Operating Instructions

Conductive multiple rod level switch for liquids

VEGAKON 66

- Relay (DPDT)

Document ID: 32649

VEGA

Contents

32649-EN-151021

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1 About this document

1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. 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 specialist personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbols used

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.

1 **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 operating instructions manual must be carried out only by trained specialist 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 VEGAKON 66 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 the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and guidelines. 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.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

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.

The safety approval markings and safety tips on the device must also be observed.

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2.5 Safety label on the instrument

The safety approval markings and safety tips on the device must be observed.

2.6 CE conformity

This device fulfills the legal requirements of the applicable EC guidelines. By attaching the CE mark, VEGA provides a confirmation of successful testing. You can find the CE conformity declaration in the download area of "www.vega.com".

2.7 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 fulfill 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:

- VEGAKON 66 compact level switch
- Documentation
  - This operating instructions manual

Constituent parts

The VEGAKON 66 consists of the components:

- Housing lid
- Housing with electronics
- Process fitting with electrodes

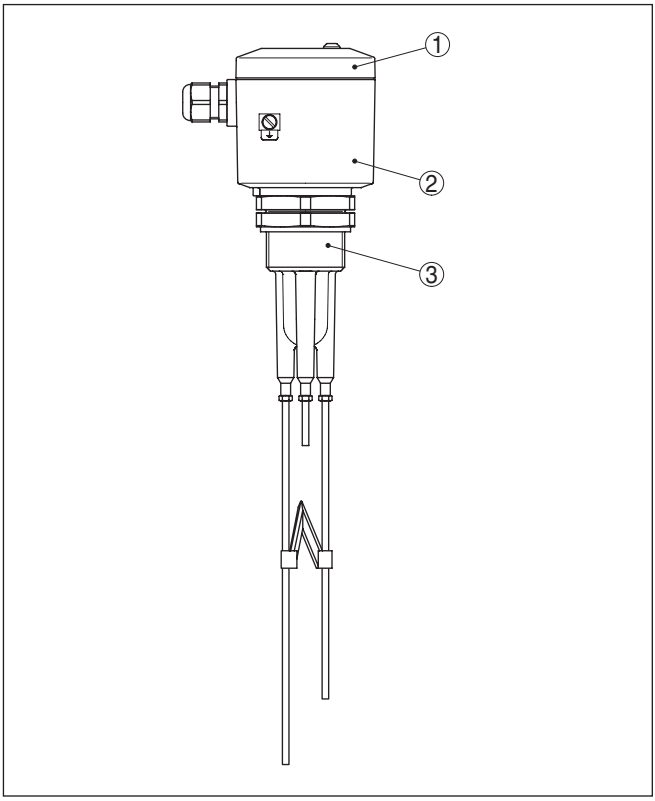

Fig. 1: VEGAKON 66

1 Housing lid
2 Housing with electronics
3 Process fitting with electrodes

Serial number - Instrument search

The type label contains the serial number of the instrument. With it you can find the following instrument data on our homepage:

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- Product code (HTML)
- Delivery date (HTML)
- Order-specific instrument features (HTML)
- Operating instructions and quick setup guide at the time of shipment (PDF)
- Order-specific sensor data

Go to www.vega.com, "*VEGA Tools*" and "*Instrument search*". Enter the serial number.

Alternatively, you can access the data via your smartphone:

- Download the smartphone app "*VEGA Tools*" from the "*Apple App Store*" or the "*Google Play Store*"
- Scan the Data Matrix code on the type label of the instrument or
- Enter the serial number manually in the app

3.2 Principle of operation

Area of application

The conductive VEGAKON 66 compact level switches detect levels of conductive liquids.

Functional principle

If at least two electrodes are covered with a conductive medium, small alternating currents (< 1 mA) flow from the measuring electrode to the ground electrode.

