

# Wireless Infrared Thermometer

CMAC 4230



User Manual Part No. 32107300-EN

Revision B

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## User Manual

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**⚠ Read this manual before using this product. Failure to follow the instructions and safety precautions in this manual can result in serious injury, damage to the product, or incorrect readings. Keep this manual in a safe location for future reference.**

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Limited Warranty

## WARRANTY

Subject to the terms and conditions contained herein, SKF warrants to the Buyer that for the warranty period indicated below the products sold by SKF that are listed below (the "Products"), when properly installed, maintained and operated, will be free from defects in material and workmanship and shall be fit for the ordinary purposes for which the Products are designed.

### BUYER'S LIMITED REMEDIES

This limited warranty defines SKF's sole and exclusive liability and Buyer's sole and exclusive remedy for any claim arising out of, or related to, any alleged deficiency in any Product sold by SKF, even if such claim is based on tort (including negligence or strict liability), breach of contract, or any other legal theory. If the Product does not conform to this limited warranty, Buyer must notify SKF or SKF's authorized service representative within thirty (30) days of discovery of the nonconformity; provided, however, that SKF shall not be liable for any claim for which notice is received by SKF more than thirty (30) days following the expiration of the applicable warranty period for the Product. Upon receipt of timely notification from Buyer, SKF may, at its sole option, modify, repair, replace the Product, or reimburse Buyer for any payment made by Buyer to SKF for the purchase price of the Product, with such reimbursement being pro-rated over the warranty period.

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Except as expressly provided below, the warranty period for each Product shall commence on the date the Product is shipped by SKF to Buyer.

#### 90-DAY WARRANTY

Products warranted for ninety (90) days by SKF are as follows: cable assemblies, MARLIN QuickConnect (MQC), magnetic temperature probes, and all refurbished equipment.

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Products warranted for one (1) year by SKF are as follows: all Microlog products and accessories, all Microlog Inspector applications including hand-held computers, all MARLIN data managers (MDM), all MARLIN Condition Detectors (MCD), all Wireless Machine Condition Detectors (WMCD), all Multilog On-line Systems (IMx), all Multilog Condition Monitoring Units (CMU, TMU), Multilog Local Monitoring Units (LMU), all Multilog Wireless Monitoring Units (WMx), all Wireless Monitoring Systems V/T, all Vibration PenPlus, all Machine Condition Advisers, all transmitters, all Monitor Interface Modules (MIM), all Machine Condition Transmitters (MCT), MicroVibe P and Custom Products with the prefix of CMCP (with the exception of any consumable or expendable items).

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For all On-line Systems that have satisfied Criteria 1 and 2 below, the warranty period shall be either thirty (30) months from the date the On-line System is shipped by SKF to Buyer, two (2) years from the date the On-line System is installed and commissioned by SKF, or two (2) years from the date on which the installation of the On-line System has been audited and commissioned by SKF or its authorized service representative, whichever period ends first.

Criteria 1. Devices used with a Multilog On-line System (IMx), Multilog Condition Monitoring Unit (CMU), Multilog Local Monitoring Unit (LMU), including, but not limited

to, the sensing device, the interconnect cabling, junction boxes, if any, and the communications interface, must consist only of SKF-supplied or SKF-approved devices and/or components. The computer provided by Buyer must meet the requirements stipulated by SKF.

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The exclusive remedies provided in this limited warranty shall not be deemed to have failed of their essential purpose so long as SKF is willing and able to perform to the extent and in the manner prescribed in this limited warranty.

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CM-F0001 (Revision S, January 2011)



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# Introduction to the CMAC 4230 Wireless Infrared Thermometer

## Application

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The CMAC 4230 is a contactless temperature measuring device with an integrated Bluetooth™ and is designed for industrial use in hazardous areas.

## ⚠ Safety Instructions

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**⚠ WARNING!** *Your safety is extremely important. Read and follow all warnings in this document before handling and operating the equipment. You can be seriously injured, and equipment and data can be damaged if you do not follow the safety warnings.*

- **WARNING!** - Warning messages can alert you to an operating procedure, practice, condition, or statement that must be strictly observed to prevent equipment damage or destruction, or corruption or loss of data.
- **IMPORTANT:** Important messages means that there is a risk of product or property damage if the instruction is not heeded.

### Personnel Safety

Dress properly. Do not wear loose clothing or jewelry. Keep your hair, clothing, and gloves away from moving parts.

