Level measurement in bulk solids

Radar

# VEGAPULS 67
# VEGAPULS 68

## Product Information

VEGA

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**Take note of safety instructions for Ex applications**

Please note the Ex specific safety information which you can find on our homepage www.vega.com\services\downloads and which comes with every 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.

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# 1 Description of the measuring principle

**Measuring principle**

Extremely short microwave pulses with low emitted power are transmitted by the antenna system to the measured product, reflected by the product surface and received back by the antenna system. Radar waves travel at the speed of light. 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.

The latest microprocessor technology and the proven software ECHOFOX select the level echo from among a large number of false echoes and measure it precisely.

By simply entering the vessel dimensions, a level-proportional signal is generated from the distance. It is not necessary to fill the vessel for the adjustment.

**Wide application range**

VEGAPULS 67 and 68 radar sensors are particularly suitable for level measurement of bulk solids. The mechanical construction as well as the electronics were optimized for this application. Through the special horn and parabolic antennas and the improved dynamic range of the receiver, levels in measuring ranges up to 70 m (230 ft) can be measured. A reliable measurement is possible with dielectric values from 1.6.

**Versions for real-world applications**

Adaptable sensors are required for the widely varying product characteristics and mounting situations. That is why VEGAPULS 67 and 68 radar sensors are available with flange fittings, mounting strap as well as swivelling holder. An integrated connection for air rinsing is also available with VEGAPULS 68. An optional temperature adapter extends the application range to product temperatures up to 200 °C (392 °F). Mounting is very easy and requires no additional work at the measuring site.

**Independent of product characteristics**

Fluctuations in product composition or even complete product changes do not influence the measuring result. A fresh adjustment is not necessary.

**Device selection**

VEGAPULS 67 and 68 radar sensors are available with different horn and parabolic antennas. This yields a variety of instrument-specific beam angles and measurement characteristics. The selection of a suitable antenna depends on the respective application. For detailed selection you can use the tools "*Finder*" and "*Configurator*" on our website or contact one of our agencies.

## 1.1 Application examples

**Plastic granules**

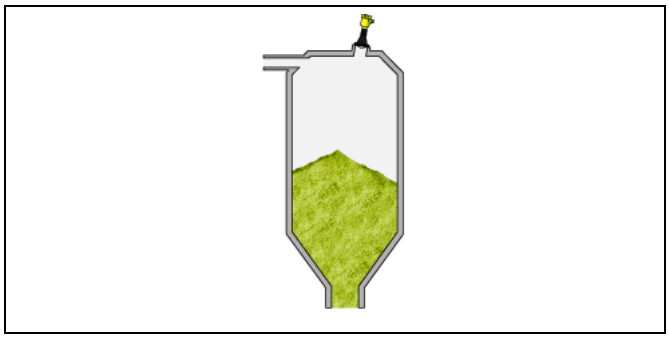

*Fig. 1: Level measurement in a plastic granules silo with VEGAPULS 67*

Plastic granules and powder are often stored in high, narrow silos which are filled pneumatically. Typical conditions are filling noise, material cones and poor reflective properties.

The high sensitivity of the VEGAPULS 67 sensor guarantees ample performance reserves for reliable level measurement even with widely varying product surface geometries.

**Clinker silo**

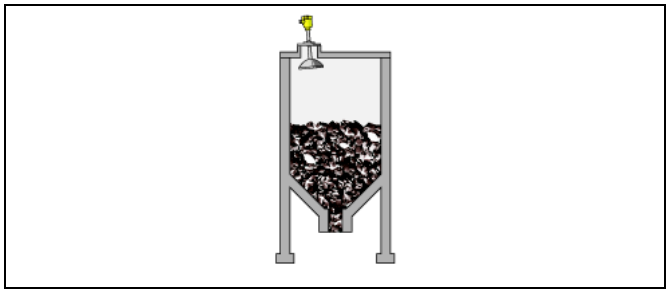

*Fig. 2: Level measurement in a clinker silo with VEGAPULS 68*

Clinker is an additive for concrete and is stored in large silos or bunkers. Its abrasive properties as well as extreme dust generation during filling place heavy demands on the level measurement.

The VEGAPULS 68 sensor is the optimum solution for level measurement. Its parabolic antenna powerfully focuses the microwaves, thus generating a strong useful signal. Interference from struts or installations is excluded.

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# 2 Type overview

| | VEGAPULS 67 | VEGAPULS 68 |
|---|---|---|
| |  |  |
| Preferred application: | Bulk solids | Bulk solids |
| Measuring range: | up to 15 m (49.21 ft) | up to 70 m (229.66 ft) |
| Process fitting: | Mounting strap, compression flange, adapter flange | Thread, swivelling holder, flange |
| Material: | PPH | 316L, Hastelloy C22 plated, Hastelloy C22 |
| Process temperature: | -40 … +80 °C (-40 … +392 °F) | -40 … +200 °C (-40 … +176 °F) |
| Process pressure: | -1 … 3 bar/-100 … 300 kPa (-14.5 … 43.51 psi) | -1 … 6 bar/-100 … 600 kPa (-14.5 … 87.02 psi) |
| Signal output: | 4 … 20 mA/HART in two-wire, four-wire, Profibus PA, Foundation Fieldbus technology | 4 … 20 mA/HART in two-wire, four-wire, Profibus PA, Foundation Fieldbus technology |
| Adjustment/Indication: | PLICSCOM | PLICSCOM |
| Remote adjustment/ indication: | VEGADIS 61 | VEGADIS 61 |

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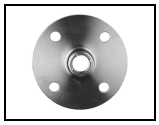
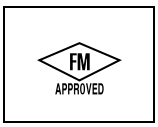
| | | | | |
|---|---|---|---|---|
| **Indicating and adjustment module** |  PLICSCOM | | | |
| **Housing** |  Plastic |  Stainless steel |  Aluminium |  Aluminium (double chamber) |
| **Electronics** |  4 … 20 mA/HART |  4 … 20 mA/HART four-wire |  Profibus PA |  Foundation Field-bus |
| **Process fitting** |  Thread |  Flange |  Flange with swivel-ling holder | |
| **Sensors** |  Plastic horn anten-na |  Stainless steel horn antenna |  Parabolic antenna | |
| **Approvals** |  Gas explosion pro-tection |  Dust-explosion pro-tection |  FM |  CSA |

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# 3 Mounting instructions

### Measuring range VEGAPULS 67

The reference plane for the measuring range of the sensors is the contact surface on the side of the antenna.

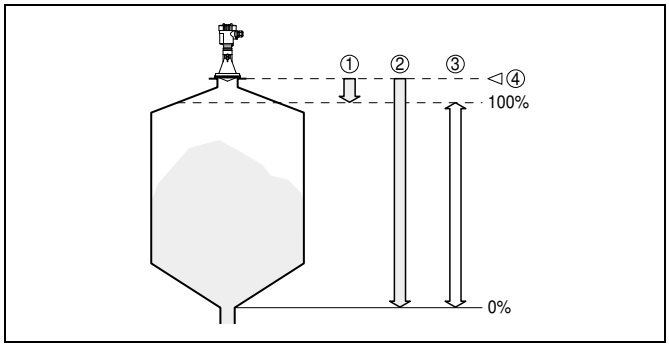


*Fig. 3: Measuring range (operating range) and max. measuring distance*

*1 full*
*2 empty (max. measuring distance)*
*3 Measuring range*
*4 Reference plane*

### Measuring range VEGAPULS 68

The reference plane for the measuring range of the sensors is the lower edge of the flange or the seal surface of the thread.

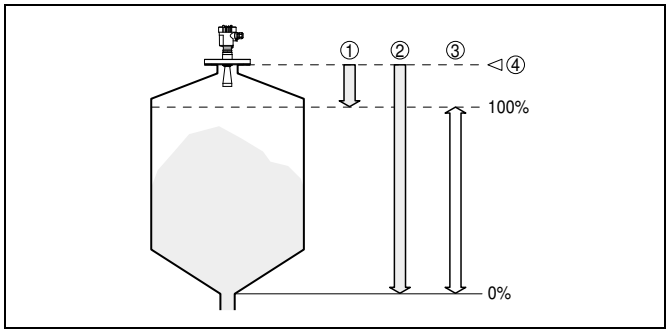


*Fig. 4: Measuring range (operating range), max. measuring distance and reference plane*

*1 full*
*2 empty (max. measuring distance)*
*3 Measuring range*
*4 Reference plane*

### Mounting position

Mount the sensor at least 200 mm (7.874 in) away from the vessel wall.

To measure as much of the vessel volume as possible, the sensor should be aligned so that the measuring beam reaches the lowest level in the vessel. In a cylindrical silo with conical outlet, the easiest way is to mount the instrument in the center of the silo.

