VEGA

Operating Instructions

VEGASON 61
4 … 20 mA/HART

Contents

Supplementary operating instructions manuals

Information:
VEGASON 61 is available in different versions. Depending on the selected version, supplementary operating instructions manuals may also come with the shipment. The supplementary operating instructions manuals are listed in section *"Product description*.

Operating instructions manuals for accessories and replacement parts

Tip:
To ensure reliable setup and operation of your VEGASON 61, 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*"

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VEGA

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.

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 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 61 is a sensor for continuous level measurement.

Detailed information on the application range of VEGASON 61 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 61 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 61 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

2.6 Fulfilling NAMUR recommendations

In respect to interference resistance and emitted interference, VEGASON 61 fulfils NAMUR recommendation NE 21.

VEGASON 61 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 61 HART, PA or FF
● DTM VEGASON 61 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 61 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 Manufacturer declaration

In conformity with DIN EN 60079-14/2004, para. 5.2.3, point c1, VEGASON 61 is suitable for use in zone 2.

The operator must use the instrument as it was intended to be used and follow the specifications of the following documents:

● this operating instructions manual
● this manufacturer declaration (24630)
● the applicable installation regulations

Max. increase of the surface temperature during operation: 23 K (individual components in the instrument)

With an ambient temperature of 70 °C (158 °F) on the housing and a process temperature of 70 °C (158 °F), the max. ambient temperature during operation is 93 °C (199 °F).

Measures for maintaining explosion protection during operation:

- Operate the instrument in the range of the specified electrical limit values. Permissible supply voltage: see "*Technical data*"
- Mount and operate the instrument in such a way that no danger of ignition by electrostatic charges is to be expected. Transducer, process fitting and housing (as the case may be depending on instrument version) are made of electrically non-conductive plastic.
- Make sure that the seal is mounted correctly between the lower part of the housing and the cover. Screw the cover on tightly.
- Make sure there is no explosive atmosphere present if you intend to operate the instrument with opened cover
- Make sure that the cable gland is tight and strain-relieved. The outer diameter of the connection cable must be adapted to the cable gland. Tighten the pressure screw of the cable gland carefully.
- Cover unused openings for cable glands tightly
- Mount the instrument in such a way that the sensor cannot touch the vessel wall or vessel installations. Keep in mind the influence of product movement in the vessel.
- The surface temperature of the housing must not exceed the ignition temperature of the surrounding explosive atmosphere

This instrument was assessed by a person who fulfils the DIN EN 60079-14 requirements.

2.9 Functional range of approved instruments

Instruments with StEx, WHG or ship approval as well as national approvals such as according to FM or CSA are partly supplied with a previous hardware or software version. For approval-technical reasons, some functions for these instruments will be only available at a later date.

You will find corresponding instructions in the description of the individual functions in this operating instructions manual.

2.10 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 61 ultrasonic sensor
● 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)
  – Supplementary instructions manual "*Heating for indicating and adjustment module PLICSCOM*" (optional)
  – Supplementary instructions manual "*Plug connector*" (optional)

Components

VEGASON 61 consists of the following components:

● Transducer with integrated temperature sensor
● Housing with electronics, optionally available with plug connector
● Housing cover, optionally available with indicating and adjustment module PLICSCOM

The components are available in different versions.
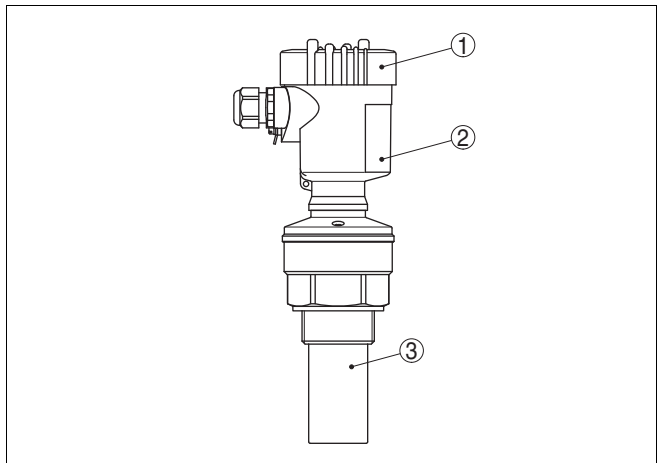

Fig. 1: VEGASON 61, version with plastic housing
1   Housing cover with integrated PLICSCOM (optional)
2   Housing with electronics, optionally available with plug connector
3   Process fitting with transducer

3.2 Principle of operation

Area of application

VEGASON 61 is an ultrasonic sensor for continuous level measurement. It is suitable for liquids and solids in virtually all industries, particularly in the water and waste water industry.

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 rtansducer as echoes. The running time of the ultrasonic pulases 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

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

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

The backlight of the indicating and adjustment module PLICSCOM is powered by the sensor. The prerequisite for this is a supply voltage at a certain level. The exact voltage specifications are stated in the "*Technical data*" in the "*Supplement*".

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.

The optional heating requires its own power supply. You can find further details in the supplementary instructions manual "*Heating for indicating and adjustment module PLICSCOM*".

This function is generally not available for approved instruments.

3.3 Operation

VEGASON 61 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 AMS™ or

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PDM
- a HART handheld

The entered parameters are generally saved in VEGASON 61, 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 %

4 Mounting

4.1 General instructions

Materials, wetted parts

Make sure that the wetted parts of VEGASON 61, 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 61 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.
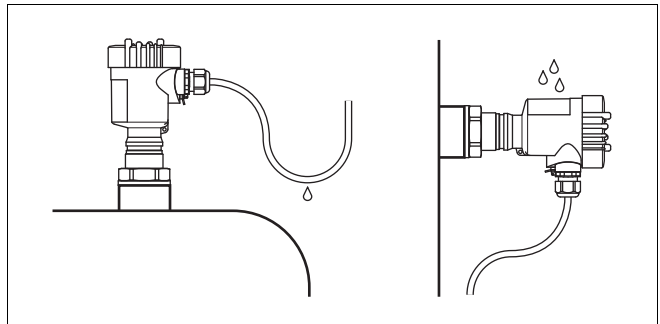

Fig. 2: Measures against moisture penetration

Measuring range

The reference plane for the measuring range is the lower edge of the transducer.

