IC200 / IC300

EN

INSTRUCTIONS
THERMAL IMAGING CAMERA

> TROTEC

TROTEC

Table of contents

Information on the use of this 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:

IC200

https://hub.trotec.com/?id=46837

IC300

https://hub.trotec.com/?id=46838

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 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.

- Do not point the device at intense energy sources, such as the sun or laser radiation, in order to avoid damage to the device.

- 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.

- Observe the storage and operating conditions (see Technical data).

Intended use

Only use the device for visual or thermographic representation of objects whilst adhering to the technical data.

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

Reasonably foreseeable misuse

Do not use the device in potentially explosive areas. Trotec accepts no liability for damages resulting from improper use. In such a case, any warranty claims will be voided. Any unauthorised modifications, alterations or structural changes to the device are forbidden.

Personnel qualification

People who use this device must:
- have read and understood the instructions, especially the Safety chapter.

Safety signs and labels on the battery

Warning of explosion risk!
These symbols indicate the following:
Do not expose the battery pack or tool to fire or excessive temperature! Do not let the battery come into contact with water or fire! Avoid direct sunlight and moisture. There is a risk of explosion!

Do not open the appliance!
This symbol indicates the following:
This device may only be repaired and serviced by the manufacturer. Any unauthorised modifications, alterations or structural changes to the device are forbidden.
Risk of injury due to electrical voltage. Damage to the device may occur.

Observe the correct disposal of the battery!
This symbol indicates the following:
Ensure that the battery is disposed of correctly and never dispose of it in waste water or public waters. The battery contains irritating, caustic and toxic substances that pose significant risks to people and the environment.

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 explosive substances
Do not expose the batteries to temperatures above 60 °C! Do not let the batteries come into contact with water or fire! Avoid direct sunlight and moisture. There is a risk of explosion!

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
Lithium-ion batteries might catch fire in case of overheating or damage. Ensure a sufficient distance to heat sources, do not subject lithium-ion batteries to direct sunlight and make sure not to damage the casing. Do not overcharge lithium-ion batteries. If the battery is not permanently installed in the device, only use smart chargers that switch off automatically when the battery is fully charged. Charge lithium-ion batteries in due time before they are discharged completely.

Caution
Keep a sufficient distance from heat sources.

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.

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Information about the device

Device description

The thermal camera IC200/IC300 creates a visible image depicting infrared radiation, which is otherwise invisible to the human eye. The thermal image and temperature are displayed on the screen in real time. To improve the view, you can select various colour palettes for depicting the thermal image. Furthermore, you can superimpose IR and digital images in order to obtain a higher-contrast thermal image.

The device has an LCD touchscreen with a screen diagonal of 3.5 inches.

For a measured result which is as precise as possible the ambient temperature, reflected temperature, humidity, distance and emissivity can be adjusted.

A stepless 16-fold digital zoom allows viewing of distant details. The focus ring of the IC300 lens additionally allows the desired measuring object to be focused.

A list of emissivities for various surfaces is provided in the chapter Emissivity. For a precise evaluation, the thermal image on the screen can be frozen or saved. The saved images can later be viewed either directly on the camera screen or on a PC using an analysis software.

An internal image analysis tool supports the evaluation of the data, which you can save as photos, IR images or a fusion of both, as well as videos.

The USB-C interface enables data transfer and real-time viewing of the recordings on a PC. The software included in the scope of delivery (download) is used for external storage and editing of the recordings.

Device depiction
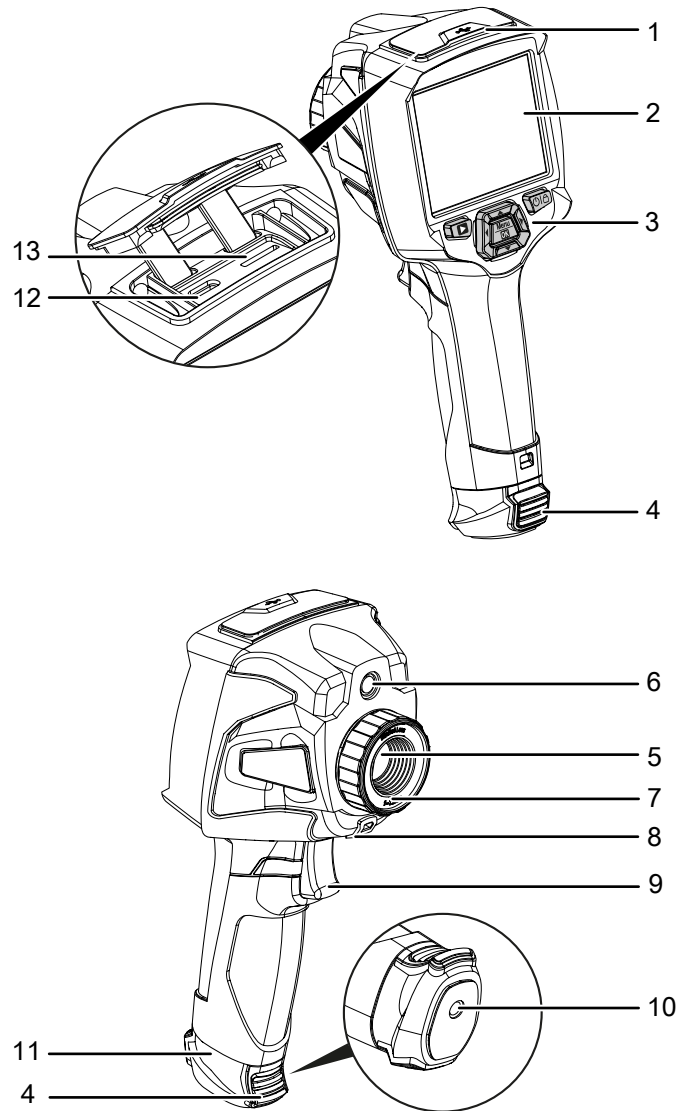
No.	Designation
1	Connectors cover
2	Display
3	Control panel
4	Battery clamps
5	Infrared camera lens
6	Digital camera lens
7	Focus ring (IC300 only)
8	Holder for protective cap
9	Trigger
10	1/4" tripod thread
11	Battery
12	USB-C port
13	microSD slot

Battery
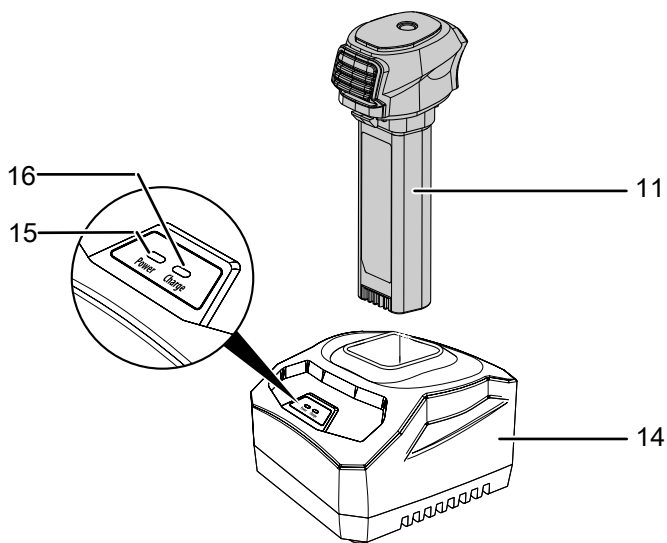
No.	Designation
11	Battery
14	Battery charger
15	*Power* battery LED
16	*Charge* battery LED

