

Quick setup guide

Pressure transmitter with chemical seal

VEGABAR 81

4 ... 20 mA/HART

With SIL qualification



Document ID: 46301



VEGA

Contents

1 For your safety	3
1.1 Authorised personnel	3
1.2 Appropriate use.....	3
1.3 Warning about incorrect use.....	3
1.4 General safety instructions	3
1.5 EU conformity.....	4
1.6 SIL qualification according to IEC 61508.....	4
1.7 Permissible process conditions	4
2 Product description	5
2.1 Configuration.....	5
3 Mounting	6
3.1 General instructions for use of the instrument	6
3.2 Ventilation and pressure compensation.....	6
4 Connecting to power supply.....	8
4.1 Connecting.....	8
4.2 Single chamber housing.....	9
4.3 Double chamber housing	9
5 Set up with the display and adjustment module	11
5.1 Insert display and adjustment module	11
5.2 Parameter adjustment	12
5.3 Menu overview	15
6 Supplement	17
6.1 Technical data	17



Information:

This quick setup guide enables quick setup and commissioning of your instrument.

You can find supplementary information in the corresponding, more detailed Operating Instructions Manual as well as the Safety Manual that comes with instruments with SIL qualification. These manuals are available in the download area of "www.vega.com".

**Operating instructions VEGABAR 81 - 4 ... 20 mA/HART:
Document-ID 45019**

**Safety Manual VEGABAR series 80 - Two-wire 4 ... 20 mA/HART
with SIL qualification: Document-ID 48369**

Editing status of the quick setup guide: 2019-04-02

1 For your safety

1.1 Authorised personnel

All operations described in this documentation must be carried out only by trained, qualified personnel authorised by the plant operator.

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

1.2 Appropriate use

The VEGABAR 81 is a pressure transmitter for process pressure and hydrostatic level measurement.

You can find detailed information about the area of application in chapter "*Product description*".

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

1.3 Warning about incorrect use

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

1.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and directives. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument. When measuring aggressive or corrosive media that can cause a dangerous situation if the instrument malfunctions, the operator has to implement suitable measures to make sure the instrument is functioning properly.

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

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

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

To avoid any danger, the safety approval markings and safety tips on the device must also be observed and their meaning read in this operating instructions manual.

1.5 EU conformity

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

You can find the EU conformity declaration on our website under www.vega.com/downloads.

1.6 SIL qualification according to IEC 61508

The Safety Integrity Level (SIL) of an electronic system is used to assess the reliability of integrated safety functions.

For detailed specification of the safety requirements, multiple SIL levels are specified according to safety standard IEC 61508. You can find detailed information in chapter "*Functional safety (SIL)*" of the operating instructions.

The instrument meets the specifications of IEC 61508: 2010 (Edition 2). It is qualified for single-channel operation up to SIL2. The instrument can be used homogeneously redundant up to SIL3 in multi-channel architecture with HFT 1.

1.7 Permissible process conditions

For safety reasons, the instrument must only be operated within the permissible process conditions. You can find detailed information on the process conditions in chapter "*Technical data*" as well as on the type label.

The permissible process pressure range is specified by "MWP" (Maximum Working Pressure) on the type label, see chapter "*Structure*". The MWP takes the element of the measuring cell and processing fitting combination with the weakest pressure into consideration and may be applied permanently. The specification refers to a reference temperature of +20 °C (+68 °F). It also applies when a measuring cell with a higher measuring range than the permissible pressure range of the process fitting is installed order-related.

In order to prevent damage to the device, the test pressure may only exceed the specified MWP briefly by 1.5 times at reference temperature. The pressure stage of the process fitting as well as the overload resistance of the measuring cell are taken into consideration here (see chapter "*Technical Data*").

In addition, a temperature derating of the process fitting, e. g. with flanges, can limit the permissible process pressure range according to the respective standard.

