User Manual of DP series Handheld Thermal Imaging Camera

V2.2

User Manual of DP series Handheld Thermal Imaging Camera

Version number	Date Modified	Author	Approved By	Note
V1.0	202001			New
V2.0	202008			Update some specification
V2.1	202103			Add human body temperature feature
V2.2	202202			Modify

Contents

1 Overview

1.1 Appearance

DP series handheld thermal imaging camera appearance is shown below,

The front of DP series handheld thermal imaging camera has 6 buttons, as shown below,

- OK & Homepage
- Up arrow
- Down arrow
- Left arrow
- Right arrow
- Return & Power

The back of DP series handheld thermal imaging camera has 1 button,

- Trigger

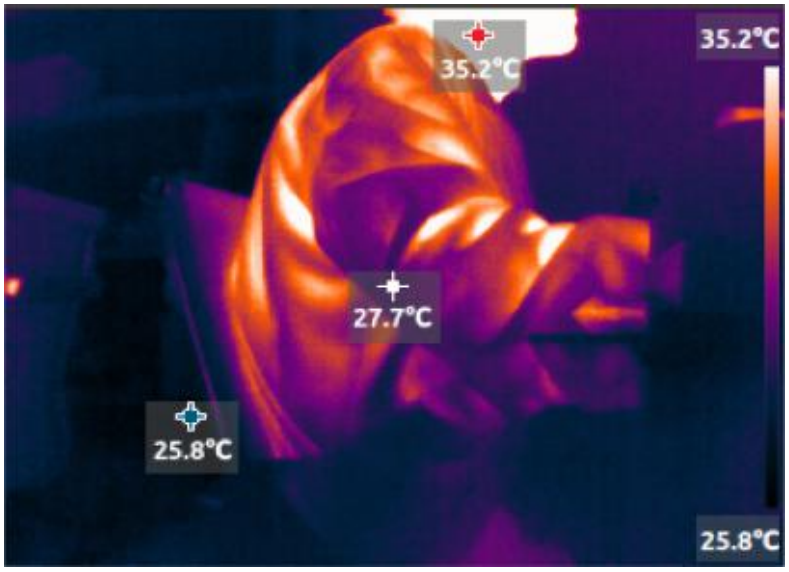
1.2 Power On/Off

- Press “Return & Power” key >1 second to power on DP series handheld thermal imaging camera, the thermal imaging will display later.
- Press “Return & Power” key >3 seconds to power off DP series handheld thermal imaging camera
- If DP series handheld thermal imaging camera has any abnormal issue, Press “Return & Power” key >8 seconds to force shutdown the camera.

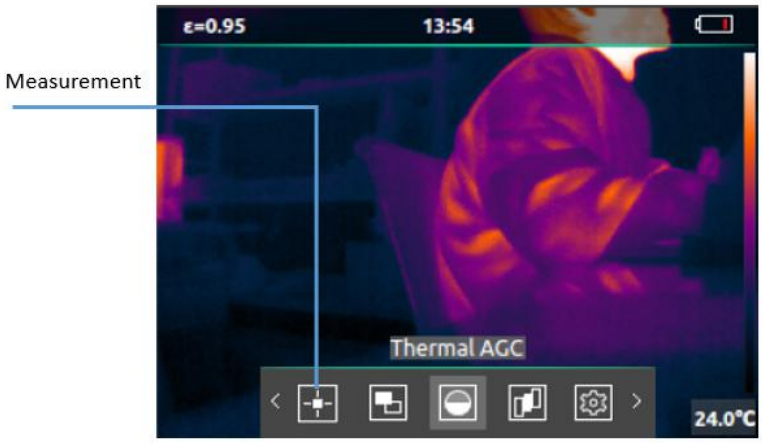
1.3 Quick Measurement

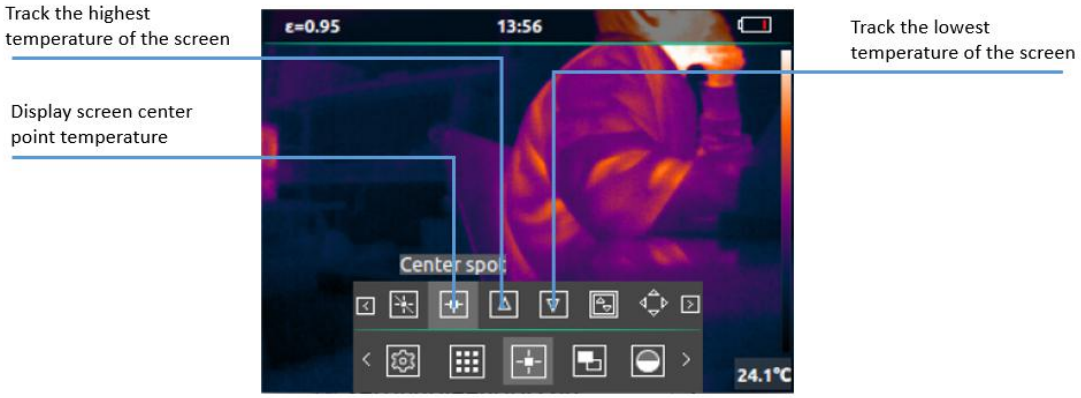
- Power on the thermal imaging camera, press and hold the “Return & Power” reuse key> 1 second as shown in the below figure, wait for the thermal imaging camera to start up, and the main page appears.

- Point the lens at the measured object as shown in the figure below, and the infrared image of the measured object will be displayed on the screen.

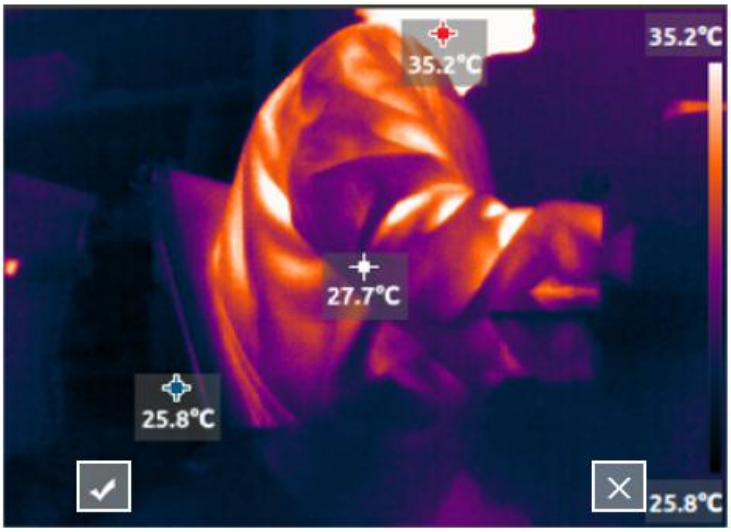


- If the temperature value is not displayed on the screen, press "OK & Homepage", then select the "Measurement" icon  , and then select "Center Spot", "Hot Spot" and "Cold Spot" in the figure below to display the temperature,





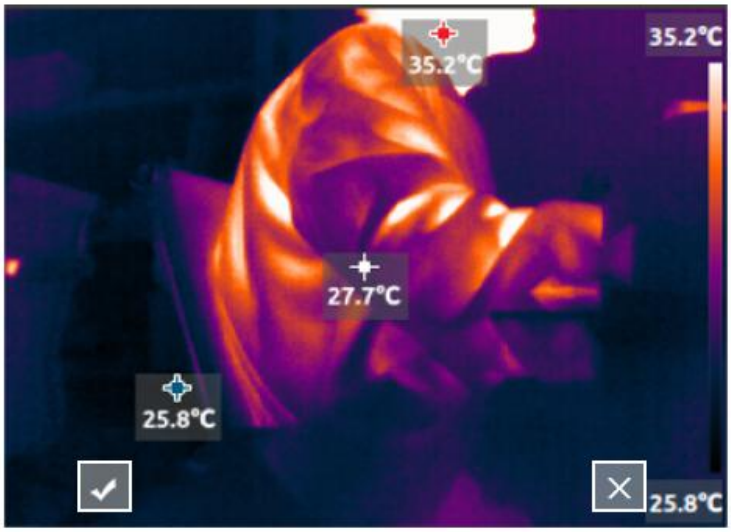
- Press the trigger button will freeze the image as the figure below,



