Operating Instructions

VEGABAR 51

Profibus PA

Document ID:
36714

Process pressure/
Hydrostatic

Contents

36714-EN-091008

Supplementary documentation

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

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1 About this document

1.1 Function

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

1.2 Target group

This operating instructions manual is directed to trained 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 51 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 label on the instrument

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

2.6 CE conformity

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

2.7 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 to DTM VEGABAR 51
- DTM VEGABAR 51 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.

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 Safety instructions for oxygen applications

For instruments in oxygen applications the special instructions in chapters "*Storage and transport*", "*Mounting*" as well as "*Technical data*" under "*Process conditions*"must be noted. Furthermore the valid national regulations, implementation instructions and memorandums of the BG (professional assoc.) must be noted.

2.10 Environmental instructions

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

Please help us 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 51 pressure transmitter
- 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 51 consists of the components:

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

The components are available in different versions.

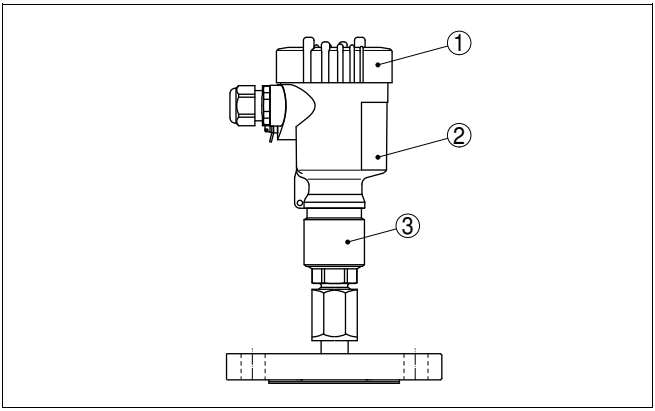

Fig. 1: Example of a VEGABAR 51 with flange connection DN 50 PN 40 and plastic housing

1 Housing cover with integrated indicating and adjustment module (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:

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- Instrument type
- Article number instrument
- Technical data: Measuring range, process pressure, process temperature, signal output, voltage supply, protection, protection class
- Order number
- Article numbers, documentation
- Serial number

The serial number allows you to 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.

Supplementary label "Oil and grease-free for oxygen applications"

Instruments in the version "*Oil and grease-free for oxygen applications*" are equipped with a supplementary label. The supplementary label contains instructions on oil and grease-free parts of the instrument.

3.2 Principle of operation

Application area

The VEGABAR 51 is a pressure transmitter with isolating diaphragm for pressure measurement of highly corrosive and hot liquids.

Functional principle

The sensor element for measuring ranges up to 60 bar is the CERTEC® measuring cell with rugged ceramic diaphragm. The hydrostatic pressure of the product or the process pressure causes a capacitance change in the measuring cell via the metal process diaphragm and the isolating system. This change is converted into a corresponding output signal.[1)]

The sensor element for measuring ranges from 100 bar is a wire strain gauge (DMS) on the rear of the process diaphragm. There, the process pressure causes a resistance change, which is converted into an appropriate output signal.

Power supply and bus communication

Power supply via the Profibus DP/PA segment coupler or VEGALOG 571 EP cards. A two-wire cable according to Profibus specification serves as carrier of both power and digital data transmission for multiple sensors. The instrument profile of VEGABAR 51 corresponds to profile specification version 3.0.

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*".

1) The isolating system protects the sensor against corrosive products and high temperatures. By selecting suitable diaphragm materials and isolating liquids, systems with a temperature resistance up to 400 °C (752 °F) can be achieved.

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.

GSD/EDD

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

3.3 Operation

VEGABAR 51 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 the adjustment program PDM

3.4 Packaging, transport and storage

Packaging

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

Caution:
Instruments for oxygen applications are sealed in PE foil and provided with a label "Oxygen! Use no Oil". Remove this foil just before mounting the instrument! See instruction under "*Mounting*".

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.

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Storage

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

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

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

Storage and transport temperature

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

3.5 Accessory and replacement parts

Indicating and adjustment module

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

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

Interface adapter

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

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

External indicating and adjustment units

VEGADIS 61 is suitable for external measured value indication and adjustment of plics® sensors. It is connected to the sensor with an up to 50 m long, four-wire, screened standard cable.

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

VEGADIS 62 is suitable for measured value indication and adjustment of sensors with HART protocol. It is looped into the 4 … 20 mA/HART signal cable.

You find further information in the operating instructions "*VEGADIS 62*" (Document-ID 36469).

Flanges

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

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

Protective cover

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

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

Electronics module

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

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

4 Mounting

4.1 General instructions

Suitability for the process conditions

Make sure that all parts of the instrument exposed to the process, in particular the sensor element, process seal and process fitting, are suitable for the existing process conditions. These include above all the process pressure, process temperature as well as the chemical properties of the medium.

You can find the specifications in chapter "*Technical data*" or on the type label.

Diaphragm protection

Caution:
After removal of the diaphragm protective cover, the diaphragm must not be pressed.

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.

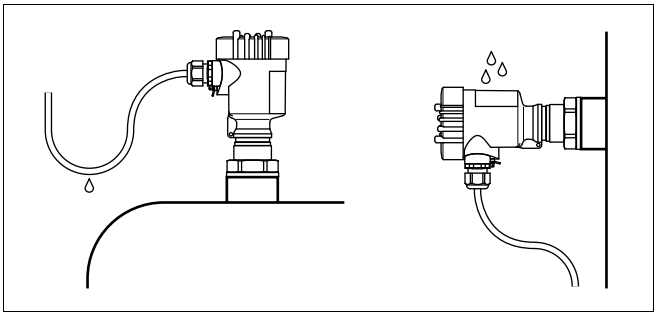


Fig. 2: Measures against moisture penetration

Ventilation and pressure compensation

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

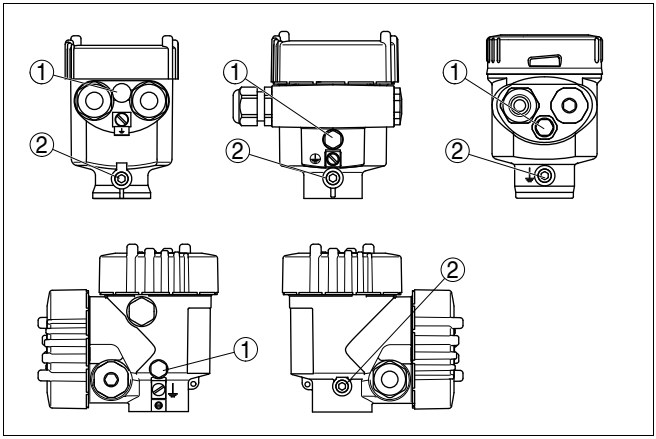


Fig. 3: Position of the filter element. Upper row single chamber housing, lower row double chamber housing

1 Filter element
2 Blind stopper

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

Information:
Make sure that the filter element is always free of buildup during operation. A high-pressure cleaner 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 permanently connected cable. The filter element is replaced by a blind stopper.

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.

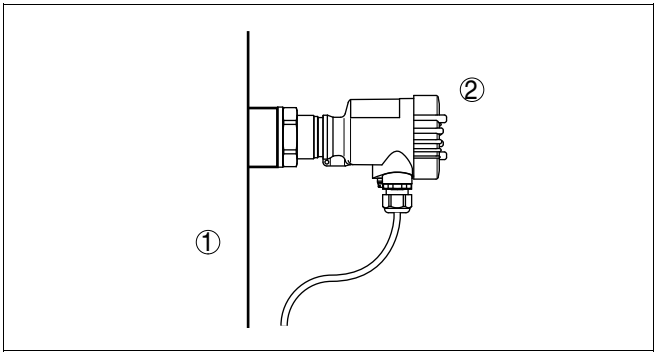


Fig. 4: Temperature ranges

1 Process temperature
2 Ambient temperature

Oxygen applications

Danger:
Instruments in the version "*Oil and grease free for oxygen*" should be unpacked just before mounting. After the protective cover of the process fitting has been removed, the label "O_2" on the process fitting is visible. Contamination by oil, grease and dirt should be avoided. Danger of explosion!

4.2 Mounting steps

Welding the socket

For mounting VEGABAR 51, 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 51 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 51 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, tube isolating diaphragm

The isolating systems are temperature and pressure-aged at 80 °C and 18 bar. The zero point is adjusted at 22 °C ±2 °C and a torque of 275 Nm. The defined installation position is: Tube isolating diaphragm horizontally, VEGABAR 51 vertically.

For installation, proceed as follows:

1 Position VEGABAR 51 with tube isolating diaphragm

2 Tighten the threaded fittings step-by-step once on the right and on the left

3 Hold VEGABAR 51, to avoid distortion from the defined installation position.

Caution:
Apart from mounting, the tube isolating diaphragm must not be permanently under torsion.

4 Check current after mounting. The current must be between 3.9 and 4.1 mA. In case of a deviating value, losen threaded fitting and mount again.

Information:
By slightly increasing or reducing the torque, the current can be set exactly to 20 mA.

4.4 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

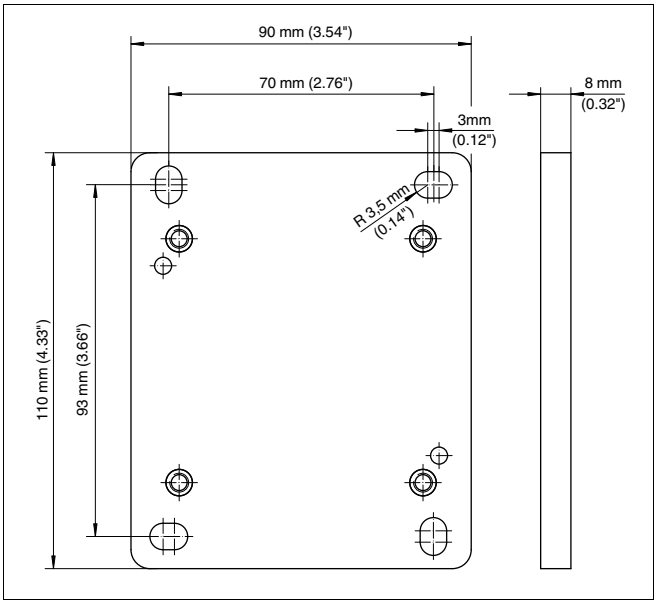


Fig. 5: Drilling template - wall mounting plate

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

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 Profibus specifications

Tip:
We recommend VEGA overvoltage arrester B63-32.

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

Power supply

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

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

Connection cable

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

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

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

Cable gland ½ NPT

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

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

Cable screening and grounding

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).

In systems without potential equalisation, connect the cable screen directly to ground potential at the power supply unit and at the sensor. In the connection box or T-distributor, the screen of the short stub to the sensor must not be connected to ground potential or to another cable screen. The cable screens to the power supply unit and to the next distributor must be connected to each other and also connected to ground potential via a ceramic capacitor (e.g. 1 nF, 1500 V). The low frequency potential equalisation currents are thus suppressed, but the protective effect against high frequency interference signals remains.

