

METREL MD 9930

Thermal camera



MD 9930

User manual

Ver. 1.0, code no. 20 752 956

Distributor:

METREL d.d.

Ljubljanska cesta 77
1354 Horjul

Slovenia

e-mail: metrel@metrel.si

web site: <http://www.metrel.si/>

Metrel GmbH

Mess und Prüftechnik
Orchideenstrasse 24
90542 Eckental -Brand
Germany

E-mail: metrel@metrel.de

Internet: <http://www.metrel.de/>

Metrel UK Ltd.

Test & Measurement
Unit 16, 1st Qtr Business Park
Blenheim Road
Epsom
Surrey
KT19 9QN,
Great Britain

E-mail: info@metrel.co.uk

Internet: <http://www.metrel.co.uk>

© 2019 METREL



Mark on your equipment certifies that this equipment meets the requirements of the EC (European Community) regulations concerning safety and electromagnetic compatibility.

No part of this publication may be reproduced or utilized in any form or by any means without permission in writing from METREL

Table of contents

1.	Introduction	4
2.	Safety	5
3.	Product Description	7
4.	Quick Start Guide	9
5.	Operation	11
6.	Temperature Measurement	14
7.	Settings Menu	17
8.	Troubleshooting	28
9.	Metrel Thermal Image Viewer PC Software	29
10.	Specifications	31
11.	Standard set	33

1. Introduction

Overview

The MD 9930 thermal camera is a handheld thermal camera used for predictive maintenance, equipment troubleshooting, and verification. Thermal and visual images are displayed on the LCD and can be saved to a Micro SD Memory card. Images can be transferred to a PC by inserting the SD card into the PC using the included card reader.

Additionally, the thermal camera provides video recording in both thermal and visual views with audio and playback.

Key features:


- 120x160 pixel thermal imaging system.
- 19,200 points of real temperature measurement.
- Fast measurements (50 Hz thermal refresh rate).
- Hot, Cold, Centre crosshair for temperature tracking.
- Large, easy-to-read, bright graphical TFT display.
- Scene temperature range lock function.
- LED flashlight.
- Laser pointer.
- Running time up to 8 hours on one battery charge.
- Smart and compact design.
- Rugged with drop test of 2m and IP 56.

2. Safety

Terms in this manual

WARNING identifies conditions and actions that could result in serious injury or even death to the user.

CAUTION identifies conditions and actions that could cause damage or malfunction in the instrument.

 This symbol adjacent to another symbol, terminal or operating device indicates that the operator must refer to an explanation in the Operating Instructions to avoid personal injury or damage to the meter.

General precautions

WARNING

Do not disassemble or modify the Thermal Imager.

Do not point the thermal camera (with or without the lens cover) at intensive energy sources, for example devices that emit laser radiation, or the sun.

This can affect the accuracy of the camera or damage to the sensor.

Do not use the thermal camera at temperatures higher than +50°C or lower than -20°C. High or low temperatures can cause damage to the thermal camera.

Clean the case with a damp cloth and a weak soap solution. Do not use abrasives, isopropyl alcohol, or solvents to clean the case or lens/screen.

Be careful when you clean the infrared lens. Do not clean the infrared lens too vigorously. This can damage the anti-reflective coating.

Avoid condensation

When taking the thermal camera from colder to warmer environment, condensation may appear. Power off and wait until it warms up and dries to protect the camera.

Storage

When not using, store the camera in a cool dry place. If storing complete with battery, the charge will slowly leak and can lead to exhausting the battery.

Battery precautions

Only use the intended equipment to charge or discharge the battery.

If you do not use the intended equipment, you can decrease the performance or the life-time of the battery. A different than intended current can run to the battery. This can cause the battery to become hot, or cause an explosion and injury to persons.

Do not remove the battery while the thermal camera is working. It may cause the thermal camera to work abnormally.

Do not disassemble or modify the battery.

The battery contains safety and protection devices for the battery. If they become damaged it can cause the battery to heat up and explode or catch fire.

If a leak from the battery occurs and the fluid gets into contact with the eyes, flush them well with water and immediately seek medical care. Avoid rubbing the eyes to prevent further injury.

Do not make holes in the battery housing or expose it to high pressure, shock or impact force.

Keep battery at ambient temperatures below 50°C. Avoid locations near heating bodies, fire or in direct sunlight. Do not use soldering iron or similar tools on the battery or its housing.

Always charge the battery in the specified temperature range 0°C to +50°C. Charging it outside this range can cause it to heat up, lowers its life span, permanently decreases performance or breaks it.

Prevent battery contact with water and salt.

Laser precautions









CAUTION

To prevent eye damage and personal injury, do not look into the laser. Do not point laser directly or indirectly (using reflective surfaces) at persons or animals.

