Operating Instructions

VEGABAR 64

4 … 20 mA/HART

Document ID:
27525

Process pressure/
Hydrostatic

Contents

27525-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 64 is a pressure transmitter for measurement of gauge pressure, absolute pressure and vacuum.

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 64 HART, PA or FF
- DTM VEGABAR 64 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 64 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*"

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- VEGABAR 64 pressure transmitter
- Documentation
  - this operating instructions manual
  - Test certificate for pressure transmitters
  - Safety Manual 31637 "*VEGABAR series 50 and 60 - 4 … 20 mA/HART*" (optional)
  - Operating instructions manual 27835 "*Indicating and adjustment module PLICSCOM*" (optional)
  - Supplementary instructions manual 31708 "*Heating for indicating and adjustment module*" (optional)
  - Supplementary instructions manual "*Plug connector for continuously measuring sensors*" (optional)
  - Ex-specific "*Safety instructions*" (with Ex-versions)
  - if necessary, further certificates

Components

VEGABAR 64 consists of the following components:

- Process fitting with measuring cell
- Housing with electronics, optionally available with plug connector
- Housing cover, optionally available with indicating and adjustment module PLICSCOM

The components are available in different versions.

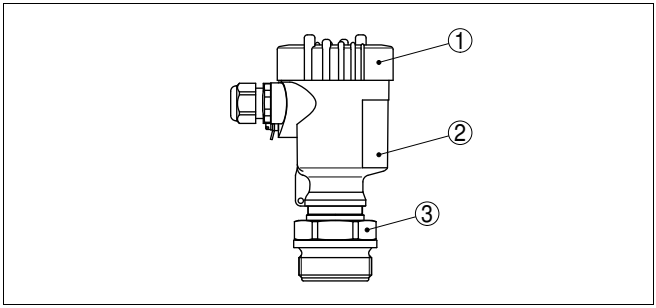

Fig. 1: Example of a VEGABAR 64 with process fitting G1½ A and plastic housing
1 Housing cover with integrated PLICSCOM (optional)
2 Housing with electronics
3 Process fitting with measuring cell

Type label

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

- Sensor type
- Article and serial number device

- Technical data: Measuring range, process pressure, process temperature, signal output, voltage supply, protection, protection class
- Order number
- Article numbers documentation
- SIL identification (with SIL rating ex works)

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 64 is a pressure transmitter for use in the paper, food processing and pharmaceutical industries as well as in water/sewage water plants. Depending on the version, it is used for level, gauge, absolute pressure or vacuum measurement. Measured products are gases, vapours and liquids, also those containing abrasive substances.

Functional principle

The sensor element is the CERTEC® measuring cell with flush, abrasion resistant ceramic diaphragm. The hydrostatic pressure of the medium or the process pressure causes a capacitance change in the measuring cell via the diaphragm. This change is converted into an appropriate output signal and outputted as measured value.

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

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

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

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

The background lighting of the indicating and adjustment module is powered by the sensor. Prerequiste is a certain heigt of the operating voltage. You can find the exact voltage specifications in chapter "*Technical data*".

The optional heating requires its own operating voltage. You can find 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 64 can be adjusted with different adjustment media:

- with indicating and adjustment module
- with the suitable VEGA DTM in conjunction with an adjustment software according to the FDT/DTM standard, e.g. PACTware and PC
- with manufacturer-specific adjustment programs AMS™ or PDM
- With a HART handheld

The entered parameters are generally saved in VEGABAR 64, 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.

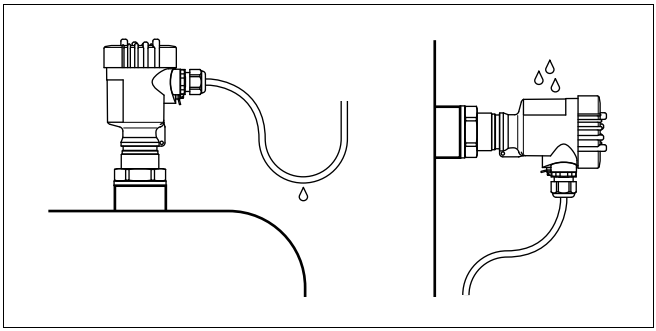

Fig. 2: Measures against moisture penetration

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.

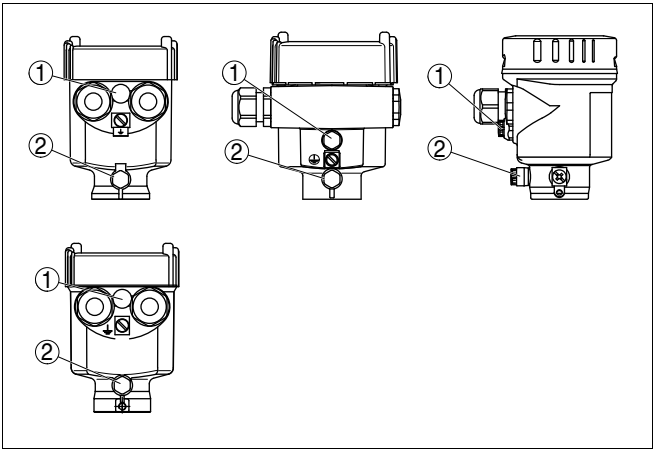

Fig. 3: Position of the filter elements
1 Filter element for ventilation of the electronics housing
2 Filter element for ventilation of the measuring cell

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.

Temperature limits

Higher process temperatures often mean also higher ambient temperatures. Make sure that the upper temperature limits stated in chapter "*Technical data*" for the environment of the electronics housing and connection cable are not exceeded.

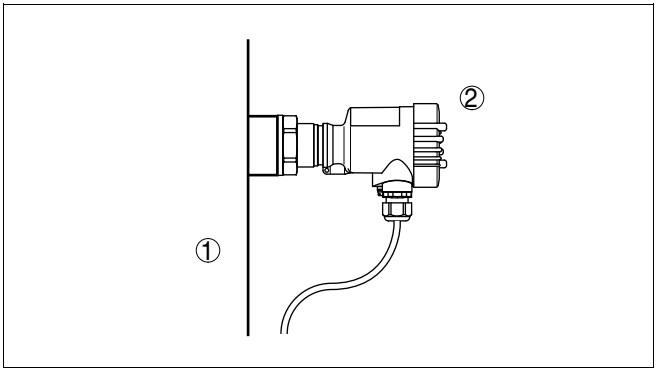

Fig. 4: Temperature ranges
1 Process temperature
2 Ambient temperature

4.2 Mounting steps

Welding the socket

For mounting VEGABAR 64, a welded socket is required. You can find these components in the supplementary instructions manual "*Welded socket and seals*".

Sealing/Screwing in threaded versions

Seal the thread with teflon, hemp or a similar resistant seal material on the process fitting thread 1½ NPT.

→ Screw VEGABAR 64 into the welded socket. Tighten the hexagon on the process fitting with a suitable wrench. Wrench size, see chapter "*Dimensions*".

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

Sealing/Screwing in flange versions

Seal the flange connections according to DIN/ANSI with a suitable, resistant seal and mount VEGABAR 64 with suitable screws.

Sealing/Screwing in hygienic fittings

Use the seal suitable for the respective process fitting. You can find the components in the supplementary instructions manual "*Welded socket and seals*".

4.3 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

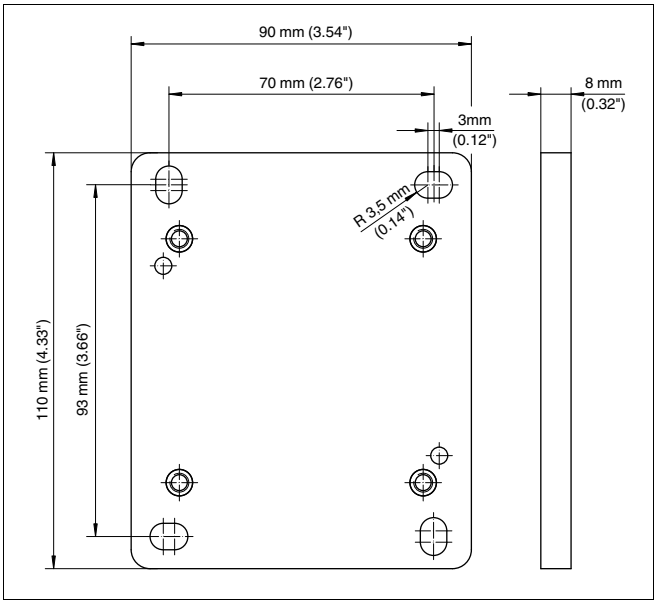

Fig. 5: Drilling template - wall mounting plate

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

Tip:
We recommend using VEGA overvoltage arresters B63-48 and ÜSB 62-36G.X.

Take note of safety instructions for Ex applications

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

Select power supply

Power supply and current signal are carried on the same two-wire cable. The voltage supply range can differ depending on the instrument version.

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

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

Keep in mind the following additional influences on the operating voltage:

- Output voltage of the power supply unit can be lower under nominal load (with a sensor current of 20.5 mA or 22 mA in case of fault message)
- Influence of additional instruments in the circuit (see load values in chapter "*Technical data*")

Selecting connection cable

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

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

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

Cable gland ½ NPT

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

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

Cable screening and grounding

If screened cable is necessary, connect the cable screen on both ends to ground potential. In the sensor, the screen must be connected directly to the internal ground terminal. The ground terminal on the outside of the housing must be connected to the potential equalisation (low impedance).

If potential equalisation currents are expected, the connection on the processing side must be made via a ceramic capacitor (e. g. 1 nF, 1500 V). The low frequency potential equalisation currents are thus suppressed, but the protective effect against high frequency interference signals remains.

Select connection cable for Ex applications

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

5.2 Connection 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.

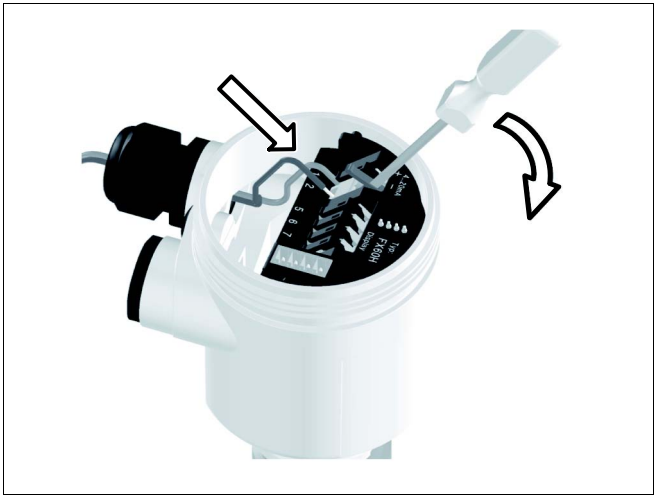

Fig. 6: Connection steps 6 and 7

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

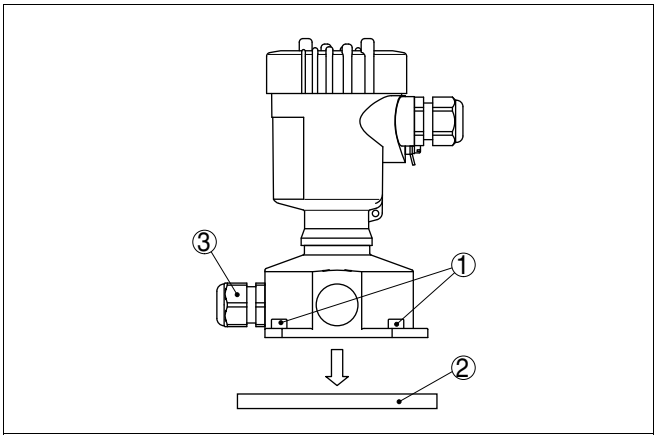

Fig. 7: Components of the external housing for plics® devices
1 Screws
2 Wall mounting plate
3 Cable gland

3 Loop the connection cable through the cable entry on the housing base[1)]

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.

