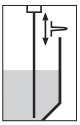
Operating Instructions

VEGAFLEX 67
400 °C/160 bar
4 … 20 mA/HART - four-wire



Contents

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Supplementary operating instructions manuals

Information:
VEGAFLEX 67 is available in different versions. Depending on the selected version, supplementary operating instructions manuals may also come with the shipment. The supplementary operating instructions manuals are listed in section *"Product description*.

Operating instructions manuals for accessories and replacement parts

Tip:
To ensure reliable setup and operation of your VEGAFLEX 67, we offer accessories and replacement parts. The associated documents are:

- Operating instructions manual "*External indicating and adjustment unit VEGADIS 61*"
- Operating instructions manual "*Oscillator VEGAFLEX series 60*"
- Supplementary instructions manual "*Flanges according to DIN-EN-ASME-JIS*"

1 About this document

1.1 Function

This operating instructions manual has all the information you need for quick setup and safe operation. Please read this manual before you start setup.

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.

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 operator. For safety and warranty reasons, any internal work on the instruments must be carried out only by personnel authorised by the manufacturer.

2.2 Appropriate use

VEGAFLEX 67 is a sensor for continuous interface measurement in liquids.

Detailed information on the application range of VEGAFLEX 67 is available in chapter "*Product description*".

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

VEGAFLEX 67 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 (e.g. the VDE regulations in Germany) as well as all prevailing safety regulations and accident prevention rules.

2.5 CE conformity

VEGAFLEX 67 is in CE conformity with EMC (89/336/EWG) and LVD (73/23/EWG).

Conformity has been judged according to the following standards:

- EMC:
  - Emission EN 61326: 2004 (class A)
  - Susceptibility EN 61326: 2004 including supplement A
- LVD: EN 61010-1: 2001

2.6 Fulfilling NAMUR recommendations

With regard to interference resistance and interference emission, VEGAFLEX 67 fulfils NAMUR recommendation NE 21.

VEGAFLEX 67 and its indicating and adjustment components fulfill NAMUR recommendation NE 53 in respect to compatibility. VEGA instruments are generally upward and downward compatible:

- Sensor software to DTM VEGAFLEX 67 HART, PA or FF
- DTM VEGAFLEX 67 for adjustment software PACTware™
- Indicating and adjustment module for sensor software

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

The software version of VEGAFLEX 67 can be determined as follows:

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

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

2.7 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.

2.8 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:

- Chapter "*Storage and transport*"
- Chapter "*Disposal*"

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- VEGAFLEX 67 level sensor
- Documentation
  - this operating instructions manual
  - Operating instructions manual "*Indicating and adjustment module*" (optional)
  - Supplementary instructions manual "*Plug connector for continuously measuring sensors*" (optional)
  - Ex-specific "*Safety instructions*" (with Ex-versions)
  - if necessary, further certificates

Components

VEGAFLEX 67 consists of the following components:

- Process fitting with probe
- Housing with electronics
- Housing cover, optionally available with indicating and adjustment module

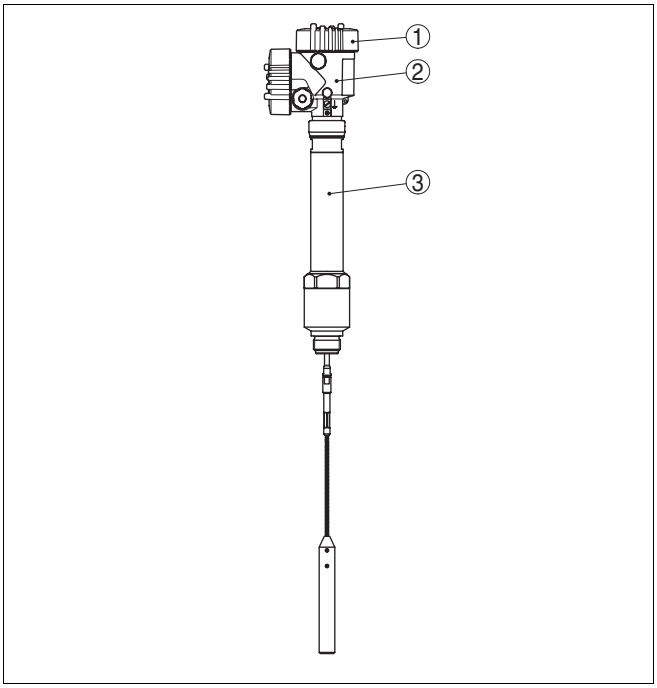

Fig. 1: VEGAFLEX 67 in cable version with double chamber housing
1 Housing cover with integrated PLICSCOM (optional)
2 Housing with electronics
3 Process fitting

3.2 Principle of operation

Area of application

VEGAFLEX 67 is a level sensor with coax, rod or cable probe for continuous interface measurment.

It is designed for industrial use in all areas of process technology and can be used in liquids.

Functional principle

High frequency microwave impulses are guided along a steel cable or rod or a rod inside a steel tube. When reaching the product surface, a part of the microwave impulses is reflected. The other part passes the upper product and is reflected a second time by the interface. The running times to the two product layers are processed by the instrument.

Prerequisites for interface measurement

Upper medium (L2)

- The upper medium must not be conductive

- The dielectric value of the upper medium must be known (input necessary). Min. dielectric values: Rod version 1.7, coax version 1.4. You will find a list of the dielectric values on our homepage: www.vega.com.
- The composition of the upper medium must be stable, no varying products or mixtures
- The upper medium must be homogeneous, no stratifications within the medium
- Min. thickness of the upper medium 100 mm
- Clear separation from the lower medium, no emulsion phase, no mull layer
- If possible, no foam on the surface

Lower medium (L1)

- The dielectric value must be 10 higher than the dielectric value of the upper medium, preferably electrically conductive. Example: upper medium dielectric value 2, lower medium at least dielectric value 12

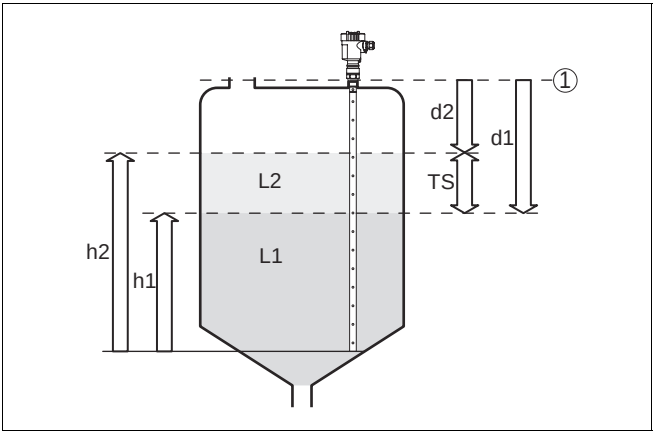

Fig. 2: Interface measurement
1 Reference plane
d1 Distance to the interface (HART value 1)
d2 Distance to the level (HART value 3)
TS Thickness of the upper medium (d1 - d2)
h1 Height - Interface
h2 Height - Level
L1 Lower medium
L2 Upper medium

Output signal

The interface is processed directly by the sensor.

The analogue output (4 … 20 mA) transfers the height to the interface (h1) in percent. This is also the value to be adjusted.

The display of PLICSCOM and PACTware™ outputs the distance to the interface (d1) in m(d).

The HART protocol can transmit the distance to the interface - HART value 1 (d1) and the distance to the level (d2) - HART value 3.

The values can be processed e.g. with a HART interface module (HIM) or with a VEGAMET 625. VEGAMET 625 can also generate the difference out of the two values.

Power supply

Four-wire electronics with separate power supply.

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

The data for power supply are stated in chapter "*Technical data*" in the "*Supplement*".

Measured value transmission is carried out via the 4 … 20 mA/HART output separate from power supply.

The backlight of the indicating and adjustment module is powered by the sensor. The prerequisite for this is a supply voltage at a certain level. The exact voltage specifications are stated in chapter "*Technical data*" in the "*Supplement*".

3.3 Operation

VEGAFLEX 67 can be adjusted with different adjustment media:

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

The entered parameters are generally saved in VEGAFLEX 67, optionally also in the indicating and adjustment module or in PACTware™.

3.4 Storage and transport

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.

Storage and transport temperature

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

4 Mounting

4.1 General instructions

Installation 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°).

Welding work

Before beginning with the welding work, remove the oscillator out of the sensor. By doing this, you avoid damages ont he electrode due to inductive couplings.

Handling

The housing of the threaded versions must not be used to screw the instrument in! Applying tightening force on the housing can damage its rotational mechanical parts.

