



# Testo 870 thermal imager

Instruction manual



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testo 870 brief instructions

testo 870 instruction manual

Thermography Pocket Guide

Videos testo 870

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# 1 Safety and waste disposal

## 1.1 About this document

- The instruction manual is an integral part of the instrument.
- Keep this document throughout the entire operating life of the instrument.
- Always use the complete original instruction manual.
- Please read this instruction manual through carefully and familiarise yourself with the product before putting it to use.
- Pass this instruction manual on to any additional or subsequent users of the product.
- Pay particular attention to the safety instructions and warning advice in order to prevent injury and damage to the product.

## 1.2 Safety

### General safety instructions



- Only operate this instrument in the proper manner, for its intended purpose and within the parameters specified in the technical data.
- Do not apply any force to open the instrument.
- Do not operate the instrument if there are signs of damage on the housing, mains unit or connected cables.
- Always comply with the locally valid safety regulations when carrying out measurements. Dangers may also arise from objects to be measured or the measuring environment.
- Do not store the product together with solvents.
- Do not use any desiccants.
- Only perform maintenance and repair work on this instrument that is described in this documentation. Follow the prescribed steps exactly.
- Use only original spare parts from Testo.
- During operation, this instrument must not be pointed at the sun or other intensive sources of radiation (e.g. objects with temperatures exceeding 500 °C). This can lead to serious damage to the detector. The manufacturer does not provide any warranty for any such damage to the microbolometer detector.

## Batteries

- Improper use of batteries may cause the batteries to be destroyed, or lead to injury due to current surges, fire or escaping chemicals.
- Only use the batteries supplied in accordance with the instructions in the instruction manual.
- Do not short-circuit the batteries.
- Do not take the batteries apart and do not modify them.
- Do not expose the batteries to heavy impacts, water, fire or temperatures in excess of 60 °C.
- Do not store the batteries in the proximity of metal objects.
- In the event of contact with battery acid: rinse affected areas thoroughly with water, and if necessary consult a doctor.
- Do not use any leaky or damaged batteries.
- Only charge the rechargeable battery in the instrument or in the recommended charging station.
- Immediately stop the charging process if this is not completed in the given time.
- Take the rechargeable battery out of the instrument or the charging station immediately if it is not functioning properly or if it shows signs of overheating. Rechargeable battery may be hot!
- When not in use for a long period of time, take the rechargeable battery out of the instrument to prevent exhaustive discharge.

## Warnings

Always pay attention to any information denoted by the following warnings. Implement the precautionary measures specified!

Display	Explanation
 <b>WARNING</b>	Indicates possible serious injury.
 <b>CAUTION</b>	Indicates possible minor injury.
<b>ATTENTION</b>	Indicates possible damage to equipment.

## 1.3 Waste disposal

- Dispose of faulty rechargeable batteries and spent batteries in accordance with the valid legal specifications.
- At the end of its useful life, dispose of the instrument via separate collection for electrical and electronic devices. Please observe local regulations regarding waste disposal, or alternatively return the product to Testo for disposal.

## 2 Technical data

### Image output

Feature	Values
Infrared resolution	160 x 120 pixels (FPA, amorphous silicon)
Thermal sensitivity (NETD)	<100 mK @ 30 °C
Field of view (FOV) / min. focusing distance	34° x 26° / < 0.5 m (fixed-focus lens)
Geometric resolution (IFOV)	3.68 mrad
SuperResolution (optional function)	320 x 240 pixels / 2.3 mrad
IR image refresh rate	9 Hz
Spectral range	7.5 - 14 µm

### Image presentation

Feature	Values
Display	8.9 cm (3.5") TFT, QVGA (320 x 240 pixels)
Display options	<ul style="list-style-type: none"> <li>• Infrared image</li> <li>• Real image (only for testo 870-2)</li> </ul>
Interface	USB 2.0 micro B
Colour palettes	4 options: iron, rainbow HC, grey, cold-hot

### Measuring

Feature	Values
Measurement range	-20 to 280 °C
Accuracy	Information valid for specified measurement range + tolerance ±2 °C , ±2 % of reading (higher value applies)

