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## Operating Instructions

Conductive multiple rod electrode

### Conductive probe EL 4



Document ID: 32653



**VEGA**

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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 EL 4 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.

## 2.5 Safety instructions for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

## 2.6 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:

- EL 4 point level switch
- Documentation
  - This operating instructions manual

#### Constituent parts

The EL 4 consists of the components:

- Housing lid
- Housing
- Process fitting with electrode

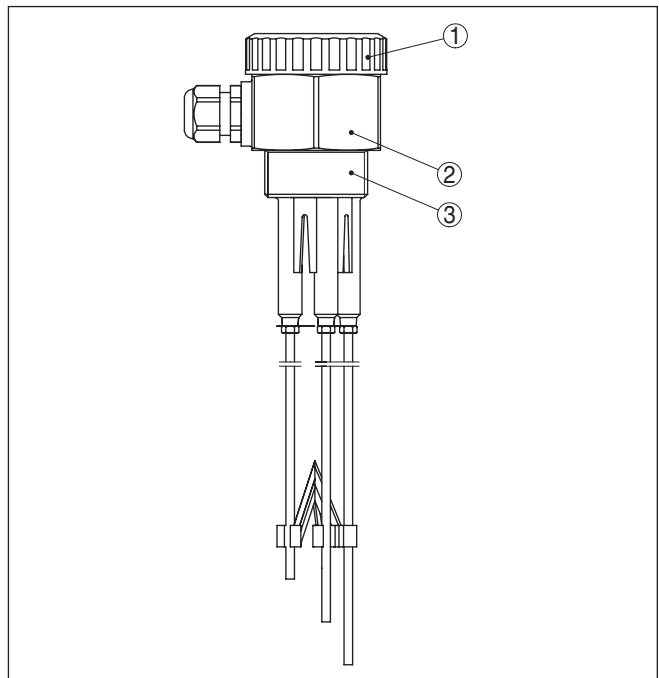


Fig. 1: Conductive multiple rod electrode EL 4

- 1 Housing lid
- 2 Housing
- 3 Process fitting

To create a measuring system you need one conductive probe and a VEGATOR 256C, 631 or 632 signal conditioning instrument.

#### 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:

- 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](http://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

EL 4 is a point level sensor with partly insulated conductive electrode for level detection.

EL 4 is very rugged and can be used in all areas of industrial process technology.

The level switch can be used in conductive liquids such as e.g. water. Typical applications are overflow and dry run protection.

The conductive measuring principle places no special requirements on installation. Hence, many different applications can be equipped with EL 4.

#### Functional principle

Conductive probes detect the product resistance when their electrodes are covered by the product.

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

A low alternating current flows through the electrodes, is measured for amplitude and phase position by the electronics of the signal conditioning instrument and converted into a switching command.

#### Voltage supply

EL 4 is operated with an external processing unit. The connected signal conditioning instrument powers EL 4 and provides a switching signal. A connected device can be activated directly with this switching command (e.g. a warning system, a PLC, a pump, etc.).

You can find the exact range of the voltage supply in chapter "Technical data" in the operating instructions manual of the signal conditioning instrument.

### 3.3 Operation

The probe does not have its own electronics. The measurement is carried out via the connected signal conditioning instrument.

### 3.4 Storage and transport

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.

#### Packaging

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 %



## 4 Mounting

### 4.1 General instructions

#### Switching point

In general the level switch can be mounted in any position. The instrument must be mounted in such a way that the probe is at the height of the requested switching point.

#### Handling

The probe is provided with a special hexagon for tightening. Due to the hexagon shape, the housing itself can be used to screw the instrument in.

The wrench size is stated in chapter "Supplement" under "Dimensions".

#### Moisture

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

You can give your EL 4 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.

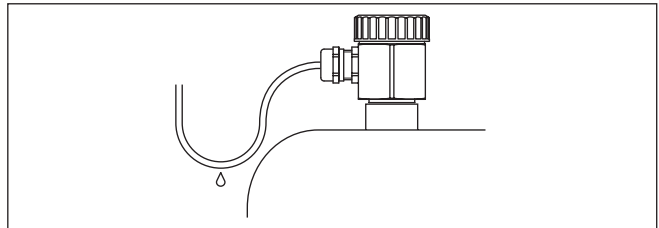


Fig. 2: Measures against moisture ingress

#### Transport

Do not hold EL 4 on its electrode rods. Particularly with long rod versions, the sensor can be damaged by the weight of the instrument.