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

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

5.2 Connection procedure

Single/Double chamber housing

Proceed as follows:

1 Unscrew the housing cover
2 If 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.

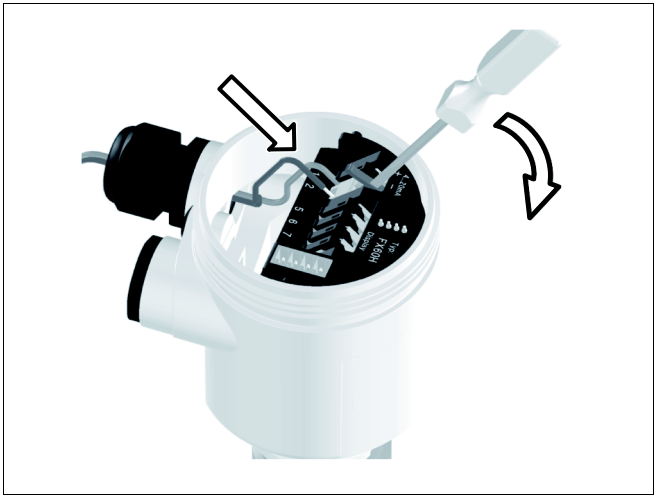


Fig. 6: Connection steps 6 and 7

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

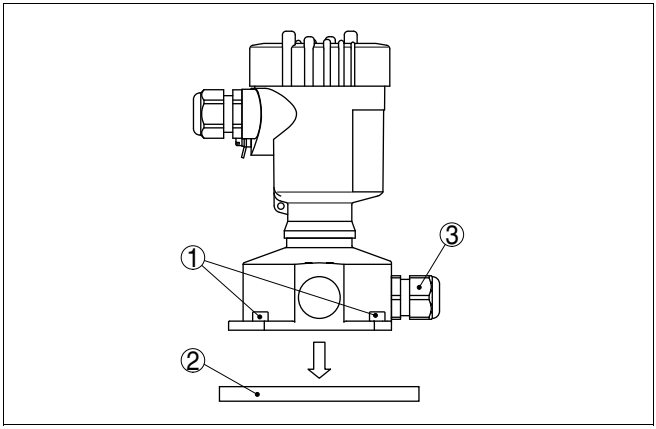


Fig. 7: Components of the external housing

1 Screw
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.

Electronics and connection compartment

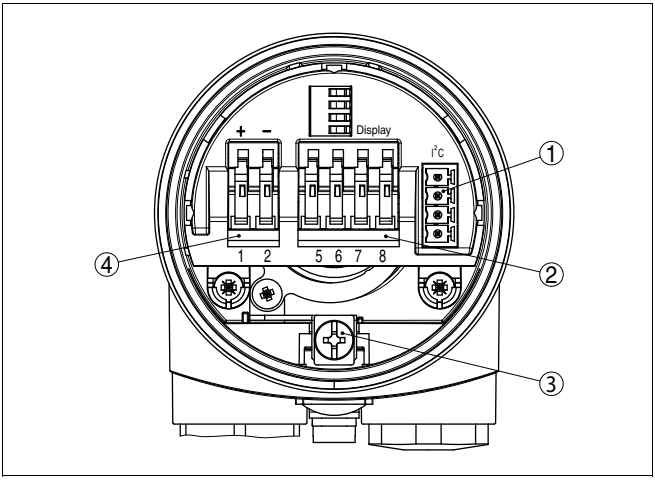


Fig. 8: Electronics and connection compartment, single chamber housing

1 Plug connector for VEGACONNECT (I²C interface)
2 Spring-loaded terminals for connection of the external indication VEGADIS 61
3 Ground terminal for connection of the cable screen
4 Spring-loaded terminals for voltage supply

Wiring plan

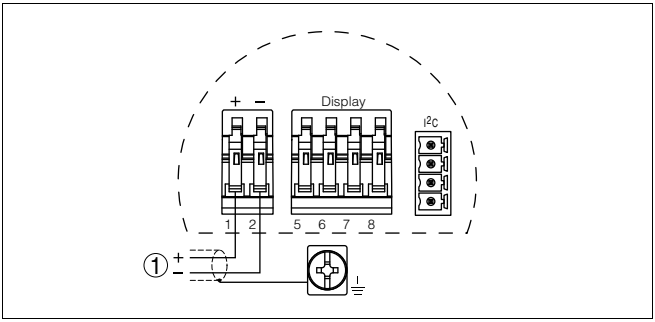


Fig. 9: Wiring plan, single chamber housing

1 Voltage supply/Signal output

5.4 Wiring plan, double chamber housing

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

Electronics compartment

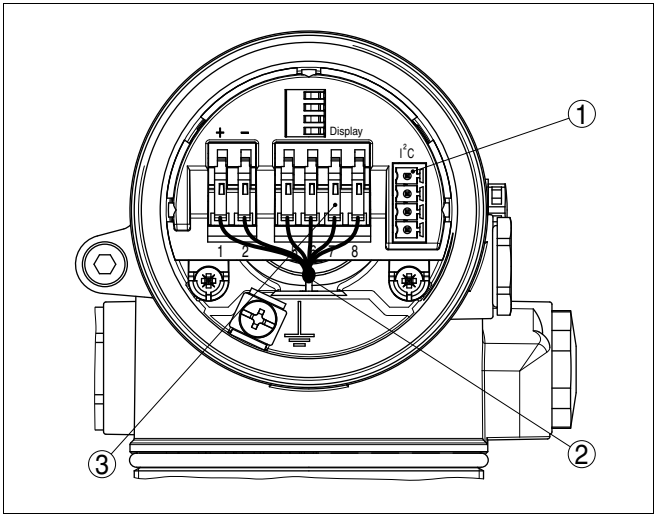


Fig. 10: Electronics compartment, double chamber housing

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

Connection compartment

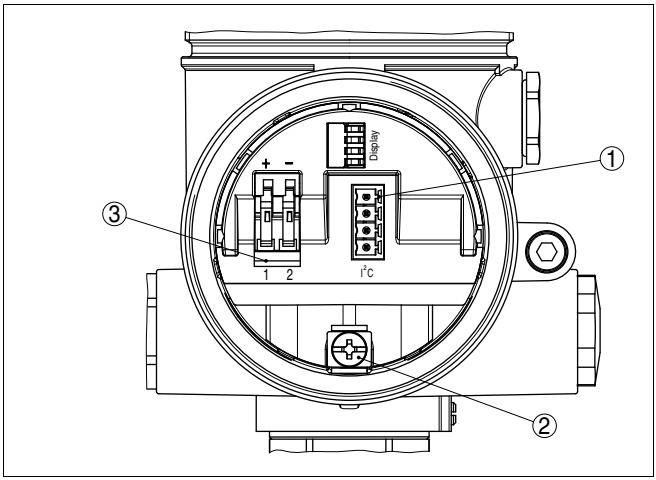


Fig. 11: Connection compartment, double chamber housing

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

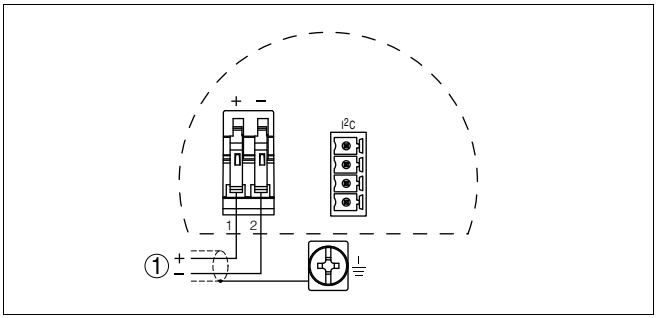


Fig. 12: Wiring plan with double chamber housing

1 Voltage supply/Signal output

5.5 Wiring plan double chamber housing Ex d

Electronics compartment

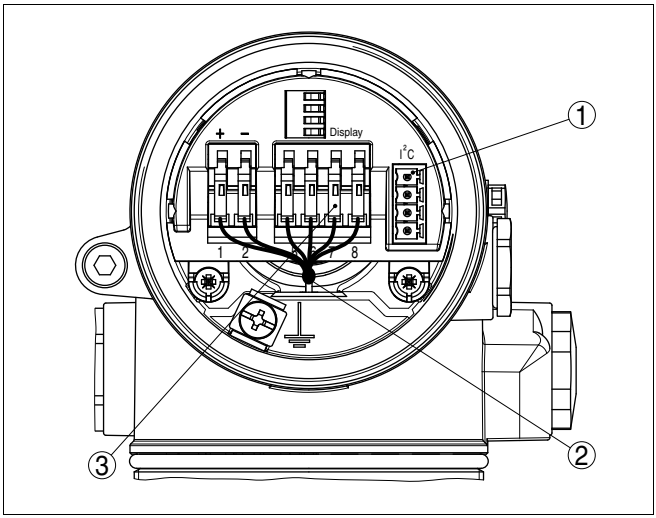


Fig. 13: Electronics compartment, double chamber housing

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

Connection compartment

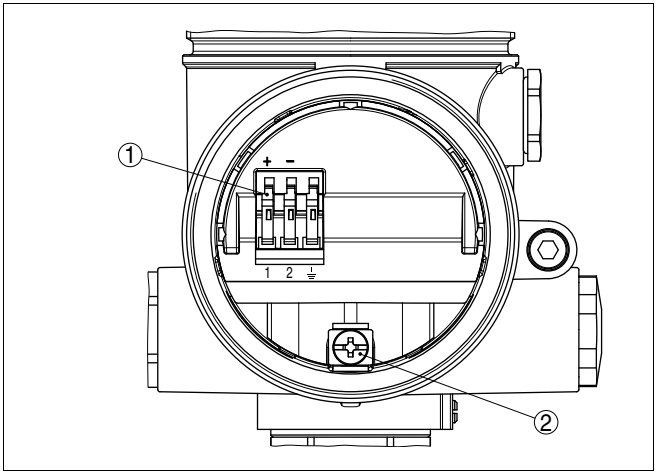


Fig. 14: Connection compartment double chamber housing Ex d

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

Wiring plan

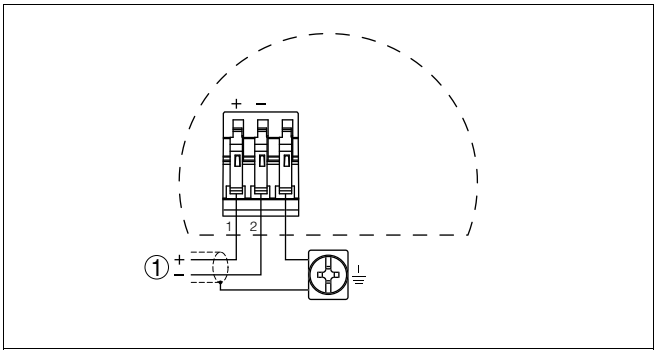


Fig. 15: Wiring plan double chamber housing Ex d

1 Voltage supply/Signal output

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

Wire assignment, connection cable

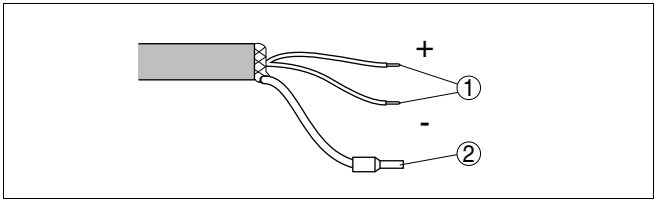


Fig. 16: Wire assignment, connection cable

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

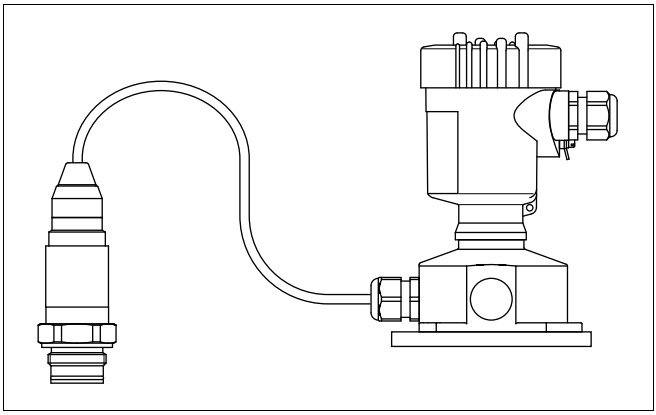


Fig. 17: VEGABAR 51 in IP 68 version 25 bar and axial cable outlet, external housing

