APPENDIX G: MANUAL

Please see the following pages.

Operating Instructions

VEGAPULS 68

4 ... 20 mA/HART

Contents

29261-EN-040525

1 About this document

1.1 Function

This operating instructions manual has all the information you need for quick set-up and save operation of VEGAPULS 68. Please read this manual before you start set-up.

1.2 Target group

This operating instructions manual is directed to trained personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbolism used

Information, tip, note
This symbol indicates helpful additional information.

Caution, warning, danger
This symbol informs you of a dangerous situation that could occur. Ignoring this cautionary note can impair the person and/or the instrument.

Ex applications
This symbol indicates special instructions for Ex applications.

- **List**
  The dot set in front indicates a list with no implied sequence.

→ **Action**
This arrow indicates a single action.

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1 **Sequence**
Numbers set in front indicate successive steps in a procedure.

2 For your safety

2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained and authorised specialist personnel. For safety and warranty reasons, any internal work on the instruments must be carried out only by VEGA personnel.

2.2 Appropriate use

VEGAPULS 68 is a sensor for continuous level measurement.

2.3 Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

VEGAPULS 68 is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The emitting frequencies of all VEGAPULS sensors are in the C or K-band range (depending on the instrument version). The low emitted powers are far below the internationally permitted limit values, in case of correct use, no health problems are expected. There are no restrictions in using the instrument also outside metalic, closed vessels. The user must take note of the safety instructions in this oeprating instructions manual, the country-specific installation standards (e.g. the VDE regulations in Germany) as well as all prevailing safety regulations and accident prevention rules.

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2.5 CE conformity

VEGAPULS 68 is in CE conformity with EMC (89/336/EWG), meets the Namur recommendation NE 21 and is in CE conformity with NSR (73/23/EWG).

Conformity has been judged acc. to the following standards:

- EMC:
  - Emission EN 61326: 1997 (class B)
  - Susceptibility EN 61326: 1997/A1: 1998
- NSR: EN 61010-1: 2001

2.6 FCC Compliance

Changes or modifications not expressly approved by VEGA could void the user's authority to operate the equipment.

VEGAPULS sensors with all antenna versions, except the parabolic antenna, are FCC-approved.

This device complies with Part 15 of the FCC rules. Operation is subject to the following conditions:

1. This device may not cause harmful interference.
2. This device must accept any interence received, including interference that may cause undesired operation.

2.7 Safety information for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

2.8 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified acc. to DIN EN ISO 14001.

Please help us fulfil this obligation by observing the environmental instructions in this manual:

- Chapter "Storage and transport"
- Chapter "Disposal"

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- VEGAPULS 68radar sensor
- documentation
  - this operating instructions manual
  - Ex-specific safety instructions (with Ex versions) and, if necessary, further certificates.

Components

VEGAPULS 68 consists of the following components:

- horn antenna with process fitting (depending on the version flange or thread), optionally available with swivelling holder and flange
- housing with electronics
- housing cover, optionally available with indicating/ adjustment module PLICSCOM.

The components are available in different versions:

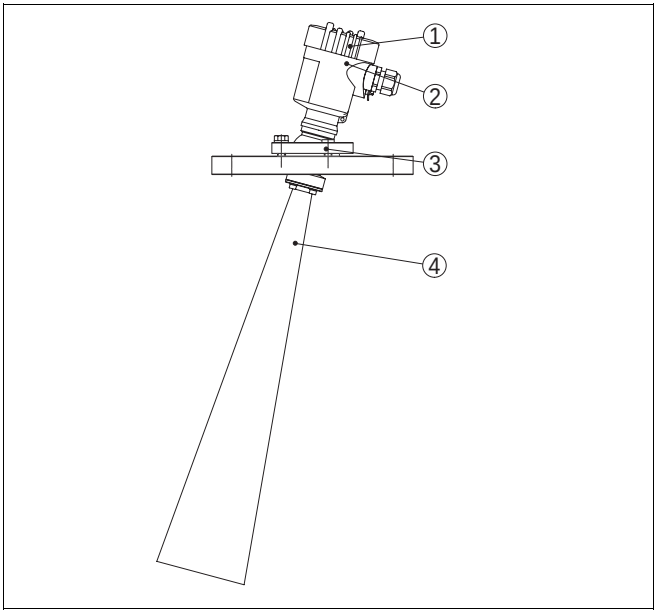

Fig. 1: VEGAPULS 68 with swivelling holder

1 Housing cover with integrated PLICSCOM (optional)
2 Housing with electronics
3 Swivelling holder with flange
4 Horn antenna

3.2 Principle of operation

Area of application

VEGAPULS 68 is a radar sensor in the K-band range for continuous level measurement.

A suitable version of VEGAPULS 68 is available for each respective area of application:

- The version with horn antenna is particularly suitable for use in small silos and vessels for measurement of nearly every kind of solid product.
- The version with parabolic antenna is particularly suitable for use in large silods and vessels with a measuring distance of up to 70 m and for measurement of solids with small DK values.

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Physical principle

The antenna of the radar sensor emits short radar pulses with a duration of approx. 1 ns. These pulses are reflected by the product and received by the antenna as echoes. The running time of the radar pulses from emission to reception is proportional to the distance and hence to the level. The determined level is converted into a corresponding output signal and outputted as measured value.

Power supply

Two-wire electronics 4 ... 20 mA/HART for power supply and measured value transmission on the same cable.

The power supply range can differ depending on the instrument version. The exact range is stated in the Technical data in the Supplement.

3.3 Adjustment

VEGAPULS 68 can be adjusted with three different adjustment media:

- with the indicating and adjustment module PLICSCOM
- with an adjustment software acc. to FDT/DTM standard, e.g. PACTware and PC
- with a HART handheld

The entered parameters are generally saved in VEGAPULS 68, optionally also in PLICSCOM or in PACTware.

3.4 Storage and transport

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test acc. to EN 24180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions PE foam or PE foil can be also used. Dispose of the packaging material via specialised recycling companies.

Storage and transport temperature

- Storage and transport temperature see Supplement, Technical data, Ambient conditions
- Relative humidity 20 ... 85 %

4 Mounting

4.1 General instructions

Mounting location

Select an installation position you can easily reach for mounting and connecting as well as later retrofitting of an indicating and adjustment module PLICSCOM. The housing can be rotated by 330° without the use of any tools. You can also install the indicating and adjustment module PLICSCOM in four different positions (each displaced by 90°).

Humidity

Use the recommended cable (see chapter "*Connecting to power supply*") and tighten the cable entry.

You can protect your VEGAPULS 68 against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This applies mainly to mounting outdorrs, in areas where moisture is expected (e.g. by cleaning processes) or on cooled or heated vessels.

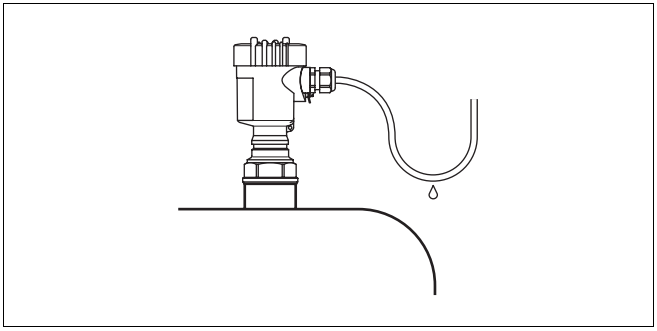


Fig. 2: Measures against moisture penetration

Measuring range

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

Information:
If the product reaches the antenna, buildup can form on it over a period of time and later cause measurement errors.

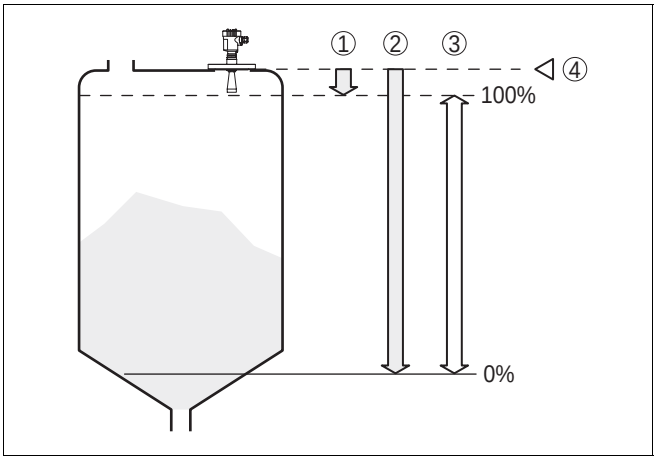


Fig. 3: Measuring range (operating range) and max. measuring distance

1 full
2 empty (max. measuring distance)
3 Measuring range

Pressure/Vacuum

In case of gauge or low pressure in the vessel, you have to seal the process fitting. Before use, check if the seal material is resistant against the measured product.

4.2 Mounting preparation

Dismounting of the horn antenna

Information:

This nformation applies only to special versions!

VEGAPULS 68 can be configured in many ways. It is also available as a version in which the horn antenna is larger than the process fitting. In this case the antenna must be dismounted from the process fitting before mounting:

1 Loosen the hexagon screws on the antenna socket (1) with an Allan key (size 3)

2 Remove the antenna (2)

3 Insert the antenna from below into the process fitting and protect it from falling down

4 Fasten with hexagon screws (1); torque max. 10 Nm

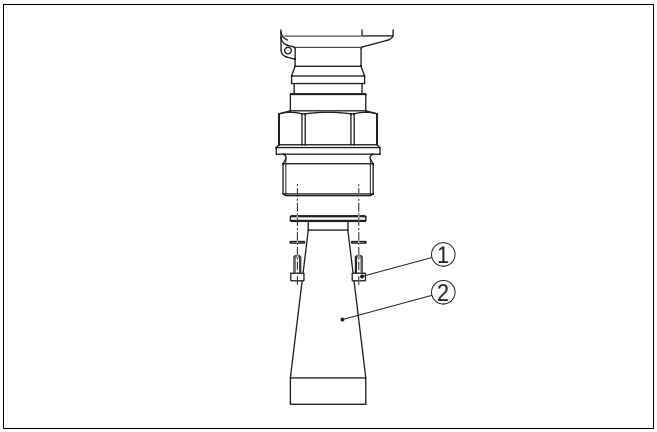


Fig. 4: Dismounting of the horn antenna

1 Hexagon screws on the antenna socket
2 Antenna

4.3 Mounting instructions

Installation position

When mounting the sensor, keep a distance of at least 200 mm to the vessel wall. von der Behälterwand entfernt ist. If the sensor is installed in the center of concave or arched tank tops, multiple echoes can arise. These can, however, be faded out by an appropriate adjustment (see Set-up).

