About this IR Camera User Guide

Symbols Used

This mark denotes issues that may affect the IR camera's operation.

This mark denotes additional topics that complement the basic operation procedures.

■ **What do the icons listed in the Camera User Guide mean?**
Information displayed on the LCD Monitor (p.22)

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Thumb Index

Introduction to the camera's components and battery loading.

Preparing the IR Camera

Describes basic functions, learn how to turn on/off the IR camera and work with the control panel and LCD monitor.

Basic function

Describes working with the camera, from each of the analysis settings to using the camera's various analysis tools.

Shooting

Explains how to review recorded images, erase images and playback voice memos.

Playback and erase

Explains how to transfer images or video to a computer.

You must read this section before connecting your camera to a computer.

Connection and download

Table of Contents

Functions and operations tables

Read This First

Please Read

Test Shots

Before you shoot important subjects, we highly recommend that you shoot several trial images to confirm that the IR camera is functioning and being operated correctly.
Please note that TROTEC, its subsidiaries and affiliates, and its distributors are not liable for any consequential damages arising from any malfunction of an IR camera or accessory that results in the failure of an image to be recorded or to be recorded in a format that is not machine readable.

Warning Against Copyright Infringement

Safety Precautions

Before using the camera, please ensure that you read and understand the safety precautions described below. Always ensure that the IR camera is operated correctly.

The safety precautions noted on the following pages are intended to instruct you in the safe and correct operation of the IR camera and its accessories to prevent injuries or damage to yourself, other persons and equipment.

Warnings

Read on to learn about using this IR camera properly.

Avoid damaging eyesight

> ***Warning:*** Do not trigger the laser pointer at human or animal eyes. Exposure to the laser produced by the laser pointer may damage eyesight.

Do not disassemble

Do not attempt to disassemble or alter any part of the equipment that is not expressly described this guide

Stop operating immediately if it emits smoke or noxious fumes

Failure to do so may result in fire or electrical shock. Immediately turn the IR camera's power off, remove the IR camera battery or unplug the power cord from the power outlet. Confirm that smoke and fume emissions have ceased.

Stop operating immediately if it is dropped or the casing is damaged

Failure to do so may result in fire or electrical shock. Immediately turn the IR camera's power off, remove the IR camera battery or unplug the power cord from the power outlet.

Do not use substances containing alcohol, benzene, thinners or other flammable substances to clean or maintain the IR camera

The use of these substances may lead to fire.

Remove the power cord on a regular periodic basis and wipe away the dust and dirt that collects on the plug, the exterior of the power outlet and the surrounding area

In dusty, humid or greasy environments, the dust that collects around the plug over long periods of time may become contaminated and short-circuit, leading to fire.

Do not handle the power cord if your hands are wet
Handling it with wet hands may lead to electrical shock. When unplugging the cord, ensure that you hold the solid portion of the plug. Pulling on the flexible portion of the cord may damage or expose the wire and insulation, creating the potential for fires and electrical shocks.

Do not cut, alter or place heavy items on the power adapter cord
Any of these actions may cause an electrical short circuit, which may lead to fire or electrical shock.

Use only the recommended power accessories
Use of power sources not expressly recommended for this IR camera may lead to overheating, distortion of the IR camera, fire, electrical shock or other hazards.

Do not place the batteries near a heat source or expose them to directly to flame or heat
Neither should you immerse them in water. Such exposure may damage the batteries and lead to the leakage of corrosive liquids, fire, electrical shock, explosion or serious injury.

Do not attempt to disassemble, alter or apply heat to the batteries
This is serious risk of injury due to an explosion. Immediately flush with water any area of the body, including the eyes and mouth, or clothing, that comes into contact with the inner contents of a battery. If the eyes or mouth contact these substances, immediately flush with water and seek medical assistance.

Avoid dropping or subjecting the batteries to severe impacts that could damage the casings
It could lead to leakage and injury.

Do not short-circuit the battery terminals with metallic objects, such as key holders
It could lead to overheating, burns and other injuries.

Before you discard a battery, cover the terminal with tape or other insulators to prevent direct contact with other objects
Contact with the metallic components of other materials in waste containers may lead to fire or explosions. Discard the batteries in specialized waste facilities if available in your area.

Use only recommended batteries and accessories
Using batteries not expressly recommended for this equipment may cause explosions or leaks, resulting in fire, injury and damage to the surroundings.

Disconnect the compact power adapter from both the IR camera and power outlet after recharging and when the IR camera is not in use to avoid fires and other hazards
Continuous use over a long period of time may cause the unit to overheat and distort, resulting in fire.

Do not use the battery charger or compact power adapter if the cable or plug is damaged, or if the plug is not fully inserted into the power outlet
The battery charger varies according to region.

Exercise due caution when screwing on the separately sold tele-lens, close-up lens
If the lens is loosened and falls off, the glass shards may cause an injury.

If your camera is used for prolong periods, the IR camera body may become warm
Please take care when operating the IR camera for an extended period as your hands may experience a warming sensation.

Prevent Malfunction

Read on to learn about preventing malfunctions of the IR camera

Avoid damaging the detector of the IR camera

Warning: Do not aim the IR camera directly into the sun or at other intense heat source which could damage the detector of the IR camera.

Avoid Condensation Related Problems

Moving the IR camera rapidly between hot and cold temperatures may cause condensation (water droplets) on its external and internal surfaces.
You can avoid this by placing the IR camera in the plastic case (bundle) and letting it adjust to temperature changes slowly before removing it from the case.

If Condensation Forms Inside the IR Camera

Stop using the camera immediately if you detect condensation. Continued use may damage the IR camera. Remove the power cord, and battery or a household power source, from the IR camera and wait until moisture evaporates completely before resuming use.

Extended Storage

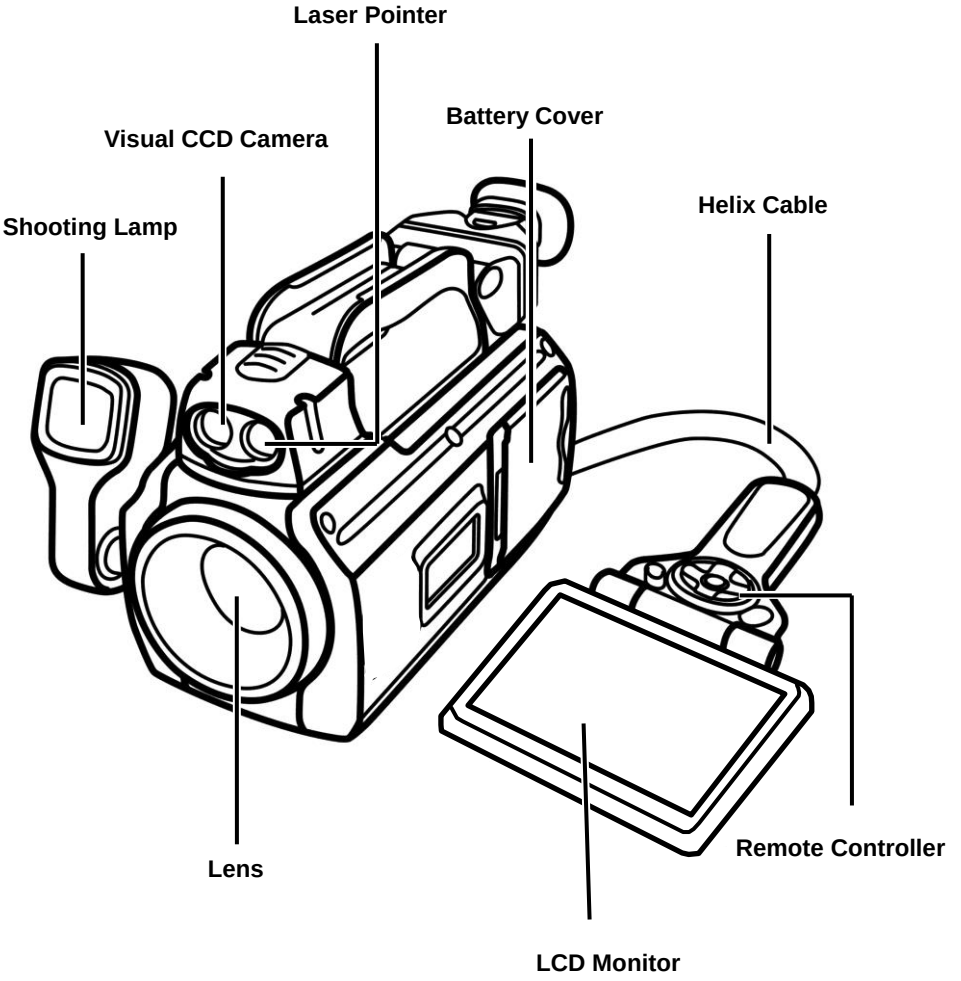
When not using the IR camera for extended periods of time, remove the battery from the IR camera or battery charger and store the IR camera in a safe place. Storing the IR camera for extended periods with battery the installed will run down the battery.

Right Reserved

TROTEC reserves the right to change the functions and configurations of our products without prior notice.

