



# Product information

## Radar

Level measurement in liquids

VEGAPULS WL 61

VEGAPULS 61

VEGAPULS 62

VEGAPULS 63

VEGAPULS 64

VEGAPULS 65

VEGAPULS 66



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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](http://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.

# 1 Measuring principle

## Measuring principle VEGAPULS WL 61, 61, 62, 65, 66

Extremely short microwave pulses are transmitted by the antenna system to the measured product, reflected by the product surface and received back by the antenna system. The time from emission to reception of the signals is proportional to the level in the vessel. A special time stretching procedure ensures reliable and precise measurement of the extremely short transmission periods and the conversion into level.

The radar sensors operate with low emitted power in the C and K band frequency range.

## Measuring principle VEGAPULS 64

The sensor emits a continuous, high frequency radar signal through the antenna. The emitted signal is reflected by the product surface and received as an echo by the antenna.

The difference between the emitted and received signal is determined by special algorithms in the sensor electronics and converted into level.

The VEGAPULS 64 operates with low emitted power in the W band frequency range.

## Applications in liquids

Low frequency C band sensors are used for continuous level measurement of liquids under difficult process conditions. They are suitable for applications in storage tanks, process vessels or standpipes and can be used universally thanks to the different antenna versions.

The high frequency K band sensors are universally implementable for continuous level measurement of liquids. They are suitable for level measurement in storage containers, reactors and process vessels, even under difficult process conditions. With the various antenna versions and materials, they are the optimal solution for almost all applications and processes.

The high frequency W band sensors are suitable for continuous level measurement of liquids. The small process fittings offer particular advantages in small tanks or tight mounting spaces. The very good signal focusing ensures the use in vessels with many installations such as stirrers and heating spirals.

## Advantages

Non-contact radar technology is characterized by extremely high accuracy. The measurement is influenced neither by fluctuating product features nor by changing process conditions such as temperature and pressure.

## Input variable

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.

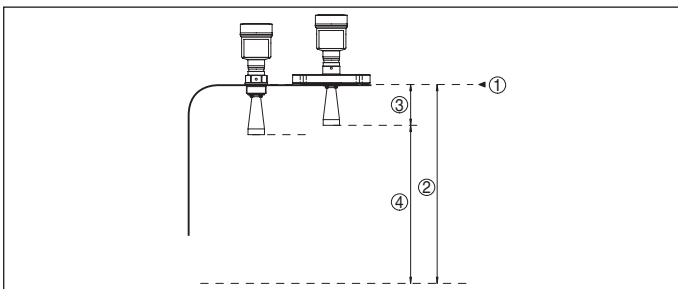


Fig. 1: Data of the input variable with VEGAPULS 62

- 1 Reference plane
- 2 Measured variable, max. measuring range
- 3 Antenna length
- 4 Utilisable measuring range

## 2 Type overview

VEGAPULS WL 61



VEGAPULS 61



VEGAPULS 62



<b>Applications</b>	Water processing, pump stations, storm water overflow tank, flow measurement in open flumes and level monitoring	Corrosive liquids in small vessels under easy process conditions	Storage tanks and process vessels under extremely difficult process conditions
<b>Max. measuring range</b>	15 m (49.21 ft)	35 m (114.8 ft)	35 m (114.8 ft)
<b>Antenna/Material</b>	Plastic horn antenna	Plastic horn antenna/completely PVDF encapsulated	Horn antenna or standpipe antenna 1/2"/316L
<b>Process fitting/Material</b>	Thread G1½/PBT or mounting strap/316L	Thread G1½/PVDF, mounting strap/316L or flange/PP	Thread G1½/316L according to DIN 3852-A or flange/316L, Alloy C22 (2.4602)
<b>Process temperature</b>	-40 ... +80 °C (-40 ... +176 °F)	-40 ... +80 °C (-40 ... +176 °F)	-196 ... +450 °C (-321 ... +842 °F)
<b>Process pressure</b>	-1 ... +2 bar/-100 ... +200 kPa (-14.5 ... +29.0 psi)	-1 ... +3 bar/-100 ... +300 kPa (-14.5 ... +43.5 psi)	-1 ... +160 bar/-100 ... +16000 kPa (-14.5 ... +2320 psig)
<b>Deviation</b>	≤ 2 mm	≤ 2 mm	≤ 2 mm
<b>Frequency range</b>	K-band	K-band	K-band
<b>Signal output</b>	<ul style="list-style-type: none"> <li>● 4 ... 20 mA/HART - two-wire</li> <li>● Profibus PA</li> <li>● Foundation Fieldbus</li> </ul>	<ul style="list-style-type: none"> <li>● 4 ... 20 mA/HART - two-wire</li> <li>● 4 ... 20 mA/HART - four-wire</li> <li>● Profibus PA</li> <li>● Foundation Fieldbus</li> <li>● Modbus and Levelmaster protocol</li> </ul>	
<b>Indication/Adjustment</b>	<ul style="list-style-type: none"> <li>● PACTware</li> <li>● VEGADIS 62</li> </ul>	<ul style="list-style-type: none"> <li>● PLICSCOM</li> <li>● PACTware</li> <li>● VEGADIS 81</li> <li>● VEGADIS 62</li> </ul>	
<b>Approvals</b>	<ul style="list-style-type: none"> <li>● ATEX</li> <li>● IEC</li> </ul>	<ul style="list-style-type: none"> <li>● ATEX</li> <li>● IEC</li> <li>● Shipbuilding</li> <li>● Overfill protection</li> <li>● FM</li> <li>● CSA</li> <li>● EAC (Gost)</li> </ul>	

VEGAPULS 63



VEGAPULS 64



VEGAPULS 65



VEGAPULS 66



Aggressive liquids under extremely difficult process conditions	Liquids under extremely difficult process conditions	Aggressive liquids under easy process conditions	Storage tanks and process vessels under extremely difficult process conditions
35 m (114.83 ft)	30 m (98.43 ft)	35 m (114.83 ft)	35 m (114.83 ft)
Completely encapsulated antenna system/PTFE, PFA or PVDF	Thread with integrated horn antenna/ PEEK and 316L or Alloy C22 (2.4602), plastic horn antenna/PP, flange with encapsulated antenna system/PTFE and PFA	Rod antenna, PVDF or PTFE encapsulated, PFA plated	Horn antenna or standpipe antenna 2", 316L
Flange or hygienic fitting/316L, Alloy 400 (2.4360)	Mounting strap/316L, thread/316L, flange/316L or Alloy C22 (2.4602), hygienic fittings/316	Thread G1½ according to DIN 3852-A/ PVDF or 316L, flange/PTFE-plated	Flange/316L, Alloy C22 (2.4602)
-196 ... +200 °C (-321 ... +392 °F)	-196 ... +200 °C (-321 ... +392 °F)	-40 ... +150 °C (-40 ... +302 °F)	-60 ... +400 °C (-76 ... +752 °F)
-1 ... +16 bar/-100 ... +1600 kPa (-14.5 ... +232 psig)	-1 ... 25 bar/-100 ... 2500 kPa (-14.5 ... 362.5 psig)	-1 ... +16 bar/-100 ... +1600 kPa (-14.5 ... +232 psig)	-1 ... +160 bar/-100 ... +16000 kPa (-14.5 ... +2321 psi)
≤ 2 mm	≤ 1 mm	≤ 8 mm	≤ 8 mm
K-band	W-band	C-band	C-band
<ul style="list-style-type: none"> <li>● 4 ... 20 mA/HART - two-wire</li> <li>● 4 ... 20 mA/HART - four-wire</li> <li>● Profibus PA</li> <li>● Foundation Fieldbus</li> <li>● Modbus and Levelmaster protocol</li> </ul>	<ul style="list-style-type: none"> <li>● 4 ... 20 mA/HART - two-wire</li> </ul>	<ul style="list-style-type: none"> <li>● 4 ... 20 mA/HART - two-wire</li> <li>● 4 ... 20 mA/HART - four-wire</li> <li>● Profibus PA</li> <li>● Foundation Fieldbus</li> <li>● Modbus and Levelmaster protocol</li> </ul>	
<ul style="list-style-type: none"> <li>● PLICSCOM</li> <li>● PACTware</li> <li>● VEGADIS 81</li> <li>● VEGADIS 62</li> </ul>	<ul style="list-style-type: none"> <li>● PLICSCOM</li> <li>● PACTware</li> <li>● VEGADIS 81</li> <li>● VEGADIS 82</li> </ul>	<ul style="list-style-type: none"> <li>● PLICSCOM</li> <li>● PACTware</li> <li>● VEGADIS 81</li> <li>● VEGADIS 62</li> </ul>	
<ul style="list-style-type: none"> <li>● ATEX</li> <li>● IEC</li> <li>● Shipbuilding</li> <li>● Overfill protection</li> <li>● FM</li> <li>● CSA</li> <li>● EAC (Gost)</li> </ul>	<ul style="list-style-type: none"> <li>● ATEX</li> <li>● IEC</li> <li>● Shipbuilding</li> <li>● Overfill protection</li> <li>● FM</li> <li>● CSA</li> <li>● EAC (Gost)</li> </ul>	<ul style="list-style-type: none"> <li>● ATEX</li> <li>● IEC</li> <li>● Shipbuilding</li> <li>● Overfill protection</li> <li>● FM</li> <li>● CSA</li> </ul>	

