Operating Instructions

Suspension pressure transmitter with METEC® measuring cell

VEGABAR 67

Profibus PA

Document ID: 36743

Contents

36743-EN-130321

Supplementary documentation

Information:

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

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1 About this document

1.1 Function

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

1.2 Target group

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

1.3 Symbolism used

Information, tip, note
This symbol indicates helpful additional information.

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

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

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

Ex applications
This symbol indicates special instructions for Ex applications.

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

→ **Action**
This arrow indicates a single action.

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

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

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2 For your safety

2.1 Authorised personnel

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

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

2.2 Appropriate use

Model VEGABAR 67 is a pressure transmitter for level and gauge measurement.

You can find detailed information on the application range in chapter "*Product description*".

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

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

2.3 Warning about incorrect use

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

This is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The user must take note of the safety instructions in this operating instructions manual, the country-specific installation standards as well as all prevailing safety regulations and accident prevention rules.

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

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

2.5 Safety label on the instrument

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

2.6 CE conformity

This device fulfills the legal requirements of the applicable EC guidelines. By attaching the CE mark, VEGA provides a confirmation of successful testing. You can find the CE conformity declaration in the download area of "www.vega.com".

2.7 Measuring range - permissible process pressure

Due to the application, a measuring cell with a measuring range higher than the permissible pressure range of the process fitting may have been integrated. The permissible process pressure is stated with "Process pressure" on the type label, see chapter 3.1 "*Configuration*". For safety reasons, this range must not be exceeded.

2.8 Fulfillment of NAMUR recommendations

The device fulfills the requirements of the applicable NAMUR recommendations.

2.9 Safety instructions for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

2.10 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfill this obligation by observing the environmental instructions in this manual:

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

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- VEGABAR 67 pressure transmitter with suspension cable
- Straining clamp (optionally available with screwed fitting)
- External electronics
- or VEGABAR 67 pressure transmitter with connection tube
- Documentation
  - this operating instructions manual
  - Test certificate for pressure transmitters
  - Ex specific safety instructions (with Ex versions), if necessary further certificates
  - Operating instructions manual 27835 "*Display and adjustment module PLICSCOM*" (optional)
  - Supplementary instructions manual 31708 "*Heating for display and adjustment module*" (optional)
  - Supplementary instructions manual "*Plug connector for continuously measuring sensors*" (optional)

Constituent parts

VEGABAR 67 with suspension cable consists of the following components:

- Transmitter
- Suspension cable
- External housing with electronics, optionally available with plug connector

VEGABAR 67 with connection tube consists of the following components:

- Transmitter
- Connection tube (optionally available with lock fitting)
- Housing with integrated electronics

The components are available in different versions.

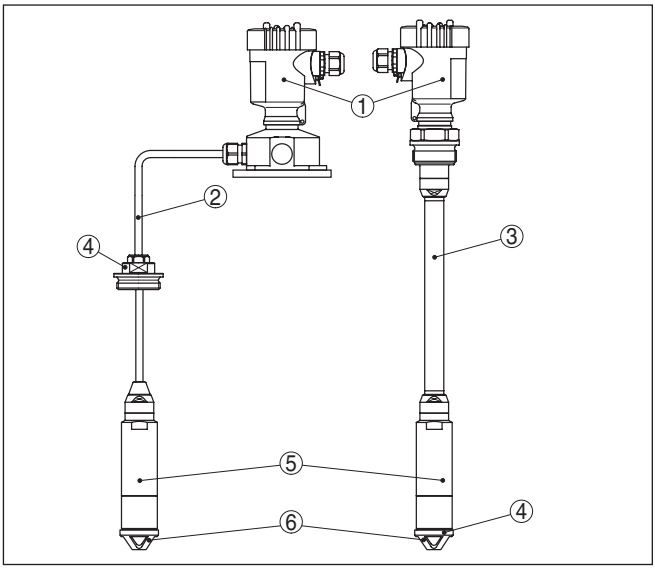


Fig. 1: Example of a VEGABAR 67 with suspension cable (left) and connection tube (right)

1 *Housing with integrated electronics*
2 *Suspension cable*
3 *Connection tube*
4 *Threaded fitting*
5 *Transmitter*
6 *Protective cap*

Type plate

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

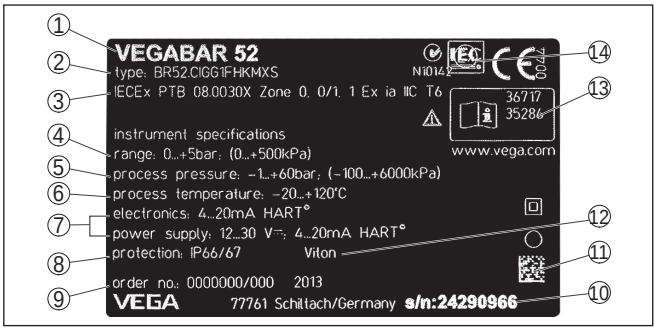


Fig. 2: Layout of the type label (example)

1 *Instrument type*
2 *Product code*
3 *Approvals*
4 *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 *ID numbers, instrument documentation*

With the serial number, you can access the delivery data of the instrument via www.vega.com, "*VEGA Tools*" and "*serial number search*". In addition to the type label outside, you can also find the serial number on the inside of the instrument.

3.2 Principle of operation

Application area

VEGABAR 67 is a suspension pressure transmitter for level measurement in vessels. Measured products can be all media against which the wetted materials of VEGABAR 67 are resistant.[1)]

Functional principle

The METEC® measuring cell is the measuring unit. It consists of the ceramic-capacitive CERTEC® measuring cell and a special, temperature-compensated isolating system.

The hydrostatic pressure of the product or the process pressure causes a capacitance change in the measuring cell via the metallic process diaphragm and the isolating liquid. This change is converted into a corresponding output signal.

The CERTEC® measuring cell is also equipped with a temperature sensor. The temperature value can be displayed via the display and adjustment module or processed via the signal output.

Power supply and bus communication

Power supply via the Profibus DP/PA segment coupler or VEGALOG 571 EP cards. A two-wire cable according to Profibus specification serves as carrier of both power and digital data transmission for

1) For use in atmospherically closed vessels under vacuum, VEGABAR is available with absolute pressure measuring ranges.

multiple sensors. The instrument profile of VEGABAR 67 corresponds to profile specification version 3.0.

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

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

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

This function is generally not available for approved instruments.

GSD/EDD

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

3.3 Operation

The instrument can be adjusted with the following adjustment media:

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

3.4 Packaging, transport and storage

Packaging

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

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

Transport

Transport must be carried out under consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Storage

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

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

- 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 %

3.5 Accessories and replacement parts

Display and adjustment module

The display and adjustment module PLICSCOM is used for measured value indication, adjustment and diagnosis. It can be inserted into the sensor and removed at any time.

You can find further information in the operating instructions "*Display and adjustment module PLICSCOM*" (Document-ID 27835).

Interface adapter

The interface adapter VEGACONNECT 4 enables the connection of communication-capable instruments to the USB interface of a PC. For parameter adjustment of these instruments, an adjustment software such as PACTware with VEGA-DTM is required.

You can find further information in the operating instructions "*Interface adapter VEGACONNECT*" (Document-ID 32628).

External display and adjustment unit

VEGADIS 61 is suitable for external measured value indication and adjustment of plics® sensors. It is connected to the sensor with an up to 25 m long, four-wire, screened standard cable.

You can find further information in the operating instructions "*VEGADIS 61*" (Document-ID 27720).

Flanges

Flanges are available in different versions according to the following standards: DIN 2501, EN 1092-1, ANSI B 16.5, JIS B 2210-1984, GOST 12821-80.

You can find additional information in the supplementary instructions manual "*Flanges according to DIN-EN-ASME-JIS*" (Document-ID 31088).

Measuring instrument holder

The measuring instrument holder is used for wall/tube mounting of VEGABAR series 50 pressure transmitters and VEGAWELL 52 suspension pressure transmitters. Supplied reducers enable the adaptation to different instrument diameters. The material used is 316L.

Protective cover

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

You will find additional information in the supplementary instructions manual "*Protective cover*" (Document-ID 34296).

Electronics module

The electronics module is a replacement part for pressure transmitter VEGABAR. One version is available for each type of signal output.

You find further information in the operating instructions "*Electronics module VEGABAR series 50 and 60* " (Document-ID 30175).

4 Mounting

4.1 General instructions

Suitability for the process conditions

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

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

Diaphragm protection

To protect the diaphragm, the process fitting is covered by a protective cap.

Remove the protective cap just before installation so that the diaphragm will not get damaged. It is recommended to keep the cap and use it again later for storage or transport.

Installation position

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

Moisture

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

You can give your instrument additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This applies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.

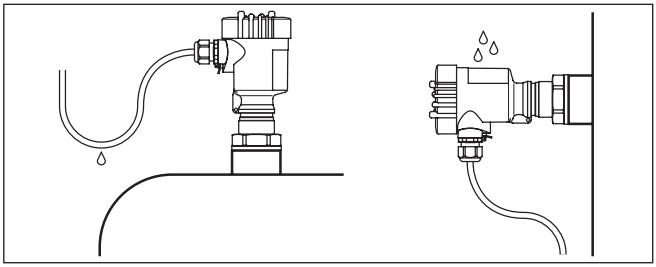


Fig. 3: Measures against moisture penetration

Ventilation and pressure compensation

The ventilation of the electronics housing as well as the atmospheric pressure compensation for the measuring cell are realised via a filter element in the area of the cable gland.

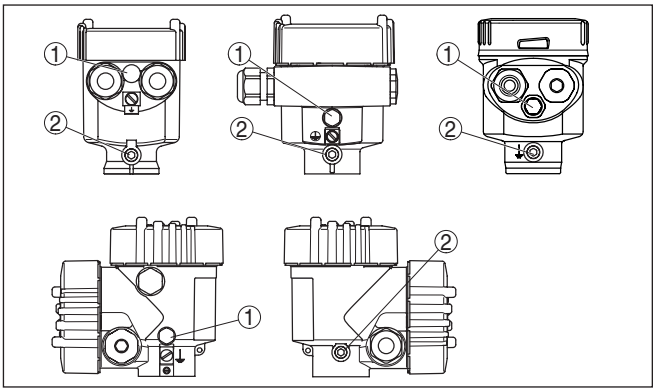


Fig. 4: Position of the filter element

1 Filter element
2 Blind plug

Caution:
Due to the filter effect, the pressure compensation is time delayed. When opening/closing the housing cover quickly, the measured value can change for a period of approx. 5 s by up to 15 mbar.

Information:
Make sure that the filter element is always free of buildup during operation. A high-pressure cleaner may not be used for cleaning.

With instrument versions in protection IP 66/IP 68, 1 bar, the ventilation is realised via the capillaries in the permanently connected cable. The filter element is replaced by a blind plug.

4.2 Mounting preparations

For the suspension cable version note the following points when selecting the mounting position:

- Sideways movements of the transmitter can cause measurement errors

1. Therefore, mount VEGABAR 67 in a calm area or in a suitable protective tube

- The suspension cable has a capillary for atmospheric pressure compensation

2. Therefore lead the cable end into a dry space or directly to the external electronics

The external electronics is provided with terminals and a filter element for pressure compensation. Keep in mind for all versions:

- The protective cover prevents mechanical damage to the measuring cell. It should only be removed when the sensor is deployed in extremely polluted water.

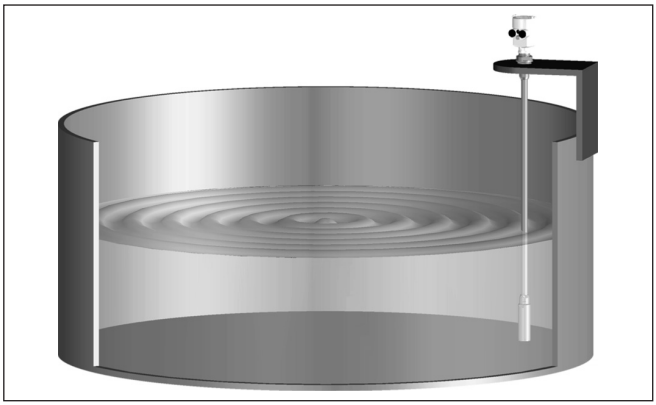


Fig. 5: Mounting example: Version with connection tube in an open vessel

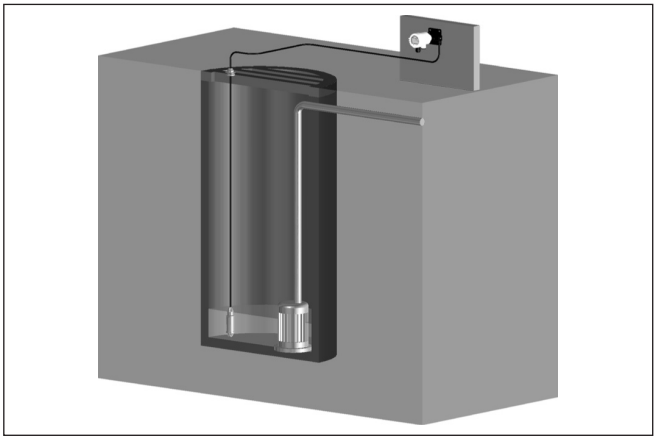


Fig. 6: Mounting example: Version with suspension cable in a pump shaft

4.3 Mounting steps with straining clamp

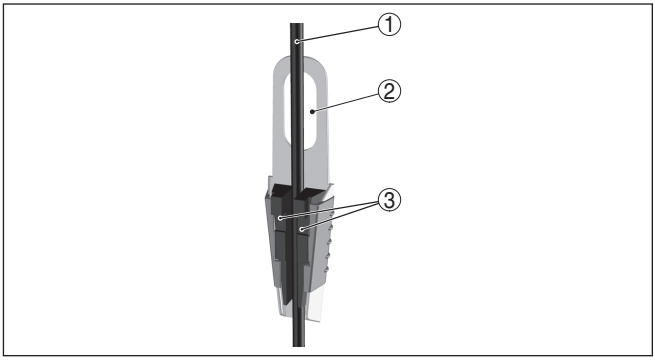


Fig. 7: Straining clamp

1 Suspension cable
2 Suspension opening
3 Clamping jaws

Mount VEGABAR 67 with straining clamp as follows:

1. Hang the straining clamp on a suitable wall hook
2. Lower VEGABAR 67 to the requested height
3. Slide the clamping jaws upward and push the suspension cable between them
4. Hold the suspension cable, push the clamping jaws downward and fix them with a light blow

Removal is carried out in reverse order.