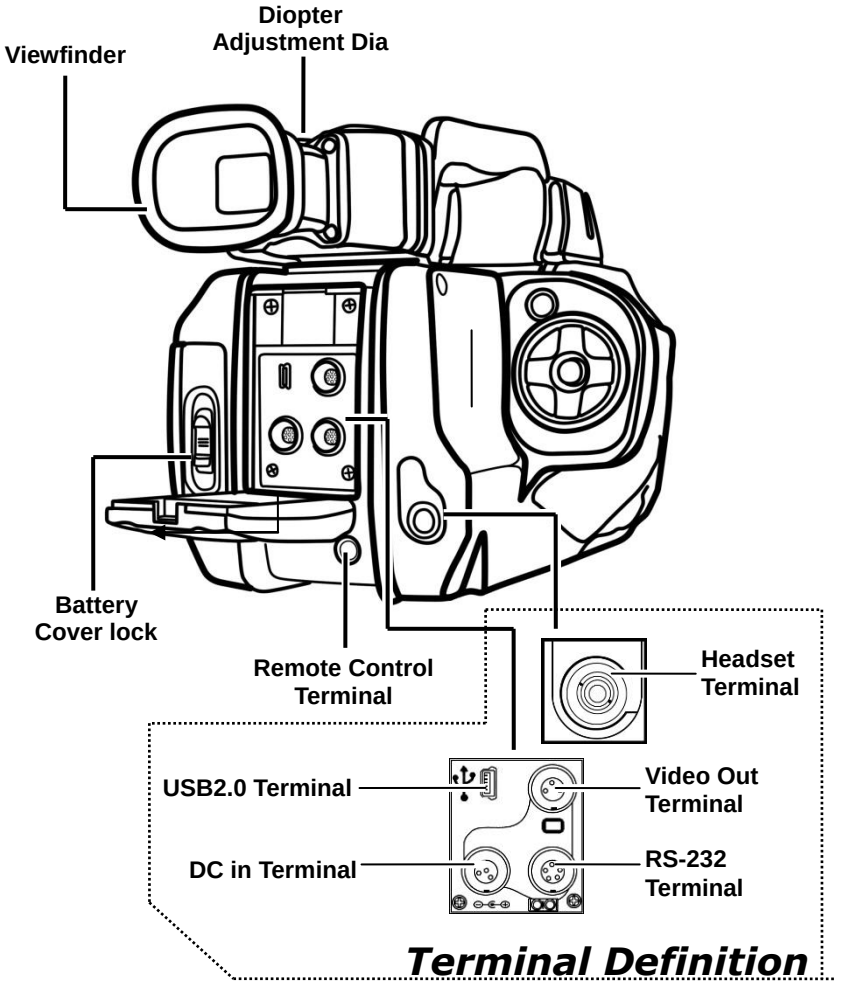
Component Guide

Front View



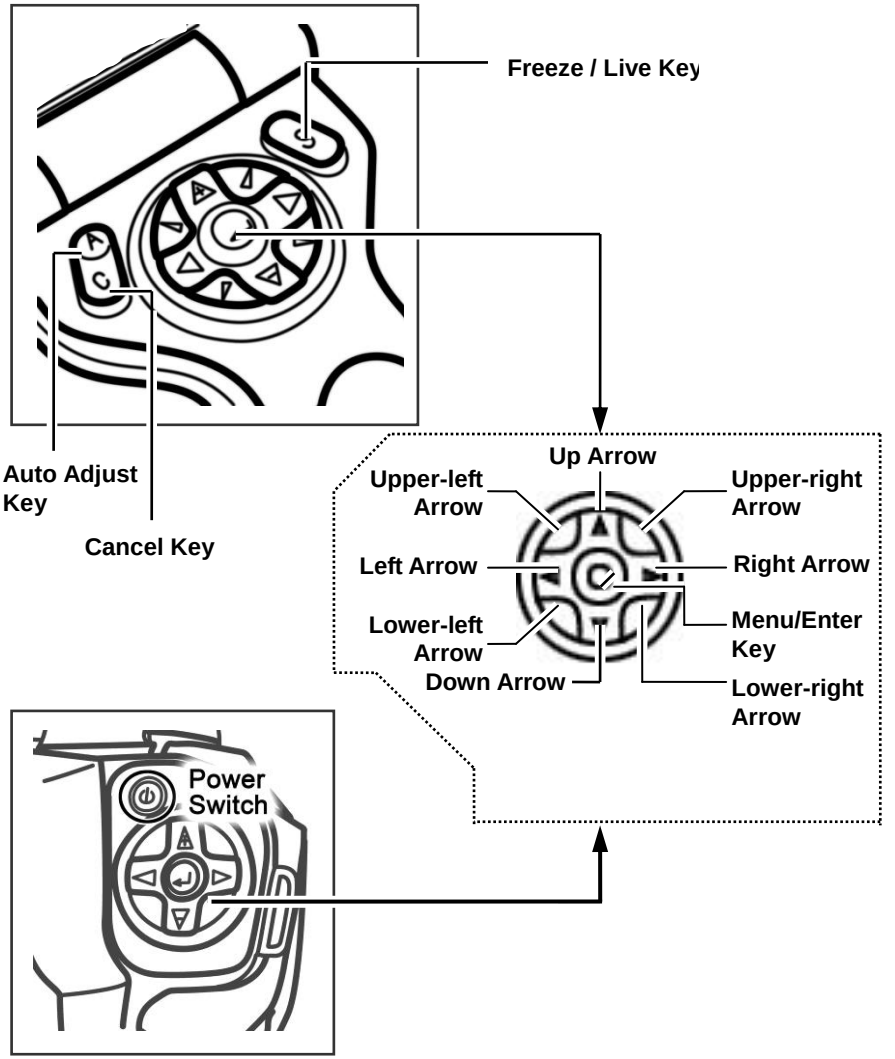
Component Guide

Back / Bottom View



Component Guide

Controls

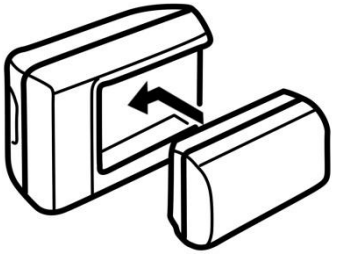


Preparing the IR Camera

Charging the Battery Pack

Follow the steps below to charge the battery pack for the first time and subsequently when the low battery icon appears on the LCD Display.

1



Align the edge of the battery pack with the line on the battery, then insert the battery in the direction of the arrow.

2 **Attach the power cord to the battery charger and plug the other end into a power outlet.**

- After charging, unplug the battery charger and remove the battery pack.

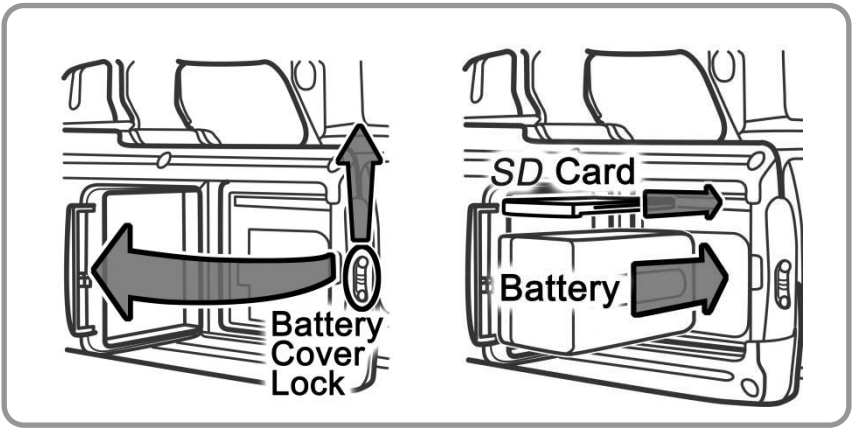
- This is a lithium ion battery pack so there is no need to discharge it completely before recharging. It can be recharged at any time. However, since the maximum number of charge cycle is approximately 300 (battery life), you are recommended to only charge the battery pack after having discharge it completely to prolong battery life.
- Charging times will vary according to the surrounding humidity and battery pack charge state.

Preparing the IR Camera

Installing the Battery Pack / SD Card

Install the Battery Pack and the SD card (supplied) into the camera as follows.

Charge the battery pack before using it for the first time.



1 **Check that the power is off and slide the battery cover lock in the direction of the arrow, the battery cover opens automatically.**

2 **Insert the battery pack.**

- The battery terminal side should face leftward.
- Insert the battery pack all the way in until the battery lock clicks. To remove the battery pack, push the battery lock.

3 **Insert the SD card.**

- The no label side of the SD card should face the battery
- To remove the SD card, push the SD card.

4 Close the SD card/battery cover.

- Remove the battery pack when the camera is not in use.
- You must format the SD card in FAT32 format. Otherwise, the IR camera may not recognize the SD card.

Battery Status Symbols

The following icons indicate the battery status on the LCD screen.

	**Sufficient battery charge**
	**Low battery**
	**Replace or recharge battery**

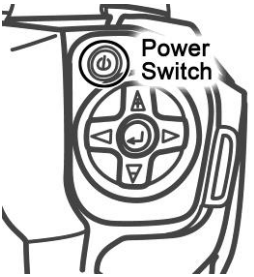
Preparing the IR Camera

Turning the Power On / Off

The power indicator remains lit while camera is powered on.

Powering the IR camera

1



Press and hold the power switch for 3 seconds.

- The power indicator lights green.
- Connect the remote controller if needed.

2

After a few seconds a startup image will appear on the screen.

Turning the Power Off

1 **Hold the power switch for 3 seconds.**

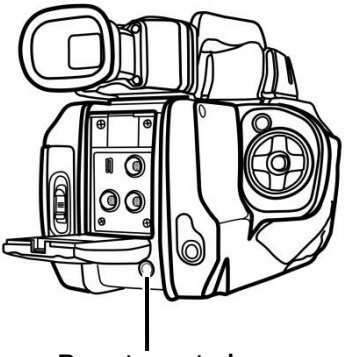
- The power indicator goes off.

Preparing the IR Camera

Connecting the Remote Controller

The detachable remote controller, with LCD display and all necessary control buttons can be connected to the camera body. You can view, capture and analyze images while the IR camera is positioned in hard-to-reach areas.

1 **Turn off the IR camera.**

2 

Attach the helix cable of the remote controller to the remote control terminal on the camera body.

3 **Turn on the IR camera.**

You can implement all the functions of the IR camera through the remote controller.

Using the LCD Monitor

If you wish to use the LCD monitor for shooting, playing back thermal images and adjusting menu settings, follow the instruction below.

