Thermal Imager

User Manual

Part Number: 72-13450

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1 - Introduction

Overview

The Thermal Imager is handheld imaging 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. Transferring Images to a PC is accomplished by removing the SO memory card and connecting it to a PC through the included card reader.

In addition to the features mentioned above, the Thermal Imager provide video recording with audio and play back.

2 - Safely Information

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

Do not disassemble or do a modification to the Thermal Imager.

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

This can have an unwanted effect on the accuracy of the camera. It can also cause damage to the detector in the Thermal Imager.

Do not use the Thermal Imager in a temperature higher than +50°C (+122°F), lower than -20°C (-4°F). High temperature or low temperature can cause damage to the Thermal Imager.

Only use the correct equipment to discharge the battery.

If you do not use the correct equipment, you can decrease the performance or the life cycle of the battery. If you do not use the correct equipment, an incorrect flow of current to the battery can occur. This can cause the battery to become hot, or cause an explosion and injury to persons.

Do not pull out the battery when the thermal imager is working.

If you pull out the battery when the thermal imager is working, may cause the thermal imager work unnormal.

Do not disassemble or do a modification to the battery.

The battery contains safety and protection devices which, if they become damaged, can cause the battery to become hot, or cause an explosion or an ignition. If there is a leak from the battery and the fluid gets into your eyes, do not rub your eyes. Flush well with water and immediately get medical care.

Do not make holes in the battery with objects. Do not hit the battery with a hammer. Do not step on the battery, or apply strong impacts or shocks to it.

Do not put the battery in or near a fire, or in direct sunlight, or other high-temperature locations. Do not solder directly onto the battery.

Always charge the battery in the special temperature rang.

The temperature range through which you can charge the battery is 0°C to +50°C (+32°F to +122°F). If you charge the battery at temperatures out of this range, it can cause the battery to become hot or to break. It can also decrease the performance or the life cycle of the battery.

Do not get water or salt water on the battery, or permit the battery to get wet.

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

Take the Thermal Imager from cold to hot, it will appear condensation in thermal Imager. To protect the Thermal Imager, you should power of the Thermal Imager, wait until the Thermal Imager has become war enough for the condensation to evaporate.

Storage

If you do not use the Thermal Imager, put the Thermal Imager in cool and dry environment, if you store Thermal Imager equipped with the battery, the power of the battery will be exhausted.

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3 - Packing Lists

Standard Accessories

Item	Quantity	Description
Thermal Imager	1	
Lens	1	Field of view = 17°× 17°, f = 9mm
Li-ion battery	1	3.7V, 2600mAH
Adaptor	1	Input AC Volts:100V to 240V, 50/60HZ, 0.3A Output DC Volts: 5V 2400mA
Micro SD	1	8GByte
USB Cable	1	
USB OTG cable	1	
Non-slip Strap	1	
User Manual	1	
Warranty Card	1	
PC Software & Installation CD	1	
Gift Box & Carrying Case	1	

4 - Specifications

Imaging and optical data	
Field of View (FOV) / Minimum Focus Distance	17°×17°/ 0.5m
Spatial Resolution (IFOV)	3.78mrad
Thermal Sensitivity / NETD	< 0.1°C @ +30°C (+86oF) /100 mK
Image Frequency	50Hz
Focus Mode	Manual
Zoom	1-32 × continuous, digital zoom
Focal Length	9mm
Focal Plane Array(FPA) / Spectral Range	Uncooled microbolometer / 8-14 µm
IR Resolution	80 x 80 pixels
Image presentation	
Display	2.8 in. LCD 240 x 320 pixels
Image Modes	IR image, Visual Image, Image Fusion
Colour Palettes	IRON Rainbow Grey, Grey Inverted
Measurement	
Object Temperature Range	-20"C to +150°C (4°F to +302°F) 0°C to +350°C (+32°F to +662°F)

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Accuracy	±2°C (±3.6°F) or ±2% of reading (Environment temperature 10°C to +35°C, object temperature > 0°C.)
Measurement Analysis	
Spot	Center Spot
Automatic Hot / Cold Detection	Auto hot or cold markers
Emissivity Correction	Variable from 0.01 to 1.0
Measurement Corrections	Emissivity, Reflected temperature
Storage of Videos	
Storage Media	8 GBytes Micro SD card
Video Storage Format	Standard MPEG-4 encode, 1280×960@30fps, on memory card > 60 minutes
Video Storage Mode	IR/Visual images; simultaneous storage of IR and visual images
Storage of Images	
Image Storage Format	Standard JPEG, including measurement data, on memory card > 6000 pictures
Image Storage Mode	IR/visual images; simultaneous storage of IR and visual images
Set-up	
Laser	< Class 2
Set-up Commands	Local adaptation of units, language, date and time formats, information of camera
Languages	Multinational
Digital Camera	
Built-in Digital Camera	5 Mega pixels
Built-in Digital Lens Data	FOV 59°
Data Communication Interfaces	
Interfaces	USB-mini, audio, HDMI
USB	Data transform between camera and PC Live video between camera and PC
Video Out	HDMI
Power system	
Battery	Li-ion battery, 4 hours operating time
Input Voltage	DC 5V
Charging System	In camera (AC adapter)
Power Management	Automatic shutdown

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Environmental Data	
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 (Operating and Storage)	10% to 90%
Drop Test	2m
Bump	25g (IEC60068-2-29)
Vibration	2g (IEC60068-2-6)
Physical Data	
Camera Weight incl. Battery	<500g
Camera Size (L × W × H)	224×77×96

