

The logo graphic consists of a series of parallel lines that form a stylized 'V' shape on the left, which then transitions into a horizontal line extending to the right.

VOLTcraft®

**IR-2200-50D USB
INFRA RED THERMOMETER**

Ⓒ OPERATING INSTRUCTIONS

Page 18 – 32

Best.-Nr. / Item No. / N° de commande / Bestnr.:
10 09 21



Version 08/11

TABLE OF CONTENTS

	Page
1. Introduction	19
2. Intended use	20
3. Features	20
4. Delivery content	20
5. Safety instructions	21
6. Operating elements	23
7. Display elements	24
8. Inserting the battery / replacing the battery	24
9. Operation	25
10. Maintenance and care	31
11. Disposal	31
12. Technical data	32

1. INTRODUCTION

Dear Customer,

Thank you for making the excellent decision to purchase this Voltcraft® product.

You have acquired a high-quality product with a brand name that is distinguished by its special competence and continuous innovation in the fields of measuring, charging and power technology.

With Voltcraft®, you will be able to cope even with difficult tasks as an ambitious hobbyist or as a professional user. Voltcraft® offers reliable technology with an exceptional cost-performance ratio. Therefore, we are certain that your starting to use Voltcraft will also be the beginning of a long, successful relationship.

We hope you will enjoy using your new Voltcraft® product!

Alle enthaltenen Firmennamen und Produktbezeichnungen sind Warenzeichen der jeweiligen Inhaber. Alle Rechte vorbehalten.

2. INTENDED USE

The infrared thermometer is a measuring device for non-contact temperature measurement. It determines the temperature based on the emitted infrared energy and the emissivity of an object. This type of measurement is very useful to measure objects that are hot, difficult to reach or moving. The device measures the surface temperature of an object. The temperature behind transparent surfaces such as glass or plastic cannot be measured. The temperature measuring range is between -50°C and $+2200^{\circ}\text{C}$ (-58 bis $+3992^{\circ}\text{F}$). A 9 V block battery is required for power supply. In addition to contact-free infrared temperature measurement, the device may also be used for measurements with traditional temperature sensors (K type). With its integrated USB interface it is possible to transmit temperature data to a computer.

This product is EMC-tested and meets the requirements of the applicable European and national directives. Compliance assessment (CE marking) was passed successfully; the relevant statements and documents are available from the manufacturer.

This product may only be used as described above, otherwise it may incur damage. There are additional dangers such as short-circuits, fire, electric shocks. Read the operating instructions thoroughly and keep them for future reference.

3. FEATURES

- Dual targeting laser with focal point
- Integrated alarm function with high and low alarm values and visual as well as acoustic signalling.
- Saves maximum, minimum, and average temperatures as well as temperature differences during measurements
- Continuous measurement function
- Emissivity adjustable from 0.10 to 1.00
- Additional temperature measurement via type K contact sensor
- Backlight for the display can be switched on
- Can store up to 100 measured values
- Transmission of temperature measurement values to a computer via the USB interface

4. DELIVERY CONTENT

- Infrared thermometer
- Storing case
- 9V block battery
- K-type wire sensor
- USB interface cable
- Software CD
- Tripod
- Operating instructions

5. SAFETY INSTRUCTIONS



The warranty will be void if damage is incurred resulting from non-compliance with these operating instructions! We do not assume any liability for consequential damage and for damage to property and injury to persons caused by unprofessional use or non-compliance with the safety instructions! The exclamation mark indicates important notes in these operating instructions that should strictly be observed. The unauthorized conversion and/or modification of the product is inadmissible for safety and approval reasons (CE).

