Manual

Elma Thermo X250

English

EAN	5706445840779

ENGLISH

1 Introduction

1.1 Introduction

The Elma Thermo X250 is a handheld thermal imager used for preventive maintenance, troubleshooting and verification. Focus the lens on the object, view the thermal and visual images on the LCD display, save images or video internally or on the included Micro SD memory card. Plug it into a PC or transfer the images and video if the "**ELMA THERMO X Software**" is installed.

2 Safety information

2.1 Do not disassemble or modify the thermal imager.

2.2 Do not point the thermal imager towards intensive energy sources, e.g. devices that emit laser radiation or the sun. This can have an undesirable effect on the accuracy of the camera. It can also cause damage to the detector in the thermal imager.

2.3 Do not use the thermal imager at a temperature higher than +50°C (+122°F), or lower than -20°C (-4°F). High temperature or low temperature can cause damage to the device

2.4 Improper use of the device can reduce the lifecycle.

2.5 The battery cannot be removed.

2.6 Do not place the device in or near fire, in direct sunlight or other high temperature locations.

2.7 Always charge in the temperature range below.

2.8 The temperature range when charging the battery is 0°C to +50°C (+32°F to +122°F). Charging outside of this range may cause the battery to heat up, break or reduce the performance or lifecycle of the battery.

2.9 Keep the device away from water/salt water, do not get it wet.

2.10 Clean the camera with a damp cloth and a mild soap solution. Do not use abrasives, isopropyl alcohol or solvents to clean the housing or lens/display.

2.11 Be careful when cleaning the infrared lens. Do not clean the infrared lens too vigorously as this may damage the anti-reflective coating.

2.12 Avoid condensation. Moving the thermal imager from cold to warm will cause condensation inside the camera, wait until the thermal imager has cooled down enough for the condensation to evaporate before using it.

