



Product information

Vibrating

Level detection in bulk solids

VEGAVIB 61

VEGAVIB 62

VEGAVIB 63

VEGAWAVE 61

VEGAWAVE 62

VEGAWAVE 63



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Take note of safety instructions for Ex applications



Please note the Ex specific safety information that you can find at www.vega.com and that comes with each instrument. In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units. The sensors must only be operated on intrinsically safe circuits. The permissible electrical values are stated in the certificate.

1 Description of the measuring principle

Measuring principle

VEGAVIB and VEGAWAVE are point level sensors based on the vibration principle. VEGAVIB is equipped with a vibrating rod as sensor element, VEGAWAVE has a tuning fork.

Both are designed for industrial use in all areas of process technology and are deployed mainly in bulk solids.

The vibrating element (vibrating rod or tuning fork) is energized piezo-electrically and vibrates at its mechanical resonance frequency. The piezos are mechanically fixed and hence not subject to temperature shock limitations. When the vibrating element is immersed in the product, the vibration frequency changes. This change is detected by the integrated electronics module and converted into a switching command.

Typical applications are overflow and dry run protection systems. Due to the rugged vibration measuring system, the vibrating level switches remain virtually unaffected by chemical and physical properties of the bulk solid.

They also work when subjected to strong external vibrations or changing products.

Function monitoring

The electronics module continuously monitors the following criteria:

- Correct vibrating frequency
- Line break to the piezo drive

If one of the stated malfunctions is detected or in case of power failure, the electronics takes on a defined switching condition, e.g. the relay deenergises (safe state).

Solid detection in water

With instruments in the version for solid detection in water (option), the vibrating element is adjusted to the density of water. If submerged in water (density 1 g/cm³), the level switch signals "uncovered". Only if the vibrating element is also covered with solids (e.g. sand, sludge, etc.) will the sensor signal "covered".

VEGAVIB 61, 62, 63

Vibrating rod version

VEGAVIB series 60 level switches are available in standard, cable and tube versions and, thanks to the multitude of available process fittings, provide the ideal solution for any application. They are made completely of stainless steel, have all standard approvals and the vibrating rod can also be polished, e.g. for applications in the food processing industry.

VEGAVIB is virtually unaffected by product properties and thus does not have to be adjusted.

The level switches can be used in applications with process temperatures up to 250 °C (482 °F) and pressures of up to 16 bar (232 psig).

You can detect bulk solids from 0.02 g/cm³ (0.0007 lbs/in³).

VEGAVIB profits from its cylindrical design. No granules can stick to the rod sensor and the sensor must not be oriented when being mounted. The rod form can also be cleaned very easily.

VEGAVIB vibrating rods have smaller installation dimensions than the VEGAWAVE tuning fork; the process fittings of VEGAVIB are available in thread sizes from 1".

VEGAWAVE 61, 62, 63

Tuning fork version

VEGAWAVE series 60 level switches are available in standard, cable and tube version and, in combination with many different process fittings, provide a suitable instrument for any application. They are made completely of stainless steel and have all standard approvals.

VEGAWAVE is virtually unaffected by product properties and thus does not have to be adjusted.

The level switches can be used in applications with process temperatures up to 250 °C (482 °F) and pressures up to 25 bar (363 psig).

The tuning fork version is very rugged and insensitive to buildup. Yet VEGAWAVE can detect very light solids from 0.008 g/cm³ (0.0003 lbs/in³).

1.2 Application examples

Plastics processing

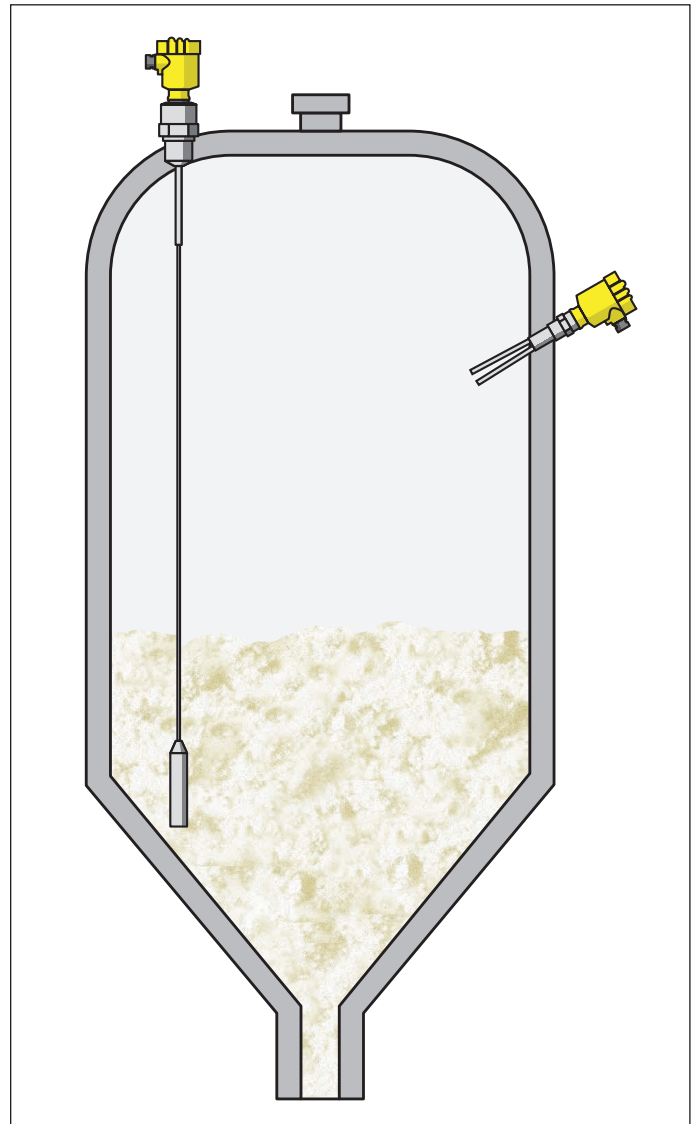


Fig. 1: Level detection in a silo storing plastic granules

A large number of finished products are produced in the chemical industry as powder, granules or pellets. Plastic granules and powder are often stored in high, narrow silos which are filled pneumatically.

Vibrating level switches like VEGAVIB/VEGAWAVE have proven their worth for level detection of plastics. Even with very low bulk solid densities, e.g. down to 20 g/l, and continuously changing products, the instruments always deliver accurate results.

Advantages:

- Tuning fork implementable down to a density < 20 g/l (e.g. aerosiles)
- Product-independent switching point
- Setup without filling

Building materials industry

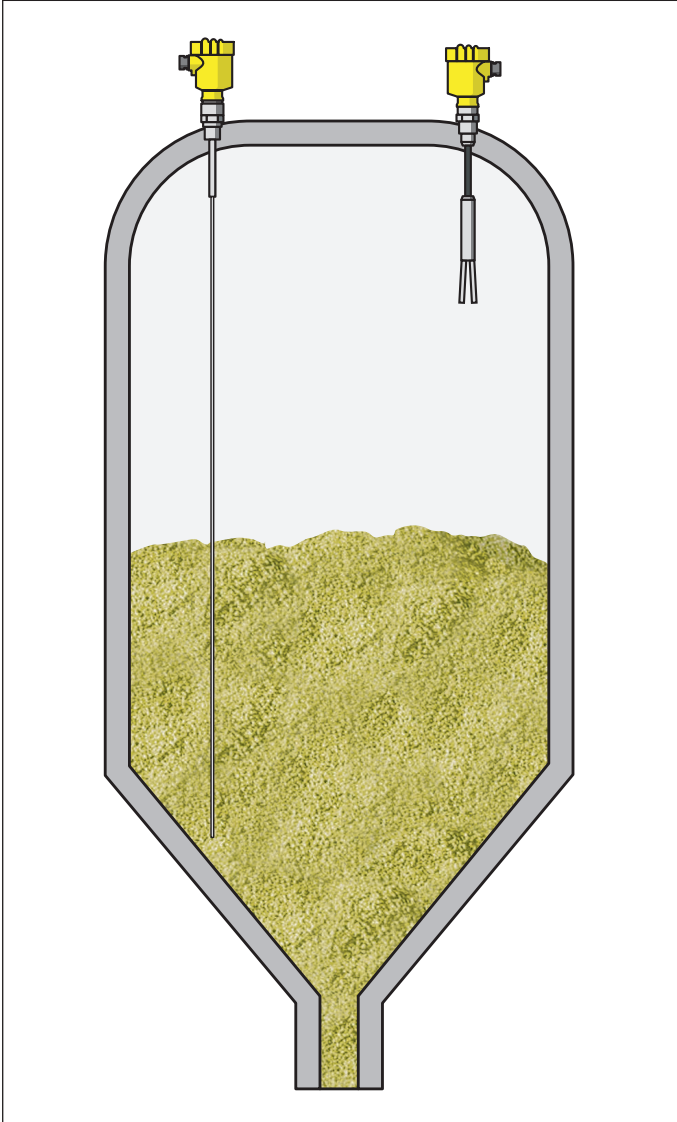


Fig. 2: Silo for aggregate in the building materials industry

Cement or aggregates are placed in interim storage in multiple chamber silos. When the chambers are filled, huge quantities of dust are generated. Depending on the consistency of the aggregate, different material cones are formed and the product properties can change from filling to filling.