Electronics and connection compartment for power supply

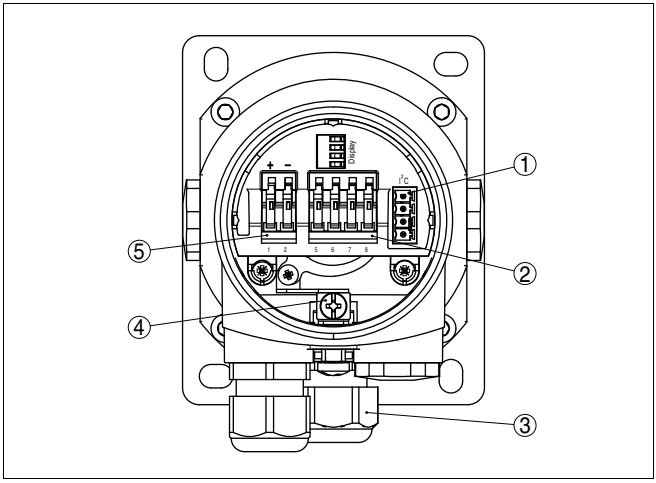


Fig. 18: Electronics and connection compartment

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

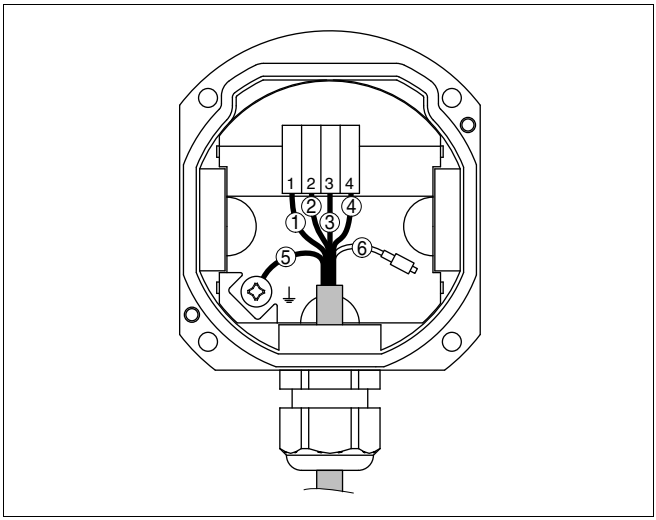


Fig. 19: Connection of the sensor in the housing socket

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

Wiring plan external electronics

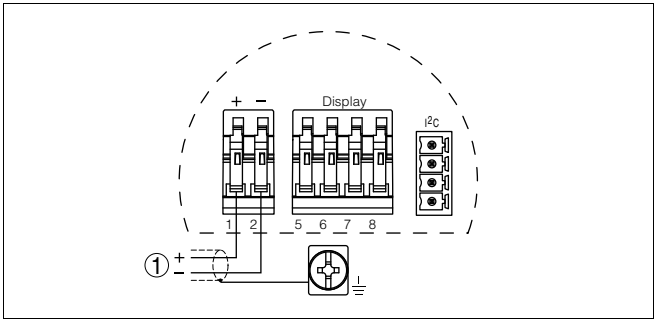


Fig. 20: Wiring plan external electronics

1 Power supply

5.8 Switch on phase

Switch on phase

After VEGABAR 51 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.

36714-EN-091008

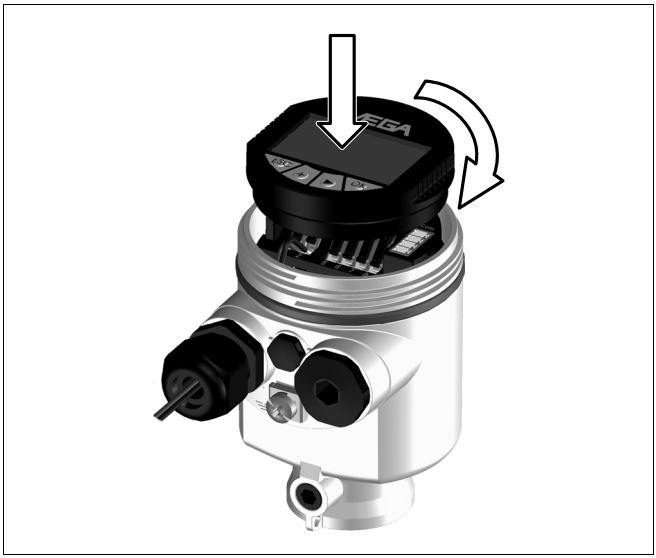


Fig. 21: Insert indicating and adjustment module

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

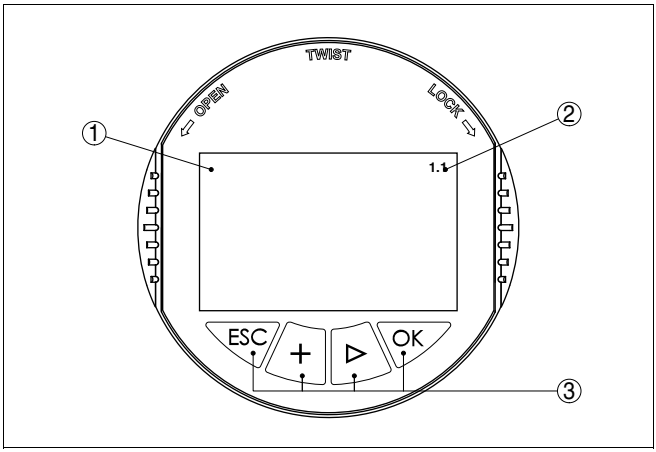


Fig. 22: Indicating and adjustment elements

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

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

Level or process pressure measurement

VEGABAR 51 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 51 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.

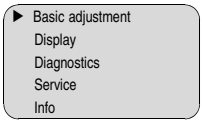
The actual measured value is also displayed in the menu items for min./max. adjustment.

Select unit

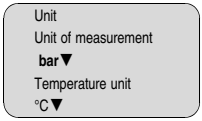
In this menu item you select the adjustment unit as well as the unit for the temperature indication in the display.

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.



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



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

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

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

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

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

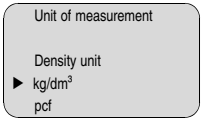
Proceed as follows:

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

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

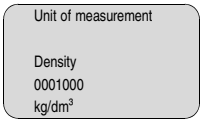
3 Activate the selection with ***[OK]*** and select the requested unit with ***[->]*** (in the example m).

4 Confirm with ***[OK]***, the submenu "*Density unit*" appears.



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

[4)] 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 thus 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).

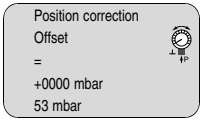
→ Confirm with ***[OK]***.

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

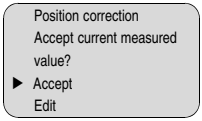
Carry out position correction

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.

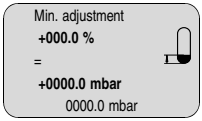


3 Confirm with ***[OK]*** and move to min.(zero) adjustment with ***[->]***.

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]***.

[5)] Selection options: °C, °F.

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

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

The min. adjustment is finished.

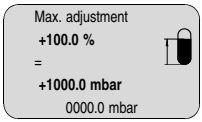
Information:
For an adjustment with filling, simply enter the actual measured value indicated at the bottom of the display.

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

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, simply enter the actual measured value indicated at the bottom of the display.

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

Process pressure measurement

Parameter adjustment "Process pressure measurement"

Set up VEGABAR 51 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.

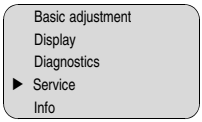
The actual measured value is displayed in addition to the menu items for zero/span adjustment.

Select application "Process pressure measurement"

VEGABAR 51 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]***.

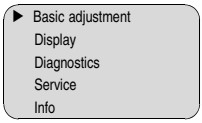
5 Select "*Process pressure*" from the list and confirm with ***[OK]***.

Select unit

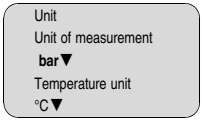
In this menu item you select the adjustment unit as well as the unit for the temperature indication in the display.

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.



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



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

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

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

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

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).

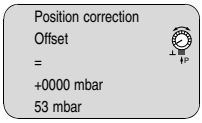
→ Confirm with ***[OK]***.

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

Carry out position correction

Proceed as follows:

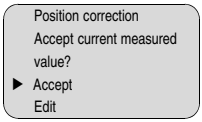
1 Activate in the menu item "*Position correction*" the selection with ***[OK]***.



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

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

[7)] Selection options: °C, °F.

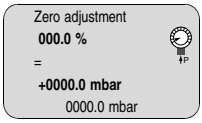


3 Confirm with ***[OK]*** and move to min.(zero) adjustment with ***[->]***.

Carrying out zero adjustment

Proceed as follows:

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



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

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

The zero adjustment is finished.

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

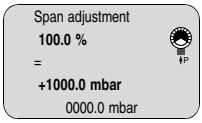
Information:
For an adjustment with pressure, simply enter the actual measured value indicated at the bottom of the display.

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]***.

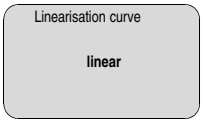
The span adjustment is finished.

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

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

Linearisation curve

A linearization is necessary for all vessels in which the vessel volume does not increase linearly with the level - e. g. in a horizontal cylindrical or spherical tank - and the indication or output of the volume is required. Corresponding 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 51 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*".