### Mounting and alignment of VEGAPULS 67

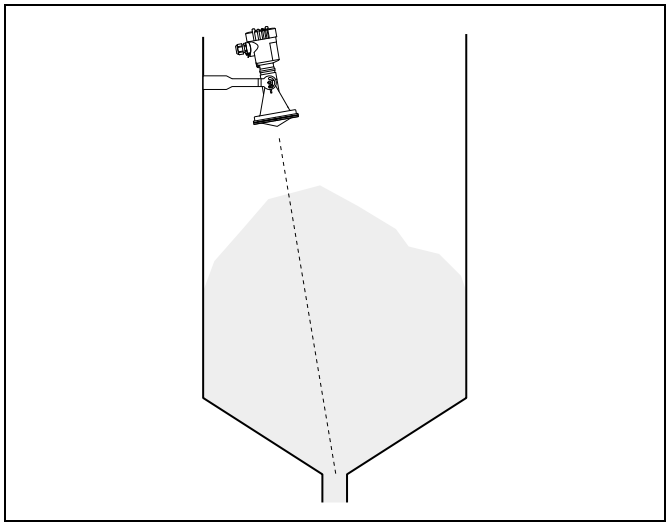

*Fig. 5: Mounting with mounting strap and alignment in open vessel*

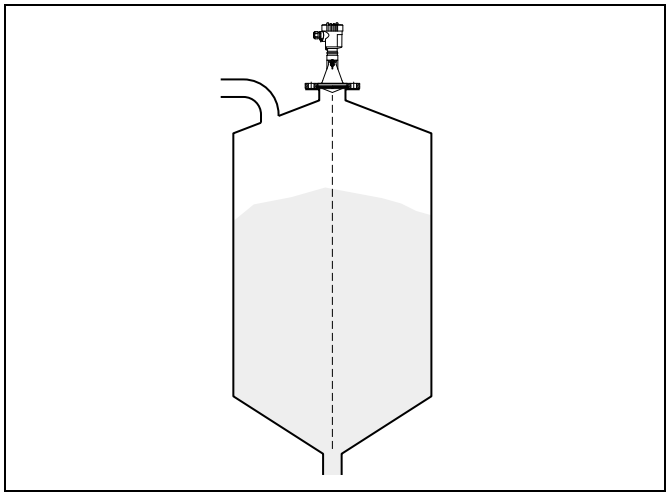

*Fig. 6: Flange mounting and alignment in closed vessel*

### Mounting and alignment of VEGAPULS 68

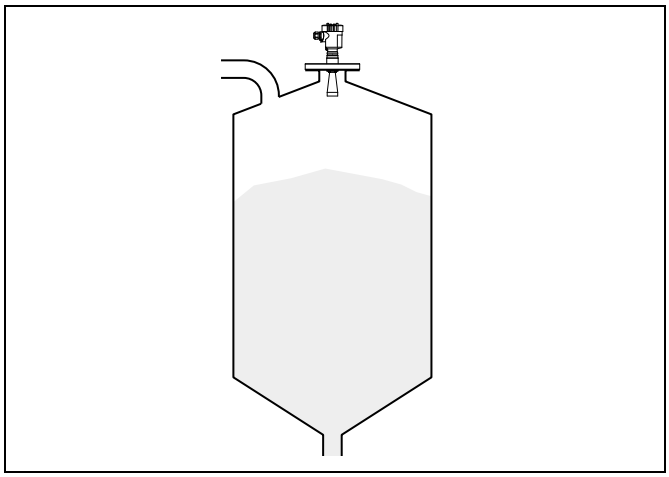

*Fig. 7: Alignment of VEGAPULS 68 when mounted in center of silo*

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If mounting in the center of the silo is not possible, the sensor can be aligned towards the vessel center by means of an optional swivelling holder. The description in the operating instructions manual of the sensors gives a simple overview of how to determine the inclination angle.

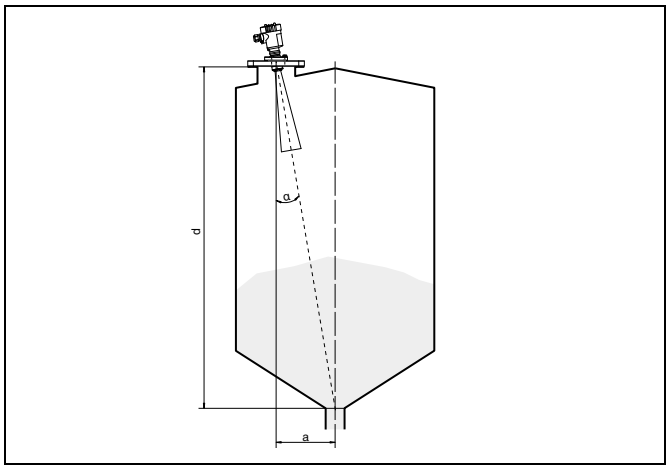


*Fig. 8: Installation and alignment of VEGAPULS 68 when mounted outside the silo center.*

**Socket VEGAPULS 67**
For mounting VEGAPULS 67 on a socket, an appropriate compression flange for DN 80 (ASME 3" or JIS 80) as well as a suitable adapter flange are available.

To keep false reflections from a vessel socket to a minimum, the socket should be as short as possible. The socket end should be rounded.

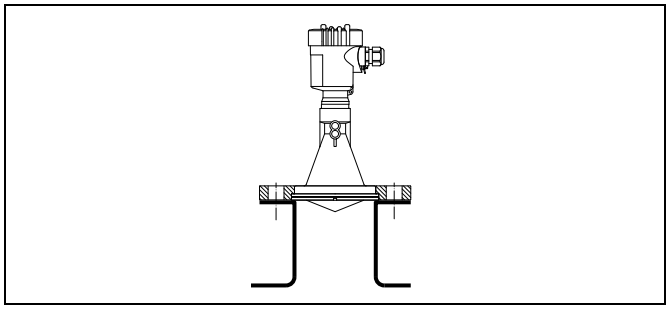

*Fig. 9: Recommended socket mounting*

If the medium has good reflective properties, VEGAPULS 67 can also be mounted on a longer socket piece. Recommended values for socket heights are specified in the operating instructions manual. You must carry out a false echo storage afterwards.

**Tip:**
In new facilities it is useful to incline the vessel socket in the direction of the outlet. False reflections from the vessel wall are thus reduced and measurement all the way down to the bottom of the conical outlet is possible.

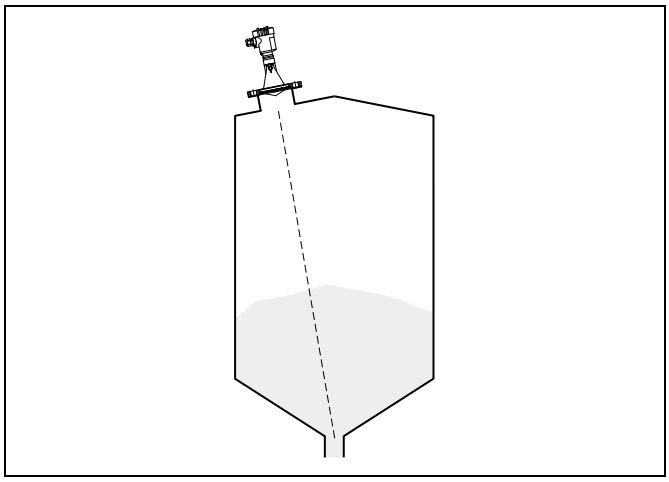

*Fig. 10: Alignment in silos*

**Socket VEGAPULS 68**
The socket piece should be dimensioned in such a way that the antenna end protrudes slightly out of the socket.

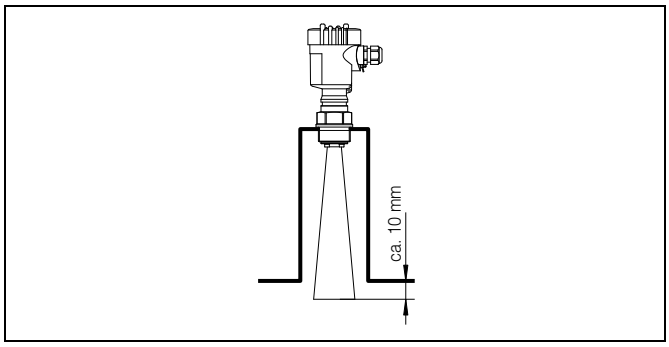


*Fig. 11: Recommended socket mounting*

When using a swivelling holder, keep in mind that the distance between antenna and socket gets smaller as the inclination of the sensor increases. Additional false reflections may be generated which can influence the measuring result at close range.

If the medium has good reflective properties, VEGAPULS 68 can also be mounted on a longer socket piece. Recommended values for socket heights are specified in the operating instructions manual of the sensor.

**Mounting in multiple channel silo**
The silo walls of multiple chamber silos are often made of profile walls, such as e.g. profile sheeting, to ensure the required stability. If the radar sensor is mounted very close to a heavily structured vessel wall, considerable false reflections can be generated. Hence the sensor should be mounted at a large distance from the separating wall. The optimal mounting position is on the outer wall of the silo with the sensor directed towards the emptying aperture in the silo center.

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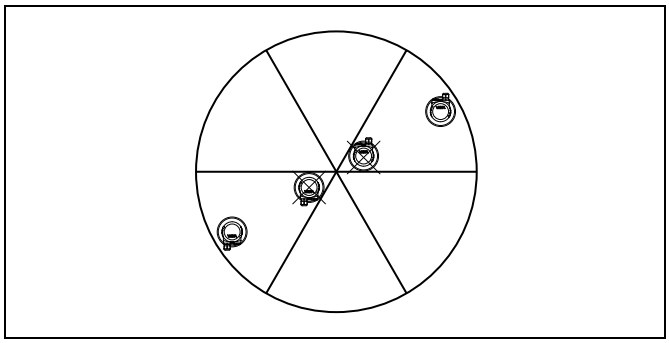

*Fig. 12: Installation in multiple chamber silos*

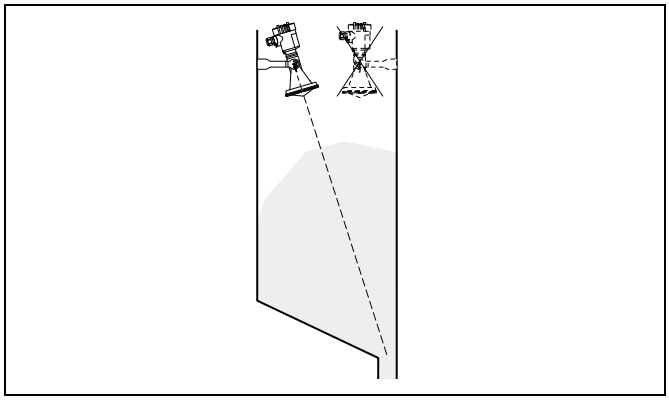

*Fig. 13: Alignment in multiple chamber silos*

**Vessel installations**
Silo installations such as e.g. ladders, level switches, struts, and also structured vessel walls, can cause false echoes that get superimposed on the useful echo. The mounting location of the radar sensor should be a place where no installations cross the microwave signals. Make sure when planning your measurement loop that the radar signals have a "clear view" to the product.

**Material heaps**
Large material heaps are best measured with several instruments, which can be mounted on e.g. traverse cranes. For this type of application it is advantageous to orient the sensor perpendicular to the bulk solid surface.

The sensors do not influence each other.

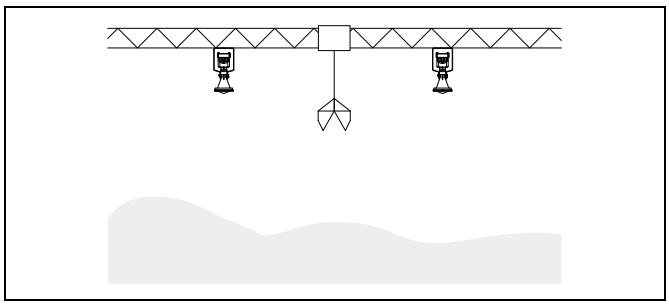

*Fig. 14: Radar sensors on traverse crane*

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# 4 Electrical connection

## 4.1 General requirements

The supply voltage range can differ depending on the instrument version. You can find exact specifications in chapter "*Technical data*".