Control panel
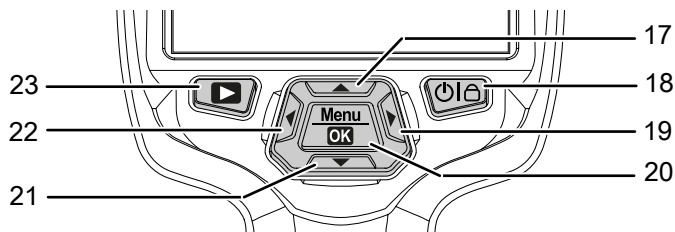
No.	Designation	Meaning
17	*Up* arrow button	Button for menu control
18	*On/Off* button	Switching the device on and off, switching the temperature scale
19	*Right* arrow button	Button for menu control
20	*Menu/OK* button	Button for menu control, confirming the selection
21	*Down* arrow button	Button for menu control
22	*Left* arrow button	Button for menu control
23	*Play* button	Opening data memory

Display
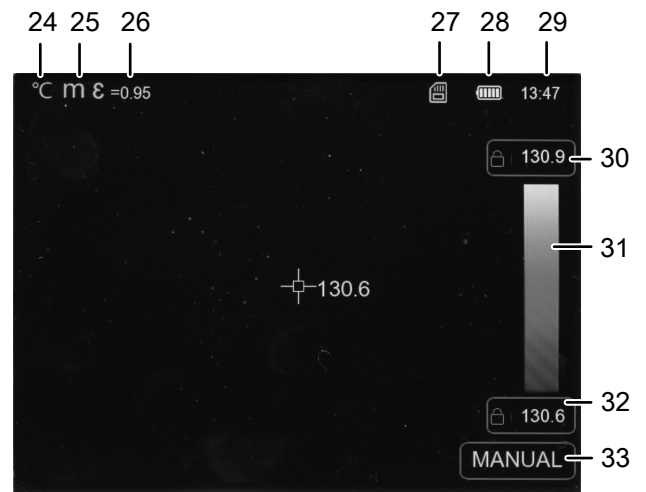
No.	Designation
24	*Temperature unit* indication
25	*Distance unit* indication
26	*Emissivity* indication
27	*microSD* indication
28	*Battery status* indication
29	*Time* indication
30	*Upper measuring point* indication
31	*Temperature scale* indication
32	*Lower measuring point* indication
33	*Temperature scale setting* indication

Technical data

Parameter		Value	
Model		IC200	IC300
Measure	Temperature range	-20 °C to +550 °C	0 °C to +650 °C
	Accuracy	±2 °C, ±2 % of the measured value, at 10 °C to 35 °C ambient temperature and > 0 °C object temperature	
Radiometric image performance	Detector type	Focal Plane Array (FPA), uncooled microbolometer	
	Detector resolution	256 x 192 pixels	384 x 288 pixels
	Spectral range	8 to 14 µm	
	Field of view (FOV)	56° x 42°	41.1° x 31.1°
	Geometric resolution	3.5 mrad	1.89 mrad
	Thermal sensitivity	≤ 0.1 °C at 30 °C	0,05 °C at 30 °C
	Refresh rate	25 Hz	50 Hz
	Focus / min. focus distance	fixed / 0.5 m	manual / 0.5 m
Visual image performance	Digital photo camera	2 megapixels	
	Field of view (FOV)	65°	
Image representation	Display	3.5 inch touch LCD, 640 x 480 pixels	
	Zoom	16x infinitely variable digital	
	Image display	Pseudo colours, 8 colour palettes	
	Image display options	IR image, real image, DuoVision Plus display (overlay of infrared and real images in random intensities), DuoVision Plus display (fusion of infrared and real image as contour-accentuated detail-enhanced thermogram), picture-in-picture, auto fusion, zoom	
Measurement and analysis	Measuring spots	1 centre spot, 3 movable temperature measuring spots (can be freely configured)	
	Measuring functions	Isotherm, line profile analysis, sector analysis (rectangle), various alarm functions, Min/Max temperature tracking (hot/cold spot), measurements at up to 3 temperature measuring points	
	Area measurement	3 areas	
	Degree of emission	User-defined variably adjustable from 0.01 to 1.0	
	Measurement correction	Emissivity, reflected object temperature, ambient temperature, relative humidity level, object distance	
Data storage	Memory	3.4 GB internal eMMC memory (> 60 minutes video/6000 images) plus 16 GB microSD card	
	Video file format	MPEG-4, 640 x 480 pixels at 30 fps	
	Image file format	JPEG or HIR files with measurement data; simultaneous saving of IR and real image possible	
	Interfaces	USB type C, Wi-Fi 802.11	
Power supply	Battery type	Li-ion battery (2,600 mAh); rechargeable, exchangeable	
	Operating time	approx. 4 h	
	Mains power	5 V, 2.4 A	
	Energy saving mode	User-defined	
Ambient conditions	Operating and storage temperature	-15 °C to +50 °C, -40 °C to +70 °C (without battery)	
	Humidity	10 % to 90 % RH (non-condensing)	
	Type of protection	IP54	
	Impact resistance (falling from)	2 m	
Dimensions	Dimensions	96 x 77 x 224 mm	
	Weight	500 g	
	Tripod thread	¼ inch	

Scope of delivery

- 1 x Thermal imaging camera
- 1 x USB power adapter
- 1 x Battery charging station (IC300 only)
- 1 x USB cable
- 1 x Wrist strap
- 1 x microSD card
- 1 x Software (via download)
- 1 x Transport case
- 1 x Quick guide

Transport and storage

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

Transport

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

The supplied Li-ion batteries are subjects to the requirements of dangerous goods legislation.

Observe the following when transporting or shipping Li-ion batteries:

- The user may transport the batteries by road without any additional requirements.
- If transport is carried out by third parties (e.g. air transport or forwarding company), special requirements as to packaging and labelling must be observed. This includes consulting a dangerous goods specialist when preparing the package.
  - Only ship batteries if their housing is undamaged.
  - Mask open terminals with tape and pack the battery in a way that it cannot move inside the packaging.
  - Please also observe any other national regulations.

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
- For storing the device, use the transport case included in the scope of delivery in order to protect the device from external influences.
- the storage temperature complies with the values specified in the Technical data
- Battery/Batteries removed during prolonged storage

Operation

Inserting the microSD memory card

The microSD memory card can be used to extend the device's internal memory in order to store images and videos.

Please proceed as follows to insert the microSD memory card:
1. Open the rubber cover on the top of the device (1).
2. Push the microSD card into the slot (13) until it clicks into place.
   ⇨ The *microSD* indication (27) appears on the display.
3. Close the rubber cover (1).

Inserting/changing the battery

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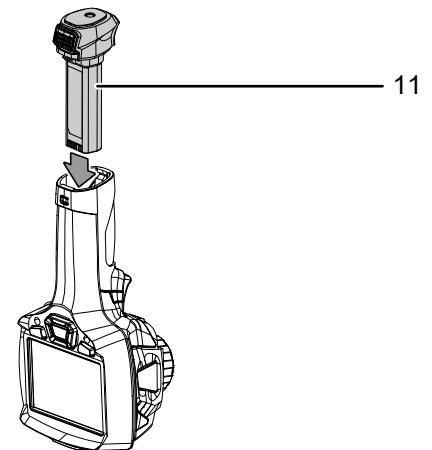> Make sure that the surface of the device is dry and the device is switched off.