1) 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

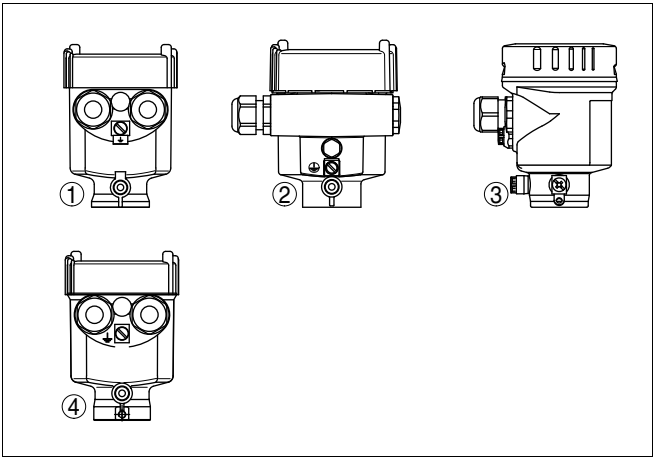

Fig. 8: Material versions, single chamber housing
1 Plastic
2 Aluminium
3 Stainless steel
4 Stainless steel casting

Electronics and connection compartment

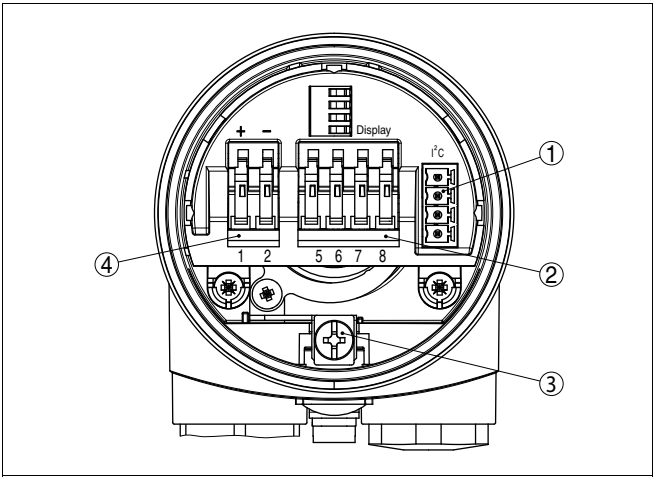

Fig. 9: Electronics and connection compartment, single chamber housing
1 Plug connector for VEGACONNECT (I^2C interface)
2 Spring-loaded terminals for connection of the external indication VEGADIS 61
3 Ground terminal for connection of the cable screen
4 Spring-loaded terminals for voltage supply

Wiring plan

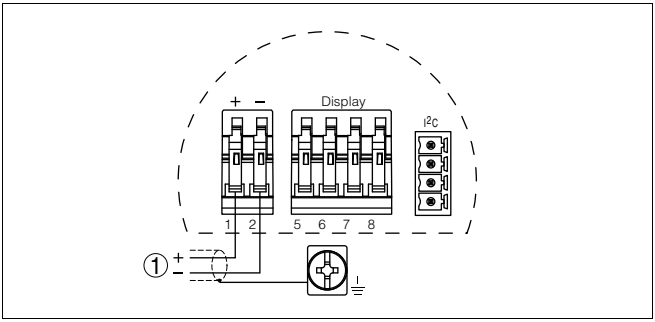

Fig. 10: Wiring plan, single chamber housing
1 Voltage supply/Signal output

5.4 Wiring plan, double chamber housing

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

Housing overview

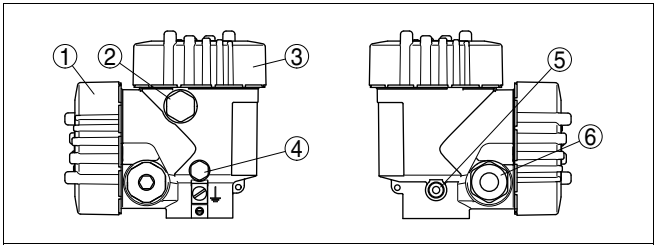

Fig. 11: Double chamber housing
1 Housing cover, connection compartment
2 Blind stopper or plug M12 x 1 for VEGADIS 61 (optional)
3 Housing cover, electronics compartment
4 Filter element for pressure compensation of the electronics housing
5 Filter element for pressure compensation of the measuring cell
6 Cable entry or plug

Electronics compartment

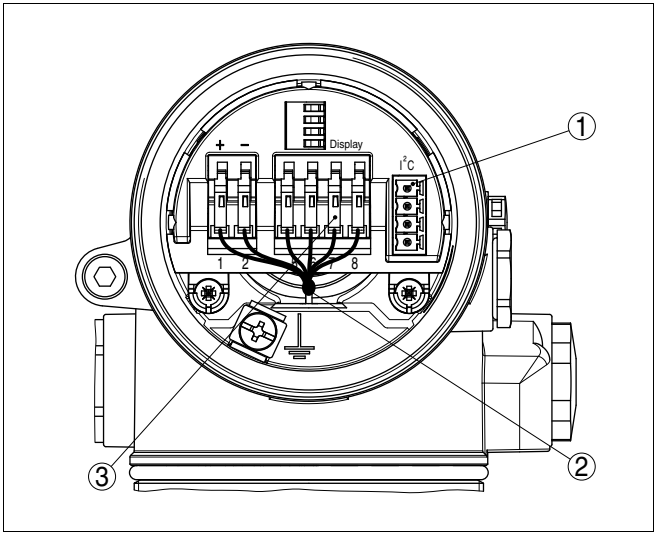

Fig. 12: Electronics compartment, double chamber housing
1 Plug connector for VEGACONNECT (I²C interface)
2 Internal connection cable to the connection compartment
3 Terminals for VEGADIS 61

Connection compartment

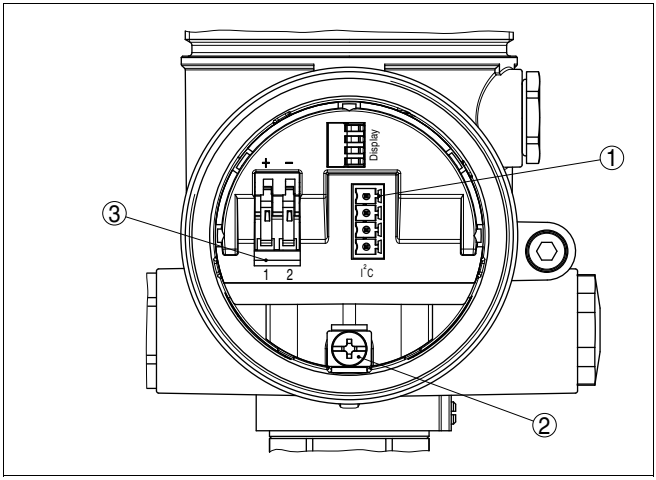

Fig. 13: Connection compartment, double chamber housing
1 Plug connector for VEGACONNECT (I²C interface)
2 Ground terminal for connection of the cable screen
3 Spring-loaded terminals for voltage supply

Wiring plan

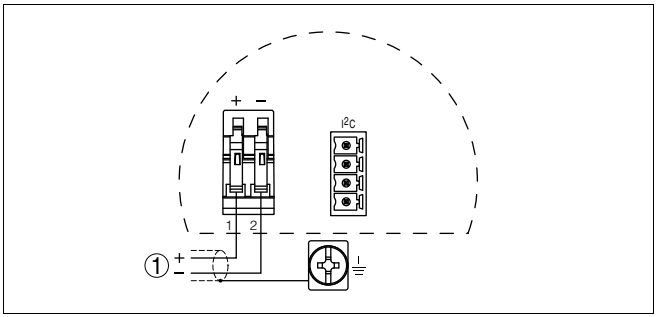

Fig. 14: Wiring plan, double chamber housing
1 Voltage supply/Signal output

5.5 Wiring plan double chamber housing Ex d

Housing overview

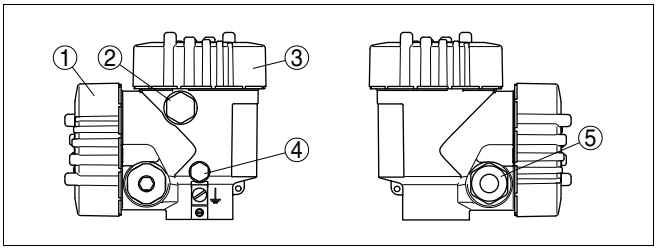

Fig. 15: Double chamber housing
1 Housing cover, connection compartment
2 Blind stopper or plug M12 x 1 for VEGADIS 61 (optional)
3 Housing cover, electronics compartment
4 Filter element for air pressure compensation
5 Cable gland

Electronics compartment

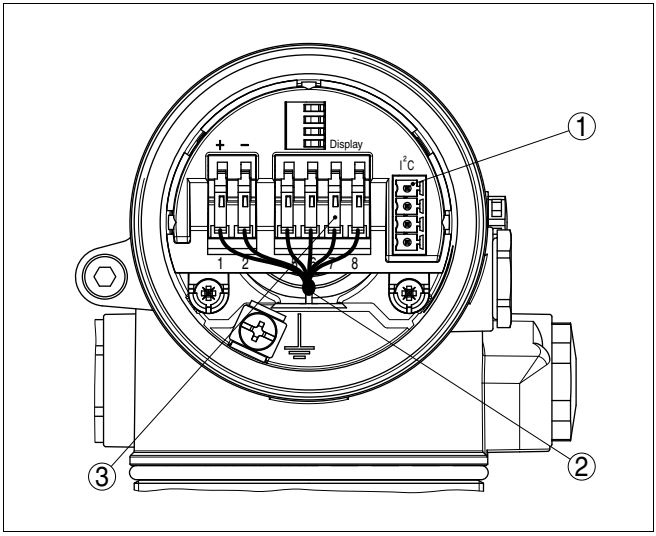

Fig. 16: Electronics compartment, double chamber housing
1 Plug connector for VEGACONNECT (I^2C interface)
2 Internal connection cable to the connection compartment
3 Terminals for VEGADIS 61

Connection compartment

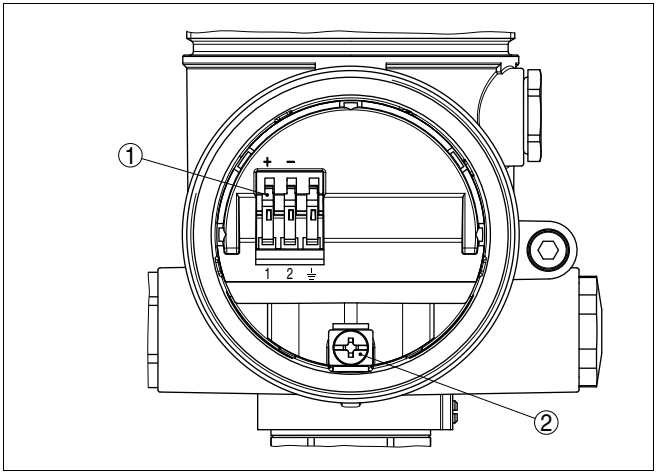

Fig. 17: Connection compartment double chamber housing Ex d
1 Spring-loaded terminals for power supply and cable screen
2 Ground terminal for connection of the cable screen