### 3 Instruments and applications

#### VEGAPULS WL 61

VEGAPULS WL 61 is the ideal sensor for all applications in water and sewage water applications. It is particularly suitable for use in water processing, pump stations as well as overflow basins, for flow measurement in open flumes and gauge monitoring. VEGAPULS WL 61 provides an economical solution through versatile and simple mounting options. The flood-proof IP 68 housing ensures continuous, maintenance-free operation.

#### VEGAPULS 61

The VEGAPULS 61 is a sensor for continuous level measurement of liquids under simple process conditions. Due to its simple and versatile mounting options, VEGAPULS 61 offers a truly cost-effective solution. The encapsulated antenna system ensures maintenance-free operation.

The version with encapsulated antenna system is particularly suitable for level measurement of aggressive liquids in small vessels. The version with plastic horn antenna is particularly suitable for flow measurement in open flumes or gauge measurement of open waters.

#### VEGAPULS 62

VEGAPULS 62 is a universally implementable sensor for continuous level measurement of liquids. It is suitable for level measurement in storage containers, reactors and process vessels, even under difficult process conditions. With its various antenna versions and materials, VEGAPULS 62 is the optimal solution for almost all applications and processes. Its wide temperature and pressure range makes project planning simple.

The version with horn antenna is particularly suitable for storage tanks and process vessels for measurement of products like solvents, hydrocarbons and fuels. The version with parabolic antenna is particularly suitable for measurement of products with low  $\epsilon_r$  value at large measuring distances.

#### VEGAPULS 63

The VEGAPULS 63 is a sensor for continuous level measurement of aggressive liquids or liquids with hygienic requirements. It is suitable for applications in storage tanks, process vessels, dosing vessels and reactors. The encapsulated antenna system of VEGAPULS 63 protects against pollution and ensures continuous, maintenance-free operation. Front-flush mounting ensures optimum cleanability even in case of the most stringent hygienic requirements.

#### VEGAPULS 64

The VEGAPULS 64 is a radar sensor for continuous level measurement of liquids.

Special advantages result from the small process fittings for small tanks and the very good focussing in applications in large tanks. This is made possible by the high emitting frequency of 80 GHz with an especially small beam angle.

#### VEGAPULS 65

The VEGAPULS 65 is a radar sensor for continuous measurement of liquids under simple process conditions. It is particularly suitable for level measurement in vessels with small process fittings and simple process conditions. The slim rod antenna allows installation in small vessel openings.

#### VEGAPULS 66

The VEGAPULS 66 is a radar sensor for continuous level measurement of liquids under difficult process conditions. It is suitable for applications in storage tanks, process vessels or standpipes. VEGAPULS 66 can be used universally thanks to its different antenna versions.

#### Application areas

The radar sensors of the VEGAPULS series described in this manual are used for non-contact level measurement of liquids. They measure all kinds of liquids, even under high pressure and at extreme temperatures. The sensors can be used in simple but also aggressive liquids and are suitable for applications with maximum hygienic requirements.

#### Level measurement in vessels

For level measurement in vessels with conical bottom it can be advantageous to mount the sensor in the centre of the vessel, as measurement is then possible down to the bottom.

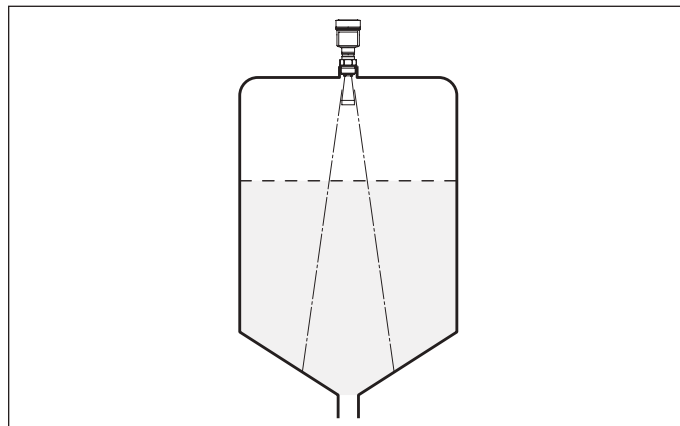


Fig. 9: Level measurement in vessels with conical bottom

#### Measurement in a surge pipe

By using a surge pipe in the vessel, influences from internal vessel installations and turbulence can be excluded. Under these prerequisites, the measurement of products with low dielectric values ( $\epsilon_r$  value  $\geq 1.6$ ) is possible. In very adhesive products, measurement in a surge pipe is not recommended.

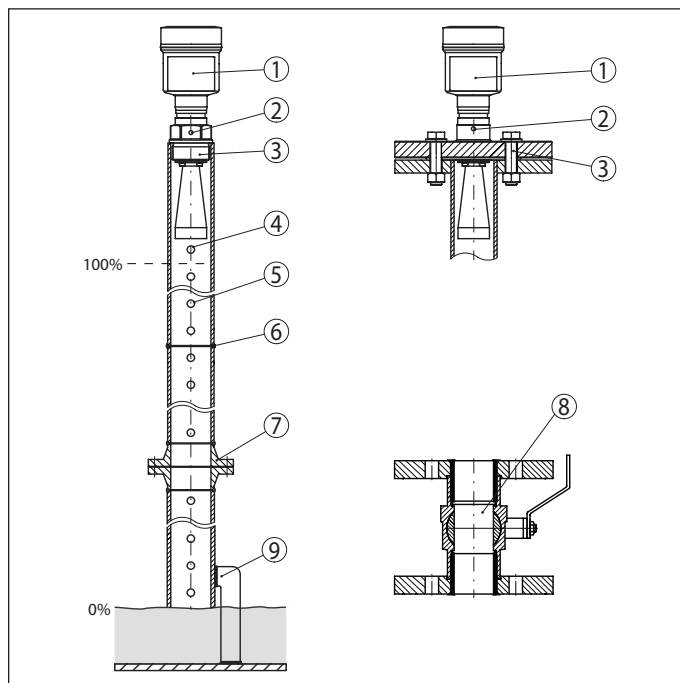


Fig. 10: Configuration surge pipe

- 1 Radar sensor
- 2 Polarisation marking
- 3 Thread or flange on the instrument
- 4 Vent hole
- 5 Holes
- 6 Weld joint
- 7 Welding neck flange
- 8 Ball valve with complete opening
- 9 Fastening of the surge pipe

#### Flow measurement

Flow measurement in open flumes with a defined constriction, such as e.g. a rectangular overflow, can be realized with a level measurement.

