

# Operating Instructions

Capacitive cable electrode for level detection

## VEGACAP 35

Relay (DPDT)



Document ID: 33759



# VEGA

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# 1 About this document

## 1.1 Function

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

## 1.2 Target group

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

## 1.3 Symbols used



### Document ID

This symbol on the front page of this instruction refers to the Document ID. By entering the Document ID on [www.vega.com](http://www.vega.com) you will reach the document download.



### Information, tip, note

This symbol indicates helpful additional information.



**Caution:** If this warning is ignored, faults or malfunctions can result.



**Warning:** If this warning is ignored, injury to persons and/or serious damage to the instrument can result.



**Danger:** If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.



### Ex applications

This symbol indicates special instructions for Ex applications.



### SIL applications

This symbol indicates instructions for functional safety which must be taken into account particularly for safety-relevant applications.



### List

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



### Action

This arrow indicates a single action.



### Sequence of actions

Numbers set in front indicate successive steps in a procedure.



### Battery disposal

This symbol indicates special information about the disposal of batteries and accumulators.

## 2 For your safety

### 2.1 Authorised personnel

All operations described in this documentation must be carried out only by trained, qualified personnel authorised by the plant operator.

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

### 2.2 Appropriate use

The VEGACAP 35 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.

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 the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

### 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 operator 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 operator 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 by the user.

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 the manufacturer. Arbitrary conversions or modifications are explicitly forbidden. For safety reasons, only the accessory specified by the manufacturer must be used.

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

## 2.5 EU conformity

The device fulfils the legal requirements of the applicable EU directives. By affixing the CE marking, we confirm successful testing of the product.

You can find the CE Certificate of Conformity in the download section under "[www.vega.com](http://www.vega.com)".

## 2.6 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 (ANSI/NFPA 70).

Installations in Canada shall comply with the relevant requirements of the Canadian Electrical Code.

## 2.7 Safety instructions for Ex areas

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

## 2.8 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfil this obligation by observing the environmental instructions in this manual:

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

## 3 Product description

### 3.1 Configuration

#### Scope of delivery

The scope of delivery encompasses:

- VEGACAP 35 point level switch

The further scope of delivery encompasses:

- Documentation
  - Operating instructions VEGACAP 35
  - If necessary, further certificates



#### Information:

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

#### Constituent parts

The VEGACAP 35 consists of the components:

- Process fitting with probe
- Housing with electronics
- Housing lid

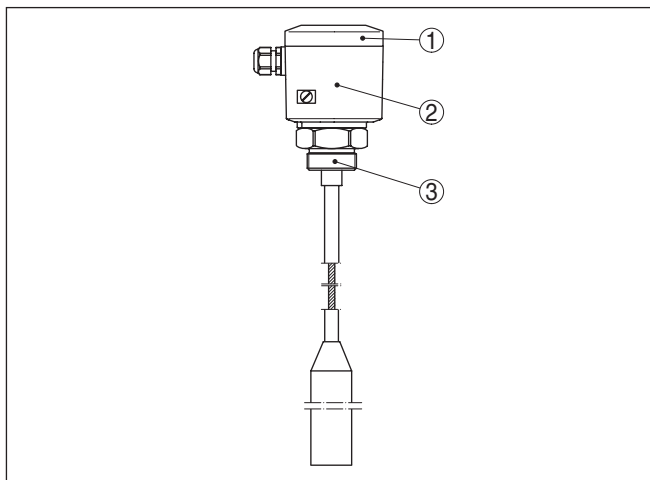


Fig. 1: VEGACAP 35

- 1 Housing lid
- 2 Housing with electronics
- 3 Process fitting
- 4 Gravity weight

#### Type label

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

- Article number
- Serial number
- Technical data

- Article numbers, documentation

With the serial number, you can access the delivery data of the instrument via "[www.vega.com](http://www.vega.com)", "Search". You can find the serial number on the inside of the instrument as well as on the type label on the outside.

## 3.2 Principle of operation

### Application area

VEGACAP 35 is an adjustment-free, capacitive point level sensor for bulk solids.

Typical applications are overfill and dry run protection.

The probe works in liquids from a dielectric constant of 1.5.

### Functional principle

Probe, measured product and vessel wall form an electrical capacitor. The capacitance is influenced by three main factors.

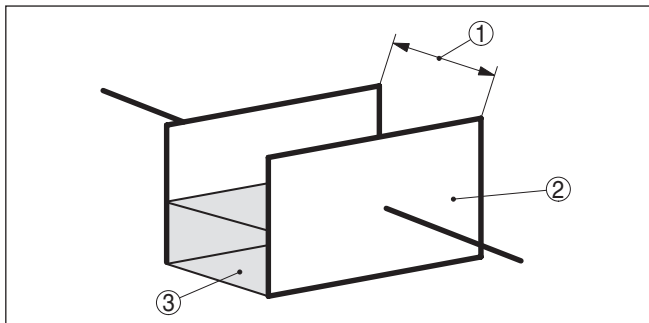


Fig. 2: Functional principle - Plate capacitor

- 1 Distance between the electrode surfaces
- 2 Size of the electrode surfaces
- 3 Type of dielectric between the electrodes

The probe and the vessel wall are the capacitor plates. The measured product is the dielectric. Due to the higher dielectric constant of the product compared to air, the capacitance increases as the probe is gradually covered.

