



testo 865s thermal imager

Instruction manual



Analysis software
testo IRSofT

Use the testo IRSofT software to analyze your thermal images extensively and in detail, and to create professional reports. You can download the software free of charge and licence-free via the following link:



testo Thermography App

Use the testo Thermography App to transfer thermal images live to your smartphone/tablet and create quick analyses and simple reports directly on site.

Download the app free of charge for Android or iOS from the app store:

testo Thermography
App



Contents

1	Safety and disposal.....	5
1.1	About this document.....	5
1.2	Security	5
1.3	Disposal	6
2	Technical data	7
3	Description of the instrument	10
3.1	Use.....	10
3.2	Instrument / operating elements overview.....	10
3.3	Displays overview.....	11
3.4	Power supply.....	12
4	Operation	13
4.1	Commissioning.....	13
4.2	Switching instrument on and off	13
4.3	Getting to know the menu	14
4.4	Quick select button.....	15
5	Performing the measurement.....	17
5.1	Setting measuring functions	18
5.1.1	Activating/disabling Pixel mark.....	18
5.1.2	Activating the differential temperature	18
5.2	Saving an image.....	20
5.3	Image gallery.....	20
5.4	Setting the scale.....	22
5.5	Setting emissivity and reflected temperature.....	24
5.5.1	Selecting the emissivity	26
5.5.2	Customizing the emissivity	26
5.5.3	Setting RTC.....	26
5.6	Selecting the colour palette	26
5.7	Configuration	26
5.7.1.1	Settings	26
5.7.1.2	SuperResolution.....	27
5.7.1.3	Save JPEG.....	28
5.7.2	Configure key	28
5.7.2.1	Ambient conditions	28
5.7.2.2	Info	29

Contents

5.7.3	Certificates.....	29
5.7.3.1	Fullscreen mode	29
5.7.3.2	Reset options.....	29
6	Maintenance.....	31
6.1	Charging the rechargeable battery	31
6.2	Changing the rechargeable battery.....	31
6.3	Cleaning the instrument.....	33
6.4	Firmware update.....	34
6.4.1	Performing an update using IRSOft.....	34
6.4.1.1	Preparing the camera	34
6.4.1.2	Performing an update	34
6.4.2	Performing an update with the camera	35
6.4.2.1	Preparing the camera	35
6.4.2.2	Performing an update	35
7	Tips and assistance.....	36
7.1	Questions and answers	36
7.2	Accessories and spare parts.....	36
8	Authorisations and certification.....	37

1 Safety and disposal

1.1 About this document

- The instruction manual is an integral part of the instrument.
- Keep this documentation to hand so that you can refer to it when necessary.
- Always use the complete original instruction manual.
- Please read this instruction manual through carefully and familiarize yourself with the product before putting it to use.
- Hand this instruction manual on to any 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 Security

General safety instructions

- Only operate the product properly, for its intended purpose, and within the parameters specified in the technical data.
- Do not apply any force.
- Do not operate the instrument if there are signs of damage on the housing, mains unit or connected cables.
- Dangers may also arise from objects to be measured or the measuring environment. Always comply with the locally valid safety regulations when carrying out measurements.
- 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 when doing the work.
- Use only original spare parts from Testo.
- Only use the original mains unit 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 650 °C). This can cause 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 immediately if it is not functioning properly or if it shows signs of superheating. 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
 WARNING	Indicates possible serious injury.
 CAUTION	Indicates possible minor injury.
ATTENTION	Indicates possible damage to equipment.