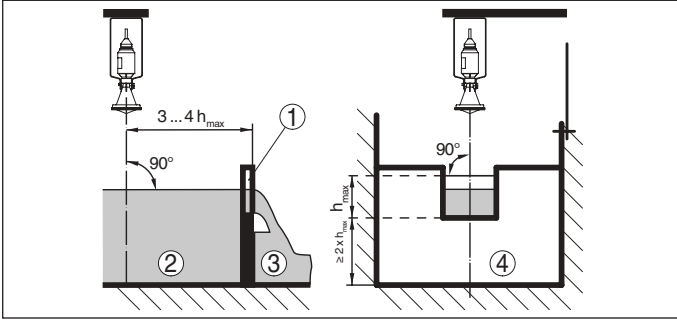


Fig. 11: Flow measurement with rectangular overflow:  $d_{min}$  minimum distance of the sensor;  $h_{max}$  = max. filling of the rectangular overflow

- 1 Overflow orifice (side view)
- 2 Headwater
- 3 Tailwater
- 4 Overfall orifice (view from tailwater)

**Measurement in difficult applications**

The electronics version with increased sensitivity enables use of the instrument also in applications with very poor reflective properties and products with low  $\epsilon_r$  value.

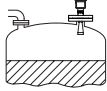
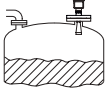
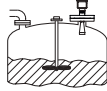
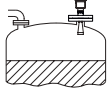
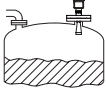
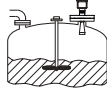
## 4 Selection criteria

		VEGAPULS						
		WL 61	61	62	63	64	65	66
<b>Vessel</b>	Small vessels	●	●	-	●	●	-	-
	Storage tanks	●	●	●	●	●	●	●
	Process vessels	-	-	●	●	●	-	●
<b>Process</b>	Simple process conditions	●	●	●	●	●	●	●
	Extremely difficult process conditions	-	-	●	●	●	-	●
	Aggressive liquids	-	●	-	●	●	●	●
	Bubble or foam generation	-	-	-	-	●	●	●
	Wave movements at the surface	-	-	-	-	●	●	●
	Steam or condensation	●	●	●	●	●	-	●
	Buildup	●	●	●	●	●	-	●
	Flow measurement	●	●	●	-	●	-	-
<b>Installation</b>	Front flush installation	●	●	-	●	●	-	-
	Threaded fittings	●	●	●	-	●	●	-
	Flange connections	●	●	●	●	●	●	●
	Hygienic fittings	-	●	-	●	●	●	-
	Mounting strap	●	●	-	-	●	-	-
<b>Antenna</b>	Antenna extension	-	-	●	-	-	-	●
	Standpipe antenna	-	-	●	-	-	-	●
	Narrow transmission lobe	-	-	●	●	●	-	-
	Measurement in a bypass tube or surge pipe	●	●	●	●	-	-	●
	Rinsing air connection	-	-	●	-	-	-	●
<b>Suitability for industry-specific applications</b>	Chemical	-	-	●	●	●	-	-
	Power generation	●	●	-	●	●	-	-
	Foodstuffs	-	-	-	●	●	-	-
	Metal production	-	-	●	-	-	-	-
	Offshore	-	-	-	-	●	-	●
	Paper	-	●	●	●	●	-	-
	Petrochemical	-	-	●	●	●	-	●
	Pharmaceutical	-	●	-	●	●	-	-
	Shipbuilding	-	-	-	●	●	-	●
	Environment and recycling industry	-	-	●	●	●	-	●
	Water, waste water	●	●	-	-	●	-	●
	Cement industry	-	-	●	-	-	-	-







## 5 Measuring range dimensioning

### Vessel








Applications	Storage tank		Storage tank with product circulation		Stirrer vessel	
						
<b>VEGAPULS 62</b>	DN 50 (antenna ø 48 mm)	DN 80 (antenna ø 75 mm) DN 100 (antenna ø 95 mm)	DN 50 (antenna ø 48 mm)	DN 80 (antenna ø 75 mm) DN 100 (antenna ø 95 mm)	DN 50 (antenna ø 48 mm)	DN 80 (antenna ø 75 mm) DN 100 (antenna ø 95 mm)
<b>VEGAPULS 63</b>	DN 50	DN 80, DN 100	DN 50	DN 80, DN 100	DN 50	DN 80, DN 100
<b>Dielectric constant &lt;3</b>	up to 20 m (65.62 ft)	up to 35 m (114.83 ft)	up to 20 m (65.62 ft)	up to 35 m (114.83 ft)	up to 10 m (32.81 ft)	up to 20 m (65.62 ft)
<b>Dielectric constant 3 ... 10</b>	up to 20 m (65.62 ft)	up to 35 m (114.83 ft)	up to 20 m (65.62 ft)	up to 35 m (114.83 ft)	up to 10 m (32.81 ft)	up to 20 m (65.62 ft)
<b>Dielectric constant &gt;10</b>	up to 20 m (65.62 ft)	up to 35 m (114.83 ft)	up to 20 m (65.62 ft)	up to 35 m (114.83 ft)	up to 20 m (65.62 ft)	up to 35 m (114.83 ft)

### Measurement tubes

Applications	Surge pipe		Bypass	
				
<b>VEGAPULS 62</b>	DN 50 (antenna ø 48 mm)	DN 80 (antenna ø 75 mm) DN 100 (antenna ø 95 mm)	DN 50 (antenna ø 48 mm)	DN 80 (antenna ø 75 mm) DN 100 (antenna ø 95 mm) <sup>1)</sup>
<b>VEGAPULS 63</b>	DN 50	DN 80, DN 100	DN 50	DN 80, DN 100
<b>Dielectric constant &lt;3</b>	up to 30 m (98.43 ft)	up to 35 m (114.83 ft)	up to 30 m (98.43 ft)	up to 35 m (114.83 ft)
<b>Dielectric constant 3 ... 10</b>	up to 30 m (98.43 ft)	up to 35 m (114.83 ft)	up to 30 m (98.43 ft)	up to 35 m (114.83 ft)
<b>Dielectric constant &gt;10</b>	up to 30 m (98.43 ft)	up to 35 m (114.83 ft)	up to 30 m (98.43 ft)	up to 35 m (114.83 ft)

<sup>1)</sup> Free radiating radar possible, however, guided radar is recommended as there is less influence from bypass openings.