Feature	Values
Extended display range	Values with no guarantee of accuracy, prefixed with a tilde (~...) on the display. -40 to -22 °C 286 to 290 °C
Measurement	<ul style="list-style-type: none"> <li>• Single point measurement</li> <li>• Coldspot</li> <li>• Hotspot</li> </ul>

### Digital camera (only testo 870-2)

Feature	Values
File format	.jpg
Lens	34° x 26°

### Image storage

Feature	Values
File format	<ul style="list-style-type: none"> <li>• .bmt and .jpg</li> <li>• Export options in .bmp, .jpg, .png, .xls., csv</li> </ul>
Memory capacity	Internal mass storage 1.6 GB, > 2000 images (without SuperResolution)

### Power supply

Feature	Values
Battery type	Li-Ion rechargeable battery 2500 mAh / 3.7 V
Operating time	4 h @ 20 °C
Charging option	In instrument/in charging station (optional)
Charging time	approx. 5 h via mains unit approx. 8 h via a PC's USB interface

### Ambient conditions

Feature	Values
Operating temperature	-15 to 50 °C
Storage temperature	-30 to 60 °C
Humidity	20 - 80 %RH, not condensing

**Physical features**

Feature	Values
Weight	550 g (including battery)
Dimensions	96 x 95 x 219 mm
Housing	PC/ABS
Protection class (IEC 60529)	IP 54
Vibration (IEC 60068-2-6)	2 G

**Standards, tests, warranty**

Feature	Values
EU Directive	2004/108/EC
Warranty	2 years, warranty conditions: see <a href="http://www.testo.com/warranty">www.testo.com/warranty</a>

## 3 Description of the instrument

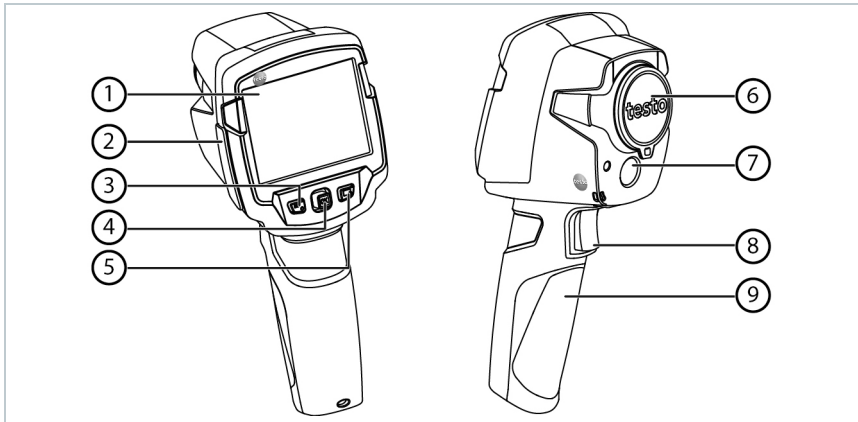
### 3.1 Use



The testo 870 is a handy, robust thermal imager. You can use it to undertake the non-contact measurement and display of surface temperature distribution.

**Areas of application**

- Building inspection: Energy efficiency rating of buildings (heating, ventilation, air-conditioning trade, building engineers, engineering firms, experts)
- Production monitoring / quality assurance: monitoring of production processes
- Preventive maintenance / servicing: Electrical and mechanical inspection of systems and machines

## 3.1 Instrument / operating elements overview



Element	Function
1 Display	Displays infrared and real images, menus and functions
2 Interface terminal	Contains micro USB interface for power supply and connection to the computer
3 -  button - Esc button	- Switch camera on and off - Cancel action
4 - OK button - Joystick	- Open menu, select function, confirm setting - Navigate within the menu, select function, select colour palette
5 Quick select button 	Opens the function assigned to the quick select button; the icon for the selected function is displayed bottom right
6 Infrared camera lens; protective cap	Takes infrared images; protects the lens
7 Digital camera (only testo 870-2)	Takes real images
8 Trigger	Saves the displayed image
9 Battery compartment	Contains the rechargeable battery

