BE20

EN

INSTRUCTIONS
VOLTAGE DETECTOR

TRT-BA-BE20-TC220411TTRT01-006-EN

TROTEC

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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 these instructions via the following link:



BE20

https://hub.trotec.com/?id=41279

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.**

- 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 AAA.
- 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 (see Disposal chapter).
- Remove the batteries from the device if you will not be using the device for a longer period of time.
- Never short-circuit the terminals of batteries!
- 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.
- Immediately before and after each use, test the voltage detector for proper functioning. The voltage detector must not be used if one or several indications on the voltage detector fail or if the functionality of the device cannot be clearly recognized.
- When using the voltage detector, do not touch the test probes, and only hold the device by the insulated handles.
- The voltage detector must not be used when the battery compartment is open.
- At locations with load background noises, check whether the acoustic signals of the device can be perceived before using the device.
- Observe the maximum permissible duty cycle of 30 seconds for voltage detection. The device must never be applied to voltages for more than 30 seconds.
- For technical reasons, the device must not be operated for 10 minutes after each voltage detection. The device may only be used again for the next voltage detection after the rest period of 10 minutes has elapsed.
- After each use, screw the supplied test probe protectors onto the two test probes to prevent injuries.
- Depending on the internal impedance of the voltage detector, the device may either indicate "operating voltage present" or "operating voltage not present" if an interference voltage is present.
- A voltage detector with a relatively low internal impedance will not indicate all interference voltages with an initial value above ELV, compared to the reference value of 100 kΩ. Upon contact with the system parts to be checked, the voltage detector may temporarily reduce the interference voltages by discharging to a level below ELV; however, after the voltage detector has been removed, the interference voltage will assume its original value again.
- If the "voltage present" indication does not appear, it is highly recommended that you insert the earthing device before starting work.
- A voltage detector with a relatively high internal impedance will not clearly indicate "operating voltage not present" if an interference voltage is present, compared to the reference value of 100 kΩ.
- If the "voltage present" indication appears for a part that is considered to be disconnected from the system, it is highly recommended that you take additional measures (e.g. using an additional suitable voltage detector, visual inspection of the disconnection point in the electric network, etc.) to check the "operating voltage not present" state of the system part to be checked, and to make sure that the voltage indicated by the voltage detector is an interference voltage.
- A voltage detector indicating two internal impedance values has passed the design test for handling interference voltages and – within the technical limits – is able to differentiate between operating voltage and interference voltage, and to directly or indirectly indicate the existing type of voltage.
- Observe the storage and operating conditions (see Technical data).

Intended use

Only use the device to indicate voltage ranges between 12 and 690 V DC or 12 and 400 V AC whilst adhering to the technical data. The device may be used in facilities of overvoltage category 3 (CAT III = domestic installations).

> **Notice**
>
> When used as a bipolar voltage detector, the voltage detector operates without battery supply. For all other functions, two microbatteries of type 1.5 V AAA must be inserted into the voltage detector.

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

Qualified electricians 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.
- take measures to protect themselves from direct contact with live parts.
- have read and understood the instructions, especially the Safety chapter.

Electrically skilled person

Electrically skilled personnel must be able to read and understand electric circuit diagrams, to put electrical systems into service and to maintain them, to wire control cabinets, to ensure the functionality of electrical components and to identify possible hazards from electrical and electronic systems.

Residual risks

Warning of electrical voltage
Risk of death due to electric shock!
An electric shock can result in severe personal injury or death! The device may only be used by qualified electricians in accordance with all safety instructions listed here.

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
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
There is a danger of suffocation for children due to packaging material! Keep packaging films and parts away from children. There is a risk of death due to suffocation.

