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Technical Information
Cerabar PMP21
IO-Link

Process pressure measurement

Pressure transducer with metal sensors

Application

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

Your benefits

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

Endress+Hauser
People for Process Automation

Table of contents

About this document

Document function

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

Symbols

Safety symbols

DANGER

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

WARNING

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

CAUTION

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

NOTICE

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

Electrical symbols

⊜ Protective earth (PE)
Ground terminals, which must be grounded prior to establishing any other connections. The ground terminals are located on the inside and outside of the device.

⏚ Ground connection
Grounded clamp, which is grounded via a grounding system.

Tool symbols

Open-ended wrench

Symbols for certain types of Information

Permitted
Procedures, processes or actions that are permitted.

Forbidden
Procedures, processes or actions that are forbidden.

Tip
Indicates additional information

Reference to documentation

1., 2., 3. Series of steps

Reference to page:

Result of an individual step:

Symbols in graphics

A, B, C ... View

1, 2, 3 ... Item numbers

1., 2., 3. Series of steps

Documentation

The following document types are available in the Downloads area of the Endress+Hauser website (www.endress.com/downloads):

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

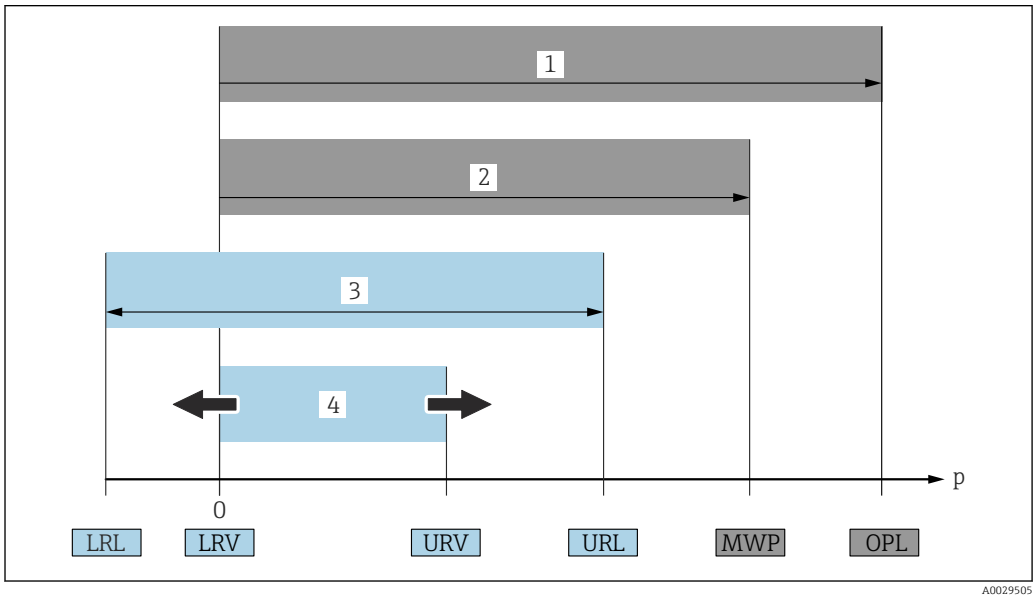
Operating Instructions (BA)

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

Brief Operating Instructions (KA)

Guide that takes you quickly to the 1st measured value
The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

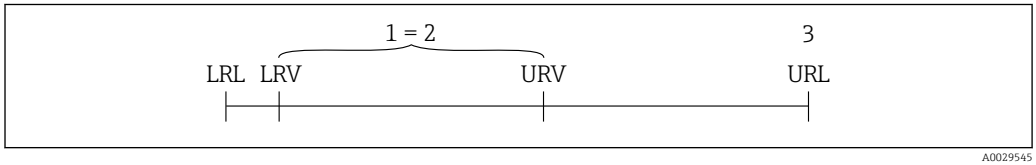
Terms and abbreviations



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

The turn down is preset in the factory and can be changed.

Turn down calculation



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

Example

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

Turn down (TD):

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

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

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

Registered trademarks

IO-Link

is a registered trademark of the IO-Link Consortium.

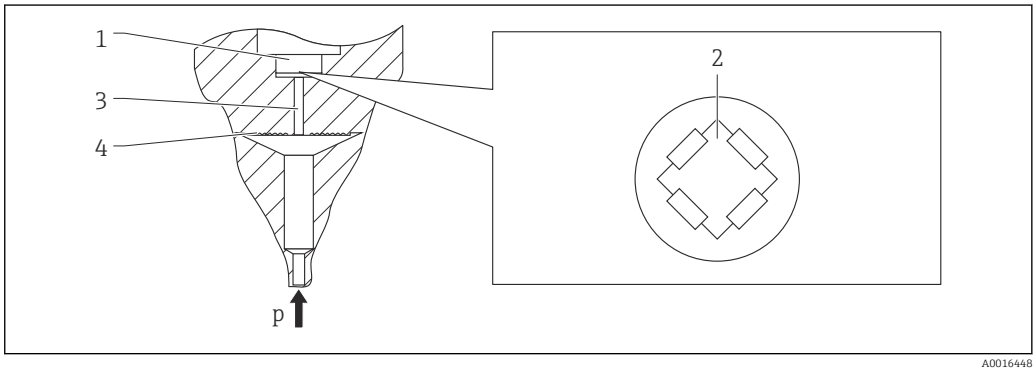
Function and system design

Measuring principle - process pressure measurement

Devices with metallic process membrane

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

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



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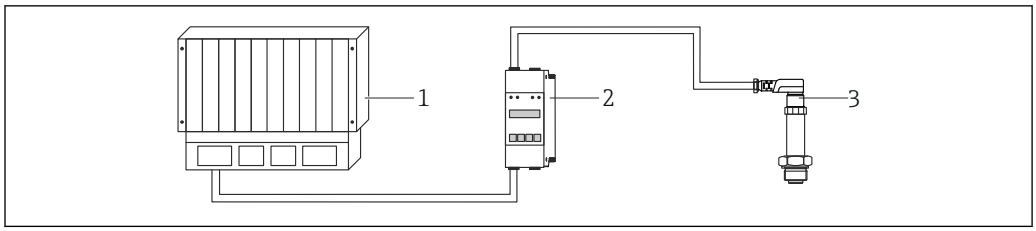
1 Silicon measuring element, substrate
2 Wheatstone bridge
3 Channel with fill fluid
4 Metallic process membrane

Measuring system

A complete measuring system comprises:



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

Device features

Field of application

Gauge pressure and absolute pressure

Process connections

- Thread ISO 228, also flush-mounted
- Thread DIN 13
- Thread ASME
- Thread JIS

Measuring range

From −400 to +400 mbar (−6 to +6 psi) to −1 to +400 bar (−15 to +6 000 psi).

OPL (depends on the measuring range)

Max. 0 to +600 bar (0 to +9 000 psi)

MWP

Max. 0 to +400 bar (0 to +6 000 psi)

Process temperature range (temperature at process connection)

−40 to +100 °C (−40 to +212 °F)

Ambient temperature range

−40 to +70 °C (−40 to +158 °F)

Reference accuracy

Up to 0.3 %, TD 5:1, for details, see "Reference accuracy" section.

Supply voltage

Electronic version	Supply voltage
IO-Link	10 to 30 V_{DC} IO-Link communication is guaranteed only if the supply voltage is at least 18 V.