The capacitance change is converted by the electronics module into a switching command.

### Voltage supply

VEGACAP 35 is a compact instrument, i.e. it can be operated without external evaluation system. The integrated electronics evaluates the level signal and outputs a switching signal. With this switching signal, a connected device can be operated directly (e.g. a warning system, a pump etc.).

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

## 3.3 Adjustment

The probe can be adapted to the dielectric constant of the product directly on the electronics module.

A switching command can be triggered when the probe is covered or laid bare.

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

- Control lamp for indication of the switching status
- Potentiometer for switching point adaptation (covered)
- DIL switch for mode adjustment

### 3.4 Packaging, transport and storage

#### Packaging

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

The packaging of standard instruments consists of environment-friendly, recyclable 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 " *Supplement - Technical data - Ambient conditions* "
- Relative humidity 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.



## 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

#### Suitability for the ambient conditions

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

#### Switching point

In general, VEGACAP 35 must be mounted vertically. The instrument must be mounted in such a way that the probe is at the height of the requested switching point.

#### Welding work

Before beginning the welding work, remove the electronics module from the sensor. By doing this, you avoid damage to the electronics through inductive coupling.

Ground the probe before welding directly on the rod or cable.

#### Handling

With threaded versions, the housing must not be used to screw in the instrument! Applying tightening forces on the housing can damage its internal parts.

Use the hexagon for screwing in.

#### Moisture

Use the recommended cables (see chapter " *Connecting to power supply*") and tighten the cable gland.

You can give your instrument additional protection against moisture penetration by leading the connection cable downward in front of the cable gland. Rain and condensation water can thus drain off. This applies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.

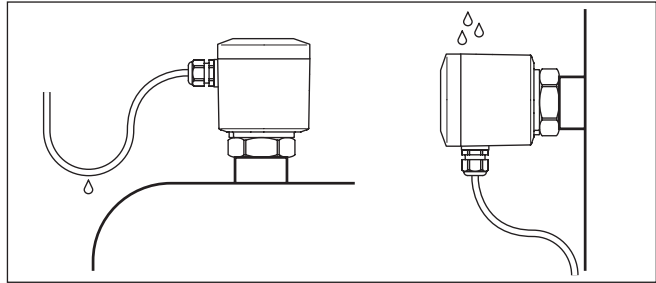


Fig. 3: Measures against moisture ingress

### 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.

### Cable entries - NPT thread 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.

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

### Agitators and fluidization

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 electrode for VEGACAP 35, but check if you can mount a short level switch on the side of the vessel in horizontal position.

### Inflowing medium

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

This applies particularly to instrument versions with a longer probe.

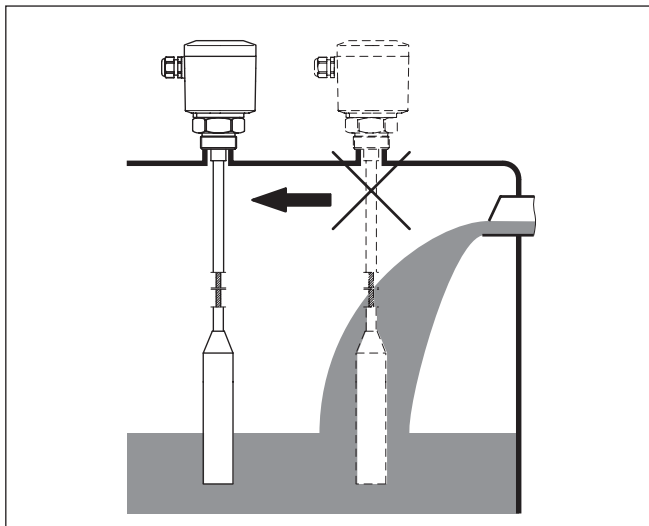


Fig. 4: Inflowing medium

#### Mounting socket

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

#### Material cone

In silos with bulk 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 probe detects the average value of the material cone.

The probe 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  $d/6$  from the vessel wall.

