

Operating Instructions

Ultrasonic sensor for continuous level measurement

VEGASON 61

Profibus PA



Document ID: 28784



VEGA

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Supplementary documentation



Information:

Supplementary documents appropriate to the ordered version come with the delivery. You can find them listed in chapter "*Product description*".

Instructions manuals for accessories and replacement parts



Tip:

To ensure reliable setup and operation of your VEGASON 61, we offer accessories and replacement parts. The corresponding documentations are:

- 27835 - Display and adjustment module PLICSCOM
- 32628 - Interface adapter VEGACONNECT
- 27720 - External indication VEGADIS 61
- 34296 - Protective cover
- 30176 - Electronics module VEGASON series 60

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1 About this document

1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

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

1.3 Symbols 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.



SIL applications

This symbol indicates instructions for functional safety which must be taken into account particularly for safety-relevant applications.



List

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



Action

This arrow indicates a single action.



Sequence of actions

Numbers set in front indicate successive steps in a procedure.



Battery disposal

This symbol indicates special information about the disposal of batteries and accumulators.

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 plant operator.

During work on and with the device the required personal protective equipment must always be worn.

2.2 Appropriate use

VEGASON 61 is a sensor for continuous level measurement.

You can find detailed information about the area of application in chapter "*Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

2.3 Warning about incorrect use

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

This is a state-of-the-art instrument complying with all prevailing regulations and guidelines. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

The safety approval markings and safety tips on the device must also be observed.

2.5 Safety label on the instrument

The safety approval markings and safety tips on the device must be observed.

2.6 CE conformity

The device fulfills the legal requirements of the applicable EC guidelines. By affixing the CE marking, we confirm successful testing of the product.

2.7 Fulfillment of NAMUR recommendations

NAMUR is the automation technology user association in the process industry in Germany. The published NAMUR recommendations are accepted as the standard in field instrumentation.

The device fulfills the requirements of the following NAMUR recommendations:

- NE 21 – Electromagnetic compatibility of equipment
- NE 43 – Signal level for malfunction information from measuring transducers
- NE 53 – Compatibility of field devices and display/adjustment components

For further information see www.namur.de.

2.8 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.

2.9 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 fulfill this obligation by observing the environmental instructions in this manual:

- Chapter "*Packaging, transport and storage*"
- 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
 - Operating instructions manual 27835 "Display and adjustment module PLICSCOM" (optional)
 - Supplementary instructions manual 31708 "Heating for display and adjustment module" (optional)
 - Supplementary instructions manual "Plug connector" (optional)
 - Ex-specific "Safety instructions" (with Ex versions)
 - if necessary, further certificates

Constituent parts

The VEGASON 61 consists of the components:

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

The components are available in different versions.

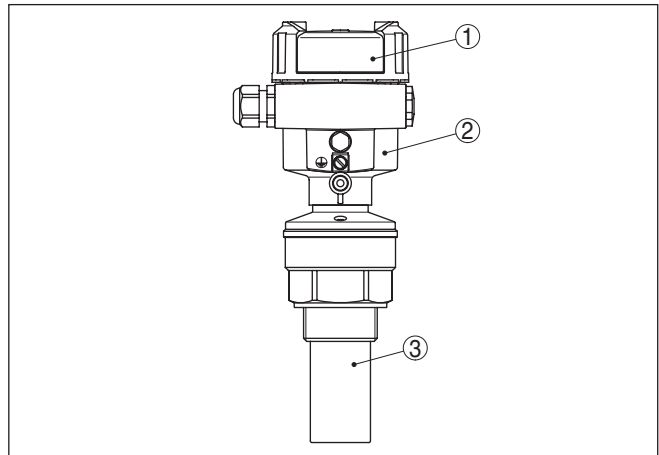


Fig. 1: VEGASON 61 - version with plastic housing

- 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

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.

Application area

Functional principle

The transducer of the ultrasonic sensor transmits short ultrasonic pulses to the measured product. These pulses are reflected by product surface and received back 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 and bus communication

Power supply via the Profibus DP/PA segment coupler or VEGALOG 571 EP cards. A two-wire cable according to Profibus specification serves as carrier of both power and digital data transmission for multiple sensors. The instrument profile of VEGASON 61 corresponds to profile specification version 3.0.

The backlight of the display and adjustment module is powered by the sensor. Prerequisite is a certain level of operating voltage.

The data for power supply are specified in chapter "*Technical data*".

The optional heating requires its own operating voltage. You can find details in the supplementary instructions manual "*Heating for display and adjustment module*".

This function is generally not available for approved instruments.

GSD/EDD

The GSD (instrument master files) and bitmap files necessary for planning your Profibus-DP-(PA) communication network are available from the download section on the VEGA homepage www.vega.com under "*Services - Downloads - Software - Profibus*". There you can also find the appropriate certificates. In a PDM environment, an EDD (Electronic Device Description) is also required to enable the full range of sensor functions (also available as a download). A CD with the appropriate files can be ordered via e-mail under info@de.vega.com or by phone from one of the VEGA agencies under the order number "DRIVER.S".

3.3 Operation

The instrument can be adjusted with the following adjustment media:

- With the display and adjustment module
- with the suitable VEGA DTM in conjunction with an adjustment software according to the FDT/DTM standard, e.g. PACTware and PC
- with the adjustment program PDM

3.4 Packaging, transport and storage**Packaging**

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test based on ISO 4180.

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.

Transport	Transport must be carried out in due consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.
Transport inspection	The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.
Storage	<p>Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.</p> <p>Unless otherwise indicated, the packages must be stored only under the following conditions:</p> <ul style="list-style-type: none">● Not in the open● Dry and dust free● Not exposed to corrosive media● Protected against solar radiation● Avoiding mechanical shock and vibration
Storage and transport temperature	<ul style="list-style-type: none">● Storage and transport temperature see chapter "<i>Supplement - Technical data - Ambient conditions</i>"● Relative humidity 20 ... 85 %

4 Mounting

4.1 General instructions

Suitability for the process conditions

Make sure that all parts of the instrument coming in direct contact with the process, especially the sensor element, process seal and process fitting, are suitable for the existing process conditions, such as process pressure, process temperature as well as the chemical properties of the medium.

You can find the specifications in chapter "*Technical data*" and on the nameplate.

Installation position

Select an installation position you can easily reach for mounting and connecting as well as later retrofitting of a display and adjustment module. The housing can be rotated by 330° without the use of any tools. You can also install the display 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 instrument 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 outdoor mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.

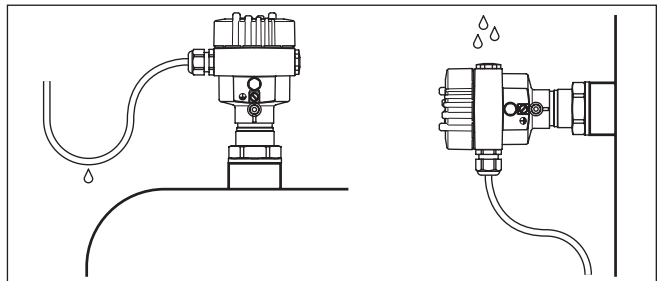


Fig. 2: Measures against moisture ingress

Measuring range

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

Make sure that a minimum distance from the reference plane - the so-called dead zone, in which measurement is not possible - is maintained. The exact value of the dead zone is stated in chapter "*Technical data*".

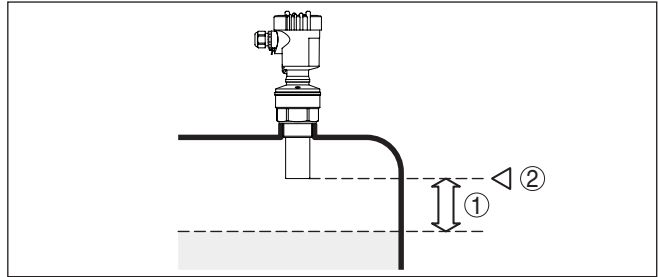


Fig. 3: Minimum distance to the max. level

- 1 Dead zone
- 2 Reference plane



Information:

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

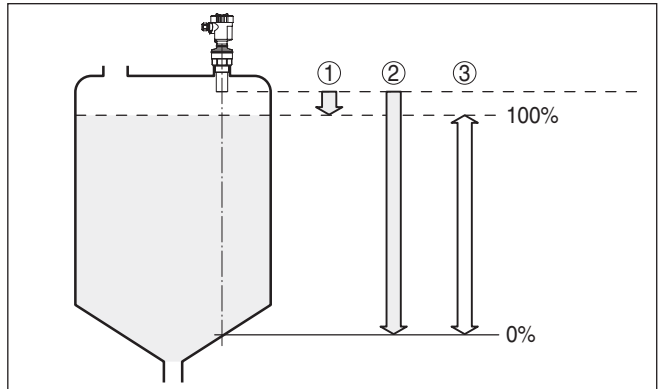


Fig. 4: Measuring range (operating range) and max. measuring distance

- 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 does, 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 instructions

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".

Screwing in

**Warning:**

The housing must not be used to screw the instrument in! Applying tightening force can damage internal parts of the housing.

Installation position

When mounting the sensor, keep a distance of at least 200 mm (7.874 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 chapter "Setup").