## 3.1 Displays overview



Element	Function
1	Battery capacity / charge status: : Battery operation, capacity 75-100% : Battery operation, capacity 50-75% : Battery operation, capacity 25-50% : Battery operation, capacity 10-25% : Battery operation, capacity 0-10% -  -  -  -  (animated): Mains operation, battery is charging : Mains operation, battery fully charged
2 Image display	IR image or real image display (only testo 870-2)
3  or	Unit set for reading and scale displays
4 Scale	<ul style="list-style-type: none"> <li>- Temperature unit</li> <li>- Grey characters: Measurement range</li> <li>- Black characters: temperature margin of the image displayed, showing the minimum/maximum reading (with automatic scale adjustment) or the selected minimum/maximum display value (with manual scale adjustment)</li> </ul>
5  or	Automatic or manual scale adjustment activated
6	Emissivity set

## 3.2 Power supply

The power is supplied to the instrument via a replaceable rechargeable battery or the mains unit provided (battery must be inserted).

With an attached mains unit, power is supplied automatically via the mains unit and the rechargeable battery is charged (only at ambient temperatures from 0 to 40°C).

If the instrument is switched off when connected to a PC via the USB interface, the rechargeable battery is charged via the USB interface.

It is also possible to charge the battery using a charging station (accessory).

The instrument is equipped with a buffer battery to maintain the system data during an interruption in the power supply (e.g. when the battery is changed).

# 4 Operation

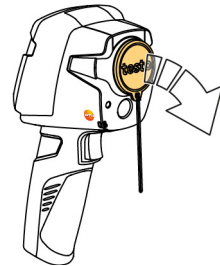
## 4.1 Initial operation


Please read the testo 870 1st steps commissioning instructions supplied (0970 8702).

## 4.2 Switching instrument on and off

### Switching on the camera

- 1 - Remove protective cap from the lens.



- 2 - Press .
- ▶ The camera starts.
- ▶ The start screen appears on the display.




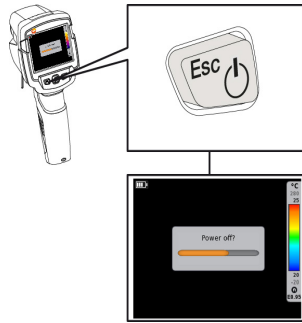


The camera carries out automatic zeroing approx. every 60 seconds in order to guarantee measuring accuracy. A "click" is heard when this happens. The image freezes briefly when this occurs. Zeroing is carried out more frequently during the camera warm-up period (takes approx. 90 seconds).

During the warm-up period no measuring accuracy is guaranteed. The image can already be used for indication purposes and saved.

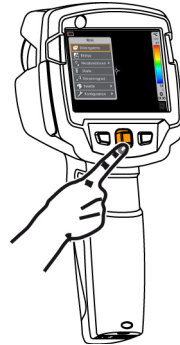
### Switching off the camera

- 1 - Press and hold down  until the progress bar is complete.
- ▶ The display goes off.
- ▶ The camera is switched off.

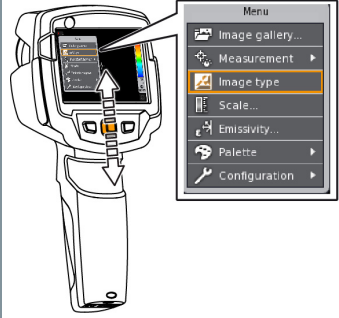


## 4.3 Getting to know the menu

- 1 - Press **OK** to open the menu.



- 2 - Move the **Joystick** down/up to highlight a function (orange border).



- 3 - Press **OK** to select the function.

- 3.1 - Move the **Joystick** to the right to open the submenu (indicated with ►).  
- Move the **Joystick** to the left to go back to the main menu.

## 4.4 Colour palette quick change




testo 870-2: this function is only available if the **Image type** is set to infrared image.



- 1 - Move the **Joystick** down/up to switch between the colour palettes.

## 4.5 Quick select button

The quick select button is another navigation option that you can use to call up certain functions simply at the touch of a button.

### Quick select menu items

Menu item	Function
 <b>Image type</b> (only testo 870-2)	Alternately switches the image display between infrared and real image.
 <b>Image gallery</b>	Opens an overview of saved images.
 <b>Scale</b> (testo 870-2: this function is only available if the <b>Image type</b> is set to infrared)	Set scale limits.

