Operating Instructions

VEGABAR 66

Foundation Fieldbus

Document ID:
28261

Process pressure/
Hydrostatic

Contents

28261-EN-081209

Supplementary documentation

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

Instructions manuals for accessories and replacement parts

Tip:
To ensure reliable setup and operation of your instrument, we offer accessories and replacement parts. The corresponding instructions manuals are:

- 32036 - Welded socket and seals
- 27720 - External indication VEGADIS 61
- 34296 - Protective cover
- 30175 - Electronics module VEGABAR series 50 and 60

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1 About this document

1.1 Function

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

1.2 Target group

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

1.3 Symbolism used

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

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

Ex applications
This symbol indicates special instructions for Ex applications.

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

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

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

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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

VEGABAR 66 is a suspension 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 misuse

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

2.4 General safety instructions

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

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

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

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2.5 Safety approval markings and safety tips

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

2.6 CE conformity

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 Fulfillment of NAMUR recommendations

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

- Sensor software for DTM VEGABAR 66 HART, PA or FF
- DTM VEGABAR 66 for adjustment software PACTware
- Indicating and adjustment module for sensor software

The parameter adjustment of the basic sensor functions is independent of the software version. The range of available functions depends on the respective software version of the individual components.

The software version of VEGABAR 66 can be determined as follows:

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

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

2.8 Safety instructions for Ex areas

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

2.9 Environmental instructions

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

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

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

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3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- VEGABAR 66 pressure transmitter with suspension cable
- Straining clamp (optionally available with screwed fitting)
- External electronics
- or VEGABAR 66 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 "*Indicating and adjustment module PLICSCOM*" (optional)
  - Supplementary instructions manual 31708 "*Heating for indicating and adjustment module*" (optional)
  - Supplementary instructions manual "*Plug connector for continuously measuring sensors*" (optional)

Components

VEGABAR 66 with suspension cable consists of the following components:

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

VEGABAR 66 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.

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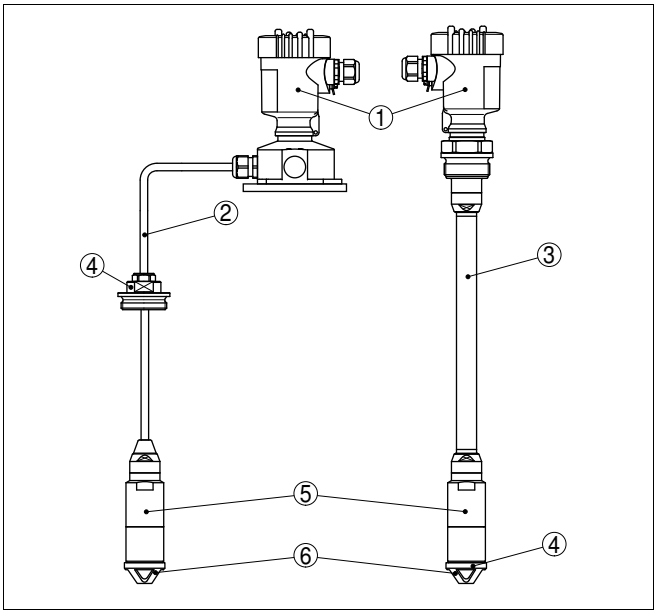

Fig. 1: Example of a VEGABAR 66 with suspension cable (left) and connection tube (right)

1 Housing with integrated electronics
2 Suspension cable
3 Connection tube
4 Screw connection
5 Transmitter
6 Protective cap

Type label

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

- Article number
- Serial number
- Technical data
- Article numbers 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 66 is a suspension pressure transmitter for level measurement in wells, basins and atmospherically open vessels.

For use in atmospherically closed vessels under vacuum, the instrument is available with absolute pressure measuring ranges.

Functional principle

The actual sensor element is the CERTEC® measuring cell with rugged ceramic diaphragm. The hydrostatic pressure causes a capacitance change in the measuring cell via the ceramic diaphragm. This change is converted into an appropriate output signal.

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

Power supply and bus communication

Power is supplied via the H1 Fieldbus. A two-wire cable according to Fieldbus specification serves as carrier of both power and digital data for multiple sensors. This cable can be operated in two versions:

- via an H1 interface card in the control system and additional power supply
- via a Linking device with HSE (High speed Ethernet) and additional power supply according to IEC 61158-2

DD/CFF

The DD (Device Descriptions) and CFF (capability files) necessary for planning and configuration of your FF (Foundation Fieldbus) communication network are available in the download area of the VEGA homepage www.vega.com under "*Services - Downloads - Software - Foundation Fieldbus*". The appropriate certificates are also available there. A CD with the appropriate files and certificates 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".

The backlight of the indicating 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 power supply. You can find further details in the supplementary instructions manual "*Heating for indicating and adjustment module*".

This function is generally not available for approved instruments.

3.3 Operation

VEGABAR 66 can be adjusted with different adjustment media:

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- with indicating and adjustment module
- with the suitable VEGA DTM in conjunction with an adjustment software according to the FDT/DTM standard, e.g. PACTware and PC
- a configuration tool

The entered parameters are generally saved in VEGABAR 66, optionally also in the indicating and adjustment module or in PACTware.

3.4 Packaging, transport and storage

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test according to DIN EN 24180.

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

Transport

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

Transport inspection

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

Storage

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

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

- 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 %

4 Mounting

4.1 General instructions

Suitability for process conditions

Make sure that all parts of the instrument in contact with the measured product, 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*" in the or on the type label.

Mounting position

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

Moisture

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

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

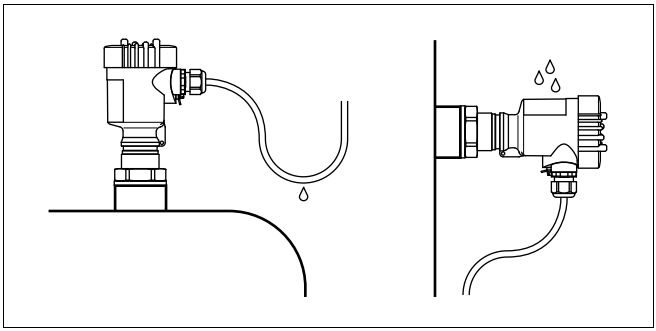

Fig. 2: Measures against moisture penetration

Ventilation

Ventilation for the measuring cell is realised by means of a filter element in the socket of the electronics housing. Ventilation for the electronics housing is realised via an additional filter element in the area of the cable glands.

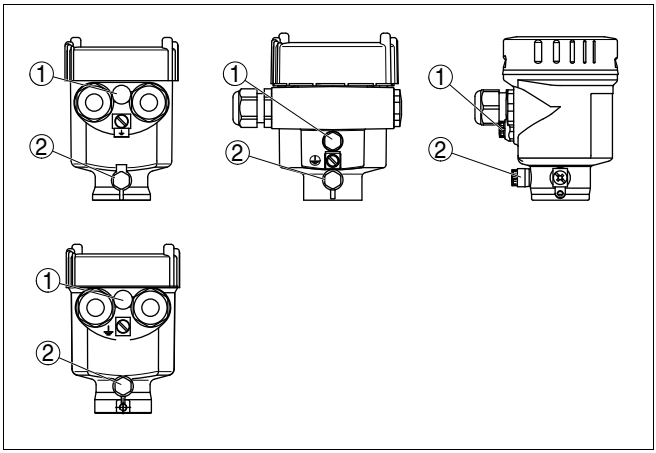

Fig. 3: Position of the filter elements
1 Filter element for ventilation of the electronics housing
2 Filter element for ventilation of the measuring cell

Information:
Make sure that the filter elements are always free of buildup during operation. A pressure washer must 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 fix connected cable. The filter elements are replaced by blind stoppers.

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

→ Therefore, mount VEGABAR 66 in a calm area or in a suitable protective tube

Information:
We recommend the measuring instrument holder from the line of VEGA accessories (article no. BARMONT.A) to fasten VEGABAR 66.

- The suspension cable has a capillary for atmospheric pressure compensation

→ 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.

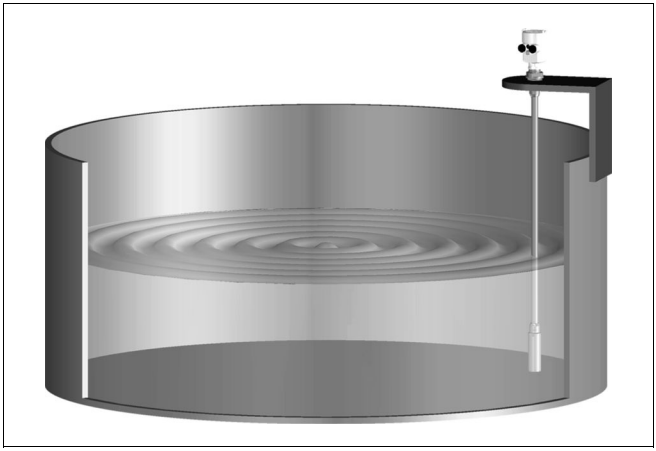

Fig. 4: Mounting example: Version with connection tube in an open vessel

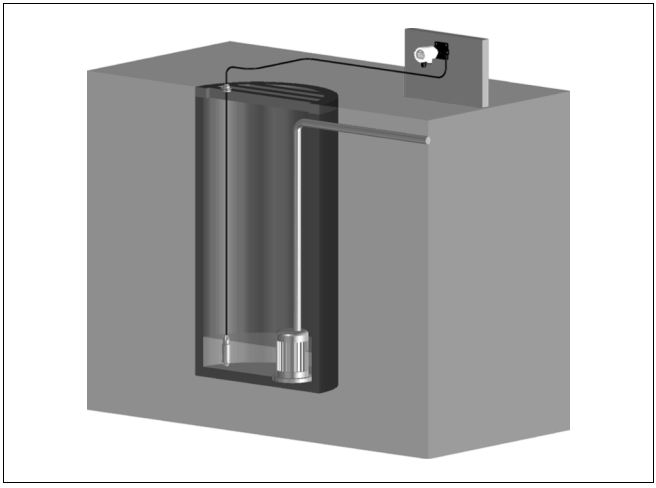

Fig. 5: Mounting example: Version with suspension cable in a pump shaft

4.3 Mounting steps with straining clamp

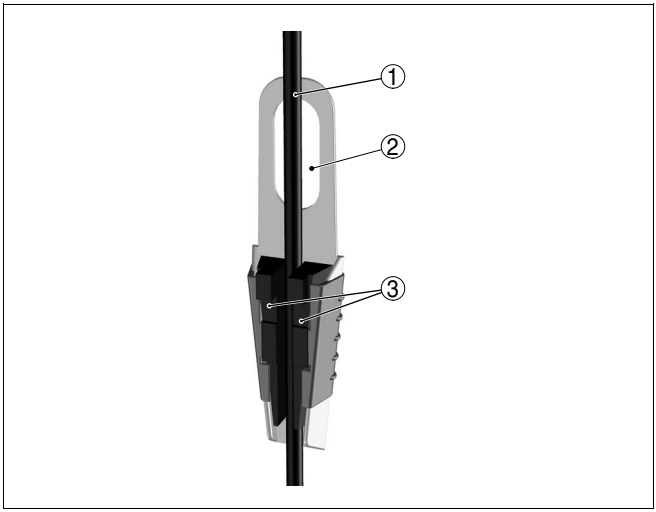

Fig. 6: Straining clamp
1 Suspension cable
2 Suspension opening
3 Clamping jaws

Mount VEGABAR 66 with straining clamp as follows:

1 Hang the straining clamp on a suitable wall hook

2 Lower VEGABAR 66 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

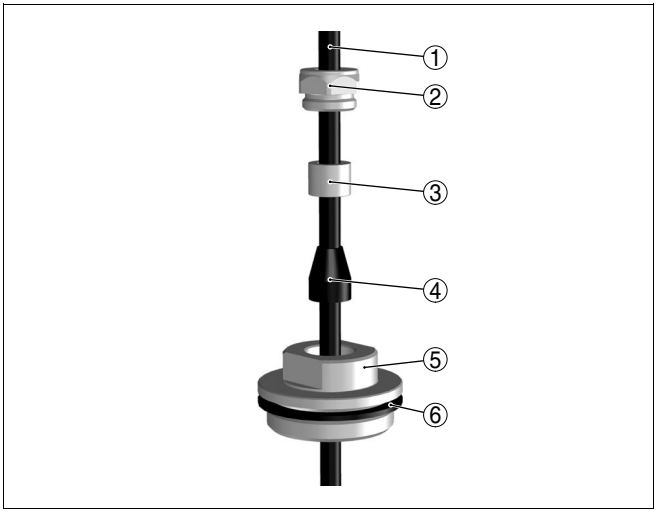

Fig. 7: Screw connection
1 Suspension cable
2 Seal screw
3 Cone bushing
4 Seal cone
5 Screw connection
6 Seal

