Product information

Guided Wave Radar

Level and interface measurement in liquids

VEGAFLEX 81
VEGAFLEX 83
VEGAFLEX 86

Document ID: 46597

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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.

46597-EN-160921

1 Measuring principle

Measuring principle

High frequency microwave pulses are coupled onto a cable or rod and guided along the probe. The pulse is reflected by the product surface. The time from emission to reception of the signals is proportional to the distance of the level.

The instrument is supplied with the probe length (0 % and 100 %) already adjusted. In most cases setup on site is not required. In any case, you set up VEGAFLEX without medium. The shortenable, bare cable and rod versions can be simply adapted to the local requirements, if necessary.

Level measurement in liquids

Density fluctuations, steam generation or strong pressure and temperature fluctuations do not influence the measuring result. Also buildup on the probe or the vessel wall do not influence the measurement. This makes VEGAFLEX simple in planning.

An ideal application is level measurement in a bypass tube or standpipe, because even products with a dielectric constant below 1.6 can be reliably measured. Weld seams, buildup and corrosion inside the tube do not influence the accuracy of the level measurement. Even if overfilling up to the process fitting occurs, the measurement is reliable. VEGAFLEX 81 also offers a special solution for ammonia applications.

Different probes are available

- Cable probes for applications in high vessels up to 75 m (246 ft)
- Rod probes for applications in vessels up to 6 m (20 ft)
- Coax probes for application in low viscosity liquids, with vessel installations, in vessels up to 6 m (20 ft) high

The measured quantity is the distance between process fitting of the sensor and product surface. Depending on the sensor version, the reference plane is the seal surface on the hexagon or the lower side of the flange.

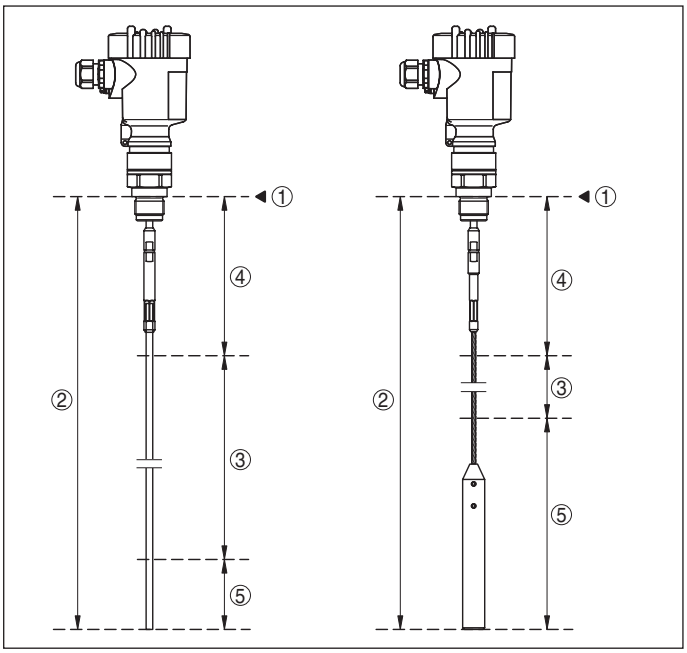


Fig. 1: Measuring ranges of the VEGAFLEX cable and rod versions

1 Reference plane
2 Probe length (L)
3 Measuring range
4 Upper dead band
5 Lower dead band

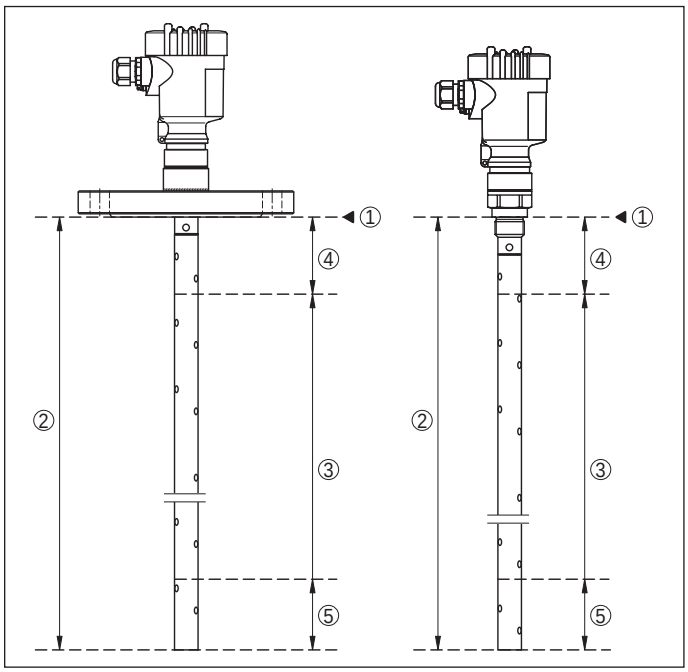


Fig. 2: Measuring ranges of VEGAFLEX - coax version

1 Reference plane
2 Probe length (L)
3 Measuring range
4 Upper dead band
5 Lower dead band

Interface measurement in liquids

Non-conductive products only partly reflect the energy of microwaves. The non-reflected energy passes through the medium and is reflected at the phase boundary to a second liquid. Interface measurement takes advantage of this effect. You can select this function on VEGAFLEX via the adjustment tools.

You thus get a reliable total level as well as the level of the lower medium in your vessel.

Typical applications are interface measurements in storage tanks, separators and pump sumps. VEGAFLEX normally determines the level of water underneath a non-conductive medium. Since the instrument is independent of the density of the medium, a reliable, maintenance-free and precise measurement can be realised.

By simply switching over, the instruments can be used for interface measurement of liquids.

Thanks to its guide tube, the coax version is not influenced by vessel installations and reliably measures products with low dielectric constant. Therefore this instrument version is be preferred.

Prerequisites for interface measurement

Upper medium (L2)

- The upper medium must not be conductive
- The dielectric constant of the upper medium must be known
- The composition of the upper medium must be stable, no varying products or mixtures
- The upper medium must be homogeneous, no stratifications within the medium
- The layer can only be measured if it has a thickness ≥ 100 mm (4 in)
- Clear separation from the lower medium, no emulsion phase, no detritus layer
- If possible, no foam on the surface

Lower medium (L1)

- The dielectric constant must be 10 higher than the dielectric constant of the upper medium, preferably electrically conductive. Example: upper medium dielectric constant 2, lower medium at least dielectric constant 12

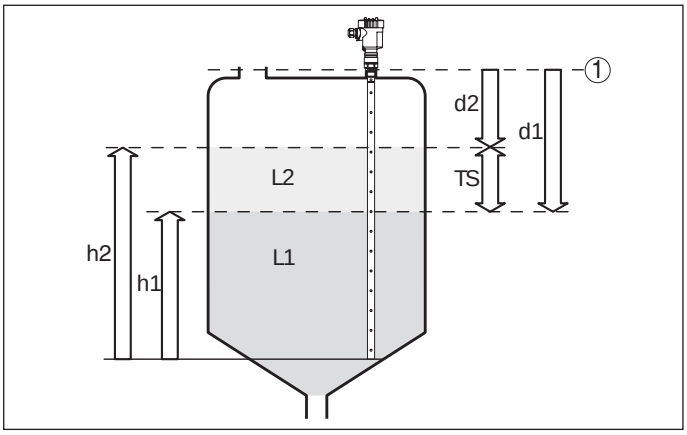


Fig. 3: Interface measurement

1 Reference plane
d1 Distance to the interface (HART value 1 or Primary Value)
d2 Distance to the level (HART value 3 or Third Value)
TS Thickness of the upper medium (d1 - d2)
h1 Height - Interface
h2 Height - Level
L1 Lower medium
L2 Upper medium

2 Type overview

VEGAFLEX 81
Cable version

VEGAFLEX 81
Rod version

VEGAFLEX 81
Coax version

Applications	Storage tanks, liquids with agitated surface	Storage tanks, liquids with smooth surface	Storage tanks, liquids with low dielectric constant, vessel with installations
Max. measuring range	75 m (246 ft)	6 m (19.69 ft)	6 m (19.69 ft)
Probe	Cable probe ø 2 mm ø 4 mm	Rod probe ø 8 mm ø 12 mm	Coax probe ø 21.1 mm ø 42.2 mm
Process fitting	Thread from G¾, ¾ NPT Flanges from DN 25, 1"	Thread from G¾, ¾ NPT Flanges from DN 25, 1"	Thread from G¾, ¾ NPT Flanges from DN 25, 1"
Process temperature	-40 … +200 °C (-40 … +392 °F)	-40 … +200 °C (-40 … +392 °F)	-40 … +200 °C (-40 … +392 °F)
Process pressure	-1 … +40 bar/-100 … +4000 kPa (-14.5 … +580 psig)	-1 … +40 bar/-100 … +4000 kPa (-14.5 … +580 psig)	-1 … +40 bar/-100 … +4000 kPa (-14.5 … +580 psig)
Measuring accuracy	±2 mm	±2 mm	±2 mm
Signal output	• 4 … 20 mA/HART - two-wire • 4 … 20 mA/HART - four-wire • Profibus PA • Foundation Fieldbus • Modbus and Levelmaster protocol		
Indication/Adjustment	• PLICSCOM • PACTware • VEGADIS 81 • VEGADIS 62		
Approvals	• ATEX • IEC • Shipbuilding • Overfill protection • FM • CSA • EAC (GOST)		