3. Product Description

Back view

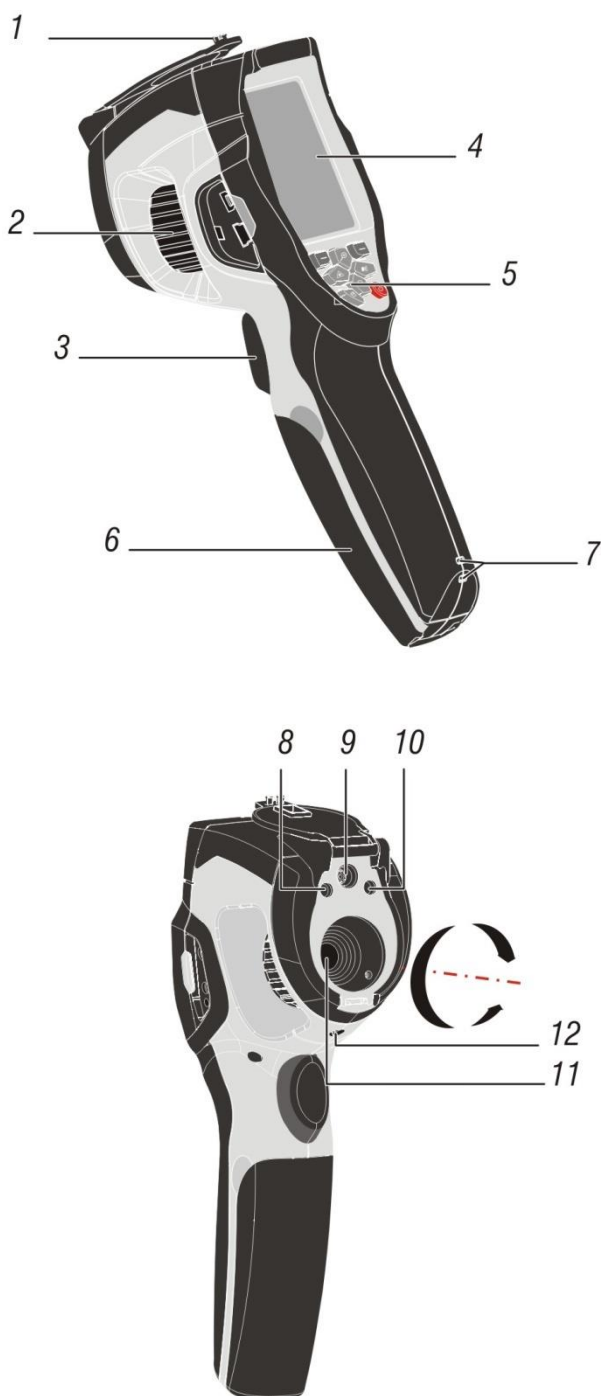
1. Infrared camera lens cover,
2. Lens focus adjust wheel,
3. Trigger,
4. LCD display,
5. Buttons:

 (Left)	Menu/select button
 (Right)	Lock/close button
	Up/Zoom out Button
	Down/Zoom in Button
	Right /light button
	Left /laser button
	Files browse button
	Power button

6. Battery box,
7. Holes for non-slip strap.

Front view

8. LED Light,
9. Visible light camera,
10. Laser pointer,
11. IR Imaging lens,
12. Hole for lanyard.



Interface






- 13.
- 14. Charging light,
- 15. USB/charger port,
- 16. Audio/microphone input,
- 17. HDMI output,
- 18. Micro SD card slot.
- 19.

4. Quick Start Guide

This is a quick overview of the camera operation. For more detailed information, refer to chapter 5.

Powering and charging the thermal camera

- Press and hold the power button for >2 seconds to switch the unit on. A start-up screen will appear. The unit is now ready to use.
- To switch off, press and hold power button for > 2 seconds. Note that the Auto Power Off function switches the unit off automatically after a programmed period of time.
- With the power on, the battery status icon  is located at the top left of the display. When battery power is low (indicated with symbol ) , connect to an AC source or a computer USB port using the supplied USB cable. See chapter 3 for location of USB port on the camera.
- When powered off, the battery charging is indicated with red LED. If the red LED is off, it indicates the battery is full.
- The unit can also be powered up and in used while charging in which case the battery symbol  is displayed in the upper left corner of the screen.

NOTE:

Make sure to charge the camera at temperatures near room temperature. When charging at extreme temperatures, the battery capacity may be decreased.


NOTE:

The camera takes a warm up period of about 10 minutes to reach the specified accuracy.

Control Buttons and Trigger

Become familiar with the operation of the control buttons and the trigger as described below.

POWER / BACK / LOCK button

Press and hold >2 seconds to cycle the meter power ON or OFF. Short press to exit a menu screen. Also used to lock the current scene temperature range. Icon  will appear on the display above the button when this option is available.

OK / MENU button

Short press to access the Settings Menu, to confirm an edit, or to save an image when prompted. An "OK" icon appears on the display above the button when this option is available.

UP and DOWN navigation arrow buttons

Scroll the Settings Menu or select a menu item setting.

TRIGGER / LED flashlight

Short press will take a snapshot of the current image. Short press again to discard image and return to live image mode. Long press will turn the LED flashlight on, repeated long press will turn it off.

Measure, Save, Delete, and Review IR Images

- Point the thermal camera toward the object or area of interest.
- Pull the trigger to capture the image. Press *OK / MENU BUTTON* to save image. Press *POWER / BACK / LOCK BUTTON* to share the image. “Save” and “share” options are indicated on screen.
- To review an image see chapter Settings Menu.
- To delete images from the internal memory, access the Settings Menu and delete the stored images as described in the chapter.






WARNING: All images are deleted when the internal memory is erased.

5. Operation

Charging the Battery

Before you use the thermal camera for the first time, charge the battery for a minimum of one and one-half hours. The battery status shows on the four-segment charge indicator.



To charge the battery:

Connect the AC power adapter into a wall outlet and connect the DC output to the thermal camera's charging port. The charge light turns on. The battery indicator eventually goes through changes "  →  →  →  " as the battery charges. Continue charging until the indicator becomes  and the charge light turns off. Disconnect the power adapter when the battery is full charged.

WARNING

Make sure that the thermal camera is near room temperature before you connect it to the charger. Do not charge in hot or cold areas. When you charge in extreme temperature, battery capacity may be decreased.

Power on and off

To turn the thermal camera on, push the Power  Button. When thermal camera is powered on, push and hold the Power  Button for two seconds to turn the thermal camera off.

NOTE

The thermal camera needs sufficient warm-up time for the most accurate temperature measurements and best image quality. This time can vary by environmental conditions. It is best to wait a minimum of 10 minutes for the best results.

Desktop

The desktop is as follows:

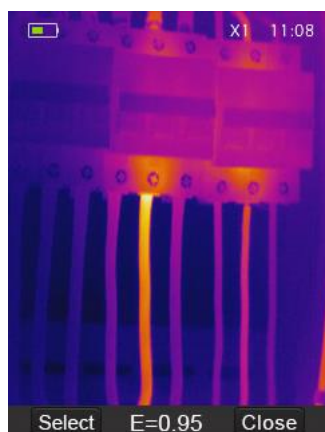


Figure 1: camera desktop

Lens and camera field of view

This table lists the horizontal Filed of view (FOV), vertical FOV and IFOV for lens.

