

EN

ORIGINAL INSTRUCTIONS
CLAMP METER



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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:




BE42



<https://hub.trotec.com/?id=46446>

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.



- 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).
- Do not perform a voltage measurement if the device has been set to resistance measurement.
- Disconnect the measuring cables from the device before replacing the batteries.

Intended use

Only use the device for measurements within the measuring ranges and overvoltage categories specified in the technical data. Use the specified measuring equipment (clamp meter, measuring cable or non-contact voltage detector, depending on the device).

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 voltage detector following 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 and the measuring cables for damages and proper function 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

When performing non-contact measurements of the current, disconnect the measuring cables from the device beforehand.



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

Using the true RMS clamp meter BE42 you can easily check the amperage of alternating currents, AC and DC voltages, resistances as well as the continuity of circuits, fuses and contacts.

Both sinusoidal and non-sinusoidal signals, which arise e.g. due to interferences from frequency converters or computers, can be measured precisely.

Furthermore, AC voltages in electric fields can be detected without contact and the forward voltage of diodes can be tested.

The current measurement is effected without contact via the electromagnetic field, which is why the electric circuit does not have to be interrupted for this method. Therefore, running systems, which cannot be switched off separately, can also be checked.

Owing to the galvanic isolation, the measuring signal is also potential-free towards the variable to be measured.

The device is additionally equipped with a torch to carry out measurements in poorly lit areas more easily.

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

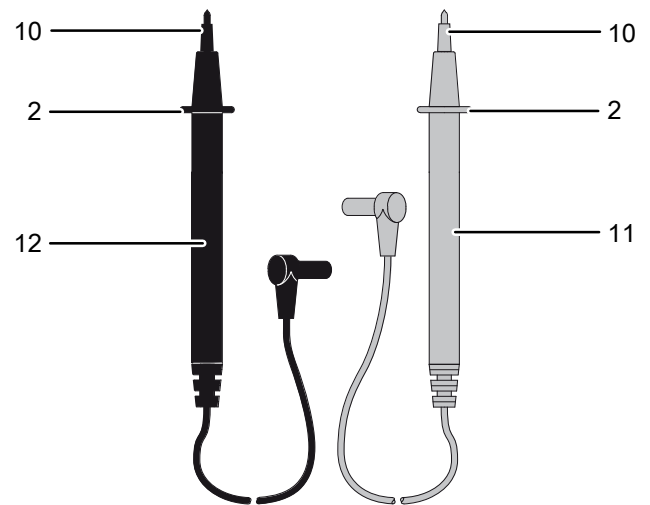
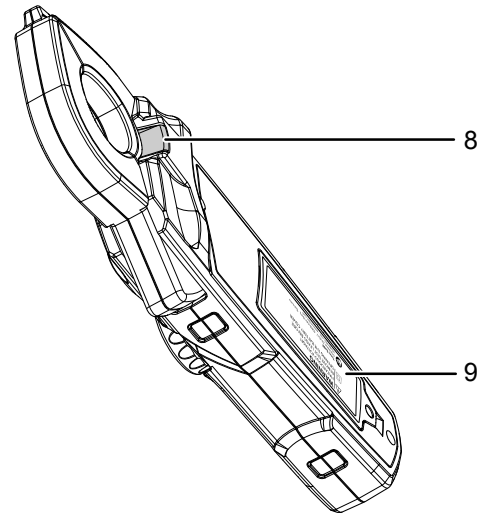
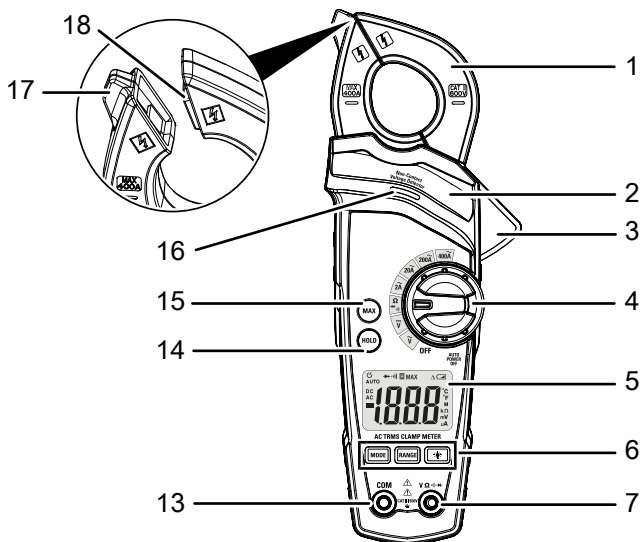
In line with the overvoltage categories there are measurement categories defining the permissible scope of application of measurement and testing devices for electrical equipment and systems in low-voltage networks.