Use the hexagon for screwing in.

Moisture

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

You can give your VEGAFLEX 67 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 mounting outdoors, in areas where moisture is expected (e.g. by cleaning processes) or on cooled or heated vessels.

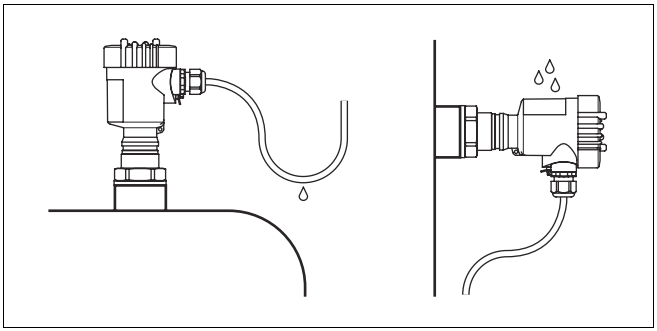

Fig. 3: Measures against moisture penetration

Measuring range

The reference plane for the measuring range of the sensors is the seal surface of the thread or flange.

Keep in mind that a min. distance must be maintained below the reference plane and possibly also at the end of the probe - measurement in these areas is not possible (dead zone). Keep in mind that the cable length cannot be used up to the end because measurement in the area of the gravity weigh is not possible. These min. distances are listed in chapter "*Technical data*" in the "*Supplement*".

Pressure

The process fitting must be sealed if there is gauge or low pressure in the vessel. Before use, check if the seal material is resistant against the measured product and the process temperature.

The max. permissible pressure is stated in chapter "*Technical data*" in the "*Supplement*" or on the type label of the sensor.

4.2 Mounting instructions

Installation position

Mount VEGAFLEX 67 in such a way that the probe does not touch any installations or the vessel wall during installation.

Mount cable and rod versions of VEGAFLEX 67 in such a way that the distance to vessel installations or the vessel wall is at least 300 mm (11.8 in).

During operation, the probe must not touch any installations or the vessel wall. If necessary, fasten the probe end.

In vessels with conical bottom it can be advantageous to mount the sensor in the center of the vessel, as measurement is then possible down to the lowest point of the bottom. When using the cable version, keep in mind that measurement down to the end of the probe is not possible. The exact value of the min. distance (lower dead zone) is stated in chapter "*Technical data*" in the "*Supplement*".

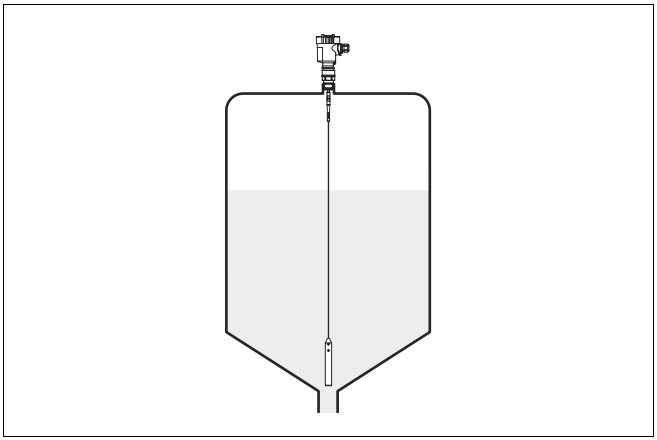

Fig. 4: Vessel with conical bottom

Inflowing medium

Make sure that the probe is not subjected to strong lateral forces. Mount VEGAFLEX 67 at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

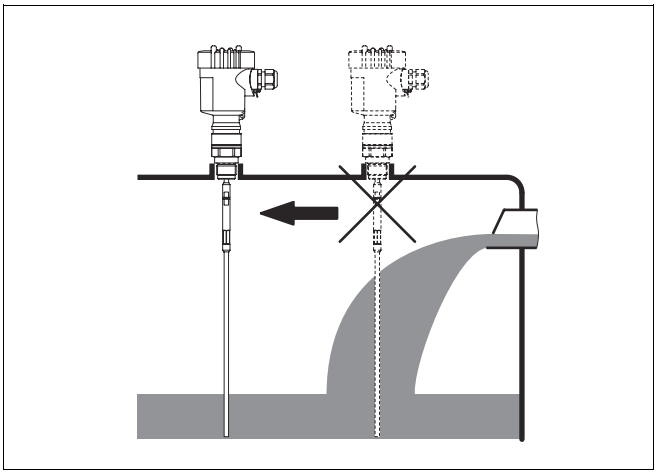

Fig. 5: Lateral load

Excessive system vibration or shocks, e.g. caused by agitators or turbulence in the vessel (e.g. from fluidisation) can cause the coax probe of VEGAFLEX 67 to vibrate in resonance. Should a coax probe of more than 1 m (3.3 in) length should be used, you can provide a suitable support or guy directly above the end of the probe to stabilise it.

Fasten

If the probe can touch the vessel wall during operation due to product movements or agitators etc., the measuring probe should be fixed securely.

There is a thread (M12) in the gravity weight, e.g. for a lug (article no. 2.27423).

Make sure that the probe cable is not completely taut. Avoid tensile loads on the rope.

Avoid undetermined cable-vessel-connection, i.e. the connection must be either grounded reliably or isolated reliably. Any change of this requirement will cause measurement errors.

Heat insulation

VEGAFLEX 67 should be integrated in the vessel installation. This prevents the electronics from strong heating by heat radiation.

Make sure that with heated vessels the permissible ambient temperature on the housing is not exceeded. The permissible ambient temperature is stated in chapter "*Technical data*" under "*Ambient conditions*".

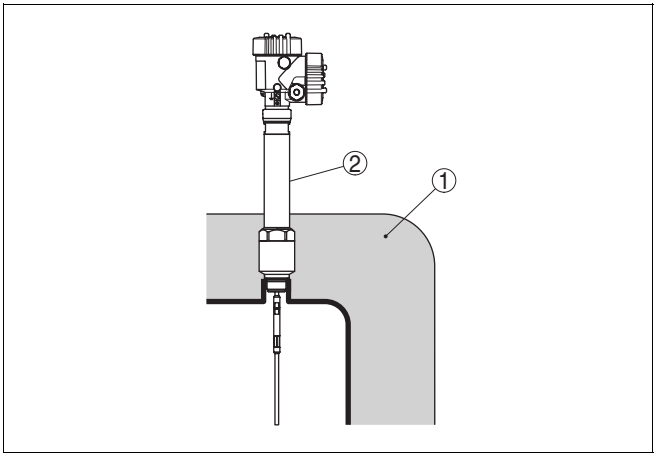

Fig. 6: Vessel with heat insulation
1 Heat insulation
2 Ambient temperature on the housing

5 Connecting to voltage supply

5.1 Preparing the connection

Note safety instructions

Generally note the following safety instructions:

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

Tip:
We recommend using VEGA overvoltage arresters FS-LB-I and ÜSB 62-36G.X.

Take note of safety instructions for Ex applications

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

Select power supply

Voltage supply and current output are carried along separate two-wire connection cables if reliable separation is required. The voltage supply range can differen depending on the instrument version.

The data for power supply are stated in chapter "*Technical data*" in the "*Supplement*".

The standard version can be operated with an earth-connected current output, the Exd version must be operated with a floating output.

This instrument is designed in protection class I. To maintain this protection class, it is absolutely necessary that the ground conductor be connected to the internal ground terminal. Take note of the general installation regulations.

As a rule, connect VEGAFLEX 67 to vessel ground (potential euqalisation) or in case of plastic vessels to the next ground potential. For this purpose, there is a ground terminal on the side of the instrument housing.

Selecting connection cable

For power supply, an approved installation cable with PE conductor is necessary.

The 4 … 20 mA current output is connected with standard two-wire cable without screen. If strong electromagnetic interference is expected, screened cable should be used.

An outer cable diameter of 5 … 9 mm ensures the seal effect of the cable entry.

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Cable screening and grounding

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

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

Select connection cable for Ex applications

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

5.2 Connection procedure

Proceed as follows:

1 Unscrew the housing cover

2 Loosen compression nut of the cable entry

3 Remove approx. 10 cm (4 in) of the cable mantle (current output), strip approx. 1 cm (0.4 in) insulation from the ends of the individual wires

4 Insert the cable into the sensor through the cable entry

5 Lift the opening levers of the terminals with a screwdriver

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

7 Press down the opening lever of the terminals, you will hear the terminal spring closing.

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

9 Connect the screen to the internal ground terminal and the external ground terminal to potential equalisation

10 Tighten the compression nut of the cable entry. The seal ring must completely encircle the cable

11 Connect the lead cable for power supply in the same way according to the wiring plan, in addition connect the ground conductor to the inner ground terminal.