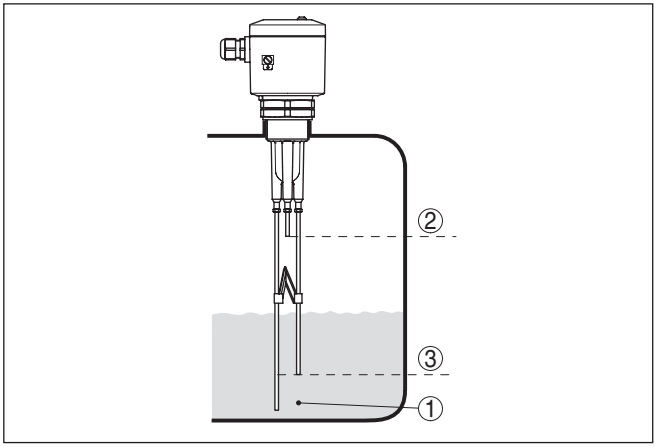


Fig. 2: Functional principle

1 Ground probe
2 Max. level (max. electrode)
3 Min. level (min. electrode)

These alternating currents are measured in respect to their amplitude and phase position and converted into a switching command.

VEGAKON 66 can be used for reliable detection of products over a very wide conductivity and viscosity range.

A level detection can be realised with two measuring electrodes, e.g. a pump or two-point control with three measuring electrodes.

Voltage supply

VEGAKON 66 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 Operation

The VEGAKON 66 is a compact level switch with integrated electronics module.

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

- Control lamp for indication of the switching status
- Mode changeover for selection of the output signal
- DIL switch for adjustment of the damping
- Rotary switch for adjustment of the conductivity value

3.4 Storage and transport

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 carton material. The sensing element is additionally protected with a cardboard cover. For special versions, PE foam or PE foil is also used. Please dispose of the packaging material through 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 %

4 Mounting

4.1 General instructions

Suitability for the process conditions

Make sure that all parts of the instrument coming in direct contact with the process, especially the sensor element, process seal and process fitting, are suitable for the existing process conditions, such as process pressure, process temperature as well as the chemical properties of the medium.

You can find the specifications in chapter "*Technical data*" and on the nameplate.

Moisture

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

You can give your VEGAKON 66 additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. 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.

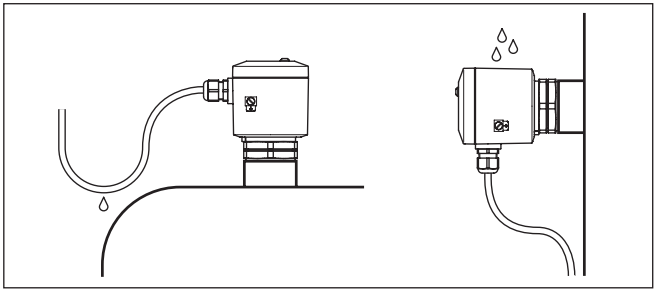


Fig. 3: Measures against moisture ingress

Pressure/Vacuum

The process fitting must be sealed if there is gauge or low pressure in the vessel. Before use, check if the seal 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

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

Due to agitators, equipment vibration or similar, the level switch can be subjected to strong lateral forces.

During operation, the probe must not touch any installations or the vessel wall. If necessary, secure the end of the probe (insulated). Provide a suitable insulated support directly above the probe end.

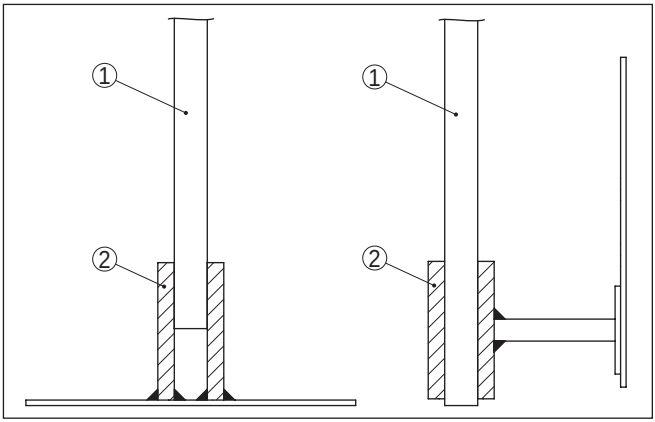


Fig. 4: Fasten the probe

1 Measuring probe
2 Plastic sleeve at the probe end or laterally mounted

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 personnel authorised by the plant operator.
- Always switch off power supply, before connecting or disconnecting the instrument.

Note:
Install a separating facility for the instrument which is easy to access. The separating facility must be marked for the instrument (IEC/EN61010).

