

Appendix G: Manual

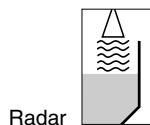
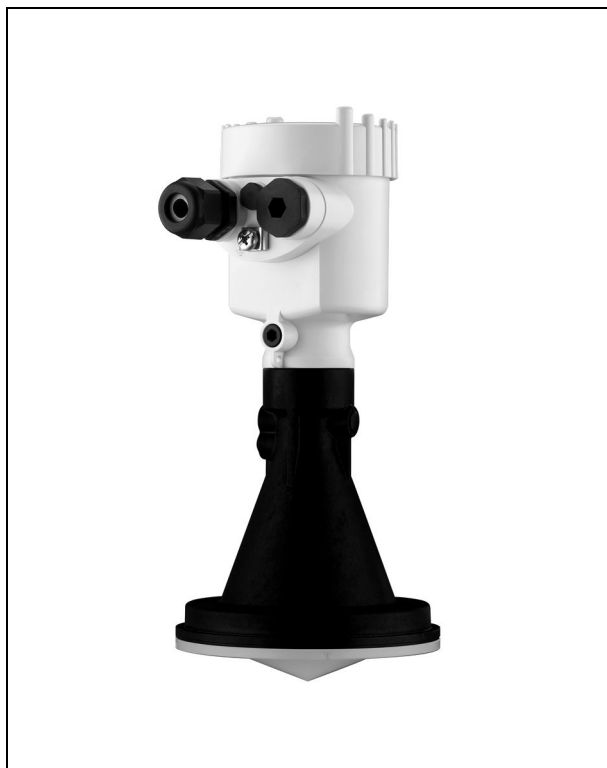
Please refer to the following pages.



Operating Instructions

VEGAPULS 67

4 ... 20 mA/HART



Radar

Content

1 About this document

1.1	Function	4
1.2	Target group	4
1.3	Symbolism used	4

2 For your safety

2.1	Authorised personnel	5
2.2	Appropriate use	5
2.3	Warning about misuse	5
2.4	General safety instructions	5
2.5	Safety approval markings and safety tips	6
2.6	CE conformity	6
2.7	Fulfilling of NAMUR recommendations	6
2.8	FCC/IC conformity (only for USA/Canada)	7
2.9	Safety instructions for Ex areas	8
2.10	Manufacturer declaration	8
2.11	Functional range of approved instruments	9
2.12	Environmental instructions	9

3 Product description

3.1	Configuration	10
3.2	Principle of operation	11
3.3	Operation	12
3.4	Packaging, transport and storage	12

4 Mounting

4.1	General instructions	14
4.2	Mounting preparation	15
4.3	Mounting instructions	18

5 Connecting to power supply

5.1	Preparing the connection	24
5.2	Connection steps - Instrument housing	25
5.3	Wiring plan, single chamber housing	26
5.4	Wiring plan, double chamber housing	28
5.5	Wiring plan - version IP 66/IP 68, 1 bar	30
5.6	Switch on phase	30

6 Set up with the indicating and adjustment module PLICSCOM

6.1	Short description	31
6.2	Insert indicating and adjustment module	31
6.3	Adjustment system	33

6.4	Setup procedure	34
6.5	Menu schematic	41
6.6	Saving the parameter adjustment data	43
7	Setup with PACTware™ and other adjustment programs	
7.1	Connect the PC via VEGACONNECT 3	44
7.2	Connect the PC via VEGACONNECT 4	46
7.3	Parameter adjustment with PACTware™	47
7.4	Parameter adjustment with AMS™ and PDM	48
7.5	Saving the parameter adjustment data	48
8	Maintenance and fault rectification	
8.1	Maintenance, cleaning	49
8.2	Remove interferences	49
8.3	Exchanging the electronics module.	51
8.4	Instrument repair	52
9	Dismounting	
9.1	Dismounting steps	53
9.2	Disposal	53
10	Supplement	
10.1	Technical data.	54
10.2	Dimensions.	61
10.3	Industrial property rights.	66
10.4	Trademark	66

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 VEGAPULS 67, we offer accessories and replacement parts. The associated documents are:

- 27720 - VEGADIS 61
- 30176 - Electronics module VEGAPULS series 60

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 personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbolism used



Information, tip, note

This symbol indicates helpful additional information.



Caution: If this warning is ignored, faults or malfunctions can result.

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

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



Ex applications

This symbol indicates special instructions for Ex applications.



List

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



Action

This arrow indicates a single action.



Sequence

Numbers set in front indicate successive steps in a procedure.

2 For your safety

2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorised by the plant operator.

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

2.2 Appropriate use

VEGAPULS 67 is a sensor for continuous level measurement.