2.13 Storage. If the thermal imager is not used for an extended period of time, store it in a cool and dry environment.

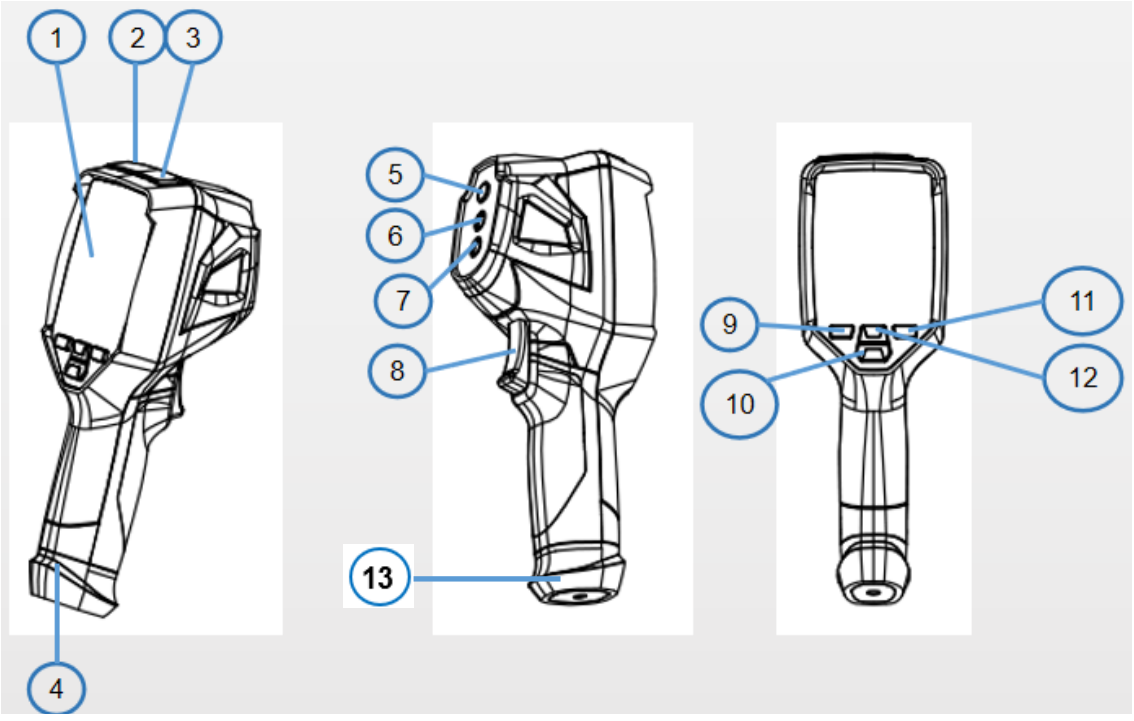
3 Specifications

Image and optical data	
Field of view (FOV) / Minimum focus distance	56°x 42°/ 0.5m
Resolution (IFOV)	5.4 mrad
Thermal sensitivity/NETD	< 0.1 °C @ +30 °C (+86 °F) / 100 mK
Frame rate	25Hz
Focus setting	Focus free
Focal length	2.6mm
Focal Plane Array (FPA) / Spectral range	Uncooled microbolometer / 7.5-14 µm
IR resolution	192 x 256 pixels
Image presentation	
Display	3.2" LCD, 240 x 320 pixels
Image modes	IR image, Visual image, Picture in picture and Auto fusion
Colour palettes	Iron, Rainbow, White Warm, Black Warm, Brown Warm, Blue/Red, Hot/Cold, Feather
Measurement	
Object temperature range	-20 °C to +550 °C (-4 °F to +1022 °F)
Accuracy	±2 °C (3.6 °F) or ±2% of reading (Ambient temperature 10-35 °C, object temperature >0 °C).
Analysing measurements	
Spot	Centre point
Automatic hot/cold detection	Automatic hot or cold markers
Corrections of measurements	Emissivity, reflected temperature
Save videos	
Storage media	Micro SD card and 4 GB internal EMMC
Format for video storage	Standard MPEG-4, 240x320@30fps, on SD card > 30 min.
Video storage mode	IR video storage
Save images	
Format of saved images	Standard JPEG or HIR files images including measurement data on memory card > 6000 images
Image storage mode	Simultaneous storage of IR and visual images
Image analyses	Internal image analysis tools, full featured.
Setting up	
Device setup	Device setting, language, date/time formats, camera information
Language settings	English - Danish - Norwegian - Swedish
Digital camera	
Built-in digital camera	2 megapixel
Built-in digital lens data	65° FOV

Data communication	
Interfaces/ Interfaces	USB Type C
USB TYPE C	Images and Live video are transferred between camera and PC
WIFI	WIFI connection to mobile device, Tablet or Phone
Power supply	
Battery power	Fixed Li-ion battery, non-removable, 4 hours runtime
Input voltage	DC 5V
Charging	In-camera (AC to 5V USB-C adapter)
Auto Power Off	Automatic shutdown (adjustable)
Environmental data/environment	
Operating temperature range	- 15°C to + 50°C (5° F to + 122°F)
Storage temperature range	- 40°C to +70°C (-40°F to +158°F)
Humidity (operation and storage)	10% ~ 90%
Drop test	2m
Bump	25g (IEC60068-2-29)
Vibration	2g (IEC60068-2-6)
Physical data	
Weight, incl. battery	390g
Dimensions (L × W × H) mm	224x77x96

4 Description of the device

1	LCD display, there may be a protective film on the display	5	Flashlight	9	Menu/OK button
2	USB C / Charging	6	Infrared camera lens	10	Down arrow key
3	For Micro SD card	7	Visual camera	11	On/Off/Lock key (Return key)
4	Fixed battery	8	Release button	12	Up arrow key
				13	Mounting to tripod



5 Before starting

5.1 Charge the battery

Before using the thermal imager for the first time, the battery may need to be charged.
The battery status is shown on the 5-segment battery indicator.

Charge the battery: Connect the charger to the camera's **USB C connector (2**) on the top of the camera, the battery indicator flashes for a few seconds, the 5 segments show how much the camera is charged.

Press the On/Off/Lock/Return button (11) .when the battery indicator has stopped flashing and all 5 segments are lit. The battery is then fully charged.

Note: Note
Make sure the thermal imager is in an environment close to room temperature before connecting it to the charger. Do not charge in hot or cold areas. Charging in extreme temperatures may reduce the capacity.

5.2 Switch on

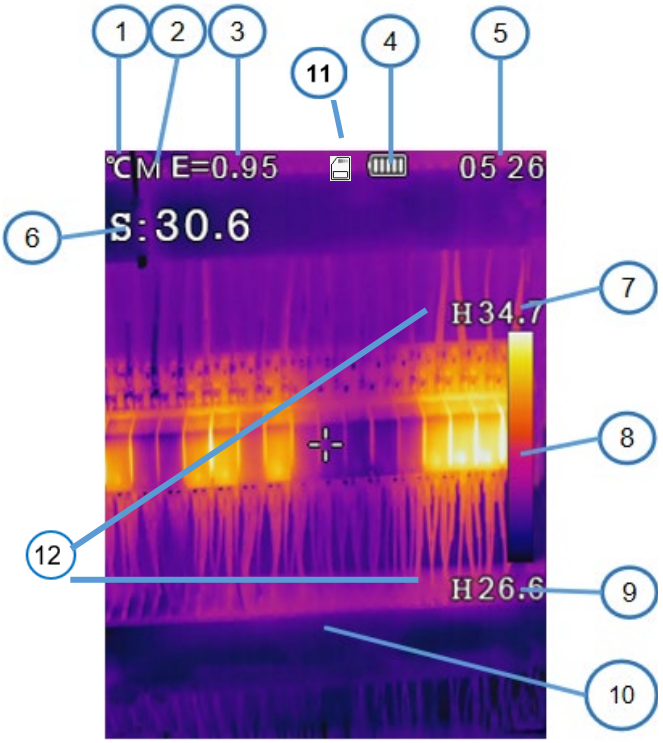
Press the On/Off/Lock button (11) . for 2 seconds.
At start-up, the camera will take 5-6 seconds to "warm up" and the screen will show a completely normal image. When the thermal sensor is calibrated, the thermal image will appear on the screen as shown here.

5.3 Switch off

Press the On/Off/Lock button (11) for 2-3 seconds until the display goes black.

Elements on the screen at startup

1	Temperature unit (°C - °F - K)
2	Distance unit (M - Ft)
3	Emissivity (ε)
4	Battery indicator
5	Time of day
6	Centre Spot temperature display
7	Max. temperature
8	Temperature colour bar
9	Min. temperature
10	Display screen
11	SD card symbol when inserted in the device
12	A (Auto) H (HG) Locked temperature scale



5.4 Lock

On/Off/Lock key (11) .to lock the current temperature range . When locked, adjust the high/low temperature level by holding down the **Up Arrow** key **(12)** **or Down Arrow** key **(10)** change from/to high/low by pressing **the Trigger key (8)** This focuses only on the temperature range of interest.

