

# ***VOLTCRAFT®***

- (D)** Bedienungsanleitung  
**IR 650-16D IR-Thermometer**  
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- (GB)** Operating Instructions  
**IR 650-16D IR thermometer**  
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# 1. Introduction

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Dear customer,

Thank you for purchasing this product.

This product complies with statutory national and European regulations.

To ensure that the product remains in this state and to guarantee safe operation, always follow the instructions in this manual.



These operating instructions are part of this product. They contain important information on setting up and using the product. Do not give this product to a third party without the operating instructions. Therefore, retain these operating instructions for reference!

For technical queries, please contact:

International: [www.conrad.com/contact](http://www.conrad.com/contact)

United Kingdom: [www.conrad-electronic.co.uk/contact](http://www.conrad-electronic.co.uk/contact)

## 2. Explanation of symbols

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The symbol with an exclamation mark in a triangle is used to highlight important information in these operating instructions. Always read this information carefully.



The arrow symbol alerts the user to the presence of important tips and notes on using the device.

### 3. Intended use

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The infrared thermometer is a measuring device for contactless temperature measurement. It determines the temperature by infrared energy that is emitted by an object and by its emission ratio. It is especially useful for measuring the temperature of hot, difficult to access or moving objects. The device measures the surface temperature of an object. It cannot measure through transparent surfaces such as glass or plastics.

The IR thermometer itself must not come into contact with the measured temperature. Always maintain sufficient safety distance and observe the permitted ambient conditions.

Diagnostic application for medical purposes is not permissible.

The emission level can be adjusted to the surface properties of the measured object at hand.

A 9 V block battery is required for the voltage supply. Do not use any other power supply.

For safety and approval purposes, you must not rebuild and/or modify this product. Using the product for purposes other than those described above may damage the components. In addition, improper use can cause injuries. Read the instructions carefully and store them in a safe place. Only make this product available to third parties together with its operating instructions.

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### 4. Package contents

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- Infrared thermometer
- 9 V monobloc battery
- Storage pouch
- Operating instructions

## Up-to-date operating instructions

To download the latest operating instructions, visit [www.conrad.com/downloads](http://www.conrad.com/downloads) or scan the QR code on this page. Follow the instructions on the website.



## 5. Features and functions

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- Dual target laser with focal point
- Integrated alarm function (optical and acoustic signal) for upper and lower alarm values
- Storage of the maximum, minimum, average and difference temperature during measurement.
- Adjustable emission level from 0.10 to 1.00
- Optional background illumination for the display
- 16:1 optics
- IR measurement range -40 to +650 °C
- Tripod thread

## 6. Safety instructions

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Read the operating instructions and safety information carefully. If you do not follow the safety information and information on proper handling in these operating instruction, we will assume no liability for any resulting personal injury or damage to property. Such cases will invalidate the warranty/guarantee.

### a) General information

- The device is not a toy. Keep it out of the reach of children and pets.
- Do not leave packaging material lying around carelessly. It may become a dangerous toy for children.



- Protect the product from extreme temperatures, direct sunlight, strong jolts, high humidity, moisture, flammable gases, vapours and solvents.
- If it is no longer possible to operate the product safely, stop using it and prevent unauthorised use. Safe operation can no longer be guaranteed if the product:
  - is visibly damaged,
  - is no longer working properly,
  - has been stored for extended periods in poor ambient conditions or
  - has been subjected to any serious transport-related stress.
- Always handle the product carefully. Jolts, impacts or a fall even from a low height may damage the product.
- Do not use in the immediate proximity of strong magnetic or electromagnetic fields or transmission aerials. These may distort the measurements.
- During outdoor use, the appliance must only be operated when the weather conditions are suitable and only with the appropriate safety devices.
- Water vapour, dust, smoke and/or vapours may impair the optical characteristics and lead to faulty measurements!
- Do not use the thermometer immediately after it has been brought from a cold environment into a warm room. The resulting condensation may destroy the interior components. In addition, the lens may become misty, which can lead to inaccurate measurements. Wait until the thermometer has reached the ambient temperature before using it.
- Always comply with the accident prevention regulations for electrical equipment when using the product in commercial facilities.
- Trained personnel must supervise the use of electrical appliances in schools, training facilities and DIY workshops.
- Consult a technician if you are not sure how to use or connect the product.
- Maintenance, modifications and repairs must be done by a technician or a specialist repair centre.
- If you have questions which remain unanswered by these operating instructions, contact our technical support service or other technical personnel.