Wiring plan

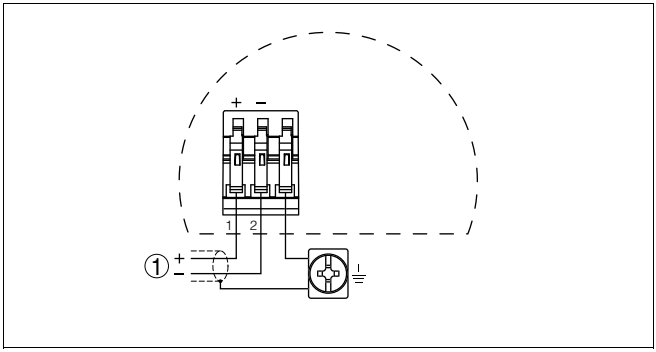

Fig. 18: Wiring plan double chamber housing Ex d
1 Voltage supply/Signal output

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

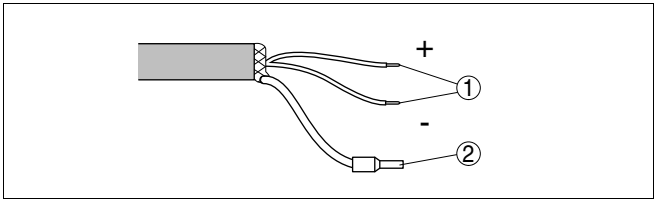

Fig. 19: Wire assignment, connection cable
1 brown (+) and blue (-) to power supply or to the processing system
2 Shielding

5.7 Wiring plan, external housing with version IP 68

Overview

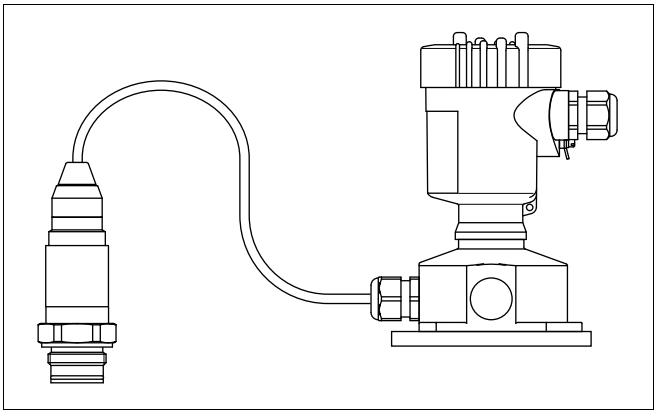

Fig. 20: VEGABAR 64 in IP 68 version 25 bar, non-Ex and axial cable outlet, external housing

Electronics and connection compartment

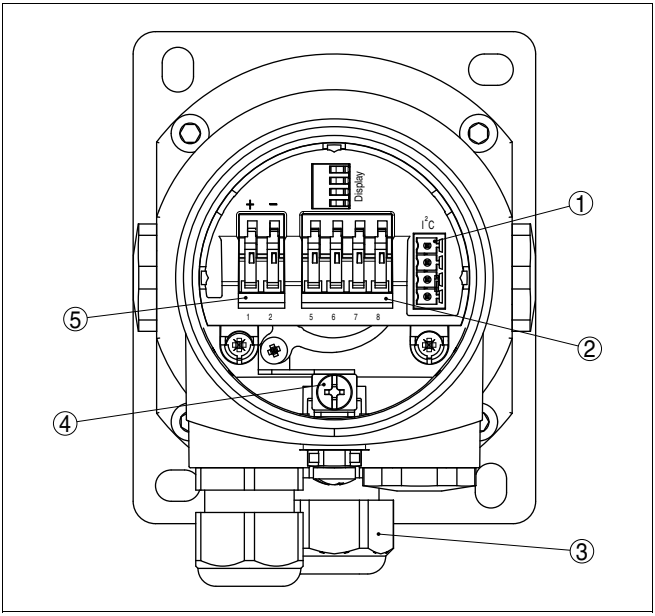

Fig. 21: Electronics and connection compartment

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 voltage supply*

Terminal compartment, housing socket

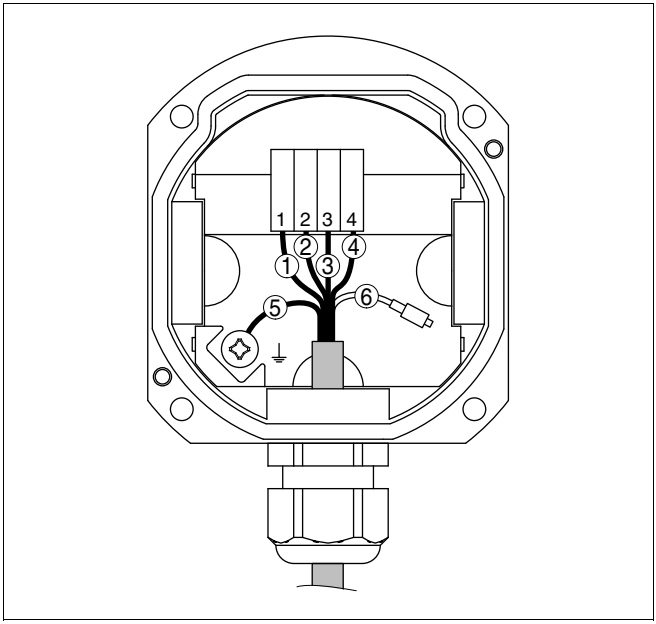

Fig. 22: Connection of the sensor in the housing socket
1 Brown
2 Blue
3 Yellow
4 White
5 Shielding
6 Breather capillaries

Wiring plan external electronics

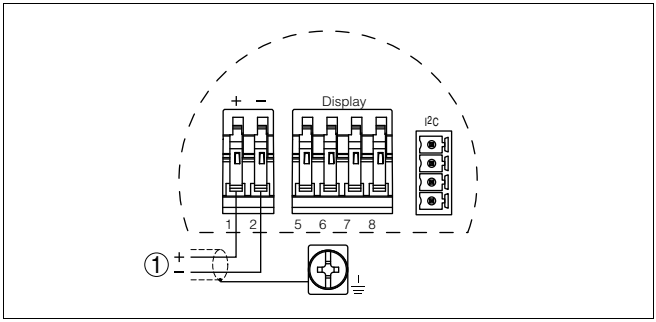

Fig. 23: Wiring plan external electronics
1 Power supply

5.8 Switch on phase

Switch on phase

After connecting VEGABAR 64 to power supply or after a voltage recurrence, the instrument carries out a self-check for approx. 30 seconds:

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

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

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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. …- 02 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.

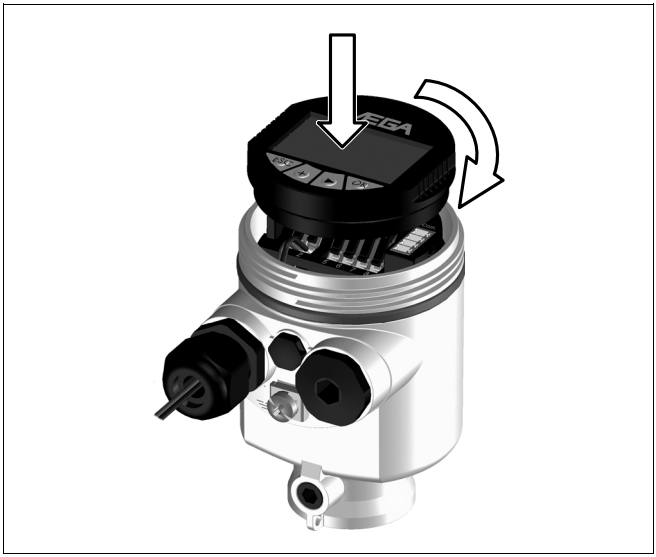


Fig. 24: Mounting the indicating and adjustment module

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

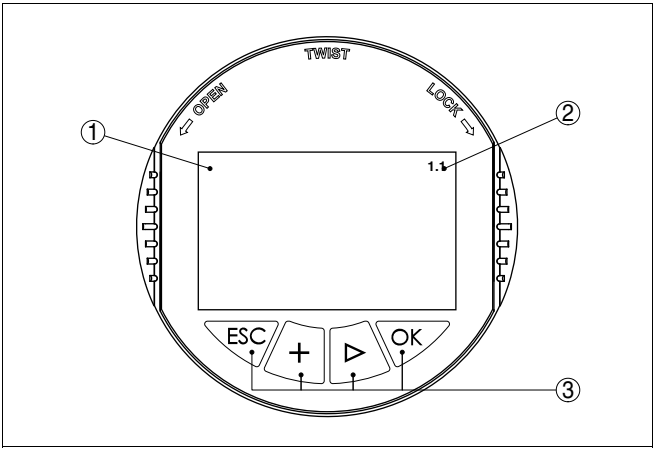


Fig. 25: Indicating and adjustment elements
1 LC display
2 Indication of the menu item number
3 Adjustment keys

Key functions

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

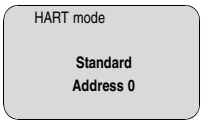
Adjustment system

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

6.4 Setup procedure

Address setting HART-Multidrop

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



Level or process pressure measurement

VEGABAR 64 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 64 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.

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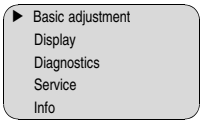
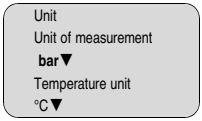
To select the adjustment unit (in the example switching over from bar to mbar) you have to proceed as follows:[2)]

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



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



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

4 Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (in the example mbar).

5 Confirm with ***[OK]*** and move to position correction with ***[->]***.

The adjustment unit is 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.

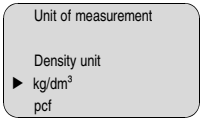
Proceed as follows:

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.

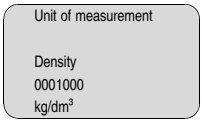
3 Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (in the example m).

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.

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



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:[3)]

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

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

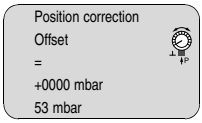
→ Confirm with ***[OK]***.

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

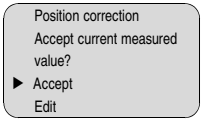
Carry out position correction

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.

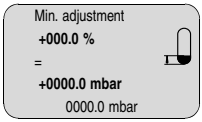


3 Confirm with ***[OK]*** and move to min.(zero) adjustment with ***[->]***.

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 ***[->]***.

3) Selection options: °C, °F.

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

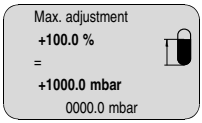
The min. adjustment is finished.

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 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 64 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.

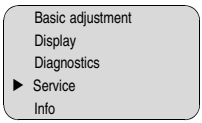
The actual measured value is displayed in addition to the menu items for zero/span adjustment.

Select application "Process pressure measurement"

VEGABAR 64 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]***.

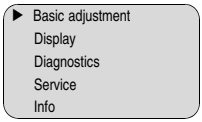
Select unit

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

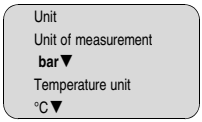
To select the adjustment unit (in the example switching over from bar to mbar) you have to proceed as follows:[4)]

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.

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).