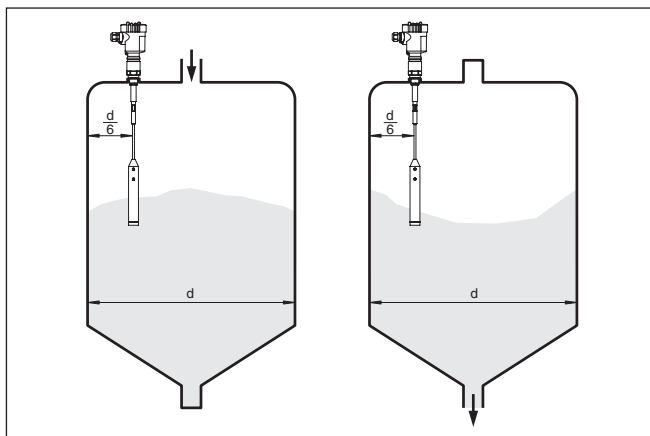


Fig. 5: Filling and emptying centred

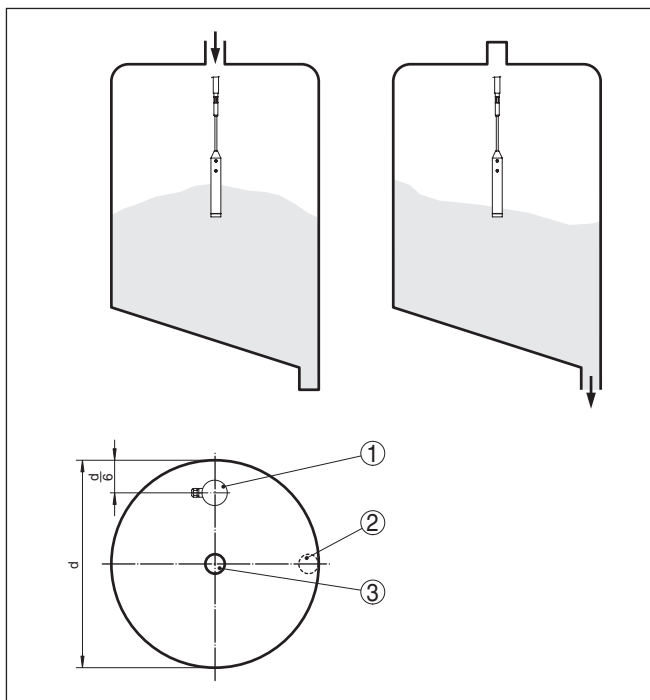


Fig. 6: Filling in the centre, emptying laterally

- 1 VEGACAP 35
- 2 Discharge opening
- 3 Filling opening

**Tensile load**

Make sure that the max. permissible tensile load of 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*".

## 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.

#### Voltage supply

Connect the voltage supply according to the following connection diagrams. The electronics module CAP E31R is designed in protection class I. To maintain this protection class, it is absolutely necessary that the ground conductor be connected to the internal ground terminal. Take note of the general installation regulations.

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

#### Connection cable

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

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

Use cable with round cross-section. 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.



#### Note:

When placing the housing cover, make sure that the inspection glass is above the signal lamp of the electronics module.

### 5.2 Wiring plan, single chamber housing

#### Wiring plan

We recommend connecting VEGACAP 35 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.

The two relays (DPDT) work synchronously. Hence it is possible to control also e.g. a horn and a magnet valve.

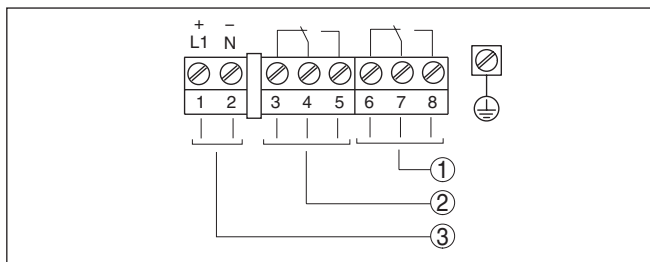


Fig. 7: Wiring plan

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

### Connection to a PLC

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

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

## 6 Setup

### 6.1 General information

The figures in brackets refer to the following illustrations.

#### Function/Configuration

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

- Potentiometer for switching point adaptation
- DIL switch for mode adjustment - A/B
- Control lamp



#### Note:

As a rule, always set the mode with the mode switch (5) before starting setup VEGACAP 35. The switching output will change if you set the mode switch (5) afterwards. This could possibly trigger other connected instruments or devices.

### 6.2 Adjustment elements

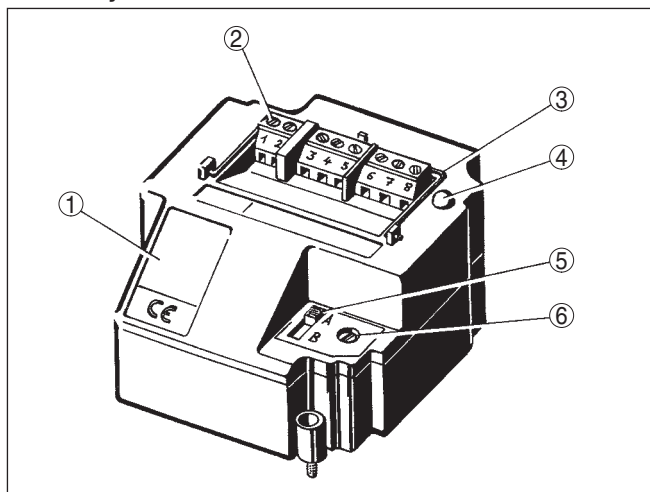


Fig. 8: Oscillator with relay output

- 1 Type label
- 2 Connection terminals
- 3 Tensile proving ring
- 4 Control lamp
- 5 DIL switch for mode adjustment
- 6 Potentiometer for switching point adaptation

The switching status of the electronics can be checked with closed housing (only plastic housing), see "Function table".



#### Note:

When placing the housing cover, make sure that the inspection glass is above the signal lamp (LED) of the electronics module.



To adjust VEGACAP 35, loosen first of all the four screws on the upper side of the instrument with a screwdriver and remove the housing cover.

### Switching point adaptation (6)

You can adapt the switching point to the solid with the potentiometer. The electronics is adjustment free and an adaption is only necessary in exceptions. See "*Exceptions*".

