Warnings, Cautions and Notes

Definitions

! **WARNING** Could cause bodily injury or death.

! **CAUTION** Could cause damage to equipment or permanent loss of data.

! **NOTE** provides useful information to the operator.

**Important Information** – Read before using the Instrument

! **WARNING** – Laser Radiation is emitted from this device. **Do Not** stare into Laser Beam. **Class 2 Laser, 635 nm, 0.9mW**

! **CAUTION** - Never point the lens directly toward a strong radiation source (ie. Sun, direct or reflected laser beam, etc.), with power on or power off, as damage may result to the thermal detector used inside. **Permanent damage may result!**

! **CAUTION** - The original shipping carton should be kept for use for future transportation. Do not drop, shake or impact the thermal imager excessively, in use or during transportation.

! **CAUTION** - Store the unit in its original case in a cool, dry, well-ventilated area away from strong electromagnetic fields.

! **CAUTION** - Protect the surface of the lens from being stained or damaged by foreign objects such as sludge or chemicals. Please replace the lens cap after use.

! **CAUTION** - Please remember to backup image data regularly to avoid losing important data.

! **NOTE** - For maximum measurement accuracy, allow 3 to 5 minutes for
camera to stabilize after initial power up.

! **NOTE** - Each camera is factory calibrated. It is recommended that calibration be performed every 12 months.

! **CAUTION** - Do not open case. Unit does not contain any user serviceable parts. Repair should be performed by factory authorized technicians only. Opening the product will void your warranty.
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Appendix A
Common material emissivity (FYI)

Appendix B
Factory default parameter setting table
Introduction

Thank you for choosing ICI Instruments “IR 640 P” hand-held infrared thermal imager.

Features

IR 640 P includes the following features:

11 user selectable color palettes
11 user selectable languages
1-8 X digital zoom
10 removable spot measurements
5 areas measurements
2 lines measurements
Shortcut key custom
Auto focus
Manual focus
Bluetooth
WIFI
Power save mode
LCD brightness adjustment
Video Output- NTSC or PAL
Network settings
Time/date settings
Restore factory settings
SD card unload, formatting
SD card capture, video saving
Voice capture or text annotation
Continuous image capture
Alarm screenshots
Alarm video
Isotherm
Temperature measurement settings
Built in Emissivity Table list of common materials
CMOS visible image and storage
Thermal image and CCD image fusion
High/low temperature fusion

Upgrades and Options

IR 640 P is factory upgradeable for Wide Angle or Telephoto Lenses.

Applications:

Preventive maintenance

- Power industry: Power line and power facility thermal state checking; problem and defect diagnosis.
- Electrical system: Identify potential circuit overloads.
- Mechanical system: Reduce downtime and avoid catastrophic failure.

Construction science

- Roof: Quick identification of water penetration problems.
- Structure: Commercial and residential energy audits.
- Moisture detection: Determine root cause of moisture and mildew.
- Evaluation: Evaluate the resolution to ensure the area completely dry.

Others
- Iron and steel industry: Inspect steel refining and rolling processes; diagnose hot-blast stove defects; detect the embryo temperature of armor plate, etc.
- Medical: Human body surface temperature detection and screening.
- Petro/chemical: Oil pipeline status inspection; material surface temperature detection; insulation inspection; power equipment status, etc.
1.1 Standard accessories

- Infrared thermal image camera (with wrist strap and lens)
- Shoulder strap
- Carrying case
- Video out cable
- Lithium ion batteries (2)
- Charging dock
- Lithium battery charger
- Lens cap
- User manual, Infrared report and analysis software system CD
- SD card
- SD card reader
- Network cable (Mini-USB to RJ45)

1.2 Optional accessories

- External 0.5x wide-angle lens
- External 2x, 3x telescopic lens
- Carrying case
- AC adapter (include power line)
- Europe standard power line
- Tripod
2 Camera overview

2.1 Function keys
[1] **Power key**

Press and hold the Power Key for > 3 seconds to power on/off the camera

! **Note:** After powering off, please wait ten seconds before powering the camera on again

[2] **Menu/Confirm key**

Includes **Up, Down, Left, Right** and **Menu/Confirm** (center) keys. Function varies with operation mode.

In **Menu mode**, it is used for menu selection. **Up** and **Down** keys are for same level of menu operation. **Left** and **Right** keys are for different levels menu operation. **Confirm** key (center) is to activate the menu and confirm the choice.

In **Image mode**, press **Up** or **Down** key to activate X2 digital zoom. The screen will display “X2” in the upper left corner. Press **Up** or **Down** key to return to the original image.

In **Spot Measurement** editing mode (activated immediately after adding a spot or by selecting via the **A** key), press the **Menu** key to pop up the attribute box. Press four navigation keys to move the spot location.

