Operating Instructions

Vibrating level switch for liquids

VEGASWING X S

NAMUR

Document ID: 1040730

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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.

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

Disposal
This symbol indicates special instructions for disposal.

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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 Intended use

The VEGASWING X S 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 hazards, please observe the safety symbols and warnings affixed to the instrument. Particular attention should be paid to the following safety symbol and warning:

Warning

Protection against electrostatic discharge (ESD)

This instrument contains electrostatically sensitive components. Before opening the sensor housing, you must discharge yourself (e.g. by touching an earthed metal part) to remove any static charge from your body.

2.5 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).

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3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- VEGASWING X S point level switch

The further scope of delivery encompasses:

- Documentation
  - 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 X S consists of the components:

- Housing lid
- Housing with electronics
- Process fitting with tuning fork
- Extension tube or suspension cable (optional)

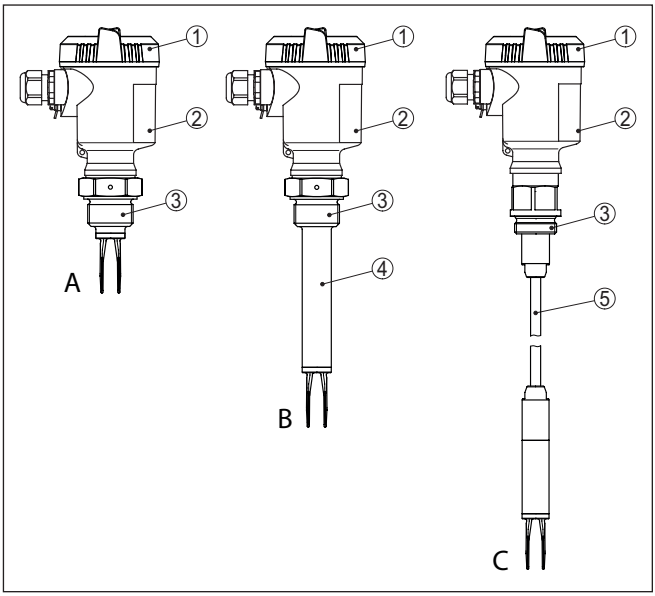

Fig. 1: VEGASWING X S, Instrument versions

A Compact version
B Tube version
C Suspension cable version
1 Housing lid
2 Housing with electronics
3 Process fitting
4 Tube
5 Suspension cable

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***".

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3.2 Principle of operation

Application area

VEGASWING X S 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 include overfill protection, overflow protection and dry-run protection. In addition, the frequency measurement from the tuning fork can be used to monitor the density of the medium or to detect interface layers. The compact tuning fork allows it to be used in pipework from DN 32 upwards, as well as in all types of vessels and tanks.

Thanks to its simple and robust measuring system, as well as a wide range of optional materials and coatings that come into contact with the medium, the VEGASWING X S can be used almost regardless of 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 X S 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 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. 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.

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 health status (green)
- Control lamp for indication of the switching status (yellow)
- Control lamp for fault indication (red)
- DIL switch for adjustment of the density range
- Mode switch for selecting the switching behaviour (min./max.)
- Test 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 consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

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 "*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.

XCOM

The pluggable display, adjustment and communication module XCOM can be mounted easily on the device electronics as an option.

For devices with NAMUR electronics, only the XCOM B communication module may be used.

The XCOM enables wireless adjustment by Bluetooth with smart phones/tablets or PCs/notebooks.

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.

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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

Lock fitting

The lock fitting is used for for infinite locking with tube extension.

The following lock fittings are available:

- AC-SGX-ARV****1*** - -50 … +280 °C / unpressurized
- AC-SGX-ARV****4*** - -20 … +80 °C / up to 0.1 bar
- AC-SGX-ARV****2*** - -50 … +150 °C / up to 16 bar
- AC-SGX-ARV****3*** - -50 … +250 °C / up to 64 bar
- AC-SGX-ARV****5*** - -50 … +150 °C / up to 100 bar
- AC-SGX-ARV****6*** - -50 … +280 °C / up to 100 bar

The wetted parts of the lock fitting can be made either of stainless steel (316L) or Alloy C22 (2.4602).

Lock fittings cannot be used in coated tube extensions.

You can find additional information in the operating instructions manuals of the lock fittings.

Fork protection

To protect the tuning fork against damage, the sensor can be equipped with a fork guard.

The fork protection can also be fitted retrospectively. Once fitted, it can be inserted into the vessel provided the process fitting is 1½" or larger.

Fork protection is recommended, for example, when using a suspension cable version on strongly moving medium surfaces.

Measuring instrument holder

Vibrations and turbulences in the vessel can lead to damage in the tube and suspension cable versions of the VEGASWING X S in the long term.

The measuring instrument holder is a suitable support for fixing the vibrating element in tube or suspension cable versions.

External test button

The external test button enables simple starting of a test process without opening the housing.

The test button is installed in place of a free cable gland and can also be retrofitted.

The use of an external test button is particularly suitable for frequently recurring on-site tests.

External housing

If the standard sensor housing is too large, or if there are strong vibrations or high ambient temperatures, you can use an external housing.

The external housing allows the operating elements and display to be fitted in a clearly visible and easily accessible location.

The electronics are accommodated by the external housing which can be installed up to 30 m (98.4 ft) away from the sensor with a connection cable.

Float for oil/water detection

The float for oil/water detection is part of a sensor system. It is used to detect liquids or light liquids on water. It consists of a float, a VEGASWING X S and a conductive measuring probe. The system can distinguish between water and light liquids such as oil.

Electronics module

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.

Battery

To adjust the instrument by Bluetooth, the NAMUR electronics require an additional voltage supply from a battery.

You can also retrofit this battery later if required.

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 X S 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 a small, round depression at the centre that indicates 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 X S, 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 ≥ 0.4 g/cm³ (0.014 lbs/in³) the density switch must be set to ≥ 0.4 g/cm³.

Keep in mind that foams with a density ≥ 0.4 g/cm³ (0.014 lbs/in³) can be detected by the sensor. This can lead to incorrect measurements, particulary when the sensor is used for dry run protection.

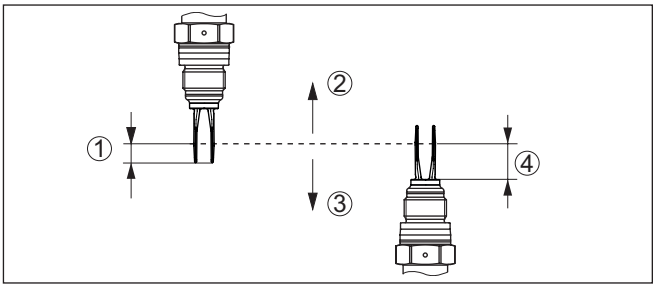

Fig. 2: Vertical mounting

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. 33 mm (1.3 in)

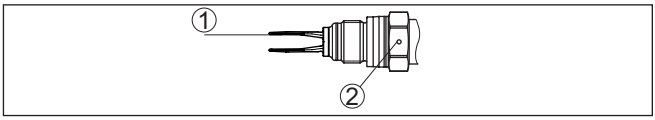

Fig. 3: Horizontal mounting

1 Switching point
2 Marking for fork position with threaded version

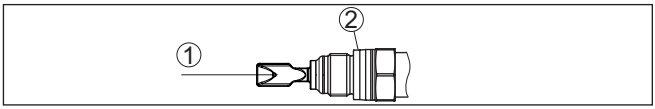

Fig. 4: Horizontal installation (recommended mounting position, particularly for adhesive products)

1 Switching point
2 Marking with threaded version facing upward, marking aligned to flange holes with flange versions

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

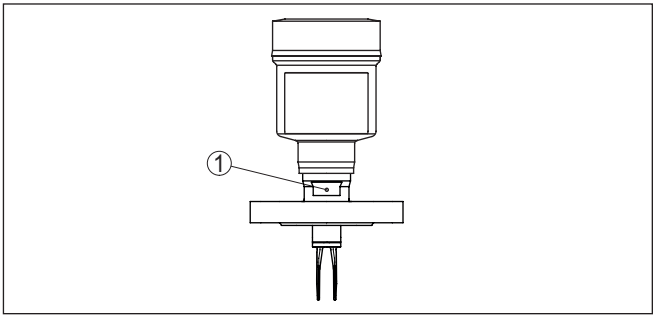

Fig. 5: Fork position with flange versions

1 Marking with flange version, facing up

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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
- Align the housing so that the cable gland points downwards or to the side
- 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 X S 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

VEGASWING X S has a defined thread starting point. This means that every VEGASWING X S is in the same fork position after being screwed in. Remove therefore the supplied seal from the thread of VEGASWING X S. 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 X S 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 X S 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.