### Mode adjustment (5)

With the mode switch you can change the switching condition of the relay. You can set the required mode (A - max. detection or overflow protection, B - min. detection or dry run protection).

We recommend connecting according to the idle current principle (relay contact deenergizes when the switching point is reached), because the relay always takes on the same (safe) state if a failure is detected or in case of mains failure.

### Signal lamp (4)

Control lamp for indication of the switching status.

- Control lamp on = Relay deenergised

### Switching point adjustment

The measuring system is immediately ready for operation.

The switching point must no longer be set with VEGACAP 35.

The probe has an active length and a screen segment. Thanks to the screen segment, the so called standing capacitance, caused by the vessel after installation of the probe, is mainly compensated.

As a default setting, the electronics module is adjusted to the basic capacitance of the probe. The relay output switches when the covering is in the range of the active probe tip (gravity weight).

Changing dielectric values of the products, such as e.g. caused in mixing vessels are no problem for the switching accuracy within the active pin (active pin: 200 mm/7.9 in). The selection of the electrode length is hence very important because the length of the electrode determines the switching point. This switching point cannot be shifted on the electrode. Except: when the electrode cable is shortened.

### Exceptions

In exceptions, e.g. in pipelines or if the probe is mounted very close to the vessel wall, it can happen that the probe signals already overflowing (covering) in uncovered condition.

In this case, the switching point must be re-adjusted.

For adjustment, the vessel must not be filled and the switching point adjustment is also possible in dismantled condition.

A fresh adjustment is necessary in the following cases:

- in narrow space installation conditions with high standing capacitance (e.g. in tubes etc.)
- after exchange of the electronics module

### Fresh adjustment

Proceed as follows for a fresh adjustment:

1. Make sure that the probe is uncovered.
2. Pierce the cover of the potentiometer (6) with a screwdriver.

3. Turn the below potentiometer (6) first of all anticlockwise (max. 20 turns) until the control lamp signals "covered".  
Mode A (overflow protection) = control lamp lights  
Mode B (dry run protection) = control lamp extinguishes  
If this condition is already reached, you can continue with the next step.
4. Turn the potentiometer (6) very slowly (due to the damping) clockwise until the control lamp signals "uncovered".  
Mode A (overflow protection) = control lamp extinguishes  
Mode B (dry run protection) = control lamp lights
5. Turn the potentiometer (6) clockwise according to the following table.
6. The probe is now ready for operation.

Sensitivity

	Standard	very sensitive
additional turns	Dielectric constant >1.5 = 2.5 turns	-

Tab. 1: Number of additional turns for the potentiometer (6)









**Note:**  
With the measurement of products with very low dielectric values, the number of turns can be reduced up to 1 according to the table.  
This setting is too sensitive with conductive, adhesive products.











**Note:**  
When placing the housing cover, make sure that the inspection glass is above the signal lamp of the electronics module.

6.3 Function table

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

	Level	Switching status	Control lamp
Mode A Overflow protec- tion		 Relay energized	
Mode A Overflow protec- tion		 Relay deener- gized	

	Level	Switching status	Control lamp
Mode B Dry run protection		 Relay energized	
Mode B Dry run protection		 Relay deenergized	
Failure of the supply voltage (mode A/B)	any	 Relay deenergized	

## 7 Maintenance and fault rectification

### 7.1 Maintenance

#### Maintenance

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

#### Cleaning

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

Take note of the following:

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

### 7.2 Rectify faults

#### Reaction when malfunction occurs

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

#### Causes of malfunction

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

- Sensor
- Process
- Voltage supply
- Signal processing

#### Fault rectification

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

#### 24 hour service hotline

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

The hotline is manned 7 days a week round-the-clock. Since we offer this service worldwide, the support is only available in the English language. The service is free, only standard call charges are incurred.

## Checking the switching signal

Error	Cause	Rectification
<ul style="list-style-type: none"> <li>● The instrument signals covered without being covered by the medium</li> <li>● The instrument signals uncovered while covered with the medium</li> </ul>	Wrong mode selected	Set the correct mode on the mode switch (A - overflow protection, B - dry run protection). Wiring should be carried out according to the idle current principle.
	Operating voltage too low	Check operating voltage
	Shortcircuit in the probe, e.g. because of moisture in the housing	Remove the electronics module. Check the resistance between the marked plug connections. See the following instructions.
	Electronics defective	Press the mode switch (A/B). If the instrument then changes the mode, the instrument may be mechanically damaged. Should the switching function in the correct mode still be faulty, return the probe for repair.  Push the mode switch. If the probe then does not change the mode, the electronics module may be defective. Exchange the electronics module.

## Check the resistance in the probe

Remove the electronics module. Check the resistance between the two plug connections.