Do not overreach. Keep proper footing and balance at all times to enable better control of the device during unexpected situations.

Use safety equipment. Always wear eye protection. Non-skid safety shoes, hard hat, or hearing protection must be used for appropriate conditions.

Do not repair or adjust energized equipment alone, under any circumstances. Someone capable of providing first aid must always be present for your safety.

To work on or near high voltage, you should be familiar with approved industrial first aid methods.

Always obtain first aid or medical attention immediately after an injury. Never neglect an injury, no matter how slight it seems.

### Device Safety

Use only accessories that are recommended by the manufacturer.

Do not attempt to open the device.

Device service must be performed only by qualified SKF repair personnel.

Use only accessories recommended or provided by SKF Reliability Systems.

### **Energized equipment**

Never work on energized equipment unless authorized by a responsible authority. Energized electrical equipment is dangerous. Electrical shock from energized equipment can cause death. If you must perform authorized emergency work on energized equipment, be sure that you comply strictly with approved safety regulations.

### **Hazardous Locations**

The device must not be opened inside the hazardous area.

The batteries must be changed only outside the hazardous area.

Additional batteries must not be carried in the hazardous area.

Only the approved battery types must be used.

In potentially explosive areas, the device must be operated only when in its leather pouch. Please ensure that the leather pouch is always closed completely and is undamaged while using.

Only the accessories approved by the manufacturer must be used.

Avoid using the device in corrosive acidic or alkaline mediums.

The supplied thermocouple must be used only outside the hazardous area.

### **Avoid Submerging in Water**

This equipment has been designed to be splash and dust resistant. However, avoid direct contact with water, wet surfaces, or condensing humidity. If the instrument is subjected to these conditions, adverse operation may result, and there is a risk serious injury or damage should electrical shock or fire occur. Allow the instrument to dry thoroughly before operation. Avoid opening the card slot door in locations where contact with water or other contaminants may occur.

### **Avoid Damage**

To avoid costly damage to the instrument or injury from a falling instrument, place the instrument on a solid stable surface when not in use and do not place any heavy objects on it.

Use a damp, clean cloth for cleaning. Do not use cleaning fluids, abrasives, or aerosols. They could cause damage, fire, or electrical shock.

### **Avoid Battery Compartment Exposure**

Do not open the battery compartment in a hazardous area, or in locations where contact with water or other contaminants may occur.

## Errors and load restrictions

If there is a possibility of the safety of the device being hampered, the device must be taken out of operation and removed from the hazardous area immediately. Accidental re-commissioning of the device must be prevented. We recommend sending the device to the manufacturer for examination.

The safety of the device may be at risk if, for example:

- damages are visible on the casing
- the device has been subjected to excessive loads for which it is not designed
- the device has been improperly stored
- the device has been damaged in transit
- labels on the device are illegible
- malfunctions occur -obvious measuring inaccuracies occur
- measurements using the device are not possible any longer
- permitted threshold values have been exceeded

## Laser Safety

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The following safety regulations must be also observed:



***Warning! Laser beam! Do not look directly into the laser beam! Do not aim the beam at other people! Danger of eye damage!***

Laser class 2

Power < 1 mW

Wave length 635 nm

## Technical specifications


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Measuring range:	-30 to +900 °C
Display resolution:	0.1 °C
Ambient temperature:	0 to +50 °C; laser operation up to a maximum of 45 °C
Storage temperature:	-20 to +50 °C (without batteries)
Batteries / power supply:	2 x LR06 (AA) type approved in compliance with IEC
Emissivity:	0,10 to 1.50 (0.95 preset)
Measuring spot marking:	3 point laser marking

## Introduction to the CMAC 4230 Wireless Infrared Thermometer

### Technical specifications

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Optical resolution (standard optics):	60:1 (19 mm measuring spot for 1.15 m)
Accuracy (+25 °C):	± 0.75% of the measured value or ± 0.75 K, whichever is greater (± 2 K for measurement objects below -5 °C)
Ambient derating (at +25 °C ± 25 K):	< 0.05 K/K or < 0.05 %/K, whichever is greater
Reproducibility:	± 0.5% of the measured value or ± 0.5 K, whichever is greater; ± 1K for measurement objects below -5 °C
Spectral sensitivity:	8-14 µm
Response time:	250 ms (95%)
Dimensions:	200 x 170 x 50 mm
Weight:	Approximately 600 g
CE mark:	 0102