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.

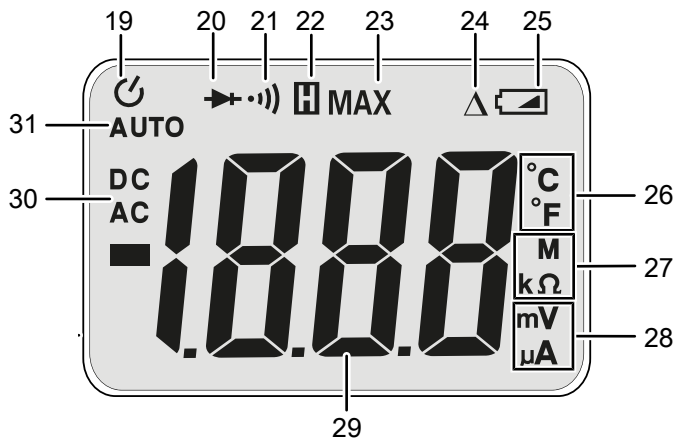
Often several values are indicated on the device, for instance CAT III/ 1000 V and CAT IV/600 V. In these cases, different maximum voltages apply to the stated scopes of application. If no measurement category is specified, the measurement device is only considered as safe in measurement category CAT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

Device depiction



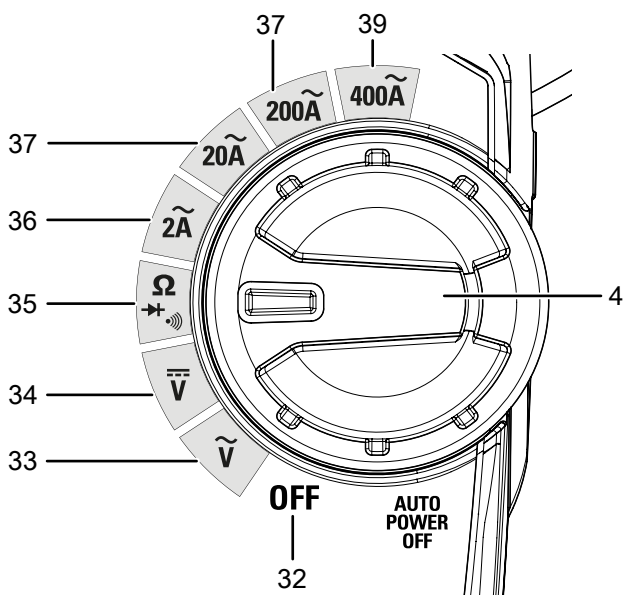
No.	Designation
1	Clamp
2	Protection against contact
3	Lever for opening the clamp
4	Rotary switch
5	Display
6	Setting buttons
7	Input connection for measuring cable (red)
8	Torch
9	Battery compartment
10	Test probes
11	Red measuring cable
12	Black measuring cable
13	COM connection for measuring cable (black)
14	<i>HOLD</i> button
15	<i>MAX</i> button
16	<i>NCV detection</i> LED
17	<i>NCV</i> sensor
18	Wear indicator for clamping tongue

Display



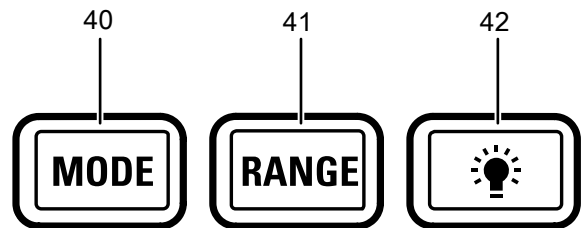
No.	Designation
19	Indication – device switched on
20	Diode test icon
21	Continuity test icon
22	Hold function icon
23	MAX icon
24	Compare mode icon
25	Battery status indication
26	Units of the temperature
27	Units of the resistance
28	Units of the amperage and electrical voltage
29	Measurement value display
30	Alternating current and direct current indication
31	Automatic measuring range detection indication