1

Attach the remote controller to the camera body.

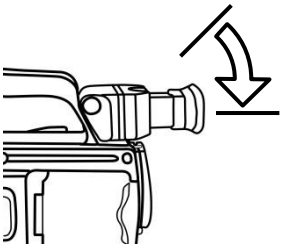
2 **Aim the IR camera at the subject.**

Do remember to make the subject in center of the image that is shown on the LCD monitor (or the viewfinder).

Using the Viewfinder

If you cannot view the screen clearly when the surrounding light is too bright, you can use the viewfinder.

1 **Turn on the viewfinder (P.27 Shortcut settings).**

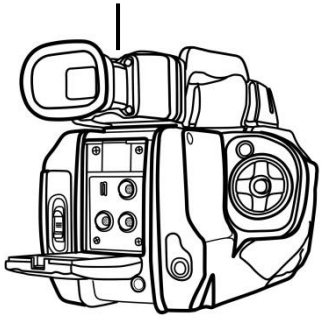
2 

Adjust the angle of the viewfinder.

3 **Aim the IR camera at the subject.**

You can use the Diopter Adjustment Dia to suit your eyesight.

Diopter Adjustment Dia

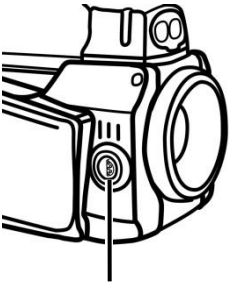


Preparing the IR Camera

Using an Externally Mounted Shooting Lamp

The shooting lamp (supplied) can be connected to the camera to illuminate the dark areas. You can produce clear, high-quality visual images to do compliment your inspections.

1 **Turn off the IR camera.**

2 

Shooting lamp terminal

Attach the shooting lamp to the shooting lamp terminal on the camera body.

3 **Turn on the IR camera.**

4 **Select [Setup]-- [Others]--[Control]-[Lamp] to turn on the illuminator. You can also turn on the lamp in the shortcut (P.27 Shortcut settings).**

If you use the optional lens when the shooting lamp is attached, a portion of the visual image will be blocked by the optional lens and will appear dark.

Preparing the IR Camera

Using a Headset

The headset can be connected to the camera to record and replay voice comment. You can save an image with voice comment.

1 **Turn off the IR camera.**

2 

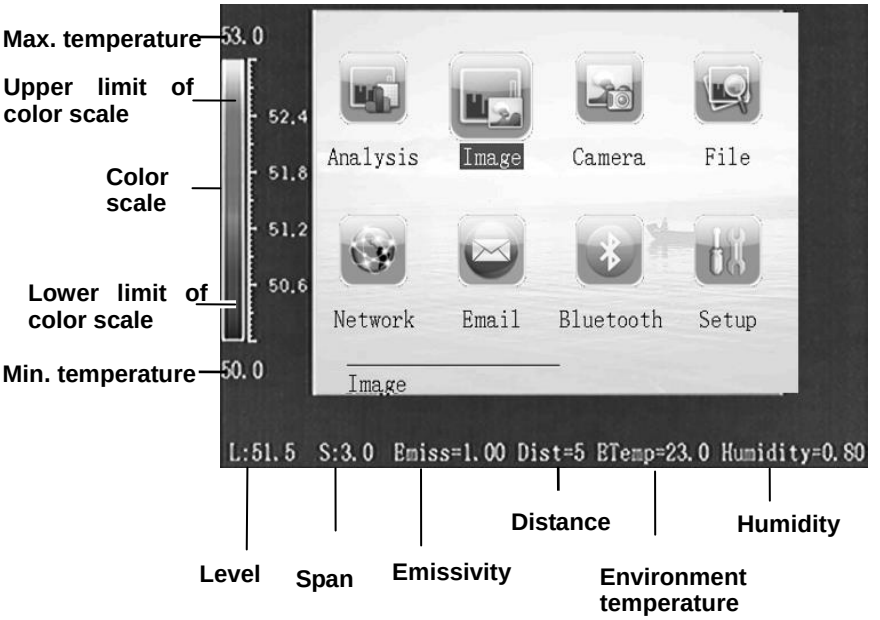
Attach the cable of the headset to the headset terminal the camera body.

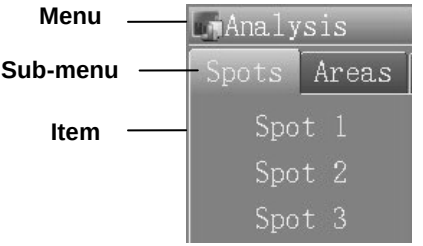
3 **Turn on the IR camera.**

Preparing the IR Camera

Checking the Information on the LCD Monitor

The LCD monitor has a field of vision of 100% of the actual shooting image.
The following information is displayed.





About the information on the screen.

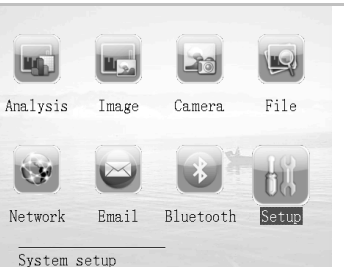
Maximum temp	The maximum temperature of the color scale.
Minimum temp	The minimum temperature of the color scale.
Level	The brightness of the image.
Span	The contrast of the image.
Emissivity	Depending on the emissivity of the object set the emissivity accordingly
Distance	Depending on the distance to the object set the distance accordingly
Environment temperature	The ambient temperature.
Humidity	The ambient humidity.

Basic Functions

Setting the date and time

You need to set the Data / Time when you turn on the IR camera for the first time.

1 **Press C key to enter menu then use the direction keys to select the [Setup].**



2 **Use the direction key to select [Others] then press the *ENTER* key.**

3 **Setting Date and Time**

- Use the direction key (LEFT or RIGHT) to select [Date time].
- .Use the direction key (UP or DOWN) to select an item to change. Use the direction key (LEFT or RIGHT) to set the values.

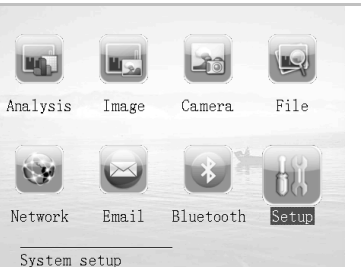
4 **After adjusting the settings, press the *ENTER* key to save changes, or press the *C* key to go back to upper menu without saving.**

Basic Functions

Local Settings

In this menu item, you can setup the display style of the built-in menu system.

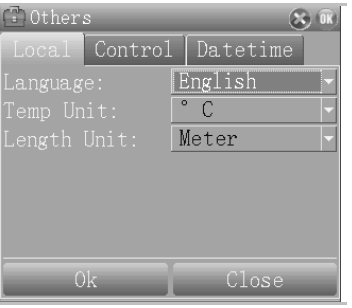
1 **Press C key to enter the menu then use the direction key to select [Setup].**



2 **Use the direction key to select [Others] then press the *ENTER* key.**

3 **Local Setup.**

- Use the direction key (LEFT or RIGHT) to select [Local]
- Use the direction key (UP or DOWN) to select an item to change.



4 **After adjusting the settings, press the *Enter* key to save changes, or press the *C* key to exit without saving.**

About the others settings

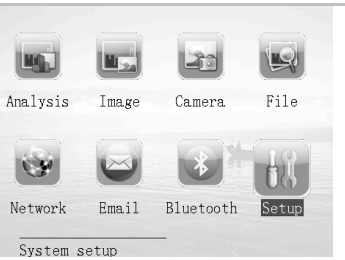
Language	Selects the language of the menus and messages.
Temp unit	Sets the format of the displayed temperature unit of the camera, °C or °F.
Length unit	Sets the length unit: metre or foot.
Video output	Set the video output to off or on.
Video Mode	Sets the format of the video output of the camera. PAL or NTSC are available.
Lamp	Turn on/off the lamp.
Laser	Turn on/off the laser.
OLED	Turn on/off the viewfinder (OLED).
USB mode	Select the USB mode. USB disk: download the files from camera to the computer. Transfer: transfer the real-time video from the camera to computer.

Basic Functions

Toolbar/ Shortcut Settings

In this menu item, you can setup the shortcut at the bottom left corner of screen.

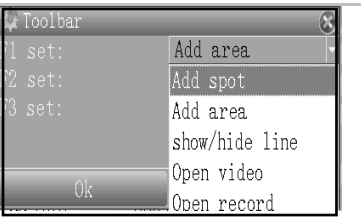
1 **Press C key to enter the menu then use the direction keys to select [Setup].**



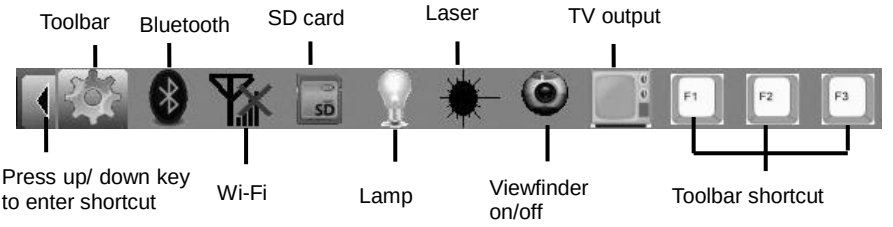
2 **Use the direction keys to select [Toolbar] then press the *ENTER* key.**

3 **Toolbar Settings.**

You can add spot/ area /line /open video/ open record to each shortcut icon on the bottom left of the screen.



About the shortcut icons



Basic Functions

Appearance Settings

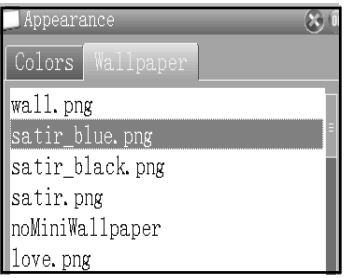
In this menu item, you can choose the appearance of the built-in menu system.

