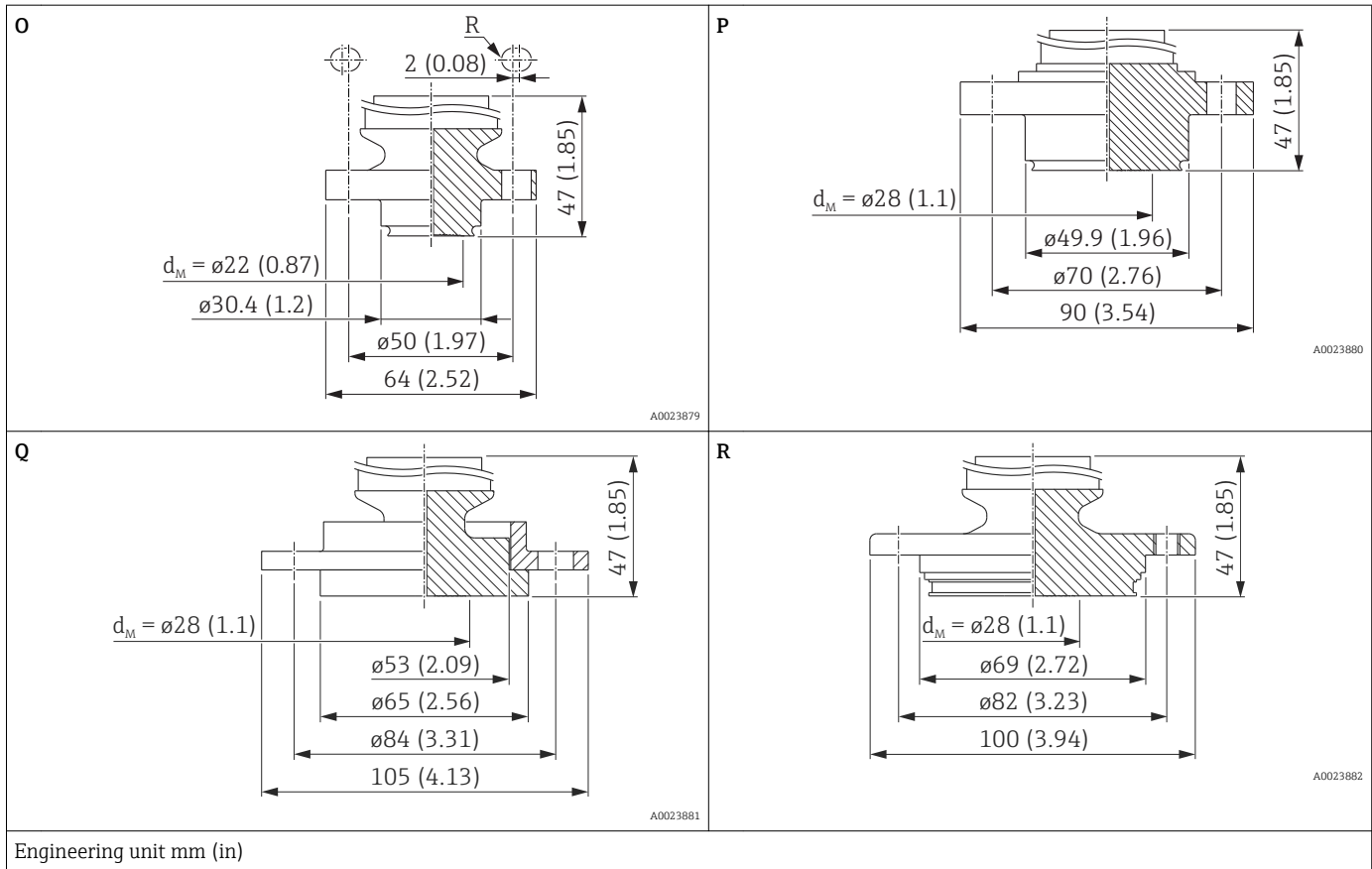
2) The roughness of the surface in contact with the medium is $R_a 0.76 \mu\text{m}$ (30 μin). Optionally available as an ASME-BPE-compliant version for use in biochemical processes, wetted surfaces $R_a 0.38 \mu\text{m}$ (15 μin), electropolished; to be ordered using order feature 570 "Service", option "HK" in the order code.

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



Item ^{1) 2)}	Designation	Nominal pressure	Weight	Approval	Option ³⁾
			kg (lb)		
I	SMS 1"	PN 25	0.7 (1.54)	3A, ASME-BPE	T6J
J	SMS 1½"	PN 25	0.8 (1.76)	3A, ASME-BPE	T7J
K	SMS 2"	PN 25	0.9 (1.98)	3A, ASME-BPE	TXJ
L	Varivent B pipe DN 10-15	PN 40	0.7 (1.54)	EHEDG, 3A, ASME-BPE	TPJ
M	Varivent F pipe DN 25-32	PN 40	0.9 (1.98)	EHEDG, 3A, ASME-BPE	TQJ
N	Varivent N pipe DN 40-162	PN 40	1.1 (2.43)	EHEDG, 3A, ASME-BPE	TRJ

- 1) Material: AISI 316L (1.4435)
- 2) The roughness of the surface in contact with the medium is $R_a 0.76 \mu\text{m}$ (30 μin). Optionally available as an ASME-BPE-compliant version for use in biochemical processes, wetted surfaces $R_a 0.38 \mu\text{m}$ (15 μin), electropolished; to be ordered using order feature 570 "Service", option "HK" in the order code.
- 3) Product Configurator, order code for "Process connection"

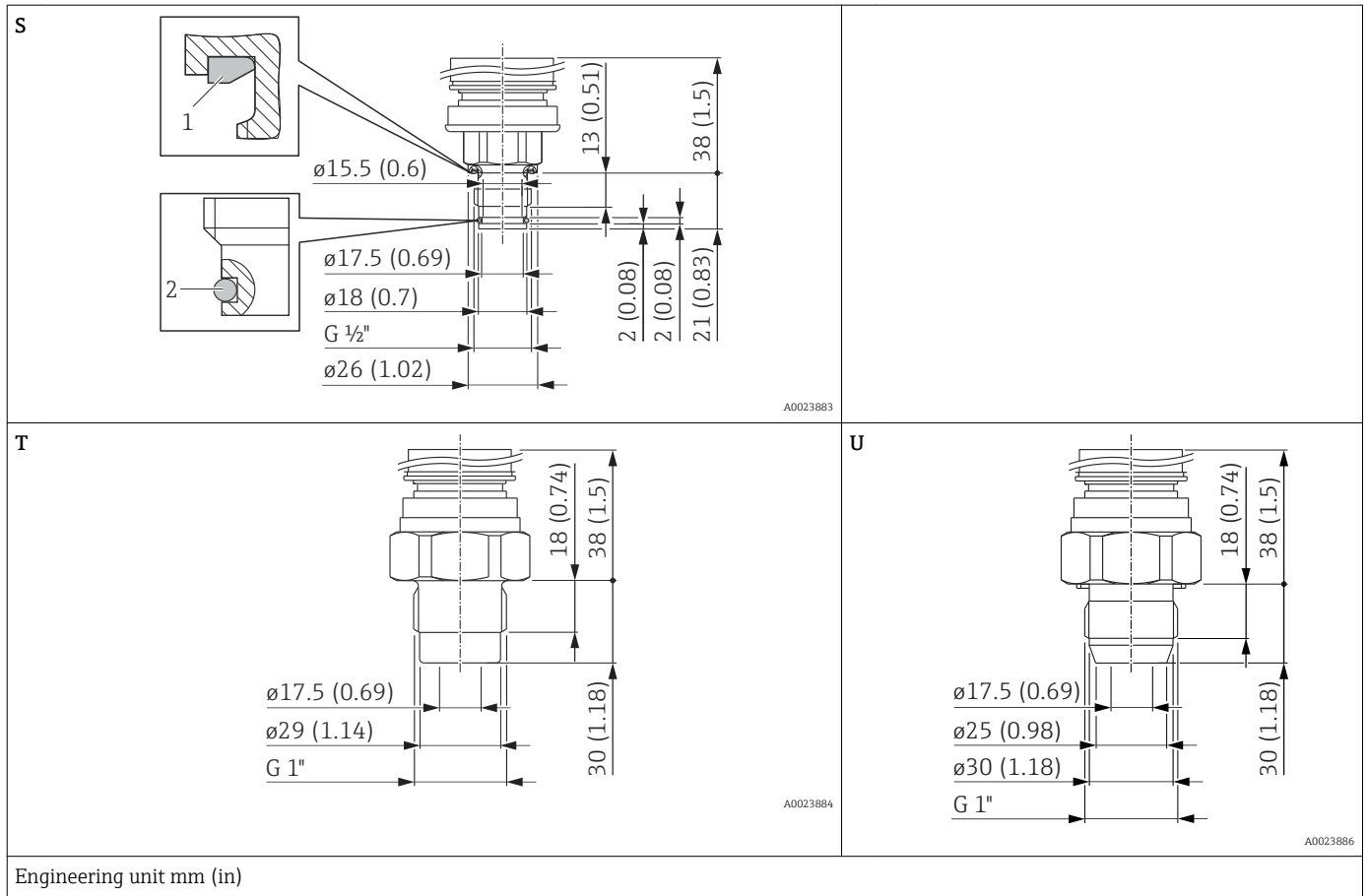


Item ^{1) 2)}	Designation	Nominal pressure	Boltholes		Weight kg (lb)	Approval	Option ³⁾
			Number	Diameter			
				mm (in)			
O	NEUMO BioControl D 25	PN 16	4	R: 3.5 (0.14)	0.8 (1.76)	EHEDG, 3A, ASME-BPE	S1J
P	NEUMO BioControl D 50	PN 16	4	9 (0.35)	1.2 (2.65)	EHEDG, 3A, ASME-BPE	S4J
Q	DRD DN 50	PN 25	4	11.5 (0.45)	1.0 (2.21)	ASME-BPE	TIJ
R	APV Inline DN 50	PN 40	6	8.6 (0.34)	1.2 (2.65)	EHEDG, 3A, ASME-BPE	TPJ
			2	M8			

1) Material: AISI 316L (1.4435)

2) The roughness of the surface in contact with the medium is $R_a 0.76 \mu\text{m}$ (30 μin). Optionally available as an ASME-BPE-compliant version for use in biochemical processes, wetted surfaces $R_a 0.38 \mu\text{m}$ (15 μin), electropolished; to be ordered using order feature 570 "Service", option "HK" in the order code.

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

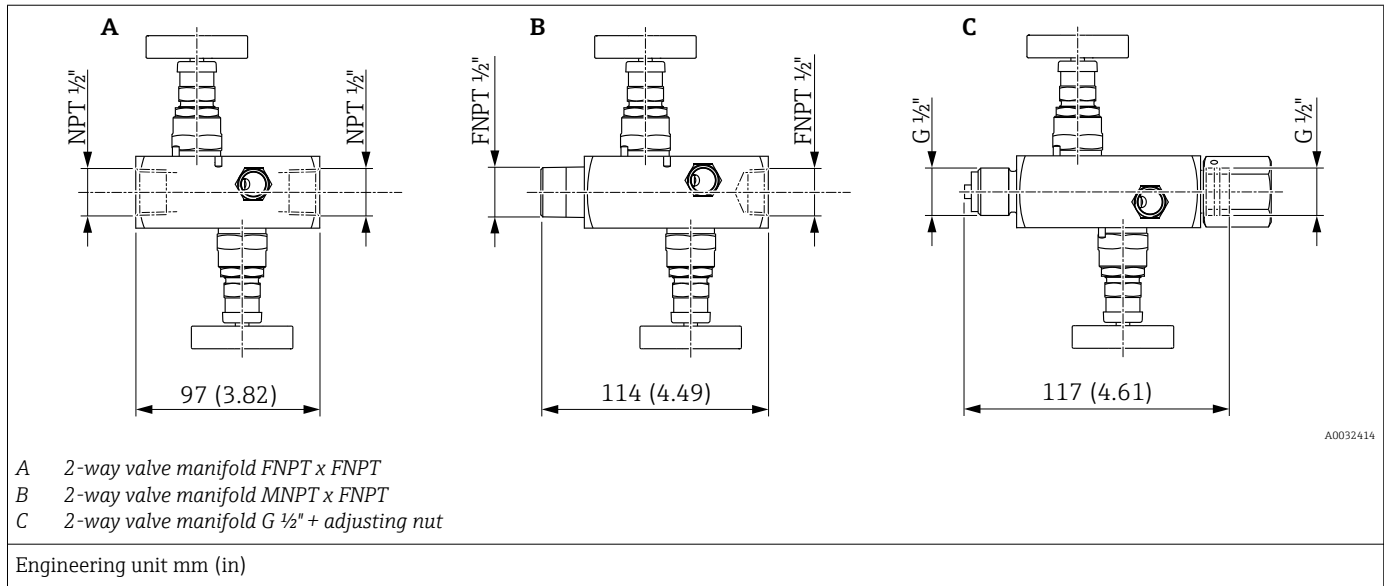


Item ^{1) 2)}	Designation	Seal		Nominal pressure	Weight kg (lb)	Approval	Option ³⁾
		Item	Designation				
S	Thread ISO228 G $\frac{1}{2}"$	1	FKM form seal pre-installed	PN 40	0.5 (1.1)	ASME-BPE	GOJ
		2	FKM O-ring pre-installed				
T	Thread ISO228 G1"	-	Sealing via O-ring. VMQ O-ring included with the accessories QE and QF.	PN 40	0.8 (1.76)	3A, ASME-BPE	GZj ⁴⁾
U	Thread ISO228 G1"	1	Metal joint	PN 100	0.8 (1.76)	ASME-BPE	GXJ

- 1) Material: AISI 316L (1.4435)
- 2) The roughness of the surface in contact with the medium is $R_a 0.76 \mu\text{m}$ (30 μin). Optionally available as an ASME-BPE-compliant version for use in biochemical processes, wetted surfaces $R_a 0.38 \mu\text{m}$ (15 μin), electropolished; to be ordered using order feature 570 "Service", option "HK" in the order code.
- 3) Product Configurator, order code for "Process connection"
- 4) EHEDG in combination with EHEDG certified process adapter or weld in adapter; for details see TI00426F.

**Valve manifold DA63M-
(optional)**

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



2-way valve manifolds in 316L or AlloyC can be

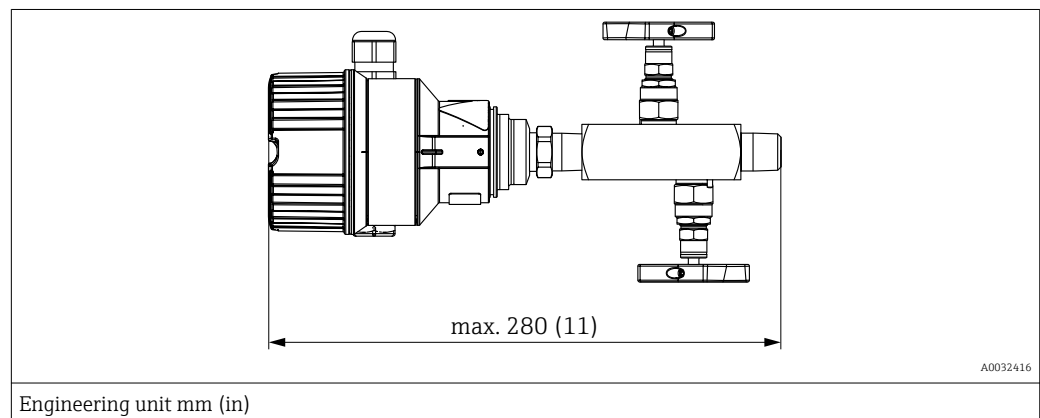
- ordered as an **enclosed** accessory (seal for mounting is enclosed)
- ordered as a **mounted** accessory (mounted valve manifolds are supplied with a documented leakage test).

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.

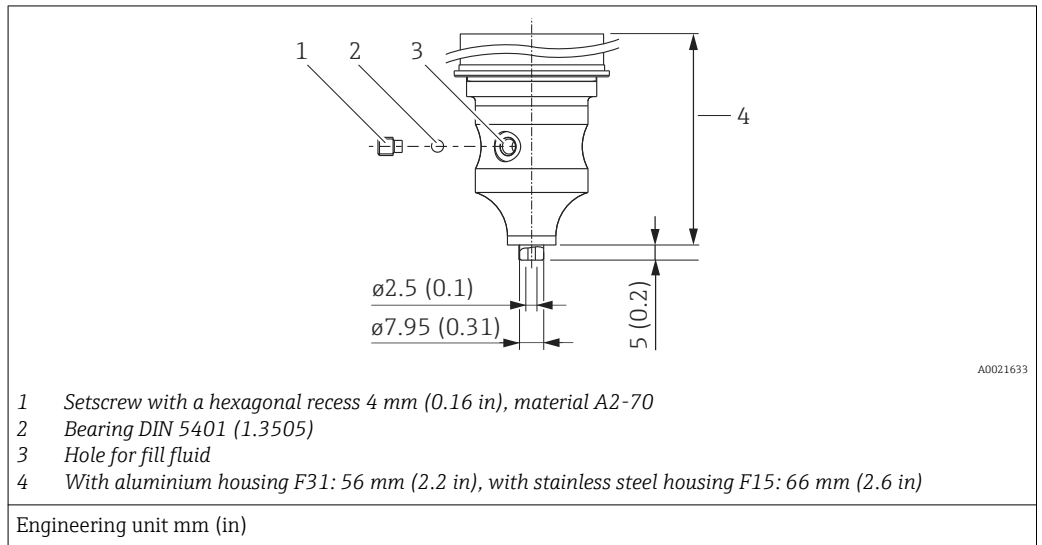
Mounting on valve manifold



Ordering information:

Product Configurator, order code for "Accessories mounted".

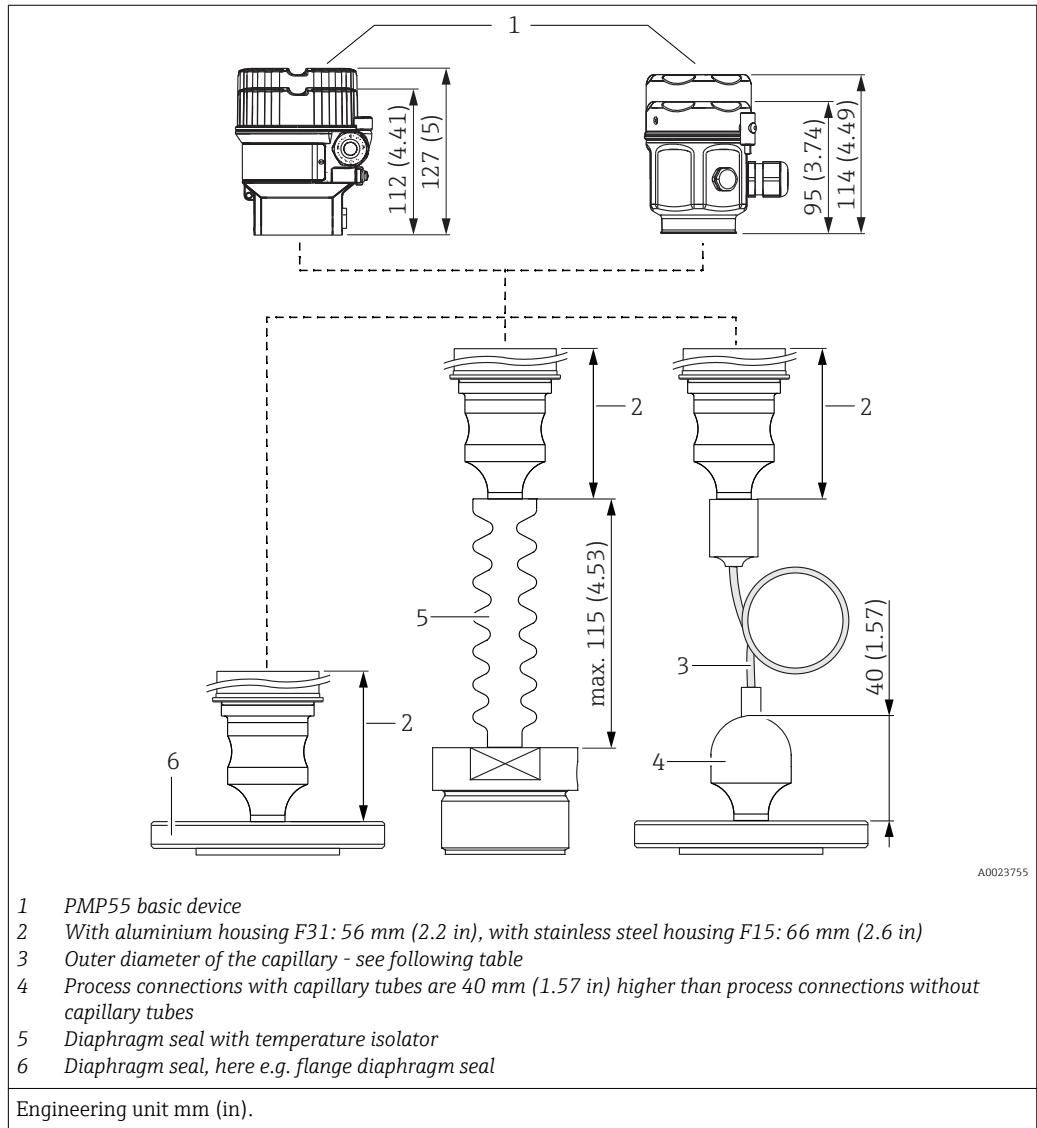
PMP51: process connections **Prepared for diaphragm seal mount**



Material	Designation	Weight kg (lb)	Approval ¹⁾	Option ²⁾
AISI 316L (1.4404)	Prepared for diaphragm seal mount	1.9 (4.19)	CRN	XSJ

- 1) CSA approval: Product Configurator, "Approval" ordering feature
- 2) Product Configurator, "Process connection" ordering feature

PMP55 basic device - examples



Outer diameter of capillary

Designation	Outer diameter
Flexible armor made from 316L	8 mm (0.31 in)
Flexible armor with PVC-coating	10 mm (0.39 in)
Flexible armor with PTFE-coating	12.5 mm (0.49 in)

Diaphragm seal connection

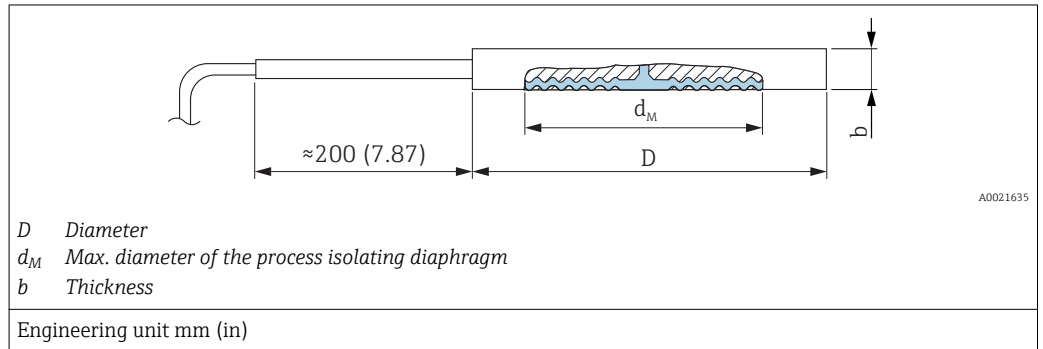
Designation	OptionProduct Configurator, "Diaphragm seal connection" ordering feature
Direct	A
Temperature isolator	B
..... m capillary	D
..... ft capillary	E

Process connections for PMP55 with flush-mounted process isolating diaphragm



- The weights of the diaphragm seals are given in the tables. For weight of housing, see → 48
- The following drawings are schematic diagrams. 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 → 113
- For further information please contact your local Endress+Hauser Sales Center.

