

# EN

INSTRUCTIONS  
MULTIMETER



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**Information on the use of these instructions**


**Symbols**


 **Warning of electrical voltage**  
This symbol indicates dangers to the life and health of persons due to electrical voltage.

 **Warning**  
This signal word indicates a hazard with an average risk level which, if not avoided, can result in serious injury or death.

 **Caution**  
This signal word indicates a hazard with a low risk level which, if not avoided, can result in minor or moderate injury.

**Notice**  
This signal word indicates important information (e.g. material damage), but does not indicate hazards.

 **Info**  
Information marked with this symbol helps you to carry out your tasks quickly and safely.

 **Follow the manual**  
Information marked with this symbol indicates that the instructions must be observed.

You can download the current version of the instructions and the EU declaration of conformity via the following link:




BE47

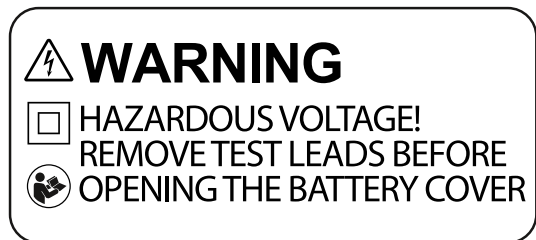


<https://hub.trotec.com/?id=43017>

**Safety**

**Read this manual carefully before starting or using the device. Always store the manual in the immediate vicinity of the device or its site of use.**

-  **Warning**  
**Read all safety warnings and all instructions.** Failure to follow the warnings and instructions may result in electric shock, fire and / or serious injury. **Save all warnings and instructions for future reference.**
- The device is supplied with a warning sign. Prior to initial start-up, make sure to paste the corresponding warning sign in your local language over the one present at the rear of the device.



- Do not use the device in potentially explosive rooms or areas and do not install it there.
- Do not use the device in an aggressive atmosphere.
- Protect the device from permanent direct sunlight.
- Do not open the device.
- Do not remove any safety signs, stickers or labels from the device. Keep all safety signs, stickers and labels in legible condition.
- Use batteries of type 6LR61 (9 V battery).
- Never charge batteries that cannot be recharged.
- Different types of batteries and new and used batteries must not be used together.
- Insert the batteries into the battery compartment according to the correct polarity.
- Remove discharged batteries. Batteries contain materials hazardous to the environment. Dispose of the batteries according to the national regulations.

- Remove the batteries from the device if you will not be using the device for a longer period of time.
- Never short-circuit the supply terminal in the battery compartment!
- Do not swallow batteries! If a battery is swallowed, it can cause severe internal burns within 2 hours! These burns can lead to death!
- If you think batteries might have been swallowed or otherwise entered the body, seek medical attention immediately!
- Keep new and used batteries and an open battery compartment away from children.
- Observe the storage and operating conditions (see Technical data).
- Disconnect the measuring cables from the device before replacing the batteries.
- Do not exceed the measuring range of a function specified in the technical data.
- Always disconnect the measuring tips from the circuit before changing the type of measurement.
- Proceed with the utmost care when measuring voltages above 25 VAC rms or 35 VDC. There is a risk of an electric shock at these voltage levels.
- Before carrying out the diode, resistance or continuity test, make sure that the object to be measured has zero potential and that any capacitors are discharged. If you have previously carried out measurements on live parts, disconnect the measuring tips from the object to be measured before the diode, resistance or continuity test.

### Intended use

Only use the multimeter for measuring voltage, current or resistance whilst adhering to the technical data.

Any use other than the intended use is regarded as misuse.

### Reasonably foreseeable misuse

Do not use the device in potentially explosive atmospheres, when wet or very humid.

Unauthorized modifications of the device are forbidden.

### Personnel qualification

People who use this device must:

- master the 5 safety rules of electrical engineering
  - 1. De-energise
  - 2. Secure against restart
  - 3. Verify de-energised state (bipolar)
  - 4. Earth and short-circuit
  - 5. Cover neighbouring live parts
- use the measuring device in accordance with safe working procedures.
- be aware of the dangers that occur when working with electric devices in damp areas.
- take measures to protect themselves from direct contact with live parts.
- have read and understood the instructions, especially the Safety chapter.