1. If applicable, remove the empty battery. To do so, press the clamps on both sides (4) and pull out the battery (11).
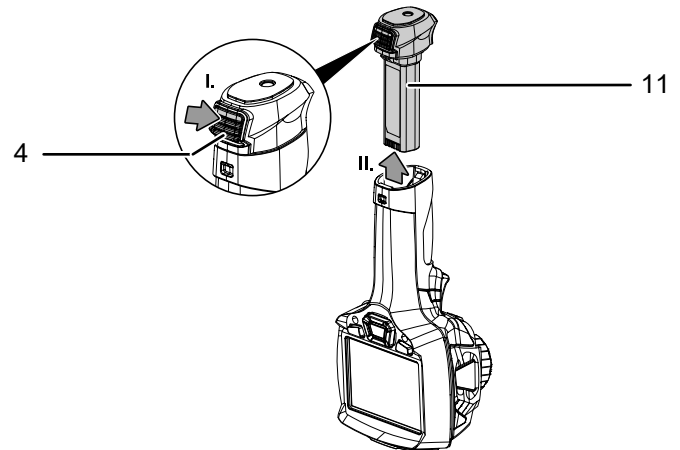
2. Charge the battery as described in the section *Charging the battery* in the Maintenance chapter.
3. Reinsert the charged battery until it perceptibly clicks into place.

Switching the device on

1. Remove the protective cap from the IR lens.
2. Press the *Power* button (18) for approx. 3 seconds.
   - ⇨ The Trotec logo appears on the display.
   - ⇨ The real image is displayed.
3. Wait a moment until the device has started up completely.
   - ⇨ The *IR calibrating* indication briefly appears on the display.
   - ⇨ After calibration, a current IR image appears in the display and the main menu is displayed.

Manually focussing (IC300 only) and calibrating the IR camera

☞ **Info**

An image that is not sharply focussed leads to deviations in the temperature measurement!

1. Turn the focus ring (7) to the left or right until the object to be thermographed is sharply focussed.
   - ⇨ The internal shutter of the IR camera closes briefly and an automatic adjustment (calibration) to the temperatures in the image section is performed.
   - ⇨ The automatic adjustment is performed at regular intervals.

Freezing the camera image

The camera image can be paused and released as follows:

1. Pull the trigger (9).
   - ⇨ The image is frozen and the menu for saving opens.
2. Pull the trigger (9) again.
   - ⇨ The display shows the current, movable camera image again.

Taking/recording an infrared image/video

Please proceed as follows to record and save an image:

1. Pull the trigger (9).
   - ⇨ The image is frozen and the menu for saving opens.
   - ⇨ You can add text or edit the image settings before saving.
2. Use the *Right* arrow button (19) and the *Left* arrow button (22) to navigate to the *Add text* button (35) and add the desired text. Confirm with the *Menu/OK* button (20) or touch the button on the display.

3. Use the other menus as described in the Software chapter to edit the image if necessary.
4. Use the *Right* arrow button (19) and the *Left* arrow button (22) to navigate to the *Save* button (34) and confirm with the *Menu/OK* button (20) or touch the button on the display.
   - ⇨ The image is saved with the desired settings.

Please proceed as follows to record and save a video:

1. Pull and hold the trigger (9) for approx. 2 seconds.
   - ⇨ The image and sound recording is started.
2. Briefly pull the trigger (9).
   - ⇨ The recording is saved.

Setting the temperature scale

You can adjust the temperature scale and thus control the display of the current camera image. You can choose from the following options:

- Manual (MANUAL): The user can determine the limit measuring points and thus the temperature scale independently. This option helps you visualize even small temperature differences (see chapter "Thermography terms").

- Automatic (AUTO): The device constantly adjusts the temperature span automatically. The relation of temperature and colour is linear.

- Histogram (HG): The infrared image is enhanced by means of special algorithms emphasizing the colour differences. The relation of temperature and colour is not linear.

1. To set the temperature scale manually, tap the *Temperature scale* indication (31) until "MANUAL" appears.
   ⇨ A lock icon appears next to the number in the *Upper measuring point* indication (30) and *Lower measuring point* indication (32).
2. Tap the *Upper measuring point* indication (30) or *Lower measuring point* indication (32) and select the upper or lower measured value. To do so, tap the arrows to the right and left of the value or use the *Right* arrow button (19) and *Left* arrow button (22).
3. Tap on a free area next to the settings window to close the settings window.
   ⇨ The upper or lower measured value is set.
4. Tap the *Temperature scale* indication (31) again to set the temperature scale automatically.
   ⇨ The *Temperature scale* indication (31) shows "AUTO".
   ⇨ An "A" appears next to the number in the *Upper measuring point* indication (30) and *Lower measuring point* indication (32).
5. Tap the *Temperature scale* indication (31) again to switch to histogram display.
   ⇨ The *Temperature scale* indication (31) shows "HG".
   ⇨ An "H" appears next to the number in the *Upper measuring point* indication (30) and *Lower measuring point* indication (32).
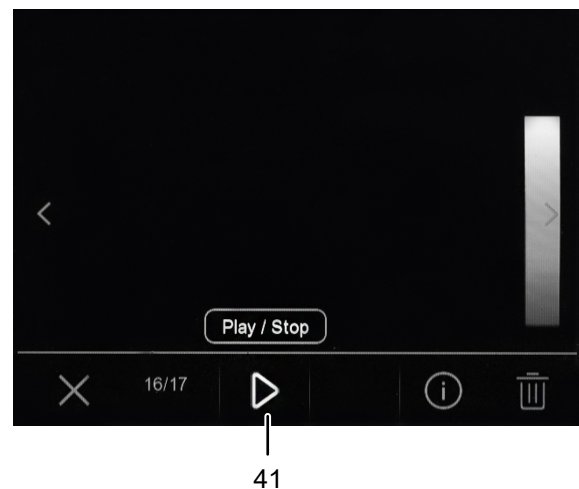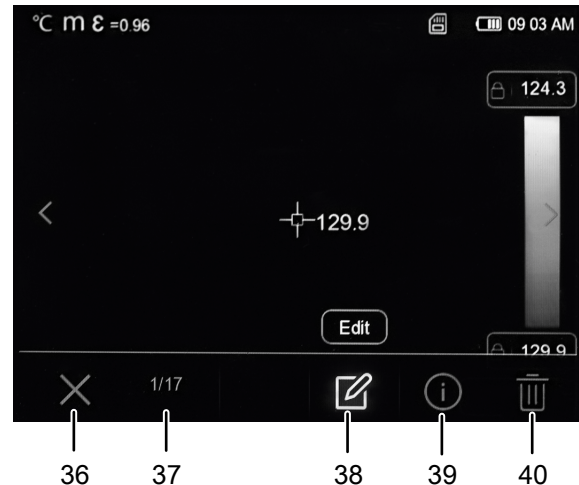
☞ **Info**
By briefly pressing the *Power* button (18) you can quickly switch between the "MANUAL" and "AUTO" scales while viewing the current IR image.

