TRIPLETT
Test Equipment & Tools

USER MANUAL

IRTC500
Compact Thermal Imager

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Welcome, and congratulations on your purchase of the Triplett IRTC500 Compact Thermal Imager designed to deliver fast, accurate, and reliable thermal images for a wide range of applications. Whether you are inspecting electrical systems, diagnosing HVAC issues, conducting building inspections or preventive maintenance, the IRTC500 is built to help you work smarter, faster, and safer.

1. Introduction

- This handheld compact thermal imager is used for electrical inspections, mechanical diagnostics, building inspections, and more.
- Focus the lens on the object and the thermal and visual images are displayed on the LCD and can be saved to the microSD card.
- Transferring images to a PC is accomplished by removing the microSD card and connecting it to a PC.
- In addition to the features mentioned above, the thermal imager provides video recording and play back.

2. Safety Information

- Do not disassemble or modify the thermal imager as this would void the warranty.
- Do not point the thermal imager at intensive energy sources, for example devices that emit laser radiation or the sun as this can have unwanted effects on the accuracy of the camera, it can also cause damage to the detector.
- Do not use the thermal imager in temperatures higher than 50°C (122°F) or lower than -20°C (-4°F). Operating in too high or too low temperatures can cause damage to your thermal imager.
- Only use the correct equipment to charge the battery. If you do not use the correct battery charger, you can decrease the performance or the life cycle of your battery. It can also cause the battery to heat up or cause an explosion resulting in personal injury.
- Do not disassemble or modify the battery, the battery contains safety and protection devices which, if they become damaged, can cause the battery to overheat, or cause an ignition or explosion.
- If there is a leak from the battery and fluid gets into your eyes, do not rub your eyes, flush well with water and immediately seek medical attention.
- Do not drill holes in the battery, hit the battery with a hammer, step on it, or subject it to strong impacts or shocks.
- Do not put the battery in or near fire, into direct sunlight, or other high-temperature locations.
- Always charge the battery in the temperature range of 0 to 50°C (32 to 122°F). If you charge the battery outside of this temperature range, it can cause the battery to become hot or to malfunction and it can also decrease the performance or life cycle of the battery.
- Do not permit the battery to get wet.
- Clean the case with a damp cloth and a mild soap solution. Do not use abrasives, isopropyl alcohol, or solvents to clean the case, lens, or screen.
- Be careful when you clean the infrared lens. Do not clean the lens too vigorously as this can damage the anti-reflective coating.

- Do not expose the thermal imager to sudden temperature changes (e.g., from cold to hot), as this can lead to internal condensation. To protect your camera, you should power it off and wait long enough until the camera has become warm enough for the condensation to evaporate.
- If you do not use the thermal imager, store it in a cool and dry environment. Remove the battery from the camera and store it separately to prevent unintended battery discharge.

3. Specifications

Imaging and Optical Data	
Field of View (FOV)/Minimum Focus Distance	42°x 32°/0.5m
Thermal Sensitivity/NETD	<0.05°C at 30°C (86°F)/40mK
Image Frequency	9Hz
Focus Mode	Focus free
Focal Plane Array (FPA)/Spectral Response	Uncooled microbolometer/8-14µm
IR Resolution	160x 120 pixels (19,200 pixels)
Image Presentation	
Display	2.8 in. LCD, 320 x 240 pixels
Image Modes	IR image, Visual image, Auto fusion
Color Palettes	Iron, Rainbow, White hot, Black hot, Brown hot, Blue red, Hot cold, Feather
Measurement	
Object Temperature Range	-20 to 150°C (-4 to 302°F)
Accuracy	±2°C (3.6°F) or ±2% of reading (Environmental temperature 10 to 35°C, object temperature > 0°C)
Measurement Analysis	
Spot	Center Spot
Automatic Hot/Cold detection	Auto hot or cold markers
Measurement Corrections	Emissivity (adjustable 0.01-1.0)
Storage of Videos	
Storage Media	8GB microSD card and 3.4GB internal EMMC
Video Storage Format	Standard MPG, 640 x 480 at 30fps, on microSD card >60minutes
Video Storage Mode	IR/visual images; simultaneous storage of IR and visual images