Output

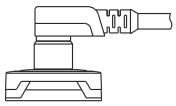
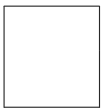
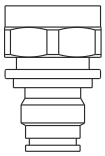
- C/Q output for communication (SIO mode (switch output))
- Current output 4 to 20 mA

Material

- Housing made of 316L (1.4404)
- Process connections made of 316L (1.4404)
- Process membrane made of 316L (1.4435)

Options

- Min. alarm current setting
- 3.1 Material certificates
- Calibration certificate
- Cleaned of oil and grease

Overview	Item	Description
C - 1  A0021987	C- 1	M12 plug Housing cap made of plastic
D  **E**  A0027215	D E	Housing Process connection (sample illustration)

System integration

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

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

1) Product Configurator, order code for "Marking"

For devices with IO-Link, an IO-DD is available in the Downloads area of the Endress+Hauser website.

Input

Measured variable

Measured process variable

Gauge pressure or absolute pressure

Calculated process variable

Pressure

Measuring range **Metallic process membrane**

Devices for gauge pressure measurement

Sensor	Maximum sensor measuring range		Smallest calibratable span [1]	MWP	OPL	Factory settings [2]	Option [3]
	lower (LRL)	upper (URL)					
	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]		
400 mbar (6 psi) [4]	−0.4 (−6)	+0.4 (+6)	0.4 (6)	1 (15)	1.6 (24)	0 to 400 mbar (0 to 6 psi)	1F
1 bar (15 psi) [4]	−1 (−15)	+1 (+15)	0.4 (6)	2.7 (40.5)	4 (60)	0 to 1 bar (0 to 15 psi)	1H
2 bar (30 psi) [4]	−1 (−15)	+2 (+30)	0.4 (6)	6.7 (100.5)	10 (150)	0 to 2 bar (0 to 30 psi)	1K
4 bar (60 psi) [4]	−1 (−15)	+4 (+60)	0.8 (12)	10.7 (160.5)	16 (240)	0 to 4 bar (0 to 60 psi)	1M
6 bar (90 psi) [4]	−1 (−15)	+6 (+90)	2.4 (36)	16 (240)	24 (360)	0 to 6 bar (0 to 90 psi)	1N
10 bar (150 psi) [4]	−1 (−15)	+10 (+150)	2 (30)	25 (375)	40 (600)	0 to 10 bar (0 to 150 psi)	1P
16 bar (240 psi) [4]	−1 (−15)	+16 (+240)	5 (75)	25 (375)	64 (960)	0 to 16 bar (0 to 240 psi)	1Q
25 bar (375 psi) [4]	−1 (−15)	+25 (+375)	5 (75)	25 (375)	100 (1500)	0 to 25 bar (0 to 375 psi)	1R
40 bar (600 psi) [4]	−1 (−15)	+40 (+600)	8 (120)	100 (1500)	160 (2400)	0 to 40 bar (0 to 600 psi)	1S
100 bar (1 500 psi) [4]	−1 (−15)	+100 (+1500)	20 (300)	100 (1500)	160 (2400)	0 to 100 bar (0 to 1 500 psi)	1U
400 bar (6 000 psi) [4]	−1 (−15)	+400 (+6000)	80 (1200)	400 (6000)	600 (9000)	0 to 400 bar (0 to 6 000 psi)	1W

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

Devices for absolute pressure measurement

Sensor	Maximum sensor measuring range		Smallest calibratable span [1]	MWP	OPL	Factory settings [2]	Option [3]
	lower (LRL)	upper (URL)					
	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]		
400 mbar (6 psi) [4]	0 (0)	0.4 (+6)	0.4 (6)	1 (15)	1.6 (24)	0 to 400 mbar (0 to 6 psi)	2F
1 bar (15 psi) [4]	0 (0)	1 (+15)	0.4 (6)	2.7 (40.5)	4 (60)	0 to 1 bar (0 to 15 psi)	2H
2 bar (30 psi) [4]	0 (0)	2 (+30)	0.4 (6)	6.7 (100.5)	10 (150)	0 to 2 bar (0 to 30 psi)	2K
4 bar (60 psi) [4]	0 (0)	4 (+60)	0.8 (12)	10.7 (160.5)	16 (240)	0 to 4 bar (0 to 60 psi)	2M
10 bar (150 psi) [4]	0 (0)	10 (+150)	2 (30)	25 (375)	40 (600)	0 to 10 bar (0 to 150 psi)	2P
40 bar (600 psi) [4]	0 (0)	+40 (+600)	8 (120)	100 (1500)	160 (2400)	0 to 40 bar (0 to 600 psi)	2S
100 bar (1 500 psi) [4]	0 (0)	+100 (+1500)	20 (300)	100 (1500)	160 (2400)	0 to 100 bar (0 to 1 500 psi)	2U
400 bar (6 000 psi) [4]	0 (0)	+400 (+6000)	80 (1200)	400 (6000)	600 (9000)	0 to 400 bar (0 to 6 000 psi)	2W

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

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

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

Output

Output signal

Description	Option [1]
IO-Link (SSP Ed. 2 V1.1),4 to 20 mA	A

1) Product Configurator, order code for "Output"

Switching capacity

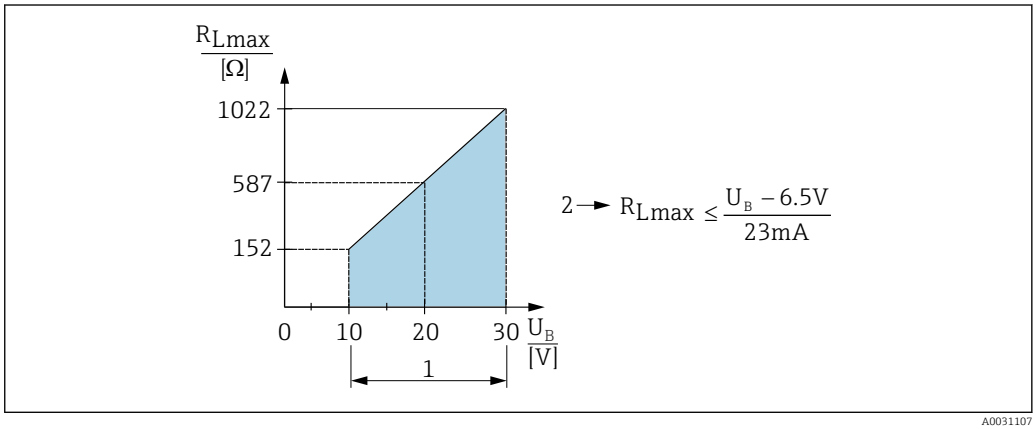
- Switch status ON: $I_a \leq 200$ mA [1) 2)]; Switch status OFF: $I_a \leq 1$ mA
- Switch cycles: >10,000,000
- Voltage drop PNP: ≤2 V
- Overload protection: Automatic load testing of switching current;
  - Max. capacitance load: 1 µF at max. supply voltage (without resistive load)
  - Max. cycle duration: 0.5 s; min. t_{on}: 40 µs
  - Periodic disconnection from protective circuit in the event of overcurrent (f = 2 Hz) and "F804" displayed

Signal range 4 to 20 mA

3.8 to 20.5 mA

Load (for 4 to 20 mA devices)

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



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

If load is too great:

- Failure current is indicated and "S803" displayed (indication: MIN alarm current)
- Periodic checking to establish if it is possible to quit fault state
- In order to guarantee sufficient terminal voltage, a maximum load resistance RL (including line resistance) must not be exceeded depending on the supply voltage UB of the supply unit.

1) For the switch output 1 x PNP + 4 to 20 mA output 100 mA can be guaranteed over the entire temperature range. For lower ambient temperatures, higher currents are possible but cannot be guaranteed. Typical value at 20 °C (68 °F) approx. 200 mA. For the switch output "1 x PNP", 200 mA can be guaranteed over the entire temperature range.
2) Larger currents are supported, thus deviating from the IO-Link standard.

