Operating Instructions

Vibrating level switch for liquids under extreme process temperatures and pressures

VEGASWING 66

Relay

With SIL qualification

Document ID: 58109

Contents

58109-EN-230825

Safety instructions for Ex areas:
Take note of the Ex specific safety instructions for Ex applications. These instructions are attached as documents to each instrument with Ex approval and are part of the operating instructions.

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1 About this document

1.1 Function

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

1.2 Target group

This operating instructions manual is directed to trained personnel. The contents of this manual must be made available to the qualified personnel and implemented.

1.3 Symbols used

Document ID
This symbol on the front page of this instruction refers to the Document ID. By entering the Document ID on www.vega.com you will reach the document download.

Information, note, tip: This symbol indicates helpful additional information and tips for successful work.

Note: This symbol indicates notes to prevent failures, malfunctions, damage to devices or plants.

Caution: Non-observance of the information marked with this symbol may result in personal injury.

Warning: Non-observance of the information marked with this symbol may result in serious or fatal personal injury.

Danger: Non-observance of the information marked with this symbol results in serious or fatal personal injury.

Ex applications
This symbol indicates special instructions for Ex applications.

- **List**
  The dot set in front indicates a list with no implied sequence.

1 **Sequence of actions**
Numbers set in front indicate successive steps in a procedure.

Disposal
This symbol indicates special instructions for disposal.

2 For your safety

2.1 Authorised personnel

All operations described in this documentation must be carried out only by trained and authorized personnel.

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

2.2 Appropriate use

The VEGASWING 66 is a sensor for point level detection.

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

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

2.3 Warning about incorrect use

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

2.4 General safety instructions

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

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

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

To avoid any danger, the safety approval markings and safety tips on the device must also be observed.

2.5 Conformity

The device complies with the legal requirements of the applicable country-specific directives or technical regulations. We confirm conformity with the corresponding labelling.

The corresponding conformity declarations can be found on our homepage.

2.6 NAMUR recommendations

NAMUR is the automation technology user association in the process industry in Germany. The published NAMUR recommendations are accepted as the standard in field instrumentation.

The device fulfils the requirements of the following NAMUR recommendations:

- NE 21 – Electromagnetic compatibility of equipment
- NE 53 – Compatibility of field devices and display/adjustment components
- NE 107 – Self-monitoring and diagnosis of field devices

For further information see www.namur.de.

2.7 Installation and operation in the USA and Canada

This information is only valid for USA and Canada. Hence the following text is only available in the English language.

Installations in the US shall comply with the relevant requirements of the National Electrical Code (NEC - NFPA 70) (USA).

Installations in Canada shall comply with the relevant requirements of the Canadian Electrical Code (CEC Part) (Canada).

2.8 Safety instructions for Ex areas

For applications in explosion-proof areas (Ex), only devices with corresponding Ex approval may be used. Observe the Ex-specific safety instructions. These are an integral part of the operating instructions and are enclosed with every device with Ex approval.

2.9 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 "*Packaging, transport and storage*"
- Chapter "*Disposal*"

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- VEGASWING 66 point level switch

The further scope of delivery encompasses:

- Documentation
  - Operating instructions VEGASWING 66
  - Safety Manual (SIL)
  - Instructions for optional instrument features
  - Ex-specific " *Safety instructions*" (with Ex versions)
  - If necessary, further certificates

Information:
Optional instrument features are also described in this operating instructions manual. The respective scope of delivery results from the order specification.

Constituent parts

The VEGASWING 66 consists of the components:

- Housing lid
- Housing with electronics
- Process fitting with tuning fork

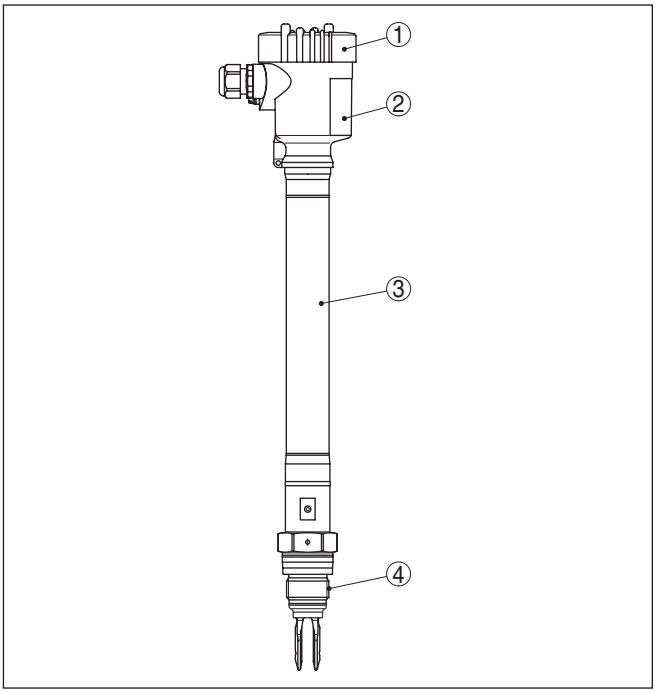

Fig. 1: VEGASWING 66, compact version with plastic housing

1 Housing lid
2 Housing with electronics
3 Temperature adapter
4 Process fitting

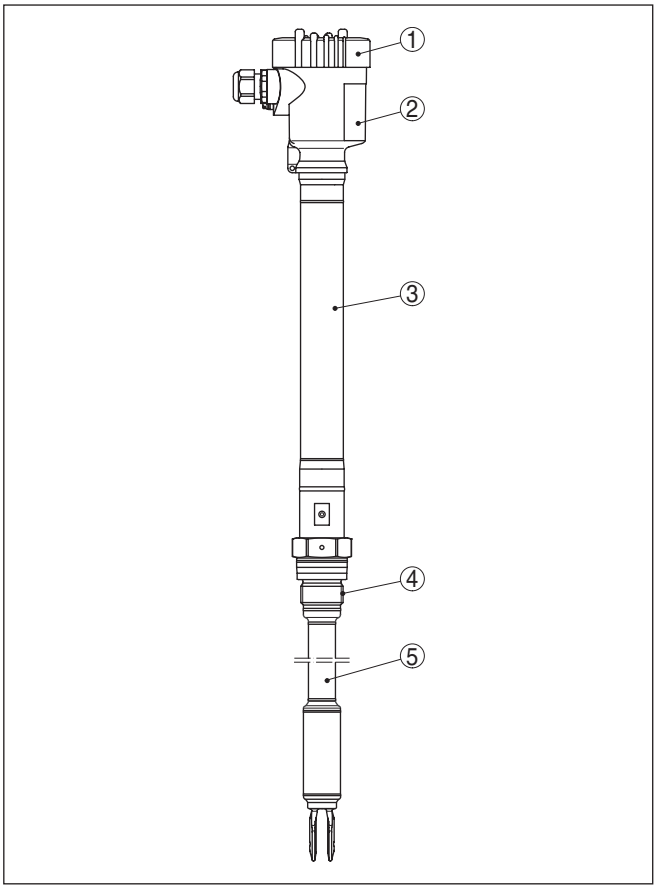

Fig. 2: VEGASWING 66 with plastic housing and tube extension

1 Housing lid
2 Housing with electronics
3 Temperature adapter
4 Process fitting
5 Tube extension

Type label

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

- Instrument type
- Information about approvals
- Configuration information
- Technical data
- Serial number of the instrument
- QR code for device identification
- Manufacturer information

Documents and software

To find order data, documents or software related to your device, you have the following options:

- Move to " www.vega.com" and enter in the search field the serial number of your instrument.
- Scan the QR code on the type label.
- Open the VEGA Tools app and enter the serial number under "***Documentation***".

3.2 Principle of operation

Application area

VEGASWING 66 is a point level sensor with tuning fork for point level detection.

It is designed for industrial use in all areas of process technology and can be used in liquids. It is particularly suitable for applications with high temperatures up to 450 °C (842 °F) and high process pressure up to 160 bar (2320 psig).