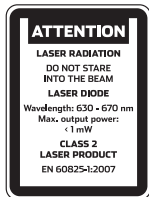
Persons / Product

- The device must not be subjected to heavy mechanical stress or strong vibrations.
- The device must not be exposed to electromagnetic fields, extreme temperatures, direct sunlight or moisture.
- The device must not be exposed to high humidity or fluids. When used outdoors, the device may only be used in appropriate weather conditions or with proper protection.
- Steam, dust, smoke and/or vapours can impair the optical characteristics of the thermometer and lead to false measuring results.
- The device should not be operated immediately after it has been taken from a cold to a warm environment. Condensation may destroy the device. If the lens is steamed up, measured results can be faulty. Allow the product to adapt to the ambient temperature before using it.
- If you have any reason to believe that safe operation is no longer possible, switch off the device and secure it against inadvertent operation. Reasons to assume that safe operation is no longer possible are the following:
 - the product shows visible damage,
 - the device no longer functions, or
 - the product was stored under unfavourable conditions for an extended period of time,
 - the product was exposed to heavy stress during transport.
- The product is not a toy. Keep it away from children and pets!
- On industrial sites the accident prevention regulations of the association of the industrial workers' society for electrical equipment and utilities must be adhered to.
- In schools, training facilities, hobby and selfhelp-workshops, the operation of electric devices is to be supervised by trained personnel.

Laser

- When operating the laser equipment, always make sure that the laser beam is directed so that no one is in the projection area and that unintentionally reflected beams (e.g., from reflective objects) cannot be directed into areas where people are present.
- Laser radiation can be dangerous, if the laser beam or its reflection enters unprotected eyes. Therefore, before using the laser equipment, familiarise yourself with the statutory regulations and instructions for operating such a laser device.
- Never look into the laser beam and never point it at people or animals. Laser radiation can seriously damage your eyes.
- If laser radiation enters your eyes, close your eyes immediately and move your head away from the beam.

- If your eyes have been irritated by laser radiation, do not continue to carry out tasks with safety implications, such as working with machines, working from great heights or close to high voltage. Also, do not operate any vehicles until the irritation has completely subsided.
- Do not point the laser beam at mirrors or other reflective surfaces. The uncontrolled, reflected beam may strike people or animals.
- Never open the device. Setting or maintenance tasks must only be executed by a trained specialist familiar with potential hazards. Improperly executed adjustments might result in dangerous laser radiation.
- The product is equipped with a class 2 laser. Laser signs in different languages are included in the package. If the sign on the laser is not written in the language of your country, please affix the appropriate sign onto the laser.

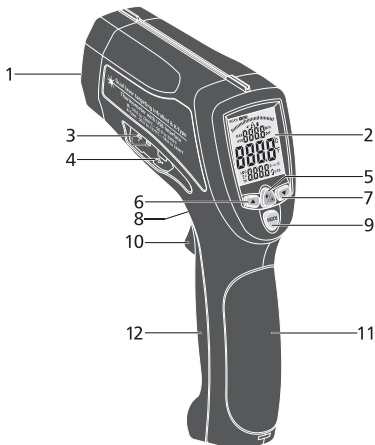


- Caution: if operation settings or procedures other than those described in these instructions are used, it could lead to exposure to dangerous radiation.

Miscellaneous

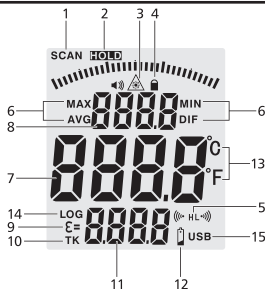
- Maintenance, service and repair work may only be carried out by a specialist/specialised workshop.
- For any questions concerning the measuring device that are not treated in these operating instructions, contact our technical support at the following address or telephone number:
Voltcraft®, 92242 Hirschau, Lindenweg 15, Telefon 0180 / 586 582 7.

6. OPERATING ELEMENTS



- | | | | |
|---|--------------------------------------|----|--------------------------------------------|
| 1 | IR sensor + laser outlet | 7 | Button ▼ |
| 2 | LCD | 8 | Button for opening the battery compartment |
| 3 | Temperature sensor connection socket | 9 | Button "MODE" |
| 4 | USB interface | 10 | Measuring button |
| 5 | Button "Backlight/Laser" | 11 | Battery compartment |
| 6 | Button ▲ | 12 | Handle |

7. DISPLAY ELEMENTS



- | | | | |
|---|-------------------------------------|----|---------------------------|
| 1 | Measuring indicator | 9 | Emissivity icon |
| 2 | HOLD indicator | 10 | Type K indicator |
| 3 | Laser icon | 11 | Emissivity / type K value |
| 4 | Continuous measurement icon | 12 | Battery symbol |
| 5 | High/low alarm indicator | 13 | °C/°F indicator |
| 6 | MAX/MIN/AVG/DIF indicators | 14 | Datalogger indicator |
| 7 | Temperature display | 15 | USB indicator |
| 8 | Temperature display MAX/MIN/AVG/DIF | | |

8. INSERTING THE BATTERY / REPLACING THE BATTERY



Make sure that the polarity is correct when inserting the batteries. Remove the batteries if you are not using the device for an extended period of time to prevent damage to the device by leakage. Leaking or damaged batteries may cause caustic burns if they come into contact with skin. Therefore, use suitable protective gloves to handle damaged batteries.

