testo 835

Infrared and contact thermometer



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1. General information

Please read this document through carefully and familiarise yourself with the operation of the product before using it. Keep this documentation to hand so that you can refer to it when necessary.

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2. Safety information

Avoid electrical hazards:

- Do not conduct measurements on or near live parts!

Adhere to the product safety/warranty requirements:

- Always operate the instrument properly and according to its intended purpose and within the parameters specified. Do not use force.
- Do not store with solvents (e.g. acetone).
- Only open the instrument if this is expressly described in the documentation for the purpose of maintenance or repair work.

Ensure correct disposal:

- Dispose of defective rechargeable batteries and spent batteries at the collection points provided.
- Send the instrument directly to us at the end of its life cycle. We will ensure that it is disposed of in an environmentally friendly manner.

3. Intended use

The testo 835 is a compact infrared thermometer for non-contact measurement of surface temperatures. When a probe is connected, a contact measurement can also be carried out. The H2 version also has an integrated humidity probe for measuring ambient humidity.

The product should not be used in the following areas:

- Potentially explosive areas
- For diagnostic measurements in the medical sector

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4. Technical data

Feature	Values
Infrared measurement	
Lens	50:1 + opening diameter of the sensor (24 mm /0.95”)
Spectral range	8 to 14 µm
Laser type	4–point laser
Output / wavelength	< 1 mW / 8 to 14 µm
Class / standard	2 / EN 60825–1:2007
Measuring range	**T1 / H1:** –30 to +600 °C / –22 to +1112 °F **T2:** –10 to +1500 °C / 14 to +2732 °F
Resolution	0.1°C/°F
Accuracy (at +23 °C / 73.4 °F, ±1 digit)	**T1 / H1:** ±2.5 °C / ±4.5 °F (–30.0 to –20.1 °C / –22.0 to –4.1 °F) ±1.5 °C / ±2.7 °F(–20.0 to –0.1 °C / –4.0 to 31.8 °F) ±1.0 °C/ ±1.8 °F (0.0 to +99.9 °C / 32.0 to +211.9 °F) ±1 % of the measuring value (remaining range) **T2:** ±2.0 °C / ±3.6 °F or ±1 % of the measuring value (the higher value applies)
Measuring rate	0.5 s
Contact measurement	
Sensor type	Thermocouple type K (connectable)
Measuring range	**T1 / H1:** –50 to +600 °C / –58 to +1112 °F **T2:** –50 to +1000 °C/ –58 to +1832 °F
Resolution	0.1 °C/°F
Accuracy (±1 digit)	± (0.5 °C / 0.9 °F + 0.5 % of the measuring value)
Measuring rate	0.5 s
Humidity measurement (only H1)	
Measuring range	0 to 100 % RH (at –20 to +50 °C) / –4 to +122 °F)
Resolution	0.1 %RH (humidity) 0.1 °C/°F (temperature) 0.1 °C td/°F td (dew point temperature)
Accuracy (±1 digit)	± 2 %RH ± 0.5 °C/ 0.9 °F
Measuring rate	0.5 s
General	
Operating temperature	–20 to +50 °C / –4 to 122 °F
Transportation/storage temperature	–30 to +50 °C / –22.0 to 122 °F
Voltage supply	3 x battery type AA or via USB port (only in conjunction with EasyClimate software)
Battery life	25 h (typical at 25 °C / 77 °F without laser and display illumination) 10 h (typical at 25 °C / 77 °F without display illumination)
Housing	ABS/PC
Dimensions	193 x 166 x 63 mm / 7.6 x 6.5 x 2.5”
Weight	**T1 / T2:** 514 g / 1.13 lbs (incl. batteries) **H2:** 527 g / 1.16 lbs (incl. batteries)
EC Directive	2004/108/EC
Warranty	2 years, warranty terms: see www.testo.com/warranty

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5. Product description

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1 Infrared sensor (IR) lens
2 4-point laser for measurement spot marking
3 Ambient humidity probe, ambient temperature probe (only H1)
4 Trigger (measurement, switching on)
5 Battery compartment
6 USB interface, probe connector socket for thermocouple probe (TC)
7 Control keys:
- [⏻]: Switch instrument on/off
- [💾]: Save measuring values
- [ε]: Open Emissivity menu
- [Esc]: Back
- [✥]: 5-way joystick (press, up, down, left, right): Open configuration menu, confirm entry, navigate

8 Display

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6. Initial operation

6.1 Inserting batteries



1 Open the battery compartment: open up the cover.
2 Insert batteries (3x type AA). **Observe the polarity!**
3 Close the battery compartment: close the cover again.