1.3 Disposal

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

2 Technical data

Infrared image output

Feature	Values
Infrared resolution	160 x 120
Thermal sensitivity (NETD)	< 100 mK
Field of view (FOV) / min. focusing distance	31° x 23° / <0.5 m
Geometric resolution (IFOV)	3.4 mrad
SuperResolution	320 x 240 pixels / 2.1 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	- Infrared image
Colour palettes	4 options: - Grey - Cold-hot - Iron - Rainbow HC

Measurement

Feature	Values
Measuring range	--20 to +280°C
Accuracy	--30 to -20 °C: ±3 °C, otherwise ±2 °C, ±2 % of measured value
Emissivity/reflected temperature adjustment	0.01 to 1/manual
Analysis functions	- Center spot - Hot/cold spot detection - Delta T
IFOV warner	Included in the scope of delivery
testo ScaleAssist	Included in the scope of delivery

Imager features

Feature	Values
Fullscreen mode	Included in the scope of delivery
Save JPEG	Included in the scope of delivery
Video streaming	via USB
Interfaces	USB 2.0 micro B

Image storage

Feature	Values
File format	- .jpg - .bmt - Can export as .bmp .jpg .png .csv .xls
Memory capacity	Internal mass storage > 1000 images (without SuperResolution)

Power supply

Feature	Values
Battery type	Li-Ion rechargeable battery 3500 mAh / 3.63 V
Operating time	4.0 h @ 20 °C
Mains operation	Yes
Charging option	In instrument/in charging station (optional)
Charging time in the instrument	Approx. 3 h with 2A mains unit supplied
Charging time in charging station	Approx. 5 h via mains unit
USB interface	5V  1.8 A*

*  Direct current

Ambient conditions

Feature	Values
Operating temperature	-15 to +50°C
Storage temperature	-30 to +60°C
Humidity	20 - 80 %RH, not condensing
Housing protection class	IP54* according to IEC 60529
Vibration	2 g
Max. Operating height	2000 m

* The product offers IP54 protection, but is not suitable for permanent outdoor use.

Standards, tests

Feature	Values
EMC	2014/30/EU
RED	2014/53/EU



3 Description of the instrument

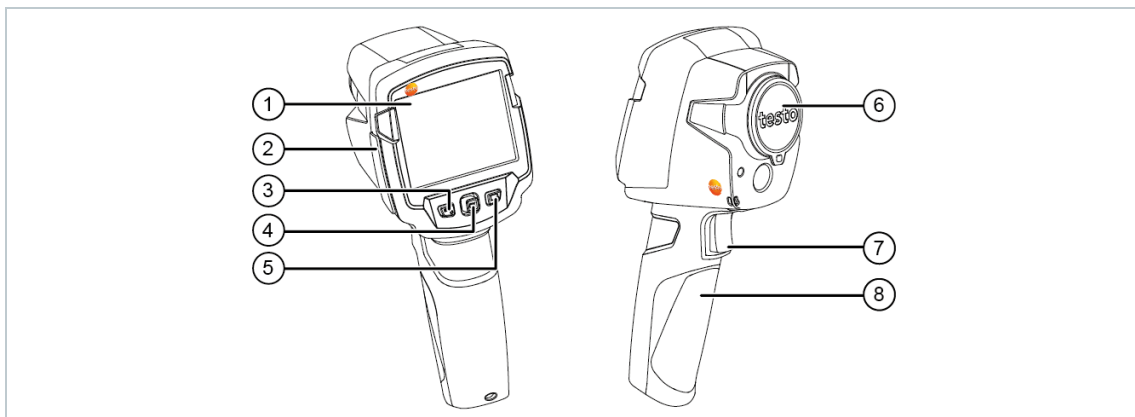
3.1 Use

The instrument 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

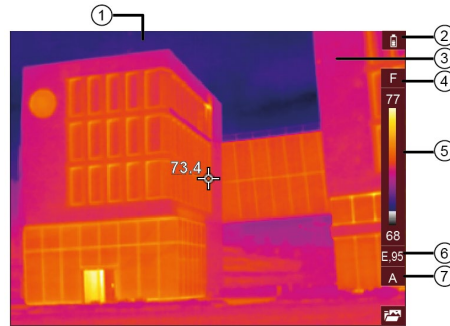
3.2 Instrument / operating elements overview



Element	Function
1 Display	Displays infrared images, menus and functions
2 Interface terminal	Contains micro USB interface for power supply and connection to the computer
3 -  key - Esc key	- Switch camera on and off - Cancel action
4 - OK key - Joystick	- Open menu, select function, confirm setting - Navigate within the menu, highlight 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

