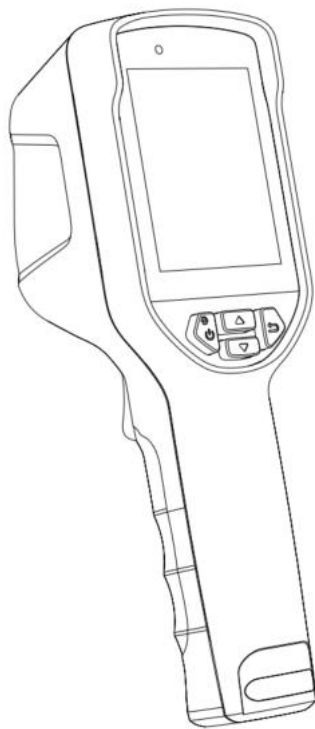




EX10 SERIES

Handheld Thermal Camera

User Manual V1.0.0



Raythink Technology Co., Ltd.

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1. Safety Information



WARNING

1. Before using the cleaning solution, ensure you have read all applicable Safety Data Sheets (SDS) and warning labels on containers.
2. It is prohibited to place the product in high-temperature environments above 60°C, low-temperature environments below -20°C, or relative humidity outside the range of 10% to 95% (non-condensing).
3. Do not disassemble or refit the thermal camera at will.



CAUTION

1. Do not use the product in conditions that exceed the specified environmental requirements. For detailed information on these requirements, refer to the product parameters.
2. Do not apply cleaning solutions or similar liquids directly to the thermal camera, cables or other components.
3. Be careful when cleaning the infrared lens. The lens has a delicate coating that can be damaged by rough objects like paper towels or the application of excessive force.
4. Do not point the thermal camera, with or without the lens cap, at intensive light sources or devices that emit laser radiation. It can have an unwanted effect on the accuracy of the thermal camera, and cause damage to the detector in the thermal camera.



(EU) 2023/1542 (Battery Directive): This product contains a battery that cannot be disposed of as unsorted municipal waste in the European Union. For details about the battery, refer to the product documentation. 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 a designated collection point. For more information, visit www.recyclethis.info



2012/19/EU (WEEE Directive): Products bearing this symbol cannot be disposed of as unsorted municipal waste in the European Union. For proper recycling, return the product to the local supplier when purchasing a new device of the same type or dispose of it at a designated collection point. For more information,

visit www.recyclethis.info.

2. Certification Information

CE Information:

Note: Raythink Technology Co., Ltd declares that the radio equipment type EX10 SERIES product is in compliance with Directive 2014/53/EU, 2011/65/EU.

Frequency range of WLAN radio module: 2,400–2,474.5 MHz

Maximum power of WLAN radio module: less than 20dbm

FCC Information:

FCC ID: 2BPTH-EX10SERIES

The FCC SAR limit for extremity SAR is 4.0W/kg (10g) and head SAR is 1.6W/kg (1g). The highest SAR value reported under this this standard during product certification when properly Limb worn (0mm) on the extremity SAR is 2.41W/kg.

