

# ENGLISH

## User manual



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## 1. PRECAUTIONS AND SAFETY MEASURES

The instrument has been designed in compliance with the directives relevant to electronic measuring instruments. For your safety and in order to prevent damaging the instrument, please carefully follow the procedures described in this manual and read all notes preceded by the symbol  with the utmost attention.

The following symbol is used in this manual:



### WARNING

When this symbol is displayed, the instrument is not able to emit a laser pointer. **Always prevent the laser from radiating to your eyes, in order to prevent any injury.** Class II laser device compliant with EN 60825-1.

### 1.1. PRELIMINARY INSTRUCTIONS



### WARNING

- Use the instrument only as specified in this user manual. An improper use may damage the instrument.
- During use and storage, keep the instrument away from direct sunlight or sources of light, hot surfaces or objects, high temperatures, high humidity or particularly critical environmental conditions.
- After a period of storage under extreme environmental conditions, **let the instrument resume normal operating conditions before using it.**
- If the instrument is moved from a cold to a hot environment, some condensation may appear on the focal lens which emits infrared rays. Wait for the condensation to dissipate before taking measurements.
- Do not touch the focal lens which emits infrared rays.
- Make sure that the target is larger than the unit's spot size. The smaller the target, the closer you should be to it. When accuracy is critical, make sure the target is at least twice as large as the spot size.
- Only the accessories provided together with the instrument will guarantee safety standards. They must be in good conditions and replaced with identical models, when necessary.
- Do not perform any measurements beyond the limits specified in chapter 11.
- Check that the battery is correctly inserted
- Do not carry out any measurement if you notice anomalous conditions such as breakages, leakages of battery liquid, blind display, etc.
- This instrument is not recommended for use in measuring shiny or polished surfaces (stainless steel, aluminum, etc.).
- The instrument cannot measure temperature through transparent surfaces such as glass. The instrument will measure the surface temperature of the glass instead.
- Steam, dust, smoke, etc. can prevent accurate measurement.

## 1.2. DURING USE

Please carefully read the following recommendations and instructions:



### WARNING

- Never press the **T** key when the laser is active and the instrument is directed towards the eyes. The instrument emits a laser pointer
- If the object to be measured has a smooth surface reflecting the laser, prevent the laser from radiating to our eyes.
- Never radiate the laser if flammable gas is present.
- If the "[ ]" symbol is displayed during use, interrupt testing and recharge the battery according to the procedure described in § 10.2.
- Be extremely careful when the laser pointer is turned on.

## 1.3. AFTER USE

- When measurement is complete, switch off the instrument
- If you expect not to use the instrument for a long period, remove the battery

## 2. GENERAL DESCRIPTION

HT3320 is an innovative digital thermometer capable of carrying out infrared (IR) temperature measurements of objects, also providing a visual display of the object thanks to the in-built photo camera, perform IR videos, recording the temperature values (logger) and measuring temperature using a K-type probe.

The characteristics of the instrument are:

- IR temperature measurement with/without in-built visual photo camera
- Distance / Spot ratio 50:1
- Image saving in JPG format (640x480pxl)
- Video saving in 3GP format
- Air temperature/humidity measurement with in-built sensor
- Temperature measurement of the dew point and of the wet bulb
- Temperature measurement by means of external K-type probe
- Datalogger function for temperature measure recording
- Internal memory and external SD Card for measure saving
- Modern and ergonomic design
- Double built-in laser pointer
- Automatic reading lock (HOLD)
- Continuous measurements (Auto Mode)
- Emissivity adjustable from 0.10 to 1.00
- Selection of measuring unit °C /°F
- Detection of MAX, MIN, DIF, AVG values
- Setting of high and low alarm thresholds on temperature measurements
- Backlit LCD display
- Automatic power off
- PC connection via USB cable for image/video/recording download

### **3. PREPARATION FOR USE**

#### **3.1. INITIAL CHECKS**

Before shipping, the instrument has been checked from an electric as well as mechanical point of view.

However, we suggest you to check it rapidly, to detect possible damage which may have occurred during transport.

In case anomalies are found, immediately contact the Dealer.

We recommend checking that the packaging contains all components indicated in § 11.3. In case the instrument should be replaced, please carefully follow the instructions given in § 12.

#### **3.2. INSTRUMENT POWER SUPPLY**

The instrument is supplied by a rechargeable Li-ION 3.7V 1400mAh battery with AC mains power supply, which also provides for the recharge of the mentioned battery. Both of these systems are provided with the instrument. The battery can also be recharged by directly connecting it to the PC via USB (see § 10.2).

#### **3.3. CALIBRATION**

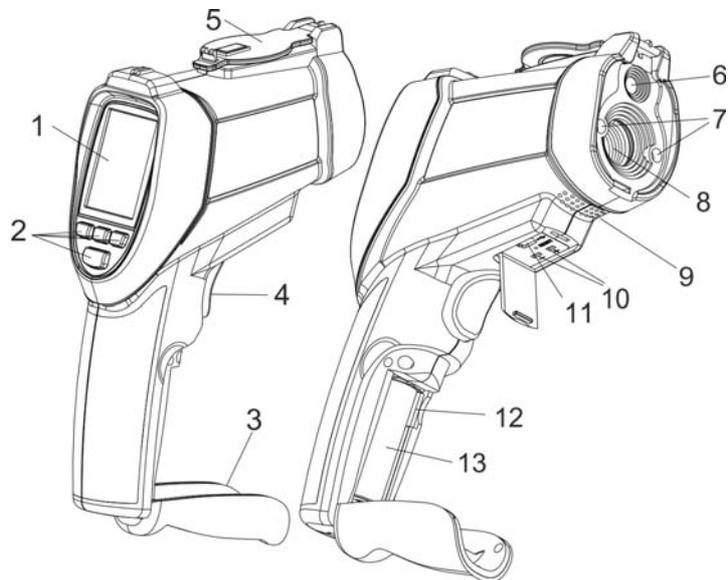
The instrument has the technical specifications described in this manual. Its performance is guaranteed for one year starting from the date of purchase.

