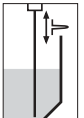
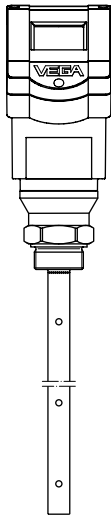


Operating Instructions

VEGAFLEX 55K



Safety information

Please read this manual carefully, and also take note of country-specific installation standards (e.g. the VDE regulations in Germany) as well as all prevailing safety regulations and accident prevention rules.

For safety and warranty reasons, any internal work on the instruments, apart from that involved in normal installation and electrical connection, must be carried out only by qualified VEGA personnel.



Note Ex area

Please note the attached safety instructions containing important information on installation and operation in Ex areas.

These safety instructions are part of the operating instructions and come with the Ex approved instruments.

Contents

Safety information 2

Note Ex area 2

1 Product description

1.1 Function 4

1.2 Application features 4

1.3 Types and versions 5

1.4 Type code 7

1.5 Technical data 8

1.6 Dimensions 11

2 Mounting

2.1 Installation instructions 14

3 Electrical connection

3.1 Connection and connection cable 15

3.2 Connection of the sensor 17

3.3 Connection of the indicating instrument VEGADIS 50 19

4 Setup

4.1 Adjustment media 20

4.2 Adjustment with the adjustment module MINICOM 20

4.3 Adjustment with the PC 26

4.4 Adjustment with HART® handheld 29

5 Diagnosis

5.1 Simulation 30

5.2 Failure rectification 30

1 Product description

1.1 Function

High frequency microwave impulses are guided along a steel rod. The microwave impulses are reflected when they reach the product surface. The impulse running time is processed by the integrated electronics and outputted as level.

The sensors detect levels in all types of liquids. Density, conductivity and dielectric value of the product do not influence the measurement. Continuously changing properties of the medium also do not influence the measured value.

In many applications, VEGAFLEX microwave sensors are the solution to difficult technical problems. Even in products with varying or fluctuating dielectric constant, the level is reliably detected. In high, narrow vessels, where non-contact measurement technologies often deliver less than optimal results, VEGAFLEX carries out problem-free measurements. The sensor part of VEGAFLEX 55 has a coaxial construction. A rod with 8 mm diameter is positioned in a tube with 21.3 mm diameter.

- Adjustment without filling or emptying the vessel.
- 4 ... 20 mA two-wire sensors, power supply and measuring signal via one two-wire cable (loop powered).
- Up to 15 sensors can be connected via one two-wire cable.
- Measuring range up to 4 m, very small minimum measuring distance.
- Unaffected by application conditions such as:
 - varying products
- Unaffected by the vessel material, e.g. metal, concrete, plastic etc.

- As an option, the display with adjustment functions can be mounted separate from the sensor.
- Low wiring costs through the use of two-wire technology.

1.2 Application features

Applications

- Level measurement of liquids.
- Measurement also in vacuum.
- All slightly conductive substances and all substances with a dielectric value $\epsilon_r > 1.5$ can be measured.
- Measuring range 0 ... 4 m.

Two-wire technology

- Power supply, signal transmission and output signal on one two-wire cable.
- 4 ... 20 mA output signal or digital output signal.

Rugged

- Highly resistant materials: PCTFE, 1.4435, Hastelloy C22.

Precise and reliable

- Resolution 1 mm.
- Unaffected by noise, steam, gas compositions and inert gas stratification.
- Unaffected by varying density.
- Measurements under pressure up to 40 bar and with product temperatures up to 150°C.

Communicative

- Integrated measured value display.
- As an option, display can be mounted separate from the sensor.
- Adjustment from the PLC level.

Approvals

- Ex Zone 0 EEx ia IIC T 6 acc. to ATEX II 1/2 G
- Ex Zone 0 EEx d ia IIC T 6 acc. to ATEX II 1/2 G

Adjustment with PC

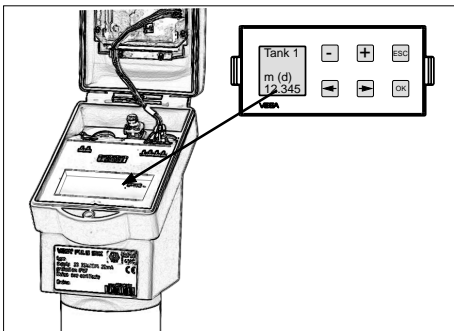
The setup and adjustment of VEGAFLEX sensors is generally done on the PC with the adjustment program VVO (VEGA Visual Operating) under Windows®. The program leads quickly through adjustment and parameter setting by means of pictures, graphics and process visualisations.

The PC can be connected at any individual location in the system or directly to the signal cable. This is done by connecting the two-wire PC interface converter VEGACONNECT 2 or 3 to the sensor or to the signal cable.

The adjustment and parameter data can be saved with the adjustment software on the PC and can be protected by passwords. On request, the adjustments can be quickly transferred to other sensors.

Adjustment with adjustment module MINICOM

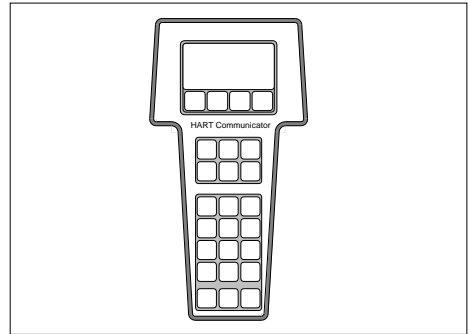
With the small (3.2 cm x 6.7 cm) 6-key adjustment module MINICOM, the adjustment can be carried out in clear text dialogue. The adjustment module can be plugged into VEGAFLEX or the external indicating instrument VEGADIS 50. Thus, VEGAFLEX can also be adjusted from the external indicating instrument VEGADIS 50.



Detachable adjustment module MINICOM

Adjustment with HART® handheld

Series 50 sensors with 4 ... 20 mA output signal can also be adjusted with the HART® handheld or via a PC with HART® software (e.g. Smart version). A special DDD (Data Device Description) is not necessary. The sensors can be adjusted with the HART® standard menus of the handheld.



HART® handheld

1.3 Types and versions

VEGAFLEX series 50 K

In general, all VEGAFLEX series 50 sensors can be adjusted with the pluggable adjustment module MINICOM or with any standard HART® handheld. With the software VEGA Visual Operating (VVO), it is also possible to adjust the sensor with a PC.

4 ... 20 mA sensors

Two-wire sensors for connection to a power supply unit or a PLC.

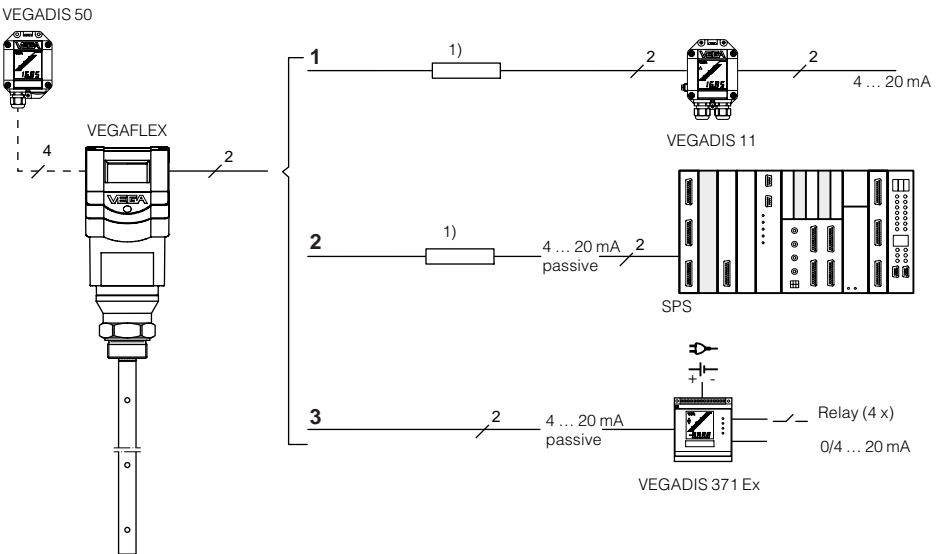
Configuration

A measuring system with a VEGAFLEX can be realised in different ways (see following illustration).