Voltage supply

Connect the voltage supply according to the following connection diagrams. The electronics module KONE60R 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 screen. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

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.

5.2 Connection instructions

Danger:
Switch off power supply before starting connection work.

Connect mains voltage according to the connection diagrams.

5.3 Wiring plan

Floating relay output

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

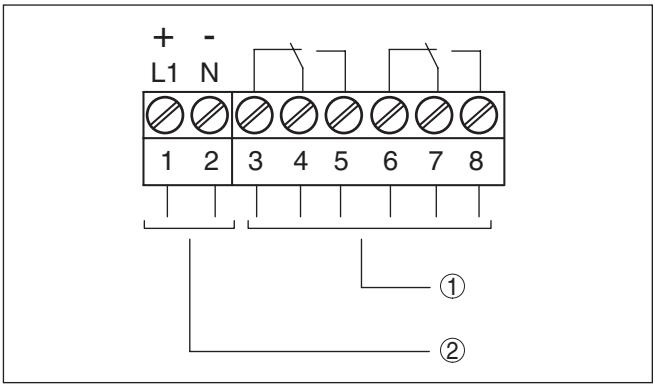


Fig. 5: Electronics with relay output

1 Relay output
2 Voltage supply

6 Setup

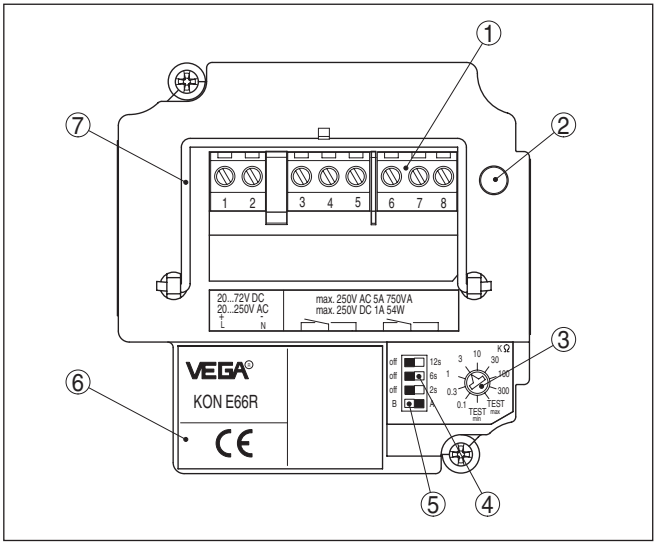
6.1 General information

Function/Configuration

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

- DIL switch for mode adjustment
- DIL switch for adjustment of the damping
- Rotary switch for adjustment of the conductivity value
- Control lamp for indication of the switching status

6.2 Adjustment elements



1 Connection terminals
2 Control lamp (LED)
3 Rotary switch: Adjustment of the conductivity value
4 Selection switch: Switch-on delay
5 Selection switch: Mode (A/B) VEGAKON 66
6 Type label
7 Tensile proving ring

Signal lamp (2)

The switching condition of the signal lamp can be checked when the housing is closed. To adjust VEGAKON 66 loosen the four screws with a wrench on the upper side of the instrument and remove the housing cover.

Rotary switch: Adjustment of the conductivity value (3)

With the rotary switch you can set the sensitivity of the instrument. Position 0.1 kΩ is the less sensitive and switch position 300 kΩ the most sensitive one, see chart "*Switching point adjustment*".

Selection switch: Switching delay (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 switching delay refers to the switching status of both relay outputs.

With the switches (2 s, 6 s, 12 s) you can set the switching delay 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 switching delay will be 14 s.

Mode adjustment (5)

With the mode adjustment (A/B) you can change the switching condition of the output. You can set the required mode according to the "*Function chart*" (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 Switching point adjustment

Rotary switch position

Switching point at approx. 1 cm covering.