Focal Length	Horizontal FOV	Vertical FOV	IFOV
9 mm	19°	25°	2.78mrad

IFOV (Instantaneous Field of View) is the size of the object caught in the single pixel on the detector. It is given as spatial angle with unit mrad. It depends on the lens and detector size.

$DTS_{theoretical}$ is distance to spot. It is the distance at which the given size spot can be measured. At unity distance, the IFOV can be then directly translated to spot size. For accurate temperature measurement, the spot has to be about three times the size of $DTS_{theoretical}$.

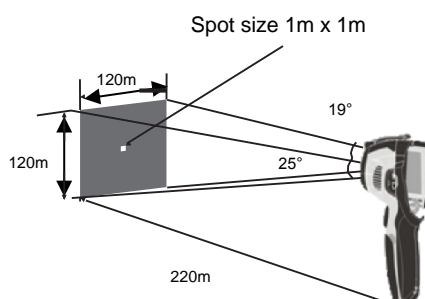
$$IFOV = \frac{\text{Pixel size}}{\text{Lens focal length}}$$

$$DTS_{theoretical} = \frac{1}{IFOV}$$

$$DTS_{measured} = \frac{DTS}{3}$$

EXAMPLE:

The FOV of the camera is 21° x 21°, which is about 0.36x 0.36 rad. The detector resolution is 80x80 pixel. Each pixel then covers about 4.53 mrad, which is IFOV. This means that at 1m distance, each pixel is covering 4.53mm² actual space. Temperature can be accurately measured on about 13.6mm² at 1m distance. If turned the other way, DTS can be the calculated distance at which each pixel will



cover 1m² space, which is about 220m. Thermal camera uses 7,5mm lens, so knowing the IFOV gives the pixel size of the detector as 34µm.

Focus

To adjust focus rotate the IR lens clockwise or anti-clockwise. When target comes into focus, it shows a sharp image. When the target moves out of focus, the thermal image becomes blurry.

NOTE

Correct focus is important in all imaging applications. Correct focus makes sure that the infrared energy is correctly directed onto the pixels of the detector. Without the correct focus, the thermal image can be blurry and the radiometric data will be inaccurate. Out-of-focus infrared images are of little value.

Shutter

Shutter in thermal cameras is used as a reference for periodic calibration of the sensor. When it closes, it deflects all thermal energy from the outside and so provides the reference for a uniform zero.

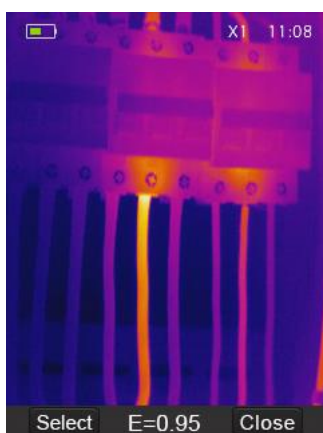
Calibration status can be easily seen as blurry or sharp image. MD 9930 supports automatic or manual calibration.

In manual, push the Power button to recalibrate. In Auto, the camera will correct itself automatically when it needs to.

Zoom

Thermal camera offers 1-32x continuous zoom functions.

Press the Up button while in desktop mode to zoom out 10%. Continuous press will result in continued zoom out. Press the Down button to zoom in 10%, or continuously. When the view is zoomed in or out, the zoom factor "X1" is displayed in



the upper status bar, as in Figure 2.

Figure 2: Zoom

LED light

In desktop, press the right button and hold about 2 seconds to turn the LED light on. Press for 2s again to turn it off.

Laser

In desktop, press the left button and hold about 2 seconds to turn the laser on. Press again for 2s again to turn off.

6. Temperature Measurement

All objects radiate infrared energy. The amount of energy radiated depends on the surface temperature and the surface emissivity of the object – the higher either of them, the higher the radiated energy. The thermal camera senses the radiated infrared energy from the surface of the object and uses this data to calculate a temperature. Emissivity to be used in calculation has to be set by hand.

Many common objects and materials, such as painted metal, wood, water, skin, and cloth are very good at radiating energy (have high emissivity) and default setting of 0.95 produces accurate temperature reading.

This simplification does not work on shiny surfaces or unpainted metals as they have an emissivity of <0.6 . These materials are not good at radiating energy and are classified as low emissivity. To measure them more accurately, an emissivity correction is necessary. Adjusting the emissivity setting results in more accurate temperature calculation. See **Emissivity Adjustment** for a list of surface emissivity values for different materials.

Emissivity Adjustment

The correct emissivity value is an important part of temperature calculation. Understanding the surface emissivity can help obtain more accurate temperature measurements.

NOTE:

Reliable and consistent measurement of temperatures on surfaces with an emissivity of <0.60 is problematic. The lower the emissivity, the higher is potential error of the camera's temperature calculations. This is true even when adjustments to the emissivity and reflected background are performed properly. See Settings Menu.

Material	Emissivity
Water	0.96
Stainless steel	0.14
Aluminum plate	0.09
Asphalt	0.96
Concrete	0.97
Cast iron	0.81
Rubber	0.95
Wood	0.85
Brick	0.75
Tape	0.96
Brass plate	0.06
Human skin	0.98
PVC plastic	0.93

Polycarbonate	0.80
Oxidized copper	0.78
Rust	0.80
Paint	0.90
Soil	0.93

Emissivity of a given material can be found in lists. Some common ones are collected above in Table 1: Emissivity values for common materials.

The global emissivity displays in desktop screen as $E = 0.xx$.

