

UFPA Infrared Camera
User Manual

Please read carefully before first use



WARNING

DO NOT USE WHEN RAINING!
DO NOT OPEN OR EXCHANGE PARTS!
REPAIR ONLY CAN BE CONDUCTED BY STUFF!

NOTICE

- Directing device to strong light source (such as sun light) is prohibited under any condition, including after power down. This will cause malfunction or even critical damage to the device.
- Avoid shock and impact during operation or transport.
- Device must be in original case during transport and storage. Storage temperature is between -40°C to 60°C .
- Typical storage place is cool, dry, ventilated, and without strong electrical or magnetic field.
- Avoid oil or any chemical liquid on Infrared lens surface. Close lens lid after operation.
- Export and backup data on PC after operation. Format internal FLASH memory periodically for best performance.

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1. Product Summary

This new generation Infrared Camera (equipped with Uncooled Focal Plan Array Micro-bolometer) produces crisp thermal image and accurate temperature reading to help increase system maintenance quality and efficiency in many industries. Crisp thermal image, accurate temperature reading, clear user interface, reliable product quality, and

affordable cost makes the new standard in Infrared imaging industry!

Typical Application:

- **Power Plant:** Monitor and diagnose the condition of electrical wire and equipment, measure surface temperature, detect power leak, and prevent system malfunction
- **Electronics:** Monitor and control printed circuit board or LED board temperature during the curing process; Locate poor soldering, track discontinuities, incorrect component values and power ratings as well as incorrect polarities in the production place; and other type of applications in electronic fields
- **Medical Application:** Accurately measure human body temperature in a distance, critical under a contaminated condition
- **Other Applications:** Constructions, civil engineering, university research, and etc.

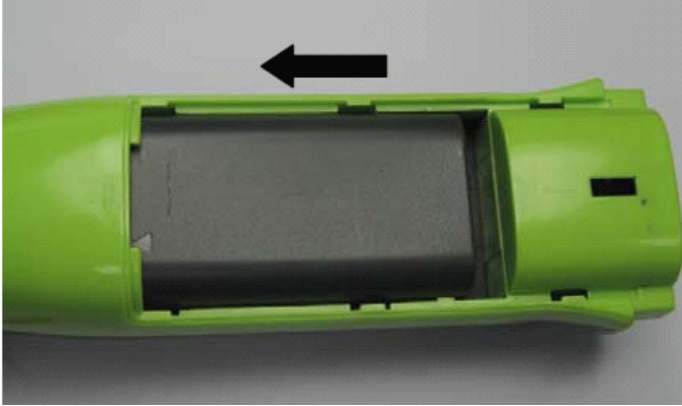
1.1 Standard Item List

Infrared Camera comes with the following standard items and accessories:

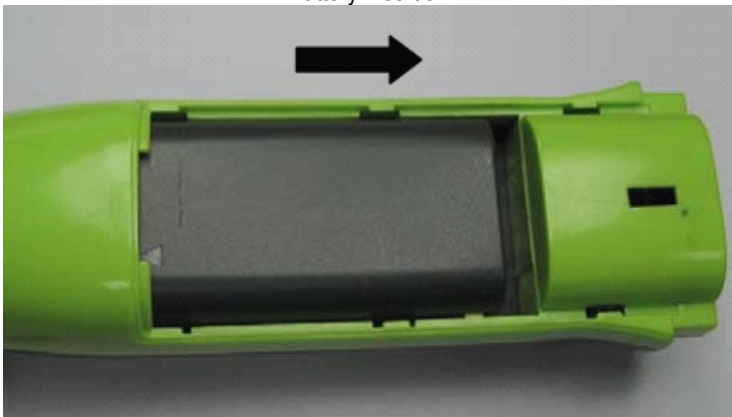
Item Name	Quantity
Infrared Camera	1
Li-Ion Battery	2
Battery Charger	1
USB Cable	1
Video Cable	1
User Manual	1
Software CD	1
Transport Case	1

2. Battery and Charger

It is recommended to charge battery immediately when device indicates low power. By press and move in the indicated direction, user can easily insert and remove battery.



Battery Insertion



Battery Removal

Device comes with two sets of Li-Ion battery and one battery charger. It is strongly recommended to operate only with the included battery and charger. Use any other brand charger or Li-Ion battery may cause fire or critical damage.

2.1 Charging Battery

- 1) Following the direction indicated on battery charger, insert the Li-Ion battery, press firmly and push all the way in.
- 2) During charging, the red LED will be on, and when charging is completed, the green LED will be on instead.

Note: Normally takes 4 hours to completely charge one battery.

2.2 Notes for Using Battery Charger

- 1) Charging can only be conducted in a cool, dry, room environment, not under direct sunlight or during rain.
- 2) Do not short-circuit the battery. Do not place battery with metal material such as key chain. These may cause short-circuit during transportation.
- 3) Do not place battery in high temperature environment ($\geq 60^{\circ}\text{C}$) or in fire. This may cause fire or explosion.
- 4) Do not try to modify or open the battery or the charger.
- 5) Li-Ion battery has no memory effect, thus unlike Ni-Cd battery, charging can be conducted at any time.
- 6) It is recommended to remove battery from charger when charging is completed.