Keep batteries out of the reach of children. Do not leave batteries lying around openly. There is a risk of them being swallowed by children or pets.

Never try to disassemble batteries and avoid short-circuits and contact with fire.

Never try to charge non-rechargeable batteries. There is danger of explosion!

Replace the battery when the "Battery symbol" is displayed.

1. Press the button for opening the battery compartment, open the battery compartment lid to open the battery compartment.
2. Remove the used battery from the battery clip and connect a battery of the same type to the clip with the correct polarity. The battery clip is designed so that the battery can only be connected with the correct polarity. Do not apply any force when connecting the battery.
3. Close the battery compartment again by closing the battery compartment lid.

9. OPERATION

Mode of operation

Infrared thermometers measure the surface temperature of an object. The sensor of the device measures the heat radiation emitted, reflected and transmitted by the object and calculates a temperature value.

The emission level is a value used to describe the energy radiation characteristics of a material. The higher the value, the more capable the material is of emitting radiation. Many organic materials and surfaces have an emissivity of approx. 0.95. Metallic surfaces or shiny materials have a lower emissivity; therefore measuring results are inaccurate. For this reason, emissivity can be adjusted.

Measurement

1. Point the measurement aperture at the test object in as vertical a position as possible. Make sure that the object to be measured is not smaller than the IR measurement spot of the device (also see measuring spot size).
2. Press and hold down the measuring button. The measured value is displayed. The displayed value represents the average surface temperature of the IR measuring spot. During the measurement, "SCAN" is displayed.
3. When the measuring button is released, the last measured value is displayed for about another 7 seconds so that it can be read more comfortably. "HOLD" is displayed as well.
4. The device automatically shuts down 7 seconds after the measuring button has been released.
5. If the temperature measuring range is exceeded, "—" is displayed.



In order to determine the hottest spot of the test object, hold down the measuring button and scan the object to be measured in a zigzag movement until you have found the hottest spot. The highest temperature measured will be displayed in the top of the display as maximum temperature if the max temperature function is activated.

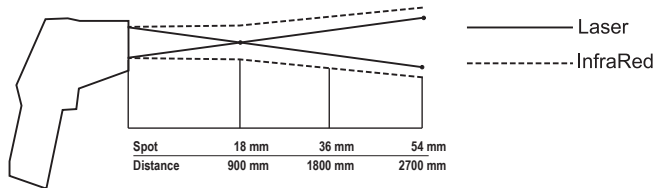
For accurate measuring results, the infrared thermometer must have adapted to ambient temperature. Always allow the device to reach ambient temperature when it is taken to a new location.

Shiny surfaces lead to false results. For compensation, shiny surfaces can be covered with adhesive tape or matte black paint. The device is not able to take measurements through transparent surfaces such as glass. It measures the surface temperature of the glass.

Extended measurements of high temperatures at short distances will heat up the measuring device and consequently result in faulty measurements. For accurate results, the following rule of thumb applies: The higher the temperature, the higher the measuring distance and the shorter the measurement duration should be.

IR measuring spot size - distance-to-spot ratio (D/S)

In order to obtain accurate measuring results, the object to be measured must be larger than the IR measuring spot of the IR thermometer. The measured temperature is the average temperature of the measured area. The smaller the test object, the shorter the distance to the infrared thermometer must be. See the following diagram for the exact measuring spot size. The diagram is also printed on the device. For exact results, the object to be measured should be at least twice the size of the measuring spot.



The ideal measuring distance for these two infrared thermometers is at the focal point of the two targeting lasers, because these offer the best measuring accuracy. The measuring spot size at the focal point is 18 mm.

Double targeting Laser

The double targeting lasers may be activated or deactivated. Press the measuring button to switch on the measuring device. Press the button for backlight and laser. When the laser is active, the "laser symbol" is displayed. By pressing the button for backlight and laser again, the targeting laser is deactivated and the "laser symbol" vanishes.