Typical applications are overfill and dry run protection. The small tuning fork allows the use in pipelines from DN 32 as well as in all kinds of vessels and tanks.

Thanks to its simple and robust measuring system, VEGASWING 66 is virtually unaffected by the chemical and physical properties of the liquid.

It functions even under difficult conditions such as turbulence, foam generation, buildup, external vibration or changing products.

Function monitoring

The electronics module of VEGASWING 66 continuously monitors the following criteria via frequency evaluation:

- Strong corrosion or damage on the tuning fork
- Loss of vibration
- Break in the vibration drive circuit

If a malfunction is detected or in case of voltage supply, the electronics takes on a defined switching status, i.e. the relay deenergises (safe state).

Functional principle

The tuning fork vibrates at its mechanical resonance frequency of approx. 1400 Hz. When the tuning fork is submerged in the product, the frequency changes. This change is detected by the integrated electronics module and converted into a switching command.

Voltage supply

VEGASWING 66 can be operated without external evaluation system. The integrated electronics evaluates the level signal and outputs a switching signal. With this switching signal, a connected device can be operated directly (e.g. a warning system, a pump etc.).

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

3.3 Adjustment

With the factory setting, products with a density ≥ 0.7 g/cm³ (0.025 lbs/in³) can be detected. The instrument can be adapted to products with lower density.

On the electronics module you will find the following display and adjustment elements:

- Signal lamp for indication of the operating status (green)
- Control lamp for indication of the switching status (yellow)
- Control lamp for fault indication (red)
- DIL switch for sensitivity adjustment
- Mode switch for selecting the switching behaviour (min./max.)

3.4 Packaging, transport and storage

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test based on ISO 4180.

The packaging of standard instruments consists of environment-friendly, recyclable carton material. The sensing element is additionally protected with a cardboard cover. For special versions, PE foam or PE foil is also used. Please dispose of the packaging material through specialised recycling companies.

Transport

Transport must be carried out in due consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Storage

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

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

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

Storage and transport temperature

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

Lifting and carrying

With instrument weights of more than 18 kg (39.68 lbs) suitable and approved equipment must be used for lifting and carrying.

3.5 Accessories

The instructions for the listed accessories can be found in the download area on our homepage.

PLICSLED

The pluggable display module PLICSLED is used for clearly visible indication of the switching status. It can be attached to the electronics of the sensor and removed at any time.

Flanges

Screwed flanges are available in different versions according to the following standards: DIN 2501, EN 1092-1, BS 10, ASME B 16.5, JIS B 2210-1984, GOST 12821-80.

Plug connector

For connecting the sensors with a separator to voltage supply or signal processing, the sensors are also available with plug connectors.

The following plug connectors are available:

- M12 x 1
- ISO 4400
- Harting HAN 7D
- Harting HAN 8D
- Amphenol-Tuchel

4 Mounting

4.1 General instructions

Process conditions

Note:
For safety reasons, the instrument must only be operated within the permissible process conditions. You can find detailed information on the process conditions in chapter " *Technical data*" of the operating instructions or on the type label.

Hence make sure before mounting that all parts of the instrument exposed to the process are suitable for the existing process conditions.

These are mainly:

- Active measuring component
- Process fitting
- Process seal

Process conditions in particular are:

- Process pressure
- Process temperature
- Chemical properties of the medium
- Abrasion and mechanical influences

Ambient conditions

The instrument is suitable for standard and extended ambient conditions acc. to DIN/EN/BS EN/IEC/ANSI/ISA/UL/CSA 61010-1. It can be used indoors as well as outdoors.

Switching point

In general, VEGASWING 66 can be installed in any position. The instrument only has to be mounted in such a way that the tuning fork is at the height of the desired switching point.

The tuning fork has lateral markings (notches) that indicate the switching point with vertical mounting. The switching point applies to water in conjunction with the basic setting of the density switch ≥ 0.7 g/cm³ (0.025 lbs/in³). When mounting VEGASWING 66, make sure that this marking is at the height of the requested switching point. Keep in mind that the switching point of the instrument will shift if the medium has a density other than water - water is 1 g/cm³ (0.036 lbs/in³). For products ≤ 0.7 g/cm³ (0.025 lbs/in³) and ≥ 0.47 g/cm³ (0.017 lbs/in³) the density switch must be set to ≥ 0.47 g/cm³.

Keep in mind that foams with a density ≥ 0.45 g/cm³ (0.016 lbs/in³) are detected by the sensor. This can lead to incorrect measurements, particulary when the sensor is used for dry run protection.

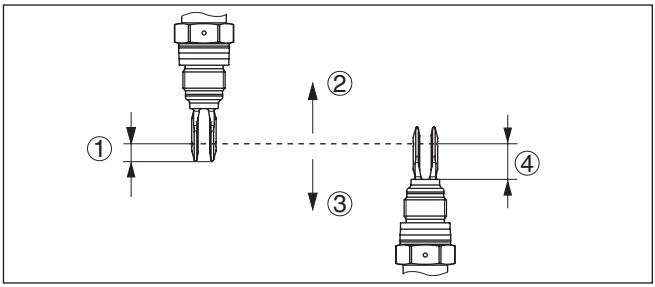

Fig. 3: Vertical mounting

1 Switching point approx. 13 mm (0.51 in)
2 Switching point with lower density
3 Switching point with higher density
4 Switching point approx. 33 mm (1.3 in)

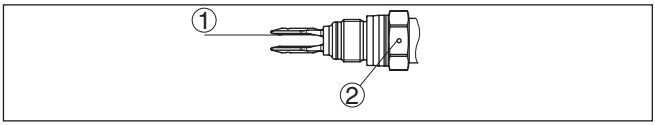

Fig. 4: Horizontal mounting

1 Switching point
2 Marking on top with threaded versions, marking aligned to flange holes with flange versions

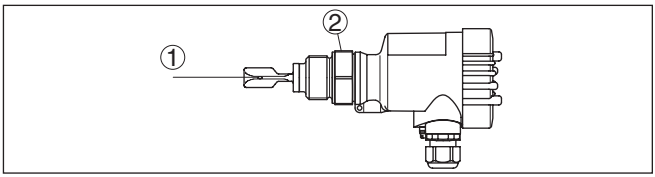

Fig. 5: Horizontal installation (recommended mounting position, particularly for adhesive products)

1 Switching point
2 Marking with screwed version, facing up

In the case of flange versions, the fork is aligned as follows.

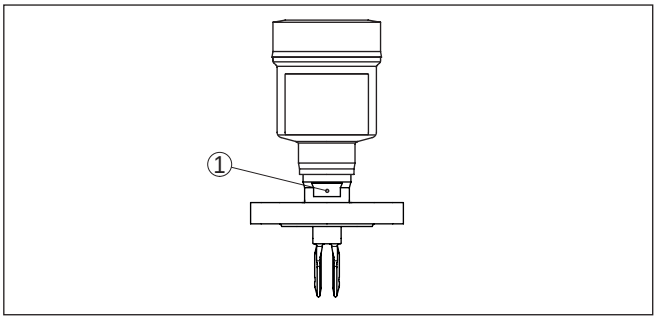

Fig. 6: Fork position with flange versions

1 Marking with flange version, facing up

Protection against moisture

Protect your instrument against moisture ingress through the following measures:

- Use a suitable connection cable (see chapter " *Connecting to power supply*")
- Tighten the cable gland or plug connector
- Lead the connection cable downward in front of the cable entry or plug connector

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

Note:
Make sure that during installation or maintenance no moisture or dirt can get inside the instrument.

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

Transport

Caution:
Do not hold VEGASWING 66 on the tuning fork. Particularly with flange or tube versions, the tuning fork can be damaged just by the weight of the instrument. Transport coated instruments very carefully and avoid touching the tuning fork.

Remove the packaging or the protective cover just before mounting.

Handling

The vibrating level switch is a measuring instrument and must be treated accordingly. Bending the vibrating element will destroy the instrument.