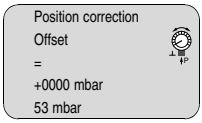
→ Confirm with ***[OK]***.

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

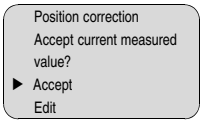
Carry out position correction

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.



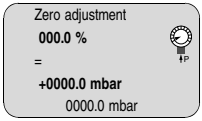
3 Confirm with ***[OK]*** and move to min.(zero) adjustment with ***[->]***.

[5)] Selection options: °C, °F.

Carrying out zero adjustment

Proceed as follows:

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



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

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

The zero adjustment is finished.

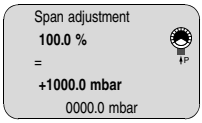
Information:
The zero adjustment shifts the value of the span adjustment. The span, i.e. the difference between these values, however, remains unchanged.

Information:
For an adjustment with pressure, 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]***.

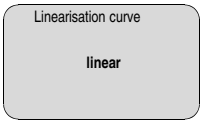
3 Confirm with ***[OK]*** and move to the menu overview with ***[ESC]***.

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]***.

Linearisation curve

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



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

Caution:
Note the following, if VEGABAR 64 is used as part of an overfill protection system according to WHG:

If a linearisation curve is selected, the measuring signal is no longer compulsorily linear proportional to the level. This must be taken into consideration by the user, particularly when adjusting the switching point on the level switch.

Copy sensor data

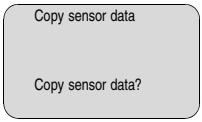
This function enables reading out parameter adjustment data as well as writing parameter adjustment data into the sensor via the indicating and adjustment module. A description of the function is available in the operating instructions manual "*Indicating and adjustment module*".

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

- Measured value presentation
- Adjustment
- Damping
- Linearisation curve
- Sensor-TAG
- Displayed value
- Display unit
- Scaling
- Current output
- Unit of measurement
- Language

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

- SIL
- HART mode
- PIN
- Application



Reset

Basic adjustment

If the "*Reset*" (sensor-specific basic adjustment) is carried out, the sensor resets the values of the following menu items to the reset values (see chart):

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	1 s
	Linearisation	linear
	Sensor-TAG	Sensor
Display	Displayed value 1	bar
	Displayed value 2	%
	Display unit	Volume/l
	Scaling	0.00 to 100.0
	Decimal point indication	8888.8
Service	Current output - characteristics	4 … 20 mA
	Current output - failure	< 3.6 mA
	Current output - min. current	3.8 mA
	Current output - max. current	20.5 mA

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	SIL	no reset
	Language	no reset
	HART mode	no reset
	Application	no reset

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Factory setting
Like basic adjustment, furthermore special parameters are reset to default values.[6)]

Pointer
The min. and max. temperature or pressure values are each reset to the actual value.

Optional settings

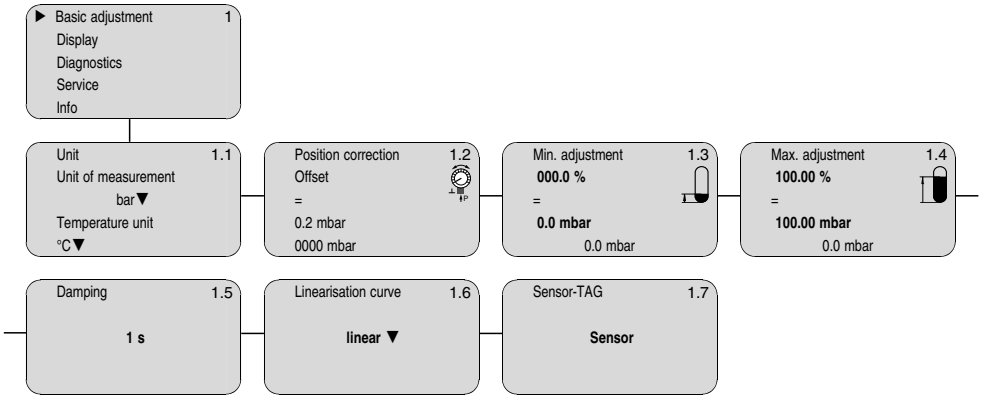
Additional adjustment and diagnosis options such as e.g. scaling, simulation or trend curve presentation are shown in the following menu schematic. You will find a detailed description of these menu items in the operating instructions manual "*Indicating and adjustment module*".

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

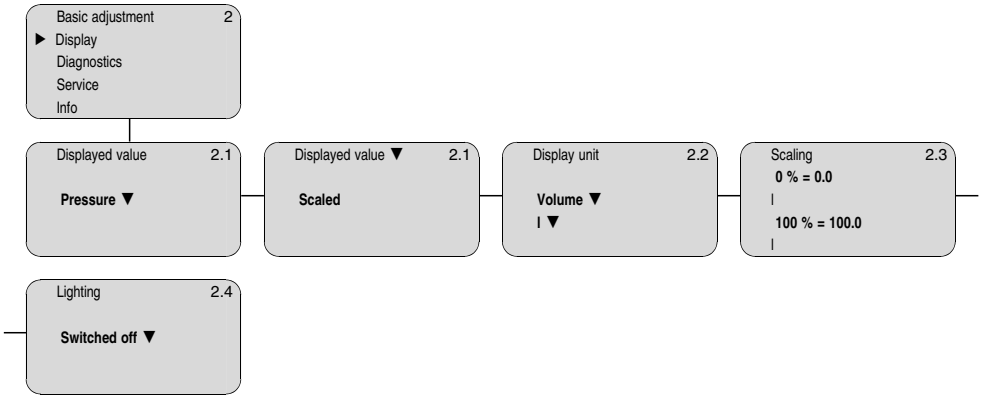
6.5 Menu schematic

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

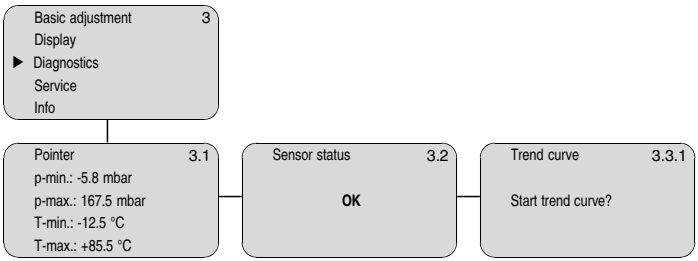
Basic adjustment



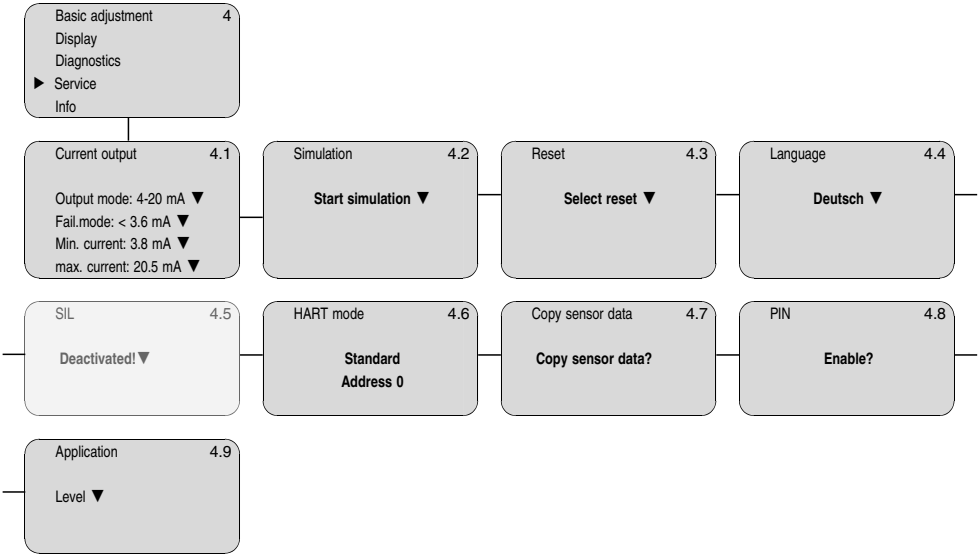
Display



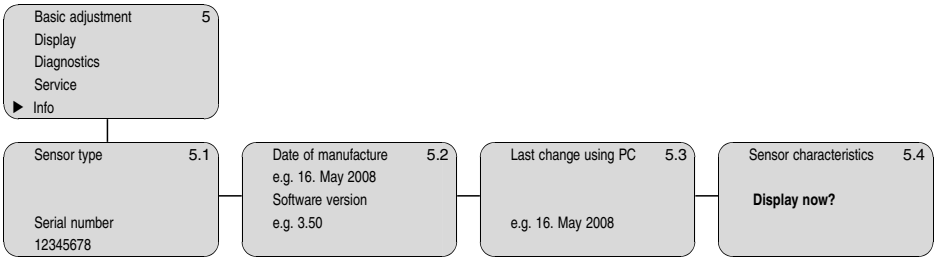
Diagnostics



Service



Info



7 Setup with PACTware and other adjustment programs

7.1 Connect the PC via VEGACONNECT

Internal connection via I²C interface

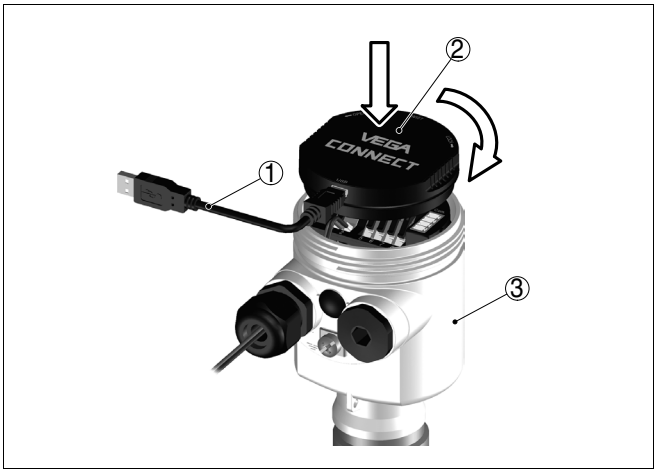


Fig. 26: Connection of the PC via VEGACONNECT directly to the sensor
1 USB cable to the PC
2 VEGACONNECT
3 Sensor

External connection via I²C interface

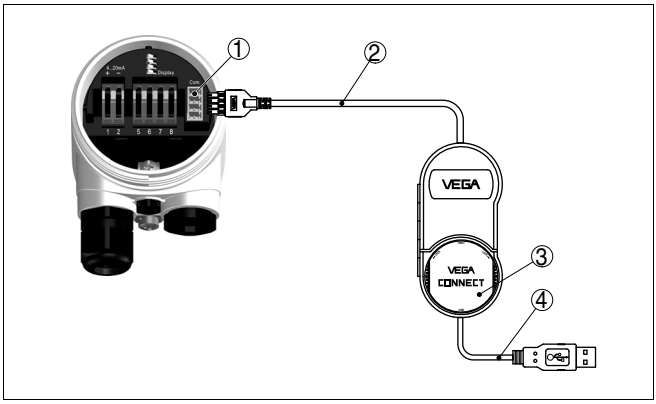


Fig. 27: Connection via I²C connection cable
1 I²C bus (com.) interface on the sensor
2 I²C connection cable of VEGACONNECT
3 VEGACONNECT
4 USB cable to the PC

Necessary components:

- VEGABAR 64
- PC with PACTware and suitable VEGA DTM
- VEGACONNECT
- Power supply unit or processing system

Connection via HART

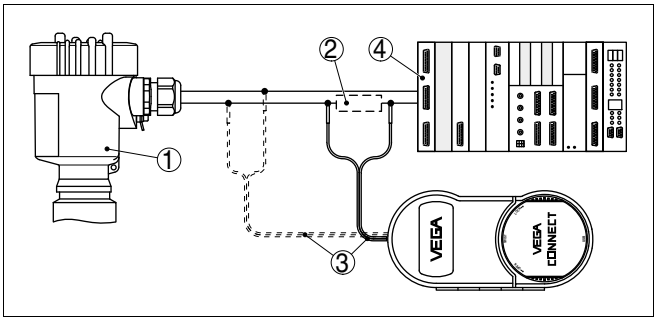


Fig. 28: Connecting the PC via HART to the signal cable
1 VEGABAR 64
2 HART resistor 250 Ω (optional depending on processing)
3 Connection cable with 2 mm pins and terminals
4 Processing system/PLC/Voltage supply

Necessary components:

- VEGABAR 64
- PC with PACTware and suitable VEGA DTM
- VEGACONNECT
- HART resistor approx. 250 Ω
- Power supply unit or processing system

Note:
With power supply units with integrated HART resistance (internal resistance approx. 250 Ω), an additional external resistance is not necessary. This applies, e. g. to the VEGA instruments VEGATRENN 149A, VEGADIS 371, VEGAMET 381). Common Ex separators are also usually equipped with a sufficient current limitation resistance. In such cases, VEGACONNECT 4 can be connected parallel to the 4 … 20 mA cable.