You can find detailed information on the application range 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 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

This 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 as well as all prevailing safety regulations and accident prevention rules.

The emitting frequency of VEGAPULS 67 is in the K band range. The low transmitting power lies far below the internationally permitted limit values. When the instrument is used correctly, it presents no danger to human health.

The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for trouble-free operation of the instrument.

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

2.5 Safety approval markings and safety tips

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

2.6 CE conformity

VEGAPULS 67 is in CE conformity with EMC (89/336/EEG) and LVD (73/23/EEG).

Conformity has been judged according to the following standards:

- EMC:
 - Emission EN 61326: 1997 (class B)
 - Susceptibility EN 61326: 1997/A1:1998
- R & TTE directive: I-ETS 300-440 Expert Opinion No. 05-111723, Notified Body No. 0700
- LVD: EN 61010-1: 2001

2.7 Fulfilling of NAMUR recommendations

With respect to interference resistance and emitted interference, the NAMUR recommendation NE 21 is fulfilled.

With respect to compatibility, the NAMUR recommendation NE 53 is fulfilled. This applies also to the corresponding indicating and adjustment components. VEGA instruments are generally upward and downward compatible.

- Sensor software for DTM VEGAPULS 67 HART, PA or FF
- DTM VEGAPULS 67 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 VEGAPULS 67 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.

2.8 FCC/IC conformity (only for USA/Canada)

The VEGAPULS 67 must be configured pointing downward inside enclosed metal, concrete, or fibre-reinforced plastic vessels only. Any other use is prohibited.

Note about this manual: this manual is intended to be used internationally. There are figures and illustrations which depict the use of the device in open air and open-topped tank environments. These types of installations are not in compliance with FCC/IC approvals.

This VEGAPULS 67 sensor is FCC/IC approved with all of the antennas described in this operating instructions manual.

Modifications or changes to this device not expressly approved by VEGA could void the user's authority to operate this equipment.

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

- The device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the users will be required to correct the inference at their own expense.

2.9 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.

2.10 Manufacturer declaration

In conformity with DIN EN 60079-14/2004, para. 5.2.3, point c1, VEGAPULS 67 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 (24626)
- the applicable installation regulations

Max. increase of the surface temperature during operation:
27 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 97 °C (207 °F).

Measures to maintain 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 from electrostatic charges is to be expected. The antenna, the process fitting or the 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 lower part of the housing and 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.

2.11 Functional range of approved instruments

Instruments with specific approvals are partly supplied with an earlier hardware or software version. For approval-technical reasons, some functions for these instruments will be available only at a later date.

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

2.12 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 "*Packaging, transport and storage*"
- Chapter "*Disposal*"

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- VEGAPULS 67 radar sensor
- Mounting strap (option)
- Compression or adapter flange (optional)
- Documentation
 - this operating instructions manual
 - Operating instructions manual - 27835 "*Indicating and adjustment module PLICSCOM*" (optional)
 - Supplementary instructions manual - 31708 "*Heating for indicating and adjustment module*" (optional)
 - Supplementary instructions manual "*Plug connector for continuously measuring sensors*" (optional)
 - Ex-specific "*Safety instructions*" (with Ex-versions)
 - if necessary, further certificates

Components

VEGAPULS 67 consists of the following components:

- Process fitting with encapsulated antenna system
- Housing with electronics, optionally available with plug connector, optionally available with connection cable
- Housing cover, optionally available with indicating and adjustment module PLICSCOM

The components are available in different versions.

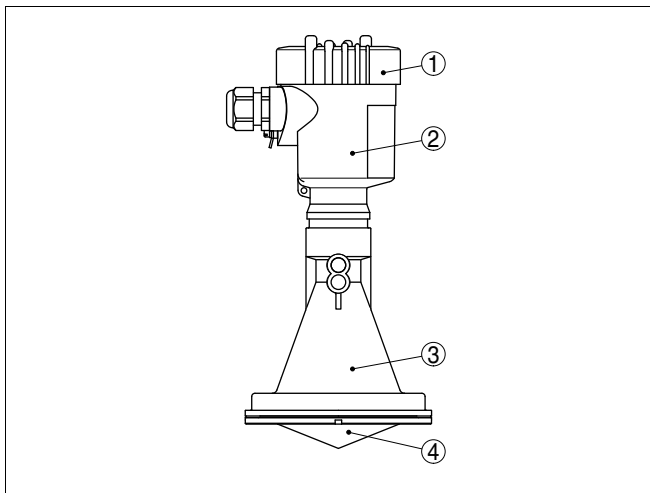


Fig. 1: VEGAPULS 67 - version with plastic housing
 1 Housing cover with integrated PLICSCOM (optional)
 2 Housing with electronics
 3 Process fitting with plastic horn antenna
 4 Antenna cover

3.2 Principle of operation

Application range

VEGAPULS 67 is a radar sensor in K-band technology for continuous level measurement in solids.