Warning:
The housing must not be used to screw the instrument in! Applying tightening force can damage internal parts of the housing.

Use the hexagon above the thread for screwing in.

Cable glands

Metric threads
In the case of instrument housings with metric thread, the cable glands are screwed in at the factory. They are sealed with plastic plugs as transport protection.

You have to remove these plugs before electrical connection.

NPT thread
In the case of instrument housings with self-sealing NPT threads, it is not possible to have the cable entries screwed in at the factory. The free openings for the cable glands are therefore covered with red dust protection caps as transport protection. The dust protection caps do not provide sufficient protection against moisture.

Prior to setup you have to replace these protective caps with approved cable glands or close the openings with suitable blind plugs.

4.2 Mounting instructions

Welded socket

The thread and the seal on the threaded version of VEGASWING 66 correspond to DIN 3852 part 2, screwed plug Form A.

Use screw-in openings or screw-in sleeves according to DIN 3852 part 2.

Make sure that with instruments with 1 NPT thread, the screw-in opening on the vessel has an inside diameter of at least 29.5 mm (1.16 in).

To mount the sensor, proceed as follows:

1. Screw the VEGASWING 66 into the mounting boss up to the stop. You can determine the later position already before welding.
2. Mark the position of the VEGASWING 66 on the mounting boss.
3. Mark the respective position of the mounting boss on the vessel.

   In case of lateral mounting, make sure the mark on the spanner flat of VEGASWING 66 points upwards.
4. Remove the VEGASWING 66 from the mounting boss before welding.
5. Weld the mounting boss according to your marking.

Adhesive products

In case of horizontal mounting in adhesive and viscous products, the surfaces of the tuning fork should be vertical in order to reduce buildup on the tuning fork. On the screwed version you will find a marking on the hexagon. With this, you can check the position of the tuning fork when screwing it in.

In the case of flange versions, the fork is aligned with the flange holes.

When used in adhesive and viscous products, the tuning fork should protrude into the vessel to avoid buildup. For that reason, nozzles for flanges and mounting bosses should be avoided when mounting horizontally.

Pressure/Vacuum

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

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

Note:
Seal for instruments with process fitting thread

The thread and the seal form on the mounting boss correspond to DIN 3852, part 2, screwed plug Form A.

We recommend using a temperature and medium-resistant seal for dismounting the instrument for maintenance and revision purposes.

Flange mounting

In devices with a large flange process fitting, the flange may deform when the fixing screws are tightened. In this case, choose a device version with a short tube extension because the tube version is not affected by the high torque due to a special decoupling of the tuning fork drive.

Mounting in the vessel insulation

Instruments for high temperatures have a temperature adapter between process fitting and electronics housing. This is used for thermal decoupling of the electronics from high process temperatures.

Information:
The temperature adapter may be embedded in the vessel insulation only up to max. 50 mm (1.97 in). Only then is a reliable temperature decoupling guaranteed.

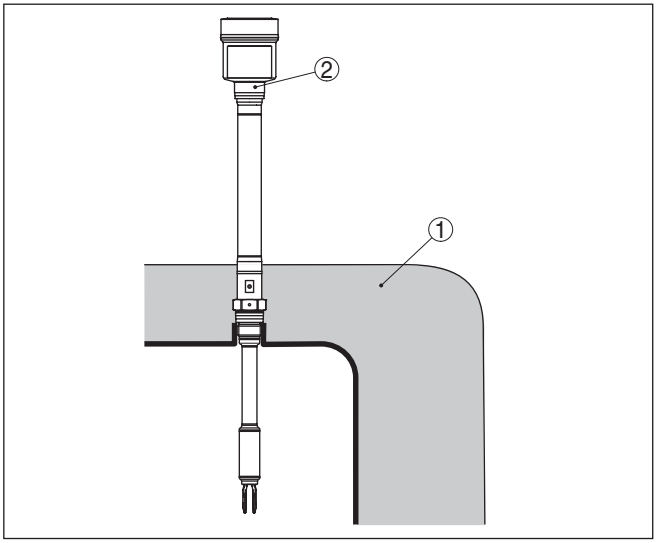

Fig. 7: Mounting the instrument on insulated vessels.

1 Temperature isolation - max. 50 mm (1.97 in)
2 Ambient temperature on the housing

Inflowing medium

If VEGASWING 66 is mounted in the filling stream, unwanted false measurement signals can be generated. For this reason, mount

VEGASWING 66 at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

This applies particularly to instrument types with long extension tube.

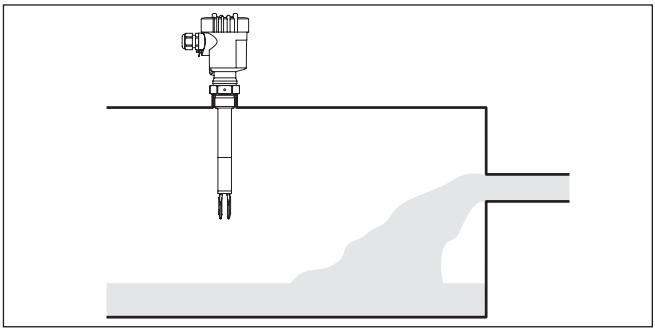

Fig. 8: Inflowing medium

Product flow

To make sure the tuning fork of VEGASWING 66 generates as little resistance as possible to product flow, mount the sensor so that the surfaces are parallel to the product movement.

Agitators

Due to the effects of agitators, equipment vibration or similar, the level switch can be subjected to strong lateral forces. For this reason, do not use an overly long extension tube (optional) for VEGASWING 66, instead check if it is possible to mount a short level switch VEGASWING 66 on the side of the vessel in horizontal position.

Extreme vibration caused by the process or the equipment, e.g. agitators or turbulence in the vessel, can cause a long extension tube of VEGASWING 66 to vibrate in resonance. This leads to increased stress on the upper weld joint. Should a longer tube version be necessary, you can provide a suitable support directly above the tuning fork to secure the extension tube.

This measure applies mainly to applications in Ex areas of category 1G or WHG as well as to ship classifications. Make sure that the tube is not subject to bending stress due to this measure.

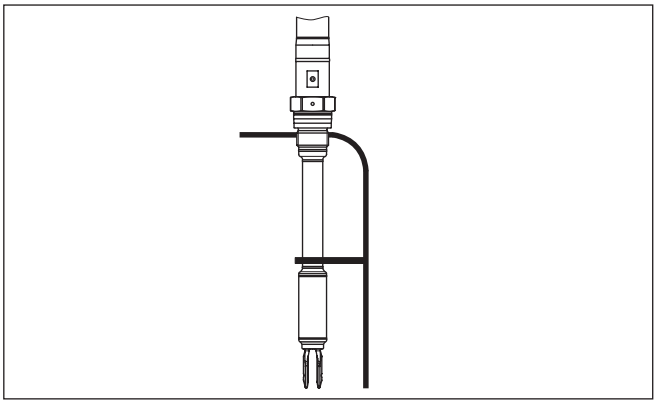

Fig. 9: Lateral suppot of VEGASWING 66

Gas-tight leadthrough

The second seal of the gas-tight leadthrough (option) prevents an uncontrolled leakage of the medium. The service life of the gas-tight leadthrough depends on the chemical resistance of the materials. See " *Technical data*".

Caution:
If it is determined (e.g. via a fault signal from VEGASWING 66) that medium has already penetrated into the vibrating element, the instrument must be exchanged immediately.

5 Connecting to power supply

5.1 Preparing the connection

Note safety instructions

Always keep in mind the following safety instructions:

Warning:
Connect only in the complete absence of line voltage.

- The electrical connection must only be carried out by trained, qualified personnel authorised by the plant operator.
- Always switch off power supply, before connecting or disconnecting the instrument.

Note:
Install a disconnecting device for the instrument which is easy to access. The disconnecting device must be marked for the instrument (IEC/EN 61010).