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 64, 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™ and PDM

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

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

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 64 requires special cleaning instructions for each application. Please ask the VEGA agency serving you.

8.2 Remove interferences

Reaction when malfunctions occur

The operator of the system is responsible for taken suitable measures to 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 the 4 … 20 mA signal

Connect a handheld multimeter in the suitable measuring range according to the wiring plan.

? 4 … 20 mA signal not stable

- Level fluctuations

→ Set the integration time via the indicating and adjustment module or PACTware

- no atmospheric pressure compensation

→ Check the pressure compensation in the housing and clean the filter element, if necessary

? 4 … 20 mA signal missing

- Wrong connection to power supply

→ Check connection according to chapter "*Connection steps*" and if necessary, correct according to chapter "*Wiring plan*"

- No power supply

→ Check cables for breaks; repair if necessary

- Operating voltage too low or load resistance too high

→ Check, adapt if necessary

? Current signal greater than 22 mA or less than 3.6 mA

- electronics module or measuring cell defective

→ Exchange instrument or return instrument for repair

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[7)]

→ 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

→ Exchange instrument or return instrument for repair

Reaction after fault rectification

Depending on the failure reason and measures taken, the steps described in chapter "*Set up*" must be carried out again, if necessary.

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

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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:

- 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

Pressure measurement in the pipeline 8 bar (800 KPa)

Product temperature 50 °C, hence within the compensated range

VEGABAR 64 with measuring range 25 bar

Calculation of the set Turn Down: TD = 10 bar/8 bar, TD = 1.25

Basic accuracy digital output signal in percent:
$F_{perf} = \sqrt{((F_T)^2 + (F_{KI})^2)}$

$F_T = (0.05\ \% + 0.1\ \% \times TD)$

$F_{KI} = 0.075\ \%$

$F_{perf} = \sqrt{((0.05\ \% + 0.1\ \% \times 1.25)^2 + (0.075\ \%)^2)}$

$F_{perf} = 0.19\ \%$

Total deviation digital output signal in percent:
$F_{total} = F_{perf} + F_{stab}$

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

$F_{stab} = (0.1\ \% \times 1.25)/year$

$F_{stab} = 0.125\ \%$

$F_{total} = 0.19\ \% + 0.125\ \% = 0.315\ \%$

Total deviation digital output signal absolute:
$F_{total} = 0.315\ \% \times 8\ bar/100\ \% = 25.2\ mbar$

Basic accuracy analogue output signal in percent:
$F_{perf} = \sqrt{((F_T)^2 + (F_{KI})^2 + (F_a)^2)}$

$F_T = (0.05\ \% + 0.1\ \% \times TD)$

$F_{KI} = 0.075\ \%$

$F_a = 0.15\ \%$

$F_{perf} = \sqrt{((0.05\ \% + 0.1\ \% \times 1.25)^2 + (0.075\ \%)^2 + (0.15\ \%)^2)}$

$F_{perf} = 0.24\ \%$

Total deviation analogue output signal in percent:
$F_{total} = F_{perf} + F_{stab}$

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

$F_{stab} = (0.1\ \% \times 1.25)/year$

$F_{stab} = 0.125\ \%$

$F_{total} = 0.24\ \% + 0.125\ \% = 0.365\ \%$

Total deviation analogue output signal absolute:
$F_{total} = 0.365\ \% \times 8\ bar/100\ \% = 29.2\ mbar$

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 64 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.

10 Supplement

10.1 Technical data

General data

Parameter, pressure	Gauge pressure, absolute pressure, vacuum
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	
– Process fitting	316L, PVDF, PVDF plated, Hastelloy C4 plated
– Diaphragm	sapphire ceramic® (99.9 % oxide ceramic)
– Joining material diaphragm/Basic element measuring cell	Glass solder
– Measuring cell seal	FKM (VP2/A), FFKM (Kalrez 6375), EPDM (A+P 75.5/KW75F), FFKM (Chemraz 535), FFKM (FDA/3A)
– Seal, process fitting thread G1½ A	Klingersil C-4400
Materials, non-wetted parts	
– Electronics housing	Plastic PBT (polyester), Alu die-casting powder-coated, 316L
– External electronics housing	plastic PBT (Polyester)
– Socket, wall mounting plate external electronics housing	plastic PBT (Polyester)
– Seal between housing socket and wall mounting plate	TPE (fixed connected)
– Seal, housing cover	NBR (stainless steel housing), silicone (Alu/plastic housing)
– Inspection window in housing cover for indicating and adjustment module	Polycarbonate (UL-746-C listed)
– Ground terminal	316Ti/316L
– Connection between IP 68 transmitter and external electronics housing	PUR, FEP, PE
– Type plate support with IP 68 version on cable	PE hard
Weight approx.	0.8 … 8 kg (1.764 … 17.64 lbs), depending on process fitting

Output variable

Output signal	4 … 20 mA/HART

HART output values	
– HART value (Primary Value)	Process pressure
– HART value (Secondary Value)	Temperature
Signal resolution	1.6 µA
Failure signal current output (adjustable)	mA-value unchanged 20.5 mA, 22 mA, < 3.6 mA
Max. output current	22 mA
Load	see load diagram under Power supply
Fulfilled NAMUR recommendations	NE 43

Dynamic behaviour output

Run-up time approx.	10 s

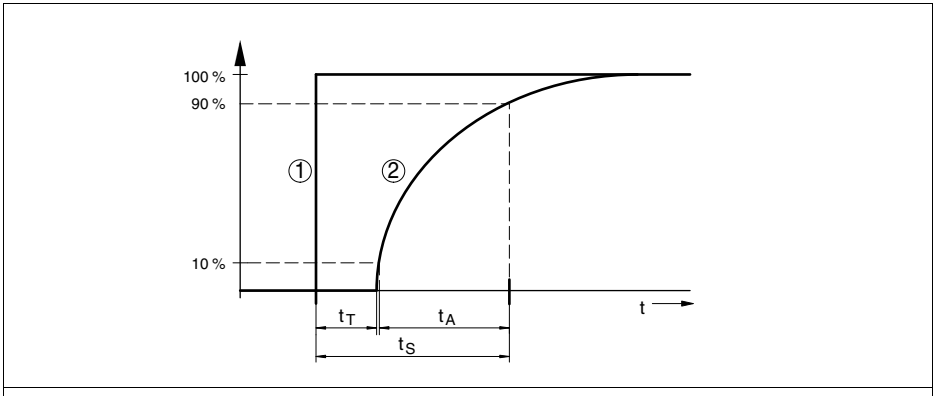

Fig. 29: Sudden change of the process variable, dead time t_T, rise time t_A and step response time t_S
1 Process variable
2 Output signal

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

Additional output parameter - temperature

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

Range	-50 … +150 °C (-58 … +302 °F)
Resolution	1 °C (1.8 °F)

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Accuracy

- in the range of 0 … +100 °C (+32 … +212 °F) ±3 K
- in the range of -50 … 0 °C (-58 … +32 °F) and +100 … +150 °C (+212 … +302 °F) typ. ±4 K

Input variable

Adjustment

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

- percentage value -10 … 110 %
- pressure value -20 … 120 %

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

- zero -20 … +95 %
- span -120 … +120 %[8)]
- Difference between zero and span max. 120 % of the nominal range

Recommended max. turn down 10 : 1 (no limitation)

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
0 … 60 bar/0 … 6000 kPa	200 bar/20000 kPa	-1 bar/-100 kPa
-1 … 0 bar/-100 … 0 kPa	35 bar/3500 kPa	-1 bar/-100 kPa
-1 … 1.5 bar/-100 … 150 kPa	50 bar/5000 kPa	-1 bar/-100 kPa
-1 … 5 bar/-100 … 500 kPa	65 bar/6500 kPa	-1 bar/-100 kPa
-1 … 10 bar/-100 … 1000 kPa	90 bar/9000 kPa	-1 bar/-100 kPa
-1 … 25 bar/-100 … 2500 kPa	130 bar/13000 kPa	-1 bar/-100 kPa
-1 … 60 bar/-100 … 6000 kPa	200 bar/20000 kPa	-1 bar/-100 kPa
-0.05 … 0.05 bar/-5 … 5 kPa	15 bar/1500 kPa	-0.2 bar/-20 kPa
-0.1 … 0.1 bar/-10 … 10 kPa	20 bar/2000 kPa	-0.4 bar/-40 kPa
-0.2 … 0.2 bar/-20 … 20 kPa	30 bar/3000 kPa	-0.8 bar/-80 kPa
-0.5 … 0.5 bar/-50 … 50 kPa	35 bar/3500 kPa	-1 bar/-100 kPa

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

Nominal range	Overload, max. pressure	Overload, min. pressure
Absolute pressure		
0 … 0.1 bar/0 … 10 kPa	15 bar/1500 kPa	0 bar abs.
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.
0 … 60 bar/0 … 6000 kPa	200 bar/20000 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
-15 … 0 psig	500 psig	-15 psig
-15 … 25 psig	700 psig	-15 psig
-15 … 70 psig	950 psig	-15 psig
-15 … 150 psig	1300 psig	-15 psig
-15 … 350 psig	1900 psig	-15 psig
-15 … 900 psig	2900 psig	-15 psig
-0.7 … 0.7 psig	200 psig	-3 psig
-1.5 … 1.5 psig	290 psig	-6 psig
-3 … 3 psig	430 psig	-12 psig
-7 … 7 psig	500 psig	-15 psig
Absolute pressure		
0 … 1.5 psi	200 psi	0 psi
0 … 15 psi	500 psi	0 psi
0 … 35 psi	700 psi	0 psi
0 … 70 psi	900 psi	0 psi
0 … 150 psi	1300 psi	0 psi
0 … 350 psi	1900 psi	0 psi

Nominal range	Overload, max. pressure	Overload, min. pressure
0 … 900 psi	2900 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[9)]

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: < 0.075 %
- Turn down > 5 : 1: < 0.015 % x TD

Deviation with absolutely flush process fittings EV, FT

- Turn down 1 : 1 up to 5 : 1: < 0.05 %
- Turn down > 5 : 1: < 0.01 % x TD

Deviation with absolute pressure measuring range 0.1 bar

- Turn down 1 : 1 up to 5 : 1: < 0.25 % x TD
- Turn down > 5 : 1: < 0.05 % x TD

Influence of the product or ambient temperature

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

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

- In the compensated temperature range 0 … +100 °C (+32 … +212 °F): < (0.05 % + 0.1 % x TD)
- Outside the compensated temperature range: < (0.05 % + 0.15 % x TD)

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

Thermal change zero signal and output span with absolute pressure measuring range 0.1 bar, reference temperature 20 °C (68 °F):

– In the compensated temperature range 0 … +100 °C (+32 … +212 °F)	< (0.1 % + 0.1 % x TD)
– Outside the compensated temperature range	< (0.15 % + 0.15 % 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.