<b>Manufacturer:</b>	<b>Model (LR6):</b>
Varta	Alkaline No. 4806 LR6
Varta	Alkaline Extra Longlife No. 4006
Varta	Alkaline Maxi Tech No. 4706
Varta	Alkaline Electric Power No. 8006
Varta	No. 4706 Alkaline LR6
Varta	LR6 High Energy No. 4906
Duracell	Alkaline
Duracell	Professional Alkaline Battery Procell
Duracell	Alkaline Ultra
Duracell	Ultra M3 MN1500 LR6
Duracell	Plus MN1500 LR6
Duracell	Procell MN1500 LR6
Panasonic	Alkaline Power Line Industrial Battery LR6
Panasonic	Powermax 3 LR6
Eveready	Alkaline Energizer
Eveready	Energizer No. E91
GP	Super Alkaline Battery 15A LR6
Daimon	Alkaline
Rayovac	Maximum Alkaline Battery
Double Lion King	Alkaline Battery
RS	Alkaline

### **Bluetooth™ configuration**

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The CMAC 4230 allows data transfer via Bluetooth™. System requirements:

- Windows-compatible computer (operating systems 98, ME, 2000, XP or higher).
- Bluetooth system completely installed on the computer (not included in the scope of supply).



## Functional description and operating instructions

- Please take the time to read through this operating manual carefully to ensure that you are familiar with all the functions of your CMAC 4230.

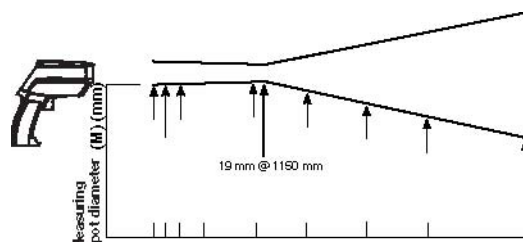
### Operation

All objects with a temperature above absolute zero radiate infrared energy that spreads in all directions at the speed of light. If an infrared thermometer is aimed at a measurement object, the lens gathers the energy and focuses it on an infrared sensor. The sensor reacts by generating a voltage signal that is directly proportional to the absorbed energy. The microprocessor-controlled electronic unit of the device can determine and display the current temperature using additional parameters. Measurement objects with a shiny or polished surface not only radiate energy, but also reflect a part of the radiation from their surroundings.

An emissivity factor between 0.1 and 1.5 takes account of this fact so that only the actually radiated (and not the reflected) energy is included in the calculation of the measured value. The majority of applications are measured with an emissivity of 0.95. The CMAC 4230 is therefore preset to 0.95 and can be adjusted in steps of 0.01 depending on the application. Emissivity range over 1.00 is intended for applications, where adjacent measurement objects having different temperatures are to be measured. For example, this is the case if there are two conveying lines with different temperatures and the temperature of the colder one is to be measured. The radiated reflected energy would thereby falsify the measurement and hence a correct result would be impossible. The temperature can now also be measured accurately using the emissivity setting  $> 1.00$  by way of a one-time reference measurement using a contact thermometer.

### Measuring marking

Keep in mind that the measured part of the object surface (3 point measuring spot marking) changes with the increasing measuring distance as shown in the figure.



19 mm @ 1150 mm

Focus point E:M = 60:1 Distant field E:M = 35:1

The ratio between the measuring distance and measuring spot diameter is approximately 60: 1 at distance (e) between the sensor and the measurement object

(mm) the focus point and approximately 35:1 in the distant field (> 10 m). To take continuous readings, set the **LOCK** switch in the battery compartment to **On** and press the measurement button (the laser does not remain on continuously). Reset the **LOCK** switch to **Off** for the normal operation. The laser sight makes sighting a measurement object easier. Laser points indicate the exact diameter of the measuring spot. Use the **LASER** function key for switching the laser on and off by keeping the measurement button pressed. The laser icon (refer to 8.5 Display screen) indicates the switched-on laser.

## Measurement

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Aim at the object to be measured and press the measurement button. The measured temperature appears in the display. It is visible in the display for seven seconds after releasing the measurement button. If another button is not pressed, the device switches off automatically after this time. Selected functions remain set and the function selection menu returns to the initial position. To recall the last measured value, press **ENTER** without pressing the measurement button.