Rotary switch



No.	Designation	Meaning
32	Switch position OFF	Switching the device off
33	AC voltage	Activates the measurement of AC voltages.
34	DC voltage	Activates the measurement of DC voltages.
35	Resistance / diode test / continuity	For measuring the resistance / diode testing / continuity check
36	Amperage 2 A	For non-contact measurements of the amperage of alternating current in the range of 2 A
37	Amperage 20 A	For non-contact measurements of the amperage of alternating current in the range of 20 A
38	Amperage 200 A	For non-contact measurements of the amperage of alternating current in the range of 200 A
39	Amperage 400 A	For non-contact measurements of the amperage of alternating current in the range up to 400 A

Setting buttons



No.	Designation	Meaning
40	MODE button	For selecting the desired measuring mode: For measuring the resistance / diode testing / continuity check
41	RANGE button	For choosing between manual and automatic setting of the measuring range Also for choosing the individual measuring ranges in the manual setting
42	Light bulb icon button	Switching the display illumination on/off. Switching the torch on/off.

Technical data

Parameter	Value
Model	BE42
Weight	287 g (incl. batteries)
Dimensions (length x width x height)	217 x 80 x 38 mm
Max. diameter of conductor	approx. 28 mm
Display	LSC (2000 counts)
Measuring rate	2 per second
Input resistance (V AC and V DC)	10 MΩ
Max. input value alternating current	400 A
Max. input value voltage (AC and DC)	600 V AC/DC
Max. input value resistance, diode, continuity	250 V AC/DC
Frequency range alternating current	50/60 Hz (AAC)
Frequency range AC voltage	50–400 Hz (VAC)
Ambient conditions	5°C to 40°C (41°F to 104°F)
Storage conditions	-20°C to 60°C (-4°F to 140°F)
Relative humidity	max. 80 % RH at 31 °C (87 °F), decreasing linearly up to 50 % RH at 40 °C (104 °F)
Type of protection	IP20
Batteries	2 x 1.5 V AAA
Overvoltage protection	Category III 600 V
Automatic switch-off	after 15 minutes

Measuring ranges

Note

When exceeding the measuring range, the measured value might be displayed nonetheless. Please observe the measuring range and the overvoltage protection! Measurements above the given measuring range are not permitted!



Info

The accuracy is specified with \pm (% deviation from the measured value + counter deviating from the last digit of the value) (at a temperature of 23 °C \pm 5 °C and a relative humidity of < 80 %).

Measuring range	Resolution	Accuracy	Measuring range exceeded
AC voltage (V/AC)			
2 V	1 mV	\pm (1.8 % + 8 digits)	OL will be indicated on the display.
20 V	10 mV		
200 V	0.1 V		
600 V	1 V	\pm (2.5 % + 8 digits)	
DC voltage (V/DC)			
200 mV	1 mV	\pm (0.8 % + 4 digits)	OL will be indicated on the display.
2 V	10 mV		
20 V	0.1 V	\pm (1.5 % + 2 digits)	
200 V	1 V		
600 V	1 V	\pm (2.0 % + 2 digits)	
Alternating current (A/AC)			
2 A	0.01 A	\pm (2.5 % + 10 digits)	OL will be indicated on the display.
20 A	0.1 A		
200 A	1 A	\pm (2.5 % + 4 digits)	
400 A	1 A		
		\pm (3 % + 6 digits)	
Resistance(Ω)			
200 Ω	0.1 Ω	\pm (1.0 % + 4 digits)	OL will be indicated on the display.
2 kΩ	1 Ω		
20 kΩ	10 Ω		
200 kΩ	100 Ω	\pm (1.5 % + 2 digits)	
2 MΩ	1 kΩ		
20 MΩ	10 kΩ	\pm (2.5 % + 3 digits)	
		\pm (3.5 % + 5 digits)	

Function	Range
Diode measurement	Test voltage: approx. 2.5 V Test current: approx. 0.6 mA
Continuity check	Acoustic signal at \leq 100 Ω Acoustic signal possible at 20 Ω – 150 Ω No acoustic signal at $>$ 150 Ω

- OL = outside limits

Scope of delivery

- 1 x device
- 1 x Red measuring cable
- 1 x Black measuring cable
- 3 x 1.5 V battery AAA
- 1 x manual

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

When transporting the device, ensure dry conditions and protect the device from external influences e.g. by using a suitable bag.

