

# EN

OPERATING MANUAL  
VOLTAGE DETECTOR



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**Notes regarding the operating manual**


**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 operating manual must be observed.

You can download the current version of the operating manual and the EU declaration of conformity 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.
  - 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.
  - The device is only designed to display the voltage range and is not suitable for measuring purposes.
  - 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.
  - The voltage detector may only be used within the specified rated voltage range and in electrical installations of up to 400 V AC and 690 V DC.
  - The voltage detector may only be used in circuits of overvoltage category CAT III with max. 600 V conductor to earth.
  - 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.

- For technical reasons, the device cannot display DC voltages within the range of approx. 0 V to 8 V.
- Check the device for proper functioning before and after each use. The device must not be used if any of the LED indicators does not function correctly or if the correct functionality of the device cannot be clearly recognized.
- 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 k $\Omega$ . 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 k $\Omega$ .
- 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 as given in the Technical data chapter.

### 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).

### Note

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.

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

### Improper use

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

Unauthorized modifications of the device are forbidden.

## Personnel qualifications

Qualified electricians who use this device must:

- master the 5 safety rules (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 operating manual, 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 wither 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

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

Test the device for proper functioning at a known voltage source before each measurement.

### Note

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

### Note

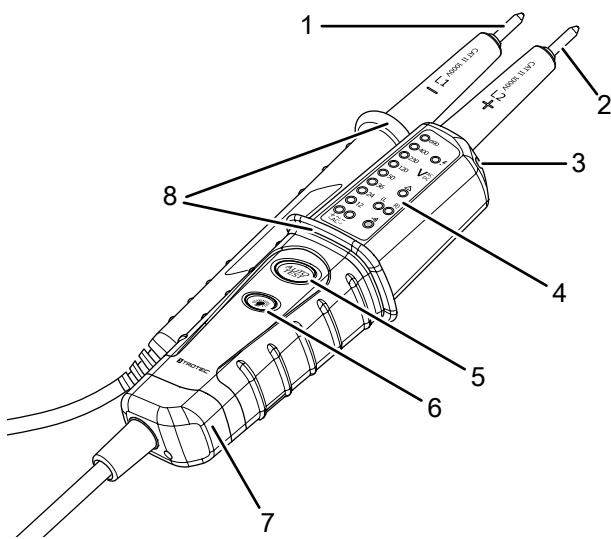
Do not use abrasive cleaners or solvents to clean the device.

## Information about the device

### Device description

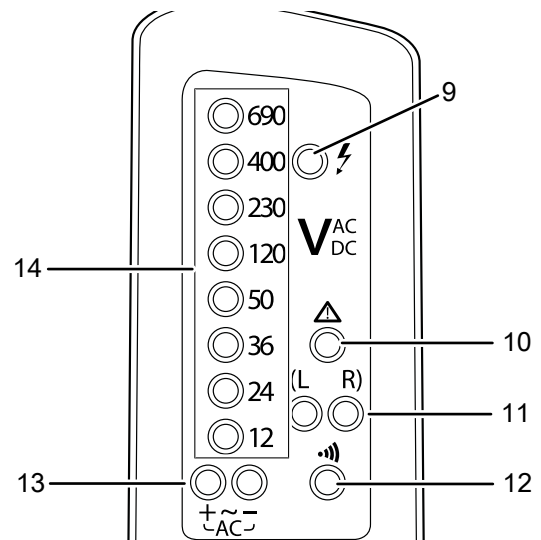
The bipolar voltage detector serves to indicate voltage ranges between 12 and 690 V DC or 12 and 400 V AC. The voltage amounts are displayed in 8 sections on an LED display with their polarity being indicated. The device may be used in facilities of overvoltage category 3 (CAT III = domestic installations). 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   | LED torch power button     |
| 7   | Battery compartment        |
| 8   | Protection against contact |

### Display



| No. | Designation                                                                                         |
|-----|-----------------------------------------------------------------------------------------------------|
| 9   | Unipolar voltage detection phase display                                                            |
| 10  | Warning indication voltage mode                                                                     |
| 11  | Left-turning rotary field direction display (L)<br>Right-turning rotary field direction display (R) |
| 12  | Continuity check indication                                                                         |
| 13  | Polarity indicator AC +<br>Polarity indicator AC -                                                  |
| 14  | Voltage detection LED displays                                                                      |

## Technical data

| Parameter                                       | Value                               |
|-------------------------------------------------|-------------------------------------|
| Voltage indication                              | 12/24/36/50/120/230/400/690 V AC/DC |
| Voltage detection                               | automatically                       |
| Display tolerance                               | -30 % to 0 % of the displayed value |
| Polarity indicator                              | + / - / ~                           |
| Display delay                                   | < 0.1 s LED                         |
| Frequency range                                 | 50 / 60 Hz                          |
| Power input                                     | approx. 2.1 W for 600 V             |
| Current consumption                             | $I_s < 0.2 \text{ A}$               |
| 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 k $\Omega$    |
| Test current           | < 5 $\mu \text{ A}$ |
| 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
- 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
- The storage temperature is the same as the range given in the Technical data chapter.
- Remove the batteries from the device.