VEGAVIB 62/VEGAWAVE 62 offer an additional protection against overfilling of silos with additives. The flexible suspension cable avoids mechanical load caused by movement of bulk solids. Filling is not necessary for setup. Since both instrument versions VEGAVIB/VEGAWAVE have virtually no moving parts, they are not subject to wear.

Advantages:

- Very rugged tuning fork
- High abrasion resistance
- Insensitive to buildup
- Setup without filling

2 Type overview

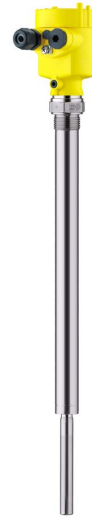
VEGAIB 61



VEGAIB 62



VEGAIB 63



Preferred applications	Bulk solids	Bulk solids	Bulk solids
Length	-	0.3 ... 80 m (0.984 ... 262.47 ft)	0.3 ... 4 m (0.984 ... 13.12 ft)
Process fitting	Thread G1, G1½, flanges	Thread G1, G1½, flanges	Thread G1, G1½, flanges
Process temperature	-50 ... +150 °C (-58 ... +302 °F)	-20 ... +80 °C (-4 ... +176 °F)	-50 ... +150 °C (-58 ... +302 °F)
Process temperature with temperature adapter	-50 ... +250 °C (-58 ... +482 °F)	-	-50 ... +250 °C (-58 ... +482 °F)
Process pressure	-1 ... 16 bar/-100 ... 1600 kPa (-14.5 ... 232 psig)	-1 ... 6 bar/-100 ... 600 kPa (-14.5 ... 87 psig)	-1 ... 16 bar/-100 ... 1600 kPa (-14.5 ... 232 psig)
Signal output	Relay, transistor, two-wire output, contactless electronic switch	Relay, transistor, two-wire output, contactless electronic switch	Relay, transistor, two-wire output, contactless electronic switch

VEGAWAVE 61



VEGAWAVE 62







VEGAWAVE 63






Preferred applications	Bulk solids	Bulk solids	Bulk solids
Length	-	0.3 ... 80 m (0.984 ... 262.47 ft)	0.3 ... 4 m (0.984 ... 13.12 ft)
Process fitting	Thread G1½, flanges	Thread G1½, flanges	Thread G1½, flanges
Process temperature	-50 ... +150 °C (-58 ... +302 °F)	-20 ... +80 °C (-4 ... +176 °F)	-50 ... +150 °C (-58 ... +302 °F)
Process temperature with temperature adapter	-50 ... +250 °C (-58 ... +482 °F)	-	-50 ... +250 °C (-58 ... +482 °F)
Process pressure	-1 ... 25 bar/-100 ... 2500 kPa (-14.5 ... 363 psig)	-1 ... 6 bar/-100 ... 600 kPa (-14.5 ... 87 psig)	-1 ... 25 bar/-100 ... 2500 kPa (-14.5 ... 363 psig)
Signal output	Relay, transistor, two-wire output, contactless electronic switch	Relay, transistor, two-wire output, contactless electronic switch	Relay, transistor, two-wire output, contactless electronic switch

3 Housing overview

Plastic PBT		
Protection rating	IP 66/IP 67	IP 66/IP 67
Version	Single chamber	Double chamber
Application area	Industrial environment	Industrial environment

Aluminium		
Protection rating	IP 66/IP 67, IP 66/IP 68 (1 bar)	IP 66/IP 67, IP 66/IP 68 (1 bar)
Version	Single chamber	Double chamber
Application area	Industrial environment with increased mechanical stress	Industrial environment with increased mechanical stress

Stainless steel 316L			
Protection rating	IP 66/IP 67	IP 66/IP 67, IP 66/IP 68 (1 bar)	IP 66/IP 67, IP 66/IP 68 (1 bar)
Version	Single chamber, electropolished	Single chamber, precision casting	Double chamber, precision casting
Application area	Aggressive environment, food processing, pharmaceutical	Aggressive environment, extreme mechanical stress	Aggressive environment, extreme mechanical stress

4 Mounting instructions

Switching point

In general, VEGAVIB/VEGAWAVE can be installed in any position. The instrument only has to be mounted in such a way that the vibrating element is at the height of the desired switching point.

The only exception is vertical mounting of the tuning fork from below. In this position there is the danger of solid particles getting stuck between the fork tines.

Mounting socket

The vibrating element should protrude into the vessel to avoid buildup. For that reason, avoid using mounting bosses for flanges and screwed fittings. This applies particularly to horizontal installation and use with adhesive products.

Filling opening

Install the instrument in such a way that the vibrating element does not protrude directly into the filling stream. Should such an installation location be necessary, mount a suitable baffle above or in front of the vibrating element, e.g. L80 x 8 DIN 1028 (see Fig. Part "a."). In abrasive solids, mounting according to fig. Part "b." has proven to be a good solution. The mound that forms in the concave baffle protects it from abrasion.

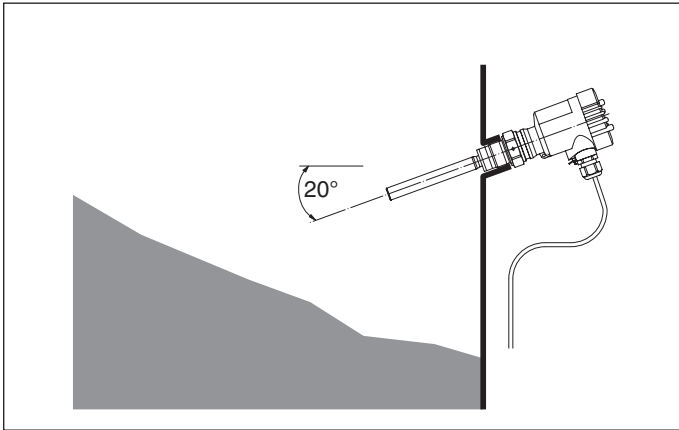


Fig. 16: Horizontal mounting

- a. Convex mounting
- b. Concave mounting

Inflowing medium

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

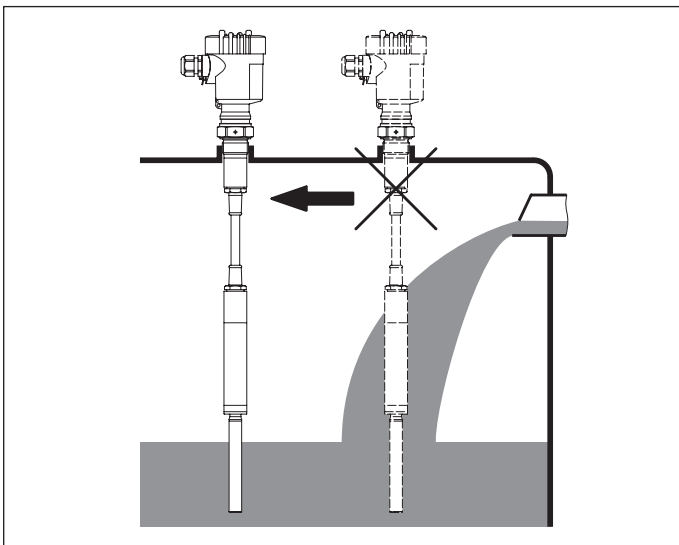


Fig. 17: Inflowing medium

Horizontal installation

To achieve a very precise switching point, you can install VEGAVIB/VEGAWAVE horizontally. However, if the switching point can have a tolerance of a few centimeters, we recommend mounting VEGAVIB/VEGAWAVE approx. 20° inclined to the vessel bottom to avoid buildup.

