TP7

EN

INSTRUCTIONS
PYROMETER

TROTEC

TRT-BA-TP7-TC220613TTRT01-005-EN

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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 of laser radiation
This symbol indicates dangers to the health of persons due to laser radiation.

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

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

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

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

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

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

TP7

https://hub.trotec.com/?id=42338

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.
- Do not immerse the device in water. Do not allow liquids to penetrate into the device.
- The device may only be used in dry surroundings and must not be used in the rain or at a relative humidity exceeding the operating conditions.
- Protect the device from permanent direct sunlight.
- Do not expose the device to strong vibrations.
- 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.
- Avoid looking directly into the laser beam.
- Never point the laser beam at people or animals.
- Use batteries of type 6LR61 (9 V battery).
- Never charge batteries that cannot be recharged.
- Different types of batteries and new and used batteries must not be used together.
- Insert the batteries into the battery compartment according to the correct polarity.
- Remove discharged batteries. Batteries contain materials hazardous to the environment. Dispose of the batteries according to the national regulations.
- Remove the batteries from the device if you will not be using the device for a longer period of time.

- Never short-circuit the 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.
- Observe the storage and operating conditions (see Technical data).

Intended use

This device is exclusively intended for measuring temperature by means of an infrared sensor in the measuring range specified in the technical data.

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

Reasonably foreseeable misuse

The device must not be pointed at people or animals. Do not use the device in potentially explosive atmospheres, for measurements in liquids or at live parts. Any unauthorised modifications, alterations or structural changes to the device are forbidden.

Personnel qualification

People who use this device must:

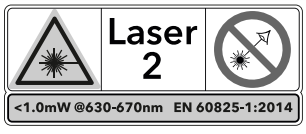
- be aware of the dangers that occur when working with laser measuring devices.
- have read and understood the instructions, especially the Safety chapter.

Safety signs and labels on the device

Notice

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:

Warning sign	
Meaning	The warning sign is located on the back of the device and indicates that the device is equipped with a class 2 laser. The power is less than 1.0 mW. The frequency range of the laser is 630 to 670 nm. **Do not look directly into the laser beam or the opening from which the laser beam emerges!**

Residual risks

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 of laser radiation

Laser class 2, P max.: < 1 mW, λ: 400-700 nm, EN 60825-1:2014

Do not look directly into the laser beam or the opening from which it emerges.

Never point the laser beam at people, animals or reflective surfaces. Even brief eye contact can lead to eye damage.

Examining the laser output aperture by use of optical instruments (e.g. magnifying glass, magnifiers and the like) entails the risk of eye damage.

When working with a laser of class 2, observe the national regulations on wearing eye protection.

Warning

Risk of suffocation!

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

Warning

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

Warning

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

Caution

Keep a sufficient distance from heat sources.

Notice

To 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.

Information about the device

Device description

The pyrometer TP7 uses an infrared sensor to measure surface temperatures without contact. An integrated multi-laser pointer serves for the determination of the measuring spot.

You can set the emission ratio of the material to be measured so as to achieve a more precise measurement result.

For the temperature measurement the device allows you to set freely definable thresholds. Exceeding or falling below these preselected thresholds is indicated by an acoustic alarm function and visually by a changed display colour.

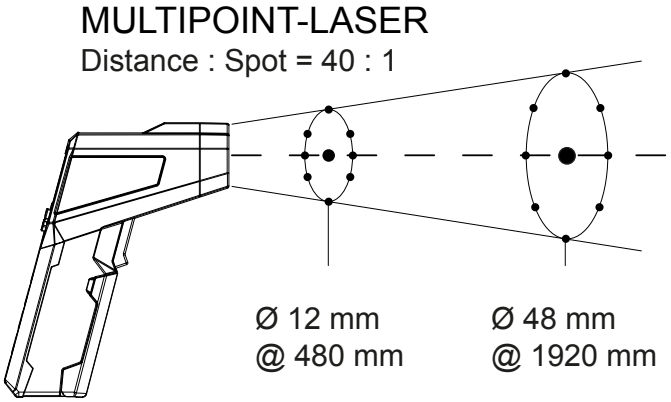
The display can be illuminated as needed. When not in use, an automatic switch-off saves the battery.

Measuring principle

The device measures the temperature by means of an infrared sensor. Important factors playing a role in the temperature measurement are the measuring spot diameter and the degree of emission.

Measuring spot

Observe the ratio of the distance (D) to the measuring spot diameter (S). The larger the distance to the object, the larger the measuring spot diameter and hence, the less precise the measured result. The device calculates an average temperature from all the temperatures in the measuring spot.