5 - Structure Description

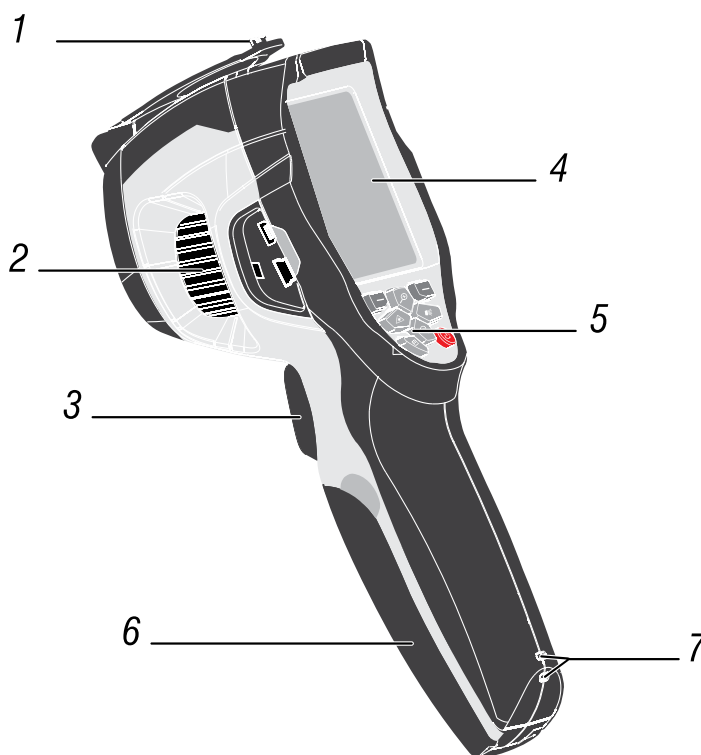### 5.1 - Back View

1 - Infrared Camera Lens Cover

2 - Lens Focus Adjuster

3 - Trigger

4 - LCD Display

5 - Buttons

- ▬ (Lett) Menu/OK Button

- ▬ (Right) Lock/Cancel 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

5.2 - Front View

8 - LED light

9 - Visual Camera

10 - Laser Pointer

11 - Infrared Camera lens

12 - Hole for Tripod Insertion
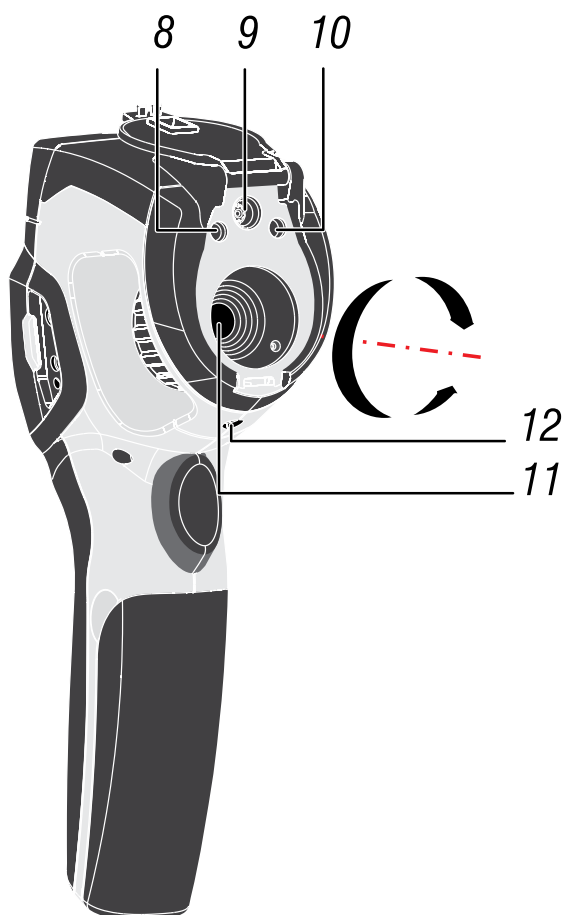
5.3 - Interface

13 - Charge light

14 - USB Cable Connection /Charger Input Terminal

15 - Audio/Microphone

16 - HDMI Output

17 - Micro SD card

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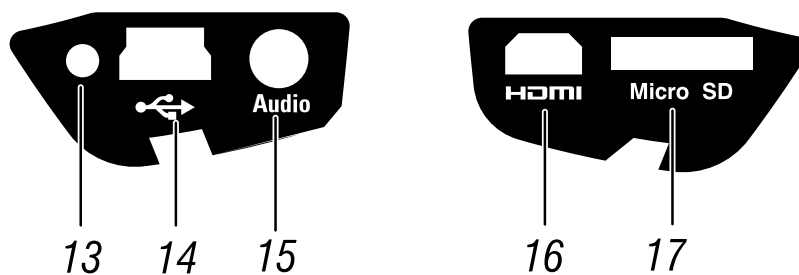
6 - Before You Start

6.1 - How to Charge the Battery

Before you use tile Thermal Imager for tile first time, charge the battery for minimum of one and one-half hours. The battery status shows on the four-segment charge Indicator.

To charge the battery, use follow before:

1 - Connect the ac power adapter into an ac wall outlet and connect the dc output to the Thermal Imager's ac power socket, the charge light is on. The battery indicator becomes " ▭ → ▭ → ▬ → ▬ ", while the battery charges with the ac power adapter.

2 - Charge until the charge Indicator becomes ▬ , the charge light is off.

3 - Disconnect ac power adapter when the battery is full charged.

Note

Make sure that the Thermal Imager 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.

6.2 - Power On and Off

To turn the Thermal Imager on, push the Power ⏻ Button. When Thermal Imagers power on, Push and hold the Power ⏻ Button for two seconds, turn the Thermal Imager off.

Note

The Thermal Imager needs sufficient warm-up time for the most accurate temperature measurements and best image quality. This time can often vary by environmental conditions. It is best to wait a minimum of 10 minutes If tile most accurate temperature measurements very Important to your application.

6.3 - Desktop

The Desktop is as follow:

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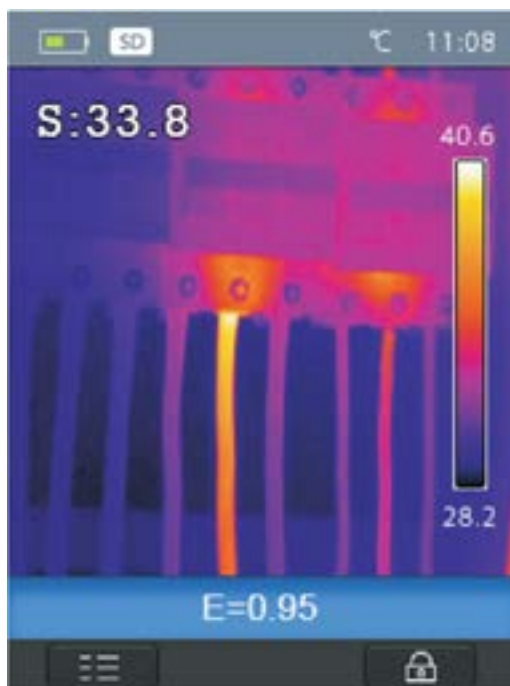
6.4 - Lens

The Thermal Imager has a Lens.

FOV is the largest area that your imager can see at a set distance.

This table lists the horizontal FOV. Vertical FOV and IFOV for lens.

Focal Length	Horizontal FOV	Vertical FOV	IFOV
9mm	17°	17°	3.78mrad

IFOV (Instantaneous Reid of View) is the smallest detail within the FOV that can be detected or seen at a set distance, the unit is rad. The formula is this:

IFOV = (Pixel Size)/(Lens focal length);

D:S theoretical (=1 / IFOV theoretical) is the calculated spot size based on the pixel size of the Thermal Imager detector array and lens focal length.

