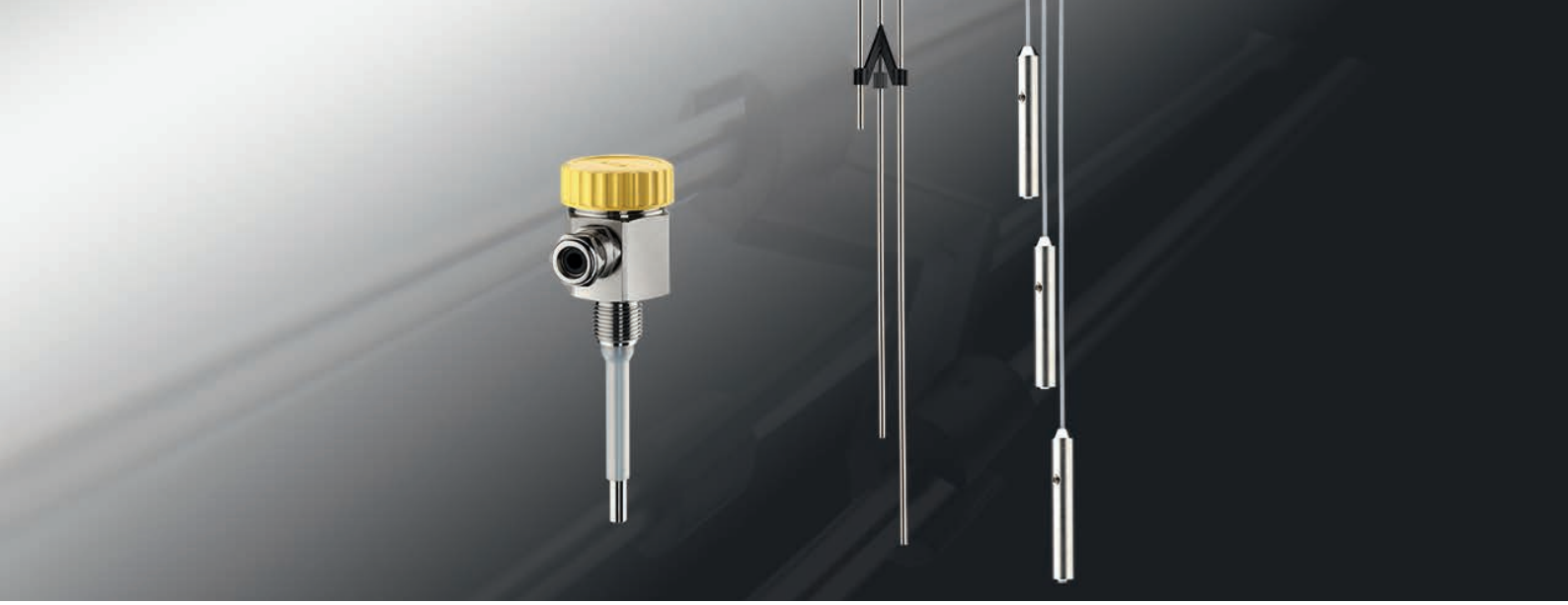

Product information
Conductive

Level detection in conductive liquids

VEGAKON 61
VEGAKON 66
Probes EL 1, 3, 4, 6, 8

Document ID: 33064

Contents

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.

33064-EN-220324

1 Measuring principle

Measuring principle

Conductive probes are used for level detection in conductive liquids.

The instruments are designed for industrial use in all areas of process technology.

Conductive probes detect the product resistance when their electrodes get covered by the product. A small alternating current, measured continuously by the electronics of the compact instrument or a separate controller, is checked for amplitude and phase position and converted into a switching signal.

A conductive probe consists of a ground electrode and a level-related measuring electrode.

The switching signal is determined by the length or mounting position of the respective measuring electrode.

In conductive vessels, the vessel wall can be used as the ground electrode. The measuring probe can then consist of only one measuring electrode.

The sensors are maintenance free and rugged and can be implemented in all areas of industrial measurement engineering.

1.2 Application examples

Overflow protection

Measuring system for detection of the max. level in an electrically conductive vessel (e.g. as overflow protection)

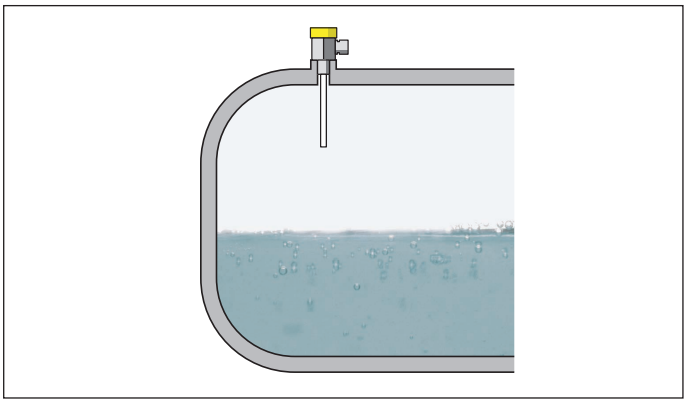

Fig. 1: Overflow protection

Simple, inexpensive level detection, e.g. as overflow protection in watery liquids.

Advantages:

- Easy, reliable sensors
- Small mounting dimensions

Two-point control (e.g. as pump control)

Due to the many possible ways of application, conductive level switches are ideal for all measuring tasks in connection with water and aqueous solutions. The large number of electrical and mechanical versions guarantees simple integration into existing processes.

Pump control is a frequent application in the area of water and waste water.

To empty a pump sump automatically with a pump when a certain level is exceeded and to switch the pump off again when the min. level is reached, the pump can be controlled with a conductive measuring probe.