1 **Press C key to enter the menu then use the direction keys to select [Setup].**

2 **Use the direction key to select [Theme] then press the *ENTER* key.**

3 **Appearance Setup.**

- Use the direction key (LEFT or RIGHT) to select [Color] or [Wallpaper].
- Use the direction key (UP or DOWN) to select an item.



4 **After adjusting the settings, press the *Enter* key to save changes, or press the *C* key to exit without saving.**

Basic Functions

Checking the memory card capacity

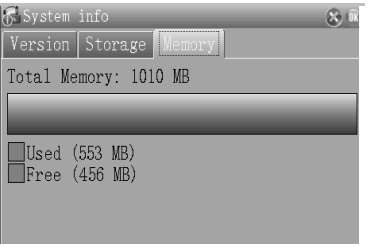
Please check the memory card capacity before saving an image or recording video.

1 **Press C key to enter the menu then use the direction keys to select [Setup].**

2 **Use the direction keys to select [SysInfo] and press [Enter].**

3 **Use the direction key to select [Storage] and [Memory] to check the capacity.**

RED	USED
GREEN	FREE



Bluetooth settings

You can attach voice annotation to images via the blue-tooth.

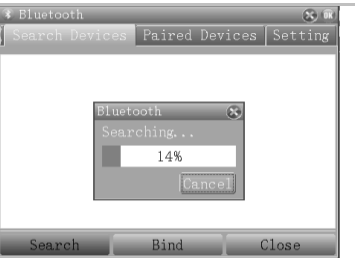
Bluetooth settings

1 **Use the direction key to select [Bluetooth] then press the *ENTER* key.**

2 **Select [Setting], then select [Start Bluetooth] and press [ENTER/OK].**

At the same time, turn on the blue-tooth headset. You need to press the power switch for seconds until the indicator lights red and blue.

3 **Use the direction key to select [search devices]. Then select [Search].Select [Bind] after searching the blue-tooth.**



4 **You can attach voice annotation now. Please refer to P57.**

Basic Functions

Selecting Menus and Settings

Follow the steps below to enter/exit menu.

1. Press C key to enter menu mode

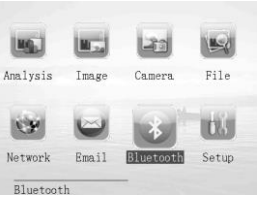
2. Use the direction keys to select menu

Analysis menu

Image menu

Camera menu

File menu



Bluetooth menu

Setup menu

3 **Press [enter] to enter a submenu or press C key to exit menu**

All the menus details will be introduced in later chapters.

Basic Functions

Resetting to the Default Settings

You can resetting to default.

1 **Press C key to enter the menu then use the direction keys to select [Analysis].**

2 **Use the direction keys (LEFT or RIGHT) to select [Settings]. Then select [Restore].**

The data in storage will not be deleted when you reset the menu, the button operation will be set to default.

About Emissivity, Inside/outside shutter and Compare

Emissivity	Object emissivity table.
Inside/ outside shutter	In some cases, the camera may suffer from non-uniformity problems due to a temperature difference inside the camera body and the environment. If you encounter such problem, please use the “outside shutter” to adjust the camera to the best status. Normally, except in this special case, the “Inside shutter” is recommended. When selecting the “Outside shutter”, please cover the lens, and then press A key to adjust image.

Laser Position	Turn on the laser first, select this item and press [Enter], then you can use the direction keys to move the laser point on the screen.
Compare	Temperature comparison: temperature difference between object 1 & object 2.

Focus Adjustment and digital zoom

Auto focus

Aim at the object, press A+C keys together, the camera will auto-focus until the image is clear enough.

Autofocus Subject Shooting Problems

The autofocus may not work well on the following types of subjects:

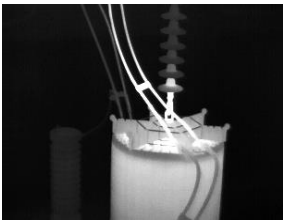
- Subjects with extremely low contrast to the surroundings
- Subjects mixing with close and far objects
- Subjects that are moving quickly
- Subjects with horizontal stripes

To Shoot these objects, you can focus an object at a similar distance first, after that focus on the subject object. You may also use manual focus.

Manual focus

1 

Aim the IR camera at the subject.

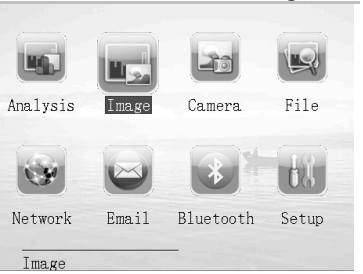
2 

Press the UPPER-RIGHT or LOWER- RIGHT to focus until the object on screen is clear enough.

Digital zoom

You can use the upper-left or lower-left key to fulfill the digital zoom. After that, you can follow the steps below to view the whole image.

1 **Press C key to enter menu then use the direction keys to select the [Image].**



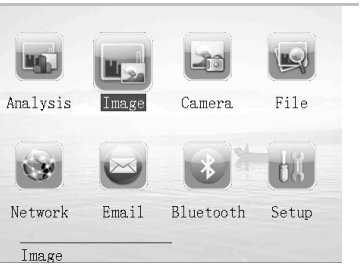
2 **Use the direction keys (LEFT or RIGHT) to select [Adjust], then select [Zoom] and press [enter]. Use the direction keys (left /right/ up/ down) to view the image.**

Duo-Vision Display modes

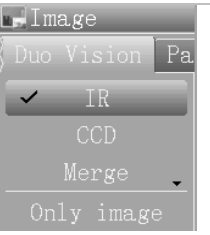
Thermal, Visual and Duo-Vision image display

This IR camera records visual images with its built-in digital camera. You can capture a visual image as a reference to the thermal image.

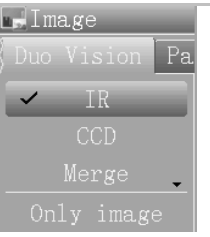
1 **Press C key to enter menu then use the direction keys to select. [Image].**



2 **Use the direction keys to select [Duo Vision].**



3 **Use the direction keys to select display mode, then press *ENTER* key.**



Shooting

IR Camera Adjustment

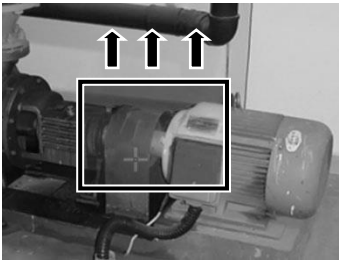
In **Merge** (**Duo-Vision)** display mode, you can see the thermal images “fuse” into the visible images.

About the display modes

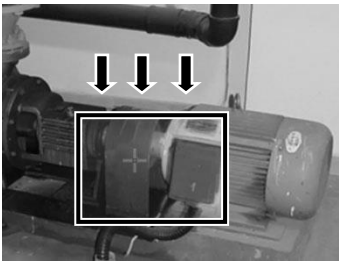
IR	In this mode, you can use the analysis tools to analyze the target. You see the image with pseudo color.
CCD (visible)	In this mode , you can see the image with full color. But you can not use any analysis tools to analyze the target.
Merge (Duo Vision)	In this mode, you can see the background image is full color visible image. And the thermal image “fuses” on it in the center square. You can use any analysis tools to analyze the target.
Only image	Hide the analysis tools and display the image only.

In **Merge** (**Duo-Vision)** display mode, you can move the fusion area. At first, you need to select [Position]. Then follow the steps below to move the fusion area.

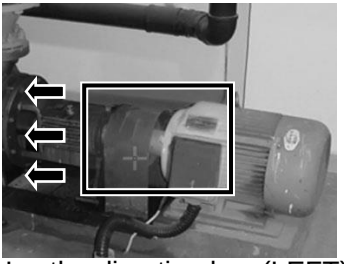
1. Use the direction keys to move the fusion square:



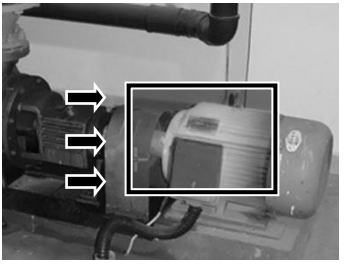
Use the direction key (UP)



Use the direction key (DOWN)



Use the direction key (LEFT)



Use the direction key (RIGHT)

1.About the merge settings

Merge Percent	Sets the ratio of IR image and Visual image. The value is from 1% to 100%.

The item above is activated only in [Merge] mode.

.

Image adjustment

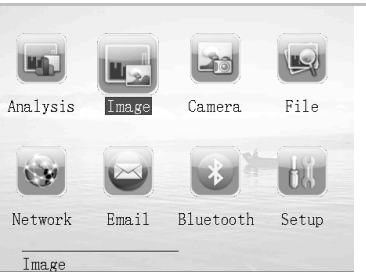
You can adjust the Level (brightness) and Span (contrast) of the image captured by the IR camera, manually or automatically.

Auto adjust

The IR camera will automatically adjust the brightness and / or contrast and calibrate when you press the ***A*** key.

How to use Auto adjust in menu?

1 **Press C key to enter the menu then use the direction keys to select [Image].**



2 **Use the direction keys (LEFT or RIGHT) to select [Adjust]**

3 **Use the direction keys (UP or DOWN) to select [Auto Adjust], then press the *ENTER* key.**

You can also enter [Auto Adj.] to set Level and Span.

Shooting

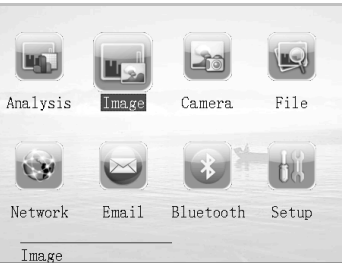
IR Camera Adjustment

Manual adjust

You can press C+UP/DOWN to adjust image level, and press C+LEFT/RIGHT to adjust image span. You can also adjust the Level and Span of the image manually in the built-in menu system.

