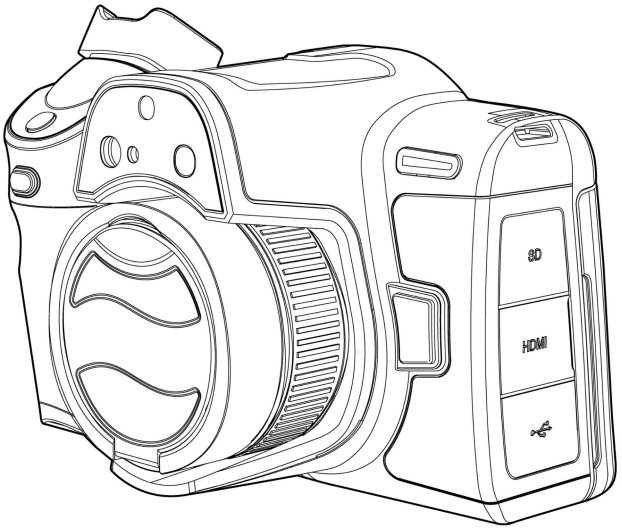
Yaoguang S Series

Handheld Thermal Camera

User Manual V1.0.0



IRay Technology Co., Ltd.

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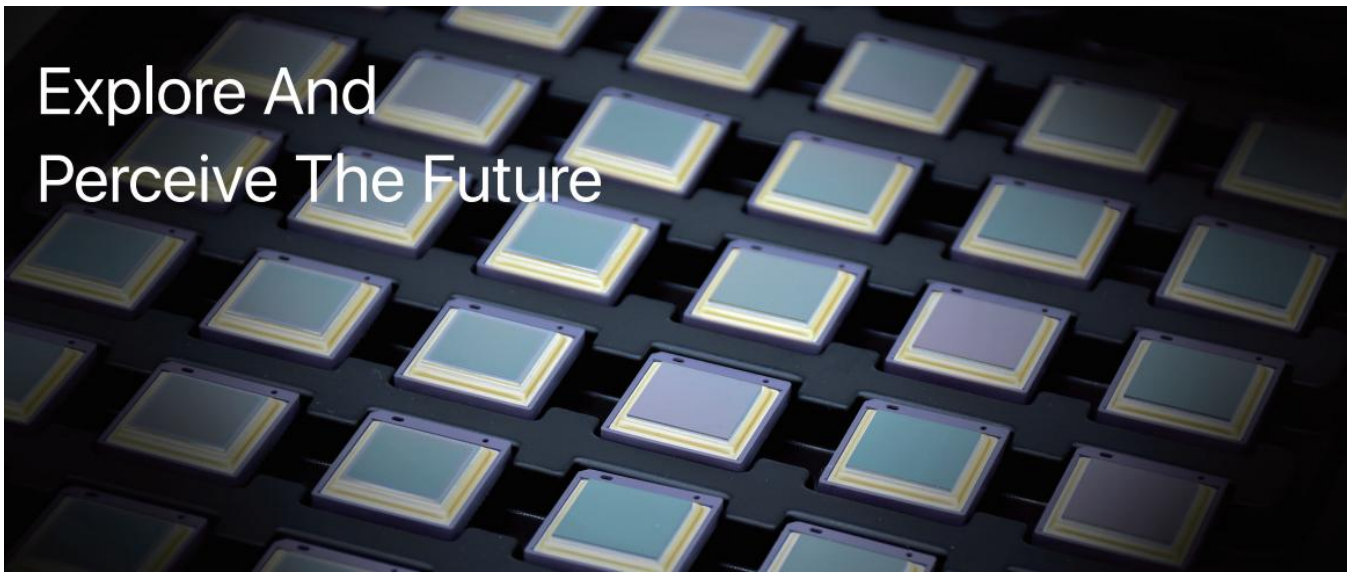
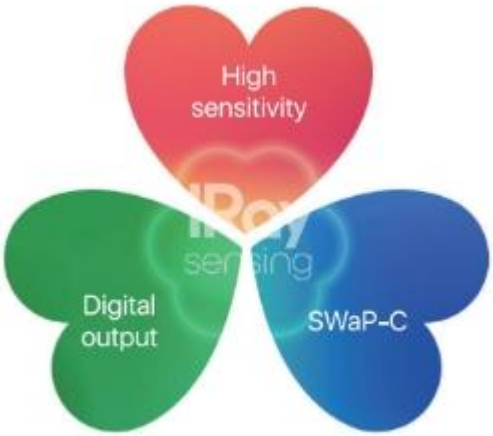


Introduction to IRay Technology

IRay Technology Co., Ltd. concentrates on developing infrared thermal imaging technologies and manufacturing relevant products, with completely independent intellectual property rights. IRay is committed to providing global customers with professional and competitive infrared thermal imaging products and solutions. The main products include IRFPA detectors, thermal imaging modules, and terminal thermal imaging products.

With R&D personnel accounts for 48% of all employees, 787 intellectual property projects in terms of IRay have been authorized and accepted: 629 patented technologies authorized and accepted in China (including those for integrated circuit chips, MEMS sensors design and manufacture, Matrix III image algorithms and intelligent precise temperature measurement algorithms, etc.); 18 patented technologies authorized and accepted overseas; 101 software copyrights; and 39 integrated circuit layout designs. （The statistic data is up to August,2021）

IRay products have been applied in various fields, including epidemic prevention and control, industrial thermography, security and fire control, night vision observation, automatic driving, Internet of Things, AI, and machine vision.



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1. Legal Disclaimer

1.1. Legal Disclaimer

The thermal cameras manufactured by IRAY TECHNOLOGY are warranted for a period of two-year and the accessories are warranted for a period of three-month form the delivery date of the original purchase, provided such products have been under normal storage, use and maintenance.

This warranty extends only to the original purchaser and is not transferable. It is not applicable to any product which has be subjected to misuse, neglect, accident or abnormal conditions of operation.

In the case of a defect in a product covered by this warranty the product must not be further used or maintained in order to prevent additional damage. The purchaser shall promptly report any defect to IRAY TECHNOLOGY or this warranty will not apply.

IRAY TECHNOLOGY will, at its option, repair or replace any such defective product free of charge if, upon inspection, the product or accessories prove to be defective, the user can contact with after-sales service department of IRAY TECHNOLOGY within the said warranty period.

1.2. Copyright

©IRay Technology Co., Ltd. 2022. All rights reserved worldwide. All contents in this manual, including words, pictures, images, etc., belong to IRAY TECHNOLOGY CO., LTD. (Hereinafter referred to as “THE COMPANY” or “IRAY TECHNOLOGY”). No part of the manual, in whole or part, may be copied, photocopied, translated, or transmitted without the prior written permission of IRAY TECHNOLOGY.

This manual is used as a guide. The photos, graphics, diagrams and illustrations provided in the manual are only used to explain, which may be different from the specific product. The real product shall prevail. We try our best to make sure the contents in this manual are accurate. We do not provide any representations or warranties in this manual.

IRAY TECHNOLOGY reserve the right to update the manual. If you need the latest version of this manual, please contact us. It is recommended that you use this manual with the guidance of professionals.

1.3. Quality Assurance

The Quality Management System under which these products are developed and manufactured has been

certified in accordance with the ISO9001 standard.

We reserve the right to make changes and improvements on any of the products without prior notice.

2. Safety Information

WARNING

Applicability: Class B digital devices.

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

Applicability: Digital devices subject to 15.19/RSS-247 issue 1.

NOTICE: This device complies with Part 15 of the FCC Rules and with RSS-247 issue 1 of Industry Canada. 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.
This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law. This device should not be modified (otherwise the granted design nation number will become invalid)
Applicability: Digital devices subject to 15.21. NOTICE: Changes or modifications made to this equipment not expressly approved by IRAY Systems may void the FCC authorization to operate this equipment.
Applicability: Digital devices subject to 2.1091/2.1093/OET Bulletin 65. Radiofrequency radiation exposure Information: The radiated output power of the device is below the FCC/IC radio frequency exposure limits. Nevertheless, the device shall be used in such a manner that the potential for human contact during normal operation is minimized.
Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.
The highest SAR value reported under this standard during product certification for use at the body is 1.34W/kg. This device was tested for typical body-worn operations with the back of the handset kept 0.0cm from the body.

This device was tested for typical body-worn operations. To comply with RF exposure requirements, a minimum separation distance of 0.5 cm must be maintained between the user's body and the handset, including the antenna. Third-party belt-clips, holsters, and similar accessories used by this device should not contain any metallic components. Body-worn accessories that do not meet these requirements may not comply with RF exposure requirements and should be avoided. Use only the supplied or an approved antenna.
Applicability: Cameras with one or more laser pointers. Do not look directly into the laser beam. The laser beam can cause eye irritation.
Applicability: Cameras with one or more batteries. Do not disassemble or do a modification to the battery. The battery contains safety and protection devices which, if damage occurs, can cause the battery to become hot, or cause an explosion or an ignition.
Applicability: Cameras with one or more batteries. If there is a leak from the battery and you get the fluid in your eyes, do not rub your eyes. Flush well with water and immediately get medical care. The battery fluid can cause injury to your eyes if you do not do this.
Applicability: Cameras with one or more batteries. Do not continue to charge the battery if it does not become charged in the specified charging time. If you continue to charge the battery, it can become hot and cause an explosion or ignition. Injury to persons can occur.
Applicability: Cameras with one or more batteries.