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.

Pressure stage, process fitting

– Thread 316L	PN 60
– Thread Aluminium	PN 25
– Thread PVDF	PN 10
– Hygienic fittings 316L	PN 6, PN 10, PN 25, PN 40
– Flange 316L	PN 16, PN 40,150 lbs, 300 lbs, 600 lbs
– Flange with extension 316L	without PN specification, PN 16, PN 40 or 150 lbs, 300 lbs, 600 lbs
– Flange PVDF	PN 16

Product temperature standard version, depending on the meas. cell seal[10)]

– FKM (VP2/A)	-20 … +120 °C (-4 … +248 °F)
– EPDM (A+P 75.5/KW75F)	-40 … +120 °C (-40 … +248 °F), 1 h: 140 °C/284 °F cleaning temperature
– FFKM (Kalrez 6375)	-10 … +120 °C (+14 … +248 °F)
– FFKM (Chemraz 535)	-30 … +120 °C (-22 … +248 °F)

Product temperature version with extended temperature range, depending on the meas. cell seal as well as order specification

– FKM (VP2/A)	-20 … +150 °C (-4 … +302 °F)
– EPDM (A+P 75.5/KW75F)	-40 … +150 °C (-40 … +302 °F)

10) With process fitting PVDF, max. 100 °C (212 °F).

– FFKM (Kalrez 6375)	-10 … +150 °C (+14 … +302 °F)
– FFKM (Chemraz 535)	-30 … +150 °C (-22 … +302 °F)
Vibration resistance	mechanical vibrations with 4 g and 5 … 100 Hz[11]
Shock resistance	Acceleration 100 g/6 ms[12]

Electromechanical data - version IP 66/IP 67

Cable entry/plug[13]	
– 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)

[11] Tested according to the regulations of German Lloyd, GL directive 2.
[12] Tested according to EN 60068-2-27.
[13] Depending on the version M12 x 1, according to DIN 43650, Harting, 7/8" FF.

Electromechanical data - version IP 66/IP 68, 1 bar

Cable entry	
– Single chamber housing	• 1 x IP 68 cable gland M20 x 1.5; 1 x blind 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[14)]	
– 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 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)

14) 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 mm² (AWG 20)
– Wire resistance	< 0.036 Ω/m (0.011 Ω/ft)
– Standard length	5 m (16.40 ft)
– Max. length	180 m (590.5 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	12 … 36 V DC
– EEx-ia instrument	12 … 30 V DC
– Exd instrument	18 … 36 V DC
Operating voltage with lighted indicating and adjustment module	
– Non-Ex instrument	20 … 36 V DC
– EEx-ia instrument	20 … 30 V DC
– EEx-d-ia instrument	20 … 36 V DC
Permissible residual ripple	
– < 100 Hz	U_{ss} < 1 V
– 100 Hz … 10 kHz	U_{ss} < 10 mV
Load	see diagram

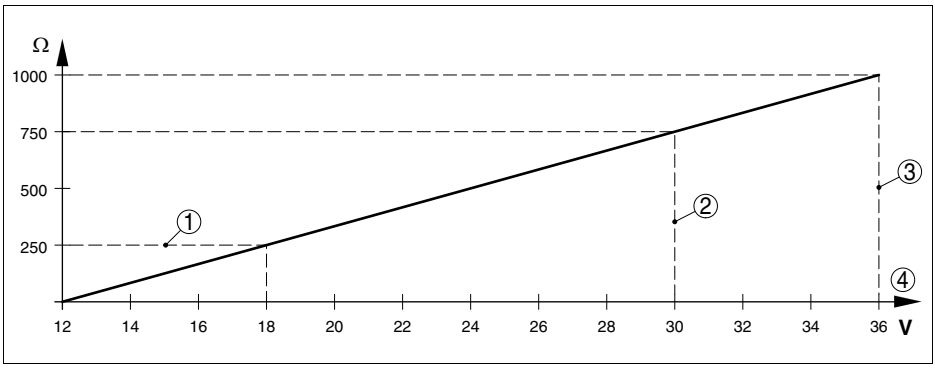

Fig. 30: Voltage diagram
1 HART load
2 Voltage limit EEx-ia instrument
3 Voltage limit non-Ex/Exd instrument
4 Operating voltage

Electrical protective measures

Protection class	
– Housing, standard	IP 66/IP 67[15]
– Aluminium and stainless housing (optionally available)	IP 68 (1 bar)[16]
– Transmitter in IP 68 version	IP 68
– External housing	IP 65
Overvoltage category	III
Protection class	II

Functional safety (SIL)

The functional safety is already activated Ex factory for instruments with SIL qualification. For instruments Ex factory without SIL qualification, the functional safety must be activated by the user for applications according to SIL via the indicating and adjustment module or via PACTware.

Functional safety according to IEC 61508-4	
– Single channel architecture (1oo1D)	up to SIL2
– double channel diversitary redundant architecture (1oo2D)	up to SIL3

[15] 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.
[16] Only with instruments with absolute pressure ranges.

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You can find detailed information in the supplied Safety Manual of the instrument series or under "www.vega.com", "*Downloads*", "*Approvals*".

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*".

10.2 Dimensions

Housing

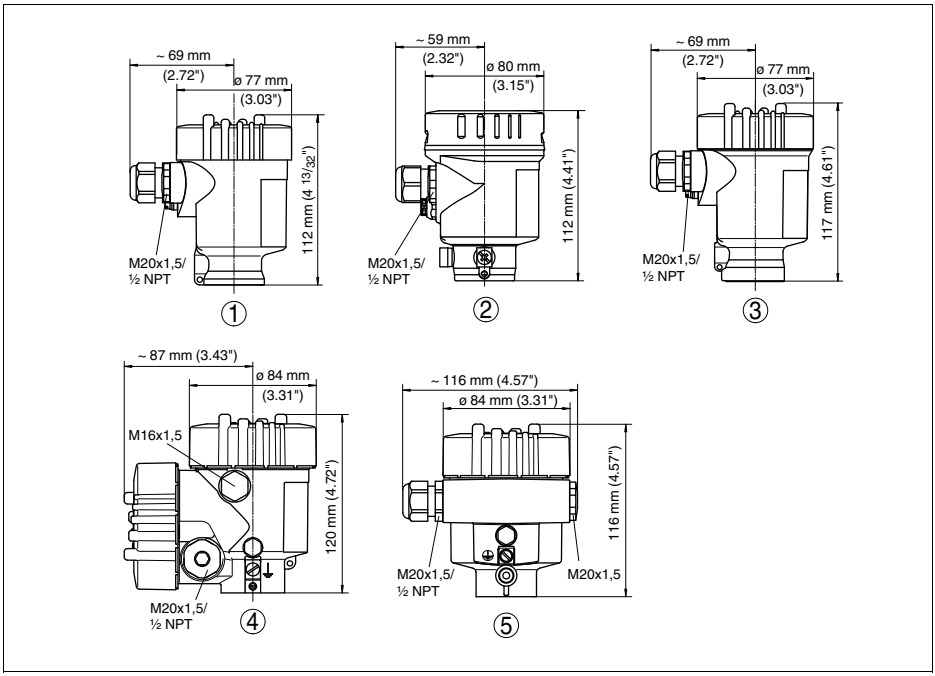


Fig. 31: Housing versions (with integrated PLICSCOM the housing is 9 mm/0.35 in higher)
1 Plastic housing
2 Stainless steel housing
3 Aluminium double chamber housing
4 Aluminium housing

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

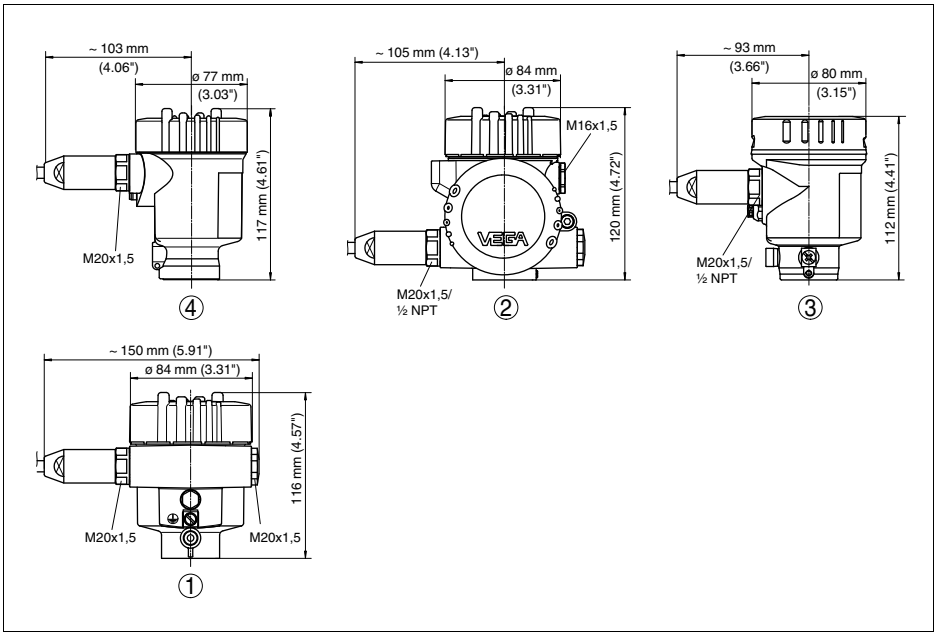


Fig. 32: Housing versions in protection IP 66/IP 68, 1 bar (with integrated indicating and adjustment module the housing is 9 mm/0.35 in higher)

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

External housing with IP 68 version

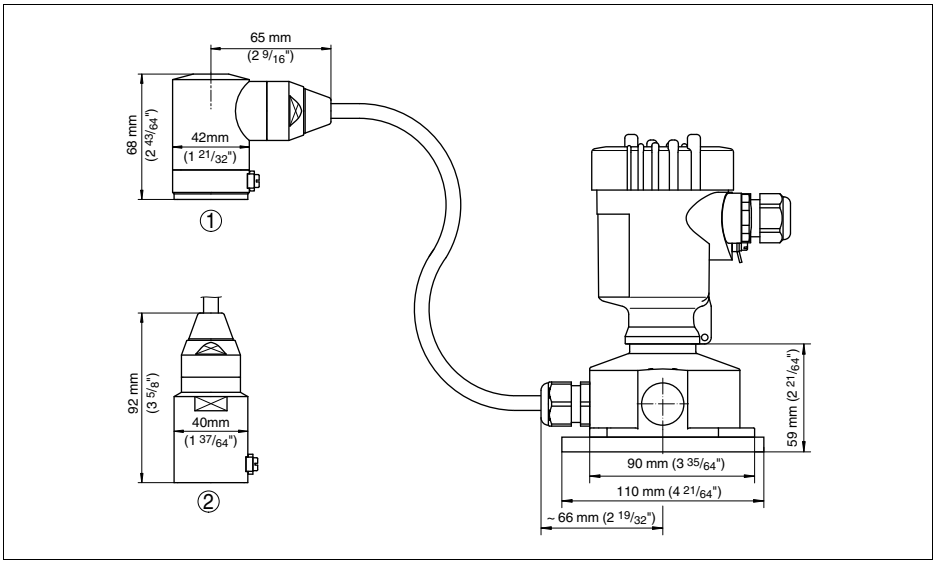


Fig. 33: IP 68 version with external housing - non-Ex
1 Lateral cable outlet
2 Axial cable outlet