Material	Emissivity
Water	0.96
Stainless steel	0.14
Aluminum plate	0.09
Asphalt	0.96
Concrete	0.97
Cast iron	0.81
Rubber	0.95
Wood	0.85
Brick	0.75
Tape	0.96
Brass plate	0.06
Human skin	0.98
PVC plastic	0.93
Polycarbonate	0.80
Oxidized copper	0.78
Rust	0.80
Paint	0.90
Soil	0.93

Table 1: Emissivity values for common materials

Emissivity can be set in the Settings menu. See Settings Menu.

Reflected Temperature

When describing the energy on the surface of an object, part of it is emitted by it. If it is reflective, then part of the energy seen is also the energy from the environment being reflected. It has to be taken into the account to calculate the temperature

accurately. In most cases, the reflected temperature is the same as the ambient of the measured object.

Reflections have very little effect on object with high emissivity and can be ignored.

To measure the reflected temperature (or background temperature):

1. Set the emissivity to maximum (0.95).
2. Set the focus to near range.
3. Face away from the object under test and point camera to any high emissivity object.
4. Take the measurement of the scene. Imager automatically takes central, highest and lowest temperatures.
5. Calculate the average temperature of the background scene.
6. Insert it as Reflected Temperature parameter in the Settings Menu.

Thermal camera reporter software

Thermal camera reporter software is supplied with the thermal camera. This software is intended for thermal camera and for analysing images, organizing data and information, and making professional reports. Thermal camera reporter software allows audio annotations and commentary to be reviewed on a PC.

7. Settings Menu

Image gallery, measurements and settings are accessible through the Settings menu.

Main menu

Main Menu is the main interface for accessing the settings of the camera. It is accessible by pressing the Settings button.



Figure 3: Settings main menu

- **Measure:** settings for display of radiometric temperature measurement data in the thermal images.
- **Emiss:** settings for the material type, emissivity of the measured object, and reflected temperature.
- **Image:** choose camera source to be displayed on the screen: IR, visible light, fusion, and more.
- **Palette:** set the colour scheme to display temperature range.
- **Range:** set the temperature measurement range.
- **Settings:** language, unit of temperature measurement, date, time, restore factory settings and product information.

Measure

Set number of temperature point displayed on screen.

In main menu, highlight “Measure” and press Select button to open Measure



submenu. It contains Spot, Hot and Cold. The icon  means the measurement is in use. The icon  means the measurement is not in use.



Figure 4: Measure menu

Spot: Measure the center point temperature. Highlight and press Select to turn on or off.

Hot: capture maximum temperature in the image. Highlight and press Select to turn on or off.

Cold: capture minimum temperature in the image. Highlight and press Select to turn on or off.

Emiss

Set emissivity and reflected temperature for accurate temperature measurements. Use Up and Down buttons to highlight the menu, then press Select to open.

Emissivity: Set Custom by highlighting it, pressing Select to open, then use Up and Down to set. The available range is 0.01–0.95 in steps of 0.01. A value for a material can be chosen in the drop down menu. Navigate to it using Up and Down then press Select to use.

Reflected temperature: set by selecting, then using Up and Down buttons. See chapter Reflected Temperature for more information.

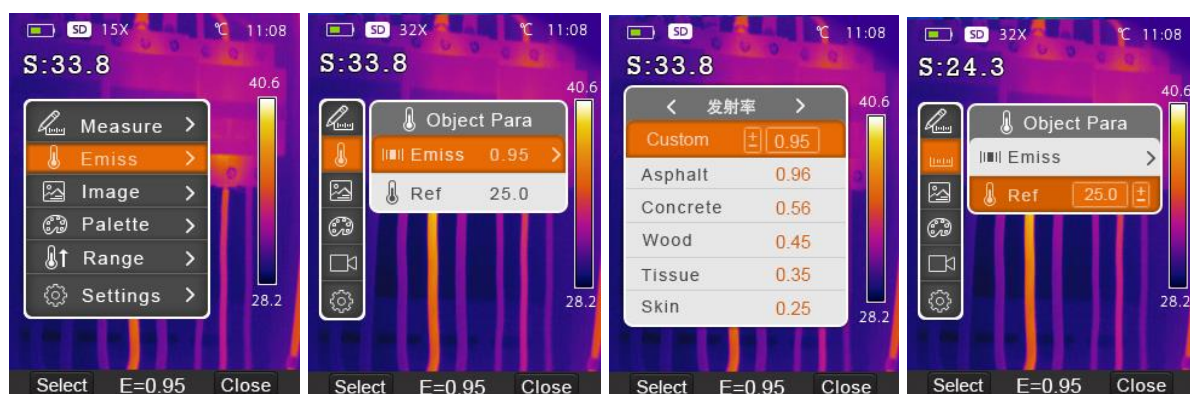


Figure 5: Setting the emissivity

Image

Set properties of the viewed image.

Use Up and Down buttons to highlight Image in the Main menu.

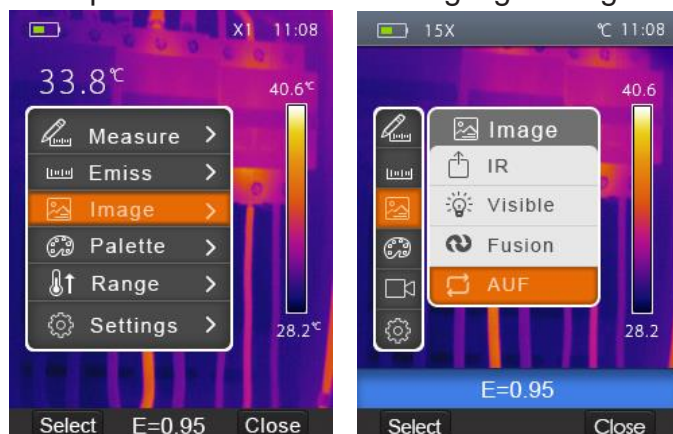



Figure 6: IR, visual and fusion image settings

- Press Select button to open the submenu that contains the settings:
- IR: displays only infrared information,
- Visible: displays only visible light information,
- Fusion: displays a mix of infrared and visible light information,
- AUF: Auto Fusion compares the centre crosshairs area temperature with the full screen and calculates the mix ratio. AUF has a lock span mode. In it, only the chosen temperature span on screen will be displayed in IR, while the rest of the screen will be in visible light. Press “” key to lock the current span.