4.4 Mounting steps with screwed connection

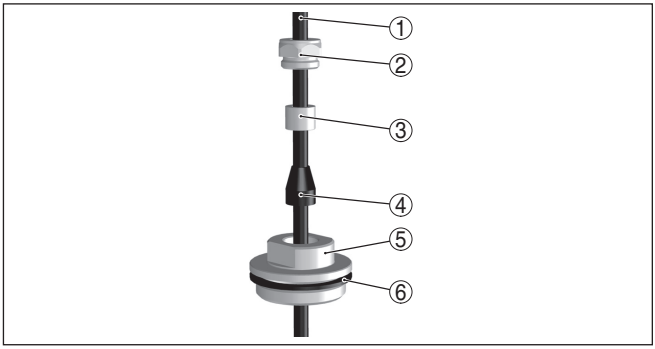


Fig. 8: Threaded fitting

1 Suspension cable
2 Seal screw
3 Cone bushing
4 Seal cone
5 Threaded fitting
6 Seal

Mount VEGABAR 67 with screwed connection as follows:

1. Weld the welded socket into the vessel top
2. Lower VEGABAR 67 to the requested height by means on the welded socket G1½ or 1½ NPT on the vessel side
3. Insert the suspension cable from below into the open screwed connection
4. Slide the seal cone and the cone sleeve over the suspension cable, fasten manually with the seal screw
5. Screw the screwed connection into the socket, tighten with SW 30 and then tighten seal screw with SW 19

How to correct the height:

1. Loosen seal screw with SW 19
2. Slide seal cone and cone sleeve to the requested position on the cable
3. Fasten the seal screw

Removal is carried out in reverse order.

4.5 Mounting steps with lock fitting

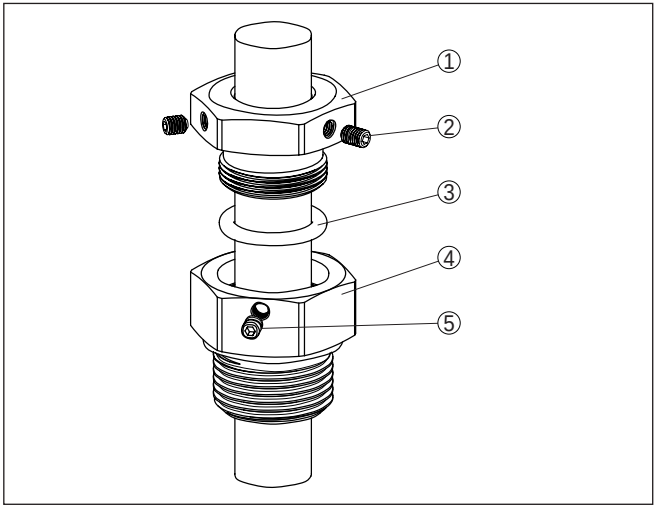


Fig. 9: Lock fitting

1 Upper hexagon
2 Fixing screw
3 Washer disk
4 Lower hexagon
5 Fixing screw

Mount VEGABAR 67 with lock fitting as follows:

1. Weld the welded socket G1½ or 1½ NPT to the vessel top
2. Lower VEGABAR 67 through the welded socket.

3. Turn the lock fitting on the lower hexagon into the welded socket. Use a resistant seal. Spanner width SW 41, torque max. 80 Nm.
4. Adjust the connection tube of VEGABAR 67 to the requested height and hold it
5. Turn the upper hexagon into the lower hexagon. Spanner width SW 41, torque max. 80 Nm. VEGABAR 67 is now temporarily hold by the washer disc.
6. Tighten fixing screws (2) and (5) with an Allen wrench size 2.5. Torque max. 7 Nm.

The fixing screws press lightly into the connection tube and fasten VEGABAR 67 in this position

4.6 Mounting steps with housing and thread

Fig. 10: Housing and thread

1 Housing
2 Seal
3 Thread

Mount into the vessel

Mount VEGABAR 67 with housing and thread in the following way:

1. Weld the welded socket G1½ or 1½ NPT to the vessel top
2. Insert the transmitter with connection tube or suspension cable into the opening
3. Turn the thread with seal into the socket and tighten with SW 46[2)]

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

Mounting into the basin

Mount VEGABAR 67 with housing and thread in the following way:

1. Fasten the mounting bracket at the suitable height on the basin wall

Information:
We recommend articles from the line of VEGA accessories:

- Mounting bracket of stainless steel, article no. 2.21615
- Counter nut of PP, article no. 2.10371

[2)] Seal with resistant material with thread 1½ NPT.

2. Insert the transmitter with connection tube or suspension cable into the opening of the mounting bracket and counter nut
3. Fasten counter nut with SW 46 on the thread

Removal is carried out in reverse order.

4.7 Mounting steps, external housing

Wall mounting

1. Mark the holes according to the following drilling template
2. Depending on the mounting surface, fasten the wall mounting plate with 4 screws

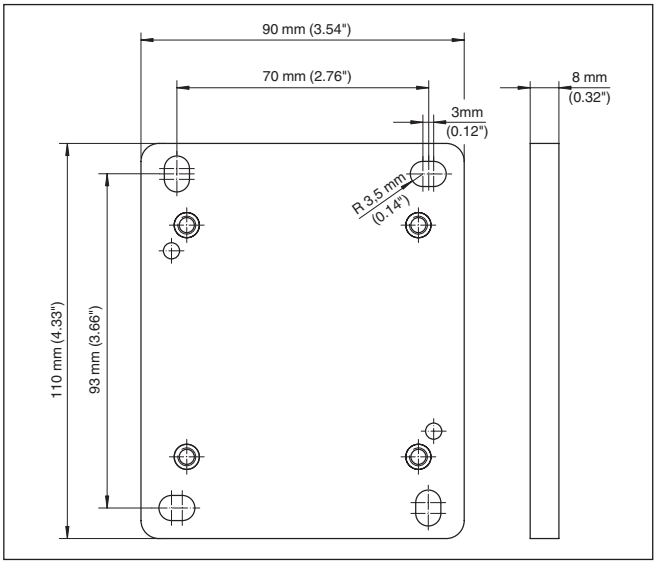


Fig. 11: Drilling template - wall mounting plate

Tip:
Mount the wall mounting plate so that the cable entry of the socket housing points downward. The socket housing can be displaced by 180° to the wall mounting plate.

Warning:
The four screws of the socket housing must only be hand screwed. A torque > 5 Nm (3.688 lbf ft) can damage the wall mounting plate.

5 Connecting to power supply

5.1 Preparing the connection

Safety instructions

Always keep in mind the following safety instructions:

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

Tip:
We recommend VEGA overvoltage arrester B63-32.

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

Voltage supply

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

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

Connection cable

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

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

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

Cable gland ½ NPT

On the instrument with cable entry ½ NPT and plastic housing there is a metallic ½" threaded insert moulded into the plastic housing.

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

Cable screening and grounding

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

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

next distributor must be connected to each other and also connected to ground potential via a ceramic capacitor (e.g. 1 nF, 1500 V). The low frequency potential equalisation currents are thus suppressed, but the protective effect against high frequency interference signals remains.

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

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

5.2 Connection procedure

Single/Double chamber housing

Proceed as follows:

1. Unscrew the housing cover
2. If a display and adjustment module is installed, remove it by turning it to the left.
3. Loosen compression nut of the cable entry
4. Remove approx. 10 cm of the cable mantle, strip approx. 1 cm insulation from the individual wires
5. Insert the cable into the sensor through the cable entry
6. Lift the opening levers of the terminals with a screwdriver (see following illustration)
7. Insert the wire ends into the open terminals according to the wiring plan
8. Press down the opening levers of the terminals, you will hear the terminal spring closing
9. Check the hold of the wires in the terminals by lightly pulling on them
10. Connect the screen to the internal ground terminal, connect the outer ground terminal to potential equalisation
11. Tighten the compression nut of the cable entry. The seal ring must completely encircle the cable
12. Screw the housing cover back on

The electrical connection is hence finished.

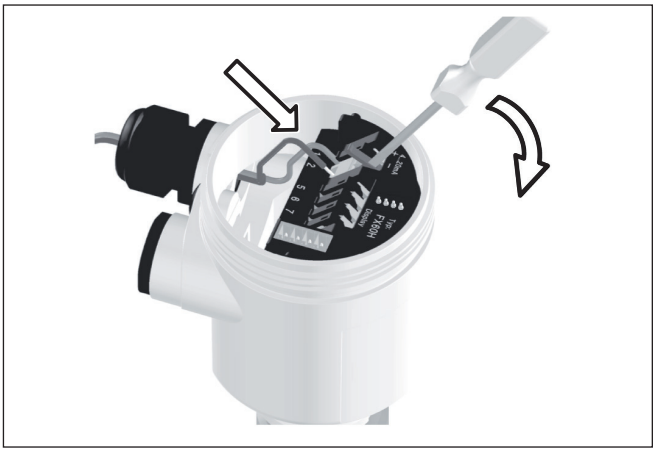


Fig. 12: Connection steps 6 and 7

IP 68 version with external housing

Proceed as follows:

1. Loosen the four screws on the housing base with an Allen key size 4
2. Remove the mounting plate from the housing socket

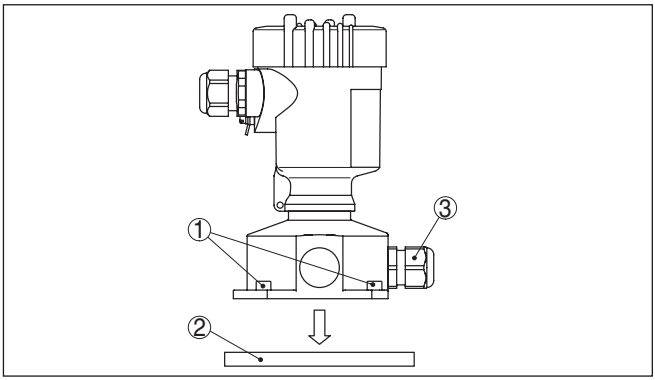


Fig. 13: Components of the external housing

1 Screws
2 Wall mounting plate
3 Cable gland

3. Loop the connection cable through the cable entry on the housing base[3)]

[3)] The connection cable is already preconfectioned. If necessary, shorten it to the requested length, cut the breather capillaries clean. Remove approx. 5 cm of the cable mantle, strip approx. 1 cm insulation from the ends of the individual wires. After shortening the cable, fasten the type plate with support back onto the cable.

Information:
The cable gland can be mounted in three positions each displaced by 90°. Simply exchange the cable gland against the blind plug in the suitable thread opening.

4. Connect the wire ends as described under "*Single/Double chamber housing*" according to the numbering
5. Connect the screen to the internal ground terminal, connect the outer ground terminal above on the housing to potential equalisation
6. Tighten the compression nut of the cable entry. The seal ring must completely encircle the cable
7. Attach the mounting plate again and tighten the screws

The electrical connection of the sensor to the external housing is finished.

5.3 Wiring plan, single chamber housing

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

Electronics and connection compartment

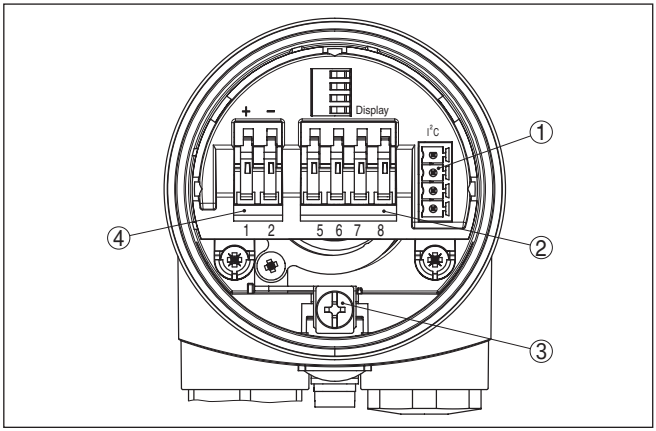


Fig. 14: Electronics and connection compartment, single chamber housing

1 Plug connector for VEGACONNECT (I^2C interface)
2 Spring-loaded terminals for connection of the external indication VEGADIS 61
3 Ground terminal for connection of the cable screen
4 Spring-loaded terminals for voltage supply

Wiring plan

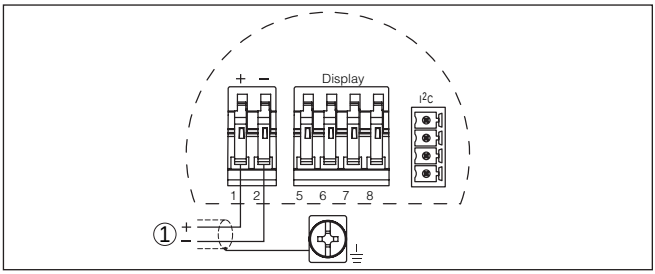


Fig. 15: Wiring plan, single chamber housing

1 Voltage supply, signal output

5.4 Wiring plan, double chamber housing

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

Electronics compartment

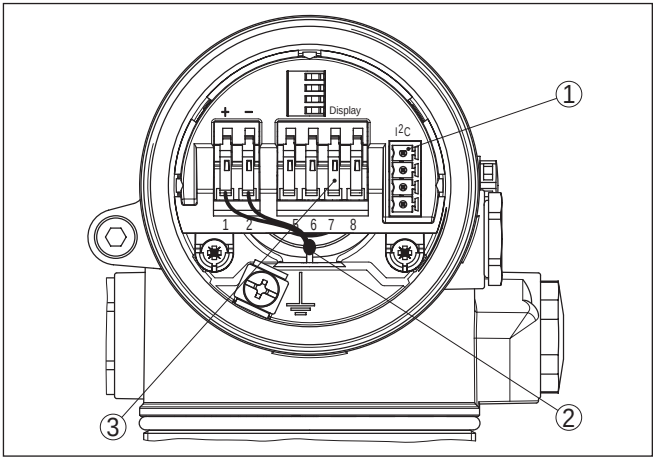


Fig. 16: Electronics compartment, double chamber housing

1 Plug connector for VEGACONNECT (I^2C interface)
2 Internal connection cable to the connection compartment
3 Terminals for VEGADIS 61

