VOLTCRAFT®

GB Operating instructions

WB-200 thermal imaging camera

Item No. 1897504

CE

Table of contents

GB

1. Introduction

Dear customer,

Thank you for purchasing this Voltcraft® product.

Voltcraft® produces high-quality measuring, charging and network devices that offer outstanding performance and innovation.

With Voltcraft®, you will be able to cope with even the most difficult tasks whether you are an ambitious hobby user or a professional user. Voltcraft® offers you reliable technology at an extraordinarily favourable cost-performance ratio. We are confident that starting with Voltcraft® will be the beginning of a long, successful relationship. We hope you enjoy your new Voltcraft® product!

If there are any technical questions, please contact:

International: www.conrad.com/contact

United Kingdom: www.conrad-electronic.co.uk/contact

2. Explanation of symbols

The symbol with an exclamation mark in a triangle is used to highlight important information in these operating instructions. Always read this information carefully.

The arrow symbol indicates special information and tips on how to use the product.

This product has been CE tested and complies with the necessary national and European regulations.

3. Intended use

The WB-200 thermal imaging camera enables non-contact infrared temperature measurement from -10 to +400 °C with imaging temperature display. The IR sensor (bolometer matrix) has a resolution of 80 x 60 pixels and enables simultaneous measurement of 4800 temperature points. The temperature points are shown in a false colour thermal image on the display. Switchable markers can be used to display minimum and maximum ranges on the screen.

A colour graphics display with menu and function buttons facilitate operation.

The camera is powered by a 18650 rechargeable lithium-ion battery cell. The battery is charged via the integrated micro USB port (only charging is possible). The battery charging current must be 5 V/DC (for example, a computer USB socket or an external USB charger can be used). The DC power source must provide sufficient power.

Do not connect non-rechargeable primary batteries (zinc-carbon, alkaline, etc.).

The camera is protected against a fall from a height of 2 m and conforms to protection class IP54. It is dustproof and splashproof.

The camera has no ATEX protection. Do not operate the camera in potentially explosive atmospheres (Ex).

Do not operate the camera under adverse environmental conditions such as flammable gases, vapours or solvents.

Any use other than that described above is not permitted and may damage the product. Furthermore, there are dangers such as short circuit, fire, electric shock etc.

The product must not be modified or reassembled!

The safety instructions and charging instructions must be observed!

Using this product for any purposes other than those described above may damage the product and result in a short circuit, fire or electric shock. The product must not be modified or reassembled!

Read the operating instructions carefully and keep them in a safe place for future reference.

4. Delivery content

- WB-200 thermal imaging camera
- 18650 rechargeable Li-ion battery cell (3.7 V, 2500 mAh, 9.25 Wh)
- 16 GB microSD memory card
- USB charging cable
- Quick start guide
- CD with detailed operating instructions

Up-to-date operating instructions

Download the latest operating instructions via the link www.conrad.com/downloads or scan the QR code. Follow the instructions on the website.

5. Safety instructions

These instructions contain important information on how to use the thermal imaging camera correctly. Please read them carefully before using the thermal imaging camera for the first time.

Damage caused due to failure to observe these instructions will void the warranty. We shall not be liable for any consequential damage. We shall not be liable for damage to property or personal injury caused by incorrect handling or failure to observe the safety information! Such cases will void the warranty/guarantee.