Mount VEGABAR 66 with screwed connection as follows:

1 Weld the welded socket into the vessel top
2 Lower VEGABAR 66 to the requested height by means on the welded socket G1½ A 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, fasten with SW 30 and then fasten 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

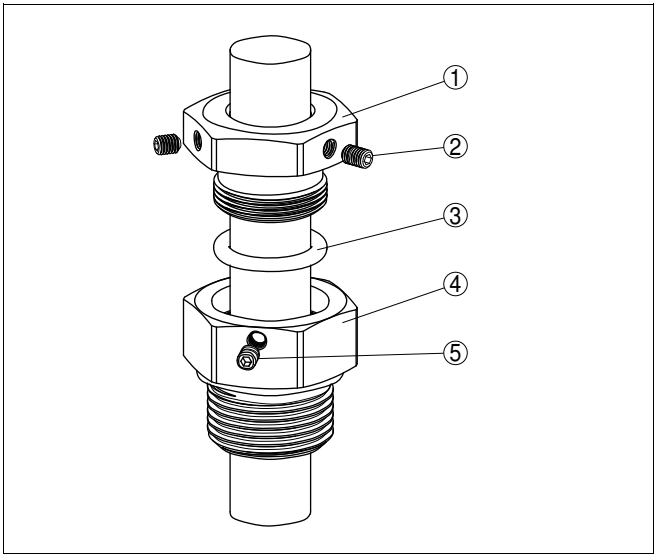

Fig. 8: Lock fitting
1 Upper hexagon
2 Fixing screws
3 Clamping disc
4 Lower hexagon
5 Fixing screws

Mount VEGABAR 66 with lock fitting as follows:

1 Weld the welded socket G1½ A or 1½ NPT to the vessel top

2 Lower VEGABAR 66 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 66 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 66 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 66 in this position

4.6 Mounting steps with housing and thread

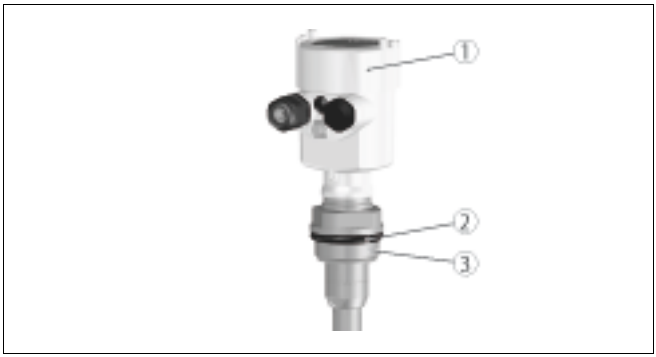

Fig. 9: Housing and thread
1 Housing
2 Seal
3 Thread

Mount into the vessel

Mount VEGABAR 66 with housing and thread in the following way:

1 Weld the welded socket G1½ A 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[1)]

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

Removal is carried out in reverse order.

[1)] Seal the 1½ NPT thread with teflon, hemp or a similar resistant material.

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

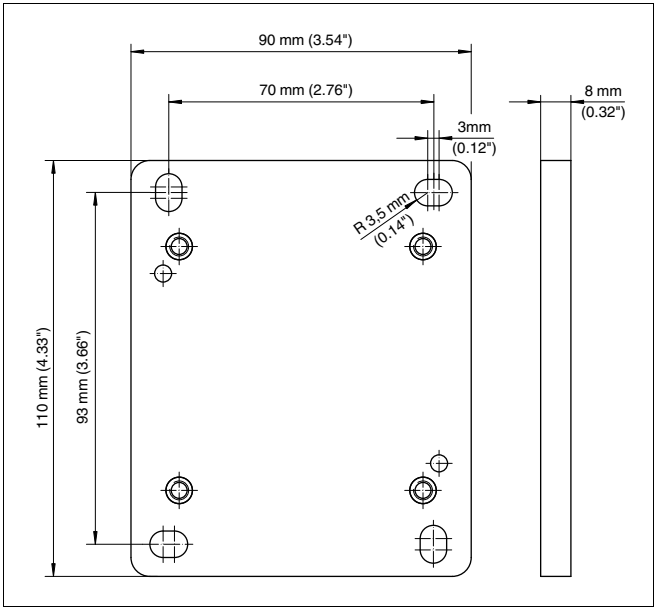

Fig. 10: Drilling template - wall mounting plate

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

Note safety instructions

Always keep in mind the following safety instructions:

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

Tip:
We recommend VEGA overvoltage arrester B63-32.

Take note of safety instructions for Ex applications

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

Select power supply

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

Selecting connection cable

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

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.

Make sure that the entire installation is carried out according to the Fieldbus specification. In particular, make sure that the termination of the bus is done with appropriate terminating resistors.

Cable gland ½ NPT

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

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

Cable screening and grounding

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

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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.

Select connection cable for Ex applications

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

5.2 Connection procedure

Single/Double chamber housing

Proceed as follows:

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

The electrical connection is finished.

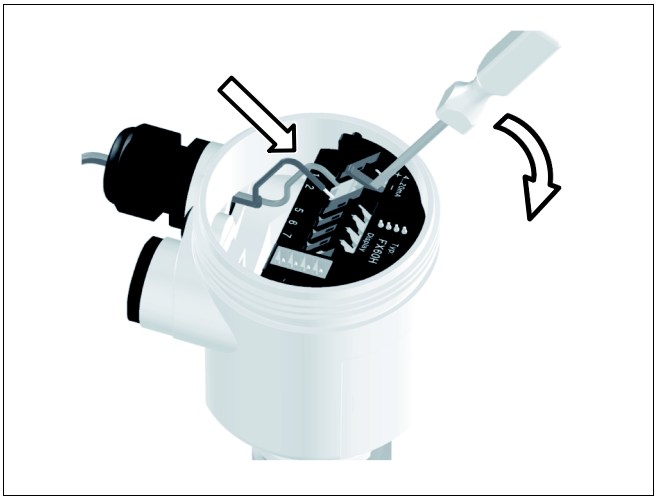


Fig. 11: Connection steps 6 and 7

IP 68 version with external housing

Proceed as follows:

1 Loosen the four screws on the housing socket with an Allen key size 4

2 Remove the housing socket from the mounting plate

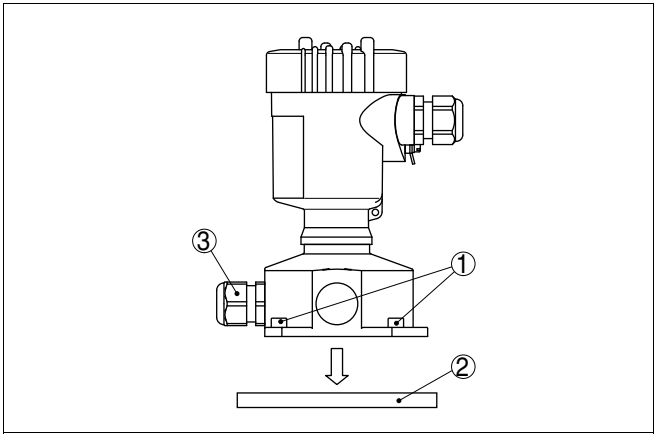


Fig. 12: Components of the external housing for plics® devices
1 Screws
2 Wall mounting plate
3 Cable gland

3 Loop the connection cable through the cable entry on the housing base[2)]

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 hence ready.

[2)] 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.

5.3 Wiring plan, single chamber housing

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

Housing overview

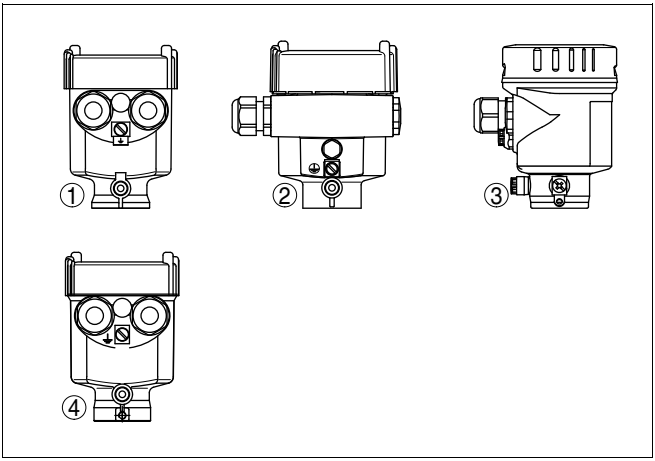


Fig. 13: Material versions, single chamber housing
1 Plastic
2 Aluminium
3 Stainless steel
4 Stainless steel casting

Electronics and connection compartment

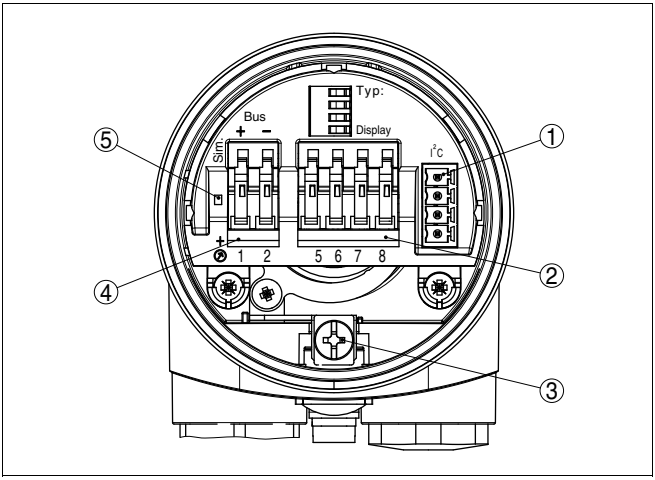


Fig. 14: Electronics and connection compartment, single chamber housing
1 Plug connector for VEGACONNECT (I^2C interface)
2 Spring-loaded terminals for connection of the external indication VEGADIS 61
3 Ground terminal for connection of the cable screen
4 Spring-loaded terminals for Foundation Fieldbus connection
5 Simulation switch ("on" = mode for simulation release)

Wiring plan

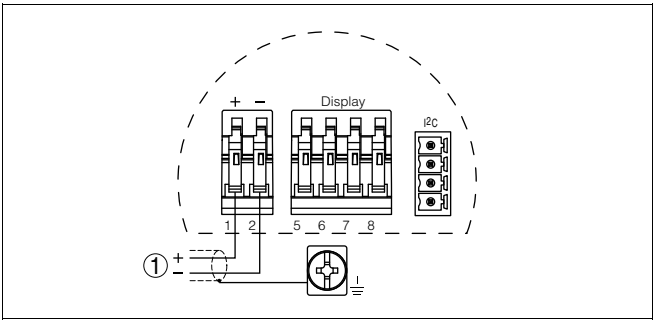


Fig. 15: Wiring plan, single chamber housing
1 Voltage supply/Signal output

5.4 Wiring plan, double chamber housing

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

Housing overview

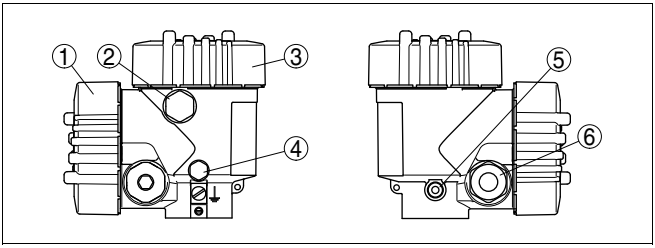


Fig. 16: Double chamber housing
1 Housing cover, connection compartment
2 Blind stopper or plug M12 x 1 for VEGADIS 61 (optional)
3 Housing cover, electronics compartment
4 Filter element for pressure compensation of the electronics housing
5 Filter element for pressure compensation of the measuring cell
6 Cable entry or plug