1. 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,

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

2. 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.*

3. Device Introduction

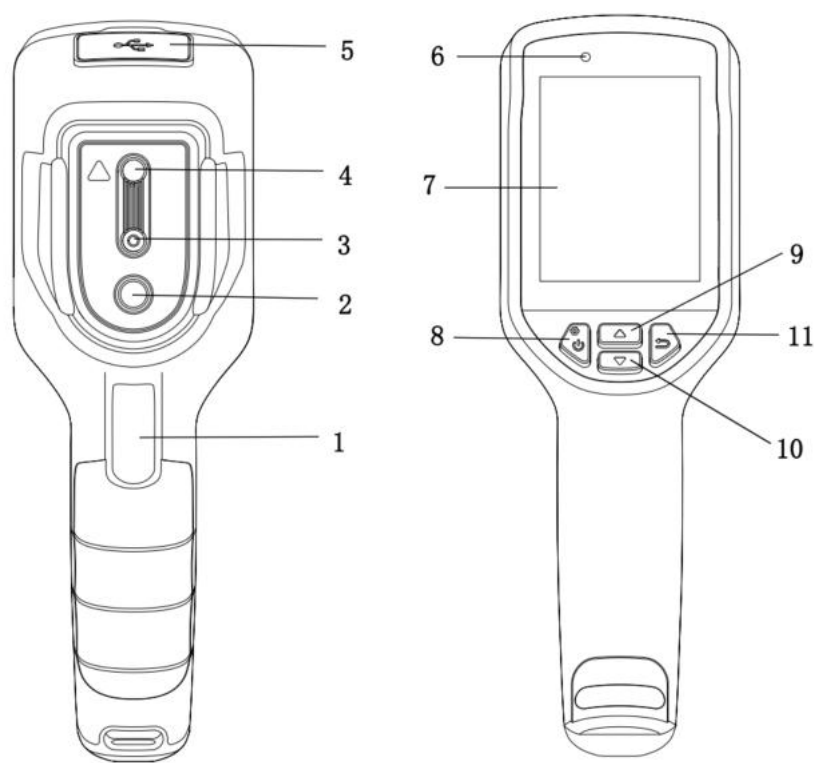


Table 2.1 Module Introduction

No.	Name	Description
1	Trigger	Photo Taking (press)/Video taking (press and hold) Only responds on the home screen. On other screens, pressing returns to the home screen, while pressing and holding does nothing.
2	Visible light*	Visible light imaging
3	Infrared lens	Infrared imaging
4	Laser pointer*	Laser (available on certain models)
5	Type-C	Data transmission/Charging

6	LEDs	Indicate the charging status and operating status of the device
7	Screen	Display images
8	Power button	Confirm (press)/Powering on or off (press and hold) When there is no menu on home screen, press to call up the menu; when the cursor is on the level-I menu, press to open the level-II menu.
9	Up button	When there is no menu on home screen, switch to palette (press)/adjust the fusion ratio in fusion mode (press and hold)*(available on certain models)
10	Down button	When there is no menu on home screen, open the gallery (press)/turn on or off the laser pointer (press and hold)*(available on certain models)
11	Back button	Return (press)/shutter correction (press and hold)

Note: * indicates that some models are not supported

This is a CLASS 2 LASER PRODUCT for LRF, intended for industrial and professional use ($\lambda=655\text{nm}$, energy output $<0.9\text{mW}$). It complies with EN 60825-1:2014+A11:2021.



Note: The laser warning label with the following information is attached to the camera.

Caution:

1. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure (or alternatively, equivalent appropriate warnings).
2. Please don't stare into beam when using it!
3. Please power off before maintenance and service.

EX10 complies with 21 CFR 1040.10 and 1040.11, and FDA performance standards for laser products.

4. Quick Start Guide

Follow the steps below:**1. Charging:**

- Charge the device using a power adapter supporting an output voltage of 5V/9V/12V and an output current of 3A/2A/1.5A and a USB cable.
- The USB cable in the accessory can be used to connect a computer to charge the device.
- When charging, open the protective cover on the top of the device and connect one end of the data cable to the device's USB TYPE-C port and the other end to an adapter or computer to charge the device.

2. Startup

Press and hold the Power button  to turn on

3. Find the target

Point the thermal camera at the object of interest.

4. Capture image

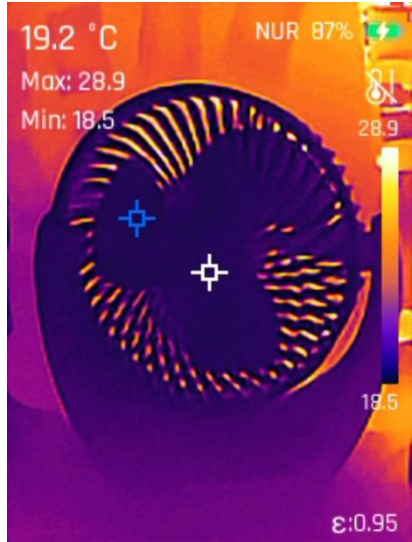
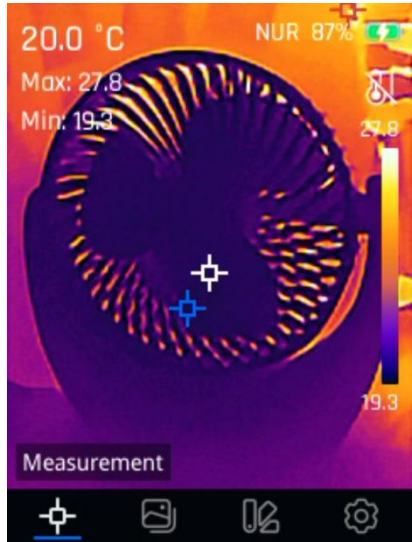
Click the Trigger button to capture an image.

