



Product information

Conductive

Level detection in liquid

VEGAKON 61

VEGAKON 66

Probes EL 1, 3, 4, 6, 8



Document ID: 33064

VEGA

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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

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 signal conditioning instrument, 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)

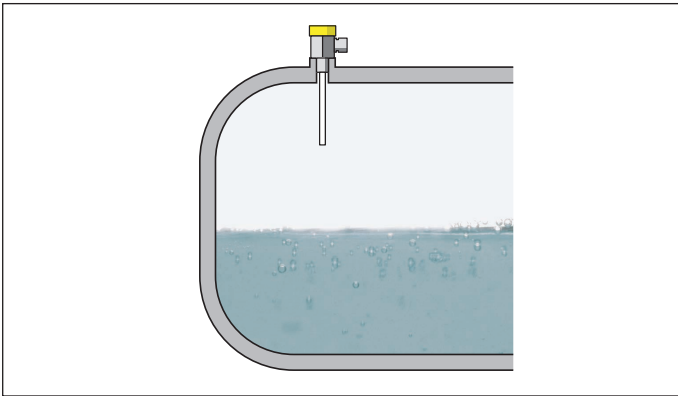


Fig. 1: Overflow protection

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.

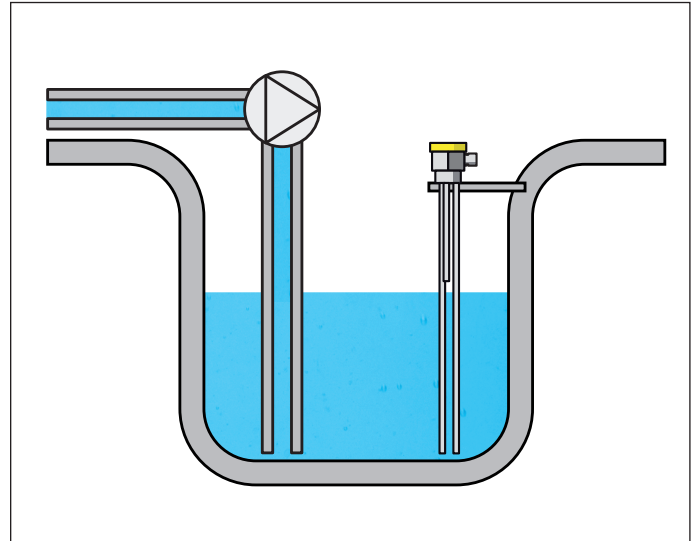


Fig. 2: Pump control with an EL 3 conductive measuring probe

Advantages:

- Up to five switching points with one sensor possible

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.

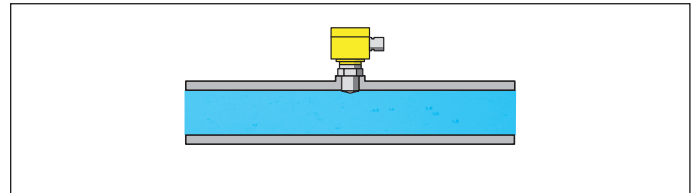


Fig. 3: Dry run protection in pipelines

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

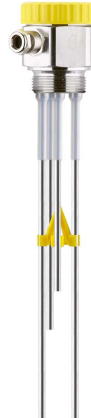


Applications	Conductive liquids, pipelines	Conductive liquids
Version	Compact level switch, partly insulated	Compact level switch, rod - partly insulated
Insulation	PTFE	PP
Length	--	0.12 ... 4 m (0.394 ... 13.12 ft)
Process fitting	Thread G1, cone, Tuchenhausen	Thread G1½
Process temperature	-40 ...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

EL 1



EL 3



EL 4



Applications	Conductive liquids	Conductive liquids	Conductive liquids
Version¹⁾	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 G1½	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 signal conditioning instrument.



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 G1½
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 signal conditioning instrument.

3 Mounting instructions

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.