### Residual risks



#### Warning of electrical voltage

Electric shock due to insufficient insulation! Check the device for damages and proper functioning before each use.

If you detect damages, do not use the device any longer.

Do not use the device when either the device or your hands are damp or wet!

Do not use the device when the battery compartment or the housing is open.



#### Warning of electrical voltage

Electric shock due to contact with live parts! Do not touch any live parts. Secure neighbouring live parts by covering them or by switching them off.



#### Warning of electrical voltage

Electric shock due to contact with live parts! When using the measuring tips, make sure not to reach behind the protection against contact.



#### Warning of electrical voltage

There is a risk of a short-circuit due to liquids penetrating the housing!

Do not immerse the device and the accessories in water. Make sure that no water or other liquids can enter the housing.



#### Warning of electrical voltage

Work on the electrical components must only be carried out by an authorised specialist company!



#### Warning

Risk of suffocation!

Do not leave the packaging lying around. Children may use it as a dangerous toy.

**Warning**  
The device is not a toy and does not belong in the hands of children.

**Warning**  
Dangers can occur at the device when it is used by untrained people in an unprofessional or improper way! Observe the personnel qualifications!

**Caution**  
Keep a sufficient distance from heat sources.

**Notice**  
To avoid damages to the device, make sure that the correct measuring range is selected before carrying out a measurement.  
If you are unsure, select the largest measuring range. Remove the measuring cables from the measuring point before changing the measuring range.

**Notice**  
To prevent damages to the device, do not expose it to extreme temperatures, extreme humidity or moisture.

**Notice**  
Do not use abrasive cleaners or solvents to clean the device.

**Notice**  
Before commissioning, check the function of the device at a known voltage source, e.g. on a known and safe 230 V voltage source or on a known and safe 9 V battery. Select the correct measuring range!

**Information about the device**

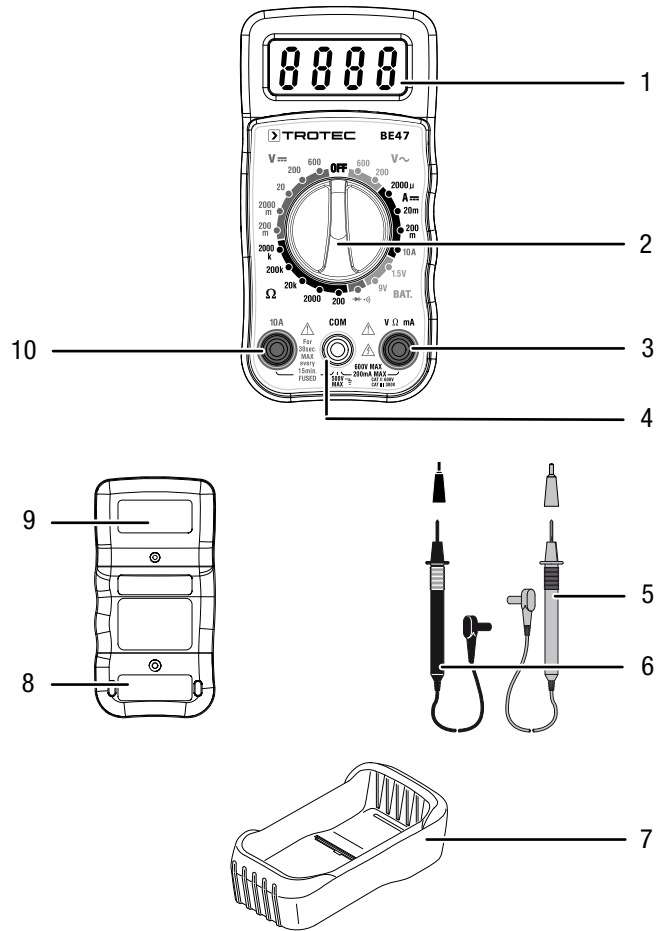
**Device description**

The multimeter is a battery-powered, mobile hand-held measuring device with an extensive range of measurement possibilities.