There must no longer be a connection (high impedance). If there is still a connection, exchange the instrument or return it for repair

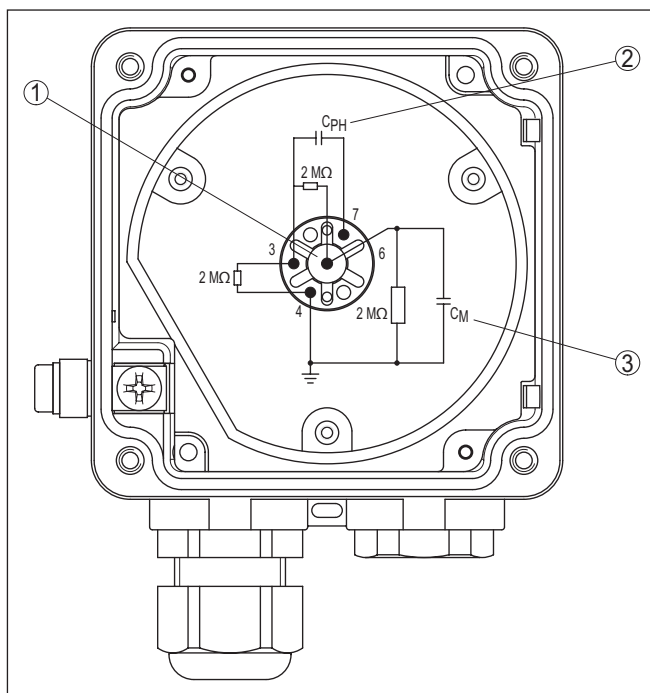


Fig. 9: Check the resistance in the probe

- 1 Contact 1 (middle pin)
- 2 Variable capacitor (phase)
- 3 Capacitor

Measure the resistance values between the following contacts with an ohmmeter (range MΩ).

#### Contact 4 against contact 1 (middle pin)

The resistor must be 2 MΩ.

If the resistor is lower, this means moisture in the housing or a fault in the electrode insulation. A possible reason could be also a non-insulated electrode which is used in a conductive (humid) medium.

If the resistor is higher or if the connection is interrupted, the reason is mostly a contact error in the adapter plate or a defective resistor due to strong electrostatic arking.

In both cases, the probe must be repaired in our premises.

#### Contact 4 against vessel

The electrical connection between contact 4 and metal vessel (not the mounting boss or probe flange) should be good. Measure the resistance value between contact 4 and vessel with an ohmmeter (range very small).

- Shortcircuit (0 ... 3 Ω) - optimum connection
- Resistor > 3 Ω - bad connection

If the resistance value is  $> 3 \Omega$ , this can be due to corrosion on the thread or flange or the thread was covered e.g. with teflon tape.

Check the connection to the vessel. If there is no connection, you can connect a cable from the outer ground terminal to the vessel.

Keep in mind that coated flanges must always be connected via the ground terminal to the vessel.

#### **Contact 7 against contact 1 (middle pin)**

The resistor must be infinite ( $> 10 \text{ M}\Omega$ )

If the resistor is lower, then moisture can be penetrated or the compensation capacitor or variable capacitor (phase) is defective.

#### **Contact 3 (screen) against contact 4**

The resistor must be  $2 \text{ M}\Omega$ .

In case of lower values, the electrode insulation is defective or moisture is penetrated into the housing.

In case of higher values, there is a contacting error in the adapter plate or the resistor is defective.

#### **No fault**

If you cannot find a fault in the probe, then exchange the electronics module by a similar replacement electronics (if available).

If the fault is eliminated after inserting the new electronics module, then you have to carry out a fresh adjustment with the new electronics module because electronics modules have certain manufacturing tolerances.

If the fault still exists or if no replacement electronics module is available, then you have to return the probe for repair.

#### **Contact 3 (screen) against contact 1 (middle pin)**

The resistor must be  $2 \text{ M}\Omega$ .

In case of lower values, the electrode insulation is defective or moisture is penetrated into the housing.

In case of higher values, there is a contacting error in the adapter plate or the resistor is defective.

#### **Reaction after fault rectification**

Depending on the reason for the fault and the measures taken, the steps described in chapter "Set up" may have to be carried out again.

### **7.3 Exchanging the electronics module**

If it is necessary to exchange the electronics module, you should use an electronics module type CAP E31R

Proceed as follows:

1. Switch off power supply
2. Loosen the four screws of the housing cover with a Phillips screwdriver.
3. Remove the housing cover
4. Loosen the screws of the terminals with a Allen wrench.
5. Pull the connection cables out of the terminals.

6. Loosen the two screws with a Torx screwdriver.
  7. Open the tensile ring on the old electronics module and pull out the old electronics module.
  8. Compare the new electronics module with the old one. The type label of the electronics module must correspond to that of the old electronics module.
  9. Insert the new electronics module.
  10. Screw in and tighten the two screws with a Torx screwdriver.
  11. Lead the connection cable through the cable gland.
  12. Insert the wire ends into the open terminals according to the wiring plan and tighten them.
  13. Check the hold of the wires in the terminals by lightly pulling on them.
  14. Tighten cable gland and check on tightness. The seal ring must completely encircle the cable.
  15. Carry out a fresh adjustment. See chapter "*Set up, new adjustment*".
  16. Screw the housing lid back on
- The electronics exchange is now finished.

## 7.4 Shortening of the probe

The cable of the probe can be shortened individually.