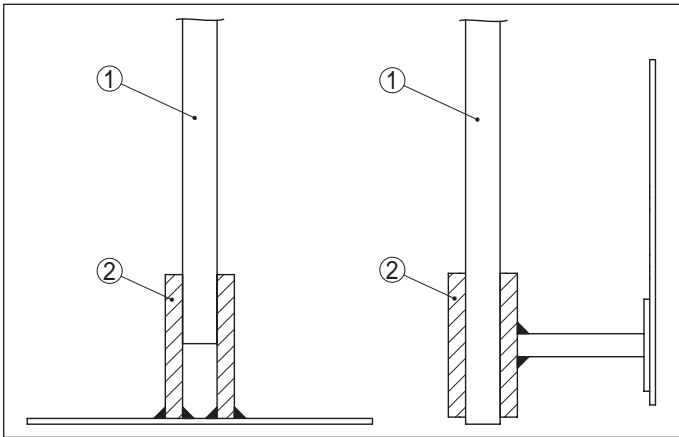


Fig. 11: Fasten the probe

- 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.

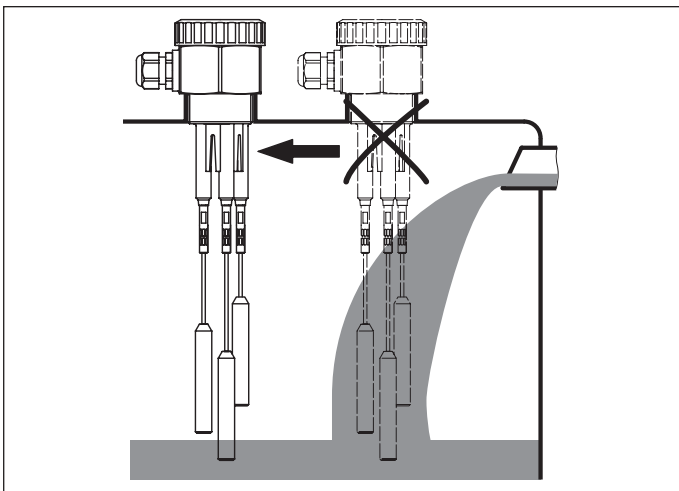


Fig. 12: Inflowing medium

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.

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.

Shorten the probe

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.

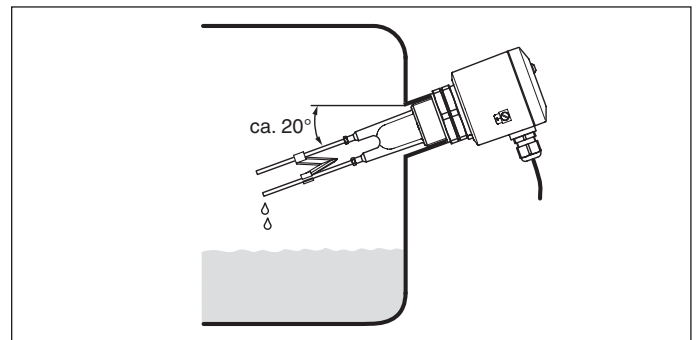


Fig. 13: Horizontal mounting

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.

4 Electrical connection

4.1 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. 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.

4.2 Wiring plan VEGAKON 61, 66

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.

