

Operating Instructions

Vibrating level switch for liquids

VEGASWING 61

NAMUR



Document ID: 29226



VEGA

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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 instruction 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.



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 61 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 SIL conformity

VEGASWING 61 fulfills the requirements to functional safety according to IEC 61508 or IEC 61511. You find further information in the supplied Safety Manual.

2.7 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

For further information see www.namur.de.

2.8 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 I) (Canada).

2.9 Safety instructions for Ex areas

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

2.10 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 61 point level switch

The further scope of delivery encompasses:

- Documentation
 - Operating instructions VEGASWING 61
 - Safety Manual (SIL) - optional
 - 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. The respective scope of delivery results from the order specification.

Constituent parts

The VEGASWING 61 consists of the components:

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

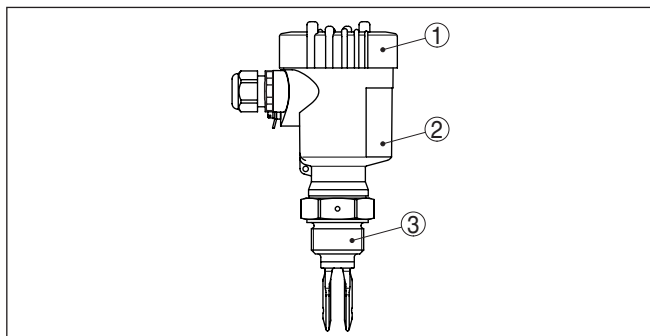


Fig. 1: VEGASWING 61

- 1 Housing lid
- 2 Housing with electronics
- 3 Process fitting

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**".

Application area**3.2 Principle of operation**

VEGASWING 61 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.

Typical applications are overfill and dry run protection. With its tuning fork of only 40 mm length, VEGASWING 61 can also be mounted e.g. in pipelines from DN 32. The small tuning fork allows use in vessels, tanks and pipes. Thanks to its simple and robust measuring system, VEGASWING 61 is virtually unaffected by the chemical and physical properties of the liquid.

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

Function monitoring

The electronics module of VEGASWING 61 continuously monitors the following criteria via frequency evaluation:

- Strong corrosion or damage on the tuning fork
- Loss of vibration
- Line break to the piezo drive

If one of these faults is detected or if the voltage supply fails, the electronics takes on a defined output status (safe state).

Functional principle

The tuning fork is piezoelectrically energised and vibrates at its mechanical resonance frequency of approx. 1200 Hz. The piezos are fixed mechanically and are hence not subject to temperature shock limitations. The frequency changes when the tuning fork is covered by the medium. This change is detected by the integrated electronics module and converted into a switching command.

Voltage supply

VEGASWING 61 is a compact instrument, i.e. it 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

The switching condition of VEGASWING 61 with plastic housing can be checked when the housing is closed (signal lamp). With the basic

setting, products with a density $\geq 0.7 \text{ g/cm}^3$ (0.025 lbs/in^3) can be detected. The instrument can be adapted if products with lower density are to be measured.

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

- Control lamp for indication of the switching status
- DIL switch for sensitivity adjustment
- Mode switch to select the switching condition (reverse characteristics)
- Simulation key

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 see chapter "Supplement - Technical data - Ambient conditions"
- Relative moisture 20 ... 85 %

Storage and transport temperature

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.

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 61 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 $\geq 0.7 \text{ g/cm}^3$ (0.025 lbs/in³). When mounting VEGASWING 61, 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/cm^3 (0.036 lbs/in³). For products $\leq 0.7 \text{ g/cm}^3$ (0.025 lbs/in³) and $\geq 0.5 \text{ g/cm}^3$ (0.018 lbs/in³) the density switch must be set to $\geq 0.5 \text{ g/cm}^3$.

Keep in mind that foams with a density $\geq 0.45 \text{ g/cm}^3$ (0.016 lbs/in³) are detected by the sensor. This can lead to erroneous switchings, particularly when the sensor is used for dry run protection.

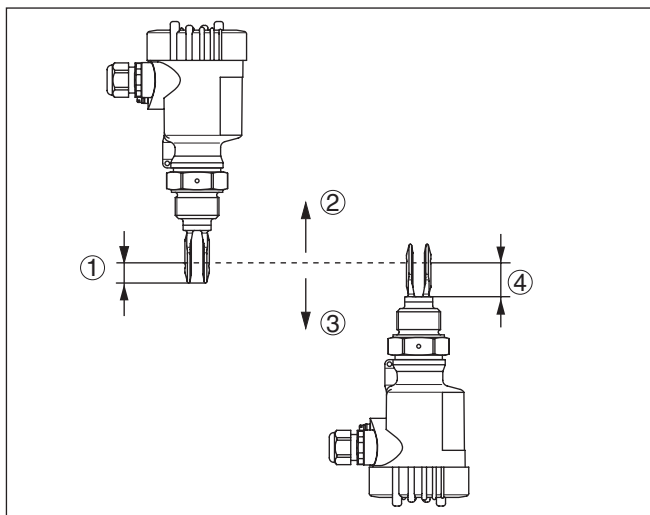


Fig. 2: Vertical mounting

- 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. 27 mm (1.06 in)