It features the following functional properties and equipment:

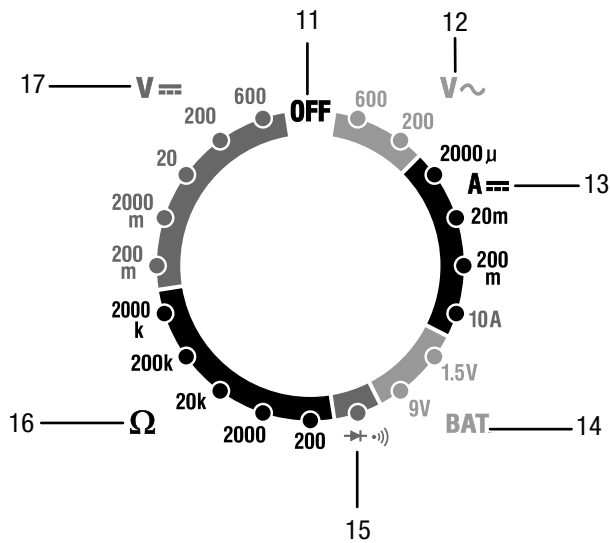
- Manual range selection
- 2000 count LC display
- Safety category CAT II 600 V / CAT III 300 V
- AC and DC voltage measurement
- Direct current measurement
- Resistance measurement
- Diode testing function
- Acoustic continuity testing

**Device depiction**



No.	Designation
1	LC display
2	Rotary switch
3	V/Ω/mA connection socket
4	COM socket
5	Red measuring tip
6	Black measuring tip
7	Protective cover
8	Battery compartment
9	Fuses
10	10 A socket

## Rotary switch



No.	position	Description
11	OFF	Device is switched off.
12	V AC	AC voltage: up to 600 V AC up to 200 V AC
13	A DC	Direct current: up to 2000 $\mu$ A up to 20 mA up to 200 mA up to 10 A
14	BAT.	Battery voltage: up to 1.5 V up to 9 V
15	→ •	Diode test / continuity measurement
16	$\Omega$	Resistance measurement: up to 200 $\Omega$ up to 2000 $\Omega$ up to 20 k $\Omega$ up to 200 k $\Omega$ up to 2000 k $\Omega$
17	V DC	DC voltage: up to 200 mV DC up to 2000 mV DC up to 20 V DC up to 200 V DC up to 600 V DC

## Technical data

### General characteristics

Parameter	Value
Diode test	Max. testing current of 1 mA, open-circuit voltage of 2.8 V DC (typically)
Continuity test	An acoustic signal is emitted if the resistance is less than 30 $\Omega$
Battery testing current	9 V (6 mA); 1.5 V (100 mA)
Input impedance	>1 M $\Omega$
V AC range	45 Hz to 450 Hz
A DC voltage drop	200 mV
LC display	3 ½ digits, 2000 count LCD, 0.5 inch digits
Measuring range exceeded	OL will be displayed
Polarity	Automatic (no indication for positive); minus (-) sign for negative
Measuring speed	2 x per second, nominal
Battery indication	BAT is indicated if the battery voltage drops below the operating voltage threshold
Battery	9 V monobloc battery
Fuses	mA, $\mu$ A range: 0.5 A/600 V (fast acting) A range: 10 A / 600 V (fast acting)
Operating temperature	0 °C to 50 °C (32 °F to 122 °F)
Storage temperature	-20 °C to 60 °C (-4 °F to 140 °F)
Relative humidity	Operation: <70 % Storage: <80%
Operating height above sea level	Maximum 2000 m (7000 ft)
Weight	260 g (9.17 oz.)
Dimensions	121.5 x 60.6 x 40 mm (4.78" x 2.38" x 1.57")
Safety	This measuring device is designed for indoor use and complies with overvoltage category CAT II 600 V / CAT III 300 V, pollution level 2.

