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WARRANTY

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User's Guide



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Handheld Thermal Imager

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! Warnings, caution and attention


! Definitions


 **Warning** Represents a dangerous situation or act that may cause bodily harm or death.


 **Caution** Represents a situation or behavior that may cause damage to a thermal imager or permanent loss of data.


 **Attention** Represents prompt information useful to the user.


Important information—Read before using the instrument.


 **Warning** —The instrument is equipped with a laser transmitter, do not stare at the laser beam. The laser specifications are 635 nm, 0.9mW, class II.


 **Caution** —For very sensitive thermal sensors are integrated in the thermal imagers, in any case (on or off) lens aligned directly to any strong radiation sources (such as the sun, a laser beam or reflection) is strictly prohibited, otherwise permanent damage will be caused to the thermal imager!


 **Caution** -Thermal imagers must transported inside original package. No strong shaking or collision during the transportation and usage of thermal imager.


 **Caution** —The imager is recommended to keep inside original with environment of cool and dry, ventilation without a strong electromagnetic.

 **Caution** - Keep any part of imagers from greasy dirt and any chemicals. Please put on the lens cover after use.

 **Caution**-In order to prevent potential risks of data loss, please always copy data (backup) in the computer.

 **Attention** -Thermal imager may take 3-5 minutes of warm-up to accurately measure the temperatures.

 **Attention** - Each thermal imager has been subjected to temperature calibration shipped out. It is recommended that temperature calibration be carried out every year.

 **Caution** -Please do not open or refit the machine. The maintenance and repairmen can only be carried out by the authorized persons.

1 Brief Introduction

Thank you for choosing OMEGA TI-420 infrared thermal imager.

Main Applications

Predictive maintenance

- Power industry: transmission line, power equipment, thermal status inspection, fault diagnosis
- Electrical system: identification circuit overload.
- Mechanical systems: reduce downtime and prevent failures.

Architecture and building

- Roof: rapid and efficient detection of water seepage
- Building structure: conduct infrared energy assessment for commercial buildings and residential buildings.
- Wet probing: find the root of moisture and mildew.
- Repair: evaluate remedial measures to ensure that the area is completely dry.

Others

- Iron and steel industry: monitoring of steel rolling, rolling process, diagnosis of hot blast furnace damage, annealing of plate temperature, etc.
- Fire extinguish: forest fire prevention and potential fire source finding, special material self-ignition prevention, electrical fire safety inspection.
- Medical: Body surface temperature detection and temperature distribution analysis.
- Petrochemical Industry: pipeline inspection, material interface testing, thermal leakage and insulation structure, power equipment inspection.

1.1 Package Contents

- Thermal imager with standard lens
- Battery
- Power adapter
- SD card
- USB cable
- AV cable
- Warranty card
- Rigid portable case*
- Strap

1.2 Optional

- Sun shade
- Portable bag
- Mobile phone mounting bracket
- OTG USB cable

Statement: The asterisk mark content is not standard in specified models. The package contents subject to change without any prior notice.

1.3 Safety Instructions

Warning

To prevent eye injuries or bodily injuries :

- Please don't look directly at the laser. Do not aim the laser directly to the human or animal or indirectly from the reflecting surface.
- Never use an optical tool (such as a binocular, telescope, microscope, etc.) to look straight at the laser.
The optical tool may focus the laser and damage the eye.
- Please use the product only in accordance with the instructions, or you may be exposed to dangerous laser radiation.
- Please do not disassemble the product. Laser beams can damage your eyes. Please fix the product only through authorized technical service sites.

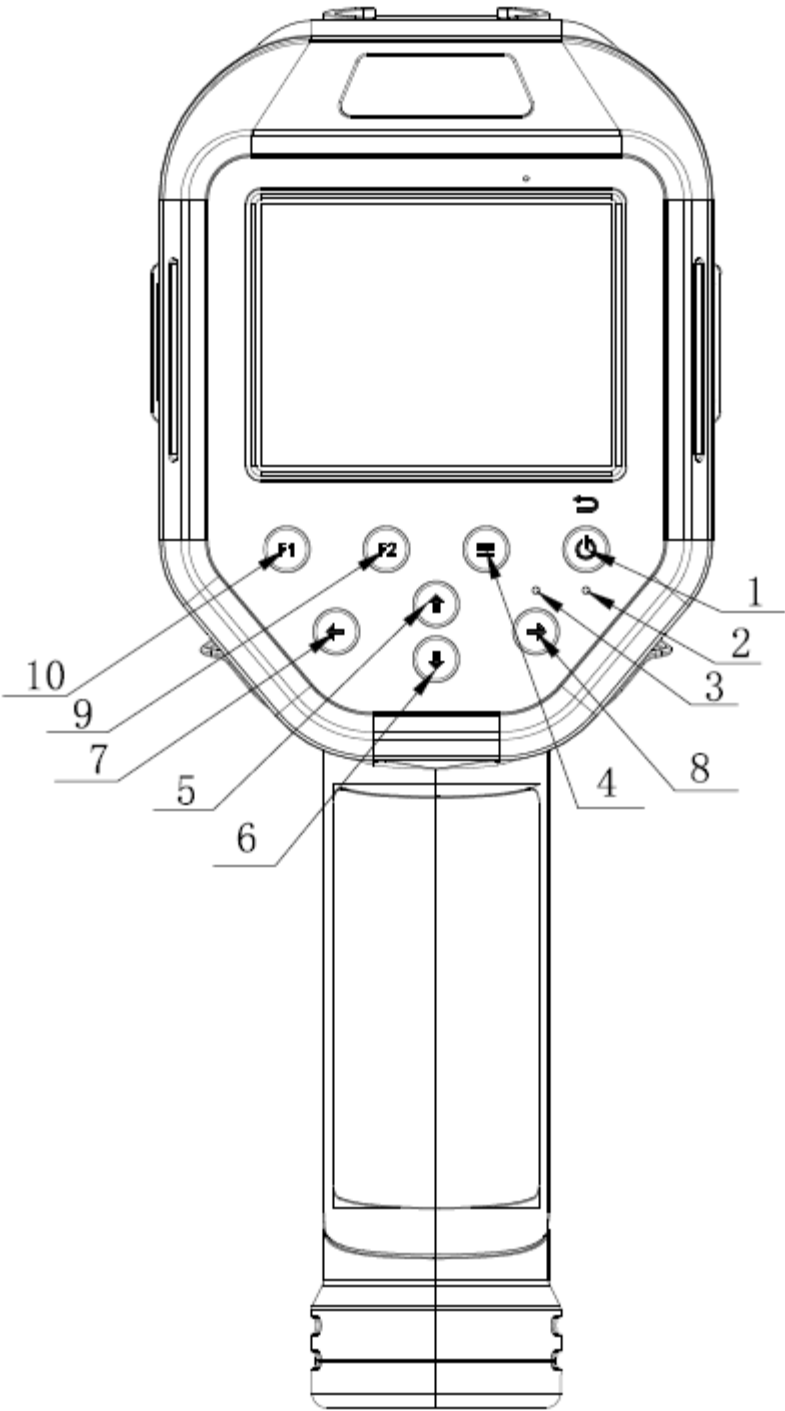
Warning

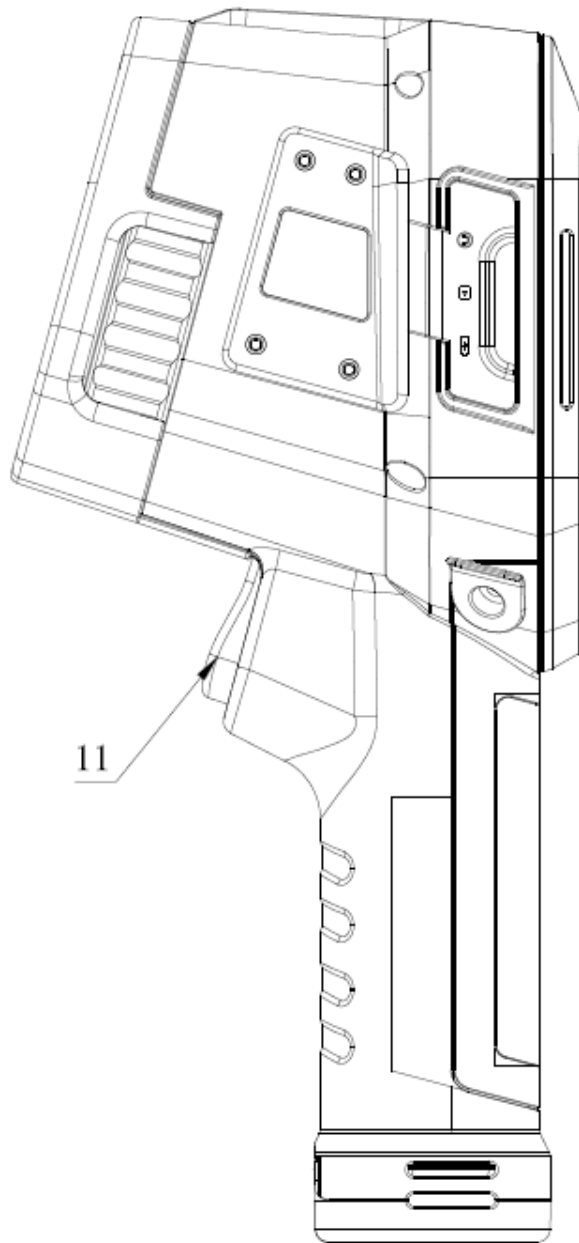
In order to prevent personal injury :

- Please only use the product for the specified purpose, otherwise it may weaken the protection of the product.
- Please replace the battery when indication of insufficient battery capacity, otherwise the measurement may be incorrect.
- Please do not use this product surrounded by explosive gas.
- Please do not use if the product is abnormal.
- For actual temperature, refer to emissivity information. The reflective object causes the measured temperature lower than the actual temperature.
- Please do not disassemble the battery.
- Please charge the battery only with the OMEGA approved power adapter.
- Please do not disassemble or squeeze batteries and batteries.
- Use only the spare parts specified.
- Please be certified by technical personnel to repair the product.