In line temperature measurement editing mode (activated immediately after adding a line or by selecting via the **A** key), press the **Menu** key to pop up the attribute box. If measurement line is horizontal, press **Up** and **Down** keys to move the line location; press **Left** and **Right** keys to move the reference line. If measurement line is vertical, press **Left** and **Right** keys to move the line; press **Up** and **Down** keys to move the reference line.

In area measurement editing mode (activated immediately after adding an area or by selecting via the **A** key), press the **Confirm** key to pop up the attribute box. Select in the attribute box the parameter to be edited, either size or position. Press the four navigation keys to move the area location or change the size of the area.

[3] **Cancel/Auto Focus key (Marked “C”)**
• Pressing and releasing the C key cancels the present operation when in Menu mode.

• Pressing and releasing the C key when an image is frozen or being viewed from memory, will return to real-time measurement status.

• When a parameter is selected, such as a measurement cursor, pressing the C key will delete the highlighted measurement.

• Press and hold the Key for > 3 seconds to auto focus

[4] Freeze/Save key (Marked “S”)

Used for freezing or saving thermal image. Short press the key once to freeze the image, Press C to return to real-time measurement. Short press the key twice to save the image. In file management, press the key to choose whether delete the chosen image or video.

[5] Select/Auto key (Marked “A”)

The “A” or attribute button performs 3 functions.

a) The first function is modification of selected parameters. It is obtained by a quick press and release (less than 2 seconds), with this functions to modify their parameters. Subsequent presses will “scroll” through the available parameters. The selected function will be highlighted in yellow.

b) The second function is calibration. Press and hold the Key for > 3 seconds for auto calibration to get accurate temperature measurement results.

c) The third function is blue tooth. Open blue tooth, select the image, short press to send the image.

[6] F1 Trigger/Shortcut key
The standard configuration is to save the image

[7] Laser switch

Short press to turn on the laser, press again to turn off. In menu there is auto turn off laser option, the standard configuration is 60s.

[8] F2 Key

Short press to switch thermal image /CCD image/fusion mode.

Long press to turn on the LED light. In menu there is auto turn off LED light option, the standard configuration is 60s.

[9] F3 User –defined Key

The standard configuration is to switch temperature range

F1, F3 is user defined key, except standard configuration, it can define below functions:

Image playback, record-short press to enter image playback or start taking video

Light-press once to turn on the light, press again to turn off the light

Spot, area temperature- press once to add spot or area, press again to delete the spot or area

LCD brightness adjustment- press once to pop out LCD brightness adjustment bar

Fusion transparency-press once to pop out fusion transparency bar

[10] Microphone

Used for voice annotation when saving the image
2.2 Interface


It is a video output interface

[12] **Network interface**

Use network cable (Mini-USB to RJ45) to connect Internet

[13] **SD card slot**

Accepting standard size SD card such as supplied 8GB capacity card, for device upgrade or image storage

[14] **Power interface**

External power input interface. Power source should be +12VDC. Center pin is positive terminal
3 Basic operation

3.1 Battery Installation and Replacement

3.1.1 Inserting or removing battery

Battery compartment is located at the end of the camera, below the view finder.

Insert the battery (the battery contacts must face into the battery compartment), press battery in until the battery is locked in place.

When inserting the battery, note the triangle mark’s direction should point upwards, do not overexert when inserting the battery, this can cause damage the camera or battery.
! **CAUTION:** Use only original manufacturer replacement battery. Use of incorrect battery may result in physical or electrical damage to the instrument due to incorrect voltage or physical size difference.

### 3.1.2 Replacing battery

When battery has approximately 5% charge remaining, the warning will be
displayed and the instrument will turn off in approximately 10 seconds.

It’s better to replace batteries now.

### 3.2 Battery safety and usage

- Batteries should be stored in an ambient temperature of -4°F (-20°C) to 67.9°F (+20°C). Lithium batteries will self-discharge during storage, so they should be fully charged before storage. Self-discharge may affect long term battery performance. Furthermore, it is recommended that the battery should be charged in a set time, as below;

  - **Ambient temperature of:**
    - -4°F (-20°C) to 67.9°F (+20°C), once every 6 months
    - 67.9°F (+20°C) to 113°F (+45°C), once every 3 months
    - 113°F (+45°C) to 149°F (+60°C), once every month

- Battery should have greater than 50% charge prior to recharge.

- The ambient temperature for charging should be 32°F (0°C) to 104°F (+40°C). If under 32°F (0°C), the battery capacity will be diminished; if over 104°F (+40°C), the battery may overheat, resulting in permanent damage.

**WARNING:**

- Never disassemble, incinerate or puncture battery
- Never short circuit the battery
- Keep the battery dry
- Keep out of reach of children
Always dispose of battery in accordance with local, state and federal regulations

3.3 Quick access

3.3.1 Capture an image

- After installing the battery, press and hold the power key (≥3 seconds) until the display comes on. After approximately 50 seconds, the power on routine will finish and the camera will start its measurements.
- Remove the lens cap and aim at the target. Adjust the focus for the clearest target thermal image.
- Press A key for auto calibration to get the best image
- ! NOTE: Failure to properly focus the camera will result in increased measurement error. When the image quality becomes worse or a ghost image appears, please press button A for a long time to compulsion in force.