**Measuring ranges**

Function	Measuring range	Resolution	Accuracy
DC voltage (V DC)	200 mV	0.1 mV	± (0.5 % + 2 digits)
	2000 mV	1 mV	
	20 V	0.01 V	
	200 V	0.1 V	± (1.0 % + 2 digits)
	600 V	1 V	
AC voltage (V AC, 50 / 60 Hz)	200 V	0.1 V	± (1.2 % + 2 digits)
	600 V	1 V	
Direct current (A DC)	2000 µA	1 µA	± (1.0 % + 2 digits)
	20 mA	10 µA	
	200 mA	100 µA	± (1.2 % + 2 digits)
	10 A	10 mA	± (2.0 % + 2 digits)
Resistance (Ω)	200 Ω	0.1 Ω	± (0.8 % + 2 digits)
	2000 Ω	1 Ω	
	20 kΩ	0.01 kΩ	
	200 kΩ	0.1 kΩ	± (1.0 % + 2 digits)
	2000 kΩ	1 kΩ	
Battery test	9 V	10 mV	± (1.0 % + 2 digits)
	1.5 V	1.0 mV	

**Note:**

The accuracy is based on an ambient temperature of 18 °C to 28 °C and a relative humidity of less than 75 %.

The accuracy specification consists of two values:

- % value referring to the reading: Corresponds to the accuracy of the installation to be measured.
- + digits: Corresponds to the accuracy referring to the analogue to digital converter.

**Scope of delivery**

- 1 x Multimeter BE47 (without batteries)
- 1 x Safety measuring lines with test probes
- 1 x Quick guide

**Transport and storage**

**Notice**

If you store or transport the device improperly, the device may be damaged.  
Note the information regarding transport and storage of the device.

**Transport**

For transporting the device use a suitable bag to protect it from external influences.

**Storage**

When the device is not being used, observe the following storage conditions:

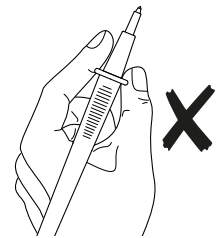
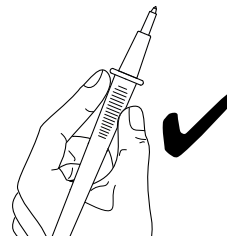
- dry and protected from frost and heat
- protected from dust and direct sunlight
- at the temperature specified in the technical data
- Batteries are removed from the device

**Operation**



**Warning of electrical voltage**

Electric shock due to contact with live parts! When using the measuring tips, make sure not to reach behind the protection against contact.



## Inserting the battery

Insert the battery before first use as follows:



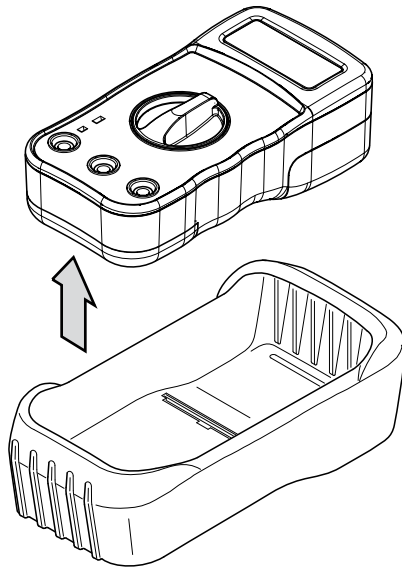
### Danger

Disconnect the measuring tips from the device before opening the battery compartment.

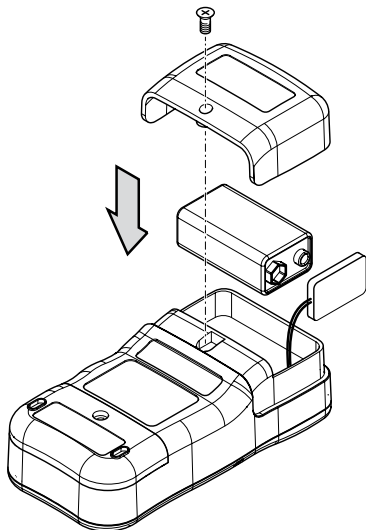
### Notice

Make sure that the surface of the device is dry and the device is switched off.

1. Remove the protective cover (7) from the device.



2. Loosen the screw at the battery compartment (8).
3. Open the battery compartment.
4. Connect the battery to the battery clip with correct polarity.