Electronics compartment

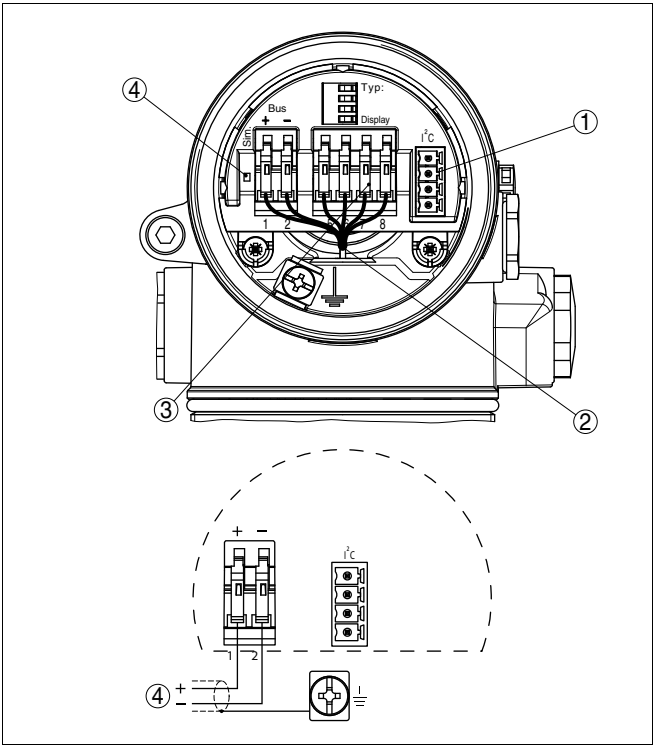


Fig. 17: Electronics compartment, double chamber housing
1 Simulation switch ("on" = mode for simulation release)
2 Connection for VEGACONNECT (I^2C interface)
3 Internal connection cable to the connection compartment

Connection compartment

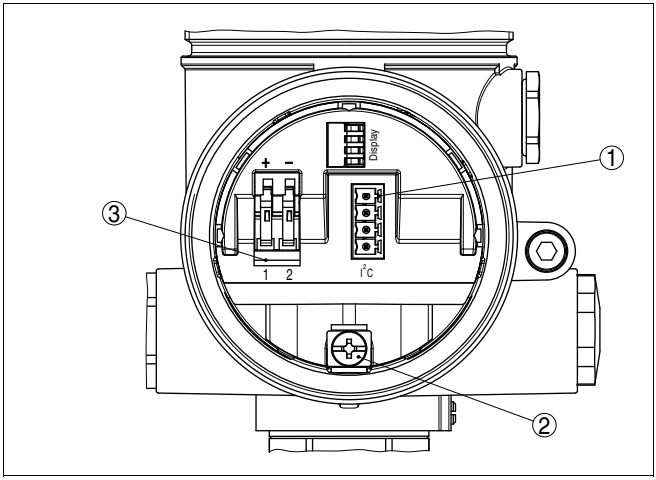


Fig. 18: Connection compartment, double chamber housing
1 Plug connector for VEGACONNECT (I^2C interface)
2 Ground terminal for connection of the cable screen
3 Spring-loaded terminals for voltage supply

Wiring plan

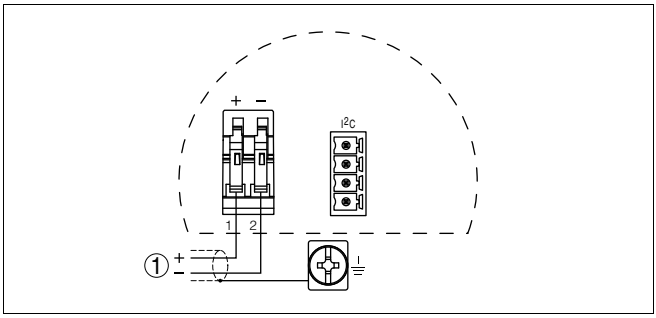


Fig. 19: Wiring plan, double chamber housing
1 Voltage supply/Signal output

5.5 Wiring plan double chamber housing Ex d

Housing overview

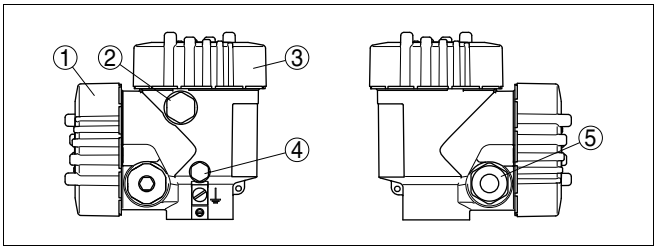


Fig. 20: Double chamber housing
1 Housing cover, connection compartment
2 Blind stopper or plug M12 x 1 for VEGADIS 61 (optional)
3 Housing cover, electronics compartment
4 Filter element for air pressure compensation
5 Cable gland

Electronics compartment

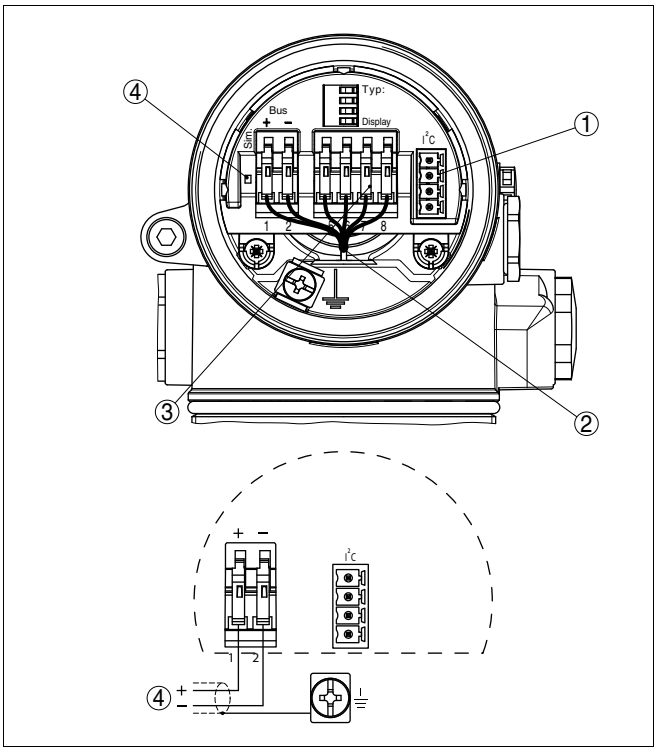


Fig. 21: Electronics compartment, double chamber housing
1 Simulation switch ("on" = mode for simulation release)
2 Connection for VEGACONNECT (I^2C interface)
3 Internal connection cable to the connection compartment

Connection compartment

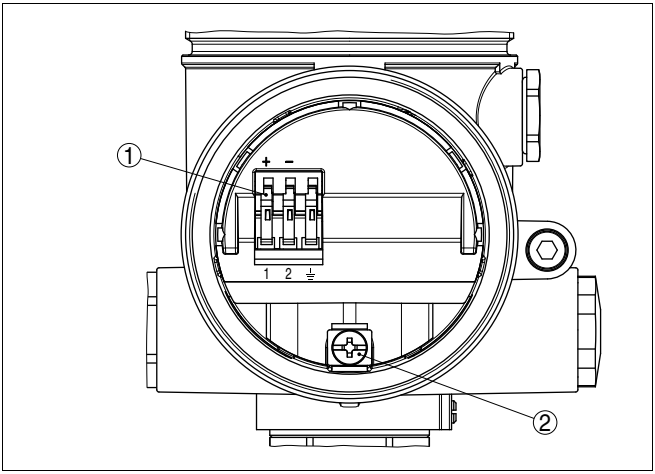


Fig. 22: Connection compartment double chamber housing Ex d
1 Spring-loaded terminals for power supply and cable screen
2 Ground terminal for connection of the cable screen

Wiring plan

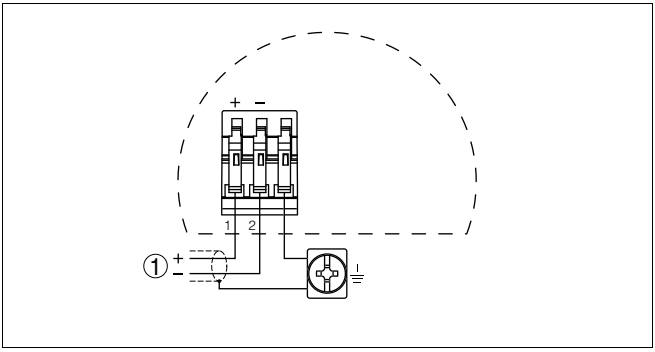


Fig. 23: Wiring plan double chamber housing Ex d
1 Voltage supply/Signal output

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

This version is only available for instruments with absolute pressure measuring ranges.

Wire assignment, connection cable

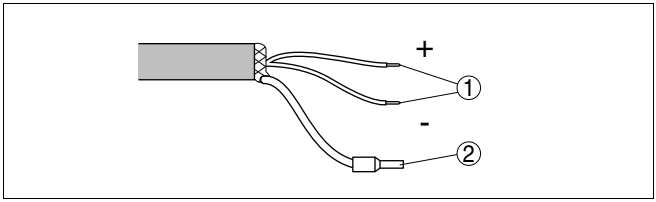


Fig. 24: Wire assignment, connection cable
1 brown (+) and blue (-) to power supply or to the processing system
2 Shielding

5.7 Wiring plan, external housing with version IP 68

Overview

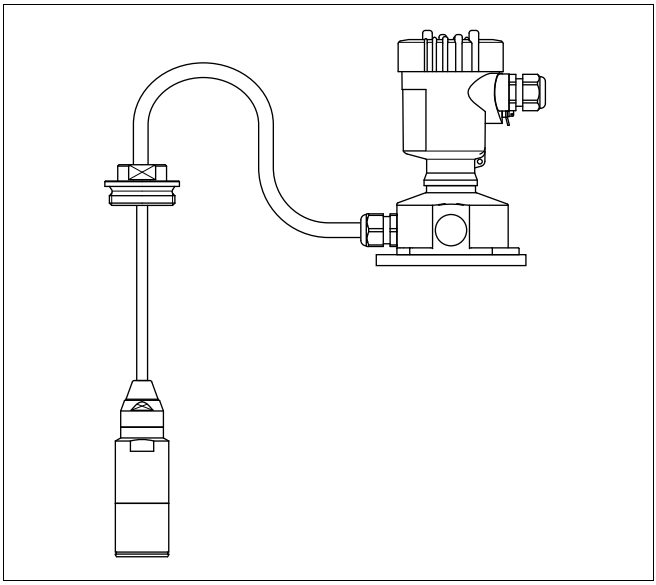


Fig. 25: VEGABAR 66 in IP 68 version 25 bar, non-Ex and axial cable outlet, external housing

Electronics and connection compartment

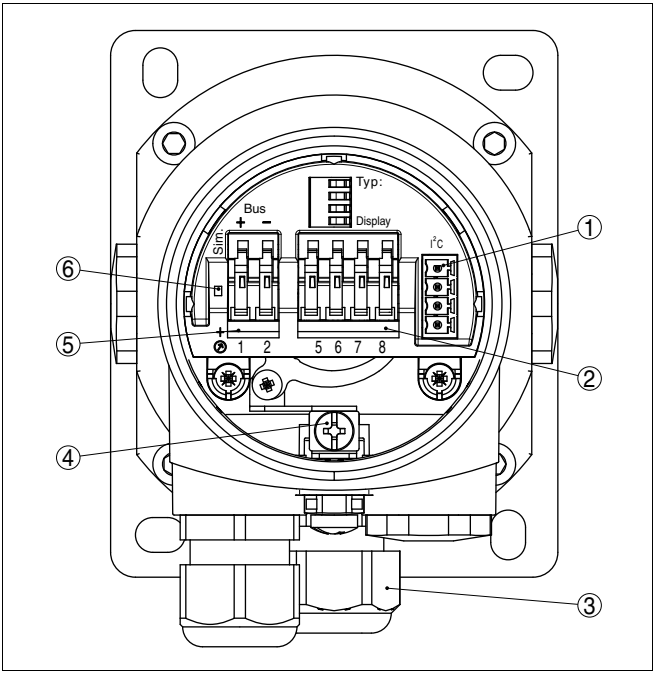


Fig. 26: Electronics and connection compartment, single chamber housing
1 Plug connector for VEGACONNECT (I^2C interface)
2 Spring-loaded terminals for connection of the external indication VEGADIS 61
3 Cable gland to VEGABAR
4 Ground terminal for connection of the cable screen
5 Spring-loaded terminals for Foundation Fieldbus connection
6 Simulation switch ("on" = mode for simulation release)