The external indicating instrument VEGADIS 50 can be mounted up to 25 m away from the sensor.

Two-wire technology

- 1 4 ... 20 mA sensor, power supply and measuring signal via one two-wire cable (loop-powered), indicating instrument VEGADIS 11 only possible with four-wire technology.
- 2 Connection to a PLC (active).
- 3 Connection to indicating instrument VEGADIS 371 with up to four relay outputs.



¹⁾ only with HART®

1.4 Type code

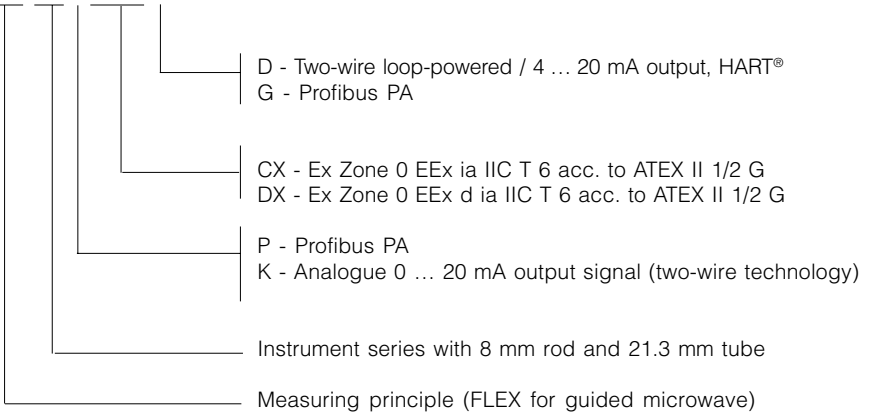
The second figure of the type name, e.g. VEGAFLEX 5[5]... distinguishes the instruments according to the version of the sensor component.

The letter, e.g. VEGAFLEX 55[K] characterises the output signal:

K stands for an analogue 4 ... 20 mA output signal (compact instrument)

P stands for a digital signal transmission for connection to Profibus PA

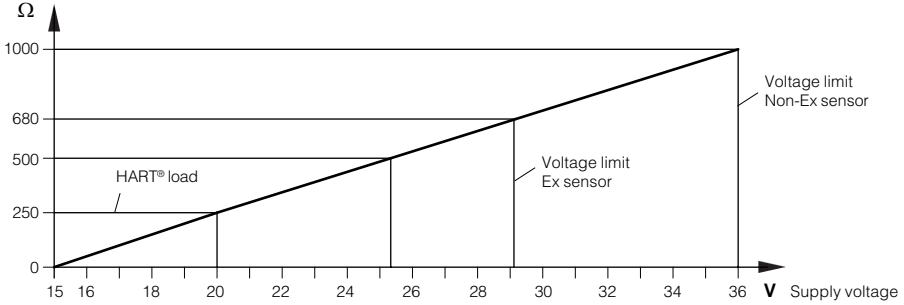
VEGAFLEX 55 K .CX D



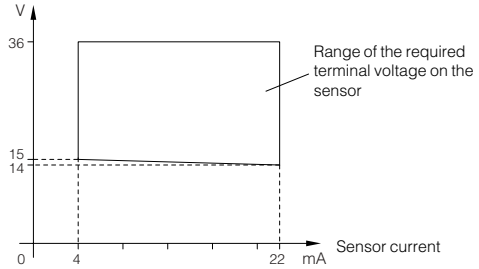
1.5 Technical data

Power supply

Supply voltage	
- two-wire sensor	24 V DC (15 ... 36 V DC)
Current consumption	
- two-wire sensor	max. 22.5 mA
Power consumption	
- two-wire sensor	max. 810 mW



The min. supply voltage depends on the sensor current.



Measuring range

VEGAFLEX 55	0.1 ... 4 m
-------------	-------------

Output signal

4 ... 20 mA current signal, load max. 500 Ω

Adjustment

- PC and adjustment software VEGA Visual Operating
- adjustment module MINICOM
- HART® handheld

Accuracy (under reference conditions acc. to IEC 770 - relating to the max. meas. range)

Linearity error	< 0.1 %
Temperature drift	0.015 %/10 K
Resolution of the 4 ... 20 mA signal	0.025 % of range (DA converter)
Resolution	1 mm

Characteristics

Min. span between full and empty adjustment	
- analogue output signal	10 mm

Ambient conditions

Vessel pressure	-1 ... 40 bar
Ambient temperature on the housing	-40°C ... +60°C
Process temperature	-40°C ... +150°C
Storage and transport temperature	-40°C ... +80°C
Protection	IP 66/IP 67 (meets both protection standards)
Protection class	
- two-wire sensor	II
- four-wire sensor	I
Overvoltage category	III
Min. dielectric constant	$\epsilon_r > 1.5$

Process fittings

VEGAFLEX 55	G $\frac{3}{4}$ " A, $\frac{3}{4}$ " NPT, G 1A, 1" NPT, G $1\frac{1}{2}$ " A, $1\frac{1}{2}$ " NPT 1.4435 (stst) or Hastelloy C22 plated flanges
-------------	---

Ex technical data 

Ex-Zone 0 acc. to ATEX II 1/2 G
 Ex Zone 0 EEx ia IIC T 6 acc. to ATEX II 1/2 G
 Ex Zone 0 EEx d ia IIC T 6 acc. to ATEX II 1/2 G
 The permissible operating data of the VEGAFLEX sensors for Ex areas are listed in the certificate.

Materials

Housing	PBT (Valox) or Aluminium (powder-coated)
Coax rod	1.4435 (stst: 316L) or Hastelloy C22

Connection cables

Two-wire sensor

- power supply and signal via one two-wire cable.

The cable resistance depends on the supply voltage (see diagram).

Conductor cross-section	generally 2.5 mm ²
Ground connection	max. 4 mm ²
Cable entry	2 x M20 x 1.5 (cable diameter 5 ... 9 mm) 2 x 1/2" NPT with ExD housing

CE conformity

VEGAFLEX sensors meet the protective regulations of EMC (89/336/EWG) and NSR (73/23/EWG). Conformity has been judged acc. to the following standards:

EMC Emission	EN 50 081 - 1: 1992
Susceptibility	EN 50 082 - 2: 1995
NSR	EN 61 010 - 1: 1993

Display

Display	scalable, analogue and digital display of measured values (option).
---------	---

An external measured value display, powered by the sensor, can be mounted at a distance of up to 25 m from the sensor.

