



OPTIBAR PC 5060 Technical Datasheet

Pressure transmitter for the measurement of process pressure, level, differential pressure, density and interface with ceramic measuring cell

- Maximum overload and vacuum resistance under all process conditions
- Broad selection of process connections also for hygienic applications
- Modular converter platform for all applications



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1.1 OPTIBAR pressure transmitter

The OPTIBAR PC 5060 C features a ceramic capacitive measuring cell that demonstrates its robustness and longevity in various applications. The pressure transmitter is a universal measuring device for gases, vapours and liquids. The measuring cell can be built into the process absolutely front-flush.

As a special advantage, the pressure transmitters offer process temperatures up to 150°C / 302°F and full resistance against sudden temperature shocks.

Highlights

- High plant availability thanks to maximum overload and vacuum resistance in the ceramic measuring cell
- The wear-free measuring cell guarantees minimum service and maintenance costs
- Minimum measuring ranges with high measuring accuracy
- Process temperatures up to 150°C / 302°F without diaphragm seal
- Resistant to temperature shocks
- Front-flush mounted, hygienic process connections for the food and beverage industry
- Extremely quick step response times < 85 ms
- Universal modularity of the entire OPTIBAR process series
- Display and adjustment module with optional bluetooth communication can be used for remote measured value indication, adjustments and diagnostics
- Quick start-up for all applications
- Extensive diagnostic and parameterisation functions on the display module or the user-friendly DTM

Industries

- General process technology
- Power generation
- Chemical and petrochemical
- Environmental technology
- Water and wastewater
- Food and beverage
- Marine

Applications

- Monitoring from low pressure to absolute vacuum
- Overload resistant level and overpressure measurement in batch tanks
- Monitoring of supply pressure in pipelines
- Dry-run protection of delivery pumps

1.2 Options

The OPTIBAR process pressure series allows free choice of pressure sensors, process connections, electronics and housings - so that each device is perfectly adapted to its measuring task.



① The optional display and adjustment module makes it possible to start-up the converter on site. With double chamber housings it can be installed on the side.

② The converter can be configured using the optional display and adjustment module as well as via PACTware™ or the optionally available USB communicator. Regardless of the selected option, user guidance and navigation are absolutely identical.

There is a variety of converters available, which can be used regardless of the housing or sensor selected. In addition to the standard configuration with 2-wire 4...20 mA and HART® (version 7) signal, Foundation Fieldbus and Profibus PA can be selected depending on the application.

③ Note that not all approvals are available with all housings.

④ The OPTIBAR process pressure series comprises relative and absolute pressure sensors with metallic and ceramic measuring cells as well as a differential pressure measuring cell with metallic diaphragm for any application in industrial process measuring industry.

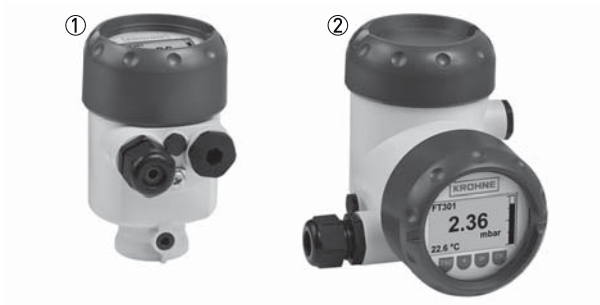


Figure 1-1: Plastic housing

- ① Single chamber
- ② Double chamber

The plastic housing is cost-effective and features a low net weight. Converters can only be used in hazardous areas in intrinsically safe operation.

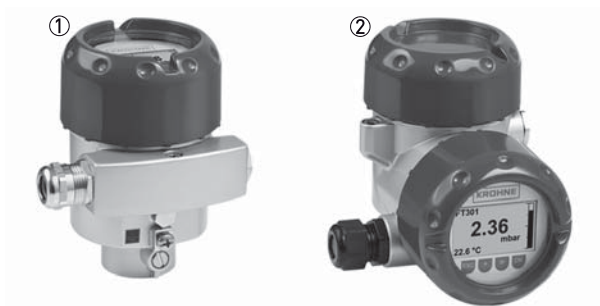


Figure 1-2: Aluminium housing

- ① Single chamber
- ② Double chamber

The standard housing for all pressure transmitters – it is perfectly equipped for industrial use and can be used in hazardous areas for all protection types.

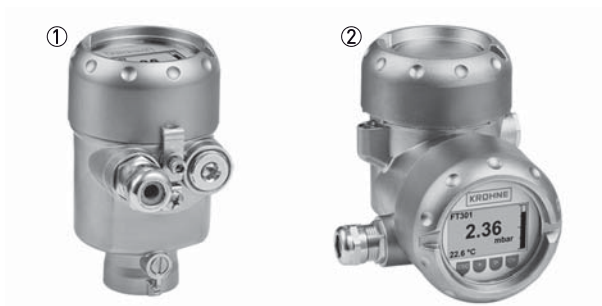


Figure 1-3: Stainless steel housing (precision casting)

- ① Single chamber
- ② Double chamber

For applications that place particular demands on the mechanical robustness of the converter. These housings can be used with all protection types for hazardous areas.



Figure 1-4: Stainless steel housing (electro-polished)

- ① Single chamber

Recommended for applications requiring the corrosion resistance of stainless steel but not the mechanical robustness of a stainless steel precision casting housing. Also suitable for hygienic applications that require an IP69K protection class for steam jet cleanings. Converters can only be used in hazardous areas in intrinsically safe operation.

1.3 Measuring principle

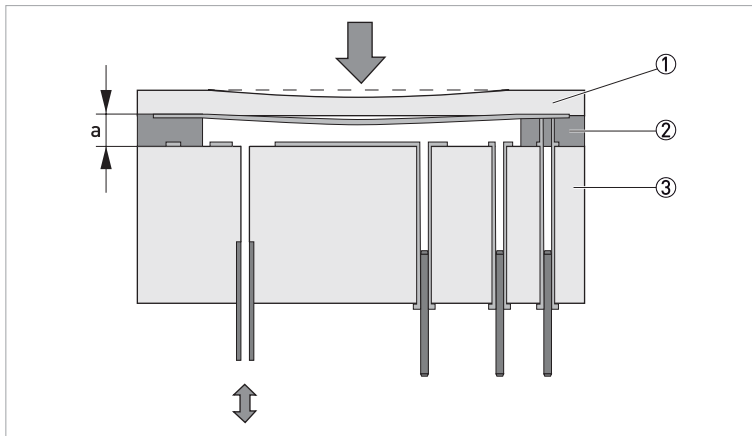


Figure 1-5: Ceramic measuring cell

- ① Diaphragm
- ② Glass solder connection
- ③ Base body

The OPTIBAR PC 5060 C sensor element is the CERTEC[®] measuring cell with robust ceramic diaphragm. The measuring cell is made up of a ceramic base body welded to the equally ceramic diaphragm via a glass solder connection. The base body and the diaphragm are inside the measuring cell, partially coated with gold and passivated against environmental impacts with an extremely thin glass layer. Pressure acting on the measuring cell diaphragm causes a change in capacitance in the measuring cell. This change is evaluated by the sensor electronics and converted into a corresponding output signal by the converter electronics. A temperature sensor behind the diaphragm allows for the additional output of a temperature measurement.

The ceramic measuring cell is available in two designs:

- Diameter 17.5 mm / 0.69" for small process connections
- Diameter of 28 mm / 1.1" for large process connections

The measuring cells are configured differently depending on the type of pressure selected:

Relative pressure: The measuring cell is open to the atmosphere. The ambient pressure is compensated directly in the measuring cell and thus has no influence on the measurement.

Absolute pressure: The measuring cell is evacuated and enclosed. The process pressure is measured in reference to vacuum. Any change in the ambient pressure changes the measured value.

2.1 Technical data

- The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.
- Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Downloadcenter).

Measuring system

Measuring principle	Capacitive ceramic measuring cell
Application range	<ul style="list-style-type: none"> • Process pressure measurement • Level of liquids • Differential pressure measurement ① • Density measurement ① • Interface measurement ①
Measuring range	25 mbar...100 bar / 0.73...1450.38 psi
Display and User interface	
Local control	Operation via 4 push buttons on the display and adjustment module
Display and adjustment module	<ul style="list-style-type: none"> • Indication of measured value or derived measured value such as filling height • Quick start adjustment and extended adjustment of all parameters • Warning and diagnostic information
Remote control	<ul style="list-style-type: none"> • Bluetooth® via OPTICHECK Pressure Mobile application available in Google Play Store and Apple App Store • PACTware™, incl. Device Type Manager (DTM) • HART® Hand Held Communicator • AMS® from Emerson Process • PDM® from Siemens
Operating and display languages	German, English, French, Spanish, Portuguese, Italian, Dutch, Russian, Turkish, Polish, Czech, Chinese and Japanese
Integrated clock	
Date format	Day / Month / Year
Time format	12 hours / 24 hours
Time zone	CET (Factory setting)
Rate deviation	Maximum 10.5 minutes / year
① Only available for electronic differential pressure when the slave sensor is activated	

Measuring accuracy

Process pressure				
Reference conditions acc. to DIN 61298-1	<ul style="list-style-type: none"> Ambient temperature (constant): +15...+25°C / +59...+77°F Relative humidity (constant): 45...75% Ambient pressure (constant): 860...1060 mbar / 86...106 kPa / 12.5...15.4 psi Measuring accuracy according to IEC 61298-2 (terminal based) Curve characteristic: linear Vertical mounting position, measuring diaphragm pointing down Effect of mounting position < 0.2 mbar / 20 Pa / 0.029 psi (a position-dependent zero offset can be corrected) Deviation in the current output due to strong, high-frequency electromagnetic fields acc. to EN 61326-1 <math>\pm 150 \mu\text{A}</math> 			
Reference accuracy acc. to DIN EN 60770 (different availability depending on measuring range and process connection)	Includes the non-linearity, hysteresis and repeatability under reference conditions. Applies to the digital interfaces (HART [®] , Profibus PA, Foundation Fieldbus) as well as for the analogue 4...20 mA current output. Turn down (TD) is the relation of nominal range/set measuring span. [% of the set span]			
	Accuracy class	0.05%	0.10%	0.20%
	TD of 1:1 to 5:1	± 0.05	± 0.1	± 0.2
	TD > 5:1	$\pm 0.01 \times \text{TD}$	$\pm 0.02 \times \text{TD}$	$\pm 0.04 \times \text{TD}$
Effect of ambient / process temperature	Ambient temperature effect on zero and span in relation to the set measuring span. Applies to the digital interfaces (HART [®] , Foundation Fieldbus, Profibus PA) as well as for the analogue 4...20 mA current output. [% of the set span per 28°C / 50°F] All performance characteristics are in conformance with $\geq \pm 3$ -sigma			
	Accuracy class	-40...0°C / -40...+32°F	0...+100°C / +32...+212°F	+100...+150°C / +212...+302°F
	0.05% 0.1%	0.21 x TD + 0.21	0.105 x TD + 0.105 max. 0.075 x TD + 0.075 ①	0.07 x TD + 0.07
	0.2% 100 mbar abs.	0.41 x TD + 0.41	0.21 x TD + 0.21 max. 0.15 x TD + 0.15 ①	0.14 x TD + 0.14
	0.2% 0.05%, 0.1% with PN=25 mbar	0.63 x TD + 0.63	0.315 x TD + 0.315 max. 0.225 x TD + 0.225 ①	0.21 x TD + 0.21
	① Maximum value apply for the entire temperature intervall.			
Effect of ambient / process temperature for climate compensated measuring cell	Ambient temperature effect on zero and span in relation to the set measuring span. Applies to the digital interfaces (HART [®] , Foundation Fieldbus, Profibus PA) as well as for the analogue 4...20 mA current output. [% of the set span per 28°C / 50°F] All performance characteristics are in conformance with $\geq \pm 3$ -sigma			
	Measuring range	-40...0°C / -40...+32°F	0...+100°C / +32...+212°F	+100...+150°C / +212...+302°F
	-1...0 bar, -1...1.5 bar, 10 bar, 25 bar, 60 bar, 100 bar	0.21 x TD + 0.21	0.105 x TD + 0.105 max. 0.075 x TD + 0.075 ①	0.07 x TD + 0.07
	-0.5 bar...0.5 bar, 1 bar, 2.5 bar	0.41 x TD + 0.41	0.21 x TD + 0.21 max. 0.15 x TD + 0.15 ①	0.14 x TD + 0.14
	0.4 bar, -0.2...0.2 bar	0.63 x TD + 0.63	0.315 x TD + 0.315 max. 0.225 x TD + 0.225 ①	0.21 x TD + 0.21
	① Maximum value apply for the entire temperature intervall.			