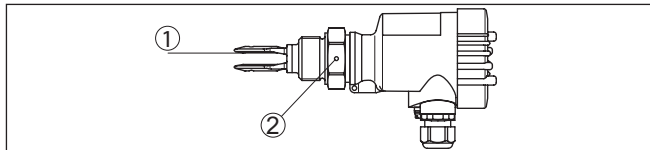


Fig. 3: Horizontal mounting

- 1 Switching point
- 2 Marking with screwed version

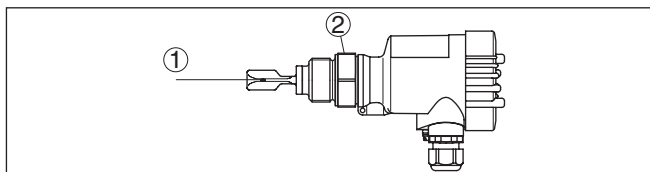


Fig. 4: Horizontal installation (recommended mounting position, particularly for adhesive products)

- 1 Switching point
- 2 Marking with screwed version, facing up

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

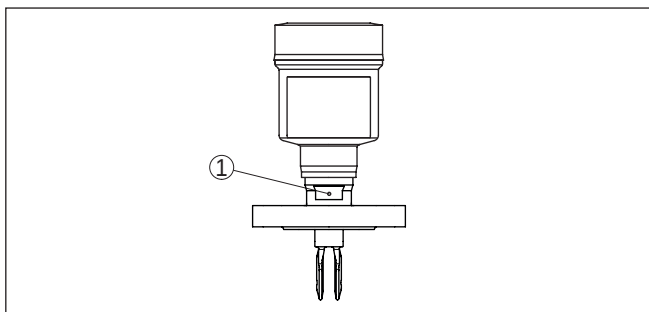


Fig. 5: Fork position with flange versions

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.

In applications where the process temperature is frequently or permanently below the ambient temperature, condensation may form. In these cases, use the instrument version with a gas-tight feedthrough.



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 61 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.

Welded socket

4.2 Mounting instructions

VEGASWING 61 has a defined thread starting point. This means that every VEGASWING 61 is in the same fork position after being screwed in. Remove therefore the supplied seal from the thread of VEGASWING 61. This seal is not required when using a welded socket with O-ring in front.

Keep in mind that this welded socket is not suitable for coated instrument versions.

Screw VEGASWING 61 completely into the welded socket. The later position can be determined already before welding. Mark the appropriate position of the welded socket. Before welding, unscrew VEGASWING 61 and remove the rubber ring from the welded socket. The welded socket has a marking (notch). Weld the socket with the notch facing upward, or in case of pipelines (DN 32 up to DN 50), aligned with the direction of flow.

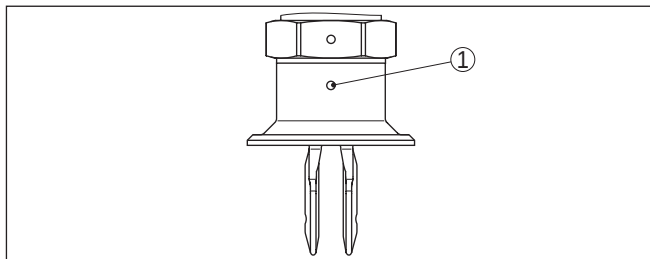


Fig. 6: Marking on the welded socket

1 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. When the hexagon touches the seal, the thread can still be turned by approx. half a turn. This is sufficient to reach the recommended installation position.

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.

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

Inflowing medium

If VEGASWING 61 is mounted in the filling stream, unwanted false measurement signals can be generated. For this reason, mount VEGASWING 61 at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

Product flow

To make sure the tuning fork of VEGASWING 61 generates as little resistance as possible to product flow, mount the sensor so that the surfaces are parallel to the product movement.

Enamel coating

Instruments with enamel coating should be treated very carefully and shocks should be avoided. Unpack VEGASWING 61 directly before installation. Insert VEGASWING 61 carefully into the vessel opening and avoid touching any sharp vessel parts.

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 61) 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.

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 following diagrams. Take note of the general installation regulations. As a rule, connect VEGASWING 61 to vessel ground (PA), or in case of plastic vessels, to the next ground potential. On the side of the instrument housing there is a ground terminal between the cable entries. This connection serves to drain off electrostatic charges. In Ex applications, the installation regulations for hazardous areas must be given priority.

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

Connection cable

The instrument is connected with standard two-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. A cable outer diameter of 5 ... 9 mm (0.2 ... 0.35 in) ensures the seal effect of the cable gland. If you are using cable with a different diameter or cross-section, exchange the seal or use a suitable cable gland.



In hazardous areas, use only approved cable connections for VEGASWING 61.

Connection cable for Ex applications



Take note of the corresponding installation regulations for Ex applications.

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

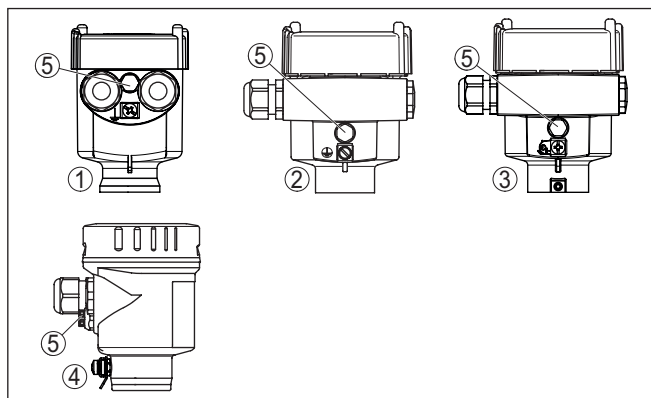


Fig. 7: Material versions, single chamber housing

- 1 Plastic (not with Ex d)
- 2 Aluminium
- 3 Stainless steel (not with Ex d)
- 4 Stainless steel, electropolished (not with Ex d)
- 5 Filter element for pressure compensation or blind plug with version IP66/ IP68, 1 bar (not with Ex d)