Functional principle

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

Voltage supply

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

The supply voltage range can differ depending on the instrument version.

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

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

The optional heating requires its own power supply. You can find detailed information in the supplementary instructions manual "*Heating for indicating and adjustment module*". This function is generally not available for approved instruments.

3.3 Operation

VEGAPULS 67 can be adjusted with different adjustment media:

- with indicating 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 manufacturer-specific adjustment programs AMST™ or PDM
- With a HART handheld

The entered parameters are generally saved in VEGAPULS 67, optionally also in the indicating and adjustment module or in PACTware™.

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 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.

Transport

Transport must be carried out under 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

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

**Storage and transport
temperature**

- 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 see "*Supplement - Technical data - Ambient conditions*"
- Relative humidity 20 ... 85 %

4 Mounting

4.1 General instructions

Mounting position

The VEGAPULS 67 must be mounted such that it is pointing downward inside enclosed metal, concrete, or fibre-reinforced plastic vessels only. Any other use is prohibited. 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 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.

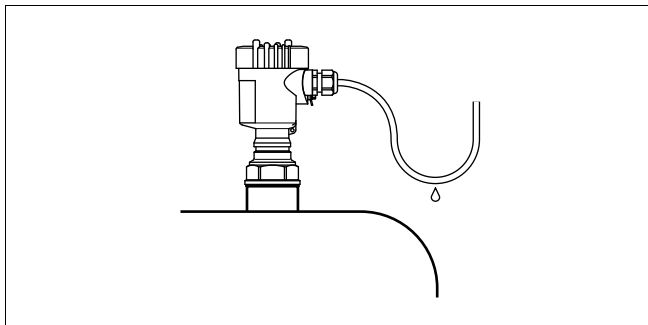


Fig. 2: Measures against moisture penetration

Measuring range

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

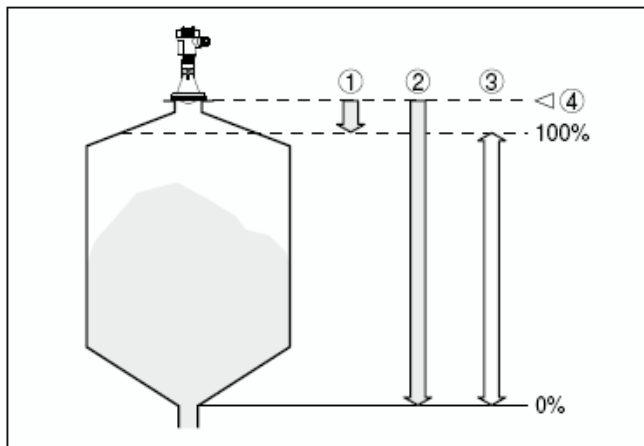


Fig. 3: Measuring range (operating range) and max. measuring distance

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

i

Information:

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

Materials, wetted parts

Make sure that the wetted parts of the instrument, 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 can find the specifications in chapter "Technical data".

4.2 Mounting preparation

VEGAPULS 67 can be mounted via a compression or adapter flange.

Compression or adapter flange

Direct mounting on a flange DN 80/ANSI 3" is possible with a compression flange. Mounting on flange DN 100/ANSI 4" and DN 150/ANSI 6" is possible with an optional adapter flange. You can find illustrations of this in chapter "Dimensions".

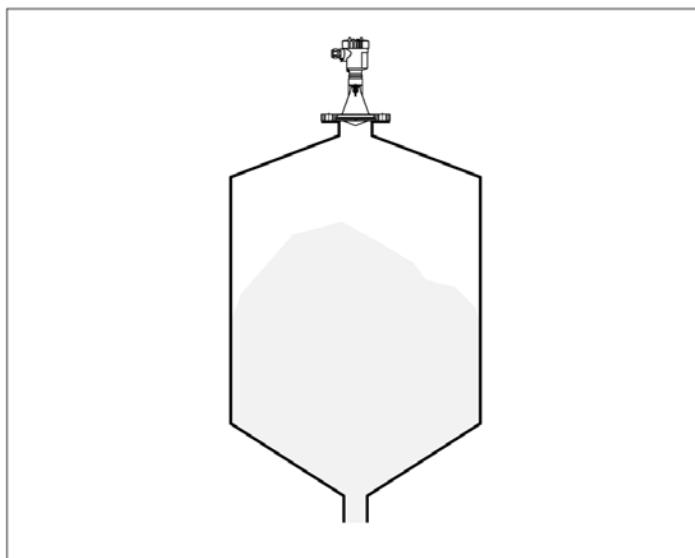


Fig. 7: VEGAPULS 67 - flange mounting

4.3 Mounting instructions

Mounting position

Mount VEGAPULS 67 at least 200 mm (7.874 in) away from the vessel wall.

