VER.1.0

Thermal Camera

USER MANUAL

This manual may be inconsistent with the product due to product enhancements or version changes, please refer to the actual product.

-CONTENTS -

01 Important Note 1

02 Safety Information 1

03 Precautions..... 1

04 User Notice 3

05 Product Introduction 3

06 Item List 4

07 Product Components 5

08 Basic Operation 7

09 Structural Diagram..... 19

10 FAQ..... 21

11 Emissivity of Common Objects 22

01 Important Note

This manual is a general manual covering multiple models of thermal cameras in a product line, which means that some functions and instructions may not apply to the specific model of thermal camera。

02 Safety Information

1. Before using the cleaning solution, read all applicable material safety data sheets and warning labels on the containers.
2. Do not place the product in an environment above 70℃ or below -40℃.
3. Do not disassemble or modify the infrared thermal camera at will.

03 Precautions

Please strictly follow the following precautions at all times:

1. Try to keep the device stable and avoid violent shaking when using it.
2. Do not use or store the device in an environment that exceeds the permitted working temperature or storage temperature.
3. Do not directly aim the device at high-intensity heat radiation sources such as the sun, lasers, and spot welders.
4. Do not expose the device to dusty or humid environments.

   When using in a wet environment, avoid splashing water on the instrument. Cover the lens when the device is not in use.
5. When not using this device, please place the instrument and all accessories in the dedicated packaging box.
6. Do not block the holes on the device.

7. Do not knock, throw, or shake the instrument and accessories, to avoid damage.
8. Do not disassemble the device by yourself, which may cause damage and void the warranty.
9. Avoid using the TF card for other purposes.
10. Please do not use the device in an environment that exceeds the working temperature, which may cause damage to the device.
11. Do not use soluble or similar liquids on the device or cables, which may cause damage to the device.
12. The batteries involved in this device are intended to be removed or replaced only by authorised professional personnel. End-users must not remove the battery themselves, as this may impair the waterproof/dustproof performance and cause safety hazards.
13. When wiping the device, please follow measures below:
    - Non-optical surfaces: Use a clean, soft cloth to wipe the non-optical surfaces of the thermal camera when necessary.
    - Optical surfaces: When using the thermal camera, avoid contaminating the optical surfaces of the lens, especially avoid touching the lens with hands as sweat on hands may leave marks on the lens glass and may corrode the optical coating on the glass surface. When the optical lens surface is contaminated, carefully wipe it with special lens paper.

04 User Notice

[Calibration]

To ensure temperature measurement accuracy, it is recommended to return the device to the factory for calibration once a year.

[Accuracy]

To obtain highly accurate results, it is recommended to wait for 5-10 min after turning on the thermal camera before measuring the temperature.

[Document Update]

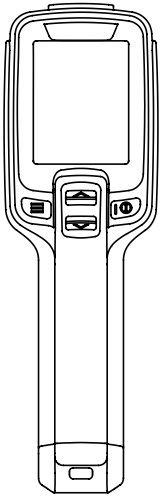
The manual is updated multiple times every year, and notifications for key product changes will be regularly released. To access the latest manual and notifications, please visit the official website.

05 Product Introduction

This product is a tool-type handheld infrared thermal camera for temperature measurement, with two resolutions: 120*90 and 256*192. Besides, the lasers, lighting lamps, and visible light lens are provided, and the device can be connected to a PC, to meet the needs of different scenarios.