Electronics and connection compartment

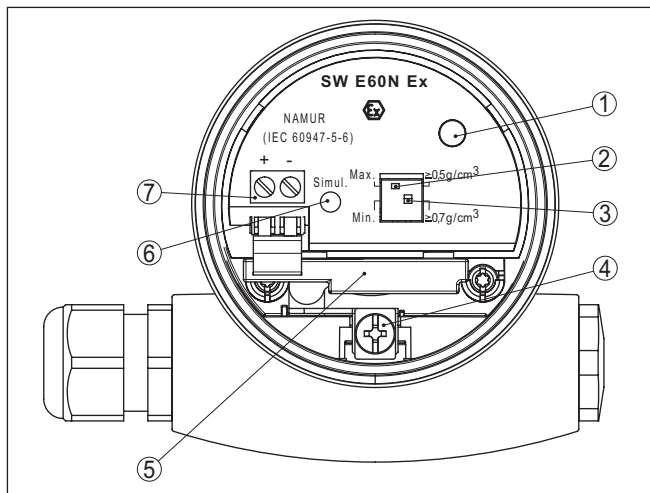


Fig. 8: Electronics and connection compartment, single chamber housing

- 1 Control lamp
- 2 DIL switch for characteristics reversal
- 3 DIL switch for sensitivity adjustment
- 4 Ground terminal
- 5 EMC filter element
- 6 Simulation key
- 7 Connection terminals

Wiring plan

For connection of the amplifier according to NAMUR (IEC 60947-5-6, EN 50227). You can find further information in the "Technical data".

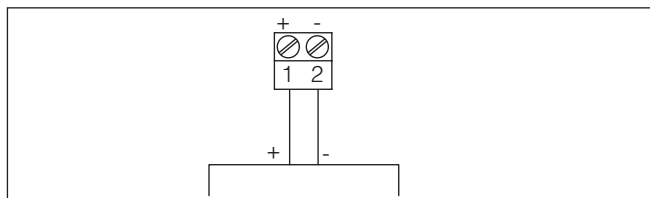


Fig. 9: Wiring plan, single chamber housing

Wire assignment, connection cable

5.4 Wiring plan - version IP66/IP68, (1 bar)

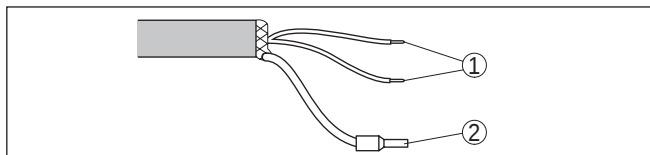


Fig. 10: Wire assignment, connection cable

- 1 Brown (+) and blue (-) to power supply or to the processing system
- 2 Shielding

6 Setup

6.1 General information

The figures in brackets refer to the following illustrations.

Function/Configuration

The switching condition of the electronics can be checked when the housing cover is closed (control lamp). With the basic setting, products with a density $\geq 0.7 \text{ g/cm}^3$ (0.025 lbs/in³) can be detected. For products with lower density, the switch must be set to $\geq 0.5 \text{ g/cm}^3$ (0.018 lbs/in³).

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

- Signal lamp (1)
- DIL switch for characteristics reversal - min./max. (2)
- DIL switch for adjustment of the density range (3)
- Simulation key (4)



Note:

Always immerse the tuning fork of VEGASWING 61 in a liquid to test its function. Do not test the function of VEGASWING 61 with your hand. This can damage the sensor.

6.2 Adjustment elements

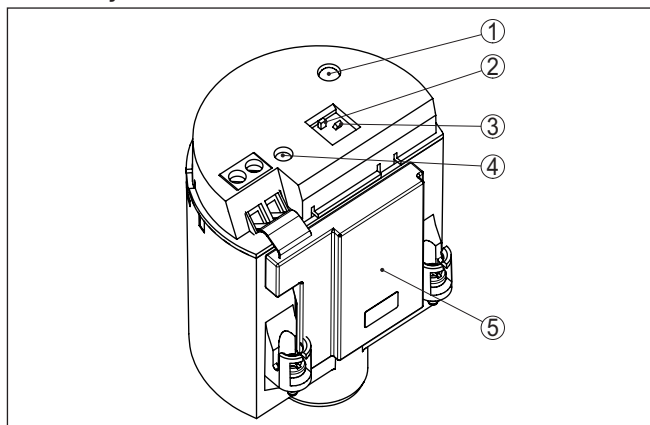


Fig. 11: Oscillator SWE60N - NAMUR output

- 1 Control lamp (LED)
- 2 DIL switch for characteristics reversal
- 3 DIL switch for adjustment of the density range
- 4 Simulation key
- 5 EMC filter element

Signal lamp (1)

Single-coloured control lamp for indication of the switching condition.

- red = High current $\geq 2.2 \text{ mA}$
- dark = Low current $\leq 1.0 \text{ mA}$

- red (flashing) = Failure ≤ 1.0 mA

Characteristics reversal (2)

The characteristics reversal can be carried out with the DIL switch. You can choose between falling characteristic curve (switch position max.) and rising characteristic curve (switch position min.). This allows you to output the desired current.