Diaphragm seal cell structure (Pancake)

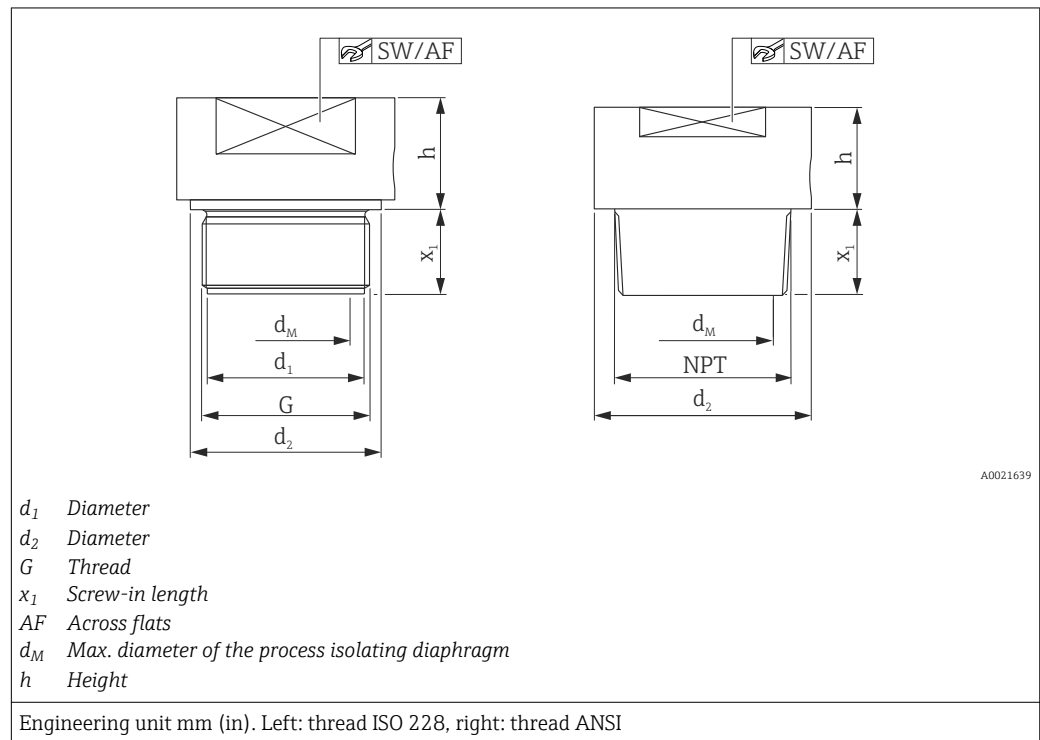


Flange			Diaphragm seal				Approval ¹⁾	Option ²⁾
Material	Nominal diameter	Nominal pressure ³⁾	D	b	d _M	Weight		
			[mm]	[mm]	[mm]	[kg (lb)]		
AISI 316L	DN 50	PN 16-400 ⁴⁾	102	20	59	1.3 (2.87)	-	UIJ ⁵⁾
	DN 80	PN 16-400 ⁴⁾	138	20	89	2.3 (5.07)	-	UIJ ⁵⁾
	DN 100	PN 16-400 ⁴⁾	162	20	89	3.1 (6.84)	-	UKJ
	[in]	[lb/sq.in]	[in (mm)]	[in (mm)]	[in (mm)]			
	2	150-2500	3.89 (99)	0.79 (20)	2.32 (59)	1.3 (2.87)	CRN	ULJ ⁵⁾
	3	150-2500	5.00 (127)	0.79 (20)	3.50 (89)	2.3 (5.07)	CRN	UMJ ⁵⁾
4	150-2500	6.22 (158)	0.79 (20)	3.50 (89)	3.1 (6.84)	CRN	URJ	

- 1) CSA approval: Product Configurator, order code for "Approval"
- 2) Product Configurator, order code for "Process connection"
- 3) The specified nominal pressure applies to the diaphragm seal. The maximum pressure for the measuring device is dependent on the lowest-rated element, with regard to pressure, of the selected components → 47.
- 4) For PTFE coating MWP = 250 bar (3 625 psi), for details, see "Range of application of the PTFE foil" → 46
- 5) With TempC Membrane.

PMP55: process connections with flush-mounted process isolating diaphragm

Thread ISO 228 and ANSI



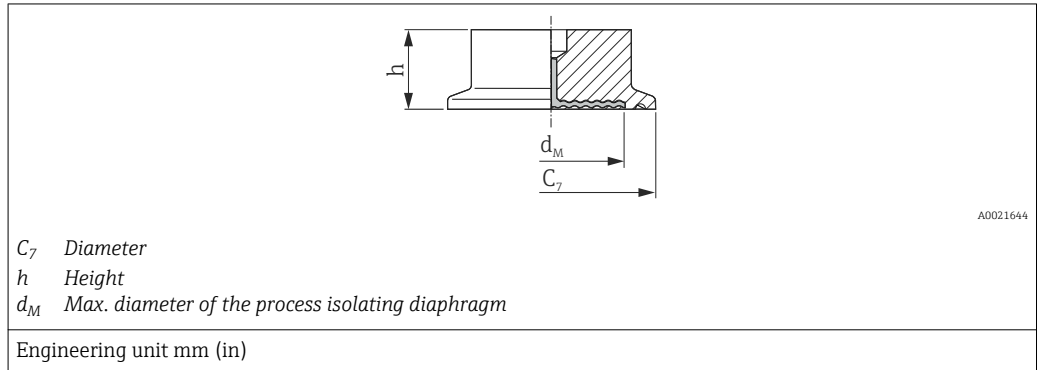
Threaded connection							Diaphragm seal			Approval ¹⁾	Option ²⁾
Material	G	Nominal pressure	d ₁	d ₂	x ₁	SW/AF	d _M	h	Weight		
		PN	[mm]	[mm]	[mm]		[mm]	[mm]	[kg (lb)]		
AISI 316L	G 1" A	400	30	39	21	41	30	19	0.4 (0.88)	-	GTJ
Alloy C276									0.5 (1.1)	-	GTC
AISI 316L	G 1 ½" A	400	44	55	30	50	42	20	0.9 (1.98)	-	GVJ
Alloy C276									1.0 (2.21)	-	GVC
AISI 316L	G 2"	400	56	68	30	65	50	20	1.9 (4.19)	-	GWJ
Alloy C276									2.1 (4.63)	-	GWC
AISI 316L	1" MNPT	400	-	45	28	41	24	17	0.6 (1.32)	CRN	U5J
Alloy C276									0.7 (1.54)	CRN	U5C
AISI 316L	1 ½" MNPT	400	-	60	30	41	36	20	0.9 (1.98)	CRN	U7J
Alloy C276				52	30	46	32	20	1.0 (2.21)	CRN	U7C
AISI 316L	2" MNPT	400	-	78	30	65	38	35	1.8 (3.97)	CRN	U8J
Alloy C276									2.0 (4.41)	CRN	U8C

1) CSA approval: Product Configurator, order code for "Approval"

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

PMP55: process connections with flush-mounted process isolating diaphragm

Tri-Clamp ISO 2852



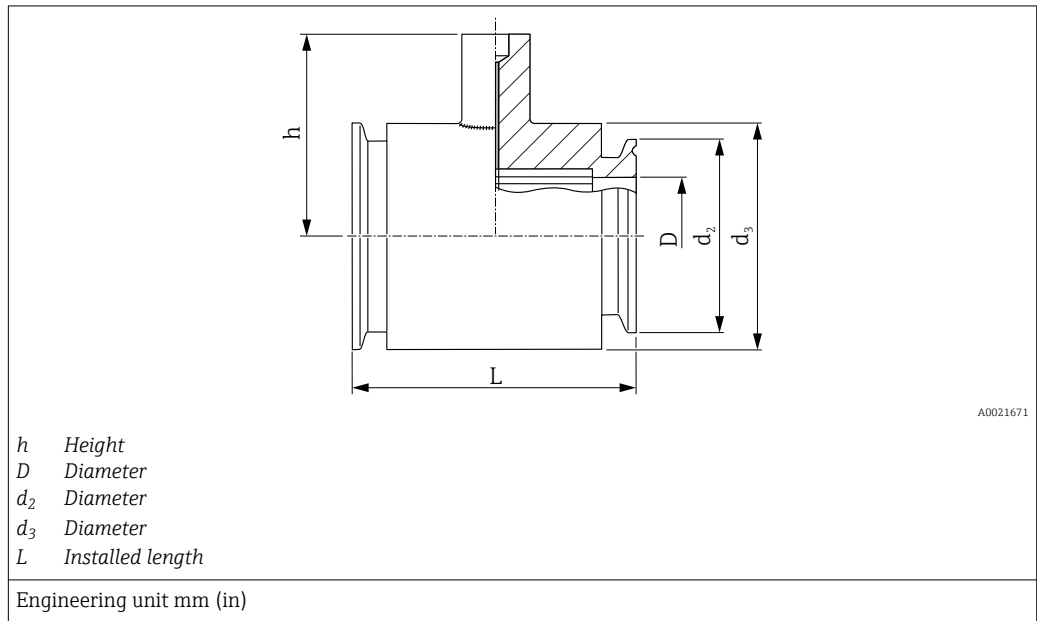
Material ¹⁾	Nominal diameter ISO 2852	Nominal diameter DIN 32676	Nominal diameter [in]	C_7 [mm]	d_M		h [mm]	Weight [kg (lb)]	Approval ²⁾	Option ³⁾
					Standard	With TempC Membrane				
					[mm]	[mm]				
AISI 316L	ND 25 / 33.7	DN 25	1	50.5	24	-	37	0.32 (0.71)	EHEDG, 3A, CRN, ASME-BPE	TCJ
	ND 38	DN 40	1 ½	50.5	36	36	30	1 (2.21)	EHEDG, 3A, CRN, ASME-BPE	TJJ ^{4) 5)}
	ND 51 / 40	DN 50	2	64	48	41	30	1.1 (2.43)	EHEDG, 3A, CRN, ASME-BPE	TDJ ^{4) 5)}
	ND 63.5	-	2 ½	77.5	61	61	30	0.7 (1.54)	EHEDG, 3A, ASME-BPE	TEJ ⁶⁾
	ND 76.1	-	3	91	73	61	30	1.2 (2.65)	EHEDG, 3A, CRN, ASME-BPE	TFJ ⁵⁾

- 1) Surface roughness of the surfaces in contact with the medium $R_a < 0.76 \mu\text{m}$ (29.9 μin) as standard. Lower surface roughness available on request
- 2) CSA approval: Product Configurator, order code for "Approval"
- 3) Product Configurator, order code for "Process connection"
- 4) Process connections without TempC Membrane: optionally available as ASME-BPE-compliant diaphragm seal version for use in biochemical processes, wetted surfaces $R_a < 0.38 \mu\text{m}$ (15 μin), electropolished (the electropolished version with nominal diameter DN 40 / 1 ½ inch has a standard diameter d_M of 35 mm); ordering information: Product Configurator, order code for "Service", option HK
- 5) Alternatively available with TempC Membrane.
- 6) With TempC Membrane

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

PMP55: process connections with flush-mounted process isolating diaphragm

Pipe diaphragm seal Tri-Clamp ISO 2852

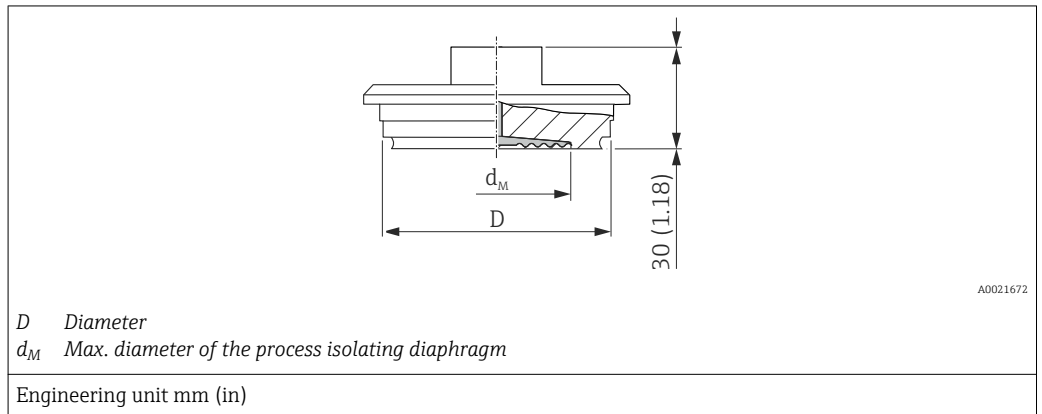


Material ¹⁾	Nominal diameter ISO 2852	Nominal diameter	Nominal pressure	D	d ₂	d ₃	h	L	Weight	Approval ²⁾	Option ³⁾
		[in]		[mm]	[mm]	[mm]	[mm]	[mm]			
AISI 316L	DN 10	¾	PN 40	10.5	25	34	41.5	140	0.6 (1.32)	3A, CRN	SIJ
	DN 25	1	PN 40	22.5	50.5	54	67	126	1.7 (3.75)	3A, CRN	SBJ
	DN 38	1 ½	PN 40	35.5	50.5	69	67	126	1.0 (2.21)	3A, CRN	SCJ ⁴⁾
	DN 51	2	PN 40	48.6	64	78	79	100	1.7 (3.75)	3A, CRN	SDJ ⁴⁾

- 1) Surface roughness of the surfaces in contact with the medium $R_a < 0.76 \mu\text{m}$ (29.9 μin) as standard.
- 2) CSA approval: Product Configurator, order code for "Approval"
- 3) Product Configurator, order code for "Process connection"
- 4) incl. 3.1 and pressure test according to Pressure Equipment Directive, Category II

PMP55: hygienic process connections with flushmounted process isolating diaphragm

Varivent for pipes

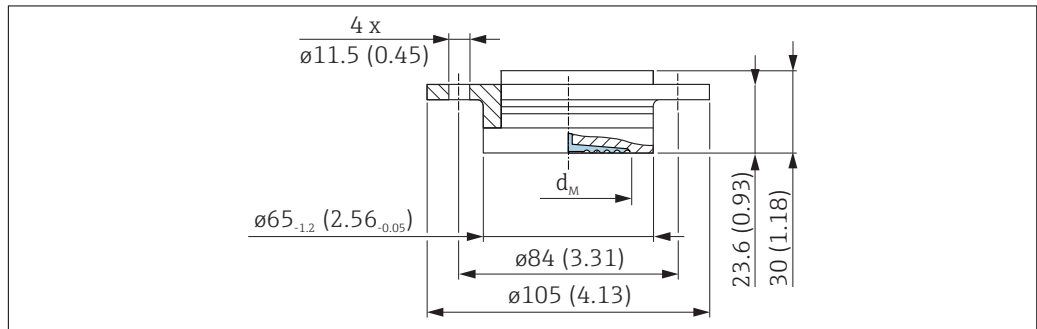


Material ¹⁾	Designation	Nominal pressure	D	d _M		Weight	Approval	Option ²⁾
				Standard	With TempC diaphragm			
				[mm]	[mm]			
AISI 316L	Type F for tubes DN 25 - DN 32	PN 40	50	34	36	0.4 (0.88)	EHEDG, 3A, ASME-BPE	TQJ ³⁾
AISI 316L	Type N for tubes DN 40 - DN 162	PN 40	68	58	61	0.8 (1.76)	EHEDG, 3A, ASME-BPE	TRJ ^{4) 3)}

- 1) Surface roughness of the wetted surfaces $R_a < 0.76 \mu\text{m}$ (29.9 μin) as standard.
- 2) Product Configurator, order code for "Process connection"
- 3) Alternatively available with TempC diaphragm.
- 4) Diaphragm seal versions optionally in conformity with ASME-BPE for use in biochemical processes, wetted surfaces $R_a < 0.38 \mu\text{m}$ (15 μin) , electropolished; ordering information: Product Configurator "Service" ordering feature, option HK. In combination with the "Electropolished" option, the wetted parts of the Varivent connection type N are made of 316L (1.4435).

PMP55: hygienic process connections with flush mount process isolating diaphragm

DRD DN50 (65 mm)



A0021673

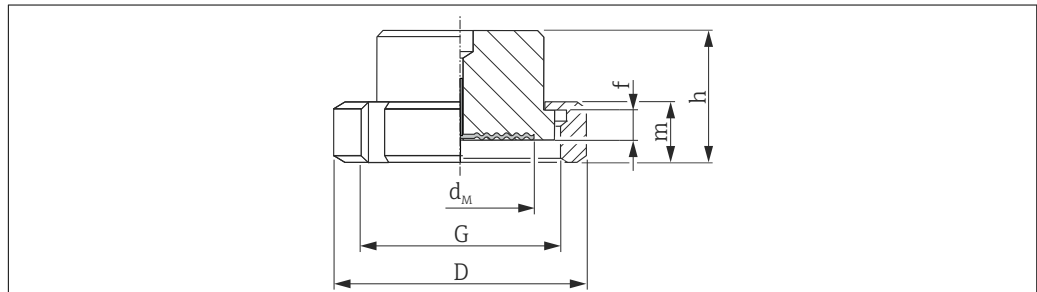
d_M Max. diameter of the process isolating diaphragm

Engineering unit mm (in)

Material ¹⁾	Nominal pressure	d_M		Weight	Option ²⁾
		Standard	With TempC Membrane		
		[mm]	[mm]	[kg (lb)]	
AISI 316L	PN 25	50	48	0.75 (1.65)	TIJ ³⁾

- 1) Surface roughness of the surfaces in contact with the medium $R_a < 0.76 \mu\text{m}$ (29.9 μin) as standard.
- 2) Product Configurator, order code for "Process connection"
- 3) Alternatively available with TempC Membrane.