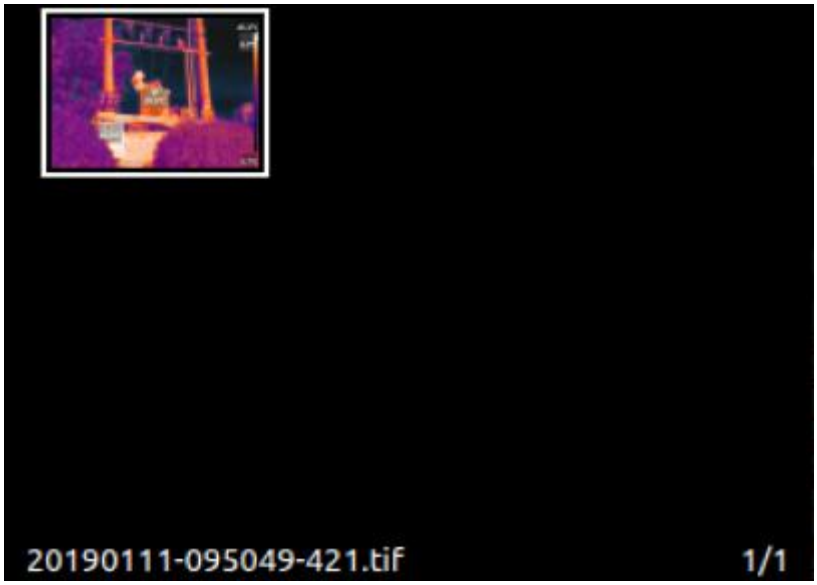
- As shown in the figure below, you can save the thermal image and visible light image by pressing the "trigger button" or "OK & Homepage", and press the "Return & Power" to cancel saving.

1.4 Save, Delete and View Infrared Thermal Image

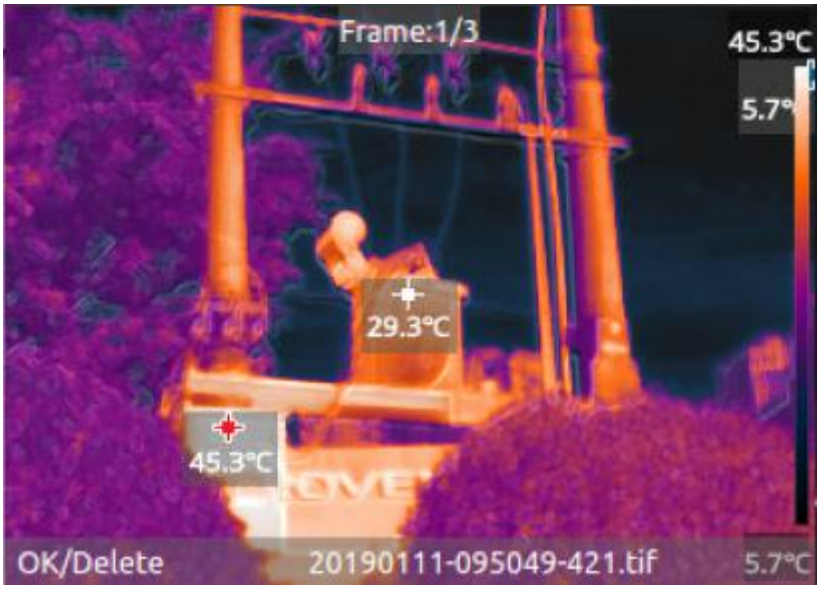
- Power on the thermal camera.
- Point the lens to the object.
- Press the "trigger" to freeze the thermal image and visible light image, continue to press the "trigger" or "OK & Homepage" to save the thermal image and visible light image, press the "Return & Power" cancel saving.



- Press Return will view the saved thermal images and visible images.



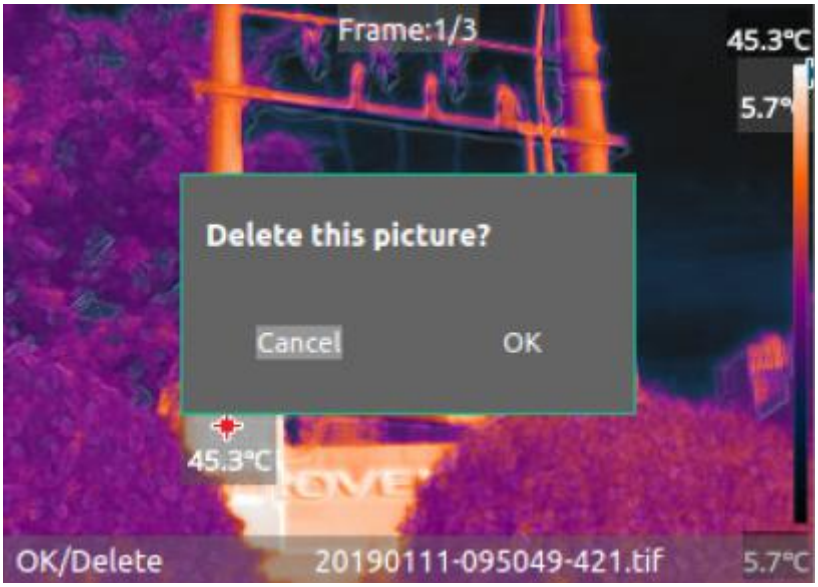
- Every time take pictures will save 3 frames into 1 picture,
    - 1st frame: the image frame of what you see is what you get



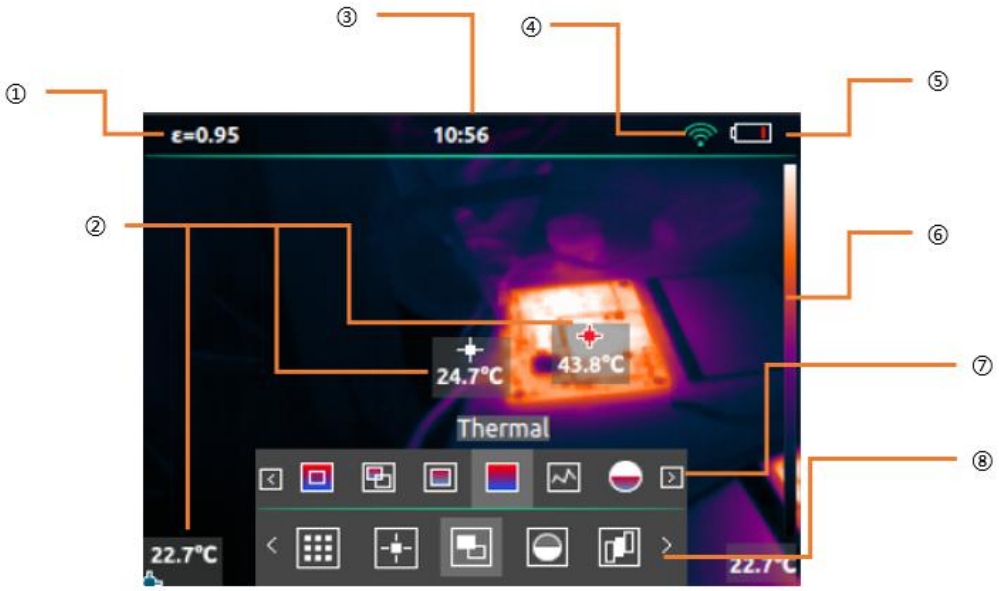
- 2nd frame: the raw image frame of thermal image

- 3rd frame: the raw image frame of visible light image

- In the album, press "OK & Homepage" to preview the image in full screen. You can view the 3 frames of each picture by using the up and down arrow keys. The left and right arrow keys select the previous or next picture.
- When previewing the picture in full screen, press "OK & Homepage" to choose deleting the picture, press "Return & Power" to return to the album.



1.5 Main Page



1. Current Emissivity
2. Hot spot, cold spot and central spot
3. Time
4. WiFi
5. Battery
6. Color bar
7. Second level menu
8. First level menu

1.6 Control and trigger keys

According to the below description to operate control and trigger keys,

- "OK & Homepage" is only used as the homepage key to open the menu when the main page interface is turned on, other times as the Ok key.
- Use the arrow keys to select the direction of the scroll menu and settings.
- "Return & Power" short press as the return key, press> 3 seconds to power off the camera. If the camera works abnormally, press "Return & Power"> 8 seconds to force turn off the camera.
- The "trigger key" trigger key is taking picture and storing picture confirmation key.