Modes

- min. - rising characteristic curve (High current when immersed)
- max. - falling characteristics (Low current when immersed)

The NAMUR output can be switched over to falling or rising characteristics (see also "*Function table*").

For applications according to WHG, the DIL switch must be set to position max.

Adjustment of the density range (3)

With this DIL switch (3) you can set the switching point to liquids having a density between 0.5 and 0.7 g/cm³ (0.018 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 ≥ 0.5 g/cm³ (0.018 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.



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 erroneous switchings, particularly when the sensor is used for dry run protection.

Simulation key (4)

The simulation key is located in a recess on the upper side of the electronics module. Push the simulation key with a suitable object (screwdriver, pen, etc.).

When the key is pushed, a line break between sensor and processing unit is simulated. The signal lamp on the sensor extinguishes. The measuring system must signal a fault and take on a safe state when the key is pushed.

Keep in mind that downstream connected instruments will be activated during operation. This allows you to check the correct function of the measuring system.

6.3 Function table

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



Note:

The mode setting on the NAMUR amplifier must be selected in such a way that the switching output takes on safe state in case of fault signal ($I \leq 0.6$ mA).

	Level	Switching status	Control lamp
Falling character- istics max.		$\geq 2.2 \text{ mA}$	 Red
Falling character- istics max.		$\leq 1.0 \text{ mA}$	 Off
Rising character- istics min.		$\geq 2.2 \text{ mA}$	 Red
Rising character- istics min.		$\leq 1.0 \text{ mA}$	 Off
Fault	any	$\leq 1.0 \text{ mA}$	 flashes red

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 61 signals "covered" without being submerged (overflow protection) VEGASWING 61 signals "uncovered" when being submerged (dry run protection)	Operating voltage too low	Check operating voltage
	Electronics defective	Press the characteristic reversal 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.
		Push the characteristic reversal 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 characteristic selected	Set the correct characteristics on the characteristics reversal switch (overflow protection, dry run protection). Wiring should be carried out according to the idle current principle.
Signal lamp flashes red	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 Ex applications only an electronics module with respective 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.

In general, all electronics modules of series SW60 can be interchanged. If you want to use an electronics module with a different signal output, you carry out the complete setup. You find the necessary, suitable operating instruction on our homepage.



Note:

Keep in mind that enamelled instrument versions need special electronics modules. These electronics modules are called SW60E or SW60E1.

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.

The following is required:

- The serial number of the instrument
- A short description of the fault
- Details of the medium, if applicable

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 supply*" in reverse.



Warning:

When dismantling, 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 | 316L, Alloy C22 (2.4602), Alloy 400 (2.4360) |
| – Process fitting - flange | 316L, 316L with Alloy C22 (2.4602) plated, 316L with ECTFE coated, 316L with PFA coating, Alloy 400 (2.4360), Duplex steel (1.4462) |
| – Process seal | Klingsil C-4400 |
| – Tuning fork | 316L, Alloy C22 (2.4602), Alloy C4 (2.4610) enamelled |
| – Extension tube: ø 21.3 mm (0.839 in) | 316L, Alloy C22 (2.4602), Alloy C22 (2.4602) enamelled, 316L with ECTFE coating, 316L with PFA coating |

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 |
| – Seal between housing and housing cover (lacquer-compatible version) | EPDM |
| – Optical fibre in housing cover | PMMA (Makrolon) |
| – Ground terminal | 316L |
| – Cable gland | PA, stainless steel, brass |
| – Sealing, cable gland | NBR |
| – Blind plug, cable gland | PA |
| – Temperature adapter (optional) | 316L |

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

- The Second Line of Defense (SLOD) is 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.

– Supporting material	316L
– Glass potting	Borosilicate glass (Schott no. 8421)
– Contacts	1.4101
– Helium leak rate	$< 10^{-6}$ mbar l/s
– Pressure resistance	PN 64
Sensor length	
– Length VEGASWING 61	See chapter "Dimensions"
Instrument weight (depending on process fitting)	0.8 ... 4 kg (0.18 ... 8.82 lbs)
Layer thickness (typical)	
– Enamel	600 μm ± 200 μm (0.024 in ± 0.008 in)
– ECTFE	500 μm +500/-200 μm (0.02 in +0.02/-0.008 in)
– PFA	600 μm +500/-300 μm (0.024 in +0.02/-0.012 in)
Surface quality	
– Standard	$R_a < 3$ μm (1.18 ⁻⁴ in)
– Hygienic version (3A)	$R_a < 0.8$ μm (3.15 ⁻⁵ in)
– Hygienic version (3A)	$R_a < 0.3$ μm (1.18 ⁻⁵ in)
Process fittings	
– Pipe thread, cylindrical (DIN 3852-A)	G $\frac{3}{4}$, G1
– Pipe thread, conical (ASME B1.20.1)	$\frac{3}{4}$ NPT, 1 NPT
– Flanges	DIN from DN 25, ASME from 1"
– hygienic fittings	Slotted nut DN 40 PN 40, Clamp 1" DIN 32676 ISO 2852/316L, Clamp 2" DIN 32676 ISO 2852/316L, conus DN 25 PN 40, Tuchenhausen Varivent DN 50 PN 10
Max. torque - process fitting	
– Thread G $\frac{3}{4}$, $\frac{3}{4}$ NPT	75 Nm (55 lbf ft)
– Thread G1, 1 NPT	100 Nm (73 lbf ft)
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)
Gas-tight leadthrough (optional)	
– Leakage rate	$< 10^{-6}$ mbar l/s
– Pressure resistance	PN 64
High voltage test (enamel)	< 5 KV