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 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

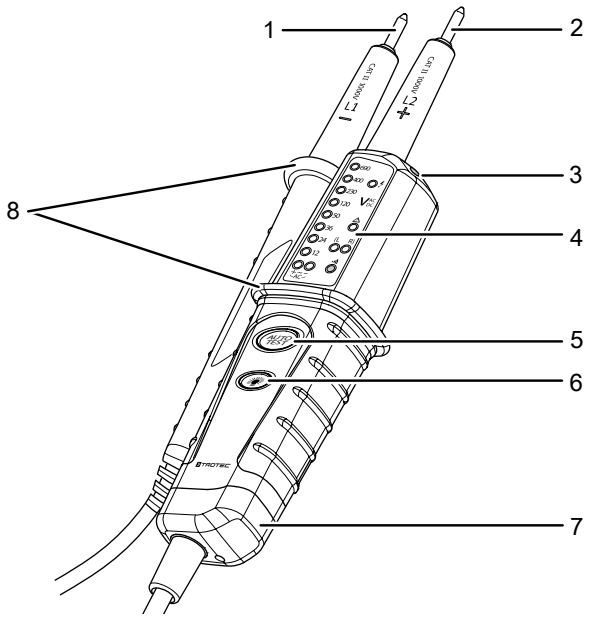
Device description

The bipolar voltage detector serves to indicate voltage ranges between 12 and 690 V DC or 12 and 400 V AC. The voltage amounts are displayed in 8 sections on an LED display with their polarity being indicated.

The device may be used in facilities of overvoltage category 3 (CAT III = domestic installations).

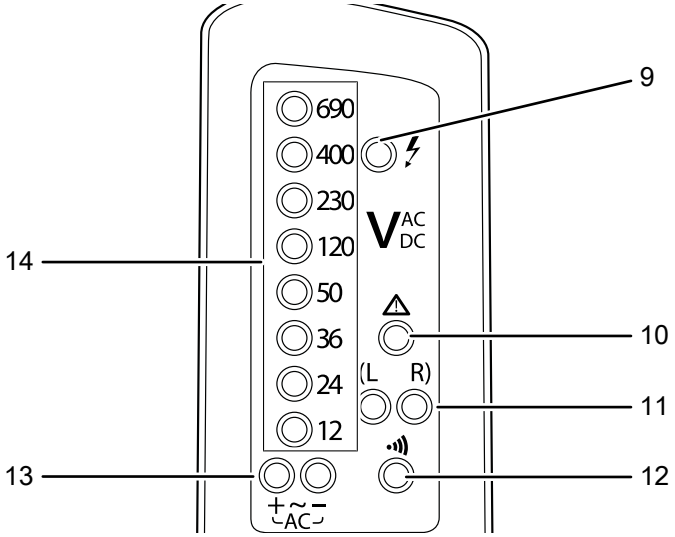
The device is further equipped with a torch for easier voltage detections on poorly lit areas.

Device depiction



No.	Designation
1	Test probe L1 (–)
2	Test probe L2 (+)
3	LED torch
4	Display
5	*Autotest* button
6	*Torch* button
7	Battery compartment
8	Protection against contact

Display



No.	Designation	Function
9	*Phase testing* indication	illuminated during unipolar voltage detection at an alternating voltage of 100 V or more
10	*Warning* indication	from a voltage of 50 V: slightly illuminated from a voltage of 120 V: fully illuminated
11	*Rotary field direction* indications	illuminated according to the measured rotary field direction: *(L)* = left-turning rotary field direction *(R)* = right-turning rotary field direction
12	*Continuity test* indication	single = illuminated if the continuity test has been successful with indications (14) = functional test in progress.
13	*Polarity* indications	illuminated according to the measured polarity: *AC +/AC -* = current flow direction both = alternating voltage
14	*Voltage detection* LEDs	single = illuminated according to the measured voltage all with indication (12) = functional test in progress

Technical data

Parameter	Value
Voltage indication	12–690 V DC 12–400 V AC
Voltage detection	automatic
Display tolerance	-30 % to 0 % of the displayed value
Polarity indicator	+ / - / ~
Display delay	< 0.1 s LED
Frequency range	50/60 Hz
Power consumption	approx. 2.1 W for 600 V
Current consumption	I_s < 0.2 A
Maximum permissible measuring time for voltages	duty cycle = 30 s
Rest period between voltage detections	10 minutes
LED display from	> 8 V AC/DC
Operating temperature	-10 °C to +55 °C
Relative humidity	85 % max.
Overvoltage category	CAT III – 600 V
Type of protection	IP64
Dimensions (length x width x height)	240 x 40 x 78 mm
Battery	2 x 1.5 V AAA
Weight	237 g