Long-term stability acc. to DIN 16086 and IEC 60770-1	Applies to the digital interfaces (HART®, Profibus PA, Foundation Fieldbus) as well as for the analogue 4...20 mA current output. [% of set span]			
	Time period	Measuring cell Ø 28 mm		Measuring cell Ø 17.5 mm
		All measuring ranges	Measuring range 0...0.025 bar / 0...2.5 kPa	All process connections Process connection G1/2 (ISO228-1)
	1 year	<± 0.05 x TD	<± 0.1 x TD	<± 0.1 x TD <± 0.25 x TD
	5 years	<± 0.1 x TD	<± 0.2 x TD	<± 0.2 x TD <± 0.5 x TD
	10 years	<± 0.2 x TD	<± 0.4 x TD	<± 0.4 x TD <± 1 x TD
Long-term stability acc. to DIN 16086 and IEC 60770-1 for climate compensated measuring cell	Applies to the digital interfaces (HART®, Profibus PA, Foundation Fieldbus) as well as for the analogue 4...20 mA current output. [% of set span]			
	Nominal measuring range in bar / kPa	Nominal measuring range in psi	Measuring cell Ø 28 mm	Measuring cell Ø 17.5 mm
	0...0.4 bar / 0...40 kPa	0...6 psig	<± (1 x TD) / year	<± (1.5 x TD) / year
	-0.2...0.2 bar / -20...20 kPa	-3...3 psig		
	0...1 bar / 0...100 kPa	0...15 psig	<± (0.25 x TD) / year	<± (0.375 x TD) / year
	0...2.5 bar / 0...250 kPa	0...35 psig		
	-1...0 bar / -100...0 kPa	-15...0 psig		
	-1...1.5 bar / 100...150 kPa	-15...25 psig		
	-0.5...0.5 bar / -50...50 kPa	-7...7 psig		
	0...10 bar / 0...1000 kPa	0...150 psig	<± (0.1 x TD) / year	<± (0.15 x TD) / year
	0...25 bar / 0...2500 kPa	0...350 psig		
	0...60 bar / 0...6000 kPa	0...900 psig		
	0...100 bar / 0...10000 kPa	0...1450 psig		
	-1...10 bar / -100...1000 kPa	-15...150 psig		
	-1...25 bar / -100...2500 kPa	-15...350 psig		
	-1...60 bar / -100...6000 kPa	-15...900 psig		

Measuring cell temperature	
The evaluation is made by using the display and adjustment module for indication, the current output and additional current output for analogue signal output and HART [®] , Profibus PA and Foundation Fieldbus for digital signal output.	
Operating temperature / nominal temperature range	-60...+150°C / -76...+302°F
Resolution	< 0.2 K
Accuracy at 0...+100°C / +32...+212°F	<±2 K
Accuracy at -60...0°C / -76...+32°F	Typ. <± 4 K
Accuracy at +100...+150°C / +212...+302°F	Typ. <± 4 K
Electronics temperature	
The evaluation is made by using the display and adjustment module for indication, the current output and additional current output for analogue signal output and HART [®] , Profibus PA and Foundation Fieldbus for digital signal output.	
Operating temperature / nominal temperature range	-40...+85°C / -40...+185°F
Resolution	< 0.1 K
Accuracy at -40...+85 °C / -40...+185 °F	<± 3 K

Operating conditions

Temperature		
Version	Ambient temperature	Storage and transport temperature
Standard version	-40...+80°C / -40...+176°F	-60...+80°C / -76...+176°F
IP66 / IP68 version (1 bar / 14.5 psi)	-20...+80°C / -4...+176°F	-20...+80°C / -4...+176°F
IP68 version (25 bar / 362.6 psi), connection cable PUR	-20...+80°C / -4...+176°F	-20...+80°C / -4...+176°F
IP68 version (25 bar / 362.6 psi), connection cable PE	-20...+60°C / -4...+140°F	-20...+60°C / -4...+140°F
Temperature derating		
Version	Process temperature	Ambient temperature
+130°C / +266°F	+100°C / +212°F	+80°C / +176°F
	+130°C / +266°F	+55°C / +131°F
+150°C / +302°F	+100°C / +212°F	+80°C / +176°F
	+150°C / +302°F	+50°C / +122°F
SIP process temperature (SIP = Sterilisation on place)		
Applies to instruments configurations suitable for vapour, i.e. material measuring cell seal EPDM or FFKM (Perlast G75S).		
Vapour stratification up to 2 hours	+150°C / -302°F	

Process temperature (with process connection PVDF, process temperature max. 100°C / 212°F)			
Measuring cell seal		Sensor version	
		Standard	Extended temperature range Measuring cell ø 28 mm
FKM	VP2/A	-20...+130°C / -4...+266°F	-20...+150°C / -4...+302°F
	A+P 70.16	-40...+130°C / -40...+266°F	-
	Endura V91A	-40...+130°C / -40...+266°F	-40...+150°C / -40...+302°F
	ET 7067	-20...+130°C / -4...+266°F	-
	V70SW	-	-10...+150°C / +14...+302°F
EPDM	A+P 70.10-02	-40...+130°C / -40...+266°F	-40...+150°C / -40...+302°F
	ET 7056	-40...+130°C / -40...+266°F	-
	E70Q	-	-40...+150°C / -40...+302°F
	Fluoraz SD890	-5...+130°C / +23...+266°F	-
FFKM	Kalrez 6375	-20...+130°C / -4...+266°F	-20...+150°C / -4...+302°F
	Perlast G75S	-15...+130°C / +5...+266°F	-15...+150°C / +5...+302°F
	Perlast G75B	-15...+130°C / +5...+266°F	-15...+150°C / +5...+302°F
	Perlast G92E	-15...+130°C / +5...+266°F	-15...+150°C / +5...+302°F
	Chemraz 535	-30...+130°C / -22...+266°F	-

Further operating conditions

Housing material	Version	Protection acc. to IEC 60529	Protection acc. to NEMA
Plastic (PBT)	Single chamber	IP66 / IP67	Type 4X
	Double chamber		
Aluminium	Single chamber	IP66 / IP67	Type 4X
		IP68 (1 bar / 14.5 psi)	-
	Double chamber	IP66 / IP67	Type 4X
Stainless steel (electro-polished)	Single chamber	IP66 / IP67	Type 4X
		IP69K	
Stainless steel (precision casting)	Single chamber	IP66 / IP67	Type 4X
		IP68 (1 bar / 14.5 psi)	-
	Double chamber	IP66 / IP67	Type 4X
Stainless steel	Transmitter, version with external housing	IP68 (25 bar / 363 psi)	-
Connection of the feeding power supply unit	Networks of overvoltage category III		

Altitude above sea level	
by default	up to 2000 m (6562 ft)
with connected overvoltage protection	up to 5000 m (16404 ft)
Pollution degree	2 (when used with fulfilled housing protection)
Protection rating (IEC/EN 61010-1)	II
Mechanical stress (depending on the instrument version)	
Reference conditions	Single chamber housing, aluminium
Vibration resistance acc. to EN 60068-2-6	4 g at 5...200 Hz (vibration with resonance)
Shock resistant acc. to EN 60068-2-27	50 g, 2.3 ms (mechanical shock), 2 g with double chamber housing, stainless steel

Materials

Wetted parts		
Process connection	316L (1.4404), PVDF, Alloy C22 (2.4602), Alloy C276 (2.4819), Duplex (1.4462), Titanium Grade 2	
Diaphragm	Sapphire ceramic [®] (>99.9% AL ₂ O ₃ ceramic)	
Joining material diaphragm/base body	Glass (non-wetted for double seal and moulded seal)	
Measuring cell seal	FKM (VP2/A, A+P 70.16, Endura V91A, ET 7067, V70SW), EPDM (A+P 75.5, ET 7056, E70Q, Fluoraz SD890), FFKM (Kalrez [®] 6375, Perlast [®] G75S, Perlast [®] G75B, Perlast [®] G92E, Chemraz 535)	
Hygienic fitting with compression nut (form seal)	FKM (ET 6067), EPDM (EPDM 7076), FFKM (Chemraz 535), FEPM (Fluoraz SD890)	
Gasket for process connection (included in the scope of delivery)	Thread G1/2 (EN 837)	Klingersil [®] C-4400
	Thread G1 1/2 (DIN 3852)	Klingersil [®] C-4400
	M44 x 1.25 (DIN 13)	FKM, FFKM and EPDM
	M30 x 1.5 (DIN 13)	FKM, FFKM and EPDM
	Hygienic connection with compression nut	FKM, EPDM, FFKM, FEPM
Surface quality hygienic connections	Process connection	Typ. R _a < 0.8 µm
	Ceramic diaphragm	Typ. R _a < 0.7 µm
Materials non-wetted parts		
Sensor housing	Plastic PBT (Polyester), Aluminium AlSi10Mg low copper content <0.4% (powder-coated, basis: Polyester), 316L	
Cable gland	PA, stainless steel, brass	
Cable gland: Seal, closure	NBR, PA	
Seal, housing lid	Silicone SI 850 R, NBR silicone-free	
Inspection window housing cover	Polycarbonate (UL-746-C listed), glass with Aluminium and stainless steel precision casting housing	
Ground terminal	316L	
External housing - deviating materials		
Housing and socket	Plastic PBT (Polyester), 316L	
Socket seal	EPDM	

Seal below wall mounting plate (Only for 316L with 3A approval)	EPDM
Inspection window housing cover	Polycarbonate (UL-746-C listed)
Ground terminal	316Ti / 316L
Connection cable with IP 68 (25 bar) between transmitter and external electronics housing	
Cable cover	PE, PUR
Type label support on cable	PE hard
Connection cable with IP 68 (1 bar) fix connected to the sensor.	PE, PUR

Process connection

Thread	from G1/2 and 1/2-14 NPT (female)
Flanges	from DN 25 (DIN / EN) / 1" (ASME)
Flanges with extension	from DN 25 (DIN / EN) / 1" (ASME)
Other connections	ISO 2852 / DIN 32676, DIN 11851, Neumo BioConnect / BioControl, Varivent, DRD, SMS and PMC

Maximum tightening torques for the process connection

G1/2 and G3/4	30 Nm / 22.13 ft lb
Process connections according to 3A with exchangeable sealing	20 Nm / 14.75 ft lb
Hygienic fitting with compression nut (hexagon)	40 Nm / 29.5 ft lb
G1, M30 x 1.5	50 Nm / 36.88 ft lb
G1 for PASVE	100 Nm / 73.76 ft lb
G1 1/2	200 Nm / 147.5 ft lb

Maximum tightening torques for screws

PMC1 and PMC1 1/4	2 Nm / 1.5 ft lb
PMC1 1/2	5 Nm / 3.7 ft lb

Maximum tightening torques for NPT cable glands and conduit pipes

Plastic housing	10 Nm / 7.4 ft lb
Aluminium housing	50 Nm / 37 ft lb
Stainless steel housing	50 Nm / 37 ft lb

Electrical connections

Mechanical - Standard	
Cable entry	M20 x 1.5, 1/2-14 NPT
Cable gland	M20 x 1.5, 1/2-14 NPT
Blind plug	M20 x 1.5, 1/2-14 NPT
Closing cap	M20 x 1.5, 1/2-14 NPT
Connector option	M12 x 1, Harting HAN 7D, 8D, 7/8" FF

Material cable gland / Seal insert	Cable diameter			
	5...9 mm / 0.20...0.35"	6...12 mm / 0.24...0.47"	7...12 mm / 0.27...0.47"	10...14 mm / 0.39...0.55"
PA / NBR	X	X	-	X
Brass, nickel-plated / NBR	X	X	-	-
Stainless steel / NBR	-	-	X	-
Wire cross-section (spring-loaded terminals)				
Massive wire, stranded wire	0.2...2.5 mm ² (AWG 24...14)			
Stranded wire with end sleeve	0.2...1.5 mm ² (AWG 24...16)			
Mechanical - Display and adjustment module				
Display element	Display with backlight turnable in 90° steps			
Measured value indication	5 digits (13x7 mm / 0.51x0.27")			
Adjustment elements	4 keys [OK], [->], [+], [ESC]			
Bluetooth interface (optional)	Bluetooth LE 4.1			
	Max. participants 1			
	Effective range typ. 25 m / 82 ft (depending on the local conditions)			
	Bluetooth Switch [On], [Off]			
Protection rating	Unassembled IP20			
	Mounted in the housing without lid IP40			
Materials	ABS Housing			
	Polyester foil inspection window			
Functional safety	SIL non-reactive			
Ambient temperatures below -20°C / -4°F may affect the readability of the display				
Mechanical - IP66 / IP68 (1 bar)				
Connection cable				
Structure of connecting cable	Four wires, one pressure compensation capillary, one suspension cable, screen braiding, metal foil and cable jacket			
Wire cross-section	0.5 mm ² / AWG 20			
Wire resistance	0.037 Ω/m / 0.012 Ω/ft			
Standard length	5 m / 16.40 ft			
Max. length	180 m / 590.5 ft			
Min. bending radius	25 mm / 0.98" at 25°C / 77°F			
Diameter	ca. 8 mm / 0.31"			
Material	PE (black)			
	PUR (blue)			
Mechanical - Electronic differential pressure measurement				
Connection cable between master and slave sensor				
Data transfer	Digital (I ² C bus)			
Structure of connecting cable	Four wires, one suspension cable, screen braiding, metal foil, cable jacket			
Wire cross-section	0.34 mm ² / AWG 22			
Wire resistance	< 0.05 Ω/m / 0.015 Ω/ft			