2 Introduction of infrared thermal imager

2.1 Function Keys.





[1] Power On / Off

Used for thermal imager on and off. Pressing the key more than three seconds, turn on / turn off the imager. After turn on, this key is used as the return key.



Attention: After turn off, it is recommended to wait at least ten seconds before turn on to ensure the safety of the thermal imager.

[2] Power on indicator

Indicator is green after turn on.

[3] Charging indicator

After the connection of the power adapter, if the battery is installed correctly, the red charging indicator lights up. When the charging is complete, the charging indicator will go out; if the battery is not installed correctly, the red charging indicator will flicker continuously



[4] Main menu

Enter the main menu, you can view and set thermal imager isotherms, measurements, voice notes, system settings, files, SD card, and about the machine and other options.

Isotherm - open and close the isotherm function, set isothermal temperature and isothermal type.

Temperature measurement - add or delete the temperature measurement line, set temperature correction and level / span.

In the "temperature correction" option, you can set the transmissivity, test distance, ambient temperature, reflected temperature, humidity and correction temperature according to the actual ambient temperature. In the "horizontal / span" option, you can set specific parameters for patterns and levels and spans.

Voice annotation – voice recording and playback.

System setting- set auto power off, Date and time, language, system, unit, etc. Factory settings can be restored under this menu.

File - you can see the system directory name and the number of documents and other information.

SD card – set SD card connection mode, select the default built-in memory card, the images can be saved to the SD card.

When the mode switch to the "USB flash", the imager contacted with the PC, you can view files in the SD card by PC, and the thermal imager can't take pictures.

About the machine -you can see the relevant information about the thermal imager.

[5] [6] [7] [8] Direction keys

The arrow keys include up, down, and left and right, referring to 5, 6, 7, 8, respectively.

[9] F2 Measurement key

Set the camera display mode, palette, flashlight and laser light switch, add and delete spot, line, area, picture view, etc..

Add temperature spots - manually set the temperature measurement spots one by one. Select spot and click on the arrow keys to move it.

Add temperature areas - manually set the temperature measurement areas one by one. Select area and click on the arrow keys to move it.

High and low temperature capture switch - after capturing high and low temperatures, the maximum and minimum values in the temperature range are displayed at the top of the screen, while the maximum and minimum temperature points are marked with H and L respectively.

Emissivity - adjusted emissivity ratio, which adjusts the emissivity of the thermal imager

Commonly used materials - enter common material options, you can choose the emissivity of commonly used materials, after the election, you can set the emissivity of the thermal imager to the corresponding value.



Lens & temperature range - chose the lens and range of the thermal imager.

Temperature alarm - through this option, you can control the temperature alarm on and off.

[10] F1 Display orient menu key

Enter the display menu, you can set the camera display mode, palette, flashlight and laser light switch, temperature measurement, line area deletion and playback, view, etc..

Mode - you can choose three modes, the imager, digital camera and picture in picture.

Palette - can switch imager palette, including the palette options: iron red, hot, gray, rainbow, rain and grey red six palette.

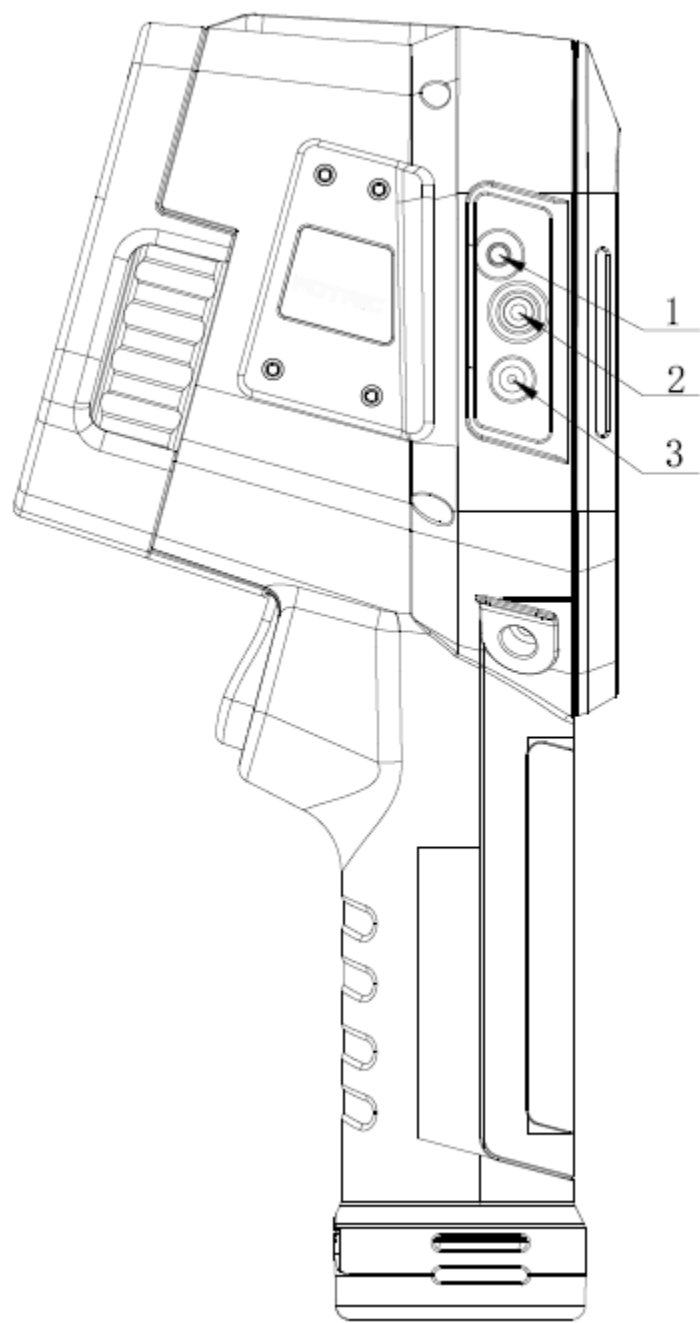
Flashlight - switch option controls the on and off of the thermal imager flashlight.

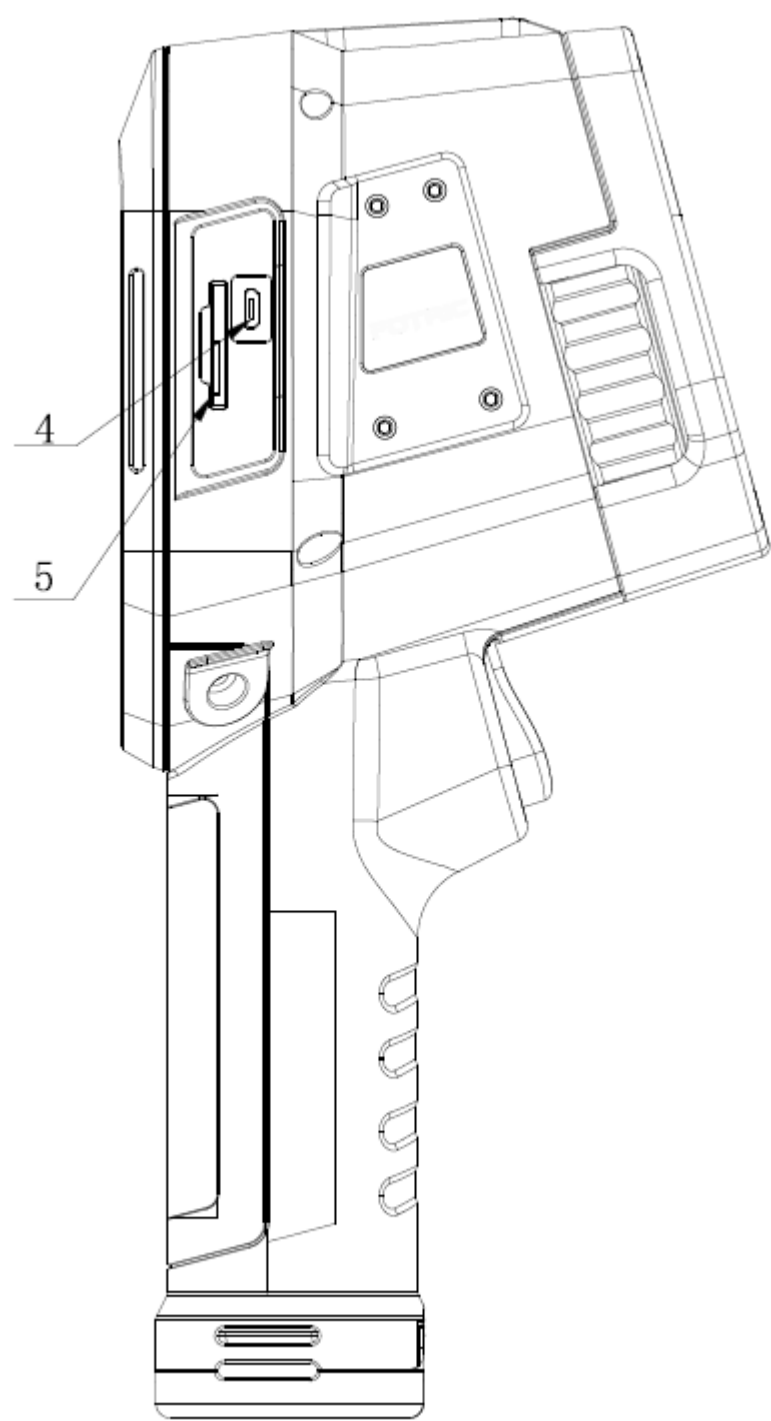
The laser light - laser light switch option controls the on and off of the thermal imager laser light.