Menu item	Function
 <b>Emissivity</b> (testo 870-2: this function is only available if the <b>Image type</b> is set to infrared)	Set emissivity (E) and reflected temperature (RTC).
 <b>Adjustment</b> (testo 870-2: this function is only available if the <b>Image type</b> is set to infrared)	Carries out manual zeroing.

### Changing assignment

- 1 - Move the **Joystick** to the right.
  - ▶ The **Configure key** selection menu appears.
  - ▶ The activated function is marked with a tick (✓).
- 2 - Move the **Joystick** up/down until the orange box appears around the required menu item.
  - Press **OK**
  - ▶ The quick select button is assigned to the selected menu item.
  - ▶ The icon for the selected function is displayed bottom right.



### Using the quick select button

- 1 - Press .
  - ▶ The function assigned to the quick select button is carried out.



## 5 Performing the measurement

### CAUTION

High thermal radiation (e.g. due to sun, fire, furnaces)  
Detector may be damaged!

- Do not point the camera at objects with temperatures exceeding 500 °C.

### Ideal framework conditions

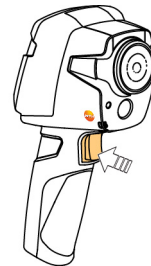
- Building thermography, investigating the building shell:  
Considerable temperature difference between inside and outside required (ideal:  $\geq 15$  °C /  $\geq 27$  °F).
- Consistent weather conditions, no intensive sunlight, no precipitation, no strong wind.
- To ensure maximum accuracy, the camera requires an adjustment time of 10 minutes after it is switched on.

### Important camera settings

- Emissivity and reflected temperature must be set correctly in order to precisely determine the temperature. Subsequent adjustment is possible via the PC software, if required.
- When auto-scaling is activated, the colour scale is continuously adjusted to the min./max. values of the current measurement image. This means that the colour assigned to a specific temperature is changing constantly! To be able to compare multiple images based on the assigned colour, scaling must be set manually to fixed values, or must be subsequently adjusted to uniform values using the PC software.

## 5.1 Saving an image

- 1 - Press **trigger**.
  - ▶ The image is automatically saved.
  - ▶ testo 870-2: regardless of the image type set, an infrared image is saved with an attached real image.





If a higher resolution is required: in the menu under **Configuration** select **SuperResolution** (optional function), for four times as many readings.

## 5.2 Setting measuring functions

- 1 - Open the **Measurement** submenu. Procedure: see Getting to know the menu, page 11.
  - ▶ The submenu opens with the measuring functions:
    - **Single point measurement**: the temperature measuring point in the centre of the image is marked with white crosshairs and the value is displayed. In saved images the crosshairs can be moved using the joystick, in order to read the value of other measuring points.
    - **Coldspot**: the lowest temperature measuring point is marked with blue crosshairs and the value is displayed.
    - **Hotspot**: the highest temperature measuring point is marked with red crosshairs and the value is displayed.
    - **Measurement range**: temperature range of the readings displayed (for info).
- 2 - Move the **Joystick** up/down to select the required function and then press **OK**.

## 5.3 Image gallery

Saved images can be displayed, analysed or deleted.

### File names



	Designation	Explanation
1	-	Infrared preview
2	IR 000000	Infrared image, testo 870-2: with attached real image Consecutive number



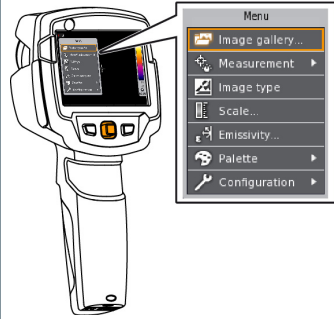
File names can be changed via the PC, e.g. in Windows Explorer.

### Displaying a saved image

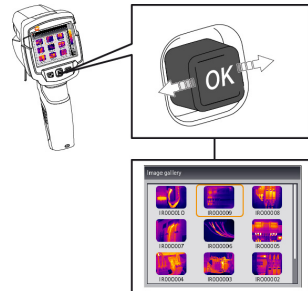
Saved images can be viewed and analysed in the image gallery.

- 1 - Select **Image gallery** function. For how to proceed: see Getting to know the menu, page 11.

- ▶ All saved images are displayed in the form of an infrared preview.