- This device was shipped in a safe condition.
- To ensure safe operation and to avoid damaging the device, always observe the safety information and warnings in these instructions.
- The unauthorized conversion and/or modification of the device is not permitted for safety and certification reasons.
- Consult an expert when in doubt about the operation, safety or connection of the device
- Measuring instruments and their accessories are not toys and must be kept out of the reach of children.
- Always comply with the accident prevention regulations for electrical equipment when using the product in commercial facilities.
- In schools, educational facilities, hobby and DIY workshops, measuring instruments must be used under the responsible supervision of qualified personnel. The same applies when the measuring instrument is used by people with reduced physical and mental capabilities.
- Do not use in the immediate vicinity of strong magnetic or electromagnetic fields, transmitter aerials or RF generators. These may distort the measurements.
- If you suspect that safe operation is no longer possible, stop using the device immediately and prevent unauthorized use. Safe operation can no longer be assumed if:
  - There are signs of damage
  - The device does not function properly
  - The device was stored under unfavourable conditions for a long period of time
  - The device was subjected to rough handling during transport.
- Do not switch the device on immediately after it has been brought from a cold room into a warm one. The condensation generated may destroy the product. Leave the device switched off and allow it to reach room temperature.
- Do not leave packaging material lying around carelessly, as it may become a dangerous toy for children.
- Store the device in a safe place where it cannot fall down! Otherwise, this could cause injuries.
- Never place the measuring instrument on a flammable surface (e.g. carpet) during charging. Always use a suitable, non-flammable, heatproof surface.
- Ensure adequate ventilation during charging. Never cover the measuring instrument during charging.
- Never charge defective or damaged rechargeable batteries.

6. Notes on rechargeable batteries

Make sure that you have read and understood the following information and safety instructions before handling rechargeable batteries.

a) General information

- Do not leave rechargeable batteries lying around unattended. Children or pets may swallow them. If rechargeable batteries have been swallowed, seek medical attention immediately!
- Rechargeable batteries must not be short-circuited, disassembled or thrown into a fire. This may cause a fire or explosion!
- Leaking or damaged rechargeable batteries can cause corrosive injuries in case of contact with the skin. Therefore you should use suitable protective gloves for this.
- Do not recharge normal, non-rechargeable batteries. This may cause a fire or explosion!
- Pay attention to the correct polarity (plus pole/+ and minus pole/-). Both the device and the rechargeable battery will be damaged if the rechargeable battery is improperly installed. This may cause a fire or explosion!
- The measuring instrument is equipped with integrated charging electronics designed specifically for the type of rechargeable battery used.
- If you are not going to use the product for a long time (for example, during storage), remove the rechargeable Li-ion battery from the device.
- Do not charge/discharge damaged, leaking or deformed rechargeable batteries. This may cause a fire or explosion! Dispose of unusable rechargeable batteries in an environmentally friendly manner. Do not continue to use these rechargeable batteries.
- Charge the battery only under supervision. Stop the charging process immediately if you identify any irregularities on the battery pack (e.g. battery has expanded, etc.).
- Do not dismantle batteries, do not short-circuit them or throw them into a fire. Never attempt to recharge disposable batteries. There is a risk of explosion.

b) Additional information on lithium rechargeable batteries

- Special care must be taken when charging, operating and handling rechargeable Li-ion batteries. Do not leave devices with rechargeable Li-ion batteries unattended while charging/discharging.
- The rechargeable battery must not be exposed to temperatures exceeding +50 °C, for example, a car's interior in summer, etc. (also note all other manufacturer's information!).
- Use only a suitable external charger to charge rechargeable lithium batteries and observe the correct charging method. Do not use conventional chargers for lithium rechargeable batteries in order to avoid fire and explosion hazards!
- Store the battery dry and at room temperature. If possible, use a special storage container (e.g. LiPo bags as in model construction).
- The battery must not get damp or wet.

- The rechargeable battery should be removed from the product if it is not used for a long period of time to avoid damage through leaking. Leaking or damaged batteries may cause acid burns when they come into contact with skin. Therefore, use suitable protective gloves to handle damaged batteries.
- Batteries must be kept out of the reach of children. Do not leave batteries lying around as there is a risk that children or pets may swallow them.
- Observe the safety information in each section.