Playing back images and videos

In playback mode, you can view and edit stored images and videos. To do so, please proceed as follows:

1. Press the *Play* button (23) to open the playback mode.
2. Tap the arrows on the left and right of the **display** to scroll through the stored images and videos.
   ⇨ The *Sequence number* indication (37) shows the number of the stored file.

In playback mode, you have the following options:

No.	Button
36	*Exit playback mode*
38	*Edit image*
39	*Show information on image/video*
40	*Delete image/video*
41	*Play video*

1. Press the *Play video* button (41) to play a video. Press the button again to pause the video.
2. Press the *Edit image* button (38) to edit a stored image.
   ⇨ You have the same options as for a newly taken image (see section Taking/recording an infrared image/video and chapter Software).
3. Press the *Info* button (39) to display more detailed information on the image/video.
   ⇨ The recording date, time and thermal resolution are displayed.
4. Press the *Delete* button (40) to delete the image/video.
5. Press the *Exit* button (36) to exit the playback mode.

Data transfer via USB

You can either access the microSD memory card inserted in the device using a USB-C data cable, or transfer the data to the optionally available IR-Report NG PC software in real time and thus record fully radiometric infrared videos.

To do so, first select the desired transmission mode in the settings:

- *PC Connection* (data memory access)
- *PC Camera* (real-time data transmission to software)

1. Press the *Menu/OK* button (20).
   ⇨ The main menu will be displayed.
2. Select the *Device Setting* menu.
3. Select the submenu *USB Mode*.
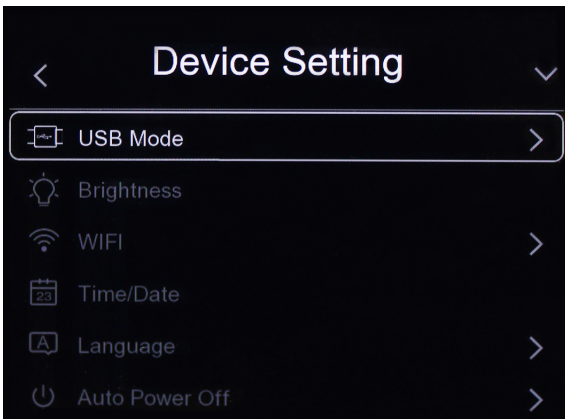
4. Select the desired transmission mode.

5. Connect the supplied USB-C data cable to the device's USB-C port (12).
6. Connect the data cable to a PC or notebook.
7. Use the *Menu/OK* button (20) to confirm the connection or tap the *OK* button.

⇨ In *PC Connection* transmission mode, the display shows *USB CONNECTED*.

⇨ In *PC Camera* transmission mode, the current camera image is displayed.

Info

To view the real-time images in the IR-Report NG PC software, please follow the instructions in the software documentation.

Switching the device off

1. Press the *Power* button (18) for approx. 3 seconds.
2. Confirm the prompt with the *Menu/OK* button (20) or tap the *OK* button.
   ⇨ The device will be switched off.

If desired, the device will switch off automatically after a preset time. This time can be set in the submenu *Auto Power Off* (see chapter Software).
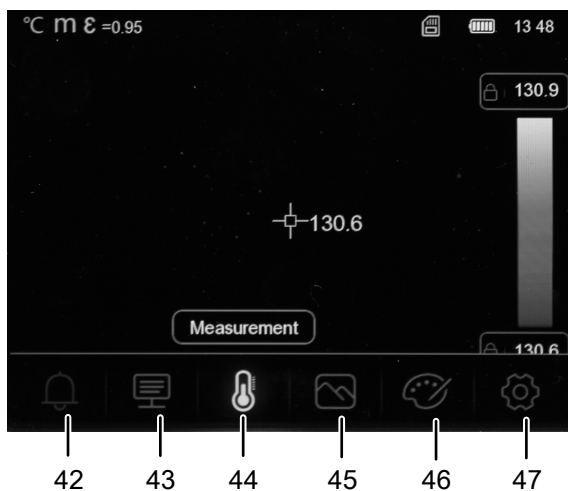
Software

You can navigate through the device's software using both the control panel buttons and the touch display.

Main menu

To open the main menu, press the *Menu/OK* button (20) or tap on the display.

The main menu consists of the following menus:

No.	Menu
42	*Alarm*
43	*Parameters*
44	*Measurements*
45	*Image Mode*
46	*Display*
47	*Device Setting*

Navigation in the Alarm, Parameters, Measurements, Image Mode and Display menus

You can select the menus and submenus either using the control panel buttons or the touch display.

- Use the *Right* arrow button (19) and the *Left* arrow button (22) to navigate to the desired submenu. Then press the *Up* arrow button (17) to open a menu/submenu and the *Down* arrow button (21) to close a menu/submenu. If necessary, use the *Right* arrow button (19) and the *Left* arrow button (22) to set the desired value.

- Tap the icon of the desired menu/submenu on the display to open the menu/submenu and tap in the centre of the display to close the menu/submenu. If necessary, set the desired value by scrolling or touching the arrows on the display.

Navigation in the Device Setting menu

The submenus of the *Device Setting* menu are controlled differently from the other menu options:

- Use the *Up* arrow button (17) and the *Down* arrow button (21) to navigate to the desired submenu or press the *Menu/OK* button (20) to open the submenu. Press the *Left* arrow button (22) to exit the submenu.

- Tap the desired submenu to open it. Tap the arrow in the upper left corner of the display to exit the submenu again.

Alarm menu

The following settings can be made in this menu:

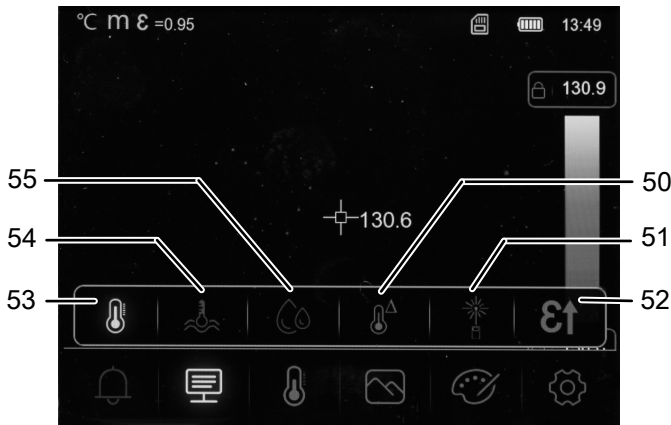| No.	Submenu
48	*Below alarm*
49	*Above alarm*

Please proceed as follows to set an alarm.

1. From the main menu, select the *Alarm* menu (42).
2. Choose between the options *Below alarm* (48) and *Above alarm* (49).
3. Set the desired value.
   ⇨ In the *Display* menu you can adjust the colour display for falling below and exceeding the alarm thresholds.
4. Exit the menu.
   ⇨ All set values are saved.

Parameters menu

The following settings can be made in this menu:

No.	Submenu
50	*Infrared compensation*
51	*Distance*
52	*Emissivity*
53	*Ambient temperature*
54	*Reflection temperature*
55	*Humidity*

Please proceed as follows to make the individual settings:
1. From the main menu, select the *Parameters* menu (43).
2. Select the desired setting.
3. Set the desired value.
4. If necessary, open another submenu by exiting the first submenu and then navigating to the respective submenu.
   ⇨ All set values are saved. In the next submenu, new values can be set.
5. Exit the menu.
   ⇨ All set values are saved.

