VEGA

ABLE Instruments & Controls

Level measurement in liquids

Guided Microwave

VEGAFLEX 61
VEGAFLEX 63
VEGAFLEX 65
VEGAFLEX 66

Product Information

VEGA

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VAT No: GB 417 2481 61

Content

1 Description of the measuring principle

Measuring principle

High frequency microwave impulses are guided along a steel cable or rod or a rod inside a steel tube. When they reach the product surface, the microwave pulses are reflected and received by the processing electronics. The running time is processed by the instrument.

A microprocessor identifies these level echoes, which are subsequently measured by the ECHOFOX software, evaluated and converted into level information.

Time-consuming adjustment with medium is not necessary. The instruments are preset to the ordered probe length. The shortenable cable and rod versions can be adapted individually to the local requirements.

Insensitive to steam

Even process conditions such as intense steam generation do not influence the function of the measurement.

Unaffected by material fluctuations

Density fluctuations or changes of the dielectric constant do not influence the function.

Buildup: no problem

Buildup or condensation on the probe or vessel wall do not influence the measuring result.

Wide application range

With measuring ranges up to 32 m (105 ft), the sensors are well suited for tall vessels. Temperatures up to 150 °C (302 °F) and pressures from vacuum up to 40 bar (580 psig) ensure a wide application range.

VEGAFLEX 66 is particularly suitable for the measurement of liquids with high process temperatures. Its mechanical configuration was specially optimised for such applications. With these high temperature versions, process temperatures from -200° to +400° C (-328 … +752 °F) and pressures up to 400 bar (5800 psig) are possible.

1.1 Application examples

Storage vessels

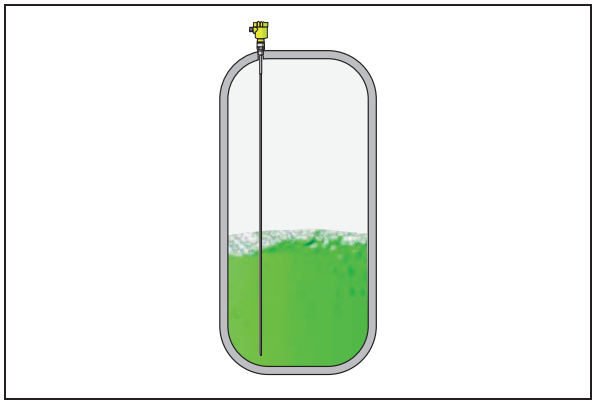

Fig. 1: Level measurement in a storage vessel with VEGAFLEX 61

The guided microwave principle is suitable for level measurement in storage vessels. The sensor can be set up without filling or adjustment with medium.

The coax version is especially suitable for low viscosity liquids with low dielectric value. This also applies when the requirements on the accuracy of the measurement are very high.

Cable and rod probes are available for different lengths and loads.

The measurement is independent of product characteristics such as density, temperature, overpressure, foam, dielectric value and buildup.

Different, as well as frequently changing products and mixtures can be measured.

Food processing or pharmaceutical vessels

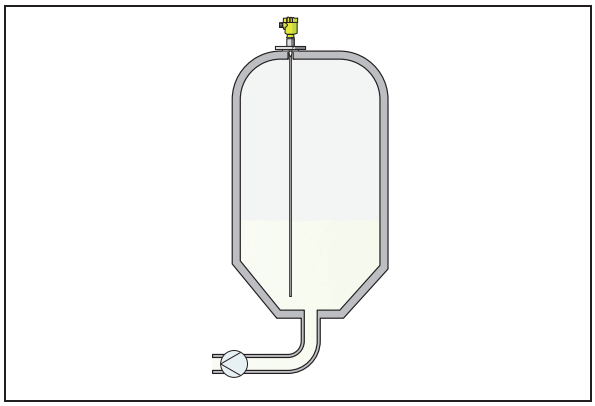

Fig. 2: Level measurement in a vessel with foodstuffs with VEGAFLEX 63

The fully PFA insulated VEGAFLEX 63 is ideal for level measurement in vessels in the food processing and pharmaceutical industries. The sensor can be set up without filling or adjustment with

medium. Fully insulated rod probes are available up to 4 m (13 ft) and cable probes up to 32 m (105 ft).

The wetted parts are made of the food safe plastics PFA and TFM-PTFE.

The measurement is unaffected by product characteristics such as density, temperature or overpressure. Even foam and buildup do not influence the measurement.

Different, as well as frequently changing products and mixtures can be measured.

Standpipe or bypass

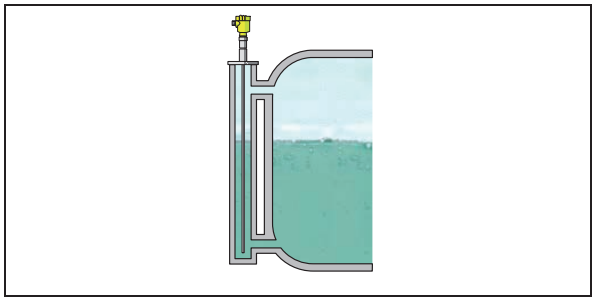

Fig. 3: Level measurement in a bypass tube

Standpipes or bypass tubes are often used in distillation columns, e.g. in the petrochemical industry. Also in this environment, measurement with guided microwaves has many advantages.

The configuration of the standpipe or bypass tube does not influence the measurement. Lateral tube connections, mixing holes, buildup or corrosion in the tube do not influence the measuring result.

Product temperatures up to 400 °C (752 °F) can be measured, up to 150 °C (302 °F) even with standard versions.

The sensor utilises nearly the entire vessel height, and can measure with high accuracy up to approx. 30 mm (1.181 in) below the process fitting. A possible overfilling even in this range is detected reliably.

VEGAFLEX sensors are also available with SIL2.

2 Type overview

	VEGAFLEX 61 with cable measuring probe	VEGAFLEX 61 with rod measuring probe
		
Application:	Liquids	Liquids
Measuring range:	0.15 … 32 m (0.492 … 104.99 ft)	0.15 … 4 m (0.492 … 13.12 ft)
Process fitting:	Thread, flange	Thread, flange
Material:	316L and PCTFE, 316 (1.4401)	316L and PCTFE, Hastelloy C22 (2.4602)
Process temperature:	-40 … +150 °C (-40 … +302 °F)	-40 … +150 °C (-40 … +302 °F)
Process pressure:	-1 … 40 bar/-100 … 4000 kPa (-14.5 … 580 psig)	-1 … 40 bar/-100 … 4000 kPa (-14.5 … 580 psig)
Signal output:	4 … 20 mA/HART in two-wire, four-wire, Profibus PA, Foundation Fieldbus technology	4 … 20 mA/HART in two-wire, four-wire, Profibus PA, Foundation Fieldbus technology

	VEGAFLEX 63 with cable measuring probe	VEGAFLEX 63 with rod measuring probe	VEGAFLEX 65 with coax measuring probe
			
Application:	Liquids	Liquids	Liquids
Measuring range:	1 … 32 m (3.28 … 104.99 ft)	0.5 … 4 m (1.64 … 13.12 ft)	0.05 … 6 m (0.164 … 19.69 ft)
Process fitting:	Flange, Tri-Clamp, bolting	Flange, Tri-Clamp, bolting	Thread, flange
Material:	PTFE (TFM 1600)	PTFE (TFM 1600)	316L and PTFE (TFM 4105), Hastelloy C22 (2.4602) and PTFE (TFM 4105)
Process temperature:	-40 … +150 °C (-40 … +302 °F)	-40 … +150 °C (-40 … +302 °F)	-40 … +150 °C (-40 … +302 °F)
Process pressure:	-1 … 16 bar/-100 … 1600 kPa (-14.5 … 232 psig)	-1 … 16 bar/-100 … 1600 kPa (-14.5 … 232 psig)	-1 … 40 bar/-100 … 4000 kPa (-14.5 … 580 psig)
Signal output:	4 … 20 mA/HART in two-wire, four-wire, Profibus PA, Foundation Fieldbus technology	4 … 20 mA/HART in two-wire, four-wire, Profibus PA, Foundation Fieldbus technology	4 … 20 mA/HART in two-wire, four-wire, Profibus PA, Foundation Fieldbus technology

-20 … +250 °C (-4 … +482 °F)	VEGAFLEX 66 with cable measuring probe	VEGAFLEX 66 with rod measuring probe	VEGAFLEX 66 with coax measuring probe
			
Application:	Liquids	Liquids	Liquids
Measuring range:	1 … 32 m (3.28 … 104.99 ft)	0.5 … 4 m (1.64 … 13.12 ft)	0.3 … 6 m (0.984 … 19.69 ft)
Process fitting:	Thread, flange	Thread, flange	Thread, flange
Material:	316L and PEEK GF30, Hastelloy C22 (2.4602) and PEEK GF30	316L and PEEK GF30, Hastelloy C22 (2.4602) and PEEK GF30	316L and PEEK GF30, Hastelloy C22 (2.4602) and PEEK GF30
Process temperature:	-20 … +250 °C (-4 … +482 °F)	-20 … +250 °C (-4 … +482 °F)	-20 … +250 °C (-4 … +482 °F)
Process pressure:	-1 … 100 bar/-100 … 10000 kPa (-14.5 … 1450 psig)	-1 … 100 bar/-100 … 10000 kPa (-14.5 … 1450 psig)	-1 … 100 bar/-100 … 10000 kPa (-14.5 … 1450 psig)
Signal output:	4 … 20 mA/HART in two-wire, four-wire, Profibus PA, Foundation Fieldbus technology	4 … 20 mA/HART in two-wire, four-wire, Profibus PA, Foundation Fieldbus technology	4 … 20 mA/HART in two-wire, four-wire, Profibus PA, Foundation Fieldbus technology

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-110 … +400 °C (-166 … +752 °F)	VEGAFLEX 66 with cable measuring probe	VEGAFLEX 66 with rod measuring probe	VEGAFLEX 66 with coax measuring probe
			