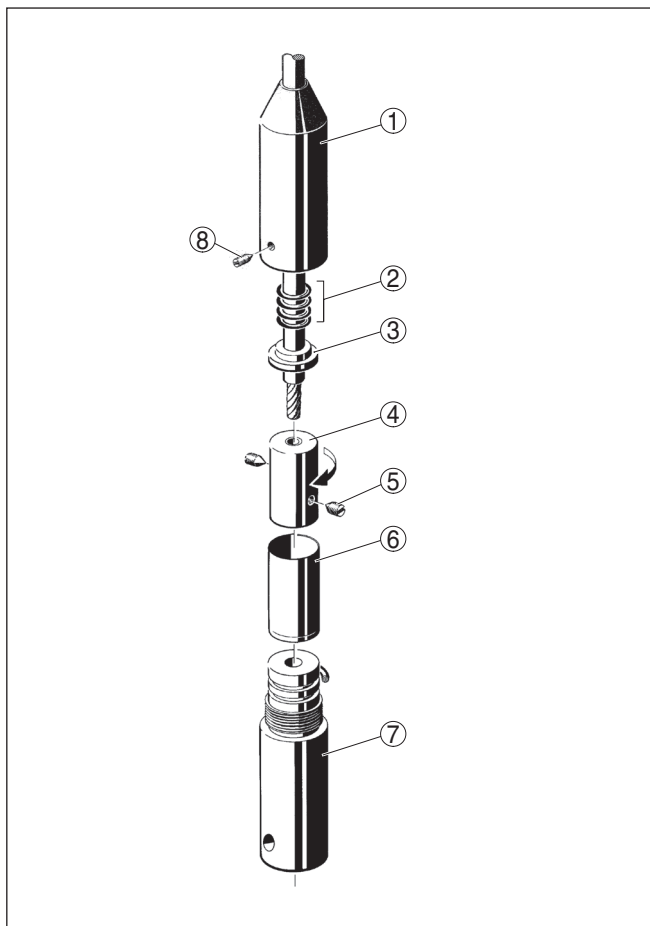


Fig. 10: Shortening of the cable probe

- 1 Upper part of the weight
- 2 O-rings
- 3 Isolating socket
- 4 Locking sleeve
- 5 Threaded pins
- 6 Insulating sleeve
- 7 Lower part of the weight
- 8 Threaded pin

1. Unscrew pin (8)
2. Unscrew the lower part of the weight (7)
3. Shift the upper part of the weight (1), the four O-rings (2) and the insulating sleeve (3) upward above the planned curring site.
4. Remove the insulating sleeve (6) from the locking sleeve (4).
5. Loosen the two pins (5) on the locking sleeve (4).

6. Pull the cable out of the locking sleeve (4).
7. To avoid splicing of the steel cable, tin the cable before shortening with a soldering iron and tighten the wire.
8. Shorten the cable with a cut-off wheel or a metal saw at the lower end. Make sure the length is correct before shortening.
9. Shorten the insulation of the cable with a sharp knife by 60 mm (2.36 in).
10. Shift the chamfered side of the locking sleeve (4) with a rotary movement onto the cable.  
Make sure that the cable is flush with the lower side of the locking sleeve (4).
11. Lock the cable with the two pins (5).  
Make sure that the cable screen has no contact to the inner steel cable.
12. Shift the isolating sleeve (6) onto the locking sleeve (4).
13. Shift the lower part of the weight (7) to the upper part of the weight (1) and screw them together.
14. Lock the upper part of the weight (1) with pin (8).
15. Check the correct length of the probe.
16. Carry out a fresh adjustment. See chapter "*Set up, new adjustment*".

## 7.5 How to proceed if a repair is necessary

You can find an instrument return form as well as detailed information about the procedure in the download area of our homepage: [www.vega.com](http://www.vega.com).

By doing this you help us carry out the repair quickly and without having to call back for needed information.

If a repair is necessary, please proceed as follows:

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and, if need be, also a safety data sheet outside on the packaging
- Please contact the agency serving you to get the address for the return shipment. You can find the agency on our home page [www.vega.com](http://www.vega.com).

## 8 Dismount

### 8.1 Dismounting steps

**Warning:**

Before dismantling, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "*Mounting*" and "*Connecting to voltage supply*" and carry out the listed steps in reverse order.

### 8.2 Disposal

The instrument consists of materials which can be recycled by specialised recycling companies. We use recyclable materials and have designed the electronics to be easily separable.

**WEEE directive**

The instrument does not fall in the scope of the EU WEEE directive. Article 2 of this Directive exempts electrical and electronic equipment from this requirement if it is part of another instrument that does not fall in the scope of the Directive. These include stationary industrial plants.

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

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

## 9 Supplement

### 9.1 Technical data

#### General data

Material 316L corresponds to 1.4404 or 1.4435

#### Materials, wetted parts

– Process fitting - thread	St 37, 316Ti or Aluminium
– Process seal	Klingersil C-4400
– Insulation (partly insulated)	PE/PA 12
– Probe (cable PE/PA 12 partly insulated: ø 6 mm/0.236 in)	316L
– Gravity weight	316L

#### Materials, non-wetted parts

– Housing	Plastic PBT (polyester), Alu die-casting powder-coated
– Seal between housing and housing lid	Silicone
– Ground terminal	316L
– Cable gland	PA, stainless steel, brass
– Sealing, cable gland	NBR
– Blind plug, cable gland	PA

#### Process fittings

– Pipe thread, cylindrical (DIN 3852-A)	G1½
– Pipe thread, conical (ASME B1.20.1)	1½ NPT