46597-EN-160921

	VEGAFLEX 83 Cable version	VEGAFLEX 83 Rod version	VEGAFLEX 83 Rod version - Foodstuffs
			
Applications	Aggressive and corrosive liquids	Aggressive and corrosive liquids	Hygienic applications in the food processing and pharmaceutical industry
Max. measuring range	32 m (105 ft)	4 m (13.12 ft)	4 m (13.12 ft)
Probe	Cable probe ø 4 mm PFA coated	Rod probe ø 10 mm PFA coated	Rod probe ø 8 mm Polished version (Basle Standard)
Process fitting/Material	Flanges from DN 25, 1" Hygienic fittings PTFE-TFM 1600	Flanges from DN 25, 1" Hygienic fittings PTFE-TFM 1600	Hygienic fittings
Process temperature	-40 … +150 °C (-40 … +392 °F)	-40 … +150 °C (-40 … +302 °F)	-20 … +150 °C (-4 … +302 °F)
Process pressure	-0.5 … +16 bar/-50 … +1600 kPa (-7.3 … +232 psig)	-0.5 … +16 bar/-50 … +1600 kPa (-7.3 … +232 psig)	-1 … +40 bar/-100 … +4000 kPa (-14.5 … +580 psig)
Deviation	±2 mm	±2 mm	±2 mm
Signal output	• 4 … 20 mA/HART - two-wire • 4 … 20 mA/HART - four-wire • Profibus PA • Foundation Fieldbus • Modbus and Levelmaster protocol		
Indication/Adjustment	• PLICSCOM • PACTware • VEGADIS 81 • VEGADIS 62		
Approvals	• ATEX • IEC • Shipbuilding • Overfill protection • FM • CSA • EAC (GOST)		

VEGAFLEX 86 Cable version	VEGAFLEX 86 Rod version	VEGAFLEX 86 Coax version
		

Applications	High temperature applications	High temperature applications	High temperature applications
Max. measuring range	75 m (246 ft)	6 m (19.69 ft)	6 m (19.69 ft)
Probe	Cable probe ø 2 mm ø 4 mm	Rod probe ø 16 mm	Coax probe ø 42.2 mm
Process fitting	Thread G1½ Flanges from DN 40, 2"	Thread G1½ Flanges from DN 40, 2"	Thread G1½ Flanges from DN 40, 2"
Process temperature	-196 … +450 °C (-321 … +842 °F)	-196 … +450 °C (-321 … +842 °F)	-196 … +450 °C (-321 … +842 °F)
Process pressure	-1 … +400 bar/-100 … +40000 kPa (-14.5 … +5800 psig)	-1 … +400 bar/-100 … +40000 kPa (-14.5 … +5800 psig)	-1 … +400 bar/-100 … +40000 kPa (-14.5 … +5800 psig)
Deviation	±2 mm	±2 mm	±2 mm
Signal output	• 4 … 20 mA/HART - two-wire • 4 … 20 mA/HART - four-wire • Profibus PA • Foundation Fieldbus • Modbus and Levelmaster protocol		
Indication/Adjustment	• PLICSCOM • PACTware • VEGADIS 81 • VEGADIS 62		
Approvals	• ATEX • IEC • Shipbuilding • Overfill protection • FM • CSA • EAC (GOST)		

3 Instrument selection

Application areas

VEGAFLEX 81

VEGAFLEX 81 is suitable for applications with liquids in small vessels under ordinary process conditions. There are application possibilities in nearly all areas of industry.

Through a large selection of gravity weights, the VEGAFLEX 81 can be also used in standpipes and bypass tubes.

VEGAFLEX 83

The PFA-coated VEGAFLEX 83 is suitable for measurement in aggressive liquids or applications with special hygienic requirements. Application possibilities can be found in the chemical industry as well as in the food processing and pharmaceutical sector.

The polished version of VEGAFLEX 83 is particularly suitable for level measurement under hygienic conditions in, for example, vessels with foodstuffs.

VEGAFLEX 86

VEGAPULS 86 is suitable for high temperature applicatons in liquids, e.g. in storage tanks and process vessels. The application possibilities can be found in the chemical industry, the environmental and recycling technology as well as in the petrochemical industry.

Applications

Level measurement in conical vessels

During operation, the probe must not touch any installations or the vessel wall. If necessary, fasten the probe end.

In vessels with conical bottom it can be advantageous to mount the sensor in the center of the vessel, as measurement is then possible down to the lowest point of the vessel bottom.

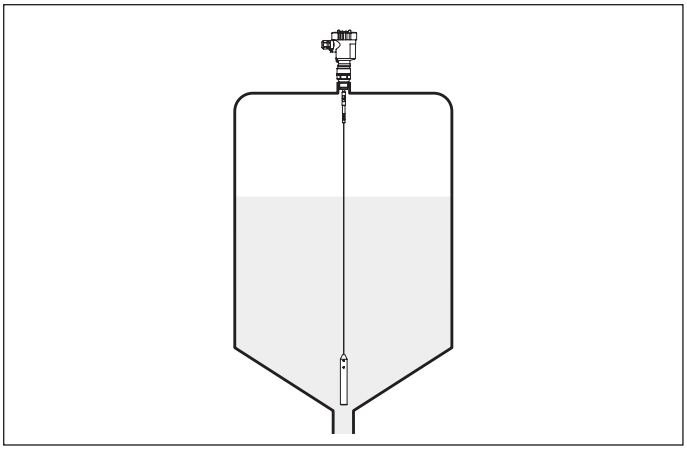


Fig. 13: Vessel with conical bottom

Measurement in a standpipe or bypass tube

When a standpipe or bypass tube is used in a vessel, the influences from vessel installations and turbulence can be excluded. In such case, measurement of products with low dielectric values (ε_r value ≥ 1.6) is possible. In very adhesive products, measurement in a standpipe or bypass tube is not recommended.

If VEGAFLEX is used in standpipes or bypass tubes, contact with the tube wall should be avoided. We offer spacers as accessories for fastening the probe in the middle of the tube.

If chemical resistance is not a problem, we recommend using a metal tube to improve measurement reliability.

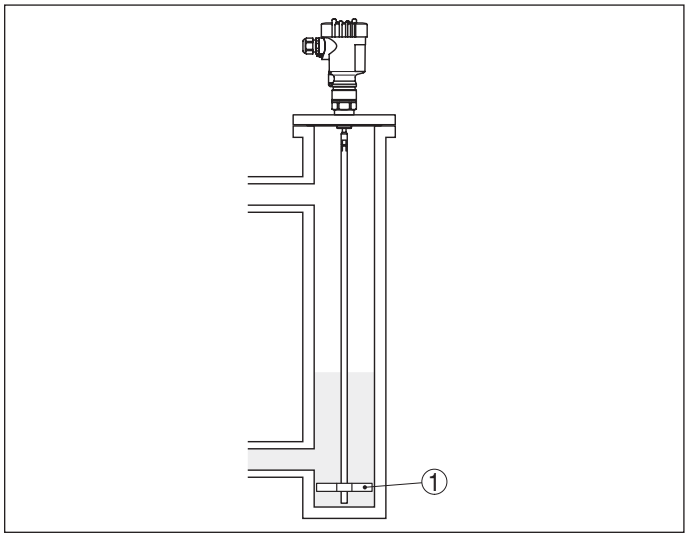


Fig. 14: Position of the spacer

1 Spacer

Note:

Measurement in a standpipe is not recommended for extremely adhesive products.

Interface measurement

Through simple switching, all instruments of the VEGAFLEX 80 series can also measure liquid interfaces. Typical applications are the measurement of oil or solvents on water. The measuring principle is maintenance-free because no moving parts are used. VEGAFLEX operates completely independent of the density of the product. This means reliable measured values without additional effort for correction.