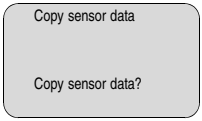
The following data are read out or written with this function:

- Measured value presentation
- Adjustment
- Damping
- Linearisation curve
- Sensor-TAG

- Displayed value
- Scaling unit (Out-Scale unit)
- Positions after the decimal point (scaled)
- Scaling PA/Out-Scale 4 values
- Unit of measurement
- Language

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

- Sensor address
- PIN
- Application



Reset

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	Sensor address	126
	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	PA-Out
Service	Additional PA value	Secondary Value 1
	Out-Scale-Unit	Volume/l
	Scaling	0.00 to 100.0
	Decimal point indication	8888.8

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

Menu section	Function	Reset value
Basic settings	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, in addition, special parameters are reset to default values.[9)]

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

Optional settings

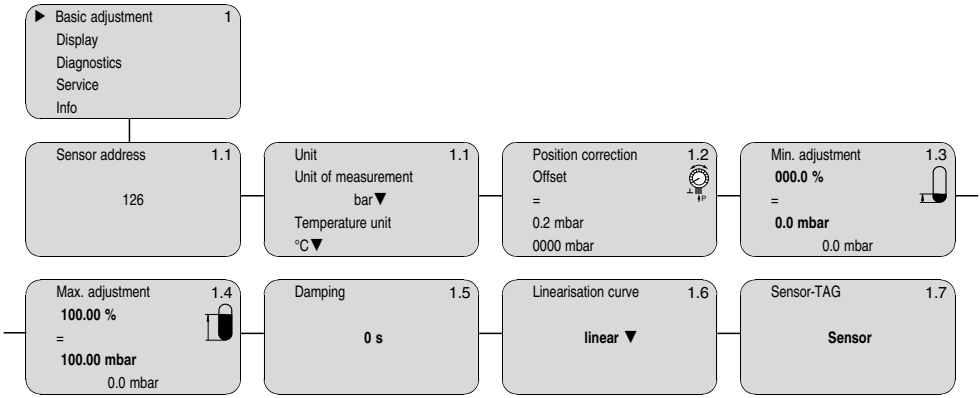
Additional adjustment and diagnosis options such as e.g. scaling, simulation or trend curve presentation are shown in the following menu schematic. You will find a detailed description of these menu items in the operating instructions manual "*Indicating and adjustment module*".

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

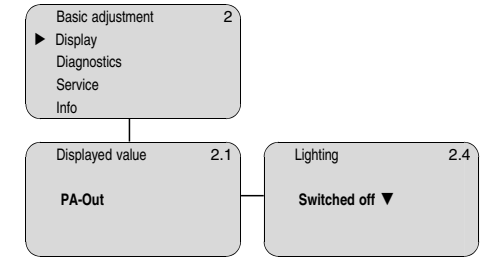
6.5 Menu schematic

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

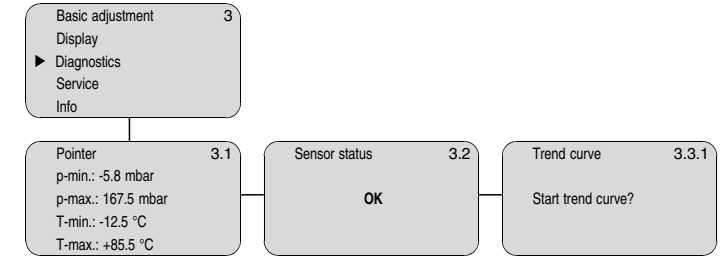
Basic adjustment



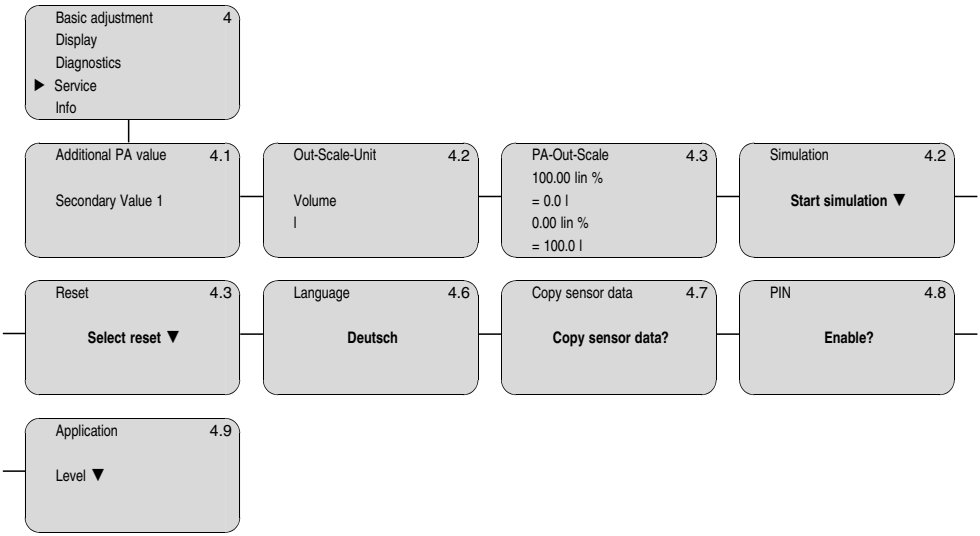
Display



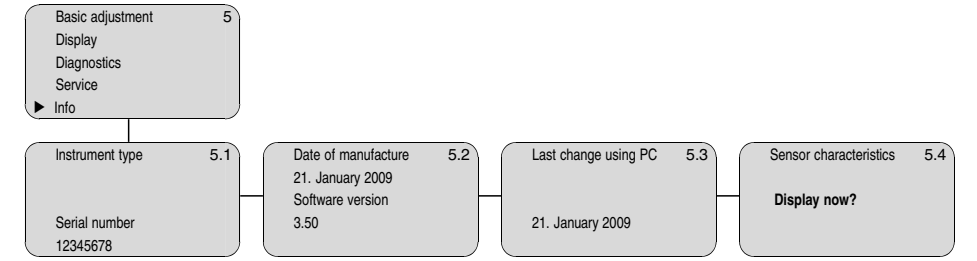
Diagnostics



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 51 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 Connect the PC via VEGACONNECT

VEGACONNECT directly on the sensor

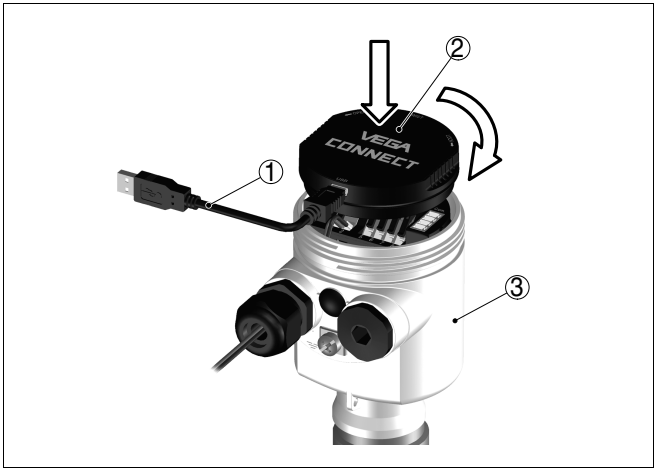


Fig. 23: Connection of the PC via VEGACONNECT directly to the sensor

1 USB cable to the PC
2 VEGACONNECT
3 Sensor

VEGACONNECT externally

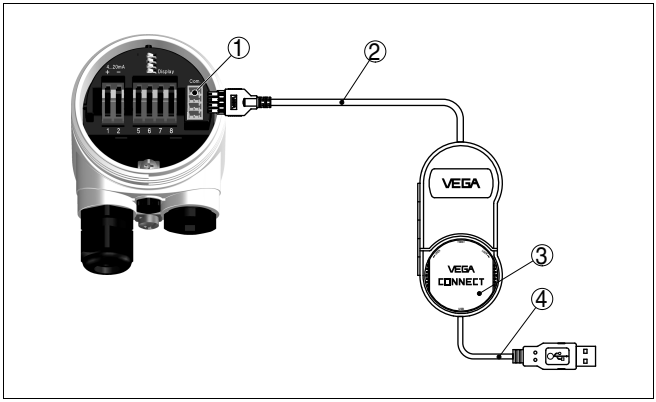


Fig. 24: Connection via VEGACONNECT externally

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

Necessary components:

- VEGABAR 51
- 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 51, DTM-Collection in the actual version must be used.

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

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

7.3 Parameter adjustment with PDM

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

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

7.4 Saving the parameter adjustment data

It is recommended to document or save the parameter adjustment data. 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 the instrument is used properly, no special maintenance is required in normal operation.

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

Cleaning

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

Caution:
Never clean the separating diaphragm mechanical, for example with tools when using instruments with isolating diaphragms! This can damage the diaphragm and filling oil can penetrate.

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

VEGABAR 51 offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Voltage supply
- Signal processing

Fault rectification

The first measures to be taken are to check the output signals as well as to evaluate the error messages via the 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 this way and faults 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**.

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

Checking Profibus PA

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

- Max. supply current of the segment coupler exceeded

→ Measure the current consumption, reduce size of segment

? Wrong presentation of the measured value in Simatic S5

- Simatic S5 cannot interpret the number format IEEE of the measured value

→ Insert converting component from Siemens

? In Simatic S7 the measured value is always presented as 0

- Only four bytes are consistently loaded in the PLC

→ Use function component SFC 14 to load 5 bytes consistently

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

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

→ Check values and correct, if necessary

? No connection between PLC and PA network

- Incorrect adjustment of the bus parameter and the segment coupler-dependent baud rate

→ Check data and correct, if necessary

? Instrument does not appear during connection setup

- Profibus DP cable pole-reversed

→ Check cable and correct, if necessary

- Incorrect termination

→ Check termination at the beginning and end points of the bus and terminate, if necessary, according to the specification

- Instrument not connected to the segment, double assignment of an address

→ Check and correct, if necessary

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

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

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.

8.3 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 51 or on the delivery note.

8.4 Software update

The software version of VEGABAR 51 can be determined as follows:

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

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

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

The following components are required to update the sensor software:

- Sensor
- 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. The additional files are installed automatically. Depending on the sensor, this procedure lasts approximately 1 h.

8.5 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 Dismount

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	
Pressure type	Gauge pressure or gauge pressure
Measuring principle	Depending on the measuring range ceramic-capacitive or strain gauge (DMS), each with isolating system
Communication interface	I^2C bus

Materials and weights	
Material 316L corresponds to 1.4404 or 1.4435	
Materials, wetted parts	
– Process fitting	316L
– Diaphragm	316L, Hastelloy C276, Hastelloy C2, Tantalum, Titanium, PTFE on 316Ti, 316L with gold-coating, Hastelloy C4
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 ring, 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	digital output signal, format according to IEEE-754
Sensor address	126 (default setting)
Current value	10 mA, ±0.5 mA

Dynamic behaviour output

Run-up time approx.	10 s

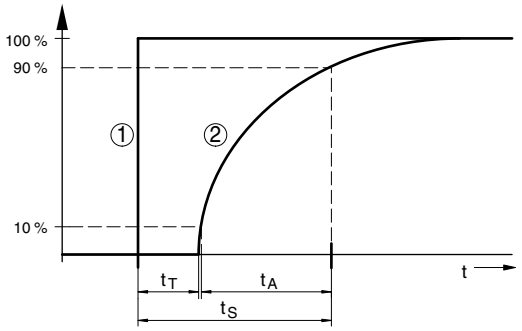

Fig. 25: Sudden change of the process variable, dead time t_T, rise time t_A and step response time t_S

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 %)

To this amounts the reaction time of the isolatng system. This time varies from values < 1 s with compact isolating diaphragms up to several seconds with capillary systems.