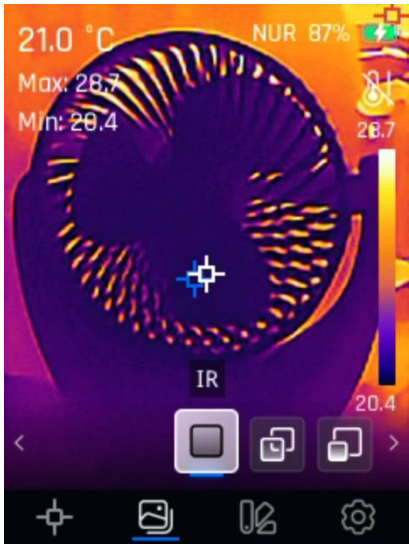
5. PC analysis

Download the thermal camera client software, launch the application, and use a USB cable to import data for secondary analysis.

5. Screen Introduction

Table 4.1 Screen Introduction

Name	Description	Illustration
Home screen	Preview screen, maximum temperature, minimum temperature, central point temperature, Wi-Fi hotspot, laser, super-resolution status, temperature bar, battery level, date and time, emissivity, etc.	 The Home screen displays a thermal image of a fan. The top left shows the current temperature: 19.2 °C. Below it are the maximum and minimum temperatures: Max: 28.9 and Min: 18.5. The top right shows the battery level: NUR 87% and a Wi-Fi icon. A temperature bar is on the right side, with values 28.9 and 18.5. The bottom right shows the emissivity: ε:0.95. A central crosshair is visible on the fan.
Level-I menu	Measurement, image mode, palette setting and settings	 The Level-I menu displays a thermal image of a fan. The top left shows the current temperature: 20.0 °C. Below it are the maximum and minimum temperatures: Max: 27.8 and Min: 19.3. The top right shows the battery level: NUR 87% and a Wi-Fi icon. A temperature bar is on the right side, with values 27.8 and 19.3. The bottom left shows the word "Measurement". The bottom right has four icons: a crosshair, a folder, a magnifying glass, and a gear.

Measurement	Central point, hot and cold points, 3-6 custom points	
Image mode	Infrared, visible light, PIP, fusion, registration, etc. (see 5.12 for details)	
Palette Settings	6 to 9	
Settings	For details, see section 6	

6. Procedure

6.1 Powering On and Off

1. When the device is powered off, press and hold the Power button to turn it on.
2. When the device is powered on, press and hold the Power button to turn it off.
3. If the device crashes, you can force it to restart by pressing and holding the Power button (for more than 10 seconds).

6.2 Save Image

1. In auto-save mode, click the Trigger button to automatically save the image.
2. In manual save mode, manually choose to save or cancel saving the image after clicking the Trigger button.

Note: The auto/manual mode can be switched in Device Settings - Shoot Settings.

6.3 View/Delete Images

When you take and save an image, you can view the saved image at any time as follows:

1. In the observation interface, click the Down button to access the gallery; or select the gallery in the setting interface.
2. Use the direction buttons to select the image you want to view.
3. Click the Power button to view the image in full screen.
4. Press and hold the Back button to delete the image.
5. Press the Back button continuously to return to the thermal imaging interface.

6.4 Central Point Measurement

You can use point temperature measurement to measure the temperature, and the measurement results will be displayed in the upper left corner of the screen.

1. In the thermal imaging interface, click the Power button to display the main menu toolbar.
2. In the toolbar, select the "Measurement" option and click the Power button to display the level-II menu toolbar.
3. In the toolbar, select the "Central Point" option and click the Power button to enable central point measurement (enabled by default). The central point temperature will be displayed in the upper left corner of the screen.