VEGABAR 64 - threaded fitting 1

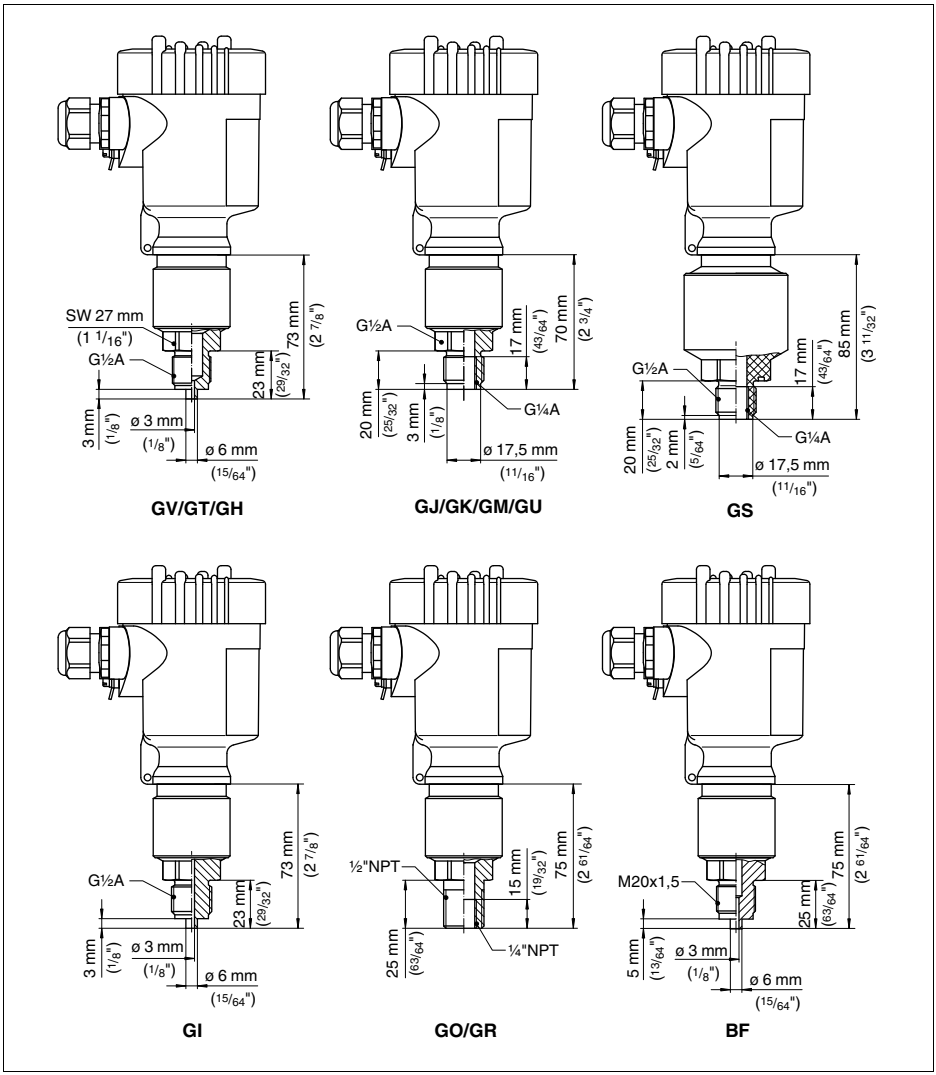


Fig. 34: VEGABAR 64 - threaded fitting: GV/GT/GH = G½ A manometer connection EN 837, GJ/GK/GM/GU = G½ A inner G¼ A, GS = G½ A inner G¼ A PVDF, GI = G½ A manometer connection volume-reduced, GO/GR = ½ NPT, BF = M20 x 1.5 manometer connection EN 837

VEGABAR 64 - threaded fitting 2

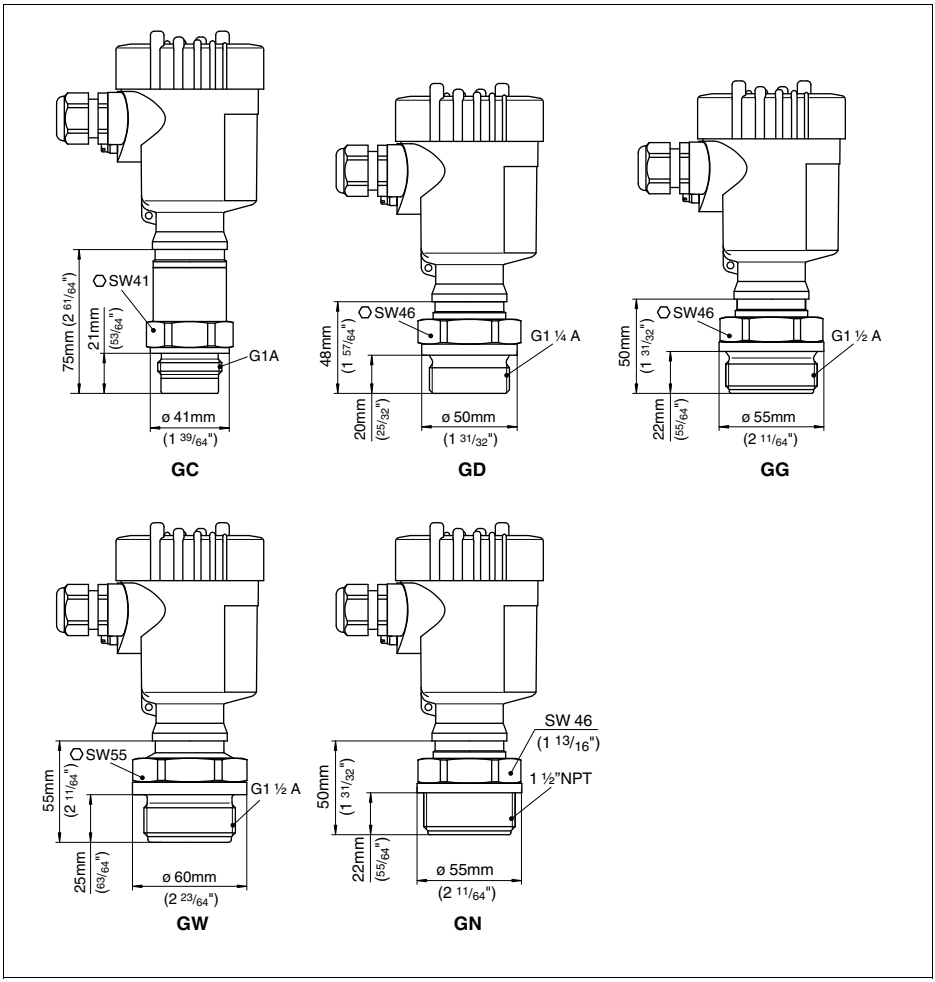


Fig. 35: VEGABAR 64 - threaded fitting: GC = G1 A, GD = G1¼ A, GG = G1½ A, GW = G1½ A PVDF, GE = G2 A, GN = 1½ NPT

For the version with temperature range up to 150 °C/302 °F, the measure of length increases by 28 mm (1.1 in).

VEGABAR 64 - hygienic fitting 1

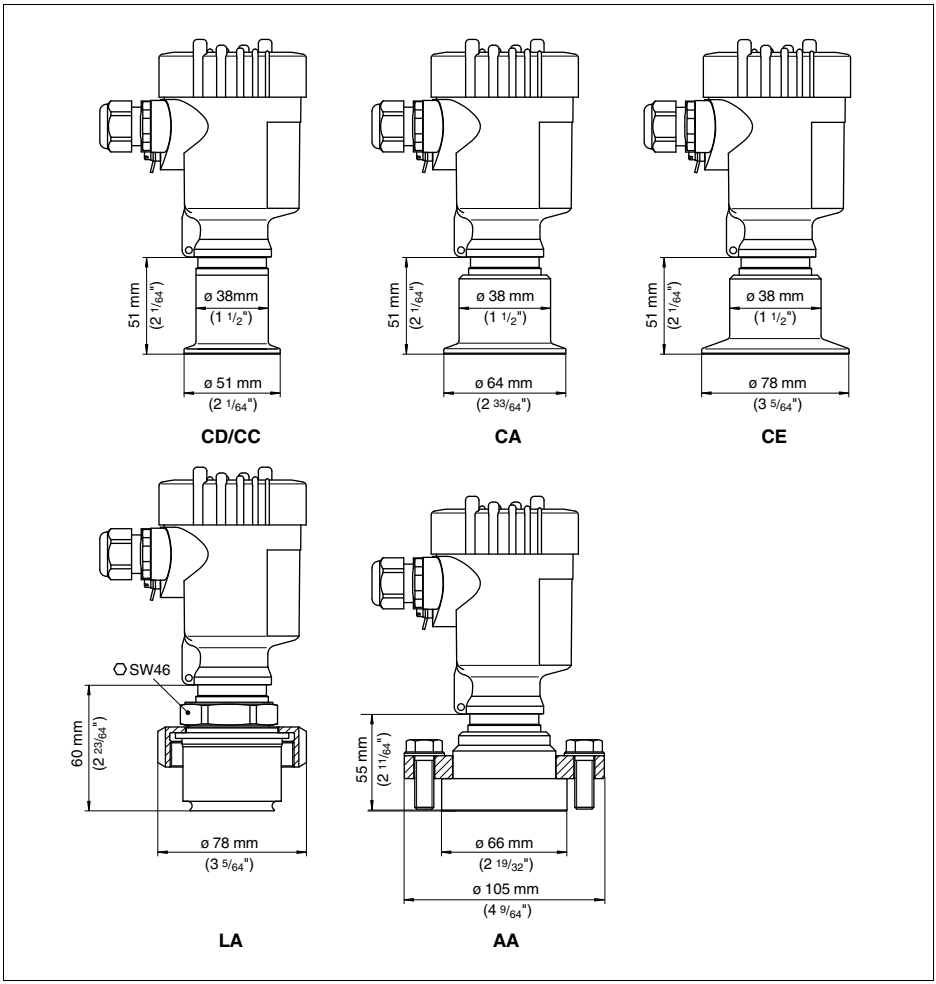


Fig. 36: VEGABAR 64 - hygienic fitting: CD/CC = Tri-Clamp 1"/Tri-Clamp 1½", CA = Tri-Clamp 2", CA = Tri-Clamp 2½", LA = hygienic fitting with compression nut F40, AA = DRD