Orient the tuning fork of VEGAWAVE so that the product cannot remain lying on the fork surface. There is a mark on the thread hexagon for aligning the fork. Make sure that the mark points upward.

Material cone

In silos containing solids, material cones can form which change the switching point. Please keep this in mind when installing the sensor in the vessel. We recommend selecting an installation location where the vibrating element detects an average value of the material cone.

The vibrating element must be mounted in a way that takes the arrangement of the filling and emptying apertures into account.

To compensate measurement errors caused by the material cone in cylindrical vessels, the sensor must be mounted at a distance of $d/10$ from the vessel wall.

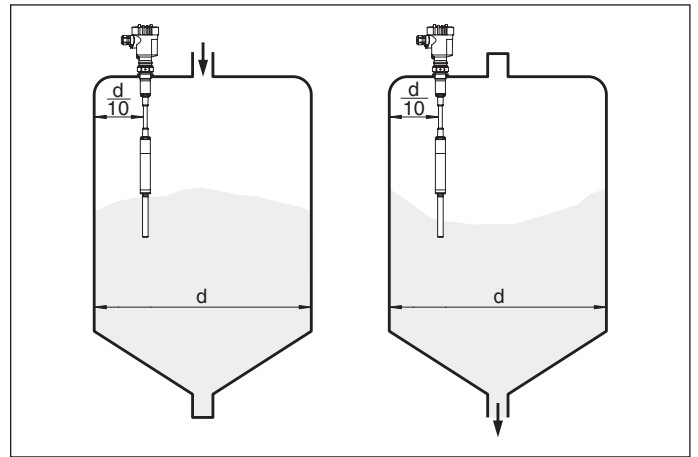


Fig. 18: Filling and emptying centred

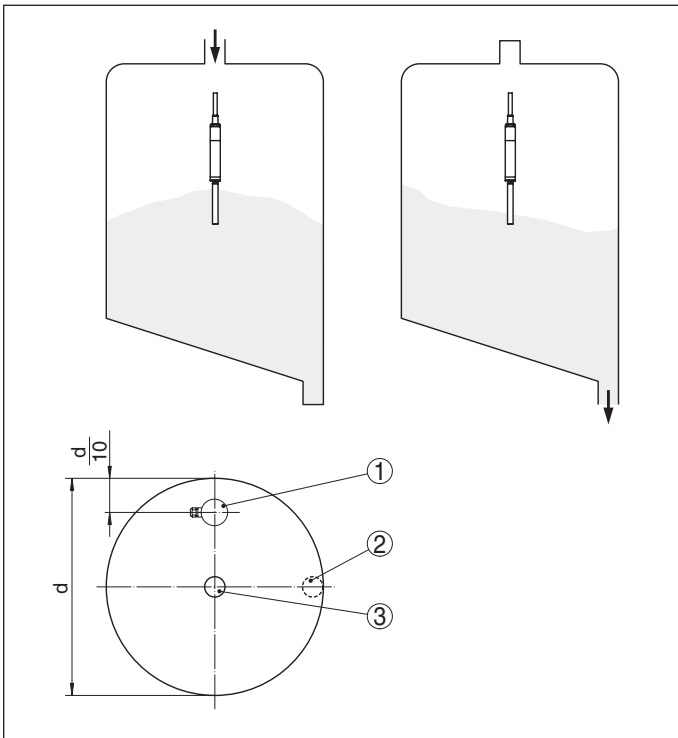


Fig. 19: Filling in the centre, emptying laterally

- 1 VEGAVIB/VEGAWAVE
- 2 Discharge opening
- 3 Filling opening

Tensile load

With cable version, make sure that the max. permissible tensile load on the suspension cable is not exceeded. The danger of this happening exists particularly with very heavy solids and large meas. lengths. The max. permissible load is stated in chapter "Technical data".

Agitators

Due to filling or extraction forces, vibrations or similar, the level switch can be subjected to strong lateral forces. For this reason, do not use an overly long extension tube for VEGAVIB/VEGAWAVE, but check if a VEGAVIB 61 or a VEGAWAVE 61 level switch couldn't be used instead, mounted on the side of the vessel in horizontal position.

Extreme vibration caused by the process or the equipment, e.g. by fluidization or beaters in the vessel, can cause the extension tube of VEGAVIB/VEGAWAVE 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 or guy directly above the vibrating element to secure the extension tube.



This measure applies mainly to applications in Ex areas. Make sure that the tube is not subject to bending stress due to this measure.

If an installation from above is necessary, check if you can use a cable version.

Over a longer period of time, strong vibration can damage the instrument electronics. You can decouple the electronics from the process by using a remote (displaced) housing.

Product flow

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

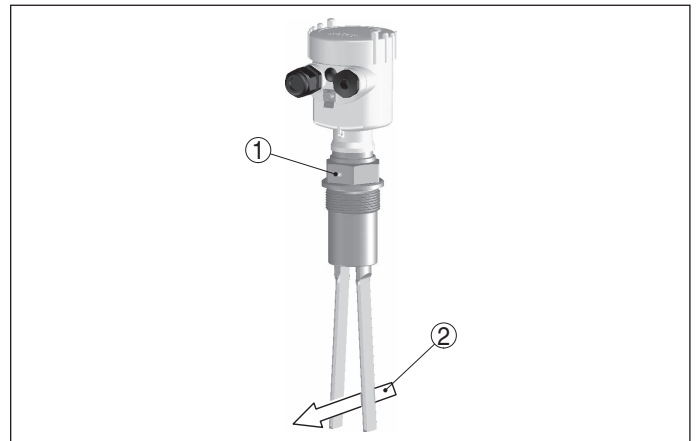


Fig. 20: Flow orientation of the tuning fork

- 1 Marking with screwed version
- 2 Direction of flow

Lock fitting

For height adjustment, VEGAVIB/VEGAWAVE in tube version can be mounted with a lock fitting. This lock fitting is available for applications in unpressurized areas or as a version for pressures up to 16 bar (232 psig).

Baffle protection against falling rocks

In applications such as grit chambers or settling basins for coarse sediments, the vibrating element must be protected against damage with a suitable baffle.

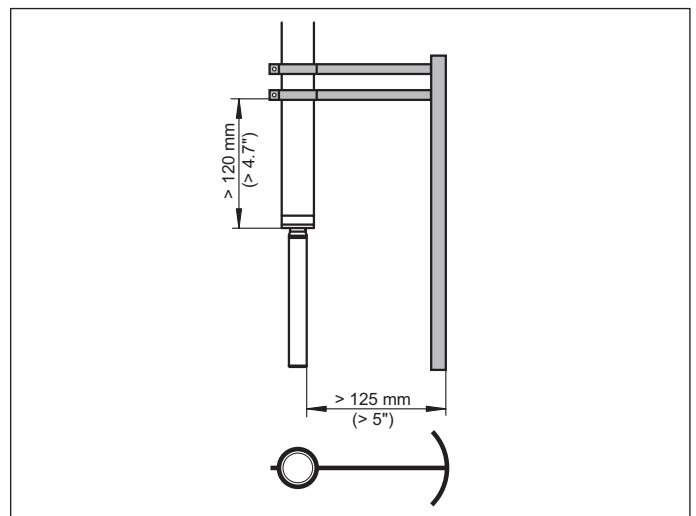


Fig. 21: Baffle for protection against mechanical damage

Pressure/Vacuum

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

Protective cover

To protect the sensor against pollution and strong heat due to the sun, you can snap a weather protective cover onto the sensor housing.

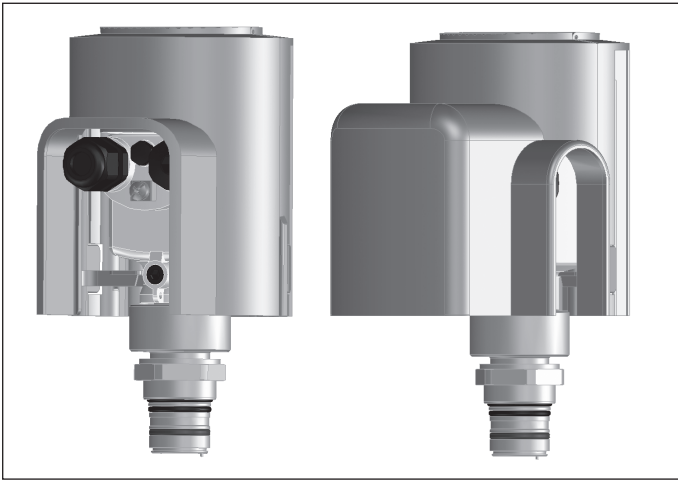


Fig. 22: Weather protection cover in different versions

5 Electrical connection

5.1 Preparing the connection

Note safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage

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.