If this distance cannot be ensured, a false echo storage should be carried out during set-up. This applies particularly if buildup on the vessel wall is expected. In this case, we recommend repeating the false echo storage later on with existing buildup.

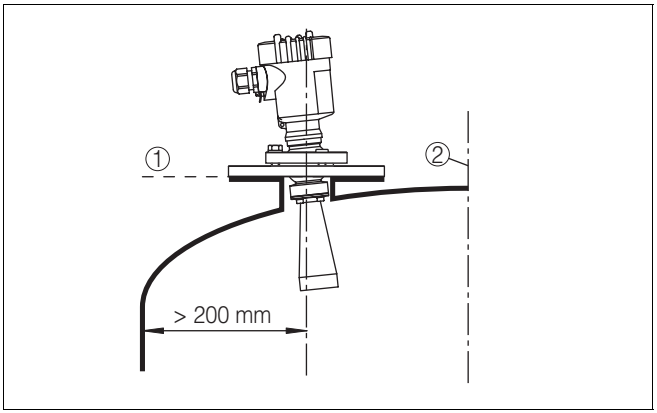


Fig. 5: Installation position

1 Reference plane

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

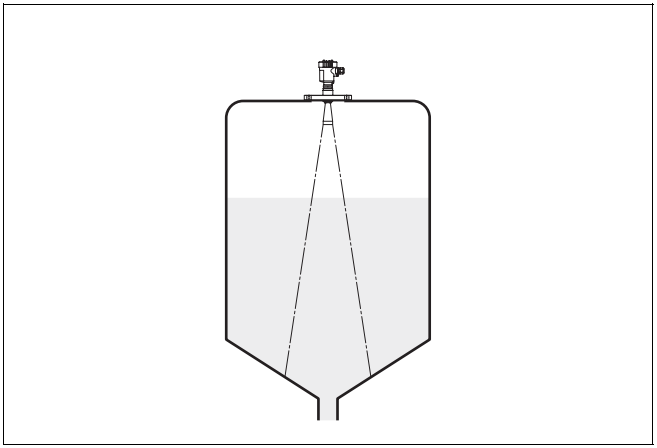


Fig. 6: Vessel with conical bottom

Socket

Preferably VEGAPULS 68 should be mounted without socket flush to the vessel top.

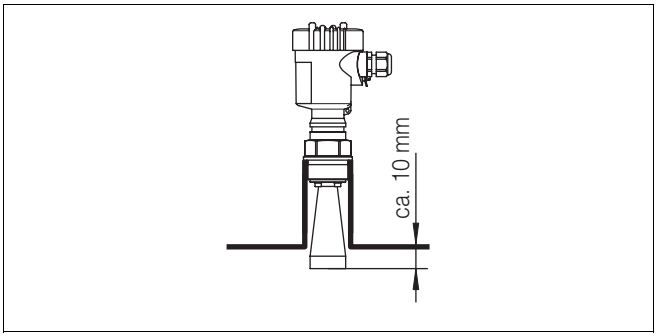
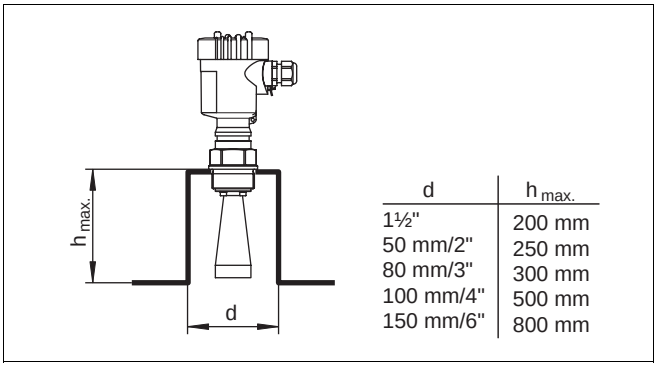


Fig. 7: Recommended socket mounting

If the reflective properties of the medium are good, you can mount VEGAPULS 68 also on a socket piece. The socket end should be smooth and burr-free, if possible also rounded. Carry out a false echo storage.



d	h max.
1½"	200 mm
50 mm/2"	250 mm
80 mm/3"	300 mm
100 mm/4"	500 mm
150 mm/6"	800 mm

Fig. 8: Deviating socket dimenstions

Sensor orientation

Direct the sensor as close as vertical to the product surface to achieve optimum measuring results.

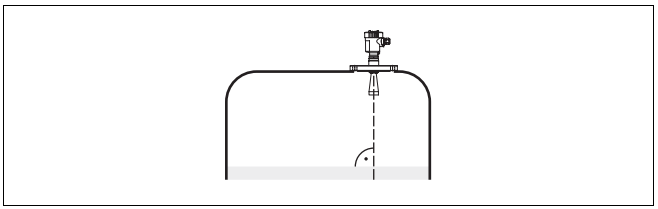


Fig. 9: Orientation in liquids

To optimally direct the sensor to solid products, a swivelling holder can be implemented.

Vessel installations

The radar sensor should be installed at a location where no installations cross the radar signals.

Vessel installations such as, for example, ladders, limit switches, heating spirals, struts, etc. can cause false echoes superimposed on the useful echo. Make sure when planning your measuring location that the radar signals have "free access" to the measured product.

In case of existing vessel installations, a false echo storage should be carried out during set-up.

If large vessel installations such as struts or supports cause false echoes, these can be attenuated through supplementary measures. Small, inclined sheet metal baffles above the installations scatter the radar signals and avoid a direct false echo reflection.

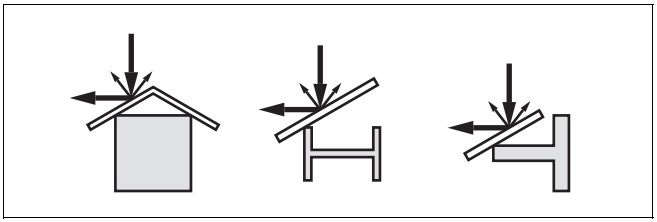


Fig. 10: Cover smooth profiles with deflectors

Material heaps

Large material heaps are detected with several instruments, which can be mounted on e.g. traverse cranes. For this type of application, it is best to orient the sensor at the right angle to the solid surface.

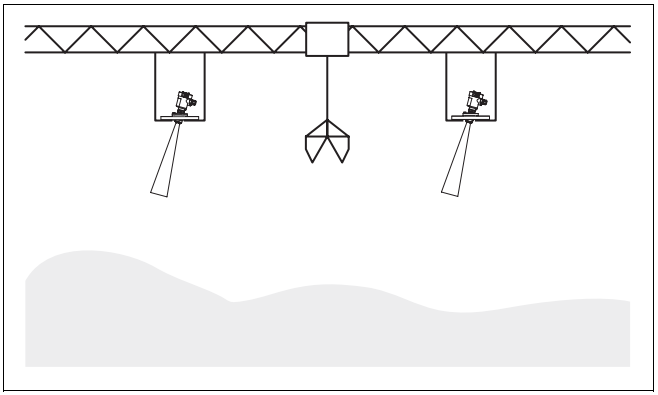


Fig. 11: Radar sensors on traverse crane

Inflowing material

Do not mount the instruments in or above the filling stream. Make sure that you detect the product surface and not the inflowing material.

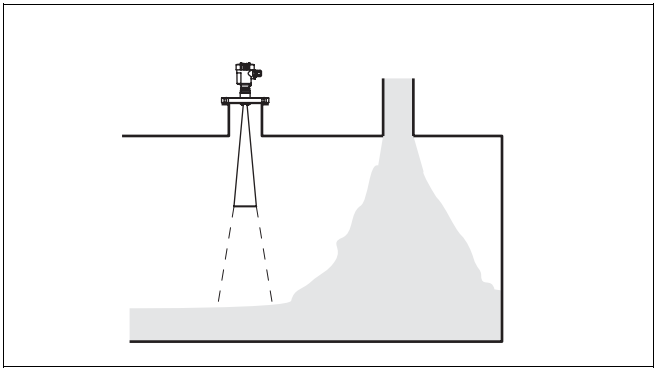


Fig. 12: Inflowing material

5 Connecting to power supply

5.1 Preparing the connection

Note safety instructions

Always observe the following safety instructions:

- Connect only in the complete absence of line voltage
- If overvoltages are expected, overvoltage arresters should be installed.

Tip:
We recommend VEGA overvoltage arresters ÜS-F-LB-I and ÜSB 62-36G.X.

Take note of safety instructions for Ex areas

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

Select power supply

Power supply and current signal are transmitted via the same two-wire connection cable. The power supply range can differ depending on the instrument version. The exact range is stated in the Technical data in the Supplement.

Provide a reliable separation between the supply circuit and the mains circuits acc. to DIN VDE 0106 part 101.

The VEGA power supply units VEGATRENN 149AEx, VEGASTAB 690, VEGADIS 371 as well as all VEGAMETs meet this requirement. When using one of these instruments, protection class III is ensured for VEGAPULS 68.

Bear in mind the following factors regarding supply voltage:

- the reduction of the output voltage of the power supply unit under nominal load (with a sensor current of 20.5 mA or 22 mA in case of fault signal)
- the influence of additional instruments in the circuit (see load values in Technical data)

Select connection cable

Use standard, unscreened two-wire cable to connect VEGAPULS 68. An outer cable diameter of 5 ... 9 mm ensures the seal effect of the cable entry. If electromagnetic interference is expected, we recommend the use of screened cable.

Cable screening and grounding

Connect 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 potential equalization facility (low impedance).

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). The low frequency potential equalisation currents are thus suppressed, but the protective effect against high frequency interference signals remains.

Select connection cable for Ex applications

Take note of the corresponding installation regulations for Ex applications. In particular, make sure that no potential equalisation currents flow over the cable screen. In case of grounding on both sides this can be achieved by the use of a capacitor or a separate potential equalisation.