Output variable

Output	Two-wire NAMUR output
Current consumption	
– Falling characteristics (max.)	≥ 2.2 mA uncovered/ ≤ 1.0 mA covered
– Rising characteristics (min.)	≤ 1.0 mA uncovered/ ≥ 2.2 mA covered
– Fault message	≤ 1.0 mA

Necessary processing system	NAMUR processing system according to IEC 60947-5-6 (EN 50227/DIN 19234)
Suitable signal conditioning instruments	VEGATOR 111, 112
Modes (NAMUR output adjustable to falling or rising characteristics)	
– Min.	rising characteristic curve (High current when immersed)
– Max.	falling characteristics (Low current when immersed)

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/cm ³ (0.036 lbs/in ³) (water)
– Product viscosity	1 mPa s
– Superimposed pressure	0 kPa
– Sensor installation	Vertically from top
– Density selection switch	≥ 0.7 g/cm ³

Measurement accuracy

Deviation	± 1 mm (0.04 in)
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Influence of the process temperature on the switching point

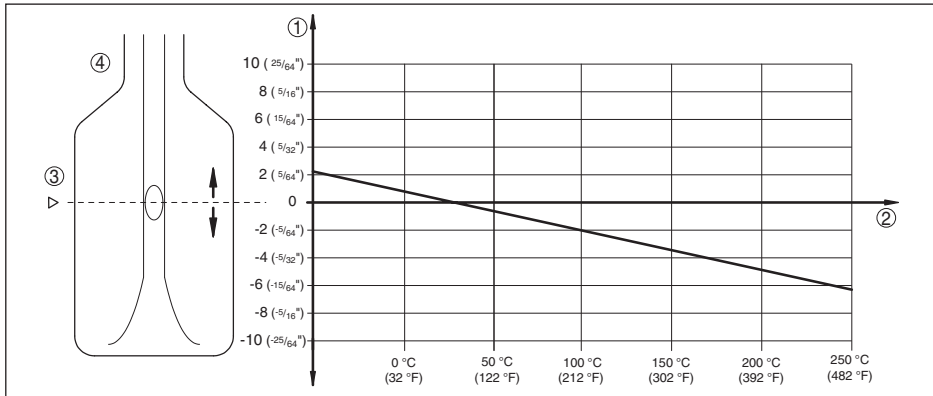


Fig. 12: Influence of the process temperature on the switching point

- 1 Shifting of the switching point in mm (in)
- 2 Process temperature in °C (°F)
- 3 Switching point at reference conditions (notch)
- 4 Tuning fork

Influence of the product density on the switching point

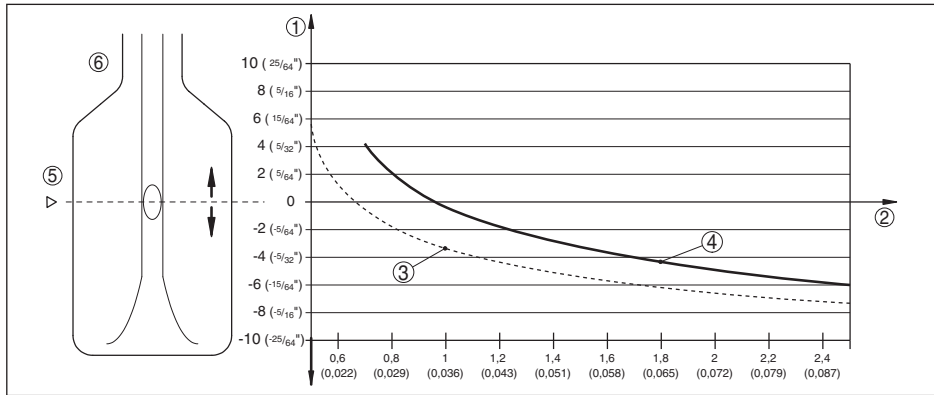


Fig. 13: Influence of the product density on the switching point

- 1 Shifting of the switching point in mm (in)
- 2 Product density in g/cm³ (lb/in³)
- 3 Switch position ≥ 0.5 g/cm³ (0.018 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

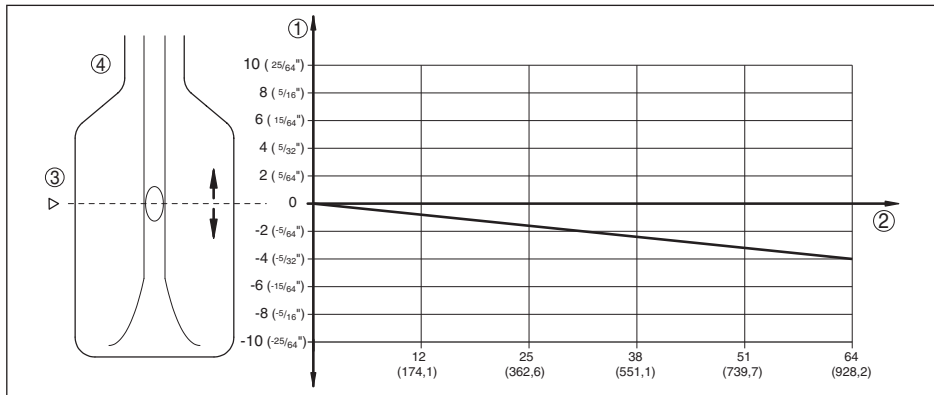


Fig. 14: Influence of the process pressure to the switching point

- 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. 500 ms (on/off)