Unipolar phase testing

Voltage range	100 to 690 V AC
Frequency range	50/60 Hz

Continuity test

Measuring range	< 300 kΩ
Test current	< 5 µA
Overvoltage protection	690 V AC/DC

Phase sequence indicator

Voltage range	100 to 400 V
Frequency range	50/60 Hz
Measuring principle	double-pole and contact-electrode

Scope of delivery

- 1 x Voltage detector BE20 (without batteries)
- 1 x Measuring tip set (4 mm)
- 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

When transporting the device, ensure dry conditions and 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
- at the temperature specified in the technical data
- Batteries are removed from the device

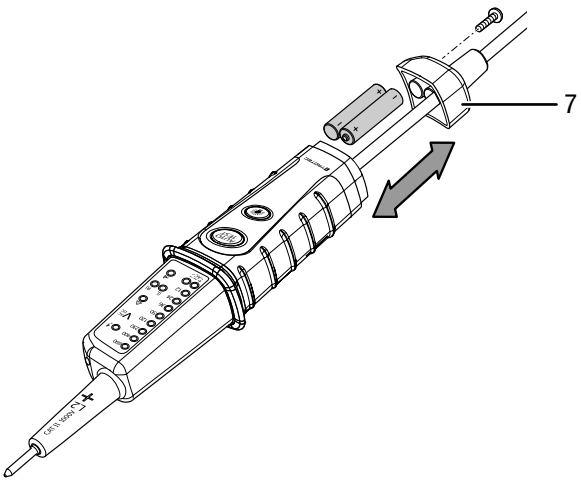
Operation

Inserting the batteries

Notice

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

1. Loosen the screw below the battery compartment cover (7) with a suitable screwdriver.
2. Remove the battery compartment cover (7).
3. Insert the batteries (2 x 1.5 V batteries AAA) into the battery compartment with correct polarity.
4. Place the battery compartment cover (7) back onto the device and retighten the screw.



Function test

Info

Check the device for reliable functioning at a known voltage source before each voltage detection.

Info

The *Warning* indication (10) is also illuminated if the battery level is low; it is lit as soon as there is a voltage exceeding 50 V.

Notice

A defective voltage detector must not be used. If the device does not react as described when you carry out the function test, no longer use the voltage detector.

1. Press and hold the *Autotest* button (5) on the device for a few seconds.
   ⇨ The *Continuity test* indication (12) lights up.
   ⇨ All *Voltage detection* LEDs (14) light up.
   ⇨ If the autotest has been successful, an acoustic signal is emitted.
2. Before performing a measurement with two test probes, check the functionality of the device by holding together both test probes (1, 2).
   ⇨ If the test is successful, all *Voltage detection* LEDs (14) and the *Continuity test* indication (12) light up. An acoustic signal is emitted additionally.
   ⇨ If the test has not been successful, replace the batteries as described in the Chapter "Inserting the batteries", and repeat the function test.

Measuring with one test probe

Unipolar phase testing

Warning of electrical voltage

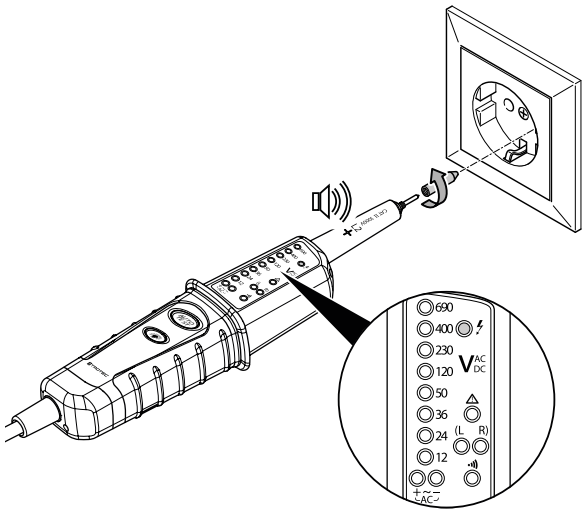
Risk of electric shock and risk of injury!