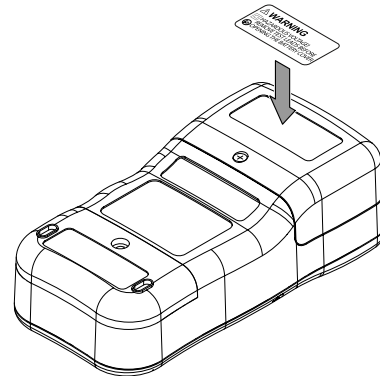


5. Insert the battery with the battery clip into the battery compartment.
6. Close the battery compartment and retighten the screw.
7. Place the device back into the protective cover.

## Attaching the warning sign

Prior to initial start-up, check whether the warning sign at the rear of the device is in your local language, if not, paste the proper one over it. A warning sign in your native language is supplied along with the device. Please proceed as follows to attach the warning sign to the rear of the device:

1. Remove the label in your local language from the supplied film.
2. Affix the label in the intended position at the rear of the device.



## Undefined displays

If measuring inputs are open or touched by hand, this can lead to undefined displays. This is not a malfunction but a reaction of the sensitive measuring input to existing interference voltages.

Normally, when there is no high interference level at the workplace, and in case of a short circuit at the measuring input, zero is displayed immediately. If the measuring object is connected, the exact measured value is displayed. Fluctuations in the displayed value by some digits are systemic and within the tolerance.

If you have selected the resistance measuring range, the continuity testing range or the diode test and the measuring input is open, the overflow indication will be displayed.



**IMPORTANT INFORMATION ON THE MEASURING PROCESS!**



**Warning of electrical voltage**

Improper handling of the measuring device entails a risk of electric shock!

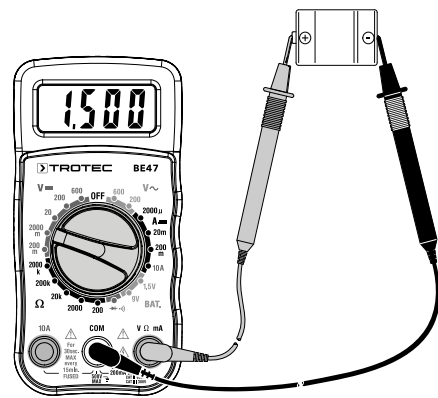
Before carrying out voltage measurements, observe the following:

- Never apply a voltage exceeding the rated nominal voltage of the measuring device between the connections or between the connections and earth (see imprint on the housing).
- Check the measuring tips for damaged insulation and for continuity. Replace damaged measuring tips.
- Check the insulation of the measuring device sockets.
- Before commissioning, check the function of the device at a known voltage source, e.g. on a known and safe 230 V voltage source or on a known and safe 9 V battery.
- First connect the measuring tip connected to earth and afterwards the live measuring tip. When disconnecting the measuring tips, proceed in reverse order, i.e. disconnect the live measuring tip first.
- Prior to every voltage measurement make sure that the measuring device is not set to the current measuring range.
- If the device indicates an exceedance of the measuring range (*OL*) immediately after being connected to the measuring object, first switch off the circuit at the measuring object, then immediately remove the measuring tips from the measuring object.
- Do not switch any motors in the measuring circuit on or off during a measurement. Voltage peaks caused by a switch-on or switch-off can damage the measuring device.

**Measuring DC voltage**

1. Turn the rotary switch (2) to the largest V DC voltage measuring range ((17), 600 V DC).
2. Insert the plug of the black measuring tip into the *COM* (4) measuring socket and the plug of the red measuring tip into the *V/Ω/mA* (3) measuring socket.
3. Connect both measuring tips to the measuring object with correct polarity (black to minus, red to plus).
  - ⇒ If the input voltage is negative, a minus (-) will appear in front of the measured value on the display.
  - ⇒ The measured value will be indicated on the display.
4. Turn the rotary switch (2) to the position that is closest to the indicated value but does not fall below it.
  - ⇒ The measured value will be indicated on the display.

