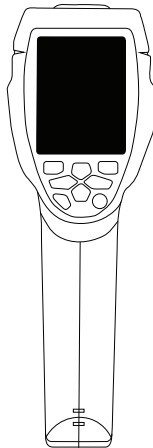




T-CAM 80/T-CAM 160 XT SERIES

USER MANUAL

PLEASE READ THIS MANUAL BEFORE SWITCHING THE UNIT ON.
IMPORTANT SAFETY INFORMATION INSIDE.



ICI cameras fall under US Federal Law and Export Control.

Revision History

08.2020.001	Document created
11.2020-001	Added export clause
05.2021-001	Resized, renamed for ISO standards
06.2021-001	Added quick start guide instructions, added critical notes, adjusted layout, and removed references to non-relevant applications
06.2021-002	Added user notice section and fixed a numbering error
12.2022-001	Updated the specifications tables

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1. Disclaimers

1-1 Terms and Conditions

Warranty Terms and Condition of Sale are made available online at:

<https://infraredcameras.com/support/terms-and-conditions-of-sale/>

1-2 U.S. Government Regulations

This product may be subject to U.S. Export Regulations. Please send any inquiries to support@infraredcameras.com

1-3 Copyright

© 2022, Infrared Cameras, Inc. All rights reserved worldwide. No parts of the software including source code may be reproduced, transmitted, transcribed or translated into any language or computer language in any form or by any means, electronic, magnetic, optical, manual or otherwise, without the prior written permission of Infrared Cameras, Inc.

The documentation must not, in whole or part, be copied, photocopied, reproduced, translated or transmitted to any electronic medium or machine readable form without prior consent, in writing, from Infrared Cameras, Inc. Names and marks appearing on the products herein are either registered trademarks or trademarks of Infrared Cameras, Inc. and/or its subsidiaries. All other trademarks, trade names or company names referenced herein are used for identification only and are the property of their respective owners.

1-4 Quality Assurance

Infrared Cameras, Inc. is committed to a policy of continuous development; therefore we reserve the right to make changes and improvements on any of the products without prior notice.

1-5 Customer Help

For customer help, visit:

<https://infraredcameras.com/support/>

E-mail:

support@infraredcameras.com

2. User Notice

2-1 Calibration

Annual calibration to the thermal camera is recommended. Contact customer service to schedule maintenance.

2-2 Accuracy

For very accurate results, we recommend that you wait a minimum of 5 minutes after you have started the camera before measuring a temperature.

2-3 Cybersecurity

After the products are connected to the Internet, they may face risks including but not limited to network attacks, hacker attacks, virus infections, etc. The company will not be responsible for the abnormal operation of the products and any loss or liability caused therefrom shall be at your own risk.

2-4 Disposal of Electronic Waste

Electrical and electronic equipment (EEE) contains materials, components and substances that may be hazardous and present a risk to human health and the environment when waste electrical and electronic equipment (WEEE) is not handled correctly.

Equipment marked with the below crossed-out wheeled bin is electrical and electronic equipment. The crossed-out wheeled bin symbol indicates that waste electrical and electronic equipment should not be discarded together with unseparated household waste, but must be collected separately.

All local authorities have established collection schemes under which residents can dispose of equipment at a recycling center or other collection points, or WEEE will be collected directly from households. More detailed information is available from the administration of the relevant local authority. Always dispose of waste in accordance with local, state, and federal regulations.



2-5 Intended Use

The T-Cam Series cameras are used for surface temperature assessment of energy emitted from the first 1/1000th of an inch of a subject. Thermal and visual images are displayed on the LCD and can be saved to a Micro SD Memory card. Additionally, the imager provides video recording with audio and play back.

Environment of use: industrial and petrochemical buildings, electrical plants, security rooms, science labs, animal reserves as well as environmental conservatories, among others.

You agree that this product is for civilian use only, and shall not use applications that may infringe the rights of third parties, medical and safety devices or other applications where product failure may lead to life-threatening or personal injury, as well as weapons of mass destruction, chemical and biological weapons, nuclear explosions, unsafe use of nuclear energy, dangerous or humanitarian purposes. Any loss or liability caused therefrom shall be at the your own risk.

2-6 Manual Update

The user manual will be updated from time to time. To access the latest manuals, translations of manuals, and notifications, go to:

<https://infraredcameras.com/product-resources/>

The manufacturer reserves the right to alter the specifications of the product without prior notification. The manufacturer allows himself the right to modify without any preliminary opinion the technical specifications of the product.

2-7 Scope of Application

Infrared Cameras, Inc. issues generic manuals that cover several cameras within a model line.

This means that this manual may contain descriptions and explanations that do not apply to your particular camera model. This manual may contain technical inaccuracies or typographical errors.

2-8 Authoritative Versions

The authoritative version of this publication is English. In the event of divergences due to translation errors, the English text has precedence.

Any late changes are first implemented in English. Other languages may or may not be available.

2-9 Training

To read about infrared training, visit:

<https://infraredtraininginstitute.com/>

3. Safety Information

- Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- To prevent eye damage and personal injury, do not look into the laser. Do not point the laser directly at people or animals or indirectly off reflective surfaces.
- Do not disassemble or modify the thermal device.
- Do not point the imager (with or without the lens cover) at intensive energy sources, e.g. devices that emit laser radiation, or the sun. This can affect the accuracy of the camera, and cause damage to the detector.
- Do not use the imager in an ambient temperature outside of the operation range. High/low temperatures can cause damage to the device.
- Do not use the imager in an ambient temperature higher than 50°C (122°F) or lower than -20°C (-4°F). High/low temperatures can cause damage to the device.
- Always charge the battery in the special temperature range. The temperature range to charge the battery is 0°C to +50°C (32°F to 122°F). Charging the battery at temperatures outside this range can cause the battery to become hot or to explode. It can also decrease the performance or the life cycle of the battery.
- Do not continue to charge the battery if it does not become charged in the specified charging time. If you continue to charge the battery, it can become hot and cause an explosion or ignition. Injury to persons can occur.
- Do not attach the batteries directly to a car's cigarette lighter socket. Using the incorrect equipment can cause the battery to become hot or cause an explosion.
- Only use the correct equipment to discharge the battery. Using the incorrect equipment can decrease the performance or the life cycle of the battery. Using the incorrect equipment can cause the battery to become hot or cause an explosion.
- Do not connect the positive terminal and the negative terminal of the battery to each other with a metal object (such as wire). Damage to the batteries can occur.
- The battery contains safety and protection devices which, if they become damaged, can cause the battery to become hot, or cause an explosion or an ignition.
- Do not put holes in the battery with objects. Damage to the battery may occur.
- Do not hit the battery with a hammer or apply strong impacts or electric shocks to it. Damage to the battery may occur.
- Do not put the battery in or near a fire, stove or other high-temperature locations. Damage or ignition of the battery may occur.

