

CONDROL

EN Thermal imager

RU Тепловизор



IR-CAM4

USER MANUAL / РУКОВОДСТВО ПОЛЬЗОВАТЕЛЯ

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Congratulations on your purchase of the thermal imaging camera IR-CAM4 CONDROL.

Safety instructions provided in this user manual should be carefully read before you use the product for the first time.

1. SAFETY REGULATIONS

The user manual should be read carefully before you use the product for the first time. If the product is given to someone for temporary use, be sure to enclose user manual to it.

- Do not misuse the product.
- Store the product beyond reach of children and unauthorized people.
- It is prohibited to disassemble or repair the product yourself. Entrust product repair to qualified personnel and use original spare parts only.
- 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!
- Store the unit in its original case in a cool, dry, well-ventilated area away from strong electromagnetic fields.
- 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.
- Do not use the product in explosive environment, close to flammable materials.
- Protect the product from exposure to high temperature, for example, prolonged heating in the sun, fire, water and moisture.
- It is prohibited to disassemble, incinerate or puncture the battery
- Do not short circuit the battery
- Avoid heating the battery to avoid the risk of explosion.
- Remove the battery from the device if it not used for a long time.
- Do not leave discharged battery in the device.

2. FUNCTIONS/APPLICATIONS

IR-CAM4 CONDROL is a multifunctional thermal imaging camera intended for non-contact measurement of the object surface temperature. It is designed to

meet the requirements of service organizations, construction companies, service providers. IR-CAM 3 CONDROL combines professional features, intuitive operation and a wide range of measured temperatures.

Features:

- User selectable Auto or manual level and span control
- °C, °F or K measurement scale
- 6 user selectable color palettes
- 11 user selectable languages
- Hot temperature spot measurement
- Cold temperature spot measurement
- 1 removable spot measurements
- High temperature alarm setting
- T Reflect - Reflected temperature compensation
- 2X digital zoom
- Freeze screen for viewing current image
- Video Output – NTSC or PAL
- 1 Area measurement
- Image storage via TF card
- T Correct – Measurement Offset correction
- Built in Emissivity Table list of common materials

Applications:

1) 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.

2) 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.

3) Others

- Iron and steel industry: Inspect steel refining and rolling processes; diagnose hot-blast stove defects; detect the embryo temperature of armor plate, etc.
- Firefighting: Forest fire prevention and detection of latent ignition source. Preventive detection on specific materials of auto-ignition. Detection of potential spark ignition sources.
- Medical: Human body surface temperature detection and screening.
- Petro/chemical: Oil pipeline status inspection; material surface temperature detection; insulation inspection; power equipment status, etc.

3. TECHNICAL SPECIFICATIONS

Detector characteristics	Detector type	Un-cooled FPA micro-bolometer
	Array size/format	160×120
Image characteristics	Field of view/min focus distance	25°×19° / 0.1m
	Spatial resolution (IFOV)	2.72mrad
	Thermal sensitivity	≤0.06°C@30°C
	Frame frequency	50Hz
	Focus	Manual
	Zoom	2X
	Spectral range	8-14um
Image display	LCD display	3.5" TFT LCD, 640 x 480
Measurement	Temperature ranges	-20°C- +350°C
	Accuracy	± 2 °C or ± 2% of reading, whichever is greater
	Measurement correction	Automatic / manual
	Measurement mode	Up to 1 movable spots. Maximum/minimum temp auto tracking. Up to 1 movable areas (maximum, minimum and average temperatures). Alarm (voice, color)
	Image control	Color palette
Image adjustment		Auto/manual

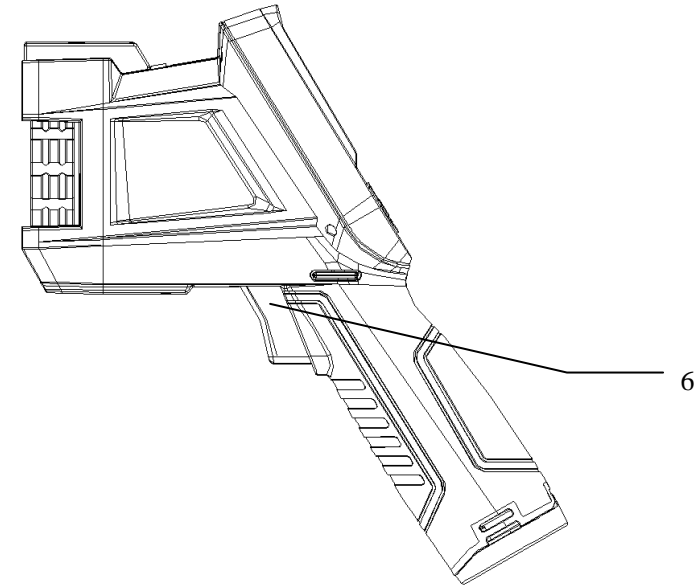
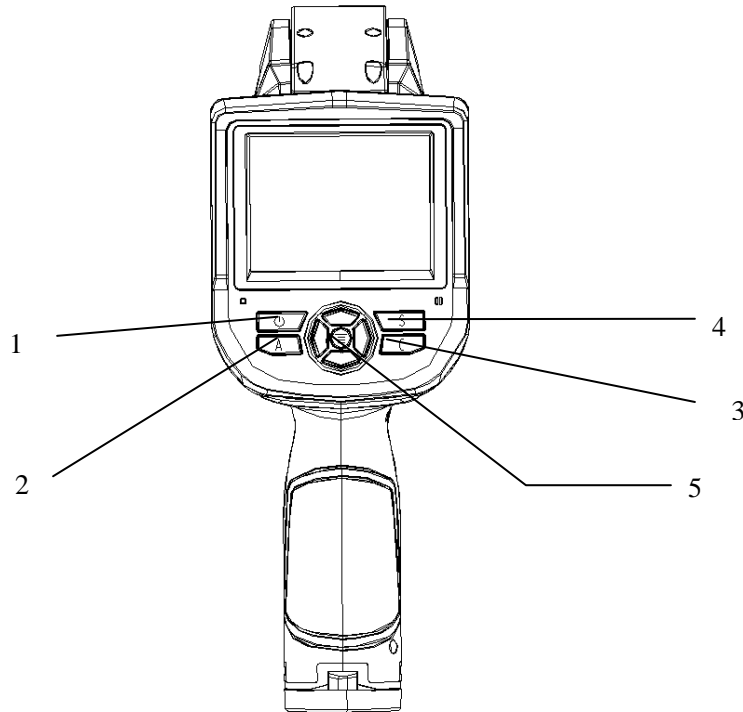
		gain and brightness
	Setup functions	Date/time, temperature unit, language
	Emissivity correction	Variable from 0.01 to 1.0
	Background temperature correction	Automatic corrections according to user input
	Atmospheric transmission correction	Automatic correction according to user input object distance, humidity and temperature
Image storage	Storage card	8G SD card, max 16G
	Storage mode	Manual/Auto single file saving
	File format	Thermal: JPEG with original thermal measurement data included
Power source	Battery type	7.4V 2600mAh Li-ion
	Battery operating time	4 hours continuous operation
	Battery charging mode	Intelligent charger or power adaptor 12V(optional) to random charge
	Power saving	Auto-sleep and auto-shut down
	External power	10-15V DC
	Environment	Operating temperature
Storage temperature		-25...+60°C
Humidity		Operating and storage: ≤90% non-condensing
Dust and water protection rate		IP54
Drop test		2m
Physical characteristics	Dimension	105*245*230mm
	Weight	980g
Interface	SD card slot	Micro SD card slot
	External DC input	YES
	Video output	YES
	USB	Image, measurement data transfer