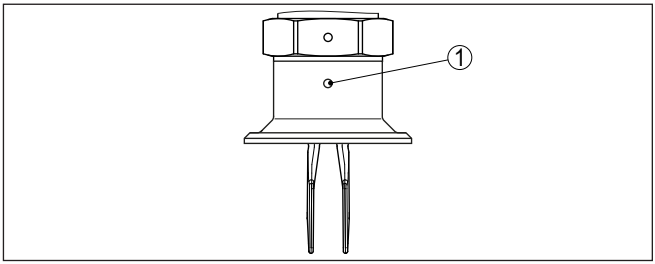

Fig. 6: Marking on the welded socket

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.

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.

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.

Inflowing medium

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

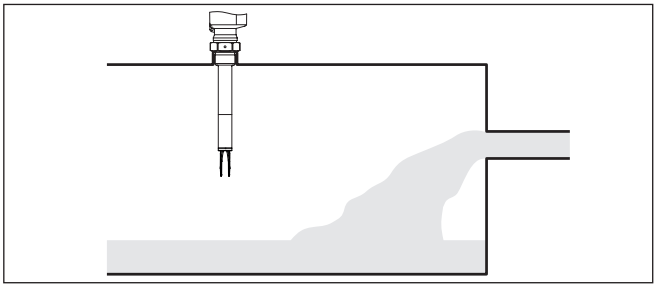

Fig. 7: Inflowing medium

Fork protection

To protect the tuning fork against damage, the sensor can be equipped with a fork guard.

The fork protection can also be fitted retrospectively. Once fitted, it can be inserted into the vessel provided the process fitting is 1½" or larger.

Fork protection is recommended, for example, when using a suspension cable version on strongly moving medium surfaces.

Push the fork guard over the tuning fork onto the tube neck.

Tighten the conical nut with an open-ended wrench (size 30) to a torque of 38 ±3 Nm (28 ±2.2 lbf ft) until the fork guard no longer turns.

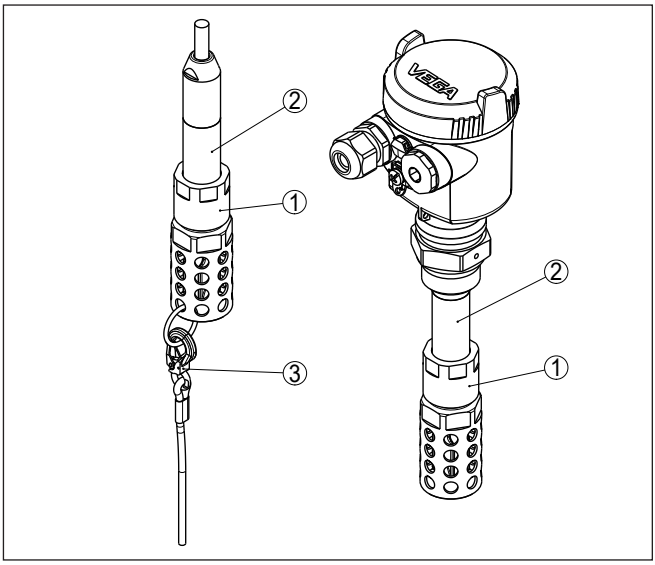

Fig. 8: Fork guard for damage protection

1 Fork protection
2 Extension tube or vibrating element with suspension cable
3 Straining (provided by customer)

Product flow

To make sure the tuning fork of VEGASWING X S 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 X S, instead check if it is possible to mount a short level switch VEGASWING X S 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 X S 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.

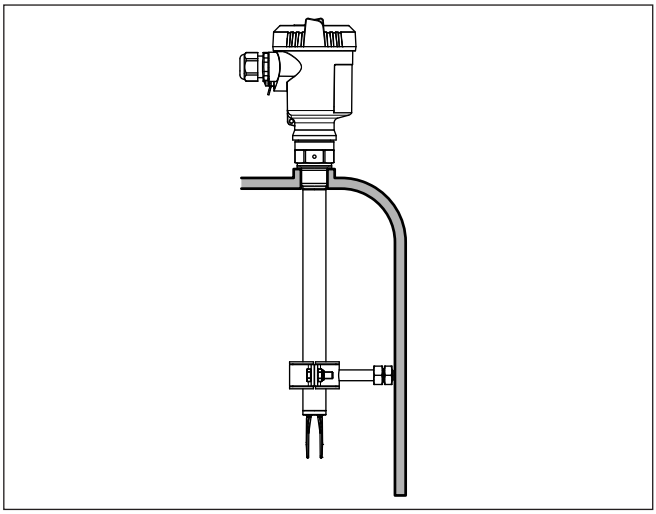

Fig. 9: Lateral suppot of VEGASWING X S

Second Line of Defense

The optional Second Line of Defense (gas-tight leadthrough) avoids due to a second sealing the uncontrolled penetration of the medium. The lifetime of the gastight leadthrough depends ont he chemical resistance of the materials. See "*Technical data*".

Caution:
If it is determined (e.g. via a fault signal from VEGASWING X S) 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 X S 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 X S.

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 with pressure-tight encapsulation, the housing cover may only be opened if there is no explosive atmosphere present.

Proceed as follows:

1. Unscrew the housing lid

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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. Press in the actuating lever of the connection terminal with a screwdriver.
6. Insert the wire ends into the open terminals according to the wiring plan
7. Release the actuating lever of the connection terminal
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

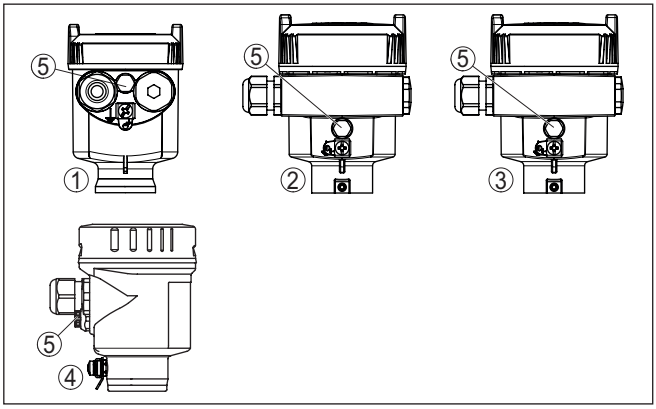

Fig. 10: Material versions, single chamber housing

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)

Ensure that the housing cover with inspection window is used when a display, adjustment and communication module is installed.

Note:
Use only the appropriate housing cover of the VEGASWING X instrument series. The cover of the 60 instrument series must not be

mounted or used on instruments of the VEGASWING X series. Only the enclosed, matching X housing cover is designed to fit the new housing and to ensure correct and permanent sealing.

This will ensure compliance with the intended ignition protection types as well as the explosion protection requirements for explosion-proof instruments.

Using an unsuitable housing cover on the VEGASWING X instrument series will lead to loss of conformity with the valid explosion protection directives and constitute a considerable safety risk.

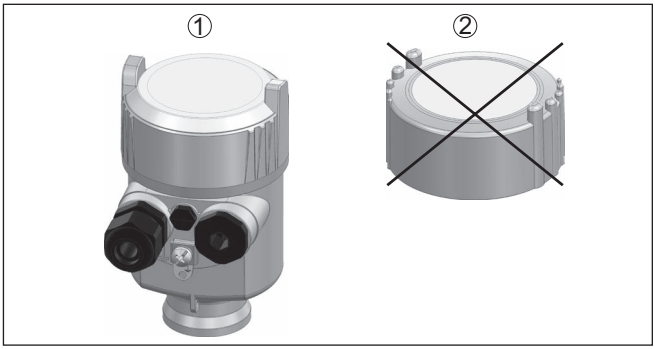

Fig. 11: Use only the housing cover provided

1 Housing cover X
2 Housing cover - instrument series 60

Electronics and connection compartment

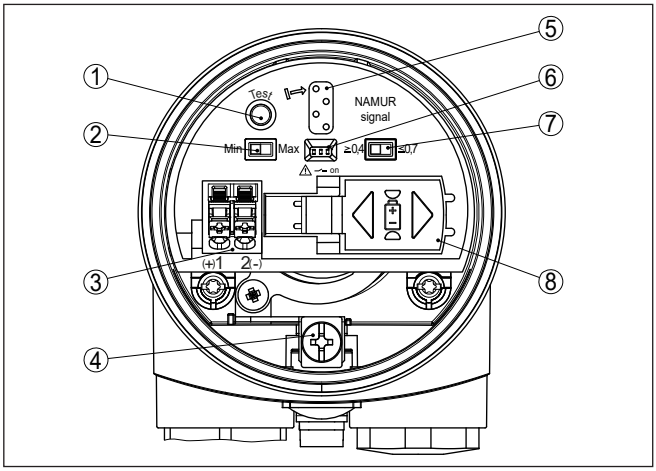

Fig. 12: Electronics and connection compartment, single chamber housing

1 *Test key*
2 *Mode switch for selecting the switching behaviour (min./max.)*
3 *Terminals - voltage supply*
4 *Ground terminal*
5 *Connection contacts - display, adjustment and communication module*
6 *Signal lamps - operating status (green), switching status (yellow), fault indication (red)*
7 *DIL switch for adjustment of the density range*
8 *Cover - Battery compartment*

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*".