- Do not put the battery in direct sunlight or other high-temperature locations. Damage or ignition of the battery may occur.
- Do not solder directly onto the battery. Damage to the battery may occur.
- Do not get water or salt water on the battery or device or permit the device or battery to get wet. Damage to the battery may occur.
- Remove any water or moisture on the battery before you install it. Damage to the battery may occur.
- If there is a leak from the battery and the fluid gets into the eyes, do not rub the eyes. Flush well with water and immediately get medical care.
- Always dispose of battery in accordance with local, state and federal regulations.
- Do not use the battery if, when used, charged, or placed in storage, there is an unusual smell from the battery, the battery feels hot, changes color, changes shape, or is in an unusual condition. Speak with a sales office if one or more of these problems occurs.
- Clean the case with a damp cloth and a weak soap solution. Do not use abrasives, isopropyl alcohol, or solvents to clean the case or lens/screen.
- Be careful when cleaning the infrared lens. Do not clean the infrared lens too vigorously. This can damage the anti-reflective coating.
- Avoid condensation. Taking the imager from cold to hot will cause condensation in thermal imager. To protect the imager, power on the device and wait until it becomes warm enough for the condensation to evaporate.
- Keep device out of reach of children.
- After the eyepiece is used for long time, its contrast will be lowered, and the scene will be whitened. You can switch to the LCD display, and switch back to the eyepiece some time later.
- Storage: If you do not use the imager for a long period of time, put the device in a cool and dry environment. Batteries should be stored in an ambient temperature of -20 °C to 20 °C (-4 °F to 67.9 °F). Lithium batteries will discharge time and should be fully charged before storage. It is recommended to fully recharge the batteries every 3 months to prevent damage. Store the device in an ambient temperature of -40 °C to 70 °C (-40 °F to 158 °F).

THE ENCAPSULATION RATING IS ONLY APPLICABLE WHEN ALL THE OPENINGS ON THE CAMERA ARE SEALED WITH THEIR CORRECT COVERS, HATCHES, OR CAPS. THIS INCLUDES THE COMPARTMENTS FOR DATA STORAGE, BATTERIES, AND CONNECTORS.

4. Technical Specifications

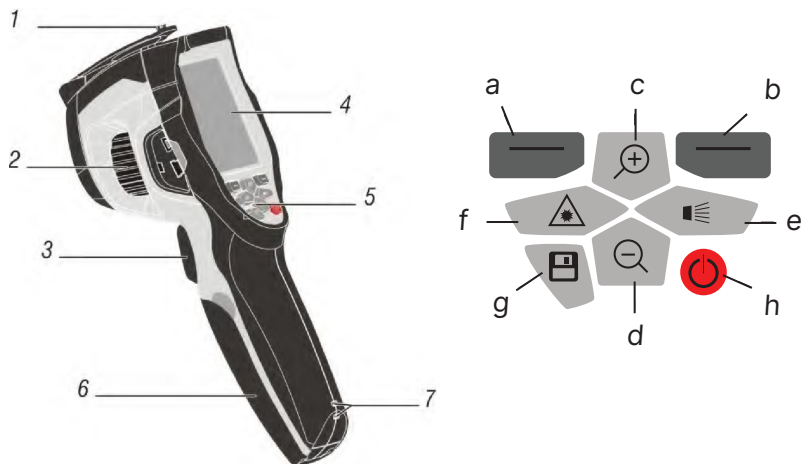
	T-Cam 80	T-Cam 160 XT
Detector Array	Microbolometer	
Accuracy	$\pm 2^{\circ}\text{C}$ ($\pm 3.6^{\circ}\text{F}$) or $\pm 2\%$	
Temperature Range	-20°C to 150°C (-4°F to 302°F) Optional: 0°C to 350°C (32°F to 662°F)	
Operation Range	-15°C to 50°C (5°F to 68°F)	
Storage Range	-40°C to 70°C (-40°F to 158°F)	
FOV	17° x 17°	
Measurement Distance	0.5 m (1.64 ft)	
Focal Length	9 mm, manual	
Pixel Resolution	80 x 80	160 x 120
Spectral Band	8 μm to 14 μm	
Thermal Sensitivity (NETD)	< (10 mK) 0.01 $^{\circ}\text{C}$ at 30 $^{\circ}\text{C}$ (86 $^{\circ}\text{F}$)	< (50 mK) 0.05 $^{\circ}\text{C}$ at 30 $^{\circ}\text{C}$ (86 $^{\circ}\text{F}$)
Frame Rate	50 Hz	
Dynamic Range	14-bit	
Humidity	5% to 95% non-condensing	
Pixel Operability	> 99 %	
Drop Test	2 m (6.56 ft)	
Dimensions (without lens)	224 mm x 77 mm x 96 mm (L x W x H $\pm .5$ mm) (8.81" x 3.03" x 3.78" (L x W x H ± 0.02 ")	
Power	DC 5V	
Battery	Li-ion, 4 hours, rechargeable	
Weight	500 g (1.10 lbs)	
Interface	Mini-USB, Micro-HDMI, audio	
Video Format	MP4, 1280 x 960 @ 30 fps	
Video Out	Micro-HDMI	
Image Format	JPG	
Image Polarity	White Hot, Black Hot, Iron, Rainbow	
Emissivity Correction	0.1 to 1.0	
Screen	2.8" Color LCD, 240 x 320	
Digital Camera	5 MP	
Zoom	1-32X continuous, digital zoom	
Voice/Text Annotation	60 seconds per image	









SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

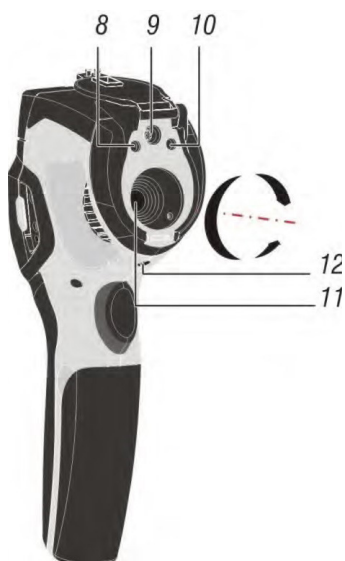
	T-Cam 80	T-Cam 160 XT
IP Rating	IP54	
Language	Multinational	
Internal non-uniformity correction (NUC)		
Built-in microphone		
Earphone jack		

5. Structure

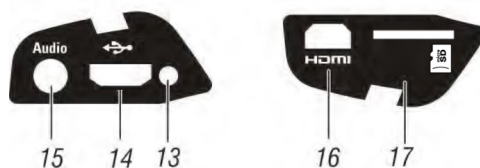
5-1 Appearance and Definitions of Housing Interface



