

testo 880 · Thermal imager

Instruction manual



1	Contents	3
2	Safety and the environment	4
	2.1. About this document	4
	2.2. Ensure safety	5
	2.3. Protecting the environment	6
3	Specifications	7
	3.1. Use	7
	3.2. Technical data	8
4	Product description	12
	4.1. Overview	12
	4.2. Basic properties	13
5	First steps	15
	5.1. Commissioning	15
	5.2. Getting to know the product	17
6	Using the product	23
	6.1. Menu functions	23
	6.1.1. Measuring functions	23
	6.1.2. Image gallery	25
	6.1.3. Scale	26
	6.1.4. Display	27
	6.1.5. Emissivity	27
	6.1.6. Palette	30
	6.1.7. Configuration	30
	6.2. Measuring	34
7	Maintaining the product	36
8	Tips and assistance	38
	8.1. Questions and answers	38
	8.2. Accessories and spare parts	39
	8.3. Service information	Fehler! Textmarke nicht definiert.



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.

Symbols and writing standards

Representation	Explanation
	Warning advice, risk level according to the signal word: Warning! Serious physical injury may occur. Caution! Slight physical injury or damage to the equipment may occur. > Implement the specified precautionary measures.
	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.
Menu	Elements of the instrument, the instrument display or the program interface.
[OK]	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.

During operation, testo 880 may not be pointed at the sun or other high-radiation sources (e.g. objects with temperatures higher than 500 °C). This can lead to serious damage to the detector. Damage caused in this way to the microbolometer detector is excluded from warranty coverage.

- > 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 the rechargeable battery 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 measuring 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!

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 880 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 (heating, ventilation and air conditioning trade, company technicians, engineering offices, experts): Energy evaluation of buildings
- Preventative maintenance (servicing): Mechanical and electrical inspection of systems and machines
- Production monitoring (quality assurance): Monitoring production processes

The testo 880 is available in several versions, which are tailored to various usage requirements:

- testo 880-1: High-quality wide-angle lens 32° x 24° with F1 lens, detector 160 x 120 interpolated to 320 x 240 pixels, NETD < 0.1 °C, manual focus, 1 GB SD card for approx. 800-1000 images, minimum focusing distance 10 cm, Integrated digital camera
- testo 880-2: High-quality wide-angle lens 32° x 24° with F1 lens, detector 160 x 120 interpolated to 320 x 240 pixels, NETD < 0.1 °C, manual focus, 1 GB SD card for approx. 800-1000 images, minimum focusing distance 10 cm, Exchangeable lens, display of surface moisture distribution, lens protection glass included in delivery
- testo 880-3: High-quality wide-angle lens 32° x 24° with F1 lens, detector 160 x 120 interpolated to 320 x 240 pixels, NETD < 0.1 °C, 1 GB SD card for approx. 800-1000 images, minimum focusing distance 10 cm, Integrated digital camera with power LEDs for illumination, dynamic motor focus, real-time display of the surface temperature distribution using radio humidity probes (optional)

Export control

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

The testo 880 with 33 Hz in particular can only be exported to countries outside of the European Union with an export permit from the authorities.

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 24°/0.1 m (0.33 ft) Telephoto lens: 12° x 9°/0.6 m (1.97 ft)
Thermal sensitivity (NETD)	< 0.1 °C at 30 °C (< 0.18 °F at 86 °F)
Geometric resolution	Standard lens: 3.5 mrad Telephoto lens: 1.3 mrad
Refresh rate	testo 880-1: 9 Hz testo 880-2/-3: 33 Hz within EU, 9 Hz outside of EU
Focus	Manual testo 880-3: manual + motorized
Detector type	FPA 160 x 120 pixels, a.Si
Spectral range	8 - 14 µm

Visual image output (testo 880-1/-3 only)

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

Image presentation

Characteristic	Values
Image display	3.5" LCD with 320 x 240 pixels
Display options	testo 880-2: Infrared image testo 880-1/-3: Infrared image/real image/infrared and real image
Video stream	testo 880-1: 9 Hz testo 880-2/-3: 25 Hz within EU, 9 Hz outside of EU
Colour palettes	8 options