Signal output

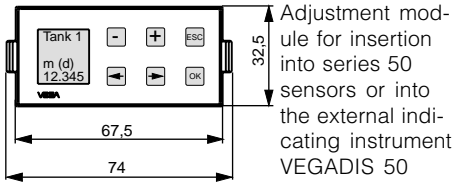
Signal output	
- two-wire technology	4 ... 20 mA (see diagram)
Resolution of the 20 mA signal	0.025 % of range
Load	0 ... 500 Ω

Two-wire technology:

The analogue 4 ... 20 mA output signal (measuring signal) is transmitted together with the power supply via one two-wire cable.

1.6 Dimensions

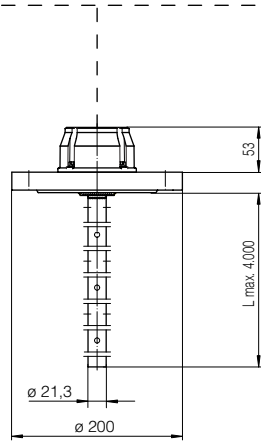
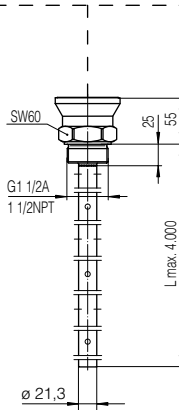
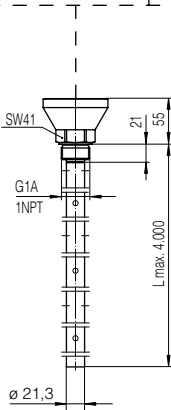
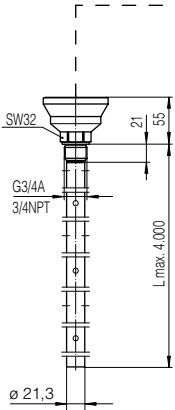
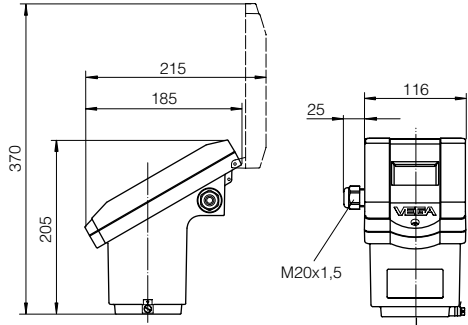
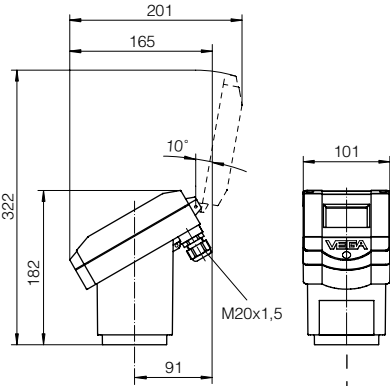
Adjustment module MINICOM



x = nicht messbarer Bereich

Plastic housing

Aluminium housing



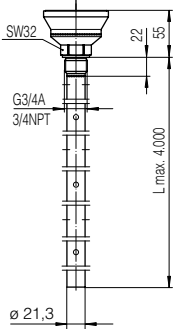
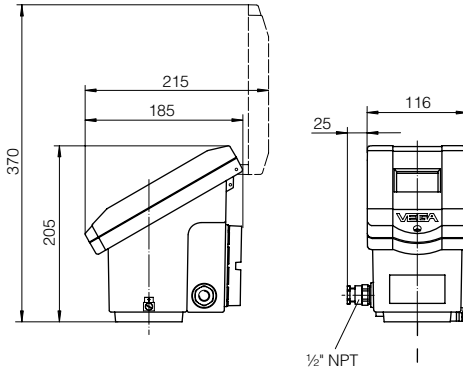
Thread
G $\frac{3}{4}$ A / $\frac{3}{4}$ " NPT

Thread
G 1A / 1" NPT

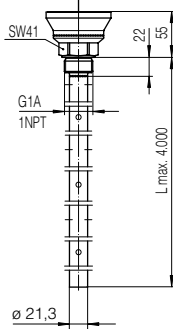
Thread
G $1\frac{1}{2}$ A / $1\frac{1}{2}$ " NPT

Flange

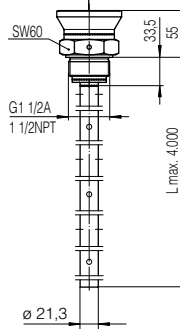
Aluminium housing with ExD terminal compartment



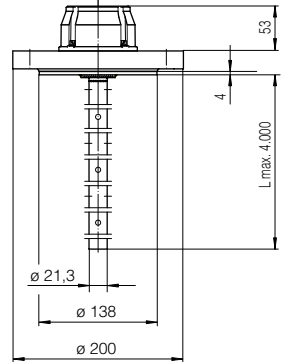
Thread
G 3/4A / 3/4" NPT
(Hastelloy C22)



Thread
G 1A / 1" NPT
(Hastelloy C22)



Thread
G 1 1/2A / 1 1/2" NPT
(Hastelloy C22)



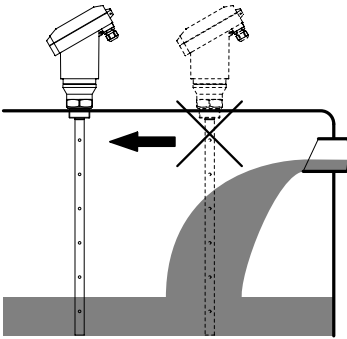
Flange
(Hastelloy C22)

2 Mounting

2.1 Installation instructions

Lateral load

Make sure that the cable is not subjected to strong lateral forces. Mount VEGAFLEX at a location where no interference caused by, e.g., stirrers, filling inlets etc. can occur.



Lateral load

Pressure

In case of gauge or low pressure in the vessel, the mounting boss must be sealed on the thread. Use the supplied seal ring. Make sure that the seal ring is resistant to the medium.

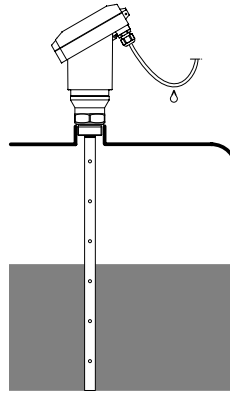
Cable entries

When mounting outdoors, on cooled vessels or in humid areas where cleaning is done, e.g. with steam or high pressure, the seal of the electrical cable entry is very important.

Use electrical cable with a round cross-section and tighten the cable entry firmly. The cable entry is suitable for cable diameters of 5 mm to 9 mm.

Moisture from outside

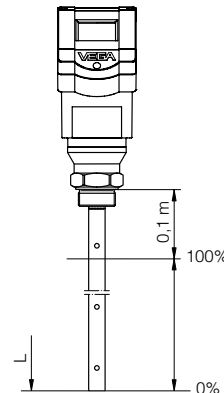
To avoid moisture ingress, the connection cable leading to the housing should be looped downward (directly in front of the cable entry), so that rain and condensation water can drain off. This mainly applies to outdoor mounting, in areas where moisture is expected (e.g. by cleaning processes) or to cooled or heated vessels.



Moisture

Measuring range

Keep in mind that the entire length of the rod cannot be used.



Measuring range

3 Electrical connection

3.1 Connection and connection cable

Safety information

As a rule, do all work in the complete absence of line voltage. Always switch off the power supply before you carry out connecting work on the sensors. Protect yourself and the instrument, especially when you use sensors which do not work with low voltage.