SMS nozzles with coupling nut



A0021674

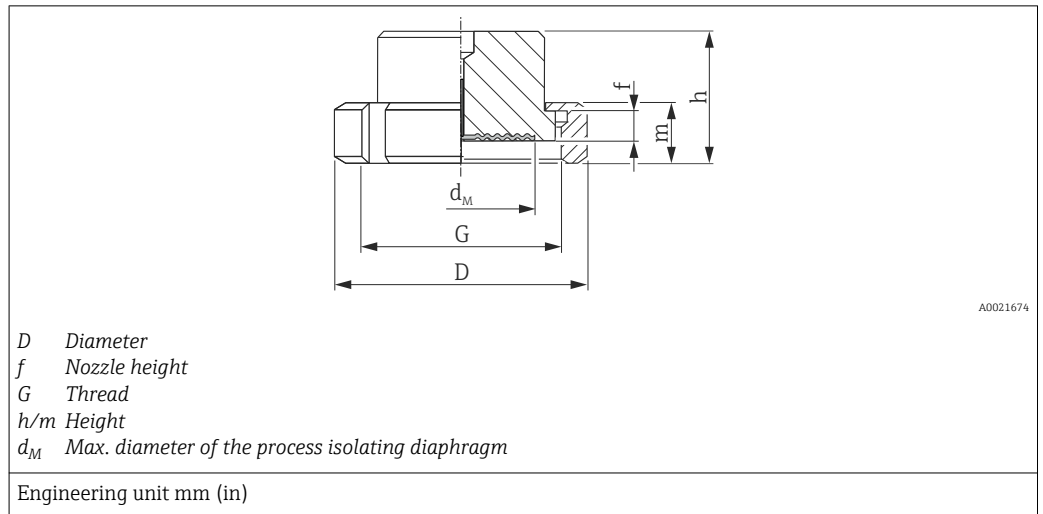
D Diameter
 f Nozzle height
 G Thread
 h Height
 m Height
 d_M Max. diameter of the process isolating diaphragm

Engineering unit mm (in)

Material ¹⁾	Nominal diameter	Nominal pressure	D	f	G	m	h	d_M	Weight	Approval	Option ²⁾
			[mm]	[mm]		[mm]	[mm]	[mm]			
AISI 316L	1	PN 25	54	3.5	Rd 40 - 1/6	20	42.5	24	0.25 (0.55)	3A, ASME-BPE	T6J
	1 ½	PN 25	74	4	Rd 60 - 1/6	25	57	36	0.65 (1.43)		T7J ³⁾
	2	PN 25	84	4	Rd 70 - 1/6	26	62	48	1.05 (2.32)		TXJ ³⁾

- 1) Surface roughness of the surfaces in contact with the medium $R_a < 0.76 \mu\text{m}$ (29.9 μin) as standard.
- 2) Product Configurator, order code for "Process connection"
- 3) Alternatively available with TempC Membrane.

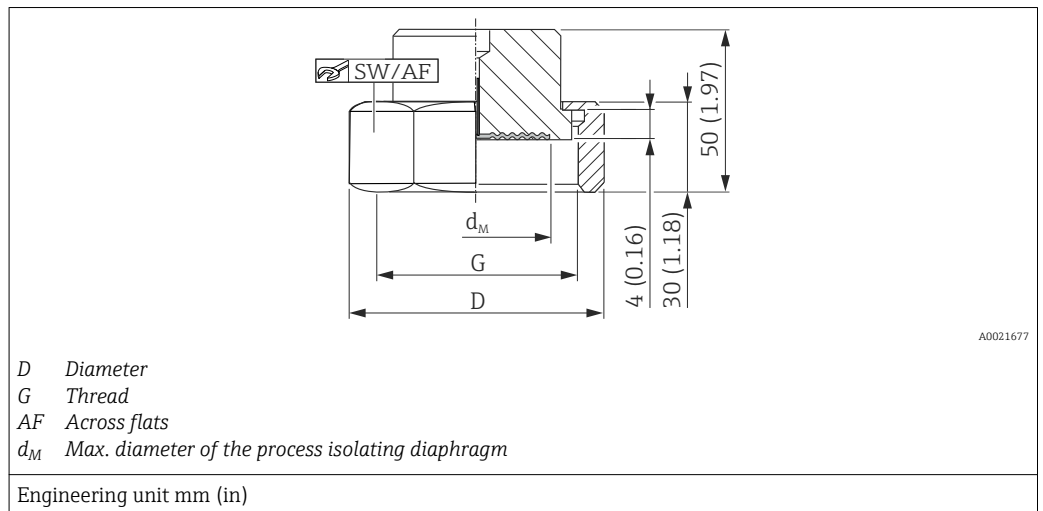
APV-RJT nozzles with coupling nut



Material ¹⁾	Nominal diameter	Nominal pressure	D	f	G	m	h	d_M	Weight	Option ²⁾
	[in]	[bar]								
AISI 316L	1	PN 40	77	6.5	1 13/16 - 1/8"	22	42.6	21	0.45 (0.99)	T0J
	1 ½	PN 40	72	6.4	2 5/16 - 1/8"	22	42.6	28	0.75 (1.65)	T1J
	2	PN 40	86	6.4	2 7/8 - 1/8"	22	42.6	38	1.2 (2.65)	T2J

- 1) Surface roughness of the surfaces in contact with the medium $R_a < 0.76 \mu\text{m}$ (29.9 μin) as standard.
- 2) Product Configurator, order code for "Process connection"

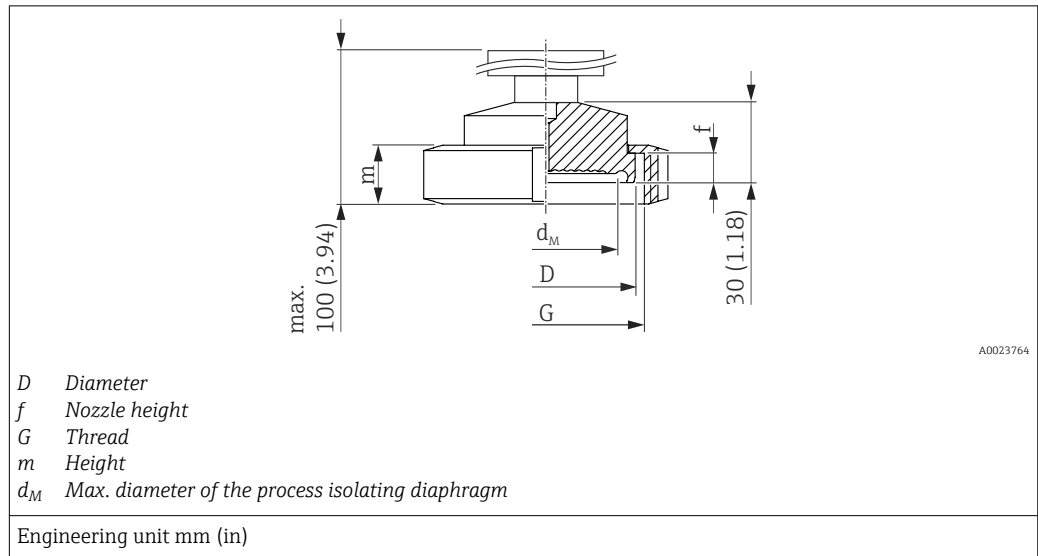
APV-ISS nozzles with coupling nut



Material ¹⁾	Nominal diameter	Nominal pressure	D	G	SW/AF	d_M	Weight	Option ²⁾
	[in]	[bar]						
AISI 316L	1	PN 40	54.1	1 ½" - 1/8"	46.8	24	0.4 (0.88)	T3J
	1 ½	PN 40	72	2" - 1/8"	62	34	0.6 (1.32)	T4J
	2	PN 40	89	2 ½" - 1/8"	77	45	1.1 (2.43)	T5J

- 1) Surface roughness of the surfaces in contact with the medium $R_a < 0.76 \mu\text{m}$ (29.9 μin) as standard.
- 2) Product Configurator, order code for "Process connection"

Aseptic pipe union, nozzle, DIN 11864-1 Form A; pipe DIN 11866-A

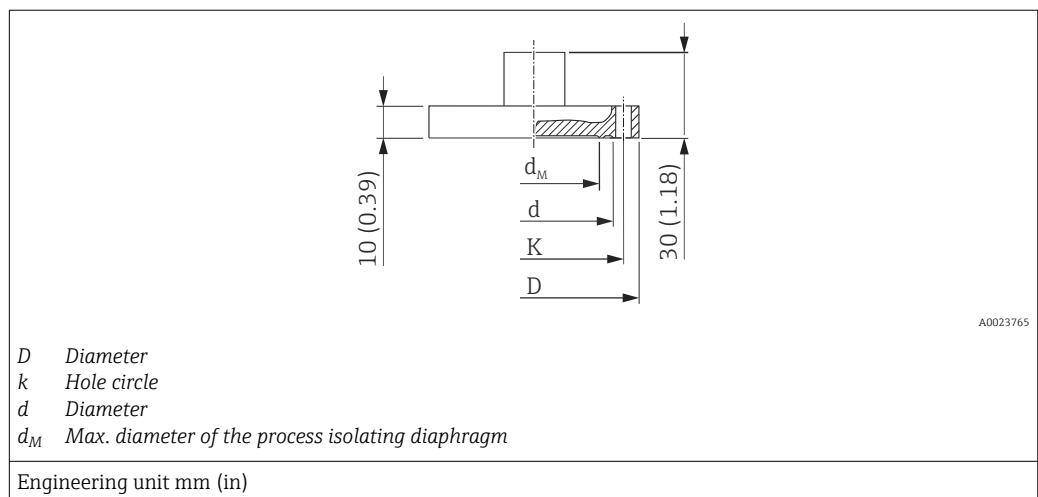


Material ¹⁾	Nozzle				Slotted-nut		Diaphragm seal		Approval	Option ²⁾
	Nominal diameter	Nominal pressure	D	f	G	m	d_M	Weight		
	[in]	[bar]	[mm]	[mm]			[mm]	[kg (lb)]		
AISI 316L	DN 40	PN 40	55	10	Rd 65 x 1/6"	21	36	0.63 (1.39)	EHEDG, 3A, ASME-BPE	NCJ
	DN 50	PN 25	67	11	Rd 78 x 1/6"	22	48	0.92 (2.03)	EHEDG, 3A, ASME-BPE	NDJ

1) Surface roughness of the surfaces in contact with the medium $R_a < 0.76 \mu\text{m}$ (29.9 μin) as standard.

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

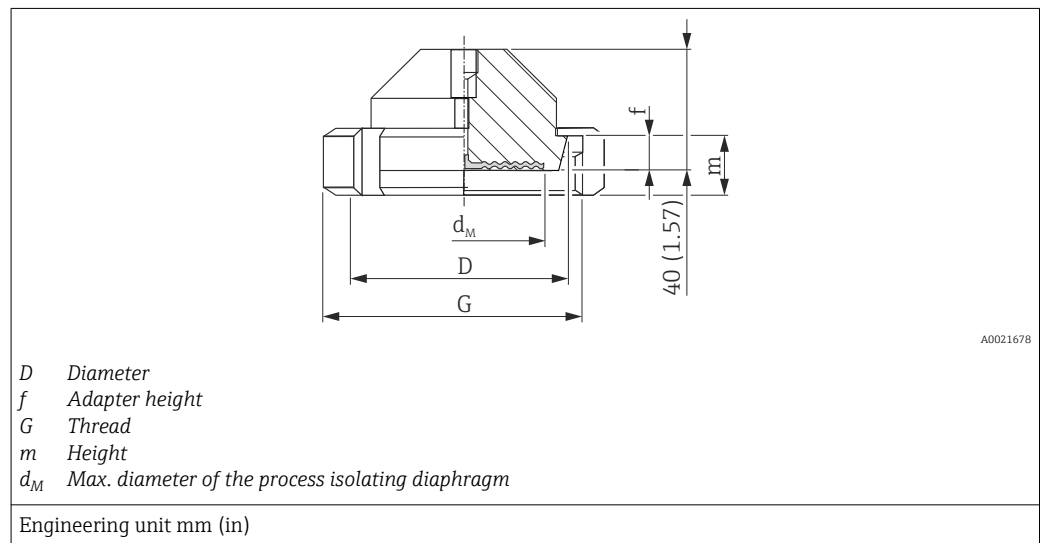
Aseptic flange connection, DIN 11864-2 Form A; pipe DIN 11866-1



Material ¹⁾	Collar flange					Diaphragm seal		Approval	Option ²⁾		
	Nominal diameter	Nominal pressure	K	d	D	d _M	Weight				
	[in]	[bar]	[mm]	[mm]	[mm]	[mm]	[kg (lb)]				
AISI 316L	DN 32	PN 16	59	47.7	76	25	1.5 (3.31)	EHEDG, 3A, ASME-BPE	NFJ		
	DN 40		65	53.7	82	35	1.7 (3.75)			EHEDG, 3A, ASME-BPE	NXJ
	DN 50		77	65.7	94	45	2.2 (4.85)				

- 1) Surface roughness of the surfaces in contact with the medium $R_a < 0.76 \mu\text{m}$ (29.9 μin) as standard.
- 2) Product Configurator, order code for "Process connection"

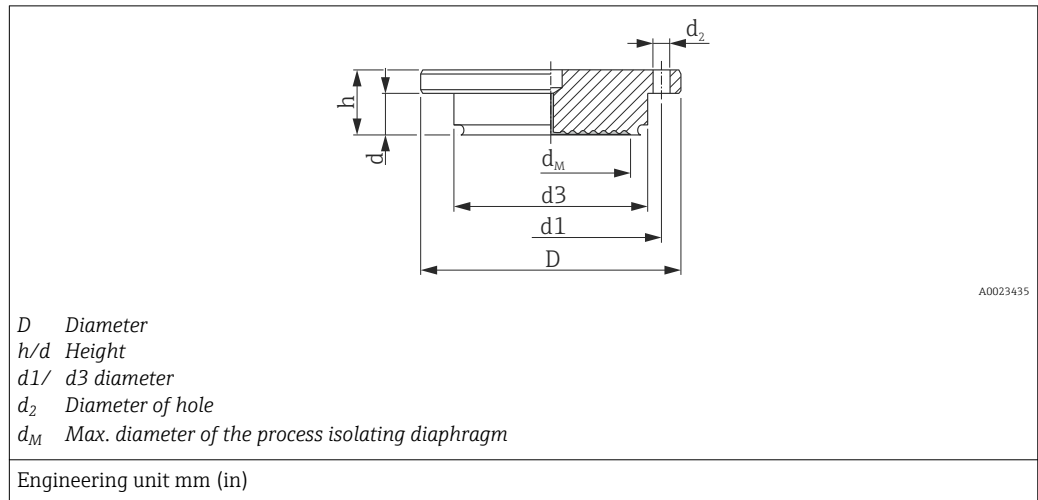
Taper adapter with slotted-nut, DIN 11851



Material ¹⁾	Taper adapter				Slotted-nut		Diaphragm seal			Approval	Option ²⁾
	Nominal diameter	Nominal pressure	D	f	G	m	d _M		Weight		
		PN					Standard	With TempC Membrane			
[in]	[bar]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg (lb)]			
AISI 316L	DN 32	PN 40	50	10	Rd 58 x 1/6"	21	32	28	0.45 (0.99)	EHEDG, 3A, ASME-BPE	MIJ ³⁾
	DN 40	PN 40	56	10	Rd 65 x 1/6"	21	38	36	0.45 (0.99)		MZJ ³⁾
	DN 50	PN 25	68.5	11	Rd 78 x 1/6"	19	52	48	1.1 (2.43)		MRJ ³⁾
	DN 65	PN 25	86	12	Rd 95 x 1/6"	21	66	61	2.0 (4.41)		MSJ ³⁾
	DN 80	PN 25	100	12	Rd 110 x 1/4"	26	81	61	2.55 (5.62)		MTJ ³⁾

- 1) Surface roughness of the surfaces in contact with the medium $R_a < 0.76 \mu\text{m}$ (29.9 μin) as standard.
- 2) Product Configurator, order code for "Process connection"
- 3) Alternatively available with TempC Membrane.

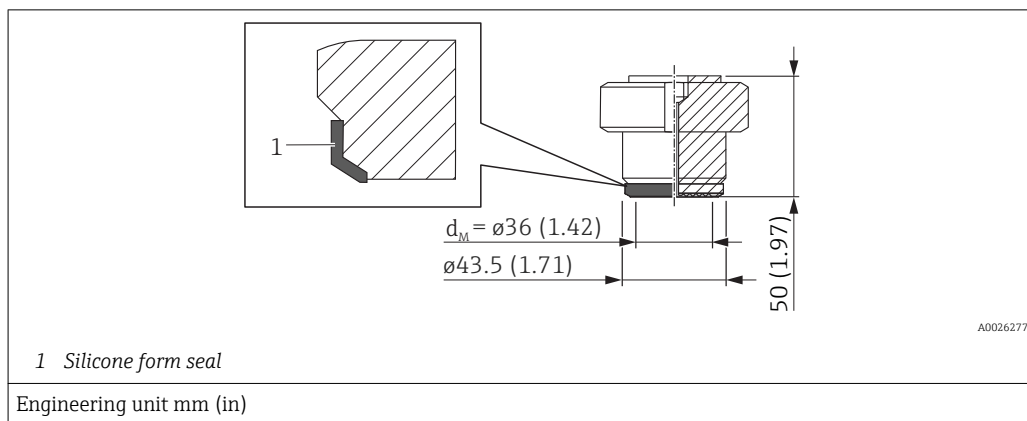
NEUMO BioControl



Material ¹⁾	NEUMO BioControl Process temperature range: -10 to +200 °C (+14 to +392 °F)								Diaphragm seal			Approval	Option ²⁾
									d _M		Weight		
	Nominal diameter	Nominal pressure	D	d	d ₂	d ₃	d ₁	h	Standard	With TempC Membrane			
[bar]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg (lb)]		
AISI 316L	DN 50	PN 16	90	17	4 x Ø 9	50	70	27	40	36	1.1 (2.43)	3A, ASME- BPE	S4J ³⁾
	DN 80	PN 16	140	25	4 x Ø 11	87.4	115	37	61	61	2.6 (5.73)	EHEDG, 3A, ASME- BPE	S6J 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 Membrane.
- 4) With TempC Membrane

Universal process adapter

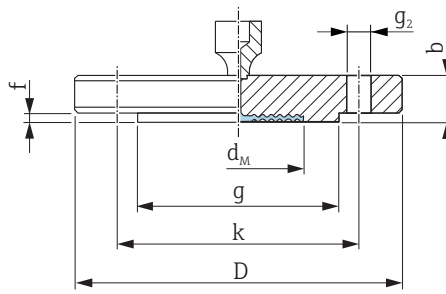


Designation	Nominal pressure	Material ¹⁾	Weight	Approval ²⁾	Option ³⁾
			[kg (lb)]		
Universal adapter with silicone form seal (spare part no.: 52023572) FDA 21CFR177.2600/USP Class VI	PN 10	AISI 316L (1.4435)	0.8 (1.76)	EHEDG, 3A, ASME-BPE	UPJ ^{4) 5)}

- 1) The roughness of the surface in contact with the medium is $R_a < 0.76 \mu\text{m}$ (29.9 μin). Optionally available as an ASME-BPE-compliant version for use in biochemical processes, surfaces in contact with medium $R_a < 0.38 \mu\text{m}$ (15 μin) electropolished, ordering information: Product Configurator, order code for "Service", option "HK"
- 2) EHEDG or 3A approval only with approved process connection.
- 3) Product Configurator, order code for "Process connection"
- 4) Endress+Hauser supplies these slotted-nuts in stainless steel AISI 304 (1.4301) or in AISI 304L (1.4307).
- 5) Alternatively available with TempC Membrane.

PMP55: process connections with flush-mounted process isolating diaphragm

EN/DIN flanges, connection dimensions as per EN 1092-1/DIN 2527 and DIN 2501-1 A0021680



A0021680

D Diameter of flange
 b Thickness
 g Raised face
 f Raised face
 k Hole circle
 g_2 Diameter of hole
 d_M Max. diameter of the process isolating diaphragm

Engineering unit mm

Flange ^{1) 2) 3)}							Boltholes			Diaphragm seal		Option ⁴⁾
Nominal diameter	Nominal pressure	Shape ⁵⁾	D	b	g	f	Quantity	g_2	k	d_M	Weight	
			[mm]	[mm]	[mm]	[mm]		[mm]	[mm]	[mm]	[mm]	
DN 25	10-40	B1 (D)	115	18	68	3	4	14	85	32	2.1 (4.63)	CNJ ⁶⁾
DN 25	63-160	B2 (E)	140	24	68	2	4	18	100	28	2.5 (5.51)	QIJ
DN 25	250	B2 (E)	150	28	68	2	4	22	105	28	3.7 (8.16)	QJJ
DN 25	400	B2 (E)	180	38	68	2	4	26	130	28	7.0 (15.44)	QSJ
DN 32	10-40	B1 (D)	140	18	77	2.6	4	18	100	34	1.9 (4.19)	CPJ
DN 40	10-40	B1 (D)	150	18	87	2.6	4	18	110	48	2.2 (4.85)	CQJ
DN 50	10-40	B1 (D)	165	20	102	3	4	18	125	59	3.0 (6.62)	CXJ ⁶⁾
DN 50	63	B2 (E)	180	26	102	3	4	22	135	59	4.6 (10.14)	PDJ
DN 50	100-160	B2 (E)	195	30	102	3	4	26	145	59	6.2 (13.67)	QOJ
DN 50	250	B2 (E)	200	38	102	3	8	26	150	59	7.7 (16.98)	QMJ
DN 50	400	B2 (E)	235	52	102	3	8	30	180	59	14.7 (32.41)	QVJ
DN 80	10-40	B1 (D)	200	24	138	3.5	8	18	160	89	5.3 (11.69)	CZJ ⁶⁾
DN 80	100	B2 (E)	230	32	138	4	8	24	180	89	8.9 (19.62)	PPJ
DN 100	100	B2 (E)	265	36	175	5	8	30	210	89	13.7 (30.21)	PQJ

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, rhodium>gold or PTFE is $R_a < 0.8 \mu\text{m}$ ($31.5 \mu\text{in}$). Lower surface roughness on request.