Storage of Images	
Image Storage Format	Standard JPEG or HIR files including measurement data, on the microSD card >6000 pictures
Image Storage Mode	IR/visual images; simultaneous storage of IR and visual images
Image Analysis	Internal image analysis tools, Complete function
Set-Up	
Set-Up Commands	Local adaptation of units, language, date and time formats, information of camera
Languages	12 language options
Digital Camera	
Built-in Digital Camera	2 Megapixels
Built-in Digital Lens Data	FOV 59°
Data Communication Interfaces	
Interfaces	USB-Type C
USB	Data transfer between camera and PC
	Live video between camera and PC
Power System	
Battery	Li-ion battery, 4 hours operating time
Input Voltage	DC 5V
Charging System	In camera (AC adapter)
Power Management	Auto Power Off with options 5, 10, 15, 30 min or OFF
Environmental Data	
Operating Temperature Range	-15 to 50°C (5 to 122°F)
Storage Temperature Range	-40 to 70°C (-40 to 158°F)
Humidity (Operating and Storage)	10% to 90%
Drop Test	2m
Bump	25g (IEC60068-2-29)
Vibration	2g (IEC60068-2-6)
Physical Data	
Camera Weight, Incl. Battery	0.4lbs (180g)
Camera Size (L x W x H)	3.5 x 3.3 x 1" 90 x 85 x 25mm)

4. Before You Start

4-1. How to Charge the Battery

- Before you use the thermal imager for the first time, charge the battery for about three and a half hours. The battery status is shown on the six-segment charge indicator.
- Charge the battery as follows:
  1. Connect the cable to USB-C input on the camera and USB-A end to a power adapter. The charging indicator will be visible on the display while the battery charges.
  2. Charge until the charge indicator changes to " ".
  3. Disconnect from ac power when the battery is fully charged.

Note: Make sure that the camera is near room temperature before you connect it to the charger. Do not charge in unusually hot or cold areas. When you charge in extreme temperatures, battery capacity may be decreased.

4-2. Power On

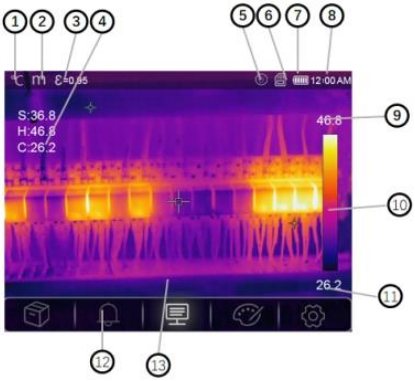
To turn the camera on, push the **Power** " button.

Note: After you power on your thermal imager, it needs sufficient warm-up time for the most accurate temperature measurements and best image quality. The visible image will appear first, and the thermal sensor will calibrate internally for several seconds. After that the thermal image will also be displayed on the screen.

4-3. Power Off

When the thermal imager is turned on, push and hold the Power "⏻" button for two seconds and it will turn off.

4-4. Display Elements



1- Temperature units
2- Distance units
3- Emissivity
4- Center spot temperature reading
5- Flashlight ON status
6- SD card
7- Battery capacity status
8- Time
9- Max Temperature of current scene
10- Color Bar
11- MIN temperature of current scene
12- Main Menu
13- Image Display Area

4-5. Shutter

- The thermal image becomes blurry when the thermal imager is not properly corrected after a few minutes or if you change to a different target. An automatic correction will be made to improve the image quality.

4-6. Temperature Measurement

- All objects radiate infrared energy, the quantity of energy radiated is 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 very 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.
- To more accurately measure materials with low emissivity, an emissivity correction is necessary. Adjustment to the emissivity setting will usually allow the thermal imager to calculate a more accurate estimate of the actual temperature.
- For more information, please see Emissivity Adjustment to get the most accurate temperature measurements.

