# Operating Instructions

**Radar sensor for continuous level measurement of liquids**

## VEGAPULS 63

Foundation Fieldbus

Document ID: 36514

# Contents

**Safety instructions for Ex areas**

Take note of the Ex specific safety instructions for Ex applications. These instructions are attached as documents to each instrument with Ex approval and are part of the operating instructions.

Editing status: 2020-04-21

# 1 About this document

## 1.1 Function

This instruction provides all the information you need for mounting, connection and setup as well as important instructions for mainte-nance, fault rectification, the exchange of parts and the safety of the user. 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 must be made available to the qualified personnel and implemented.

## 1.3 Symbols used

**Document ID**
This symbol on the front page of this instruction refers to the Docu-ment ID. By entering the Document ID on www.vega.com you will reach the document download.

**Information, note, tip:** This symbol indicates helpful additional infor-mation and tips for successful work.

**Note:** This symbol indicates notes to prevent failures, malfunctions, damage to devices or plants.

**Caution:** Non-observance of the information marked with this symbol may result in personal injury.

**Warning:** Non-observance of the information marked with this symbol may result in serious or fatal personal injury.

**Danger:** Non-observance of the information marked with this symbol results in serious or fatal personal injury.

**Ex applications**
This symbol indicates special instructions for Ex applications.

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

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

**Battery disposal**
This symbol indicates special information about the disposal of bat-teries and accumulators.

# 2 For your safety

## 2.1 Authorised personnel

All operations described in this documentation must be carried out only by trained, qualified 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

VEGAPULS 63 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.

## 2.3 Warning about incorrect use

Inappropriate or incorrect use of this product can give rise to application-specific hazards, e.g. vessel overfill through incorrect mounting or adjustment. Damage to property and persons or environmental contamination can result. Also, the protective characteristics of the instrument can be impaired.

## 2.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and directives. 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. When measuring aggressive or corrosive media that can cause a dangerous situation if the instrument malfunctions, the operator has to implement suitable measures to make sure the instrument is functioning properly.

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. For safety reasons, only the accessory specified by the manufacturer must be used.

To avoid any danger, the safety approval markings and safety tips on the device must also be observed.

The low transmitting power of the radar sensor is far below the internationally approved limits. No health impairments are to be expected with intended use. The band range of the transmission frequency can be found in chapter "*Technical data*".

## 2.5 EU conformity

The device fulfils the legal requirements of the applicable EU direc-
tives. By affixing the CE marking, we confirm the conformity of the
instrument with these directives.

The EU conformity declaration can be found on our homepage.

**Electromagnetic compatibility**
Instruments in four-wire or Ex-d-ia version are designed for use in an
industrial environment. Nevertheless, electromagnetic interference
from electrical conductors and radiated emissions must be taken into
account, as is usual with class A instruments according to EN 61326-
1. If the instrument is used in a different environment, the electromag-
netic compatibility to other instruments must be ensured by suitable
measures.

## 2.6 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 fulfils the requirements of the following NAMUR recom-
mendations:

- NE 21 – Electromagnetic compatibility of equipment
- NE 53 – Compatibility of field devices and display/adjustment
  components
- NE 107 – Self-monitoring and diagnosis of field devices

For further information see www.namur.de.

## 2.7 Radio license for Europe

The instrument was tested according to the latest issue of the follow-
ing harmonized standards:

- EN 302372 - Tank Level Probing Radar

It is hence approved for use inside closed vessels in countries of the
EU.

Use is also approved in EFTA countries, provided the respective
standards have been implemented.

For operation inside of closed vessels, points a to f in annex E of
EN 302372 must be fulfilled.

## 2.8 Radio license for USA

This approval is only valid for USA. Hence the following text is only
available in the English language.

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

- This device may not cause interference, and
- This device must accept any interference, including interference
  that may cause undesired operation of the device

This device is approved for unrestricted use only inside closed, stationary vessels made of metal, concrete and reinforced fiberglass.

For operation outside of closed vessels, the following conditions must be fulfilled:

● This device shall be installed and maintained to ensure a vertically downward orientation of the transmit antenna's main beam. Furthermore, the use of any mechanism that does not allow the main beam of the transmitter to be mounted vertically downward is prohibited.
● Operation of the instrument with hygienically encapsulated horn antenna ø 48 mm is only permitted within closed vessels.
● This device shall be installed only at fixed locations. The LPR device shall not operate while being moved or while inside a moving container.

● Hand-held applications are prohibited.
● Marketing to residential consumers is prohibited.

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

## 2.9    Radio license for Canada

This approval is only valid for Canada. Hence the following texts are only available in the English/French language.

This device complies with Industry Canada's license-exempt RSS standards. Operation is subject to the following conditions:

● This device may not cause interference, and
● This device must accept any interference, including interference that may cause undesired operation of the device

This device has been approved for both closed containers and open-air environments with the following limitations:

● Closed Containers: For installations utilizing a tilt during installation: This device is limited to installation in a completely enclosed container made of metal, concrete or reinforced fiberglass to prevent RF emissions, which can otherwise interfere with aeronautical navigation, the maximum approved tilt angle is 10°.
● Open Air Environment: For operation outside of closed vessels, the following condition must be fulfilled: This device shall be installed and maintained to ensure a vertically downward orientation of the transmit antenna's main beam. Furthermore, the use of any mechanism that does not allow the main beam of the transmitter to be mounted vertically downward is prohibited.
● Operation of the instrument with hygienically encapsulated horn antenna ø 48 mm is only permitted within closed vessels.

The installation of the LPR/TLPR device shall be done by trained installers, in strict compliance with the manufacture's instructions.

This device shall be installed only at fixed locations. The LPR device shall not operate while being moved or while inside a moving container.

Hand-held applications are prohibited.

VEGA

Marketing to residential consumers is prohibited.

The use of this device is on a "no-interference, no-protection" basis. That ist, the user shall accept operatings of high-powered radaar in the same frequency band which may interfere with or damage this device.

However, devices found to interfere with primary licensing operations will be required to be removed at the user's expense.

The installer/user of this device shall ensure that it is at least 10 km from the Dominion Astrophysical Radio Observatory (DRAO) near Penticton, British Columbia. The coordinates of the DRAO are latitude 49°19′15″ N and longitude 119°37′12″W. For devices not meeting this 10 km separation (e.g., those in the Okanagan Valley, British Columbia,) the installer/user must coordinate with, and obtain the written concurrence of, the Director of the DRAO before the equipment can be installed or operated. The Director of the DRAO may be contacted at 250-497-2300 (tel.)or 250-497-2355 (fax). (Alternatively, the Manager, Regulatory Standards, Industry Canada, may be contacted.)

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux conditions suivantes :

● L'appareil ne doit pas produire de brouillage; et
● L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Cet appareil est homologué pour une utilisation dans les cuves fermées et les environnements ouverts avec les restrictions suivantes :

● Cuves fermées : Pour les installations impliquant une inclinaison lors de l'installation : cet appareil ne doit être installé que dans une cuve totalement fermée et en métal, en béton ou en matière plastiqe renforcée de fibres de verre, pour empêcher les émissions RF susceptibles d'interférer avec la navigation aéronautique. L'angle d'inclinaison maximum autorisé est de 10°.
● Environnement ouvert : Pour l'utilisation hors des cuves fermées, la condition suivante doit être remplie : L'appareil doit être installé et entretenu de manière à garantir une orientation verticale vers le bas du faisceau principal de l'antenne émettrice. De plus, l'utilisation de tout mécanisme ne permettant pas l'orientation verticale vers le bas du faisceau principal de l'émetteur est interdite
● Il est uniquement autorisé d'exploiter l'appareil avec hygiénic capsulé antenne cône ø 48 mm dans des boîtiers fermés.

L'installation d'un dispositif LPR ou TLPR doit être effectuée par des installateurs qualifiés, en pleine conformité avec les instructions du fabricant.

Cet appareil ne doit être installé qu'à des emplacements fixes. L'appareil LPR ne doit pas être utilisé pendant qu'il est en train d'être déplacé ou se trouve dans un conteneur en mouvement.

Les applications portables sont interdites.

La vente à des particuliers est interdite

36514-EN-200427

VEGAPULS 63 • Foundation Fieldbus

Ce dispositif ne peut être exploité qu'en régime de non-brouillage et de non-protection, c'est-à-dire que l'utilisateur doit accepter que des radars de haute puissance de la même bande de fréquences puissent brouiller ce dispositif ou même l'endommager. D'autre part, les capteurs de niveau qui perturbent une exploitation autorisée par licence de fonctionnement principal doivent être enlevés aux frais de leur utilisateur.

La personne qui installe/utilise ce capteur de niveau doit s'assurer qu'il se trouve à au moins 10 km de l'Observatoire fédéral de radio-astrophysique (OFR) de Penticton en Colombie-Britannique. Les coordonnées de l'OFR sont : latitude N 49° 19′ 15″, longitude O 119° 37′ 12″. La personne qui installe/utilise un dispositif ne pouvant respecter cette distance de 10 km (p. ex. dans la vallée de l'Okanagan [Colombie-Britannique]) doit se concerter avec le directeur de l'OFR afin d'obtenir de sa part une autorisation écrite avant que l'équipement ne puisse être installé ou mis en marche. Le directeur de l'OFR peut être contacté au 250-497-2300 (tél.) ou au 250-497-2355 (fax). (Le Directeur des Normes réglementaires d'Industrie Canada peut également être contacté).

## 2.10 Installation and operation in the USA and Canada

This information is only valid for USA and Canada. Hence the following text is only available in the English language.

Installations in the US shall comply with the relevant requirements of the National Electrical Code (ANSI/NFPA 70).

Installations in Canada shall comply with the relevant requirements of the Canadian Electrical Code.

## 2.11 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 63 radar sensor
- Disc springs (flange version with encapsulated antenna system)[1]
- Optional accessory

The further scope of delivery encompasses:

- Documentation
  - Quick setup guide VEGAPULS 63
  - Instructions for optional instrument features
  - Ex-specific "*Safety instructions*" (with Ex versions)
  - If necessary, further certificates

**Information:**
Optional instrument features are also described in this operating instructions manual. The respective scope of delivery results from the order specification.

**Scope of this operating instructions**

This operating instructions manual applies to the following instrument versions:

- Hardware from 2.1.1
- Software from 4.5.2

**Type label**

The type label contains the most important data for identification and use of the instrument:

---

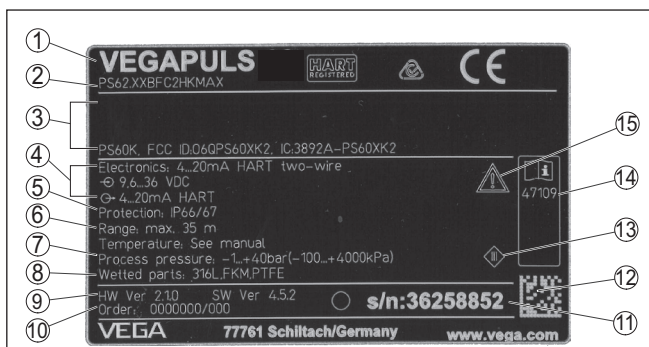[1] Use see chapter "Mounting instructions, sealing to the process"

*Fig. 1: Layout of the type label (example)*

*1 Instrument type*
*2 Product code*
*3 Approvals*
*4 Power supply and signal output, electronics*
*5 Protection rating*
*6 Measuring range*
*7 Process and ambient temperature, process pressure*
*8 Material wetted parts*
*9 Hardware and software version*
*10 Order number*
*11 Serial number of the instrument*
*12 Data matrix code for VEGA Tools app*
*13 Symbol of the device protection class*
*14 ID numbers, instrument documentation*
*15 Reminder to observe the instrument documentation*

**Serial number - Instrument search**

The type label contains the serial number of the instrument. With it you can find the following instrument data on our homepage:

● Product code (HTML)
● Delivery date (HTML)
● Order-specific instrument features (HTML)
● Operating instructions and quick setup guide at the time of shipment (PDF)
● Order-specific sensor data for an electronics exchange (XML)
● Test certificate (PDF) - optional

Move to "www.vega.com" and enter in the search field the serial number of your instrument.

Alternatively, you can access the data via your smartphone:

● Download the VEGA Tools app from the "*Apple App Store*" or the "*Google Play Store*"
● Scan the DataMatrix code on the type label of the instrument or
● Enter the serial number manually in the app

## 3.2 Principle of operation

**Application area**

The VEGAPULS 63 is a radar sensor for continuous level measurement of aggressive liquids or with hygienic requirements. It is suitable

for applications in storage tanks, process vessels, dosing vessels and reactors.

The standard electronics enables the use of instruments in products with an $\varepsilon_r$ value ≥1.8. The electronics version with increased sensitivity also enables use of the instrument in applications with very poor reflective properties or products with an $\varepsilon_r$ value ≥1.5. The values that can actually be reached depend on the measuring conditions and the antenna system i.e. the standpipe or bypass tube.

**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 transit 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.

## 3.3 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 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**

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:

● 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**

● Storage and transport temperature see chapter "*Supplement - Technical data - Ambient conditions*"
● Relative humidity 20 … 85 %

**Lifting and carrying**

With instrument weights of more than 18 kg (39.68 lbs) suitable and approved equipment must be used for lifting and carrying.

## 3.4 Accessories

The instructions for the listed accessories can be found in the download area on our homepage.

**PLICSCOM**

The display and adjustment module is used for measured value indication, adjustment and diagnosis.

The integrated Bluetooth module (optional) enables wireless adjustment via standard adjustment devices.

**VEGACONNECT**

The interface adapter VEGACONNECT enables the connection of communication-capable instruments to the USB interface of a PC.

**VEGADIS 81**

The VEGADIS 81 is an external display and adjustment unit for VEGA plics® sensors.

**VEGADIS adapter**

The VEGADIS adapter is an accessory part for sensors with double chamber housings. It enables the connection of VEGADIS 81 to the sensor housing via an M12 x 1 plug.

**Overvoltage protection**

The overvoltage arrester B81-35 is used instead of the terminals in the single or double chamber housing.

**Protective cover**

The protective cover protects the sensor housing against soiling and intense heat from solar radiation.

**Flanges**

Screwed flanges are available in different versions according to the following standards: DIN 2501, EN 1092-1, BS 10, ASME B 16.5, JIS B 2210-1984, GOST 12821-80.

# 4 Mounting

## 4.1 General instructions

**Screwing in**

Devices with threaded fitting are screwed into the process fitting with a suitable wrench via the hexagon.

See chapter "*Dimensions*" for wrench size.

⚠ **Warning:**
The housing or the electrical connection may not be used for screwing in! Depending on the device version, tightening can cause damage, e. g. to the rotation mechanism of the housing.

**Protection against moisture**

Protect your instrument against moisture ingress through the following measures:

- Use a suitable connection cable (see chapter "*Connecting to power supply*")
- Tighten the cable gland or plug connector
- Lead the connection cable downward in front of the cable entry or plug connector

This applies mainly to outdoor installations, in areas where high humidity is expected (e.g. through cleaning processes) and on cooled or heated vessels.

⚠ **Note:**
Make sure that the degree of contamination specified in chapter "*Technical data*" meets the existing ambient conditions.

⚠ **Note:**
Make sure that during installation or maintenance no moisture or dirt can get inside the instrument.

To maintain the housing protection, make sure that the housing lid is closed during operation and locked, if necessary.

**Process conditions**

⚠ **Note:**
For safety reasons, the instrument must only be operated within the permissible process conditions. You can find detailed information on the process conditions in chapter "*Technical data*" of the operating instructions or on the type label.

Hence make sure before mounting that all parts of the instrument exposed to the process are suitable for the existing process conditions.

These are mainly:

- Active measuring component
- Process fitting
- Process seal

Process conditions in particular are:

- Process pressure
- Process temperature
- Chemical properties of the medium
- Abrasion and mechanical influences

## 4.2 Mounting instructions

**Polarisation**

The emitted radar impulses of the radar sensor are electromagnetic waves. The polarisation is the direction of the electrical wave component. By turning the instrument in the connection flange or mounting boss, the polarisation can be used to reduce the effects of false echoes.

The position of the polarisation is marked on the process fitting of the instrument.
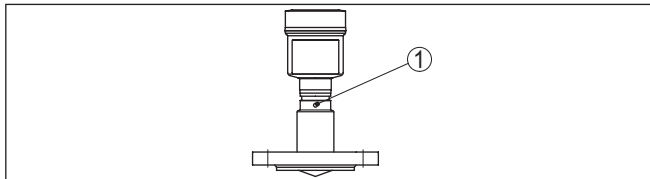


*Fig. 2: Position of the polarisation*

*1   Marking hole*

**Installation position**

When mounting the VEGAPULS 63, 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*").

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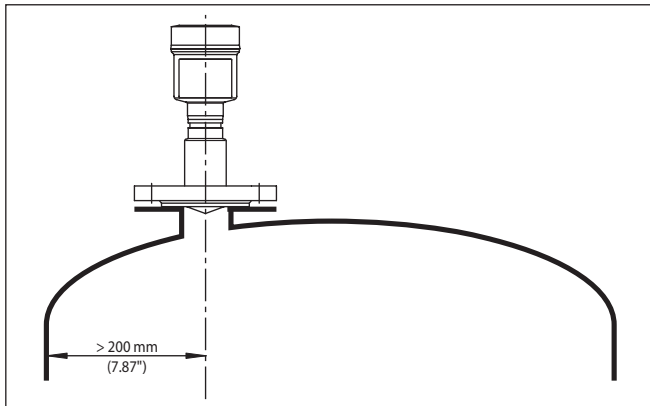


> 200 mm
(7.87")

*Fig. 3: Mounting of the radar sensor on round vessel tops*

In vessels with conical bottom it can be advantageous to mount the sensor in the centre of the vessel, as measurement is then possible down to the bottom.
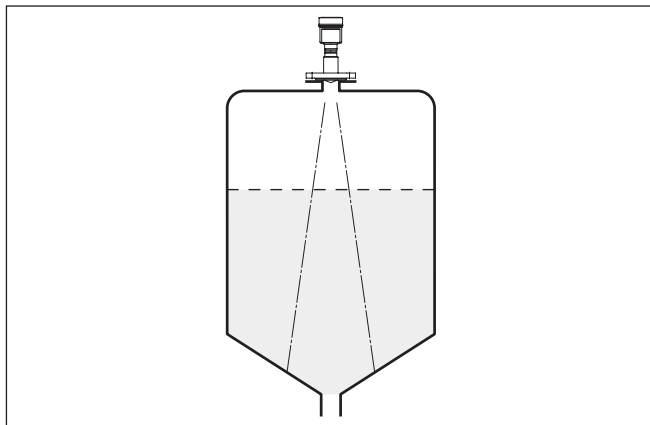
**VEGA**



*Fig. 4: Mounting of the radar sensor on vessels with conical bottom*

**Reference plane**

The measuring range of VEGAPULS 63 begins physically at the end of the antenna; the adjustment, however, begins at the reference plane. The reference plane is different depending on the sensor version.