1	Camera lens cover	
2	Lens focus adjuster	
3	Trigger	
4	LCD display	
5	Buttons	
a	(Left) 	Menu/Select
b	(Right) 	Lock/Close
c		Up/Zoom out
d		Down/Zoom in
e		Right/LED flashlight
f		Left/Laser
g		Files Browse
h		Power
6	Battery bay	
7	Holes for non-slip strap	

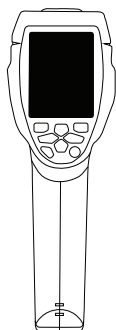


8	LED light
9	Visual camera
10	Laser pointer
11	Infrared camera lens
12	Hole for tripod insertion

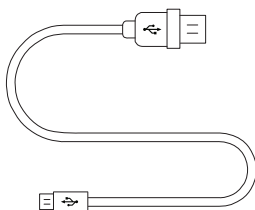


13	Charge light
14	USB/Charger input terminal
15	Audio/Microphone
16	HDMI output
17	MicroSD card slot

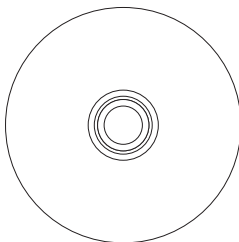
6. Package Includes



T-Cam device



Micro-USB to USB Cable



Software CD

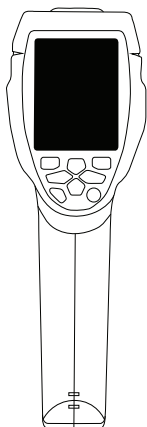
**ENSURE ALL SYSTEM EQUIPMENT AND COMPONENT ITEMS ARE PRESENT
BEFORE BEGINNING INSTALLATION**

7. Quick Start Instructions

7-1 Tripod Setup

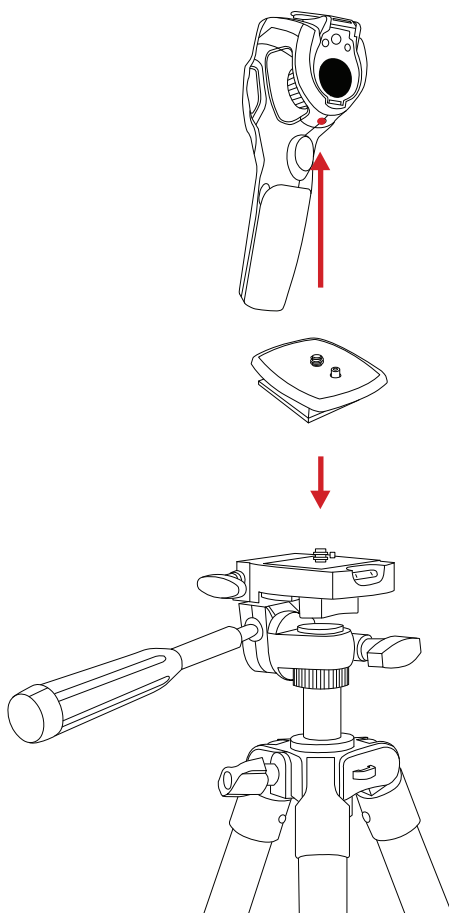
A.

The T-Cam can be used as a handheld device.



or

Mount the fully charged T-Cam to a tripod using the 1/4-20 mount.

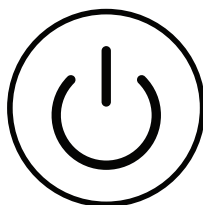


MAKE SURE TRIPODS DO NOT BLOCK THE DIRECT PATH OF PERSON(S) TO BE IMAGED TO ENSURE THE EQUIPMENT WILL NOT BE MOVED OR KNOCKED DOWN. USING A DIVIDING BARRIER WILL HELP KEEP TRIPODS SEPARATE FROM THE PATH.

TURN ON THE CAMERA BY PUSHING AND HOLDING THE POWER BUTTON FOR TWO SECONDS

B.

Power on device.



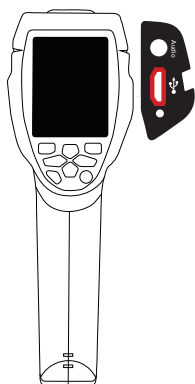
PRESS AND HOLD THE POWER BUTTON FOR MORE THAN TWO SECONDS TO SHUT DOWN THE CAMERA.

THE THERMAL IMAGER NEEDS SUFFICIENT WARM-UP TIME FOR THE MOST ACCURATE TEMPERATURE MEASUREMENTS AND BEST IMAGE QUALITY. THIS TIME CAN OFTEN VARY BY ENVIRONMENTAL CONDITIONS. IT IS BEST TO WAIT A MINIMUM OF 10 MINUTES FOR THE DEVICE TO COMPLETELY WARM-UP.

7-2 Charging Instructions

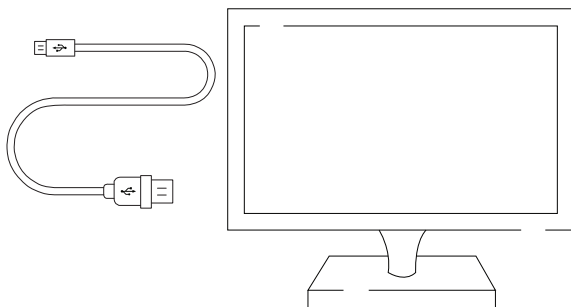
A.

Plug the Micro-USB end of the USB cable into the right side of the T-Cam device.



B.

Plug the other end of the USB cable into an available USB port on a computer.



WHEN USING A COMPUTER FOR CHARGING THE COMPUTER SHOULD BE POWERED ON.

CHARGE THE BATTERY FOR A MINIMUM OF 1.5 HOURS BEFORE USING. ICI DOES NOT RECOMMEND CHARGING THE DEVICE WHILE IT IS CONNECTED TO A TRIPOD. LAY DEVICE FACE DOWN ON A FLAT AND STABLE DESK OR TABLE WHILE CHARGING.

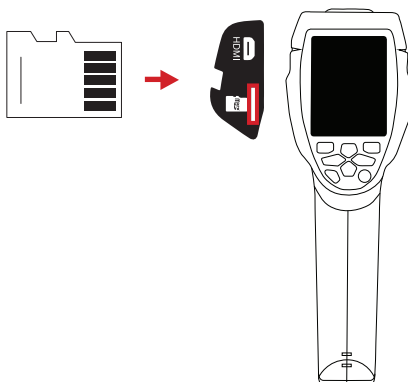
ENSURE THE IMAGER IS NEAR ROOM TEMPERATURE BEFORE CHARGING THE DEVICE. DO NOT CHARGE IN EXTREMELY HOT OR COLD AREAS. THE BATTERY CAPACITY MAY BE DECREASED IF CHARGED IN AN EXTREME TEMPERATURE ENVIRONMENT.

