

# EN

ORIGINAL INSTRUCTIONS  
DIGITAL MULTIMETER



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**Notes regarding the 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.

**Note**  
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:




BE50



<https://hub.trotec.com/?id=39962>


**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, if available, over the one present at the rear of the device as described in chapter Operation. Otherwise, choose a label in a language you know.

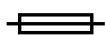
**WARNING**

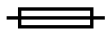


**HAZARDOUS VOLTAGE!  
REMOVE TEST LEADS  
BEFORE OPENING THE  
BATTERY COVER.**


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**TO AVOID FIRE  
AND POSSIBLE  
ELECTRIC ARCS,  
ONLY USE FUSES WITH  
THE SPECIFIED RATINGS:**

 **F 10 A / 1000 V**

 **F 500 mA / 1000 V**

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 **9V BATTERY  
NEDA 1604 IEC 6F22**

- Do not use the device in potentially explosive rooms or areas and do not install it there.
- Do not use the device in aggressive atmosphere.
- Protect the device from permanent direct sunlight.

- Do not remove any safety signs, stickers or labels from the device. Keep all safety signs, stickers and labels in legible condition.
- Do not open the device.
- 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 from the device. 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 measuring mode.
- 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.
- Ensure that the measuring area has zero potential and the capacitors are discharged before you carry out diode, resistance or continuity tests. Disconnect the measuring lines from the measuring area before switching over the device to diode, resistance or continuity tests if you have previously carried out measurements on live components

### Intended use

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

Intended use comprises:

- measurements of AC and DC voltages
- measurements of direct and alternating currents
- capacitance measurements
- frequency / duty cycle measurements
- resistance measurements
- temperature measurements using external type K sensor
- testing diodes
- acoustic continuity tests

The device is dust- and water-proof as per IP67 and corresponds to the overvoltage categories CAT III (1000 V) and CAT IV (600 V).

To use the device for its intended use, only use accessories and spare parts which have been approved by Trotec.

### Foreseeable misuse

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

Unauthorized modifications of the device are forbidden.

### Personnel qualifications

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.

**Safety signs and labels on the device**

**Note**

Do not remove any safety signs, stickers or labels from the device. Keep all safety signs, stickers and labels in legible condition.

The following safety signs and labels are attached to the device:

Safety symbol	Meaning
	This sign warns you of hazards when using electric power. Exercise caution and observe the safety instructions.
	The device is provided with double insulation against electric shock.
	This sign indicates that the operating manual must be observed.

**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.

**Note**

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.

**Note**

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

**Note**

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

**Note**

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 comes with the following functional properties and equipment features:

- Automatic / manual range selection
- 4000 digit display, can be illuminated with white light
- Can also be operated while wearing gloves
- Fold-out stand and holding fixture for measuring tips
- Protection type IP67, safety category CAT III (1000 V) / CAT IV (600 V)
- AC and DC voltage measurement
- Measurement of direct and alternating currents
- Resistance measurement
- Capacitance measurement
- Frequency / duty cycle measurement
- Temperature measurement using external type K sensor
- Diode testing function
- Acoustic continuity testing
- Hold function and relative value measurement function

### Overvoltage protection and measurement category

The power grid is permanently subjected to short-time voltage peaks, the so-called voltage surge, which can be very low, for instance when a light switch is actuated, but also very high when a network operator switches over power lines. The height of the surge voltage depends on the position within a low-voltage network in which a device/machine is operated. The closer this position is to the supply line, the higher is the surge voltage to be expected. This means that an electricity meter of a house must be able to absorb a higher surge voltage than a WLAN router.