Example: If Thermal Imager uses 9mm lens, because the Pixel Size of detector is 34um. Horizontal FOV is 17°, Vertical FOV is 17°, the IFOV is

34um/9mm = 3.78mrad;

D:S theoretical (=1 / IFOV theoretical) = 265:1

Spot Size= 100.00cm*100.00cm
(Based upon IFOVtheoretical)
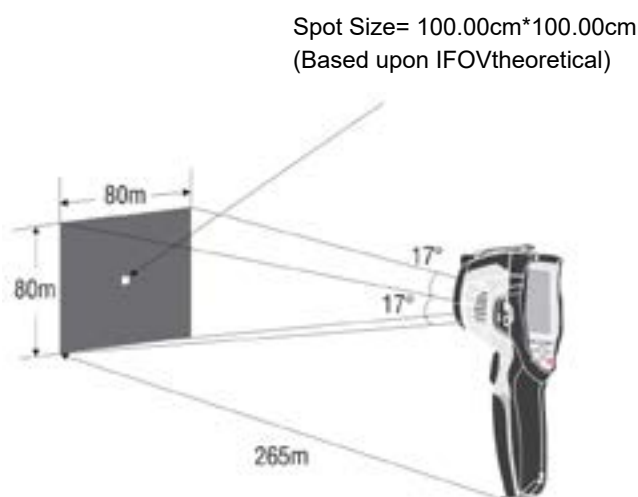
D:S measure (=1 / IFOV measure) is the spot size needed to provide an accurate temperature measure.

Typically, D:S measure is 2 to 3 times smaller than D:S theoretical, which means the temperature measurement area of the target need to be 2 to 3 times larger than that determined by the calculated theoretical D:S.

Note:

IFOV theoretical represents the smallest objects that the thermal Imager can detect or see. IFOV measure represents the smallest object form which an accurate temperature can be measured by the thermal Imager.

6.5 - Focus

To adjust focus, clockwise or Anti-clockwise rotates the IR Lens. When target comes into focus, it shows a sharper 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

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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 frequently unusable or of little value.

6.6 - Shutter

The thermal image of the Thermal Imager becomes blurry, when the Thermal Imager no correcting after some minutes or the Thermal Imager changes target. To get fine thermal image, the Thermal Imager need to correct.

The Thermal Imager has two mode for correcting, Manual and Auto Mode. In Manual Mode, push the Power button, the Thermal Imager will correct. In Auto Mode, the Thermal Imager can correct automatically while The thermal image of the Thermal Imager becomes blurry.

6.7 - Zoom

Thermal Imager offers 1-32x continuous zoom functions.

    1 - In desktop, press the up button, image zoom out 1 0%, long press will continue to zoom out.

    2 - In desktop, press the down button, image zoom in 10%, long press will continue to zoom in.

When zoom in or zoom out, the zoom factor ″1X″ displays in the upper status bar.
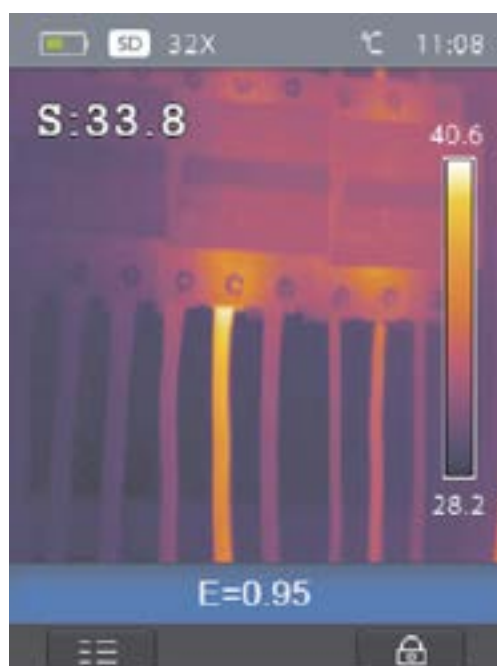
6.8 - LED Light

    1 - In desktop, press the right button and hold about 2 seconds, the LED light is on.

    2 - In desktop, press the right button and hold about 2 seconds again, the LED light is off.

6.9 - Laser

    1 - In desktop, press the left button and hold about 2 seconds, the laser is on.

    2 - In desktop, press the left button and hold about 2 seconds again, the laser is off.

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6.10 - Temperature Measurement

All objects radiate infrared energy. The quantity of energy radiated is base on the actual surface temperature and the surface emissivity of the object. The Thermal Imager senses the infrared energy from the surface of the object and uses this data to calculate an estimated temperature value. Many common objects and materials such as painted metal, wood, water, skin, and cloth 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 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 more accurately measure materials with a low emissivity, an emissivity correction is necessary. Adjustment to the emissivity setting will usually allow the Thermal Imager to calculate a more accurate estimate of the actual temperature. More information please see Emissivity Adjustment to get the most accurate temperature measurements.

6.11 - Emissivity Adjustment

The correct emissivity value is important to make the most accurate temperature measurement. Emissivity of a surface can have a large effect on the apparent temperatures that the Thermal imager observes. Understanding the emissivity of the surface, but may not always, allow you to obtain more accurate temperature measurements.

Note:

Surfaces with an emissivity of <0.60 make reliable and consistent determination of actual temperature problematic. The lower the emissivity, the more potential error is associated with the Imager's temperature measurement calculations. This is also true even when adjustments to the emissivity and reflected background adjustments are performed properly.

Emissivity is set directly as a value or from a list of emissivity values for some common materials. The global emissivity displays in LCD Screen as E=x.xx.

The following table gives typical emissivity of important materials.

Material	Emissivity
Water	0.96
Stainless steel	0.14
Aluminium 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	0.8
Oxidized copper	0.78
Rust	0.8
Paint	0.9
Soil	0.93

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6.12 - Reflected Temperature

Using the offset factor, the reflection is calculated out due to the low emissivity and the accuracy of the temperature measurement with Infrared Instruments is improved. In most cases, the reflected temperature is identical to the ambient air temperature. Only when objects with strong emissions with much higher temperature are in the proximity of the object being measured should be determined and used. The reflected temperature has only little effect on objects with high emissivity. The reflected temperature can be set individually.

Follow these steps to get the right value for the reflected temperature.

1 - Set the emissivity to 1.0

2 - Adjust the optical lens to near focus

3 - Looking in the opposite direction away from the object, take a measurement and freeze the image

4 - Determine the average value of the Image and use that value for your Input of reflected temperature.

6.13 - The Thermal Imager Reporter Software

Thermal Imager Reporter software is supplied with the Thermal Imager. This Software is intended for Thermal Imager and contains future to analyze Images, organize data and information and make professional reports. Thermal Imager Reporter software allows audio annotations and commentary to be reviewed on a PC.