- 2 - Move **Joystick** to select an image.



- 3 - Press **OK** to open the selected image.

- ▶ The image is displayed.

### Analysing an image

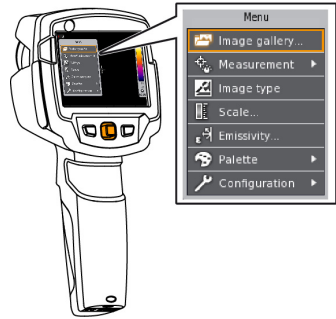
Saved images can be analysed using the Single point measurement, Hotspot and Coldspot measuring functions. In saved images the crosshairs, which mark the measuring point, can be moved using the joystick.

For a description of the individual functions, please read the information in the relevant sections.

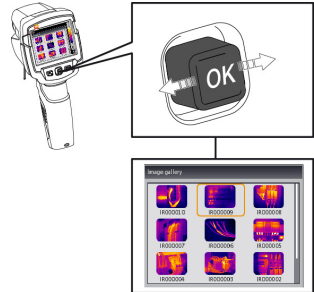
## Deleting an image

- 1 - Select **Image gallery** function, see Getting to know the menu, page 11.

- ▶ All saved images are displayed in the form of an infrared preview.

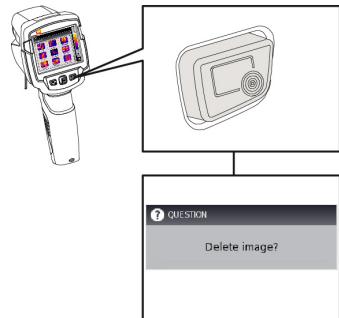


- 2 - Move **Joystick** to select an image.



- 3 - Press .

- ▶ **Delete image?** is displayed.



- 4 - Press **OK** to delete the image.

- 4.1 - Press **Esc** to cancel the process.

## 5.4 Image type



This function is only available for the testo 870-2 version.

The display can be switched between infrared image and real image (digital camera).

- 1 - Select **Image type** function. For how to proceed: see Getting to know the menu, page 11.
- ▶ The image type displayed switches alternately between the infrared image view and real image view.

## 5.5 Setting the scale

Manual scaling can be activated instead of automatic scaling (continuous automatic adjustment to the current min./max. values). The scale limits can be set within the measurement range.

The activated mode is displayed bottom right:  automatic scaling,  manual scaling.





Auto-scaling continuously adjusts the scale to the readings presented, and the colour assigned to a temperature value changes.

In manual scaling fixed limit values are defined, and the colour assigned to a temperature value is fixed (important for visual image comparisons).

The scaling affects how the infrared image appears on the display, but has no effect on the recorded readings.






### Setting automatic scaling

- 1 - Select **Scale** function. For how to proceed: see Getting to know the menu, page 11.
- 2 - Move the **Joystick** to the left until  **Auto** is selected and then press **OK**.
- ▶ Automatic scaling is activated.  is displayed bottom right.

### Setting manual scaling

The lower limit value, the temperature range (upper and lower limit value simultaneously) and the upper limit value can be set.

- 1 - Select **Scale** function. For how to proceed see Getting to know the menu, page 11.

- 2 - Move the **Joystick** to the left/right until  (lower limit value) is selected.
  - Move the **Joystick** up/down to set the value.
- 2.1 - Move the **Joystick** to the left/right until  (lower limit value) and  (upper limit value) are selected.
  - Move the **Joystick** up/down to set the values.
- 2.2 - Move the **Joystick** to the right until  (upper limit value) is selected.
  - Move the **Joystick** up/down to set the value.
- 3 - Press **OK**.
  - ▶ Manual scaling is activated.  is displayed bottom right.

## 5.6 Setting emissivity and reflected temperature

testo 870-2: this function is only available if the **Image type** is set to infrared image.

You can choose between user-defined emissivity and 8 materials with permanently set emissivity. The reflected temperature (RTC) can be set individually.



Other materials can be imported into the instrument from an existing list using the PC software.

### Emissivity information:

The emissivity describes the capability of a body to emit electromagnetic radiation. This is material-specific and must be adapted for correct measurement results.