Select power supply

Connect the operating voltage according to the following diagrams. Oscillators with relay output VB60R/WE60R and contactless electronic switch VB60C/WE60C are designed in protection class 1. To maintain this protection class, it is absolutely necessary that the ground conductor be connected to the internal ground terminal. Take note of the general installation regulations. As a rule, connect VEGAVIB/VEGAWAVE to vessel ground (PA), or in case of plastic vessels, to the next ground potential. On the side of the 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".

Select connection cable

The instrument is connected with standard cable with round cross section. An outer cable diameter of 5 ... 9 mm (0.2 ... 0.35 in) ensures the seal effect of the cable gland.

If cable with a different diameter or wire cross section is used, exchange the seal or use an appropriate cable connection.



In hazardous areas, use only approved cable connections for VEGAVIB/VEGAWAVE.

Select connection cable for Ex applications

Take note of the corresponding installation regulations for Ex applications.

5.2 Wiring plan

Relay output

We recommend connecting VEGAVIB/VEGAWAVE in such a way that the switching circuit is open when there is a level signal, line break or failure (safe state).

The relays are always shown in non-operative condition.

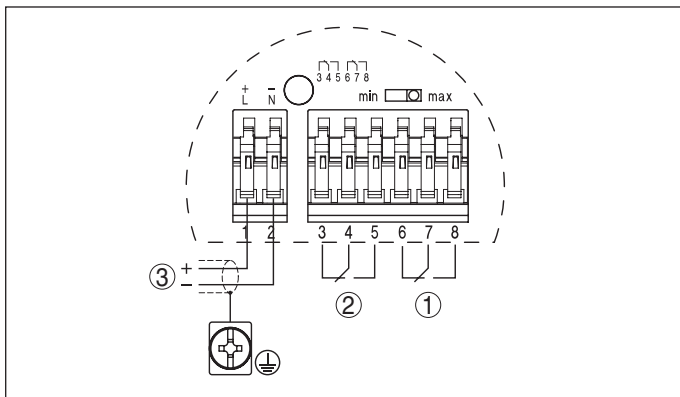


Fig. 23: Wiring plan, single chamber housing

- 1 Relay output
- 2 Relay output
- 3 Voltage supply

Transistor output

We recommend connecting VEGAVIB/VEGAWAVE in such a way that the

switching circuit is open when there is a level signal, line break or failure (safe state).

The instrument is used to control relays, contactors, magnet valves, warning lights, horns as well as PLC inputs.

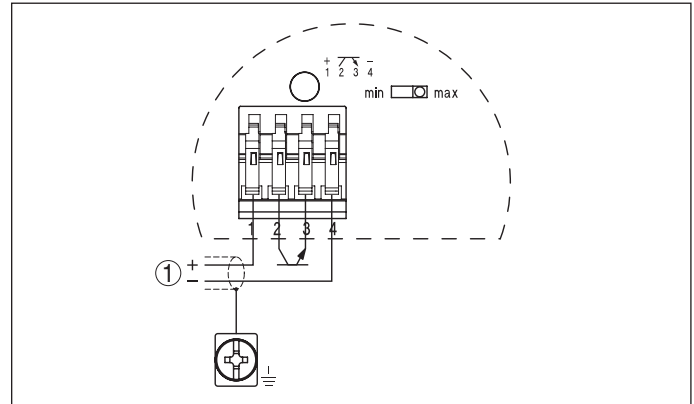


Fig. 24: Wiring plan, single chamber housing

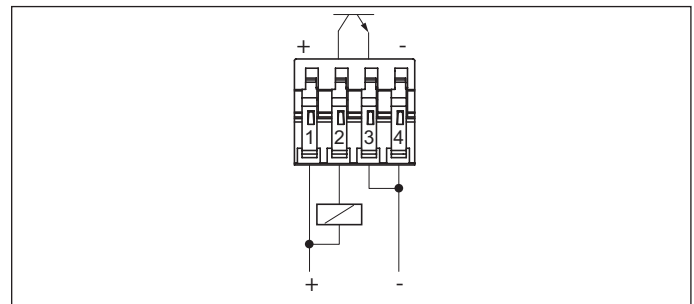


Fig. 25: NPN action

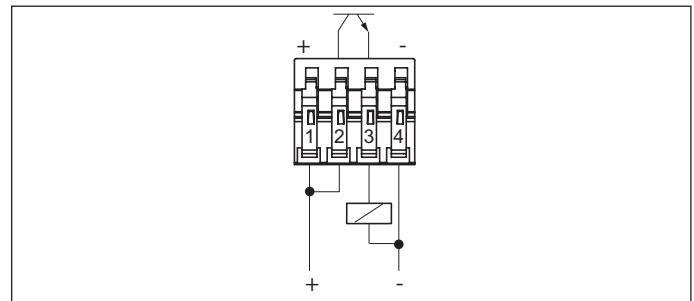


Fig. 26: PNP action

Contactless electronic switch

We recommend connecting VEGAVIB/VEGAWAVE in such a way that the switching circuit is open when there is a level signal, line break or failure (safe state).

The contactless electronic switch is always shown in non-operative condition.

The instrument is used for direct control of relays, contactors, magnet valves, warning lights, horns etc. It must not be operated without an intermediately connected load, because the electronics would be destroyed if connected directly to the mains. It is not suitable for connection to low voltage PLC inputs.

Domestic current is temporarily lowered below 1 mA after switching off the load so that contactors, whose holding current is lower than the constant domestic current of the electronics, are reliably switched off.

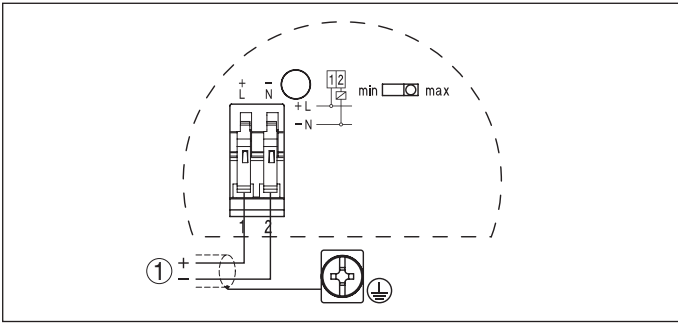


Fig. 27: Wiring plan, single chamber housing

1 Shielding

Two-wire output

We recommend connecting VEGAVIB/VEGAWAVE in such a way that the switching circuit is open when there is a level signal, line break or failure (safe state).

For connection to a VEGATOR signal conditioning instrument dto. Ex. The sensor is powered by the connected VEGATOR signal conditioning instrument. Further information is available in chapter "Technical data", "Ex-technical data" are available in the supplied "Safety information manual".

The wiring example is applicable for all suitable signal conditioning instruments.

Take note of the operating instructions manual of the signal conditioning instrument. Suitable signal conditioning instruments are listed in chapter "Technical data".