Take note of safety instructions for Ex applications

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

Voltage supply

Connect the voltage supply according to the connection diagrams. The electronics module with relay output is designed in protection class I. To maintain this protection class, it is absolutely necessary that the earth conductor be connected to the inner earth conductor terminal. Keep the general installation regulations in mind. Take note of the corresponding installation regulations for hazardous areas with Ex applications.

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

Connection cable

The instrument is connected with standard three-wire cable without shielding. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, shielded cable should be used.

Make sure that the cable used has the required temperature resistance and fire safety for max. occurring ambient temperature

Use cable with round cross section for instruments with housing and cable gland. To ensure the seal effect of the cable gland (IP protection rating), find out which cable outer diameter the cable gland is suitable for.

- 5 … 9 mm (0.20 … 0.35 in)
- 6 … 12 mm (0.24 … 0.47 in)
- 10 … 14 mm (0.40 … 0.55 in)

Use a cable gland fitting the cable diameter.

In hazardous areas, use only approved cable connections for VEGASWING 66.

Connection cable for Ex applications

Take note of the corresponding installation regulations for Ex applications.

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Cover all housing openings conforming to standard according to EN 60079-1.

5.2 Connection procedure

With Ex instruments, the housing cover may only be opened if there is no explosive atmosphere present.

Proceed as follows:

1. Unscrew the housing lid
2. Loosen compression nut of the cable gland and remove blind plug
3. Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) of insulation from the ends of the individual wires
4. Insert the cable into the sensor through the cable entry
5. Open the terminals with a screwdriver
6. Insert the wire ends into the open terminals according to the wiring plan
7. Tighten the terminals with a screwdriver
8. Check the hold of the wires in the terminals by lightly pulling on them
9. Tighten the compression nut of the cable entry gland. The seal ring must completely encircle the cable
10. Screw the housing lid back on

The electrical connection is finished.

5.3 Wiring plan, single chamber housing

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

Housing overview

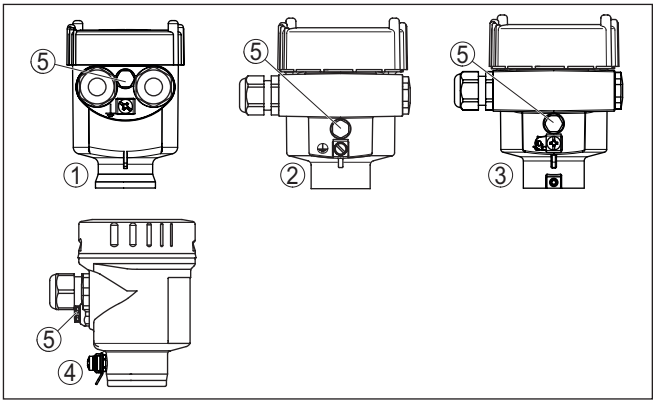

Fig. 10: Material versions, single chamber housing

1 *Plastic (not with Ex d)*
2 *Aluminium*
3 *Stainless steel, precision casting*
4 *Stainless steel, electropolished (not with Ex d)*
5 *Filter element for pressure compensation (not with Ex d)*

Electronics and connection compartment

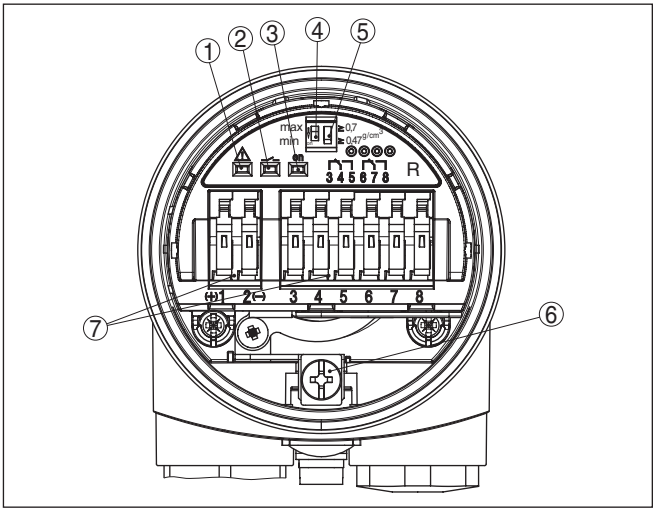

Fig. 11: Electronics and connection compartment, single chamber housing

1 *Control lamp - fault indication (red)*
2 *Control lamp - Switching status (yellow)*
3 *Control lamp - Operating status (green)*
4 *Mode switch for selecting the switching behaviour (min./max.)*
5 *DIL switch for sensitivity adjustment*
6 *Ground terminal*
7 *Connection terminals*

Wiring plan

We recommend connecting VEGASWING 66 according to the closed-circuit principle, i.e. the switching circuit is open when there is a level signal, line break or fault (safe state).

Information:
The relays (2 x SPDT) are always shown in non-operative condition.

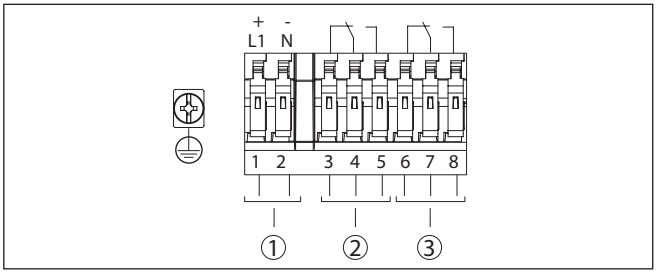

Fig. 12: Wiring plan, single chamber housing

1 Voltage supply
2 Relay output SPDT
3 Relay output SPDT

Connection to a PLC

If inductive loads or stronger currents are switched through, the gold plating on the relay contact surface will be permanently damaged. The contact is then no longer suitable for switching low-voltage circuits.

Inductive loads also result from the connection to a PLC input or output and/or in combination with long cables. It is imperative that you take measures to extinguish sparks to protect the relay contact (e.g. Z diode) or use an electronic version with transistor output.

SIL For the safety function, only the NO contact (NO = Normally Open) may be used (closed circuit principle).

Connect both NO contacts in series.

Mode	Overflow protection (mode max.)	Dry run protection (mode min.)
Vibrating element	Covered	Uncovered
Relay	NO contact open (currentless)	NO contact open (currentless)

You will find further information in the Safety Manual.

6 Setup

6.1 General information

The figures in brackets refer to the following illustrations.

Function/Configuration

In the basic setting, products with a density ≥ 0.7 g/cm³ (0.025 lbs/in³) can be detected. For products with lower density, you have to set the switch to ≥ 0.47 g/cm³ (0.017 lbs/in³).

Optionally the instrument can be supplied instead of ≥ 0.47 g/cm also with a min. density range of ≥ 0.42 g/cm³ (0.015 lbs/in³).

On the electronics module you will find the following display and adjustment elements:

- Signal lamps (1, 2, 3)
- DIL switch for mode setting - min./max. (4)
- DIL switch for adjustment of the density range (5)

Note:
Always immerse the tuning fork of VEGASWING 66 in a liquid to test its function. Do not test the function of VEGASWING 66 with your hand. This can damage the sensor.