#### 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.

### 4.2 Mounting instructions

#### Agitators and fluidization

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

Extreme vibration caused by the system, e.g. due to agitators or turbulence in the vessel from fluidisation, can cause the probe of EL 4 to vibrate in resonance. If a longer rod version is necessary, you can secure the probe by fastening a suitable isolated brace or guy directly above the end of the rod.

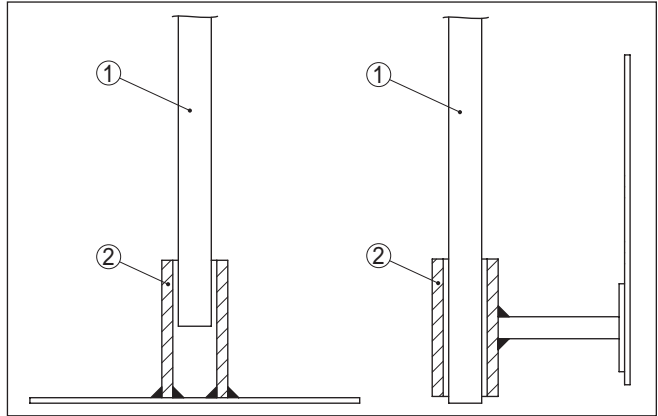


Fig. 3: Fasten the probe

1 Measuring probe

2 Plastic sleeve at the probe end or laterally mounted

### Inflowing medium

If EL 4 is mounted in the filling stream, unwanted false measurement signals can be generated. For this reason, mount EL 4 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.

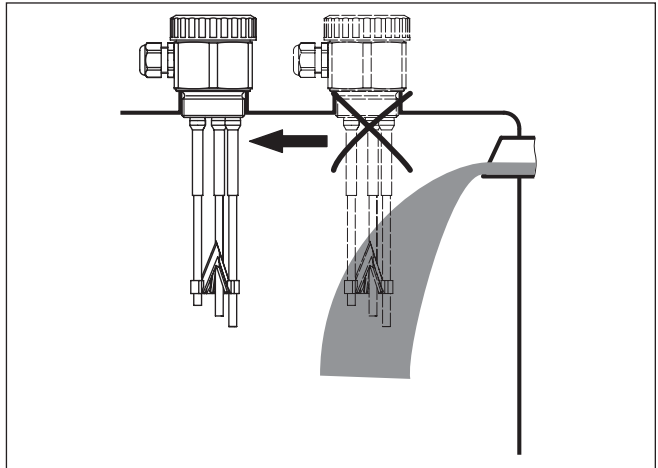


Fig. 4: Inflowing medium

### Socket

The probe should protrude into the vessel to avoid buildup. For that reason, avoid using high mounting bosses for screw-in fittings. This applies particularly to use in adhesive products.

**Ground connection**

Make sure that the mechanical connection of the probe to the vessel is electrically conductive 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 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.

#### Voltage supply

You can find the electrical connection of EL 4 in the operating instructions manual of the corresponding signal conditioning instrument.

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

#### Connection cable

The instrument is connected with standard two-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 Wiring plan

#### Terminal compartment

You can find the electrical connection of EL 4 in the operating instructions manual of the corresponding signal conditioning instrument.

#### Line monitoring with VEGATOR 631

To realize a line monitoring with a VEGATOR 631 signal conditioning instrument, a resistor of 220 kΩ must be integrated in the connection housing of the probe between terminal 1 and 2.

When a fault message is generated, the switching output is simultaneously activated.

If a fault message is not wanted, a bridge must be provided on the signal conditioning instrument instead of the resistor in the connection housing of the probe.

The line monitoring is thus deactivated and the fault message rendered invalid.

Take note of the operating instructions manual of the signal conditioning instrument.



With Ex versions, this 220 kΩ resistor is already integrated ex factory in the connection housing of the probe. The Ex measuring system (max. and ground connection cable of the probe to the signal conditioning instrument) is generally monitored for line break.

- Terminal 1 = longest rod (ground)
- Terminal 2 = shortest rod (max.)