Measurements menu

The following settings can be made in this menu:
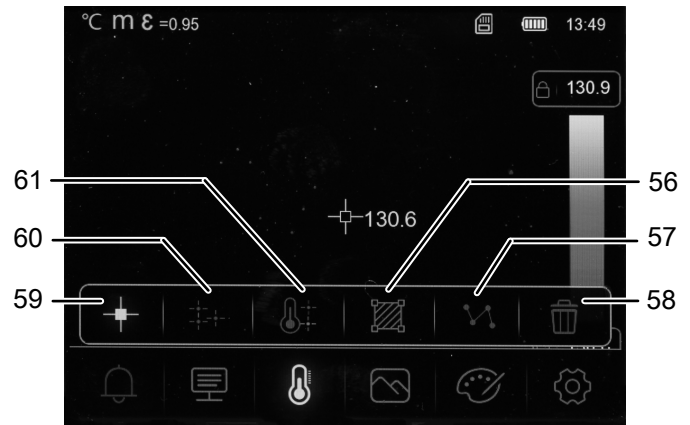
Item	Submenu
56	*Area*
57	*Line*
58	*No measurement* (delete all measuring tools)
59	*Centre spot*
60	*Measuring point*
61	*High/Low* (min./max. temperature)

1. From the main menu, select the *Measurements* menu (44).
   ⇨ You can now choose between the submenus.

Showing the centre spot
1. Select the submenu *Centre spot* (59).
   ⇨ A centre spot appears in the middle of the display.

Setting a measuring point
1. Select the menu *Measuring point* (60).
   ⇨ A measuring point appears on the display.
   ⇨ An acoustic signal is emitted.
   ⇨ Next to the measuring point, a number (e.g. P1) and the current temperature are displayed, provided that this was set in the general settings for this point.
2. Tap the measuring point and drag it to the desired position.
   ⇨ The currently active measuring point is highlighted in grey.
3. Add one or two measuring points by pressing the *Menu/OK* button (20) or tapping the *Measuring point* icon (60).
   ⇨ You can set up to three measuring points if needed.
4. To delete the measuring point, tap and hold it. The query *Delete Spot?* appears. Select the *Delete All* or *Delete* button.

Showing the minimum/maximum value
1. Open the submenu *High/Low* (61).
   ⇨ The highest and lowest measured values are shown next to the corresponding measuring points on the display.

Creating an area
1. Open the submenu *Area* (56).
   ⇨ An area appears on the display.
2. Tap the middle of the area and drag it to the desired position.
3. Tap the corners of the area to increase or reduce the size of the area.
4. Add one or two areas by pressing the *Menu/OK* button (20) or tapping the *Area* icon (56).
   ⇨ You can add up to three areas if needed.
5. To delete the area, tap and hold it. The query *Delete Area Box?* appears. Select the *Delete All* or *Delete* button.

Activating a line
1. Open the submenu *Line* (57).
   ⇨ A horizontal line and the temperature profile along this line are displayed.
2. When the line is activated, press the *Up* arrow button (17) or the *Down* arrow button (21) or tap the line and drag it up or down.
3. Move the measuring point on the line with your finger.
4. Add a vertical line by pressing the *Menu/OK* button (20) or tapping the *Line* icon (57).
5. To delete the line, tap and hold it. The query *Delete Line?* appears. Select the *Delete* button.

Hiding all measuring tools
1. Select the submenu *No measurement* (58).
   ⇨ All previously set measuring tools will be hidden.

Image Mode menu

The following settings can be made in this menu:

No.	Submenu
62	*Auto fusion*
63	*Zoom*
64	*Thermal image*
65	*Fusion*
66	*Camera*

1. From the main menu, select the *Image Mode* menu (45).
   ⇨ You can now choose between the submenus.

Showing the thermal image
1. Open the submenu *Thermal image* (64).
   ⇨ The infrared camera image is shown on the display.

Setting the fusion value
1. Open the submenu *Fusion* (65).
2. Set the desired value.
   ⇨ Depending on the setting selected, part of the display is shown as a real image and the remaining part as an infrared image.

Activating the camera image
1. Open the submenu *Camera* (66).
   ⇨ The real image of the camera is shown on the display.

Setting auto fusion
1. Open the submenu *Auto fusion* (62).
   ⇨ The infrared image is highlighted with contour lines from the digital image to increase its contrast. The device calculates the ratio of the image parts automatically.

Setting the zoom
1. Open the submenu *Zoom* (63).
2. Set the desired value.
   ⇨ You can continuously set a zoom of up to 16x.
   ⇨ The image on the display is enlarged by the value set.

Display menu

In this menu, you can select the colour palette for the display of the infrared image and adjust the display for falling below and exceeding the alarm values.
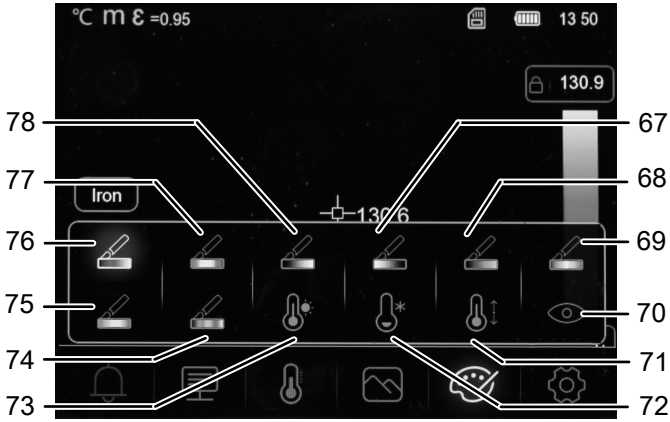
Please proceed as follows to select the colour palette of the infrared image:

1. From the main menu, select the *Display* menu (46).
2. Select one of the following colour palettes:

No.	Submenu
67	*Black hot*
68	*Brown hot*
69	*Blue red*
74	*Feather*
75	*Hot cold*
76	*Iron*
77	*Rainbow*
78	*White hot*

Please proceed as follows to adjust the display for falling below and exceeding the alarm values:

1. From the main menu, select the *Display* menu (46).
2. Select one of the following alarm value displays:

No.	Submenu	Display
70	*Vision zone*	The areas whose temperature is between the set alarm values are displayed as an infrared image using the selected colour palette. The remaining image is displayed as a real image.
71	*Zone alarm*	The areas whose temperature is between the set alarm values are shown in yellow. The remaining image is shown in grey.
72	*Below alarm*	The areas whose temperature falls below the set alarm value are shown in blue. The remaining image is shown in grey.
73	*Above alarm*	The areas whose temperature exceeds the set alarm value are shown in red. The remaining image is shown in grey.

