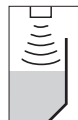


Operating Instructions

VEGASON 66

4 ... 20 mA/HART - four-wire



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Supplementary operating instructions manuals



Information:

VEGASON 66 is available in different versions and is supplied specifically according to the order. Depending on the selected version, supplementary operating instructions manuals are included in the delivery. The supplementary operating instructions are stated in paragraph "*Product description*".

Operating instructions manuals for accessories and replacement parts



Tip:

To ensure reliable setup and operation of your VEGASON 66, VEGA offers accessories and replacement parts. The associated documents are:

- Operating instructions manual "*External indicating and adjustment unit VEGADIS 61*"
- Operating instructions manual "*Oscillator VEGASON series 60*"
- Operating instructions manual "*Transmitting electronics VEGASON 64, 65, 66*"

1 About this document

1.1 Function

This operating instructions manual has all the information you need for quick setup and safe operation. Please read this manual before you start setup.

1.2 Target group

This operating instructions manual is directed to trained, qualified 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: If this warning is ignored, faults or malfunctions can result.

Warning: If this warning is ignored, injury to persons and/or serious damage to the instrument can result.

Danger: If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.



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.



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 specialist personnel authorised by the operator. For safety and warranty reasons, any internal work on the instruments must be carried out only by personnel authorised by the manufacturer.

2.2 Appropriate use

VEGASON 66 is a sensor for continuous level measurement.

Detailed information on the application range of VEGASON 66 is available in chapter "*Product description*".

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

VEGASON 66 is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The user must take note of the safety instructions in this operating 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.

2.5 CE conformity

VEGASON 66 is in CE conformity with EMC (89/336/EWG) and to NSR (73/23/EWG).

Conformity has been judged according to the following standards:

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

VEGASON 66 is designed for use in an industrial environment. Nevertheless, electromagnetic interference from electrical conductors and radiated emissions must be taken into

account, as is usual with a class A instrument acc. to EN 61326. If VEGASON 66 is used in a different environment, the electromagnetic compatibility to other instruments must be ensured by suitable measures.

2.6 Fulfilling NAMUR recommendations

In respect to interference resistance and emitted interference, VEGASON 66 fulfils NAMUR recommendation NE 21.

VEGASON 66 and its indicating/adjustment components fulfill NAMUR recommendation NE 53 in respect to compatibility. VEGA instruments are generally upward and downward compatible:

- Sensor software to DTM-VEGASON 66 HART, PA or FF
- DTM VEGASON 66 for adjustment software PACTware™
- Indicating and adjustment module for sensor software

The parameter adjustment of the basic sensor functions is independent of the software version. The range of available functions depends on the respective software version of the individual components.

The software version of VEGASON 66 can be determined as follows:

- via PACTware™
- on the type label of the electronics
- via the indicating and adjustment module

You can view all software histories on our website www.vega.com. Make use of this advantage and get registered for update information via e-mail.

2.7 Safety instructions 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 according 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:

- VEGASON 66 ultrasonic sensor
- unassembled cable gland
- Documentation
 - this operating instructions manual
 - Ex specific safety instructions (with Ex versions), if necessary further certificates
 - Operating instructions manual "*Indicating and adjustment module PLICSCOM*" (optional)

Components

VEGASON 66 consists of the following components:

- transducer with process fitting (depending on version flange, swivelling holder or thread)
- housing with electronics (depending on version remote)
- Housing cover, optionally available with indicating and adjustment module PLICSCOM

The components are available in different versions.

Version A compact in flange version

Version B compact with swivelling holder

Version C separate with swivelling holder

Version D separate with threaded fitting

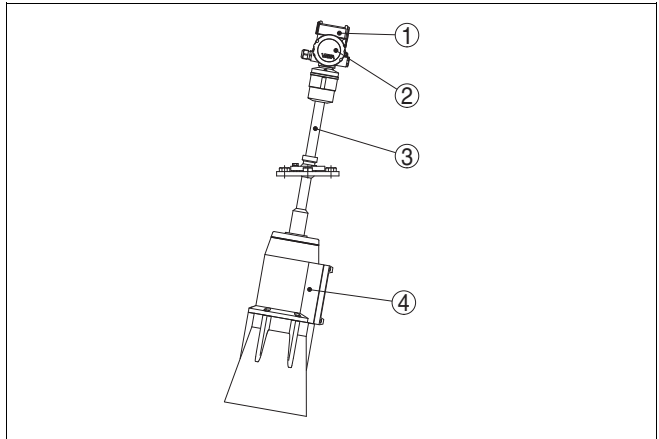


Fig. 1: VEGASON 66 compact with swivelling holder
 1 Housing cover with integrated PLICSCOM (optional)
 2 Housing with electronics
 3 Swivelling holder with flange
 4 Transducer

3.2 Principle of operation

Area of application

VEGASON 66 is an ultrasonic sensor for continuous level measurement. It is particularly suitable for solids, but also good for liquids.

Physical principle

The transducer of the ultrasonic sensor transmits short ultrasonic pulses to the measured product. These pulses are reflected by product surface and received again by the transducer as echoes. The running time of the ultrasonic pulses from emission to reception is proportional to the distance and hence the level. The determined level is converted into an appropriate output signal and outputted as measured value.

Power supply

Four-wire electronics with separate power supply.

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

Measured value transmission is carried out via the 4 ... 20 mA/ HART output separate from power supply.

The backlight of the indicating and adjustment module is powered by the sensor¹⁾. Requirement is a certain height of the supply voltage. The exact voltage specifications are stated in the "Technical data" in the "Supplement".

3.3 Operation

VEGASON 66 can be adjusted with four different adjustment media:

- the adjustment module PLICSCOM
- the suitable VEGA DTM in conjunction with an adjustment software according to the FDT/DTM standard, e.g. PACTware™ and PC
- the manufacturer-specific adjustment programs AMST™ or PDM
- a HART handheld

The entered parameters are generally saved in VEGASON 66, 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 according to DIN EN 24180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is 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 %

¹⁾ This function is presumably available from October 2006.

4 Mounting

4.1 General instructions

Materials, wetted parts

Make sure that the wetted parts of VEGASON 66, especially the seal and process fitting, are suitable for the existing process conditions such as pressure, temperature etc. as well as the chemical properties of the medium.

You will find specification in chapter "*Technical data*" in the "*Supplement*".

Installation location

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

Moisture

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

You can give your VEGASON 66 additional protection 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 outdoors, in areas where moisture is expected (e.g. by cleaning processes) or on cooled or heated vessels.

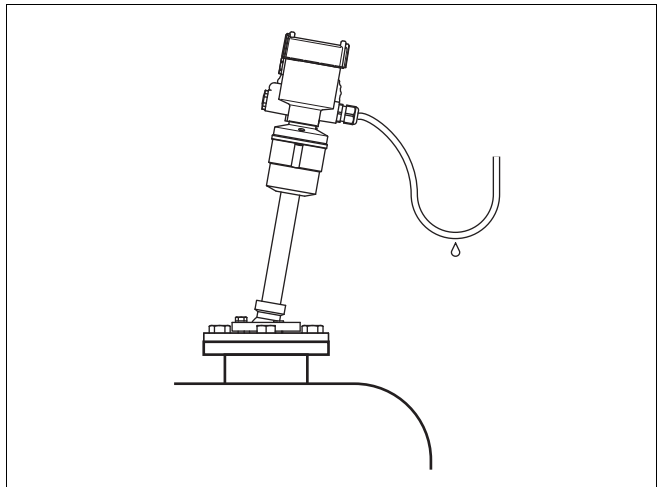


Fig. 2: Measures against moisture penetration

Measuring range

The reference plane for the measuring range (version A) is the lower edge of the flange. The reference plane for versions B, C and D is the lower edge of the transducer.

Make sure that for all versions a min. distance - the so called dead zone - below the reference plane is maintained in which a measurement is not possible. The exact value of the dead zone is stated in the "Technical data" in the "Supplement".



Information:

If the medium reaches the transducer, buildup can form on it and cause faulty measurements later on.

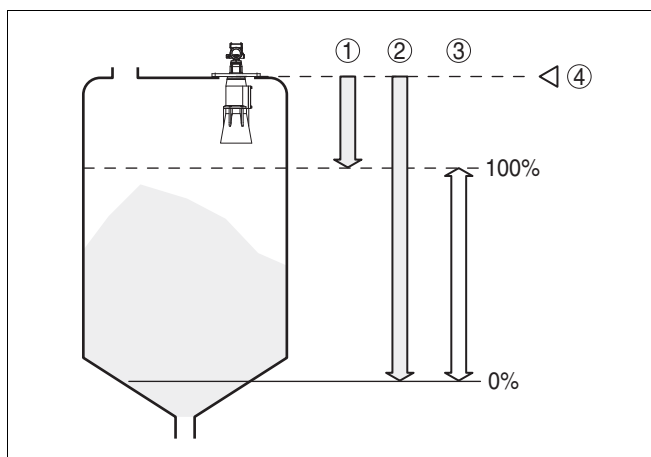


Fig. 3: Version A - Measuring range (operating range) and max. measuring distance

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

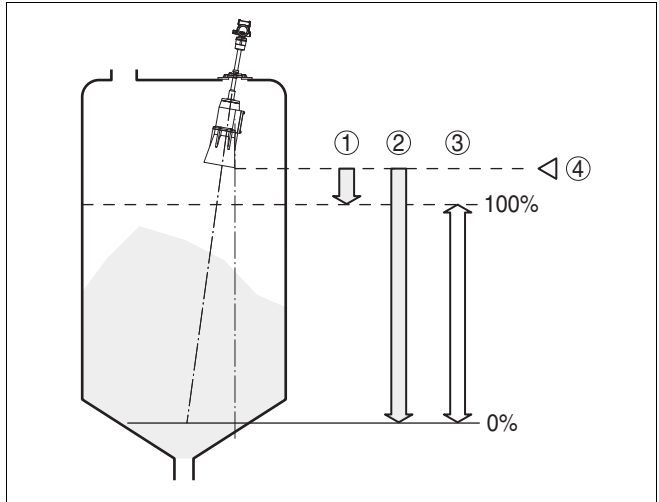


Fig. 4: Version B, C, D - Measuring range (operating range) and max. measuring distance

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

Pressure/Vacuum

Gauge pressure in the vessel does not influence VEGASON 66. Low pressure or vacuum, however, damp the ultrasonic pulses. This influences the measuring result, particularly if the level is very low. With pressures under -0.2 bar (-20 kPa) you should use a different measuring principle, e.g. radar or guided microwave.

