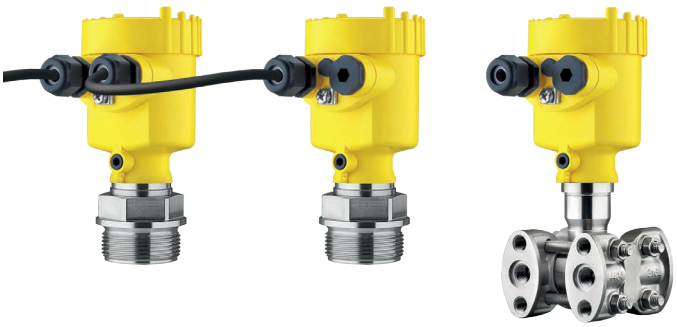
Product information

Differential pressure

Mechanical and electronic differential pressure measurement

VEGADIF 85
VEGABAR 81
VEGABAR 82
VEGABAR 83
VEGABAR 86
VEGABAR 87



Document ID: 36135

Contents

Take note of safety instructions for Ex applications

Please note the Ex specific safety information that you can find at www.vega.com and that comes with each instrument. In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units. The sensors must only be operated on intrinsically safe circuits. The permissible electrical values are stated in the certificate.

36135-EN-220620

1 Measuring principle

Mechanical differential pressure

A metallic measuring cell is used as sensor element. The process pressures are transmitted via the separating diaphragms and filling oils to a piezoresistive sensor element (resistance measuring bridge using semiconductor technology).

The difference between the acting pressures changes the bridge voltage. This change is measured, further processed and converted into a corresponding output signal.

In addition, the measuring cell temperature and the static pressure are measured on the low pressure side. The measuring signals are further processed and are available as additional output signals.

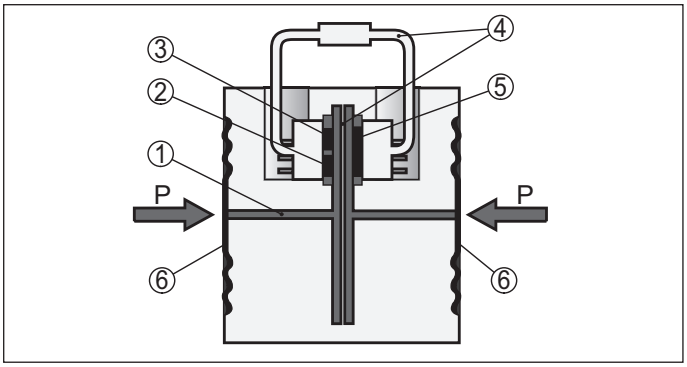


Fig. 1: Configuration metallic measuring cell

P1, P2 Process pressures
1 Filling fluid
2 Temperature sensor
3 Absolute pressure sensor, static pressure
4 Overload system
5 Differential pressure sensor
6 Separating diaphragms

Electronic differential pressure

For an electronic differential pressure measurement, a Secondary sensor is combined with a Primary sensor of the VEGABAR series.

The sensors are connected via a shielded four-wire cable. The measured value from the Secondary sensors is read in and factored into the calculations. Power supply and parameter adjustment are carried out through the Primary sensor.

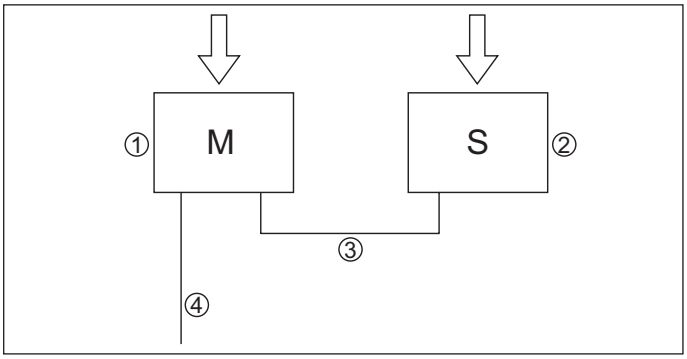


Fig. 2: Principle, electronic differential pressure measurement

P1, P2 Process pressures
1 Primary sensor
2 Secondary sensor
3 Connection Primary-Secondary
4 Output signal

The sensor element is e.g. the CERTEC® measuring cell with robust ceramic diaphragm. The process pressure deflects the ceramic diaphragm and causes a capacitance change in the measuring cell. This capacitance change is converted into an electrical signal and outputted as measured value via the output signal.

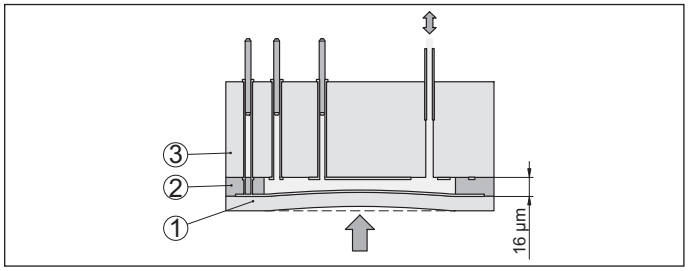


Fig. 3: Configuration of the CERTEC® measuring cell

1 Process diaphragm
2 Glass joint
3 Base element

In addition, the measuring cell temperatures and the static pressure are measured on the low pressure side as own value. The measuring signals are further processed and are available as additional output signals.

2 Type overview

Mechanical differential pressure

VEGADIF 85

VEGADIF 85 with chemical seal CSS

VEGADIF 85 with chemical seal CSB

Measuring cell	Piezoresistive	Piezoresistive	Piezoresistive
Diaphragm	Metal	Metal	Metal
Media	Gases, vapours and liquids	gases, vapours and liquids, also aggressive ones, at high temperatures	gases, vapours and liquids, also aggressive ones, at high temperatures
Process fitting	NPT ¼-18 according to IEC 61518	Plus side: Flanges from DN 50 or ¾"	Plus and minus side: Flanges from DN 15 or ½", hygienic fittings from 1½"
Material Process fitting	316L, Alloy C276 (2.4819), Superduplex (2.4410)	316L, Alloy C276 (2.4819)	316L, Alloy C276 (2.4819, Duplex (1.4462)
Diaphragm material	316L, Alloy C276 (2.4819)	316L, Alloy C276 (2.4819), Tantalum, Inconell 600	316L, Alloy C276 (2.4819), Tantalum, Duplex (1.4462), PFA coating
Seal	FKM, EPDM	-	-
Isolating liquid	Silicone oil	Silicone oil, high temperature oil, halocarbon oil, medical white oil	Silicone oil, high temperature oil, halocarbon oil, medical white oil, Neobee M-20
Measuring range	0.01 … 40 bar (0.145 … 580 psig)	0.1 … 40 bar (1.45 … 580 psig)	0.1 … 40 bar (1.45 … 580 psig)
Smallest adjustable span	1 mbar (0.015 psig)	1 mbar (0.015 psig)	1 mbar (0.015 psig)
Process temperature	-40 … +105 °C (-40 … +225 °F)	-40 … +400 °C (-40 … +752 °F)	-40 … +400 °C (-40 … +752 °F)
Ambient, storage and transport temperature	-40 … +80 °C (-40 … +176 °F)	-40 … +80 °C (-40 … +176 °F)	-40 … +80 °C (-40 … +176 °F)
Smallest deviation	< ±0.065 %	< ±0.065 % + influence of the chemical seal	< ±0.065 % + influence of the chemical seal
Signal output	• 4 … 20 mA • 4 … 20 mA/HART • Profibus PA • Foundation Fieldbus • Modbus	• 4 … 20 mA • 4 … 20 mA/HART • Profibus PA • Foundation Fieldbus • Modbus	• 4 … 20 mA • 4 … 20 mA/HART • Profibus PA • Foundation Fieldbus • Modbus
Indication/Adjustment	• PLICSCOM • PACTware • VEGADIS 81 • VEGADIS 82	• PLICSCOM • PACTware • VEGADIS 81 • VEGADIS 82	• PLICSCOM • PACTware • VEGADIS 81 • VEGADIS 82
Approvals	• ATEX • SIL • FM • CSA • EAC (GOST) • Shipbuilding • Overfill protection	• ATEX • SIL • FM • CSA • EAC (GOST) • Shipbuilding • Overfill protection	• ATEX • SIL • FM • CSA • EAC (GOST) • Shipbuilding • Overfill protection

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Electronic differential pressure

	VEGABAR 81	VEGABAR 82	VEGABAR 83
			
Measuring cell	Piezoresistive/DMS	CERTEC®	Piezoresistive/strain gauge, METEC®
Diaphragm	Metal	Ceramic	Metal
Media	gases, vapours and liquids, also aggressive ones, at high temperatures	gases, vapours and liquids, also with abrasive substances	gas, vapours and liquids, also viscous
Process fitting	Thread from G½ or ½ NPT Flanges from DN 20 Boltings, tube isolating diaphragm each from DN 25	Thread from G1 or ½ NPT Flanges from DN 25 Extension fittings from 1"	Thread from G1 or ½ NPT Flanges from DN 20 Boltings, tube isolating diaphragm each from DN 25
Material Process fitting	316L	316L, PVDF, Alloy C22 (2.4602), Alloy C276 (2.4819)	316L
Diaphragm material	316L, Alloy C276 (2.4819), Tantalum, gold on 316L	Al_2O_3 ceramic	Alloy C276 (2.4819), gold-coated, gold/rhodium-coated
Measuring cell seal	-	FKM, EPDM, FFKM	-
Isolating liquid	Silicone oil, high temperature oil, Halocarbon oil Medical white oil	Dry measuring system	Silicone oil, Halocarbon oil Medical white oil
Measuring range	-1 … +1000 bar/-100 … +100 MPa (-14.5 … +14500 psig)	-1 … +100 bar/-100 … +10 MPa (-14.5 … +1450 psig)	-1 … +1000 bar/-100 … +100 MPa (-14.5 … +14500 psig)
Smallest measuring range	0.4 bar/40 kPa (5.802 psig)	0.025 bar/2.5 kPa (1.45 psig)	0.1 bar/10 kPa (1.45 psig)
Process temperature	-90 … +400 °C (-130 … +752 °F)	-40 … +150 °C (-40 … +302 °F)	-40 … +200 °C (-40 … +392 °F)
Smallest deviation	< ±0.2 % + influence of the chemical seal	< 0.05 %	< 0.075 %
Signal output	• 4 … 20 mA • 4 … 20 mA/HART • Profibus PA • Foundation Fieldbus • Modbus	• 4 … 20 mA • 4 … 20 mA/HART • Profibus PA • Foundation Fieldbus • Modbus	• 4 … 20 mA • 4 … 20 mA/HART • Profibus PA • Foundation Fieldbus • Modbus
Interface	Digital interface for Primary-Secondary combination	Digital interface for Primary-Secondary combination	Digital interface for Primary-Secondary combination
Indication/Adjustment	• PLICSCOM • PACTware • VEGADIS 81 • VEGADIS 82	• PLICSCOM • PACTware • VEGADIS 81 • VEGADIS 82	• PLICSCOM • PACTware • VEGADIS 81 • VEGADIS 82
Approvals	• ATEX • SIL • FM • CSA • EAC (GOST) • Shipbuilding • Overfill protection	• ATEX • SIL • FM • CSA • EAC (GOST) • Shipbuilding • Overfill protection	• ATEX • SIL • FM • CSA • EAC (GOST) • Shipbuilding • Overfill protection