IF YOU DO NOT USE THE IMAGER FOR A LONG PERIOD OF TIME, PUT THE DEVICE IN A COOL AND DRY ENVIRONMENT. THE BATTERY WILL DISCHARGE OVER TIME; THEREFORE, THE IMAGER SHOULD BE CHARGED OCCASIONALLY TO PREVENT DAMAGE TO THE BATTERY OR THE DEVICE.

7-3 Memory Card Installation

A.

Insert the Micro-SD Card into the side of the T-Cam device until a clicking sound is heard.



DO NOT FORCE MICRO-SD CARD INTO THE SLOT. THE SIDE OF THE CARD WITH CONTACT PINS MUST BE INSERTED FIRST. IF THERE IS RESISTANCE FLIP THE CARD AROUND AND TRY AGAIN. TO EJECT THE MEMORY CARD PRESS UNTIL A CLICK IS HEARD AND THEN RELEASE. MEMORY CARD WILL BE EJECTED.





8. Operation Instructions

8-1 How to Charge the Battery

Before using the imager for the first time, charge the battery for a minimum of 1.5 hours. The battery status is shown by the indicator in the upper-left corner of the screen.

8-1-1 Charging via USB Cable

To charge the battery, follow these instructions:

1. Plug the Micro-USB cord into the device's Micro-USB port and the plug the other end of the USB cable into an available computer USB port; the charge light will turn on. The battery indicator becomes " >  > ", while the battery charges.
2. Charge until the charge indicator becomes , and the charge light turns off.
3. Disconnect power adapter when the battery is full charged.

ENSURE THE IMAGER IS NEAR ROOM TEMPERATURE BEFORE CHARGING THE DEVICE. DO NOT CHARGE IN EXTREMELY HOT OR COLD AREAS. THE BATTERY CAPACITY MAY BE DECREASED IF CHARGED IN AN EXTREME TEMPERATURE ENVIRONMENT.

8-2 Power On/Off the Device

To turn the camera on, push and hold the Power Button for 2 seconds. Push and hold for more than 3 seconds to power off the device.

THE THERMAL IMAGER NEEDS SUFFICIENT WARM-UP TIME FOR THE MOST ACCURATE TEMPERATURE MEASUREMENTS AND BEST IMAGE QUALITY. THIS TIME CAN OFTEN VARY BY ENVIRONMENTAL CONDITIONS. IT IS BEST TO WAIT A MINIMUM OF 10 MINUTES FOR THE DEVICE TO COMPLETELY WARM-UP.

8-3 LED Light

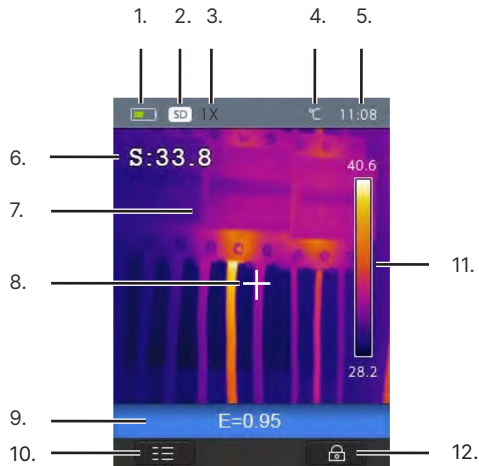
To turn the flashlight on, push and hold the LED Flashlight button for 2 seconds. Repeat to power off the flashlight.

8-4 Laser

To turn the laser on, push and hold the Laser button for 2 seconds. Repeat to power off the laser.

8-5 User Interface

The device interface appearance:



- | | |
|-----------------------------------------|-----------------------------------------------|
| 1. Battery Life | 7. Image Display |
| 2. SD Card Indicator [^] | 8. Temperature Measurement Point ⁺ |
| 3. Zoom Factor | 9. Emissivity |
| 4. Temperature Units | 10. Main Menu |
| 5. Time | 11. Level & Span |
| 6. Temperature Measurement [*] | 12. Lock |

[^] WHEN AN SD CARD IS NOT INSTALLED A FLOPPY DISK ICON WILL DISPLAY INSTEAD AND IMAGES WILL BE SAVED DIRECTLY TO THE IMAGING DEVICE.

^{*} ONLY THE CENTER POINT TEMPERATURE IS ACTIVATED IN THE PRESENTED IMAGE ABOVE. HOT SPOT AND COLD SPOT TEMPERATURE POINTS ARE ALSO AVAILABLE IN THE SETTINGS MENU.

⁺ ONLY THE CENTER POINT TEMPERATURE IS ACTIVATED IN THE PRESENTED IMAGE ABOVE. ADDITIONAL TARGETS WILL APPEAR WHEN THE HOT SPOT AND COLD SPOT TEMPERATURE POINTS ARE ENABLED IN THE SETTINGS.

8-6 Lens

FOV is the largest area the imager can see at a set distance.

This table lists the horizontal FOV, vertical FOV and IFOV for standard lens.

Focal Length	Horizontal FOV	Vertical FOV	IFOV
9 mm	17°	17°	3.78 mrad

IFOV (Instantaneous Field of View) is the smallest detail within the FOV that can be detected or seen at a set distance, the unit is rad. The formula is this:

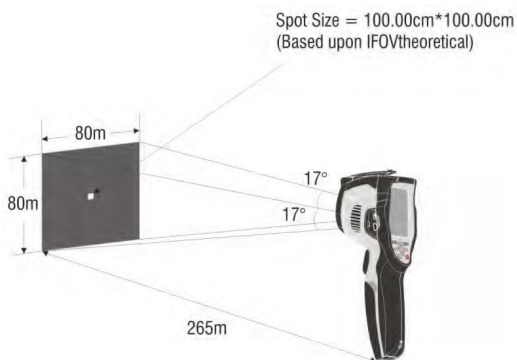
$$\text{IFOV} = (\text{Pixel Size}) / (\text{Lens focal length});$$

D:S theoretical (= 1/ IFOV theoretical) is the calculated spot size based on the pixel size of the detector array and lens focal length.

Example: If the thermal imager uses a 9mm lens, because the pixel size of the detector is 34 μm , then horizontal FOV is 17°, vertical FOV is 17°, the IFOV is

$$34 \mu\text{m} / 9 \text{ mm} = 3.78 \text{ mrad};$$

$$\text{D:S theoretical (= 1/ IFOV theoretical) } = 265:1$$



D:S_{measure} (= 1/ IFOV _{measure}) is the spot size needed to provide an accurate temperature measure. Typically, D:S_{measure} is 2 to 3 times smaller than D:S _{theoretical}, which means the temperature measurement area of the target need to be 2 to 3 times larger than that determined by the calculated theoretical D:S.

IFOV _{theoretical} represents the smallest objects that the thermal imager can detect or see. IFOV _{measure} represents the smallest object form which an accurate temperature can be measured by the thermal imager.