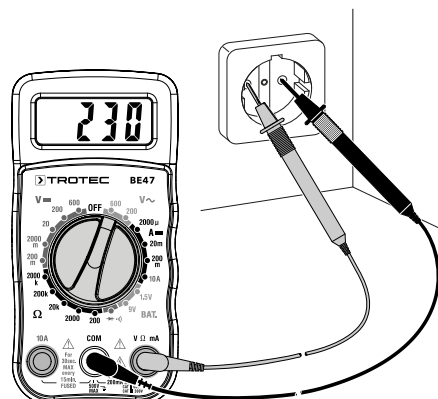
Example:



**Measuring AC voltage**

1. Select the desired V AC voltage measuring range (12) using the rotary switch (2).
2. Insert the plug of the black measuring tip into the *COM* (4) measuring socket and the plug of the red measuring tip into the *V/Ω/mA* (3) measuring socket.
3. Connect both measuring tips to the measuring object with correct polarity (black to minus, red to plus).
  - ⇒ If the input voltage is negative, a minus (-) will appear in front of the measured value on the display.
  - ⇒ The measured value will be indicated on the display.
4. Turn the rotary switch (2) to the position that is closest to the indicated value but does not fall below it.
  - ⇒ The measured value will be indicated on the display.

Example:





## Measuring direct current

### Notice

Never connect a voltage source to the multimeter's measuring sockets when a current measuring range is selected. Otherwise the device could be damaged.

### Notice

Observe that a measurement time of 30 seconds must not be exceeded when carrying out a current measurement from 400 mA in the 10 A range. Otherwise, the device may be damaged due to excessive heating.

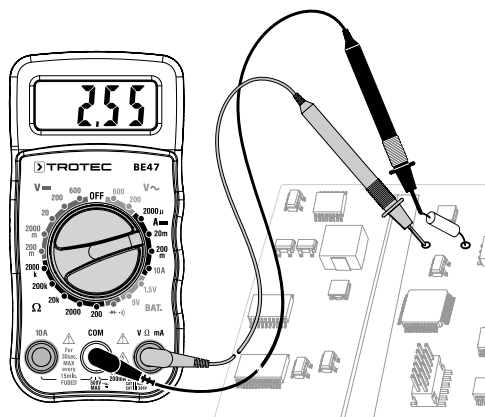
Before carrying out current measurements, observe the following:

- ✓ The electrical circuit is deactivated. The capacitors are discharged.
  - ✓ The voltage in the measuring circuit is not higher than 600 V (CAT III) to ground.
1. Interrupt the circuit to be checked and connect the measuring device in series with the consumer in this circuit.
  2. Depending on the expected measuring current, select the  $\mu\text{A}$ , mA or 10 A range (13) using the rotary switch (2).
  3. Insert the plug of the black measuring tip into the COM (4) measuring socket and the plug of the red measuring tip into the  $V/\Omega/\text{mA}$  (3) measuring socket.
  4. Switch off the voltage supply at the measuring object and connect the measuring tips to the measuring object with correct polarity (in series; red to plus, black to minus).
  5. Switch the measuring circuit back on and read the measured value from the display.

### Note:

If you have selected the 10 A range for safety's sake, but the measuring current amounts to less than 400 mA, switch the measuring circuit back off. Plug the red measuring tip into the  $V/\Omega/\text{mA}$  (8) measuring socket and select a measuring range in the mA range. Switch the measuring circuit back on.

Example:



## Measuring resistance

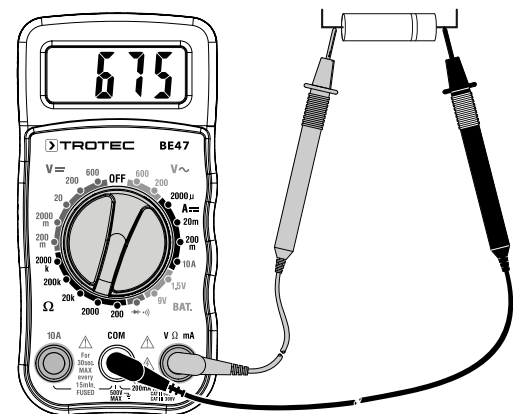


### Warning of electrical voltage

Before carrying out resistance, continuity or diode measurements, switch off the current of the electric circuit and discharge all capacitors.