The green signal lamp lights up when the voltage supply is activated.

The yellow signal lamp lights in the "High Current" switching status.

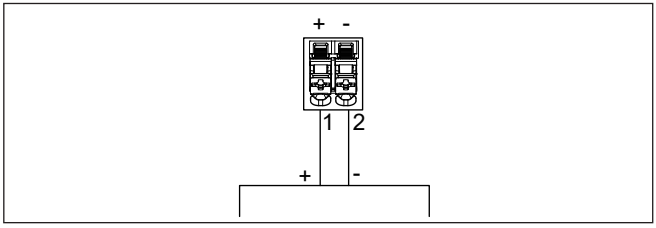

Fig. 13: Wiring plan - NAMUR electronics

6 Set up with the electronics module

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 ≥ 0.7 g/cm³ (0.025 lbs/in³) can be detected. For products with lower density, the switch must be set to ≥ 0.4 g/cm³ (0.014 lbs/in³).

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

- Signal lamps (5)
- Mode of operation switching for characteristics reversal - Min/Max (3)
- DIL switch for adjustment of the density range (6)
- Test key (2)

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

Display, adjustment and communication module
A Bluetooth connection can be established with the optional display, adjustment and communication module.

This enables wireless adjustment with smart phones/tablets or PCs/ notebooks.

Fig. 14: XCOM display, adjustment and communication module with Bluetooth

6.2 Adjustment elements

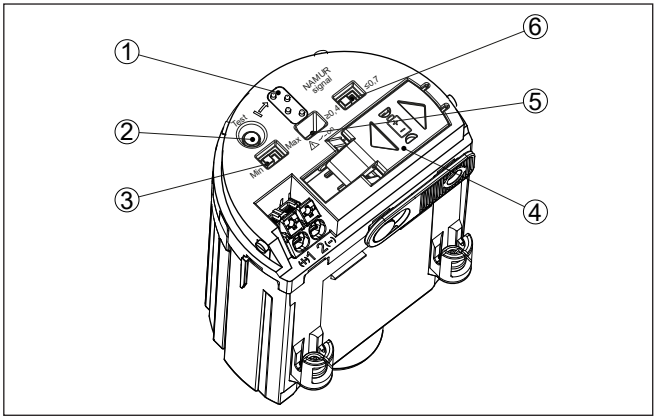

Fig. 15: Electronics module - NAMUR output

1 *Connection contacts - display, adjustment and communication module*
2 *Test key*
3 *Mode of operation switching for characteristics reversal (Min./Max.)*
4 *Battery compartment*
5 *Signal lamps - operating status (green), switching status (yellow), fault indication (red)*
6 *DIL switch for adjustment of the density range*

Signal lamps (5)

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

Control lamp (5) - fault indication (red)

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

- Red LED lights = Failure ≤ 1.0 mA
- Red (flashes) = Malfunction ≥ 2.2 mA (function check or Out of specification)

Signal lamp (5) - Switching condition (yellow)

The signal lamp for indication of the switching status.

With the mode setting (3), the switching condition and hence the function of the signal lamp can be changed.

- Yellow LED lights up = High current ≥ 2.2 mA
- Yellow LED off = Low current ≤ 1.0 mA

Signal lamp (5) - Operating condition (green)

- Green LED lights = operating voltage on

Characteristics reversal (3)

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.

- 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 (6)

With this DIL switch (6) the switching point can be set to liquids with a density between 0.4 and 0.7 g/cm³ (0.014 and 0.025 lbs/in³). In the basic setting, liquids with a density of ≥ 0.7 g/cm³ (0.025 lbs/in³) can be detected. For liquids with a lower density, the switch must be set to ≥ 0.4 g/cm³ (0.014 lbs/in³). The specifications for the position of the switching point refer to the medium water - density value 1 g/cm³ (0.036 lbs/in³). For media with a different density, the switching point shifts towards the housing or tuning fork end depending on the density and type of installation.

Note:
Keep in mind that foams with a density ≥ 0.4 g/cm³ (0.014 lbs/in³) can be detected by the sensor. This can lead to incorrect measurements, particulary when the sensor is used for dry run protection.

Note:
During vigorous boiling or bubbling processes, or in the event of extreme outgassing, the density of the gas/medium mixture may become so low that it can no longer be detected by the sensor. This may lead to faulty measurements.

Test key (2)

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

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

After releasing the test key, the sensor restarts and runs an extensive self-diagnosis. The red LED then lights up if an error is detected.

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 ≤ 0.6 mA).

	Level	Switching status	Signal lamp - green Voltage supply	Signal lamp - yellow Switching status	Signal lamp - red Fault message
Falling characteristics max.		≥ 2.2 mA	☼	☼	○
Falling characteristics max.		≤ 1.0 mA	☼	○	○
Rising characteristics min.		≥ 2.2 mA	☼	☼	○
Rising characteristics min.		≤ 1.0 mA	☼	○	○
Failure of the supply voltage (mode max./ min.)	any	≤ 1.0 mA	○	○	○
Malfunction	any	≤ 1.0 mA	☼	○	☼

7 Display, adjustment and communication module XCOM

7.1 Inserting the display, adjustment and communication module

The display, adjustment and communication module can be inserted into the sensor and removed again at any time.

Proceed as follows:

1. Unscrew the housing lid
2. Place the display, adjustment and communication module on the electronics and turn to the right until it snaps into place.

   Make sure that the connecting contacts are above the contact surfaces.
3. Screw housing lid with inspection window tightly back on

Disassembly is carried out in reverse order.

The display, adjustment and communication module is powered by the sensor, an additional connection is not necessary.

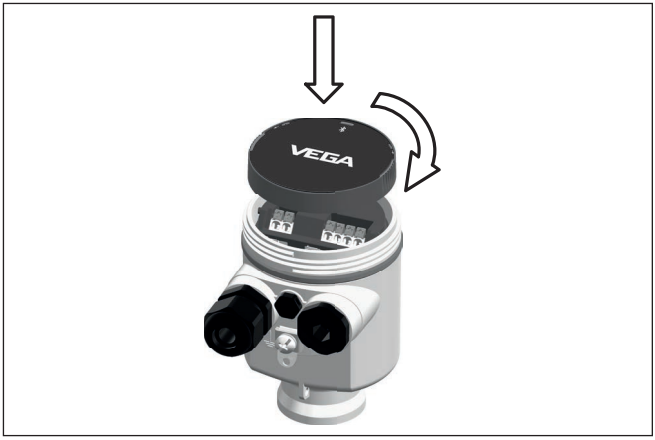

Fig. 16: Insertion into sensor housing

Note:
If you want to retrofit a display, adjustment and communication module to the instrument, a raised cover with inspection window is required.

8 Set up with Smartphone/tablet

8.1 Preparations

System requirements

Ensure that the following minimum system requirements are met, depending on the adjustment instruments:

	Smartphone/Tablet	PC/Notebook
Operating system	iOS 13 or later Android 8.0 or later	Windows 10 or later
Bluetooth	5.0	5.0
Software	VEGA Tools app	DTM Collection

Download the VEGA Tools app from the "*Apple App Store*", "*Google Play Store*" or "*Baidu Store*" to your smartphone or tablet.

Download the DTM Collection and the associated PACTware adjustment software from our homepage onto your PC or notebook.

Information:
If your PC/notebook does not have an integrated Bluetooth function or if this does not meet the required Bluetooth standard, an external Bluetooth USB adapter can be used.

Activate Bluetooth

Ensure that the Bluetooth function on the XCOM is activated. To do this, the switch on the underside must be set to "LOW" or "HIGH". The factory setting is "OFF".

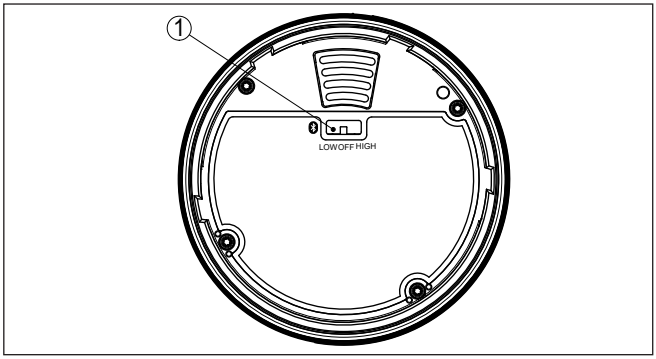

Fig. 17: Switch for Bluetooth functions

Image	Function
	Instrument version with Bluetooth

Labelling	Function
LOW	Bluetooth security mode for reduced Bluetooth range is enabled

Labelling	Function
OFF	Bluetooth deactivated
HIGH	Bluetooth with maximum range is enabled

Bluetooth security mode

In safe mode, the emitted power of the Bluetooth signal is reduced. This reduces the range within which the Bluetooth connection can be used.