3.3.2 Temperature measurement

- If no measurement cursors are on screen, add a measurement spot, area or line by pressing MENU and selecting Measurement. Press CONFIRM and scroll left or right to select the proper measurement parameter. Aim the cursor indicator onto the target object on the screen. The temperature will be displayed in the upper right corner of the screen. For highest accuracy measurements, force a calibration cycle by pressing the A key for 3 seconds until “Calibrating” appears in upper left portion of display.
- If you want to measure the current thermal image in detail, press S key to freeze the image for on-screen analysis. Save the image if future analysis is desired.
- If the target object’s temperature is lower or higher than the limits of
the camera, it will display <XXX° or >XXX° with XXX being the min or max temperature of the selected range.

- To modify the measurements attributes, select the measurement parameter, and then press the **Confirm** key. The screen will display the settings dialog box. The below figures are spot, line and area measurement respectively.

![Spot attributes dialog box](image)

Spot attributes can amend emissivity, distance and reference temperature. When **Set Ref** is set as **Yes**, the displayed values of other measurements will be their delta from this measurement.

![Line attributes dialog box](image)

Line attributes can amend emissivity, distance, highest temperature, lowest temperature, average temperature, max temperature difference, the cross point temperature and reference temperature. Press A key for up and down switch. When **Set Ref** is set as **Yes**, the displayed values of other measurements will be their delta from this
measurement.

<table>
<thead>
<tr>
<th>Area Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emissivity</td>
</tr>
<tr>
<td>Distance</td>
</tr>
<tr>
<td>Measure Type</td>
</tr>
<tr>
<td>Ref object</td>
</tr>
</tbody>
</table>

Area attributes dialog box

Area attributes can amend emissivity, distance, highest temperature, lowest temperature, average temperature, max temperature difference and reference temperature. Left and right key for choice, press A key for up and down switch. When Set Ref is set as Yes, the displayed values of other measurements will be their delta from this measurement.

! NOTE: Thermal camera can only select one reference temperature object

### 3.3.3 Freeze and save image

There are three ways to save the image:

1. Press S key to freeze the image and then select **Save** to save the image, or select **Cancel** to exit the operation.
2. Press Menu key to activate the main menu. Choose File->Save and the system will initiate the save cycle.
3. With the “Trigger” parameter, located in Setup->Sys. Setup->Trigger, set to “Save Key”, pulling and releasing the trigger key will initiate the save cycle.

### 3.3.4 Viewing stored Images

There are Two ways to open the image file:

1. Press the Ok key to activate the main menu, select "File Manager" menu ,
then select the submenu (via the arrow keys to select)

2. Click the "Preview" option in the floating panel to open the selected file (via the left and right keys to switch selection)

- After you open the image, you could use upper and lower sections of the playback control panel keys to playback the current store images.
- Press Cancel key to exit and return to the current state.

### 3.3.5 Export saved images

Can use card reader to download, delete, and format the TF files.

**Note:** It is recommended to use the thermal camera curing formatting capabilities in software for SD card format.

### 3.3.6 LED screen settings

There are two methods for your settings: 1. Press **Menu** key to activate the main menu. Choose **general settings**->**LCD brightness adjustment** to adjust LED screen brightness. 2. Set shortcut key to LCD brightness adjustment to adjust LED screen brightness.

### 3.3.7 Menu operating instructions

- Keyboard operation: press the "OK" button to pop up the floating panel, use left and right arrow keys on the floating panels to select the icon, click "OK" key to enter the relevant interface.
- Main menu interface: via "up and down" key to select the menu icon, click "OK" key to enter the submenu.
- Sub-menu interface: via "up and down" key to select, if there’s the ">>" mark, using right-click to enter the lower menu
- Parameter interface: The "up and down" key is to modify, the "left and right" key is to choose
- `<   >` means modify the setting of the current menu.
- Press the "Ok" button to confirm the changes, save and return to the previous menu, press the "C" key to cancel the changes and return to the previous menu.

- Cancel and return to the previous menu button: 🚨 Save and return to the previous menu button. (For touch screen)
Switch button, by the left and right keys to modify the switch settings

4 Operation guide

4.1 Graphic interface description

4.1.1 Screen graphic interface

[1] Company logo
[2] Emissivity: the current emissivity setting
[4] Result: Indicates the temperature value of the target object. Black and
yellow denotes the temperature value of the selected object.

[5] **Spot temperature measurement:** white crosshair

[6] **System time:** the current system time

[7] **Battery status:** Indicates the current battery status.