Signal on alarm 4 to 20 mA

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

Factory setting MAX alarm: >21 mA

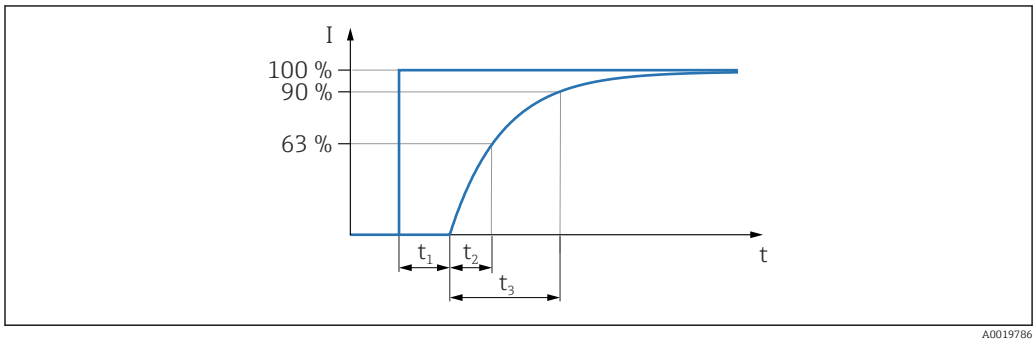
Alarm current

Description	Option
Min. alarm current set	IA [1]

1) Product Configurator, order code for "Service"

Dead time, time constant

Presentation of the dead time and the time constant:



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Dynamic behavior

Dead time (t_1) [ms]	Time constant (T63), t_2 [ms]	Time constant (T90), t_3 [ms]
7 ms	11 ms	16 ms

Dynamic behavior of switch output

Response time ≤20 ms

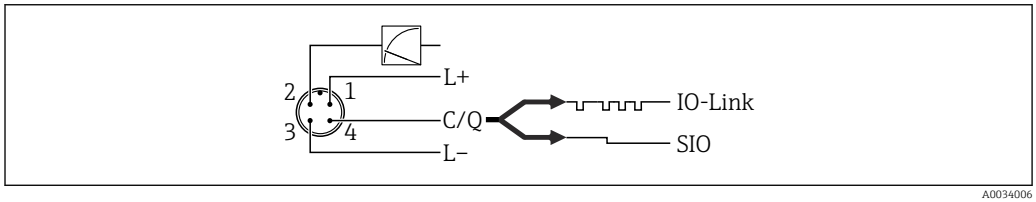
Energy supply

WARNING

An incorrect connection compromises electrical safety!

- A suitable circuit breaker must be provided for the device in accordance with IEC/EN 61010.
- **Non-hazardous area:** To meet device safety specifications according to the IEC/EN 61010 standard, the installation must ensure that the maximum current is limited to 500 mA.
- When using the measuring device in hazardous areas, installation must also comply with the applicable national standards and regulations and the Safety Instructions or Installation or Control Drawings.
- All explosion protection data are provided in separate Ex documentation, which is available on request. The Ex documentation is supplied as standard with all devices approved for use in explosion hazardous areas.
- Protective circuits against reverse polarity are integrated.

Terminal assignment



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1 M12 plug

1 Supply voltage +
2 4-20 mA
3 Supply voltage -
4 C/Q (IO-Link communication or SIO mode)

Supply voltage

Electronic version	Supply voltage
IO-Link	10 to 30 V_{DC} IO-Link communication is guaranteed only if the supply voltage is at least 18 V.

Current consumption and alarm signal

Electronic version	Current consumption	Alarm signal [1]
IO-Link	Maximum current consumption: ≤ 300 mA	

1) For MAX alarm (factory setting)

Power supply fault

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

Electrical connection

Degree of protection

Connection	Degree of protection	Option [1]
M12 plug	IP65/67 NEMA Type 4X enclosure	M

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

Residual ripple

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

Influence of power supply on the process value

≤0.005 % of URV/1 V

Overvoltage protection

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

Performance characteristics of metallic process membrane

Reference conditions

- As per IEC 60770
- Ambient temperature T_A = constant, in the range of: +21 to +33 °C (+70 to +91 °F)
- Humidity φ = constant, in the range of: 5 to 80 % rH
- Ambient pressure p_A = constant, in the range of: 860 to 1 060 mbar (12.47 to 15.37 psi)
- Position of the measuring cell = constant, in the range of: horizontal ±1° (see also "Influence of the installation position" section)
- Zero based span
- Process membrane material: AISI 316L (1.4435)
- Filling oil: synthetic oil polyalphaolefin FDA 21 CFR 178.3620, NSF H1
- Supply voltage: 24 V_{DC} ± 3 V_{DC}
- Load: 320 Ω (for 4 to 20 mA output)

Measuring uncertainty for small absolute pressure measuring ranges

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

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

Resolution

Current output: min. 1.6 µA

Reference accuracy

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

% of the calibrated span to the maximum turn down		
Reference accuracy	Non-linearity	Non-repeatability
±0.3	±0.1	±0.1

Overview of the turn down ranges → 7

Thermal change of the zero output and the output span

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

Long-term stability

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

Switch-on time

≤2 s

For small measuring ranges, pay attention to the thermal compensation effects.

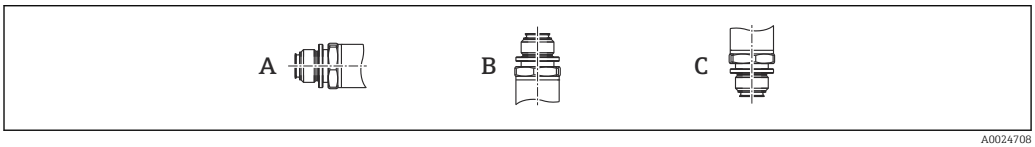
Mounting

Mounting requirements

- No moisture may enter the housing when installing or operating the device, or when establishing the electrical connection.
- Point the cable and plug downwards where possible to prevent moisture from entering (e.g. rain or condensation water).

Influence of the installation position

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



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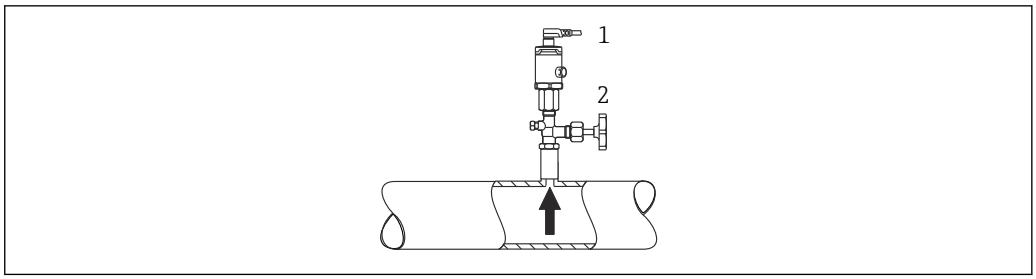
Process membrane axis is horizontal (A)	Process membrane pointing upwards (B)	Process membrane pointing downwards (C)
Calibration position, no effect	Up to +4 mbar (+0.058 psi)	Up to −4 mbar (−0.058 psi)

Mounting location

Pressure measurement

Pressure measurement in gases

Mount the device with the shutoff device above the tapping point to allow any condensate to flow into the process.