12 Screw the housing cover back on

The electrical connection is finished.

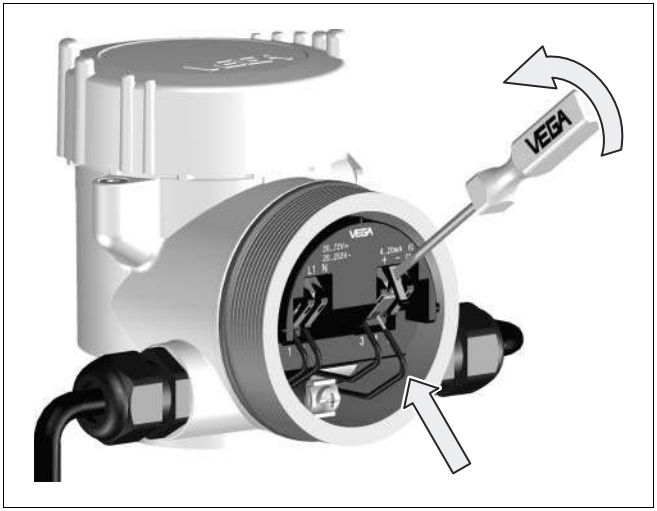


Fig. 7: Connection steps 5 and 6

5.3 Wiring plan, double chamber housing

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

Housing overview

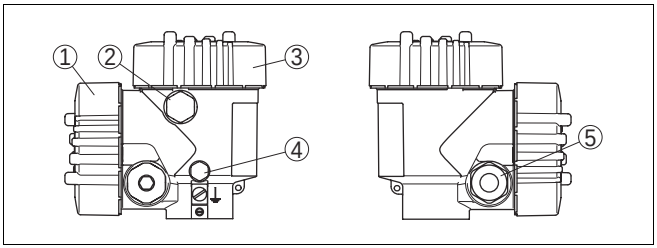


Fig. 8: Double chamber housing
1 Housing cover, connection compartment
2 Blind stopper or plug M12x1 for VEGADIS 61 (option)
3 Housing cover, electronics compartment
4 Filter element for pressure compensation or blind stopper with version IP 66/ IP 68, 1 bar[1)]
5 Cable entry or plug

1) Version IP 66/IP 68, 1 bar not with four-wire instruments

Electronics compartment

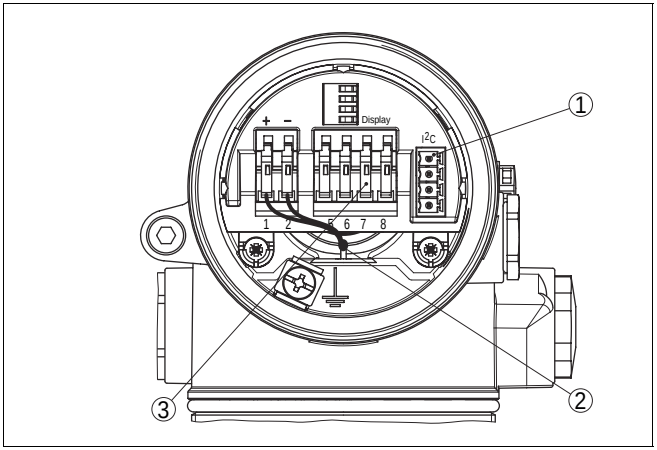


Fig. 9: Electronics compartment, double chamber housing
1 Plug connector for VEGACONNECT (I^2C interface)
2 Internal connection cable to the connection compartment
3 Terminals for VEGADIS 61

Connection compartment

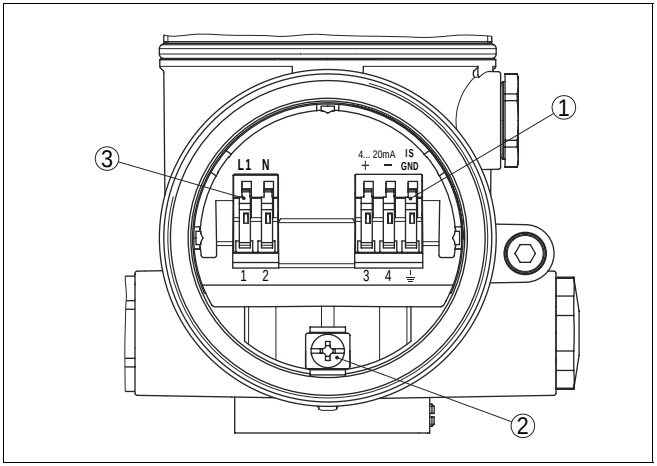


Fig. 10: Connection compartment, double chamber housing
1 Spring-loaded terminals for signal output
2 Ground terminal for connection of the ground conductor and screen
3 Spring-loaded terminals for voltage supply

Wiring plan

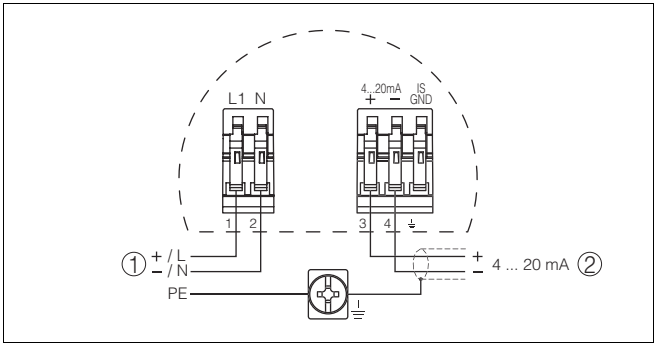


Fig. 11: Wiring plan, double chamber housing
1 Voltage supply
2 Signal output

6 Setup 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 revision ...- 01 or higher of the indicating and adjustment module as well as of the corresponding sensor, an integrated backlight can be switched on via the adjustment menu. The hardware revision is stated on the type label of the indicating and adjustment module or the sensor electronics.

Information:
This function is for instruments with StEx, WHG or ship approval as well as country-specific approvals such as those according to FM or CSA, available at a later date.

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

6.2 Insert the indicating and adjustment module

Mounting/dismounting the indicating and adjustment module

The indicating and adjustment module can be inserted in the sensor and removed 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/adjustment module is powered by the sensor, an additional connection is not necessary.

Fig. 12: Installation of the indicating and adjustment module

Note:
If you intend to retrofit VEGAFLEX 67 with an indicating and adjustment module for continuous measured value indication, a higher cover with an inspection glass is required.

6.3 Adjustment system

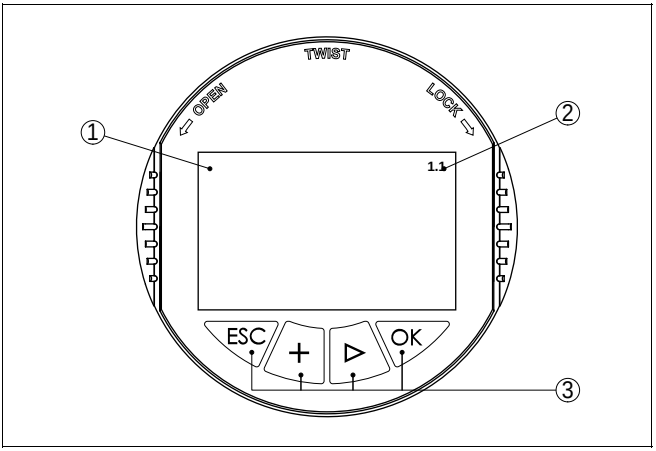


Fig. 13: Indicating and adjustment elements
1 LC display
2 Indication of the menu item number
3 Adjustment keys

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 a 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

Switch-on phase

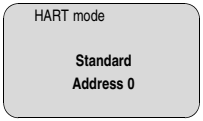
After connecting VEGAFLEX 67 to power supply or after a voltage recurrence, the instrument carries out a self-check for approx. 30 seconds:

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

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

Address setting HART-Multidrop

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



Parameter adjustment

As VEGAFLEX 67 is a distance measuring instrument, the distance from the sensor to the product surface is measured. To have the real product level displayed, an allocation of the measured distance to the percentage height must be made. To carry out this adjustment, the distance is entered with full and empty vessel. If these values are not known, an adjustment with the distance values, e.g. 10 % and 90 % is also possible. Starting point for these distance specifications is always the seal surface of the thread or flange. With these settings, the real level is calculated. Furthermore the operating range of the sensor is limited from maximum to the required range.