If you cannot keep this distance you should carry out a false echo storage before setup. This applies mainly if buildup on the vessel wall is expected. In this case, we recommend repeating a false echo storage later with existing buildup.

Socket

A corresponding compression flange for DN 80 (ASME 3" or JIS 80) as well as a suitable adapter flange are available for mounting VEGAPULS 67.

With housing version plastic, Alu single chamber and stainless steel, the compression flange can be connected directly to the housing. A later mounting is not possible with the Alu double chamber housing, the mounting type must be determined when ordering.

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

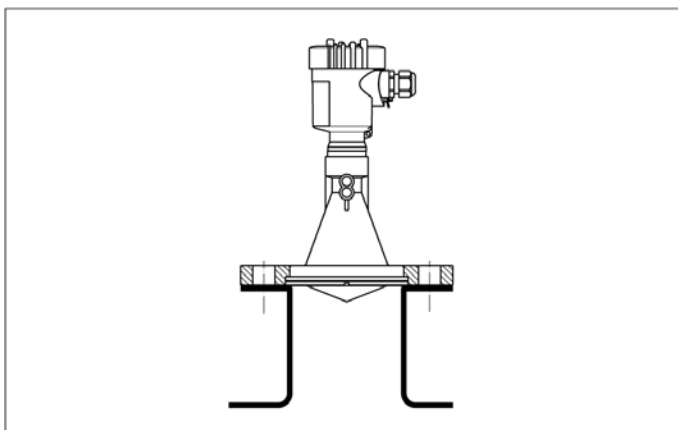
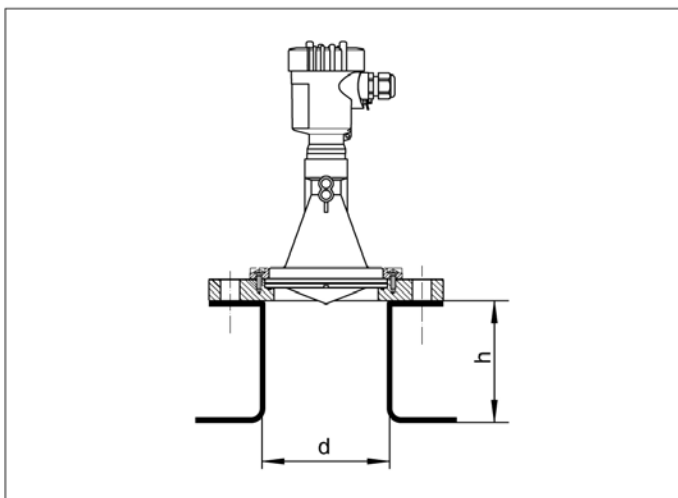


Fig. 8: Recommended socket mounting

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



The below charts specify the max. socket piece length h depending on the diameter d .

Socket diameter d	Socket length h
80 mm	300 mm
100 mm	400 mm

Socket diameter d	Socket length h
150 mm	500 mm

Socket diameter d	Socket length h
3"	11.8 in
4"	15.8 in
6"	19.7 in

**Tip:**

In new plants, it is useful to incline the vessel socket in the direction of emptying. False reflections from the vessel wall are thus reduced and measurement all the way down to the conical outlet is possible.

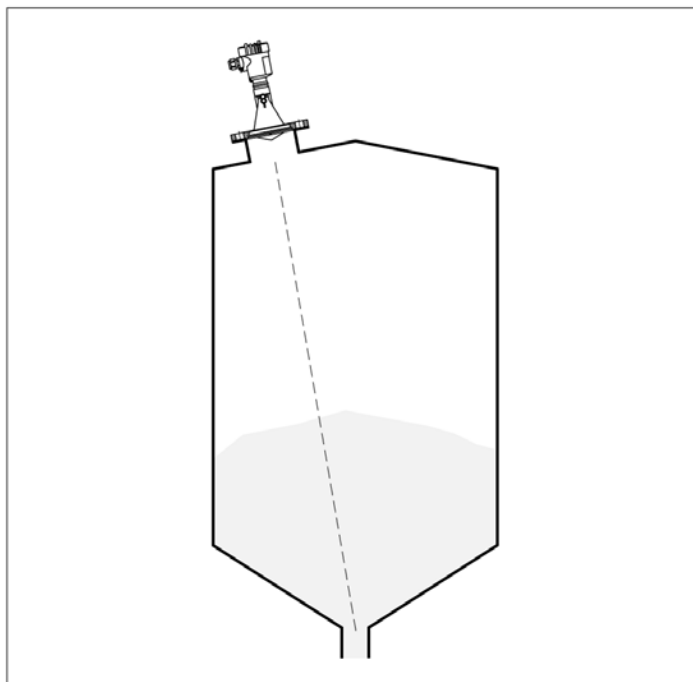


Fig. 10: Alignment in silos

Mounting in multiple channel silo

The silo walls of multiple chamber silos are often made of profile walls, such as e.g. profile sheetings, to ensure the required stability. If the radar sensor is mounted very close to a