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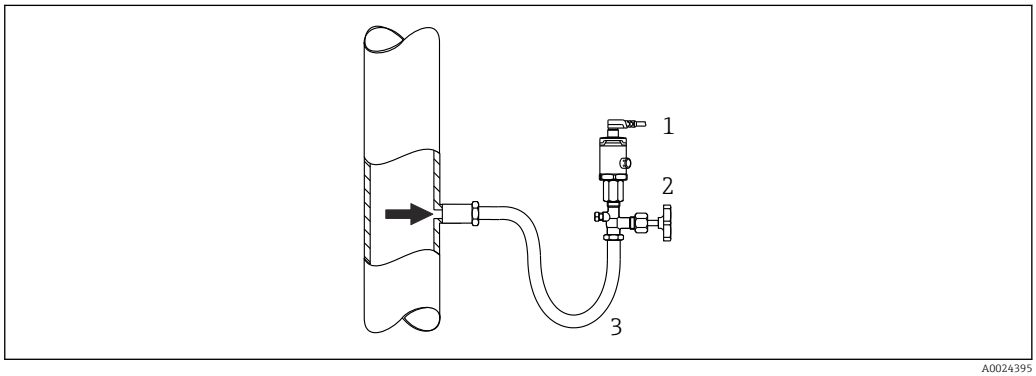
1 Device
2 Shutoff device

Pressure measurement in vapors

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

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

Note the max. permitted ambient temperature of the transmitter!



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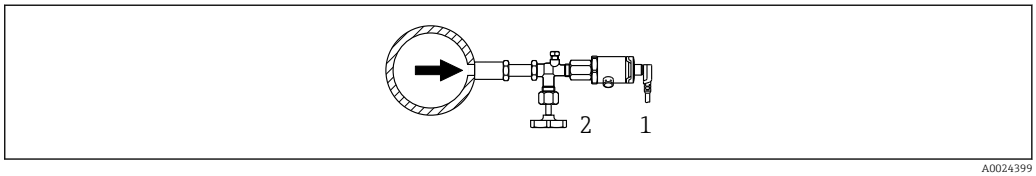
1 Device
2 Shutoff device
3 Siphon

Pressure measurement in liquids

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



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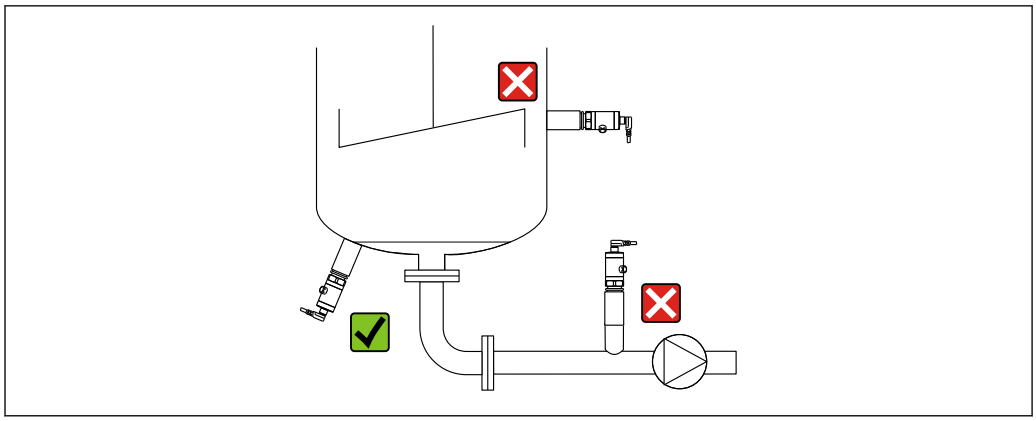
1 Device
2 Shutoff device

Level measurement

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



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Environment

Ambient temperature range

Ambient temperature range [3]
−40 to +70 °C (−40 to +158 °F)

Storage temperature range

−40 to +85 °C (−40 to +185 °F)

Climate class

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

Degree of protection

Connection	Degree of protection	Option [1]
M12 plug	IP65/67 NEMA Type 4X enclosure	M

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

Vibration resistance

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

Electromagnetic compatibility

- Interference emission as per EN 61326-1 equipment B
- Interference immunity as per EN 61326-1 (industrial environment)
  For intended use, the switch output can switch to the communication mode for 0.2 s in the event of transient faults
- Maximum deviation: 1.5% with TD 1:1

For more details, please refer to the Declaration of Conformity.

Process

Process temperature range for devices with metallic process membrane

Process temperature range
−40 to +100 °C (−40 to +212 °F)

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

Applications with changes in temperature

Frequent extreme changes in temperatures can temporarily cause measuring errors. Internal temperature compensation occurs more quickly the smaller the change in temperature and the longer the time interval involved.

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

Pressure specifications

WARNING

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

- For pressure specifications, see the "Measuring range" section and the "Mechanical construction" section.
- The Pressure Equipment Directive (2014/68/EU) uses the abbreviation "PS". The abbreviation "PS" corresponds to the MWP (maximum working pressure) of the measuring device.
- MWP (maximum working pressure): The MWP (maximum working pressure) is specified on the nameplate. This value is based on a reference temperature of +20 °C (+68 °F) and may be applied to the device for an unlimited period of time. Observe the temperature dependency of the MWP.
- OPL (over pressure limit): The test pressure corresponds to the over pressure limit of the sensor and may only be applied temporarily to ensure that the measurement is within the specifications and no permanent damage develops. In the case of sensor range and process connections where the over pressure limit (OPL) of the process connection is smaller than the nominal value of the sensor, the device is set at the factory, at the very maximum, to the OPL value of the process connection. If you want to use the entire sensor range, select a process connection with a higher OPL value.

Mechanical construction

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

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

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

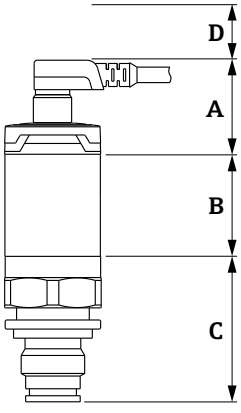
Design, dimensions

Device height

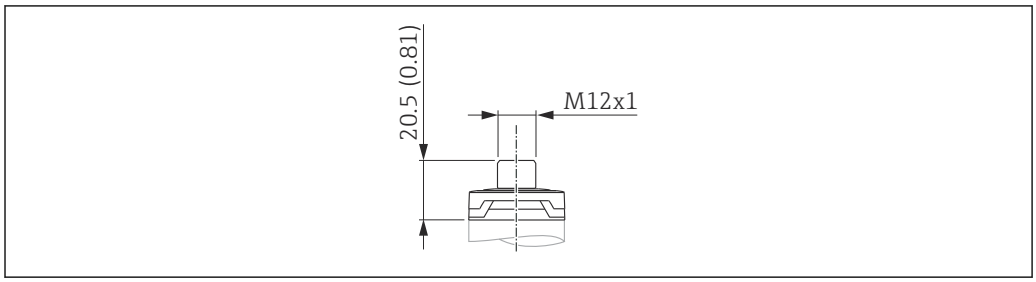
The device height is calculated from

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

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

Section	Height	Example
Electrical connection	(A)	
Housing height	(B)	
Process connection height	(C)	
Installation clearance	(D)	

Electrical connection

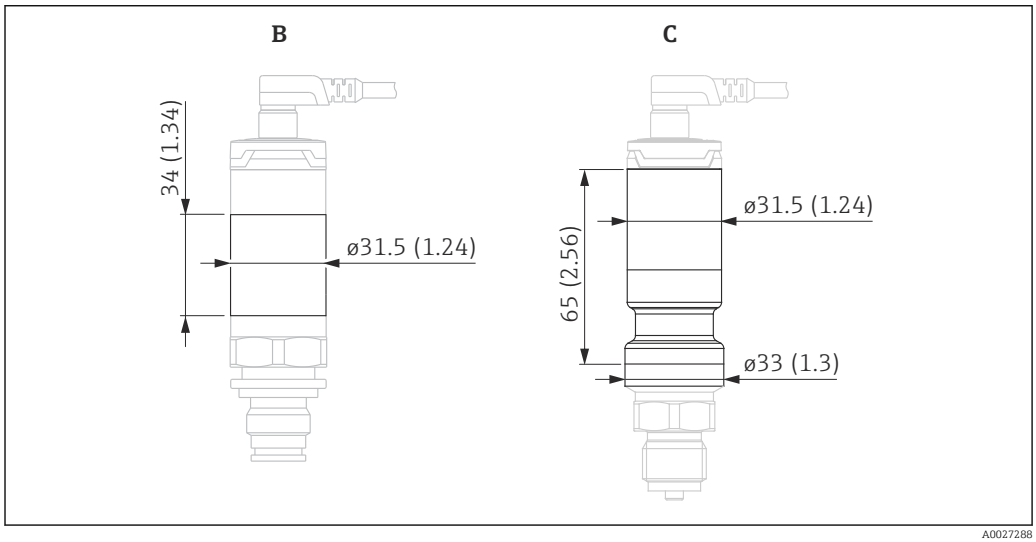


2 M12 plug IP65/67. Unit of measurement mm (in)

Material	Weight kg (lbs)	Option [1]
Housing cap made of plastic	0.012 (0.03)	M Plug connector with cable can be ordered as an accessory

