



# **Operating Instructions for Conductive Level Limit Switch**

**Model: NES, NE-104/-304**



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### Manufactured and sold by:

Kobold Messring GmbH  
Nordring 22-24  
D-65719 Hofheim  
Tel.: +49(0)6192-2990  
Fax: +49(0)6192-23398  
E-Mail: [info.de@kobold.com](mailto:info.de@kobold.com)  
Internet: [www.kobold.com](http://www.kobold.com)

## 2. Note

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Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The instruction manuals on our website [www.kobold.com](http://www.kobold.com) are always for currently manufactured version of our products. Due to technical changes, the instruction manuals available online may not always correspond to the product version you have purchased. If you need an instruction manual that corresponds to the purchased product version, you can request it from us free of charge by email ([info.de@kobold.com](mailto:info.de@kobold.com)) in PDF format, specifying the relevant invoice number and serial number. If you wish, the operating instructions can also be sent to you by post in paper form against an applicable postage fee.

Operating instructions, data sheet, approvals and further information via the QR code on the device or via [www.kobold.com](http://www.kobold.com)

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

## 3. Instrument Inspection

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Instruments are inspected before shipping and sent out in perfect condition.

Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

### **Scope of delivery:**

The standard delivery includes:

- Conductive Level Limit Switch    model: NES
- respectively conductive electrode relay    model: NE

## 4. Regulation Use

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The KOBOLD limit switches of model NES are used in connection with the electrode relay, model: NE, for level monitoring and pump control of conductive liquids. The design without any moving parts allows service with critical media with, for example, solid content, negligible density or high viscosity.

The minimum medium conductivity should be 20  $\mu\text{S}/\text{cm}$ .

Any use of the device which exceeds the manufacturer's specifications, may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

## 5. Operating Principle

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The instruments operate on the conductive principle. A low a.c. voltage is applied between the conductive wall of the tank or the ground electrode (longest electrode) and one respectively several switching point electrode. If the conductive medium touches the electrodes, a negligible alternating current flows across the electrodes and the conductive medium to the electrode relay. The relay amplifies the alternating current and operates one bi-stable interval relay with lock which is therefore suitable for an interval switching e.g. of a pump control (min./max. control).

Unlike to the NE-104 with only one limit value indication, one connection for a ground electrode and one min. and max. electrode, the relay NE-304 can observe two signals. The NE-304 offers connections for one ground electrode and two level limits at a time.

The outputs of NE-304 can both be operated as a min./max. control or separately as a limit switch (alarm) and a min./max. control.

## 6. Mechanical Connection

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The electrodes can for example be screwed into the tank cover and sealed via a pipe thread. The electrode length corresponds to the desired switching points and may be shortened as necessary. The electrode tip must be free of insulating materials. The electrodes must be installed so that the electrode rods or the pendant electrodes are not short-circuited neither by the side of the tank, nor by each other. Please ensure that the rods do not bend. The reference or ground electrode must be at least as long as the longest switching electrode. If the side of the tank is adequately conductive and is not coated with insulating material, it can be used as a ground electrode. The clearance between the switching electrode and the side of the tank should be as small as possible, so that the conductivity of the measuring distance does not drop below 20  $\mu\text{S}/\text{cm}$ .

Generally, please note:

- The level probes are generally intended for vertical installation.
- Short level electrodes, up to approx. 300 mm in length, can be installed in other positions.
- Long level electrodes must be supported if subjected to high lateral loads.
- If used in liquids which form a conductive coating on the electrode insulation, push the spacer away from the end of the electrode insulation by at least 150 mm. This means that you will obtain a high transition resistance with an uncovered electrode.
- When shortening an electrode, please ensure that electrode cladding is not damaged at other places during the trimming operation. Remove the rod cladding at the tip of the probe over a length of 3 - 5 mm.
- The screw in thread should be sealed with appropriate sealant.



