



Laboratory Equipment Manufacturer
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Operation Manual Infrared Camera **IR-CAM-160**



PLEASE READ THIS MANUAL CAREFULLY BEFORE OPERATION

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MRC.06.14

To Our Customer

Dear Customer:

Thank you for choosing this Infrared Camera!

Please read this user manual carefully before first use. Also please keep in a safe place for reference in the future.

Please operate with the recommended instructions in user manual.

We reserve the right to change this user manual without further notice.



WARNING

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

NOTICE

- In order not to cause malfunction or even damage the device please do not direct the lens towards strong high-temperature radiation source (such as the sun) whether the power is on or off!
- Avoid violent shock and impact during operation or transport.
- Storage temperature is between -40°C and 70°C . The device must be kept in original packing case during transport.
- Typical storage place is cool, dry, ventilated, and without strong electromagnetic field.
- Keep the lens surface off grease or any chemical substance which would damage the lens. Close the lid after operation.
- Please regularly backup data on PC to prevent potential data loss and format the internal FLASH memory duly to make it operate properly.

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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. This Infrared Camera is packed with advanced features, such as colored thermal image, voice annotation, sound and color alarm, FLASH memory storage, USB connection to PC, and analysis software. Crisp thermal image, accurate temperature reading, clear user interface, reliable product quality, and affordable cost makes this Series Infrared Camera the new standard in Infrared imaging industry!

Typical Application:

- **Power Plant:** Monitor and diagnose the condition of electrical wire and equipment, detect power leak, and prevent system malfunction
- **Petrochemical Industry:** oil pipeline check, material interface detect, heat leakage, insulation structure and power equipment detect.
- **Fire Protection:** forest fire protection and latent fire source search, self-ignition prevention and detection of special material, electric fire precaution detect.
- **Medical Application:** Accurately measure human body temperature in a distance, critical under a contaminated condition
- **Building Industry:** humidity, air leakage and insulation defects detect.
- **Other Applications:** Civil engineering, university research, and railway etc.

1.1 Standard Item List

This Series Infrared Camera comes with the following standard items and accessories:

Item	Quantity
Infrared Camera	1
Li-Ion Battery	2
Battery Charger	1
USB Cable	1
Video Cable	1
User Manual	1
IR Analysis Software CD	1
Suitcase	1

1.2 Optional Item List

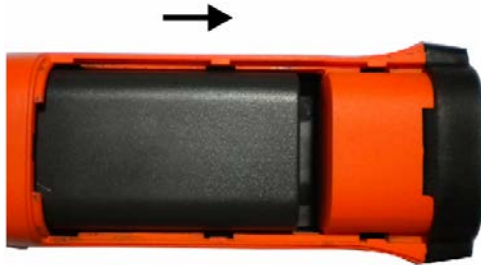
- Wide Angle Lens
- Telephoto Lens

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.

: Normally it takes 3 hours to completely charge one battery.

2.2 Direct Charging

- 1) The battery can also be charged by using an adapter.
Normally it takes 5 hours to charge one battery in this mode.

2.3 Attention for Using Battery Charger

- 1) Battery Charging can only be conducted inside of a house.
- 2) Do not short-circuit the battery.
- 3) Do not put the battery in high temperature environment ($\geq 60^{\circ}\text{C}$). Never disassemble the battery or put it into fire, which may cause explosion.
- 4) Do not try to modify the battery or the charger.
- 5) Please remove the charger from AD socket as soon as charging is completed.

3. Panel Function Summary

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

3.1 Main Control Panel



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.

3, 4, 5, 6. Direction Buttons

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

In main menu, 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 8, 3.3) and in area measure mode:

- Select the measure spot; press ▲, ▼, ◀, and ▶ to move the spot in the same direction.
- Select the measure line and sampling line; press ▲, ▼, ◀, and ▶ to move the line in the same direction.
- Select area box: in **move** menu, press ▲, ▼, ◀, and ▶ moves area box, and in **size** menu, press ▲, ▼, ◀, ▶ resizes area box.
- Select Color Palette or temperature measurement limit: 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.

: 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.

9. Laser Sight

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

3.2 Rear Interface Panel



10. Video Output

CVBS standard video output.

11. Audio Output

Audio output playbacks recorded voice annotation.

12. USB 2.0 Interface

USB2.0 interface transfers data between device and PC.

13. External DC In

External DC requirement is 12V.

3.3 Side View



14. Hotkey Button

Press Hotkey button to switch between Color Palette, area measurement rectangle, temperature limits, and 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, $\text{+*}=\text{x}$ 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.
4. Press ▲ button or ▼ button to switch between normal and 2X zoom. Upper-left LCD corner displays x2 when in 2X zoom.
5. When measure 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 IR Analysis 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.

: 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 Replace Lens

1. Screw off the lens on device, replace it with another lens and screw on tightly.



2. Press ◀ or ▶ to adjust "IR Lens" in "Analysis Setup" menu.
3. Operate Image Save and Image Playback according to the steps mentioned in 4.3 and 4.4 hereinabove.

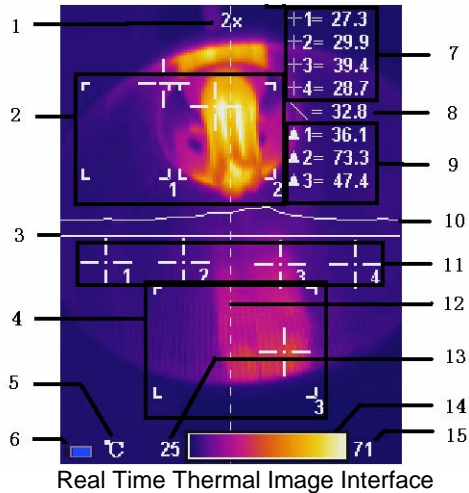
4.6 Connect to PC

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

5. Operation Menu

5.1 Display Summary

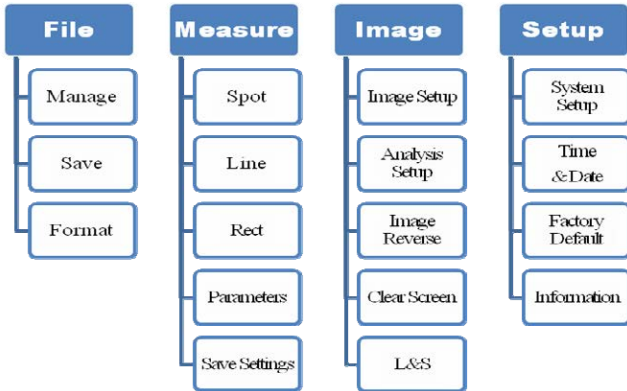
All items can be selected by short pressing the Hotkey button (Note: Long press Hotkey button will turn on/off laser sight). The selected item is flashing in yellow color. If no operation in 2 seconds after selection, Hotkey mode will exit automatically.



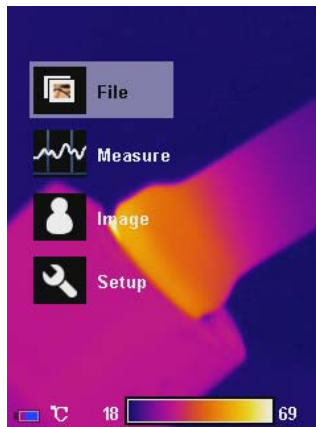
- 1 **Symbol for 2X zoom:** symbol 2X denotes enlarge twice in size; press ▲、▼ button to realize the function.
 - 2, 4 **Area measure box:** 3 areas can be selected in area measure mode.
 - 3 **Horizontal measure line:** Horizontal sampling line.
 - 5 **Temperature unit:** there are three options: °C、°F、K.
 - 6 **Battery condition:** indicates current battery power condition.
 - 7 **Point measure:** $\text{---}1$, $\text{---}2$, $\text{---}3$ and $\text{---}4$ indicates temperature value of point 1, 2, 3 and 4 respectively.
 - 8 **Line measure:** the temperature value in the crossing of measure line and cursor line.
 - 9 **Area measure:** measure points within the area (maximum, minimum or average temperature is optional)
 - 10 **Temperature distribution curve:** sample temperature distribution curve of the measure line.
 - 11 **Point measure cursor:** 4 measure points can be selected.
 - 12 **Cursor line:** it appears in line measure mode.
 - 13, 15 **Lower limit temperature, upper limit temperature:** the lower and upper limit temperature of the color code at the same time.
 - 14 **Color code:** color palette. Any kind of color code is available in the 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.