3. Panel Function Summary

In this manual, “long press” means press and hold button down for about 2 seconds, and “press” or “short press” means press and release.

3.1 Main Control Panel

As shown in the following image:



1. Power ON/OFF Button

Long press this button to turn on or off the device.

2. Power LED Light

When device is powered on, the Power LED Light will be on also.

3, 4, 5, 6. Direction Buttons

Up (▲), Down (▼), Left (◀), and Right (▶), 4 direction buttons have different usage under different mode.

In main manual, direction buttons are used for moving selected items or changing slide-bar value. In real time Infrared view mode, directions buttons provide one-click access:

Press ◀ to freeze Infrared image and press again to unfreeze

Long press ◀ to save current Infrared image

Press ▲ or ▼ to switch between normal view and 2X zoom

After press Hotkey button (refer page 7, 3.3) and in area measurement mode:

- Select area box on screen: select move in menu, press ▲, ▼, ◀, and ▶ moves area box, and select size in menu, press ▲, ▼, ◀, ▶ resizes area box.
- Select Color Palette or temperature measurement limit on screen: Press ▲, ▼, to

change, and ◀, ▶ has no effects.

7. OK (Menu/Confirm) Button

This button has different functions under different conditions:

- In real time Infrared view mode, press this button opens the main menu.
- In main menu, press this button to confirm operation.
- In real time Infrared view mode, long press this button to manually rectify measurement result.
- In image viewing mode, long press this button to exit.

Note: After auto rectifying, if device has abnormal noise, long press OK button to perform manual rectifying usually solves such issues.

8. MIC

Internal MIC records audio annotation.

3.2 Rear Interface Panel

As shown in the following image:



9. External DC In

External DC requirement is 12V.

10. USB 2.0 Interface

USB2.0 interface transfers data between device and PC.

11. Video Output

CVBS standard video output.

12. Audio Output

Audio output playbacks recorded voice annotation.

3.3 Side View

As shown in the following image:



13. Hotkey Button

Short press Hotkey button to switch between Color Palette, area measurement rectangle, temperature limits, and long press Hotkey button to turn on/off laser sight.

14. Laser Sight

Long press Hotkey button to turn on/off laser sight.

15. Sound Alarm Buzzer

Signal sound alarm when reaches temperature limit.







4. Quick Start Reference

4.1 Infrared Image



1. Insert Li-Ion battery correctly.
2. Long press Power button until LED light is on and wait until system finishes initialization.
3. Remove IR Lens lid if closed, point to target, and adjust focus to get crisp thermal image.
4. Long press OK button to rectify thermal image.

4.2 Measure Target Temperature

1. Point device to measurement target, and adjust to correct focus. On the upper-right

- LCD corner,  *= $\times\times$ displays the spot measurement result. For better accuracy, long press OK button to perform manual rectify.
2. Select Area (Rect) Measurement to measure max, min, and average temperature within a rectangle box.
 3. It is recommended to **press**  **button** to freeze thermal image first, and then apply different and detailed analysis. **Press**  **button** one more time to unfreeze or long **press**  **button** to save current thermal image.
 4. Press  **button** or  **button** to switch between normal and 2X zoom.
 5. When measurement result is outside temperature range, screen display changes to indicate either below or above temperature range.





4.3 Infrared Image and Voice Annotation

Each thermal image can save up to 40 seconds voice annotation data. Image and voice annotation can later be reviewed on PC by bundled software. To save Infrared image, **first press**  **button** to freeze image, and then **long press**  **button** again to open the voice recording menu. If only needs store Infrared image, select Cancel, otherwise select Record. Press OK button to confirm.

In main menu, File→Save provides the same function.

Note: Select Cancel during voice recording to exit.

4.4 Infrared Image Playback

1. Press OK button to open main menu.
2. Select File→Manage, and select folder to view stored thermal image.
3. When viewing thermal image, **press**  **button** or  **button** to switch image in the same folder.
4. The  icon indicates voice annotation attached to current thermal image. Press  **button** to playback.
5. Long press OK button to exit.

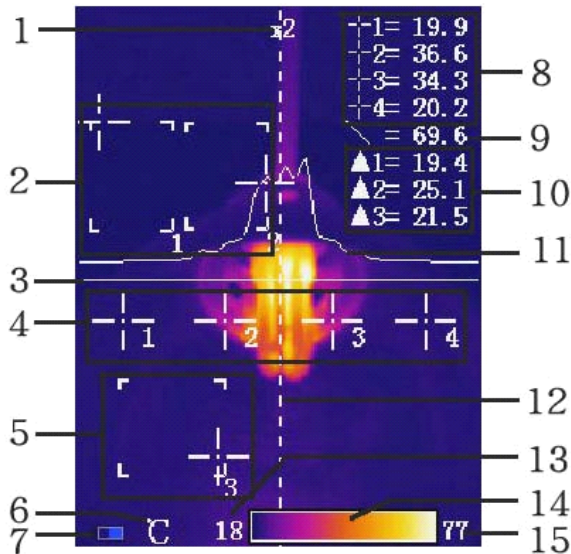
4.5 Connect to PC

Connect device to PC using included USB 2.0 cable. Refer IRSee software manual for additional PC operation instruction. It is recommended to format device periodically.