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Electronic differential pressure

VEGABAR 86

VEGABAR 87

Measuring cell	CERTEC®	METEC®
Diaphragm	Al_2O_3 ceramic	Alloy C276 (2.4819)
Media	Liquids, also with abrasive content	gas, vapours and liquids, also viscous
Process fitting	Straining clamp, unassembled threaded fitting from G1½, thread G1½, flanges from DN 50	Straining clamp, unassembled threaded fitting from G1½, thread G1½, flanges from DN 50
Material Process fitting	PE, PUR, FEP, 316L	FEP, 316L
Diaphragm material	316L, PE-coating, PVDF	316L
Measuring cell seal	FKM, EPDM, FFKM	-
Isolating liquid	Dry measuring system	Medical white oil
Measuring range	0 … +25 bar/0 … +2500 kPa (-14.5 … +362.6 psig)	0 … +25 bar/0 … +2500 kPa (-14.5 … +362.6 psig)
Smallest measuring range	0.025 bar/2.5 kPa (1.45 psig)	0.1 bar/10 kPa (1.45 psig)
Process temperature	-40 … +100 °C (-40 … +212 °F)	-12 … +100 °C (+10.4 … +212 °F)
Smallest deviation	< 0.1 %	< 0.1 %
Signal output	• 4 … 20 mA • 4 … 20 mA/HART • Profibus PA • Foundation Fieldbus • Modbus	• 4 … 20 mA • 4 … 20 mA/HART • Profibus PA • Foundation Fieldbus • Modbus
Interface	Digital interface for Secondary-Primary combination	Digital interface for Secondary-Primary combination
Indication/Adjustment	• PLICSCOM • PACTware • VEGADIS 81 • VEGADIS 82	• PLICSCOM • PACTware • VEGADIS 81 • VEGADIS 82
Approvals	• ATEX • IEC • SIL • FM • CSA • EAC (GOST) • Shipbuilding • Overfill protection	• ATEX • IEC • SIL • FM • CSA • EAC (GOST) • Shipbuilding • Overfill protection

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3 Overview, mechanical differential pressure

Configuration

The mechanical differential pressure consists of the differential pressure transmitter VEGADIF 85 and an optionally connection chemical seal system.

Differential pressure transmitter

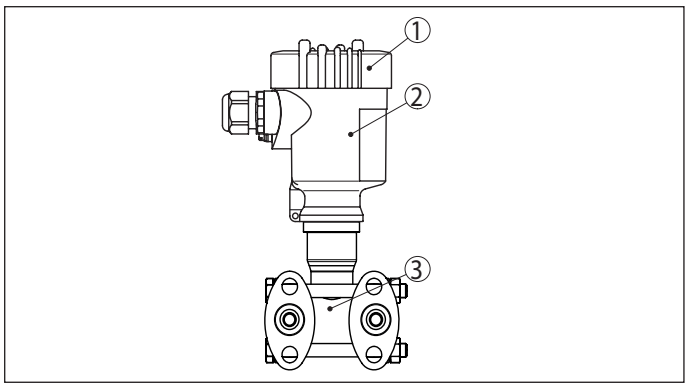


Fig. 4: VEGADIF 85 differential pressure transmitter

1 Housing cover, optionally with integrated display and adjustment module
2 Housing with electronics
3 Process component with measuring cell

Single-sided chemical seal CSS

The chemical seal CSS consists of the components: separating diaphragm, process fitting as well as connection piece with transmission line (capillaries). The components are fully welded to each other and to the associated differential pressure transmitter and represent a hermetically sealed system.

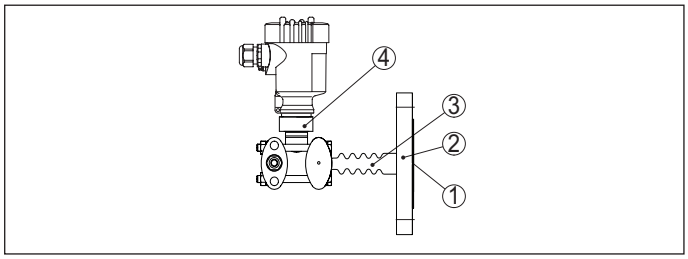


Fig. 5: VEGADIF 85 with chemical seal CSS

1 VEGADIF 85
2 Process fitting
3 Transmission line (capillaries)
4 Separating diaphragm

Double-sided chemical seal CSB

The chemical seal CSB consists of the components: separating diaphragm, process fitting as well as transmission lines (capillaries). The components are fully welded to each other and to the associated differential pressure transmitter and represent a hermetically sealed system.

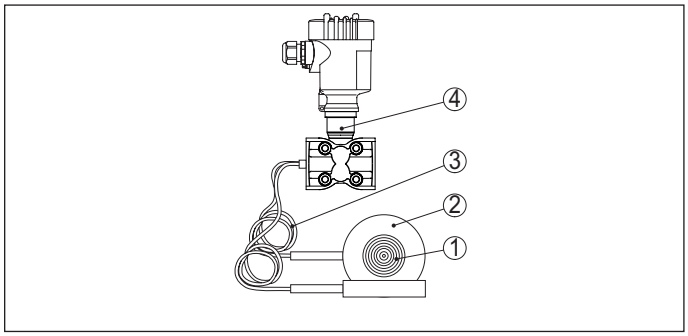


Fig. 6: VEGADIF 85 with chemical seal CSB

1 VEGADIF 85
2 Transmission line (capillaries)
3 Process fitting
4 Separating diaphragm

Application areas

The differential pressure transmitter VEGADIF 85 is used for various applications such as differential pressure measurements of filters and pumps as well as level measurements in pressurized vessels. Through the precise measuring cell grading and low deviation flow, density and interface measurements can be realised.

The differential pressure transmitter is suitable for all gases, vapours and liquids where product-resistant sensors are required. For extremely moist areas, IP68 versions are available.

Differential pressure measurement

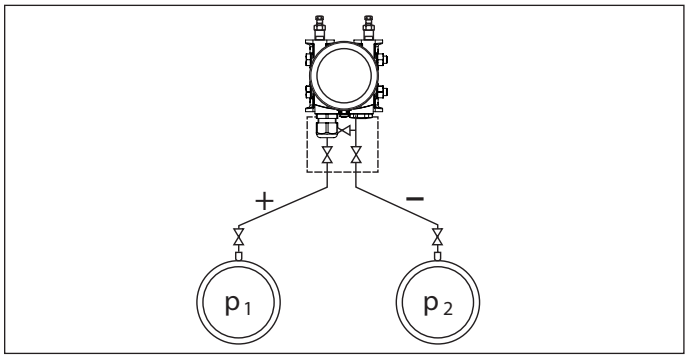


Fig. 7: Differential pressure measurement with VEGADIF 85

Level measurement

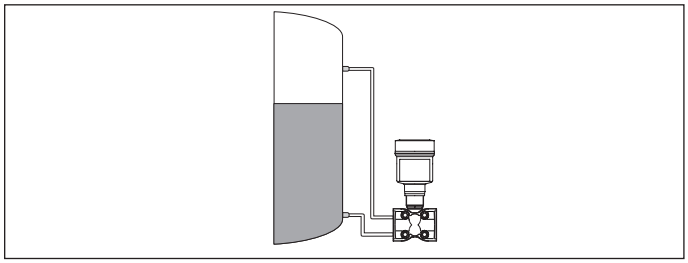


Fig. 8: Level measurement with VEGADIF 85

Flow measurement

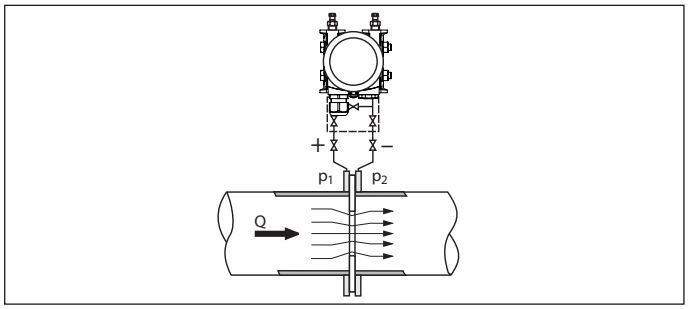


Fig. 9: Flow measurement with VEGADIF 85 and DP flow element

Density measurement

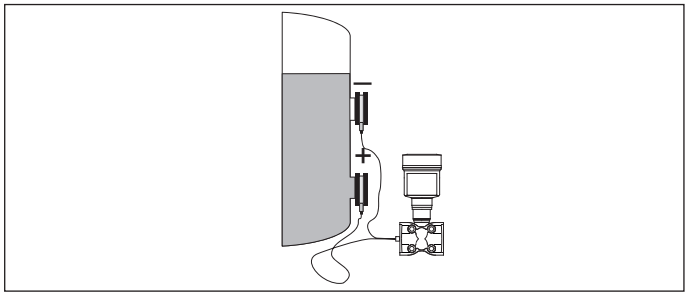


Fig. 10: Density measurement with VEGADIF 85

Interface measurement

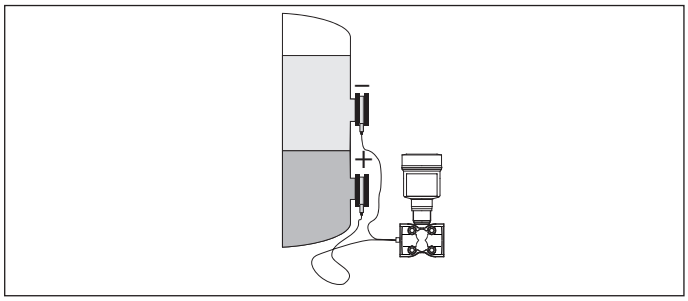


Fig. 11: Interface measurement with VEGADIF 85

4 Overview, electronic differential pressure

Configuration and housing protection classes

Pressure transmitters VEGABAR 81, 82 and 83 are available in different materials and housing protection classes. The following illustrations show typical examples.