## 6 Housing overview

<b>Plastic PBT</b>			
<b>Protection rating</b>	IP 66/IP 67	IP 66/IP 67	
<b>Version</b>	Single chamber	Double chamber	
<b>Application area</b>	Industrial environment	Industrial environment	
<b>Aluminium</b>			
<b>Protection rating</b>	IP 66/IP 67, IP 66/IP 68 (1 bar)	IP 66/IP 67, IP 66/IP 68 (1 bar)	
<b>Version</b>	Single chamber	Double chamber	
<b>Application area</b>	Industrial environment with increased mechanical stress	Industrial environment with increased mechanical stress	
<b>Stainless steel 316L</b>			
<b>Protection rating</b>	IP 66/IP 67	IP 66/IP 67, IP 66/IP 68 (1 bar)	IP 66/IP 67, IP 66/IP 68 (1 bar)
<b>Version</b>	Single chamber, electropolished	Single chamber, precision casting	Double chamber, precision casting
<b>Application area</b>	Aggressive environment, food processing, pharmaceutical	Aggressive environment, extreme mechanical stress	Aggressive environment, extreme mechanical stress

## 7 Mounting

### Installation position

The sensor is mounted in a position which is at least 200 mm (7.874 in) away from the vessel wall. If the sensor is installed in the center of dished or round vessel tops, multiple echoes can arise. However, these can be suppressed by an appropriate adjustment.

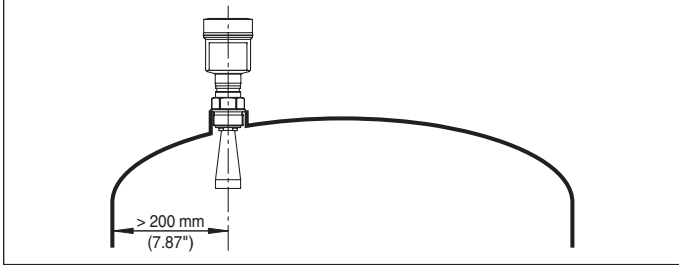


Fig. 24: Mounting of the radar sensor on round vessel tops

### Mounting examples

The following illustrations show mounting examples and measurement setups for the individual sensors.

#### Pump shaft

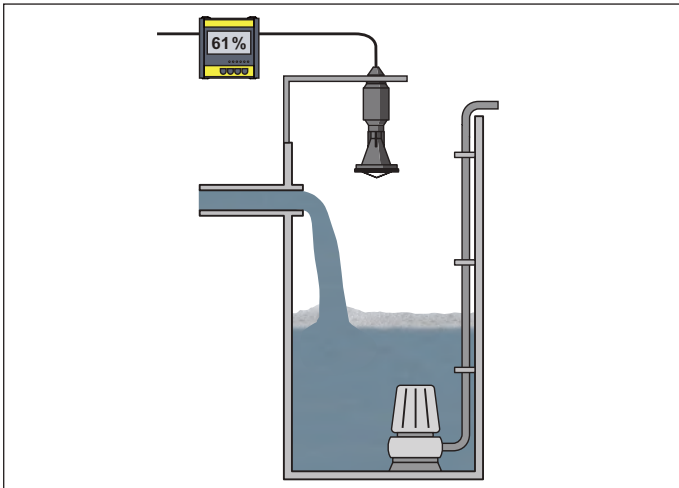


Fig. 25: Level measurement in the pump shaft with VEGAPULS WL 61

The strongly focussed measuring signal of VEGAPULS WL 61 offers considerable advantages particularly in tight spaces. The sensor operates reliably even with foam and buildup on the shaft wall.

#### Acid tank



Fig. 26: Level measurement in an acid tank with VEGAPULS 61

A non-contact measuring principle is particularly suitable for level measurement in acid tanks.

VEGAPULS 61 is characterised by a small process fitting and a PVDF encapsulated antenna. The sensor is insensitive to temperature fluctuations and gas phases.

#### Reactor

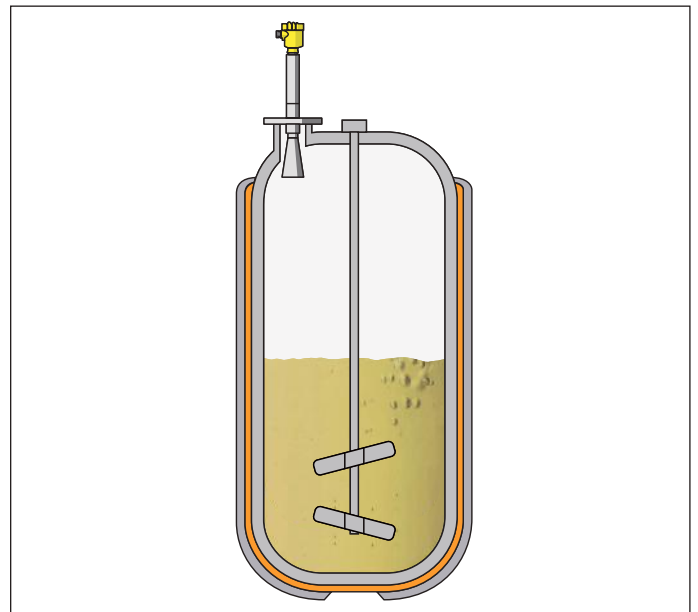


Fig. 27: Level measurement in a reactor with VEGAPULS 62

For the production of resins, different basic substances are mixed with solvents and a reaction is caused by adding process heat.

Non-contact measurement with the radar sensor VEGAPULS 62 is ideal for use in the production of reaction products. Since the measurement is performed without direct contact to the medium, virtually no buildup forms on the sensor.

**Sugar evaporator**

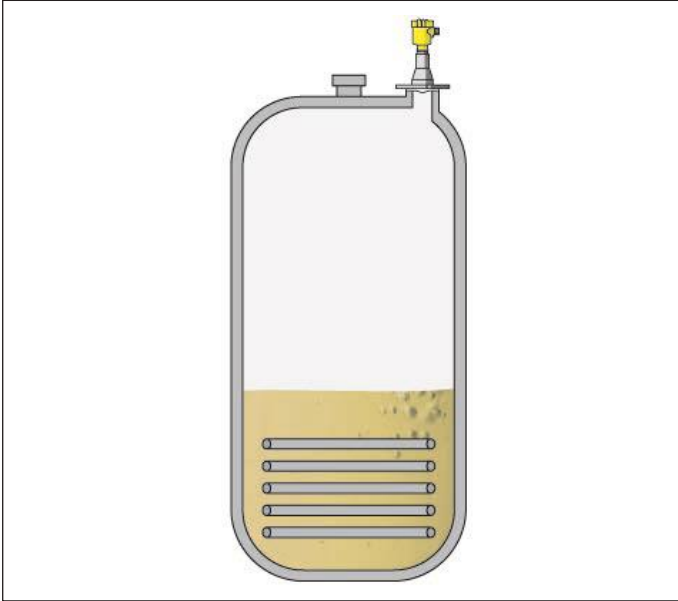


Fig. 28: Level measurement in a sugar evaporator with VEGAPULS 63

The VEGAPULS 63 radar sensor is particularly suitable for level measurement in the sugar evaporator.

The PTFE encapsulated horn antenna is protected against contamination or adhesion by the juice. The instrument is gauge and low pressure resistant, even with dynamic pressure and suctions.