4.2 Mounting preparations

Mounting - Version B

Version B is supplied in two parts: Transducer and electronics housing.

Assemble the version as follows:

- 1 Loosen the screws on the fixing ring (4) with a hexagon spanner (size 4), remove the transducer tube out of the swivelling holder
- 2 Mount the flange
- 3 Insert the transducer tube in the requested length from below into the swivelling holder
- 4 Fasten with screws (4); torque max. 10 Nm
- 5 Remove the plug from below out of the instrument housing and plug it into the socket of the transducer tube

- 6 Plug the electronics housing to the transducer tube. Do not squeeze any cables. The housing is in the correct position, if the lower notch (2) of the transducer tube is no longer visible
- 7 Tighten the screws (5) on the housing moderately with a hexagon spanner (size 4)
- 8 Loosen terminal screw of the swivelling holder (3) with a fork spanner (SW 13)
- 9 Direct the sensor with the swivelling holder to the measured product
- 10 Fasten the swivelling holder with screw (3), torque max. 20 Nm
- 11 Secure screw (3) with lacquer or similar to ensure permanent tightness of the swivelling holder
- 12 Rotate the housing in such a way that the cable entry points downwards (moisture can drain off). Fasten the housing with screws (5); torque Aluminium housing max. 5 Nm, torque plastic housing max. 2 Nm

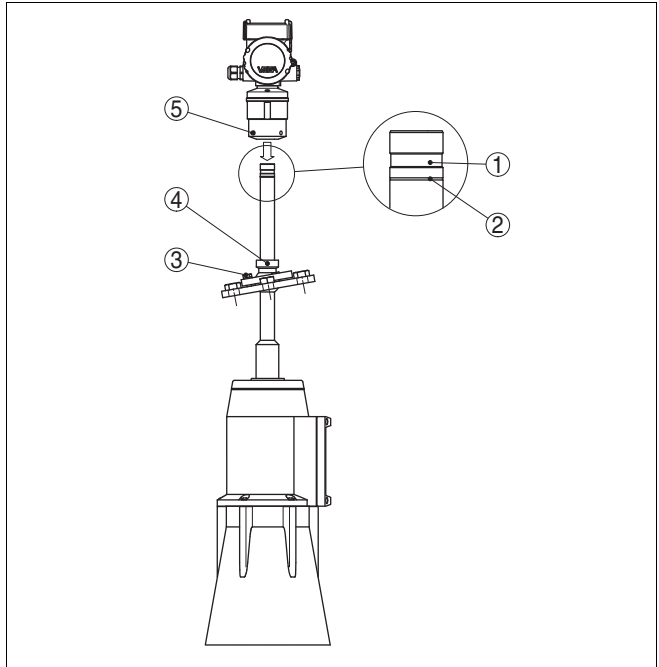


Fig. 5: Mounting - Version B

- 1 Groove to lock the housing
- 2 Marking notch
- 3 Screw of swivelling holder (hexagon SW 13)
- 4 Grub screw, fixing ring (hexagon spanner - size 4)
- 5 Terminal screws, housing (hexagon spanner - size 4)

Mounting - Version C

Version C is supplied in three parts: Transducer, transducer cable and electronics for wall mounting.

Assemble the version as follows:

- 1 Loosen the screws on the fixing ring (4) with a hexagon spanner (size 4), remove the transducer tube out of the swivelling holder
- 2 Mount the flange
- 3 Insert the transducer tube in the requested length from below into the swivelling holder
- 4 Fasten with screws (4); torque max. 10 Nm
- 5 Remove the plug from below out of the connection head and plug it into the socket of the transducer tube

- 6 Plug the connection head to the transducer tube. Do not squeeze any cables. The cylinder is in the correct position, if the lower notch (2) of the transducer tube is no longer visible
- 7 Tighten the screws (5) on the cylinder moderately with a hexagon spanner (size 4)
- 8 Loosen terminal screw of the swivelling holder (3) with a fork spanner (SW 13)
- 9 Direct the sensor with the swivelling holder to the measured product
- 10 Fasten the swivelling holder with screw (3), torque max. 20 Nm
- 11 Secure screw (3) with lacquer or similar to ensure permanent tightness of the swivelling holder
- 12 Rotate the connection head in such a way that the cable entry points downwards (moisture can drain off). Fasten the cylinder with screws (5); torque max. 5 Nm
- 13 Insert the plug at the end of the transducer cable into the socket on the remote electronics

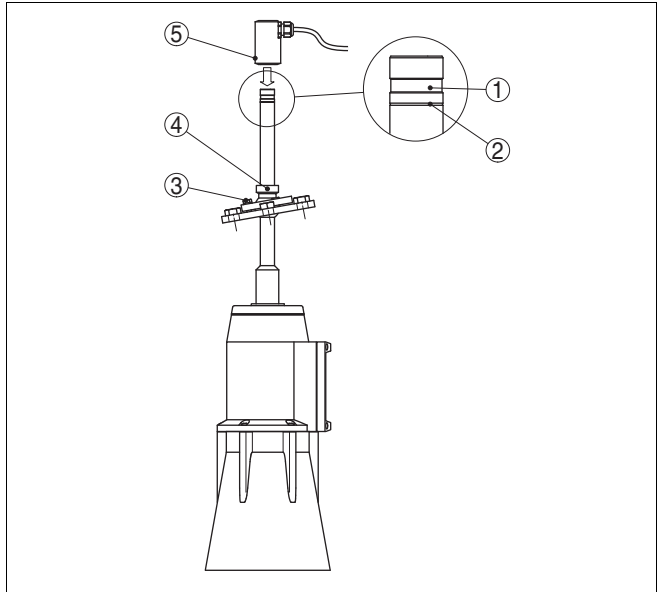


Fig. 6: Mounting - Version C

- 1 Groove for locking the connection head
- 2 Marking notch
- 3 Screw of swivelling holder (hexagon SW 13)
- 4 Grub screw, fixing ring (hexagon spanner - size 4)
- 5 Terminal screws, connection head (hexagon spanner - size 4)

Mounting - Version D

Version D is supplied in three parts: Transducer, transducer cable and electronics for wall mounting.

Assemble the version as follows:

- 1 Loosen the hexagon nut (3) on the transducer cable
- 2 Insert the transducer tube from below into the mounting opening G1 A
- 3 Fasten (SW 46) the hexagon nut (3)
- 4 Remove the plug from below out of the connection head and plug it into the socket of the transducer tube
- 5 Plug the connection head to the transducer tube. Do not squeeze any cables. The cylinder is in the correct position, if the lower notch (2) of the transducer tube is no longer visible
- 6 Tighten the screws (4) on the cylinder moderately with a hexagon spanner (size 4)

- 7 Rotate the connection head in such a way that the cable entry points downwards (moisture can drain off). Fasten the cylinder with screws (4); torque max. 5 Nm
- 8 Insert the plug at the end of the transducer cable into the socket on the remote electronics

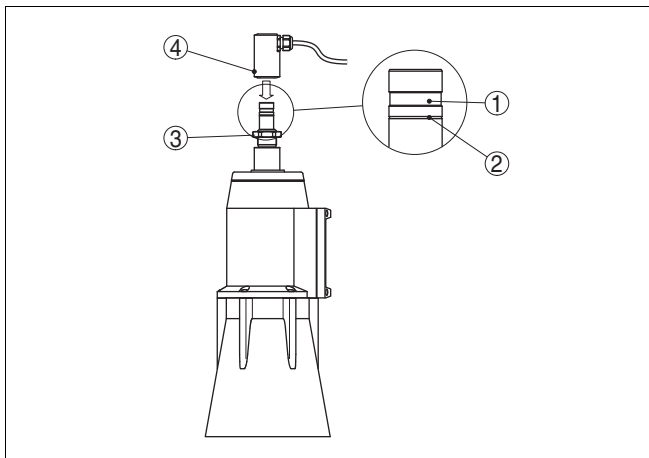


Fig. 7: Mounting - Version D

- 1 Groove for locking the connection head
- 2 Marking notch
- 3 Hexagon nut SW 46
- 4 Terminal screws, connection head (hexagon spanner - size 4)

4.3 Mounting instructions

Installation location

Mount VEGASON 66 at least 500 mm (19.7 in) from the vessel wall. If the sensor is installed in the center of vessels with dished or round tops, multiple echoes can arise. These can, however, be suppressed by an appropriate adjustment (see "Setup").