5. Operation Menu

5.1 Display Summary

All items can be selected by short pressing the Hotkey button (Note: Long press Hotkey button will turn on/off laser sight). The selected item is flashing in yellow color. If no operation in 2 seconds after selection, Hotkey mode will exit automatically.



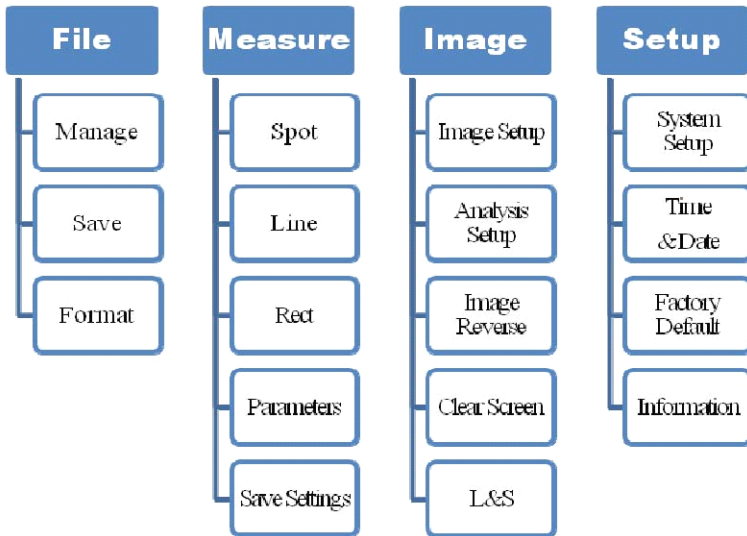
Thermal Image Screen Shot

- 1 Zoom indicator
- 2 5 Area Measure Box
- 3 Horizontal measure line
- 4 Spot measure
- 5 Spot measure
- 6 Temperature unit
- 7 Battery power condition
- 8 Spot measure result: ---| 1, ---| 2, ---| 3, ---| 4 indicates measure result for spot 1, 2, 3, 4 respectively.
- 9 Line measure result
- 10 Area measure result: Selectable from max, min, and average temperature within the measure rectangle

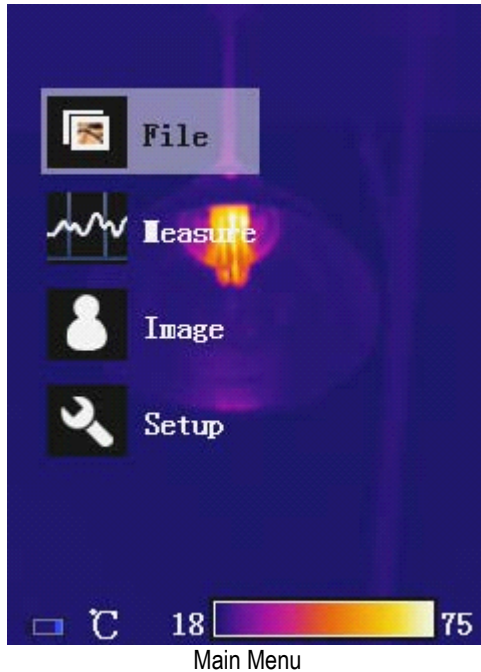
- 11 Line measure curve
- 12 Line measure cursor: Cursor is vertical when line measure is horizontal and vice versa
- 13 15 Temperature range
- 14 Color Palette

5.2 Main Menu

Menu and sub-menu items:



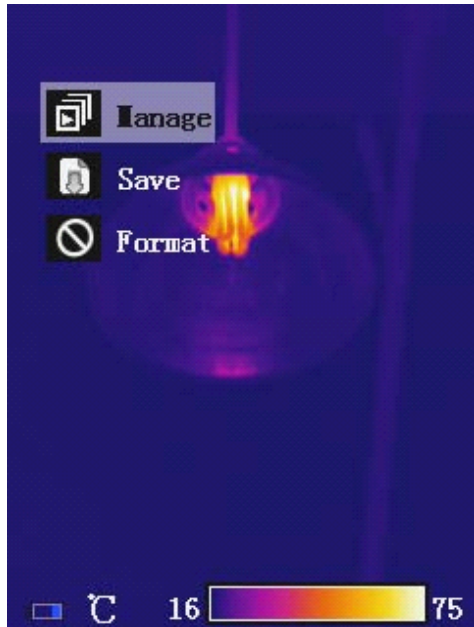
Press OK button (when not in Hotkey mode) to enter main menu. Note if press OK button too long, instead of enter main menu, triggers manual rectify.