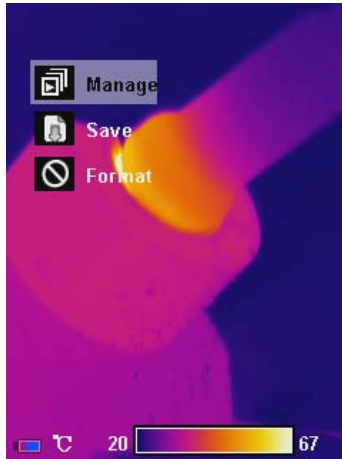


Main Menu

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

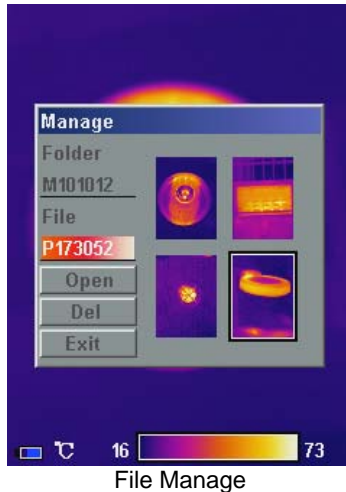
Using File menu to save, playback, delete thermal image and voice annotation.



File Sub-menu

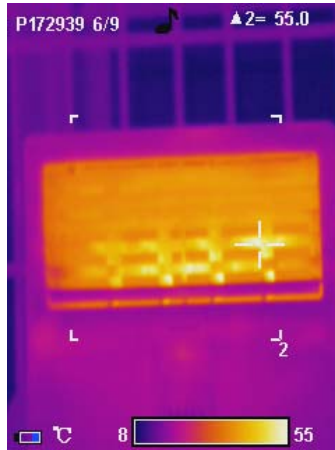
Manage

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



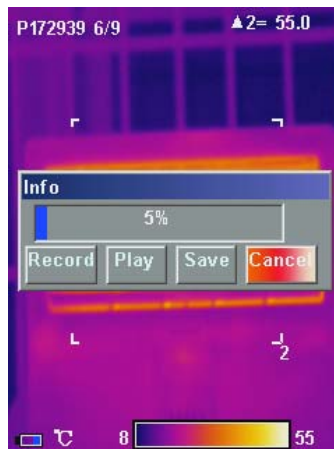
Folder is automatically created if not exist when saving thermal image. Folder name is MYMMDD, and YYMMDD is year, month, and date. For example, Jan 2nd, 2009 folder is M090102. All thermal images taken in this day is saved in this folder. Thermal image file name is Phhmmss, and hhhmmss is hour, minute,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



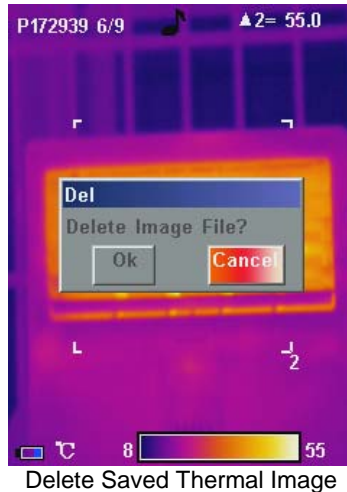
Thermal Image preview

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.



To exit thermal image playback, long press OK button.

Save

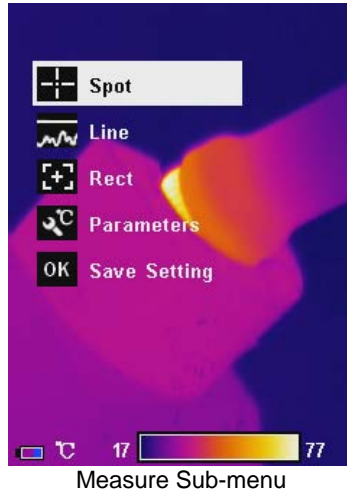
Save current thermal image. Freeze image first before saving.

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

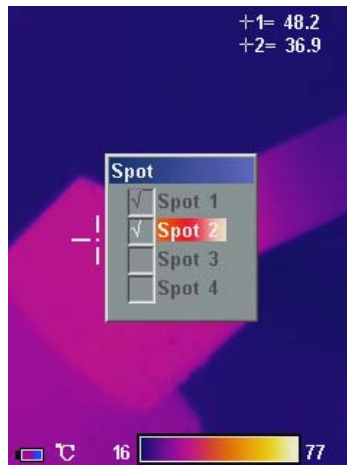
There are 5 items: Spot, Line, Area (Rect), Parameters, and Save Setting in Measure menu.



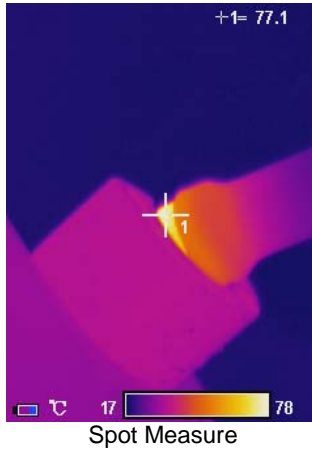
Measure Sub-menu

Spot Measure

Press ◀ or ▶ button to select or deselect. Selected spot is check marked. Up to 4 spots can be selected at the same time.



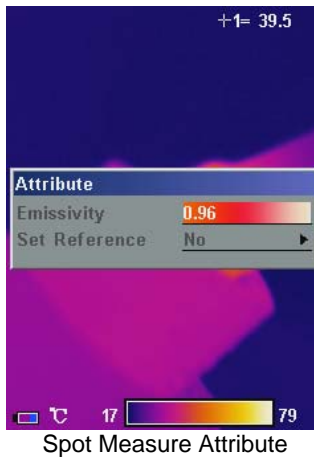
Spot Target Selection



Measure result on upper-right LCD corner is temperature reading at location marked with +1= . Up to 4 spots can be selected.

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.



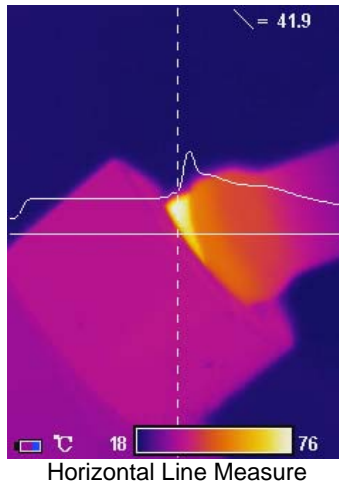
Emissivity: Refer to Appendix *Emissivity of raw materials*.

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

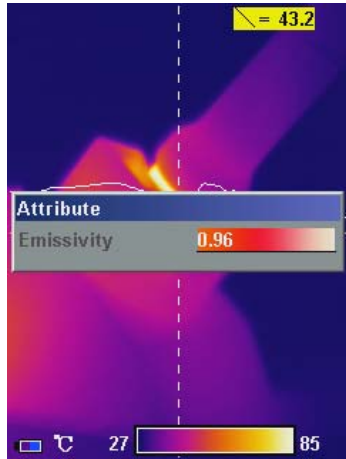
Line Measure

There are 2 line measure options: vertical and horizontal.