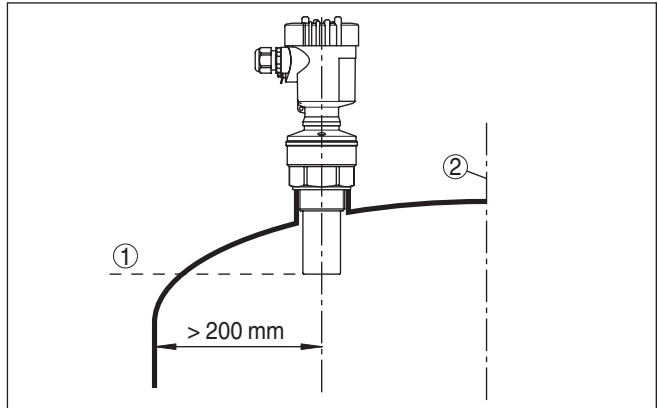


Fig. 5: Mounting on round vessel tops

- 1 Reference plane
- 2 Vessel center or symmetry axis

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

In vessels with conical 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.

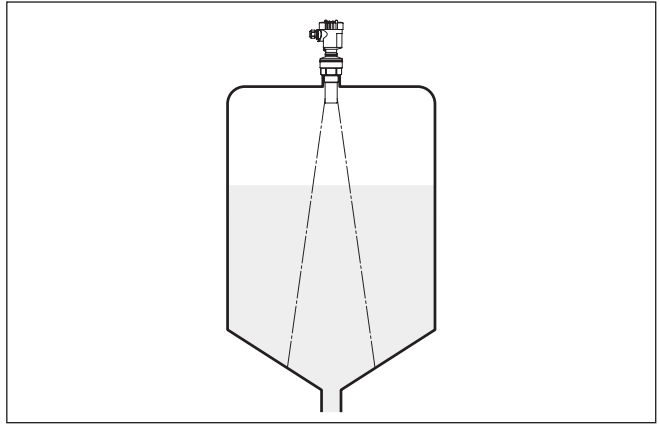


Fig. 6: Vessel with conical bottom

Socket

Socket pieces should be dimensioned so that the lower end of the transducer protrudes at least 10 mm (0.394 in) out of the socket.

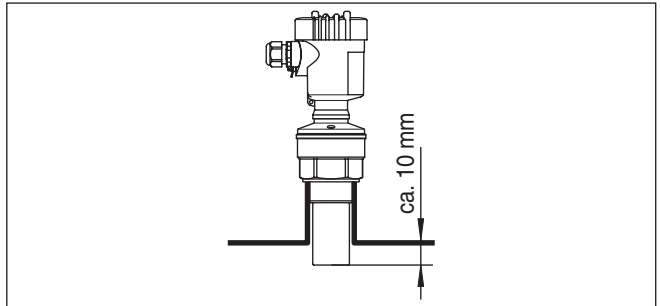


Fig. 7: Recommended socket mounting

If the reflective properties of the medium are good, you can mount VEGASON 61 on sockets which are higher than the length of the transducer. 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. Carry out a false echo storage.

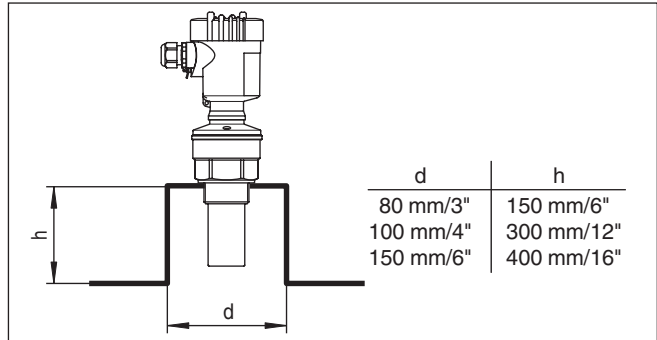


Fig. 8: Deviating socket dimensions

Sensor orientation

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

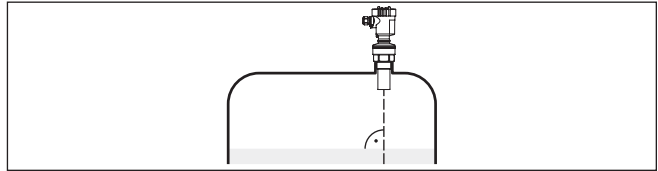


Fig. 9: Alignment in liquids

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.

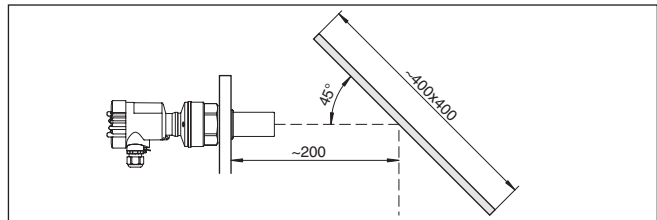


Fig. 10: Beam deflector

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 that interfere with the useful echo. Make sure when planning your measuring site that the ultrasonic signals have a "clear view" to the measured product.

In case of 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.

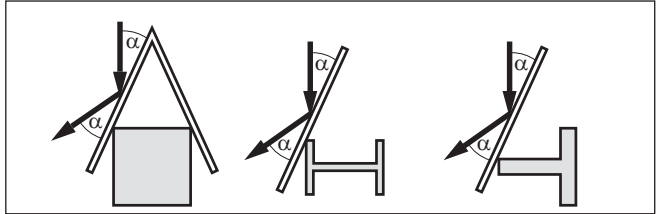


Fig. 11: Cover flat, large-area profiles with deflectors

Agitators

If there are agitators in the vessel, a false signal 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.

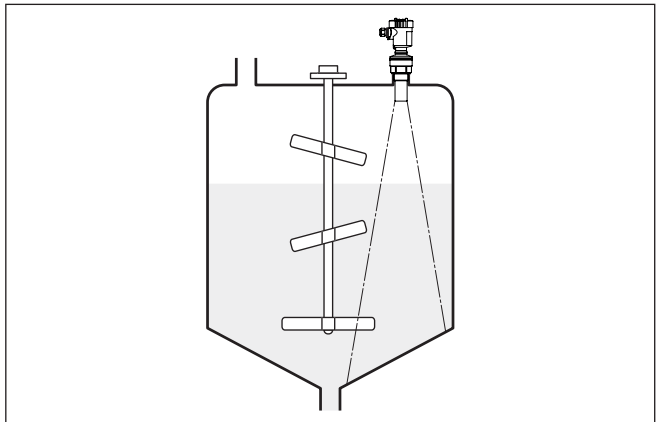


Fig. 12: Agitators

Inflowing medium

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

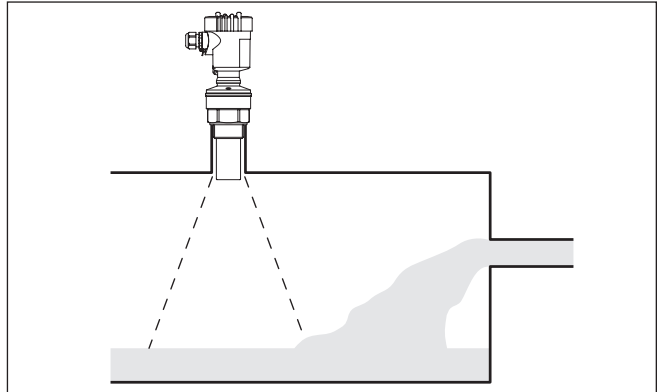


Fig. 13: Inflowing liquid

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 wave radar is unaffected by foam generation and is particularly suitable for such applications.

Air turbulences

If there are strong air currents in the vessel, e.g. due to strong winds in outdoor installations or air turbulence, e.g. by cyclone extraction 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.

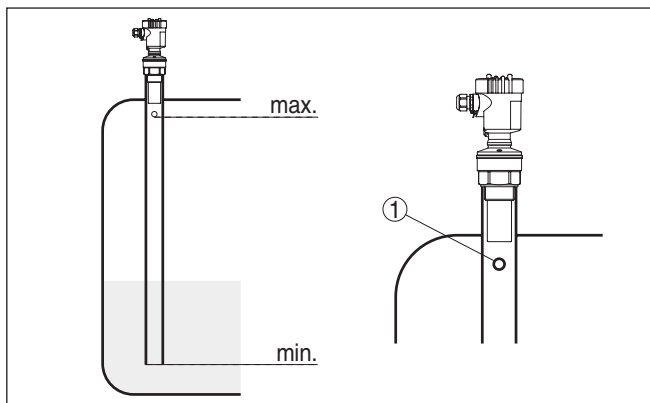


Fig. 14: Standpipe in the tank

1 Vent hole: $\varnothing 5 \dots 10 \text{ mm}$ (0.197 ... 0.394 in)

VEGASON 61 can be used from tube diameters of 40 mm (1.575 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 extremely adhesive products.

5 Connecting to power supply

5.1 Preparing the connection

Safety instructions

Always keep in mind the following safety instructions:

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



Tip:

We recommend VEGA overvoltage arrester B63-32.



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

Voltage supply

Power is supplied via a Profibus DP/PA segment coupler or a VEGA-LOG 571 EP input card. The power supply range can differ depending on the instrument version.

The data for power supply are specified in chapter "*Technical data*".

Connection cable

Connection is made with screened cable according to the Profibus specification. Power supply and digital bus signal are carried over the same two-wire connection cable.

Use cable with round cross-section. A cable outer diameter of 5 ... 9 mm (0.2 ... 0.35 in) ensures the seal effect of the cable gland. If you are using cable with a different diameter or cross-section, exchange the seal or use a suitable cable gland.

Please make sure that your installation is carried out according to the Profibus specification. In particular, make sure that the termination of the bus is done with appropriate terminating resistors.

Cable gland ½ NPT

On the instrument with cable entry ½ NPT and plastic housing there is a metallic ½" threaded insert moulded into 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 that corrode the connection between threaded insert and housing. This would influence the stability of the connection and the tightness of the housing.