2 Product description

2.1 Configuration

Type label

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



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

- 1 Instrument type and product code
- 2 Field for approvals
- 3 Power supply and signal output, electronics
- 4 Technical data
- 5 Order number
- 6 Serial number of the instrument
- 7 QR code
- 8 Symbol of the device protection class
- 9 ID numbers, instrument documentation
- 10 Reminder to observe the instrument documentation
- 11 SIL identification

Serial number - Instrument search

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

- Product code (HTML)
- Delivery date (HTML)
- Order-specific instrument features (HTML)
- Operating instructions, quick setup guide and Safety Manual at the time of shipment (PDF)
- Test certificate (PDF) - optional

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

Alternatively, you can access the data via your smartphone:

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

3 Mounting

3.1 General instructions for use of the instrument

Protection against moisture

Protect your instrument against moisture ingress through the following measures:

- Use a suitable connection cable (see chapter "Connecting to power supply")
- Tighten the cable gland or plug connector
- When mounting horizontally, turn the housing so that the cable gland or plug connector point downward
- Lead the connection cable downward in front of the cable entry or plug connector

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

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

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

3.2 Ventilation and pressure compensation

Filter element - Position

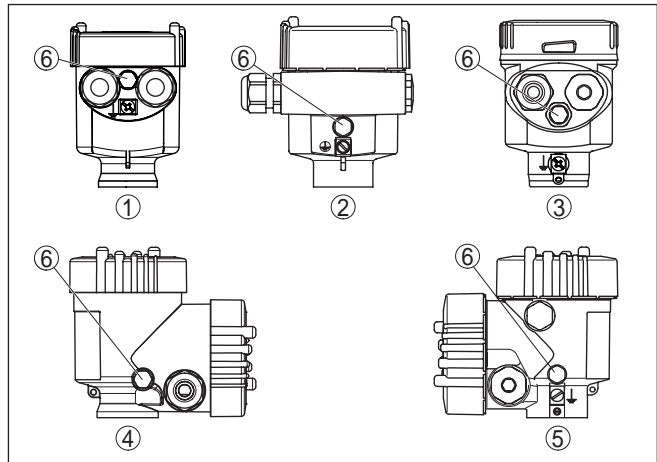


Fig. 2: Position of the filter element

- 1 Plastic, stainless steel single chamber (precision casting)
- 2 Aluminium - single chamber
- 3 Stainless steel single chamber (electropolished)
- 4 Plastic double chamber
- 5 Aluminium, stainless steel double chamber housing (precision casting)
- 6 Filter element

With the following instruments a blind plug is installed instead of the filter element:

- Instruments in protection IP 66/IP 68 (1 bar) - ventilation via capillaries in non-detachable cable
- Instruments with absolute pressure

4 Connecting to power supply

4.1 Connecting

Connection technology

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

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



Information:

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

Connection procedure

Proceed as follows:

1. Unscrew the housing lid
2. If a display and adjustment module is installed, remove it by turning it slightly to the left
3. Loosen compression nut of the cable gland and remove blind plug
4. Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) of insulation from the ends of the individual wires
5. Insert the cable into the sensor through the cable entry

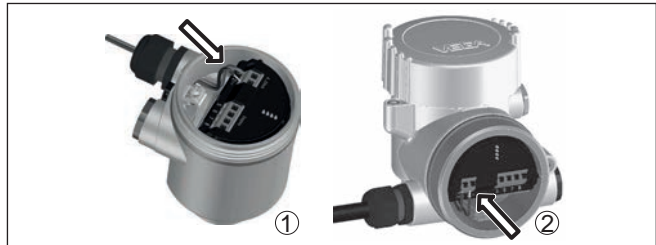


Fig. 3: Connection steps 5 and 6

- 1 Single chamber housing
- 2 Double chamber housing

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



Information:

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

You can find further information on the max. wire cross-section under "*Technical data - Electromechanical data*".

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

8. Connect the screen to the internal ground terminal, connect the external ground terminal to potential equalisation
 9. Tighten the compression nut of the cable entry gland. The seal ring must completely encircle the cable
 10. Reinsert the display and adjustment module, if one was installed
 11. Screw the housing lid back on
- The electrical connection is finished.