● **Flange with encapsulated antenna system:** The reference plane is the lower edge of the flange plating
● **Hygienic fittings:** The reference plane is the highest contact point between sensor process fitting and welded socket

The following graphic shows the position of the reference plane with different sensor versions.
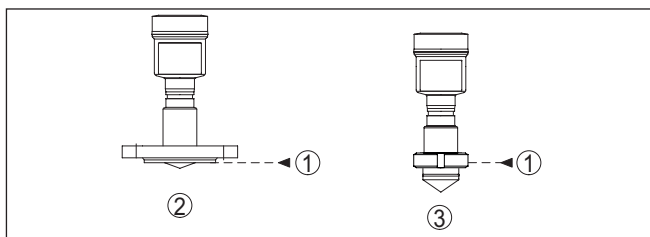


*Fig. 5: Position of the reference plane*

*1    Reference plane*
*2    Flange connections*
*3    Hygienic fittings*

**Inflowing medium**

Do not mount the instruments in or above the filling stream. Make sure that you detect the medium surface, not the inflowing product.
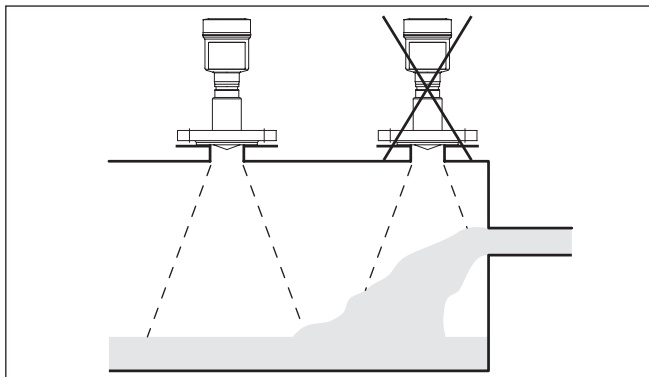
*Fig. 6: Mounting of the radar sensor with inflowing medium*

**Mounting socket**

**Flush mounting**
The best way to mount the sensor, also with respect to cleanability, is flush on a block flange (flange without socket piece) or through a hygienic fitting.

**Mounting on socket**
If the reflective properties of the medium are good, you can mount VEGAPULS 63 on a socket piece. You will find recommended values for socket heights in the following illustration. The socket end should be smooth and burr-free, if possible also rounded. Then carry out a false signal suppression.
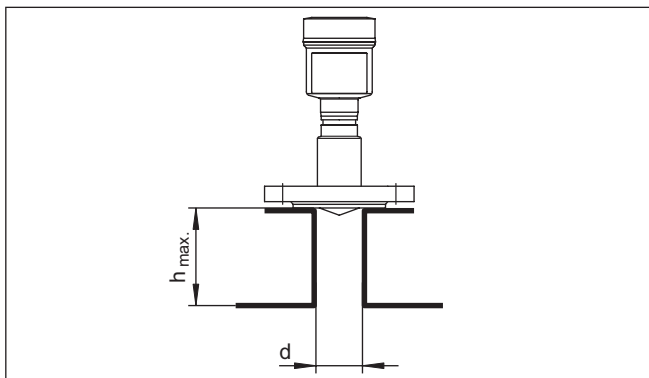


*Fig. 7: Deviating socket dimensions*

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

| Socket diameter d | Socket length h |
|---|---|
| 50 mm | ≤ 100 mm |
| 80 mm | ≤ 300 mm |
| 100 mm | ≤ 400 mm |

| Socket diameter d | Socket length h |
|---|---|
| 150 mm | ≤ 500 mm |

| Socket diameter d | Socket length h |
|---|---|
| 2" | ≤ 3.9 in |
| 3" | ≤ 11.8 in |
| 4" | ≤ 15.8 in |
| 6" | ≤ 19.7 in |

**Sealing to the process**

The VEGAPULS 63 with flange and encapsulated antenna system, the PTFE washer of the antenna encapsulation serves also as process seal.
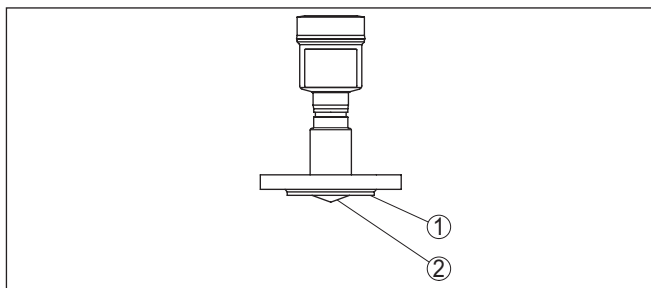


*Fig. 8: VEGAPULS 63 with flange and encapsulated antenna system*

*1 PTFE washer*
*2 Antenna encapsulation*

However, PTFE-plated flanges have a preload loss over time at high temperature changes.

**Note:**
Therefore, use disc springs to compensate for this preload loss during mounting. They are included in the scope of delivery of the instrument and are intended for the flange screws.

To seal effectively, the following requirements must be fulfilled:

1. Make sure the number of flange screws corresponds to the number of flange holes
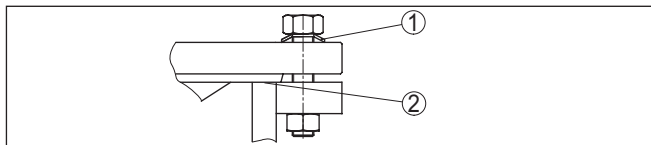
2. Use of disc springs as previously described



*Fig. 9: Use of disc springs*

*1 Disc spring*
*2 Sealing surface*

3. Tighten screws with the necessary torque (see chapter "*Technical data*", "*Torques*")

⚠ **Note:**
Tighten screws with the necessary torque (see chapter "*Technical data*", "*Torques*")[2]

**Exchange, flange plating**  The PTFE washer in 8 mm version can be exchanged by the user in case of wear or damage.

Proceed as follows while dismounting:

1. Dismount and clean the instrument, note chapters "*Dismounting steps*" and "*Maintenance*"

2. Unscrew and remove the PTFE disc by hand, protecting the thread against dirt.
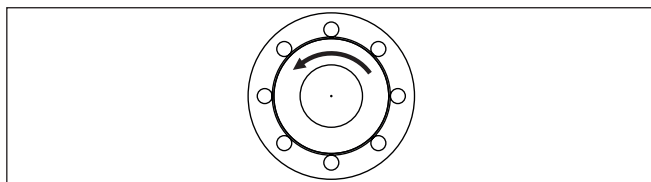


*Fig. 10: VEGAPULS 63 - Loosening the PTFE washer*

3. Remove the sealing and clean the sealing groove

4. Insert the supplied new sealing, place the PTFE washer onto the thread and tighten it manually

5. Mount the sensor, tighten the flange screws (torque see chapter "*Technical data*", "*Torques*")

⚠ **Note:**
We recommend re-tightening the screws at regular intervals, depending on process pressure and temperature. Recommended torque, see chapter "*Technical data*", "*Torques*".

**Sensor orientation**  In liquids, direct the sensor as perpendicular as possible to the medium surface, to an achieve optimum measurement.
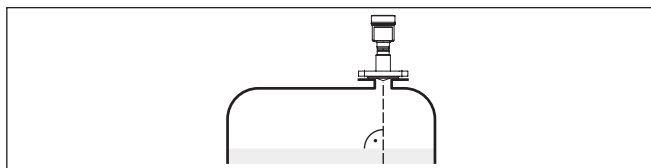


*Fig. 11: Alignment in liquids*

**Vessel installations**  The mounting location of the radar sensor should be a place where no other equipment or fixtures cross the path of the radar signals.

[2] The torques specified in the technical data only apply to the plating shown here in the area of the sealing surface. For plating up to the outer diameter, the values are for orientation only; the torque values actually required are application-specific.

Vessel installations, such as e.g. ladders, limit switches, heating spirals, struts, etc., can cause false echoes and impair the useful echo. Make sure when planning your measuring point that the radar sensor has a "clear view" to the measured product.

In case of existing vessel installations, a false signal suppression 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.
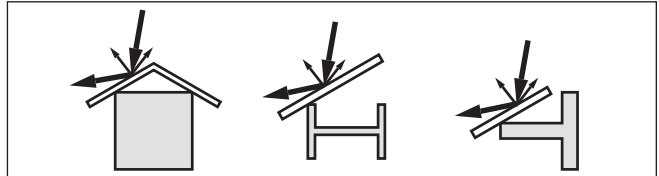


*Fig. 12: Cover flat, large-area profiles with deflectors*

**Agitators**

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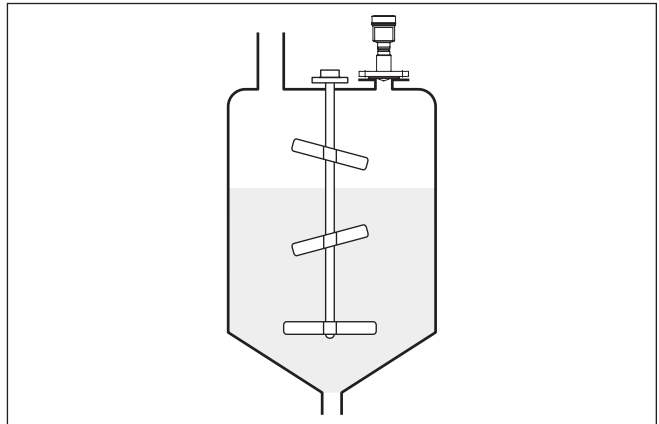


*Fig. 13: Agitators*

**Foam generation**

Through the action of filling, stirring and other processes in the vessel, compact foam can form on the medium surface, damping the emitted signals considerably.

If foams are causing measurement errors, the biggest possible radar antennas, the electronics with increased sensitivity or low frequency radar sensors (C band) should be used.

As an alternative, sensors with guided microwave can be used. These are unaffected by foam generation and are best suited for such applications.

## 4.3 Measurement setup - Pipes

**Measurement in a surge pipe**

By using a surge pipe in the vessel, the influence of vessel installations and turbulence can be excluded. Under these prerequisites, the measurement of products with low dielectric values ($\varepsilon_r$ value ≤ 1.6) is possible.

Note the following illustrations and instructions for measurement in a surge pipe.

**Information:**
Measurement in a surge pipe is not recommended for extremely adhesive products.
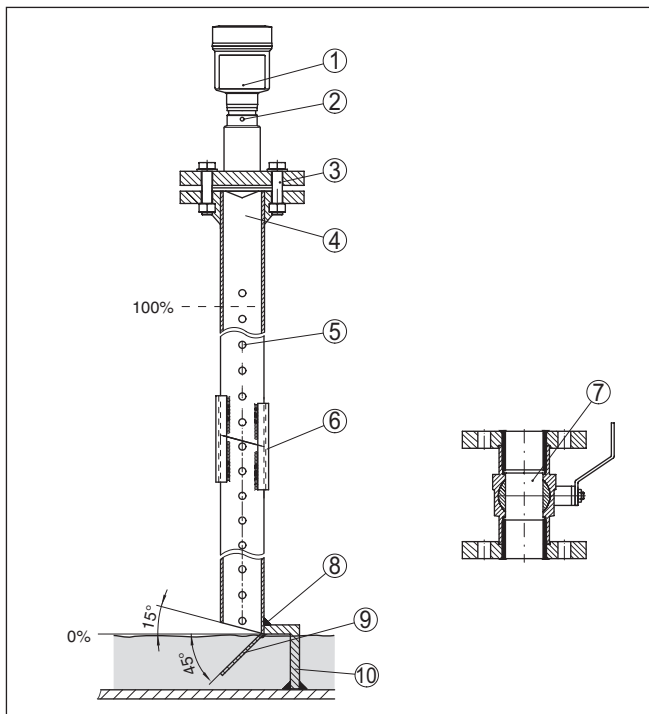
**Configuration surge pipe**



*Fig. 14: Configuration surge pipe VEGAPULS 63*

1   *Radar sensor*
2   *Polarisation marking*
3   *Thread or flange on the instrument*
4   *Vent hole*
5   *Holes*
6   *Welding connection through U-profile*
7   *Ball valve with complete opening*
8   *Surge pipe end*
9   *Reflector sheet*
10  *Fastening of the surge pipe*
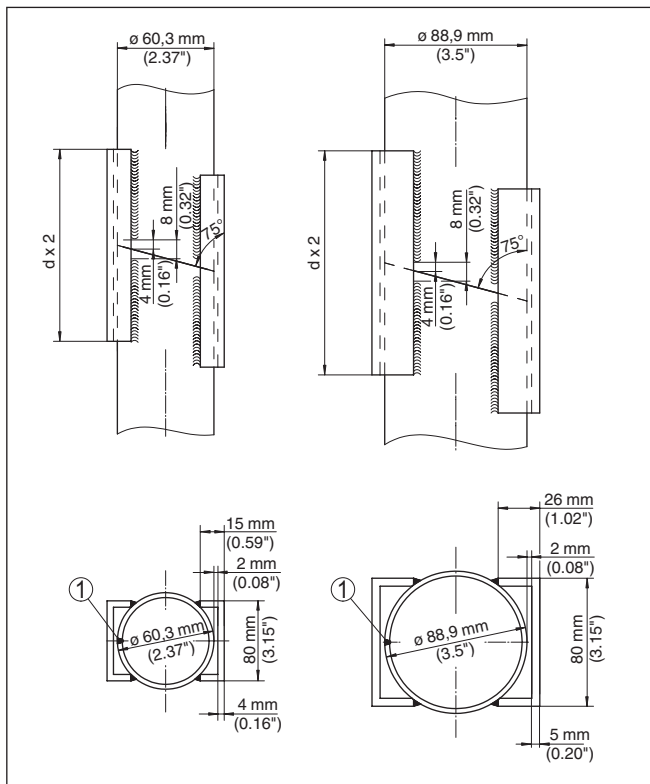
**Surge pipe extension**



*Fig. 15: Welding connection with surge pipe extension for different example diameters*

*1    Position of the welded joint with longitudinally welded pipes*

**Instructions and requirements, surge pipe**

**Instructions of orientation of the polarisation:**
● Note marking of the polarisation on the sensor
● With threaded versions, the marking is on the hexagon, with flange versions between two flange holes
● The marking must be in one plane with the holes in the surge pipe

**Instructions for the measurement:**
● The 100 % point must be below the upper vent hole and the antenna edge
● The 0 % point is the end of the surge pipe
● During parameter adjustment, select "*Application standpipe*" and enter the tube diameter to compensate for errors due to running time shift
● A false signal suppression with the installed sensor is recommended but not mandatory
● The measurement through a ball valve with unrestricted channel is possible

**Constructive requirements:**
● Material metal, smooth inner surface
● Preferably pultruded or straight beaded stainless steel tube
● Welded joint should be straight and lie in one axis with the holes
● Flanges are welded to the tube according to the orientation of the polarisation
● When using a ball valves, align the transitions on the inside and fix accurately
● Gap size with junctions ≤ 0.1 mm
● Surge pipes must extend all the way down to the requested min. level, as measurement is only possible within the tube
● Diameter of holes ≤ 5 mm, any number OK, on one side or completely through
● The antenna diameter of the sensor should correspond to the inner diameter of the tube
● Diameter should be constant over the complete length

**Instructions for surge pipe extension:**
● The ends of the extension tubes must be bevelled and exactly aligned
● Welded connection via external U profiles according to illustration above. Length of the U profiles should be at least double the tube diameter
● Do not weld through the pipe wall. The surge pipe must remain smooth inside. Roughness and beads on the inside caused by unintentional penetration should be removed since they cause strong false echoes and encourage buildup
● An extension via welding neck flanges or pipe collars is not recommended.

**Measurement in the bypass tube**

An alternative to measurement in a surge pipe is measurement in a bypass tube outside of the vessel.
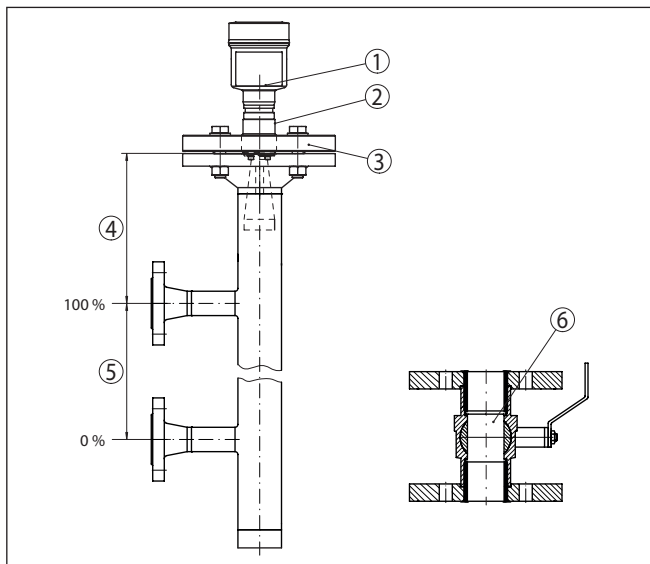
**Configuration bypass**



*Fig. 16: Configuration bypass*

*1 Radar sensor*
*2 Polarisation marking*
*3 Instrument flange*
*4 Distance sensor reference plane to upper tube connection*
*5 Distance of the tube connections*
*6 Ball valve with complete opening*

**Instructions and requirements, bypass**

**Instructions of orientation of the polarisation:**
● Note marking of the polarisation on the sensor
● With threaded versions, the marking is on the hexagon, with flange versions between two flange holes
● The marking must be in one plane with the tube connections to the vessel

**Instructions for the measurement:**
● The 100 % point may not be above the upper tube connection to the vessel
● The 0 % point may not be below the lower tube connection to the vessel
● Min. distance, sensor reference plane to upper edge of upper tube connection > 300 mm
● During parameter adjustment, select "*Application standpipe*" and enter the tube diameter to compensate for errors due to running time shift
● A false signal suppression with the installed sensor is recommended but not mandatory
● The measurement through a ball valve with unrestricted channel is possible

**Constructional requirements on the bypass pipe:**
● Material metal, smooth inner surface
● In case of an extremely rough tube inner surface, use an inserted tube (tube in tube) or a radar sensor with tube antenna
● Flanges are welded to the tube according to the orientation of the polarisation
● Gap size with junctions ≤ 0.1 mm, for example, when using a ball valve or intermediate flanges with single pipe sections
● The antenna diameter of the sensor should correspond to the inner diameter of the tube
● Diameter should be constant over the complete length

# 5    Connecting to the bus system

## 5.1    Preparing the connection

**Safety instructions**
Always keep in mind the following safety instructions:

● Carry out electrical connection by trained, qualified personnel authorised by the plant operator
● If overvoltage surges are expected, overvoltage arresters should be installed

⚠ **Warning:**
Only connect or disconnect in de-energized state.

**Voltage supply**
The instrument requires a operating voltage of 9 … 32 V DC. Operating voltage and the digital bus signal are carried on the same two-wire connection cable. Power is supplied via the H1 power supply.

**Connection cable**
Connection is carried out with screened cable according to Fieldbus specification.

Use cable with round cross section for instruments with housing and cable gland. To ensure the seal effect of the cable gland (IP protection rating), find out which cable outer diameter the cable gland is suitable for.

Use a cable gland fitting the cable diameter.

Make sure that the entire installation is carried out according to the Fieldbus specification. In particular, make sure that the bus is terminated with suitable terminating resistors.

**Cable glands**
**Metric threads**
In the case of instrument housings with metric thread, the cable glands are screwed in at the factory. They are sealed with plastic plugs as transport protection.

ℹ **Note:**
You have to remove these plugs before electrical connection.

**NPT thread**
In the case of instrument housings with self-sealing NPT threads, it is not possible to have the cable entries screwed in at the factory. The free openings for the cable glands are therefore covered with red dust protection caps as transport protection.