06 Item List

- Thermal camera (including battery) 1pc
- Quick Operation Guide 1pc
- Data Download Card 1pc
- USB data cable 1pc
- Wristband 1pc
- Charger 1pc



Thermal camera
(including battery)



Quick Operation Guide



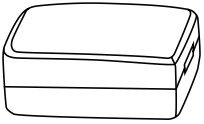
Data Download Card



USB data cable



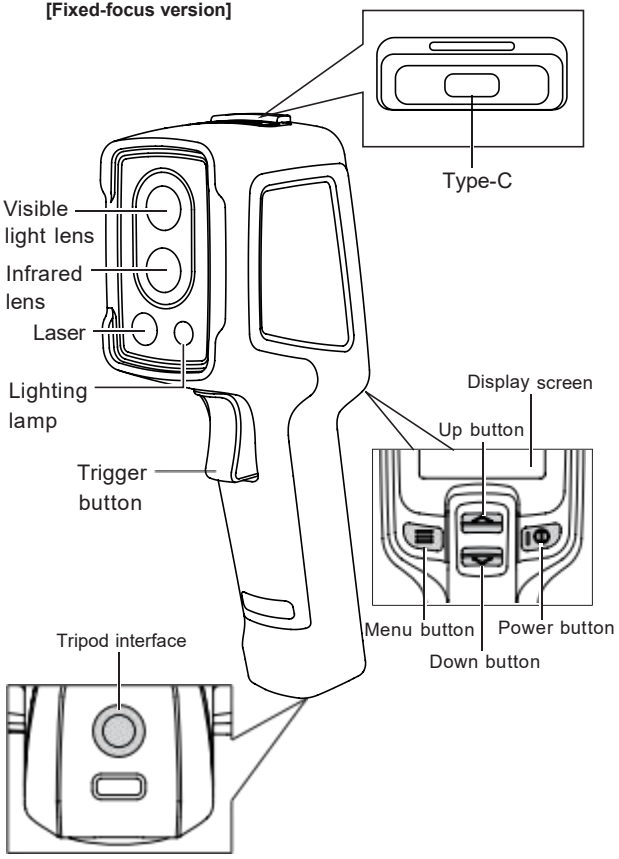
Wristband



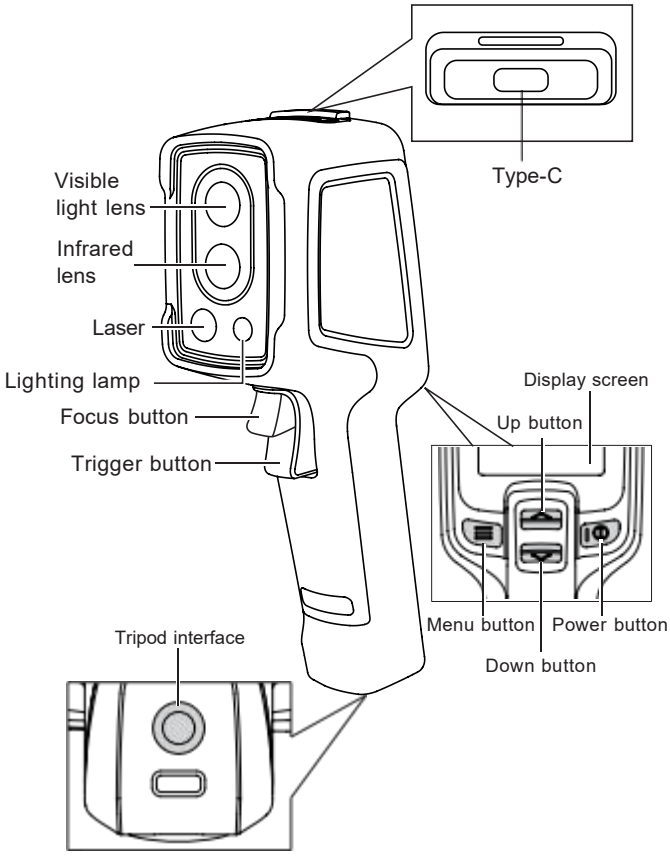
Charger

07 Product Components

[Fixed-focus version]



[Auto-focusing version]



08 Basic Operation

[Quick Start Guide]

Please follow the steps below:

Charging

Please use a 5V 1A or 5V 2A power adapter and USB cable to charge the device;

Use the USB cable in the accessories to connect the device to the computer for charging;

When charging, open the protective cover on the top of the device, connect one end of the data cable to the USB Type-C interface of the device, and connect the other end to the adapter or computer.