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

Housing

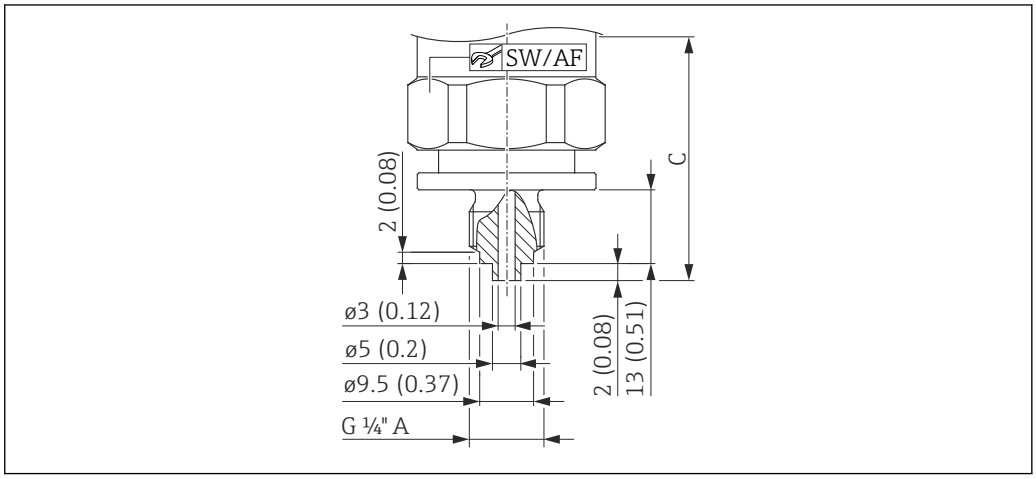


Unit of measurement mm (in)

Item	Material	Weight kg (lbs)
B (up to 100 bar (1 500 psi))	Stainless steel 316L	0.090 (0.20)
C (400 bar (6 000 psi))	Stainless steel 316L	0.090 (0.20)

Process connections with internal, metallic process membrane

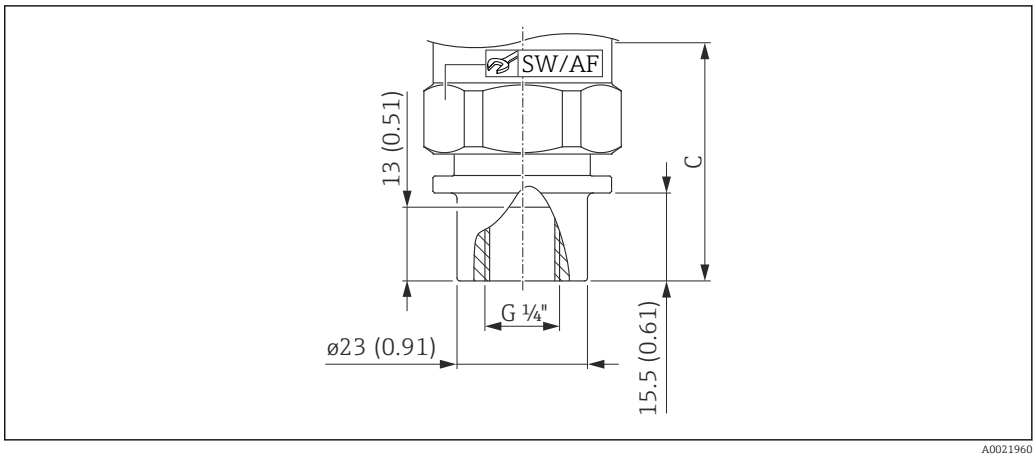
Thread ISO 228 G



3 *Thread ISO 228 G ¼" A, EN 837. Unit of measurement mm (in)*

Material	Nominal value up to 100 bar (1 500 psi)			Nominal value 400 bar (6 000 psi)			Option [1]
	Weight	Height C	SW/ AF	Weight	Height C	SW/ AF	
	kg (lbs)			kg (lbs)			
316L	0.200 (0.44)	57 (2.24)	32	0.240 (0.53)	69 (2.72)	27	WTJ

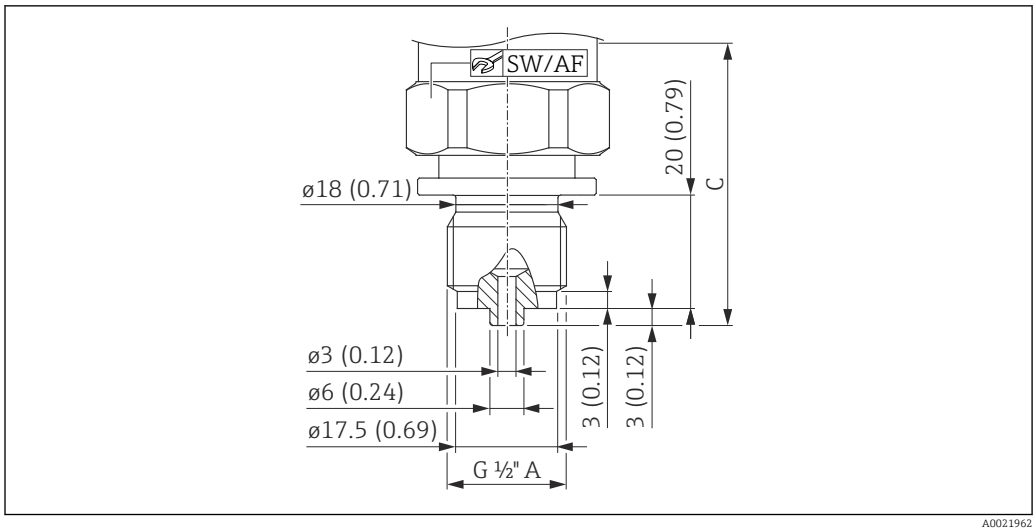
1) Product Configurator, order code for "Process connection"



4 *Thread ISO 228 G ¼" (female). Unit of measurement mm (in)*

Material	Nominal value up to 100 bar (1 500 psi)			Nominal value 400 bar (6 000 psi)			Option [1]
	Weight	Height C	SW/ AF	Weight	Height C	SW/ AF	
	kg (lbs)			kg (lbs)			
316L	0.220 (0.49)	57 (2.24)	32	0.260 (0.57)	69 (2.72)	27	WAJ