Setting menu

The following settings can be made in this menu:

Submenu	Setting	Option/function
Device Setting (79)	USB Mode	PC Connection, PC Camera
	Brightness	Continuously 0–100 %
	WIFI	On/Off
	Time/Date	Date/time
	Language	Traditional Chinese, English, German, Spanish, French, Italian, Japanese, Korean, Dutch, Turkish, Simplified Chinese, Portuguese, Polish
	Auto Power Off	Off/5 min./10 min./15 min./30 min.
	About	Information about the device (manufacturer, production date, serial number, software, memory space)
Measure Setting (80)	Max Temp	On/Off
	Min Temp	On/Off
	Distance Unit	m/ft
	Temp. Unit	°C/°F/K
	Temp. Range	-20 to 150 °C/50 to 550 °C
	Emissivity	Available options: water, stainless steel, aluminium plate, asphalt, concrete, cast iron, rubber, wood, brick, tape, brass plate, human skin, PVC plastic, polycarbonate, oxidized copper, rust, paint, soil
	Alarm mode	OFF/Above alarm/Below alarm/Zone alarm
	Shutter period	Auto/1 min./3 min./5 min./10 min./15 min./30 min./OFF
	Image Align	Alignment of image overlay/contour lines of digital and infrared image
Reset (81)	Format Memory	Delete all saved files
	Default settings	Delete all saved settings, import factory settings

Device Setting

1. From the main menu, select the *Setting* menu (47).
2. Open the submenu *Device Setting* (79) and make the following settings.

Selecting the USB mode

To select the USB mode, please proceed as described in the section "Data transfer via USB".

Setting the brightness

Please proceed as follows to adjust the brightness of the display:

1. Open the submenu *Brightness*.
2. Press and hold the *Up* arrow button (17) to decrease the brightness or the *Down* arrow button (21) to increase the brightness.
   Alternatively, you can move the slider on the display with your finger to set the desired brightness.
   ⇨ The brightness of the display changes continuously during the setting.

Switching Wi-Fi on/off

Please proceed as follows to switch on Wi-Fi for connection to the free Trotec app MultiMeasure Mobile.

1. Open the submenu *WIFI*.
2. Press the *Menu/OK* button (20) or move the slider of the *WIFI* option to switch Wi-Fi on or off.
   ⇨ In addition, the SSID and the Wi-Fi password are displayed.

Setting the date and time

Please proceed as follows to set the date and time for the system and the time stamp on the images/videos:

1. Open the submenu *Time/Date*.
2. Select the desired date.
3. Select the desired time.
4. Tap the *Set date* button to confirm the selection.
   ⇨ Date and time have been set.
   ⇨ The time is shown in the *Time* indication (29).

Selecting a language

Please proceed as follows to set the language for the menu texts:

1. Open the submenu *Language*.
2. Navigate to the desired language.
   ⇨ A frame is displayed around the currently selected language.
3. Confirm the selection with the *Menu/OK* button (20).
   ⇨ All menu text are displayed in the set language.

Setting the automatic switch-off

Please proceed as follows to activate or deactivate the automatic switch-off of the device or to set the time until automatic switch-off:
1. Open the submenu *Auto Power Off*.
2. Select the desired option.
3. Confirm the selection with the *Menu/OK* button (20).
   ⇨ The option for automatic switch-off is set.

Device information

Please proceed as follows to view information about the device:
1. Open the submenu *About*.
   ⇨ The following information about the device is displayed:
      - manufacturer
      - production date
      - serial number
      - software version
      - memory space

Measure Setting
1. From the main menu, select the *Setting* menu (47).
2. Open the submenu *Measure Setting* (80) and make the following settings.

Setting the maximum and minimum temperature display

Please proceed as follows to show or hide the maximum and minimum temperatures:
1. Open the submenu *Max Temp* or *Min Temp* (89).
2. Press the *Menu/OK* button (20) or move the slider of the desired option to show or hide the maximum/minimum values.
3. Confirm the selection with the *Menu/OK* button (20).
   ⇨ The option for showing or hiding the maximum and minimum temperature is set.

Selecting the distance unit

Please proceed as follows to select the unit for distances:
1. Open the submenu *Distance Unit*.
2. Select the desired option.
3. Confirm the selection with the *Menu/OK* button (20).
   ⇨ The distance unit is set.
   ⇨ The distance unit is shown in the *Distance unit* indication (25).

Selecting the temperature unit

Please proceed as follows to select the unit for the temperature:
1. Open the submenu *Temp. Unit*.
2. Select the desired option.
3. Confirm the selection with the *Menu/OK* button (20).
   ⇨ The temperature unit is set.
   ⇨ The temperature unit is shown in the *Temperature unit* indication (24).

Selecting the temperature scale

Please proceed as follows to select the scale to be used by the device for measuring the temperature:
1. Open the submenu *Temp. Range*.
2. Select the desired option.
3. Confirm the selection with the *Menu/OK* button (20).
   ⇨ The temperature scale is set.

Selecting the emissivity

> **Info**
> Observe the information in the chapter Emissivity when selecting the emissivity!

Please proceed as follows to select the emissivity:
1. Open the submenu *Emissivity*.
2. Select the desired option.
3. Confirm the selection with the *Menu/OK* button (20).
   ⇨ The emissivity is set.
   ⇨ The emissivity is shown in the *Emissivity* indication (26).

Setting the alarm mode

Please proceed as follows to enable and disable or to select the alarm mode:
1. Open the submenu *Alarm mode*.
2. Select the desired option.
3. Confirm the selection with the *Menu/OK* button (20).
   ⇨ The alarm mode is set.

Setting the recalibration

Please proceed as follows to set the time interval at which the device should recalibrate the infrared image:
1. Open the submenu *Shutter period*.
2. Select the desired option.
3. Confirm the selection with the *Menu/OK* button (20).
   ⇨ The recalibration is set.

Aligning the camera image

> **Note**
> For a good result, make sure that the infrared image is superimposed as precisely as possible on the contour lines resulting from the digital image. Note that the aperture angles of the infrared and digital camera are different and therefore an exact overly of all objects at all distances is naturally impossible.

Please proceed as follows to align the image overlay/contour lines of the digital and infrared image:
1. Open the submenu *Image Align*.
   ⇨ The current camera image is displayed.
2. Either use the *Up* (17), *Down* (21), *Right* (19) and *Left* (22) arrow buttons or tap on the arrows on the display to align the image.
   ⇨ The camera image is shifted in the desired direction.
3. Confirm the selection with the *Menu/OK* button (20).
   ⇨ The camera image is aligned.

Reset

> **Info**
> Save important images and videos externally before formatting the device's memory!

1. From the main menu, select the *Setting* menu (47).
2. Open the submenu *Reset* (81) and make the following settings.

Format Memory

Select this option to format the memory of the device. All saved files will be deleted.

Default settings

Select this option if you want to restore the original settings of the device. All device settings made will be deleted.

PC software

Use the IR-Report NG PC software (download) included in the scope of delivery to carry out a detailed analysis and visualisation of your measured results. You can only use all configuration, visualisation and functional options of the device when using this PC software.

Installation requirements

Make sure that the following minimum requirements for installing the IR-Report NG PC software are fulfilled:
- Supported operating systems (32 or 64 bit version):
  – Windows 7
  – Windows 8
  – Windows 10
  – Windows 11

Installing the PC software

The PC software can be downloaded and installed as follows:
1. Visit the website uk.trotec.com.
2. Click on *Products & Services*.
3. Click on *Services and on Downloads*.
4. Then select *Software* in the category menu.
5. Select the IR-Report NG PC software from the list.
6. Double-click on the downloaded file to start the installation.
7. Follow the instructions of the installation wizard.

Starting the PC software

1. Connect the activated device and your PC with the USB connection cable included in the scope of delivery or read out the SD card included in the scope of delivery with a corresponding card reader. Then transfer the desired data to your PC.

> **Info**
> Information regarding the use of the IR-Report NG software is provided in the help text of the software.