8-7 Focus

To adjust the focus, turn the lens focus adjuster clockwise or counter-clockwise. When the target comes into focus, it shows a sharper image. When the target moves out of focus, the thermal image becomes blurry.

Correct focus is important in all imaging applications. Correct focus makes sure that the infrared energy is correctly directed onto the pixels of the detector. Without the correct focus, the thermal image can be blurry, and the radiometric data will be inaccurate. Out-of-focus infrared images are frequently unusable or of little value.

8-8 Non-uniformity Correction (NUC)

Non-uniformity correction (NUC) is used to compensate for the non-uniformity of detector pixels or other optical interference. A common need for NUC correction is to reduce excess noise in an image caused by rapid changes in ambient temperature within an environment.

The imager has two modes for correcting, Manual and Auto Mode. In Manual Mode, push the Power button and the imager will correct itself. In Auto Mode, the imager can correct itself automatically while imaging.

When the device is performing a correction the user will hear a click and the image may clear of some noise grain as the device makes its adjustment.

8-9 Zoom

The imager offers 1-32x continuous zoom functions.

- Press the Zoom Out button and the image will zoom out 10%. Press and hold for continuous zooming.
- Press the Zoom In and image zooms in 10%. Press and hold for continuous zooming.

When zoomed in or zoomed out, the zoom factor displays in the upper status bar.



8-10 Emissivity Adjustment

The correct emissivity value is important in order to receive the most accurate temperature measurement. Emissivity of a surface can have a large effect on temperatures the imager observes. Adjusting the emissivity setting will allow the imager to calculate a more accurate estimate of the actual temperature.

The emissivity displays on the LCD screen as $E=x.xx$.

Emissivity is set directly or can be chosen from a list based on some common materials. See chart on next page.

Change the emissivity as follows:

1. Press the Menu button.
2. Highlight Emiss from the Menu.
3. Press the Select button.
4. Highlight Custom option (choosing an emissivity from the provided list will auto-confirm and close the Menu).
5. Press Select button and use the up and down buttons to change to a desired emissivity.
6. Press Select to confirm. Press Close to exit without changes.

SEE CHART ON NEXT PAGE FOR COMMON MATERIAL VALUES.

All objects radiate infrared energy. The amount of energy radiated varies based on the actual surface temperature and the surface emissivity of the object. The Thermal imager senses the infrared energy from the surface of the object and uses this data to calculate an estimated temperature value.

Many common objects and materials such as painted metal, wood, water, skin, and cloth are particularly good at radiating energy and it is easy to get relatively accurate measurements. For surfaces that are good at radiating energy (high emissivity), the emissivity factor is ≥ 0.90 . This simplification does not work on shiny surfaces or unpainted metals as they have an emissivity of < 0.6 . These materials are not good at radiating energy and are classified as low emissivity.

SURFACES WITH AN EMISSIVITY OF < 0.60 MAKE RELIABLE AND CONSISTENT MEASUREMENTS PROBLEMATIC. THE LOWER THE EMISSIVITY, THE GREATER POTENTIAL FOR ERROR WITHIN THE DEVICE'S CALCULATIONS. ERRORS MAY STILL OCCUR EVEN WHEN ADJUSTMENTS ARE PERFORMED PROPERLY.

The following table gives typical emissivity of important materials:

Material	Emissivity
Water	0.36
Stainless steel	0.14
Aluminum plate	0.09
Asphalt	0.96
Concrete	0.97
Cast iron	0.81
Rubber	0.95
Wood	0.85
Brick	0.75
Tape	0.96
Brass plate	0.06
Human skin	0.98
PVC plastic	0.93
Polycarbonate	0.80
Oxidized copper	0.78
Rust	0.80
Paint	0.90
Soil	0.93

8-11 Reflected Temperature

Using the offset factor, the reflection is calculated out due to the low emissivity, improving temperature measurements. In most cases, the reflected temperature is identical to the ambient air temperature. The reflected temperature has little effect on objects with high emissivity. The reflected temperature can be set individually.

Follow these steps to get the right value for the reflected temperature.

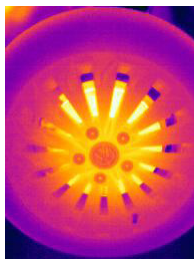
1. Set the emissivity to 1.0.
2. Adjust the optical lens to near focus.
3. Looking away from the object, take a measurement and freeze image.
4. Determine the average value of the image and use value as the reflected temperature.

8-12 Image Mode

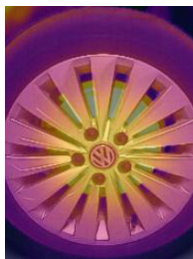
The imager has 4 image modes: IR, Visible, Fusion, and AUF (also known as Mix).

1. IR: displays only the infrared image.
2. Visible: displays only the visible image.
3. Fusion: displays a infrared box over the visible image.
4. AUF (Mix): displays a fusion of infrared and visible images.

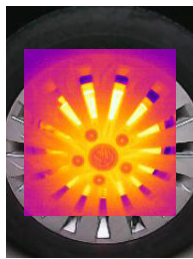
1.



2.



3.



4.



8-12-1 Change Image Mode

Change the image mode as follows:

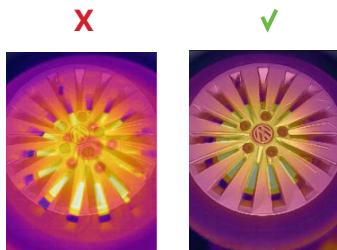
1. Press the Menu button.
2. Highlight Image from the Menu.
3. Press the Select button. A sub-menu will open.
4. Press the up and down buttons to highlight desired image mode.
5. Press Select to confirm and auto-close Menu. Press Close to exit without changes.

IF THE AUF (MIX) OR FUSION MODES ARE USED MAKE SURE YOUR ALIGNMENT DISTANCE IS SET CORRECTLY.

8-13 Alignment

When using AUF (Mix) and Fusion modes it is important to ensure the alignment distance is set correctly to receive the best image. Align the images as follows:

1. Press the Menu button.
2. Highlight Settings from the Menu.
3. Press the Select button. A sub-menu will open.
4. Highlight Alignment in the sub-menu.
5. Press Select.
6. Press the up and down buttons to highlight proper alignment amount.
7. Press Select to confirm and auto-close Menu. Press Close to exit without changes.



USERS SHOULD STAND AT THE CORRECT DISTANCE FROM THE TARGET WHEN PERFORMING IMAGE ALIGNMENT. THE PROPER DISTANCE IS DETERMINED BY USING THE DISTANCE SETTINGS. IMAGE MAY REQUIRE REALIGNMENT WHEN CHANGING INSPECTION LOCATIONS.

8-14 Polarity

The polarity (color palette) lets the user change the false-color presentation of the infrared images on display or captured to enhance temperature differences. A variety of palettes are available. Change the polarity as follows:



1. Press the Menu button.
2. Highlight Palette from the Menu.
3. Press the Select button. A sub-menu will open.
4. Highlight the desired palette.
5. Press Select to confirm and auto-close Menu. Press Close to exit without changes.