Emissivity

Emissivity is a value used to describe the energy radiation characteristics of a material.

Most organic materials have an emissivity of 0.95. Metals or shiny materials come with a much lower value.

A material's emissivity depends on various factors, e.g. on

- Material composition
- Surface condition
- Temperature

The emissivity can range between 0.1 and 1 (in theory).

The following rule of thumb can be assumed:

- When a material is rather dark and its surface texture matt, it probably has a high emissivity.
- The brighter and smoother the surface of a material, the lower will be its emissivity, presumably.
- The higher the emissivity of the surface to be measured, the better it is suited for non-contact temperature measurement by use of a pyrometer or thermal imaging camera, since falsifying temperature reflections become negligible.

Nevertheless, entering an emissivity as appropriate as possible is indispensable for a precise measurement.

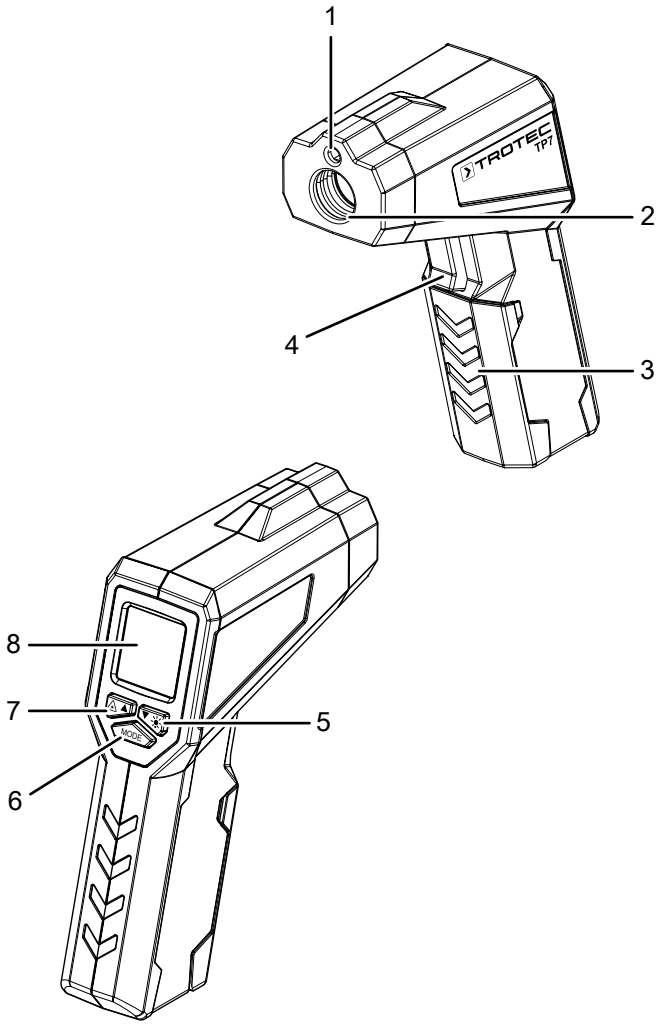
Emissivity table

The table below may be used as reference for setting the emissivity. It supplies reference values for the emissivity of common materials.

Material	Emissivity
Aluminium, roughened	0.1 to 0.3
Aluminium, alloy A3003, oxidized	0.3
Aluminium, oxidized	0.2 to 0.4
Asbestos	0.92 to 0.95
Tarmac	0.92 to 0.95
Basalt	0.7
Concrete	0.92 to 0.95
Bitumen	0.98 to 1.00
Lead, oxidized	0.2 to 0.6
Lead, rough	0.4
Roofing felt	0.95
Ice	0.98
Iron (forged), blunt	0.9
Iron, oxidized	0.5 to 0.9
Iron, rusted	0.5 to 0.7
Enamel varnish, black	0.95
Earth	0.92 to 0.96
Paint (not alkaline)	0.90 to 0.95
Paint (non-metal)	0.95
Gypsum	0.60 to 0.95
Glass, pane	0.85 to 0.95
Rubber	0.92 to 0.95
Cast iron, molten	0.2 to 0.3
Cast iron, not oxidized	0.2
Skin	0.98
Haynes alloy	0.3 to 0.8
Radiator enamel	0.95
Timber (natural)	0.90 to 0.95
Inconel, electro-polished	0.15
Inconel, oxidized	0.70 to 0.95
Inconel, sand-blasted	0.3 to 0.6
Limestone	0.95 to 0.98
Carborundum	0.9
Ceramics	0.88 to 0.95
Gravel	0.95
Carbon, graphite	0.70 to 0.85
Carbon, not oxidized	0.8 to 0.9