Qualified personnel

Instruments which are not operated with a protective low voltage must only be connected by qualified personnel.

Connection

For connection, a standard two-wire cable with max. 2.5 mm² can be used. Quite often, the "Electromagnetic pollution" from electronic actuators, energy lines and transmitting stations is so considerable that the two-wire cable should be shielded.

We recommend the use of shielded cable. Shielding is also a good preventative measure against future sources of interference. Ground the shielding only on one sensor end (fig. 3.1 a). It is advantageous to ground the shielding on both ends. However, you must make sure that no earth equalisation currents flow through the cable shielding (fig. 3.1 b). Earth equalisation currents (when grounding at both ends) can be prevented by connecting the cable shielding on one end (e.g. in the switching cabinet) via a capacitor (e.g. 0.1 µF; 250 V AC) to the earth potential. Use a very low-resistance earth connection (foundation, plate or mains earth). In Ex applications, the shielding must be grounded only at one end. Potential transfer can occur if the shielding is grounded at both ends.

Ex protection

If an instrument is used in areas endangered by dust explosion, the necessary regulations as well as the Ex certificate of VEGAFLEX for systems in Ex areas should be noted.

Connection cable

Make sure that the connection cables are specified for the expected operating temperatures in your systems.

The cable must have an outer diameter of 5 ... 9 mm (1/5 ... 1/3 inch). Otherwise, the seal effect of the cable entry will not be ensured.

Cables for intrinsically safe circuits must be marked blue and must not be used for other circuits. Note the special wiring regulations for Profibus PA sensors (P), see "1.5 Technical data connection cables".

Earth conductor terminal

On VEGAFLEX sensors, the earth conductor terminal is galvanically connected to the metal thread.

Grounding at one end (next to the sensor)

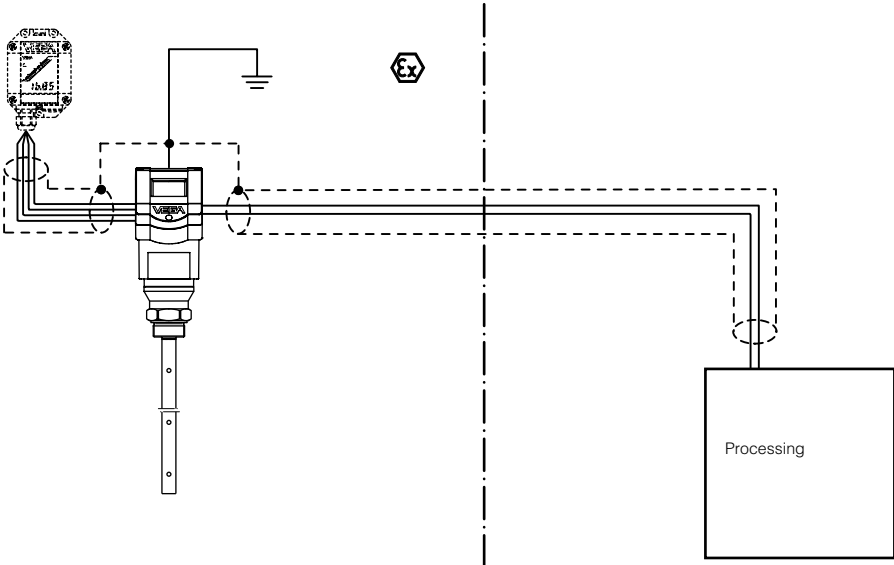


Fig. 3.1 a

Grounding at both ends (on the signal conditioning instrument via the potential separating capacitor)

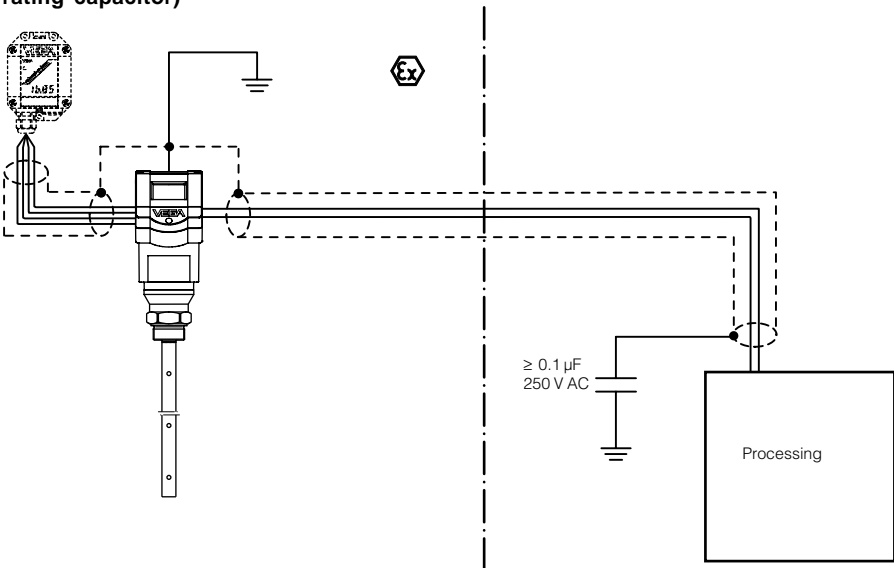
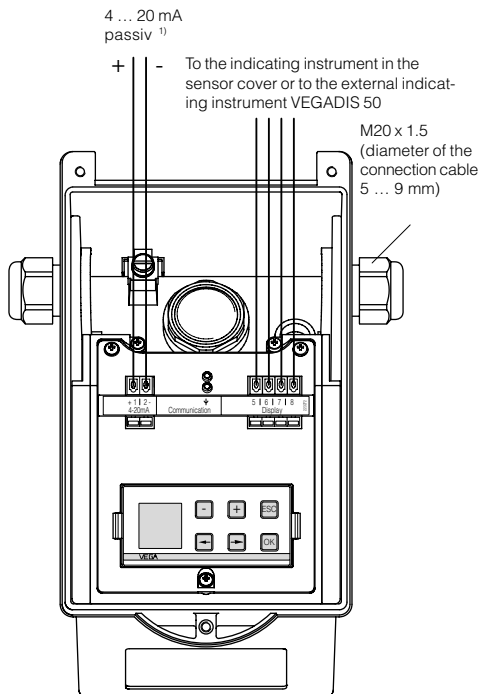


Fig. 3.1 b

3.2 Connection of the sensor

- Loosen the closing screws on the upper side of the sensor.
- Open the sensor cover.
- Remove the sleeve nut from the cable fitting and slide it a short distance up the connection cable.
- Remove the rubber seal from the cable fitting and slide it also a short distance up the connection cable.
- Remove the outer insulation of the connection cable over a length of approx. 10 cm.
- Insert the cable through the cable fitting into the sensor.
- Connect the cables. Push the white tabs of the spring-loaded terminals with a small screwdriver and insert the copper core of the connection cable into the terminal opening. Check the hold of the individual wires in the terminals by pulling lightly on them.
- Screw the sleeve nut back onto the cable fitting and screw it down tightly.