Non-metals (paper, ceramic, gypsum, wood, paints and coatings), plastics and food have high emissivity, which means that the surface temperature can be easily measured using infrared.

Because of their low or non-uniform emissivity, bright metals and metal oxides only have limited suitability for infrared measurement. Highly inaccurate measurements should be expected. A remedy for this is coatings that increase emissivity, e.g. paint or emission adhesive (accessory: 0554 0051), which must be applied to the object to be measured.

The following table gives typical emissivities of important materials. These values can be used as a guide for user-defined settings.

Material (material temperature)	Emissivity
Aluminium, bright rolled (170 °C)	0.04
Cotton (20 °C)	0.77
Concrete (25 °C)	0.93
Ice, smooth (0 °C)	0.97
Iron, emery-ground (20 °C)	0.24
Iron with casting skin (100 °C)	0.80
Iron with rolling skin (20 °C)	0.77
Gypsum (20 °C)	0.90
Glass (90 °C)	0.94
Rubber, hard (23 °C)	0.94
Rubber, soft grey (23 °C)	0.89
Wood (70 °C)	0.94
Cork (20 °C)	0.70
Radiator, black anodised (50 °C)	0.98
Copper, slightly tarnished (20 °C)	0.04
Copper, oxidised (130 °C)	0.76
Plastics: PE, PP, PVC (20 °C)	0.94
Brass, oxidised (200 °C)	0.61
Paper (20 °C)	0.97
Porcelain (20 °C)	0.92
Black paint, matt (80 °C)	0.97
Steel, heat-treated surface (200 °C)	0.52
Steel, oxidised (200 °C)	0.79
Clay, burnt (70 °C)	0.91
Transformer paint (70 °C)	0.94
Brick, mortar, plaster (20 °C)	0.93

#### Reflected temperature information:

Using this offset factor, the reflection is calculated out based on the low emissivity, and the accuracy of the temperature measurement with infrared measuring instruments is improved. In most cases, the reflected temperature is identical to the ambient air temperature. Only when objects with strong emissions at much lower temperatures (such as cloudless skies during outdoor readings) or much higher temperatures (such as ovens or machines) are in proximity to the object being measured should the radiation temperature of

these sources be determined and used. The reflected temperature has little effect on objects with high emissivity.

@ Further information can be found in the Pocket Guide.

- 1 - Select **Emissivity** function. For how to proceed: see Getting to know the menu, page 11.
- 2 - Move the **Joystick** up/down to select the required material (with permanently set emissivity) and then press **OK**.
- 2.1 - Move the **Joystick** up/down until **User defined** is selected.
  - Move the **Joystick** to the right until **E** is selected.
  - Manually set value.
- 3 - Move the **Joystick** to the right until **RTC** is selected.
  - Manually set value.
- 4 - Press **OK**.

## 5.7 Selecting the colour palette

testo 870-2: this function is only available if the **Image type** is set to infrared image.

- 1 - Select **Palette** function. For how to proceed: see Getting to know the menu, page 11.
  - 2 - Move the **Joystick** up/down to select the required colour palette and then press **OK**.
- @ For further setting options, see Colour palette quick change, page 12.

## 5.8 Configuration

### Fullscreen mode

The scale and the quick select button function indicator can be hidden.

- 1 - Select **Fullscreen Mode** function. For how to proceed: see Getting to know the menu, page 11.
- ▶ When Fullscreen Mode is activated, the scale and icon for the quick select button are hidden. When a key is pressed, these elements are displayed briefly.

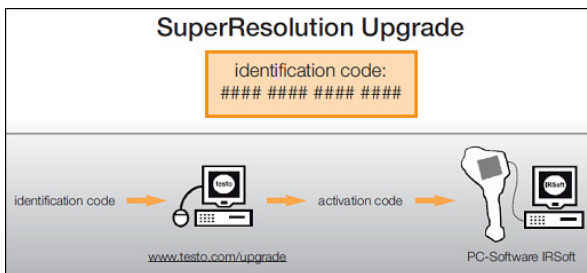
### SuperResolution (optional function)

SuperResolution is a technology to improve image quality. Each time an image is recorded, a sequence of images is saved on the thermal imager and used to calculate an image with four times more readings, with the aid of the PC software (no interpolation). The geometric resolution (IFOV) is improved by a factor of 1.6.