8-15 Level & Span Adjustment

There are two modes for level and span: Auto Gain Control (AGC) and Manual.

Auto: level and span are decided automatically by the minimum and maximum temperatures detected by the device.

Manual: level and span are decided by the user input values.

The AGC function is enabled by default and automatically assists users in fine-tuning image contrast. If disabled, users will be able to manually change the level and span. Press the Lock button to change modes.  means Manual and  means AGC.

Manually change level and span as follows:

1. Press and hold Lock button until setting adjustment module appears.
2. Press left button to decrease value. Press right button to increase value.
3. Press up button or down button to switch between Minimum Temperature and Maximum Temperature options.
4. Press Ok to confirm. Press Cancel to exit without changes.

8-16 Measurement Tracking



Tracking is available for locating the specific temperature points. The measurements display in the upper right corner. Users can track the following points:

Spot: measures the center point temperature.

Hot: captures the maximum temperature.

Cold: captures the minimum temperature.

Enable settings as follows:

1. Press the Menu button.
2. Highlight Measure from the Menu.
3. Press the Select button. A sub-menu will open.
4. Highlight desired tracker in the sub-menu.
5. Press the Select button to enable the corresponding measurement. The icon  means the point is enabled. The icon  means it is disabled. The Menu automatically closes after selection and must be reopened to verify changes have occurred.

THE HOT AND COLD SPOT TEMPERATURE TRACKERS WILL BOUNCE AROUND THE SCREEN TO DETECT TEMPERATURES AS THE USER MOVES THE DEVICE ACROSS A SCENE. TO GET STABLE RESULTS IT IS BEST PRACTICE TO HOLD THE DEVICE IN A STABLE POSITION WHILE TAKING MEASUREMENTS. USE OF A TRIPOD IS HIGHLY RECOMMENDED.

8-17 Temperature Compensation

The imager has temperature compensation to correct surrounding environmental sources of energy. To get a more accurate temperature measurement, set the temperature compensation.

Set the temperature compensation as follows:

1. Press the Menu button.
2. Highlight Emissivity from the Menu.
3. Press the Select button. A sub-menu will open.
4. Highlight Temp. Comp. in the sub-menu.
5. Press the Select button.
6. Press the Up or Down button to modify the temperature compensation.
7. Press the Select button to confirm. Press Close to exit without changes.
8. Press Close to exit the menu.

8-18 Alarm

The Alarm enables threshold settings for temperature screening. An audible will sound and the Level & Span bar will flash red on-screen if the threshold is exceeded.

Set the threshold as follows:

1. Press the Menu button.
2. Highlight Emissivity from the Menu.
3. Press the Select button. A sub-menu will open.
4. Highlight Alarm in the sub-menu.
5. Press the Select button.
6. Press the Up or Down button to modify the Alarm settings.
7. Press the Select button to confirm. Press Close to exit without changes.
8. Press Close to exit the menu.

THE DEFAULT ALARM THRESHOLD IS 37.3°C (99.14°F).

WHEN MEASURING HIGH TEMPERATURE OBJECTS ENSURE THE TEMPERATURE RANGE IS SET TO THE 0°C TO 500°C (32°F TO 932°F) RANGE TO OBTAIN THE MOST ACCURATE RESULTS.

8-19 Reflective Temperature

The reflective temperature is important for radiometric temperature measurement. The imager has temperature compensation for reflective objects. Set the reflective temperature to get the most accurate temperature measurements. In most cases, the reflected temperature is identical to the ambient temperature.



Change the reflected temperature as follows:

1. Press the Menu button.
2. Highlight Emissivity from the Menu.
3. Press the Select button. A sub-menu will open.
4. Highlight T. Refl. in the sub-menu.
5. Press the Select button.
6. Press the Up or Down button to modify the Reflective Temperature.
7. Press the Select button to confirm. Press Close to exit without changes.
8. Press Close to exit the menu.

8-20 Temperature Ranges

The default temperature measurement range is -20°C ~ 150°C (-4°F ~ 302°F). There may be other options depending on purchased package.

Change the temperature range as follows:

1. Press the Menu button.
2. Highlight Range from the Menu.
3. Press the Select button. A sub-menu will open.
4. Highlight desired temperature range in the sub-menu.
5. Press the Select button to enable the corresponding measurement. The icon  means the point is enabled. The icon  means it is disabled.
6. Press the Select button to confirm and automatically close the Menu. Press Close to exit without changes.

WHEN MEASURING HIGH TEMPERATURE OBJECTS ENSURE THE TEMPERATURE RANGE IS SET TO THE 0°C TO 500°C RANGE TO OBTAIN THE MOST ACCURATE MEASUREMENT RESULTS.

THE DEVICE WILL PERFORM A NUC CORRECTION AFTER A NEW TEMPERATURE SCALE IS SELECTED.

8-21 Languages

Change the device language as follows:

1. Press the Menu button.
2. Highlight Settings from the Menu.
3. Press the Select button. A sub-menu will open.
4. Highlight Language from the sub-menu.
5. Press the Select button.
6. Highlight desired language.
7. Press the Select button to confirm and automatically close the Menu. Press Close to exit without changes.



PERFORM A FACTORY RESET TO RESTORE DEFAULT SETTINGS.

8-22 Temperature Unit

There are three units to choose from: °C, °F, and K. By default the imager is set to measure temperatures in Celsius (°C). Change the temperature scale as follows:

1. Press the Menu button.
2. Highlight Settings from the Menu.
3. Press the Select button. A sub-menu will open.
4. Highlight Temp. Unit from the sub-menu.
5. Press the Select button.
6. Highlight desired temperature unit.
7. Press the Select button to confirm and automatically close the Menu. Press Close to exit without changes.

PERFORMING A FACTORY RESET ERASES CUSTOMIZED USER CONFIGURATIONS STORED ON THE DEVICE AND RESTORES THE ORIGINAL DEFAULT SETTINGS PROGRAMMED BY THE MANUFACTURER. THE PROCESS CANNOT BE UNDONE.

8-23 Factory Settings

If measurements are skewed the user should try adjusting the emissivity and ambient temperature before attempting to restore factory setting. Restore default settings as follows:

1. Press the Menu button.
2. Highlight Settings from the Menu.
3. Press the Select button. A sub-menu will open.
4. Highlight Factory Set from the sub-menu.
5. Press the Select button.
6. Press the Ok button to confirm reset. Menu automatically closes to perform reset. Press Cancel to exit without changes.