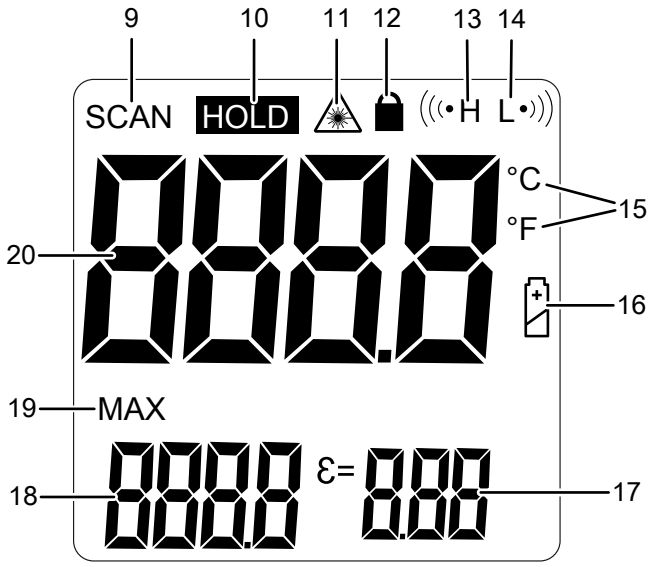
Material	Emissivity
Plastic, non-transparent	0.95
Copper, oxidized	0.4 to 0.8
Varnish	0.80 to 0.95
Marble	0.90 to 0.95
Brass, highly polished	0.3
Brass, oxidized	0.5
Molybdenum, oxidized	0.2 to 0.6
Nickel, oxidized	0.2 to 0.5
Plastic	0.85 to 0.95
Plaster	0.90 to 0.95
Sand	0.9
Snow	0.9
Steel, heavy plate	0.4 to 0.6
Steel, cold-rolled	0.7 to 0.9
Steel, oxidized	0.7 to 0.9
Steel, polished sheet metal	0.1
Steel, stainless	0.1 to 0.8
Cloth	0.95
Wallpaper (non-metal)	0.95
Textiles (non-metal)	0.95
Titanium, oxidized	0.5 to 0.6
Clay	0.90 to 0.95
Water	0.93
Cement	0.90 to 0.96
Brick (rough)	0.90 to 0.95
Zinc, oxidized	0.1

Device depiction



No.	Designation	Function
1	Laser pointer	Marking the measuring point
2	Infrared sensor	Temperature sensor
3	Battery compartment with cover	Battery connection
4	Measurement button	Carrying out measurements
5	*Light* button	- Switching the display illumination on and off - Navigating forward in the menu
6	*MODE* button	Going through the menu functions
7	*Laser* button	- Switching the laser pointer on and off - Navigating back in the menu
8	Display	Measurement value and status displays

Display



No.	Designation	Function
9	*SCAN* indication	Measurement is on
10	*HOLD* indication	Measured value will be held
11	*Laser* indication	Laser pointer active
12	*Continuous measurement* indication	Flashes: continuous measurement in progress
13	*Upper alarm threshold* indication	Flashes: setting the upper alarm threshold Illuminated: upper alarm threshold active
14	*Lower alarm threshold* indication	Flashes: setting the lower alarm threshold Illuminated: lower alarm threshold active
15	*Temperature unit* indication	Unit of the displayed temperature
16	*Battery status* indication	Lights up when the battery is low
17	*Emissivity* indication	Flashes: setting the emissivity Illuminated: current emissivity
18	*MAX temperature* indication	Maximum value is displayed
19	*MAX* indication	Maximum value of the last measurement
20	Measurement value display	Current or last measured value

Technical data

Parameter	Value
Model	TP7
Weight	224 g
Dimensions (length x width x height)	160 mm x 49 mm x 122 mm
Measuring range	-50°C to 1000°C (-58°F to 1832°F)
Resolution	0.1 °C / °F
Target display	Laser class II, 630 to 670 nm < 1 mW
Accuracy	±2.5 °C (±4.5 °F) at -50 °C to 20 °C (-58 °F to 68 °F) ±1 % at 21 °C to 300 °C (69 °F to 572 °F) ±1.5 % at 301 °C to 1000 °C (573 °F to 1832 °F)
Emissivity	adjustable from 0.10 to 1.0
Optical resolution	40:1 (D:S)
Smallest measuring spot	ø 25.4 mm
Spectral sensitivity	8~14 µm
Response time	< 150 ms
Operating temperature	0 °C to 50 °C (32 °F to 122 °F), 10 % to 90 % RH
Storage conditions	-10 °C to 60 °C, < 80 % RH
Power supply	9 V battery
Switch-off	After approx. 10 seconds of non-use

Scope of delivery

- 1 x Device TP7 (without batteries)
- 1 x Quick guide
- 1 x Storage bag

Transport and storage

Notice

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

Transport

For transporting the device, use the bag included in the scope of delivery in order to protect the device from external influences.