Emissivity

The emissivity is used to describe the energy radiation characteristic of a material (see also chapter Thermography terms).

A material's emissivity depends on various factors:

- composition,
- surface condition,
- temperature.

The emissivity can range between 0.01 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 can be neglected.

Entering an emissivity as accurate as possible is indispensable for a precise measurement.

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

Material	Temperature (°C)	Emissivity (approximate)
Aluminium		
Polished aluminium	100	0.09
Customary aluminium foil	100	0.09
Electrolytically chromium-plated aluminium oxide	25 – 600	0.55
Mild aluminium oxide	25 – 600	0.10 – 0.20
Strong aluminium oxide	25 – 600	0.30 – 0.40
Iron		
Polished cast iron	200	0.21
Processed cast iron	20	0.44
Polished tempered iron	40 – 250	0.28
Polished steel ingot	770 – 1040	0.52 – 0.56
Raw, welded steel	945 – 1100	0.52 – 0.61
Surface iron oxide	20	0.69
Fully rusted surface	22	0.66
Rolled iron plate	100	0.74
Oxidized steel	198 – 600	0.64 – 0.78

Material	Temperature (°C)	Emissivity (approximate)
Cast iron (oxidizing at 600 °C)	198 – 600	0.79
Steel (oxidizing at 600 °C)	125 – 520	0.78 – 0.82
Electrolytic iron oxide	500 – 1200	0.85 – 0.95
Iron plate	925 – 1120	0.87 – 0.95
Cast iron, heavy iron oxide	25	0.80
Tempered iron, iron oxide	40 – 250	0.95
Melting surface	22	0.94
Molten cast iron	1300 – 1400	0.29
Molten structural steel	1600 – 1800	0.28
Liquid steel	1500 – 1650	0.28
Pure iron ore	1515 – 1680	0.42 – 0.45
Galvanized, shiny iron plate	28	0.23
Copper		
Copper oxide	800 – 1100	0.13 – 0.16
Copper mirror	100	0.05
Strong copper oxide	25	0.078
Liquid copper	1080 – 1280	0.13 – 0.16
Brass		
Brass mirror	28	0.03
Brass oxide	200 – 600	0.59 – 0.61
Chromium		
Polished chrome	40 – 1090	0.08 – 0.36
Gold		
Gold mirror	230 – 630	0.02
Silver		
Polished silver	100	0.05
Nickel		
Nickel chromium (heat-resistant)	50 – 1000	0.65 – 0.79
Nickel chromium alloy	50 – 1040	0.64 – 0.76
Nickel chromium alloyed (heat-resistant)	50 – 500	0.95 – 0.98
Nickel silver alloy	100	0.14
Polished, galvanized	25	0.05
Galvanized	20	0.01
Nickel wire	185 – 1010	0.09 – 0.19

Material	Temperature (°C)	Emissivity (approximate)
Lead		
Pure lead (not oxidized)	125 – 225	0.06 – 0.08
Stainless steel		
18 -8	25	0.16
304 (8Cr, 18Ni)	215 – 490	0.44 – 0.36
310 (25Cr, 208Ni)	215 – 520	0.90 – 0.97
Tin		
Finished tin plate	100	0.07
Heavily oxidized	0 – 200	0.60
Zinc		
Oxidizing at 400 °C	400	0.01
Zinc oxide ash	25	0.28
Magnesium		
Magnesia	275 – 825	0.20 – 0.55
Metallic materials		
Hg	0 – 100	0.09 – 0.12
Sheet metal		0.88 – 0.90
Non-metallic materials		
Brick	1100	0.75
Fire brick	1100	0.75
Graphite (lamp black)	96 – 225	0.95
Porcelain enamel (white)	18	0.90
Asphaltum	0 – 200	0.85
Glass (surface)	23	0.94
Lime paint	20	0.90
Oak	20	0.90
Piece of coal		0.85
Isolation piece		0.91 – 0.94
Glass tube		0.90
Porcelain enamel products		0.90
Porcelain enamel designs		0.83 – 0.93
Solid materials		0.80 – 0.93
Ceramic (vase)		0.90
Film		0.90 – 0.93
Heat-resistant glass	200 – 540	0.85 – 0.95
Mica		0.94 – 0.95
Glass		0.91 – 0.92
Level chalk layer		0.88 – 0.93

Material	Temperature (°C)	Emissivity (approximate)
Epoxy glass plate		0.86
Epoxy hydroxybenzene plate		0.80
Electric materials		
Semiconductor		0.80 – 0.90
Transistor (plastic sealed)		0.30 – 0.40
Transistor (metal diode)		0.89 – 0.90
Gold-plated copper sheet		0.30
Soldered plated copper		0.35
Zinc-plated lead wire		0.28
Brass wire		0.87 – 0.88

Thermography terms

Span (contrast)

If the temperatures in the image are homogenously distributed and close together, the image might not be very colourful / contrasty, and the contours might not be easily visible. To increase the contrast of the image, first go to the MANUAL display mode (see section "Setting the temperature scale"). The menu bar at the bottom of the screen must be deactivated. Point the camera at the area to be examined, hold it steady and then press the Play button (23) for approx. 1 second. The calibration indicator briefly appears in the display and you can hear the shutter in the device. This is done to set LEVEL and SPAN optimally for the selected image section and can be repeated as often as desired. If you press the *Up* arrow button (17) or *Down* arrow button (21) after these settings, the set temperature range will be increased or decreased. The representation of individual thermal areas in the image changes and becomes more contrasty.

Level (average temperature / temperature level / brightness)

When changing the span (see Span), it often makes sense to also adjust or shift the average temperature (Level). If, for instance, the span is reduced to a minimum first and then the level of this extremely narrowed temperature range is shifted up/down (by pressing the right/left arrow button), the image will become useless even in parts as it will either have a totally excessive or insufficient contrast. However, this allows you to visualize even the smallest temperature differences in the object when traversing the individual temperature sections (e.g. in underfloor heating).

Emission

Any object whose temperature lies above absolute zero (-273,15 °C) emits heat radiation. Its surface condition (e.g. colour, structure, material composition etc.) and temperature, among other things, determine how well the heat is emitted. The emissivity of an object indicates who much heat it radiates compared to an ideal black body. An ideal black body has a theoretical emissivity of 1. Other factors such as transmission and reflection can be neglected in this ideal case. In practice, however, this is not possible. Surfaces that strongly reflect in the visible light spectrum are often also highly reflective in the infrared spectral range, as is the case with polished aluminium for instance.

The formula is: **transmission** + **reflection** + **emission** = **1**

In most cases, the transmission factor can be neglected. If the surface to be thermographed is highly reflective, the share of reflection increases correspondingly and the share of emission decreases.

Example:
- transmission = 0
- reflection = 0,8
- emission = 0.2

Highly reflective surfaces reflect all temperatures whatsoever from surrounding heat sources, which are thus indirectly captured and measured by the thermal imaging camera, while the surface temperature of the actual measuring object is not being measured. To overcome this problem, special labels or sprays with a high defined emissivity are often applied on the surface to be measured.

The general rule is: The higher the emissivity, the lower the reflectance, the easier the thermography.

Reflected temperature

The location of heat sources in the surroundings influencing the measurement and the determination of the average temperature which is emitted by them and can be reflected by the object to be thermographed.

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.