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 batteries from the device.

Operation

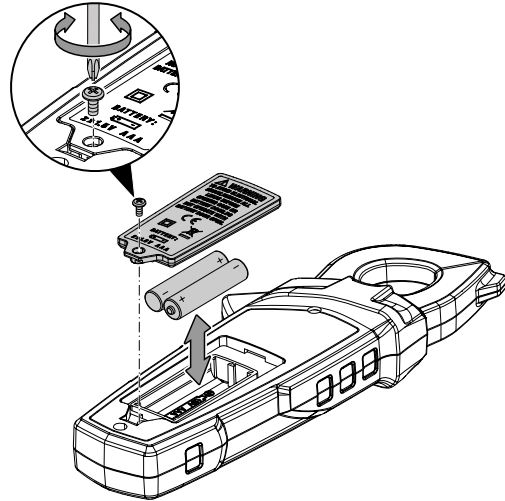
Inserting the batteries

Insert the batteries contained in the scope of delivery (3 x 1.5 V AAA) before first use.

- Disconnect the measuring cables from the device.

Note

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



Please proceed as follows to insert the batteries into the device:

1. Loosen the screw and open the cover of the battery compartment.
2. Insert the batteries into the battery compartment with correct polarity.
3. Close the battery compartment and fasten the cover in place.

Changing the location



Info

Please note that moving from a cold area to a warm area can lead to condensation forming on the device's circuit board. This physical and unavoidable effect can falsify the measurement. In this case, the display shows either no measured values or they are incorrect. Wait a few minutes until the device has become adjusted to the changed conditions before carrying out a measurement.

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.

Setting the measuring range

After it has been switched on, the device runs in the automatic measuring range mode. In this mode, the optimum measuring range for the measurement carried out is selected. Please proceed as follows to adapt the measuring range manually:

1. Press the *RANGE* button (41).
 - ⇒ The icon for the automatic measuring range detection (31) goes out.
 - ⇒ The current measuring range is shown in the measurement value display (29).
2. Repeatedly press the *RANGE* button (41) to select the measuring range.
3. Press the *RANGE* button (41) for a long time to deactivate manual measuring range selection and return to automatic measuring range detection.

Non-contact voltage detection



Info

Observe the specifications in the technical data. Even if the device does not show any response, there might still be a voltage outside the device's measuring range.



Info

The conductors in electrical cables are often twisted. In order to obtain an optimum result, rub the NCV sensor alongside the cable to position it as closely as possible to the live conductor.



Info

Static electricity or other current sources can make the device respond by mistake. This is a familiar phenomenon.

Without contact the device detects whether alternating voltage is present.

To do so, please proceed as follows:

1. Turn the rotary switch (4) to AC voltage position (33).
2. Move the device with the NCV sensor (17) in the direction of the object to be examined.
 - ⇒ If the device determines an electric field in connection with an AC voltage, the NCV detection LED (16) is illuminated. The closer the device is positioned to the voltage source or the more powerful this source is, the higher is the flash frequency and brightness of the LED.

Performing measurements with the measuring cables

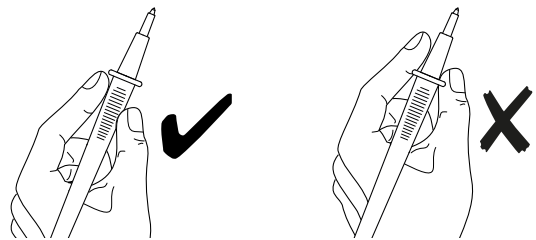


Warning of electrical voltage

Risk of electric shock and risk of injury!

Make sure that the power of the electric circuit is switched off and all capacitors are completely discharged.

- Make sure to observe the device's nominal voltage specified in the technical data during the measurement.
- Check the measuring cables for damaged insulation before each measurement.
- When holding onto the measuring cables, make sure not to reach behind the protection against contact (2):

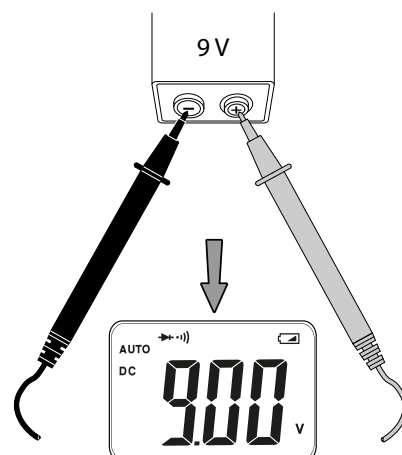


Performing a voltage measurement

Please proceed as follows to measure the DC voltage:

1. Connect the black measuring cable (12) to the COM connection (13) and the red measuring cable (11) to the Input connection (7).
2. Turn the rotary switch (4) to (34) position.
 - ⇒ The direct current icon is displayed on the alternating current/direct current indication (30).
3. Repeatedly press the *RANGE* button (41) to select the desired measuring range.
 - ⇒ The resolution in the measurement value display (29) will change accordingly.
4. Tap the desired measuring points of the electric circuit with the test probes at the measuring cables with correct polarity (10).
 - ⇒ The measured value will be displayed in the measurement value display (29).

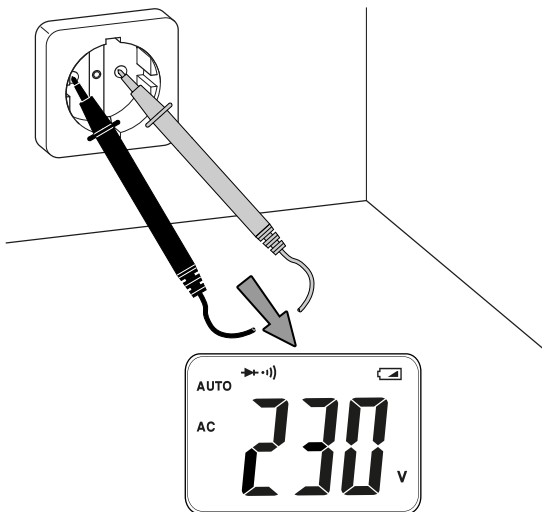
Example:



Please proceed as follows to measure the AC voltage:

1. Connect the black measuring cable (12) to the COM connection (13) and the red measuring cable (11) to the Input connection (7).
2. Turn the rotary switch (4) to position (33).
 - ⇒ The alternating current icon is displayed in the alternating current/direct current indication (30).
3. Repeatedly press the *RANGE* button (41) to select the desired measuring range.
 - ⇒ The resolution in the measurement value display (29) will change accordingly.
4. Tap the desired measuring points of the electric circuit with the test probes at the measuring cables (10).
 - ⇒ The measured value will be displayed in the measurement value display (29).

Example:



Resistance measurement

Please proceed as follows to measure the resistance:

1. Connect the black measuring cable (12) to the COM connection (13) and the red measuring cable (11) to the Input connection (7).
2. Turn the rotary switch (4) to the resistance position (35).
 - ⇒ The unit of the resistance (27) will appear on the display.
3. Tap the desired measuring points of the electric circuit with the test probes at the measuring cables (10).
 - ⇒ The measured value will be displayed in the measurement value display (29).

Continuity testing

Please proceed as follows to check the continuity of the circuit to be tested:

1. Connect the black measuring cable (12) to the COM connection (13) and the red measuring cable (11) to the Input connection (7).
2. Turn the rotary switch (4) to the continuity position (35).
3. Press the *MODE* button (40) once.
 - ⇒ The icon for the continuity test appears on the display (21).
4. Tap the desired measuring points of the electric circuit with the test probes at the measuring cables (10).
 - ⇒ The device will emit an acoustic signal if the measured resistance amounts to less than 100 Ω.

Diode testing

Please proceed as follows to test the forward voltage of a diode:

1. Connect the black measuring cable (12) to the COM connection (13) and the red measuring cable (11) to the Input connection (7).
2. Turn the rotary switch (4) to the continuity position (35).
3. Press the *MODE* button (40) twice.
 - ⇒ The icon for the diode test (20) appears on the display.
4. Connect the test probe (10) of the red measuring cable (14) to the diode's anode.
5. Connect the test probe (10) of the black measuring cable (5) to the diode's cathode.
 - ⇒ If a diode is working, a voltage between 0.4 V and 0.7 V is shown on the display.
 - ⇒ If a diode is short-circuited, a measured value of almost 0 mV is shown on the display.
 - ⇒ If OL is indicated on the display (5), the test probes are not positioned correctly.
 - ⇒ If a diode is defective (open), OL is always shown on the display, irrespective of how the test probes are positioned.