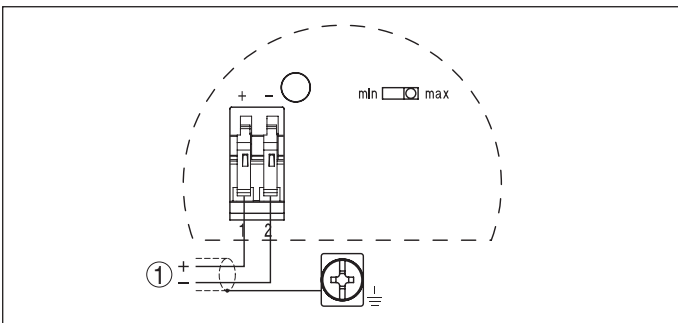


Fig. 28: Wiring plan, single chamber housing

1 Voltage supply

NAMUR output

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

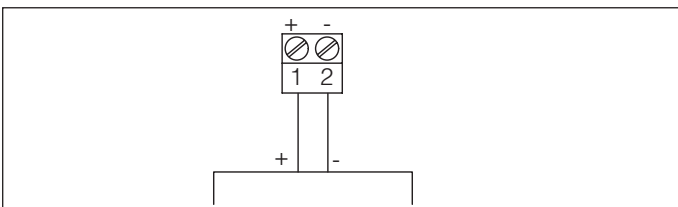


Fig. 29: Wiring plan, single chamber housing

6 Adjustment

6.1 Adjustment, general

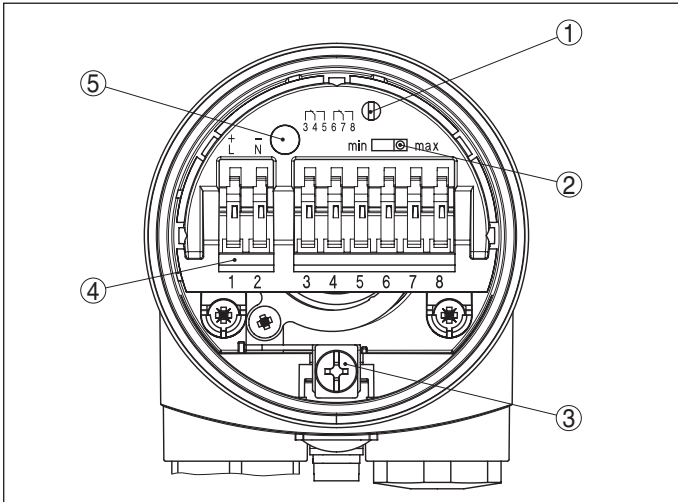


Fig. 30: Adjustment elements electronics module e.g. relay output (VB60R or WE60R)

- 1 Potentiometer for switching point adaptation
- 2 DIL switch for mode adjustment
- 3 Ground terminal
- 4 Connection terminals
- 5 LED display

Switching point adaptation (1)

VEGAVIB

With the potentiometer you can adapt the switching point of VEGAVIB to the solid. It is already preset and must only be modified in special cases.

By default, the potentiometer is set to the right stop (0.05 ... 1 g/cm³/0.002 ... 0.036 lbs/in³). In very light solids, turn the potentiometer to the left stop (0.02 ... 0.1 g/cm³/0.0007 ... 0.0036 lbs/in³). This makes VEGAVIB more sensitive and allows it to detect light solids more reliably.

For very heavy solids leave the potentiometer in right position (> 0.3 g/cm³/0.011 lbs/in³). Hence, VEGAVIB is less sensitive and can shake off heavy solids by strong vibrations.

These values do not apply for instruments detecting solids in water. In such cases, the potentiometer is preset to complete right position and should not be changed.

VEGAWAVE

The VEGAWAVEs with tuning fork are preset to a product density of > 0.02 g/cm³ (0.0007 lbs/in³). In very light solids, turn the potentiometer to complete left position 0.008 ... 0.1 g/cm³ (0.0003 ... 0.0036 lbs/in³). By doing this, the tuning fork will be more sensitive and can detect very light solids, such as e. g. Aerosils more reliably.

Mode adjustment (2)

With the mode adjustment (min./max.) you can change the switching condition of the output. You can set the required mode (max. - max. detection or overflow protection, min. - min. detection or dry run protection).

LED display (5)

Light-emitting diode for indication of the switching status.

Simulation key (only with NAMUR and two-wire electronics)

The simulation key of the NAMUR electronics is lowered on the upper side of the electronics module. On the two-wire electronics, the simulation key is located on the signal conditioning instrument. 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.

6.2 Recurring function test - NAMUR electronics

According to IEC 61508.

SIL

VEGAVIB/VEGAWAVE is qualified in mode A (overflow protection) for use in measuring chains of stage SIL2 according to IEC 61508 (redundant, stage SIL3).

You find the "Safety Manual" with detailed specification on SIL on our website.

Recurring function test

The recurring test according to IEC 61508 can be carried out by pushing the simulation key on the electronics module or by briefly (> 2 seconds) interrupting the supply to the sensor. The correct sequence of the switching conditions must be monitored via the switching amplifier as well as the connected systems. The sensor must neither be removed nor a response triggered by filling the vessel.

You can carry out the function test with the outputted current values also directly via a safety PLC or a process control system.

Simulation key on the electronics module

VEGAVIB/VEGAWAVE has an integrated simulation key. The simulation key is lowered on the electronics module. Push the simulation key for > 2 seconds.

If VEGAVIB/VEGAWAVE is connected to an SPLC, you have to interrupt the connection cable to the sensor for > 2 seconds.

After releasing the simulation key or briefly interrupting the connection cable to the sensor, you can check the complete measuring system on correct function. A switching procedure is simulated during the test.

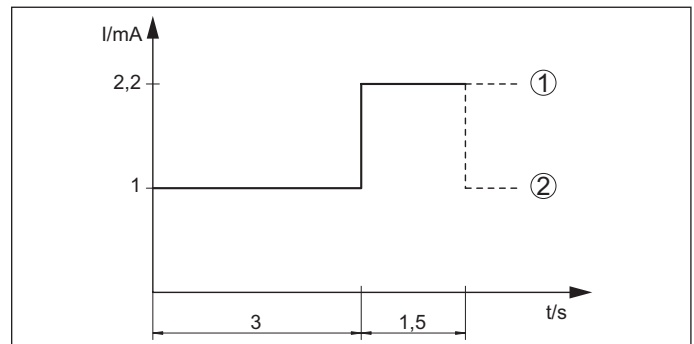


Fig. 31: Flow chart of the function test - NAMUR electronics

- 1 Full signal
- 2 Empty signal

Check if all the switching conditions occur in the correct sequence and the stated time period. If this is not the case, there is a fault in the measuring system. Keep in mind that connected instruments are activated during the function system. This allows you to check the correct function of the measuring system.

6.3 Recurring function test - Two-wire electronics

According to IEC 61508.

SIL

VEGAVIB/VEGAWAVE in conjunction with a suitable signal conditioning instrument is qualified in mode A (overflow protection) for use in measuring chains of level SIL2 according to IEC 61508 (redundant, level SIL3).

You find the "Safety Manual" with detailed specification on SIL on our website.

Recurring function test

The recurring test according to IEC 61508 can be carried out by pushing the test key on the signal conditioning instrument or by briefly (> 2 sec-

onds) interrupting the supply to the sensor. The correct sequence of the switching conditions must be monitored via the two LEDs on the signal conditioning instrument as well as the connected systems. The sensor must neither be removed nor a response triggered by filling the vessel.

You can carry out the function test with the outputted current values also directly via a safety PLC or a process control system.

The implementation and switching sequence of the function test is described also in the operating instructions manual of the appropriate signal conditioning instrument.

Test key on the signal conditioning instrument

The signal conditioning instrument has an integrated test key. The test key is lowered in the front plate of the signal conditioning instrument. Push the test key with a suitable object (e.g. screwdriver, pen etc.) for > 2 seconds.

If VEGAVIB/VEGAWAVE is connected to an SPLC, you have to interrupt the connection cable to the sensor for > 2 seconds.

After releasing the test key or interrupting the connection cable to the sensor, the complete measuring system can be checked on correct function. The following operating conditions are simulated during the test:

- Fault message
- Empty signal
- Full signal

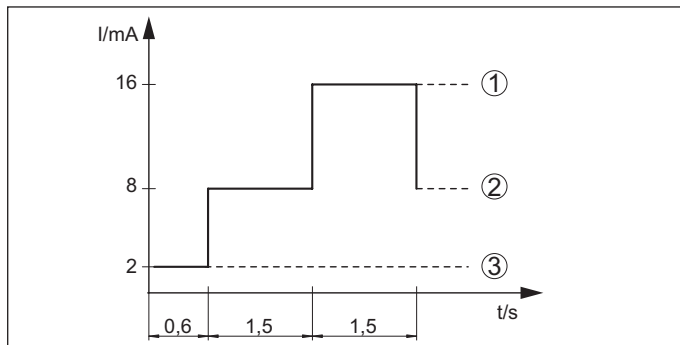


Fig. 32: Flow chart of the function test - two-wire electronics

- 1 Full signal
- 2 Empty signal

Check if all the switching conditions occur in the correct sequence and the stated time period. If this is not the case, there is a fault in the measuring system. Keep in mind that connected instruments are activated during the function test. This allows you to check the correct function of the measuring system.