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Make sure that 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*".
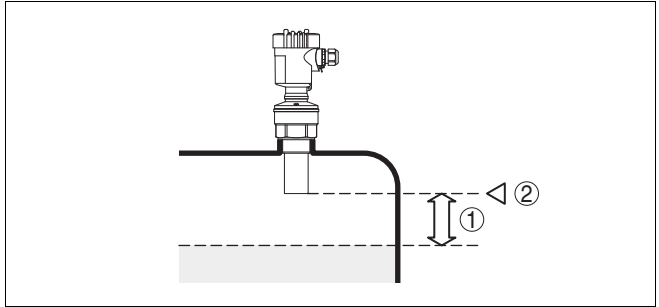

Fig. 3: Min. distance to the max. level
1   Dead zone
2   Reference plane

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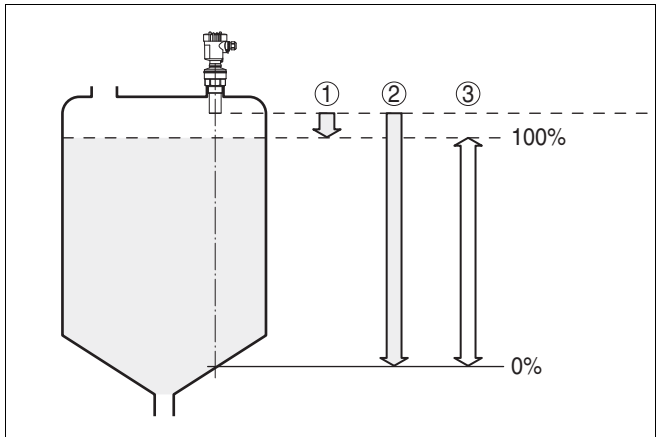

Fig. 4: Measuring range (operating range) and max. measuring distance
1   full
2   empty (max. measuring distance)
3   Measuring range

Pressure/Vacuum

Gauge pressure in the vessel does not influence VEGASON 61. 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. guided microwave.

4.2 Mounting instructions

Screwing in

Screw VEGASON 61 into the mounting socket with an appropriate spanner applied to the hexagon of the process fitting. Max. torque see chapter "*Technical data*".

⚠ **Warning:**
The housing must not be used to screw in the instrument! Applying tightening force on the housing can damage its internal mechanical parts.

Installation location

When mounting VEGASON 61, keep a distance of at least 200 mm (7.9 in) to the vessel wall. If the sensor is installed in the center of dished or round vessel 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.
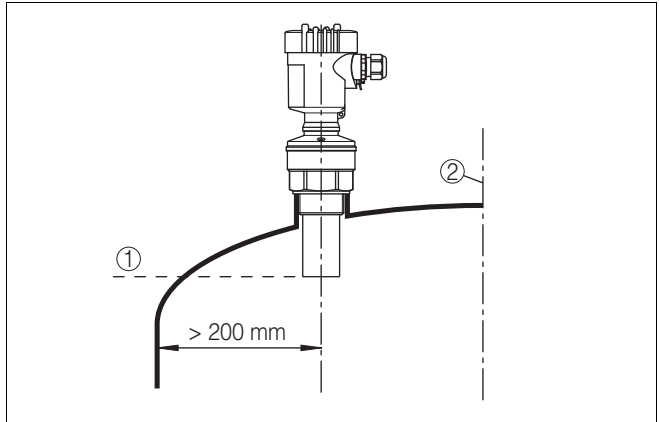
Fig. 5: Mounting on round vessel tops
1   Reference plane
2   Vessel center or symmetry axis

In vessels with conical vessel bottom it can be advantageous to mount the sensor in the center of the vessel, as measurement is then possible down to the lowest point of the vessel bottom.
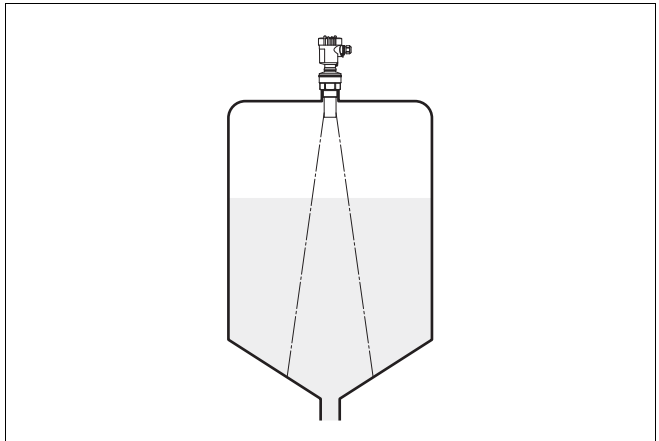
Fig. 6: Vessel with conical bottom

Socket   Socket pieces should be dimensioned such that the lower end of the transducer protrudes at least 10 mm (0.4 in) out of the socket.
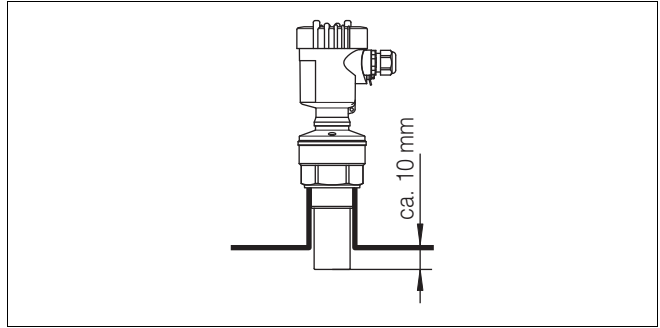
Fig. 7: Recommended socket mounting

If the reflective properties of the medium are good, you can mount VEGASON 61 on sockets higher than the transducer length. You will find recommended values for socket heights in the following illustration. The socket end should be smooth and burr-free, if possible also rounded. Then carry out a false echo storage.

d	h
100 mm/4"	300 mm/12"
150 mm/6"	400 mm/16"
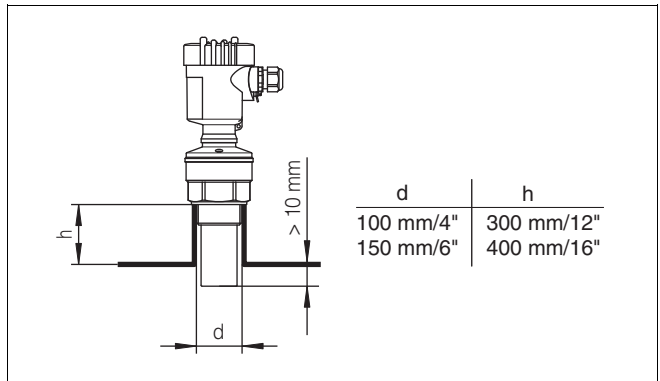
Fig. 8: Deviating socket dimensions

Sensor orientation

In liquids, direct the sensor as perpendicular as possible to the product surface to achieve optimum measurement results.
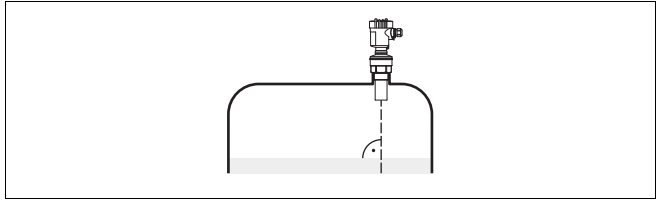
Fig. 9: Orientation in liquids