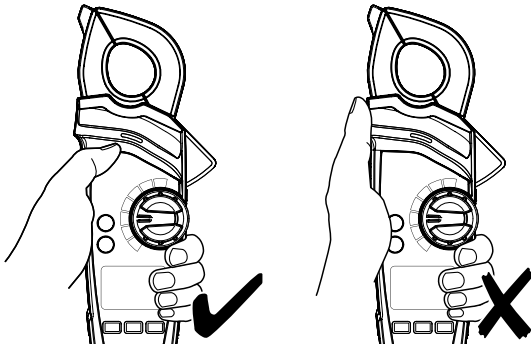
Performing measurements with the clamp



Warning of electrical voltage

Risk of electric shock and risk of injury!

- Disconnect the measuring cables from the device.
- When holding onto the clamp meter, make sure not to reach behind the protection against contact (2):

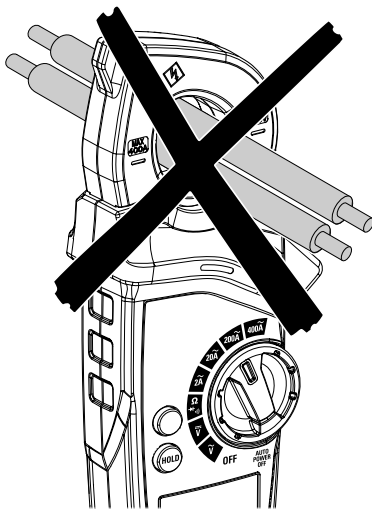


- When performing measurements, align the conductor to be tested in the centre of the clamp.



Info

Only measure one conductor at a time to ensure an unambiguous measurement result.



Current measurement

Please proceed as follows to measure the amperage of alternating currents (AC):

1. Depending on the desired measuring range, turn the rotary switch to the following positions (4):
 - position (36) for an amperage of 2 A,
 - position (37) for an amperage of 20 A,
 - position (38) for an amperage of 200 A or
 - position (39) for an amperage of 400 A.
 If the measuring range is not known to you, select the highest amperage (position (39) amperage 400 A) and switch to a lower amperage, if necessary.
2. Squeeze the lever (3) to open the clamp (1) insert the conductor to be measured centrally in the clamp.
3. Use the clamping jaws' alignment marks on the clamp as guidance to properly centre the conductor (1).
 - ⇒ The measured value will be displayed in the measurement value display (29).

Further functions

Freezing the displayed measured value

The hold function allows you to freeze the currently measured result in the measurement value display (29). To do so, please proceed as follows:





1. Carry out a measurement.
2. Press the *HOLD* button (14).
 - ⇒ An acoustic signal is emitted.
 - ⇒ The current measured value is frozen in the measurement value display (29).
 - ⇒ The icon for the hold function appears on the display (22).
3. Press the *HOLD* button (14) again to deactivate the Hold function.

Displaying the maximum value

The MAX function allows you to show the current maximum value in the measurement value display (29). To do so, please proceed as follows:

1. Carry out a measurement.
2. Press the *MAX* button (15).
 - ⇒ The icon for the MAX function appears on the display (23).
 - ⇒ The current maximum value is shown in the measurement value display (29).
3. Carry out further measurements.
 - ⇒ The maximum value is updated currently in the measurement value display (29).
4. Press the *MAX* button (15) again to deactivate the MAX function.

Using the display illumination and torch

1. Press the  (42) button briefly to switch on the display illumination.
2. Press the  (42) button briefly again to switch off the display illumination.
3. Press the  (42) button for a long time to switch on the torch.
4. Press the  (42) button for a long time again to switch off the torch.

Switch-off

Please proceed as follows to switch the device off:

1. Turn the rotary switch (4) to the Off switch position (32).
⇒ The device switches off.

The device switches off automatically after approx. 15 minutes of non-use.

Maintenance and repair

Battery change



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.

A battery change is required when the display (5) of the battery indication (25) indicates an empty battery or if the device can no longer be switched on. See chapter Operation.

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:

- The battery voltage is too low. Exchange the batteries immediately.

The device displays implausible measured values:

- The battery voltage is too low. Exchange the batteries immediately.
- The opening of the current clamp is dirty. Clean the device as described in the Cleaning chapter.
- The wear indicator for clamping tongs (18) is worn too heavily. Please contact the manufacturer.

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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