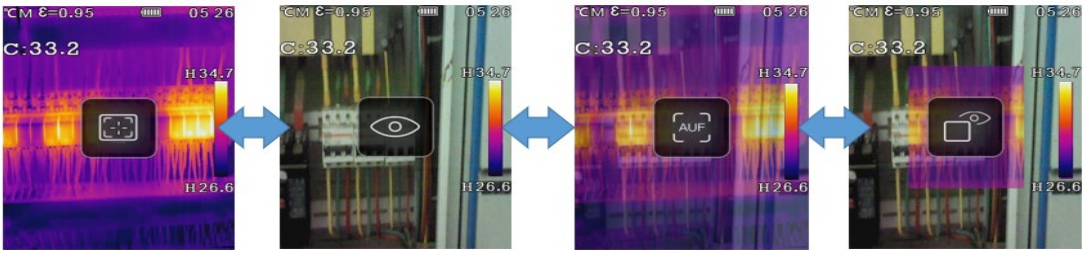
5.5 The shutter

The thermal image from the camera is blurred if the thermal camera cannot correct after a few minutes or if the camera changes direction. To get a good thermal image, the camera must be corrected. The thermal imager has an Auto calibration option that can be set from Auto to Off or in a number of minute time intervals. In **Auto** mode, the thermal imager will continuously correct automatically if the thermal image is blurred, see more in the Auto Calibration section.

5.6 Image mode

There are 4 image modes, press the **Up arrow** key **(12)** or **Down arrow** key **(10)** to change image mode.

Select: Thermal image Camera Automatic fusion Picture in picture



5.7 Temperature measurement

All objects radiate infrared energy. The amount of radiated energy is based on the actual surface temperature and the surface emissivity of the object. The camera detects the infrared energy from the object's surface and uses this data to calculate an estimated temperature value. Many common materials such as painted metal, wood, water, skin and fabric are very good at radiating energy and it is easy to get relatively accurate measurements. For surfaces that are good at radiating energy (high emissivity), the emissivity factor is >=0.90. This does not apply to glossy surfaces or unpainted metals as they have a low emissivity of <0.6. These materials are not good at radiating energy and are classified as low emissivity. To more accurately measure low emissivity materials, an emissivity correction is needed. Adjusting the emissivity setting will usually allow the thermal imager to calculate a more accurate estimate of the actual temperature. See more in the section on **Emissivity adjustment** for the most accurate temperature measurements**.**

5.8 Emissivity adjustment

The correct emissivity value is important for the most accurate temperature measurement. The emissivity of the surface can have a large effect on the apparent temperatures that the thermal imager measures. Understanding and knowing the emissivity of the surface is important to obtain more accurate temperature measurements.

Please note

Surfaces with an emissivity of <0.60 make the reliability of the actual temperature problematic. The lower the emissivity, the greater the potential error associated with the temperature measurement. This is true even when emissivity and reflected background adjustments are performed correctly. Emissivity is set directly as a value or, as here, from a list of emissivity values for some very common materials. The set emissivity is displayed on the LCD screen as **ε** =x.xx
The following table shows the typical emissivity of a number of materials.

Material	**Emissivity**	**Material**	**Emissivity**	**Material emissivity**	**Emissivity**
Customised	0.95	Rubber	0.95	Polycarbona	0.80
Water (water)	0.96	Wood	0.85	Oxidised	**0.73**
Stainless steel	0.14	Bricks	0.75	Rust	0.80
Aluminium plate	0.09	Aluminium	0.96	Aluminium	0.90
Asphalt	0.96	Brass plate	0.06	Soil	0.93
Concrete	0.97	Human skin	0.98		
Cast iron	0.81	PVC plastic	0.93		

5.9 Reflected temperature

By using the offset factor, the reflection can be equalised due to the low emissivity and the accuracy of temperature measurement with infrared instruments is improved. In most cases, the reflected temperature is the same as the ambient air temperature. Only if there are highly radiant objects with significantly higher temperatures close to the object being measured should these be determined and used. The reflected temperature has little effect on objects with high emissivity. The reflected temperature can be set individually.
Follow these steps to find the correct value for the reflected temperature.

1. Set the emissivity to 1.0
2. Point the camera in the opposite direction - away from the object - take a measurement and freeze the image.
3. Determine the average value of the image and use this value as input for the reflected temperature

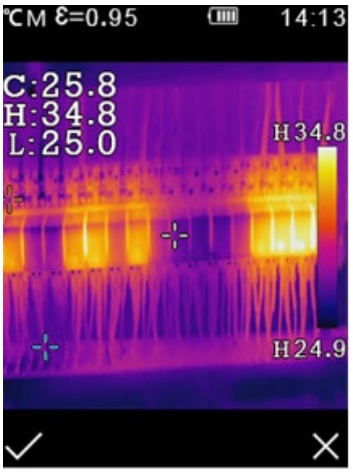
5.10 Elma Thermo X250

The device has photo and video functions. Thousands of images can be stored in the photo function. Image resolution is 1280*960, the format is .jpg and saves both infrared and normal images. Several hours of infrared video can be recorded and saved in .mp4 format.

Please note
Images and video files are stored on the SD memory card if it is inserted in the device, otherwise they are stored in the internal memory.

The images can be viewed and analysed in the PC software.