#### **3.4. STORAGE**

In order to guarantee precise measurement, after a long storage time under extreme environmental conditions, wait for the instrument to come back to normal condition (see the environmental specifications contained in § 11.2).

## 4. NOMENCLATURE

### 4.1. INSTRUMENT DESCRIPTION

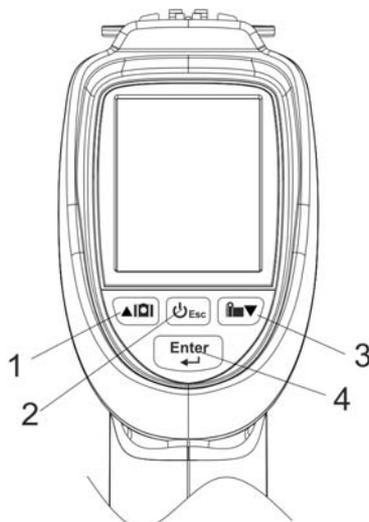


**CAPTION:**

1. LCD display
2. Function keys (see § 4.2)
3. Battery compartment cover
4. **T** key (Trigger)
5. Lens protection cover
6. In-built photo camera
7. Double laser pointer
8. IR sensor
9. In-built sensor for temperature/humidity measurement
10. Connector for k-type thermocouple insertion
11. USB interface
12. Slot for SD card insertion
13. Battery

Fig. 1: Instrument description

### 4.2. DESCRIPTION OF FUNCTION KEYS



**CAPTION:**

1. Key (Arrow/Photo camera)
2. Key Esc (**ON/OFF** and **ESC**)
3. Key (Arrow/Video)
4. Key (**ENTER**)

Fig. 2: Description of function keys

### 4.3. DESCRIPTION OF THE SYMBOLS SHOWN ON THE DISPLAY

Symbol	Description	Symbol	Description
	Photo camera activation		Data freezing on the display (HOLD – releasing of T key)
	Activation of IR temperature measurement without photo camera		Alarm for high temperature threshold exceeded activated
	Activation of temperature measurement of dew point		Alarm for high temperature threshold exceeded in progress
	Active laser pointer		Alarm for low temperature threshold exceeded activated
	Measurement performance (Scan - pressure of T key)		Alarm for low temperature threshold exceeded in progress
<b>AT</b>	Air Temperature	<b>DIF</b>	It indicates the difference between two measured IR temperature values
<b>RH%</b>	Air relative humidity	<b>AVG</b>	It indicates the average value among the measured IR temperature values
<b>DP</b>	Dew point temperature	<b>MIN</b>	It indicates the minimum value among the measured IR temperature values
<b>WB</b>	Wet bulb temperature	<b>MAX</b>	It indicates the maximum value among the measured IR temperature values
<b>TK</b>	It indicates the temperature value measured with the K probe		It indicates the current mode of continuous measurement (see § 6.5)

Table 1: Description of the symbols shown on the display

## 5. SETTING SYSTEM PARAMETERS

Every time it is switched on, the instrument shows the following general menu

	IR CAM
	IR MEASURE
	DEW POINT
	DATALOGGER
	DATA MEMORY
	SETTINGS

Fig. 3: Instrument general menu

Select item "SETTINGS" using the arrow keys ▲ or ▼ and confirming with the **ENTER** key. The following screen appears on the display:

SYSTEM SET	SYSTEM SET
Date/Time	Keypress Alert
Unit (°C /°F)	Memory Status
Language	Factory Settings
Font color	
Cursor	
Backlight	
Auto Power Off	
Screen Timeout	

Fig. 4: System setting menu

Use the arrow keys ▲ or ▼ to select the items and confirm with **ENTER** to access the relevant programming sections.

### 5.1. DATE/TIME SETTING

In this section it is possible to set the system Date/Time. There are two options to set the Time: “24 hours” (00-24 format) or AM/PM.

#### Date setting

1. Press the **ENTER** key to switch from a Date field to the other
2. Use the arrow keys ▲ or ▼ to set the Date values in format “DD-MM-YYYY”
3. Press the **ESC** key to save and exit the function

#### Time setting

1. Press the **ENTER** key to switch from a Time format to the other
2. Use the arrow keys ▲ or ▼ to set the Time values
3. Press the **ESC** key to save and exit the function

### 5.2. MEASURING UNIT SETTING

In this section it is possible to set the temperature measuring unit either in °C (Celsius) or °F (Fahrenheit)

1. Use the arrow keys ▲ or ▼ to select the option °C or °F (see Fig. 5)
2. Press the **ESC** key to save and exit the function



Fig. 5: Selection of the measuring unit

### 5.3. LANGUAGE SETTING

In this section it is possible to set the system language, choosing among the available options

1. Use the arrow keys ▲ or ▼ to select the desired language (see Fig. 6)
2. Press the **ESC** key to save and exit the function

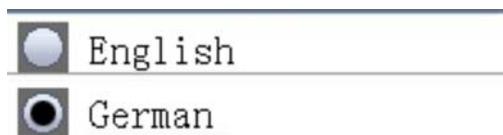


Fig. 6: System language selection

#### 5.4. FONT COLOR SETTING

In this section it is possible to set the color of the font shown on the instrument's display

1. Use the arrow keys ▲ or ▼ to select the desired color, choosing among the available options: **Orange**, **Green**, **Black**, **Blue**, **Gold** and **Purple** (see Fig. 7)
2. Press the **ESC** key to save and exit the function

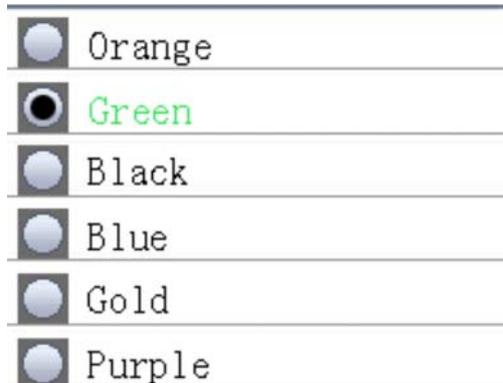


Fig. 7: Font color selection

#### 5.5. CURSOR SHAPE SETTING

In this section it is possible to set the shape of the central cursor (if required) associated with the IR sensor