The national installation standards as well as the valid safety regulations and accident prevention rules must be observed.

In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units.

## 4.2 Voltage supply

**4 … 20 mA/HART two-wire**
The VEGA power supply units VEGATRENN 149AEx, VEGASTAB 690, VEGADIS 371 as well as VEGAMET signal conditioning instruments are suitable for power supply. When one of these instruments is used, a reliable separation of the supply circuits from the mains circuits according to DIN VDE 0106 part 101 is ensured for the sensor.

**4 … 20 mA/HART four-wire**
Power supply and current output are carried on two separate connection cables.

The standard version can be operated with an earth-connected current output, the Exd version must be operated with a floating output.

The instrument is designed in protection class I. To maintain this protection class, it is absolutely necessary that the ground conductor be connected to the internal ground conductor terminal.

**Profibus PA**
Power is supplied by a Profibus DP/PA segment coupler or a VEGALOG 571 EP input card.

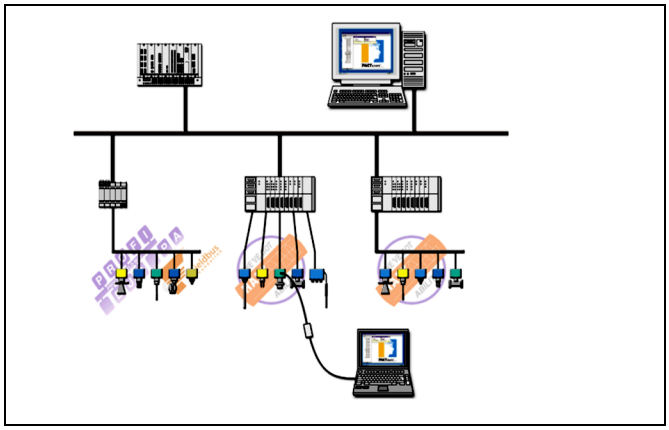

*Fig. 15: Integration of instruments in a Profibus PA system via segment coupler DP/PA or data recording systems with Profibus PA input card*

**Foundation Fieldbus**
Power supply via the H1 Fieldbus cable.

## 4.3 Connection cable

**In general**
The sensors are connected with standard cable without screen. An outer cable diameter of 5 … 9 mm ensures the seal effect of the cable entry.

**4 … 20 mA/HART two-wire and four-wire**
If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used. In HART multidrop mode the use of screened cable is generally recommended.

**Profibus PA, Foundation Fieldbus**
The installation must be carried out according to the appropriate bus specification. The sensor is connected respectively with screened cable according to the bus specification. Make sure that the bus is terminated via appropriate terminating resistors.

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

In Ex applications, the corresponding installation regulations must be noted for the connection cable.

## 4.4 Connection of the cable screen and grounding

If screened cable is necessary, the cable screen must be connected on both ends to ground potential. If potential equalisation currents are expected, the connection on the evaluation side must be made via a ceramic capacitor (e.g. 1 nF, 1500 V).

**Profibus PA, Foundation Fieldbus**
In systems with potential separation, the cable screen is connected directly to ground potential on the power supply unit, in the connection box and directly on the sensor.

In systems without potential equalisation, connect the cable screen directly to ground potential only at the power supply unit and at the sensor - do not connect to ground potential in the connection box or T-distributor.

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## 4.5 Wiring plan

### Single chamber housing

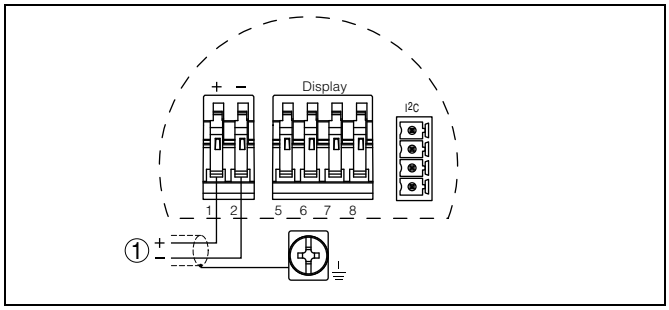


*Fig. 16: Connection HART two-wire, Profibus PA, Foundation Fieldbus*

*1 Voltage supply and signal output*

### Double chamber housing - two-wire

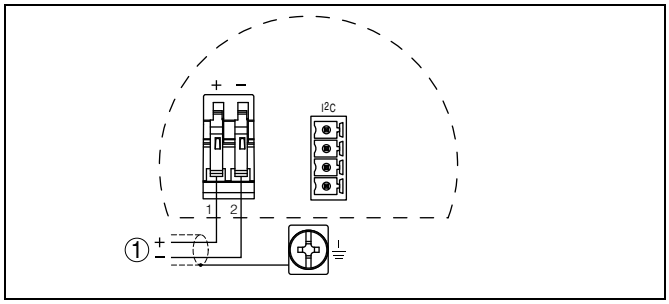


*Fig. 17: Connection HART two-wire, Profibus PA, Foundation Fieldbus*

*1 Voltage supply and signal output*

### Double chamber housing - 4 … 20 mA/HART four-wire

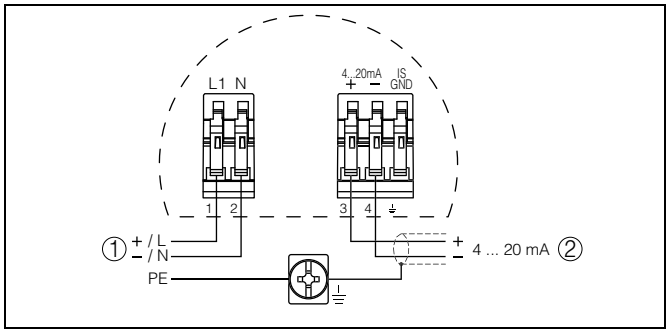


*Fig. 18: Connection 4 … 20 mA/HART four-wire*

*1 Voltage supply*
*2 Signal output*

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

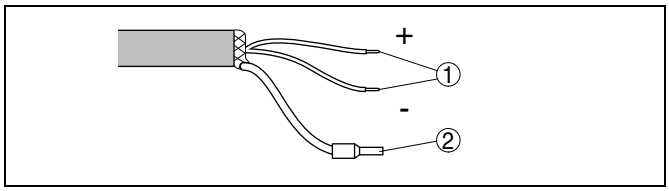


*Fig. 19: Wire assignment, connection cable*

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

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# 5 Operation

## 5.1 Overview

The sensors can be adjusted with the following adjustment media:

- with indicating and adjustment module
- an adjustment software according to FDT/DTM standard, e.g. PACTware and PC

and, depending on the signal output, also with:

- A HART handheld (4 … 20 mA/HART)
- The adjustment program AMS (4 … 20 mA/HART and Foundation Fieldbus)
- The adjustment program PDM (Profibus PA)
- A configuration tool (Foundation Fieldbus)

The entered parameters are generally saved in the sensor, optionally also in the indicating and adjustment module or in the adjustment program.

## 5.2 Adjustment with the indicating and adjustment module PLICSCOM

**Setup and indication**

PLICSCOM is a pluggable indication and adjustment module for plics® sensors. It can be placed in four different positions on the instrument (each displaced by 90°). Indication and adjustment are carried out via four keys and a clear, graphic-capable dot matrix display. The adjustment menu with language selection is clearly structured and enables easy setup. After setup, PLICSCOM serves as indicating instrument: through the screwed cover with glass insert, measured values can be read directly in the requested unit and presentation style.

The integrated background lighting of the display can be switched on via the adjustment menu.[1)]

**PLICSCOM adjustment**

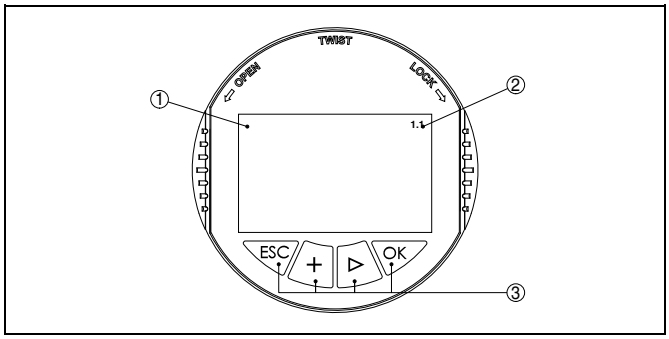


*Fig. 20: Indicating and adjustment elements*

*1 LC display*
*2 Indication of the menu item number*
*3 Adjustment keys*

**Key functions**

- ***[OK]*** key:
  - Move to the menu overview
  - Confirm selected menu
  - Edit parameter
  - Save value
- ***[->]*** key to select:
  - menu change
  - list entry
  - Select editing position
- ***[+]*** key:
  - Change value of the parameter
- ***[ESC]*** key:
  - interrupt input
  - jump to the next higher menu

## 5.3 Adjustment with PACTware

**PACTware/DTM**

Independent of the respective signal output 4 … 20 mA/HART, Profibus PA or Foundation Fieldbus, the sensors can be adjusted with PACTware directly on site. The sensors with signal output 4 … 20 mA/HART can be also operated via the HART signal on the signal cable.

A VEGACONNECT interface adapter as well as an instrument driver for the respective sensor is necessary for adjustment with PACTware. All currently available VEGA DTMs are included as a DTM Collection with the current PACTware version on a CD. They can be purchased for a token fee from the responsible VEGA agency. In addition, this DTM Collection incl. the basic version of PACTware can be downloaded free of charge from the Internet.

To use the entire range of functions of a DTM, incl. project documentation, a DTM licence is required for that particular instrument family. This licence can be bought from the VEGA agency serving you.

1) For instruments with national approvals such as e.g. according to FM or CSA, only available at a later date.