Standard length	5 m / 16.40 ft
Max. length	25 m / 82 ft
Min. bending radius	25 mm / 0.98" at 25°C / 77°F
Diameter	ca. 8 mm / 0.31"
Material	PE (black) PUR (blue)
Mechanical - IP68 (25 bar)	
Connecting cable between IP68 device and external housing	
Structure of connecting cable	Four wires, one pressure compensation capillary (not with Ex d version), one suspension cable, screen braiding, metal foil and cable jacket
Wire cross-section	0.5 mm ² / AWG 20
Wire resistance	0.037 Ω/m / 0.012 Ω/ft
Standard length	5 m / 16.40 ft
Max. length	180 m / 590.5 ft
Min. bending radius	25 mm / 0.98" at 25°C / 77°F
Diameter	ca. 8 mm / 0.31"
Material	PE (black) PUR (blue)
Cable entry / Connector	
External housing	1 x cable gland M20 x 1.5 (cable Ø 5...9 mm), 1 x blind plug M20 x 1.5
	1 x connector (depending on version), 1 x blind plug M20 x 1.5
Spring load terminals for wire cross-section up to	2.5 mm ² / AWG 14

Electrical		
Operating voltage	Non-Ex device: 9.6...35 VDC	
	Ex ia device: 9.6...30 VDC	
	Ex d device: 9.6...35 VDC	
	Background lighting on display from 16 VDC	
	Electronic differential pressure from 12 VDC	
Reverse polarity protection	Integrated	
Permissible residual ripple	Non-Ex devices	for U_n 12 VDC ($9.6 \text{ VDC} < U_B < 14 \text{ VDC}$) $\leq 0.7 V_{\text{eff}}$ (16...400 Hz) for U_n 24 VDC ($18 \text{ VDC} < U_B < 35 \text{ VDC}$) $\leq 1.0 V_{\text{eff}}$ (16...400 Hz)
	Ex ia d devices and Ex ia devices	for U_n 24 VDC ($18 \text{ VDC} < U_B < 35 \text{ VDC}$) $\leq 1.0 V_{\text{eff}}$ (16...400 Hz)
Load	$R_{L, \text{max}} = (U_B - 9.6) / 22 \text{ mA}$	
Potential connections and electrical separating measures in the instrument	Electronics: Not electrically isolated	
	Reference voltage: 500 V AC (galvanic separation between electronics and metal housing parts)	
	Conductive connection: Between ground terminal and metallic process connection	
Over voltage category	III	
Protection class	II	

Output signal

Output signal	4...20 mA / HART® version 7.3 3.8...20.5 mA (factory setting acc. to NAMUR recommendation)	
Signal resolution	0.3 μA	
Error signal of current output (adjustable)	High alarm $\geq 21 \text{ mA}$ Low Alarm $\leq 3.6 \text{ mA}$ Last valid measured value (not possible with SIL)	
Max. output current	21.5 mA	
Switch-on phase	Run-up time with operating voltage U_B :	$\geq 12 \text{ VDC} \leq 9 \text{ s}$
		$< 12 \text{ VDC} \leq 22 \text{ s}$
	Starting current:	$\leq 10 \text{ mA}$ for 5 ms after switching on, then $\leq 3.6 \text{ mA}$
Additional current output (optional)		
Output signal	4...20 mA (passive)	
Range of the output signal	3.8...20.5 mA (default setting)	
Signal resolution	0.3 μA	
Error signal of second current output (adjustable)	High alarm $\geq 21 \text{ mA}$ Low alarm $\leq 3.6 \text{ mA}$ Last valid measured value (not possible with SIL)	
Max. output current	21.5 mA	
Starting current	$\leq 10 \text{ mA}$ for 5 ms after switching on, $\leq 3.6 \text{ mA}$	
Load	Load resistor, see chapter "Voltage supply"	

Approvals and certificates

CE	The device complies with the legal requirements of the EU directive. The manufacturer confirms compliance with these regulations by affixing the CE marking.
Electromagnetic compatibility (EMC)	EMC conformity for EN 61326-1:2013, EN 61326-2-3:2013, EN 61326-2-5:2013, EN 61326-3-2:2008
NAMUR	NE 21 - Electromagnetic compatibility of equipment NE 43 - Signal level for the failure information of digital transmitters NE 53 - Compatibility of field devices and display/adjustment components NE 107 - Self-monitoring and diagnosis of field devices
Classification according to Pressure Equipment Directive (PED 2014/68/EU)	For gases of fluid group 1 and liquids of fluid group 1, the requirements are fulfilled according to article 4, paragraph (3) (sound engineering practice).

2.2 Dimensions and weight

The following dimensional drawings represent only an extract of the possible versions. Detailed dimensional drawings can be requested individually.

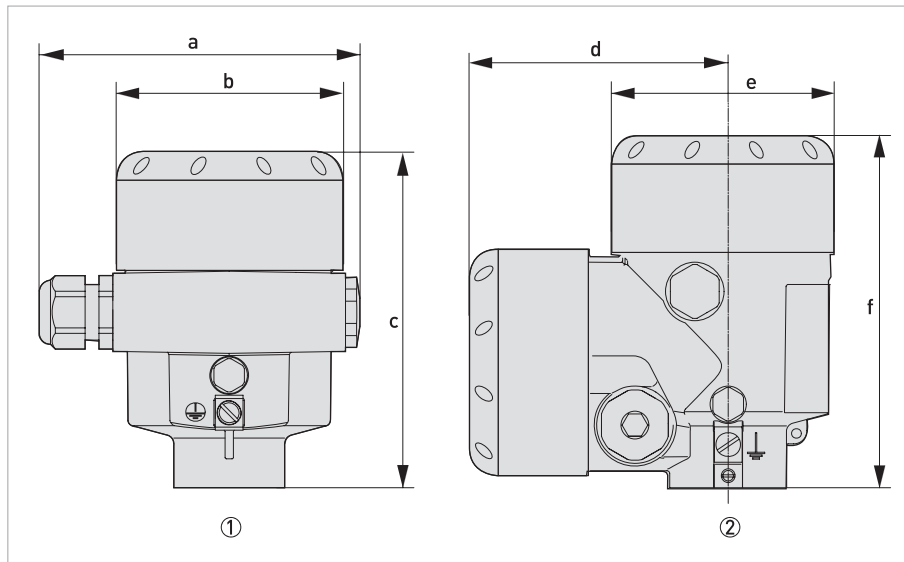


Figure 2-1: Aluminium housing

- ① Single chamber
- ② Double chamber

	Dimension [mm]	Dimension [inch]
a	116	4.57
b	86	3.39
c	116	4.57
d	87	3.43
e	86	3.39
f	120	4.72

With integrated display and adjustment module the height of the housing increases by 18 mm / 0.71 inch.

Housing version	Weight [kg]	Weight [lb]
Single chamber, aluminium	0.83	1.84
Double chamber, aluminium	1.24	2.73

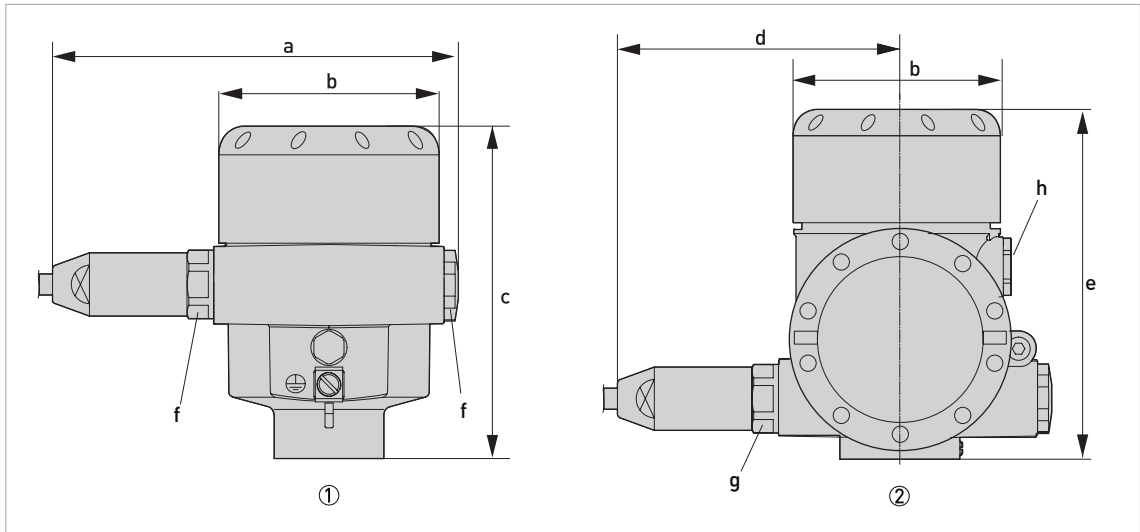


Figure 2-2: Aluminium housing in IP66 / IP68 (1 bar) version

- ① Single chamber
- ② Double chamber

	Dimension [mm]	Dimension [inch]
a	150	5.91
b	86	3.39
c	116	4.57
d	105	4.13
e	120	4.72
f		M20 x 1.5
g		M20 x 1,5 / 1/2-14 NPT
h		M16 x 1.5

With integrated display and adjustment module the height of the housing increases by 18 mm / 0.71 inch.

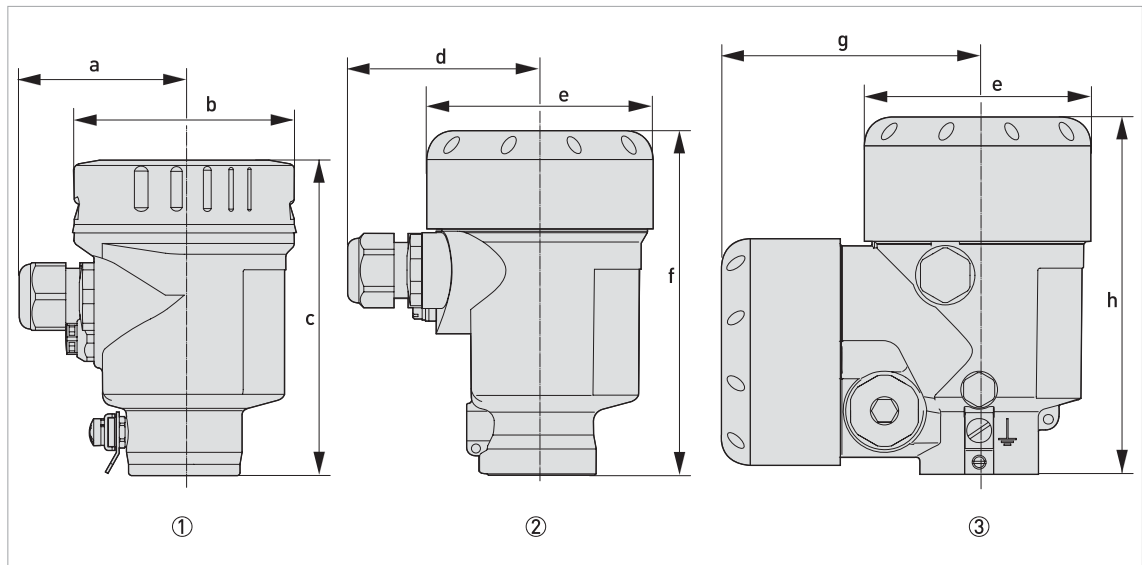


Figure 2-3: Stainless steel housing

- ① Single chamber, stainless steel (electro-polished)
- ② Single chamber, precision casting
- ③ Double chamber, precision casting

	Dimension [mm]	Dimension [inch]
a	59	2.32
b	80	3.15
c	112	4.41
d	69	2.72
e	79	3.11
f	117	4.61
g	87	3.42
h	120	4.72

With integrated display and adjustment module the height of the housing increases by 9 mm / 0.35 inch or 18 mm / 0.71 inch.