Connection compartment

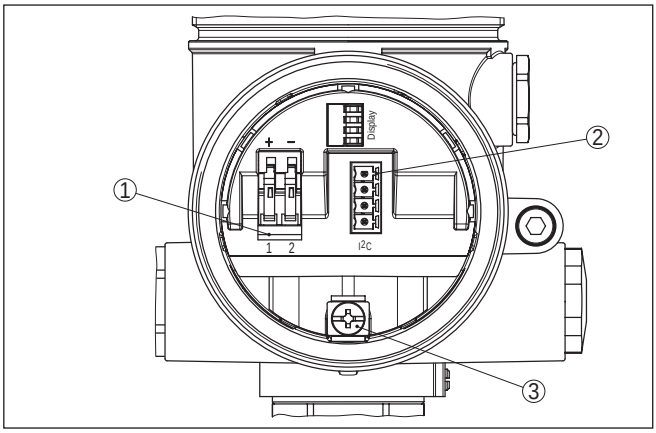


Fig. 17: Connection compartment, double chamber housing

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

Wiring plan

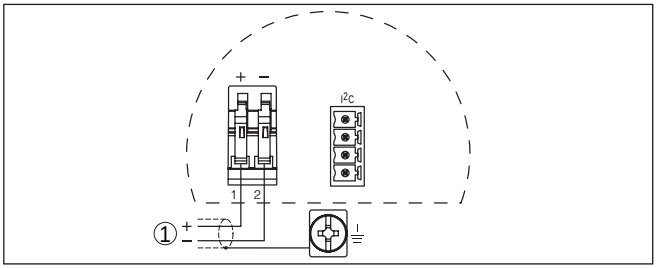


Fig. 18: Wiring plan, double chamber housing

1 Voltage supply, signal output

5.5 Wiring plan, double chamber housing Ex d

Electronics compartment

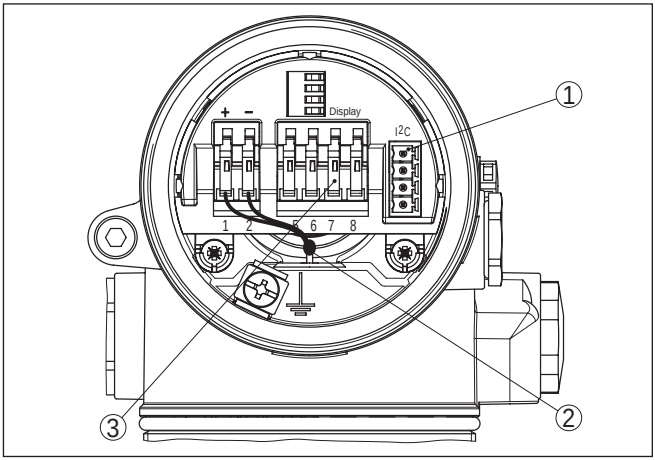


Fig. 19: Electronics compartment, double chamber housing

1 Plug connector for VEGACONNECT (I^2C interface)
2 Internal connection cable to the connection compartment
3 Terminals for VEGADIS 61

Connection compartment

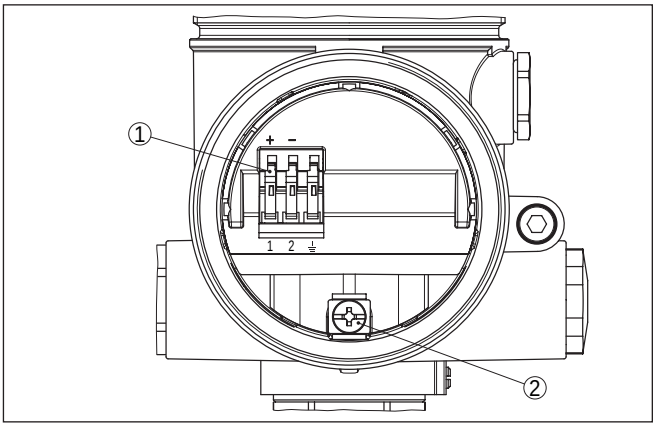


Fig. 20: Connection compartment, Ex-d double chamber housing

1 Spring-loaded terminals for power supply and cable screen
2 Ground terminal for connection of the cable screen

Wiring plan

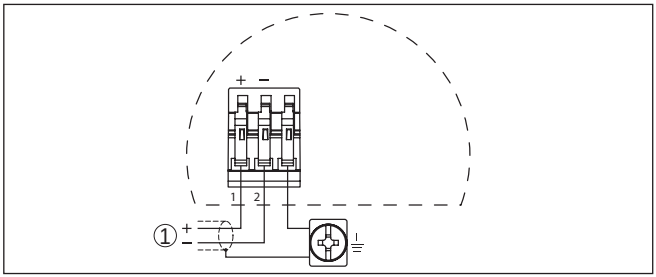


Fig. 21: Wiring plan, Ex-d double chamber housing

1 Voltage supply, signal output

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

Wire assignment, connection cable

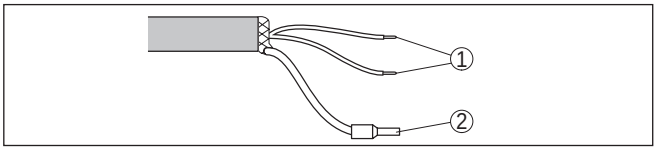


Fig. 22: Wire assignment, connection cable

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

5.7 Wiring plan, external housing with version IP 68

Overview

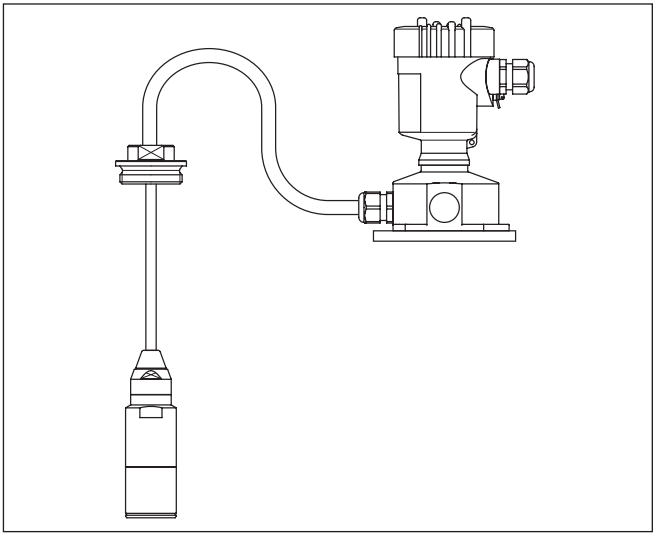


Fig. 23: VEGABAR 67 in IP 68 version 25 bar, non-Ex and axial cable outlet, external housing

Electronics and connection compartment for power supply

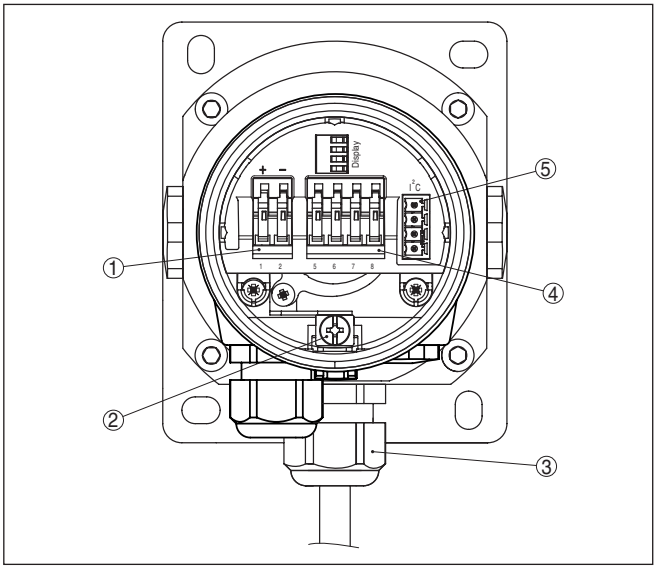


Fig. 24: Electronics and connection compartment

1 *Spring-loaded terminals for voltage supply*
2 *Ground terminal for connection of the cable screen*
3 *Cable gland to the process component*
4 *Spring-loaded terminals for connection of the external indication VEGADIS 61*
5 *Plug connector for VEGACONNECT (I^2C interface)*

Terminal compartment, housing socket

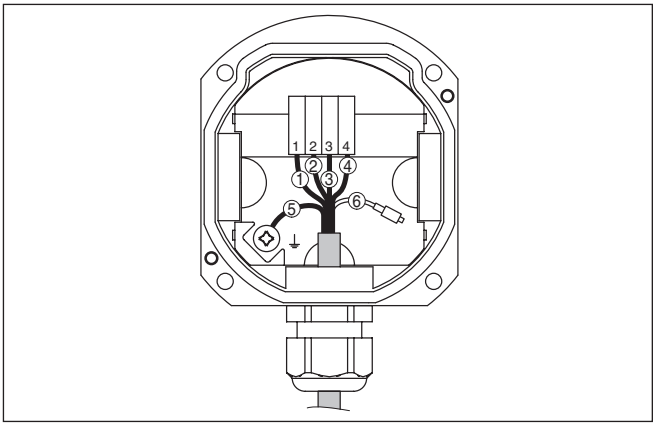


Fig. 25: Connection of the sensor in the housing socket

1 Brown
2 Blue
3 Yellow
4 White
5 Shielding
6 Breather capillaries

Wiring plan external electronics

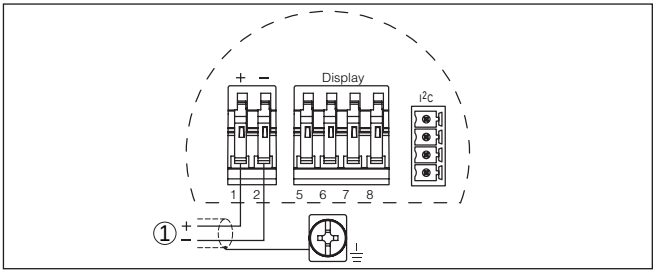


Fig. 26: Wiring plan external electronics

1 Voltage supply

5.8 Switch-on phase

Switch-on phase

After VEGABAR 67 is connected to voltage supply or after voltage recurrence, the instrument carries out a self-check for approx. 30 seconds. The following steps are carried out:

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

Then the current measured value will be displayed and the corresponding digital output signal will be outputted to the cable.[2)]

6 Set up with the display and adjustment module PLICSCOM

6.1 Short description

Function/Configuration

The display and adjustment module is used for measured value display, adjustment and diagnosis. It can be mounted in the following housing versions and instruments:

- All sensors of the plics® instrument family, in the single as well as in the double chamber housing (optionally in the electronics or connection compartment)
- External display and adjustment unit VEGADIS 61

From a hardware version …- 01 or higher of the display and adjustment module resp. …- 03 or higher of the corresponding sensor electronics, an integrated backlight can be switched on via the adjustment menu. The hardware version is stated on the type label of the display and adjustment module or the sensor electronics.

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

6.2 Insert display and adjustment module

Mount/Dismount display and adjustment module

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

Proceed as follows:

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

Removal is carried out in reverse order.

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

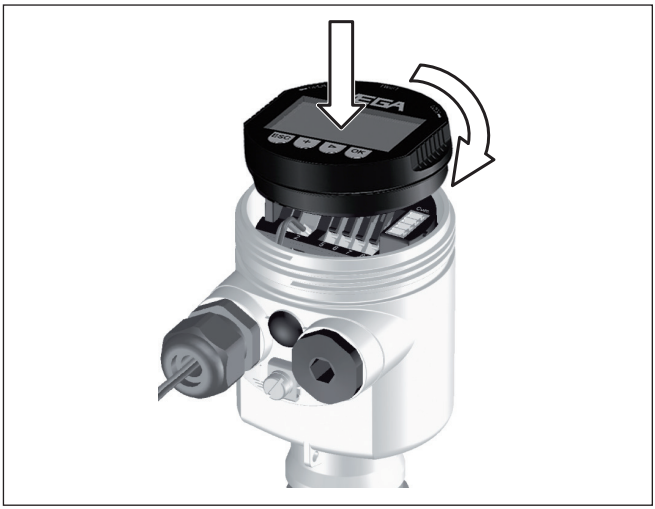


Fig. 27: Insert display and adjustment module

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

6.3 Adjustment system

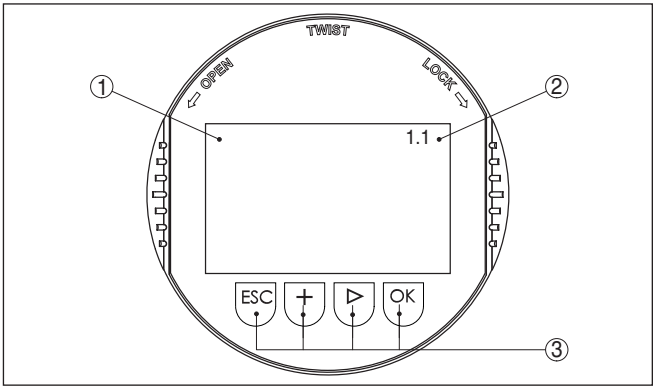


Fig. 28: Display and adjustment elements

1 *LC display*
2 *Indication of the menu item number*
3 *Adjustment keys*

Key functions

- ***[OK]*** key:
  - Move to the menu overview
  - Confirm selected menu
  - Edit parameter

  - Save value

- ***[->]*** key to select:
  - Menu change
  - Select list entry
  - Select editing position
- ***[+]*** key:
  - Change value of the parameter
- ***[ESC]*** key:
  - interrupt input
  - Jump to next higher menu

Adjustment system

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

6.4 Setup steps

Address setting

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

Level or process pressure measurement

VEGABAR 67 can be used for level as well as for process pressure measurement. Default setting is level measurement. The mode can be changed in the adjustment menu.