The real product level during this 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.

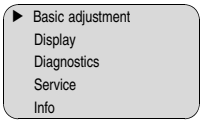
In the main menu item "*Basic adjustment*", the individual submenu items should be selected one after the other and provided with the correct parameter values.

Start your parameter adjustment with the following menu items of the basic adjustment:

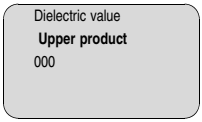
Carrying out min. adjustment

Proceed as follows:

1 Move from the measured value display to the main menu by pushing ***[OK]***.

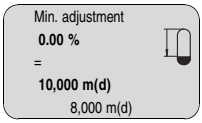


2 Select the menu item "*Basic adjustment*" with ***[->]*** and confirm with ***[OK]***. Now the menu item "**Dielectric value**" is displayed.



3 Enter the DK value of the upper medium and confirm with ***[OK]***.

Save the settings with ***[OK]*** and move to "Min. adjustment" with ***[->]***.



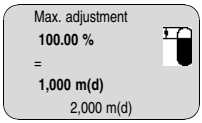
4 Prepare the % value for editing with ***[OK]*** and set the cursor to the requested position with ***[->]***. Set the requested percentage value with ***[+]*** and save with ***[OK]***. The cursor jumps now to the distance value.

5 Enter the appropriate distance value in m (corresponding to the percentage value) for the empty vessel (e.g. distance from the sensor to the vessel bottom).

6 Save the settings with ***[OK]*** and move to "Max. adjustment" with ***[->]***.

Carrying out max. adjustment

Proceed as follows:



1 Prepare the % value for editing with ***[OK]*** and set the cursor to the requested position with ***[->]***. Set the requested percentage value with ***[+]*** and save with ***[OK]***. The cursor jumps now to the distance value.

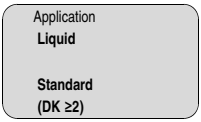
2 Enter the appropriate distance value in m (corresponding to the percentage value) for the full vessel. Keep in mind that the max. level must lie below the dead band.

3 Save the settings with ***[OK]***.

Application

Each product has different reflective properties. In addition, there are various interfering factors which have to be taken into account: agitated product surfaces and foam generation (with liquids); dust generation, material cones and echoes from the vessel wall (with solids). To adapt the sensor to these different conditions, you should first select in this menu item under "*Medium*" the selection "*Liquid*" or "*Solid*".

With coax versions, this menu item must be set to "*Liquid*".



Depending on the dielectric value, measured products can have a different reflective property. Therefore an additional selection possibility is available.

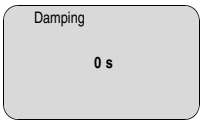
Under "*Sensitivity*" you can select "*Standard (DK ≥2)*" or "*Increased sensitivity (DK <2)*".

Through this additional selection, the sensor is adapted perfectly to the product and measurement reliability, particularly in products with bad reflective properties, is considerably increased.

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

Damping

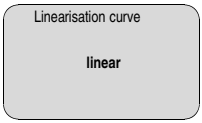
To suppress fluctuations in the measured value display, e.g. caused by an agitated product surface, an integration time can be set. This time can be between 0 and 999 seconds. Keep in mind that the reaction time of the entire measurement will then be longer and the sensor will react to measured value changes with a delay. In general, a period of a few seconds is sufficient to smooth the measured value display.



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

Linearisation curve

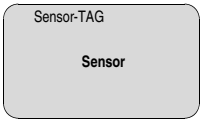
A linearization is necessary for all vessels in which the vessel volume does not increase linearly with the level - e.g. with a cylindrical or spherical tank - and the indication or output of the volume is required. Corresponding linearization curves are preprogrammed for these vessels. They represent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



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

Sensor-TAG

In this menu item you can enter an unambiguous designation for the sensor, e.g. the measurement loop name or the tank or product designation. In digital systems and in the documentation of larger plants, a singular designation should be entered for exact identification of individual measuring sites.



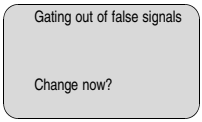
With this menu item, the Basic adjustment is finished and you can now jump to the main menu with the ***[ESC]*** key.

Gating out of false signals

High sockets or vessel installations, such as e.g. struts or agitators as well as buildup and weld joints on the vessel walls cause interfering reflections which can impair the measurement. A false echo storage detects and marks these false echoes, so that they are no longer taken into account for the

level measurement. A false echo memory should be created with empty vessel so that all potential interfering reflections will be detected.

Probes in coax version require no gating out of false echoes since they are not influenced by false reflections.



Proceed as follows:

1 Move from the measured value display to the main menu by pushing ***[OK]***.

2 Select the menu item "*Service*" with ***[->]*** and confirm with ***[OK]***. Now the menu item "*False signal suppression*" is displayed.

3 Confirm "*False signal suppression - Change now*" with ***[OK]*** and select in the below menu "*Create new*". Enter the actual distance from the sensor to the product surface. All false signals in this area are detected by the sensor and saved after confirming with ***[OK]***.

Note:
Check the distance to the product surface, because if an incorrect (too large) value is entered, the existing level will be saved as false signal. The filling level would then no longer be detectable in this area.

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*".

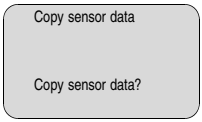
The following data are read out or written with this function:

- Measured value presentation
- Adjustment
- Medium
- Vessel form
- Damping
- Linearisation curve
- Sensor-TAG
- Displayed value
- Display unit

- Scaling
- Current output
- Unit of measurement
- Language
- Sensitivity
- Dielectric value

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

- HART mode
- PIN
- SIL
- Sensor length/Sensor type
- Gating out of false signals



Reset

Basic adjustment

If the function "*Reset*" is carried out, the sensor resets all settings to default.

The following values will be reset:

Function	Reset value
Max. adjustment	Distance, upper dead zone
Min. adjustment - Rod/Coax version	Distance, supplied sensor length
Min. adjustment - Cable version	Distance, lower dead zone
Integration time ti	0 s
Linearization	linear
Sensor-TAG	Sensor
Display	Distance
Current output - characteristics	4 … 20 mA
Current output - max. current	20 mA
Current output - min. current	4 mA
Current output - failure	<3.6 mA
Application - rod/coax version	Liquid
Application - Cable version	Solid

All special parameters are reset to delivery status.

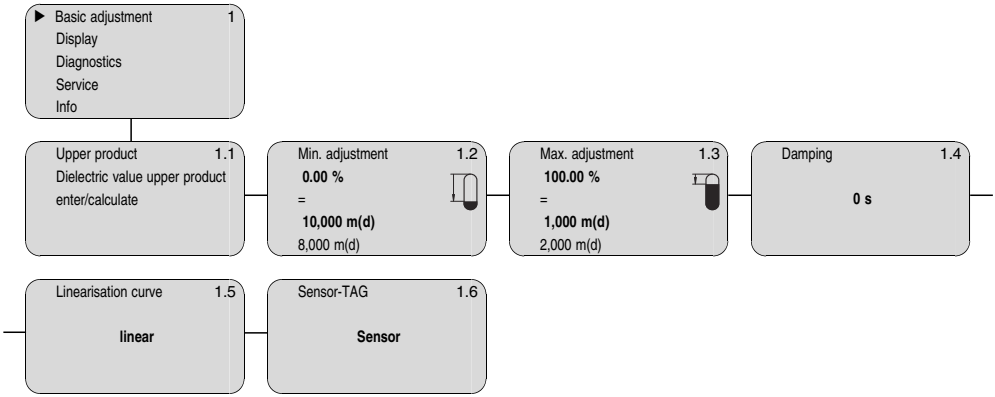
Pointer
The min. and max. values are reset to the actual value.

Optional settings

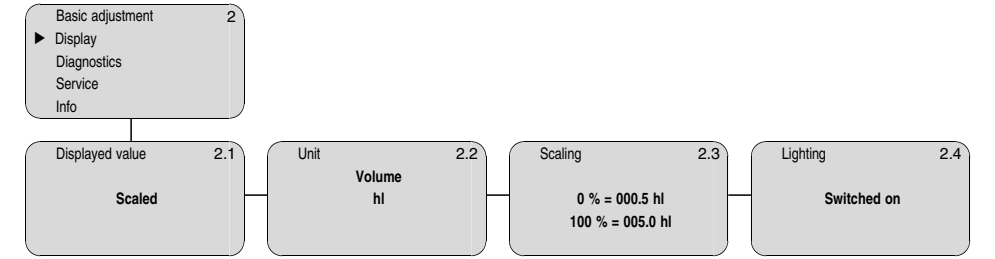
Additional adjustment and diagnosis options such as e.g. scaling, simulation or trend curve presentation are shown in the following menu schematic. You will find a detailed description of these menu items in the operating instructions manual "*Indicating and adjustment module*".