Cable screening and grounding

In systems with potential equalisation, connect the cable screen directly to ground potential at the power supply unit, in the connection box and at the sensor. The screen in the sensor must be connected directly to the internal ground terminal. The ground terminal outside on the housing must be connected to the potential equalisation (low impedance).

In systems without potential equalisation, connect the cable screen directly to ground potential at the power supply unit and at the sensor. In the connection box or T-distributor, the screen of the short stub to the sensor must not be connected to ground potential or to another cable screen. The cable screens to the power supply unit and to the

next distributor must be connected to each other and also connected to ground potential 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.



The total capacitance of the cable and of all capacitors must not exceed 10 nF in Ex applications.



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

5.2 Connection procedure

Proceed as follows:

1. Unscrew the housing cover
2. If a display and adjustment module is installed, remove it by turning it to the left.
3. Loosen compression nut of the cable entry gland
4. Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) of 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 down the opening levers of the terminals, you will hear the terminal spring closing

9. Check the hold of the wires in the terminals by lightly pulling on them
 10. Connect the screen to the internal ground terminal, connect the outer ground terminal to potential equalisation
 11. Tighten the compression nut of the cable entry gland. The seal ring must completely encircle the cable
 12. Screw the housing lid back on
- The electrical connection is 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

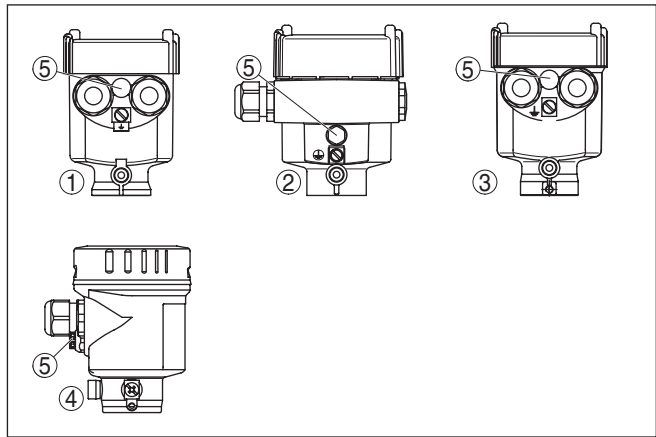


Fig. 16: Material versions, single chamber housing

- 1 Plastic
- 2 Aluminium
- 3 Stainless steel, precision casting
- 4 Stainless steel, electro-polished
- 5 Filter element for air pressure compensation of all material versions. Blind plug with version IP 66/IP 68, 1 bar for Aluminium and stainless steel

Electronics and terminal compartment

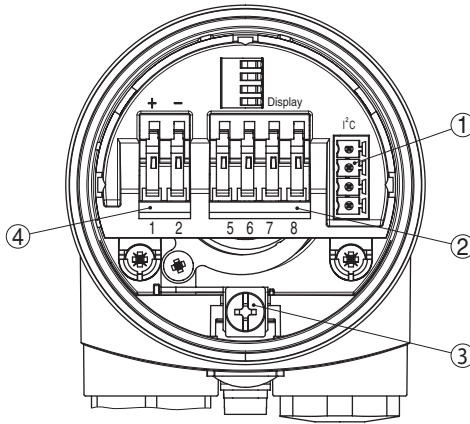


Fig. 17: Electronics and terminal compartment, single chamber housing

- 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

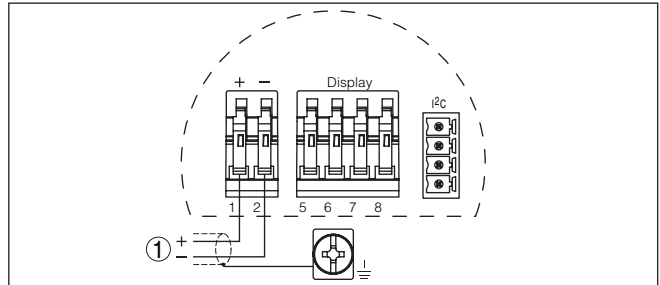


Fig. 18: Wiring plan, single chamber housing

- 1 Voltage 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

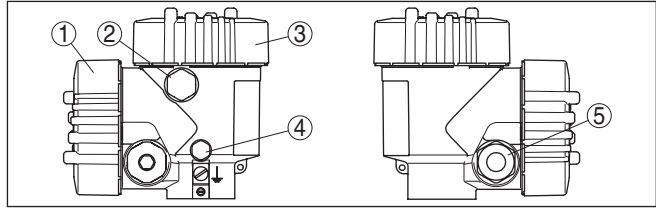


Fig. 19: Double chamber housing

- 1 Housing cover, connection compartment
- 2 Blind plug or plug M12 x 1 for VEGADIS 61 (optional)
- 3 Housing cover, electronics compartment
- 4 Filter element for air pressure compensation
- 5 Cable gland

Electronics compartment

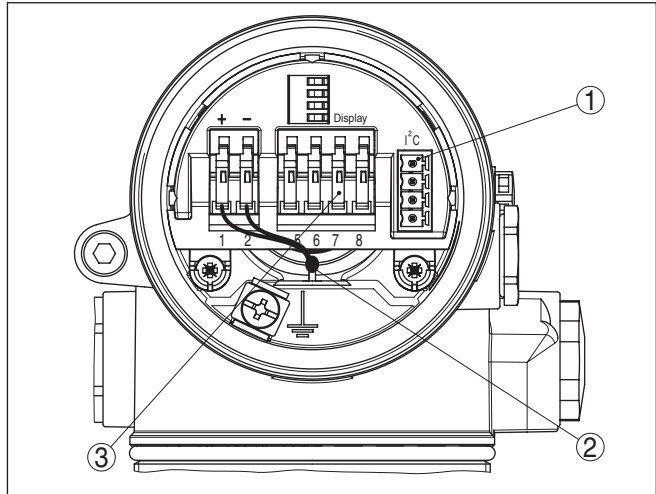


Fig. 20: Electronics compartment, double chamber housing

- 1 Plug connector for VEGACONNECT (I²C interface)
- 2 Internal connection cable to the connection compartment
- 3 Terminals for VEGADIS 81

Terminal compartment

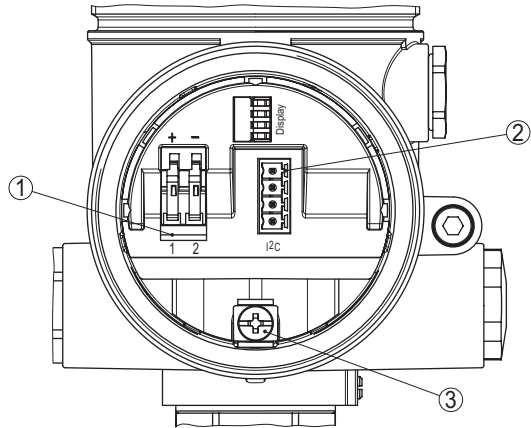


Fig. 21: Terminal compartment, double chamber housing

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

Wiring plan

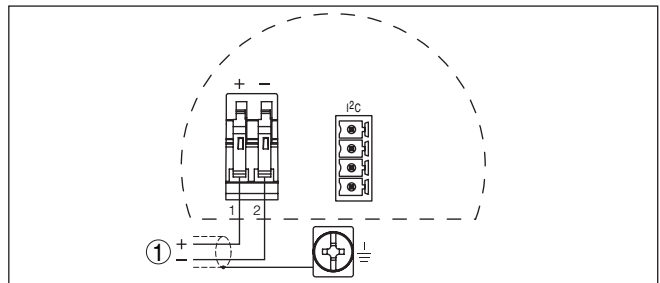


Fig. 22: Wiring plan, double chamber housing

- 1 Voltage supply, signal output

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

Wire assignment, connection cable

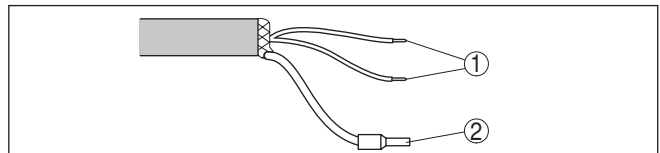


Fig. 23: Wire assignment, connection cable

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

Switch-on phase**5.6 Switch-on phase**

After VEGASON 61 is connected to voltage supply or after voltage recurrence, the instrument carries out a self-check for approx. 30 seconds. The following steps are carried out:

- Internal check of the electronics
- Indication of the instrument type, the firmware as well as the sensor TAGs (sensor designation)
- Status byte goes briefly to fault value

Then the current measured value will be displayed and the corresponding digital output signal will be outputted to the cable.¹⁾

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

6 Set up with the display and adjustment module PLICSCOM

6.1 Short description

Function/Configuration

The display and adjustment module 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 display and adjustment unit VEGADIS 61

From a hardware version ...- 01 or higher of PLICSCOM as well as a hardware version ...- 01, 03 or higher of the corresponding sensor, an integrated backlight can be switched on via the adjustment menu. The hardware version is stated on the type label of the PLICSCOM or the sensor electronics.



Note:

You can find detailed information on adjustment in the operating instructions manual "*Display and adjustment module*".

6.2 Insert display and adjustment module

Mount/Dismount display and adjustment module

The display and adjustment module can be inserted into the sensor and removed again at any time. It is not necessary to interrupt the power supply.

Proceed as follows:

1. Unscrew the housing cover
2. Place the display 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 display and adjustment module onto the electronics and turn it to the right until it snaps in.
4. Screw housing cover with inspection window tightly back on

Disassembly is carried out in reverse order.

The display and adjustment module is powered by the sensor, an additional connection is not necessary.