7 - Menus

The menus, together with buttons, are access for Image, measurement, Emiss, Palette, temperature measurement range, take photo and video, review and settings.

7.1 - Main Menu

Main menu is the main Interface of the Thermal Imager's menus. It contains six items such as Measure, Emiss, Image, Palette, Temperature measurement range, Settings.

Measure: Set for the calculation and display of radiometric temperature measurement data related to the thermal images.

Emiss: Setting the materials type and the emissivity of the measured object, you can also set the environment reflected temperature.

Image: Set image source for the display on the Thermal Imager's LCD. It contains six items such as Infrared Image, visual Image and fusion.

Palette: Set the type of colour bar.

Range: Set the temperature measurement range.

Settings: Set for the user preferences such as language, unit of temperature measurement, date, time. Restore factory setting and display product information.

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7.2 - Image Mode

1 - In main menu, press ″up″ and ″down″ button, highlight ″Image″.

2 - Press ″select″ button, popup Image submenu which contains infrared image, visual image and fusion.

3 - Press ″up″ and "down″ button, highlight the Image mode which you want to choose.

4 - Press ″Select″ to confirm, ″Close″ to exit without change.

Thermal Imager has 3 kinds of Image modes for display. IR, Visible, IR_MIX_VIS, AUF mode.

IR: Displays only Infrared Image:

Visible: Displays only visible image;

IR_Mil_VIS: Display fusion image of infrared and visible images.

AUF: Auto Fusion mode, compare the centre area temperature with full screen, the machine will calculate the mix ratio of Infrared and visible Images automatically.

Press ″ ![icon] ″ key to enter lock mode of AUF, the lock mode of AUF is to help users to find the temperature they are interested, users can set the temperature manually and the selected temperature range is coloured with palette, the other temperature will be displayed with visible camera.

7.2.1 - Image Palette

The Image Palette lets you change the false-Colour presentation of the infrared images on display or captured. A variety of palettes are available for specific applications. The standard palettes offer an equal, linear presentation of colours that allow for best presentation of detail.

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Standard Palette

1 - In main menu, press ″up″ and ″down″ button, highlight ″Palette″.

2 - Press ″select″ button, popup the Image palette submenu. It shows four kinds of palettes, they are IRON, Rainbow, Grey, Grey Inverted.

3 - Press ″up″ and ″down″ button, highlight the palette which you want to choose.

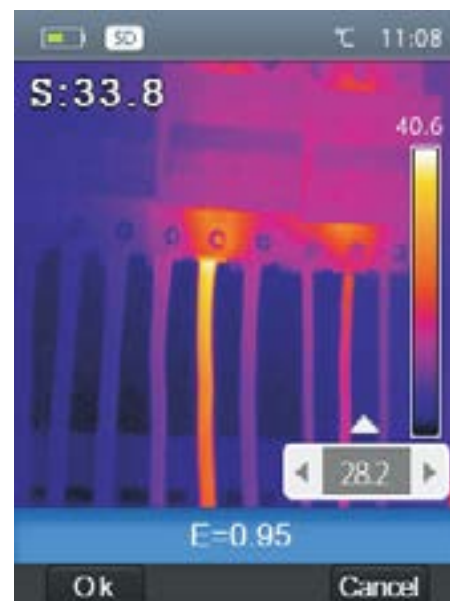4 - Press ″select″ button to select palette, press ″close″ button to return.

7.2.2 - Image Adjustment

There are two kinds of mode for image adjustment, Auto and Manual. Press right function button to change mode. [icon] means Manual, [icon] means Auto.

Auto: Level and span are decided by the thermal image of minimum temperature and maximum temperature.

Manual: Level and span are decided by the manual values, which decide by ″Max Temp″ and ″Min Temp″. Long press right function button to display menu for adjusting ″Max Temp″ and ″Min Temp″, ADA AD

Press left button to decrease value, press right button to Increase value. Press up button or down button to switch ″Min Temp″ and ″Max Temp″, press ″Ok″ to confirm, press ″cancel″ to exit without change.

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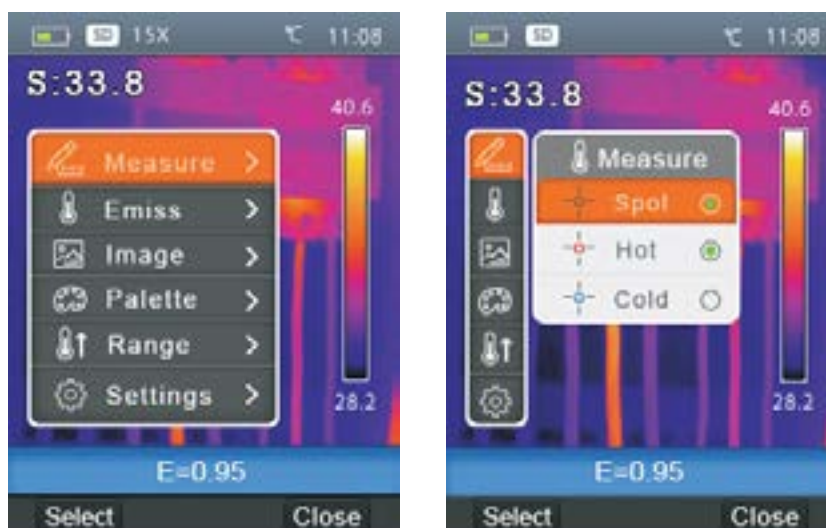Page <15>   05/07/23   V1.0

7.3 - Measurement Menu

In main menu, highlight ″Measure″ and press ″select″ button, popup Measure submenu which contains Spot, Hot, Cold.

Spot: Measure tile center point temperature.

Hot: Capture maximum temperature.

Cold: Capture minimum temperature.

7.3.1 - Open and Close

Press ″Select″ to select Spot, Hot, Cold to open the corresponding point of tile temperature measurement. The icon ⬛ means to open corresponding point measurement. The icon ⬛ means to close corresponding point measurement

Object Parameter Menu

In main menu, press ″up″ and ″down″ button, highlight ″Emiss″, press ″select″ button, popup object parameter submenu.