For the purpose of simplification, the power grid is divided into four overvoltage categories. A rated surge voltage is assigned to overvoltage categories in each case, indicating the voltage peaks for which a device has to be designed:

Overvoltage category	Rated surge voltage	Examples
CAT I	1500 V	Devices with power adapter: e.g.: laptops, monitors, telephones
CAT II	2500 V	Devices with cold-device plugs: e.g.: household appliances, printers, laboratory equipment, telephone system
CAT III	4000 V	Devices without a plug: e.g.: sub-distributions, cables, sockets, CNC machines, construction cranes, energy storage systems
CAT IV	6000 V	Devices at the feed point: e.g.: electricity meters, primary overcurrent protection devices, main switches

In line with the overvoltage categories there are measurement categories defining the permissible scope of application of measurement and testing devices for electrical equipment and systems in low-voltage networks.

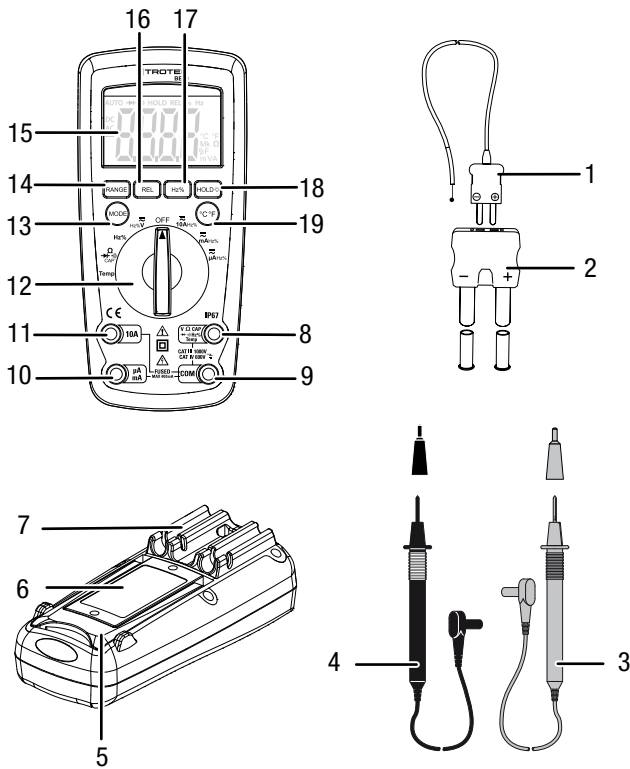
The design of a measurement device determines in which environments and for which voltages it can be safely used. What is important in this connection for example is the touchability of live parts, anti-kink protection guards on the measuring lines or the insulation. Depending on the design details, the measurement device can carry out safe measurements up to a specific voltage in one or several overvoltage categories. The measurement category is specified on the measurement device as well as in the operating manual.

The measurement category is indicated including the maximum voltage height, which can either be 300, 600 or 1000 Volt. The designation CAT III/1000 V for example means that the measurement device may be used in low-voltage indoor installation for voltages up to 1000 volts.

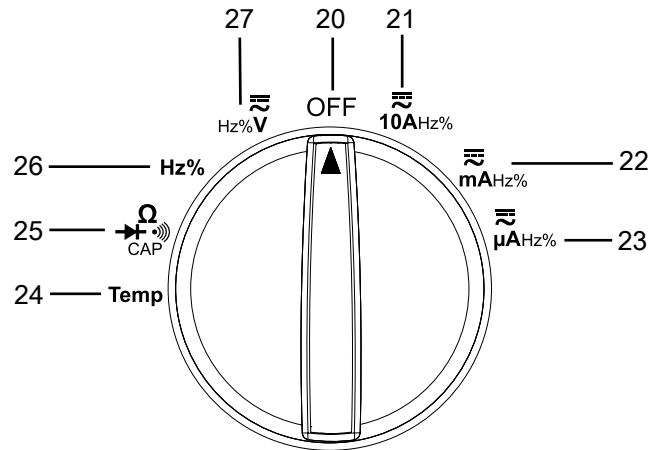
Often several values are indicated on the device, for instance CAT III/ 1000 V and CAT IV/600 V. In these cases, different maximum voltages apply to the stated scopes of application. If no measurement category is specified, the measurement device is only considered as safe in measurement category CAT I.

This measurement device is suited for measurement categories CAT III (1000 V) and CAT IV (600 V).

