



## testo 876 · Thermal imager

Instruction manual



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## 2 Safety and the environment

### 2.1. About this document

#### Use

- > Please read this documentation through carefully and familiarize yourself with the product before putting it to use. Pay particular attention to the safety instructions and warning advice in order to prevent injuries and damage to the products.
- > Keep this document to hand so that you can refer to it when necessary.
- > Hand this documentation on to any subsequent users of the product.

#### Warnings

Always pay attention to information that is marked by the following warnings with warning pictograms. Implement the specified precautionary measures.

Representation	Explanation
<b>NOTICE</b>	indicates circumstances that may lead to damage to the products

#### Symbols and writing standards

Representation	Explanation
<b>i</b>	Note: Basic or further information.
1. ...	Action: more steps, the sequence must be followed.
2. ...	
> ...	Action: a step or an optional step.
- ...	Result of an action.
<b>Menu</b>	Elements of the instrument, the instrument displays or the program interface.
<b>[OK]</b>	Control keys of the instrument or buttons of the program interface.
...   ...	Functions/paths within a menu.
“...”	Example entries

## 2.2. Ensure safety

- > Only operate the product properly, for its intended purpose and within the parameters specified in the technical data. Do not use any force.
- > Do not operate the instrument if there are signs of damage at the housing, mains unit or feed lines.

The thermal imager must not be directed at the sun or other sources of intense radiation (e.g. objects with temperatures greater than 500 °C) during operation. This may lead to serious damage to the detector. The manufacturer accepts no warranty for this type of damage to the detector.

- > The objects to be measured or the measurement environment may also pose risks: Note the safety regulations valid in your area when performing the measurements.
- > Do not store the product together with solvents. Do not use any desiccants.
- > Carry out only the maintenance and repair work on this instrument that is described in the documentation. Follow the prescribed steps exactly. Use only original spare parts from Testo.
- > Improper use of rechargeable batteries can lead to destruction or injuries by means of current surges, fire or escaping chemicals. The following instructions must be observed to avoid such hazards:
  - Only use in accordance with the directions in the instruction manual.
  - Do not short, take apart or modify.
  - Do not expose to heavy impacts, water, fire or temperatures above 60 °C.
  - Do not store in the proximity of metal objects.
  - Do not use leaky or damaged rechargeable batteries. In the event of contact with battery acid: Thoroughly wash affected area with water and consult a doctor, if necessary.
  - Only charge in the instrument or the recommended charging station.

- Immediately stop the charging process if this is not completed in the given time.
- In the event of improper function or signs of overheating, immediately remove the rechargeable battery from the measuring instrument/charging station. Caution: Rechargeable battery may be hot!
- During longer breaks, remove the battery from the instrument to avoid exhaustive discharge.

## **2.3. Protecting the environment**

- > Dispose of faulty rechargeable batteries/spent batteries in accordance with the valid legal specifications.
- > At the end of its useful life, send the product to the separate collection for electric and electronic devices (observe local regulations) or return the product to Testo for disposal.

## 3 Specifications

### 3.1. Use

The testo 876 is a handy and robust thermal imager. It opens the door to contactless determination and illustration of the temperature distribution on surfaces for you.

Typical areas of application are:

- Building inspection: Energetic assessment of buildings, inspection of heating, ventilation and air conditioning systems.
- Preventative maintenance (servicing): Mechanical and electrical inspection of systems and machines
- Production monitoring (quality assurance): Monitoring production processes

Basic properties:

- High-quality wide-angle lens 32° x 23, detector 160 x 120, manual focus, 2 GB SD card for approx. 1000 images, minimum focus distance 10 cm, integrated digital camera, dynamic motorfocus, exchangeable lens, display of surface moisture distribution

#### Export control

Thermal imagers may be subject to the export restrictions of the European Union.

Please observe the national regulations for export control when exporting.

### 3.2. Technical data

#### Infrared image output

Characteristic	Values
Field of vision/min. focusing distance	Standard lens: 32° x 23°/0.1 m (0.33 ft) optional: 9° x 7° / 0.5 m (1.64 ft)
Thermal sensitivity (NETD)	<80mK at 30°C (86°F)
Geometric resolution	Standard lens: 3.3 mrad Telephoto lens: 1 mrad

Characteristic	Values
Refresh rate	9Hz
Focus	manual + motorized
Detector type	FPA 160 x 120 pixels, a.Si
Spectral range	8 - 14 $\mu$ m

### Visual image output

Characteristic	Values
Field of vision/min. focusing distance	33.2° x 25.2° / 0.4m (1.31ft.)
Image size	640 x 480 pixels
Refresh rate	8 to 15 Hz

### Image presentation

Characteristic	Values
Image display	3.5" LCD with 320 x 240 pixels, Foldable by 90° and rotatable by 180°
Display options	Infrared image/real image/infrared and real image
Video output	USB 2.0
Video stream	9 Hz
Colour palettes	4 options

### Measuring

Characteristic	Values
Temperature range (can be changed)	-20 - 100 °C/0 - 280°C (-4 - 212 °F/32 - 536°F)
Accuracy	$\pm 2$ °C ( $\pm 3.6$ °F) or $\pm 2$ % of reading (whichever is the greater)
Reproducibility	$\pm 1$ °C ( $\pm 1.8$ °F) or $\pm 1$ % (whichever is the greater)
Measuring point minimum diameter	Standard lens: 10 mm at 1 m Telephoto lens: 3 mm at 1 m
On-time (time to image)	30 s