4. DELIVERY PACKAGE

1. Thermal imager
2. Carry case
3. Li-ion battery (2 pcs.)
4. User manual
5. CD-disk
6. Battery charger
7. Lens cap
8. Memory card
9. Memory card reader
10. USB cable

5. PRODUCT DESCRIPTION

5.1. Buttons



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 - Select/Auto key (Marked "A")

The "A" or attribute button performs 2 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. The functions include:

- **Measurement points, areas**

Cursors - pressing the arrow keys will move their position. Pressing the Menu key will pop up the attribute box. Pressing the **C** key will delete the selected parameter.

Areas – Arrow keys adjust the attribute specified in the pop up attribute box.

Pressing the Menu key will pop up the attribute box. In this box, the user can select to adjust either position or size of the area. After selection, the arrows will then adjust the attribute.

- **Color Palette**

Pressing the left or right arrows will scroll through the available color palettes, displaying their name above the palette. The selected palette will become active after about 3 seconds of selecting it and will be set as the default power on palette.

- **Level/Span values**

Pressing the left or right arrow will reduce or increase the Span and pressing the up or down arrow will reduce or increase the Level. If the unit is in Automatic mode, modifying any of these parameters will select Manual mode.

b) The second function performed is to force an internal calibration cycle. This is performed by pressing and holding the **A** key for 5 seconds or more. The camera will make automatic correction to get the most accurate thermal measurement.

3 - Cancel/Camera 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.

4 - Freeze/Save key (Marked “S”)

Used for freezing or saving thermal image. Press the key once to freeze the

image. Press Confirm to save the image or Press C to return to real-time measurement.

5 - Menu/Confirm key (bar)

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 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.

6 - Trigger/Shortcut key

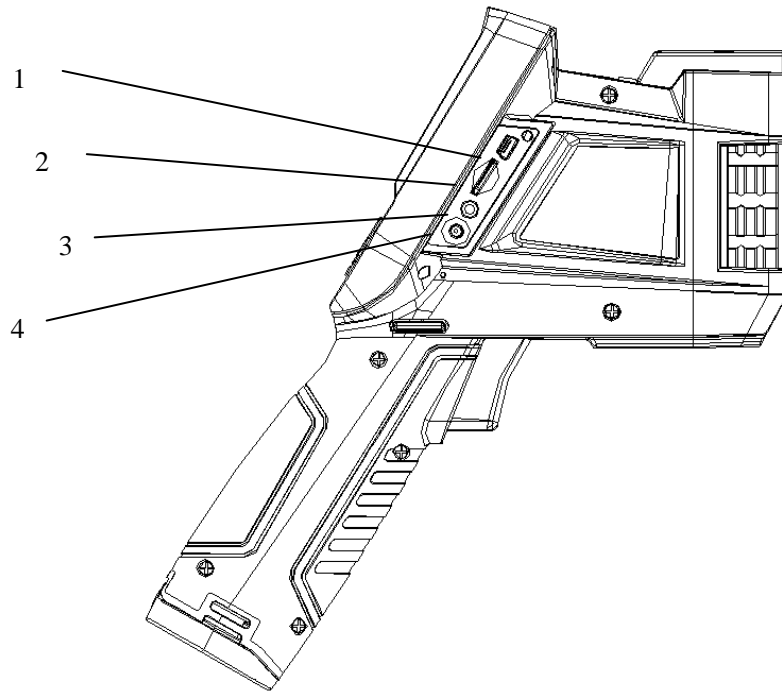
The trigger key serves as a shortcut to access the following functions:

Spot– Pulling and releasing trigger adds a spot. Pulling and releasing trigger again removes the spot.

Area –Pulling and releasing trigger adds an area. Pulling and releasing trigger again removes the area.

Save – the same with “S” key, pressing to initiate a Save cycle.

5.2. Interface



1 - USB output

Inserting USB cable to this port and connecting to computer for data transmission (only support USB2.0).

2 - TF Card slot

Accepting standard size TF card such as supplied 2GB capacity card, for device upgrade or image storage.