Fault	Cause	Remedy
Camera does not take/record pictures/videos	Internal memory full	Delete files no longer needed to free up storage space.
Battery quickly discharged	Battery too old or damaged	Use a new battery.
Battery not charging	Charging cable not inserted correctly	Check the connection for proper fit.
	Battery too old or damaged	Use a new battery.
	USB cable may be defective	Check the USB cable for damage and replace it if required.
	Contacts dirty	Use a dry, clean cloth to clean the contacts.
SD memory card is not recognized	Contacts dirty	Use a dry, clean cloth to carefully clean the contacts.
	File formatting incorrect	The SD memory card should be formatted to FAT32 in order to be recognized by the device.

Maintenance and repair

Charging the battery

⚠ **Warning of electrical voltage**
Before each use of the charger or power cable, check for damages. If you notice damages, stop using the charger or power cable!

The battery should be charged prior to initial start-up and when the battery is low. The current battery status can be checked via the *Battery status* indication (28).

You can charge the battery using the camera's USB-C port (12) or using the battery charger (IC300 only).

Charging via the USB-C port
✓ The device is switched off.
1. Connect the supplied USB power adapter to the device's USB-C port (12).
2. Plug the USB power adapter into a sufficiently fused mains socket. Only use the original charger or one with identical specifications, for otherwise both battery and camera could be damaged!

The alternative:
1. Connect the supplied USB-C data cable to the device's USB-C port (12).
2. Connect the data cable to a PC or notebook.
   ⇨ The display shows a red, empty battery. While the battery is charging, the indication gradually changes to a white, charged battery.
   ⇨ The battery is fully charged when a white, fully charged battery is displayed.
3. Remove the data cable from the device and from the PC.

Charging with battery charger (IC300)

There are four adapters for different socket variants included in the scope of delivery for the power adapter connector:

- Europe (102)
- USA (103)
- Great Britain (99)
- Australia (100)

Before using the system, you have to connect the correct adapter for your mains to the power adapter. To do so, please proceed as follows:

1. Select the correct adapter from the scope of delivery.
2. Place the adapter on the connector at an angle and turn it clockwise until it clicks into place.
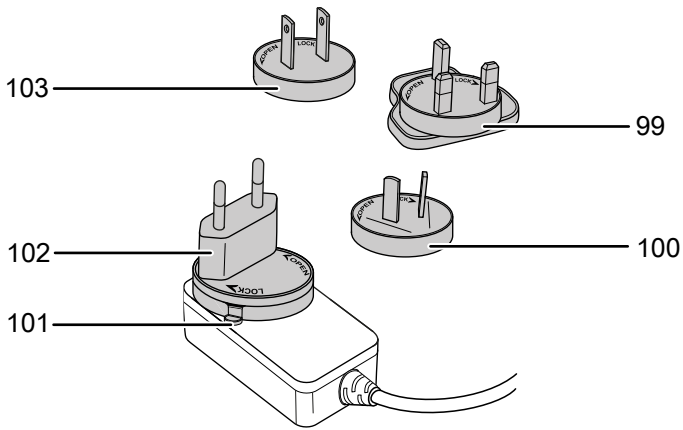

3. To remove the adapter, hold down the lever (101). Turn the adapter counter-clockwise and take it off the connector.

Please proceed as follows to charge the battery using the battery charger:

1. Plug the USB-C plug of the power adapter into the USB-C port on the back of the charger.
2. Plug the charger into a sufficiently fused power socket. Only use the original charger or one with identical specifications, for otherwise both battery and camera could be damaged!
   ⇨ The *Power* battery LED (15) is illuminated in green when the charger is receiving power.
3. Remove the battery from the device as described in the chapter Inserting the battery.

4. Insert the battery into the battery charger.
   ⇨ While the battery is being charged, the *Charge* battery LED (16) of the battery charger is illuminated in red.
   ⇨ When the battery is fully charged, the *Charge* battery LED (16) of the battery charger will be illuminated in green.
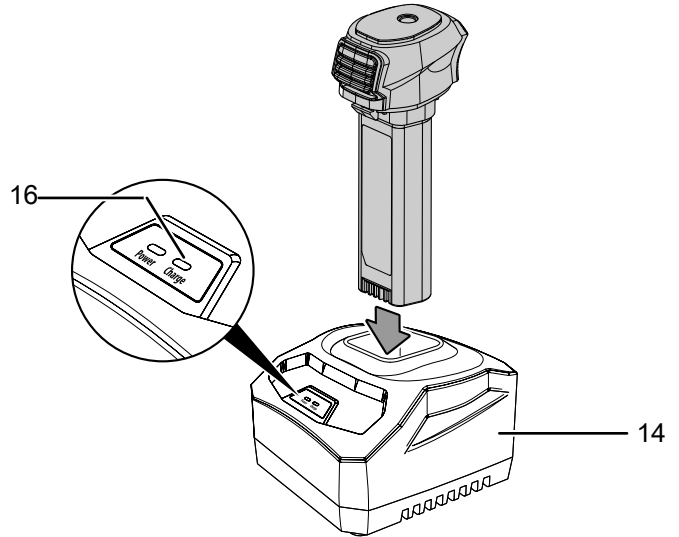
5. Remove the charged battery from the battery charger and insert it into the camera as described in the chapter Inserting the battery.
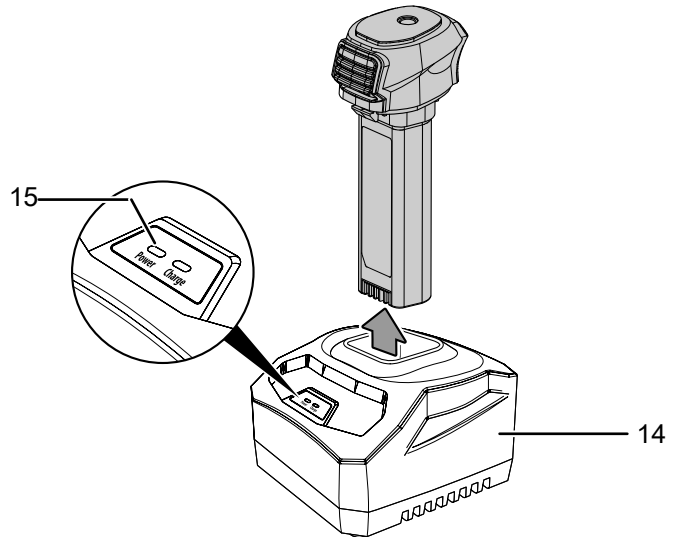
Cleaning

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

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.

Declaration of conformity

We – Trotec GmbH – declare in sole responsibility that the product designated below was developed, constructed and produced in compliance with the requirements of the EU Radio Equipment Directive in the version 2014/53/EU.

Product model / Product:	IC200
	IC300
Product type:	thermal imaging camera
Year of manufacture as of:	2023

Relevant EU directives:
- 2011/65/EU

Applied harmonised standards:
- EN 300 328 V2.2.2
- EN 55035:2017

Applied national standards and technical specifications:
- EN 301 489-1 V2.2.3:2019-11
- EN 301 489-17 V3.2.4:2020-09
- EN 50665:2017
- EN 55035:2017/A11:2020
- EN IEC 61000-3-2:2019/A1:2021-04
- EN IEC 61326-1:2021
- EN IEC 61326-2-2:2021

Manufacturer and name of the authorised representative of the technical documentation:

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