6.2 Adjustment elements

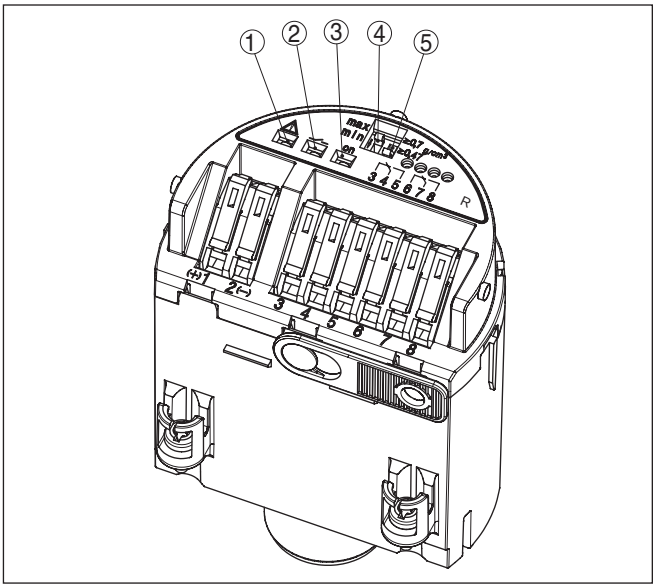

Fig. 13: Oscillator - Relay output

1 *Control lamp for fault indication (red)*
2 *Control lamp for indication of the switching status (yellow)*
3 *Signal lamp for indication of the operating status (green)*
4 *Mode switch for selecting the switching behaviour (min./max.)*
5 *DIL switch for adjustment of the density range*

58109-EN-230825

Control lamp (1) - fault indication (red)

The instrument monitors the vibrating frequency, electronics temperature and internal instrument functions.

- Red LED lights = fault
- Relay deenergizes

Signal lamp (2) - Switching condition (yellow)

The signal lamp for indication of the switching condition of the relay.

With the mode setting (4), the switching condition and hence the function of the signal lamp can be changed.

- Yellow LED lights = relay energized

Signal lamp (3) - Operating condition (green)

- Green LED lights = operating voltage on

Mode setting (4)

With the mode setting (min./max.) you can change the switching condition of the relay. You can set the required mode according to the " *Function table*" (max. - max. detection or overflow protection, min. - min. detection or dry run protection).

Adjustment of the density range (5)

With this DIL switch (3) you can set the switching point to liquids having a density between 0.47 and 0.7 g/cm³ (0.017 and 0.025 lbs/in³). With the basic setting, liquids with a density of ≥ 0.7 g/cm³ (0.025 lbs/in³) can be detected. In liquids with lower density, you must set the switch to ≥ 0.47 g/cm³ (0.017 lbs/in³). The specifications for the position of the switching point relate to water - density value 1 g/cm³ (0.036 lbs/in³). In products with a different density, the switching point will shift in the direction of the housing or tuning fork end depending on the density and type of installation.

Optionally the instrument can be also supplied with a min. density range of ≥ 0.42 g/cm³ (0.015 lbs/in³). In this case, the max. permissible process pressure is limited to 25 bar (363 psig).

Note:
Keep in mind that foams with a density ≥ 0.45 g/cm³ (0.016 lbs/in³) are detected by the sensor. This can lead to incorrect measurements, particulary when the sensor is used for dry run protection.

Note:
In case of intense boiling or bubbling processes as well as extreme outgassing, the density of the gas/product mixture at the product surface can be so low that it can't be detected by the sensor. This can cause incorrect measurements.

6.3 Function table

The following table provides an overview of the switching conditions depending on the set mode and the level.

	Level	Switching status	Signal lamp - green Voltage supply	Signal lamp - yellow Switching status	Signal lamp - red Fault message
Mode max. Overflow protection		 Relay energized	☼	☼	○
Mode max. Overflow protection		 Relay deenergized	☼	○	○
Mode min. Dry run protection		 Relay energized	☼	☼	○
Mode min. Dry run protection		 Relay deenergized	☼	○	○
Failure of the supply voltage (mode max./ min.)	any	 Relay deenergized	○	○	○
Fault	any	 Relay deenergized	☼	○	☼

6.4 Proof test

SIL

To find out possible undetected, dangerous failures, a proof test must be carried out in adequate time intervals to check the safety function. It is the user's responsibility to choose the type of testing.

You will find further instructions in the Safety Manual.

The following options are available for carrying out the proof test:

1. Short interruption of the supply line to the sensor
   Average coverage (detected errors)
2. Dismounting of the sensor and immersion in the original medium

High coverage (detected errors)

3. Filling of the vessel up to the switching point

   High coverage (detected errors)

1 Short interruption of the supply line to the sensor

This test is valid if you cannot change the vessel filling or cannot dismount the sensor.

Test without filling or dismounting the sensor

1. Separate the instrument briefly (> 2 s) from voltage supply.

   After switching on again, the instrument must take on the same switching status.

   If this is not the case, then there is a fault in the measuring system.

   Make sure the connected downstream devices are activated during the function test.

2. Set the mode switch (min./max.)

   Check if the switching status changes (signal lamp - switching status). By doing so, you can check the function of the measuring system.

   If this is not the case, then there is a fault in the measuring system.

   Make sure the connected downstream devices are activated during the function test.

You can find the coverage of the test in the Safety Manual.

2 Dismounting of the sensor and immersion in the original medium

You can dismount the sensor for test purposes and check its function by immersing the vibrating element in the original medium.

Procedure

1. Separate the instrument briefly (> 2 s) from voltage supply.

   After switching on again, the instrument must take on the same switching status.

   If this is not the case, then there is a fault in the measuring system.

   Make sure the connected downstream devices are activated during the function test.

2. Set the mode switch (min./max.)

   Check if the switching status changes (signal lamp - switching status). By doing so, you can check the function of the measuring system.

   If this is not the case, then there is a fault in the measuring system.

   Make sure the connected downstream devices are activated during the function test.

3. Dismount the instrument and immerse the vibrating element up to the switching point in the original medium.

Check if the switching status changes (signal lamp - switching status). By doing so, you can check the function of the measuring system.

If this is not the case, then there is a fault in the measuring system.

Make sure the connected downstream devices are activated during the function test.

You can find the coverage of the test in the Safety Manual.

3 Filling the vessel up to the switching point

If this does not cause any problems, you can fill the vessel up to the switching point and monitor the correct sensor reaction.

Procedure

1. Separate the instrument briefly (> 2 s) from voltage supply.

   After switching on again, the instrument must take on the same switching status.

   If this is not the case, then there is a fault in the measuring system.

   Make sure the connected downstream devices are activated during the function test.

2. Set the mode switch (min./max.)

   Check if the switching status changes (signal lamp - switching status). By doing so, you can check the function of the measuring system.

   If this is not the case, then there is a fault in the measuring system.

   Make sure the connected downstream devices are activated during the function test.

3. Fill the vessel up to the switching point.

   Check if the switching status changes (signal lamp - switching status). By doing so, you can check the function of the measuring system.

   If this is not the case, then there is a fault in the measuring system.

   Make sure the connected downstream devices are activated during the function test.

You can find the coverage of the test in the Safety Manual.

7 Maintenance and fault rectification

7.1 Maintenance

Maintenance

If the device is used properly, no special maintenance is required in normal operation.

Cleaning

The cleaning helps that the type label and markings on the instrument are visible.

Take note of the following:

- Use only cleaning agents which do not corrode the housings, type label and seals
- Use only cleaning methods corresponding to the housing protection rating

7.2 Rectify faults

Reaction when malfunction occurs

The operator of the system is responsible for taking suitable measures to rectify faults.

Causes of malfunction

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

- Sensor
- Process
- Voltage supply
- Signal processing

Fault rectification

The first measure to take is to check the output signal. In many cases, the causes can be determined this way and the faults quickly rectified.

24 hour service hotline

Should these measures not be successful, please call in urgent cases the VEGA service hotline under the phone no. **+49 1805 858550**.

The hotline is also available outside normal working hours, seven days a week around the clock.

Since we offer this service worldwide, the support is provided in English. The service itself is free of charge, the only costs involved are the normal call charges.