The emitted power can be adjusted using the adjustment devices and is saved in the settings of the connected sensor. This has the advantage that when an XCOM is connected to another sensor, it automatically reads and uses the emitted power stored there.

Safety mode is activated using the switch (bottom of XCOM).

8.2 Connecting

Connecting

Start the adjustment app and select the function "*Setup*". The smartphone/tablet searches automatically for Bluetooth-capable instruments in the area.

The message "*Connecting …*" is displayed.

The devices found are listed and the search is automatically continued.

Select the requested instrument in the device list.

Authenticate

When establishing the connection for the first time, the operating tool and the sensor must authenticate each other. After the first correct authentication, each subsequent connection is made without a new authentication query.

Enter Bluetooth access code

For authentication, enter the 8-to-20-digit Bluetooth access code in the next menu window. You can find the code on the information sheet "*PINs and Codes*" in the device packaging.

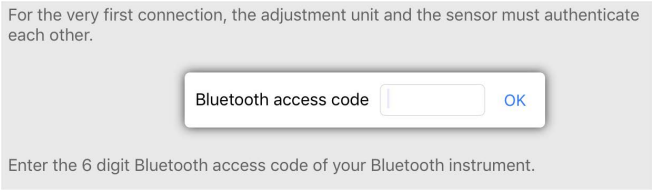

Fig. 18: Enter Bluetooth access code

Note:
If an incorrect code is entered, the code can only be entered again after a delay time. This time gets longer after each incorrect entry.

The message "*Waiting for authentication*" is displayed on the smartphone/tablet.

Connected

After connection, the sensor adjustment menu is displayed on the respective adjustment tool.

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If the Bluetooth connection is interrupted, e.g. due to a too large distance between the two devices, this is displayed on the adjustment tool. The message disappears when the connection is restored.

Change device code

Parameter adjustment of the device is only possible if the parameter protection is deactivated or the adjustment released. When delivered, parameter protection is deactivated by default and can be activated at any time.

For instruments with SIL or Security Approval, the parameter adjustment protection is activated at the factory.

It is recommended to enter a personal device code. To do this, go to menu "*Extended functions*", "*Access protection*", menu item "*Protection of the parameter adjustment*".

8.3 Sensor parameter adjustment

Enter parameters

The sensor adjustment menu is divided into two areas, which are arranged next to each other or one below the other, depending on the adjustment tool.

- Navigation section
- Menu item display

The selected menu item can be recognized by the colour change.

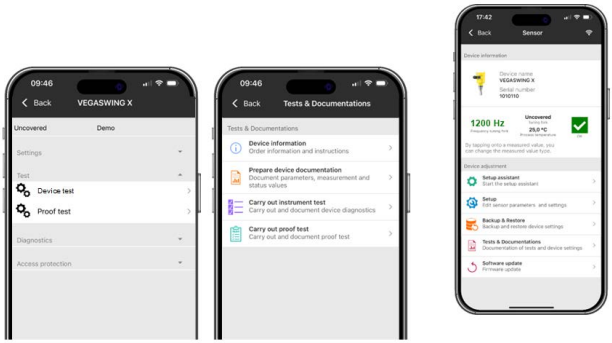

Fig. 19: Examples of the app view

Enter the requested parameters and confirm via the keyboard or the editing field. The settings are then active in the sensor.

Close the app to terminate connection.

Main menu

The main menu is divided into four areas with the following functions:

Settings: Settings, e. g. measurement loop name, mode of operation, application, signal output, display, reset and switching delay

Test: Settings, e. g. for function test and proof test

Diagnosis: Information, e. g. on device status, measured value status, diagnosis, event memory and sensor information

Access protection: Protection of parameter adjustment and Bluetooth access

Note:
In the main menu item "*Settings*" you will find the setup wizard which guides you step by step through the setup procedure.

The setup wizard starts automatically is you are starting the sensor for the first time.

8.4 Sensor parameter adjustment - Settings

Overview

The Settings menu item is divided into four sub-levels.

Sensor: Settings, e. g. for measurement loop name, mode of operation, application

Display: Display functions - signalling, display, menu language, appearance and backlight

Extended options: Switching delay, SIL operation

General: Settings, e. g. temperature unit, system recovery

Setup wizard: The setup wizard - follow the instructions

Sensor

Measurement loop name

Assign a suitable name to your measuring point. You can enter names with a maximum of 32 characters.

- Upper and lower case letters from A … Z
- Numbers from 0 … 9
- Special characters

Mode of operation

The mode of operation is set exclusively using the mode switch on the electronics module. To do this, remove the display, adjustment and communication module.

You can choose between the modes of operation "*Overfill protection*" or "*Dry run protection*".

- Min = dry run protection - vibrating element uncovered = switching output open (≤1.0 mA)
- Max = overfill protection - vibrating element covered = switching output open (≤1.0 mA)

In this menu item you can read out the selected mode of operation without removing the display, adjustment and communication module, e. g. overfill protection (Max, covered = switching output open, ≤1.0 mA)

Density setting

The density is set with the switch on the electronics module. Remove the display, adjustment and communication module to do this.

You can choose between two different density ranges.

- ≥ 0.7 g/cm³
- ≥ 0.4 g/cm³

In this menu item you can read out the selected density setting without removing the display, adjustment and communication module.

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Density unit

Choose between two different units for the density unit display.

- g/cm³
- lbs/ft³

Extended options

Switching delay

In this menu item you can set the type and duration of the switching delay.

You can select the switching delay (DS1) and/or the reset delay (DR1) and set both values separately.

You can set the delay times in a range from 0 to 60 seconds. The default value is 0.50 s.

SIL operation

In this menu item you can activate or deactivate the SIL functions.

This is only possible if the sensor has already been ordered as a SIL version.

If the SIL function is activated, the instrument switches over to SIL operation automatically.

The instrument then also performs a reset so that setup must be repeated.

Some functions may change or may no longer be available in SIL mode.

General information

Temperature unit

Select the temperature display unit.

You can choose between °C, K or °F.

System recovery

In this function, you can restart the sensor, restore the factory settings (Reset), save the sensor settings or copy previously saved settings to the sensor (backup).

Reset

Note:
After this menu window, the reset process is carried out. No further safety inquiry follows.

Default setting
Resetting of the parameter settings including special parameters to the default values of the respective instrument. All individual settings as well as the measured value memory are deleted.

The following table shows some important default values of the instrument. Depending on the instrument version or application, all menu items may not be available or some may be differently assigned:

Menu - Sensor

Menu item	Default value
Measurement loop name	Sensor
Switching delay (DS1)	0.250 s

Menu item	Default value
Reset delay (DR1)	0.250 s

Backup
With this function, you can save the sensor settings or copy previously saved settings to the sensor.

- Restore
- Create

Setup assistant

Start setup wizard

The wizard system guides you step by step through the setup.

- Device identification
- Measurement loop name
- Device name
- Application
- Mode of operation
- Verify and lock (only for instruments with SIL version)

8.5 Sensor parameter adjustment - Test

Function test

You can start the function test with this function.

The instrument automatially runs an instrument test and outputs the result directly.

You can document the instrument test and add a comment.

Here, data such as the measurement loop name, serial number, date or temperature are also recorded.

The results will be displayed in a PDF test report and in your myVEGA account.

You can access the data via our customer portal **myVEGA**. Signing up for myVEGA is free of charge.

Proof test

You can select the optionally possible function tests with this function.

This function is only available if the instrument has already been ordered as a SIL or WHG version.

Proof Test according to SIL (IEC 61508/61511)

Proof Test according to WHG

It is not essential to remove the instrument in order to carry out the functional test.

Caution:
During the function test, the safety function must be considered unsafe.

The function test has an influence on downstream devices.

Take other measures to maintain the safety function if necessary.

After the function test, the status specified for the safety function must be restored.

1. Checking the instrument information

2. Device identification
3. Visual inspection of the cables, cable gland, housing, mechanical and electrical installation, etc.
4. Entering remarks on the report
5. Select test sequence

Test 1
Simulation of the upper and lower error current

Move to control level or remove the instrument and immerse it in a medium with a similar density and viscosity.

Test 2
Simulation of the fault current and the output. Simulation of the switching status.

Test 3
This test method also works without the VEGA Tools App or PACTware with DTM adjustment.

Check the output with the test key on the electronics module or an external test button installed in the M12 thread of a free cable gland.

Test 4
Check the output with the test key on the VEGATOR controller.

Follow the instructions of the respective test method during the test process.

You can document the Proof Test and add a comment.

The results are displayed in a PDF test report. This file can be found in the folder "*VEGA Tools/Documentation*".

You can also access the data via our customer portal **myVEGA**. Signing up for myVEGA is free of charge.