## b) 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. Before using the thermometer, 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. Do not drive 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. Configuration or maintenance tasks must only be completed by a trained specialist who is familiar with the 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 in your local language, attach the appropriate sign to the laser.



### **ATTENTION**

**LASER RADIATION**  
**DO NOT STARE INTO THE BEAM**  
**LASER DIODE**

Wavelength: 630 - 670 nm  
Max. output power: < 1 mW  
**CLASS 2 LASER PRODUCT**  
EN 60825-1:2014

- Caution: Using equipment or procedures other than those described in these instructions could lead to exposure to dangerous radiation.



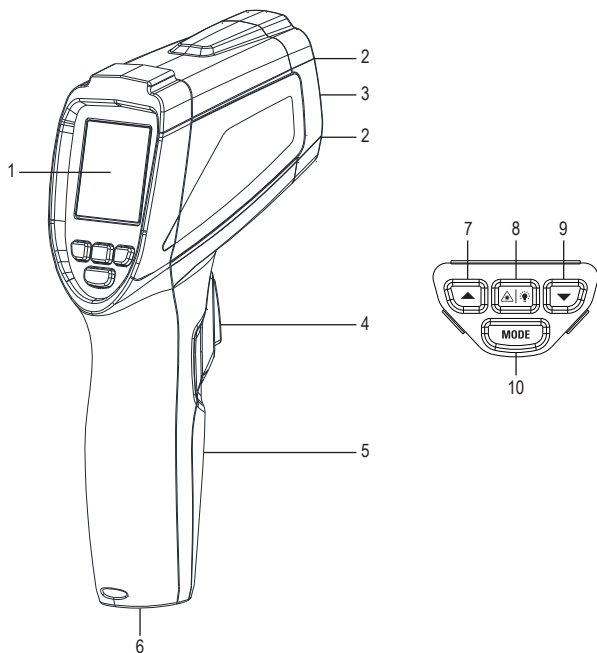
### **c) Battery**

- To prevent battery leakage, remove the battery if you do not plan to use the product for an extended period. Leaking or damaged batteries may cause acid burns when they come into contact with skin. Always use protective gloves when handling damaged batteries.
- Keep batteries out of the reach of children. Do not leave batteries lying around, as they constitute a choking hazard for children and pets.
- Batteries must not be dismantled, short-circuited or thrown into fire. Never recharge non-rechargeable batteries. Danger of explosion!



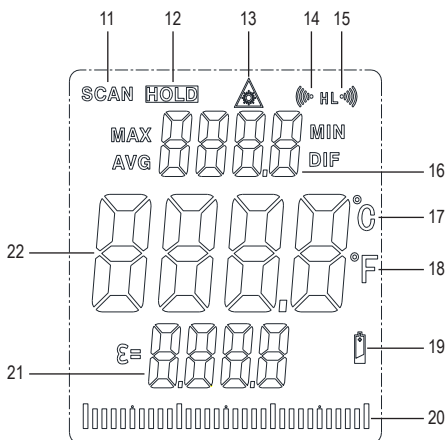
## 7. Product overview

---



- |   |                           |    |                        |
|---|---------------------------|----|------------------------|
| 1 | Display                   | 6  | Tripod thread          |
| 2 | Laser outlet              | 7  | ▲ button               |
| 3 | IR sensor                 | 8  | Laser/Backlight button |
| 4 | Measuring button          | 9  | ▼ button               |
| 5 | Battery compartment cover | 10 | <b>MODE</b> button     |