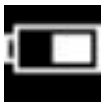
1.7 Charge and Export Pictures

1.7.1 Charge

Open the charging and data interface silicone plug then can see the USB interface. You can use the accessory's USB data cable to charge the camera at any time. The camera can still be used during the charging process.

The transformer chooses a universal USB interface 5V 2A or larger charger.

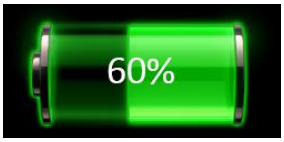
If the camera is power on and charging, please return to the homepage and press the "OK & Homepage". You can view the current power in the upper right corner of the screen, and the battery will have a green charging mark inside.



Battery

Charging state

If the camera is power off and charging, the display is always show the current battery level as shown below,



1.7.2 Export Picture

There are several methods to export camera pictures,

- When the thermal imaging camera is power on, connect the camera USB interface to the computer with the accessory's USB cable. A USB drive letter will appear on the computer. You can select the pictures to copy to the computer.
- When the thermal imaging camera is power on, connect the Android phone through the USB OTG cable. You can select the pictures to copy to the Android phone.
- When the thermal imaging camera is power on, turn on WiFi, and copy the pictures of interest to your computer or Android phone through Dianyang's PC analysis software or Android App.

2 Operation and Settings

2.1 Main Page Operation

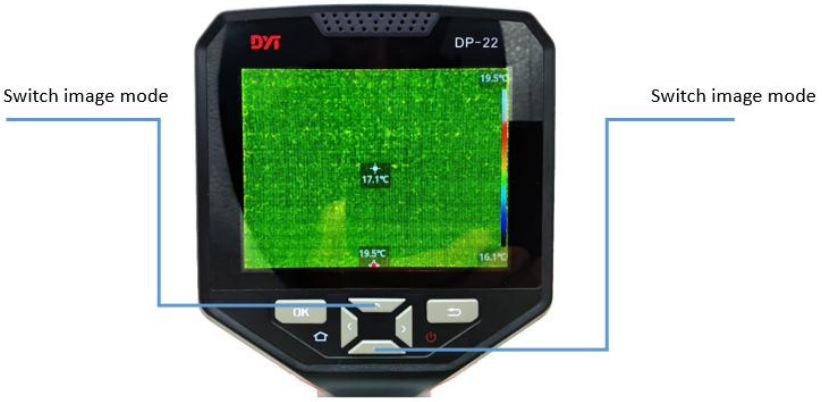
2.1.1 Quick Operation

2.1.1.1 Quick Switch Color Palettes

When there is no menu on the main page, you can press the left and right arrow keys to quickly switch between 8 types of color palettes. For details about color palettes, see 2.1.3.4 Color palette. (If the main page displaying visible light image, you cannot switch color palette)

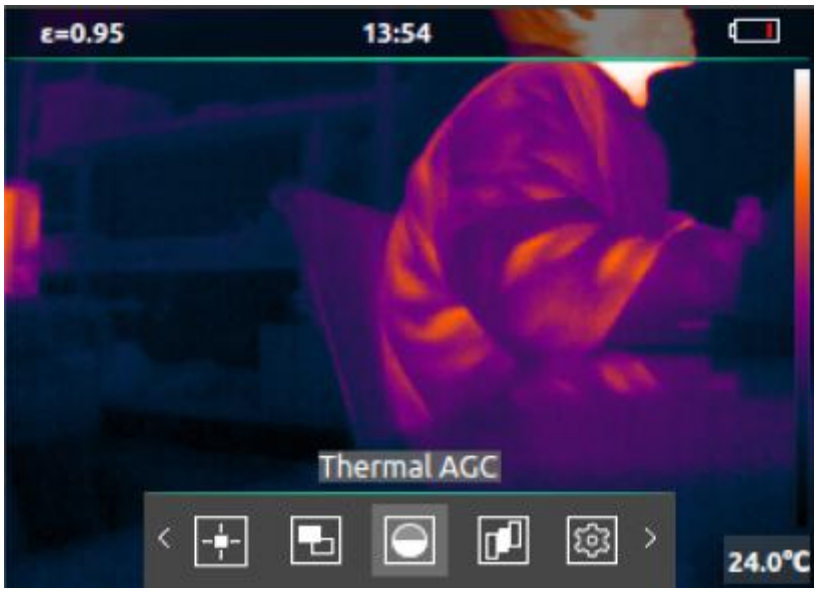
2.1.1.2 Quickly Switch Image Modes

When no menu appears on the main page, you can press the up and down arrow keys to quickly switch between image modes. For details about the image mode, see 2.1.3.2 Image Mode.



2.1.2 First Level Menu

Power on the camera, press the "OK & Homepage" to display the first-level menu and the status bar on the top. In this state, press the "Return & Power" to close the first-level menu and status bar. The icon selected in the menu is the current operable function, and there is a text prompt on the top of icon.

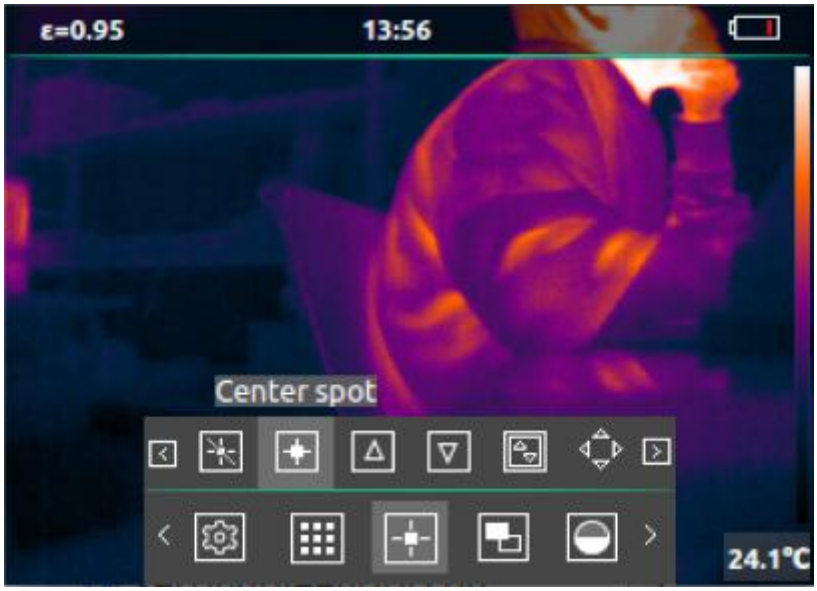


No.	Function	Icon	Description
1	Settings		Setting up the camera
2	Album		Viewing Pictures
3	Measurement		Temperature measurement options, such as displaying the highest and lowest temperature.

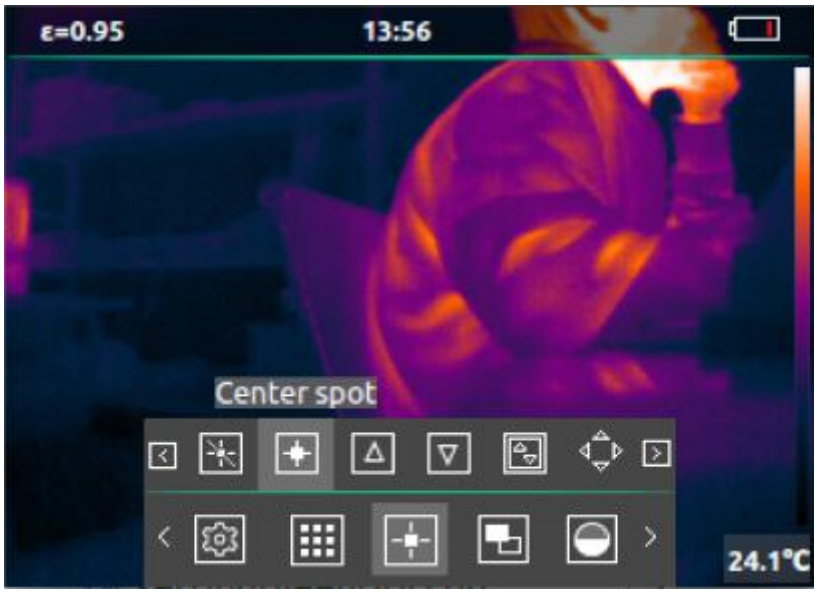
4	Image Mode		Select the image display mode, such as picture-in-picture, outline fusion etc.
5	Thermal AGC		Select the effect of the image, such as high contrast, gentle and so on.
6	Color palette		Select the infrared thermal imaging palette, such as iron, white hot, etc.