– Can be ordered optionally	approx. 250 ms (on/off)
Measuring frequency	approx. 1200 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	-1 ... 64 bar/-100 ... 6400 kPa (-14.5 ... 928 psig) The process pressure is dependent on the process fitting, for example Clamp or flange (see the following diagrams)
Maximum allowable operating pressure	100 bar/10000 kPa (1450 psig) or 1.5 times process pressure The function of the instrument is ensured up to an operating pressure of 100 bar/10000 kPa (1450 psig) at a maximum process temperature of +50 °C (+122 °F) (only with threaded versions).
Process temperature (thread or flange temperature)	
– VEGASWING 61 of 316L/Alloy C22 (2.4602)	-50 ... +150 °C (-58 ... +302 °F)
Process temperature (thread or flange temperature) with temperature adapter (option)	
– VEGASWING 61 of 316L/Alloy C22 (2.4602)	-50 ... +250 °C (-58 ... +482 °F)
– VEGASWING 61 enamelled	-50 ... +200 °C (-58 ... +392 °F)
– VEGASWING 61 with ECTFE coating	-50 ... +150 °C (-58 ... +302 °F)
– VEGASWING 61 with PFA coating	-50 ... +250 °C (-58 ... +482 °F)
– VEGASWING 61 with PFA coating (with FDA and EG 1935/2004 approval)	-50 ... +150 °C (-58 ... 302 °F)

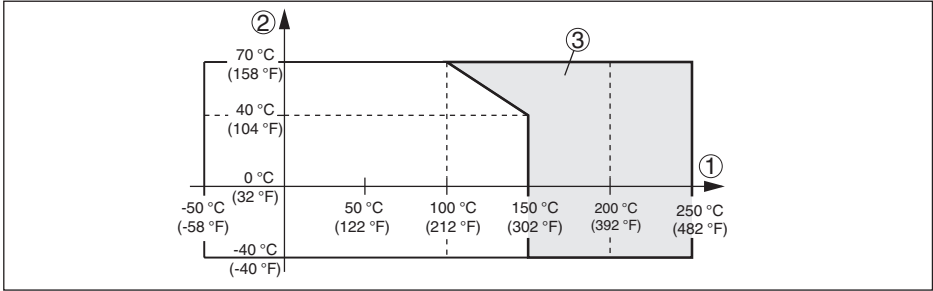


Fig. 15: Ambient temperature - Process temperature

- 1 Process temperature in °C (°F)
- 2 Ambient temperature in °C (°F)
- 3 Temperature range with temperature adapter

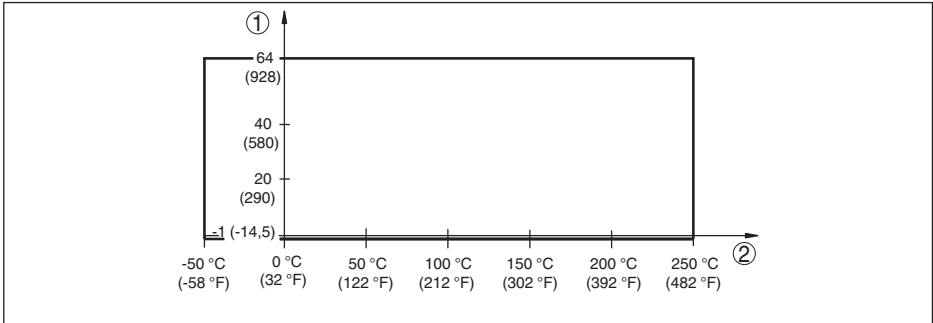


Fig. 16: Process temperature - Process pressure with switch position $\geq 0.7 \text{ g/cm}^3$ (sensitivity switch)

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

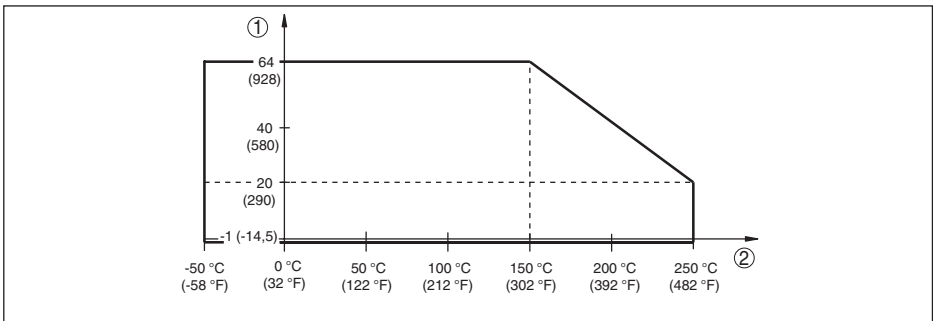


Fig. 17: Process temperature - Process pressure with switch position $\geq 0.5 \text{ g/cm}^3$ (sensitivity switch)

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

SIP process temperature (SIP = Sterilization in place)

PFA and ECTFE coatings are not suitable for SIP cleaning

Vapour stratification up to 2 h

+150 °C (+302 °F)

Additional process conditions

Viscosity - dynamic	0.1 ... 10000 mPa s (requirement: with density 1)
Flow velocity	max. 6 m/s (with a viscosity of 10000 mPa s)
Density	
– Standard sensitivity	0.7 ... 2.5 g/cm ³ (0.025 ... 0.09 lbs/in ³)
– High sensitivity	0.5 ... 2.5 g/cm ³ (0.018 ... 0.09 lbs/in ³)
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)