Only use the correct equipment to remove the electrical power from 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. Injury to persons can occur.
Make sure that you read all applicable MSDS (Material Safety Data Sheets) and warning labels on containers before you use a liquid. The liquids can be dangerous. Injury to persons can occur.
1. Make sure you read all applicable Material Safety Data Sheets (SDS) and warning labels on containers before you use a liquid. The liquids can be dangerous. Injury to persons can occur.
2. It is prohibited to use the product in a high temperature above 85 °C or in a low temperature below-45 °C.
3. It is forbidden to disassemble or refit the thermal camera at will.

Caution

1. Do not use the product under conditions that doesn't match the environmental requirements. For specific use environment requirements, see the product parameter table.
2. Do not apply solvents or equivalent liquids to the camera, the cables, or other items.
3. Be careful when you clean the infrared lenses. The lens has an anti-reflective coating

which is easily damaged. Damage to the infrared lens can occur with too much force or cleaning with rough objects such as tissues.

4. No matter there is a lens cover or not, do not point the infrared thermal camera towards strong light or equipment with laser radiation. This will affect the accuracy of the thermal camera and even damage the detector in the thermal camera.

Do not use the camera in temperatures more than +50 ° C (+122 ° F), unless other information is specified in the user documentation or technical data. High temperatures can cause damage to the camera.

Do not point the infrared camera (with or without the lens cover) at strong energy sources, for example, devices that cause 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 camera.

Applicability: Cameras with one or more laser pointers.

To prevent damage, put the protective cap on the laser pointer when you do not operate the laser pointer. Damage to the laser pointer can occur if you do not do this.

Applicability: Cameras with one or more batteries.

Do not attach the batteries directly to a car's cigarette lighter socket, unless IRAY Systems supplies a specific adapter to connect the batteries to a cigarette lighter socket. Damage to the batteries can occur.

Applicability: Cameras with one or more batteries.

Do not connect the positive terminal and the negative terminal of the battery to each other with a metal object (such as wire). Damage to the batteries can occur.

Applicability: Cameras with one or more batteries. Do not get water or salt water on the battery, or permit the battery to become wet. Damage to the batteries can occur.
Applicability: Cameras with one or more batteries. Do not make holes in the battery with objects. Damage to the battery can occur.
Applicability: Cameras with one or more batteries. Do not hit the battery with a hammer. Damage to the battery can occur.
Applicability: Cameras with one or more batteries. Do not put your foot on the battery, hit it or cause shocks to it. Damage to the battery can occur.
Applicability: Cameras with one or more batteries. Do not put the batteries in or near a fire, or into direct sunlight. When the battery becomes hot, the built-in safety equipment becomes energized and can stop the battery charging procedure. If the battery becomes hot, damage can occur to the safety equipment and this can cause more heat, damage or ignition of the battery.
Applicability: Cameras with one or more batteries. Do not put the battery on a fire or increase the temperature of the battery with heat. Damage to the battery and injury to persons can occur.
Applicability: Cameras with one or more batteries.

Do not put the battery on or near fires, stoves, or other high-temperature locations. Damage to the battery and injury to persons can occur.
Applicability: Cameras with one or more batteries. Do not solder directly onto the battery. Damage to the battery can occur.
Applicability: Cameras with one or more batteries. Do not use the battery if, when you use, charge, or put the battery in storage, there is an unusual smell from the battery, the battery feels hot, changes color, changes shape, or is in an unusual condition. Speak with your sales office if one or more of these problems occurs. Damage to the battery and injury to persons can occur.
Applicability: Cameras with one or more batteries. Only use a specified battery charger when you charge the battery. Damage to the battery can occur if you do not do this.
Applicability: Cameras with one or more batteries. Only use a specified battery for the camera. Damage to the camera and the battery can occur if you do not do this.
Applicability: Cameras with one or more batteries. The temperature range through which you can charge the battery is ±0°C to +45°C (+32°F to +113°F), unless other information is specified in the user documentation or technical data. 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.

Applicability: Cameras with one or more batteries. The temperature range through which you can remove the electrical power from the battery is -15°C to +50°C (+5°F to +122°F), unless other information is specified in the user documentation or technical data. If you operate the battery out of this temperature range, it can decrease the performance or the life cycle of the battery.
Applicability: Cameras with one or more batteries. When the battery is worn, apply insulation to the terminals with adhesive tape or equivalent materials before you discard it. Damage to the battery and injury to persons can occur if you do not do this.
Applicability: Cameras with one or more batteries. Remove any water or moisture on the battery before you install it. Damage to the battery can occur if you do not do this.
Do not apply solvents or equivalent liquids to the camera, the cables, or other items. Damage to the battery and injury to persons can occur.
Be careful when you clean the infrared lens. The lens has an anti-reflective coating which is easily damaged. Damage to the infrared lens can occur.
Do not use too much force to clean the infrared lens. This can cause damage to the anti-reflective coating.

3. Notice to user

3.1. Calibration

IRAY TECHNOLOGY recommends that you verify your calibration yearly in order to ensure accuracy. You can verify the calibration through IRAY TECHNOLOGY or third-party organizations.

3.2. Accuracy

For very accurate results, we recommended that you wait 5 minutes after you have started the camera before measuring a temperature.

3.3. Video Teaching

You can search for mount and use videos from our website：www.infiray.com.

3.4. Documentation Updates

Our manuals are updated several times per year, and we also issue product-critical notifications of changes on a regular basis. Please visit our website to access the latest manuals and notifications.

3.5. Scope of Application

This manual is applicable for all products in a range, which means that parts of the manual may not apply to a particular model.

3.6. Disposal of electronic waste

2006/66/EC (battery directive): This product contains a battery that cannot be disposed of as unsorted municipal waste in the European Union. See the product documentation for specific battery information. The battery is marked with this symbol, which may include lettering to indicate cadmium (Cd), lead (Pb),

or mercury (Hg). For proper recycling, return the battery to your supplier or to a designated collection point. For more information see: www.recyclethis.info

4. Customer Help

4.1. FAQ

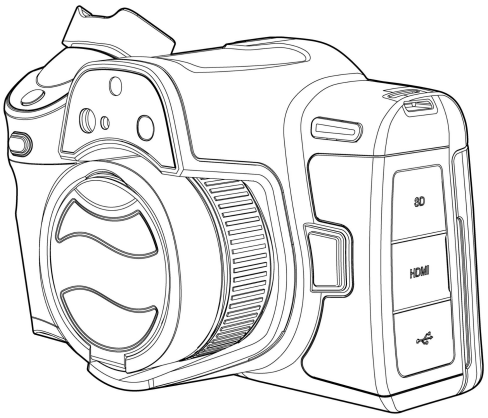
You can find answers to FAQ about this model on the service support page of our official website.

4.2. Download

You can download the following contents from our website: www.infiray.com

- Product Documentation
- Client Software
- How-to Videos

5. Introduction



5.1. General description

The S series is designed for the expert requiring the highest performance and the latest technology available. The camera series have excellent ergonomics, and can achieve high accuracy and high-quality image with high-sensitivity and high-resolution infrared detectors. Custom OS, intelligent application and assisted function, 5.5-inch angle adjustable screen and rotatable handles make S series well suited for

professional use.

5.2. Key benefits

• Tailor made for research and development: The S series has high accuracy

and high sensitivity, to accurately measure the smallest temperature differences. With

real-time radiometric recording by the camera, it is possible to capture fast events on

the camera's SD card for further analysis by the supplied analysis software.

• Flexible and feature rich: A wide variety of measuring and analysis functions makes

the camera flexible for your every need. The programmable buttons and AI function improves the interaction and control ability.

• Highest performance with the latest technology: The S series is equipped

with the innovative IRAY intelligent image fusion feature, which produces an

image richer in detail than ever before. With its continuous autofocus, the image continues to be clear, which improves work efficiency greatly.

• Intelligent Work Flow: S series are integrated with Work Flow Template, which can be edited via IRPT_TAS, auto image naming and complete complicated work flow with multiple image annotation and memory function.

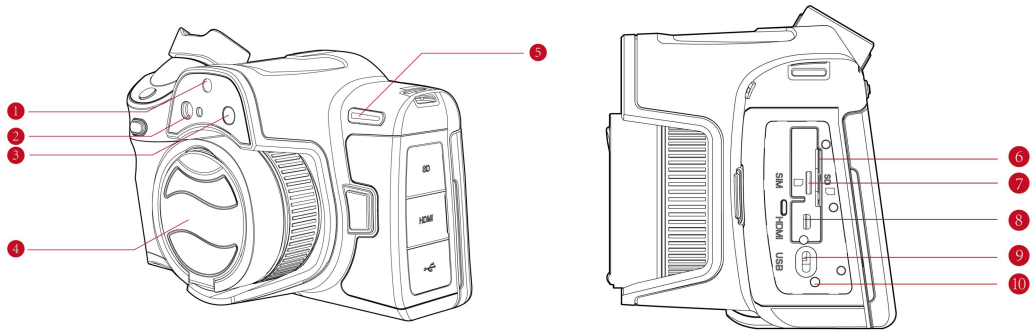
5.3. Packaging List

Standard Accessories				
Thermal camera	Li-ion battery	Power adapter	USB cable	HDMI cable
Neck strap	Hand strap	SD card	Hard safety case	Battery charger
Charging cables(white)	Download card	Calibration certificate	Quick start guide	User documentation

Optional Accessories				
Li-ion battery	Bluetooth headsets	Long focus lens	Wide angle lens	Micro-lens
Lens bag	Portable bag			