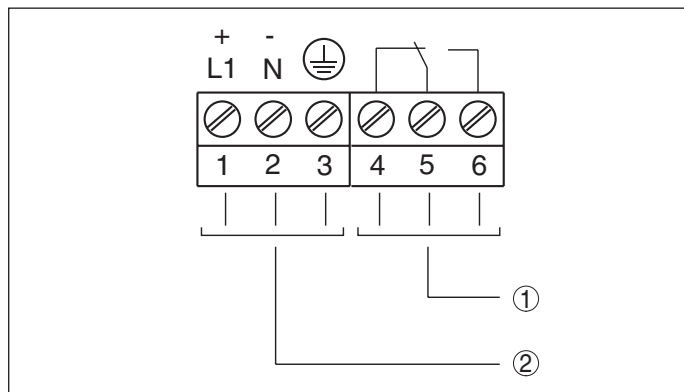


Fig. 14: VEGAKON 61 - electronics with relay output

- 1 Relay output
2 Voltage supply

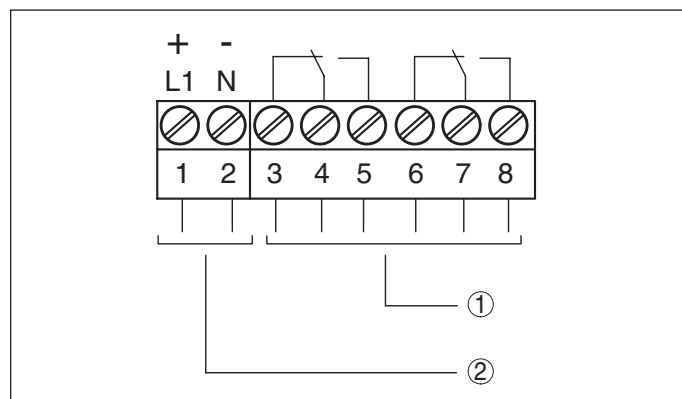


Fig. 15: VEGAKON 66 - electronics with relay output

- 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.

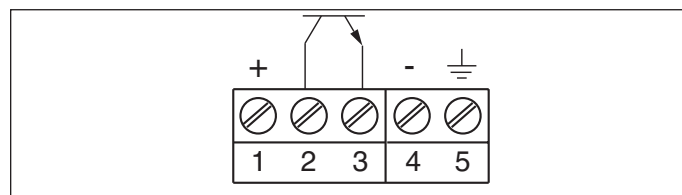


Fig. 16: VEGAKON 61 - transistor output

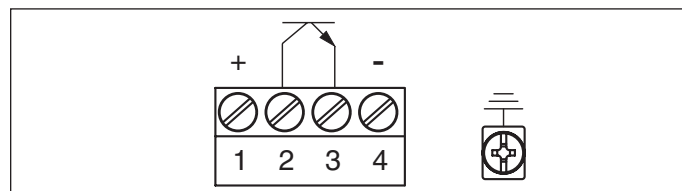


Fig. 17: VEGAKON 66 - transistor output

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.