#### Weight

– Instrument weight (depending on process fitting)	0.8 ... 4 kg (0.18 ... 8.82 lbs)
– Gravity weight	approx. 900 g (32 oz)
– Cable weight: ø 6 mm (0.236 in)	approx. 180 g/m (1.9 oz/ft)
Sensor length (L)	400 ... 20000 mm (15.75 ... 787.4 in)

Active tip (gravity weight) 200 mm (7.874 in)

#### Max. tensile load (cable)

– PE/PA 12 partly insulated: ø 6 mm (0.236 in)	10 KN (2248 lbs)
--	------------------

Max. torque (process fitting - thread) 100 Nm (74 lbf ft)

#### Torque for NPT cable glands and Conduit tubes

– Plastic housing	max. 10 Nm (7.376 lbf ft)
– Aluminium housing	max. 50 Nm (36.88 lbf ft)

Measuring frequency 430 kHz

#### Output variable

Output	Relay output (DPDT), 2 floating spdts
Switching voltage	
– Min.	10 mV

– Max.	253 V AC, 253 V DC
	With circuits > 150 V AC/DC, the relay contacts must be in the same circuit.
Switching current	
– Min.	10 µA
– Max.	3 A AC, 1 A DC
Breaking capacity	
– Min.	50 mW
– Max.	750 VA AC, 54 W DC
	If inductive loads or stronger currents are switched through, the gold plating on the relay contact surface will be permanently damaged. The contact is then no longer suitable for switching low-level signal circuits.
Potential separation	> 500 V DC
Contact material (relay contacts)	AgNi (Au plated) or AgSnO (Au plated)
Modes (switchable)	A (overflow protection)/B (dry run protection)
Switching delay	
– When immersed	0.7 s
– When laid bare	0.7 s
– In the event of a fault	1 s

#### 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

Process pressure	-1 ... 16 bar/-100 ... 1600 kPa (-14.5 ... 232 psig)
	See following diagram
Process temperature	See following diagram

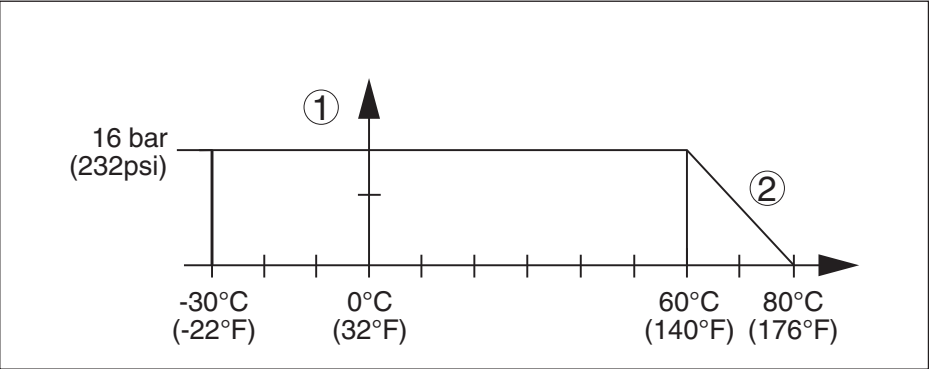


Fig. 11: Process pressure - Process temperature - VEGACAP 35 with process fitting of Aluminium

- 1 Process pressure
- 2 Process temperature

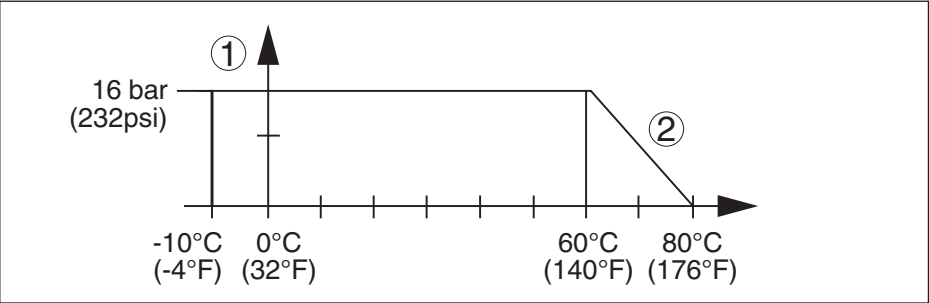


Fig. 12: Process pressure - Process temperature - VEGACAP 35 with process fitting of 316L

- 1 Process pressure
- 2 Process temperature

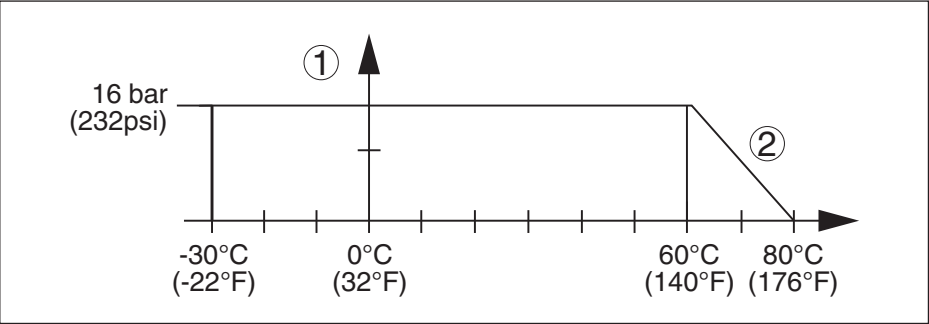


Fig. 13: Process pressure - Process temperature - VEGACAP 35 with process fitting of 316Ti