2.1.3 Second Level Menu

When the first-level menu is display, press "OK & Homepage" to enter the second-level menu or setting interface, and in the second level menu state or setting interface, press "Return & Power" Return to the first-level menu. The icon selected in the second-level menu is the current operable function, and there is a text prompt on the top of the icon.



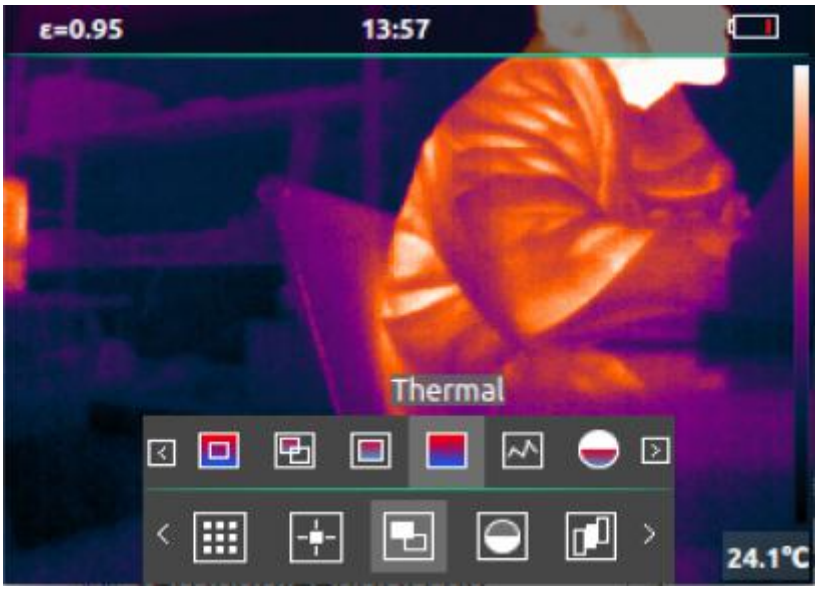
2.1.3.1 Measurement



The function is shown below,

No.	Function	Icon	Description
1	No measurements		Cancel all measurement
2	Center spot		Measure the center point temperature of the thermal imaging camera
3	Hot spot		Track and measure the highest temperature points imaged by the camera
4	Cold spot		Track and measure the lowest temperature point imaged by the camera
5	Zone		Select part of the area for temperature measurement
6	Edit Zone		Zoom in or out the zone.

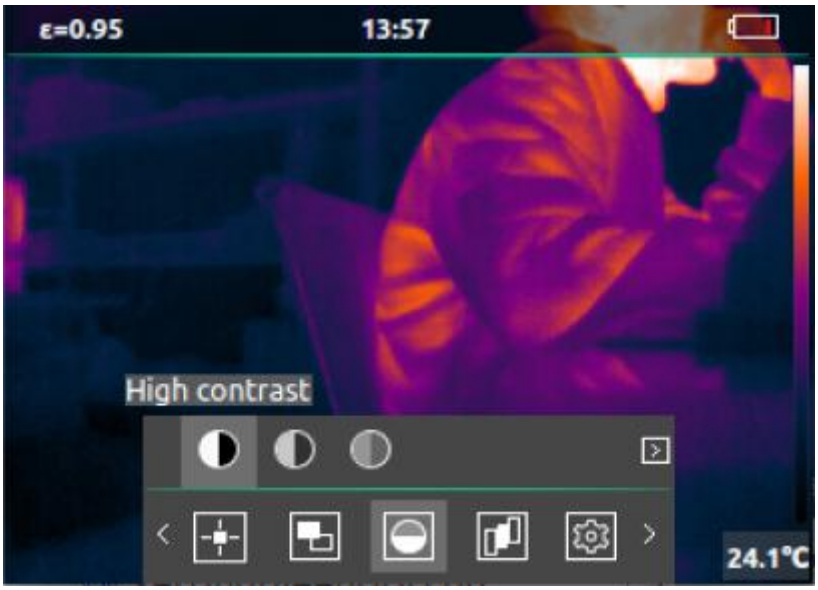
2.1.3.2 Image Mode



The function is shown below,

No.	Function	Icon	Description
1	Outline Fusion		Fusion of visible edge lines and infrared thermal imaging
2	Overlay fusion		Infrared thermal imaging and visible light overlay display
3	Picture in Picture		Infrared thermal imaging as a picture-in-picture display in the center of visible light
4	Thermal		Only display infrared thermal image
5	Visible		Only display visible light
6	Fusion adjustment		Adjust the fusion percentage of overlay fusion
7	Fusion offset adjustment		When the visible light and thermal image is not 100% coincide based on different distance of the object, then you may use this function to adjust the visible image to coincide the thermal image.

2.1.3.3 Thermal AGC



The function is shown below,

No.	Function	Icon	Description
1	High contrast		Choose high contract mode to view infrared thermal image
2	Legacy		Choose legacy mode to view infrared thermal image
3	Gentle		Choose gentle mode to view infrared thermal image

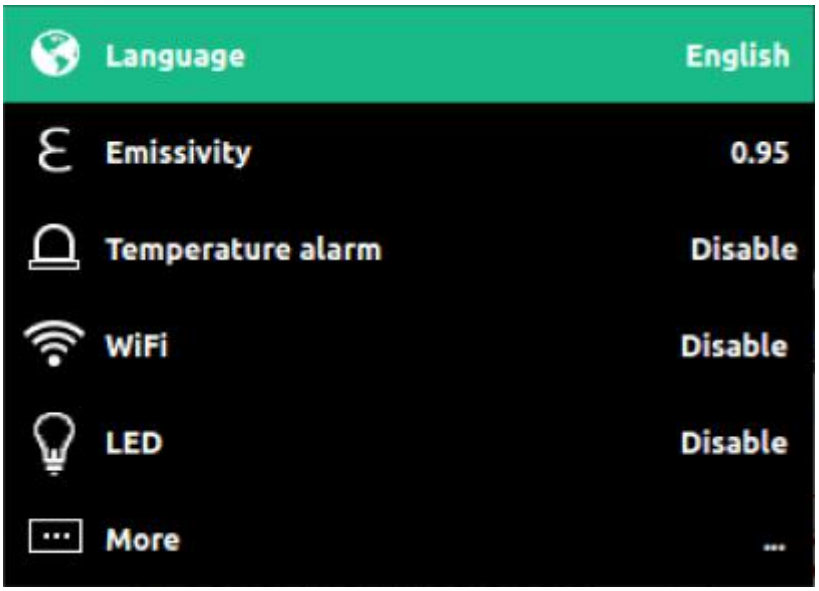
2.1.3.4 Color Palette

The function is shown below,

No.	Function	Icon	Description
1	Tyrian		
2	White Hot		
3	Black Hot		
4	Rainbow		
5	Glory		
6	Iron		
7	Hottest		
8	Coldest		