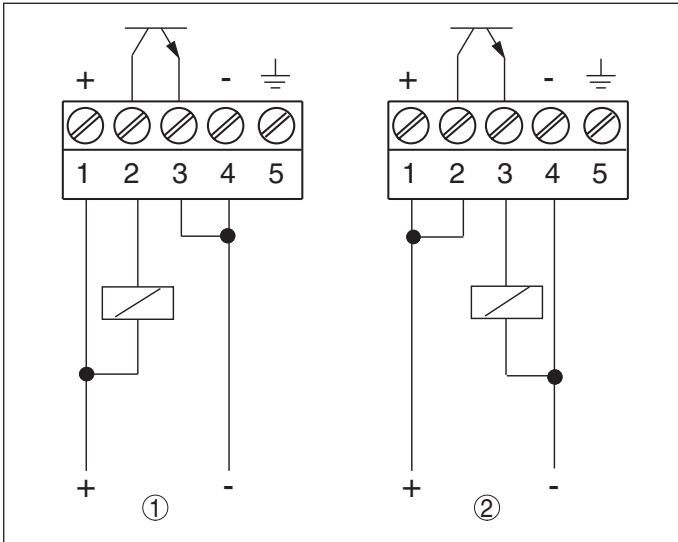


Fig. 18: VEGAKON 61 - electronics with transistor output

- 1 NPN action
2 PNP action

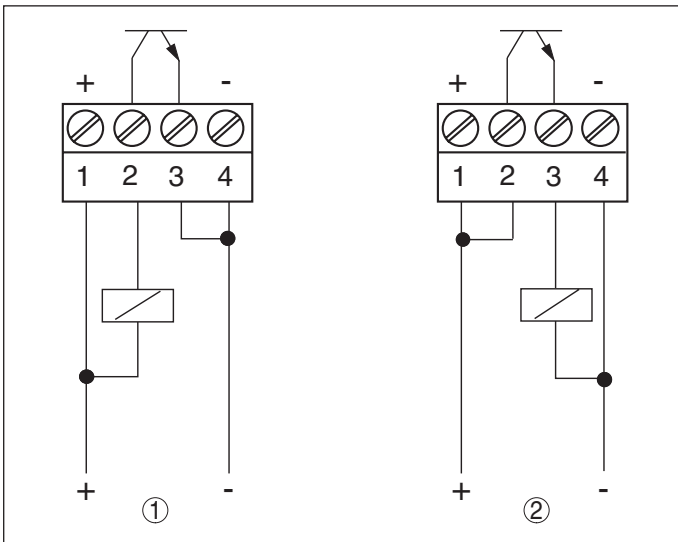


Fig. 19: VEGAKON 66 - electronics with transistor output

- 1 NPN action
2 PNP action

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

For connection to a signal conditioning instrument

You can find the electrical connection of the conductive probes in the product information manual "Signal conditioning instruments for conductive electrodes".

You can find suitable signal conditioning instruments in chapter "Technical data".

Select connection cable

To ensure the seal effect of the cable gland, the conductive probes are connected with standard cable with round cross-section. The outer diameter of the cable is stated in chapter "Technical data".

Line monitoring with VEGATOR 131, 132, 631, 632

The line break monitoring or alarm function defines the function of the signal conditioning instrument in case of failure.

To realize line break monitoring with the signal conditioning instruments VEGATOR 131, 132, 631 and 632, a supplementary electronics must be mounted in the connection housing of the probe.

When a fault message is generated, the switching output is simultane-

ously activated. Only failures of channel 1 are monitored.

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

The supplementary electronics for line break monitoring is available in two different versions differing optically in the cable colours.

- Cable colour red - in conjunction with a VEGATOR 632 signal conditioning instrument
- Cable colour blue - in conjunction with a VEGATOR 131, 132, 631 signal conditioning instrument

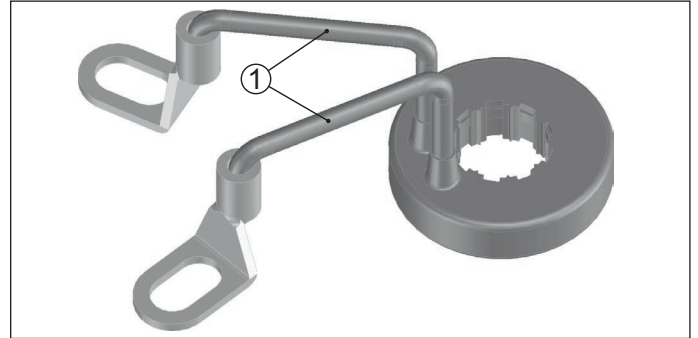


Fig. 20: Supplementary electronics for line break monitoring in conjunction with VEGATOR 131, 132, 631, 632

- 1 Connection cable red - in conjunction with the VEGATOR 632 signal conditioning instrument
2 Connection cable blue - in conjunction with the VEGATOR 131, 132, 631 signal conditioning instrument