Clear all - remove the set temperature points, lines, isotherms, and regions.

[11] camera taking key

2.2 Interfaces





[1] Audio

This interface is headset interface, which can be connected to the external headset for voice recording and playback.

[2] Video

Video output.

[3] Power

The external power input interface, the power requirements of DC12V, the center plug is positive

[4] Micro-USB

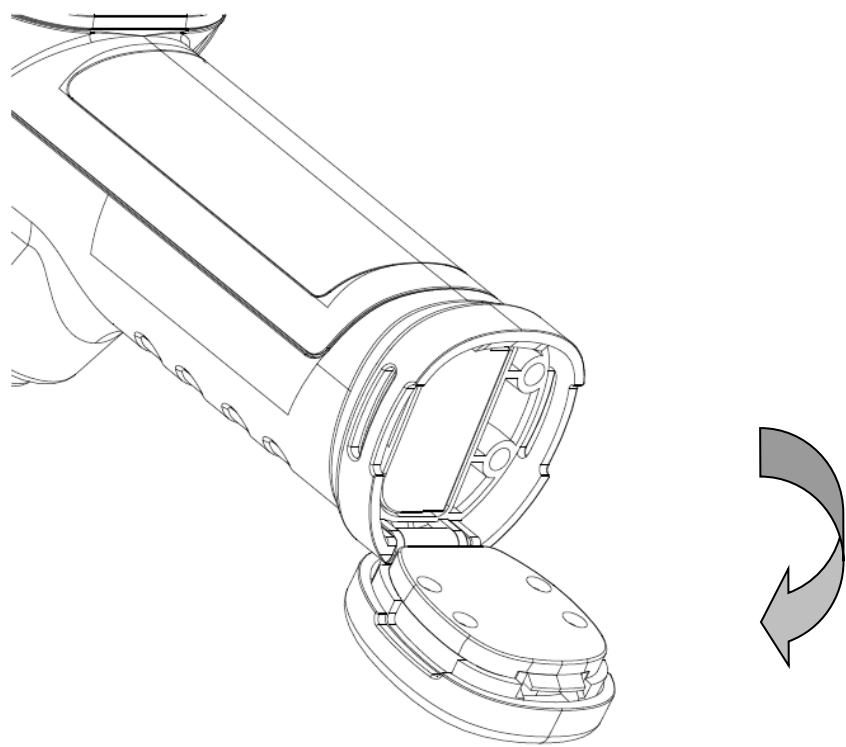
[5] SD card slot

3 Operating instructions

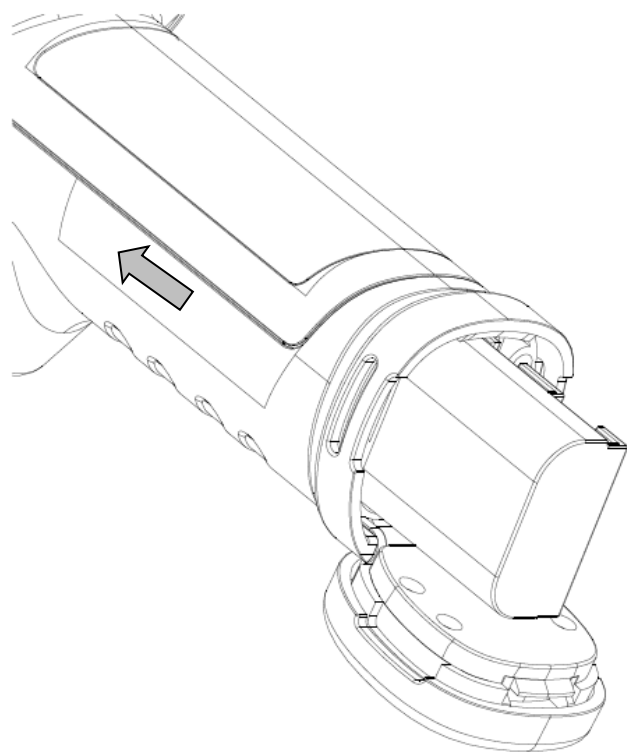
3.1 Basic Operation

3.1.1 Loading and Unloading of Battery

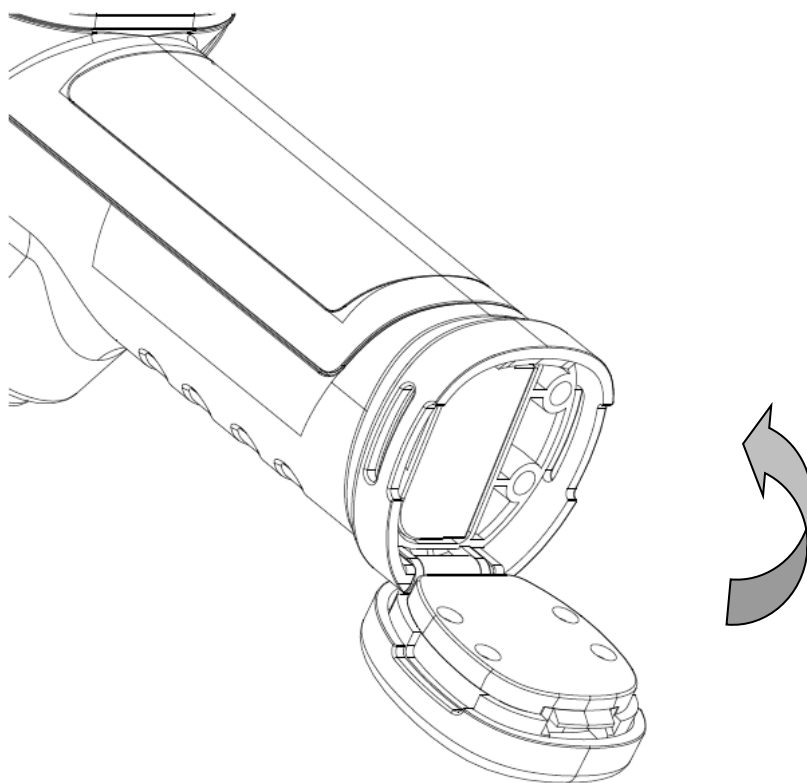
The battery is in the handle of the instrument. Push the battery cover at the bottom, then unloading the battery.




When you loading the battery, please note that one end of the battery contact should inserted firstly.



Close the battery cover and use the instrument when you hear voice sounds like "pa".



 **Attention:** The instrument shall use standard batteries, otherwise the mechanical or electrical performance of the instrument may be damaged due to the incorrect size and voltage of the battery.

Common sense of battery safety

➤ The battery should be stored in the -20°C ~ 20°C ambient temperature, because the battery self-discharge phenomenon exists little during storage, in order to avoid over discharge of the battery during storage and affect the battery capacity, the battery should be charged once of a period. The interval is as follows:

- Environmental temperature is -20°C ~ 20°C , once every 6 months
- Environmental temperature is 20°C ~ 45°C , once every 3 month.
- Environmental temperature is 45°C ~ 60°C , once every 1 months

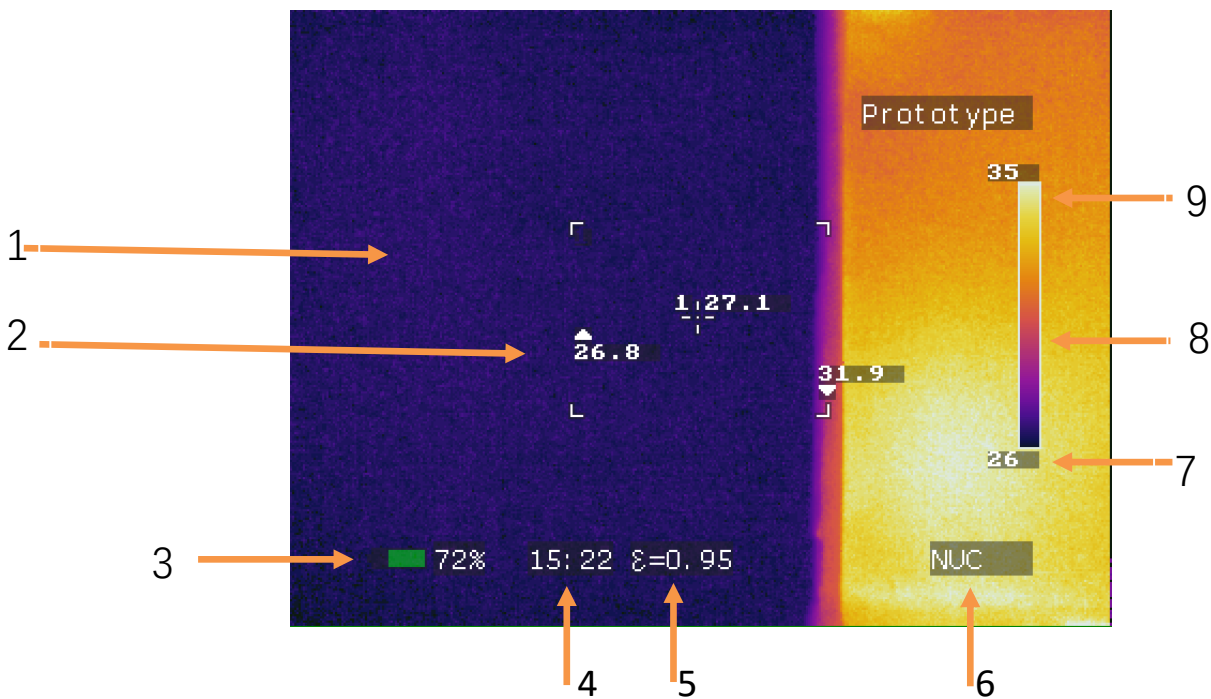
Each charge must be greater than 50% of the battery capacity