6.5 Hot Spot and Cold Spot Tracing

You can turn on cold spot/hot spot tracking and mark the location of the lowest/highest temperature point across the full screen:

1. In the thermal imaging interface, click the Power button to display the main menu toolbar.
2. In the toolbar, select the "Measurement" option and click the Power button to display the level-II menu toolbar.
3. In the toolbar, select "High Temperature Point" or "Low Temperature Point" and click the Power button to enable the corresponding function.

6.6 Custom Point Measurement

1. In the thermal imaging interface, click the Power button to display the main menu toolbar.
2. In the toolbar, select the "Measurement" option and click the Power button to display the level-II menu toolbar.
3. In the toolbar, select the "Custom Point 1" option, use the direction buttons to move the position of the custom point in the imaging interface, and press the Trigger button to confirm the placement position. Select the "Custom Point 1" option again to turn off the custom point display function. "Custom Point 2" and "Custom Point 3" are operated in the same way.

6.7 Image Settings

6.7.1 Introduction to Image Mode



- **Thermal imaging:** Displaying the infrared image
- **Thermal fusion:** An image formed by fusing infrared and visible light images in a specific ratio. On the home screen, press and hold the Up button to adjust the fusion ratio between the infrared and visible light images.
- **PIP:** The visible light image is superimposed with an infrared image at the center
- **Visible light:** visible light image

Note: For better dual-spectrum image effects, when using PIP and thermal fusion mode, you can complete the alignment of dual-spectrum images by manual adjustment in the dual-spectrum alignment interface.

See 5.10 for details of adjustment method

6.7.2 Steps to Change Image Mode

1. In the observation interface, click the Power button to display the main menu toolbar;
2. In the toolbar, select the "Image Mode" option and click the Power button to display the level-II menu toolbar;
3. In the toolbar, select the corresponding image mode and click the Power button to toggle to the selected image mode;

6.7.3 Palette Settings

You can change the palette used in the thermal camera to distinguish between different temperatures, and a suitable palette can help you analyze images more effectively.

1. In the observation interface, click the Power button to display the main menu toolbar;
2. In the toolbar, select the "Palette" option and click the Power button to display the level-II menu toolbar;
3. In the toolbar, select a new palette and click the Power button to toggle the selected palette.

6.8 Shutter Correction

6.8.1 Introduction to Shutter Correction

Shutter correction is used to compensate for the non-uniformity of detector pixel or other optical interference. Shutter correction can be performed when image quality degrades, a situation commonly encountered during rapid ambient temperature changes.

6.8.2 Shutter Correction Operation

In the observation interface, press and hold the Back button to perform a correction. During shutter correction, the screen will freeze for a short time, which is normal.

6.9 Fusion Ratio

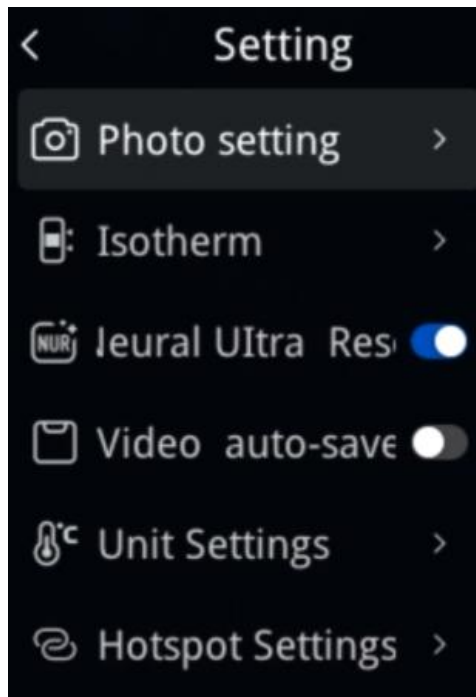
In the observation interface, in fusion mode, fusion ratio can be adjusted via pressing and holding the Up

button.