The manufacturer packed the device to the best of his abilities to protect it against transport damage.

Storage

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

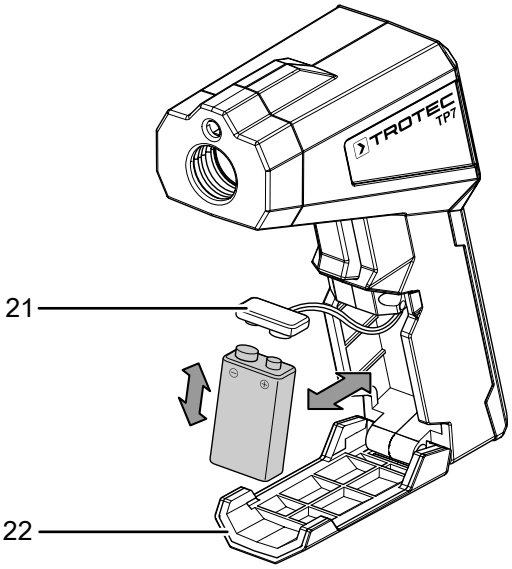
- dry and protected from frost and heat
- protected from dust and direct sunlight
- protected from dust ingress in the supplied bag
- at the temperature specified in the technical data
- battery is removed from the device

Operation

Inserting the battery

Notice

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



1. Open the battery compartment by folding open the cover (22) with your fingers.
2. Use the battery clip (21) to connect the new battery (1 x 9 V) with correct polarity.
3. Close the cover of the battery compartment.

Carrying out a measurement

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.

- Ensure that the surface to be measured is free of dust, dirt or similar substances.
- To be able to gain exact measurement results on surfaces which reflect heavily, stick matt masking tape to the surface or apply matt black paint with a very high and known emissivity.
- Note the 40:1 ratio of the distance to the measuring spot diameter. For accurate measurements the measuring object should be at least twice as large as the measuring spot.

Carrying out a quick measurement

Please proceed as follows to carry out a quick measurement:

1. Point the device at the object to be measured.
2. Press the measurement button (4).
   ⇨ The device turns on and carries out a measurement.
   ⇨ The currently measured value will be indicated on the display (20).

Carrying out an extended measurement

Please proceed as follows to carry out an extended measurement. The device measures the temperature for as long as you hold down the measurement button (4):

1. Point the device at the object to be measured.
2. Press and hold the measurement button (4).
   ⇨ The device turns on and starts a measurement.
   ⇨ The *SCAN* indication (9) appears on the display.
   ⇨ The currently measured value will be indicated on the display (20).
3. Let go of the measurement button (4) again.
   ⇨ The device stops the measurement and the *HOLD* indication (10) appears on the display.
   ⇨ In addition, the *MAX* indication (19) appears and the maximum value (18) of the measurement is displayed.

Switching the continuous measurement function on or off

The device comes with a function for continuous measurements. If this function is activated, the device constantly measures the temperature until deactivated.

Please proceed as follows to switch on the continuous measurement function:

1. Repeatedly press the *MODE* button (6) until the corresponding icon in the *Continuous measurement* indication (12) flashes.
   ⇨ *OFF* will be indicated in the measurement value display (20).
2. Press the *Laser* button (7) or the *Light* button (5).
   ⇨ *ON* will be indicated in the measurement value display (20).
3. Press the measurement button (4) to start a continuous measurement.
   ⇨ The device starts measuring.
4. Press the measurement button (4) again to stop the continuous measurement.
   ⇨ The device stops the continuous measurement operation and indicates the determined measured value.

Setting the temperature unit (°C / °F)

The default setting for the temperature unit is °C. This setting can be manually changed to °F at the device.

Please proceed as follows to change the temperature unit:

1. Repeatedly press the *MODE* button (6) until the *Temperature unit* indication (15) flashes, showing the currently set temperature unit.
2. Press the *Laser* button (7) or the *Light* button (5) to change the temperature unit on the device.

Switching the laser pointer on or off

Warning of laser radiation

Class 2 laser radiation.