To reduce the min. distance to the medium, you can also mount VEGASON 61 with a beam deflector. By doing this, it is possible to fill the vessel nearly to maximum. Such an arrangement is suitable primarily for open vessels such as e.g. overflow basins.
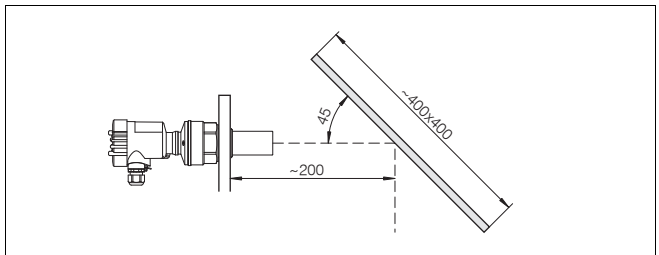
Fig. 10: Beam deflector

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.
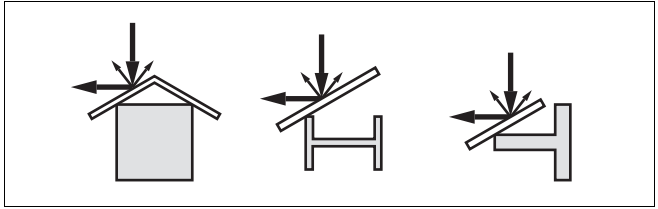
Fig. 11: Cover smooth profiles with deflectors

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.
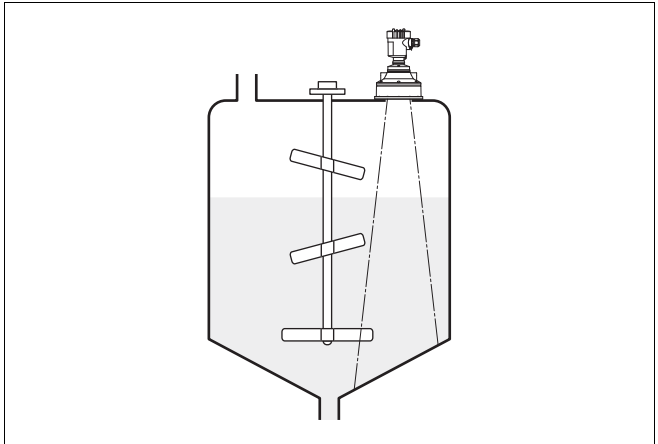
Fig. 12: Agitators

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.
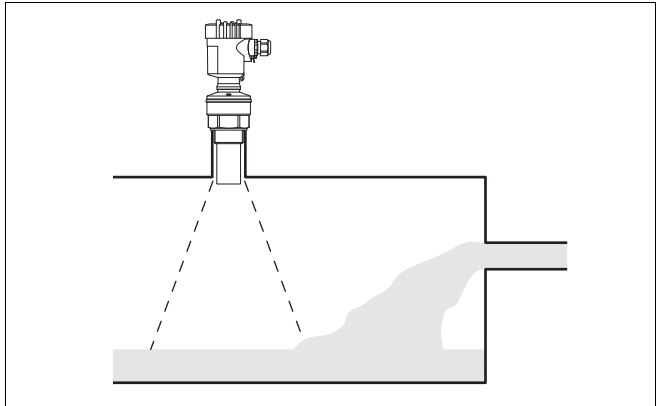
Fig. 13: Inflowing liquid

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 61 in a standpipe or use a different measuring principle, e.g. radar or guided radar (TDR).

Standpipe measurement

By using a standpipe (surge or bypass tube), the influence of vessel installations, foam generation and turbulence is excluded.

Standpipes must extend all the way down to the requested min. level, as measurement is only possible within the tube.
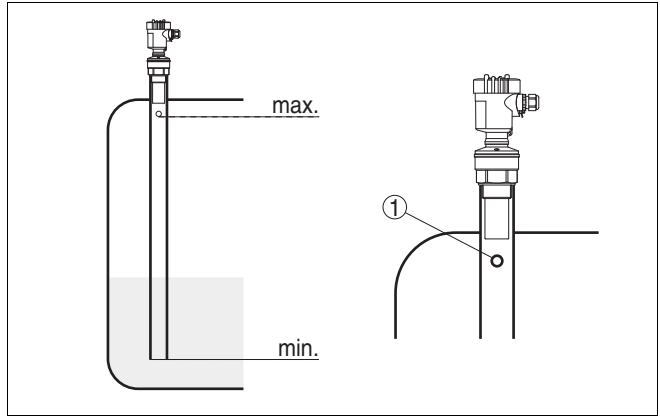
Fig. 14: Standpipe in tank
1   Vent hole ø 5 … 10 mm (0.2 … 0.4 in)

VEGASON 61 can be used from tube diameters of 40 mm (1.6 in).

Avoid large gaps and thick welding joints when connecting the tubes. Generally carry out a false echo storage.

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

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 using VEGA overvoltage arresters ÜS-F-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

Power supply and current signal are transmitted via the same two-wire connection cable. The supply voltage 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 require-ment.

Bear in mind the following factors regarding supply voltage:

- Output voltage of the power supply unit can be lower under nominal load (with a sensor current of 20.5 mA or 22 mA in case of failure message)
- Influence of additional instruments in the circuit (see load values in the "*Technical data*")

Selecting the connection ca-ble

VEGASON 61 is connected with standard two-wire cable without screen. A outer cable diameter of 5 … 9 mm ensures the seal effect of the cable gland. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used. For HART multidrop operation we recommend as standard practice the use of screened cable.

Cable gland ½ NPT

On VEGASON 61 with cable gland ½ NPT and plastic housing, a metal ½" threaded insert is moulded in the plastic housing.

Caution:
No grease should be used when screwing the NPT cable gland or steel tube into the threaded insert. Standard grease can contain additives affecting the connection between threaded insert and housing. This will influence the stability of the connection and the tightness of the housing.

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 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 steps - Instrument housing

Proceed as follows:

1   Unscrew the housing cover
2   If an indicating and adjustment module is installed, remove it by turning it slightly to the left.
3   Loosen compression nut of the cable entry
4   Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) 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
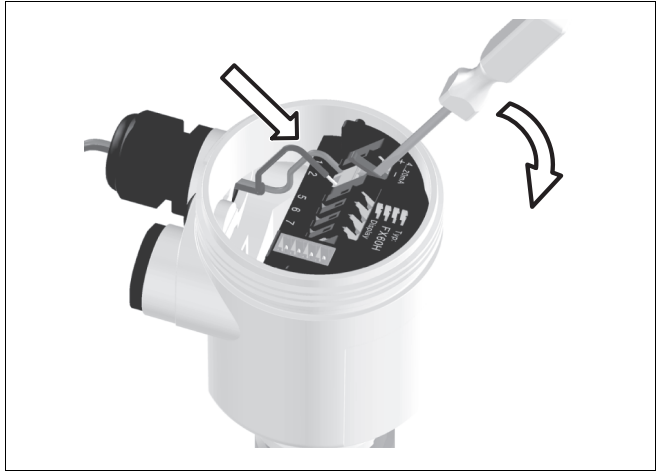
Fig. 15: Connection steps 6 and 7

8 Press the opening lever of the terminals downward, 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 hence finished.