➤ The battery should be charged at 0°C to 40°C ambient temperature. Under 0°C will reduce the capacity of battery, while the battery temperature is too high and may cause the damage caused by charging at 40°C .

Warning

- ! Do not disassemble, squeeze, and prick batteries;
- ! Do not short-circuit the external contacts of the battery
- ! Keep the battery dry. Do not put it in the fire or water;
- ! Please do not place it where children can touch it
- ! Dispose of waste batteries according to local government regulations

3.1.3 Work Interface



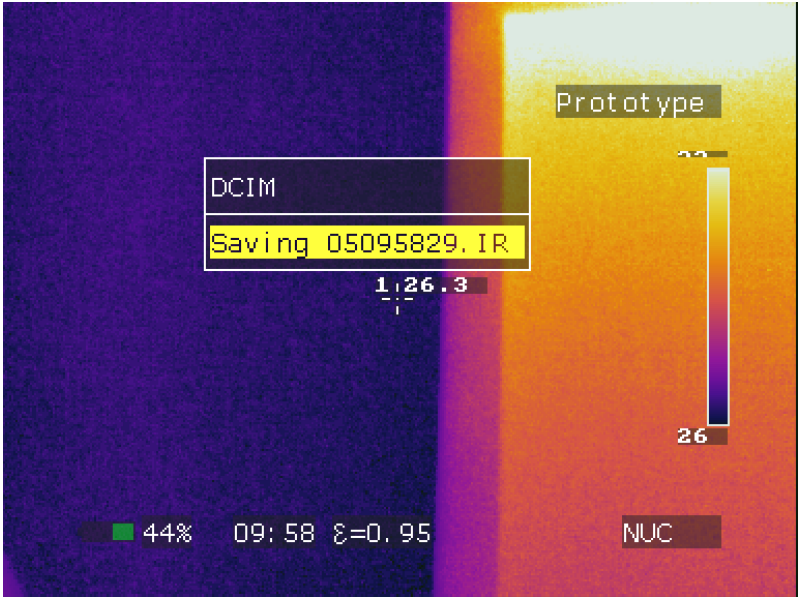
- [1] Temperature area: rectangular area
- [2] Point temperature mark: white cross cursor.
- [3] Battery status: shows current battery status.
- [4] System time
- [5] Emissivity: set emissivity.
- [6] NUC
- [7] Lower limit temperature: lower limit value of color mark temperature.
- [8] Color bar: color bar, different color palettes correspond to different color scales.
- [9] Upper limit temperature: upper limit value of color code.

! Note: different modes have different functions. Therefore, all the signs in the interface are not necessarily displayed under various modes.

3.1.4 Taking Picture

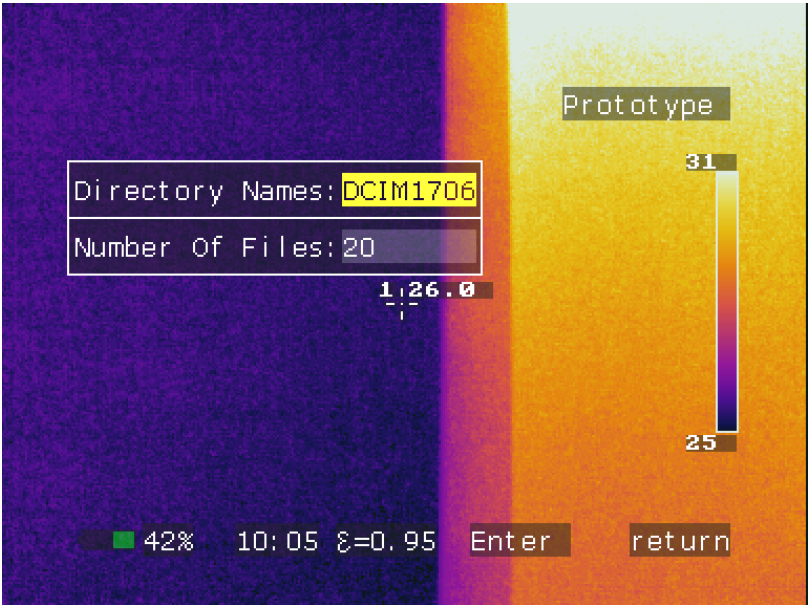
- After installing the battery, press the thermal imager power switch (greater than 3 seconds) until the boot screen appears. After about 50 seconds, the instrument is initialized and entered the working state.
- Open the lens cover, aim at the target, adjust the focus of the camera lens, and make the target image clear.
- When shooting an image, the main screen displays the name and file name of the save file for the image.

! Note: Unclear focus leading to inaccurate measurement.

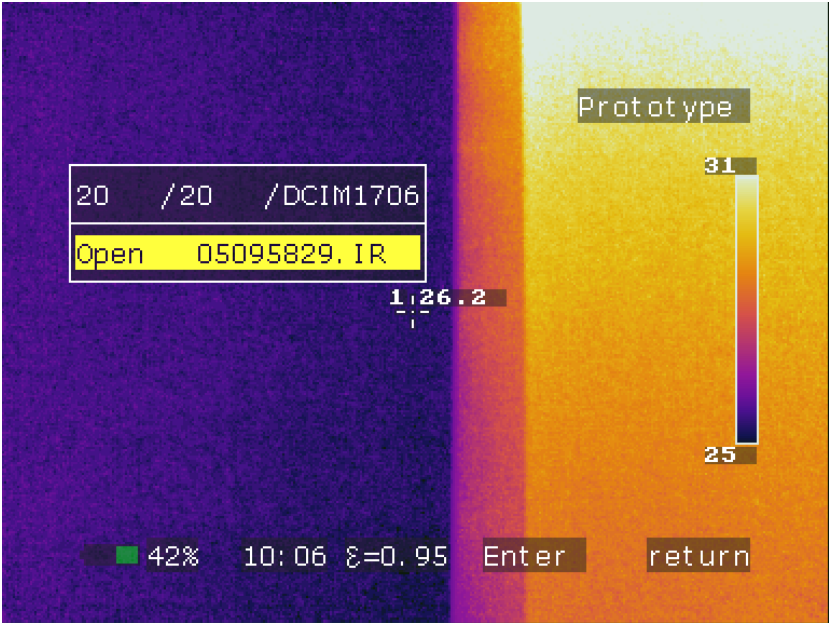


3.1.5 Playback Images

- Press the menu key to activate main menu, select the folder under the file menu with the arrow keys, and click ok.



- Press the display menu key F1, enter the playback view, use the left and right arrow keys to view the picture. When you have finished checking, click the return key to return to the real time image of the thermal imager.

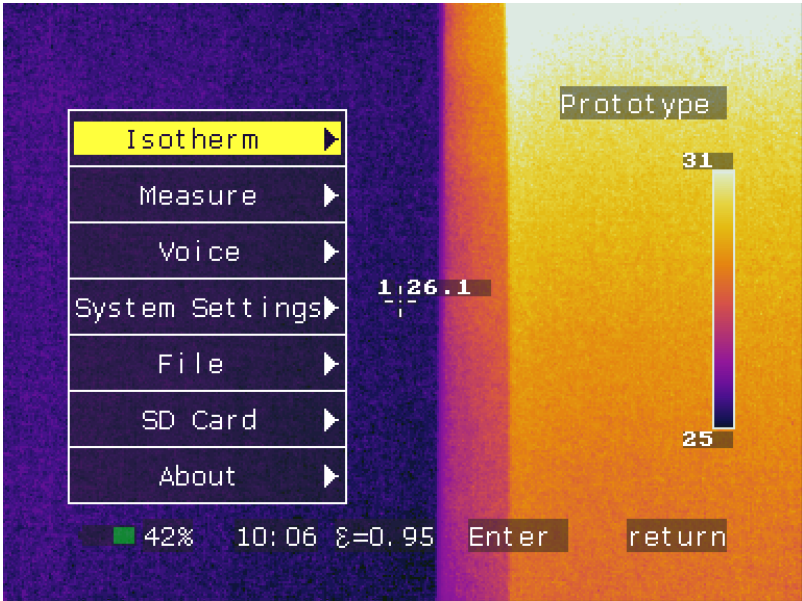


3.1.6 Export Saved Images

- Using micro-USB port to download the SD card image, connecting the instrument USB port and PC USB port with standard USB cable, then enter SD card under the main menu, select "USB flash" mode, you can view files in the SD card in PC terminal.
- ! Note: if you shoot the image at this point, it will prompt "No SD Card" and change the SD card mode to "built-in memory" to continue shooting the image.
- Or remove the SD card, insert it into the SD card reader, and connect to the USB port of the PC machine. You can view and export the stored images.