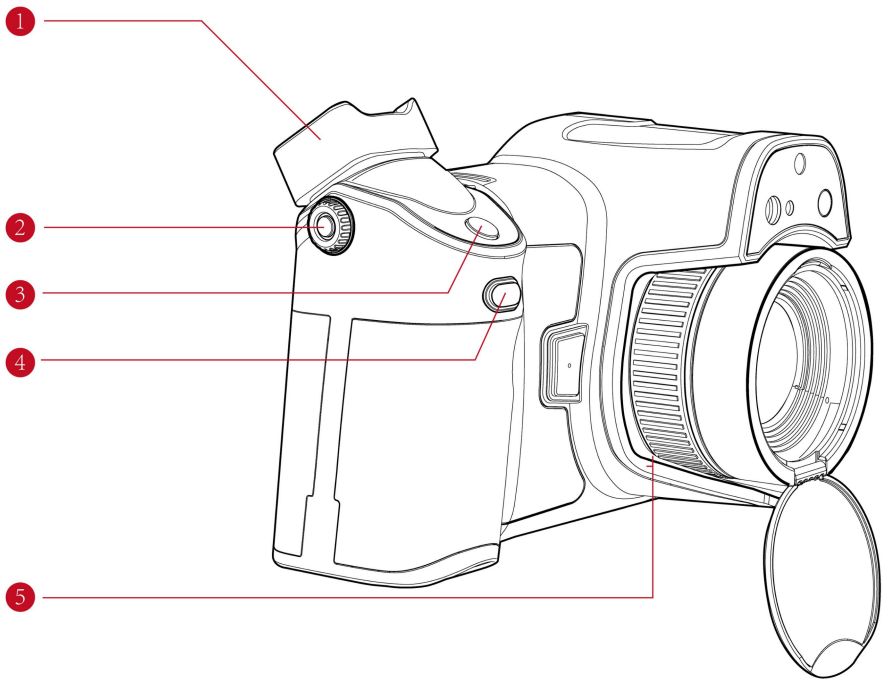
6. Camera Overview

6.1. View from the left



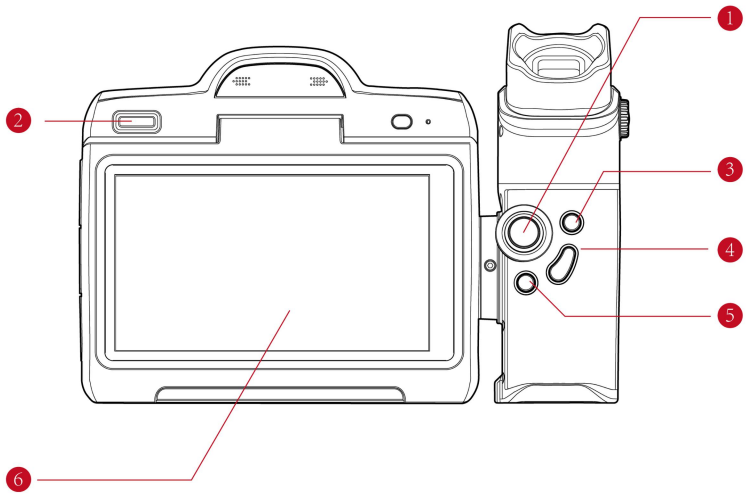
No.	Name	Function Description
1	Visible light	
2	LRF	
3	LED supplement light	
4	Infrared lens	
5	Power button	Press and hold for 3s to power on；Press and hold for 3s to display power off/reboot menu；Press to enter sleep mode.
6	SD card slot	Standard 64GB， support hot plug, support SD， SDHC， SDXC，Max. extendable to 2TB； Remove SD card and transmit data to PC or other devices via card reader. Note：Damage to memory card may occur if the memory card is removed when SD card is operating.
7	SIM card slot	China Mobile Note： only applicable to some models
8	Micro HDMI output port	digital video output
9	USB port	charge or data transmission
10	Charge indicator	Power, charging and connection status indicator; The green LED flashes: the battery is being charged; The green LED glows continuously: the battery is fully charged.

6.2. View form the right



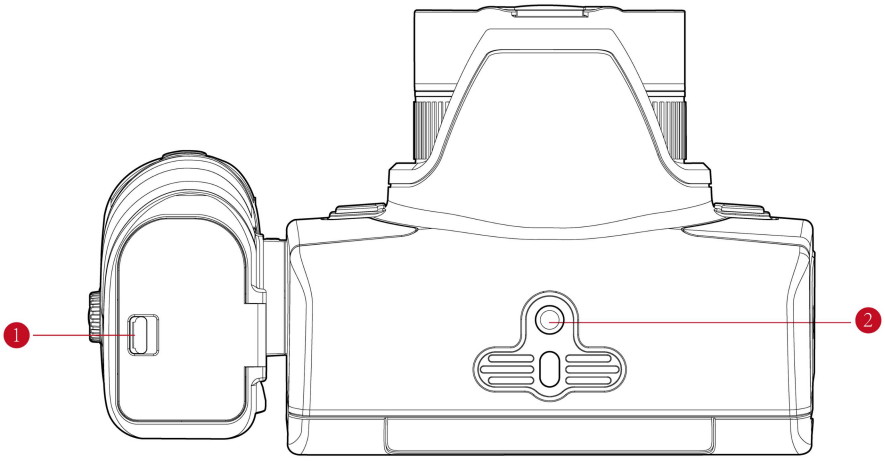
No.	Name	Function Descriptions
1	Viewfinder	
2	Viewfinder Diopter Knob	Change the diopter of the viewfinder.
3	Image Capture Button	Press: image capture；Press and hold: start/end video capture
4	Auto Focus Button	Auto focus
5	Manual Focus Ring	Adjust the focus manually

6.3 View from the front



No.	Name	Function Description
1	Joystick Button	Menu navigation；Select and change value
2	LCD/Viewfinder toggle button	Press: toggle between LCD screen and viewfinder
3	Playback Button	Press: open gallery； Press and hold for 2S to perform manual correction
4	OK/Programmable Button	OK button: click Programmable button: press and hold, including voice recognition, laser range finding Note: only available for some models
5	Back Button	Dialogue box and menu
6	LCD touch screen	

6.4 View from the bottom



No.	Name	Function Description
1	Battery Compartment	Detachable battery
2	Tripod Mount Interface	Support standard 1/4″-20-UNC

7. Quick Start Guide

Please follow the below steps.
Memory：open the silicone cap on the left，inserted the dedicated SD card in the accessories, then seal the silicone cap.
Battery：open the battery compartment cap on the handle bottom, insert the dedicated battery in the accessory and close the cap of the battery compartment.
Power Supply： Power on by pressing and holding the ON button for 3 sec; press and hold OFF button for 3 seconds to pop up off/reboot menu; Press to enter sleep mode.
Focus Manual focus，rotate the lens focus ring. Auto focus, press the Auto Focus button. Laser-aided focus, go to (Settings) >Function >Focus Mode=Laser aided focus via joystick button.
Image Capture Image Freeze，go to （Settings）>Function>Image Analysis=ON via joystick button ，the image is frozen and enter into image preview interface after pressing the image capture button. Pressing the image capture button is OK if the image analysis is disabled.

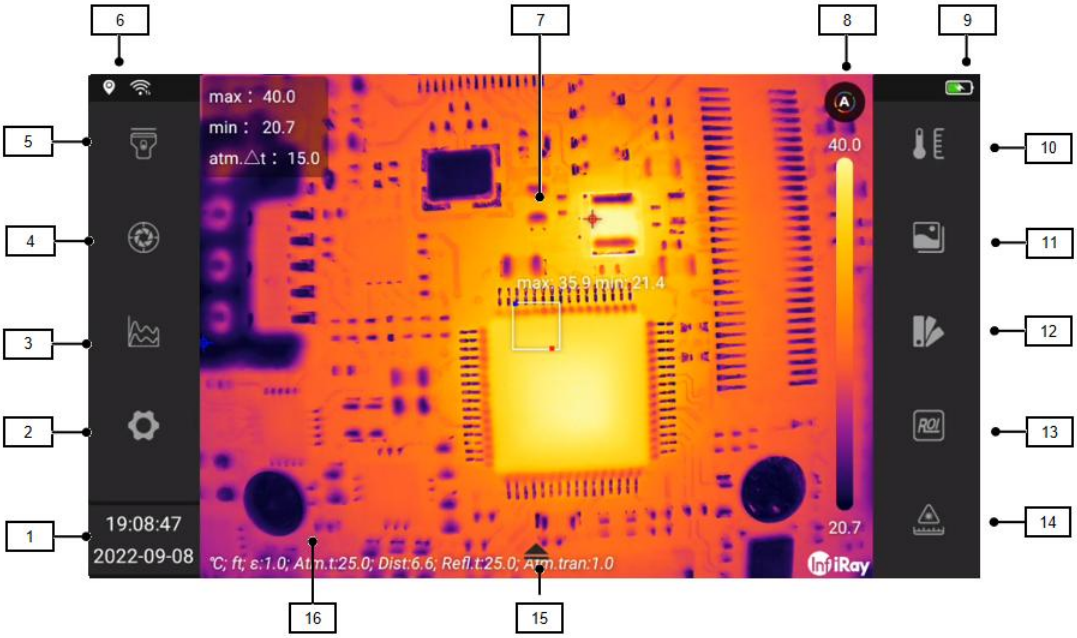
Image Replay Click Gallery button. Push the joystick button, select the file via up/down/left/right button. Press Ok button to enter image preview interface.
Color Palettes Go to （Color Palettes）via joystick button. Enter to submenu by pressing OK button. Select a different color palette via joystick button. Confirm by pressing Ok button.
Temperature Measurement Range Go to （Settings）>Function>Measurement Range=No via joystick button，select the appropriate temperature measurement range and press Ok button.
PC Software Analysis Download the client software（visit *www.infiray.com，enter Support-Product* Support Center，find S1280, click and enter software to download）, start the software: Export the data to perform secondary analysis via USB cable or SD card. The thermal camera is connected via WLAN or hotspot, and ensure that the PC and the thermal camera is in the same LAN, then perform secondary analysis.