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**Ensure that the insulation of the rods is not damaged during insertion of the rods into the flange or the screw-fitting.**

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## 7. Electrical Connection

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### 7.1 Conductive Level Switch (Electrodes with screw in thread and housing)

- The Conductive Level Switch is supplied with built-in terminal block for electrical connection.
- Numbering: shortest electrode 1; second-shortest electrode 2, etc.
- The Conductive Level Switch can only be used in conjunction with a suitable electrode relay (e.g. NE-104 or NE-304).



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**Ensure that the cable gland and the housing cover of the limit switch are strongly tightened after connection.**

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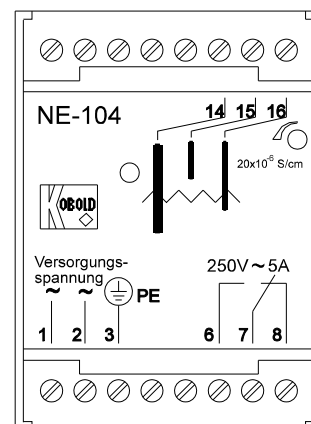
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**Maximum cable length: 300 m, minimum cross-section 0,5 mm<sup>2</sup>. Starting at a cable length of approx. 15 m and for EMC critical installation environment, a screened and low capacity cable must be used which is connected to an adequate shielded ground**

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## 7.2 NE-104 Electrode Relay

The NE-104 electrode relay is the standard relay for all conductive limit electrodes. It is supplied with a quiescent current relay, i.e., the relay picks up (contact 6-7 closes) when auxiliary power is applied. If the electrodes are wetted or the power fails, the relay disengages (contact 7-8 closes). The signal lamp (red LED) is energised when the relay picks up.



### Electrode connection

#### Usage as Min./Max. switch (2 electrodes)

- Connect the ground or reference electrode to terminal 14.
- Connect the switching electrode to terminal 15.

Level	Relay	LED
Below the switching electrode	relay picks up, contact 6-7 closed	on
Reaches or above the switching electrode	relay drops out, contact 7-8 closed	out

#### Usage as interval control (3 electrodes)

- Connect the ground or reference electrode to terminal 14.
- Connect the Max-switching electrode to terminal 15 and the Min-switching electrode to terminal 16.
- Contact 6-7 is closed when the tank is empty. When the liquid reaches the Max. electrode, the relay changes over and contact 7-8 closes. The relay remains changed over until the level falls below the Min. electrode. The interval then repeats itself.
- The changeover contact may be used for evacuating or filling - as shown in the circuit examples.

### Terminating the mains voltage

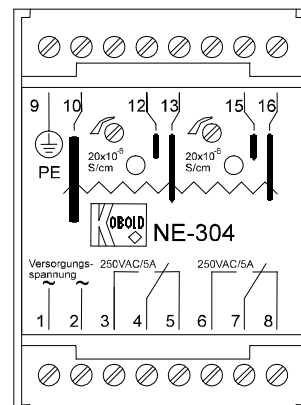
- The mains voltage is terminated at terminals 1 and 2, and the protective ground conductor at terminal 3 (PE).



**Note: Terminal 14 (ground) is internally linked to terminal 3 (PE).**

## 7.3 NE-304 Electrode Relay

The NE-304 electrode relay is a double relay with two separated electrode circuits and one reference electrode. It is supplied with a quiescent current relay, i.e., the relay picks up (contact 3-4 and 6-7 close) when auxiliary power is applied. If the electrodes are wetted or the power fails, the relay disengages (contact 4-5 and 7-8 close). The signal lamps (red LED's) are energised when the relay picks up.



### Electrode connection

#### Usage as Min./Max. switch (3 electrodes)

- Connect the ground or reference electrode to terminal 10.
- Connect Min.-switching electrode to terminal 12 and the Max.-switching electrode to terminal 15.