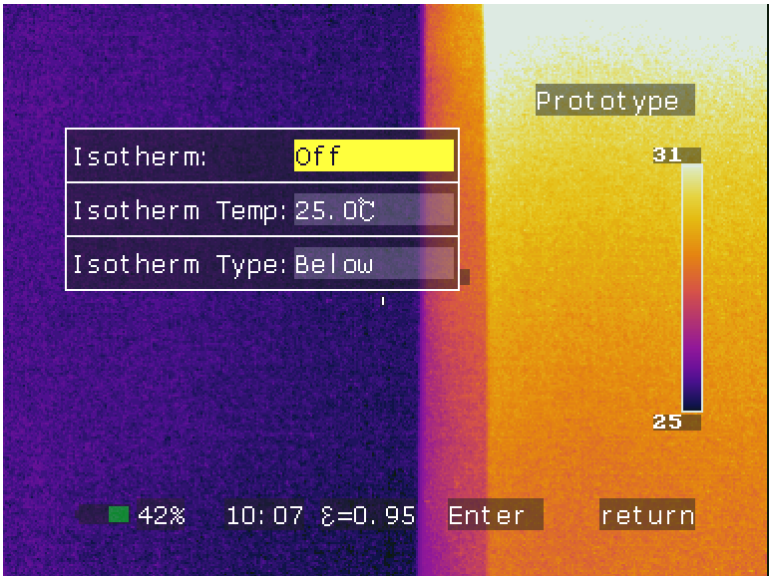
3.2 Main Menu

The main menu includes isotherm settings, measurements, voice notes, system notes, files, SD cards, and about imager.



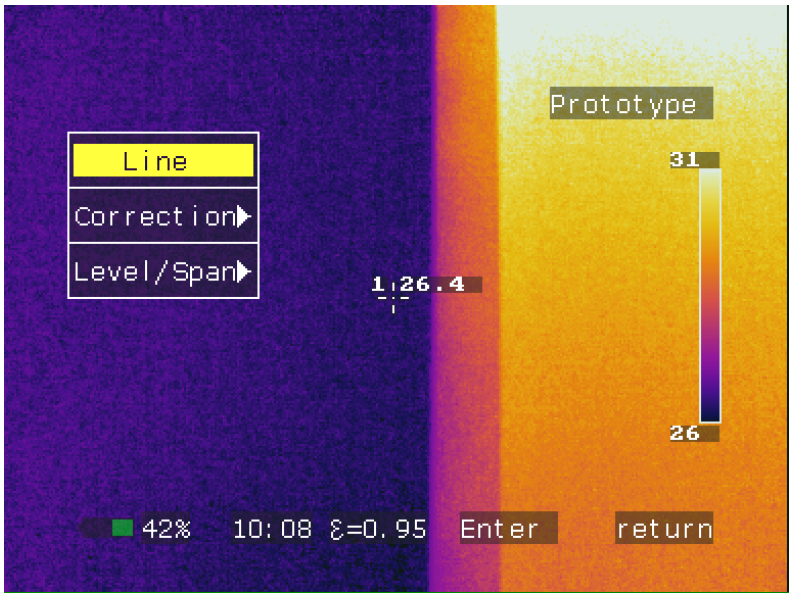
3.2.1 Isotherms

Set the isotherms on and off, the isothermal temperature and the isothermal type.



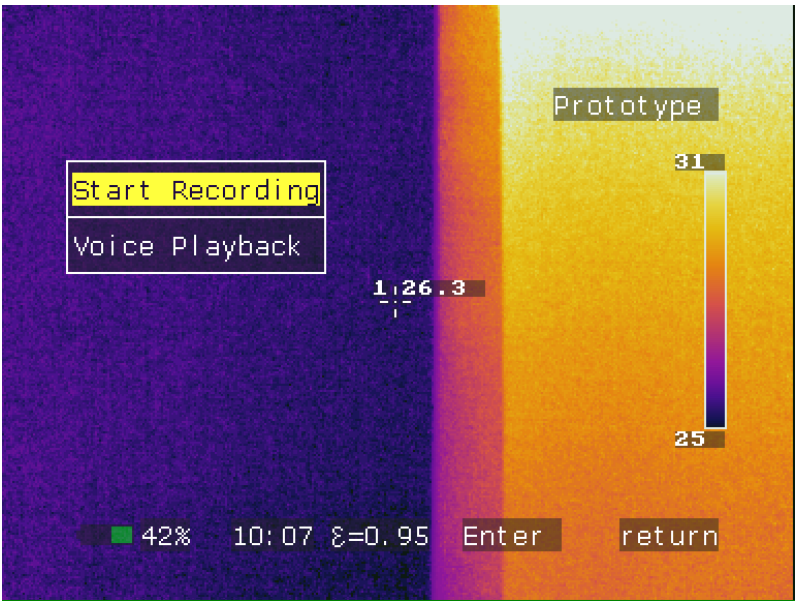
3.2.2 Measurement

Set temperature measurement line, temperature correction and level / span and other parameters.



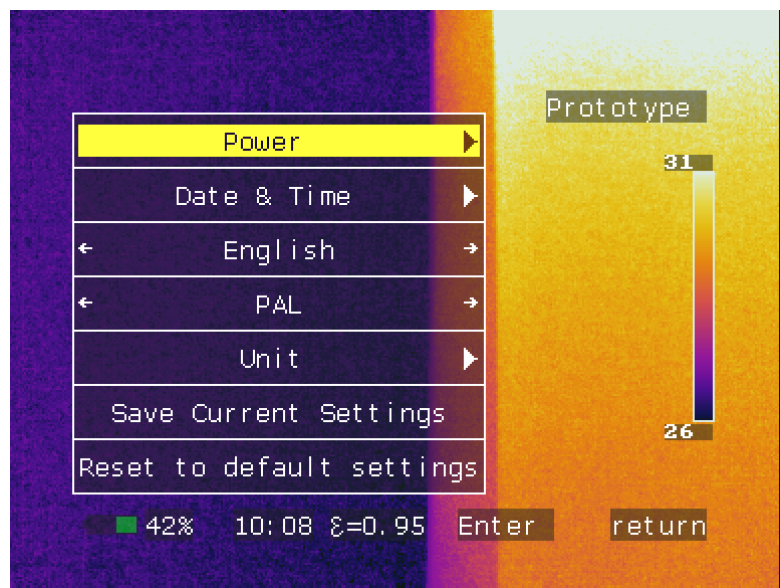
3.2.3 Voice Note

Voice record and playback for better understand the images.



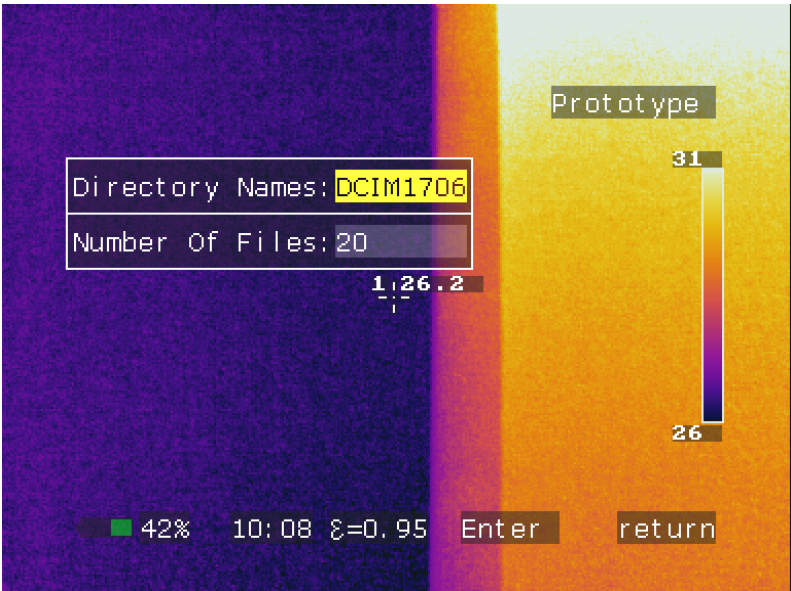
3.2.4 System Setting

Enter the system settings option, you can set the thermal imager automatic shutdown time, the date and time of the system, language, system and units and other parameters, and can resume production settings.