## Operating and display elements

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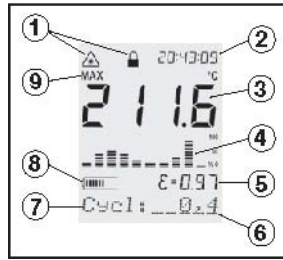
- (A) Acoustic/optical warning signal
- (B) Display
- (C) Arrow keys
- (D) Enter key
- (E) 11 setting switches
- (F) Measurement button
- (G) Tripod connection
- (H) 6 function keys

### To select the functions:

- Switch on the device by pressing the measurement button (F).
- Press the appropriate function key (H).
- To change the functions, either press **ENTER** or press the current function key first and then the desired one.



## Display screen



- (1) Status and warning icon
- (2) Time
- (3) Measured value
- (4) Graphical display of the measured value
- (5) Emissivity
- (6) Status line
- (7) Mode display
- (8) Battery status
- (9) MAX, MIN, DIFF Icon

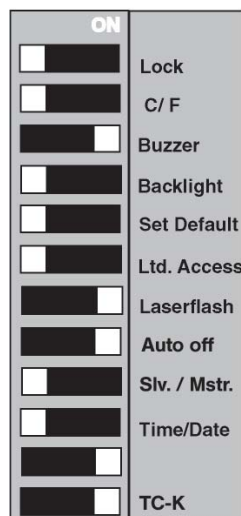
## Settings

Open the battery compartment. You can set the DIL switches.

Lock:	(ON) locks the measurement button.
°C / °F:	Toggling the display between °C and °F (the time and date format also change).
Buzzer:	(ON) acoustic alarm.
Backlight:	(ON) display light
Set default:	Reset to the factory defaults.
Ltd. Access:	Function keys are disabled.
Laserflash:	The laser marking starts blinking when the alarm values are exceeded.
Auto Off:	(On) The turn-off time does not extend automatically after receiving a command from the software (applicable only to the operation in the master mode)
Slv./Mstr.:	Toggles the Bluetooth™ mode.
Time/Date:	Toggles between the date and time display.
TC-K:	Thermocouple type Temperature range for the K type: -30 to +400 °C

➤ The thermocouple must be used only outside the Hazardous area!

### Factory defaults DIL switch



## Setup

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### Slave mode (passive mode/Bluetooth™)


The thermometer is constantly “on” in this mode. This is advantageous when the temperature needs to be monitored continuously.


- When thermometer is operated continuously, batteries discharge considerably quickly when compared with those used intermittently.



### How to Establish a Connection with the Data Manager

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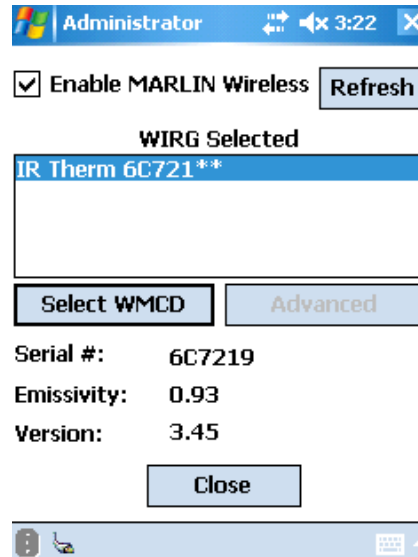
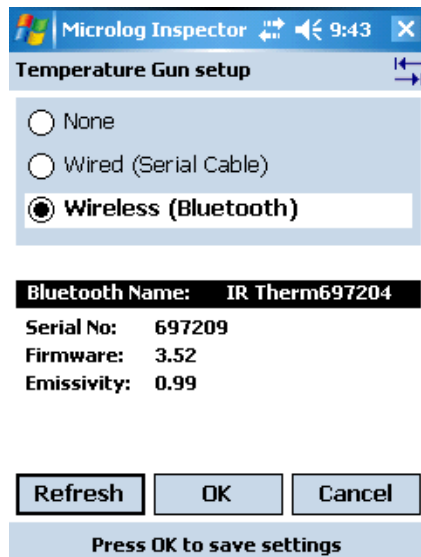
(Microlog Inspector only) On the Microlog Inspector, the WIRG Connection icon () displays at the bottom of the screen during temperature data collection if the Microlog Inspector is connected with the WIRG.

(MARLIN only) On the MARLIN, the Wireless Connection icon () at the bottom of the screen displays the data manager’s connection status with the WIRG, and allows access to the **WIRG Setup** screen. The icon appears blue when the data manager detects and establishes communication with the WIRG, and gray when the wireless connection is disabled, or when the data manager does not detect the WIRG.