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

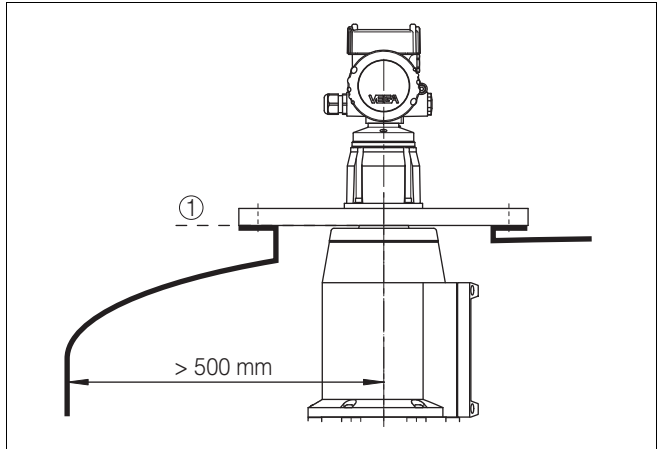


Fig. 8: Installation location
1 Reference plane

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

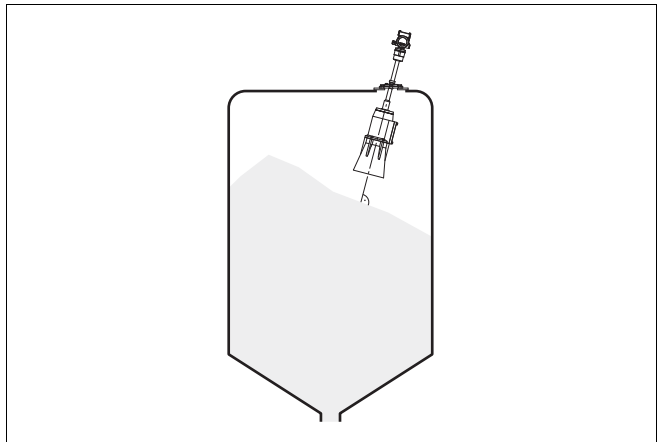


Fig. 9: Vessel with conical bottom

Socket

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

If the reflective properties of the medium are good, you can mount VEGASON 66 on a socket piece. The socket end should be smooth and burr-free, if possible also rounded. Carry out a false echo storage.

Sensor orientation

In liquids, direct the sensor as perpendicular as possible to the product surface to achieve optimum measurement results.

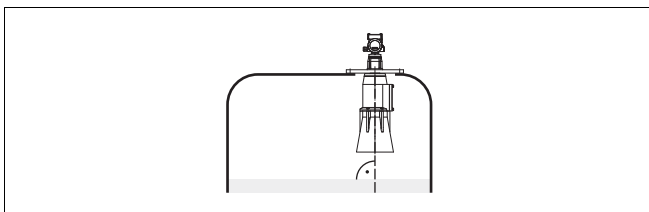


Fig. 10: Orientation in liquids

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

Vessel installations

The ultrasonic sensor should be installed at a location where no installations cross the ultrasonic beam.

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 site that the ultrasonic signals have "free access" to the measured product.

If there are existing vessel installations, a false echo storage should be carried out during setup.

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

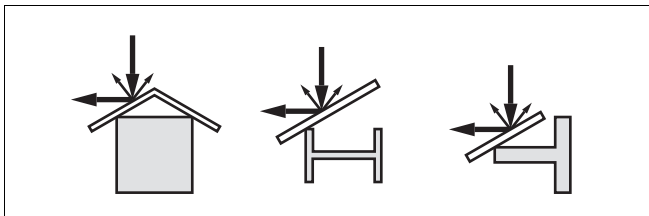


Fig. 11: Cover smooth profiles with deflectors

Agitators

If there are agitators in the vessel, a false echo storage should be carried out with the agitators in motion. This ensures that the interfering reflections from the agitators are saved with the blades in different positions.

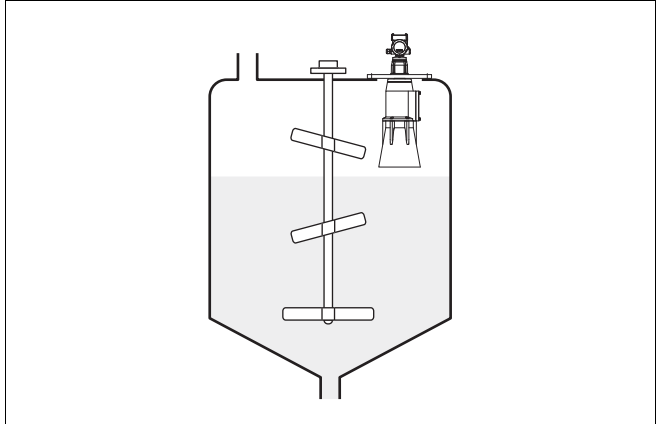


Fig. 12: Agitators

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 toward the solid surface.

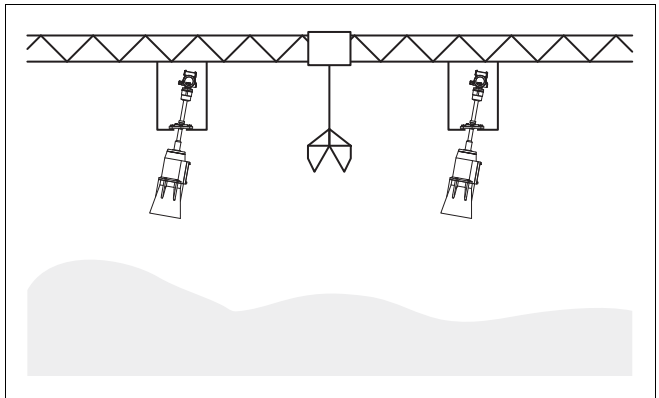


Fig. 13: Transducers on traverse crane

Inflowing medium

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

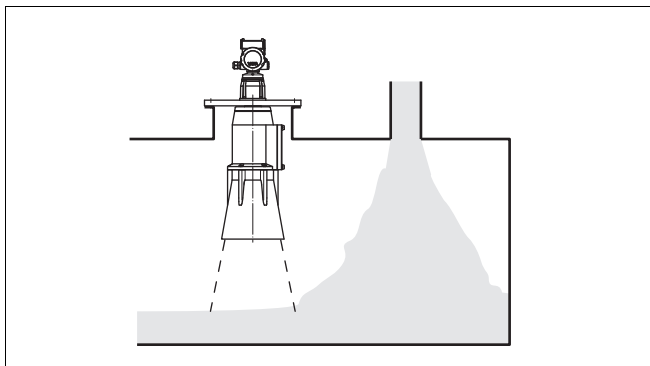


Fig. 14: Inflowing medium

Foam

Through the action of filling, stirring and other processes in the vessel, dense foams which considerably damp the emitted signals may form on the product surface.

If foams are causing measurement errors, the sensor should be used in a standpipe or, alternatively, the more suitable guided radar sensors (TDR) should be used.

Guided radar is not influenced by foam generation and is particularly suitable for such applications.

Air turbulence

If there are strong air currents in the vessel, e.g. due to strong winds in outdoor installations, or because of air turbulence, e.g. by cyclone exhaustion you should mount VEGASON 66 in a standpipe or use a different measuring principle, e.g. radar or guided radar (TDR).

Heat fluctuations

Strong heat fluctuations, e.g. caused by the sun, can cause measurement errors. In this case, you should use a sun shield.

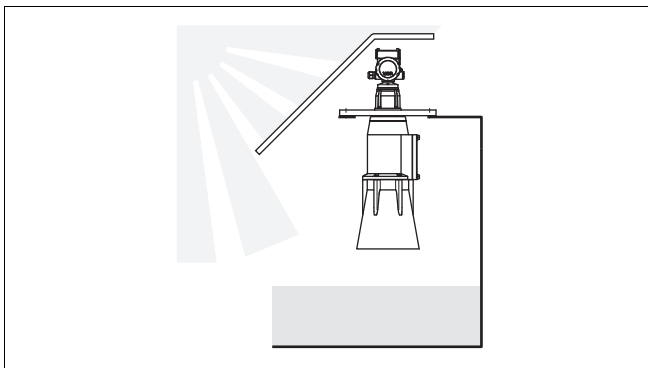


Fig. 15: Heat fluctuations

5 Connecting to voltage supply

5.1 Preparing the connection

Note safety instructions

Generally not the following safety instructions:

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



Tip:

We recommend VEGA overvoltage arresters FS-LB-I and ÜSB 62-36G.X.

Take note of safety instructions for Ex applications



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

If reliable separation is required, power supply with mains voltage and current output are transmitted via separate two-wire connection cables. The supply voltage range can differ depending on the instrument version. The exact range is stated in the "Technical data" in the "Supplement".

This 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 terminal. Take note of the general installation regulations.

As a rule, connect VEGASON 66 to vessel ground (potential equalisation) or in case of plastic vessels to the next ground potential. For this purpose, there is a ground terminal on the side of the instrument housing.

Selecting the connection cable

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

The 4 ... 20 mA current output is connected with standard two-wire cable without screen. If strong electromagnetic interference is expected, screened cable should be used.

An outer cable diameter of 5 ... 9 mm ensures the seal effect of the respective cable entry.

Cable screening and grounding

If screened cable is necessary, 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 equalisation (low impedance).