Fig. 24: Insert display and adjustment module



Note:

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

6.3 Adjustment system

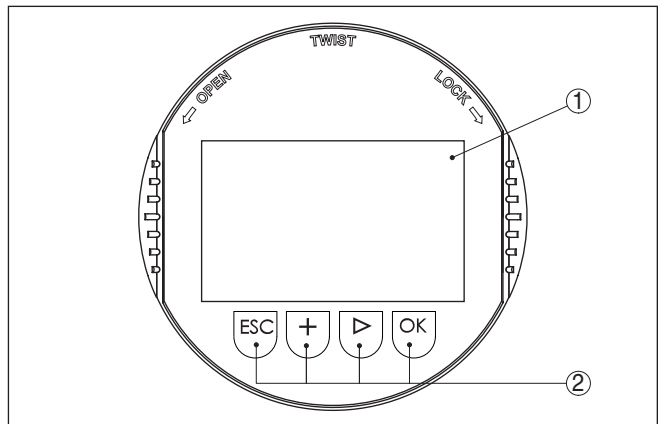


Fig. 25: Display and adjustment elements

- 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
 - Select list entry
 - Select editing position
- [+] key:
 - Change value of the parameter
- [ESC] key:
 - Interrupt input
 - Jump to next higher menu

Adjustment system

The sensor is adjusted via the four keys of the display 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 steps

Address setting

Before starting the actual parameter adjustment of a Profibus PA sensor, the address setting must first be carried out. You will find a detailed description in the operating instructions manual of the display and adjustment module or in the online help of PACTware or DTM.

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 lower side of the flange, with 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.

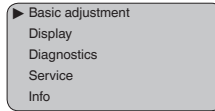
The real product level during this adjustment is not important, because the min./max. adjustment is always carried out without changing the product level. These settings can be made ahead of time without the instrument having to be installed.

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.

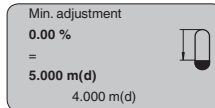
Start your parameter adjustment with the following menu items of the basic adjustment:

Carry out min. adjustment Proceed as follows:

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



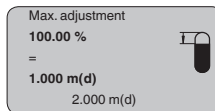
2. Select the menu item "Basic adjustment" with **[->]** and confirm with **[OK]**. Now the menu item "Min. adjustment" is displayed.



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 suitable distance value in m for the empty vessel (e.g. distance from the sensor to the vessel bottom) corresponding to the percentage value.
5. Save the settings with **[OK]** and move to "Max. adjustment" with **[->]**.

Carry out max. adjustment

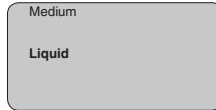
Proceed as follows:



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 "Liquid" or "Solid".



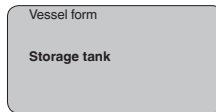
With solids, you can also choose between "Powder/Dust", "Granular/Pellets" or "Ballast/Pebbels".

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

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

Vessel form

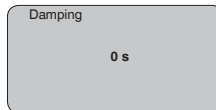
Apart from the medium, the vessel shape can also influence the measurement. To adapt the sensor to these measuring conditions, this menu item offers different options depending on whether liquid or bulk solid is selected. With "Liquids" these are "Storage tank", "Stilling tube", "Open vessel" or "Stirred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



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

Damping

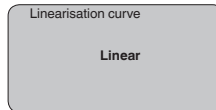
To suppress fluctuations in the measured value display, e. g. caused by an agitated product surface, a damping can be set. This time can be between 0 and 999 seconds. Keep in mind that the reaction time of the entire measurement will then be longer and the sensor will react to measured value changes with a delay. In general, a period of a few seconds is sufficient to smooth the measured value display.



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

Linearisation curve

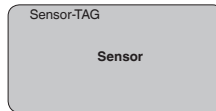
A linearisation is necessary for all vessels in which the vessel volume does not increase linearly with the level - e.g. in a horizontal cylindrical or spherical tank - and the indication or output of the volume is required. Corresponding linearisation curves are preprogrammed for these vessels. They 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 parameters via the appropriate keys, save your settings and jump to the next menu item with the **[->]** key.

Sensor-TAG

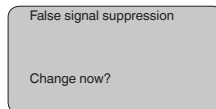
In this menu item you can enter an unambiguous designation for the sensor, e.g. the measurement loop name or the tank or product designation. In digital systems and in the documentation of larger plants, a singular designation should be entered for exact identification of individual measuring points.



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

False signal suppression

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 low level so that all potential interfering reflections can be detected.



Proceed as follows:

1. Move from the measured value display to the main menu by pushing **[OK]**.
2. Select the menu item "Service" with **[->]** and confirm with **[OK]**. Now the menu item "False 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]**.

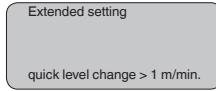


Note:

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

Extended setting/Quick level change

The menu item "Extended setting" offers the possibility to optimise VEGASON 61 for applications in which the level changes very quickly. To do this, select the function "Quick level change > 1 m/min."



Note:

Since with the function "Quick level change > 1 m/min." the generation of an average value of the signal processing is considerably reduced, false reflections by agitators or vessel installations can cause measured value fluctuations. A false echo memory is thus recommended.

Copy sensor data

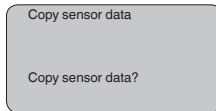
This function enables reading out parameter adjustment data as well as writing parameter adjustment data into the sensor via the display and adjustment module. A description of the function is available in the operating instructions manual "Display and adjustment module".

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
- Scaling unit (Out-Scale unit)
- Positions after the decimal point (scaled)
- Scaling PA/Out-Scale 4 values
- Unit of measurement
- Language

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

- Sensor address
- PIN



Reset

Basic adjustment

If the "Reset" is carried out, the sensor resets the values of the following menu items to the reset values (see chart):²⁾

Menu section	Function	Reset value
Basic settings	Max. adjustment	0 m(d)
	Min. adjustment	Meas. range end in m(d) ³⁾
	Medium	Liquid

²⁾ Sensor-specific basic adjustment.

³⁾ Depending on the sensor type, see chapter "Technical data".

Menu section	Function	Reset value
	Vessel form	not known
	Damping	0 s
	Linearization	Linear
	Channel	PV lin. %
	Sensor-TAG	Sensor
Display	Displayed value	PA-Out
Service	Additional PA value	Secondary Value 1 %
	Out-Scale-Unit	%
	PV-Out-Scale	0.00 lin % = 0.0 % 100.0 lin % = 100 %
	Unit of measurement	m(d)

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

Menu section	Function	Reset value
Basic settings	Sensor address	No reset
Service	Language	No reset

Default setting

Like basic adjustment, but in addition, special parameters are reset to default values.⁴⁾

Peak value indicator

The min. and max. distance and temperature 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 "*Display and adjustment module*".

6.5 Menu schematic

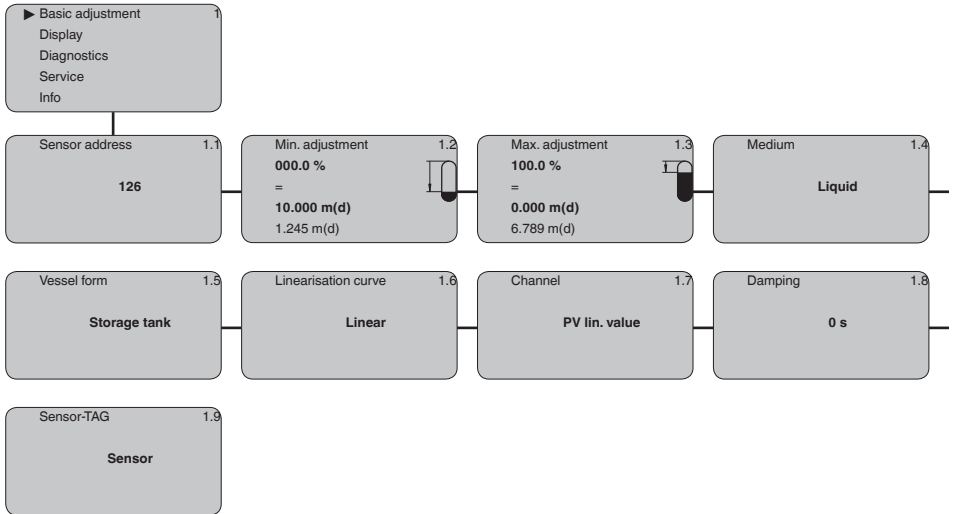


Information:

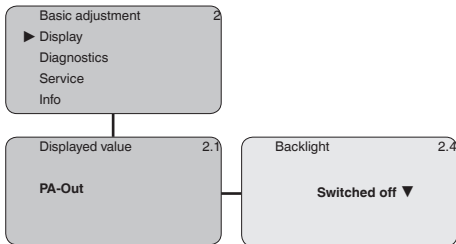
Depending on the version and application, the highlighted menu windows may not always be available.

⁴⁾ Special parameters are parameters which are set customer-specifically on the service level with the adjustment software PACTware.