5.2 Connection procedure

Proceed as follows:

1 Unscrew the housing cover

2 If a PLICSCOM indicating and adjustment module is installed, remove it by turning it slightly to the left.

3 Loosen compression nut on the cable entry

4 Remove approx. 10 cm of the cable mantle, strip approx. 1 cm insulation from the ends of the individual wires

5 Insert the cable into the sensor through the cable entry

6 Lift the opening levers of the terminals with a screwdriver (see following illustration)

7 Insert the wire ends into the open terminals according to the wiring plan

8 Press down the opening levers of the terminals, you will hear the terminal spring closing

9 Check the hold of the wires in the terminals by lightly pulling on them

10 Connect the screen to the internal ground terminal and the external ground terminal to potential equalisation

11 Tighten the compression nut of the cable entry, the seal ring must completely encircle the cable

12 Screw the housing cover back on

The electrical connection is finished.

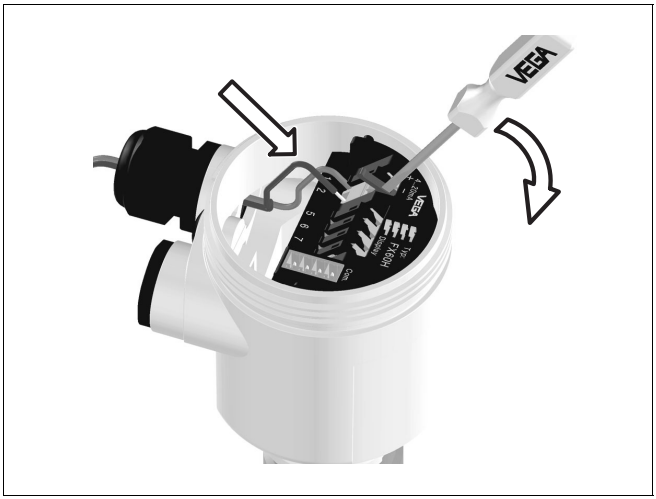


Fig. 13: Connection steps 6 and 7

5.3 Wiring plans, single chamber housing

The following illustrations apply to the non-Ex as well as to the Ex ia version.

Housing overview

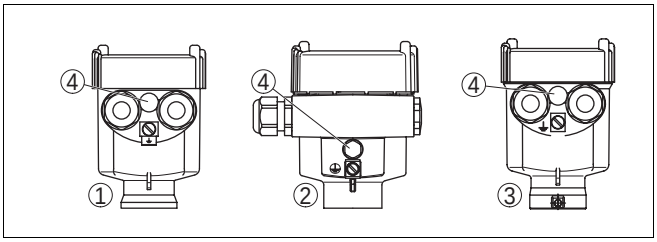


Fig. 14: Material versions, single chamber housing

1 *Plastic*
2 *Aluminium*
3 *Stainless steel*
4 *Filter element for pressure compensation*

Electronics and connection compartment

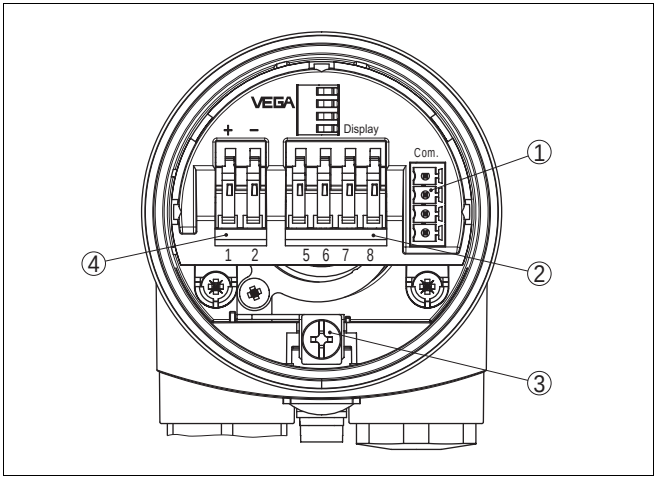


Fig. 15: Electronics and connection compartment, single chamber housing

1 *Plug connector for VEGACONNECT (I²C interface)*
2 *Spring-loaded terminals for connection of the external indication VEGADIS 61*
3 *Ground terminal for connection of the cable screen*
4 *Spring-loaded terminals for power supply*

Wiring plan

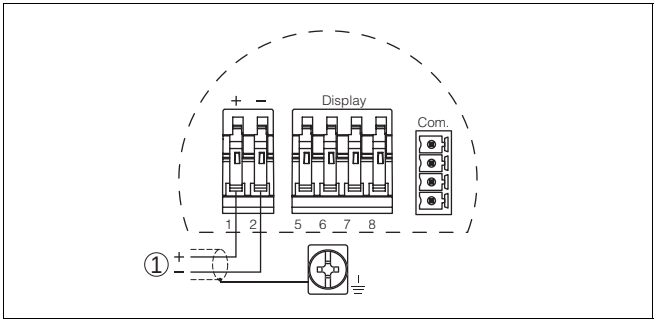


Fig. 16: Wiring plans, single chamber housing

1 Power supply/Signal output

5.4 Wiring plans, double chamber housing

The following illustrations apply to the non-Ex as well as to the Ex ia version. The Exd version is described in the next subchapter.

Housing overview

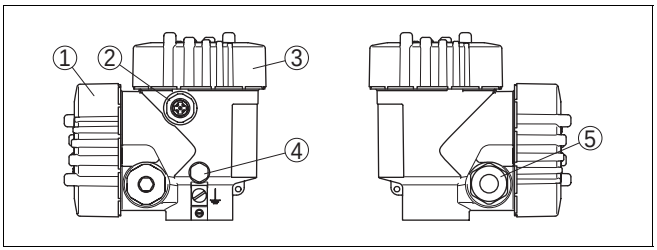


Fig. 17: double chamber housing

1 Housing cover, connection compartment
2 Plug M12x1 for VEGADIS 61
3 Housing cover, electronics compartment
4 Filter element for pressure compensation
5 Cable entry or plug

Electronics compartment

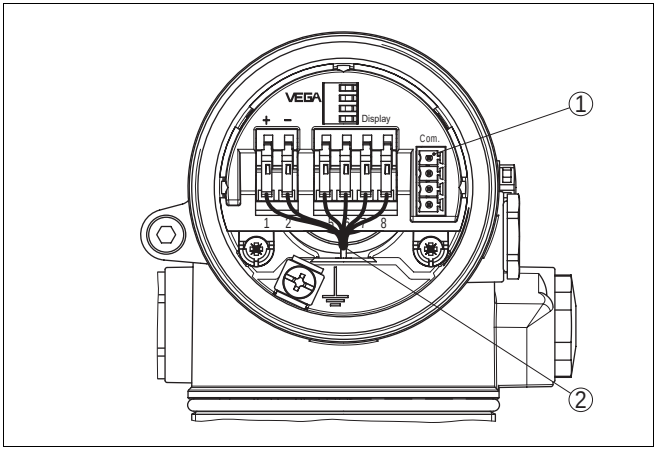


Fig. 18: Electronics compartment, double chamber housing

1 Plug connector for VEGACONNECT (I²C interface)
2 Internal connection cable to the connection compartment

Connection compartment

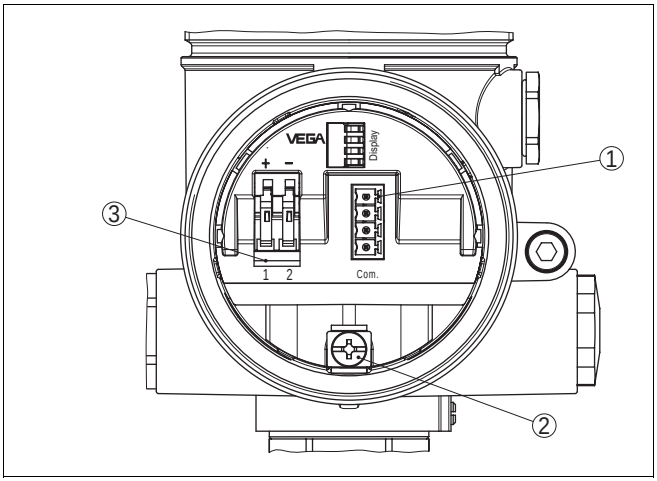


Fig. 19: Wiring plan, double chamber housing

1 Plug connector for VEGACONNECT (I²C interface)
2 Ground terminal for connection of the cable screen
3 Spring-loaded terminals for power supply

Wiring plan

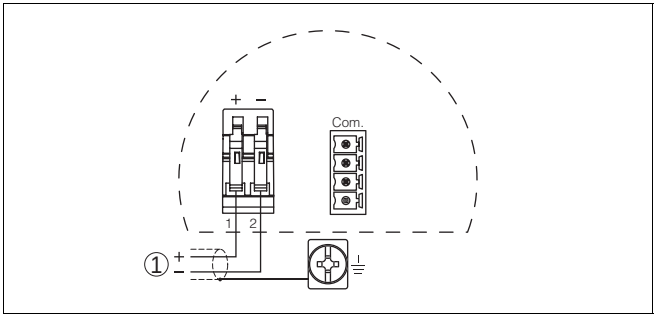


Fig. 20: Wiring plan, double chamber housing

1 Power supply/Signal output

5.5 Wiring plans, double chamber housing Exd

Housing overview

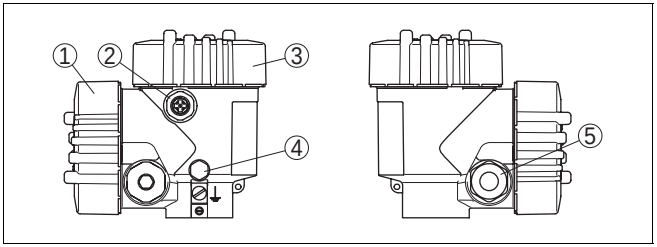


Fig. 21: double chamber housing

1 Housing cover, connection compartment
2 Plug M12x1 for VEGADIS 61
3 Housing cover, electronics compartment
4 Filter element for pressure compensation
5 Cable entry or plug