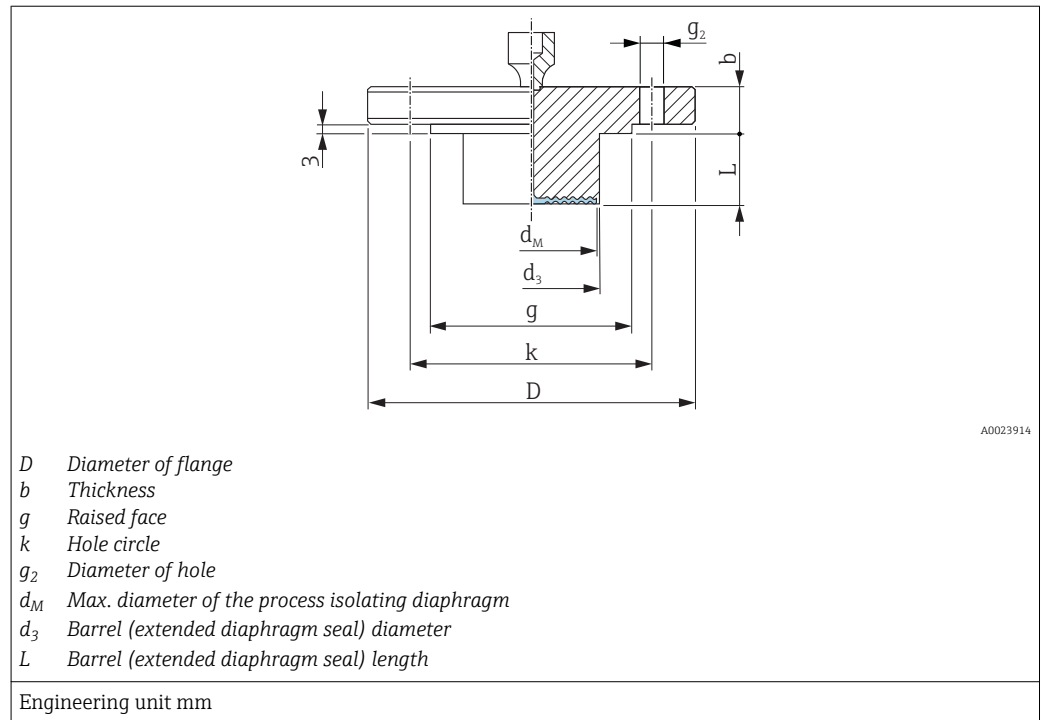
3) The flange raised face is made of the same material as the process isolating diaphragm.

4) Product Configurator, "Process connection" section

5) Description as per DIN 2527 provided in brackets

6) Alternatively available with TempC membrane. Diameter of process isolating diagram modified in TempC version: DN25: 28 mm; DN50: 61 mm.

EN/DIN flanges with barrel (extended diaphragm seal), connection dimensions as per EN 1092- 1/DIN 2527 and DIN 2501-1



Flange ^{1) 2)}			Boltholes			Diaphragm seal		Option ³⁾			
Nominal diameter	Nominal pressure	Shape ⁴⁾	D	b	g	Quantity	g ₂	k	d _M	Weight	
			[mm]	[mm]	[mm]		[mm]	[mm]	[mm]	[mm]	
DN 50	PN 10-40	B1 (D)	165	20	102	4	18	125	47	⁵⁾	FDJ ⁵⁾
DN 80	PN 10-40	B1 (D)	200	24	138	8	18	160	72	⁵⁾	FEJ ⁵⁾

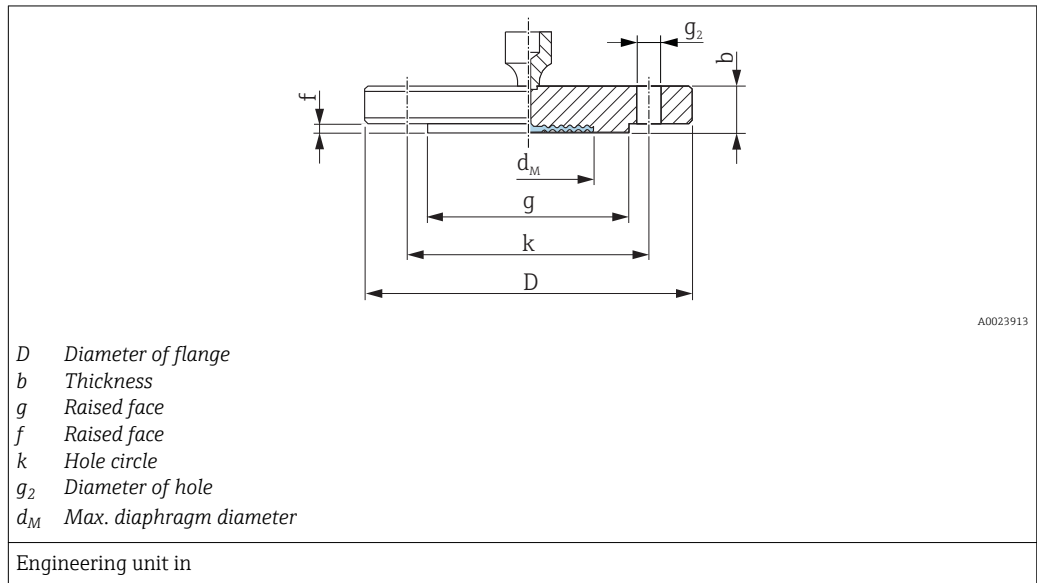
- 1) Material: AISI 316L
- 2) In the case of process isolating diaphragms made of Alloy C276, Monel or tantalum, the raised face of the flange and the barrel pipe are made of 316L
- 3) Product Configurator, "Process connection" section
- 4) Description as per DIN 2527 provided in brackets
- 5) Available with 50 mm (1.97 in), 100 mm (3.94 in) and 200 mm (7.87 in) barrel, (extended diaphragm seal), for barrel (extended diaphragm seal) diameter and weight see the following table

Option ¹⁾	Nominal diameter	Nominal pressure	(L)	d ₃	Weight
			[mm]	[mm]	[kg (lb)]
FDJ	DN 50	PN 10-40	50 / 100 / 200	48.3	3.2 (7.1) / 3.8 (8.4) / 4.4 (9.7)
FEJ	DN 80	PN 10-40	50 / 100 / 200	76	6.2 (13.7) / 6.7 (14.8) / 7.8 (17.2)

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

PMP55: process connections with flush-mounted process isolating diaphragm

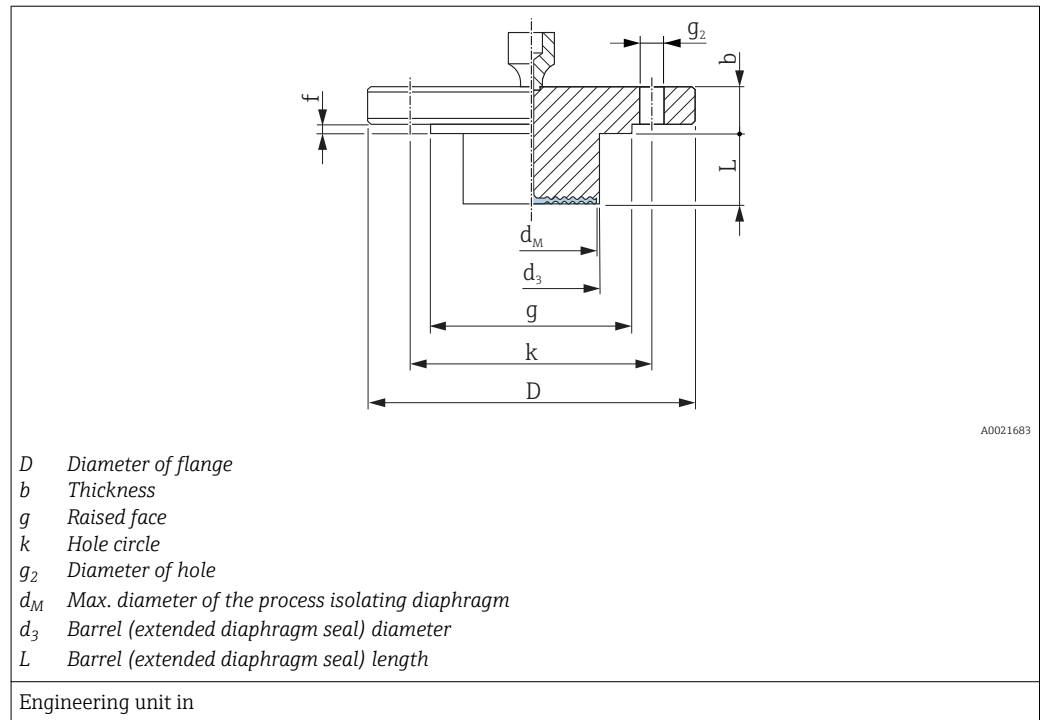
ASME flanges, connection dimensions as per ASME B 16.5, raised face RF



Flange ^{1) 2) 3)}						Boltholes			Diaphragm seal		Approval ⁴⁾	Option ⁵⁾
Nominal diameter	Class	D	b	g	f	Quantity	g ₂	k	d _M	Weight		
[in]	[lb./sq.in]	[in]	[in]	[in]	[in]		[in]	[in]	[in]	[in]		
1	150	4.25	0.56	2	0.08	4	0.62	3.12	1.26	1.2 (2.65)	CRN ⁶⁾	ACJ ⁷⁾
1	300	4.88	0.69	2	0.08	4	0.75	3.5	1.26	1.3 (2.87)	CRN	ANJ ⁷⁾
1	400/600	4.88	0.69	2	0.25	4	0.75	3.5	1.26	1.4 (3.09)	CRN	A0J
1	900/1500	5.88	1.12	2	0.25	4	1	4	1.26	3.2 (7.06)	CRN	A2J
1	2500	6.25	1.38	2	0.25	4	1	4.25	1.26	4.6 (10.14)	CRN	A4J
1 ½	150	5	0.69	2.88	0.06	4	0.62	3.88	1.89	1.5 (3.31)	CRN	AEJ
1 ½	300	6.12	0.81	2.88	0.06	4	0.88	4.5	1.89	2.6 (5.73)	CRN	AQJ
2	150	6	0.75	3.62	0.06	4	0.75	4.75	2.32	2.2 (4.85)	CRN	AFJ ⁷⁾
2	300	6.5	0.88	3.62	0.06	8	0.75	5	2.32	3.4 (7.5)	CRN	ARJ ⁷⁾
2	400/600	6.5	1	3.62	0.25	8	0.75	5	2.32	4.3 (9.48)	CRN	A1J
2	900/1500	8.5	1.5	3.62	0.25	8	1	6.5	2.32	10.3 (22.71)	CRN	A3J
2	2500	9.25	2	3.62	0.25	8	1.12	6.75	2.32	15.8 (34.84)	CRN	A5J
3	150	7.5	0.94	5	0.06	4	0.75	6	3.5	5.1 (11.25)	CRN	AGJ ⁷⁾
3	300	8.25	1.12	5	0.06	8	0.75	6	3.5	7.0 (15.44)	CRN	ASJ ⁷⁾
4	150	9	0.94	6.19	0.06	8	0.75	7.5	3.5	7.2 (15.88)	CRN	AHJ
4	300	10	1.25	6.19	0.06	8	0.88	7.88	3.5	11.7 (25.8)	CRN	ATJ

- 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, rhodium>gold or PTFE is $R_a < 0.8 \mu\text{m}$ ($31.5 \mu\text{in}$). Lower surface roughness on request.
- 3) The flange raised face is made of the same material as the process isolating diaphragm.
- 4) CSA approval: Product Configurator, order code for "Approval"
- 5) Product Configurator, order code for "Process connection"
- 6) CRN approval not for TempC membrane.
- 7) Alternatively available with TempC membrane. Diameter of process isolating diaphragm is modified in TempC version: nominal diameter 1": 1.1 in; 2": 2.40 in.

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



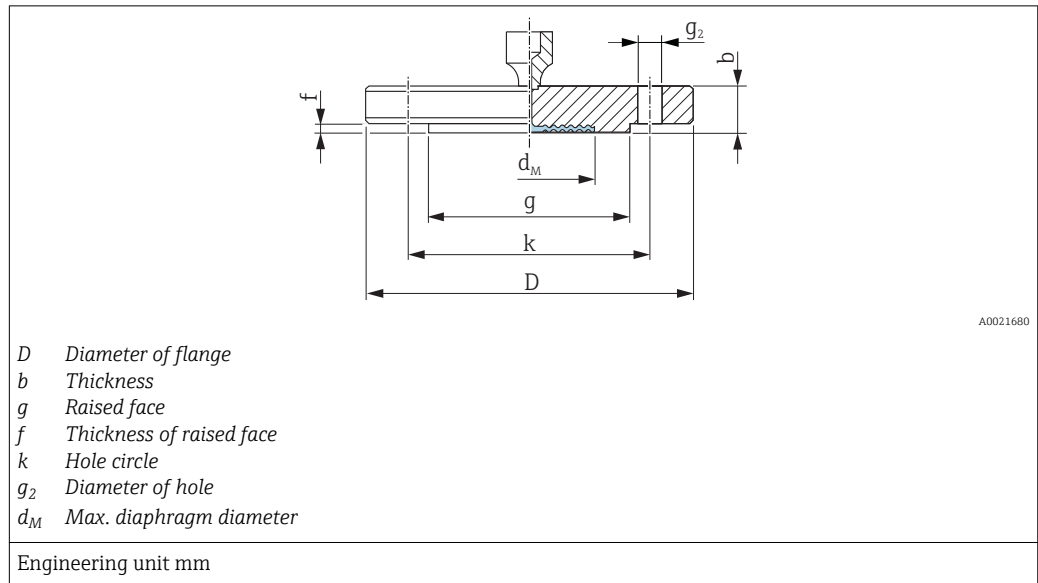
Flange ^{1) 2)}						Boltholes			Diaphragm seal		Approval ³⁾	Option ⁴⁾
Nominal diameter	Class	D	b	g	f	Quantity	g ₂	k	d _M	Weight		
[in]	[lb./sq.in]	[in]	[in]	[in]	[in]		[in]	[in]	[in]	[kg (lb)]		
2	150	6	0.75	3.62	0.06	4	0.75	4.75	1.85	⁵⁾	CRN	FMJ ⁵⁾
3	150	7.5	0.94	5	0.06	4	0.75	6	2.83	⁵⁾	CRN	FNJ ⁵⁾
3	300	8.25	1.12	5	0.06	8	0.88	6.62	2.83	⁵⁾	CRN	FWJ ⁵⁾
4	150	9	0.94	6.19	0.06	8	0.75	7.5	3.5	⁵⁾	CRN	FOJ ⁵⁾
4	300	10	1.25	6.19	0.06	8	0.88	7.88	3.5	⁵⁾	CRN	FXJ ⁵⁾

- 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 isolating diaphragms made of Alloy C276, Monel or tantalum, the raised face of the flange and the barrel pipe are made of 316L.
- 3) CSA approval: Product Configurator, "Approval" ordering feature
- 4) Product Configurator, "Process connection" section
- 5) Available with 2", 4", 6" and 8" barrel (extended diaphragm seal), for barrel (extended diaphragm seal) diameter and weight see the following table

Option ¹⁾	Nominal diameter	Class	(L)	d ₃	Weight
	[in]	[lb./sq.in]	in (mm)	in (mm)	[kg (lb)]
FMJ	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)
FNJ	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)
FWJ	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)
FOJ	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)
FXJ	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"

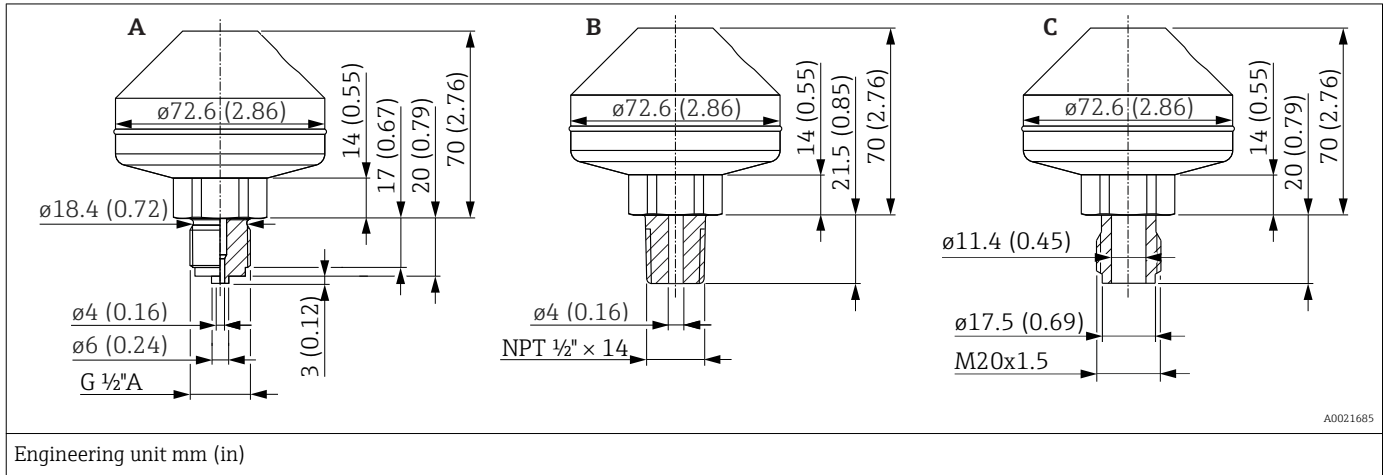
JIS flanges, connection dimensions as per JIS B 2220 BL, raised face RF



Flange ^{1) 2) 3)}						Boltholes			Diaphragm seal		Option ⁴⁾
Nominal diameter	Nominal pressure	D	b	g	f	Quantity	g ₂	k	d _M	Weight	
		[mm]	[mm]	[mm]	[mm]		[mm]	[mm]	[mm]	[mm]	
25 A	10 K	125	14	67	1	4	19	90	32	1.5 (3.31)	KCJ
40 A	10 K	140	16	81	2	4	19	105	48	2.0 (4.41)	KEJ
50 A	10 K	155	16	96	2	4	19	120	59	2.3 (5.07)	KFJ
80 A	10 K	185	18	127	2	8	19	150	89	3.3 (7.28)	KGJ
100 A	10 K	210	18	151	2	8	19	175	89	4.4 (9.7)	KHJ

- 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, rhodium>gold or PTFE is $R_a < 0.8 \mu\text{m}$ (31.5 μin). Lower surface roughness on request.
- 3) The flange raised face is made of the same material as the process isolating diaphragm.
- 4) Product Configurator, "Process connection" section

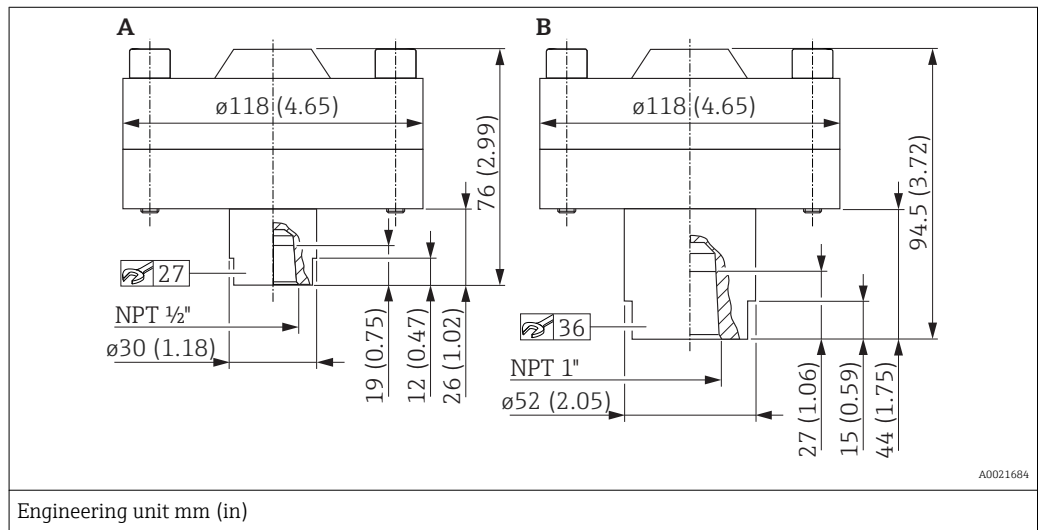
PMP55 process connections Welded separators