Depending on the application only the respective subchapter "Level or process pressure measurement" is of importance. There, you find the individual adjustment steps.

Level measurement

Parameter adjustment "Level measurement"

Set up VEGABAR 67 in the following sequence:

1. Selecting adjustment unit/density unit
2. Carry out a position correction
3. Carry out min. adjustment
4. Carry out max. adjustment

In the menu item "*Adjustment unit*" you select the physical unit in which the adjustment should be carried out, e.g. mbar, bar, psi…

The position correction compensates the influence of the mounting position or static pressure on the measurement. It does not influence the adjustment values.

Information:
The steps 1, 3 and 4 are not necessary for instruments which are already preset according to customer specifications!

You can find the data on the type label on the instrument or in the menu items of the min./max. adjustment.

The display and adjustment module enables the adjustment without filling or pressure. Thanks to this, you can carry out your settings already in the workshop without the instrument having to be installed.

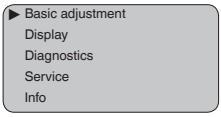
The actual measured value is also displayed in the menu items for min./max. adjustment.

Select unit

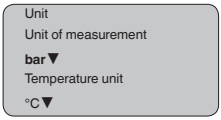
In this menu item you select the adjustment unit as well as the unit for the temperature indication in the display.

To select the adjustment unit (in the example switching over from bar to mbar), proceed as follows:[5)]

1. Push the ***[OK]*** button in the measured value display, the menu overview is displayed.



2. Confirm the menu "***Basic adjustment***" with *[OK]*, the menu item "*Unit*" will be displayed.



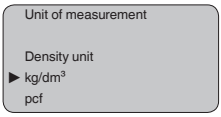
3. Activate the selection with ***[OK]*** and select "***Units of measurement*** with *[->]*.
4. Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (in the example mbar).
5. Confirm with ***[OK]*** and move to position correction with ***[->]***.

The adjustment unit is thus switched over from bar to mbar.

Information:
When switching over to adjustment in a height unit (in the example from bar to m), the density also has to be entered.

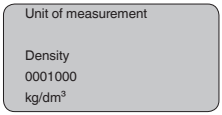
Proceed as follows:

1. Push the ***[OK]*** button in the measured value display, the menu overview is displayed.
2. Confirm the menu "***Basic adjustment***" with *[OK]*, the menu item "*Units of measurement*" will be displayed.
3. Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (in the example m).
4. Confirm with ***[OK]***, the submenu "*Density unit*" appears.



[5)] Selection options: mbar, bar, psi, Pa, kPa, MPa, inHg, mmHg, inH_2O, mmH_2O.

5. Select the requested unit, e.g. kg/dm³ with ***[->]*** and confirm with ***[OK]***, the submenu "*Density*" appears.



6. Enter the requested density value with ***[->]*** and ***[+]***, confirm with ***[OK]*** and move to position correction with ***[->]***.

The adjustment unit is thus switched over from bar to m.

Proceed as follows to select the temperature unit:[6)]

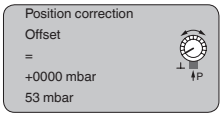
1. Activate the selection with ***[OK]*** and select "***Temperature unit*** with *[->]*.
2. Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (e.g. °F).
3. Confirm with ***[OK]***.

The temperature unit is hence switched over from °C to °F.

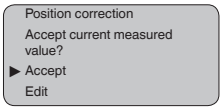
Carry out a position correction

Proceed as follows:

1. Activate in the menu item "*Position correction*" the selection with ***[OK]***.



2. Select with ***[->]***, e.g. to accept actual measured value.

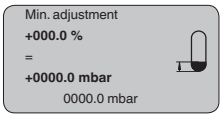


3. Confirm with ***[OK]*** and move to min.(zero) adjustment with ***[->]***.

Carry out min. adjustment

Proceed as follows:

1. Edit the % value in the menu item "*Min. adjustment*" with ***[OK]***.



2. Set the requested percentage value with ***[+]*** and ***[->]***.
3. Confirm with ***[OK]*** and edit the requested mbar value.
4. Set the requested mbar value with ***[+]*** and ***[->]***.
5. Confirm with ***[+]*** and move to max. adjustment with ***[->]***.

The min. adjustment is finished.

[6)] Selection options: °C, °F.

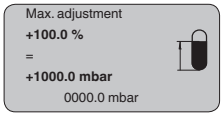
Information:
For an adjustment with filling, simply enter the actual measured value indicated at the bottom of the display.

If the adjustment ranges are exceeded, the message "*Outside parameter limits*" appears. The editing procedure can be aborted with ***[ESC]*** or the displayed limit value can be accepted with ***[OK]***.

Carry out max. adjustment

Proceed as follows:

1. Edit the % value in the menu item "*Max. adjustment*" with ***[OK]***.



Information:
The displayed pressure for 100 % corresponds to the nominal measuring range of the sensor (in the above example 1 bar = 1000 mbar).

2. Set the requested percentage value with ***[->]*** and ***[OK]***.
3. Confirm with ***[OK]*** and edit the requested mbar value.
4. Set the requested mbar value with ***[+]*** and ***[->]***.
5. Confirm with ***[OK]*** and move to the menu overview with ***[ESC]***.

The max. adjustment is finished.

Information:
For an adjustment with filling, simply enter the actual measured value indicated at the bottom of the display.

If the adjustment ranges are exceeded, the message "*Outside parameter limits*" appears. The editing procedure can be aborted with ***[ESC]*** or the displayed limit value can be accepted with ***[OK]***.

Process pressure measurement

Parameter adjustment "Process pressure measurement"

Set up VEGABAR 67 in the following sequence:

1. Select application "Process pressure measurement"
2. Select the unit of measurement
3. Carry out a position correction
4. Carrying out zero adjustment
5. Carry out span adjustment

In the menu item "*Adjustment unit*" you select the physical unit in which the adjustment should be carried out, e.g. mbar, bar, psi…

The position correction compensates the influence of the mounting position or static pressure on the measurement. It does not influence the adjustment values.

In the menu items "*zero*" and "*span*" you determine the span of the sensor, the span corresponds to the end value.

Information:
The steps 1, 3 and 4 are not necessary for instruments which are already preset according to customer specifications!

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You can find the data on the type label on the instrument or in the menu items of the zero/span adjustment.

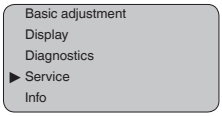
The display and adjustment module enables the adjustment without filling or pressure. Thanks to this, you can carry out your settings already in the workshop without the instrument having to be installed.

The actual measured value is displayed in addition to the menu items for zero/span adjustment.

Select application "Process pressure measurement"

VEGABAR 67 is preset to application "Level measurement". Proceed as follows when switching over to application "Process pressure measurement":

1. Push the ***[OK]*** button in the measured value display, the menu overview is displayed.
2. Select the menu "***Service***" with *[->]* and confirm with ***[OK]***.



3. Select the menu item "***Application***" with *[->]* and edit with ***[OK]***.

Warning:
Note the warning: "*Output can change*".

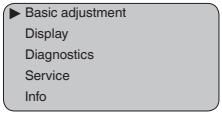
4. Select with ***[->]*** "*OK*" and confirm with ***[OK]***.
5. Select "*Process pressure*" from the list and confirm with ***[OK]***.

Select unit

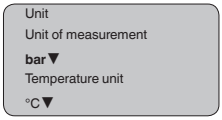
In this menu item you select the adjustment unit as well as the unit for the temperature indication in the display.

To select the adjustment unit (in the example switching over from bar to mbar), proceed as follows:[7)]

1. Push the ***[OK]*** button in the measured value display, the menu overview is displayed.



2. Confirm the menu "***Basic adjustment***" with *[OK]*, the menu item "*Unit*" will be displayed.



3. Activate the selection with ***[OK]*** and select "***Units of measurement*** with *[->]*.

[7)] Selection options: mbar, bar, psi, Pa, kPa, MPa, inHg, mmHg, inH_2O, mmH_2O.

4. Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (in the example mbar).
5. Confirm with ***[OK]*** and move to position correction with ***[->]***.

The adjustment unit is thus switched over from bar to mbar.

Proceed as follows to select the temperature unit:[8)]

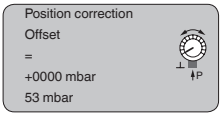
1. Activate the selection with ***[OK]*** and select "***Temperature unit*** with *[->]*.
2. Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (e.g. °F).
3. Confirm with ***[OK]***.

The temperature unit is hence switched over from °C to °F.

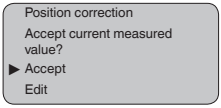
Carry out a position correction

Proceed as follows:

1. Activate in the menu item "*Position correction*" the selection with ***[OK]***.



2. Select with ***[->]***, e.g. to accept actual measured value.

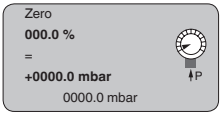


3. Confirm with ***[OK]*** and move to min.(zero) adjustment with ***[->]***.

Carrying out zero adjustment

Proceed as follows:

1. Edit the mbar value in the menu item "*zero*" with ***[OK]***.



2. Set the requested mbar value with ***[+]*** and ***[->]***.
3. Confirm with ***[+]*** and move to span adjustment with ***[->]***.

The zero adjustment is finished.

Information:
The zero adjustment shifts the value of the span adjustment. The span, i.e. the difference between these values, however, remains unchanged.

Information:
For an adjustment with pressure, simply enter the actual measured value indicated at the bottom of the display.

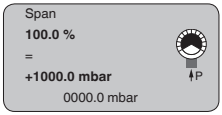
[8)] Selection options: °C, °F.

If the adjustment ranges are exceeded, the message "*Outside parameter limits*" appears. The editing procedure can be aborted with ***[ESC]*** or the displayed limit value can be accepted with ***[OK]***.

Carry out span adjustment

Proceed as follows:

1. Edit the mbar value in the menu item "*span*" with ***[OK]***.



Information:
The displayed pressure for 100 % corresponds to the nominal measuring range of the sensor (in the above example 1 bar = 1000 mbar).

2. Set the requested mbar value with ***[->]*** and ***[OK]***.
3. Confirm with ***[OK]*** and move to the menu overview with ***[ESC]***.

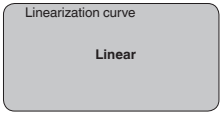
The span adjustment is finished.

Information:
For an adjustment with pressure, simply enter the actual measured value indicated at the bottom of the display.

If the adjustment ranges are exceeded, the message "*Outside parameter limits*" appears. The editing procedure can be aborted with ***[ESC]*** or the displayed limit value can be accepted with ***[OK]***.

Linearization curve

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



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

Caution:
Note the following if the VEGABAR 67 with corresponding approval is used as part of an overfill protection system according to WHG (Water Resources Act):

If a linearization curve is selected, the measuring signal is no longer linearly proportional to the level. This must be taken into consideration by the user, particularly when setting the switching point on the limit signal indicator.

Copy sensor data

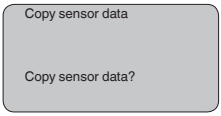
This function enables reading out parameter adjustment data as well as writing parameter adjustment data into the sensor via the display and adjustment module. A description of the function is available in the operating instructions manual "*Display and adjustment module*".

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

- Measured value presentation
- Adjustment
- Damping
- Linearization curve
- Sensor-TAG
- Displayed value
- Scaling unit (Out-Scale unit)
- Positions after the decimal point (scaled)
- Scaling PA/Out-Scale 4 values
- Unit of measurement
- Language

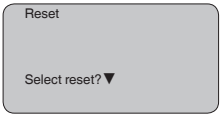
The following safety-relevant data are **not** read out or written:

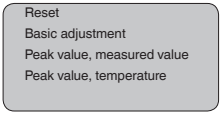
- Sensor address
- PIN
- Application



Reset

The reset function resets all parameters adjusted by the user to the delivery status and the peak values to the actual values.