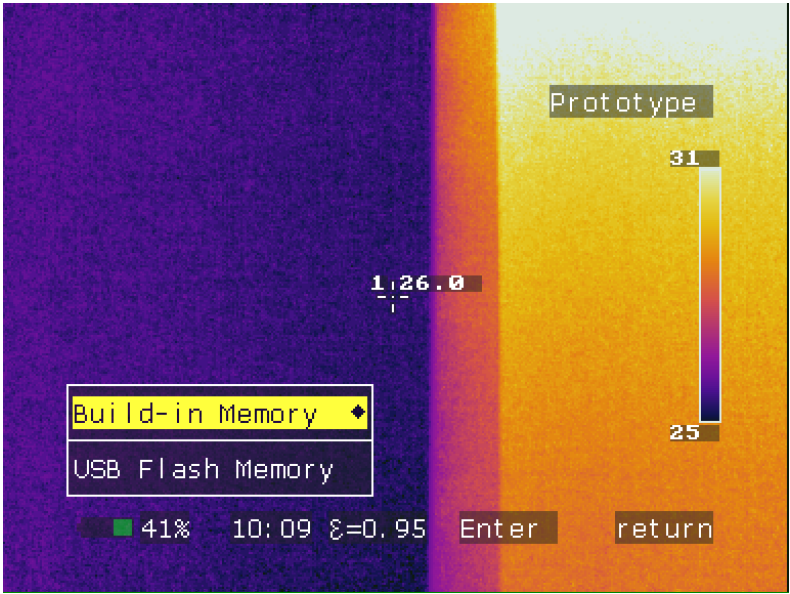
3.2.5 Files

Select the appropriate folder and the number of files in that folder.



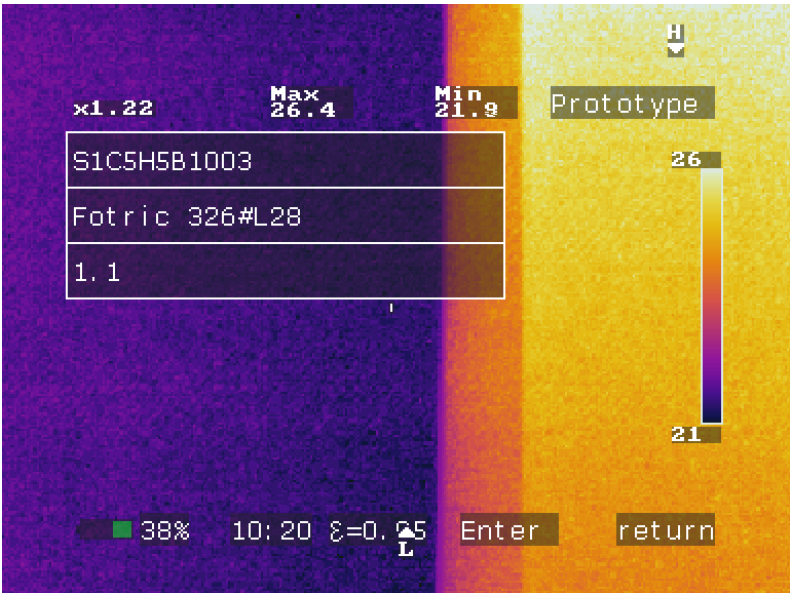
3.2.6 SD Card

Set the SD card connection mode. Under "Built-in memory" mode, thermal imager can take pictures; under "USB flash" mode can connect PC, read SD card image, or connect to the phone and take pictures by the phone.



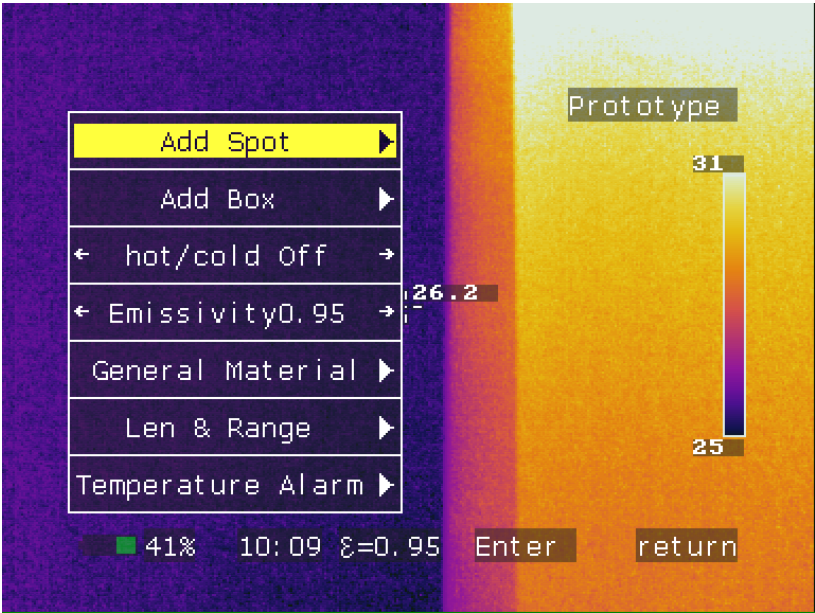
3.2.7 About this imager

View the serial number and version number of the thermal imager.



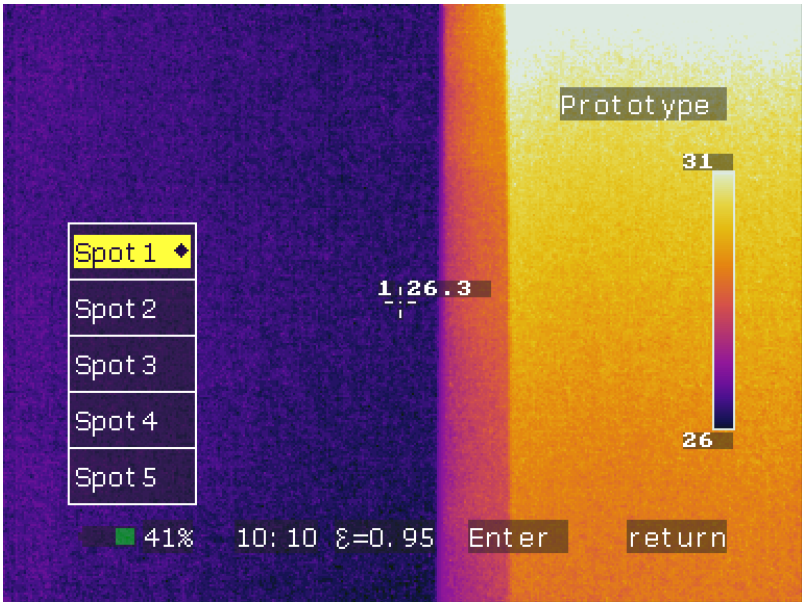
3.3 Measurement Menu

The menu includes adding temperature measurement points, temperature measurement areas, high and low temperature capture on /off, emissivity, common materials, lens temperature range and temperature alarm switch, etc.



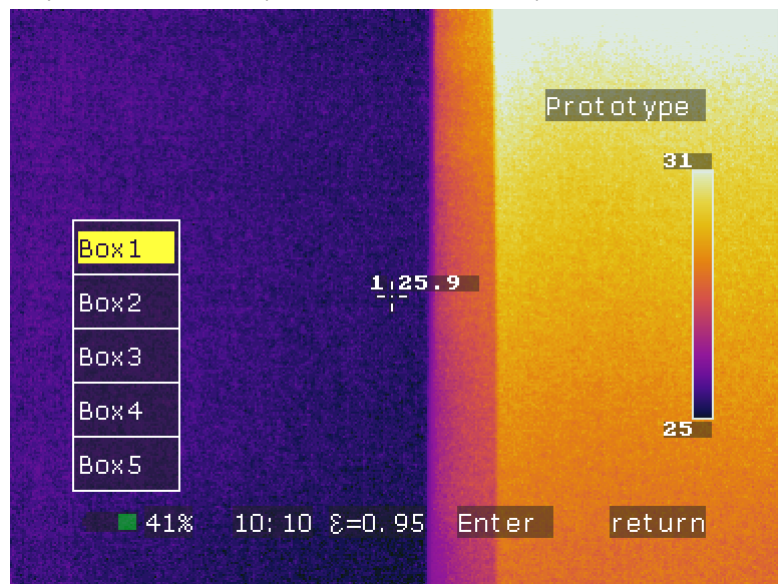
3.3.1 Spot

Add the temperature measurement point, the number of temperature measurement points vary according to the model. Select the temperature points, you can use the arrow keys to move the temperature measurement points.



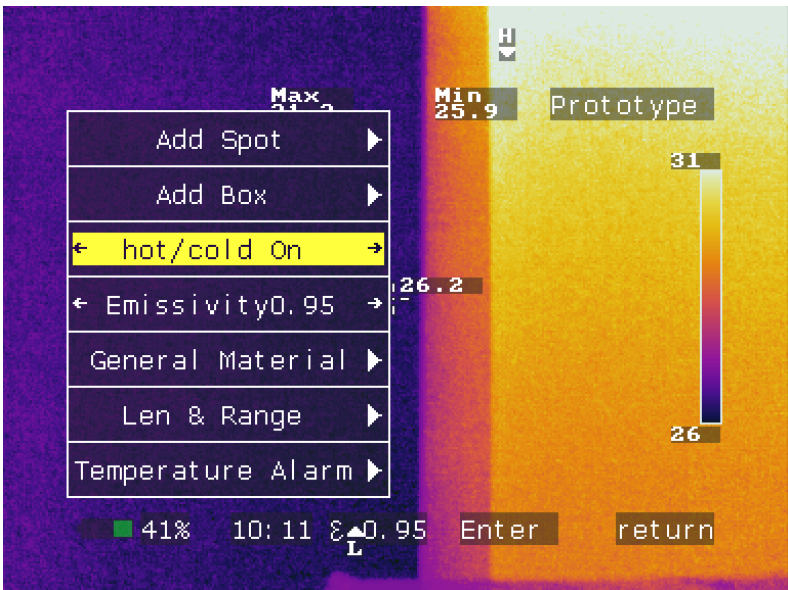
3.3.2 Area

Add temperature measurement area, the number of temperature measurement area varies according to the model. Select area, you can use the arrow keys to move the temperature measurement point, the size of the region fixed.