7. Operating elements

1 "Back" button
2 "SET" button (setting)
3 On/Off button
4 "Left" button for menu and cursor
5 TFT colour display
6 Rubber cover with microSD card slot and micro USB charging socket
7 IR camera lens
8 "Right" button for menu and cursor
9 Trigger button for image storage
10 Handle
11 Battery compartment with integrated tripod thread (1/4" UNC 20)

8. Product description

The thermal imaging camera has a graphic TFT colour display. This display can be used for all necessary displays and to implement all settings.

The main menu, which can be called up via a multi-function button, allows you to set the operating parameters. The arrow buttons allow easy navigation in the menu.

The camera provides a visual representation of heat distribution in objects and on surfaces. Temperature distribution is displayed with false colour photography. Three different colour palettes can be set to ensure the best possible contrast display.

The temperature in the centre of the image (spot area) as well as the maximum and minimum temperature values are indicated by a marker. The thermal imaging function can be used for many areas of application with the extensive setting options.

Thermal images can be stored on a microSD memory card.

9. Inserting and charging the battery

The lithium-ion battery is delivered pre-charged and must be fully charged before initial use.

Only use the charging cable included to charge the rechargeable Li-ion battery. A different charging cable might be undersized. This creates a fire hazard.

The camera becomes hot during charging. Place the camera on a flat, robust and heat-resistant surface.

Inserting the rechargeable battery into the camera and removing the rechargeable battery

- Place the measuring instrument sideways on a soft surface.
- Use a suitable Phillips-head screwdriver to unscrew the two screws on the battery compartment (11).
- Pull the battery compartment out of the camera handle.
- Insert the rechargeable battery into the measuring instrument with the plus (+) contact first. The polarity is indicated on the battery compartment cover.
- Close the battery compartment in reverse order and screw it back in carefully.

Charging the battery pack

The battery must be charged upon initial operation or when the battery status indicator lights up red.

1 Open the rubber cover (6) on the top of the device.

2 Insert the micro USB plug on the charging cable into the micro USB charging socket on the camera.

3 Insert the USB plug on the charging cable into a USB charging socket on a computer or on a suitable USB charger.

4 The charging indicator will appear on the display to indicate the charging process.

5 When the battery symbol turns green, the charging process is completed.

6 Disconnect the charging cable and close the rubber cover carefully.

7 The measuring instrument is ready for operation.

10. Inserting and removing the memory card

The measuring instrument allows thermal images to be stored on a removable microSD memory card. This makes it is possible to easily exchange data and further process image data on a computer.

microSD cards of up to 16 GB can be used.

To insert/replace the memory card, proceed as follows:

- Open the rubber cover (6) on the top of the device.
- The memory card slot is on the left. The symbol for the correct position of the memory card is indicated. The memory card contacts must face the display.
- Gently push the memory card into the slot until it clicks into place. Ensure that the memory card engages in the slot. This is the only way of ensuring reliable storage.
- To remove the memory card, briefly press on the card until it is unlocked and pushed up slightly. You can then easily remove the card.
- Carefully close the rubber cover to ensure protection against moisture and dust.

⟶ **If the memory card is not recognised when triggering memory with the red trigger button (9) for image storage (card symbol with a red X on the display), check the memory capacity, the correct fit or the correct data formatting (FAT32) of the memory card.**

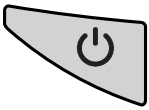
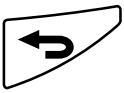
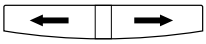
11. Setup

a) Turning the camera on and off

- Use the red on/off button (3) to turn the camera on and off.
- To turn the camera on, press and hold down the red on/off button on the keypad below the display for approx. two seconds.
- The camera will turn on and display the “VOLTCRAFT” start screen for approx. four seconds. The image sensor will be calibrated at the same time. This is indicated by a quiet clicking sound.
- Once the automatic calibration is completed, the currently captured thermal image is displayed.
- To turn the camera off, press and hold down the red on/off button on the keypad below the display for approx. two seconds. The device turns off.