Housing version	Weight [kg]	Weight [lb]
Single chamber, stainless steel (electro-polished)	0.73	1.61
Single chamber, precision casting	1.31	2.89
Double chamber, precision casting	2.86	6.31

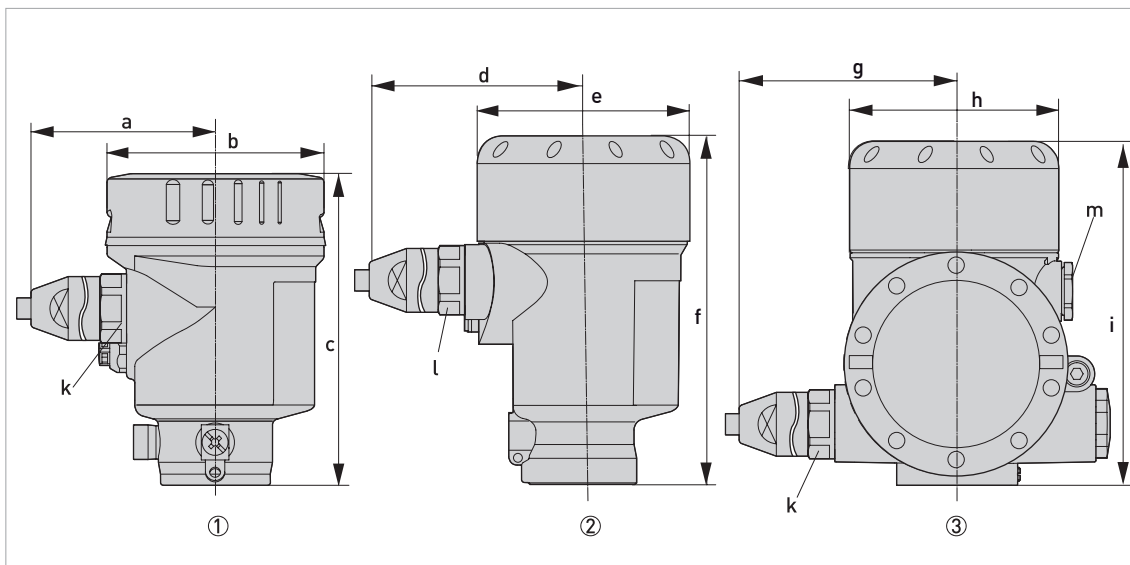


Figure 2-4: Stainless steel housing in IP66 / IP68 (1 bar) version

- ① Single chamber, stainless steel (electro-polished)
- ② Single chamber, precision casting
- ③ Double chamber, precision casting

	Dimension [mm]	Dimension [inch]
a	93	3.66
b	80	3.15
c	112	4.41
d	103	4.06
e	79	3.11
f	117	4.61
g	105	4.13
h	86	3.39
i	120	4.72
k	M20 x 1.5 / 1/2-14 NPT	
l	M20 x 1.5	
m	M16 x 1.5	

With integrated display and adjustment module the height of the housing increases by 9 mm / 0.35 inch.

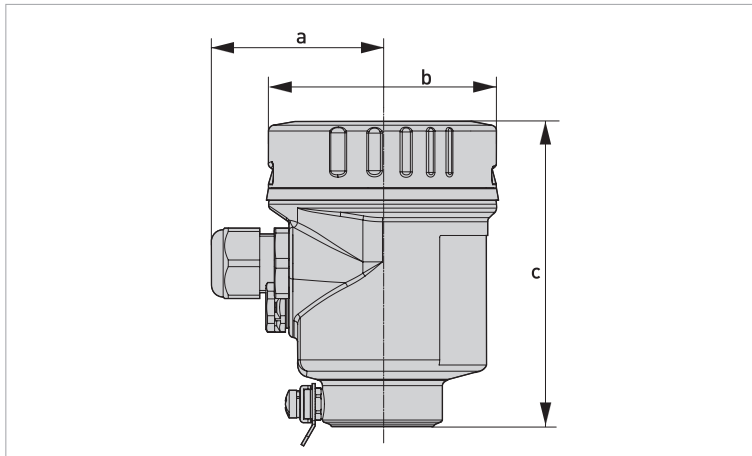


Figure 2-5: Stainless steel (electro-polished) IP69K version

	Dimension [mm]	Dimension [inch]
a	59	2.32
b	80	3.15
c	104	4.10

With integrated display and adjustment module the height of the housing increases by 9 mm / 0.35 inch.

Housing version	Weight [kg]	Weight [lb]
Single chamber, stainless steel (electro-polished)	0.73	1.61

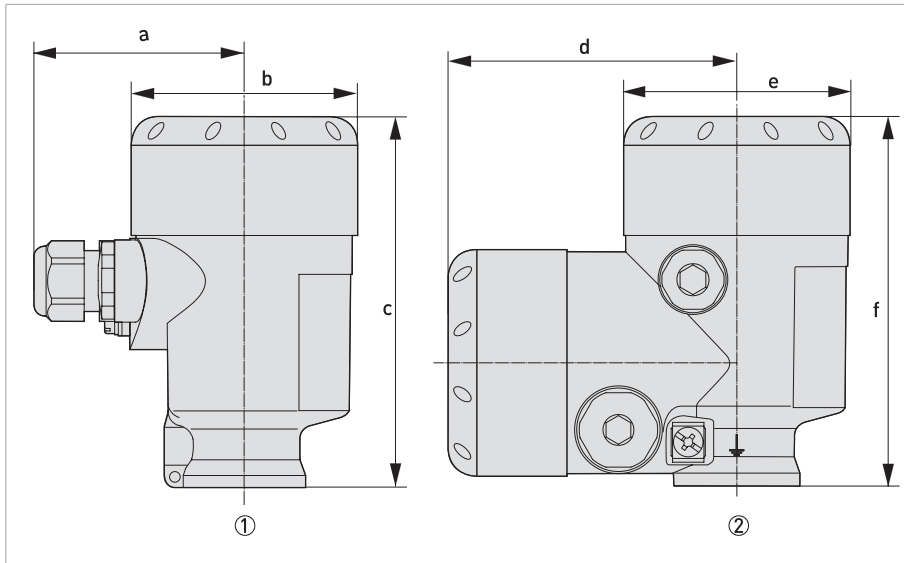


Figure 2-6: Plastic housing

- ① Single chamber
- ② Double chamber

	Dimension [mm]	Dimension [inch]
a	69	2.72
b	79	3.11
c	112	4.41
d	84	3.31
e	79	3.11
f	112	4.41

With integrated display and adjustment module the height of the housing increases by 9 mm / 0.35 inch.

Housing version	Weight [kg]	Weight [lb]
Single chamber, plastic	0.40	0.88
Double chamber, plastic	0.51	1.13

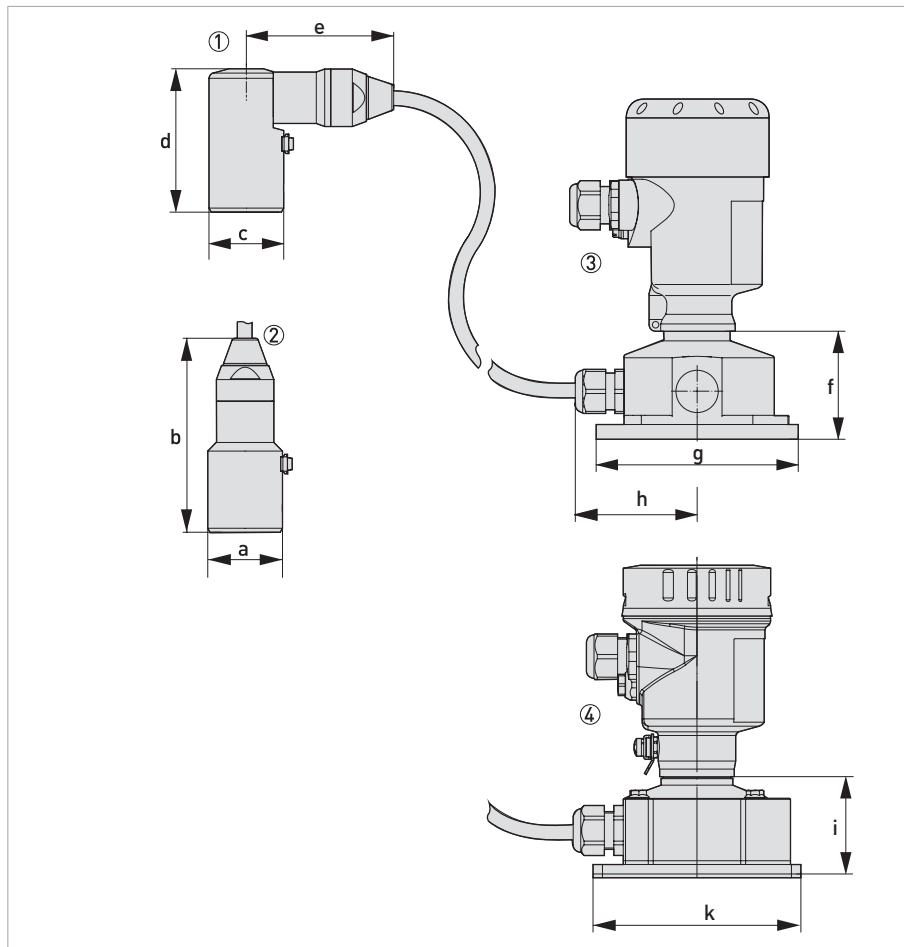


Figure 2-7: External housing

- ① Cable outlet, lateral
- ② Cable outlet, axial
- ③ Plastic single chamber housing (base in plastic)
- ④ Stainless steel single chamber housing (base in stainless steel)

	Dimension [mm]	Dimension [inch]
a	42	1.65
b	108	4.25
c	42	1.65
d	80	3.15
e	82	3.23
f	59	2.32
g	110 x 90	4.33 x 3.54
h	66	2.60
i	51	2.01
k	110 x 90	4.33 x 3.54

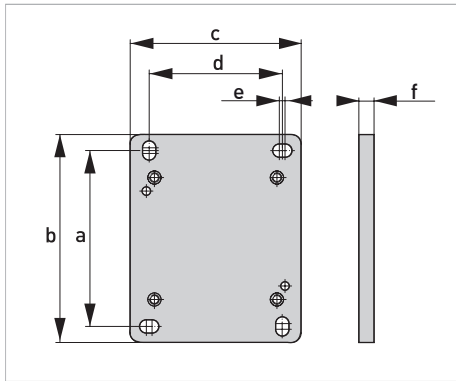


Figure 2-8: Mounting plate

	Dimension [mm]	Dimension [inch]
a	93	3.66
b	110	4.33
c	90	3.54
d	70	2.76
e	3	0.12
f	8	0.31

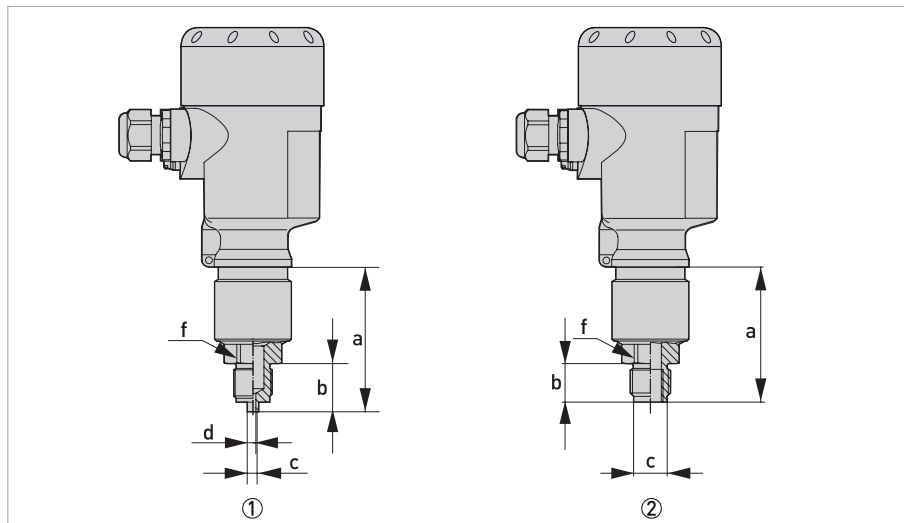


Figure 2-9: Thread recessed

- ① Thread ISO228 G1/2 EN837-1
 ② Thread ISO228 G1/2 - G1/4 female DIN3852

Dimension [mm]	a	b	c	d	e	f
①	73	23	6	3	-	WS 27
②	70	20	17.5	-	-	WS 27

Dimension [inch]	a	b	c	d	e	f
①	2.87	0.91	0.24	0.12	-	1.06
②	2.76	0.79	0.69	-	-	1.06

For the version with a temperature range up to 150°C / 302°F the measure of length increases by 28 mm / 1.1".

For the version with "secondary process barrier" the measure of length increases by 17 mm / 0.67".

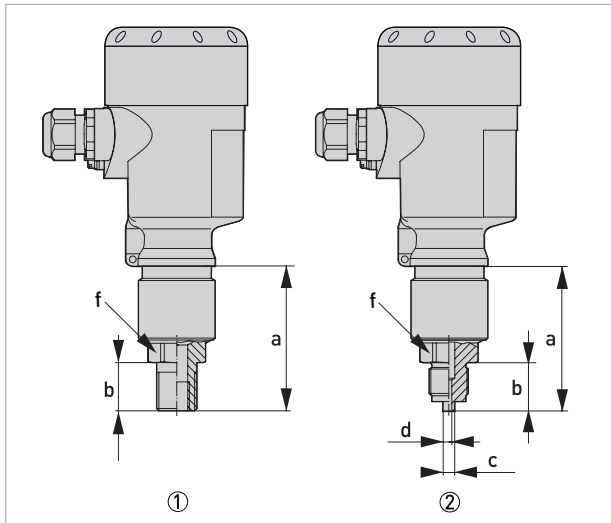


Figure 2-10: Thread recessed

- ① Thread ANSI 1/2 NPT - 1/4 NPT female
- ② Thread DIN13 M20 x 1.5 EN837-1

Dimension [mm]	a	b	c	d	e	f
①	75	25	-	-	-	WS 27
②	75	25	6	3	-	WS 27

Dimension [inch]	a	b	c	d	e	f
①	2.95	0.98	-	-	-	1.06
②	2.95	0.98	0.24	0.12	-	1.06

For the version with a temperature range up to 150°C / 302°F the measure of length increases by 28 mm / 1.1".