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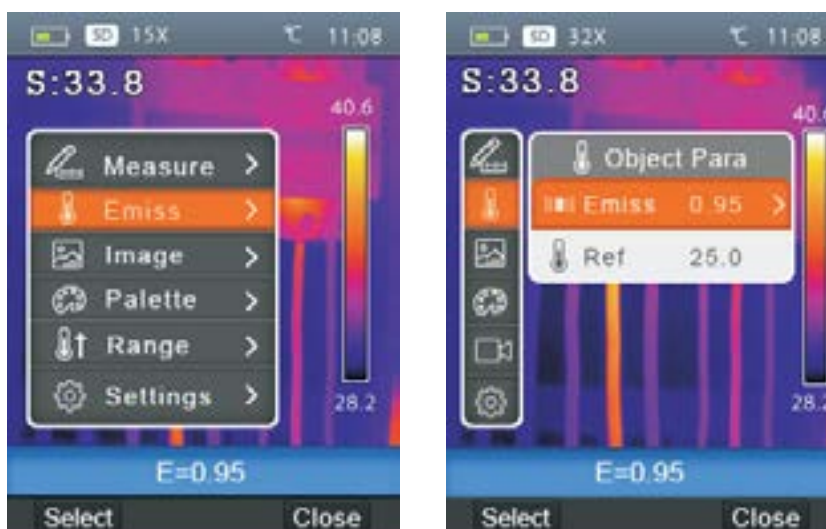
7.3.2 - Emissivity

In Object parameter submenu, press ″up″ and ″down″ button, highlight ″Emiss″, press ″select″ button, popup emissivity submenu.

″Emiss″ sets object emissivity, the value range is 0.01 to 1.00;
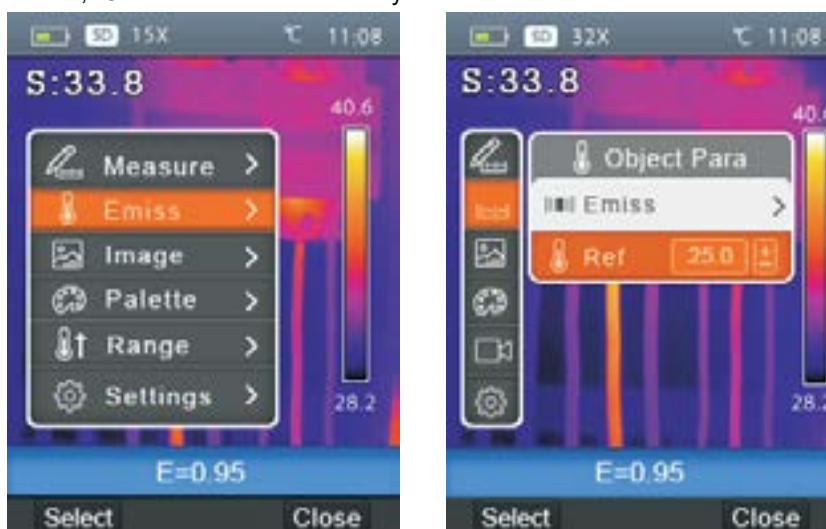
7.3.3 - Reflective Temperature

The reflective temperature is important tor radiometric temperature measurement Thermal Imager has temperature compensation for reflective temperature. To get more accurate temperature measurement, accurately set1tte reflective temperature. In most cases, the reflected temperature Is Identical to the ambient temperature. Only when objects with strong emissions with much higher temperature are in the proximity of the object being measured, the reflected temperature must set.

   1 - In Object parameter submenu, press ″up″ and ″down″ button, highlight ″Ref″.

   2 - Press ″select″ button, the reflective temperature will be modified.

   3 - Press ″up″ and ″down″ button to modify the Reflective temperature.

   4 - Press ″select″ to confirm, ″Close″ to exit without modify.

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7.3.4 - Temperature Ranges

The temperature measurement ranges have ″-20°C to 150°C″ and ″0°C to 350°C″ to choose. The overlap temperature of the two ranges is more accurate to choose ″-20°C to 150°C″.

   1 - In main menu, press ″up″ and ″down″ button, highlight ″Range″.

   2 - Press ″select″ button, popup temperature ranges submenu.

   3 - Press ″up″ and ″down″ button, highlight the Range which you want to choose.

   4 - Press ″Select″ to confirm, ″Close″ to exit without change.
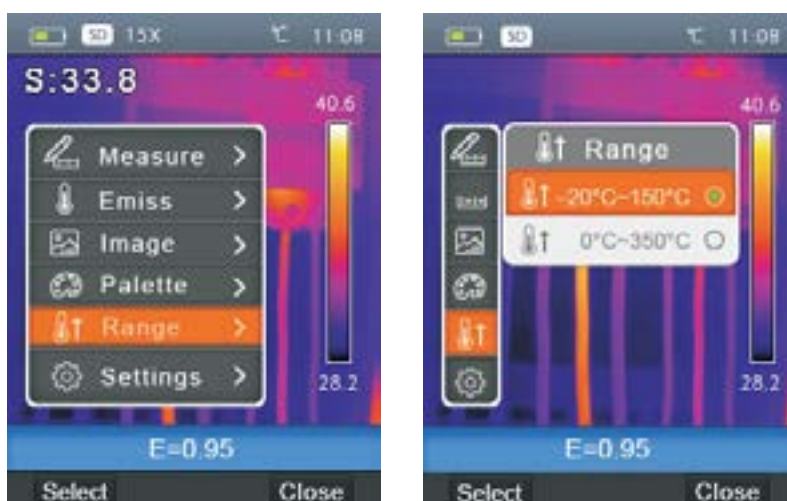
7.3.5 - Settings Menu

   1 - In main menu, press ″up″ and ″down″ button, highlight ″Settings″.

   2 - Press ″select″ button, popup Settings submenu. Two pages in Setting submenu.

   3 - Press ″left″ and ″right″ button, switch the page which you want to choose. Press ″up″, ″down″ button, highlight the Setting item.

   4 - Press ″Select″ button to entry into Setting item, ″Close″ to exit Setting submenu.

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7.3.6 - Language

1 - In Settings submenu, press ″up″ and ″down″ button, highlight ″Language″.

2 - Press ″select″ button, popup language submenu.

3 - Press ″up″, ″down″, ″left″ and ″right″ button, highlight the language which you want to choose.

4 - Press ″Select″ button to confirm, ″Close″ to exit without change.

7.3.7 - Temperature Unit

1 - In Settings submenu, press ″up″ and ″down″ button, highlight ″Temp. Unit″

2 - Press ″select″ button, popup Temperature Unit submenu.

3 - Press ″up″ and ″down″ button, highlight the temperature unit which you want to choose.

4 - Press ″Select″ to confirm, ″Close″ to exit without change.

Temperature Unit have three types to choose: °C, °F and K.

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

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7.3.8 - Factory Set

1 - In Settings submenu, press ″up″ and ″down″ button, highlight ″Factory Set″.

2 - Press ″Select″ button, popup ″Factory Set″ submenu.