6.10 Dual-spectrum Registration

1. In the observation interface, click the Power button to display the main menu toolbar.
2. In the toolbar, select the "Image Mode" option and click the Power button to display the level-II menu toolbar.
3. In the toolbar, select the "Registration" option, use the direction buttons to move the visible light image in the observation interface, press the Trigger button to confirm, and press and hold the Trigger button to restore the factory registration parameters.

7. Settings



7.1 Measurement Parameters

7.1.1 Emissivity Settings

In order to obtain more accurate measurement results, you need to set the emissivity according to the target to be measured before each measurement. Emissivity refers to the ratio of the radiation capacity of an object to the radiation capacity of a blackbody at the same temperature, which is opposite to object's reflectance. At the same target temperature, a higher target emissivity means that the target can radiate a greater proportion of energy.

For example, the emissivity of human skin is 0.98 and that of printed circuit board is 0.91. For more information on emissivity, you can refer to the quick start guide in the package or check it from other sources.

Emissivity settings:

1. In the observation interface, click the Power button to display the main menu toolbar;
2. In the toolbar, select the "Settings" option and click the Power button to enter the "Settings";
3. Select "Measurement Parameters" in the list, click the Power button, and then select "Emissivity" to set the emissivity;

7.1.2 Ambient Temperature Settings

1. In the observation interface, click the Power button to display the main menu toolbar;
2. In the toolbar, select the "Settings" option and click the Power button to enter the "Settings";
3. Select "Measurement Parameters" in the list, click the Power button, and then select "Ambient Temperature" to set the ambient temperature;

7.1.3 Distance Settings

At different distances, the measurement results will be affected differently. To accurately measure temperature, thermal camera requires distance information of objects to compensate for the results.

1. In the observation interface, click the Power button to display the main menu toolbar;
2. In the toolbar, select the "Settings" option and click the Power button to enter the "Settings";
3. Select "Measurement Parameters" in the list, click the Power button, and then select "Distance" to set the distance;

7.2 Temperature Measurement Gears

The temperature measurement gears of the device are divided into high temperature gear, low temperature gear and automatic gear. Users need to manually select the appropriate gear based on the usage conditions to ensure measurement accuracy.

7.3 Temperature Scale

Click this menu to enter the temperature scale setting interface. When the cursor changes to , click the Power button to turn on or off the temperature scale. When the temperature scale mode is enabled, pressing the Up and Down buttons allows you to select the threshold object to adjust: both upper and lower thresholds, upper threshold only, or lower threshold only. After selecting the target threshold for

adjustment, press the Power button to enter the threshold editing mode. Press and hold the Up and Down buttons for quick threshold adjustment. After completing the threshold setting, press the Power button to confirm, then press the Back button to return to the preview screen.

7.4 Alarm Settings

The device supports high and low temperature alarms. Users can set thresholds for the high temperature alarm and low temperature alarm, and turn on or off the alarm by setting the "On" and "Off" options. After a high or low temperature alarm is triggered, an alarm icon will appear on the screen as a prompt.

For automatic shooting at alarm function, you can set the time interval between captures and the number of images to be taken. After this function is enabled, images will be captured at the set time interval once the high or low temperature alarm is triggered. Once the set number of images is reached, shooting will stop.

7.5 Image Capture Settings

7.5.1 Automatically Save Images

When this function is enabled, the photo will be automatically saved upon capturing.

7.5.2 Time-lapsed Image Capture

The device supports time-lapsed image capture, and users can manually set the time interval and number of photos. If this function is enabled, images will be captured at the set time interval. When the set number of images is reached, shooting will stop, and this function will be automatically turned off.

7.6 Isotherm

Isotherm settings

7.7 Intelligent Super-resolution

Turn on/off real-time super resolution

7.8 Video Taking Settings

You can choose to save the video automatically

7.9 Units Settings

Supports three temperature units: Celsius, Fahrenheit and Kelvin. Supports two distance units: meters and feet.

7.10 Wi-Fi Settings

After the device hotspot is turned on, you can connect to the client software to enable the wireless screen projection function. The user name and password shall be subject to display on the device interface. (This function is only available on some certain models)

7.11 Screen Display

Users can selectively display or hide specified information based on their personal preferences, including color bars, hot spots, time, emissivity, battery, and temperature units. User can also turn on or off all information with one click through the "All button".