**Device depiction**



**Rotary switch**



No.	Designation
1	Temperature sensor
2	Adapter for temperature sensor
3	Red measuring tip
4	Black measuring tip
5	Fold-out stand
6	Battery compartment
7	Holding fixture for measuring tips
8	V/Ω socket
9	COM socket
10	mA socket
11	10 A socket
12	Rotary switch
13	MODE button
14	RANGE button
15	LC display
16	REL button
17	Hz% button
18	HOLD button
19	°C/°F button

No.	Position	Description
20	OFF	The device is switched off.
21	10A	Direct and alternating current: up to 10 A
22	mA	Direct and alternating current: up to 400 mA
23	μA	Direct and alternating current: up to 400 μA
25	Ω	Resistance measurement: 0.1 Ω to 10 MΩ
		Diode test / continuity measurement
	CAP	Capacitance measurement: 10 pF to 100 μF
26	Hz%	Frequency measurement: 1 mHz to 10 MHz Duty cycle: 0.1 % to 99.9 %
27	V	DC voltage: 0.1 V to 1000 V AC voltage: 0.1 mV to 1000 V

## Technical data

### General characteristics

Parameter	Value
Diode test	Test current of 0.3 mA, test voltage approx. 1.5 V DC (typically)
Continuity test	An acoustic signal is emitted if the resistance amount to less than 150 Ω.
LC display	3 3/4 digits, 4000 count LCD
Exceedance of the measuring range (outside limits)	OL will be displayed.
Polarity	Automatic (no indication for positive); minus (-) sign for negative
Measuring speed	2 x per second, nominal
Battery indication	The battery icon will be displayed when the battery voltage drops below the operating voltage threshold.
Battery	9 V battery
Fuses	mA, μA range: 0.5 A / 1000 V (fast acting) A range: 10 A / 1000 V (fast acting)
Operating temperature	0°C to 50°C (32°F to 122°F)
Relative humidity	< 70 %
Operating height above sea level	Max. 2000 m (7000 ft)
Type of protection	IP67
Weight	approx. 320 g (11.29 oz)
Dimensions	182 x 82 x 55 mm (7.17" x 3.23" x 2.17")
Safety	This measuring device is designed for indoor use and complies with overvoltage category CAT III (1000 V) / CAT IV (600 V).

### Measuring ranges

Function	Measuring range	Resolution	Accuracy
DC voltage (V DC)	400 mV	0.1 mV	± (1.0 % + 2 digits)
	4 V	1 mV	± (1.2 % + 2 digits)
	40 V	10 mV	
	400 V	100 mV	
AC voltage (V AC) (50 / 60 Hz)	400 mV	0.1 mV	± (1.5 % + 2 digits)
	4 V	1 mV	± (2.0 % + 5 digits)
	40 V	10 mV	
	400 V	100 mV	
Direct current (A DC)	1000 V	1 V	± (2.0 % + 8 digits)
	400 μA	100 nA	± (1.0 % + 3 digits)
	4 mA	1 μA	± (1.5 % + 3 digits)
	40 mA	10 μA	
Alternating current (A AC)	400 A	100 μA	± (2.5 % + 5 digits)
	10 A	10 mA	
	400 μA	100 nA	± (2.0 % + 5 digits)
	4 mA	1 μA	
Capacitance (nF)	40 mA	10 μA	± (2.5 % + 5 digits)
	400 A	100 μA	
	40 nF	0.01 nF	± (5.0 % + 7 digits)
	40 nF	0.1 nF	± (3.0 % + 5 digits)
Resistance (Ω)	4 μF / 40 μF	1 nF / 10 nF	± (5.0 % + 5 digits)
	100 μF	100 nF	
	400 Ω	0.1 Ω	± (1.2 % + 4 digits)
	4 kΩ	1 Ω	± (1.0 % + 2 digits)
	40 kΩ	10 Ω	± (1.2 % + 2 digits)
	400 kΩ	100 Ω	
Resistance (Ω)	4 MΩ	1 kΩ	± (2.0 % + 3 digits)
	40 MΩ	10 kΩ	