Manual adjust in the menu

1 **Press C key to enter the menu then use the direction keys to select [Image].**



2 **Use the direction keys (LEFT or RIGHT) to select [Adjust].**

3 **Use the direction keys (UP or DOWN) to select an item (Max temp, Min-temp, level, span) to change. Use the direction keys (LEFT or RIGHT) to change the values, then press the *ENTER* key.**

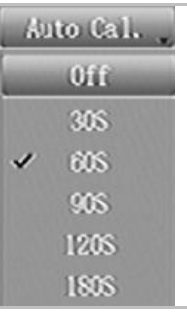
About the adjust items

Maximum temp	Adjust the maximum temperature of the color scale.
Minimum temp	Adjust the minimum temperature of the color scale.
Level	Adjust the brightness of the image.
Span	Adjust the contrast of the image.

About the auto calibration

You can set the period of auto shutter. The shutter takes action in every period.

1 **Use the direction keys (UP or DOWN) to select [Auto Cal.] and press [Enter], then set the period.**



Shooting

IR Camera Adjustment

Palette settings

1 **Press C key to enter the menu then use the direction keys to select [Image].**

2 **Use the direction keys (LEFT or RIGHT) to select [Palette]. Then use the direction keys (UP or DOWN) to choose the palette.**

3 **After this operation, press the *ENTER* key to save changes, or press the *C* key to close the menu without saving.**

The camera provides 6 kinds of palettes: Iron, Iron inverted, Rainbow, Feather, Grey and Grey inverted.

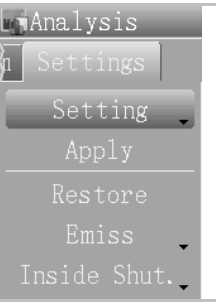
Measurement Range

The camera can measure higher temperatures though the standard filter (supplied) or high temperature lens (optional).

1 **Press C key to enter the menu then use the direction keys to select [Analysis].**

2 **Use the direction keys (LEFT or RIGHT) to select [Settings].**

3 **Use the direction keys (UP or DOWN) to select [Setting], then press the ENTER key.**



4 **Use the direction keys (UP or DOWN) to select [Filter], and select [On].**

5 **Select the filter (Off/On) to change the temperature range**

- When [Filter] is [Off], the temperature range is [-20—150℃].
- When [Filter] is [On], the temperature range is [120—600℃].
- The range can be up to 2000℃(optional).

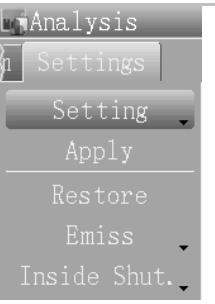
Shooting

IR Camera Adjustment

Global settings

1 **Press C key to enter the menu then use the direction keys to select [Analysis].**

2 **Use the direction keys (LEFT or RIGHT) to select [Settings].**



3 **Use the direction keys to select [setting], and press [Enter].**

- Use the direction keys (UP or DOWN) to select an item to change.
- Use the direction keys (LEFT or RIGHT) to set the values.

4 **After this operation, press the *ENTER* key to save changes, or press the *C* key to go back to the upper menu without saving.**

About the Global Settings

Emissivity	Depending on the emissivity of the object set the emissivity accordingly
Distance	Depending on the distance to the object set the distance accordingly
Amb Temp	Input ambient temperature.
Refl. Temp	Reflection temperature: depending on the reflection of the object set the reflection temperature accordingly.
Humidity	Input ambient humidity.
Offset	Corrects the measured temperature value of the camera to ensure the measurement accuracy under special circumstances.
Background	Show/hide the black background of reading on screen.

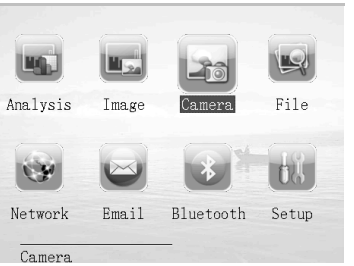
Shooting

IR Camera Adjustment

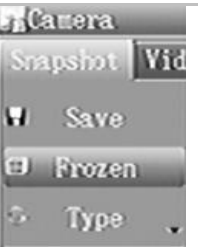
Freezing / Activating an image

You can activate / freeze a thermal image by pressing the S key on the keypad. Pressing the S key again will activate the image.
Or you can freeze an image in the menu mode.

1 **Press C key to enter the menu then use the direction keys to select [Camera].**



2 **Use the direction keys (LEFT or RIGHT) to select [Snapshot]. Then use the direction keys (UP or DOWN) to select [Frozen].**
To activate the image, please select [Activate] again.



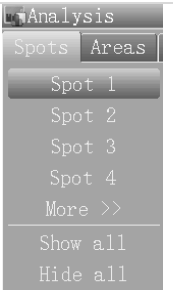
Setting analysis tools

This topic briefly explains how to set the analysis tools on the thermal image.

Spot analysis

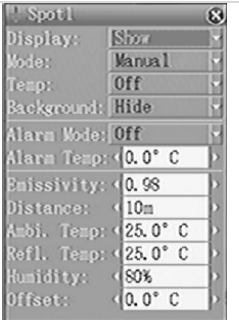
1 **Press C key to enter the menu then use the direction keys to select [Analysis].**

2 **Use the direction keys (LEFT or RIGHT) to select [Spots], then use the direction keys (UP or DOWN) to select a spot and press *ENTER* key.**



3 **Setting the spot analysis.**

- Use the direction keys (UP or DOWN to select an item to change.



About the spot settings

Display	Show or hide the spot.	
Mode	**Manual**	Move the spot manually.
	Max	The spot will track the highest temperature on the screen automatically.
	Min	The spot will track the lowest temperature on the screen automatically.
Temp	**On**	Display the spot temperature reading.
	Off	Hide the spot temperature reading.
Background	Add background to the spot reading.	
Alarm Mode	Set the alarm mode: off/above/below/equal.	
Alarm Temp	Set the alarm temperature.	

About Emissivity, Distance, Ambient Temp, Humidity and Offset settings, please refer to Global setting.

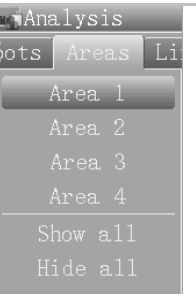
Shooting

Using the Analysis Functions

Area analysis

1 **Press C key to enter the menu then use the direction keys to select [Analysis].**

2 **Use the direction keys (LEFT or RIGHT) to select [Areas], then use the direction keys (UP or DOWN) to select an area and press *ENTER* key.**



3 **Setting the analysis area.**

- Use the direction keys (UP or DOWN) to select an item to change.

About the area setting

Display	Show or hide the area analysis.
Max	Display the highest temperature in the area.
Min	Display the lowest temperature in the area.
Average	Display the average temperature in the area.

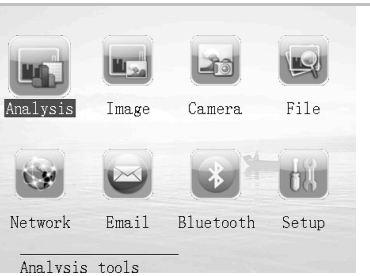
You can select an area and use the direction keys (up/ down / left /right) to move the area or use the (upper-left/right & lower-left/right) to change the size of the area.

Shooting

Using the Analysis Functions

Line analysis

1 **Press C key to enter the menu then use the direction keys to select [Analysis].**



2 **Use the direction keys (LEFT or RIGHT) to select [Lines]**

3 **Use the direction keys (UP or DOWN) to select [Horizontal] and press *ENTER* key. A line and its temperature distribution will be displayed on the screen.**

4 **Moving the line analysis and spot.**

- Start from step 1 to set or select a line analysis.
- Use the direction keys (UP or DOWN) to move the line. Use the direction keys (LEFT or RIGHT) to move the spot. The temperature of the spot will change in real-time.

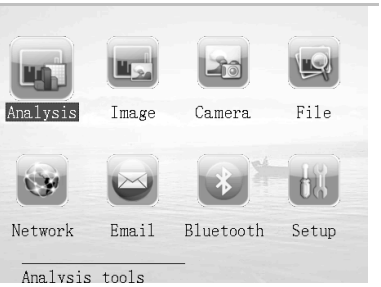
Select [Horizontal] again, then press [Enter], the line will disappear.

Shooting

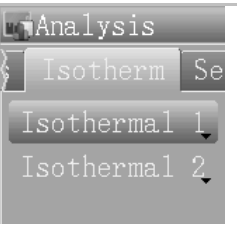
Using the Analysis Functions

Isotherm analysis

1 **Press C key to enter the menu then use the direction keys to select [Analysis].**



2 **Use the direction keys (LEFT or RIGHT) to select [Isotherm], then use the direction keys (UP or DOWN) to select [Isothermal 1].**



3 **Setting isotherm.**

- Use the direction keys (UP or DOWN to select an item to change.
- Use the direction keys (Left or Right to set the value.

About the isotherm settings

Display	Show or hide the isotherm analysis.