5.3 Wiring plan, single chamber housing

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

Housing overview
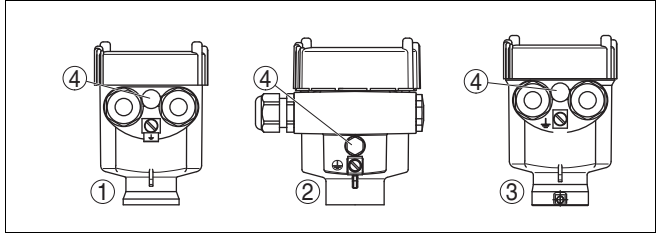
Fig. 16: Material versions, single chamber housing
1   Plastic
2   Aluminium
3   Stainless steel
4   Filter element for pressure compensation or blind stopper with version IP 66/
*   IP 68, 1 bar*

Electronics and connection compartment
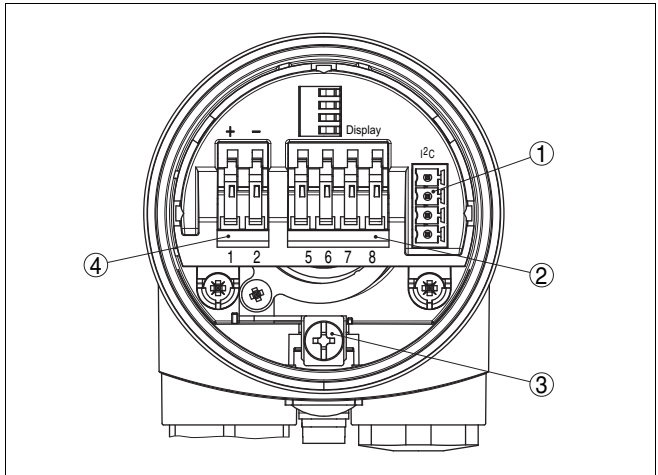
Fig. 17: Electronics and connection compartment, single chamber housing
1   Plug connector for VEGACONNECT (I²C interface)
2   Spring-loaded terminals for connection of the external indication VEGADIS
*   61*
3   Ground terminal for connection of the cable screen
4   Spring-loaded terminals for voltage supply
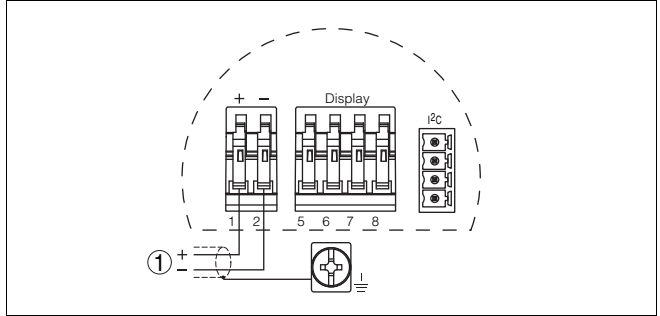
Wiring plan

Fig. 18: Wiring plan, single chamber housing
1   Power supply/Signal output

5.4   Wiring plan, double chamber housing

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

Housing overview
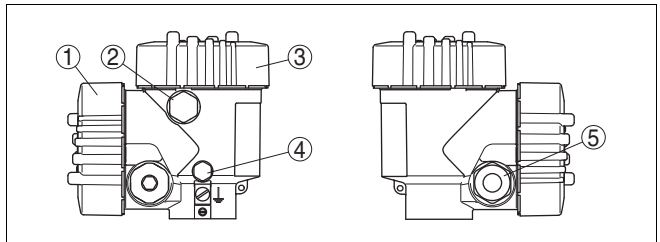
Fig. 19: Double chamber housing
1   Housing cover, connection compartment
2   Blind stopper or plug M12x1 for VEGADIS 61 (option)
3   Housing cover, electronics compartment
4   Filter element for pressure compensation or blind stopper with version IP 66/
*   IP 68, 1 bar[1]*
5   Cable entry or plug

[1]   Version IP 66/IP 68, 1 bar not with four-wire instruments

Electronics compartment
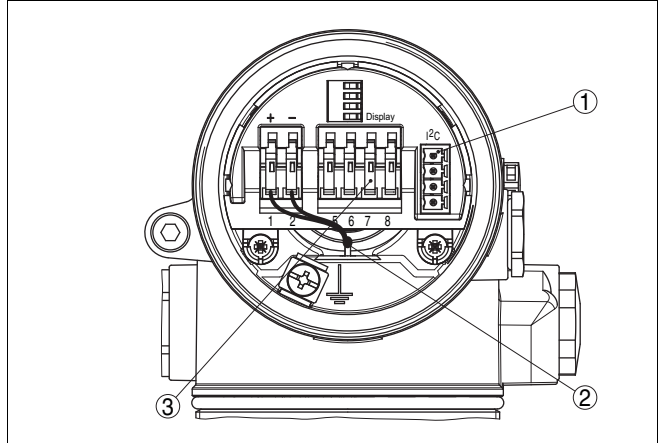
Fig. 20: Electronics compartment, double chamber housing
1   Plug connector for VEGACONNECT (I²C interface)
2   Intrnal connection cable to the connection compartment
3   Terminals for VEGADIS 61

Connection compartment
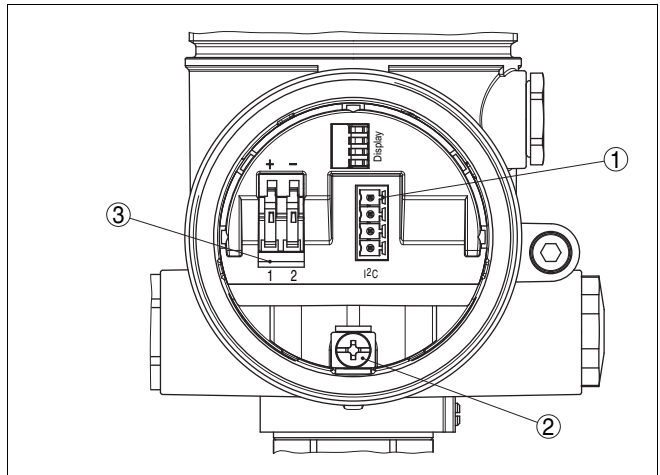
Fig. 21: Connection compartment, double chamber housing
1   Plug connector for VEGACONNECT (I²C interface)
2   Ground terminal for connection of the cable screen
3   Spring-loaded terminals for voltage supply
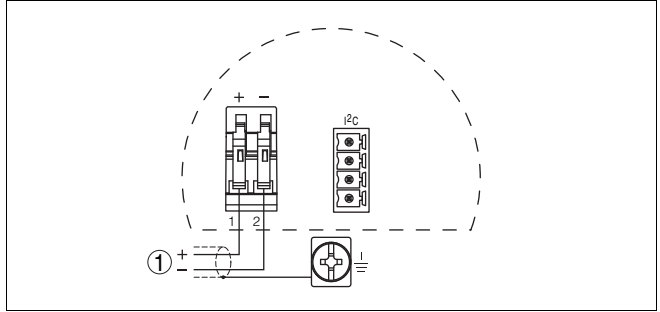
Wiring plan