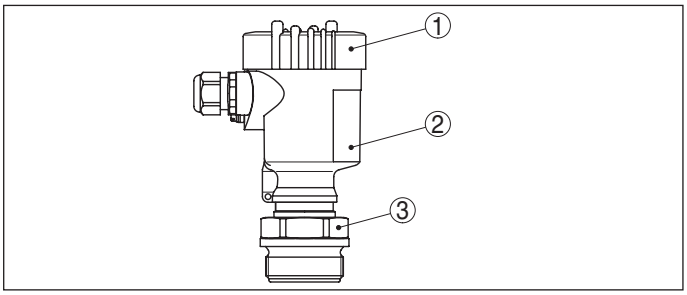


Fig. 12: Example of a VEGABAR 82 with plastic housing with protection rating IP66/IP67

1 Housing lid with integrated display and adjustment module (optional)
2 Housing with electronics
3 Process fitting with measuring cell

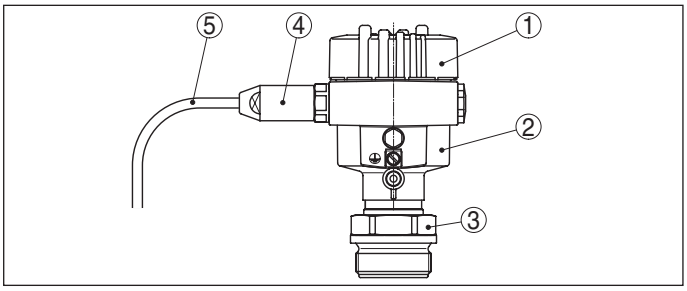


Fig. 13: Example of a VEGABAR 82 with aluminium housing in protection class IP66/IP68, 1 bar

1 Housing lid with integrated display and adjustment module (optional)
2 Housing with electronics
3 Process fitting with measuring cell
4 Cable gland
5 Connection cable

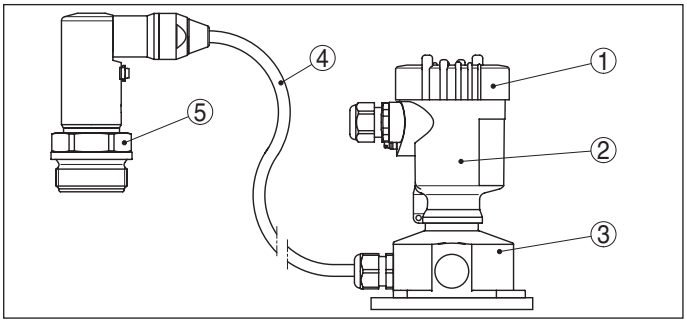


Fig. 14: Example of a VEGABAR 82 with protection rating IP68 and external electronics

1 Housing lid with integrated display and adjustment module (optional)
2 Housing with electronics
3 Housing base
4 Connection cable
5 Process module

Application areas

The electronic differential pressure is used for various applications such as differential pressure measurements of filters and pumps as well as level measurements in pressurized vessels. Through the precise measuring cell grading and low deviation flow, density and interface measurements can be realised.

The differential pressure transmitter VEGADIF 85 is suitable for all gases, vapours and liquids where product-resistant sensors are required. For extremely moist areas, IP68 versions are available.

Level measurement

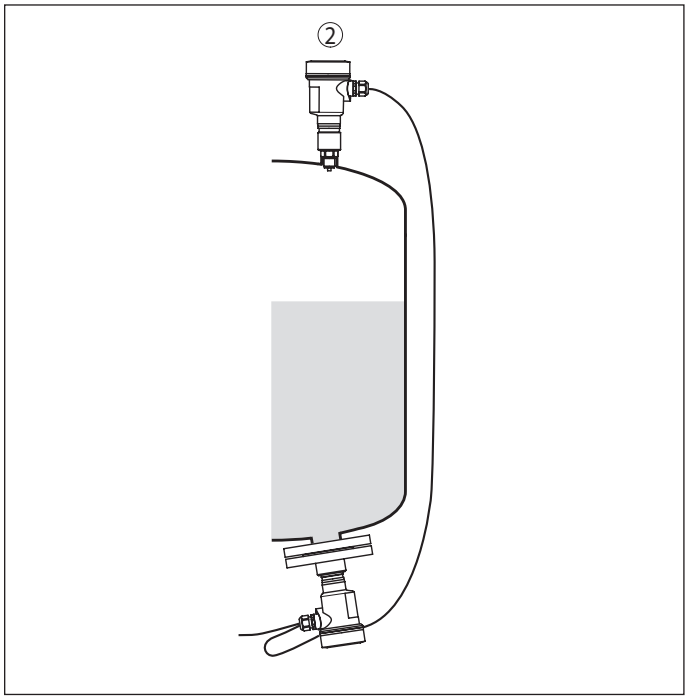


Fig. 15: Measurement setup, level measurement in pressurized vessel

1 VEGABAR 82
2 VEGABAR 82 - Secondary sensor

Differential pressure measurement

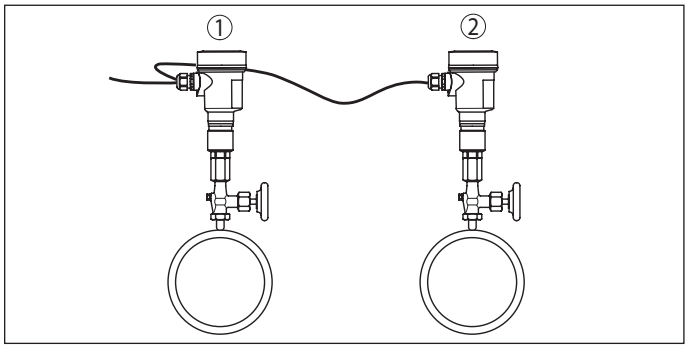


Fig. 16: Measurement setup for differential pressure measurement of gases in pipelines

1 VEGABAR 82
2 VEGABAR 82 - Secondary sensor

Interface measurement

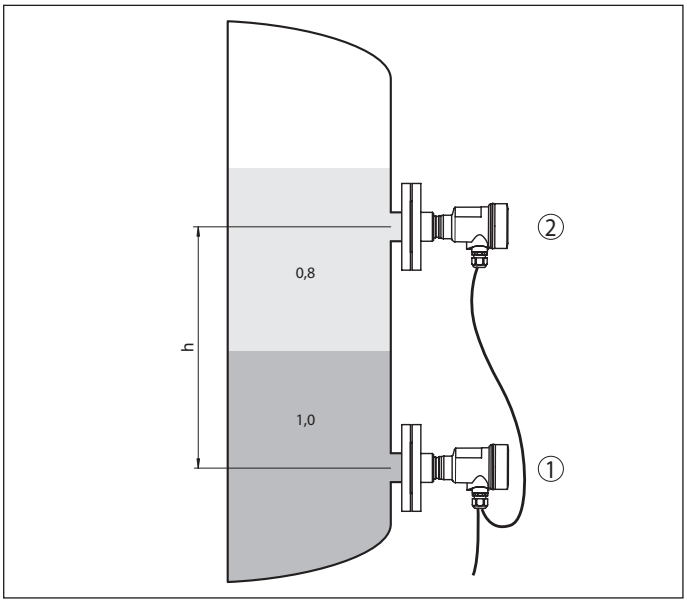


Fig. 17: Measurement setup with interface measurement, h = distance between the two measuring points

1 VEGABAR 82
2 VEGABAR 82 - Secondary sensor

Density measurement

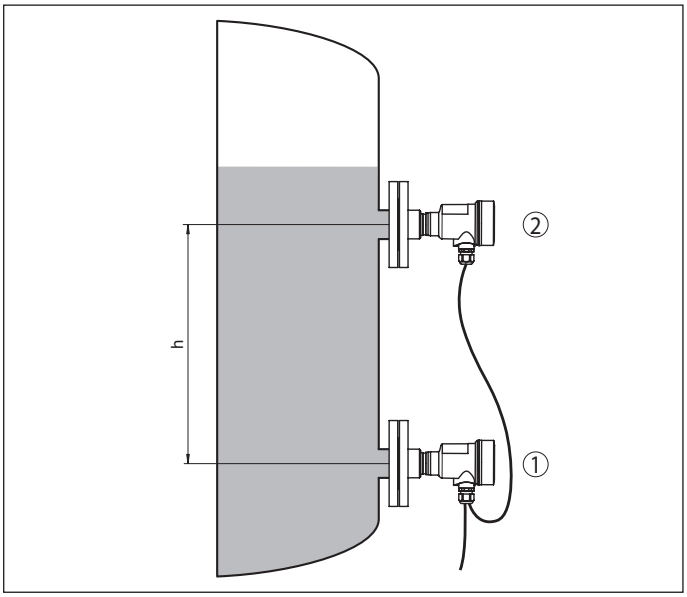


Fig. 18: Measurement setup for density measurement, h = distance between the two measuring points

1 VEGABAR 82
2 VEGABAR 82 - Secondary sensor

Density-compensated level measurement

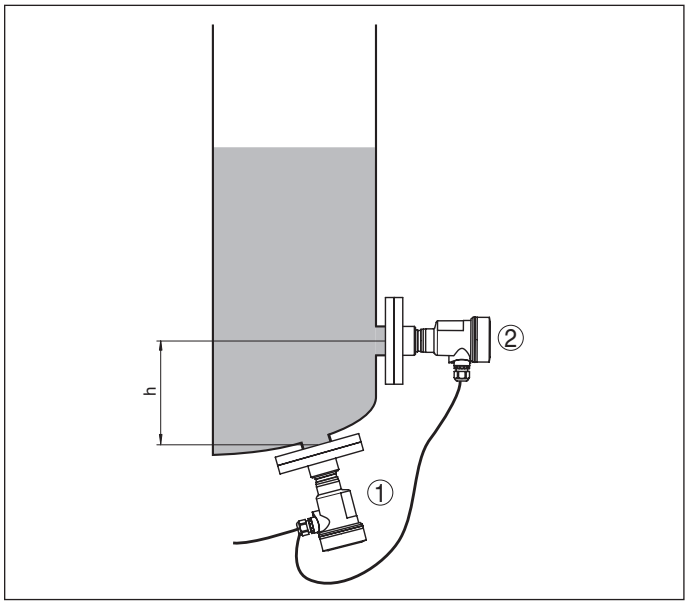


Fig. 19: Measurement setup for density-compensated level measurement, h = distance between the two measuring points