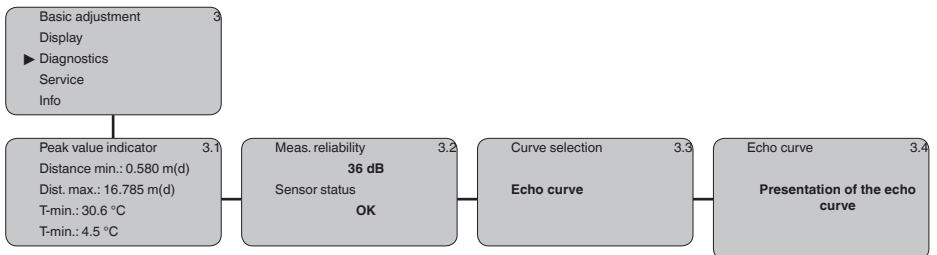
Basic adjustment



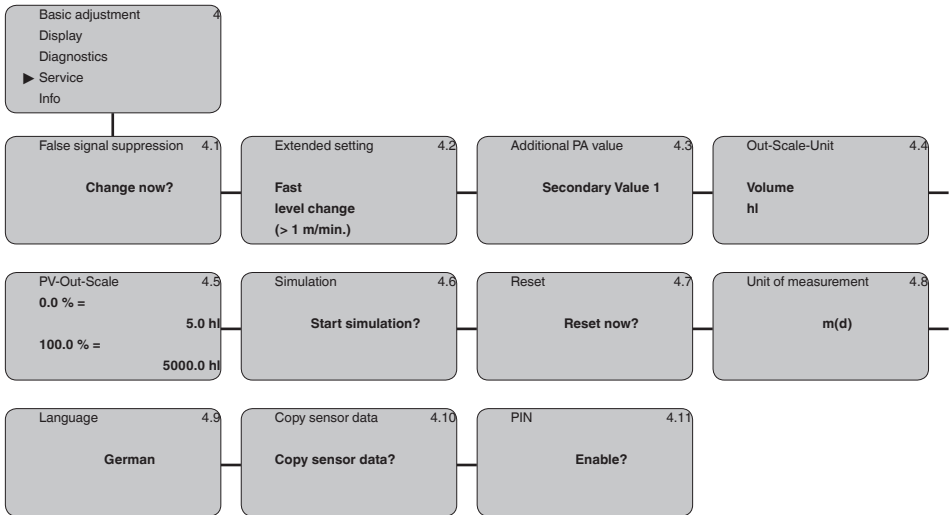
Display



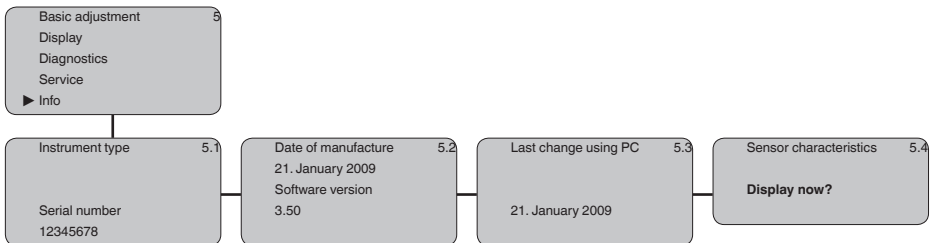
Diagnostics



Service



Info



6.10 Saving the parameter adjustment data

We recommend noting the adjusted data, e.g. in this operating instructions manual, and archiving them afterwards. They are thus available for multiple use or service purposes.

If VEGASON 61 is equipped with a display and adjustment module, the most important data can be read out of the sensor into the display and adjustment module. The procedure is described in the operating instructions manual "*Display 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 the sensor, the display 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 Set up with PACTware and other adjustment programs

7.1 Connect the PC via VEGACONNECT

VEGACONNECT directly on the sensor

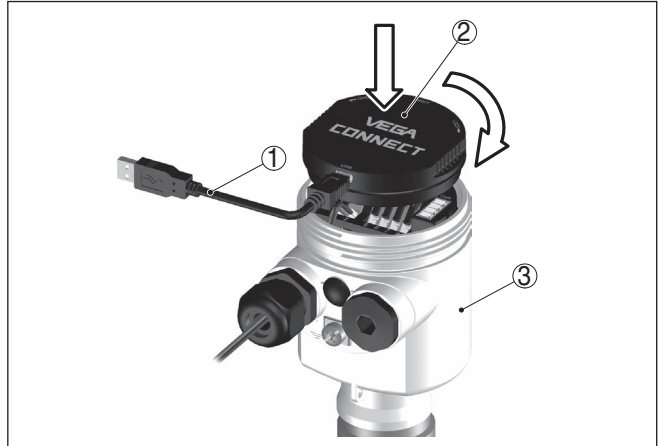


Fig. 26: Connection of the PC via VEGACONNECT directly to the sensor

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

VEGACONNECT externally

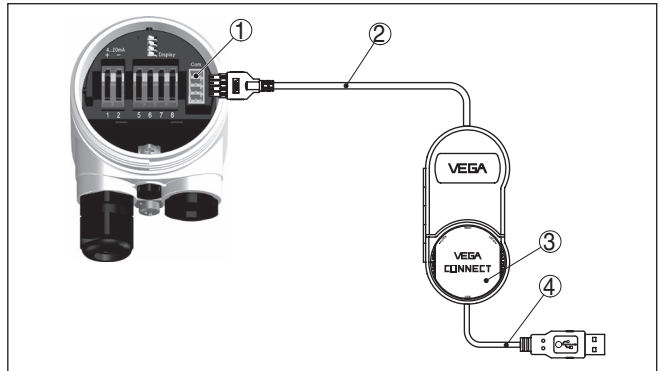


Fig. 27: Connection via VEGACONNECT externally

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

Necessary components:

- VEGASON 61
- PC with PACTware and suitable VEGA DTM

- VEGACONNECT
- Power supply unit or processing system

7.2 Parameter adjustment with PACTware

Prerequisites

For parameter adjustment of the instrument via a Windows PC, the configuration software PACTware and a suitable instrument driver (DTM) according to FDT standard are required. The latest PACTware version as well as all available DTMs are compiled in a DTM Collection. The DTMs can also be integrated into other frame applications according to FDT standard.



Note:

To ensure that all instrument functions are supported, you should always use the latest DTM Collection. Furthermore, not all described functions are included in older firmware versions. You can download the latest instrument software from our homepage. A description of the update procedure is also available in the Internet.

Further setup steps are described in the operating instructions manual "DTM Collection/PACTware" attached to each DTM Collection and which can also be downloaded from the Internet. Detailed descriptions are available in the online help of PACTware and the DTMs.

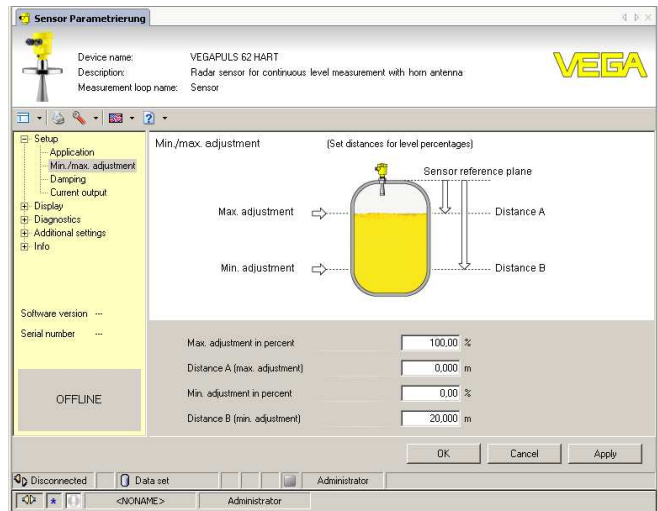


Fig. 28: Example of a DTM view

Standard/Full version

All device DTMs are available as a free-of-charge standard version and as a full version that must be purchased. In the standard version, all functions for complete setup are already included. An assistant for simple project configuration simplifies the adjustment considerably. Saving/printing the project as well as import/export functions are also part of the standard version.

In the full version there is also an extended print function for complete project documentation as well as a save function for measured value

and echo curves. In addition, there is a tank calculation program as well as a multiviewer for display and analysis of the saved measured value and echo curves.

The standard version is available as a download under www.vega.com/downloads and "Software". The full version is available on CD from the agency serving you.

7.3 Parameter adjustment with PDM

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

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. That way they are 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.

8 Maintenance and fault rectification

8.1 Maintenance

If the instrument is used properly, no special maintenance is required in normal operation.

8.2 Rectify faults

Reaction when malfunctions occur

The operator of the system is responsible for taking suitable measures to rectify faults.

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
- Voltage 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 display 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 and the faults rectified this way.

24 hour service hotline

Should these measures not be successful, please call in urgent cases the VEGA service hotline under the phone no. **+49 1805 858550**.

The hotline is manned 7 days a week round-the-clock. Since we offer this service worldwide, the support is only available in the English language. The service is free, only standard call charges are incurred.

Checking Profibus PA

The following table describes possible errors and helps to remove them:

Error	Cause	Rectification
When an additional instrument is connected, the segment fails.	Max. supply current of the segment coupler exceeded	Measure the current consumption, reduce size of segment
Wrong presentation of the measured value in Simatic S5	Simatic S5 cannot interpret the number format IEEE of the measured value	Insert converting component from Siemens
In Simatic S7 the measured value is always presented as 0	Only four bytes are consistently loaded in the PLC	Use function component SFC 14 to load 5 bytes consistently

Error	Cause	Rectification
Measured value on the display and adjustment module does not correspond to the value in the PLC	The menu item "Display - Display value" is not set to "PA-Out"	Check values and correct, if necessary
No connection between PLC and PA network	Incorrect adjustment of the bus parameter and the segment coupler-dependent baud rate	Check data and correct, if necessary
Instrument does not appear during connection setup	Profibus DP cable pole-reversed	Check cable and correct, if necessary
	Incorrect termination	Check termination at the beginning and end points of the bus and terminate, if necessary, according to the specification
	Instrument not connected to the segment, double assignment of an address	Check and correct, if necessary



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

Error messages via the display and adjustment module

Error code	Cause	Rectification
E013	no measured value available	<ul style="list-style-type: none"> - Sensor in boot phase - Sensor does not find an echo, e.g. due to faulty installation or wrong parameter adjustment
E017	Adjustment span too small	<ul style="list-style-type: none"> - Carry out a fresh adjustment and increase the distance between min. and max. adjustment
E036	no operable sensor software	<ul style="list-style-type: none"> - Carry out a software update or send instrument for repair
E041	Hardware error, electronics defective	<ul style="list-style-type: none"> - Exchange the instrument or send it in for repair
E113	Communication conflict	<ul style="list-style-type: none"> - Exchange the instrument or send it in for repair

Reaction after fault rectification

Depending on the reason for the fault and the measures taken, the steps described in chapter "Set up" may have to be carried out again.