Item	Designation	Material	Measuring range	Nominal pressure	Approval	Weight	Option ¹⁾
			[bar (psi)]			[kg (lb)]	
A	Welded, ISO 228 G 1/2 A EN837	AISI 316L	≤ 160 (2320)	PN 160	-	1.43 (3.15)	UBJ
B	Welded, ANSI 1/2 MNPT				CRN ²⁾		UCJ
C	Welded, thread DIN13 M20x1.5				-		UFJ

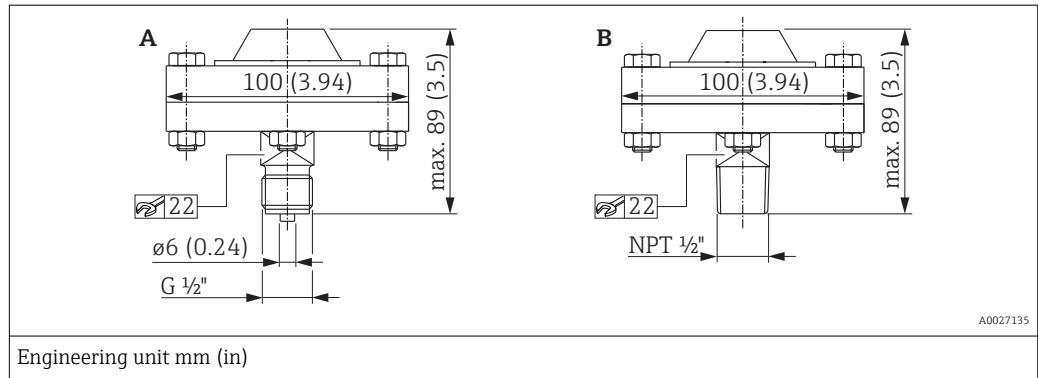
- 1) Product Configurator, order code for "Process connection"
- 2) CSA approval: Product Configurator, order code for "Approval"

Threaded separators



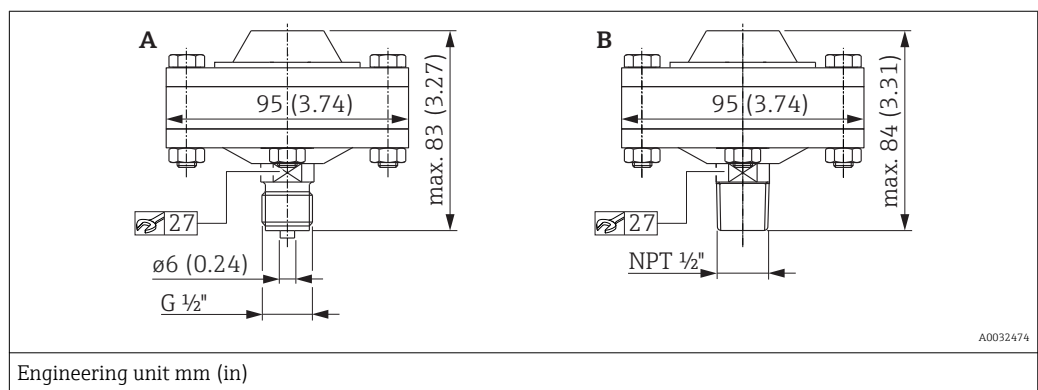
Item	Designation	Material	Measuring range	Nominal pressure	Weight	Option ¹⁾
			[bar (psi)]		[kg (lb)]	
A	Threaded, 1/2" NPT with FKM Viton seal -20 to +200 °C (-4 to +392 °F)	AISI 316L screws made of A4	≤ 250 (3625)	PN 250	4.75 (10.47)	UGJ
B	Threaded, 1" NPT with FKM Viton seal -20 to +200 °C (-4 to +392 °F)				5.0 (11.03)	UHJ

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



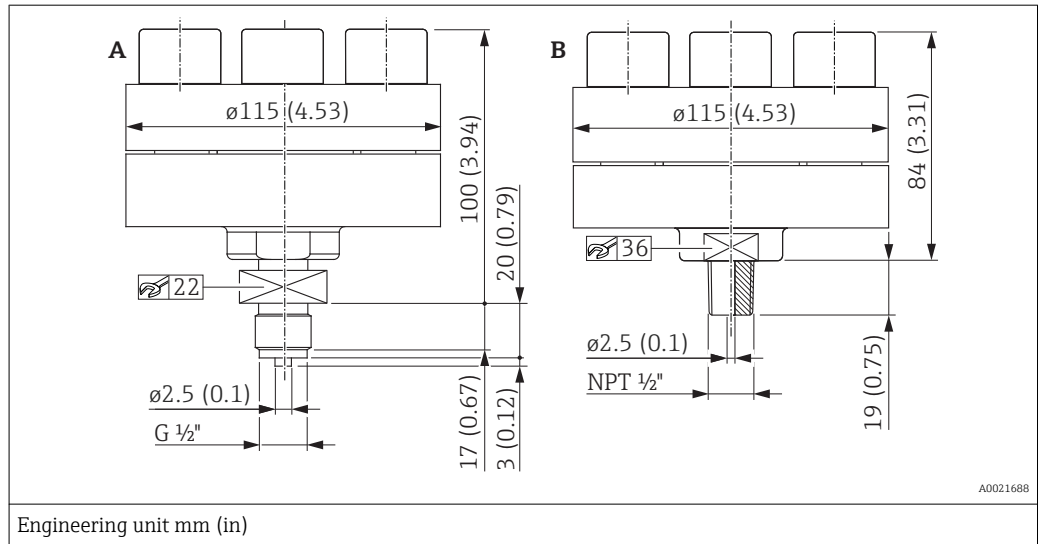
Item	Designation	Material	Measuring range	Nominal pressure	Weight	Option ¹⁾
			[bar (psi)]		[kg (lb)]	
A	Threaded, ISO 228 G ½ A EN837 with PTFE seal -40 to +260 °C (-40 to +500 °F)	AISI 316L, screws made of A4	≤ 40 (580)	PN 40	1.43 (3.15)	UDJ ²⁾
B	Threaded, ANSI ½ MNPT with PTFE seal -40 to +260 °C (-40 to +500 °F)					UEJ ²⁾

- 1) Product Configurator, order code for "Process connection"
 2) In combination with silicone oil, inert oil and vegetable oil.



Item	Designation	Material	Measuring range	Nominal pressure	Weight	Option ¹⁾
			[bar (psi)]		[kg (lb)]	
A	Threaded, ISO 228 G ½ A EN837 with metal seal (silver-plated) -60 to +400 °C (-76 to +752 °F)	AISI 316L, screws made of A4	≤ 40 (580)	PN 40	1.38 kg (3.04 lb)	UDJ ²⁾
B	Threaded, ANSI ½ MNPT with metal seal (silver-plated) -60 to +400 °C (-76 to +752 °F)					UEJ ²⁾

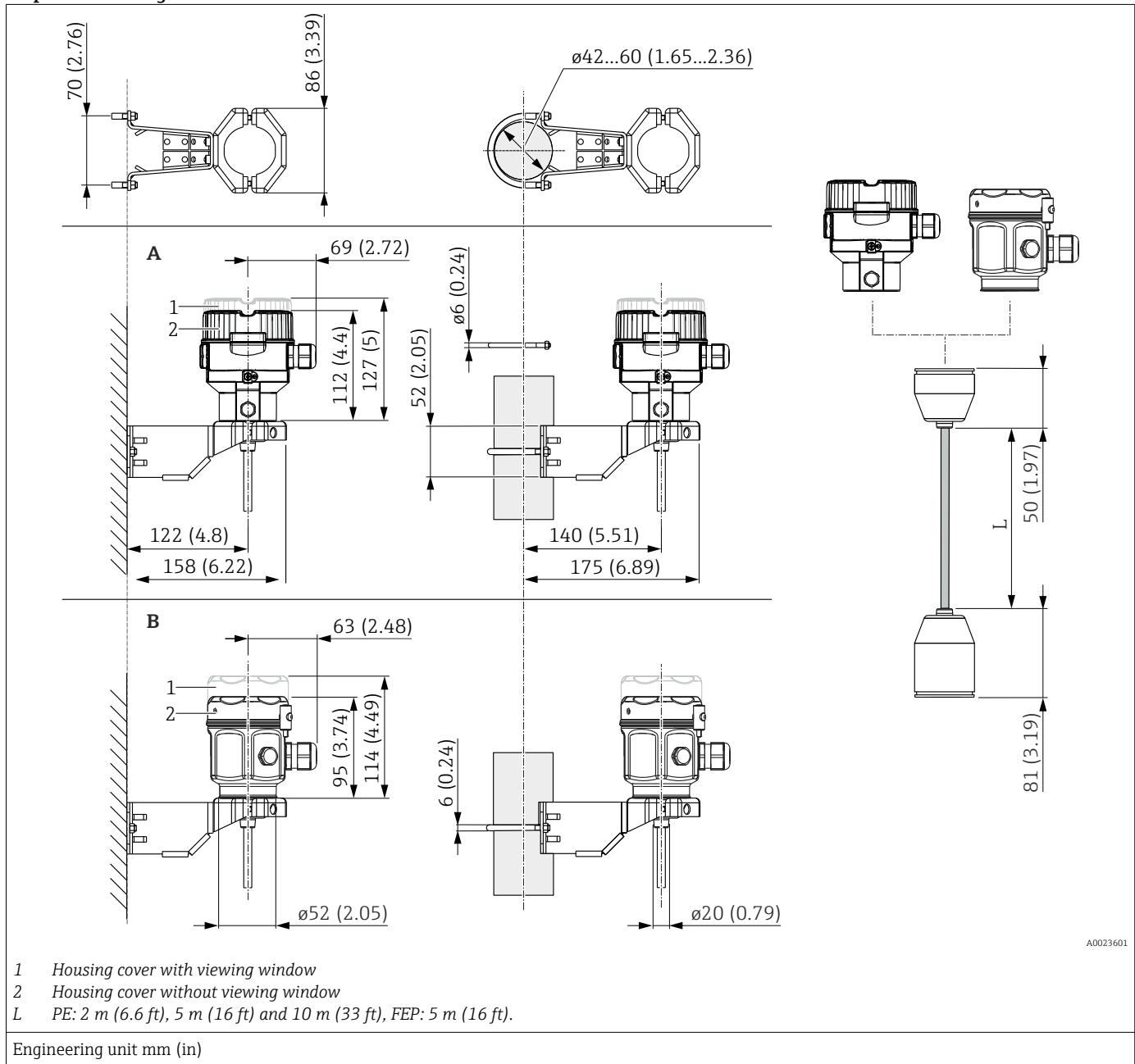
- 1) Product Configurator, order code for "Process connection"
 2) In combination with high-temperature oil.



Item	Designation	Material	Measuring range	Nominal pressure ¹⁾	Weight	Option ²⁾
			[bar (psi)]		[kg (lb)]	
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)	PN 400	4.75 (10.47)	UDJ
B	Threaded, ANSI ½ MNPT, with integrated seal lip -60 to +400 °C (-76 to +752 °F)					UEJ

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

Wall and pipe mounting with
"Separate housing" version



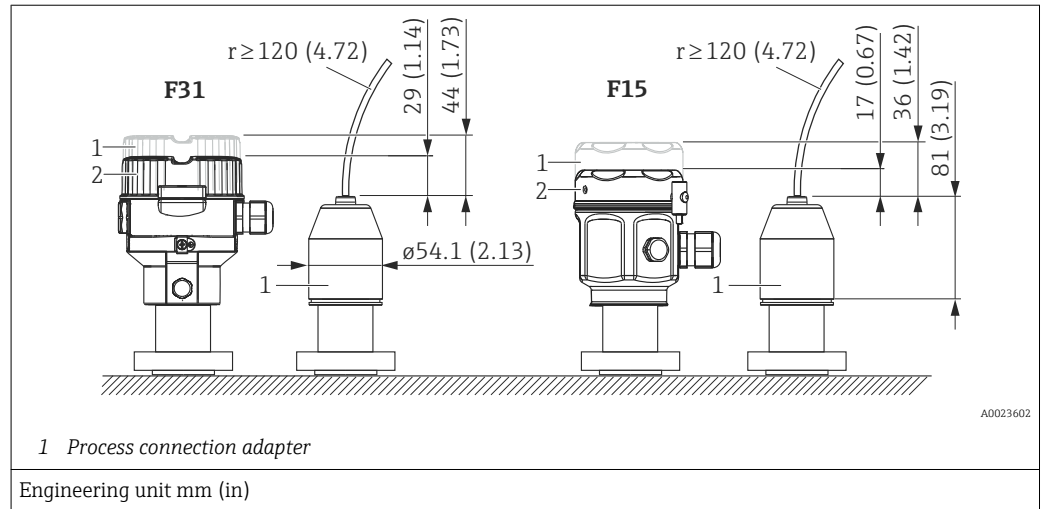
Item	Designation	Weight (kg (lb))		Option ¹⁾
		Housing (F31 or F15)	Mounting bracket	
A	Dimensions with F31 housing	→ 48	0,5 (1.10)	U
B	Dimensions with F15 housing			

1) Product Configurator, "Separate housing" ordering feature

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

Reduction in installation height

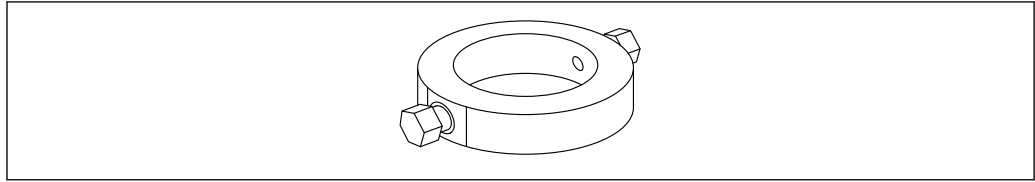
If the separate housing is used, the mounting height of the process connection is reduced compared to the dimensions of the standard version.



Weight

Component part	Weight
Housing	See "Housing" section
Process connection	See "Process connections" section
Capillary with armoring made of AISI 316L (1.4404)	0.16 kg/m (0.35 lb/m) + 0.2 kg (0.44 lb) (weight per capillary line)
Capillary with armoring made of AISI 316L (PVC)	0.21 kg/m (0.46 lb/m) + 0.2 kg (0.44 lb) (weight per capillary line)
Capillary with armoring made of AISI 316L (PTFE)	0.29 kg/m (0.64 lb/m) + 0.2 kg (0.44 lb) (weight per capillary line)

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 isolating diaphragm 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 devices".

Order options

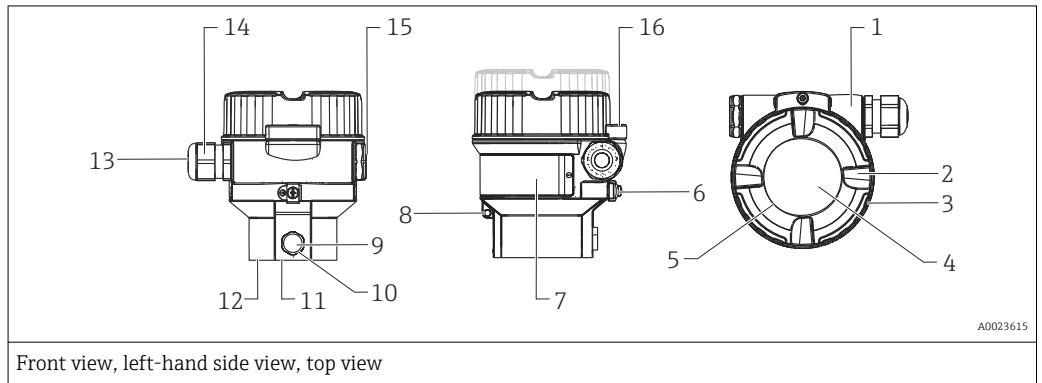
Flushing rings can be ordered as a separate accessory or as an order option for the device.

Material	Nominal diameter	Approval ¹⁾	Accessory ²⁾ Part number	Order option ^{3) 4)}			
				Cerabar			
				PMP55			
AISI 316L	EN1092-1						
	DN25	-	71377379	PO			
	DN50	-	71377380	PP			
	DN80	-	71377383	PQ			
	ASME B16.5						
	NPS 1"	-	71377369	PK			
	NPS 2"	CRN	71377370	PL			
	NPS 3"	CRN	71377371	PM			

- 1) CSA approval: Product Configurator, order code for "Approval"
- 2) Inspection certification according to EN10204-3.1 material
- 3) Product Configurator order code for "Accessories enclosed"
- 4) 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.

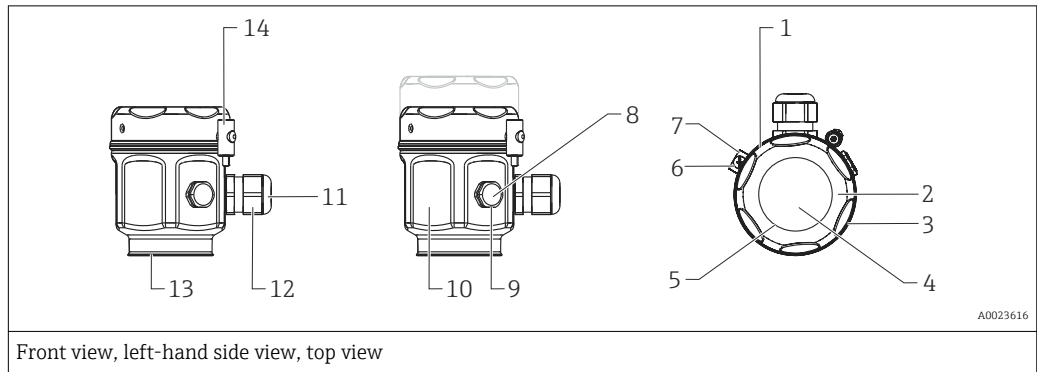
Endress+Hauser offers additional flushing rings as **Technical Special Products (TSP)**.

Materials not in contact with process F31 housing



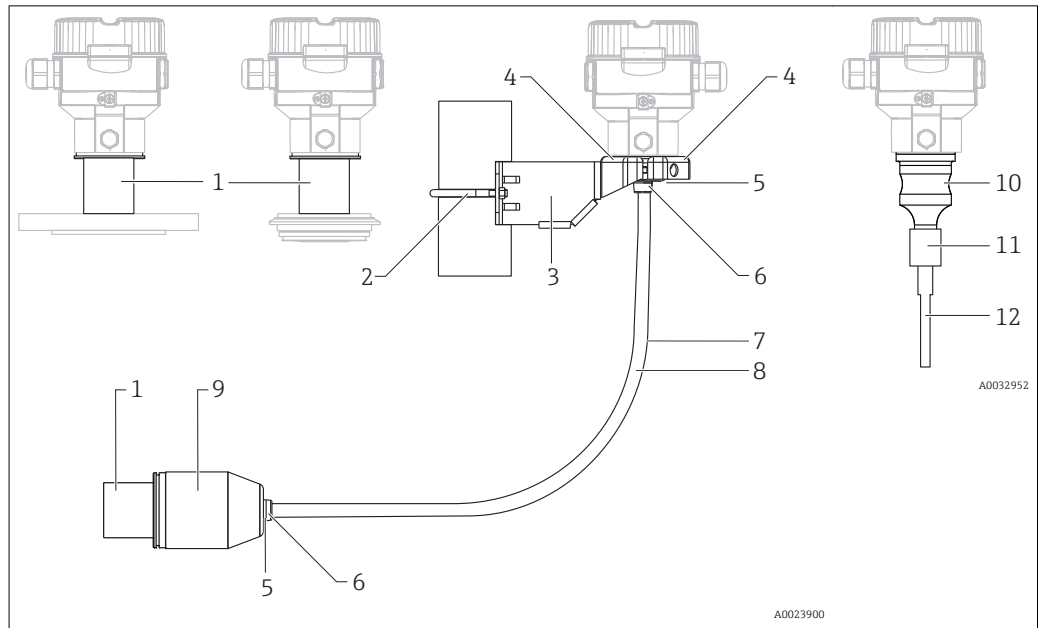
Item number	Component part	Material
1	F31 housing, RAL 5012 (blue)	Die-cast aluminum with protective powder-coating on polyester base
2	Cover, RAL 7035 (gray)	Die-cast aluminum with protective powder-coating on polyester base
3	Cover seal	EPDM
4	Sight glass	Mineral glass
5	Sight glass seal	Silicone (VMQ)
6	External ground terminal	AISI 304 (1.4301)
7	Nameplates	Plastic film
8	Fastening for wired-on tag plate	AISI 304 (1.4301)/AISI 316 (1.4401)
9	Pressure compensation filter	AISI 316L (1.4404) and PBT-FR
10	Pressure compensation filter, O-ring	VMQ or EPDM
11	Sealing ring	EPDM
12	Snap ring	PC Plastic
13	Seal of cable gland and blind plug	EPDM/NBR
14	Cable gland	Polyamide (PA), for dust ignition-proof: CuZn nickel-plated
15	Blind plug	PBT-GF30 FR for dust ignition-proof, Ex d, FM XP and CSA XP: AISI 316L (1.4435)
16	Cover clamp	Clamp AISI 316L (1.4435), screw A4