<b>Characteristic</b>	<b>Values</b>
Measuring functions	Standard measurement (1-point), Cold-/ Hotspot, Display of the surface moisture distribution via manual entry of the ambient humidity/temperature, solar (manual entry of the radiation intensity), isotherm, min./max. on area

### Image storage

<b>Characteristic</b>	<b>Values</b>
File format	.bmt Export options in .bmp, .jpg, .csv
Removable memory	SD card
Memory capacity	Scope of delivery: 2 GB (approx. 1000 images)

### Lens

<b>Characteristic</b>	<b>Values</b>
Standard lens	32° x 23°
Telephoto lens	9° x 7°
Aperture	1.0

### Audio functions

<b>Characteristic</b>	<b>Values</b>
Sound recording/playback	via headset (included in delivery)
Recording period	max. 30 s per image

### Housing

<b>Feature</b>	<b>Values</b>
Housing material	ABS and TPE
Housing fronts	ABS and PC (nickel plated)

**Power supply**

<b>Characteristic</b>	<b>Values</b>
Battery type	Fast-charging, Li-ion battery can be changed on-site
Operating time	approx. 5 h at 20 - 30 °C (68 - 86 °F)
Charging option	In instrument/in charging station (optional)
Mains operation	Yes, with mains unit 0554 8808
Mains unit output voltage	5 V/4 A

**Ambient conditions**

<b>Characteristic</b>	<b>Values</b>
Operating temperature	-15 - 40 °C (5 - 113 °F)
Storage temperature	-30 - 60 °C (-22 - 140 °F)
Air humidity	20 - 80 %RH, not condensing
Enclosure rating of the housing	IP54 (Interface terminals closed, battery connected, lens mounted)

**Physical features**

<b>Characteristic</b>	<b>Values</b>
Weight	900 g (including battery)
Dimensions	210 x 85 x 97mm (8.27 x 3.35 x 3.82")
Tripod mounting	Yes, with adapter (included in delivery)
Vibration	2 G

**Standards, tests, warranty**

<b>Characteristic</b>	<b>Values</b>
EU Directive	2004/108/EC
Vibration	IEC 60068-2-6
Warranty	2 years, warranty conditions: see website <a href="http://www.testo.com/warranty">www.testo.com/warranty</a>

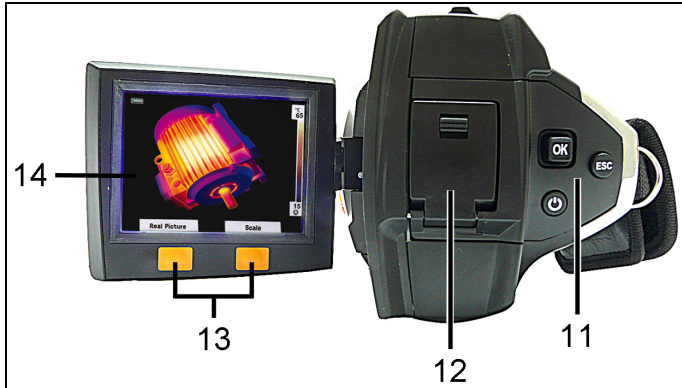
## 4 Product description

### 4.1. Overview


#### Product components



- 1 **[Motor focus controller]**: for motorized focussing.  
**[Trigger]**: for recording (freezing/saving) images.
- 2 Lens digital camera: to record visual images
- 3 Lens infrared camera: to record thermographic images.  
Exchangeable lens.
- 4 **Rotating ring** Manual focussing: for manual focussing.
- 5 **Lens lock ring**
- 6 Metric thread: To fasten a tripod  
Do not use table tripods, danger of tipping over!
- 7 **[Motor focus switch]**: to switch the motor focus on/off.
- 8 Battery compartment with battery shaft, buffer battery shaft,  
memory card shaft
- 9 Wrist strap
- 10 Fixing ring for carrier belt



11 Control keys:

Key	Functions
[  , OK] and Joystick	Switch the camera on/off <ul style="list-style-type: none"> <li>Press [OK]: Open menu, confirm selection/setting.</li> <li>[OK] move up / down / right / left = Joystick-function: Select functions, navigate</li> </ul>
[Esc]	Cancel action.

12 Interface terminal USB-interface, mains socket to connect the supplied mains unit, headset socket, status LED

Status-LED: off (no mains unit connected), flashes (mains unit connected and rech. batt. is being charged), lights (mains unit connected and rech. batt. charging completed).

13 Left/right speed dialling key ["xy"]: Call up function. The display shows which function is assigned to the speed dialling key.

14 Display, foldable by 90° and rotatable by 180°

**i** When the camera is switched on, the display remains active even when folded in. It is recommended to use the energy saving options to prolong the battery lifetime, see Power-save options..., page 31.

## 4.2. Basic properties

### Voltage supply

The power is supplied to the instrument via an exchangeable rechargeable battery or via the included mains unit.

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



Under high ambient temperatures a longer charging time may be required.

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Charging the battery is also possible using a desktop charging station (accessory).

The instrument is equipped with a buffer battery (type CR 1632) to maintain the system data during an interruption in the power supply (e.g. when the battery is changed).