4-7. Emissivity Adjustment

- Emissivity of a surface can significantly influence the apparent temperatures that the thermal imager observes. Using the correct emissivity value is important to make the most accurate temperature measurements.
- Understanding the emissivity of a surface can help you obtain more accurate temperature measurements, although this may not always be the case.
  Note: Surfaces with an emissivity of <0.60 make reliable and consistent determination of actual temperature problematic, the lower the emissivity, the more potential errors are associated with the thermal imager's temperature measurement calculations. This is also true even when adjustments to the emissivity are performed properly.
- Emissivity is set directly as a value or from a list of the emissivity values for some common materials, the emissivity displays on the LCD Screen as E=x.xx.
- The following table gives typical emissivity of important materials.

Material	Emissivity
Water	0.96
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

Material	Emissivity
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

4-8. Reflected Temperature

- Using the offset factor, the reflection is calculated out due to the low emissivity and the accuracy of the temperature measurement is enhanced.
  In most cases, the reflected temperature is the same as the ambient air temperature. Only when high emission objects with significantly higher temperatures are near the measured object should the reflected temperature be determined and applied. For objects with high emissivity, the reflected temperature has minimal impact.
- 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 in the opposite direction away from the object, take a measurement and freeze the image.

4. Determine the average value of the image and use that value for your input of the reflected temperature.

4-9. InfraRead Software

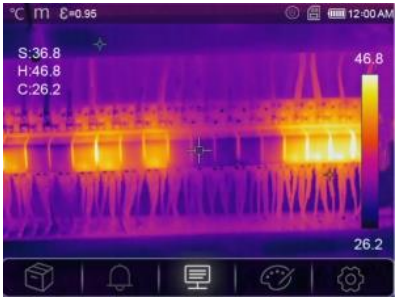
- The thermal imager is supplied with free InfraRead PC software. This software contains features to analyze images, organize data and information, and make professional reports.
- You can customize the reports and add your company logo and information.
- You can save the reports as .pdf or .xlsx and export them.

5. Menus

The menus allow you to access images, measurements, emissivity, color palettes, temperature measurement range, review images and video, and access settings.

5-1. Main Menu

- Short Press the **"OK/ESC"** button, the **Main** menu will pop up. The **Main** menu is the main interface of the thermal imager's menus.
- It contains the **Gallery**, **Alarm**, **Parameters**, **Image Mode**, **Palette** and **Settings**.



	Gallery	Enter the gallery. (Image View Mode)
	Alarm Setting	Settings for High and Low Temperature Alarms
	Parameters	Contains settings for temperature calculation
	Image Mode	Contains settings for setting Image Source on LCD
	Palette	Sets the type of Color scheme for Thermal
	Setting	Contains User Preferences Language, Temp Units, Date and Time, Restore Factory Settings, Product Info

5-2. Image Mode

- In the main menu, press the **Left/Right** Button to highlight **"Image Mode"** , Short Press the **OK/ESC** button to display the Image Submenu which contains the (3) kinds of Image modes to select from. Long Press **OK/ESC** to exit.

- We offer three image modes to choose from:

IR: Displays only infrared images.

Visible: Displays only visible images

AUF: Auto Fusion mode, compare the center area temperature with full screen, the thermal imager will calculate the mix ratio of infrared and visual images automatically.

5-3. Image Palette

- A variety of palettes are available for specific applications, the standard palettes offer an equal, linear presentation of colors that allow for the best presentation of detail.

Standard Palette

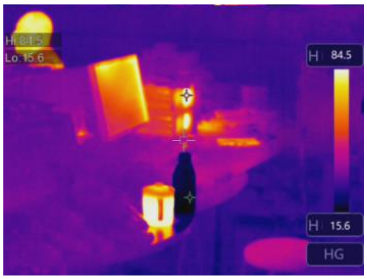
- In the main menu, press the Left/Right Button, highlight "Palette".
- Short Press the "OK/ESC" button and the "Palette" Menu will be displayed.
- Press the Left/Right Button, highlight the palette you want, and press "OK/ESC"..
- The palette will change according to your selection.