For the version with "secondary process barrier" the measure of length increases by 17 mm / 0.67".

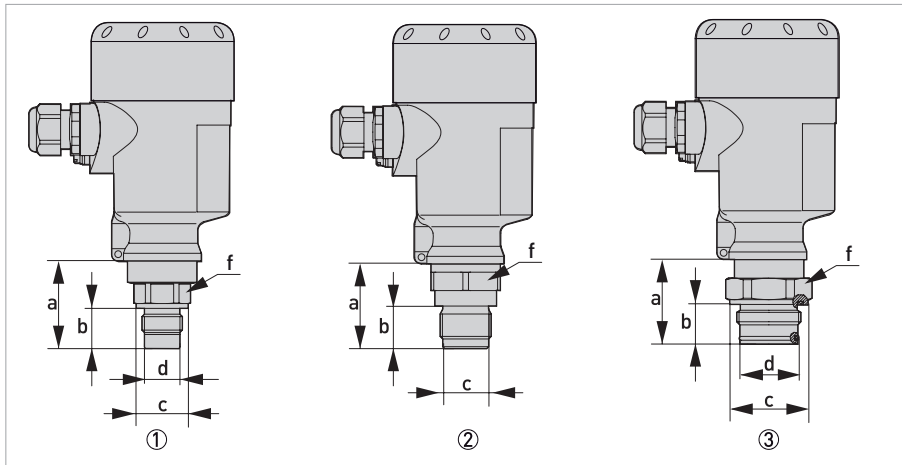


Figure 2-11: Thread front-flush

- ① Thread ISO228 G1/2 DIN3852
- ② Thread ISO228 G3/4 DIN3852
- ③ Thread ISO228 G1 DIN3852

Dimension [mm]	a	b	c	d	e	f
①	45	21	27	18	-	WS 27
②	44	22	24	-	-	WS 36
③	44	21	40	30	-	WS 41

Dimension [inch]	a	b	c	d	e	f
①	1.77	0.83	1.06	0.71	-	1.06
②	1.73	0.87	0.95	-	-	1.42
③	1.73	0.83	1.58	1.18	-	1.61

For the version with a temperature range up to 150°C / 302°F the measure of length increases by 28 mm / 1.1".

For the version with "secondary process barrier" the measure of length increases by 17 mm / 0.67".

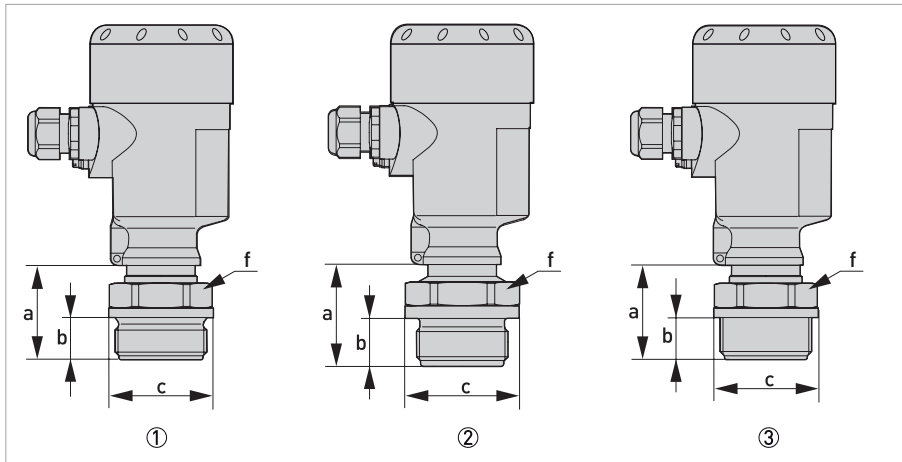


Figure 2-12: Thread front-flush

- ① Thread ISO228 G1 1/2 DIN3852
- ② Thread ISO G1 1/2 PVDF DIN 3852
- ③ Thread ANSI 1 1/2 NPT

Dimension [mm]	a	b	c	d	e	f
①	50	22	55	-	-	WS 46
②	55	25	60	-	-	WS 55
③	55	22	55	-	-	WS 46

Dimension [inch]	a	b	c	d	e	f
①	1.97	0.87	2.17	-	-	1.81
②	2.17	0.98	2.36	-	-	2.17
③	2.17	0.87	2.17	-	-	1.81

For the version with a temperature range up to 150°C / 302°F the measure of length increases by 28 mm / 1.1".

For the version with "secondary process barrier" the measure of length increases by 17 mm / 0.67".

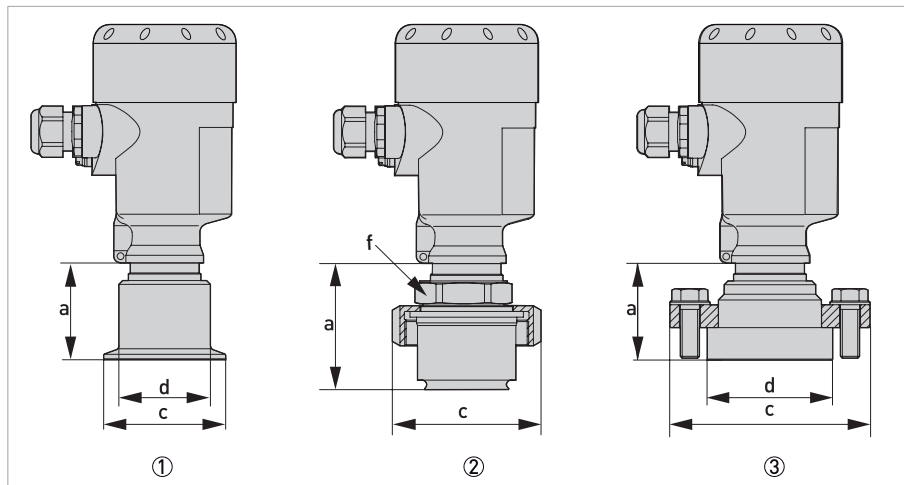


Figure 2-13: Hygienic connection

- ① Clamp DN50 2" PN16, DIN32676 / ISO2852
- ② Hygienic fitting with compression nut
- ③ Flange DRD PN40

Dimension [mm]	a	b	c	d	e	f
①	51	-	48	64	-	-
②	60	-	-	78	-	WS 46
③	55	-	66	105	-	-

Dimension [inch]	a	b	c	d	e	f
①	2.01	-	1.89	2.52	-	-
②	2.36	-	-	3.07	-	1.81
③	2.17	-	2.60	4.13	-	-

For the version with a temperature range up to 150°C / 302°F the measure of length increases by 28 mm / 1.1".

For the version with "secondary process barrier" the measure of length increases by 17 mm / 0.67".

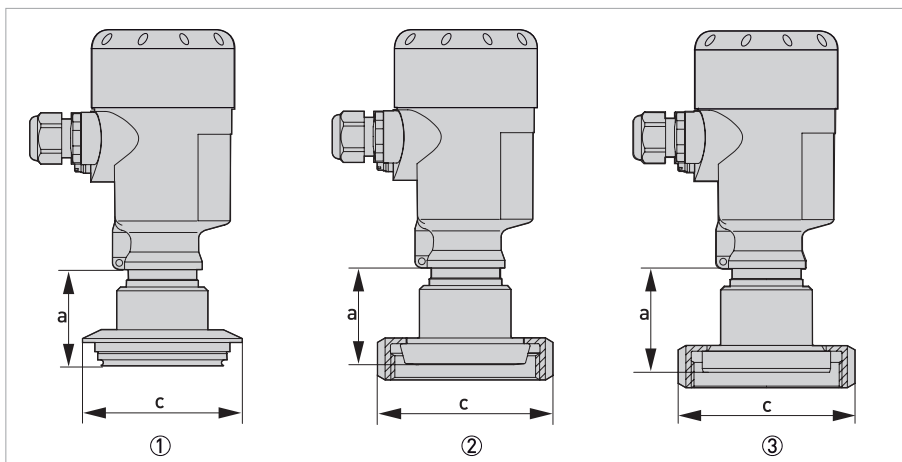


Figure 2-14: Hygienic connection

- ① Varivent N50-40 PN25
- ② Collar connection DIN 11851, DN40 PN40
- ③ Collar connection DIN 11864-1 Form A, DN50 PN 40

Dimension [mm]	a	b	c	d	e	f
①	51	-	84	-	-	-
②	51	-	78	-	-	-
③	50	-	92	-	-	-

Dimension [inch]	a	b	c	d	e	f
①	2.01	-	3.31	-	-	-
②	2.01	-	3.07	-	-	-
③	1.97	-	3.62	-	-	-

For the version with a temperature range up to 150°C / 302°F the measure of length increases by 28 mm / 1.1".

For the version with "secondary process barrier" the measure of length increases by 17 mm / 0.67".

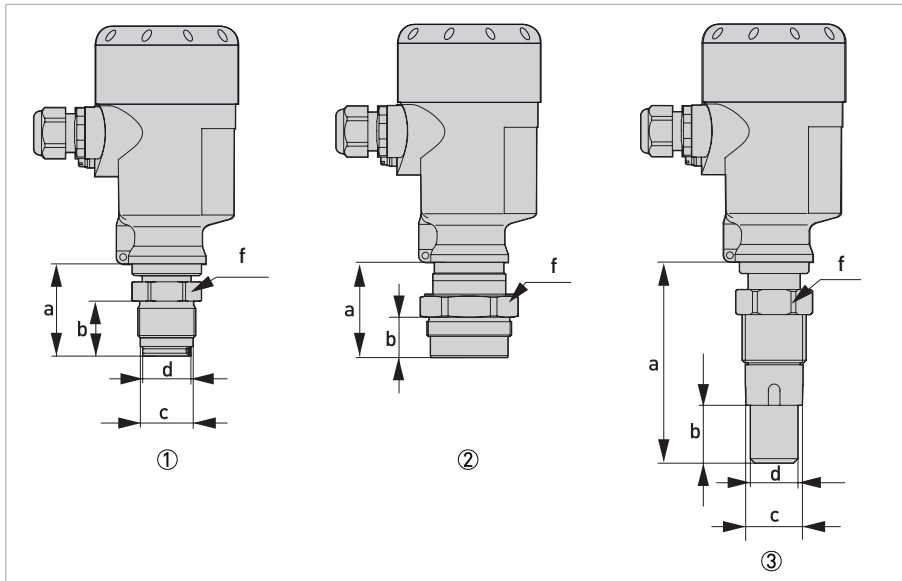


Figure 2-15: Flange with extension

- ① Thread DIN13 M30x1.5
- ② Thread DIN13 M44x1.25, pressure screw
- ③ Thread ISO228 G1, suitable for PASVE

Dimension [mm]	a	b	c	d	e	f
①	48	29	27.4	25	-	WS 32
②	52	21	-	-	-	WS 46
③	106	30	29.9	24.7	-	WS 26

Dimension [inch]	a	b	c	d	e	f
①	1.89	1.14	1.08	0.98	-	1.26
②	2.05	0.83	-	-	-	1.81
③	4.17	1.18	0.97	0.97	-	1.42

For the version with a temperature range up to 150°C / 302°F the measure of length increases by 28 mm / 1.1".

For the version with "secondary process barrier" the measure of length increases by 17 mm / 0.67".

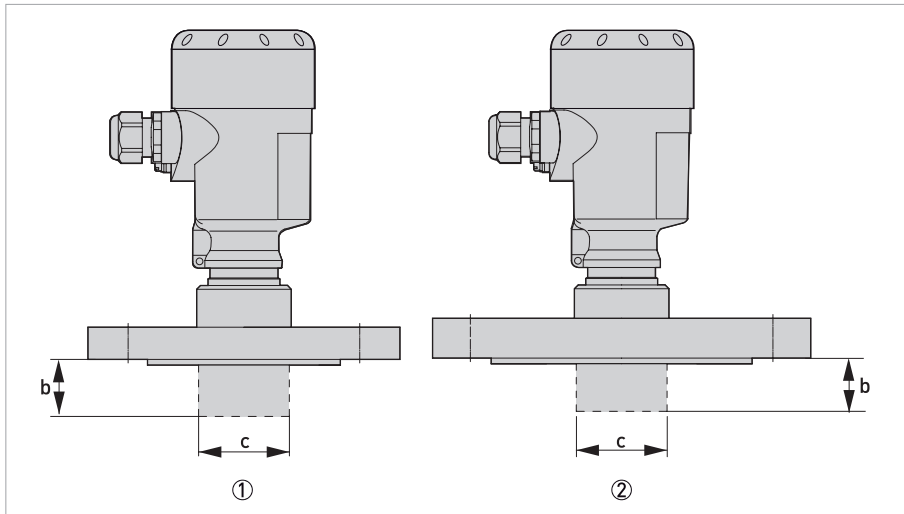


Figure 2-16: Flange with extension

- ① Flanged connection DN50 PN40 with selectable extension
- ② Flanged connection DN80 PN40 with selectable extension

Dimension [mm]	a	b	c	d	e	f
①	-	32...300	32...60	-	-	-
②	-	25...300	38...90	-	-	-

Dimension [inch]	a	b	c	d	e	f
①	-	1.26...11.81	1.26...2.36	-	-	-
②	-	0.98...11.81	1.50...3.54	-	-	-

For the version with a temperature range up to 150°C / 302°F the measure of length increases by 28 mm / 1.1".