Unfavourable surrounding conditions, e.g. electrostatic fields or good insulation, can have negative influences on the unipolar phase testing. Always carry out an additional bipolar voltage detection.

Notice

The device is only suited for unipolar phase testing if it contains charged batteries.

1. Touch the measuring point to be tested with the test probe L2 (2).
   ⇨ The *Phase testing* indication (9) lights up and an acoustic signal is emitted if there is an AC voltage exceeding 100 V.

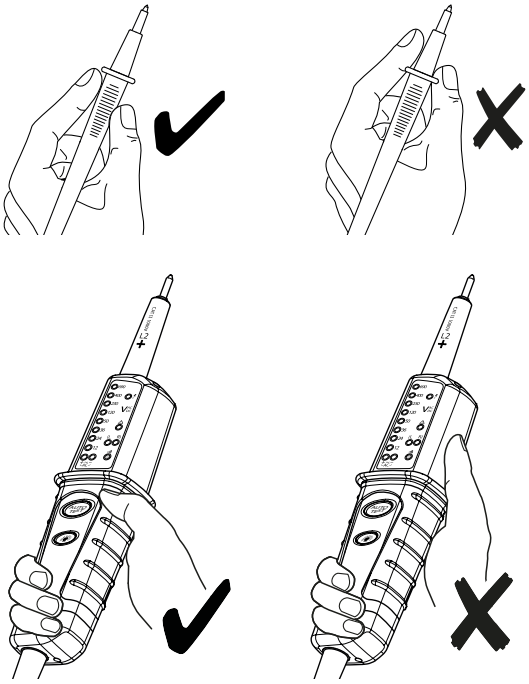


Measuring with two test probes

Warning of electrical voltage

Risk of electric shock and risk of injury!

- During the measurement, make sure to observe the measuring ranges of the device specified in the technical data.
- Test the device for proper functioning at a known voltage source before each measurement.
- When holding onto the device, make sure to always hold it by the insulated handles and do not reach behind the protection against contact (8). Never reach behind the protection against contact and never touch the test probes.



Voltage detection

Info

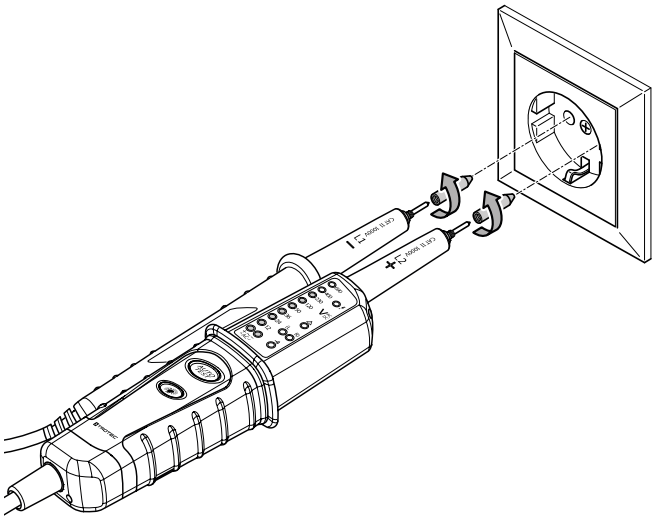
For technical reasons, the instrument cannot display DC voltages within the range of approx. 0 V to 8 V.

Info

Note that the actual voltage can be up to 30 % lower than the voltage indicated on the display. For example: If a voltage value of 36 V is displayed, the actual voltage can have its range between 25.2 and 36 V (see display tolerance).

Notice

Before carrying out the voltage detection on the socket, screw the supplied tips onto both test probes (1, 2). This ensures an easier voltage detection on the socket.



1. Use both test probes (1, 2) to touch the measuring points of the voltage source you would like to test.
   ⇨ The respective *Voltage detection* LEDs (14) light up according to the voltage applied.
   ⇨ The corresponding *Polarity* indication (13) lights up.
   ⇨ If both *Polarity* indications *AC +* and *AC –* (13) light up simultaneously, there is an AC voltage.