Electromechanical data - version IP66/IP67 and IP66/IP68 (0.2 bar)

Options of the cable entry	
– Cable entry	M20 x 1.5; ½ NPT
– Cable gland	M20 x 1.5; ½ NPT or plug connector M 12 x 1, Harting etc.
– Blind plug	M20 x 1.5; ½ NPT
– Closing cap	½ NPT
Screw terminals	for wire cross-section up to 1.5 mm ² (AWG 16)

Electromechanical data - version IP66/IP68 (1 bar)

Options of the cable entry	
– Cable entry	M20 x 1.5; ½ NPT
– Cable gland	M20 x 1.5; ½ NPT
– Blind plug	M20 x 1.5; ½ NPT
– Closing cap	½ NPT
Connection cable	
– Wire cross-section	> 0.5 mm ² (AWG 20)
– Wire resistance	< 0.036 Ω/m (0.011 Ω/ft)
– Tensile strength	< 1200 N (270 lbf)
– 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

Adjustment elements

Mode switch	
– Min.	rising characteristic curve (High current when immersed)

– Max.	falling characteristics (Low current when immersed)
Sensitivity switch	
– $\geq 0.5 \text{ g/cm}^3$	$0.5 \dots 2.5 \text{ g/cm}^3$ ($0.018 \dots 0.09 \text{ lbs/in}^3$)
– $\geq 0.7 \text{ g/cm}^3$	$0.7 \dots 2.5 \text{ g/cm}^3$ ($0.025 \dots 0.09 \text{ lbs/in}^3$)
Test key	simulation of a line break between sensor and processing unit

Voltage supply

Operating voltage (characteristics according to standard)	for connection to an amplifier according to NAMUR IEC 60947-5-6, approx. 8.2 V
Off-load voltage	U_0 approx. 8.2 V
Short-circuit current	I_0 approx. 8.2 mA

Electrical protective measures

Protection rating	
– Plastic housing	IP66/IP67 acc. to IEC 60529, Type 4X acc. to NEMA
– Aluminium and stainless steel (standard)	IP66/IP68 (0.2 bar) acc. to IEC 60529, type 6P acc. to NEMA ¹⁾
– Aluminium and stainless housing (optionally available)	IP66/IP68 (1 bar) acc. to IEC 60529, type 6P acc. to NEMA
Altitude above sea level	up to 5000 m (16404 ft)
Overvoltage category	I
Pollution degree	4
Protection rating (IEC 61010-1)	II

9.2 Dimensions

Housing in protection IP66/IP67 and IP66/IP68 (0.2 bar)

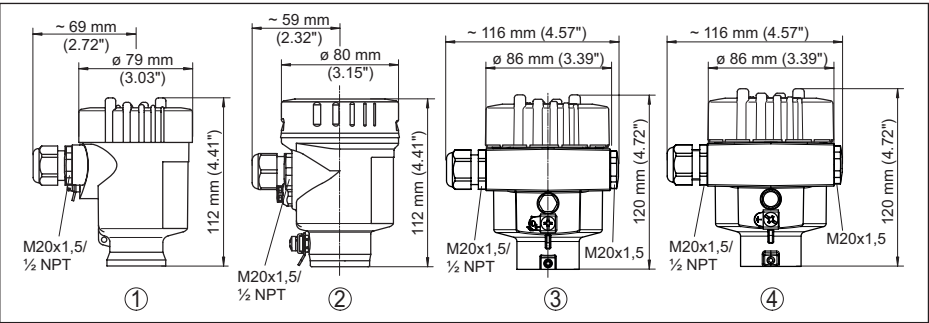


Fig. 18: Housing versions in protection IP66/IP67 and IP66/IP68 (0.2 bar)

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

¹⁾ A suitable cable is required for maintaining the protection rating.

Housing in protection rating IP66/IP68 (1 bar)

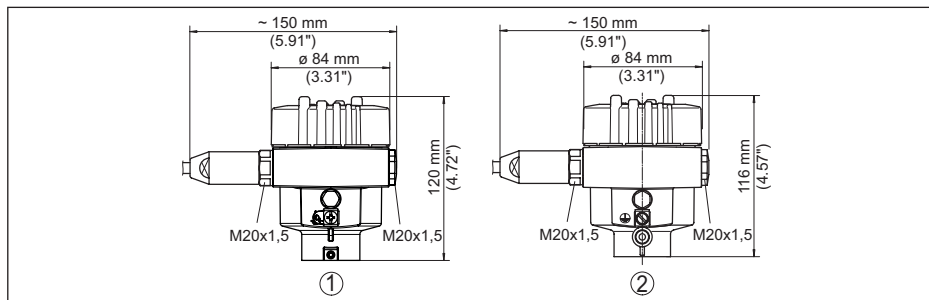


Fig. 19: Housing versions with protection rating IP66/IP68 (1 bar)

- 1 Stainless steel single chamber (precision casting)
- 2 Aluminium - single chamber