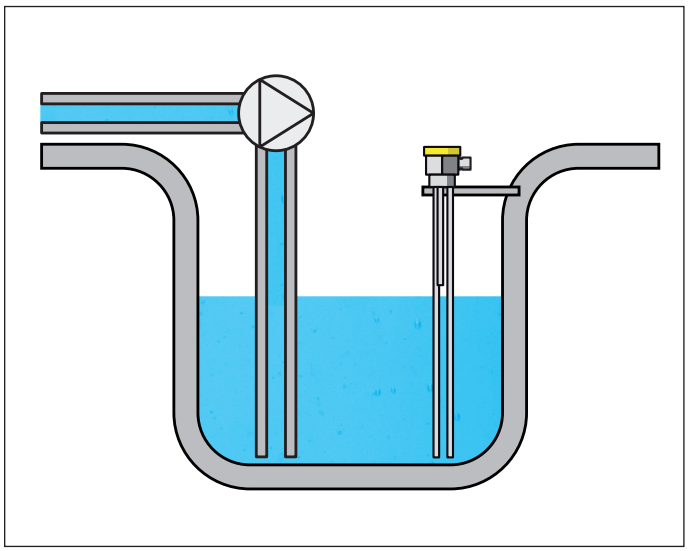

Fig. 2: Pump control with an EL 3 conductive measuring probe

Advantages:

- Up to five switching points with one sensor possible
- Exchangeable rod probes
- Rod probes can be shortened
- Available with rugged metal housings

Dry run protection in pipelines

Thanks to its virtually front-flush conical electrode, the conductive level switch VEGAKON 61 is ideal for use in pipelines. Its flow-efficient profile does not change the pipe cross section and thus prevents turbulence.

The VEGAKON 61 measures the field strength at its tip, and is thus insensitive to buildup.

VEGAKON 61 calibrates itself automatically and therefore needs no adjustment.

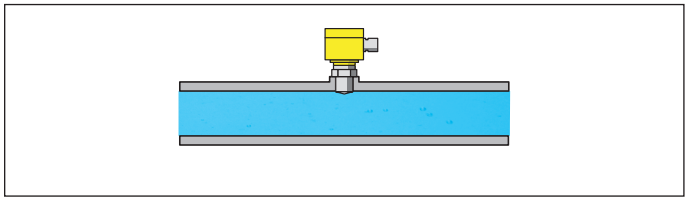

Fig. 3: Dry run protection in pipelines

Advantages:

- Suitable for very adhesive products
- Adjustment free
- Causes no turbulence
- Does not change pipe cross sectional area
- Robust and abrasion resistant

2 Type overview

VEGAKON 61

VEGAKON 66

Applications	Conductive liquids, pipelines	Conductive liquids
Version	Compact level switch, partly insulated	Compact level switch, rod - partly insulated
Insulation	PTFE	PP
Length	--	0.12 … 4 m (0.394 … 13.12 ft)
Process fitting	Thread G1, cone, Tuchenhagen	Thread G1½
Process temperature	-40 … +150 °C (-40 … +302 °F)	-40 … +100 °C (-40 … +212 °F)
Process pressure	-1 … 25 bar/-100 … 2500 kPa (-14.5 … 363 psigg)	-1 … 6 bar/-100 … 600 kPa (-14.5 … 87 psig)

EL 1

EL 3

EL 4

Applications	Conductive liquids	Conductive liquids	Conductive liquids
Version [1]	Rod - partly insulated	Rod - partly insulated	Rod - partly insulated
Insulation	PTFE	PTFE	PP
Length	0.04 … 4 m (0.131 … 13.12 ft)	0.1 … 4 m (0.328 … 13.12 ft)	0.1 … 4 m (0.328 … 13.12 ft)
Process fitting	Thread G½	Thread G1½	Thread G1½
Process temperature	-50 … +130 °C (-58 … +266 °F)	-50 … +130 °C (-58 … +266 °F)	-20 … +100 °C (-4 … +212 °F)
Process pressure	-1 … 63 bar/-100 … 6300 kPa (-14.5 … 914 psig)	-1 … 63 bar/-100 … 6300 kPa (-14.5 … 914 psig)	-1 … 6 bar/-100 … 600 kPa (-14.5 … 87 psig)

[1] For connection to a VEGATOR controller.

EL 6

EL 8

Applications	Conductive liquids	Conductive liquids
Version [2]	Cable - partly insulated	Rod - partly insulated
Insulation	FEP	PE
Length	0.22 … 50 m (0.722 … 164.04 ft)	0.03 … 1 m (0.098 … 3.281 ft)
Process fitting	Thread G1½	Thread G½
Process temperature	-20 … +100 °C (-4 … +212 °F)	-10 … +60 °C (+14 … +140 °F)
Process pressure	-1 … 6 bar/-100 … 600 kPa (-14.5 … 87 psig)	-1 … 6 bar/-100 … 600 kPa (-14.5 … 87 psig)

[2] For connection to a VEGATOR controller.