Terminal compartment, housing socket

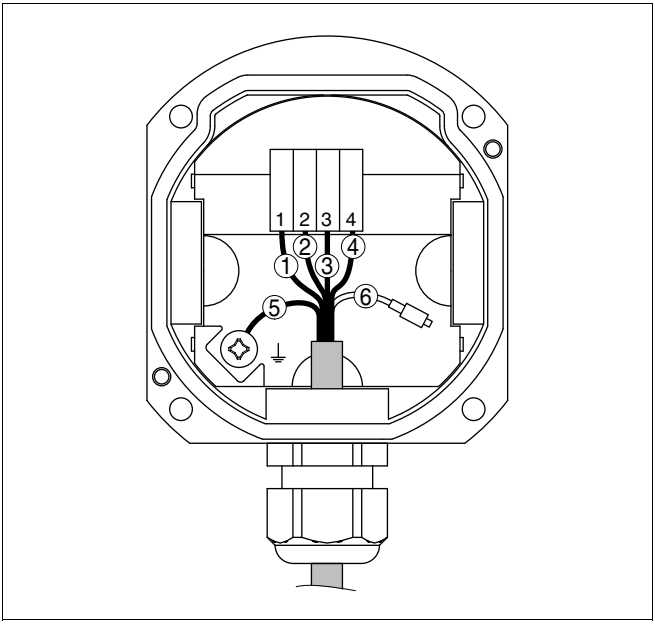


Fig. 27: Connection of the sensor in the housing socket
1 Brown
2 Blue
3 Yellow
4 White
5 Shielding
6 Breather capillaries

Terminal compartment, housing socket

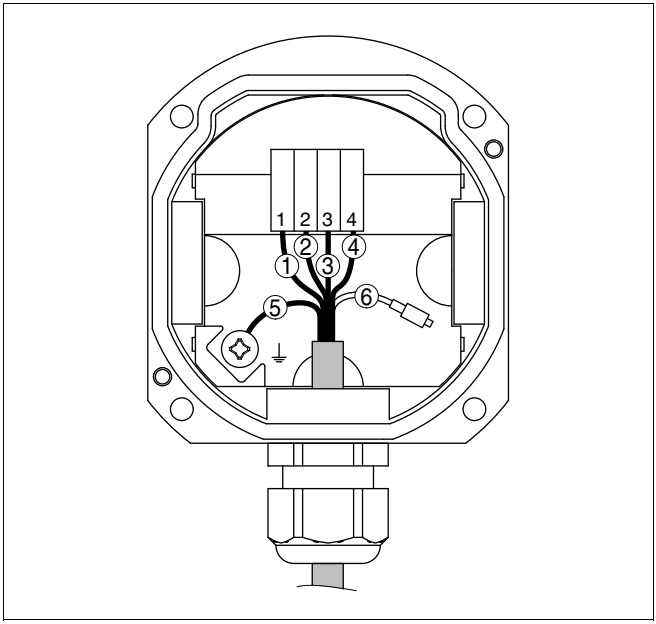


Fig. 28: Connection of the sensor in the housing socket
1 Brown
2 Blue
3 Yellow
4 White
5 Shielding
6 Breather capillaries

5.8 Switch on phase

Switch on phase

After VEGABAR 66 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.[3)]

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

6 Set up with the indicating and adjustment module PLICSCOM

6.1 Short description

Function/Configuration

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

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

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

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

6.2 Insert indicating and adjustment module

Mount/Dismount indicating and adjustment module

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

Proceed as follows:

1 Unscrew the housing cover

2 Place the indicating and adjustment module in the desired position on the electronics (you can choose any one of four different positions - each displaced by 90°)

3 Press the indicating and adjustment module onto the electronics and turn it to the right until it snaps in.

4 Screw housing cover with inspection window tightly back on

Removal is carried out in reverse order.

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

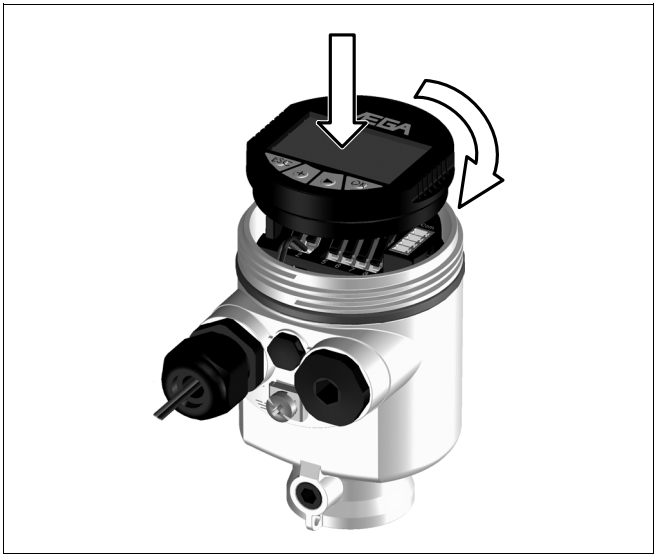


Fig. 29: Mounting the indicating and adjustment module

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

6.3 Adjustment system

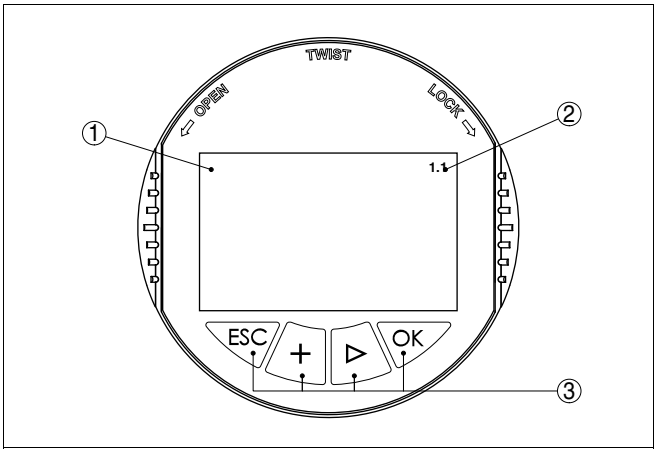


Fig. 30: Indicating and adjustment elements
1 LC display
2 Indication of the menu item number
3 Adjustment keys

Key functions

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

Adjustment system

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

6.4 Setup procedure

Level or process pressure measurement

VEGABAR 66 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 66 in the following sequence:

1 Selecting adjustment unit/density unit
2 Carry out position correction
3 Carrying out min. adjustment
4 Carrying 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 indicating and adjustment module enables the adjustmetn without filling or pressure. Thanks to this, you can carry out your settings already in the factory without the instrument having to be installed.

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

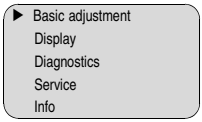
Select unit

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

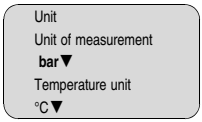
To select the adjustment unit (in the example switching over from bar to mbar) you have to proceed as follows:[4)]

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

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



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 hence 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.

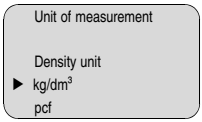
Proceed as follows:

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

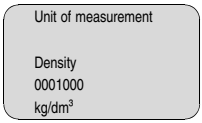
2 Confirm the menu "***Basic adjustment***" with *[OK]*, the menu item "*Units of measurement*" will be displayed.

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 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 hence switched over from bar to m.

Proceed as follows to select the temperature unit:[5)]

→ Activate the selection with ***[OK]*** and select "***Temperature unit*** with *[->]*.

→ Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (e.g. °F).

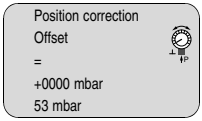
→ Confirm with ***[OK]***.

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

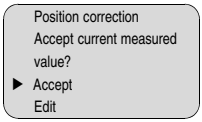
Carry out position correction

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.

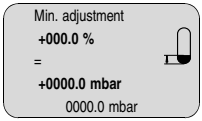


3 Confirm with ***[OK]*** and move to min.(zero) adjustment with ***[->]***.

Carrying out 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 Edit the requested mbar value with ***[OK]***.

4 Set the requested mbar value with ***[+]*** and ***[->]***.

5 Confirm with ***[+]*** and move to max. adjustment with ***[->]***.

The min. adjustment is finished.

Information:
For an adjustment with filling, you simply enter the displayed actual measured value. If the adjustment ranges are exceeded, the message "*Outside parameter limits*" appears. The editing procedure can be

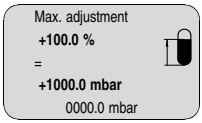
[5)] Selection options: °C, °F.

aborted with ***[ESC]*** or the displayed limit value can be accepted with ***[OK]***.

Carrying 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 Edit the requested mbar value with ***[OK]***.

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, you simply enter the displayed actual measured value. 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 66 in the following sequence:

1 Select application "Process pressure measurement"

2 Select the unit of measurement

3 Carry out position correction

4 Carrying out zero adjustment

5 Carrying 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!

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

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

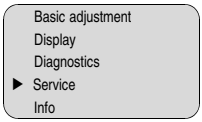
The actual measured value is displayed in addition to the menu items for zero/span adjustment.

Select application "Process pressure measurement"

VEGABAR 66 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]***.

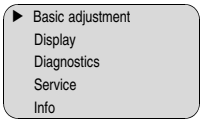
5 Select "*Process pressure*" from the list and confirm with ***[OK]***.

Select unit

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

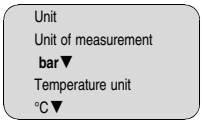
To select the adjustment unit (in the example switching over from bar to mbar) you have to proceed as follows:[6)]

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



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

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 hence switched over from bar to mbar.

Proceed as follows to select the temperature unit:[7)]

→ Activate the selection with ***[OK]*** and select "***Temperature unit*** with *[->]*.

→ Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (e.g. °F).

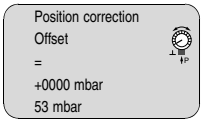
→ Confirm with ***[OK]***.

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

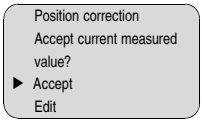
Carry out position correction

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.



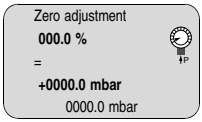
3 Confirm with ***[OK]*** and move to min.(zero) adjustment with ***[->]***.

Carrying out zero adjustment

Proceed as follows:

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

7) Selection options: °C, °F.



2 Set the requested mbar value with ***[+]*** and ***[->]***.

3 Confirm with ***[+]*** and move to span adjustment with ***[->]***.

The zero adjustment is finished.

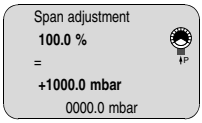
Information:
The zero adjustment shifts the value of the span adjustment. The span, i.e. the difference between these values, however, remains unchanged.

Information:
For an adjustment with pressure, you simply enter the displayed actual measured value. 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]***.

Carrying 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, you simply enter the displayed actual measured value. 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]***.

Copy sensor data

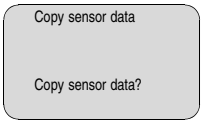
This function enables reading out parameter adjustment data as well as writing parameter adjustment data into the sensor via the indicating and adjustment module. A description of the function is available in the operating instructions manual "*Indicating and adjustment module*".

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

- Measured value presentation
- Adjustment
- Damping
- Linearisation curve
- Sensor-TAG
- Displayed value
- Unit of measurement
- Language

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

- PIN
- Application



Reset

Basic adjustment

If the "*Reset*" is carried out, the sensor resets the values of the following menu items to the reset values (see chart):[8)]

Menu section	Function	Reset value
Basic settings	Unit of measurement	bar
	Temperature unit	°C
	Zero/Min. adjustment	Measuring range begin
	Span/Max. adjustment	Measuring range end
	Density	1 kg/l
	Density unit	kg/l
	Damping	0 s
	Linearisation	linear
	Sensor-TAG	Sensor
Display	Displayed value	AI-Out

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

Menu section	Function	Reset value
Basic settings	Position correction	no reset
Display	Lighting	no reset
Service	Language	no reset

[8)] Sensor-specific basic adjustment.

Menu section	Function	Reset value
	Application	no reset

Factory setting
Like basic adjustment, furthermore special parameters are reset to default values.[9)]

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

Optional settings

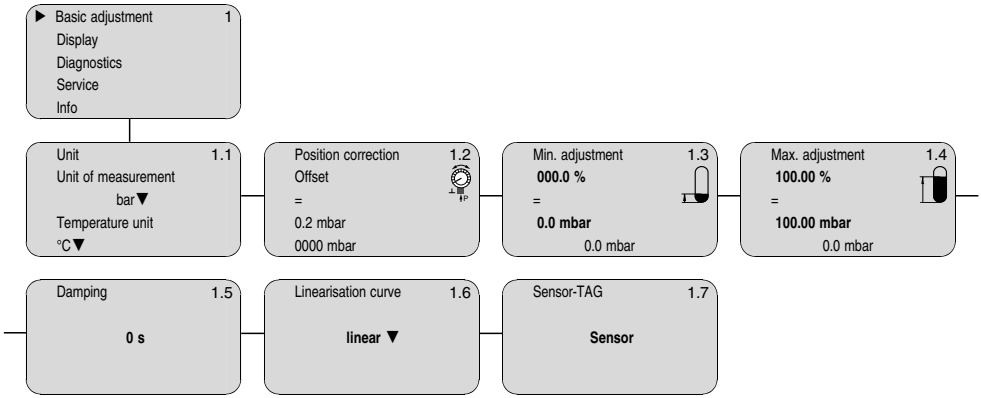
Additional adjustment and diagnosis options such as e.g. scaling, simulation or trend curve presentation are shown in the following menu schematic. You will find a detailed description of these menu items in the operating instructions manual "*Indicating and adjustment module*".