	Level	Relay	LED
Min-electrode	Reaches or above the switching electrode	relay drops out, contact 4-5 closed	out
	Below the switching electrode	relay picks up, contact 3-4 closed	on
Max.-electrode	Reaches or above the switching electrode	relay drops out, contact 7-8 closed	out
	Below the switching electrode	relay picks up, contact 6-7 closed	on

#### Usage as two interval controls (5 electrodes)

- Connect the ground or reference electrode (longest rod) to terminal 10.
- Pump 1: Connect the Max.-switching electrode to terminal 12 and the Min.-switching electrode to terminal 13. Contact 3-4 is closed when the tank is empty (LED 1-on). When the liquid reaches the Max. electrode, the relay changes over and contact 4-5 closes (LED 1-out). The relay remains changed over until the level falls below the Min. electrode. The interval then repeats itself.
- Pump 2: Connect the Max.-switching electrode to terminal 15 and the Min.-switching electrode to terminal 16. Contact 6-7 is closed when the tank is empty (LED 2-on). When the liquid reaches the Max. electrode, the relay changes over and contact 7-8 closes (LED 2-out). The relay remains changed over until the level falls below the Min. electrode. The interval then repeats itself.
- The changeover contact may be used for evacuating or filling—as shown in the circuit examples.



**Usage as one interval control and one switch point (4 electrodes)**

- Connect the ground or reference electrode (longest rod) to terminal 10.
- Pump 1: Connect the Max.-switching electrode to terminal 12 and the Min.-switching electrode to terminal 13.
- Connect the switch point electrode to terminal 15.

**Terminating the mains voltage**

- The mains voltage is terminated at terminals 1 and 2, and the protective ground conductor at terminal 9 (PE).

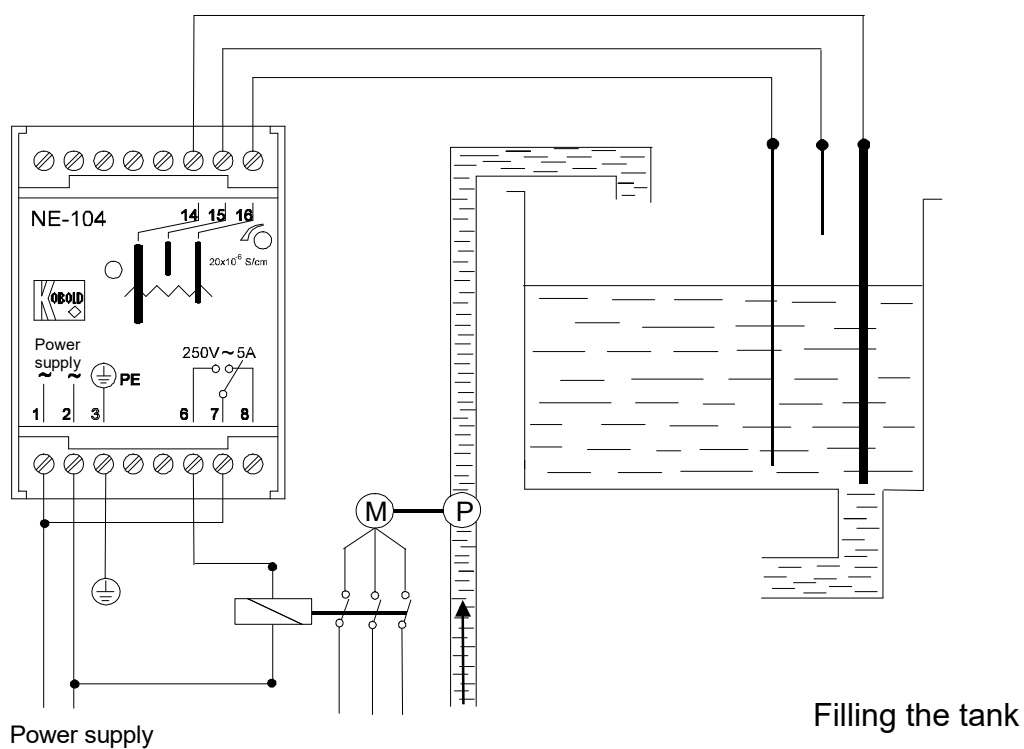
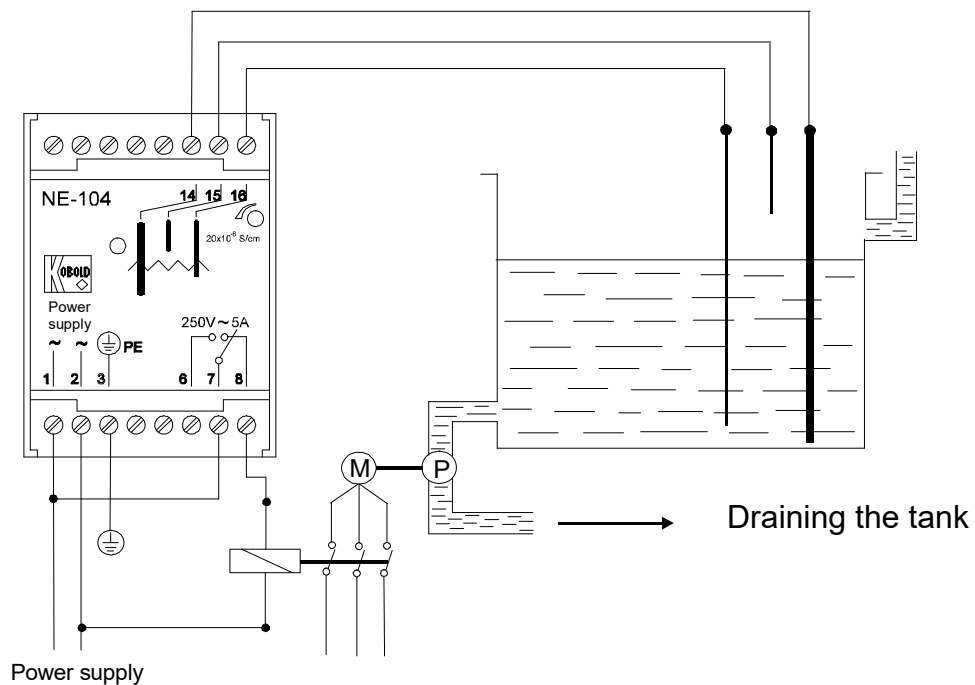