Application:	Liquids	Liquids	Liquids
Measuring range:	1 … 32 m (3.28 … 104.99 ft)	0.5 … 6 m (1.64 … 19.69 ft)	0.3 … 6 m (0.984 … 19.69 ft)
Process fitting:	Thread, flange	Thread, flange	Thread, flange
Material:	316L and Aluminium oxide-ceramic 99.7 % (Al_2O_3)	316L and Aluminium oxide-ceramic 99.7 % (Al_2O_3), Hastelloy C22 and Aluminium oxide-ceramic 99.7 % (Al_2O_3)	316L and Aluminium oxide-ceramic 99.7 % (Al_2O_3), Hastelloy C22 and Aluminium oxide-ceramic 99.7 % (Al_2O_3)
Process temperature:	-110 … +400 °C (-166 … +752 °F)	-110 … +400 °C (-166 … +752 °F)	-110 … +400 °C (-166 … +752 °F)
Process pressure:	-1 … 160 bar/-100 … 16000 kPa (-14.5 … 2321 psig)	-1 … 160 bar/-100 … 16000 kPa (-14.5 … 2321 psig)	-1 … 160 bar/-100 … 16000 kPa (-14.5 … 2321 psig)
Signal output:	4 … 20 mA/HART in two-wire, four-wire, Profibus PA, Foundation Fieldbus technology	4 … 20 mA/HART in two-wire, four-wire, Profibus PA, Foundation Fieldbus technology	4 … 20 mA/HART in two-wire, four-wire, Profibus PA, Foundation Fieldbus technology

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-200 … +400 °C (-328 … +752 °F)	VEGAFLEX 66 with cable measuring probe	VEGAFLEX 66 with rod measuring probe	VEGAFLEX 66 with coax measuring probe
			
Application:	Liquids	Liquids	Liquids
Measuring range:	1 … 32 m (3.28 … 104.99 ft)	0.5 … 6 m (1.64 … 19.69 ft)	0.3 … 6 m (0.984 … 19.69 ft)
Process fitting:	Thread, flange	Thread, flange	Thread, flange
Material:	316L and Aluminium oxide-ceramic 99.7 % (Al_2O_3)	316L and Aluminium oxide-ceramic 99.7 % (Al_2O_3), Hastelloy C22 and Aluminium oxide-ceramic 99.7 % (Al_2O_3)	316L and Aluminium oxide-ceramic 99.7 % (Al_2O_3), Hastelloy C22 and Aluminium oxide-ceramic 99.7 % (Al_2O_3)
Process temperature:	-200 … +400 °C (-328 … +752 °F)	-200 … +400 °C (-328 … +752 °F)	-200 … +400 °C (-328 … +752 °F)
Process pressure:	-1 … 400 bar/-100 … 40000 kPa (-14.5 … 5800 psig)	-1 … 400 bar/-100 … 40000 kPa (-14.5 … 5800 psig)	-1 … 400 bar/-100 … 40000 kPa (-14.5 … 5800 psig)
Signal output:	4 … 20 mA/HART in two-wire, four-wire, Profibus PA, Foundation Fieldbus technology	4 … 20 mA/HART in two-wire, four-wire, Profibus PA, Foundation Fieldbus technology	4 … 20 mA/HART in two-wire, four-wire, Profibus PA, Foundation Fieldbus technology

Indicating and adjustment module	 PLICSCOM			
Housing	 Plastic	 Stainless steel	 Aluminium	 Aluminium (double chamber)
Electronics	 4 … 20 mA/HART two-wire	 4 … 20 mA/HART four-wire	 Profibus PA	 Foundation Field-bus
Process fitting	 Thread	 Flange		
Sensors	 Cable probe	 Rod probe	 Coax probe	
Approvals	 Gas-explosion protection	 Ship approvals	 SIL	

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3 Mounting instructions

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

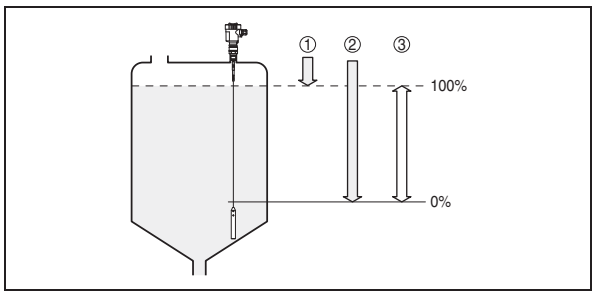


Fig. 4: Measuring range (operating range) and max. measuring distance

1 full
2 empty (max. measuring distance)
3 Measuring range

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 band). Keep in mind that the cable length cannot be used all the way to the end because measurement in the area of the gravity weight is not possible. A possible overfilling however, is also detected reliably within the dead band.

These min. distances (dead zones) are specified in chapter "*Technical data*".

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

Installation position
Mount VEGAFLEX in such a way that the probe does not touch any installations or the vessel wall during operation. If necessary, fasten the probe end. If such an unsuitable installation location cannot be avoided, use a coax electrode - this sensor is not influenced by such installation conditions.

When mounting the cable and rod versions of VEGAFLEX keep at least a distance of 300 mm (11.81 in) to vessel installations or the vessel wall.

VEGAFLEX can also be mounted in a standpipe or bypass tube with an inner diameter of 25 mm (1 in). Make sure that the probe does not touch the tube during operation. VEGAFLEX sensors are the ideal replacement for displacer systems because they have no moving parts. Furthermore VEGAFLEX is unaffected by density fluctuations and is easy to install.

If possible, mount the sensor flush with the vessel top. If this is not possible, use short sockets with small diameter.

In case of unfavourable mounting conditions such as e.g. very high (h > 200 mm/7.9 in) or very wide (ø > 200 mm/7.9 in) sockets or a distance to the vessel wall or vessel installations of < 300 mm (11.81 in), we recommend carrying out a false echo storage for the area in question. Use the adjustment software PACTware™ with DTM. If such an installation location is necessary, use a coax probe. It is not influenced by unfavourable installation conditions.

Standpipes or bypass tubes
Standpipes or bypass tubes are normally metal tubes with a diameter of 30 … 200 mm (1.18 … 7.87 in). In measurement technology such a tube corresponds to a coax probe. It does not matter if the standpipe is perforated or slotted for better mixing. Lateral inlets with bypass tubes also do not influence the measurement.

Measuring probes can be mounted in bypass tubes up to DN 200.

If VEGAFLEX is used in standpipes or bypass tubes, contact with the tube wall should be avoided. We offer spacers as accessories for fastening the probe in the middle of the tube.

Depending on the tube diameter or tube length, one or several spacers can be mounted. With cable probes, the cable can also be strained to avoid contact with the tube.

The max. temperature for the spacers is 250°C (482°F).

Keep in mind that buildup can form on the spacers. Strong buildup can influence the measurement.

For process technical reasons, plastic standpipes can always be used. However, they offer no advantages for the measurement. If durability is no problem, then we recommend the use of metal standpipes.

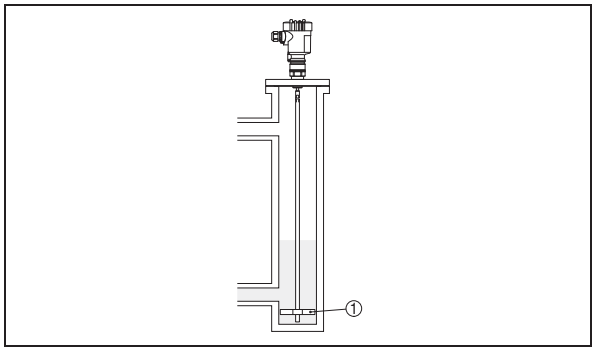


Fig. 5: Position of the spacer

1 Spacer

Note:
Measurement in a standpipe is not recommended for very adhesive products.

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

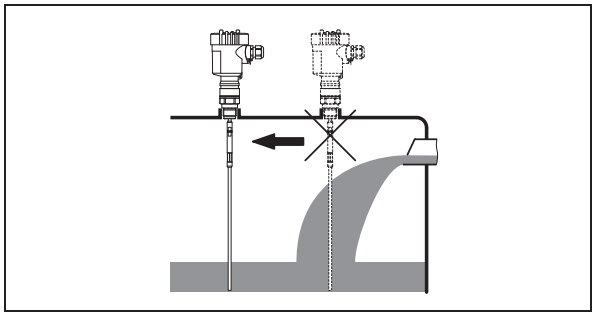


Fig. 6: Lateral load

Fixing

If there is a danger of the probe touching the vessel wall during operation due to product movements or agitators etc., the measuring probe should be securely fixed.

In the gravity weight there is a thread (M12), e.g. for a ring bolt (article no. 2.27424).

Make sure that the probe cable is not extremely taut. Avoid tensile loads on the cable. Use a slightly pre-stressed tension spring to fasten the cable.

Avoid undefined cable-vessel connections, i.e. the connection must be either grounded reliably or isolated reliably. Any uncontrolled deviation from this requirement can lead to measurement errors.

4 Electrical connection

4.1 General prerequisites

The supply voltage range can differ depending on the instrument version. You can find exact specifications in chapter "*Technical data*".

The national installation standards as well as the valid safety regulations and accident prevention rules must be observed.

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

4.2 Voltage supply

4 … 20 mA/HART two-wire
Supply voltage and current signal are carried on the same two-wire cable. The requirements on the power supply are specified in chapter "*Technical data*".

The VEGA power supply units VEGATRENN 149AEx, VEGASTAB 690, VEGADIS 371 as well as the VEGAMET signal conditioning instruments are suitable for power supply. When one of these instruments is used, a reliable separation of the supply circuit from the mains circuits according to DIN VDE 0106 part 101 and protection class II is ensured.

4 … 20 mA/HART four-wire
Power supply and current output are carried on two separate connection cables.

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

The 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 conductor terminal.

Profibus PA
Power is supplied by a Profibus DP/PA segment coupler or a VEGALOG 571 EP input card.

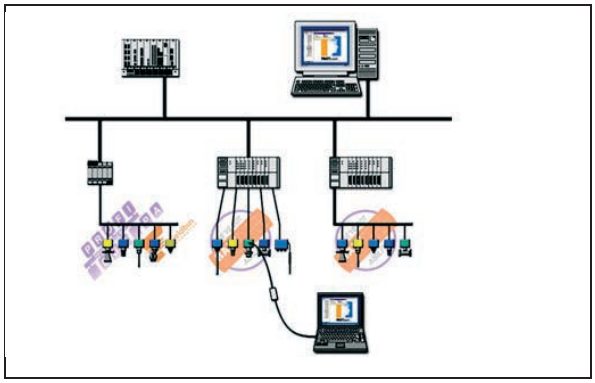


Fig. 7: Integration of instruments in a Profibus PA system via segment coupler DP/PA or data recording systems with Profibus PA input card

Foundation Fieldbus
Power supply via the H1 Fieldbus cable.

4.3 Connection cable

Generally
The sensors are connected with standard cable without screen. An outer cable diameter of 5 … 9 mm ensures the seal effect of the cable entry.