1. Use the arrow keys ▲ or ▼ to select the options: **Off** (no cursor), **Cross**, **Circle** (see Fig. 8)
2. Press the **ESC** key to save and exit the function

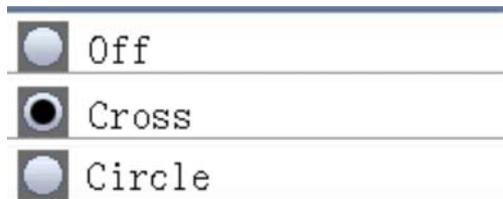


Fig. 8: Selection of measuring cursor shape

#### 5.6. BACKLIGHT BRIGHTNESS PERCENTAGE SETTING

In this section it is possible to set the brightness percentage of the display's backlight

1. Use the arrow keys ▲ or ▼ to select the options from **30%** (minimum brightness) to **100%** (maximum brightness) (see Fig. 9)
2. Press the **ESC** key to save and exit the function

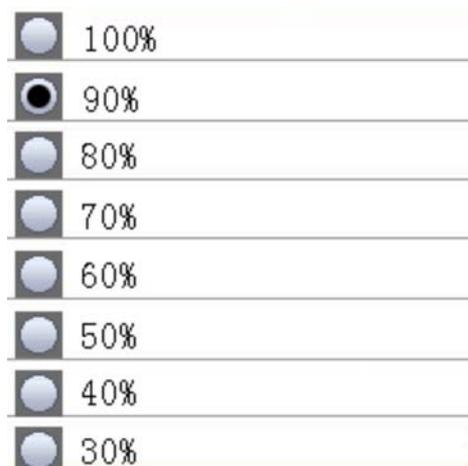


Fig. 9: Backlight percentage selection

### 5.7. AUTO POWER OFF SETTING

In this section it is possible to disable the Auto Power Off function of the instrument or to set a value among the available ones

1. Use the arrow keys ▲ or ▼ to select the options: **Disabled**, **3 Min**, **15 Min** or **60 Min** (see Fig. 10)
2. Press the **ESC** key to save and exit the function



Fig. 10: Auto Power Off setting selection

### 5.8. DISPLAY SWITCHING OFF SETTING

In this section it is possible to disable the automatic switching off function of the display (the function may be enabled again by pressing any key) or to choose a time value among the available ones

1. Use the arrow keys ▲ or ▼ to select the options: **Disabled**, **30s**, **1 Min** or **2 Min** (see Fig. 11)
2. Press the **ESC** key to save and exit the function

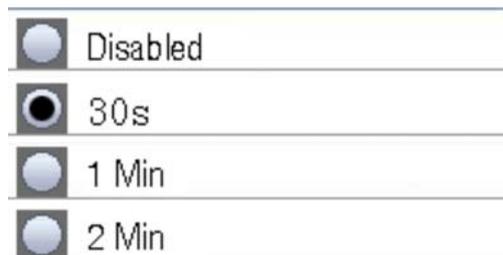


Fig. 11: Display switching off setting selection

### 5.9. KEY SOUND SETTING

In this section it is possible to disable/enable the sound associated with the pressure of the function keys of the instrument

1. Use the arrow keys ▲ or ▼ to select the options: **Disable**, **Enable** (see Fig. 12)
2. Press the **ESC** key to save and exit the function

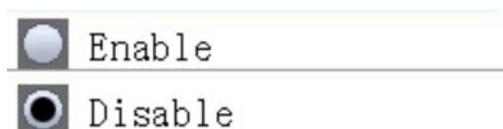


Fig. 12: Key sound setting selection

### 5.10. MEMORY STATUS SETTING

In this section it is possible to select the type of memory (internal or SD Card) in which to save the measured data. The instrument also provides indications on the used and on the free memory space.

1. Use the arrow keys ▲ or ▼ to select the options: **Device memory**, **SD Card** (see Fig. 13)
2. Press the **ENTER** key to format the internal memory or the SD Card. Press the down arrow key ▼ to confirm the operation or the up arrow key ▲ to cancel the operation.
3. Press the **ESC** key to save and exit the function

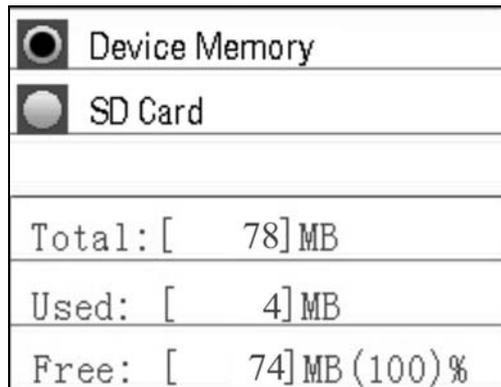


Fig. 13: Memory selection for data saving



### WARNING

Use a micro SD Card with a maximum capacity of **8GB**

### 5.11. DEFAULT SETTINGS

This section allows automatically setting the factory-set default conditions on the instrument, as described in Table 2

Parameter	Default value	Parameter	Default value
Emissivity	0.95	Measuring unit	°C
HIGH alarm	Enabled	Language	English
LOW alarm	Enabled	Character color	Orange
Laser	Enabled	Cursor	Circle
Continuous measurement	Disabled	Backlight	100%
MAX/MIN	Enabled	Automatic power off	3 min
Average/Difference	Enabled	LCD switching off	30s
AT / RH%	Enabled	Key sound	Disabled
DP / WB	Enabled	Memory status	Internal
K type	Enabled	Language	English

Table 2: Parameter default values

## 6. SETTING MEASURING FUNCTIONS

In each measuring mode (see § 7), by pressing the **ENTER** key, the instrument shows the following screen:

MEASURE SET	MEASURE SET
Emissivity	Dewpoint / Wetbulb
Alarm High	Type K
Alarm Low	
Laser	
Auto Mode	
Max/Min	
Average/Diff	
Ambient Temp. / %RH	

Fig. 14: Measurement setting menu

Use the arrow keys ▲ or ▼ to select the items and confirm with **ENTER** to access the relevant programming sections.