Palette

The Image Palette lets you change the false-color presentation of the infrared images. All variants offer an equal linear presentation of temperature, but differ in contrast to achieve different levels of detail or allow for printing. Some are intended for specific applications.

- In main menu, press Up and Down buttons to highlight “Palette”.
- Press Select button to open the Palette submenu. It shows the four kinds of palettes available: Iron, Rainbow, Grey, and Grey Inverted.
- Press Up and Down buttons to highlight the chosen palette.
- Press Select button to select palette, press Close button to return.

Temperature ranges

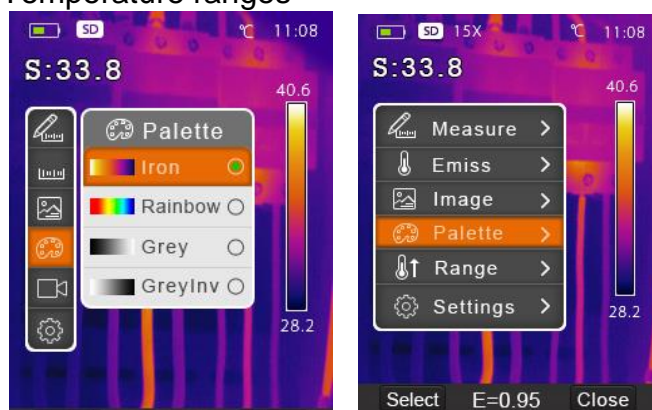


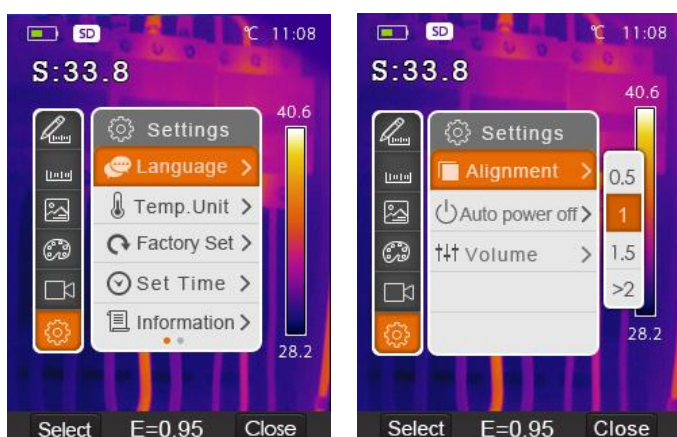
Figure 7: Palette menu

Images has two temperature ranges: -20–150°C and 0–350°C. The range in their overlap offer the highest accuracy for temperature measurements, so it is more beneficial to use the lower range.

- In main menu, navigate to Range menu using Up and Down buttons.
- Open by pressing Select.
- Use Up and Down buttons to highlight the chosen range.
- Press Select to confirm or Close to exit without change.



Figure 8: Temperature range menu



Settings menu

Settings contain general options, localization, and factory reset.

In main menu, press Up and Down buttons to highlight “Settings”.

Use Select button to open the submenu. There are two pages in it. The second is accessible by using Down button another time after reaching the bottom of first.

Press Select button to select an item and change its settings or Close to exit Setting submenu.

Language

- Navigate to Language submenu in the Settings and open it.
- Choose a language using Up and Down buttons.
- Press Select button to confirm or Close to exit without change.



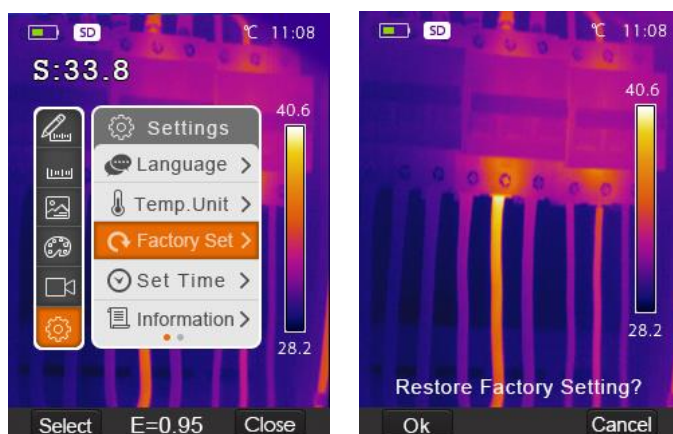
Temperature Unit

- There are three units to choose from: °C, °F and K. Conversion relationship: $^{\circ}\text{F}=1.8^{\circ}\text{C}+32$, $\text{K}=273.15+^{\circ}\text{C}$.
- Navigate to Temp. Unit submenu in the Settings and open it.
- Select the desired unit and select it using Select button.



Factory Set

Navigate to Factory Set submenu in the Settings and open it.
Press "OK" to restore factory settings or "Cancel" to exit without change.



Factory Settings of the thermal camera are the following:

Item	Parameter	Value
Measurement	Center Spot Measurement	off
	Hot Spot Measurement	off
	Cold Spot Measurement	off
Measurement Parameters	Emissivity	0.95
	Reflective temperature	25°C
Image	Mode	Infrared
	Palette	Iron
	Adjustment	Auto
System Setting	Language	English
	HDMI Output	off
	Laser	off
	Lamp	off

Set time

Navigate to Set time submenu in the Settings and open it.

Use Left and Right buttons to select item to edit.

Use Up and Down buttons to edit the highlighted value.



Information

Navigate to Information submenu and use Select button to open it.



Press "Close" button to return to desktop.

Alignment

- Navigate to Alignment submenu and use Select button to open it.
- Use Up and Down buttons to select value.
- Press Select button to confirm or Close to exit without change.
-



Power off

The thermal camera will shut down after selected time of inactivity. Available durations are 5 minutes, 10minutes, or 30 minutes. OFF means no automatic power off.