Prerequisites for interface measurement

- The upper medium must not be conductive
- The dielectric constant of the upper medium must be known (input required). Min. dielectric constant: rod version 1.7.
- The composition of the upper medium must be stable, no varying products or mixtures
- The upper medium must be homogeneous, no stratifications within the medium
- Min. thickness of the upper medium 100 mm
- Clear separation from the lower medium, no emulsion phase, no detritus layer
- If possible, no foam on the surface

Lower medium (L1)

- The dielectric constant must be 10 higher than the dielectric constant of the upper medium, preferably electrically conductive. Example: upper medium dielectric constant 2, lower medium at least dielectric constant 12

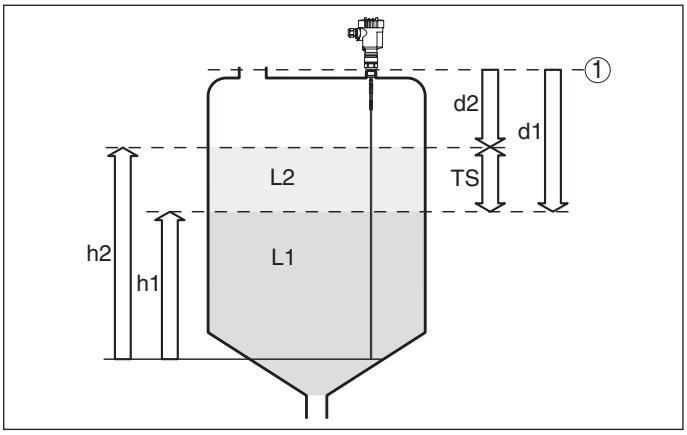


Fig. 15: Interface measurement

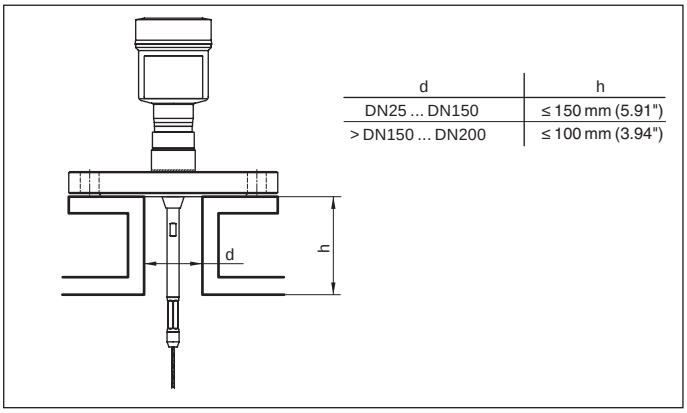
1 Reference plane
d1 Distance to the interface (HART value 1)
d2 Distance to the level (HART value 3)
TS Thickness of the upper medium (d1 - d2)
h1 Height - Interface
h2 Height - Level
L1 Lower medium
L2 Upper medium

Mounting socket

If possible, avoid sockets. Mount the sensor flush with the vessel top. If this is not possible, use short sockets with small diameter.

Higher sockets or sockets with a bigger diameter can generally be used. They can, however, increase the upper blocking distance (dead band). Check if this is relevant for your measurement.

In such cases, always carry out a false signal suppression after installation. You can find further information under "*Setup procedure*".



d	h
DN25 ... DN150	≤ 150 mm (5.91")
> DN150 ... DN200	≤ 100 mm (3.94")

Fig. 16: Mounting socket

When welding the socket, make sure that the socket is flush with the vessel top.

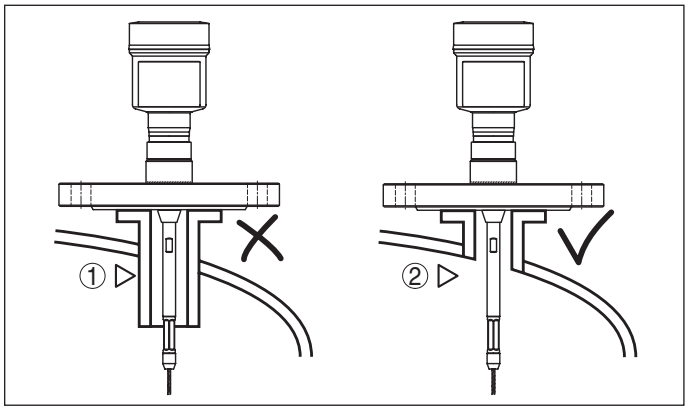


Fig. 17: Socket must be installed flush

1 Unfavourable installation
2 Socket flush - optimum installation

Plastic vessel/Glass vessel

The guided microwave principle requires a metallic surface on the process fitting. Therefore, in plastic vessels, etc., use an instrument version with flange (from DN 50) or place a metal sheet (ø > 200 mm/8 in) beneath the process fitting when screwing it in.

Make sure that the plate has direct contact with the process fitting.

When installing rod or cable probes in vessels without metal walls, e.g. in plastic vessels, the measured value can be influenced by strong electromagnetic fields (emitted interference according to EN 61326: class A). In this case, use a probe with coaxial version.

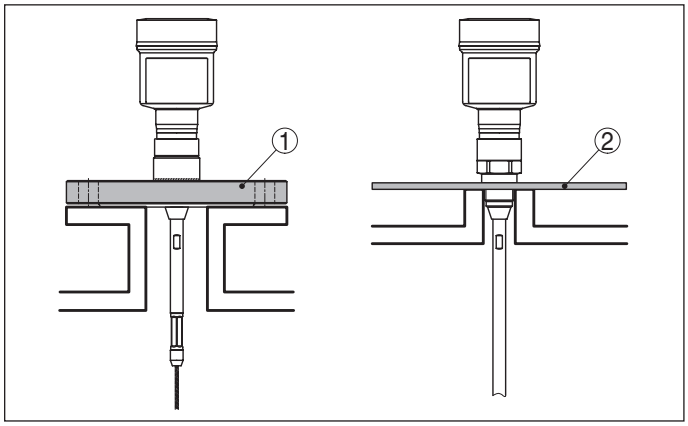


Fig. 18: Installation in non-metallic vessel

1 Flange
2 Metal sheet

Ammonia applications

For applications in ammonia, a special, gas-tight instrument version of VEGAFLEX 81 as coax probe is available.

For this special application, the instrument is equipped with high resistant seals of elastomer-free materials. The instrument seal and the "Second Line of Defense" are made of borosilicate glass GPC 540.

Steam boiler applications

Vapours, superimposed gases, high pressures and temperature differences can change the spreading speed of radar impulses.

For automatic correction of these deviations, the VEGAFLEX can be optionally equipped with a running time correction over the reference distance. Hence the probe can execute an automatic running time correction.

The reference point must hence not be overfilled. The upper dead band is hence 450 mm (17.7 in).

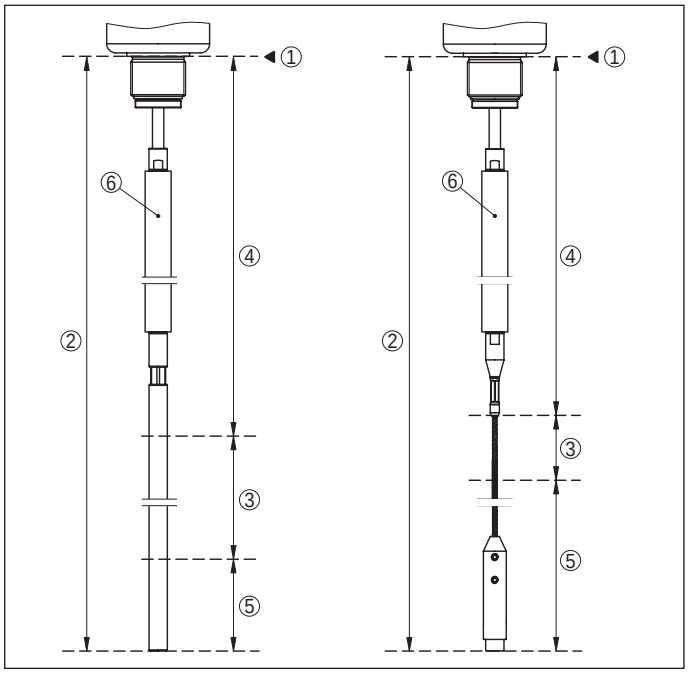


Fig. 19: Measuring ranges - VEGAFLEX with steam compensation

1 *Reference plane*
2 *Probe length (L)*
3 *Measuring range*
4 *Upper dead band*
5 *Lower dead band*
6 *Additional upper dead band by steam compensation*
7 *Reference measurement distance to steam compensation*

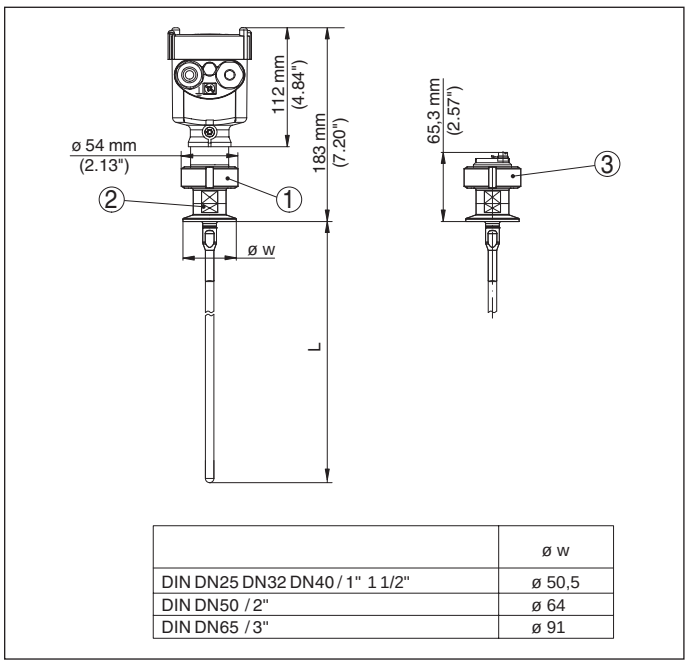
Autoclaved version

For use in an autoclave, e.g. for sterilization, the polished version of VEGAFLEX is available as autoclavable version.