Rotary switch position	Conductivity value (medium)
Test max.	Switching condition with complete covering is simulated
0.1 kΩ (insensitive)	> 6.6 mS
0.3 kΩ	> 1.7 mS
1 kΩ	> 540 µS
3 kΩ	> 180 µS
10 kΩ	> 54 µS
30 kΩ	> 20 µS
100 kΩ	> 5.7 µS
300 kΩ (sensitive)	> 1.6 µS
Test min.	Empty state is simulated

Examples of conductivity values

Medium	Conductivity value	Recommended rotary switch position
Tap water	0.2 mS	3 kΩ
Saltwater (3.5 %)	35 mS	0.1 kΩ
Beer	1.4 mS	1 kΩ
Fruit juice	2 mS	0.3 kΩ
Milk, yogurt	3 mS	0.3 kΩ
Ketchup	15 mS	0.1 kΩ

Determination of the response height

In case of horizontally mounted instruments, the response height is determined by the mounting height.

In case of vertically mounted instruments, the response height is determined by the length of the probe rods.

The modification of the response height by turning the conductivity value switch is not useful.

To adapt the response height, you can shorten the measuring rods by sawing them off. Before shortening, unscrew the rods out of the plastic threaded part of the sensor to avoid damaging the probe.

The numbers of the rods are visible on the lower side of the thread.

The ground rod (no. 1) must have the same length or must even be longer than the longest of the other rods.

The max. rod (no. 2) defines the response height with single point level switches or the upper switching level with two-point control. It is the shortest rod.

The min. rod (no. 3) defines the lower switching level, it must hence be longer than the max. rod. It is not available with instruments for single point level detection.

The electronics recognises if a min. rod is screwed in and changes automatically from single to two-point control.

Standard setting

For products with a good conductivity (> 3 mS), set the rotary switch - cnductivity setting (3) generally to switch position 3 kΩ. Hence the instrument is already completely adjusted.

Take note of the instructions in chart "*Examples of conductivity values*". The recommended settings take also influences such as e.g. condensation or slight buildup into account.

If there is danger of strong buildup or condensation, you can set the instrument more insensitive by one rotary switch position.

The "*Function chart*" shows how to select the switching condition of the output.

Level detection for max. signal

The following settings apply to products with low conductivity (< 3 mS)

1. Fill the vessel until the shortest probe is covered approx. 1 cm
2. Switch on the power supply
3. Set the A/B switch to mode A
4. Set the rotary switch to position "TEST min."
5. Turn the rotary switch slowly clockwise until the red LED lights

The instrument is adapted to the medium, i.e. the relay deenergized with max. level.

Level detection for min. signal

The following settings apply to products with low conductivity (< 3 mS)

1. Empty the vessel until the min. measuring electrode is only covered approx. 1 cm
2. Switch on the power supply

3. Set the A/B switch to mode B
4. Set the rotary switch to position "TEST max."
5. Turn the rotary switch slowly anticlockwise until the red LED lights

The instrument is adapted to the medium, i.e. the relay deenergized with min. level.

Two-point control - A-mode

The following settings apply to products with low conductivity (< 3 mS)

1. Fill the vessel until the shortest probe is covered approx. 1 cm
2. Switch on the power supply
3. Set the A/B switch to mode A
4. Set the rotary switch to position "TEST min."
5. Turn the rotary switch slowly clockwise until the red LED lights

The instrument is adapted to the medium, i.e, the relay deenergizes when the max. level is reached. Only when the min. probe is decreased, the relay energizes again.

Example: A filling pump is switched on when the level falls below the min. signal, fills the vessel until the max. signal is reached and is then switched off.

Two-point control - B-mode

The following settings apply to products with low conductivity (< 3 mS)

1. Empty the vessel until the min. measuring electrode is only covered approx. 1 cm
2. Switch on the power supply
3. Set the A/B switch to mode B
4. Set the rotary switch to position "TEST max."
5. Turn the rotary switch slowly anticlockwise until the red LED lights

The instrument is adapted to the medium, i.e. the relay energizes at max. level. Only of the min. probe is decreased, the relay denergizes again.

Example: An emptying pump is switched on when the level reaches the max. signal, empties the vessel until the min. signal is reached and is then switched off.

Dry adjustment

In case of several measurement loops (same medium), the adjustment of one instrument with medium is sufficient. The determined switch position can be transferred to all other instruments.

When the conductivity value is known, the switching point adjustment can be carried out according to the setup in chart "*Rotary switch adjustment*".

When exchanging the electronics module, it is sufficient to take over the setting of the old electronics module.