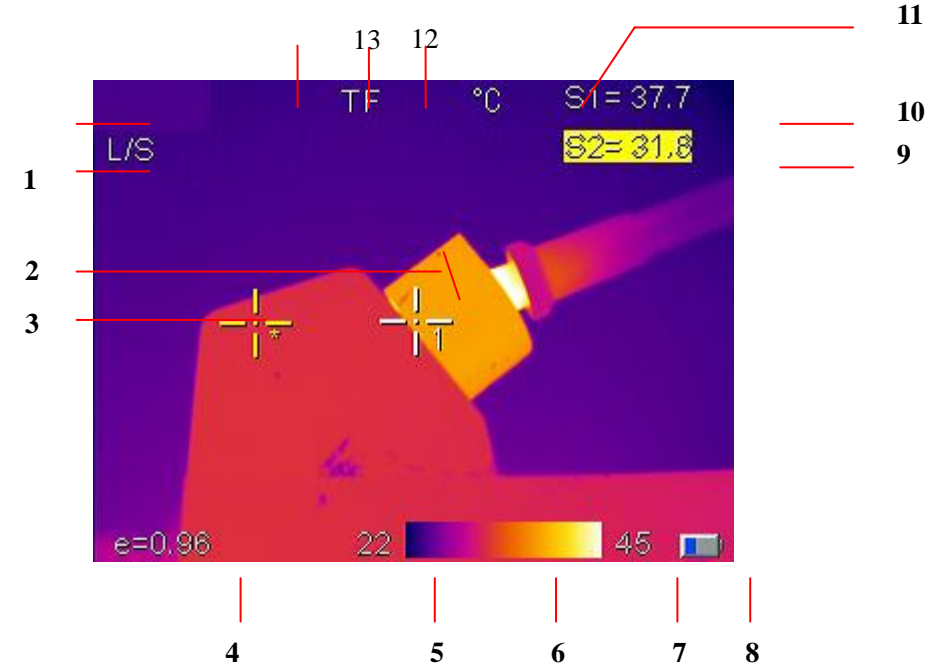
3 - Video port

It is a video output interface.

4 - Power interface

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

5.3. Display



1 - Operating status: displays the current operational status.

2 - Spot temperature measurement: White crosshair.

3 - Selected spot temperature: Yellow crosshair, and show by“*” .

4 - Emissivity: Indicates Imagers emissivity setting.

5 - Minimum temperature: Indicates minimum value of the palette.

6 - Palette: Palette bar. User can choose different palettes.

7 - Maximum temperature: Indicates maximum value of the palette.

8 - Battery status: Indicates the current battery status.

9, 10 – Result: Indicates the temperature value of the target object. Black and yellow

denotes the temperature value of the selected object.

11 - Temperature unit: Three options: °C, °F or K.

12 - SD card symbol: Displays “TF” when TF card is installed.

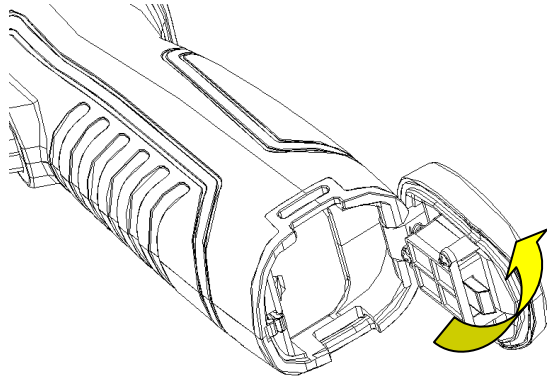
13 - Digital zoom symbol: Displays “X2” when digital zoom is activated.

NOTE: Not all models have all functions, so the working status screen may not show all features.

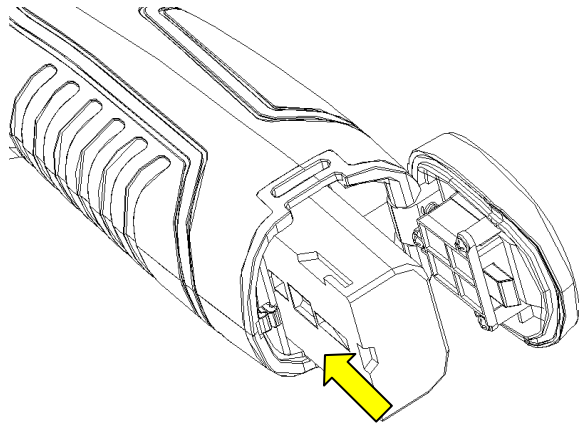
6. BEFORE START OPERATION

6.1. Battery installation and replacement

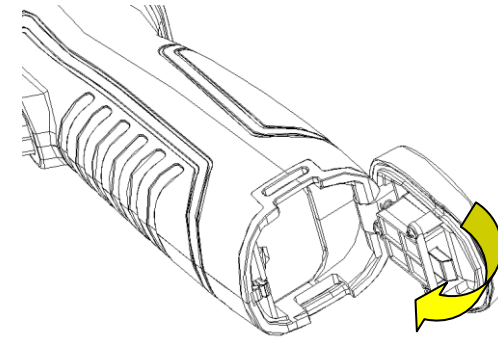
Battery compartment is located inside the handle. Turn the cover counter-clockwise to remove. Remove battery for replacement.



Insert the battery (the battery contacts must face into the battery compartment).



Replace the cover and screw down.

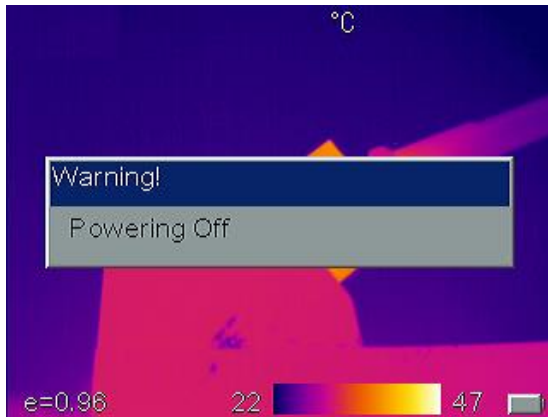


CAUTION: Use only original manufacturer replacement battery. Use of incorrect battery may result in physical or electrical damage to the instrument due to incorrect voltage or physical size difference.

6.2. Replacement of the battery



When battery has approximately 5% charge remaining, the warning will be displayed and the instrument will turn off in approximately 3 seconds.



Powering off display

It's better to replace batteries now.