Example: Flange isolating diaphragm DN 80, filling silicone oil KN 2.2, capillary length 10 m, measuring range 1 bar

Process temperature	Reaction time
40 °C	approx. 2 s
20 °C	approx. 3 s
-20 °C	approx. 11 s

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

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 %

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- Span -120 … +120 % [11)]
- Difference between zero and span max. 120 % of the nominal range

Adjustment range with measuring ranges from 100 bar, relating to the nominal measuring range:

- zero/Min. -5 … +95 %
- span/Max. -5 … +105 %

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

Nominal measuring ranges and overload resistance

Nominal range	Overload capacity, max. pressure	Overload capacity, min. pressure
Gauge pressure		
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 … 100 bar/0 … 10 MPa	200 bar/20000 kPa	-1 bar/-100 kPa
0 … 250 bar/0 … 25 MPa	500 bar/50 MPa	-1 bar/-100 kPa
0 … 400 bar/0 … 40 MPa	800 bar/80 MPa	-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
-0.2 … 0.2 bar/-20 … 20 kPa	30 bar/3000 kPa	-1 bar/-100 kPa
-0.5 … 0.5 bar/-50 … 50 kPa	35 bar/3500 kPa	-1 bar/-100 kPa
0 … 2.5 bar/0 … 250 kPa	50 bar/5000 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.
0 … 60 bar/0 … 6000 kPa	200 bar/20000 kPa	0 bar abs.
0 … 100 bar/0 … 10 MPa	200 bar/20000 kPa	0 bar abs.
0 … 400 bar/0 … 40 MPa	800 bar/80000 kPa	0 bar abs.

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

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

Reference conditions according to DIN EN 61298-1

– Temperature	+18 … +30 °C (+64 … +86 °F)
– Relative humidity	45 … 75 %
– Air pressure	860 … 1060 mbar/86 … 106 kPa (12.5 … 15.4 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	depending on the isolating diaphragm version

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) = nominal measuring range/set span.

Deviation

– Turn down 1 : 1	< 0.2 %
– Turn down up to 5 : 1	< 0.2 %
– Turn down up to 10 : 1	< 0.3 %

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.

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

Ambient conditions

Ambient, storage and transport temperature

– Standard version	-40 … +80 °C (-40 … +176 °F)

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

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– Version for oxygen applications[13)]	-40 … +60 °C (-40 … +140 °F)
– Versions IP 66/IP 68, 1 bar and IP 68, PE connection cable	-20 … +60 °C (-4 … +140 °F)
– Versions IP 66/IP 68, 1 bar and IP 68, PUR connection cable	-20 … +80 °C (-4 … +176 °F)

Additional temperature influence through isolating diaphragm

The specifications refer to diaphragm material 316L as well as isolating liquid silicone oil. They are only used for estimation. The actual values depend on the diameter, material and strength of the diaphragm as well as the isolating liquid. They are available on request.

Temperature coefficient of the isolating diaphragm in mbar/10 K with

– Flange DN 25 PN 40, Form C, DIN 2501	4.8
– Flange DN 40 PN 40, Form C, DIN 2501	1
– Flange DN 50 PN 40, Form C, DIN 2501	2
– Flange DN 50 PN 40 with extension 50 mm	1.9
– Flange DN 50 PN 40 with extension 100 mm	1.9
– Flange DN 50 PN 40 with extension 200 mm	2.1
– Flange DN 80 PN 40, Form C, DIN 2501	0.4
– Flange 1" 150 lbs RF ANSI B16.5; with extension 2", 3"	1.8
– Flange 2" 150 lbs RF ANSI B16.5; with extension 2"	2
Temperature coefficient of a cooling element, depending on the diaphragm-ø	0.1 … 1.5
Temperature coefficient of a 1 m long capillary line, depending on the diaphragm-ø	0.1 … 15

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.

Product temperature depending on the isolating liquid (temperature: p_{abs} > 1 bar/14.5 psi/p_{abs} < 1 bar/14.5 psi)[14)]

– silicone oil KN2.2	-40 … +150 °C/-40 … +150 °C (-40 … +302 °F/-40 … +302 °F)
– Silicone oil KN2.2 and cooling element or capillaries	-40 … +200 °C/-40 … +150 °C (-40 … +392 °F/-40 … +302 °F)
– High temperature oil KN3.2 and cooling element	-10 … +300 °C/-10 … +200 °C (+14 … +572 °F/ +14 … +572 °F)

13) Up to 60 °C (140 °F).
14) Version for oxygen applications up to 60 °C (140 °F).

– High temperature oil KN3.2 and cooling element 300 mm or capillaries	-10 … +400 °C/-10 … +200 °C (+14 … +752 °F/ +14 … +572 °F)
– Halocarbon oil KN21	-40 … +150 °C/-40 … +80 °C (-40 … +302 °F/-40 … +176 °F)
– Halocarbon oil KN21 for oxygen applications	-40 … +60 °C/-40 … +60 °C (-40 … +140 °F/-40 … +140 °F)
– Silicone-free liquid KN70	-40 … +70 °C (-40 … +158 °F), no vacuum
– Med. white oil KN92 (FDA)	-10 … +150 °C/-10 … +160 °C (+14 … +302 °F/ +14 … +320 °F)
– Med. white oil KN92 (FDA) and cooling element	-10 … +250 °C/-10 … +160 °C (+14 … +482 °F/ +14 … +320 °F)
– Med. white oil KN92 (FDA) and cooling element 300 mm	-10 … +400 °C/-10 … +160 °C (+14 … +482 °F/ +14 … +320 °F)
Vibration resistance	mechanical vibrations with 4 g and 5 … 100 Hz[15]
Shock resistance	Acceleration 100 g/6 ms[16]

Electromechanical data - version IP 66/IP 67

Cable entry/plug[17]

– 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)

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

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Spring-loaded terminals for wire cross-section	< 2.5 mm² (AWG 14)

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[18)]

– 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)

Connection cable between IP 68 instrument and external housing:

18) Depending on the version M12 x 1, according to DIN 43650, Harting, 7/8" FF.

– 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 rating	
– unassembled	IP 20
– mounted into the sensor without cover	IP 40
Materials	
– Housing	ABS
– Inspection window	Polyester foil

Power supply

Supply voltage	
– Non-Ex instrument	9 … 32 V DC
– EEx-ia instrument	9 … 24 V DC
– EEx-d instrument	9 … 32 V DC
Operating voltage with lighted indicating and adjustment module[19]	
– Non-Ex instrument	12 … 32 V DC[20]
– EEx-ia instrument	12 … 24 V DC[21]
– EEx-ia instrument	12 … 32 V DC[22]
Power supply by/max. number of sensors	
– DP/PA segment coupler	max. 32 (max. 10 with Ex)
– VEGALOG 571 EP card	max. 15 (max. 10 with Ex)

19) Is available at a later date for instruments with StEx, WHG or ship approval as well as country-specific approvals such as those according to FM or CSA.
20) From measuring range 100 bar, 13 … 32 V DC.
21) From measuring range 100 bar, 13 … 32 V DC.
22) From measuring range 100 bar, 13 … 32 V DC.

Electrical protective measures

Protection rating	
– Housing, standard	IP 66/IP 67[23]
– Aluminium and stainless housing (optionally available)	IP 68 (1 bar)[24]
– Process component in IP 68 version	IP 68
– 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*".

[23] 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.

[24] Only with instruments with absolute pressure ranges.

10.2 Information on Profibus PA

Instrument master file

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

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

Ident number

Each Profibus instrument gets an unambiguous ident number (ID number) from the Profibus user organisation (PNO). This ID number is also included in the name of the GSD file. For VEGABAR 51 the ID number is **0 x 076F(hex)** and the GSD file **BR__076F.GSD**. As an option to this manufacturer-specific GSD file, PNO provides also a general so-called profile-specific GSD file. For VEGABAR 51 you have to use the general GSD file **PA139701.GSD**. If the general GSD file is used, the sensor must be set to the profile-specific ident number via the DTM software. By default, the sensor operates with the manufacturer-specific ID number.

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

Cyclical data traffic

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

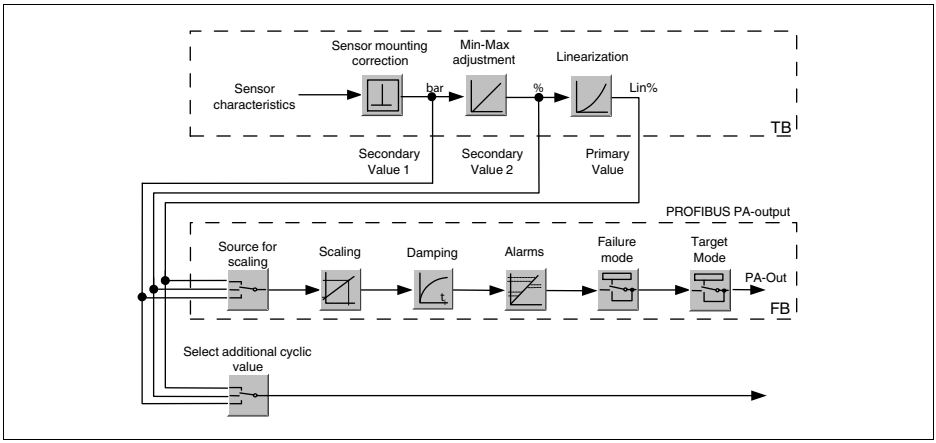


Fig. 26: VEGABAR 51: Block diagram with AI (PA-OUT) value and Additional Cyclic Value

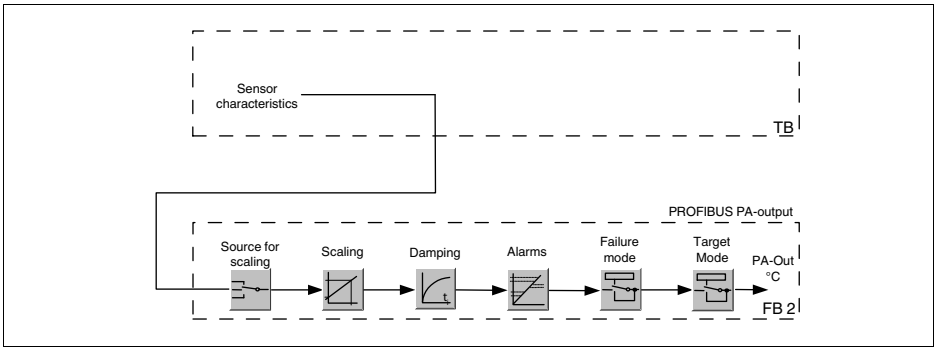


Fig. 27: VEGABAR 51: Block diagram with temperature value

Module of the PA sensors

For the cyclic data traffic, VEGABAR 51 provides the following modules:

- AI (PA-OUT)
  - PA-OUT value of the FB1 after scaling
- Temperature

– PA-OUT value of the FB2 after scaling

- Additional Cyclic Value

– Additional cyclical value (depending on the source)

- Free Place

– This module must be used if a value should not be used in the data telegram of the cyclical data traffic (e.g. replacement of the temperature and Additional Cyclic Value)

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

Tip:
The modules are available in two versions:

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

Examples of telegram configuration

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

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

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

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

Fig. 28: Telegram configuration example 1

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

- AI (PA-OUT)
- Temperature

- Free Place

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

Fig. 29: Telegram configuration example 2

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

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

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

Fig. 30: Telegram configuration example 3

Data format of the output signal

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

Fig. 31: Data format of the output signal

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

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

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

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

Fig. 32: Data format of the measured value

Coding of the status byte associated with the PA output value

Status code	Description according to Profibus standard	Possible cause
0x00	bad - non-specific	Flash-Update active
0x04	bad - configuration error	● Adjustment error ● Configuration error with PV-Scale (PV-Span too small) ● Unit irregularity ● Error in the linearization table
0x0C	bad - sensor failure	● Hardware error ● Converter error ● Leakage pulse error ● Trigger error
0x10	bad - sensor failure	● Measured value generation error ● Temperature measurement error
0 x 1f	bad - out of service constant	"Out of Service" mode switched on
0 x 44	uncertain - last unstable value	Failsafe replacement value (Failsafe-Mode = "Last value" and already valid measured value since switching on)
0 x 48	uncertain substitute set	● Switch on simulation ● Failsafe replacement value (Failsafe-Mode = "Fsafe value")
0 x 4c	uncertain - initial value	Failsafe replacement value (Failsafe-Mode = "Last valid value" and no valid measured value since switching on)
0 x 51	uncertain - sensor; conversion not accurate - low limited	Sensor value < lower limit
0 x 52	uncertain - sensor; conversion not accurate - high limited	Sensor value > upper limit
0 x 80	good (non-cascade) - OK	OK
0 x 84	good (non-cascade) - active block alarm	Static revision (FB, TB) changed (10 sec. active, after the parameter of the static category was written)
0 x 89	good (non-cascade) - active advisory alarm - low limited	Lo-Alarm

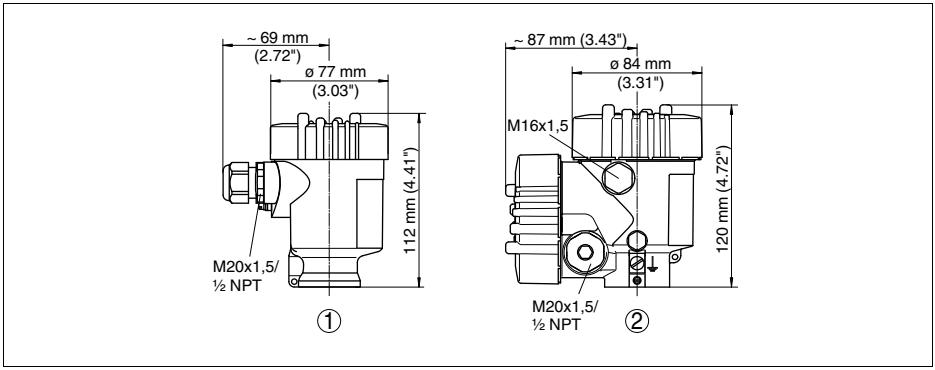
Status code	Description according to Profibus standard	Possible cause
0 x 8a	good (non-cascade) - active advisory alarm - high limited	Hi-Alarm
0 x 8d	good (non-cascade) - active critical alarm - low limited	Lo-Lo-Alarm
0 x 8e	good (non-cascade) - active critical alarm - high limited	Hi-Hi-Alarm

10.3 Dimensions

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

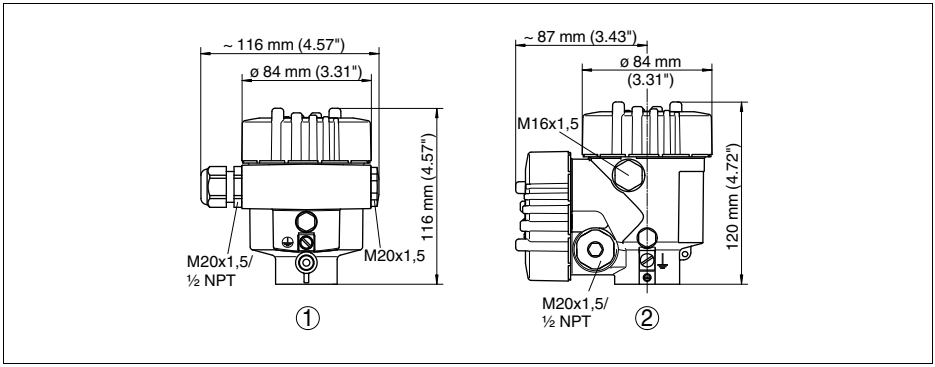
The two chamber housings are not available with instruments with 4 … 20 mA signal output

Plastic housing



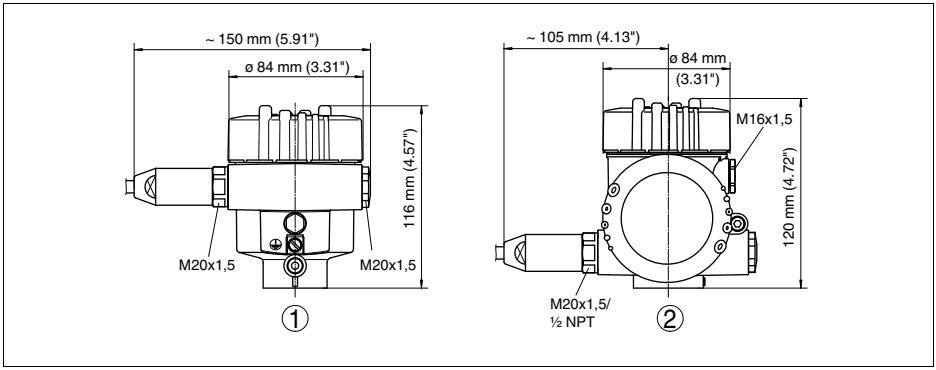
1 Single chamber version
2 Double chamber version

Aluminium housing



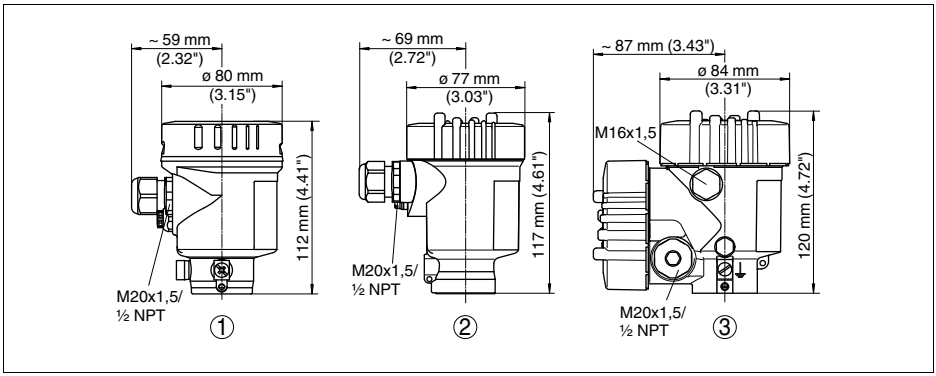
1 Single chamber version
2 Double chamber version

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



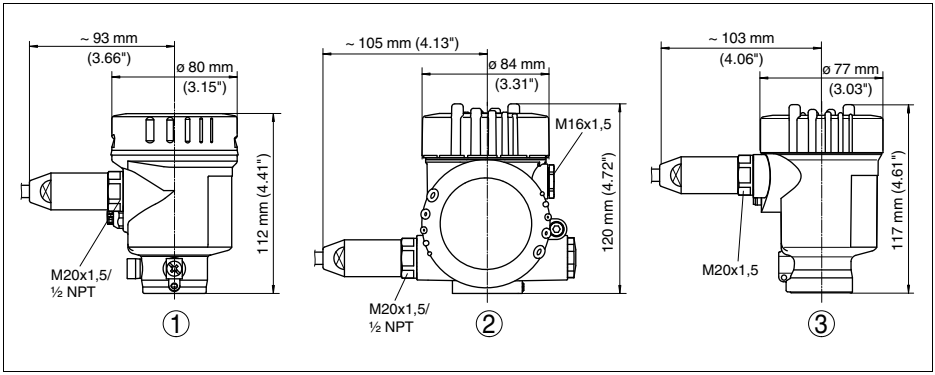
1 Single chamber version
2 Double chamber version

Stainless steel housing



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

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



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

IP 68 version with external housing

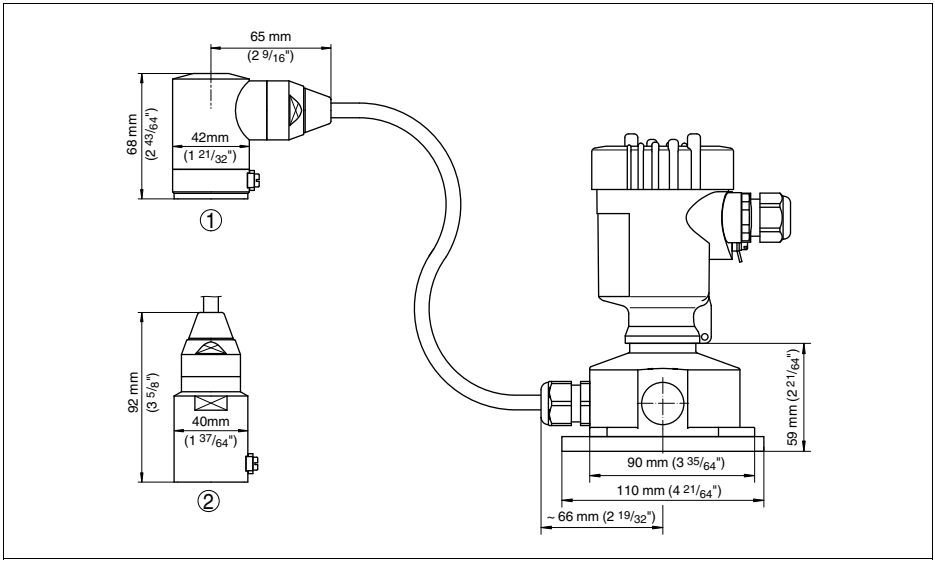
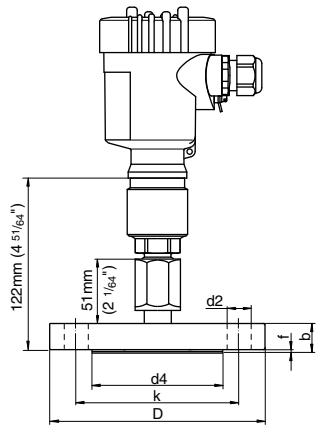