### File formats and file names

The images are saved according to the following pattern:  
XX\_YYYYY.ZZZ

XX: **IV** for infrared image with attached real image, **VI** for real image.

YYYYY: 5-digit consecutive number (is reset when resetting to factory settings, see Factory reset, page 33).

ZZZ (file extension): **BMT** for IR image with relevant real image, **BMP** for real image.

## 5 First steps

### 5.1. Commissioning

#### Contact the rechargeable battery

The rech. batt. is included separately and must be inserted.

- > Slide the rech. batt. completely into the battery shaft, until it clicks into place.



- The camera starts automatically.

#### Perform basic settings

- > Remove the protective film from the display.
- The start screen appears on the display.
- The **Landeseinstellungen (Country settings)** dialogue is opened.

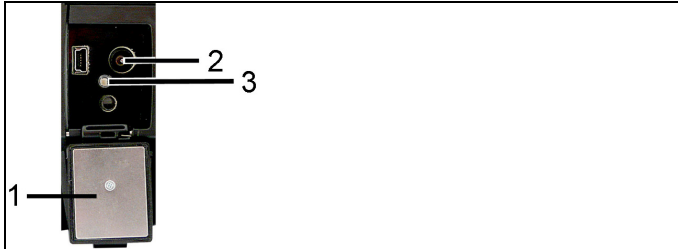
Instrument language (**Language**) and temperature unit (**Unit**) can be set.

1. Move **Joystick** up/down to select the desired option.
  - The selected option has an orange border.
2. Confirm the selection with **[OK]**.
  - The selected setting is highlighted orange (□). The arrows (◀▶) show that the setting can be changed.
3. Move **Joystick** up/down to change the setting.
4. Confirm the entry with **[OK]**.
5. Confirm the settings with **Übernehmen (Apply)**.
6. Press **[⏻]** to switch off the thermal imager.

### Initial charging of rechargeable battery

The camera is delivered with a partially charged battery.  
Completely charge the battery before use.

- > Connect the country-specific adapter required for the existing mains to the mains unit.



1. Open the cover of the interface terminal on the camera (1).
  2. Connect the mains unit to the mains socket (2).
  3. Connect the mains plug to a power socket.
- The camera starts automatically.

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**i** The rech. batt. can be recharged with the camera switched on or off. This does by no means influence the time required to charge the battery.

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- Charging of the rech. batt. is started.
- The charge status is indicated by the status LED (3):
  - LED flashes: Charging in process.
  - LED lights: Battery charged, charging process finished.
- 4. Charge the rech. batt. completely, then disconnect the device from the mains unit.
- After initial charging of the rech. batt. the camera is ready for use.

Charging the battery is also possible using a desktop charging station (accessory).



**Rechargeable battery care:**

- Do not fully exhaust rechargeable batteries.
  - Store rechargeable batteries only in charged condition and at low temperatures, but not below 0°C (best storage conditions with a charge level of 50-80%, at an ambient temperature of 10-20°C, recharge completely before use).
  - During longer breaks, you should discharge and recharge the batteries every 3-4 months. Trickle charging should not exceed 2 days
- 

## 5.2. Getting to know the product

### Adjusting the hand strap

1. Open the velcro fastening.
2. Loosen the strap.
3. Match the hand strap by loosening or fastening the strap.

### Insert the memory card

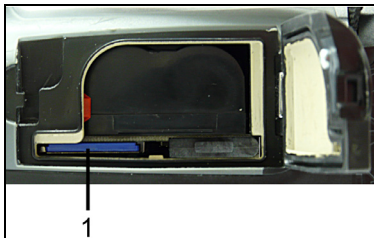
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SDHC-cards (SD High Capacity) are not supported.

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1. Open the rech. batt. cover on the underside of the camera.
2. Push the memory card (SD-card) into the card slot (1).



- > To remove the memory card: Press on the memory card to release the lock.

### Mount/remove infrared protection glass

Installation:

1. Attach the protection glass fastened to the red mounting ring to the lens and turn the mounting ring clockwise to the stop.
2. Remove the red mounting ring from the protection glass.



**Removal:**

1. Attach the red mounting ring to the protection glass.
2. Turn the mounting ring anticlockwise and remove the protection glass.

After mounting/removing the protection glass, activate or deactivate the **Protection glass** option, Optics..., page 30. If this option is set incorrectly, the stated measuring accuracy is not guaranteed.

**Changing lens**



Only lenses that were adjusted to the respective thermal imager can be used. The serial number on the lens must match the serial number of the instrument, see Optics..., page 30.

- > Switch instrument off before changing the lens.
- > To keep the lens from falling out: Hold the instrument with the lens pointing up.
  1. Turn lens lock ring anticlockwise to the stop (approx. 2 cm).
  2. Remove lens.
  3. Insert the new lens, thereby take care to align the white markings on lens and instrument to each other.
  4. Turn the lens lock ring clockwise to the stop.

Always store lenses not in use in the container designed for this in the case.

- > Turn the lens ring clockwise to the stop, place the lens in the container and close it.