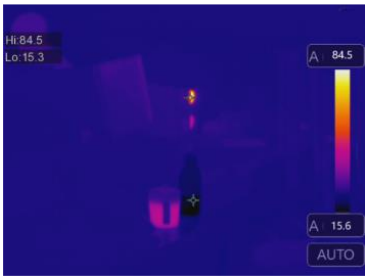
	Iron
	Rainbow
	White hot
	Black hot

	Brown hot
	Blue red
	Hot cold
	Feather

5-4. Histogram Mode and Auto Mode

- **Auto Mode:** Level and span are decided by the thermal image of minimum and maximum temperature, the relationship between temperature and color is linear.
- **Histogram Mode:** The thermal image is enhanced by histogram algorithms, the relationship between temperature and color is not linear, some part of the image is enhanced.
- Press the **Power/Lock** Button to change the mode.





5-5. Parameter Menu

- In the Main Menu press the “Left/Right” Button to highlight “Parameter.”
- Short press the “OK/ESC” Button and the Parameter submenu will appear.
- Short press the “OK/ESC” Button to select the Parameter.
- Long press to exit the “Parameter” Menu.

5-6. Ambient Temperature Compensation

Ambient Temperature will affect the measurement of the thermal imager. This thermal imager has an Ambient Temperature Compensation Feature, which allows you to adjust the temperature from 0˚C to 50˚C or 14˚ F to 122˚F.

5-7. Reflective Temperature

- In reflective temperature submenu, press the “◀” and “▶” arrow to change the temperature values.
- Reflective temperature is important for radiometric temperature measurements. This thermal imager has temperature compensation for reflective temperatures. To obtain a more accurate temperature measurement, ensure the reflective temperature is set correctly.
- In most cases, the reflected temperature is identical to the ambient temperature, only when objects with strong emissions with much higher temperature are in the proximity of the object being measured, the reflected temperature must be set.

5-8. Atmospheric Humidity

Water droplets in the air can absorb infrared rays. The wet air can affect the temperature accuracy of the measurement. This thermal imager has a feature to compensate for humidity and can be set from 10% to 100% humidity.

5-9. Infrared Compensation

This feature allows correcting the temperature measurement for external factors that affect infrared radiation readings.

5-10. Distance

The accuracy and clarity of a thermal image decreases with distance, as objects farther away appear smaller and may emit less distinguishable thermal radiation, potentially affecting temperature readings and detail resolution.

- The distance can be set in from 0 to 610 meters (0 to 2000ft).

5-11. Emissivity

- In emissivity submenu, press the "◄" and "►" arrow to change the emissivity values.
- The emissivity ranges from 0.01 to 1.00.

5-12. Device Setting

There are multiple pages in Device setting, use the ﹀ Down button to go to next setting, or use the ﹀ Up button to go to previous setting.

5-12-1. USB Mode

- There are two modes for USB: **PC Connection** or **PC Camera**, press the "◄" or "►"arrow to switch mode.
- PC Connection: Connect the USB cable to the PC and the thermal imager and "USB Connection" will show with "Cancel" or "OK" options. Press "OK" and the thermal imager will show up as a drive on your PC.
- PC Camera: Connect the USB cable to the PC and the thermal imager, this will allow you to see the device as a UVC Camera (Universal Video Class Standard). This standard defines how video streaming devices
- PC Connection sets the device as Mass Storage mode.
- PC Camera sets the device as UVC Camera mode on a PC

5-12-2. Flashlight

- Press the "◄" and "►" to highlight Flashlight and "OK/ESC" to turn ON or OFF.