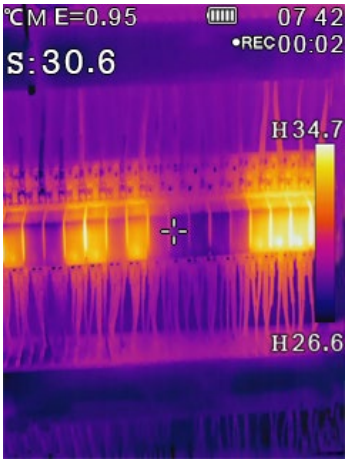
5.11 Capture and save an image



1. Point to the object and press **the Shutter button (8),** the image will freeze.
2. Save with the **Menu/OK** button **(9)** or cancel by pressing **the Shutter button (8)** again or press **the On/Off/Lock/Return button (11)**
3. After the image is saved, new images can be taken

5.12 Capture and save a video

The thermal camera can take thermal .mp4 videos



1. Point to the object and press and hold the **Shutter button (8)** for 1 sec. until you see **REC** counting (sec.) in the top right corner under the clock.
2. Stop and save the video recording by pressing the **Shutter button (8)** again.
3. After the video is saved, new videos or images can be taken

ELMA THERMO
X_2.1.25_Setup.exe

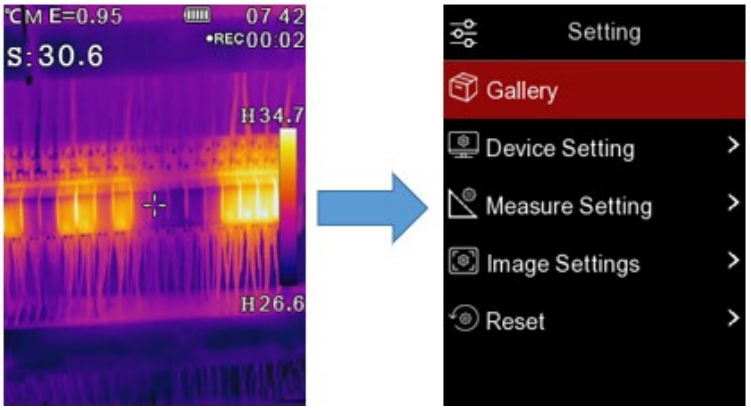
5.13 ELMA THERMO X Software

ELMA THERMO X Software can be downloaded from wwww.elma.dk and installed on a Windows PC.
This software is designed for thermal imaging cameras and includes features for analysing images, organising data and information and creating professional reports. With **the ELMA THERMO X Software** it is also possible to write comments.

ELMA THERMO X is also available as an app for iOS and Android, where you can live stream to your mobile device.

6 Menus

The menus, together with the 4 buttons (9-10-11-12), provide access to a number of settings and sub-menus:



6.1 Settings

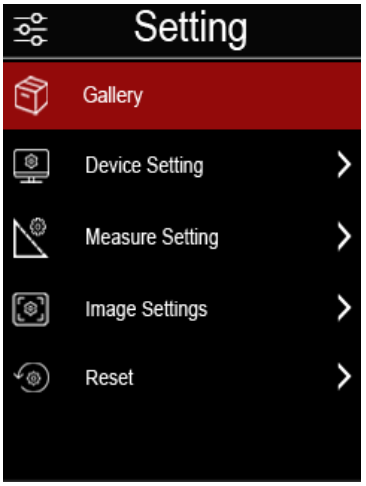
Press **the Menu/OK** button **(9).**
The main menu will be opened.

Use **the Up arrow** key **(12) or Down arrow** key **(10)** and **Menu/OK** to select a setting

	6.2 Gallery:	Go to the gallery where saved images and video can be recalled on the screen and possibly deleted
	6.3 Device setting:	Settings for devices and systems, including USB mode, Flashlight, WIFI, Time/Date, Language, Auto power off and About
	6.4 Measure setting:	Settings for Max Temp, Min Temp, ε Emissivity, Ambient Temperature, Reflection Temperature, Alarm Mode, Distance, Temperature Range, Temp. Unit, Distance Unit, Autocalibration
	6.5 Image settings:	Settings for Palette, Image Super Resolutions, Image Transform, Image Adjustment.
	6.6 Reset:	Format Memory, Default Settings.

6.2 Gallery.

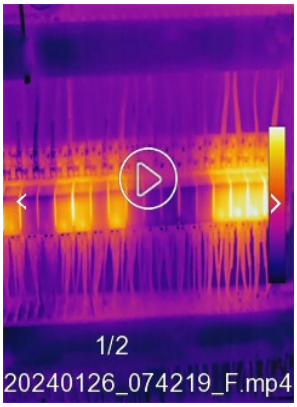
Press **the Menu/OK** button **(9)** to access the images and video that are stored.
Press the **Up arrow** key **(12)** **or the Down arrow** key **(10)** to browse through all images/videos
NB! Images/videos are automatically "named" according to the time it was recorded. E.g. 20240126_074219_F*.Type**

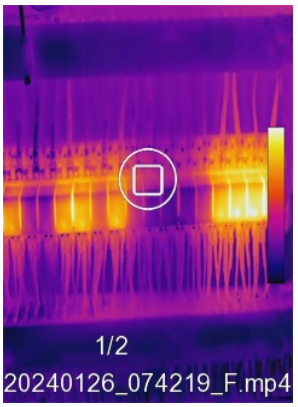


Video recorded 26-01-2024 at 07:42:19

*	Video F ~	Image A ~
**	Video ~mp4	Image ~ **jpg**

Play a video





If a video (seen by this icon ) is displayed, press **the Shutter button (8)** to play the video, press again to stop playing the video.