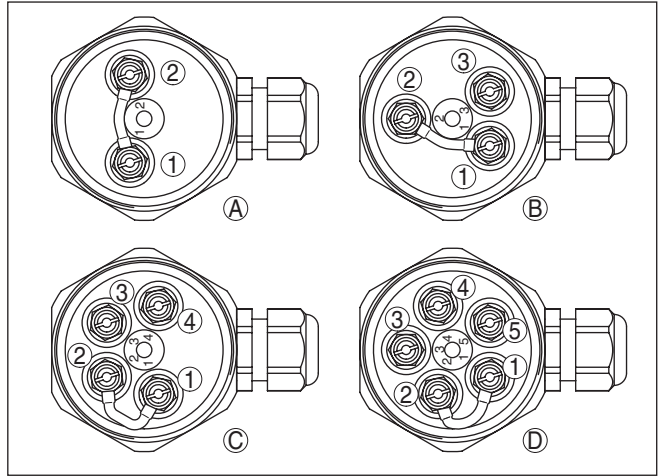


Fig. 5: Connection compartment of the probe - 220 kΩ resistance between terminals 1 and 2

- 1 Connection terminal 1 = longest rod
- 2 Connection terminal 2 = shortest rod
- A Probe with 2 rods
- B Probe with 3 rods
- C Probe with 4 rods
- D Probe with 5 rods

**Line monitoring with VEGATOR 632**

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

To realize line monitoring with a signal conditioning instrument VEGATOR 632, a supplementary electronics must be mounted in the connection housing of the probe.

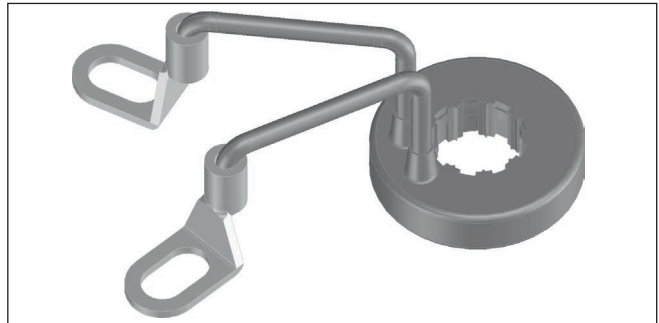


Fig. 6: Supplementary electronics for line break monitoring in conjunction with VEGATOR 632

1. Connect the eyelet according to the following illustration.  
Make sure that the eyelets have no contact to other metal parts.

2. Open one of the other terminals and attach the additional electronics.
3. Tighten the terminal.

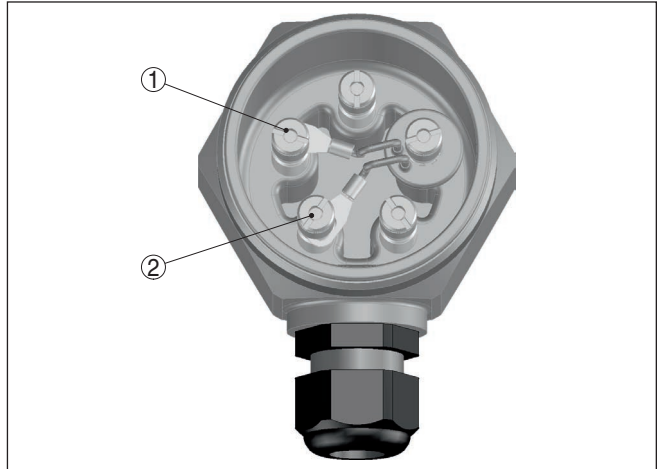


Fig. 7: Mounting of the additional electronics for line break monitoring

- 1 Connection to terminal 1 (ground rod = longest rod)
- 2 Connection to terminal 2 (max. rod = shortest rod)
- 3 Supplementary electronics for line break monitoring with VEGATOR 632

If you are using a probe without additional electronics for line break monitoring, a fault signal will be triggered.

Keep in mind that in case of a fault signal also the switching output will be activated.

Only failures of channel 1 are monitored.

Take note of the operating instructions manual of the signal conditioning instrument.

## 6 Setup

### 6.1 General information

You can find the setup procedure for EL 4 in the operating instructions manual of the corresponding signal conditioning instrument.

## 7 Maintenance and fault rectification

### 7.1 Maintenance

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

### 7.2 Rectify faults

#### Causes of malfunction

EL 4 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

You can find information on fault rectification in the operating instructions manual of the corresponding signal conditioning instrument.

#### 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.

### 7.3 Shortening the probe

The probe can be shortened by any amount.



#### Note:

Take note when shortening multiple probes that terminal 1 corresponds to the longest probe and terminal 2 to the shortest probe.