#### To set up the WIRG for communication:

- Power on the WIRG and enable its Bluetooth setting.
- Power on your Microlog Inspector / MARLIN.
- (Microlog Inspector only) On the **Settings** display, select the **Temperature Gun** icon to display the **Temperature Gun Setup** screen.

(MARLIN only) Press the Wireless Connection icon in the MARLIN’s taskbar. The **WIRG Setup** screen displays.



The Microlog Inspector **Temperature Gun setup** Display. The MARLIN WIRG Setup Display.

- (Microlog Inspector only) Select the **Wireless (Bluetooth)** option to enable the WIRG / Microlog Inspector connection.

(MARLIN only) Check the **Enable MARLIN Wireless** check box to enable the WIRG / MARLIN connection.

- If the Microlog Inspector's / MARLIN's Bluetooth setting was disabled, it will automatically be enabled.
  - The WIRG is disabled by default. Once you have enabled the WIRG on the Microlog Inspector / MARLIN, it will remain enabled until you disable it again, even after exiting Microlog Inspector / MARLIN.
- (Microlog Inspector only) Press the **Refresh** button to initiate discovery and establish connection with the WIRG within about a ten foot radius of the Microlog Inspector.

- Microlog Inspector can only connect to one WIRG at a time. Make sure that only one WIRG is powered on when attempting to establish connection. If Microlog Inspector detects more than one WIRG, the message, **Too many Devices**, displays. If this message displays, make sure only one WIRG is powered on and press **Refresh** again.

(MARLIN only) Press the **Refresh** button to update the displayed list with the names of all WIRGs within about a ten foot radius of the MARLIN.

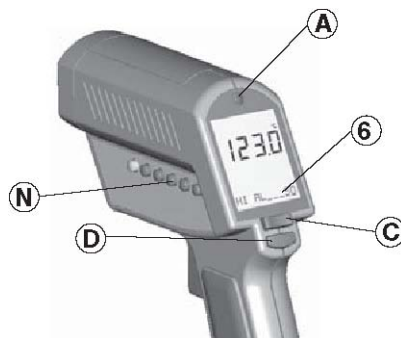
- (MARLIN only) From the list, highlight the name of WIRG that you wish to connect to.
- (Microlog Inspector only) Press **OK** to save your WIRG setup, or press **Cancel** to exit the **Temperature Gun setup** display without saving your changes.

(MARLIN only) Press the **Select WMCD** button to connect to the highlighted WIRG, or press the **Close** button to exit the **WIRG Setup** display without saving your changes.

- (Microlog Inspector only) The Microlog Inspector stores the selected WIRG for all operators. This eliminates the need for the operator to select the same WIRG each time he or she logs in.  
(MARLIN only) The MARLIN data manager stores the selected WIRG with the currently logged in operator name. This eliminates the need for the operator to select the same WIRG each time he or she logs in.
- (Microlog Inspector only ) Once the Microlog Inspector establishes communication with the WIRG, the WIRG's name (**IR Therm697204**), serial number, firmware version, and emissivity display in the bottom portion of the screen.  
(MARLIN only) Once the MARLIN establishes communication with the selected WIRG, two asterisks appear next to the WIRG's name in the list (**IR Therm697204\*\***), and the WIRG's name, serial number, emissivity and firmware version display in the bottom portion of the screen.

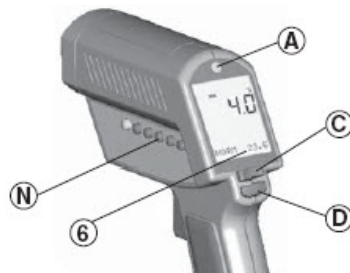
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### High alarm (upper limit)



The setting of a temperature value, when exceeded, should initiate an optical (blinking red LED (A) and blinking laser) and an acoustic warning signal. Press **SETUP** (N) twice. Change the current setting (6) using arrow keys (C). Confirm the input by pressing **ENTER** (D).

### Low alarm (lower limit)



The setting of a temperature value, which when drops below this value should initiate an optical (blinking green LED (A) and blinking laser) and an acoustic warning

signal. Press **SETUP** (N) three times. Change the current setting (6) using arrow keys (C). Confirm the input by pressing **ENTER** (D).

### Time



Set the time (2) (appears in the display, in the data memory and in the printout). Press **SETUP** (N) four times. Change the setting using arrow keys (C) and **ENTER** (D). Press **SETUP** again to confirm the change.

