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User's Guide

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Ti-120 Series

3-in-1 Infrared Thermal Imaging Camera

Where Do I Find Everything I Need For Process Measurement and Control? OMEGA …Of Course!

TEMPERATURE

- ✓ Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- ✓ Wire: Thermocouple, RTD & Thermistor
- ✓ Calibrators & Ice Point References
- ✓ Recorders, Controllers & Process Monitors
- ✓ Infrared Pyrometers

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- ✓ Load Cells & Pressure Gages
- ✓ Displacement Transducers
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- ✓ Data Logging Systems
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- ✓ Signal Conditioners
- ✓ Data Acquisition Software

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- ✓ Cartridge & Strip Heaters
- ✓ Immersion & Band Heaters
- ✓ Flexible Heaters
- ✓ Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- ✓ Metering & Control Instrumentation
- ✓ Refractometers
- ✓ Pumps & Tubing
- ✓ Air, Soil & Water Monitors
- ✓ Industrial Water & Wastewater Treatment
- ✓ pH, Conductivity & Dissolved Oxygen Instruments

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! Warnings, caution and attention

! Definitions

Warning Represents a dangerous situation or act that may cause bodily harm or death.

Caution Represents a situation or behavior that may cause damage to a thermal imager or permanent loss of data.

Attention Represents prompt information useful to the user.

Important information–Read before using the instrument.

Warning –The instrument is equipped with a laser transmitter, do not stare at the laser beam. The laser specifications are 635 nm, 0.9mW, classⅡ.

Caution –For very sensitive thermal sensors are integrated in the thermal imagers, in any case (on or off) lens aligned directly to any strong radiation sources (such as the sun, a laser beam or reflection) is strictly prohibited, otherwise permanent damage will be caused to the thermal imager!

Caution -Thermal imagers must transported inside original package. No strong shaking or collision during the transportation and usage of thermal imager.

Caution –The imager is recommended to keep inside original with environment of cool and dry, ventilation without a strong electromagnetic.

Caution - Keep any part of imagers from greasy dirt and any chemicals. Please put on the lens cover after use.

Caution-In order to prevent potential risks of data loss, please always copy data (backup) in the computer.

Attention -Thermal imager may take 3-5 minutes of warm-up to accurately measure the temperatures.

Attention - Each thermal imager has been subjected to temperature calibration shipped out. It is recommended that temperature calibration be carried out every year.

Caution -Please do not open or refit the machine. The maintenance and repairmen can only be carried out by the authorized persons.

1. Brief Introduction

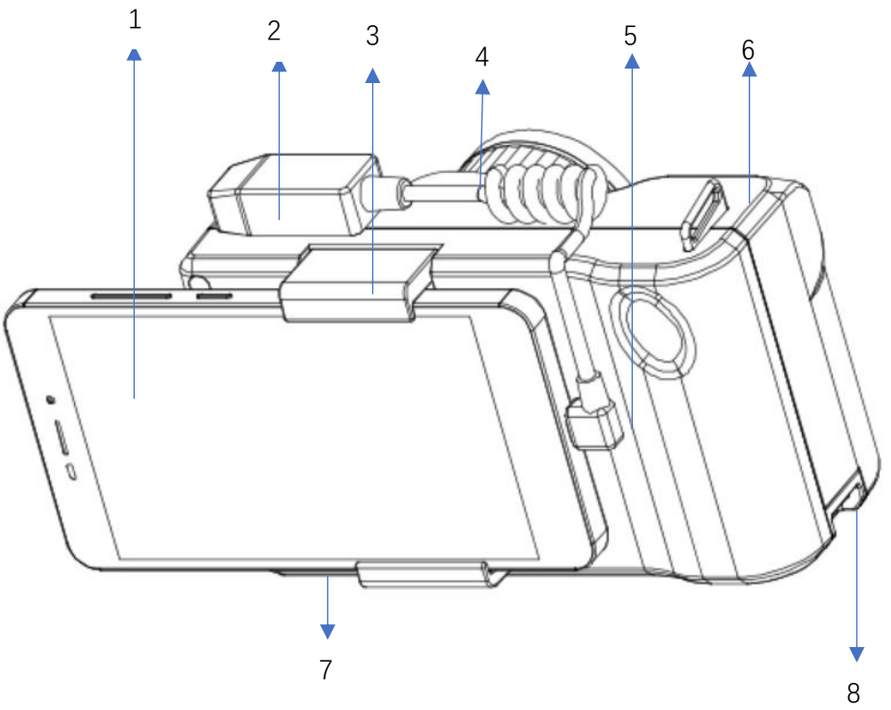
Thank you for choosing OMEGA TI-120 3-in-1 infrared thermal imaging camera.