Continuity test

Warning of electrical voltage

Risk of electric shock and risk of injury when carrying out the continuity test!

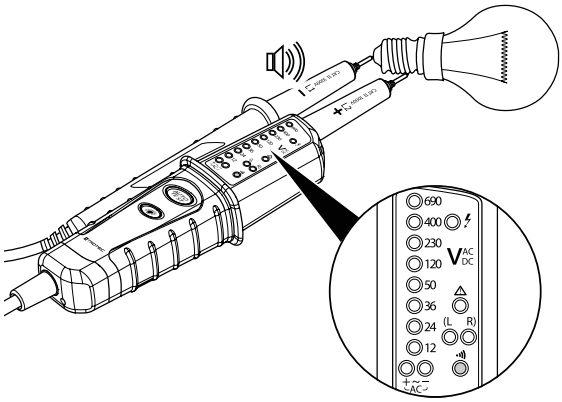
Make sure that the power of the electric circuit is switched off and all capacitors are completely discharged.

Notice

The device is only suited for the continuity test if it contains charged batteries.

✓ All capacitors are completely discharged.

1. Use both test probes (1, 2) to touch the measuring points of the de-energised measuring object.
   ⇨ If the continuity test has been successful, an acoustic signal is emitted and the *Continuity test* indication (12) lights up.

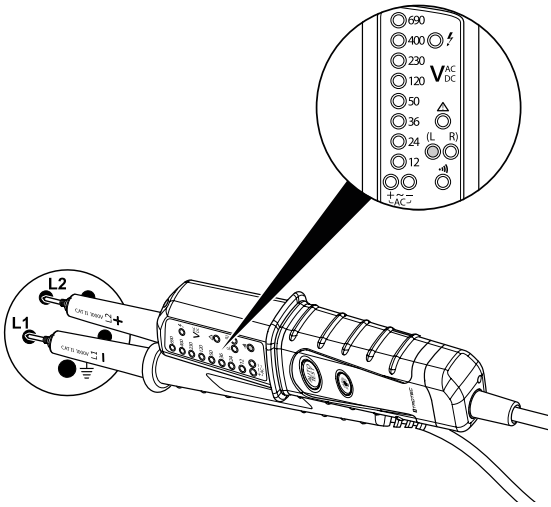


Rotary field direction display

Notice

The device is only suited for rotary field direction display if it contains charged batteries.

1. Use both test probes (1, 2) to touch the measuring points of the voltage source you would like to test.
   ⇨ According to the measurement result, the left-turning (L) or right-turning (R) *Rotary field direction* indication (11) lights up.



Further functions

Switching on the torch

Please proceed as follows to use the torch:

✓ Charged batteries have been inserted into the device.

1. Press and hold the *Torch* button (6).
   ⇨ The LED torch (3) will be illuminated for as long as the *Torch* button (6) is pressed.
2. Release the *Torch* button (6) to switch off the LED torch.

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.

The device does not respond:

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

The voltage detection results in the LED display being inexplicable:

- The battery voltage is too low. Exchange the batteries immediately.
- Check all cable connections for potential defects. In case of defective connections/cables, you must not continue using the device.

The device still does not operate correctly after these checks:

Please contact the manufacturer's customer service.

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 wheeled bin indicates that this device and any associated components (e.g. remote controls) must not be disposed of with household waste at the end of their life, in accordance with the Waste Electrical and Electronic Equipment Directive (2012/19/EU) and national laws.

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.



This icon with the crossed-out wheeled bin indicates that batteries or accumulators must not be disposed of with household waste at the end of their life. If the device contains batteries or accumulators that contain mercury, cadmium or lead, the respective chemical symbol (Hg, Cd or Pb) is shown below the icon of the crossed-out wheeled bin. To prevent environmental pollution, do not carelessly leave batteries or electrical and electronic equipment containing batteries in public areas. In the European Union, batteries and accumulators must be returned to a designated collection point in accordance with REGULATION (EU) 2023/1542 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 July 2023 concerning batteries and waste batteries. Remove batteries/accumulators and dispose of them separately 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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