7 Dimensions

Housing

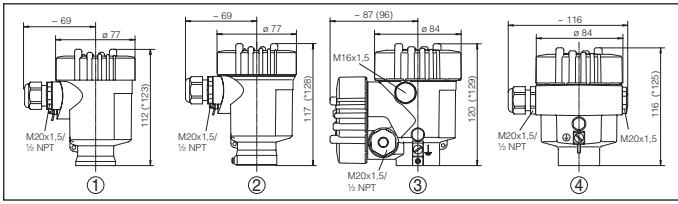


Fig. 33: Housing versions

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

VEGAVIB 61

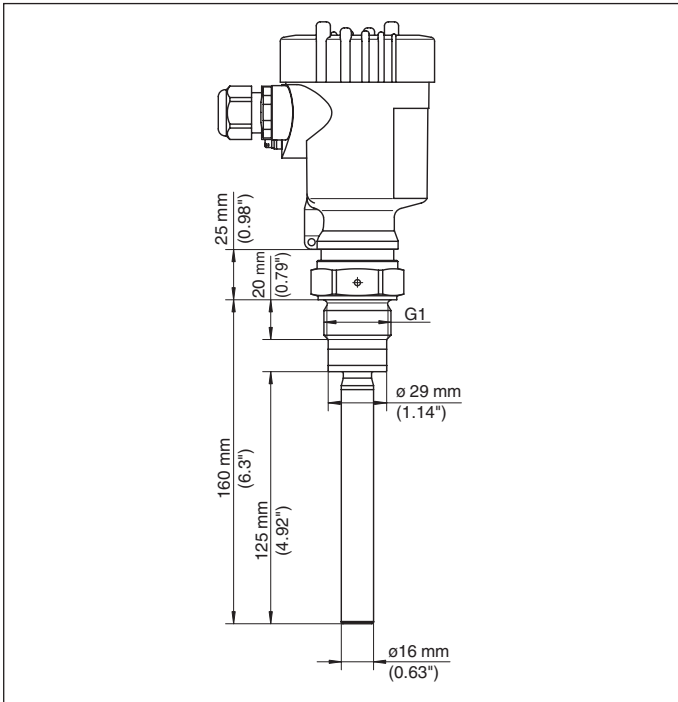


Fig. 34: VEGAVIB 61 - threaded version G1

VEGAVIB 61

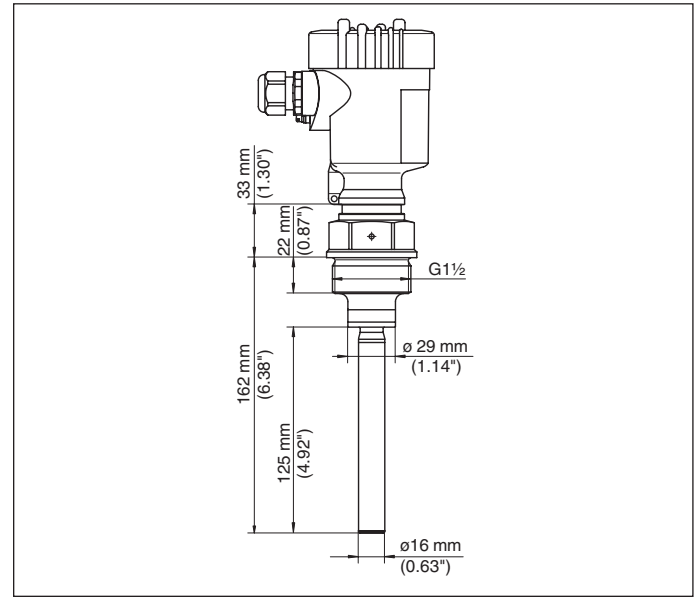


Fig. 35: VEGAVIB 61 - threaded version G1½

VEGAVIB 62

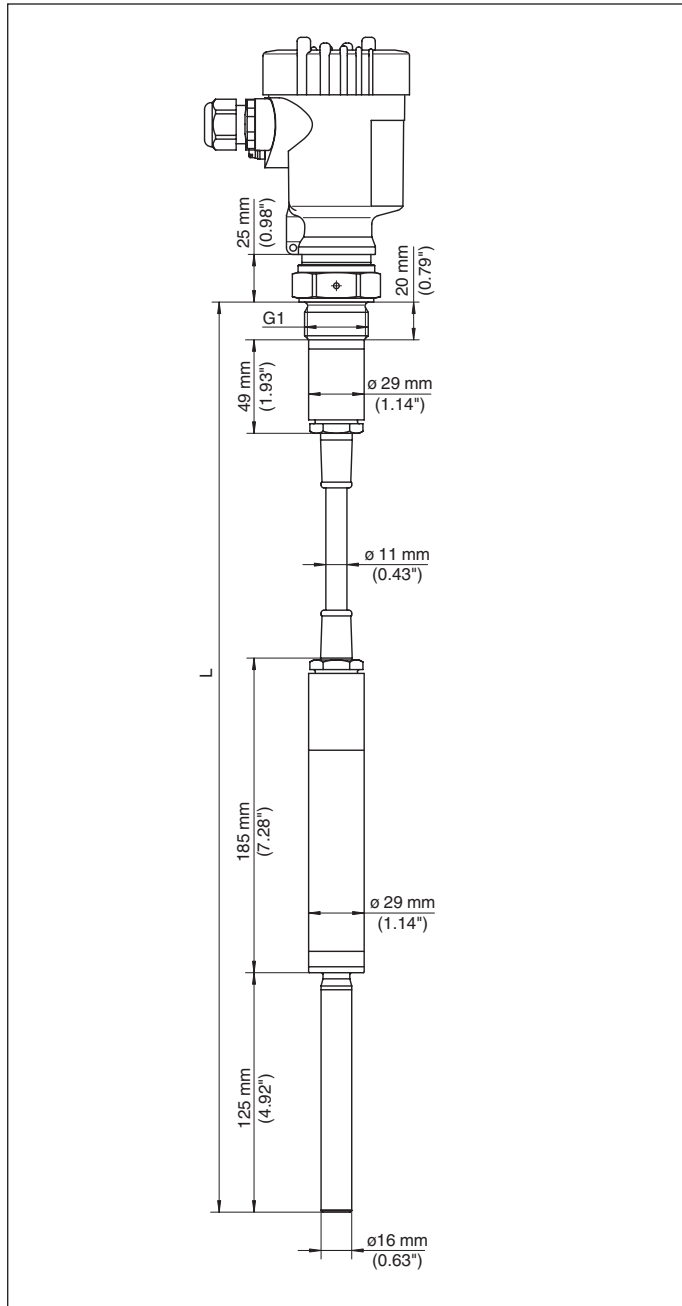


Fig. 36: VEGAVIB 62 - threaded version G1