Using ▲ and ▼ button to select menu item, and selected item is highlighted with white background. Press OK or ► button to enter sub-menu. Press ◀ button to return to previous menu or exit.

5.2.1 File

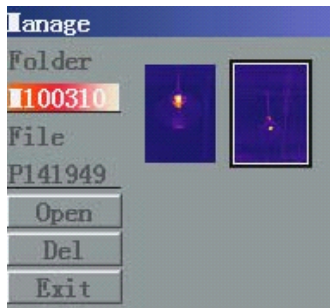
Using File menu to save, playback, delete thermal image and voice annotation.



File Sub-menu

Manage

Select Manage to review saved thermal image, add or edit voice annotation, or delete thermal image.

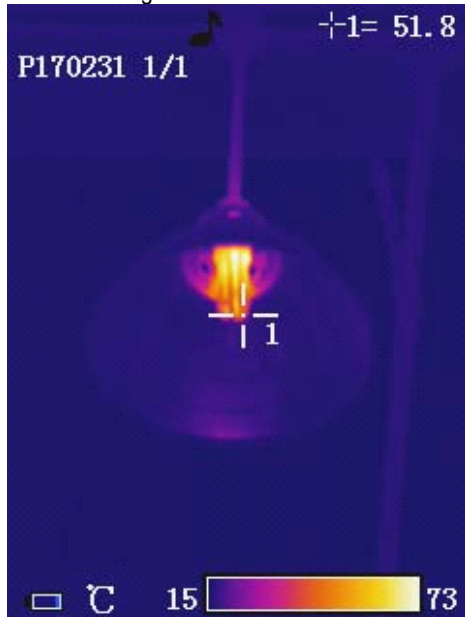


File Manage

↓
Folder is automatically created if not exist when saving thermal image. Folder name is MYMMDD, and YYMMDD is year, month, and date. For example, Jan 2nd, 2009 folder is M090102. All thermal images taken in this day is saved in this folder. Thermal image file

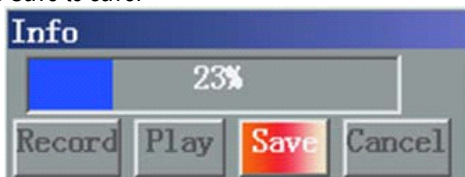
name is Phhmmss, and hhhmmss is hour, minute, second (according to system time). For example, P080502 in folder M090102 means the thermal image taken at 08:05:02 time in Jan 2nd, 2009.

In File Manage window, press ▲ and ▼ button to select items. Selected item is highlighted with red background. Press ◀ and ▶ button to switch folder or file when highlighted. After select thermal image, press Open to view thermal image or Delete to delete. Press Exit to exit File Manage window.



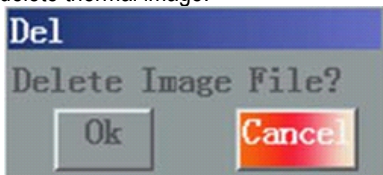
Saved Thermal Image

Press ◀ or ▶ button to switch saved thermal image in the same folder. The 🎵 icon indicates voice annotation data with current thermal image. Long press ▲ button to enter Voice Annotation menu. If voice annotation already exists, press Record will record new voice annotation and erase previously saved one. Press Cancel first to stop recording then press Save to save.



Voice Annotation

Long press ▼ button to delete thermal image.



Delete Saved Thermal Image

To exit thermal image playback, long press OK button.

Save

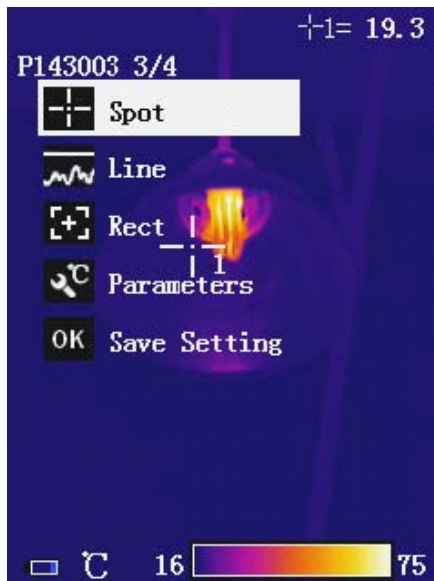
Save current thermal image. Freeze image first before saving.

Format

Format the internal FLASH memory. Press OK to confirm or cancel to exit. Format will erase all saved thermal images. It is recommended to transfer data to PC before format.

5.2.2 Measure

There are 5 items: Spot, Line, Area (Rect), Parameters, and Save Setting in Measure menu.