1.1 Package Contents

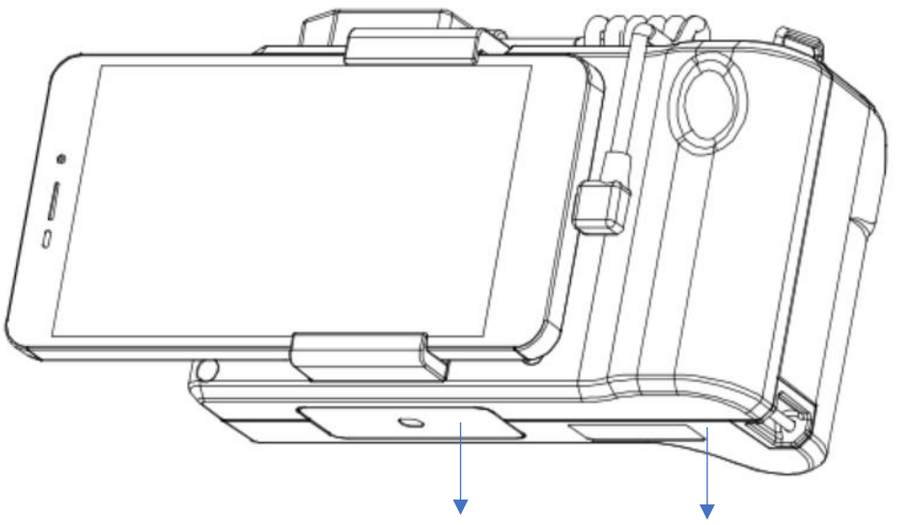
- Thermal imager (included Battery)
- Standard lens
- Lens cover
- Power adapter
- Smartphone
- USB – Micro-USB OTG cable
- USB – USB cable
- Strap
- User Manual
- Warranty card
- Calibration Certificate
- Rigid potable case

2. Introduction of Thermal Imaging Camera

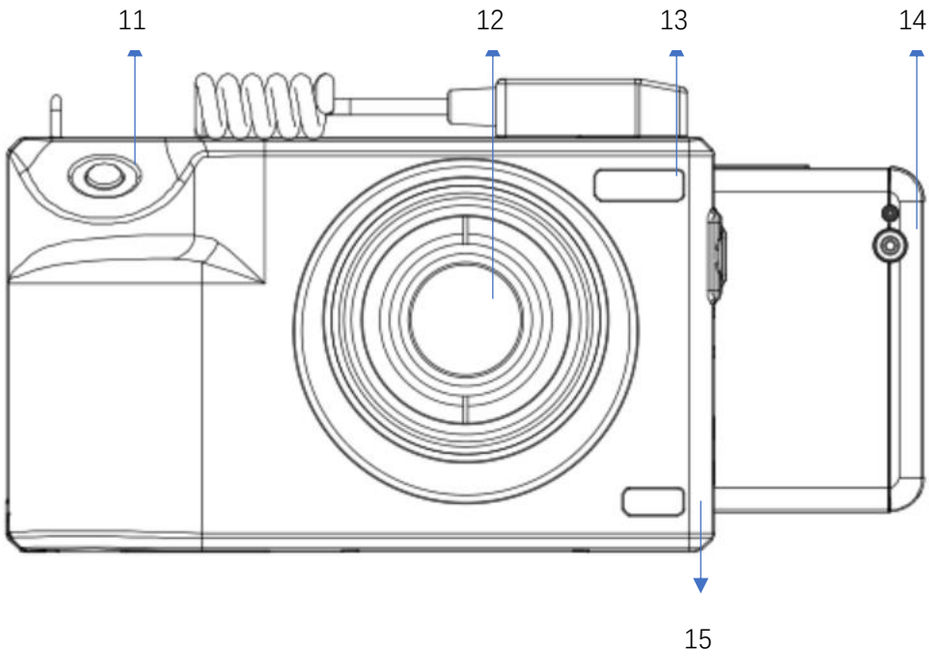
1.2 Function Keys.