3 Selection criteria

		VEGAKON		Conductive probes EL				
Version		**61 Compact**	**66 Compact Rod**	**EL 1 Rod**	**EL 3 Rod**	**EL 4 Rod**	**EL 6 Cable**	**EL 8 Rod**
Measuring probes	**Number of probes**	**1**	**2 … 3**	**1**	**2 … 5**	**2 … 5**	**2 … 5**	**1**
Vessel	Probe length up to 1 m	–	●	–	-	●	●	●
	Probe length up to 4 m	–	●	●	●	●	●	–
	Probe length up to 50 m	–	–	–	–	–	●	–
	Pipelines	●	–	–	–	–	–	–
Process	Steam or condensation	●	●	●	●	●	●	●
	Buildup	●	–	–	–	–	–	-
	Changing density	●	●	●	●	●	●	●
	Temperatures up to +60 °C	●	●	●	●	●	●	●
	Temperatures up to +100 °C	●	–	●	●	●	●	–
	Temperatures > +150 °C	●	–	●	●	–	–	–
	Pressures up to 6 bar	●	●	●	●	●	●	●
	Pressures up to 25 bar	●	–	●	●	–	–	–
	Pressures up to 63 bar	–	–	●	●	–	–	–
	Narrow space above the vessel	●	–	–	–	–	●	-
Process fitting	Thread G½	–	–	●	-	–	–	●
	Thread G1	●	–	–	–	–	–	–
	Thread G1½	–	●	–	●	●	●	–
	Cone	●	–	–	–	–	–	–
	Tuchenhagen Varivent	●	–	–	–	–	–	–
Sensor	PE insulation	–	–	–	–	–	–	●
	PTFE insulation	●	–	●	●	–	–	–
	PP insulation	–	●	–	–	●	●	–
	FEP insulation	–	–	–	–	–	●	–
Industry	Chemical	○	○	●	●	○	○	○
	Power generation	○	●	●	●	●	●	●
	Foodstuffs	○	○	○	○	○	○	○
	Offshore	○	○	○	○	○	○	○
	Petrochemical	○	○	●	●	○	○	○
	Pharmaceutical	○	○	○	○	○	○	○
	Shipbuilding	○	○	○	○	○	○	○
	Environment and recycling industry	●	●	●	●	●	●	●
	Water	●	●	●	●	●	●	●
	Waste water	○	○	●	●	○	○	○

● = optimum suitability

○ = possible with limitations

– = not recommended

4 Mounting

Switching point
Mount the probe in such a way that the rod or cable electrodes do not touch the vessel wall during operation.

Agitators
Due to agitators, vibrations or similar, the probe can be subjected to strong lateral forces.

Excessive system vibration or shocks, e.g. caused by agitators or turbulence in the vessel (e.g. from fluidisation) can cause the rod probe to vibrate in resonance. This can lead to increased material stress. Should a longer rod probe be necessary, you can provide a suitable insulated support or guy directly above the end of the probe to stabilise it.

In case of strong product movements, foam generation and flow in the vessel, the probe can be also mounted in bypass tubes.

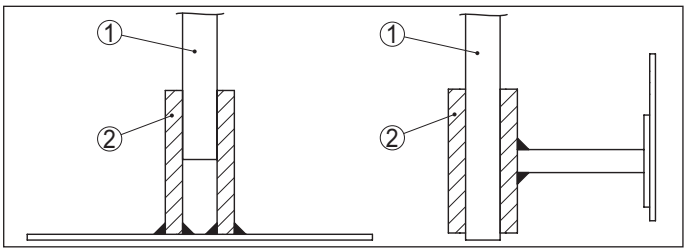

Fig. 4: Fasten the probe

1 Measuring probe
2 Plastic socket on the probe end
3 Measuring probe
4 Plastic socket laterally mounted

Inflowing medium
If the conductive sensors are mounted in the filling stream, unwanted false measuring signals may be triggered. For this reason, mount the instruments at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

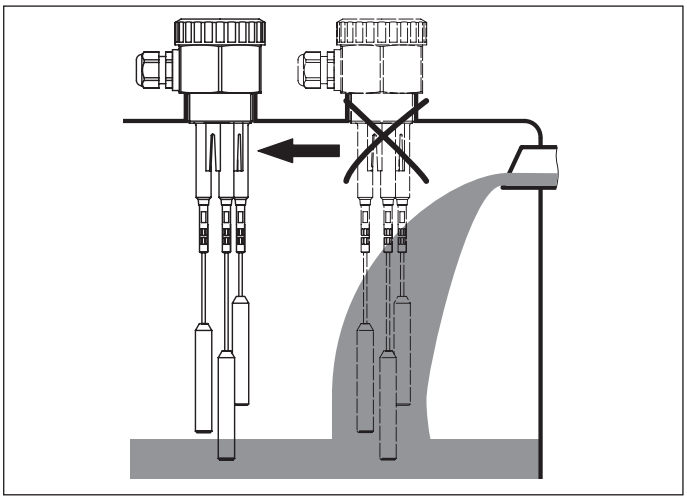

Fig. 5: Inflowing medium

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

Insulating measures in metal vessels such as e.g. covering the thread with teflon tape can interrupt the necessary electrical connection to the vessel. Ground the probe on the vessel.

Shortening of the electrode
The rods of the probe can be shortened individually.

Metal vessel
If probes without ground electrode are used, you must make sure that the mechanical connection of the probe is connected electrically conductive to the vessel to ensure sufficient grounding.

Use conductive seals such as e.g. copper, lead etc.

Insulating measures such as e.g. covering the thread with teflon tape can interrupt the necessary electrical connection. If this is necessary, use the ground terminal on the housing to connect the instrument with the vessel.

A ground electrode must be provided for probes EL 4 and 6 as well as with VEGAKON 66.

Non-conductive vessels
Generally use probes with a ground electrode in non-conductive vessels, e.g. plastic tanks.

Horizontal mounting
If you mount a VEGAKON 66 laterally, we recommend mounting it approx. 20° inclined so that the liquid medium can drain off more easily and no buildup can generate on the isolation.

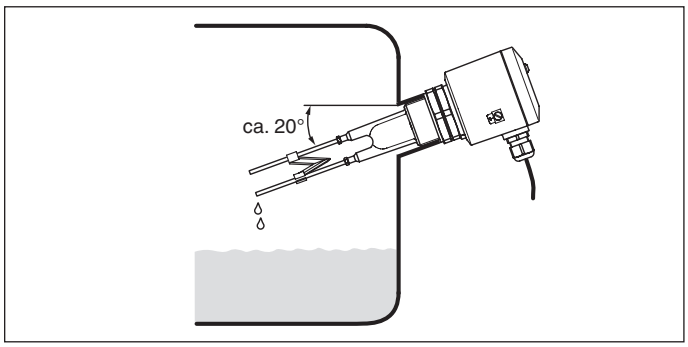

Fig. 6: Horizontal mounting

Ground connection
If probes without ground electrode are used, you must make sure that the mechanical connection of the probe is connected electrically conductive to the vessel to ensure sufficient grounding.