Measurement

Characteristic	Values
Temperature range (can be changed)	-20 - 100 °C/0 - 350 °C (-4 - 212 °F/32 - 662 °F)
Accuracy	±2 °C (±3.6 °F) or ±2 % of reading (whichever is the greater)
Measuring point minimum diameter	3 x 3 pixels Standard lens: 10 mm at 1 m Telephoto lens: 4 mm at 1 m
On-time	40 sec
Humidity and air temperature measurement with radio probe (optional)	testo 880-3: 0 - 100 % RH, -20 - 70 °Ctd (-4 - 158 °Ftd), -20 - 70 °C (-4 - 158 °F) air temperature
Radio probe accuracy	±2 % RH/±0.5 °C (±0.9 °F) air temperature
Measuring functions	Standard measurement (1-point), 2-point measurement, Coldspot/Hotspot testo 880-2/-3: Display of the surface moisture distribution via manual entry of the humidity testo 880-3 optional: Humidity measurement with radio humidity probe
Compensation for	manual

Characteristic	Values
reflected temperature	
Setting emissivity	8 materials + 1 user defined (can be freely defined, 0.01 - 1.00)

Image storage

Characteristic	Values
File format	.bmt Export options in .bmp, .jpg, .csv
Removable memory	SD card
Memory capacity	Scope of delivery: 1 GB (approx. 800 - 1000 images)

Lens

Characteristic	Values
Standard lens	32° x 24°
Telephoto lens	12° x 9°, testo 880-2, -3 only: optional

Laser measuring spot marking

Characteristic	Values
Classification of the laser	635 nm, Class 2

Voltage supply

Characteristic	Values
Battery type	Fast-charging, Li-ion battery can be changed on-site
Operating time	Approx. 5 h at 20 °C (68 °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

Characteristic	Values
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

Characteristic	Values
Weight	900 g (including battery)
Dimensions	152 x 106 x 262 mm (5.98 x 4.17 x 10.31")
Tripod mounting	Yes, with adapter (included in delivery)
Housing	ABS, die-cast zinc

PC software

Characteristic	Values
System requirements	Operating system Windows XP Service Pack 2 or Windows Vista USB 2.0 interface

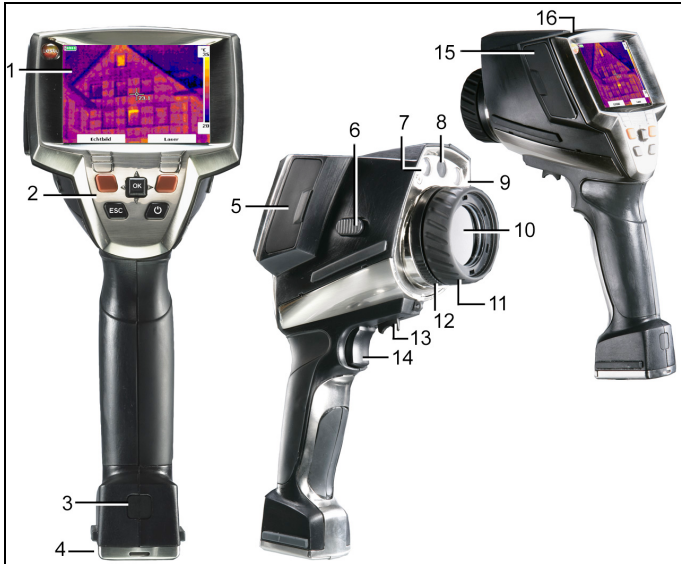
Standards, tests, warranty

Characteristic	Values
EU Directive	2004/108/EC
Warranty	2 years, warranty conditions: See web page www.testo.com/warranty


4 Product description

4.1. Overview

Product components



- 1 Display.
- 2 Control keys:

Key	Functions
	Switch the imager on/off.
[OK] and Joystick	<ul style="list-style-type: none"> • Press [OK]: Open menu, confirm selection/setting. • Move [OK] up/down/right/left = Joystick function: Select functions, navigate
[Esc]	Cancel action.
Left/right ["xy"] quick select button	Call up a function. The display shows which function is assigned to each quick select button.

- 3 Instrument rechargeable battery lock release button.
- 4 Metric thread: For fastening the included tripod adapter.
Do not use desktop tripods, danger of tilting!
- 5 Right interface terminal: Radio module slot.
- 6 **[Autofocus switch]**: For switching the autofocus on and off (only testo 880-3).
- 7 2 LEDs: For illumination for the visual image (only testo 880-3).
- 8 Digital camera lens: For recording visual images (only testo 880-1/-3)
- 9 Laser: For aiming at the measuring field.



Laser radiation. Do not look into the beam.