6.3. Battery safety and usage

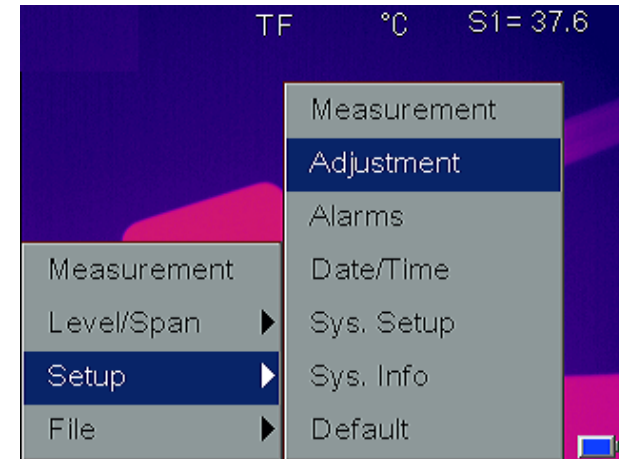
- Batteries should be stored in an ambient temperature of -4°F (-20°C) to 67.9°F (+20°C). Lithium batteries will self-discharge during storage, so they should be fully charged before storage. Self-discharge may affect long term battery performance. Furthermore, it is recommended that the battery should 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 battery dry
- Keep out of reach of children
- Always dispose of battery in accordance with local, state and federal regulations

6.4. Menu

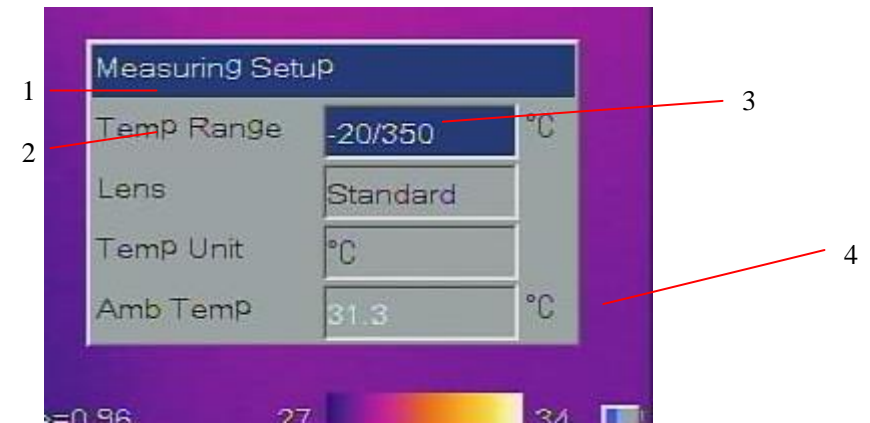
Main menu



1 - Main menu: Displays four options: Measurement, auto/manually, Setup, and File.

2 - Low-level menu: The > indicates a low-level menu is available, accessed by the right arrow key.

Dialog box



1 - Dialog box name: Displays the dialog box name, e.g. Measuring Setup.

2 - Item title: A dialog box may contain several items, such as Temp Range.

3 - Item content: Items show specified content. Black means valid or changeable and white means invalid for this selection.

4 - Unit: Indicates the current selected temperature unit.

Prompt box interface



[1] Prompt box name: Display the prompt box name, e.g. Del file.

[2] Content: Display the content in the prompt box, e.g. Del Image File?

6.4.1. Measurement

Used for adding or deleting a measurement. Press **Menu** key to activate the main menu. Select **Measurement** and press **Confirm** key. It will display the Measurement dialog box. Use the **Left** and **Right** arrows to scroll through the available measurement options. Highlight the option you wish to use and press **Confirm** key. Options are:

- None – Deletes all measurements from the screen.

- Add Hot Spot – adds a moving cursor that automatically displays the hottest spot in the image. Designated by SH and +H.
- Add Cold Spot – adds a moving cursor that automatically displays the coldest spot in the image. Designated by SL and +L.
- Add Spot – adds up to 1 fixed cursors, user adjustable by the cursor editing mode. Designated by S1, +1
- Area – adds up to 1 area boxes, with min, max or average detection. Areas can be sized and moved by the user. Designated by []1,.

NOTE: To delete a single object, press A key to select the object and then press C key to delete.



6.4.2. Auto/manually

By adjusting the temperature and color corresponding relation, users can observe enhanced image quality and easily find and analyze thermal fault. There are two operational modes Auto/Manually available.

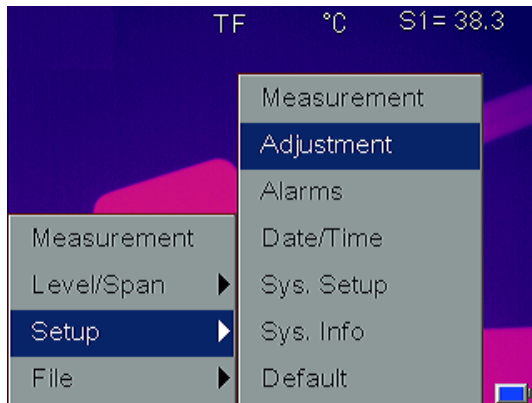
Press **Menu** key to activate the main menu and select **Auto/Manually**. The

low-level menu will display the inactive mode followed by a “?”. Pressing the > key followed by the **Confirm** key will switch to the displayed mode. Press **A** key to select palette or adjust it manually.

In **Auto** mode, the camera automatically determines the low and high temperature levels to assign to the lower and upper ends of the palette. In **Manually** mode, the Operator may assign the lower and upper end values to enhance the image quality by adjusting the temperature to color relationship.

In **Manually** mode pressing the **left** or **right** arrow will reduce or increase the Span and pressing the **up** or **down** arrow will reduce or increase the Level.

6.4.3. Setup menu



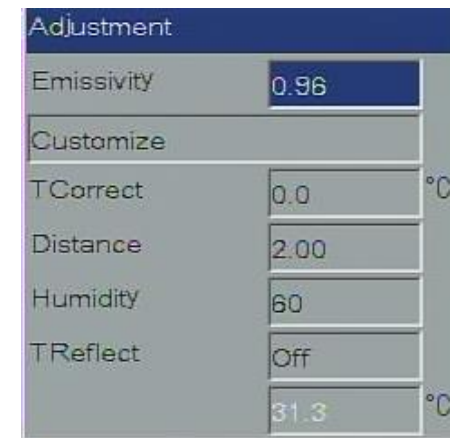
6.4.3.1. Measurement



Press **Menu** key to activate the main menu. Select Setup->MeasureSet and press **Confirm** key to pop up the Measuring Setup dialog box. User can view or set temperature range, lens type, temperature unit, ambient temperature, reference type and reference temperature. Press **Up** and **Down** keys to choose different items, **Left** and **Right** keys to modify the item contents.

- **Temp Range:** -20°C- +350°C
- **Lens:** For IR-160L,only support Standard lens
- **Temperature unit:** Select between °C, °F and K scales.
- **Ambient temperature :** Camera will display internal ambient temperature automatically. Used for automatic calibration and is not user editable.