For the version with "secondary process barrier" the measure of length increases by 17 mm / 0.67".

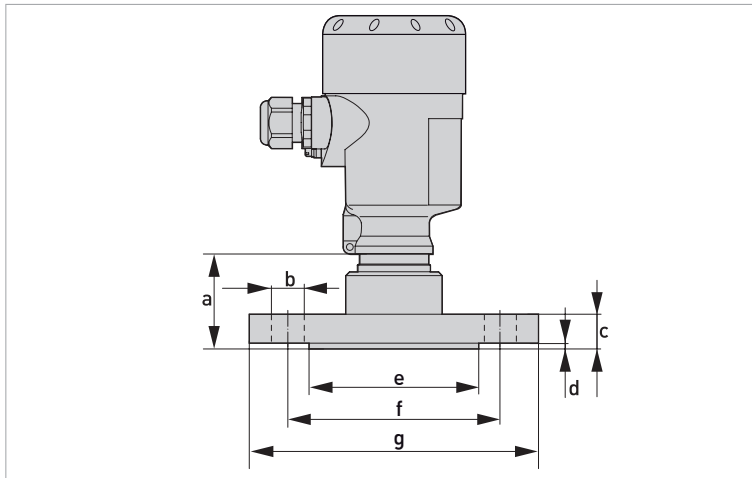


Figure 2-17: Dimensions - Flange

Flange connection acc. to DIN 2501 or ASME B16.5

Dimension [mm]	a	b	c	d	e	f	g
DN40 PN40 Form C	50	4 x Ø 18	18	3	88	110	150
DN50 PN40 Form C	50	4 x Ø 18	20	3	102	125	165
DN80 PN40 Form C	51	8 x Ø 18	24	3	138	160	200
2" Class 150lb RF	51	4 x Ø 19.1	19.1	3.2	91.9	120.7	152.4
3" Class 150lb RF	51	4 x Ø 19.1	23.9	3.2	127	152.4	190.5

Flange connection acc. to DIN 2501 or ASME B16.5

Dimension [inch]	a	b	c	d	e	f	g
DN40 PN40 Form C	1.97	4 x Ø 0.71	0.71	0.12	3.46	4.33	5.91
DN50 PN40 Form C	1.97	4 x Ø 0.71	0.79	0.12	4.02	4.92	6.50
DN80 PN40 Form C	2.01	8 x Ø 0.71	0.95	0.12	5.43	6.30	7.87
2" Class 150lb RF	2.01	4 x Ø 0.75	0.75	0.13	3.62	4.75	6
3" Class 150lb RF	2.01	4 x Ø 0.75	0.94	0.13	5	6	7.50

For the version with a temperature range up to 150°C / 302°F the measure of length increases by 28 mm / 1.1".

For the version with "secondary process barrier" the measure of length increases by 17 mm / 0.67".

2.3 Pressure ranges

Adjustment

Data refers to the nominal measuring range, pressure values smaller than -1 bar cannot be set

Adjustment range of min/max adjustment in relation to the nominal range:

- Percent value -10...110%
- Pressure value -20...120%

Adjustment range of the zero / span adjustment in relation to the nominal range

- Zero -20...+95%
- Span: -120...+120%
- Difference between zero and span: max. 120% of the nominal range

Level (min./max. adjustment)

- Percent value -10...110%
- Pressure value -120...120%

Differential pressure ① (zero/span adjustment)

- Zero -95...+95%
- Span: -120...+120%

Density ① (min./max. adjustment)

- Percent value -10...110%
- Density value according to the measuring ranges in kg/dm³

Interface ① (min./max. adjustment)

- Percent value -10...110%
- Height value according to the measuring ranges in m

① Only available for electronic differential pressure when the slave sensor is activated

Recommended maximum Turn Down (TD): 20:1 (no limit)

Nominal ranges and overload capacity in bar/kPa

This information is provided as an overview and refers to the measuring cell. Limitations due to the material and design of the process connection as well as the type of pressure selected are possible. The information given on the nameplate applies. Data on overload capability apply for reference temperature.

Nominal range	Maximum pressure	Minimum pressure
Gauge pressure		
0...+0.025 bar / 0...+2.5 kPa ①	+5 bar / +500 kPa	-0.05 bar / -5 kPa
0...+0.1 bar / 0...+10 kPa	+15 bar / +1500 kPa	-0.2 bar / -20 kPa
0...+0.4 bar / 0...+40 kPa	+30 bar / +3000 kPa	-0.8 bar / -80 kPa
0...+1 bar / 0...+100 kPa	+35 bar / +3500 kPa	-1 bar / -100 kPa
0...+2.5 bar / 0...+250 kPa	+50 bar / +5000 kPa	-1 bar / -100 kPa
0...+5 bar / 0...+500 kPa	+65 bar / +6500 kPa	-1 bar / -100 kPa
0...+10 bar / 0...+1000 kPa	+90 bar / +9000 kPa	-1 bar / -100 kPa
0...+25 bar / 0...+2500 kPa	+125 bar / +12500 kPa	-1 bar / -100 kPa
0...+60 bar / 0...+6000 kPa	+200 bar / +20000 kPa	-1 bar / -100 kPa
0...+100 bar / 0...+10000 kPa ①	+200 bar / +20000 kPa	-1 bar / -100 kPa
-1...0 bar / -100...0 kPa	+35 bar / +3500 kPa	-1 bar / -100 kPa
-1...+1.5 bar / -100...+150 kPa	+40 bar / +4000 kPa	-1 bar / -100 kPa
-1...+5,0bar / -100...+500kPa	+65 bar / +6500 kPa	-1 bar / -100 kPa
-1...+10 bar / -100...+1000 kPa	+90 bar / +9000 kPa	-1 bar / -100 kPa
-1...+25 bar / -100...+2500 kPa	+125 bar / +12500 kPa	-1 bar / -100 kPa
-1...+60 bar / -100...+6000 kPa	+200 bar / +20000 kPa	-1 bar / -100 kPa
-1...+100 bar / -100...+10000 kPa ①	+200 bar / +20000 kPa	-1 bar / -100 kPa
-0.025...+0.025 bar / -2.5...+2.5 kPa	+5 bar / +500 kPa	-0.05 bar / -5 kPa
-0.05...+0.05 bar / -5...+5 kPa	+15 bar / +1500 kPa	-0.2 bar / -20 kPa
-0.2...+0.2 bar / -20...+20 kPa	+20 bar / +2000 kPa	-0.4 bar / -40 kPa
-0.5...+0.5 bar / -50...+50 kPa	+35 bar / +3500 kPa	-1 bar / -100 kPa

① Only for measuring cell Ø28 mm

Nominal range	Maximum pressure	Minimum pressure
Absolute pressure		
0...+0.1 bar / 0...+10 kPa	+15 bar / +1500 kPa	0 bar abs.
0...+1 bar / 0...+100 kPa	+35 bar / +3500 kPa	0 bar abs.
0...+2.5 bar / 0...+250 kPa	+50 bar / +5000 kPa	0 bar abs.
0...+5 bar / 0...+500 kPa	+65 bar / +6500 kPa	0 bar abs.
0...+10 bar / 0...+1000 kPa	+90 bar / +9000 kPa	0 bar abs.
0...+25 bar / 0...+2500 kPa	+125 bar / +12500 kPa	0 bar abs.
0...+60 bar / 0...+6000 kPa	+200 bar / +20000 kPa	0 bar abs.
0...+100 bar / 0...+10000 kPa ①	+200 bar / +20000 kPa	0 bar abs.

① Only for measuring cell Ø28 mm

Nominal range	Maximum pressure	Minimum pressure
Gauge pressure		
0...+0.4 psi ①	+ 75 psi	-0.7 psi
0...+1.5 psi	+225 psi	-3 psi
0...+5 psi	+375 psi	-11.50 psi
0...+15 psi	+525 psi	-14.51 psi
0...+30 psi	+725 psi	-14.51 psi
0...+75 psi	+975 psi	-14.51 psi
0...+150 psi	+1350 psi	-14.51 psi
0...+300 psi	+1900 psi	-14.51 psi
0...+900 psi	+2900 psi	-14.51 psi
0...+1450 psi ①	+2900 psi	-14.51 psi
-14.5...0 psi	+525 psi	-14.51 psi
-14.5...+20 psi	+600 psi	-14.51 psi
-14.5 ... +75 psi	+975 psi	-14.51 psi
-14.5...+150 psi	+1350 psi	-14.51 psi
-14.5...+300 psi	+1900 psi	-14.51 psi
-14.5...+900 psi	+2900 psi	-14.51 psi
-14.5...+1500 psi ①	+2900 psi	-14.51 psi
-0.7...+0.7 psi	+75 psi	-2.90 psi
-3...+3 psi	+225 psi	-5.80 psi
-7...+7 psi	+525 psi	-14.51 psi

① Only for measuring cell Ø28 mm

Nominal range	Max. working pressure (MWP)	Overload capacity min. pressure
Absolute pressure		
0...1.5 psi	225 psi	0 psi
0...15 psi	525 psi	0 psi
0...30 psi	725 psi	0 psi
0...75 psi	975 psi	0 psi
0...150 psi	1350 psi	0 psi
0...300 psi	1900 psi	0 psi
0...900 psi	2900 psi	0 psi
0...+1450 psi ①	2900 psi	0 psi

① Only for measuring cell Ø28 mm

2.4 Ambient temperature effect on current output

Applies to the analogue 4...20 mA current output and refers to the set span
< 0.05% / 10 K, max. < 0.15%, each case at -40...+80°C / -40...+176°F

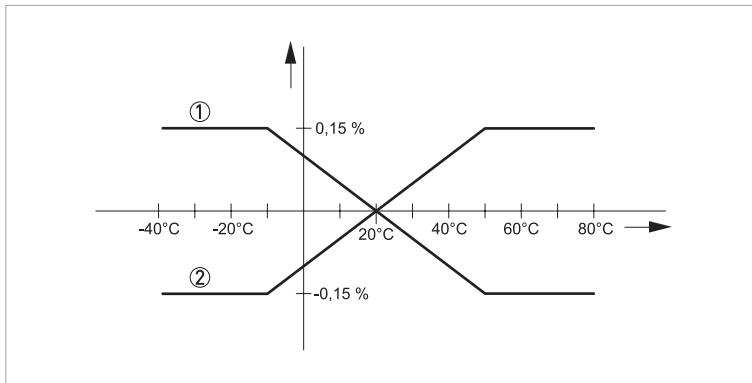


Figure 2-18: Ambient temperature effect on current output

- ① Falling characteristics
- ② Rising characteristics

2.5 Dynamic behaviour of the current output

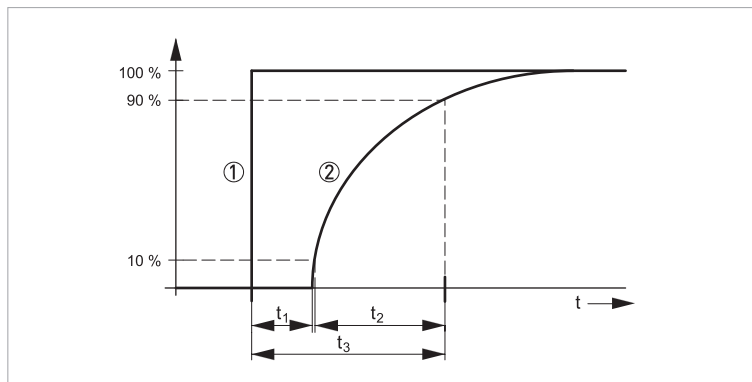


Figure 2-19: Behaviour at an abrupt change in the process variable.
 t_1 - dead time; t_2 - rise time; t_3 - step response time

- ① Process variable
- ② Output signal

	Standard	IP68 (25 bar)
Dead time (t_1)	≤ 25 ms	≤ 50 ms
Rise time 10...90% (t_2)	≤ 55 ms	≤ 150 ms
Step response time (t_3)	≤ 80 ms (t_i : 0 seconds, 10...90%)	≤ 200 ms (t_i : 0 seconds, 10...90%)
Damping (63% of input variable)	0...999 seconds, adjustable in 0.1 second steps	

These parameters depend on the temperature.

3.1 Intended use

For devices used in hazardous areas, additional safety notes apply.

Responsibility for the use of the measuring devices with regard to suitability, intended use and corrosion resistance of the used materials against the measured fluid lies solely with the operator.

The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose.