Use conductive seals, such as those made of copper or lead, etc. Insulating measures, such as covering the thread with Teflon tape, can interrupt the necessary electrical connection with metal vessels. For this reason, ground the probe on the vessel or use a conductive seal material.

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 voltage supply
Connect the operating voltage according to the following diagrams. The oscillator with relay output is 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 VEGAKON 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
VEGAKON and probes EL are 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, only use approved cable connections for approved instruments.

Select connection cable for Ex applications

Take note of the corresponding installation regulations for Ex applications.

5.2 Wiring plan VEGAKON 61, 66

Compact device
VEGAKON level switches are compact devices with different, selectable electronics versions.

Relay output
Is used to switch external voltage sources to relays, contactors, magnetic valves, horns etc.

We recommend connecting VEGAKON 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.

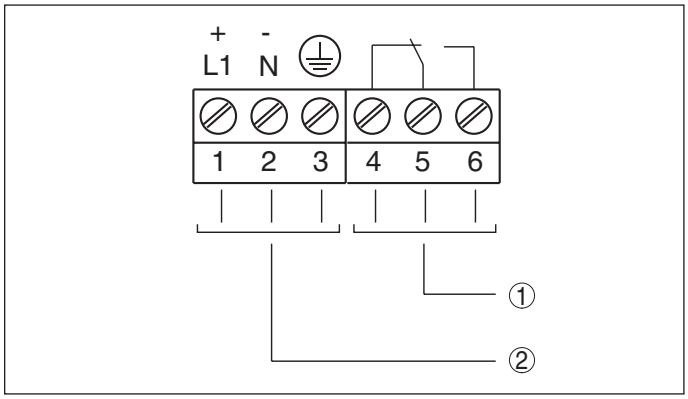

Fig. 7: VEGAKON 61 - electronics with relay output

1 Relay output
2 Voltage supply

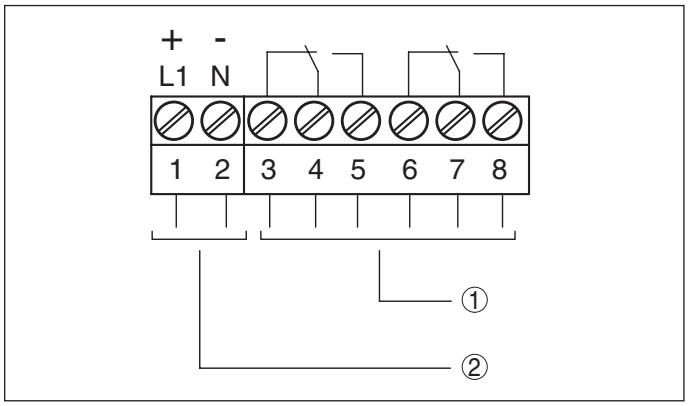

Fig. 8: VEGAKON 66 - electronics with relay output

1 Relay output
2 Voltage supply

Transistor output
Is used to switch external voltage sources to relays, contactors, magnetic valves, horns etc.

We recommend connecting VEGAKON 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.

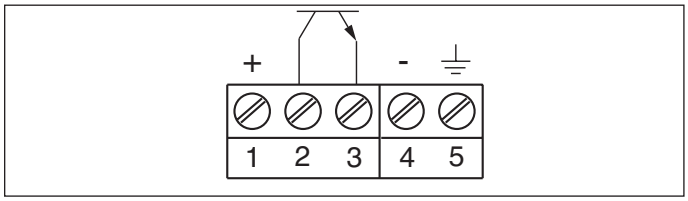

Fig. 9: VEGAKON 61 - transistor output

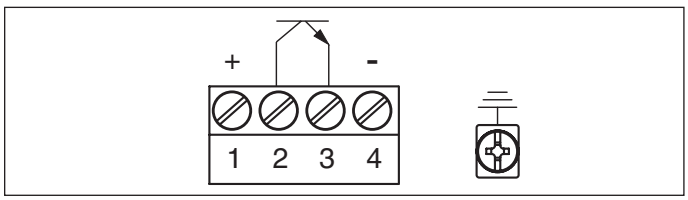

Fig. 10: VEGAKON 66 - transistor output

The transistor switches the operating voltage of the electronic module to the binary input of a PLC or an electrical load. Through different connections of the consumer (load), PNP or NPN action can be attained.