[8] **Manual/auto enhancement mode:** choose manual or auto mode

[9] **Min temperature:** indicates minimum value of the palette

[10] **Palette:** palette bar. User can choose different palettes

[11] **Calibration/freeze:** indicates the calibration status or freeze status

[12] **Wi-Fi:** Wi-Fi is open will change along with Wi-Fi signal

[13] **Bluetooth:** select Bluetooth function

[14] **Max temperature:** indicates the max value of the palette

[15] **Battery status:** indicates the current battery status

[16] **Lens:** 0.5x or 2x

[17] **Record:** current record status.

Continuous capture mark

Record mark

[18] **SD card:** indicate the TF card load status

[19] **Mode switch:** current mode.

IR mode, CCD mode, fusion mode.
4.1.2 Floating bar interface

Floating bar interface: from left to right, up to down is adding spot, adding line, adding area, delete, taking photo, record, playback and main menu.

4.1.3 Main menu

The main menu items: display the main menu item, document management, temperature settings, image settings, camera settings, general settings, network settings, SD card management and system setting.
4.1.4 Sub-menu interface

[1] Figure name: Displays the name of the dialog box. The name of the dialog box as shown in the example is "temperature measurement setting."

[2] Item title: A dialog box may contain more than one item. As shown in the above figure

[3] Item Content: each item corresponds to the content of a project, the left and right keys to make changes, ">" indicates the lower menu.


4.2 Measurement Object Adding

This feature is used to increase or clear the measuring object. The following dialog box pops up, press the Enter key, floating menu pops up, select the temperature measurement target to add and press the Enter key.
If select "trash can", then press OK key, then the all the objects will be cleared.

! NOTE: When you delete a single temperature measurement object, directly press “A” key and choose the object, then press the "C" key to delete.

4.3 Recording

This function is used to save the video, save format to MP4. Pressing the Enter key, floating menu pops up, select video and press the Enter key, as shown below:

[Image of Recording Figure]

Press stop key to end the recording, and return to the current operation status.

4.4 Photo

This item is for photo. And back up in the JPG format. Pop up the floating menu after pressing confirm key. Then finish the photo. If turn up function of mark is shown. Backup note will pop up in the OSD as followed.
Voice record note for photo
Continuous photo marks will appear in the status column if set to ‘continuous photo’.

4.5 Preview
This item is for the preview files of backup. Press confirming key. Pop up the floating items, select preview and press confirm key and it will appear as followed.

Preview OSD
Switch to files by pressing key of left or right. Open it and it will appear in the screen by pressing confirm key. Press C key to quit
4.6 Settings

4.6.1 General settings

Pressing the confirm key will pop up the panel and select the SETTING to open the main menu. Select the general setting in the main menu. General setting OSD will pop up after pressing confirming key. Users could set the time of auto calibration / definition of shortcut key /Bluetooth/pattern of power saving/ brightness adjustment of LCD / unit of temperature / unit of distance/external video output switch (in total 8 items). Switch between items by pressing key of up or down. Change the value by pressing key of left or right.

“>” means secondary -menu and enter the menu by pressing the right key.
**Time of Auto calibration**: Set time interval of auto calibration to get better thermal image and improve the precision. The unit is factory set in seconds.

![Auto calibration OSD](image)

**Shortcut key**: Users could set the Functions of shortcut key. System offers image saving, temperature range switch, image playback, record, LED light, OLED light brightness adjustment, transparency adjustment, and adding/deleting a spot or deleting an area of choice. When select shortcut key of light. It will open the lighting. Then it closes. When select shortcut key of spot 1. It will add or remove the spot 1. When select shortcut key of area 1. It will add or remove the area 1. When select shortcut key of record. It starts to record. When select shortcut key of photo. It starts to save the photos you took.
Shortcut key setting

**Power saving**: Screen off and power off

**Time of screen off**: If without any operation, thermal imaging camera will screen off to save power. Press any key except the power key, thermal imaging camera will screen on. This function is not valid when time is set to 0 minute.

**Time of power off**: If without any operation, thermal imaging camera will power off to save power. This function is not valid when time is set to 0 minute.

Power saving OSD

**Auto off time**: includes laser and LED auto off time, used for auto off when the laser or LED turn on, the default time is 60s
Auto off time OSD

**LCD brightness adjustment**: It is valid when changing the brightness

LCD brightness adjust OSD
4.6.2 Temperature measurement setting

Temperature measurement setting menu

Press OK button to call out the Setting Menu. Select “Measuring Setting”, then press “OK” again to call out the setting interface. In this interface, level, magnification, Environment Temp, Ref Temp, adjustment, object temperature can be set. Use UP & Down button to select, “>” means there is sub menu, press Right Button to enter the sub menu.

Level: Setting the Measuring Level of the thermal camera.

Magnification: setting the Magnification and the different Temp range.

Environment Temp: It will automatically detect the Environment Temp after the camera start-up.

Ref Temp: When it is enabled, the target temperature shown on the LCD is the D-Value between the real temp and the Ref-Temp.
Object temperature: When turn on object temperature, the temperature target display the object temperature in the bottom right corner.