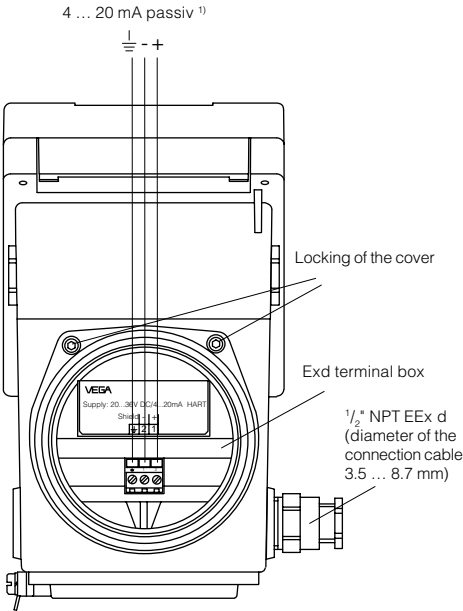


Two-wire technology (analogue) (loop powered)

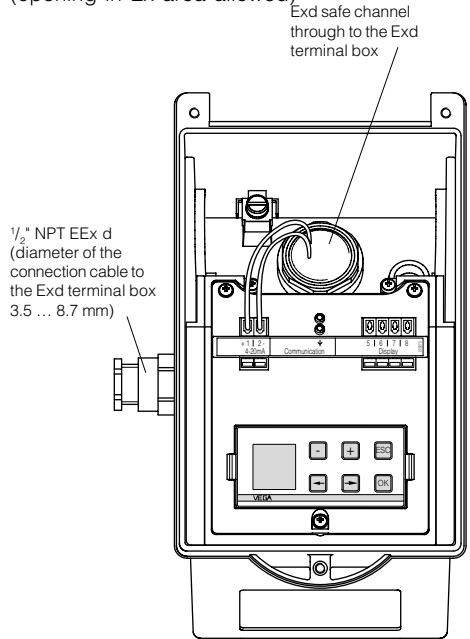
¹⁾ 4 ... 20 mA passive means that the sensor consumes a level-dependent current of 4 ... 20 mA (consumer).

Exd version (loop-powered with pressure-tight encapsulated terminal compartment)

EEx d terminal compartment
(opening in Ex area not allowed)



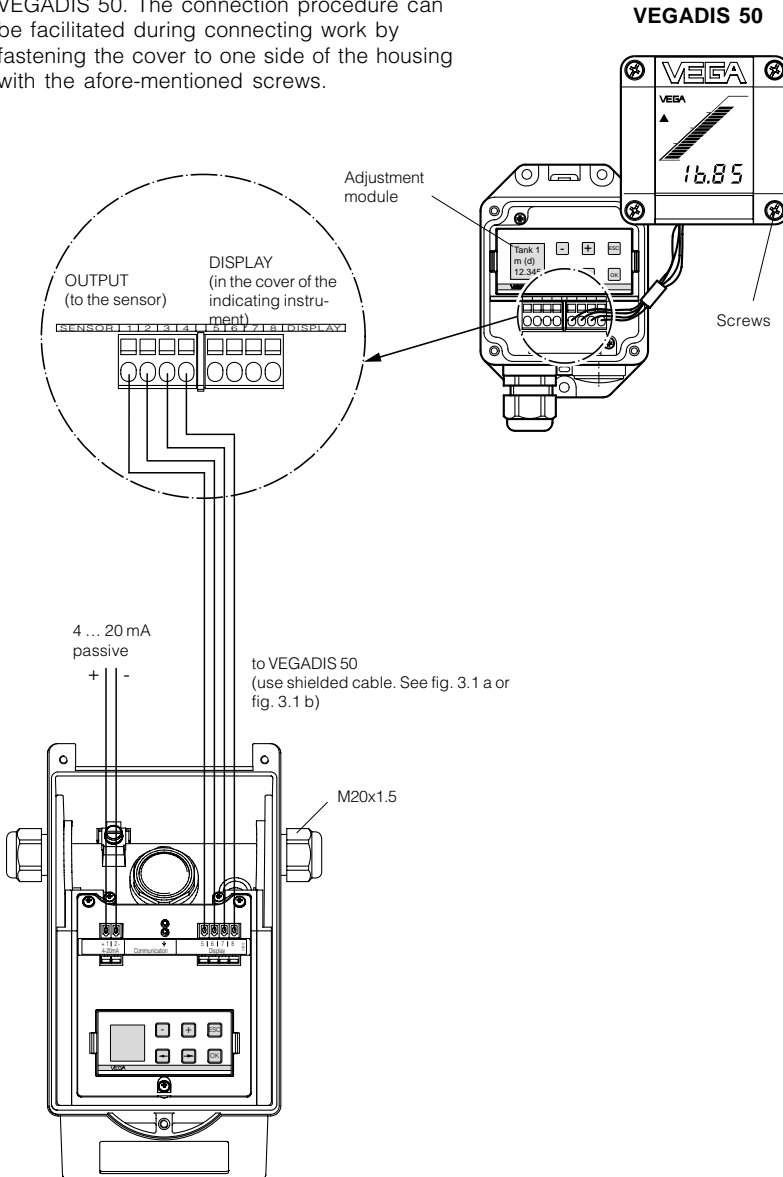
Adjustment module and indication terminal compartment
(opening in Ex area allowed)



¹⁾ 4 ... 20 mA passive means that the sensor consumes a level-dependent current of 4 ... 20 mA (consumer).

3.3 Connection of the indicating instrument VEGADIS 50

Loosen the 4 screws of the housing cover on VEGADIS 50. The connection procedure can be facilitated during connecting work by fastening the cover to one side of the housing with the afore-mentioned screws.



Two-wire sensor
(loop powered)

4 Setup

4.1 Adjustment media

- Series 50 sensors can be adjusted with the
- PC (adjustment program VVO)
 - detachable adjustment module MINICOM
 - HART® handheld.

It is only possible to use one adjustment device at a time.

Adjustment module MINICOM

With the adjustment module MINICOM, you can adjust directly in the sensor or in the external indicating instrument VEGADIS 50. With a dialogue text display and 6 keys, the module offers the same adjustment functionality as the adjustment software VVO.

Adjustment program VVO

With the adjustment program VVO (VEGA Visual Operating System) on the PC, the sensors can be adjusted in a very convenient, user-friendly manner. The PC communicates with the sensor via the interface converter VEGACONNECT 2 or 3. A digital adjustment signal is superimposed on the signal and supply cables. The PC can be connected at any location along the cable or directly to the sensor.

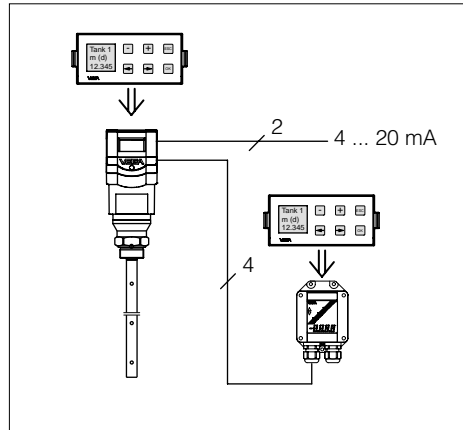
HART® handheld

VEGAFLEX 50 K sensors, like other HART® protocol-compatible instruments, can be adjusted with the HART® handheld. A manufacturer-specific DDD (Data Device Description) is not required. The sensors communicate with the HART® standard menus, through which all sensor functions are accessible. Functions that are rarely used, such as, for example, the scaling of the A/D converter for the signal output or the adjustment with medium, are not possible or are blocked with the HART® handheld. These functions must be carried out with the PC or the adjustment module MINICOM.