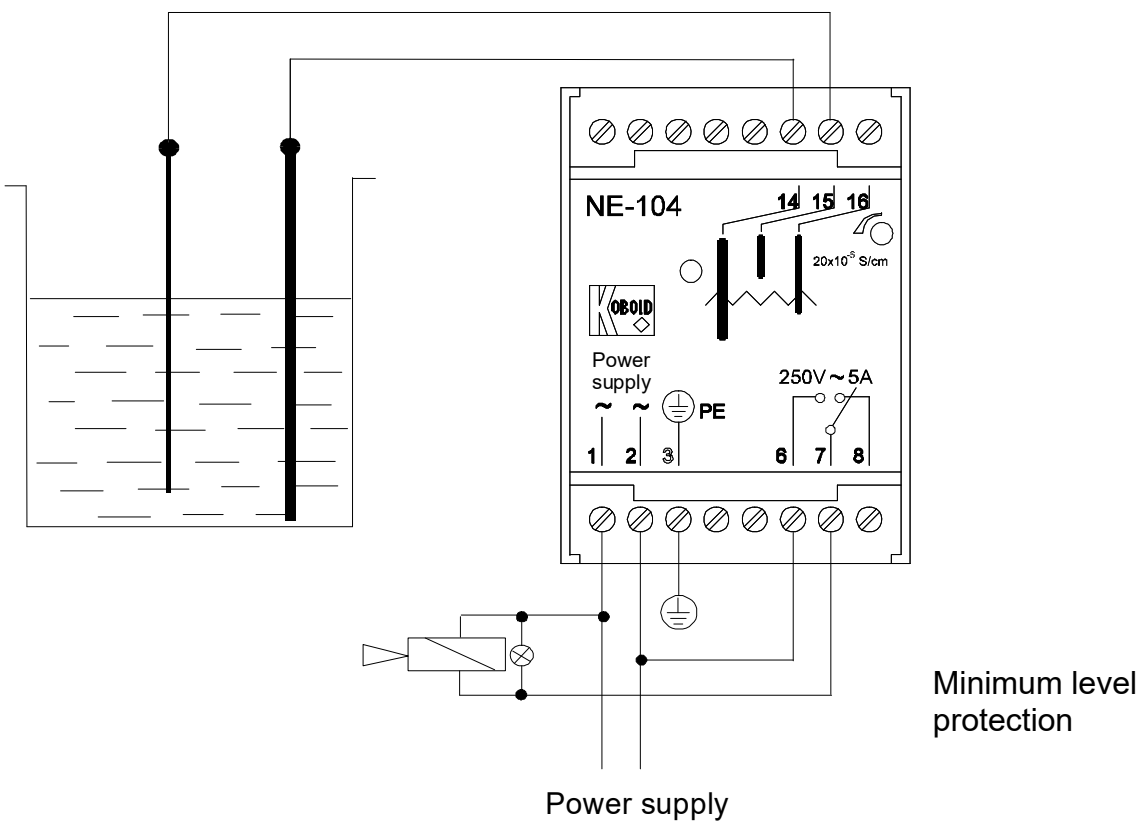
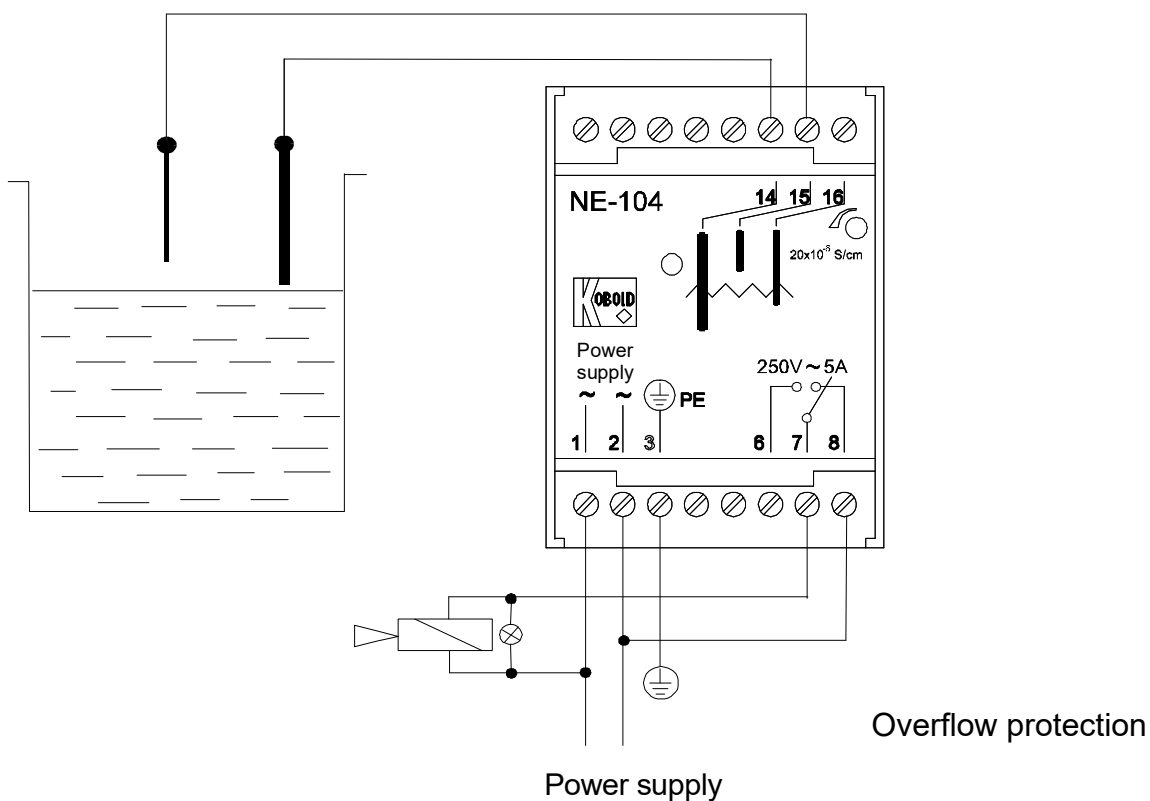
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**Note: Terminal 10 (ground) is internally linked to terminal 9 (PE).**