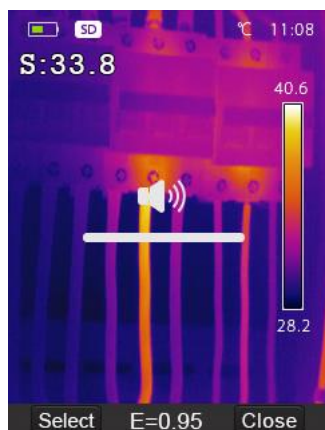
- Navigate to Alignment submenu and use Select button to open it.
- Use Up and Down buttons to select the option.
- Press Select button to confirm or Close to exit without change.
-



Volume

Navigate to Volume submenu and use Select button to open it.
Use Left and Right buttons set the volume.

Press Select button to confirm or Close to exit without change.



Camera Menu

Thermal camera has separate photo and video modes. In photo mode, the camera can save thousands of images with resolution 1280*960 in JPEG format. It stores both infrared and visible light data in an image.

In video mode, the camera captures video in .mp4 format for hours. Infrared data is saved in it as well.

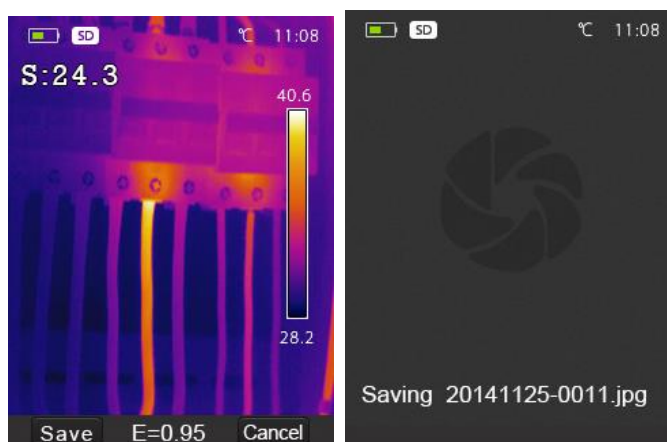
NOTE

Images and video files are stored in SD Memory Card. Images can easily be read and analysed within thermal camera PC software.

Save Image

In desktop, press Trigger button to freeze the image.

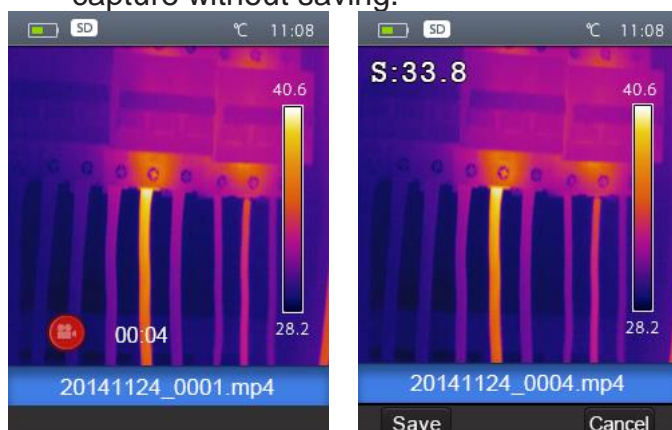
Press Save button to save image. Created filename is shown. Press “Cancel” to return to desktop without saving the image.



Video Menu

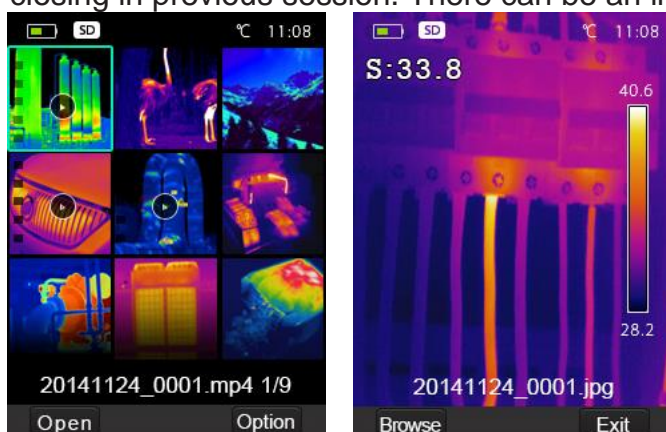
- The thermal camera supports .mp4 video capture.
- In desktop, press Trigger button and hold for about 2 seconds to start video capture with voice.
- Insert microphone or earphone with microphone to the Audio port to record voice as well.

- To stop the video capture, press the Trigger button again.
- Press Save button to save video to file. Press Cancel button to stop video capture without saving.



File Browser

In desktop, press File Browser button (left below) to browse the memory. File browser displays images and videos saved on SD card. It opens into last state before closing in previous session. There can be an image or a video open.



1. Open an image

Navigate to desired image and press Open button to open it.

Press Up button to zoom out or Down button to zoom in.

Press Left button to open previous image or Right to open next image.

To return to files browser, press Browse key.

To return to desktop, press File browser button again or press Exit button.

2. Play a video

Navigate to video in the File Browser. Press Open button to open.



Insert earphones to hear the recorded sound.

Play video by pressing Trigger button.

Return to File Browser by pressing Browse button.

Return to desktop by pressing Exit button.

3. Delete a file or all files

Navigate to the file to be erased.

Press Option key to open Options menu.

Select Delete with Up and Down buttons. Press Ok to erase the chosen file.

Select Delete All with Up and Down buttons. Press Ok to erase all files on the SD card.

USB Mode

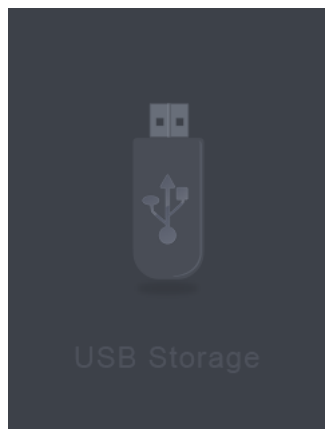
Connect USB cable to device. The menu will open automatically.