## 8. Display



- |   |                        |
|---|------------------------|
| 11 Measuring indicator <b>SCAN</b>            | 17 Degrees Celsius     |
| 12 Standby indicator <b>HOLD</b>              | 18 Degrees Fahrenheit  |
| 13 Laser symbol for activated target laser    | 19 Low-battery symbol  |
| 14 Alarm symbol for the upper limit value     | 20 Bar graph           |
| 15 Alarm symbol for the lower limit value     | 21 Emission level      |
| 16 <b>MAX/MIN/AVG/DIF</b> temperature display | 22 Temperature display |

## 9. Inserting/changing the battery

→ Replace the battery when the low-battery symbol appears on the display.

- Loosen the screw using a Phillips screwdriver. Remove the battery compartment cover.

- Remove the flat battery from the battery clip and connect a new battery of the same type with the correct polarity to the battery clip.  
The battery clip is constructed so the battery can be connected only with the correct polarity. Do not use force when plugging in the battery.
- Replace the cover of the battery compartment again and secure it with the previously loosened screw.

## 10. Operation

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### a) Function

- Infrared thermometers measure the surface temperature of an object. The sensor of the device analyses the emitted and reflected heat radiation of the object measured, and converts this information into a temperature value.
- Emissivity is used to describe the energy emission characteristics of a material. The higher the emission level, the more radiation a material can emit.
- Many organic materials and surfaces have an emission level of approx. 0.95.
- Metallic surfaces or shiny materials have low emissivity. This results in imprecise measuring values. For this reason, the emission level can be set.

### b) Measuring

- Point the measuring hole, preferably at a 90° angle, at the object to be measured. Make sure the object to be measured is not smaller than the IR measuring spot of the device.
- Press and hold the measuring button. The measuring value is indicated on the display. The displayed measurement value corresponds to the average surface temperature of the IR measuring spot. During measurement, the **SCAN** indicator is shown on the display.
- After releasing the measuring button, the last measured value will be displayed for approx. 8 seconds for improved readability. The **HOLD** indicator also appears.
- About 8 seconds after releasing the measuring button, the device turns off automatically.
- Horizontal bars appear on the display if the temperature range is exceeded.

- To determine the hottest spot on the measured object you have to scan the object, with the measuring button held down, in a zigzag motion until you find the hottest spot. When the MAX temperature function is active, the highest measured temperature appears at the top of the display during measurement.

In order to obtain exact measured values, the infrared thermometer has to be adjusted to the ambient temperature. Allow the device to adjust to the ambient temperature after relocation.

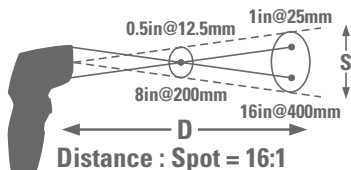
Shiny surfaces affect the measured result. To compensate, the shiny part of the surface can be covered with adhesive tape or matt black paint.

The device cannot measure through transparent surfaces such as e.g. glass. Instead, it measures the surface temperature of the glass.

Prolonged measurement of high temperatures at near measuring distances leads to self-heating of the measuring device and thus to inaccurate measurements. In order to obtain exact measured values, remember the following rule of thumb: The higher the temperature, the greater the measuring distance and the shorter the measuring time.

### c) IR measuring spot size - Ratio measuring distance:measuring surface

- In order to obtain precise measuring results, the measured object must be larger than the IR measuring spot. The measured temperature is calculated using the average temperature of the measured area. The smaller the object, the closer it must be to the thermometer.
- The exact size of the measuring spot is shown in the following diagram. It is also indicated on the thermometer. To ensure precise measurements, the measured object should be at least twice the size of the measuring spot.



→ The optimal measuring distance for this infrared thermometer is the focal point of both target lasers as this affords the greatest measuring accuracy. The size of the measuring spot at the focal point is 12.5 mm.

- The smallest measurement diameter is achieved up to a distance of 20 cm. The measurement diameter is 12.5 mm. However, keep sufficient distance to avoid faulty measurement due to heating of the IR thermometer.
- Example: At a distance of 2 m, the measurement diameter is 125 mm.