7.12 Auto Shutdown

The device supports setting auto-shutdown with five available options: 5 minutes, 10 minutes, 20 minutes, 120 minutes, and off.

7.13 System Settings

In the system settings, users can view the device-related information and perform operations such as restoring factory settings, formatting the SD card, setting the date and time, configuring the language, updating the system, and viewing open-source licenses.

8. Technical data

Model	EX10	EX10 Pro
Detector resolution	160×120	
Super resolution	320×240	
Focal length	2.6mm	
FOV	40°×30°	

Model	EX10	EX10 Pro
Focusing mode	Fixed focus	
IFOV (Spatial resolution)	4.62 mrad	
Minimum imaging distance	11cm	
Measurement range	-20~150°C; 100~550°C automatic range switching	
Thermal sensitivity	40mK	
Wavelength range	8-14μm	
Frame rate	25Hz	
Display size	2.8-inch, 240×320 resolution	
Daylight camera	None	2 megapixels
Palette	White-hot, black-hot, iron-red, lava, rainbow, rainbow HC	White-hot, black-hot, iron-red, lava, rainbow, rainbow HC, black-red, purple-orange, special
Image mode	Infrared	Infrared, visible light, PIP, dual-spectrum fusion
Temperature Range Extension	Automatic/Manual	
Storage medium	Built-in memory 8GB	
Image file format	JPEG	
State grid format	Supports	
Video recording	Standard MP4 video recording	
Communication interface	USB2.0	
Video transmission	UVC (with temperature data)	UVC (with temperature data) + Wi-Fi (without temperature data)
Video resolution	240×320	
Measurement accuracy	±2% or ±2°C of the reading, the greater shall prevail	
Measurement unit	Celsius, Fahrenheit, Kelvin	
Temperature alarm	Supports (high and low temperature alarms)	
Automatic shooting at alarm	Yes	
Color Alarm (Isotherm)	Alarms above/below/between isotherms. Images displayed in palette mode within the isotherm range and in white-hot mode in other areas	

Model	EX10	EX10 Pro
Analysis software	PC (infrared analysis software)	PC (infrared analysis software) or mobile device (IOS/Android APP)
Analysis report	PDF format (PC analysis software support required)	PDF format (PC or APP analysis software support required)
Analysis functions on device end	Central temperature point/Highest temperature point/Lowest temperature point/3 custom points	Central temperature point/Highest temperature point/Lowest temperature point/6 custom points
Quick start	Supports	
Connection methods	USB2.0 Type-C	
WiFi	Not supported	Supports
Laser pointer	Not supported	Supports
Battery	2750mAh lithium-ion battery	
Charging time	More than 90% in 75 minutes	
Charging mode	USB2.0 Type-C line charging, does not support fast charging	
Operating time	≥10 hours	
Operating temperature	-20°C~ 50°C	
Storage temperature	-40°C~ 70°C	
External interfaces	TYPE-C USB2.0, tripod interface	
Ingress protection rating	IP54	
Impact and vibration	2.5G(IEC60068-2-6), 25G(IEC60068-2-27), 2M drop protection	
Weight and dimensions	255g±10g (including battery), 207.2*67*81.5mm	275g±10g (including battery), 207.2*67*81.5mm
Packaging	Infrared thermal camera, USB cable, qualification certificate, calibration certification, wrist strap, QSG	

9. Application Background

9.1 Warehouse Routine Inspection

With the help of handheld thermal cameras with large FOV infrared imaging, warehouse routine inspectors can quickly find abnormally high-temperature objects in the warehouse and take corresponding measures in time to eliminate safety hazards.

9.2 Routine Inspection of Power Distribution Cabinet

The temperature distribution of the power distribution equipment can intuitively reflect the operating status of the equipment. Poor contact or damage may cause abnormal high temperatures. With handheld temperature measurement thermal cameras, inspectors can capture abnormalities in time to ensure the safety of power distribution equipment.