Note: Note

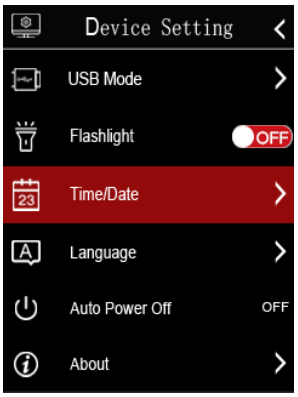
If the SD memory card is inserted in the device, only the images and videos on this SD card can be viewed.
If the SD memory card is NOT inserted in the device, only images and videos stored in the internal memory can be viewed.

NB! The same applies when the device is connected to a PC.

Delete an image/video

Press **the Menu/OK** key **(9)**, use **the Up Arrow** key **(12)** **or Down Arrow** key **(10)** to move to the file to be deleted, then press **the Menu/OK** key **(9)** again to delete the current file.
Use **the Power/Lock/Return key (11)** to exit without deleting,

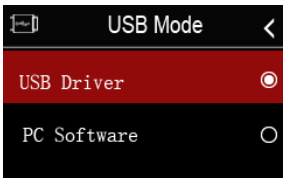
6.3 Device setting



Use **the Up arrow** key **(12)** **or Down arrow** key **(10)** to move to the desired setting, use **the Menu/OK** key **(9)** key to move to the next level.

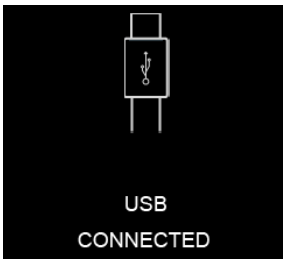
Use **the Power/Lock/Return key (11)** to exit this setting

6.3.1 USB mode

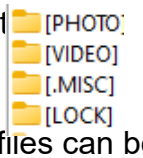


Use **the Up arrow** key **(12) or Down arrow** key **(10)** and **Menu/OK** to select the setting

USB driver

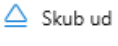


In this mode and with the USB-C cable connected to a PC, the display will show **USB CONNECTED** and on the PC you will see a "new" drive with saved files in one of the direct



From here, the files can be copied to the PC. In addition, with **ELMA THERMO X Software** you can view and create professional reports where images and comments can be inserted.

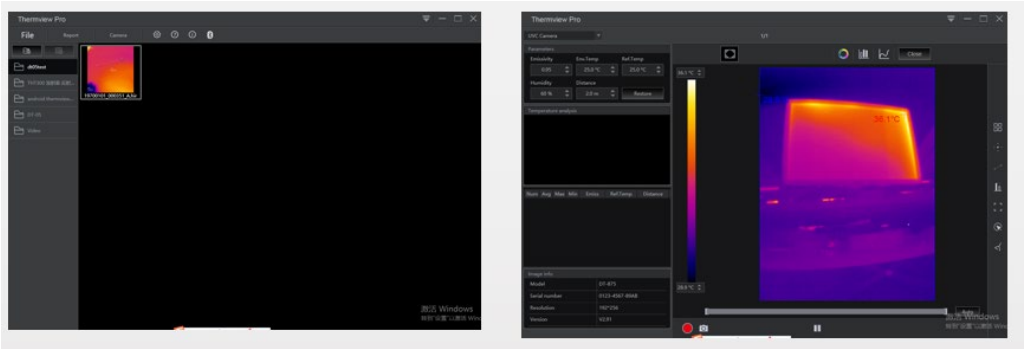
Please note
If **USB CONNECTED**, the device cannot be operated (but can be switched off).

To return to normal mode, use Windows Explorer to "eject" the drive from the PC 

and remove the USB cable from the PC/device

PC software

In this mode and with the USB-C cable connected to a PC, you will be able to analyse and edit your saved (**hir)** images (the thermographic image) via **ELMA THERMO X Software**.
The device is now a USB camera for your computer. Select the "**Camera**" menu, shown here.



Here you can analyse the thermal image in real time or you can record a thermal video and analyse it.

Use **the On/Off/Lock/Return key (11)** to exit this setting

6.3.2 Flashlight

The device has a built-in flashlight for use in dark environments, select **Flashlight** and click the **Menu/OK** button **(9)** to switch the flashlight on or off.
The light from the flashlight has no effect on the thermal image.

Use **the On/Off/Lock/Return key (11)** to exit this setting

6.3.3 WIFI

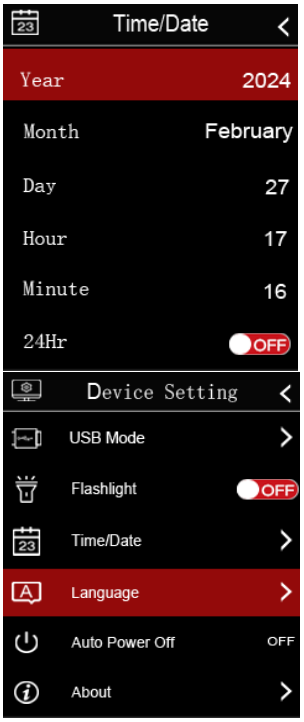
Switch WIFI on or off with the **Menu/OK** button **(9)**
The device can be connected to a tablet or mobile device via the **ELMA THERMO X** app and from there operate the device, take pictures and record video and stream directly to the mobile device. Editing the files and creating reports is also possible.