ℹ **Note:**
Prior to setup you have to replace these protective caps with approved cable glands or close the openings with suitable blind plugs.

On plastic housings, the NPT cable gland or the Conduit steel tube must be screwed into the threaded insert without grease.

Max. torque for all housings, see chapter "*Technical data*".

**Cable screening and grounding**
Make sure that the cable screen and grounding are carried out according to Fieldbus specification. We recommend to connect the cable screening to ground potential on both ends.

In systems with potential equalisation, connect the cable screening 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).

## 5.2 Connecting

**Connection technology**

The voltage supply and signal output are connected via the spring-loaded terminals in the housing.

Connection to the display and adjustment module or to the interface adapter is carried out via contact pins in the housing.

**Information:**

The terminal block is pluggable and can be removed from the electronics. To do this, lift the terminal block with a small screwdriver and pull it out. When reinserting the terminal block, you should hear it snap in.

**Connection procedure**

Proceed as follows:

1. Unscrew the housing lid

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

3. Loosen compression nut of the cable gland and remove blind plug

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

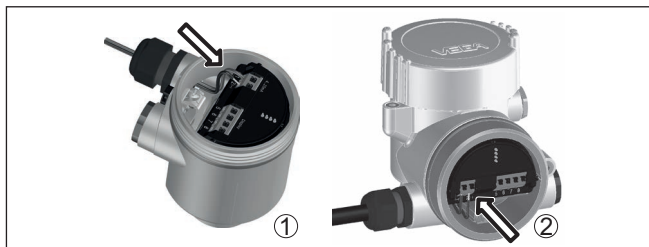5. Insert the cable into the sensor through the cable entry



*Fig. 17: Connection steps 5 and 6*

*1   Single chamber housing*
*2   Double chamber housing*

6. Insert the wire ends into the terminals according to the wiring plan

**Note:**

Solid cores as well as flexible cores with wire end sleeves are inserted directly into the terminal openings. In case of flexible cores without end sleeves, press the terminal from above with a small screwdriver, the terminal opening is then free. When the screwdriver is released, the terminal closes again.

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

8. Connect the shielding to the internal ground terminal, connect the external ground terminal to potential equalisation

9. Tighten the compression nut of the cable entry gland. The seal ring must completely encircle the cable

10. Reinsert the display and adjustment module, if one was installed

11. Screw the housing lid back on

The electrical connection is finished.

## 5.3 Wiring plan, single chamber housing

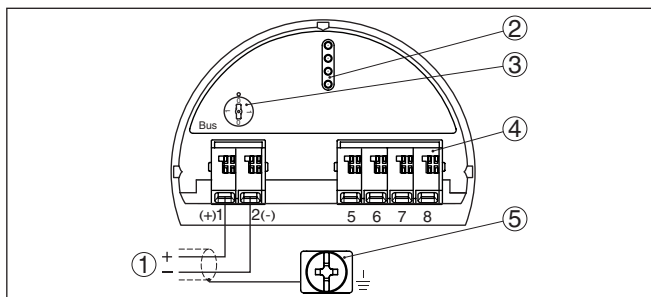**Electronics and connection compartment**



*Fig. 18: Electronics and connection compartment - single chamber housing*

*1 Voltage supply, signal output*
*2 Contact pins for the display and adjustment module or interface adapter*
*3 Simulation switch ("1" = mode for simulation release)*
*4 For external display and adjustment unit*
*5 Ground terminal for connection of the cable screening*

## 5.4 Wiring plan, double chamber housing

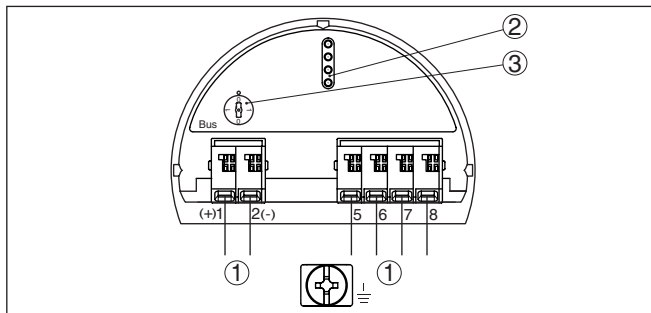**Electronics compartment**



*Fig. 19: Electronics compartment - double chamber housing*

*1 Internal connection to the connection compartment*
*2 Contact pins for the display and adjustment module or interface adapter*
*3 Simulation switch ("1" = mode for simulation release)*
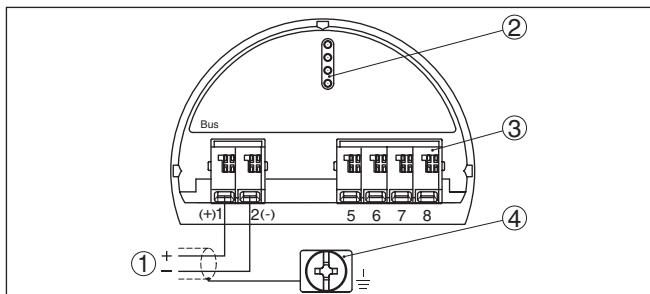
**VEGA**

**Connection compartment**



*Fig. 20: Connection compartment - double chamber housing*

*1 Voltage supply, signal output*
*2 For display and adjustment module or interface adapter*
*3 For external display and adjustment unit*
*4 Ground terminal for connection of the cable screening*

● **Information:**

ℹ Parallel use of an external display and adjustment unit and a display and adjustment module in the connection compartment is not supported.

## 5.5 Wiring plan, Ex-d-ia double chamber housing
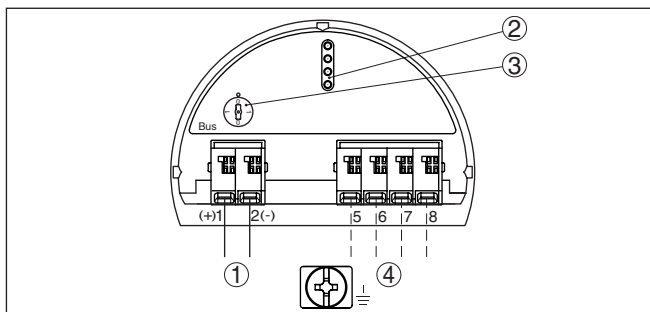
**Electronics compartment**



*Fig. 21: Electronics compartment - Ex-d-ia double chamber housing*

*1 Internal connection to the connection compartment*
*2 Contact pins for the display and adjustment module or interface adapter*
*3 Simulation switch ("1" = mode for simulation release)*
*4 Internal connection to the plug connector for external display and adjustment unit (optional)*

**Connection compartment**
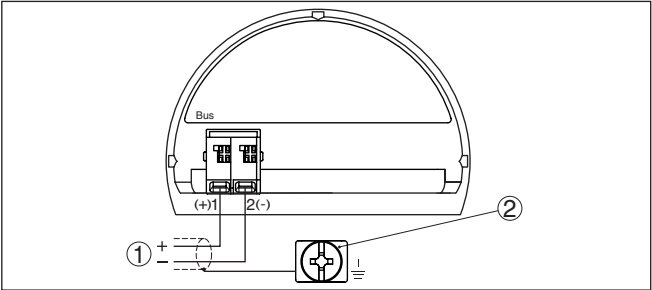


*Fig. 22: Connection compartment - Ex-d-ia double chamber housing*

*1    Voltage supply, signal output*
*2    Ground terminal for connection of the cable screening*

**Plug M12 x 1 for external display and adjustment unit**
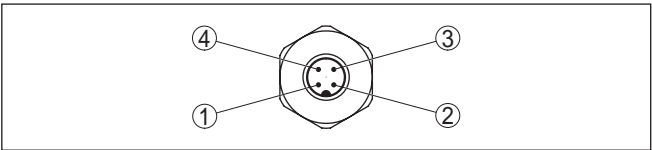


*Fig. 23: Top view of the plug connector*

*1    Pin 1*
*2    Pin 2*
*3    Pin 3*
*4    Pin 4*

| Contact pin | Colour, connection cable in the sensor | Terminal, electronics module |
|---|---|---|
| Pin 1 | Brown | 5 |
| Pin 2 | White | 6 |
| Pin 3 | Blue | 7 |
| Pin 4 | Black | 8 |

**VEGA**

### 5.6 Double chamber housing with VEGADIS-Adapter

**Electronics compartment**
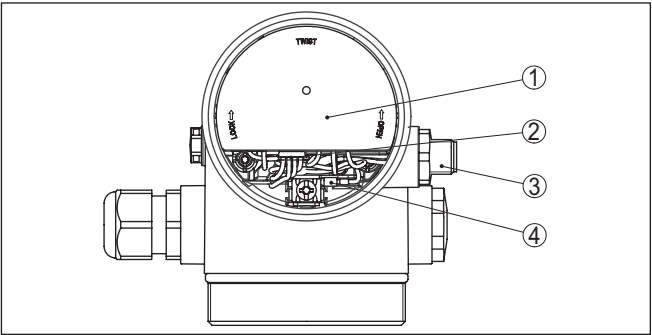


*Fig. 24: View to the electronics compartment with VEGADIS adapter for connection of the external display and adjustment unit*

*1 VEGADIS adapter*
*2 Internal plug connection*
*3 M12 x 1 plug connector*

**Assignment of the plug connector**
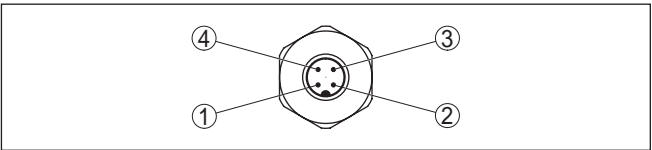


*Fig. 25: View to the plug connector M12 x 1*

*1 Pin 1*
*2 Pin 2*
*3 Pin 3*
*4 Pin 4*

| Contact pin | Colour, connection cable in the sensor | Terminal, electronics module |
|---|---|---|
| Pin 1 | Brown | 5 |
| Pin 2 | White | 6 |
| Pin 3 | Blue | 7 |
| Pin 4 | Black | 8 |

## 5.7 Wiring plan - version IP66/IP68 (1 bar)

**Wire assignment, con-
nection cable**
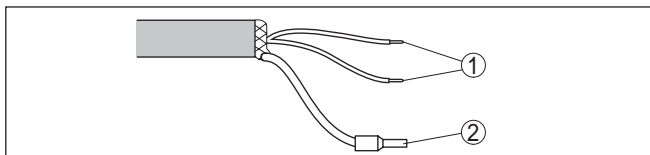


*Fig. 26: Wire assignment in permanently connected connection cable*

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

## 5.8 Switch-on phase

After connecting VEGAPULS 63 to the bus system, the device first
performs a self-test:

● Internal check of the electronics
● Indication of the status message "*F 105 Determine measured
  value*" on the display or PC
● Status byte goes to fault value

Then the actual measured value is output to the signal cable. The
value takes into account settings that have already been carried out,
e.g. default setting.

# 6 Set up with the display and adjustment module

## 6.1 Insert display and adjustment module

The display and adjustment module can be inserted into the sensor and removed again at any time. You can choose any one of four different positions - each displaced by 90°. It is not necessary to interrupt the power supply.

Proceed as follows:

1. Unscrew the housing lid

2. Place the display and adjustment module on the electronics in the desired position and turn it to the right until it snaps in.

3. Screw housing lid 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. 27: Installing the display and adjustment module in the electronics compartment of the single chamber housing*
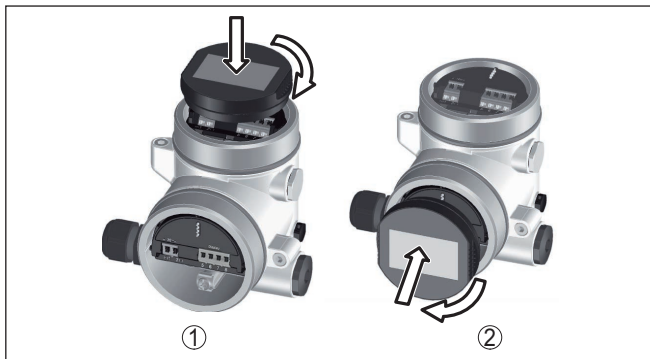
*Fig. 28: Installing the display and adjustment module in the double chamber housing*

*1    In the electronics compartment*
*2    In the connection compartment*

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

## 6.2   Adjustment system



*Fig. 29: Display and adjustment elements*

*1    LC display*
*2    Adjustment keys*

**Key functions**

● *[OK]* key:
  – Move to the menu overview
  – Confirm selected menu
  – Edit parameter
  – Save value

● *[->]* key:
  – Change measured value presentation
  – Select list entry
  – Select menu items
  – Select editing position

● *[+]* key:

– Change value of the parameter

● *[ESC]* key:
  – Interrupt input
  – Jump to next higher menu

**Operating system - Keys direct**

The instrument is operated via the four keys of the display and adjustment module. The individual menu items are shown on the LC display. You can find the function of the individual keys in the previous illustration.

**Adjustment system - keys via magnetic pen**

With the Bluetooth version of the display and adjustment module you can also adjust the instrument with the magnetic pen. The pen operates the four keys of the display and adjustment module right through the closed lid (with inspection window) of the sensor housing.
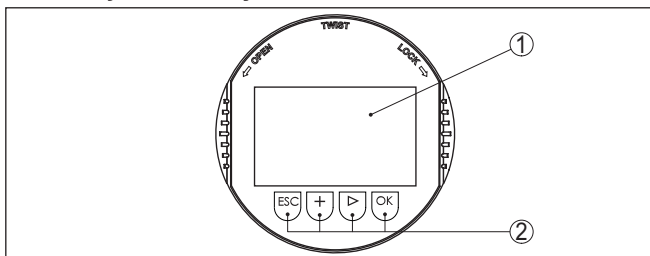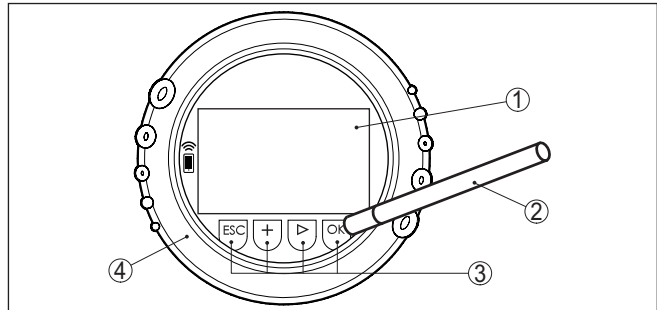


*Fig. 30: Display and adjustment elements - with adjustment via magnetic pen*

*1 LC display*
*2 Magnetic pen*
*3 Adjustment keys*
*4 Lid with inspection window*

**Time functions**

When the *[+]* and *[->]* keys are pressed quickly, the edited value, or the cursor, changes one value or position at a time. If the key is pressed longer than 1 s, the value or position changes continuously.

When the *[OK]* and *[ESC]* keys are pressed simultaneously for more than 5 s, the display returns to the main menu. The menu language is then switched over to "*English*".

Approx. 60 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.

## 6.3 Measured value indication - Selection of national language

**Measured value indication**

With the *[->]* key you move between three different indication modes.

In the first view, the selected measured value is displayed in large digits.

In the second view, the selected measured value and a corresponding bargraph presentation are displayed.

In the third view, the selected measured value as well as a second selectable value, e.g. the temperature of the electronics, are displayed.

During the initial setup of an instrument shipped with factory settings, use the "*OK*" key to get to the menu "*National language*".

**Selection of national language**

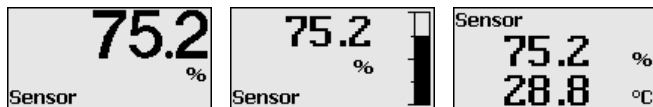This menu item is used to select the national language for further parameter adjustment. You can change the selection via the menu item "*Setup - Display, Menu language*".

```
Language
  Deutsch
✓ English
  Français
  Español
  Русский
  ▼
```

With the "*OK*" key you move to the main menu.

## 6.4 Parameter adjustment

The instrument is adapted to the application conditions via the parameter adjustment. The parameter adjustment is carried out with an adjustment menu.

**Main menu**

The main menu is divided into five sections with the following functions:

```
Setup
Display
Diagnostics
Additional adjustments
Info
```
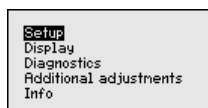
**Setup:** Settings, for example, for medium, application, vessel, adjustment, damping

**Display:** Language setting, settings for the measured value indication as well as lighting

**Diagnosis:** Information, e.g. on instrument status, pointer, measurement reliability, simulation, echo curve

**Further settings:** e.g. instrument units, unit SV 2, false signal suppression, linearization, date/time, reset, copy sensor data

**Info:** Instrument name, hardware and software version, date of manufacture, device ID, instrument features

In the main menu item "*Setup*", the individual submenu items should be selected one after the other and provided with the correct parameters to ensure optimum adjustment of the measurement. The procedure is described in the following.

**Setup**

**Setup - Medium**

Every medium has different reflective properties. With liquids, there are additional interfering factors such as turbulent product surface and foam generation. With bulk solids, the additional interfering fac-

**VEGA**

tors are dust generation, angle of repose and secondary echoes from the vessel wall.

To adapt the sensor to these different measuring conditions, the selection "*Liquid*" or "*Bulk solid*" should be made in this menu item.

Through this selection, the sensor is optimally adapted 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 with *[OK]* and jump to the next menu item with the *[ESC]* and the *[->]* key.

**Setup - Application**

In addition to the medium, also the application, i.e. the measuring site, can influence the measurement.

With this menu item, the sensor can be adapted to the applications. The adjustment possibilities depend on the selection "*Liquid*" or "*Bulk solid*" under "*Medium*".

The following options are available when "*Liquid*" is selected:

The selection "*Standpipe*" opens a new window in which the inner diameter of the applied standpipe is entered.

Following the characteristics of the applications and the metrological features of the sensor are described.