Function	Measuring range	Resolution	Accuracy
Frequency / duty cycle	9.999 Hz	0.001 Hz	n/s
	99.99 Hz	0.01 Hz	± (1.5 % + 5 digits)
	999.9 Hz	0.1 Hz	± (1.2 % + 3 digits)
	9.999 kHz	1 Hz	
	99.99 kHz	10 Hz	
		999.9 kHz	100 Hz
	9.999 MHz	1 kHz	± (1.5 % + 4 digits)
Duty cycle %	0.1-99.9 %	0.1 %	± (1.2 % + 2 digits)
Temperature (°C / °F)	-20 °C to +760 °C	1 °C	± 3.0 %
	-4 °F to +1400 °F	1 °F	± 5 °C / 9 °F
Diode measurement	Test voltage: approx. 1.5 V ± 10 % + 5 digits	1 mV	
	Test current: typ. 0.3 mA		
Continuity test	Acoustic signal at ≤ 150 Ω		
	Typ. test current 0.3 mA		

**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
- 2 x Measuring tip
- 2 x Protective cap for measuring tips
- 1 x Temperature sensor (type K) with adapter
- 1 x 9 V battery
- 1 x Quick guide

**Transport and storage**

**Note**

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 the bag included in the scope of delivery in order to protect the device from external influences.

**Storage**

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

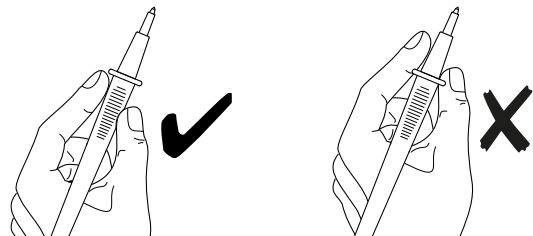
- dry and protected from frost and heat
- protected from dust and direct sunlight
- with a cover to protect it from invasive dust if necessary
- the storage temperature complies with the values specified in the Technical data
- Remove the battery from the device.

**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.

**Note**

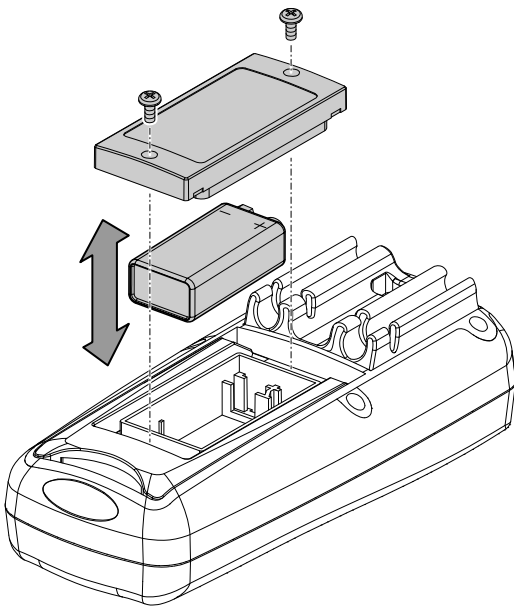
Disconnect the measuring tips from the device before opening the battery compartment.

**Note**

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



1. Loosen the screws at the battery compartment (6).
2. Open the battery compartment.
3. Connect the battery to the battery clip with correct polarity.