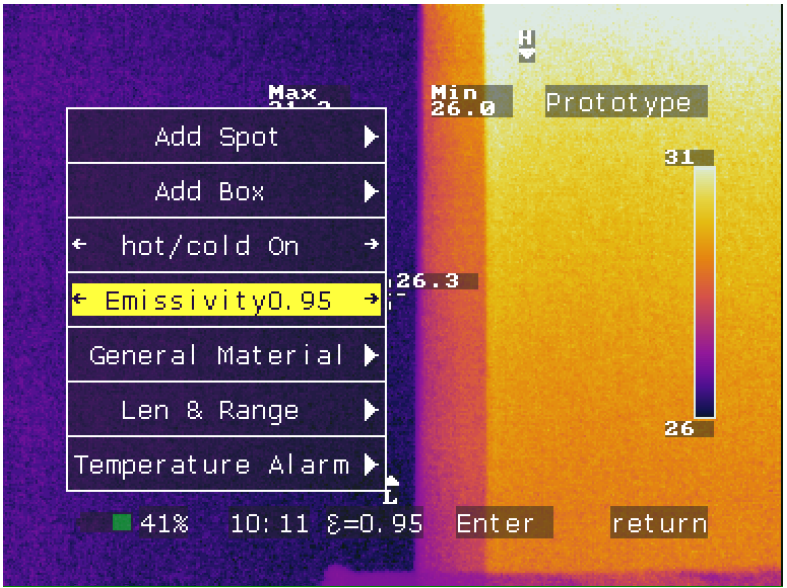
3.3.3 High and Low Temperature Capture

Open the high and low temperature capture, the image will appear Max and Min numerical points, representing the highest temperature and minimum temperature values. At the same time, H and L are used to mark the position of the highest and lowest pixels in the picture.



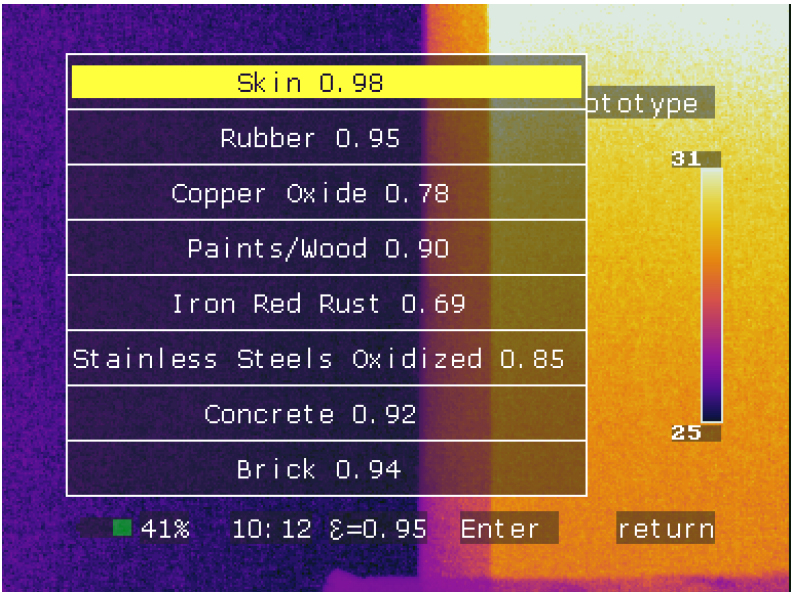
3.3.4 Emissivity

Adjust the emissivity of the thermal imager.



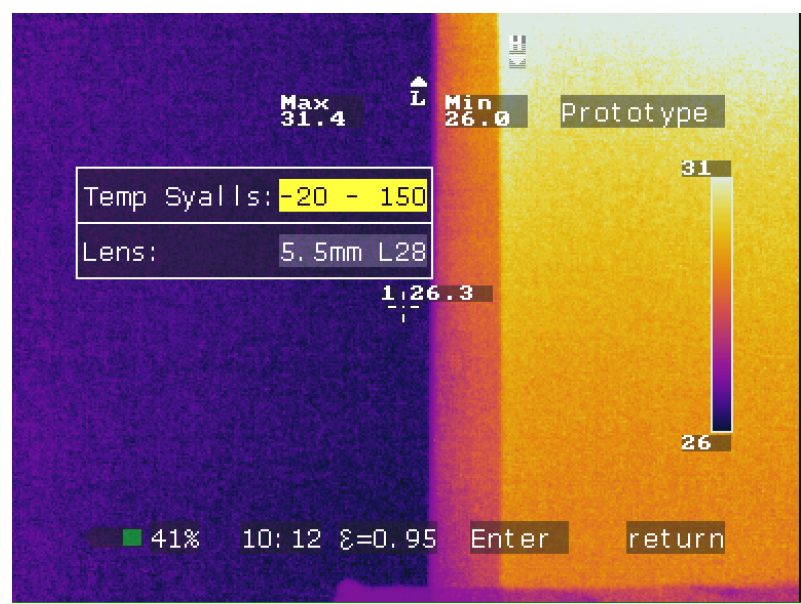
3.3.5 Commonly Used Materials

Select material from the commonly used materials list



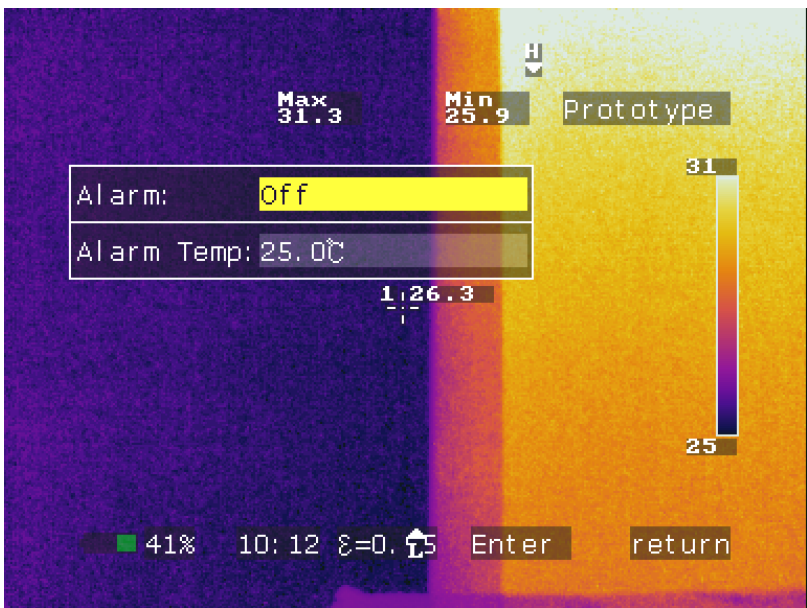
3.3.6 Lens & Temperature Range

Change the lens and temperature range, the temperature range is divided into "-20~150", "0~350" and "200~650", lens have "Len0", "Len1" and "Len2" options.



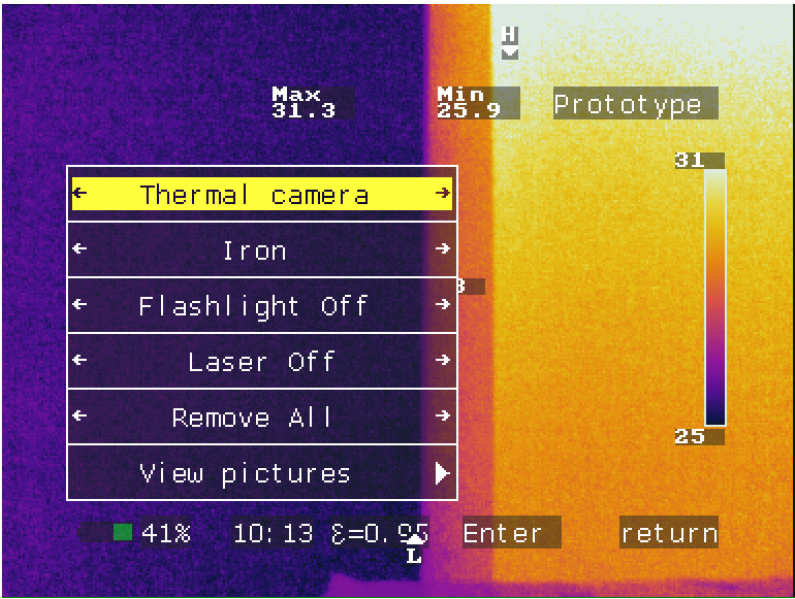
3.3.7 Temperature Alarm

There are three options for temperature alarm, which are turn off, high temperature alarm and low temperature alarm.