Power on

Press and hold the power button to power on the device.

Find the target

Align the thermal camera with the object concerned.

Capture the image

Click the trigger button to capture the image.

PC analysis software

Download the software from the data card to the computer, connect the computer and the thermal camera with a USB cable, and import the data from the thermal camera for secondary analysis.

WiFi

In the "Menu - WiFi", turn on the WiFi switch to connect to the network.

Local upgrade

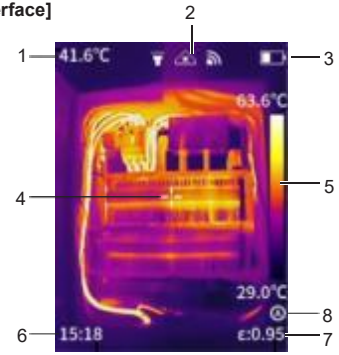
If there is a new upgrade package for the device, after connecting to the wireless network, you can upgrade the device soft-

ware in "Menu - OTA Upgrade".

AP mode

Create a WiFi hotspot with this device. After connecting your phone or computer to the hotspot, you can use analysis software to directly view the photos/videos inside the device, as well as control the device's observation and display in sync with the device's screen.

[User Interface]



	Name	Description
1	Center Point Temperature	Display the temperature of the center point
2	Status bar	Display the status of the lighting, laser, and wifi (supported by some models)
3	Battery	Display the remaining battery power
4	Center cursor	Indicate the target position of the cursor
5	Ribbon	The temperature range of the current displayed palette and image
6	Time	Display time
7	Emissivity	Display the current emissivity value
8	Auto dimming	Auto dimming

[Operation Instructions]

Power on and off

1. Long press the power button for 2 seconds to power on the device in the power-off state.
2. Long press the power button for 2 seconds to power off the device in the power-on state.
3. If the device crashes, force the shutdown by long pressing the power button.

Save image

1. In the real-time preview interface, click the trigger button to automatically save the picture.

   Note: The automatic/manual mode can be switched by long pressing the menu button on the main preview interface.

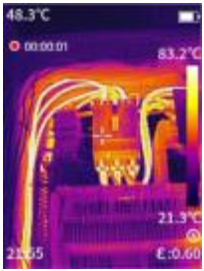
View/delete image

When a picture is taken and saved, it is stored in the memory of the device and can be viewed at any time by following the steps below:

1. Click the menu button to enter the gallery;
2. Use the directional keys on the navigation key to select the image to be viewed;
3. Press OK to view the picture in full screen;
4. When viewing the picture, press the menu button to choose to view the visible-light image or delete the picture. (If the picture is deleted, the visible light or infrared picture associated will be also deleted)
5. Click the backspace key to return to the thermal imaging interface;

Save video

1. In the real-time preview interface, long press the trigger button for 2s, to display a countdown for recording on the screen. At that time, the red dot will flash, indicating that the recording has been started. Press the trigger button or the backspace key to end the recording.



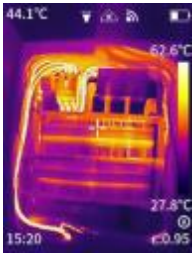
View/delete video

When a video is shot and saved, it is stored in the memory of the device and can be viewed at any time by following the steps below:

1. Click the menu button to enter the gallery;
2. Use the directional keys on the navigation key to select the video to be viewed;
3. Press OK to play the video;
4. During the video playback, press the menu key to bring up the edit menu and delete individual videos.

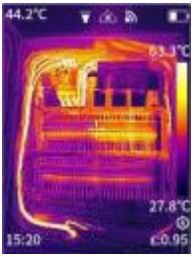
[Image Mode]

Infrared Mode (IR) - infrared image



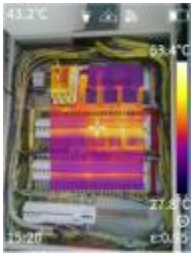
Fusion Mode (MIF) - MIF image

Visible light details are superimposed on the infrared thermal image, to help the user accurately distinguish the target location.