6.5 Menu schematic

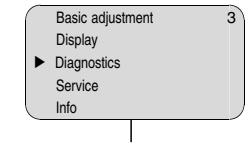
Basic adjustment

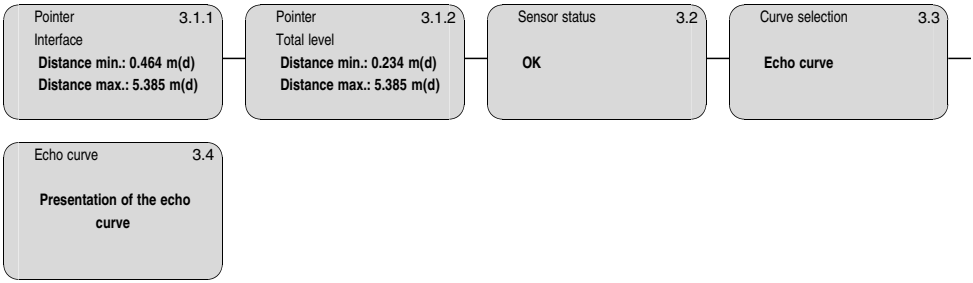


Display

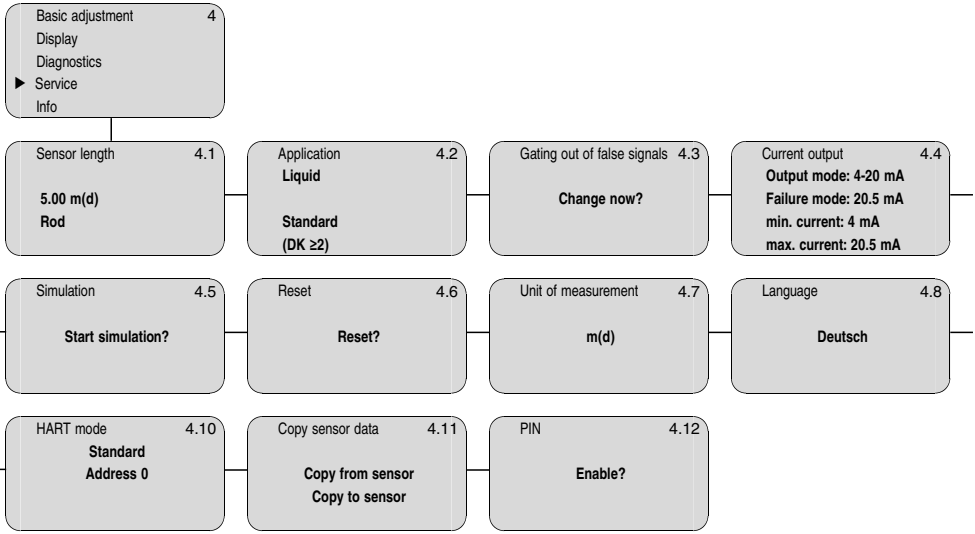


Diagnostics

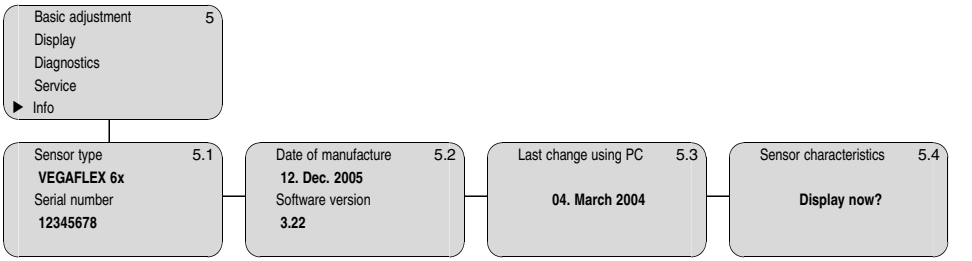




Service



Info



7 Setup with PACTware™ and other adjustment programs

7.1 Connecting the PC

Connecting the PC directly to the sensor

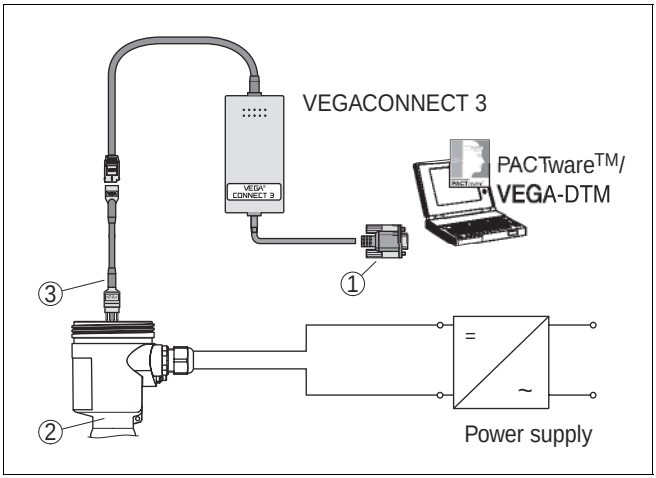


Fig. 14: Connection directly to the sensor
1 RS232 connection
2 VEGAFLEX 67
3 I²C adapter cable for VEGACONNECT 3

Necessary components:

- VEGAFLEX 67
- PC with PACTware™ and suitable VEGA DTM
- VEGACONNECT 3 with I²C adapter cable (article no. 2.27323)
- Power supply unit

Connecting the PC to the signal cable

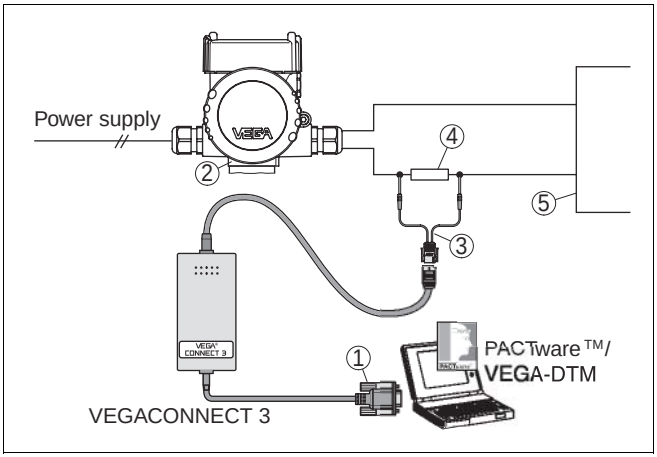


Fig. 15: Connecting the PC to the signal cable
1 RS232 connection
2 VEGAFLEX 67
3 HART adapter cable for VEGACONNECT 3
4 HART resistance 250 Ohm
5 4 … 20 mA processing

Necessary components:

- VEGAFLEX 67
- PC with PACTware™ and suitable VEGA DTM
- VEGACONNECT 3 with HART adapter cable
- HART resistance 250 Ohm
- Voltage supply
- 4 … 20 mA processing

Note:
For processings with integrated HART resistance (inner resistance approx. 250 Ohm), there is no additional, external resistance necessary. In such cases, VEGACONNECT 3 can be connected in parallel to the 4 … 20 mA cable.

7.2 Parameter adjustment with PACTware™

Further setup steps are described in the operating instructions manual "*DTM Collection/PACTware™*" attached to each CD and which can also be downloaded from our homepage. A detailed description is available in the online help of PACTware™ and the VEGA DTMs.

Note:
Keep in mind that for setup of VEGAFLEX 67, DTM-Collection 10/2005 or a newer version must be used.

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

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

7.3 Parameter adjustment with AMS™ and PDM

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

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

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 Maintenance

When used as directed in normal operation, VEGAFLEX 67 is completely maintenance free.