4.2 Adjustment with the adjustment module MINICOM

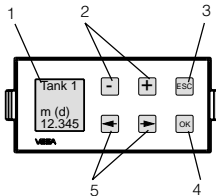
Just as with the PC, you can adjust the sensor with the small, detachable adjustment module MINICOM. The adjustment module is plugged into the sensor or into the external indicating instrument (optional).

All the adjustment options provided by a PC with the adjustment program VVO are also available with the adjustment module MINICOM. You can carry out all adjustment steps with the 6 keys of the adjustment module. A small display shows you, apart from the measured value, a short message on the menu item or an entered numerical value.



Adjustment elements

The adjustment module MINICOM is menu-orientated. The clear text indications on the display lead through the menu. The functions of the keys are described below.



"OK" key (4)

With the "OK" key you can confirm the settings.

When the symbol ▼ or ▾ is shown in the digital indication, you can switch to the lower menu level with the "OK" key.

The symbol ▾ indicates there is no branching point below the menu item, but only a further menu item of the respective function.

"ESC" key (3)

With the "ESC" key (Escape) you can interrupt an adjustment or a current function or switch to the next higher menu level.

To reach e.g. the uppermost menu level, push the "ESC" key several times.

"+" and "-" key (2)

With the "+" and "-" keys you can modify the values of the parameters or choose from a number of options.

After an initial push, the value to be adjusted flashes. Each additional push changes the value.

Arrow keys (5)

With the keys ">" and "<", you can move within the menu level from one menu item to the next.

Digital indication (1)

During operation, the digital display shows the actual measured value.

When adjusting the instrument, the clear text display shows the respective function.

- ▼ Branching point, from where you can move to the next lower menu.
- ▼ This symbol informs you of a subsequent
- ▼ safety enquiry.

Adjustment steps

On the following pages, you will see the menu schematic of the adjustment module MINICOM.

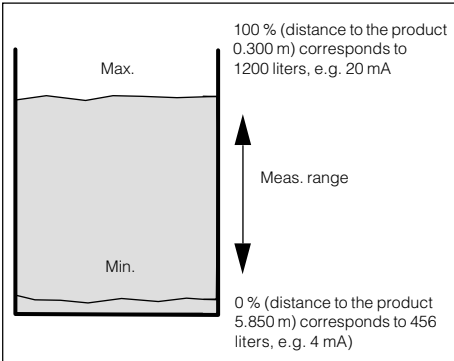
Set up the sensor in the following sequence. The numbers correspond to the sequence of the setup. You will find the numbers with the respective menu items in the menu schematic on the following pages.

1. Adjustment
2. Conditioning
3. Outputs
4. Operating range
5. Measuring conditions
6. Indication of the useful signal and noise level

1. Adjustment

Under the menu item "Adjustment", you inform the sensor of the measuring range it should operate in.

The instruments are already adjusted to the respective probe length. You only have to carry out a max. adjustment and enter the max. level.



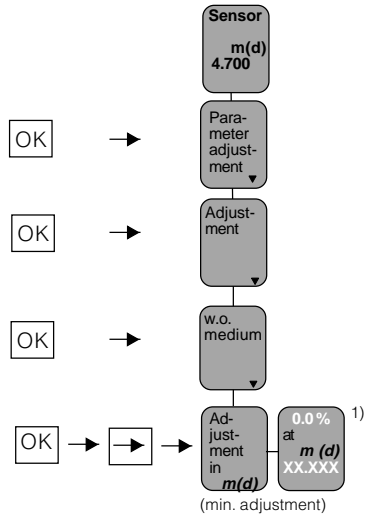
You can carry out the adjustment with or without medium. Generally, you will carry out the adjustment without medium, because you can adjust without having to fill the vessel.

Adjustment without medium

- Enter the distance of your sensor to the medium at 0 % (example: 5.850 m) with the "+" and "-" key. If you do not know the distance, you have to do a sounding.
- Enter the distance from the sensor to the medium at 100 % filling.

Key

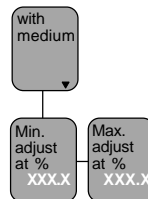
Display indication



¹⁾ In case of two values which can be modified, you can move with the "+" key to the second value (confirm with the "OK" key).

Adjustment with medium

Fill the vessel e.g. to 10 %, enter in the menu "Min-adjustment" with the "+" and "-" keys 10 % and confirm with the "OK" key. Then fill the vessel e.g. to 80 % or 100 %, enter in the menu "Max-adjustment" with the "+" and "-" keys 80 % or 100 % and confirm with the "OK" key.



2. Conditioning

Under the menu item "*Conditioning*" you choose the distance at 0 % and at 100 % filling. Then you enter the physical quantity and the unit as well as the decimal point.

- Enter in the menu window "*0 % correspond*" the value of the 0 % filling. This will be e.g. "80" for 80 liters.
- Confirm with "OK".
- With the arrow key you switch to the 100 % menu. Enter here the value of your parameter corresponding to a 100 % filling. E.g. "1200" for 1200 liters.
- Confirm with "OK".
- If necessary, choose a decimal point. Note that max. 4 digits can be shown.
- In the menu "*prop. to*", you choose the parameter (mass, volume, distance...).
- In the menu "*Unit*", you choose the physical unit (kg, l, ft³, gal, m³ ...).
- With the "ESC" key, you go back to the next higher menu level. With the arrow key, you choose the next menu item.
- In the menu "*Lin. curve*", you can choose between three standard linearisation curves.
A linear correlation between percentage value of the product distance and the percentage value of the filling volume has been preset.
You can choose between linear, spherical and cylindrical tank. Entering a user-programmable curve is only possible with the PC and the adjustment program VVO.
- In the menu item "*Integration time*", you can set a delay period for the signal output.

3. Outputs

Under the menu "*Outputs*", you determine e.g. if the current output should be inverted, or which parameter should be indicated on the sensor display.

4. Operating range

Without special adjustment, the operating range corresponds to the measuring range. The measuring range was already adjusted with the min./max. adjustment. It is generally better to choose a slightly wider span for operating range (approx. 5 %) than for the measuring range (span).

Example:

Min./Max. adjustment: 0.300 ... 5.850 m; set operating range to approx. 0.250 ... actual tube length.

5. Meas. conditions

With these functions, you can enter the ambient conditions in the vessel (see menu schematic).

6. Useful level and noise level

In the menu "*Info*", you get important information on the signal quality of the product echo. The higher the "*S-N*" value, the more reliable the measurement.