1 VEGABAR 82
2 VEGABAR 82 - Secondary sensor

5 Selection criteria, mechanical differential pressure

		VEGADIF 85	VEGADIF 85 with chemical seal CSS	VEGADIF 85 with chemical seal CSB
Wear through process	Aggressive products	–	●	●
Process temperature up to	+85 °C (+185 °F)	●	–	●
	+400 °C (+752 °F)	●	–	–
Application	Level measurement	●	●	●
	Differential pressure measurement	●	●	●
	Flow measurement	●	●	●
	Density measurement	●	●	●
	Interface measurement	●	●	●
Version process fittings	Front-flush	–	●	●
	Hygienic	–	●	●
Smallest measuring range	10 mbar (1 kPa)	●	–	–
	100 mbar (10 kPa)	●	●	●
Largest measuring range	16 bar (1.6 MPa)	●	●	●
Vacuum applications up to	1 $mbar_{abs}$ (100 Pa)	●	–	–
Suitability for industry-specific applications	Chemical	●	●	–
	Power generation	●	●	–
	Paper	●	●	●
	Environment and recycling industry	–	●	–
	Water, waste water	–	●	–

6 Selection criteria, electronic differential pressure

		VEGABAR 81	VEGABAR 82	VEGABAR 83	VEGABAR 86	VEGABAR 87
Wear through process	Aggressive products	●	–	●	–	●
	Abrasive products	–	●	–	●	–
Process temperature up to	+100 °C (+212 °F)	●	●	●	●	●
	+150 °C (+302 °F)	●	●	●	–	–
	+200 °C (+302 °F)	●	–	●	–	–
	+400 °C (+752 °F)	●	–	–	–	–
Application	Level measurement	●	●	●	●	●
	Differential pressure measurement	●	●	●	–	–
	Flow measurement	●	●	●	–	–
	Density measurement	●	●	●	●	●
	Interface measurement	●	●	●	●	●
Measuring system	Dry	–	●	●	●	–
	Oil-filled	●	–	●	–	●
Version process fittings	Front-flush	●	●	●	●	●
	Hygienic	●	●	●	●	●
Smallest measuring range	25 mbar (2.5 kPa)	–	●	–	●	–
	400 mbar (40 kPa)	●	●	●	●	●
Largest measuring range	25 bar (2.5 MPa)	●	●	●	●	●
	100 bar (10 MPa)	●	●	●	–	–
	1000 bar (100 MPa)	●	–	●	–	–
Vacuum applications up to	1 $mbar_{abs}$ (100 Pa)	–	●	–	●	●
Suitability for industry-specific applications	Aggregates and mining industry	–	–	●	–	–
	Chemical	●	●	–	–	–
	Power generation	●	●	–	–	–
	Renewable energies	●	●	–	●	–
	Foodstuffs	–	●	●	–	–
	Metal production	–	●	–	–	–
	Offshore	●	–	●	●	–
	Paper	●	●	●	●	–
	Petrochemical	●	–	●	–	–
	Pharmaceutical	–	●	●	–	–
	Shipbuilding	–	●	●	●	–
	Environment and recycling industry	–	●	–	●	–
	Water, waste water	–	●	–	●	–
	Cement industry	–	●	–	–	–

7 Comparison mechanical and electronic differential pressure

		Mechanical differential pressure	Electronic differential pressure
Process/Environment	High static pressure	●	-
	Vacuum	-	●
	High process temperature	●	●
	Temperature fluctuations in the process	-	●
	Large temperature difference between the measurement points	-	●
	Abrasive solids	-	●
Measurement loop	Low installation and mounting expenditure	-	●
	Low maintenance expenditure	-	●
	Compact construction	●	-
	Small process fittings	-	●
Evaluation	High measurement accuracy with Turn Down up to 20 : 1	●	●
	High measurement accuracy with Turn Down up to 100 : 1	●	-
	Measurement of smallest pressure differences	●	-

● *Suitable*
- *Less resp. not suitable*

8 Housing overview

Plastic PBT		
Protection rating	IP66/IP67	IP66/IP67
Version	Single chamber	Double chamber
Application area	Industrial environment	Industrial environment

Aluminium		
Protection rating	IP66/IP67, IP66/IP68 (1 bar)	IP66/IP67, IP66/IP68 (1 bar)
Version	Single chamber	Double chamber
Application area	Industrial environment with increased mechanical stress	Industrial environment with increased mechanical stress

Stainless steel (316L)			
Protection rating	IP66/IP67	IP66/IP67, IP66/IP68 (1 bar)	IP66/IP67, IP66/IP68 (1 bar)
Version	Single chamber, electropolished	Single chamber, precision casting	Double chamber, precision casting
Application area	Aggressive environment, food processing, pharmaceutical	Aggressive environment, extreme mechanical stress	Aggressive environment, extreme mechanical stress

Separate version		
Material	Stainless steel (316L)	Plastic PBT
Protection rating	IP68 (25 bar)	IP65
Function	Transmitter	External electronics
Application area	Extremely moist environment	Industrial environment

9 Mounting, mechanical differential pressure

Mounting examples

The following illustrations show mounting examples and measurement setups for the mechanical differential pressure.

Reaction vessel

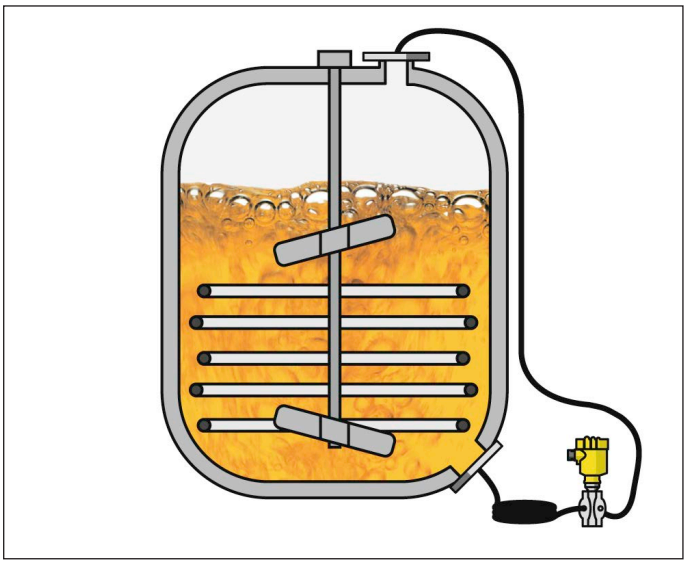


Fig. 20: Level measurement in reaction vessel with VEGADIF 85

VEGADIF 85 can be also used under high temperatures. The instrument measures the hydrostatic pressure of the liquid column in a reaction vessel independently of foam on the medium surface. Its advantages are the high resistance diaphragm materials and the low oil volume of the chemical seal. The temperature influence of the chemical seal is thus kept low.

Boiler

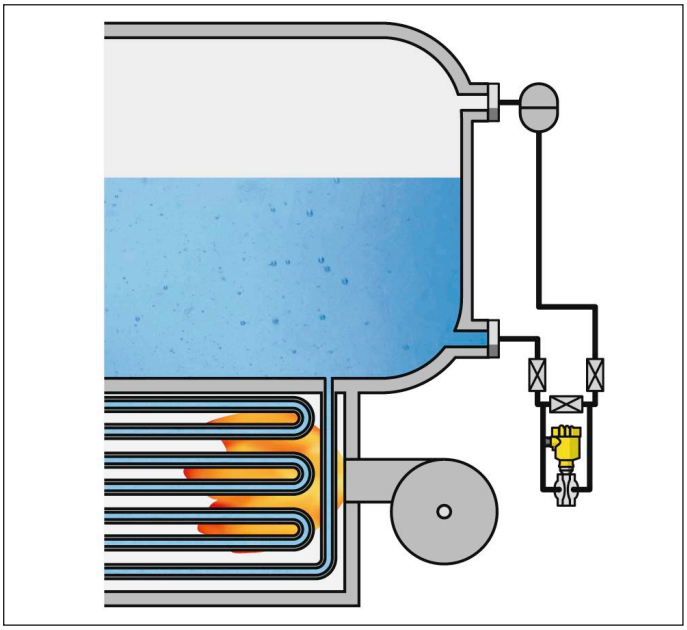


Fig. 21: Level measurement in a boiler with VEGADIF 85

VEGADIF 85 can be also used with high temperatures and pressures. The instrument measures the hydrostatic pressure of the liquid column in a boiler independent of the static pressure in the vessel.

Pump

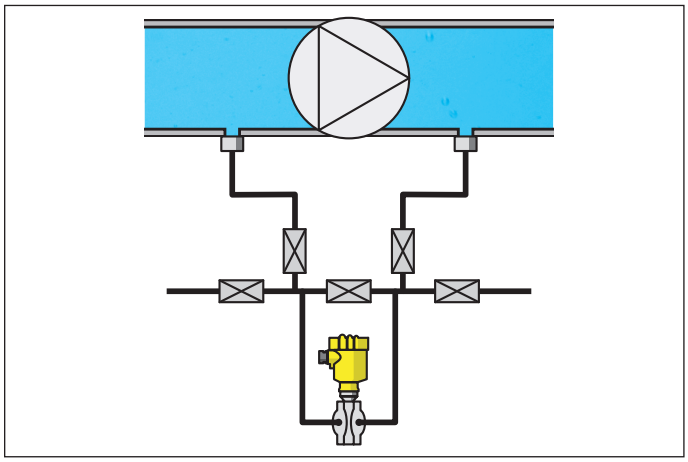


Fig. 22: Differential pressure measurement on a pump

The VEGADIF 85 can be also used for measurement of the difference between pump input and output. The instrument measures this pressure difference independent from the static pressure.

10 Mounting, electronic differential pressure

Mounting examples

The following illustrations show mounting examples and measurement setups for the electronic differential pressure.