**Switch the imager on/off**

1. Remove protection cap from the lens.
2. Press .
  - The start screen appears on the display. The type designation of the imager and the firmware version are shown.
  - The measurement view is opened after the warm-up period.
  - The imager performs an automatic zeroing approx. every 60 sec. This can be recognized by means of a "click". The image is frozen briefly when this occurs.
- > To switch off: Press .
  - The display goes out and the imager is switched off.

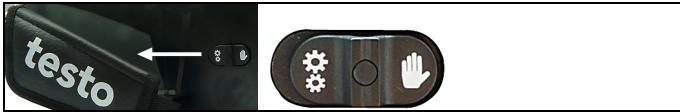
## Manually focusing the image

### NOTICE

#### Possible damage to the auto mechanism!

- > Only use **Rotating ring** with the motor focus switched off.
- > Slide **[Motor focus switch]** towards the lens (position: )
- > Turn **Rotating ring** of the lens until the image is in focus.

## Focussing with the motor focus



- > Slide the **[Motor focus switch]** towards the hand strap.



- > Move the **[Motor focus controller]**, until the image is correctly focussed.

## Recording (freeze/save) an image



- > Press **[Trigger]**.
- The image is frozen (still).

If the image is to be saved, press the speed selection key **[Folder]** to set the desired memory location, see Create new folder, page 25.

- The IR-image or the IR-/real image is displayed. Infrared image is saved, real image is saved in the same file as an attachment to the infrared image.

- Real image is shown: Real image is saved.
- > Save image: Press **[Trigger]** once again, alternatively: Press **[OK]**.  
or  
discard the image: Press **[ESC]**.

### Getting to know the quick select buttons

The quick select buttons can be assigned functions that are required often so that you can call them up directly.

Factory settings:

- Left quick select button: **[Scale]**.
- Right quick select button: **[Image type]**.

### Changing assignment of the quick select buttons

1. Move **Joystick** left or right to open the **Configure key** function list for the left or right quick select button.
2. Move **Joystick** up/down to select the desired function.

Function	Description
<b>Image type</b>	Change display mode: Infrared image, real image or infrared/real image. <sup>1</sup>
<b>Palette</b>	Change colour palette for the infrared image.
<b>Emissivity...</b>	Set emissivity and reflected temperature.
<b>Scale...</b>	Set scale limits.
<b>Adjustment</b>	Perform manual zero point calibration.

3. Press **[OK]** to activate the selected function.

### Navigating in the menu

1. Press **[OK]** button.
  - The **Menu** is opened.

---

<sup>1</sup> Real image and infrared lens have a different angle of view due to the spacial separation. The image areas therefore do not correspond completely (parallax error).

2. Select navigation/function:
  - Move **Joystick** up or down to select the menu item.
  - Press **[OK]** to confirm the selection. Or for menu items that are marked with an arrow (▶): Move **Joystick** to the right.
  - Move **Joystick** to the left to return to the previous menu level.
  - Press **[OK]** to select the function.
  - Press **[ESC]** to cancel the process and change to Measuring Mode.
- Depending on the selected menu item, press **[OK]** to perform a setting or open a submenu/dialogue, see Menu functions, page 21.

## 6 Using the product

### 6.1. Menu functions

#### 6.1.1. Measuring functions

##### 1-point measurement

The **1-point measurement** is the standard measuring function. If this is activated () , all available options can be selected via the quick select buttons.

> **[OK] | Measurement | [OK] | 1-point measurement | [OK].**

If the **1-point measurement** is activated, the crosshairs can be moved using the **Joystick** on frozen and saved images to read off the individual temperatures.

With saved images, the **1-point measurement** must be activated via the menu for the respective opened picture.

##### Cold-/Hotspot

**Cold-/Hotspot** shows the minimum and maximum temperature point on the display. If **Cold-/Hotspot** is activated () , the quick select buttons with the **Coldspot** and **Hotspot** functions can be permanently assigned and can no longer be changed.

With frozen images, the crosshairs can be moved and the min./max. point is visible. The min./max. point is not saved.

With saved images, **Cold-/Hotspot** must be activated for the respective opened image.

> **[OK] | Measurement | Cold-/Hotspot | [OK].**

> Select left or right **Coldspot** or **Hotspot** quick select button to activate/deactivate the respective function.

##### Min./Max. on area

**Min./Max. on area** shows the minimum and maximum temperature value within the area selection shown on the display. The area selection is neither scalable nor adjustable. If **Min./Max. on area** is activated () , the quick select buttons with the **Scale...** and **Emissivity...** functions can be permanently assigned and can no longer be changed.

With frozen images, the crosshairs can be moved. The Min./Max. on area values are saved together with every image.

With saved images, **Min./Max on area** must be activated for the respective opened image.

> **[OK] | Measurement | Min./Max. on area | [OK]**.






### Isotherm

**Isotherm** shows temperatures in a selectable temperature range in a uniform colour. If **Isotherm** is activated () , the quick select buttons with the **Isotherm** and **Emissivity...** functions can be permanently assigned and can no longer be changed.

With frozen images, the crosshairs can be moved.

> **[OK] | Measurement | Isotherm | [OK]**.

To set the isotherm colour and range:

1. **[Isotherm]**
  - The **Isotherm** dialogue is opened.
2. Move **Joystick** left/right to select the desired option: Isotherm colour () , lower limit value () , temperature range () or upper limit value ().
  - The selected option has an orange border ().
3. Move **Joystick** up/down to change the colour or the value(s).
  - Changes are applied immediately so that the effects on the display of the infrared image can be checked directly.
4. Close dialogue with **[OK]** or **[Esc]**.
  - The changes are saved.