Electronics compartment

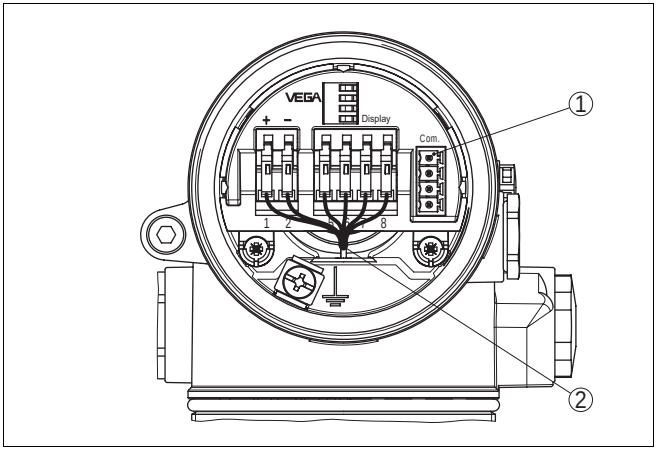


Fig. 22: Electronics compartment, double chamber housing

1 Plug connector for VEGACONNECT (I²C interface)
2 Internal connection cable to the connection compartment

Connection compartment

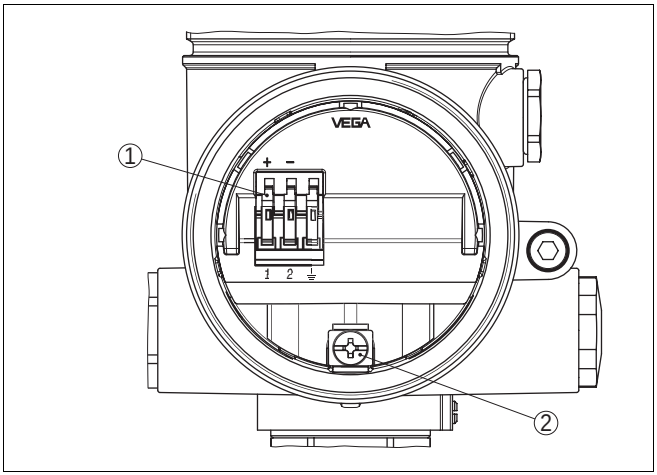


Fig. 23: Connection compartment, double chamber housing Exd

1 Spring-loaded terminals for power supply
2 Ground terminal for connection of the cable screen

Wiring plan

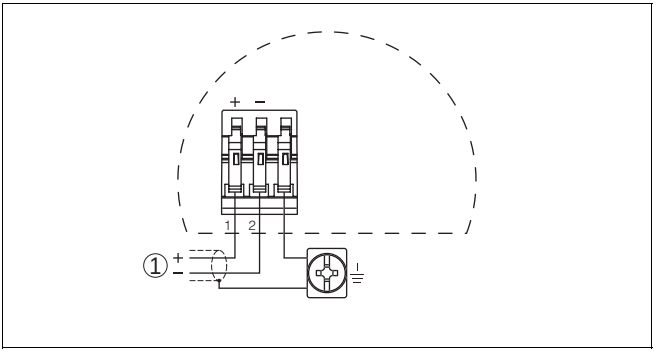


Fig. 24: Wiring plan, double chamber housing Exd

1 Power supply/Signal output

6 Set-up with the indicating and adjustment module PLICSCOM

6.1 Short description

Function/Configuration

The indicating and adjustment module PLICSCOM is used for measured value display, adjustment and diagnosis. It can be mounted in the following housing versions and instruments:

- all sensors of the plics® instrument family, in the single as well as in the double chamber housing (optionally in the electronics or connection compartment)
- external indicating instrument VEGADIS 61

6.2 Installing the indicating and adjustment module PLICSCOM

Insert/remove PLICSCOM

PLICSCOM can be inserted or removed at any time. An interruption of the power supply is not necessary.

To install, proceed as follows:

1 Unscrew the housing cover

2 Place PLICSCOM in the desired position on the electronics (you can choose any one of four different positions - each displaced by 90°)

3 Press PLICSCOM lightly onto the electronics and turn it to the right until is snaps in.

4 Screw housing cover with inspection window tightly back on

Removal is carried out in reverse order.

PLICSCOM is powered by the sensor, an additional connection is not necessary.

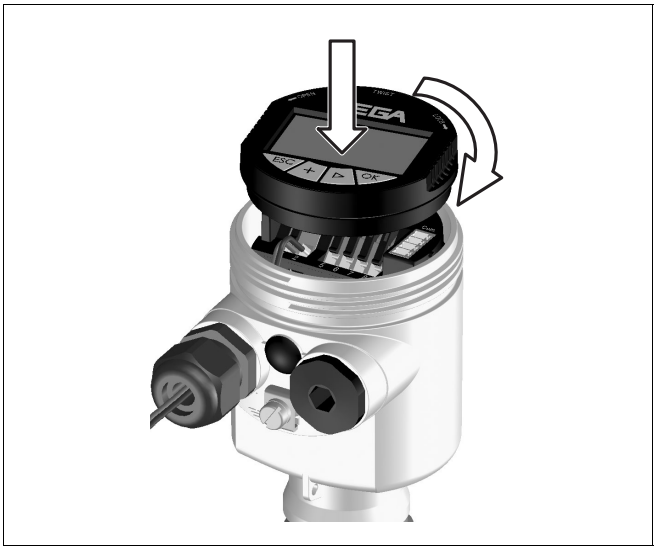


Fig. 25: Installation of PLICSCOM

Note:
If you intend to retrofit VEGAPULS 68 with PLICSCOM for continuous measured value indication, a higher cover with an inspection glass is required.

6.3 Adjustment system

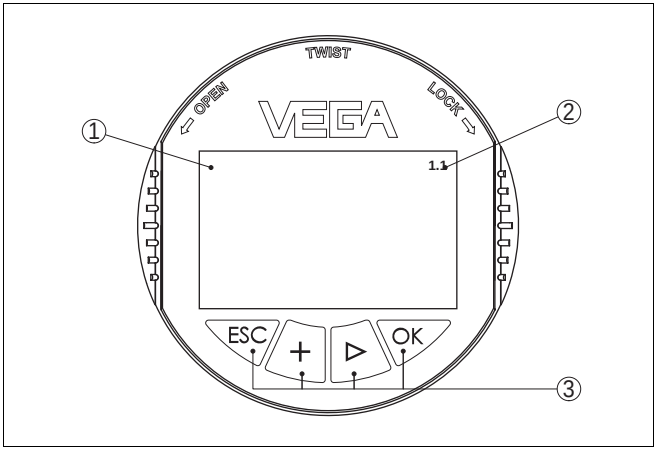


Fig. 26: Indicating and adjustment elements

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
  - editing position
- ***[+]*** key:
  - modify value of a parameter
- ***[ESC]*** key:
  - interrupt input
  - jump to the next higher menu

Adjustment system

The sensor is adjusted via the four keys of the indicating and adjustment module PLICSCOM. The LC display indicates the individual menu items. The functions of the individual keys are shown in the above illustration. Approx. 10 minutes after the last pressing of a key, an automatic reset to measured value indication is triggered. Any values not confirmed with ***[OK]*** will not be saved.

6.4 Set-up procedure

Switch on phase

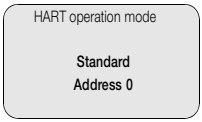
After VEGAPULS 68 is connected to power supply, the instrument carries out a self-test for approx. one minute. The following steps are carried out:

- internal check of the electronics
- indication of the instrument type, the firmware version as well as the sensor TAGs (sensor name)
- the output signal jumps briefly to the set fault current

Then the actual measured value is displayed and the corresponding current is transmitted to the cable[1].

Address setting HART-Multidrop

In HART-Multidrop mode (several sensors on one input) the address must be set before continuing with the parameter adjustment. You will find a detailed description in the operating instructions manual of PLICSCOM.



Parameter adjustment

Since VEGAPULS 68 is a distance measuring instrument, it measures the distance from the sensor to the product surface. In order to have the actual level displayed, an allocation of the measured distance to the percentage height must be carried out. To make this adjustment, the full and empty distances in the vessel are entered. If these values are not known, it is also possible to carry out the adjustment with other distances, e.g. 10 % and 90 %. Starting point of these distance values is always the seal surface of the thread or flange. The actual level is then calculated on the basis of these entered values. At the same time, the operating range of the sensor is limited from maximum range to the requested range.

[1] The values correspond to the actual level as well as to the settings already carried out, e.g. default setting.

The real product level during this adjustment is not important, because the min./max. adjustment is always carried out without changing the product level. These settings can be made ahead of time withou the instrument having to be installed.

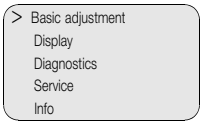
In the main menu item Basic adjustment, the individual submenu items should be selected one after the other and provided with the correct parameter values.

Start your parameter adjustment with the following menu items of the basic adjustment:

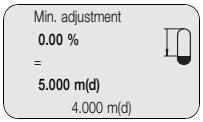
Carrying out min. adjustment

Proceed as follows:

1 Move from the measured value display to the main menu by pushing ***[OK]***.



2 Select the menu item *Basic adjustment* with ***[>]*** and confirm with ***[OK]***. Now the menu item min. adjustment is displayed.



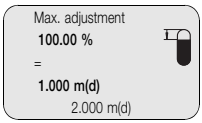
3 Prepare the percentage value for editing with ***[OK]*** and set the cursor to the requested position with ***[>]***. Set the requested percentage value with ***[+]*** and save with ***[OK]***. The cursor jumps now to the distance value.

4 Enter the appropriate distance value in m (corresponding to the percentage value) for the empty vessel (e.g. distance from the sensor to the vessel bottom).

5 Save the setting with ***[OK]*** and move to max. adjustment with ***[>]***.

Carrying out max. adjustment

Proceed as follows:



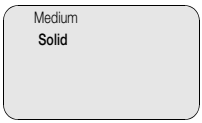
1 Prepare the percentage value for editing with ***[OK]*** and set the cursor to the requested position with ***[>]***. Set the requested percentage value with ***[+]*** and save with ***[OK]***. The cursor jumps now to the distance value.

2 Enter the appropriate distance value in m (corresponding to the percentage value) for the full vessel. Make sure that the max. level must be beneath the dead zone.