32938-EN-080610

heavily structured vessel wall, substantial false reflections can be caused. Hence the sensor should be mounted at a large distance from the separating wall.

The optimum mounting position is on the outer wall of the silo with the sensor oriented towards the outlet in the silo center.

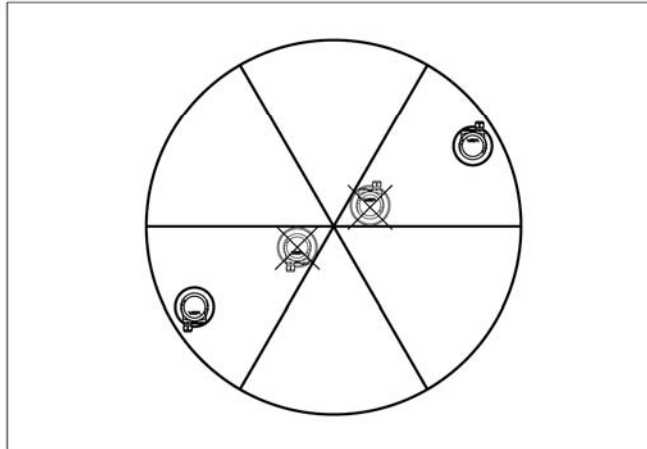


Fig. 11: Installation and orientation in multiple chamber silos

Vessel installations

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

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 baffles above the installations scatter the radar signals and prevent direct interfering reflections.

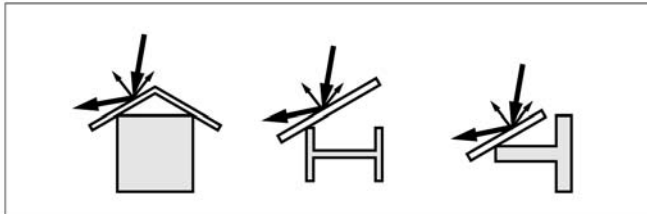


Fig. 13: Cover smooth profiles with deflectors

Air purging

An air purging is useful for avoiding buildup, particularly when there is strong condensation. Since VEGAPULS 67 has no direct purging air connection, a separate purging air connection must be provided in the mounting socket. Due to the inclination of this connection towards the top, the cleaning of the antenna cover is particularly effective.

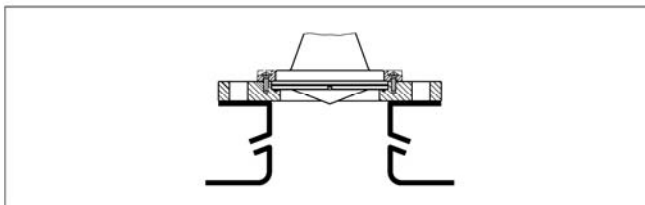


Fig. 14: Purging air connection

Material heaps

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

The sensors do not influence each other.

**Information:**

Keep in mind that for these applications, the sensors are designed for relatively slow level changes. If the sensor is used on a movable boom, the max. measuring rate must be observed (see chapter "Technical data").

5 Connecting to power supply

5.1 Preparing the connection

Note safety instructions Always keep in mind 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 B63-48 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 carried on the same two-wire cable. The voltage supply range can differ depending on the instrument version.

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

Provide a reliable separation between the supply circuit and the mains circuits according to DIN VDE 0106 part 101. The VEGA power supply units VEGATRENN 149A Ex, VEGAS-TAB 690 as well as all VEGAMETs meet this requirement.

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 fault message)
- Influence of additional instruments in the circuit (see load values in chapter "*Technical data*")

Selecting connection cable

The instrument is connected with standard two-wire cable without screen. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

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 other diameter or cross-section, you have to exchange the seal or use a suitable cable gland.

We generally recommend the use of screened cable for HART multidrop mode.