6.2 Setting the language

The measuring instrument has a language-specific user interface. **English** is set as the default user language.

1 Switch the instrument on with **[⏻]**.
2 Open settings mode with **[ ]**.
3 Use **[ ]** to select (**Language**) and open with **[ ]**.
4 Select the preferred language with **[ ]** and apply the setting with **[ ]**.

7. Operation

7.1 Connecting a probe

▶ Connect the temperature probe at the probe socket. Observe the polarity!

7.2 On / Off.

▶ Switch the instrument on: **[⏻]** or press trigger.

! The display illumination switches off automatically if no key is pressed for 30 seconds. Pressing any key switches the illumination back on.

▶ Switch off the instrument: **[⏻]**.

! The instrument switches off automatically if no key is pressed for 2 minutes.

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7.3 Changing the display

Various combinations of three measurement parameters in each case can be shown on the display.

Symbols on the display:
IR sensor, TC probe, ambient humidity / ambient temperature probe,
△ temperature difference

- The instrument is switched on.

▶ Select the desired measurement parameter display with [⇕]:

Display [unit]	Measurement parameters / comments
Max I [°C/°F] I Min	Max. IR temperature I IR temperature I Min. IR temperature
I [°C/°F] I △	TC temperature I IR temperature I Temperature difference TC minus IR View only available when thermocouple probe is plugged in.
[%RH] I [°C/°F] I [°Ctd/°Ftd]	Ambient humidity I IR temperature I Ambient dew point temperature View only available in testo 835-H1.
[%RH] I [°C/°F] I [°Ctd/°Ftd]	Ambient humidity I Ambient temperature I Ambient dew point temperature View only available in testo 835-H1.
Max I [°CDtd/°FDtd] I Min	Temperature difference IR minus dew point max. I current I min. View only available in testo 835-H1.
Max I a_w[-] I Min	Surface moisture max. I current I min. Calculated from dew point of ambient air and surface temperature. 0.00 to 0.64: non-critical / 0.65 to 0.80: potentially critical / 0.81 to 1.00: critical. View only available in testo 835 - H1.

7.4 Measuring

! Observe information on IR measurement (chapter 12)/contact measurement (chapter 13).

- The instrument is switched on.

Performing a measurement

The measurement (IR and contact measurement) is started by pressing the trigger.

▶ Remove orange protective cap from the lens.

1 Continual measurement disabled: hold down the trigger.
- SCAN is displayed.

or

Continual measurement enabled: press trigger.
- CONT is displayed.

2 Lock in on measurement object (IR) or position thermocouple (contact measurement).

- When laser is enabled: the laser points mark the measuring range for IR measurement.

3 Continual measurement disabled: release the trigger to end the measurement.

or

Continual measurement enabled: press the trigger again to end the measurement.

- HOLD is displayed.
- The measuring values are kept until the next measurement.

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8. Settings

8.1 Performing settings

- The instrument is switched on.

1 Open settings mode with [▢].

- A box appears around the selected function.

2 Select the required function with [⬍] and open with [▢].

3 Perform settings with [⬍] and apply with [▢]:

Functions

- **Backlight**: set the intensity of the display illumination.
- **Laser**: switch the laser on/off for measurement spot marking.
- **Beeper**: switch the beeper on/off.
- **Continual**: switch continual IR measurement on/off.
- **Unit**: set the temperature unit.
- **Emissivity**: set the emission level (also see chapter 8.2). This function can also be opened directly from the measurement view with [ε].
- **Memory**: manage the memory (also see chapter 8.3).
- **Alarm**: set alarm thresholds (also see chapter 8.4).
- **Calendar**: set the date and time. When measurement data is saved, it is given a date and time stamp.
- **Language**: set the user interface language (also see chapter 6.2).
- **Reset**: reset to factory settings.
- **Information**: display instrument information.