8.6 Sensor parameter adjustment - Diagnosis

Status

You can detect the instrument status with this function.

Status parameter adjustment

You will find the change counter, operating hours, checksum of the parameter adjustment here.

In SIL instruments you also get the operating hours since the last SIL locking and the checksum.

Measured value status

Here you will find the measured values status of the instrument.

This includes the status, frequency and amplitude of the tuning fork.

Status outputs

Here you will find the data for the instrument output.

Status of the switching output, number of switching cycles and the switching cycles since the last restart.

Vibrating frequency

Vibrating frequency

Here you will find all the information about the instrument's vibrating frequency.

This includes, among other things, the amplitude and the frequency of the tuning fork, the warning limits and the fault limits.

Peak indicator

Peak indicator

You can display different peak indicator functions with this function.

These include the frequency and the amplitude of the tuning fork and also the process and electronic temperature.

You will find the maximum and minimum values as well as the corresponding operating hours.

Measured values

Measured values

Status, frequency and amplitude

Additional measured values

Electronics temperature, process temperature

Outputs

Status of the switching output, NAMUR current output

Simulation

Measured value

You can select the measured value of the simulation.

To do this, you can simulate the coverage (covered/uncovered), the frequency of the tuning fork or the status of the switching output.

Then you can enter the simulation value and start the simulation.

Diagnostic behaviour

You can determine the behaviour outside the specified electronics temperature.

- Out of specification
- Define switching status - switch to safe switching status (malfunction, output open)

Status signals

You can switch the status signals for function checking, out of specification, maintenance required on and off.

Service recording

Service recording

The app must remain permanently active during service recording.

The instrument can still be operated, however.

Customer service

Customer service

Here you will find your personal instrument service data.

- Service phone
- 24 h hotline
- Send mail to Service

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Measured value memory

Measured value memory

You can show the instrument values graphically with this function.

These include the vibrating frequency, the amplitude, the frequency, different temperature values as well as the output values.

You can select and simultaneously display two values.

Event memory

Events

The event memory can record events such as status changes or switch changes, parameter changes and cybersecurity events.

A maximum of 100 events can be recorded in one ring memory at any one time.

The event file can also be saved additionally as a PDF.

Sensor information

Sensor information

This overview provides you will all the information about the instrument.

This includes, for example, the device name, the order code, the measurement loop name, the serial number, the software and hardware version, optional data for SIL or WHG, the mode of operation, the factory calibration date and much more.

Sensor characteristics

Sensor characteristics

This overview shows you all of the instrument's features.

These are the ordered properties of the instrument such as, for example, the electronics version, the process temperature, the process fitting, the cable gland, the instrument housing, the approvals and much more.

8.7 Sensor parameter adjustment - Access protection

Bluetooth access code

You can change the Bluetooth access code of the instrument with this function.

Show/change access code

- at least 8 characters, maximum 20 characters
- Upper and lower case letters
- Numbers from 0 … 9
- Special characters
- No spaces

Password note

You can additionally enter a note to the password with 40 characters.

Protection of the parameterization

You can lock the instrument with a device code to protect the parameter adjustment.

The device code consists of 8 to 20 characters.

- Upper and lower case letters
- Numbers
- Special characters (without blanks)

Verify and lock

You can verify the lock the adjustment of changed parameters with this function.

This function is only necessary in SIL instruments.

9 Maintenance and fault rectification

9.1 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 that do not damage the housing, type plate or seals, e.g. a cloth dampened with water
- Use only cleaning methods corresponding to the housing protection rating

9.2 Battery exchange

To enable communication via Bluetooth the NAMUR electronics require an additional voltage supply from a battery.

Depending on the frequency and duration of data transmission, this battery will need to be replaced.

Note:
To test the battery function, briefly disconnect the device from the voltage supply or press the test button.

If the device remains in a safe state after being switched on, check the battery voltage and replace the battery if necessary.

1. Open and remove the housing cover
2. Push the battery cover (1) on the top of the electronics module in the direction of the arrow.
3. Remove the battery (2)

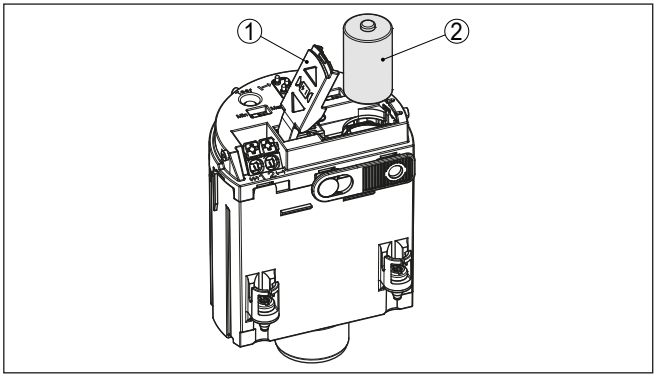

Fig. 20: Battery exchange

1 Battery cover
2 Battery (½AA)

4. Insert new battery (2) (article number 1093830).

Lithium battery size ½AA, 3.6 V (Saft LS 14250)

5. Press down the battery cover and push to the left to close.

   The battery replacement is now complete.

6. Remount the housing cover.

9.3 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.

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Checking the switching signal

Error	Cause	Rectification
VEGASWING X S signals "covered" without being submerged (overfill protection) VEGASWING X S 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 (overfill 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.
	Malfunction 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.

9.4 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.

Generally, only electronics modules of the same type series (e.g. VEGASWING X **S**) can be interchanged. The type name is stated on the electronics module.

Consult your VEGA Service partner if you want to use an electronics module with a different signal output. This applies, above all, for instruments with Ex-approval.

9.5 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
- Where applicable, details of the medium and process conditions

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.

10 Dismount

10.1 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.

10.2 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.

11 Certificates and approvals

11.1 Approvals for Ex areas

Approved versions for use in hazardous areas are available or in preparation for the device or the device series.

You can find the relevant documents on our homepage.

11.2 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.

11.3 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**.

11.4 Environment management system

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.

Help us to meet these requirements and observe the environmental instructions in the chapters "*Packaging, transport and storage*", "*Disposal*" of this instructions manual.

12 Supplement

12.1 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), Duplex steel (1.4462)
– Process fitting - flange	316L, Alloy 400 (2.4360), Alloy C22 (2.4602), 316L plated with Alloy C22 (2.4602), enamelled pressure vessel steel (1.0487), 316L coated with ECTFE, 316L coated with PFA, Duplex steel (1.4462) **Note** Devices with process fittings made of Duplex steel (1.4462) in accordance with DIN or EN standards may be used without restriction at temperatures down to -10 °C. When used at lower temperatures down to -60 °C, these devices may only be operated in accordance with Stress Case II as specified in AD 2000 Information Sheet W 10.
– Process seal	Klingersil C-4400
– Tuning fork	316L, Alloy 400 (2.4360), Alloy C22 (2.4602), duplex steel (1.4462), Alloy C22 (2.4610) enamelled, 316L coated with ECTFE, 316L coated with PFA
– Extension tube: ø 21.3 mm (0.839 in)	316L, Alloy 400 (2.4360), Alloy C22 (2.4602), Alloy C22 (2.4602) enamelled, duplex steel (1.4462), 316L coated with ECTFE, 316L coated with PFA
– Suspension cable: ø 8 mm (0.315 in), PUR	PUR, 316L, seal: FKM or EPDM
– Suspension cable: ø 8 mm (0.315 in), FEP	FEP, 316L

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

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– Seal between housing and housing cover (lacquer-compatible version)	EPDM
– Inspection window in housing cover (optional)	Plastic housing: Polycarbonate (UL746-C listed) Metal housing: Glass
– Ground terminal	316L
– Cable gland, blind plug cable gland	PA, stainless steel, brass
– Sealing, cable gland	CR/NBR
– Temperature adapter (optional)	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	Duplex steel (1.4462)
– Material	Ceramic Al_2O_3 (99.5 %)
– Helium leak rate	< 10^{-7} mbar l/s
– Pressure resistance	PN 100
Sensor length	
– Compact version	See chapter "*Dimensions*"
Sensor length (L) - Tube version	
– 316L	80 … 6000 mm (3.15 … 236.2 in)
– Duplexstahl (1.4462)	80 … 6000 mm (3.15 … 236.2 in)
– Alloy C22 (2.4602)	80 … 6000 mm (3.15 … 236.2 in)
– Alloy 400 (2.4360)	80 … 3000 mm (3.15 … 118.1 in)
– 316L with PFA coating	80 … 4000 mm (3.15 … 157.5 in)
– 316L with ECTFE coating	80 … 3000 mm (3.15 … 118.1 in)
– Alloy C22 (2.4602) enamelled	80 … 1500 mm (3.15 … 59.1 in)
– Sensor length accuracy (tube)	<1 m: ± 2 mm (± 0.079 in) >1 m: ± 5 mm (± 0.197 in)
Sensor length (L) - suspension cable version	
– PUR (max. 80 °C)	400 … 30000 mm (15.75 … 1181 in)
– FEP (max. 100 °C)	400 … 30000 mm (15.75 … 1181 in)
Weight	
– Instrument weight (depending on process fitting)	approx. 0.8 … 4 kg (0.18 … 8.82 lbs)
– Tube extension	approx. 920 g/m (9.9 oz/ft)
– Suspension cable - PUR	approx. 105 g/m (1.13 oz/ft)
– Suspension cable - FEP	approx. 132 g/m (1.42 oz/ft)
Layer thickness (typical)	
– Enamel	600 µm ±200 µm (0.024 in ±0.008 in)