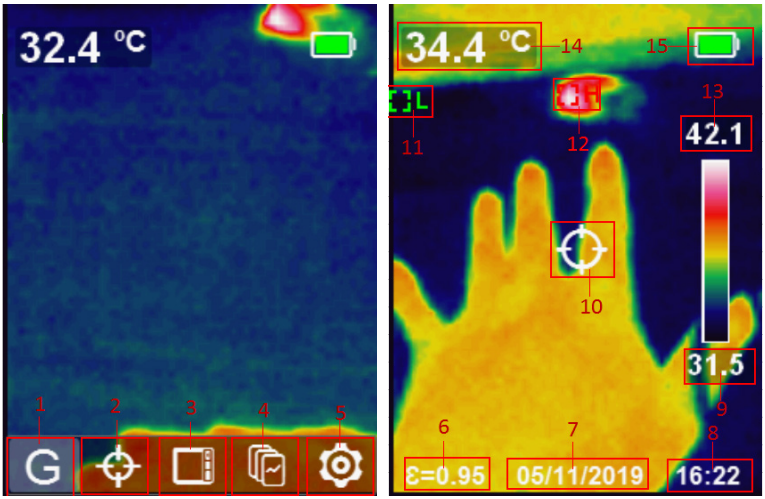
b) Control keypad

Different buttons are used to control and set the measuring instrument. The buttons have the following functions:

	**On/off button (3)** To turn the device on or off, press and hold down the button for approx. two seconds. Automatic power-off can be set in the menu. The device will then automatically power off after a preset time.
	**SET button (2)** The SET button opens the settings menu. In the settings menu, this button is used as a selection button (Enter) when pressed briefly. Use the “Back” button to exit the settings menu.
	**Back button (1)** The “Back” button returns to the previous menu item. In the main menu, pressing this button will exit the menu.
	**Cursor buttons (4/8)** Use the “left arrow” and “right arrow” cursor buttons to select the menu items and parameters in the settings menu.

c) Display elements and symbols

The following symbols and information are shown on the display.



1 “G” symbol for “Gain” for setting the temperature ranges
High Gain: Small temperature range, high detail resolution
Low Gain: Large temperature range, low detail resolution

2 “Crosshairs” symbol for setting the temperature markers in the thermal image

3 Symbol for setting the colour palettes

4 “Image gallery” symbol for displaying the stored thermal images

5 Symbol for system settings

6 Emission level display

7 Date display

8 Time display

9 Temperature scale with the lowest measured value and overlying colour distribution

10 Marker for spot measuring point (value display no. 14)

11 “L” marker for minimum value

12 “H” marker for maximum value

13 Temperature scale with the highest measured value

14 Temperature display of the spot measurement in the centre of the image

15 Battery status indicator

d) System settings

The measuring instrument allows the system data relevant to the user to be set via a menu. Such data includes the menu language, units of measurement, time and date, etc.

These system settings must be made in advance so measurements can be stored with a time stamp, etc.

- When the measuring instrument is on, press the SET button to return to the main menu.
- Press the “left arrow” (4) or “right arrow” (8) cursor buttons until the gear symbol is marked.
- Press the “SET” button to confirm the selection. The system settings menu will now open.

  Due to the size of the display, only seven menu areas can be displayed. Use the cursor buttons (4/8) to move the menu. The selected menu item will be highlighted in colour.
- To activate the menu item, press the “SET” button.
- Use the cursor buttons to select the respective parameters and press the “SET” button to confirm the selection.
- Use the “Back” button (1) to exit the menu item.