CLASS 2 LASER

- 10 Infrared camera lens: For recording thermography images.
Exchangeable lens (only testo 880-2, -3).
- 11 **Rotating ring** Manual focusing: For manual focusing.
testo 880-3: Only use rotating ring with autofocus switched off to prevent damage to the auto mechanism.
- 12 **Lens lock ring**
- 13 **[Autofocus control]**: For motorized focusing (testo 880-3 only)
- 14 **[Trigger]**: For recording (freezing/saving) images.
- 15 Left interface terminal: Memory card slot. USB interface.
Mains socket, for connecting the included mains unit. Buffer battery slot.
- 16 Status LED: off (no mains unit connected), flashing (mains unit connected, battery is charging), on (mains unit connected, charging completed).

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 45 °C).

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: **IR** for infrared image without attached real image and for surface moisture image, **IV** for infrared image with attached real image, **VI** for real image.

YYYYY: 5-digit consecutive number

ZZZ (file extension): **BMT** for infrared image with/without attached real image and for surface moisture image, **BMP** for real image.

The file names can be changed using the PC and software Windows Explorer.

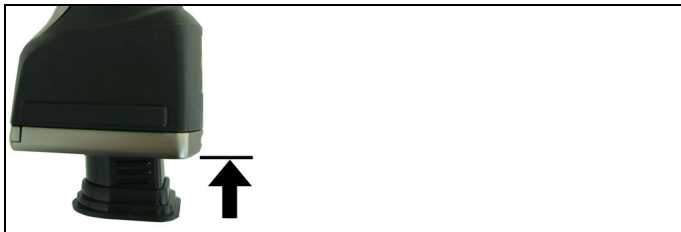
5 First steps

5.1. Commissioning

Connect rechargeable battery

The thermal imager is delivered with a rechargeable battery that is inserted in the rechargeable battery slot but not connected.

- > Push the battery all the way into the rechargeable battery slot until this is flush with the bottom of the handle.



- The thermal imager 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.

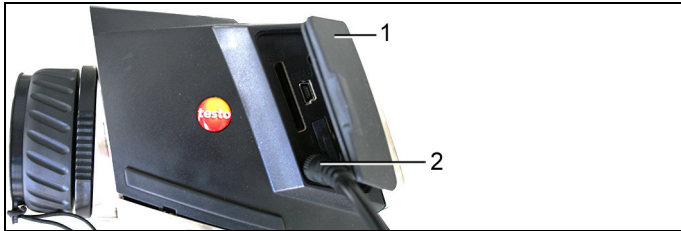
Instrument language (**Language**) and temperature unit (**Unit**) can be set.

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 thermal imager 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 on the left side of the thermal imager (1).
- 2. Connect the mains unit to the mains socket (2).



- 3. Connect the mains plug to a mains socket.
- The thermal imager starts automatically.

i For battery charging, the imager can remain switched on or be switched off. This has no influence on the duration of charging.

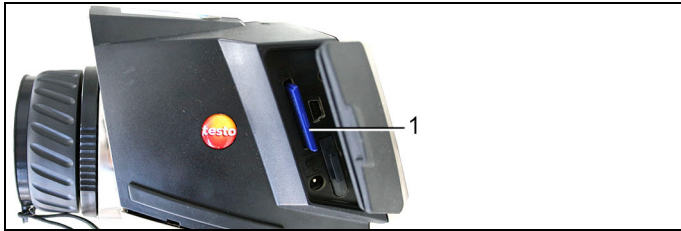
- The charging of the rechargeable battery begins.
- The charging status is displayed by the status LED:
 - LED flashing: Charging
 - LED on: Battery charged, charging finished
- 4. Charge the battery fully, then disconnect the instrument from the mains unit.
- After the initial charging of the battery, the thermal imager is ready for operation.

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

5.2. Getting to know the product

Insert the memory card

1. Open the cover on the left side of the thermal imager.
2. Insert memory card (SD card) into the card slot (SD) (1).



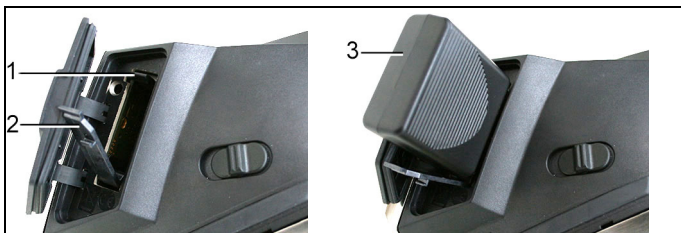
- > To remove the memory card: Press on the memory card to release the lock.