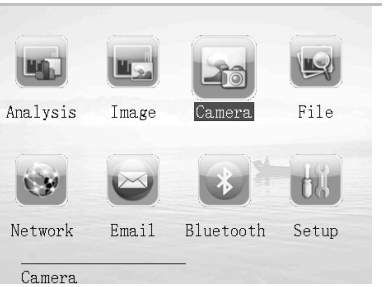
<table>
<tr><td>Above</td><td>Set the isotherm max-temperature.</td></tr>
<tr><td>Below</td><td>Set the isotherm min-temperature.</td></tr>
<tr><td>Color</td><td>Sets the color of the isotherm. Green, Transparent, Black and White are available.</td></tr>
<tr><td>Alam mode</td><td>Set the isotherm alram on/off.</td></tr>
<tr><td>Alam value</td><td>The value is from 1 to 100, and it means 1/100 to 100/100 of the screen. For example, if the span of isotherm is from 35℃ to 40℃ and the alarm value is 50. If the proportion of isotherm area between 35℃ to 40℃ is over 50/100, alarm will ring.</td></tr>
<tr><td>Mode</td><td>Sets the isothermal analysis mode. There are five modes: Dual Above, Dual Below, Above, Below and Interval.
<table>
<tr><td>Dual Above</td><td>Display the isothermal interval in a color and the parts with the higher temperatures than the upper limit of the isothermal interval in a different color.</td></tr>
<tr><td>Dual Below</td><td>Display the isothermal interval in a color and the parts with the lower temperatures than the lower limit of the isothermal interval in a different color.</td></tr>
<tr><td>Above</td><td>Display the isothermal interval and the parts with the higher temperature than the upper limit of the isothermal interval in the same color.</td></tr>
<tr><td>Below</td><td>Display the isothermal interval and the parts with the lower temperature than the lower limit of the isothermal interval in the same color.</td></tr>
<tr><td>Interval</td><td>Display the isothermal interval in one color and all the other parts are displayed in the normal pseudo color mode.</td></tr>
</table></td></tr>
</table>

Shooting

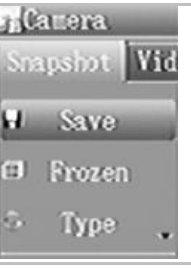
Saving the Image

You can save the image in the menu system after you freeze an image, or save it directly by holding the ***S*** key on the keypad for 3 seconds without freezing an image.

1 **Press C key to enter the menu then use the direction keys to select [Camera].**



2 **Use the direction keys (LEFT or RIGHT) to select [Snapshot], then use the direction keys (UP or DOWN) to select [Save] and press the *ENTER* key.**



The display mode decides the save image type.

3 **The message of "saving image" will display on the screen.**

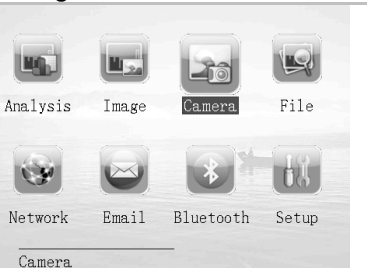
The image will be saved in the current folder.

Shooting

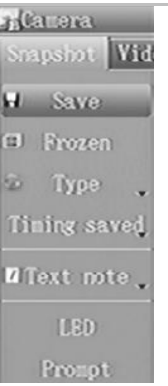
Save images settings

This part introduces about saving images settings.

1 **Press C key to enter the menu then use the direction keys to select [Camera].**



2 **Use the direction keys (LEFT or RIGHT) to select [Snapshot] Then use the direction keys (UP or DOWN) to select [Type], then press the [enter] key.**



3 **Use the direction keys (UP or DOWN) to select the type of image and press the enter key.**

About the settings

IR image	Only save a thermal image.
CCD image	Only save a visible CCD image.
IR and CCD	Save an IR image and CCD image together at the same time.
Timing saved	Users can set the IR camera saves images automatically.For example, save an image in every 3 minutes.
LED	The lamp will turn on when saving the image.
Prompt	The prompt will pop-up when saving image.

Shooting

Attaching Memos to Images

You can save an image with voice or text annotation.

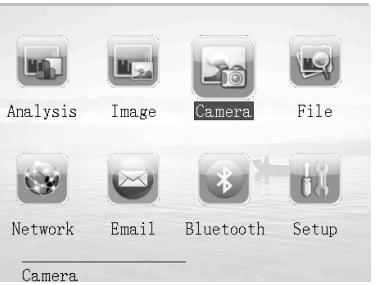
Voice annotation

You can attach a voice memo to an image.

1 **Install the headset or Bluetooth headset.**

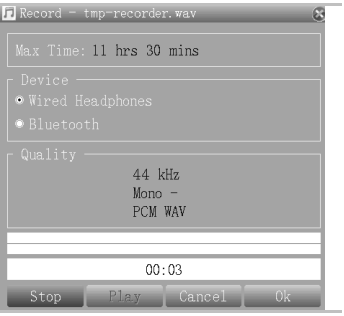
2 **Freeze an image by pressing S key.**

3 **Press C key to enter the menu then use the direction keys to select [Camera].**



4 **Use the direction keys (LEFT or RIGHT) to select [Video], then use the direction keys (UP or DOWN) to select [Save voice] and press [Enter].**

5 **Select [Record] and speak toward the microphone of the headset. To stop recording, press the *C* key or select [Cancel].**



6 **Save the image.**

How to connect blue-tooth headset please refer to P30

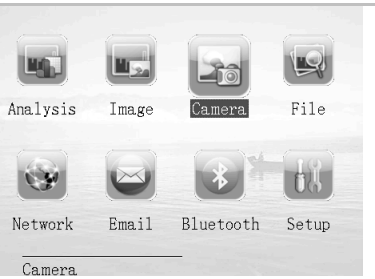
Shooting

Attaching Memos to Images

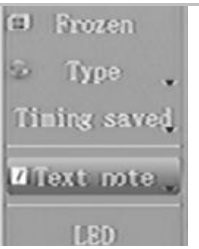
Text annotation

1 **Freeze an image by pressing S key.**

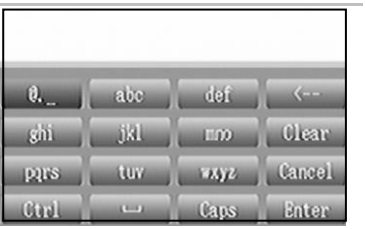
2 **Press C key to enter the menu then use the direction keys to select [Camera].**



3 **Use the direction keys (LEFT or RIGHT) to select [Snapshot], then use the direction keys (UP or DOWN) to select [Text note] and press [Enter].**



4 **Use the keypad on the screen to input text to the image then press [Enter]. Press C key or [Esc] to exit the keypad.**



5 **Save the image.**

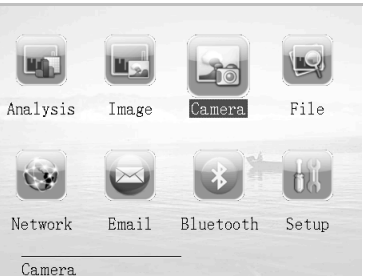
Shooting

Recording thermal video

You can record thermal video and save it onto the memory card using the follow steps.

Recording thermal video

1 **Press C key to enter the menu then use the direction keys to select [Camera].**



2 **Use the direction keys (LEFT or RIGHT) to select [Video], then use the direction keys (UP or DOWN) to select [Record] and press [Enter].**

3 **Use the direction keys (UP or DOWN) to select [Stop] and press [Enter] to stop recording.**

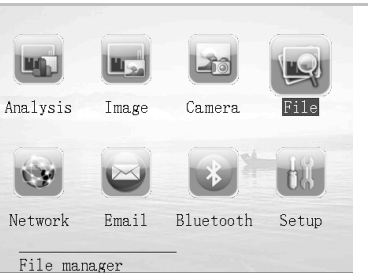
4. **Use the direction keys (Up or Down) to select [Play] and press [Enter] to play the video.**

Playback and Erase

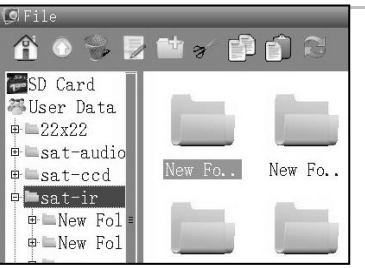
Opening images/videos

You can view and analyze the recorded images/videos on the LCD monitor.

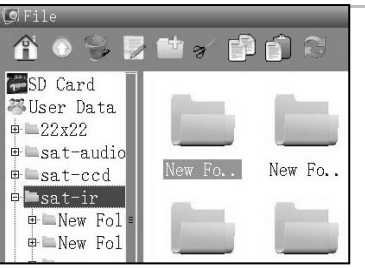
1 **Press C key to enter the menu then use the direction keys to select [File].**



2 **Use the direction keys (up/down) to select [SD Card/ User Data].**



3 **Use the direction keys (up/down) to select folders，then use the direction keys (left/right) to select a file to open.**



1. You can analyze and attach memos to a recorded image when you open it.
2. Please connect the headset when you play back voice annotation.

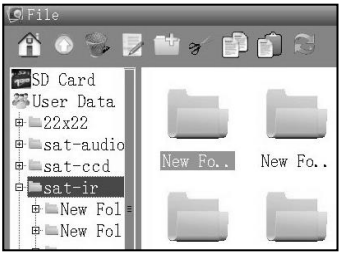
Playback and Erase

Erasing images

Please note that erased images/videos cannot be recovered.
Exercise caution before erasing images/videos.

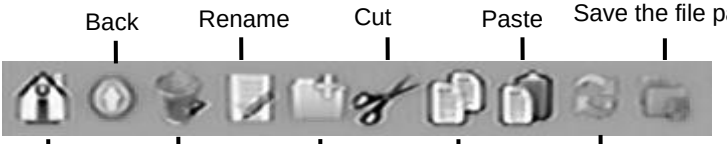
1 **Press C key to enter the menu then use the direction keys to select [File].**

2 **Follow the steps above to open a file (image/video).**



3 **Use the direction keys to select the trash icon and press [Enter] to delete the file.**

About the icons



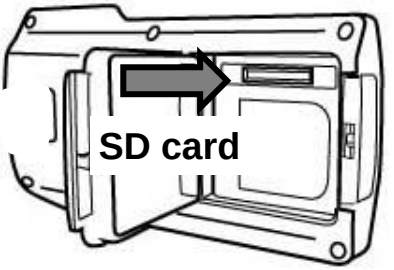
Download the Images

Download the images

You can remove the SD card from the camera, and download the images to the computer via the supplied SD card reader.