8.2 Details: Emissivity

The emission level can be set in three different ways.

- The ε Emissivity function is opened.

Select material

▶ Select a material (with allocated typical emission level) from the list with [⬍] and apply the selection with [▢].

Customise manual

1 Use [⬍] to select Customise manual and open the function with [▢].

2 Set the emission level with [⬍] and apply this setting with [▢].

Customise automatic

! A connected contact probe or a separate contact thermometer is required. The emission level is calculated via a comparison of the measured surface temperatures (contact measurement and IR measurement).
Automatic calculation is not possible if the temperature difference between the measurement object and the surrounding environment is too low or the infrared reading is higher than the contact reading: - - - is displayed and the previously set value is retained.

1 Use [⬍] to select Customise automatic and open the function with [▢].

- If a contact probe (thermocouple type K, class 1) is connected, the surface temperature measured via the thermocouple (T_{TC}) is displayed. If no contact probe is connected, the temperature (measured with a different contact thermometer) must

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be entered with [ ].
2 Apply the measured or selected value with [ ].
3 Press the trigger to calculate the surface temperature via the IR sensor (T_{IR}).
- The measured value is displayed.
4 Apply the measured value with [ ].
- The calculated emission level (ε) is displayed.
5 Apply the calculated value with [ ].

8.3 Details: Memory

- The **Memory** function is opened.

Save - New Location

This function can also be opened directly from the measurement view with [ ].

A new location can be created.

1 Use [ ] to select **Save** and open the function with [ ].
2 Use [ ] to select **New Location** and open the function with [ ].
3 Use [ ] and [ ] to enter a memory location description.
4 Use [ ] to select ↩ and confirm the entry with [ ].

Save - Save Measurement Data

This function can also be opened directly from the measurement view with [ ].

The current measurement data can be saved in an existing memory location. Only the individual readings currently shown on the display are stored, no series of measurements!

1 Use [ ] to select **Save** and open the function with [ ].
2 Select an existing location with [ ] and apply this selection with [ ].
3 Save the current measurement data with [ ].

Overview

This function can only be opened via settings mode, not with [ ] from the measurement view.

Existing memory locations can be displayed and deleted.

▶ Use [ ] to select **View** and open the function with [ ].
- The existing locations and the volume of measurement data saved there are displayed.
▶ To delete a location and the saved measurement data: open the function with [ ], confirm with [ ] (✓) and carry out deletion with [ ].

Delete

This function can only be opened via settings mode, not with [ ] from the measurement view.

The entire memory (measuring locations and measurement data) can be deleted.

1 Use [ ] to select **Delete** and open the function with [ ].
2 Confirm with [ ] (✓) and carry out deletion with [ ].

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8.4 Details: Alarm

The alarm function can be switched on/off and alarm thresholds can be set for the measurement channels Infrared (measured), Thermocouple (measured), Dewpoint distance (only H1, calculated) and Surface moisture (only H1, calculated).

- The Alarm function is opened.

1 **Select** Measurement channel and enable by pressing the joystick.
2 Switch the alarm function on/off for the selected measurement channel: joystick up/down.
3 Move the joystick to the right and set limit value(s): joystick up/down.
4 Save entries by pressing the joystick.

9. Connecting to PC software

The measuring instrument can be connected to a PC via the USB port. With testo easyClimate software (download via www.testo.com/download-center, licence key to activate the software: see back of this instruction manual), instrument configurations can be carried out on the PC and measurement data saved on the instrument can be transferred to the PC.

▶ Connect measuring instruments to a PC via USB cable.
- The instrument switches to slave mode. All instrument control keys are disabled.

For further information, please refer to the instruction manual for testo EasyClimate software.

10. Service and maintenance

10.1 Changing the batteries



1 Open the battery compartment: open up the cover.
2 Remove used batteries and insert new ones. Observe the polarity!
3 Close the battery compartment: close the cover again.

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10.2 Cleaning the instrument

Only use weak, commercially available neutral/household cleaning agents (e.g. washing-up liquid) to clean the instrument. Do not use aggressive cleaning agents or solvent!

- ▶ Wipe down the housing with a damp cloth (with detergent).
- ▶ Clean the IR lens carefully with a cotton bud dipped in water or medical alcohol.