### 6.1. EMISSIVITY SETTING

The radiating power or emissivity “ $\varepsilon$ ” is a value between 0 and 1 which indicates the capacity of an object to emit energy in the infrared frequency range. This parameter depends both on the material the object is made of and on the finishing (painting). Parameter “ $\varepsilon$ ” is set by default to 0.95 because, in practice, it has been established that approx. 90% of the objects have such a radiating power.

1. Select the first item ( $\varepsilon = x.xx$ ) and press the **ENTER** key to set emissivity (see Fig. 15 and Table 3). Use the arrow keys ▲ or ▼ to set the value and then the **ENTER** key to confirm
2. Use the arrow keys ▲ or ▼ to select one of the common materials listed below, among the options: **Concrete, Glass, Human skin, Ice/Water, Plastic, Wood**
3. Press the **ESC** key to save and exit the function



Fig. 15: Emissivity setting menu

Material	Emissivity	Material	Emissivity
Zinc (oxidized)	0.1 (*)	Carbon	0.95
Iron (polarized)	0.3	Red brick (rough)	0.75 - 0.9
Tin-plated steel	0.1 (*)	Fire clay	0.75
Gold (polished)	0.1 (*)	Asbestos	0.95
Silver (polished)	0.1 (*)	Cast iron (at 100°C)	0.45
Chromium (polished)	0.1 (*)	Cast iron (at 1000°C)	0.6 – 0.7
Steel (ground sheet)	0.6	Zirconium	0.85
Steel (oxidized)	0.9	Wrought iron	0.95
Liquid iron	0.9	Aluminium (polished)	0.1 (*)
Oxidized aluminium	0.25	Oxidized aluminium at 260°C	0.6
Oxidized aluminium at 800°C	0.3	Brass (polished)	0.1 (*)
Brass (rough)	0.2	Brass (oxidized)	0.6
Copper (polished)	0.05 (*)	Copper (oxidized)	0.8
Molten copper	0.15	Lead (pure)	0.1 (*)
Lead (oxidized at 25°C)	0.3	Lead (oxidized at 200°C)	0.6
Nickel (pure)	0.1 (*)	Nickel-Chromium	0.7
Nick-Chromium (oxidized)	0.95	Mortar	0.89 .. 0.91
Marble	0.9	Plaster	0.9
Alumina (fine grain)	0.25	Alumina (coarse grain)	0.45
Silica (fine grain)	0.4	Silica (coarse grain)	0.55
Quartz (rough)	0.9	Graphite	0.75
Timber	0.8 - 0.9	Enamel (any color)	0.9
Paint (any color)	0.95	Lacquer	0.9
Water	0.98	Rubber (smooth)	0.9
Rubber (rough)	0.98	Plastic (various)	0.8 - 0.95
Paper	0.9	Silicone	0.7
Asphalt	0.90 .. 0.98	Cloth (black)	0.98
Concrete	0.94	Human skin	0.98
Cement	0.96	Leather	0.75 .. 0.80
Sand	0.90	Charcoal powder	0.96
Earth	0.92 .. 0.96	Glass	0.90 .. 0.95
Water	0.92 .. 0.96	Ceramic	0.90 .. 0.94
Ice	0.96 .. 0.98	Rubber	0.94
Snow	0.83	Plastic	0.85 .. 0.95

(\*) Emissivity variable with point

Table 3: Emissivity values of materials

## 6.2. SETTING THE MAXIMUM ALARM TEMPERATURE THRESHOLD

The instrument is provided with an acoustic alarm on IR temperature measurements; the alarm sounds when a maximum threshold which can be set up to 1000°C is exceeded.

1. Use the arrow keys ▲ or ▼ to enable/disable the alarm (see Fig. 16)
2. With enabled alarm, press the **ENTER** key and then use the arrow keys ▲ or ▼ (press and hold the keys to quickly scroll the values) to set the threshold value. Press **ENTER** again to confirm.
3. Press the **ESC** key to save and exit the function

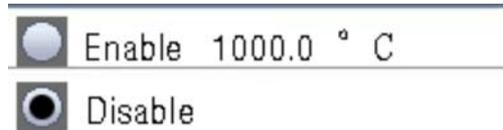


Fig. 16: Menu for setting the maximum alarm threshold

## 6.3. SETTING THE MINIMUM ALARM TEMPERATURE THRESHOLD

The instrument is provided with an acoustic alarm on IR temperature measurements, for values below a minimum threshold which can be set up to -50°C.

1. Use the arrow keys ▲ or ▼ to enable/disable the alarm (see Fig. 17)
2. With enabled alarm, press the **ENTER** key and then use the arrow keys ▲ or ▼ (press and hold the keys to quickly scroll the values) to set the threshold value. Press **ENTER** again to confirm.
3. Press the **ESC** key to save and exit the function

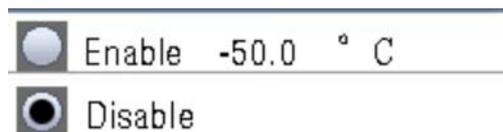


Fig. 17: Menu for setting the minimum alarm threshold

## 6.4. LASER POINTER

In this section it is possible to enable/disable the double laser pointer which can be used in IR temperature measurements.

1. Use the arrow keys ▲ or ▼ to select the options: **Disable**, **Enable** (see Fig. 18)
2. Press the **ESC** key to save and exit the function

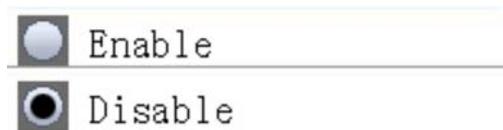


Fig. 18: Laser pointer activation menu

## 6.5. CONTINUOUS MEASUREMENT

In this section it is possible to enable/disable the continuous measurement mode of IR temperature by the instrument with no need to press the **T** key.

1. Use the arrow keys ▲ or ▼ to select the options: **Disable**, **Enable** (see Fig. 19)
2. Press the **ESC** key to save and exit the function

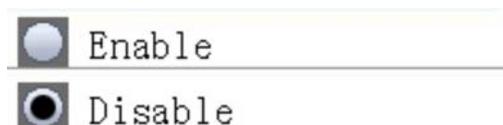


Fig. 19: Continuous measurement activation menu

### 6.6. MAX/MIN DISPLAY

In this section it is possible to enable/disable the display of the Max and Min values of IR temperature.