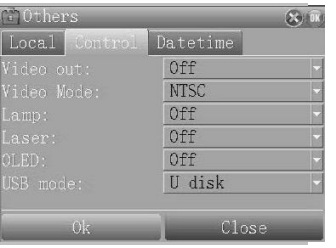
1 **Open the battery / SD card cover.**

2 **Press the SD card lightly, then the SD card will pop-up automatically.**



3 **You can download the IR images via the supplied SD card reader.**

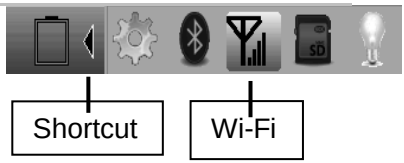
You can also connect the camera to the computer via the USB cable. Select [Setup] -[Others] - [Control]- [USB mode] – [U-disk], press [Enter]. Then you can open the file in the camera.



Wi-Fi connection

Users can use the Wi-Fi to fulfill the FTP (download and upload the FTP files) and E-mail functions.

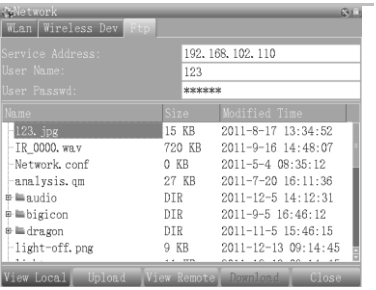
1 **Press the direction keys to enter shortcut and select the Wi-Fi icon.**
You can also enter the Wi-Fi in the menu mode.



2 **Select [Wlan] and select [Search] to search the Wi-Fi network.**

3 **Select the address and set the password. After that, select [Connect].**
You can set the ID, password, and IP in [Wireless Dev].

4 **After the Wi-Fi connection, Select [Ftp] and login the FTP server to upload or download the files.**



5 **After the Wi-Fi connection is made, you can also login the email to receive or send email.**

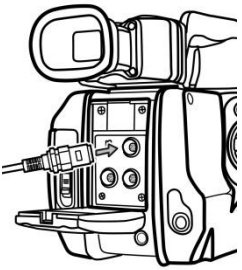
Connection

Connecting to a Monitor

A video-compatible monitor connected via the video cable (supplied) can be used to view and analyze images.

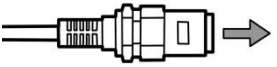
1 **Turn off the IR camera.**

2



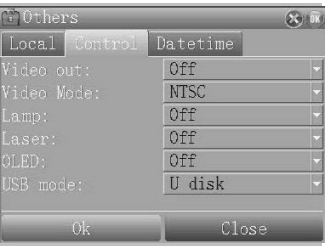
Attach the video cable to the video out terminal on the IR camera.

3



Plug the other end of the video cable to the video in jack on the monitor.

4 **Turn on the monitor and camera. Select [Setup] -[Others]-[Control]-[Video output]-[On].**

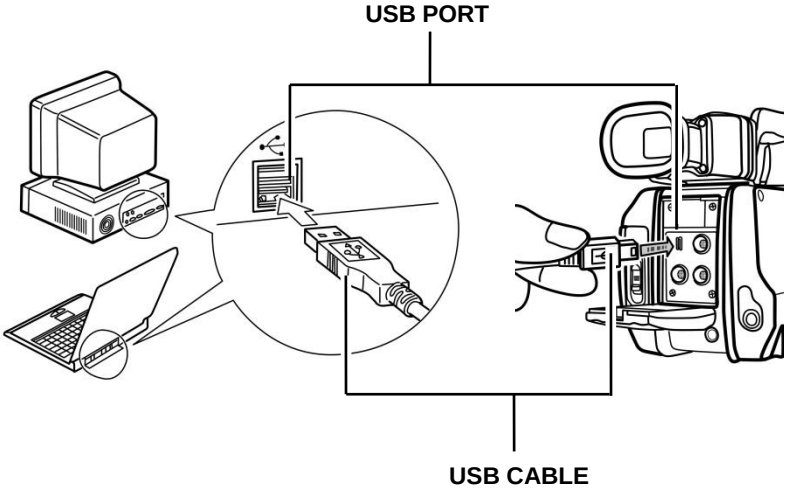


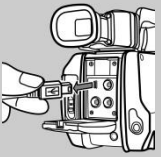
Connection

Connection

Connect the USB cable to the computer's USB port and the USB terminal on the camera.

- **You do not need to turn off the computer or camera when making this connection.**
- **Please refer to your computer manual for information regarding the location of the USB port.**





To disconnect the cable from the IR camera: Hold the cable connector firmly at both sides and pull it straight out.

Connection

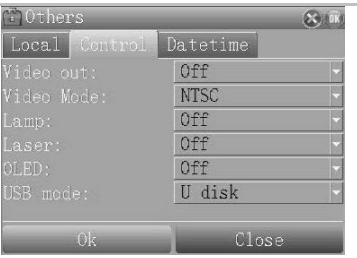
Transfer Video via USB

You can analyze and save the thermal video onto a computer directly via the USB by the optional real-time software.

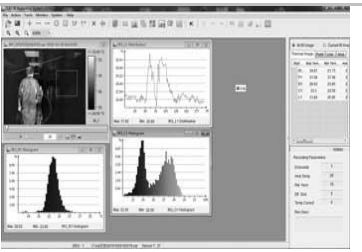
1 **Power on the camera.**

2 **Connect the USB terminal on the camera and computer via USB cable.**

3 **Select [Setup] -[Others] -[Control]-[USB mode] –[Transfer], press [Enter].**



4 **Run the software. You can analyze the real-time video, and save it in your computer's disk.**



Connection

Real-time transfer

Troubles shooting

If you have any problems in the process of connecting the IR camera to a computer to use optional real-time software, check this first.

First, Check the Following

1. Does your computer comply with these requirements?
   Ensure the system has a built-in USB port and it comes with Windows XP or greater preinstalled.
   The USB interface is not supported for systems not complying with the above conditions.
2. Is the camera correctly connected to the computer?
3. Is the battery charged sufficiently?
   You should use a household power source to power the camera when it is connected to a computer.

• If the Problem Is Not Mentioned Above

If the USB Driver is not correctly installed, it is possible that Windows is not recognizing the USB Driver. Please contact your motherboard's manufacturer for the latest driver.

The USB2.0 real-time transmission function may not properly work under some model of motherboard's chipset. In this case, connect the IR camera to another computer which is based on the chipset of Intel configuration or NVidia configuration and try again.

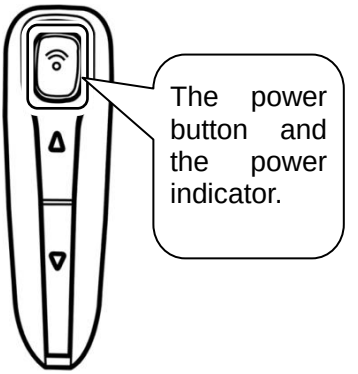
Connection

Using the Bluetooth headset

Follow the steps to install the Bluetooth headset for the first time.

1 **Turn off the camera and Bluetooth headset.**

2 **Turn on the Bluetooth headset first.**
Press and hold the power button for around 10 seconds until the power indicator begins to blink red and blue. The headset is in pairing status for 120 seconds.



3 **Turn on the camera.**
The green indicator of camera lights and the blue indicator flashes at the same time. In this mode, camera is preparing to pair to the Bluetooth headset.

4 **Press the power button of Bluetooth headset to pair the headset and camera. When the pairing is successful, the blue indicator of the headset flashes slowly.**
The Bluetooth icon on is the screen.

Make sure that the camera is not too far away from the Bluetooth headset. If possible, try to have the Bluetooth headset close to the camera in step 4.

5 **After pairing the camera and headset for the first time. The next time, you turn on the headset the power indicator will blinks blue, you can then turn on the camera, and use it.**

6 **Wearing the headset, you can record vioce memos or play back the memos.**

Press ***C*** key and ***Enter*** key together to free the Bluetooth headset.

Troubles Shooting

Problem	Cause	Solution
Camera will not operate	Power is not turned on	• Turn on the camera. See *Turning the Power On / Off* (p.16).
	Insufficient battery voltage	• Fully charge the battery.
	Poor contact between camera and battery terminals	• Wipe the terminals with a clean, dry cloth.
Camera will not record	Internal memory is full	• If required, download the images to a computer and erase them to make some space.
	Internal memory not formatted correctly	• Format the internal memory in FAT32 format.
Battery pack consumed quickly	Battery pack capacity reduced because of disuse for one year or more after being fully charged.	• Replace the battery pack with a new one.
	Battery life exceeded	• Replace the battery pack with a new one
Battery pack will not charge	Poor contact between battery pack and battery charger.	• Clean the battery terminals with clean cloth. • Connect the power cord to the battery charger and insert its plug firmly into the power outlet.
	Battery life exceeded	• Replace the battery pack with a new one.

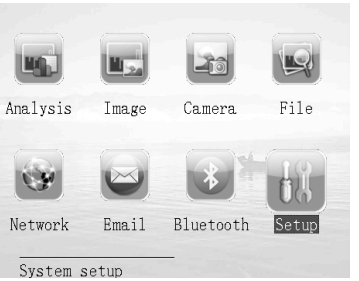
Appendix

Loading the packet program

Users can follow the steps below to update the packet program.