4 … 20 mA/HART two-wire and four-wire
If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used. In HART multidrop mode the use of screened cable is generally recommended.

Profibus PA, Foundation Fieldbus
The installation must be carried out according to the appropriate bus specification. The sensor is connected respectively with screened cable according to the bus specification. Make sure that the bus is terminated via appropriate terminating resistors.

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

In Ex applications, the corresponding installation regulations must be noted for the connection cable.

4.4 Connection of the cable screen and grounding

If screened cable is necessary, the cable screen must be connected on both ends to ground potential. If potential equalisation currents are expected, the connection on the evaluation side must be made via a ceramic capacitor (e.g. 1 nF, 1500 V).

Profibus PA, Foundation Fieldbus
In systems with potential separation, the cable screen is connected directly to ground potential on the power supply unit, in the connection box and directly on the sensor.

In systems without potential equalisation, connect the cable screen directly to ground potential only at the power supply unit and at the sensor - do not connect to ground potential in the connection box or T-distributor.

4.5 Wiring plan

Single chamber housing

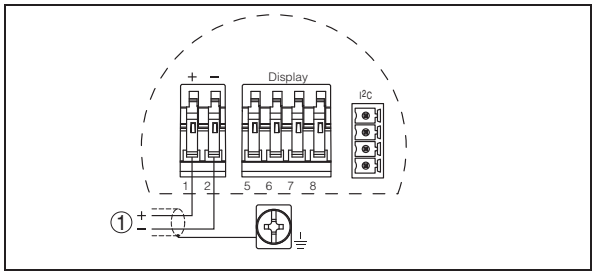


Fig. 8: Connection HART two-wire, Profibus PA, Foundation Fieldbus

1 Voltage supply and signal output

Double chamber housing - two-wire

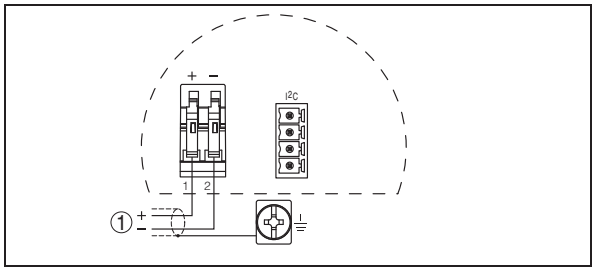


Fig. 9: Connection HART two-wire, Profibus PA, Foundation Fieldbus

1 Voltage supply and signal output

Double chamber housing - 4 … 20 mA/HART four-wire

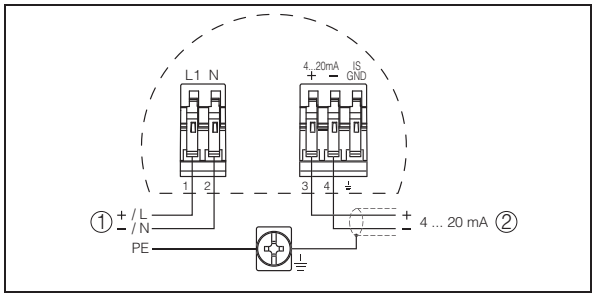


Fig. 10: Connection 4 … 20 mA/HART four-wire

1 Voltage supply
2 Signal output

Wire assignment, connection cable with version IP 66/IP 68, 1 bar

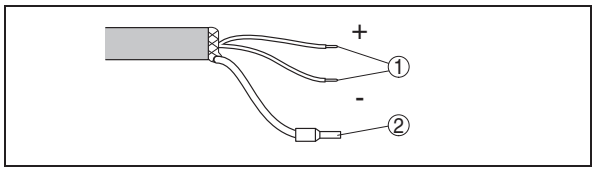


Fig. 11: Wire assignment, connection cable

1 brown (+) and blue (-) to power supply or to the processing system
2 Screen

5 Operation

5.1 Overview

The sensors can be adjusted with the following adjustment media:

- with indicating and adjustment module
- an adjustment software according to FDT/DTM standard, e.g. PACTware™ and PC

and, depending on the signal output, also with:

- a HART handheld (4 … 20 mA/HART)
- The adjustment program AMS (4 … 20 mA/HART and Foundation Fieldbus)
- The adjustment program PDM (Profibus PA)
- a configuration tool (Foundation Fieldbus)

The entered parameters are generally saved in the sensor, optionally also in the indicating and adjustment module or in the adjustment program.

5.2 Compatibility according to NAMUR NE 53

VEGAFLEX meet NAMUR recommendation NE 53. VEGA instruments are generally upward and downward compatible:

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

5.3 Adjustment with the indicating and adjustment module PLICSCOM

Setup and indication

PLICSCOM is a pluggable indication and adjustment module for plics® sensors. It can be placed in four different positions on the instrument (each displaced by 90°). Indication and adjustment are carried out via four keys and a clear, graphic-capable dot matrix display. The adjustment menu with language selection is clearly structured and enables easy setup. After setup, PLICSCOM serves as indicating instrument: through the screwed cover with glass insert, measured values can be read directly in the requested unit and presentation style.

The integrated background lighting of the display can be switched on via the adjustment menu.[1)]

PLICSCOM adjustment

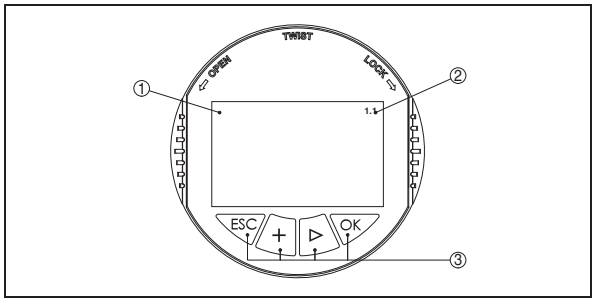


Fig. 12: Indicating and adjustment elements

1 LC display
2 Indication of the menu item number
3 Adjustment keys

Key functions

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

5.4 Adjustment with PACTware™

PACTware™/DTM

Independent of the respective signal output 4 … 20 mA/HART, Profibus PA or Foundation Fieldbus, the sensors can be operated directly on the instrument via PACTware™. The sensors with signal output 4 … 20 mA/HART can be also operated via the HART signal on the signal cable.

An VEGACONNECT interface adapter as well as an instrument driver for the respective sensor is necessary for the adjustment with PACTware™. All currently available VEGA DTMs are included as DTM Collection with the current PACTware™ version on a CD. They are available for a protective fee from our respective VEGA agency. In addition, this DTM Collection incl. the basic

1) For instruments with national approvals such as e.g. according to FM or CSA only available at a later date.

version of PACTware™ can be downloaded free-of-charge from the Internet.

To use the entire range of functions of a DTM, incl. project documentation, a DTM licence is required for that particular instrument family. This licence can be bought from the VEGA agency serving you.

Connect the PC via VEGACONNECT 3

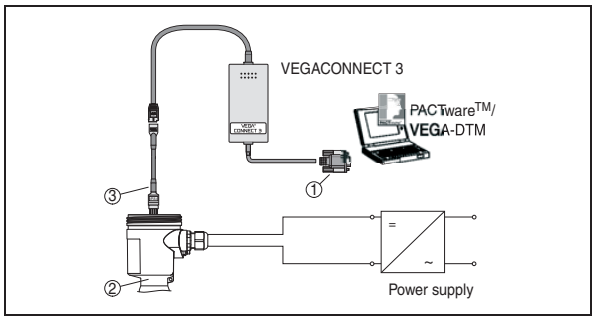


Fig. 13: Connection of the PC directly to the sensor via I²C interface

1 RS232 connection
2 VEGAFLEX
3 I²C adapter cable for VEGACONNECT 3

To adjust with PACTware™, a VEGACONNECT 3 with I²C adapter cable (art. no. 2.27323) as well as a power supply unit is necessary in addition to the PC and the suitable VEGA-DTM.

Connect the PC via VEGACONNECT 4

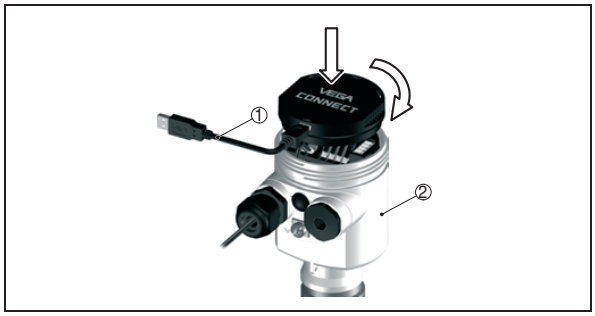


Fig. 14: Internal connection of the PC directly to the sensor via I²C interface

1 USB cable
2 Sensor

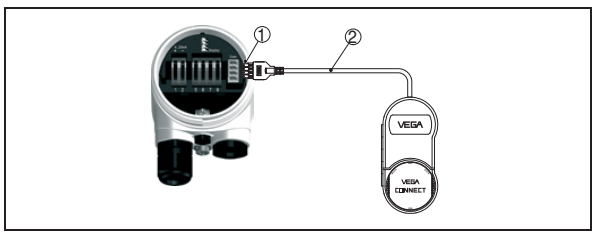


Fig. 15: External connection of the PC directly to the sensor via I²C interface

1 I²C bus (Com.) interface
2 I²C connection cable of VEGACONNECT 4

6 Technical data

General data

Material 316L corresponds to 1.4404 or 1.4435

VEGAFLEX 61

Materials, wetted parts

– Process fitting	316L and PCTFE, Hastelloy C22 (2.4602) and PCTFE
– Process seal on the instrument side (cable/rod leadthrough)	FKM (e.g. Viton), Kalrez 6375, EPDM, FKM (e.g. Viton) FEP-coated
– Process seal	On site (instruments with thread: Klingersil C-4400 is attached)
– inner conductor (up to the separation cable/rod)	1.4462
– Rod: ø 6 mm (0.236 in)	316L/Hastelloy C22 (2.4602)
– Cable: ø 4 mm (0.157 in) with gravity weight (optional)	316

VEGAFLEX 63

Materials, wetted parts

– Process fitting	PFA and PTFE (TFM 1600)
– Rod: ø 10 mm (0.394 in), cannot be shortened	PFA and PTFE (TFM 1600)
– Cable: ø 4 mm (0.157 in), cannot be shortened, with gravity weight (optionally available)	PFA and PTFE (TFM 1600)
– Process seal	On site (instruments with thread: Klingersil C-4400 is attached)