6.4.3.2. Adjustment

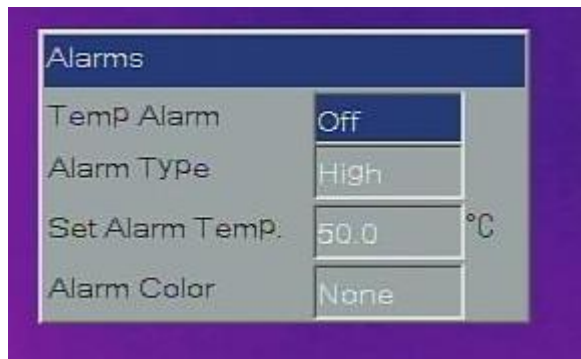


Press **Menu** key to activate the main menu. Select **Setup->Adjustment** and press **Confirm** key to pop up the Adjustment dialog box. User may set emissivity, temperature correct and ambient temperature. Press **Up** and **Down** keys to choose different items, **Left** and **Right** keys to modify the item contents.

- **Emissivity:** The emissivity of a given material will vary with temperature and surface finish. If not set manually, system will use the default value. Appendix A provides emissivities of common materials.

- **Customize:** Select material from pre-defined list via left and right keys.
- **TCorrect:** Temperature correction setup.
- **Distance:** Distance setup
- **Humidity:** Humidity value setup
- **TReflect:** when **TReflect** is on, user can input the value of background temperature.

6.4.3.3. Alarm



Press **Menu** key to activate the main menu. Select **Setup->Analysis setup** and press **Confirm** key to pop up the Analysis dialog box. User can set temperature alarm, alarm type, alarm color, isotherm color, isotherm temperature and isotherm width. Press **Up** and **Down** keys to choose menu items, **Left** and **Right** keys to modify the item contents.

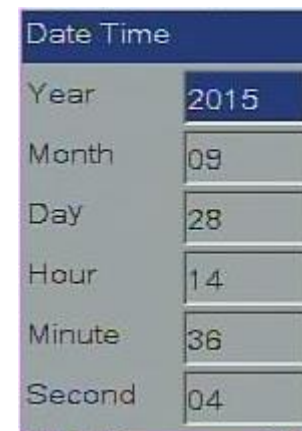
Choose **Alarm type** as high temp or low temp. Trigger alarm when the Temp of object higher or lower than the temp of **Set Alarm Temp**. All pixels above this temperature will change to the color as set in **Alarm Color**. When the **Alarm Color** is set to **None**, only the audible alarm will sound. When using alarms with **Area** measurements, the selected measurement mode, **Min**, **Max** or **Average** will have to meet or exceed the set temperature in order to trigger the alarm.

- **Temp Alarm:** **Off** disables alarm function, **On** enables alarm function and allows setting of **Set Alarm Temp** and **Alarm Color**.
- **Alarm type:** set as high temp .trigger alarm when higher than temp of

Set Alarm Temp .set as low temp. trigger alarm when lower than temp of **Set Alarm Temp**

- **Alarm Color:** Selects the color in which the alarming pixels are displayed. If set to **None**, no changes are made to the screen's color. Only enabled when **Temp Alarm** is set to **On**.

6.4.3.4. Date/Time

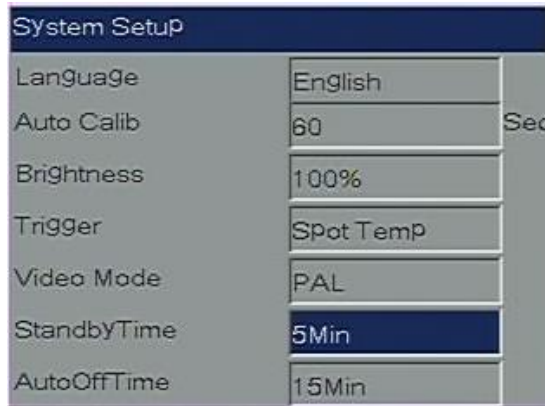


Allows the user to set the system date and time. After setting, the camera will save the current setting.

Press **Menu** key to activate the main menu. Select **Setup->Date/Time** and press **Confirm** key to open the **Date/Time** dialog box. User can set Year, Month, Day, Hour, Minute and Second. Press **Up** and **Down** keys to choose menu items, **Left** and **Right** keys to modify the item contents.

NOTE: If the imager is not used for a long period, the system clock may need reset due to the internal battery being depleted.

6.4.3.5. System setup

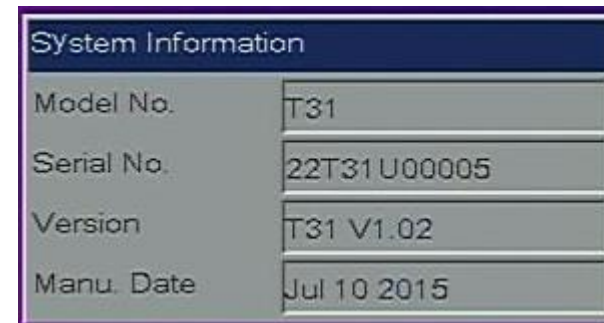


Press **Menu** key to activate the main menu. Select **Setup->Sys. Setup** and press **Confirm** key to open the **System Setup** dialog box. User can set Language, Auto calibration, LCD brightness, Trigger assignment, Video mode, Standby time and Auto off time. Press **Up** and **Down** keys to choose menu items, **Left** and **Right** keys to modify the item contents.

- **Language:** Select system language from 11: English, Spanish, French, German, Italian, Portuguese, Korean, Japanese, Russian, Simplified Chinese and Traditional Chinese.
- **Auto Calibration:** Select Auto Calibration and press right arrow key, **Auto Calib mode** dialogue box will pop up. User can select from 3 modes: **long**, **short** or **customize**. Customize can guide user to set the time interval for auto calibration. Range is **0**, which is Off and **30 to 600** in 1 second increments. Auto calibration is used to improve image quality and measurement accuracy during use.
- **LCD Brightness:** User can select the brightness of LCD display with choices being **20, 40, 60 80** and **100%**.
- **Trigger:** User can define the trigger key function from Spot Temp, Area Temp and Save key
 - **Spot Temp:** Adds or deletes Spot Measurement.
 - **Area Temp:** Adds or deletes Area Measurement.
 - **Save key:** Initiates the save routine.