Horizontal Line Measure

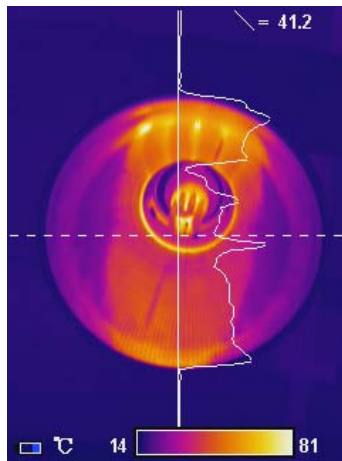


Horizontal line is temperature sampling line, and upper-right LCD corner displays temperature measurement reading on vertical cursor line intersection. After using Hotkey button select line measure, press ▲ and ▼ button to adjust sampling line position, and press ◀ and ▶ button to adjust cursor line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



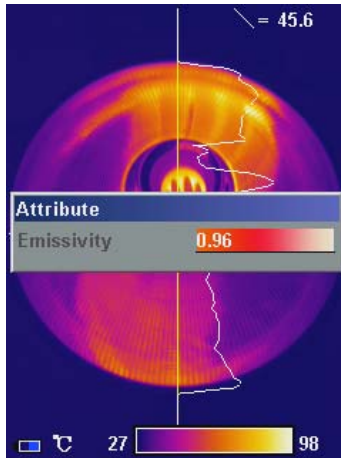
Horizontal Line Measure Attribute

Vertical Line Measure



Vertical Line Measure

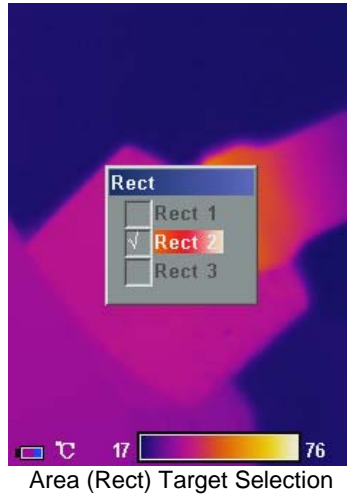
Vertical line is temperature sampling line, and upper-right LCD corner displays temperature measurement reading on horizontal cursor line intersection. After using Hotkey button select line measure, press ◀ and ▶ button to adjust sampling line position, and press ▲ and ▼ button to adjust cursor line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



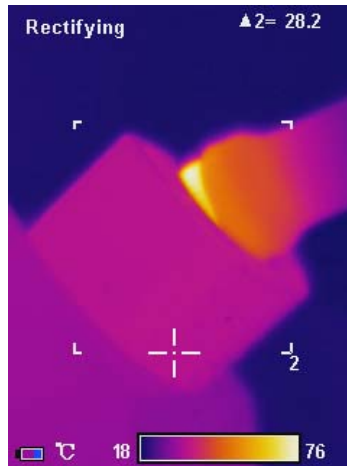
Vertical Line Measure Attribute

Area (Rect) Measure

Press ◀ or ▶ button to select or deselect. Selected Area is check marked. Up to 3 areas can be selected.



Area (Rect) Target Selection



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 in which four parameters can be adjusted namely: emissivity, set reference, measure type, move /size.



Area (Rect) Measure Attribute

Emissivity: Refer to Appendix: *Emissivity of raw materials*.

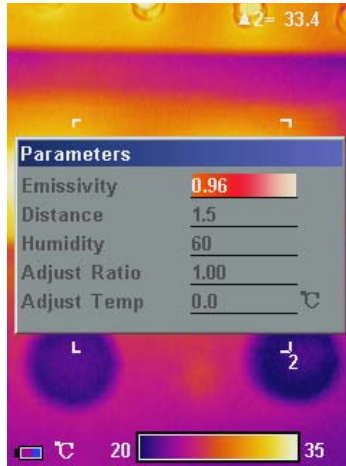
Set Reference: Set current area as reference. If selected, all measure result will be relative value to this temperature.

Measure Type: Select from 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.



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 by 0.01. Long press ◀ 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. Long press ◀ or ▶ will change Distance in 1m interval.

Humidity

This value can be omitted if target is close to device (less than 10m). Otherwise, set Humidity value according to environmental condition. Press ◀ or ▶ once to change Humidity 1%. Long press ◀ 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. Long press ◀ 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. Long press ◀ or ▶ will change this value in 1°C interval.

Save Setting

All parameter changes must be saved before power off 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

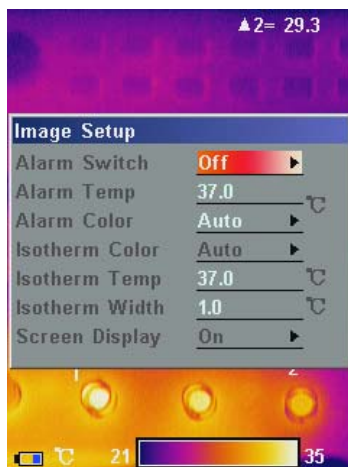


Image Setup Sub-menu

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. Press ◀ or ▶ once to change Alarm Temp 0.1°C. Long press ◀ 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 ± Isothermal Width/2). Default setting is Auto.

Isotherm Temp

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

Isotherm Width

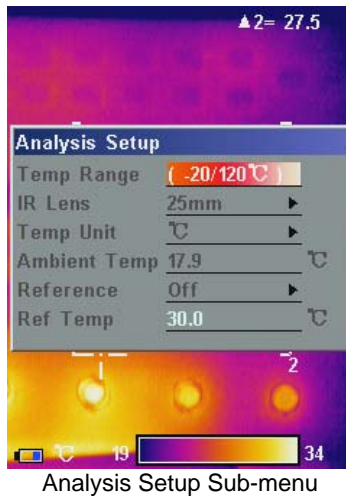
Adjust Isothermal Width to change the range of Isothermal Color display. Press ◀ or ▶ once to change Isothermal Width 0.1°C.

Long press ◀ 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 turn on/ off this option.

Analysis Setup




Analysis Setup Sub-menu

Temp Range



Select Temperature range base on measure target temperature from 3 options: standard grade (-20/120°C) and medium grade (0/350°C) and extra grade (350/1200°C) which is customized.

IR Lens





Select correct IR Lens for best measurement result. There are 3 options for this infrared camera: 11mm (standard lens), 6.3mm (wide angle lens), and 54mm (telelens).

: The camera may need 20 seconds to readjust a new lens before it can work properly.

Temp Unit

Press  or  to select Temperature Unit from $^{\circ}\text{C}$, $^{\circ}\text{F}$, and K.
 $=9/5^{\circ}\text{F} + 32$, $\text{K} = 273.15 + ^{\circ}\text{C}$

Ambient Temp

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

Reference

Set reference spot or area to display measure results as relative value.

Ref Temp





Press  or  once to change Ref Temp 0.1°C . Long press  or  will change Ref Temp in 1°C interval. 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

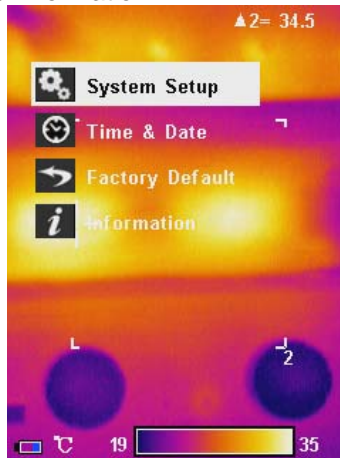
Press OK button to clear all screen items except Logo mark.

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 in Setup menu: System Setup, Time & Date, Factory Default, and Information.



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

There are 11 different language options: Simplified Chinese, Traditional Chinese, English, Korean, Japanese, German, French, Russian, Italian, Portuguese and Spanish.

Auto Rectify

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

Auto Save

Set the number of seconds to perform next auto-save. Set value between 5 to 3600 seconds. Value 0 means disabling auto-save feature. Press ◀ or ▶ once to change the value by 1 second. Long press ◀ or ▶ will change the value in 10 intervals.

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.

: 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 10min, 20min, 30min, and None.

Time & Date

Set system date and time. Press ▲ or ▼ button to select an item, press ◀ or ▶ button to change its value and press OK button to confirm. If Li-Ion battery is removed for a long time, it is necessary to reset system time and date.

Factory Default

Restore factory default and rectify some improper settings.

Information

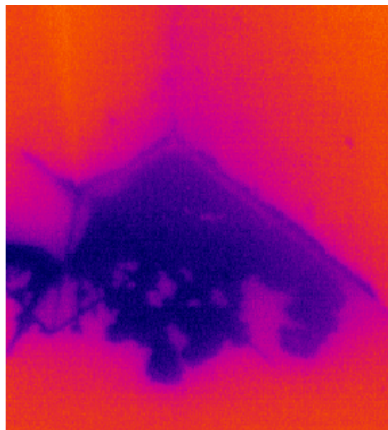
Select to display system information, such as: serial number, software version, and production date etc.