VEGAFLEX 65

Materials, wetted parts

– Process fitting	316L and PTFE (TFM) +25 % GF; Hastelloy C22 (2.4602) and PCTFE (TFM) +25 % GF
– Tube: ø 21.3 mm (0.839 in)	316L, Hastelloy C22 (2.4602)
– Process seal on the instrument side (cable/rod leadthrough)	FKM (e.g. Viton), Kalrez 6375, EPDM, FKM (e.g. Viton) FEP-coated
– Process seal	On site (instruments with thread: Klingersil C-4400 is attached)

VEGAFLEX 66

Materials, wetted parts - version -20 … +250 °C (-4 … +482 °F)

– Process fitting - coax version	316L, Hastelloy C22 (2.4602) and PEEK GF30
– Process fitting - rod version	316L, Hastelloy C22 (2.4602) and PEEK GF30
– Process fitting - cable version	316L and PEEK GF30
– Tube: ø 21.3 mm (0.839 in)	316L, Hastelloy C22 (2.4602)
– Rod: ø 6 mm (0.236 in)	316L, Hastelloy C22 (2.4602)
– Cable: ø 4 mm (0.157 in)	316
– Process seal on the instrument side (cable/rod leadthrough)	Kalrez 6375
– Process seal	On site (instruments with thread: Klingersil C-4400 is attached)

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

– Process fitting - coax version	316L, Hastelloy C22 (2.4602) and Aluminium oxide ceramic 99.7 % (Al2O3)
– Process fitting - rod version	316L, Hastelloy C22 (2.4602) and Aluminium oxide ceramic 99.7 % (Al2O3)
– Process fitting - cable version	316L, Hastelloy C22 (2.4602) and Aluminium oxide ceramic 99.7 % (Al2O3)
– Tube: ø 21.3 mm (0.839 in)	316L, Hastelloy C22 (2.4602)
– Rod: ø 6 mm (0.236 in)	316L, Hastelloy C22 (2.4602)
– Cable: ø 4 mm (0.157 in)	316
– Process seal on the instrument side (cable/rod leadthrough)	graphite
– Process seal	On site (instruments with thread: Klingersil C-4400 is attached)

Materials, wetted parts - version -200 … +400 °C (-328 … +752 °F)

– Process fitting - coax version	316L, Hastelloy C22 (2.4602) and Aluminium oxide ceramic 99.7 % (Al2O3)
– Process fitting - rod version	316L, Hastelloy C22 (2.4602) and Aluminium oxide ceramic 99.7 % (Al2O3)
– Process fitting - cable version	316L, Hastelloy C22 (2.4602) and Aluminium oxide ceramic 99.7 % (Al2O3)
– Tube: ø 43 mm (1.693 in)	316L
– Rod: ø 16 mm (0.63 in)	316L
– Cable: ø 6 mm (0.236 in)	316
– Process seal on the instrument side (cable/rod leadthrough)	graphite
– Process seal	On site (instruments with thread: Klingersil C-4400 is attached)

Materials, non-wetted parts

Materials, non-wetted parts	
– Housing	Plastic PBT (polyester), Alu die-casting powder-coated, 316L
– Seal between housing and housing cover	NBR (stainless steel housing), silicone (Alu/plastic housing)
– Inspection window in housing cover for PLICSCOM (optional)	Polycarbonate
– Ground terminal	316L

Weights approx.

Depending on process fitting

Instrument weight VEGAFLEX 61, 63, 65	approx. 0.8 … 8 kg (0.176 … 17.64 lbs)
Instrument weight - VEGAFLEX 66 (-20 … +250 °C/-4 … +482 °F)	approx. 0.8 … 8 kg (0.176 … 17.64 lbs)
Instrument weight - VEGAFLEX 66 (-110 … +400 °C/-166 … +752 °F)	approx. 0.8 … 8 kg (0.176 … 17.64 lbs)
Instrument weight VEGAFLEX 66 (-200 … +400 °C/-328 … +752 °F)	approx. 6 … 12 kg (13.23 … 26.46 lbs)
Weights	
– Cable: ø 4 mm (0.157 in)	80 g/m (0.86 oz/ft)
– Cable: ø 6 mm (0.236 in)	170 g/m (1.8 oz/ft)
– Rod: ø 6 mm (0.236 in)	220 g/m (2.365 oz/ft)
– Rod: ø 10 mm (0.394 in)	620 g/m (6.7 oz/ft)
– Rod: ø 16 mm (0.63 in)	1600 g/m (17.2 oz/ft)
– Tube: ø 21.3 mm (0.839 in)	920 g/m (9.9 oz/ft)
– Tube: ø 43 mm (1.693 in)	3600 g/m (38.7 oz/ft)
– Gravity weight (optionally available)	325 g (11.5 oz)
– Gravity weight - VEGAFLEX 66 (-200 … +400 °C/-328 … +752 °F, optional)	730 g (25.8 oz)

Lengths

Lengths (L)	
– Cable: ø 4 mm (0.157 in)	1 … 32 m (3.28 … 104.99 ft)
– Cable: ø 6 mm (0.236 in)	1 … 60 m (3.28 … 196.85 ft)
– Trimming accuracy - cable	±0.05 %
– Rod: ø 6 mm (0.236 in)	0.3 … 4 m (0.984 … 13.12 ft)
– Rod: ø 10 mm (0.394 in)	0.3 … 4 m (0.984 … 13.12 ft)
– Rod: ø 16 mm (0.63 in)	0.3 … 6 m (0.984 … 19.69 ft)
– Trimming accuracy - rod	< 1 mm (0.039 in)
– Tube: ø 21.3 mm (0.839 in)	0.3 … 6 m (0.984 … 19.69 ft)
– Tube: ø 43 mm (1.693 in)	0.3 … 6 m (0.984 … 19.69 ft)

Lateral load

Lateral load	
– Rod: ø 6 mm (0.236 in)	4 Nm (3 lbf ft)
– Rod: ø 10 mm (0.394 in)	4 Nm (3 lbf ft)
– Rod: ø 16 mm (0.63 in)	30 Nm (22 lbf ft)
– Tube: ø 21.3 mm (0.839 in)	60 Nm (44 lbf ft)
– Tube: ø 43 mm (1.693 in)	100 Nm (73 lbf ft)

Max. tensile load

Max. tensile load	
– VEGAFLEX 61 - cable: ø 4 mm (0.157 in)	5 KN (1124 lbf)
– VEGAFLEX 63 - cable: ø 4 mm (0.157 in)	2 KN (450 lbf)
– VEGAFLEX 66 - cable: ø 4 mm (0.157 in)	2.5 KN (562 lbf)
– VEGAFLEX 66 - cable: ø 6 mm (0.236 in)	10 KN (2248 lbf)

Output variable

4 … 20 mA/HART

Output signal	4 … 20 mA/HART
Signal resolution	1.6 µA
Fault message	Current output unchanged 20.5 mA, 22 mA, < 3.6 mA (adjustable)
Max. output current	22 mA

Load	
– 4 … 20 mA/HART two-wire instrument	see load diagram under Power supply
– 4 … 20 mA/HART four-wire instrument	max. 500 Ohm[2)]
Damping (63 % of the input variable)	0 … 999 s, adjustable
Fulfilled NAMUR recommendations	NE 43
Profibus PA	
Output signal	digital output signal, format according to IEEE-754
Sensor address	126 (default setting)
Current value	10 mA, ±0.5 mA
Integration time (63 % of the input variable)	0 … 999 s, adjustable
Foundation Fieldbus	
Output	
– Signal	digital output signal, Foundation Fieldbus protocol
– Physical layer	according to IEC 61158-2
Channel Numbers	
– Channel 1	Primary Value
– Channel 2	Secondary Value 1
– Channel 3	Secondary Value 2
Transmission rate	31.25 Kbit/s
Current value	10 mA, ±0.5 mA
Integration time (63 % of the input variable)	0 … 999 s, adjustable

Input variable

Parameter	Level of liquids
Cable and rod version	
Min. dielectric value with rod, cable version	εr > 1.6
Dead band with rod version	
– top	80 mm (3.15 in)
– bottom	0 mm
Dead band with cable version	
– top	150 mm (5.91 in)
– bottom	250 mm (9.843 in), gravity weight + 100 mm (3.937 in)

2) With inductive load ohmic share min. 25 Ω/mH.

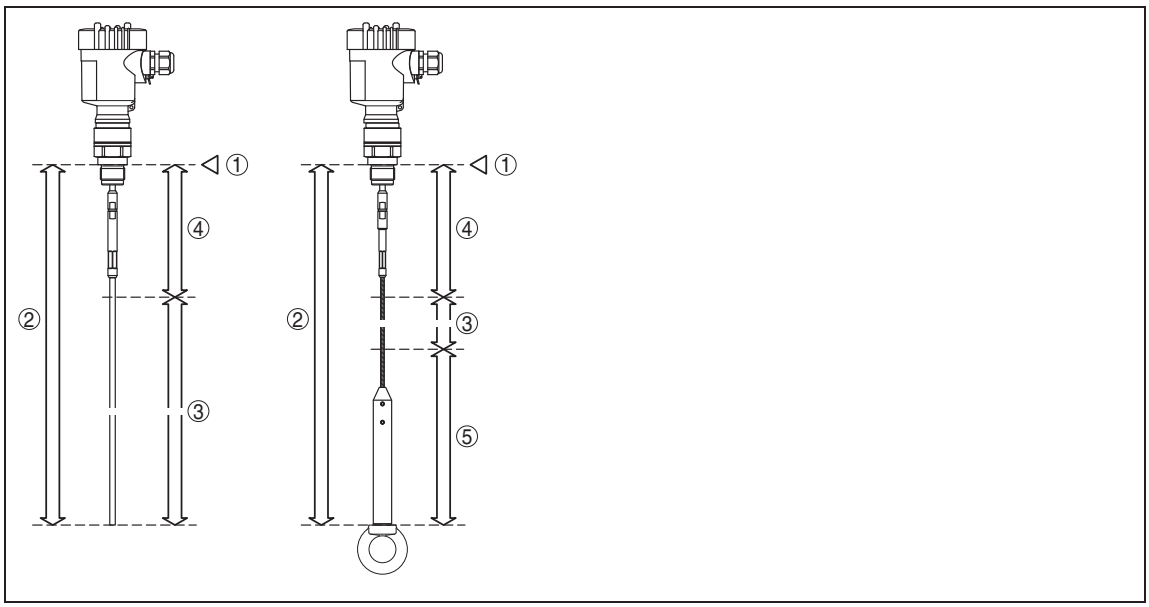


Fig. 16: Measuring ranges of VEGAFLEX with cable and rod version e.g. VEGAFLEX 61