3 Save the settings with ***[OK]*** and move to the medium selection with ***[>]***.

Medium selection

Each product has different reflective properties. In solids, other influencing factors are dust generation, material cone and additional echoes caused by the vessel wall. Through medium selection, the sensor is optimally adapted to the product and the reliability, particularly in products with bad reflective properties is considerably increased.



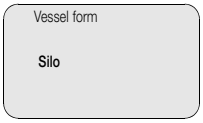
For solids you choose also *Powder/Dust*, *Granular/Pellets* or *Ballast/Pebbels*.

In liquids additional interfering factors are fluctuating product surfaces and foam generation. To adapt the sensor to these different measurement conditions, the general selection *Solid* or *Liquid* is made in this menu item.

Enter the requested parameters via the appropriate keys, save your settings and jump to the next menu item with the ***[>]*** key.

Vessel form

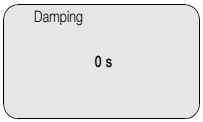
Apart from the medium, also the vessel form can influence the measurement. To adapt the sensor to these conditions, this menu item offers (depending on whether liquid or solid is selected) different options. These are for *Solid Silo* or *Bunker*, for *Liquid Storage tanke*, *Stilling tube*, *Open vessel* or *Stirred vessel*.



Enter the requested parameters via the appropriate keys, save your settings and jump to the next menu item with ***[>]*** key.

Damping

To suppress fluctuation in the measured value display, e.g. by agitated product surfaces, an integration time can be set. This time can be between 0 and 999 seconds. Please note that the reaction time of the entire measurement will be longer and the sensor will react to quick changes of the measured value with a corresponding delay. In general, a time of a few seconds is sufficient to smooth the measured value display.

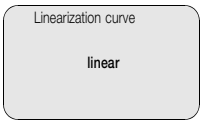


Enter the requested parameter via the respective keys, save your settings and jump to the next menu item with the ***[>]*** key.

Linearization curve

A linearization is necessary for all vessels in which the vessel volume does not increase linearly with the level - e. g. in a cylindrical or spherical tank - and the indication or output of the volume is requested. Corresponding linearization curves are preprogrammed for these vessels. They represent the correlation between the level percentage and vessel volume. By activating the appropriate curve, the volume percentage of the vessel is displayed correctly. If the volume should not be displayed in percent but e.g. in l or kg, a scaling can be set in the menu item *Display*.

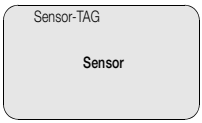
29261-EN-040525



Enter the requested parameter via the respective keys, save your settings and jump to the next menu item with the ***[>]*** key.

Sensor-TAG

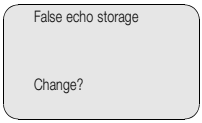
In this menu item you can enter an unambiguous designation for the sensor, e.g. the measurement loop name or the tank or product designation. In digital systems and in the documentation of larger plants, a unique designation should be entered for exact identification of individual measuring sites.



With this menu item, the Basic adjustment is finished and you can now jump to the main menu with the ***[ESC]*** key.

False echo storage

High sockets or vessel installations, such as e.g. struts or stirrers as well as buildup and weld joints on the vessel walls cause false reflections which influence the measurement. A false echo storage detects and marks these false echoes so that they are no longer taken into account for the level measurement. A false echo memory should be created with empty vessel so that all probably existing false reflections can be detected.



Proceed as follows:

1 Move from the measured value display to the main menu by pushing ***[OK]***.

2 Select the menu item *Service* with ***[>]*** and confirm with ***[OK]***. Now the menu item false echo storage is displayed.

3 Confirm *False echo storage - Change now* with ***[OK]*** and select in the below menu *Create new*. Enter the actual distance from the sensor to the product surface. All false echoes in this area are detected by the sensor and saved after confirming with ***[OK]***.

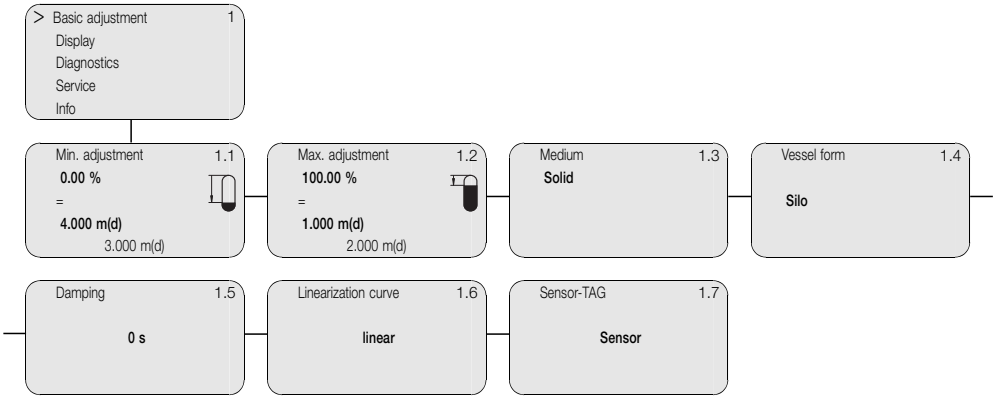
Note:
Check the distance to the product surface as in case of a wrong (too big) setting, the real level will be saved as false echo. Hence the level can no longer be detected in this area.

Optional settings

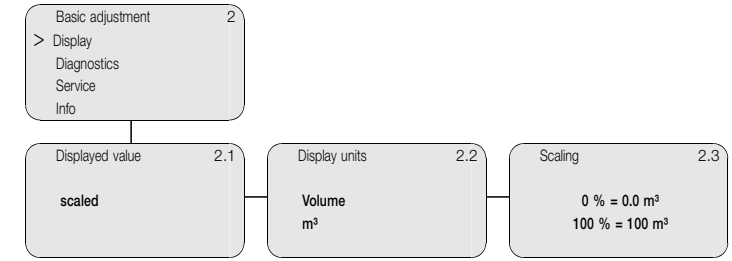
Additional adjustment and diagnosis options such as e.g. scaling, simulation or echo or trend curve presentation are shown in the following menu schematic. You will find a detailed description of these menu items in the operating instructions manual of the indicating and adjustment module PLICSCOM.

6.5 Menu schematic

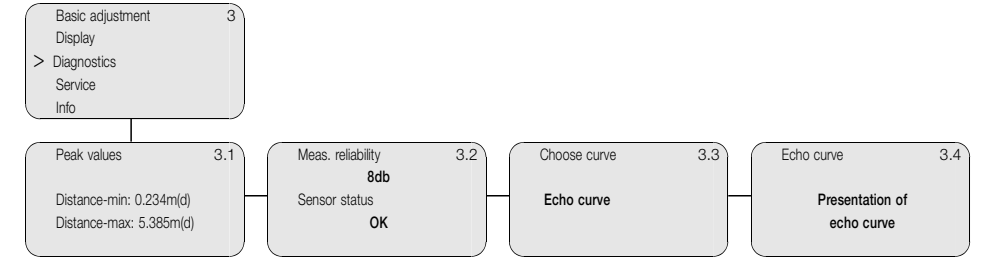
Basic adjustment



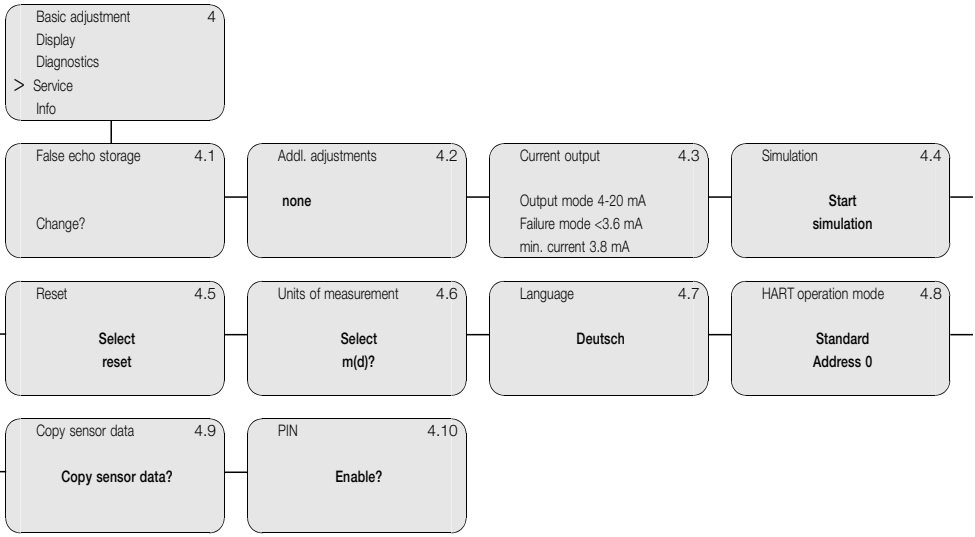
Display



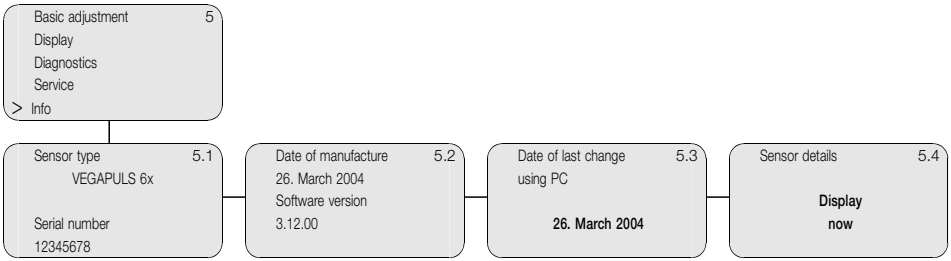
Diagnostics



Service



Info



7 Set-up with PACTware

7.1 Connecting the PC

Connecting the PC directly to the sensor

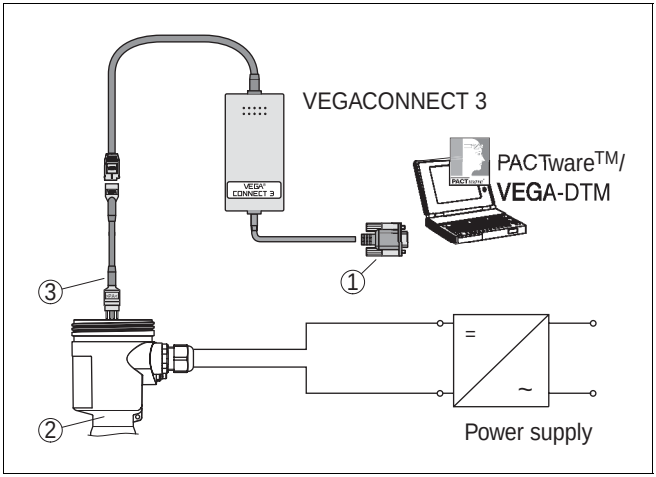


Fig. 27: Connecting the PC directly to the sensor

1 RS232 connection
2 VEGAPULS 68
3 I²C adapter cable for VEGACONNECT 3

Necessary components:

- VEGAPULS 68
- PC with PACTware and suitable VEGA-DTM
- VEGACONNECT 3 with I²C adapter cable (article no. 2.27323)
- power supply unit

Connecting the PC to the signal cable

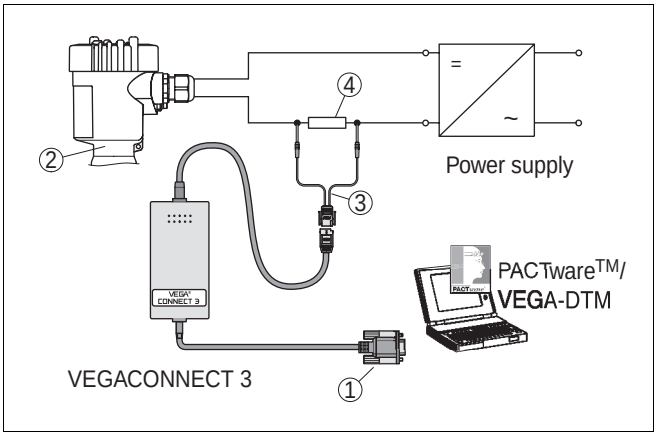


Fig. 28: Connecting the PC to the signal cable

1 RS232 connection
2 VEGAPULS 68
3 HART adapter cable for VEGACONNECT 3
4 HART resistance 250 Ohm

Necessary components:

- VEGAPULS 68
- PC with PACTware and suitable VEGA-DTM
- VEGACONNECT 3 with HART adapter cable
- HART resistance approx. 250 Ohm
- power supply unit

Note:
With power supply units with integrated HART resistance (internal resistance approx. 250 Ohm), an additional external resistance is not necessary (e.g. VEGATRENN 149A, VEGADIS 371, VEGAMET 381/624/625, VEGASCAN 693). In these cases, VEGACONNECT 3 can be connected in parallel to the 4 ... 20 mA cable.

7.2 Parameter adjustment with PACTware

Further set-up steps are described in the operating instructions manual *DTM Collection/PACTware* attached to each CD and which can also be downloaded from out homepage. A detailed description is available in the online help of PACTware and the VEGA-DTMs.

Note:
Keep in mind that for set-up of VEGAPULS 68, DTM-Collection 04/2004 or a newer should be applied.

All actually available VEGA-DTMs are provided in the DTM Collection on CD and are available from the respective VEGA agency against a token fee. This CD includes also the up-to-date PACTware version. The basic version of this DTM Collection incl. PACTware is also available as a free-of-charge download from the Internet.

8 Maintenance and fault rectification

8.1 Maintenance

When used as intented in normal operation, VEGAPULS 68 is completely maintenance-free.

8.2 Fault rectification

Causes of failure

VEGAPULS 68 offers maximum reliability. Nevertheless, it is possible that failures occur during operation. These can have the following reasons, e.g.:

- Sensor
- Process
- Power supply
- Signal processing.

Fault rectification

The first measures to be taken are to check the output signal as well as to evaluate the error message relayed via the adjustment module PLICSCOM. The procedure is described below. Further comprehensive diagnostics options can be carried out with a laptop with the software PACTware and the suitable DTM. In many cases, the reasons can be determined in this way and the fault can be rectified.

24 hour service hotline

Should these measures not be successful, you can call the VEGA service hotline in urgent cases under the phone number **+49 1805 858550**.

The hotline is available to you 7 days a week, round-the-clock. Since we offer this service world-wide, the support is only available in English language. The service is free of charge, only the standard telephone costs will be charged.

Checking the 4 ... 20 mA signal

Connect a hand-held multimeter with a suitable measuring range acc. to the wiring plan.

? 4 ... 20 mA signal not stable

- level fluctuations

→ set integration time via PLICSCOM or PACTware

? 4 ... 20 mA signal missing

- incorrrect connection to power supply

→ check connection acc. to chapter "Connection procedure" and correct, if necessary, acc. to chapter "Wiring plans"

- no power supply

→ check cables for line break, repair, if necessary

- power supply too low or load resistance too high

→ check and adapt, if necessary

? Current signal greater than 22 mA or less than 3.6 mA

- electronics module defective

→ exchange instrument or return for repair

In Ex applications, the regulations for the wiring of intrinsically safe circuits must be observed.

Fault messages viaPLICS-COM

? E013

- no measured value available

→ sensor in boot phase

→ sensor does not find an echo, e.g. through incorrect installation or wrong parameter adjustment

? E017

- adjustment span too small

→ carry out a fresh adjustment and increase the distance between min. and max. settings

? E036

- no operable sensor software

→ carry out a software update or return instrument for repair

? E041

- hardware error, electronics defective

→ exchange instrument or return it for repair

8.3 Repairing the instrument

If it is necessary to repair VEGAPULS 68, please proceed as follows:

You can download in the Internet from our homepage www.vega.com under: You can download from our homepage www.vega.com under: "Services > Downloads > Formulare und Zertifikate> Reparaturformular a return form (23 KB).

You will thus help us to carry out the repair quickly and without further checking.

- Print out and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and possibly a safety data sheet to the instrument
- Send the instrument to the following address: VEGA Grieshaber KG; Abteilung Reparatur; Am Hohenstein 113; 77761 Schiltach/Germany

9 Dismounting

9.1 Dismounting procedure

Take note of chapters "Mounting" and "Connecting to power supply" and carry out the listed steps in reverse order.

9.2 Disposal

VEGAPULS 68 consists of materials which can be recycled by specialised recycling companies. We have purposely designed the electronic modules to be easily separable. Mark the instrument as scrap and dispose of it according to government regulations (electronic scrap ordinance, ...)

Materials: see Technical data

If you cannot dispose of the instrument properly, please contact us about disposal methods or return.

10 Supplement

10.1 Technical data

General data

Materials, non-wetted parts	
– housing	plastic PBT (Polyester), Alu die-casting powder-coated, stainless steel 1.4435
– seal ring between housing and housing cover	NBR (stainless steel housing), silicone (Alu/plastic housing)
– inspection window in housing cover for PLICSCOM	Polycarbonate
– ground terminal	stainless steel 1.4571/1.4435
Materials, wetted parts	
– process fitting	thread G1½A and 1½ NPT, flansches DN 50 ... DN 200 and 2" ... 8": stainless steel 1.4435
– antenna	stainless steel 1.4435, PTFE (TFM 1600 PTFE)
– seal, antenna system	Viton, Kalrez 2035, 6375, 6623
Weight	
– process fitting, thread	2.0 ... 2.8 kg (depending on thread size and housing)
– process fitting, flange	4.2 ... 15.4 kg (depending on flange size and housing)
– process fitting, swivelling holder with flange	5.2 ... 16.4 kg (depending on flange size and housing)

Output variable

Output signal	4 ... 20 mA/HART
Resolution	1.6 µA
Fault signal	current output unchanged, 20.5 mA, 22 mA, < 3.6 mA (adjustable)
Current limitation	22 mA
Load	
– 4-wire sensor[2)]	max. 500 Ohm [3)]
– 2-wire sensor[4)]	see load diagram in Power supply
Integration time (63% of the input variable)	0 ... 999 s, adjustable
Rise time	150 ms (ti: 0 s, 0 ... 100 %)
Fulfilled Namur recommendation	NE 43

Input variable

Parameter	distance between process fitting and product surface
Min. distance from antenna end	400 mm
Max. measuring range	60 m (optional 70 m)

Accuracy (similar to DIN EN 60770-1)

Reference conditions acc. to DIN EN 61298-1

– temperature	18 ... 30°C
– relative humidity	45 ... 75 %
– pressure	860 ... 1060 mbar (86 ... 106 kPa)

2) Not with VEGABAR.
3) With inductive load, ohmic share at least 25 Ohm/mH.
4) Not with VEGASON 64, 65 and 66.

Characteristics curve deviation and measurement characteristics[5)]

Average temperature coefficient of the zero signal (temperature error)	0.06 %/10 K
Resolution, general	max. 1 mm
Frequency	K-band
Interval	> typ. 4 s
Adjustment time [6)]	> 4 s (depending on the parameter adjustment)

Max. emitted power

Received average emitted power reaching an object directly in front of the antenna

– distance 1 m	108 nW per cm^2 (108 x 10^{-9} W/cm^2)
– distance 5 m	4.3 nW per cm^2 (4.3 x 10^{-9} W/cm^2)

Beam angle depending on the antenna diameter

– ø 40 mm	22°
– ø 48 mm	18°
– ø 75 mm	10°
– ø 95 mm	8°

Accuracy see diagram

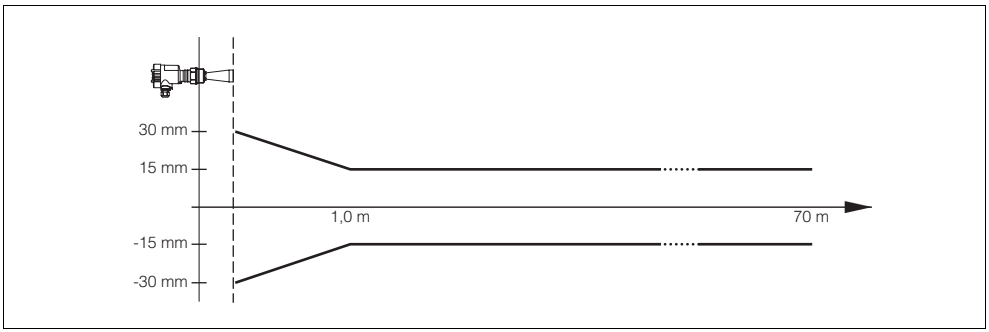


Fig. 29: Accuracy VEGAPULS 68

[5)] Relating to the nominal range, incl. hysteresis and repeatability, determined acc. to the limit point method.