Fig. 22: Wiring plan, double chamber housing
1   Power supply/Signal output

5.5   Wiring plan, version IP 66/IP 68, 1 bar

Wire assignment, connection cable
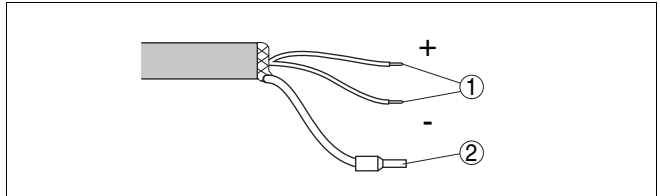
Fig. 23: Wire assignment, connection cable
1   brown (+) and blue (-) to power supply or to the processing system
2   Screen

5.6   Switch-on phase

Switch-on phase

After connecting VEGASON 61 to power supply or after a voltage recurrence, the instruments 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.[2]

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[2]   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

With hardware revision …- 01 or higher of PLICSCOM or …-02, …-04 or higher of the respective sensor, an integrated backlight can be switched on via the adjustment menu. The hardware revision is stated on the type label of the 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.

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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.
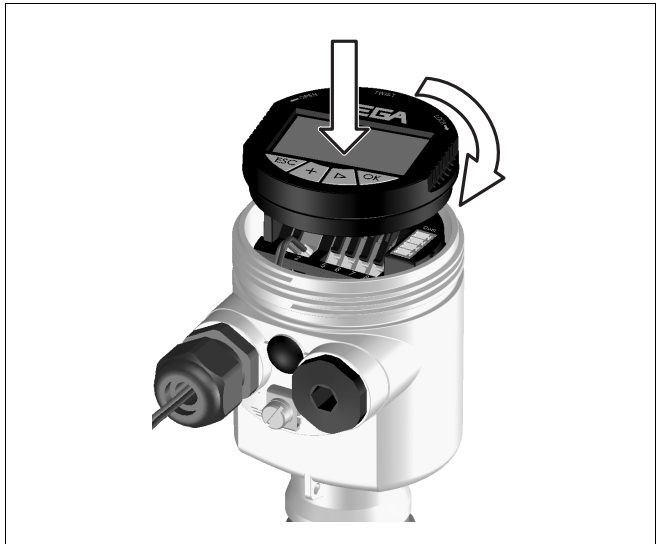
Fig. 24: Installation of the indicating and adjustment module

Note:
If you intend to retrofit VEGASON 61 with an indicating and
adjustment module for continuous measured value indication,
a higher cover with an inspection glass is required.

VEGA

6.3 Adjustment system
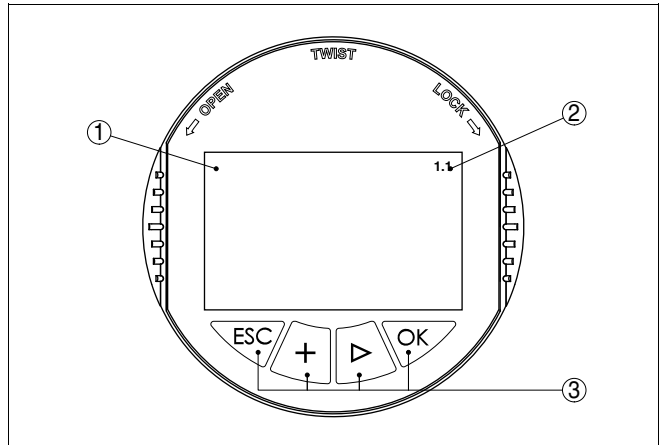
Fig. 25: Indicating and adjustment elements
1 LC display
2 Indication of the menu item number
3 Adjustment keys

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-Multi-drop

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.

```
HART mode

     Standard
     Address 0
```
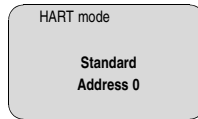
Parameter adjustment

As VEGASON 61 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 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
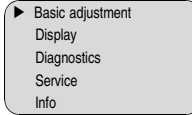
2   Select the menu item "***Basic adjustment***" with *[->]* and confirm with *[OK]*. Now the menu item "*Min. adjustment*" is displayed.

Min. adjustment
0.00 %
=
5.000 m(d)
         4.000 m(d)
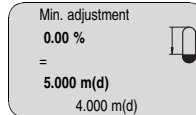
3   Prepare the % value for editing with *[OK]* and set the cursor to the requested position with *[->]*. Set the requested percentage value with *[+]* and save with *[OK]*. The cursor jumps now to the distance value.

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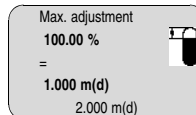
1   Prepare the % value for editing with *[OK]* and set the cursor to the requested position with *[->]*. Set the requested percentage value with *[+]* and save with *[OK]*. The cursor jumps now to the distance value.

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*".

> Medium
> **Liquid**
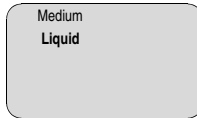
With solids, you can also choose between "*Powder/Dust*", "*Granular/Pellets*" or "*Ballast/Pebbels*".

Through this additional selection, the sensor is adapted perfectly to the product and measurement reliability, partic- ularly 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*".
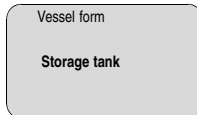
> Vessel form
>
> **Storage tank**

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.
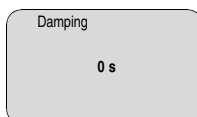
> Damping
>
> **0 s**

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*".
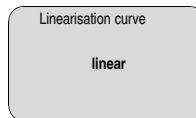
Linearisation curve

linear

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.

Sensor-TAG

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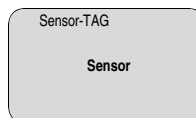
With this menu item, the Basic adjustment is finished and you can now jump to the main menu with the *[ESC]* key.

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.

Gating out of false signals

Change now?
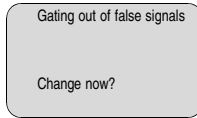
Proceed as follows:

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.

Copy sensor data   This function enables to read out parameter adjustment data
                            as well as write parameter adjustment data into the sensor via
                            the indicating and adjustment module PLICSCOM. A descrip-
                            tion of the function is available in the operating instructions
                            manual "*Indicating and adjustment module*".