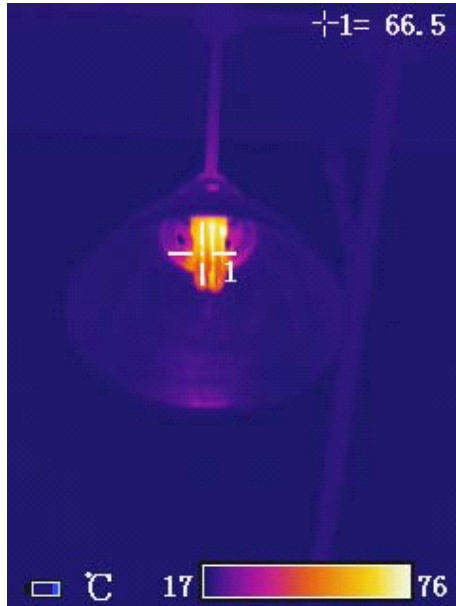
Measure Sub-menu

Spot Measure

Press ◀ or ▶ button to select or deselect. Selected spot is check marked.



Spot Measure Selection



Spot Measure

Measure result on upper-right LCD corner is temperature reading at location marked with + . Can select up to 4 spot locations.

Spot Measure Attribute

Press Hotkey button until spot marker is flashing in yellow, and then use \blacktriangle , \blacktriangledown , \blacktriangleleft , \blacktriangleright buttons to move spot location to different directions. Press OK button to enter Attribute Menu. After 2 seconds with no operation, system will exit to real time Infrared view screen.



Spot Measure Attribute

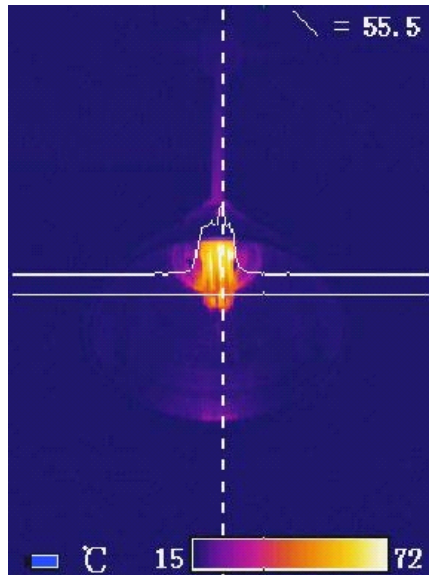
Emissivity: Refer Appendix for emissivity of raw materials.

Set Reference: Set current spot as reference point. If selected, all measure result will be relative value to this spot temperature.

Line Measure

There are 2 line measure options: vertical and horizontal.

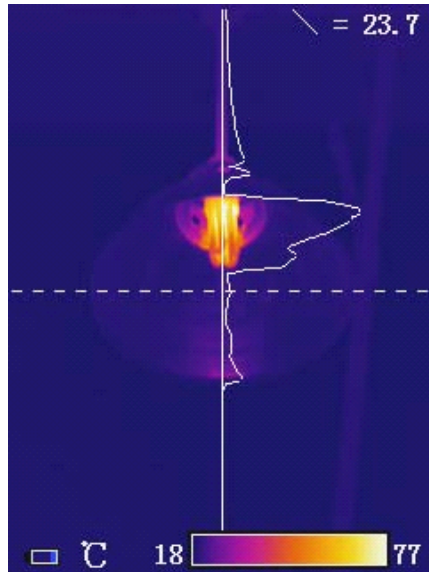
Horizontal Line Measure



Horizontal Line Measure

Horizontal line is temperature sampling line, and upper-right LCD corner displays temperature measurement reading on vertical cursor line intersection. After using Hotkey button select line measure, press ▲ and ▼ button to adjust sampling line position, and press ◀ and ▶ button to adjust cursor line position. Press OK button to enter Attribute Menu. After 2 seconds with no operation, system will exit to real time Infrared view screen.

Vertical Line Measure

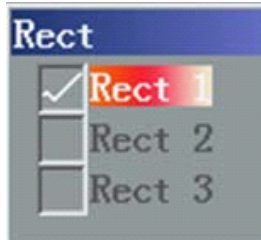


Vertical Line Measure

Vertical line is temperature sampling line, and upper-right LCD corner displays temperature measurement reading on horizontal cursor line intersection. After using Hotkey button select line measure, press ◀ and ▶ button to adjust sampling line position, and press ▲ and ▼ button to adjust cursor line position. Press OK button to enter Attribute Menu. After 2 seconds with no operation, system will exit to real time Infrared view screen.

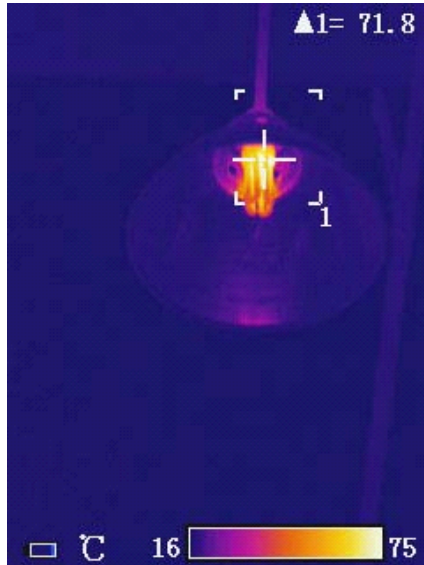
Area (Rect) Measure

Press ◀ or ▶ button to select or deselect. Selected Area is check marked.