Flue gas scrubber

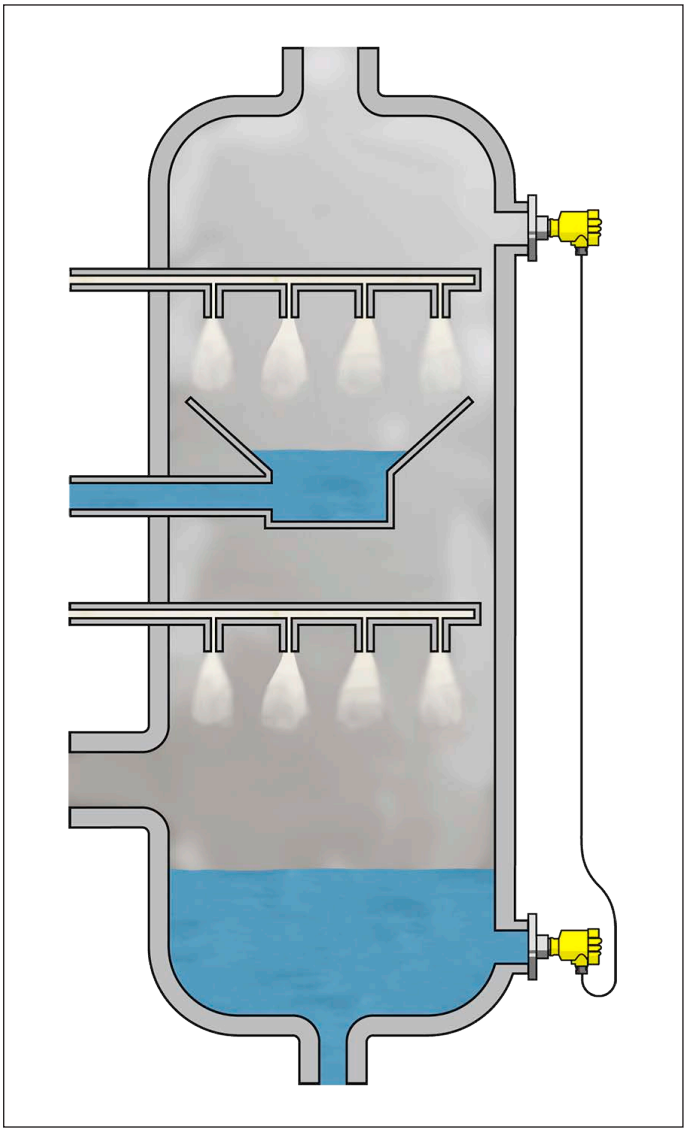


Fig. 23: Level measurement in flue gas scrubber with VEGABAR 82

The electronic differential pressure can be also used with small levels. The instrument measures the hydrostatic pressure of the liquid column in a flue gas scrubber independent of foam on the medium surface.

Stock deaerator

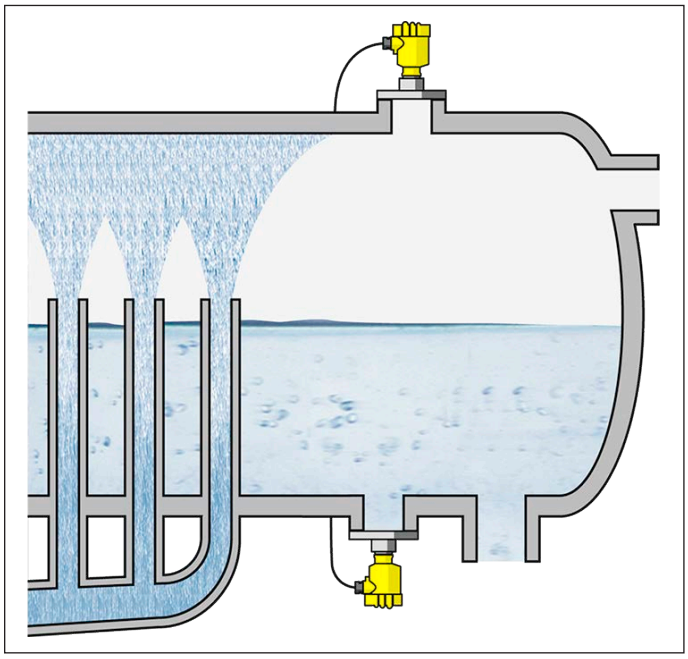


Fig. 24: Level measurement on stock deaerator with VEGABAR 82

The electronic differential pressure can be also used with small levels and superimposed vacuum. The instrument measures the hydrostatic pressure of the liquid column with millimetre accuracy in the stock deaerator.

Drying cylinder

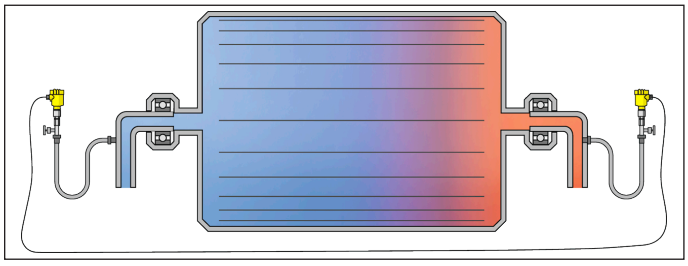


Fig. 25: Differential pressure measurement on a drying cylinder

The electronic differential pressure can be also used for the measurement of the pressure difference between input and output of the drying cylinder. The instrument measures this pressure difference independent from the static pressure.

11 Electronics - 4 … 20 mA - two-wire

Configuration of the electronics

The plug-in electronics is mounted in the electronics compartment of the instrument and can be exchanged by the user when servicing is required. The electronics is completely encapsulated to protect against vibration and moisture.

The terminals for voltage supply as well as the plug with I^2C interface for parameter adjustment are located on the upper side of the electronics. In the double-chamber housing, these connection elements are located in the separate connection compartment.

Voltage supply

Power supply and current signal are carried on the same two-wire cable. The operating voltage can differ depending on the instrument version.

You can find the data of the voltage supply in chapter " *Technical data*" in the operating instructions manual of the respective instrument.

Provide a reliable separation between the supply circuit and the mains circuits according to DIN EN 61140 VDE 0140-1.

Specifications of the voltage supply:

- Operating voltage
  - 9.6 … 35 V DC
- Permissible residual ripple - Non-Ex, Ex-ia instrument
  - for U_N 12 V DC: ≤ 0.7 V_{eff} (16 … 400 Hz)
  - for U_N 24 V DC: ≤ 1.0 V_{eff} (16 … 400 Hz)
- Permissible residual ripple - Ex-d-ia instrument
  - for U_N 24 V DC: ≤ 1.0 V_{eff} (16 … 400 Hz)

Keep in mind the following additional factors that influence the operating voltage:

- Lower output voltage of the power supply unit under nominal load (e.g. with a sensor current of 20.5 mA or 22 mA in case of fault signal)
- Influence of additional instruments in the circuit (see load values in chapter " *Technical data*" of the operating instructions of the respective instrument)

Connection cable

The instrument 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, shielded cable should be used.

Cable screening and grounding

If shielded cable is required, we recommend connecting the cable screening on both ends to ground potential. In the sensor, the cable screening must be connected directly to the internal ground terminal. The ground terminal on the outside of the housing must be connected to the ground potential (low impedance).

Connection

Single chamber housing

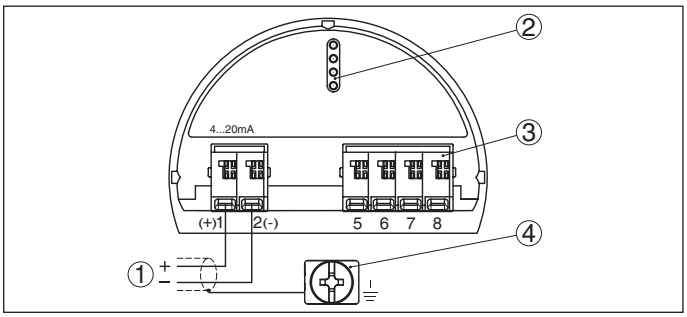


Fig. 26: Electronics and connection compartment, single chamber housing

1 Voltage supply/Signal output
2 For display and adjustment module or interface adapter
3 For external display and adjustment unit
4 Ground terminal for connection of the cable screening

12 Electronics - 4 … 20 mA/HART - two-wire

Configuration of the electronics

The plug-in electronics is mounted in the electronics compartment of the instrument and can be exchanged by the user when servicing is required. The electronics is completely encapsulated to protect against vibration and moisture.

The terminals for voltage supply as well as the contact pins with I^2C interface for parameter adjustment are located on the upper side of the electronics. In the double-chamber housing, the terminals are located in the separate terminal compartment.

Voltage supply

Power supply and current signal are carried on the same two-wire cable. The operating voltage can differ depending on the instrument version.

You can find the data of the voltage supply in chapter " *Technical data*" in the operating instructions manual of the respective instrument.

Provide a reliable separation between the supply circuit and the mains circuits according to DIN EN 61140 VDE 0140-1.

Specifications of the voltage supply:

- Operating voltage
  - 9.6 … 35 V DC
- Permissible residual ripple - Non-Ex, Ex-ia instrument
  - for U_N 12 V DC: ≤ 0.7 V_{eff} (16 … 400 Hz)
  - for U_N 24 V DC: ≤ 1.0 V_{eff} (16 … 400 Hz)
- Permissible residual ripple - Ex-d-ia instrument
  - for U_N 24 V DC: ≤ 1.0 V_{eff} (16 … 400 Hz)

Keep in mind the following additional factors that influence the operating voltage:

- Lower output voltage of the power supply unit under nominal load (e.g. with a sensor current of 20.5 mA or 22 mA in case of fault signal)
- Influence of additional instruments in the circuit (see load values in chapter " *Technical data*" of the operating instructions of the respective instrument)

Connection cable

The instrument 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, shielded cable should be used.

We generally recommend the use of shielded cable for HART multidrop mode.

Cable screening and grounding

If shielded cable is required, we recommend connecting the cable screening on both ends to ground potential. In the sensor, the cable screening must be connected directly to the internal ground terminal. The ground terminal on the outside of the housing must be connected to the ground potential (low impedance).

Connection

Single chamber housing

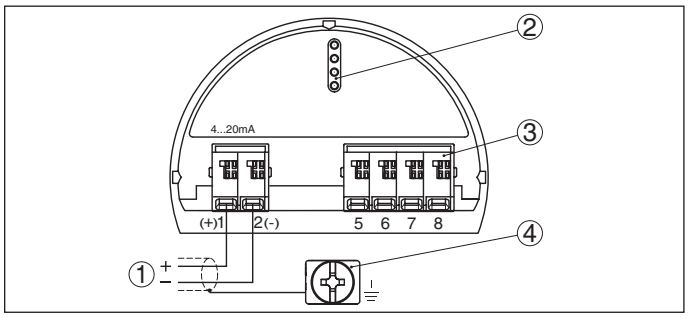


Fig. 27: Electronics and connection compartment, single chamber housing

1 Voltage supply/Signal output
2 For display and adjustment module or interface adapter
3 For external display and adjustment unit
4 Ground terminal for connection of the cable screening

Double chamber housing

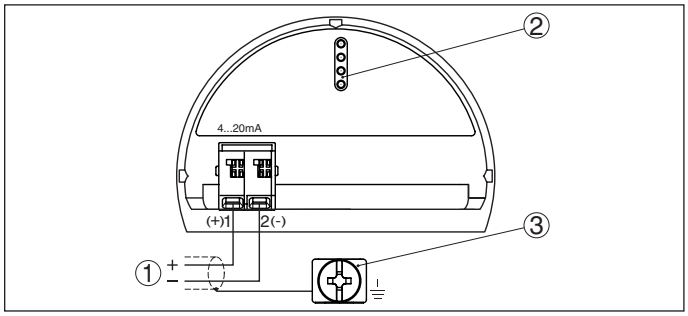


Fig. 28: Connection compartment, double chamber housing

1 Voltage supply/Signal output
2 For display and adjustment module or interface adapter
3 Ground terminal for connection of the cable screening

13 Electronics - Profibus PA

Configuration of the electronics

The plug-in electronics is mounted in the electronics compartment of the instrument and can be exchanged by the user when servicing is required. The electronics is completely encapsulated to protect against vibration and moisture.