8.3 Exchanging the electronics module

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



In Ex applications, only instruments and electronics modules 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 new electronics module must be loaded with the settings of the sensor. These are the options:

- 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, inside the housing or on the delivery note.



Information:

When loading on site, first of all the order data must be downloaded from the Internet (see operating instructions manual "*Electronics module*").

Assignment

The electronics modules are adapted to the respective sensor and distinguish also in the signal output or power supply.

8.4 Software update

The software version of VEGASON 61 can be determined as follows:

- on the type label of the electronics
- Via the display and adjustment module
- via PACTware

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.

The following components are required to update the sensor software:

- Sensor
- Voltage supply
- VEGACONNECT
- PC with PACTware
- Current sensor software as file

Load sensor software to PC

At "www.vega.com/downloads" go to "*Software*". Select under "*plics sensors and instruments*", "*Firmware updates*" the respective instrument series and software version. Load the zip file via the right mouse key with "*Save target as*" e.g. on the desktop of your PC. Move with the right mouse key to the folder and select "*Extract all*". Save the extracted files, for example on the desktop.

Prepare update

Connect the signal conditioning instrument to power supply and provide the connection from the PC to the instrument via the interface adapter. Start PACTware and go via the menu "*Project*" to the *VEGA project assistant*. Select "*USB*" and "*Set instruments online*". Activate the project assistant with "*Start*". The assistant establishes the connection automatically and opens the parameter adjustment window "*Sensor # online parameter adjustment*". Connect this parameter adjustment window before you carry out further steps.

Load software into sensor

Select with the right mouse key the sensor in the project and go to "*Additional function*". Then click to "*Software update*". The window "*Sensor # software update*" opens. PACTware checks now the sensor data and displays the actual hardware and software version of the sensor. This takes approximately 60 s.

Push the button "*Update software*" and select the previously extracted hex file. Then the software update can be started. The additional files are installed automatically. Depending on the sensor, this procedure can last up to 1 h. Then the message appears "*Software update successfully executed*".

8.5 How to proceed if a repair is needed

You can find a repair form as well as detailed information on how to proceed at www.vega.com/downloads and "*Forms and certificates*".

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

If a repair is necessary, please proceed as follows:

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and, if need be, also a safety data sheet outside on the packaging
- Please contact the agency serving you to get the address for the return shipment. You can find the agency on our home page www.vega.com.

9 Dismount

9.1 Dismounting steps

**Warning:**

Before dismantling, be aware of dangerous process conditions such as e.g. pressure in the vessel or pipeline, 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 parts 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. 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 on humans and the environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

If you have no way to dispose of the old instrument properly, please contact us concerning return and disposal.

10 Supplement

10.1 Technical data

General data

Materials, wetted parts

- Process fitting, transducer PVDF
- Seal between transducer and process fitting EPDM, FKM

Materials, non-wetted parts

- Housing Plastic PBT (polyester), Alu die-casting powder-coated, 316L
- Seal between housing and housing cover NBR (stainless steel housing), silicone (Alu/plastic housing)
- Inspection window in housing cover Polycarbonate
- Ground terminal 316Ti/316L

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

Max. torque mounting boss 25 Nm

Output variable

Output signal digital output signal, format according to IEEE-754

Cycle time min. 1 s (dependent on the parameter setting)

Sensor address 126 (default setting)

Current value 10 mA, ±0.5 mA

Damping (63 % of the input variable) 0 ... 999 s, adjustable

Met NAMUR recommendation NE 43

Resolution, digital > 1 mm (0.039 in)

Input variable

Measured variable distance between lower edge of the transducer and product surface

Measuring range

- Liquids up to 5 m (16.4 ft)
- Bulk solids up to 2 m (6.562 ft)

Dead zone 0.25 m (0.82 ft)

Reference conditions to measuring accuracy (according 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 psig)

Other reference conditions

- Reflector ideal reflector, e.g. metal plate 2 x 2 m (6.56 x 6.56 ft)

- False reflections Biggest false signal, 20 dB smaller than the useful signal

Measuring characteristics

Ultrasonic frequency	70 kHz
Interval	> 2 s (dependent on the parameter adjustment)
Abstrahlwinkel at -3 dB	11°
Step response or adjustment time ⁵⁾	> 3 s (dependent on the parameter adjustment)

Measuring accuracy

Resolution, general	> 1 mm (0.039 in)
Deviation ⁶⁾	see diagram

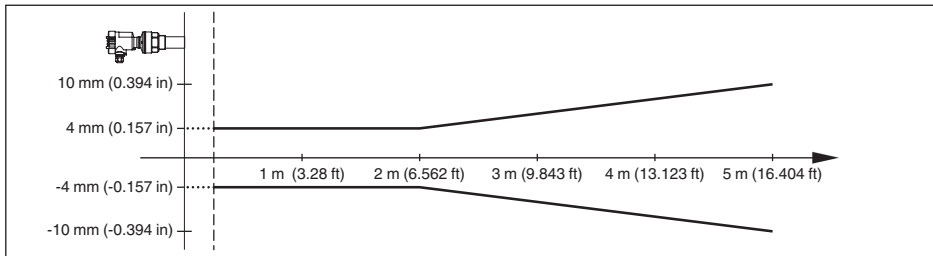


Fig. 29: Deviation VEGASON 61

Influence of the ambient temperature to the sensor electronics⁷⁾

Average temperature coefficient of the zero signal (temperature error) 0.06 %/10 K

Ambient conditions

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

Process conditions

Process pressure	-20 ... 200 kPa/-0.2 ... 2 bar (-2.9 ... 29 psig)
Process temperature (transducer temperature)	
- Seal EPDM	-40 ... +80 °C (-40 ... +176 °F)
- Seal FKM	-20 ... +80 °C (-4 ... +176 °F)
Vibration resistance	mechanical vibrations with 4 g and 5 ... 100 Hz ⁸⁾

⁵⁾ Time to output the correct level (with max. 10 % deviation) after a sudden level change.

⁶⁾ Incl. non-linearity, hysteresis and non-repeatability.

⁷⁾ Relating to the nominal measuring range.

⁸⁾ Tested according to the guidelines of German Lloyd, GL directive 2.

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

Cable entry/plug⁹⁾

- Single chamber housing
 - 1 x cable gland M20 x 1.5 (cable: \varnothing 5 ... 9 mm), 1 x blind plug M20 x 1.5
 - or:
 - 1 x closing cap M20 x 1.5; 1 x blind plug M20 x 1.5
 - or:
 - 1 x closing cap ½ NPT, 1 x blind plug ½ NPT
 - or:
 - 1 \square x plug (depending on the version), 1 \square x blind stopper M20 \square x1.5
- Double chamber housing
 - 1 x cable entry M20 x 1.5 (cable: \varnothing 5 ... 9 mm), 1 x blind plug M20 x 1.5; 1 x blind plug M16 x 1.5 or optionally available with 1 x plug M12 x 1 for external display and adjustment unit
 - or:
 - 1 x closing cap ½ NPT, 1 x blind plug ½ NPT, 1 x blind plug M16 x 1.5 or optionally 1 x plug M12 x 1 for external display and adjustment unit
 - or:
 - 1 x plug (depending on the version), 1 x blind plug M20 x 1.5; 1 x blind plug M16 x 1.5 or optionally available with 1 x plug M12 x 1 for external display and adjustment unit

Spring-loaded terminals for wire cross-section < 2.5 mm² (AWG 14)

Electromechanical data - version IP 66/IP 68 (1 bar)

Cable entry

- Single chamber housing 1 x IP 68 cable gland M20 x 1.5; 1 x blind plug M20 x 1.5
- Double chamber housing 1 \square x IP \square 68 cable gland M20 \square x1.5; 1 \square x blind stopper M20 \square x1.5; 1 \square x blind stopper M16 \square x1.5

Connection cable

- Wire cross-section 0.5 mm² (AWG 20)
- Wire resistance < 0.036 Ω /m (0.011 Ω /ft)
- Tensile strength < 1200 N (270 lbf)
- Standard length 5 m (16.4 ft)
- Max. length 1000 m (3280 ft)
- Min. bending radius 25 mm (0.984 in) with 25 °C (77 °F)
- Diameter approx. 8 mm (0.315 in)
- Colour - standard PE Black
- Colour - standard PUR Blue
- Colour - Ex-version Blue

⁹⁾ Depending on the version M12 x 1, according to DIN 43650, Harting, 7/8" FF.