If potential equalisation currents are expected, the connection on the processing 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 applica-
tions**



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 steps

Proceed as follows:

- 1 Unscrew the housing cover
- 2 Loosen compression nut of the cable entry
- 3 Remove approx. 10 cm (4 in) of the cable mantle (current output), strip approx. 1 cm (0.4 in) insulation from the ends of the individual wires
- 4 Insert the cable into the sensor through the cable entry
- 5 Lift the opening levers of the terminals with a screwdriver
- 6 Insert the wire ends into the open terminals according to the wiring plan
- 7 Press the opening lever of the terminals downward, you will hear the terminal spring closing
- 8 Check the hold of the wires in the terminals by lightly pulling on them
- 9 Connect the screen to the internal ground terminal and the external ground terminal to potential equalisation
- 10 Tighten the compression nut of the cable entry, the seal ring must completely encircle the cable
- 11 Connect the lead cable for power supply in the same way acc. to the wiring plan, in addition connect the ground conductor to the inner ground terminal.
- 12 Screw the housing cover back on

The electrical connection is hence finished.

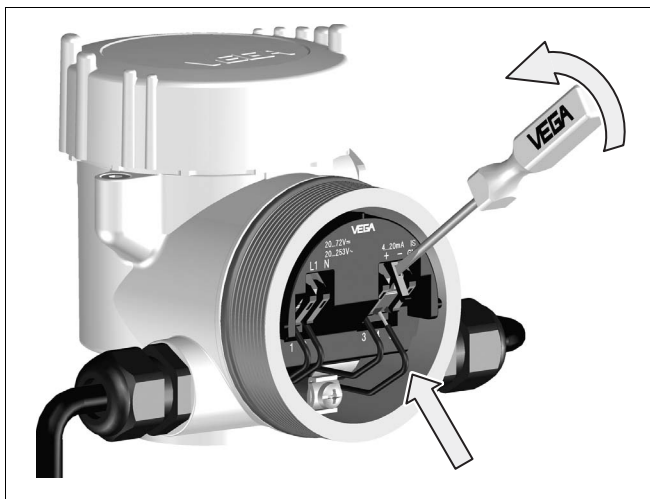


Fig. 16: Connection steps 5 and 6

5.3 Wiring plan, double chamber housing

Housing overview

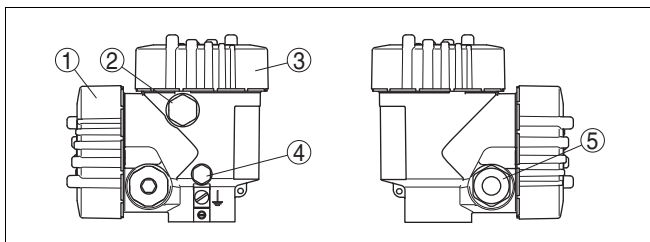


Fig. 17: Double chamber housing

- 1 Housing cover, connection compartment
- 2 Blind stopper or plug M12x1 for VEGADIS 61 (option)
- 3 Housing cover, electronics compartment
- 4 Filter element for pressure compensation or blind stopper with version IP 66/
IP 68, 1 bar²⁾
- 5 Cable entry or plug

²⁾ Version IP 66/IP 68, 1 bar not with four-wire instruments

Electronics compartment

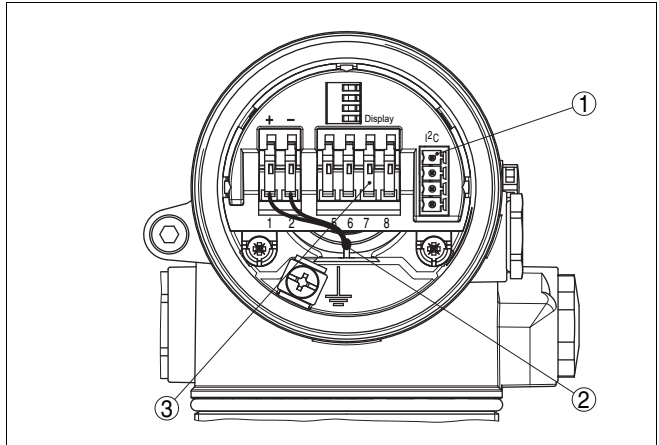


Fig. 18: Electronics compartment, double chamber housing

- 1 Plug connector for VEGACONNECT (I²C interface)
- 2 Internal connection cable to the connection compartment
- 3 Terminals for VEGADIS 61

Connection compartment

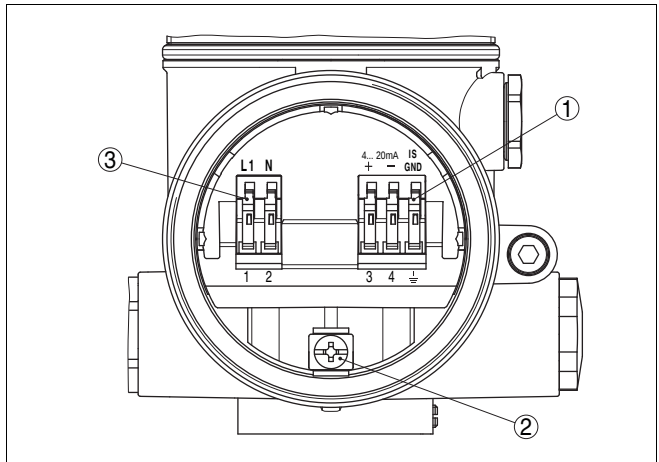


Fig. 19: Connection compartment, double chamber housing

- 1 Spring-loaded terminals for signal output
- 2 Ground terminal for connection of the ground conductor and screen
- 3 Spring-loaded terminals for voltage supply

Wiring plan

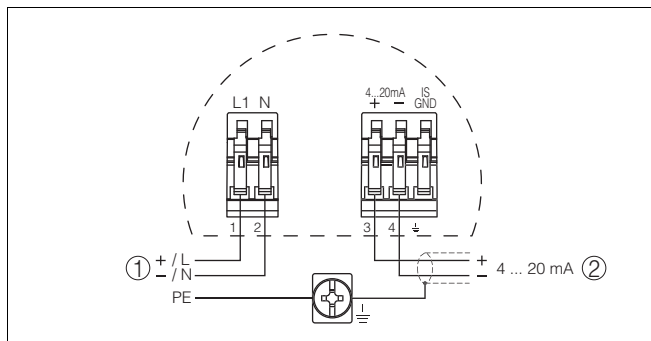


Fig. 20: Wiring plan, double chamber housing

- 1 Voltage supply
- 2 Signal output

5.4 Switch-on phase

Switch-on phase

After connecting VEGASON 66 to power supply or after a voltage recurrence, the instrument carries out a self-check for approx. 30 seconds:

- Internal check of the electronics
- Indication of the instrument type, the firmware as well as the sensor TAGs (sensor designation)
- Output signal jumps briefly (approx. 10 seconds) to the set fault current

Then the corresponding current is transmitted to the cable.³⁾

³⁾ The value corresponds to the actual measured level as well as to the settings already carried out, e.g. default setting.

6 Setup 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 and adjustment unit VEGADIS 61

From a hardware revision ...- 01 or higher of PLICSCOM as well as the respective sensor an integrated background lighting can be switched via the adjustment menu.⁴⁾ You will find the hardware revision on the respective type label of PLICSCOM or the sensor electronics.



Information:

This function is for instruments with StEx, WHG or ship approval as well as country-specific approvals such as those according to FM or CSA, available at a later date.



Note:

You will find detailed information on the adjustment in the operating instructions manual of the "Indicating and adjustment module PLICSCOM".

6.2 Insert the indicating and adjustment module

Mounting/dismounting the indicating and adjustment module

The indicating and adjustment module can be inserted in the sensor and removed at any time. It is not necessary to interrupt the voltage supply.

Proceed as follows:

- 1 Unscrew the housing cover
- 2 Place the indicating and adjustment module in the desired position on the electronics (you can choose any one of four different positions - each displaced by 90°)
- 3 Press the indicating and adjustment module onto the electronics and turn it to the right until it snaps in.

⁴⁾ This function will presumably be available from October 2006.

- 4 Screw housing cover with inspection window tightly back on

Removal is carried out in reverse order.

The indicating/adjustment module is powered by the sensor, an additional connection is not necessary.



Fig. 21: Installation of the indicating and adjustment module



Note:

If you intend to retrofit VEGASON 66 with an indicating and adjustment module for continuous measured value indication, a higher cover with an inspection glass is required.

6.3 Adjustment system

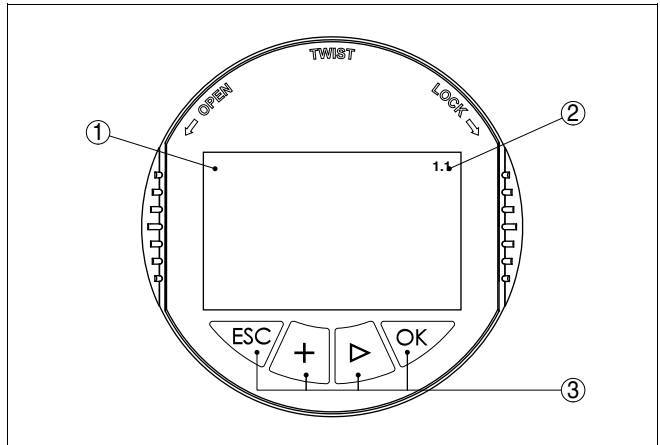


Fig. 22: Indicating and adjustment elements

- 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

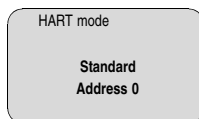
Adjustment system

The sensor is adjusted via the four keys of the indicating and adjustment module. 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 Setup procedure

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 "*Indicating and adjustment module*" or in the online help of PACTware™ or DTM.