2.2 Settings

The settings interface is shown below,



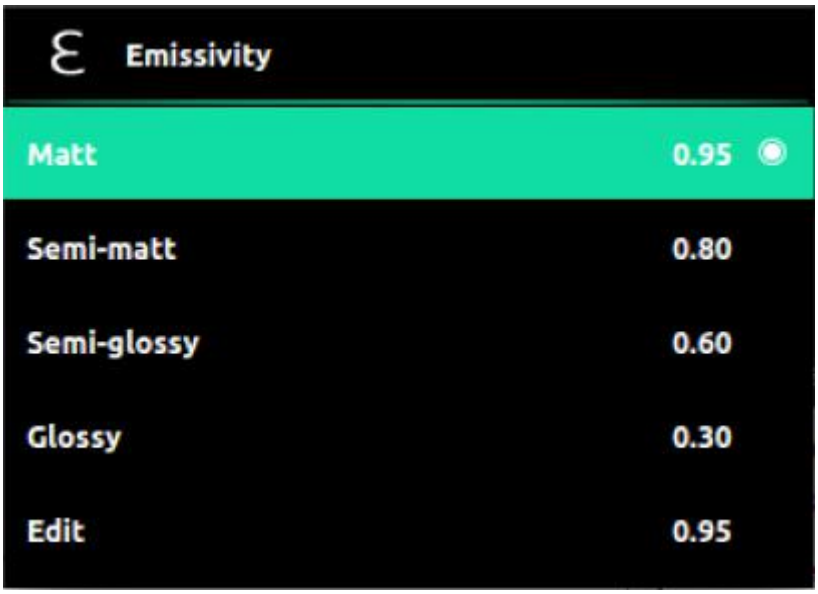
2.2.1 Language

Select the language in the setting interface, click "OK & Homepage" to select the following different languages,

No.	Language
1	English
2	Simplified Chinese
3	Spanish
4	French
5	Japanese
6	Korean
7	Russian
8	Arabic
9	Traditional Chinese

2.2.2 Emissivity

Select the emissivity in the setting interface, and press "OK & Homepage" to set different emissivity of the object, or you can manually edit the emissivity.

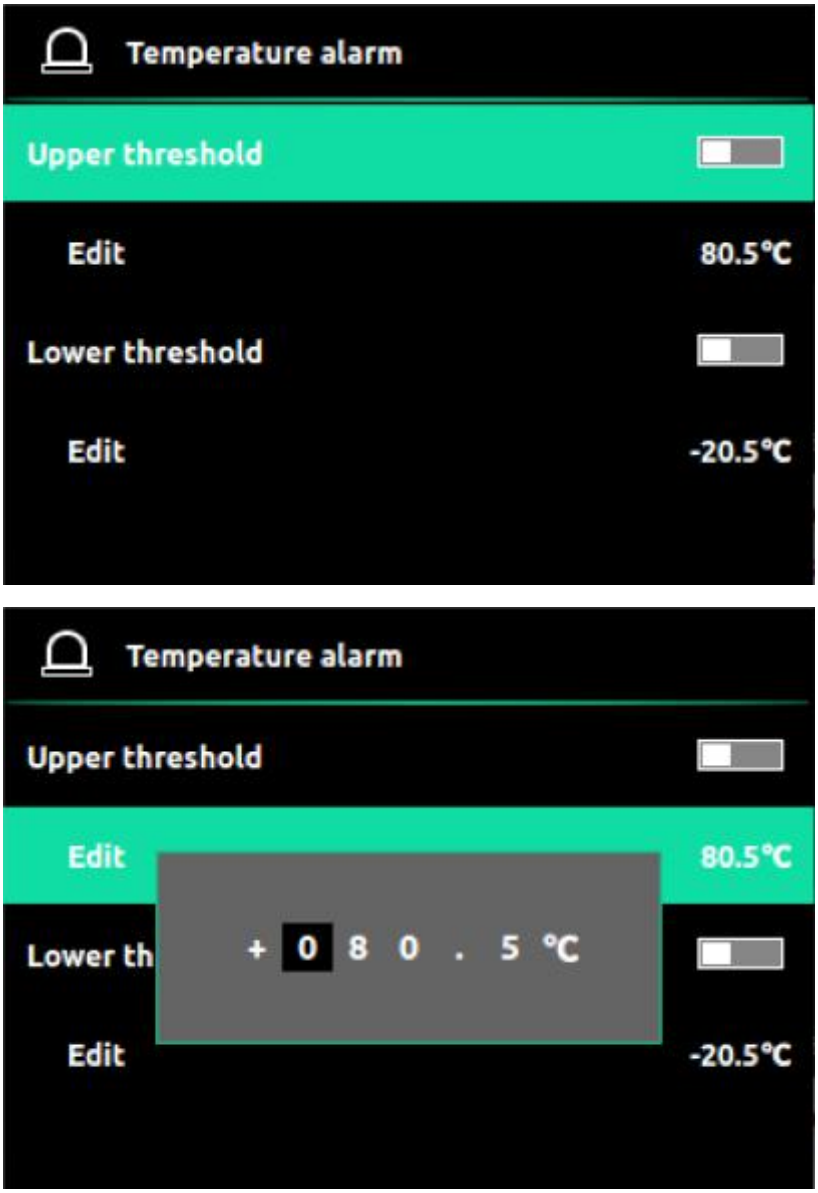


No.	Emissivity	Value
1	Matt	0.95
2	Semi-matt	0.80
3	Semi-glossy	0.60
4	Glossy	0.30
5	Edit Emissivity	Customization

2.2.3 Temperature alarm

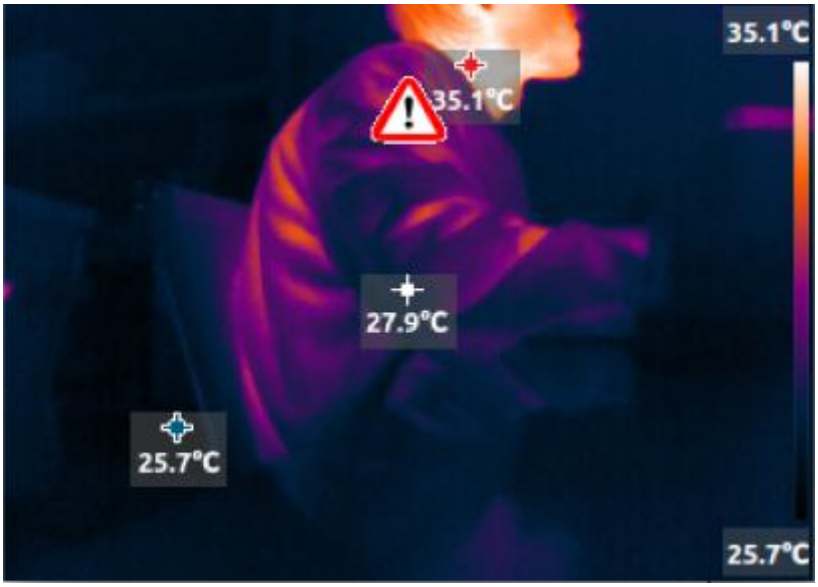
Select the temperature alarm in the setting interface, and press "OK & Homepage" to alert the temperature above or below the threshold on the screen.

When the temperature in the screen meets above or below one of the thresholds, an alarm will pop up. When the zone temperature measurement is selected, the alarm icon will only be displayed when the temperature in the zone is above or below the threshold temperature.



2.2.3.1 Alarm above threshold

Edit the upper limit alarm value, and then turn on the upper limit alarm switch (these two steps are in no particular order). If the temperature value in the screen area is higher than the set threshold temperature, an alarm icon will pop up on the screen. When the temperature value in the screen area is lower than the set threshold temperature, the alarm icon will disappear.



2.2.3.2 Alarm below threshold

Edit the lower limit alarm value, and then turn on the lower limit alarm switch (these two steps are in no particular order). If the temperature value in the screen area is higher than the set threshold temperature, an alarm icon will pop up on the screen. When the temperature value in the screen area is lower than the set threshold temperature, the alarm icon will disappear.