Element	Function
7 Trigger	Saves the displayed image
8 Battery compartment	Contains the rechargeable battery

3.3 Displays overview



Element	Function
1 Status bar	In the status bar, values are displayed depending on the setting.
2 	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%  : Mains operation, battery is charging
3 Image display	IR image display.
4 °C or °F	Unit set for reading and scale displays
5 Scale	- Temperature unit - 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)
6 E ...	Emissivity set
7 A, M or S	A - automatic scale adjustment M - manual scale adjustment S - ScaleAssist is enabled

3.4 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). Operation is possible with the mains unit connected.

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

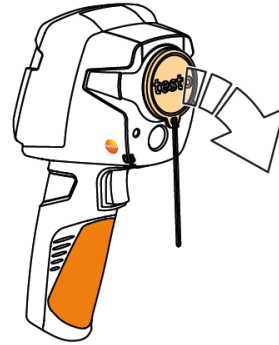
4.1 Commissioning

Please refer to the commissioning instructions supplied for testo 865s, 868s, 871s, 872s (0973 8723).

4.2 Switching instrument on and off

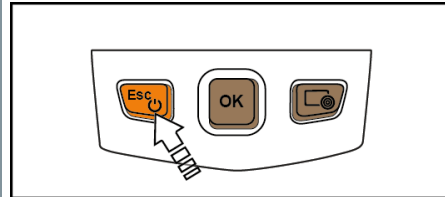
Switching on the camera

- 1 - Remove protective cap from the lens.



- 2 - Press .

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

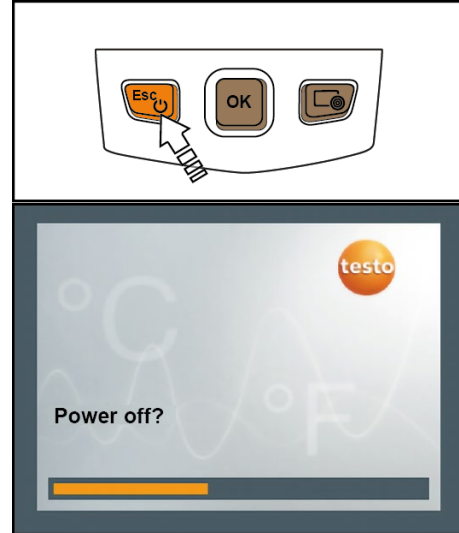


To ensure measuring accuracy, the camera performs automatic zeroing approx. every 60 s. A “click” is heard when this happens. The image freezes briefly when this occurs. Zeroing is carried out more frequently during the camera warm-up period (takes approx. 90 seconds).

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

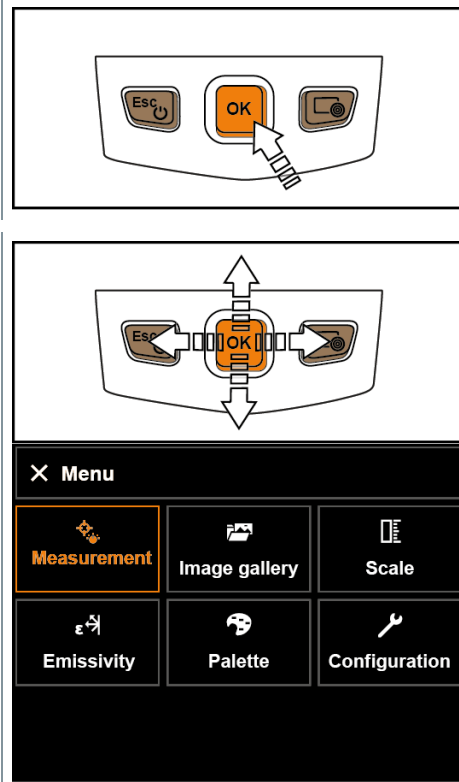
- 1 - Press and hold down  until the progress bar is complete.