[6)] Time to output the correct level (with max. 10 % deviation) after a sudden level change.

Ambient conditions

Ambient, storage and transport temperature	
– without PLICSCOM	-40 ... +80°C (-40 ... +176°F)
– with PLICSCOM	-20 ... +70°C (-4 ... +158°F)

Process conditions

Vibration resistance	mechanical vibrations with 4 g and 5 ... 100 Hz [7]
Vessel pressure	
– without swivelling holder	-1 ... 40 bar (-100 ... 4000 kPa)
– with swivelling holder	-1 ...1 bar (-10 ... 100 kPa)
Proces temperature (flange temperature, depending on the seal of the antenna system)	
– Viton	-40 ... +130°C (-40 ... +266°F)
– Viton with temperature adapter	-40 ... +200°C (-40 ... +392°F)
– Kalrez 6375	-20 ... +130°C (-4 ... +266°F)
– Kalrez 6375 with temperature adapter	-20 ... +200°C (-4 ... +392°F)
– Kalrez 2035, 6623	-15 ... +130°C (-5 ... +266°F)
– Kalrez 2035, 6623 with temperature adapter	-15 ... +200°C (-5 ... +392°F)
Pressure on cooling air connection	max. 6 bar

[7] tested acc. to the regulations of German Lloyd, GL-directive 2.

Electromechanical data

Cable entry/plug (dependent on the version)	
– single chamber housing	• 1 x cable entry M20x1.5 (cable-ø 5 9 mm), 1 x blind stopper M20x1.5 or: • 1 x closing cap ½ NPT, 1 x blind stopper ½ NPT or: • 1 x plug M12x1, 1 x blind stopper M20x1.5
– double chamber housing	• 1 x cable entry M20x1.5 (cable-ø 5 9 mm), 1 x blind stopper M20x1.5, plug M12x1 for VEGADIS 61 or: • 1 x closing cap ½ NPT, 1 x blind stopper ½ NPT, plug M12x1 for VEGADIS 61 or: • 1 x plug M12x1, 1 x blind stopper M20x1.5, plug M12x1 for VEGADIS 61
Spring-loaded terminals	for wire cross sections up to 2.5 mm²

Indicating and adjustment module PLICSCOM

Power supply and data transmission	through sensor via gold-plated sliding contacts (I²C bus)
Display	LC display in dot matrix
Adjustment elements	4 keys
Protection	
– unassembled	IP 20
– mounted into the sensor without cover	IP 40
Materials:	
– Housing	ABS
– inspection window	Polyester foil

Power supply

Power supply	
– non-Ex instrument	15 ... 36 V DC (14 ... 36 V with VEGAMET)
– EEx ia instrument	15 ... 30 V DC (14 ... 30 V with VEGAMET)
– EExd ia instrument	20 ... 36 V DC
Permissible residual ripple	
– < 100 Hz	Uss < 1 V
– 100 Hz ... 10 kHz	Uss < 10 mV
Load	see diagram

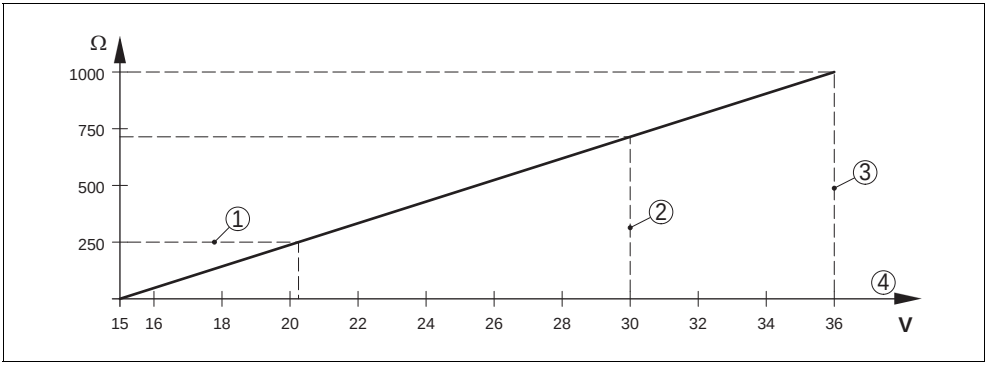


Fig. 30: Voltage diagram
1 HART load
2 Voltage limit EEx ia instrument
3 Voltage limit non-Ex instrument/Exd instrument
4 Power supply

Electrical protective measures

Protection	IP 66/IP 67
Overvoltage category	III
Protection class	II

Approvals [8]

ATEX II 1G, 1/2 G EEx ia II T6, ATEX II 1/2 D IP6X T, ATEX II 1/2G, 2 G EEX d ia IIC T6

[8] Deviating data with Ex applications: see separate safety instructions.

10.2 Dimensions

Housing

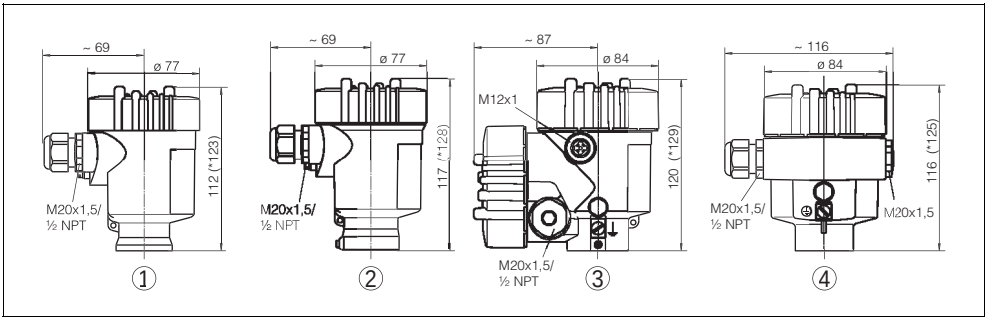
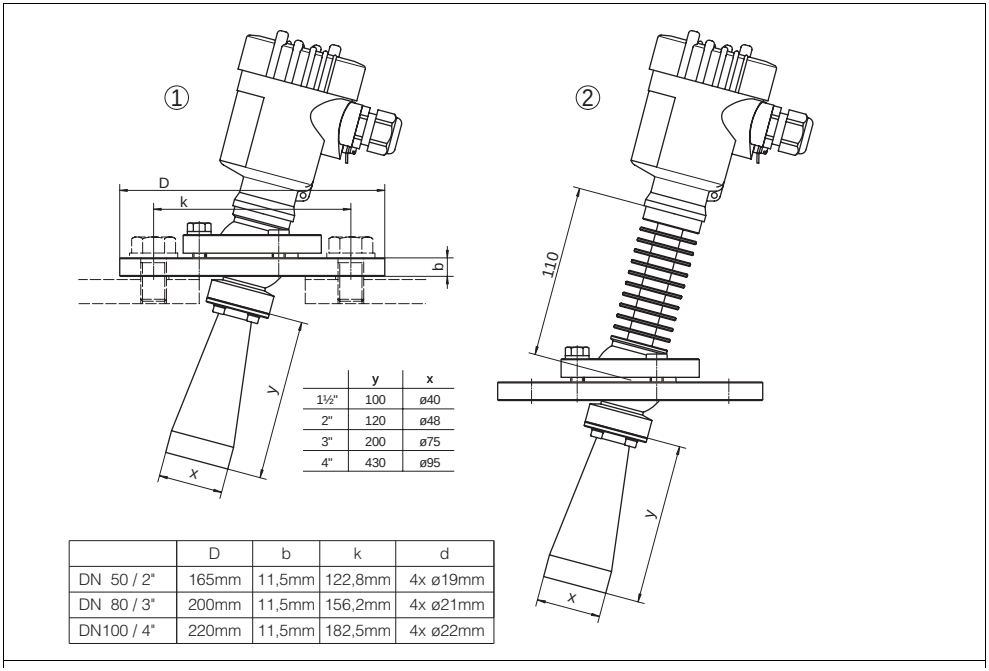


Fig. 31: Housing versions
1 Plastic housing (dimension with integrated PLICSCOM)*
2 Stainless steel housing (dimension with integrated PLICSCOM)*
3 Aluminium double chamber housing (dimension with integrated PLICSCOM)*
4 Aluminium housing (dimension with integrated PLICSCOM)*

VEGAPULS 68 with swivelling holder

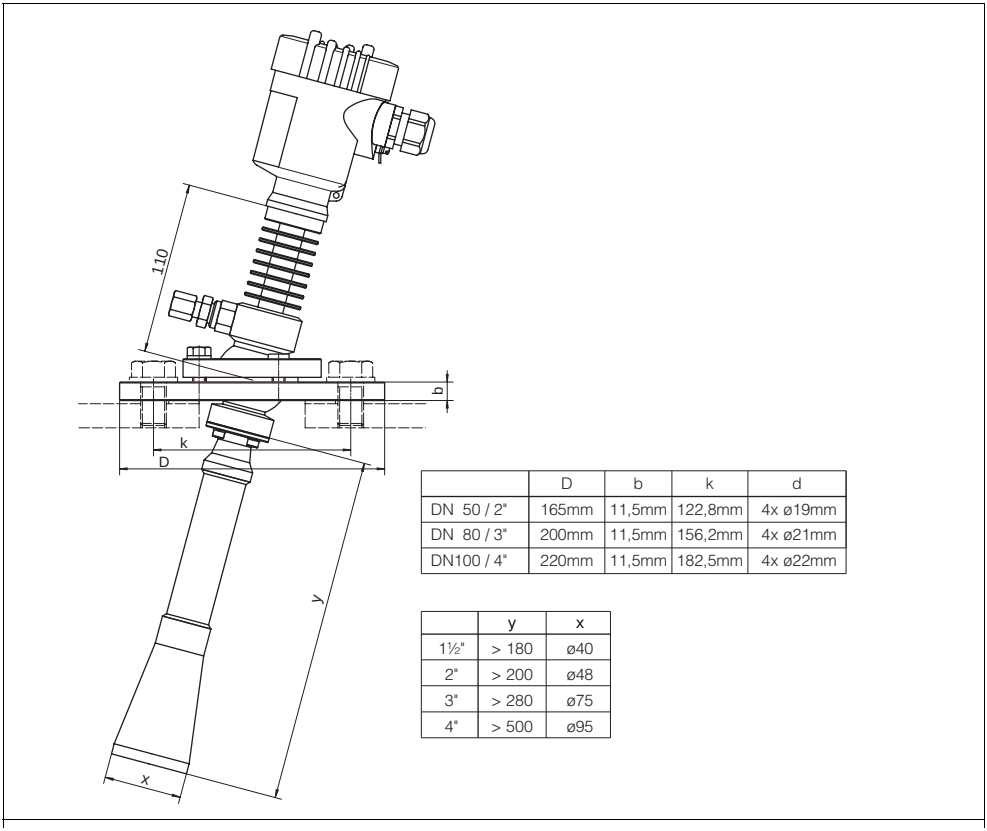


	y	x
1½"	100	ø40
2"	120	ø48
3"	200	ø75
4"	430	ø95

	D	b	k	d
DN 50 / 2"	165mm	11,5mm	122,8mm	4x ø19mm
DN 80 / 3"	200mm	11,5mm	156,2mm	4x ø21mm
DN100 / 4"	220mm	11,5mm	182,5mm	4x ø22mm