**Process vessels**

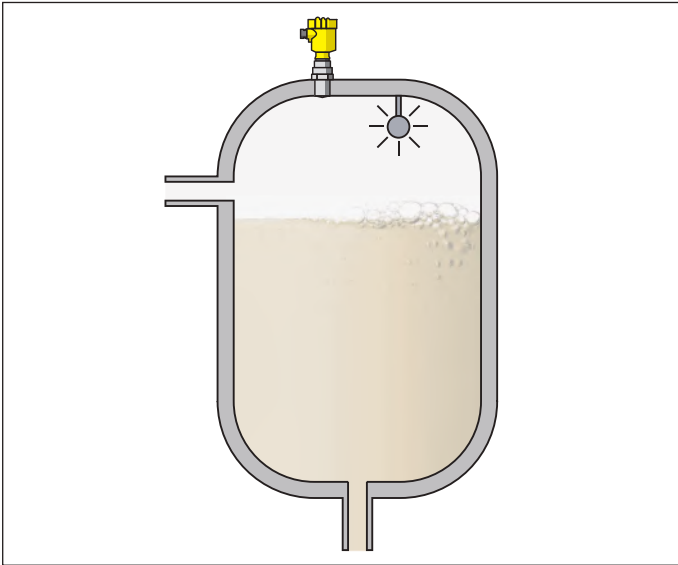


Fig. 29: Level measurement in a small process vessel with VEGAPULS 64

The strongly focussed measuring signal of VEGAPULS 64 offers considerable advantages particularly in small process vessels in the food processing industry. The sensor operates reliably even with frequently changing filling and emptying processes.

**Storage tank**

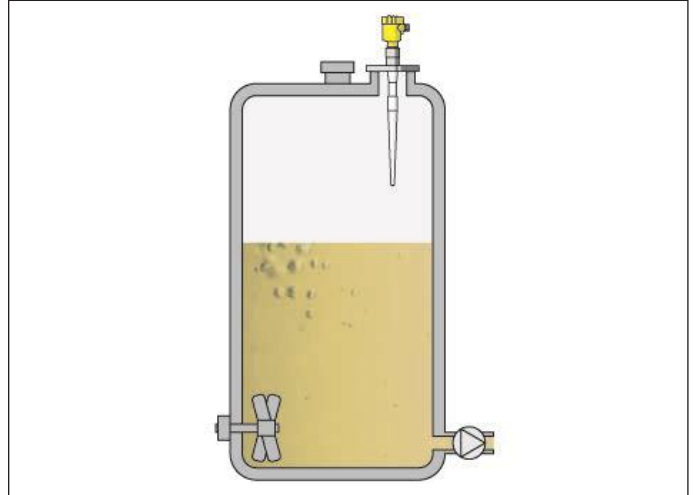


Fig. 30: Level measurement in a storage tank with VEGAPULS 65

The VEGAPULS 65 radar sensor is particularly suitable for level measurement in a storage tank.

**Storage tower**

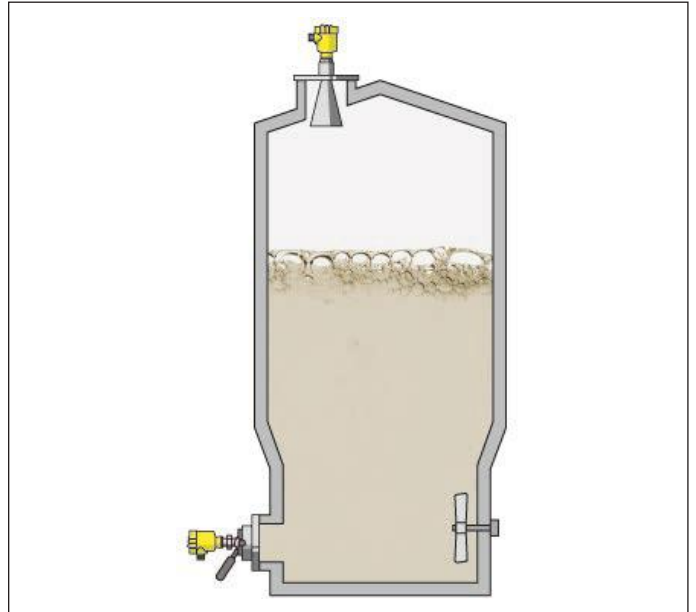


Fig. 31: Level measurement in a storage tower with VEGAPULS 66

The VEGAPULS 66 radar sensor is particularly suitable for level measurement in a storage tower for paper suspension.

With the large antenna and the low frequency measuring system, the sensor functions even in case of steam and fluctuating surface.

## 8 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<sup>2</sup>C 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  $9.6\text{ V} < U_N < 14\text{ V}: \leq 0.7\text{ V}_{\text{eff}}$  (16 ... 400 Hz)
  - for  $18\text{ V} < U_N < 35\text{ V}: \leq 1.0\text{ V}_{\text{eff}}$  (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

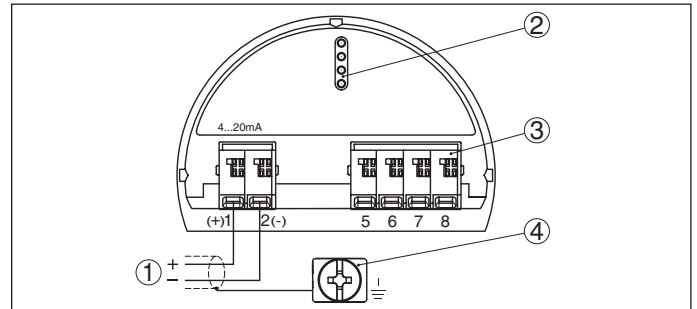


Fig. 32: Electronics and connection compartment, single chamber housing

- 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 screen

#### Double chamber housing

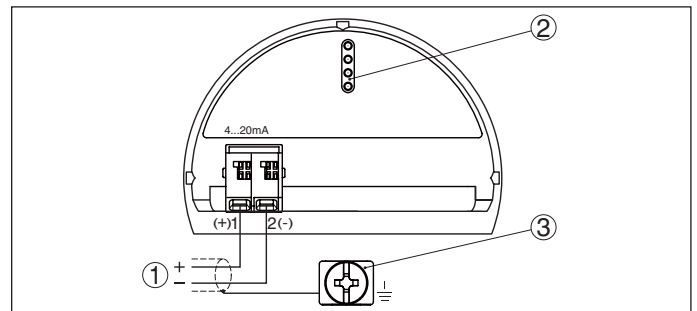


Fig. 33: Connection compartment, double chamber housing

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

### Wire assignment connection cable VEGAPULS WL 61

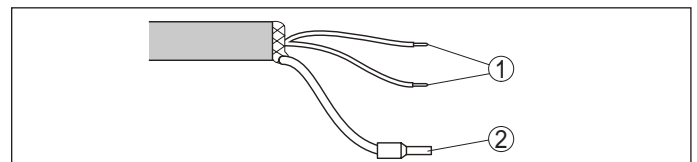


Fig. 34: Wire assignment in permanently connected connection cable

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

## 9 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<sup>2</sup>C 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 voltage 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

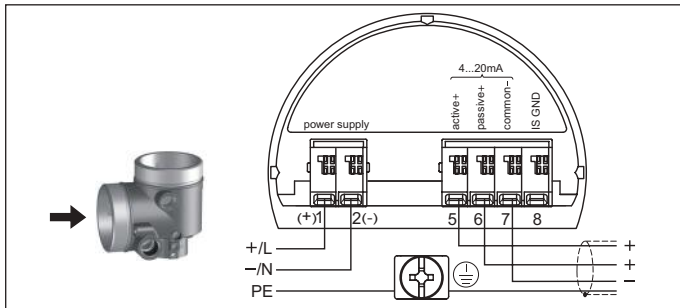


Fig. 35: Connection compartment, double chamber housing

- 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	

## 10 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<sup>2</sup>C 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