8.2 Rectify faults

Causes of malfunction

VEGAFLEX 67 offers maximum reliability. Nevertheless faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Power supply
- Signal processing

Fault rectification

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

24 hour service hotline

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

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

Checking the 4 … 20 mA signal

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

? 4 … 20 mA signal not stable

- Level fluctuations

→ Set integration time via the indicating/adjustment module

? 4 … 20 mA signal missing

- Wrong connection

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

- No supply voltage

→ Check cables on interruption, repair, if necessary

- supply voltage too low or load resistance too high

→ Check, adapt if necessary

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

- Electronics module defective

→ Exchange instrument or return instrument for repair

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

Fault messages via the indicating/adjustment module

? E013

- no measured value available

→ sensor in boot phase

→ sensor does not find an echo, e.g. because of faulty installation or incorrect parameter adjustment

→ Wrong sensor length entered

? E017

- Adjustment span too small

→ Carry out a fresh adjustment and increase the distance between min. and max. adjustment

? E036

- no operable sensor software

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

? E042/E043

- Hardware error, electronics defective

→ Exchange instrument or return instrument for repair

8.3 Exchange of the electronics module

Preparations

If the electronics module is defective, it can be replaced by the user.

In Ex applications, only an electronics module with appropriate Ex approval may be used.

If there is no electronics module available on site, one can be ordered from the agency serving you.

The new oscillator must contain the order data of the sensor. These can be loaded as follows:

- at the factory by VEGA
- or on site by the user

Information:
When loading on site, the order data must be downloaded from the Internet (see Operating Instructions manual "*Oscillator*").

In both cases, the serial number of VEGAFLEX 67 is required. The serial numbers are stated on the type label of VEGAFLEX 67, on the inner wall of the housing or on the delivery note.

Assignment

The oscillators are adapted to the respective sensor and differ in their signal output or in their power supply. You can find a suitable oscillator in the following overview.

4 … 20 mA/HART four-wire

Electronics module FX-E.67V suitable for VEGAFLEX 67 - 4 … 20 mA/HART four-wire:

- FX-E.67V**X** (X = without approvals)

8.4 Instrument repair

If a repair is necessary, please proceed as follows:

You can download a return form (23 KB) in the Internet from our 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 filled in form and if necessary, a safety data sheet to the instrument

- Please ask the agency serving you for the address of your return shipment. You find the respective agency on our website www.vega.com under: "*Company - VEGA worldwide*"

9 Dismounting

9.1 Dismounting procedure

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 electronic modules 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 (in Germany, e.g. ElektroG). 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 "*Technical data*"

If you cannot dispose of the instrument properly, please contact us about disposal methods or return.

10 Supplement

10.1 Technical data

General data

Material 316L corresponds to 1.4404 or 1.4435

Materials, wetted parts - version -110 … +400 °C (-166 … +752 °F)

– Process fitting - coax version	316L and Aluminium oxide-ceramic 99.7 % (Al_2O_3), Hastelloy C22 (2.4602) and Aluminium oxide-ceramic 99.7 % (Al_2O_3)
– Process fitting - rod version	316L and Aluminium oxide-ceramic 99.7 % (Al_2O_3), Hastelloy C22 (2.4602) and Aluminium oxide-ceramic 99.7 % (Al_2O_3)
– Process fitting - cable version	316L and Aluminium oxide-ceramic 99.7 % (Al_2O_3)
– Tube ø 21.3 mm (0.84 in)	316L, Hastelloy C22 (2.4602)
– Rod ø 6 mm (0.24 in)	316L, Hastelloy C22 (2.4602)
– Cable ø 4 mm (0.16 in)	316 (1.4401)
– Seal	graphite

Materials, non-wetted parts

– Housing	Plastic PBT (Polyester), Alu die-casting powder-coated, 316L
– Seal ring between housing and housing cover	NBR (stainless steel housing), silicone (Alu/plastic housing)
– Inspection window in housing cover (optional)	Polycarbonate
– Ground terminal	316L

Weights

– Plastic housing	3200 g (113 oz)
– Aluminium housing	3630 g (128 oz)
– Aluminium double chamber housing	3940 g (139 oz)
– Stainless steel housing	4000 g (141 oz)
– Tube ø 21.3 mm (0.84 in)	approx. 920 g/m (9.9 oz/ft)
– Rod ø 6 mm (0.24 in)	approx. 220 g/m (2.4 oz/ft)
– Cable ø 4 mm (0.16 in)	approx. 80 g/m (0.86 oz/ft)
– Gravity weight (optionally only available with cable version)	approx. 325 g (11.5 oz)

Lengths (L)	
– Tube ø 21.3 mm (0.84 in)	0.3 … 6 m (1 … 20 ft)
– Rod ø 6 mm (0.24 in)	0.3 … 4 m (1 … 13 ft)
– Cable ø 4 mm (0.16 in)	1 … 32 m (3 … 105 ft)
Lateral load	
– Tube ø 21.3 mm (0.84 in)	60 Nm (44 lbf ft)
– Rod ø 6 mm (0.24 in)	4 Nm (3 lbf ft)
Max. tensile load - cable ø 4 mm (0.16 in)	2.5 KN (562 lbf)

Output variable

Output signal	4 … 20 mA/HART
Resolution	1.6 µA
Failure message	Current output unchanged 20.5 mA, 22 mA, <3.6 mA (adjustable)
Current limitation	22 mA
Load	max. 500 Ohm[2)]
Integration time (63 % of the input variable)	0 … 999 s, adjustable
Fulfilled NAMUR recommendations	NE 43

Input variable

Parameter	Level of liquids
Min. dielectric figure (lower medium)	by 10 higher than the ε_r of the upper medium
Min. layer thickness (upper medium)	>100 mm (3.9 in)
Min. dielectric figure (upper medium) - coax version	ε_r >1.4
Dead band - coax version ø 43 mm (1.7 in)	
– top	30 mm (1.2 in)
– bottom	0 mm

[2)] With inductive load ohmic share min. 25 Ohm/mH.

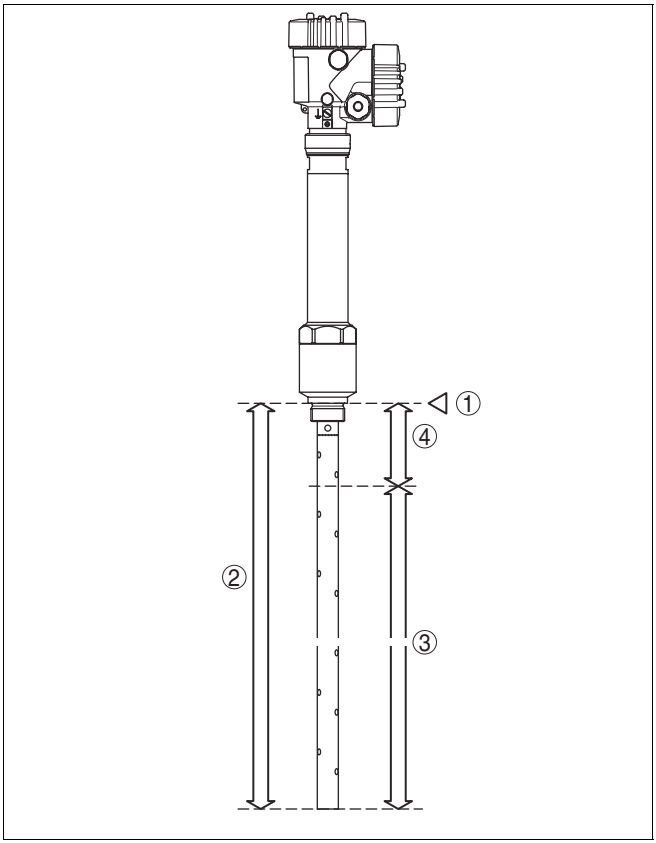


Fig. 16: Measuring range of VEGAFLEX 67 - coax version
1 Reference plane
2 Probe length
3 Measuring range
4 Upper dead band

Min. dielectric figure (upper medium) - rod, cable version	ε_r >1.6
Dead zone - rod version ø 16 mm (0.63 in)	
– top	80 mm (3.1 in)
– bottom	0 mm
Dead zone - cable version ø 6 mm (0.24 in)	
– top	150 mm (5.9 in)
– bottom	250 mm (9.8 in), gravity weight + 100 mm