APP Analysis

Download mobile application software（Android：visit www.iraytek.com，（visit www.iraytek.com，enter Support-Product Support Center，find S1280，click and enter software to download IRPT_TAS_android_Vxxx.apk, IOS: https://apps.apple.com/cn/app/id1605567151），start the application software， The thermal camera is connected via WLAN or hotspot, the mobile device can find and connect with the thermal camera to perform secondary analysis via search function.

8. Screen Elements

8.1. General



8.1.1. Explanation

No.	Name	Description
1	Date & Time	Present Date and Time
2	Setting Button	Press to enter settings interface
3	Isotherm Button	Press to enable isotherm function, alarm color can be changed in settings.
4	Image Calibration Button	Press to perform manual calibration
5	Flashlight	Press to turn on LED lamp
6	Status Indicator	Present current connection status of Wi-Fi, Bluetooth
7	Image Display Area	Display current real-time image and OSD (Environmental parameters, analyzing tools)
8	Temperature Scale	Mode switch button, measuring scale
9	Status Indicator	Present current location, power capacity info
10	Buttons	Press to present analyzing parameter settings：emissivity, atmospheric temperature, distance, atmospheric transmissivity, reflected temperature
11	Image Mode Button	Press to enter image mode submenu
12	Color Palettes Button	Press to enter submenu
13	Analyzing Button	Press to enter submenu, select spot/ line/ box/circle/polygon
14	LRF Button	Press to enable laser range finding function and present target distance
15	Extended Tool Bar Button	Wake extended tool bar
16	Extended Tool Bar	Including image/video capture, gallery, manual focus, zoom in/out

8.1.2. Status Indicators

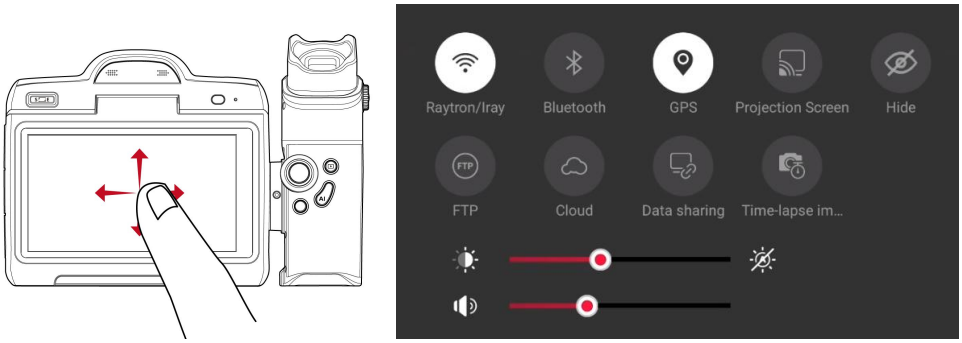
	Battery level indicators : slow charging indicator : fast charging indicator
	GPS status indicator Grey：Disable GPS White：Enable GPS
	Bluetooth status indicator Grey： enable Bluetooth, no paring device White：enable Bluetooth，device paired
	Wi-Fi connection status indicator : enable Wi-Fi， disconnected : enable Wi-Fi， connected

8.1.3. Additional Image Information

Additional image information includes emissivity, atmospheric temperature, target distance and location, which are stored in the image files and can be viewed in the gallery. The additional information can be presented on the real-time image via configurations and OSD overlaid on the saved image.

9. Shortcut Tool Bar

To open the swipe-down menu, place your finger at the top of the screen and swipe down.



To perform fast configuration via shortcut tool bar, including： （WLAN）, （Bluetooth）, （GPS）, （screen projection）, （FTP）, （Cloud）, （Data sharing）, （time-lapsed image capture）, （hide）.

1. Select to configure Wi-Fi，press to enable/disable，press and hold to enter detailed setting interface，please refer to 20.6.1 for detailed information.

2. Select to configure Bluetooth，press to enable/disable，press and hold to enter detailed setting interface，please refer to 20.6.2 for detailed information on Bluetooth pairing.

3. Select to configure GPS，press to enable/disable， please refer to 20.6.7 for detailed information on GPS.

4. Select to configure wireless projection screen， press to enable/disable， please refer to chapter 17 for detailed information on wireless projection screen.

5. Select to configure FTP service，please refer to chapter 18 for detailed information on FTP.

6. Select to configure cloud service， press to enable/disable， please refer to chapter 16 for detailed information on cloud.

7. Select to configure data sharing service，press to enable/disable，please refer to chapter 19 for detailed information on data sharing.

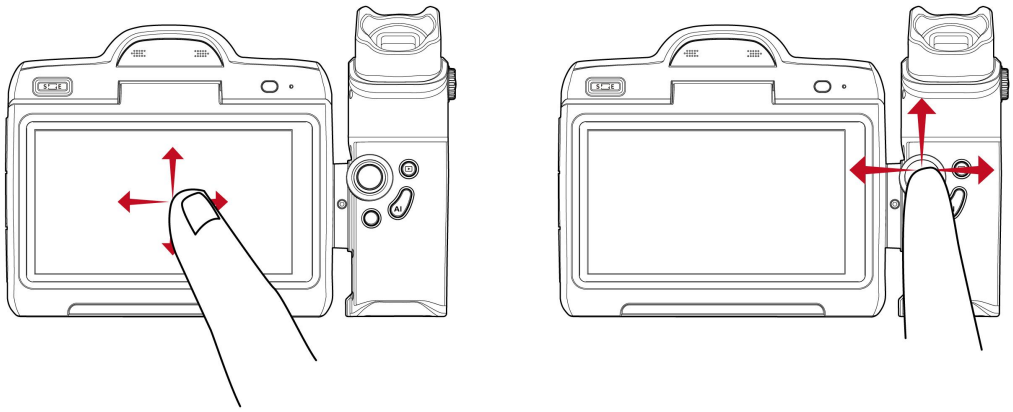
8. Select configure time-lapsed image capture service, press to enable/disable, please refer to chapter 20.5 for detailed information on time-lapsed image capture.

9. Press to enable/disable hide service.

10. Move slider to set screen brightness，press to enable/disable auto screen brightness.

11. Move slider to set volume.

9.1. Navigating the menu system



The above figures illustrate two ways of navigating menu systems:

- Using your finger or a stylus pen specially designed for capacitive touch usage. (Figure on the left)
- Using the joystick and the back button. Or two types as a combination.

We suppose to navigate with joystick in this manual, but you can also navigate with finger or a stylus pen in most cases.

9.2. Navigating using the joystick

You navigate the menu system by using the joystick and the back button:

1. To navigate in menus, submenus, and dialog boxes, and to change values in dialog boxes, move the joystick up/down or left/right.

2. To confirm changes and settings in menus and dialog boxes, Press Ok button or Programmable button.

3. To leave dialog boxes and to go back in the menu system, push the back button .

10. Handling the camera

10.1. Charging the battery

***Note**:*

- *You must charge the battery for 4 hours before you start using the camera for the*

first time. Ensure fast charging with the charger delivered with the product.

- *The adapter can charge the charging base and the camera, please choose the correct USB cable, the white cable should be connected with the charging base and the black cable should be connected with the camera.*

10.1.1. Charge with power adapter

Please follow the below steps:

1. Connect the black USB cable plug to the Type-C connector on the thermal camera.

2. Connect the black USB cable with the power adapter and plug to a mains socket.

3. The green LED glows continuously: the battery is fully charged, then disconnect USB cable.

10.1.2. Charge via PC

Charge by connecting the thermal camera to the PC with black USB cable.

***Note:** The computer should be turned on when charging via computer, which costs more time than charging with power adapter.*

10.1.3. Using the stand-alone battery charger to charge the battery

Stand-alone battery charger LED indicator：

Type of signal	Explanation
The green LED glows continuously.	No battery or the battery is fully charged.
The green LED flashes.	The battery is being charged.

Please follow the below steps:

1. Connect the power adapter and charging base with the white USB cable, plug the power adapter to a mains socket.

2. Put the battery in the battery charger.

***Note**: if you charge the battery via charging base, the matched charging cable should be used to enter fast charge status.*

10.2. Turning on and turning off the camera

1. To turn on the camara, press and hold the On/off button for 3s.

2. To turn off the camera, push and hold the On/off button for more than 3s, touch the button.

3. To reboot the camera, push and hold the power button for more than 15s.

Note: *Do not remove the battery to turn off the camera.*

10.3. Viewfinder

Caution

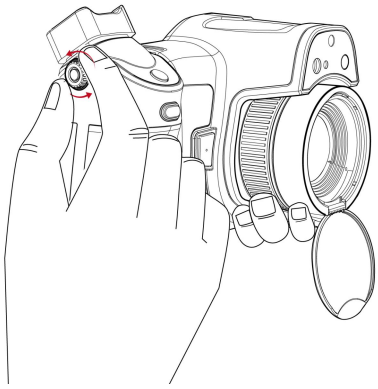
Make sure that the beams from the intensive energy sources do not go into the viewfinder. The beams can cause damage to the camera. This includes the devices that emit laser radiation, or the sun.