**Note:**

Probably the operation of the instrument in the following applications is subject to national restrictions in respect to the radio license (see chapter "*For your safety*"):

● Plastic tank
● Transportable plastic tank

VEGAPULS 63 • Foundation Fieldbus

- Open water
- Open flume
- Rain water spillover

**Storage tank:**
- Vessel:
  – Large volume
  – Upright cylindrical, horizontal round
- Process/measurement conditions:
  – Condensation
  – Smooth medium surface
  – High requirements on measurement accuracy
  – Slow filling and emptying
- Properties, sensor:
  – Low sensitivity to sporadic false echoes
  – Stable and reliable measured values through averaging
  – High measurement accuracy
  – No short reaction time of the sensor required

**Storage tank, circulation:**
- Setup: large-volumed, upright cylindrical, spherical
- Medium speed: slow filling and emptying
- Installations: small, laterally mounted or large, top mounted stirrer
- Process/measurement conditions:
  – Relatively smooth medium surface
  – High requirements on measurement accuracy
  – Condensation
  – Slight foam generation
  – Overfilling possible
- Properties, sensor:
  – Low sensitivity to sporadic false echoes
  – Stable and reliable measured values through averaging
  – High measurement accuracy, because not set for max. speed
  – False signal suppression recommended

**Storage tank on ships:**
- Medium speed: slow filling and emptying
- Vessel:
  – Installations in the bottom section (bracers, heating spirals)
  – High sockets 200 … 500 mm, also with large diameters
- Process/measurement conditions:
  – Condensation, buildup by movement
  – Max. requirement on measurement accuracy from 95 %
- Properties, sensor:
  – Low sensitivity to sporadic false echoes
  – Stable and reliable measured values through averaging
  – High measurement accuracy
  – False signal suppression required

**Stirrer vessel:**
- Vessel:
  – Mounting socket
  – Large agitator blades of metal

- – Vortex breakers, heating spirals
- ● Process/measurement conditions:
  - – Condensation, buildup by movement
  - – Strong vortex generation
  - – Very agitated surface, foam generation
  - – Fast to slow filling and emptying
  - – Vessel is filled and emptied very often
- ● Properties, sensor:
  - – Higher measurement speed through less averaging
  - – Sporadic false echoes are suppressed

**Dosing vessel:**
- ● Setup: all vessel sizes possible
- ● Medium speed:
  - – Fast filling and emptying
  - – Vessel is filled and emptied very often
- ● Vessel: tight installation situation
- ● Process/measurement conditions:
  - – Condensation, buildup on the antenna
  - – Foam generation
- ● Properties, sensor:
  - – Measurement speed optimized by virtually no averaging
  - – Sporadic false echoes are suppressed
  - – False signal suppression recommended

**Standpipe:**
- ● Medium speed: very fast filling and emptying
- ● Vessel:
  - – Vent hole
  - – Joins like flanges, weld joints
  - – Shifting of the running time in the tube
- ● Process/measurement conditions:
  - – Condensation
  - – Buildup
- ● Properties, sensor:
  - – Measurement speed optimized through little averaging
  - – Entering the tube inside diameter takes the running time shift into consideration
  - – Echo detection sensitivity reduced

**Bypass:**
- ● Medium speed:
  - – Fast up to slow filling with short up to long bypass tube possible
  - – Often the level is hold via a control facility
- ● Vessel:
  - – Lateral outlets and inlets
  - – Joins like flanges, weld joints
  - – Shifting of the running time in the tube
- ● Process/measurement conditions:
  - – Condensation
  - – Buildup
  - – Separation of oil and water possible
  - – Overfilling into the antenna possible

● Properties, sensor:
  – Measurement speed optimized through little averaging
  – Entering the tube inside diameter takes the running time shift into consideration
  – Echo detection sensitivity reduced
  – False signal suppression recommended

**Plastic tank:**
● Process/measurement conditions:
  – Condensation on the plastic ceiling
  – In outdoor facilities, water and snow on vessel top possible
  – Measurement through the vessel top, if appropriate to the application
● Properties, sensor:
  – False signals outside the vessel are not taken into consideration
  – False signal suppression recommended

**Transportable plastic tank:**
● Process/measurement conditions:
  – Material and thickness different
  – Measured value jump with vessel change
  – Measurement through the vessel top, if appropriate to the application
● Properties, sensor:
  – Quick adaptation to changing reflection conditions due to vessel change required
  – False signal suppression required

**Open water:**
● Process/measurement conditions:
  – Slow gauge change
  – Extreme damping of output signal due to wave generation
  – Ice and condensation on the antenna possible
  – Floating debris sporadically on the water surface
● Properties, sensor:
  – Stable and reliable measured values through frequent averaging
  – Insensitive in the close range

**Open flume:**
● Process/measurement conditions:
  – Slow gauge change
  – Ice and condensation on the antenna possible
  – Smooth water surface
  – Exact measurement result required
● Properties, sensor:
  – Stable and reliable measured values through frequent averaging
  – Insensitive in the close range

**Rain water spillover:**
● Rate of level change: slow level change
● Process/measurement conditions:

– Ice and condensation on the antenna possible
– Spiders and insects build nests in the antennas
– Turbulent water surface
– Sensor flooding possible
● Properties, sensor:
– Stable and reliable measured values through frequent averaging
– Insensitive in the close range

**Demonstration:**
● Adjustment for all applications which are not typically level measurements
– Instrument demonstration
– Object recognition/monitoring (additional settings required)
● Properties, sensor:
– Sensor accepts all measured value changes within the measuring range immediately
– High sensitivity to interference, because virtually no averaging

**Caution:**
If liquids with different dielectric constants separate in the vessel, for example through condensation, the radar sensor can detect under certain circumstances only the medium with the higher dielectric constant. Keep in mind that layer interfaces can cause faulty measurements.

If you want to measure the total height of both liquids reliably, please contact our service department or use an instrument specially designed for interface measurement.

**Setup - Vessel height, measuring range**

Through this selection the operating range of the sensor is adapted to the vessel height, which considerably increases measurement reliability under different basic conditions.

The min. adjustment must be carried out independently of this.

| Setup | Vessel height/Meas. range |
|---|---|
| Medium<br>Application<br>**Vessel type**<br>Vessel height/Me. range<br>Max. adjustment<br>▼ | 35.000 m |

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

**Setup - Vessel form**

Apart from the medium and the application, the vessel form itself can influence the measurement. To adapt the sensor to these measuring conditions, this menu item offers different options for vessel bottom and ceiling for certain applications.

| Setup | Vessel bottom | Vessel top |
|---|---|---|
| Medium<br>Application<br>**Vessel type**<br>Vessel height/Me. range<br>Max. adjustment<br>▼ | ✓Straight<br>Conical<br>Angular | Straight<br>✓Dished boiler |

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

**Setup - Adjustment**

Since the radar sensor is a distance measuring instrument, the distance from the sensor to the medium surface is measured. To indicate the actual level, an allocation of the measured distance to the percentage height must be carried out.

To perform the adjustment, enter the distance with full and empty vessel, see the following example:
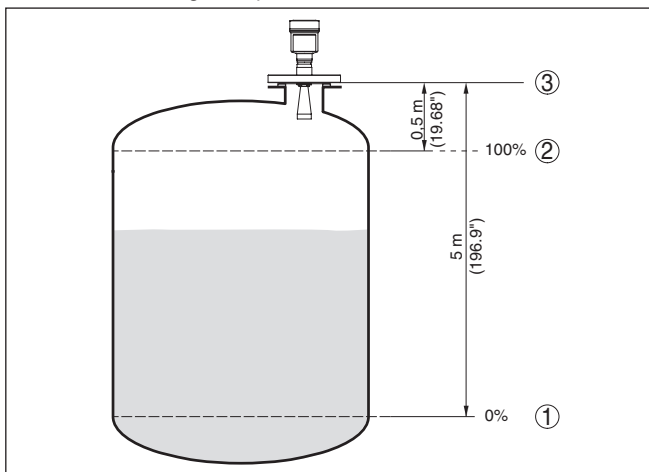


*Fig. 31: Parameterisation example, Min./max. adjustment*

1   Min. level = max. measuring distance
2   Max. level = min. measuring distance
3   Reference plane

If these values are not known, an adjustment with the distances of e.g. 10 % and 90 % is possible. Starting point for these distance specifications is always the sealing surface of the thread or flange. You can find further specifications on the reference plane in the chapters "*Mounting instructions*" and "*Technical data*". The actual level is calculated on the basis of these settings.

The actual 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.

**Setup - Min. adjustment**

Proceed as follows:

1.   Select the menu item "*Setup*" with *[->]* and confirm with *[OK]*. Now select with *[->]* the menu item "*Min. adjustment*" and confirm with *[OK]*.
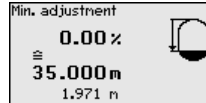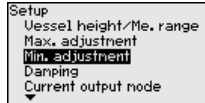
2.  Edit the percentage value with *[OK]* and set the cursor to the requested position with *[->]*.
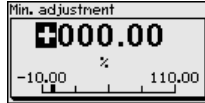
3.  Set the requested percentage value with *[+]* and save with *[OK]*. The cursor jumps now to the distance value.
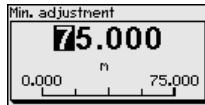
4.  Enter the suitable distance value in m for empty vessel (e.g. distance from the sensor to the vessel bottom) corresponding to the percentage value.

5.  Save settings with *[OK]* and move with *[ESC]* and *[->]* to the max. adjustment.

**Setup - Max. adjustment**    Proceed as follows:

1.  Select with *[->]* the menu item Max. adjustment and confirm with *[OK]*.
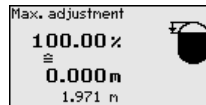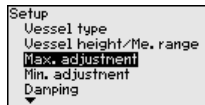
2.  Prepare the percentage value for editing with *[OK]* and set the cursor to the requested position with *[->]*.
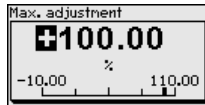
3.  Set the requested percentage value with *[+]* and save with *[OK]*. The cursor jumps now to the distance value.
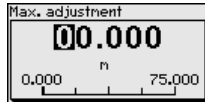
4.  Enter the appropriate distance value in m (corresponding to the percentage value) for the full vessel. Keep in mind that the max. level must lie below the min. distance to the antenna edge.

5.  Save settings with *[OK]*

**Setup - Damping**    To damp process-dependent measured value fluctuations, set an integration time of 0 … 999 s in this menu item.
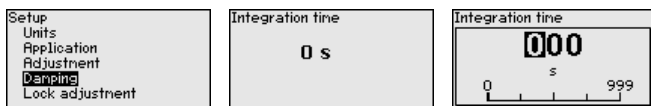
The default setting is a damping of 0 s.

**Setup - Lock adjustment**    In this menu item, the PIN is activated/deactivated permanently. Entering a 4-digit PIN protects the sensor data against unauthorized access and unintentional modifications. If the PIN is activated permanently, it can be deactivated temporarily (i.e. for approx. 60 min.) in any menu item.
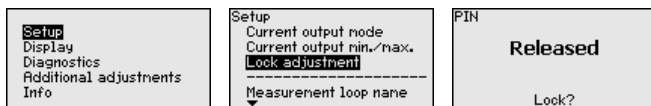
Only the following functions are permitted with activated PIN:

● Select menu items and show data
● Read data from the sensor into the display and adjustment module

⚠ **Caution:**
When the PIN is active, adjustment via PACTware/DTM as well as other systems is also blocked.

In delivery status, the PIN is "*0000*".

**Display - Language**    This menu item enables the setting of the requested national language.
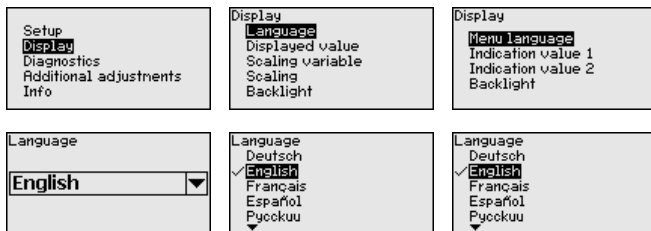
In delivery status, the sensor is set to the ordered national language.

**Display - Indicated value**    In the menu item "*Display*" you can define which measured value should be presented on the display.

The sensor delivers the following measured values:

● PV (Primary Value): Linearised percentage value
● SV1 (Secondary Value 1): Percentage value after the adjustment
● SV2 (Secondary Value 2): Distance value before the adjustment
● AI-OUT 1
● AI-OUT 2
● AI-OUT 3
● Height

**VEGA**

| Setup | Display | Displayed value |
|---|---|---|
| **Display** | Language | **Distance** ▼ |
| Diagnostics | **Displayed value** | |
| Additional adjustments | Backlight | |
| Info | | |

| Displayed value | Displayed value |
|---|---|
| ✓**Distance** | SV2 (Distance) |
| PV (Lin. Percent) | AI-Out 1 |
| SV1 (Percent) | ✓**AI-Out 2** |
| SV2 (Distance) | AI-Out 3 |
| AI-Out 1 | Height |
| ▼ | ▼ |
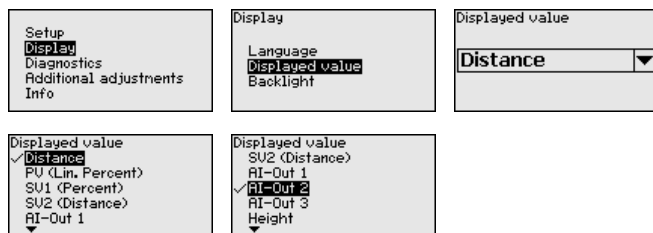
**Display - Backlight**
The optionally integrated background lighting can be switched on via the adjustment menu. This function depends on the level of the supply voltage, see operating instructions of the respective sensor.

To maintain the function of the device, the lighting is temporarily switched off if power supply is insufficient.

| Setup | Display | Display |
|---|---|---|
| **Display** | Language | Menu language |
| Diagnostics | Displayed value | Indication value 1 |
| Additional adjustments | Scaling variable | Indication value 2 |
| Info | Scaling | **Backlight** |
| | **Backlight** | |

In delivery status, the lighting is switched on.

**Diagnostics - Device status**
In this menu item, the device status is displayed.

| Setup | Diagnostics | Device status |
|---|---|---|
| Setup | **Sensor status** | **OK** |
| Display | Peak values | |
| **Diagnostics** | Electronics temperature | |
| Additional adjustments | Meas. reliability | |
| Info | Simulation | |
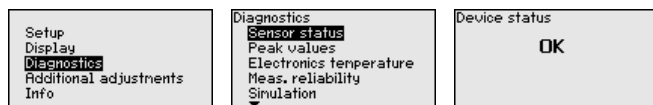
**Diagnostics - Peak values (distance)**
The respective min. and max. measured distance values are saved in the sensor. The values are displayed in the menu item "*Peak values*".

| Setup | Diagnostics | Peak values (Distance) |
|---|---|---|
| Setup | Device status | Min. |
| Display | **Peak values (Distance)** | 0.108 m |
| **Diagnostics** | Electronics temperature | Max. |
| Additional adjustments | Meas. reliability | 12.911 m |
| Info | Simulation | |
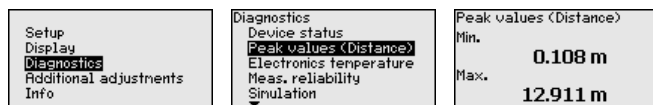
**Diagnosis - Electronics temperature**
The respective min. and max. measured values of the electronics temperature are saved in the sensor. These values as well as the current temperature value are displayed in the menu item "*Peak values*".

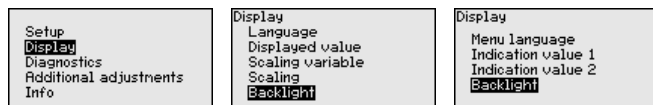| Setup | Diagnostics | Diagnostics |
|---|---|---|
| Setup | Sensor status | Peak values Distance |
| Display | Peak values | Peak indicator, reliab. |
| **Diagnostics** | **Electronics temperature** | **Peak values further** |
| Additional adjustments | Meas. reliability | Echo curve |
| Info | Simulation | Simulation |
| | ▼ | ▼ |

| Electronics temperature | |
|---|---|
| Actual | 28.30 ℃ |
| Min. | 20.40 ℃ |
| Max. | 32.20 ℃ |
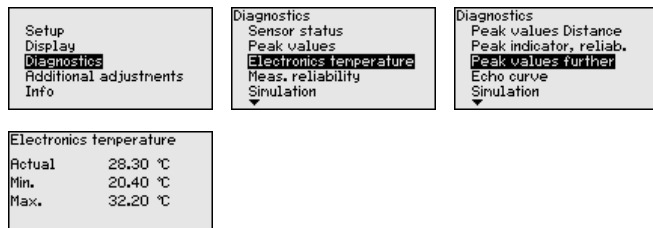
**Diagnosis - Measurement reliability**
When non-contact level sensors are used, the measurement can be influenced by the respective process conditions. In this menu item, the measurement reliability of the level echo is displayed as a dB

VEGAPULS 63 • Foundation Fieldbus

value. Measurement reliability equals signal strength minus noise. The higher the value, the more reliable the measurement. A well functioning measurement normally has a value > 10 dB.
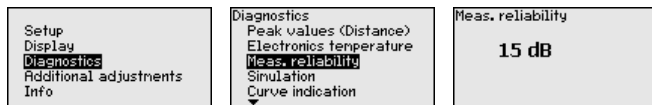


**Diagnosis - Simulation**  In this menu item you simulate measured values via the signal output. Hence, the signal path can be tested via the segment coupler up to the input card of the control system.
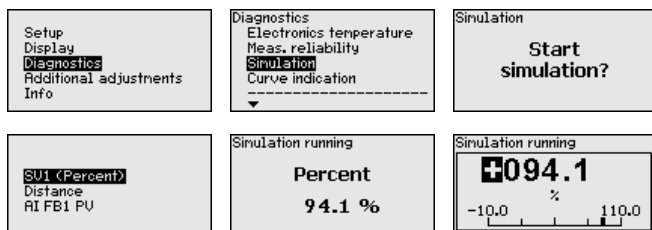


How to start the simulation:

1. Push *[OK]*
2. Select the requested simulation variable with *[->]* and confirm with *[OK]*.
3. With *[OK]* you start the simulation, first of all the actual measured value is displayed in %
4. Start the editing mode with *[OK]*
5. Set the requested numerical value with *[+]* and *[->]*
6. Push *[OK]*

●  **Note:**
ℹ  During simulation, the simulated value is output as Profibus PA signal.

How to interrupt the simulation:

→  Push *[ESC]*

●  **Information:**
ℹ  The simulation is automatically terminated 10 minutes after the last pressing of a key.

**Diagnosis - Curve indica-**  The "*Echo curve*" shows the signal strength of the echoes over the
**tion**  measuring range in dB. The signal strength enables an evaluation of the quality of the measurement.
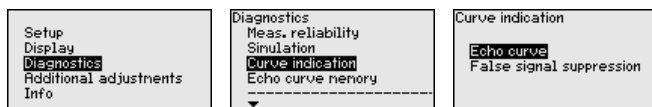


The "*False signal suppression*" displays the saved false echoes (see menu "*Additional settings*") of the empty vessel with signal strength in "dB" over the entire measuring range.

**VEGA**

A comparison of echo curve and false signal suppression allows a more detailed statement about measurement reliability.
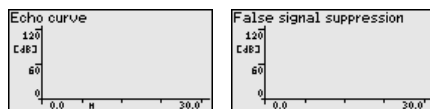


The selected curve is continuously updated. A submenu with zoom functions is opened with the *[OK]* key:

- "X-Zoom": Zoom function for the meas. distance
- "Y-Zoom": 1, 2, 5 and 10x signal magnification in "*dB*"
- "Unzoom": Reset the presentation to the nominal measuring range without magnification

**Diagnostics - Echo curve memory**

The function "*Echo curve memory*" makes it possible to save the echo curve at the time of setup. This is generally recommended, and it is absolutely necessary if you want to use the Asset Management functions. If possible, the curve should be saved with a low level in the vessel.

With the adjustment software PACTware and a PC, a high resolution echo curve can be displayed and used to recognize signal changes during operation. In addition, the echo curve of setup can be displayed in the echo curve window and compared with the current echo curve.
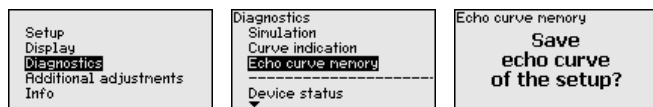


**Additional adjustments**

**Additional adjustments - Instrument units**

In this menu item you select the measured variable of the system and the temperature unit.
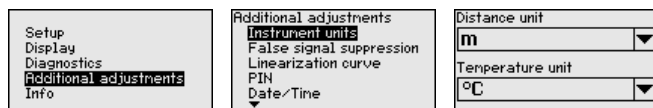


**Additional adjustments - Unit SV2**

In this menu item, you define the unit of the Secondary Values 2 (SV2):
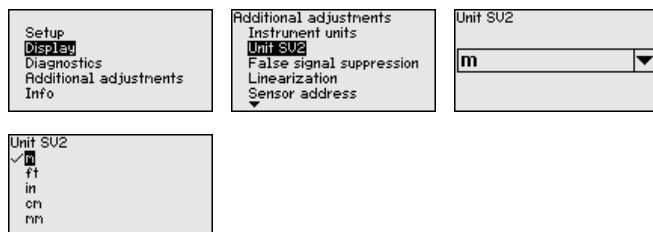
**Additional settings - False signal suppression**

The following circumstances cause interfering reflections and can influence the measurement:

- High mounting sockets
- Vessel internals such as struts
- Agitators
- Buildup or welded joints on vessel walls

**● Note:**
**ℹ** A false signal suppression detects, marks and saves these false signals to ensure that they are ignored in the level measurement.