4.2 Single chamber housing



The following illustration applies to the non-Ex, Ex-ia and Ex-d version.

Electronics and connection compartment

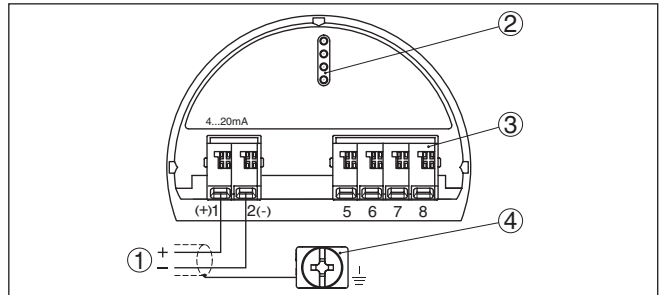


Fig. 4: Electronics and connection compartment - single chamber housing

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

4.3 Double chamber housing



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

Connection compartment

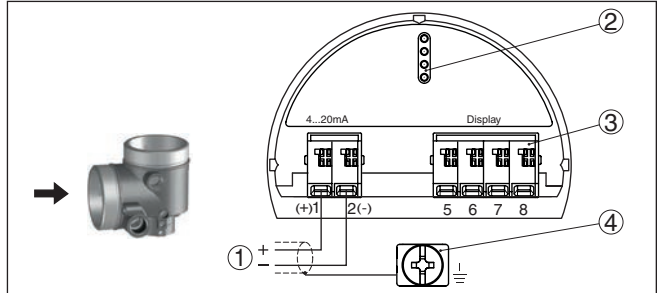


Fig. 5: Connection compartment - double chamber housing

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

5 Set up with the display and adjustment module

5.1 Insert display and adjustment module

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

Proceed as follows:

1. Unscrew the housing lid
2. Place the display and adjustment module on the electronics in the desired position and turn it to the right until it snaps in.
3. Screw housing lid with inspection window tightly back on

Disassembly is carried out in reverse order.

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



Fig. 6: Installing the display and adjustment module in the electronics compartment of the single chamber housing

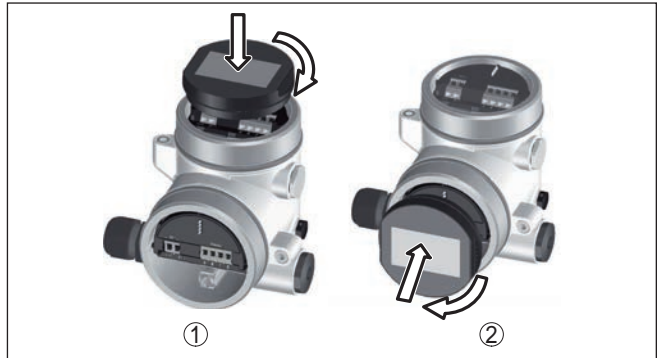


Fig. 7: Installing the display and adjustment module in the double chamber housing

- 1 In the electronics compartment
- 2 In the connection compartment



Note:

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

5.2 Parameter adjustment

Operating sequence

A parameter change with SIL qualified instruments must always be carried out as follows:

- Unlock adjustment
- Change parameters
- Lock adjustment and verify modified parameters

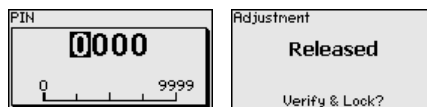
This ensures that all modified parameters have been deliberately changed.

Unlock adjustment

The instrument is shipped in locked condition.

To prevent unintentional or unauthorized adjustment, the instrument is protected (locked) against all parameter changes while in normal operating condition.

For each parameter change you have to enter the PIN of the instrument. In delivery status, the PIN is "0000".



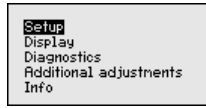
Change parameters

You can find a description below the respective parameter.