5-12-3. Brightness

- Press the "◄" and "►" to highlight Brightness and "OK/ESC" to select. Use the " ◄ " and ► " " to adjust from 0 to 100%.

5-12-4. Watermark

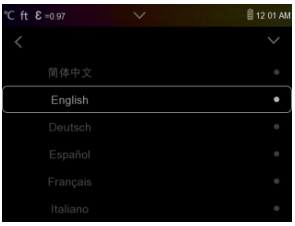
- Press the "◄" and "►" to highlight Watermark and "OK/ESC" to turn ON or OFF.

5-12-5. Time/Date

- Press the "◀" and "▶"to select Year, Month, Day, Hour, Minute. Press "OK/ESC" to select, then "◀" and "▶" to adjust. Press "OK/ESC" again to SAVE changes.

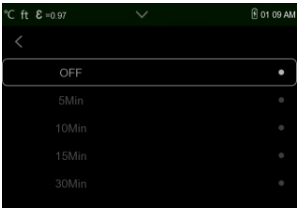
5-12-6. Language

- Press the "◀" and "▶" to select desired language and "OK/ESC" to select.



5-12-7. Auto Power OFF

- There are five options in the Auto Power Off menu: "OFF", "5Min", "10Min", "15Min" and "30Min".



- Press the "◀" and "▶" to highlight and "OK/ESC" to select.

5-12-8. About

This screen contains all product information such as Software Version, Serial Number and available storage.

6. Measure Setting

There are (7) options in the Measure Setting Menu. Max Temp, Min Temp, Distance Unit, Temp Unit, Temp Range. Emissivity, Alarm Mode and Image Align.

6-1. Max Temp
Selecting this option will add a “maximum temperature spot” on your thermal image showing the highest temperature the detector has registered.

6-2. Min Temp
Selecting this option will add a “minimum temperature spot” on your thermal image showing the lowest temperature the detector has registered.

6-3. Distance Unit
Allows for changing units of distance between meters and feet.

6-4. Temp. Unit
Allows for changing units of temperature between Celsius (°C), Fahrenheit (°F) and Kelvin (K).

6-5. Temp. Range
There are (2) ranges to select from -4 to 302°F (-20 to 150°C) or 32 to 1022°F (0 to 550°C) Allows for “manual temperature range” selection. When using the manual temperature, users who know the exact temperature range they are working within may achieve even greater accuracy. If the range is unknown, then it is best to select the highest range.

6-6. Emissivity
There are (18) commonly known presets of materials with known emissivity values to select from in the menu.

Quickly pick the emissivity from the table below	
Material	**Emissivity**
Water	0.96
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

6-7. Alarm Mode

Allows for setting the type of alarm mode. There are (4) options – OFF, Above alarm, Below alarm and Zone alarm.

6-8. Image Align

- Press the "◀" and "▶" to align the visible and infrared images.
- Press the **"OK/ESC"** button to save the alignment setting.

6-9. Reset

There are (2) options on this menu. "Format Memory" and "Default Settings" Format memory is used when you need to reformat your microSD card. Default Settings will restore the thermal imager to factory defaults. The Default Settings are as follows:

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

7. Image and Video Menus

- The thermal imager has photo and video functions.
- In photo function, the thermal imager can save thousands of images with image resolution of 1280 x 960. The image format is ".jpg" and infrared and visible data are stored in one image.
- In video function, the thermal imager records in videos in ".mp4" format.

Note: Images and video files are stored on the microSD card. Images can easily be read and analyzed within the InfraRead software.

7-1. Save Images

1. Press the  button, freeze an image, the save menu will display.
2. Press the **OK/ESC** Button to save the image. It will flash for a second, after the image is saved, the display will return to live image mode.

7-2. Video Menu

The thermal imager features ".mp4" video capture.

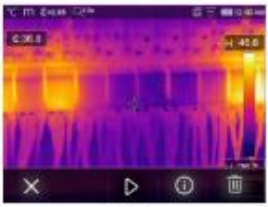
1. In desktop, press the  button and hold it for about 2 seconds to start video capture.
2. To stop video capture, press the  button again, the video is saved on the microSD card.