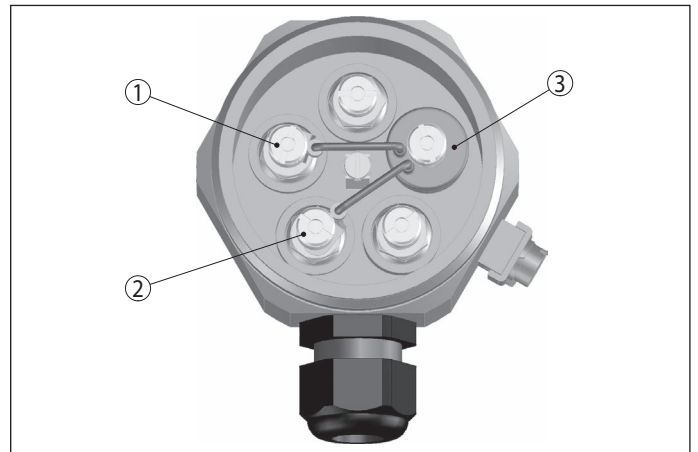
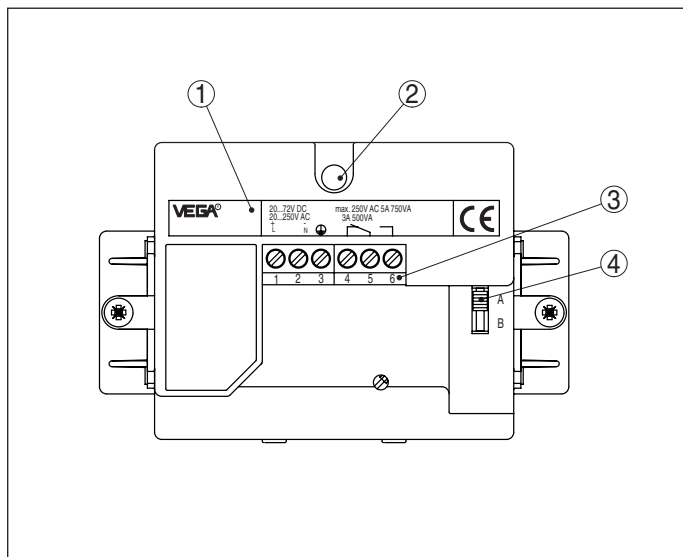


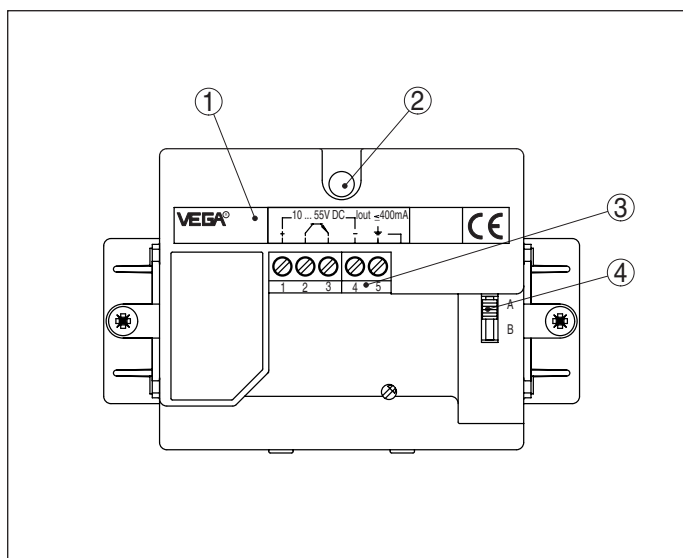
Fig. 21: Mounting of the additional electronics for line break monitoring

- 1 Connection to terminal 1 (ground rod = longest rod)
2 Connection to terminal 2 (max. rod = shortest rod)
3 Additional electronics for line break monitoring