- ▶ 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 to highlight a function (orange border).
- 3 - Press **OK** to select the function.



- 3.1 - Return to the main menu: Select **Menu** and move the joystick to the left or press **Esc**.

4.4 Quick select button

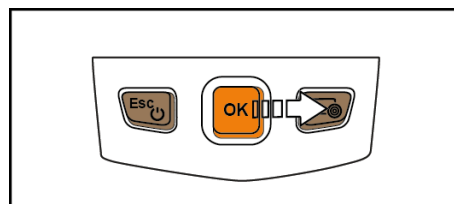
The quick select button is another navigation option that you can use to call up certain functions simply at the touch of a button.

Quick select menu items

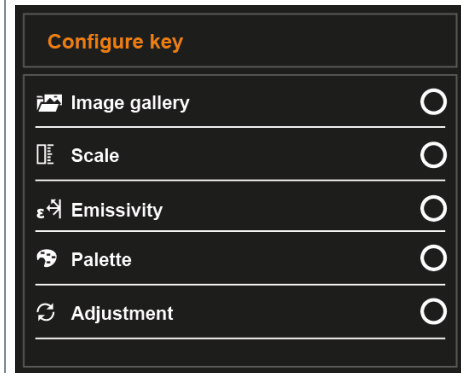
Menu item	Function
 Image gallery	Opens an overview of saved images.
 Scale This function is only available if the Image type is set to infrared	Set scale limits.
 Emissivity This function is only available if the Image type is set to infrared	Set emissivity (E) and reflected temperature (RTC).
 Palette	Toggles the palette selection.
 Adjustment This function is only available if the Image type is set to infrared	Carries out manual zeroing.

Changing assignment of quick select button

- 1 - Move the joystick to the right.
 - ▶ The **Configure key** selection menu appears.
 - ▶ The activated function is marked with a dot (●).
- 2 - Move the joystick up/down until the orange box appears around the required menu item.
 - Press **OK**.

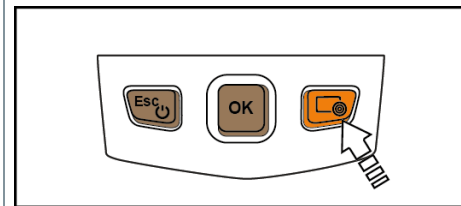


- ▶ The quick select button is assigned to the selected menu item.
- ▶ The icon for the selected function is displayed bottom right.



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 > 650 °C.**
-

Ideal framework conditions

- Building thermography, investigating the building shell:
Considerable temperature difference between inside and outside required (ideal: $\geq 15\text{ °C}$ / $\geq 27\text{ °F}$).
- 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 Setting measuring functions

- 1 - Open the **Measurement settings** submenu.
 - ▶ The submenu with the measurement settings opens:
 - **Pixel mark:**
 - **Center spot:** the temperature measuring point in the centre of the image is marked with white crosshairs and the value is displayed.
 - **Coldspot, Hotspot:** the lowest or highest temperature measuring point is marked with blue or red crosshairs and the value is displayed.
 - **Show all:** All measuring points are displayed.
 - **Differential temperature:** identifies the difference between two temperatures.
 - **IFOV:** the IFOV warner shows what can be measured accurately from a specific distance.
- 2 - Move the **joystick** up/down to select the required function and then press **OK**.

5.1.1 Activating/disabling Pixel mark

- 1 - Open **Menu**.
- 2 - Select **Measurement settings**.
 - ▶ The **Measurement settings** menu opens.
- 3 - Select **Pixel mark**.
- 4 - Select **Center spot** and press **OK** to enable (✓) or disable the function.
 - Select **Hotspot / Coldspot** and press **OK** to enable (✓) or disable the function.
 - Select **Show all** and press **OK** to activate all ranges.