Hence you can separate the housing from the process fitting.

The side of the process fitting is provided with a cover after the housing is removed.

After autoclaving, attach the housing again and the instrument is immediately ready for operation.



	ø w
DIN DN25 DN32 DN40 / 1" 1 1/2"	ø 50,5
DIN DN50 / 2"	ø 64
DIN DN65 / 3"	ø 91

Fig. 20: Autoclaved version

1 *Groove nut*
2 *Process fitting*
3 *Cover with groove nut*

4 Selection criteria

		VEGAFLEX 81			VEGAFLEX 83			VEGAFLEX 86		
		Cable	Rod	Coax	Cable	Rod	Polished rod	Cable	Rod	Coax
Vessel	Vessels < 6 m	●	●	●	●	●	●	●	●	●
	High vessels > 6 m	●	–	–	●	–	–	●	–	–
	Non-metallic vessels	○	○	○	○	○	○	○	○	○
	Measurement in a standpipe or bypass tube	●	●	○	–	○	●	●	●	○
Process	Aggressive liquids	–	–	–	●	●	–	–	–	–
	Bubble or foam generation	●	●	●	●	●	●	●	●	●
	Wave movements at the surface	●	●	●	●	●	●	●	●	●
	Steam or condensation	●	●	●	●	●	●	●	●	●
	Buildup	●	●	–	●	●	●	●	●	–
	Changing density	●	●	●	●	●	●	●	●	●
	Ammonia application	–	–	●	–	–	–	–	–	–
	High temperatures > 200 °C	–	–	–	–	–	–	●	●	●
	Pressures up to 400 bar	–	–	–	–	–	–	●	●	●
	Hygienic applications	–	–	–	○	○	●	–	–	–
	Narrow space above the vessel	●	○	–	●	–	–	●	○	–
	Steam boiler application	–	–	–	–	–	–	–	–	●
Process fitting	Threaded fittings	●	●	●	–	–	–	●	●	●
	Flange connections	●	●	●	●	●	●	●	●	●
	Hygienic fittings	–	–	–	●	●	●	–	–	–
Probe	Stainless steel	●	●	●	–	–	●	●	●	●
	PFA coating	–	–	–	●	●	–	–	–	–
	Polished (Basel Standard)	–	–	–	–	–	●	–	–	–
	Probe can be shortened	●	●	–	–	–	–	●	●	–
Industry	Chemical	●	●	●	●	●	●	●	●	●
	Power generation	●	●	●	○	○	–	●	●	●
	Foodstuffs	–	–	–	●	●	●	–	–	–
	Offshore	●	●	●	○	○	–	●	●	●
	Petrochemical	●	●	●	○	○	–	●	●	●
	Pharmaceutical	–	–	–	●	●	●	–	–	–
	Shipbuilding	●	○	○	–	–	–	●	○	○
	Environment and recycling industry	●	●	●	●	●	●	●	●	●
	Water	●	●	○	●	●	●	○	○	○
	Waste water	○	○	–	○	○	○	○	○	–

– not recommended

○ possible with limitations

● optimum suitability

5 Housing overview

Plastic PBT		
Protection rating	IP 66/IP 67	IP 66/IP 67
Version	Single chamber	Double chamber
Application area	Industrial environment	Industrial environment

Aluminium		
Protection rating	IP 66/IP 67, IP 66/IP 68 (1 bar)	IP 66/IP 67, IP 66/IP 68 (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	IP 66/IP 67	IP 66/IP 67, IP 66/IP 68 (1 bar)	IP 66/IP 67, IP 66/IP 68 (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

6 Mounting

Mounting examples

The following illustrations show mounting examples and measurement setups.

Storage vessels

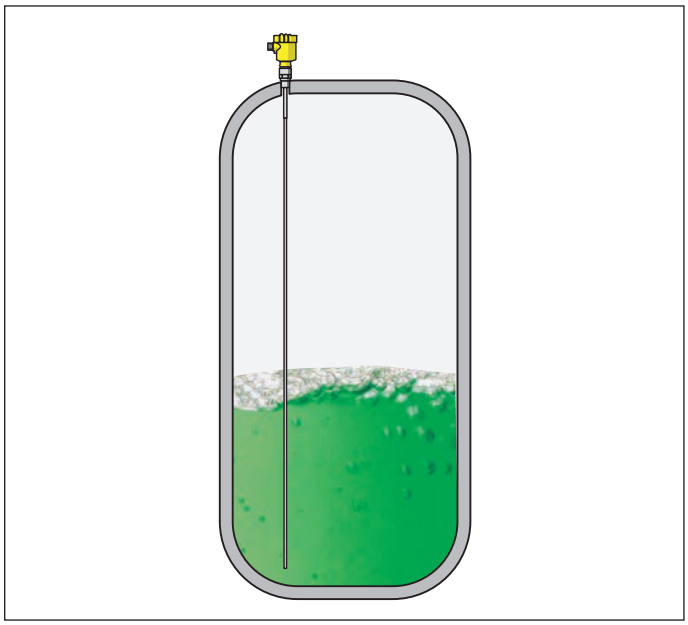


Fig. 28: Level measurement in a storage vessel with VEGAFLEX 81

The guided microwave principle is ideal for level measurement in storage vessels. The sensor can be set up without filling or adjustment with medium.

Cable and rod probes are available for different lengths and loads.

The coax version is especially suitable for low viscosity liquids with low dielectric constant. This also applies when the requirements on the accuracy of the measurement are very high.

The measurement is independent of product characteristics such as density, temperature, overpressure, foam, dielectric constant and buildup.

Different, as well as frequently changing products and mixtures can be measured.

Tanks with foodstuffs

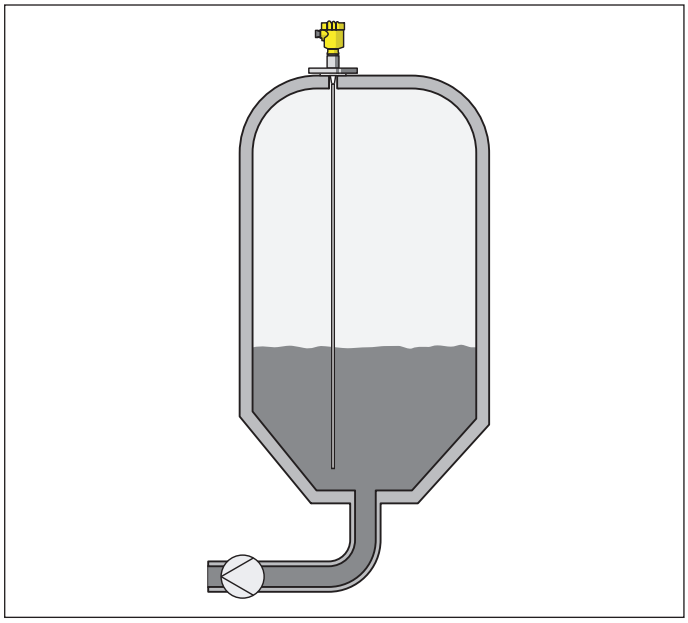


Fig. 29: Level measurement in a vessel with foodstuffs with VEGAFLEX 83

The fully PFA insulated VEGAFLEX 83 is ideal for level measurement in vessels in the food processing and pharmaceutical industries. The sensor can be set up without filling or adjustment with medium. Fully insulated rod probes are available in lengths up to 4 m (13 ft) and cable probes up to 32 m (105 ft).

The wetted parts are made of the food safe plastics PFA and TFM-PTFE.

The measurement is unaffected by product characteristics such as density, temperature or overpressure. Even foam and buildup do not influence the measurement.

Different, as well as frequently changing products and mixtures can be measured.