NB! The WIFI code and SSID value can be found in the menu.

Use **the On/Off/Lock/Return key (11)** to exit this setting

6.3.4 Time/Date

Use **the Up Arrow** key **(12)** **or Down Arrow** key **(10)** to select year, month, day, hours, minutes and set to 12 or 24 hour time, then press the **Menu/OK** key **(9)** and set the selected time



Use **the On/Off/Lock/Return key (11)** to exit this setting

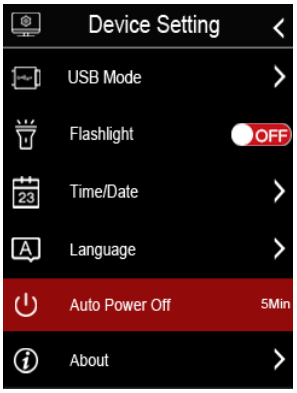
6.3.5 Language selection

Select language between:

English
Danish
Swedish
Norwegian

Use **the Up Arrow** key **(12)** **or Down Arrow** key **(10)** to select the language and use **the Menu/OK** key **(9)** key at the selected language.

Use **the On/Off/Lock/Return key (11)** to exit this setting



6.3.6 Automatic switch-off

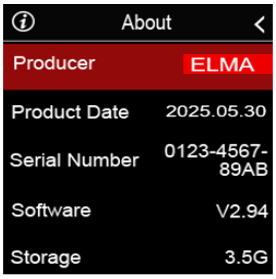
There are four options for automatic switch-off:

Off - 5Min - 10Min - **15Min** - 30Min.

Press **the Menu/OK** button **(9)** once or several times to select the desired option.

Use **the On/Off/Lock/Return key (11)** to exit this setting

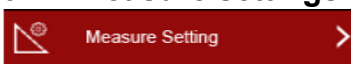
6.3.7 ABOUT

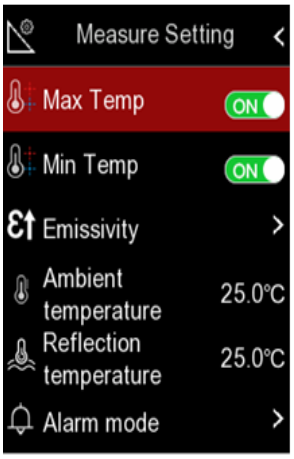


The info menu contains a variety of information about this device, such as software version, serial number, etc.

Use **Power/Lock/Return (11)** to exit this setting

6.4 Measure settings





6.4.1 Max Temp change to **ON/OFF** by **pressing the Menu/OK button (9)**

6.4.2 Min Temp change to **ON/OFF** by **pressing the Menu/OK button (9)**

If these are **ON**, 2 extra values are shown on the display, in addition to **S** (Spot) temperature which is always shown.

If **Max Temp** is **ON**, **the H** (Hot) temperature is displayed.

The display shows the highest value with a corresponding red + showing the location with the highest temperature.

If **Min Temp** is **ON**, **the C** (Cold) temperature is shown

The display shows the lowest value with a corresponding blue + showing the location with the lowest temperature

6.4.3 Emissivity

Set the emissivity of the object, the value range is 0.01 ~ 1.00 **See more in section 5.8**

Use the **Up Arrow** key **(12)** **or the Down Arrow** key **(10)** and select from the list.

If **Custom** emissivity is selected, press **the Menu/OK** button **(9)** again and adjust the value with the **Up Arrow** button **(12)** **or Down Arrow** button **(10).**

Use **the On/Off/Lock/Return key (11)** to exit this setting

6.4.4 Ambient temperature

The ambient temperature will affect the measurements, so you may need to compensate for this.
Set the camera in the range -10°C to 50 degrees.

Use **the Up Arrow** key **(12)** **or Down Arrow** key **(10) and** select the temperature in which the measurement should be taken

Use **the On/Off/Lock/Return key (11)** to exit this setting

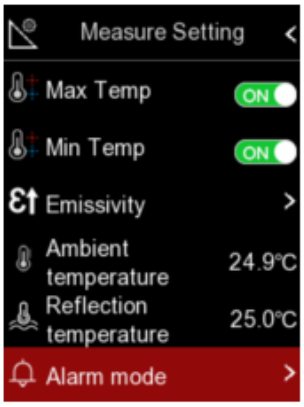
6.4.5 Reflective temperature

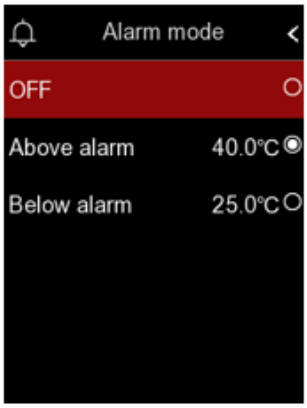
Use **the Up Arrow** key **(12)** **or the Down Arrow** key **(10)** and set the reflective temperature.