3 - Press ″OK″ to restore factory setting, ″Cancel″ to exit without change.
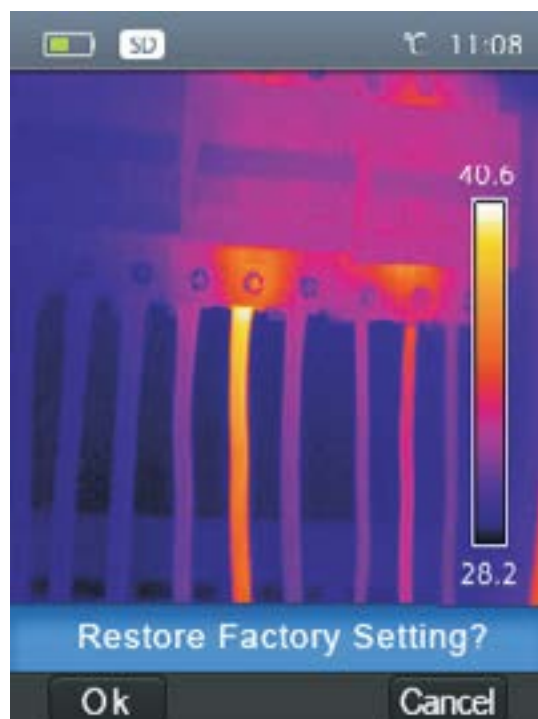
Factory Settings of the Thermal Imager is as follow:

Item	Parameter	Value
Measurement	Center Spot Measurement	off
	Hot Soot 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

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7.3.9 - Set Time

1 - In Settings submenu, press ″Up″ and ″Down″ button, highlight ″Set time″.

2 - Press ″select″ button, popup ″Set time″ submenu.

3 - Press ″Left″ and ″Right″ button, highlight the item which you want to choose.

4 - Press ″Up″ and ″Down″ button, modify the value of the selected item.
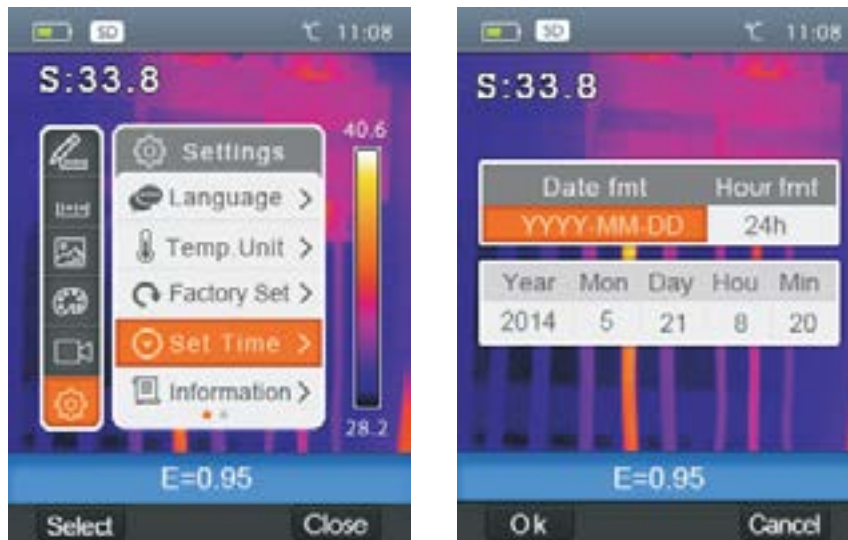
7.3.10 - Information

1 - In Settings submenu, press ″Up″ and ″Down″ button, highlight ″Information″.

2 - Press ″select″ button, popup ″Information″ submenu.

3 - Press ″Close″ key return to desktop.

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7.4 - Alignment

1 - In Settings submenu, press ″Up″ and ″Down″ button, highlight ″Alignment″.

2 - Press ″select″ button, popup ″Alignment″ submenu.

3 - Press ″up″ and ″down″ button, highlight the item which you want to choose.

4 - Press ″Select″ to confirm, ″Close″ to exit without change

7.5 - Power off

1 - In Settings submenu, press ″Up″ and ″Down″ button, highlight ″Auto power off″.

2 - Press ″select″ button, popup ″Auto power off″ submenu.

3 - Press ″up″ and ″down″ button, highlight the item Which you want to choose.

4 - Press ″Select″ to confirm,″Close″ to exit without change.

The Thermal Imager will shut down after shut down time of inactivity. There are 5 minutes,10 minutes,30 minutes to select for setting shut downtime. ″OFF″ means to never shut down.

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7.6 - Volume

1 - In Settings submenu, press ″up″ and ″down″ button, highlight ″Volume″

2 - Press ″select″ button, popup Volume submenu.

3 - Press ″left″ and ″right″ button, change the volume level.

4 - Press ″Select″ to confirm,″Close″ to exit without change.
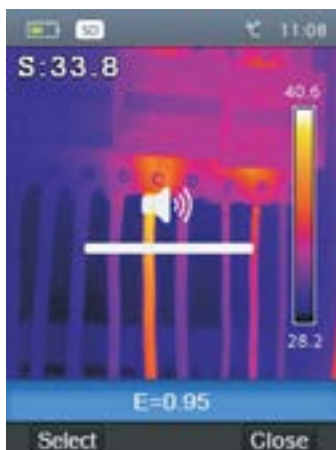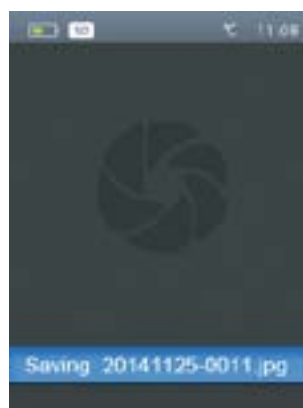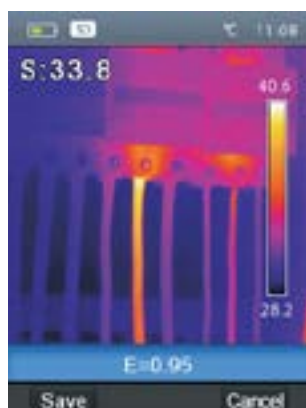

7.7 - Camera Menu

Thermal Imager has photo and video functions. In photo function, the Imager can save thousands of images. Every image resolution is 1280*960, format is .jpg, and stores infrared data and visible data in an image. In video function, the Imager has .mp4 video capture for hours, and save infrared data in .mp4 format.

Note:

Images and video files are stored in SD Memory Card. Images can easily be read and second analyzed within Thermal Imager PC software.

7.7.1 - Save Image

1 - In desktop, press Trigger button, freeze an Image.

2 - Press ″save″ key save image, and show the file name saved, press ″Cancel″ return desktop without saving image.