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

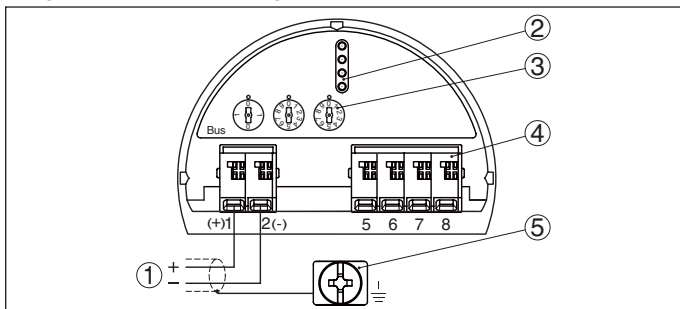


Fig. 36: Electronics and connection compartment, single chamber housing

- 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 screen

#### Connection, double chamber housing

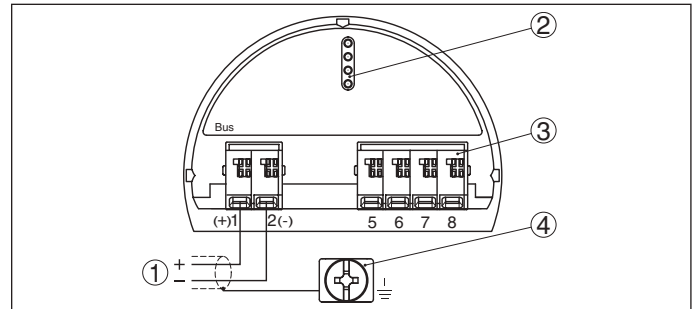


Fig. 37: Connection compartment, double chamber housing

- 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 screen

#### Wire assignment connection cable VEGAPULS WL 61

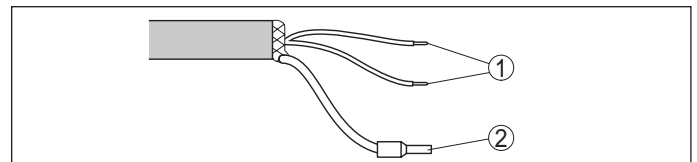


Fig. 38: Wire assignment in permanently connected connection cable

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

## 11 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<sup>2</sup>C 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

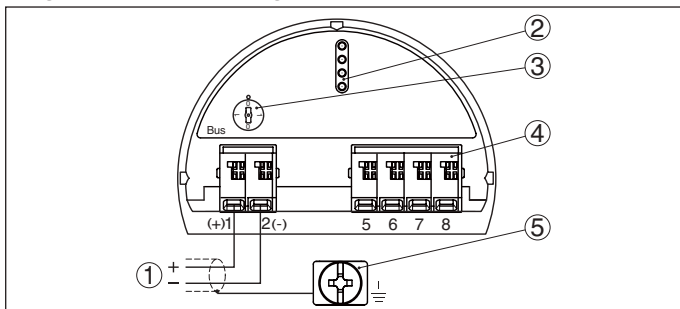


Fig. 39: Electronics and connection compartment, single chamber housing

- 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 screen

#### Connection, double chamber housing

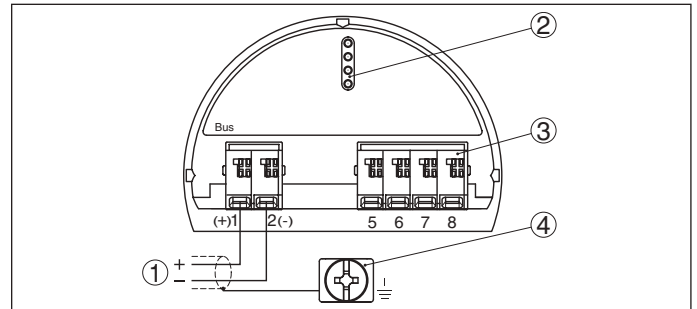


Fig. 40: Connection compartment, double chamber housing

- 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 screen

#### Wire assignment connection cable VEGAPULS WL 61

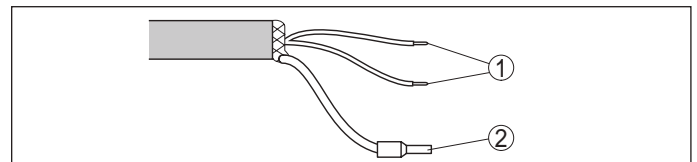


Fig. 41: Wire assignment in permanently connected connection cable

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



## 12 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<sup>2</sup>C 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, screened 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 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

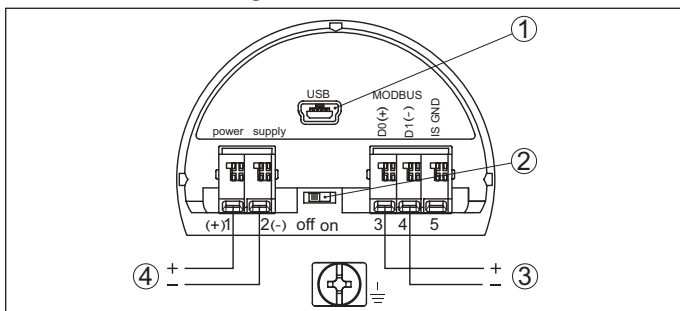


Fig. 42: Connection compartment

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

## 13 Adjustment

### 13.1 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. 43: 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. 44: 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. 45: 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.

### 13.2 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.

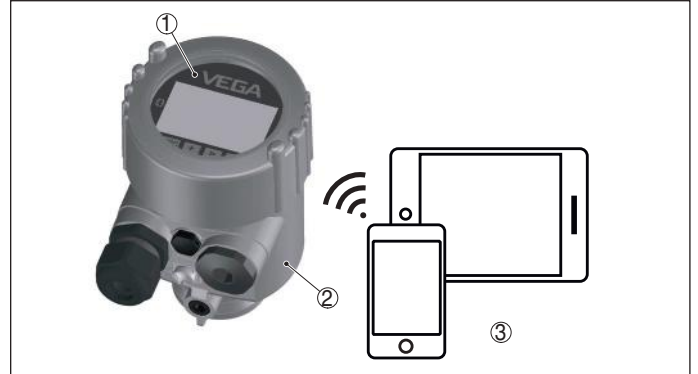


Fig. 46: Wireless connection to smartphones/tablets

- 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. 47: Connection of the PC via Bluetooth USB adapter

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

### 13.3 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.

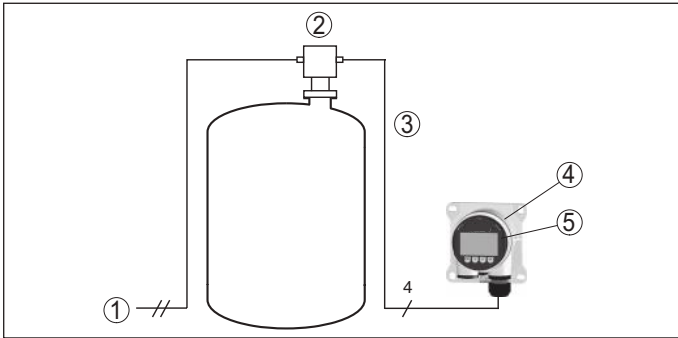


Fig. 48: Connection of VEGADIS 81 to the sensor

- 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

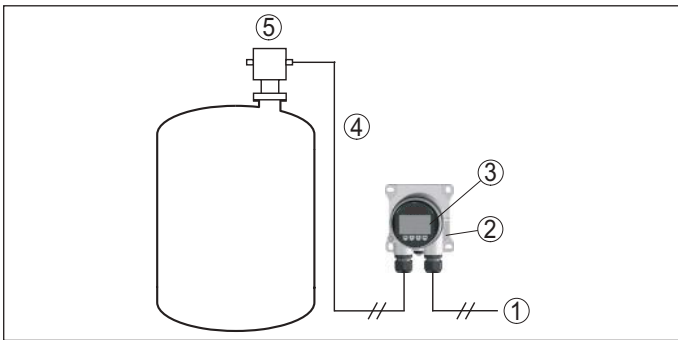


Fig. 49: Connection of VEGADIS 82 to the sensor

- 1 Voltage supply/Signal output sensor
- 2 External display and adjustment unit
- 3 Display and adjustment module
- 4 ... 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.