### Moisture

The ambient temperature and humidity values entered manually are used to calculate the relative surface moisture for each pixel. The values are shown as a humidity image. The special colour palette indicates which areas are at risk of mould:

Colour	Surface moisture	Assessment
green	0...64%RH	non-critical
yellow/orange	65...80%RH	potentially critical
red	>80%RH	critical

If this function is enabled () , the shortcut buttons are permanently assigned the functions **Humidity** and **Emission level....**

The values for relative humidity and ambient temperature are shown at the top of the display.

1. **[OK] | Measurement | [OK] | Humidity | [OK]**.
  - The **Humidity** dialogue box is opened. The values for the ambient temperature and humidity can be entered.
2. Move **Joystick** up/down to select the desired option.
  - The selected option has an orange border.
3. Confirm the selection with **[OK]**.
  - The selected number is highlighted orange.
4. Move **Joystick** up/down to set the desired value. Move **Joystick** right/left to change between the numbers.
5. Confirm the entry with **[OK]**.
6. Confirm the settings with **Apply**.

### Solar

To detect and document failures in photovoltaic systems, the solar function can be selected. The sun's radiation intensity measured (with an external instrument) can be entered for documentation purposes. This value is saved with the IR- image.

If this function is enabled () , the shortcut buttons are permanently assigned the functions **Intensity** and **Hotspot**.

The radiation intensity value is shown at the top of the display.

1. **[OK] | Measurement functions | [OK] | Solar | [OK]**.
  - The **Solar** dialogue box is opened. The radiation intensity value can be entered.
2. Confirm selection with **[OK]**.
  - The selected number is highlighted orange.
3. Move **Joystick** up/down to set the required value. Move **Joystick** right/left to switch between the numbers.
4. Confirm entry with **[OK]**.
5. Confirm settings with **[Apply]**.

### Measuring range

The measuring range can be set to adapt to the respective area of application.

1. **[OK] | Measurement | [OK] | Measurement range**.
2. Select the desired temperature range and confirm with **[OK]**.

**i** Depending on the scene temperature, the measuring range may be undershot or exceeded. In this case, --- or +++ is shown instead of the readings.

> If this occurs, change the measuring range.

---

## 6.1.2. Image gallery

### Show images...

1. [OK] | Image gallery | [OK] | Show images... | [OK].

- The **Folder** dialogue is opened.
- The folder name of the opened folder is displayed in the header. **ROOT** designates the base folder (top level).
- The saved data is shown as preview images (image overview). The image saved last is shown directly behind the folders.

Optional:

> Press the right [Page scroll] quick select button to change to page scroll.

In page scroll, you can navigate in groups of 3 x 3 images/folders (page by page). To select/open an image/folder, you must change back into **Single Image**.

2. Navigate:

- In page scroll: Move **Joystick** up/down to change between the pages.
- In single image: Move **Joystick** up/down/left/right to select a preview image/a folder (orange border).
- Open selected folder with [OK].

3. In single image: Press [OK] to open selected preview image. Press **Gallery** to return to the image overview.



**Delete image**

1. In single image: Select image (orange border) or select and open image.
2. Press **Delete** to delete the selected or open image.
  - A confirmation request appears as to whether the image should really be deleted.
3. Confirm with **[OK]** or cancel process with **[Esc]**.

**Create new folder**

1. In the **Folder** dialogue: Select **New Folder** with the joystick and confirm with **[OK]**.
  - The **Folder name** dialogue is opened.
2. Name folders: Use the **Joystick** to select the desired letters and confirm with **[OK]**.

The folder name can consist of up to 8 characters. Incorrect entries can be deleted using the right **[◀C]** quick select button.

3. Press left **[Create Folder]** quick select button to create the folder.






**Erase all**

1. **[OK] | Image gallery | [OK] | Erase all... | [OK]**.
  - A confirmation request appears as to whether all files on the memory card should be deleted. Folders are not deleted.
2. Confirm erase with **[OK]** or cancel process with **[Esc]**.

**6.1.3. Scale...****Set scale limits**

You can choose between auto-scaling (continuous, automatic adjustment to the current min./max. values) and manual scaling. The scale limits can be set within the activated measuring range (see Measuring range, page 23). All temperatures that undershoot or exceed the limit value are shown in the colour of the limit value (depending on the selected colour palette, see Palette, page 29). Temperature ranges that are not relevant can thus be hidden.

1. **[OK] | Scale... | [OK]**.
  - The **Set scale** dialogue is opened.


2. Move **Joystick** left/right to select the desired option: Auto-scaling (  ), min. value (  ), temperature range (  ) or max. value (  )
  - The selected option has an orange border (  ).
3. With the selection of min. value, temperature range or max. value: Move **Joystick** up/down to change the value(s).
  - Changes are applied immediately so that the effects on the display of the infrared image can be checked directly.
4. Close dialogue with **[OK]** or **[Esc]**.
  - The changes are saved.

## 6.1.4. Display...

### Select display options

The presentation can be adapted by means of showing/hiding the following elements: Crosshairs, temperature scale and quick select buttons.