10.3.1. Viewfinder Switch

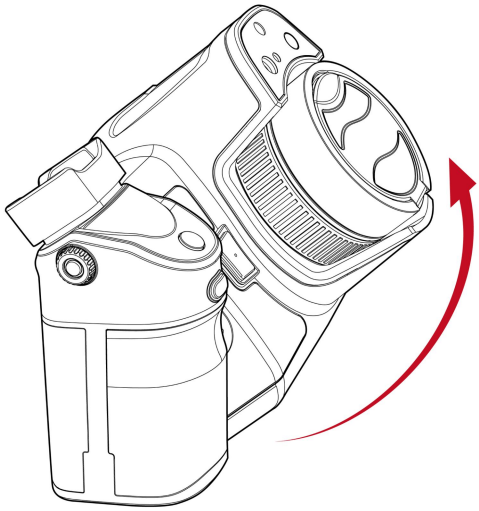
LCD touch screen display by default after power on, press LCD/Viewfinder button to switch, LCD will be off, the viewfinder is on. Press LCD/Viewfinder button again, the LCD will screen is displayed, the viewfinder will be off.

10.3.2. Adjusting the viewfinder's dioptric correction

You can make the image sharper by adjusting the viewfinder's dioptric correction. To adjust the viewfinder's dioptric correction, look through the viewfinder and rotate the adjustment knob clockwise or counter-clockwise for the best sharpness.



10.4. Adjusting the angle of the lens



10.5. Laser Range Finding

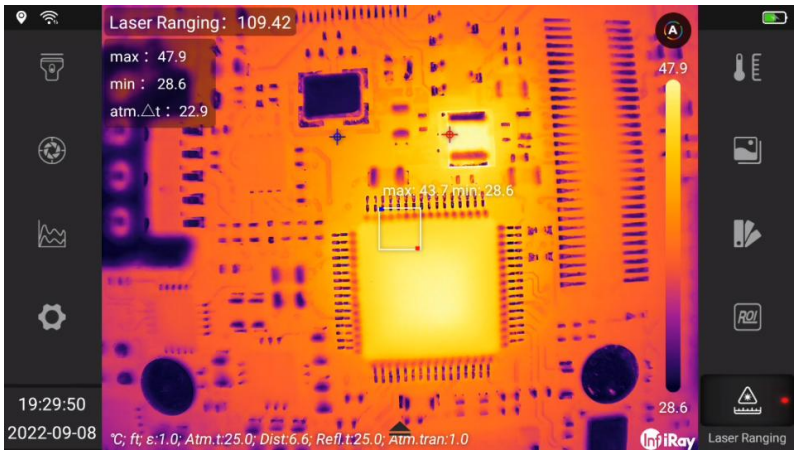
Warning

Do not look directly into the laser beam. The laser beam can cause eye irritation.

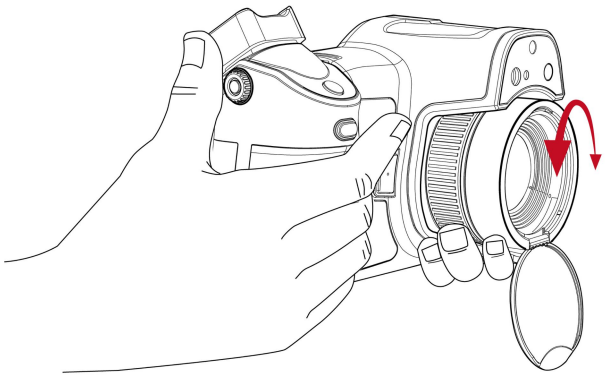
Please follow the below steps:

1. Go to (LRF) via joystick button.

2. Press Ok button to turn on laser range finding to perform continuous range finding, the measured value is displayed on the top left of the screen.



10.6. Adjusting the infrared camera focus



Please follow this procedure:

Execute one of the following operations:

- For far focus, rotate the focus ring clockwise.
- For near focus, rotate the focus ring anticlockwise.

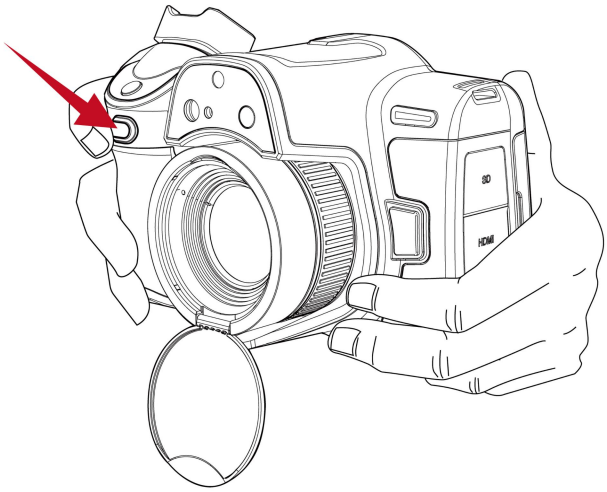
Note:

- *Do not touch the lens surface when you adjust the infrared camera focus manually. If this happens, clean the lens according to the instructions in 25.2 Cleaning Infrared lens.*
- *The focus ring can be rotated infinitely, but only a certain amount of rotation is needed when focusing.*
- *The response of the focus mechanism is progressive, meaning that a faster rotation of the focus ring gives a disproportional higher speed of focus change. This allows for both fine adjustment with a relatively large (but slow) rotation and rapid change with a smaller (but faster) rotation. Furthermore, for a very slow rotation, the lens moves in*

very small, discrete steps (which you can hear), allowing for a controlled fine adjustment of the focus.

10.7. Autofocus

The infrared camera can be configured to autofocus when you push Autofocus button.



10.8. Continuous autofocus

The infrared camera can be set up to perform continuous autofocusing.

***Note**:*

- *When continuous autofocus is enabled, you can also manually adjust the focus by rotating the focus ring.*
- *To stop continuous autofocus (e.g., to stabilize the focus before saving an image), Please press the Autofocus button.*

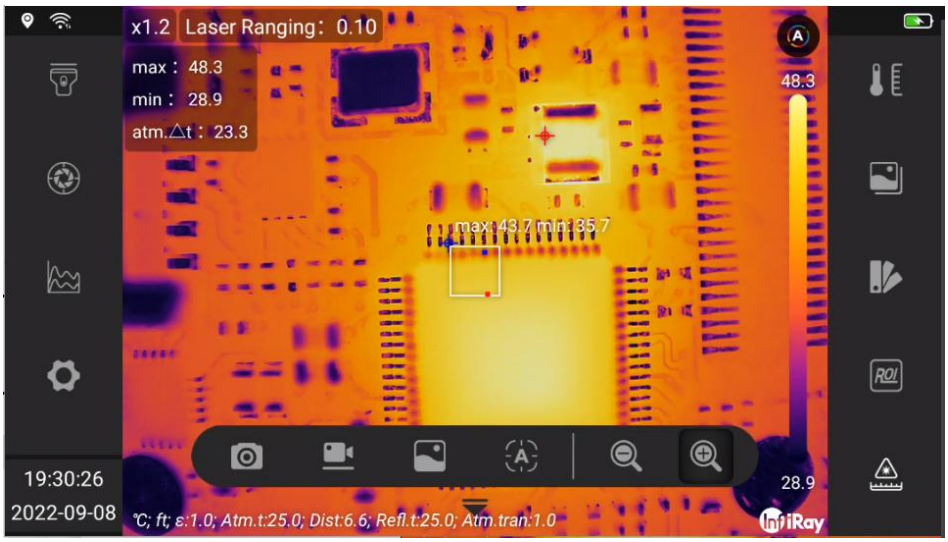
Follow this procedure:

To enable the continuous autofocus, please select (*Settings*) >*Function* Settings>*Continuous Autofocus*=Yes.

10.9. Using the digital zoom function

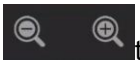
The current zoom factor is displayed in the upper left corner of the screen.

In preview/edit mode, it is possible to pan a zoomed image by touching the screen.



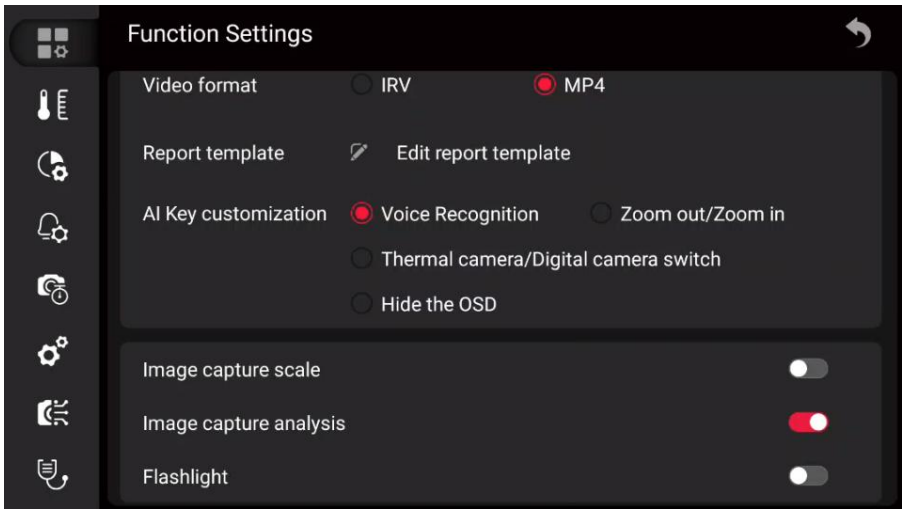
Please follow this procedure:

1. To zoom, click the visual button icon to wake up visual button tool bar.

2. Click  to zoom in or zoom out.

10.10. Assigning functions to the programmable buttons

You can assign different functions to the programmable buttons.