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

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 through the cable gland into the sensor

- 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. 16: 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 with potential equalisation
 - 11 Tighten the compression nut of the cable entry. The seal ring must completely encircle the cable
 - 12 Screw the housing cover 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

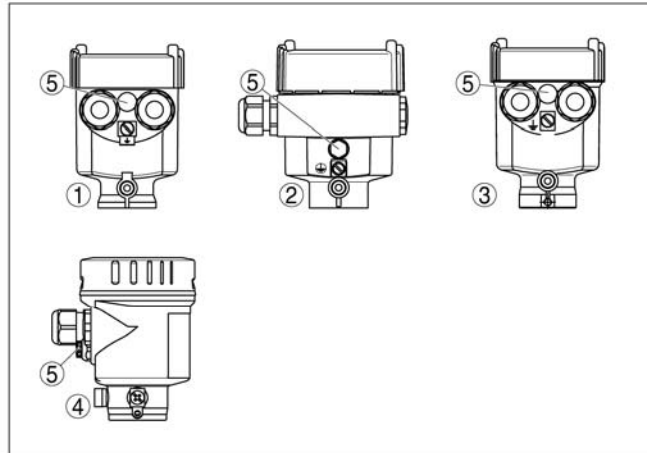


Fig. 17: Material versions, single chamber housing

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

Electronics and connection compartment

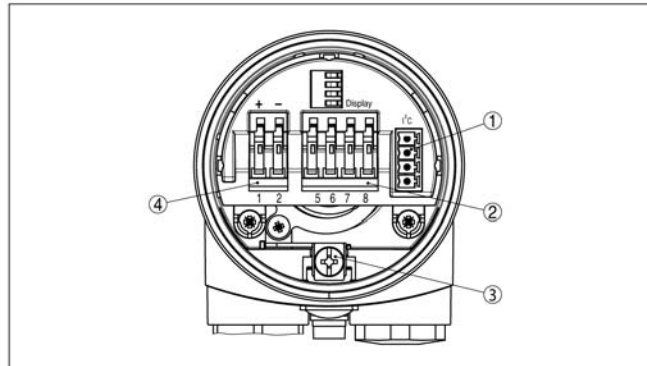


Fig. 18: Electronics and connection compartment, single chamber housing

- 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

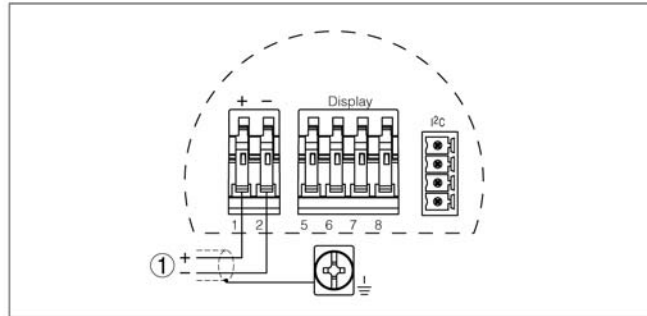
Wiring plan

Fig. 19: Wiring plan, single chamber housing
1 Voltage supply/Signal output

5.4 Wiring plan, double chamber housing

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

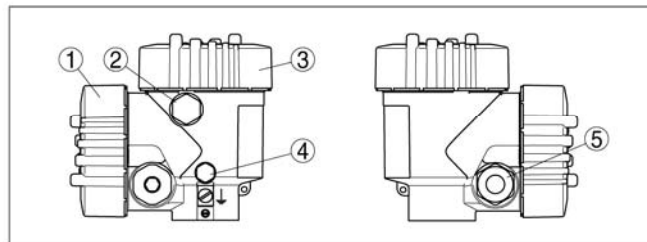
Housing overview

Fig. 20: Double chamber housing
1 Housing cover, connection compartment
2 Blind stopper 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

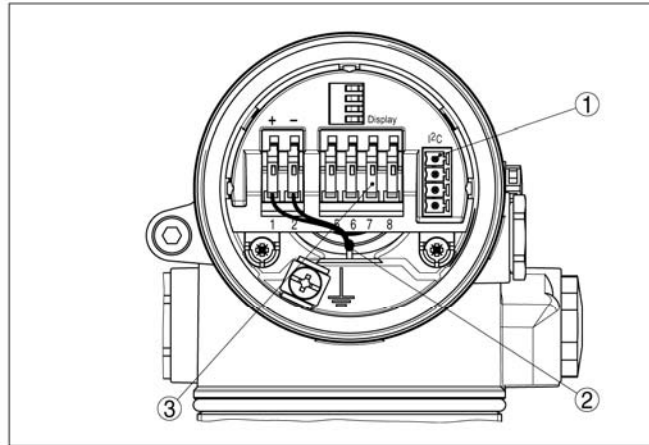


Fig. 21: Electronics compartment, double chamber housing
 1 Plug connector for VEGACONNECT (I²C interface)
 2 Internal connection cable to the connection compartment
 3 Terminals for VEGADIS 61