This should be done with the lowest possible level so that all potential interfering reflections can be detected.

Proceed as follows:

1. Select with *[->]* the menu item "*False signal suppression*" and confirm with *[OK]*.

```
Additional adjustments
 Instrument units
 False signal suppression
 Linearization curve
 PIN
 Date/Time
 ▼
```

```
False signal suppression

 Create new
```

```
    00.000
        m
 0.000        35.000
```
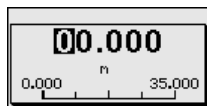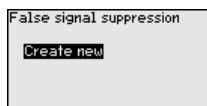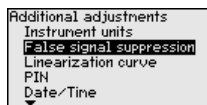
2. Confirm 3-times with *[OK]* and enter the actual distance from the sensor to the product surface.

3. All interfering signals in this range are detected by the sensor and stored after being confirmed with *[OK]*.

**● Note:**
**ℹ** Check the distance to the medium 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.

If a false signal suppression has already been saved in the sensor, the following menu window appears when selecting "*False signal suppression*":

```
False signal suppression

 Delete
 Update
 Create new
```
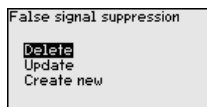
**Delete**: An already created false signal suppression will be completely deleted. This is useful if the saved false signal suppression no longer matches the metrological conditions in the vessel.

**Extend**: is used to extend an already created false signal suppression. This is useful if a false signal suppression was carried out with

too high a level and not all false signals could be detected. When selecting "*Extend*", the distance to the product surface of the created false signal suppression is displayed. This value can now be changed and the false signal suppression can be extended to this range.

**Additional settings - Linearization**

A linearization is necessary for all vessels in which the vessel volume does not increase linearly with the level - e.g. a horizontal 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*".

```
Setup                    Additional adjustments      ✓Linear
Display                    Instrument units           Horiz. cylinder
Diagnostics                False signal suppression   Sphere
Additional adjustments     Linearization curve        Palmer-Bowlus Flume
Info                       PIN                        Venturi, trapezoidal weir
                           Date/Time
```

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

⚠ **Caution:**
Note the following if instruments with appropriate approval are used as part of an overfill protection system according to WHG:

If a linearisation curve is selected, the measuring signal is no longer necessarily linear to the filling height. This must be considered by the user especially when setting the switching point on the limit signal transmitter.
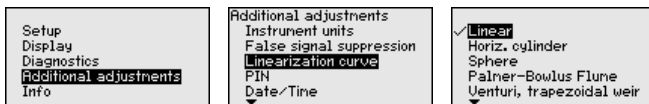
**Additional settings - PIN**

Entering a 4-digit PIN protects the sensor data against unauthorized access and unintentional modification. In this menu item, the PIN is displayed or edited and changed. However, this menu item is only available if adjustment is enabled in the menu "*Setup*".

```
Setup                    Additional adjustments      Additional adjustments
Display                   False signal suppression    PIN
Diagnostics               Linearization curve         Date/Time
Additional adjustments    PIN                         Reset
Info                      Date/Time                   Copy instr. settings
                          Reset                       Probe type
```

```
PIN
    Actual PIN
        0
    Change?
```
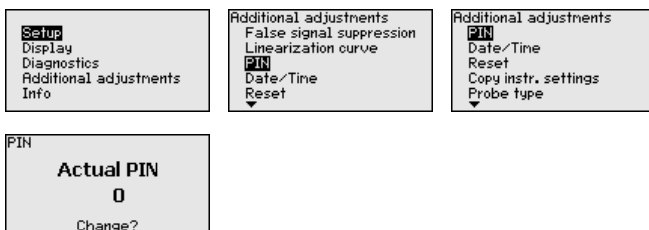
In delivery status, the PIN is "*0000*".

**Additional settings - Date/Time**

In this menu item, the internal clock of the sensor is set.

```
Setup                    Additional adjustments
Display                   Linearization curve
Diagnostics               PIN
Additional adjustments    Date/Time
Info                      Reset
                          HART operation mode
```
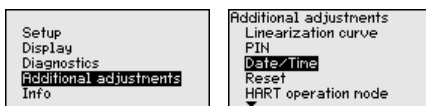
**Additional settings - Reset**

When a reset is carried out, all settings (with only a few exceptions) are reset. The exceptions are: PIN, language, lighting, SIL and HART mode.

```
Display                    Reset
  Language                   Factory settings
  Displayed value            Basic settings
  Scaling variable           Setup
  Scaling                    False signal suppression
  Backlight                  Peak val. measurement
```

The following reset functions are available:

● **Delivery status:** Restoring the parameter settings at the time of shipment from the factory. A created false signal suppression, user-programmable linearization curve, measured value memory as well as event memory will be deleted.
● **Basic settings:** Resetting of the parameter settings incl. special parameters to the default values of the respective instrument. Any created false signal suppression, user programmable linearization curve, measured value memory as well as event memory will be deleted.
● **Setup:** Resetting of the parameter settings to the default values of the respective instrument . Order-related settings remain but are not taken over into the current parameters. User-generated false signal suppression, user-programmed linearization curve, meas-ured value memory, echo curve memory as well as event memory remain untouched. The linearization is set to linear.
● **False signal suppression:** Deletes a previously created false signal suppression. The false signal suppression created at the factory remains active.
● **Peak values, measured value:** Resets the measured min. and max. distances to the current measured value.

Select the requested reset function *[->]* and confirm with *[OK]*.

The following table shows the default values of VEGAPULS 63:

| Menu section | Menu item | Default value |
|---|---|---|
| Setup | Measurement loop name | Sensor |
| | Medium | Liquid/Water |
| | | Bulk solids/Crushed stones, gravel |
| | Application | Storage tank |
| | | Silo |
| | Vessel form | Vessel bottom, dished form |
| | | Vessel top, dished form |
| | Vessel height/Measur-ing range | Recommended measuring range, see "*Technical data*" in the supplement |
| | Min. adjustment | Recommended measuring range, see "*Technical data*" in the supplement |
| | Damping | 0.0 s |

| Menu section | Menu item | Default value |
|---|---|---|
| Display | Language | Like order |
| | Displayed value | Distance |
| | Display unit | m(d) |
| | Scaling | 0.00 %, 0 l |
| | | 100.00 %, 100 l |
| | Backlight | Switched on |
| Additional adjustments | Distance unit | m |
| | Temperature unit | °C |
| | Unit SV2 | m |
| | Probe length | Length of standpipe ex factory |
| | Linearisation curve | Linear |

**Additional settings - Copy instrument settings**

The instrument settings are copied with this function. The following functions are available:

- **Read from sensor:** Read data from sensor and store into the display and adjustment module
- **Write into sensor:** Store data from the display and adjustment module back into the sensor

The following data or settings for adjustment of the display and adjustment module are saved:

- All data of the menu "*Setup*" and "*Display*"
- In the menu "*Additional settings*" the items "*Distance unit, temperature unit and linearization*"
- The values of the user-programmable linearisation curve



The copied data are permanently saved in an EEPROM memory in the display and adjustment module and remain there even in case of power failure. From there, they can be written into one or more sensors or kept as backup for a possible sensor exchange.

The type and the volume of the copied data depend on the respective sensor.

> **Note:**
> Before the data are stored in the sensor, a check is carried out to determine if the data fit the sensor. If the data do not fit, a fault signal is triggered or the function is blocked. When data are being written into the sensor, the display shows which instrument type the data originate from and which TAG-no. this sensor had.

**Info - Instrument name**

In this menu, you read out the instrument name and the instrument serial number:

VEGAPULS 63 • Foundation Fieldbus
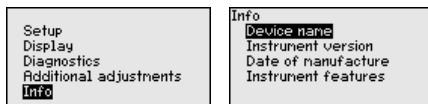
**Info - Instrument version**  In this menu item, the hardware and software version of the sensor is displayed.
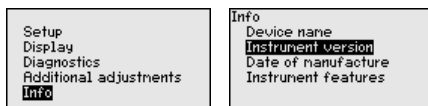
**Info - Date of manufacture**  In this menu item, the date of factory calibration of the sensor as well as the date of the last change of sensor parameters are displayed via the display and adjustment module or via the PC.
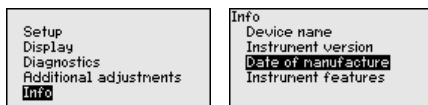
**Info - Device ID**  In this menu item, the FF Device ID of the instrument will be displayed:
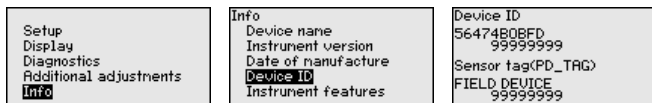
**Instrument features**  In this menu item, the features of the sensor such as approval, process fitting, seal, measuring range, electronics, housing and others are displayed.
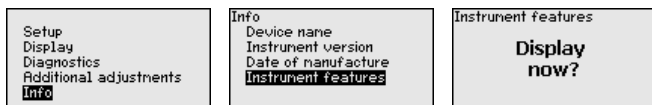
## 6.5 Saving the parameterisation data

**On paper**  We recommended writing down the adjustment data, e.g. in this operating instructions manual, and archiving them afterwards. They are thus available for multiple use or service purposes.

**In the display and adjustment module**  If the instrument is equipped with a display and adjustment module, the parameter adjustment data can be saved therein. The procedure is described in menu item "*Copy device settings*".

# 7 Setup with PACTware

## 7.1 Connect the PC

**Via the interface adapter directly on the sensor**
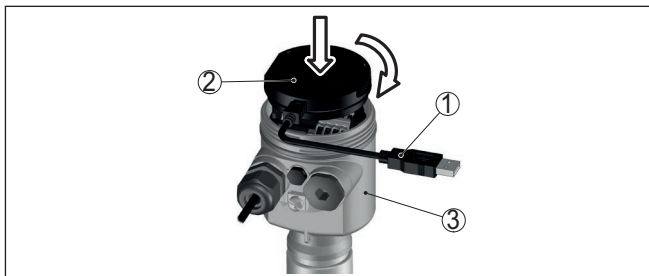


*Fig. 32: Connection of the PC directly to the sensor via the interface adapter*

*1 USB cable to the PC*
*2 Interface adapter VEGACONNECT*
*3 Sensor*

## 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.
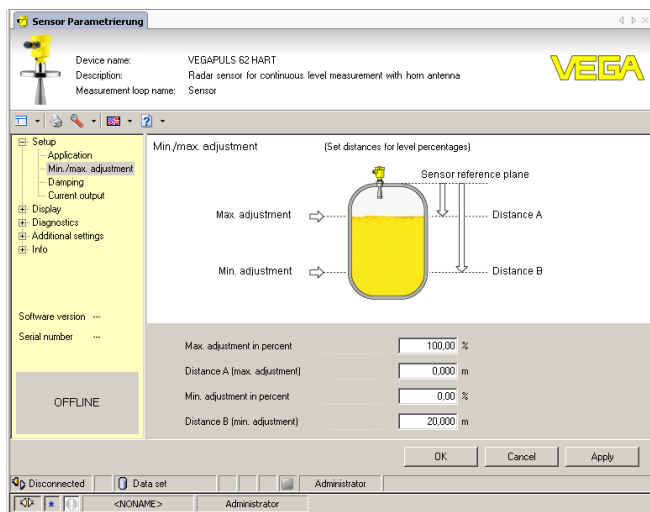
*Fig. 33: Example of a DTM view*

**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 Saving the parameterisation data

We recommend documenting or saving the parameterisation data via PACTware. That way the data are available for multiple use or service purposes.

# 8 Set up with other systems

## 8.1 DD adjustment programs

Device descriptions as Enhanced Device Description (EDD) are available for DD adjustment programs such as, for example, AMS↑ and PDM.

The files can be downloaded at www.vega.com/downloads under "*Software*".

## 8.2 Field Communicator 375, 475

Device descriptions for the instrument are available as EDD for parameterisation with Field Communicator 375 or 475.

Integrating the EDD into the Field Communicator 375 or 475 requires the "Easy Upgrade Utility" software, which is available from the manufacturer. This software is updated via the Internet and new EDDs are automatically accepted into the device catalogue of this software after they are released by the manufacturer. They can then be transferred to a Field Communicator.

# 9 Diagnosis, asset management and service

## 9.1 Maintenance

**Maintenance**

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

**Cleaning**

The cleaning helps that the type label and markings on the instrument are visible.

Take note of the following:

● Use only cleaning agents which do not corrode the housings, type label and seals
● Use only cleaning methods corresponding to the housing protection rating

## 9.2 Measured value and event memory

The instrument has several memories available for diagnostic purposes. The data remain there even in case of voltage interruption.

**Measured value memory**

Up to 100,000 measured values can be stored in the sensor in a ring memory. Each entry contains date/time as well as the respective measured value. Storable values are for example:

● Distance
● Filling height
● Percentage value
● Lin. percent
● Scaled
● Current value
● Measurement reliability
● Electronics temperature

When the instrument is shipped, the measured value memory is active and stores distance, measurement reliability and electronics temperature every 3 minutes.

The requested values and recording conditions are set via a PC with PACTware/DTM or the control system with EDD. Data are thus read out and also reset.

**Event memory**

Up to 500 events are automatically stored with a time stamp in the sensor (non-deletable). Each entry contains date/time, event type, event description and value. Event types are for example:

● Modification of a parameter
● Switch-on and switch-off times
● Status messages (according to NE 107)
● Error messages (according to NE 107)

The data are read out via a PC with PACTware/DTM or the control system with EDD.

**Echo curve memory**

The echo curves are stored with date and time and the corresponding echo data. The memory is divided into two sections:

**Echo curve of the setup:** This is used as reference echo curve for the measurement conditions during setup. Changes in the measurement conditions during operation or buildup on the sensor can thus be recognized. The echo curve of the setup is stored via:

● PC with PACTware/DTM
● Control system with EDD
● Display and adjustment module

**Further echo curves:** Up to 10 echo curves can be stored in a ring buffer in this memory section. Additional echo curves are stored via:

● PC with PACTware/DTM
● Control system with EDD

## 9.3 Asset Management function

The instrument features self-monitoring and diagnostics according to NE 107 and VDI/VDE 2650. In addition to the status messages in the following tables there are more detailed error messages available under the menu item "*Diagnostics*" via the respective adjustment module.

**Status messages**

The status messages are divided into the following categories:

● Failure
● Function check
● Out of specification
● Maintenance required

and explained by pictographs:
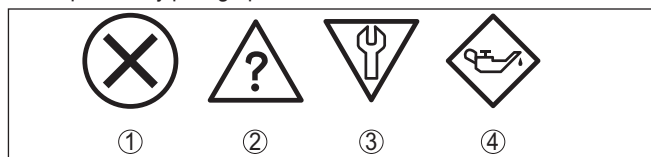


*Fig. 34: Pictographs of the status messages*

*1 Failure - red*
*2 Out of specification - yellow*
*3 Function check - orange*
*4 Maintenance required - blue*

**Failure:** Due to a malfunction in the instrument, a fault message is output.

This status message is always active. It cannot be deactivated by the user.

**Function check:** The instrument is being worked on, the measured value is temporarily invalid (for example during simulation).

This status message is inactive by default.

**Out of specification:** The measured value is unreliable because an instrument specification was exceeded (e.g. electronics temperature).

This status message is inactive by default.

**Maintenance required:** Due to external influences, the instrument function is limited. The measurement is affected, but the measured value is still valid. Plan in maintenance for the instrument because a failure is expected in the near future (e.g. due to buildup).

This status message is inactive by default.

**Failure (failure)**

| Code<br>Text message | Cause | Rectification | DevSpec<br>Diagnosis Bits |
|---|---|---|---|
| F013<br>no measured value available | Sensor does not detect an echo during operation<br>Antenna system dirty or defective | Check or correct installation and/or parameter settings<br>Clean or exchange process component or antenna | Bit 0 |
| F017<br>Adjustment span too small | Adjustment not within specification | Change adjustment according to the limit values (difference between min. and max. ≥ 10 mm) | Bit 1 |
| F025<br>Error in the linearization table | Index markers are not continuously rising, for example illogical value pairs | Check linearisation table<br>Delete table/Create new | Bit 2 |
| F036<br>No operable software | Failed or interrupted software update | Repeat software update<br>Check electronics version<br>Exchanging the electronics<br>Send instrument for repair | Bit 3 |
| F040<br>Error in the electronics | Hardware defect | Exchanging the electronics<br>Send instrument for repair | Bit 4 |
| F080 | General software error | Disconnect operating voltage briefly | Bit 5 |
| F105<br>Determine measured value | The instrument is still in the start phase, the measured value could not yet be determined | Wait for the end of the switch-on phase<br>Duration up to approx. 3 min. depending on the version and parameter settings | Bit 6 |
| F113<br>Communication error | Error in the internal instrument communication | Disconnect operating voltage briefly<br>Send instrument for repair | Bit 12 |
| F125<br>Impermissible electronics temperature | Temperature of the electronics in the non-specified range | Check ambient temperature<br>Insulate electronics<br>Use instrument with higher temperature range | Bit 7 |
| F260<br>Error in the calibration | Error in the calibration carried out in the factory<br>Error in the EEPROM | Exchanging the electronics<br>Send instrument for repair | Bit 8 |
| F261<br>Error in the configuration | Error during setup<br>False signal suppression faulty<br>Error when carrying out a reset | Repeat setup<br>Repeat reset | Bit 9 |

| Code<br>Text message | Cause | Rectification | DevSpec<br>Diagnosis Bits |
|---|---|---|---|
| F264<br>Installation/Setup error | Adjustment not within the vessel height/measuring range<br>Max. measuring range of the instrument not sufficient | Check or correct installation and/or parameter settings<br>Use an instrument with bigger measuring range | Bit 10 |
| F265<br>Measurement function disturbed | Sensor no longer carries out a measurement<br>Operating voltage too low | Check operating voltage<br>Carry out a reset<br>Disconnect operating voltage briefly | Bit 11 |

*Tab. 6: Error codes and text messages, information on causes as well as corrective measures*

**Function check**

| Code<br>Text message | Cause | Rectification | DevSpec<br>Diagnosis Bits |
|---|---|---|---|
| C700<br>Simulation active | A simulation is active | Finish simulation<br>Wait for the automatic end after 60 mins. | Bit 19 |

**Out of specification**

| Code<br>Text message | Cause | Rectification | DevSpec<br>Diagnosis Bits |
|---|---|---|---|
| S600<br>Impermissible electronics temperature | Temperature of the electronics in the non-specified range | Check ambient temperature<br>Insulate electronics<br>Use instrument with higher temperature range | Bit 23 |
| S601<br>Overfilling | Danger of vessel overfilling | Make sure that there is no further filling<br>Check level in the vessel | Bit 24 |

**Maintenance**

| Code<br>Text message | Cause | Rectification | DevSpec<br>Diagnosis Bits |
|---|---|---|---|
| M500<br>Error during the reset "delivery status" | The data could not be restored during the reset to delivery status | Repeat reset<br>Load XML file with sensor data into the sensor | Bit 13 |
| M501<br>Error in the non-active linearisation table | Hardware error EEPROM | Exchanging the electronics<br>Send instrument for repair | Bit 14 |
| M502<br>Error in the diagnostics memory | Hardware error EEPROM | Exchanging the electronics<br>Send instrument for repair | Bit 15 |

| Code | Cause | Rectification | DevSpec |
| Text message | | | Diagnosis Bits |
|---|---|---|---|
| M503<br>Measurement reliability too low | The echo/noise ratio is too small for reliable measurement | Check installation and process conditions<br>Clean the antenna<br>Change polarisation direction<br>Use instrument with higher sensitivity | Bit 16 |
| M504<br>Error at a device interface | Hardware defect | Check connections<br>Exchanging the electronics<br>Send instrument for repair | Bit 17 |
| M505<br>No echo available | Level echo can no longer be detected | Clean the antenna<br>Use a more suitable antenna/sensor<br>Remove possible false echoes<br>Optimize sensor position and orientation | Bit 21 |

*Tab. 9: Error codes and text messages, information on causes as well as corrective measures*

## 9.4   Rectify faults

**Reaction when malfunction occurs**

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

**Fault rectification**

The first measures are:

● Evaluation of fault messages
● Checking the output signal
● Treatment of measurement errors

A smartphone/tablet with the adjustment app or a PC/notebook with the software PACTware and the suitable DTM offer you further comprehensive diagnostic possibilities. In many cases, the causes can be determined in this way and the faults eliminated.