Lasers of class 2 only radiate in the visible range and during continuous wave operation (lasting beam) no more than 1 milliwatt (mW) of output will be emitted. Looking directly into the laser beam for a longer period of time (more than 0.25 seconds) can cause damage to the retina.

Avoid looking directly into the laser beam. Never look into the laser beam using optical aides. Do not suppress the winking reflex when looking into the laser beam unintentionally. Never point the laser beam at people or animals.

Warning of laser radiation

Please note that when the laser is switched on, the laser pointer will light up as soon as you press the measurement button (4).

Ex works the laser pointer is switched off.

Please proceed as follows to switch the laser pointer on or off:

1. Press the *Laser* button (7).
   ⇨ The *Laser* indication (11) appears.
   ⇨ The laser pointer is switched on.
2. Press the *Laser* button (7) again.
   ⇨ The *Laser* indication (11) disappears.
   ⇨ The laser pointer is switched off.

The device memorizes the selected setting when switching off.

Switching the display illumination on or off

Ex works the display illumination is switched off.

Please proceed as follows to activate or deactivate the display illumination:

1. Press the *Light* button (5).
   ⇨ The display illumination will be switched on.
2. Press the *Light* button (5) again.
   ⇨ The display illumination will be switched off.

The device memorizes the selected setting when switching off.

Setting the emissivity

To achieve a more precise measurement you can previously enter a degree of emission that is as accurate as possible.

Please proceed as follows to set the degree of emission at the device:

1. Repeatedly press the *MODE* button (6) until the *Emissivity* indication (17) flashes, showing the currently set emissivity.
2. Use the *Laser* button (7) or the *Light* button (5) to change the emissivity to the desired value between 0.10 and 1.00.
3. Press the *Laser* button (7).
   ⇨ The set emissivity value will be increased by 0.01.
4. Press the *Light* button (5).
   ⇨ The set emissivity value will be reduced by 0.01.
5. Press the measurement button (4) to adopt the set emissivity for the next measurement.

Setting the upper and lower alarm thresholds

You can set both an upper and lower alarm threshold for the measured value at the device. Upon exceeding or falling below this value an acoustic signal will be emitted by the device. Additionally, the display lights up in one of the following colours:

Display colour	Acoustic signal	Meaning
Flashing in red	Constant	Surface temperature exceeds activated upper threshold. Also works when the display illumination is deactivated.
Flashing in blue	Constant	Surface temperature below activated lower threshold. Also works when the display illumination is deactivated.
Continuously illuminated in green	-	Surface temperature is in normal range. The display will only be illuminated in green if the display illumination is activated.

Please proceed as follows to set the upper and lower alarm thresholds:

1. Repeatedly press the *MODE* button (6) until the *Upper alarm threshold* indication (13) or *Lower alarm threshold* indication (14) flashes.
   ⇨ *OFF* will be indicated in the measurement value display (20).
2. Press the *Laser* button (7) or the *Light* button (5).
   ⇨ *ON* will be indicated in the measurement value display (20).
3. Press the *MODE* button (6) again.
   ⇨ The currently saved value for the alarm threshold will be indicated in the measurement value display (20).
4. Use the *Laser* button (7) or the *Light* button (5) to change the value for the alarm threshold as desired.

Enabling/disabling the alarm threshold

Please proceed as follows to enable/disable the upper and lower alarm thresholds:

1. Repeatedly press the *MODE* button (6) until the *Upper alarm threshold* indication (13) or *Lower alarm threshold* indication (14) flashes.
   ⇨ *OFF* will be indicated in the measurement value display (20).
2. Press the *Laser* button (7) or the *Light* button (5) to activate the alarm threshold.
   ⇨ *ON* will be indicated in the measurement value display (20).
   ⇨ The desired alarm threshold is now activated.

3. Press the *Laser* button (7) or the *Light* button (5) again to deactivate the alarm threshold.
   ⇨ *OFF* will be indicated in the measurement value display (20).
   ⇨ The desired alarm threshold is now deactivated.

Switching the device off

The device switches off automatically after approx. 10 seconds of non-use.

Maintenance and repair

Battery change

A battery change is required when the *Battery status* indication (16) lights up or 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.

Display segments are only faintly visible or flicker:

- Check the charging status of the battery. Change the battery, if required (see chapter Inserting the battery).
- Make sure that the battery is properly positioned. Check the polarity is correct.

The device displays implausible measured values:

- Check the charging status of the battery. Change the battery, if required (see chapter Inserting the battery).
- Make sure that the battery is properly positioned. Check the polarity is correct.
- The sensor is defective or soiled. Clean the device as described in the Cleaning chapter.

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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