### Date



Set the date (2) (appears in the data memory and in the printout). Press **SETUP** (N) five times. Change the setting using arrow keys (C) and **ENTER** (D). Press **SETUP** again to confirm the change.

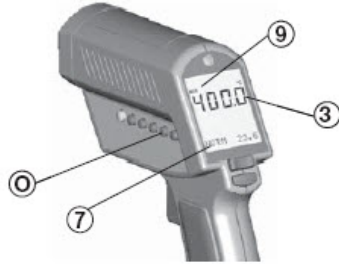
### Offset



This function adds or subtracts the configured offset value ( $\pm 10$  °C) from every measured temperature value. You can minimize (permissible) deviations in the display of different devices or improve the accuracy within a restricted temperature range when emissivity is set correctly. Press **SETUP** (N) until "Offset" appears in the display. Select the value using arrow keys (C) and confirm by pressing **ENTER** (D). The icon (1) appears in the display.

## Setting the mode

### Max value



To activate the maximum value mode, press **MODE** (0) until the **MAX** icon (9) appears. The highest measured value (3) is always displayed as long as the measurement button is kept pressed. The currently measured value appears in the status line (7).

### Min value



To activate the minimum value mode, press **MODE** (0) until the **MIN** icon (9) appears. The lowest measured value (3) is always displayed as long as the measurement button is kept pressed. The currently measured value appears in the status line (7).

### Min-Max range



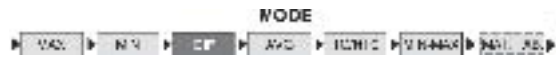
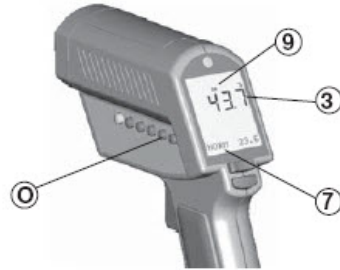
## Functional description and operating instructions

### Setting the mode



To display the minimum and maximum temperature values determined during the measurement in the status line, press **MODE** (0) until both values are displayed (6).

### Difference value



To activate the difference value mode, press **MODE** (0) until the **DIF** icon (9) appears. The difference between the highest and lowest measured temperature (3) is always displayed as long as the measurement button is kept pressed. The currently measured value appears in the status line (7).

### Average Value



To activate the average value mode, press **MODE** (0) until the **AVG** icon (9) appears. The average of measured temperatures (3) is calculated and displayed as long as the measurement button is pressed. The current measured value appears in the status line (7).

### Sensor port

This function must be executed only outside the hazardous area.

#### To determine an unknown emissivity:

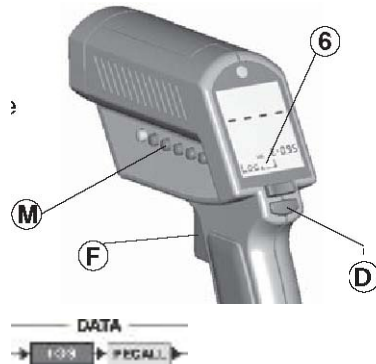
- Connect the sensor to the port at the end of the handle.



- Press **MODE** until the corresponding sensor icon appears in the display. The temperature measured by the sensor appears in the status line. The infrared measured value appears in the main display screen.

## Data

### Storing measured values



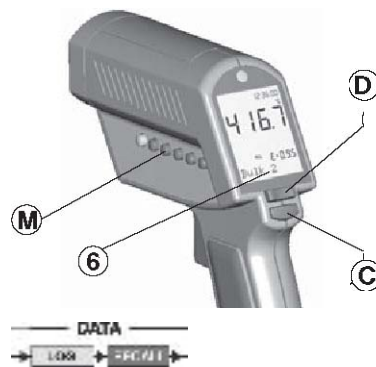
#### To store measured values:

- Use **ENTER** (D) for invoking **LOG** (6) in the display.
- Now press the measurement button (F) and record.
- Make sure the laser marking remains inside the surface to be measured.

#### To store the temperature value:

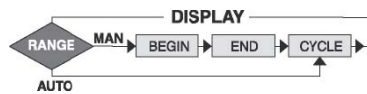
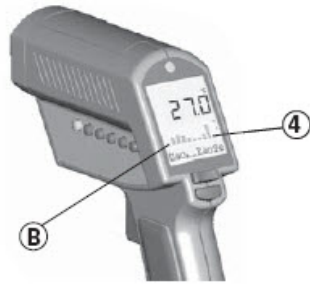
- Release the measurement button. The next memory location is invoked.
  - Pressing the **DATA** key (M) once invokes the same function.