Parameter adjustment

As VEGASON 66 is a distance measuring instrument, the distance from the sensor to the product surface is measured. To have the real product level displayed, an allocation of the measured distance to the percentage height must be made. To carry out this adjustment, the distance is entered with full and empty vessel. If these values are not known, an adjustment with the distance values, e.g. 10 % and 90 % is also possible. Starting point for these distance specifications is always the lower side of the flange (flange version, for all other versions the lower side of the transducer).

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.

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 without 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:

Carry out min. adjustment

Proceed as follows:

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

► Basic adjustment
Display
Diagnostics
Service
Info

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

Min. adjustment
0.00 %
=
5.000 m(d)
4.000 m(d)



- 3 Prepare the % 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 settings with **[OK]** and move to "Max. adjustment" with **[->]**.

Carry out max. adjustment

Proceed as follows:

Max. adjustment
100.00 %
=
1.000 m(d)
2.000 m(d)

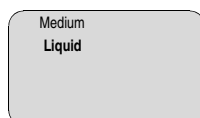


- 1 Prepare the % value for editing with **[OK]** and set the cursor to the requested position with **[->]**. Set the requested percentage value with **[+]** and save with **[OK]**. The cursor jumps now to the distance value.
- 2 Enter the appropriate distance value in m (corresponding to the percentage value) for the full vessel. Keep in mind that the max. level must lie below the dead band.
- 3 Save the settings with **[OK]** and move to "Medium selection" with **[->]**.

Medium selection

Each product has different reflective properties. In addition, there are various interfering factors which have to be taken into account: agitated product surfaces and foam generation (with liquids); dust generation, material cones and echoes from the

vessel wall (with solids). To adapt the sensor to these different conditions, you should first select in this menu item "*Liquid*" or "*Solid*".



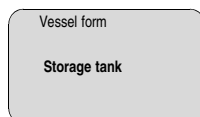
With solids, you can also choose between "*Powder/Dust*", "*Granular/Pellets*" or "*Ballast/Pebbles*".

Through this additional selection, the sensor is adapted perfectly to the product and measurement reliability, particularly in products with bad reflective properties, is considerably increased.

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

Vessel form

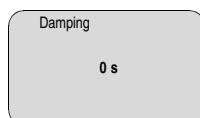
Apart from the medium, the vessel shape can also influence the measurement. To adapt the sensor to these measuring conditions, this menu item offers different options depending on whether liquid or solid is selected. With "*Liquid*" these are "*Storage tank*", "*Stilling tube*", "*Open vessel*" or "*Stirred vessel*", with "*Solid*", "*Silo*" or "*Bunker*".



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

Damping

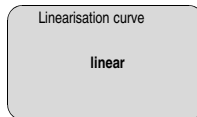
To suppress fluctuations in the measured value display, e.g. by fluctuating product surfaces, an integration time can be set. This time can be between 0 and 999 seconds. Keep in mind that also the reaction time of the complete measurement will be bigger and the sensor will react on measured value changes with a delay. In general a time of a few seconds will be sufficient to smooth the measured value display.



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

Linearisation curve

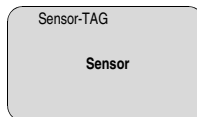
A linearization is necessary for all vessels in which the vessel volume does not increase linearly with the level - e.g. with a cylindrical or spherical tank - and the indication or output of the volume is required. Corresponding linearization curves are preprogrammed for these vessels. They represent 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 also set in the menu item "*Display*".



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

Sensor-TAG

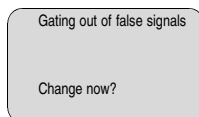
In this menu item you can enter an unambiguous designation for the sensor, e.g. the measurement loop name or the tank or product designation. In digital systems and in the documentation of larger plants, a singular designation should be entered for exact identification of individual measuring sites.



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

Gating out of false signals

High sockets or vessel installations, such as e.g. struts or agitators as well as buildup and weld joints on the vessel walls cause interfering reflections which can impair 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 potential interfering reflections will 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 signal suppression" is displayed.
- 3 Confirm "False signal suppression - 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 signals in this area are detected by the sensor and saved after confirming with **[OK]**.



Note:

Check the distance to the product surface, because if an incorrect (too large) value is entered, the existing level will be saved as false signal. The filling level would then no longer be detectable in this area.

Optional settings

Additional adjustment and diagnosis options such as e.g. scaling, simulation 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.

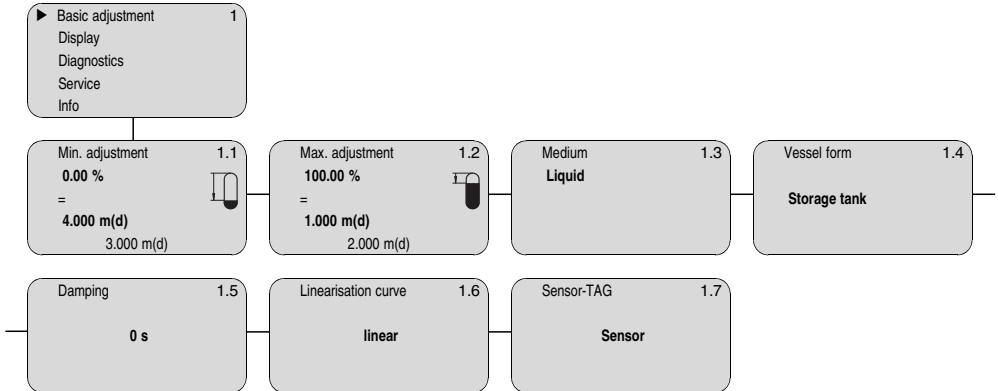
6.5 Menu schematic



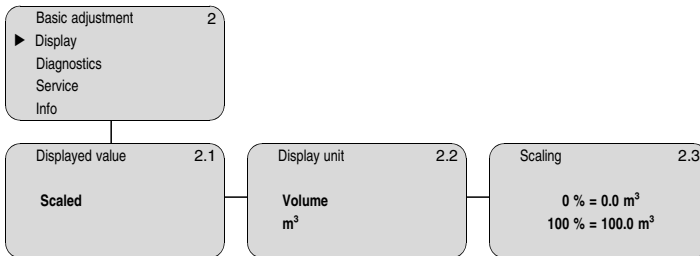
Information:

Depending on the version and application, the highlighted menu windows are not always available.?