Hidden function keys can be shown again by pressing a quick select button: The first press of the button shows the function keys again. To trigger a function, the button must be pressed again.

1. **[OK]** | **Display...** | **[OK]**.
  - The **Display options** dialogue is opened.
2. Move **Joystick** up/down to select the desired option.
  - The selected option has an orange border (  ).
3. Activate (  ) or deactivate (  ) option with **[OK]**.
4. Confirm settings with the **[Apply]** quick select button.  
**or**  
Discard settings with **[Esc]**.

## 6.1.5. Emissivity...

### Emissivity

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 are only somewhat suited for infrared measurement. You must anticipate highly inaccurate measurements. A remedy for this is coatings that increase the emissivity, e.g. paint or emission adhesive (art. no. 0554 0051) which must be applied to the object being measured.

The following table gives typical emissivities of important materials. These values can be used as orientation with the user-defined settings.

<b>Material (material temperature)</b>	<b>Emissivity</b>
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, oxidized (130 °C)	0.76
Plastics: PE, PP, PVC (20 °C)	0.94
Brass, oxidized (200 °C)	0.61
Paper (20 °C)	0.97
Porcelain (20 °C)	0.92
Black paint, matt (80 °C)	0.97

Material (material temperature)	Emissivity
Steel, heat-treated surface (200 °C)	0.52
Steel, oxidized (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

Using this offset factor, the reflection is calculated out due to the low emissivity and the accuracy of the temperature measurement with infrared instruments is improved. In most cases, the reflected temperature is identical to the ambient air temperature. Only when objects with strong emissions with much higher temperatures (such as ovens or machines) are in the proximity of the object being measured should the radiation temperature of these heat sources be determined and used (e.g. using a globe thermometer). The reflected temperature has only little effect on objects with high emissivity.


### Set emissivity/reflected temperature



You can choose between a user-defined emissivity and 8 materials with recorded emissivities.

The reflected temperature can be set individually.

**i** The designation of the materials in the selection list is configured during commissioning of the thermal imager in the language selected by the user. A translation does not occur in the event of subsequent changeover of the language in the instrument.

Using the PC software, other materials can be imported into the instrument from an existing list. The language for the materials here depends on the operating system language of the PC.

1. **[OK] | Emissivity... | [OK]**.
  - The **Emissivity** dialogue is opened.
2. Move **Joystick** up/down to select the desired material.
  - The selected material is highlighted orange (  ). The corresponding emissivity is shown to the right next to the material.

3. Move **Joystick** to the right to switch to the setting of the emissivity (only available when selecting **User defined**) or to **Reflected temp.**
  - The selected option has an orange border (.
4. Confirm the selection with **[OK]**.
  - The selected number is highlighted orange (.
5. Move **Joystick** up/down to set the desired value. Move **Joystick** right/left to change between the numbers.
6. Confirm the entry with **[OK]**.
7. Confirm the settings with **Apply**.
  - The changes are saved.
  - The selected emissivity (**€**) is shown at the bottom right in the display in measurement view.

### 6.1.6. Palette

#### Change colour palette for the infrared image



You can choose between 4 existing palettes. The currently activated option is marked with a tick (✓).

1. **[OK] | Palette | [OK]**.
2. Move **Joystick** up/down to select the desired option.
3. Confirm the selection with **[OK]**.

### 6.1.7. Configuration

#### Time/date...



Time and date can be set. Time and date format are automatically set based on the selected instrument language.

1. **[OK] | Configuration... | [OK] | Time/date... | [OK]**.
  - The **Set time/date** dialogue is opened.
2. Move **Joystick** up/down to select the desired option.
  - The selected option has an orange border (.
3. Confirm the selection with **[OK]**.
  - The selected number is highlighted orange (.
4. Move **Joystick** up/down to set the value. Move **Joystick** right/left to change between the numbers.

5. Confirm the entry with **[OK]**.
6. Confirm the settings with **Apply**.

### Country settings...

Instrument language and temperature unit can be set.

1. **[OK]** | **Configuration...** | **[OK]** | **Country settings...** | **[OK]**.
  - The **Country settings** dialogue is opened.
2. Move **Joystick** up/down to select the desired option.
  - The selected option has an orange border (.
3. Confirm the selection with **[OK]**.
  - The selected setting is highlighted orange (.
4. Move **Joystick** up/down to change the setting.
5. Confirm the entry with **[OK]**.
6. Confirm the settings with **Apply**.




### Optics...

The lenses adjusted to the instrument are shown. Only the lenses that are shown may be used.

The high-temperature filter registered in the instrument is shown. With use of another high-temperature filter, the specified accuracy is not ensured.

- > **[OK]** | **Configuration...** | **[OK]** | **Optics...** | **[OK]**.

Using the **Protection glass** option, you can set whether an infrared protection glass is used or not. Ensure the correct setting to prevent corruption of the measurement results.

- > Press **[OK]** to activate () or deactivate () the **Protection glass** option.
- With the option activated, the protection glass symbol () is shown in the bottom right of the display.