4.6.3 Adjustment

Press OK button to call out the “Adjustment” under menu “Measuring Setting”. In this menu, Emissivity, TCorrect, Distance, Humidity, TReflect can be set. Use UP & Down button to select, use LEFT & Right to set the value. “>” means there is sub menu, press Right Button to enter the sub menu.

Emissivity: Different target has different emissivity, so the user can set different emissivity for different target. If it is not set, then the system will use it’s default setting. Attached Common emissivity table for reference.
**TCorrect**: Correct the target Temperature.

**Distance**: Setting the distance between the camera and the target to make sure exact measuring. Set the real distance if the distance is shorter than 10 meters. (Unit 0.5m)

**Humidity**: Set the humidity of the current environment.

**TReflect**: It will only functioned after it is enabled. Can use fixed temp as reference temperature.

4.6.4 **Image settings**

![Image Setting Menu](image)

Press OK button to call out the Image setting menu under "Setting". In this menu, **Manual/Auto-Enhance Mode, IR transparency, Alarm setting, Isotherm, IR fusion, video output** can be set. Use UP &Down button to select. Use the LEFT & Right arrows to set the value. ” >” means there is sub menu, press Right Button to enter the sub menu.

**Manual/Auto/Auto-Enhance Mode**: Adjust the image quality for the user to get better image for analysis purpose.

When Auto-Enhance Mode is activate you can switch between manual and
automatic. Press “A” button will enter manual mode, it can adjust the palette with “UP, Down, LEFT, Right” buttons. By Pressing “C” the system will return into Auto Mode.

When Auto-Enhance Mode is deactivated, can switch between manual and automatic. Press “A” button will enter manual mode, it can adjust the palette with “UP, Down, LEFT, Right” buttons. Press “C” will return the users to Auto Mode.

The modes can be switched with the Auto-enhance mode Button.

If select auto mode, the camera will automatic adjust the to the range of temperature sensed in the image.

If select “Auto-Enhancement “, both High temp target and low temp target can be viewed in the image.

If Manual mode is selected, the User can set the palette value to adjust the image quality. Press “UP” button to increase the level and span range, press Down to decrease the level and span range. Press Left button to reduce the upper limit/increase the bottom limit; Press RIGHT button to increase the upper limit/decrease the lower limit.

Alarm Setting

**Alarm Types**: It is only functioned when measuring. User cab set alarm OFF, High **temp alarm**, Low temp alarm here. It will alarm when
A proper setting is selected. Alarm Isotherm color can be set in “Alarm Color”

**Alarm Color**: The color of the target area shown on the LCD will be changed into the alarm color set when the temperature is over the alarm temp. 9 color types can be selected. If “colorless” is selected, then the color will not change when alarm.

**Alarm Temperature**: Setting alarm Temperature. Only functioned when it is enabled.

**Alarmlink**: It will automatic saved when there is alarm including snapshots and video record.

**Time Interval**: Set the alarmlink time interval.

**Alarm video time**: set the alarm video time, or choose to turn off this function

![]( Isotherm Setup Menu

**Isotherm**: Activates the Isotherm display by displaying the image in the set temperature range by the specified color.

**Isotherm Color**: 9 colors available for your choice, Setting to ‘Off’ will disable the feature.

**Isotherm low value**: Allows Users to Set the Isotherm low value
**Isotherm upper value**: Allows Users to Set the Isotherm upper value

IR Fusion High & Low temperature Menu

**IR Fusion High & Low temperature**:  
It consists of three options--IR Fusion High Temp, IR fusion Low Temp, and OFF. Set IR Fusion High Temp, when the actual temperature is higher than the temperature of IR fusion set up, CCD image will be shown. Vice versa.

4.6.5 **Network settings**

Network Setup Menu

Press the menu button to show up the floating panel and choose the “setup” option to active the main menu. Select “Network function.”
**IP Address**: This IP address must be the only one, cannot be conflicted with the other IP address of the same network segment.

**Sub network mask**: Divide the segment of the sub network.

**Default network gateway**: set the gateway address to realize the communication among different segment.

### 4.6.6 SD card management

![SD Card Management Figure]

Press the Enter key to pop up floating panel, then select "Settings" option to activate the main menu, select the "SD Card Management item in the setup menu.

**Unload**: Unload SD card.

**Format**: This function is used to format the SD card. Select the formatting options, pressing the confirm key to format, press cancel or "C" key
to cancel the formatting

! **Note:** Verify that the file is no longer needed or have been backed up before formatting; after formation, the saved thermal imaging pictures will be lost unrecoverable. If format by PC, please select FAT32 to format the card

### 4.6.7 Capture setting

Capture setting menu

Pressing confirm key to pop up the floating panel, then select "capture Settings" option to activate the main menu, selected the camera settings option

**Associated Pictures:** This function is to associate the infrared images with digital image, to save the picture together.