The terminals for voltage supply as well as the contact pins with I^2C interface for parameter adjustment are located on the upper side of the electronics. In the double-chamber housing, the terminals are located in the separate terminal compartment.

Voltage supply

The voltage supply is provided by a Profibus DP /PA segment coupler.

Specifications of the voltage supply:

- Operating voltage
  - 9 … 32 V DC
- Max. number of sensors per DP/PA segment coupler
  - 32

Connection cable

Connection is carried out with shielded cable according to Profibus specification.

Make sure that the entire installation is carried out according to the Profibus specification. In particular, make sure that the bus is terminated with suitable terminating resistors.

Cable screening and grounding

In systems with potential equalisation, connect the cable screening directly to ground potential at the power supply unit, in the connection box and at the sensor. The screen in the sensor must be connected directly to the internal ground terminal. The ground terminal outside on the housing must be connected to the potential equalisation (low impedance).

In systems without potential equalisation, connect the cable shielding directly to ground potential on the power supply unit and the sensor. In the connection box or T-distributor, the shielding of the short stub to the sensor may not be connected to ground potential or to another cable screening.

Connection

Single chamber housing

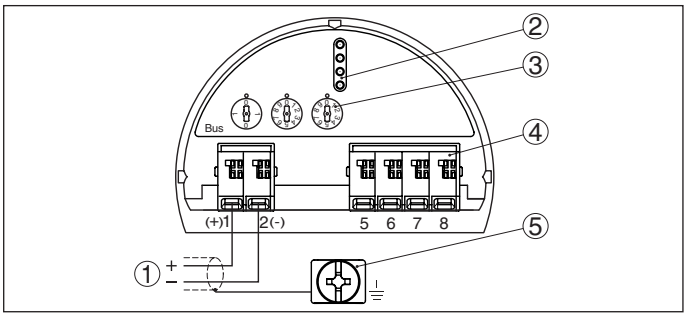


Fig. 29: Electronics and connection compartment, single chamber housing

1 Voltage supply/Signal output
2 For display and adjustment module or interface adapter
3 Selection switch for bus address
4 For external display and adjustment unit
5 Ground terminal for connection of the cable screening

Connection, double chamber housing

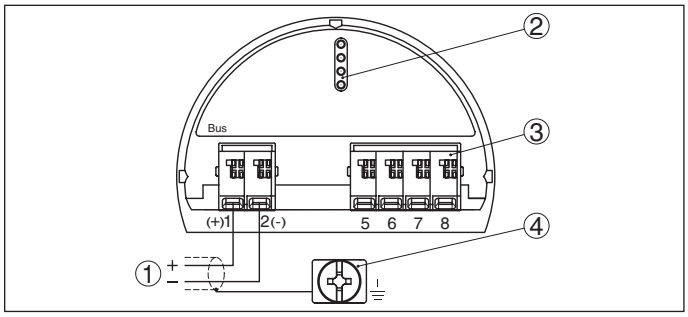


Fig. 30: Connection compartment, double chamber housing

1 Voltage supply, signal output
2 For display and adjustment module or interface adapter
3 For external display and adjustment unit
4 Ground terminal for connection of the cable screening

14 Electronics - Foundation Fieldbus

Configuration of the electronics

The plug-in electronics is mounted in the electronics compartment of the instrument and can be exchanged by the user when servicing is required. The electronics is completely encapsulated to protect against vibration and moisture.

The terminals for voltage supply as well as the contact pins with I^2C interface for parameter adjustment are located on the upper side of the electronics. In the double-chamber housing, the terminals are located in the separate terminal compartment.

Voltage supply

Power supply via the H1 Fieldbus cable.

Specifications of the voltage supply:

- Operating voltage
  - 9 … 32 V DC
- max. number of sensors
  - 32

Connection cable

Connection is carried out with shielded cable according to Fieldbus specification.

Make sure that the entire installation is carried out according to the Fieldbus specification. In particular, make sure that the bus is terminated with suitable terminating resistors.

Cable screening and grounding

In systems with potential equalisation, connect the cable screening directly to ground potential at the power supply unit, in the connection box and at the sensor. The screen in the sensor must be connected directly to the internal ground terminal. The ground terminal outside on the housing must be connected to the potential equalisation (low impedance).

In systems without potential equalisation, connect the cable shielding directly to ground potential on the power supply unit and the sensor. In the connection box or T-distributor, the shielding of the short stub to the sensor may not be connected to ground potential or to another cable screening.

Connection

Single chamber housing

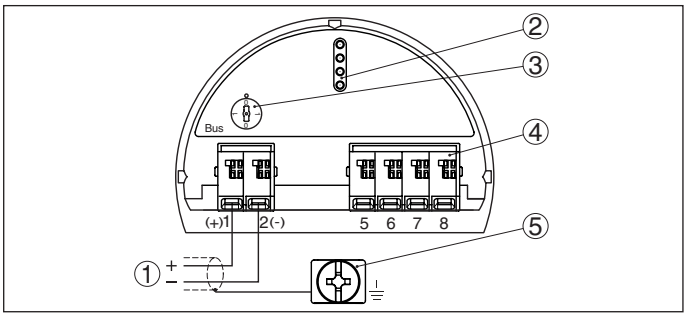


Fig. 31: Electronics and connection compartment, single chamber housing

1 Voltage supply/Signal output
2 Contact pins for the display and adjustment module or interface adapter
3 Selection switch for bus address
4 For external display and adjustment unit
5 Ground terminal for connection of the cable screening

Connection, double chamber housing

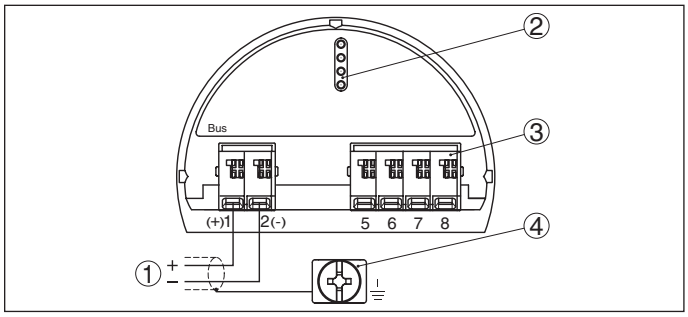


Fig. 32: Connection compartment, double chamber housing

1 Voltage supply, signal output
2 For display and adjustment module or interface adapter
3 For external display and adjustment unit
4 Ground terminal for connection of the cable screening

15 Electronics - Modbus, Levelmaster protocol

Configuration of the electronics

The plug-in electronics is mounted in the electronics compartment of the instrument and can be exchanged by the user when servicing is required. The electronics is completely encapsulated to protect against vibration and moisture.

The contact pins with I^2C interface for parameter adjustment are located on the upper side of the electronics. The terminals for the power supply are located in the separate connection compartment.

Voltage supply

Power supply via the Modbus host (RTU)

- Operating voltage
  - 8 … 30 V DC
- max. number of sensors
  - 32

Connection cable

The instrument is connected with standard two-wire, twisted cable suitable for RS 485. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, shielded cable should be used.

For power supply, a separate two-wire cable is required.

Make sure that the entire installation is carried out according to the Fieldbus specification. In particular, make sure that the bus is terminated with suitable terminating resistors.

Cable screening and grounding

In systems with potential equalisation, connect the cable screening directly to ground potential at the power supply unit, in the connection box and at the sensor. The screen in the sensor must be connected directly to the internal ground terminal. The ground terminal outside on the housing must be connected to the potential equalisation (low impedance).

In systems without potential equalisation, connect the cable shielding directly to ground potential on the power supply unit and the sensor. In the connection box or T-distributor, the shielding of the short stub to the sensor may not be connected to ground potential or to another cable screening.

Connection

Double chamber housing

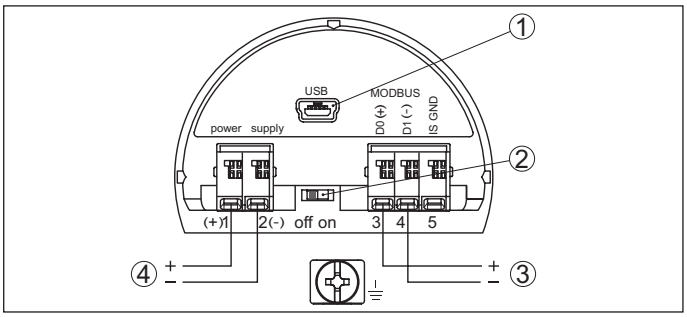


Fig. 33: Connection compartment

1 USB interface
2 Slide switch for integrated termination resistor (120 Ω)
3 Modbus signal
4 Voltage supply

16 Electronics - Secondary

Configuration of the electronics

The plug-in electronics is mounted in the electronics compartment of the instrument and can be exchanged by the user when servicing is required. The electronics is completely encapsulated to protect against vibration and moisture.

The terminals for voltage supply as well as the contact pins with I^2C interface for parameter adjustment are located on the upper side of the electronics. In the double-chamber housing, the terminals are located in the separate terminal compartment.

Voltage supply

The Secondary sensor can be mounted up to 25 m away from the Primary sensor, by which it is directly powered. A separate power supply is not required.

Connection cable

The Secondary sensor is connected to the Primary sensor with standard four-wire, shielded cable.

Cable screening and grounding

Connect the cable screening on both ends to ground potential. In the Secondary and Primary sensor, the shielding must be connected directly to the internal ground terminal. The ground terminal on the outside of the respective housing must be connected to the potential equalisation (low impedance).