This function is available as an additional option (article no. 0554 7806) and must be activated before it can be used.

Activate function:



you will receive an envelope with an access code (**identification code**), which you should enter on the website **www.testo.com/upgrade**. When all necessary data has been entered, an **activation code** is generated, and this can be used to activate the function via the IRSoft PC software. Please observe the installation requirements and steps on the website or in the email sent to you.

To use the function, the following conditions must be fulfilled:

- The camera is hand-held.
- The objects to be imaged do not move.

- 1 - Open **SuperResolution** function. For how to proceed: see Getting to know the menu, page 11.
- 2 - Press **OK** to enable or disable the function.
- 3 - Move the **Joystick** until **OK** is selected.
- 4 - Press **OK**.

### Save JPEG

Infrared images are saved in BMT (image with all temperature data) format. The image can also be saved in JPEG format (without temperature data) at the same time. The image content corresponds to the infrared image shown on the display, including scale display and image marks for the selected measuring functions. The JPEG file is saved under the same file name as the associated BMT file and can be opened on the PC, even without using the IRSof PC software.

- 1 - Open **Save JPEG** function. For how to proceed: see Getting to know the menu, page 11.
- 2 - Press **OK** to enable or disable the function.
- 3 - Move the **Joystick** until **OK** is selected.
- 4 - Press **OK**.

### Power-save options

The illumination intensity of the display can be set. A lower intensity increases the battery life.

- 1 - Select **Power-save options** function. For how to proceed: see Getting to know the menu, page 11.
- 2 - Move the **Joystick** up/down to select the required intensity level and then press **OK**.

### Language

The user interface language can be set.

- 1 - Select **Language** function. For how to proceed: see Getting to know the menu, page 11.
- 2 - Move the **Joystick** up/down to select the required language and then press **OK**.

### Temperature unit

The temperature unit can be set.

- 1 - Open the **Temperature unit** submenu. For how to proceed: see Getting to know the menu.
- 2 - Move the **Joystick** up/down to select the required unit and then press **OK**.

### Set time/date

Time and date can be set. The time and date format are set automatically based on the selected user interface language.

- 1 - Select **Set time/date** function. For how to proceed: see Getting to know the menu, page 11.
- 2 - Move the **Joystick** to the right/left to select the required setting option.
- 3 - Move the **Joystick** up/down to set the value.
- 4 - After setting all values, press **OK**.

### Reset counter



After a reset, the consecutive numbering of images starts again from the beginning. When saving images, already saved images with the same number are overwritten!

Back up all saved images before resetting the counter to prevent possible overwriting.

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- 1 - Select **Reset counter** function. For how to proceed: see Getting to know the menu, page 11.
  - ▶ **Reset counter?** is displayed.
- 2 - Press **OK** to reset the counter.
- 2.1 - Press **Esc** to cancel the process.

### Formatting

The image memory can be formatted.



When formatting, all data saved in the memory is lost.

Back up all saved images before formatting to prevent loss of data. Formatting does not reset the counter.

- 1 - Select **Format** function. For how to proceed: see Getting to know the menu, page 11.
  - ▶ **Format memory?** is displayed.
- 2 - Press **OK** to format the memory.
- 2.1 - Press **Esc** to cancel the process.

### Factory settings

The instrument settings can be reset to the factory settings.



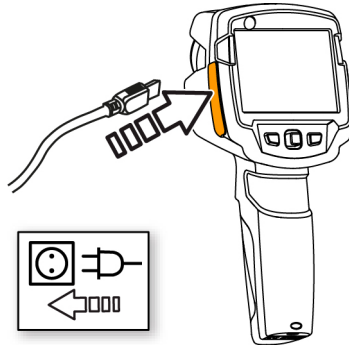
Time/date, country settings and counter are not reset.

- 1 - Select **Factory settings** function. For how to proceed: see Getting to know the menu, page 11.
  - ▶ **Apply factory settings?** is displayed.
- 2 - Press **OK** to apply factory settings.
- 2.1 - Press **Esc** to cancel the process.