The OPTIBAR PC 5060 C process pressure transmitter is suitable for measuring the process pressure and level of gases, vapours and liquids. In combination with a slave sensor, the OPTIBAR PC 5060 C also provides the option of electronic differential pressure measurement of differential pressure, level, density and interface. The available measuring ranges and the respective permissible overloads are indicated on the nameplate. For details refer to *Technical data* on page 8. To observe the intended use, adhere to the following points:

- Observe the instructions in this document.
- Comply with the technical specifications (for further information refer to *Technical data* on page 8).
- Only suitably qualified personnel may install and operate the device.
- Observe the generally accepted standards of good practice.

3.2 Installation specifications

Observe the relevant directives, ordinances, standards and accident prevention regulations (e.g. VDE/VDI 3512, DIN 19210, VBG, Elex V, etc.).

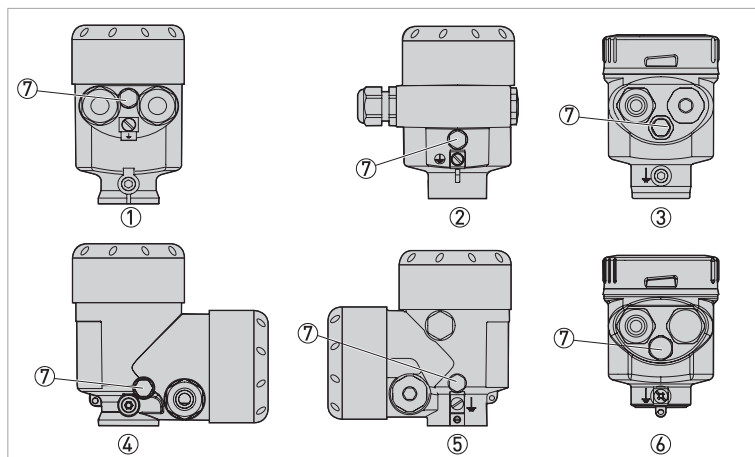
The accuracy of the measurement is only guaranteed if the transmitter and accompanying impulse line(s), if any, have been correctly installed. In addition, extreme ambient conditions including large fluctuations in temperature, vibrations and shocks should be kept as far away as possible from the measuring equipment.

3.3 Venting

The ventilation for the electronics housing is assured via a filter element in the vicinity of the cable glands, which is permeable to air but moisture-blocking.

In order to ensure effective ventilation, the filter element must be always free of deposits.

Do not use a high-pressure cleaner to clean the housing. The filter element may become damaged and as a result moisture can penetrate into the housing. The exception to this is the IP69K single chamber housing.



- ① Single chamber housing, plastic, stainless steel precision casting
- ② Single chamber housing, aluminium
- ③ Single chamber housing, stainless steel electro-polished
- ④ Double chamber housing, plastic
- ⑤ Double chamber housing, aluminium
- ⑥ Single chamber housing IP69k
- ⑦ Filter element

3.4 Measurement setup for measuring the process pressure

The following points should be observed in this application:

- The pressure transmitter must be mounted above the measuring point.

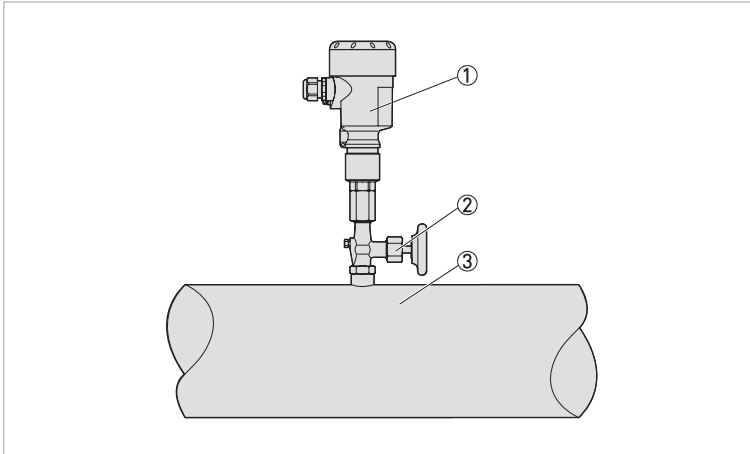


Figure 3-1: Measurement setup for measuring the process pressure of gases

- ① Pressure transmitter
- ② Shut-off valve
- ③ Tapping point

3.5 Measurement setup for measuring steam

The following points should be observed in this application:

- The pressure transmitter should be connected via a syphon to protect the measuring cell from non-permitted high temperatures.
- Siphon to be kept free of insulation.
- When using superheated steam, the siphon must be filled with water prior to start-up.

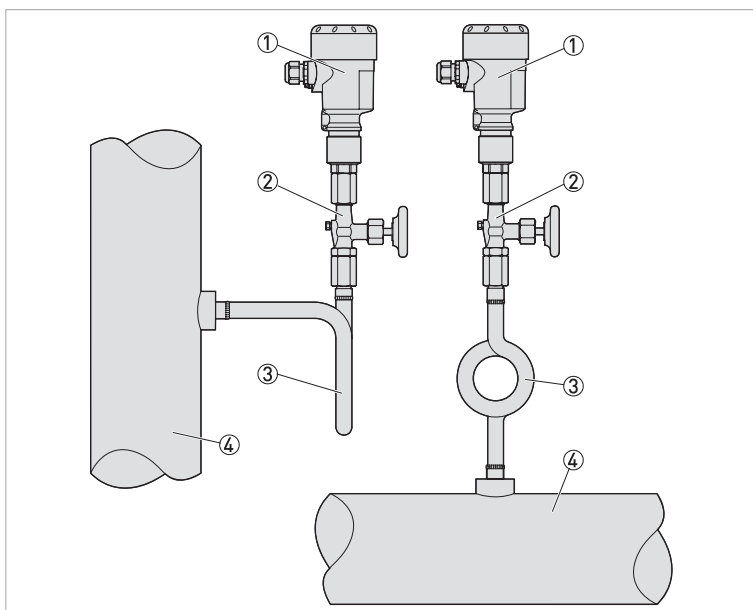


Figure 3-2: Measurement setup for measuring steam

- ① Pressure transmitter
- ② Shut-off valve
- ③ Syphon
- ④ Tapping point

3.6 Measurement setup for measuring fluids

The following points should be observed in this application:

- The pressure transmitter must be mounted below the measuring point.

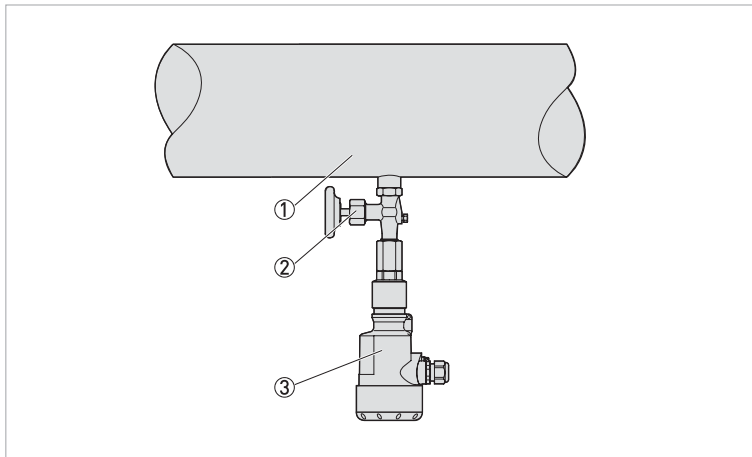


Figure 3-3: Measurement setup for measuring fluids

- ① Tapping point
- ② Shut-off valve
- ③ Pressure transmitter

3.7 Measurement setup for level measurement

The following points should be observed in this application:

- The pressure transmitter should be mounted below the lowest level.
- The pressure transmitter should be protected from filling/emptying current and agitator surges when mounted.

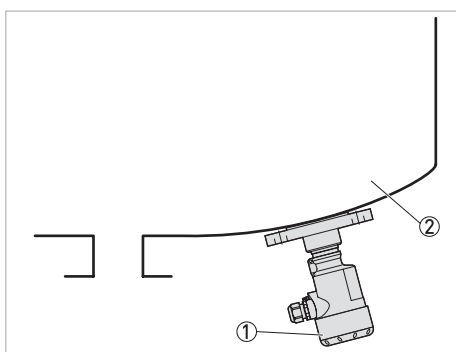


Figure 3-4: Measurement setup for level measurement

- ① Pressure transmitter
- ② Tank

3.8 External housing

A mounting plate is available as an option to facilitate the mounting of the external housing. For further information refer to *Technical data* on page 8.

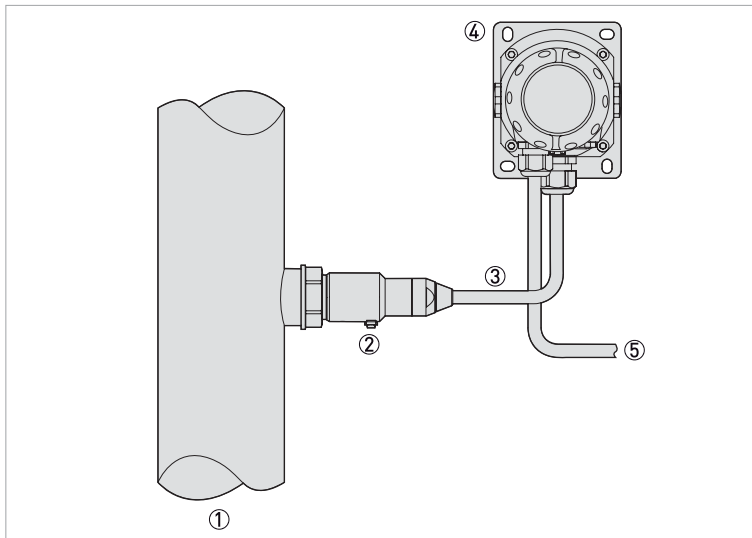


Figure 3-5: Measurement setup with an external housing

- ① Tapping point
- ② Sensor assembly
- ③ Connecting cable
- ④ External housing
- ⑤ Signal cable

IP68 version (25 bar)

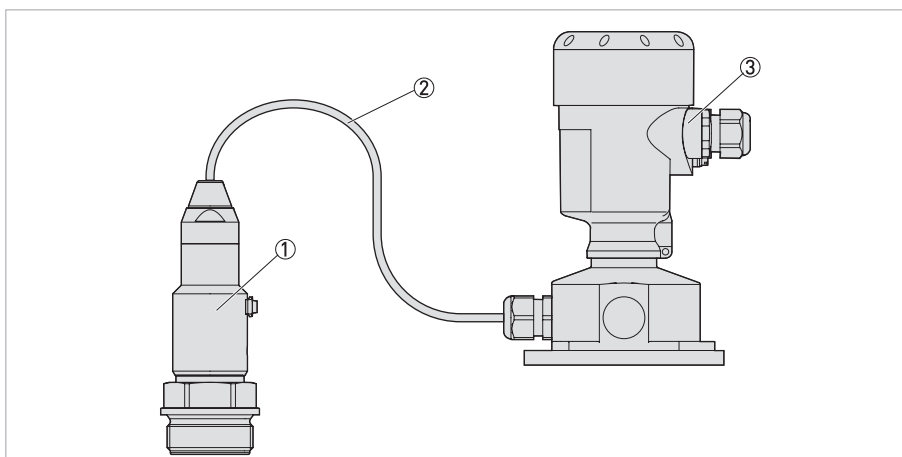


Figure 3-6: Process assembly

- ① Sensor assembly
- ② Connection cable
- ③ External housing

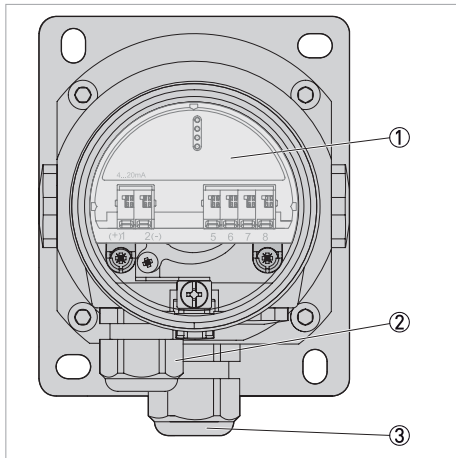


Figure 3-7: External housing (IP68)

- ① Electronic insert
- ② Cable gland for the power supply
- ③ Cable gland for the sensor connection cable

4.1 Safety instructions

*All work on the electrical connections may only be carried out with the power disconnected.
Take note of the voltage data on the nameplate!*

Observe the national regulations for electrical installations!

*Observe without fail the local occupational health and safety regulations.
Any work done on the electrical components of the measuring device may only be carried out by
properly trained specialists.*

*Look at the device nameplate to ensure that the device is delivered according to your order.
Check for the correct supply voltage printed on the nameplate.*

4.2 Notes for electrical cables

*The device must be grounded to a spot in accordance with regulations in order to protect
personnel against electric shocks.*

*Cables may only be connected when the power is switched off! Since the transmitter has no
switch-off elements, overcurrent protection devices, lightning protection and/or energy isolating
devices need to be provided by the customer.*

Metric thread M16 x 1.5 mm

The cable glands with metric threads are screwed in by the factory. They are sealed using plastic plugs to protect them during transport. Remove these plugs prior to establishing an electrical connection.