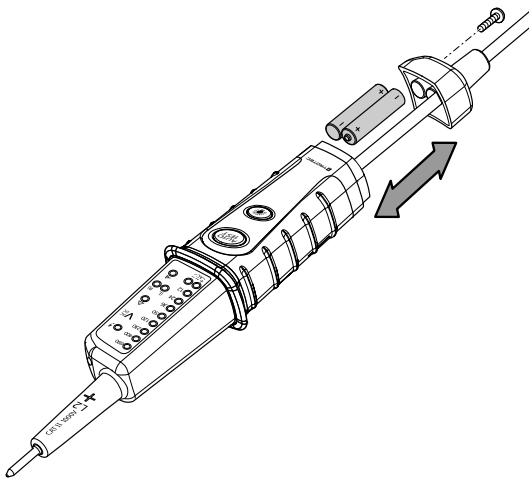
## Operation

### Inserting the batteries

#### Note

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 LED is also illuminated if the battery level is low; it is lit as soon as there is a voltage exceeding 50 V.

1. Press and hold the autotest button (5) on the device for a few seconds.
  - ⇒ The continuity test indication (12) is illuminated.
  - ⇒ All voltage detection LED displays (14) are illuminated.
  - ⇒ If the autotest has been successful, an acoustic signal is emitted.

#### Note

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.

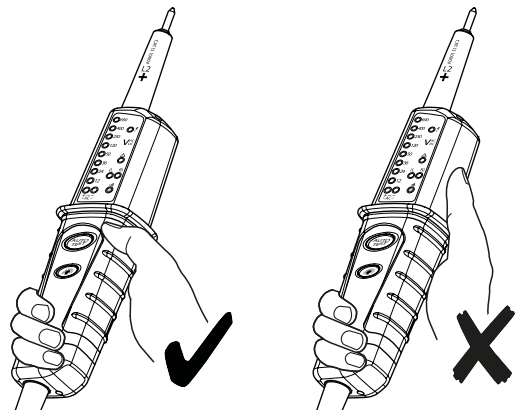
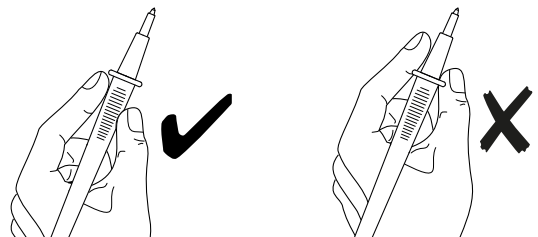
### Voltage detection



#### 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.



#### Info

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

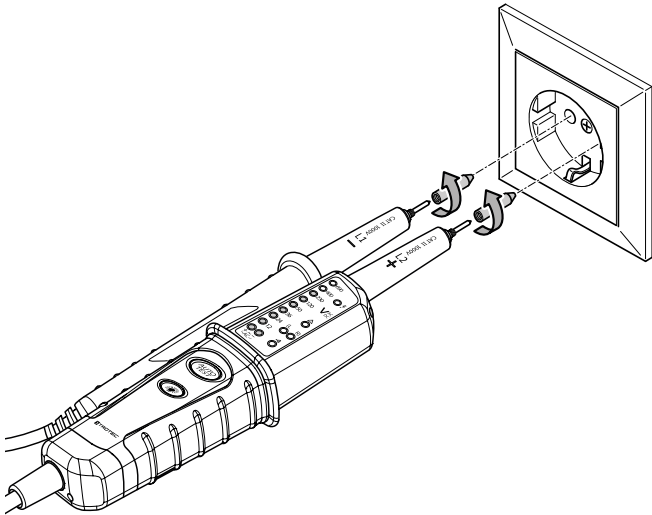


#### Note

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).

**Note**

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.