F15 housing

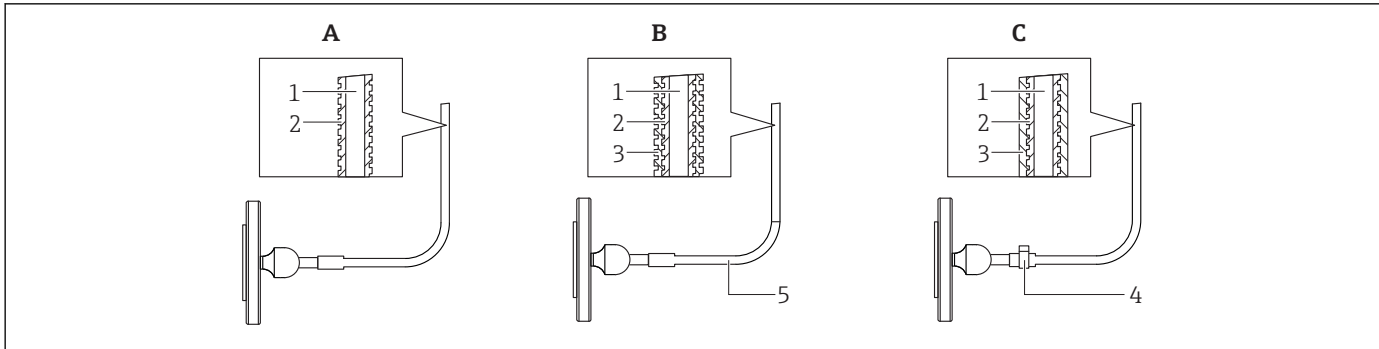


Item number	Component part	Material
1	F15 housing	AISI 316L (1.4404)
2	Cover	
3	Cover seal	Silicone with PTFE coating
4	Sight glass for non-hazardous area, ATEX Ex ia, NEPSI Zone 0/1 Ex ia, IECEx Zone 0/1 Ex ia, FM NI, FM IS, CSA IS	Polycarbonate (PC)
4	Sight glass for ATEX 1/2 D, ATEX 1/3 D, ATEX 1 GD, ATEX 1/2 GD, ATEX 3 G, FM DIP, CSA dust ignition-proof	Mineral glass
5	Sight glass seal	Silicone (VMQ)
6	External ground terminal	AISI 304 (1.4301)
7	Fastening for wired-on tag plate	AISI 304 (1.4301)/AISI 316 (1.4401)
8	Pressure compensation filter	AISI 316L (1.4404) and PBT-FR
9	Pressure compensation filter, O-ring	VMQ or EPDM
10	Nameplates	Lasered on
11	Cable gland	Polyamide (PA), for dust ignition-proof: CuZn nickel-plated
12	Seal of cable gland and blind plug	NBR/Silicone/EPDM
13	Sealing ring	EPDM
14	Screw	A4-50

Connecting parts



Item number	Component part	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 from separate housing	FKM, EPDM
6	<ul style="list-style-type: none"> ▪ Gland for cable from separate housing: ▪ Screws: 	<ul style="list-style-type: none"> ▪ AISI 316L (1.4404) ▪ A2
7	PE cable for separate housing	Abrasion-proof cable with strain-relief Dynema members; shielded using aluminum-coated film; insulated with polyethylene (PE-LD), black; copper wires, twisted, UV-resistant
8	FEP cable for separate housing	Abrasion-proof cable; shielded using 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 tubing (available only if flexible armor for capillary has PVC coating or PTFE hose)	Polyolefin



A0028087

Item	Component part	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 the process

NOTICE

- ▶ The device components in contact with the process are specified in the "Mechanical construction" → 48 and "Ordering information" → 124 sections.

Delta-ferrite content

The delta-ferrite content of the wetted parts material can be guaranteed and certified to $\leq 3\%$ if the option "KF" is chosen in the Product Configurator "Material of the process isolating diaphragm" ordering feature. When PMC51 with hygienic process connections is chosen, the deltaferrite content can be guaranteed and certified to $\leq 1\%$ if the option "KF" is chosen in the Product Configurator "Material of the process isolating diaphragm" ordering feature.

TSE Certificate of Suitability (Transmissible Spongiform Encephalopathy)

The following applies to all process wetted device components:

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

Process connections

- "Clamp connections" and "Hygienic process connections" (see also "Ordering information" section): AISI 316L (DIN/EN material number 1.4435)
- Endress+Hauser supplies process connections with a threaded connection as well as DIN/ EN flanges made of stainless steel as per 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 isolating diaphragm

Device	Designation	Option ¹⁾
PMC51	Al ₂ O ₃ aluminum oxide ceramic (FDA ²⁾ , USP Class VI+121°C), ultrapure 99.9 % (see also www.endress.com/ceraphire)	Standard
PMP51	AISI 316L (DIN/EN material number 1.4435)	A
	AISI 316L with gold-rhodium coating	M
	Alloy C276 (DIN/EN material number 2.4819)	B
PMP55	AISI 316L (DIN/EN material number 1.4435)	A
	AISI 316L, TempC	E
	AISI 316L with gold-rhodium coating	M
	AISI 316L with 0.25 mm (0.01 in) PTFE coating	S
	Alloy C276 (DIN/EN material number 2.4819)	B ³⁾
	Monel (2.4360)	C ³⁾
	Tantalum (UNS R05200)	D ³⁾

- 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 material of the flange raised face is made of the same material as the process isolating diaphragm.

Seals

Type	Designation	Option ¹⁾
PMC51	FKM Viton	A
	FKM Viton, FDA, 3A Class I, USP Class VI	B
	FFKM Perlast G75LT	C
	NBR	F
	HNBR, FDA, 3A Class II, KTW, AFNOR, BAM	G
	NBR, Low temperature	H
	EPDM, FDA	J
	EPDM, FDA, 3A Class II, USP Class VI+121°C, DVGW, KTW, W270, WRAS, ACS, NSF61	K
	FFKM Kalrez 6375	L
	FFKM Kalrez 7075	M
	FFKM Kalrez 6221, FDA, USP Class VI	N
	Fluoroprene XP40, FDA, USP Class VI+121°C, 3A Class I	P
	VMQ Silicone, FDA	S

- 1) Product Configurator, "Seal" ordering feature

Fill fluid

Designation	Option PMP51 ¹⁾
Silicone oil	1
Inert oil	2
Synthetic oil as per FDA 21 CFR 178.3620 (b)(1) and NSF H-1	3

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

Designation	Option PMP55 ¹⁾
Silicone oil, suitable for foods FDA 21 CFR 175.105	1
Inert oil	2
Vegetable oil, suitable for foods FDA 21 CFR 172.856	4
High-temperature oil	5
Low-temperature oil	6

1) Only select FDA-approved filling oils for diaphragm seal devices with 3-A and EHEDG certification!

Operability

Operating concept

Operator-oriented menu structure for user-specific tasks

- Commissioning
- Operation
- Diagnosis
- Expert level

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 control

Efficient diagnostic behavior increases measurement availability

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

Local operation

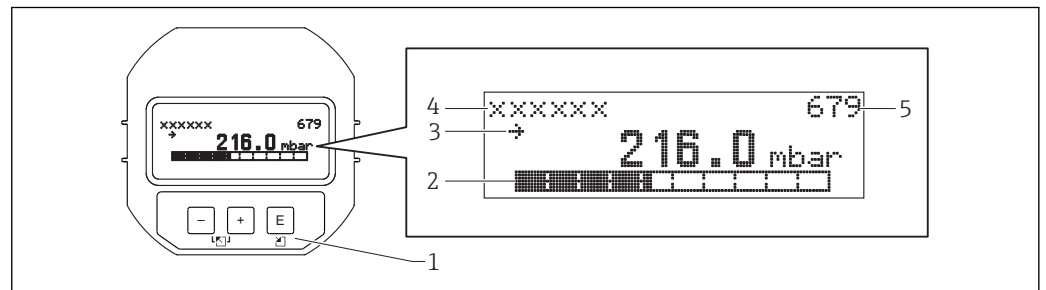
Local display (optional) for devices with HART-, PROFIBUS PA- or FOUNDATION Fieldbus-Elektronik

A 4-line liquid crystal display (LCD) is used for display and operation. The local display shows measured values, dialog texts as well as fault and notice messages in plain text, thereby supporting the user at every stage of operation. The liquid crystal display of the device can be turned in 90° stages. Depending on the orientation of the device, this makes it easy to operate the device and read the measured values.

Functions

- 8-digit measured value display including sign and decimal point, bar graph for 4 to 20 mA HART as current display; or for PROFIBUS PA as graphic display of the standardized value of the AI Block; for FOUNDATION Fieldbus as graphic display of the transducer output in relation to the set pressure range.
- Simple and complete menu guidance as parameters are split into several levels and groups
- Each parameter is given a 3-digit ID number for easy navigation
- Possibility of configuring the display to suit individual requirements and preferences, such as language, alternating display, contrast setting, display of other measured values such as sensor temperature etc.
- Comprehensive diagnostic functions (fault and warning message, peak-hold indicators etc.)

Overview



- 1 Operating keys
- 2 Bar graph
- 3 Symbol
- 4 Header line
- 5 Parameter identification number

A0016498

Ordering information: Product Configurator, "Output, Operation" ordering feature

Function	Operation via display			
	Analog electronic	HART	PROFIBUS PA	FOUNDATION Fieldbus
Position adjustment (zero point correction)	–	✓	✓	✓
Setting lower range value and upper range value - reference pressure present at the device	–	✓	✓	✓
Device reset	–	✓	✓	✓
Locking and unlocking parameters relevant to the measured value	–	✓	✓	✓
Value acceptance indicated by the green LED	–	–	–	–
Switching damping on and off	–	✓	✓	✓

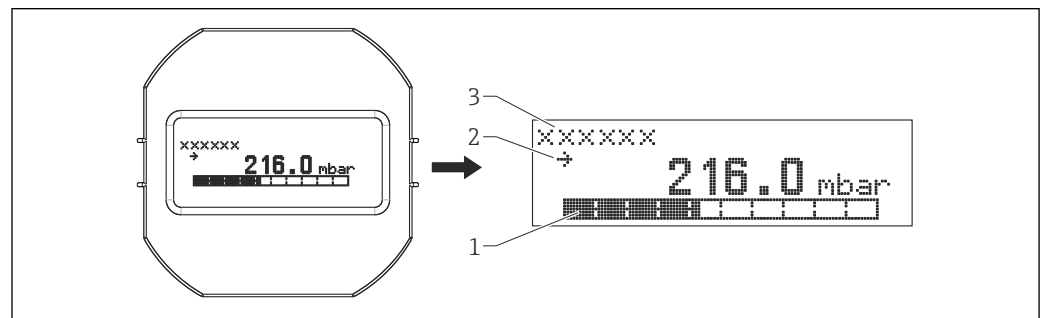
Local display (optional) for devices with analog electronics

A 4-line liquid crystal display (LCD) is used. The local display shows measured values, fault messages and notice messages. The liquid crystal display of the device can be turned in 90° stages. Depending on the orientation of the device, this makes it easy to operate the device and read the measured values.

Functions:

- 8-digit measured value display including sign and decimal point, bar graph for 4 to 20 mA as current display.
- Diagnostic functions (fault and warning message etc.)

Overview



A0023993

- 1 Bar graph
- 2 Symbol
- 3 Parameter name

Ordering information: Product Configurator, "Display, operation" ordering feature

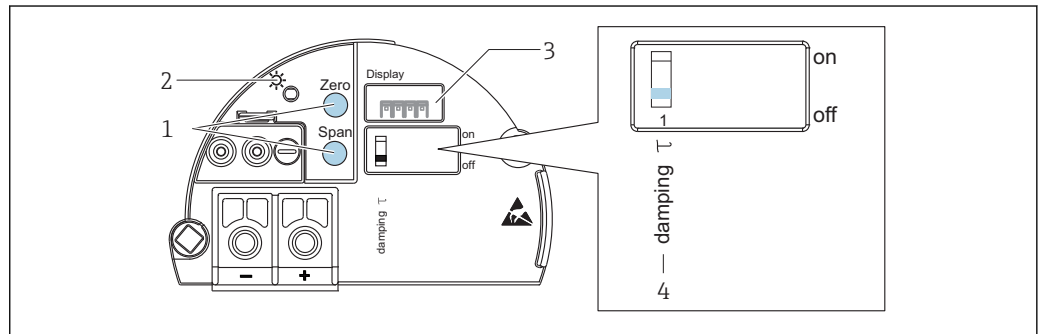
Operating keys and elements located inside on the electronic insert

Function	Operation with operating keys and elements on the electronic insert			
	Analog electronics	HART	PROFIBUS PA	FOUNDATION Fieldbus
Position adjustment (zero point correction)	✓	✓	✓	✓
Setting lower range value and upper range value - reference pressure present at the device	✓	✓	–	–
Device reset	✓	✓	✓	✓
Locking and unlocking parameters relevant to the measured value	–	✓	✓	✓
Value acceptance indicated by the green LED	✓	✓	✓	✓
Switching damping on and off	✓	✓	✓	✓

Ordering information:

Product Configurator, "Output, Operation" ordering feature

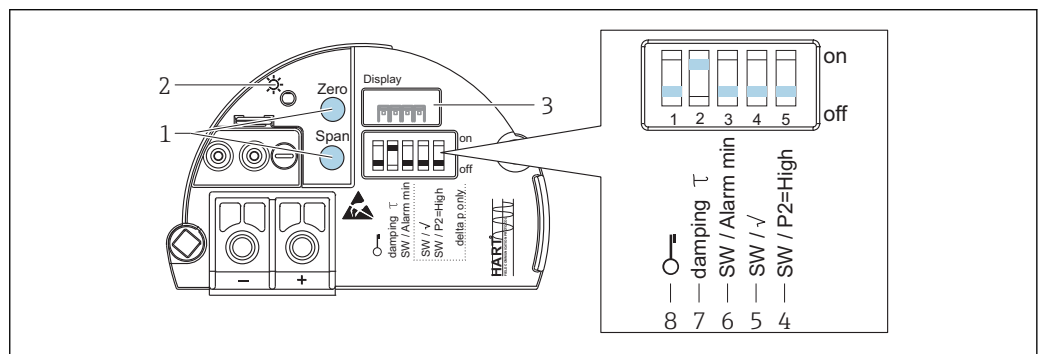
Analog



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- 1 Operating keys for lower range value (zero), upper range value (span), position zero adjustment or reset
- 2 Green LED to indicate successful operation
- 3 Slot for optional local display
- 4 DIP switch for switching damping on/off

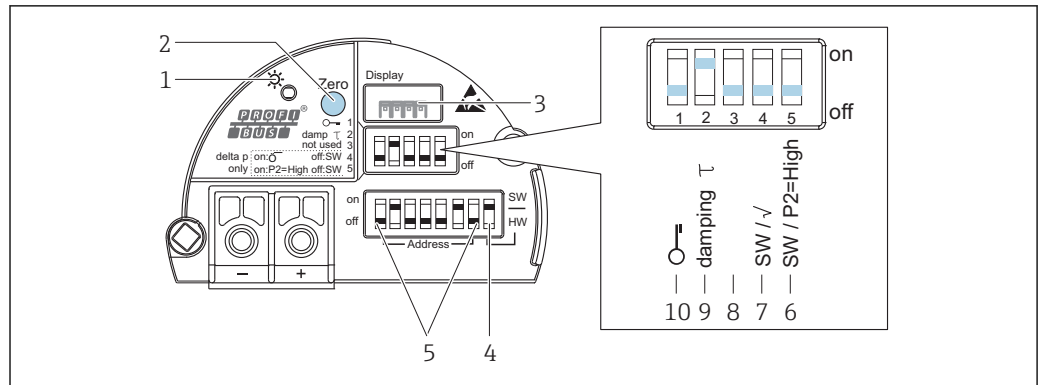
HART



A0032658

- 1 Operating keys for lower range value (zero) and upper range value (span)
- 2 Green LED to indicate successful operation
- 3 Slot for optional local display
- 4 DIP switch only for Deltabar M
- 5 DIP switch only for Deltabar M
- 6 DIP switch for alarm current SW / Alarm Min (3.6 mA)
- 7 DIP switch for switching damping on/off
- 8 DIP switch for locking/unlocking parameters relevant to the measured value

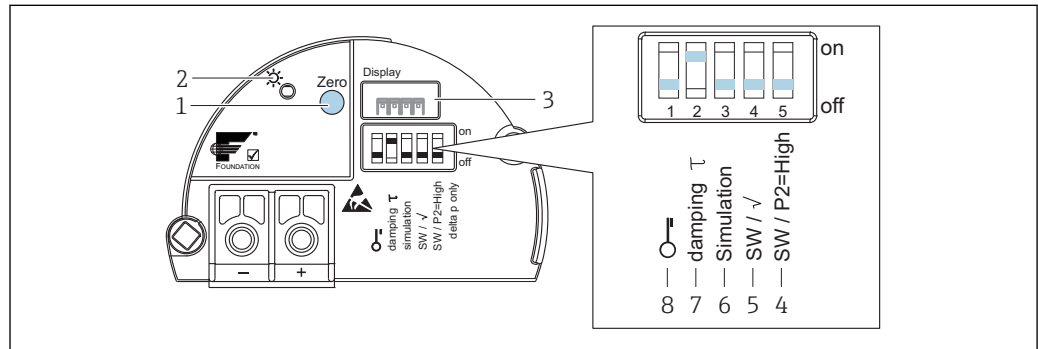
PROFIBUS PA



A0032659

- 1 Green LED to indicate successful operation
- 2 Operating key for position zero adjustment (Zero) or reset
- 3 Slot for optional local display
- 4 DIP-switch for bus address SW / HW
- 5 DIP-switch for hardware address
- 6 DIP switch only for Deltabar M
- 7 DIP switch only for Deltabar M
- 8 Not used
- 9 DIP switch for switching damping on/off
- 10 DIP switch for locking/unlocking parameters relevant to the measured value

FOUNDATION Fieldbus



A0032660

- 1 Operating key for position zero adjustment (Zero) or reset
- 2 Green LED to indicate successful operation
- 3 Slot for optional local display
- 4 DIP switch only for Deltabar M
- 5 DIP switch only for Deltabar M
- 6 DIP-switch for simulation mode
- 7 DIP switch for switching damping on/off
- 8 DIP switch for locking/unlocking parameters relevant to the measured value

Operating languages

You can also choose another language in addition to the standard language "English":




Designation	Option ¹⁾
English	AA
German	AB
French	AC
Spanish	AD
Italian	AE
Dutch	AF

Designation	Option ¹⁾
Chinese	AK
Japanese	AL

1) Product Configurator "Additional Operation Language" ordering feature

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	HART	PROFIBUS PA	FOUNDATION Fieldbus
FieldCare →  111	✓ ¹⁾	✓ ²⁾	✓
FieldXpert SFX100 →  111	✓	—	✓
NI-FBUS Configurator →  112	—	—	✓

- 1) Commubox FXA195 required
 2) Profiboard or Proficard required

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
- Loading and saving device data (upload/download)
- 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 laptop. For details refer to TI00405C/07/EN.

 For the following Endress+Hauser devices you will need the "ToF Adapter FXA291" as an additional accessory:

- Cerabar M
- Deltabar M
- Deltapilot M

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
- Reading and writing of data from control and regulation systems
- 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 a virtual device by a real device
- Save and print a configuration

System integration (Except analog electronics)

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

Designation	Option ¹⁾
Tagging (TAG), see additional spec.	Z1
Bus address, see additional spec.	Z2

1) Product configurator "Marking" ordering feature

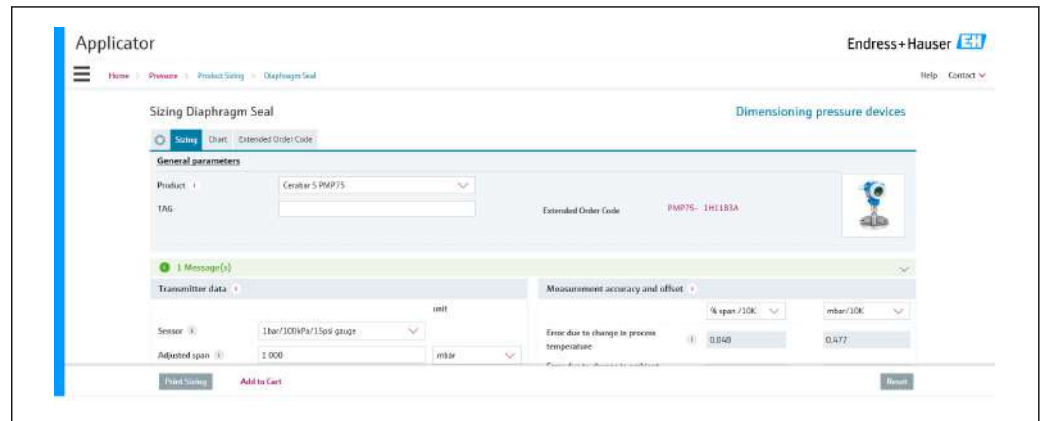
Planning instructions for diaphragm seal systems

NOTICE

Diaphragm seal systems sized/ordered incorrectly

The performance and the permitted range of application of a diaphragm seal system depend on the process isolating diaphragm used, the filling oil, the coupling, the unit design and on the specific process and ambient conditions present in the individual application.