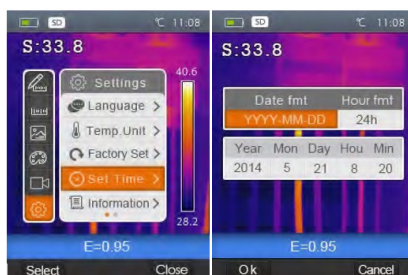
Factory settings of the imager are as follows:

Item	Parameter	Value
Measurement	Center Spot Measurement	off
	Hot Spot Measurement	off
	Cold Spot Measurement	off
Parameters	Emissivity	0.95
	Reflective temperature	25°C
Image	Mode	Infrared
	Palette	Iron
	Adjustment	Auto
System Setting	Language	English
	HDMI Output	off
	Laser	off
	Lamp	off

PERFORMING A FACTORY RESET WILL ERASE ANY IMAGES SAVED DIRECTLY TO THE DEVICE. A FACTORY RESET WILL NOT FORMAT THE MEMORY CARD HOWEVER USERS MAY WISH TO REMOVE IT BEFORE ATTEMPTING A FACTORY RESET OF THE DEVICE.

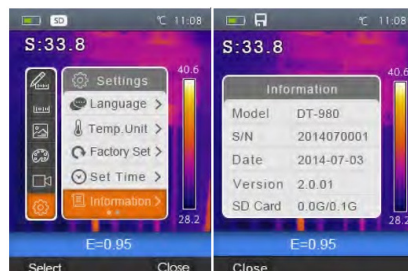
8-24 Set time

1. Press the Menu button.
2. Highlight Settings from the Menu.
3. Press the Select button. A sub-menu will open.
4. Highlight Set Time from the sub-menu.
5. Press Left or Right button to highlight the correct option.
6. Press Up or Down button to modify the value of selected item.
7. Press the Ok button to confirm and automatically close the Menu. Press Cancel to exit without changes.



8-25 Information

1. Press the Menu button.
2. Highlight Settings from the Menu.
3. Press the Select button. A sub-menu will open.
4. Highlight Information from the sub-menu.
5. Press the Select button.
6. Press Close to exit the Menu.

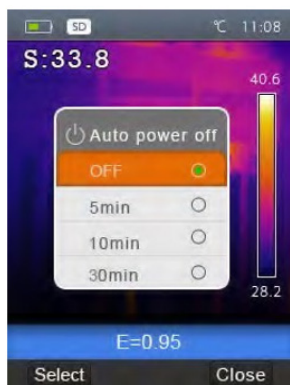


8-26 Power Management Settings

To save power users can change the auto shut off settings. The device can be set to turn off after 5 minutes, 10 minutes, or 30 minutes. Auto shut off can also be turned off completely by selecting OFF in the settings.

Adjust power management settings as follows:

1. Press the Menu button.
2. Highlight Settings from the Menu.
3. Press the Select button. A sub-menu will open.
4. Highlight Auto power off from the sub-menu.
5. Press the Select button.
6. Press the Up or Down button to highlight the desired setting.
7. Press the Select button to confirm and automatically close the Menu. Press Close to exit without changes.



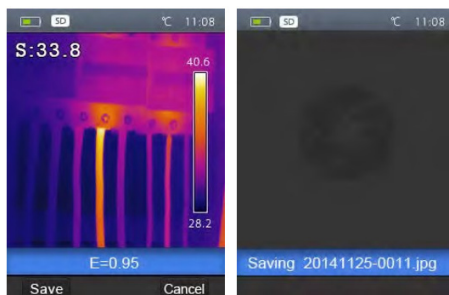
8-27 Volume

1. Press the Menu button.
2. Highlight Settings from the Menu.
3. Press the Select button. A sub-menu will open.
4. Highlight Volume from the sub-menu.
5. Press the Select button.
6. Press the Left or Right button to change the volume level.
7. Press the Select button to confirm and automatically close the Menu. Press Close to exit without changes.

8-28 Save Image

Every image is 1280 × 960, and saves in a .jpg format. Infrared data and visible data is stored in an image. Capture an image as follows:

1. Press the Trigger button to freeze an image.
2. Press the Save button to save the image. The file name shows on screen. Press the Cancel button to return to the main interface without saving the image.

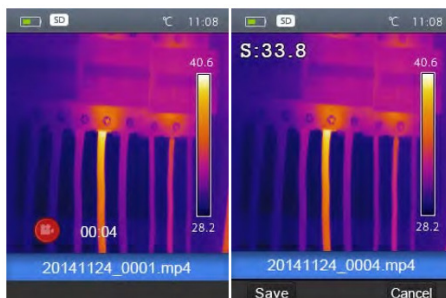


IMAGES AND VIDEO FILES ARE STORED IN THE SD MEMORY CARD. IMAGES CAN EASILY BE READ AND ANALYZED WITHIN THE IMAGER SOFTWARE.

8-29 Video Menu

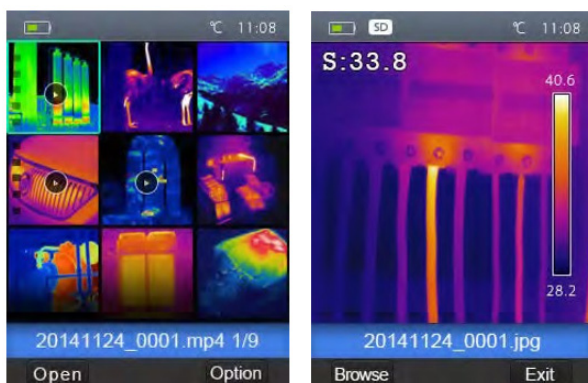
In video mode, the imager can capture hours of .mp4 videos, and saves the infrared data to the file.

1. Insert earphone with microphone in order to record voices.
1. Press the Trigger button and hold for about 2 seconds. Video capture will start.
2. To stop video capture, press the Trigger button again.
3. Press the Save button to save the video. Press the Cancel button to return to the main interface without saving the file.



8-30 Open an Image

1. Press the Browse button. The imager will display images and videos saved to the SD Memory Card.
2. Press the Up, Down, Left, and Right buttons to highlight an image.
3. Press the Open button to open the image.
4. Press the Up button to zoom in. Press down button to zoom out.
5. Press the Left button to open previous image. Press the Right button to open next image.
6. Press the Browse button to return files browser. Press the Exit button to return to thermal capture interface.

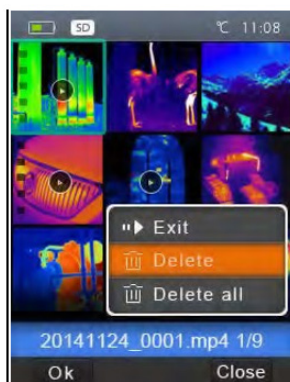


8-31 Play a Video

1. Press the Browse button. The imager will display images and videos saved to the SD Memory Card.
2. Press the Up, Down, Left and Right button to highlight a video.
3. Press the Open button to enter the video player interface.
4. To hear voices insert earphones with a microphone.
5. To play a video press the Trigger button.
6. Press the Browse button to return files browser. Press the Exit button to return to thermal capture interface.