Picture-in-Picture Mode (PIP) - picture-in-picture image

The central area of the visible light is superimposed on the infrared thermal image, to help the user distinguish the target location.



Visible Light Mode (VL) - visible light image

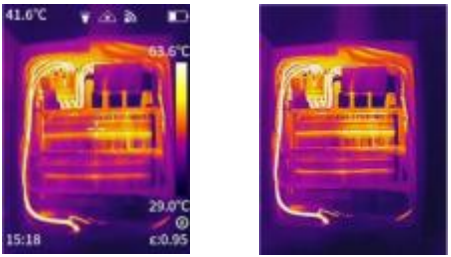


Steps of changing image mode

In the real-time preview interface, switch between different modes by using the navigation up and down keys.

[Setup Interface]

Super-resolution mode is a powerful image processing technique that helps the user convert the low-resolution images into the high-resolution images, thereby improving image definition and details. In the super-resolution mode, clearer images can be obtained.



Before the super resolution After the super resolution

[Temperature Range]

The temperature range of the device includes the high-temperature mode, low-temperature mode, and automatic mode. The user needs to select the corresponding temperature mode according to the usage conditions, so as to ensure temperature accuracy.

[Emissivity]

To obtain accurate measurement results, set the emissivity based on the target location before each measurement. Emissivity refers to the ratio of the radiation ability of an object to the radiation ability of a black body at the same temperature, and is relative to the object reflectivity. At the same target temperature, a higher emissivity means that the target can radiate a higher proportion of energy outward.

For example, the emissivity of human skin is 0.98, and the emis-

sivity of printed circuit boards is 0.91. For more information on emissivity, please refer to the "Emissivity of Common Objects" or consult other sources.

Emissivity settings:

1. On the thermal imaging interface, click OK to display the main menu toolbar.
2. In the toolbar, select the "Emissivity" option to set the emissivity.

[Palette]

Change the palette used in the thermal camera to distinguish different temperatures, which is helpful to analyze the image easily. 1. On the real-time preview interface, click the OK to display the main menu toolbar.

1. On the real-time preview interface, click the OK to display the main menu toolbar.
2. In the toolbar, select "Palette", click the "Menu" button to switch to different color bands.

[Center Point]

Enable or disable the center point on the screen.

[Center Point]

Enable or disable the center point on the screen.

[Temperature Unit]

1. On the thermal imaging interface, click the menu key to display the main menu toolbar.
2. In the toolbar, select the “Area Temperature Measurement” option, and click the menu key to display none, small area, medium area, and large area.
3. Set different areas according to user needs, and display the highest and lowest temperatures of the current area.

[High- and Low-Temperature Alarm]

The device supports high and low temperature alarm function, allowing the user to set the high-temperature alarm threshold and low-temperature alarm threshold, and to enable and disable the alarm function by selecting 'On' or 'Off'. After the high- and low-temperature alarm is triggered, an icon will appear in the screen for notification.

If the 'LED Alarm' option is enabled, the LED light will flash to indicate the alarm.

[Reflection Temperature]

The reflection temperature is used to compensate or correct the thermal radiation reflected on the measured object. If the emissivity of the measured target is relatively low and the actual temperature is much lower than that of its reflection source, setting this parameter and compensating for the reflection temperature are conductive to accurately measuring the temperature. The user can modify the parameters according to the actual situation.

[Target Distance]

Different distances have different effects on the measurement results. To accurately measure the temperature, the thermal camera needs the distance information of the object, so as to compensate the results.

1. On the thermal imaging interface, click OK to display the main menu toolbar.
2. In the toolbar, select the 'Target Distance' option, click OK to set the distance;

[Distance Unit]

The device supports two distance display modes: meters and yards.

[Auto Power Off]

The device supports the automatic shutdown, with options of 5 min, 10 min, 20 min, and off.

[Screen Brightness]

The device supports three levels of brightness adjustment: low, medium, and high.