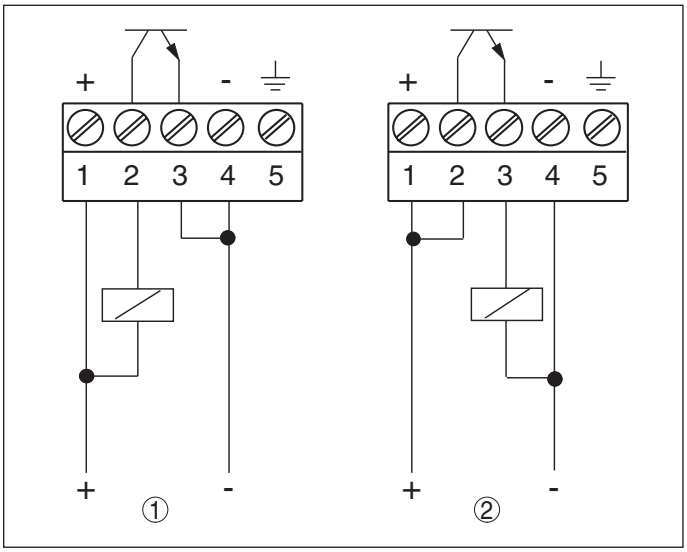

Fig. 11: VEGAKON 61 - electronics with transistor output

1 NPN action
2 PNP action

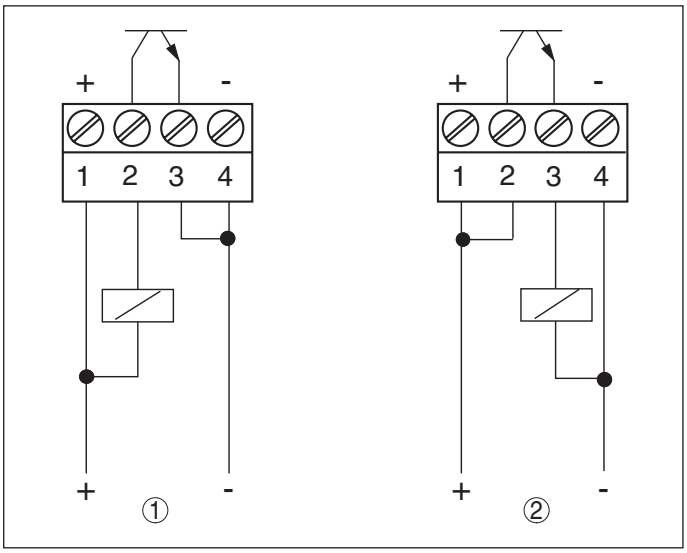

Fig. 12: VEGAKON 66 - electronics with transistor output

1 NPN action
2 PNP action

5.3 Wiring plan EL 1, EL 3, EL 4, EL 6, EL 8

Connection to a controller

The conductive probes type EL require a controller of VEGATOR series.

The electrical connection of the conductive probes is described in the product information of the VEGATOR 131, 132 controllers.

Select connection cable

The conductive probes are connected with standard cable with a round cross-section to ensure the sealing effect of the cable gland.

Line monitoring with VEGATOR 131, 132

The line break monitoring or alarm function defines the function of the controller in case of failure.

To realize line break monitoring with the controllers VEGATOR 131, 132, a supplementary electronics must be mounted in the connection housing of the probe.

When a fault signal is generated, the switching output is simultaneously activated. Only failures of channel 1 are monitored.

The line break monitoring is required for probes with approval according to WHG (WRA) or Ex.

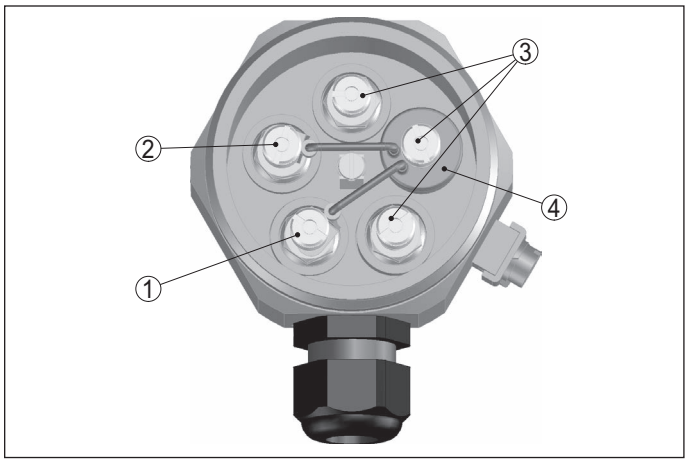

Fig. 13: Supplementary electronics for line break monitoring in conjunction with VEGATOR 131, 132

1 Connection to terminal 1 (ground rod = longest rod)
2 Connection to terminal 2 (max. rod = shortest rod)
3 Additional terminals - Individually configurable switching points
4 Additional electronics for line break monitoring

6 Adjustment

6.1 Adjustment elements VEGAKON 61 R, 61 T

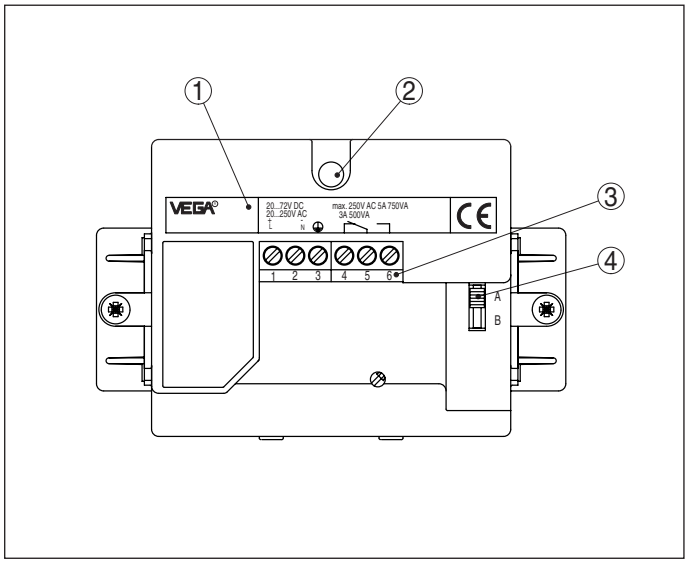

Fig. 14: Electronics module VEGAKON 61 R (relay output)

1 Type label
2 Control lamp (LED)
3 Connection terminals
4 Mode switch (A/B)

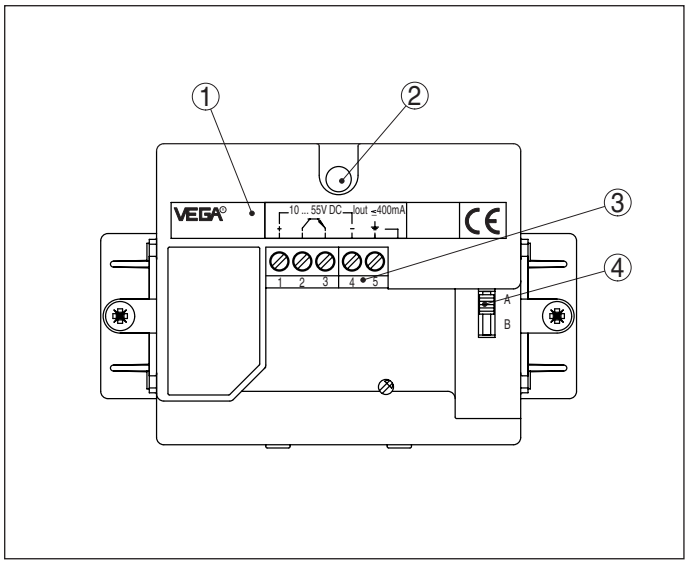

Fig. 15: Electronics module VEGAKON 61 T (transistor output)