Area (Rect) Measure Selection

Area (Rect) Measure Operation

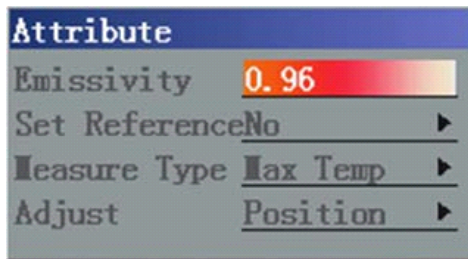


Area (Rect) Measure

Measure result on upper-right LCD corner is the temperature measurement result within the corresponding rectangle. There are 3 measure types: max, min, and average temperature.

Area (Rect) Measure Attribute

Press Hotkey button until area rectangle is flashing in yellow. Press OK button to enter Attribute Menu.



Area (Rect) Measure Attribute

Emissivity: Refer Appendix for emissivity of raw materials.

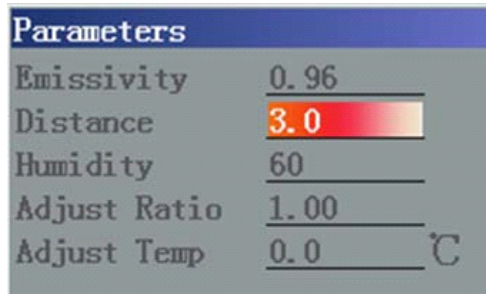
Set Reference: Set current spot as reference point. If selected, all measure result will be relative value to this temperature.

Measure Type: Select between max, min, and average.

Adjust: Adjust rectangle position and size.

Parameters

Change different settings to adjust temperature measurement accuracy. Press ▲ and ▼ button to select different parameters, and press ◀ and ▶ button to change value.



Parameters	
Emissivity	0.96
Distance	3.0
Humidity	60
Adjust Ratio	1.00
Adjust Temp	0.0 °C

Parameter Sub-menu

Emissivity

Emissivity varies based on target subject material, surface temperature, surface roughness, measurement angle, and etc. Press ◀ or ▶ once to change Emissivity 0.01. Press and hold ◀ or ▶ will change Emissivity in 0.1 intervals.

Distance

This value can be omitted if target subject is close to device (less than 10m). Otherwise, set Distance value accordingly to get more accurate temperature reading. Press ◀ or ▶ once to change Distance 0.1m. Press and hold ◀ or ▶ will change Distance in 1m interval.

Humidity

Humidity can be set according to environmental condition. Press ◀ or ▶ once to change Humidity 1%. Press and hold ◀ or ▶ will change Humidity in 10% interval.

Adjust Ratio

Due to long time usage of device, the sensitivity of IR detector may decrease. In such case, it is necessary to adjust ratio value to get more accurate temperature reading. During calibration, if temperature reading is higher than actual target temperature, change ratio value lower, and vice versa. Press ◀ or ▶ once to change ratio value 0.01. Press and hold ◀ or ▶ will change ratio value in 0.1 intervals.

Adjust Temp

Under certain condition, it is necessary to adjust temperature reading by a pre-define value. Normally this option should be left unchanged. Press ◀ or ▶ once to change 0.1°C. Press and hold ◀ or ▶ will change this value in 1°C interval.

Save Setting

All above parameter changes must be saved before power down device. Otherwise, changes will not be saved for next power on.

5.2.3 Image

There are 5 items: Image Setup, Analysis Setup, Image Reverse, Clear Screen, and Auto/Manual (L&S) in Image menu.

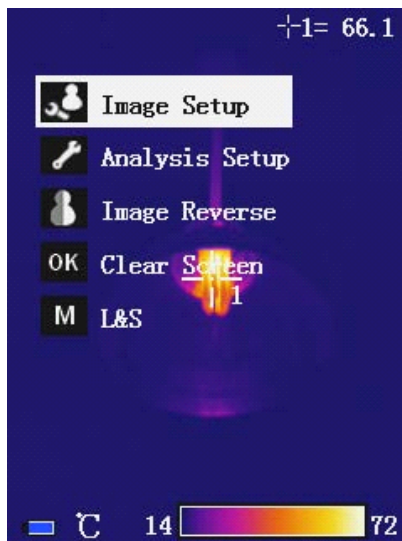


Image Sub-menu

Image Setup

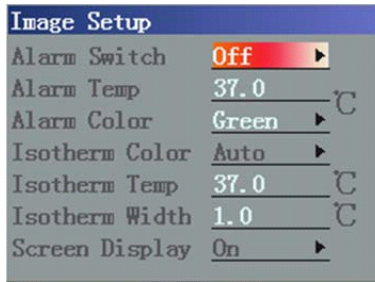


Image Setup Sub-menu

Alarm Switch

Press ◀ or ▶ turns on or off the alarm function. If the Alarm Switch is on, when target subject within area box has surface temperature exceeding Alarm Temp, device will alarm with buzzer sound and mark the high temperature location as Alarm Color if Alarm Color is set.