**Connection of the PC via VEGACONNECT**

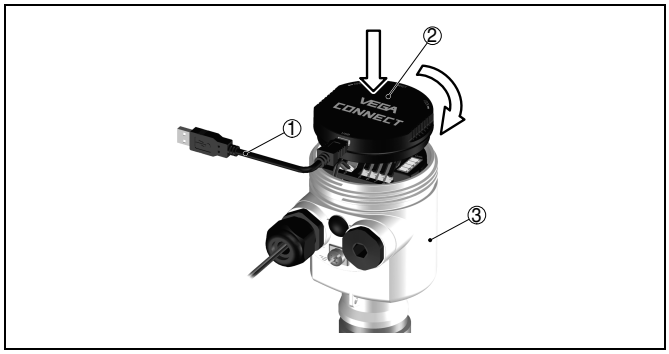


*Fig. 21: Connection of the PC via VEGACONNECT directly to the sensor*

*1 USB cable to the PC*
*2 VEGACONNECT*
*3 Sensor*

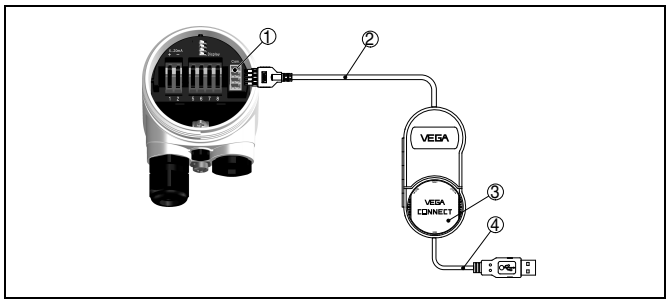


*Fig. 22: Connection via I²C connection cable*

*1 I²C bus (com.) interface on the sensor*
*2 I²C connection cable of VEGACONNECT*
*3 VEGACONNECT*
*4 USB cable to the PC*

Necessary components:

- 
- PC with PACTware and suitable VEGA DTM
- VEGACONNECT
- Power supply unit or processing system

## 5.4 Adjustment with other adjustment programs

**PDM**

For VEGA PA sensors, instrument descriptions for the adjustment program PDM are available as EDD. The instrument descriptions are already implemented in the current version of PDM. For older versions of PDM, a free-of-charge download is available via Internet.

**AMS**

For VEGA FF sensors, instrument descriptions for the adjustment program AMS™ are available as DD. The instrument descriptions are already implemented in the current version of AMS™. For older versions of AMS™, a free-of-charge download is available via Internet.

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# 6 Technical data

## General data VEGAPULS 67

316L corresponds to 1.4404 or 1.4435, 304 corresponds to 1.4301

| | |
|---|---|
| Materials, wetted parts | |
| – Horn antenna | PBT-GF30 |
| – Focussing lens | PP |
| – Adapter flange | PPH |
| – Seal, adapter flange | FKM (Viton) |
| Materials, non-wetted parts | |
| – Compression flange | PPH |
| – Mounting strap | 304 |
| – Fixing screws, mounting strap | 316L |
| – Fixing screws, adapter flange | 304 |
| – Housing | Plastic PBT (polyester), Alu die-casting powder-coated, 316L |
| – Seal between housing and housing cover | NBR (stainless steel housing), silicone (Alu/plastic housing) |
| – Inspection window in housing cover for PLICSCOM | Polycarbonate (UL-746-C listed) |
| – Ground terminal | 316Ti/316L |
| Weight | 0.7 … 3.4 kg (1.5 … 7.5 lbs), depending on the process fitting and housing material |

## General data VEGAPULS 68

316L corresponds to 1.4404 or 1.4435

| | |
|---|---|
| Materials, wetted parts | |
| – Process fitting | 316L, Hastelloy C22, Hastelloy C22 plated |
| – Seal - process fitting 316L | Klingersil C-4400 |
| – Antenna | 316L, 316L electropolished, Hastelloy C22 |
| – Antenna cone | PTFE (TFM 1600) |
| – seal, antenna system | FKM (Viton), FFKM (Kalrez 2035, 6230, 6375) |
| Materials, non-wetted parts | |
| – Housing | Plastic PBT (polyester), Alu die-casting powder-coated, 316L |
| – Seal between housing and housing cover | NBR (stainless steel housing), silicone (Alu/plastic housing) |
| – Inspection window in housing cover for PLICSCOM | Polycarbonate (UL-746-C listed) |
| – Ground terminal | 316Ti/316L |
| Weight with horn antenna | |
| – Process fitting - thread | 2 … 2.8 kg (4.4 … 6.2 lbs), depending on thread size and housing |
| – Process fitting - flange | 4.2 … 15.4 kg (9.3 … 34 lbs), depending on flange size and housing |
| – Process fitting - swivelling holder with flange | 5.2 … 16.4 kg (11.5 … 35.2 lbs), depending on the flange size and housing |
| Weight with parabolic antenna | |
| – Process fitting - thread | 2.8 … 3.6 kg (6.2 … 13.7 lbs), depending on thread size and housing |
| – Process fitting - flange | 5 … 16.2 kg (11 … 35.7 lbs), depending on the flange size and housing |
| – Process fitting - swivelling holder with flange | 6 … 17.2 kg (13.2 … 37.9 lbs), depending on the flange size and housing |

## Output variable

**4 … 20 mA/HART**

| | |
|---|---|
| Output signal | 4 … 20 mA/HART |
| Signal resolution | 1.6 µA |
| Fault message | Current output unchanged 20.5 mA, 22 mA, < 3.6 mA (adjustable) |
| Max. output current | 22 mA |
| Load | |
| – 4 … 20 mA/HART two-wire instrument | see load diagram under Power supply |
| – 4 … 20 mA/HART four-wire instrument | max. 500 Ω[2)] |
| Damping (63 % of the input variable) | 0 … 999 s, adjustable |
| Fulfilled NAMUR recommendations | NE 43 |

**Profibus PA**

| | |
|---|---|
| Output signal | digital output signal, format according to IEEE-754 |
| Sensor address | 126 (default setting) |
| Current value | 10 mA, ±0.5 mA |
| Integration time (63 % of the input variable) | 0 … 999 s, adjustable |

[2)] With inductive load ohmic share min. 25 Ω/mH.

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**Foundation Fieldbus**

| | |
|---|---|
| Output | |
| – Signal | digital output signal, Foundation Fieldbus protocol |
| – Physical layer | according to IEC 61158-2 |
| Channel Numbers | |
| – Channel 1 | Primary Value |
| – Channel 2 | Secondary Value 1 |
| – Channel 3 | Secondary Value 2 |
| Transmission rate | 31.25 Kbit/s |
| Current value | 10 mA, ±0.5 mA |
| Integration time (63 % of the input variable) | 0 … 999 s, adjustable |

## Input variable VEGAPULS 67

| | |
|---|---|
| Measured value | distance between process fitting and product surface |
| Min. distance from antenna end | 50 mm (1.969 in)[3] |
| Measuring range | up to 15 m (49.21 ft) |

## Input variable VEGAPULS 68

| | |
|---|---|
| Measured value | distance between process fitting and product surface |
| Min. distance from antenna end | 400 mm (15.75 in) |
| Max. measuring range | up to 70 m (229.66 ft) |

## Meas. accuracy VEGAPULS 67

| | |
|---|---|
| Resolution, general | > 1 mm (0.039 in) |
| Deviation[4] | see diagrams |

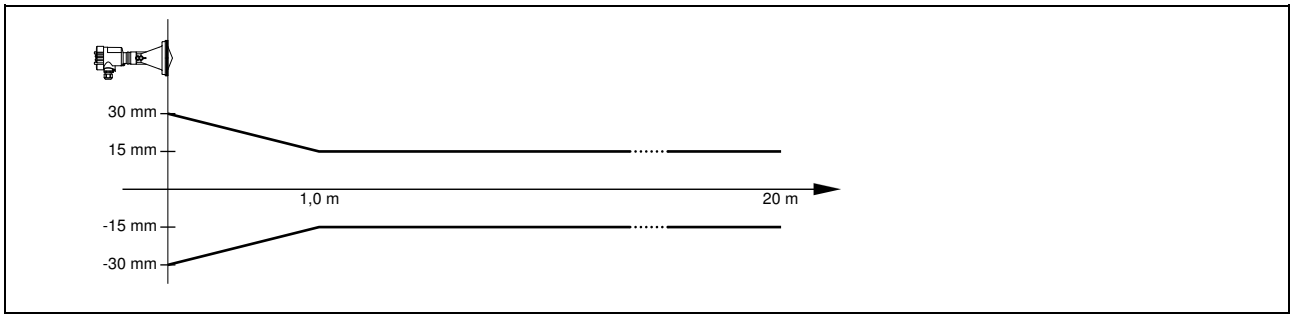


*Fig. 23: Deviation VEGAPULS 67 in mm, meas. range in m*

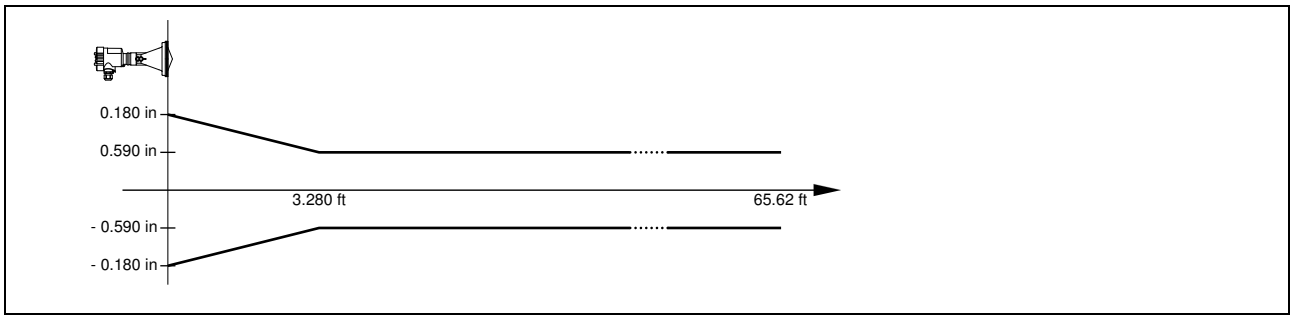


*Fig. 24: Deviation VEGAPULS 67 in Inch, meas. range in ft*

## Meas. accuracy VEGAPULS 68

| | |
|---|---|
| Resolution, general | > 1 mm (0.039 in) |
| Deviation[5] | see diagrams |

[3] In products with low dielectric value up to 50 cm (19.69 in).
[4] Incl. non-linearity, hysteresis and non-repeatability.
[5] Incl. non-linearity, hysteresis and non-repeatability.