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– 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 < 0.76 µm (2.99^{-5} in) - hand-polished
– Hygienic version (3A)	R_a < 0.38 µm (1.49^{-5} in) - electropolished
– Hygienic version (3A)	R_a < 0.30 µm (1.18^{-5} in) - hand polished
Process fittings	
– Pipe thread, cylindrical (DIN 3852-A)	G¾, G1, G1½, G2
– Pipe thread, conical (ASME B1.20.1)	¾ NPT, 1 NPT, 1½ NPT, 2 NPT
– Flanges	DIN from DN 25, ASME from 1"
– hygienic fittings	Slotted nut as of DN 40 PN 40, clamp as of 1" DIN 32676 ISO 2852/316L, cone as of DN 25 PN 40, Tuchenhagen Varivent DN 50 PN 10, aseptic fitting F40 PN25, SMS DN38 PN6, NEUMO Biocontrol DN26 PN16, Swagelok VCR, slotted nut DIN 11864 as of DN25 etc.
Max. permissible tensile load - Tragkabel	500 N (112 lbf)
Max. lateral load - Tube	150 Nm (110 lbf ft)
Max. torque - process fitting	
– Thread G¾, ¾ NPT	75 Nm (55 lbf ft)
– Thread G1, 1 NPT	100 Nm (73 lbf ft)
– Thread G1½, 1½ NPT, G2, 2 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)
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
Required controller	NAMUR controller according to IEC 60947-5-6 (EN 50227/DIN 19234)
Suitable controllers	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)

Bluetooth with display, adjustment and communication module	
Adjustment element	Mechanical 3-step switch (display, adjustment and communication module)
– Switch positions	LOW, OFF and HIGH
Bluetooth standard	5.x
Effective range[1)]	up to 100 m (328 ft)

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	± 0.5 mm (0.02 in)
Non-repeatability	0.1 mm (0.004 in)
Hysteresis	approx. 2 mm (0.08 in) with vertical mounting
Switching delay	
– Standard	approx. 0.25 s (on/off)
– adjustable	0.25 … 60 s (on/off)
Measuring frequency	approx. 1200 Hz

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

Process conditions	
Measured variable	Point level of liquids
Process pressure	
– Compact version	-1 … 40 bar/-100 … 4000 kPa (-14.5 … 580 psig) -1 … 64 bar/-100 … 6400 kPa (-14.5 … 928 psig) -1 … 100 bar/-100 … 10000 kPa (-14.5 … 1450 psig) The process pressure is dependent on the process fitting, for example Clamp or flange (see the following diagrams)

[1)] Depending on the local conditions

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– Tube version	-1 … 40 bar/-100 … 4000 kPa (-14.5 … 580 psig) -1 … 64 bar/-100 … 6400 kPa (-14.5 … 928 psig) -1 … 100 bar/-100 … 10000 kPa (-14.5 … 1450 psig) The process pressure is dependent on the process fitting, for example Clamp or flange (see the following diagrams)
– Suspension cable version	-1 … 25 bar/-100 … 2500 kPa (-14.5 … 352 psig)
Maximum allowable operating pressure	100 bar/10000 kPa (1450 psig) or 1.5 times process pressure
Process temperature (thread or flange temperature)	
– VEGASWING X S	-50 … +150 °C (-58 … +302 °F)
Process temperature (thread or flange temperature) with temperature adapter (option)	
– VEGASWING X S of 316L/Alloy C22 (2.4602)	-60 … +280 °C (-76 … +536 °F)
– VEGASWING X S enamelled	-60 … +200 °C (-76 … +392 °F)
– VEGASWING X S with ECTFE coating	-60 … +150 °C (-76 … +302 °F)
– VEGASWING X S with PFA coating	-60 … +250 °C (-76 … +482 °F)
– VEGASWING X S coated with PFA (approved for foodstuff)	-60 … +150 °C (-76 … 302 °F)
– VEGASWING X S, suspension cable version PUR	-20 … +80 °C (-4 … +176 °F)
– VEGASWING X S, suspension cable version FEP	-20 … +100 °C (-4 … +212 °F)

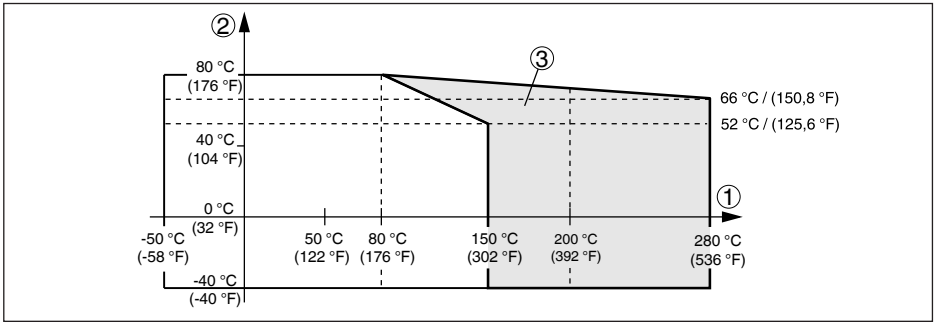

Fig. 21: Ambient temperature - Process temperature

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

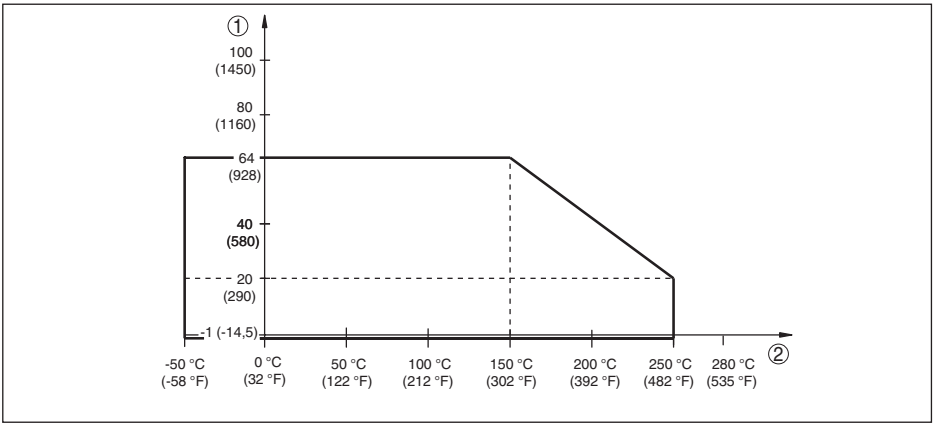

Fig. 22: Process temperature - Process pressure with switch position ≥ 0.4 g/cm³ (sensitivity switch)

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/cm³ (0.025 … 0.09 lbs/in³)
– High sensitivity	0.4 … 2.5 g/cm³ (0.014 … 0.09 lbs/in³)
Vibration resistance EN 60068-2-64-2008 + A1:2019	
– 3 axes x 2 hours	50 m/s² (RMS) at 5 … 2000 Hz
Shock resistance	
– acc. to IEC 60068-2-27:2008	11 ms at ±10 g peak acceleration 6 ms at ±30 g peak acceleration 3 ms at ±50 g peak acceleration If the sensor length >50 cm (16.69 in), the extension tube must be secured. See also the mounting instructions.
Impact resistance	
– Compact version	IK 08 (5 J) acc. to EN 62262:2002

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.