6. Building Thermal Imaging Summary

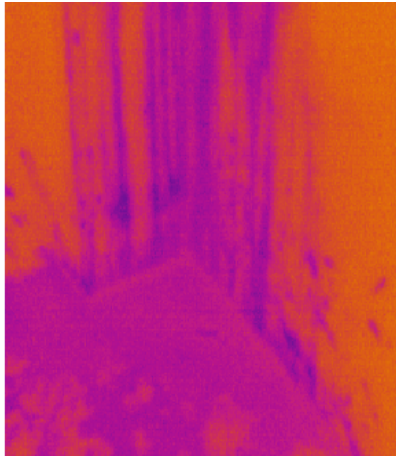
As the quality of life improves and the low-carbon life style becomes known, higher demands are being set on buildings. The features of our IR camera make it possible to detect slight temperature difference and to analyze indoor humidity and leakage. Hereinafter are images in some cases.



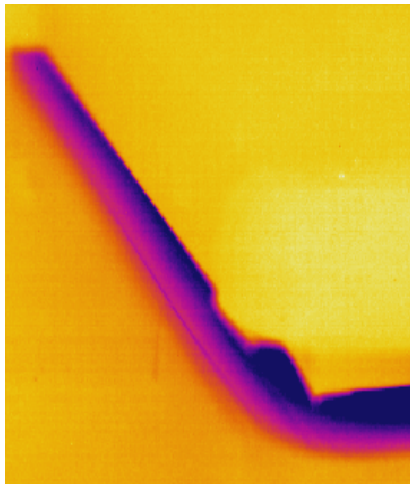
The effect drawing of building detection



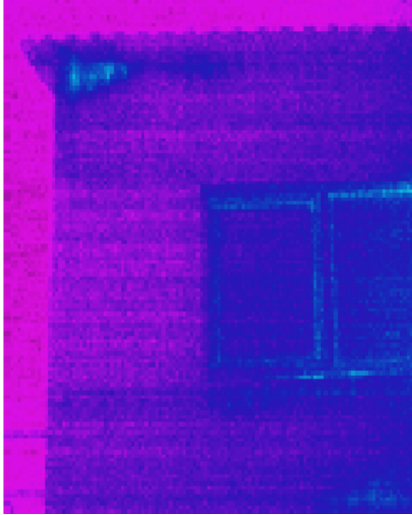
The effect drawing of indoor humidity



The effect drawing of indoor water leakage



The effect drawing of indoor corner air leakage



The effect drawing of outdoor corner air leakage

7. Technical Specification

IR Detector	Type	New UFPA micro-bolometer
	Resolution	160×120
	Pixel Spacing	25μm
Infrared Image Quality	Standard Lens	21°×16°/0.15m
	Optional Lens	Wide-angle 35°×27°/0.05m telelens 4°×3°/0.8m
	Spatial Resolution	2.3mrad(standard lens)
	Thermal Sensitivity	<60mk at 30℃
	Frame-frequency	50/60Hz
	Focusing	Manual
	Digital Zoom	2X
	Spectral Range	8~14μm
Display	LCD	3.5" Color LCD
Measure	Temperature Range	-20℃~+120℃/ 0℃~+350℃ Up to 1200 ℃(optional)
	Accuracy	±2 or ±2%(reading range), select the bigger value
	Measure rectification	Auto/Manual
	Measure Mode	4 spots, 3 areas available under real time mode(max, min and average temp) line measure, isothermal display, temp difference measure and temp alarm (sound/color)
	Color Palette	12 Colors selectable (including iron red, rainbow, black-white, and white-black etc.)
	Image Setup	Auto/Manual adjust contrast, brightness
	System Setup	Date, Time, Temperature Unit °C/°F/K 10 Languages available, namely: Chinese (simplified & traditional), English, Italian, Japanese, Russian, French, German, Korean, Spanish and Portuguese.
	Emissivity Rectification	Adjustable from 0.01 to 1.0
	Ambient Temp Rectification	Auto, according to background temperature input
	Atmospheric Trans Correction	Auto, according to distance, relative humidity, ambient temperature input

Continued table: Technical Specification

Storage	Storage Media (Built-in Memory)	Up to over 1500 images
	Storage Mode	Auto/Manual single frame image storage
	File Type	JPEG, with 14 bits measure data
	Voice Annotation	40 Seconds voice recording per image (built-in microphone)
Laser	Director	Class 2, 1mW/635nm Red
Power Supply	Battery Type	Rechargeable Li-Ion Battery
	Battery Operating Time	3 Hours (Under normal temperature)
	Charging type	Intelligent charger
	Power Save	Included
	External Power	12V±5% DC
Operating Condition	Operation Temperature	-20 °C +50°C
	Storage Temperature	-40°C ~ +70°C
	Humidity	≤90% (non condensing)
	Protection Grade	IP54
	Shock	25G IEC68-2-29
	Vibration	2G IEC68-2-26
Physical	Weight	≤780g(Include battery and lens)
	Size (LxWxH)	330mm×95mm×86mm

8. 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.

For simple problems arising during operation, please refer to the following table. If the problem cannot be settled, please cut off the power and contact our technical department.

Problem	Cause and Solution
Camera cannot be powered on	<ul style="list-style-type: none">● No battery or batteries are not installed correctly → Install battery correctly.● Battery power is used up. → Change battery or recharge.● Save power mode → power on after 5 seconds.
Device power off automatically	<ul style="list-style-type: none">● Battery power is used up. → Change battery.
Battery power is soon used up	<ul style="list-style-type: none">● Ambient temperature is too high or low.● Battery is not fully charged. → recharge battery fully.● Battery may already reach end of life. (300 usage cycles) → use new battery to charge.
No thermal image	<ul style="list-style-type: none">● Lens lid is closed. → Remove lens lid.
Thermal image is black and white	<ul style="list-style-type: none">● Black & white palette may be selected. → restore factory default.

9. Appendix: Emissivity of Raw Material

(For reference purpose only)

Material	Surface	Temp (°C)	Emissivity (ε)
Aluminum	inoxidized	100	0.20
	Oxidized	100	0.55
Brass	Brown polished	20	0.40
	Unpolished	38	0.22
	Oxidized	100	0.61
Copper	Oxidized badly	20	0.78
Iron	Oxidized	100	0.74
	Rusted	25	0.65
Cast Iron	Oxidized	200	0.64
	inoxidized	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 Oxidized	200	0.79
Brick	--	20	0.93
Concrete	--	20	0.92
Glass	Smooth flat	20	0.94
Lacquer	White	100	0.92
	Natural Black	100	0.97
Carbon	Smoky black	25	0.95
	Candle smoke	20	0.95
	Black-lead rough	20	0.98
Paint	16 Color average	100	0.94
Paper	White	20	0.93
Soil	--	20	0.90
Wood	Polished	30	0.90
Water	--	30	0.96
Skin	Human	32	0.98
China	Fine	21	0.90
	Rough	21	0.93

***Uncooled Focal Plane Infrared
Cameras***

IRSee Report Software

User Manual

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Disclaimer

1. Limited Liability

Software does not guarantee the quality, performance or applicability of any hidden special purpose.

The contents of this manual will be updated because of device upgrade or other various reasons. Our company reserves the right to edit this manual without further notice.

2. Quality Assurance

The quality administration system of this product during the process of R&D and production has been approved in accordance with ISO9001 standard.

3. Compatibility with Previous Versions

This IRSee Software version supports all file and data created by any IRSee Software version.

4. Compatibility with Infrared Camera

This Software supports all JPEG format image recorded by TI Series Infrared Camera.

I . Software Installation

Welcome to Use IRSee software.

1. Introduction

The IRSee Report version has a friendly user interface, 4 methods for measure analysis, and the function to save analysis report in Word, PDF, Excel and other formats.

2. System Requirements

The files of the IRSee software consist of IR image, visual image and graphic file, all of which are far bigger than normal text files, thus the following standards of the computer hardware configuration should be met:

2.1 Hardware Requirements

- CPU PENTIUM ® Dual-Core 2.0GHz processor or faster.
- 1Gbytes or more system memory.
- 20G or bigger hard disk.
- 1440×900 or higher resolution screen.