7-3. File Browser

Press the "◄" and "►" Button, highlight **"Gallery"**, then press the **OK/ESC** Button and the file browser will pop up, which displays pictures and videos saved on the microSD Card.

7-4. Play a Video

When the selected file type is video, press the "◄" and "►" and highlight the "play" icon to play video or stop to "stop" the video.



Play Video

Stop Play Video

7-5. Delete a File

Click on the “Trash Bin” icon to delete a file.

8. InfraRead PC Software

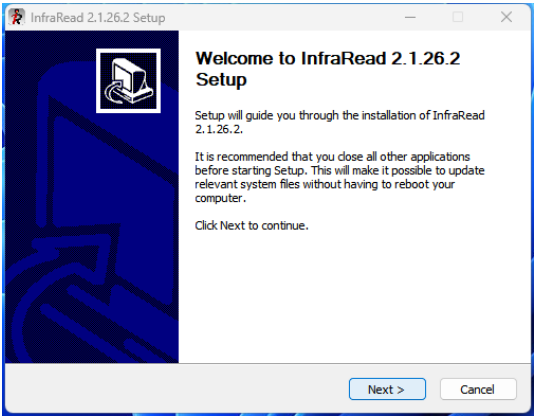
8-1. System Requirements

Windows X or higher with .NET Framework 4.5 installed.

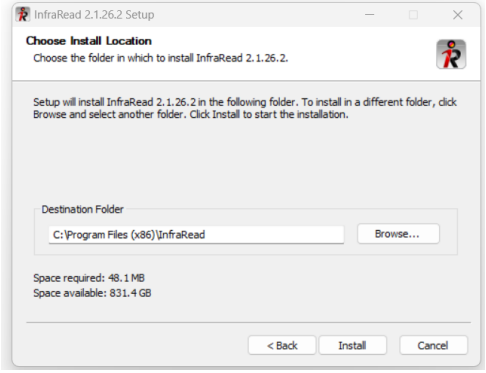
8-2. InfraRead Install

****NOTE:** Please download the latest InfraRead Software from www.triplett.com/software

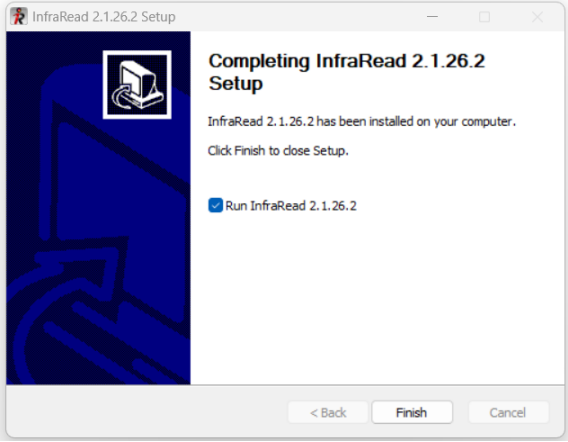
1. Click to run “setup.exe” and follow the prompts to install.



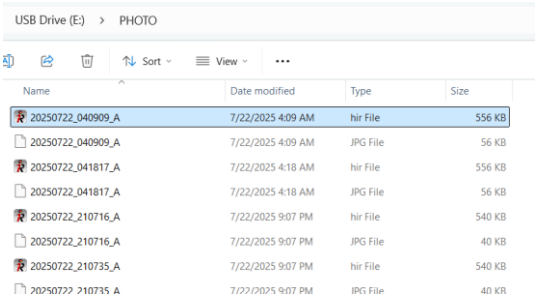
2. Click “Next” to install, until the installation is finished.