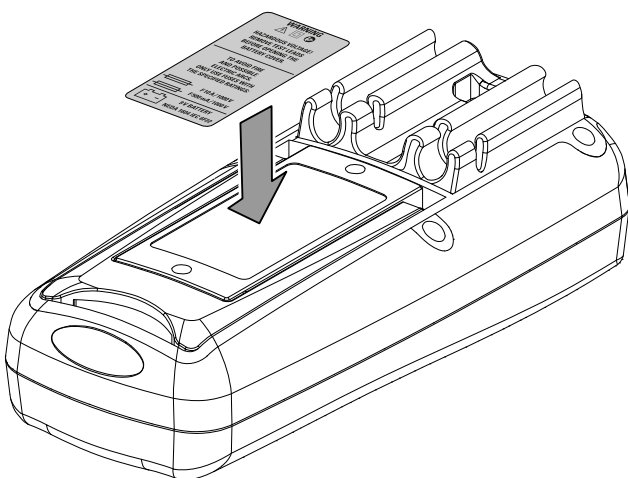


4. Close the battery compartment and retighten the screws.

#### 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 or in case of a short circuit at the measuring input zero is displayed immediately. Or, 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 the resistance measuring range, the continuity testing range or the diode test was selected and the measuring input is open, the *OL* indication (exceedance of the measuring range) 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!



##### Warning of electrical voltage

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

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.

Before carrying out current measurements, observe the following:

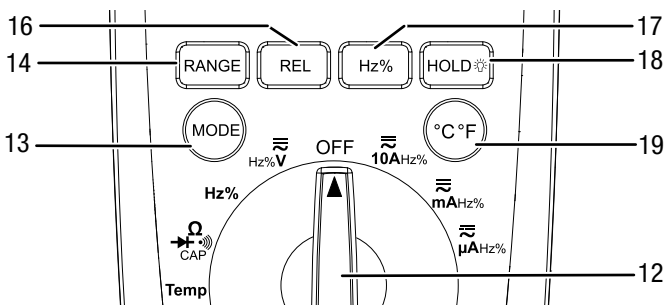
- Before connecting a measuring device to an electric circuit, cut off the circuit current. Discharge the capacitors.
- For measuring the current, interrupt the circuit to be checked and connect the measuring device in series with the consumer in this circuit.
- Never connect a voltage source to the multimeter's measuring sockets when a current measuring range is selected. Otherwise the device could be damaged.
- The voltage in the measuring circuit must not be higher than 1000 V (CAT III) or 600 V (CAT IV) to earth.
- For measuring higher currents starting at 400 mA in the 10 A range, one must observe a maximum measurement duration of 30 s each with an intermission of 15 minutes between two measurements. Otherwise, the device may be damaged due to excessive heating.

Before carrying out capacitance measurements, observe the following:

- Discharge each capacitor before carrying out a measurement! Residual voltage in the capacitor can lead to a destroyed measuring device! Do not discharge the capacitor by means of a short circuit. Instead bypass the connections using a 100 kΩ resistor.
- Never connect the measuring inputs to a voltage source. This will destroy the measurement device.
- For reasons of safety, measure whether there is a residual charge in the capacitor (using the DCV range) before you perform a capacitance measurement.

**Operating elements**

You can select the following operating elements for the measurement:



Rotary switch (12):

- Setting the type of measurement

MODE button (13):

- Changing the measuring mode within the type of measurement set

RANGE button (14):

- Selecting the next higher measuring range possible

REL button (16):

- Showing the difference between two measured values

Hz% button (17):

- Measuring the duty cycle

HOLD button/display illumination (18):

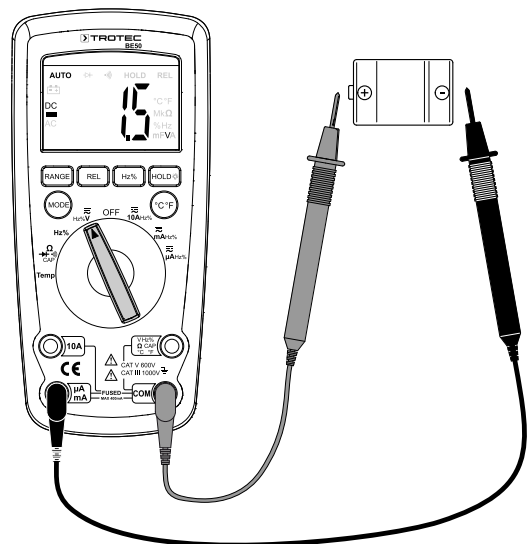
- Freezing the measurement value (Hold function): press briefly
- Switching the display illumination on/off: press for a long time