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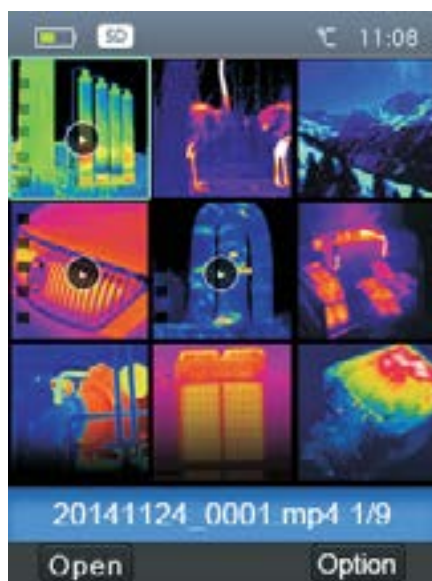
7.8 - Video Menu

The Thermal Imager has .mp4 video capture.

1 - In desktop, press Trigger button and hold for about 2 seconds, start video capture with voice.

2 - Insert earphone with microphone, voice can be recorded too.

3 - To stop video capture, press Trigger button again.

4 - Press "Save" key, The video saved In the Video file. Press "Cancel" key, stop video capture without saving file.
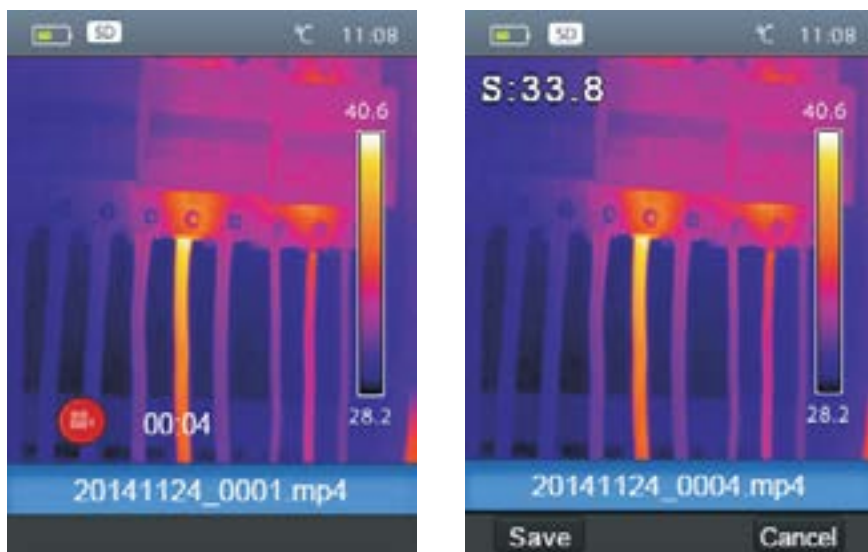
7.9 - Files Browser

In desktop, press "Files Browse" button, popup files Browser, Which displays images and videos saved in SD Memory Card.

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7.9.1 - Open an Image

1 - Press ″up″, ″down″ , ″left″ and ″right″ button, highlight an Image which you want to choose.

2 - Press ″Open″ key to open an image.

3 - Press ″Up″ button to zoom out, ″Down″ button to zoom in.

4 - Press ″Left″ button to open previous Image, Press ″Right″ button to open next image.

5 - To return files browser, Press ″Browse″ key.

6 - To return desktop, Press ″Files browse″ button again or press ″Exit″ key.
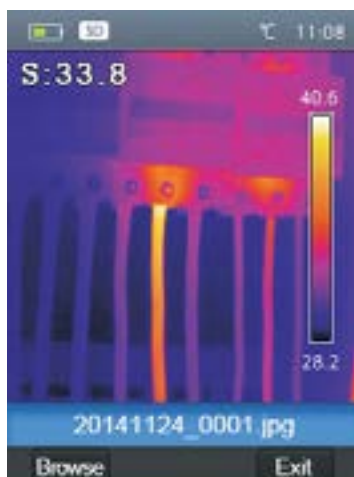
7.9.2 - Play a Video

1 - Press ″up″, ″down″, ″left″ and ″right″ button, highlight a video which you want to choose.

2 - Press ″Open″ key entry player interface.

3 - To hear voice, Insert earphone with microphone.

4 - To play a video, press ″Trigger″ button.

5 - To return flies browser, Press ″Browse″ key.

6 - To return desktop, Press ″Files browse″ button again or press ″Exit″ key.

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7.9.3 - Delete a File or all Files

1 - Press ″up″, ″down″, ″left″ and ″right″ button, highlight an image and a video which you want to choose.

2 - Press ″Option″ key, popup ″Option″ submenu.

- Press ″Up″ and ″Down″ button, highlight "Delete", Press ″OK″ key Delete the selected file.
- Press ″Up″ and ″Down″ button, highlight ″Delete all″, Press ″OK″ key Delete all file.
- Press ″Up″ and ″Down″ button, highlight ″Exit″, Press ″OK″ key return desktop.
- Press ″Close″ return files Browser.

7.10 - USB Mode

Connect USB cable to device, popup the menu as follow:

Then are two modes for USB, Storage and PC Camera. Press up or down button to switch mode.

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- **Storage**

    Browse flies stored on the so card on your computer. If select Storage mode, will display a picture as follow:

- **PC Camera**

    The device is a USB camera for your computer. If select this mode, will display a picture as follow:

7.11 - HDMI Output

The video output available in the Thermal Imager enables displaying the thermal image (not includes operator menu) on an external monitor or video recording device capable of managing HDMI systems. To connect the Thermal Imager, proceed as follows:

1 - Connect the Thermal Imager to the external HDMI monitor or recording device using the HDMI video cable provided.

2 - Turn on the external HDMI monitor or device.

3 - Power on the Thermal Imager.

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

5 - Once the operations on the external device are finished, Switch off the extern device and disconnect the HDMI video cable from the thermal Imager.

8 - Fault Diagnosis and Exclusion

If you encounter any problems while using the thermal Imager, overhaul according to the following table. If the problem persists, disconnect the power and contact with the company's technical support department.