- **Video Mode:** Allows selection of **PAL** or **NTSC** video output.
- **Standby Time:** Allows user to select **None, 2, 5, 10** or **15** minutes. If no button depressions are made during the set time, the camera will turn off the screen automatically, to prolong battery life. Press any key except power key to reactivate the screen. If set to **None**, the function is disabled.
- **AutoOffTime:** Allows user to select **None, 2, 5, 10** or **15** minutes. If no button depressions are made during the set time, the camera will turn off the main power automatically to prolong battery life. If set to **None**, the function is disabled. When **StandbyTime** is enabled, **AutoOffTime** will start calculating from StandbyTime.

6.4.3.6. System Information

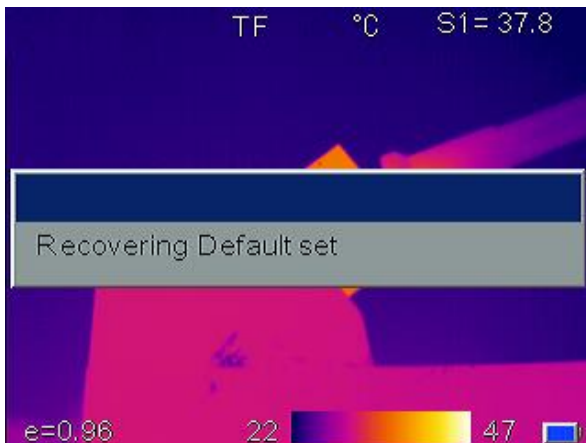


Press **Menu** key to activate the main menu. Select **Setup->Sys. Info** and press **Confirm** key to open the **System Information** dialog box. It displays the Model number, Serial number, Version number and Date of Manufacture.

6.4.3.7. Factory Default



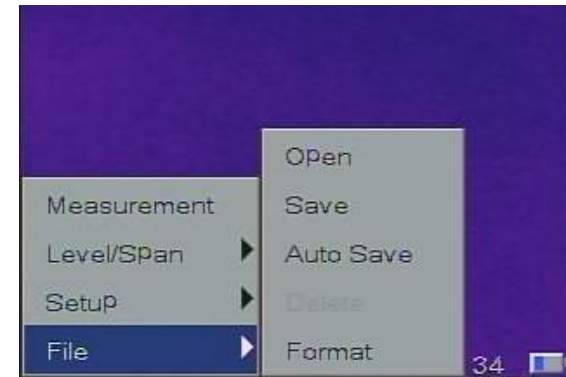
It is used for resetting factory defaults. Press **Menu** key to activate the main menu. Select **Setup->Default** and press **Confirm** key to open the **Reset** dialog box. Press **Confirm** key to reset the factory default. Press **C** key to cancel the reset operation. Appendix B indicates the detailed factory default parameter table.



NOTE: Default Reset function will delete all parameters defined by user.

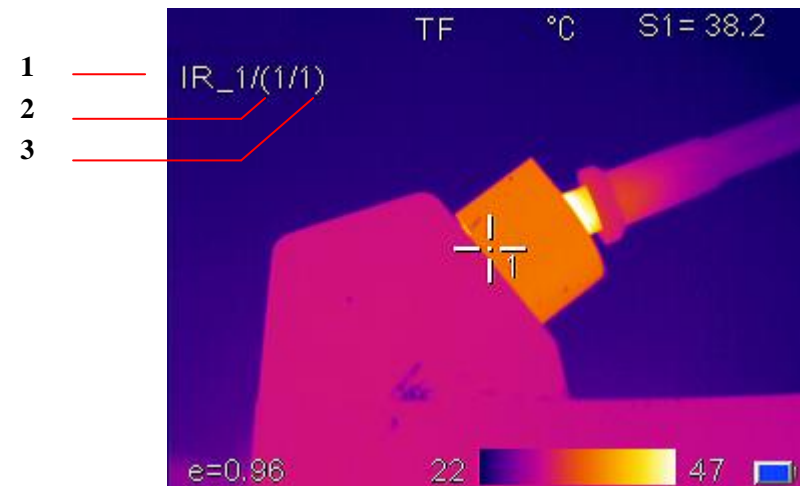
NOTE: Restoring Default settings will NOT delete images stored on the TF card.

6.4.4. File



6.4.4.1. Open

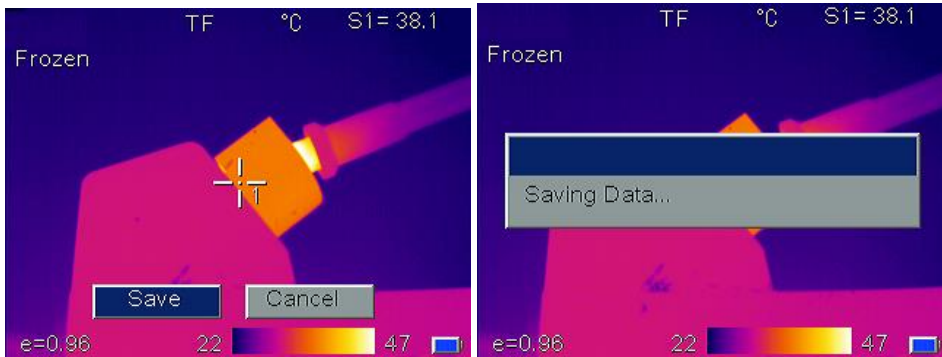
Press **Menu** key to activate the main menu. Select **File->Open**, press **Confirm** key to open the saved images. Press **Left** and **Right** keys to change the images. Press **C** key to exit the opened image and return to measurement status. The imager will open the last image displayed or the last image saved, whichever occurred last.