The tables below give typical examples of application-related measurement errors.

The images in column "*Error description*" show the actual level as a dashed line and the output level as a solid line.
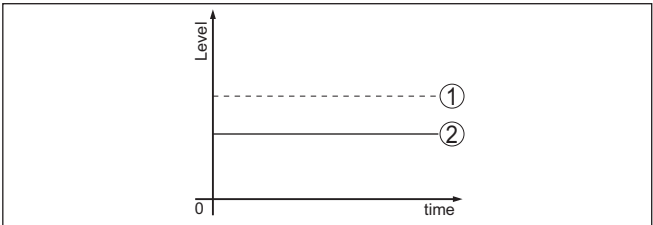


1   *Real level*
2   *Level displayed by the sensor*

**Note:**

If the output level is constant, the cause could also be the fault setting of the current output to "*Hold value*".
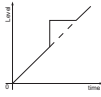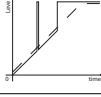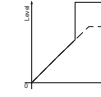
If the level is too low, the reason could be a line resistance that is too high

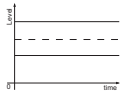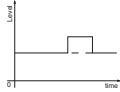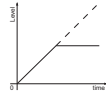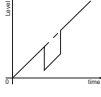**Measurement error with constant level**

| Fault description | Cause | Rectification |
|---|---|---|
| Measured value shows a too low or too high level | Min./max. adjustment not correct | Adapt min./max. adjustment |
| | Incorrect linearisation curve | Adapt linearisation curve |
| | Installation in a bypass tube or standpipe, hence running time error (small measurement error close to 100 %/large error close to 0 %) | Check parameter "Application" with respect to vessel form, adapt if necessary (bypass, standpipe, diameter). |
| Measured value jumps towards 0 % | Multiple echo (vessel top, product surface) with amplitude higher than the level echo | Check parameter "Application", especially vessel top, type of medium, dished bottom, high dielectric constant, and adapt if necessary. |
| Measured value jumps towards 100 % | Due to the process, the amplitude of the level echo sinks | Carry out a false signal suppression |
| | A false signal suppression was not carried out | |
| | Amplitude or position of a false signal has changed (e.g. condensation, buildup); false signal suppression no longer matches actual conditions | Determine the reason for the changed false signals, carry out false signal suppression, e.g. condensation. |

**Measurement error during filling**

| Fault description | Cause | Rectification |
|---|---|---|
| Measured value remains unchanged during filling | False signals in the close range too big or level echo too small | Eliminate false signals in the close range |
| | Strong foam or vortex generation | Check measurement situation: Antenna must protrude out of the socket, installations |
| | Max. adjustment not correct | Remove contamination on the antenna |
| | | In case of interferences due to installations in the close range: Change polarisation direction |
| | | Create a new false signal suppression |
| | | Adapt max. adjustment |

| Fault description | Cause | Rectification |
|---|---|---|
| Measured value remains in the area of the bottom during filling | Echo from the tank bottom larger than the level echo, for example, with products with $\varepsilon_r$ < 2.5 oil-based, solvents | Check parameters Medium, Vessel height and Floor form, adapt if necessary |
| Measured value remains momentarily unchanged during filling and then jumps to the correct level | Turbulence on the medium surface, quick filling | Check parameters, change if necessary, e.g. in dosing vessel, reactor |
| Measured value jumps towards 0 % during filling | Amplitude of a multiple echo (vessel top - product surface) is larger than the level echo | Check parameter "Application", especially vessel top, type of medium, dished bottom, high dielectric constant, and adapt if necessary. |
| | The level echo cannot be distinguished from the false signal at a false signal position (jumps to multiple echo) | In case of interferences due to installations in the close range: Change polarisation direction<br><br>Chose a more suitable installation position |
| Measured value jumps towards 100 % during filling | Due to strong turbulence and foam generation during filling, the amplitude of the level echo sinks. Measured value jumps to false signal | Carry out a false signal suppression |
| Measured value jumps sporadically to 100 % during filling | Varying condensation or contamination on the antenna | Carry out a false signal suppression or increase false signal suppression with condensation/contamination in the close range by editing. |
| Measured value jumps to ≥ 100 % or 0 m distance | Level echo is no longer detected in the close range due to foam generation or false signals in the close range. The sensor goes into overfill protection mode. The max. level (0 m distance) as well as the status message "Overfilling" are output. | Check measuring site: Antenna must protrude out of the socket<br><br>Remove contamination on the antenna<br><br>Use a sensor with a more suitable antenna |

**Measurement error during emptying**

| Fault description | Cause | Rectification |
|---|---|---|
| Measured value remains unchanged in the close range during emptying | False signal larger than the level echo<br><br>Level echo too small | Eliminate false signal in the close range. Check: Antenna must protrude from the socket |
| | | Remove contamination on the antenna |
| | | In case of interferences due to installations in the close range: Change polarisation direction |
| | | After eliminating the false signals, the false signal suppression must be deleted. Carry out a new false signal suppression |
| Measured value jumps towards 0 % during emptying | Echo from the tank bottom larger than the level echo, for example, with products with $\varepsilon_r$ < 2.5 oil-based, solvents | Check parameters Medium type, Vessel height and Floor form, adapt if necessary |
| Measured value jumps sporadically towards 100 % during emptying | Varying condensation or contamination on the antenna | Carry out false signal suppression or increase false signal suppression in the close range by editing |
| | | With bulk solids, use radar sensor with purging air connection |

**Reaction after fault rectification**

Depending on the reason for the fault and the measures taken, the steps described in chapter "*Setup*" must be carried out again or must be checked for plausibility and completeness.

**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 also available outside normal working hours, seven days a week around the clock.

Since we offer this service worldwide, the support is provided in English. The service itself is free of charge, the only costs involved are the normal call charges.

## 9.5 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, the electronics module can be ordered through the agency serving you. The electronics modules are adapted to the respective sensor and differ in signal output or voltage supply.

The new electronics module must be loaded with the default settings of the sensor. These are the options:

● In the factory
● Or on site by the user

In both cases, the serial number of the sensor is needed. The serial numbers are stated on the type label of the instrument, on the inside of the housing as well as on the delivery note.

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

⚠ **Caution:**
All application-specific settings must be entered again. That's why you have to carry out a fresh setup after exchanging the electronics.

If you saved the parameter settings during the first setup of the sensor, you can transfer them to the replacement electronics module. A fresh setup is then not necessary.

## 9.6 Software update

The device software can be updated in the following ways:

● Interface adapter VEGACONNECT
● HART signal
● Bluetooth

Depending on the method, the following components are required:

● Instrument
● Voltage supply
● Interface adapter VEGACONNECT
● Display and adjustment module PLICSCOM with Bluetooth function
● PC with PACTware/DTM and Bluetooth USB adapter
● Current instrument software as file

You can find the current instrument software as well as detailed information on the procedure in the download area of our homepage: www.vega.com.

You can find information about the installation in the download file.

⚠ **Caution:**
Instruments with approvals can be bound to certain software versions. Therefore make sure that the approval is still effective after a software update is carried out.

You can find detailed information in the download area at www.vega.com.

## 9.7 How to proceed if a repair is necessary

You can find an instrument return form as well as detailed information about the procedure in the download area of our homepage. By doing this you help us carry out the repair quickly and without having to call back for needed information.

In case of repair, proceed as follows:

VEGA

- 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
- Ask the agency serving you to get the address for the return shipment. You can find the agency on our homepage.

# 10 Dismount

## 10.1 Dismounting steps

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

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

## 10.2 Disposal

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

**WEEE directive**
The instrument does not fall in the scope of the EU WEEE directive. Article 2 of this Directive exempts electrical and electronic equipment from this requirement if it is part of another instrument that does not fall in the scope of the Directive. These include stationary industrial plants.

Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points.

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

# 11 Supplement

## 11.1 Technical data

**Note for approved instruments**

The technical data in the respective safety instructions which are included in delivery are valid for approved instruments (e.g. with Ex approval). These data can differ from the data listed herein, for example regarding the process conditions or the voltage supply.

All approval documents can be downloaded from our homepage.

---

**General data**

316L corresponds to 1.4404 or 1.4435

Materials, wetted parts

| | |
|---|---|
| − Hygienic antenna encapsulation | PTFE, TFM-PTFE, PFA |
| − Surface roughness of the antenna encapsulation | $R_a$ < 0.8 µm |
| − Additional process seal with certain hygienic fittings | FKM, EPDM |

Materials, non-wetted parts

| | |
|---|---|
| − Process fitting | 316L |
| − Plastic housing | Plastic PBT (Polyester) |
| − Aluminium die-cast housing | Aluminium die-casting AlSi10Mg, powder-coated (Basis: Polyester) |
| − Stainless steel housing | 316L |
| − Cable gland | PA, stainless steel, brass |
| − Sealing, cable gland | NBR |
| − Blind plug, cable gland | PA |
| − Inspection window housing cover | Polycarbonate (UL-746-C listed), glass[3] |
| − Ground terminal | 316L |

| | |
|---|---|
| Conductive connection | Between ground terminal and process fitting |

Process fittings

| | |
|---|---|
| − Flanges | DIN from DN 25, ASME from 1" |
| − Hygienic fittings | Clamp, slotted nut according to DIN 11851, hygienic fitting with saddle flange according to DIN 11864-2-A, SMS |

| | |
|---|---|
| Weight (depending on housing, process fitting and antenna) | approx. 3.5 … 15.5 kg (4.409 … 33.95 lbs) |

---

**Torques**

| | |
|---|---|
| Required torque of the flange screws for standard flanges | 60 Nm (44.25 lbf ft) |
| Recommended torque for tightening the flange screws of standard flanges | 60 … 100 Nm (44.25 … 73.76 lbf ft) |

---

[3] Glass with Aluminium and stainless steel precision casting housing

VEGAPULS 63 • Foundation Fieldbus

Max. torque, hygienic fittings

‒ Flange screws DRD connection          20 Nm (14.75 lbf  ft)

Max. torque for NPT cable glands and Conduit tubes

‒ Plastic housing          10 Nm (7.376 lbf ft)

‒ Aluminium/Stainless steel housing          50 Nm (36.88 lbf ft)

**Input variable**

Measured variable          The measured quantity is the distance between the end of the sensor antenna and the product surface. The reference plane for the measurement is the lower side of the flange plating.
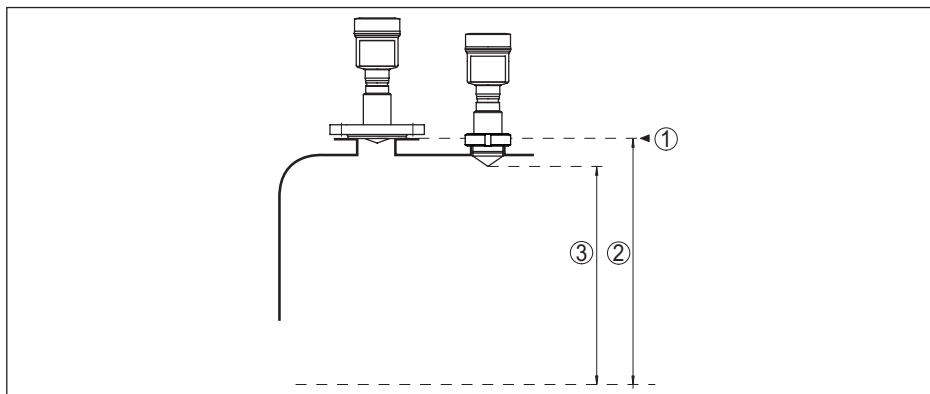


*Fig. 35: Data of the input variable*

*1    Reference plane*
*2    Measured variable, max. measuring range*
*3    Utilisable measuring range*

**Standard electronics**

Max. measuring range          35 m (114.8 ft)

Recommended measuring range

‒ Flange DN 50, 2"          up to 15 m (49.21 ft)

‒ Flange DN 80, 3"          up to 35 m (114.8 ft)

**Electronics with increased sensitivity**

Max. measuring range          75 m (246.1 ft)

Flange DN 50, 2"          up to 15 m (49.21 ft)

Flange DN 80, 3"          up to 35 m (114.8 ft)

**Output variable**

Output signal          digital output signal, Foundation Fieldbus protocol

Transmission rate          31.25 Kbit/s

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

Channel Numbers

- – Channel 1                              Process value
- – Channel 8                              Electronics temperature

Current value

- – Non-Ex and Ex ia instrument           12 mA, ±0.5 mA
- – Ex-d-ia instruments                    16 mA, ±0.5 mA

Resolution, digital                        > 1 mm (0.039 in)

## Deviation (according to DIN EN 60770-1)

Process 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)

Installation reference conditions

- – Min. distance to internal installations  > 200 mm (7.874 in)
- – Reflector                              Flat plate reflector
- – False reflections                      Biggest false signal, 20 dB smaller than the useful signal

Deviation with liquids                     ≤ 2 mm (meas. distance > 0.5 m/1.64 ft)

Non-repeatability[4]                        ≤ 1 mm

Deviation with bulk solids                 The values depend to a great extent on the application. Binding specifications are thus not possible.



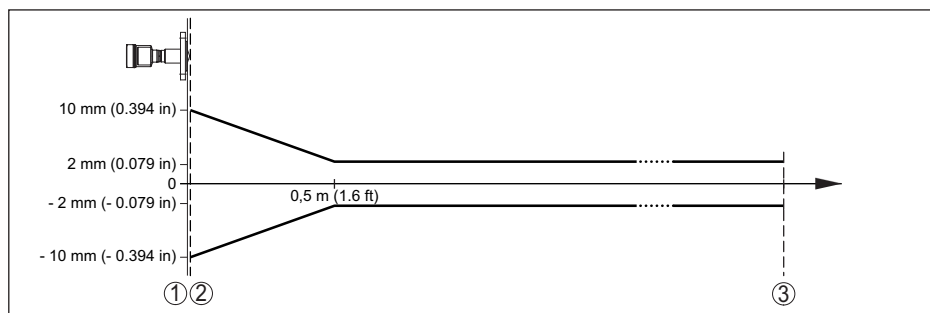*Fig. 36: Deviation under reference conditions*

*1    Reference plane*
*2    Antenna edge*
*3    Recommended measuring range*

## Variables influencing measurement accuracy

Temperature drift - Digital output         < 3 mm/10 K, max. 10 mm

Additional deviation through electromag-   < 50 mm
netic interference acc. to EN 61326

---

[4]  Already included in the meas. deviation

VEGAPULS 63 • Foundation Fieldbus

**Influence of the superimposed gas and pressure on measurement accuracy**

The propagation speed of the radar impulses in gas or vapour above the medium is reduced by high pressure. This effect depends on the type of superimposed gas or vapour and is especially large at low temperatures.

The following table shows the resulting deviation for some typical gases and vapours. The specified values refer to the distance. Positive values mean that the measured distance is too large, negative values that the measured distance is too small.

| Gas phase | Temperature | Pressure | | | | |
|---|---|---|---|---|---|---|
| | | 1 bar (14.5 psig) | 10 bar (145 psig) | 50 bar (725 psig) | 100 bar (1450 psig) | 200 bar (2900 psig) |
| Air | 20 °C/68 °F | 0 % | 0.22 % | 1.2 % | 2.4 % | 4.9 % |
| | 200 °C/392 °F | -0.01 % | 0.13 % | 0.74 % | 1.5 % | 3 % |
| | 400 °C/752 °F | -0.02 % | 0.08 % | 0.52 % | 1.1 % | 2.1 % |
| Hydrogen | 20 °C/68 °F | -0.01 % | 0.10 % | 0.61 % | 1.2 % | 2.5 % |
| | 200 °C/392 °F | -0.02 % | 0.05 % | 0.37 % | 0.76 % | 1.6 % |
| | 400 °C/752 °F | -0.02 % | 0.03 % | 0.25 % | 0.53 % | 1.1 % |
| Steam (saturated steam) | 100 °C/212 °F | 0.26 % | - | - | - | - |
| | 180 °C/356 °F | 0.17 % | 2.1 % | - | - | - |
| | 264 °C/507 °F | 0.12 % | 1.44 % | 9.2 % | - | - |
| | 366 °C/691 °F | 0.07 % | 1.01 % | 5.7 % | 13.2 % | 76 % |

**Characteristics and performance data**

| | |
|---|---|
| Measuring frequency | K-band (26 GHz technology) |

Measuring cycle time
- Standard electronics approx.           450 ms
- Electronics with increased sensitivity approx.           700 ms

Step response time[5]           ≤ 3 s

Beam angle[6]
- Clamp 2", 3"           18°
- Clamp 3½", 4"           10°
- Slotted nut DN 50           18°
- Slotted nut DN 80           10°
- Flange DN 50, ASME 2"           18°
- Flange DN 80 … DN 150, ASME 3" … 6"           10°

Emitted HF power (depending on the parameter setting)[7]
- Average spectral transmission power density           -14 dBm/MHz EIRP

[5] Time span after a sudden measuring distance change by max. 0.5 m in liquid applications, max 2 m with bulk solids applications, until the output signal has taken for the first time 90 % of the final value (IEC 61298-2).
[6] Outside the specified beam angle, the energy level of the radar signal is 50% (-3 dB) less.
[7] EIRP: Equivalent Isotropic Radiated Power.

- – Max. spectral transmission power density +43 dBm/50 MHz EIRP
- – Max. power density at a distance of 1 m < 1 µW/cm²

**Ambient conditions**

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

**Process conditions**

The following specifications are for information. The specifications on the type plate must be noted.