To assign a function to a programmable button, do the following:

1. Go to (Settings) with joystick and press the OK button.

2. Go to AI Key customization with joystick.

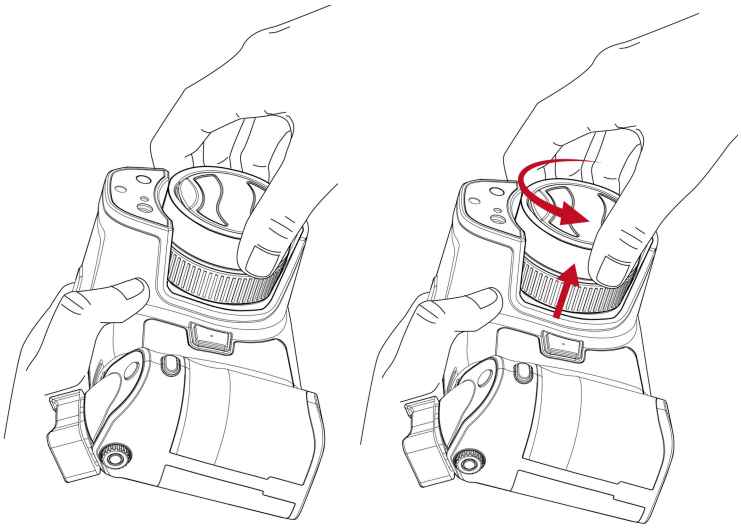
3. Select one of the functions and press the OK button.

10.11. Changing lenses

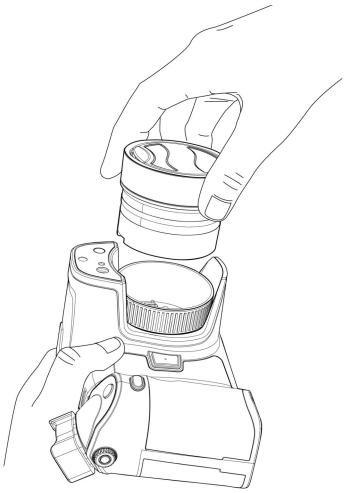
***Note**: Do not touch the lens surface when you change lenses. If this happens, clean the lens according to the instructions in 25.2 Cleaning Infrared lens.*

Follow this procedure:

1. Take a firm grip around the outermost part of the lens and rotate the lens 90° counter-clockwise.

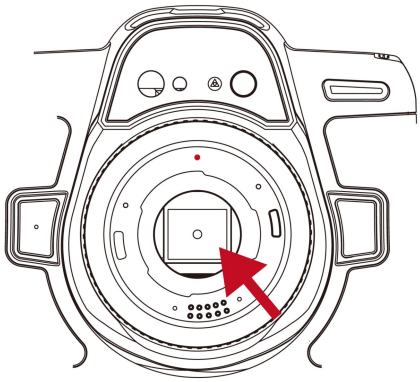


2. Carefully pull out the lens from the lens bayonet mount.

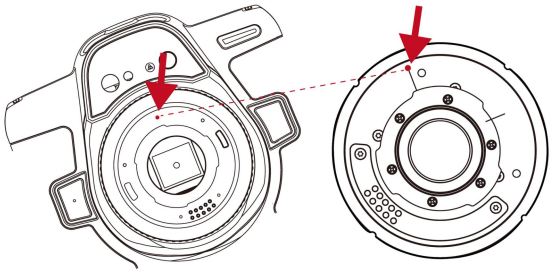


3. The infrared detector is now fully exposed. Do not touch this surface. If you see dust

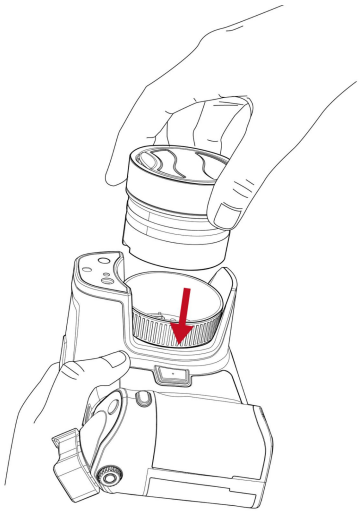
on the detector, follow the instructions in 24.3.



4. Note the index marks on the lens bayonet mount and on the lens.



5. Align the lens correctly to the bayonet mount. Carefully push the lens into position.



6. Rotate the lens 90° clockwise. The lens makes a click when it locks in place.

11. Saving and working with images

11.1. About image files

The image files include thermal information, visual information, environmental parameter and other information, which can be analyzed after being saved, for example, changing image mode, changing color palettes and change/add analyzing tools. The images can be exported to configuring software and being analyzed and generating reports.

11.2. File-naming convention

The default naming convention for image files is*-xxxx-IR.jpg or *-xxxx-DC.jpg, where * is user defined prefix added to the file name, xxxx is time stamp, -IR/-DC stands for infrared or visual images, time stamp is a combination of yyyyMMddHHmmss.

11.3. Storage capacity

The thermal camera is delivered with a standard 64GB memory card which can save 10000 images theoretically (no voice annotations).

11.4. Saving an image

You can save the image into the memory card. To save an image, press and release the image capture button.

11.5. Previewing an image

You can preview an image before you save it. This enables you to see if the image contains the information you want before you save it. You can also adjust and edit the image.

Note *The camera must be configured to display a preview image before saving. Select*

(Settings) > Function Settings > Image Capture Analysis = On.

Follow this procedure:

1. To preview an image, press and release image capture button. This displays the preview.

2. Manual image adjustment mode is now active and the status icon is presented. For image adjustment instructions, see section 12.2 LEVEL and SPAN.

3. For editing instructions, see section 11.9 Editing a saved image.

4. Execute Save or Return.

11.6. Opening a saved image

When you save an image, the image file is stored on the memory card. To display the image again, open it from Gallery.

Follow this procedure:

1. Push the Gallery button , the image files in the Gallery is arranged according to date by default.

2. To select the image by pushing the joystick up/down or left/right.

3. Select the image you want to view and push the OK button, open the image to enter image preview interface.

4. Do one or more of the following:

   (1) To view the previous/next image, move the joystick left/right.

   (2) Select to read file information, including file name, file size, date, resolution, storage path and capture place.

   (3) Select to enter editing interface，refer to section11.9 to edit a saved image.

   (4) Select to upload to cloud，refer to section 16 Cloud.

   (5) Select to rename a file.

   (6) Select to delete a file.

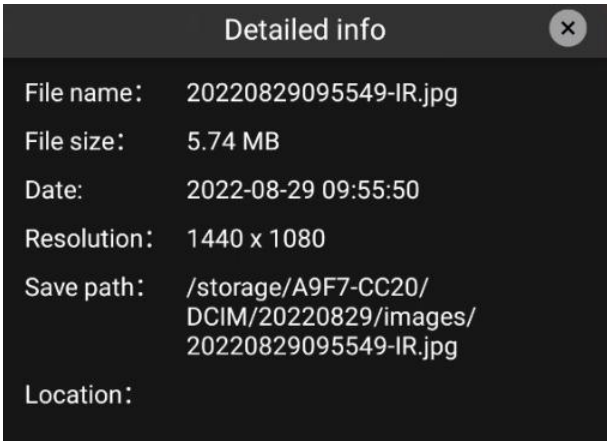
(7) To return to the gallery overview，push or Back button.

11.7. Displaying image information

Follow this procedure：

1. Open the image in Gallery.

2. Press the OK button and select from the menu .

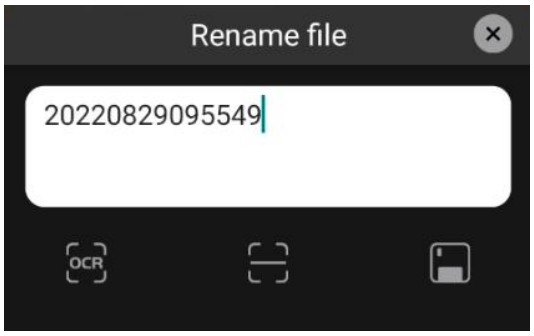


11.8. Renaming an image

Follow this procedure:

1. Open the image in Gallery.

2. Press the OK button and select from the menu, then a dialogue box pops up.



3. You can type in the text or by OCR and confirm by QR scanning.

4. Select to save.

11.9. Editing a Saved Image

You can edit a saved image. You can also edit an image in preview mode.

Follow this procedure:

1.Open the image in Gallery.

2.Push the Ok button and select from the menu.

3. The manual image adjustment mode is now active and the status icon is displayed. For image adjustment instructions, see 13.2 LEVEL and SPAN Adjustment.

4. Perform one or more of the following operations.

(1) Select to save the image as a new image file

(2) Select to discard the modification and exit to the image preview interface.

(3) Select to change image mode, please refer to 13.7 for details.

(4) Select to change palette, please refer to 13.4 for details.

(5) Select to set isotherm, please refer to 14.7 for details.

(6) Select to set environment parameters, please refer to 13.5 for details.

(7) Select to rename the file.

(8) Select to add analysis tools, please refer to 14 for details.

(9) Select to generate reports, please refer to 11.10 for details.

11.10. Create PDF Reports

You can create a PDF report and save it to a memory card. Use configuration software to transfer PDF reports to computers, mobile devices, and send reports to clients.

The naming rule of the report file is REPORTxxxx.jpg, where xxxx is the time stamp or reader configured by the system. For the configuration of the suffix, see 11.2 File Naming Rules.

You can edit report templates. For details, see 20.1.3 Editing Report Templates.

Please follow these steps.