Basic adjustment

The "*Reset*" "*Basic adjustment*" resets the values of the following menu items:

Menu section	Function	Reset value
Basic settings	Sensor address	126
	Zero/Min. adjustment	Measuring range begin
	Span/Max. adjustment	Measuring range end
	Density	1 kg/l
	Density unit	kg/l

Menu section	Function	Reset value
	Damping	0 s
	Linearization	Linear
	Sensor-TAG	Sensor
Display	Displayed value	PA-Out
Service	Additional PA value	Secondary Value 1
	Out-Scale-Unit	Volume/l
	Scaling	0.00 to 100.0
	Decimal point indication	8888.8

The values of the following menu items are *not* reset with "**Reset**:

Menu section	Function	Reset value
Basic settings	Unit of measurement	No reset
	Temperature unit	No reset
	Position correction	No reset
Display	Backlight	No reset
Service	Language	No reset
	Application	No reset

Default setting
Like basic adjustment, but in addition, special parameters are reset to default values.[9)]

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

Optional settings

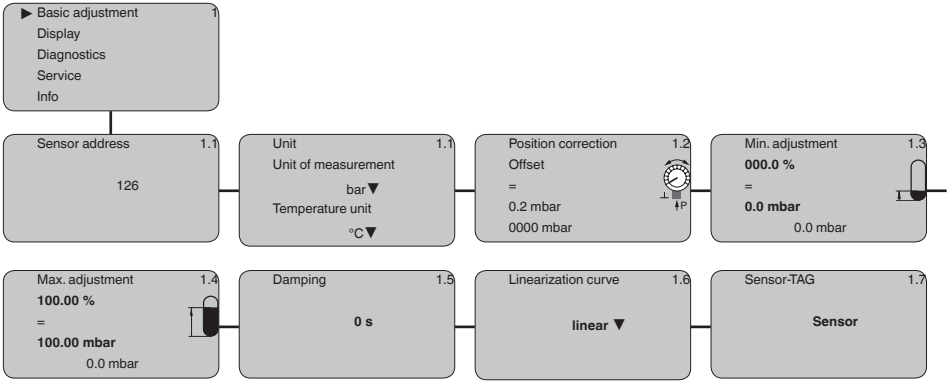
Additional adjustment and diagnosis options such as e.g. scaling, simulation or trend curve presentation are shown in the following menu schematic. You will find a detailed description of these menu items in the operating instructions manual "*Display and adjustment module*".

6.5 Menu schematic

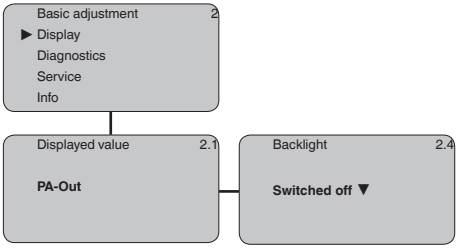
Information:
Depending on the version and application, the highlighted menu windows may not always be available.

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

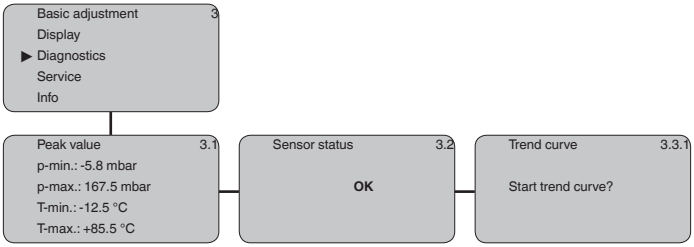
Basic adjustment



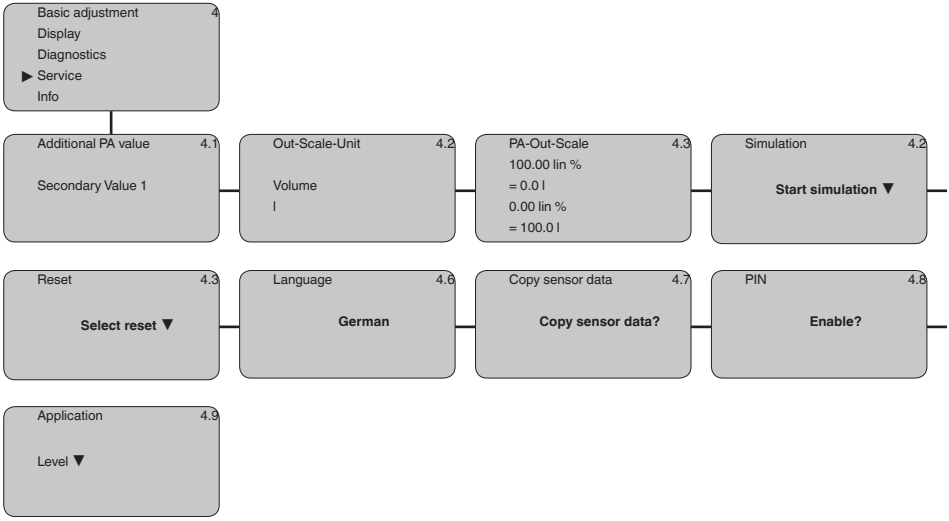
Display



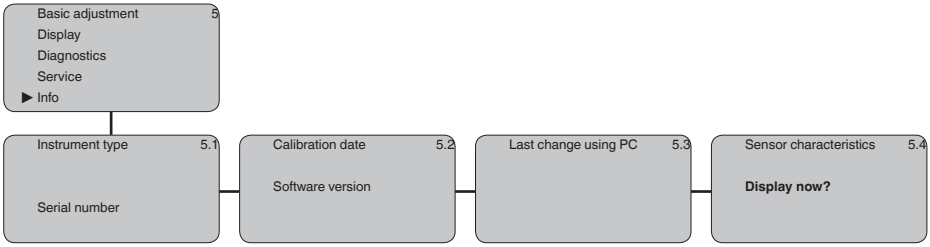
Diagnostics



Service



Info



6.10 Saving the parameter adjustment data

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

If VEGABAR 67 is equipped with a display and adjustment module, the most important data can be read out of the sensor into the display and adjustment module. The procedure is described in the operating instructions manual "*Display and adjustment module*" in the menu item "*Copy sensor data*". The data remain there permanently even if the sensor power supply fails.

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

7 Set up with PACTware and other adjustment programs

7.1 Connect the PC via VEGACONNECT

VEGACONNECT directly on the sensor

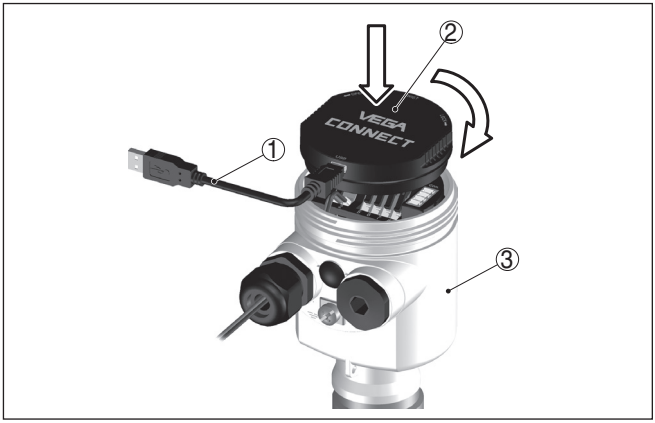


Fig. 29: Connection of the PC via VEGACONNECT directly to the sensor

1 USB cable to the PC
2 VEGACONNECT
3 Sensor

VEGACONNECT externally

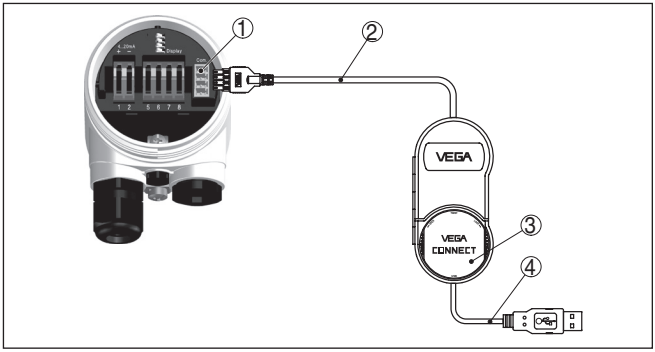


Fig. 30: Connection via VEGACONNECT externally

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

Necessary components:

- VEGABAR 67
- PC with PACTware and suitable VEGA DTM
- VEGACONNECT
- Power supply unit or processing system

7.2 Parameter adjustment with PACTware

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

Note:
Keep in mind that for setup of VEGABAR 67, DTM-Collection in the actual version must be used.

All currently available VEGA DTMs are included as a DTM Collection on a CD. They can be purchased for a token fee from the responsible VEGA agency. In addition, the actual PACTware version is also available on this CD.

In addition, this DTM Collection incl. the basic version of PACTware can be downloaded free of charge from the Internet. Move via www.vega.com and "*Downloads*" to "*Software*".

7.3 Parameter adjustment with PDM

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

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

7.4 Saving the parameter adjustment data

It is recommended to document or save the parameter adjustment data. That way they are available for multiple use or service purposes.

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

8 Maintenance and fault rectification

8.1 Maintain

Maintenance

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

In some applications, product buildup on the diaphragm can influence the measuring result. Depending on the sensor and application, take precautions to ensure that heavy buildup, and especially a hardening thereof, is avoided.

Cleaning

If necessary, clean the diaphragm. Make sure that the materials are resistant to the cleaning process, see resistance list under "*Services*" on "www.vega.com". The wide variety of applications of isolating diaphragms makes special cleaning instructions necessary for each application. Please ask the VEGA agency serving you.

Caution:
On instruments with a chemical seal, never clean the separating diaphragm mechanically with hard objects, such as tools! This can damage the diaphragm and lead to filling oil leaks.

8.2 Rectify faults

Failure reasons

VEGABAR 67 offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Voltage supply
- Signal processing

Fault rectification

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

24 hour service hotline

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

The hotline is available to you 7 days a week round-the-clock. Since we offer this service world-wide, the support is only available in the English language. The service is free of charge, only the standard telephone costs will be charged.

Checking Profibus PA

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

36743-EN-130321

Error	Cause	Rectification
When an additional instrument is connected, the segment fails.	Max. supply current of the segment coupler exceeded	Measure the current consumption, reduce size of segment
Wrong presentation of the measured value in Simatic S5	Simatic S5 cannot interpret the number format IEEE of the measured value	Insert converting component from Siemens
In Simatic S7 the measured value is always presented as 0	Only four bytes are consistently loaded in the PLC	Use function component SFC 14 to load 5 bytes consistently
Measured value on the display and adjustment module does not correspond to the value in the PLC	The menu item "*Display - Display value*" is not set to "*PA-Out*"	Check values and correct, if necessary
No connection between PLC and PA network	Incorrect adjustment of the bus parameter and the segment coupler-dependent baud rate	Check data and correct, if necessary
Instrument does not appear during connection setup	Profibus DP cable pole-reversed	Check cable and correct, if necessary
	Incorrect termination	Check termination at the beginning and end points of the bus and terminate, if necessary, according to the specification
	Instrument not connected to the segment, double assignment of an address	Check and correct, if necessary

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

Error messages via the display and adjustment module

Error code	Cause	Rectification
E013	no measured value available[10)]	– Exchange the instrument or send it in for repair
E017	Adjustment span too small	– repeat with modified values
E036	no operable sensor software	– Carry out a software update or send instrument for repair
E041	Hardware error, electronics defective	– Exchange the instrument or send it in for repair

[10)] Fault message can also appear if the pressure is higher than the nominal range.

Error code	Cause	Rectification
E113	Communication conflict	– Exchange the instrument or send it in for repair

8.3 Calculation of total deviation (according to DIN 16086)

Total deviation

The total deviation F_{total} according to DIN 16086 is the sum of basic accuracy F_{perf} and longterm stability F_{stab}. F_{total} is also called maximum practical deviation or utility error.

$F_{total} = F_{perf} + F_{stab}$

$F_{perf} = \sqrt{((F_T)^2 + (F_{KI})^2)}$

With the analogue signal output there is also the error of the current output F_a.

$F_{perf} = \sqrt{((F_T)^2 + (F_{KI})^2 (+ F_a)^2)}$

With:

- F_{total}: Total deviation
- F_{perf}: Basic accuracy
- F_{stab}: Long-term drift
- F_T: Temperature coefficient (influence of medium or ambient temperature)
- F_{KI}: Deviation
- F_a: Error current output

Example

Level measurement 1500 mmWs

Product temperature 40 °C, reference temperature 20 °C

VEGABAR 67 with measuring range 0.2 bar

Deviation < 0.1 %

Calculation ΔT: ΔT = 40 °C - 20 °C = 20 K

Calculation of the set Turn Down:

TD = 200 mbar/147 mbar, TD = 1.4

Basic accuracy digital output signal in percent:

$F_{perf} = \sqrt{((F_T)^2 + (F_{KI})^2)}$

$F_T = 0.05\ \%/10\ K \times TD$

$F_{KI} = 0.1\ \%$

$F_{perf} = \sqrt{((0.05\ \%/10\ K \times 20\ K \times 1.4)^2 + (0.1\ \%)^2)}$

$F_{perf} = 0.17\ \%$

Total deviation digital output signal in percent:

$F_{total} = F_{perf} + F_{stab}$

$F_{stab} = 0.1\ \%/year \times TD$

$F_{stab} = 0.1\ \%/year \times 1.4$

$F_{stab} = 0.14\ \%$

$F_{total} = 0.17\ \% + 0.14\ \% = 0.31\ \%$

Total deviation digital output signal absolute:
F_{total} = 0.35 % x 147 mbar/100 % = 0.46 mbar = 4.7 mm

Basic accuracy analogue output signal in percent:
$F_{perf} = \sqrt{((F_T)^2 + (F_{KI})^2 + (F_a)^2)}$
F_T = 0.05 %/10 K x TD
F_{KI} = 0.1 %
F_a = 0.15 %
$F_{perf} = \sqrt{((0.05\ \%/10\ K \times 20\ K \times 1.4)^2 + (0.1\ \%)^2 + (0.15\ \%)^2)}$
F_{perf} = 0.23 %

Total deviation analogue output signal in percent:
$F_{total} = F_{perf} + F_{stab}$
F_{stab} = 0.1 %/year x TD
F_{stab} = 0.1 %/year x 1.4
F_{stab} = 0.14 %
F_{total} = 0.23 % + 0.14 % = 0.37 %

Total deviation analogue output signal absolute:
F_{total} = 0.37 % x 147 bar/100 % = 0.54 mbar = 5.5 mm

8.4 Exchanging the electronics module

In case of a defect, the electronics module can be exchanged by the user against an identical type. If no electronics module is available on side, the module can be ordered from the agency serving you.

Ordering and exchange are possible **with** or **without** sensor serial number. The electronics module **with** serial number includes **order-specific** data such as factory setting, seal material etc. These are not included in the electronics module **without** serial number.

The serial number is stated on the type label of VEGABAR 67 or on the delivery note.