Bypass tube

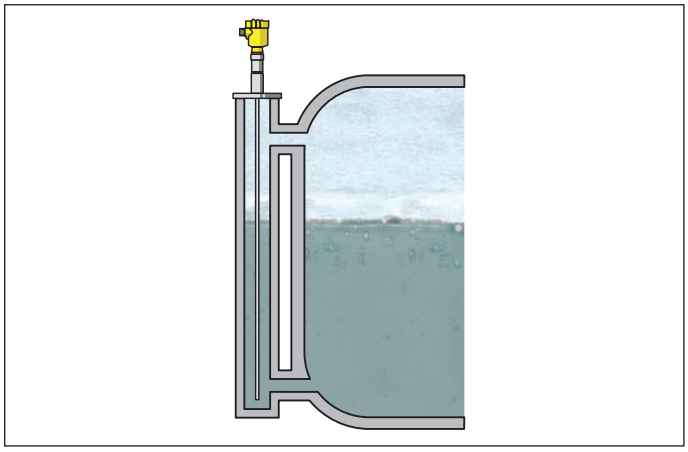


Fig. 30: Level measurement in a bypass tube

Standpipes or bypass tubes are often used in distillation columns, e.g. in the petrochemical industry. Also in this environment, measurement with guided microwaves has many advantages.

The configuration of the standpipe or bypass tube does not influence the measurement. Lateral tube connections, mixing holes, buildup or corrosion in the tube do not influence the measuring result.

Product temperatures up to 400 °C (752 °F) can be measured, up to 150 °C (302 °F) even with standard versions.

The sensor utilises nearly the entire vessel height, and can measure with high accuracy up to approx. 30 mm (1.181 in) below the process fitting. A possible overfilling even in this range is detected reliably.

VEGAFLEX sensors are also available with SIL2.

7 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
  - 12 … 35 V DC
- Permissible residual ripple - Non-Ex, Ex-ia instrument
  - for 9.6 V< U_N < 14 V: ≤ 0.7 V_{eff} (16 … 400 Hz)
  - for 18 V< U_N < 35 V: ≤ 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)
- 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 screen. If electromagnetic interference is expected which is above the test values of EN 61326-1 for industrial areas, screened cable should be used.

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

Cable screening and grounding

If screened cable is required, we recommend connecting the cable screen on both ends to ground potential. In the sensor, the screen 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

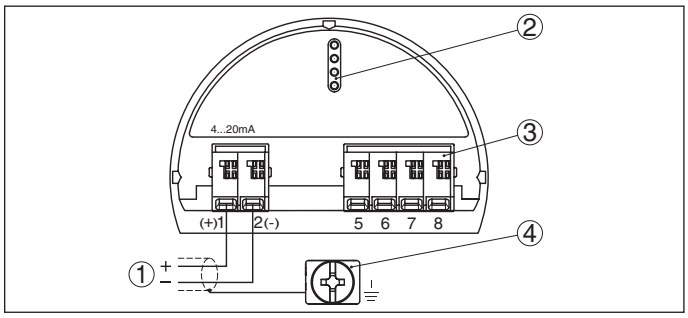


Fig. 31: Electronics and terminal compartment, single chamber housing

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 screen

Double chamber housing

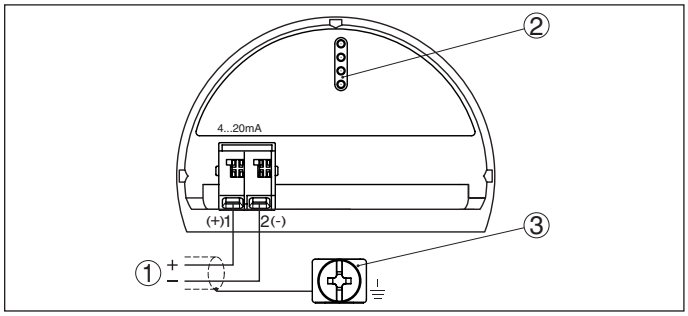


Fig. 32: Terminal compartment, double chamber housing

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

Wire assignment, connection cable with version IP 66/IP 68, 1 bar

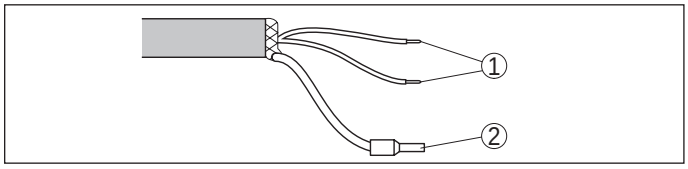


Fig. 33: Wire assignment in permanently connected connection cable

1 Brown (+) and blue (-) to power supply or to the processing system
2 Shielding

8 Electronics - 4 … 20 mA/HART - four-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 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

If a reliable separation is required, the power supply and the current output are transmitted over separate two-wire connection cables.

- Operating voltage with version for low voltage
  - 9.6 … 48 V DC, 20 … 42 V AC, 50/60 Hz
- Operating voltage with version for mains voltage
  - 90 … 253 V AC, 50/60 Hz

Connection cable

The 4 … 20 mA current output is connected with standard two-wire cable without screen. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

For power supply, an approved installation cable with PE conductor is required.

Cable screening and grounding

If screened cable is required, we recommend connecting the cable screen on both ends to ground potential. In the sensor, the screen 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, double chamber housing

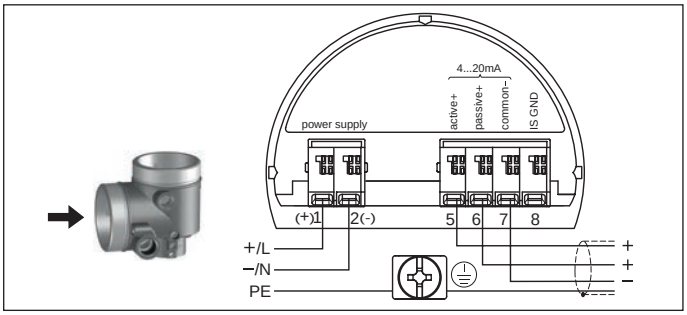


Fig. 34: Terminal compartment, double chamber housing

1 Voltage supply
2 4 … 20 mA signal output active
3 4 … 20 mA signal output passive

Terminal	Function	Polarity
1	Voltage supply	+/L
2	Voltage supply	-/N
5	4 … 20 mA output (active)	+
6	4 … 20 mA output (passive)	+
7	Mass - output	-
8	Functional ground with installation according to CSA	

9 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 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 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 screened 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 screen 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 screen directly to ground potential on the power supply unit and the sensor. In the connection box or T-distributor, the screen of the short stub to the sensor may not be connected to ground potential or to another cable screen.

Connection

Single chamber housing

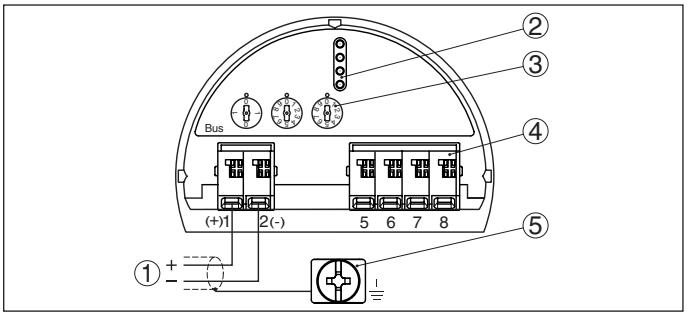


Fig. 35: Electronics and terminal compartment, single chamber housing

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 screen

Double chamber housing

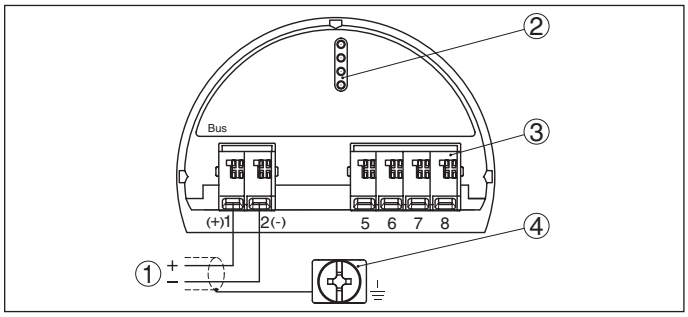


Fig. 36: Terminal compartment, double chamber housing

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 screen

Wire assignment, connection cable with version IP 66/IP 68, 1 bar

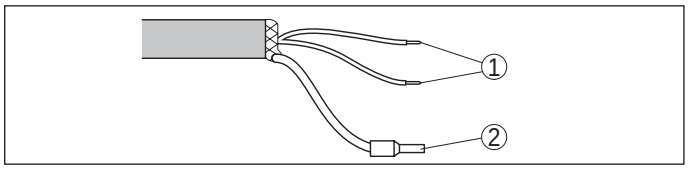


Fig. 37: Wire assignment in permanently connected connection cable

1 Brown (+) and blue (-) to power supply or to the processing system
2 Shielding

10 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 screened 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 screen 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 screen directly to ground potential on the power supply unit and the sensor. In the connection box or T-distributor, the screen of the short stub to the sensor may not be connected to ground potential or to another cable screen.