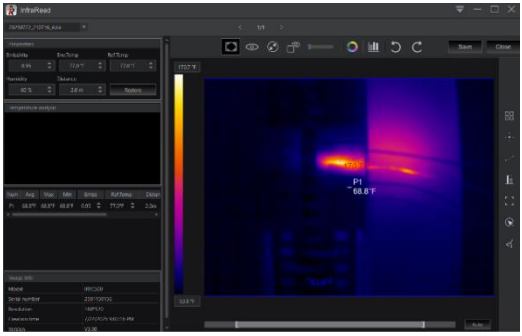
3. The Installation was Successful after you click “Finish” as seen below.



- **PC Software:** The device is a USB camera for your computer, once connected to the USB port, it will show up as a drive. Selecting “Photos” will display a list of all the images on the microSD card.

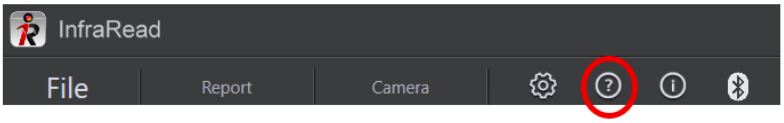


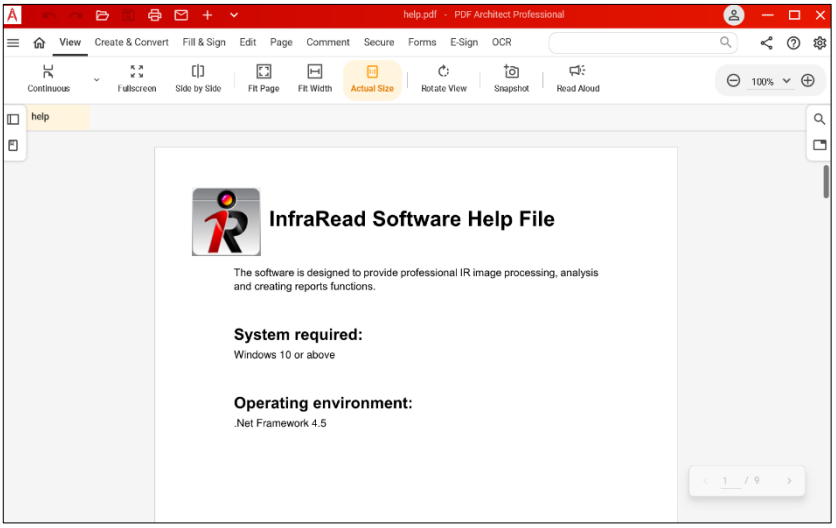
- In the PC software, you can analyze the thermal image in the “InfraRead” Software by clicking on the “InfraRead ge file



8-3. Software Help File

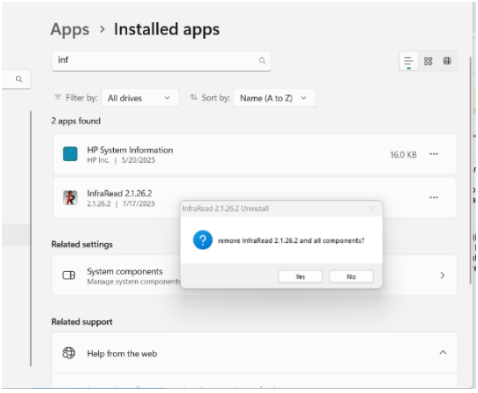
Locate the Software Help Icon in the menu bar. Click on the  icon to Open the Software Help File.





8-4. Uninstall

Uninstall InfraRead by locating it in the Installed apps menu, click “Uninstall” then click “Yes” to finish the uninstall.



9. Warranty Statement

Triplett Test Equipment offers a three-year warranty to the original purchaser of its products. We guarantee that our products will be free from defects in workmanship and materials for
three (3) years from the purchase date.

This warranty does not cover:

- Products purchased from unauthorized distributors.
- Items that have been repaired or altered by unauthorized individuals.
- Damage from misuse, abuse, misapplication, negligence, or accidents.
- Products with altered, defaced, or removed serial numbers.
- Accessories, including batteries.