Alarm Temp

When Alarm Switch is off, this option is disabled. When Alarm Switch is on, Alarm Temp is the desired alarm temperature. Short press ▲ or ▼ once to change Alarm Temp 0.1 °C. Press and hold ▲ or ▼ will change Alarm Temp in 1 °C interval. Default setting is 37.0 °C.

Alarm Color

Alarm Color can select from Auto, Black, White, Red, Orange, Yellow, Green, Blue, Gray, and Purple. Default setting is Auto, which is no color alarm.

Isotherm Color

When this option is Auto, there is no Isothermal display. Otherwise, target subject Infrared image will change to selected color when temperature is within the range of (Isothermal Temp \pm Isothermal Width/2). Default setting is Auto.

Isotherm Temp

Press ◀ or ▶ once to change Isothermal Temp 0.1 °C. Press and hold ◀ or ▶ will change Isothermal Temp in 1 °C interval. Default setting is 37.0 °C.

Isotherm Width

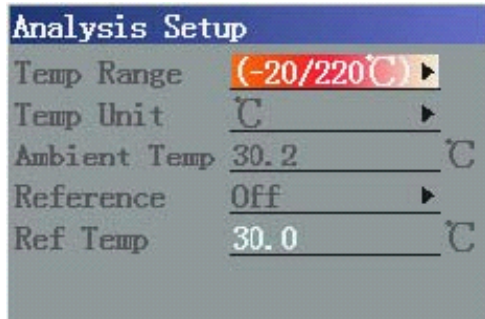
Adjust Isothermal Width to change the range of Isothermal Color display. Press ◀ or ▶ once to change Isothermal Width 0.1 °C. Press and hold ◀ or ▶ will change

Isothermal Width in 1°C interval. Default setting is 1.0°C.

Screen Display

When this option is Off, screen display will clear battery condition, temperature unit, temperature limit, and color palette. Press ◀ or ▶ to change this option.

Analysis Setup



Analysis Setup Sub-menu

Temp Range

Select Temperature range base on measure target temperature.

IR Lens

Select correct IR Lens for best measurement result.

Temp Unit

Select Temperature Unit between °C, °F, and K.

$^{\circ}\text{F} = 9/5 \times ^{\circ}\text{C} + 32$, $\text{K} = 273.15 + ^{\circ}\text{C}$

Ambient Temp

For more accurate measure result, set Ambient Temp to correct environmental temperature. Press ◀ or ▶ once to change Ambient Temp 0.1°C. Press and hold ◀ or ▶ will change Ambient Temp in 1°C interval.

Reference

Set reference point to display all measure result as relative value.

Ref Temp

Manually set a reference temperature for measurement. This option is only active when set Ref Temp as reference.

Image Reverse

Press OK button to reverse palette for thermal image display. Press OK again to switch back.

Clear Screen

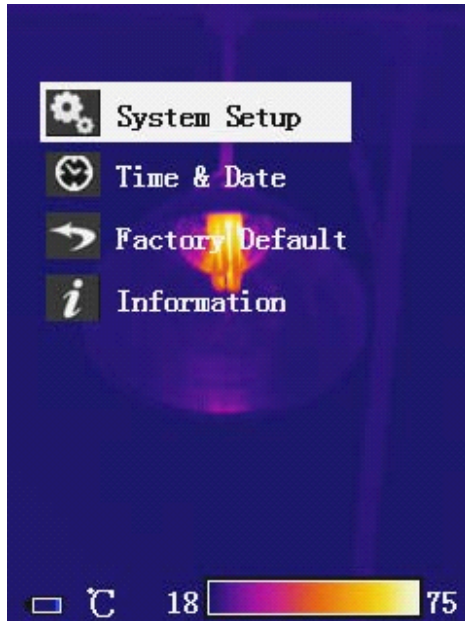
Clear all screen items except Logo mark.

L&S (Auto/Manual Mode)

Press OK button to switch between auto and manual rectifying. In manual rectifying mode, upper-left corner of LCD display shows L&S.

5.2.4 Setup

There are 4 items: System Setup, Time & Date, Factory Default, and Information in Setup menu.

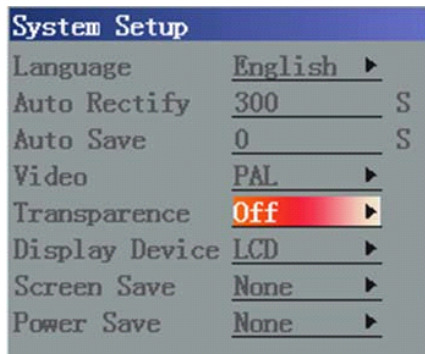


Setup Sub-menu

System Setup

System Setup includes: Language, Auto Rectify, Auto Save, Video, Transparence, Display Device, Screen Save, and Power Save. Press ▲ and ▼ button to switch selection, and press ◀ and ▶ button to adjust value. Active item is highlighted with red background.

!



System Setup Sub-menu

Language

Select different language options.