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

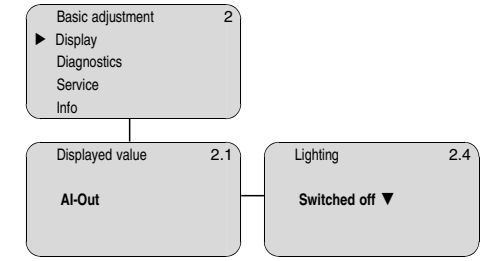
6.5 Menu schematic

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

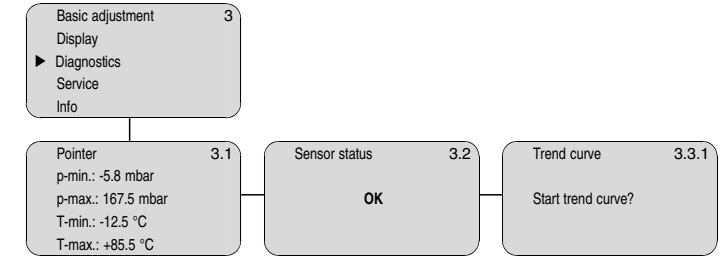
Basic adjustment



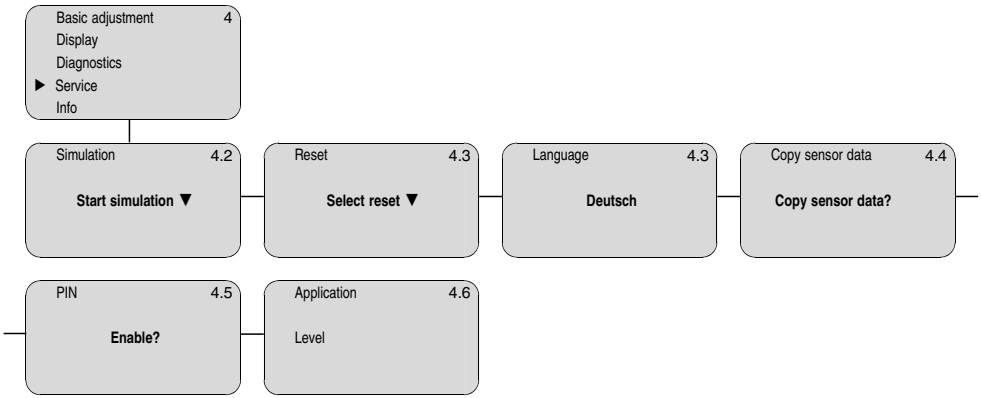
Display



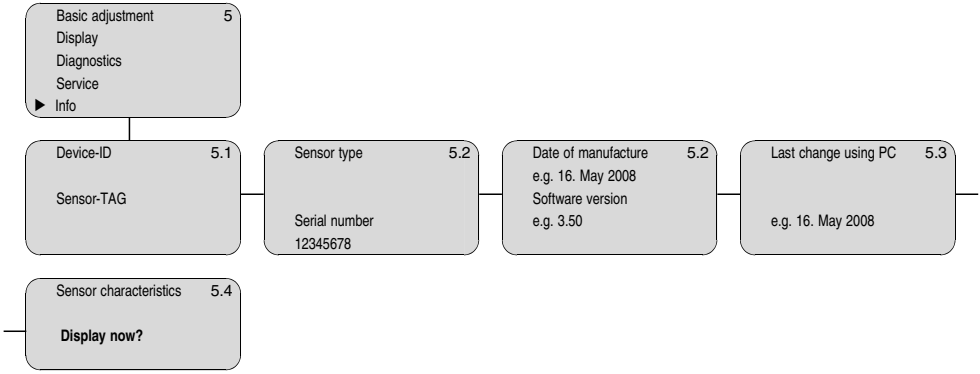
Diagnostics



Service



Info



6.6 Saving the parameter adjustment data

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

If VEGABAR 66 is equipped with an indicating and adjustment module, the most important data can be read out of the sensor into indicating and adjustment module. The procedure is described in the operating instructions manual "*Indicating and adjustment module*" in the menu item "*Copy sensor data*". The data remain there permanently even if the sensor power supply fails.

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

7 Setup with PACTware and other adjustment programs

7.1 Connecting the PC

Internal connection via I²C interface

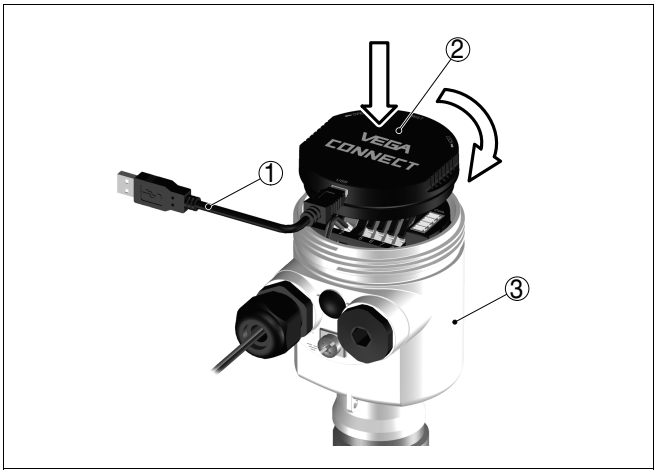


Fig. 31: Connection of the PC via VEGACONNECT directly to the sensor
1 USB cable to the PC
2 VEGACONNECT
3 Sensor

External connection via I²C interface

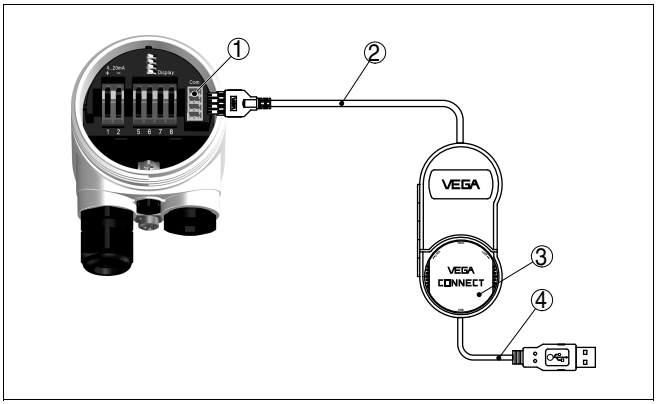


Fig. 32: Connection via I²C connection cable
1 I²C bus (com.) interface on the sensor
2 I²C connection cable of VEGACONNECT
3 VEGACONNECT
4 USB cable to the PC

Necessary components:

- VEGABAR 66
- 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 66, DTM-Collection in the actual version must be used.

All currently available VEGA DTMs are provided in the DTM Collection on CD and can be obtained from the responsible VEGA agency for a token fee. This CD includes also the up-to-date PACTware version. The basic version of this DTM Collection incl. PACTware is also available as a free-of-charge download from the Internet.

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

7.3 Parameter adjustment with AMS™

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

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

7.4 Saving the parameter adjustment data

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

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

8 Maintenance and fault rectification

8.1 Maintain

Maintenance

When used in the correct way, no special maintenance is required in normal operation.

In some applications, product buildup on the sensor 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 transmitter. Make sure that the materials are resistant against the cleanig, see resistance list under "*Services*" on "www.vega.com". The application variety of VEGABAR 66 requires special cleaning instructions for each application. Please ask the VEGA agency serving you.

8.2 Remove interferences

Causes of malfunction

A maximum of reliability is ensured. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Power supply
- Signal processing

Fault rectification

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

24 hour service hotline

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

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

Checking Foundation Fieldbus

? When an additional instrument is connected, the H1 segment fails.

- Max. supply current of the segment coupler exceeded

→ Measure the current consumption, reduce size of segment

? Measured value on the indicating and adjustment module does not correspond to the value in the PLC

- The menu item "*Display - Display value*" is not set to "*AI-Out*"

→ Check values and correct, if necessary

? Instrument does not appear during connection setup

- 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

→ Check and correct

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

Fault messages via the indicating/adjustment module

? E013

- no measured value available[10)]

→ Exchange instrument or return instrument for repair

? E017

- Adjustment span too small

→ repeat with modified values

? E036

- no operable sensor software

→ Carry out a software update or send the instrument for repair

? E041

- Hardware error, electronics defective

→ Exchange instrument or return instrument for repair

? E113

- Communication conflict

→ Exchange instrument or return instrument for repair

8.3 Calculation of total deviation (similar 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 analogue output, the error of the current output F_a is also added.

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

With:

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

- 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

Selected: VEGABAR 66 with measuring range 0.2 bar

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 x 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 x TD

F_{stab} = 0.1 %/year x 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 for the VEGA 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 66 or on the delivery note.

8.5 Software update

The following components are required to update the sensor software:

- Sensor
- Power 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 instruments and sensors*" the suitable instrument series. Load the zip file via the right mouse key with "*Save target as*" e.g. on the desktop of your PC. Extract all files available in the zip file, e.g. to the desktop.

Prepare update

Connect the sensor to power supply and provide connection from PC to the instrument via VEGACONNECT. Start PACTware and provide connection to the sensor, e.g. via the VEGA project assistant. Close the parameter window of the sensor, as far as open.

Load software into sensor

Go in the PACTware menu bar to "*Instrument data*", "*Additional functions*" and "*Update instrument software*".

PACTware checks now the actual hardware and software version of the sensor and displays the data. This procedure lasts approx. 60 s.

Push the button " ***Update software***" and select the previously extracted hex file. Then the software update can be started. Further files are installed automatically. Depending on the sensor, this procedure lasts approximately 1 h.

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 agency 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 electronics 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 to persons and environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

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

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10 Supplement

10.1 Technical data

General data

Measured value	Level
Measuring principle	Ceramic-capacitive, dry measuring cell
Communication interface	I^2C bus

Materials and weights

Material 316L corresponds to 1.4404 or 1.4435

Materials, wetted parts	
– Transmitter	316L, PVDF
– Transmitter protection (optional)	PE
– Diaphragm	sapphire ceramic® (99.9 % oxide ceramic)
– Joining material diaphragm/Basic element measuring cell	Glass solder
– Suspension cable	PE (KTW-approved), FEP, PUR
– Connection tube	316L
– Process fitting	316L, PVDF
– Measuring cell seal	FKM (VP2/A) - FDA and KTW approved, FFKM (Kalrez 6375), EPDM (A+P 75.5/KW75F)
– Seal process fitting thread G1½ A, threaded connection, lock fitting	Klingersil C-4400
– Seal, suspension cable	FKM, FEP
– Protective cap	PFA
Materials, non-wetted parts	
– Straining clamp	1.4301
– Screw connection	316L, PVDF
– Lock fitting	316L, PVDF
– Housing	Plastic PBT (polyester), Alu die-casting powder-coated, 316L
– External housing, non-Ex	plastic PBT (Polyester)
– Socket, wall mounting plate external housing	plastic PBT (Polyester)
– 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

– Connection cable between IP 68 housing and external electronics	PUR, FEP, PE
– Type plate 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)
– Screw connection	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, Foundation Fieldbus protocol
– Physical layer	according to IEC 61158-2
Channel Numbers	
– Channel 1	Primary Value
– Channel 2	Secondary Value 1
– Channel 3	Secondary Value 2
– Channel 4	Temperature Value
Transmission rate	31.25 Kbit/s
Current value	10 mA, ±0.5 mA

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 %

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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

Nominal range	Overload, max. pressure	Overload, min. pressure
Gauge pressure		
0 … 0.1 bar/0 … 10 kPa	15 bar/1500 kPa	-0.2 bar/-20 kPa
0 … 0.2 bar/0 … 20 kPa	20 bar/2000 kPa	-0.4 bar/-40 kPa
0 … 0.4 bar/0 … 40 kPa	30 bar/3000 kPa	-0.8 bar/-80 kPa
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/13000 kPa	-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

Nominal range	Overload, max. pressure	Overload, min. pressure
Gauge pressure		
0 … 1.5 psig	200 psig	-3 psig
0 … 3 psig	290 psig	-6 psig
0 … 6 psig	430 psig	-12 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

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

Nominal range	Overload, max. pressure	Overload, min. pressure
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 (similar to DIN EN 60770-1)

Reference conditions according to DIN EN 61298-1

- Temperature: +15 … +25 °C (+59 … +77 °F)
- Relative humidity: 45 … 75 %
- Air pressure: 860 … 1060 mbar/86 … 106 kPa (12.5 … 15.4 psig)

Determination of characteristics: Limit point adjustment according to IEC 61298-2

Characteristics: linear

Reference installation position: upright, diaphragm points downward

Influence of the installation position: < 0.2 mbar/20 Pa (0.003 psig)

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

Applies to **digital** interfaces (HART, Profibus PA, Foundation Fieldbus) as well as to **analogue** current output 4 … 20 mA. Specifications refer to the set span. Turn down (TD) is the relation 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

Applies to instruments with **digital** signal output (HART, Profibus PA, Foundation Fieldbus) as well as to instruments with **analogue** current output 4 … 20 mA. Specifications refer to the set span. Turn down (TD) = nominal measuring range/set span.