There are two USB modes: Storage and PC Camera. Use Up and Down buttons to select one.

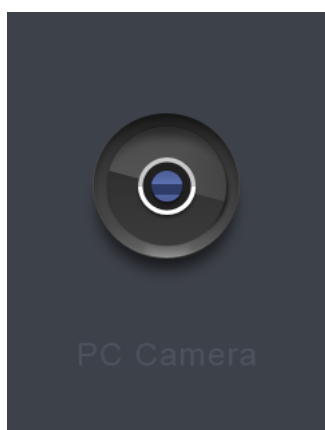
Storage

Browse files stored on the SD card using your computer. When Storage mode is selected, the following image will be displayed:



PC Camera

The device is controlled over USB by your computer. If this mode is selected, the following image will be displayed:



HDMI Output

The video output from the thermal camera enables displaying the thermal image (not including the operator menus) on an external monitor or video recording device capable of managing HDMI systems.

To make HDMI connection:

Connect the thermal camera to the external HDMI monitor or recording device using the included HDMI video cable.

Turn on the external HDMI monitor or device.

Power on the thermal camera.

With the image displayed on the external HDMI monitor or device, the thermal camera's display works simultaneously.

Once the operations on the external device are finished, switch off the external device and disconnect the HDMI video cable from the thermal camera.

8. Troubleshooting

If you encounter a problem while using the thermal camera follow the instructions in the **Error! Reference source not found.** below. If the problem persists, disconnect the power and contact the Metrel technical support department.

Table 2: Troubleshooting

Fault	Possible cause	Solution
Thermal camera doesn't turn on	No battery	Insert the battery
	Low battery	Replace or charge the battery
Thermal camera shuts down during work	Low battery	Replace or charge the battery
No image	The lens cap is covered	Open the lens cap

9. Metrel Thermal Image Viewer PC Software

Software install and uninstall

1. System requirements

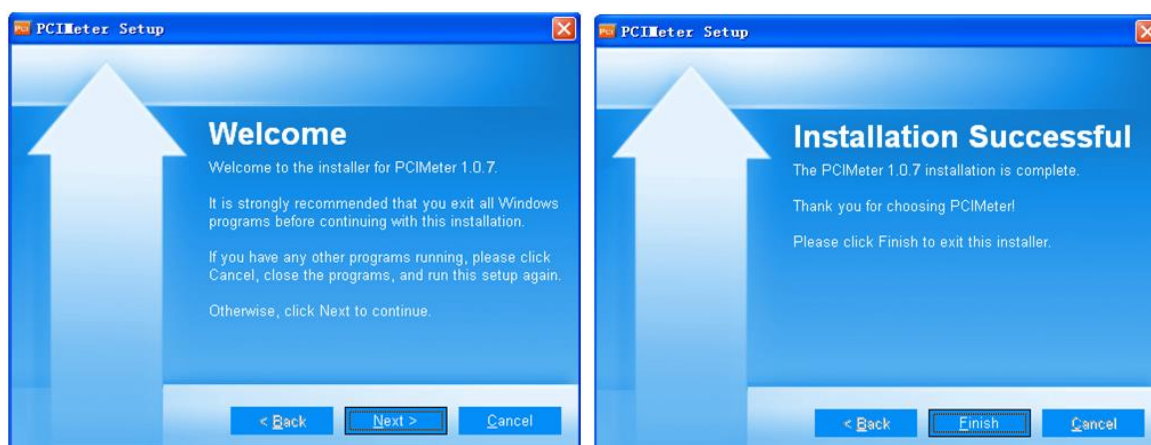
Window XP or higher version of Windows system

Net Framework 2.0 or Net Framework 3.5 (it includes 2.0) pre-installed. It is provided on the CD included in the set, or it can be downloaded.

2. Metrel Thermal Image Viewer installation

Insert the installation CD and follow the instructions on screen.

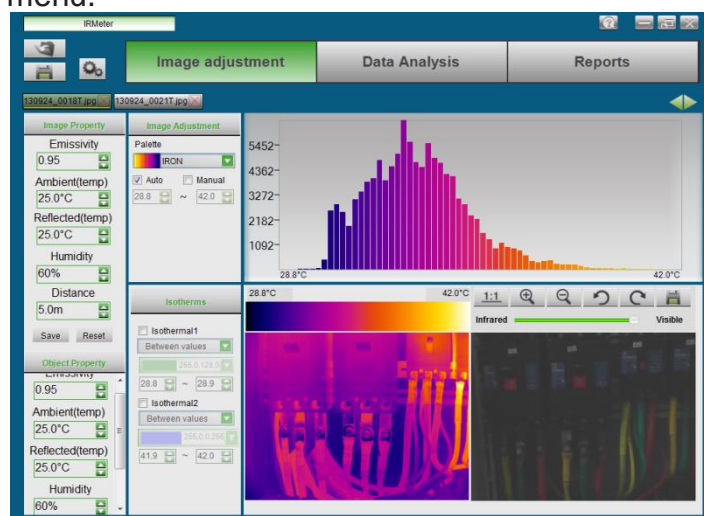
In case of digital distribution, run the “setup.exe”.



Installation is successful once window above is displayed. Click “finish” to exit the installer.

3. Running

After installation, open the program by clicking the shortcut on desktop or in the Start menu.



4. Uninstall

Uninstall Metrel Thermal Image Viewer from the start menu. Follow the instructions on the screen.