8-32 Delete a File or All Files

1. Press the Browse button. The imager will display images and videos saved to the SD Memory Card.
2. Press the Up, Down, Left and Right button to highlight an image and a video.
3. Press the Option button to open the Option sub-menu.
 - Delete the selected image:
 - Press the Up or Down button to highlight Delete. Press the OK button to delete the selected file.
 - Delete all files:
 - Press the Up or Down button to highlight Delete all. Press the OK button delete all files.
 - Exit the Browser:
 - Press the Up or Down button to highlight "Exit", press the OK button to return desktop.
4. Press the Close button to return to the files Browser.



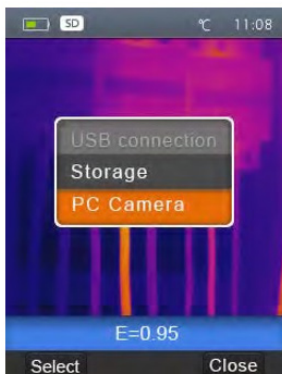
DELETED IMAGES AND VIDEO FILES CANNOT BE RESTORED AFTER DELETION. THE USER SHOULD ENSURE THEY NO LONGER NEED FILES BEFORE DELETING.

8-33 USB Mode

Connect the device to a computer using the USB cable. A menu will open with two options: Storage and PC Camera.

Storage: Browse files stored on the SD card on the user's computer.

PC Camera: The imager becomes a USB device for the user's computer.



8-34 HDMI Output

The video output available in the imager enables displaying the thermal images (not including the operator menu) on an external monitor or video recording device capable of managing HDMI systems.

Connect the Thermal imager as follows:

1. Connect the imager to the external HDMI monitor or recording device using the HDMI video cable provided.
2. Turn on the external HDMI monitor or device.
3. Power on the imager.
4. The thermal imager's display works simultaneously.
5. When finished, switch off the external device and disconnect the HDMI video cable from the thermal imager.

9 PC Software

ICI's PC Software allows audio annotations and commentary to be reviewed on a PC.

9-1 System Requirements

- Operating system: Window XP or higher
- Net Framework 2.0 or Net Framework 3.5.
 - Launch software.
 - A warning pops up to install .Net Framework. Click Install this feature.
 - Files will download and install automatically.
 - When the installation is finished, click Close.

9-2 Software Installation

1. Insert CD into the CD drive of the computer and auto run installation, or double-click the setup.exe from the CD files.
2. Click Yes to allow changes to the computer.
3. Click Next.
4. Click I Agree to agree to terms of license agreement.
5. Click Install.
6. Click Finish.

9-3 Running the Software

Launch the software using the Start menu or by double-clicking the desktop shortcut.

9-4 Uninstalling the Software

1. Go to Window Control Panel.
2. Click Programs.
3. Click Uninstall a program.
4. Find PCIMeter 1.0.9 in the list and click it.
5. Click Uninstall/Change.
6. Click Yes to confirm you want to uninstall.
7. Click Ok.

10 Cleaning and Maintenance

10-1 Cleaning the Germanium Lens

Do not use corrosive chemicals on the optical glass components. The germanium window surface is coated with anti-reflection coating. Dust, grease, and fingerprints will produce harmful substances and lead to a decline in performance, or cause scratches. If dirt is found, please use the following methods:

1. Use a blown balloon or a soft brush to clean the lens surface to avoid dust particles scratching the anti-reflection film on lens surface during the wiping process.
2. Use a soft cotton or microfiber cloth or lens wiping paper and dip in distilled water. Gently wipe the lens surface from the middle to the edge, paying attention to not crack the lens, or use too much liquid. If the lens is still not clean, replace the cloth and repeat the wiping process.

10-2 Disinfecting the Camera Surface

Do not use corrosive cleaning solutions on the optical glass components. It is recommended to disinfect the camera surface regularly with a non-corrosive sanitizing product. Follow the directions provided by the manufacturer of the cleaning solution. Adhere to the sanitation protocols and cleaning schedule set forth by the employer.

10-3 Device Calibration

It is recommended to have device(s) re-calibrated annually. Contact customer service to schedule maintenance.

10-4 Storage

When the equipment is not in use, the device should be placed in a dust-free and moisture-free environment with a stable temperature and humidity.

DO NOT USE CORROSIVE CLEANING SOLUTIONS ON THE OPTICAL GLASS COMPONENTS. DISINFECT THE CAMERA SURFACE REGULARLY WITH A NON-CORROSIVE SANITIZING PRODUCT.

CALIBRATE YOUR DEVICES ANNUALLY. CONTACT CUSTOMER SERVICE TO SCHEDULE MAINTENANCE.

11 Troubleshooting

If the user encounters any problems while using the imager, refer to the following options. If the problem persists, disconnect the power and contact the customer support department.

11-1 Thermal imager does not power on

- Ensure battery is installed
- Replace old battery
- Charge battery

11-2 Thermal imager shuts off unexpectedly

- Replace old battery
- Charge battery

11-3 No thermal image

- Open the lens cap
- If lens is foggy, use professional equipment to clean the lens

11-4 Unclear or dark visible images

- Turn on lights in imaging area
- Turn on device light
- If lens is foggy, use professional equipment to clean the lens

11-5 Temperature readings are incorrect

- Turn off the device; then, turn it back on
- Ensure the correct temperature range is selected
 - The default temperature range is -20°C to 150°C (-4°F to 302°F)
 - When measuring high temperature objects ensure the temperature range is set to the 0°C to 500°C (32°F to 932°F) range
- Device is at proper height
- Ensure device is in focus
- Adjust emissivity
- Adjust for ambient temperature
- Perform a NUC operation

11-6 Camera out of focus

- Adjust focus ring

11-7 Memory card error

- Insert memory card

12 About ICI

ICI manufactures complete systems and software. We can provide complete engineering, software, and OEM solutions. Our Fortune 500 clients rely on us for infrared equipment and thermography training (which we offer through the Infrared Training Institute).

In addition to providing custom germanium, silica, and sapphire optics, we also build windows for enclosures, as well as custom pan and tilt units. We can even provide customizable explosion-proof systems.

Our knowledge and experience stems from years of using infrared imaging and temperature measurement instruments to provide solutions to: managers, engineers, scientists, inspectors and operators in space, power companies, medical, pulp and paper, food industry, research and development, and various process industries. You can see our products and services used in industrial, commercial, and government applications worldwide. Additionally, our ICI 7320 was awarded "Product of the Month" by NASA*. Originally named Texas Infrared (still DBA), Infrared Cameras, Inc. has been in business since March, 1995.

Thank you for your dedicated and continued support.

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You may reach a customer care representative by phone or email during regular business hours: Monday – Friday 8:00AM - 5:00PM CST.