Thermal change zero zignal, reference temperature 20 °C (68 °F):

- 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

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

Thermal change, current output: < 0.15 % at -40 … +80 °C (-40 … +176 °F)

Long-term stability (similar to DIN 16086, DINV 19259-1 and IEC 60770-1)

Applies to **digital** interfaces (HART, Profibus PA, Foundation Fieldbus) as well as to **analogue** current output 4 … 20 mA. Specifications refer to the set span. Turn down (TD) = nominal measuring range/set span.

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

Long-term drift of the zero signal	< (0.1 % x TD)/year

Ambient conditions

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

Process conditions

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

Process pressure, transmitter	
– 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]
– with meas. ranges from 0.4 bar (5.8 psig)	max. 25 bar (363 psig)[14]
Pressure stage, process fitting	
– Screw connection	316L PN 3, PVDF PN 5[15]
– Thread	316L PN 25, PVDF unpressurized
– Lock fitting	unpressurized
– Flange 316L	PN 16 or PN 40
– Flange GFK	10 bar
Product temperature, suspension cable/measuring cell seal	
– PE/FKM	-20 … +60 °C (-4 … +140 °F)
– PE/EPDM	-20 … +60 °C (-4 … +140 °F)
– PUR/FKM	-20 … +80 °C (-4 … +176 °F)
– PUR/EPDM	-20 … +80 °C (-4 … +176 °F)
– FEP/FKM	-20 … +100 °C (-4 … +212 °F)
– FEP/FFKM	-10 … +100 °C (+14 … +212 °F)
– FEP/EPDM	-40 … +100 °C (-40 … +212 °F)
Product temperature, connection tube/seal meas. cell	
– FKM	-20 … +100 °C (-4 … +212 °F)
– FFKM	-10 … +100 °C (+14 … +212 °F)
– EPDM	-20 … +100 °C (-4 … +212 °F)
Product temperature, transmitter protection/seal meas. cell	
– PVDF/FKM or EPDM	-20 … +60 °C (-4 … +140 °F)
– PVDF/FFKM	-10 … +60 °C (+14 … +140 °F)
– PE/FKM or EPDM	-20 … +60 °C (-4 … +140 °F)
Calibration position	upright, diaphragm points downward
Influence of the installation position	< 0.2 mbar/20 Pa (0.003 psig)

[13] Limited by the overpressure resistance of the measuring cell.
[14] Limitation by the pressure-tightness of the cable connection.
[15] Limited by the overpressure resistance of the measuring cell.

Vibration resistance	mechanical vibrations with 4 g and 5 … 100 Hz[16]
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 stopper 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 stopper M20 x 1,5
– Double chamber housing	• 1 x cable gland M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5; plug M12 x 1 for VEGADIS 61 (optional) or: • 1 x closing cap ½ NPT, 1 x blind stopper ½ NPT, plug M12 x 1 for VEGADIS 61 (optional) or: • 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5; plug M12 x 1 for VEGADIS 61 (optional) or: • 2 x blind stopper M20 x 1.5; plug M12 x 1 for VEGADIS 61 (optional)
Spring-loaded terminals for wire cross-section	< 2.5 mm² (AWG 14)

16) Tested according to the regulations of German Lloyd, GL directive 2.
17) Tested according to EN 60068-2-27.
18) Depending on the version M12 x 1, according to DIN 43650, Harting, 7/8" FF.

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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 stopper M20 x 1.5 or: • 1 x closing cap ½ NPT, 1 x blind plug ½ NPT
– Double chamber housing	• 1 x IP 68 cable gland M20 x 1.5; 1 x blind stopper M20 x 1.5; plug M12 x 1 for VEGADIS 61 (optional) or: • 1 x closing cap ½ NPT, 1 x blind stopper ½ NPT, plug M12 x 1 for VEGADIS 61 (optional)
Connection cable	
– Configuration	four wires, one suspension cable, 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 - standard PE	Black
– Colour - standard PUR	Blue
– 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 stopper 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)

[19] Depending on the version M12 x 1, according to DIN 43650, Harting, 7/8" FF.

Connection cable between IP 68 instrument and external housing:

– Configuration	four wires, one suspension cable, one breather capillary, screen braiding, metal foil, mantle
– Wire cross-section	0.5 mm^2 (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)
– Colour - standard PE	Black
– Colour - standard PUR	Blue
– Colour - Ex-version	Blue

Indicating and adjustment module

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

Power supply

Operating voltage	
– Non-Ex instrument	9 … 32 V DC
– EEx-ia instrument	9 … 24 V DC
– EEx-id instrument	9 … 32 V DC
Operating voltage with lighted indicating and adjustment module	
– Non-Ex instrument	12 … 32 V DC
– EEx-ia instrument	12 … 24 V DC
– EEx-id instrument	12 … 32 V DC
Power supply by/max. number of sensors	
– H1 power supply	max. 32 (max. 10 with Ex)

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Electrical protective measures

Protection class	
– Transmitter	IP 68 (25 bar)
– Housing, standard	IP 66/IP 67[20]
– Aluminium and stainless housing (optionally available)	IP 68 (1 bar)[21]
– External housing	IP 65
Overvoltage category	III
Protection class	II

Approvals

Depending on the version, instruments with approvals can have different technical data.

For these instruments, the corresponding approval documents have to be taken into account. These 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*".

[20] 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.

[21] Only with instruments with absolute pressure ranges.

10.2 Information on Foundation Fieldbus

Block diagram, measured value processing

The following illustration shows the Transducer Block and Function block in simplified form.

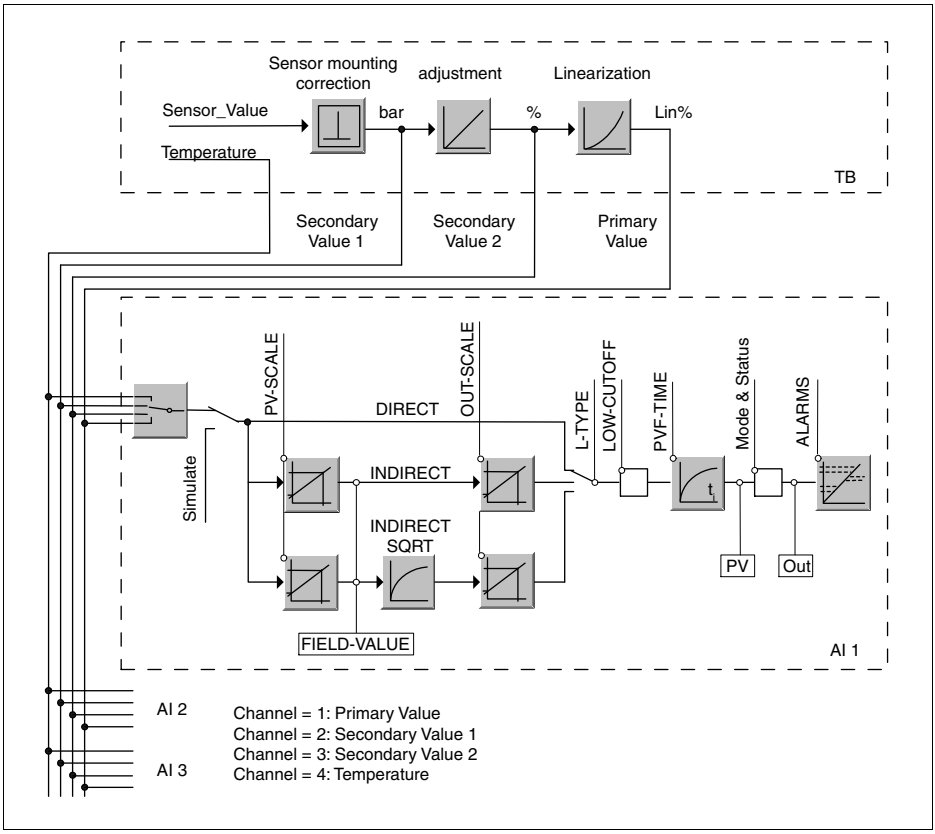


Fig. 33: Transducer Block VEGABAR 66
TB Transducer Block
AI Function Block (AI =Analogue Input)

Diagram, adjustment

The following illustration shows the function of the adjustment:

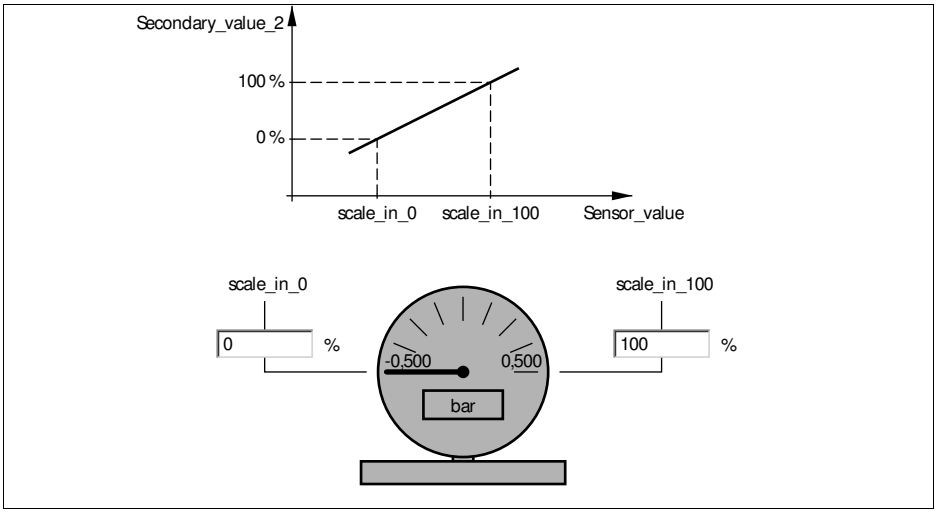


Fig. 34: Adjustment VEGABAR 66

Parameter list
The following list contains the most important parameters and their meaning:

- primary_value
  - Process Value after min/max-adjustment and linearization. Selected as input to AIFB by setting 'Channel' = 1. Unit derives from 'Primary_value_unit'
- primary_value_unit
  - Unit code of 'Primary_value'
  - %
- secondary_value_1
  - Process pressure. Selected as input to AIFB by setting 'Channel' = 2. Unit derives from 'Secondary_value_1_unit'
- secondary_value_1_unit
  - Unit code of 'Secondary_value_1'
  - bar, PSI, …, m, ft, …; in case of length type engineering unit and access to parameters the corresponding values will be converted by density factor
- secondary_value_2
  - Value after min/max-adjustment. Selected as input to AIFB by setting 'Channel' = 3. Unit derives from 'Secondary_value_2_unit'
- secondary_value_2_unit
  - Selected unit code for "secondary_value_2"
- sensor_value
  - Raw sensor value, i.e. the uncalibrated measurement value from the sensor. Unit derives from 'Sensor_range.unit'

- sensor_range
  - "Sensor_range.unit' refers to 'Sensor_value', 'Max/Min_peak_sensor_value', 'Cal_point_hi/lo'

— includes sensor unit: bar, PSI …; only unit part of DS-68 is writable

- simulate_primary_value
- simulate_secondary_value_1
- simulate_secondary_value_2
- device status

— "0: ""OK"" 13: ""non-specific error"" 17: ""Cal span too small"" 34: ""EEPROM memory fault"" 36: ""ROM memory fault"" 37: ""RAM memory fault"" 40: ""non-specific hardware fault"" 41: ""Sensor element not found"" 42: ""No leaking pulse"" 43: ""No trigger signal"" 44: ""EMI error"" 113: ""Communication hardware fault"""