**Image annotation mode:** This option has two kinds of annotations, audio annotations and text annotations. Audio annotations is to add voice when you save the picture; text annotation is to add text messages when save the image.

**CS Shots:** Set Continuous capture the number of sheets can be set for 1, 3, 5, 10 shot.

**Continuous Capture Interval:** can be 0.5s or 1s.

**Manu Setting:**
Manu Setting

Set the path to save the file, directory type can be set by custom, by month, by date. In preview mode, the playback file path set by directory type

4.6.8 System settings

Press the Enter key to pop up "Settings" option to activate the main menu, select "System Settings" item in the setup menu. Users can customize the set system language, time / date formats, time / date, restore the factory value items. Pressing the up/down key to switch the setting, use left and right arrow keys to set the contents of the setting. The ">" indicates that there's a lower-level menu, use right-click to enter.

**Language**: Set the languages

**Time / Date Format**:
Change the format of the time/date

**Time Setting:**

Customer can via the Time Setting menu to set the thermal imaging camera’s time. After the setting, the data the time will be saved.

Users can customize to set the year, month, day, hour, minute entries. Press the left and right key to do the settings.

*Note:* When left unused for a long time, due to the limited internal battery power, the thermal imaging camera need to re-adjust the system time.

**Restore the factory settings:** This function is used to restore the factory settings. Pressing the confirmation button, the setting menu will come up,
continue to press the confirm key system to restore the factory settings. When pressing the cancel button to exit, the restore the factory settings will be cancelled. The details of the thermal imaging camera’ factory parameters listed please see the Annex parameter table.

Recover Factory Setting

! Note: Recover factory setting will cancel all user-defined parameters.

System Version Info:

Model: DL700
Device NO: 23707C10002
Version: V1.01
MAC: 00:00:44:4C:52:33

System Version Figure

Display thermal imaging device model, device number, software version number and MAC address

Import: New SD card the Create DCIM / Import directory on the SD card, import the fixed file name as PicNote.cfg

File Name Form:

[Note]

Note1 =
Note2 =
Note3 =

Each line is not more than 20 words. After the import is complete, restart
Export: TF card, make sure the SD card is in the machine, then select the menu and then click the Export button to export the contents stored in the TF card the DCIM / Export directory.

4.7 File management

4.7.1 Playback

Two modes of playback:

1. File management mode: press the Enter key to pop up floating panel select "Settings" option to activate the main menu, select the file management menu in the setup menu, press the confirm button to open the infrared image in the storage. The image arrangement format has cascade grid, press the upper, lower, left, and right arrow keys to switch the stored image. Pressing the "C" key to exit open image and return to the measurement state.
2. Preview mode: press the OK button to pop-up floating panel to select "Preview" option, enter the preview mode. Through the left and right keys to switch selection, selected press the OK button to enter the playback. Pressing the "C" key to exit open image and return to the measurement state.

Video Playback Interface

Video playback interface: Via the left and right key to select the play button on the status bar, press the "confirm" key to take effect on the next key to show and hide the playback status bar (press the "on" button is displayed, press the "next" button is hidden)

The icon buttons from left to right is as follow: play / pause, stop, rewind, fast-forward, the former one, the next.
Image Playback Interface

The image playback interface: Via the left, right key to select the play button on the status bar, press the "confirm" key to take effect on the next key to show and hide the playback status bar (press the "on" button is displayed, press the "next" button is hidden)

The icon buttons from left to right is as follows: the former one (above), the next (paragraph), sound recording, voice playback, text playback.

4.7.2 Delete

This function is used to delete data stored in files on the TF card. Open File Manager by the up and down keys to select the file you want to delete, press the "S" key to bring up the prompt box, delete the currently selected image files when the Enter key is pressed, the image voice or text comments will also be deleted, then press the "C" key to undelete
! Note: Before deletion, make sure that the file is no longer needed or have backup, the deleted image cannot be recovered
## 5 Specification