1 Type label
2 Control lamp (LED)
3 Connection terminals
4 Mode switch (A/B)

Mode setting (4)
With the mode adjustment (A/B) you can change the switching condition of the output. It allows you to set the required mode (A - max. detection or overflow protection, B - min. detection or dry run protection).

Signal lamp (2)
The signal lamp shows the switching status of the output and can be checked with closed housing.

6.2 Adjustment elements VEGAKON 66 R, 66 T

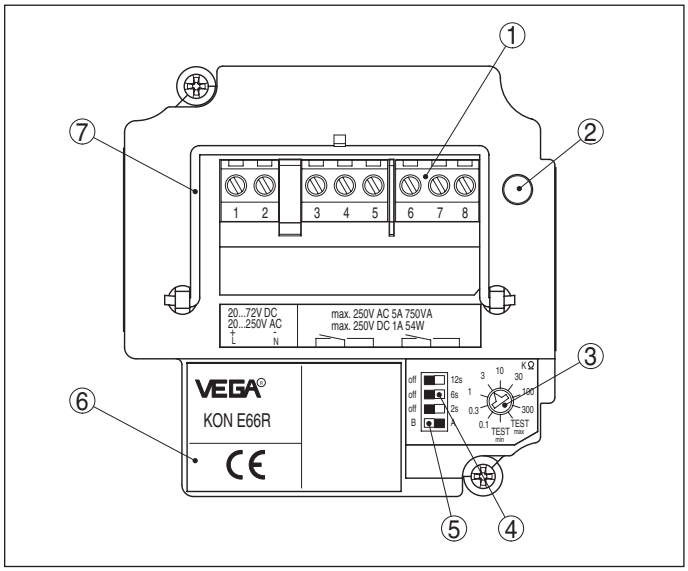

Fig. 16: Electronics module VEGAKON 66 R (relay output)

1 Connection terminals
2 Control lamp (LED)
3 Rotary switch: Adjustment of the conductivity value
4 Selection switch: Damping
5 Selection switch: Mode (A/B) VEGAKON
6 Type label
7 Tensile proving ring

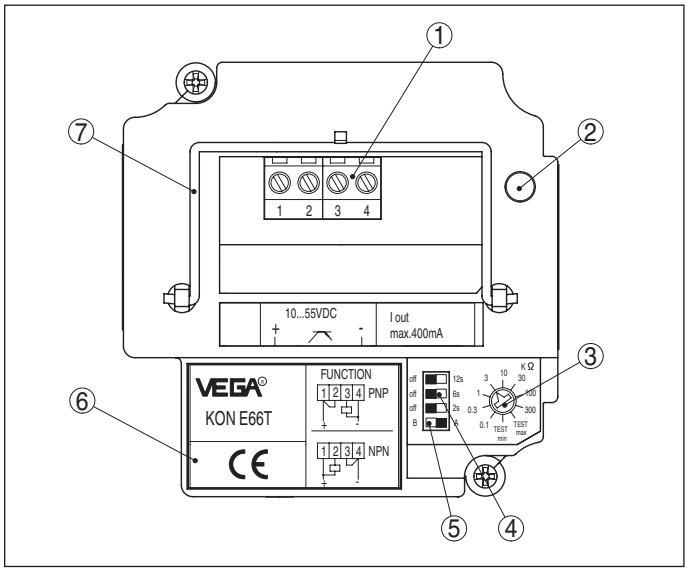

Fig. 17: Electronics module VEGAKON 66 T (transistor output)

1 Connection terminals
2 Control lamp (LED)
3 Rotary switch: Adjustment of the conductivity value
4 Selection switch: Damping
5 Selection switch: Mode (A/B) VEGAKON
6 Type label
7 Tensile proving ring

Signal lamp (2)
The signal lamp shows the switching status of the output and can be checked with closed housing.

Rotary switch: Adjustment of the conductivity value (3)
With the rotary switch you can adjust the sensitivity of the instrumet. Position 0.1 kΩ is less sensitive and switch position 300 kΩ is most sensitive.

Selection switch: Damping (4)
There are three switches on the DIL switch block by which you can adjust the switching on and off delay. Thus prevents, e.g. the instrument from permanent switching if the level is within the limits.

The delay refers to the switching status of both relay outputs.

With the switches (2 s, 6 s, 12 s) you can set the damping respectively in the range of 0 to 20 seconds. The times of the activated timers add up. If e.g. the switches 2 s and 12 s are activated, the damping will be 14 s.

Mode adjustment (5)
With the mode adjustment (A/B) you can change the switching condition of the output. It allows you to set the required mode (A - max. detection or overflow protection, B - min. detection or dry run protection).

Tensile proving ring (7)
Loosen the holding screws of the electronics module. Fold the tensile proving ring upward. With the tensile proving ring you can pul the electronics module out of the instrument housing.

6.3 Adjustment probes EL 1, EL 3, EL 4, EL 6, EL 8

The adjustment of the probes EL is carried out via a suitable controller (e.g. VEGATOR 131, 132). The connection and adjustment possibilities can be found in the product information of the respective controllers.