The system menu has the following setting functions:

Original	**National language**	**Meaning**
Language	Sprache	Menu language selection
Date/Time	Datum/Zeit	Date and time setting
Emissivity	Emissivität	Emission level setting
Auto OFF	Auto Aus	Automatic power-off setting
Brightness	Helligkeit	Setting the display brightness
Temp Unit	Temp Einheit	Temperature unit setting
Temperature Alarm	Temperatur Alarm	Setting for temperature alarms when exceeding or falling below certain levels
About	Systeminfo	System data display (model, memory card size, software version, etc.)
Format SD	Format SD	Formatting the memory card
Recovery	Wiederherstellen	Restore to factory settings
Auto Save	Auto Speichern	Setting whether images should be saved without a new query after pressing the memory button.
Temp Bar	Farbbalken	Display of colour distribution as a bar

Setting the menu language

- On initial operation, set the menu language to your national language.
- Turn on the measuring instrument and press the SET button.
- Use the cursor buttons to select the gear symbol and press the “SET” button to confirm the selection.
- Use the cursor buttons to select the menu item “Language” and press the “SET” button to confirm the selection.
- Use the cursor buttons to select “German” or “English”. Press the “SET” button to confirm the selection.
- Use the “Back” button to return to the previous menu items.

Menu structure

The following table provides an overview of the menu structure and the setting options after switching the menu language to your national language:

Language	German	
	English	

Date/Time	DD/MM/YYYY	
	MM/DD/YYYY	
	YYYY/MM/DD	
	DD/MM/YYYY MM/DD/YYYY YYYY/MM/DD	
	12H	
	07/02/2019 22:45	Use the “Back” button to advance to individual date and time fields.

Emissivity	O	Custom	0.01 – 0.99
	O	Sand	0.90
		Textiles	0.90
		Aluminium (plain)	0.04
		Concrete	0.94
		Rubber (black)	0.94
		Wood	0.94
		Varnish (matt)	0.97
		Skin (human)	0.98
		Plastic	0.94
		Paper	0.97

⟶ Firstly, select the main field for setting with the “SET” button. The yellow dot shows the active field. Then press the “SET” button again to select the parameters. The adjustable parameters are displayed in yellow.

Auto off	1 min
	5 mins
	10 mins
	Off

Brightness	Low
	Middle
	High

Temp Unit	°F
	ºC

Temperature Alarm	High	-10 to +400 °C
	Warning on	
	Warning off	
	Low	-10 to +400 °C
	Warning on	
	Warning off	

About	Model: WB-200
	Capacity: xxxx
	Available: xxxx
	Version: xxx Product ID: XXXXXXXXX

Recovery	No
	Yes

Format SD	No
	Yes

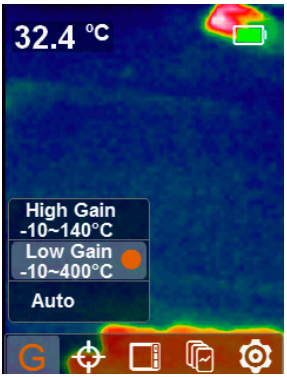
⟶ The duration of the formatting process depends on the memory card size. “Formatting...” will be displayed during formatting. Please wait until this message disappears. Do not turn off the device ahead of time, otherwise the memory card may be damaged.

Auto Save	Off
	On

Temp Bar	Off
	On

e) Setting the measurement range G

Set the measurement range to expand the scope of application of the camera. There are two ranges:



High Gain

The camera reduces the measurement range to the most commonly used temperature range and thus increases the detail display. This range is used to display precise temperature differences.

Low Gain

The camera enables measurement operation over the whole measurement range. In this case, however, the detail display is reduced. This range can be used for rough overview measurements.

Auto

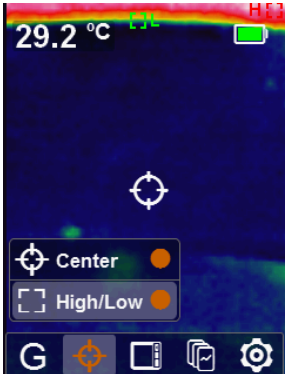
The camera automatically sets the respective mode to be displayed.