VEGABAR 64 - hygienic fitting 2

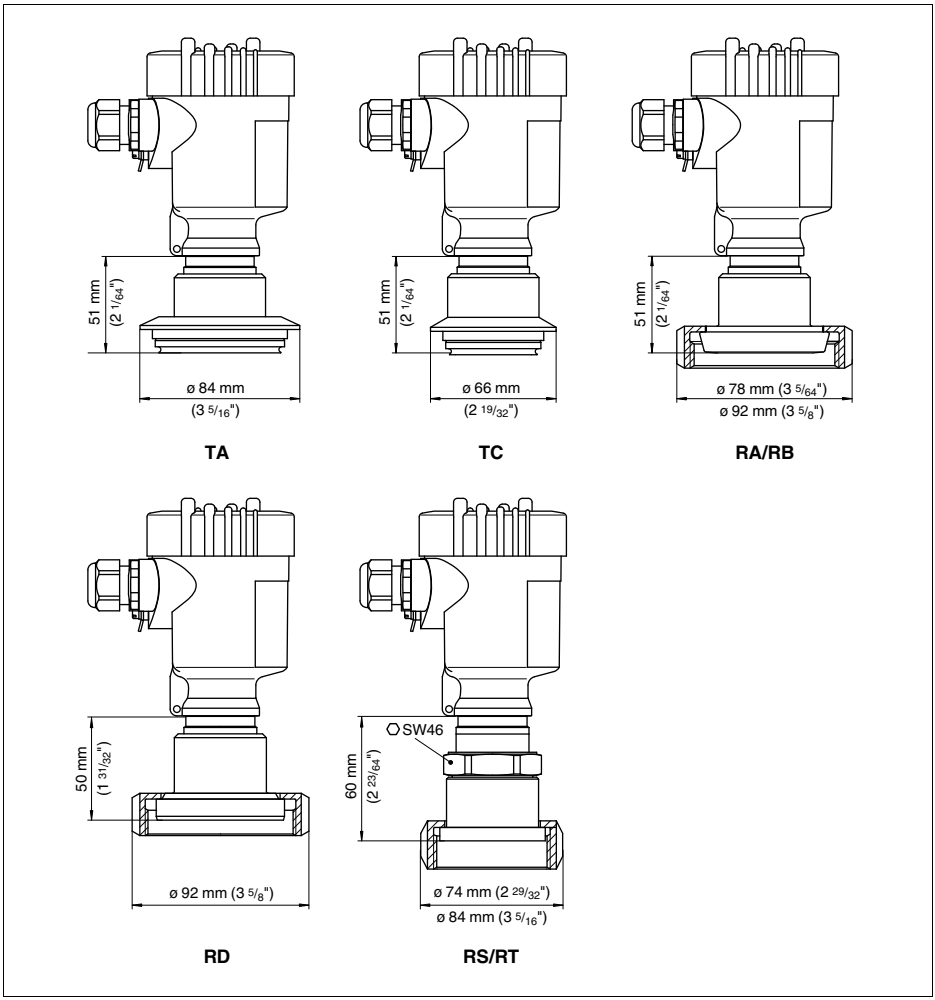
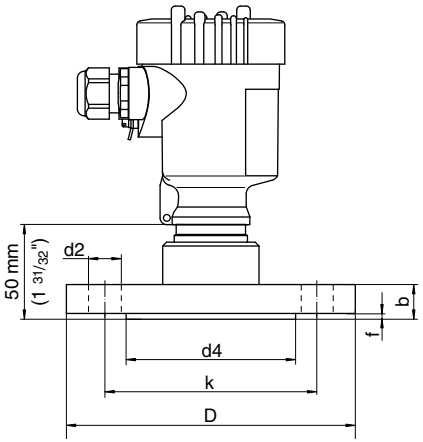


Fig. 37: VEGABAR 64 - hygienic fitting: TA = Tuchenhagen Varivent DN 32, TB = Tuchenhagen Varivent DN 25, RA/RB = bolting DN 40/DN 50 according to DIN 11851, RD = bolting DN 50 according to DIN 11864, RS/RT = SMS DN 38/DN 51

VEGABAR 64 - flange connection

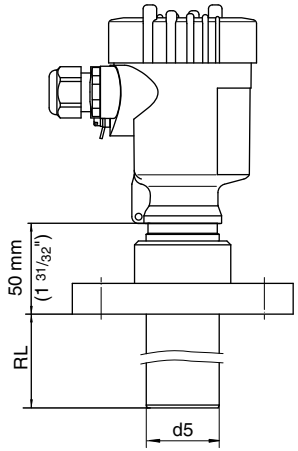


	mm	DN	PN	D	b	k	d2	d4	f
①	EA	40	40	150	18	110	4xø18	88	3
	FB	50	40	165	20	125	4xø18	102	3
	FE	80	40	200	24	160	8xø18	138	3
②	FH	50	300	6"	3/4"	4 3/4"	4xø 5/8"	3 5/8"	1/8"
	FI	80	300	7 1/2"	15/16"	6"	4xø 5/8"	5"	1/8"
	FD	300	40	460	28	410	12x ø26	380	3

	inch	DN	PN	D	b	k	d2	d4	f
①	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"
②	FH			6"	3/4"	4 3/4"	4xø 5/8"	3 5/8"	1/8"
	FI			7 1/2"	15/16"	6"	4xø 5/8"	5"	1/8"
	FD	4"	40	18 7/64"	1 7/64"	16 9/64"	12xø 45/64"	15"	1/8"

Fig. 38: VEGABAR 64 - flange connection
1 Flange connection according to DIN 2501
2 Flange fitting according to ANSI B16.5

VEGABAR 64 - flange connection with extension



EB, ED, EE, TK, IH, TV, TW

	mm	DN	PN	D	b	k	d2	d4	f	RL	d5
①	EB	40	40	150	18	110	4xø18	88	3	③	38
	ED	50	40	165	20	125	4xø18	102	3		38
	EE	80	40	200	24	160	8xø18	138	3		38
	TK	100	16	220	20	180	8xø18	158	3		38
	inch										
	EB	40	40	5 29/32"	45/64"	4 21/64"	4xø 45/64"	3 15/32"	1/8"	③	1 1/2"
	ED	50	40	6 1/2"	25/32"	4 59/64"	4xø 45/64"	4 1/64"	1/8"		1 1/2"
	EE	80	40	7 7/8"	15/16"	6 19/64"	8xø 45/64"	5 7/16"	1/8"		1 1/2"
	TK	100	16	8 21/32"	25/32"	7 3/32"	8xø 45/64"	6 7/32"	1/8"		1 1/2"
②	IH	2" 150 lbs		6"	3/4"	4 3/4"	4xø 3/4"	3 5/8"	1/8"	③	1 1/2"
	TV	3" 150 lbs		7 1/2"	15/16"	6"	4xø 3/4"	5"	1/8"		1 1/2"
	TW	4" 150 lbs		9"	15/16"	7 1/2"	4xø 3/4"	6 3/16"	1/8"		1 1/2"

Fig. 39: VEGABAR 64 - flange connection with extension
1 Flange connection according to DIN 2501
2 Flange fitting according to ANSI B16.5
3 Order-specific

VEGABAR 64 - threaded fitting for paper industry

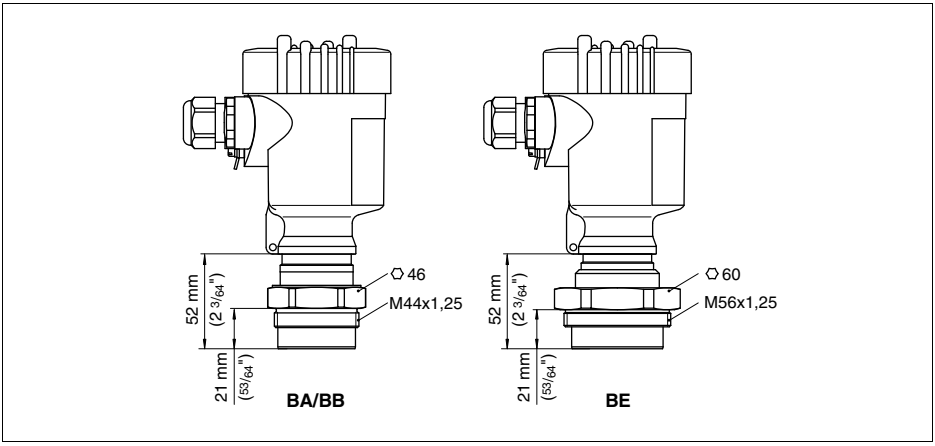


Fig. 40: VEGABAR 64 - threaded fitting for the paper industry: BA/BB = M44 x 1,25, BE = M56 x 1,25

VEGABAR 64 - extension fitting for paper industry

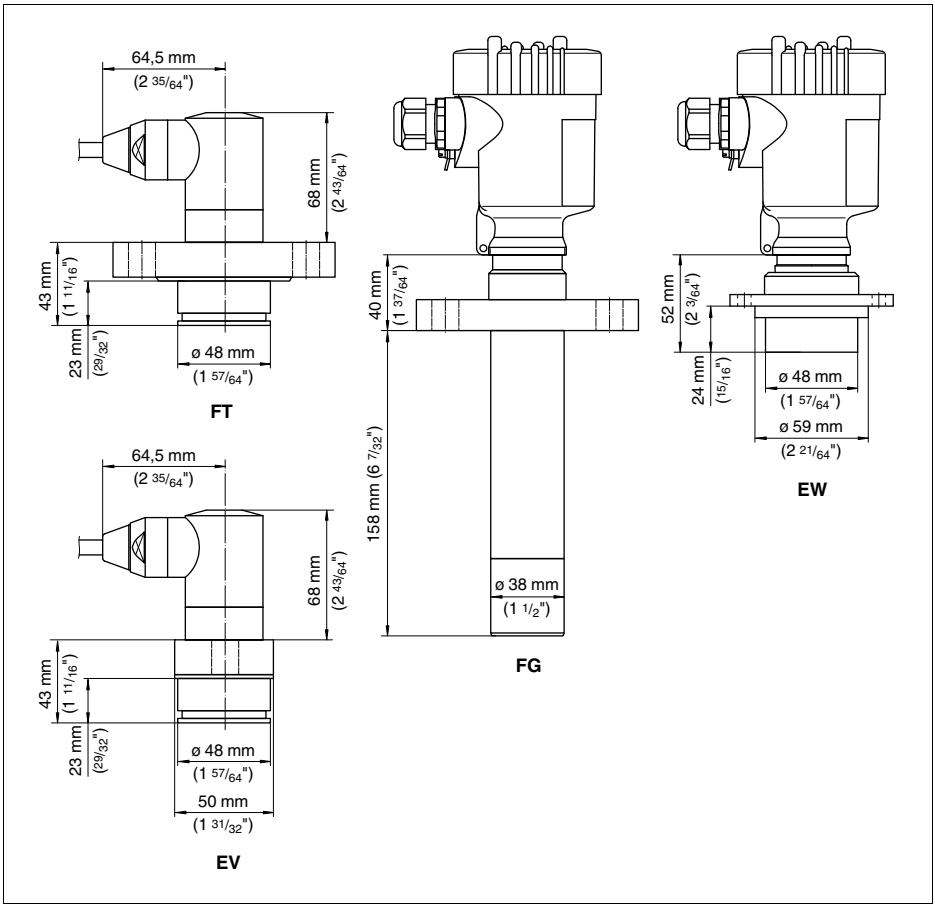


Fig. 41: VEGABAR 64 - extension fitting for paper industry: EV/FT = absolutely flush for pulper (EV: flange 2-times flattened), FG = extension for ball valve fitting, EW = flange for manometer lug

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VEGA Grieshaber KG
Am Hohenstein 113
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Germany
Phone +49 7836 50-0
Fax +49 7836 50-201
E-mail: info@de.vega.com
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