6.4 Function chart

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

	Level	Switching status, relay module E60R	Control lamp
Mode A Overflow protection		Relay energized 	○ does not light
Mode A Overflow protection		Relay deenergized 	☼ lights
Mode B Dry run protection		Relay energized 	○ does not light
Mode B Dry run protection		Relay deenergized 	☼ lights
Failure of the supply voltage (mode A/B)		Relay deenergized 	○ does not light

1 Max. detection - Vessel empty
2 Max. detection - Vessel full
3 Min. detection - Vessel full
4 Min. detection - Vessel empty

Note:
If VEGAKON 66 is used for oil warning in water, the probe must be cleaned after having responded to oil (= empty signal) because otherwise resetting to water will not be ensured reliably.

7 Maintenance and fault rectification

7.1 Maintenance

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

7.2 Electronics exchange

In general, all electronics modules of series KONE66 can be interchanged. If you want to use an electronics module with a different signal output, you can download the corresponding operating instructions manual from our homepage under Downloads.

Proceed as follows:

1. Switch off power supply
2. Unscrew the housing lid
3. Loosen compression fittings with a screwdriver
4. Pull the connection cables out of the terminals
5. Loosen the two screws with a screw driver (Phillips recessed head)
6. Lift tensile proving ring and pull out the old electronics module
7. 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.
8. Note settings of all adjustment elements of the old electronics module.

   Set the adjustment elements of the new electronics module to the same settings of the old one.
9. Screw in and tighten the two holding screws with a screwdriver (Phillips)
10. Insert the wire ends into the open terminals according to the wiring plan
11. Tighten the screw terminals
12. Check the hold of the wires in the terminals by lightly pulling on them
13. Check cable gland on tightness. The seal ring must completely encircle the cable.
14. Screw the housing lid back on

The electronics exchange is now finished.

As soon as you insert the electronics module, VEGAKON 66 is ready for operation.

7.3 Simulation of switching functions

With the rotary switch for conductivity adjustment, full covering or empty signal can be simulated.

The filling height must not be changed. You can hence easily check the response of connected signalling and switching facilities. Parts of the sensor electronics are also checked during this test.

The following switch positions, simulate the switching conditions:

- Switch position "*Test max.*" full covering (max.)
- Switch position "*Test min.*" empty signal (min.)

7.4 How to proceed if a repair is necessary

You can find an instrument return form as well as detailed information of the procedure in the download area on our homepage: 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.

8 Dismount

8.1 Dismounting steps

Warning:
Before dismounting, 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 power 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 parts to be easily separable.

WEEE directive 2002/96/EG
This instrument is not subject to the WEEE directive 2002/96/EG and the respective national laws. Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.

Correct disposal avoids negative effects on humans and the environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

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	PP (Polypropylene)
– Electrode	316Ti (1.4571)
– Process seal	Klingersil C-4400
Materials, non-wetted parts	
– Housing	Plastic PBT (polyester), Alu die-casting powder-coated
– Seal ring between housing and housing cover	Silicone
– Ground terminal	316L
Weights	
– With plastic housing	550 g (19.4 oz)
– with Aluminium housing	850 g (30 oz)
– Electrode	100 g/m (1.1 oz/ft)
Probe length (L)	
– min.	120 mm (4.7 in)
– max.	4000 mm (157.5 in)
Process fittings	
– Thread (DIN 3852-A)	G1½ (PN 25)
Measurement voltage	approx. 3 V_{eff}
Measurement current	< 3 mA

Output variable

Output	Relay output (DPDT), 2 floating spdts
Switching voltage	
– min.	10 mV
– max.	253 V AC, 253 V DC
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.
Contact material (relay contacts)	AgNi (Au plated) or AgSnO (Au plated)

Modes (switchable)	
– A	Max. detection or overflow protection
– B	Min. detection or dry run protection
Switching delay	0.5 … 20 s

Ambient conditions	
Ambient temperature on the housing	-40 … +70 °C (-40 … +158 °F)
Ambient temperature with operating voltage > 60 V DC	-40 … +50 °C (-40 … +122 °F)
Storage and transport temperature	-40 … +80 °C (-40 … +176 °F)