- ▶ 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, please contact your local Endress+Hauser Sales Center.

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
- 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

Function and design

Diaphragm seals separate the measuring system from the process.

A diaphragm seal system consists of:

- A diaphragm seal
- A capillary tube or a temperature isolator if necessary
- Fill fluid and
- a pressure transmitter.

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

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

The diaphragm seal determines the application range of the system on the basis of

- The diameter of the process isolating diaphragm
- The process isolating diaphragm: stiffness and material
- The design (oil volume)

Diameter of the process isolating diaphragm

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

Stiffness of the process isolating diaphragm

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

The Endress+Hauser TempC membrane: Highest accuracy and process safety when measuring pressure and differential pressure using diaphragm seals

To measure with even greater accuracy in these applications and increase process safety, Endress+Hauser has developed the TempC diaphragm which is based on a completely revolutionary technology. This diaphragm guarantees the utmost level of accuracy and process safety in diaphragm seal applications.

- The very low temperature effect minimizes the effect of process and ambient temperature fluctuations, thereby guaranteeing accurate and reliable measurements. Measurement inaccuracies caused by temperature are reduced to a minimum.
- The TempC membrane can be used at temperatures between -70 °C (-94 °F) and $+400\text{ °C}$ ($+752\text{ °F}$). This guarantees maximum process safety even for very long sterilization and cleaning cycles (SIP/CIP) in tanks and pipes at high temperatures.
- With a smaller process connection, the new diaphragm measures at least as accurately as a conventional diaphragm with a larger diameter. With a smaller process connection, the new membrane measures at least as accurately as a conventional membrane with a larger diameter.
- Due to the geometry of the 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. For TempC membranes, the effect of the overshoot on the output signal can be reduced by adjusting the damping.
- In addition, TempC Membrane convinces customers by its better hygiene cleanability as well as insensitivity to strong pressure load changes.

Ordering information:

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

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.

Filling oil

Observe the temperatures and pressures during commissioning and cleaning. A further selection criterion is the compatibility of the filling oil with the requirements of the medium. For example, only filling oils that do not present a health hazard are used in the food industry, e.g. vegetable oil or silicone oil. (See also the following section "Diaphragm seal filling oils".)

The filling oil used influences the thermal change, the temperature application range of a diaphragm seal system and the response time. A temperature change results in a volume change in the filling oil. The volume change depends on the thermal expansion coefficient of the filling oil and on the volume of the fill fluid at calibration temperature (constant in the range: +21 to +33 °C (+70 to +91 °F)).

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

Pressure transmitter

The pressure transmitter influences the temperature application range, the thermal change and the response time as a result of its volume change. The volume change is the volume that has to be shifted in order to pass through the complete measuring range.

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

Diaphragm seal filling oils

Medium	$P_{abs} = 0.05 \text{ bar (0.725 psi)}^{1)}$	$P_{abs} \geq 1 \text{ bar (14.5 psi)}^{2)}$
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 $p_{abs} = 0.05 \text{ bar (0.725 psi)}$ (observe temperature limits of the device and the system!)
- 2) Permitted temperature range at $p_{abs} \geq 1 \text{ bar (14.5 psi)}$ (observe temperature limits of the device and the system!)
- 3) 325 °C (617 °F) at $\geq 1 \text{ bar (14.5 psi)}$ absolute pressure.
- 4) 350 °C (662 °F) at $\geq 1 \text{ bar (14.5 psi)}$ absolute pressure (max. 200 hours).
- 5) 400 °C (752 °F) at $\geq 1 \text{ bar (14.5 psi)}$ absolute pressure (max. 10 hours).
- 6) 150 °C (302 °F) at $\geq 1 \text{ bar (14.5 psi)}$ absolute pressure.
- 7) 175 °C (347 °F) at $\geq 1 \text{ bar (14.5 psi)}$ 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 ranges and temperature ranges, are done separately in the Applicator "[Sizing Diaphragm Seal](#)".



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Operating temperature range The operating temperature range of a diaphragm seal system depends on the fill fluid, capillary length and internal diameter, process temperature and oil volume of the diaphragm seal.

The range of application can be extended by using a fill fluid with a smaller expansion coefficient and a shorter capillary.

Cleaning instructions Endress+Hauser offer flushing rings as accessories to clean process isolating diaphragms without taking the transmitters out of 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 pipe diaphragm seals. A frequent use of sterilization in place (SIP) will increase the stress on the process isolating diaphragm. Under unfavorable circumstances in the long term view we cannot exclude that a frequent temperature change could lead to a material fatigue of the process isolating diaphragm and possibly to a leakage.

Installation instructions

Diaphragm seal systems

- A diaphragm seal together with the transmitter form a closed, calibrated system, which is filled through openings in the diaphragm seal and in the transmitter's measurement system. These openings are sealed and must not be opened.
- In the case of devices with diaphragm seals and capillaries, the zero point shift caused by the hydrostatic pressure of the filling liquid 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.
- 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))

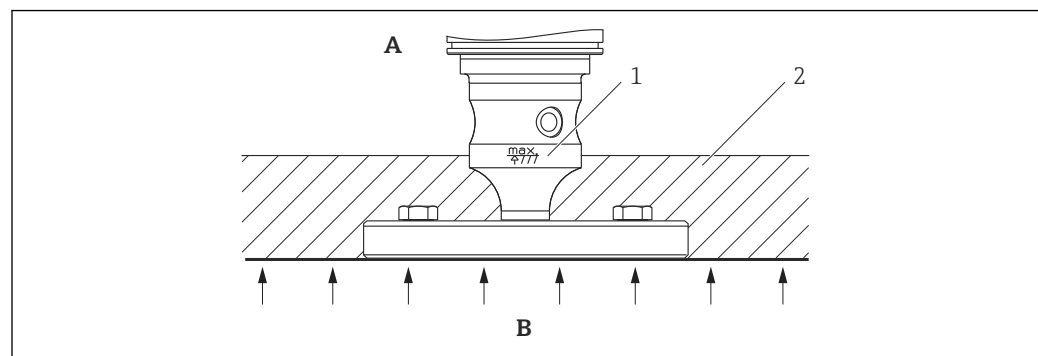
Capillary

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 if the ambient temperature is below or above the reference temperature
- With a bending radius ≥ 100 mm (3.94 in)

Thermal insulation

The PMP55 may 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 PMP55 with a flange:

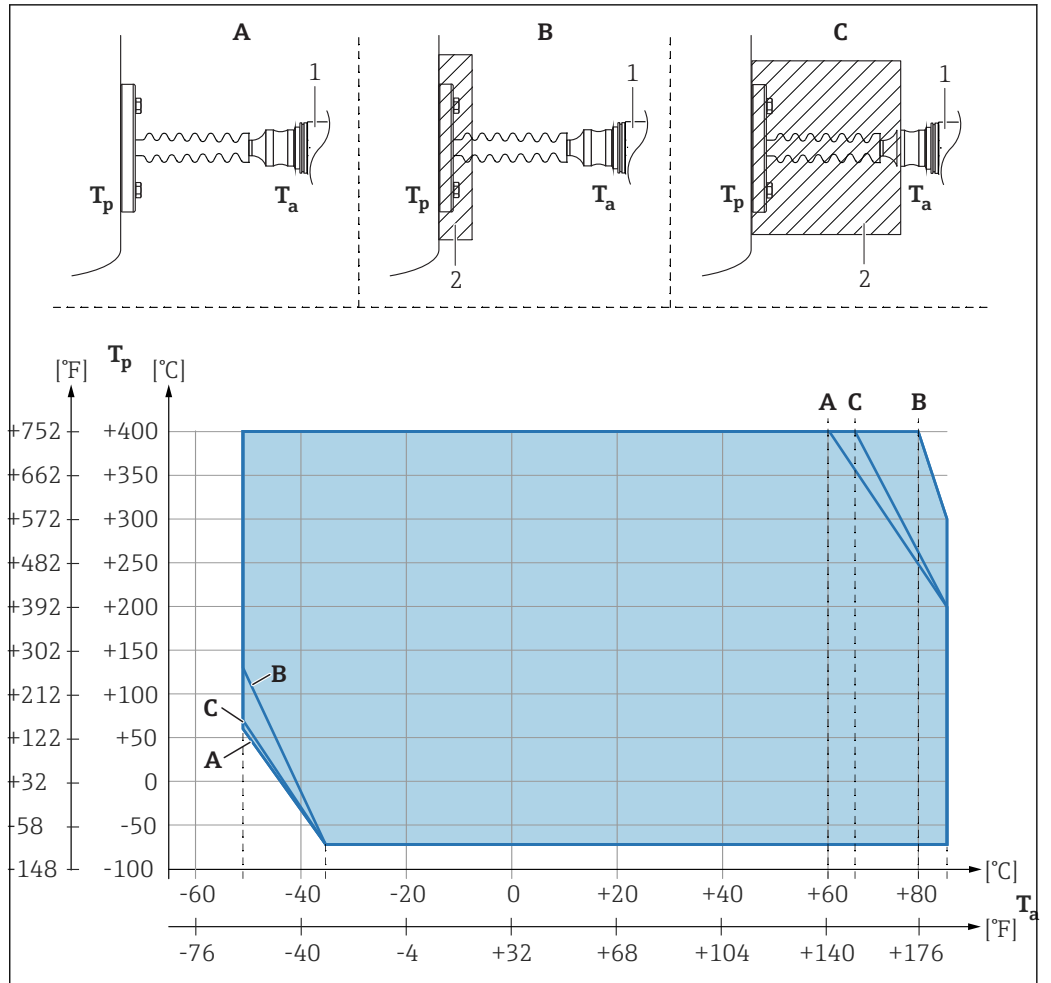


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- A Ambient temperature ≤ 70 °C (158 °F)
 B Process temperature
 1 Maximum permitted insulation height
 2 Insulation material

Mounting with temperature isolator

Endress+Hauser recommends the use of temperature isolators in the event of constant extreme medium temperatures which lead to the maximum permissible electronics temperature of +85 °C (+185 °F) being exceeded. Depending on the filling oil used, diaphragm seal systems with temperature isolators can be used for maximum temperatures of up to +400 °C (+752 °F) → 115, "Diaphragm seal filling oils" section. To minimize the influence of rising heat, Endress+Hauser recommends the device be mounted horizontally or with the housing pointing downwards. The additional installation height also brings about a zero point shift of maximum 2.1 mbar (0.315 psi) due to the hydrostatic column in the temperature isolator. You can correct this zero point shift at the device.



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

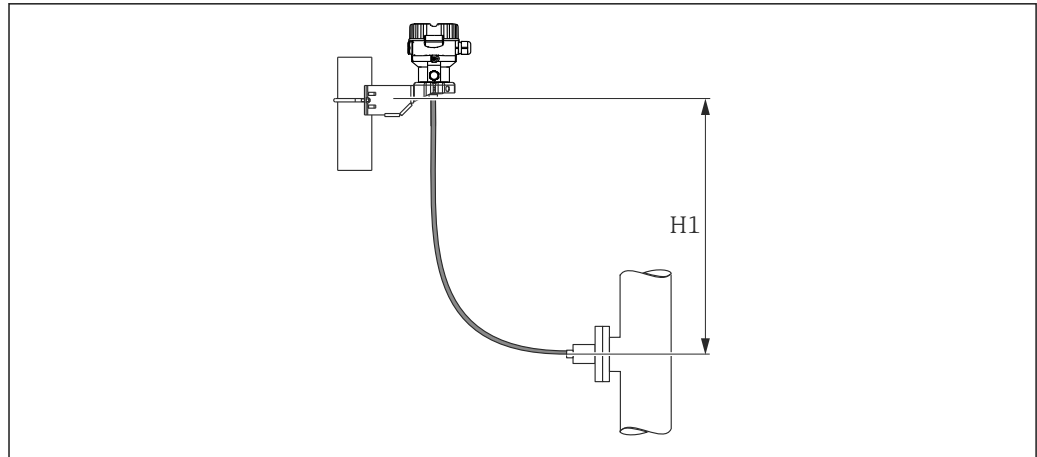
Vacuum applications

Mounting instructions

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

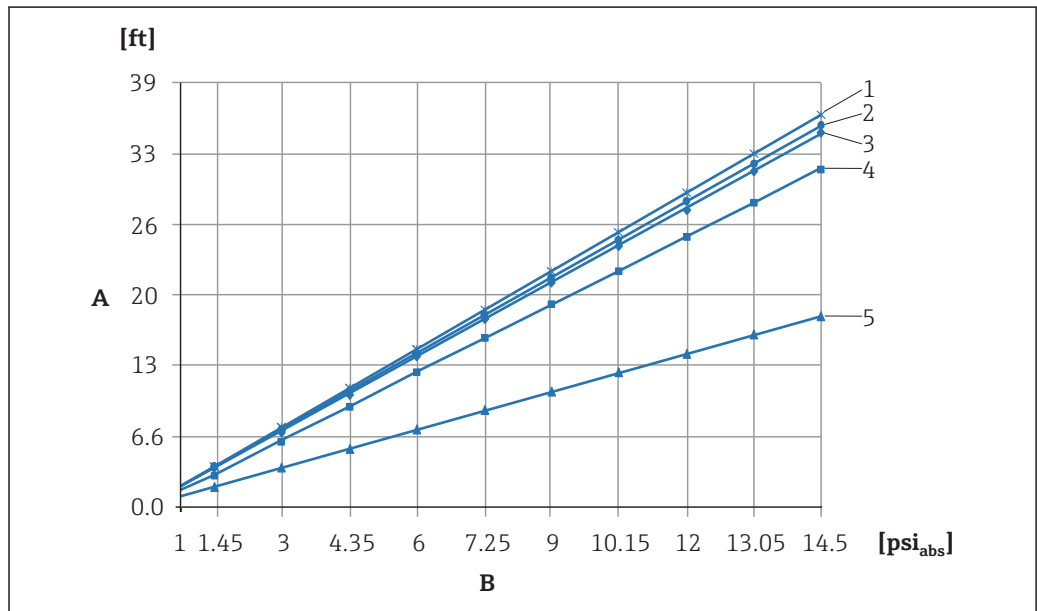
For applications under vacuum, Endress+Hauser recommends mounting the pressure transmitter below the diaphragm seal. This prevents vacuum loading of the diaphragm seal caused by the presence of fill fluid in the capillary.

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



A0023994

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



A0023986-EN

- 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

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

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

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



A0029561

Ex approvals

- ATEX
- IECEx
- FM
- CSA
- NEPSI
- 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 devices approved for use in explosion hazardous areas → 128.

EAC conformity The measuring system meets the legal requirements of the applicable EAC guidelines. These are listed in the corresponding EAC Declaration of Conformity together with the standards applied. Endress+Hauser confirms successful testing of the device by affixing to it the EAC mark.

Suitable for hygiene applications The device has been developed for use in hygienic processes. The materials in contact with the process meet FDA requirements as well as the 3-A Sanitary Standard No. 74-XX. Endress+Hauser confirms compliance with the requirements by affixing the 3-A mark to the device.

The following serial number-specific declarations (with a copy of the certification) can be ordered with the device (optional):

Product Configurator, order code for "Additional approval" option "LD"

Product Configurator, order code for "Additional approval" option "LB"

NOTICE

Risk of contamination if incorrect seals and parts are used!

- ▶ To avoid the risk of contamination, the device must be installed in accordance with EHEDG "Hygienic Equipment Design Criteria (HDC)", "Subgroup Design Principles" Doc. 8.
- ▶ Suitable assemblies and seals must be used to ensure hygiene-compliant design according to the specifications of 3-A SSI and EHEDG Position Paper (in their current version).
- ▶ The leak-proof connections can be cleaned with the cleaning methods typical of this industry (CIP and SIP). Attention must be paid to the pressure and temperature specifications of the sensor and process connections for CIP and SIP processes (clean in place/sterilization in place).
- ▶ For diaphragm seal devices with 3-A and EHEDG certificates, only select filling oils with FDA approval!



If cleaning in place (CIP) is required, adapters are available that comply with 3-A requirements. Information on 3-A and EHEDG-tested adapters can be found in the "Weld-in adapters, process adapters and flanges" documentation, TI00426F.

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)

Certificate of Compliance ASME BPE 2012

Ordering information:

Product Configurator, "Additional approval" ordering feature, option "LW"

Functional safety SIL

The Cerabar M with 4 to 20 mA output signal has been developed to assessed and certified by TÜV NORD CERT as per IEC 61508 Edition 2.0 and IEC 61511. These devices can be used to monitor the process level and pressure up to SIL 2. For a detailed description of the safety functions with Cerabar M, settings and functional safety data, see the "Functional safety manual - Cerabar M" SD00347P.

Ordering information:

Product Configurator, "Additional approval" ordering feature, option "LA"

CRN approvals

Some device versions have CRN approval. A CRN-approved process connection with a CSA approval must be ordered for a CRN-approved device. PMP55 devices with a capillary are not CRN-approved. These devices are fitted with a separate plate bearing the registration number OF10525.5C

Ordering information:

Product Configurator, "Process connection" section and

Product Configurator, "Approval" ordering feature

Other standards and guidelines

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

IEC 62828-1 / DIN EN 60770 and IEC 62828-2 / DIN EN 60770:

Transmitters for use in industrial-process control systems. Part 1: Methods for inspection and routine testing

DIN 16086:

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

EN 61326-Series:

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

EN 60529:

Degrees of protection by housing (IP code)

AD2000

The pressure retaining material 316L (1.4435/1.4404) corresponds to AD2000 - W2/W10.

Pressure Equipment Directive 2014/68/EU (PED)

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

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

Reasons:

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

Note:

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

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

Pressure equipment designated for application in every process fluid having a pressurized volume of $< 0,1$ l and a max. allowable pressure $PS > 200$ bar (2 900 psi) 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 category in accordance with Annex II. The conformity assessment of the pressure equipment shall be determined by the category I under consideration of the above-mentioned low pressurized volume. These devices shall be provided with CE marking.

Reasons:

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

Note:

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

The following also applies:

- PMP51 /PMP55 with threaded connection and internal process isolating diaphragm PN > 200: Suitable for stable gases in group 1, category I, module A
- PMP55 with pipe diaphragm seal ≥ 1.5 "/PN40: Suitable for stable gases in group 1, category II, module A2
- PMP55 with separators PN400: Suitable for stable gases in group 1, category I, module A

Manufacturer declaration

Depending on the desired configuration, the following documents can be ordered additionally with the device:

- TSE-free, materials free from animal origin
- Regulation (EC) No. 2023/2006 (GMP)
- Regulation (EC) No. 1935/2004 on materials and articles intended to come into contact with food

Downloading the Declaration of Conformity

www.endress.com → Download

Marine approval

Designation	Option ¹⁾
GL (Germanischer Lloyd)	LE
ABS (American Bureau of Shipping)	LF

Designation	Option ¹⁾
LR (Lloyd's Register)	LG
BV (Bureau Veritas)	LH
DNV (Det Norske Veritas)	LI

1) Product Configurator, "Additional approval" ordering feature

Drinking water approval

NSF 61 - approval for PMC51 and PMP51

UBA / W270 - approval for PMC51 and PMP51

Ordering information:

Product Configurator, "Additional approval" ordering feature, option "LR"

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

Endress+Hauser instruments are designed according to ANSI/ISA 12.27.01 either as single seal or dual seal devices with annunciation, allowing the user to waive the use 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.

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

Inspection certificate

Designation	PMC51	PMP51	PMP55	Option ¹⁾
3.1 Material certificate, wetted metallic parts, EN10204-3.1 inspection certificate	✓	✓	✓	JA ²⁾
Conformity to NACE MR0175, wetted metallic parts	✓	✓	✓	JB ²⁾
Conformity to NACE MR0103, wetted metallic parts	✓	✓	✓	JE ²⁾
Conformity to AD2000, wetted metallic parts, excepting process membrane	–	✓	✓	JF
Surface finish measurement ISO4287/Ra, wetted metallic parts, Inspection certificate	✓	✓	✓	KB
Helium leak test, internal procedure, inspection certificate	✓	✓	✓	KD
Pressure test, internal procedure, inspection certificate	✓	✓	✓	KE
3.1 Material certificate+Delta-Ferri measurement, internal procedure, wetted metallic parts, EN10204-3.1 inspection certificate	✓	✓	✓	KF
3.1 Material certificate+PMI test (XRF), internal procedure, wetted metallic parts, EN10204-3.1 inspection certificate	–	✓	✓	KG
Welding documentation, wetted/pressurized seams	–	✓	–	KS

1) Product Configurator, "Test, certificate" ordering feature

2) The selection of this feature for coated process isolating diaphragm / process connections refers to the metallic base material.