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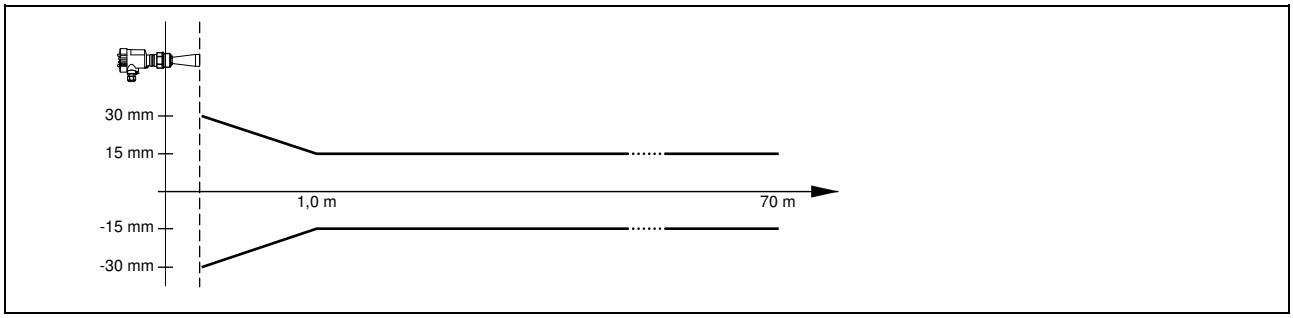


*Fig. 25: Accuracy VEGAPULS 68 with horn antenna in mm, measuring range in m*

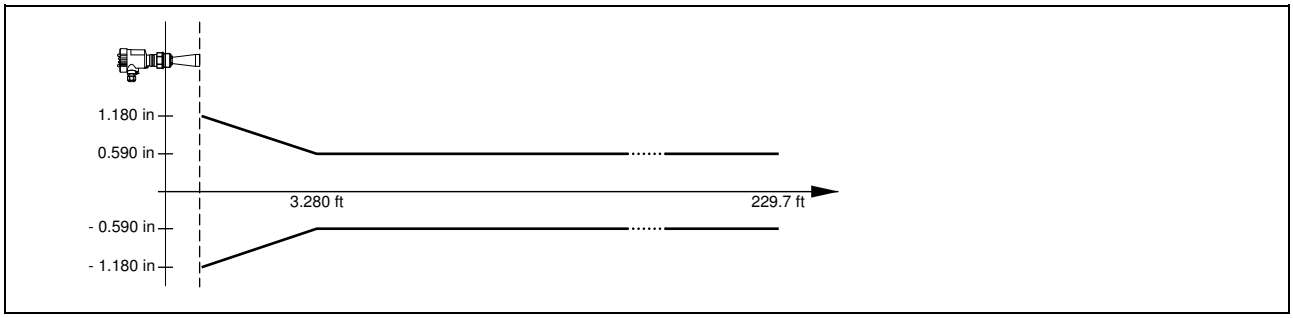


*Fig. 26: Accuracy VEGAPULS 68 with horn antenna in Inch, measuring range in ft*

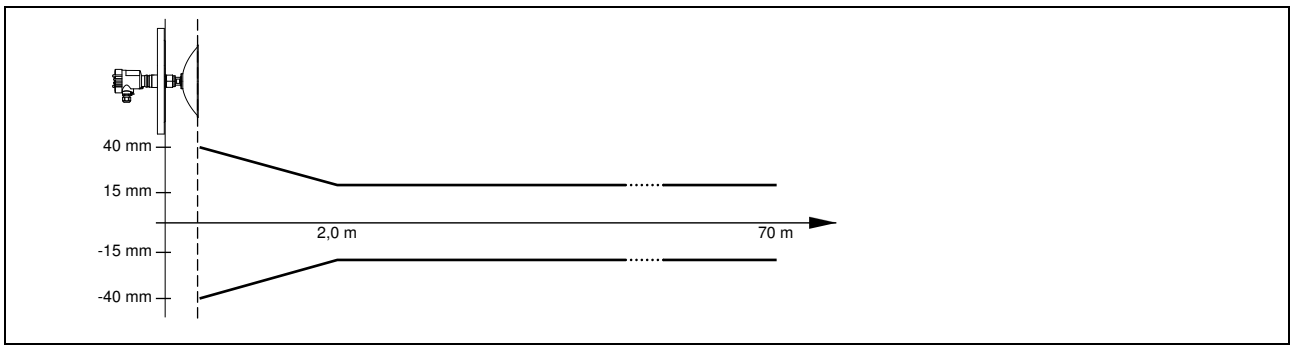


*Fig. 27: Accuracy VEGAPULS 68 with parabolic antenna in mm, measuring range in m*

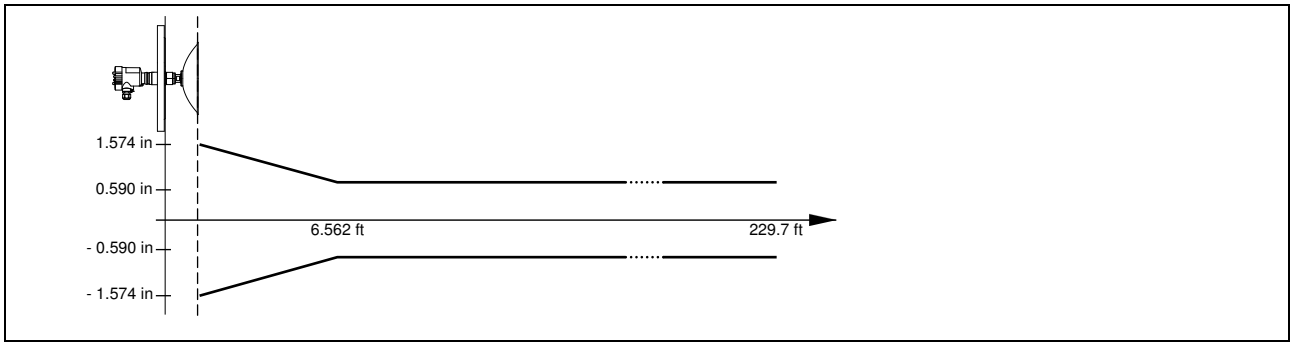


*Fig. 28: Accuracy VEGAPULS 68 with parabolic antenna in Inch, measuring range in ft*

**Influence of the ambient temperature to the sensor electronics[6)]**

| | |
|---|---|
| Average temperature coefficient of the zero signal (temperature error) | 0.03 %/10 K |

6) Relating to the nominal measuring range.

## Ambient conditions

| | |
|---|---|
| Ambient, storage and transport temperature | |
| – without PLICSCOM | -40 … +80 °C (-40 … +176 °F) |
| – with PLICSCOM | -20 … +70 °C (-4 … +158 °F) |
| – Four-wire instrument | -40 … +70 °C (-40 … +158 °F) |
| – Version IP 66/IP 68, 1 bar with connection cable PE | -20 … +60 °C (-4 … +140 °F) |

## Process conditions VEGAPULS 67

| | |
|---|---|
| Vessel pressure | -1 … 2 bar/-100 … 200 kPa (-14.5 … 29.0 psig) |
| Process temperature (measured on the process fitting) | -40 … +80 °C (-40 … +176 °F) |
| Vibration resistance | mechanical vibrations with 4 g and 5 … 100 Hz[7] |

## Process conditions VEGAPULS 68

| | |
|---|---|
| Vessel pressure - horn antenna | |
| – without swivelling holder | -1 … 40 bar/-100 … 4000 kPa (-14.5 … 580 psi) |
| – with swivelling holder | -1 … 1 bar/-100 … 100 kPa (-14.5 … 14.5 psig) not sealing |
| Vessel pressure - parabolic antenna | |
| – without swivelling holder | -1 … 6 bar/-100 … 6000 kPa (-14.5 … 87 psi) |
| – with swivelling holder | -1 … 1 bar/-100 … 100 kPa (-14.5 … 14.5 psig) not sealing |
| Process temperature (measured on the process fitting), depending on seal and antenna system | |
| – FKM (Viton) | -40 … +130 °C (-40 … +266 °F) |
| – FFKM (Kalrez 2035, 6230) | -15 … +130 °C (+5 … +266 °F) |
| – FFKM (Kalrez 2035, 6230) with temperature adapter | -15 … +200 °C (+5 … +392 °F) |
| – FFKM (Kalrez 6375) | -20 … +130 °C (-4 … +266 °F) |
| – FFKM (Kalrez 6375) with temperature adapter | -20 … +200 °C (-4 … +392 °F) |
| Vibration resistance | mechanical vibrations with 4 g and 5 … 100 Hz[8] |

## Electromechanical data - version IP 66/IP 67 and IP 66/IP 68; 0.2 bar

| | |
|---|---|
| Cable entry/plug[9] | |
| – Single chamber housing | • 1 x cable gland M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5<br>or:<br>• 1 x closing cap M20 x 1.5; 1 x blind stopper M20 x 1.5<br>or:<br>• 1 x closing cap ½ NPT, 1 x blind plug ½ NPT<br>or:<br>• 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5 |
| – Double chamber housing | • 1 x cable entry M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5; 1 x blind stopper M16 x 1.5 or optionally available with 1 x plug M12 x 1 for VEGADIS 61<br>or:<br>• 1 x closing cap ½ NPT, 1 x blind stopper ½ NPT, 1 x blind stopper M16 x 1.5 or optionally 1 x plug M12 x 1 for VEGADIS 61<br>or:<br>• 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5; 1 x blind stopper M16 x 1.5 or optionally available with 1 x plug M12 x 1 for VEGADIS 61 |
| Connection terminals | Spring-loaded terminals for wire cross-section up to 2.5 mm² (AWG 14) |

## Indicating and adjustment module

| | |
|---|---|
| Voltage supply and data transmission | through the sensor |
| Indication | LC display in dot matrix |
| Adjustment elements | 4 keys |

[7] Tested according to the regulations of German Lloyd, GL directive 2.
[8] Tested according to the regulations of German Lloyd, GL directive 2.
[9] Depending on the version M12 x 1, according to DIN 43650, Harting, Amphenol-Tuchel, 7/8" FF.