Display and adjustment module

Voltage supply and data transmission	through the sensor
Indication	LC display in dot matrix
Adjustment elements	4 keys
Protection rating	
– unassembled	IP 20
– mounted into the sensor without cover	IP 40
Material	
– Housing	ABS
– Inspection window	Polyester foil

Voltage supply

Operating voltage	
– Non-Ex instrument	9 ... 32 V DC
– Ex-ia instrument	9 ... 24 V DC
– Ex-d instrument	16 ... 32 V DC
Operating voltage with illuminated display and adjustment module	
– Non-Ex instrument	12 ... 32 V DC
– Ex-ia instrument	12 ... 24 V DC
– Ex-d instrument	20 ... 32 V DC
Power supply by/max. number of sensors	
– DP/PA segment coupler	max. 32 (max. 10 with Ex)
– VEGALOG 571 EP card	max. 15 (max. 10 with Ex)

Electrical protective measures

Protection, depending on housing version	
– Plastic housing	IP 66/IP 67 (NEMA 4X)
– Aluminium housing, stainless steel housing - investment casting, stainless steel housing - electro-polished	IP 66/IP 68 (0.2 bar) NEMA 6P ¹⁰⁾
– Aluminium and stainless housing, investment casting (optionally available)	IP 66/IP 68 (1 bar) NEMA 6P
Overvoltage category	III
Protection class	II

Approvals

Instruments with approvals can have different technical specifications depending on the version.

For that reason the associated approval documents of these instruments have to be carefully noted. They are part of the delivery or can be downloaded under www.vega.com via "VEGA Tools" and "Instrument search" as well as via "Downloads" and "Approvals".

¹⁰⁾ A suitable cable is the prerequisite for maintaining the protection rating.

10.2 Profibus PA

Instrument master file

The instrument master file (GSD) contains the characteristic data of the Profibus PA instrument. These data are, e.g. the permissible transmission rates as well as information on diagnostics values and the format of the measured value outputted by the PA instrument.

A bitmap file is also provided for the Profibus network planning tool. This file is installed automatically when the GSD file is integrated. The bitmap file is used for symbolic indication of the PA instrument in the configuration tool.

Ident number

Each Profibus instrument gets an unambiguous ident number (ID number) from the Profibus user organisation (PNO). This ID number is also included in the name of the GSD file. For VEGASON 61 the ID number is **0x0770(hex)** and the GSD file "**SN_0770.GSD**". As an option to this manufacturer-specific GSD file, PNO provides also a general so-called profile-specific GSD file. For VEGASON 61 you have to use the general GSD file "**PA139701.GSD**". If the general GSD file is used, the sensor must be set to the profile-specific ident number via the DTM software. By default, the sensor operates with the manufacturer-specific ID number.



Note:

When using the profile-specific GSD file, the PA-OUT value as well as the temperature value are transmitted to the PLC (see block diagram "Cyclical data traffic").

Cyclical data traffic

The master class 1 (e.g. PLC) cyclically reads out measured values from the sensor during operation. The below block diagram below shows which data can be accessed by the PLC.

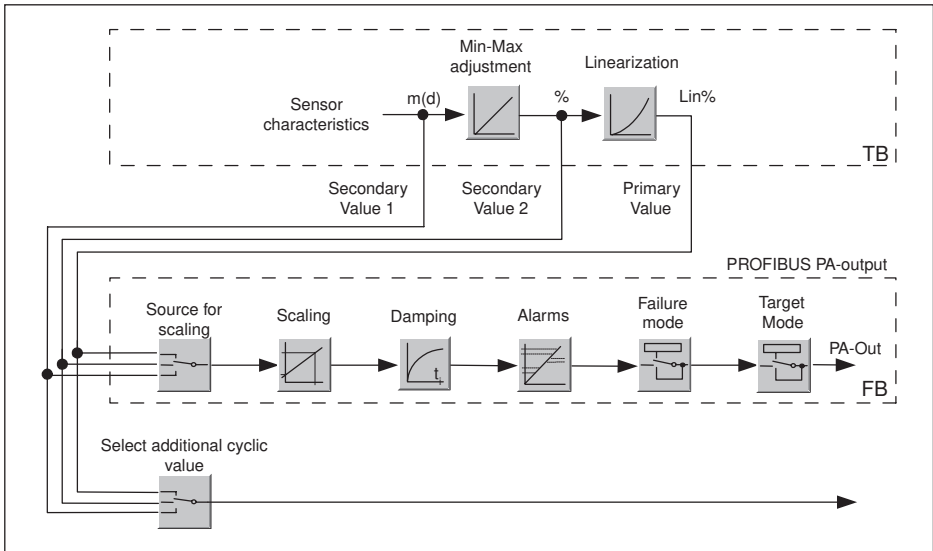


Fig. 30: VEGASON 61: Block diagram with AI (PA-OUT) value and additional cyclical value

TB Transducer Block

FB Function Block

Module of the PA sensors

For the cyclic data traffic, VEGASON 61 provides the following modules:

- AI (PA-OUT)
 - PA-OUT value of the FB1 after scaling
- Temperature
 - PA-OUT value of the FB2 after scaling
- Additional Cyclic Value
 - Additional cyclical value (depending on the source)
- Free Place
 - This module must be used if a value in the data telegram of the cyclical data traffic should not be used (e.g. replacement of temperature and Additional Cyclic Value)

A maximum of three modules can be active. By means of the configuration software of the Profibus master you can determine the configuration of the cyclical data telegram with these modules. The procedure depends on the respective configuration software.



Note:

The modules are available in two versions:

- Short for Profibus master supporting only one "Identifier Format" byte, e.g. Allen Bradley
- Long for Profibus master only supporting the "Identifier Format" byte, e.g. Siemens S7-300/400

Examples of telegram configuration

In the following you will see how the modules can be combined and how the appendant data telegram is structured.

Example 1 (standard setting) with distance value, temperature value and additional cyclical value:

- AI (PA-OUT)
- Temperature
- Additional Cyclic Value

Byte-No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Format	IEEE-754-Floating point value				Status	IEEE-754-Floating point value				Status	IEEE-754-Floating point value				Status
Value	PA-OUT (FB1)				Status (FB1)	Temperature (FB2)				Status (FB2)	Additional Cyclic Value				Status

Example 2 with distance value and temperature value without additional cyclic value:

- AI (PA-OUT)
- Temperature
- Free Place

Byte-No.	1	2	3	4	5	6	7	8	9	10
Format	IEEE-754-Floating point value				Status	IEEE-754-Floating point value				Status
Value	PA-OUT (FB1)				Status (FB1)	Temperature (FB2)				Status (FB2)

Example 3 with distance value and additional cyclical value without temperature value:

- AI (PA-OUT)
- Free Place
- Additional Cyclic Value

Telegram configuration:

Byte-No.	1	2	3	4	5	6	7	8	9	10
Format	IEEE-754-Floating point value				Status	IEEE-754-Floating point value				Status
Value	PA-OUT (FB1)				Status (FB1)	Additional Cyclic Value				Status

Data format of the output signal

Byte4	Byte3	Byte2	Byte1	Byte0
Status	Value (IEEE-754)			

Fig. 34: Data format of the output signal

The status byte corresponds to profile 3.0 "Profibus PA Profile for Process Control Devices" coded. The status "Measured value OK" is coded as 80 (hex) (Bit7 = 1, Bit6 ... 0 = 0).

The measured value is transferred as a 32 bit floating point number in the IEEE-754 format.

Byte n								Byte n+1								Byte n+2								Byte n+3							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
VZ	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰	2 ¹	2 ²	2 ³	2 ⁴	2 ⁵	2 ⁶	2 ⁷	2 ⁸	2 ⁹	2 ¹⁰	2 ¹¹	2 ¹²	2 ¹³	2 ¹⁴	2 ¹⁵	2 ¹⁶	2 ¹⁷	2 ¹⁸	2 ¹⁹	2 ²⁰	2 ²¹	2 ²²	2 ²³
Sign Bit	Exponent							Significant							Significant							Significant									

$$\text{Value} = (-1)^{VZ} \cdot 2^{(\text{Exponent} - 127)} \cdot (1 + \text{Significant})$$

Fig. 35: Data format of the measured value

Coding of the status byte associated with the PA output value

Status code	Description according to Profibus standard	Possible cause
0 x 00	bad - non-specific	Flash-Update active
0 x 04	bad - configuration error	<ul style="list-style-type: none"> – Adjustment error – Configuration error with PV-Scale (PV-Span too small) – Unit irregularity – Error in the linearization table
0 x 0C	bad - sensor failure	<ul style="list-style-type: none"> – Hardware error – Converter error – Leakage pulse error – Trigger error
0 x 10	bad - sensor failure	<ul style="list-style-type: none"> – Measured value generation error – Temperature measurement error
0 x 1f	bad - out of service constant	"Out of Service" mode switched on
0 x 44	uncertain - last unstable value	Failsafe replacement value (Failsafe-Mode = "Last value" and already valid measured value since switching on)
0 x 48	uncertain substitute set	<ul style="list-style-type: none"> – Switch on simulation – Failsafe replacement value (Failsafe-Mode = "Fsafe value")
0 x 4c	uncertain - initial value	Failsafe replacement value (Failsafe-Mode = "Last valid value" and no valid measured value since switching on)

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Status code	Description according to Profibus standard	Possible cause
0 x 51	uncertain - sensor; conversion not accurate - low limited	Sensor value < lower limit
0 x 52	uncertain - sensor; conversion not accurate - high limited	Sensor value > upper limit
0 x 80	good (non-cascade) - OK	OK
0 x 84	good (non-cascade) - active block alarm	Static revision (FB, TB) changed (10 sec. active, after the parameter of the static category has been written)
0 x 89	good (non-cascade) - active advisory alarm - low limited	Lo-Alarm
0 x 8a	good (non-cascade) - active advisory alarm - high limited	Hi-Alarm
0 x 8d	good (non-cascade) - active critical alarm - low limited	Lo-Lo-Alarm
0 x 8e	good (non-cascade) - active critical alarm - high limited	Hi-Hi-Alarm