Auto Rectify

Set the number of seconds to perform next auto-rectify. Set value between 1 to 3000 seconds. Value 0 means disabling auto-rectify feature.

Auto Save

Set the number of seconds to perform next auto-save. Set value between 1 to 3600 seconds. Value 0 means disabling auto-save feature.

Video

Select between PAL and NTSC.

Transparence

Set to enable or disable menu transparence feature.

Display Device

Select between LCD display and external monitor device. Only one video output device can be selected at one time, the other one will be disabled.

Note: If accidentally selected external monitor device and LCD display is disabled, power off and power on device to get LCD display back.

Screen Save

Set the number of minutes without operation to trigger disabling LCD display to save power. Select between 5min, 10min, 30min, and None.

Power Save

Set the number of minutes without operation to trigger power off completely. Select between 5min, 10min, 30min, and None.

Time & Date

Set system date and time. Press OK button to confirm after changes. If Li-Ion battery is removed for a long time, it is necessary to reset system time and date.

Factory Default

Press OK button to confirm restore to factory default.

Information

Select to display system information.

6. Technical Specification

IR Detector	Detector Type	Uncooled FPA
	Resolution	160×120
	Spectral Range	8 ~ 14μm
Infrared Image Quality	Standard Lens	18°×13°/0.15m
	Optional Lens	32°×24°/0.05m 12°×9°/0.15m 4°×3°/0.8m
	Spatial Resolution	1mrad/f=25mm
	Thermal Sensitivity	0.10℃, at 30℃
	Frame-rate	50/60Hz
	Focusing	Manual
	Digital Zoom	2×
	Pixel Pitch	25μm
	Accuracy and Mode	Temperature Range
Accuracy		±2℃ or ±2%
Rectify		Auto/Manual
Measure Mode		Adjustable 4 spot, 3 area, horizontal, vertical line measure, isothermal display, and sound/color alarm
Measure	Color Palette	12 Colors selectable
	Image Setup	Auto/Manual adjustable
	System Setup	Date, Time, Language
	Emissivity	Manual adjustable

	Ambient Correction	Auto
	Atmospheric Correction	Auto

Display	LCD	3.5" Color LCD
Storage	Storage Media (Internal Flash Memory)	Up to 1500 images
	Storage Feature	Auto/Manual
	File Type	JPEG with 14 bits data
	Voice Annotation	40 Seconds voice recording per image
Laser	Classification	Class 2, 1mW/635nm Red
Power Supply	Battery Type	Rechargeable Li-Ion Battery
	Battery Operating Time	3 Hours
	Device Power	Li-Ion battery with external charger External power supply (optional)
	Power Save	Included
	External Power	12V DC
Operating Condition	Operation Temperature	-20°C~ +50°C
	Storage Temperature	-40°C~ +60°C
	Humidity	≤90 % (non condensing)
	Resistant Level	IP54
Size and Weight	Weight	660g
	Size (L×W×H)	330mm×95mm×86mm

7. Technical Support

For common mistakes and issues during operation, please refer the following form. If

issue cannot be resolved, please contact our technical support department.

Problem	Possible Solution
Device cannot power up	<ul style="list-style-type: none"> ● No battery or battery not installed correctly. → Install battery correctly. ● Battery power is low. → Change battery or charge. ● Device power off protection → Wait 5 seconds to power up.
Device power off automatically	<ul style="list-style-type: none"> ● Battery power is low. → Change battery or charge.
Power consumption is too high	<ul style="list-style-type: none"> ● Ambient temperature is low. ● Battery is not fully charged. → Charge battery fully first. ● Battery may already reach end of life. (300 usage cycles) → Switch to new battery.
No thermal image	<ul style="list-style-type: none"> ● Lens lid may be closed. → Remove lens lid.
Thermal image is black and white only	<ul style="list-style-type: none"> ● Black & white palette may be selected. → Change palette.

8. Appendix: Emissivity of Raw Material

For reference purpose only

Material	Surface	Temp (°C)	Emissivity (ε)
Aluminum	Raw	100	0.20
	Oxidized	100	0.55
Brass	Brown polished	20	0.40
	Raw	38	0.22

	Oxidized	100	0.61
Copper	Oxidized	20	0.78
Iron	Oxidized	100	0.74
	Rust	25	0.65
Cast Iron	Oxidized	200	0.64
	Raw	100	0.21
Wrought Iron	Rough	25	0.94
	Polished	38	0.28
Nickel	Oxidized	200	0.37
Stainless Steel	Oxidized	60	0.85
Steel	800°C Oxidized	200	0.79
Brick	--	20	0.93
Concrete	--	20	0.92
Glass	Smooth	20	0.94
Paint	White	100	0.92
	Black	100	0.97
	16 Color average	100	0.94
Carbon	Smoke black	25	0.95
	Candle smoke	20	0.95
	Black-lead rough	20	0.98
Paper	White	20	0.93
Soil	Dry	20	0.90
Wood	Polished	30	0.90
Water	--	30	0.96
Human	Skin	32	0.98
China	Fine	21	0.90
	Rough	21	0.93