## 6 Maintenance

### 6.1 Charging the rechargeable battery

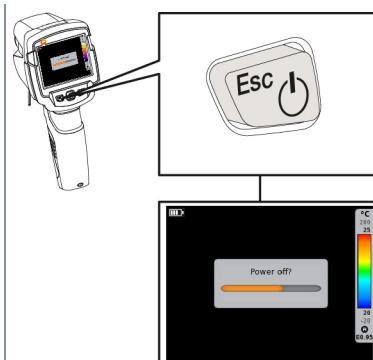
- 1 - Open the cover of the interface terminal.
- 2 - Connect the recharger cable to the Micro-USB interface.
- 3 - Connect the mains unit to a mains socket.



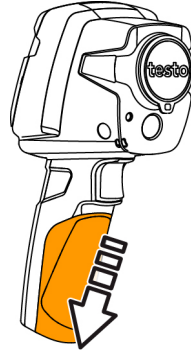
- ▶ The charging process will start.  
If the battery has been completely drained, the charging time is approx. 5 hours.
  - ▶ The charge status is not displayed while the instrument is switched off.
- 4 - Switch on the instrument to call up the charge status.
- @ For other battery charging options, see Power supply, page 10.

### 6.2 Changing the rechargeable battery

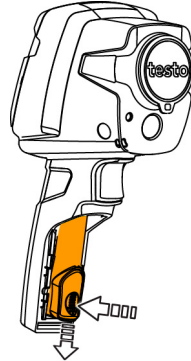
- 1 - Switch the instrument off.



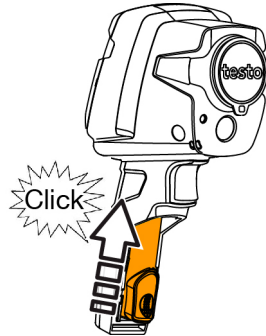
2 - Open the battery compartment.



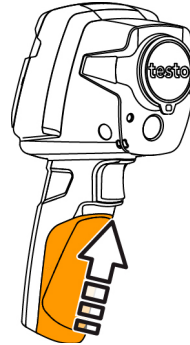
3 - Release the battery and remove.



4 - Insert new battery and slide upwards until it clicks into place.



- 5 - Close the battery compartment.



## 6.3 Cleaning the instrument

### Cleaning the instrument housing

- ✓ - The interface terminal is closed.
  - The battery compartment is closed.
- 1 - Rub down the surface of the instrument with a damp cloth. Use mild household cleaning agents or soapy water for this.

### Cleaning the lens and display

- 1 - If the lens is dirty, clean it with a cotton bud.
- 2 - If the display is dirty, clean it with a cleaning cloth (e.g. microfibre cloth).

## 7 Tips and assistance

### 7.1 Questions and answers

Question	Possible cause / solution
<b>Error! Memory full!</b> is displayed.	Insufficient memory available: Transfer images to the PC or delete.
<b>Error! Permissible instrument temperature exceeded!</b> is displayed.	Switch off the camera, allow the instrument to cool down and observe the permissible ambient temperature.
~ is displayed before a value.	Value is outside the measuring range: extended display range with no guarantee of accuracy.
--- or +++ is displayed instead of a value.	Value is outside the measuring range and the extended display range.
xxx is displayed instead of a value.	Value cannot be calculated: check parameter settings for plausibility.
Automatic zeroing (audible "click" and brief image freeze) is carried out very frequently.	Camera is still in its warm-up period (takes approx. 90 seconds): Wait until the warm-up period has passed.

If we have not been able to answer your question, please contact your dealer or Testo Customer Service. You will find contact details on the back of this document or on the website [www.testo.com/service-contact](http://www.testo.com/service-contact).

## 7.2 Accessories and spare parts

Description	Item no.
Battery charging station	0554 1103
Spare rechargeable battery	0515 0100
High-quality transport case	0516 8700
Emission tape	0554 0051
SuperResolution	0554 7806
ISO calibration certificates	
• Calibration points at 0 °C, 25 °C, 50 °C	0520 0489
• Calibration points at 0 °C, 100 °C, 200 °C	0520 0490
• Freely selectable calibration points in the range -18 °C to 250 °C	0520 0495

For further accessories and spare parts, please refer to the product catalogues and brochures or look up at [www.testo.com](http://www.testo.com).



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