4.2.1 Requirements for signal cables supplied by the customer

If the signal cable was not ordered, it is to be provided by the customer. The following requirements regarding the electrical specifications of the signal cable must be observed:

Specifications for standard signal cables

- Test voltage: ≥ 500 VAC RMS (750 VDC)
- Temperature range: $-40\dots+105^{\circ}\text{C}$ / $-40\dots+221^{\circ}\text{F}$
- Capacity: ≤ 200 pF/m / 61 pF/ft
- Inductance: ≤ 0.7 $\mu\text{H}/\text{m}$ / 0.2 $\mu\text{H}/\text{ft}$
- Use cable with round cross section.
- We generally recommend the use of a shielded cable for HART[®] multidrop mode.

Make sure that the cable used features the required temperature resistance and fire safety for the maximum possible ambient temperature.

4.2.2 Laying electrical cables correctly

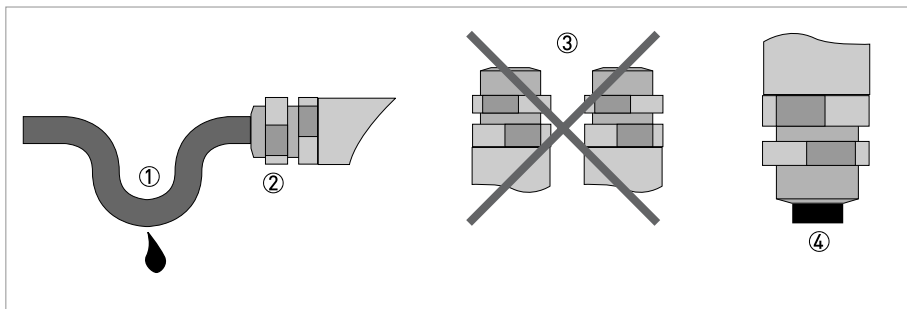


Figure 4-1: Protect housing from dust and water

- ① Lay the cable in a loop just before the housing.
- ② Tighten the screw connections of the cable entry.
- ③ Never mount the housing with the cable entries facing upwards.
- ④ Seal cable entries that are not needed with a plug.

4.2.3 Cable preparation

The device is connected with standard two-wire cable without shielding. If electromagnetic interference is expected which is above the test values of EN 61326-1 for industrial areas, a shielded cable should be used.

Check which outer diameter is suitable for the cable gland in order to ensure the sealing effect according to the specified IP protection class.

- 4.5...10 mm / 0.18...0.39" (standard)
- 4...11 mm / 0.16...0.43" (optional)

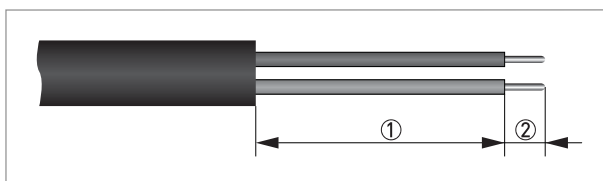


Figure 4-2: Stripping the cable

- ① 40...50 mm / 1.6...2"
- ② 5 mm / 0.2"

4.2.4 Cable entry 1/2-14 NPT (female)

With plastic housings, the NPT cable gland or the conduit steel tube must be screwed without grease into the thread.

4.2.5 Connector pin assignment

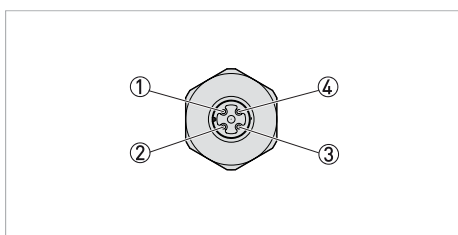


Figure 4-3: Connector M12 x 1, 4-pin, A-coding

- ① Shield
- ② Not used
- ③ VS-
- ④ VS+

Contact pin	Colour of cable	Electronic insert for terminal
Pin ①	Brown	1
Pin ④	Blue	2

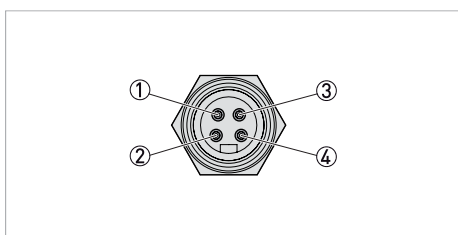


Figure 4-4: 7/8 connector, Foundation Fieldbus (FF)

- ① VS-
- ② VS+
- ③ Not connected
- ④ Cable shield

Contact pin	Colour of cable	Electronic insert for terminal
Pin ①	Blue	1
Pin ②	Brown	2
Pin ④	Green / yellow	Grounding

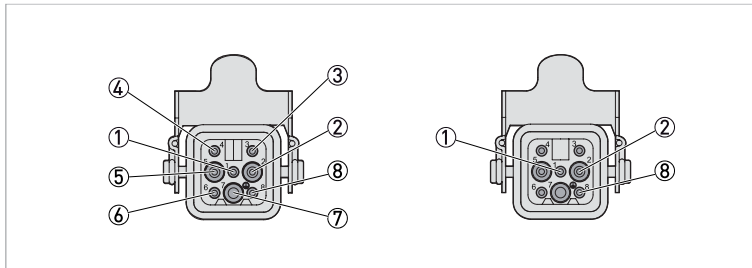


Figure 4-5: Connector, Harting HAN 8D (left) and Harting HAN 7D (right)

- ① VS-
- ② VS+

Contact pin	Colour of cable	Electronic insert for terminal
Pin ①	Black	1
Pin ②	Blue	2
Pin ⑧	Green / yellow	Grounding

4.2.6 Connection to the power supply

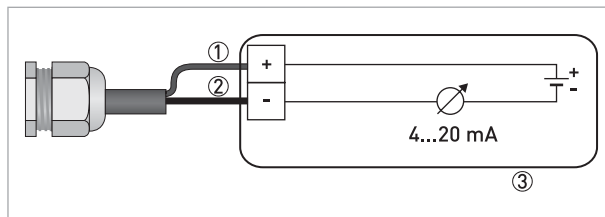


Figure 4-6: Connection to the power supply

- ① Red
- ② Black
- ③ Power supply with load

4.2.7 Cable shield and grounding

If a shielded cable is necessary, connect the cable shield on both ends to the grounding potential.

In the device, the cable shield must be connected directly to the internal ground terminal.

The ground terminal outside on the housing must be connected to the grounding potential with low impedance.

In hazardous areas, the grounding is carried out according to the installation instructions.

Significant potential differences exist inside galvanization plants as well as on vessels with cathodic corrosion protection. A two-sided shield grounding can cause unacceptably high shield currents as a result.

The metallic and wetted parts (process connection, cap flange, measuring cell and separating diaphragm etc.) are conductive connected with the inner and outer ground terminal on the housing.

4.3 Electrical connection

The power supply and signal output are connected via screw terminals in the housing. The display and adjustment module is connected to the interface adapter via contact pins.

4.3.1 Connection in the terminal compartment

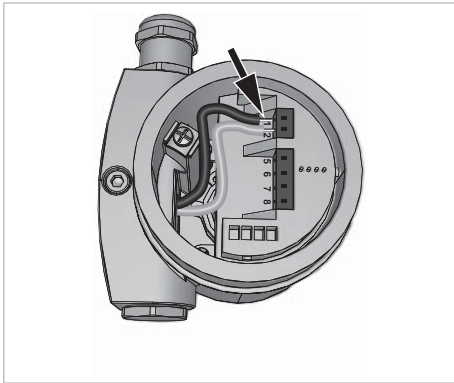


Figure 4-7: Terminal compartment from above

Procedure

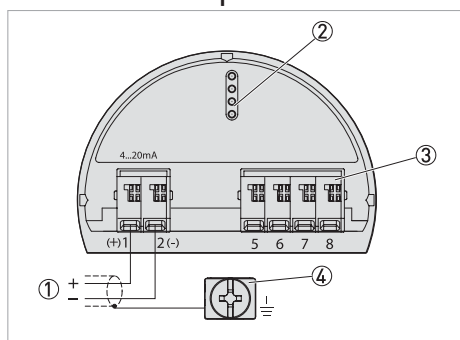
- Unscrew the housing cover.
- If present, remove the display and adjustment module by turning it to the left.
- Loosen union nut of the cable gland.
- For preparation of connection cable refer to *Cable preparation* on page 49.
- Push the cable through the cable gland into the terminal compartment.
- Insert the wire ends into the open terminal connection according to the wiring plan. Flexible cores with wire end sleeves as well as solid cores can be inserted directly into the terminal openings. In case of flexible cores, press the spring terminal with a small screwdriver to open the terminal opening.
- Check the proper hold of the wires in the terminals by lightly pulling on them.
- Connect the cable shield to the internal ground terminal, connect the outer ground terminal to the customer/plant equipotential bonding.
- Tighten the union nut of the cable gland. The sealing ring must completely enclose the cable.
- Screw the housing cover back on.

4.3.2 Single chamber housing

For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

The following illustration applies to both the non-Ex as well as the the Ex ia, and the Ex d version.

Electronics compartment



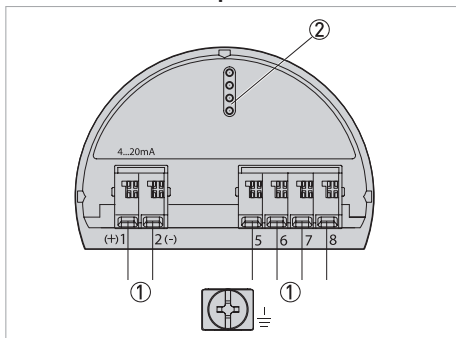
- ① Power supply / signal output
- ② Interface adapter for the display and adjustment module
- ③ Digital interface
- ④ Ground terminal for connection of the cable shield

4.3.3 Double chamber housing

For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

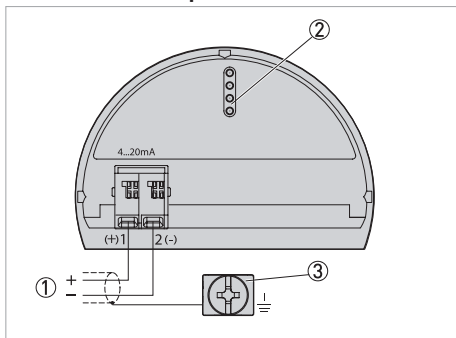
The following illustration applies to both the non-Ex as well as the Ex ia, and the Ex d version.

Electronics compartment



- ① Internal connection to terminal compartment
- ② Interface adapter for the display and adjustment module

Terminal compartment: Standard



- ① Power supply / signal output
- ② Interface adapter for the display and adjustment module
- ③ Ground terminal for connection of the cable shield

Terminal compartment: Additional current output

To make a second measured value available for use, you can use the supplementary electronics "Additional current output". Both current outputs are passive and need a power supply.

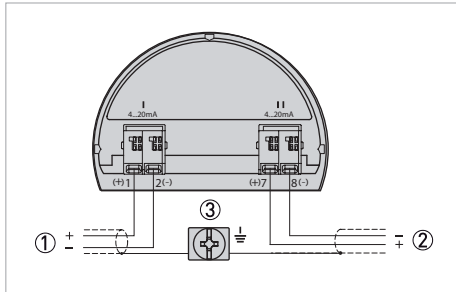


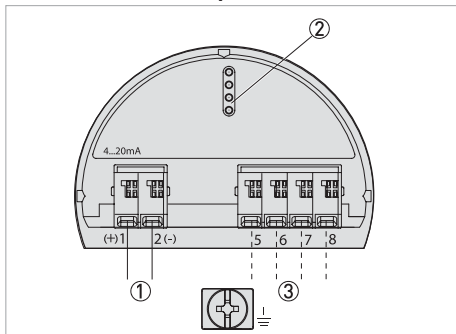
Figure 4-8: Additional current output

- ① First current output (I) - Voltage supply and signal output, sensor (HART®)
- ② Additional current output (II) - Voltage supply and signal output (without HART®)
- ③ Ground terminal for connection of the cable screening

4.3.4 Double chamber housing Ex d ia

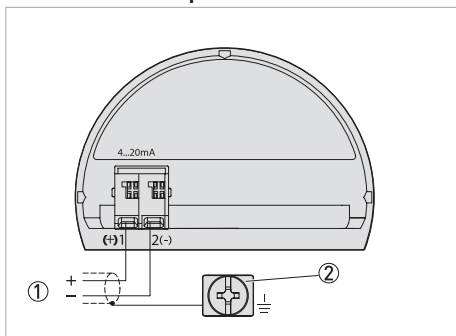
For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

Electronics compartment



- ① Power supply / signal output
- ② Interface adapter for the display and adjustment module
- ③ Digital interface

Terminal compartment



- ① Power supply / signal output
- ② Ground terminal for connection of the cable shield







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