10.3 Dimensions

Housing in protection IP 66/IP 68 (0.2 bar)

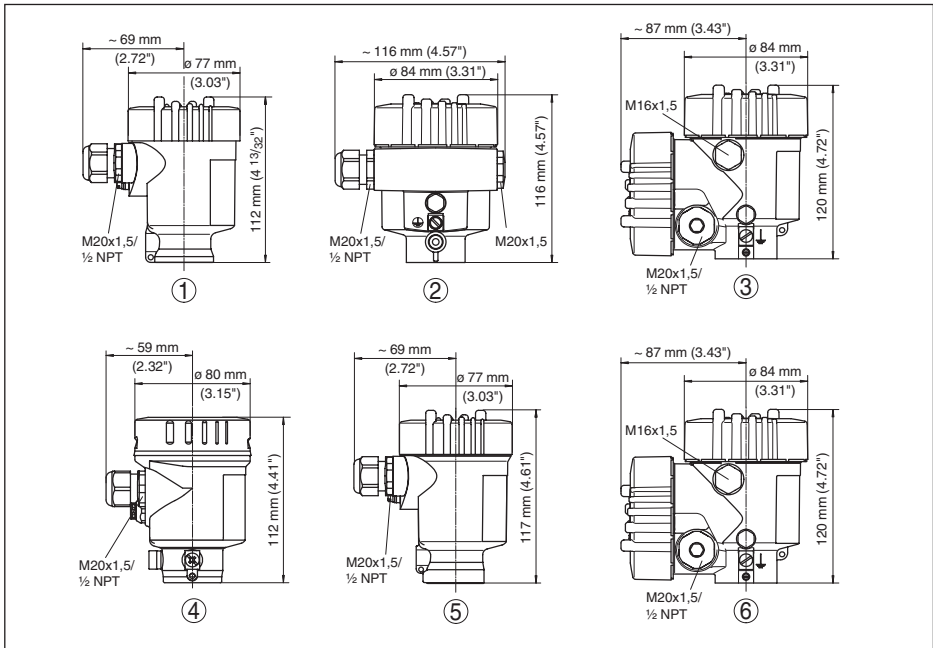


Fig. 36: Housing versions in protection IP 66/IP 68 (0.2 bar) - with integrated display and adjustment module the housing is 9 mm/0.35 in higher

- 1 Plastic housing
- 2 Aluminium housing
- 3 Aluminium double chamber housing
- 4 Stainless steel housing, electropolished
- 5 Stainless steel housing - precision casting
- 6 Stainless steel double chamber housing - precision casting

Housing in protection IP 66/IP 68 (1 bar)

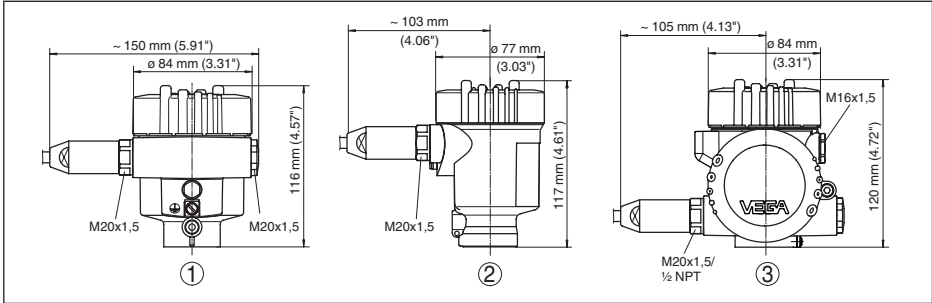


Fig. 37: Housing versions with protection rating IP 66/IP 68 (1 bar) - with integrated display and adjustment module the housing is 92mm/0.352in higher

- 1 Aluminium housing
- 2 Stainless steel housing - precision casting
- 2 Stainless steel double chamber housing - precision casting

VEGASON 61

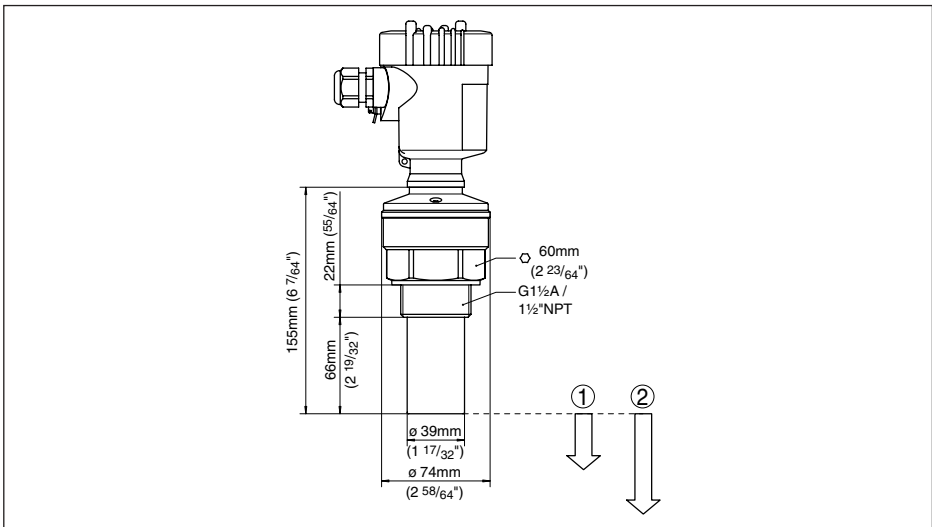


Fig. 38: VEGASON 61

- 1 Dead zone: 0.25 m (0.82 ft)
- 2 Measuring range: with liquids up to 5 m (16.4 ft), with solids up to 2 m (6.562 ft)

10.4 Industrial property rights

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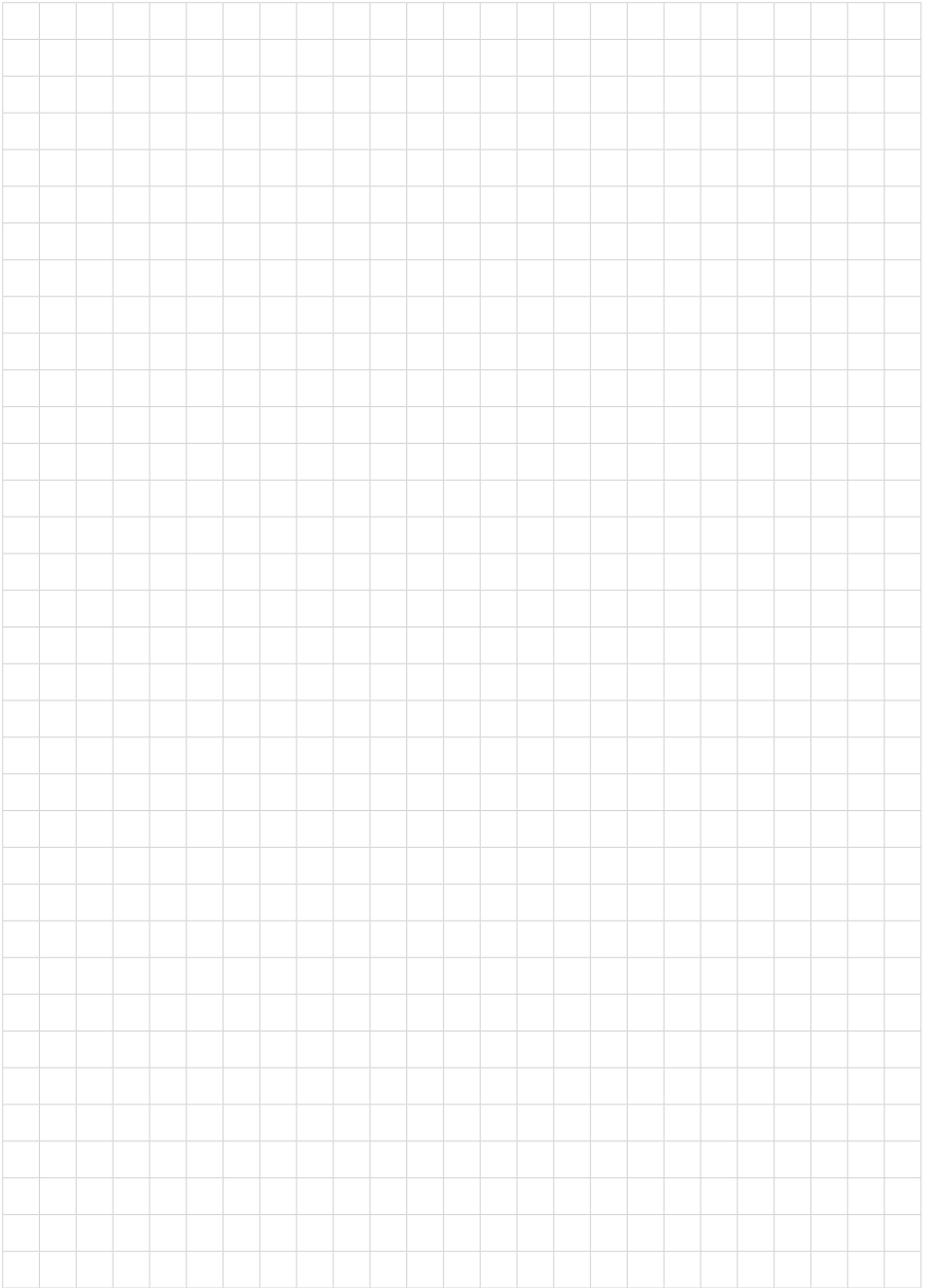
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