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| | |
|---|---|
| Protection | |
| – unassembled | IP 20 |
| – mounted into the sensor without cover | IP 40 |
| Materials | |
| – Housing | ABS |
| – Inspection window | Polyester foil |

## Supply voltage - 4 … 20 mA/HART

| | |
|---|---|
| Supply voltage | |
| – Non-Ex instrument | 15 … 36 V DC |
| – EEx-ia instrument | 15 … 30 V DC |
| – EEx-d-ia instrument | 20 … 36 V DC |
| Supply voltage with lighted indicating and adjustment module[10)] | |
| – Non-Ex instrument | 20 … 36 V DC |
| – EEx-ia instrument | 20 … 30 V DC |
| – EEx-d-ia instrument | 20 … 36 V DC |
| Permissible residual ripple | |
| – < 100 Hz | $U_{ss}$ < 1 V |
| – 100 Hz … 10 kHz | $U_{ss}$ < 10 mV |
| Load | see diagram |

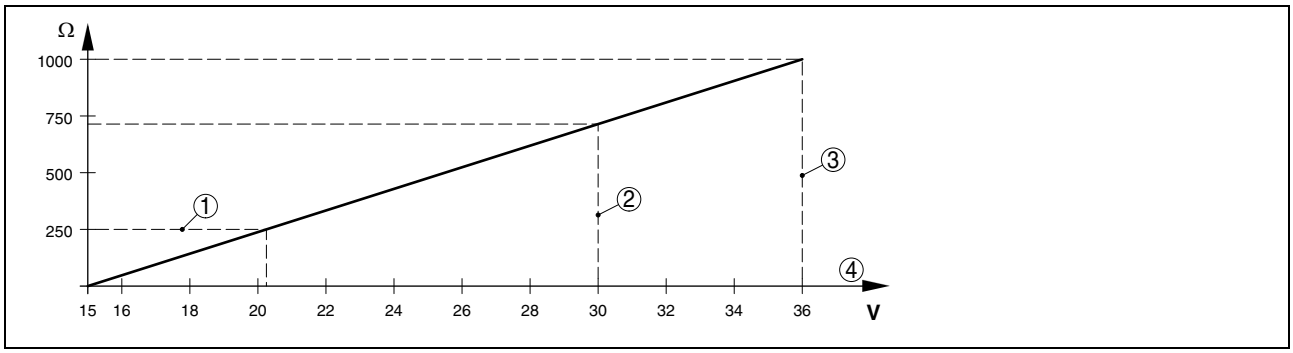


*Fig. 29: Voltage diagram sensor*

*1 HART load*
*2 Voltage limit EEx-ia instrument*
*3 Voltage limit non-Ex-/Ex-d-ia instrument*
*4 Supply voltage*

## Voltage supply - 4 … 20 mA/HART four wire instrument

| | |
|---|---|
| Supply voltage | |
| – Non-Ex and Ex-d instrument | 20 … 72 V DC, 20 … 253 V AC, 50/60 Hz (with and without lighting of the indicating and adjustment module) |
| Max. power consumption | 4 VA; 2.1 W |

## Voltage supply - Profibus PA

| | |
|---|---|
| Supply voltage | |
| – Non-Ex instrument | 9 … 32 V DC |
| – EEx-ia instrument | 9 … 24 V DC |
| Supply voltage with lighted indicating and adjustment module[11)] | |
| – Non-Ex instrument | 12 … 36 V DC |
| – EEx-ia instrument | 12 … 30 V DC |
| Power supply by/max. number of sensors | |
| – DP/PA segment coupler | max. 32 (max. 10 with Ex) |
| – VEGALOG 571 EP card | max. 15 (max. 10 with Ex) |

10) For instruments with national approvals such as e.g. according to CSA, only available at a later date.
11) For instruments with national approvals such as e.g. according to CSA, only available at a later date.

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## Power supply - Foundation Fieldbus

| | |
|---|---|
| Supply voltage | |
| – Non-Ex instrument | 9 … 32 V DC |
| – EEx-ia instrument | 9 … 24 V DC |
| Supply voltage with lighted indicating and adjustment module[12)] | |
| – Non-Ex instrument | 12 … 32 V DC |
| – EEx-ia instrument | 12 … 24 V DC |
| Power supply by/max. number of sensors | |
| – H1 power supply | max. 32 (max. 10 with Ex) |

## Electrical protective measures

| | |
|---|---|
| Protection | |
| – Plastic housing | IP 66/IP 67 |
| – Double chamber Alu-housing, four-wire instruments | IP 66/IP 67 |
| – Alu and stainless steel housing, two-wire instruments | IP 66/IP 68 (0.2 bar)[13)] |
| – Alu and stainless steel housing optional, two-wire instruments | IP 66/IP 68 (1 bar) |
| Overvoltage category | III |
| Protection class | |
| – two-wire, Profibus PA, Foundation Fieldbus | II |
| – four-wire | I |

## Approvals[14)]

| | |
|---|---|
| ATEX ia | ATEX II 1G, 1/2G, 2G EEx ia IIC T5 |
| ATEX ia+d | ATEX II 1/2G, 2G EEx d ia IIC T5 |
| ATEX D | ATEX II 1/2D IP6X T |
| IECEx | Ex ia IIC T5, Ex tD A20/A21 IP66 T, A21 |
| FM/CSA | (NI) CL I, DIV2, GP ABCD; (DIP) CL II, III, DIV1, GP EFG; (IS) CL I, II, III, DIV1, GP ABCDEF/G; (XP-IS) CL I, II, III, DIV1, GP ABCDEFG |
| Ship approvals | GL, LRS, ABS, CCS, RINA |

## CE conformity

| | |
|---|---|
| EMC (89/336/EWG) | Emission EN 61326: 1997 (class A), susceptibility EN 61326: 1997/A1: 1998 |
| R & TTE directive | R & TTE directive: I-ETS 300-440 Expert Opinion No. 05-111723, Notified Body No. 0700 |
| LVD (73/23/EWG) | EN 61010-1: 2001 |

## Functional safety (SIL)

You can find detailed information in the Safety Manual of or under www.vega.com.

| | |
|---|---|
| Functional safety according to IEC 61508-4 | |
| – Single channel architecture (1oo1D) | up to SIL2 |
| – double channel diversitary redundant architecture (1oo2D) | up to SIL3 |

## FCC conformity (only for USA/Canada)

| | |
|---|---|
| Conformity | to part 15 of the FCC regulations |

## Environmental instructions

| | |
|---|---|
| VEGA environment management system | certified according to DIN EN ISO 14001 |

You can find detailed information under www.vega.com.

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12) For instruments with national approvals such as e.g. according to CSA, only available at a later date.
13) A suitable cable is the prerequisite for maintaining the protection class.
14) Deviating data in Ex applications: see separate safety instructions.

# 7 Dimensions

### Housing in protection IP 66/IP 67 and IP 66/IP 68; 0.2 bar

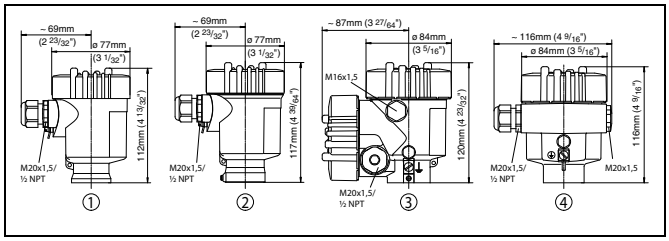



*Fig. 30: Housing versions in protection IP 66/IP 67 and IP 66/IP 68, 0.2 bar; with integrated indicating and adjustment module the housing is 9 mm ($^1/_{64}$") higher*

*1 Plastic housing*
*2 Stainless steel housing*
*3 Aluminium double chamber housing*
*4 Aluminium housing*

### VEGAPULS 67 - version with mountin loop

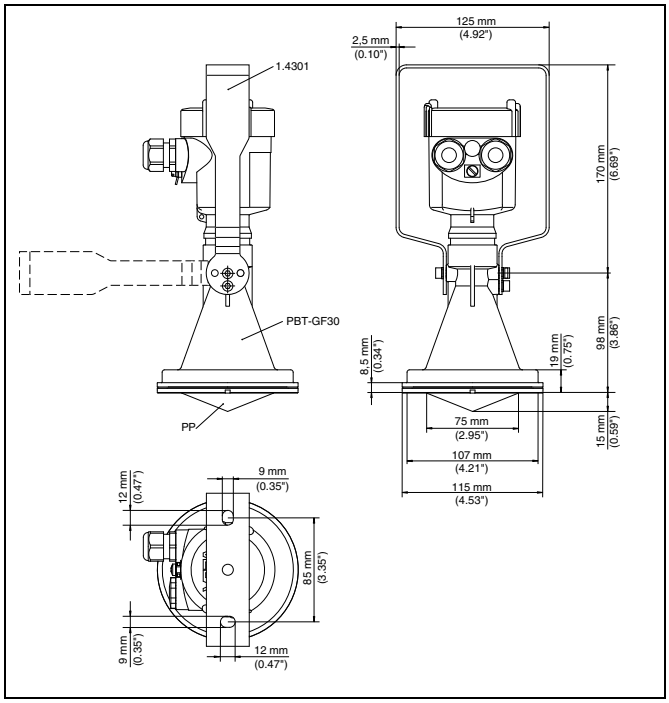



*Fig. 31: VEGAPULS 67 - version with mounting strap 170 mm or 300 mm long*

### VEGAPULS 67 - version with compression flange

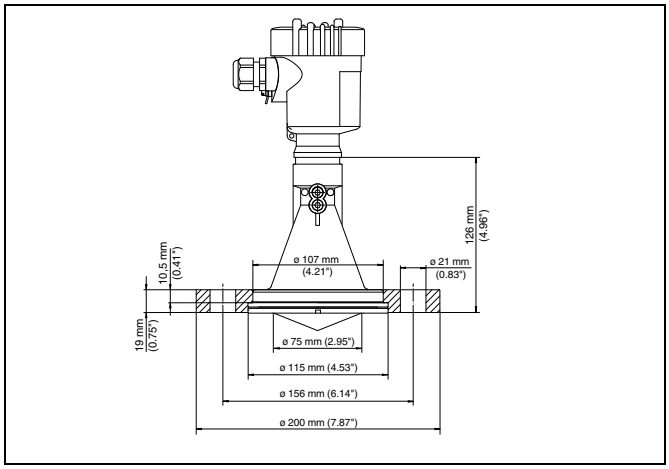
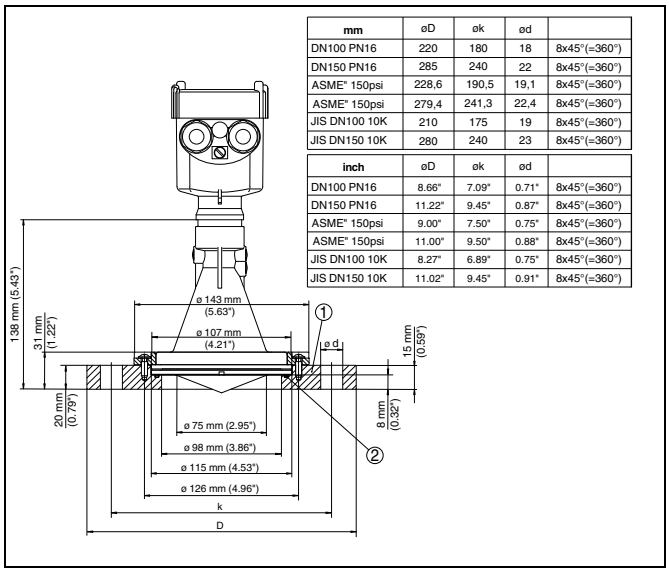