°C/°F button (19):

- Changing the temperature unit

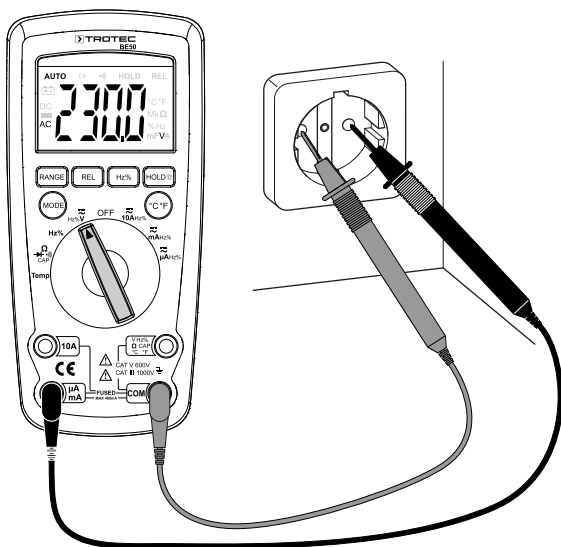
**Measuring DC voltage**

1. Set the rotary switch to the voltage measuring range, then use the MODE button (13) to select the desired measuring mode (for DC voltage: DC indication).
2. Insert the plug of the black measuring tip (4) into the COM measuring socket and the plug of the red measuring tip (3) into the V/Ω 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. If the OL indication (exceedance of the measuring range) appears after the manual range selection, switch over immediately to the respectively next higher range (RANGE button (14)). If the OL indication appears and the maximum range has been set already or in case of the automatic range selection, immediately switch off the voltage supply at the measuring object and disconnect the measuring device from the measuring object.
  - ⇒ The measured value will be indicated on the display.



## Measuring AC voltage

1. Set the rotary switch to the voltage measuring range, then use the *MODE* button (13) to select the desired measuring mode (for AC voltage: *AC* indication).
2. Insert the plug of the black measuring tip (4) into the *COM* measuring socket and the plug of the red measuring tip (3) into the *V/Ω* measuring socket.
3. Connect both measuring tips to the measuring object.
  - ⇒ 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. If the *OL* indication (exceedance of the measuring range) appears after the manual range selection, immediately switch over to the respectively next higher range (*RANGE* button (14)). If the *OL* indication appears and the maximum range has been set already or in case of the automatic range selection, immediately switch off the voltage supply at the measuring object and disconnect the measuring device from the measuring object.
  - ⇒ The measured value will be indicated on the display.



## Measuring direct current

1. Depending on the expected measuring current set the rotary switch to the  $\mu\text{A}$ , mA or 10 A range, then use the *MODE* button (13) to select the desired measuring mode (for direct current: *DC* indication).
2. Insert the plug of the black measuring tip (4) into the *COM* measuring socket and the plug of the red measuring tip (3) into the  $\mu\text{A}/\text{mA}$  or 10 A measuring socket – depending on the selected range.
3. 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).
4. Switch the measuring circuit back on and read the measured value from the display.

5. If the *OL* indication (exceedance of the measuring range) appears after the manual range selection, immediately switch over to the respectively next higher range (*RANGE* button (14)). If the *OL* indication appears and the maximum range has been set already or in case of the automatic range selection, immediately switch off the voltage supply at the measuring object and disconnect the measuring device from the measuring object.
  - ⇒ The measured value will be indicated on the display.

### Note

If there is no indication and all connections have been established correctly, the cause of the fault may be a defective internal fuse protecting the current measuring ranges (see chapter Fuse replacement).

### 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 mA socket and select a measuring range in the mA range. Switch the measuring circuit back on.