Checking the switching signal

Error	Cause	Rectification
VEGASWING 66 signals "covered" without being submerged (overflow protection) VEGASWING 66 signals "uncovered" when being submerged (dry run protection)	Operating voltage too low	Check operating voltage
	Electronics defective	Press the mode switch. If the instrument then changes the mode, the vibrating element may be covered with buildup or mechanically damaged. Should the switching function in the correct mode still be faulty, return the instrument for repair.
		Press the mode switch. If the instrument then does not change the mode, the electronics module may be defective. Exchange the electronics module.
	Unfavourable installation location	Mount the instrument at a location in the vessel where no dead zones or air bubbles can form.
	Buildup on the vibrating element	Check the vibrating element and the sensor for buildup and remove the buildup if there is any.
	Wrong mode selected	Set the correct mode with the mode switch (overflow protection, dry run protection). Wiring should be carried out according to the closed-circuit principle.
Red control lamp lights up	Error on the vibrating element	Check if the vibrating element is damaged or extremely corroded.
	Interference on the electronics module	Exchanging the electronics module
	Instrument defective	Exchange the instrument or send it in for repair

Reaction after fault rectification

Depending on the reason for the fault and the measures taken, the steps described in chapter "*Setup*" must be carried out again or must be checked for plausibility and completeness.

7.3 Exchanging the electronics

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

In general, all electronics modules of the respective type series can be interchanged. The type name is stated on the electronics module.

If you want to use an electronics module with a different signal output, you have to carry out the complete setup. You can find the required operating instructions manual on our homepage.

SIL With SIL qualified instrument, only a respective electronics module with SIL qualification must be used.

Ex In Ex applications, only instruments and electronics modules with appropriate Ex approval may be used.

You can find all the information you need to carry out an electronics exchange in the handbook of the new electronics module.

7.4 How to proceed if a repair is necessary

On our homepage you will find detailed information on how to proceed in the event of a repair.

So that we can carry out the repair quickly and without queries, generate a instrument return form there with the data of your device.

You will need:

- The serial number of the instrument
- A short description of the problem
- Details of the medium

Print the generated instrument return form.

Clean the instrument and pack it damage-proof.

Send the printed instrument return form and possibly a safety data sheet together with the device.

You will find the address for the return on the generated instrument return form.

8 Dismount

8.1 Dismounting steps

To remove the device, carry out the steps in chapters " *Mounting*" and " *Connecting to power suplly*" in reverse.

Warning:
When dismounting, pay attention to the process conditions in vessels or pipelines. There is a risk of injury, e.g. due to high pressures or temperatures as well as aggressive or toxic media. Avoid this by taking appropriate protective measures.

8.2 Disposal

Pass the instrument on to a specialised recycling company and do not use the municipal collecting points.

Remove any batteries in advance, if they can be removed from the device, and dispose of them separately.

If personal data is stored on the old device to be disposed of, delete it before disposal.

If you have no way to dispose of the old instrument properly, please contact us concerning return and disposal.

9 Supplement

9.1 Technical data

Note for approved instruments

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

All approval documents can be downloaded from our homepage.

General data

Material 316L corresponds to 1.4404 or 1.4435

Materials, wetted parts

– Process fitting - thread (up to 100 bar)	Inconel 718 (2.4668)
– Process fitting - thread (up to 160 bar)	Inconel 718 (2.4668)
– Process fitting - flange	316L or Alloy C22 (2.4602)
– Process seal	On site
– Tuning fork	Inconel 718 (2.4668)
– Extension tube: ø 21.3 mm (0.839 in) up to 100 bar (optional)	316L
– Extension tube: ø 21.3 mm (0.839 in) up to 160 bar (optional)	Alloy C22 (2.4602)

Materials, non-wetted parts

– Plastic housing	Plastic PBT (Polyester)
– Aluminium die-cast housing	Aluminium die-casting AlSi10Mg, powder-coated (Basis: Polyester)
– Stainless steel housing (precision casting)	316L
– Stainless steel housing (electropolished)	316L
– Seal between housing and housing lid	Silicone SI 850 R, NBR silicone-free
– Ground terminal	316L
– Cable gland	PA, stainless steel, brass
– Sealing, cable gland	NBR
– Blind plug, cable gland	PA
– Temperature adapter (ø 33,7 mm)	316L

Second Line of Defense resp. gas-tight leadthrough (optional)

– Second Line of Defense (SLOD)	A second level of the process separation in the form of a gas-tight feedthrough in the lower part of the housing, preventing product from penetrating into the housing. The Second Line of Defense is required for various approvals.
– Supporting material	316L
– Material	Ceramic Al_2O_3 (99.5 %)

– Contacts	Kovar (gold-plated)
– Helium leak rate	< 10^{-7} mbar l/s
– Pressure resistance	PN 160
Sensor length - Compact version with threaded process fitting	
– Alloy C22 (2.4602)	77 mm (3.03 in)
– Inconel 718 (2.4668)	77 mm (3.03 in)
Sensor length - Compact version with flange process fitting	
– Alloy C22 (2.4602)	74 mm (2.91 in)
– Inconel 718 (2.4668)	74 mm (2.91 in)
Sensor length (L) - Tube version	
– 316L, Inconel 718 (2.4668)	200 … 3000 mm (7.87 … 118.1 in)
– Alloy C22 (2.4602), Inconel 718 (2.4668)	200 … 3000 mm (7.87 … 118.1 in)
– When using a Second Line of Defense	260 … 3000 mm (10.24 … 118.1 in)
– Sensor lengths - accuracy	± 2 mm (± 0.079 in)
Weight	
– Instrument weight (depending on process fitting)	approx. 0.8 … 4 kg (0.18 … 8.82 lbs)
– Tube extension	approx. 1100 g/m (11.8 oz/ft)
Surface quality	R_a approx. 3 µm (1.18^{-4} in)
Process fittings	
– Pipe thread, cylindrical (ISO 228 T1)	G1 (acc. to DIN 3852, part 2, Form A)
– Pipe thread, conical (ASME B1.20.1)	1 NPT: core diameter of the internal thread > 28.5 mm (1.12 in)
– Flanges	DIN EN from DN 50, ASME from 1½"
Max. torque - process fitting	
– Thread G1, 1 NPT	max. 285 Nm (210 lbf ft) [1]
Torque for NPT cable glands and Conduit tubes	
– Plastic housing	max. 10 Nm (7.376 lbf ft)
– Aluminium/Stainless steel housing	max. 50 Nm (36.88 lbf ft)

Output variable	
Output	Relay output (2 x SPDT), 2 floating change-over contacts
Switching voltage	max. 253 V AC/DC With circuits > 150 V AC/DC, the relay contacts must be in the same circuit.
Switching current	max. 3 A AC (cos phi > 0.9), 1 A DC
Breaking capacity	
– Min.	50 mW

[1] Depending on the mounting boss of the vessel.

– Max.	750 VA AC, 40 W DC (at U < 40 V DC) If inductive loads or stronger currents are switched through, the gold plating on the relay contact surface will be permanently damaged. The contact is then no longer suitable for switching low-level signal circuits.
Contact material (relay contacts)	AgNi or AgSnO2 each with 3 µm gold plating
Modes (switchable)	
– Max.	Max. detection or overflow/overfill protection
– Min.	Min. detection or dry run protection

Measurement accuracy (according to DIN EN 60770-1)

Reference conditions and influencing variables (according to DIN EN 61298-1)

– Ambient temperature	+18 … +30 °C (+64 … +86 °F)
– Relative humidity	45 … 75 %
– Air pressure	860 … 1060 mbar/86 … 106 kPa (12.5 … 15.4 psig)
– Product temperature	+18 … +30 °C (+64 … +86 °F)
– Product density	1 g/cm³ (0.036 lbs/in³) (water)
– Product viscosity	1 mPa s
– Superimposed pressure	0 kPa
– Sensor installation	Vertically from top
– Density selection switch	≥ 0.7 g/cm³

Measurement accuracy

Deviation	± 1 mm (0.04 in)