Insert radio module (accessories, testo 880-3 only)

Using a radio module (accessory) the instrument can be connected with a radio humidity probe. The radio module must be connected before switching on the instrument in order for the instrument to be identified.

i Radio probes may only be used in countries in which they are permitted (see instructions for use of radio probe).

- > Switch off instrument before inserting the radio module.
1. Open the cover on the right side of the thermal imager.
 2. Release the lock (1) and open the retaining clip (2).
 3. Insert radio module into the module slot (3).



- > To remove the radio module: Press the radio module down and pull out.

Mount/remove infrared protection glass

Mounting:

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, see Configuration page 30. If this option is set incorrectly, the stated measuring accuracy is not guaranteed.

Mount tripod adapter

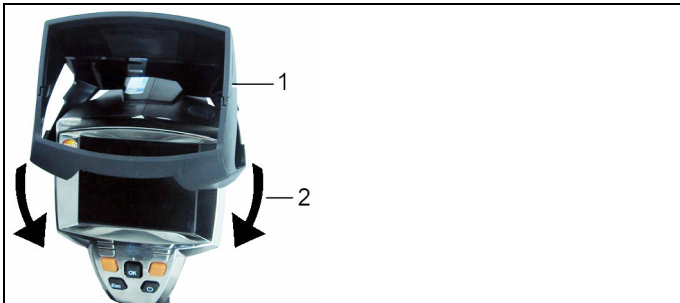
Using the included tripod adapter, the testo 880 can be fastened to the testo tripod (accessory) or to a commercially available standard tripod. With the tripod adapter mounted, the battery cannot be changed!

1. Place the tripod adapter on the lower end of the handle and screw on using the included Allen key (ISO 2936, size 4).
2. Slide thermal imager into the fastening plate of the testo tripod and lock or fasten it to the commercially available standard tripod (screw-type fastening).

Mount sunshield


The sunshield increases the readability of the display with a high exposure to light.

- > Set the sunshield on the thermal imager from above (1) and pull both sides of the sunshield down around the display (2).



Change lens (testo 880-2, -3 only)



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 Configuration page 30.

- > Switch instrument off before changing the lens.
- > To keep the lens from falling out: Hold the instrument with the lens pointing up.
- > testo 880-3: Slide **[Autofocus switch]** towards the lens (position: )
- 1. Turn lens lock ring anticlockwise to the stop (approx. 2 cm).
- 2. Remove lens.
- 3. Insert new lens, taking care to align the white markings on the lens and the instrument with one another.
- 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.

Focus image using autofocus (testo 880-3 only)


- > testo 880-3: Slide **[Autofocus switch]** towards the display (position: )
- > Move **[Autofocus control]** until the image is in focus.

Manually focusing the image



Caution! testo 880-3: Possible damage of the auto mechanism.

- > Only use **Rotating ring** with the autofocus switched off.
-

- > testo 880-3: Slide **[Autofocus switch]** towards the lens (position: )
- > Turn **Rotating ring** of the lens until the image is in focus.

Record (freeze/save) image

1. Press **[Trigger]**.
 - The image is frozen (fixed image).

If the image is to be saved, the desired storage location can be set using the left **[Folder]** quick select button, see Select the storage location (folder): page 35.

The image that is shown on the display is always the one that is saved:

- Infrared image is shown: Infrared image is saved.
 - Real image is shown (testo 880-1/-3 only): Real image is saved.
 - Infrared/real image is shown (testo 880-1/-3 only): Infrared image is saved, real image is saved in the same file as an attachment to the infrared image.
2. Save image: Press **[Trigger]** again, or: Press **[OK]**.
or
Discard 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: **[Laser]** (testo 880-2) or **[Image type]** (testo 880-1/-3).
-



Warning! Eye damage due to laser beam!

- > Do not look into the laser beam.
 - > Do not point the laser beam at people.
-

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
Image type (testo 880-1/-3 only)	Change display mode: Infrared image, real image or infrared/real image. ¹
Laser	Switch on laser for homing in on the measuring surface (hold button down). ²
Light (testo 880-3 only)	Switch on/off LEDs for lighting up objects for the digital camera.
Palette	Change colour palette for the infrared image.
Emissivity...	Set emissivity and reflected temperature.
Scale...	Set scale limits.
Adjustment	Carry out a manual zeroing.

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

Navigating in the menu

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

¹ The real image and the IR optics have different view angle owing to the spatial distance between them. For the reason, the image areas do not correspond exactly (parallax error).