2.2.4 WiFi

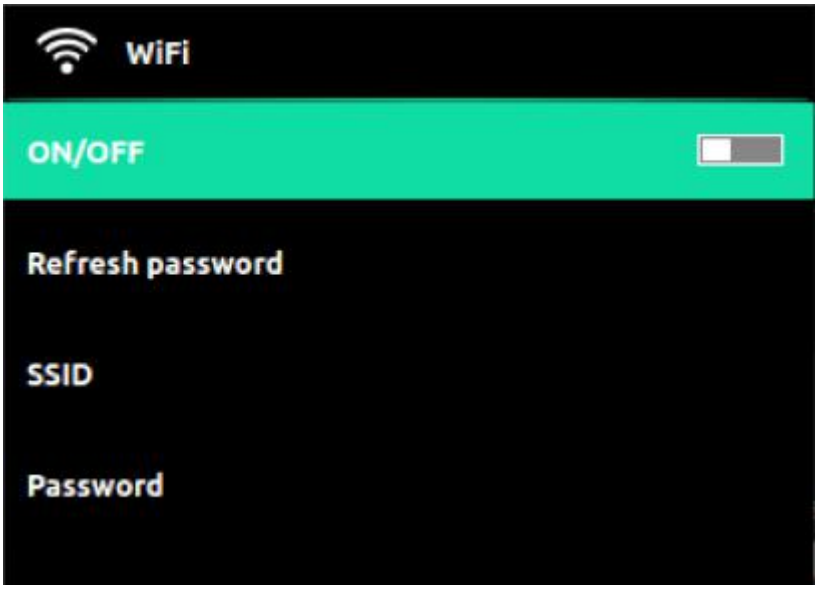
2.2.4.1 Enable and Disable WiFi

Select WiFi settings in the settings interface. After turning on the WiFi switch, the WiFi icon will be displayed on the status bar of the home page.

When the WiFi switch is turned off, the WiFi icon in the status bar will not be displayed

2.2.4.2 WiFi Configuration

Select the WiFi setting in the setting interface, and press "OK & Homepage" to set the WiFi. The SSID of the WiFi is the same as the serial number on the side of the handheld thermal imaging camera. The initial password is 12345678. When the WiFi is off, select refresh password to randomly change the WiFi password and display it. When the WiFi is on, the WiFi password cannot be changed. If you forget the WiFi password, you can view the current WiFi password on this interface.



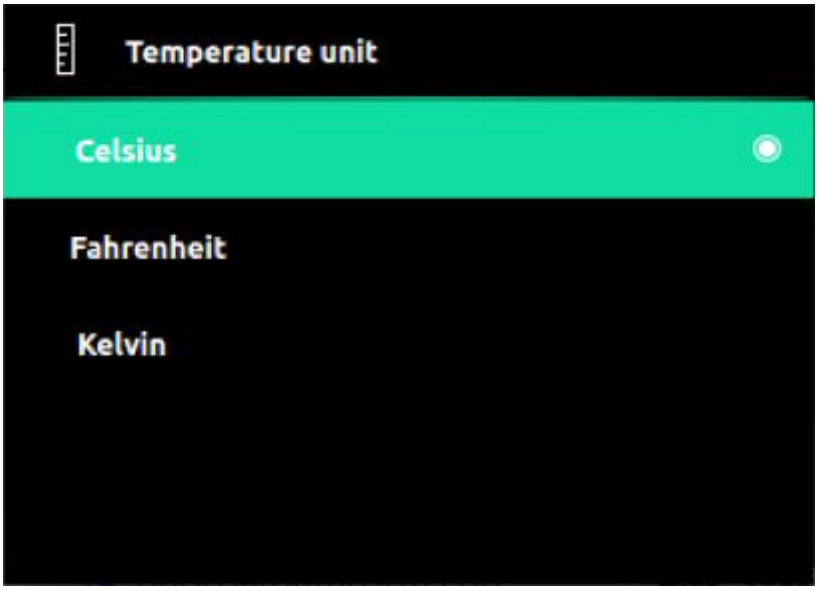
2.2.5 LED

Select the LED in the setting interface, and press "OK & Homepage" to turn the LED on or off.

2.2.6 More

Select More in the setting interface, and press "OK & Homepage" to set more settings.

2.2.6.1 Temperature Unit

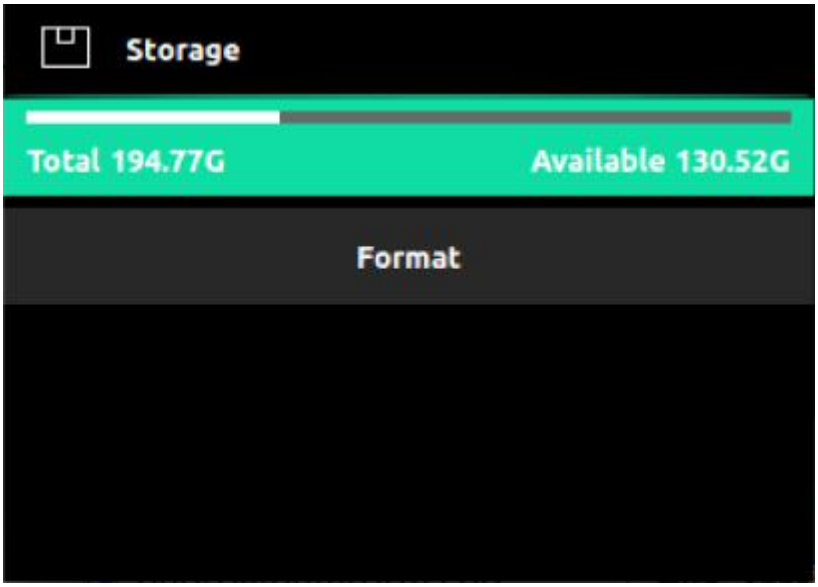


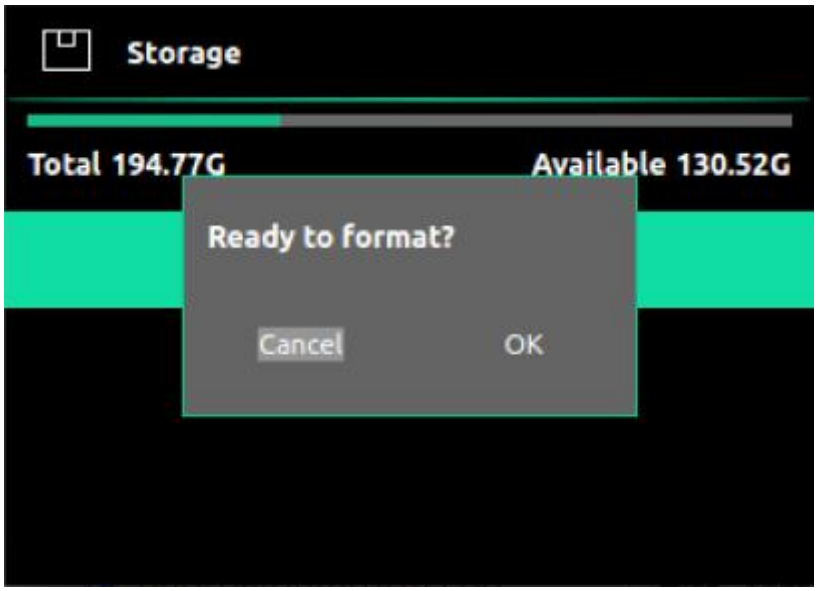
Temperature unit support below,

- Celsius
- Fahrenheit
- Kelvin

2.2.6.2 Storage

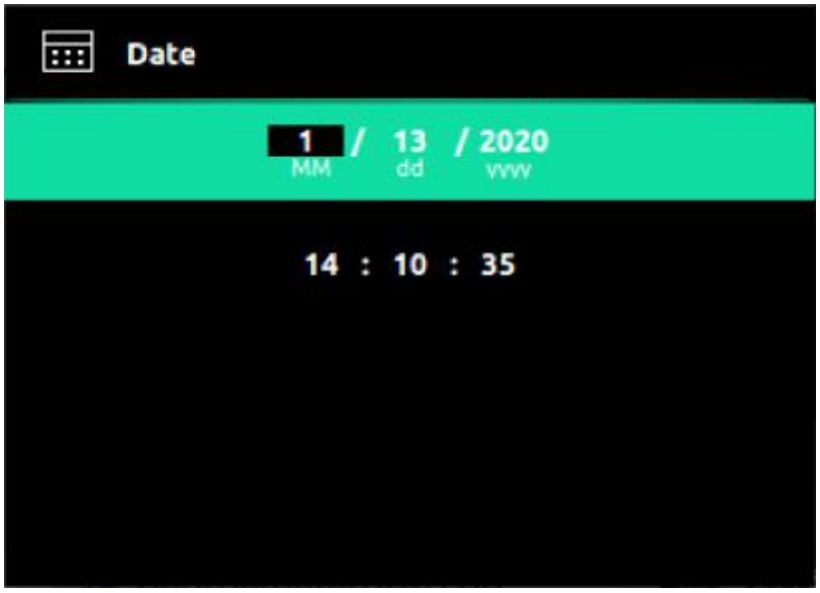
In the storage option, you can view the current and used capacity of the internal storage memory, and you can choose to format the storage memory.