Connection compartment

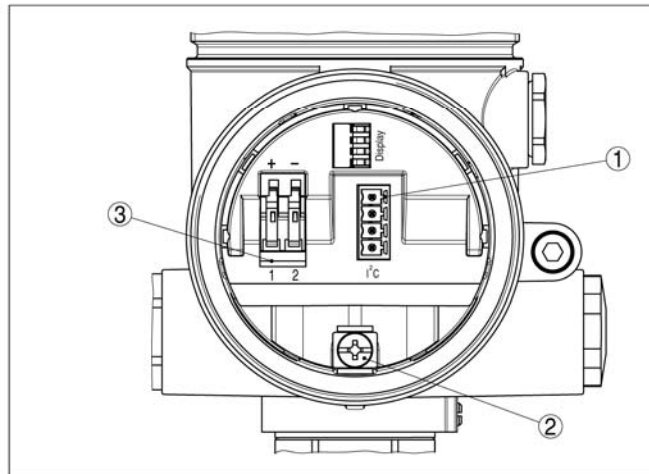


Fig. 22: Connection compartment, double chamber housing
 1 Plug connector for VEGACONNECT (I²C interface)
 2 Ground terminal for connection of the cable screen
 3 Spring-loaded terminals for voltage supply

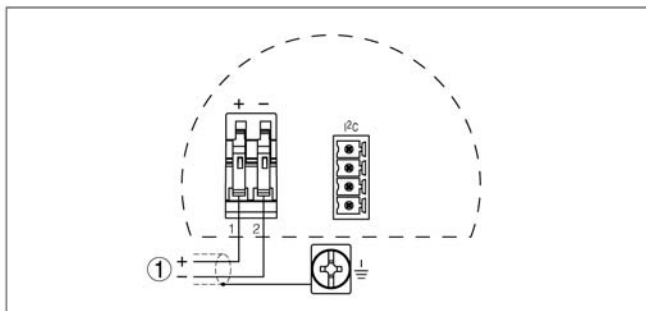
Wiring plan

Fig. 23: Wiring plan, double chamber housing
1 Voltage supply/Signal output

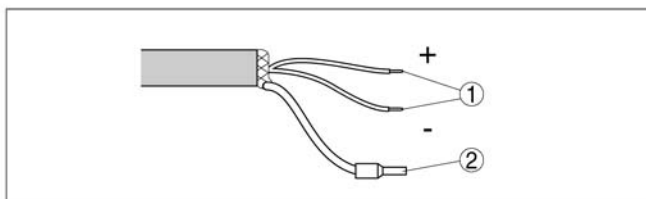
5.5 Wiring plan - version IP 66/IP 68, 1 bar**Wire assignment, connection cable**

Fig. 24: Wire assignment, connection cable
1 brown (+) and blue (-) to power supply or to the processing system
2 Shielding

5.6 Switch on phase**Switch on phase**

After connecting VEGAPULS 67 to power supply or after a voltage recurrence, the instrument carries out a self-check for approx. 30 seconds:

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

Then the corresponding current is outputted to the cable (the value corresponds to the actual level as well as the settings already carried out, e.g. factory setting).

6 Set up with the indicating and adjustment module PLICSCOM

6.1 Short description

Function/Configuration

The indicating 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 indicating and adjustment unit VEGADIS 61

From a hardware version ...- 01 or higher of the indicating and adjustment module as well as 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 indicating and adjustment module or the sensor electronics.



Note:

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

6.2 Insert indicating and adjustment module

Mount/Dismount indicating and adjustment module

The indicating 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 indicating and adjustment module in the desired position on the electronics (you can choose any one of four different positions - each displaced by 90°)
- 3 Press the indicating and adjustment module onto the electronics and turn it to the right until it snaps in.
- 4 Screw housing cover with inspection window tightly back on

Removal is carried out in reverse order.

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



Fig. 25: Installation of the indicating and adjustment module



Note:

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

6.3 Adjustment system

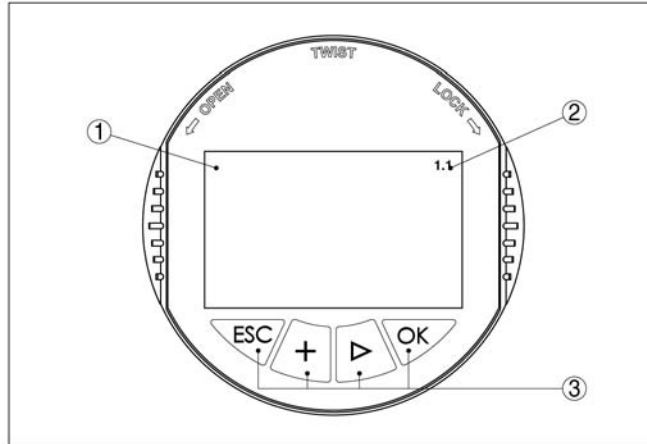


Fig. 26: Indicating and adjustment elements
 1 LC display
 2 Indication of the menu item number
 3 Adjustment keys