- 1 - Current file name, created by Imager.
- 2 - Current displayed image file number
- 3 - Total number of images currently stored

6.4.4.2. Save

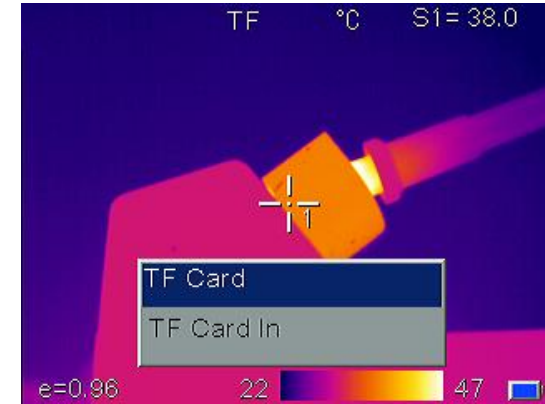
It is used for saving the image, performs the same functionality as the Save key. Press **Menu** key to activate the main menu. Select **File->Save**, press **Confirm** key to save the current image into the TF card or highlight **Cancel** and press **Confirm** key to cancel Save operation. Alternatively, the **C** key may be pressed to cancel. **Saving Data** will display.



If the TF card is not installed, the display will prompt the user to install a TF card.



The Display will acknowledge when the TF card is installed properly.



6.4.4.3. Auto Save

Auto Save allows the camera to automatically save images at a user-specified interval. With Auto Save set to 0 the function is disabled. To enable, select 10 to 3600 seconds (1 hour), in 1-second increments. To set, press **Menu** key to activate the main menu. Select **File->Auto Save**, press **Confirm** key to display the Auto Save dialog box. Press **Left** and **Right** keys to set the values. Press the **Confirm** key to accept and recording timer will start saving images at the selected interval.



6.4.4.4. Delete

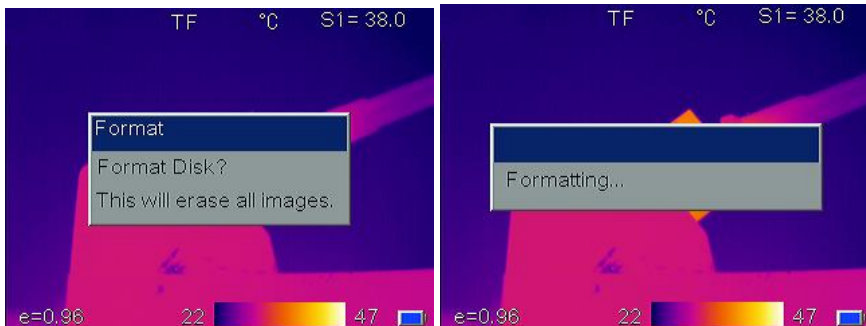
Used for deleting the image. When camera is in image replay mode, press **Menu** key to activate the main menu, select File->Delete, press **Confirm** key to pop out the below prompt box. Press **Confirm** key to delete the current opened image. Press **C** key to cancel the deletion.



CAUTION: Before deleting, make sure the file is not needed or already backed up. Files cannot be recovered after deletion.

6.4.4.5. Format

Format is used for formatting the TF card. Press **Menu** key to activate the main menu. Select File->Format and press **Confirm** key to pop up the below dialog box. Press **Confirm** key to do format; press **C** key to cancel the format.



CAUTION: Before formatting, make sure all files are not needed or already backed up. Data cannot be recovered after formatting. If formatting via PC, please use FAT16 format.

7. OPERATION

7.1. Capture an image

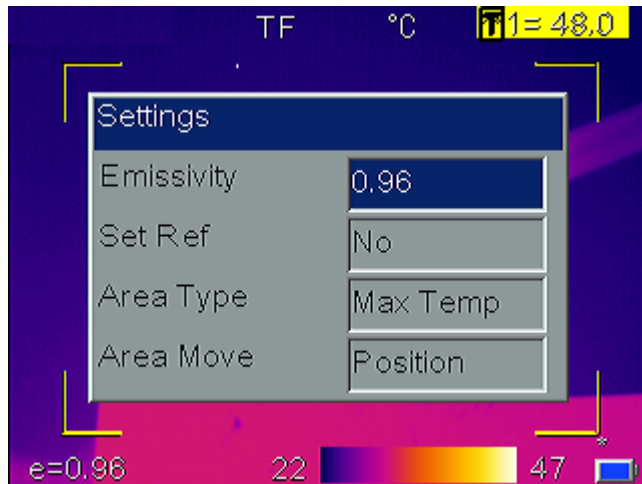
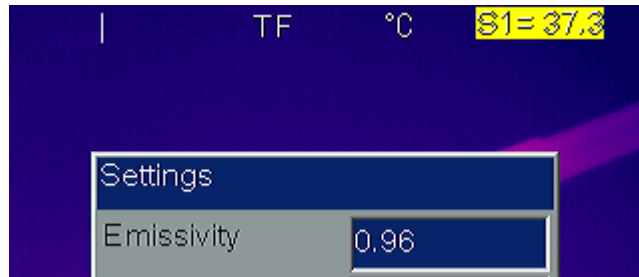
- After installing the battery, press and hold the power key (≥ 3 seconds) until the display comes on. After approximately 50 seconds, the power on routine will finish and the camera will start its measurements.
- Remove the lens cap and aim at the target. Adjust the focus for the clearest target thermal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

7.2. Temperature measurement

- If no measurement cursors are on screen, add a measurement spot, area 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 5 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. For details, see Section 4.
- 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 and area measurement respectively.



Area settings can modify the emissivity, area measurement type and area move parameter. Measurement types are Min Temp, Max Temp or Average Temp. Area Move parameter choices are Position or Size. The selected parameter will be adjusted by the directional arrow keys.

7.3. Freeze and save image

Press **S** key to freeze the image and select **“C”** to exit the operation.

There are three ways to save the image:

- Press **S** key to freeze the image and then select **“Save”** to save the image, or select **“Cancel”** to exit the operation.
- Press **Menu** key to activate the main menu. Choose **File->Save** and the system will initiate the save cycle.
- 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.

7.4. Viewing stored Images

- Press **Menu** key to activate the main menu. Choose **File->Open** to open the image.
- When image is opened, choose **Left** or **Right** keys to select the previous or next images respectively.
- It will display all IR images of each saved image, it will display **“No Image”** if there is no IR image for that saved image.
- Press **C** key to exit the Image view mode and return to the real-time measurement mode.

7.5. Export saved images

- Use of USB port to download images in TF card. With a standard USB cable, connect device port to PC and export saved images.
- Remove the TF card and insert into TF card reader, connect to USB port on PC and export saved images.

8. TROUBLESHOOTING

Please follow the table below to diagnose and correct the problem. If problem still exists, please contact our service department.