1 Reference plane
2 Probe length
3 Measuring range
4 Upper dead band
5 Lower dead band (only with cable version)

Coax version

Min. dielectric value with coax version	εr > 1.4
Dead band - coax version	
– top	30 mm (1.181 in)
– bottom	0 mm

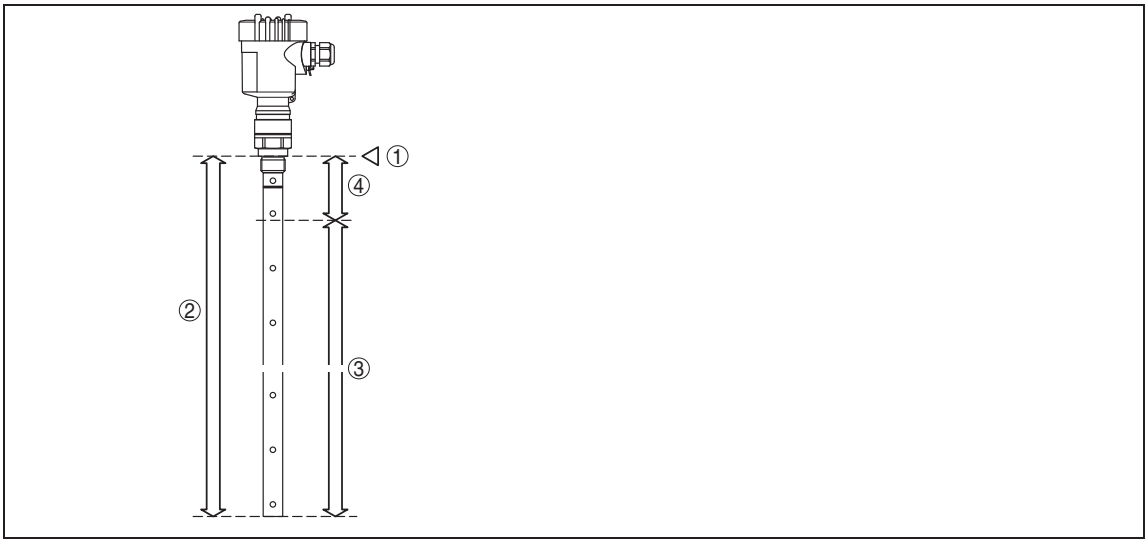


Fig. 17: Measuring ranges of VEGAFLEX with coax version e.g. VEGAFLEX 65

1 Reference plane
2 Probe length
3 Measuring range
4 Upper dead band

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 psig)

Deviation in characteristics and characteristics

Reference installation conditions	
– Flange	DN 100
– Min. distance to installations (not with coax version)	500 mm (19.69 in)
– Min. distance to metal vessel bottom	20 mm (0.787 in)
Reference reflector	Metal plate: ø 1 m (3.28 ft)
Temperature drift (current output)	0.06 %/10 K relating to the max. measuring range
Accuracy	
– Cable version	±3 mm (0.118 in)
– Rod version	±3 mm (0.118 in)
– Coax version	±3 mm (0.118 in)

Ambient conditions

Ambient, storage and transport temperature	
– Standard version	-40 … +80 °C (-40 … +176 °F)
– Version IP 66/IP 68, 1 bar with connection cable PE	-20 … +60 °C (-4 … +140 °F)

Process conditions

VEGAFLEX 61, 65

Process pressure	-1 … 40 bar/-100 … 4000 kPa (-14.5 … 580 psig), depending on the process fitting

Process temperature (thread or flange temperature)

– FKM (e.g. Viton)	-40 … +150 °C (-40 … +302 °F)
– FKM (e.g. Viton), FEP-coated	-40 … +150 °C (-40 … +302 °F)
– EPDM	-40 … +150 °C (-40 … +302 °F)
– Kalrez 6375	-20 … +150 °C (-4 … +302 °F)

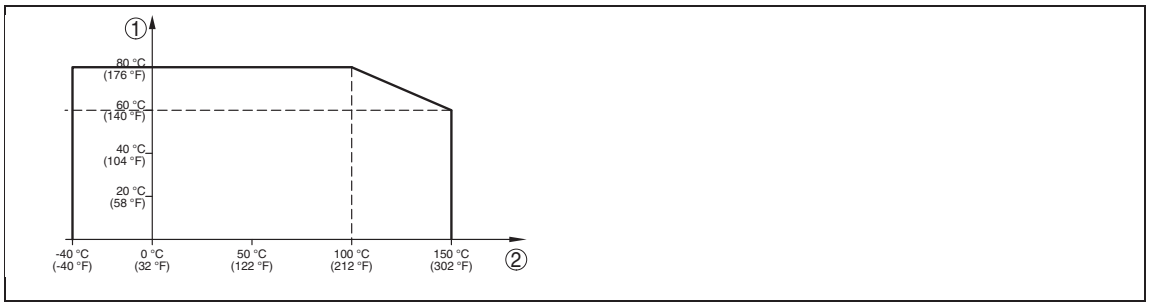


Fig. 18: VEGAFLEX 61, 65 - dependency ambient temperature to product temperature

1 Ambient temperature
2 Product temperature (depending on the seal material)

VEGAFLEX 63

Process pressure

– Flange version ≤ 2"/DN 50	-0.5 … 16 bar/-50 … 1600 kPa (-7.3 … 232 psig), depending on the process fitting
– Flange version > 2"/DN 50	-0.2 … 16 bar/-20 … 1600 kPa (-2.9 … 232 psig), depending on the process fitting
Process temperature (flange temperature)	-40 … +150 °C (-40 … +302 °F)

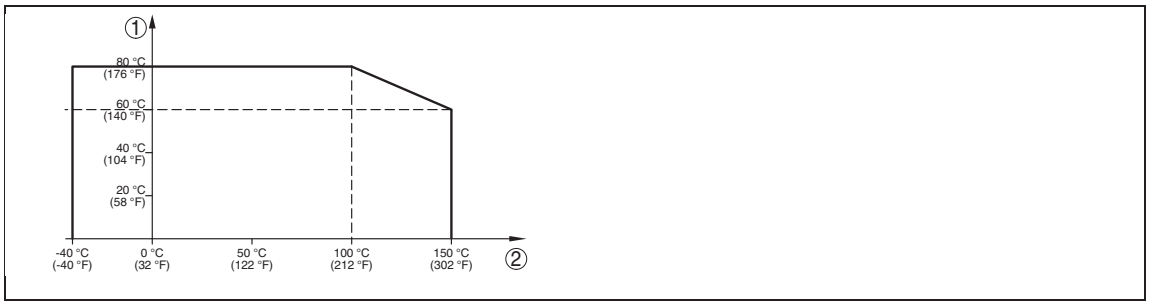


Fig. 19: VEGAFLEX 63 - dependency ambient temperature to product temperature

1 Ambient temperature
2 Product temperature (depending on the seal material)

VEGAFLEX 66 (-20 … +250 °C/-4 … +482 °F)

Process pressure	-1 … 100 bar/-100 … 10000 kPa (-14.5 … 1450 psig), depending on the process fitting
Process temperature	-20 … +250 °C (-4 … +482 °F)

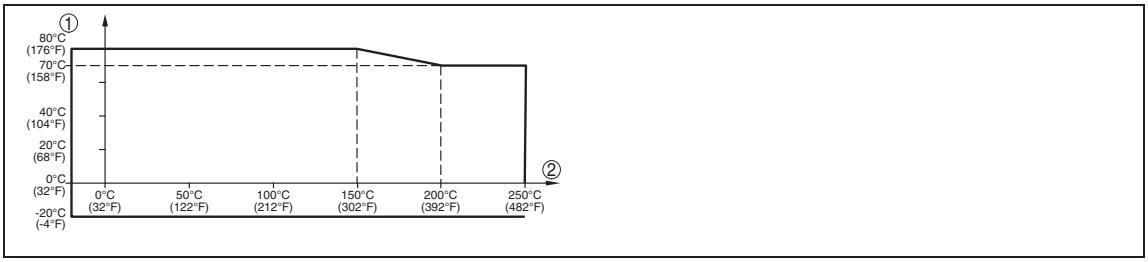


Fig. 20: Version -20 … +250 °C (-4 … +482 °F): in dependence on ambient temperature to product temperature

1 Ambient temperature
2 Product temperature (depending on the seal material)

VEGAFLEX 66 (-110 … +400 °C/-328 … +752 °F)
Not for steam pressure applications

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

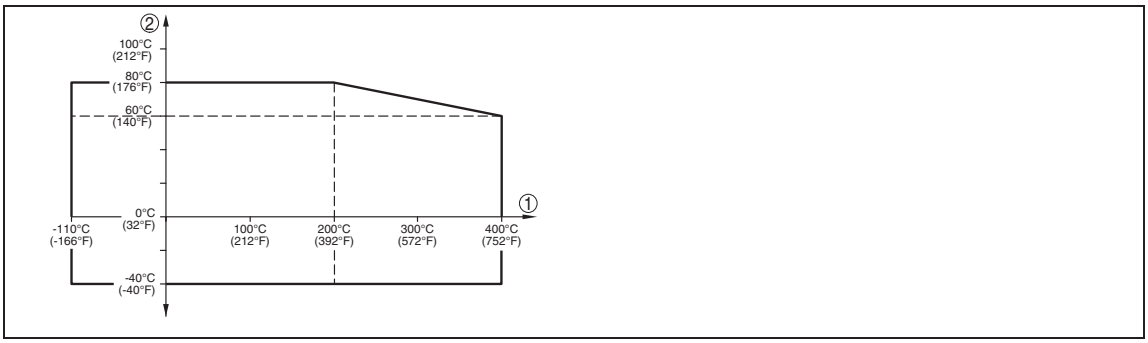


Fig. 21: Version -110 … +400 °C (-166 … +752 °F): in dependence on ambient temperature to product temperature

1 Product temperature
2 Ambient temperature

VEGAFLEX 66 (-200 … +400 °C/-328 … +752 °F)

Process pressure	-1 … 400 bar/-100 … 40000 kPa (-14.5 … 5800 psig), depending on the process fitting