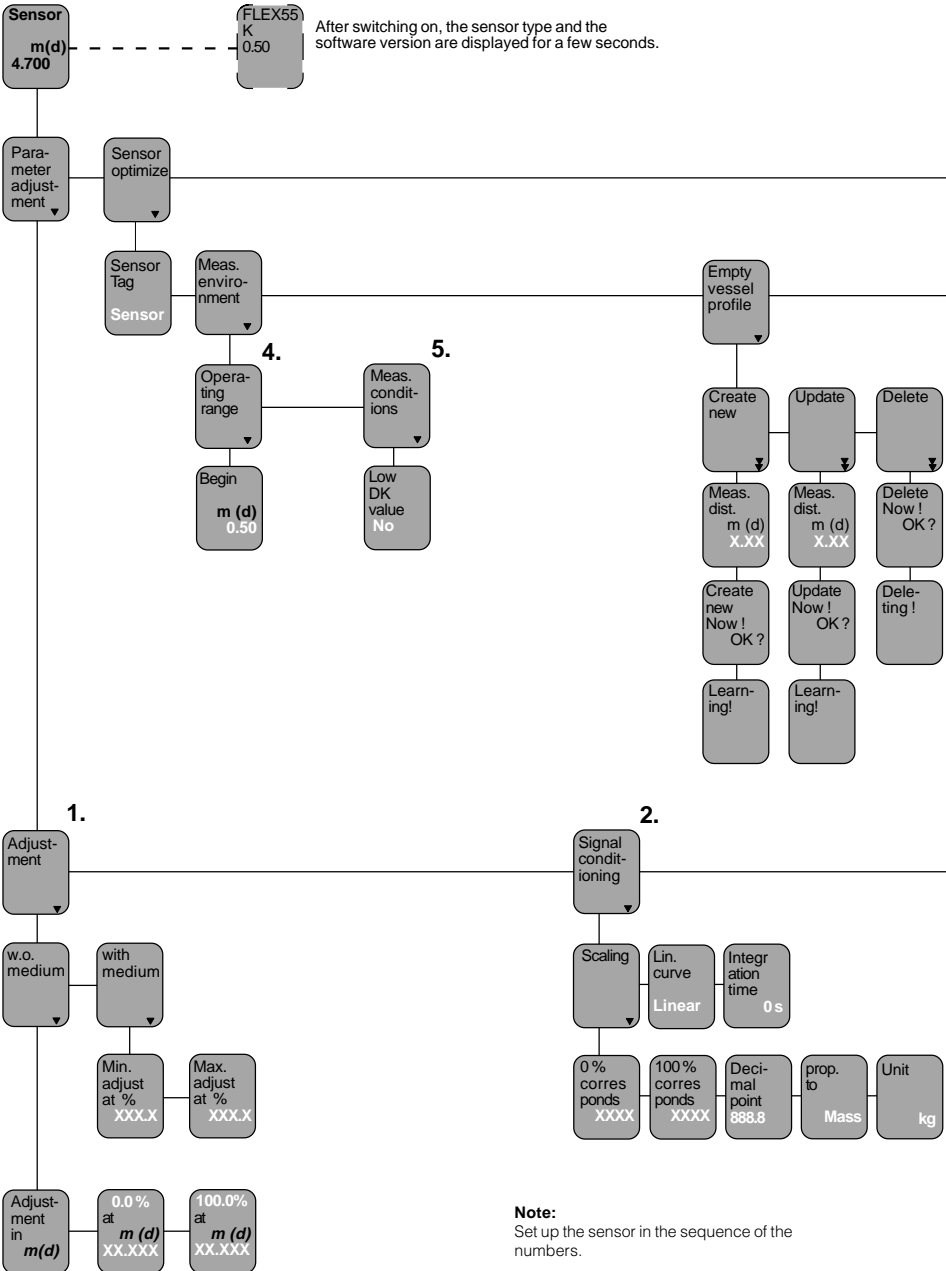
Ampl.: Means amplitude of the product echo in dB (useful signal level)

S-N: Means Signal-Noise (useful signal level minus noise level)

The higher the S-N value (useful signal level minus noise level), the higher the reliability:

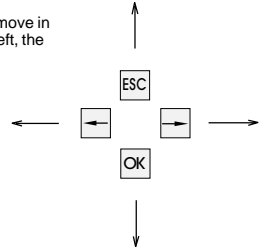
> 30 dB	Measurement good
10 ... 30 dB	Measurement satisfactory
< 10 dB	Measurement bad

Menu schematic of the adjustment module MINICOM



Note:
Set up the sensor in the sequence of the numbers.

With these keys you move in the menu field to the left, the right, top and bottom.



act. dist. **m (d)**
4.700

Ampl.: **XX** dB
S-N: **XX** dB

Add'l functions

Info

Reset to default

Language **English**

Meas. unit **m (d)**

Reset Now!
OK ?

Reset runs!

6.

Sensor Tag
Sensor

Sensor type
FLEX55 K

Serial number
1094 0213

Softw. vers.
1.00

Softw. date
15.09. 1997

act. dist. **m (d)**
4.700

Ampl.: **XX** dB
S-N: **XX** dB

3.

Outputs

mA output

Sensor displ.

prop. to Di-stance

mA output
4-20mA

Failure mode
22mA

Simulation

Simulation Now!
OK ?

Simulation %
XXX.X

act. dist. **m**
X,XX

Bolt print figures are sensor or measured value information and cannot be modified in this position.

Meas. unit
m (d)

The menu items in white letters stand for figures which can be modified with the "+" or "-" key and saved with the "OK" key.

4.3 Adjustment with the PC

Connection

The PC with the adjustment program VVO (VEGA Visual Operating from version 2.80) can be connected to the

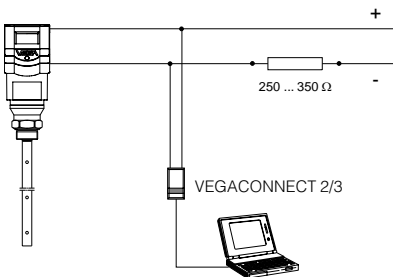
- sensor or
- signal cable.

PC on the sensor

To connect the PC to the sensor, the interface converter VEGACONNECT 2 or 3 is required. Plug it into the provided CONNECT sockets in the sensor.

PC on the signal cable

Connect the two-wire cable of VEGACONNECT 2 / 3 to the supply cable (two-wire sensor) of the sensor. If the resistance of the systems (PLC, current source etc.) connected to the supply cable is less than 250Ω , a resistor of $250 \dots 350 \Omega$ must be connected to the supply cable during adjustment. The digital signals modulated onto the signal cable would otherwise be considerably damped (short-circuited) through insufficient resistance, and communication with the PC would not be ensured.



You have connected the PC with the adjustment software VVO to your measuring system.

- Now switch on the power supply of the connected sensor.

In the first 10 ... 15 seconds the sensor starts to draw a current of approx. 22 mA (selftest) and then takes on a level-proportional or distance-proportional current of 4 ... 20 mA.

- Start the adjustment software VVO on your PC.
- In the entrance window, you choose with the arrow keys or the mouse the item "Planning" and click to "OK".
You should choose "Planning" only if you are authorised to modify instrument parameters. Otherwise choose "Operator" or "Maintenance".
In the window "User identification", you are asked for the name and the password.
- For setup (Planning), you enter under name: "VEGA" and under password also: "VEGA". It does not matter if the words are entered in small or capital letters.

VVO determines then automatically the type of the connected sensor and indicates a moment later with which sensor a connection exists.

If you get no communication with the sensor, check the following:

- The supply voltage must be at least 15 V at 4 mA or 14 V at 22 mA.
- In case VEGACONNECT 2 / 3 is directly connected to the sensor cable, the load resistance must be $250 \dots 350 \text{ Ohms}$.
- You have to use a VEGACONNECT 2 or 3. Older versions of VEGACONNECT are not compatible.

You will find further information on adjustment with the PC and the adjustment software VVO in the operating instructions manual of the adjustment software VEGA Visual Operating (VVO).

Special function

If a VEGAFLEX sensor is found, several special functions of VEGAFLEX can be chosen with the adjustment software VVO.

Under the menu item "Instrument data/Parameter adjustment", you can select sensor optimisation.

Here you find all special functions of VEGAFLEX:

- Meas. environment
- Echo curve

Meas. environment

Meas. conditions

Select in this menu which medium you want to measure in.