*Fig. 32: VEGAPULS 67 - compression flange DN 80/3"/JIS80*

### VEGAPULS 67 - version with adapter flange




| mm | øD | øk | ød | |
|---|---|---|---|---|
| DN100 PN16 | 220 | 180 | 18 | 8x45°(=360°) |
| DN150 PN16 | 285 | 240 | 22 | 8x45°(=360°) |
| ASME" 150psi | 228,6 | 190,5 | 19,1 | 8x45°(=360°) |
| ASME" 150psi | 279,4 | 241,3 | 22,4 | 8x45°(=360°) |
| JIS DN100 10K | 210 | 175 | 19 | 8x45°(=360°) |
| JIS DN150 10K | 280 | 240 | 23 | 8x45°(=360°) |

| inch | øD | øk | ød | |
|---|---|---|---|---|
| DN100 PN16 | 8.66" | 7.09" | 0.71" | 8x45°(=360°) |
| DN150 PN16 | 11.22" | 9.45" | 0.87" | 8x45°(=360°) |
| ASME" 150psi | 9.00" | 7.50" | 0.75" | 8x45°(=360°) |
| ASME" 150psi | 11.00" | 9.50" | 0.88" | 8x45°(=360°) |
| JIS DN100 10K | 8.27" | 6.89" | 0.75" | 8x45°(=360°) |
| JIS DN150 10K | 11.02" | 9.45" | 0.91" | 8x45°(=360°) |

*Fig. 33: VEGAPULS 67 - adapter flange DN 100/DN 150*

*1 Adapter flange*
*2 Seal*

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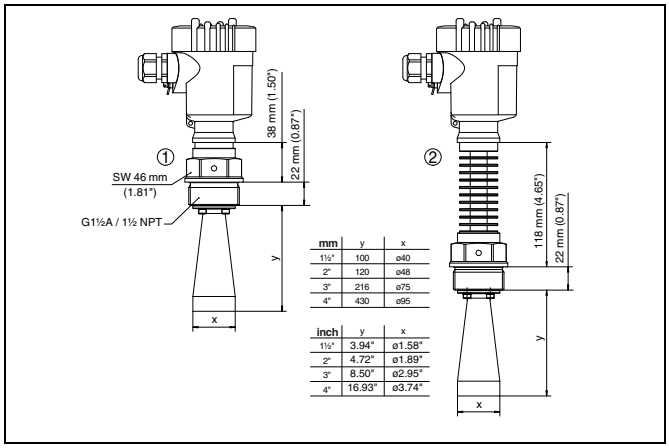
### VEGAPULS 68 - horn antenna in threaded version



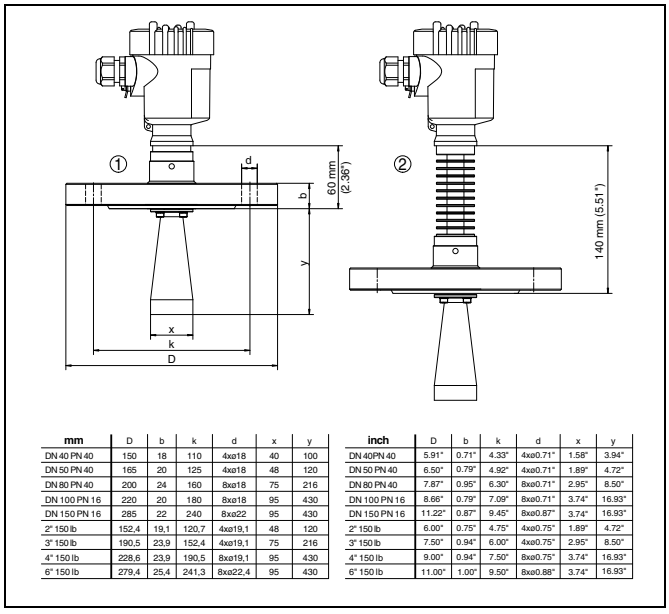

| mm | y | x |
|---|---|---|
| 1½" | 100 | ø40 |
| 2" | 120 | ø48 |
| 3" | 216 | ø75 |
| 4" | 430 | ø95 |

| inch | y | x |
|---|---|---|
| 1½" | 3.94" | ø1.58" |
| 2" | 4.72" | ø1.89" |
| 3" | 8.50" | ø2.95" |
| 4" | 16.93" | ø3.74" |

*Fig. 34: VEGAPULS 68 - horn antenna in threaded version*

*1 Standard*
*2 with temperature adapter*

### VEGAPULS 68 - horn antenna in flange version



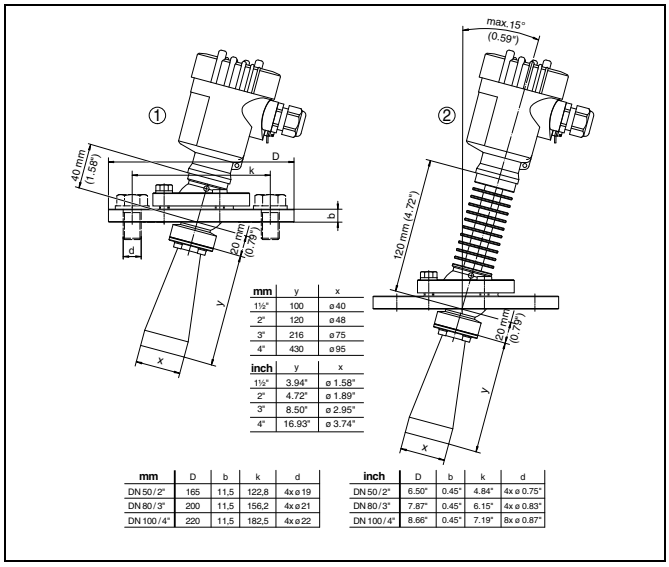

| mm | D | b | k | d | x | y |
|---|---|---|---|---|---|---|
| DN 40 PN 40 | 150 | 18 | 110 | 4xø18 | 40 | 100 |
| DN 50 PN 40 | 165 | 20 | 125 | 4xø18 | 48 | 120 |
| DN 80 PN 40 | 200 | 24 | 160 | 8xø18 | 75 | 216 |
| DN 100 PN 16 | 220 | 20 | 180 | 8xø18 | 95 | 430 |
| DN 150 PN 16 | 285 | 22 | 240 | 8xø22 | 95 | 430 |
| 2" 150 lb | 152,4 | 19,1 | 120,7 | 4xø19,1 | 48 | 120 |
| 3" 150 lb | 190,5 | 23,9 | 152,4 | 4xø19,1 | 75 | 216 |
| 4" 150 lb | 228,6 | 23,9 | 190,5 | 8xø19,1 | 95 | 430 |
| 6" 150 lb | 279,4 | 25,4 | 241,3 | 8xø22,4 | 95 | 430 |

| inch | D | b | k | d | x | y |
|---|---|---|---|---|---|---|
| DN 40PN 40 | 5.91" | 0.71" | 4.33" | 4xø0.71" | 1.58" | 3.94" |
| DN 50 PN 40 | 6.50" | 0.79" | 4.92" | 4xø0.71" | 1.89" | 4.72" |
| DN 80 PN 40 | 7.87" | 0.95" | 6.30" | 8xø0.71" | 2.95" | 8.50" |
| DN 100 PN 16 | 8.66" | 0.79" | 7.09" | 8xø0.71" | 3.74" | 16.93" |
| DN 150 PN 16 | 11.22" | 0.87" | 9.45" | 8xø0.87" | 3.74" | 16.93" |
| 2" 150 lb | 6.00" | 0.75" | 4.75" | 4xø0.75" | 1.89" | 4.72" |
| 3" 150 lb | 7.50" | 0.94" | 6.00" | 4xø0.75" | 2.95" | 8.50" |
| 4" 150 lb | 9.00" | 0.94" | 7.50" | 8xø0.75" | 3.74" | 16.93" |
| 6" 150 lb | 11.00" | 1.00" | 9.50" | 8xø0.88" | 3.74" | 16.93" |

*Fig. 35: VEGAPULS 68 - horn antenna in flange version*

*1 Standard*
*2 with temperature adapter*

### VEGAPULS 68 - horn antenna and swivelling holder




| mm | y | x |
|---|---|---|
| 1½" | 100 | ø 40 |
| 2" | 120 | ø 48 |
| 3" | 216 | ø 75 |
| 4" | 430 | ø 95 |

| inch | y | x |
|---|---|---|
| 1½" | 3.94" | ø 1.58" |
| 2" | 4.72" | ø 1.89" |
| 3" | 8.50" | ø 2.95" |
| 4" | 16.93" | ø 3.74" |

| mm | D | b | k | d |
|---|---|---|---|---|
| DN 50 / 2" | 165 | 11,5 | 122,8 | 4x ø 19 |
| DN 80 / 3" | 200 | 11,5 | 156,2 | 4x ø 21 |
| DN 100 / 4" | 220 | 11,5 | 182,5 | 4x ø 22 |

| inch | D | b | k | d |
|---|---|---|---|---|
| DN 50 / 2" | 6.50" | 0.45" | 4.84" | 4x ø 0.75" |
| DN 80 / 3" | 7.87" | 0.45" | 6.15" | 4x ø 0.83" |
| DN 100 / 4" | 8.66" | 0.45" | 7.19" | 8x ø 0.87" |