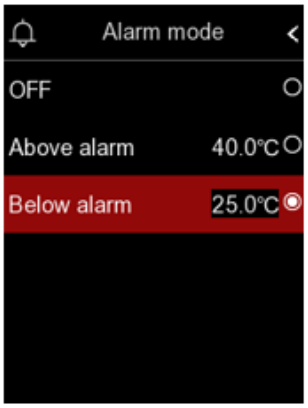
The reflected temperature is crucial for radiometric temperature measurements. The device has a temperature compensation option for the reflected temperature. For more accurate measurements, the reflected temperature should be set correctly. In most cases, the reflected temperature corresponds to the ambient temperature. Only when objects with high emissivity and significantly higher temperature are close to the measured object, the reflected temperature should be adjusted.

6.4.6 Alarm mode

This setting is used to show temperatures in red on the display if they are beyond the limits set here. Use **the Up Arrow** key **(12)** **or the Down Arrow** key **(10)** to move to one of the 3 options and use **the Menu/OK** key **(9)** to select, use the **Menu/OK** key **(9)** and **UP/DOWN ARROW (12)** again to change the value. **NOTE!** Holding **the UP/DOWN ARROW (12)** can make it faster to set the value.







Off: All displayed temperatures are shown in white.

Above alarm: If the temperature exceeds the alarm value, the H (Hot) temperature will be displayed in red.

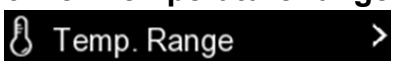
Below alarm: If the temperature is below the alarm value, the C (Cold) temperature will be displayed in red.

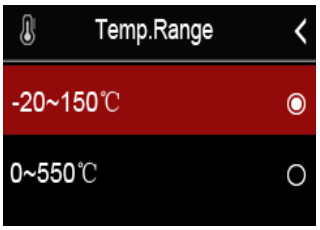
6.4.7 Distance

There are many substances in the air that can absorb infrared rays. So the object's infrared beam will decrease as the distance increases.

Adjust the distance by pressing the **Menu/OK** button **(9)** and use **the Up Arrow** button **(12)** **or the Down Arrow** button **(10)** and accept the setting with **the Menu/OK** button **(9)**

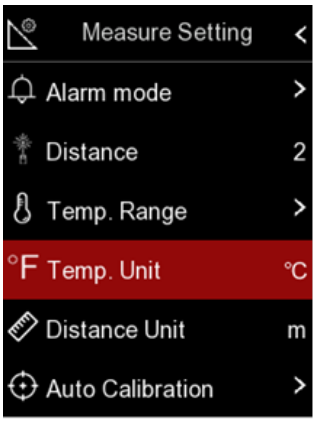
6.4.8 Temperature range





The temperature measurement ranges are: -20~150°C or 0~550°C.
If the two ranges overlap, select **-20~150°C** for best accuracy.
Use **the Up Arrow** key **(12)** **or the Down Arrow** key **(10)**
Use **the On/Off/Lock/Return key (11)** to exit this setting

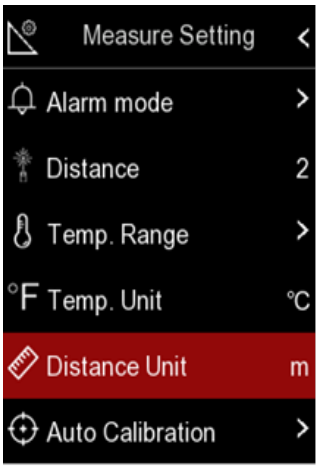
6.4.9 Temperature unit



Select one of the 3 units by pressing **the Menu/OK** button **(9)** one or more times: °C ~Celsius, °F ~Fahrenheit and K ~Kelvin.

Conversion ratio: C°
F = 1.8 * °C + 32,
K = 273.15 + °C.

6.4.10 Distance unit



Change the unit of measurement for distance between **"m"** (metres) and **"Ft"** (feet) by pressing **the Menu/OK** button **(9)**

1 (feet) = 0.3048 (metres)
1 (metre) = 3.2808399 (feet)

6.4.11 Auto calibration

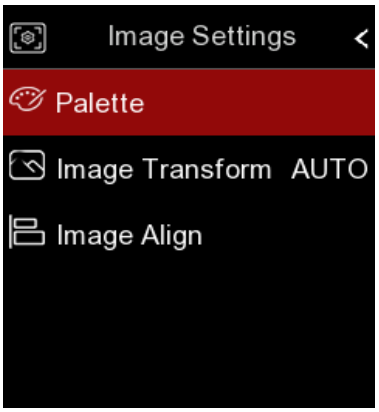
Set how often the automatic calibration should be done, choose between:
Auto - Off or a time interval from **1Min** up to **30Min**

Use the **Up Arrow** key **(12)** **or the Down Arrow** key **(10)** and accept with the **Menu/OK** key **(9)**

Use **the On/Off/Lock/Return key (11)** to exit this setting

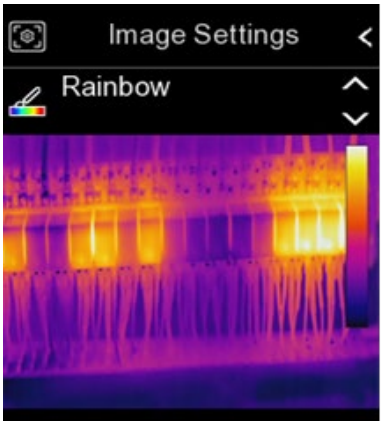
6.5 Image settings

Press **the Menu/OK** button **(9)**



6.5.1 Palette

The image palette allows you to adjust the colour reproduction of the infrared images or recordings shown on the display. There are a number of different palettes that are optimised for specific applications. The standard palettes use a linear colour scale to ensure a clear and detailed display of temperature differences.