<table>
<thead>
<tr>
<th>Items</th>
<th>Technical Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Detector characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Detector type</td>
<td>Un-cooled FPA micro-bolometer</td>
</tr>
<tr>
<td>Array size/format</td>
<td>640x480</td>
</tr>
<tr>
<td>Field of view/min focus distance</td>
<td>24°×18°/0.3m</td>
</tr>
<tr>
<td>Spatial resolution (IFOV)</td>
<td>0.65mrad</td>
</tr>
<tr>
<td>Thermal sensitivity</td>
<td>≤0.03 ℃ @30 ℃</td>
</tr>
<tr>
<td>Frame frequency</td>
<td>50/60Hz</td>
</tr>
<tr>
<td>Focus</td>
<td>Auto/Manu electronics focus</td>
</tr>
<tr>
<td>Digital zoom</td>
<td>8x, continuous zoom</td>
</tr>
<tr>
<td>Spectral range</td>
<td>8-14um</td>
</tr>
<tr>
<td>Built-in CCD camera</td>
<td>5.0 million pixels, LED lights</td>
</tr>
<tr>
<td><strong>Image display</strong></td>
<td></td>
</tr>
<tr>
<td>LCD display</td>
<td>5” High resolution color touch LCD, 800 x 480</td>
</tr>
<tr>
<td>Image display</td>
<td>Fast switch between infrared image and CCD image, with fusion and picture in picture function</td>
</tr>
<tr>
<td><strong>Image characteristics</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Temperature ranges</strong></td>
<td>-40 ℃ - +650 ℃</td>
</tr>
<tr>
<td>Accuracy</td>
<td>± 2 ℃ or ± 2% of reading, Whichever is greater</td>
</tr>
<tr>
<td><strong>Measurement correction</strong></td>
<td>Automatic / manual</td>
</tr>
<tr>
<td><strong>Measurement mode</strong></td>
<td>Up to 10 movable spots. Up to 5 movable areas (maximum, minimum and average temperature). Movable lines. Line profile. Isotherms. Temperature difference. Alarm (voice, color)</td>
</tr>
<tr>
<td><strong>Image control</strong></td>
<td>Color palette 11 palettes changeable</td>
</tr>
<tr>
<td><strong>Setup functions</strong></td>
<td>Date/time, temperature unit, language</td>
</tr>
<tr>
<td><strong>Emmissivity correction</strong></td>
<td>Variable from 0.01 to 1.0</td>
</tr>
<tr>
<td><strong>Background temperature correction</strong></td>
<td>Automatic corrections according to user input</td>
</tr>
<tr>
<td><strong>Atmospheric transmission correction</strong></td>
<td>Automatic correction according to user input object distance, humidity and temperature</td>
</tr>
<tr>
<td><strong>Image storage</strong></td>
<td>CF card (8G)</td>
</tr>
<tr>
<td><strong>Mode</strong></td>
<td>Auto/manual saving, single thermal images and CCD image link saving, thermal and CCD fusion saving.</td>
</tr>
<tr>
<td><strong>Thermal image format</strong></td>
<td>JPEG (with radiometric information) MPEG4 (with radiometric information)</td>
</tr>
<tr>
<td>Laser pointer</td>
<td>Laser locator</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td><strong>Power source</strong></td>
<td>Battery type</td>
</tr>
<tr>
<td></td>
<td>Battery operating time</td>
</tr>
<tr>
<td></td>
<td>Battery charging mode</td>
</tr>
<tr>
<td></td>
<td>Power saving</td>
</tr>
<tr>
<td></td>
<td>External power</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td>Operating temperature</td>
</tr>
<tr>
<td></td>
<td>Humidity</td>
</tr>
<tr>
<td></td>
<td>Encapsulation</td>
</tr>
<tr>
<td><strong>Physical characteristics</strong></td>
<td>Tripod mounting</td>
</tr>
<tr>
<td></td>
<td>Weight</td>
</tr>
<tr>
<td></td>
<td>Dimension</td>
</tr>
<tr>
<td></td>
<td>External DC input</td>
</tr>
<tr>
<td></td>
<td>Video output</td>
</tr>
<tr>
<td></td>
<td>Communication port</td>
</tr>
</tbody>
</table>
# 6 Troubleshooting

Please follow the table below to diagnose and correct the problem. If problem still exists, please contact our service department (400-887-1897).

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause &amp; Solution</th>
</tr>
</thead>
</table>
| The camera does not power on.          | • Battery not installed or installed incorrectly  
  → Install battery or re-install battery  
  • Battery is out of power.  
  → Change battery.  
  • “Power off” protection is enabled  
  → Wait for 5 seconds and reboot. |
| The camera powers off automatically.   | • Battery is out of power.  
  → Change battery  
  • AutoOffTime option is enabled  
  → Set as None. |
| Battery depletion is too fast          | • Environmental temperature is too low  
  • Rechargeable battery is not charged completely.  
  → Recharge the battery.  
  • Rechargeable battery is out of power completely and cannot be recharged.  
  → Change to new battery. |
| No thermal image                       | • Lens cover is not removed.  
  → Remove lens cover.  
  • In image freeze status  
  → Press C key to exit. |
| Thermal image is white-black.          | • White-black palette is selected  
  → Select normal palette. |
# Appendix A

Common material emissivity (FYI)