Fig. 32: VEGAPULS 68 with swivelling holder
1 Standard
2 with temperature adapter

VEGAPULS 68 with swivelling holder and rinsing air connection

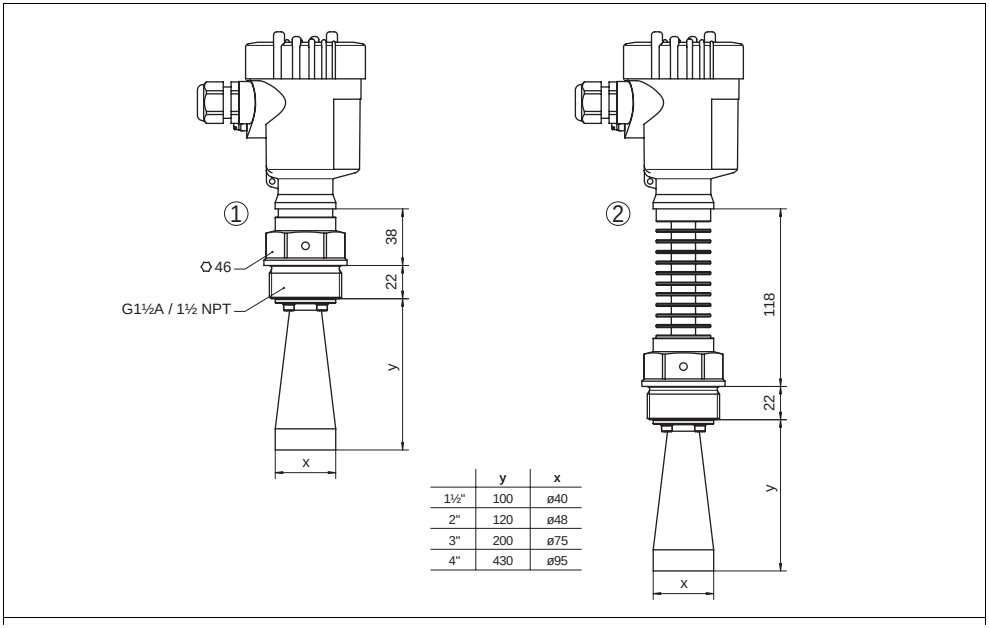


	D	b	k	d
DN 50 / 2"	165mm	11,5mm	122,8mm	4x ø19mm
DN 80 / 3"	200mm	11,5mm	156,2mm	4x ø21mm
DN100 / 4"	220mm	11,5mm	182,5mm	4x ø22mm

	y	x
1½"	> 180	ø40
2"	> 200	ø48
3"	> 280	ø75
4"	> 500	ø95

Fig. 33: VEGAPULS 68 with swivelling holder and rinsing air connection

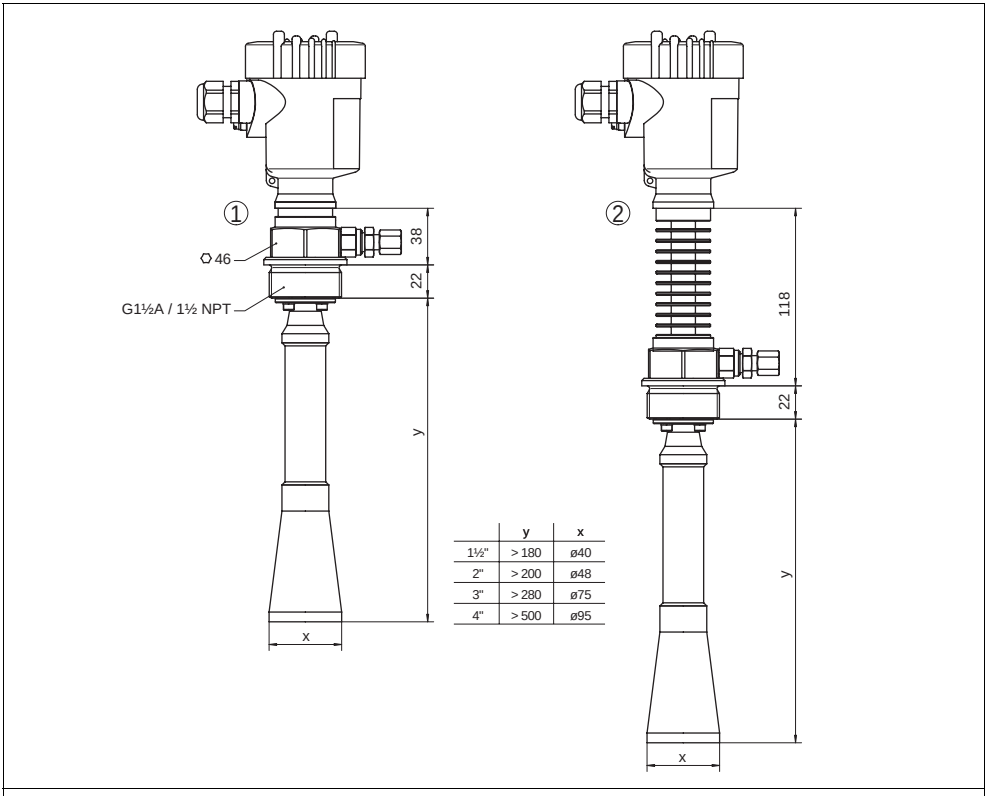
VEGAPULS 68 in screwed version



	y	x
1½"	100	ø40
2"	120	ø48
3"	200	ø75
4"	430	ø95

Fig. 34: VEGAPULS 68 in screwed version
1 Standard
2 with temperature adapter

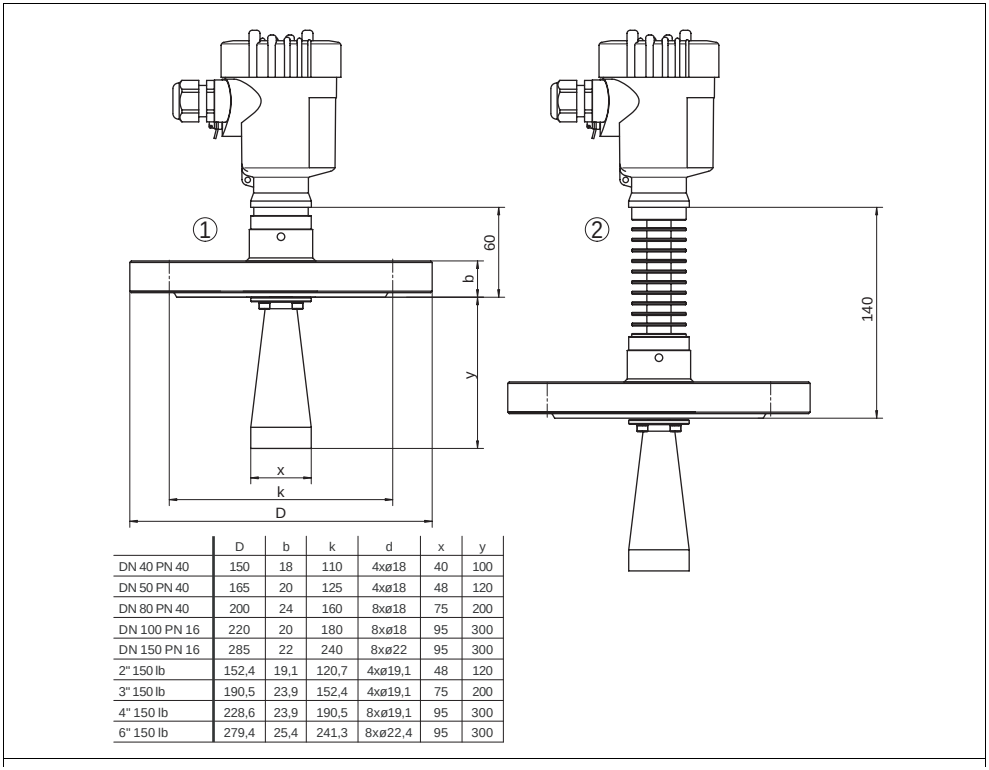
VEGAPULS 68 in screwed version with rinsing air connection



	y	x
1½"	> 180	ø40
2"	> 200	ø48
3"	> 280	ø75
4"	> 500	ø95

Fig. 35: VEGAPULS 68 in screwed version with rinsing air connection
1 Standard
2 with temperature adapter

VEGAPULS 68 in flange version



	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	200
DN 100 PN 16	220	20	180	8xø18	95	300
DN 150 PN 16	285	22	240	8xø22	95	300
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	200
4" 150 lb	228,6	23,9	190,5	8xø19,1	95	300
6" 150 lb	279,4	25,4	241,3	8xø22,4	95	300

Fig. 36: VEGAPULS 68 in flange version
1 Standard
2 with temperature adapter

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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.