Backlight

Press the button for backlight and laser to switch the backlight on or off while the measuring device is switched on.

Setting the measuring unit (°C/°F)

Using the "▲" and "▼" buttons, you may select the the temperature unit "°C" (degrees Celsius) or "°F" (degrees Fahrenheit) while the measuring device is switched on.

Data transmission USB interface

The device has an integrated USB interface to transmit temperature data to and store the measured values on a computer. Connect the infrared thermometer to your computer by the following steps:

1. Activate the USB interface in MAX, MIN, DIF or AVG mode by pressing the button for backlight and laser. Press the button until the "USB" symbol appears on the display.
2. Start your computer with a Windows® 98SE or higher OS.
3. Connect the lateral mini USB socket of your measuring device to a free USB interface on your computer with the enclosed USB cable.

- The computer automatically detects a new device. Insert the supplied software CD into a CD drive and follow the installation instructions on the screen. Let the computer search for the new driver automatically.
- After successful installation, you may start the software.
- To deactivate the USB interface, press the button in MAX, MIN, DIF or AVG mode until the USB symbol vanishes from the display.



When the USB interface is activated, the infrared and measured contact temperature values may be transferred to a computer. In connection with the LOCK function and the included software, this enables you to establish a long-term temperature record. For further information, refer to the software help menu.

Contact temperature measuring function

In addition to the infrared measuring function, the device has a contact temperature measuring function. In addition to the included wire temperature sensor, all traditional type K temperature sensors with a mini plug can be connected to the device.

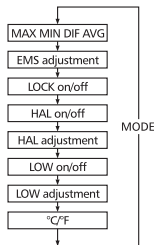
When you connect a type K temperature sensor with a mini plug to the type K temperature sensor socket, "TK" will be displayed in MAX, MIN, DIF or AVG mode when the device is switched on. When the measuring button is pressed, the measured contact temperature is displayed at the bottom of the display.



Observe that contract temperature measurement must only be conducted for standing objects that are free of voltage. Also observe that only contact temperatures up to the sensor's permissible temperature are allowed. The permissible temperature of the included wire sensor is -50 to +250 °C.

Setup menu

The setup menu allows you to select, activate or set the different functions of the device. The following illustration is a schematic of the settings menu. Use the "MODE" button to navigate within the menu. Use the "▲" and "▼" buttons to make adjustments.



Max, Min, difference and average function (MAX / MIN / DIF / AFG)

- Press the measuring button to switch on the measuring device.
- Press the "MODE" button until one of the MAX/MIN/DIF/AFG/LOG symbols flashes in the display.
 - MAX** (Device shows the highest value measured during the measurement in the top of the display)
 - MIN** (Device shows the smallest value measured during the measurement in the top of the display)

- **DIF** (Device shows the difference between the highest and the lowest temperature measured during the measurement in the bottom of the display)
 - **AVG** (Device shows the average value of the last infrared temperature measurement in the top of the display. AVG = Average)
 - **LOG** (Storage function)
3. Select the desired function with the “▲” or “▼” buttons.
 4. Press the measuring button to confirm your changes, or press the “MODE” button to move on to the next setting option.

Bargraph display

The bargraph display is located at the top of the display, showing the current reading in relation to the MIN/MAX values in a graphical format. The left end represents the MIN value of the current measuring process, the right end the MAX value.

Example:

The MIN value is 0 °C and the MAX value +100 °C. The current reading is +50 °C. In this case, the bargraph deflects into the middle of the display.

LOG storage function

The device is able to save up to 100 measured values.

1. Press the measuring button to switch on the measuring device.
2. Press the “MODE” key until one of the MAX/MIN/DIF/AVG/LOG symbols flashes in the display.
3. Press the “▲” or “▼” buttons until the LOG symbol flashes in the display.
4. Confirm your input with the measuring button.
5. Using the buttons “▲” or “▼”, select a memory location (001 – 100) where you want to save the infrared temperature reading to, then press the button “▼” once to show the previous memory location on the display.
6. Carry out an IR temperature measurement. After the measurement, the measured temperature is displayed. Press the button for backlight and laser to save the measured temperature at the selected memory position. The temperature value is saved in the selected memory position.