Calibration; unit

Designation	Option ¹⁾
Sensor range; %	A
Sensor range; mbar/bar	B
Sensor range; kPa/MPa	C
Sensor range; mm/mH ₂ O	D
Sensor range; inH ₂ O/ftH ₂ O	E
Sensor range; psi	F

Designation	Option ¹⁾
Customized pressure; see additional specification	J
Customized level; see additional specification	K

1) Product Configurator, "Calibration; unit" ordering feature

Calibration

Designation	Option ¹⁾
Factory calib. certificate 5-point	F1
DKD/DAkkS calib. certificate 10-point ²⁾	F2

1) Product Configurator "Calibration" ordering feature

2)

Service

Designation	Option ¹⁾
Cleaned from oil+grease ²⁾	HA
Cleaned for oxygen service ²⁾	HB
Cleaned from PWIS (PWIS = paint wetting impairment substances) ²⁾	HC
Adjusted min alarm current	IA
Adjusted HART Burst Mode PV	IB

1) Product Configurator "Service" ordering feature

2) Only device, not accessory or enclosed accessory

Ordering information

Detailed ordering information is available as follows:

- 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 information specific to the measuring point, such as measuring range or operating language
 - Automatic verification of exclusion criteria
 - Automatic generation of the order code with 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 **Technical Special Products (TSP)**.
For further information please contact your local Endress+Hauser Sales Center.

Scope of delivery

- Device
- Optional accessories
- Brief Operating Instruction
- Calibration certificates
- Optional certificates

Measuring point (TAG)

Order code for	895: Marking
Option	Z1: Tagging (TAG), see additional spec.
Location of measuring point identification	To be selected in the additional specification: <ul style="list-style-type: none"> ▪ Tie-on label, stainless steel ▪ Adhesive paper label ▪ Label provided ▪ RFID TAG ▪ RFID TAG + tie-on label, stainless steel ▪ RFID TAG + adhesive paper label ▪ RFID TAG + label provided
Definition of measuring point identification	To be specified in additional specification: 3 lines each with a maximum of 18 characters The measuring point designation appears on the selected label and/or the RFID TAG.
Identification on electronic nameplate (ENP)	32 characters
Identification on display module	10 characters

Configuration data sheet (HART, PROFIBUS PA, FOUNDATION Fieldbus electronics)

Pressure

If the option "J" was selected for the order code for "Calibration; Unit" in the Product Configurator, the following configuration data sheet must be completed and included with the order.


Pressure unit			
<input type="checkbox"/> mbar	<input type="checkbox"/> mmH ₂ O	<input type="checkbox"/> mmHg	<input type="checkbox"/> Pa
<input type="checkbox"/> bar	<input type="checkbox"/> mH ₂ O	<input type="checkbox"/> kgf/cm ²	<input type="checkbox"/> kPa
<input type="checkbox"/> psi	<input type="checkbox"/> ftH ₂ O		<input type="checkbox"/> MPa
	<input type="checkbox"/> inH ₂ O		

Calibration Range / Output		
Low range value (LRV):	_____	[Pressure engineering unit]
Upper range value (URV):	_____	[Pressure engineering unit]

Display	
1st Value Display ¹⁾	2nd Value Display ¹⁾
<input type="checkbox"/> Main Value	<input type="checkbox"/> None (Default)
	<input type="checkbox"/> Main Value [%]
	<input type="checkbox"/> Pressure
	<input type="checkbox"/> Current [mA] (HART only)
	<input type="checkbox"/> Temperature

1) Depending on sensor and communication version

Damping	
Damping:	_____ sec (Default 2 sec)

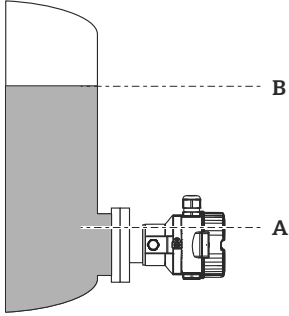
Lowest calibratable span (preset at factory) →  13

Level

If the option "K" was selected for the order code for "Calibration; Unit" in the Product Configurator, the following configuration data sheet must be completed and included with the order.

Pressure unit		Output unit (scaled unit)																																						
<input type="checkbox"/> mbar <input type="checkbox"/> mmH ₂ O <input type="checkbox"/> mmHg <input type="checkbox"/> Pa <input type="checkbox"/> bar <input type="checkbox"/> mH ₂ O <input type="checkbox"/> kgf/cm ² <input type="checkbox"/> kPa <input type="checkbox"/> psi <input type="checkbox"/> ftH ₂ O <input type="checkbox"/> inH ₂ O <input type="checkbox"/> MPa	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Mass</td> <td style="padding: 2px;">Lengths</td> <td style="padding: 2px;">Volume</td> <td style="padding: 2px;">Volume</td> <td style="padding: 2px;">Percent</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> kg</td> <td style="padding: 2px;"><input type="checkbox"/> m</td> <td style="padding: 2px;"><input type="checkbox"/> l</td> <td style="padding: 2px;"><input type="checkbox"/> gal</td> <td style="padding: 2px;"><input type="checkbox"/> %</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> t</td> <td style="padding: 2px;"><input type="checkbox"/> dm</td> <td style="padding: 2px;"><input type="checkbox"/> hl</td> <td style="padding: 2px;"><input type="checkbox"/> lgal</td> <td></td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> lb</td> <td style="padding: 2px;"><input type="checkbox"/> cm</td> <td style="padding: 2px;"><input type="checkbox"/> m³</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="padding: 2px;"><input type="checkbox"/> mm</td> <td style="padding: 2px;"><input type="checkbox"/> ft³</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="padding: 2px;"><input type="checkbox"/> ft</td> <td style="padding: 2px;"><input type="checkbox"/> in³</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="padding: 2px;"><input type="checkbox"/> inch</td> <td></td> <td></td> <td></td> </tr> </table>					Mass	Lengths	Volume	Volume	Percent	<input type="checkbox"/> kg	<input type="checkbox"/> m	<input type="checkbox"/> l	<input type="checkbox"/> gal	<input type="checkbox"/> %	<input type="checkbox"/> t	<input type="checkbox"/> dm	<input type="checkbox"/> hl	<input type="checkbox"/> lgal		<input type="checkbox"/> lb	<input type="checkbox"/> cm	<input type="checkbox"/> m ³				<input type="checkbox"/> mm	<input type="checkbox"/> ft ³				<input type="checkbox"/> ft	<input type="checkbox"/> in ³				<input type="checkbox"/> inch			
Mass	Lengths	Volume	Volume	Percent																																				
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<input type="checkbox"/> lb	<input type="checkbox"/> cm	<input type="checkbox"/> m ³																																						
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	<input type="checkbox"/> ft	<input type="checkbox"/> in ³																																						
	<input type="checkbox"/> inch																																							
Empty pressure [a]: Low pressure value (empty)	_____ [Pressure engineering unit]	Empty calibration [a]: Low level value (empty)	_____ [Scaled unit]																																					
Full pressure [b]: High pressure value (full)	_____ [Pressure engineering unit]	Full calibration [b]: High level value (full)	_____ [Scaled unit]																																					

Example



A0024007

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

Display	
1st Value Display ¹⁾ <input type="checkbox"/> Main Value	2nd Value Display <input type="checkbox"/> None (Default) <input type="checkbox"/> Main Value [%] <input type="checkbox"/> Pressure <input type="checkbox"/> Current [mA] (HART only) <input type="checkbox"/> Temperature

1) Depending on sensor and communication version

Damping
Damping: _____ sec (Default 2 sec)

**Configuration data sheet
(Analog electronics)**

Pressure

If the option "J" was selected in the "Kalibration; Einheit" ordering feature of the Product Configurator, the following configuration data sheet must be completed and included with the order.


Pressure Engineering Unit			
<input type="checkbox"/> mbar	<input type="checkbox"/> mmH ₂ O	<input type="checkbox"/> mmHg	<input type="checkbox"/> Pa
<input type="checkbox"/> bar	<input type="checkbox"/> mH ₂ O	<input type="checkbox"/> kgf/cm ²	<input type="checkbox"/> kPa
<input type="checkbox"/> psi	<input type="checkbox"/> ftH ₂ O		<input type="checkbox"/> MPa
	<input type="checkbox"/> inH ₂ O		

Calibration Range / Output		
Low range value (LRV):	_____	[Pressure engineering unit]
Upper range value (URV):	_____	[Pressure engineering unit]

Display Information	
1st Value Display ¹⁾	2st Value Display
<input type="checkbox"/> Main Value	<input type="checkbox"/> none (Default)

1) Depending on sensor and communication variant

Damping	
Damping:	_____ sec (Default 2 sec)

Smallest span (factory calibration) →  13

Additional documentation

Field of Activities Pressure measurement, powerful instruments for process pressure, differential pressure, level and flow:
FA00004P/00/EN

Technical Information

- Deltabar M: TI00434P/00/EN
- Deltapilot M: TI00437P/00/EN
- EMC test procedures: TI00241F/00/EN
- Weld-in adapter, adapter and flanges: TI00426F/00/EN

Special Documentation Mechanical accessories for pressure measuring devices: SD01553P/00/EN

Operating Instructions

- 4...20 mA Analog: BA00385P/00/EN
- 4...20 mA HART: BA00382P/00/EN
- PROFIBUS PA: BA00383P/00/EN
- FOUNDATION Fieldbus: BA00384P/00/EN

Brief operating instruction

- 4...20 mA Analog: KA01036P/00/EN
- 4...20 mA HART: KA01030P/00/EN
- PROFIBUS PA: KA01031P/00/EN
- FOUNDATION Fieldbus: KA01032P/00/EN

Functional safety manual (SIL) Cerabar M (4...20 mA): SD00347P/00/EN

Safety instructions

Directive	Approval	Category	Type	Housing		Electronics	Documentation	Option ¹⁾
				F31	F15			
ATEX	Ex ia IIC	II 1/2 G	PMC51 PMP51 PMP55	✓	✓	4 to 20 mA HART	XA00464P/00	BA
ATEX	Ex t IIC	II 1/2 D	PMC51 PMP51 PMP55	✓	✓	4 to 20 mA HART	XA00466P/00	BB
ATEX	Ex d	II 2 G	PMP51 PMP55	✓	—	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00467P/00	BC
ATEX	Ex nA	II 3 G	PMC51 PMP51 PMP55	✓	✓	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00469P/00	BD
ATEX	Ex ia IIC	II 2 G	PMC51 PMP51 PMP55	✓	✓	4 to 20 mA HART	XA00464P/00	BE
ATEX	Ex ia IIC	II 1/2 D	PMC51	✓	✓	4 to 20 mA HART	XA00465P/00	BF
ATEX	Ex ic IIC	II 3 G	PMC51 PMP51 PMP55	✓	✓	4 to 20 mA HART	XA00489P/00	BG
ATEX	Ex ia Ex ia IIC	II 1/2 G II 1/2 D	PMC51 PMP51 PMP55	✓	✓	4 to 20 mA HART	XA00468P/00	B1
ATEX	Ex ia IIC	II 2 G II 1/2 G	PMP51 PMP55	✓	✓	4 to 20 mA HART	XA00468P/00	B2
ATEX	Ex d IIC Ex ia IIC	II 2 G II 1/2 G	PMP51 PMP55	✓	—	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00504P/00	8A

1) Product Configurator, order code for "Approval"

Directive	Approval	EPL	Type	Housing		Electronics	Documentation	Option ¹⁾
				F31	F15			
IECEX	Ex ia IIC	Ga/Gb	PMC51 PMP51 PMP55	✓	✓	4 to 20 mA HART	XA00470P/00	IA
IECEX	Ex d IIC	Gb	PMP51 PMP55	✓	–	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00471P/00	IB
IECEX	Ex t IIIC	Da/Db	PMP51 PMP55	✓	✓	4 to 20 mA HART	XA00472P/00	ID
IECEX	Ex ic	Gc	PMC51 PMP51 PMP55	✓	✓	4 to 20 mA HART	XA00488P/00	IE
IECEX	Ex ia IIIC	Da/Db	PMC51	✓	✓	4 to 20 mA HART	XA00487P/00	IF
IECEX	Ex ia IIC Ex ia IIIC	Ga/Gb Da/Db	PMC51 PMP51 PMP55	✓	✓	4 to 20 mA HART	XA00473P/00	I1

1) Product Configurator, order code for "Approval"

Directive	Approval	Type	Housing		Electronics	Documentation	Option ¹⁾
			F31	F15			
NEPSI	Ex ia IIC T6	PMC51 PMP51 PMP55	✓	✓	4 to 20 mA HART	XA00533P/00	NA
NEPSI	Ex d IIC T6 Gb	PMP51 PMP55	✓	–	4 to 20 mA HART	XA00515P/00	NB

1) Product Configurator, order code for "Approval"

Directive	Approval	Electronics	Documentation	Option ¹⁾
INMETRO	Ex ia IIC T6...T4 Ga/Gb Ex ia IIC T6...T3 Ga/Gb	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA01302P/00	MA
INMETRO	Ex d IIC T6/T4 Gb	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA01284P/00	MR

1) Product Configurator, order code for "Approval"

Installation/Control Drawings

Directive	Approval	Type	Housing		Electronics	Documentation	Option ¹⁾
			F31	F15			
FM	FM IS Cl.I,II,III Div.1 Gr.A-G, AEx ia FM NI Cl.I Div.2 Gr.A-D FM IS: Zone 0,1,2,20,21,22/FM NI: Zone 2	PMC51 PMP51 PMP55	✓	✓	<ul style="list-style-type: none"> ■ 4 to 20 mA HART ■ PROFIBUS PA, FOUNDATION Fieldbus 	<ul style="list-style-type: none"> ■ XA00563P/00 ■ XA00564P/00 	FA
FM	FM XP Cl.I, II Div.1 Gr.A-D, AEx d (Factory sealed) Zone 1,2	PMP51 PMP55	✓	–	<ul style="list-style-type: none"> ■ 4 to 20 mA HART ■ PROFIBUS PA ■ FOUNDATION Fieldbus 	XA01163P/00	FB
FM	FM DIP Cl.II, III Div.1 Gr.A-D Zone 21, 22	PMP51 PMP55	✓	✓	4 to 20 mA HART	In preparation	FC
FM	FM NI Cl.I Div.2 Gr.A-D, Zone 2	PMC51 PMP51 PMP55	✓	✓	4 to 20 mA HART	FM3035394	FD

Directive	Approval	Type	Housing		Electronics	Documentation	Option ¹⁾
			F31	F15			
FM	FM IS/XP Cl.I, II Div.1 Gr.A-G, Zone 1,2	PMP51 PMP55	✓	–	<ul style="list-style-type: none"> ■ 4 to 20 mA HART ■ PROFIBUS PA, FOUNDATION Fieldbus 	<ul style="list-style-type: none"> ■ XA01160P/00 ■ XA00567P/00 	F1
CSA	C/US IS Cl.I,II,III Div.1 Gr.A-G, C/US IS Cl.I Div.2 Gr.A-D, Ex ia	PMC51 PMP51 PMP55	✓	✓	<ul style="list-style-type: none"> ■ 4 to 20 mA HART ■ PROFIBUS PA, FOUNDATION Fieldbus 	<ul style="list-style-type: none"> ■ XA00556P/00 ■ XA00558P/00 	CA
CSA	CSA C/US CP Cl.I, II Div.1 Gr.B-G, Ex d (factory sealed) Zone 1,2	PMP51 PMP55	✓		4 to 20 mA HART	XA00577P/00	CB
CSA	CSA C/US Cl.II, III Div.1 Gr.E-G, Zone 21,22	PMP51 PMP55	✓	✓	4 to 20 mA HART	In preparation	CC
CSA	CSA C/US IS/XP Cl.I, II Div.1 Gr.A-G/B-G, Zone 1,2	PMP51 PMP55	✓	–	<ul style="list-style-type: none"> ■ 4 to 20 mA HART ■ PROFIBUS PA, FOUNDATION Fieldbus 	<ul style="list-style-type: none"> ■ XA00577P/00 ■ XA00561P/00 	C1
FM CSA	FM/CSA IS + XP Cl.I, II Div.1 Gr.A-D/B-G FM IS/FM XP Cl.I, II Div.1 Gr.A-G+ CSA IS/XP Cl.I, II Div.1 Gr.A-G, Zone 1,2	PMP55	✓	–	4 to 20 mA HART	In preparation	8B

1) Product Configurator, order code for "Approval"

Combination certificate

Directive	Approval	Type	Electronics	Documentation	Option ¹⁾
KEMA/ FM / CSA	ATEX II Ex ia + FM/CSA IS ATEX II 1/2G Ex ia IIC T6 + FM/CSA IS Cl.I Div.1 Gr.AD, FM/CSA: Zone 0,1,2	PMC51	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00464P/00	8C
			4 to 20 mA HART	XA00556P/00 + XA00536P/00	
			PROFIBUS PA, FOUNDATION Fieldbus	XA00564P/00	

1) Product Configurator, order code for "Approval"

Directive	Approval	Electronics	Documentation	Option ¹⁾
KEMA/ FM / CSA	ATEX II Ex ia + FM/CSA IS ATEX II 1/2G Ex ia IIC T6 + FM/CSA IS Cl.I Div.1 Gr.A-D, FM/CSA: Zone 0,1,2	4 to 20 mA HART	<ul style="list-style-type: none"> ■ ZD00236P/00 ■ ZD00239P/00 	8C
		PROFIBUS PA, FOUNDATION Fieldbus	XA00474P/00	

1) Product Configurator, order code for "Approval"

Accessories

Manifolds

→  76

For 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, adapter test, flushing rings, block&bleed valves, protective roofs.

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

Welding necks and weld-in adapters


For dimensions and technical data see Technical Information TI00426F/00.

Designation	PMC51	PMP51	PMP55	Option ¹⁾
Weld-in adapter G1/2, 316L,	–	✓	✓	QA
Weld-in adapter G1/2, 316L, 3.1 EN10204-3.1 material, inspection certificate	–	✓	✓	QB
Weld-in tool adapter G1/2, brass	–	✓	✓	QC
Weld-in adapter G1, 316L, conical metal joint	–	✓	–	QE
Weld-in adapter G1, 316L, 3.1 EN10204-3.1 material, inspection certificate, conical metal joint	–	✓	–	QF
Weld-in tool adapter G1, brass conical metal joint	–	✓	–	QG
Weld-in adapter G1/2, 316L, for G1/2 A DIN 3852	–	✓	–	QM
Weld-in adapter G1/2, 316L, 3.1, for G1/2 A DIN 3852, EN10204-3.1 material, inspection certificate	–	✓	–	QN
Weld-in adapter G1-1/2, 316L	✓	✓	✓	QJ
Weld-in adapter G1-1/2, 316L, 3.1 EN10204-3.1 material, inspection certificate	✓	✓	✓	QK
Weld-in tool adapter G1-1/2, brass	✓	✓	✓	QL
Weld-in flange DRD DN50 65mm, 316L	✓	✓	✓	QP
Weld-in fl. DRD DN50 65mm, 316L 3.1 EN10204-3.1 material, inspection certificate	✓	✓	✓	QR
Weld-in tool flange DRD DN50 65mm, brass	✓	✓	✓	QS
Weld-in adapter Uni D65, 316L	✓	–	–	QT
Weld-in adapter Uni D65, 316L, 3.1 EN10204-3.1 material, inspection certificate	✓	–	–	QU
Weld-in tool adapter Uni D65/D85, brass	✓	–	–	Q1
Weld-in adapter Uni D85, 316L	✓	–	–	Q2
Weld-in adapter Uni D85, 316L, 3.1 EN10204-3.1 material, inspection certificate	✓	–	–	Q3
Adapter Uni > DIN11851 DN40, 316L, slotted-nut	✓	–	–	RA
Adapter Uni > DIN11851 DN50, 316L, slotted-nut	✓	–	–	RB
Adapter Uni > DRD DN50 65mm, 316L	✓	–	–	RC
Adapter Uni > Clamp 2", 316L	✓	–	–	RD
Adapter Uni > Clamp 3", 316L	✓	–	✓	RE
Adapter Uni > Varivent N, 316L	✓	–	–	RF
Adapter Uni > Cherry Burell 2", 316L	✓	–	–	RH
Adapter Uni > DIN11851 DN40, 316L, 3.1, slotted-nut, EN10204-3.1 material, inspection certificate	✓	–	–	R1
Adapter Uni > DIN11851 DN50, 316L, 3.1, slotted-nut, EN10204-3.1 material, inspection certificate	✓	–	–	R2
Adapter Uni > DRD DN50 65mm, 316L, 3.1 EN10204-3.1 material, inspection certificate	✓	–	–	R3
Adapter Uni > Clamp 2", 316L, 3.1 EN10204-3.1 material, inspection certificate	✓	–	–	R4
Adapter Uni > Clamp 3", 316L, 3.1 EN10204-3.1 material, inspection certificate	✓	–	✓	R5




Designation	PMC51	PMP51	PMP55	Option ¹⁾
Adapter Uni > Varivent, 316L, 3.1 EN10204-3.1 material, inspection certificate	✓	–	–	R6
Adapter Uni > Cherry Burell, 316L, 3.1 EN10204-3.1 material, inspection certificate	✓	–	–	R7

1) Product Configurator, order code for "Accessories"

For dimensions and technical data see Technical Information TI00426F/00.

Mounting bracket for wall and pipe mounting →  40

M12 connector →  22

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

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