5.1 Adjustment elements VEGAKON 61 R, 61 T



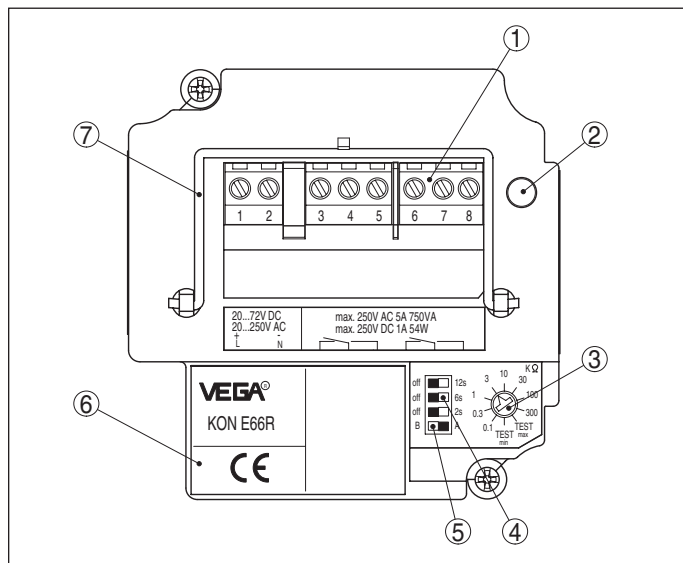
- 1 Type label
- 2 Control lamp (LED)
- 3 Connection terminals
- 4 Mode switch (A/B)



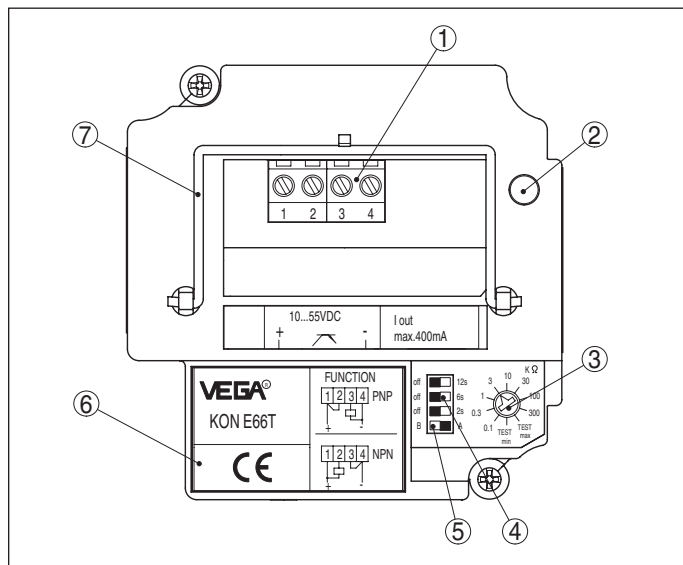
- 1 Type label
- 2 Control lamp (LED)
- 3 Connection terminals
- 4 Mode switch (A/B)

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).

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



- 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



- 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

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

With the rotary switch you can adjust the sensitivity of the instrument. Position 0.1 k Ω is less sensitive and switch position 300 k Ω 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 pull the electronics module out of the instrument housing.

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

The adjustment of probes EL is carried out via a suitable signal conditioning instrument. The adjustment possibilities are specified in the product information manual "*Signal conditioning instruments for conductive probes*".