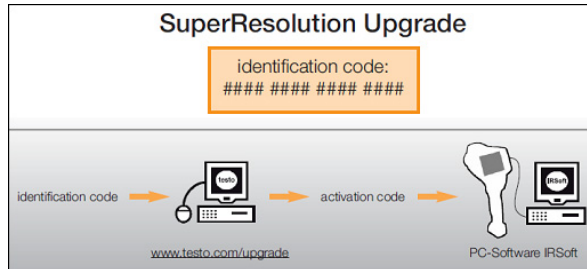
### SuperResolution (optional)

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 a higher-resolution image with the aid of the PC software (no interpolation). The pixel count increases by a factor of 4, while the geometric resolution (IFOV) is improved by a factor of 1.6.

To use the function, the imager must be hand-held (no tripod).

**i** 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 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.

Activate/deactivate function:

> **[OK]** | **Configuration...** | **[OK]** | **SuperResolution** | **[OK]**.

When you save an image, an information window with the image file name is displayed. If SuperResolution is activated () , **SuperResolution** is also displayed after the file name.

### Power-save options...

Options can be set to extend the rechargeable battery running time.

1. **[OK]** | **Configuration...** | **[OK]** | **Power-save options...** | **[OK]**.
  - The **Power-save options** dialogue is opened.
  - 2. Move **Joystick** up/down to select the desired option.
  - The selected option has an orange border () .
  - 3. Confirm the selection with **[OK]**.
  - **LCD backlight**: The selected setting is highlighted orange and can be changed () .
- > Move **Joystick** up/down to change the setting. Confirm the entry with **[OK]**.

- **Switch off LCD or Power off imager:** The selected option can be activated or deactivated.
- > Press **[OK]** to activate (  ) or deactivate (  ) the function.
  - With the option activated, the length of time until shut-down can be set.
  - > Move **Joystick** to the right and press **[OK]**. Move **Joystick** up/down to change the setting. Confirm the entry with **[OK]**.
- 4. Confirm the settings with **[Apply]**.

### **Audio settings...**

The volume of the audio playback and recording can be set.

1. **[OK] | Configuration... | [OK] | Audio settings... | [OK]**.
  - The **Audio settings...** dialogue is opened.
2. Move **Joystick** up/down to select the desired option.
  - The selected option has an orange border (  ).
3. Move **Joystick** left/right to change the setting.
4. Confirm the settings with **[Apply]**.

### **Format...**

The memory card can be formatted. During the formatting, all saved data on the SD card is lost.

1. **[OK] | Configuration... | [OK] | Format... | [OK]**.
  - A confirmation request appears as to whether the memory card should really be formatted.
2. Confirm with **[OK]** or cancel process with **[Esc]**.



### Factory reset

The instrument settings can be reset to the factory settings. Time/date and country settings are not reset.

Please note: After a factory reset, the numbering of images begins anew. When saving images, images that have already been saved and have the same number are overwritten!

> Transfer all saved images onto a PC before performing a reset to prevent possible overwriting.

1. **[OK] | Configuration... | [OK] | Factory settings... | [OK]**.
- A confirmation request appears as to whether the instrument should really be reset to the factory settings.
2. Confirm reset with **[OK]** or cancel process with **[Esc]**.

## 6.2. Measuring

### Important framework conditions

Please observe the following framework conditions in order to obtain significant measurement results.

Humidity measurement:

- Pivot the separate humidity measuring instrument slightly to shorten the adjustment time. Avoid sources of interference (e.g. breathed air).

Building thermography, investigating the building shell:

- Considerable temperature difference between inside and outside required (ideal: > 15 °C/> 27 °F).
- Consistent weather conditions, no intensive sunlight, no precipitation, no strong wind.

To ensure the highest level of accuracy, the imager requires an equalization period of 5 minutes after being switched on.

### Important settings

Before recording an image, check whether the protection glass option is set correctly to prevent corruption of the measurement results, Optics..., page 30.

Before saving an image, ensure that it is focused correctly (in focus), see Focussing with the motor focus, page 18 or Manually focusing the image, page 18. Images that are not in focus cannot be corrected retroactively!

To obtain precise readings, the emissivity and reflected temperature must be set correctly, see Set emissivity/reflected temperature, page 28. A subsequent adjustment is possible via the PC software as required.

With an activated auto scaling, the colour scale is continuously adapted to the min./max. values of the current measurement image. The colour that is to be assigned to a specific temperature thereby changes constantly. To be able to compare multiple images by means of the colouring, the scaling must be manually set to fixed values, see Scale... page 25, or must be subsequently adjusted to uniform values using the PC software.

### Select the storage location (folder):

1. While an image is frozen (fixed image): Press the left **[Folder]** quick select button.

- The **Folder** dialogue is opened.

To create a new folder, see Create new folder, page 25.

2. Select the desired folder with the joystick and open with **[OK]**.

- The folder name of the opened folder is displayed in the header.

3. Press left **[Apply]** quick select button to select the opened folder.

### Recording/playing audio comments

It is only possible to record an audio comment for frozen images. It is possible to play audio comments with frozen and saved pictures.

1. While an image is frozen (fixed image): Press the right **[Audio]** quick select button.

- The Audio dialogue is opened.

2. Select the desired function with the joystick and confirm with **[OK]**.

- Record audio comments:

1. Start recording: Press **[RECORD]**.







2. Stop recording: Press **[STOP]**.

> Continue recording: Press **[RECORD]** again.