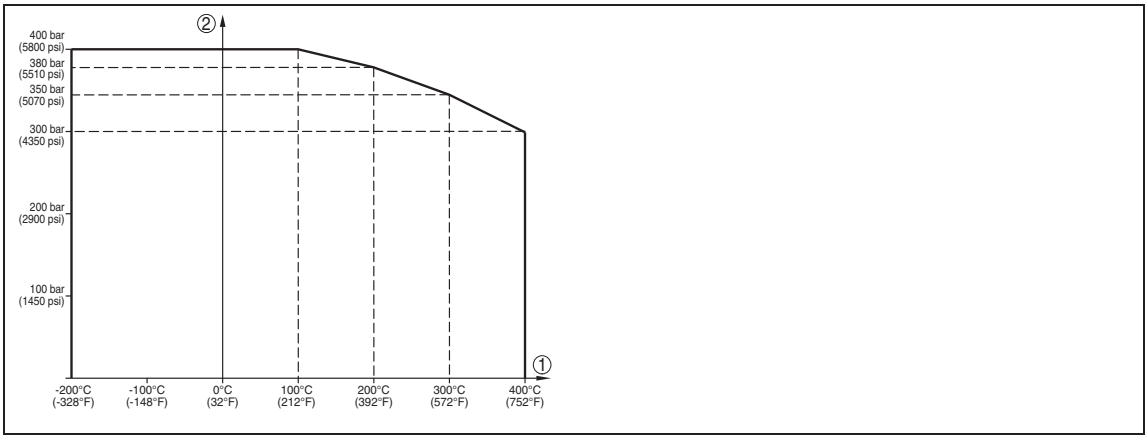


Fig. 22: Version -200 … +400 °C (-328 … +752 °F): dependency process pressure to product temperature

1 Product temperature
2 Process pressure

Process temperature	-200 … +400 °C (-328 … +752 °F)

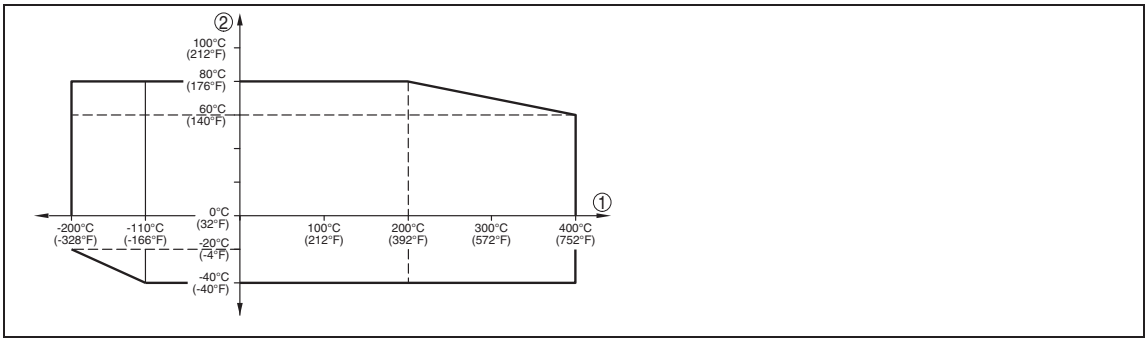


Fig. 23: Version -200 … +400 °C (-328 … +752 °F): in dependence on ambient temperature to product temperature

1 Ambient temperature
2 Product temperature (depending on the seal material)

Electromechanical data - version IP 66/IP 67 and IP 66/IP 68; 0.2 bar

Cable entry/plug[3)]

– Single chamber housing
- 1 x cable entry M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5

or:
- 1 x closing cap M20 x 1.5; 1 x blind stopper M20 x 1.5

or:
- 1 x closing cap ½ NPT, 1 x blind plug ½ NPT

or:
- 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5

– Double chamber housing
- 1 x cable entry M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5; 1 x blind stopper M16 x 1.5 or optionally available with 1 x plug M12 x 1 for VEGADIS 61

or:
- 1 x closing cap ½ NPT, 1 x blind stopper ½ NPT, 1 x blind stopper M16 x 1.5 or optionally available with 1 x plug M12 x 1 for VEGADIS 61

3) Depending on the version M12x1, according to DIN 43650, Harting, Amphenol-Tuchel, 7/8" FF.

	or: • 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5; 1 x blind stopper M16 x 1.5 or optionally available with 1 x plug M12 x 1 for VEGADIS 61
Connection terminals	Spring-loaded terminals for wire cross-section up to 2.5 mm² (AWG 14)

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

Cable entry	
– Single chamber housing	• 1 x IP 68 cable gland M20 x 1.5; 1 x blind stopper M20 x 1.5 or: • 1 x closing cap ½ NPT, 1 x blind plug ½ NPT
– Double chamber housing	• 1 x P 68 cable entry M20 x 1.5; 1 x blind stopper M20 x 1.5; plug M12 x 1 for VEGADIS 61 (optional) or: • 1 x closing cap ½ NPT, 1 x blind stopper ½ NPT, plug M12 x 1 for VEGADIS 61 (optional)
Connection cable	
– Wire cross-section	0.5 mm²
– wire resistance	< 0.036 Ohm/m
– Tensile strength	> 1200 N (270 pounds force)
– Standard length	5 m (16.4 ft)
– Max. length	1000 m (3280 ft)
– Min. bending radius	25 mm (0.984 in) with 25 °C (77 °F)
– Diameter approx.	8 mm (0.315 in)
– Colour - standard PE	Black
– Colour - standard PUR	Blue
– Colour - Ex-version	Blue

Indicating and adjustment module

Power supply and data transmission	through the sensor
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

Power supply VEGAFLEX - two-wire instrument

4 … 20 mA/HART

Supply voltage	
– Non-Ex instrument	14 … 36 V DC
– EEx-ia instrument	14 … 30 V DC
– EEx-d-ia instrument	20 … 36 V DC
Permissible residual ripple	
– < 100 Hz	U_{ss} < 1 V
– 100 Hz … 10 kHz	U_{ss} < 10 mV
Load	see diagram

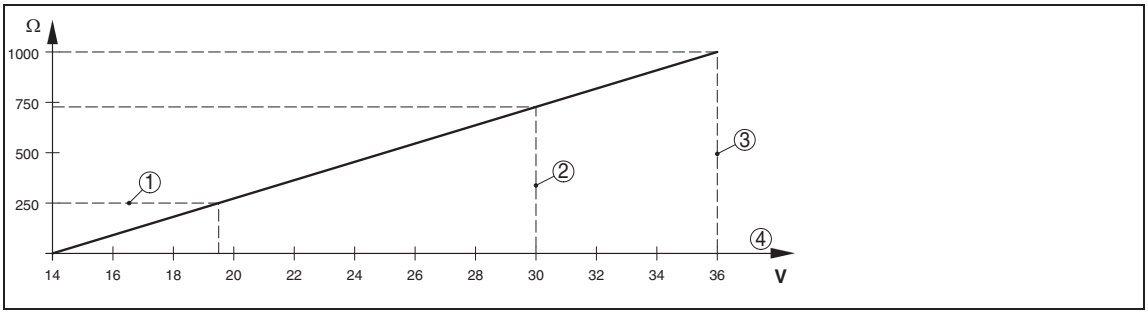


Fig. 24: Voltage diagram

1 HART load
2 Voltage limit EEx-ia instrument
3 Voltage limit non-Ex/Exd instrument
4 Supply voltage

Profibus PA

Supply voltage	
– Non-Ex instrument	9 … 32 V DC
– EEx-ia instrument	9 … 24 V DC
Power supply by/max. number of sensors	
– DP/PA segment coupler	max. 32 (max. 10 with Ex)
– VEGALOG 571 EP card	max. 15 (max. 10 with Ex)

Foundation Fieldbus

Supply voltage	
– Non-Ex instrument	9 … 32 V DC
– EEx-ia instrument	9 … 24 V DC
Power supply by/max. number of sensors	
– H1 Fieldbus cable/Voltage supply	max. 32 (max. 10 with Ex)

Power supply VEGAFLEX - four-wire instrument

4 … 20 mA

Supply voltage	
– Non-Ex and EEx-d instrument	20 … 72 V DC, 20 … 253 V AC, 50/60 Hz
Max. power consumption	4 VA; 2.1 W

Electrical protective measures

Protection	
– Plastic housing	IP 66/IP 67
– Double chamber Alu-housing, four-wire instruments	IP 66/IP 67
– Alu and stainless steel housing, two-wire instruments	IP 66/IP 68 (0.2 bar)[4]
– Alu and stainless steel housing optional, two-wire instruments	IP 66/IP 68 (1 bar)
Overvoltage category	III
Protection class	
– two-wire, Profibus PA, Foundation Fieldbus	II
– four-wire	I

Approvals[5]

VEGAFLEX 61, 62, 63, 65

ATEX	ATEX II 1G, 1/2G, 2G EEx ia IIC T6 ATEX II 1/2G, 2G EEx d ia IIC T6, ATEX II 1/2D IP66 T, WHG

4) A suitable cable is the prerequisite for maintaining the protection class.
5) Deviating data in Ex applications: see separate safety instructions.

FM	FM CI.I, Div 2 (NI) + CI.II, III, Div 1 (DIP) FM CI.I-III, Div 1 (IS) FM CI.I-III, Div 1 (IS) + CI.I-III, Div 1 Gr.C-G(XP)
CSA	CSA CI.I, Div 2 (NI) + CI.II, III, Div 1 (DIP) CSA CI.I-III, Div 1 (IS) CSA CI.I-III, Div 1 (IS) + CI.I-III, Div 1 Gr.C-G(XP)
Ship approvals	
VEGAFLEX 66	
ATEX	ATEX II 1G, 1/2G, 2G EEx ia IIC T6 ATEX II 1/2G, 2G EExd ia IIC T6
FM	FM CI.I, Div 2 (NI) + CI.II, III, Div 1 (DIP) FM CI.I-III, Div 1 (IS) FM CI.I-III, Div 1 (IS) + CI.I-III, Div 1 Gr.C-G(XP)
Ship approvals (versions up to +250 °C/482 °F)	

CE conformity

EMVG (89/336/EWG), Emission: EN 61326: 1997 (class B),
Susceptibility: EN 61326: 1997/A1: 1998
LVD (73/23/EWG), EN 61010-1: 2001
NAMUR recommendation NE 21

Functional safety (SIL)

You can find detailed information in the Safety Manual of VEGAFLEX or under www.vega.com.
Functional safety according to IEC 61508/IEC 61511

– Single channel architecture (1oo1D)	up to SIL2
– Multiple channel architecture	see "*Safety Manual*"

Environmental instructions

VEGA environment management system	certified according to DIN EN ISO 14001

You can find detailed information under www.vega.com.