6 Dimensions

VEGAKON 61

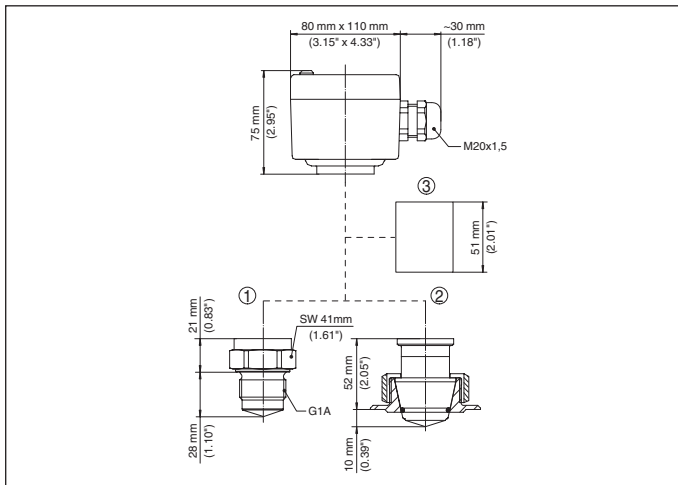


Fig. 26: VEGAKON 61

- 1 Threaded version
- 2 Cone version
- 3 Temperature adapter

VEGAKON 66

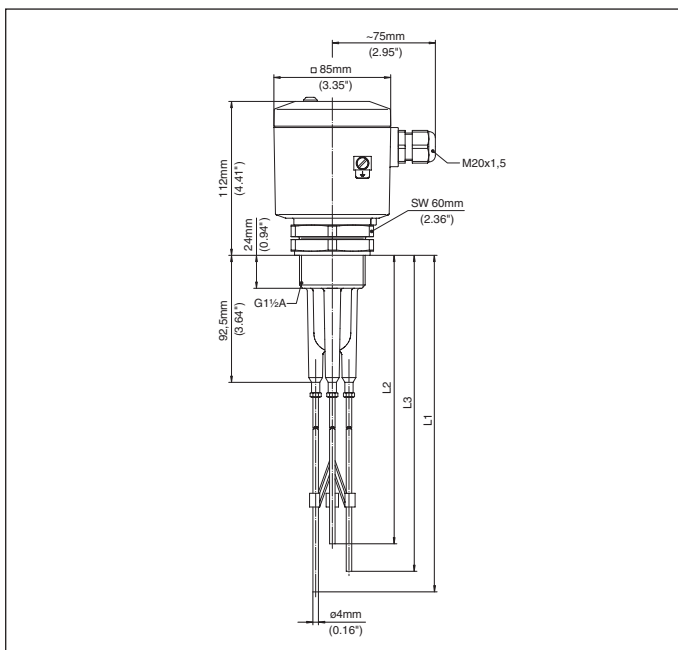


Fig. 27: VEGAKON 66 with three probes

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

EL 1

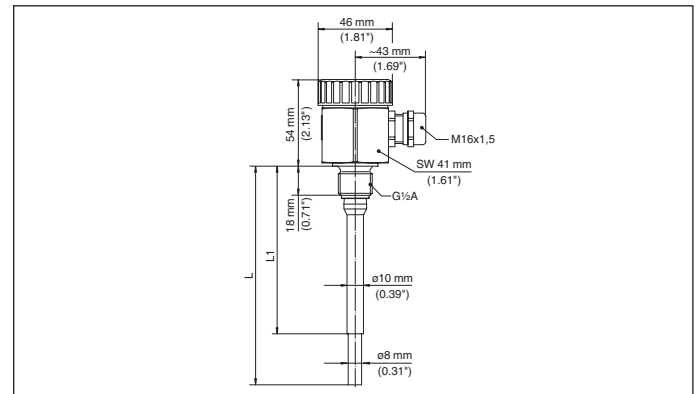


Fig. 28: Conductive rod electrode EL 1

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

EL 3

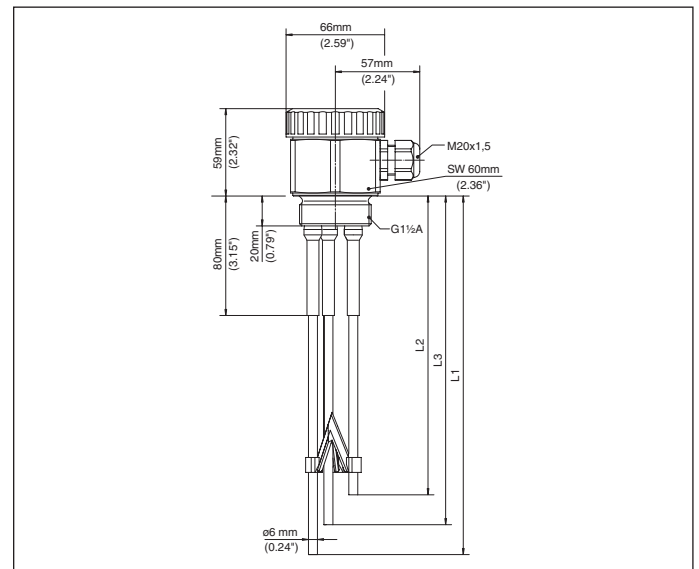


Fig. 29: Conductive multiple rod electrode EL 3

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