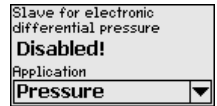
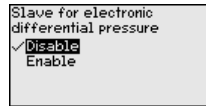
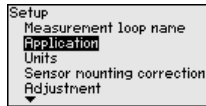
Lock adjustment and verify modified parameters

You can find a description below the parameter "Setup - Lock adjustment".

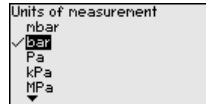
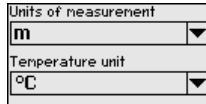
- Change setup parameters** 1. Go to the menu "Setup" via the display and adjustment module.



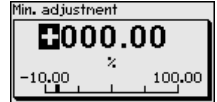
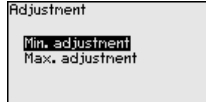
2. In this menu item you activate/deactivate the slave sensor for electronic differential pressure and select the application, e.g. level



3. Select in the menu item "Units" the adjustment unit of the instrument, e.g. "bar".



4. Depending on the application, carry out the adjustment e.g. in the menu items "Min. adjustment" and "Max. adjustment".



Parameterization example VEGABAR 81 always measures pressure independently of the process variable selected in the menu item "Application". To output the selected process variable correctly, an allocation of the output signal to 0 % and 100 % must be carried out (adjustment).

With the application "Level", the hydrostatic pressure, e.g. with full and empty vessel, is entered for adjustment. See following example:

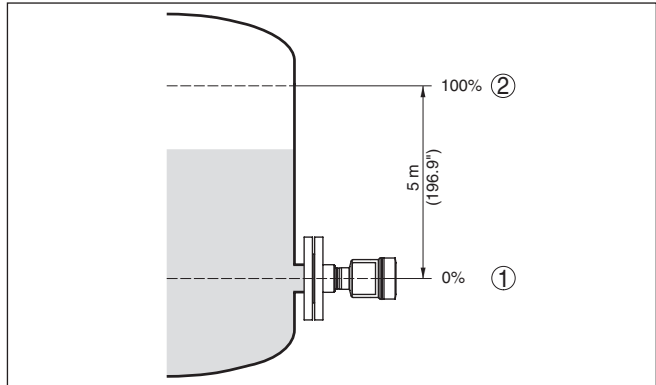


Fig. 8: Parameter adjustment example "Min./max. adjustment, level measurement"

- 1 Min. level = 0 % corresponds to 0.0 mbar
- 2 Max. level = 100 % corresponds to 490.5 mbar

If these values are not known, an adjustment with filling levels of e.g. 10 % and 90 % is also possible. By means of these settings, the real filling height is then calculated.

The real product level during the adjustment is not important, because the min./max. adjustment is always carried out without changing the product level. These settings can be made ahead of time without the instrument having to be installed.

Setup - Lock adjustment

With this menu item you safeguard the sensor parameters against unauthorized or unintentional modifications.



To detect parameterization errors reliably, safety-relevant parameters must be verified before saving them into the instrument.

1. Enter PIN

In delivery status, the PIN is "0000".

2. Character string comparison

You then have to carry out the character string comparison. This is used to check the character presentation.

3. Serial number acknowledgement

Afterwards you confirm that the serial number of your instrument was carried over correctly. This is used to check device communication.

4. Verify parameters

Confirm the modified values one after the other.

If the described process of parameter adjustment was run through completely and correctly, the instrument will be locked and hence ready for operation.