Example: If you want to save a reading to memory location 005, select memory location 004. Make the measurement and press the button for backlight and laser. The reading will be saved to memory location 005.

7. Proceed as described above, to store other values.
8. To retrieve the saved temperature values, use the “▲” or “▼” buttons to select the memory position you want to read. The saved temperature value is shown in the bottom part of the display.



If all memory positions are used, you may overwrite any memory position as desired.

To delete all saved readings in one go, proceed as follows:

1. While in LOG mode, press and hold the measuring key and select memory location "000" using the button "▼".
2. Now press the button for backlight and laser. A signal tone sounds and the display changes to memory location "001". All memory locations are now cleared and available again.

Setting the emissivity (EMS)

The measuring device is equipped with an emissivity setting. This allows you to obtain more accurate results for different materials and surfaces (also see "Operating principle").

1. Press the measuring button to switch on the measuring device.
2. Press the "MODE" button until the emissivity symbol flashes in the display.
3. Use the "▲" and "▼" buttons to adjust the emissivity to a value between 0.10 and 1.00 for the object to be measured.
4. Press the measuring button to confirm your changes, or press the "MODE" button to move on to the next setting option.
5. Your changes remain saved when the device is switched off.



You may also set the emissivity during measuring (while pressing and holding the measuring key) by pressing the buttons "▲" or "▼".

See the table following the specifications in these operating instruction for common materials and their corresponding emissivities.

Many organic materials have an emissivity of 0.95. Therefore, the factory emissivity setting is 0.95. The emissivity of a surface may also be determined by the contact temperature measurement function of the device. Measure the surface temperature with the contact temperature measuring function. Change the infrared thermometer's emissivity until the measured value corresponds to the value of the contact measurement function. To achieve the most accurate values with the contact temperature measurement function, a special K type surface temperature sensor is recommended (can be included optionally). However, this is only required for extremely precise measurements.

Continuous measurement (LOCK)

The measuring device is equipped with a continuous measurement function for long-term measurement.

1. Press the measuring button to switch on the measuring device.
2. Press the "MODE" button until the continuous measurement symbol flashes in the display.
3. Activate the continuous measurement function with the "▲" and "▼" buttons (display "ON").
4. If you now press the measuring button, the continuous measuring function will be activated. The measuring device now measures continuously until the measuring button is pressed again.



For continuous measurement operation, you may use the tripod as needed. The thread for the tripod is on the underside of the handle. The legs of the tripod can be pulled out.

Alarm functions

The measuring device has an alarm function to notify you when the measured value is not within a set temperature range. The alarm is given by a beeper. This function makes the measuring device perfect for temperature checks etc. Two temperature values can be set in the device (high and low alarm value). The alarm is triggered when the temperature is below the low alarm value or above the high one. The alarm values may be set and activated independently of each other.

To set and activate the high alarm (H = High), proceed as follows:

1. Press the measuring button to switch on the measuring device.
2. To activate the high alarm, press the "MODE" button until the high alarm symbol flashes in the display and "ON" or "OFF" is indicated (menu item "HAL ON/OFF" = high alarm ON/OFF)
3. Use the "▲" and "▼" buttons to activate ("ON") or deactivate ("OFF") the high alarm.
4. Press the "MODE" button until the high alarm symbols flash in the display and a temperature value is displayed (menu item "HAL ADJUST" = adjust high alarm)
5. Use the "▲" and "▼" buttons to enter the value which will trigger the high alarm when the temperature exceeds it.
6. Your changes remain saved when the device is switched off.

To set and activate the low alarm (L = Low), proceed as follows:

1. Press the measuring button to switch on the measuring device.
2. To activate the low alarm, press the "MODE" button until the high alarm symbol flashes in the display and "ON" or "OFF" is indicated (menu item "LAL ON/OFF" = low alarm ON/OFF)
3. Use the "▲" and "▼" buttons to activate ("ON") or deactivate ("OFF") the low alarm.
4. Press the "MODE" button until the low alarm symbols flash in the display and a temperature value is displayed (menu item "LAL ADJUST" = adjust low alarm)
5. Use the "▲" and "▼" buttons to enter the lower value which will trigger the low alarm when the temperature drops below it.
6. Your changes remain saved when the device is switched off.