² Laser and lens have a different slant due to the special separation. The laser sighting and the centre of the image thus do not correspond completely (parallax error).

- 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 23.

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.

2-point measurement

The **2-point measurement** has 2 crosshairs with which individual temperatures can be read off. If this function is activated () , the quick select buttons are fixed with the functions **Temperature 1** and **Temperature 2**.

With frozen images, only the activated crosshairs can be moved.

With saved images, the **2-point measurement** must be activated for the respective opened picture.

1. [OK] | Measurement | [OK].| 2-point measurement | [OK].
2. Select left or right **Temperature 1** or **Temperature 2** quick select button to activate one of the two crosshairs.
 - The activated crosshairs are shown red.
3. Use the **Joystick** to move the activated crosshairs in order to read off the individual temperatures.

Measuring function Cold-/Hotspot

Coldspot/Hotspot shows the min and max temperature value on the display. If this function is activated () , the quick select buttons are fixed with the functions **Coldspot** and **Hotspot**.

With frozen images, the crosshair can be moved and the min/max value is displayed. The min/max values are not saved with the image.

With saved images, the **Coldspot/Hotspot** must be activated via the menu for the respective opened picture.

1. **[OK] | Measurement | [OK] | Coldspot/Hotspot | [OK]**.
2. Select left or right quick select button to activate the respective function.
3. Confirm the settings with **Apply**.

Moisture (testo 880-2/-3 only)

The surface moisture is calculated from the ambient humidity value, either manually entered or measured by the radio humidity probe (optional, testo 880-3 only), and the measured surface temperatures. In the display, the areas that are at risk of developing mould are shown using a special colour palette:

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

If this function is activated () , the quick select buttons are fixed with the functions **Humidity** (with testo 880-3: only if no radio humidity probe is logged on, see Radio... (testo 880-3 only) page 32) and **Emissivity...**

At the upper edge of the display, the relative air humidity, air temperature and calculated dewpoint temperature are shown.

1. **[OK] | Measurement | [OK] | Humidity | [OK]**.
 - If a radio humidity probe is logged on (testo 880-3 only): The measuring function is opened. No further entries are required.
 - If no radio humidity probe is logged on: The **Humidity** dialogue is opened. The values for the ambient humidity and temperature 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**.

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 +++ are 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 25). 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 Change colour palette for the infrared image page 30). 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.

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

Material (material temperature)	Emissivity
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

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**.
- Settings are applied.
- The selected emissivity (**ε**) 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 8 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.



> **[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.
 - When the option is activated, the protection glass symbol () appears in the lower right-hand corner of the display.

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**.

Radio... (testo 880-3 only)

A radio humidity probe can be logged onto the instrument.

The **Radio...** function can only be selected if a radio module is connected (accessories), see Insert radio module (accessories, testo 880-3 only) page 17.


Every radio probe has a probe identification number (RFID). This consists of the three-digit RFID number on the probe and the position of the slide switch in the battery compartment of the radio probe (**H** or **L**). To be logged on at the instrument, the radio probe must be switched on and the transfer rate must be set to 0.5 sec. This occurs by briefly pressing the on/off button when switching on (also see instructions for use of radio probe).

1. **[OK] | Configuration... | [OK] | Radio... | [OK]**.

- The **Radio...** dialogue is opened.
- The probe IDs for the located radio probes are shown.

If no radio probe was found, this may be because of the following:

- The radio probe is not switched on or the battery of the radio probe is spent.
 - The radio probe is outside the range of the instrument.
 - Sources of interference are influencing the radio transmission (e.g. reinforced concrete, metal objects, walls or other barriers between transmitter and receiver, other transmitters of the same frequency, strong electromagnetic fields).
- > If necessary: Rectify the possible causes of the fault in radio transmission.

2. Press **[OK]** to activate () or deactivate () the radio link.
3. Move **Joystick** to the right to jump to the list of found radio probes.
4. Move **Joystick** up/down to select a probe.
 - The selected probe is highlighted orange ().
5. Confirm the selection with **Apply**.



- If no readings appear during the measurement:
- > Check the potential causes, see above.

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 (testo 880-2/-3 only):

- Gently wave the radio humidity probe (testo 880-3 only) or separate air humidity measuring instrument about to shorten the equalization period. Avoid sources of interference (e.g. breathed air).

Building thermography, investigating the building shell:

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

In order to guarantee highest accuracy, testo 880 requires an acclimatization time 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 31.