Connection

Single chamber housing

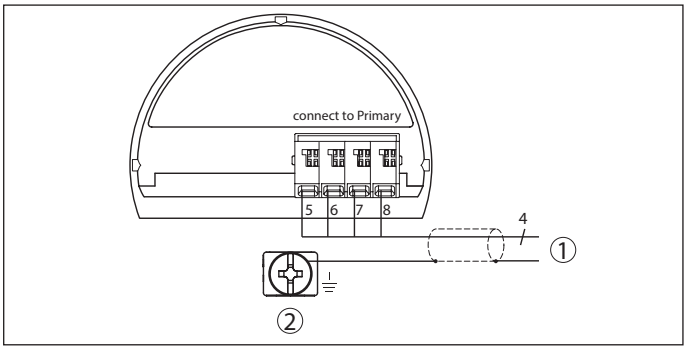


Fig. 34: Electronics and connection compartment Secondary sensor

1 To Primary sensor
2 Ground terminal for connection of the cable screening [1)]

[1)] Connect shielding here. Connect ground terminal on the outside of the housing to ground as prescribed. The two terminals are galvanically connected.

17 Adjustment

17.1 Adjustment directly at the measuring point

Via the display and adjustment module through keys
The plug-in display and adjustment module is used for measured value indication, adjustment and diagnosis. It is equipped with an illuminated full dot matrix as well as four keys for adjustment.

Fig. 35: Display and adjustment module with single chamber housing

Via a PC with PACTware/DTM
The interface converter VEGACONNECT is required for connection of the PC. The converter is placed on the sensor instead of the display and adjustment module and connected to the USB interface of the PC.

Fig. 36: Connection of the PC via VEGACONNECT and USB

1 VEGACONNECT
2 Sensor
3 USB cable to the PC
4 PC with PACTware/DTM

PACTware is an adjustment software for configuration, parameter adjustment, documentation and diagnosis of field devices. The corresponding device drivers are called DTMs.

17.2 Operation in the measurement loop environment - wireless via Bluetooth

Via a smartphone/tablet
The display and adjustment module with integrated Bluetooth functionality allows wireless connection to smartphones/tablets with iOS or Android operating system. The adjustment is carried out via the VEGA Tools app from the Apple App Store or Google Play Store.

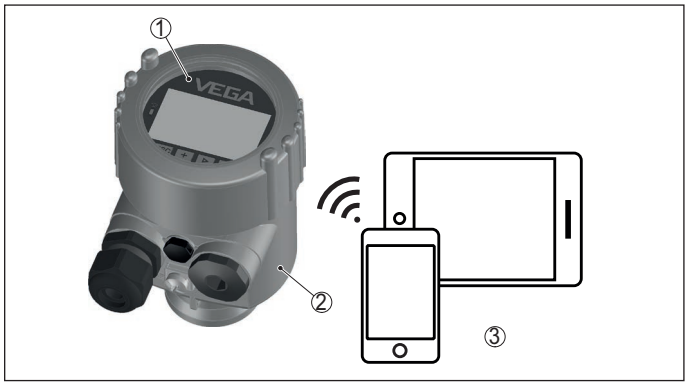


Fig. 37: Wireless connection to smartphones/tables

1 Display and adjustment module
2 Sensor
3 Smartphone/Tablet

Via a PC with PACTware/DTM
The wireless connection from the PC to the sensor is carried out via the Bluetooth USB adapter and a display and adjustment module with integrated Bluetooth function. The adjustment is carried out via the PC with PACtware/DTM.

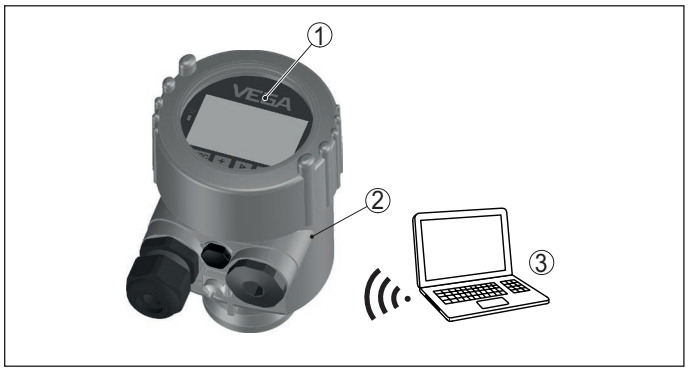


Fig. 38: Connection of the PC via Bluetooth USB adapter

1 Display and adjustment module
2 Sensor
3 PC with PACTware/DTM

17.3 Adjustment carried out at position remote from the measuring point - wired

Via external display and adjustment units
For this, the external display and adjustment units VEGADIS 81 and 82 are available. The adjustment is carried out via the keys of the built-in display and adjustment module.

The VEGADIS 81 is mounted at a distance of 50 m from the sensor and directly to the sensor electronics. VEGADIS 82 is looped directly into the signal cable at any point.

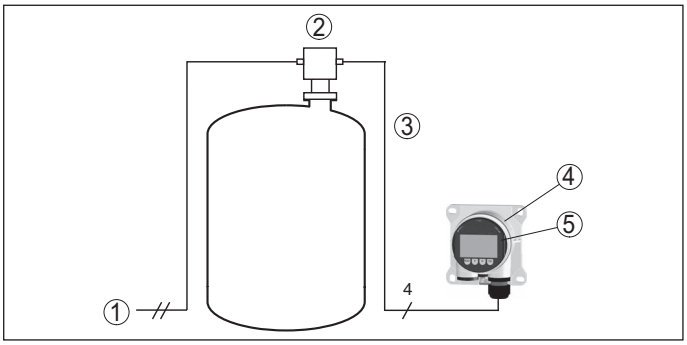


Fig. 39: Connection of VEGADIS 81 to the sensor

1 Voltage supply/Signal output sensor
2 Sensor
3 Connection cable sensor - external display and adjustment unit
4 External display and adjustment unit
5 Display and adjustment module

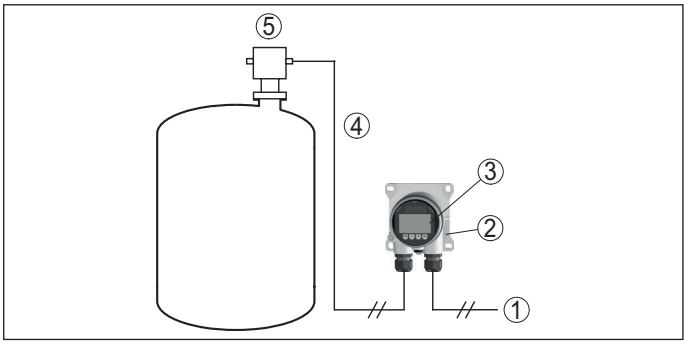


Fig. 40: Connection of VEGADIS 82 to the sensor

1 Voltage supply/Signal output sensor
2 External display and adjustment unit
3 Display and adjustment module
4 4 … 20 mA/HART signal cable
5 Sensor

Via a PC with PACTware/DTM
The sensor adjustment is carried out via a PC with PACTware/DTM.

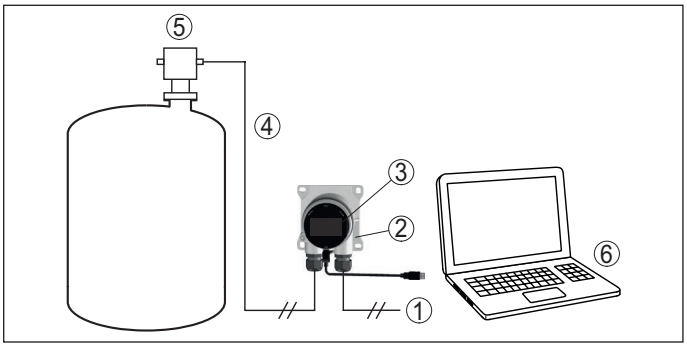


Fig. 41: Connection of VEGADIS 82 to the sensor, adjustment via PC with PACTware

1 Voltage supply/Signal output sensor
2 External display and adjustment unit
3 VEGACONNECT
4 4 … 20 mA/HART signal cable
5 Sensor
6 PC with PACTware/DTM

17.4 Adjustment carried out at position remote from the measuring point - wireless through mobile network

As an option, the radio module PLICSMOBILE can be mounted into a plics® sensor with double chamber housing. It is used for transmission of measured values and for remote parameter adjustment of the sensor.

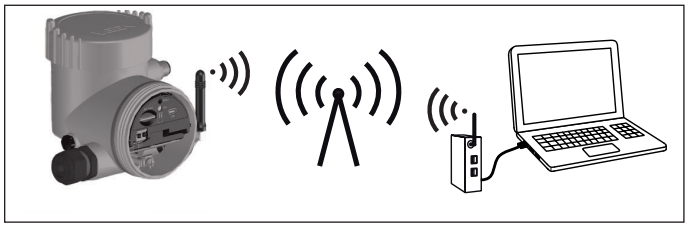


Fig. 42: Transmission of measured values and remote parameter adjustment of the sensor via mobile phone network.

17.5 Alternative adjustment programs

DD adjustment programs
Device descriptions as Enhanced Device Description (EDD) are available for DD adjustment programs such as, for example, AMS™ and PDM.

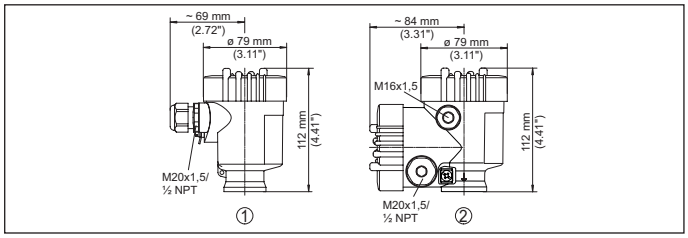
The files can be downloaded at www.vega.com/downloads under "*Software*".

Field Communicator 375, 475
Device descriptions for the instruments are available as EDD for parameterisation with Field Communicator 375 or 475.

Integrating the EDD into the Field Communicator 375 or 475 requires the "Easy Upgrade Utility" software, which is available from the manufacturer. This software is updated via the Internet and new EDDs are automatically accepted into the device catalogue of this software after they are released by the manufacturer. They can then be transferred to a Field Communicator.