2.2 Operating System

IRSee Software is compatible with Microsoft Windows 2000, XP, Vista, Windows 7. It provides a multi-language version for users.

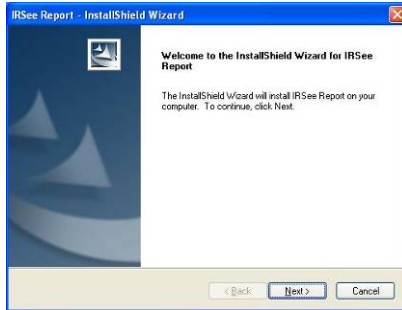
3. Software Installation

The instructions of IRSee software installation and necessary precautions before using this software will be given in detail hereinafter: Please follow the instructions when installing IRSee software application. Place software CD-ROM into CD drive, and run setup.exe in the CD root directory.

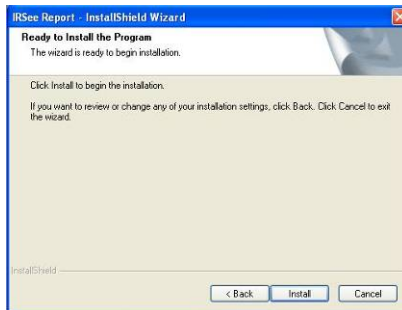
The default route is C:\Program Files \IRSee Report. You can change directory when installing.

Note: The software to operating and install in administrator on the Vista/Win7.

Step A: Running the Setup.exe, the system indicates the installation path, please adjust or change as needed.



Step B: Click the Next button to access the software installation.



Step C: Click the Next button continuously until the software installation is completed. The system will enter the decoder installation automatically.

Step D: Click and follow the default installation settings until the installation is completed.



4. Uninstall Software

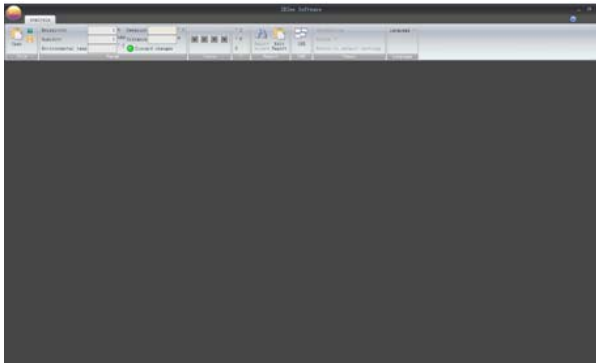
Please select the "Delete" button if want to reinstall the software.


5. Starting-up Software

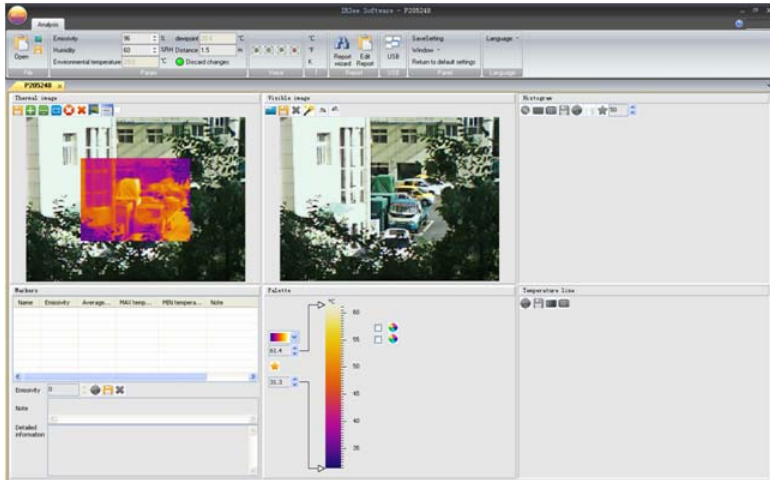
The following icon appears on Windows desktop after installing IRSee software.



Double-click the icon and startup IRSee interface.



Open an image by menu: open or icon  in the ribbon.



Note: IRSee software has 10 different working languages, namely: Chinese (simplified & traditional), English, Italian, Japanese, Russian, French, German, Korean, Spanish and Portuguese. IRSee software has auto-recognition language function with the operating system in PC, the IRSee will be in English version if the operating system is beyond mentioned languages in PC.

II. Function Description

1. Image Import and Export

1.1 Image Import

◆ Method 1:

- Click the software icon on upper left corner to pop up the menu.
- Click the Open button (also available to select a recently opened image path in the image bar) to pop up the file selection dialog box.
- Select a file in the file selection dialog box (single or multiple selections available).

◆ Method 2:

- Click the “Open” button in the ribbon.

1.2 Image Export

It is available to export in accordance with the following methods after importing images:

◆ Method 1:

- Click the button “Save Picture As” button on the software icon on the upper left corner to pop up a file selection dialog box.
- Select / a file path and save the image in the current active window.

◆ Method 2:

- Click the property analysis in toolbar.
- Click the button “Save picture As button to pop up a file selection dialog box.
- Select / a file path and save the image in the current active window.

◆ Method 3:

- Click the software icon on the top left corner.
- Click the button “Save current picture” to save the modified image on the current active window.

◆ Method 4:

- Click the property analysis in Ribbon.
- Click the button “Save current picture” to save the modified image on the current active window.

2. Modules

As displayed on the software interface, the software has the follows: the Quick Access Toolbar, Ribbon, Measuring Temperature Zone, Histogram Area, Line Profile Measurement Area, Color Code Area, Label Area, and Visible Area.

2.1 Ribbon

The Ribbon is composed of File, Parameters, Audio, Temperature Type Settings, Report Wizard, USB, Panel and Language.


2.1.1 File

2.1.1.1 Open


- Click the File button to pop up a file selection dialog box.
- Select and open a file to be analyzed in the dialog box.

2.1.1.2 Save

◆ Method 1:

- Click the  “Save current image ”button to pop up a file selection dialog box.
- Set / select the file path name where the file is saved.
- Save the image in the current active window.

◆ Method 2:

- Click the File and select the  “Save all images ” button to save all the modified images.

2.1.2 Set

2.1.2.1 Emissivity adjustment

◆ Method 1:

- Please input a required emissivity value (1-100) in the Emissivity edit box.
- Press the Enter key to confirm it.

◆ Method 2:

- Click the Up and Down keys in the edit box to adjust and set an emissivity value.

2.1.2.2 Humidity Adjustment

- Please input a required humidity value (1-100) in the humidity edit box.
- Press the Enter key to confirm.

2.1.2.3 Distance Adjustment

- Please input a required distance value (1-1000, unit: meter) in the distance edit box.
- Press the Enter key to confirm.

2.1.2.4 Ambient Temperature

Select the option to show the actual ambient temperature while the thermal image is being shot.

2.1.2.5 Dew Point Temperature

Select the option to show the dew point temperature.

2.1.2.6 Cancel Changes

Click the “Return to default settings ” button to recover the emissivity, humidity, ambient temperature, or distance to its original state.

2.1.3 Audio

When analyzing thermal images with voice information, buttons in audio section would be effective and show in green, you can replay the voice saved with the image by clicking corresponding buttons. Otherwise the buttons would show in gray and cannot be operated.

2.1.4 Set Temperature Type

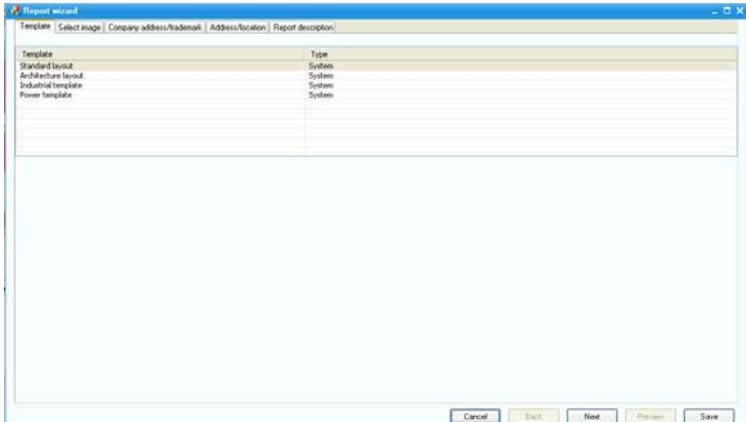
This option is used to set the temperature display unit, click °C, °F or K to set the temperature unit to Celsius, Fahrenheit or Kelvin respectively.