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## 7.4 Application examples with Electrode Relay NE-104





## 8. Commissioning

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Turn the sensitivity potentiometer fully clockwise to the right, until the stop is reached.

When the mains voltage and the electrodes have been connected according to their required function, the conductive limit switch is ready for operation. The tank may now be filled. The sensitivity is optimally adjusted with this basic setting.

Should foaming cause the relay to operate too early, the sensitivity can be reduced by turning the sensitivity potentiometer to the left, until the foam does not cause the relay to operate.

## 9. Locating and Remedying Faults

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### **The relay does not operate:**

- Check that the mains voltage is applied to terminals 1 and 2. If the voltage is present, the red LED should light up and the relay should pick up. If there is no reaction, the relay is faulty.
- If the LED is energised  
**Relay NE-104:** Disconnect the electrode from terminals 14, 15, and 16, and short-circuit terminals 14 and 15 with a wire jumper. The relay must drop out now. If there is no reaction, the relay is faulty.  
**Relay NE-304:** Disconnect the electrode from terminals 10, 12, 13, 15, and 16, and short-circuit terminals 10, 12 and 10, 15 with a wire jumper. The relay must drop out now. If there is no reaction, the relay is faulty.
- If the relay switches, remove the short-circuiting link and connect the electrodes according to the connecting instructions. Short-circuit the electrodes at the tips with a wire jumper. If the relay does not change over now, there is a cable interruption, or the electrode tips are insulated by deposits.
- If the relay with the wire jumper at the electrode tips changes over, remove the wire jumper, adjust the maximum sensitivity on the relay, and immerse the electrodes in the medium. If the relay still does not switch, the conductivity of the medium may be too low.

## **10. Maintenance**

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The Conductive Limit Switch requires absolutely no maintenance. The electrode tips should be occasionally inspected for deposits or corrosion and should be cleaned. Insulating deposits can cause a malfunction.

## 11. Technical Information

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Operating instructions, data sheet, approvals and further information via the QR code on the device or via [www.kobold.com](http://www.kobold.com)

## 12. Order Codes

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Operating instructions, data sheet, approvals and further information via the QR code on the device or via [www.kobold.com](http://www.kobold.com)

## 13. Dimensions

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Operating instructions, data sheet, approvals and further information via the QR code on the device or via [www.kobold.com](http://www.kobold.com)

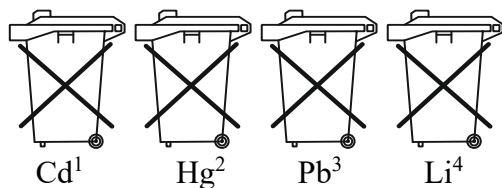
## 14. Disposal

### Note!

- Avoid environmental damage caused by media-contaminated parts
- Dispose of the device and packaging in an environmentally friendly manner
- Comply with applicable national and international disposal regulations and environmental regulations.

### Batteries

Batteries containing pollutants are marked with a sign consisting of a crossed-out garbage can and the chemical symbol (Cd, Hg, Li or Pb) of the heavy metal that is decisive for the classification as containing pollutants:



1. „Cd" stands for cadmium
2. „Hg" stands for mercury
3. „Pb" stands for lead
4. „Li" stands for lithium

### Electrical and electronic equipment



## 15. EU Declaration of Conformance

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We, KOBOLD Messring GmbH, Nordring 22-24, 65719 Hofheim, Germany, declare under our sole responsibility that the product:

**Conductive Limit Switch      Model: NE-104, NE-304**

to which this declaration relates is in conformity with the following EU directives stated below:

<b>2014/30/EU</b>	<b>EMC Directive</b>
<b>2014/35/EU</b>	<b>Low Voltage Directive</b>
<b>2011/65/EU</b>	<b>RoHS (category 9)</b>

Also, the following standards are fulfilled:

**EN IEC 61326-1:2021**

Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements, industrial area (measurement of interference immunity to HF fields up to 1 GHz)

**EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019**      Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements

Hofheim, 12 März 2024



H. Volz  
General Manager

J. Burke  
Compliance Manager