## Measuring alternating current

1. Depending on the expected measuring current set the rotary switch to the  $\mu\text{A}$ , mA or 10 A range, then use the *MODE* button (13) to select the desired measuring mode (for alternating current: *AC* indication).
2. Insert the plug of the black measuring tip (4) into the *COM* measuring socket and the plug of the red measuring tip (3) into the  $\mu\text{A}/\text{mA}$  or 10 A measuring socket – depending on the selected range.
3. Switch off the voltage supply at the measuring object and connect the measuring tips (in series) to the measuring object.
4. Switch the measuring circuit back on and read the measured value from the display.
5. If the *OL* indication (exceedance of the measuring range) appears after the manual range selection, immediately switch over to the respectively next higher range (*RANGE* button (14)). If the *OL* indication appears and the maximum range has been set already or in case of the automatic range selection, immediately switch off the voltage supply at the measuring object and disconnect the measuring device from the measuring object.
  - ⇒ The measured value will be indicated on the display.

### Note

If there is no indication and all connections have been established correctly, the cause of the fault may be a defective internal fuse protecting the current measuring ranges (see chapter Fuse replacement).

**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 mA socket and select a measuring range in the mA range. Switch the measuring circuit back on.

**Measuring resistance**

1. Set the rotary switch (12) to the resistance measuring range ( $\Omega$  /  $\rightarrow$   $\rightarrow$  / CAP), then use the *MODE* button (13) to select the resistance measurement (*M $\Omega$*  indication).
2. Insert the plug of the red measuring tip (3) into the *V/ $\Omega$*  measuring socket and the plug of the black measuring tip (4) into the *COM* measuring socket.
3. 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.
4. Turn the rotary switch (12) 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.

**Note**

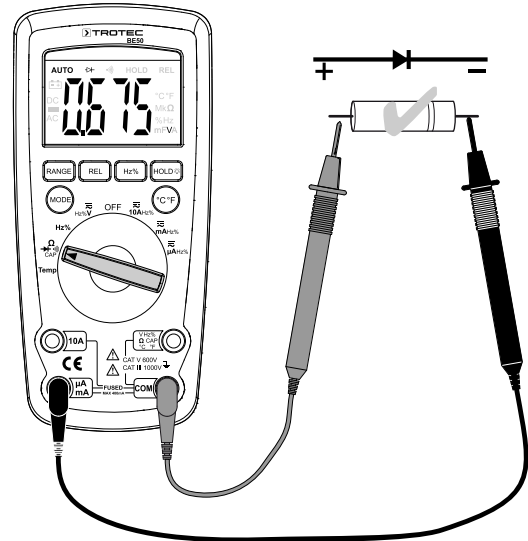
In case of very low resistance values (400  $\Omega$  range) the internal resistors of the measuring tips and sockets might lead to a falsified display. The resistance value displayed in case of short-circuited measuring tips will be put down in writing and later subtract from the measured value for the subsequent measurements.

**Diode testing**

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

1. Set the rotary switch (12) to the  $\Omega$  /  $\rightarrow$   $\rightarrow$  / CAP position, then use the *MODE* button (13) to select the diode test ( $\rightarrow$   $\rightarrow$  indication).
2. Insert the plug of the red measuring tip (3) into the *V/ $\Omega$*  measuring socket and the plug of the black measuring tip (4) into the *COM* measuring socket.

3. Connect the measuring tips to the diode. If the *OL* indication (exceedance of the measuring range) is displayed, swap the measuring tip connections at the diode.
  - ⇒ If a value is displayed, the component is working properly. The component's forward voltage will be displayed (approx. 0.2 V for Ge diodes and approx. 0.5 V in case of Si diodes).



**Measuring capacitance**

1. Set the rotary switch (12) to the  $\Omega$  /  $\rightarrow$   $\rightarrow$  / CAP position, then use the *MODE* button (13) to select the capacitance measurement (*nF* indication).
2. Insert the plug of the red measuring tip (3) into the *V/ $\Omega$*  measuring socket and the plug of the black measuring tip (4) into the *COM* measuring socket.
3. Connect the capacitor to be tested to the measuring tips. Electrolytic capacitors must be connected with correct polarity (red to plus, black to minus). Since the charging processes within the capacitor require a certain amount of time, the indication will be delayed by up to 30 s. This delay is systemic, not a malfunction. Wait until the displayed value has stabilized before reading the measured value.
  - ⇒ The measured value will be indicated on the display.