11. Questions and answers

Question	Possible causes	Possible solution
lights up.	Batteries dead.	▶ Change batteries.
– – – lights up.	Measuring values outside the measuring range.	▶ Keep to the permitted measuring range.
Instrument cannot be switched on.	Low battery.	▶ Change batteries.
Instrument switches itself off.	Instrument switches off automatically 2 minutes after a key was last actuated.	▶ Switch the instrument on again.

If we have not been able to answer your question, please contact your local dealer or Testo Customer Service. For contact details, please visit www.testo.com/service-contact.

12. Information on IR measurement

12.1 Measuring method

IR measurement is a visual measurement

- ▶ Keep lenses clean.
- ▶ Do not carry out measurement with foggy lenses.
- ▶ Keep the measuring range (the range between the instrument and the measurement object) free of obstacles. There must be no particles of dust or dirt, no humidity (rain, steam) and no gases.

IR measurement is a surface measurement

If there is dirt, dust, frost, etc. on the surface, only the outermost layer is measured, i.e. the dirt.

- ▶ For vacuum-packed food, do not measure at air pockets.
  Where the values are critical, always measure separately with a contact thermometer. Particularly in the food sector: measure core temperature with a penetration/immersion thermometer.

Adjustment time

- ▶ If the ambient temperature changes (change of location, e.g. measurement indoors/outdoors), the instrument must be allowed to equalise for 15 minutes for infrared measurement.

12.2 Emissivity

Materials have various emission levels, i.e. they emit various amounts of electromagnetic radiation. The emissivity of the instrument has a default setting of 0.95. This is ideal for the measurement of non-metals (paper, ceramic, gypsum, wood, paints and varnishes), plastics and foodstuffs.

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Because of their low or non-uniform emission level, blank metals and metal oxides are only of limited use for IR measurement.

- Coatings that increase the emission level, e.g. paint or emission adhesive (art. no. 0554 0051) must be applied to the measurement object. If this is not possible: measure using a contact thermometer.

Emissivity table for important materials (typical values)

Material (Temperature)	ε	Material (Temperature)	ε
Cotton (20°C/68°F)	0.77	Heat sink, black anodised (50°C/122°F)	0.98
Concrete (25°C/77°F)	0.93	Copper, oxidised (130°C/266°F)	0.76
Ice, smooth (0°C/32°F)	0.97	Plastics: PE, PP, PVC (20°C/68°F)	0.94
Iron, polished (20°C/68°F)	0.24	Brass, oxidised (200°C/392°F)	0.61
Iron with cast skin (100°C/212°F)	0.80	Paper (20°C/68°F)	0.97
Iron with rolled skin (20°C/68°F)	0.77	Porcelain (20°C/68°F)	0.92
Plaster (20°C/68°F)	0.90	Black paint, matt (80°C/176°F)	0.97
Glass (90°C/194°F)	0.94	Steel, heat-treated surface (200°C/392°F)	0.52
Rubber, hard (23°C/73°F)	0.94	Steel, oxidised (200°C/392°F)	0.79
Rubber, soft grey (23°C/73°F)	0.89	Clay, fired (70°C/158°F)	0.91
Wood (70°C/158°F)	0.94	Transformer paint (70°C/158°F)	0.94
Cork (20°C/68°F)	0.70	Brick, mortar, plaster (20°C/68°F)	0.93

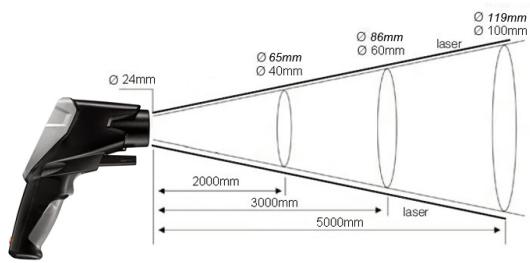
12.3 Measuring range, distance

Depending on the distance of the measuring instrument from the measurement object, a specific measuring range is recorded.

Measuring lens (ratio of distance : measuring range)

In italics = laser

Not in italics = measuring range



13. Information on contact measurement

- Observe the minimum penetration depth for immersion/penetration probes: 10x probe diameter
- Avoid using in aggressive acids or alkalis.

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