°C/°F selection

1. Press the measuring button to switch on the measuring device.
2. Press the "MODE" button until the measuring unit flashes in the display.
3. Use the "▲" and "▼" buttons to select the desired measuring unit.
4. Press the measuring button to confirm your changes, or press the "MODE" button to move on to the next setting option.
5. Your changes remain saved when the device is switched off.



You may also set the unit of measurement while the HOLD function is activated (but the measuring key is not pressed or held down) by pressing the buttons "▲" or "▼".

10. MAINTENANCE AND CARE

Cleaning the lens

Remove loose particles with clean compressed air and wipe off remaining deposits with a fine lens brush. Clean the surface using a lens cleaning cloth or a clean, soft and lint-free cloth. To remove finger prints or other grease marks, the cloth can be slightly moistened with water or a lens cleaning fluid. Do not use any liquids containing acid or alcohol to clean the lens and do not use any other solvents. Do not use a cloth that is rough or linty to clean the lens. Avoid excessive pressure when cleaning.

Cleaning the casing

To clean the casing, use water and soap or a mild cleaning agent. Do not use any scouring agents or solvents!

11. DISPOSAL

Product



Electrical and electronic products do not belong in the household waste.

Dispose of the product according to the applicable statutory provisions at the end of its service life.

Remove any inserted (rechargeable) batteries and dispose of them separately from the product.

(Rechargeable) batteries



As the end user, you are required by law (Battery Ordinance) to return all used (rechargeable) batteries; disposal of them in the household waste is prohibited.

Contaminated (rechargeable) batteries are labelled with these symbols to indicate that disposal in the domestic waste is forbidden. The designations for the heavy metals involved are: Cd = Cadmium, Hg = Mercury, Pb = Lead (name on (rechargeable) batteries, e.g. below the trash icon on the left).

Used (rechargeable) batteries can be returned to collection points in your municipality, our stores or wherever (rechargeable) batteries are sold.

You thus fulfil the legal requirements and make your contribution to protecting the environment.

12. TECHNICAL DATA

Operating voltage:	9 V block battery
Response time:	150 ms
Spectrum:	8 – 14 μm
Emissivity:	adjustable from 0.1 to 1.00
Resolution:	0.1 °C (<1000 °C), 1 °C (>1000 °C)
IR measuring spot size:	50:1
Laser:	Power < 1 mW Laser class 2 Wave-length 630 - 670 nm
Operating temperature:	0 to +50 °C
Operating humidity:	10 – 90 %
Storage temperature:	-10 to +60 °C
Storage humidity:	< 80 %
Weight:	320 g
Dimensions:	52 x 240 x 155 mm

IR measurement

Temperature measuring range	Accuracy	Repeatability
-50 to +20 °C	± 4 °C	± 1.5 °C
+20 to +500 °C	± 1.5 % ± 1.5 °C	± 0.5 % or ± 0.5 °C
+500 to +1000 °C	± 2 %	
+1000 to +2200 °C	± 3 %	± 1 %

Contact temperature measurement (type K)

Temperature measuring range	Accuracy	Repeatability
-50 to 0 °C	± 3 °C	± 1.5 °C
0 to +1370 °C	± 1 % ± 2 °C	± 1.5 °C

Surface emissivity

Measured surface	Emissivity
Asphalt	0.90 to 0.98
Brick	0.93 to 0.96
Cement	0.96
Ceramic	0.90 to 0.94
Charcoal (powder)	0.96
Chromium oxides	0.81
Cloth (black)	0.98
Concrete	0.94
Copper oxides	0.78
Glass	0.90 to 0.95
Human skin	0.98
Ice	0.96 to 0.98
Iron oxide	0.78 to 0.82

Measured surface	Emissivity
Lacquer	0.80 to 0.95
Lacquer (matt)	0.97
Lather	0.75 to 0.80
Marble	0.94
Mortar	0.89 to 0.91
Paper	0.70 to 0.94
Plaster	0.80 to 0.90
Plastic	0.85 to 0.95
Rubber (black)	0.94
Sand	0.90
Soil	0.92 to 0.96
Textiles	0.90
Water	0.92 to 0.96



The emissivity values shown in the above table are approximate. Several parameters, e.g. geometry, surface quality, may affect the emissivity of an object.