                            The following data are read out or written with this function:

●   Measured value presentation
●   Adjustment
●   Medium
●   Vessel form
●   Damping
●   Linearisation curve
●   Sensor-TAG
●   Displayed value
●   Display unit
●   Scaling
●   Current output
●   Adjustment unit
●   Language

The following safety-relevant data are **not** read out or written:

- HART mode
- PIN

> Copy sensor data
>
>
> Copy sensor data?
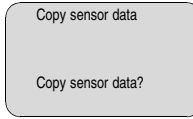
Reset

Basic adjustment

If the "*Reset*" is carried out, the sensor resets the values of the following functions to the reset values (see chart):[3]

Function	Reset value
Max. adjustment	0 m(d)
Min. adjustment	Meas. range end in m(d)[4]
Medium	Liquid
Vessel form	not known
Damping	0 s
Linearization	linear
Sensor-TAG	Sensor
Displayed value	Distance
Current output - characteristics	4 … 20 mA
Current output - max. current	20 mA
Current output - min. current	4 mA
Current output - failure	<3.6 mA
Adjustment unit	m(d)

The values of the following functions are *not* reset to the reset values (see chart) with "**Reset**":

Function	Reset value
Lighting	no reset
Language	no reset
HART mode	no reset

---

[3] Sensor-specific basic adjustment.
[4] Depending on the senso type, see "Technical data".

Factory setting
Like basic setting, in addition special parameters are reset to
default values.[5]

Pointer
The min. and max. distance and temperatur values are reset to
the actual value.

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.

[5] Special parameters are parameters which are set customer-specifically on
the service level with the adjustment software PACTware™.

6.5 Menu schematic

Information:
Depending on the version and application, the highlighted menu windows are not always available.⏷

Basic adjustment

▶ Basic adjustment	1
Display	
Diagnostics	
Service	
Info	

Min. adjustment	1.1
0.00 %	
=	
4.000 m(d)	
	3.000 m(d)

Max. adjustment	1.2
100.00 %	
=	
1.000 m(d)	
	2.000 m(d)

Medium	1.3
Liquid	

Vessel form	1.4
Storage tank	

Damping	1.5
0 s	

Linearisation curve	1.6
linear	

Sensor-TAG	1.7
Sensor	

Display

Basic adjustment	2
▶ Display	
Diagnostics	
Service	
Info	

Displayed value	2.1
Scaled	

Display unit	2.2
Volume	
m³	

Scaling	2.3
0 % = 0.0 m³	
100 % = 100.0 m³	

Lighting	2.4
Switched off ▼	

Diagnostics

Basic adjustment	3
Display	
▶ Diagnostics	
Service	
Info	

Pointer 3.1	Meas. reliability 3.2	Curve selection 3.3	Echo curve 3.4
Distance-min.: 0.234 m(d)	**36 dB**		
Distance-max.: 5.385 m(d)	Sensor status	**Echo curve**	**Presentation of the echo**
T-min.: 16.5 °C	**OK**		**curve**
T-min.: 37.5 °C			

Service

Basic adjustment 4
Display
Diagnostics
▶ Service
Info

Gating out of false signals 4.1	Extended setting 4.2	Current output 4.3	Simulation 4.4
Change now?	**None**	Output mode: 4-20 mA	**Start simulation?**
		Fail.mode <3.6 mA	
		Min. curr. 3.8 mA	

Reset 4.5	Adjustment unit 4.6	Language 4.7	HART mode 4.8
Reset?	**m(d)**	**Deutsch**	**Standard**
	select?		**Address 0**

Copy sensor data 4.9	PIN 4.10
Copy sensor data?	**Enable?**

Info

Basic adjustment 5
Display
Diagnostics
Service
▶ Info

Sensor type 5.1	Date of manufacture 5.2	Date of last change using P 6.3	Sensor characteristics 5.4
VEGASON 6x	7. July 2006		
	Software version		**Display now?**
Serial number	3.32	7. July 2006	
12345678			

6.6 Saving the parameter adjustment data

It is recommended noting the adjusted data, e.g. in this operating instructions manual and archive them afterwards. They are hence available for multiple use or service purposes.

If VEGASON 61 is equipped with an indicating and adjustment module, the most important data can be read out of the sensor into indicating and adjustment module. The procedure is described in the operating instructions manual "*Indicating and adjustment module*" in the menu item "*Copy sensor data*". The data remain there permanently even if the sensor power supply fails.

If it is necessary to exchange VEGASON 61, the indicating and adjustment module is inserted into the replacement instrument and the data are written into the sensor under the menu item "*Copy sensor data*".

7 Setup with PACTware™ and other adjustment programs

7.1 Connecting the PC

Connection of the PC directly to the sensor

Fig. 26: Connection directly to the sensor
1   RS232 connection
2   VEGASON 61
3   I²C adapter cable for VEGACONNECT 3

Necessary components:

● VEGASON 61
● 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
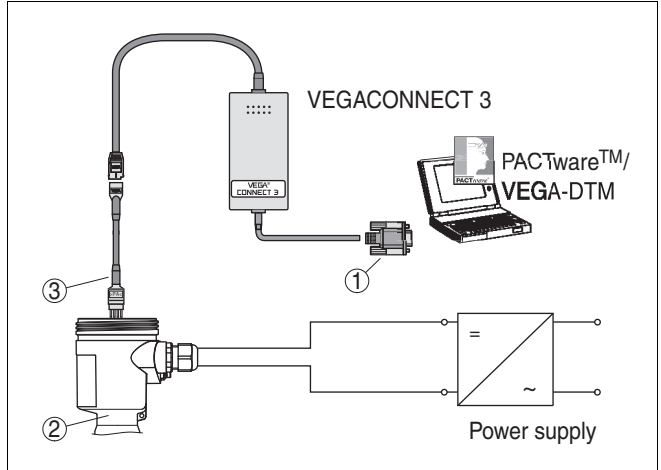signal cable**
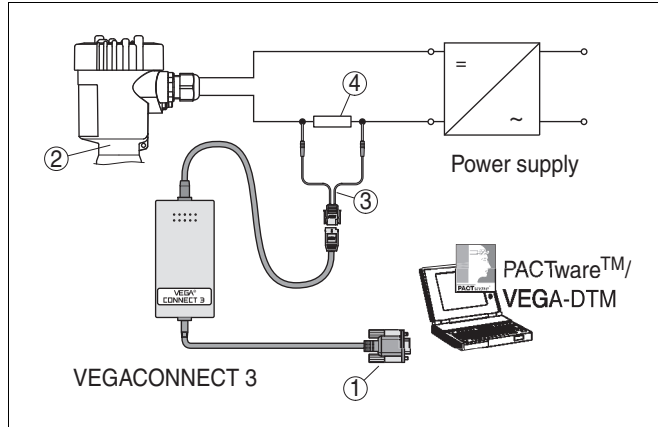
Fig. 27: Connecting the PC to the signal cable
1   RS232 connection
2   VEGASON 61
3   HART adapter cable for VEGACONNECT 3
4   HART resistance 250 Ohm

Necessary components:

- VEGASON 61
- PC with PACTware™ and suitable VEGA DTM
- VEGACONNECT 3 with HART adapter cable (art. no. 2.25397)
- 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. This applies, e.g. to the VEGA instruments VEGATRENN 149A, VEGADIS 371, VEGAMET 381. Also standard Ex separators are most of the time equipped with a sufficiently high current limitation resistor. 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 61, 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*".