8.5 Software update

The software version of VEGABAR 67 can be determined as follows:

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

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

The following components are required to update the sensor software:

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

Load sensor software to PC

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

Prepare update

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

Load software into sensor

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

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

8.6 Instrument repair

If a repair is necessary, please proceed as follows:

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

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

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and, if need be, also a safety data sheet outside on the packaging
- Please ask the agency serving you for the address of your return shipment. You can find the respective contact data on our website www.vega.com under: "*Company - VEGA worldwide*"

9 Dismounting

9.1 Dismounting steps

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

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

9.2 Disposal

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

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

Correct disposal avoids negative effects on humans and the environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

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

10 Supplement

10.1 Technical data

General data	
Measured variable	Level
Measuring principle	ceramic-capacitive, temperature-compensated chemical seal system
Communication interface	I^2C bus

Materials and weights	
Material 316L corresponds to 1.4404 or 1.4435	
Materials, wetted parts	
– Transmitter	316L
– Diaphragm	Hastelloy C276
– Suspension cable	FEP
– Connection tube	316L
– Process fitting	316L
– Seal process fitting thread G1½ A, threaded connection, lock fitting	Klingersil C-4400
– Seal, suspension cable	FEP
– Protective cap	PFA
Materials, non-wetted parts	
– Isolating liquid	Essomarcal (med. white oil, FDA-approved)
– Straining clamp	1.4301
– Threaded fitting	316L
– Lock fitting	316L
– Housing	Plastic PBT (polyester), Alu die-casting powder-coated, 316L
– External housing	plastic PBT (Polyester), 316L
– Socket, wall mounting plate external housing	plastic PBT (Polyester), 316L
– Seal between housing socket and wall mounting plate	TPE (fixed connected)
– Seal between housing and housing cover	NBR (stainless steel housing), silicone (Alu/plastic housing)
– Inspection window in housing cover for PLICSCOM	Polycarbonate (UL-746-C listed)
– Ground terminal	316Ti/316L
– Ohmic contact	Between ground terminal, process fitting and transmitter
– Connection cable between IP 68 housing and external electronics	PUR, FEP, PE
– Type label support with IP 68 version on cable	PE hard

Weight approx.	
– Basic weight	0.7 kg (1.543 lbs)
– Suspension cable	0.1 kg/m (0.07 lbs/ft)
– Connection tube	1.5 kg/m (1 lbs/ft)
– Straining clamp	0.2 kg (0.441 lbs)
– Threaded fitting	0.4 kg (0.882 lbs)
Lengths	
– Connection tube	0.25 … 6 m (0.82 … 19.69 ft)

Output variable

Output signal	digital output signal, format according to IEEE-754
Sensor address	126 (default setting)
Current value	10 mA, ±0.5 mA

Dynamic behaviour output

Run-up time approx.	10 s

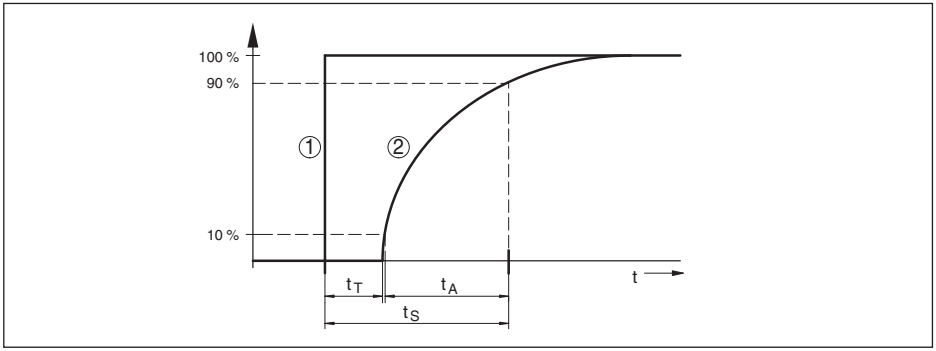


Fig. 31: Sudden change of the process variable. t_T: dead time; t_A: rise time; t_S: jump response time

1 Process variable
2 Output signal

Dead time	≤ 150 ms
Rise time	≤ 100 ms (10 … 90 %)
Step response time	≤ 250 ms (ti: 0 s, 10 … 90 %)
Damping (63 % of the input variable)	0 … 999 s, adjustable

Additional output parameter - temperature

Processing is made via output signal HART multidrop, Profibus PA and Foundation Fieldbus

Range	-50 … +150 °C (-58 … +302 °F)
Resolution	1 °C (1.8 °F)
Accuracy	
– in the range of 0 … +100 °C (+32 … +212 °F)	±3 K

– in the range of -50 … 0 °C (-58 … +32 °F) and +100 … +150 °C (+212 … +302 °F)	typ. ±4 K

Input variable

Adjustment

Adjustment range of the min./max. adjustment relating to the nominal measuring range:

– Percentage value	-10 … 110 %
– Pressure value	-20 … 120 %

Adjustment range of the zero/span adjustment relating to the nominal measuring range:

– zero	-20 … +95 %
– span	-120 … +120 % [11]
– Difference between zero and span	max. 120 % of the nominal range
Recommended max. turn down	10 : 1

Nominal measuring ranges and overload capability in bar/kPa

The specifications are only an overview and refer to the measuring cell. Limitations due to the material and version of the process fitting are possible. The specifications on the nameplate apply.

Nominal range	Overload capacity, max. pressure	Overload capacity, min. pressure
Gauge pressure		
0 … +0.1 bar/0 … +10 kPa	+15 bar/+1500 kPa	-15 psig
0 … +0.2 bar/0 … +20 kPa	+20 bar/+2000 kPa	-15 psig
0 … +0.4 bar/0 … +40 kPa	+30 bar/+3000 kPa	-15 psig
0 … +1 bar/0 … +100 kPa	+35 bar/+3500 kPa	-1 bar/-100 kPa
0 … +2.5 bar/0 … +250 kPa	+50 bar/+5000 kPa	-1 bar/-100 kPa
0 … +5 bar/0 … +500 kPa	+65 bar/+6500 kPa	-1 bar/-100 kPa
0 … +10 bar/0 … +1000 kPa	+90 bar/+9000 kPa	-1 bar/-100 kPa
0 … +25 bar/0 … +2500 kPa	130 bar/13 MPa	-1 bar/-100 kPa
Absolute pressure		
0 … 1 bar/0 … 100 kPa	35 bar/3500 kPa	0 bar abs.
0 … 2.5 bar/0 … 250 kPa	50 bar/5000 kPa	0 bar abs.
0 … 5 bar/0 … 500 kPa	65 bar/6500 kPa	0 bar abs.
0 … 10 bar/0 … 1000 kPa	90 bar/9000 kPa	0 bar abs.
0 … 25 bar/0 … 2500 kPa	130 bar/13000 kPa	0 bar abs.

Nominal measuring ranges and overload capability in psig

The specifications are only an overview and refer to the measuring cell. Limitations due to the material and version of the process fitting are possible. The specifications on the nameplate apply.

Nominal range	Overload capacity, max. pressure	Overload capacity, min. pressure
Gauge pressure		

[11] Values less than -1 bar cannot be set.

Nominal range	Overload capacity, max. pressure	Overload capacity, min. pressure
0 … +1.5 psig	+200 psig	-15 psig
0 … +3 psig	+290 psig	-15 psig
0 … +6 psig	+430 psig	-15 psig
0 … +15 psig	+500 psig	-15 psig
0 … +35 psig	+700 psig	-15 psig
0 … +70 psig	+950 psig	-15 psig
0 … +150 psig	+1300 psig	-15 psig
0 … +350 psig	+1900 psig	-15 psig
0 … +900 psig	+2900 psig	-15 psig
Absolute pressure		
0 … 15 psi	500 psi	0 psi
0 … 35 psi	700 psi	0 psi
0 … 70 psi	900 psi	0 psi
0 … 150 psi	1300 psi	0 psi
0 … 350 psi	1900 psi	0 psi

Reference conditions and actuating variables (according to DIN EN 60770-1)

Reference conditions according to DIN EN 61298-1

– Temperature	18 … 30 °C (64 … 86 °F)
– Relative humidity	45 … 75 %
– Air pressure	860 … 1060 mbar/86 … 106 kPa (12.5 … 15.4 psi)
Determination of characteristics	limit point adjustment according to DIN 16086
Characterstic curve	Linear
Reference installation position	upright, diaphragm points downward
Influence of the installation position	< 5 mbar/0.5 kPa (0.07 psig)

Deviation determined according to the limit point method according to IEC 60770[12)]

Applies to the **digital** signal output (HART, Profibus PA, Foundation Fieldbus) as well as to **analogue** current output 4 … 20 mA and refers to the set span. Turn down (TD) is the ratio nominal measuring range/set span.

Deviation

– Turn down 1 : 1 up to 5 : 1	< 0.1 %
– Turn down > 5 : 1	< 0.02 % x TD

Influence of the product or ambient temperature

Thermal change zero signal and output span

Applies to the **digital** signal output (HART, Profibus PA, Foundation Fieldbus) as well as to **analogue** current output 4 … 20 mA and refers to the set span. Turn down (TD) is the ratio nominal measuring range/set span.

Thermal change zero signal and output span, reference temperature 20 °C (68 °F):

[12)] Incl. non-linearity, hysteresis and non-repeatability.

- In the compensated temperature range 0 … +100 °C (+32 … +212 °F) — < 0.05 %/10 K x TD
- Outside the compensated temperature range — typ. < 0.05 %/10 K x TD

Thermal change, current output

Applies also to the **analogue** 4 … 20 mA current output and refers to the set span.

Thermal change, current output — < 0.05 %/10 K, max. < 0.15 %, each with -40 … +80 °C (-40 … +176 °F)

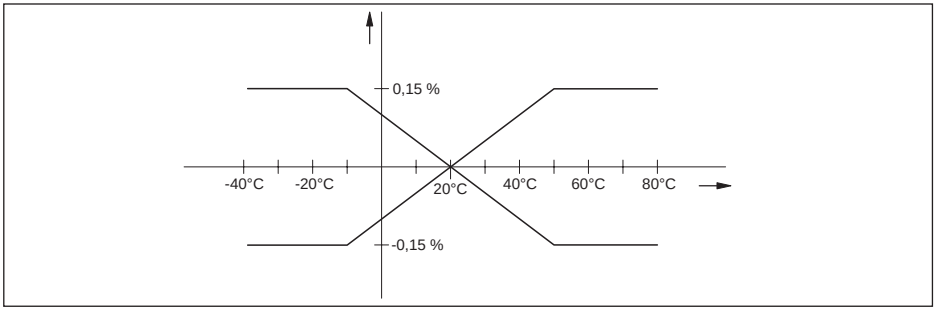


Fig. 32: Thermal change, current output

Long-term stability (according to DIN 16086 and IEC 60770-1)

Applies to **digital** HART interface as well as to **analogue** current output 4 … 20 mA under reference conditions. Specifications refer to the set span. Turn down (TD) is the relation nominal measuring range/set span.

Long-term drift of the zero signal:

- For one year — < 0.05 % x TD
- For five years — < 0.1 % x TD
- For ten years — < 0.2 % x TD

Ambient conditions

Ambient, storage and transport temperature

- Version with connection tube — -40 … +80 °C (-40 … +176 °F)
- Version with suspension cable FEP, PUR — -20 … +80 °C (-4 … +176 °F)
- Version with suspension cable PE — -20 … +60 °C (-4 … +140 °F)

Process conditions

The specifications of the pressure stage and product temperature are used as an overview. The specifications on the type label are applicable.

Process pressure

- with measuring ranges 0.1 bar (1.45 psig) or 0.2 bar (2.9 psig) — max. 15 bar (217.6 psig) or max. 20 bar (290 psig)[13)]

[13)] Limited by the overpressure resistance of the measuring cell.

– with meas. ranges from 0.4 bar (5.8 psig)	max. 25 bar (363 psig)[14]
Pressure stage, process fitting	
– Threaded fitting	316L PN 3, PVDF PN 5[15]
– Thread	316L PN 25, PVDF unpressurized
– Lock fitting	Unpressurized
Product temperature	
– Suspension cable	-12 … +100 °C (+10 … +212 °F)
– Connection tube	-12 … +100 °C (+10 … +212 °F)
Vibration resistance	mechanical vibrations with 4 g and 5 … 100 Hz[16]

With version with connection tube, vibration resistance 1 g. With lengths > 0.5 m (1.64 ft) the tube must be supported in addition.

Shock resistance	Acceleration 100 g/6 ms[17]

Electromechanical data - version IP 66/IP 67

Cable entry/plug[18]	
– Single chamber housing	– 1 x cable gland M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind plug M20 x 1.5 or: – 1 x closing cap ½ NPT, 1 x blind plug ½ NPT or: – 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5 or: – 2 x blind plug M20 x 1,5
– Double chamber housing	– 1 x cable entry M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind plug M20 x 1.5; plug M12 x 1 for the external display and adjustment unit (optional) or: – 1 x closing cap ½ NPT, 1 x blind plug ½ NPT, plug M12 x 1 for the external display and adjustment unit (optional) or: – 1 x plug (depending on the version), 1 x blind plug M20 x 1.5; plug M12 x 1 for the external display and adjustment unit (optional) or: – 2 x blind stoppers M20 x 1.5; plug M12 x 1 for the external display and adjustment unit (optional)
Spring-loaded terminals for wire cross-section	> 2.5 mm² (AWG 14)

[14] Limitation by the pressure-tightness of the cable connection.
[15] Limited by the overpressure resistance of the measuring cell.
[16] Tested according to the guidelines of German Lloyd, GL directive 2.
[17] Tested according to EN 60068-2-27.
[18] Depending on the version M12 x 1, according to ISO 4400, Harting, 7/8" FF.