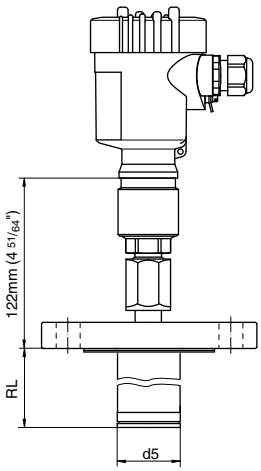
Fig. 38: IP 68 version with external housing

1 Lateral cable outlet
2 Axial cable outlet

VEGABAR 51 - flange version



ED, FR, EG, FB, FC, FH, F1, F5, FS, EE



FD, FE, FG, FJ, FK F7, FU, FQ

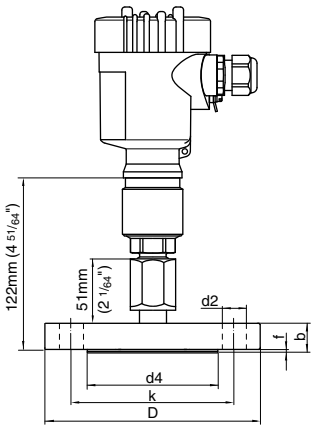
①	DN	PN	D	b	k	d2	d4	f	RL	d5	dM ③
ED	20	40	105	18	75	4xø14	58	2	-	-	-
FR	25	40	115	18	85	4xø14	68	2	-	-	-
EG	32	40	140	18	100	4xø18	78	2	-	-	-
FB	40	40	150	18	110	4xø18	88	3	-	-	-
FC	50	40	165	20	125	4xø18	102	3	-	-	-
FD	50	40	165	20	125	4xø18	102	3	50	48,3	47
FE	50	40	165	20	125	4xø18	102	3	100	48,3	47
FG	50	40	165	20	125	4xø18	102	3	200	48,3	47
FH	80	40	200	24	160	8xø18	138	3	-	-	-
FJ	80	40	200	24	160	8xø18	138	3	50	76	72
FK	80	40	200	24	160	8xø18	138	3	100	76	72
FU	80	40	200	24	160	8xø18	138	3	200	76	72
EE	100	40	235	24	190	8xø22	162	3	100	76	72

②	"	lbs	D	b	k	d2	d4	f	RL	d5	dM ③
F1	1"	150	5"	3/4"	3 7/8"	4xø 5/8"	2“	1/8"	-	-	-
F5	2"	150	6"	3/4"	4 3/4"	4xø 5/8"	3 5/8"	1/8"	-	-	-
F7	2"	150	6"	3/4"	4 3/4"	4xø 5/8"	3 5/8"	1/8"	2"	1,9"	-
FS	3"	150	7 1/2"	3/4"	6“	4xø 5/8"	5“	1/8"	-	-	-
FQ	3"	150	7 1/2"	3/4"	6“	4xø 5/8"	5“	1/8"	6"	2,9"	-

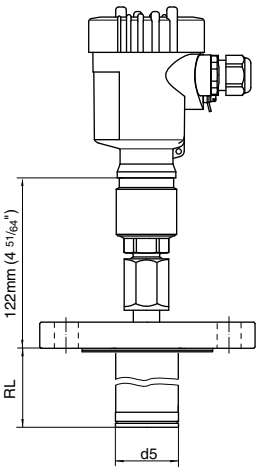
Fig. 39: VEGABAR 51 - flange version

1 Flange connection according to DIN 2501
2 Flange fitting according to ANSI B16.5
3 Diaphragm diameter

VEGABAR 51 - flange version



ED, FR, EG, FB, FC, FH, F1, F5, FS, EE



FD, FE, FG, FJ, FK F7, FU, FQ

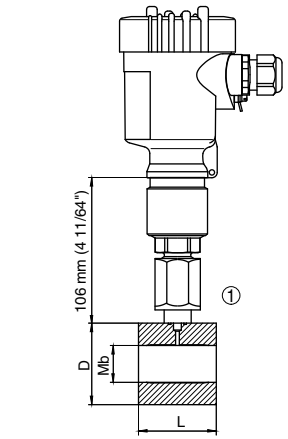
①	DN	PN	D	b	k	d2	d4	f	RL	d5	dM ③
ED	20	40	4 9/64"	45/64"	2 61/64"	4xø 35/64"	2 9/32"	5/64"	-	-	-
FR	25	40	4 17/32"	45/64"	3 11/32"	4xø 35/64"	2 43/64"	5/64"	-	-	-
EG	32	40	5 33/64"	45/64"	3 15/16"	4xø 45/64"	3 5/64"	5/64"	-	-	-
FB	40	40	5 29/32"	45/64"	4 21/64"	4xø 45/64"	3 15/32"	1/8"	-	-	-
FC	50	40	6 1/2"	25/32"	4 59/64"	4xø 45/64"	4 1/64"	1/8"	-	-	-
FD	50	40	6 1/2"	25/32"	4 59/64"	4xø 45/64"	4 1/64"	1/8"	1 31/32"	1 29/32"	1 27/32"
FE	50	40	6 1/2"	25/32"	4 59/64"	4xø 45/64"	4 1/64"	1/8"	3 15/16"	1 29/32"	1 27/32"
FG	50	40	6 1/2"	25/32"	4 59/64"	4xø 45/64"	4 1/64"	1/8"	7 7/8"	1 29/32"	1 27/32"
FH	80	40	7 7/8"	15/16"	6 19/64"	8xø 45/64"	5 7/16"	1/8"	-	-	-
FJ	80	40	7 7/8"	15/16"	6 19/64"	8xø 45/64"	5 7/16"	1/8"	1 31/32"	2 63/64"	2 53/64"
FK	80	40	7 7/8"	15/16"	6 19/64"	8xø 45/64"	5 7/16"	1/8"	3 15/16"	2 63/64"	2 53/64"
FU	80	40	7 7/8"	15/16"	6 19/64"	8xø 45/64"	5 7/16"	1/8"	7 7/8"	2 63/64"	2 53/64"
EE	100	40	9 1/4"	15/16"	7 31/64"	8xø 55/64"	6 3/8"	1/8"	-	-	-

②	"	lbs	D	b	k	d2	d4	f	RL	d5	dM ③
F1	1"	150	5"	3/4"	3 7/8"	4xø 5/8"	3 7/8"	1/8"	-	-	-
F5	2"	150	6"	3/4"	4 3/4"	4xø 5/8"	3 5/8"	1/8"	-	-	-
F7	2"	150	6"	3/4"	4 3/4"	4xø 5/8"	3 5/8"	1/8"	2"	1,9"	-
FS	3"	150	7 1/2"	3/4"	6	4xø 5/8"	6	1/8"	-	-	-
FQ	3"	150	7 1/2"	3/4"	6	4xø 5/8"	6	1/8"	6"	2,9"	-

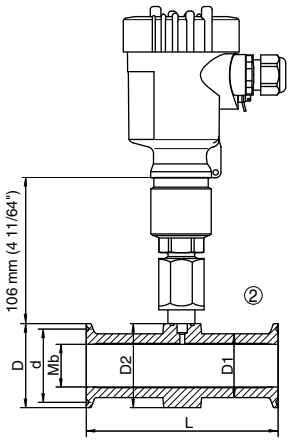
Fig. 40: VEGABAR 51 - flange version

1 Flange connection according to DIN 2501
2 Flange fitting according to ANSI B16.5
3 Diaphragm diameter

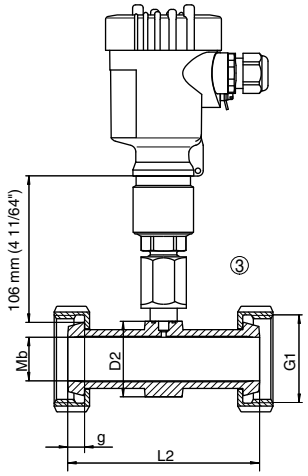
VEGABAR 51 - tube isolating diaphragm 1



mm	DN	PN	D	Mb	L
RA	25	6…400	63	28,5	60
inch	DN	PN	D	Mb	L
RA	25	6... 400	2 31/64"	1 1/8"	2 23/64"



mm	DN	PN	L	D	d	D1	D2	Mb
RH	2“	40	156	64	56,3	56	75	48
inch	DN	PN	L	D	d	D1	D2	Mb
RH	2“	40	6 9/64"	2 33/64"	2 7/32"	2 13/64"	2 61/64"	1 57/64"



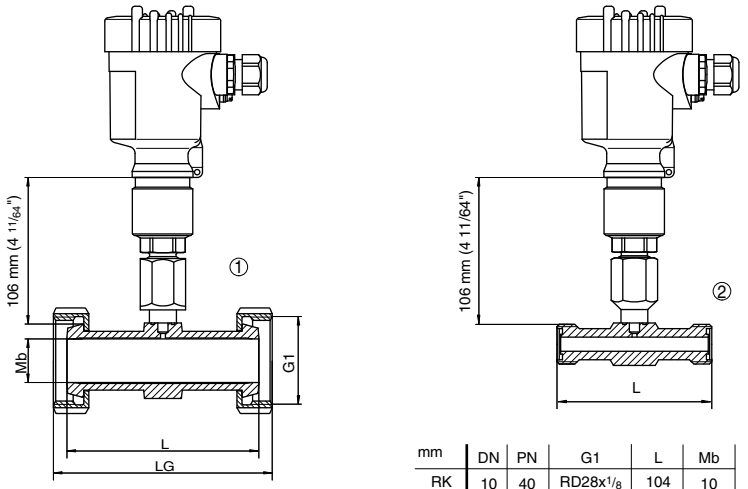
mm	DN	PN	G1	L2	D2	Mb
RT	25	40	Rd52x1,6	114	46	26
RQ	32	40	Rd58x1,6	140	52	32
RW	50	25	Rd78x1,6	156	70	50

inch	DN	PN	G1	D	d	Mb
RH	25	40	Rd52x1,6	4 31/64"	1 13/16"	1 1/32"
RH	32	40	Rd58x1,6	5 33/64"	2 3/64"	1 17/64"
RH	50	25	Rd78x1,6	6 9/64"	2 3/4"	1 31/32"

Fig. 41: VEGABAR 51 - tube isolating diaphragm

1 Tube isolating diaphragm for mounting between flanges, cell design
2 Tube isolating diaphragm Tri-Clamp

VEGABAR 51 - tube isolating diaphragm 2



mm	DN	PN	G1	L	LG	Mb
RE	25	40	Rd52x1/6	114	128	26
RP	50	25	Rd78x1/6	140	170	50
RO	80	25	Rd110x1/4	156	182	81

inch	DN	PN	G1	D	LG	Mb
RH	25	40	Rd52x1/6	4 31/64"	5 3/64"	1 1/32"
RH	50	25	Rd78x1/6	6 9/64"	6 11/16"	1 31/32"
RH	80	25	Rd110x1/4	6 17/32"	7 11/64"	3 3/16"

mm	DN	PN	G1	L	Mb
RK	10	40	RD28x1/8	104	10
RS	20	40	RD44x1/6	104	20

inch	DN	PN	G1	D	d
RK	10	40	RD28x1/8	4 3/32"	25/64"
RS	20	40	RD44x1/6	4 3/32"	25/32"