5.3 Menu overview

Setup

Menu item	Parameter	Default setting
Measurement loop name		Sensor
Application (SIL)		Application level
	Slave for electronic differential pressure	Deactivated
Units	Unit of measurement	mbar (with nominal measuring range ≤ 400 mbar) bar (with nominal measuring ranges ≥ 1 bar)
	Temperature unit	°C
Position correction (SIL)		0.00 bar
Adjustment (SIL)	Zero/Min. adjustment	0.00 bar 0.00 %
	Span/Max. adjustment	Nominal measuring range in bar 100.00 %
Damping (SIL)	Integration time	0.0 s
Linearization (SIL)	Characteristics	Linear
Current output (SIL)	Current output - Mode	Output characteristics 4 ... 20 mA Reaction when malfunctions occur ≤ 3.6 mA
	Current output - Min./Max.	3.8 mA 20.5 mA
Lock adjustment (SIL)		Released

Display

Menu item	Default setting
Menu language	Order-specific
Displayed value 1	Current output in %
Displayed value 2	Ceramic measuring cell: Measuring cell temperature in °C
	Metallic measuring cell: Electronics temperature in °C
Display format 1 and 2	Number of positions after the decimal point, automatically
Backlight	Switched on

Diagnostics

Menu item	Parameter	Default setting
Sensor status		-
Peak value	Pressure	Actual measured value
	Temperature	Actual temperature values from measuring cell, electronics
Simulation		Pressure
Proof test		-

Additional adjustments

Menu item	Parameter	Default setting
PIN		0000
Date/Time		Actual date/Actual time
Reset		-
Copy instrument settings		-
Special parameters		-
Scaling	Scaling size	Volume in l
	Scaling format	0 % corresponds to 0 l 100 % corresponds to 0 l
Current output 1 (SIL)	Current output - Meas. variable	Lin. percent - Level
	Current output - Adjustment	0 ... 100 % correspond to 4 ... 20 mA
Current output 2	Current output - Meas. variable	Measuring cell temperature (ceramic measuring cell)
	Current output - Adjustment	0 ... 100 °C correspond to 4 ... 20 mA
HART mode		Address 0
Special parameter (SIL)		-

Info

Menu item	Parameter
Device name	Device name
Instrument version	Hardware and software version
Factory calibration date	Date
Sensor characteristics	Order-specific characteristics

6 Supplement

6.1 Technical data

Note for approved instruments

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

Electromechanical data - version IP 66/IP 67 and IP 66/IP 68 (0.2 bar)¹⁾

Options of the cable entry

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

Material cable gland/Seal insert	Cable diameter			
	5 ... 9 mm	6 ... 12 mm	7 ... 12 mm	10 ... 14 mm
PA/NBR	●	●	-	●
Brass, nickel-plated/NBR	●	●	-	-
Stainless steel/NBR	-	-	●	-

Wire cross-section (spring-loaded terminals)

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

Voltage supply

Operating voltage U_B

- Non-Ex instrument 9.6 ... 35 V DC
- Ex-d instrument 9.6 ... 35 V DC
- Ex-ia instrument 9.6 ... 30 V DC

Operating voltage U_B with lighting switched on

- Non-Ex instrument 16 ... 35 V DC
- Ex-d instrument 16 ... 35 V DC
- Ex-ia instrument 16 ... 30 V DC

Reverse voltage protection Integrated

Permissible residual ripple - Non-Ex, Ex-ia instrument

- for U_N 12 V DC ($9.6 V < U_B < 14 V$) $\leq 0.7 V_{eff}$ (16 ... 400 Hz)
- for U_N 24 V DC ($18 V < U_B < 35 V$) $\leq 1.0 V_{eff}$ (16 ... 400 Hz)

Permissible residual ripple - Ex-d-ia instrument

- for U_N 24 V DC ($18 V < U_B < 35 V$) $\leq 1 V_{eff}$ (16 ... 400 Hz)

Load resistor

- Calculation $(U_B - U_{min})/0.022 A$

¹⁾ IP 66/IP 68 (0.2 bar), only with absolute pressure.

- Example - Non-Ex instrument with $U_B = 24 \text{ V DC}$ $(24 \text{ V} - 9.6 \text{ V})/0.022 \text{ A} = 655 \Omega$



Printing date:

VEGA

All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.

Subject to change without prior notice

© VEGA Grieshaber KG, Schiltach/Germany 2019



46301-EN-190404

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