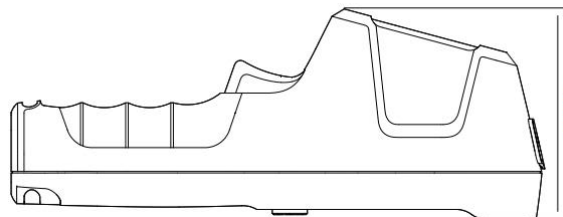
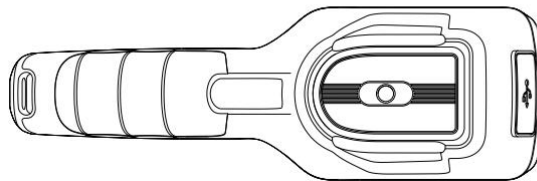
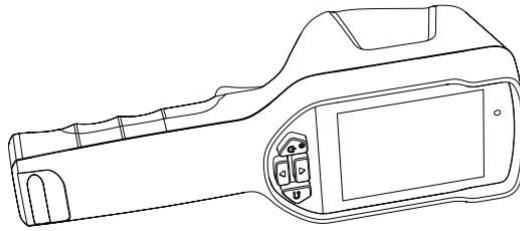
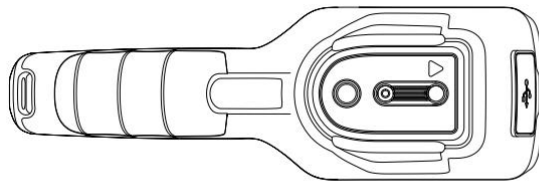
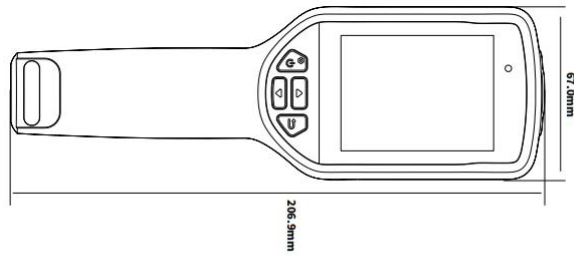
9.3 Maintenance of Heating Wire for Automotive Rear Window

The heating wire on the automotive rear window can be used to defrost and defog, and ensures the safety of automobile driving, especially in rainy and snowy weather. The overall connection and disconnection of the heating wire cannot be observed through the visible light. The handheld temperature measurement thermal camera can quickly detect the entire heating wire and analyze whether the heating wire is broken.

9.4 HVAC Maintenance

The handheld thermal camera helps HVAC engineers comprehensively capture the temperature distribution along inspected pipelines, quickly identify abnormal spots, and make accurate judgments and precise localization. This effectively avoids the economic losses associated with indiscriminate dismantling, improves service quality, and enhances customer satisfaction.

10. Dimensions



11. Cleaning the Thermal Camera

11.1 Cleaning method for shell, cables and other components of the thermal camera

Cleaning method for shell, cables and other components of the thermal camera	
Cleaning liquid	Optional liquids include: 1. Warm water 2. Mild cleaning solution
Cleaning tool	Soft cloth
Cleaning procedure	Follow the steps below: 1. Dip the cleaning liquid with the soft cloth. 2. Wring out the soft cloth to squeeze out excess cleaning liquid. 3. Clean the components with the soft cloth.



Caution

Never apply the solution or similar liquids to the thermal camera, cables, or other components, to prevent damage to the device.

11.2 Cleaning Method for Infrared Lens

Cleaning Method for Infrared Lens	
Cleaning liquid	Optional liquids include: 1. Commercial lens cleaning solution with the concentration of isopropyl alcohol over 30% 2. 96% ethanol (C ₂ H ₅ OH)
Cleaning tool	Absorbent cotton
Cleaning procedure	Follow the steps below: 1. Dip a small amount of the cleaning liquid with the absorbent cotton. 2. Wring out the absorbent cotton to squeeze out excess cleaning liquid. 3. Wipe the lens gently with the absorbent cotton. The absorbent cotton can only be used once, and should not be reused.



Caution

Do not clean the infrared lens too vigorously. It can damage the anti-reflective coating of the lens.