### 7.4 How to proceed if a repair is necessary

You can find a repair form as well as detailed information on how to proceed at [www.vega.com/downloads](http://www.vega.com/downloads) and "*Forms and certificates*".

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 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

Materials 316Ti corresponds to 1.4571, 316L corresponds to 1.4404 or 1.4435

Materials, wetted parts

|   |                          |
|---|--------------------------|
| – Process fitting   | PP                       |
| – Process seal  | Klingersil C-4400        |
| – insulation (partly insulated)                           | PP                       |
| – Electrode (rod partly PP insulated:<br>ø 4 mm/0.157 in) | 316Ti, Alloy C4 (2.4610) |

Materials, non-wetted parts

|   |     |
|---|-----|
| – Housing                                   | PP  |
| – Housing lid                               | PBT |
| – Seal between housing and housing<br>cover | NBR |
| – Cable gland                               | PA  |

Process fitting G1½ (DIN 3852-A)

Weight

|                                 |                     |
|---------------------------------|---------------------|
| – With plastic housing          | 400 g (14 oz)       |
| – Rod weight: ø 4 mm (0.157 in) | 100 g/m (1.1 oz/ft) |

Sensor length (L1 - L5) 0.1 ... 4 m (0.33 ... 13.12 ft)

Insulation length 78 mm (3 in)

#### Output variable

Suitable signal conditioning instruments VEGATOR 256C, 631, 632

#### 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 ... 6 bar/-100 ... 600 kPa (-14.5 ... 87 psig)

Process temperature EL 4 of 316L -20 ... +100 °C (-4 ... +212 °F)

Conductance of the medium min. 7.5 µS/cm

#### Electromechanical data

Cable entry 1 x cable gland M20 x 1.5 (cable:  
ø 5 ... 9 mm/0.2 ... 0.35 in)

#### Electrical protective measures

Protection rating IP 66/IP 67 (NEMA 4X)

**Approvals**

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 under [www.vega.com](http://www.vega.com) via "VEGA Tools" and "Instrument search" as well as via "Downloads" and "Approvals".

**9.2 Dimensions**

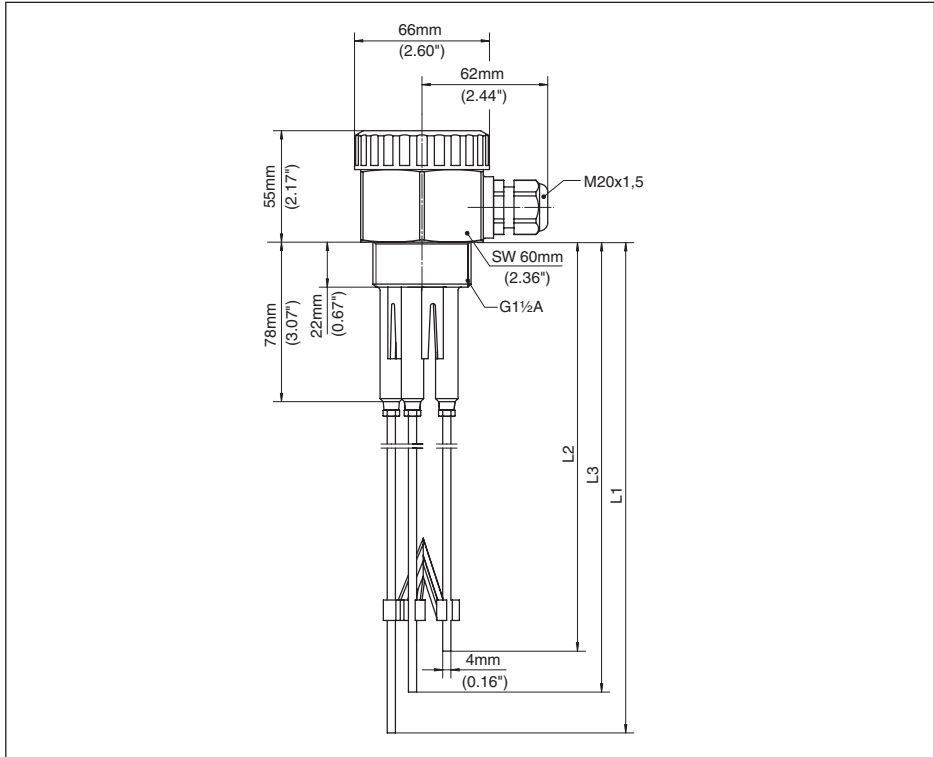


Fig. 8: Conductive multiple rod electrode EL 4

L1 Sensor length, see chapter "Technical data"

L2 Sensor length, see chapter "Technical data"

L3 Sensor length, see chapter "Technical data"

### 9.3 Industrial property rights

VEGA product lines are global protected by industrial property rights. Further information see [www.vega.com](http://www.vega.com).