2.1.5 Report Wizard

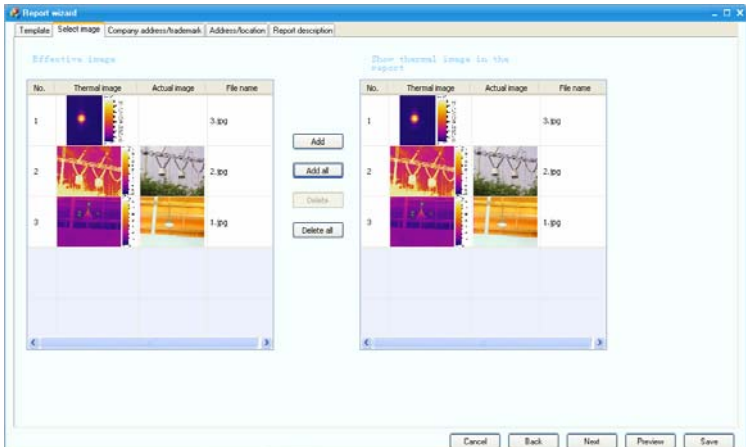
2.1.5.1 Report Wizard

Report Wizard is used for creating a report, the Report Edit is mainly used for editing a report for further analysis.

Click the Report Wizard to select the type of exported report as needed.



Click Next to select an image or multiple images.



Fill in related information in accordance with different types of report templates ->> Preview

After necessary information completed, you can click the “save” button to save the report as needed. All reports have the same format of “.HX” , and reports can be edited again in IRSee software.

Inspection Report

Company name

Customer name

Address

Address

Tel/Fax

Tel/Fax

E-mail

E-mail

Contact

Contact

Instrument name

Instrument type

Instrument serial No

Lens

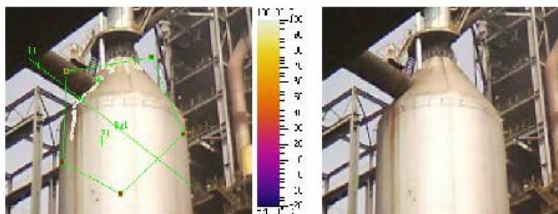
Measurement point

Name

Address details

Measurement description

NO.	File:	Date:	Measuring Time:
1	P1 00503.JPG	2011-09-02	10-5-3

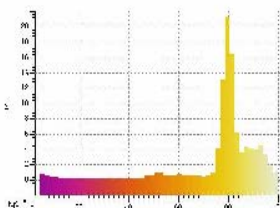


Emissivity: 0.96

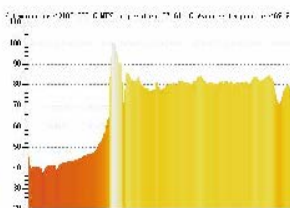
Remark

Marker	Emissivity	Mintemp.	Average temp.	Max temp.	Remark
P1	0.96	82.21° C	82.21° C	82.21° C	
L1	-	37.61° C	69.94° C	>100° C	
R1	0.96	4.41° C	79.28° C	>100° C	

Histogram



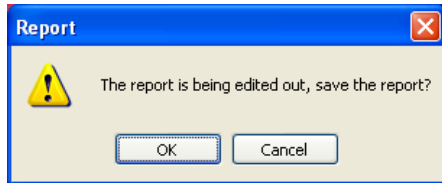
Temperature line



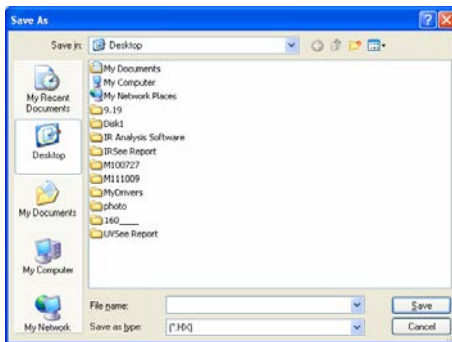
Note

2.1.5.2 Edit Report

If a report is to be closed, the system will prompt whether to save the report or not.

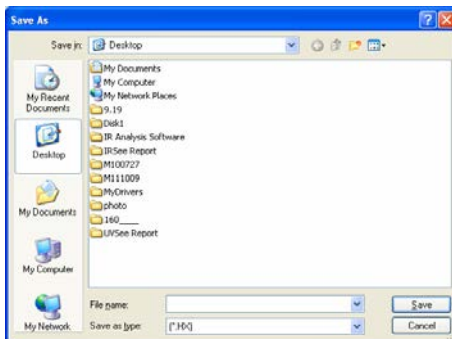


Click the OK button.



Input and select the saving path and file name, and then click the Save button.

Click the report in Ribbon --> Edit Report

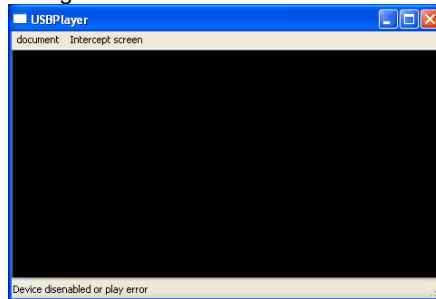


Select a saved report to reopen and edit it.

2.1.6 USB Direct-Transmission (only for device with Direct-Transmission function)

2.1.6.1 Connection

Click the Ribbon Settings ->> USB Direct-Trans

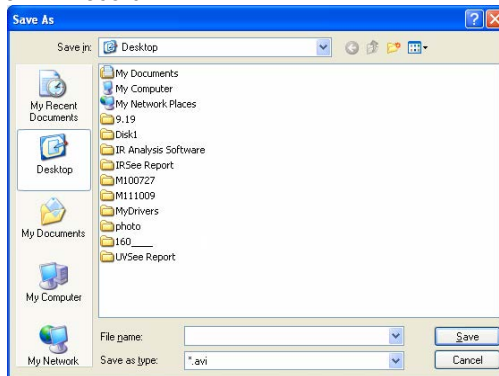


Connect a device, set to USB Direct-Trans mode for the device.

Click the device icon on PC software interface ->> Open the device ->> Play

2.1.6.2 Video

Click the device ->> Record



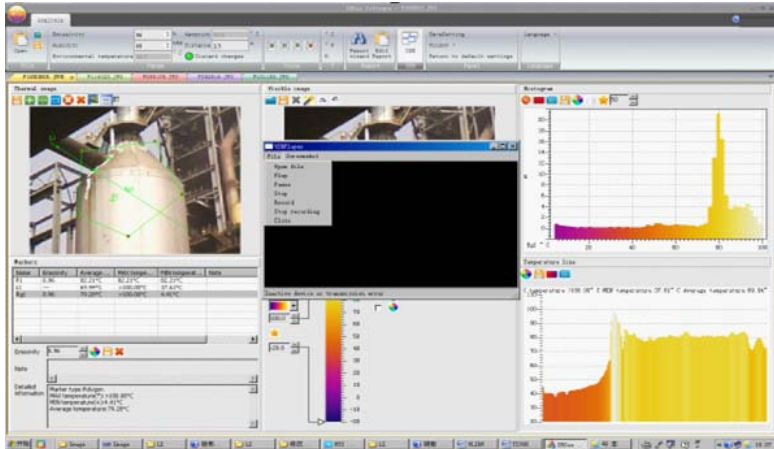
Select a video path ->> Input the name of the video file.

2.1.6.3 Stop the video

Click File ->> Stop Recording

2.1.6.4 Pause, Stop and Close Direct-trans

Click the Pause, Stop and Close buttons under the File menu respectively to stop the current operation.