7.4 Saving the parameter adjustment data

It is recommended to document or save the parameter adjustment data. They are hence available for multiple use or service purposes.

The VEGA DTM Collection and PACTware™ in the licensed, professional version provide suitable tools for systematic project documentation and storage.

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8 Maintenance and fault rectification

8.1 Maintenance

When used as directed in normal operation, VEGASON 61 is completely maintenance free.

8.2 Fault rectification

Causes of malfunction

VEGASON 61 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 indi-
cating/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

Oscillator SN-E.61H. is suitable for VEGASON 61, 62, 63 - 4 … 20mA/HART:

- SN-E.61H**X** (X = without approvals)
- SN-E.61H**D** (D = approvals XM, CM, UX, UF according to VEGA product list)
- SN-E.61H**G** (G = approvals CX according 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

⚠ **Warning:**
Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

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
− Process fitting   Thread G1½ A and 1½ NPT: PVDF
− Transducer   PVDF
− Seal transducer/process fitting   EPDM

Materials, non-wetted parts
− Housing   Plastic PBT (Polyester), Alu die-casting pow-
                                       der-coated, 316L
− Seal between housing and housing   NBR (stainless steel housing), silicone (Alu/
  cover   plastic housing)
− Inspection window in housing cover   Polycarbonate
− Ground terminal   316Ti/316L

Weight   1.8 … 4 kg (4 … 8.8 lbs), depending on
                                       process fitting and housing

Max. torque mounting boss   25 Nm

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   see load diagram in Power supply
Integration time (63 % of the input   0 … 999 s, adjustable
variable)
Fulfilled NAMUR recommendation   NE 43

Input variable

Parameter   distance between lower edge of the transducer
                                       and product surface
Dead zone   0.25 m (0.8 ft)
Measuring range
− Liquids   up to 5 m (16.4 ft)
− Solids   up to 2 m (6.6 ft)

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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 characteristics[6]

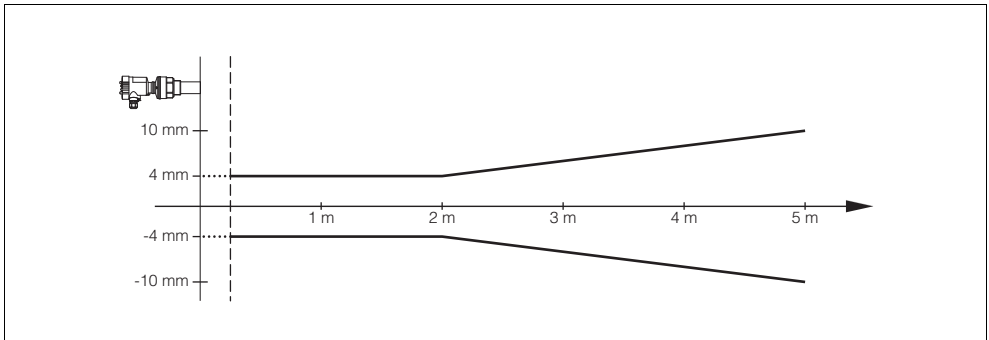|	
Average temperature coefficient of the zero signal (temperature error)	0.06 %/10 K
Resolution, general	max. 1 mm (max. 0.04 in)
Ultrasonic frequency	70 kHz
Interval	>2 s (dependent on the parameter adjustment)
Beam angle at -3 dB	11°
Adjustment time[7]	>3 s (dependent on the parameter adjustment)
Accuracy	better than 0.2 % or ±4 mm (see diagram)

Fig. 28: Accuracy VEGASON 61

Ambient conditions

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

---

[6] Relating to the nominal range, incl. hysteresis and repeatability, determined according to the limit point method.

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

Process conditions

Vessel pressure	-20 … 200 kPa/-0,2 … 2 bar (-2.9 … 29 psi)
Process temperature (transducer temperature)	-40 … +80 °C (-40 … +176 °F)
Vibration resistance	mechanical vibrations with 4 g and 5 … 100 Hz[8]

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

Cable entry/plug[9]

- − Single chamber housing
  - ● 1x cable entry M20x1.5 (cable-ø 5 … 9 mm), 1x blind stopper M20x1.5

  or:
  - ● 1x closing cap ½ NPT, 1x blind plug ½ NPT

  or:
  - ● 1x plug (depending on the version), 1x blind plug M20x1.5

- − Double chamber housing
  - ● 1x cable entry M20x1.5 (cable-ø 5 … 9 mm), 1x blind stopper M20x1.5, plug M12x1 for VEGADIS 61 (optional)

  or:
  - ● 1x closing cap ½ NPT, 1x blind stopper ½ NPT, plug M12x1 for VEGADIS 61 (optional)

  or:
  - ● 1x plug (depending on the version), 1x blind stopper M20x1.5, plug M12x1 for VEGADIS 61 (optional)

Spring-loaded terminals	for wire cross-section up to 2.5 mm^2

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[8] Tested according to the regulations of German Lloyd, GL directive 2
[9] Depending on the version M12x1, according to DIN 43650, Harting, Amphenol-Tuchel, 7/8" FF.

Electromechanical data - version IP 66/IP 68, 1 bar

Cable entry

− Single chamber housing	● 1x IP 68 cable entry M20x1.5; 1x blind stopper M20x1.5
	or:
	● 1x closing cap ½ NPT, 1x blind plug ½ NPT
− Double chamber housing	● 1x IP 68 cable entry M20x1.5; 1x blind stopper M20x1.5; plug M12x1 for VEGADIS 61 (optional)
	or:
	● 1x closing cap ½ NPT, 1x blind stopper ½ NPT, plug M12x1 for VEGADIS 61 (optional)

Connection cable

− Configuration	four wires, one suspension cable, one breather capillary, screen braiding, foil, mantle
− wire cross section	0.5 mm^2
− wire resistance	<0.036 Ohm/m
− Tensile strength	>1200 N (270 pounds force)
− Standard length	5 m (16.4 ft)
− Max. length	1000 m (3280 ft)
− Min. bending radius	25 mm (1 in) at 25 °C (77 °F)
− Diameter	approx. 8 mm
− Colour - standard PE	Black
− Colour - standard PUR	blue
− Colour - Ex-version	blue

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 instrument   14 … 36 V DC
– EEx ia instrument   14 … 30 V DC

Supply voltage with lighted indicating and adjustment module
– Non-Ex instrument   20 … 36 V DC
– EEx ia instrument   20 … 30 V DC
– EExd ia instrument   20 … 36 V DC

Permissible residual ripple
– <100 Hz U_{ss} <1 V
– 100 Hz … 10 kHz U_{ss} <10 mV