*Fig. 36: VEGAPULS 68 - horn antenna and swivelling holder*

*1 Standard*
*2 with temperature adapter*

### VEGAPULS 68 - parabolic antenna in threaded version

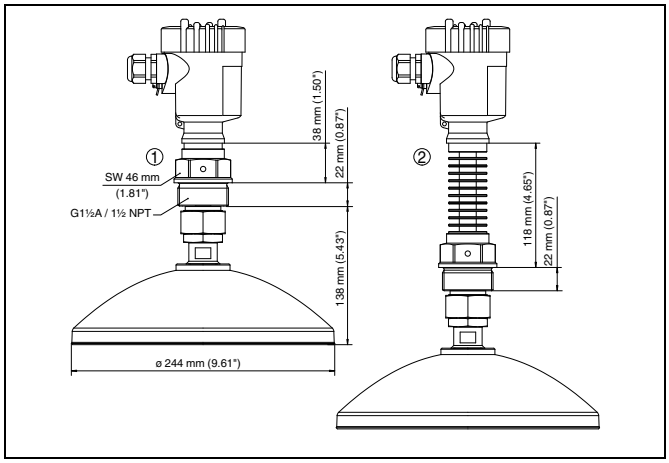



*Fig. 37: VEGAPULS 68 - parabolic antenna in threaded version*

*1 Standard*
*2 with temperature adapter*

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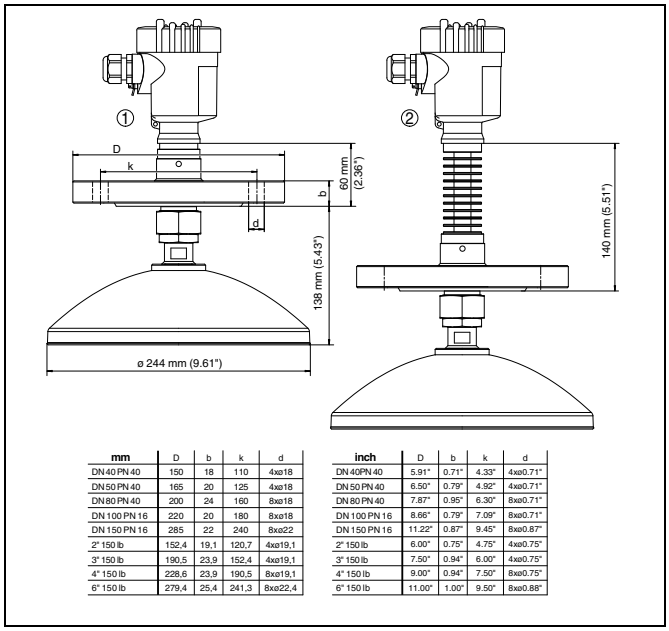
### VEGAPULS 68 - parabolic antenna in flange version



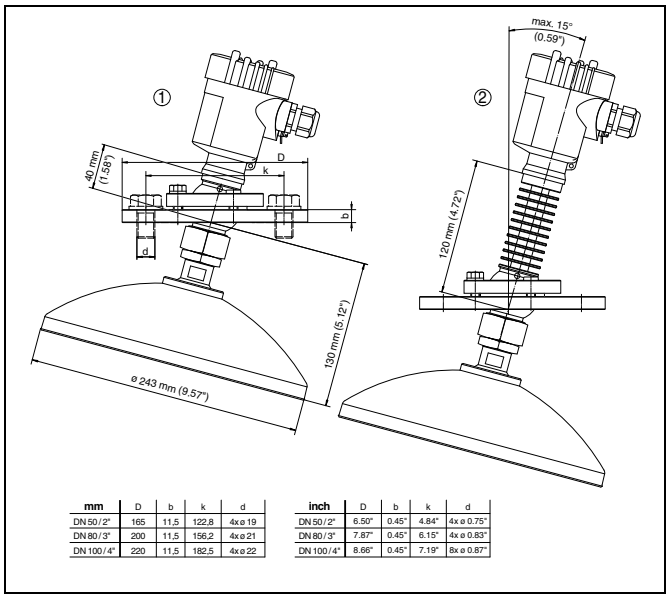

| mm | D | b | k | d |
|---|---|---|---|---|
| DN 40 PN 40 | 150 | 18 | 110 | 4xø18 |
| DN 50 PN 40 | 165 | 20 | 125 | 4xø18 |
| DN 80 PN 40 | 200 | 24 | 160 | 8xø18 |
| DN 100 PN 16 | 220 | 20 | 180 | 8xø18 |
| DN 150 PN 16 | 285 | 22 | 240 | 8xø22 |
| 2" 150 lb | 152,4 | 19,1 | 120,7 | 4xø19,1 |
| 3" 150 lb | 190,5 | 23,9 | 152,4 | 4xø19,1 |
| 4" 150 lb | 228,6 | 23,9 | 190,5 | 8xø19,1 |
| 6" 150 lb | 279,4 | 25,4 | 241,3 | 8xø22,4 |

| inch | D | b | k | d |
|---|---|---|---|---|
| DN 40PN 40 | 5.91" | 0.71" | 4.33" | 4xø0.71" |
| DN 50 PN 40 | 6.50" | 0.79" | 4.92" | 4xø0.71" |
| DN 80 PN 40 | 7.87" | 0.95" | 6.30" | 8xø0.71" |
| DN 100 PN 16 | 8.66" | 0.79" | 7.09" | 8xø0.71" |
| DN 150 PN 16 | 11.22" | 0.87" | 9.45" | 8xø0.87" |
| 2" 150 lb | 6.00" | 0.75" | 4.75" | 4xø0.75" |
| 3" 150 lb | 7.50" | 0.94" | 6.00" | 4xø0.75" |
| 4" 150 lb | 9.00" | 0.94" | 7.50" | 8xø0.75" |
| 6" 150 lb | 11.00" | 1.00" | 9.50" | 8xø0.88" |

*Fig. 38: VEGAPULS 68 - parabolic antenna in flange version*

*1 Standard*
*2 with temperature adapter*

### VEGAPULS 68 - parabolic antenna and swivelling holder




| mm | D | b | k | d |
|---|---|---|---|---|
| DN 50 / 2" | 165 | 11,5 | 122,8 | 4x ø 19 |
| DN 80 / 3" | 200 | 11,5 | 156,2 | 4x ø 21 |
| DN 100 / 4" | 220 | 11,5 | 182,5 | 4x ø 22 |

| inch | D | b | k | d |
|---|---|---|---|---|
| DN 50 / 2" | 6.50" | 0.45" | 4.84" | 4x ø 0.75" |
| DN 80 / 3" | 7.87" | 0.45" | 6.15" | 4x ø 0.83" |
| DN 100 / 4" | 8.66" | 0.45" | 7.19" | 8x ø 0.87" |

*Fig. 39: VEGAPULS 68 - parabolic antenna and swivelling holder*

*1 Standard*
*2 with temperature adapter*

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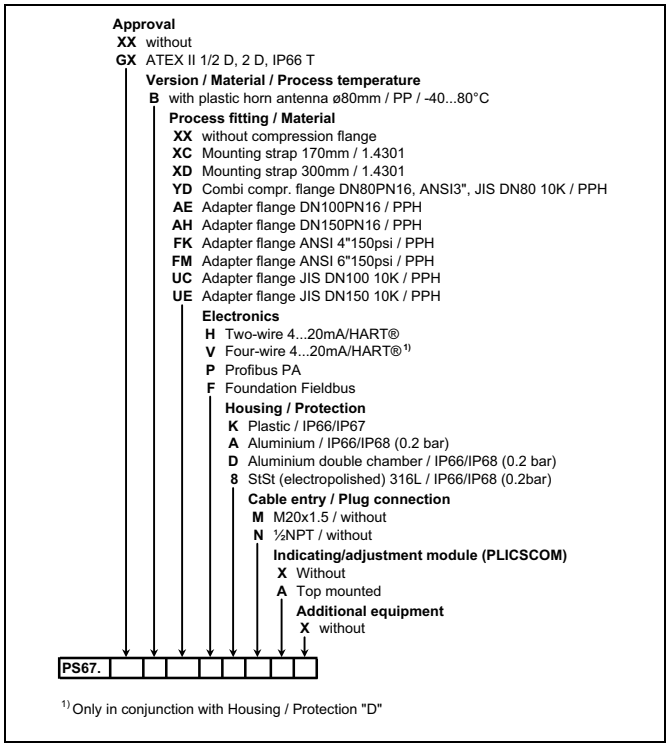
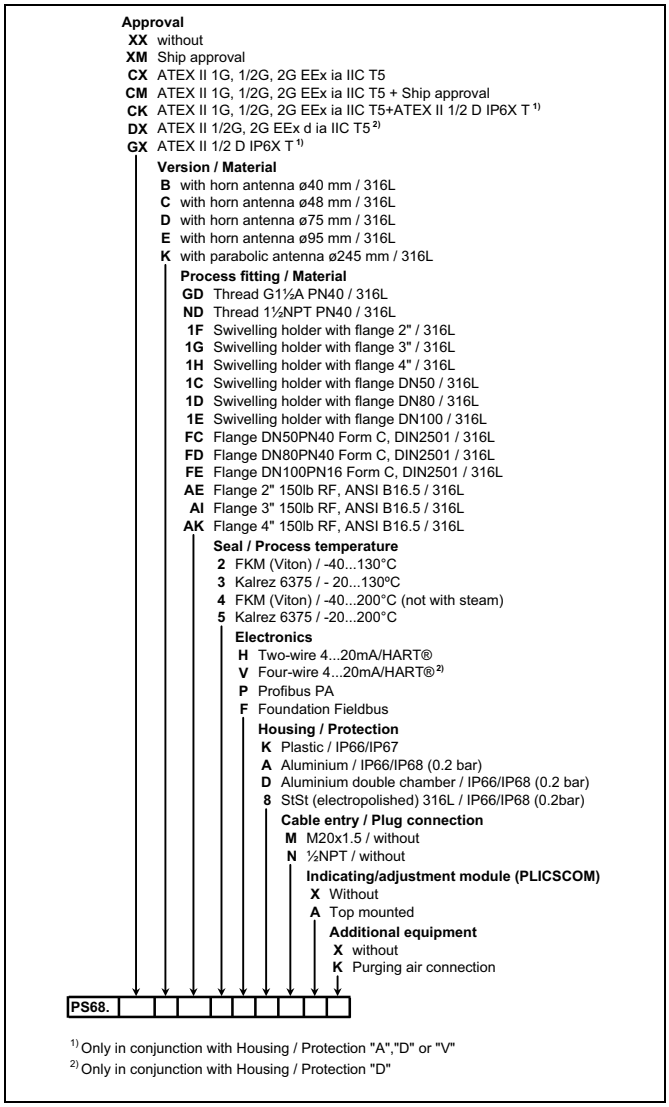
# 8 Product code

### VEGAPULS 67




1) Only in conjunction with Housing / Protection "D"

### VEGAPULS 68




1) Only in conjunction with Housing / Protection "A","D" or "V"
2) Only in conjunction with Housing / Protection "D"

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- operating instructions manuals
- menu schematics
- software
- certificates
- approvals

and much, much more



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