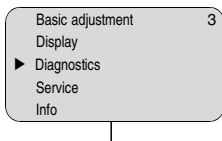
Basic adjustment

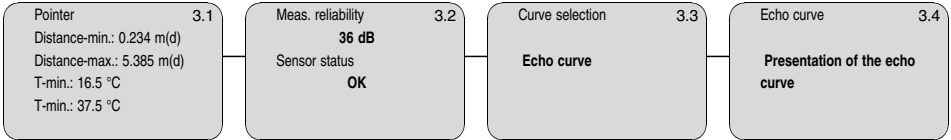


Display

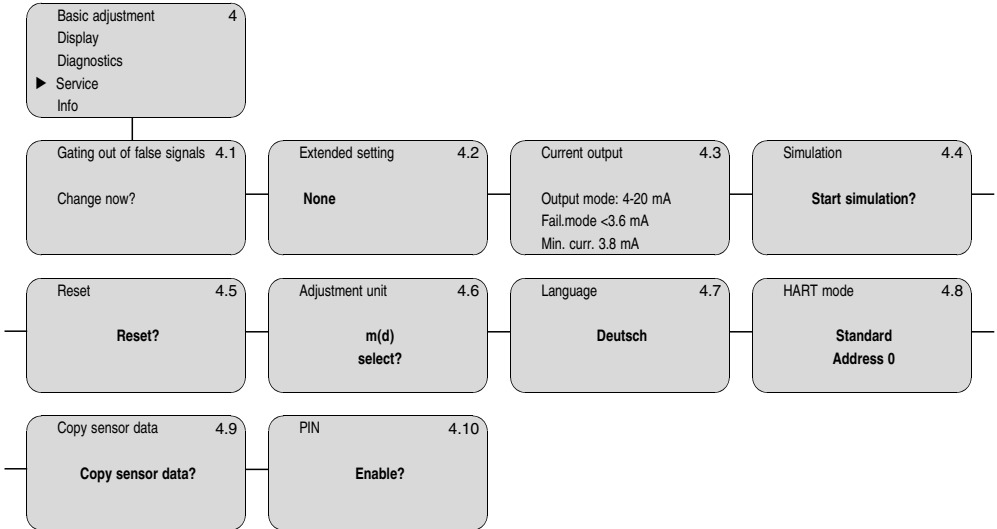


Diagnostics

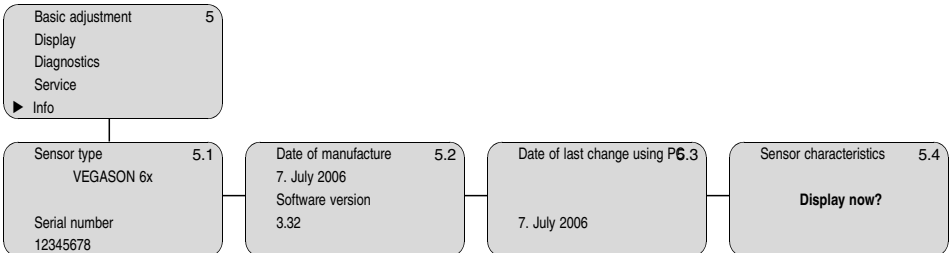




Service



Info



7 Setup with PACTware™ and other adjustment programs

7.1 Connecting the PC

Connection of the PC directly to the sensor

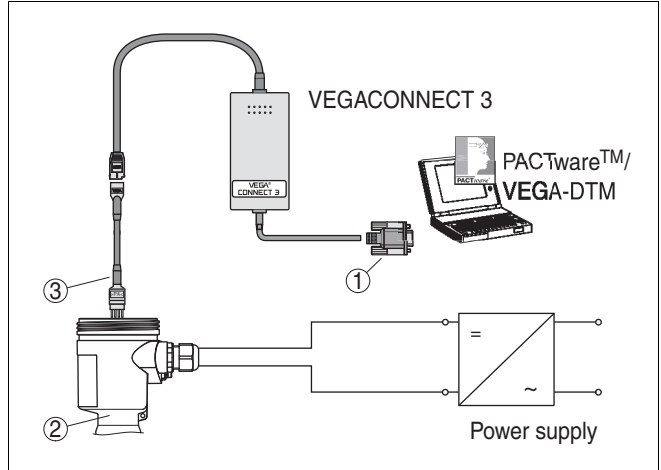


Fig. 23: Connection directly to the sensor

- 1 RS232 connection
- 2 VEGASON 66
- 3 I²C adapter cable for VEGACONNECT 3

Necessary components:

- VEGASON 66
- 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

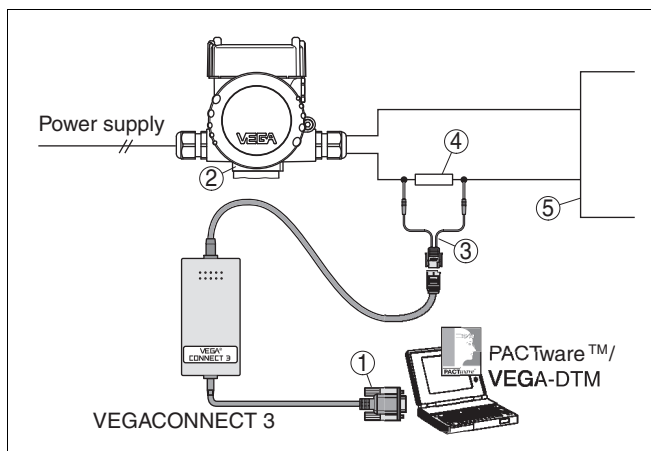


Fig. 24: Connecting the PC to the signal cable

- 1 RS232 connection
- 2 VEGASON 66
- 3 HART adapter cable for VEGACONNECT 3
- 4 HART resistance 250 Ohm
- 5 4 ... 20 mA processing

Necessary components:

- VEGASON 66
- PC with PACTware™ and suitable VEGA DTM
- VEGACONNECT 3 with HART adapter cable
- HART resistance 250 Ohm
- Voltage supply
- 4 ... 20 mA processing



Note:

For processings with integrated HART resistance (inner resistance approx. 250 Ohm), there is no additional, external resistance necessary. In such cases, VEGACONNECT 3 can be connected in parallel to the 4 ... 20 mA cable.

7.2 Parameter adjustment with PACTware™

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

**Note:**

Keep in mind that for setup of VEGASON 66, DTM Collection 10/2005 or a newer version must be used.

All currently available VEGA DTMs are provided in the DTM Collection on CD and can be obtained from the responsible VEGA agency for 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.

Go via www.vega.com and "*Downloads*" to the item "*Software*".

7.3 Parameter adjustment with AMS™ and PDM

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

Go via www.vega.com and "*Downloads*" to the item "*Software*".

8 Maintenance and fault rectification

8.1 Maintenance

When used as directed in normal operation, VEGASON 66 is completely maintenance free.

8.2 Fault rectification

Causes of malfunction

VEGASON 66 offers maximum reliability. Nevertheless faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Power supply
- Signal processing

Fault rectification

The first measures to be taken are to check the output signals as well as to evaluate the error messages via the indicating and adjustment module. The procedure is described below. Further comprehensive diagnostics can be carried out on a PC with the software PACTware™ and the suitable DTM. In many cases, the causes can be determined in this way and faults can be rectified.

24 hour service hotline

However, should this measures not be successful, call the VEGA service hotline in urgent cases under the phone no. **+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 the 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 according to the wiring plan.

? 4 ... 20 mA signal not stable

- Level fluctuations
- Set integration time via the indicating/adjustment module

- ? 4 ... 20 mA signal missing
- Wrong connection
 - Check connection according to chapter "*Connection procedure*" and, if necessary, correct according to chapter "*Wiring plan*"
 - No supply voltage
 - check cables for line break, repair, if necessary
 - supply voltage too low or load resistance too high
 - Check, adapt, if necessary
- ? Current signal greater than 22 mA or less than 3.6 mA
- Electronics defective
 - Exchange instrument or return instrument for repair



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

Fault messages via the indicating/adjustment module

- ? E013
- no measured value available
 - sensor in boot phase
 - sensor does not find an echo, e.g. because of faulty installation or incorrect parameter adjustment
- ? E017
- Adjustment span too small
 - Carry out a fresh adjustment and increase the distance between min. and max. adjustment
- ? E036
- no operable sensor software
 - Carry out software update or send instrument for repair
- ? E041
- Hardware error, electronics defective
 - Exchange instrument or return instrument for repair

8.3 Exchange the electronics module

If the electronics module is defective, it can be replaced by the user.



In Ex applications, only an instrument and an electronics module with appropriate Ex approval may be used.

If there is no electronics module available on site, one can be ordered from the VEGA agency serving you.

Sensor serial number

The order data of the sensor must be downloaded into the new electronics module. This can be done:

- at the factory by VEGA
- or on site by the user

In both cases, the sensor serial number is necessary. The serial numbers are stated on the type label of the instrument or on the delivery note.



Information:

When loading on site, the order data must be downloaded from the Internet (see Operating Instructions manual "*Oscillator*").

Assignment

The oscillators are adapted to the respective sensor and differ in their signal output or in their power supply. You can find a suitable oscillator in the following overview.

4 ... 20 mA/HART four-wire

Oscillator SN-E.64V is suitable for VEGASON 64, 65, 66 - 4 ... 20mA/HART four-wire:

- SN-E.64V**X** (X = without approvals)
- SN-E.64V**GX** (GX = with approval GX acc. to VEGA product list)

8.4 Instrument repair

If a repair is necessary, please proceed as follows:

You can download a return form (23 KB) in the Internet from our homepage www.vega.com under: "*Downloads - Forms and Certificates - Repair form*".

By doing this you help us carry out the repair quickly and without having to call back for needed information.

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof

- Attach the completed form and possibly also a safety data sheet to the instrument
- Please contact the agency serving you for the address of the return shipment

9 Dismounting

9.1 Dismounting procedure

**Caution:**

During operation, individual cores of the transducer cable carry a voltage of approx. 70 V. Therefore dismount VEGASON 66 only in voltage-free condition.

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

9.2 Disposal

The instrument consists of materials which can be recycled by specialised recycling companies. We use recyclable materials and have designed the electronic modules to be easily separable.

WEEE directive 2002/96/EG

This instrument is not subject to the WEEE directive 2002/96/EG and the respective national laws (in Germany, e.g. ElektroG). Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.

Correct disposal avoids negative effects to persons and environment and ensures recycling of useful raw materials.

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, wetted parts

– Flange	PP or Alu
– Swivelling holder, flange	galvanized steel
– Transducer	UP
– Transducer diaphragm	Alu, PFTA-coated

Materials, non-wetted parts

– Housing	Alu die-casting powder-coated
– Seal ring between housing and housing cover	silicone
– Inspection window in housing cover for PLICSCOM	Polycarbonate (UL-746-C listed)
– Ground terminal	316Ti/316L
– transducer cable with separate version C and D	silicone (1.1083)

Weight⁵⁾

– compact with flange (version A)	7.3 ... 11.3 kg (16.1 ... 24.9 lbs)
– compact with swivelling holder (version B)	8.7 ... 10.3 kg (19.1 ... 22.7 lbs)
– separate with swivelling holder (version C)	9.3 ... 11.1 kg (20.5 ... 25.5 lbs)
– separate with threaded fitting (version D)	6.5 ... 7.5 kg (14.3 ... 16.5 lbs)

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	max. 500 Ohm ⁶⁾
Integration time (63 % of the input variable)	0 ... 999 s, adjustable

⁵⁾ Depending on size and process fitting material.

⁶⁾ With inductive load, ohmic share at least 25 Ohm/mH.

Fulfilled NAMUR recommendation

NE 43

Input variable

Parameter

- Version A distance between lower edge of the flange and product surface
- version B, C and D distance between lower edge of the transducer and product surface

Dead zone

- Version A 1.8 m (5.9 ft)
- Versions B, C, D 1.4 m (4.6 ft)

Measuring range

- Liquids up to 70 m (229.7 ft)
- Solids up to 45 m (147.6 ft)

Accuracy (similar to DIN EN 60770-1)

Reference conditions according to DIN EN 61298-1

- Temperature +18 ... +30 °C (+64 ... +86 °F)
- Relative humidity 45 ... 75 %
- Air pressure 860 ... 1060 mbar/86 ... 106 kPa
(12.5 ... 15.4 psi)

Characteristic curve deviation and measurement characteristics⁷⁾

Average temperature coefficient of the zero signal (temperature error electronics)	0.06 %/10 K
Resolution, general	max. 1 mm
Ultrasonic frequency	10 kHz
Interval	>2 s (dependent on the parameter adjustment)
Beam angle at -3 dB	6°
Adjustment time ⁸⁾	>3 s (dependent on the parameter adjustment)
Accuracy	better than 0.2 % or ±6 mm (see diagram)

⁷⁾ Relating to the nominal range, incl. hysteresis and repeatability, determined according to the limit point method.