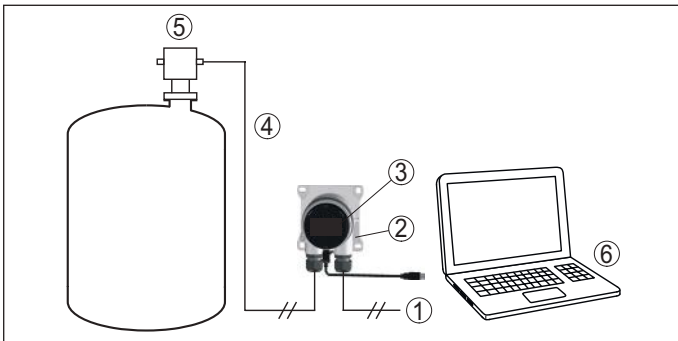


Fig. 50: Connection of VEGADIS 82 to the sensor, adjustment via PC with PACTware

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

**13.4 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.

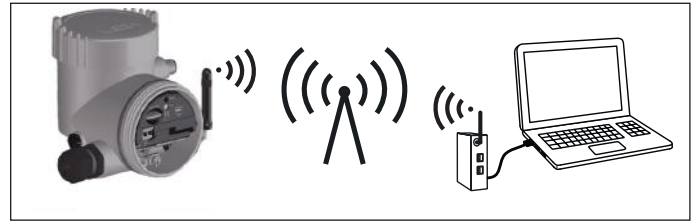


Fig. 51: Transmission of measured values and remote parameter adjustment of the sensor via mobile phone network.

**13.5 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](http://www.vega.com/downloads) under "Software".

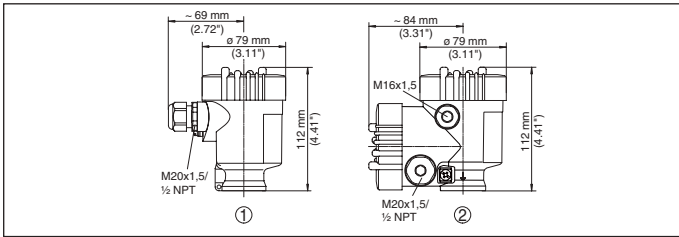
**Field Communicator 375, 475**

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.

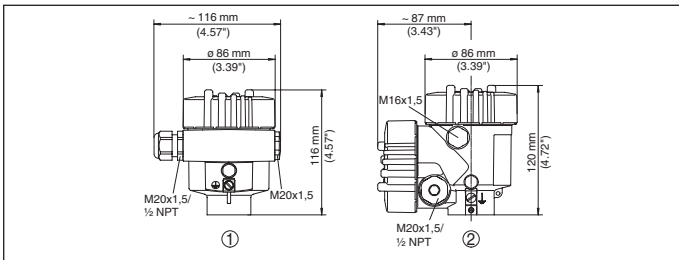
## 14 Dimensions

### Plastic housing



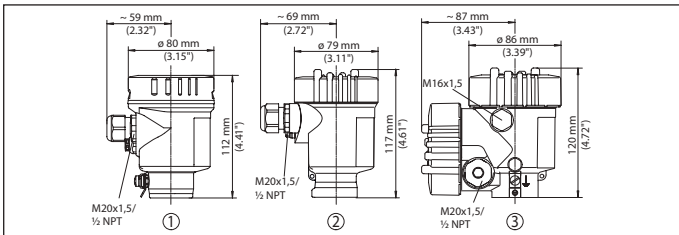
- 1 Single chamber housing
- 2 Double chamber housing

### 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

### VEGAPULS WL 61

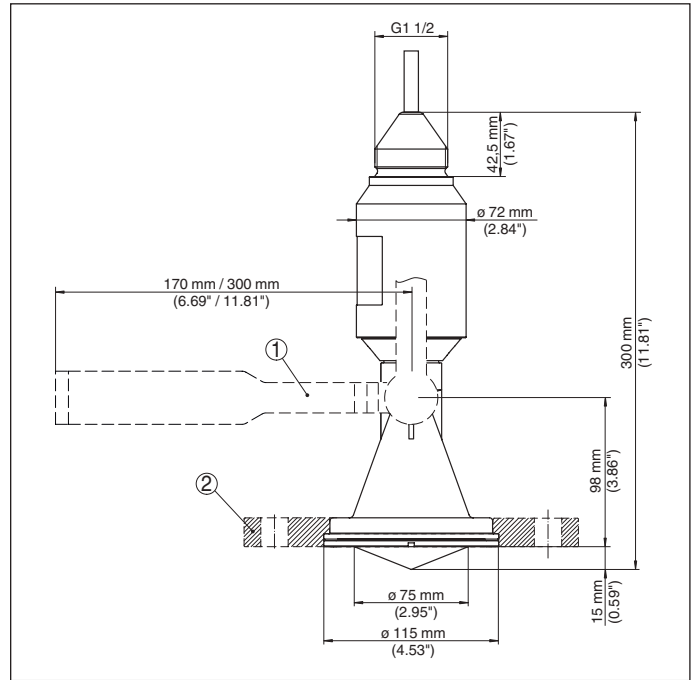
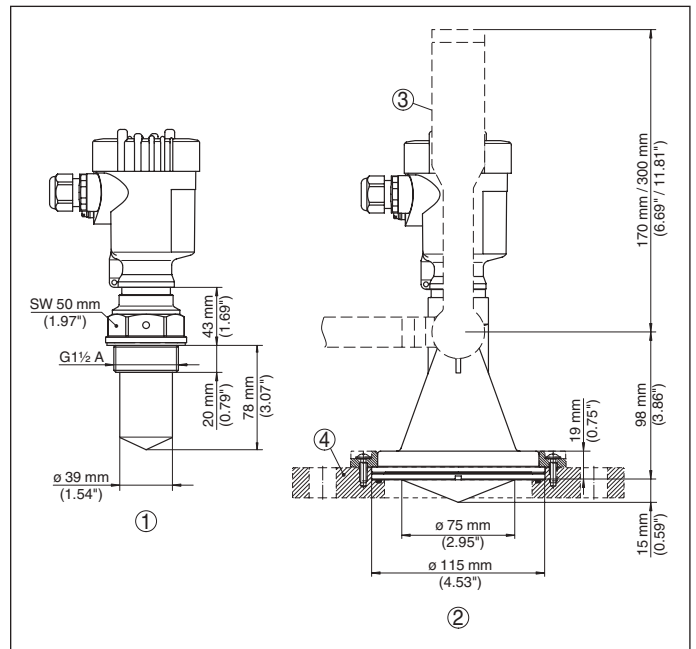