Connection

Single chamber housing

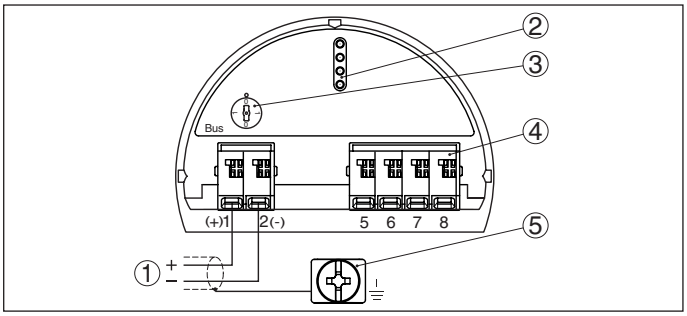


Fig. 38: Electronics and terminal compartment, single chamber housing

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 screen

Double chamber housing

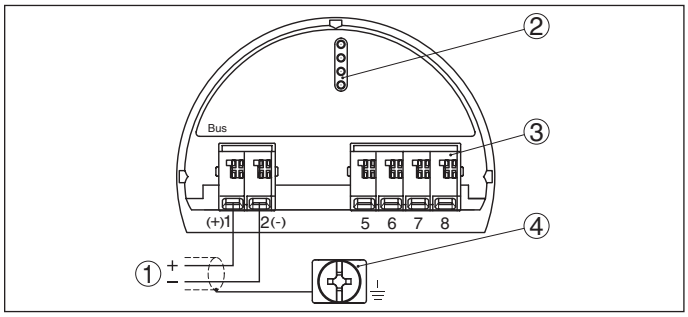


Fig. 39: Terminal compartment, double chamber housing

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 screen

Wire assignment, connection cable with version IP 66/IP 68, 1 bar

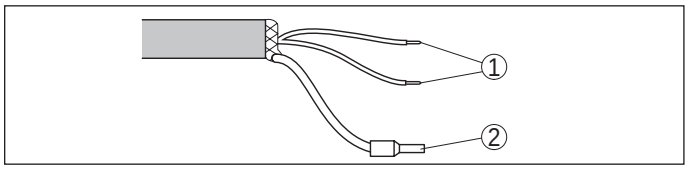


Fig. 40: Wire assignment in permanently connected connection cable

1 Brown (+) and blue (-) to power supply or to the processing system
2 Shielding

11 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

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

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

In the product configurator of VEGAFLEX, different cable glands can be selected. They cover all cable diameters in the range of 4 … 12 mm (0.16 … 0.47 in).

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 screen 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 screen directly to ground potential on the power supply unit and the sensor. In the connection box or T-distributor, the screen of the short stub to the sensor may not be connected to ground potential or to another cable screen.

Connection

Double chamber housing

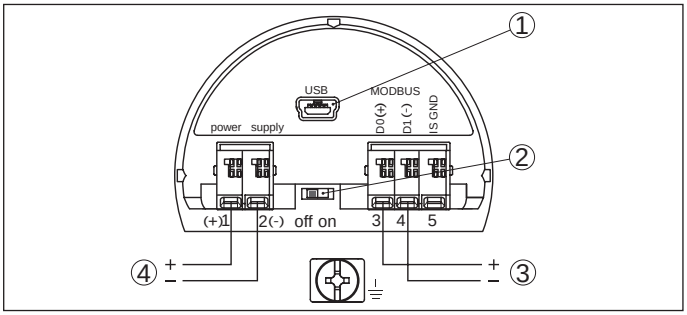


Fig. 41: Terminal compartment

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

12 Adjustment

12.1 Adjustment on the measurement loop

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. 42: Display and adjustment module with single chamber housing

Via the display and adjustment module through magnetic pen
With the Bluetooth version of the display and adjustment module, the sensor can also be adjusted with the magnetic pen. This is done right through the closed lid (with inspection window) of the sensor housing.

Fig. 43: Display and adjustment module - with adjustment via magnetic pen

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.

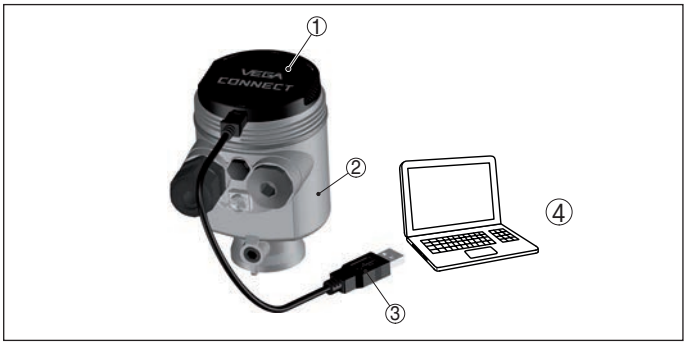


Fig. 44: Connection of the PC via VEGACONNECT and USB

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.

12.2 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.

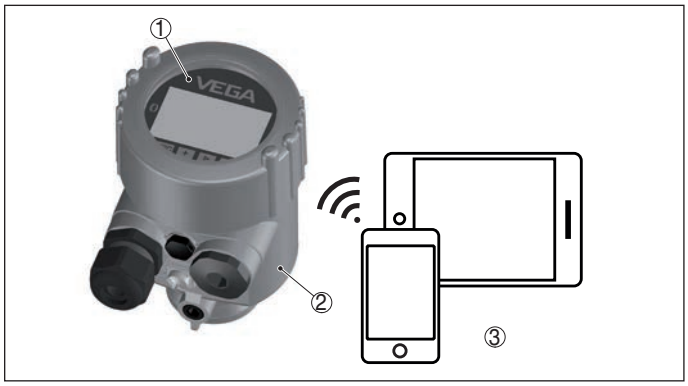


Fig. 45: Wireless connection to smartphones/tables

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.

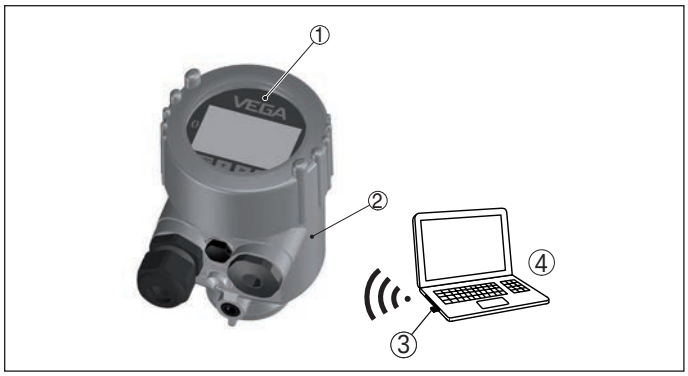


Fig. 46: Connection of the PC via Bluetooth adapter

1 Display and adjustment module
2 Sensor
3 Bluetooth USB adapter
4 PC with PACTware/DTM

12.3 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.

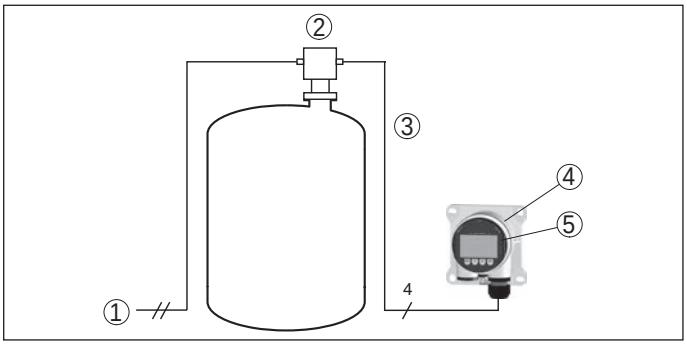


Fig. 47: Connection of VEGADIS 81 to the sensor

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

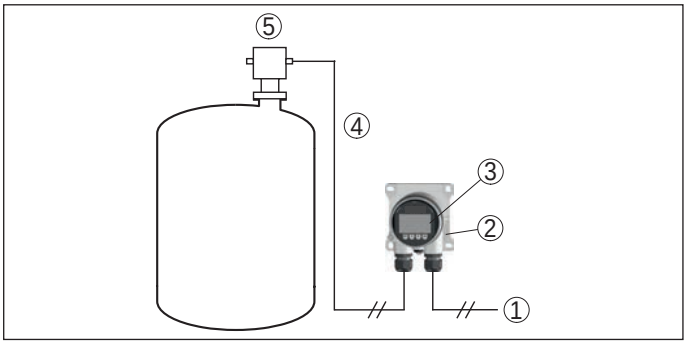


Fig. 48: Connection of VEGADIS 82 to the sensor

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.