**Unipolar phase testing**

**Note**

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

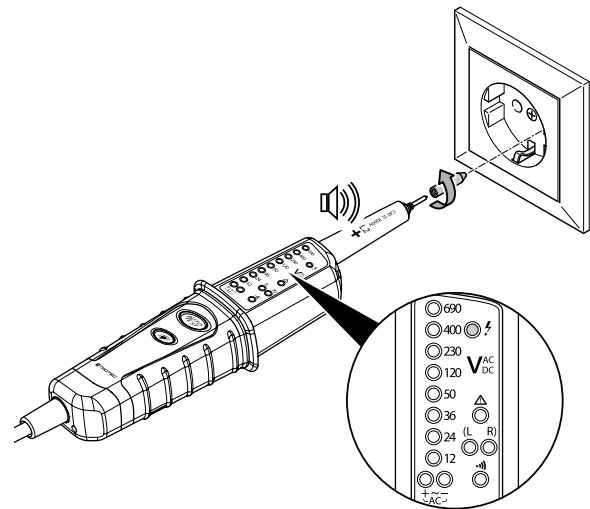


**Warning of electrical voltage**

**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.

1. Touch the measuring point to be tested with the test probe L2 (2).
  - ⇒ The unipolar voltage detection phase display (9) is illuminated and an acoustic signal is emitted if there is an AC voltage exceeding 100 V.



1. Prior to the voltage detection, check the functionality of the device by holding together both test probes (1, 2).
  - ⇒ If the test is successful, all voltage detection LED displays (14) and the continuity test indication (12) are illuminated. 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.
2. Use both test probes (1, 2) to touch the measuring points of the voltage source you would like to test.
  - ⇒ According to the existing voltage, the respective voltage detection LED displays (14) are illuminated on the display (4).
  - ⇒ The respective polarity indicator (13) is illuminated.
  - ⇒ If both polarity indicators AC + and AC – (13) are illuminated simultaneously, there is an AC voltage.



## Continuity test

### Note

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

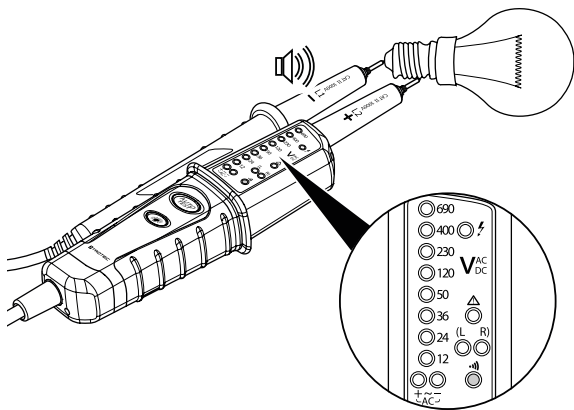


### Warning of electrical voltage

#### 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.

- ✓ All capacitors are completely discharged.
- 1. Prior to the voltage detection, check the functionality of the device by holding together test probe (1) with test probe (2).
  - ⇒ If the test is successful, all voltage detection LED displays (14) and the continuity test indication are illuminated. 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.
- 2. 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) is illuminated.

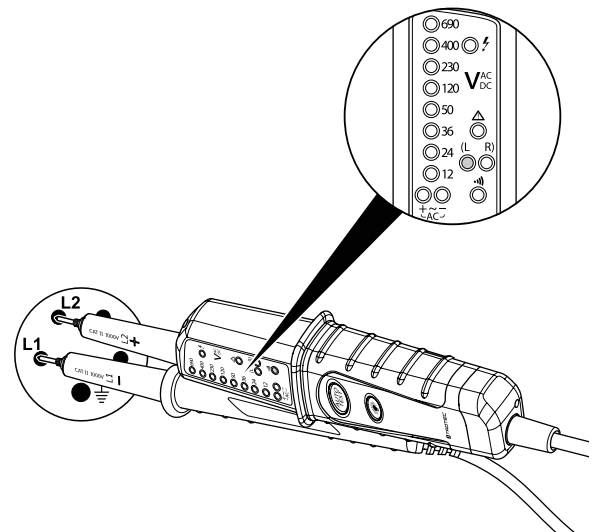


## Rotary field direction display

### Note

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

1. Prior to the voltage detection, check the functionality of the device by holding together both test probes (1, 2).
  - ⇒ If the test is successful, all voltage detection LED displays (14) and the continuity test indication (12) are illuminated. 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.
2. 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 display (11) is illuminated on the display (4).



## 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 LED torch power button (6).
  - ⇒ The LED torch (3) will be illuminated for as long as the LED torch power button (6) is pressed.
- 2. Let go of the LED torch power 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 Trotec customer service.

## Maintenance and repair

### Battery change

A battery change is required if the continuity test indication (12) is no longer illuminated and no acoustic signal is emitted when holding both test probes together.

### 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.

## Disposal



The icon with the crossed-out waste bin on waste electrical or electronic equipment stipulates that this equipment 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. For further return options provided by us please refer to our website [www.trotec24.com](http://www.trotec24.com).

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.

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)