VEGAVIB 62

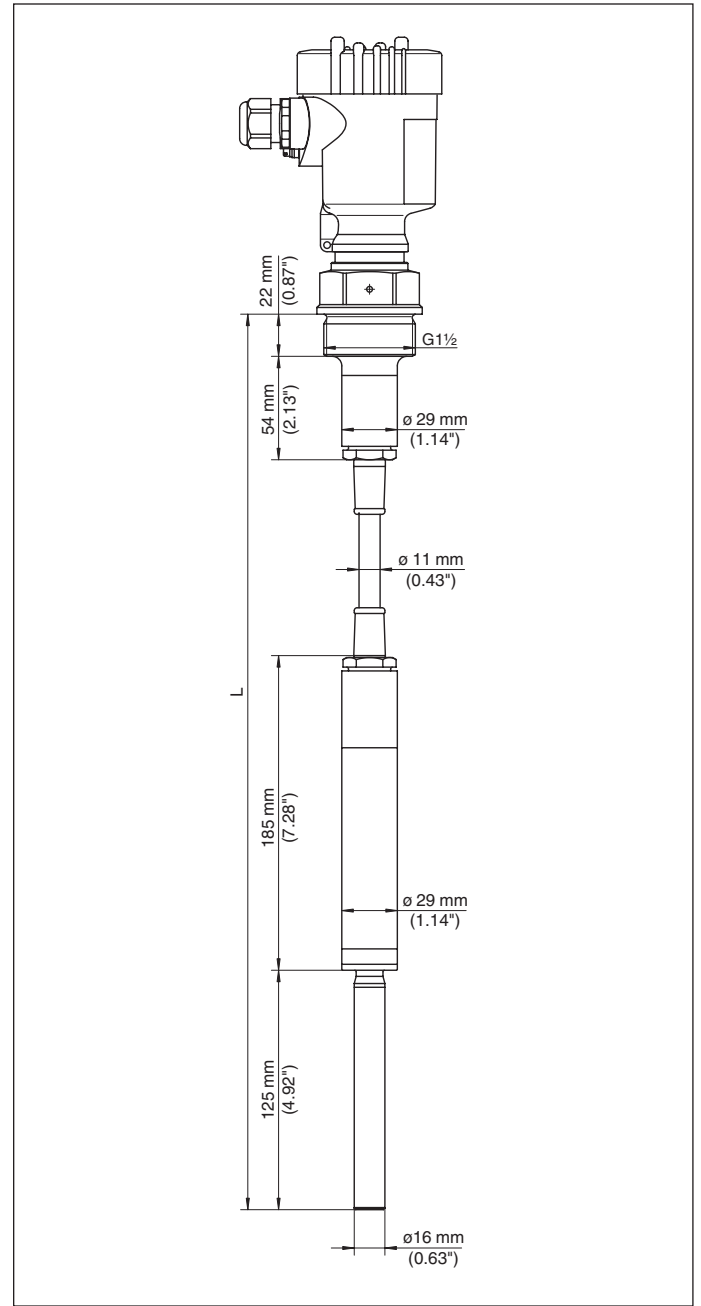


Fig. 37: VEGAVIB 62 - threaded version G1½

VEGAVIB 63

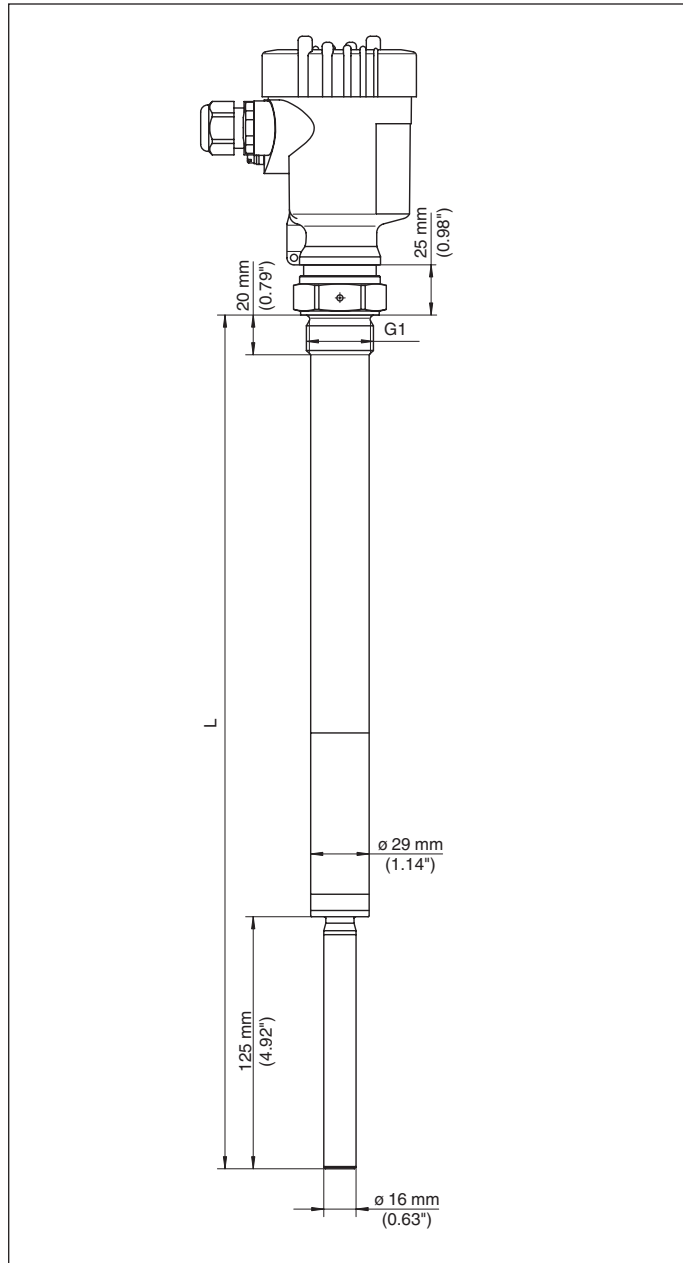


Fig. 38: VEGAVIB 63 - threaded version G1

VEGAVIB 63

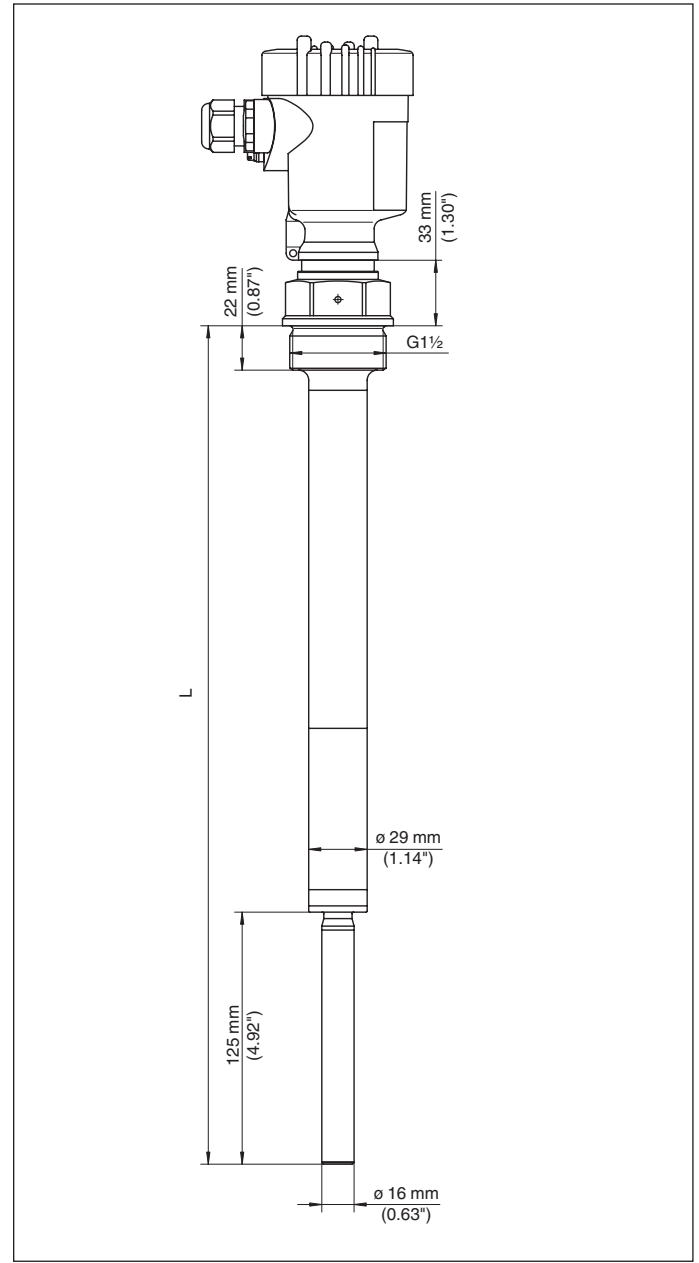


Fig. 39: VEGAVIB 63 - threaded version G1½

VEGAWAVE 61

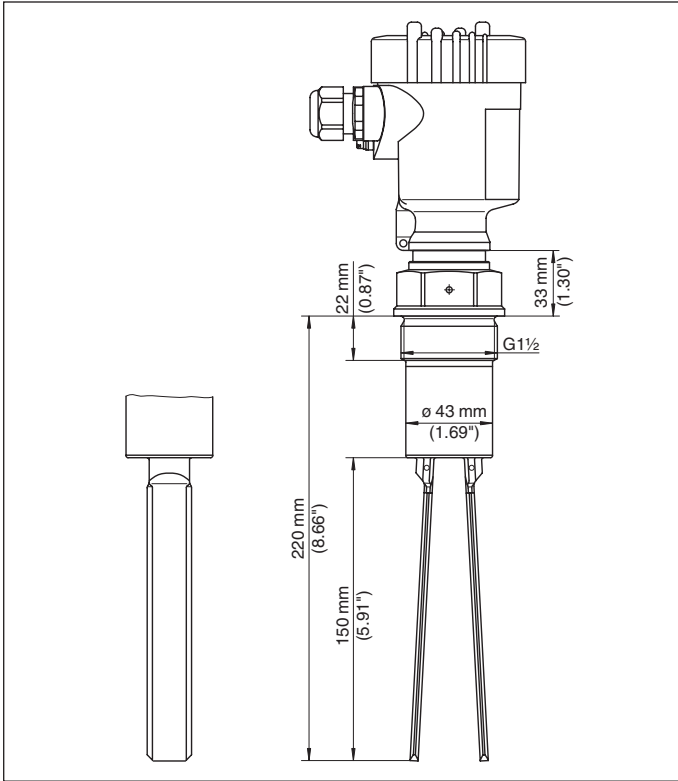


Fig. 40: VEGAWAVE 61 - threaded version G1½

VEGAWAVE 62