1. Press the gallery button.

2. Move the joystick up and down or left and right to select the image.

3. Press the OK button to display the image.

4. Select to enter the image editing interface.

5. Select to enter the report confirmation interface. Swipe up and down to check whether the content is correct.

6. Perform one or more of the following operations.

   (1) Select to return to image editing interface.

   (2) Select to save the reports to a memory card.

   (3) Select to rename a report.

11.11. Delete Image

You can delete a single image file from the memory card.

Note: Both images in the image file (thermal image and visual image) will be deleted.

Please follow these steps.

1. Press the gallery button .

2. Move the joystick up and down or left and right to select the image to be deleted.

3. Press the OK button to display the image.

4. Press the OK button and select from the menu. A dialog box will appear.

5. Press the OK button to confirm.

11.12. Delete Multiple Images

You can delete multiple images from the memory card.

Please follow these steps.

1. Press the gallery button .

2. Touch and hold one of the images you want to delete and the menu will appear on the right side of the screen.

3. Touch all other images you want to delete, or select all images by selecting.

4. Use the joystick to select and press the OK button, a dialog box will be displayed for confirmation.

5. Use the joystick to select OK and press OK button to confirm.

11.13. Delete Multiple Files

You can delete multiple files from the memory card.

Note: This will delete all files (images, videos, and reports) in the folder.

Please follow these steps.

1. Press the gallery button .

2. Touch and hold one of the files you want to delete and the menu will appear on the right side of the screen.

3. Touch all other files you want to delete, or select all images by selecting.

4. Use the joystick to select and press the OK button, a dialog box will be displayed for confirmation.

5. Use the joystick to select OK and press the OK button to confirm.

11.14. Reset Image Counter

You can reset the numbering of image file names.

***Note**: To prevent image files from being overwritten, the new counter value will be based on the highest existing filename number in the gallery.*

Follow these steps.

1. Press the OK button to display the menu system.

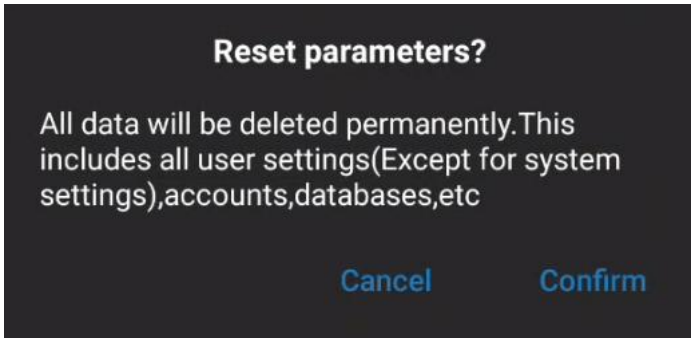
2. Use the joystick to go to Settings.

3. Press the Ok button to display the settings menu.

4. Go to *System Settings* via the joystick.

5. Go to *Reset Options* and press OK button.

6. This will display a dialog box, choose Confirm and press the OK button.



11.15. Image Annotations

You can use the annotation function to save additional information for the images, which can also be edited in the device. Annotations are the supplement to the basic information of the image, including text annotations, voice annotations, and sketch annotations.

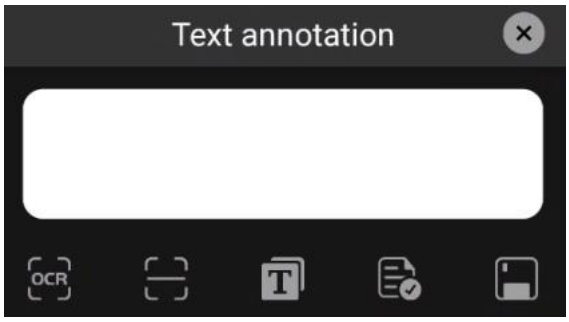
11.15.1. Add Text Annotations

You can add a text annotation to an image following the below ways.

- Soft keyboard: Enter free-form text.
- Test OCR：Recognition of printed text by taking a photo, and automatic input of recognized text.
- QR code scanning: Scan the QR code to be identified, recognize it in real time, and automatically enter the identified QR code information.
- Preset text： Use preset text to quickly input and manage the preset text, see 20.1.1 Preset text for details.

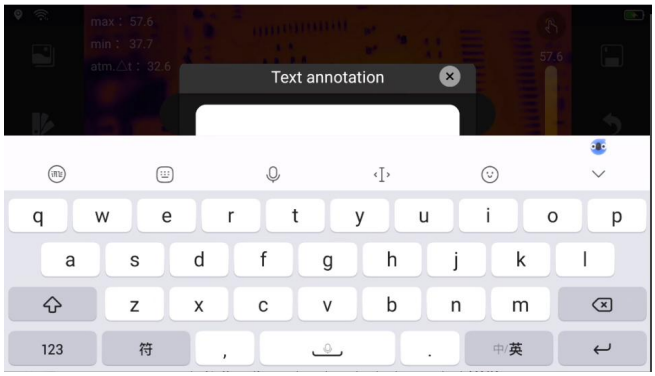
Please follow the below steps.

1. Open the image in a gallery file.
2. Press the OK button and select from the menu.
3. Select (Text annotation), and a dialog box will pop up, including text display area, (Text OCR), (QR code scanning), (Preset text), (Quickly add preset text), and (Save).



4. Follow these steps to enter free text using the soft keyboard.

(1) Press the OK button to bring up a soft keyboard where you can enter the text you want to save by touching the screen.



(2) After completion, touch on the soft keyboard to return to the dialog box.

5. Follow these steps to enter text using text OCR.

(1) Use the joystick to select , and then press the OK button to enter the camera interface.

(2) Touch to take the photo for OCR recognition.

(3) The recognized text will automatically fill in the text box.

6. Please follow the steps below to enter text by scanning the QR code.

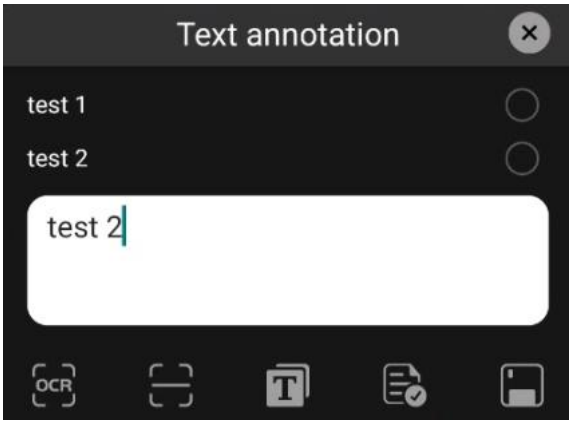
(1) Use the joystick to select , and press the OK button to enter the QR code scanning interface.

(2) Move the thermal imager to scan the QR code and make sure the image is clear.

(3) The text box will be automatically filled in when the QR code is recognized successfully.

7. Follow these steps to input preset text.

(1) Use the joystick to select , and press the OK button to display the preset text list.



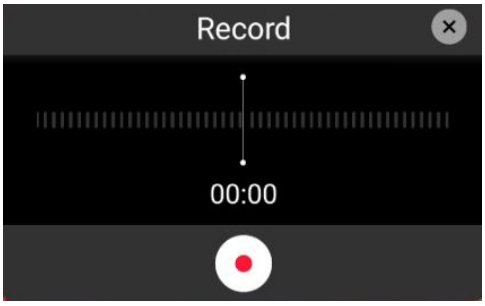
(2) Touch to confirm the preset text, and the symbol will change to . You can select one or more.

(3) The preset text will automatically fill in the text box.

8. Use the joystick to select to save.

11.15.2. Add Voice Annotations

A voice annotation is an audio recording that is saved to an infrared image. Recordings can be played back in the camera and used in the PC software. You can use a Bluetooth headset to record voice annotations. For connecting a Bluetooth headset, see 20.6.2 Bluetooth Pairing.



Follow these steps.

1. Open the image in a gallery file.

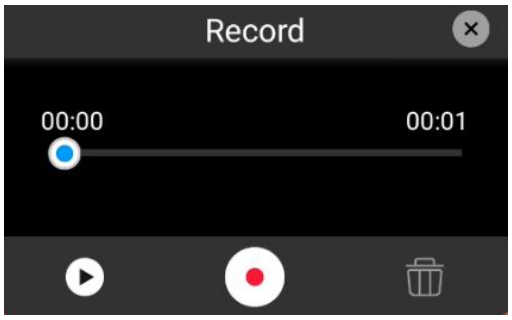
2. Press the OK button and select from the menu.

3. Select (Add Voice Annotation), and then press the OK button.

4. Select (Record) and press the OK button to start recording.

5. Select (Stop) and press the OK button to stop recording.

6. Select (Pause) and press the OK button to pause recording.



7. Select (Play) and press the OK button to listen to the recording.

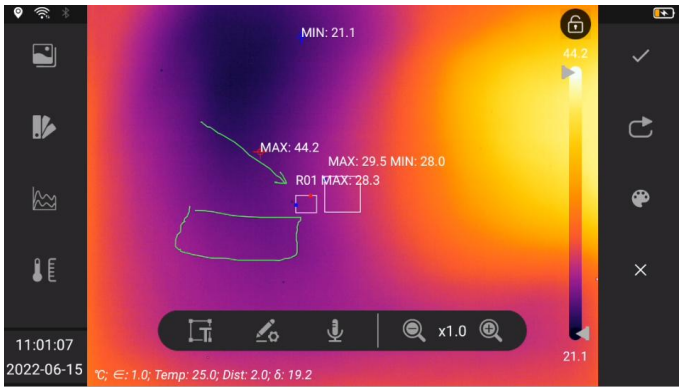
8. Select (Delete) and press the OK button to delete the recording.