⁸⁾ Time to output the correct level (with max. 10 % deviation) after a sudden level change.

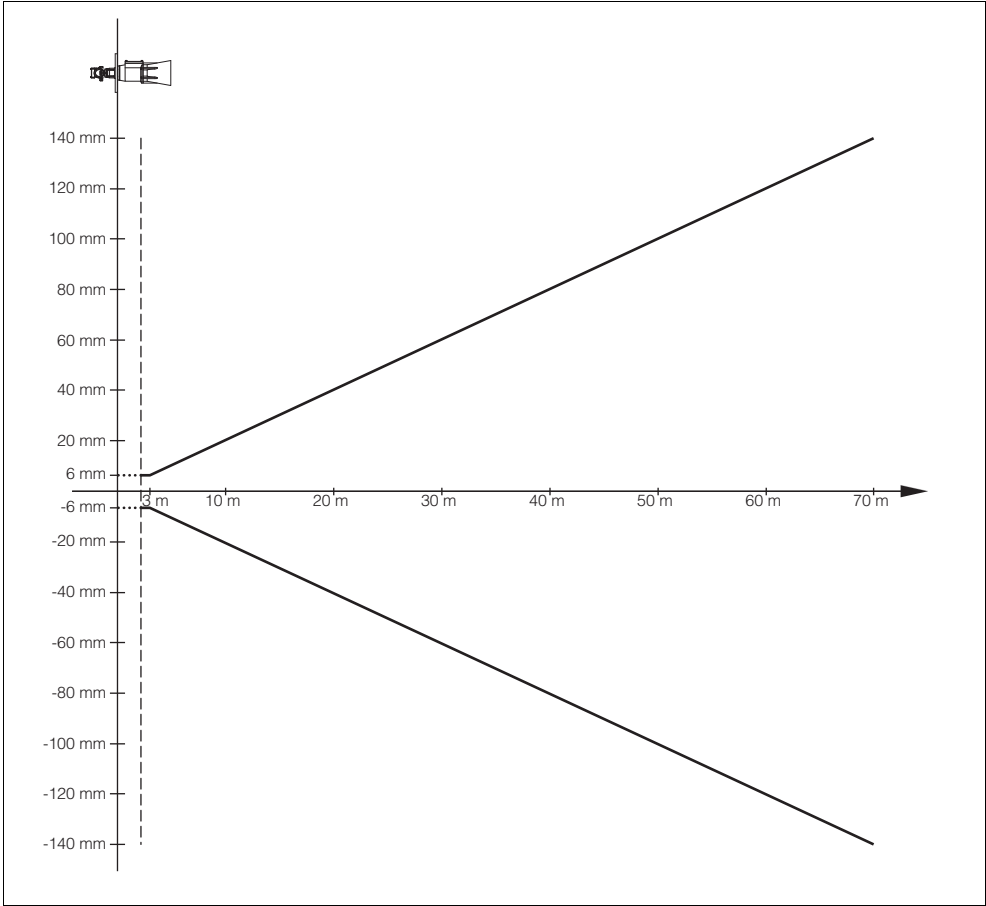


Fig. 25: Accuracy VEGASON 66 version A

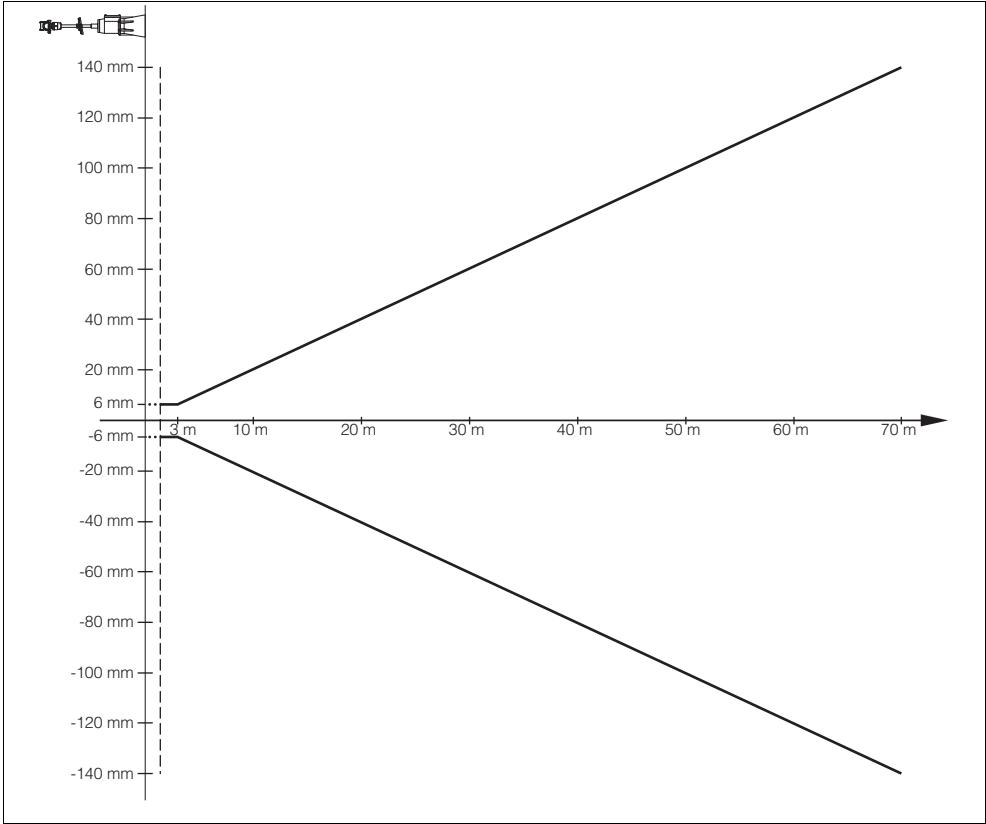


Fig. 26: Accuracy VEGASON 66 versions B, C, D

Ambient conditions

Ambient, storage and transport temperature	-40 ... +80 °C (-40 ... +176 °F)
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Process conditions

Vessel pressure	
– Version A with PP flange	0 bar
– Version A with Alu flange	-0.2 ... 2 bar/-20 ... 200 kPa (-2.9 ... 29 psi)
– Versions B and C	-0.2 ... 0.5 bar/-20 ... 50 kPa (-2.9 ... 7.3 psi)
– Version D	-0.2 ... 2 bar/-20 ... 200 kPa (-2.9 ... 29 psi)
Process temperature (transducer temperature)	-40 ... +150 °C (-40 ... +302 °F)

Vibration resistance	mechanical vibration with 1 g in the frequency range 5 ... 200 Hz ⁹⁾
----------------------	---

Electromechanical data

Cable entry

– Double chamber housing	1x cable entry M20x1.5 (cable-ø 5 ... 9 mm), 1x blind stopper M20x1.5; plug M12x1 for VEGADIS 61
	or:
	1x closing cap ½ NPT, 1x blind stopper ½ NPT, plug M12x1 for VEGADIS 61
	or:
	1x plug M12x1, 1x blind stopper M20x1.5, plug M12x1 for VEGADIS 61

Spring-loaded terminals for wire cross-section up to 2.5 mm²

Transducer cable¹⁰⁾

– length	5 ... 300 m (16.4 ... 984.3 ft)
– Diameter	9.5 ... 9.9 mm

Indicating and adjustment module

Power supply and data transmission	through sensor via gold-plated sliding contacts (I ² C 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

Voltage supply

Supply voltage	
– Non-Ex and Exd instrument	20 ... 72 V DC, 20 ... 253 V AC, 50/60 Hz (with and without lighting of the indicating and adjustment module)

⁹⁾ Tested according to the regulations of German Lloyd, GL directive 1

¹⁰⁾ With separate version C and D.