1. Use the arrow keys ▲ or ▼ to select the options: **Off, On** (see Fig. 20)
2. Press the **ESC** key to save and exit the function



Fig. 20: Max/Min display activation menu

### 6.7. AVERAGE/DIFFERENCE DISPLAY

In this section it is possible to enable/disable the display of the Average and Difference values of the IR temperature measured by the instrument.

1. Use the arrow keys ▲ or ▼ to select the options: **Off, On** (see Fig. 21)
2. Press the **ESC** key to save and exit the function



Fig. 21: Average/Difference display activation menu

### 6.8. AIR / %RH TEMPERATURE DISPLAY

In this section it is possible to enable/disable the display of the air temperature values and of the relative humidity measured by the internal sensor of the instrument.

1. Use the arrow keys ▲ or ▼ to select the options: **Off, On** (see Fig. 22)
2. Press the **ESC** key to save and exit the function



Fig. 22: Air temperature/humidity display activation menu

### 6.9. DEW POINT / WET BULB TEMPERATURE DISPLAY

In this section it is possible to enable/disable the display of the dew point and wet bulb temperature values measured by the instrument.

1. Use the arrow keys ▲ or ▼ to select the options: **Off, On** (see Fig. 23)
2. Press the **ESC** key to save and exit the function



Fig. 23: Dew point/wet bulb temperature display activation menu

## 6.10. TEMPERATURE DISPLAY WITH K-TYPE PROBE

In this section it is possible to enable/disable the display of the temperature values measured with the k-type probe.

1. Use the arrow keys ▲ or ▼ to select the options: **Off**, **On** (see Fig. 24)
2. Press the **ESC** key to save and exit the function



Fig. 24: Activation menu for display of temperature values measured with K-type probe



### WARNING

By inserting the K-type thermocouple (see § 7) the instrument automatically enables temperature measurement with K probe, whose display can be disabled by the user.

## 7. OPERATING INSTRUCTIONS

Upon start-up, the instrument shows the following 6 operating modes, which can be selected through the arrow keys ▲ or ▼, confirming with **ENTER**

	IR VIDEO
	IR MEASURE
	DEW POINT
	DATALOGGER
	DATA MEMORY
	SETTINGS

Fig. 25: Instrument general menu

MEASURING MODE	DESCRIPTION
IR VIDEO	IR temperature measurement with in-built photo camera + IR video recording + relative air temperature/humidity measurement with internal sensor (see § 7.3)
IR MEASURE	IR temperature measurement without saving (see § 7.4)
DEW POINT	IR temperature measurement + dew point temperature (see § 7.5)
DATALOGGER	Recording of temperature measurement with setting of time scan and alarm conditions (see § 7.6)
DATA MEMORY	It allows displaying and deleting images, videos and recordings saved in the instrument (see § 8)
SETTINGS	It allows setting the instrument's system parameters (see § 5)

### 7.1. SWITCHING ON/OFF THE INSTRUMENT

1. To switch on the instrument, press and hold the  $\text{U}_{\text{Esc}}$  key until the general menu is displayed
2. Press and hold the  $\text{U}_{\text{Esc}}$  key until the display switches off

### 7.2. INSTRUMENT RESET

In case all functions on the display get stuck, the instrument allows carrying out a Hardware Reset operation, in order to restore normal operation. Proceed as follows:

1. Use the tip of a pencil or of another object, slightly touching the inner part of the hole next to the USB port labeled "RESET"
2. The instrument switches off automatically and can be switched on again. The RESET operation **does not delete** any data from the memory

### 7.3. IR VIDEO MODE

This mode allows carrying out IR temperature measurement with the in-built photo camera, saving the images in standard JPG format, recording IR videos of IR temperature measurements saving them in 3GP format, measuring the air temperature/humidity with the in-built sensor and measuring temperature with type K probe (if enabled – see § 6.10)

1. Switch on the instrument and enter the “VIDEO IR” mode
2. Set the desired values of the measurement parameters (see § 6)
3. Hold the meter and point it towards the object whose temperature is to be measured. The object will appear on the display because of the in-built photo camera
4. Press and hold the ▲ key to perform a zoom operation of the image at display and press and hold the ▼ key to restore the normal sizes of the image at display
5. Press and hold the T key to start measuring, observing on the display the symbol  and the temperature value in the middle of the display, which varies in real time (see Fig. 26)



Fig. 26: IR temperature measurement with in-built photo camera

6. Release the T key to stop the measurement and freeze the last read value. The display shows the following symbol . The temperature values associated with fields AT, RH%, DP and WB, if selected (see § 6.8, 6.9) are shown on the display.
7. Fig. 27 shows the ratio between distance of the instrument from the object being measured and the spot size. As the distance (D) from the object increases, the spot size (S) becomes larger. The focal point of the instrument is 914mm (36”). The displayed spot sizes indicate the areas which include 90% of the detected energy.

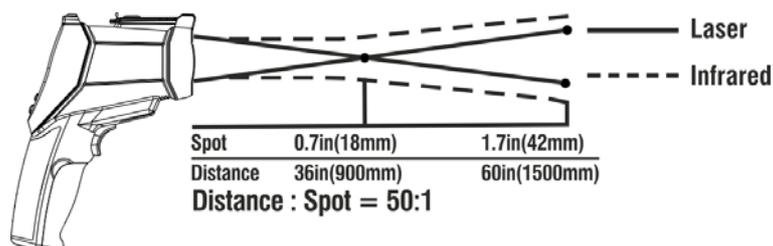


Fig. 27: Diameter of surface S with reference to the distance D from the object (in mm)

8. Make sure that the object whose temperature is to be measured is at least as large as the unit's spot (see Fig. 28). The smaller the object is, the closer you should be to it. **When accuracy is critical, make sure the object is at least twice as large as the spot size.** To find a hot spot, aim the thermometer at the measured object, then move the instrument across the object until a hot spot is located.