- 1 Process pressure
- 2 Process temperature

Dielectric constant  $\geq 1.5$

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**Electromechanical data**


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## 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            |

Screw terminals for wire cross-section up to 1.5 mm<sup>2</sup> (AWG 16)

---

**Adjustment elements**


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## Mode switch

- |     |                                       |
|-----|---------------------------------------|
| – A | Min. detection or dry run protection  |
| – B | Max. detection or overflow protection |

Potentiometer Switching point adaptation

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**Voltage supply**


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Operating voltage 20 ... 253 V AC, 50/60 Hz, 20 ... 72 V DC (at U > 60 V DC, the ambient temperature can be max. 50 °C/122 °F)

Power consumption 1 ... 9 VA (AC), approximately 1.5 W (DC)

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**Electrical protective measures**


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Protection rating IP66/IP67 (NEMA Type 4X)

Altitude above sea level up to 5000 m (16404 ft)

## Overvoltage category

- |                           |     |
|---------------------------|-----|
| – up to 2000 m (6562 ft)  | III |
| – up to 5000 m (16404 ft) | II  |

Protection class I

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**Approvals**


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Instruments with approvals can have different technical specifications depending on the version.

For that reason the associated approval documents of these instruments have to be carefully noted. They are part of the delivery or can be downloaded by entering the serial number of your instrument into the search field under [www.vega.com](http://www.vega.com) as well as in the general download area.

## 9.2 Dimensions

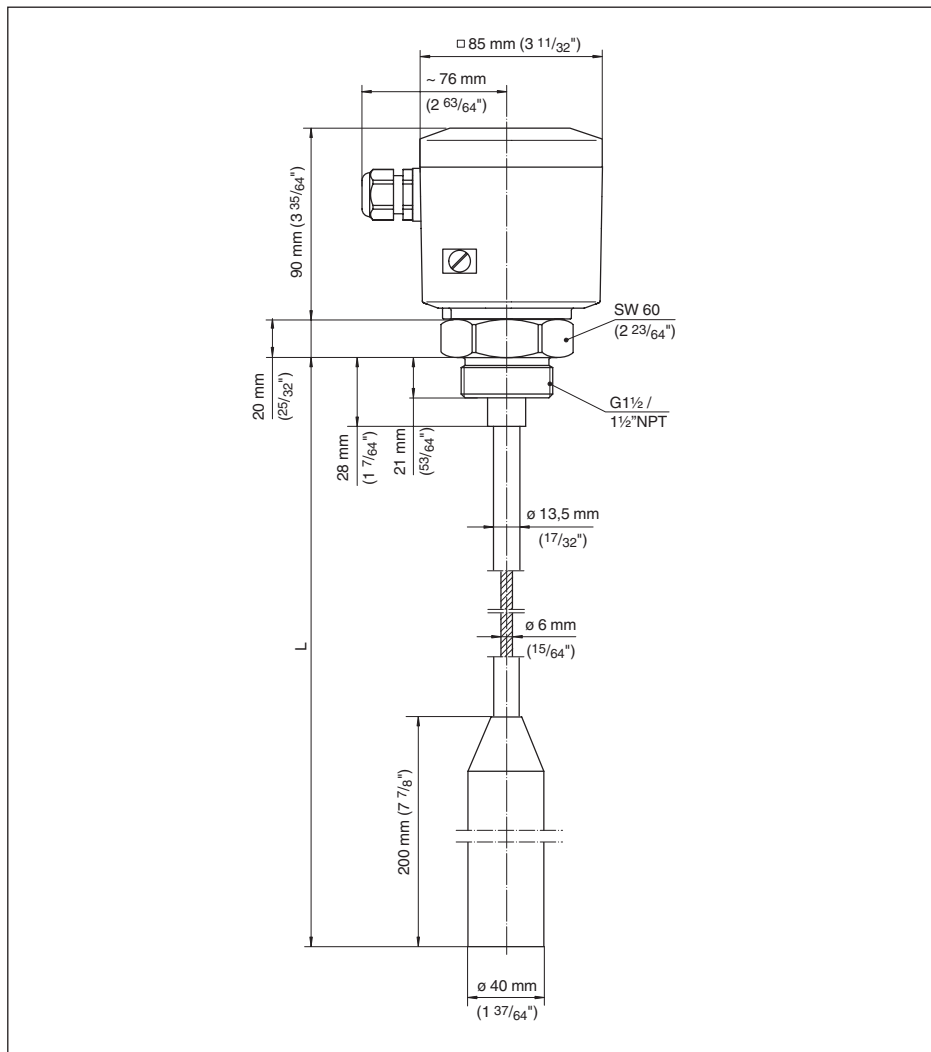


Fig. 14: VEGACAP 35, cable version with  $\phi 6 \text{ mm}$ , threaded version G1½ (ISO 228 T1)

$L$  Sensor length, see chapter "Technical data"



### 9.3 Industrial property rights

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