EL 4

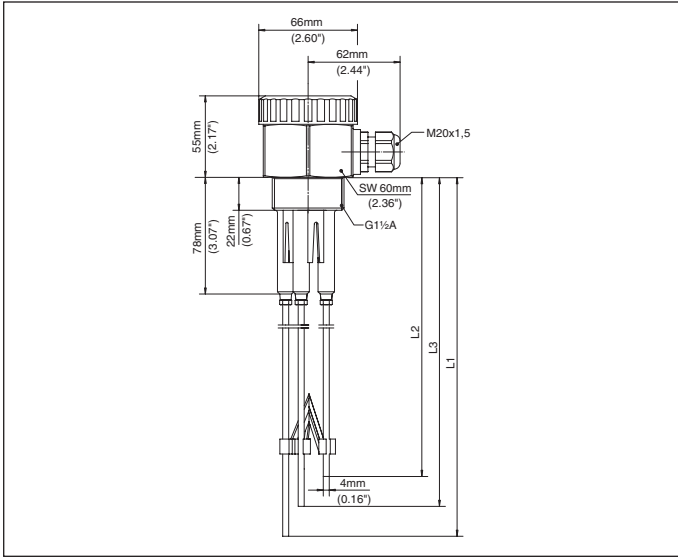


Fig. 30: Conductive multiple rod electrode EL 4

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

EL 6

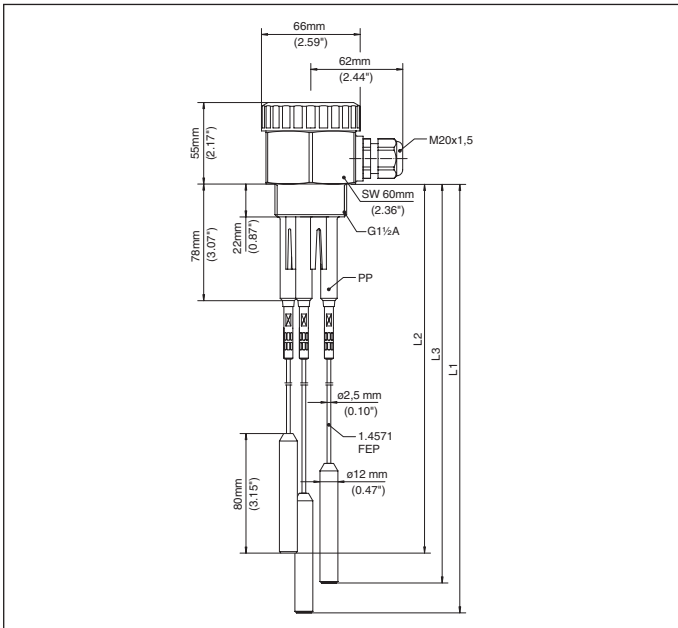


Fig. 31: Conductive multiple cable electrode EL 6

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

EL 8

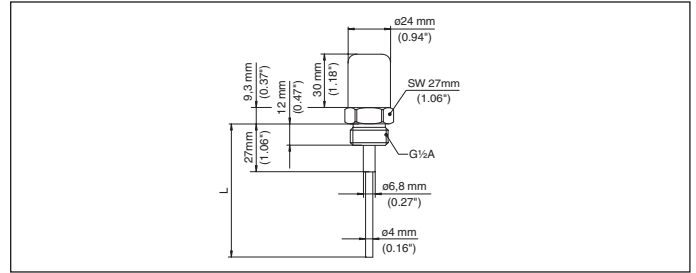


Fig. 32: Conductive rod electrode EL 8

- L Sensor length, see chapter "Technical data"



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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