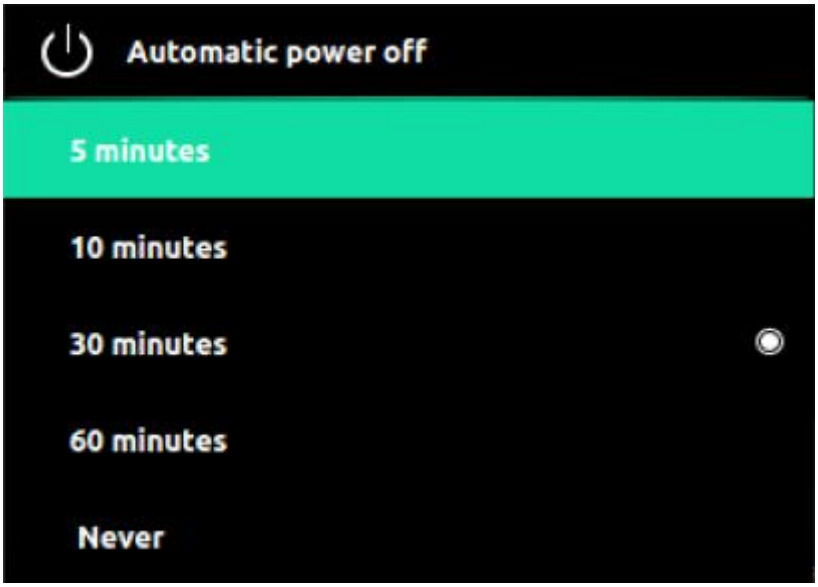


2.2.6.3 Date

Date setting can set the current date and time.



2.2.6.4 Automatic Power Off



Automatic power off can be selected for the following duration if without operating the camera

- 5 minutes
- 10 minutes
- 30 minutes
- 60 minutes
- Never

2.2.7 Temperature Bar

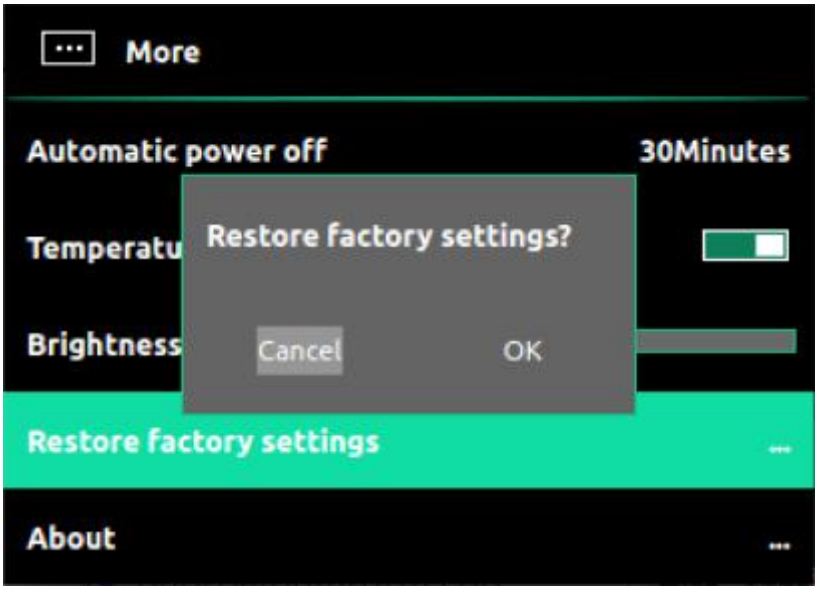
This option can display or not display temperature bar in the home page.

2.2.8 Brightness

This option can adjust the brightness of the screen.

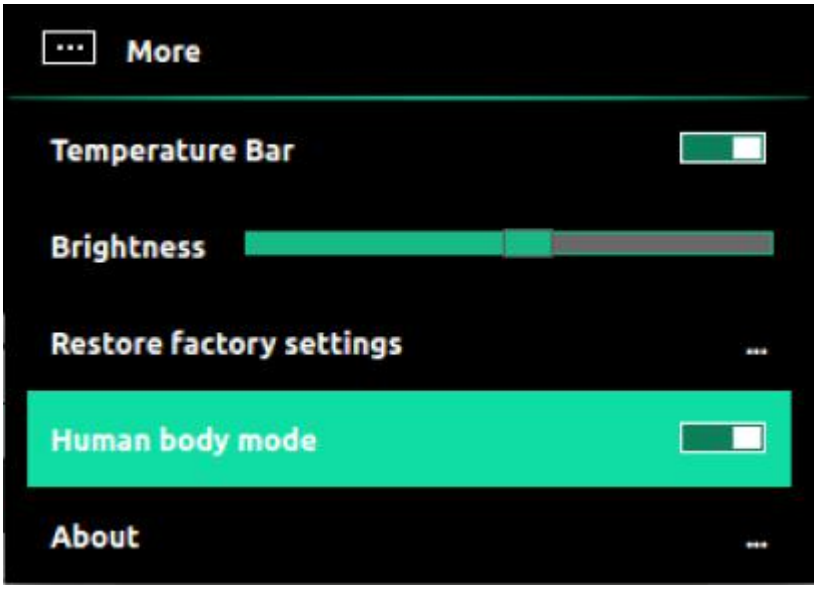
2.2.9 Restore factory settings

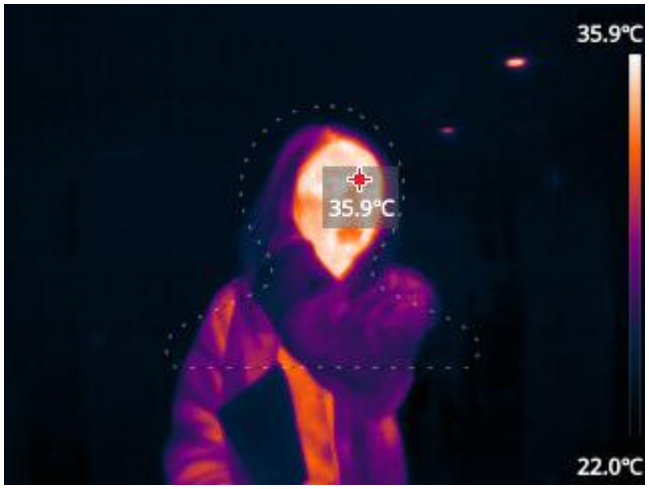
Restore factory settings will perform default factory settings on the handheld thermal imaging camera. Please proceed with caution.



2.2.10 human body temperature measurement

DP series support human body temperature measurement, choose the settings, enable the human body mode, as below picture,

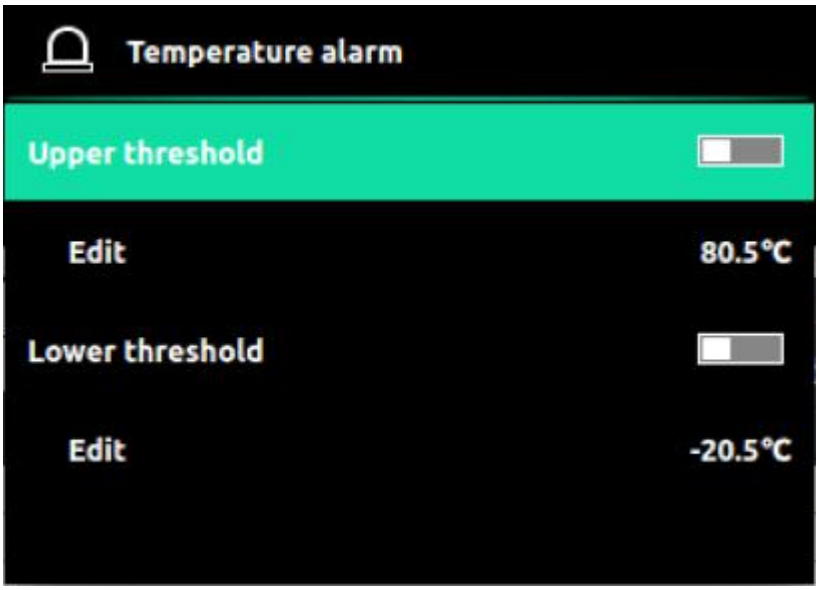




When the human body mode is on, a human head frame is displayed in the screen, let the head frame to aim at the people, by adjusting the distance between the DP series thermal camera and people, let the head of people to fill the head frame of DP series thermal camera, the measuring distance is approximately 0.75m.