Key functions

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

Adjustment system

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

6.4 Setup procedure

Address setting HART-Multidrop

In HART-Multidrop mode (several sensors on one input) the address must be set before continuing with the parameter adjustment. You will find a detailed description in the operating instructions manual "*Indicating and adjustment module*" or in the online help of PACTware™ or DTM.



Parameter adjustment

As VEGAPULS 67 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 seal surface of the thread or flange. With these settings, the real level is calculated. Furthermore the operating range of the sensor is limited from maximum to the required 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.

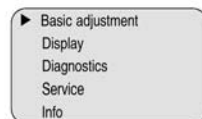
In the main menu item "*Basic adjustment*", the individual submenu items should be selected one after the other and provided with the correct parameter values.

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

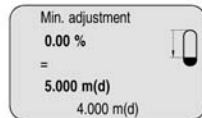
Carrying out min. adjustment

Proceed as follows:

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



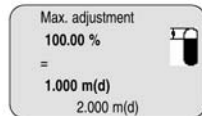
- 2 Select the menu item "Basic adjustment" with **[->]** and confirm with **[OK]**. Now the menu item "Min. adjustment" is displayed.



- 3 Prepare the % 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 **[->]**.

Carrying 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 solids, these are dust generation, material cones and additional echoes caused by the vessel wall. Due to the medium selection, the sensor is adapted in an optimum way to the product and the accuracy, particularly for products with bad reflective properties, is increased considerably.



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

In liquids, fluctuating surfaces and foam generation are further interfering factors. To adapt the sensor to the different conditions, a general selection is made in this menu item, i.e. "Solid" or "Liquid".

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

Vessel form

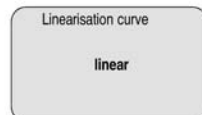
Apart from the medium, the vessel shape can also influence the measurement. To adapt the sensor to these measuring conditions, this menu item offers different options depending on whether liquid or solid is selected. With "Solid" these are "Silo" or "Bunker", with "Liquid", "Storage tank", "Stilling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



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

Linearisation curve

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



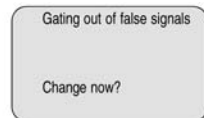
Enter the requested parameter via the appropriate keys, save your settings and jump to the next menu item with the [->] key.

Gating out of false signals

False reflections by vessel installation can impair the measurement as described in chapter "*Mounting*". A false echo storage detects and marks these false echoes, so that they are no longer taken into account for the level measurement. To detect these interfering reflections over the complete measuring range, the gating out of false echoes should be carried out with empty vessel.

**Information:**

However, the measuring signals are not damped by the product in completely empty, closed metal vessels. Due to this, considerable multiple reflections can be caused by which the noise level can increase. In such vessels, it is recommended to carry out the gating out of false echoes with part filling.



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.

Extended setting/Quick level change

The menu item "*Extended setting*" offers the possibility to optimise VEGAPULS 67 for applications in which the level changes very quickly. For this reason, select the function "*Quick level change > 1 m/min.*".

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 indicating and adjustment module. A description 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
- Inner diameter of the standpipe (with standpipe versions)
- Vessel form
- Damping
- Linearisation curve
- Sensor-TAG
- Displayed value
- Display unit
- Scaling
- Current output
- Unit of measurement
- Language

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

- HART mode
- PIN
- SIL

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):¹⁾

Function	Reset value
Max. adjustment	0 m(d)
Min. adjustment	15 m(d) (VEGAPULS 67) 70 m(d) (VEGAPULS 68)
Medium	Solid
Vessel form	not known
Damping	0 s
Linearisation	linear
Sensor-TAG	Sensor
Displayed value	Distance
Add. Adjustment	None
Current output - characteristics	4 ... 20 mA
Current output - max. current	20 mA
Current output - min. current	4 mA
Current output - failure	< 3.6 mA
Unit of measurement	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
SIL	no reset
HART mode	no reset

Factory setting

Like basic adjustment, furthermore special parameters are reset to default values.²⁾

Pointer

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

¹⁾ Sensor-specific basic adjustment.

²⁾ Special parameters are parameters which are set customer-specifically on the service level with the adjustment software PACTware™.

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 "*Indicating and adjustment module*".