Influence of the product density on the switching point

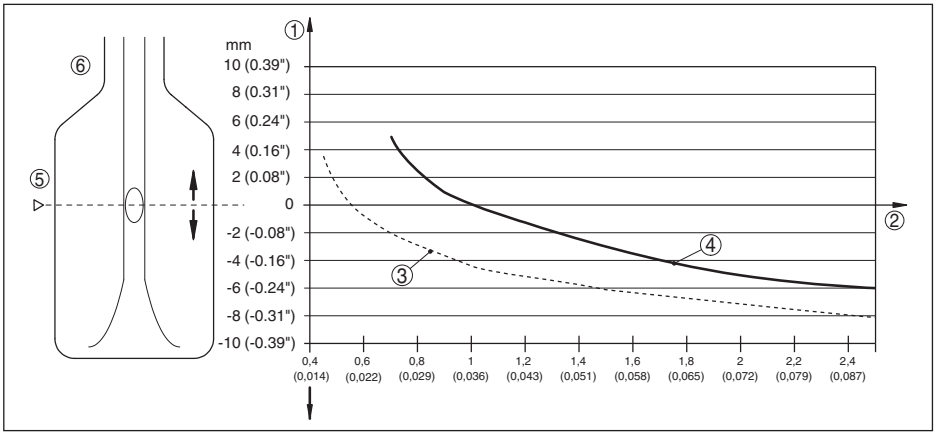

Fig. 14: Influence of the product density on the switching point

1 *Shifting of the switching point in mm (in)*
2 *Product density in g/cm³ (lb/in³)*
3 *Switch position ≥ 0.47 g/cm³ (0.017 lb/in³)*
4 *Switch position ≥ 0.7 g/cm³ (0.025 lb/in³)*
5 *Switching point at reference conditions (notch)*
6 *Tuning fork*

Influence of the process pressure to the switching point

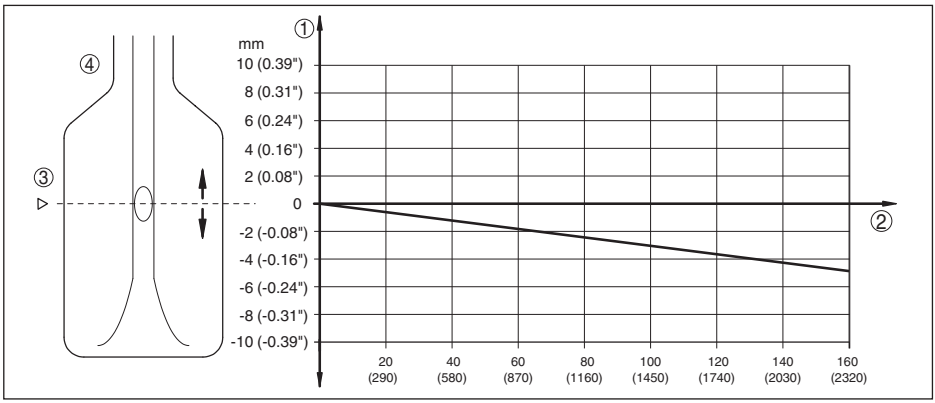

Fig. 15: Influence of the process pressure to the switching point

1 *Shifting of the switching point in mm (in)*
2 *Process pressure in bar (psig)*
3 *Switching point at reference conditions (notch)*
4 *Tuning fork*

Non-repeatability	0.1 mm (0.004 in)
Hysteresis	approx. 2 mm (0.08 in) with vertical mounting

Switching delay	
– Standard	approx. 1 s (on/off)
– Optional - can be ordered factory-made	1 … 60 s (on/off)
Measuring frequency	approx. 1400 Hz

Ambient conditions

Ambient temperature on the housing	-40 … +70 °C (-40 … +158 °F)
Storage and transport temperature	-40 … +80 °C (-40 … +176 °F)

Process conditions

Measured variable	Limit level of liquids
Process pressure	
– Instrument version up to 100 bar (1450 psig)	-1 … 100 bar/-100 … 10000 kPa (-14.5 … 1450 psig) The process pressure is dependent on the process fitting, e.g. flange (see the following diagrams)
– Instrument version up to 160 bar (2320 psig)	-1 … 160 bar/-100 … 16000 kPa (-14.5 … 2320 psig) The process pressure is dependent on the process fitting, e.g. flange (see the following diagrams)

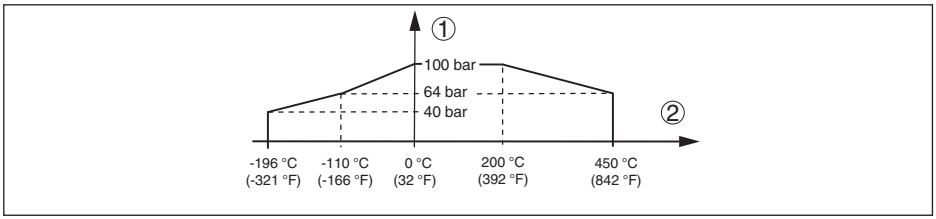

Fig. 16: Process temperature - Process pressure - Version up to 100 bar (1450 psig)

1 Process pressure in bar (psig)
2 Process temperature in °C (°F)

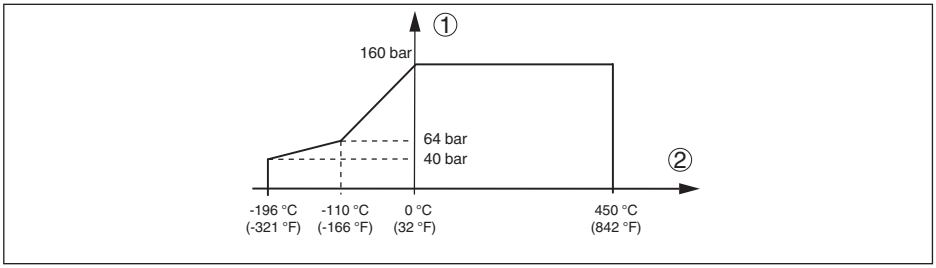

Fig. 17: Process temperature - Process pressure - Version up to 160 bar (2321 psig)

1 Process pressure in bar (psig)
2 Process temperature in °C (°F)

Process temperature (thread or flange temperature)

– VEGASWING 66 of 316L/Alloy C22 (2.4602)/Inconel 718 (2.4668)	-196 … +450 °C (-321 … +842 °F)

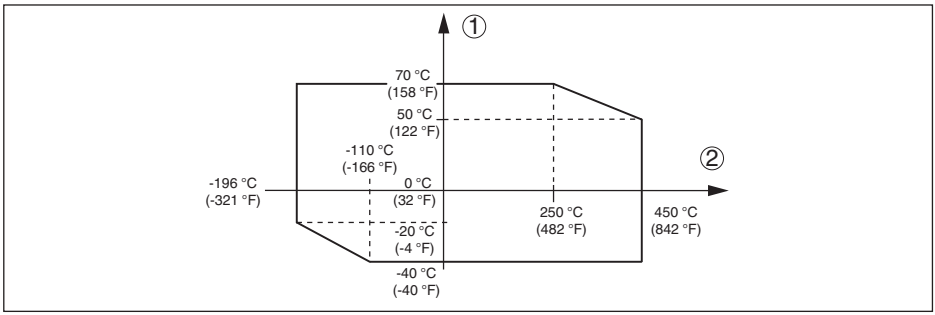

Fig. 18: Ambient temperature - Process temperature

1 Ambient temperature in °C (°F)
2 Process temperature in °C (°F)

Viscosity - dynamic	0.1 … 1000 mPa s (requirement: with density 1)
Flow velocity	max. 6 m/s (with a viscosity of 1000 mPa s)
Density	
– Standard sensitivity	0.7 … 2.5 g/cm³ (0.025 … 0.09 lbs/in³)
– High sensitivity	0.47 … 2.5 g/cm³ (0.017 … 0.09 lbs/in³)
	Optionally also ≥ 0.42 g/cm³ (0.015 lbs/in³) [2]
Vibration resistance	
– Instrument housing	1 g at 5 … 200 Hz according to EN 60068-2-6 (vibration with resonance)
– Sensor	1 g with 5 … 200 Hz according EN 60068-2-6 (vibration at resonance) with sensor length up to 50 cm (19.69 in)
	With a sensor length > 50 cm (19.69 in) you have to fix the extension tube with a suitable support. See mounting instructions.