Power consumption max. 4 VA; 2.1 W

Electrical protective measures

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

Approvals

ATEX II 2 G EEx m II T6, ATEX II 1/2 D IP66 T

10.2 Dimensions

Housing

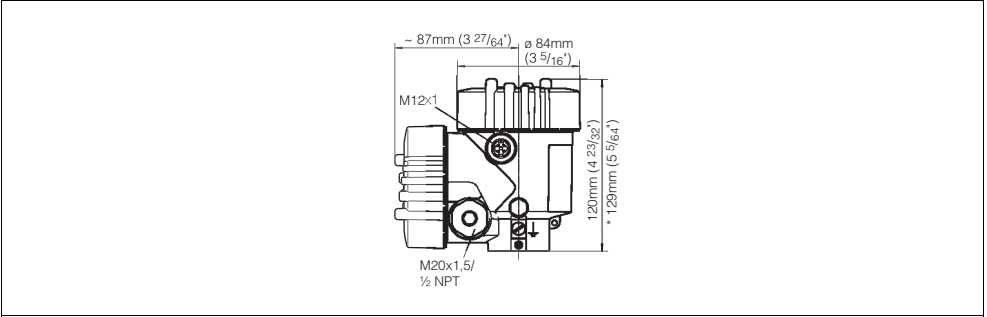


Fig. 27: Aluminium double chamber housing

* Dimension with integrated indicating and adjustment module

VEGASON 66

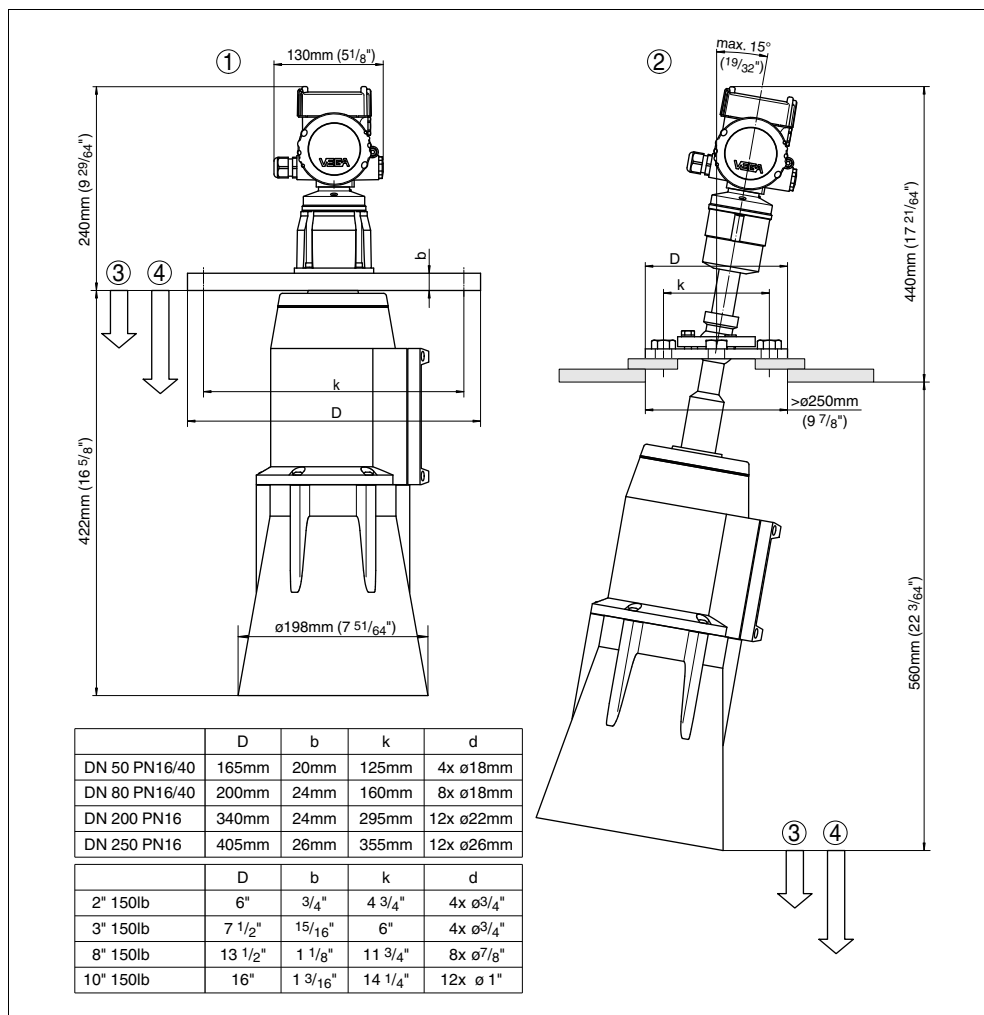


Fig. 28: VEGASON 66

1 Version A

2 Version B

3 Dead zone: version A 1.8 m (5.9 ft), version B 1.4 m (4.6 ft)

4 Measuring range: with liquids up to 70 m (229.7 ft), with solids up to 45 m (147.6 ft)

VEGASON 66

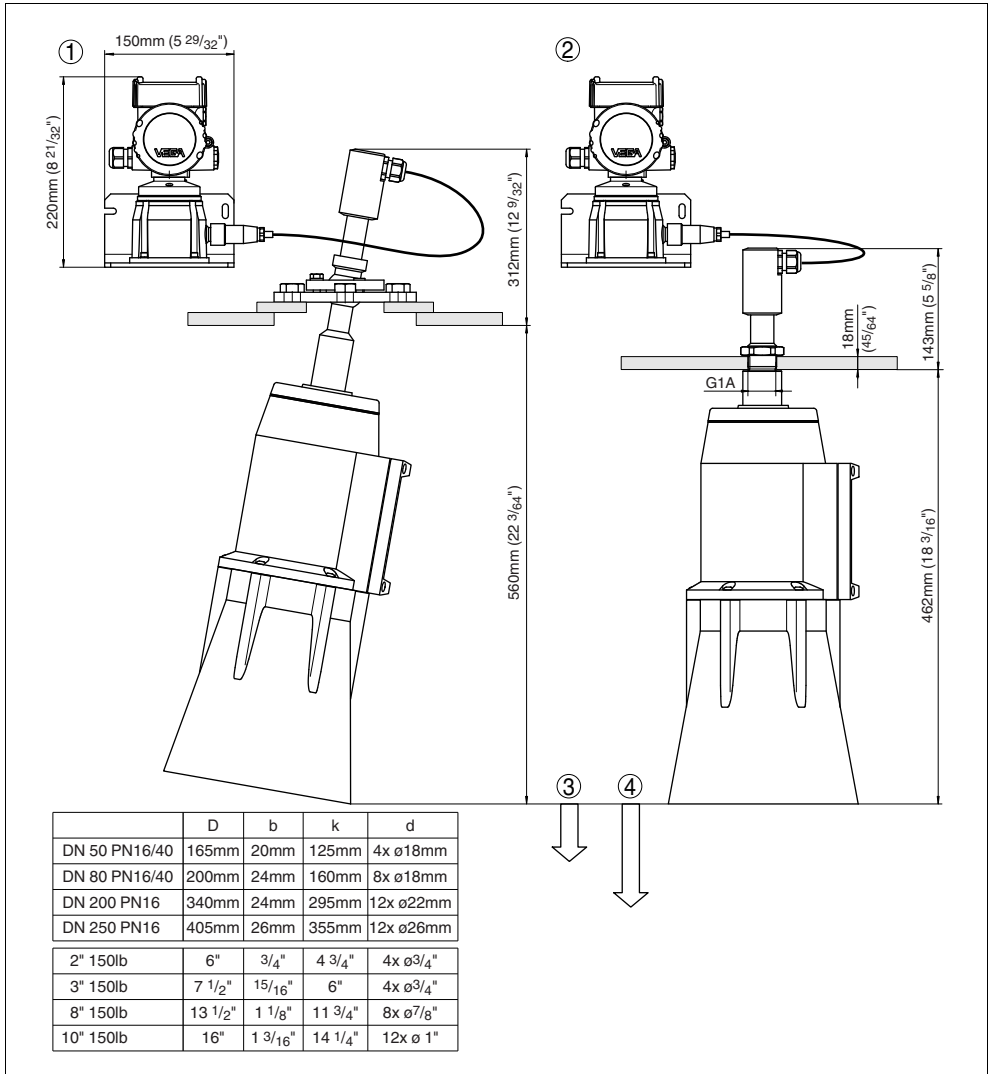


Fig. 29: VEGASON 66

1 Version C

2 Version D

3 Dead zone: 1.4 m (4.6 ft)

4 Measuring range: with liquids up to 70 m (229.7 ft), with solids up to 45 m (147.6 ft)

10.3 CE declarations of conformity



Konformitätserklärung

Declaration of conformity
Déclaration de conformité



VEGA Grieshaber KG
Am Hohenstein 113
77761 Schiltach

erklärt in alleiniger Verantwortung, daß das Produkt / declare under
our sole responsibility that our product / déclare sous sa seule
responsabilité que le produit

VEGASON 64, VEGASON 65, VEGASON 66
4 ... 20 mA/HART - Vierleiter

auf das sich diese Erklärung bezieht, mit den folgenden Normen
übereinstimmt / to which this declaration relates is in conformity
with the following standards / auquel se réfère cette déclaration
est conforme aux normes

Emission / Emission / Emission ⇒ EN 61326 : 1997 / A1 : 1998 (Klasse A)
Immission / Susceptibility / Immission ⇒ EN 61326 : 1997 / A1 : 1998
EN 61010 – 1 : 2001

gemäß den Bestimmungen der Richtlinien / following the provision
of Directives / conformément aux dispositions des Directives

73/23 EWG
89/336 EWG

Schiltach, 09.06.2004



Josef Fehrenbach
Entwicklungsleitung

10.4 Industrial property rights

VEGA product lines are global protected by industrial property rights.

Further information see <http://www.vega.com>.

Only in U.S.A.: Further information see patent label at the sensor housing.

VEGA Produktfamilien sind weltweit geschützt durch gewerbliche Schutzrechte.

Nähere Informationen unter <http://www.vega.com>.

Les lignes de produits VEGA sont globalement protégées par des droits de propriété intellectuelle.

Pour plus d'informations, on pourra se référer au site <http://www.vega.com>.

VEGA líneas de productos están protegidas por los derechos en el campo de la propiedad industrial.

Para mayor información revise la pagina web <http://www.vega.com>.

Линии продукции фирмы ВЕГА защищаются по всему миру правами на интеллектуальную собственность.

Дальнейшую информацию смотрите на сайте <http://www.vega.com>.

德（VEGA）系列产品在全球享有知保。

一步信息网站<<http://www.vega.com>>。



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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.

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