9. Select (Record) and press the OK button to re-record.

10. When finished, select (Done) and press the OK button.

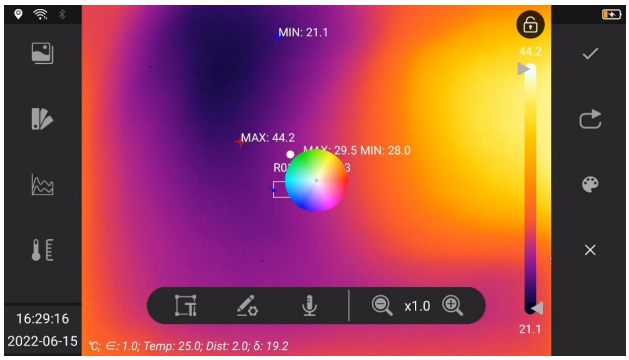
11.15.3. Add Sketch

You can add a hand-drawn graphic to an image.



Follow these steps.

1. Open the image in a gallery file.
2. Press the OK button and select from the menu.
3. Select (Add Sketch), then press the OK button, and a secondary menu will pop up on the right side of the screen.
4. Select (Palette), then press the OK button, touch the pop-up palette in the center of the screen, and select a color.

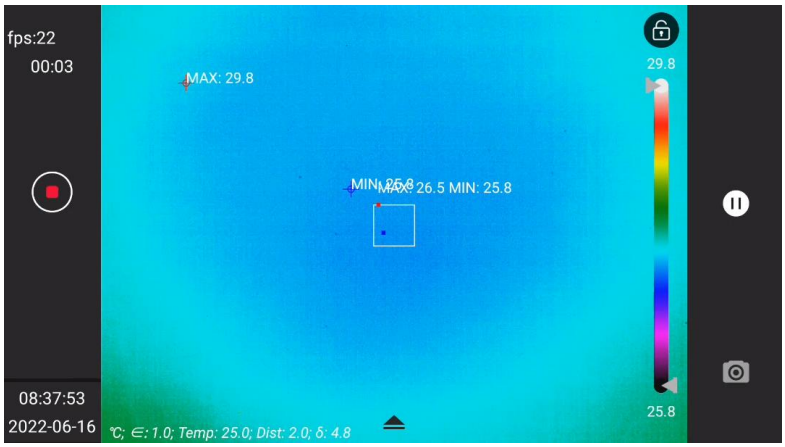


5. Sketch by touching the screen in sketch mode.
6. Select (Cancel) and press the OK button to undo in a single step.
7. Select (Save) and press the OK button to save the current sketch.
8. Select (Clear) and press the OK button to clear the unsaved sketches.

12. Recording Settings

12.1. Video Recording

You can record and save video clips to memory card.



Note: The camera can be configured to save video in *.mp4 or *.irv format. Select (Settings) > Function Settings > Video Format.

- MP4(*.mp4): After saving the file, the Mpeg recording cannot be edited.
- Infrared data compression storage (*.irv): Lossless compression storage and preservation of infrared data. Support complete radiometric infrared data analysis functions with system software. This file does not contain any visible light image information. When recording video with this setting, only thermal imaging mode is supported.

Follow these steps.

1. Long press the camera button to start video recording.

2. Carry out the following.

(1) Touch (Stop), or press and release the camera button to top recording.

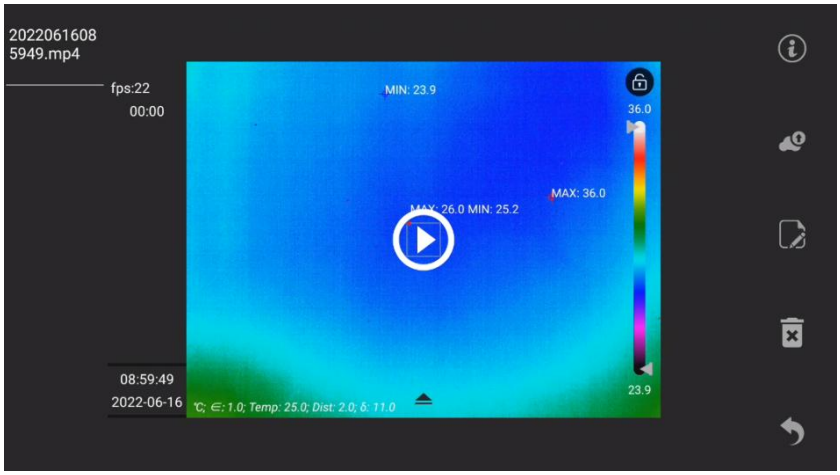
(2) Touch (Pause) to pause recording.

(3) Touch (Take Photo) to take a photo.

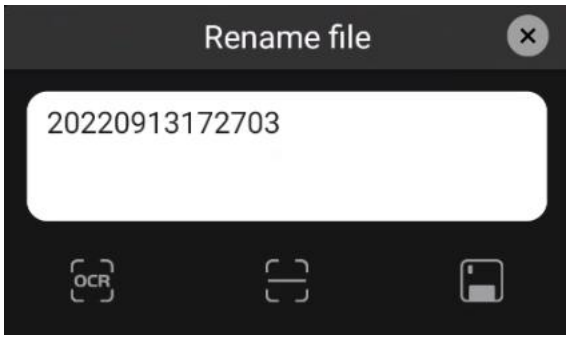
3. The recording will be automatically saved to a file and you can play it in the gallery.

12.2. Video Processing

You can view and process videos in the gallery, including (detailed info), (upload cloud), (rename), (delete), and (return).



- Touch the center of the screen (play) to enter the video playback interface.
- Select (Detailed info) to view video properties, including file name, file size, date, resolution, duration, and storage path.
- Select (Upload Cloud) to upload the video file to the cloud. To log in to the cloud platform, see 16 Cloud Platform.
- Select (Rename) to rename the file, including the text display area, (Text OCR), (QR code scan), and (Save).



13. Image Effect Adjustment

It usually requires one or several parameters to get a good image.

- Adjust the focus of the thermal imager manually or electrically.
- Adjust the infrared image by automatic or manual mode.
- Select an appropriate temperature range for the target temperature distribution.
- Choose an appropriate color palette.
- Modify the environment variable parameters.
- Calibrate the thermal imager manually.

The following sections explain how to change these settings. In some scenarios, overlay information can be hidden for better viewing.

13.1. Thermal Camera Focusing

Focusing is very important, and the wrong focus will not only affect the captured image, but also greatly affect the temperature measurement accuracy.

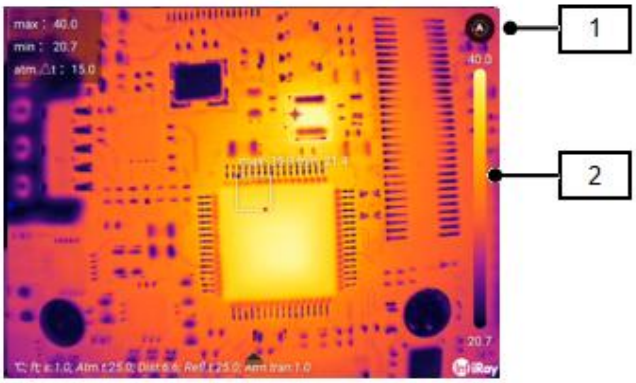
You can adjust focus by the following ways.

1. The focus can be adjusted manually by rotating the focus ring. For more information, see 10.6 Manually Adjusting Camera Focus.

2. Autofocus by pressing the button.

The camera can also be set to continuous autofocus. See 10.8 continuous Autofocus for more information.

13.2. LEVEL and SPAN Adjustment



No.	Item	Functions
1	Switch Mode	Switch Level/Span mode
2	Scale	Display the temperature range of the current palette mapping, and the scale displays the temperature range of the current image

By clicking , you can switch the level/span mode, and adjust the infrared image in automatic or manual mode to obtain different image effects.

Status Description:

Status	Comments
	Auto level/span
	Manual level/span
	Linear level/span

In automatic mode, the image is adaptively adjusted according to scene changes for the best image presentation. The temperature scale bar on the right side of the screen displays the temperature range of the current scene, and the endpoints are the maximum and minimum values.

In manual mode, you can adjust the temperature to a value close to that of a specific object in the image, improve the contrast of ROI image, highlight anomalies and analyze small temperature differences. In this mode, distribute from the lowest temperature to the highest temperature evenly (linear color distribution) by changing the color.

Method for setting manual adjustment mode.

- Level adjustment: Move the joystick up and down. Moving up is to increase the maximum and minimum temperature at the same time, and moving down is to decrease the maximum and minimum temperature at the same time. You can also make adjustment by sliding up and down on the touch screen.

- Span adjustment: Move the joystick left and right. Moving left is to decrease the maximum temperature and increase the minimum temperature, and moving right is to increase the maximum temperature and decrease the minimum temperature. You can also make adjustment by sliding left and right on the touch screen.

- MAX/MIN: With this setting, you can adjust the level manually. You can also change the upper and lower temperatures individually.

13.3. Temperature Measurement Range

The thermal camera can be configured to adjust the temperature measurement range to adapt to scenarios with different temperature distributions. If not adaptive, it's required to change the temperature range according to different application scenarios.

***Note**: Adaptive temperature measurement is applicable, but it will affect your imaging. For example, when the object in the image is beyond temperature measurement range,*
you need to set it to manual adjustment if you do not want to switch range.

Follow these steps:

1. Use the joystick to go to (Settings) and press the Ok button to display the settings menu.
2. Select the manual temperature measurement range.
3. Select the desired temperature measurement range and press the OK button.