7 Dimensions

Housing in protection IP 66/IP 67 and IP 66/IP 68; 0.2 bar

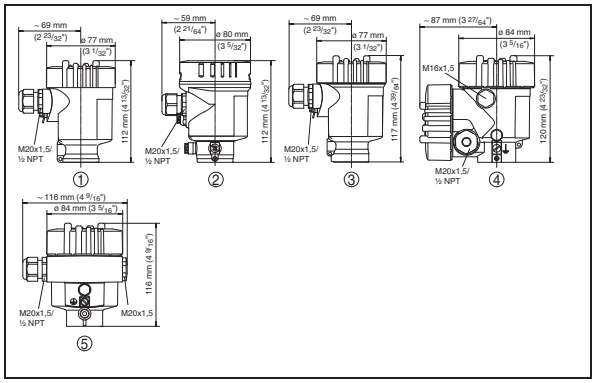


Fig. 25: Housing versions in protection IP 66/IP 67 and IP 66/IP 68, 0.2 bar (with integrated indicating and adjustment module the housing height increases by 9 mm/ 0.35 in)

1 Plastic housing
2 Stainless steel housing
3 Stainless steel housing - precision casting
4 Aluminium double chamber housing
5 Aluminium housing

Housing in protection IP 66/IP 68, 1 bar

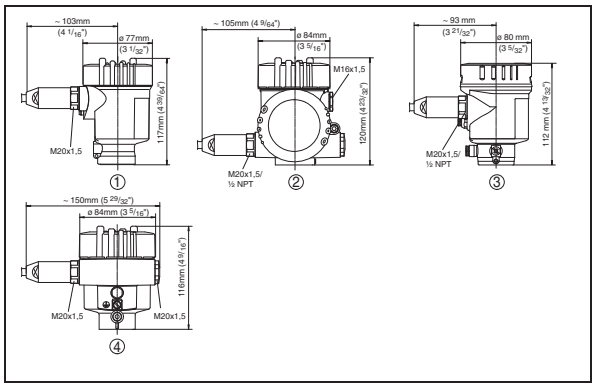


Fig. 26: Housing versions in protection IP 66/IP 68, 1 bar (with integrated indicating and adjustment module the housing is 9 mm/0.35 in higher)

1 Stainless steel housing - precision casting
2 Aluminium double chamber housing
3 Stainless steel housing
4 Aluminium housing

VEGAFLEX 61 - cable and rod version

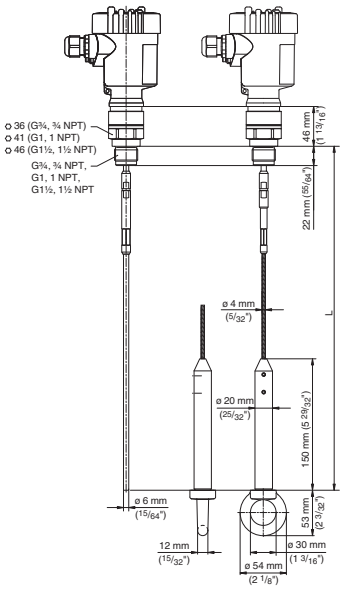


Fig. 27: VEGAFLEX 61 - cable and rod version with thread

L Sensor length, see chapter "Technical data"

VEGAFLEX 63 - flange version

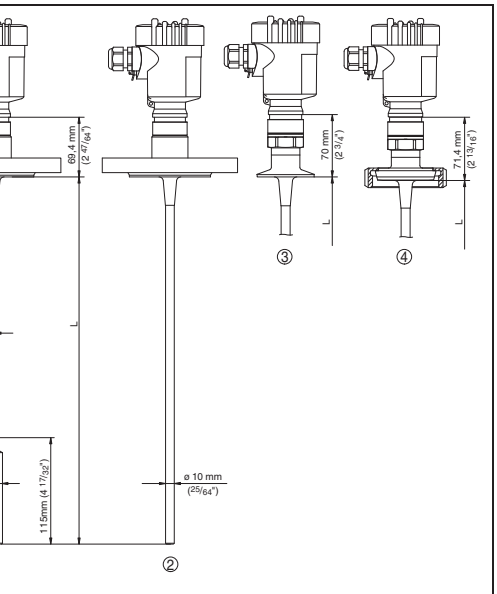


Fig. 28: VEGAFLEX 63 - flange version

L Sensor length, see chapter "Technical data"
1 Cable version with flange connection
2 Rod version with flange connection
3 Tri-Clamp
4 Bolting

VEGAFLEX 65 - coax version

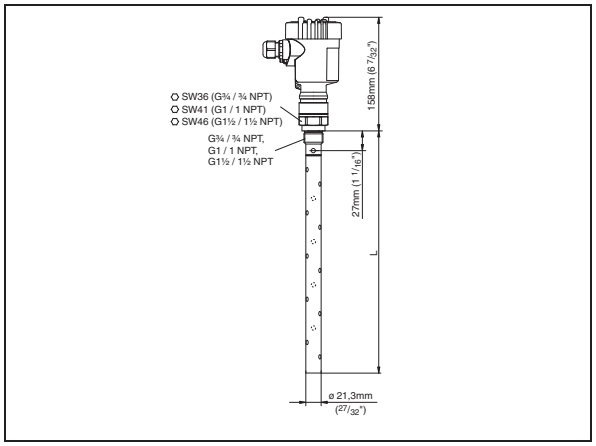


Fig. 29: VEGAFLEX 65 - coax version with thread

L Sensor length, see chapter "Technical data"

VEGAFLEX 66 - cable, rod version (-20 … +250 °C/-4 … +482 °F)

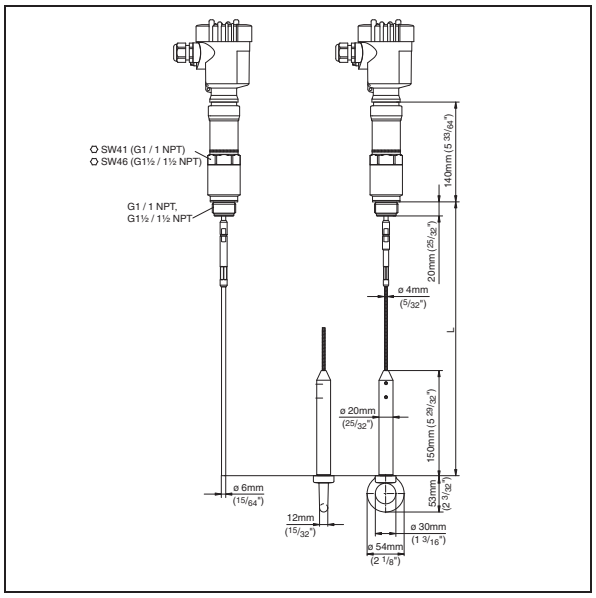


Fig. 30: VEGAFLEX 66 - cable, rod version with thread (-20 … +250 °C/-4 … +482 °F)

L Sensor length, see chapter "Technical data"

VEGAFLEX 66 - coax version (-20 … +250 °C/-4 … +482 °F)

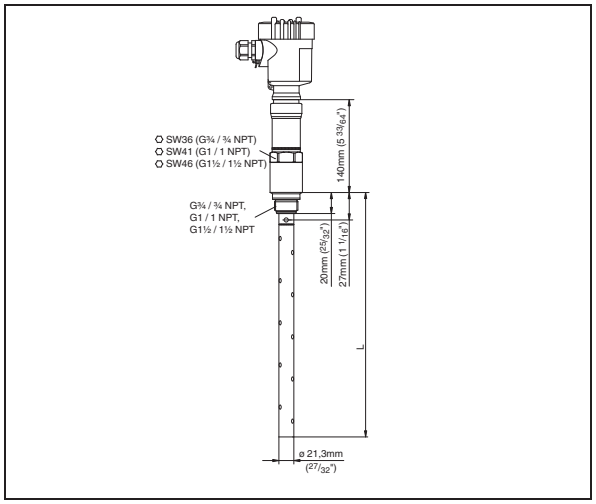


Fig. 31: VEGAFLEX 66 - coax version with thread (-20 … +250 °C/-4 … +482 °F)

L Sensor length, see chapter "Technical data"

VEGAFLEX 66 - cable, rod version (-110 … +400 °C/-166 … +752 °F)

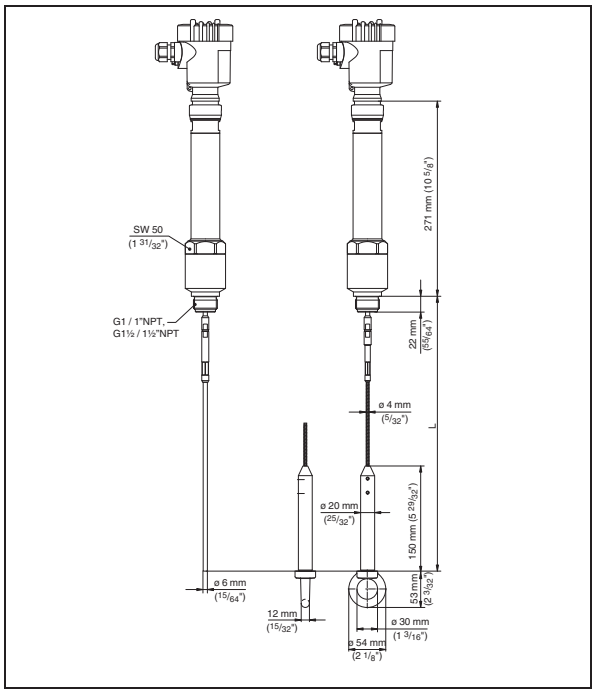


Fig. 32: VEGAFLEX - cable, rod version with thread (-110… +400 °C/-166… +752 °F)

L Sensor length, see chapter "Technical data"

VEGAFLEX 66 - coax version (-110 … +400 °C/-166 … +752 °F)

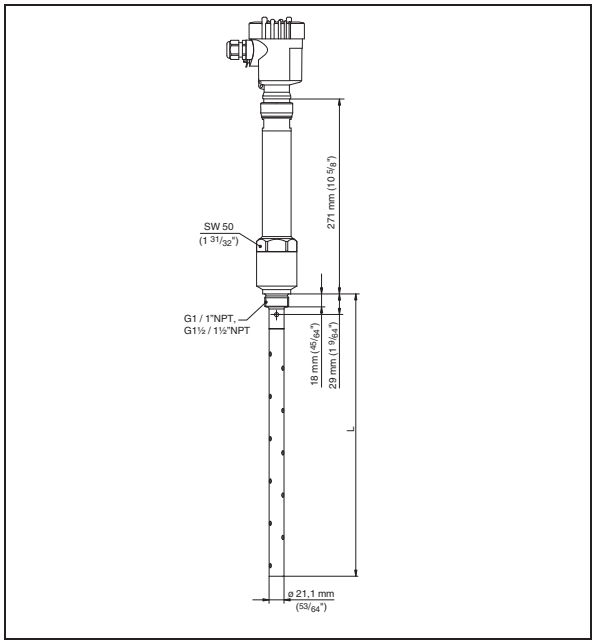


Fig. 33: VEGAFLEX - coax version with thread (-110 … +400 °C/-166 … +752 °F)