5.1.2 Activating the differential temperature

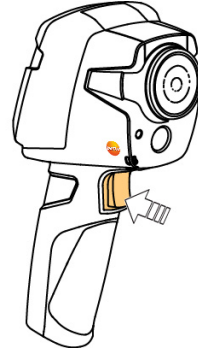
Differential temperature enables the temperatures between two measuring points to be calculated.

- 1 - Open **Menu**.

- 2 - Select **Measurement settings**.
- ▶ The **Measurement settings** menu opens.
- 3 - Select **Differential temperature** and press **OK**.
- 4 - Select **Active** and press **OK**.
- 5 - Select which differential temperature is to be calculated (P A vs. P B, P A vs. Probe, P A vs. Value, P A vs. RTC).
- 5.1 - P A vs. P B selection:
 - Move the **joystick** to the right → select measuring point **1** → press **OK** → move the measuring point to the live image using the **joystick** → press **OK**.
 - Move the **joystick** to the right → select measuring point **2** → press **OK** → move the measuring point to the live image using the **joystick** → press **OK**.
- 5.2 - P A vs. Probe selection:
 - Move the **joystick** to the right → select measuring point **1** → press **OK** → move the measuring point to the live image using the **joystick** → press **OK**.
- 5.3 - P A vs. Value selection:
 - Move the **joystick** to the right → select measuring point **1** → press **OK** → move the measuring point to the live image using the **joystick** → press **OK**.
 - Move the **joystick** to the right, set the value manually.
- 5.4 - P A vs. RTC selection:
 - Move the **joystick** to the right → select measuring point **1** → press **OK** → move the measuring point to the live image using the **joystick** → press **OK**.
 - Move the **joystick** to the right, set the RTC value in the **Emissivity** menu, see the section "Setting RTC".
- ▶ The differential temperature is shown in the top centre of the display.
- 6 - End measurement: Select **Active** and press **OK** (no check mark).

5.2 Saving an image

- 1 - Press **Trigger**.
 - ▶ The image is automatically saved.
 - ▶ An infrared image is saved.

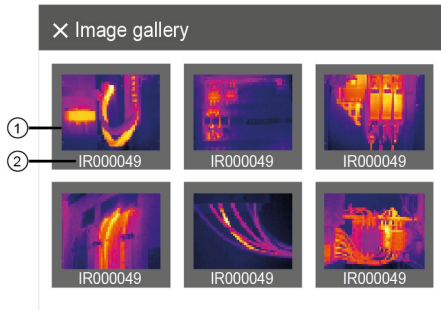


If a higher resolution is required: in the menu, select **Configuration** → **SuperResolution** for four times as many readings.

5.3 Image gallery

Saved images can be displayed, analysed or deleted.

File names



	Designation	Explanation
1	-	Infrared image preview
2	IR 000000 SR	Infrared image Consecutive number Images captured with SuperResolution



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

Displaying a saved image

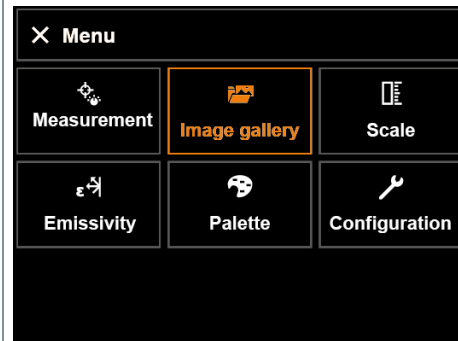
Saved images can be viewed and analyzed in the image gallery.



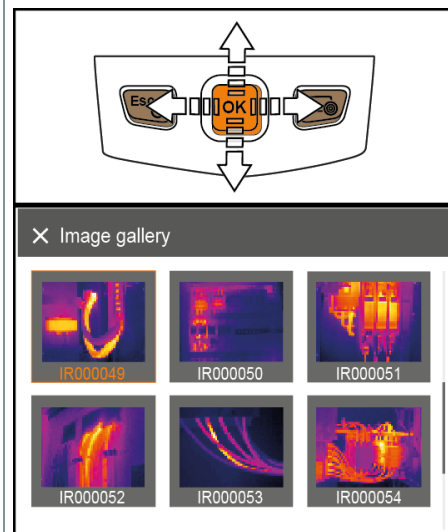
When SuperResolution is enabled, 2 images are saved in the image gallery (an **IR** image, and an **SR** image). The high-resolution SuperResolution image is saved in the background. In the status bar, the number of SuperResolution images to be saved is displayed (for

example: **SR(1)**). A maximum 5 SuperResolution images can be processed simultaneously.