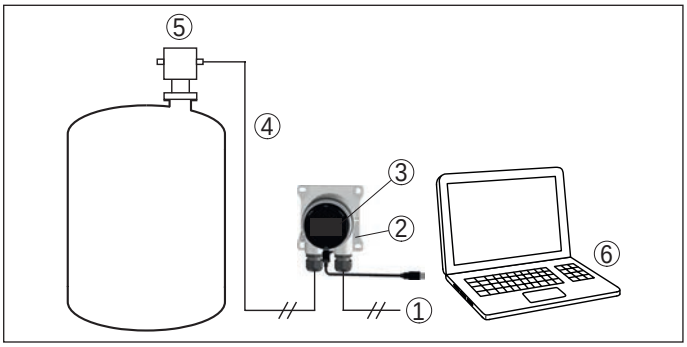


Fig. 49: Connection of VEGADIS 82 to the sensor, adjustment via PC with PACTware

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

12.4 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.

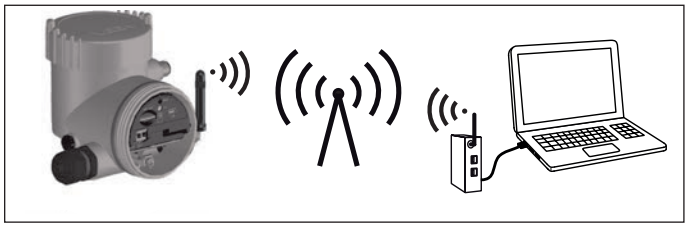


Fig. 50: Transmission of measured values and remote parameter adjustment of the sensor via mobile phone network.

12.5 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.

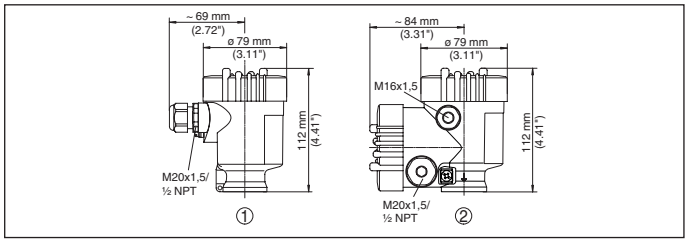
The files can be downloaded at www.vega.com/downloads under "*Software*".

Field Communicator 375, 475
Device descriptions for the instrument are available as EDD for parameter adjustment with the Field Communicator 375 or 475.

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

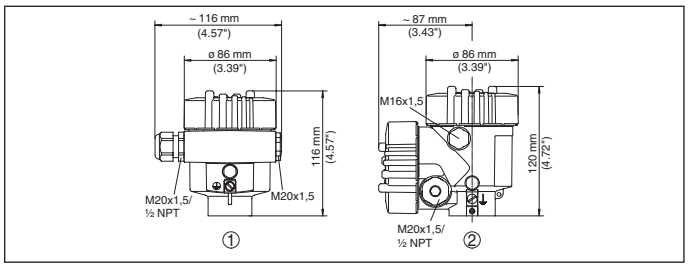
13 Dimensions

Plastic housing



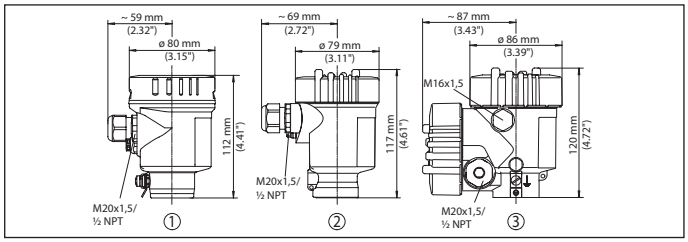
1 Single chamber housing
2 Double chamber housing

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

VEGAFLEX 81, cable and rod version

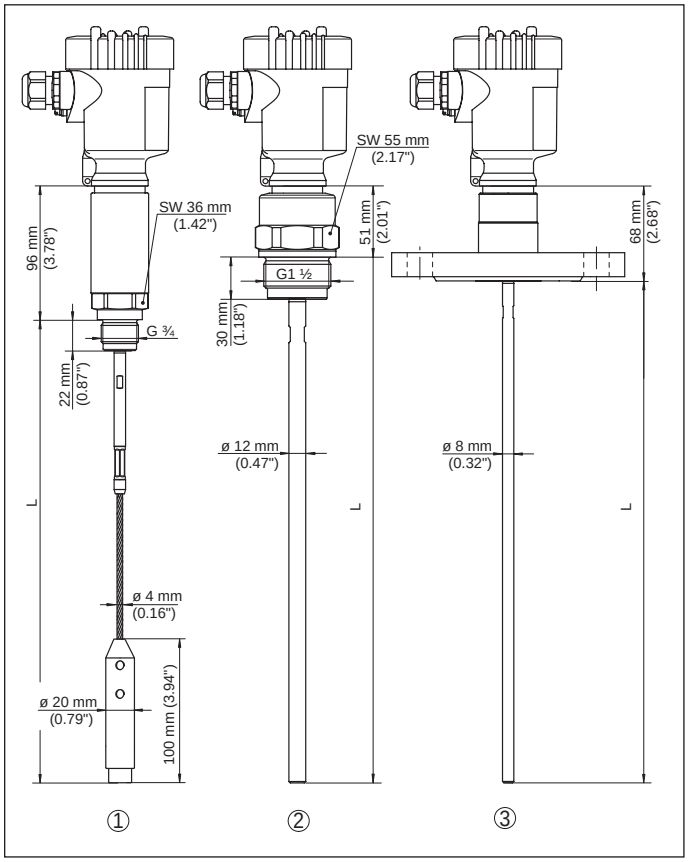


Fig. 54: VEGAFLEX 81, cable and rod version

1 Cable version, ø 4 mm (0.16 in) with threaded fitting
2 Rod version, ø 12 mm (0.47 in) with threaded fitting
3 Rod version, ø 8 mm (0.32 in) with flange connection
L Sensor length, see chapter "Technical data"

VEGAFLEX 81, Coax version

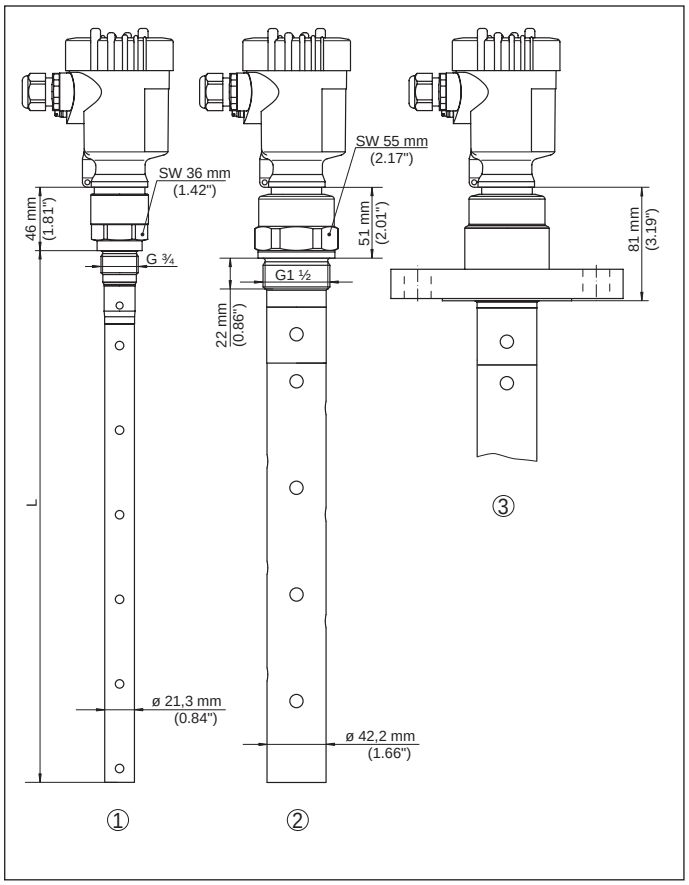


Fig. 55: VEGAFLEX 81, Coax version

1 Coax version, ø 21.3 mm (0.84 in) with threaded fitting
2 Coax version, ø 42.2 mm (1.66 in) with threaded fitting
3 Coax version, ø 42.2 mm (1.66 in) with flange connection
L Sensor length, see chapter "Technical data"