Phenomenon of the fault	Cause of the fault	Solution
Thermal Imager cannot start	No battery	Inserting the battery
	No power	Replace the battery or charge it
Thermal Imager shut down	No power	Replace the battery or charge it
No Thermal image	The lens cap cover	Opened the lens cap

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9 - Android/iOS APP Thermview

Software install and uninstall

9.1 - System required

Android mobile phone: Android 4.0 above, with USB OTG Support

iOS: iPhone4 above

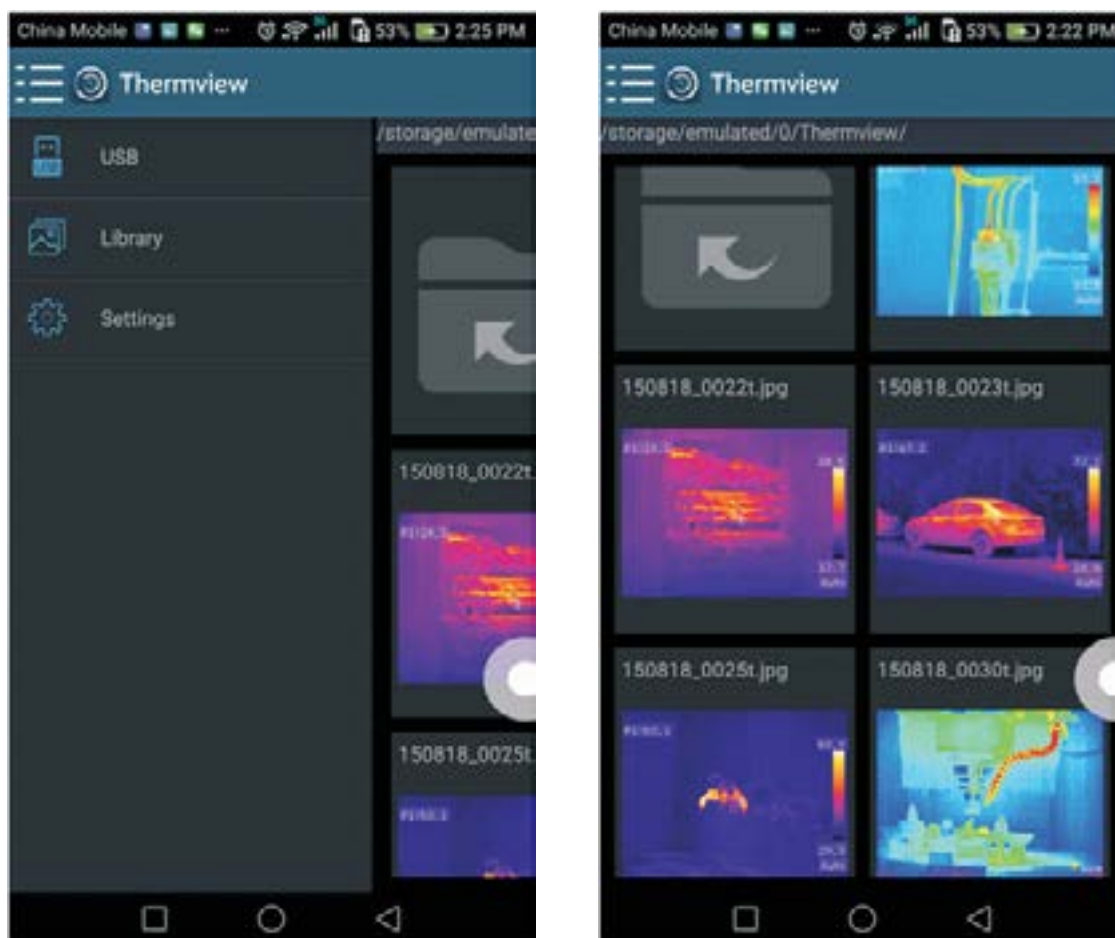**9.2 - Thermoview App install**

Android: Search "Thermview" on Google Play and install it.

iOS: Search "Thermview" on Apple Store and install it.
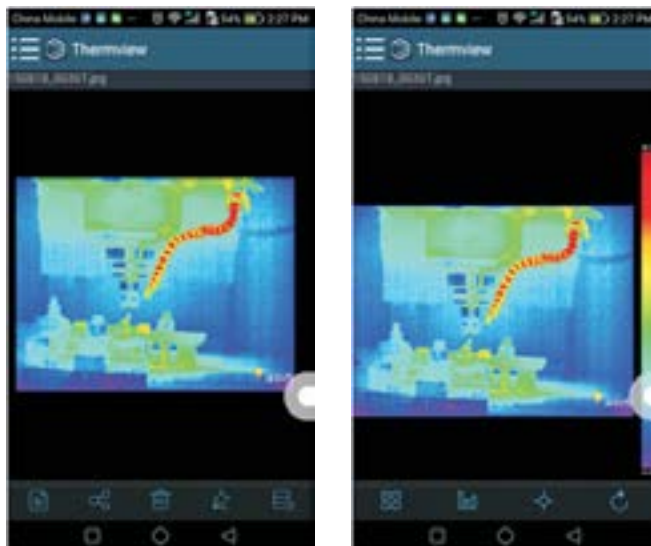
10 - Thermview function

10.1 - Import Pictures

   1 - Use the USB OTG cable download the IR pictures from the thermal imager directly

   2 - Copy the IR pictures from PC or SD card.

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10.2 - Analyse

Select a IR Picture and click " ▓ " icon ID analyse it.

10.3 - Image mode

Click " ▓ " icon to select image mode, there are four mode for you to select

- ▓ IR mode: only infrared picture displayed
- ▓ Visible mode: only visible picture displayed
- ▓ IR fusion mode: The infrared picture is fusioned with visible picture
- ▓ Visible fusion mode: full screen fusion, the visible picture is fusioned with infrared picture.

10.4 - Colourbar Select

Click " ▓ " icon to select colourbar. There are eight colourbar for you choice.

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10.5 - Analyse

Click " ▦ " icon to analyse the IR pictures. There are three analyse tools:

- ◈ Point analyse: Add a point to the picture, it will display the temperature of the point.
- ◣ Line analyse: Add a line to the picture, will display the highest, lowest and average temperature of the line.
- ▦ Area analyse: Add a rectangle to the picture, will display the highest, lowest and average temperature of the rectangle.

10.6 - Save and exit

Click " ▦ " to save and return to the main page of the APP.

11 - Report and Share

11.1 - Report

Click " ▣ " Icon to report as a .pdf file.

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11.2 - Share

Click ″ ″ icon to share the Infrared picture with Email, Cloud or Message and so on.

12 - PC Software

Software Install and Uninstall

12.1 - System required

Window XP or higher version of Windows system, please make sure you have installed Net Framework 2.0 or Net Framework 3.5(include 2.0)when you install PCI Meter software. If not, please find and install our Microsoft. NET_Framework_v2.0.exe that provided to you.

Open the net framework 2.0,Follow all tips to install Net Framework 2.0 till it finishes. If your system already have installed Net Framework 2.0,then no need to install again.

12.2 - IR Meter Install

You can insert your installation CD to install directly if you have one, or you can run ″setup.exe″ to install it as follow.

Click ″Next″ to install, till finish installation

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Installation Successful after click ″Finish″ like above.

12.3 - Running

After ensuring PCI Meter software has been installed, click shortcuts on the desktop or start menu to run the software.

12.4 - Uninstall

Uninstall PCI Meter in the start menu as follow, then click ″Next″ to finish uninstall.

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