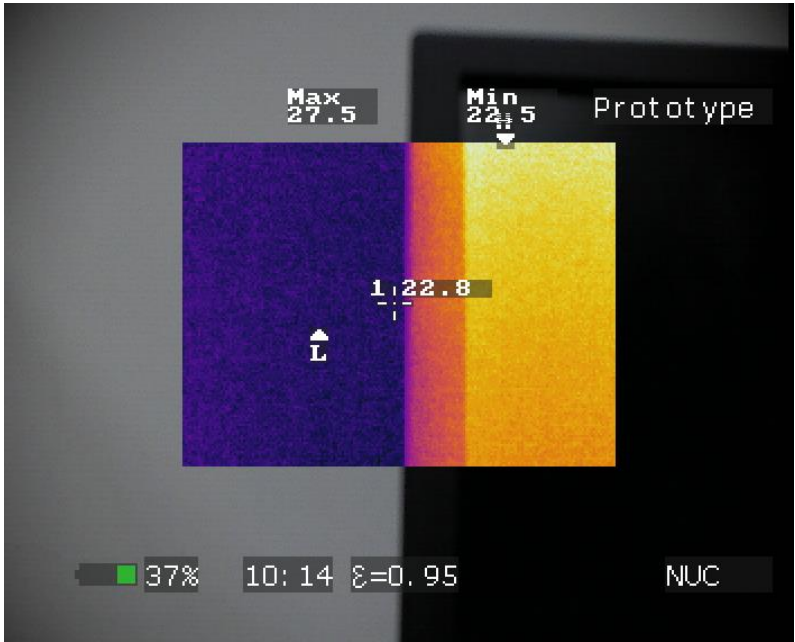
3.4 Display Menu

The display menu includes thermal imager display mode, palette, flashlight switch, laser switch, clear and playback view, and other functions.



3.4.1 Display Mode

Three display modes: thermal imager, digital camera and picture in picture. Below is the equipment in picture in picture display mode, under which you can move the thermal image by arrow key.



3.4.2 Palette

Choose the color palette options: iron red, hot, gray, rainbow, rain and grey red etc.

3.4.3 Flashlight

Turn on and off of the thermal imager flashlight.

3.4.4 Laser

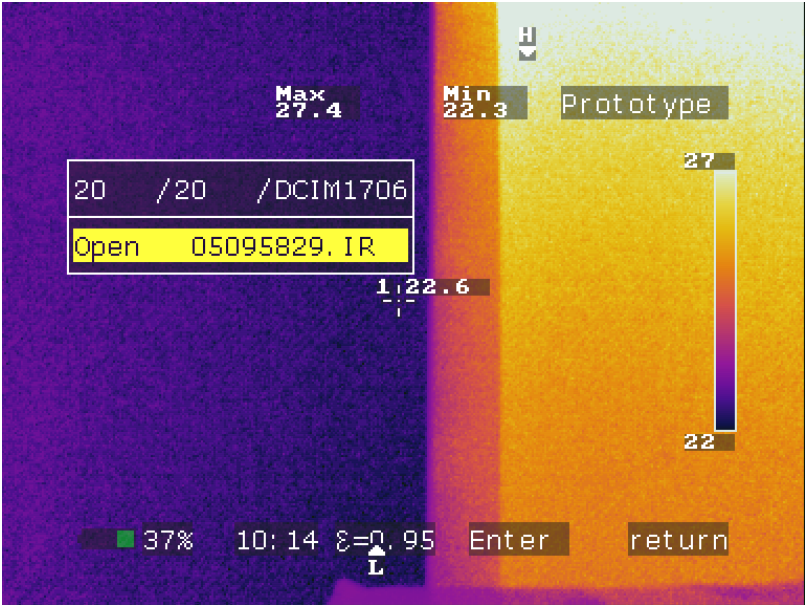
Turn on and off of the thermal imager laser.

3.4.5 Clear

The cleanup options include removing the temperature points, lines, isotherms, and regions.

3.4.6 Playback

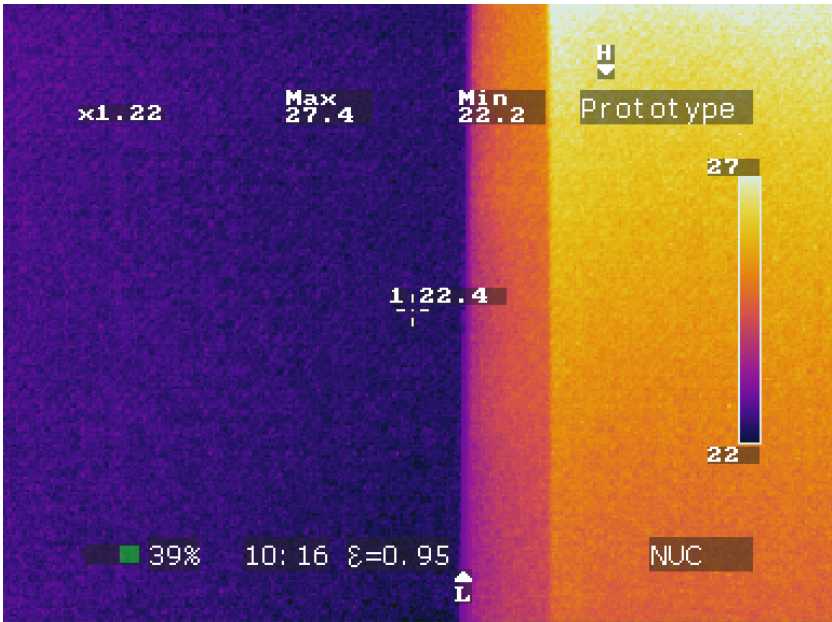
Enter the playback view option to view the captured image in the thermal imager. Before viewing, you need to select the folder you want to see in the main menu file.



3.4.7 Combination Keys

In the display menu item mainly has two combination keys: adjust thermal image magnification under thermal mode and adjust thermal image edge under picture in picture mode.

- Adjust the infrared magnification: in the thermal imager mode, press the display menu key F1, and then press the arrow keys up and down to adjust the infrared magnification. As shown below, the magnification of the image is 1.50 times magnification.



- Adjust the infrared image edge: in picture mode, press the menu key F1, and then press the arrow keys up and down, can adjust the infrared image part of the upper and lower edge.

Fault Countermeasures

If you have a problem with the thermal imager, check it out by the table below. If not work, please contact our authorized agent or our maintenance department.

Symptom	Causes and Solutions
Cannot power on	<ul style="list-style-type: none">● No battery or inaccurate battery installation. →Load the battery or reinstall the battery● Battery runs out. →Change battery.● Thermal imager power off protection →Wait 10 seconds to power on.
Automatic power off	<ul style="list-style-type: none">● Battery runs out. →Change battery.● Automatic power off is turn on →Turn off this function.
Battery consumption fast	<ul style="list-style-type: none">● The environment temperature is too low● Battery is not fully charged. →re-charge the battery.● The life of battery runs out. →buy new battery.
Inactive thermal image	<ul style="list-style-type: none">● The lens cover is not open. →Open the cover.● Freeze image status. →Press the return key to go back to active mode.
Thermal image color changed	<ul style="list-style-type: none">● Select different palette. →Select the palette you want.

Appendix A

Emissivity of common materials (for reference only)

Materials	Specification	Temperature (°C)	Emissivity (ε)
Aluminum	Non oxidation	100	0.20
	Oxidation	100	0.55
Brass	Polishing and brown	20	0.40
	Dull	38	0.22
	Oxidation	100	0.61
Copper	Severe oxidation	20	0.78
Iron	Oxidation	100	0.74
	Rust	25	0.65
Cast iron	Oxidation	200	0.64
	Non oxidation	100	0.21
Wrought iron	Dull	25	0.94
	Polishing	38	0.28
Nickel	Oxidation	200	0.37
Stainless steel	Oxidation	60	0.85
Steel	Oxidation under 800°C	200	0.79
Brick	Surface	20	0.93
Concrete	Surface	20	0.92
Glass	Polishing and flat	20	0.94
Paint	White	100	0.92
	Black	100	0.97
Carbon	Soot	25	0.95
	Candle smoke	20	0.95
	Graphite rough surface	20	0.98
Paint	Average value of 16 colors	100	0.94
Paper	White	20	0.93
Sand	Surface	20	0.90
Wood	Polishing	20	0.90
Water	Distilled water	20	0.96
Skin	Human	32	0.98
Ceramics	Fit	21	0.90
	Crude	21	0.93

Appendix B

Factory settings parameter table

Temperature setting parameter table

Parameter	Value
	OMEGA handheld thermal imager
Temperature rang	-20 ~ 150°C
Lens	Standard lens
Temperature unit	°C
Ambient temperature	30°C

Temperature correction parameter Table

Parameter	Value
Emissivity	0.96
Corrected temperature	0°C
Background temperature	close

Analyze set parameter table

Parameter	Value
Temperature alarm	Off
Threshold temperature	50.0°C
Alarm temperature	Not available
Isothermal	Off
Isothermal temperature	50.0°C
Isothermal span	1.0°C

System settings parameter table

Parameter	Value
Languish	Chinese
Automatic correction	60S
LCD brightness	60%
Shortcut key	Laser
Video format	NTSC
Turn off screen time	5 minutes
Power off time	15 minutes

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 25 months from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal two (2) years product warranty to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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omega.com info@omega.com

Servicing North America:

**U.S.A.
Headquarters:**

Omega Engineering, Inc.

Toll-Free: 1-800-826-6342 (USA & Canada only)

Customer Service: 1-800-622-2378 (USA & Canada only)

Engineering Service: 1-800-872-9436 (USA & Canada only)

Tel: (203) 359-1660

Fax: (203) 359-7700

e-mail: info@omega.com

For Other Locations Visit omega.com/worldwide