### Displaying the memory



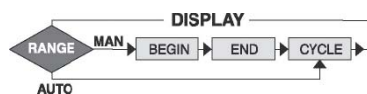
For reading the stored values, press **ENTER** (D) without pressing the measurement button. Then press the **DATA** key (M) until RCL appears in the display. A memory location is displayed (6). Use arrow keys (C) to select another memory location.

## Graphics range



The graphical component (4) of the display shows the last 10 measured values as a trend display. The measuring range of a column (B) can be calculated automatically by the device (Auto Range Function) or set manually (Manual Range Function).

## Selecting the graphics functions



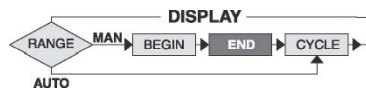
Press **DISPLAY** (L) once. Use arrow keys (C) to choose between Auto Range (temperature range includes measured minimum and maximum values) and Manual Range (refer to the *Begin (Manual Range)* section).

## Begin (Manual Range)



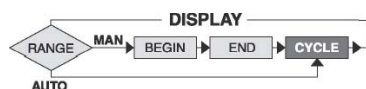
Manual setting of the lower limit of the temperature range to be shown graphically. Press **DISPLAY** (L) until “Begin” appears in the status line. Change the value (6) using arrow keys (C).

## End (Manual Range)



Manual setting of the upper limit of the temperature range to be shown graphically. Press **DISPLAY** (L) until “End” appears in the status line. Change the value (6) using arrow keys (C).

## Cycle



## Functional description and operating instructions

### Changing batteries

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The setting of the interval, in which numeric and graphical display is refreshed automatically. Press **DISPLAY** (L) until "Cycl.:" (7) appears in the status line. Change the cycle time using arrow keys (C). The default setting is 0.2 s.

### Changing batteries

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#### To change the batteries:

- First remove the leather pouch and open the battery compartment by pressing the upper handle halves lightly.
- Open the handle. You need 2 Type LR6 (AA / type approved) batteries for operating the measuring device.

***Important:***

***Always replace all batteries together.***

***Make sure of proper polarity of the inserted batteries.***

***Properly dispose all batteries in an environmentally safe manner.***

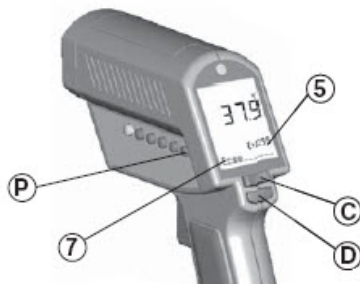
# 3 Emissivity

Most organic materials as well as lacquered and oxidized surfaces have an emissivity of 0.95. The emissivity is preset to 0.95 in the CMAC 4230 for this reason, but can be changed using the rocker switch. The determination of the temperatures of shiny or highly polished metal surfaces results in inaccurate measured values. To compensate for this, the surface to be measured can be covered with adhesive tape or painted matt black. Wait until the adhesive tape attains the same temperature as the material underneath it. Then determine the temperature of the adhesive tape (corresponds to the material) or the painted surface.

Aluminium*	0.30	Skin	0.98	Brass*	0.50
Asbestos	0.95	Wood***	0.94	Oil	0.94
Asphalt	0.95	Limestone	0.98	Paper	0.95
Basalt	0.70	Ceramics	0.95	Sand	0.90
Concrete	0.95	Carbon	0.85	Dirt	0.94
Lead*	0.50	Copper*	0.95	Snow	0.90
Ice	0.98	Plastic**	0.95	Steel*	0.80
Iron*	0.70	Foodstuffs,	0.90	Textiles	0.94
Paint	0.93	frozen		Water	0.93
Glass (plate)	0.85	Foodstuffs,	0.93	Bricks	0.90
Rubber	0.95	hot			

\*oxidized, \*\*impervious to light, more than 50 µm, \*\*\*natural

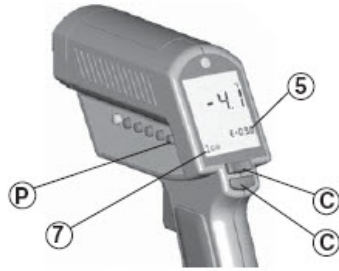
## Setting the emissivity



Press **EMISS** (P). Select **Free** (7) using the arrow keys (C). Press **EMISS** again. The emissivity icon (5) in the display starts blinking. Change the emissivity using the arrow keys (C). Confirm the input by pressing **ENTER** (D).