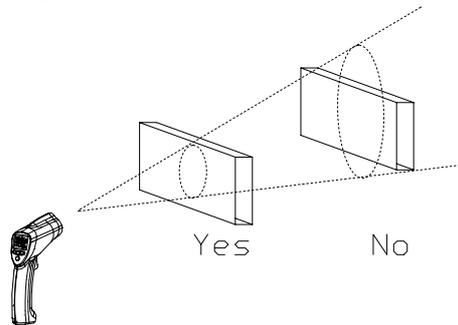


Fig. 28: Spot size area

9. The instrument displays the values of the fields MAX, MIN, MED, AVG and DIF, if selected (see § 6.6, 6.7).
10. In case continuous measurement is activated (see § 6.5), press the **ENTER** key, followed by the arrow key ▲ to exit the mode or press the arrow key ▼ to enable/disable the laser pointer if activated in the relevant section (see § 6.4).
11. While holding the instrument steady on the object on which it was pointed, press the arrow key ▲|□| to enter the saving section of IR images and other parameters (if selected) and press the arrow key ▲ again to save the image or the arrow key ▼ to exit without saving.
12. Press the arrow key |■▼ to enter the section for recording an IR video and press the START key (▼) to activate the video and the STOP key (▼) to stop recording. The instrument automatically saves the video in the memory.

#### 7.4. INFRARED TEMPERATURE MEASUREMENT

This mode allows rapidly measuring the IR temperature without using the in-built photo camera, further to carrying out air temperature/humidity/dew point/wet bulb measurements without saving them in the instrument's memory.

1. Switch on the instrument and enter the "IR MEASUREMENT" mode
2. Set the desired values of the measurement parameters (see § 6)
3. Hold the meter and point it towards the object whose temperature is to be measured.
4. Press and hold the **T** key to start measuring, observing on the display the symbol  and the temperature value in the middle of the display, which varies in real time (see Fig. 29)



Fig. 29: IR temperature measurement

5. Release the **T** key to stop the measurement and freeze the last read value. The display shows the following symbol . The temperature values associated with fields AT, RH%, DP and WB, if selected (see § 6.8, 6.9) are shown on the display.
6. The instrument displays the values of the fields MAX, MIN, MED, AVG and DIF, if selected (see § 6.6, 6.7). The cursor on the graphic bar at the bottom of the display indicates the MIN (on the left) and MAX (on the right) values and is dynamically updated according to the measured temperature value.
7. In case continuous measurement is activated (see § 6.5), press the **ENTER** key, followed by the arrow key  to exit the mode or press the arrow key  to enable/disable the laser pointer if activated in the relevant section (see § 6.4).

## 7.5. DEW POINT TEMPERATURE MEASUREMENT

This mode allows displaying the dew point temperature, which is useful when making thermographic surveys for the construction sector, further to the normal IR temperature measures and air temperature/humidity measures.

1. Switch on the instrument and enter the “DEW POINT” mode
2. Set the desired values of the measurement parameters (see § 6)
3. Hold the meter and point it towards the object whose temperature is to be measured.
4. Press and hold the **T** key to start measuring, observing on the display the symbol  and the temperature value in the middle of the display, which varies in real time (see Fig. 30)



Fig. 30: Dew point temperature measurement

5. Release the **T** key to stop the measurement and freeze the last read value. The display shows the following symbol . The temperature values associated with fields AT, RH%, DP and WB, if selected (see § 6.8, 6.9) are shown on the display.
6. The value on the bar at the bottom of the display indicates the percentage level of mould corresponding to the measured dew point temperature value (DP).
7. The instrument displays the values of the fields MAX, MIN, MED, AVG and DIF, if selected (see § 6.6, 6.7).

## 7.6. DATALOGGER FUNCTION

In this mode, the instrument records the IR temperature and air temperature/humidity values with time scan and programmable alarm conditions on the measures.

1. Switch on the instrument and enter the "DATALOGGER" mode.
2. Set the desired values of the measurement parameters (see § 6)
3. Press the **ENTER** key to enter the programming section of the datalogger function. The following screen appears on the instrument's display:

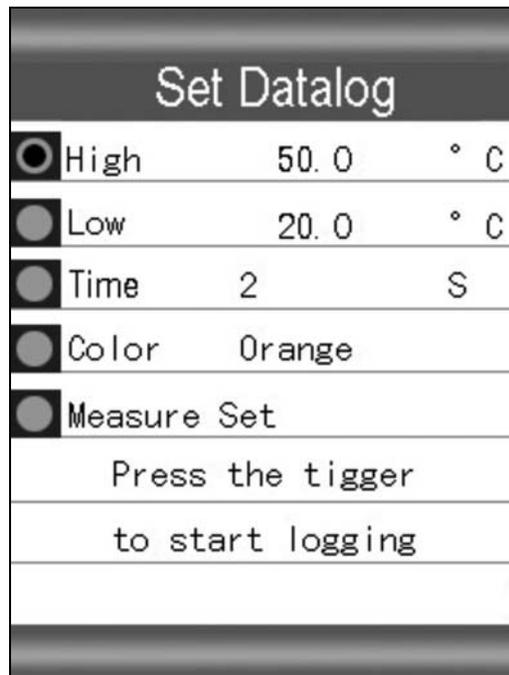


Fig. 31: Datalogger function parameter setting

4. Select the parameters using the arrow keys ▲ or ▼ and press **ENTER**. Use the arrow keys ▲ or ▼ again to set the desired values and confirm with **ENTER** again. The following parameters are programmable:

PARAMETER	DESCRIPTION
High	Setting of the maximum alarm threshold value within range -50°C ÷ 1000°C
Low	Setting of the minimum alarm threshold value within range -50°C ÷ 1000°C
Time	Setting of the time scan among consecutive recordings within the measuring campaign in the range <b>1s ÷ 3600s</b>
Color	Setting of the color of the characters shown on the display (see § 5.4)
Measure Set	Setting of the measuring parameters (see § 6)

5. Press and release the **T** key to start recording. The graphic screen with the real time temperature measurement is shown at display
6. Press the **ESC** key to stop recording. Data is automatically saved in the instrument's memory (see § 8)
7. Press the **ESC** key to exit the function and go back to the general menu.