Electromechanical data - version IP 66/IP 68 (1 bar)	
Cable entry	
– Single chamber housing	– 1 x IP 68 cable gland M20 x 1.5; 1 x blind plug M20 x 1.5 or: – 1 x closing cap ½ NPT, 1 x blind plug ½ NPT
Connection cable	
– Configuration	four wires, one suspension wire, one breather capillary, screen braiding, metal foil, mantle
– Wire cross-section	0.5 mm² (AWG 20)
– Wire resistance	< 0.036 Ω/m (0.011 Ω/ft)
– Tensile strength	> 1200 N (270 pounds force)
– Standard length	5 m (16.4 ft)
– Max. length	1000 m (3281 ft)
– Min. bending radius at 25 °C/77 °F	25 mm (0.985 in)
– Diameter approx.	8 mm (0.315 in)
– Colour - Non-Ex version	Black
– Colour - Ex-version	Blue

Electromechanical data - version IP 68	
Cable entry/plug[19]	
– External housing	– 1 x cable gland M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind plug M20 x 1.5 or: – 1 x closing cap ½ NPT, 1 x blind plug ½ NPT or: – 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5
Spring-loaded terminals for wire cross-section up to	2.5 mm² (AWG 14)
Connection cable between IP 68 instrument and external housing:	
– Configuration	four wires, one suspension wire, one breather capillary, screen braiding, metal foil, mantle
– Wire cross-section	0.5 mm² (AWG 20)
– Wire resistance	< 0.036 Ω/m (0.011 Ω/ft)
– Standard length	5 m (16.4 ft)
– Max. length non-Ex	250 m (820.21 ft)
– Max. length Ex	180 m (591.55 ft)
– Min. bending radius at 25 °C/77 °F	25 mm (0.985 in)
– Diameter	approx. 8 mm (0.315 in)
– Cable extraction force[20]	≥ 650 N (146.1 lbf)
– Colour - standard PE	Black

[19] Depending on the version M12 x 1, according to ISO 4400, Harting, 7/8" FF.

[20] With this extraction force, the suspension cable can be extracted out of the transmitter.

– Colour - standard PUR	Blue
– Colour - Ex-version	Blue

Display and adjustment module

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

Voltage supply

Operating voltage	
– Non-Ex instrument	9 … 32 V DC
– Ex-ia instrument	9 … 24 V DC
– Exd instrument	14 … 32 V DC
Operating voltage with illuminated display and adjustment module	
– Non-Ex instrument	18 … 32 V DC
– Ex-ia instrument	18 … 24 V DC
– Exd instrument	18 … 32 V DC
Max. number of sensors on the DP/PA segment coupler non-Ex/Ex	32/10

Electrical protective measures

Protection rating	
– Transmitter	IP 68 (25 bar)
– Housing, standard	IP 66/IP 67[21)]
– Aluminium and stainless housing (optionally available)	IP 68 (1 bar)[22)]
– External housing	IP 65
Overvoltage category	III
Protection class	II

Approvals

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

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

21) Instruments with gauge pressure measuring ranges cannot detect the ambient pressure when submerged, e.g. in water. This can lead to falsification of the measured value.

22) Only with instruments with absolute pressure ranges.

10.2 Information on Profibus PA

Instrument master file

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

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

Ident number

Each Profibus instrument gets an unambiguous ident number (ID number) from the Profibus user organisation (PNO). This ID number is also included in the name of the GSD file. For VEGABAR 67 the ID number is **0 x 076F(hex)** and the GSD file **BR__076F.GSD**. As an option to this manufacturer-specific GSD file, PNO provides also a general so-called profile-specific GSD file. For VEGABAR 67 you have to use the general GSD file **PA139701.GSD**. If the general GSD file is used, the sensor must be set to the profile-specific ident number via the DTM software. By default, the sensor operates with the manufacturer-specific ID number.

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

Cyclical data traffic

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

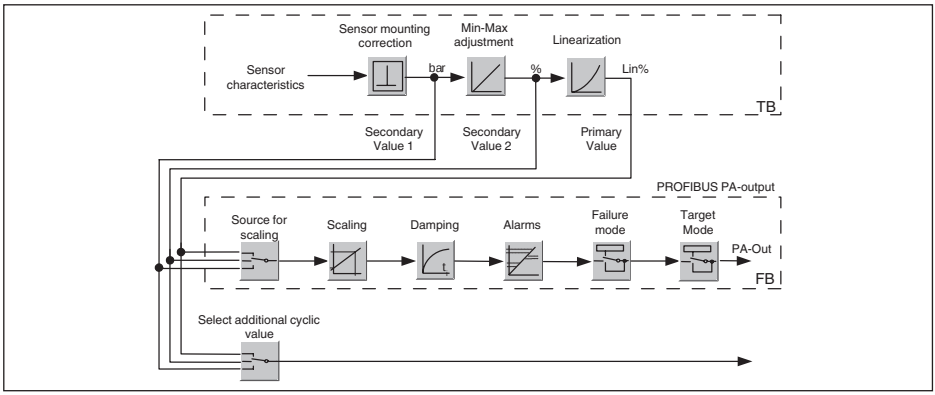


Fig. 33: VEGABAR 67: Block diagram with AI (PA-OUT) value and Additional Cyclic Value

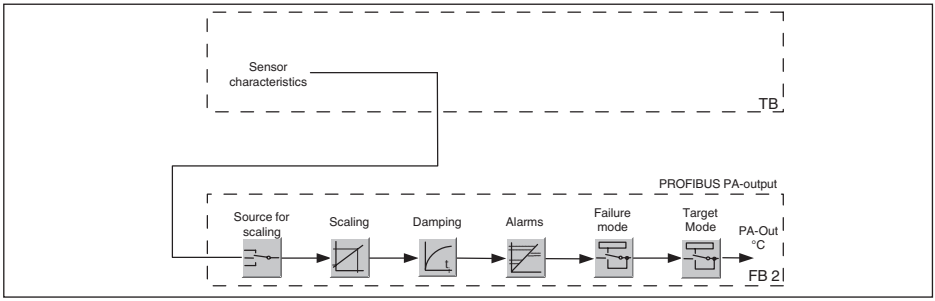


Fig. 34: VEGABAR 67: Block diagram with temperature value

Module of the PA sensors

For the cyclic data traffic, VEGABAR 67 provides the following modules:

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

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

Tip:
The modules are available in two versions:

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

Examples of telegram configuration

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

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

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

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

Fig. 35: Telegram configuration example 1

Example 2 with pressure value and temperature value without additional cyclical value:

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

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

Fig. 36: Telegram configuration example 2

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

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

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

Fig. 37: Telegram configuration example 3

Data format of the output signal

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

Fig. 38: Data format of the output signal

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

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

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

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

Fig. 39: Data format of the measured value

Coding of the status byte associated with the PA output value

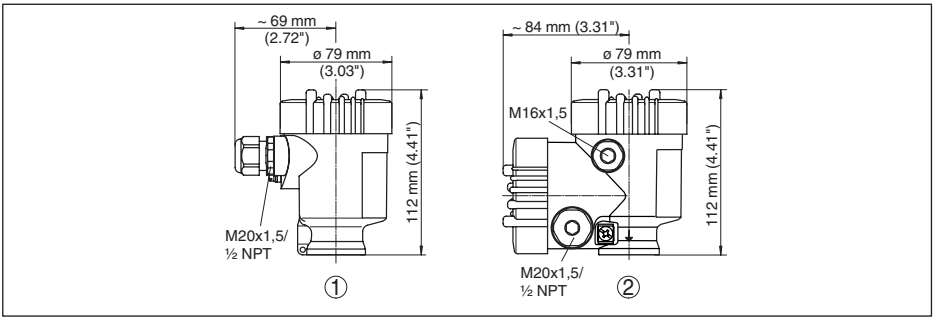
Status code	Description according to Profibus standard	Possible cause
0 x 00	bad - non-specific	Flash-Update active

Status code	Description according to Profibus standard	Possible cause
0 x 04	bad - configuration error	– Adjustment error – Configuration error with PV-Scale (PV-Span too small) – Unit irregularity – Error in the linearization table
0 x 0C	bad - sensor failure	– Hardware error – Converter error – Leakage pulse error – Trigger error
0 x 10	bad - sensor failure	– Measured value generation error – Temperature measurement error
0 x 1f	bad - out of service constant	"Out of Service" mode switched on
0 x 44	uncertain - last unstable value	Failsafe replacement value (Failsafe-Mode = "Last value" and already valid measured value since switching on)
0 x 48	uncertain substitute set	– Switch on simulation – Failsafe replacement value (Failsafe-Mode = "Fsafe value")
0 x 4c	uncertain - initial value	Failsafe replacement value (Failsafe-Mode = "Last valid value" and no valid measured value since switching on)
0 x 51	uncertain - sensor; conversion not accurate - low limited	Sensor value < lower limit
0 x 52	uncertain - sensor; conversion not accurate - high limited	Sensor value > upper limit
0 x 80	good (non-cascade) - OK	OK
0 x 84	good (non-cascade) - active block alarm	Static revision (FB, TB) changed (10 sec. active, after the parameter of the static category has been written)
0 x 89	good (non-cascade) - active advisory alarm - low limited	Lo-Alarm
0 x 8a	good (non-cascade) - active advisory alarm - high limited	Hi-Alarm
0 x 8d	good (non-cascade) - active critical alarm - low limited	Lo-Lo-Alarm
0 x 8e	good (non-cascade) - active critical alarm - high limited	Hi-Hi-Alarm

10.3 Dimensions

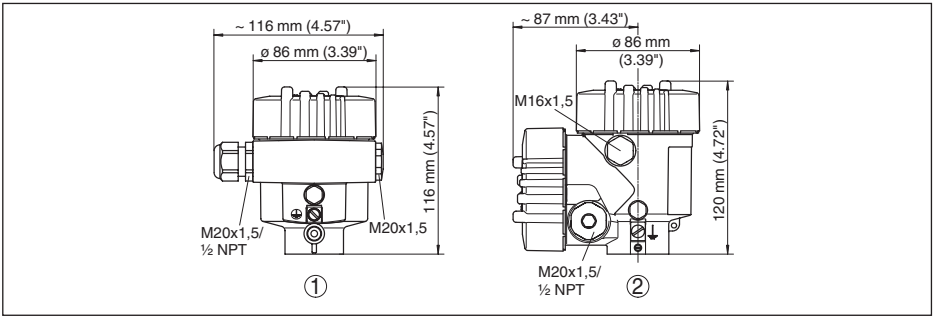
The following dimensional drawings represent only an extract of the possible versions. Detailed dimensional drawings can be downloaded on www.vega.com under "*Downloads*" and "*Drawings*".

Plastic housing



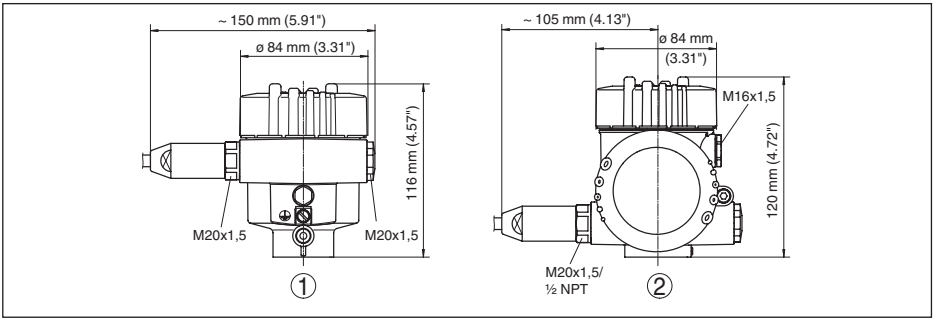
1 *Single chamber version*
2 *Double chamber version*

Aluminium housing



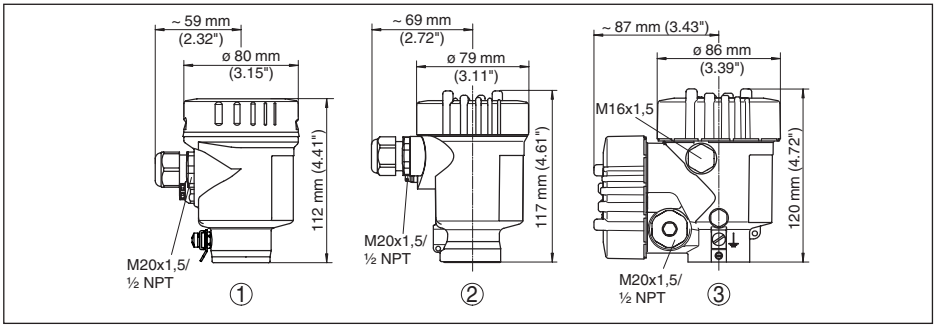
1 *Single chamber version*
2 *Double chamber version*

Aluminium housing in protection rating IP 66/IP 68, 1 bar



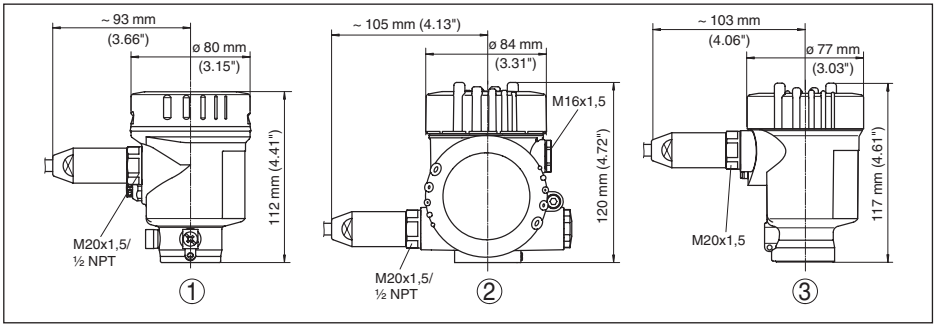
1 *Single chamber version*
2 *Double chamber version*

Stainless steel housing



1 Single chamber version, electropolished
2 Single chamber version, precision casting
2 Double chamber version, precision casting