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

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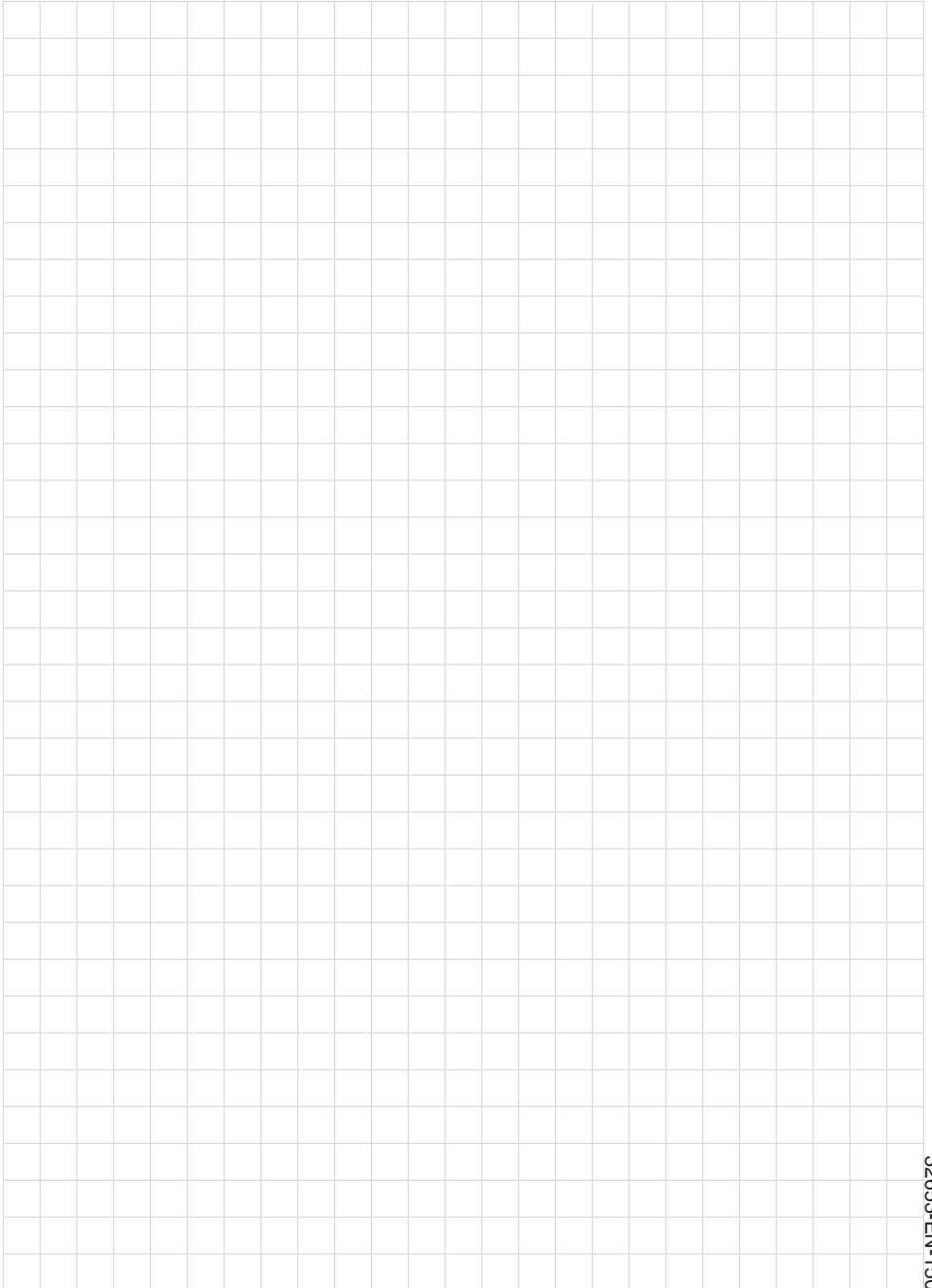
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进一步信息请参见网站<[www.vega.com](http://www.vega.com)。

### 9.4 Trademark

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







Printing date:

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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.

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