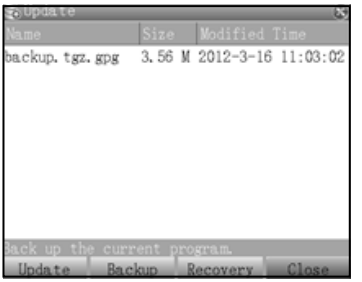
1 **Turn on the camera. Copy the packet program to the SD card and insert the card into camera.**

2 **Press C key to enter menu then use the direction keys to select [Setup].**

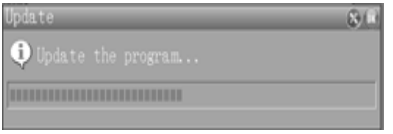


3 **Select [Update] and press [enter] to enter the update mode.**

4 **Select [Update] and press [enter].**

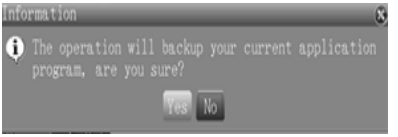


5 **The updating message will show on the screen.**



6 **The updating operation is finish now.**

If the core-board is loaded with the packet program for the first time, please backup the packet program first in *step 4*, then press "update".



Appendix

Using the Optional Lens

The optional lenses are used to expand your analyze range.

Ensure that the lens is screwed firmly onto the camera body. Injury from glass shards can occur if the lens loosens and falls off

48° Wide angle lens

This lens is for taking wide angle shots. The lens changes the focal length of the camera body's lens by a factor of 0.5x.

12° Tele-lens

This lens is for taking telephoto shots. The lens changes the focal length of the camera body's lens by a factor of 2x.

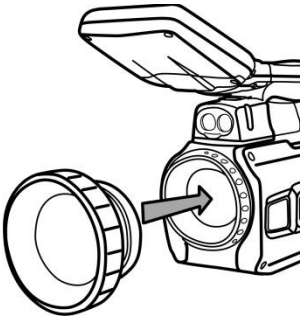
Appendix

Using the Optional Lens

How to mount optional lens

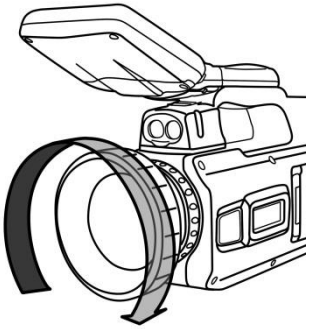
1 **Turn off the IR camera (p.16).**

2



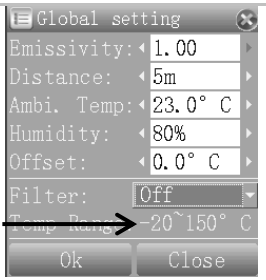
Attach the lens to the camera body.

3



Screw on the lens in the direction of the arrow.

4



The camera will change the type of lens automatically when you replace the lens. Please see the measurement range.

Appendix

Camera Care and Maintenance

Use the following procedures to clean the camera body, lens, LCD monitor and other parts.

Camera Body	**Wipe the body clean with soft cloth or eyeglass lens wiper.**
Lens	**First use a lens blower to remove dust and dirt, then remove any remaining dirt by wiping the lens lightly with soft cloth.** • Never use synthetic cleaners on the camera body or lens.
LCD monitor	**Use a lens blower brush to remove dust and dirt. If necessary, gently wipe the LCD monitor with soft cloth or an eyeglass lens wiper to remove stubborn dirt.** • Never rub or press forcefully on the LCD monitor. These actions may damage it or lead to other problems.

Never use thinners, benzene, synthetic cleaners or water to clean the camera. These substances may distort or damage the equipment.

Appendix

Emissivity table

Material	Temperature（°C）	Emissivity approximation
Metal		
Aluminum		
Polished aluminum	100	0.09
Commercial aluminum foil	100	0.09
Electrolytic chromeplate alumina	25～600	0.55
Mild alumina	25～600	0.10～0.20
Strong alumina	25～600	0.30～0.40
Brass		
Brass mirror (highly polished)	28	0.03
Brass oxide	200～600	0.61～0.59
Chrome		
Polished chrome	40～1090	0.08～0.36
Copper		
Copper mirror	100	0.05
Strong copper oxide	25	0.078
Cuprous oxide	800～1100	0.66～0.54
Liquid copper	1080～1280	0.16～0.13
Gold		
Gold mirror	230～630	0.02

Appendix

Emissivity table (continue)

Material	Temperature（°C）	Emissivity approximation
Iron		
Polished cast iron	200	0.21
Processed cast iron	20	0.44
Polished tempered iron	40～250	0.28
Polished steel ingot	770～1040	0.52～0.56
Raw welded steel	945～1100	0.52～0.61
Surface ferric oxide	20	0.69
Completely rusty surface	22	0.66
Rolled iron plate	100	0.74
Oxidized steel	198～600	0.64～0.78
Cast iron (Oxidizing at 600°C)	198～600	0.79
Steel (Oxidizing at 600°C)	125～520	0.78～0.82
Electrolytic ferric oxide	500～1200	0.85～0.89
Iron plate	925～1120	0.87～0.95
Cast iron, heavy ferric oxide	25	0.80
Tempered iron, ferric oxide	40～250	0.95
Melting surface	22	0.94
Melting cast iron	1300～1400	0.29
Melting mild steel	1600～1800	0.28
Liquid steel	1500～1650	0.42～0.53
Pure liquid iron	1515～1680	0.42～0.45

Appendix

Emissivity table (continue)

Material	Temperature（°C）	Emissivity approximation
Lead		
Pure lead (Non-oxidization)	125～225	0.06～0.08
Mildly oxidized	25～300	0.20～0.45
Magnesium		
Magnesia	275～825	0.55～0.20
Magnesia	900～1670	0.20
Hg	0～100	0.09～0.12
Nickel		
Electroplate polishing	25	0.05
Electroplate	20	0.01
non-polishing		
Nickel wire	185～1010	0.09～0.19
Nickel plate (oxidized)	198～600	0.37～0.48
Nickel oxide	650～1255	0.59～0.86
Nickel alloy		
Nickel-chrome (heat-resistance) alloy wire (shining)	50～1000	0.65～0.79
Nickel-chrome alloy	50～1040	0.64～0.76
Nickel-chrome (heat resistance)	50～500	0.95～0.98
Nickel-silver alloy	100	0.14
Silver		
Polished silver	100	0.05

Appendix

Emissivity table (continue)

Material	Temperature（°C）	Emissivity approximation
Stainless steel		
18-8	25	0.16
304(8Cr,18Ni)	215～490	0.44～0.36
310(25Cr,20Ni)	215～520	0.90～0.97
Tin		
Commercial tin plate	100	0.07
Strong oxidization	0～200	0.60
Zinc		
Oxidizing at 400°C	400	0.01
galvanized shining iron plate	28	0.23
Ash zinc oxide	25	0.28
Non-metal materials		
Brick	1100	0.75
Fire brick	1100	0.75
Graphite (lamp black)	96～225	0.95
Porcelain enamel (white)	18	0.90
Asphaltum	0～200	0.85
Glass (surface)	23	0.94
Heat-resistance glass	200～540	0.85～0.95
Calcimine	20	0.90
Oak	20	0.90

Appendix

Emissivity table (continue)

Material	Temperature（°C）	Emissivity approximation
Carbon piece		0.85
Isolation piece		0.91～0.94
Sheet metal		0.88～0.90
Glass pipe		0.90
Loop type		0.87
Porcelain enamel products		0.90
Porcelain enamel designs		0.83～0.95
Solid materials		0.80～0.93
Ceramics (vase type)		0.90
Film		0.90～0.93
Mica		0.94～0.95
Flume mica		0.90～0.93
Glass		0.91～0.92
Semiconductor		0.80～0.90
Transistor (plastics sealed)		0.30～0.40
Transistor (metal) Diode		0.89～0.90
Transmitting loop		
Pulse transmission		0.91～0.92
Level chalkiness layer		0.88～0.93
Top loop		0.91～0.92

Appendix

Emissivity table (continue)

Material	Temperature（°C）	Emissivity approximation
Electric materials		
Epoxy glass plate		0.86
Epoxy hydroxybenzene plate		0.80
Gilded sheet copper		0.30
Solder-coated copper		0.35
Tin-coated lead wire		0.28
Brass wires		0.87～0.88
Block talcum terminal		0.87

Specification

All data is based on TROTEC's testing standard. Subject to change without notice.

Type	ICX640
Image performance	
FOV/Min.focus distance	24° x18°/0.5m
Spatial resolution	0.65 mrad
Thermal sensitivity	≤0.06°C@30°C
Detector type	UFPA
Resolution	640x480
Spectral range	8-14um
Focus	Motorized, Auto-focus
Image presentation	
Image mode	IR/CCD/Duo-vision
LCD Display	5" TFT screen
Digital camera	1280 x 960 full color
Viewfinder	800 x 480 full color
Digital zoom	10X
Video output	NTSC (60Hz) or PAL (50Hz) composite video
Temperature measurement	
Measurement range	-20℃ ~ +600℃, up to +2000℃ (optional)
Accuracy	±2℃,±2% of readings

Measurement mode	9 movable spots, auto hot/cold spot, profile, 5 area boxes, isotherm
Correction	Emissivity, ambient temperature, distance, relative humidity
Delta T	Yes
Alarm	Yes
Image storage	
Type	4GB removable SD card
File format- Thermal	.JPG
File format- Visual	.JPG
Thermal video record	MPEG Format
Annotation	Voice annotation via Bluetooth
Battery system	
Working voltage	DC 8V-11V
Battery operating time	2.5 hours
Environment specification	
Operating temperature range	-20°C to +50°C
Storage temperature range	-40°C to +70°C
Humidity	10% to 95%, non-condensing
Encapsulation	IP54
Shock	25G
Vibration	2G
Physical characteristic	

Weight	1740g
Size	327mm X 143mm X 170mm
Tripod mounting	1/4"_20
Other	
Illuminator	Yes
Laser pointer	Yes
USB2.0 transfer real-time thermal data	Yes
Bluetooth	Yes
Available optional lenses	7°, 12°, 48°