Before saving an image, ensure that it is focused correctly (in focus), see Focus image using autofocus (testo 880-3 only) page 19 or Manually focusing the image page 20. 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 29. 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 26, 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 26.
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.

Aiming at the measuring surface


Using the laser, the measuring surface can be aimed at.



Warning! Eye damage due to laser beam!

- > Do not look into the laser beam.
 - > Do not point the laser beam at people.
-

To change the quick select button functions, Getting to know the quick select buttons page 20.

- > Press and hold **[Laser]**.
- When the laser is active, the laser symbol () flashes.

Caution: Laser and lens have a different slant due to the special separation. The laser sighting and the centre of the image thus do not correspond completely (parallax error). The laser dot is therefore not suitable for marking locations that were aimed at using the crosshairs.

7 Maintaining the product

Changing the 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. Press lock release button.
 - The rechargeable battery is released and sticks out a little from the rechargeable battery slot. The locking function keeps the battery from falling out.
2. Completely remove the battery from the rechargeable battery slot.
3. Insert a new battery into the rechargeable battery slot until this is flush with the bottom of the handle.
 - The thermal imager 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.

Clean lens

- > Large dust particles can be blown off.
- > Use a lens cleaning cloth for slight contamination. Do not use rubbing alcohol!

Change 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 cover on the left side of the thermal imager.
2. Remove battery holder, including buffer battery, from the battery slot.
3. Remove empty battery from the holder and insert new battery (type CR 1632).



Caution! Incorrectly inserted batteries can lead to damage of the product.

- > When inserting the batteries, observe the polarity (label on the battery holder).

4. Insert battery holder into the battery slot.

8 Tips and assistance

8.1. Questions and answers

Question	Possible causes/solution
Message Backup battery empty or not present is shown.	<ol style="list-style-type: none"> 1. Confirm the message with [OK]. 2. Change buffer battery, see Change buffer battery page 36.
Error No memory card inserted! is shown.	<p>Memory card defective or not inserted.</p> <ol style="list-style-type: none"> 1. Confirm the message with [OK]. 2. Check or insert memory card.
Error Memory card full! is shown.	<p>Insufficient memory present.</p> <ol style="list-style-type: none"> 1. Confirm the message with [OK]. 2. Insert new memory card.
Error No lens/wrong lens! is shown.	<ol style="list-style-type: none"> 1. Switch off thermal imager. 2. Check lens <p>> Change lens if necessary.</p>
Message Charging not possible! is shown.	<p>Ambient temperature is outside the permissible range for charging the battery.</p> <ol style="list-style-type: none"> 1. Confirm the message with [OK]. 2. Keep to the permissible ambient temperature.
Error Permissible instrument temperature exceeded! is shown.	<ol style="list-style-type: none"> 1. Switch off thermal imager. 2. Let instrument cool off and keep to the permissible ambient temperature.
--- or +++ is shown instead of the reading.	<p>Reading is outside of the measuring range.</p> <p>> Change measuring range.</p>

Question	Possible causes/solution
xxx is shown instead of the reading.	Reading cannot be calculated. > Check parameter settings for plausibility.
Humidity measuring function: No readings from the radio probe are shown.	Radio probe not logged on or sources of interference in the radio transmission: > Check possible causes, see Radio... (testo 880-3 only) page 32.

If we could not answer your question, please contact your dealer or Testo Customer Service. For contact data, see back of this document or web page www.testo.com/service-contact

8.2. Accessories and spare parts

Description	Article no.
Radio humidity probe (for testo 880-3) ³ consisting of radio handle and plug-in humidity probe head:	
• Radio handle version 869.85 MHz, approval e.g. for DE, ES, IT, FR, GB	0554 0189
• Radio handle version 915.00 MHz, approval e.g. for CA	0554 0191
• Plug-in humidity probe head	0636 9725
Lens protection glass	0554 8805
Sunshield	0554 8806
Rechargeable battery.	0554 8802
Desktop charging station	0554 8801
Tripod	0554 8804
Mains unit	0554 8808
SD card	0554 8803
USB cable	0449 0047

³ Radio probes and modules may only be used in those countries in which they are permitted (see radio probe instructions for use).

Description	Article no.
ISO calibration certificate for thermal imager:	
• Calibration points 0 °C, 25 °C, 50 °C in measuring range -20 °C to 100 °C	0520 0489
• Calibration points at 0 °C, 100 °C, 200 °C in measuring range 0 °C to 350 °C	0520 0490

For further accessories and spare parts, please refer to the product catalogues and brochures or look up our website: www.testo.com