To set the measurement range, proceed as follows:

- Press the “SET” button to open the settings menu.
- Use the cursor buttons to select the “G” symbol and press the “SET” button to confirm the selection.
- Use the cursor buttons to select the corresponding parameters. The selected range will be highlighted in colour.
- Press the “SET” button to confirm the selection. The setting is marked with a yellow dot.
- To exit the menu, press the “Back” button.

f) Setting the temperature markers

By default, the spot temperature for the thermal image is displayed on the upper left corner of the screen. You can use various settings to mark the actual measuring point. The middle measuring point can be displayed, in which the temperature measurement takes place. Similarly, two markers for the lowest and highest measuring points can be shown in the image.



Centre

The middle spot measuring point is marked as crosshairs. The temperature is measured here, with the temperature value displayed on the upper left corner of the screen. The spot measuring point is fixed in the centre and cannot be changed.

High/Low

The lowest measuring point is marked with a blue frame and the letter “L” in the image.

The highest measuring point is marked with a red frame and the letter “H” in the image.

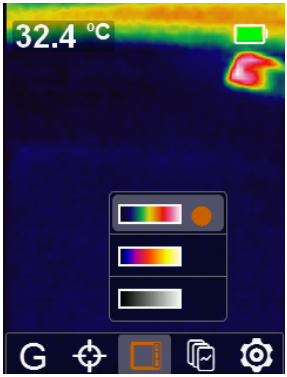
These two markers are dynamic and automatically change their position depending on the heat distribution in the image.

To display the temperature markers, proceed as follows:

- Press the “SET” button to open the settings menu.
- Use the cursor buttons to select the “crosshairs” symbol and press the “SET” button to confirm the selection.
- Use the cursor buttons to select the corresponding parameters. The selected range will be highlighted in colour.
- Press the “SET” button to confirm the selection. The setting is marked with a yellow dot. Both parameters can also be enabled.
- To exit the menu, press the “Back” button.

g) Setting the colour palette

Set the colour palette to choose the optimal display contrast for your measurement application. There are three colour palettes.



Iron palette

Typical colour palette for thermal image applications. The cool spots are displayed dark and turn from red to white for the hot spots.

Rainbow palette

The cool spots are displayed dark and turn from bright colours to white for the hot spots in rainbow mode.

Grey palette

The cool spots are displayed in black and become brighter in the grey range for the hot spots. Here, the cold to hot contrast ratio is the greatest.

To set the colour palette, proceed as follows:

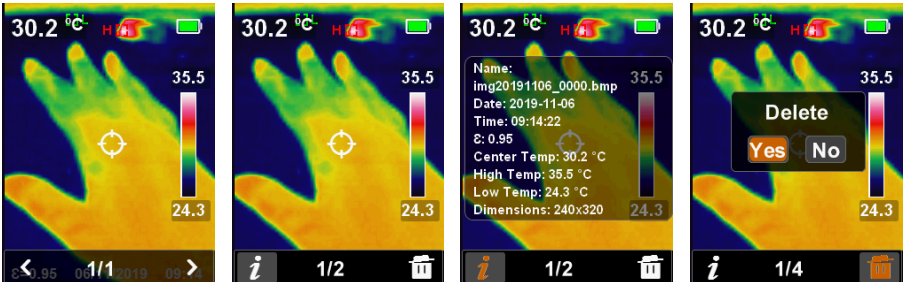
- Press the “SET” button to open the settings menu.
- Use the cursor buttons to select the “colour palette” symbol and press the “SET” button to confirm the selection.
- Use the cursor buttons to select the corresponding parameters. The selected range will be highlighted in colour.
- Press the “SET” button to confirm the selection. The setting is marked with a yellow dot.
- To exit the menu, press the “Back” button.

h) Image gallery

The saved images can be viewed directly on the camera. In addition, the thermal image parameters can be displayed and unnecessary images can be deleted directly.

To view/delete the saved images, proceed as follows:

- Press the “SET” button to open the settings menu.
- Use the cursor buttons to select the “image gallery” symbol and press the “SET” button to confirm the selection.
- Use the cursor buttons to select the corresponding image and press the “SET” button to confirm the selection.
- Use the “i” symbol to display other data stored in the image.
- Use the dustbin symbol to delete the image. Use the cursor buttons to select the function and press the “SET” button to confirm the selection. Use the “SET” button to re-confirm your entry or use “No” to cancel.