- 1 - Select **Image gallery** function.
- ▶ All saved images are displayed in the form of an infrared image preview.



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



- 3 - Press **OK** to open the selected image.
- ▶ The image is displayed.

Analyzing an image



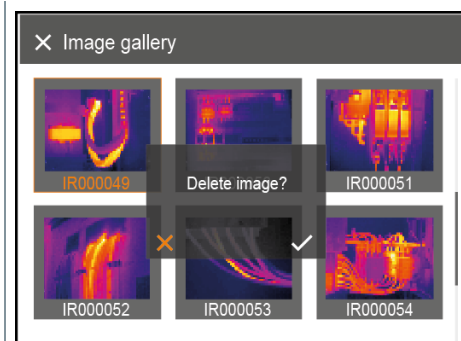
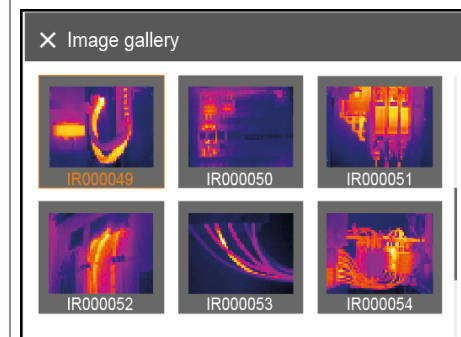
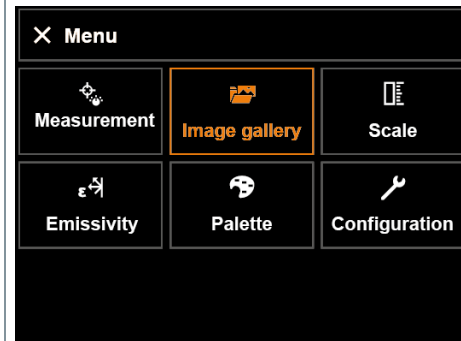
If an image is saved with SuperResolution, the image gallery contains an (IR) image and a high-resolution image (SR). The images show the same image section. They can be displayed and analyzed in the image gallery.

The measurement functions **Center spot**, **Hotspot**, **Coldspot** and **Differential temperature** can be used to analyze saved images. 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.

Delete image

- 1 - Select **Image gallery** function.
 - ▶ All saved images are displayed in the form of an infrared image 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 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: **A** automatic scaling, **M** manual scaling and **S** OptiScale (ScaleAssist).



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).

Scaling influences the way the infrared image is shown on the display but does not affect the recorded measuring values.

With ScaleAssist, a standardized scale is set depending on the inside and outside temperature.

Setting automatic scaling

- 1 - Select the Scale function.
- 2 - Move the joystick up/down until Auto is selected.
- 3 - Select

5 Performing the measurement

- 1 - Select the **Scale** function.
- 2 - Press **OK**.
- 3 - In the mode menu, move the **joystick** up/down until **ScaleAssist** is selected.
- 4 - Move the **joystick** to the right, select **Temp. In** (indoor temperature).
- Move the **joystick** up/down to set the value.
- 5 - Move the **joystick** to the right, select **Temp. Out** (outdoor temperature).
- Move the **joystick** up/down to set the value.
- 5 - If necessary, Select **X**, press **OK** to go back to the mode menu.
- 7 - Activate **ScaleAssist**: Select

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.