<table>
<thead>
<tr>
<th>Material</th>
<th>Surface</th>
<th>Temperature °C</th>
<th>Emissivity (ε)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>Non-oxidized</td>
<td>100</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>Oxidized</td>
<td>100</td>
<td>0.55</td>
</tr>
<tr>
<td>Brass</td>
<td>Burnished to Brown</td>
<td>20</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td>Dull luster</td>
<td>38</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>Oxidized</td>
<td>100</td>
<td>0.61</td>
</tr>
<tr>
<td>Copper</td>
<td>Seriously Oxidized</td>
<td>20</td>
<td>0.78</td>
</tr>
<tr>
<td>Iron</td>
<td>Oxidized</td>
<td>100</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>Rusty</td>
<td>25</td>
<td>0.65</td>
</tr>
<tr>
<td>Cast iron</td>
<td>Oxidized</td>
<td>200</td>
<td>0.64</td>
</tr>
<tr>
<td></td>
<td>Non-Oxidized</td>
<td>100</td>
<td>0.21</td>
</tr>
<tr>
<td>Wrought iron</td>
<td>Quarry-faced</td>
<td>25</td>
<td>0.94</td>
</tr>
<tr>
<td></td>
<td>Polished</td>
<td>38</td>
<td>0.28</td>
</tr>
<tr>
<td>Nickel</td>
<td>Oxidized</td>
<td>200</td>
<td>0.37</td>
</tr>
<tr>
<td>Stainless steel</td>
<td>Oxidized</td>
<td>60</td>
<td>0.85</td>
</tr>
<tr>
<td>Steel</td>
<td>Oxidized</td>
<td>200</td>
<td>0.79</td>
</tr>
<tr>
<td>Common brick</td>
<td>Surface</td>
<td>20</td>
<td>0.93</td>
</tr>
<tr>
<td>Concrete</td>
<td>Surface</td>
<td>20</td>
<td>0.92</td>
</tr>
<tr>
<td>Glass</td>
<td>Polished plate</td>
<td>20</td>
<td>0.94</td>
</tr>
<tr>
<td>Lacquer</td>
<td>White</td>
<td>100</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>100</td>
<td>0.97</td>
</tr>
<tr>
<td>Carbon</td>
<td>Smoke black</td>
<td>25</td>
<td>0.95</td>
</tr>
<tr>
<td></td>
<td>Candle soot</td>
<td>20</td>
<td>0.95</td>
</tr>
<tr>
<td></td>
<td>Rough lead surface</td>
<td>20</td>
<td>0.98</td>
</tr>
<tr>
<td>Oil paint</td>
<td>Value of 16 colors</td>
<td>100</td>
<td>0.94</td>
</tr>
<tr>
<td>Paper</td>
<td>White</td>
<td>20</td>
<td>0.93</td>
</tr>
<tr>
<td>Sand soil</td>
<td>Surface</td>
<td>20</td>
<td>0.90</td>
</tr>
<tr>
<td>Timber</td>
<td>Dressed</td>
<td>20</td>
<td>0.90</td>
</tr>
<tr>
<td>Water</td>
<td>Distilled water</td>
<td>20</td>
<td>0.96</td>
</tr>
<tr>
<td>Skin</td>
<td>Human</td>
<td>32</td>
<td>0.98</td>
</tr>
<tr>
<td>Ceramic</td>
<td>Thin</td>
<td>21</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>Thick</td>
<td>21</td>
<td>0.93</td>
</tr>
</tbody>
</table>
## Appendix B

### Factory default parameter setting table

#### Table.1 Measurement temperature setting table

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Range</td>
<td>-20 ~650°C</td>
</tr>
<tr>
<td>Lens</td>
<td>Standard</td>
</tr>
<tr>
<td>Temp Unit</td>
<td>°C</td>
</tr>
<tr>
<td>Ref Type</td>
<td>Off</td>
</tr>
<tr>
<td>Ref Temp</td>
<td>30°C</td>
</tr>
</tbody>
</table>

#### Table.2 Measurement temperature correction table

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emissivity</td>
<td>0.96</td>
</tr>
<tr>
<td>TCorrect</td>
<td>0°C</td>
</tr>
<tr>
<td>T Ambient Temp</td>
<td>Off</td>
</tr>
</tbody>
</table>

#### Table.3 Analysis setting table

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp Alarm</td>
<td>Off</td>
</tr>
<tr>
<td>Alarming Temp</td>
<td>50.0°C</td>
</tr>
<tr>
<td>Alarming Color</td>
<td>None</td>
</tr>
<tr>
<td>Isotherm Color</td>
<td>Off</td>
</tr>
<tr>
<td>Isotherm Temp</td>
<td>50.0°C</td>
</tr>
<tr>
<td>Isotherm Width</td>
<td>1.0°C</td>
</tr>
</tbody>
</table>

#### Table.4 System setting table

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>English</td>
</tr>
<tr>
<td>Brightness</td>
<td>60%</td>
</tr>
<tr>
<td>Auto Calib</td>
<td>60 Sec</td>
</tr>
<tr>
<td>Video Mode</td>
<td>Laser sight</td>
</tr>
<tr>
<td>Quick Access</td>
<td>NTSC</td>
</tr>
<tr>
<td>StandbyTime</td>
<td>5 mins</td>
</tr>
<tr>
<td>AutoOffTime</td>
<td>15 mins</td>
</tr>
</tbody>
</table>