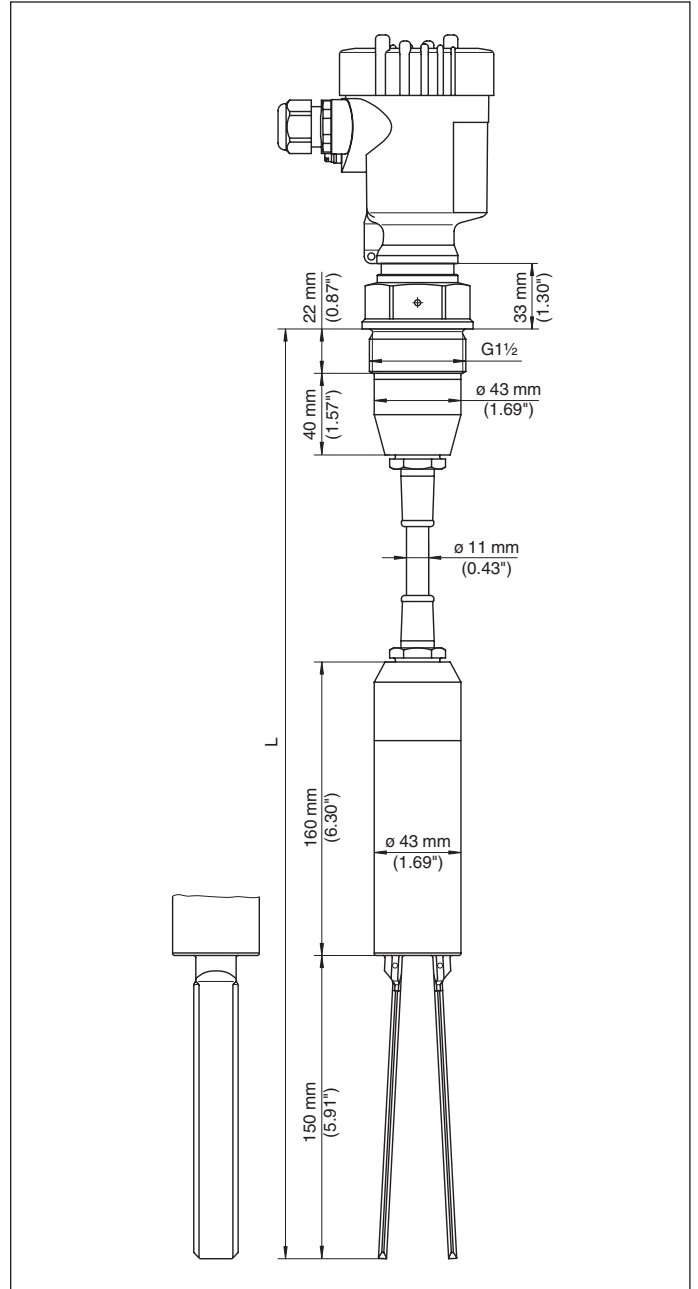


Fig. 41: VEGAWAVE 62 - threaded version G1½

VEGAWAVE 63

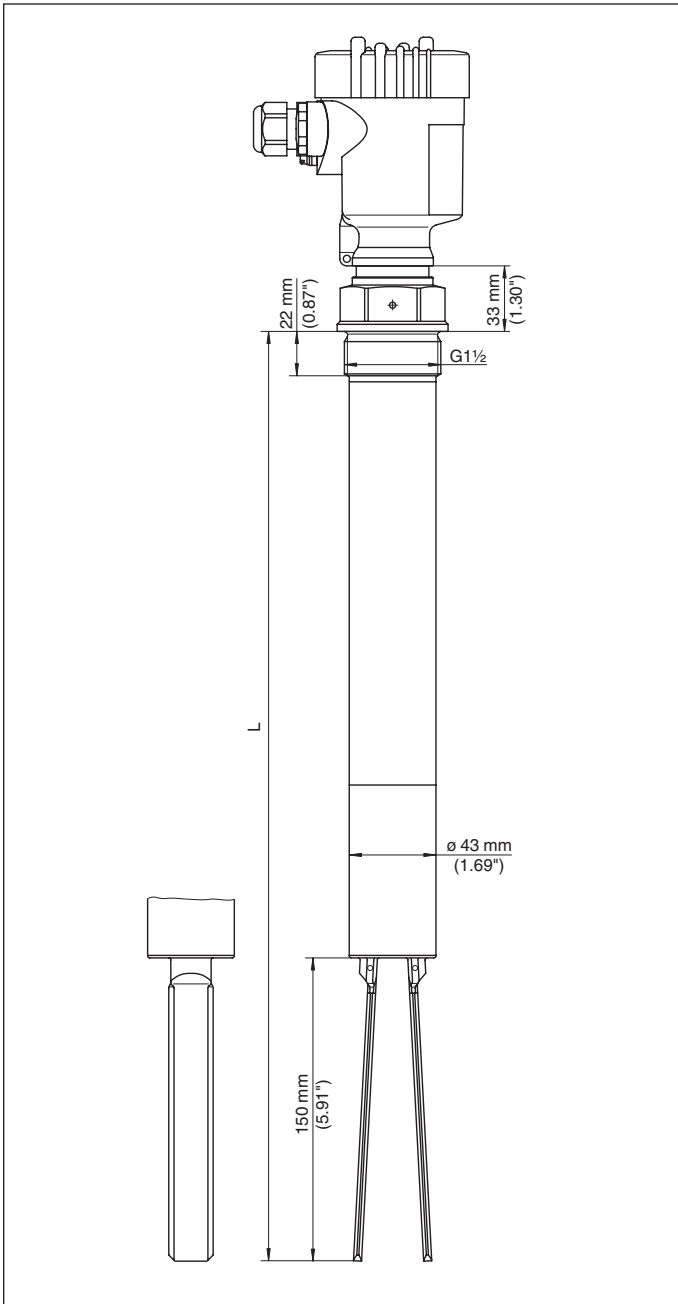


Fig. 42: VEGAWAVE 63 - threaded version G1½

Temperature adapter

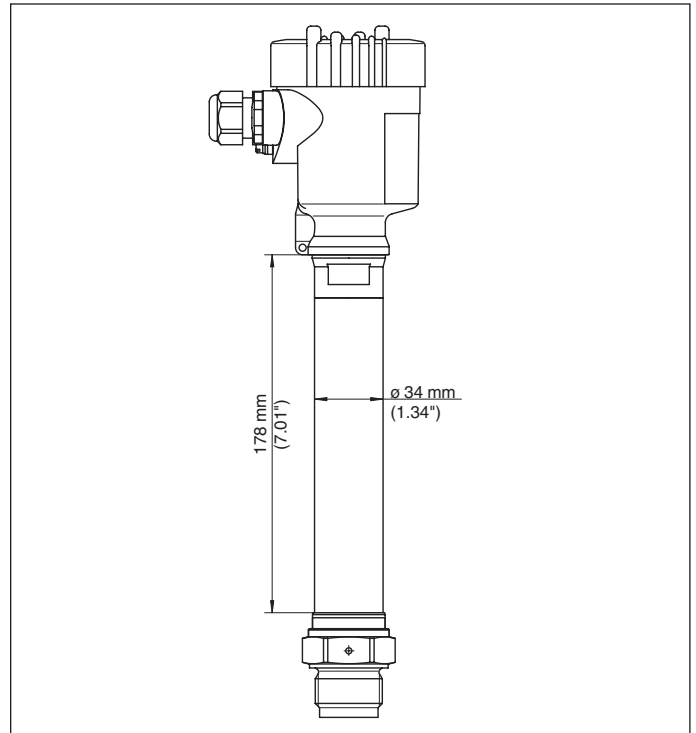


Fig. 43: Temperature adapter (only for VEGAVIB 61, 63 and VEGAWAVE 61, 63)



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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