[Laser]

The laser indicator function is usually used to point, indicate, or aim at a target or area with a laser beam. During the real-time preview, the laser can be enabled by holding down the trigger button.

[Lighting Lamp]

The lighting lamp assists the user in capturing visible light images under poor light conditions.

[Date and Time]

The device supports the date and time setting.

[Language]

The device supports multiple languages, allowing the customer to set it based on actual needs.

[Reset Settings]

Resetting Settings refers to the process of restoring the device, software, or system settings to their initial or default states. In the process, the user-customized settings, configurations, and data will be cleared, and the device or system will returned to its initial installation or factory state.

[Formatting]

Formatting usually refers to the process of clearing and reinitializing the storage media of a device or system.

[Picture-in-Picture Transparency]

In Picture-in-Picture mode, the display effect of real-time images can be changed by adjusting the infrared image transparency of picture in picture, and thus helping the user analyze images intuitively.

[Infrared Video Format]

The device supports two video formats. The IRGD format is a video format with temperature data. The MP4 format is a video format without temperature data. If the local video needs to be imported to PC analysis software for temperature analysis, the video format should be set to IRGD for storage.

[Visible Light]

The device supports two visible light resolutions, which are 240*320 and 1200*1600, allowing the user to set either resolution according to actual needs.

It is worth noting that when the device captures high-resolution images, the system resources occupied due to the large data volume will significantly increase. This not only makes the image processing process time-consuming, but also may prolong the overall shooting time.

[Wifi]

Some models support the device hotspot function, allowing to connect to the client for wireless projection when enabled. Please refer to the device interface for the username and password.

[WiFi]-[RTSP]

Certain models support the device hotspot streaming function. When the device and computer are on the same LAN, real-time

streaming and remote control/analysis can be achieved between the device and infrared analysis software.

1. Enable WiFi and RTSP switch on the device;

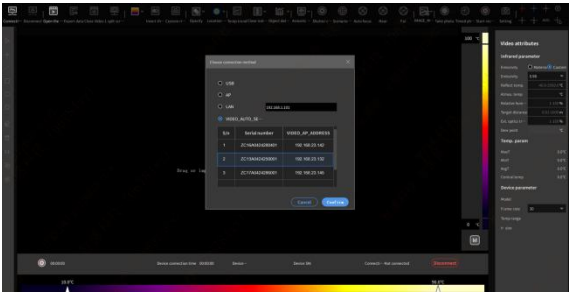


2.Connect both the device's WiFi and the computer's WiFi to the same local network;

3.Open the infrared analysis software on the computer, navigate to [Video Analysis] > [Connection Management], and select [Auto Search];

4.The software will display device information within the same LAN. Locate and select the target device, then click Confirm to establish the connection;

5.Complete real-time infrared video streaming and initiate data transmission for remote analysis.



【USB Mode】

There are two main USB modes. The first method is to use the device as a storage card, and the computer can directly access the SD card in the device through a USB cable.

The second mode is UVC projection mode. In the UVC screen

projection mode, the USB camera device is simulated by loading specific drivers (such as Potplayer). When the device is connected to the system, the driver will convert the device's video signal to the UVC standard format and transmit it to the system through the USB interface. After receiving the video signal, the system will decode it and display it on the screen, achieving the screen projection.

[Upgrade]

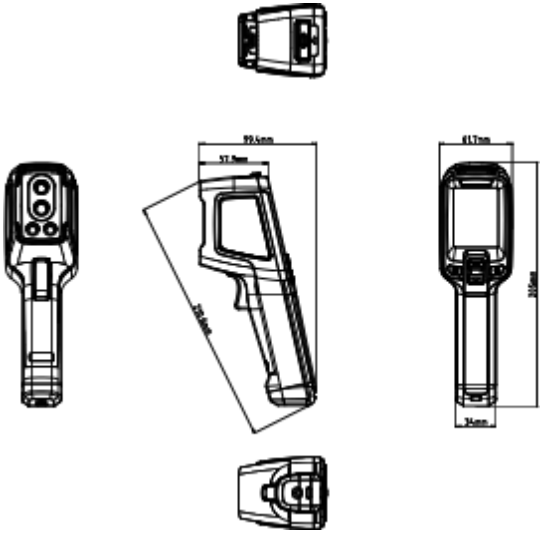
The device supports local upgrade and OTA upgrade (only supported by the device with WiFi function). Local upgrade refers to that the installation package is put under the specified file directory for upgrading by following the screen indications. In OTA upgrade mode, the software update is received and installed from remote servers via wireless networks.