- linearization type
  - Possible types of linearization are: linear, user defined, cylindrical lying container, spherical container

— "0: ""Linear"" 1: ""User def"" 20: ""Cylindrical lying container"" 21: ""Spherical container"""

- curve_points_1_10

— X and Y values for the user defined linearization curve

- curve_points_11_20

— X and Y values for the user defined linearization curve

- curve_points_21_30

— X and Y values for the user defined linearization curve

- curve_points_31_33

— X and Y values for the user defined linearization curve

- curve status
  - Result of table plausibility check

— "0: ""Uninitialized"" 1: ""Good"" 2: ""Not monotonous increasing"" 3: ""Not monotonous decreasing"" 4: ""Not enough values transmitted"" 5: ""Too many values transmitted"" 6: ""Gradient of edge too high"" 7: ""Values not excepted"" 8: ""Table currently loaded"" 9: ""Sorting and checking table"""

- SUB_DEVICE_NUMBER
- SENSOR_ELEMENT_TYPE

— 0: "non-specific"

- display_source_selector
  - Selects the type of value that is displayed on the indication-/adjustement-module

— "0: ""Physical value"" 1: ""Percent value"" 2: ""Lin percent value"" 6: ""Out(AI1)"" 7: ""Level"" 8: ""Out(AI2)"" 9: ""Out(AI3)"""

- max_peak_sensor_value
  - Holds the maximum sensor value. Write access resets to current value. Unit derives from 'Sensor_range.unit'

— Write access resets to current value

- min_peak_sensor_value
  - Holds the minimum sensor value. Write access resets to current value. Unit derives from 'Sensor_range.unit'

— Write access resets to current value

- CAL_POINT_HI

- Highest calibrated value. For calibration of the high limit point you give the high measurement value (pressure) to the sensor and transfer this point as HIGH to the transmitter. Unit derives from 'Sensor_range.unit'
- CAL_POINT_LO
- Lowest calibrated value. For calibration of the low limit point you give the low measurement value (pressure) to the sensor and transfer this point as LOW to the transmitter. Unit derives from 'Sensor_range.unit'
- CAL_MIN_SPAN
- Minimum calibration span value allowed. Necessary to ensure that when calibration is done, the two calibrated points (high and low) are not too close together. Unit derives from 'Sensor_range.unit'
- SCALE_IN
- Min/max-adjustment: Upper and lower calibrated points of the sensor. Unit derives from 'Sensor_range.unit'
- trimmed_value
- Sensor value after the trim processing. Unit derives from 'Sensor_range.unit'
- sensor_sn
- Sensor serial number
- temperature
- Process temperature. Selected as input to AIFB by setting 'Channel' = 4. Unit derives from 'Temperature.unit'
- temperature_unit
  - Unit code of 'Temperature', 'Max/Min_peak_temperature_value'
- °C, °F, K, °R
- max_peak_temperature_value
  - Holds the maximum process temperature. Write access resets to current value. Unit derives from 'Temperature.unit'
- Write access resets to current value
- min_peak_temperature_value
  - Holds the minimum process temperature. Write access resets to current value. Unit derives from 'Temperature.unit'
- Write access resets to current value

10.3 Dimensions

Housing in protection class IP 66/IP 67

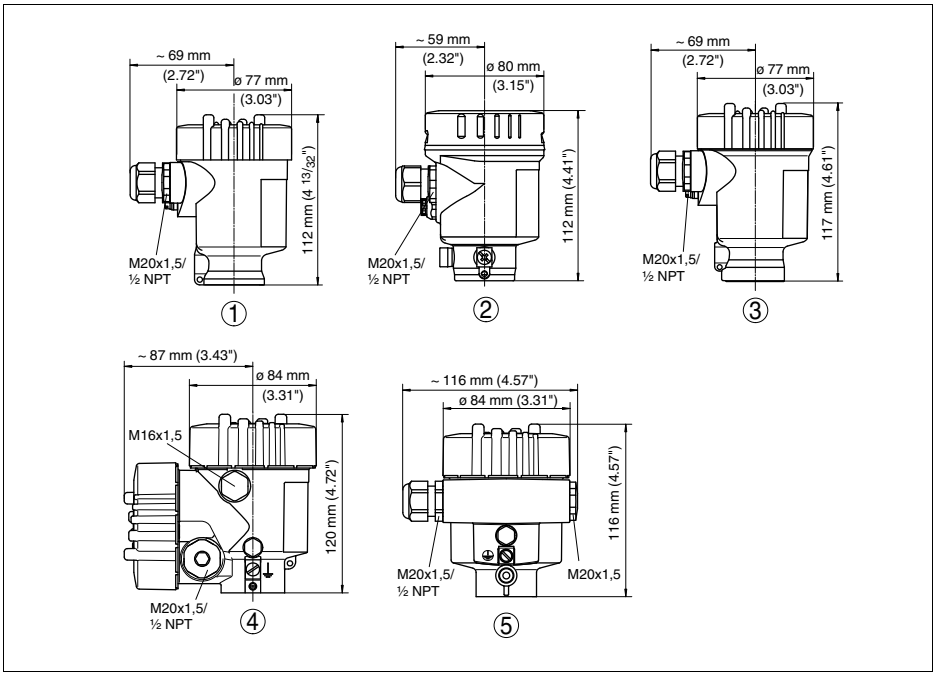


Fig. 35: Housing versions in protection IP 66/IP 67 (with integrated indicating and adjustment module the housing is 9 mm/0.35 in higher)

1 *Plastic housing*
2 *Stainless steel housing*
3 *Special steel casting housing*
4 *Aluminium double chamber housing*
5 *Aluminium housing*

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

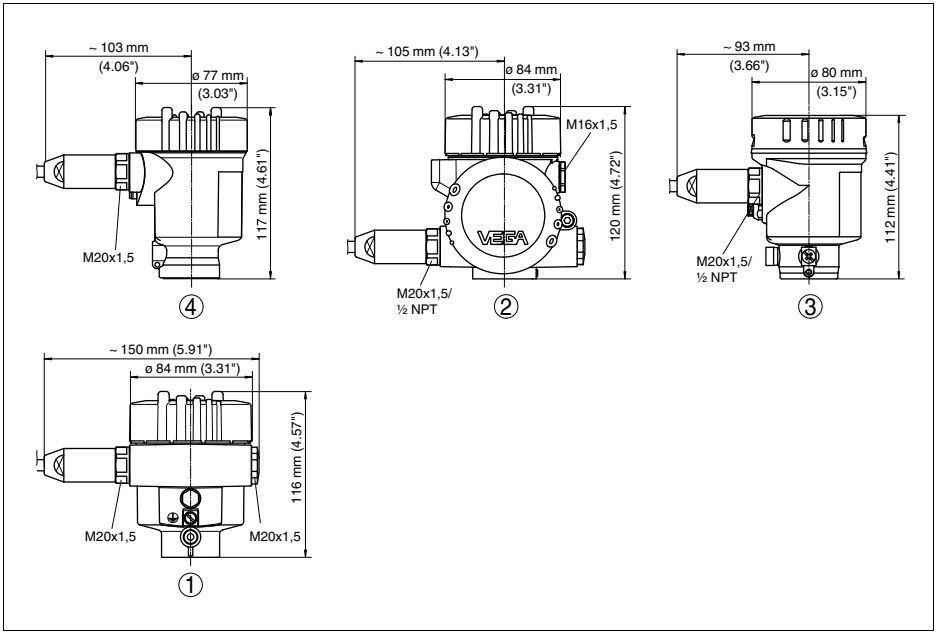


Fig. 36: Housing versions in protection IP 66/IP 68, 1 bar (with integrated indicating and adjustment module the housing is 9 mm/0.35 in higher)

1 Stainless steel housing
2 Special steel casting housing
3 Aluminium double chamber housing
4 Aluminium housing

IP 68 version with external housing

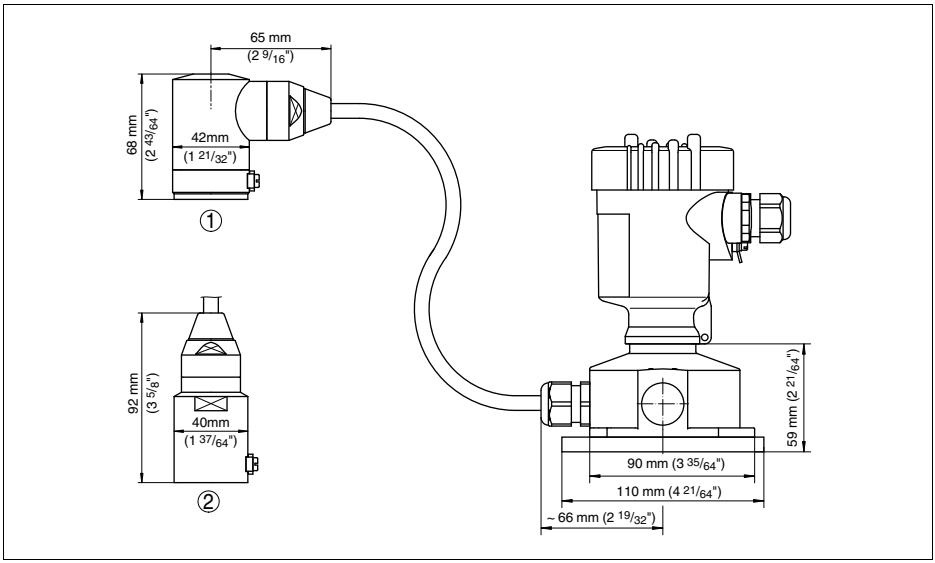


Fig. 37: IP 68 version with external housing
1 Lateral cable outlet
2 Axial cable outlet

VEGABAR 66 - standard version

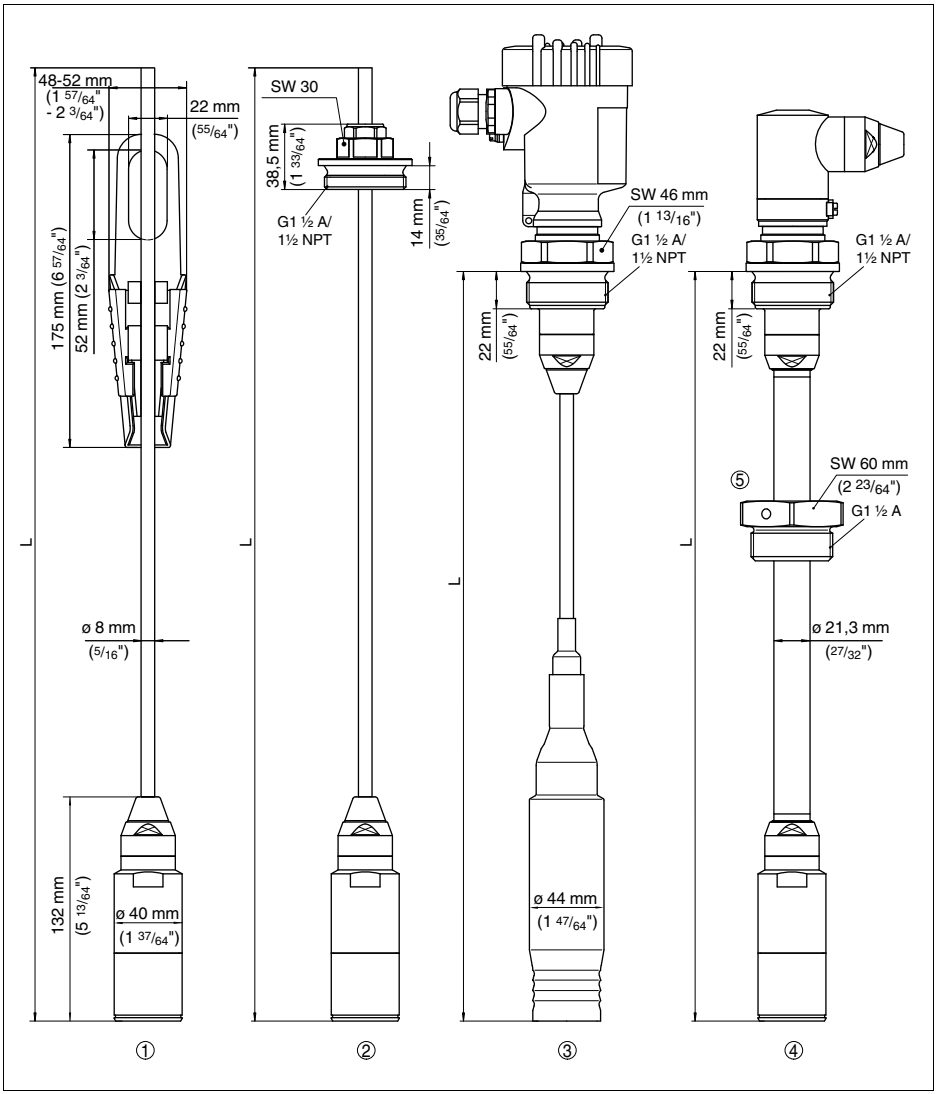


Fig. 38: VEGABAR 66 - standard version
1 with straining clamp
2 with threaded fitting G1½ A (1½ NPT)
3 with thread G1½ A (1½ NPT), transmitter with PE plastic coating
4 with direct cable outlet
5 Lock fitting