Fig. 55: Dimensions VEGAPULS

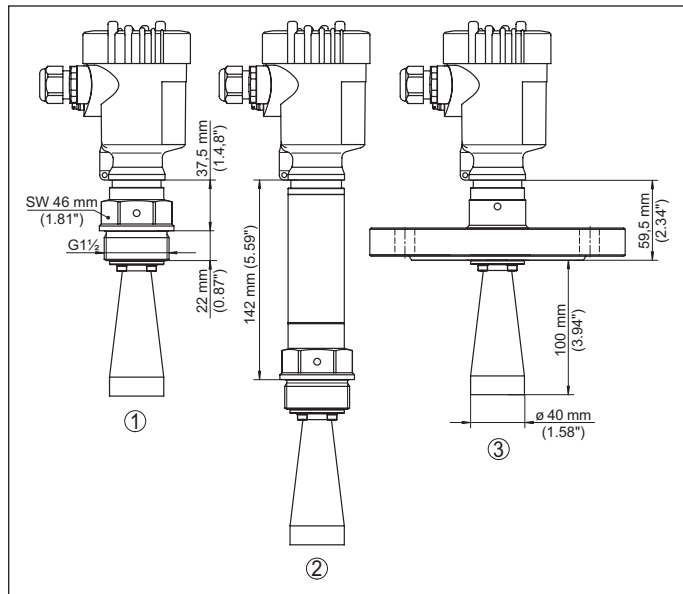
- 1 Mounting strap
- 2 Combi compression flange

### VEGAPULS 61



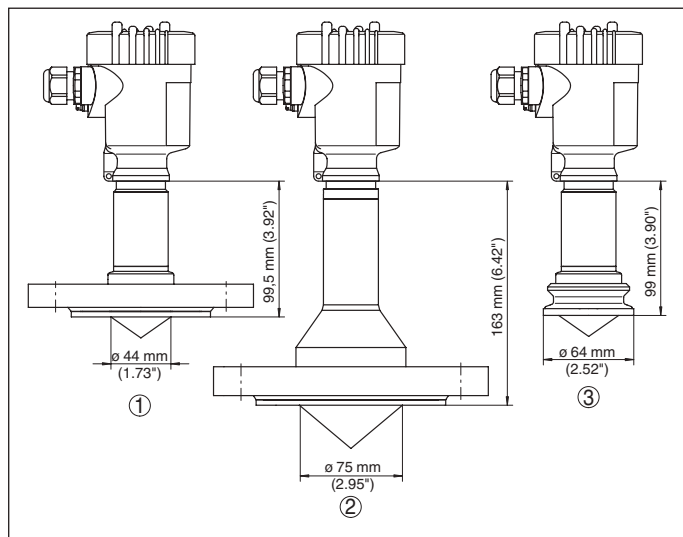
- 1 Version with encapsulated antenna system (ø 40 mm)
- 2 Version with plastic horn antenna (ø 80 mm)
- 3 Mounting strap
- 4 Adapter flange

**VEGAPULS 62**



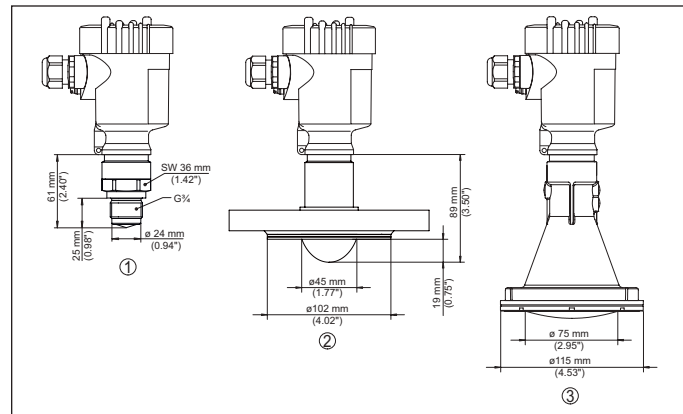
- 1 Threaded version
- 2 Threaded version with temperature adapter up to 250 °C
- 3 Flange version

**VEGAPULS 63**



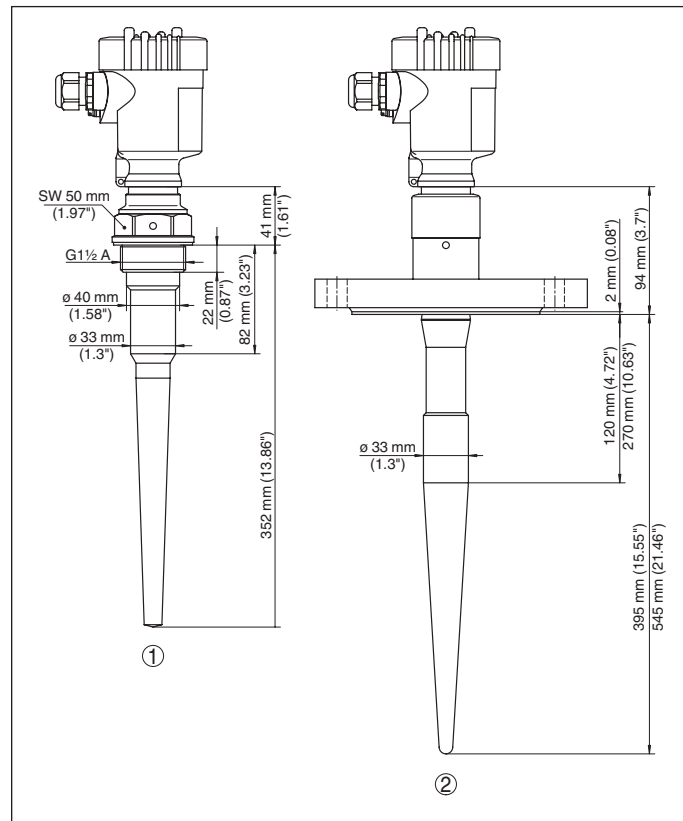
- 1 Flange version DN 50
- 2 Flange version DN 80
- 3 Clamp version 2"

**VEGAPULS 64**



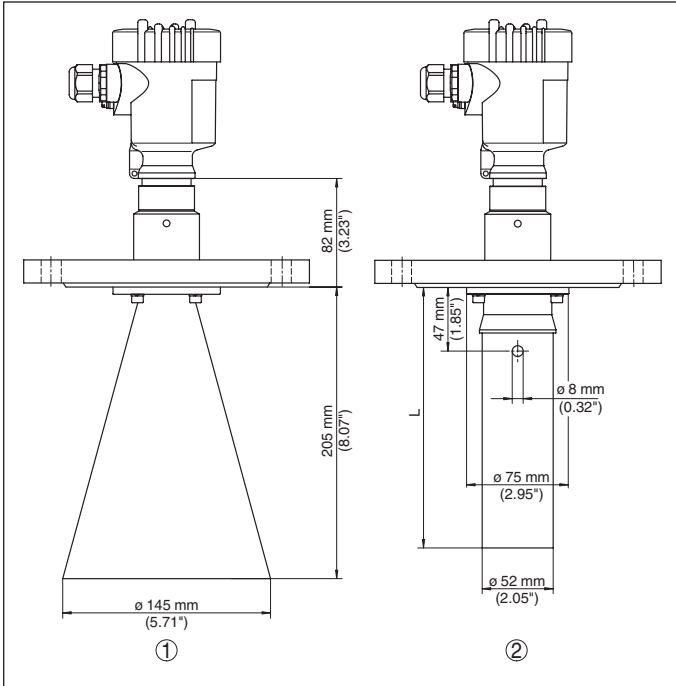
- 1 Version thread with integrated horn antenna G $\frac{3}{4}$
- 2 Version flange with encapsulated antenna system DN 80
- 3 Version with plastic horn antenna DN 80

**VEGAPULS 65**



- 1 Threaded version G1 $\frac{1}{2}$
- 2 Flange version DN 80

## VEGAPULS 66



- 1 Version with horn antenna  $\varnothing$  145 mm  
 2 Version with standpipe antenna

The listed drawings represent only an excerpt of the available process fittings. You can find more drawings at [www.vega.com/downloads](http://www.vega.com/downloads) under "Drawings".







All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.  
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