**Process temperature**

| Antenna encapsulation | Version | Process temperature (measured on the process fitting) |
|---|---|---|
| PTFE and PTFE 8 mm | Standard | -40 … +200 °C (-40 … +392 °F) |
| | Low temperature | -196 … +200 °C (-321 … +392 °F) |
| TFM-PTFE and TFM-PTFE 8 mm | Standard | -40 … +150 °C (-40 … +302 °F) |
| TFM-PTFE 8 mm | Flange Alloy 400 (2.4360) | -10 … +150 °C (14 … +302 °F) |
| PTFE | Additional process seal, FKM | -20 … +130 °C (-4 … +266 °F) |
| | Additional process seal, EPDM | -40 … +130 °C (-40 … +266 °F) |
| PFA and PFA 8 mm | Standard | -40 … +150 °C (14 … +302 °F) |
| | High temperature | -40 … +200 °C (-40 … +392 °F) |

**SIP process temperature** (SIP = Sterilisation in place)

Applies to instruments configurations suitable for vapour, i.e. flange or hygienic fitting with encapsulated antenna system.

| Vapour stratification up to 2 h | +150 °C (+302 °F) |

**Process pressure**

| Process fitting | Version | Process pressure |
|---|---|---|
| Standard (PTFE and PFA) | Flange PN 6 | -1 … 6 bar (-100 … 600 kPa/-14.5 … 87 psig) |
| | Flange PN 10 (150 lb) | -1 … 10 bar (-100 … 1000 kPa/-14.5 … 145 psig) |
| | Flange PN 16 (300 lb), PN 40 (600 lb) | -1 … 16 bar (-100 … 1600 kPa/-14.5 … 232 psig) |
| Tieftemperature version up to -196 °C (-321 °F) | Flange DN 50, DN 80 PN 16, PN 40<br>2", 3" 300 lb 600 lb | -1 … 20 bar (-100 … 2000 kPa/-14.5 … 290 psig) |

| Process fitting | Version | Process pressure |
|---|---|---|
| Hygienic | SMS | -1 … 6 bar (-100 … 600 kPa/-14.5 … 87 psig) |
| | Varivent<br>Clamp 3", 3½", 4" | -1 … 10 bar (-100 … 1000 kPa/-14.5 … 145 psig) |
| | Remaining hygienic fittings | -1 … 16 bar (-100 … 1600 kPa/-14.5 … 232 psig) |

Vibration resistance                    4 g at 5 … 200 Hz according to EN 60068-2-6 (vibration with resonance)

Shock resistance                        100 g, 6 ms according to EN 60068-2-27 (mechanical shock)

## Electromechanical data - version IP66/IP67 and IP66/IP68 (0.2 bar)

Options of the cable entry

‒ Cable entry                           M20 x 1.5; ½ NPT
‒ Cable gland                           M20 x 1.5; ½ NPT (cable ø see below table)
‒ Blind plug                            M20 x 1.5; ½ NPT
‒ Closing cap                           ½ NPT

| Material ca-<br>ble gland | Material seal<br>insert | Cable diameter | | | | |
|---|---|---|---|---|---|---|
| | | 4.5 … 8.5 mm | 5 … 9 mm | 6 … 12 mm | 7 … 12 mm | 10 … 14 mm |
| PA | NBR | – | ● | ● | – | ● |
| Brass, nickel-plated | NBR | ● | ● | ● | – | – |
| Stainless steel | NBR | – | ● | ● | – | ● |

Wire cross-section (spring-loaded terminals)

‒ Massive wire, stranded wire          0.2 … 2.5 mm² (AWG 24 … 14)
‒ Stranded wire with end sleeve        0.2 … 1.5 mm² (AWG 24 … 16)

## Electromechanical data - version IP66/IP68 (1 bar)

Options of the cable entry

‒ Cable gland with integrated connec-   M20 x 1.5 (cable ø 5 … 9 mm)
  tion cable
‒ Cable entry                           ½ NPT
‒ Blind plug                            M20 x 1.5; ½ NPT

Connection cable

‒ Wire cross-section                    0.5 mm² (AWG 20)
‒ Wire resistance                       < 0.036 Ω/m
‒ Tensile strength                      < 1200 N (270 lbf)
‒ Standard length                       5 m (16.4 ft)
‒ Max. length                           180 m (590.6 ft)
‒ Min. bending radius (at 25 °C/77 °F)  25 mm (0.984 in)
‒ Diameter                              approx. 8 mm (0.315 in)

| | |
|---|---|
| – Colour - Non-Ex version | Black |
| – Colour - Ex-version | Blue |

**Interface to the external display and adjustment unit**

| | |
|---|---|
| Data transmission | Digital ($I^2$C-Bus) |
| Connection cable | Four-wire |

| Sensor version | Configuration, connection cable | | | |
|---|---|---|---|---|
| | Cable length | Standard cable | Special cable | Shielded |
| 4 … 20 mA/HART | 50 m | ● | – | – |
| Profibus PA, Founda-tion Fieldbus | 25 m | – | ● | ● |

**Integrated clock**

| | |
|---|---|
| Date format | Day.Month.Year |
| Time format | 12 h/24 h |
| Time zone, factory setting | CET |
| Max. rate deviation | 10.5 min/year |

**Additional output parameter - Electronics temperature**

| | |
|---|---|
| Range | -40 … +85 °C (-40 … +185 °F) |
| Resolution | < 0.1 K |
| Deviation | ±3 K |
| Output of the temperature values | |
| – Indication | Via the display and adjustment module |
| – Output | Via the respective output signal |

**Voltage supply**

| | |
|---|---|
| Operating voltage $U_B$ | 9 … 32 V DC |
| Operating voltage $U_B$ with lighting switched on | 13.5 … 32 V DC |
| Power supply by/max. number of sensors | |
| – Fieldbus | max. 32 |

**Potential connections and electrical separating measures in the instrument**

| | |
|---|---|
| Electronics | Not non-floating |
| Reference voltage[8] | 500 V AC |
| Conductive connection | Between ground terminal and metallic process fitting |

---

[8] Galvanic separation between electronics and metal housing parts

VEGAPULS 63 • Foundation Fieldbus

**Electrical protective measures**

| Housing material | Version | Protection acc. to IEC 60529 | Protection acc. to NEMA |
|---|---|---|---|
| Plastic | Single chamber | IP66/IP67 | Type 4X |
| | Double chamber | IP66/IP67 | Type 4X |
| Aluminium | Single chamber | IP66/IP68 (0.2 bar) IP68 (1 bar) | Type 6P - |
| | Double chamber | IP66/IP68 (0.2 bar) IP68 (1 bar) | Type 6P - |
| Stainless steel (electro-polished) | Single chamber | IP66/IP68 (0.2 bar) IP69K (0.2 bar) | Type 6P Type 6P |
| Stainless steel (precision casting) | Single chamber | IP66/IP68 (0.2 bar) IP68 (1 bar) | Type 6P - |
| | Double chamber | IP66/IP68 (0.2 bar) IP68 (1 bar) | Type 6P - |

| | |
|---|---|
| Connection of the feeding power supply unit | Networks of overvoltage category III |
| Altitude above sea level | |
| – by default | up to 2000 m (6562 ft) |
| – with connected overvoltage protection | up to 5000 m (16404 ft) |
| Pollution degree (with fulfilled housing protection) | 4 |
| Protection rating (IEC 61010-1) | III |

## 11.2 Device communication Foundation Fieldbus

In the following, the necessary device-specific details are shown. You can find further information of Foundation Fieldbus on www.fieldbus.com.

**Overview**

The following table gives you an overview of the instrument versions and the corresponding device descriptions, the electrical characteristics of the bus system as well as the applied function blocks.

| Revisions Data | DD-Revision | Rev_01 |
|---|---|---|
| | CFF-File | 010101.cff |
| | Device Revision | 0101.ffo 0101.sym |
| | Cff-Revision | xx xx 01 |
| | Device software revision | > 4.4.0 |
| | ITK (Interoperability Test Kit) Number | 5.2.0 |

VEGA

| Electricial Characteristics | Physicial Layer Type | Low-power signaling, bus-pow-ered, FISCO I.S. |
|---|---|---|
| | Input Impedance | > 3000 Ohms between 7.8 KHz - 39 KHz |
| | Unbalanced Capacitance | < 250 pF to ground from either input terminal |
| | Output Amplitude | 0.8 V P-P |
| | Electrical Connection | 2 Wire |
| | Polarity Insensitive | Yes |
| | Max. Current Load | 10 mA |
| | Device minimum operating voltage | 9 V |
| Transmitter Function Blocks | Resource Block (RB) | 1 |
| | Transducer Block (TB) | 1 |
| | Standard Block (AI) | 3 |
| | Execution Time | 30 mS |
| Advanced Function Blocks | Discret Input (DI) | Yes |
| | PID Control | Yes |
| | Output Splitter (OS) | Yes |
| | Signal Characterizer (SC) | Yes |
| | Integrator | Yes |
| | Input Selector (IS) | Yes |
| | Arithmetic (AR) | Yes |
| Diagnostics | Standard | Yes |
| | Advanced | Yes |
| | Performance | No |
| | Function Blocks Instantiable | No |
| General Information | LAS (Link Active Scheduler) | Yes |
| | Master Capable | Yes |
| | Number of VCRs (Virtual Communication Re-lationships) | 24 |

**Parameter list**

The following table gives you an overview of the parameters used.

| FF desciptor | Description | Unit |
|---|---|---|
| PRIMARY_VALUE | PRIMARY_VALUE (Linearized value). This is the process val-ue after min/max adjustment and Linearization with the status of the transducer block. The unit is defined in "*PRIMARY_VAL-UE_UNIT*" | |
| PRIMARY_VALUE_UNIT | Selected unit code for "*PRIMARY_VALUE*" | |

VEGAPULS 63 • Foundation Fieldbus

36514-EN-200427

| FF desciptor | Description | Unit |
|---|---|---|
| SECONDARY_VALUE_1 | This is the measured value after min/max adjustment with the status of the transducer block. The unit is defined in "*SECOND-ARY_VALUE_1_UNIT*" | |
| SECONDARY_VALUE_1_UNIT | Selected unit code for "*SECONDARY_VALUE_1*" | |
| SECONDARY_VALUE_2 | This is the distance value ("*sensor_value*") with the status of the transducer block. The unit is defined in "*SECONDARY_VAL-UE_2_UNIT*" | |
| FILL_HEIGHT_VALUE | Filling height. The unit is defined in "*FILL_HEIGHT_VALUE_UNIT*" | |
| FILL_HEIGHT_VALUE_UNIT | Filling height unit | |
| CONST_VALUE | Constant value | |
| SECONDARY_VALUE_1_TYPE | Secondary value 1 type | |
| SECONDARY_VALUE_2_TYPE | Secondary value 2 type | |
| FILL_HEIGHT_VALUE_Type | Filling height value type | |
| DIAGNOSIS | AITB Diagnosis | |
| DIAG_MASK_1 | | |
| DIAG_OUT_1 | | |
| DIAG_MASK_2 | | |
| DIAG_OUT_2 | | |
| DEVICE_IDENTIFICATION | Manufacturer ID, device type, bus type ID, measurement principle, serial number, DTM ID, device revision | |
| DEVICE_NAME | Device name | |
| IS-SPARE_ELECTRONICS | Device name | |
| DEVICE_VERSION_INFO | Hard- and software version for system, function and error | |
| CALIBRATION_DATE | Day, month and year | |
| FIRMWARE_VERSION_ASCII | Software version | |
| HW_VERSION_ASCII | Hardware version | |
| ADJUSTMENT_DATA | Min./max.-adjustment physical, percent and offset | |
| FIRMWARE_VERSION_MAIN | Software versions major, minor, revision and build | |
| PHYSICAL_VALUES | Distance, distance unit, distance status, level and status | |
| DEVICE_UNITS | Distance and temperature units of the instrument | |
| APPLICATION_CONFIG | Medium type, media, application type, vessel bottom, vessel height | |
| LINEARIZATION_TYPE_SEL | Type of linearization | |
| SIMULATION_PHYSCAL | | |
| INTEGRATION_DATA | Physical offset and integration time | |
| DEVICE_CONFIG_PULS_RADAR | Electronics variant, probe type, max. measuring range, antenna extension length, adjustment propagation antenna extension lprapproval configuration | |

VEGA

| FF desciptor | Description | Unit |
|---|---|---|
| ADJUSTMENT_LIMITS_MIN | Min. range min.-/max.- values physical, percent, offset | |
| ADJUSTMENT_LIMITS_MAX | Max. range min.-/max.- values physical, percent, offset | % |
| FALSE_SIGNAL_COMMAND | | % |
| FALSE_SIGNAL_CMD_CRE-ATE_EXTEND | | |
| FALSE_SIGNAL_CMD_DE-LET_REGION | | |
| FALSE_SIGNAL_CMD_STATE | Busy, last command, errorcode | |
| FALSE_SIGNAL_CMD_CON-FIGURATION1 | Amplitude safety of the 0 % curve, safety of the false signal suppression, position of the 0 % and 100 % curve in near and far range | |
| FALSE_SIGNAL_CMD_CON-FIGURATION2 | Gradient of the manual sectors, safety at the end of false echo memory and depending on the import range gating out the false signals | |
| ECP_CURVE_AVARAGING_CONFIG | Averaging factor on increasing and decreasing amplitude | |
| LEVEL_ECHO_MEASURE-MENT | Function measured value filter | |
| ECHO_CURVE_STATUS | | |
| PACKET_COUNT | | |
| GU_ID_END | | |
| ECHO_CURVE_READ | Echo curve data | |
| ECHO_EVALUATOR | Echo parameters, first large echo, amplitude threshold first large echo | |
| ECHO_DECIDER | Echo selection criteria, fault signal on loss of echo, delay on fault signal on loss of echo | |
| DISPLAY_SETTINGS | Indication value, menu language, lightning | |
| SIL_MODE | | |
| EDENVELOPE_CURVE_FIL-TER | Parameters of envelope curve filter, activation of smooth raw value curve | |
| EDDETECTION_CURVE_FIL-TER | Parameters of the detection filter, offset threshold value curve | |
| EDECHO_COMBINATION | Parameters for echo combination, function combine echoes, amplitude difference of combined echoes, position difference of combined echoes | |
| LIN_TABLE_A … LIN_TABLE_Q | 32 couples of percentage and lin. percentage values | |
| ELECTRONICS_INFORMA-TION | Electronics version | |
| APPLICATION_CONFIG_SERVICE | Limitation measuring range begin, safety of measuring range end | |
| LEVEL_ECHO_INFO | Level echo ID, amplitude, measurement safety | |
| DEVICE_STATUS | Device status | |
| FALSE_SIGNAL_LIMITS | False signal distance min./max. | |

| FF desciptor | Description | Unit |
|---|---|---|
| USER_PEAK_ELEC_TEMP | Min.-/max.- values of electronics temperature, date | |
| USER_MIN_MAX_PHYSI-CAL_VALUE | Min.-/max.- distance values, date | |
| RESET_PEAK_PHYSICAL_VALUE | | |
| RESET_LINEARIZATION_CURVE | | |
| DEVICE_STATUS_ASCII | Device status | |
| ECHO_CURVE_PLICSCOM_REQUEST | Parameters as curve selection and resolution | |
| ECHO_CURVE_PLICSCOM_LIMITS | Parameters as start and end | |
| APPROVAL_WHG | Sensor acc. to WHG | |
| DEVICE_STATE_CONFIG | Function check, maintenance required, out of specification | |
| ELECTRONIC_TEMPERA-TURE | Electronics temperature | |
| RESET_PEAK_ELECTRON-IC_TEMP | | |
| FOCUS_RANGE_CONFIG | Width focusing range, time for opening the focusing range, min. measurement reliability in and outside the focusing range | |
| NOISE_DETECTION_INFO | Increase of the system noise | |
| NOISE_DETECTION_CON-FIG | System noise treatment | |
| ECHO_MEM_SAVE_CURVE_TYPE | | |
| ECHO_MEM_STATE | Busy, curve type, error code | |

## 11.3 Dimensions

The following dimensional drawings represent only an extract of all possible versions. Detailed dimensional drawings can be downloaded at www.vega.com/downloads under "*Drawings*".

**VEGA**
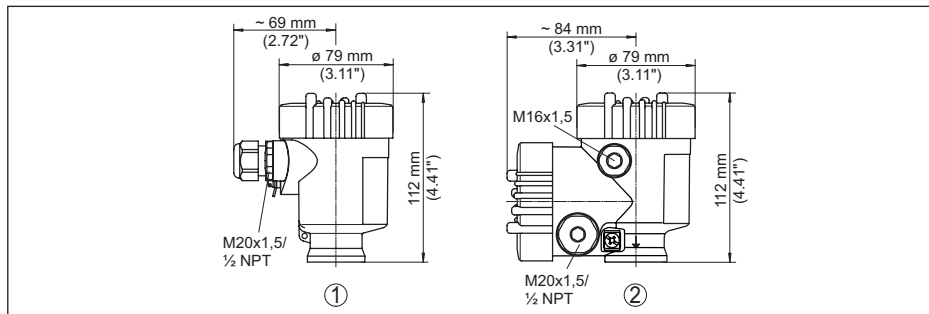
### Plastic housing



*Fig. 37: Housing versions in protection IP66/IP67 (with integrated display and adjustment module the housing is 9 mm/0.35 in higher)*

*1   Plastic single chamber*
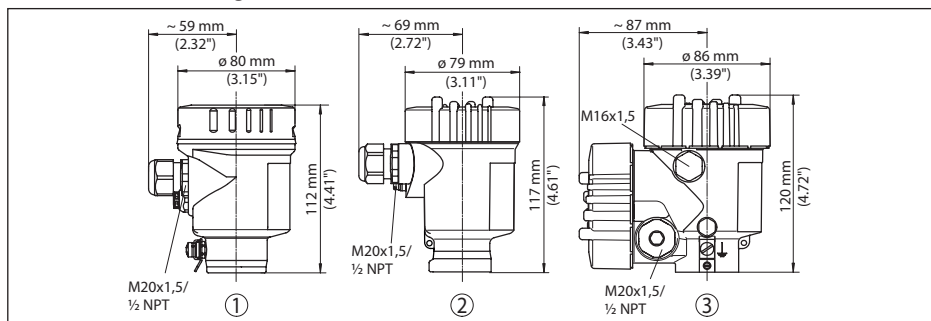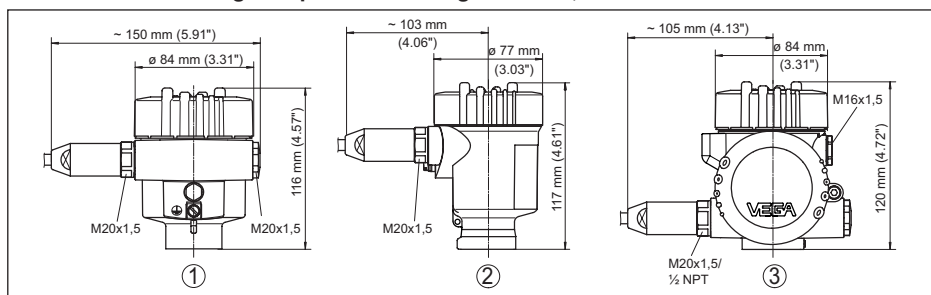*2   Plastic double chamber*