VEGASWING 61

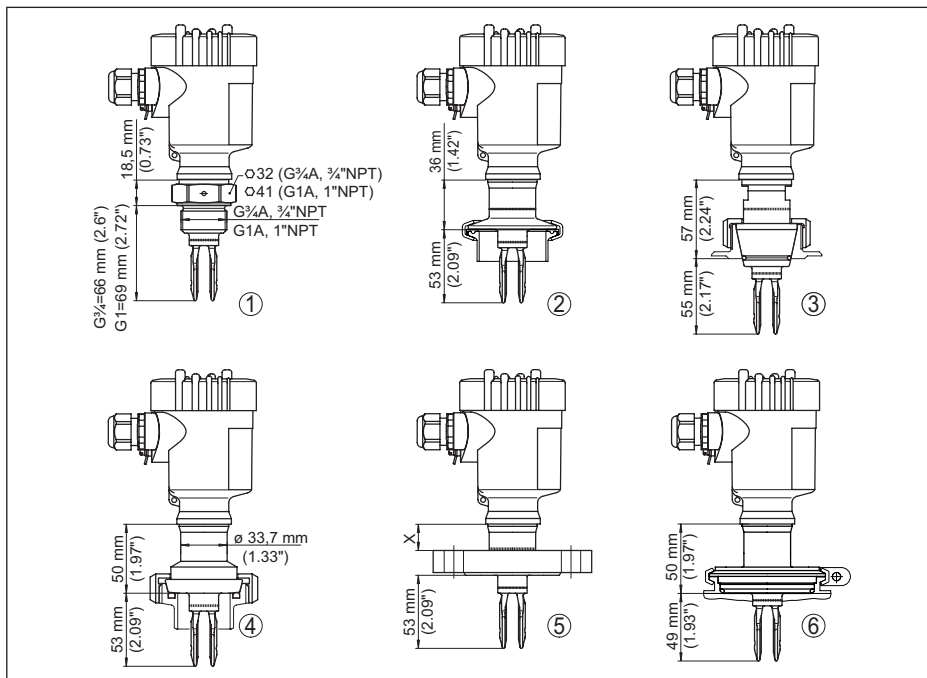


Fig. 20: VEGASWING 61

- 1 Thread
- 2 Clamp
- 3 Cone DN 25
- 4 Slotted nut DN 40
- 5 Flange
- 6 Tuchenhausen Varivent
- x 19 mm (0.75 in)
- Flansch made of Alloy 400 (2.4360): 34,8 mm (13.7 in)

VEGASWING 61, options

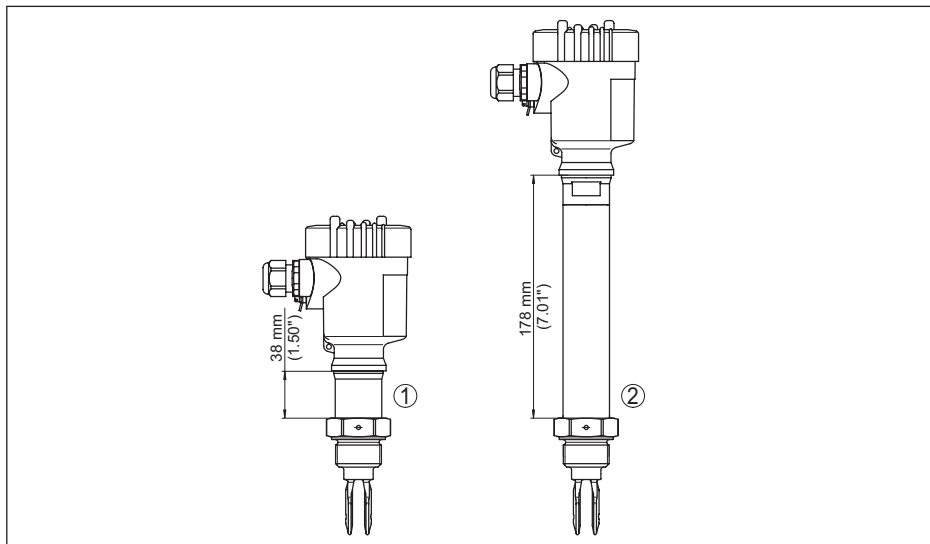


Fig. 21: Options²⁾

- 1 Gas-tight leadthrough
- 2 Temperature adapter

VEGASWING 61, switching point extension

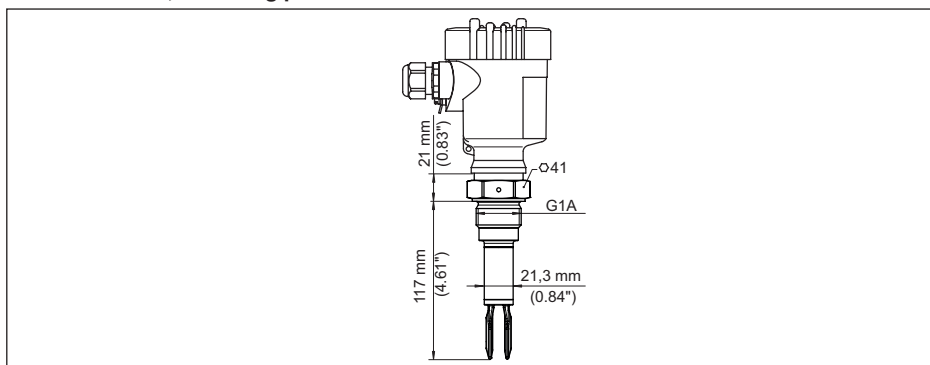


Fig. 22: Switching point extension - for easy exchange of a VEGASWING 81 or 81 A

²⁾ For flanges made of Alloy 400 (2.4360), the length of the adapter is 15.8 mm (0.62 in) longer.

9.3 Industrial property rights

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