Stainless steel housing in protection rating IP 66/IP 68, 1 bar



1 Single chamber version, electropolished
2 Single chamber version, precision casting
2 Double chamber version, precision casting

External housing with version IP 68

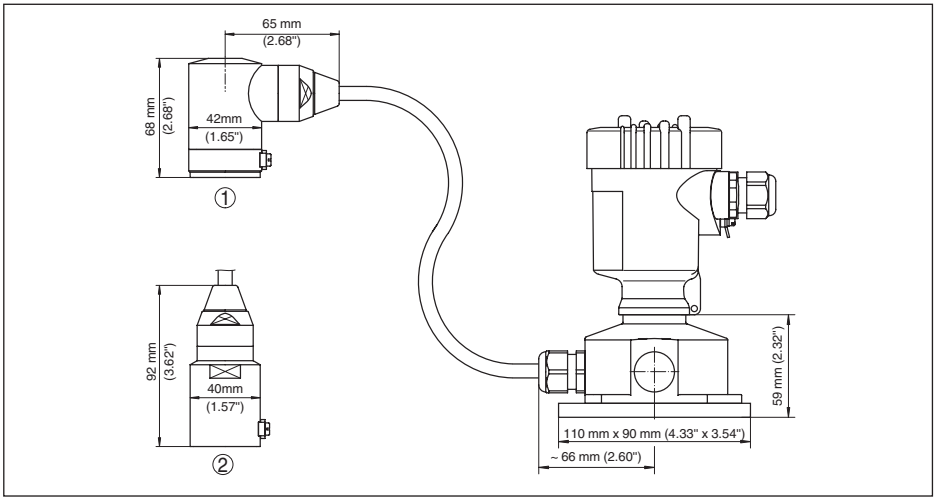


Fig. 45: IP 68 version with external housing - plastic version

1 Lateral cable outlet
2 Axial cable outlet

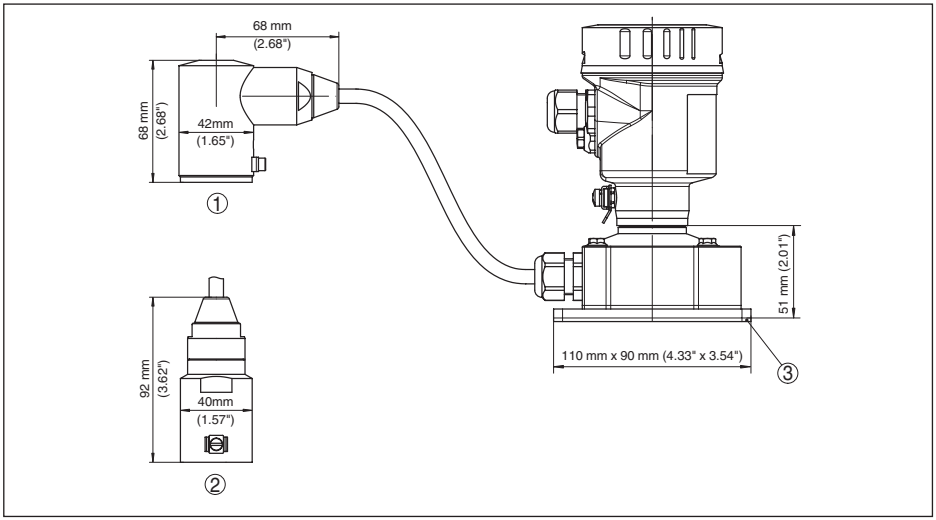


Fig. 46: External housing - Stainless steel version

1 Lateral cable outlet
2 Axial cable outlet
3 Seal 2 mm (0.079 in)

VEGABAR 67

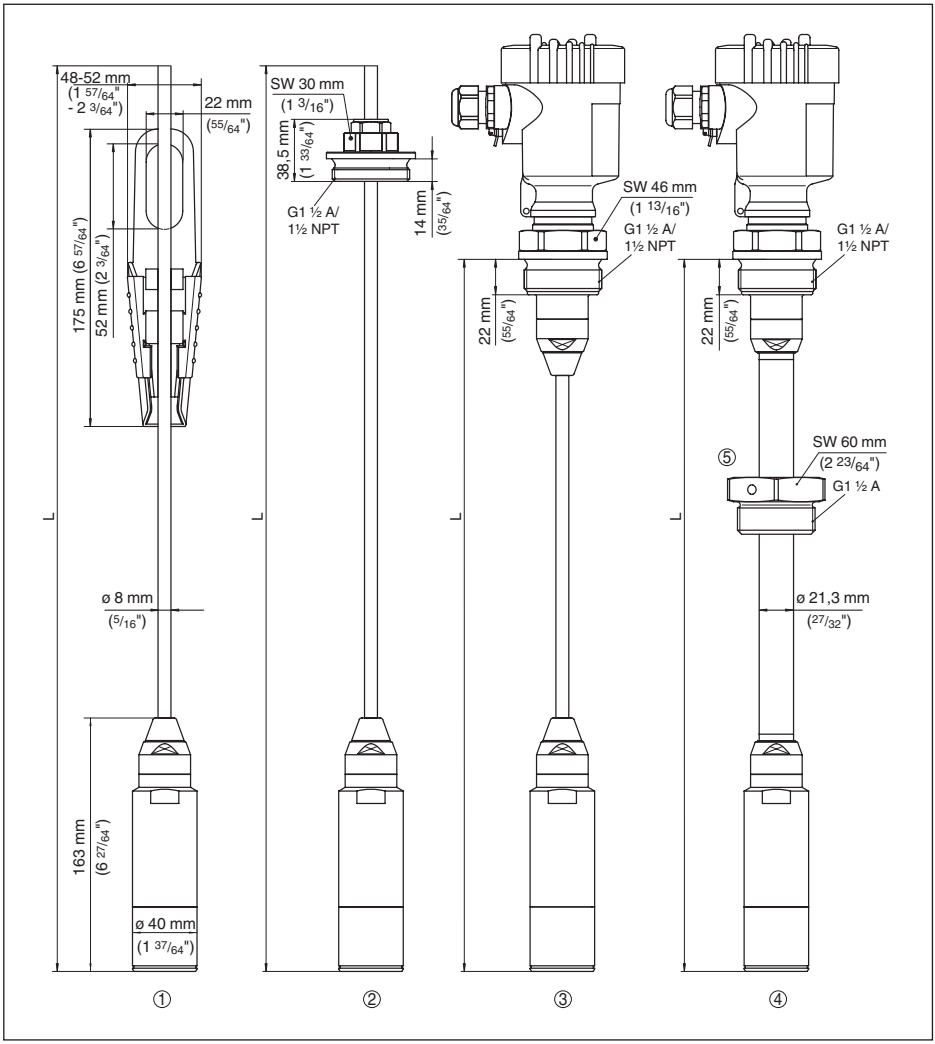
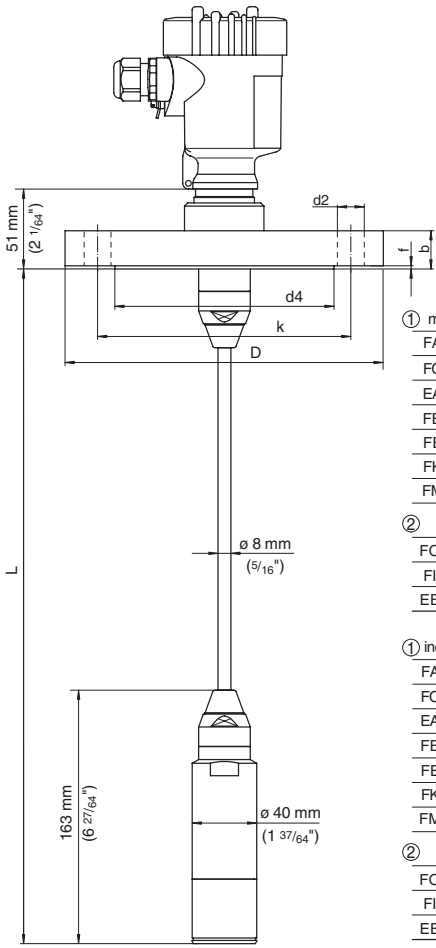


Fig. 47: VEGABAR 67, standard fittings

1 *Straining clamp*
2 *Threaded fitting*
3 *Thread G1½ A*
4 *Thread 1½ NPT*
5 *Lock fitting*

VEGABAR 67, flange connection



① mm	DN	PN	D	b	k	d2	d4	f
FA	25	40	115	18	85	4xø14	68	2
FC	32	40	140	18	100	4xø18	78	2
EA	40	40	150	18	110	4xø18	88	3
FB	50	40	165	20	125	4xø18	102	3
FE	80	40	200	24	160	8xø18	138	3
FK	100	16	220	20	180	8xø18	158	3
FM	150	16	285	22	240	8xø22	162	3

②	"	lbs	D	b	k	d2	d4	f
FO	2"	150	6"	3/4"	4 3/4"	4xø 5/8"	3 5/8"	1/8"
FI	3"	150	7 1/2"	3/4"	6	4xø 5/8"	6	1/8"
EB	4"	300	10"	1 1/4"	7 7/8"	8xø 5/8"	6 3/16"	1/8"

① inch	DN	PN	D	b	k	d2	d4	f
FA	25	40	4 17/32"	45/64"	3 11/32"	4xø 35/64"	2 43/64"	5/64"
FC	32	40	5 33/64"	45/64"	3 15/16"	4xø 45/64"	3 5/64"	5/64"
EA	40	40	5 29/32"	45/64"	4 21/64"	4xø 45/64"	3 15/32"	1/8"
FB	50	40	6 1/2"	25/32"	4 59/64"	4xø 45/64"	4 1/64"	1/8"
FE	80	40	7 7/8"	15/16"	6 19/64"	8xø 45/64"	5 7/16"	1/8"
FK	100	16	8 21/32"	25/32"	7 3/32"	8xø 45/64"	6 7/32"	1/8"
FM	150	16	11 7/32"	55/64"	9 29/64"	8xø 55/64"	6 3/8"	1/8"

②	"	lbs	D	b	k	d2	d4	f
FO	2"	150	6"	3/4"	4 3/4"	4xø 5/8"	3 5/8"	1/8"
FI	3"	150	7 1/2"	3/4"	6	4xø 5/8"	6	1/8"
EB	4"	300	10"	1 1/4"	7 7/8"	8xø 5/8"	6 3/16"	1/8"

Fig. 48: VEGABAR 67, flange connection

1 Flanges according to DIN 2501
2 Flanges according to ANSI B16.5

VEGABAR 67, hygienic fittings

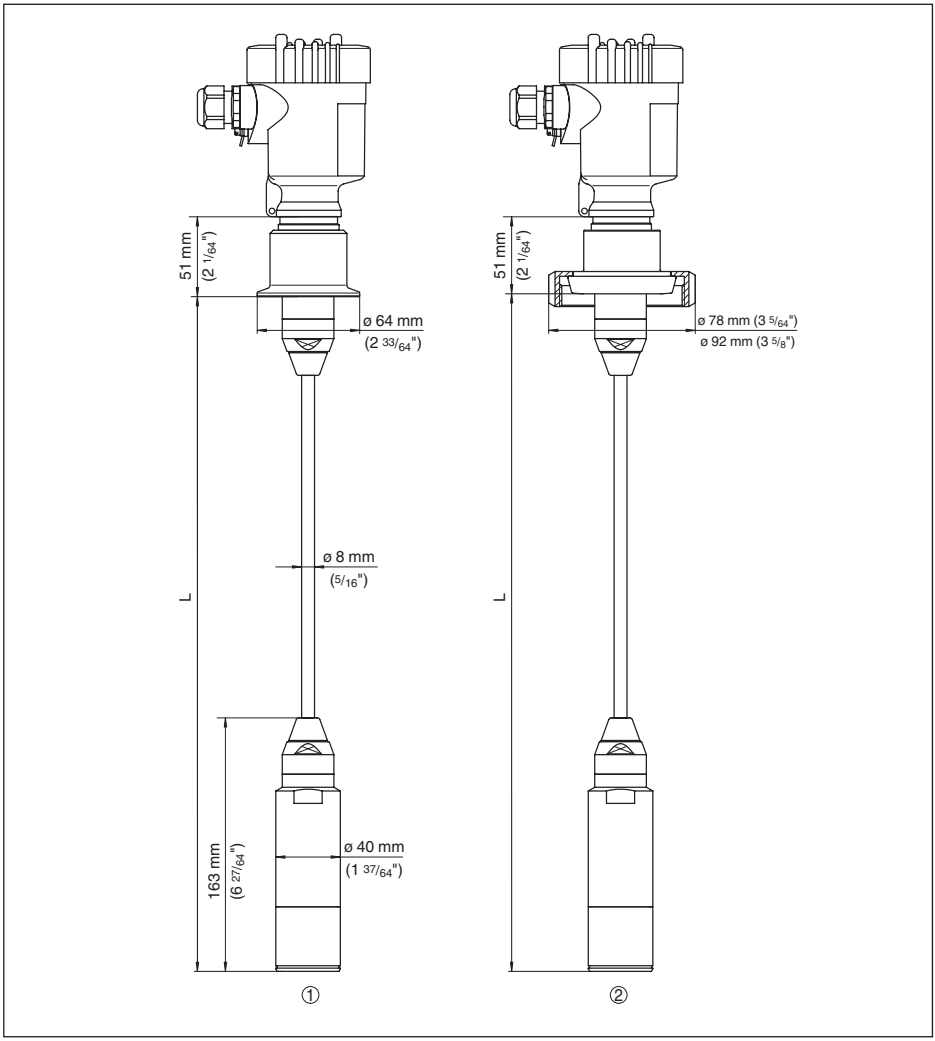


Fig. 49: VEGABAR 67, hygienic fittings

1 Clamp 2" PN16 (ø64 mm) DIN 32676, ISO 2852/316L
2 Bolting DN 50

10.4 Industrial property rights

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

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