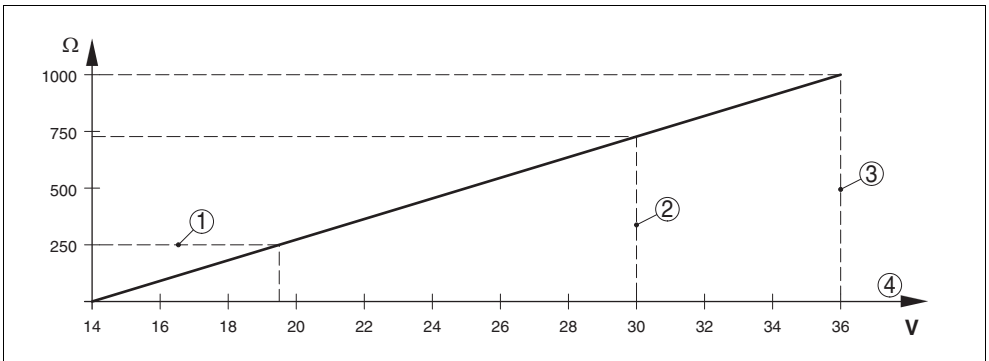Load   see diagram

Fig. 29: Voltage diagram
1   HART load
2   Voltage limit EEx ia instrument
3   Voltage limit non-Ex instrument
4   Supply voltage

Electrical protective measures

Protection
- Plastic housing   IP 66/IP 67
- Alu and stainless steel standard   IP 66/IP 68 (0.2 bar)[10]
- Alu and stainless housing, optionally available   IP 66/IP 68 (1 bar)

Overvoltage category	III
Protection class	II

Approvals[11][12]

ATEX	ATEX II 1G, 1/2G, 2G EEx ia IIC T6
FM	FM Cl.I-III, Div1 (IS), FM Cl.I., Div2 (NI)+Cl.II, III, Div1 (DIP)
Ship approvals	GL, LRS, ABS, CCS, RINA, DNV

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[10] Requirement to maintain the protection is the suitable cable.
[11] Deviating data in Ex applications: see separate safety instructions.
[12] Depending on order specification.

10.2 Dimensions

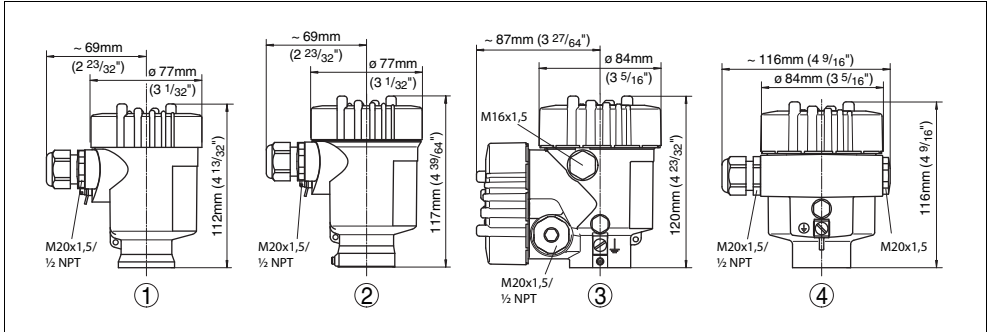### Housing in protection IP 66/IP67 and IP 66/IP 68; 0.2 bar

Fig. 30: Housing versions in protection IP 66/IP 67 and IP 66/IP 68; 0.2 bar (with integrated indicating and adjustment module the housing height increases by 9 mm ($^1/_{64}$"))
1 Plastic housing
2 Stainless steel housing
3 Aluminium double chamber housing
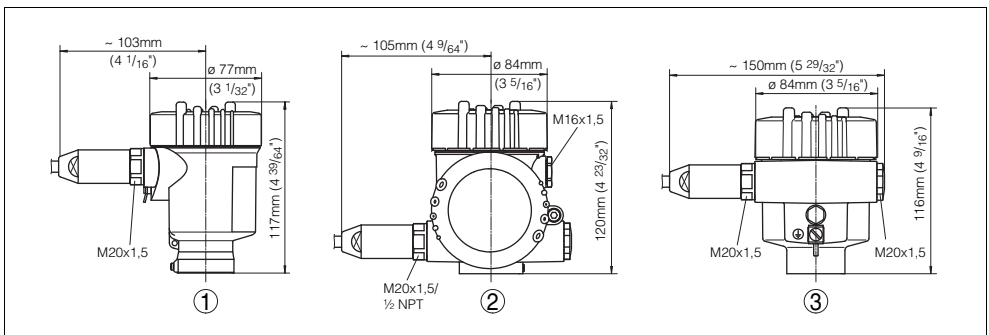4 Aluminium housing

Housing in protection IP 66/IP 68, 1 bar

Fig. 31: Housing versions in protection IP 66/IP 68, 1 bar (with integrated indicating and adjustment module the housing is 9 mm/0.4 in higher)
1 Stainless steel housing
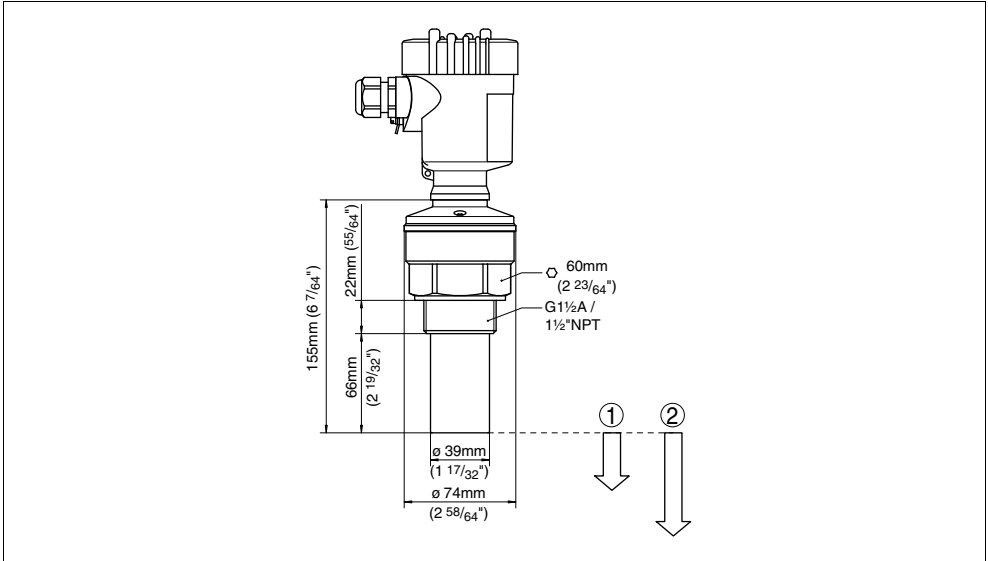2 Aluminium double chamber housing
3 Aluminium housing

VEGASON 61

Fig. 32: VEGASON 61
1   Dead zone: 0.25 m (0.8 ft)
2   Measuring range: with liquids up to 5 m (16.4 ft), with solids up to 2 m (6.6 ft)

10.3 Industrial property rights

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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 avail-
able at the time of printing.