1. If possible, disconnect other circuit areas from the resistance to be measured, since they may have an impact on the measurement.
2. Select the largest resistance measuring range ( $\Omega$ ) ((16), 2000 k $\Omega$ ) using the rotary switch (2).
3. Insert the plug of the black measuring tip into the COM (4) measuring socket and the plug of the red measuring tip into the  $V/\Omega/\text{mA}$  (3) measuring socket.
4. Connect the measuring tips to the measuring object.
  - ⇒ The measuring device may take some time to display a stable value. This is due to the measuring principle and not a malfunction.
  - ⇒ The measured value will be indicated on the display.
5. Turn the rotary switch (2) to the position that is closest to the indicated value but does not fall below it.
  - ⇒ The measured value will be indicated on the display.

Example:



## Continuity test



### Warning of electrical voltage

Before carrying out resistance, continuity or diode measurements, switch off the current of the electric circuit and discharge all capacitors.

1. Turn the rotary switch (2) to position  $\rightarrow + \rightarrow$  (15).
2. Insert the plug of the black measuring tip into the COM (4) measuring socket and the plug of the red measuring tip into the  $V/\Omega/\text{mA}$  (3) measuring socket.
3. Connect the measuring tips to the circuit to be tested.
  - ⇒ When the circuit is closed and the resistance is smaller than 30  $\Omega$ , an acoustic signal is emitted.
  - ⇒ When the circuit is open, OL is displayed.

**Diode testing**



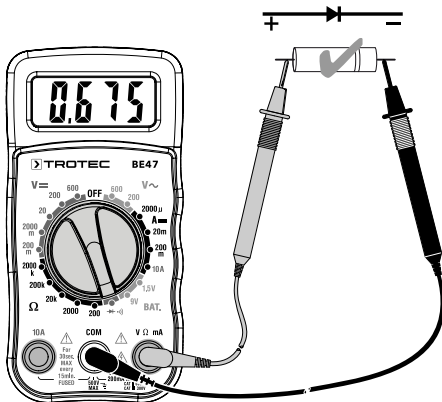
**Warning of electrical voltage**

Before carrying out resistance, continuity or diode measurements, switch off the current of the electric circuit and discharge all capacitors.

This function permits the testing of semi-conductor paths for continuity and locking function.

1. Turn the rotary switch (2) to position (15).
2. Insert the plug of the black measuring tip into the COM (4) measuring socket and the plug of the red measuring tip into the V/Ω/mA (3) measuring socket.
3. Connect the measuring tips to the diode.
  - ⇒ 400 mV to 700 mV: the component is working properly.
  - ⇒ measured value of 1: diode is blocking
  - ⇒ OL: wrong polarity – swap the connections of the measuring tips on the diode
  - ⇒ OL (even after measuring tips have been swapped): open circuit
  - ⇒ Value close to 0 mV: circuit is shorted

Example:



**Battery test**



**Danger**

Do not test batteries while they are installed in the devices. The batteries must be removed before tests can be carried out.

1. Select the desired BAT range (14) using the rotary switch (2). Use the 1.5 V position for "AAA", "AA", "C", "D" and other 1.5 V batteries. Use the 9 V position for rectangular 9 V monobloc batteries.
2. Insert the plug of the black measuring tip into the COM (4) measuring socket and the plug of the red measuring tip into the V/Ω/mA (3) measuring socket.
3. Apply the black measuring tip to the negative side of the battery. Apply the red test probe to the positive side of the battery.
  - ⇒ The measured value will be indicated on the display.

Battery type	Good	Low	Poor
1.5 V battery	>1.35 V	1.22 to 1.35 V	<1.22 V
9 V battery	>8.2 V	7.2 to 8.2 V	<7.2 V

**Maintenance and repair**

**Battery change**

A battery change is required when the battery status indication flashes or the device can no longer be switched on (see chapter Inserting the battery).



**Info**

In case of a low battery the displayed values may be inaccurate or incorrect! If so, stop using the measuring device and exchange the batteries immediately.