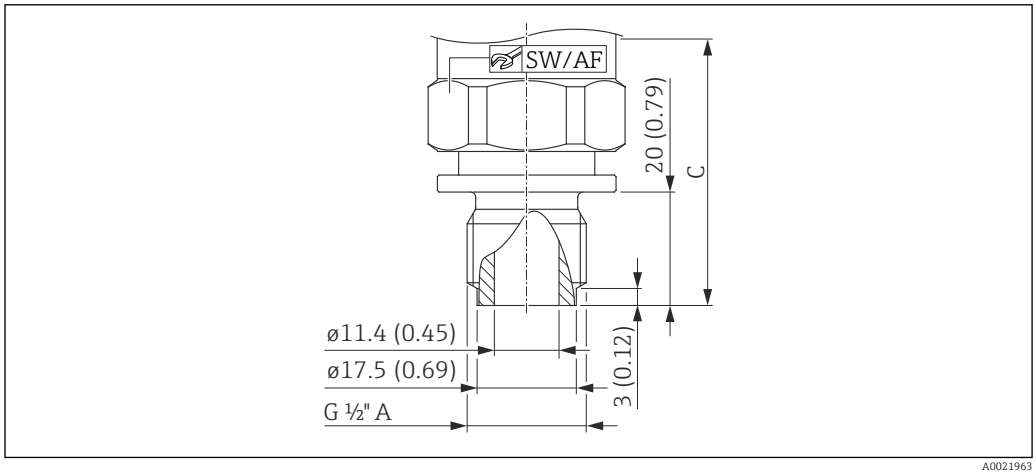
1) Product Configurator, order code for "Process connection"



5 Thread ISO 228 G ½" A, EN 837. Unit of measurement mm (in)

Material	Nominal value up to 100 bar (1 500 psi)			Nominal value 400 bar (6 000 psi)			Option [1]
	Weight	Height C	SW/ AF	Weight	Height C	SW/ AF	
	kg (lbs)			kg (lbs)			
316L	0.220 (0.49)	65 (2.56)	32	0.270 (0.60)	77 (3.03)	27	WBJ

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

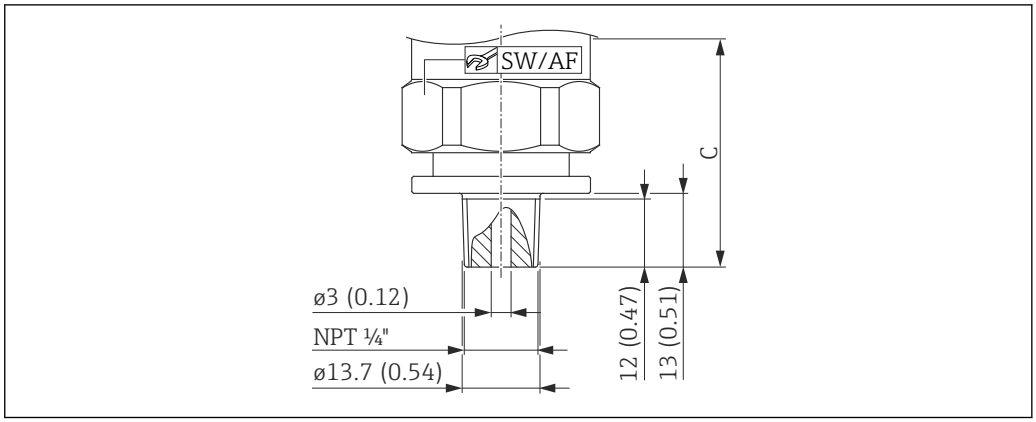


6 Thread ISO 228 G ½" A, bore 11.4 mm (0.45 in). Unit of measurement mm (in)

Material	Nominal value up to 100 bar (1 500 psi)			Nominal value 400 bar (6 000 psi)			Option [1]
	Weight	Height C	SW/ AF	Weight	Height C	SW/ AF	
	kg (lbs)			kg (lbs)			
316L	0.220 (0.49)	62 (2.44)	32	0.260 (0.57)	74 (2.91)	27	WWJ

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

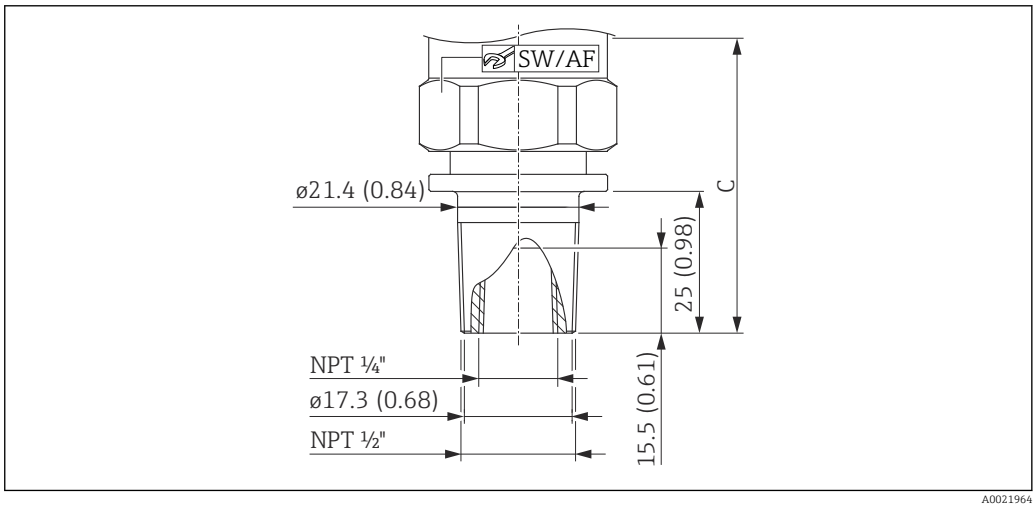
Thread ASME



7 *ASME ¼" MNPT, bore 3 mm (0.12 in). Unit of measurement mm (in)*

Material	Nominal value up to 100 bar (1500 psi)			Nominal value 400 bar (6000 psi)			Approval	Option [1]
	Weight kg (lbs)	Height C	SW/ AF	Weight kg (lbs)	Height C	SW/ AF		
316L	0.200 (0.44)	55 (2.17)	32	0.240 (0.53)	67 (2.64)	27	CRN	VUJ

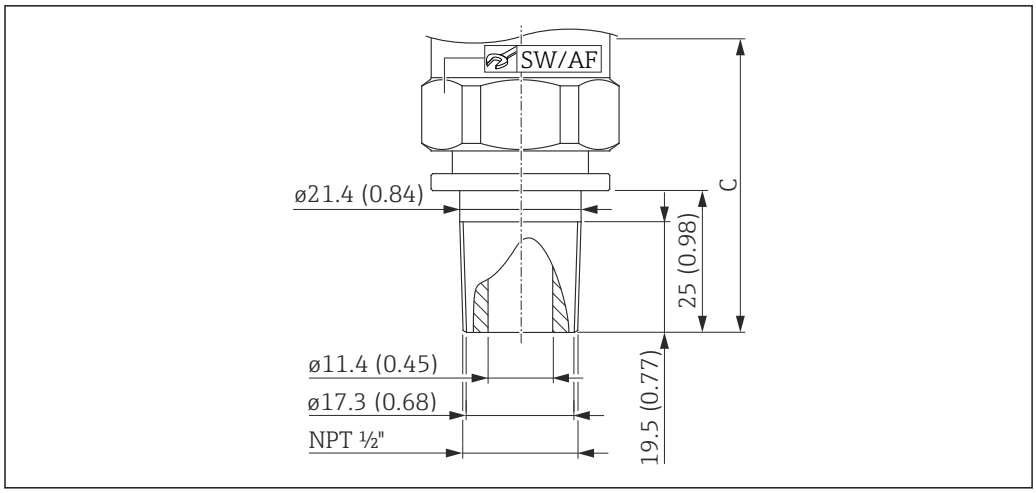
1) Product Configurator, order code for "Process connection"



8 *ASME ½" MNPT, ¼" FNPT (female). Unit of measurement mm (in)*

Material	Nominal value up to 100 bar (1500 psi)			Nominal value 400 bar (6000 psi)			Approval	Option [1]
	Weight kg (lbs)	Height C	SW/ AF	Weight kg (lbs)	Height C	SW/ AF		
316L	0.230 (0.51)	67 (2.64)	32	0.260 (0.57)	79 (3.11)	27	CRN	VXJ