2.1.6.5 Print Screen

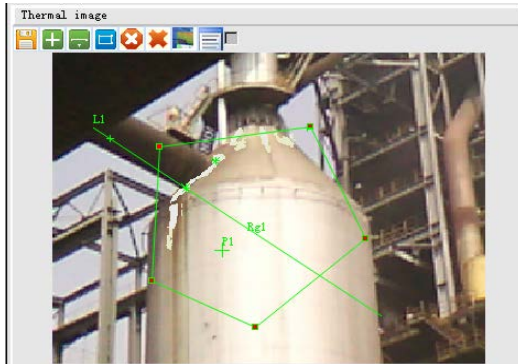
Click the Print Screen button and save the printed image into the Picture folder under the installation directory, and name it by a time format.

2.1.7 Panel

It is mainly used for showing/ hiding each area, a user can adjust the size and position of each display area as needed, and then click the “Save Settings” to save the current settings, and click the “Return to default settings” to recover.

2.2 Measuring Temperature Zone

The functional options in measuring area are shown below:



- The measurement objects can analyze the thermal images by the following three kinds of analysis methods: point, line, and area.
- Line measurement analysis has four types: arbitrary line, horizontal line, vertical line and multiple-line analysis.
- Area measurement analysis has below: rectangular, elliptical and polygonal analysis.
- The system can analyze up to 20 spots objects, 10 lines analysis object, 20 area analysis objects, 10 polygonal objects and 10 elliptical objects simultaneously.

2.2.1 Select Measured Objects


The prior sequence of object selection is point, line, and area.

- When two or more objects are simultaneously selected, the system can operate in accordance with the above prioritization.
e.g.: if both a point object and a line object are simultaneously selected, the point is more prior than line, the point object will be prior selected;
If both an area object and a line object are simultaneously selected, the line is more prior than the area; the line object will be prior selected.
- If two or more areas are simultaneously selected, the smaller area will prevail.


e.g.: If Rectangle 1 and Rectangle 2 are simultaneously selected, Rectangle 1 is smaller than Rectangle 2, Rectangle 1 will prevail.

2.2.2 Point Analysis


Create a point

- Click the button 
- Move the mouse to a point to be analyzed, and click it.

Move a point

- Move the mouse to a point to be moved.
- When the mouse status changes to , left-click to select the point.
- Move the mouse.



Delete a point

- Select a measurement point to be deleted.
- Click the  button to delete selected Measured Objects.



2.2.3 Line Analysis

Create a line



◆ Arbitrary line

- Click the  Create button to pop-up a menu.
- Click the  Arbitrary Line button.
- Set a starting point of the line in the thermal image to be analyzed.
- Left-hold and drag the mouse to the terminal point of the line.

◆ Vertical Line


- Click the  Create button to pop-up a menu.
- Click the  Vertical Line button.
- Set the vertical coordinates of starting point of the line in the thermal image to be analyzed.
- Left-hold and drag the mouse to the vertical coordinates of terminal point of the line.

◆ Horizontal Line



- Click the  Create button to pop-up a menu.
- Click the  Horizontal Line button.
- Set the horizontal coordinates of starting point of the line in the thermal image to be analyzed.
- Left-hold and drag the mouse to the horizontal coordinates of terminal point of the line.

Move and change a line


◆ Move

- Move the mouse to the position of a line to be moved.
- When the state of mouse becomes , left-click to select it.
- And then move it.

◆ Change the positions of starting point / terminal point

- Move the mouse to the position of the line to be moved.
- When the state of mouse becomes , left-click to select the line.
- Move the mouse to the position of starting point / terminal point to be moved.
- When the state of mouse becomes , left-click to select starting point / terminal point.
- Drag the mouse to the required position of starting point / terminal point.



Delete a line

- Select the line measurement object to be deleted.
- Click the  button to delete selected Measured Objects




2.2.4 Area Analysis

It has three areas: rectangle, polygon, and ellipse.




Create a rectangle

- Click the  Create Area button to pop up a menu.
- Click the Rectangle .
- Select the starting point of the rectangle in the thermal image to be analyzed.
- Drag the mouse to create a rectangular analysis area.







Move and Drag a Rectangle

- ◆ Move
 - Move the mouse into the rectangle target area.
 - When the state of mouse becomes  , click to select it.
 - Move the mouse.
- ◆ Zoom in / out
 - Move the mouse into the rectangle to be modified.
 - When the state of mouse becomes  , click to select it.
 - Move the mouse to the eight vertexes of the rectangle.
 - When the state of mouse becomes  , click to select it.
 - Move the mouse to change the size of the rectangle.


Delete a rectangle

- Select the rectangle object to be deleted.
- Click the  button to delete selected Measured Objects Create a polygon
- Click the  Create Polygon to pop-up a menu.
- Click the Polygon .
- Select the starting point of the polygon in the thermal image to be analyzed.
- Move the mouse and left-click to add other vertices of polygon.
- Right-click to stop adding the vertices to create a polygon.
- If the number of vertices is equal to or more than 50, the system can stop adding automatically.



Move and Drag a Polygon

- ◆ Move
 - Move the mouse into the polygon to be analyzed.
 - When the state of mouse becomes  , click to select it.
 - Move the mouse.
- ◆ Zoom in / out
 - Move the mouse into the polygon to be modified.
 - When the state of mouse becomes  , click to select it.
 - Move the mouse to a vertex to be modified.
 - When the state of mouse becomes  , click to select it.
 - Move the mouse to change the position of the vertex, thus to modify the polygon.

Delete a Polygon



- Select the polygon to be deleted.
- Click the  button to delete selected Measured Objects

Add an ellipse





- Click the  Add Area button to pop-up a menu.
- Click the Ellipse .
- Select the starting point of the ellipse in the thermal image to be analyzed.
- Drag the mouse to create an elliptical analysis area.

Move and Drag an Ellipse


◆ Move

- Move the mouse into the ellipse to be moved.
- When the state of mouse becomes  , click to select it.
- Move the mouse.


◆ Zoom in / out

- Move the mouse into the ellipse to be modified.
- When the state of mouse becomes  , click to select it.
- Move the mouse to the eight vertexes.
- When the state of mouse becomes  , click to select it.
- Move the mouse to change the size of the ellipse.

Delete an ellipse

- Select the ellipse to be deleted.
- Click the  button to delete selected Measured Objects


2.2.5 Save Images

Click the  Save Images button to pop up the file selection dialog box.

Select image formats

- Select / set the file path.
- Click the Save button to save the image .


2.2.6 Clear measured objects

Click the  Clear Measured Objects button to clear all point, line, area analysis of measured targets.

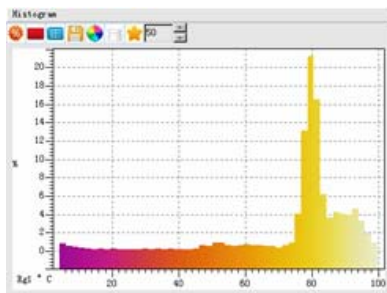
2.2.7 PIP / Infrared(only for visible image)

Click the  button to switch between the PIP and infrared modes.

2.2.8 Export Temperature Data


Click the  button to export all the points' temperature in the whole thermal image to TXT file, the temperature unit is Celsius.

2.3 Histogram Area




2.3.1 Relative / absolute Scale


If the relative scale is selected, the vertical axis represents the percentage of the number of measured points; if the absolute scale is

selected, the vertical axis represents the actual number of corresponding measured points. It is available to click the  button to switch.


2.3.2 Gradient / Solid Color Display

If the gradient histogram display mode is enabled, the system can automatically select corresponding color to fill the histogram in accordance with the temperature; If the solid color display mode is enabled, the system will fill histogram with red. it is available to click the  button to switch.


2.3.3 Enable /Disenable Grid

If the grid is enabled, it is available to draw grid dashed lines on the histogram background; if disenabled, it's unavailable to draw. it is available to click the  button to switch.


2.3.4 Save a Histogram

- Click the  Save Images button to pop up the file selection dialog box.
- Select the image format.
- Check / set the path to save the image.
- Click the Save button to save the current histogram.


2.3.5 Set the Background Color

- Click the  Set Background Color button to pop-up color selection dialog box.
- Select a background color.
- Click the OK button to confirm the background color.