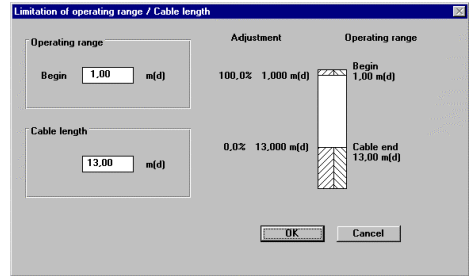
If you want to measure a product with a DK value below 2, you can increase the sensitivity of the sensor here.

Operating range

With this command, you can limit the operating range of the sensor.

Carry out the adjustment before modifying the operating range, as a later adjustment will overwrite the values of the operating range.

The right part of the graphics shows the operating range, the left part the adjustment. If e.g. you do not want to fill your vessel completely, you can limit the operating range.

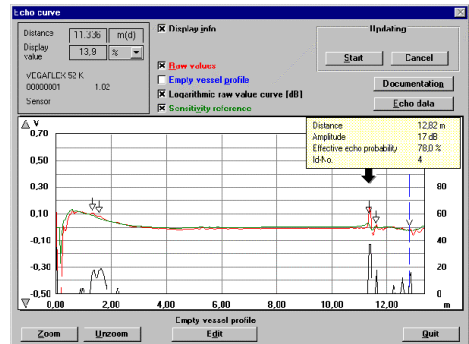


Echo curve

The echo curve shows all reflections of the guided microwave signal.

This means that not only the level signal is shown, but also interference signals, e.g. caused by vessel installations. The sensor generally interprets the highest amplitude as the level echo.

A black arrow is shown above the highest amplitude peak. When clicking to "Display info", a small window will be displayed, listing the detailed information on the selected echo.



Zoom/Unzoom

After activation of one of these two functions, you can either zoom or unzoom the curve with the left mouse key.

When activating "Zoom", you can choose the requested part of the picture by pressing the left mouse key and drawing a frame.

The following curves can be displayed:

Raw value curve (red)

The red curve represents the absolute signal, detected by the receiver of VEGAFLEX. Beside the useful echo, this curve also contains interference signals. The highest amplitude is interpreted as the level echo. Check by sounding if the value of the useful echo corresponds to the real distance to the medium. If the two values do not correspond, you have to filter out the dominant false echoes with the function "Empty vessel profile".

Vessel profile (blue)

In normal condition, this curve represents the beginning and end of the vessel. To filter out false echoes, you can modify the blue curve of the vessel profile with the function "Empty vessel profile".

Reference line (green)

All amplitudes of the red curve which are below the green reference line will be suppressed (ringing, noise, false echoes, etc.). All amplitudes above this line are possible echoes that will be evaluated by the software.

Logarithmic raw value curve (black)

This curve represents the difference between raw value curve (red) and reference line (green). The scale on the right (dB) applies to this curve.

Documentation

If you click the button "Documentation", the immediate echo curve will be saved.

Echo data

If you click the button "Echo data", a window is displayed in which all echoes detected by the sensor are listed with dB information and a probability evaluation.

Echo data					
Id.No.	Distance [m]	Width [m]	Amplitude [dB]	Effective echo prob. [%]	rel. amplitude [dB]
7	1.29	0.12	18	79.2	-
0	1.54	0.19	19	79.6	-
1	11.34	0.14	38	100.0	-
2	11.60	0.04	18	78.4	-
4	12.82	0.04	17	78.0	-

Quit

Start

If you click "Start", the echo curve is updated continuously. With "Stop" you can terminate the update.

Empty vessel profile

With the functions in this window, you can filter out false echoes. The blue empty vessel profile curve in the echo curve window represents the actual empty vessel profile.

Determine the level by sounding. It is possible to filter out the echo if the sensor has interpreted a false echo as the probable level echo instead of the sounded level. Choose the function "Create new". Enter the sounded distance to the medium. All false echoes within the range of the adjusted distance are gated out automatically. Please note that the blue curve of the empty vessel profile also changes.

Measured distance to product surface m(d)

Update Create new Delete Cancel

With "Update" you can extend the empty vessel profile, in case new false echoes appear when the level falls.

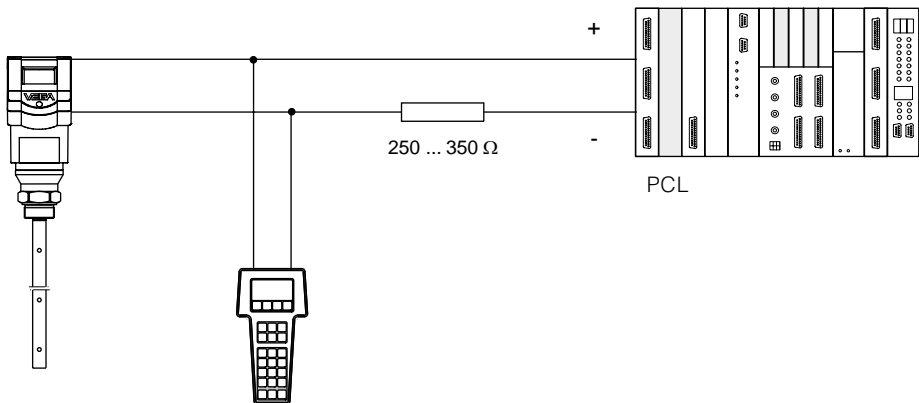
If you want to delete the existing empty vessel profile, click "Delete".

4.4 Adjustment with HART® handheld

The VEGAFLEX sensors can be set up with any HART® handheld. A special DDD (Data Device Description) is not necessary. Just connect the HART® handheld to the signal cable after having connected the sensor to the power supply.

Note

If the resistance of the signal current circuit is less than $200\ \Omega$, a resistor of $250\ \dots\ 350\ \Omega$ must be connected to the signal/connection cable during adjustment. Simply loop the resistor into the sensor connection cable (see figure).



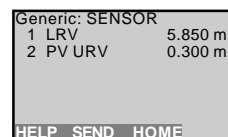
The most important adjustment steps

You will find the complete adjustment procedure via HART® protocol in the operating instructions of the HART® handheld.

To enter parameters, first press "ENTER".

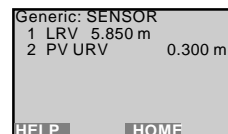


The entered value will be saved in the handheld, but not in the sensor itself. Press "SEND" to transmit the entered value to the sensor.



Press "OK" to acknowledge the following warning. Follow the instructions on the display.

Press again "OK", and the adjustment that was just carried out is displayed.



5 Diagnosis

5.1 Simulation

To simulate a certain filling, you can call up the function "Simulation" on the adjustment module MINICOM, in the software program VVO or in the HART® handheld. This function simulates a certain current value. Please keep in mind that connected devices, such as e.g. a PLC, react according to their settings and will probably activate alarms or system functions.

5.2 Failure rectification

Error		Corrective measure
E 013	Sensor does not find a level echo	<ul style="list-style-type: none"> - Message is displayed during the warm-up phase. - If the message remains, the DK value of the medium might be too low. Check the useful level and noise level. See "4.2 Adjustment with adjustment module MINICOM; 6. Useful level and noise level". If the message still remains, carry out a new adjustment.
E 017	Adjustment span too small	Carry out the adjustment again. Make sure that the difference between min. and max. adjustment is at least 10 mm.
E 036	Software update incorrect	Return the instrument for repair.
E 040	Hardware failure/ Electronics defective	Check all connection cables. Contact our service department.

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