- To exit the menu, press the “Back” button.

12. Taking measurements

In order to obtain precise measured values, the measuring instrument must be adjusted to the ambient temperature. Allow the device to adjust to the ambient temperature after relocation.

Lengthy IR measurements of high temperatures at a small measuring distance cause self-heating of the measuring instrument and thus an inaccurate measurement. In order to obtain precise measured values, remember the following rule of thumb: The higher the temperature, the greater the measuring distance and the shorter the measuring time.

⟶ Shiny surfaces affect the IR measurement results. To compensate, the shiny part of the surface can be covered with adhesive tape or matt black paint. In this case, the emission level must always be adjusted to the surface to be measured. The device cannot measure through transparent surfaces such as glass. Instead, it measures the surface temperature of the glass.

a) Function

Infrared thermal imaging cameras measure the surface temperature of an object and indicate these temperature distributions with false colour photography.

The IR detector records the heat radiation emitted, reflected and transmitted through the object and converts this information into a temperature value. The measuring instrument has a built-in detector with a resolution of 80 x 60 pixels. This means that the detector records 80 x 60 temperature points in one measurement.

The emission level is a value used to describe the energy radiation characteristics of a material. The higher this value, the more radiation a material can emit.

Many organic materials and surfaces have an emission level of approx. 0.95. Metallic surfaces or shiny materials have a lower emission level. This will cause an inaccurate reading. For this reason, a matt black layer of paint or matt adhesive tape should be applied to metallic shiny surfaces or the emission level should be preset accordingly.

The IR lens (7) is at the front of the device. Clean the lens with a soft cloth for lenses (eyeglass cleaning cloth, etc.). This prevents damage or soiling of the lens.

The IR camera lens has a 50° x 38° field of view (FOV).

b) Carrying out IR measurement

- Turn on the camera. It takes approx. four seconds for the detector to be calibrated.

⟶ The calibration process is identifiable by a short click sound. Calibration is also carried out regularly during measurement. This helps the detector to retain its accuracy over longer measuring phases. During the calibration procedure, the detector is covered internally and no temperature updates are carried out (frozen image).

- As soon as the initialisation is completed, the thermal image is displayed with false colours. The measurement is carried out continuously with an update rate of <9 Hz.
- The colour palettes, the temperature unit and the emission level can be set in the settings menu as desired. Preset values are colour palette 1, degrees Celsius and emission level 0.95.
- The display shows the measured value for the centre of the image. Min and Max markers can automatically measure and mark temperature peaks depending on the setting.
- Turn off the measuring instrument once the measurement is completed.

c) Saving the screen content

IR thermal images or screenshots of measured values can be stored on the removable microSD memory card. The images are saved in bitmap format (.bmp) and can be reused by all graphics and table editing programs. This allows for logging of measurement series.

- Switch the measuring instrument on.
- Make sure a memory card is inserted.
- Perform a measurement. Use the red trigger button (9) to capture the desired image.
- The display now shows the “Save” symbol in the toolbar. Press the corresponding cursor button. Use “X” to cancel the saving and “tick” to save the image.
- The measuring instrument will create a separate folder named “Images” in the memory card. The images can be stored with a time stamp in the file name as follows:

  img Datum_Fortlaufende Zahl.bmp

Example:
img20190208_0000.bmp
img20190208_0001.bmp

The data on the memory card can be read by the measuring instrument or a computer via an optional memory card terminal.

d) Automatic shut-off feature

The camera enables automatic power-off after a preset time. This function protects the rechargeable battery and extends the operating time. The automatic shut-off function can be disabled to allow longer measurements to be carried out.

The automatic power-off can be set in the system settings under the “Auto Off” menu item.