[About the Device]

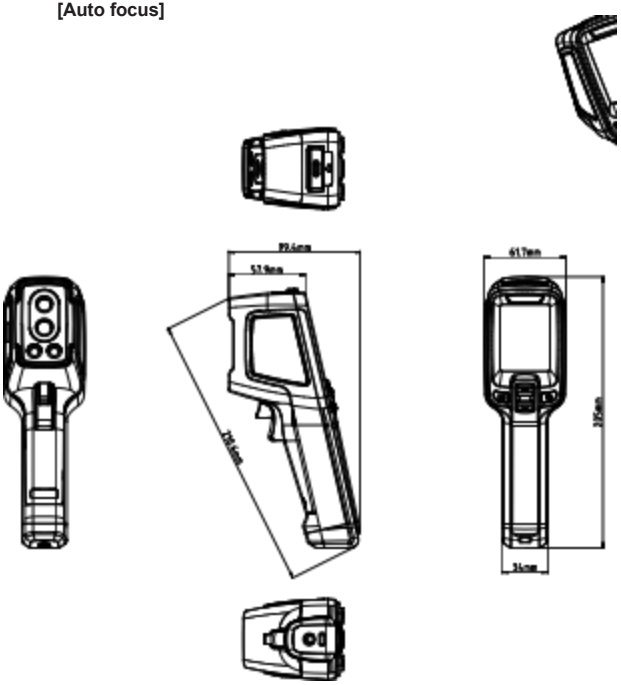
View the software version, firmware version, serial number, content capacity, and other information from “About the Device”.

09 Structural Diagram

[Fixed-focus version]



[Auto focus]



10 FAQ

1. **Why does the thermal camera make a 'clicking' sound?**

   The 'clicking' sound inside the instrument is caused by the automatic calibration of the thermal camera. This usually occurs when the thermal camera is moving quickly or just turned on. The thermal camera will automatically adjust it according to the changes in ambient temperature, to compensate for the impact of these changes on the accuracy of the detector. This usually lasts for 2-3 seconds, and the screen may experience a freeze.

2. **The thermal camera cannot be started.**

   It may be due to low battery power. Please use the original adapter to charge the device for 10 min before restarting it.

3. **The image of the thermal camera is unclear.**

   There are usually two possibilities. The device is in an auto-focusing mode and needs to be refocused.

   If it is still unclear, it may be caused by the incorrect temperature measurement range selected. Switch to the corresponding temperature measurement range.

4. **There is a large difference between the measured temperature and the actual temperature.**

   Answer: The measured target needs to correspond to the correct emissivity. The distance parameter set by the device should be consistent with the actual distance.

5. **The device will automatically shut down if idling for a long time.**

   Answer: The possible reason is that the automatic shutdown function is enabled, 5 min, 10 min, 20 min, or never should be set according to the actual usage situation.

11 Emissivity of Common Objects

Material	Emissivity	Material	Emissivity
Wood	0.85	Black paper	0.86
Water	0.96	Polycarbonate	0.8
Brick	0.75	Concrete	0.97
Stainless steel	0.14	Copper oxide	0.78
Adhesive tape	0.96	Cast iron	0.81
Aluminum plate	0.09	Rust	0.8
Copper plate	0.06	Gypsum	0.75
Black aluminum	0.95	Paint	0.9
Human skin	0.98	Rubber	0.95
Asphalt	0.96	Soil	0.93
PVC plastic	0.93		

FCC warning:

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.

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.

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