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

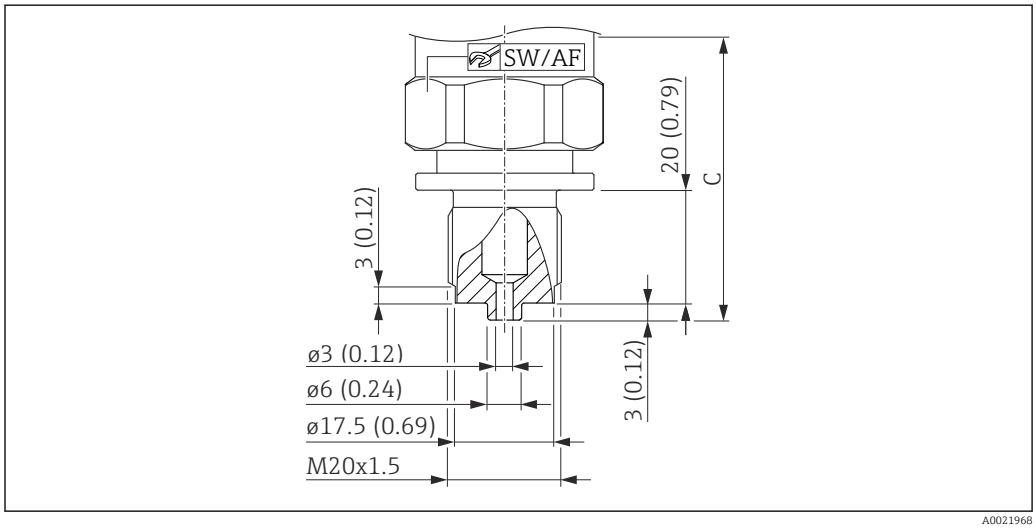


9 ASME ½" MNPT, bore 11.4 mm (0.45 in). Unit of measurement mm (in)

Material	Nominal value up to 100 bar (1 500 psi)			Nominal value 400 bar (6 000 psi)			Approval	Option [1]
	Weight kg (lbs)	Height C	SW/ AF	Weight kg (lbs)	Height C	SW/ AF		
316L	0.230 (0.51)	67 (2.67)	32	0.270 (0.60)	79 (3.11)	27	CRN	VWJ

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

Thread DIN13

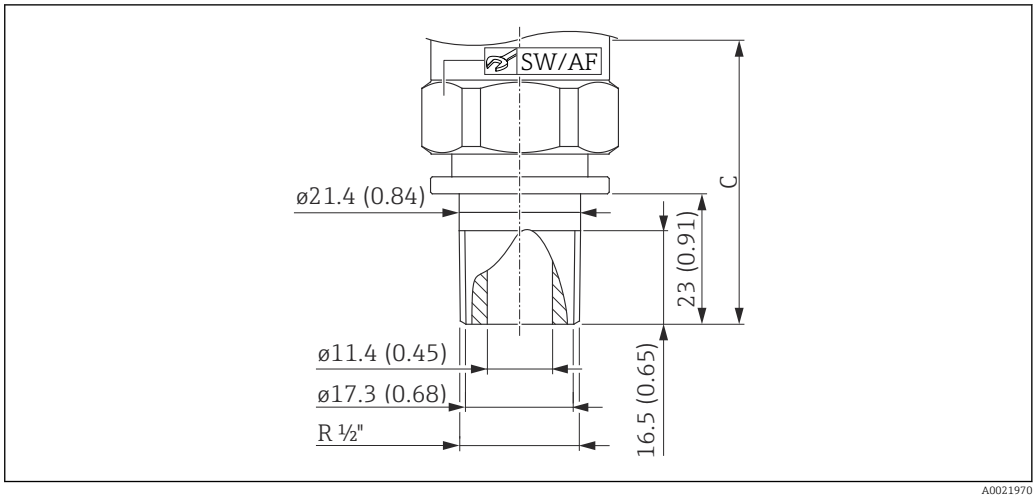


10 DIN 13 M20 x 1.5, EN 837, bore 3 mm (0.12 in). Unit of measurement mm (in)

Material	Nominal value up to 100 bar (1 500 psi)			Nominal value 400 bar (6 000 psi)			Option [1]
	Weight kg (lbs)	Height C	SW/ AF	Weight kg (lbs)	Height C	SW/ AF	
316L	0.220 (0.49)	65 (2.56)	32	0.260 (0.57)	77 (3.03)	27	X4J

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

Thread JIS B0203 R ½" (male))



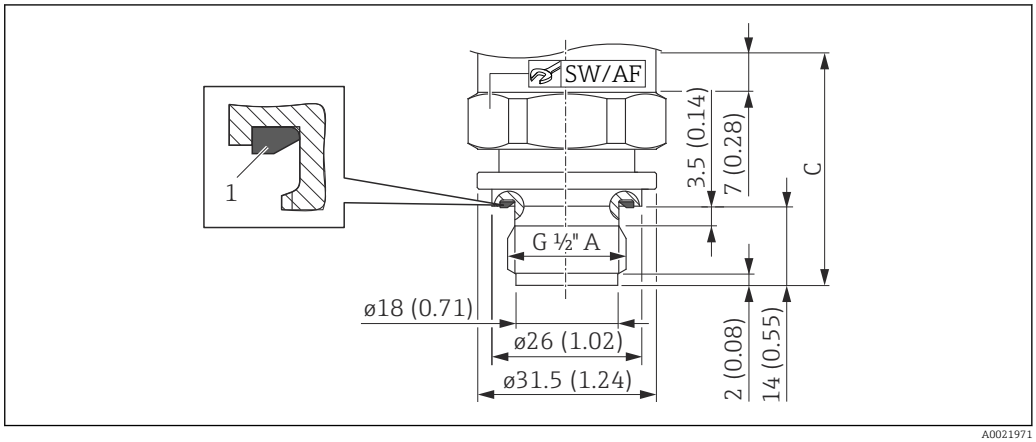
11 Diameter of process membrane: 17.2 mm (0.68 in). Unit of measurement mm (in)

Material	Nominal value up to 100 bar (1 500 psi)			Nominal value 400 bar (6 000 psi)			Option [1]
	Weight kg (lbs)	Height C	SW/ AF	Weight kg (lbs)	Height C	SW/ AF	
316L	0.230 (0.51)	65 (2.56)	32	0.260 (0.57)	77 (3.03)	27	ZJJ

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

Process connections with flush-mounted, metallic process membrane

Thread ISO 228 G ½" A

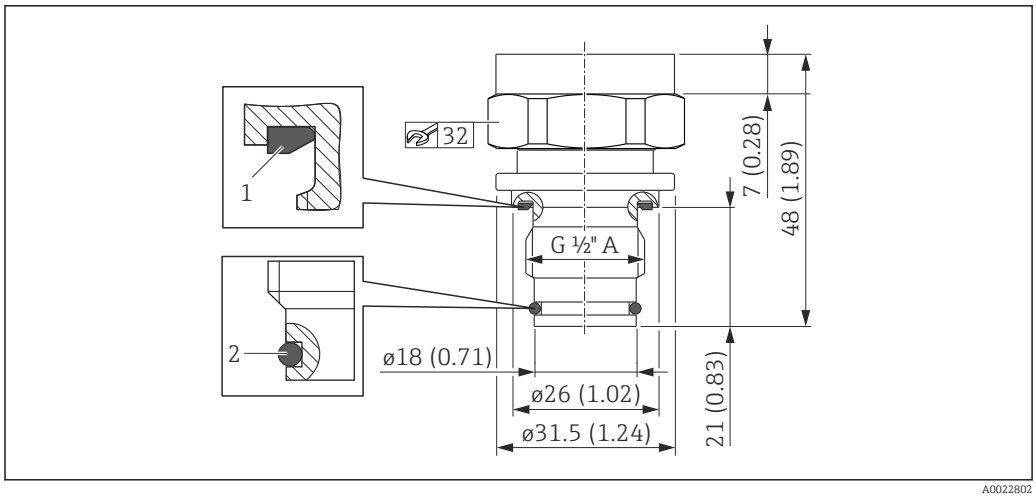


12 DIN 3852, Form E. Diameter of process membrane: 17.2 mm (0.68 in). Unit of measurement mm (in)

1 FKM form seal pre-installed

Material	Nominal value up to 100 bar (1 500 psi)			Nominal value 400 bar (6 000 psi)			Option [1]
	Weight kg (lbs)	Height C	SW/ AF	Weight kg (lbs)	Height C	SW/ AF	
316L	0.140 (0.31)	41 (1.61)	32	0.120 (0.26)	35 (1.38)	32	WJJ