VEGABAR 66 - transmitter 32 mm

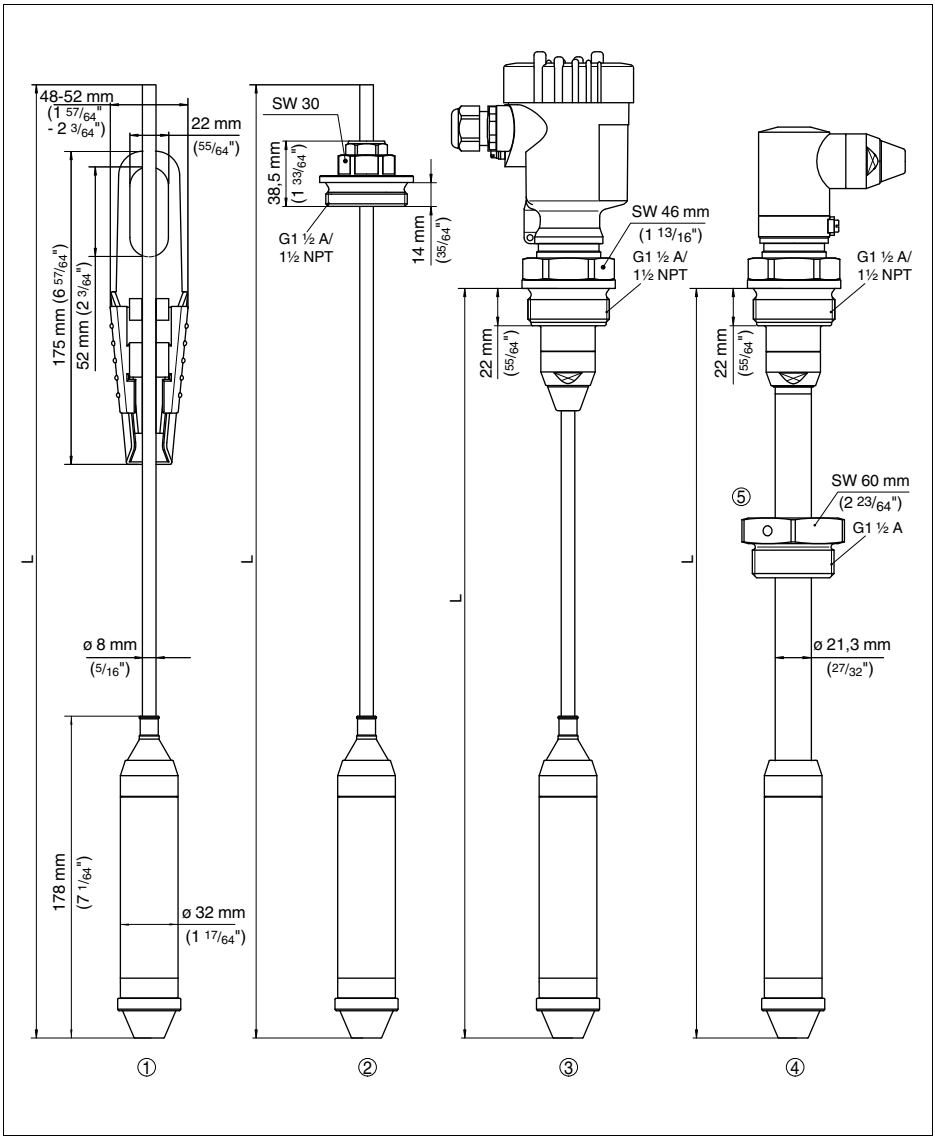


Fig. 39: VEGABAR 66 - transmitter 32 mm
1 with straining clamp
2 with threaded fitting G1½ A (1½ NPT)
3 with thread G1½ A (1½ NPT)
4 with direct cable outlet

5 Lock fitting

VEGABAR 66 - PVDF version

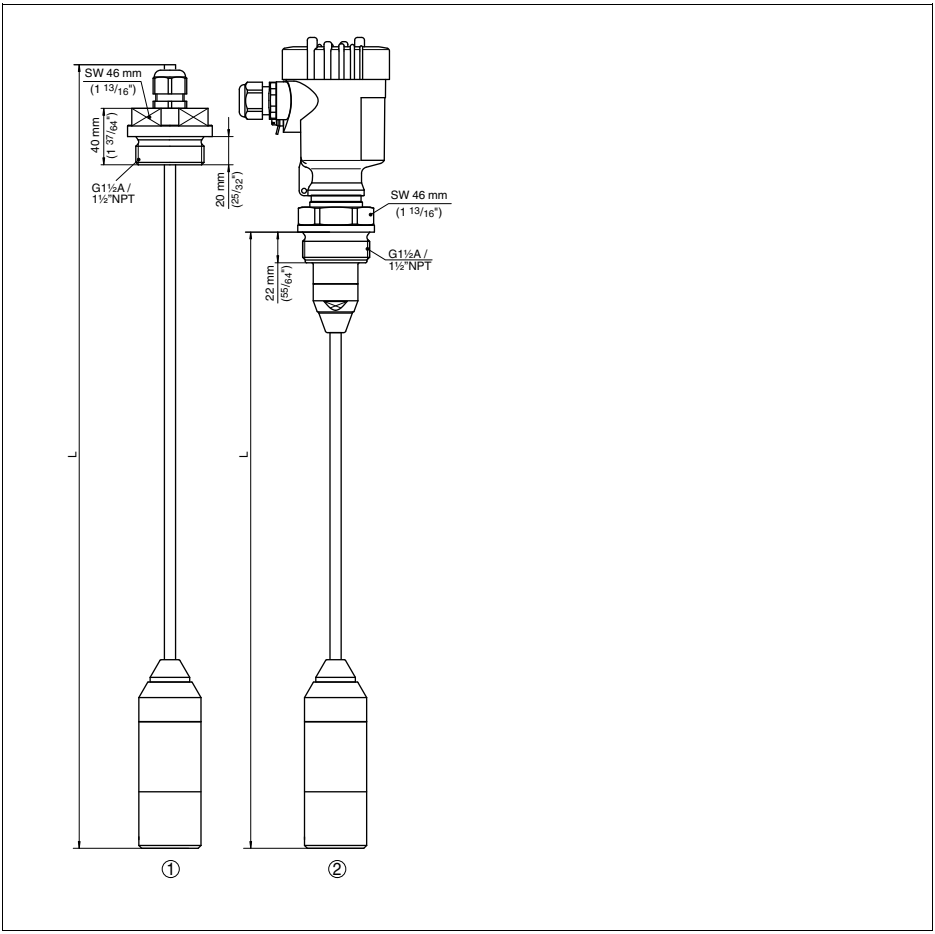
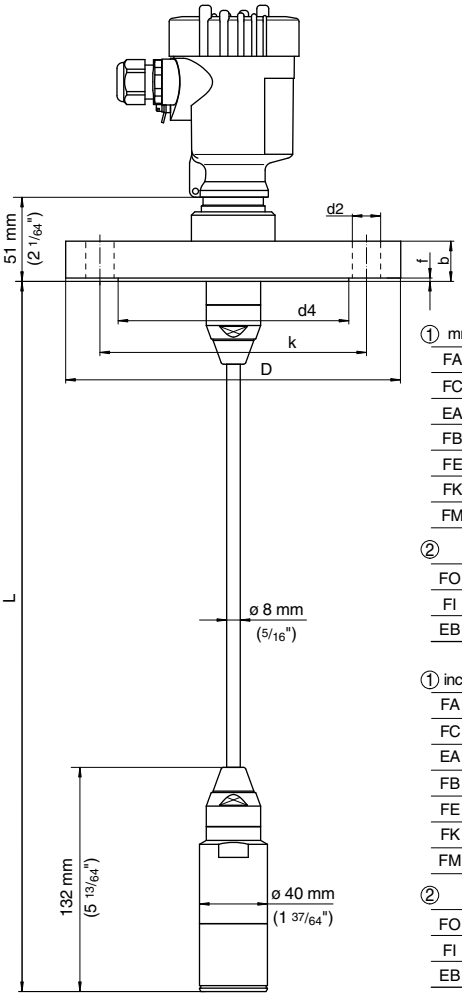


Fig. 40: VEGABAR 66 - PVDF version
1 with threaded fitting G1½ A (1½ NPT)
2 with thread G1½ A (1½ NPT)

VEGABAR 66 - 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. 41: VEGABAR 66 - flange connection
1 Flanges according to DIN 2501
2 Flanges according to ANSI B16.5

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VEGABAR 66 - hygienic fittings

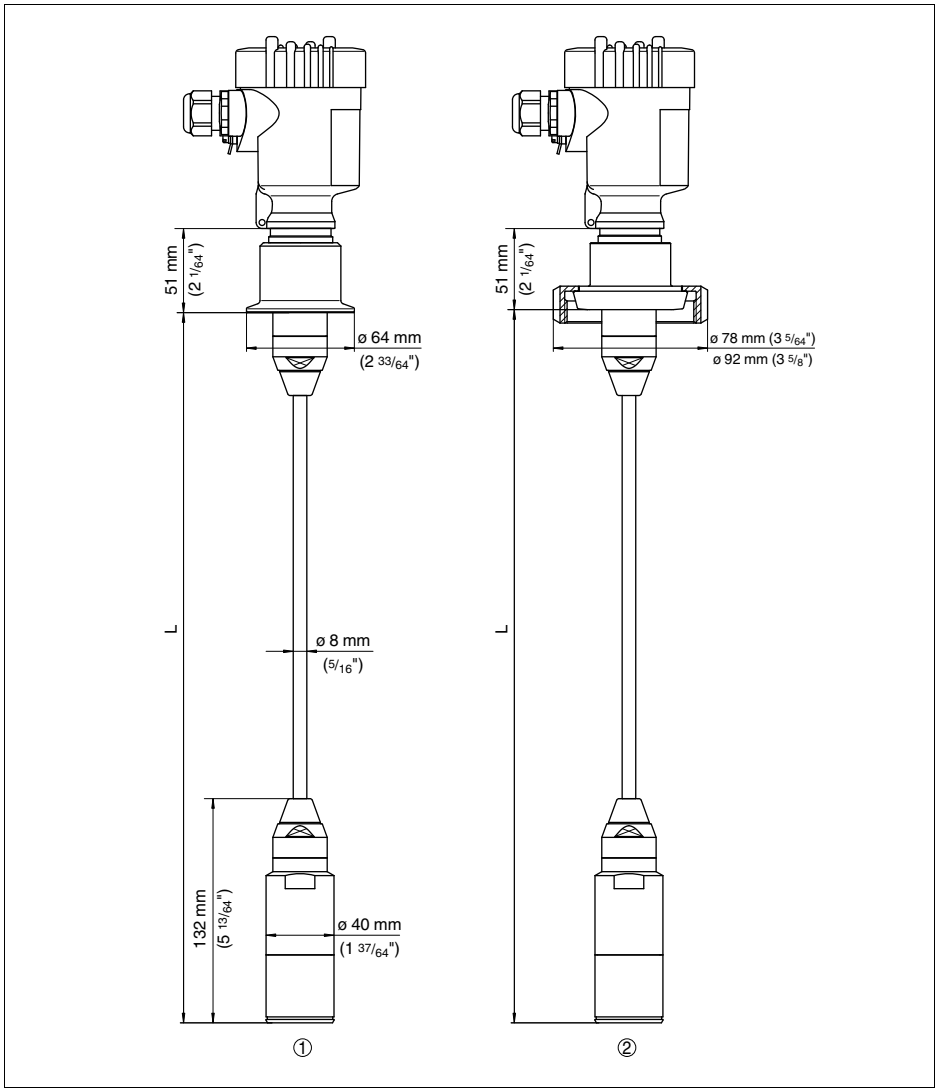

Fig. 42: VEGABAR 66 - hygienic fittings
1 Tri-Clamp 2"
2 Bolting DN 50

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