Process conditions	
Permissible process temperature	-40 … +100 °C (-40 … +212 °F)
Process pressure	-1 … 6 bar/-100 … 600 kPa (-14.5 … 87 psig)
Conductance of the medium	min. 5 µS/cm with 30 mm electrode covering

Electromechanical data	
Cable gland	
– with relay module	1 x cable entry M20 x 1.5; 1 x blind plug M20 x 1.5 (cable gland M20 x 1.5 is attached)
Screw terminals	for wire cross-section up to 1.5 mm^2 (AWG 16)

Voltage supply	
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)

Electrical protective measures	
Protection rating	
– Plastic housing	IP 66 (NEMA 4X)
– Aluminium housing	IP 66/IP 67 (NEMA 4X)
Overvoltage category	II
Protection class	I

9.2 Dimensions

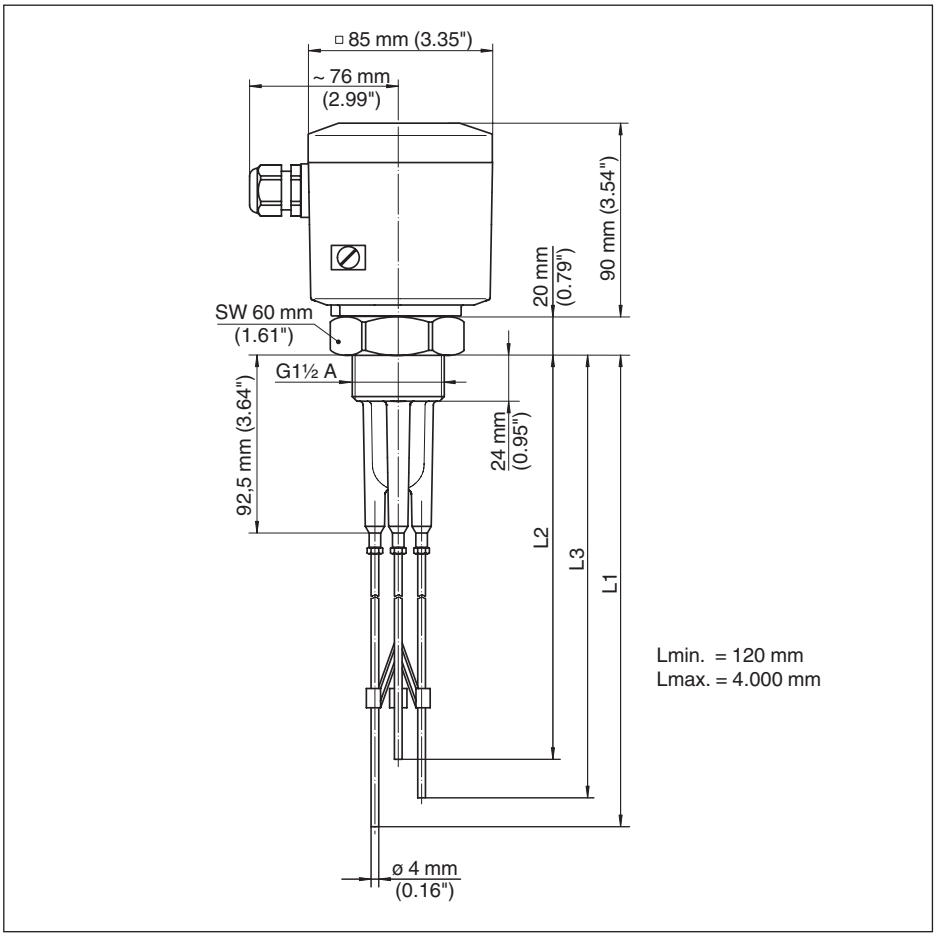


Fig. 21: VEGAKON 66 with three probes

The length of the electrode is calculated from the seal surface of the thread.
Hence the metallic rods are 92.5 mm (3.64 in) shorter.
L1 Length ground probe from seal surface
L2 Length max. probe from seal surface
L3 Length min. probe from seal surface

9.3 Industrial property rights

VEGA product lines are global protected by industrial property rights. Further information see www.vega.com.

Only in U.S.A.: Further information see patent label at the sensor housing.

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9.4 Trademark

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

Printing date:

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

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