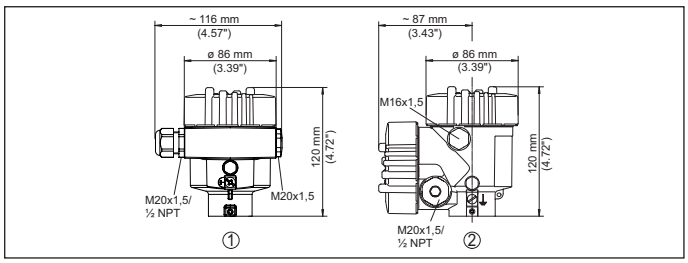
18 Dimensions

Plastic housing



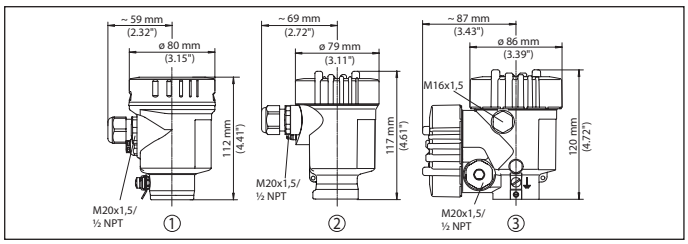
1 Single chamber housing
2 Double chamber housing

Aluminium housing



1 Single chamber housing
2 Double chamber housing

Stainless steel housing



1 Single chamber housing (electropolished)
2 Single chamber housing (precision casting)
2 Double chamber housing (precision casting)

Ventilation on process axis

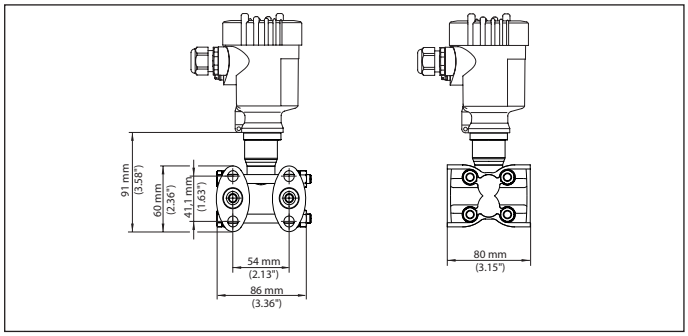


Fig. 43: VEGADIF 85, ventilation on process axis

Lateral ventilation

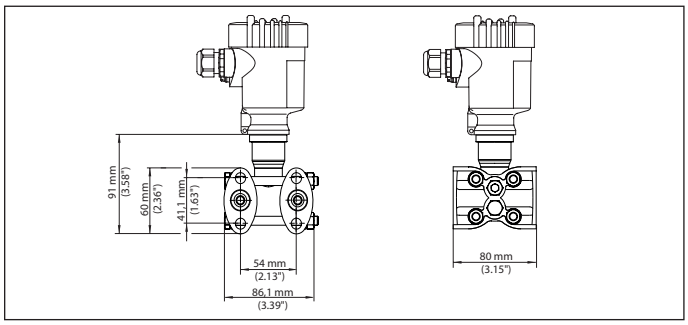


Fig. 44: VEGADIF 85, lateral ventialtion

Oval flange, prepared for chemical seal connection

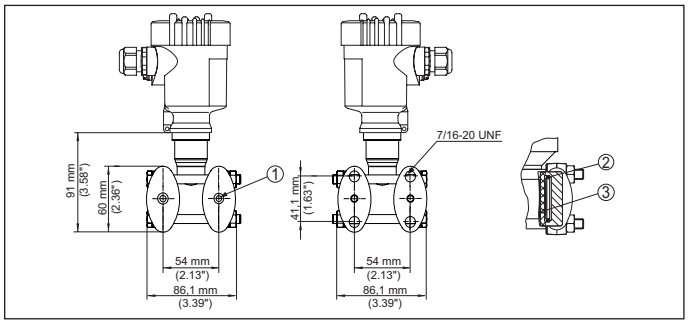
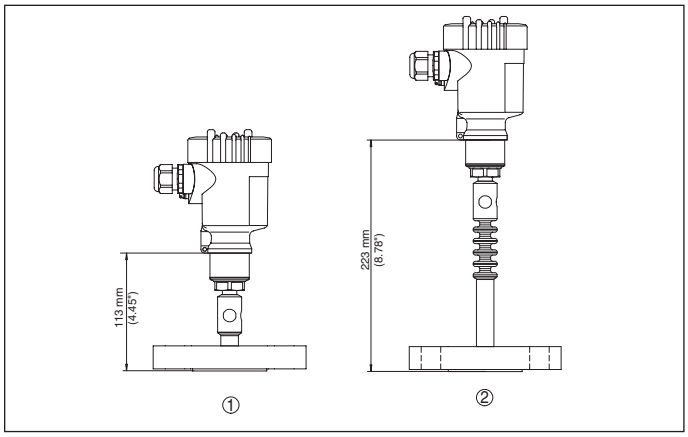


Fig. 45: left: Process fitting VEGADIF 85 prepared for chemical seal assembly. right: Position of the copper ring seal

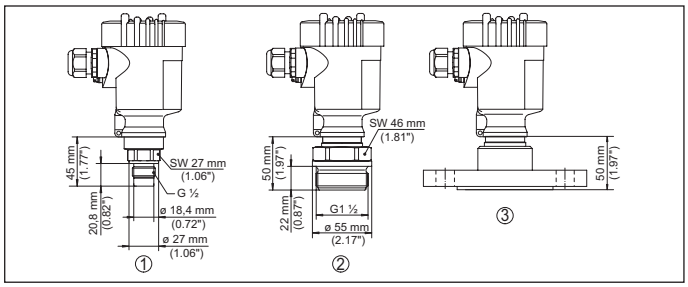
1 Chemical seal connection
2 Copper ring seal
3 Cup diaphragm

VEGABAR 81



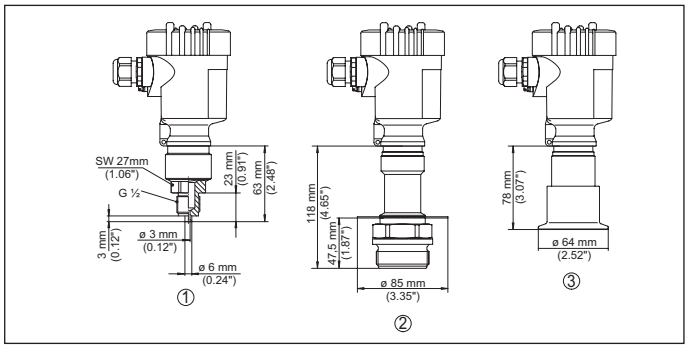
1 Flange version (+150 °C)
2 Flange version with cooling element (+300 °C)

VEGABAR 82



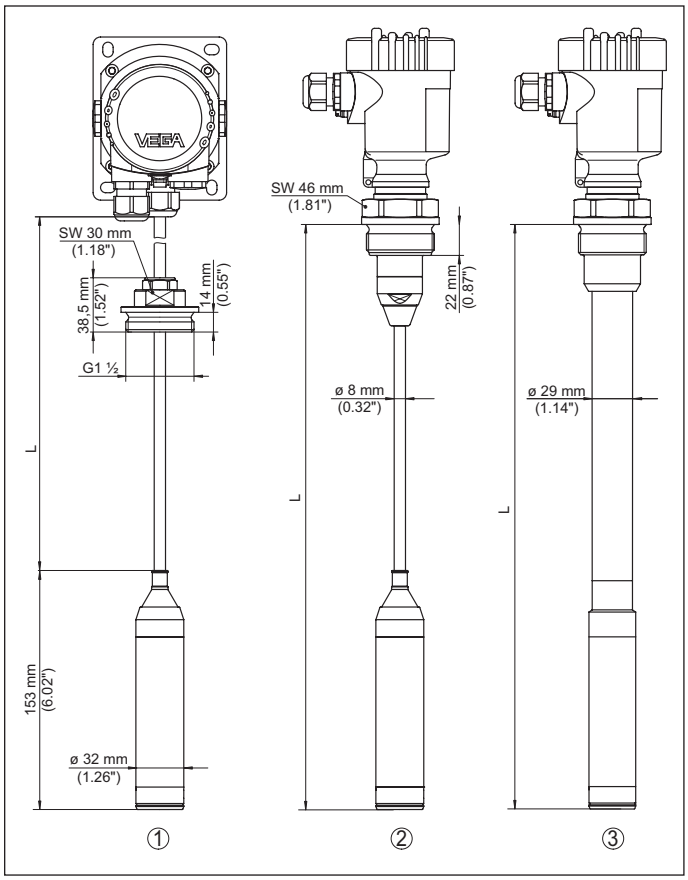
1 *Threaded version G½, front-flush*
2 *Threaded version G1½*
3 *Flange version DN 50*

VEGABAR 83



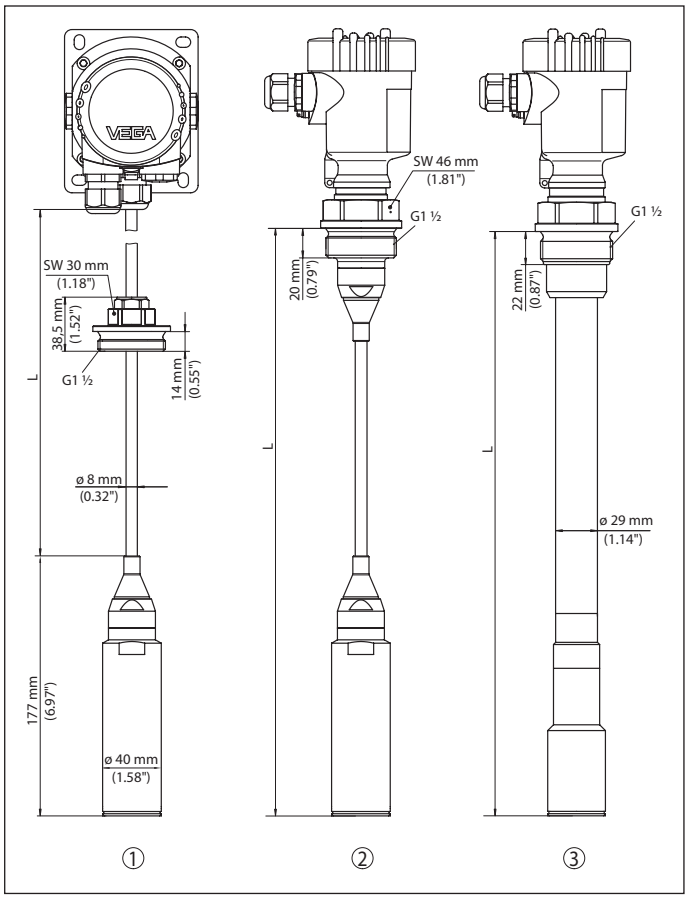
1 *Threaded version G½, manometer connection EN 837*
2 *Threaded version front-flush with screening sheet (-12 … +200 °C)*
3 *Clamp version 2"*

VEGABAR 86



1 *Version with suspension cable and threaded fitting unassembled G1½*
2 *Threaded version G1½, suspension cable*
3 *Threaded version G1½, connection tube*

VEGABAR 87



1 Version with suspension cable and threaded fitting unassembled G1½
2 Threaded version G1½, suspension cable
3 Threaded version G1½, connection tube

The listed drawings represent only an excerpt of the available process fittings. You can find more drawings at www.vega.com/downloads under " *Drawings*".

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