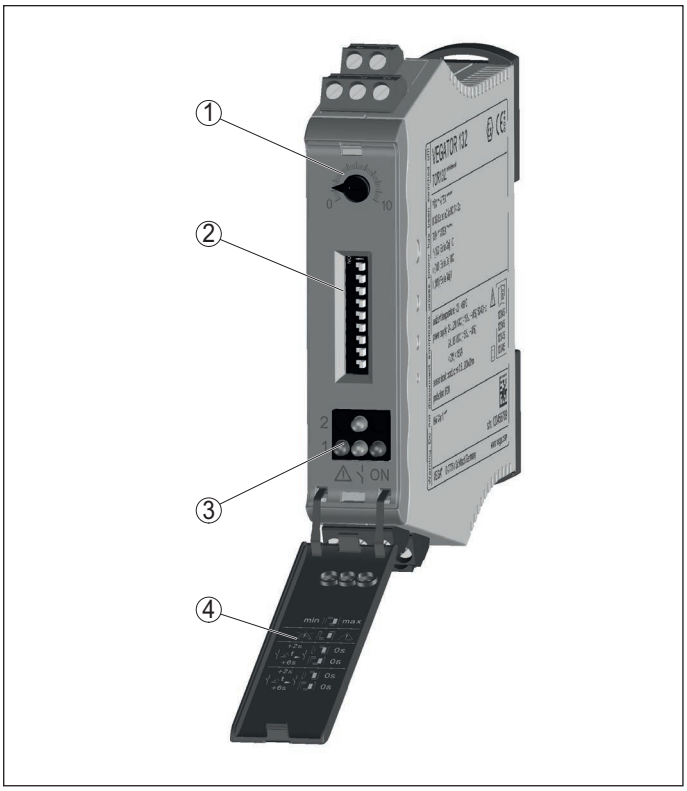

Fig. 18: Display and adjustment elements on the example of VEGATOR 132

1 Potentiometer for switching point adjustment
2 DIL switch block
3 Signal lamps (LEDs)
4 Hinged front cover

7 Dimensions

VEGAKON 61

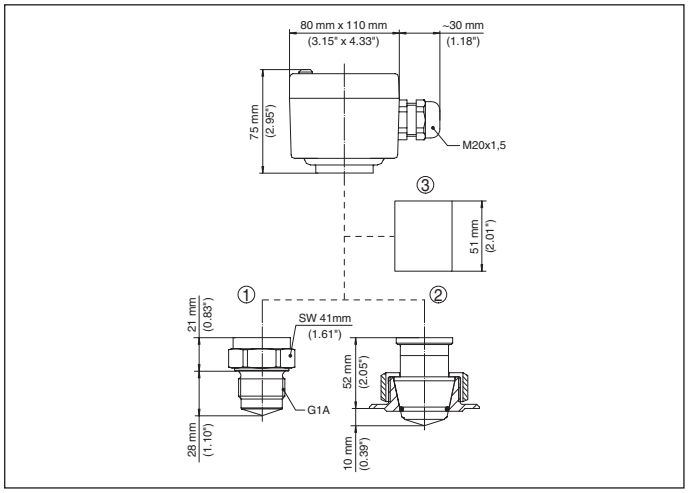

Fig. 19: VEGAKON 61

1 Threaded version
2 Cone version
3 Temperature adapter

VEGAKON 66

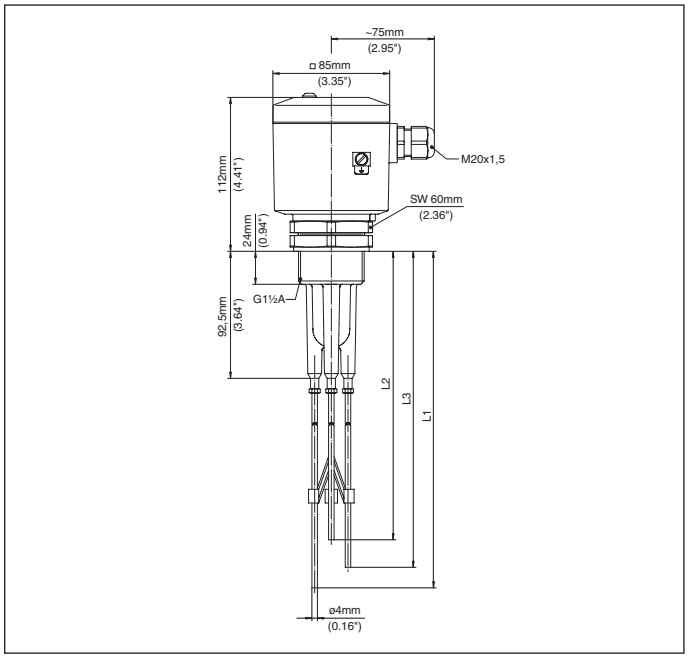

Fig. 20: VEGAKON 66 with three probes

L1 Length ground probe
L2 Length max. probe
L3 Length min. probe

EL 1

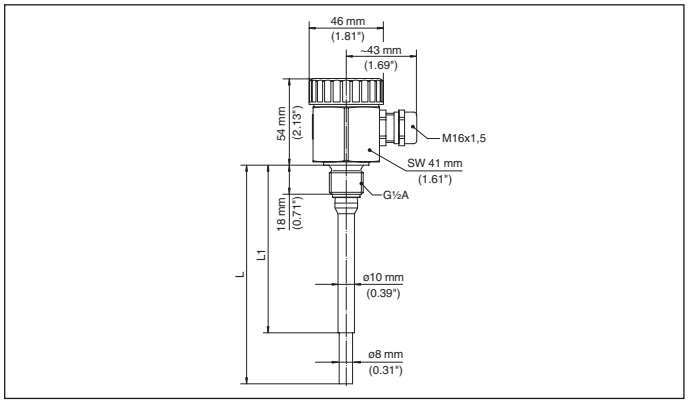

Fig. 21: Conductive rod electrode EL 1

L Sensor length, see chapter " Technical data"
L1 Insulation length, see chapter " Technical data"