Problem	Cause & Solution
The camera does not power on.	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● Battery is out of power. →Change battery ● AutoOffTime option is enabled →Set as None.
Battery depletion is too fast	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● Lens cover is not removed. →Remove lens cover. ● In image freeze status →Press C key to exit.
Thermal image is white-black.	<ul style="list-style-type: none"> ● White-black palette is selected →Select normal palette.

9. CARE AND MAINTENANCE

Attention! This product is an accurate optical and electronic device and requires delicate handling. If the device is given to somebody for temporary use, be sure to enclose user manual to it.

It is prohibited to point the device at the sun and other sources of intense radiation (for example, objects whose temperature exceeds +1000 ° C). It may cause a serious damage of the sensor. The manufacturer is not responsible for this type of damage of microbolometer detector.

The actual temperature of the object may differ from the measurement result of the device. The examined surfaces may be potentially dangerous. Measured objects or a measurement environment may also present a certain risk.

The user should follow the safety rules set by particular industry.

Observation of the following recommendations will extend the life of the device:

- Do not disassemble the device. It does not contain any user serviceable parts. Repair should be performed by factory authorized technicians only.
- Never point the lens directly toward a strong radiation source (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!
- 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.
- Do not allow moisture, construction dust, foreign objects get inside the product;
- If moisture gets inside the device, please contact service center;
- Store the unit and all accessories in its original case in a cool, dry, well-ventilated area away from strong electromagnetic fields, beyond reach of children and unauthorized people.
- 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.
- Please remember to backup image data regularly to avoid losing important data.
- For maximum measurement accuracy, allow 3 to 5 minutes for camera to

stabilize after initial power up.

- Each camera is factory calibrated. It is recommended that calibration is performed every 12 months.
- It is prohibited to disassemble, incinerate or puncture the battery
- Do not short circuit the battery
- Avoid heating the battery to avoid the risk of explosion.
- Remove the battery from the device if it not used for a long time.
- Do not leave discharged battery in the device.

10. UTILIZATION

Expired tools, accessories and package should be passed for waste recycle. Please send the product to the following address for proper recycle:

Condrol GmbH
Wasserburger Strasse 9
84427 Sankt Wolfgang
Germany



Do not throw the product in municipal waste!

According to European directive 2002/96/EC expired measuring tools and their components must be collected separately and submitted to environmentally friendly recycle of wastes.

11. WARRANTY

All Condrol GmbH products go through post-production control and are governed by the following warranty terms. The buyer's right to claim about defects and general provisions of the current legislation do not expire.

1) Condrol GmbH agrees to eliminate all defects in the product, discovered during the warranty period, that represent the defect in material or workmanship in full volume and at its own expense.

2) The warranty period is 24 months and starts from the date of purchase by the end consumer (see the original supporting document).

3) The Warranty doesn't cover defects resulting from wear and tear or improper use, malfunction of the product caused by failure to observe the instructions of this user manual, untimely maintenance and service and insufficient care, the use of non-original accessories and spare parts. Modifications in design of the product relieve the seller from responsibility for warranty works. The warranty does not cover cosmetic damage, that doesn't hinder normal operation of the product.

4) Condrol GmbH reserves the right to decide on replacement or repair of the device.

5) Other claims not mentioned above, are not covered by the warranty.

6) After holding warranty works by Condrol GmbH warranty period is not renewed or extended.

7) Condrol GmbH is not liable for loss of profit or inconvenience associated with a defect of the device, the rental cost of alternative equipment for the period of repair.

This warranty applies to German law except provision of the United Nations Convention on contracts for the international sale of goods (CISG).

In warranty case please return the product to retail seller or send it with defect description to the following address:

Condrol GmbH
Wasserburger Strasse 9
84427 Sankt Wolfgang
Germany

Appendix A

Common material emissivity (FYI)

Material	Surface	Temperature°C	Emissivity (ϵ)
Aluminum	Non- oxidized	100	0.20
	Oxidized	100	0.55
Brass	Burnished to Brown	20	0.40
	Dull luster	38	0.22
	Oxidized	100	0.61
Copper	Seriously Oxidized	20	0.78
Iron	Oxidized	100	0.74
	Rusty	25	0.65
Cast iron	Oxidized	200	0.64
	Non- Oxidized	100	0.21
Wrought iron	Quarry-faced	25	0.94
	Polished	38	0.28
Nickel	Oxidized	200	0.37
Stainless steel	Oxidized	60	0.85
Steel	Oxidized	200	0.79
Common brick	Surface	20	0.93
Concrete	Surface	20	0.92
Glass	Polished plate	20	0.94
Lacquer	White	100	0.92
	Black	100	0.97
Carbon	Smoke black	25	0.95
	Candle soot	20	0.95
	Rough lead surface	20	0.98
Oil paint	Value of 16 colors	100	0.94
Paper	White	20	0.93
Sand soil	Surface	20	0.90

Timber	Dressed	20	0.90
Water	Distilled water	20	0.96
Skin	Human	32	0.98
Ceramic	Thin	21	0.90
	Thick	21	0.93

Appendix B

Factory default parameter setting table

Table.1 Measurement temperature setting table

Parameter	Value
	IR-160L
Temperature Range	-20 ~ 350°C
Lens	Standard
Temp Unit	°C
Ref Type	Off
Ref Temp	30°C

Table.2 Measurement temperature correction table

Parameter	Value
Emissivity	0.96
TCorrect	0°C
TAmbient Temp	Off

Table.3 Analysis setting table

Parameter	Value
Temp Alarm	Off
Alarming Temp	50.0°C
Alarming Color	None

Table.4 System setting table

Parameter	Value
Language	English
Brightness	60S
Auto Calib	60%
Quick Access	NTSC
StandbyTime	5 mins
AutoOffTime	15 mins

CONDOTROL

LASER DISTANCE METERS / ЛАЗЕРНЫЕ ДАЛЬНОМЕРЫ



SMART 60 Vector 60/80 Vector 100 XP3 Pro XP4 Pro

LASER LEVELS / ЛАЗЕРНЫЕ НИВЕЛИРЫ



NEO X200 NEO X220 NEO X1-360 NEO X2-360
XLiner Duo 360 XLiner Combo 360 Omniliner 3D Omniliner G3D