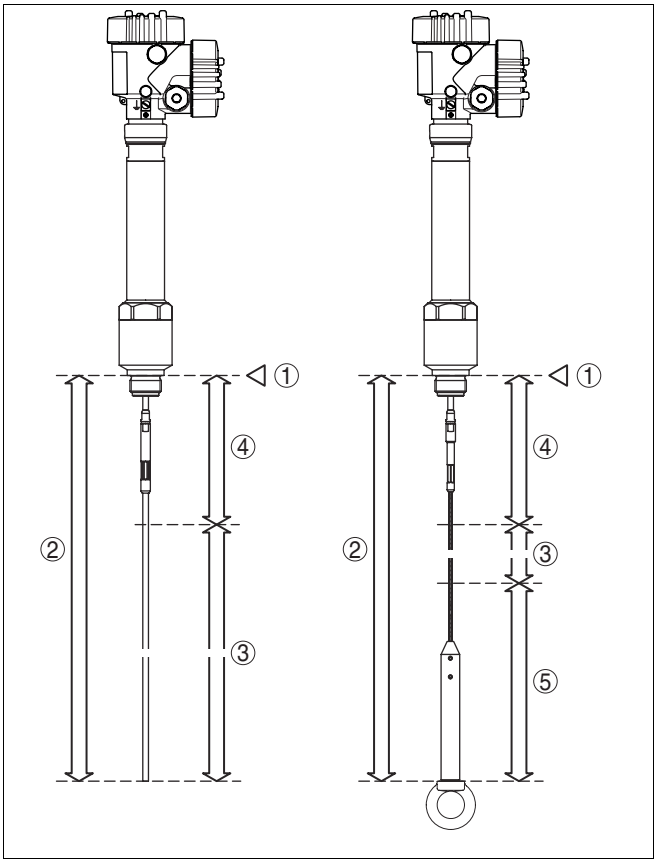


Fig. 17: Measuring ranges of the VEGAFLEX 67 - rod and cable version
1 Reference plane
2 Probe length
3 Measuring range
4 Upper dead band
5 Lower dead band (only with cable versions)

Accuracy (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 psi)

Deviation in characteristics and characteristics

Reference installation conditions

– Flange	DN 100
– min. distance to installations	500 mm (20 in)
Reference reflector	Metal plate ø 1 m (40 in) not with coax version
Temperature drift (current output)	0.06 %/10 K relating to the max. measuring range
Accuracy	see diagrams

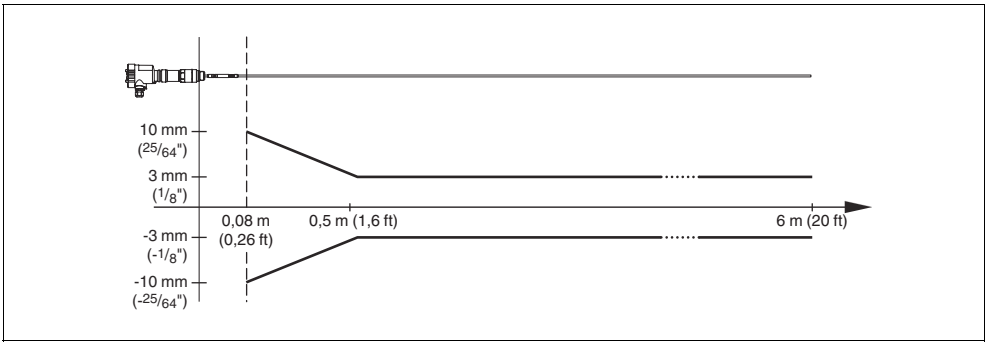


Fig. 18: Accuracy rod version -110 … +400 °C (-166 … +752 °F)

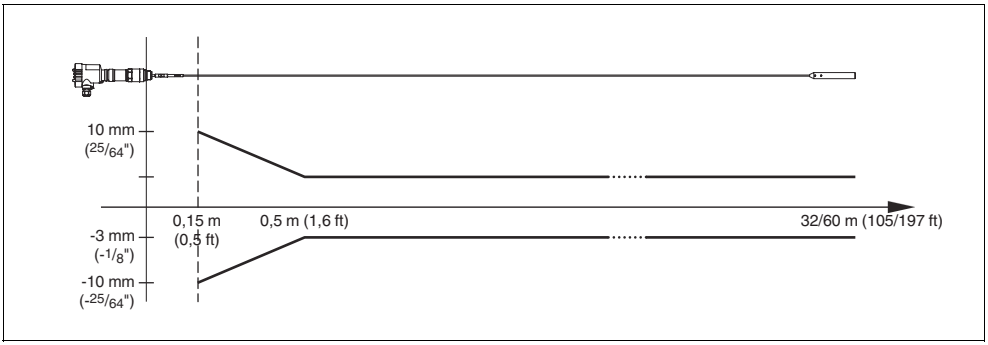


Fig. 19: Accuracy cable version -110 … +400 °C (-166 … +752 °F)

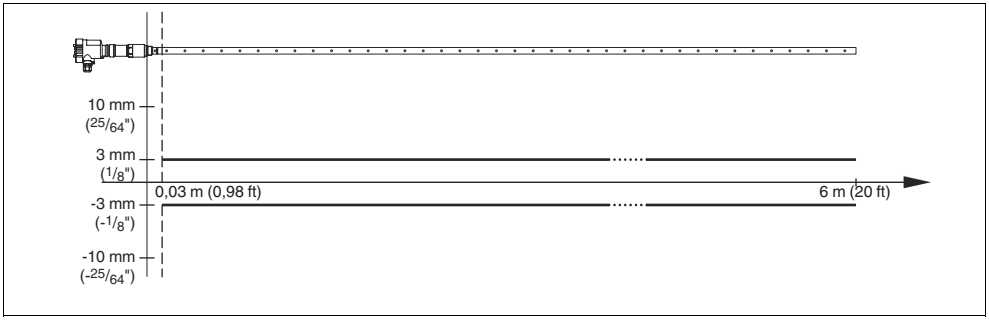


Fig. 20: Accuracy coax version -110 … +400 °C (-166 … +752 °F)

Ambient conditions

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

Process conditions

Process pressure	-1 … 160 bar/-100 … 16000 kPa (-14.5 … 2321 psi), depending on the process fitting
Process temperature (graphite seal)	-110 … +400 °C (-166 … +752 °F)

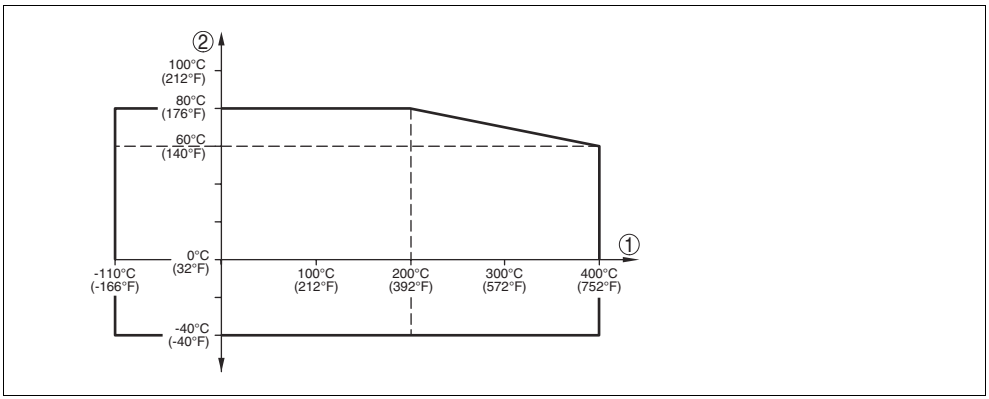


Fig. 21: Ambient temperature - product temperature (version -110 … +400 °C/-166 … +752 °F)
1 Product temperature
2 Ambient temperature

Electromechanical data - version IP 66/IP 67

Cable entry	
– Double chamber housing	• 1x cable entry M20x1.5 (cable-ø 5 … 9 mm), 1x blind stopper M20x1.5, plug M12x1 for VEGADIS 61 (optional) or: • 1x closing cap ½ NPT, 1x blind stopper ½ NPT, plug M12x1 for VEGADIS 61 (optional) or: • 1x plug (depending on the version), 1x blind stopper M20x1.5, plug M12x1 for VEGADIS 61 (optional)
Spring-loaded terminals	for wire cross-section up to 2.5 mm^2

Indicating and adjustment module

Power supply and data transmission	through sensor via gold-plated sliding contacts (I^2C bus)
Indication	LC display in Dot matrix
Adjustment elements	4 keys
Protection	
– unassembled	IP 20
– mounted into the sensor without cover	IP 40
Materials	
– Housing	ABS
– Inspection window	Polyester foil

Voltage supply

Supply voltage	
– Non-Ex and Exd instrument	20 … 72 V DC, 20 … 253 V AC, 50/60 Hz (with and without lighting of the indicating and adjustment module)
Power consumption	max. 4 VA; 2.1 W

Electrical protective measures

Protection	IP 66/IP 67
Overvoltage category	III
Protection class	I

32767-EN-061227

Approvals[3)]	
ATEX ia	ATEX II 1G, 1/2G, 2G EEx ia IIC T6
ATEX ia+d	ATEX II 1/2G, 2G EExd ia IIC T6
FM	FM Cl.I, Div 2 (NI)+Cl.II, III, Div 1 (DIP); FM Cl.I-III, Div 1 (IS); FM Cl.I-III, Div 1 (IS)+Cl.I-III, Div 1 Gr.C-G(XP)
CSA	CSA Cl.I, Div 2 (NI)+Cl.II, III, Div 1 (DIP); CSA Cl.I-III, Div 1 (IS); CSA Cl.I-III, Div 1 (IS)+Cl.I-III, Div 1 Gr.C-G(XP)
Ship approvals	

[3)] Deviating data in Ex applications: see separate safety instructions.