Electromechanical data

Options of the cable entry	
– Cable entry	M20 x 1.5; ½ NPT
– Cable gland	M20 x 1.5; ½ NPT (cable diameter see table below) or plug connector M 12 x 1, Harting etc.
– Blind plug	M20 x 1.5; ½ NPT
– Closing cap	½ NPT

[2] Max. permissible process pressure: 25 bar (363 psig)

Material cable gland	Material seal insert	Cable diameter				
		4.5 … 8.5 mm	5 … 9 mm	6 … 12 mm	7 … 12 mm	10 … 14 mm
PA	NBR	–	●	●	–	●
Brass, nickel-plated	NBR	●	●	●	–	–
Stainless steel	NBR	–	●	●	–	●

Wire cross-section (spring-loaded terminals)

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

Adjustment elements

Mode switch	
– Max.	Max. detection or overflow/overfill protection
– Min.	Min. detection or dry run protection
Sensitivity switch	
– ≥ 0.47 g/cm³	0.47 … 2.5 g/cm³ (0.017 … 0.09 lbs/in³)
– ≥ 0.7 g/cm³	0.7 … 2.5 g/cm³ (0.025 … 0.09 lbs/in³)

Voltage supply

Operating voltage	20 … 253 V AC, 50/60 Hz, 20 … 72 V DC
Max. power consumption	3 VA (AC), 1 W (DC)

Electrical protective measures

Protection rating	IP66/IP67 acc. to IEC 60529, Type 4X acc. to NEMA
Altitude above sea level	up to 5000 m (16404 ft)
Overvoltage category	III
Pollution degree	4
Protection rating (IEC 61010-1)	I

9.2 Dimensions

VEGASWING 66, housing

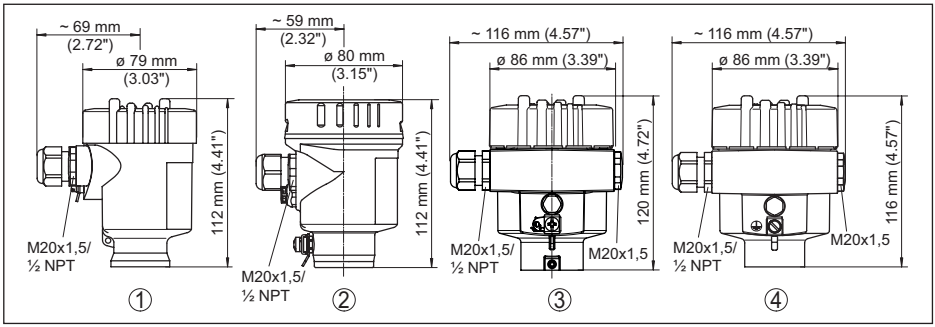

Fig. 19: Housing versions

1 *Plastic single chamber*
2 *Stainless steel single chamber (electropolished)*
3 *Stainless steel single chamber (precision casting)*
4 *Aluminium - single chamber*

VEGASWING 66, compact version

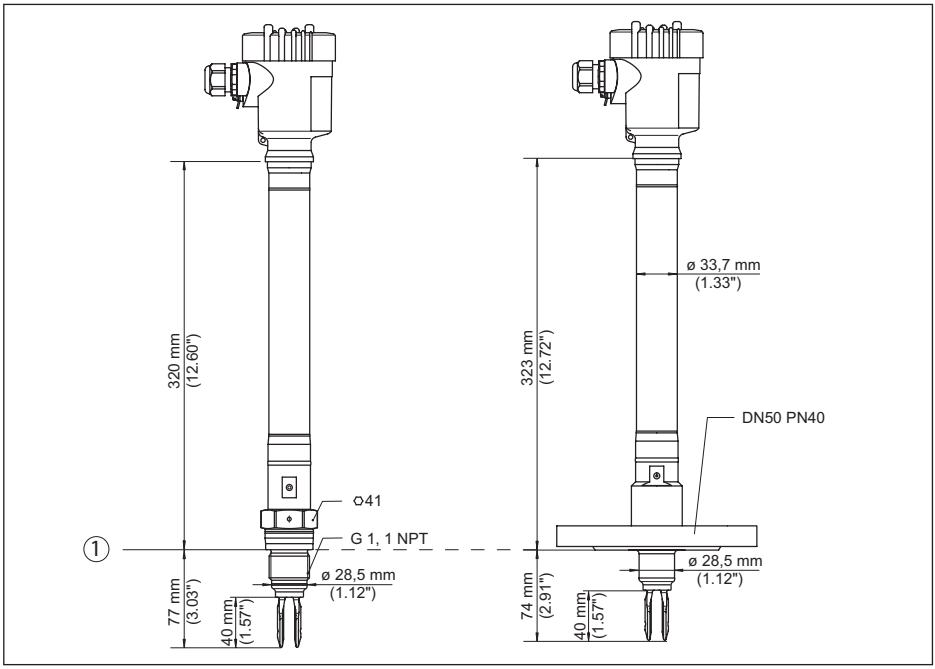

Fig. 20: VEGASWING 66, compact version

1 *Sealing surface*

VEGASWING 66, tube version

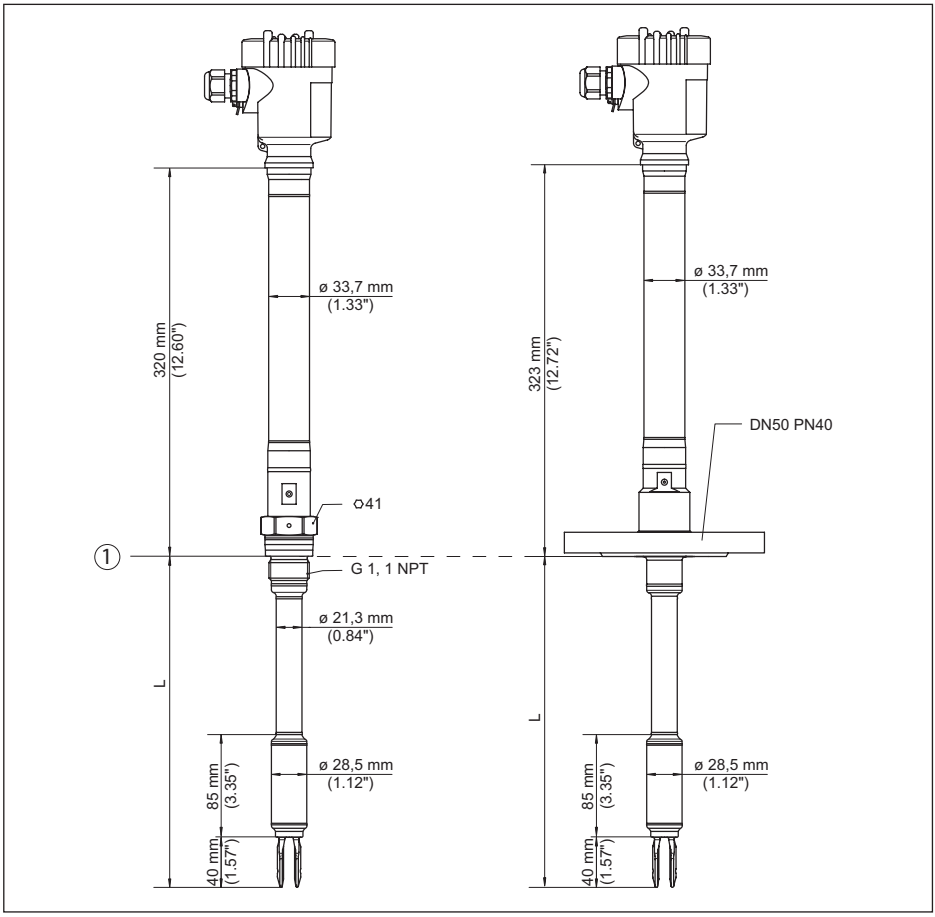

Fig. 21: VEGASWING 66, tube version

L Sensor length, see chapter " Technical data"
1 Sealing surface

9.3 Industrial property rights

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