### Aluminium housing
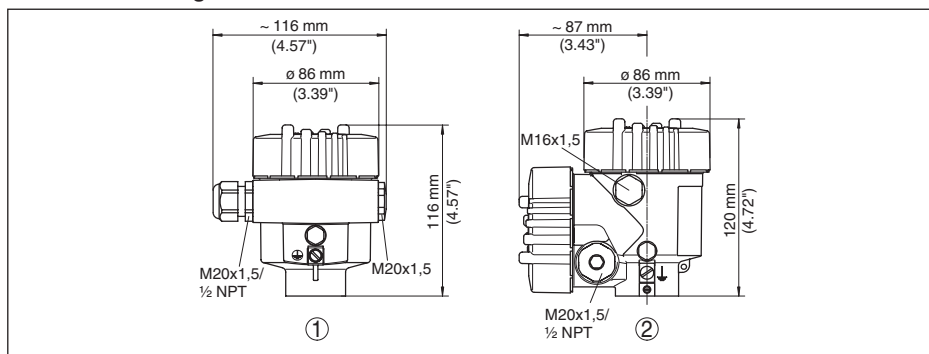


*Fig. 38: Housing versions with protection rating IP66/IP68 (0.2 bar), (with integrated display and adjustment module the housing is 18 mm/0.71 in higher)*

*1   Aluminium - single chamber*
*2   Aluminium - double chamber*

**Aluminium housing with protection rating IP66/IP68, 1 bar**
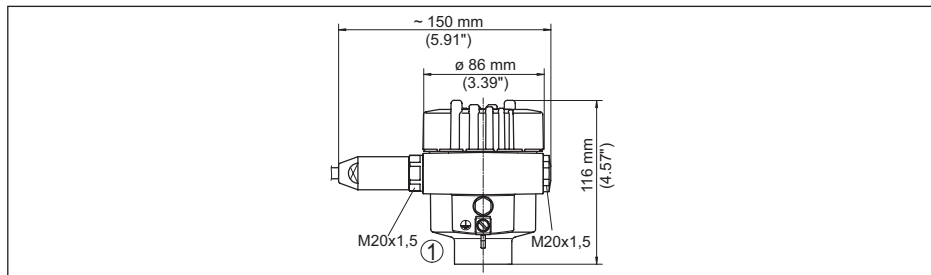


*Fig. 39: Housing version with protection rating IP66/IP68 (1 bar), (with integrated display and adjustment module the housing is 18 mm/0.71 in higher)*

1   Aluminium - single chamber

**Stainless steel housing**



*Fig. 40: Housing versions with protection rating IP66/IP68 (0.2 bar), (with integrated display and adjustment module the housing is 18 mm/0.71 in higher)*

1   Stainless steel single chamber (electropolished)
2   Stainless steel single chamber (precision casting)
3   Stainless steel double chamber housing (precision casting)

**Stainless steel housing with protection rating IP66/IP68, 1 bar**



*Fig. 41: Housing version with protection rating IP66/IP68 (1 bar), (with integrated display and adjustment module the housing is 18 mm/0.71 in higher)*

1   Stainless steel single chamber (precision casting)

**VEGAPULS 63, flange version**
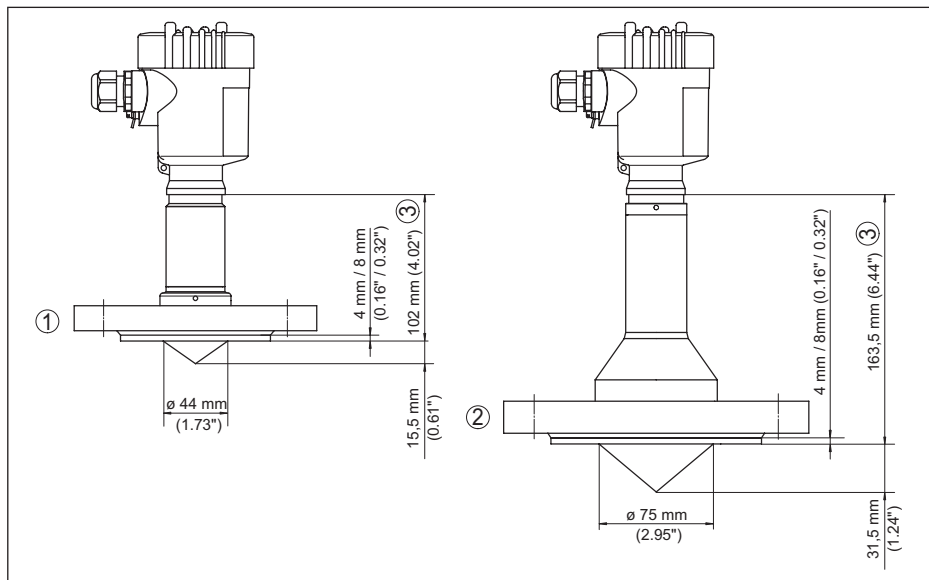


*Fig. 42: VEGAPULS 63, flange version*

1 DN 50, DN 65, 2", 2½"
2 from DN 80, 3"
3 With stainless steel housings and Aluminium double chamber housings, this dimension is 98 mm (3.86")

VEGAPULS 63 • Foundation Fieldbus

**VEGAPULS 63, flange version, low temperature**
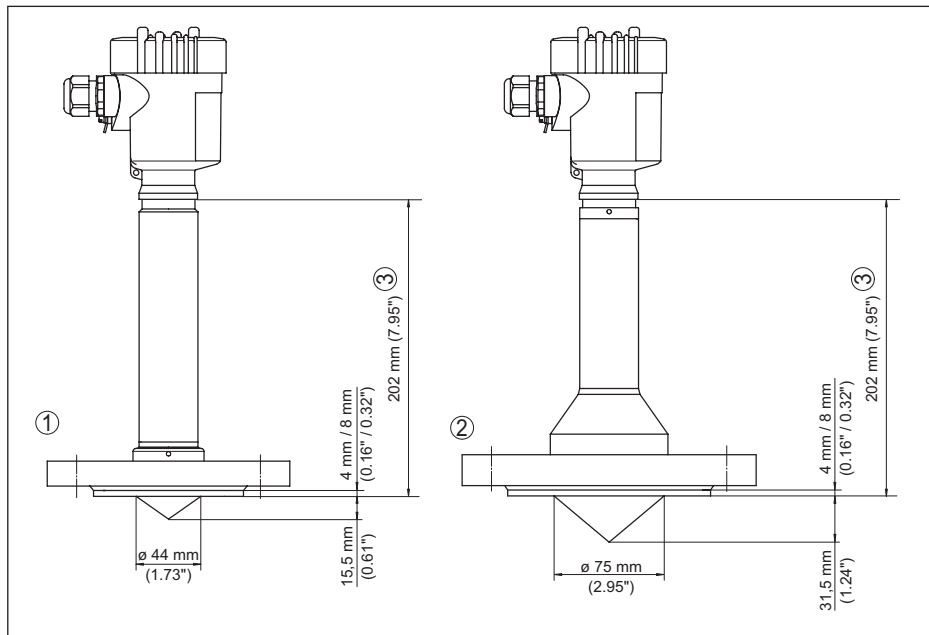


*Fig. 43: VEGAPULS 63, flange version, low temperature*

1   DN 50, DN 65, 2", 2½"
2   from DN 80, 3"
3   With stainless steel housings and Aluminium double chamber housings, this dimension is 198 mm (7.80")
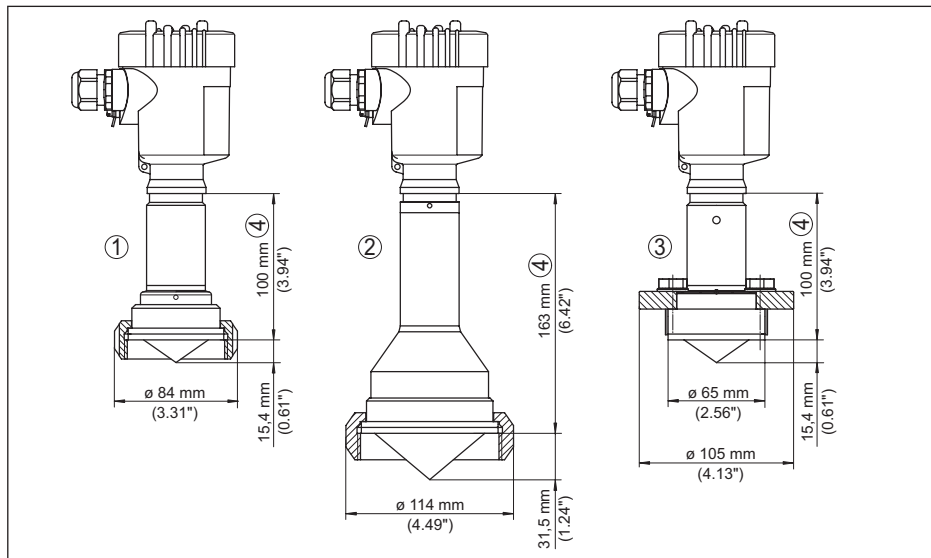
**VEGAPULS 63, hygienic fitting 1**
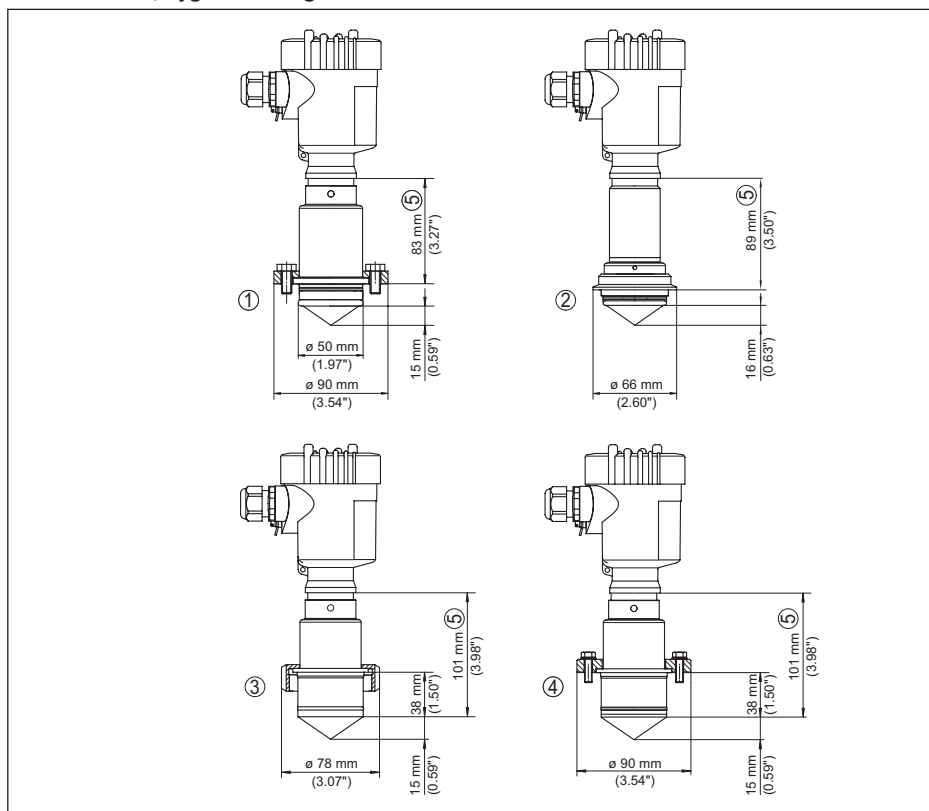


*Fig. 44: VEGAPULS 63, hygienic fitting 1*

*1 NeumoBiocontrol*
*2 Tuchenhagen Varivent DN 25*
*3 Hygienic fitting LA*
*4 Hygienic fitting LB*
*5 With stainless steel housings and Aluminium double chamber housings, this dimension is 4 mm (0.157") less*

VEGAPULS 63 • Foundation Fieldbus

**VEGAPULS 63, hygienic fitting 2**



| Clamp-Stutzen<br>clamp-socket<br>DIN32676/<br>ISO2852 | w |
|---|---|
| DN 50 / 2" | ø 64 |
| DN 50 / 2,5" | ø 77,5 |
| DN 65 / 3" | ø 91 |
| DN 80 / 3,5" | ø 106 |
| DN 100 / 4" | ø 119 |
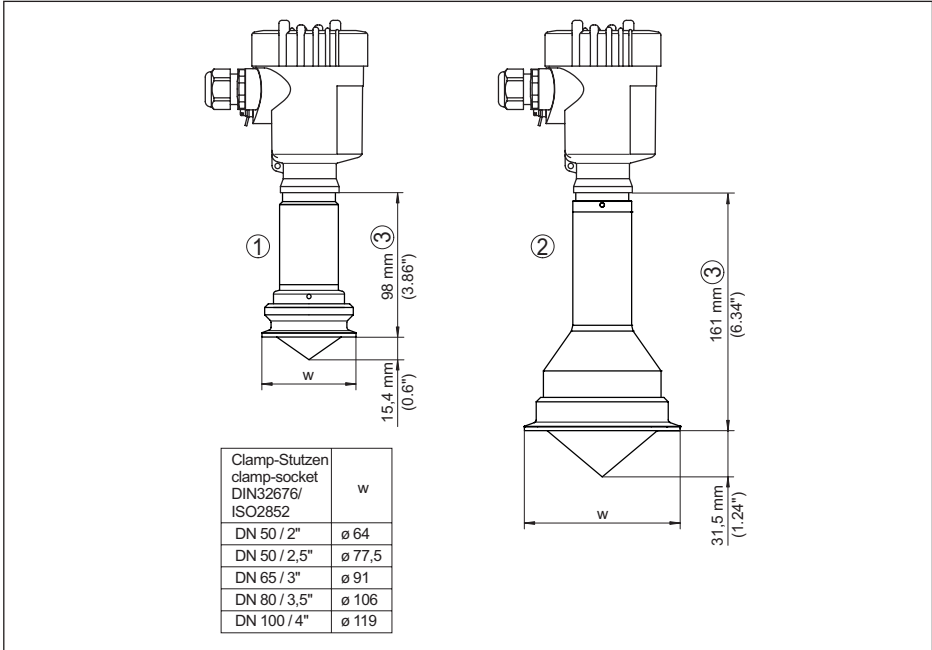
*Fig. 45: VEGAPULS 63, hygienic fitting 2*

1   *Clamp 2" (ø 64 mm), 2½" (ø 77.5 mm), 3" (ø 91 mm), (DIN 32676, ISO 2852)*
2   *Clamp 3½" (ø 106 mm), 4" (ø 119 mm), (DIN 32676, ISO 2852)*
3   *With stainless steel housings and Aluminium double chamber housings, this dimension is 4 mm (0.157") less*

**VEGAPULS 63, hygienic fitting 3**
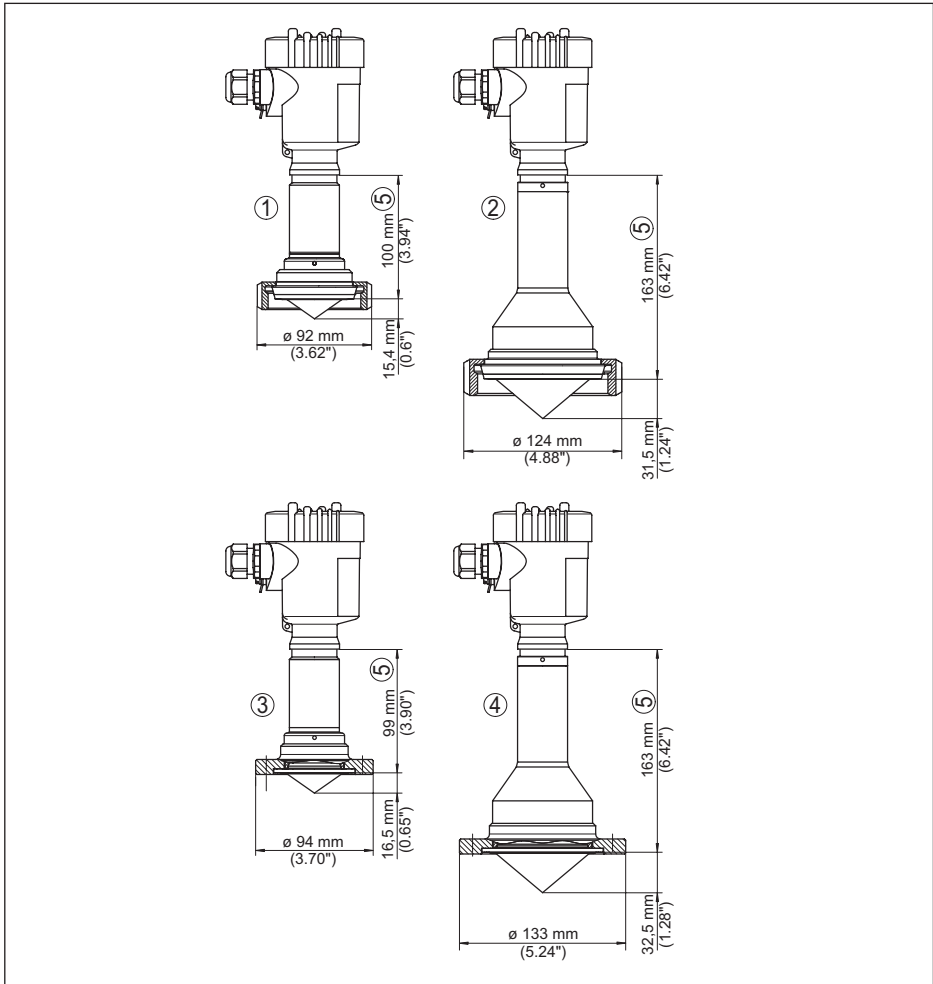


*Fig. 46: VEGAPULS 63, hygienic fitting 3*

1   *Slotted nut DN 50, 2" (DIN 11851)*
2   *Slotted nut DN 80, 3" (DIN 11851)*
3   *Slotted nut DN 50 (DIN 11864-2)*
4   *Slotted nut DN 80 (DIN 11864-2)*
5   *With stainless steel housings and Aluminium double chamber housings, this dimension is 4 mm (0.157") less*

**VEGAPULS 63, hygienic fitting 4**



*Fig. 47: VEGAPULS 63, hygienic fitting 4*

*1    SMS DN 51*
*2    SMS DN 76*
*3    DRD*
*4    With stainless steel housings and Aluminium double chamber housings, this dimension is 4 mm (0.157") less*

## 11.4 Industrial property rights

VEGA product lines are global protected by industrial property rights. Further information see www.vega.com.

VEGA Produktfamilien sind weltweit geschützt durch gewerbliche Schutzrechte.

Nähere Informationen unter www.vega.com.

Les lignes de produits VEGA sont globalement protégées par des droits de propriété intellectuelle. Pour plus d'informations, on pourra se référer au site www.vega.com.

VEGA lineas de productos están protegidas por los derechos en el campo de la propiedad industrial. Para mayor información revise la pagina web www.vega.com.

Линии продукции фирмы ВЕГА защищаются по всему миру правами на интеллектуальную собственность. Дальнейшую информацию смотрите на сайте www.vega.com.

VEGA系列产品在全球享有知识产权保护。

进一步信息请参见网站<www.vega.com。

## 11.5 Trademark

All the brands as well as trade and company names used are property of their lawful proprietor/originator.

# INDEX

VEGAPULS 63 • Foundation Fieldbus

36514-EN-200427

36514-EN-200427

Printing date:

**VEGA**

$\mathsf{C}\mathsf{E}$

36514-EN-200427