## 7.7. TEMPERATURE MEASUREMENT WITH K-TYPE PROBE

### WARNING



- Do not compare the infrared temperature measurement with the measurements made with K-type thermocouples, since (because of the totally different nature of the two methods) the obtained values may differ remarkably
- Measurement with the K-type thermocouple can be used in situations where IR measurement cannot be used (e.g.: measurement of shiny/bright surfaces such as glass and plexiglas)

1. Select one of the measuring modes “IR VIDEO” or “IR MEASUREMENT”, “DEW POINT” or “DATA LOGGER”
2. Activate the temperature measuring option with K-type probe (see § 6.10)
3. Connect the K-type probe to the corresponding inputs (see Fig. 1 – Part 10) respecting the polarity marked on the instrument and on the probe.
4. Press the **T** key to start measuring. While measuring, the symbol  is shown on the display and the temperature value will be indicated as “TK”.
5. Release the **T** key to stop the measurement and freeze the last read value. The display shows the following symbol . The temperature values associated with fields AT, RH%, DP and WB, if selected (see § 6.8, 6.9) are shown on the display. The instrument displays the values of the fields MAX, MIN, MED, AVG and DIF, if selected (see § 6.6, 6.7)
6. For the “IR VIDEO” mode press the arrow key  to enter in the section of saving temperature measurement with type K probe more than IR imagine and other parameters (if selected) and press again the  key to save or the  to exit without save. For the “DATA LOGGER” mode the data are automatically saved

## 8. OPERATIONS WITH THE MEMORY

The instrument allows saving, in the internal memory or in the external mini SD Card (see § 5.10), IR images in JPG format (640x480pxl), IR videos in 3GP format and recordings in BIN/TXT format. These data can be recalled on the display as follows:

1. Select item “DATA MEMORY” using the arrow keys ▲ or ▼ and press **ENTER**. The following screen appears on the instrument’s display:

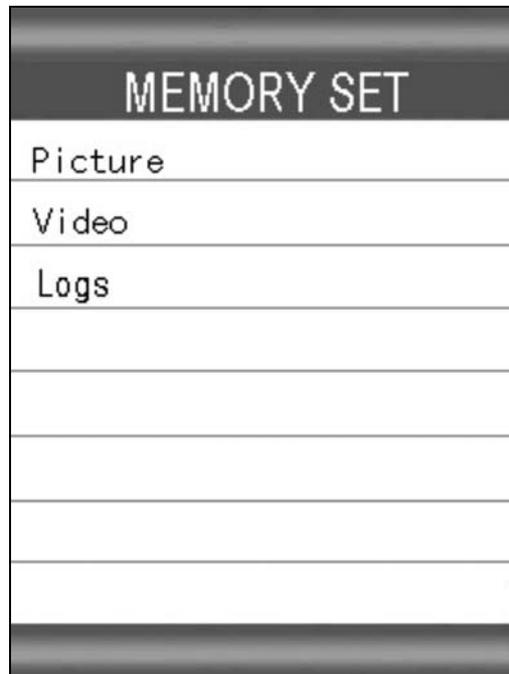


Fig. 32: Memory area display

PARAMETER	DESCRIPTION
Picture	It allows showing on the display and deleting the IR images saved in the instrument
Video	It allows playing and deleting the IR videos saved in the instrument
Logs	It allows showing on the display and deleting the recordings saved in the instrument

2. Use the arrow keys ▲ or ▼ to select items “Picture”, “Video” or “Logs” and confirm with **ENTER**
3. Press the **ENTER** key to display the images/recordings or playing a video and **ENTER** again to delete (by confirming) the selected items

## 9. CONNECTING THE INSTRUMENT TO THE PC

1. Press **ESC** key up to show the general menu at display
2. Connect the instrument to the PC via the provided USB cable. The “USB” message is shown on the display. The instrument is detected by the PC as a removable disk, from which you can save images, videos and recordings inside the HD (in separate folders), or delete data from the PC

## 10. MAINTENANCE

### 10.1. GENERAL

1. The instrument you purchased is a precision instrument. While using and storing the instrument, carefully observe the recommendations listed in this manual in order to prevent possible damage or danger during use.
2. Do not use the instrument in environments with high humidity levels or high temperatures. Do not expose to direct sunlight.
3. Always switch off the instrument after use. In case the instrument is not to be used for a long time, remove the battery to avoid liquid leaks that could damage the instrument's internal circuits.

### 10.2. INTERNAL BATTERY CHARGE

When the display shows the following symbol "", it is necessary to recharge it. This operation is possible both using the battery charger connected to the electric mains, and by connecting the instrument to the PC via USB cable



#### WARNING

Only expert and trained technicians should perform this operation. Before carrying out this operation, make sure you have removed possible input thermocouples.

#### Recharge via USB cable

1. Connect the USB cable to the instrument (see Fig. 1 – Part 11) and to the USB port of the PC. The instrument gives out a sound and a screen with the symbol "USB" is shown on the display.
2. Enter any measuring mode to observe the recharging process of the battery. Disconnect the cable when the symbol "" appears on the display.

#### Recharge through external battery charger

1. Connect the USB cable to the instrument (see Fig. 1 – Part 11) and to the USB port of the battery charger.
2. Connect the battery charger to the electric mains. The instrument gives out a sound and a screen with the symbol "USB" is shown on the display.
3. Enter any measuring mode to observe the recharging process of the battery. Disconnect the cable when the symbol "" appears on the display.

### 10.3. CLEANING THE INSTRUMENT

Use a soft and dry cloth to clean the instrument. Never use wet cloths, solvents, water, etc.

### 10.4. END OF LIFE



**WARNING:** the symbol indicates that the appliance, the battery and its accessories must be collected separately and correctly disposed of.

## 11. TECHNICAL SPECIFICATIONS

Accuracy is indicated as [% of reading + degree]. It is referred to the following reference conditions: temperature 18 ÷ 28 °C (64 ÷ 82 °F), humidity < 80 % RH.