L Sensor length, see chapter "Technical data"

VEGAFLEX 66 - cable, rod version (-200 … +400 °C/-328 … +752 °F)

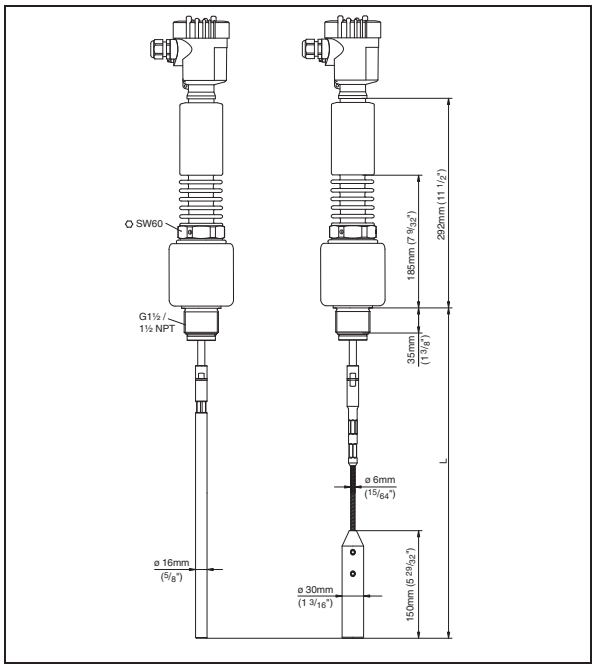


Fig. 34: VEGAFLEX 66 - cable, rod version with thread (-200 … +400 °C/-328 … +752 °F)

L Sensor length, see chapter "Technical data"

VEGAFLEX 66 - coax version (-200 … +400 °C/-328 … +752 °F)

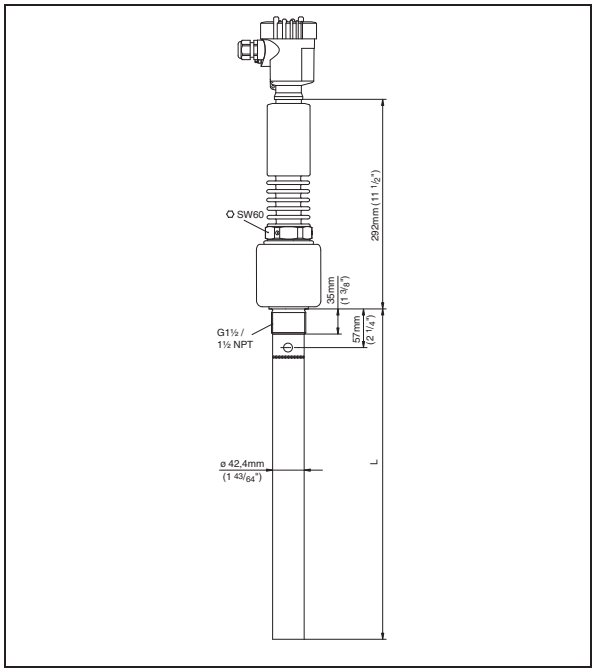
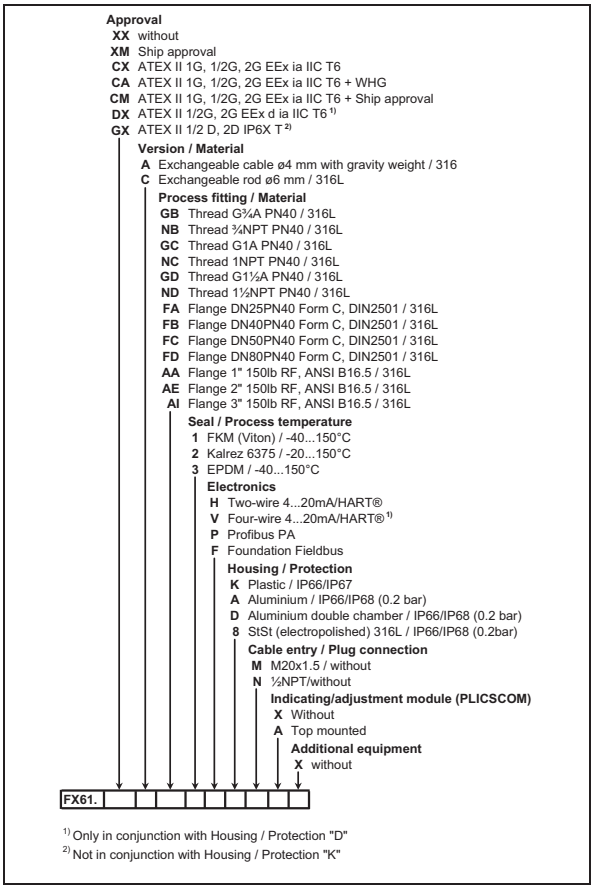


Fig. 35: VEGAFLEX 66 - coax version with thread (-200 … +400 °C/-328 … +752 °F)

L Sensor length, see chapter "Technical data"

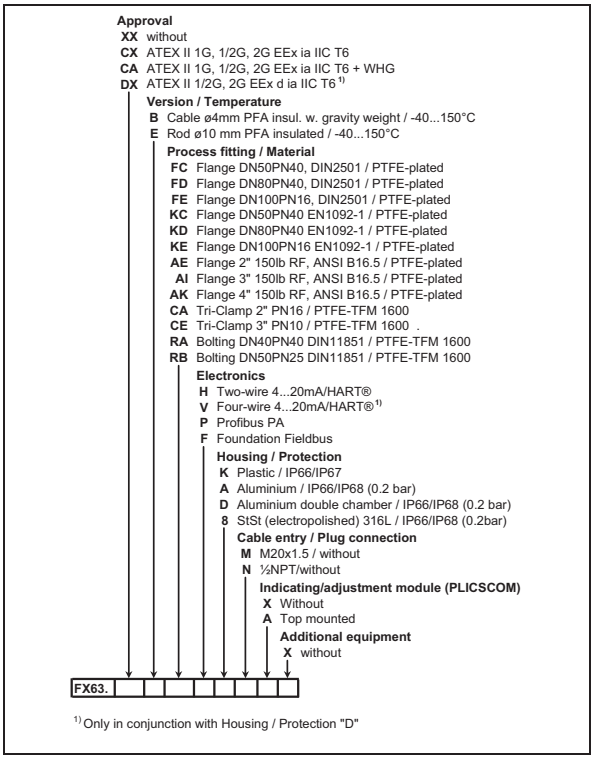
8 Product code

VEGAFLEX 61



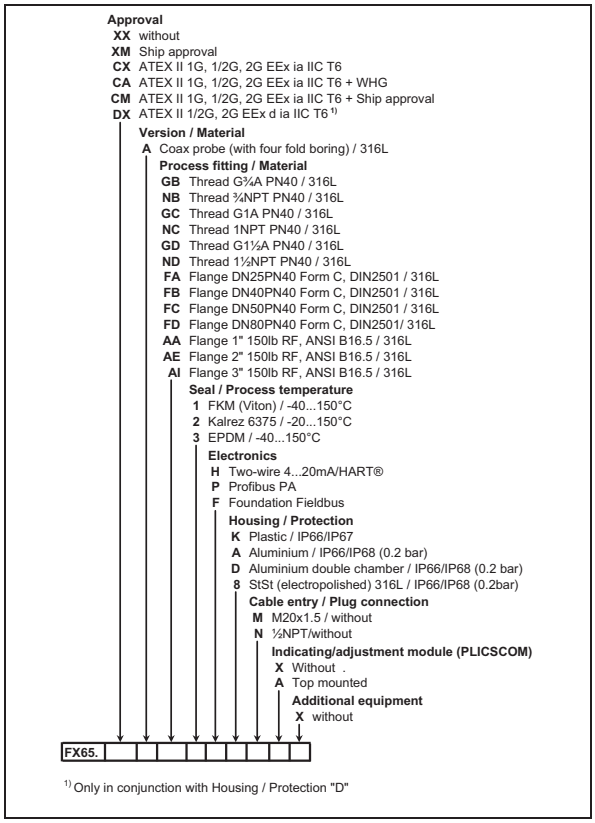
1) Only in conjunction with Housing / Protection "D"
2) Not in conjunction with Housing / Protection "K"

VEGAFLEX 63



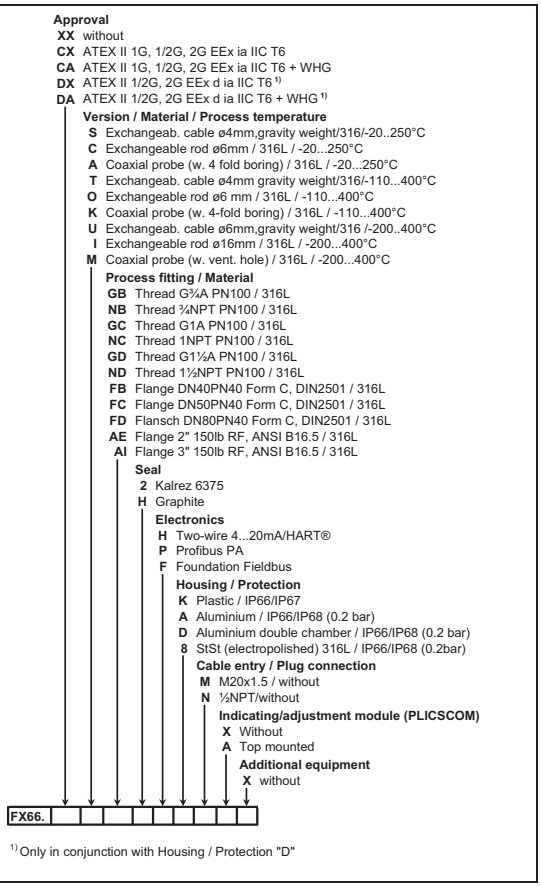
1) Only in conjunction with Housing / Protection "D"

VEGAFLEX 65



1) Only in conjunction with Housing / Protection "D"

VEGAFLEX 66



1) Only in conjunction with Housing / Protection "D"