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– Blind plug	M20 x 1.5; ½ NPT
– Closing cap	½ NPT
Screw terminals	for wire cross-section up to 1.5 mm² (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 mm² (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	
– Max.	Max. detection or overfill protection
– Min.	Min. detection or dry run protection
Sensitivity switch	
– ≥ 0.4 g/cm³	0.4 … 2.5 g/cm³ (0.014 … 0.09 lbs/in³)
– ≥ 0.7 g/cm³	0.7 … 2.5 g/cm³ (0.025 … 0.09 lbs/in³)

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_U approx. 8.2 mA
Battery (optional)	Lithium battery size ½AA, 3.6 V (Saft LS 14250)
	Non-rechargeable

Electrical protective measures

Protection rating

Housing material	Protection acc. to IEC 60529	Protection acc. to NEMA
Plastic	IP66/IP67	Type 4X
Aluminium	IP66/IP68 (0.2 bar) IP66/IP68 (1 bar)	Type 4X/6P Type 4X/6P
Stainless steel (electro-polished)	IP66/IP68 (0.2 bar) IP68 (0.2 bar)/IP69	Type 4X/6P Type 4X/6P
Stainless steel (precision casting)	IP66/IP68 (0.2 bar) IP66/IP68 (1 bar)	Type 4X/6P Type 4X/6P

Connection of the feeding power supply unit	Networks of overvoltage category III
Altitude above sea level	
– by default	up to 2000 m (6562 ft)
– with connected overvoltage protection	2000 … 5000 m (6562 … 16404 ft)
Overvoltage category	III
Pollution degree[2)]	4
Protection class	III

12.2 Dimensions

VEGASWING X S, plastic housing

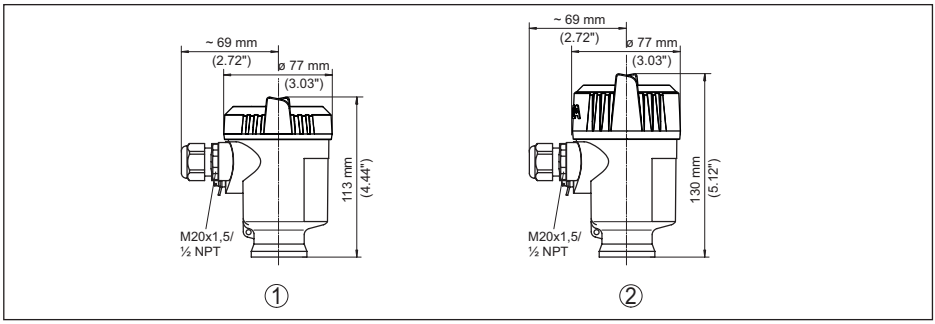

Fig. 23: Housing versions - plastic

1 Plastic single chamber
2 Plastic single chamber with high lid for the display, adjustment and communication module

[2)] When used with fulfilled protection.

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VEGASWING X S, Stainless steel housing (precision casting)

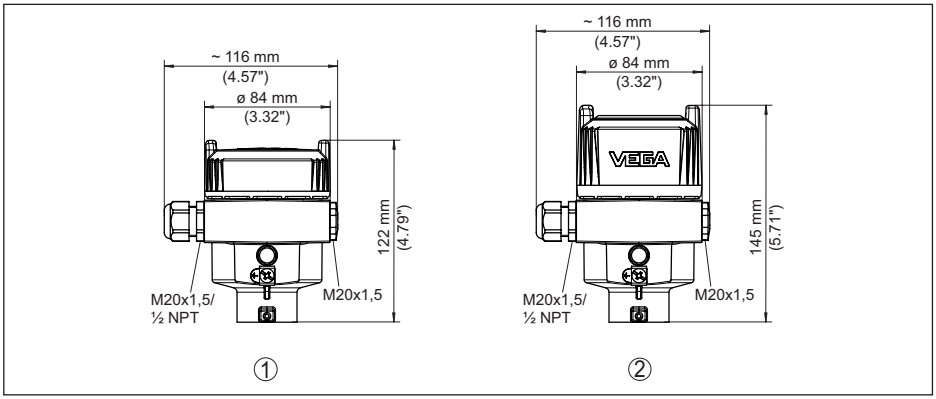

Fig. 24: Housing versions - stainless steel (precision casting)

1 *Stainless steel single chamber (precision casting)*
2 *Steinless steel single chamber (precision casting) with high lid for the display, adjustment and communication module*

VEGASWING X S, stainless steel housing (electropolished)

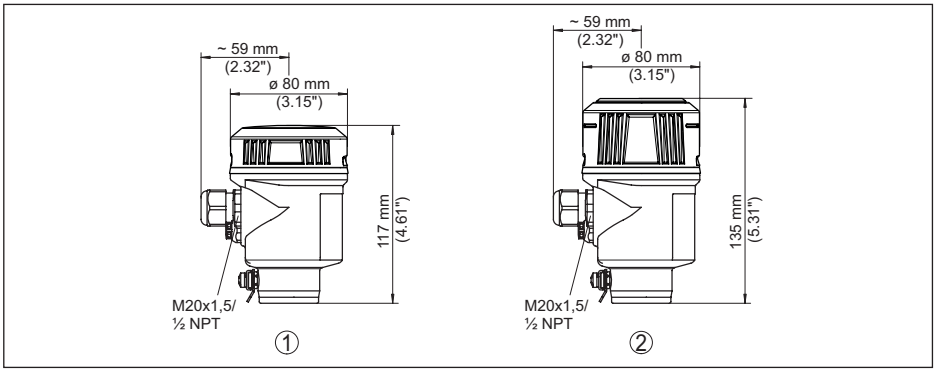

Fig. 25: Housing version - stainless steel (electropolished)

1 *Stainless steel single chamber (electropolished)*
2 *Steinless steel single chamber (electropolished) with high lid for the display, adjustment and communication module*

VEGASWING X S, aluminium housing

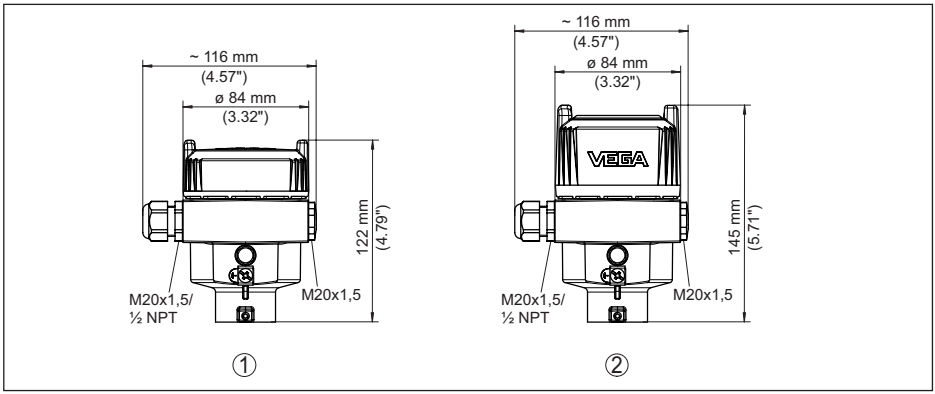

Fig. 26: Housing versions - Aluminium

1 Aluminium - single chamber
2 Aluminium single chamber with high lid for the display, adjustment and communication module