5.5.1 Selecting the emissivity

- 1 - Select the **Emissivity** function.
- 2 - Move the **joystick** up/down to select the required substance or material (with fixed emissivity).
- 3 - Select

- 1 - Select **Configuration** → **Settings** → **Country settings**.
- 2 - Move the **joystick** up/down to select the required language 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 **Configuration** → **Settings** → **Set time/date**.
- 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, select

- The objects to be imaged do not move.
 - 1 - Select **Menu** → **Configuration** → **SuperResolution**.
 - 2 - Press **OK** to enable or disable the function.

5.7.1.3 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 IRSoft PC software.

- 1 - Select **Menu** → **Configuration** → **Save JPEG**.
- 2 - Press **OK**.
- 3 - Move the **joystick** up/down until **On/Off** is selected.
- 4 - Add a date/time stamp to a JPEG file if required. Turn function on or off for this.
- 5 - Select

- 3 | - Move the **joystick** to the right.
- 4 | - Move the **joystick** up/down to set the humidity value.
- 5 - **Select**

2 - Select the **Reset image counter** function.

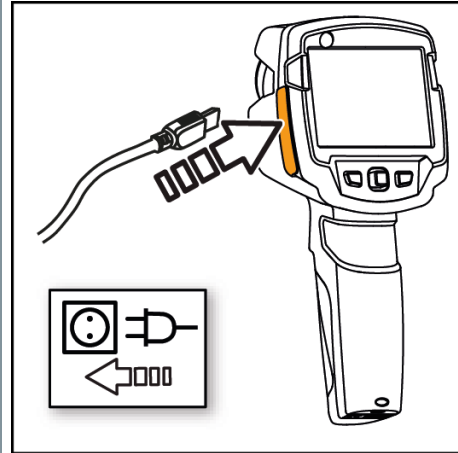
▶ **Reset image counter?** is displayed.

3 - Select

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 starts.
If the battery has been completely drained, the charging time is approx. 5 hours.
 - ▶ Whether the battery is full or charging is indicated.

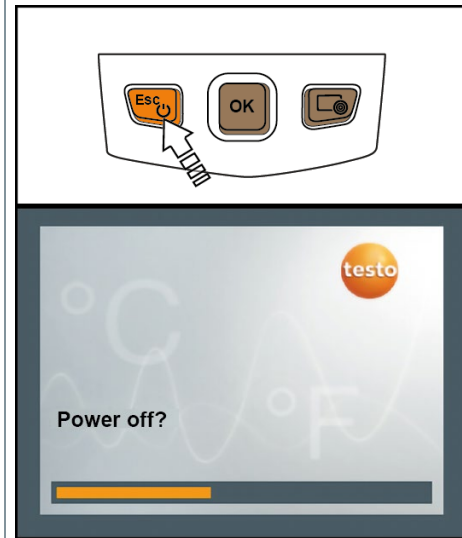
6.2 Changing the rechargeable battery

⚠ WARNING

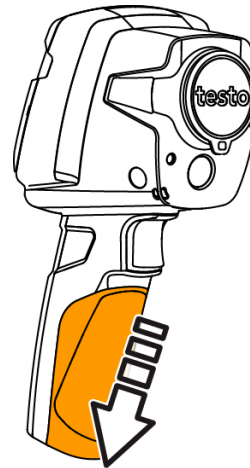
Serious risk of injury to the user and/or destruction of the instrument

- > There is a risk of explosion if the battery is replaced with one that is the wrong type.
- > Dispose of spent/faulty batteries in accordance with the relevant legal specifications.

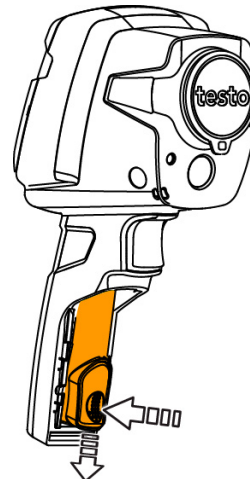
- 1 - Switch the instrument off.