10.2 Dimensions

Housing

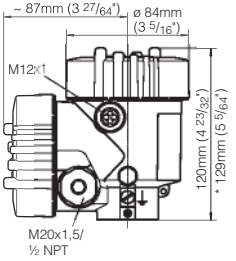


Fig. 22: Aluminium double chamber housing (with integrated indicating and adjustment module the housing is 9 mm/0.35 in higher)

VEGAFLEX 67, cable, rod version (-110 … +400 °C/-166 … +752 °F)

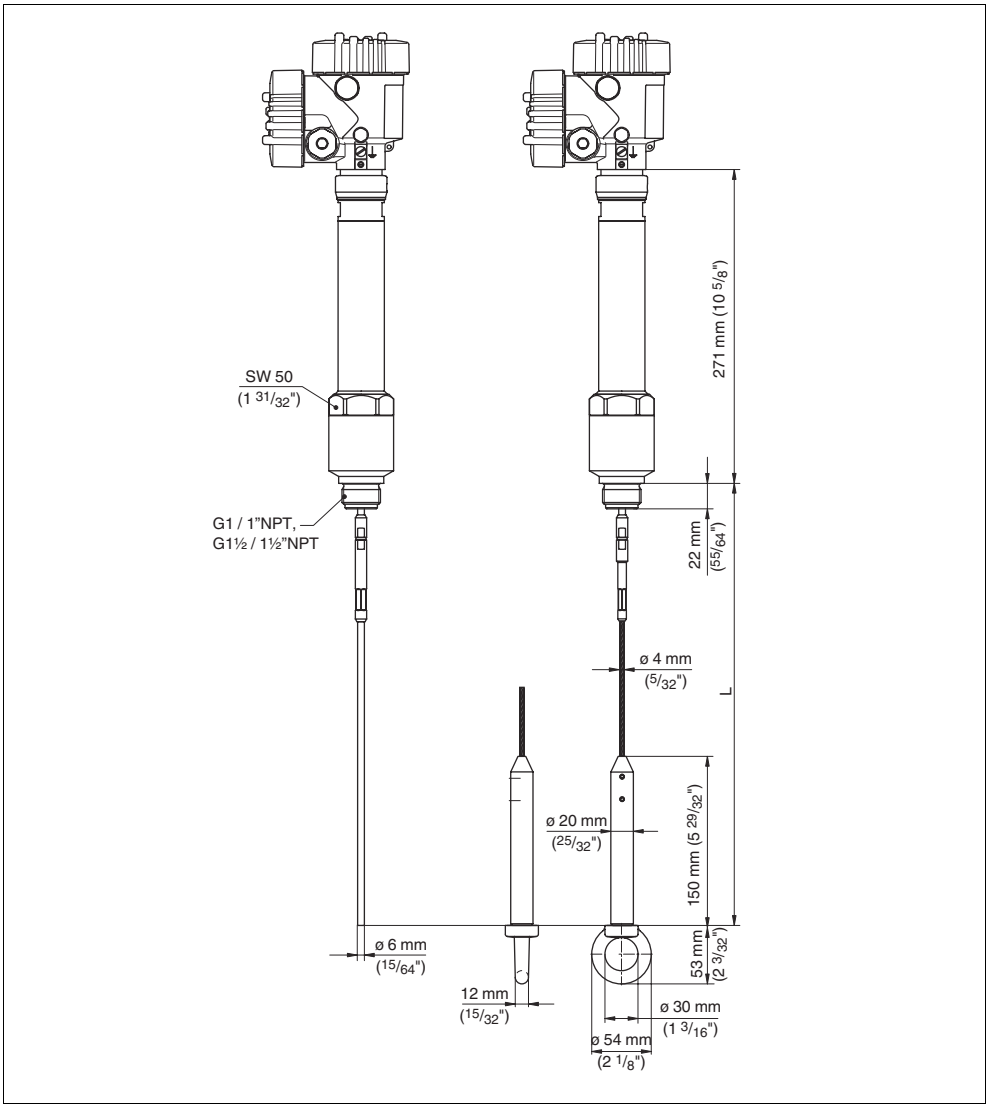


Fig. 23: VEGAFLEX 67, cable, rod version with thread (-110 … +400 °C/-166 … +752 °F)
L Sensor length, see "Technical data"

VEGAFLEX 67, coax version (-110 … +400 °C/-166 … +752 °F)

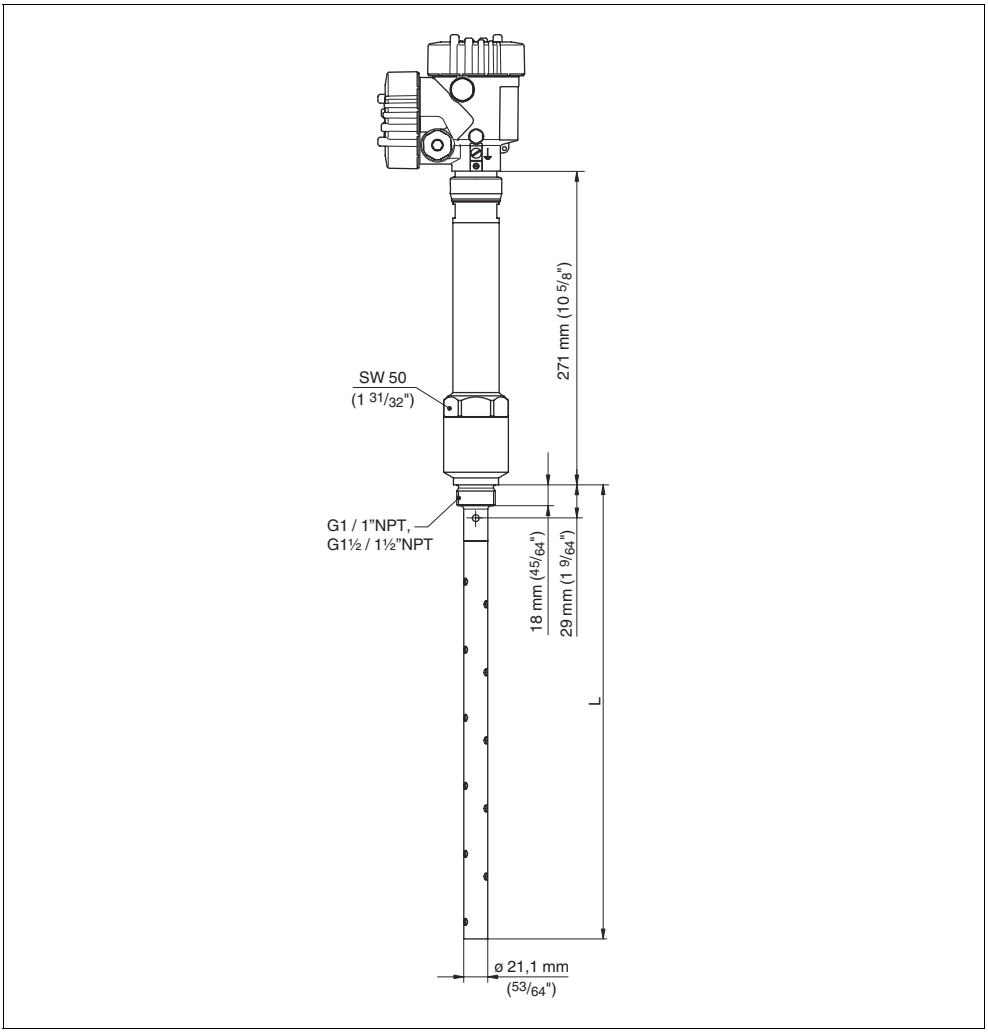


Fig. 24: VEGAFLEX 67, coax version with thread (-110 … +400 °C/-166 … +752 °F)
L Sensor length, see "Technical data"

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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.