Fig. 42: VEGABAR 51 - tube isolating diaphragm

1 Tube isolating diaphragm with threaded socket according to DIN 11851
2 Tube isolating diaphragm with threaded socket according to DIN 11864-1

36714-EN-091008

VEGABAR 51 - tube isolating diaphragm 3

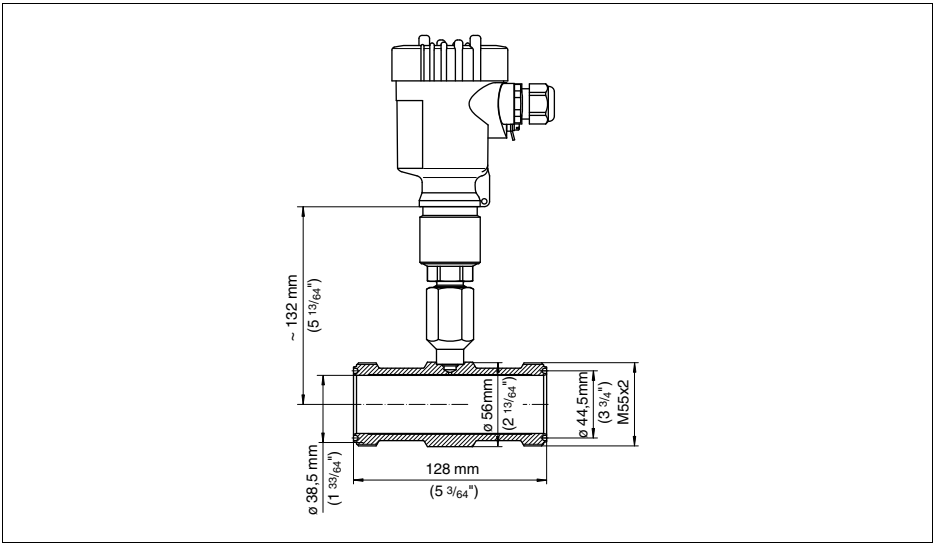


Fig. 43: VEGABAR 51 - tube isolation diaphragm - ECO

VEGABAR 51 - hygienic fitting

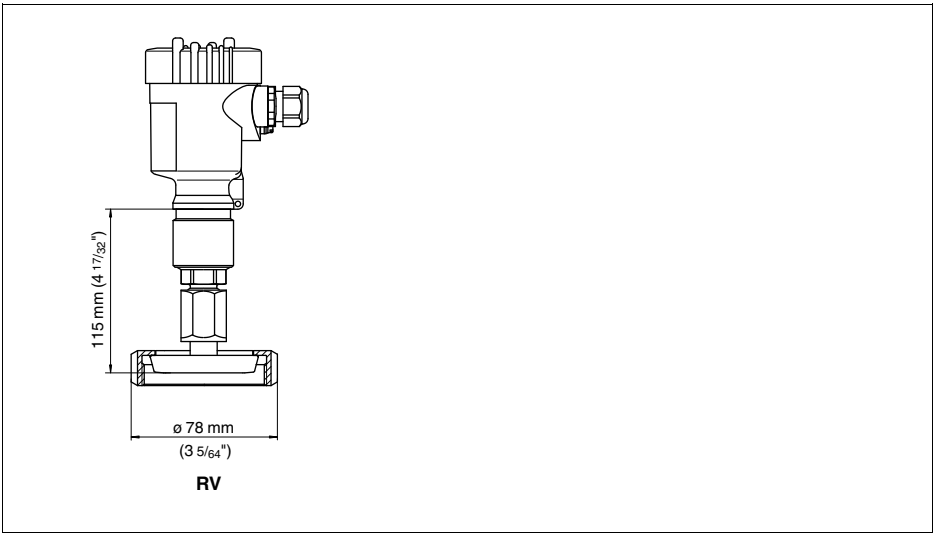
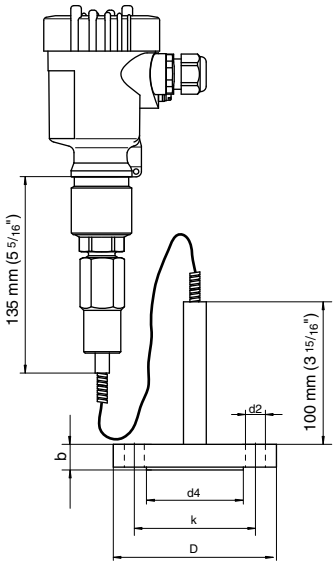


Fig. 44: VEGABAR 51 - RV = bolting according to DIN 11851

VEGABAR 51 - cell isolating diaphragm



mm	DN	PN	D	b	d4	k	d2
ZA	25	40	115	18	68	85	14
ZB	40	40	150	18	88	110	18
ZC	50	40	165	20	102	125	18
ZD	80	40	200	24	138	160	18

inch	DN	PN	D	b	d4	k	d2
ZA	25	40	4 17/32"	45/64"	2 43/64"	3 11/32"	35/64"
ZB	40	40	5 29/32"	45/64"	3 15/32"	4 21/64"	45/64"
ZC	50	40	6 1/2"	25/32"	4 1/64"	4 59/64"	45/64"
ZD	80	40	7 7/8"	15/16"	5 7/16"	6 19/64"	45/64"

Fig. 45: VEGABAR 51 - ZA = cell isolating diaphragm DN 25/PN 16, ZB = cell isolating diaphragm DN 40/PN 16, ZC = cell isolating diaphragm DN 50/PN 16, ZD = cell isolating diaphragm DN 80/PN 16

VEGABAR 51 - threaded version

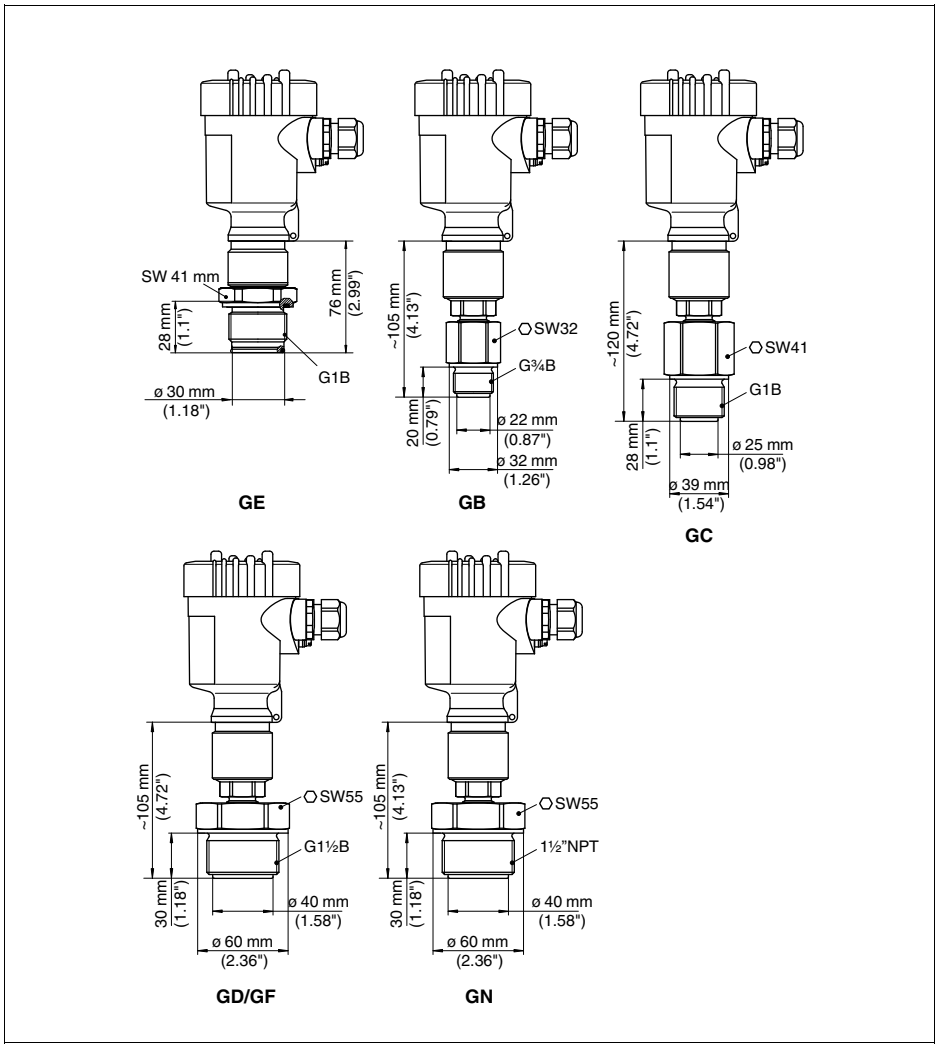


Fig. 46: VEGABAR 51 - threaded version

VEGABAR 51 - Threaded version with temperature adapter

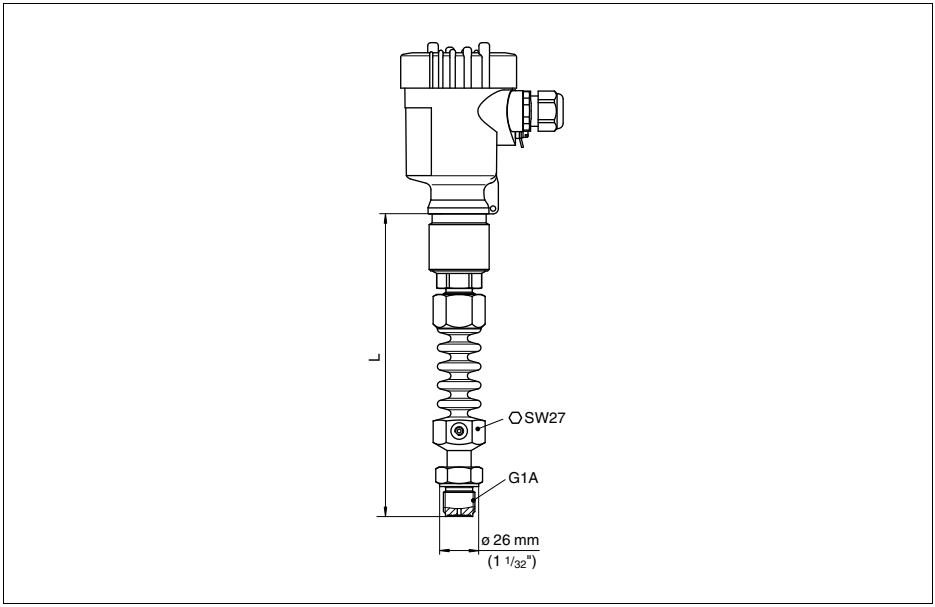


Fig. 47: VEGABAR 51 - threaded version with temperature adapter. The length depends on the respective temperature stage, e.g. L = 152 mm (6 in) at 200 °C (392 °F)

10.4 Industrial property rights

VEGA product lines are global protected by industrial property rights.
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VEGA Grieshaber KG
Am Hohenstein 113
77761 Schiltach
Germany
Phone +49 7836 50-0
Fax +49 7836 50-201
E-mail: info@de.vega.com
www.vega.com

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