DP series thermal camera will start hottest tracing to measure human body temperature. The default fever temperature degree is 37.5°C, you can set the alarm of fever temperature in the settings-temperature alarm-upper threshold.

Noted: the mode of human body temperature of lower threshold is not available.



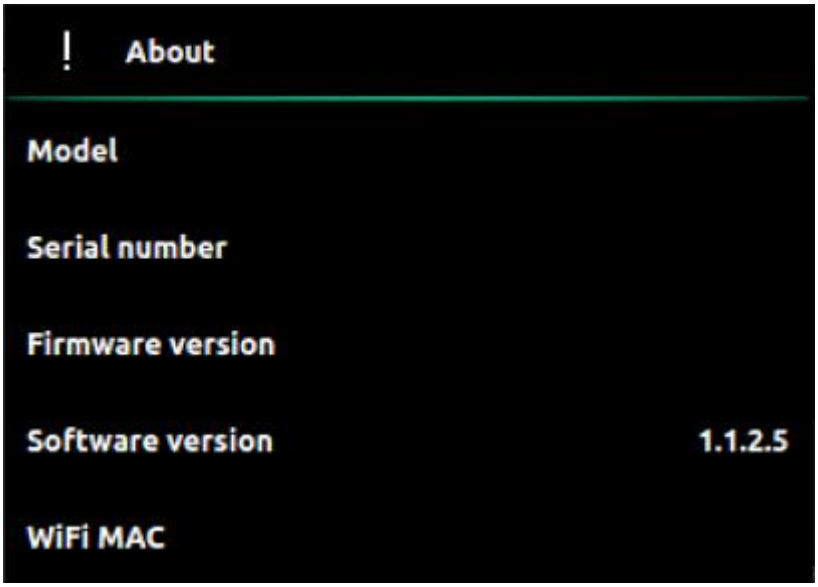
If detect the fever, the thermal camera will pop up the following dynamic icon on the screen for alarm.

The accuracy of human body temperature measurement is higher than the general specification, in order to get the accurate temperature measurement result, please pay attention to the following operating items:

- The distance between the people and the DP series thermal camera is 0.75m.
- Make sure the DP series thermal camera working temperature to be 25°C.
- It is better to power on the DP series for 15 minutes then measuring.
- Do not include any high temperature objects inside the screening. Such as: sunlight or objects that are illuminated by sunlight, PC, screen, TV, water heater, socket, charger, etc.
  The thermal camera can be mounted on a standard ¼" tripod to support long-term testing.

2.2.11 About

In the about option can view the basic information of the thermal imaging camera.



3 Maintenance

3.1 Battery Service and Replacement

If the battery cannot be charged and needs to be replaced, please contact your local distributor for repair and replacement.

3.2 Calibration

The camera is calibrated in the factory. If calibration is required, please contact your local distributor.

3.3 Clean

If necessary, wipe the case with a damp cloth. Use high-quality lens cleaning products to wipe off the dust or stains on the instrument lens and display. Do not use abrasives or solvents to clean the case, lens or display.

4 Specification

The DP series Infrared thermal imaging camera specification is below,

Parameter		Specification	
		DP22	DP21
Infrared Thermal Imaging	Resolution	320x240	220x160
	Frequency band	8~14um	8~14um
	Frame rate	9Hz	9Hz
	NETD	70mK@25°C (77°C)	70mK@25°C (77°C)
	Field of view	Horizontal 56°, vertical 42°	Horizontal 35°, vertical 26°
	Lens	4mm	4mm
	Temperature range	-10°C ~ 450°C (14°F ~ 842°F)	-10°C ~ 450°C (14°F ~ 842°F)
	Temperature measurement accuracy	±2°C or ±2%	±2°C or ±2%
	Temperature measurement	Hottest, coldest, central point, zone area temperature measurement	Hottest, coldest, central point, zone area temperature measurement
	Color palette	Tyrian, white hot, black hot, iron, rainbow, glory, Hottest, coldest.	Tyrian, white hot, black hot, iron, rainbow, glory, Hottest, coldest.
Visible	Resolution	640x480	640x480
	Frame rate	25Hz	25Hz
	LED light	Support	Support
Display	Display Resolution	320x240	320x240
	Display Size	3.5 inch	3.5 inch
	Image mode	Outline fusion, overlay fusion, picture-in-picture, infrared thermal imaging, visible light	Outline fusion, overlay fusion, picture-in-picture, infrared thermal imaging, visible light
General	Working time	5000mah battery, >4 hours in 25°C (77°F)	5000mah battery, >4 hours in 25°C (77°F)
	Battery Charge	Built-in battery, it is recommended to use +5V & ≥2A universal USB charger	Built-in battery, it is recommended to use +5V & ≥2A universal USB charger
	WiFi	Support App and PC software data transmission	Support App and PC software data transmission
	Operating temperature	-20°C~+60°C (-4°F ~ 140°F)	-20°C~+60°C (-4°F ~ 140°F)
	Storage temperature	-40°C~+85°C (-40°F ~185°F)	-40°C~+85°C (-40°F ~185°F)
	Waterproof and dustproof	IP54	IP54
	Camera Dimension	230mm x 100mm x 90mm	230mm x 100mm x 90mm
	Net weight	420g	420g
	Package dimension	270mm x 150mm x 120mm	270mm x 150mm x 120mm
	Gross weight	970g	970g
Storage	Capacity	Built-in memory, about 6.6G available, can store more than 20,000 pictures	Built-in memory, about 6.6G available, can store more than 20,000 pictures

	Picture storage mode	Simultaneous storage of infrared thermal imaging, visible light and fusion images	Simultaneous storage of infrared thermal imaging, visible light and fusion images
	File format	TIFF format, support full frame pictures temperature analysis	TIFF format, support full frame pictures temperature analysis
Image analysis	Windows platform analysis software	Provide professional analysis functions to analyze full pixels temperature analysis	Provide professional analysis functions to analyze full pixels temperature analysis
	Android platform analysis software	Provide professional analysis functions to analyze full pixels temperature analysis	Provide professional analysis functions to analyze full pixels temperature analysis
Interface	Data and charging interface	USB Type-C（Support battery charging and data transmission）	USB Type-C（Support battery charging and data transmission）
Secondary development	Open interface	Provide WiFi interface SDK for secondary development	Provide WiFi interface SDK for secondary development

5 Appendix

5.1 Emissivity

The emissivity of common materials is as follows,

Material	Emissivity	Material	Emissivity
Asphalt	0.90 - 0.98	Cloth (black)	0.98
Concrete	0.94	Skin (human body)	0.98
Cement	0.96	Leather	0.75 - 0.80
Sand	0.9	Charcoal (powder)	0.96
Soil	0.92 - 0.96	Paint	0.80 - 0.95
Water	0.92 - 0.96	Lacquer (matte)	0.97
Ice	0.96 - 0.98	Rubber (black)	0.94
Snow	0.83	Plastic	0.85 - 0.95
Glass	0.90 - 0.95	Wood	0.9
Pottery	0.90 - 0.94	Paper	0.70 - 0.94
Marble	0.94	Chrome oxide	0.81
Plaster	0.80 - 0.90	Copper oxide	0.78
Stucco	0.89 - 0.91	Iron oxide	0.78 - 0.82
brick	0.93 - 0.96	textile	0.9

6 Technical Support

Please access Shenzhen Dianyang Technology Co., Ltd. website to get more technical support,

http://www.dianytech.com/

FCC Warning

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.