VEGAFLEX 83, PFA coated version

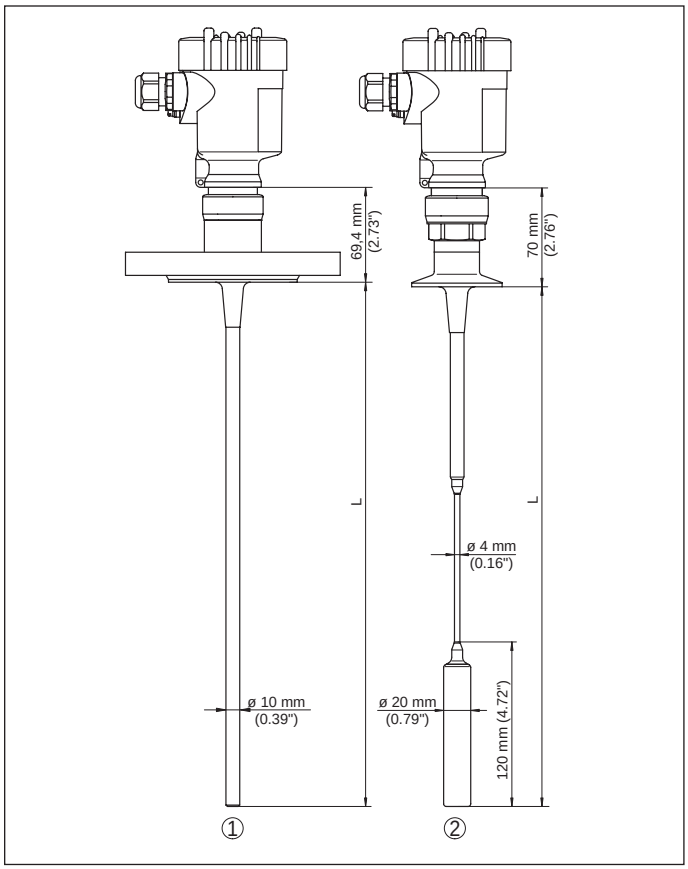


Fig. 56: VEGAFLEX 83, PFA coated version

1 Rod version, ø 10 mm (0.39 in) with flange connection
2 Cable version, ø 4 mm (0.16 in) with Clamp connection
L Sensor length, see chapter "Technical data"

VEGAFLEX 83, polished version

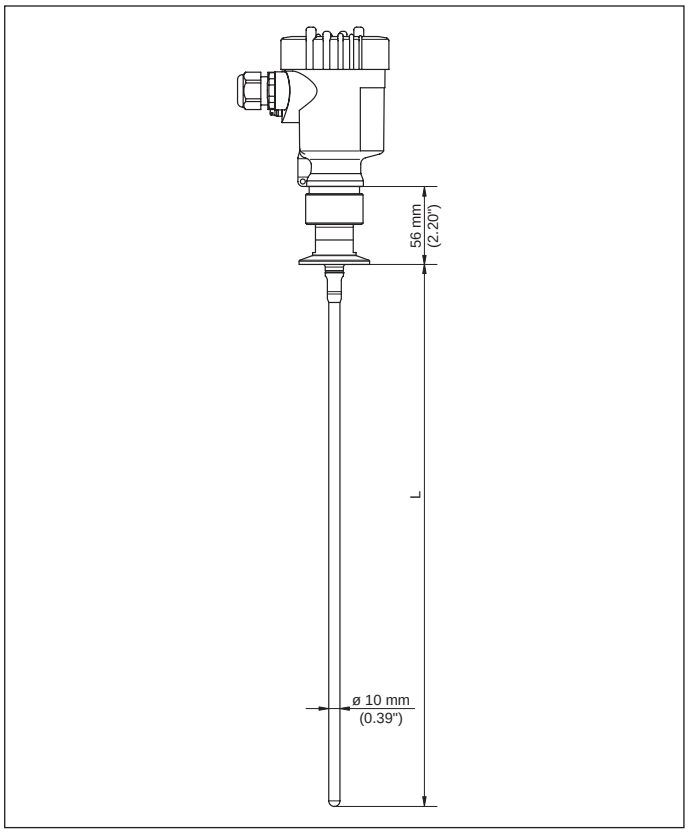


Fig. 57: VEGAFLEX 83, polished version (Basle Standard), rod version ø 10 mm (0.39 in) with Clamp connection

L Sensor length, see chapter "Technical data"

VEGAFLEX 86, cable and rod version

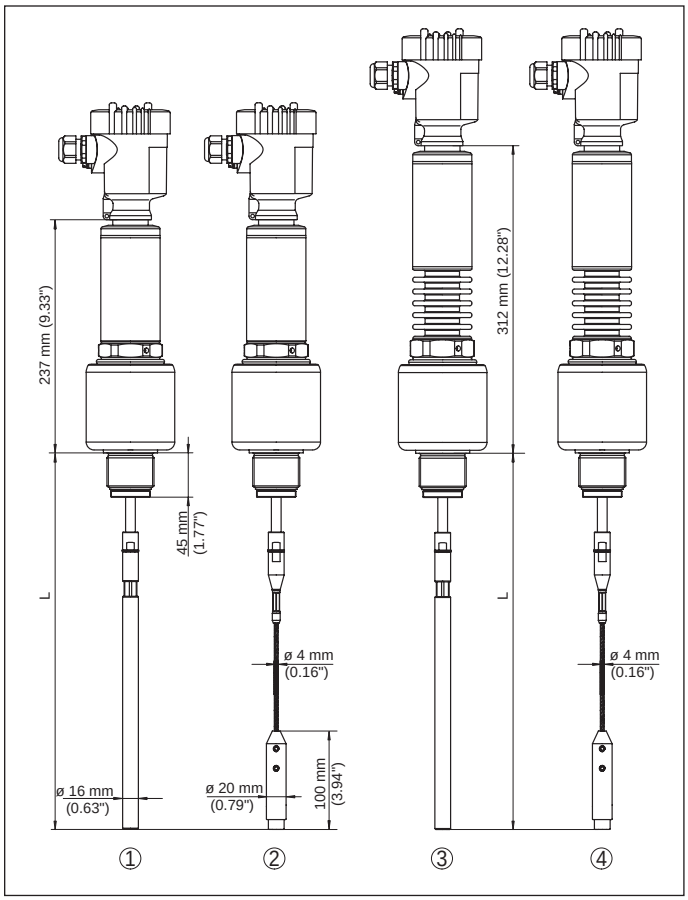


Fig. 58: VEGAFLEX 86, cable and rod version with threaded fitting

1 Rod version, ø 16 mm (0.63 in), -20 … +250 °C/-4 … +482 °F
2 Cable version, ø 4 mm (0.16 in), -20 … +250 °C/-4 … +482 °F
3 Rod version ø 16 mm (0.63 in), -200 … +400 °C/-328 … +752 °F
4 Cable version, ø 4 mm (0.16 in), -200 … +400 °C/-328 … +752 °F
L Sensor length, see chapter "Technical data"

VEGAFLEX 86, Coax version

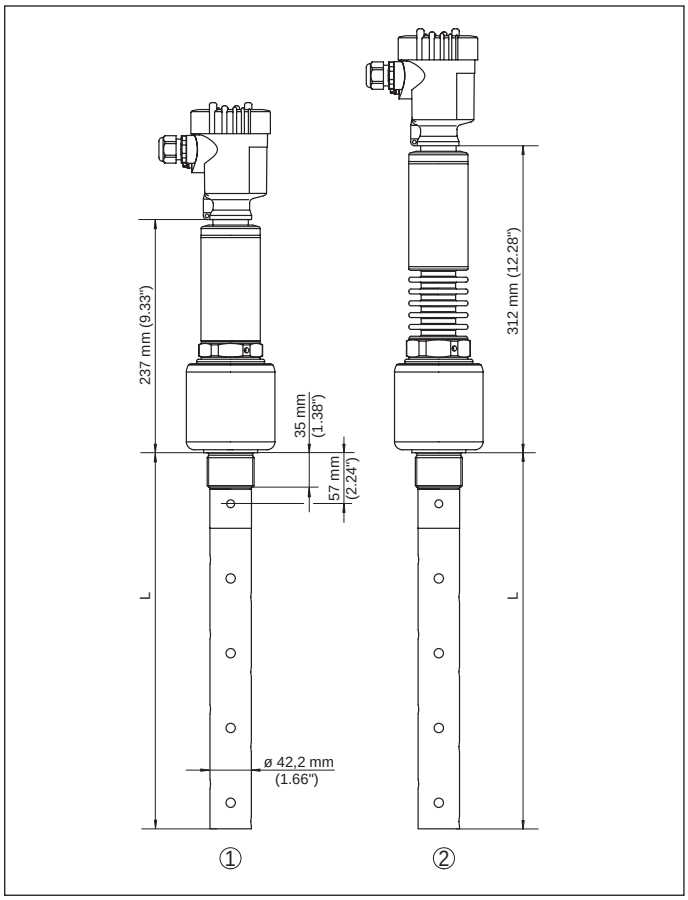


Fig. 59: VEGAFLEX 86, coax version with threaded fitting

1 Coax version, ø 42.2 mm (1.66 in), -20 … +250 °C/-4 … +482 °F
2 Coax version, ø 42.2 mm (1.66 in), -200 … +400 °C/-328 … +752 °F
L Sensor length, see chapter "Technical data"

The listed drawings are only an excerpt of the available process fittings. You can find more drawings on our homepage www.vega.com » Downloads » Drawings.

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