### INFRARED TEMPERATURE MEASUREMENT

Function	Measuring range	Resolution	Accuracy	Response time
°C	-50°C ÷ 1000°C	0.1°C	±3.5°C (-50 ÷ 20°C) ±(1.0%rgd + 1.0°C) (20 ÷ 500°C) ±1.5%rgd (500 ÷ 1000°C)	150ms
°F	-58°F ÷ 1832°F	0.1°F	±6.3°F (-58 ÷ 68°F) ±(1.0%rgd + 1.8°F) (68 ÷ 932°F) ±1.5%rgd (932 ÷ 1832°F)	

Spectrum response: 8 ÷ 14µm  
 D/S ratio: 50:1  
 Emissivity: Adjustable 0.10 ÷ 1.00  
 Sensor: Thermopile  
 Laser Diode: Output <1mW, Wavelength 675nm, Class II laser product

### MEASUREMENT BY MEANS OF EXTERNAL, K-TYPE PROBE

Function	Measuring range	Resolution	Accuracy (*)
°C	-50°C ÷ 1370°C	0.1°C	±2.5°C (-50 ÷ 0°C) ±(0.5%rgd + 1.5°C) (0 ÷ 1370°C)
°F	-58°F ÷ 2498°F	0.1°F	±4.5°F (-58 ÷ 32°F) ±(0.5%rgd + 2.7°F) (32 ÷ 2498°F)

(\*) Uncertainty of the sole instrument, without external probe

### RELATIVE AIR/HUMIDITY TEMPERATURE MEASUREMENT WITH INTERNAL PROBE

Function	Measuring range	Resolution	Uncertainty
Air temperature	0°C ÷ 50°C (32°C ÷ 122°F)	0.1°C	±0.5°C / ±0.9°F (10 ÷ 40°C) / (50 ÷ 140°F) ±1.0°C / ±1.8°F (other measuring fields)
Dew point temp.		(0.1°F)	
Relative humidity	0 ÷ 100%RH	0.1%	±3%RH (40% ÷ 60%) ±3.5%RH (0% ÷ 40%) and (60% ÷ 80%) ±5%RH (80% ÷ 100%)

#### 11.1. GENERAL CHARACTERISTICS

##### Mechanical characteristics

Size (L x W x H): 205x155x62mm (8x6x2inches)  
 Weight (battery included): 410g (14 ounces)

##### Power supply

Battery type: 1x3.7V 1400mAh Li-ION battery  
 Low battery indication: the display shows symbol "▢"  
 Battery life: approx. 4 continuous operating hours  
 Battery recharge: approx. 2 hours with USB/battery charge  
 External adapter: 100-240VAC 50/60Hz / 5VDC

##### Display

Characteristics: 2.2" (320x240pxl), backlit LCD display  
 Auto Power Off: programmable: 3, 15, 60min and disabled

##### Memory

Internal memory capacity: 70MB (50kB/image; video 3.1MB/min)  
 External memory: micro SD card (max 8GB)

## 11.2. ENVIRONMENT

### 11.2.1. Environmental conditions

Operating temperature:	0°C ÷ 50°C (32°F ÷ 122°F)
Operating humidity:	10 ÷ 90%RH
Storage temperature:	-10°C ÷ 60°C (14°F ÷ 140°F)
Storage humidity:	< 90%RH
Max operating altitude:	2000m (6562ft)

**This instrument complies with European Directive EMC 2004/108/EC**

## 11.3. ACCESSORIES PROVIDED

- Rechargeable Li-ION battery
- K-type wire probe
- Battery charger power supply
- USB cable
- Tripod
- User manual
- Carrying case

## 11.4. OPTIONAL ACCESSORIES

The following K-type thermocouples are available:

Model	Description	Temperature range	Accuracy (at 100°C)	Probe length (mm)	Probe diameter (mm)
TK107	Air and gas temperature	-40 ÷ 800 °C	± 2.2 °C	200	1.5
TK108	Inner temperature of fluids and semisolid substances	-40 ÷ 800 °C	± 2.2 °C	200	3
TK109	Inner temperature of fluids and solid substances, fruit, food, etc.	-40 ÷ 800 °C	± 2.2 °C	200	4
TK110	Surface temperature	-40 ÷ 400 °C	± 2.2 °C	200	5
TK111	Surface temperature with fixed tip at 90°C	-40 ÷ 400 °C	± 2.2 °C	260	5

## 12. SERVICE

### 12.1. WARRANTY CONDITIONS

This instrument is warranted against any material or manufacturing defect, in compliance with the general sales conditions. During the warranty period, defective parts may be replaced. However, the manufacturer reserves the right to repair or replace the product.

Should the instrument be returned to the After-sales Service or to a Dealer, transport will be at the Customer's charge. However, shipment will be agreed in advance.

Only use original packaging for shipment; any damage due to the use of non-original packaging material will be charged to the Customer.

The manufacturer declines any responsibility for injury to people or damage to property.

The warranty shall not apply in the following cases:

- Repairs that may become necessary as a consequence of an incorrect use of the instrument or due to its use together with non-compatible appliances.
- Repairs that may become necessary as a consequence of improper packaging.
- Repairs which may become necessary as a consequence of interventions performed by unauthorized personnel.
- Modifications to the instrument performed without the manufacturer's explicit authorization.
- Use not provided for in the instrument's specifications or in the instruction manual.

The content of this manual cannot be reproduced in any form without the manufacturer's authorization.

**Our products are patented and our trademarks are registered.** The manufacturer reserves the right to make changes in the specifications and prices if this is due to improvements in technology.

### 12.2. SERVICE

If the instrument does not operate properly, before contacting the After-sales Service, please check the conditions of the battery and replace it, if necessary.

Should the instrument still operate improperly, check that the product is operated according to the instructions given in this manual.

Should the instrument be returned to the After-sales Service or to a Dealer, transport will be at the Customer's charge. However, shipment will be agreed in advance.

**A report will always be enclosed to a shipment, stating the reasons for the product's return.**

Only use original packaging for shipment; any damage due to the use of non-original packaging material will be charged to the Customer.