Press **the Menu/OK** button **(9)** and set the **Standard palette**

Select from the 8 colour palettes by pressing **the Up Arrow** key **(12)** or **Down Arrow** key **(10)**, press **the Menu/OK** key **(9)** to accept the selected palette

Use **the On/Off/Lock/Return key (11)** to exit this setting.

The 8 colour palettes

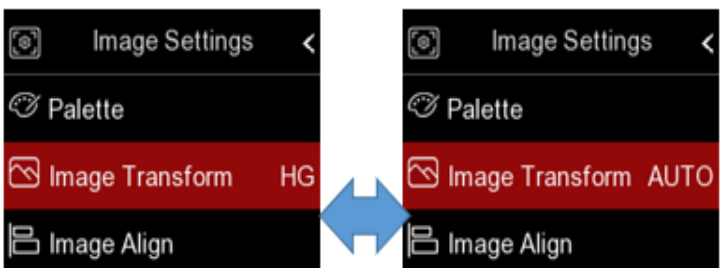
Iron	Rainbow	White Warm Grey	Black warm Grey inverted	Brown warm	Blue/red	Warm/cold	Feather

6.6 Image Super Resolution

Increases the digital resolution of the thermal image beyond the IR lens specifications.
Press **the Menu/OK** button **(9)** to switch modes. **ON** or **OFF**

6.7 Image transformation

HG **AUTO**



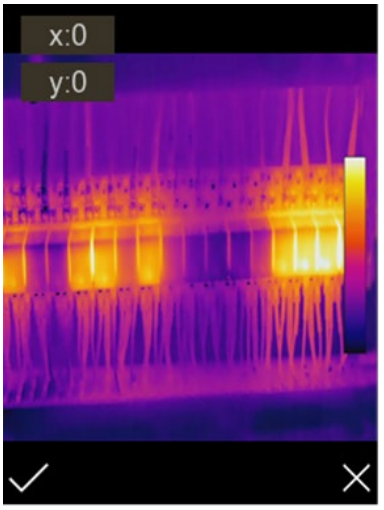
Auto mode (**AUTO**)**:** Level and span are automatically determined based on the minimum and maximum temperature of the image. The relationship between temperature and colour is linear.

Histogram mode (**HG**): The thermal image is enhanced using a histogram algorithm.

The relationship between temperature and colour is non-linear, which means that certain parts of the image are highlighted to increase the level of detail.

Press **the Menu/OK** button **(9)** to switch modes.

6.8 Image adjustment

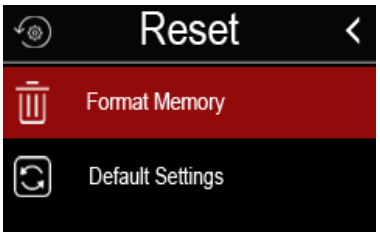


Correcting and adjusting the optical image in relation to the thermal image at the given distance

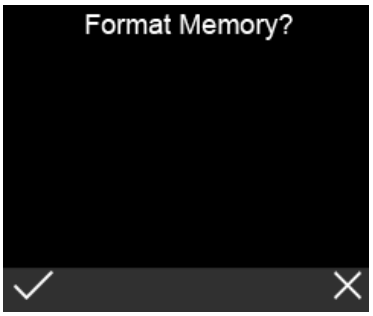
Press or hold **the Up Arrow** key **(12)** **or Down Arrow** key **(10)** to adjust the **X** value, press **the Trigger key (8)** to save and switch to the **Y** value to adjust the visible and infrared.

Press the On/Off/Lock button (11) .to cancel the setting, press the **Menu/OK** button **(9)** to save the adjustment setting.

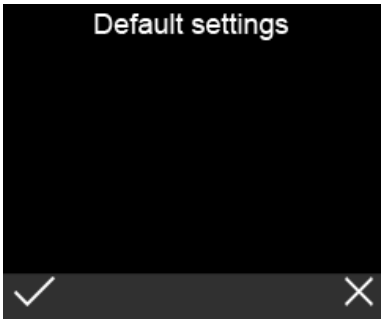
6.9 Reset



6.9.1 Format memory



If the SD card is inserted in the device, only the SD card is formatted (deletes the entire image gallery), the device setting is not affected. To erase the internal memory, first remove the SD card and repeat the following steps.
Press **the Menu/OK** button **(9)** and confirm with **the Menu/OK** button **(9)** again
Or cancel by pressing **the On/Off/Lock button (11) .**



6.9.2 Default settings

Factory settings:

Range	Parameter	Parameter Value
Measurement settings	Centre Spot Measurement	ON
	Max Temp	OFF
	Min Temp	OFF
	Emissivity	0.95
	Reflective temperature	25°C
Image settings	Mode of operation	Infrared
	Palette	Iron
	Image transformation	Auto
	Image Adjustment	X = 0 and Y = 0
Device setting	Language setting	English language
	Lamp	OFF

elma instruments

Elma Instruments A/S
Ryttermarken 2
DK-3520 Farum
T: +45 7022 1000
info@elma.dk
www.elma.dk

Elma Instruments AS
Garver Ytteborgsvei 83
N-0977 Oslo
T: +47 22 10 42 70
firma@elma-instruments.no
www.elma-instruments.no

Elma Instruments AB
Pepparvägen 27
S-123 56 Farsta
T: +46 (0)8-447 57 70
info@elma.se
www.elma.se