## Selecting the material

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Press EMISS. (P). The display shows a material name (7), the emissivity and the newly calculated measured value (5). Use arrow keys (C) for selecting another material. Use ENTER (D) to confirm the selection.

## Emissivity in case of an unknown value

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To be used only outside the Hazardous area!

- Connect a sensor to set the device for a material having an unknown emissivity (only outside the Hazardous area).
- Press the measurement button and maintain the measuring range of the sensor within the range of the object to be measured.
- Wait until the measured value of the sensor stabilizes and then record the measured value. Release the measurement button and press it again.
- Measure the same range of the object. Press the **Emiss.** key and select the **Free** material name using arrow keys.
- Press the **Emiss.** key again until the emissivity icon starts blinking.
- Use arrow keys to change the value until the displayed temperature matches that of the contact sensor.
  - Reference the *Sensor Port* section in Chapter 4 for details on connecting the sensor.

## Taking care of your device

### Troubleshooting

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Display	Fault	Procedure
-0 -	The target temperature is above or the range below the measuring range	Select a target within
-U -		
EEPROM-Err	EEPROM error	Please contact the manufacturer
CalAreaErr	Calibration error	Please contact the manufacturer
ProbCalErr	Calibration error	Please contact the manufacturer
No display	Weak or discharged	Replace batteries batteries
Battery icon blinks or LowBatt displays	Weak or flat batteries	Replace batteries
Laser does not work	Weak or flat batteries	Replace batteries
	Ambient temperature over +45 °C	Work at an ambient temperature of +45 °C or less

### Repairs

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Repair work is subject to the different nationally valid regulations and directives. Work should be performed by the manufacturer, as all repairs must be examined to ensure functional safety.

## Cleaning, maintenance and storage

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***Only use an appropriate cloth or sponge to clean the device. Do not use solvents or abrasive cleaning agents for cleaning, especially the lens.***

### To clean the lens:

- Blow off loose particles with clean air.
- Remove the remaining impurities carefully using a soft brush.
- Wipe the surface carefully with a moist swab. The swab can be moistened with water.

The functionality and accuracy of the device should be checked by the manufacturer every two years.

Remove the batteries from the device if it is to be stored for long periods.

The storage temperature should be within the permitted range between -20 to +50 °C (without batteries).



# Appendix A

## Physical and Environmental Specifications

### Physical characteristics

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#### Dimensions

Height:	200 mm (7.87 in.)
Width:	170 mm (6.69 in.)
Depth:	50 mm (1.97 in.)
Weight:	Approximately 600 g
Spectral range:	8 to 14 $\mu\text{m}$
Laser:	Laser class 2
Bluetooth chip:	Class II chip
Bluetooth power:	1 mW Tx power
Bluetooth range:	Up to 10 m

### Power supply

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Two LR6 batteries (AA) in compliance with IEC; type approved

### Environment

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Temperature range:	-30 to +900 $^{\circ}\text{C}$ (-22 to +1 652 $^{\circ}\text{F}$ )
Ambient temperature:	0 to +50 $^{\circ}\text{C}$ (32 to +122 $^{\circ}\text{C}$ ), maximum +45 $^{\circ}\text{C}$ (+113 $^{\circ}\text{F}$ ) with laser
Storage temperature (without batteries):	-20 to +50 $^{\circ}\text{C}$ (-4 to +122 $^{\circ}\text{F}$ )
Relative humidity:	10 to 95% relative humidity

### Accuracy at 25 $^{\circ}\text{C}$ (77 $^{\circ}\text{F}$ )

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	$\pm 0.75\%$ of the measured value or
	$\pm 0.75$ K, whichever is greater
	$\pm 2$ K for measurement objects below $-5^{\circ}\text{C}$ (23 $^{\circ}\text{F}$ )
Response time:	250 ms

## Regulatory approvals

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Suitable for Class I, Division 2, Groups A, B, C, D

NI/I/2/ABCD/T6 Ta = 50 °C

I/2/IIC/T6 Ta = 50 °C

**▲ WARNING! The CMAC 4230 Wireless infrared thermometer must not be opened in the hazardous area and must be operated only when in its leather pouch. The batteries must be changed only outside of the hazardous area.**