#### d) Dual target laser

- The dual target laser can be activated and deactivated. Press and hold the backlight/laser button.
- When the laser is activate, the laser symbol appears on the display.
- Press the backlight/laser button again to deactivate the target laser. The laser symbol disappears.
- The target laser is constructed in dual design and marks the inner, approximate edge area of the measuring surface (approx. 90%).
- When both laser spots meet, the smallest measuring surface has been achieved. The latter has a diameter of 12.5 mm
- With larger distances, the two laser spots move apart, analogue to the measuring surface.

#### e) Backlight

When the device is on, press the backlight/laser button to turn the display backlight on/off.

#### f) Max., min., differential and average measuring function

- When the measuring button is released, the last measured value is frozen on the display. The standby indicator **HOLD** lights up on the display.
- Repeatedly press the **MODE** button. One of the following indicators and the associated measured value appears on the display:

**MAX:** the highest measured value of the last measurement

**MIN:** the lowest measured value of the last measurement

**AVG:** Average value of the last measurement

**DIF:** Difference between highest and lowest measured value of the last measurement

## g) Bar graph

- The bar graph can be used to graphically display the current measured value in relation to the MIN/MAX values. The left end represents the MIN value of the current measurement, the right end the MAX value.
- Example: The MIN value is 0 °C and the MAX value +100 °C. The current measurement is +50 °C. In this case the bar graph deflects to the middle of the display.

# 11. Settings

---

## a) Emission level

The measuring device allows setting the emission ratio. Thus, different materials and surfaces can be measured with exact results.

- Hold the **MODE** button for approx. 1 second to access the setup menu. The symbol for the emission level flashes.
- Press the ▲ or ▼ button to change the value. Press and hold the button for fast setting.
- Press the measuring button to confirm your input or press the **MODE** button to proceed to the next setting.
- When the device is switched off, the set value is retained.

————→ Following the technical data you will find a table with typical materials and their emission level.

## b) Temperature unit

- Hold the **MODE** button for approx. 1 second to access the setup menu.
- Press the **MODE** until measuring unit flashes on the display.
- Use ▲ and ▼ to select the desired measuring unit.
- Press the measuring button to confirm your input or press the **MODE** button to proceed to the next setting.
- When the device is switched off, the set value is retained.

## c) Alarm

The measuring device is equipped with an alarm function on underrunning/exceeding preset temperature values. The alarm features a signal tone as well as lighting up the display red.

This function makes the measuring device ideal for temperature monitoring, etc.

The device has two adjustable temperature values (upper and lower alarm value). The alarm is triggered on underrunning the lower alarm value or exceeding the upper alarm value.

Those values can be adjusted and activated independently. The upper alarm limit value, however, must be higher than the lower alarm limit value.

Proceed as follows to set and activate the upper alarm value (H = High):

- Hold the **MODE** button for approx. 1 second to access the setup menu.
- Press the **MODE** button until the display flashes the alarm symbol and the letter **H** for the upper threshold value.
- Press the **▲** or **▼** button to change the value.
- Press the laser/backlight button to turn the alarm on or off.
- Press the measuring button to confirm your input or press the **MODE** button to proceed to the next setting.
- When the device is switched off, the set value is retained.

Proceed as follows to set and activate the lower alarm value (L = Low):

- Hold the **MODE** button for approx. 1 second to access the setup menu.
- Press the **MODE** button until the display flashes the alarm symbol and the letter **L** for the lower limit value.
- Press the **▲** or **▼** button to change the emissivity.
- Press the laser/backlight button to activate (ON) or deactivate (OFF) the alarm.
- Press the measuring button or **MODE** to confirm your input.
- When the device is switched off, the set value is retained.

### d) Switch-off after 10 minutes of continuous operation (TRIG function)

If you use the TRIG function, the product switches off automatically when the measuring button is pressed for longer than 10 minutes without interruption. This means that unwanted continuous measurement can be prevented if, for example, the measuring button is pressed accidentally.