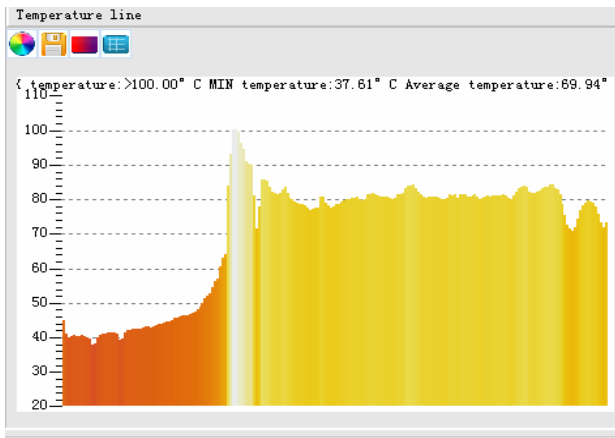
2.3.6 Show / Hide the Out-of-Range Column

Click the  button to show or hide any column out of temperature range of color code bar, composed of points.


2.3.7 Reset

Click the  Reset button to reload the default state to the histogram.


2.4 Line Profile Measurement Area




2.4.1 Show /hide grid lines

Click the  Grid button to switch the grid display and hide mode.

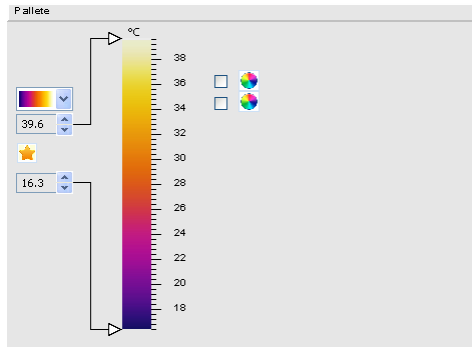
2.4.2 Set the background color

- Click the  background color button to pop-up color selection dialog box.
 - Select a background color.
 - Click the OK button to confirm the background color.
-

2.4.3 Save the line profile measurement image


- Click the  button to pop up the file selection dialog box.
- Select an image format.
- Check / set the path to save the image.
- Click the Save button to save the line profile measurement image.

2.5 Color Code Area





It is available to adjust the type of color code, 12 kinds of color bars are available. A User can also adjust the maximum or minimum temperature, and isothermal upper and lower limits, any out-of-range temperature can not be supported. If the dew point is selected, the corresponding color code of below the dew point temperature will be unified.

2.5.1 Default maximum or minimum temperature and upper and lower limits of isothermal color

Click the  button to reload default settings.



2.5.2 Adjust upper and lower temperature

- ◆ Method 1:
 - Move the mouse to  the upper and lower temperature on left side of the color bar ;
 - When the mouse's status turns , please left-click to select;

- Drag the mouse to the required temperature value position.
- ◆ Method 2:
 - Click the scroll bar on the arrow button to adjust upper and lower temperature (each step is 0.1)

2.5.3 Adjust upper and lower limits of isothermal color,

If the isothermal color is enabled, a user can adjust the isothermal scope


- ◆ Method 1:
 - Move the mouse to  the upper and lower temperature on right side of the color bar.
 - When the mouse's status turns , please left-click to select.
 - Drag the mouse to the required temperature value position.
- ◆ Method 2:
 - Click the scroll bar on the arrow button to adjust upper and lower limits (each step is 0.1).

2.5.4 Select a dew point

When a dew point is selected, all points which temperature is below the dew point will be colored in uniform.

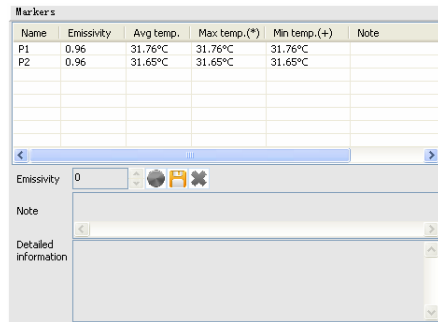
2.5.5 Set isothermal color and dew point color

The default isothermal color is fluorescent green, the default dew point color is blue, and the dew point is prior selected.


- Click the  Set Color button, to pop up the color selection dialog box.
 - Select / customize the background color.
 - Click the OK button to confirm the selected color.

2.6 Label Area


The Label Area indicates detailed information of measured objects, when the measured object changes, the object's label will change accordingly, the structure of label area is as below:



2.6.1 Set the color of measured object

- Select a measured object in the label list.
- Click the  button to set a color for currently selected object.
- Select / customize a color.
- Click the OK button to conform the color of measured object.


2.6.2 Add remarks for measured object

- Select a measured object in the label list.
- Add Remarks in the Remarks edit box (0-512 characters available).
- Click the  Upload Current Settings button to add remarks.

2.6.3 Change emissivity of measured object

- Select a measured object in the label list.
- Adjust the scroll bar of emissivity.


2.6.4 Remove a measured object

- Select a measured object in the label list.
- Click the  button to delete the currently selected object.

2.6.5 Add detailed Information in Image remarks

If any object in the label is not selected, it is available to input information.

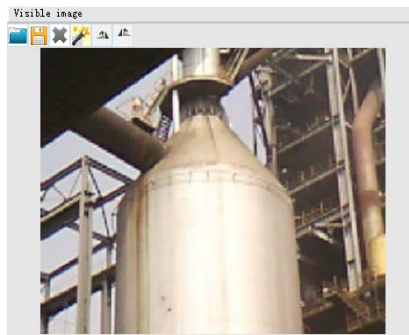
Markers					
Name	Emissivity	Avg temp.	Max temp.(*)	Min temp.(+)	Note
P1	0.96	31.76°C	31.76°C	31.76°C	
P2	0.96	31.65°C	31.65°C	31.65°C	

Emisivity 0 


Note

Detailed information


2.7 Visible Light




2.7.1 Open an Image

- Click the  Open button to pop up the file selection dialog box.
- Select a file to be added from the dialog box.



2.7.2 Save an image

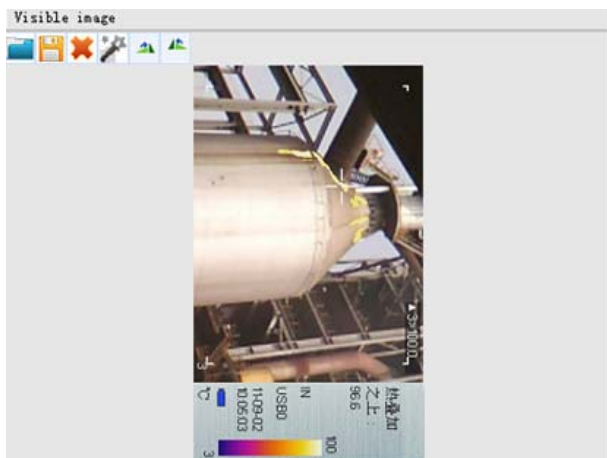
- Click the  Save button to pop up the file selection dialog box.
- Select an image format.
- Check / set the path where the image is saved.
- Save the visible light image.

2.7.3 Delete an image

Click the  Delete button to delete the currently added visible image.

2.7.4 Flip an image

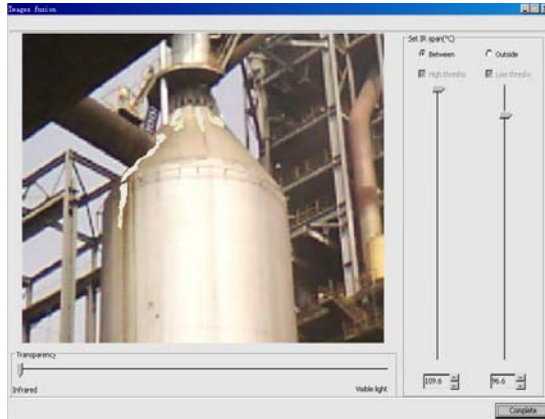
Click the  or  button to flip an image clockwise or counterclockwise.



2.7.5 PIP

This feature is available for any image that with visible light.

Click the  button to set an image.



- Set the transparency
 Drag the lower left progress bar to adjust the PIP values between infrared image and visible image.
- Set infrared display range
 Drag the right two progress bars to adjust the infrared display range of interval or above upper or below lower limit.



Click the “OK” button to save the file, the updated image is displayed on the measurement area.