VEGASWING X S, compact version

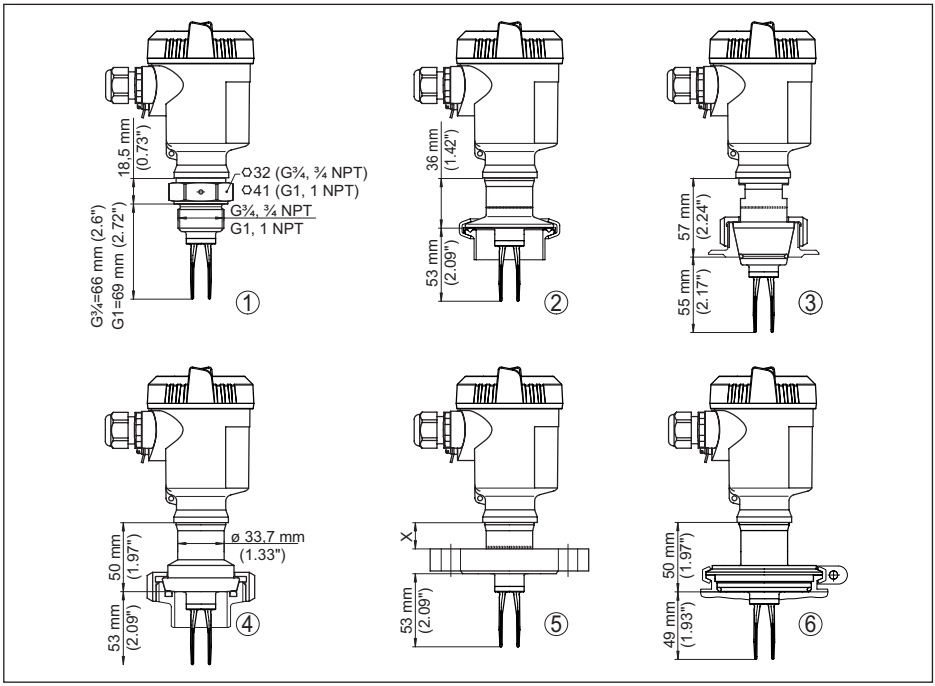

Fig. 27: VEGASWING X S, compact version

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

VEGASWING X S, tube version

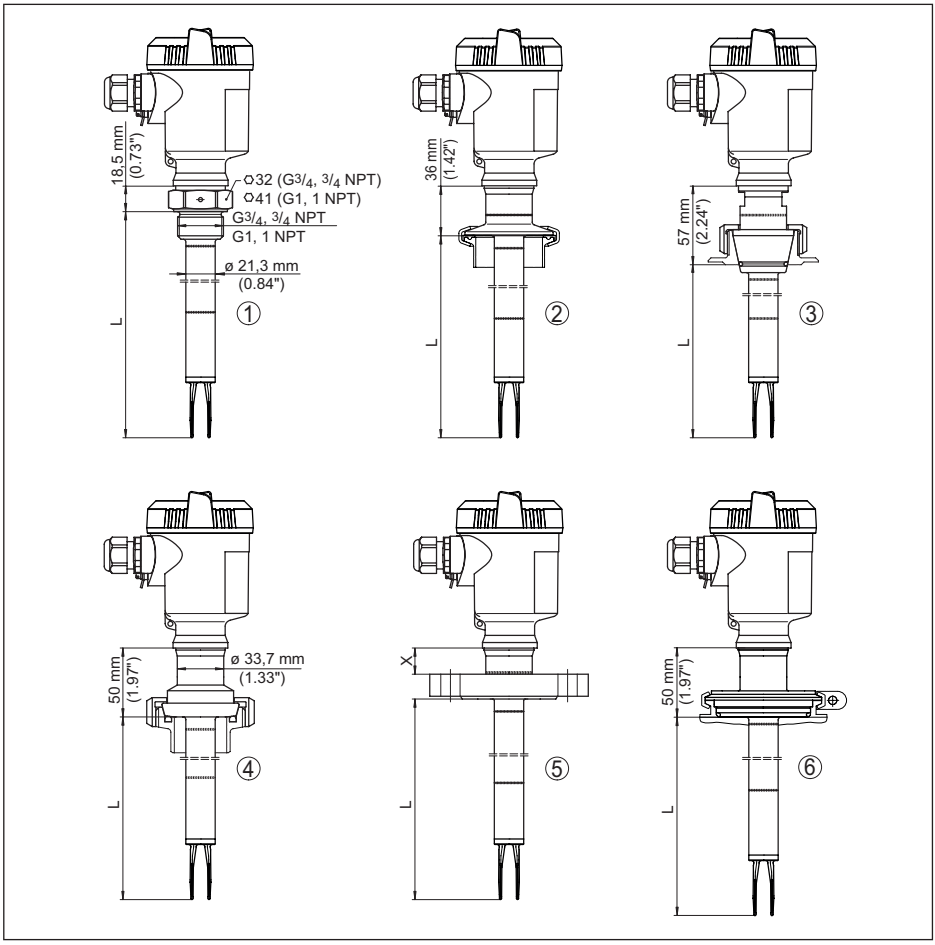

Fig. 28: VEGASWING X S, tube version

1 *Thread*
2 *Clamp*
3 *Cone DN 25*
4 *Slotted nut DN 40*
5 *Flange*
6 *Tuchenhagen Varivent*
L *Sensor length, see chapter "Technical data"*
x *19 mm (0.75 in)*
Flansch made of Alloy 400 (2.4360): 34,8 mm (13.7 in)

VEGASWING X S, suspension cable version

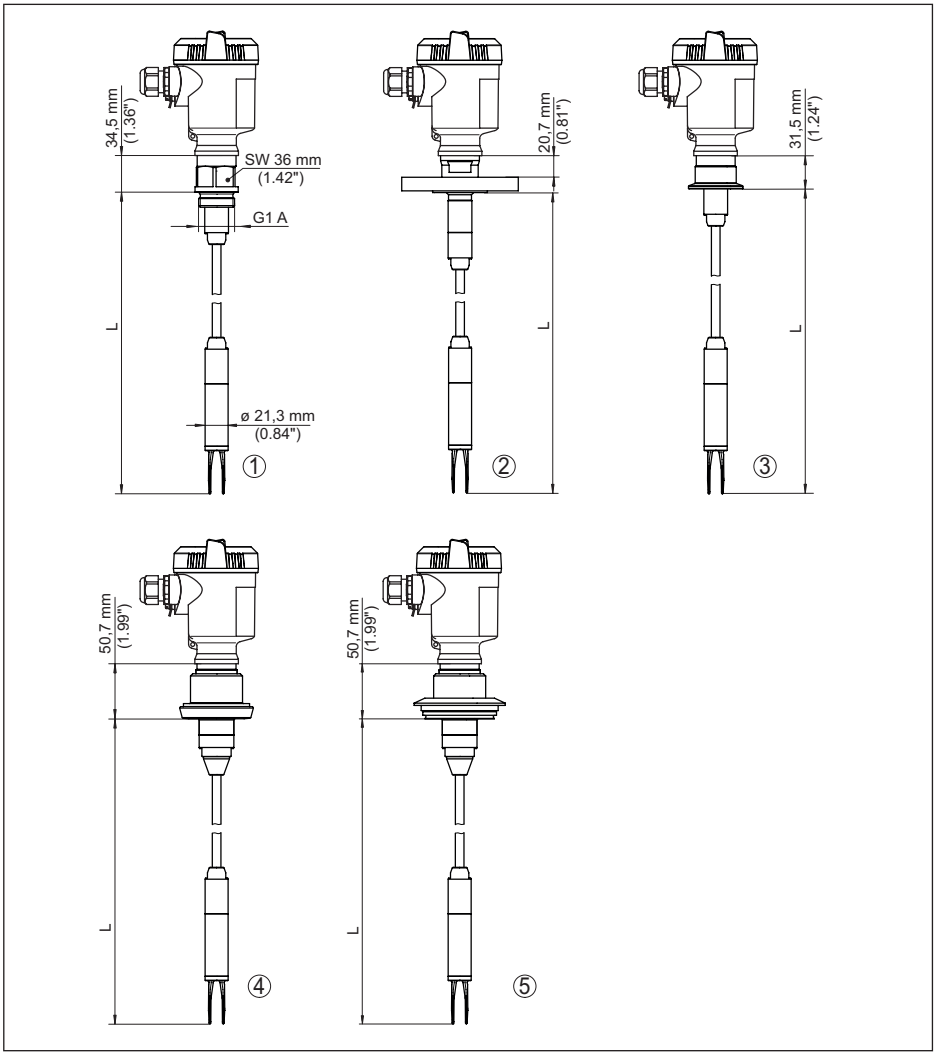

Fig. 29: VEGASWING X S, suspension cable version

1 Thread
2 Clamp
3 Cone DN 25
4 Slotted nut DN 40
5 Flange
6 Tuchenhagen Varivent
L Sensor length, see chapter "Technical data"
x 19 mm (0.75 in)
Flansch made of Alloy 400 (2.4360): 34,8 mm (13.7 in)

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VEGASWING X S, device version +280 °C

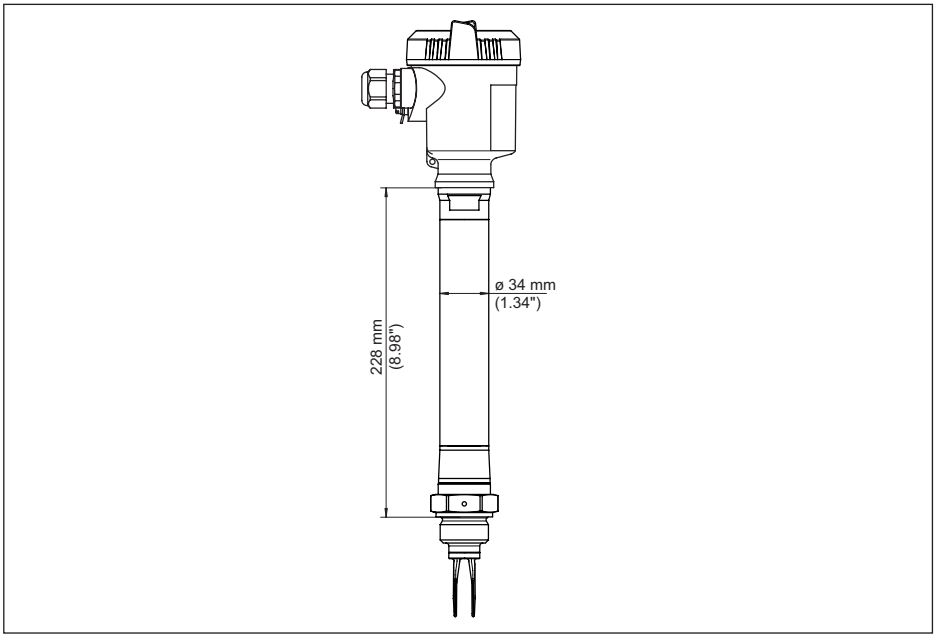

Fig. 30: VEGASWING X S, device version with temperature adapter up to +280 °C (+536 °F)

12.3 Industrial property rights

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12.4 Trademark

All the brands as well as trade and company names used are property of their lawful proprietor/ originator.

Printing date:

All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.
Subject to change without prior notice

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