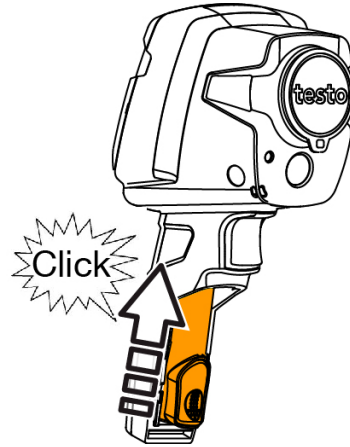
- 2 - Open battery compartment.



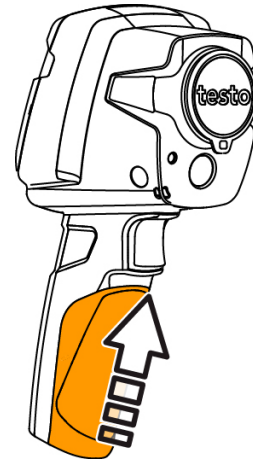
- 3 - Release the battery and remove.



- 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).

6.4 Firmware update

The current firmware version is available. There are two options available:

- Performing an update using IRSoft or
- Performing an update with the thermal imager

Downloading firmware

- 1 - Download firmware: **Firmware-testo-865-872.exe**
- 2 - Unzip file: double-click on the exe. file
 - ▶ **FW_T87x_Vx.xx.bin** is stored in the selected folder.

6.4.1 Performing an update using IRSoft

6.4.1.1 Preparing the camera

- ✓ - The rechargeable battery is fully charged or the camera is connected to the mains adapter.
- 1 - Connect the computer to the camera with the USB cable.
 - 2 - Switch on the camera.

6.4.1.2 Performing an update

- ✓ IRSoft is activated.
- 1 - Select **Camera** → **Configuration**.
 - 2 - Click on **Configure thermal imager**.
 - ▶ The **Camera settings** window opens.
 - 3 - Select **Instrument settings** → **Firmware Update** → **OK**.
 - ▶ **FW_T87x_Vx.xx.bin** is displayed.
 - 4 - Select **Open**.
 - ▶ Firmware update is performed.
 - ▶ Thermal imager is automatically restarted. Update complete.



In certain circumstances, the camera reports: **Firmware update finished. Please restart the device.** A restart is not performed.

Action:

- After 10 seconds, switch off the camera; switch back on again after 3 seconds.

- ▶ The current firmware version is displayed.

6.4.2 Performing an update with the camera

6.4.2.1 Preparing the camera

- ✓ - The rechargeable battery is fully charged or the camera is connected to the mains adapter.
- 1 - Switch on the camera.
- 2 - Open the cover of the interface.
- 3 - Connect the computer to the camera with the USB cable.
 - ▶ The camera is displayed as **MTP Device - testo_8xx** in Window Explorer.

6.4.2.2 Performing an update

- 1 - Copy the **FW_T87x_Vx.xx.bin**- file to the camera directory using drag & drop.
- 2 - Wait until the firmware has been copied.
 - ▶ Firmware update is performed.
- 3 - Observe the progress bar.
 - ▶ Thermal imager is automatically restarted. Update complete.

7 Tips and assistance

7.1 Questions and answers

Question	Possible cause / solution
Error! Memory full! is displayed.	Insufficient memory available: Transfer images to the PC or delete.
Error! Permissible instrument temperature exceeded! 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.
 is displayed on screen.	Real image camera only takes very dark or sometimes even black real images. Restart the camera.

If we have not been able to answer your question, please contact your dealer or Testo Customer Service.

7.2 Accessories and spare parts

Description	Order no.
Battery charging station 5 V, 2 A	0554 1103
Spare rechargeable battery	0554 8721
Mains unit	0554 1106
Additional markers for ϵ -Assist function (10 off)	0554 0872
Emission tape	0554 0051
ISO calibration certificate: calibration points at 0°C, 25°C, 50°C	0520 0489
ISO calibration certificate: calibration points at 0°C, 100°C, 200°C	0520 0490
ISO calibration certificate: 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
and brochures
catalogues

8 Authorisations and certification

Please refer to the commissioning instructions supplied for testo 865s, 868s,
871s, 872s (0973 8723).