10. Specifications

Imaging and optical data	
Field of view (FOV) / Minimum focus distance	19° x 25° / 0.5 m
Spatial resolution (IFOV)	2.78mrad
Thermal sensitivity / NETD	< 0.1°C @ +30°C / 100 mK
Image refresh rate	50 Hz
Focus	Manual
Zoom	1–32× continuous, digital zoom
Focal length	9 mm
Focal Plane Array (FPA) / Spectral range	Uncooled microbolometer / 8–14 μm
IR resolution	120× 160pixels
Image presentation	
Display	2.8" LCD, 240 × 320 pixels
Image modes	IR image, Visual light image, Image Fusion
Color palettes	IRON, Rainbow, Grey, Grey Inverted
Measurement	
Object temperature ranges	–20°C to +150°C 0°C to +350°C
Accuracy	±2°C or ±2% of reading Environment temperature 10°C -35°C, object temperature > 0°C.
Measurement analysis	
Spot temperature	Center Spot
Automatic hot /cold detection	Auto hot or cold markers
Emissivity	User-adjustable from 0.01 to 1.0
User corrections	Emissivity, Reflected temperature
Storage	
Storage media	8 Gb Micro SD card
Video storage format	Standard MPEG-4 encode, 1280x960@30fps; > 60 minutes on included memory card
Video storage mode	Simultaneous storage of IR and visual images.
Image storage format	Standard JPEG, including measurement data; > 6000 pictures on included memory card
Image storage mode	Simultaneous storage of IR and visual images.
Set-up	
Laser	< class 2
Set-up options	Localization of units, language, date and time formats; information on camera.
Languages	English, Chinese, Chinese simplified
Visible light camera	
Built-in digital camera	5 Megapixels
Built-in digital lens data	FOV 59°
Data communication interfaces	
Interfaces	USB-mini, audio, HDMI

USB	Data transfer between camera and PC Live video from camera and PC
Video out	HDMI
Power system	
Battery	Li-ion battery, 4 hours operating time
Input voltage	DC 5V
Charging system	In camera, with AC adapter
Power management	Automatic shutdown
Environmental data	
Operating temperature range	-15°C to +50°C
Storage temperature range	-40°C to +70°C
Humidity (operating and storage)	10%~90%
Drop test	2m
Bump	25g(IEC60068-2-29)
Vibration	2g(IEC60068-2-6)
Physical measurements	
Camera weight, incl. battery	<500g
Camera size (L × W × H)	224x77x96

11. Standard set

- Thermal camera with the lens FOV 19° x 25° and focal length 9 mm;
- Li-Ion battery 3,7 V 2600 mAh;
- AC adapter: input 100–240 V_{AC}, 50/60 Hz, 0.9 A; output 5V_{DC}, 2.4A;
- Micro SD card 8 Gb;
- Micro USB to USB cable;
- USB to OGT cable;
- Non-slip strap;
- User manual;
- Warranty card;
- PC SW installation CD;
- Carrying bag.

IR thermal camera

MD 9930 IR thermal camera with Bluetooth



MD 9930 is the go-to imager for most applications. Extremely versatile, with a great thermal resolution, it can view and check nearly any thermally stressed object. From electrical distribution boards, motors, bearings and friction, to hidden fault finding in the water or electrical systems in buildings. It can shoot both thermal, visible light and combined images that help with orientating and locating the fault from the image. Thermal focus is can be set manually and there is 32x digital zoom available. Cursors and central thermometer make images easy to read while thermal videos with high frame rate can follow quick changes in temperature. Audio comments can be added to the videos.



160 x 120
pixels

MEASUREMENT FUNCTIONS:

- Temperature,
- Temperature difference.

KEY FUNCTIONS:

- Very fast frame rate 50 hz,
- Automatic markers on screen (hot spots, cold spots, central),
- 5 different palletes,
- Lock and compare feature,
- Temperature in °C, °F or K,
- Laser pointer,
- LED flashlight,
- Thermal and visible light videos,
- Simultaneous storage of visible light and IR images for video,
- Live transmission of video over HDMI or USB
- Included 8 GB micro SD card (for more than 6000 images),
- Included card reader for PC,
- PC software for image editing and report building included,
- Li-Ion batteries with long life,
- Internal memory,
- Hold image feature,
- PC software.

APPLICATIONS:

- Troubleshooting electrical installations and equipment,
- Solar farm inspection,
- Building and facility maintenance,
- Filed service,
- Energy loss analysis,
- Troubleshooting other installations (pipes, carpentry, windows, etc).

TECHNICAL SPECIFICATION

FUNCTION	
IR sensor resolution	160x120 pxl
Temperature range	-20 – 350°C
Thermal sensitivity/NETD	0,1°C @ 30°C / 100 mK
Thermal accuracy	Higher value $\pm 2^\circ\text{C}$ or $\pm 2\%$
Field of vision	25° x 19°
Spectral range	8 – 14 μm
Emmisivity	0.01 – 1.0
Frame rate	50 Hz
Focal length	9 mm
Spatial resolution	2,78 mrad
Min focused distance	0.5m
Focus	Manual
Visible light camera resolution	5 Mpxl
Visible light lens FOV	59°
Fusion view	yes
Color palettes	4
Display resolution	240x320 pxl
Video format	MPEG-4, 1280x960@30fps
Image format	JPEG, measurement data included
Data storage	100 MB internal + SD card
Data communication	USB, HDMI
IP protection	IP 65
Operation temperature range	-15°C – 50°C
Storage temperature range	-40°C – 70°C
Humidity (operation and storage)	10% – 90%
Drop test	2m
Weight	500g
Size (LxWxH)	224mm x 77mm x 96mm

ORDERING INFORMATION



Standard set (MD 9930)

- MD 9930 IR thermal camera
- Software CD
- USB cable
- USB OTG cable
- MicroSD card
- Li-ion battery
- AC adapter
- Non-slip strap
- Carrying case
- Instruction manual

METREL D.D.

Measuring and Regulation Equipment
 Manufacturer
 Ljubljanska 77, SI-1354 Horjul, Slovenia
 T +386 (0)1 75 58 200, F +386 (0)1 75 49 226
 metrel@metrel.si, www.metrel.si

Note! Photographs in this catalogue may slightly differ from the instruments at the time of delivery.
 Subject to technical change without notice.