13. Cleaning and maintenance

a) General information

To ensure the accuracy of the thermal imaging camera over a long period of time, it should be calibrated at least once a year.

The measuring instrument is absolutely maintenance-free except for occasional cleaning and battery replacement.

Regularly check the device for technical safety, for example, for damage to the casing or deformation, etc.

b) Cleaning the casing

Always observe the following safety information before cleaning the device:

Do not use abrasive detergents, petrol, alcohol or other similar chemicals to clean the device. These may corrode the surface of the measuring instrument. In addition, the vapours emitted by these substances are explosive and harmful to your health. Do not use sharp-edged tools, screwdrivers or metal brushes to clean the device.

To clean the device and the display, use a clean, lint-free, antistatic and slightly damp cleaning cloth. Allow the device to dry completely before using it again.

c) Cleaning the lens

Remove loose particles with clean compressed air and wipe off remaining residue with a fine lens brush. Clean the surface of the lens with a lens cloth or a soft, lint-free cloth.

The cloth can be moistened with water or a lens cleaning solution to remove fingerprints and other residue.

Do not use any acidic, alcoholic or other solvents or rough, linty cloth to clean the lens.

Avoid applying too much pressure when cleaning the lens.

14. Disposal

Electronic products are raw material and do not belong in the household waste. At the end of its service life, dispose of the product according to the relevant statutory regulations. Remove the inserted battery cell and dispose of it separately from the product.

Disposal of used batteries/rechargeable batteries!

You are required by law to return all used batteries. They must not be placed in household waste.

Contaminated batteries/rechargeable batteries are labelled with symbols to indicate that disposal in the domestic waste is forbidden. The designations for the heavy metals involved are: Cd=cadmium, Hg=mercury, Pb=lead (the marking can be seen on the battery, e.g., underneath the refuse bin symbol shown on the left). Used batteries can be returned to local collection points, our stores or battery retailers.

That way you fulfil your statutory obligations and contribute to the protection of the environment!

15. Troubleshooting

In purchasing this measuring device, you have acquired a product which has been designed to the state of the art and is operationally reliable. However, problems and malfunctions may still occur. This section tells you how to troubleshoot common issues:

Error	Possible cause	Solution
The camera does not work.	Is the battery empty?	Check the status. Charge the battery, if necessary.
The measured value does not change.	You are currently in the image gallery mode.	Press the “Back” button until you are in the measuring mode.

Repairs other than those described above should be performed only by an authorised specialist. If you have questions about the measuring instrument, please contact our technical support team.

16. Technical data

Measuring tolerances

These accuracy readings are valid for one year at a temperature of +23 °C (± 5 °C) and a relative humidity of less than 75%, non-condensing.

The accuracy of measurements may be affected when the device is used in a high-frequency electromagnetic field.

Measurement range	-10 to +400 °C
Accuracy	± 5% or ± 5 °C
Resolution	0.1 °C
IR resolution (bolometer matrix)	80 x 60 pixels (4800 pixels)
Detector pixel size	17 µm
Thermal sensitivity (NETD)	150 mK
Field of view (FOV)	50° x 38°
Geometric resolution (IFOV)	11 mrad
Refreshing rate	<9 Hz
Focus	focus free (fix-focus)
Minimum focus area	25 cm
Spectral range	8 – 14 µm
Colour LC display	6.1 cm (2.4”), 240 x 320 pixels
Colour palettes	iron, rainbow, grey
Emission level	0.1 – 0.99 (0.95 preset)
Operating temperature	-10 to +45 °C
Storage temperature	-20 to +50 °C
Power supply	rechargeable Li-ion battery 3.7 V/DC, 2500 mAh, USB charging
Battery life	approx. 5 h
Interface	microSD slot (max. 16 GB)
Image storage format	bmp
Protection type	IP54
Fall and impact protection	max. 2 m
Product dimensions (L x W x H)	78 x 72 x 213 mm
Weight	approx. 389 g

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