Appendix A Emissivities of Commonly Used Materials

(1) Metal

Material	Temperature (°C)	Emissivity
Aluminum		
Polished aluminum	100	0.09
Commercial aluminum foil	100	0.09
Mild aluminum oxide	25~600	0.10~0.20
Strong aluminum oxide	25~600	0.30~0.40
Brass		
Brass mirror (highly polished)	28	0.03
Brass oxide	200~600	0.59~0.61
Chromium		
Polished chromium	40~1090	0.08~0.36
Copper		
Copper mirror	100	0.05
Strong copper oxide	25	0.078
Cuprous oxide	800~1100	0.66~0.54
Molten copper	1080~1280	0.16~0.13
Gold		
Gold mirror	230~630	0.02
Iron		
Polished cast iron	200	0.21
Machined cast iron	20	0.44
Completely rusted surface	20	0.69
Cast iron (oxidized at 600°C)	19~600	0.64~0.78
Electrolytic iron oxide	125~520	0.78~0.82
Iron oxide	500~1200	0.85~0.89
Iron plate	925~1120	0.87~0.95
Cast iron, heavy iron oxide	25	0.8
Melted surface	22	0.94

Material	Temperature (°C)	Emissivity
Melted cast iron	1300~1400	0.29
Pure molten iron	1515~1680	0.42~0.45
Steel		
Steel (oxidized at 600°C)		
Steel oxide	100	0.74
Melted mild steel	1600~1800	0.28
Molten steel	1500~1650	0.42~0.53
Lead		
Pure lead (non-oxidized)	125~225	0.06~0.08
Mildly oxidized	25~300	0.20~0.45
Magnesium		
Magnesium oxide	275~825	0.55~0.20
Mercury		
Mercury	0~100	0.09~0.12
Nickel		
Electroplating and polishing	25	0.05
Electroplating without polishing	20	0.01
Nickel wire	185~1010	0.09~0.19
Nickel plate (oxidized)	198~600	0.37~0.48
Nickel oxide	650~1255	0.59~0.86
Nickel alloy		
Nickel-chromium (heat resistant) alloy wire (bright)	50~1000	0.65~0.79
Nickel-chromium alloy	50~1040	0.64~0.76
Nickel-chromium (heat resistant)	50~500	0.95~0.98
Silver		
Polished silver	100	0.05
Stainless steel		
18/8 stainless steel	25	0.16
304 (8Cr, 18Ni)	215~490	0.44~0.36
310 (25Cr, 20Ni)	215~520	0.90~0.97

Material	Temperature (°C)	Emissivity
Tin		
Commercial tin plate	100	0.07
Zinc		
Oxidation at 400°C	400	0.01
Galvanized bright iron plate	28	0.23
Grey zinc oxide	25	0.28

(2) Non-metals

Material	Temperature (°C)	Emissivity
Brick	1100	0.75
Firebrick	1100	0.75
Graphite (lamp black)	96~225	0.95
Enamel (white)	18	0.9
Asphalt	0~200	0.85
Glass (surface)	23	0.94
Heat-resistant glass	200~540	0.85~0.95
Wall plaster	20	0.9
Oak	20	0.9
Carbon sheet	-	0.85
Insulating sheet	-	0.91~0.94
Metal sheet	-	0.88~0.90
Glass tube	-	0.9
Coil type	-	0.87
Enamel product	-	0.9
Enamel pattern	-	0.83~0.95
Capacitor		
Rotary type	-	0.30~0.34
Ceramic (bottle type)	-	0.9
Film	-	0.90~0.93
Mica	-	0.94~0.95
Flume type mica	-	0.90~0.93

Material	Temperature (°C)	Emissivity
Glass	-	0.91~0.92
Semiconductor		
Transistor (plastic package)	-	0.80~0.90
Transistor (metal)	-	0.30~0.40
Diode	-	0.89~0.90
Transmitting coil		
Pulse transmission	-	0.91~0.92
Flat chalk layer	-	0.88~0.93
Top ring	-	0.91~0.92
Electronic materials		
Epoxy glass plate	-	0.86
Epoxy phenol plate	-	0.8
Gold-plated copper sheet	-	0.3
Solder-coated copper	-	0.35
Tin-coated lead wire	-	0.28
Copper wire	-	0.87~0.88

— Raythink, sense difference —