**Note**

If a capacitor is defective, a value of zero is displayed. Observe that electrolytic capacitors can show considerable scattering within their tolerance range. Bear in mind that electrolytic capacitors can come with a substantial scattering within their tolerance range.

### Measuring frequency / duty cycle

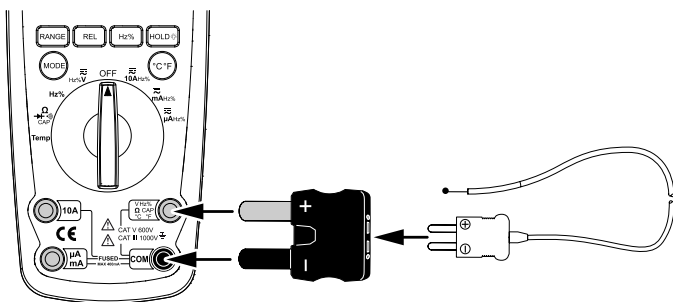
1. Set the rotary switch (12) to the frequency measuring range (*Hz%*).
2. Insert the plug of the red measuring tip (3) into the *V/Ω* measuring socket and the plug of the black measuring tip (4) into the *COM* measuring socket.
3. Connect the measuring tips to the measuring object.  
⇒ The frequency will be displayed.
4. If you want to measure a duty cycle, press the *Hz%* button (17).

### Measuring temperature

#### Note

For a temperature measurement never connect the temperature sensor to a voltage source, since this would destroy the measuring device.

1. Set the rotary switch (12) to *Temp* and, if necessary, switch between the units *°C* and *°F* using the *°C/°F* button (19).
2. Plug the connectors of the temperature sensor with correct polarity into the sockets *COM* (-) and *V/Ω* (+). The two sockets for current measurement (10) and (11) must not be assigned during a temperature measurement.
3. Hold the measuring tip of the temperature sensor to the measuring object and, if possible, wait for approx. 30 seconds until a stable measured value will be displayed.
4. Disconnect the temperature sensor from the measuring sockets before switching over into another measuring mode.



## 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).

### Fuse replacement



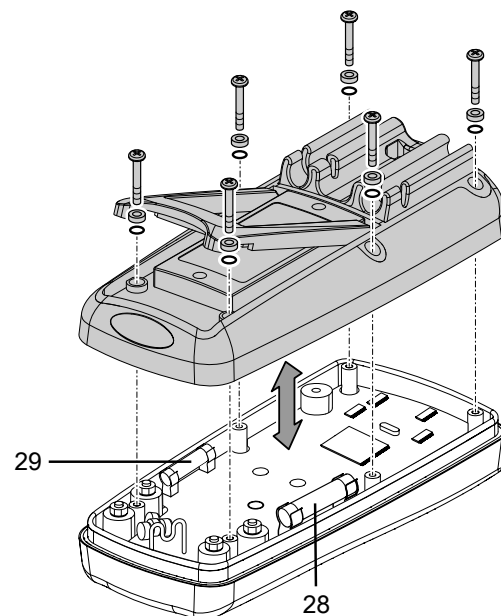
#### Caution

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.

#### Note

Only replace fuses of the same type!

1. Open the housing at the rear by loosening the 6 screws.
2. Replace the defective fuse:
  - 10 A range: 10 A / 1000 V (28)
  - 400 mA range: 0.5 A / 1000 V (29)



3. Attach the cover and secure it by tightening the screws.

### 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.

For repairs or device testing, contact the manufacturer.

### 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 battery 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 battery 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.

Trotec GmbH

Grebener Str. 7  
D-52525 Heinsberg

☎ +49 2452 962-400

☎ +49 2452 962-200

✉ [info@trotec.com](mailto:info@trotec.com)

[www.trotec.com](http://www.trotec.com)