- Play recording:

1. Select beginning of recording: Press **[STOP]** again.

2. Start playback: Press **[PLAY]**.

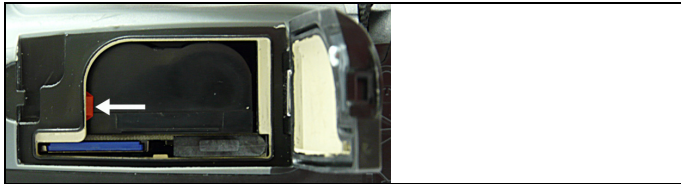
3. Stop playback: Press [].
  - > Continue playback: Press [] again.
- Change audio comment:
  1. Selection position from which the recording should be overwritten: Begin playback with [] and stop at the desired point [].
  2. Use [] to overwrite the recording as of the desired point.
- Delete recording:
  - > Press [].
    - The complete recording is deleted.
- Exit Audio dialogue:
  - > Press **[ESC]**.

## 7 Maintaining the product

### Changing the rechargeable battery

To prevent losing the instrument settings: Only change the rechargeable battery when a buffer battery is inserted in the instrument or the mains unit is connected.

1. Unlock the battery compartment cover.
2. Press the unlocking button.



- The rechargeable battery is released and sticks out a little from the rechargeable battery slot.
3. Pull the rech. batt. completely out of the batty shaft.
  4. Slide the rech. batt. completely into the battery shaft, until it clicks into place.
- The camera starts automatically.

### Clean thermal imager

- > If the housing of the thermal imager is dirty, clean it with a damp cloth. Do not use any aggressive cleaning agents or solvents! Weak household cleaning agents and soap suds may be used.

### Cleaning lens/infrared protection glass

- > Large dust particles can be removed with a clean optical cleaning brush (available in specialized photography shops).
- > Use a lens cleaning cloth for slight contamination. Do not use rubbing alcohol!

### Changing the buffer battery

To prevent losing the instrument settings: Only change the buffer battery when a charged rechargeable battery is inserted or the mains unit is connected.

1. Open the rech. batt. cover on the underside of the camera.
2. Pull the battery holder together with the buffer battery out of the battery shaft.
3. Remove the exhausted battery from the holder and insert new battery (type CR 1632).

#### NOTICE

##### **Incorrectly inserted batteries can damage the product!**

- > When inserting the batteries, observe the polarity (label on inside of cover).

4. Push the battery holder into the battery shaft.

## 8 Tips and assistance

### 8.1. Questions and answers

Question	Possible causes/solution
Message <b>Backup battery empty or not present</b> is shown.	<ol style="list-style-type: none"> <li>1. Confirm the message with <b>[OK]</b>.</li> <li>2. Change buffer battery, see Changing the buffer battery, page 37.</li> </ol>
Error <b>No memory card inserted!</b> is shown.	<p>Memory card defective or not inserted.</p> <ol style="list-style-type: none"> <li>1. Confirm the message with <b>[OK]</b>.</li> <li>2. Check or insert memory card.</li> </ol>
Error <b>Memory card full!</b> is shown.	<p>Insufficient memory present.</p> <ol style="list-style-type: none"> <li>1. Confirm the message with <b>[OK]</b>.</li> <li>2. Insert new memory card.</li> </ol>
Error <b>No lens/wrong lens!</b> is shown.	<ol style="list-style-type: none"> <li>1. Switch off thermal imager.</li> <li>2. Check lens</li> </ol> <p>&gt; Change lens if necessary.</p>
Message <b>Charging not possible!</b> is shown.	<p>Ambient temperature is outside the permissible range for charging the battery.</p> <ol style="list-style-type: none"> <li>1. Confirm the message with <b>[OK]</b>.</li> <li>2. Keep to the permissible ambient temperature.</li> </ol>
Error <b>Permissible instrument temperature exceeded!</b> is shown.	<ol style="list-style-type: none"> <li>1. Switch off thermal imager.</li> <li>2. Let instrument cool off and keep to the permissible ambient temperature.</li> </ol>
<b>---</b> or <b>+++</b> is shown instead of the reading.	<p>Reading is outside of the measuring range.</p> <p>&gt; Change measuring range.</p>
<b>xxx</b> is shown instead of the reading.	<p>Reading cannot be calculated.</p> <p>&gt; Check parameter settings for plausibility.</p>

If we could not answer your question, please contact your dealer or Testo Customer Service. For contact details see the rear side of this document or the web page [www.testo.com/service-contact](http://www.testo.com/service-contact)

## 8.2. Accessories and spare parts

Description	Article no.
Lens protection glass	0554 8805
Additional battery	0554 8852
Fast battery charger	0554 8851
Aluminium tripod	0554 8804
Mains unit	0554 8808
SD card	0554 8803
USB cable	0449 0047
Adhesive emission tape	0554 0051
Automotive charging adapter	0554 8817
Retrofit telephoto lens	Testo Service
ISO calibration certificate for thermal imager:	
<ul style="list-style-type: none"> <li>• Calibration points 0 °C, 25 °C, 50 °C in measuring range -20 °C...100 °C</li> </ul>	0520 0489
<ul style="list-style-type: none"> <li>• Calibration points at 0 °C, 100 °C, 200 °C in measuring range 0 °C...280 °C</li> </ul>	0520 0490
<ul style="list-style-type: none"> <li>• Freely selectable calibration points in the range -18 °C...250 °C</li> </ul>	0520 0495

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