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



13 Diameter of process membrane: 17.2 mm (0.68 in). Unit of measurement mm (in)

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

Material	Weight	Option [1]
	kg (lbs)	
316L	0.150 (0.33)	WUJ

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

Suitable for weld-in adapter 52002643 and 52010172

Materials in contact with process

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

TSE Certificate of Suitability

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

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

Process connections

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

Process membrane

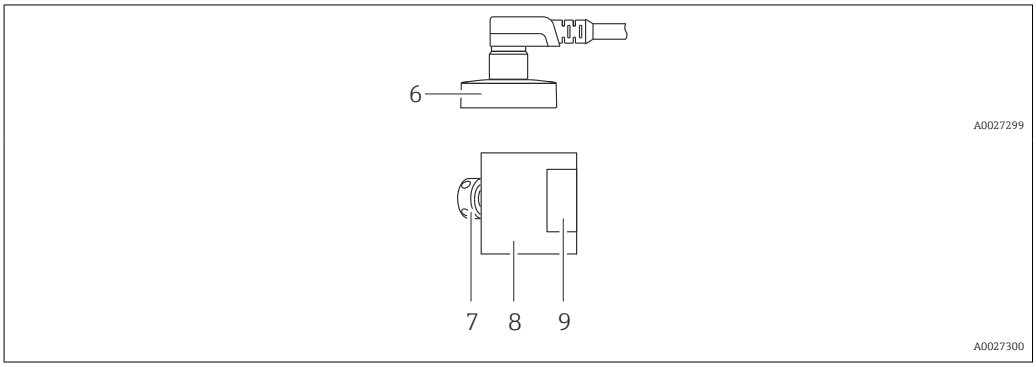
Metallic process membrane
Material: AISI 316L (DIN/EN material number 1.4435)

Seals

See the specific process connection.

Materials not in contact with process

Housing



Item number	Component	Material
6	M12 plug	316L (1.4404)
7	Pressure compensation element	Standard: PBT/PC
8	Housing	316L (1.4404)
9	Nameplates	Plastic foil (attached to housing) or directly lasered onto the housing

Filling oil

Synthetic oil polyalphaolefin FDA 21 CFR 178.3620, NSF H1

Cleaning

Description	Option [1]
Cleaned of oil and grease	HA

1) Product Configurator, order code for "Service"

Operability

IO-Link

Operating concept for devices with IO-Link

Operator-oriented menu structure for user-specific tasks

Reliable operation

Operation in the following languages:
Via IO-Link: English

Efficient diagnostics increase measurement reliability

- Remedial measures
- Simulation options

IO-Link information

IO-Link is a point-to-point connection for communication between the measuring device and an IO-Link master. The measuring device features an IO-Link communication interface type 2 with a second IO function on pin 4. This requires an IO-Link-compatible assembly (IO-Link master) for operation. The IO-Link communication interface enables direct access to the process and diagnostic data. It also provides the option of configuring the measuring device while in operation.

Physical layer, the measuring device supports the following features:
- IO-Link specification: Version 1.1
- IO-Link Smart Sensor Profile 2nd Edition
- SIO mode: Yes
- Speed: COM2; 38.4 kBaud
- Minimum cycle time: 2.5 msec.
- Process data width: 48 bits (Float32+14-bit vendor-spec. + 2 bits SSC)
- IO-Link data storage: Yes
- Block configuration: Yes

IO-Link download

http://www.endress.com/download
- Select "Software" as the media type.
- Select "Device Driver" as the software type.
  Select IO-Link (IODD).
- In the "Text Search" field enter the device name.

https://ioddfinder.io-link.com/
Search by
- Manufacturer
- Article number
- Product type

Certificates and approvals

CE mark

The measuring system meets the legal requirements of the applicable EC guidelines. These are listed in the corresponding EC Declaration of Conformity together with the standards applied.

Endress+Hauser confirms successful testing of the device by affixing to it 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 marking

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

A0029561

EAC conformity

The device meets the legal requirements of the applicable EAC Directives. These are listed in the corresponding EAC Declaration of Conformity along with the standards applied.

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

Approval

CSA C/US General Purpose

Pressure Equipment Directive 2014/68/EU (PED)

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

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

Reasons:

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

Note:

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

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

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

Reasons:

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

Note:

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

The following also applies:

Devices with threaded connection and internal process membrane PN > 200:

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

External standards and guidelines

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

DIN EN 60770 (IEC 60770):

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

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

DIN 16086:

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

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

EN 61326-X:

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

EN 60529:

Degrees of protection provided by enclosures (IP code)

NAMUR - User association of automation technology in process industries.

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

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

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

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

CRN approval

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

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

Calibration unit

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

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

Calibration

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

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

Inspection certificates

Description	Option [1]
3.1 Material documentation, wetted metal parts, EN10204-3.1 inspection certificate	YES

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

Documentation currently available on the Endress+Hauser website: www.endress.com → Downloads or with the serial number of the device under Online Tools in the Device Viewer.

Service

- Cleaned of oil+grease (wetted)
- Min. alarm current set

Product documentation on paper

A printed (hard copy) version of test reports, declarations and inspection certificates can optionally be ordered via order code 570 "Service", option I7 "Product documentation on paper". The documents are then provided with the device upon delivery.

Ordering information

Detailed ordering information is available from your nearest sales organization www.addresses.endress.com or in the Product Configurator at www.endress.com:

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

3. Select **Configuration**.

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

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

Accessories

Weld-in adapter

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

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

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

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

M12 plug-in jacks

M12 plug (self-configurable connection to M12 plug)
- Degree of protection: IP67
- Material:
  - Union nut: Cu Sn/Ni
  - Body: PBT
  - Seal: NBR
- Option [4]: R1
- Order number: 52006263

M12 plug, angled with 5 m (16 ft) cable
- Degree of protection: IP67
- Material:
  - Union nut: GD Zn/Ni
  - Body: PUR
  - Cable: PVC
- Cable colors:
  - 1 = BN = brown
  - 2 = WT = white
  - 3 = BU = blue
  - 4 = BK = black
- Option [5]: RZ
- Order number: 52010285

4) Product Configurator: order code "620"
5) Product Configurator: order code "620"

M12 plug, angled (self-configurable connection to M12 plug)
- Degree of protection: IP67
- Material:
  - Union nut: GD Zn/Ni
  - Body: PBT
  - Seal: NBR
- Option [6]: RM
- Order number: 71114212

Documentation

The following document types are available in the Downloads area of the Endress+Hauser website (www.endress.com/downloads):

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

Field of activities	Pressure measurement, powerful instruments for process pressure, differential pressure, level and flow: FA00004P
Technical Information	- TI00241F: EMC Test Procedures - TI00426F: Weld-in adapters, process adapters and flanges (overview)

6) Product Configurator: order code "620"

71620099

www.addresses.endress.com

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