- Hold the **MODE** button for approx. 1 second to access the setup menu.
- Press the **MODE** button until **TRIG** flashes on the display.
- Press the laser/backlight button to activate (ON) or deactivate (OFF) the function.

## 12. Care and cleaning

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Never use aggressive detergents, rubbing alcohol or other chemical solutions, as these may damage the casing or cause the product to malfunction.

### a) Cleaning the lens

- Remove loose particles with clean compressed air and wipe off remaining residues with a fine lens brush.
- Clean the surface of the lenses using a lens cloth or a soft, lint-free cloth.
- The cloth can be moistened with water or a lens cleaning solution to remove fingerprints and other residues.
- Do not use any acidic, alcoholic or other solvents or rough, linty cloth to clean the lens.
- Avoid applying too much pressure when cleaning the lens.

### b) Cleaning the housing

Use a clean, lint-free, antistatic and slightly damp cleaning cloth.



## 13. Troubleshooting

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The IR thermometer you have purchased was designed using the latest technology and is safe to use.

However, problems and malfunctions may still occur.

Therefore, we would like to describe here how you can solve any problems.

Error	Possible cause
The device does not work.	Is the battery empty?
Incorrect measurement display.	Is the wrong emission level set?
	Is the lens dirty?
	Is the measuring surface covered with a glass pane?
	Was the permissible operating temperature exceeded or fallen below?

## 14. Disposal

---

### a) Product



Electronic devices are recyclable waste and must not be disposed of in the household waste. Always dispose of the product according to the relevant statutory regulations. Remove any inserted batteries and dispose of them separately from the product.

## b) Batteries



You are required by law to return all used batteries (Battery Directive). Batteries must not be placed in household waste.

Batteries containing hazardous substances are labelled with this symbol to indicate that disposal in household waste is forbidden. The abbreviations for heavy metals in batteries are: Cd = Cadmium, Hg = Mercury, Pb = Lead (indicated on the battery, e.g. below the trash icon on the left).

Used batteries can be returned to local collection points, our stores or battery retailers.

You thus fulfil your statutory obligations and contribute to the protection of the environment.

## 15. Technical Data

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Power supply .....	9 V block battery
Temperature range .....	-40 to +650 °C
Resolution.....	0.1 °C
IR optics.....	16:1
Emission level.....	0.1 – 1.00 (adjustable)
Response time.....	150 ms
Laser class .....	2
Laser wave length .....	630 – 670 nm
Laser output.....	<1 mW
Operating conditions.....	0 to +50 °C, 10 – 90 % RH
Storage conditions.....	-10 to +60 °C, <80 % RH
Dimensions.....	198 x 112 x 55 mm
Weight .....	177 g

Measurement range	Accuracy	Reproducibility
<0 °C	± (2 °C + 0.2 °C per degree)	±0.8 % or ±1 °C (whichever is greater)
≥0 °C	±1.5 °C or ±1.5 % (whichever is greater)	

### The emission levels of different surfaces

Surface	Emission level
Asphalt	0.90 – 0.98
Concrete	0.94
Chromium oxide	0.81
Ice	0.96 – 0.98
Ferric oxide	0.78 – 0.82
Earth	0.92 – 0.96
Hard plaster	0.80 – 0.90
Glass	0.90 – 0.95
Rubber (black)	0.94
Ceramic	0.90 – 0.94
Carbon (powder)	0.96
Copper oxide	0.78
Varnish	0.80 – 0.95

Surface	Emission level
Varnish (matt)	0.97
Marble	0.94
Human skin	0.98
Mortar	0.89 – 0.91
Paper	0.70 – 0.94
Plastic	0.85 – 0.95
Sand	0.90
Foam	0.75 – 0.80
Fabric (black)	0.98
Textiles	0.90
Water	0.92 – 0.96
Cement	0.96
Brick	0.93 – 0.96

→ The emission ratios in the above table are approximate values. Parameters such as the shape and characteristics of the material can affect the emissivity of an object.

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