**Fuse replacement**



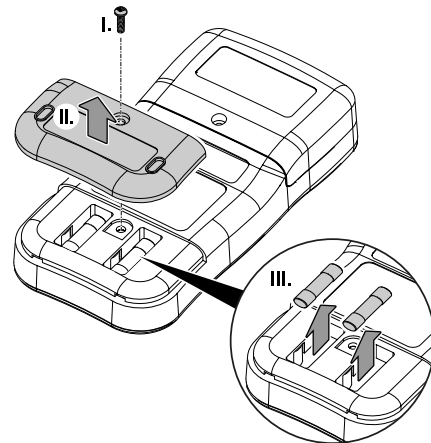
**Caution**

Switch the device off and remove the measuring tips from the measuring sockets before opening the device! Internal fuses may only ever be replaced with fuses of the same type, never with one of a higher amperage or with a provisional solution! Otherwise the consequences include the risk of accidents, the destruction of the device and the loss of warranty.

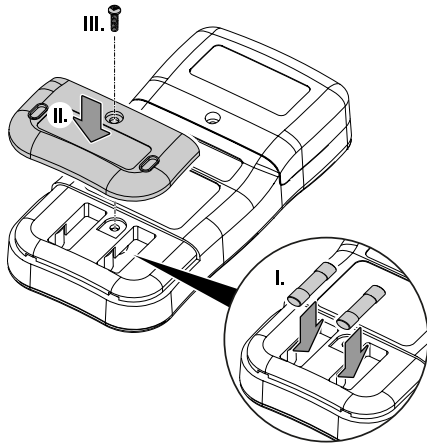
**Notice**

Only replace fuses of the same type!

1. Loosen the screw of the fuse compartment (I.) and remove the fuse compartment cover (II).
2. Remove the defective fuse (III.).



3. Insert a new fuse (I.):  
mA and  $\mu$ A range: 0.5 A / 600 V  
- A range: 10 A / 600 V
4. Attach the cover (II.) and secure it by tightening the screw (III.).



### Cleaning

Clean the device with a soft, damp and lint-free cloth. Make sure that no moisture enters the housing. Do not use any sprays, solvents, alcohol-based cleaning agents or abrasive cleaners, but only clean water to moisten the cloth.

### Repair

Do not modify the device or install any spare parts. For repairs or device testing, contact the manufacturer.

### Errors and faults

The device has been checked for proper functioning several times during production. If malfunctions occur nonetheless, check the device according to the following list.

#### Display segments are only faintly visible or flicker:

- Do not perform another measurement or stop ongoing measurements immediately!
- The battery voltage is too low. Exchange the batteries immediately.

#### The device displays implausible measured values:

- Do not perform another measurement or stop ongoing measurements immediately!
- The battery voltage is too low. Exchange the batteries immediately.

### Disposal

Always dispose of packing materials in an environmentally friendly manner and in accordance with the applicable local disposal regulations.



The icon with the crossed-out waste bin on waste electrical or electronic equipment is taken from Directive 2012/19/EU. It states that this device must not be disposed of with the household waste at the end of its life. You will find collection points for free return of waste electrical and electronic equipment in your vicinity. The addresses can be obtained from your municipality or local administration. You can also find out about other return options that apply for many EU countries on the website <https://hub.trotec.com/?id=45090>. Otherwise, please contact an official recycling centre for electronic and electrical equipment authorised for your country.

The separate collection of waste electrical and electronic equipment aims to enable the re-use, recycling and other forms of recovery of waste equipment as well as to prevent negative effects for the environment and human health caused by the disposal of hazardous substances potentially contained in the equipment.



In the European Union, batteries and accumulators must not be treated as domestic waste, but must be disposed of professionally in accordance with Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators. Please dispose of batteries and accumulators according to the relevant legal requirements.

#### Only for United Kingdom

According to Waste Electrical and Electronic Equipment Regulations 2013 (SI 2013/3113) (as amended) and the Waste Batteries and Accumulators Regulations 2009 (SI 2009/890) (as amended), devices that are no longer usable must be collected separately and disposed of in an environmentally friendly manner.

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