EL 3

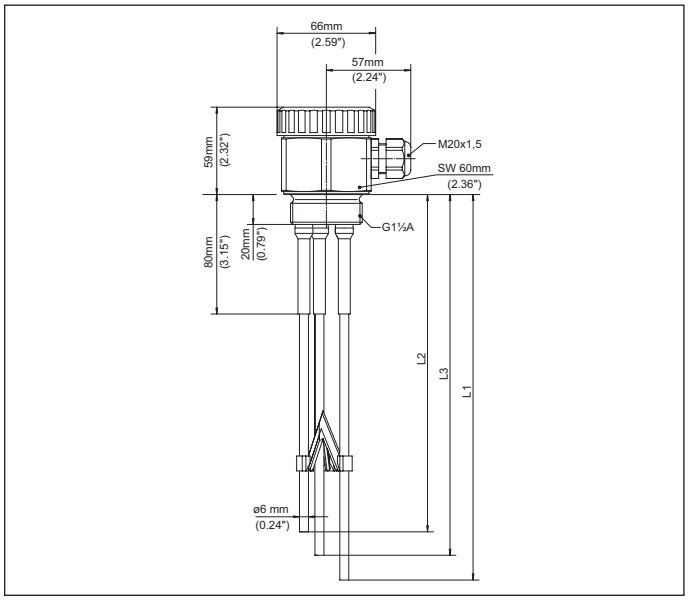

Fig. 22: Conductive multiple rod electrode EL 3

L1 Sensor length, see chapter " Technical data"
L2 Sensor length, see chapter " Technical data"
L3 Sensor length, see chapter " Technical data"

EL 4

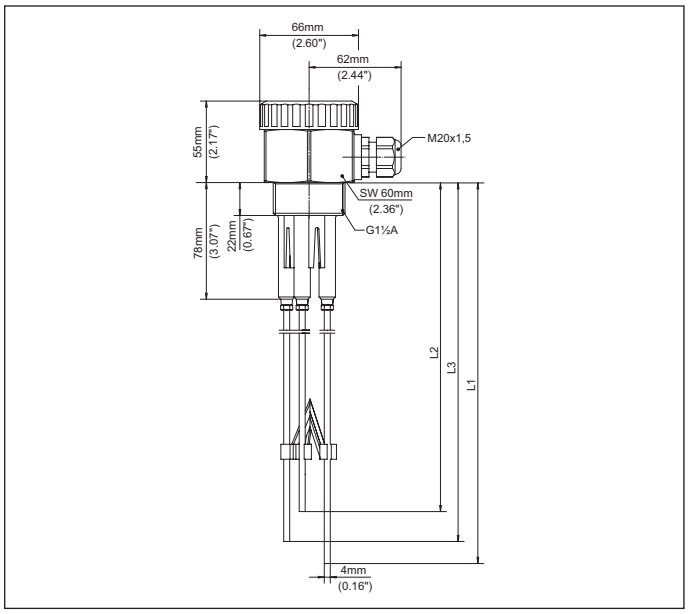

Fig. 23: Conductive multiple rod electrode EL 4

L1 Sensor length, see chapter " Technical data"
L2 Sensor length, see chapter " Technical data"
L3 Sensor length, see chapter " Technical data"

EL 6

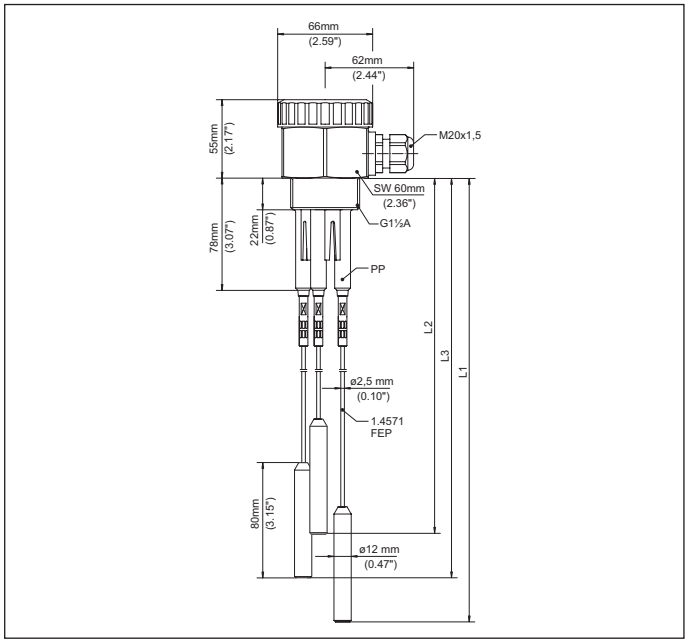

Fig. 24: Conductive multiple cable electrode EL 6

L1 Sensor length, see chapter " Technical data"
L2 Sensor length, see chapter " Technical data"
L3 Sensor length, see chapter " Technical data"

EL 8

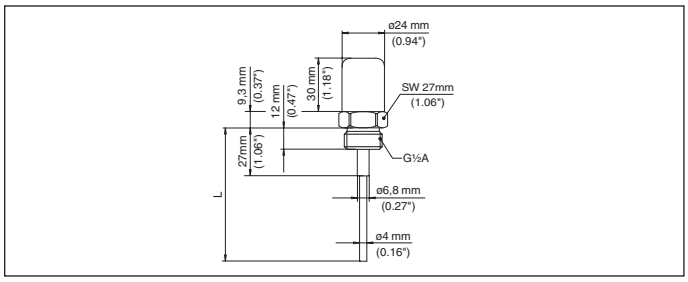

Fig. 25: Conductive rod electrode EL 8

L Sensor length, see chapter " Technical data"

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