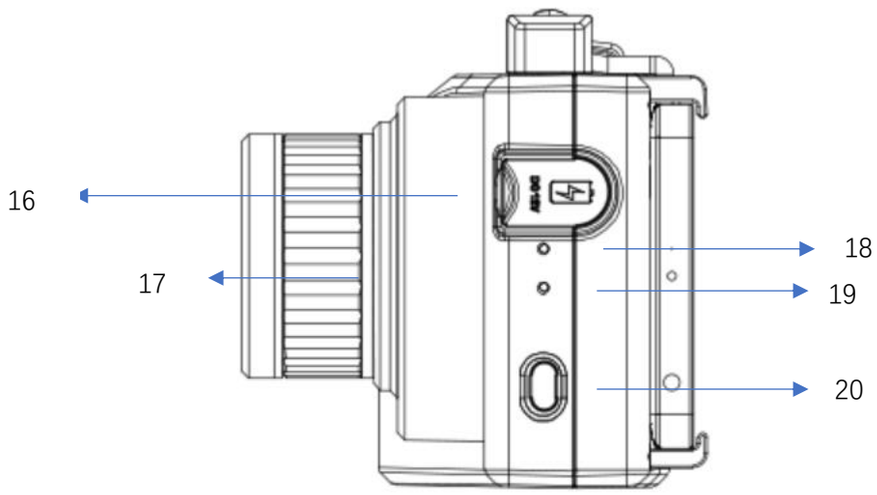
1. Smartphone (require to support OTG)
2. USB Data Port (when connect between smartphone and PC software - Omega TI Analyzer)
3. Adjustable hook for smartphone (upper)
4. OTG cable port
5. Smartphone connection port
6. Wrist band (upper)
7. Adjustable hook for smartphone (lower)
8. Wrist band (lower)



9. Tripod standard tapping hole 1/4-UNC-20
10. Model serial



11. Shutter
12. Adjustable Focus Lens
13. LOGO
14. Digital Camera of the Smartphone
15. Product Model



16. External power interface (supporting charging and external power supply)
17. Manual focusing lens ring
18. Power indicator (red)
    - ✧ When the thermal imager is turned off and connected to the charger for charging, the indicator lights up and automatically goes out when the electricity is full
    - ✧ When the thermal imager is turned on and the external power supply is connected, the power indicator keeps on the normal state
19. Power indicator (green) (light is turned on under operation, or turned off)
20. Power button (press to turn on, press and hold to turn off)

3. Quick Start

Please follow the following steps:

1. Before starting the thermal imager for the first time, charge the battery to full capacity
2. Connect smartphone and thermal imager with OTG cable
3. Carry the smartphone into the thermal imager holder
4. Press the power button to turn on the thermal imager
5. Manual focusing of the target
6. Press the shutter to capture picture
7. Click save
8. Download and install PC software OMEGA TI Analyzer
9. Install TI Analyzer software and related driver on PC
10. Start TI Analyzer professional analysis software
11. Connect the smartphone to PC using USB cable
12. Open the memory folder of the smartphone and find the thermal image file in IRs/Gallery to copy to PC
13. Under the TI Analyzer software, in the Quick Collection Bar, right-click to add a thermal image
14. Double-click thermal image or full radiation thermal image video to open for analysis
15. For long-term online testing, connect thermal imager to PC using OTG cable
16. Open the thermal imager workspace in TI Analyzer
17. Click on the connection button, select USB+, and select the USB port number to connect thermal imager
18. Full-radiation thermography video can be displayed, analyzed or recorded in real time

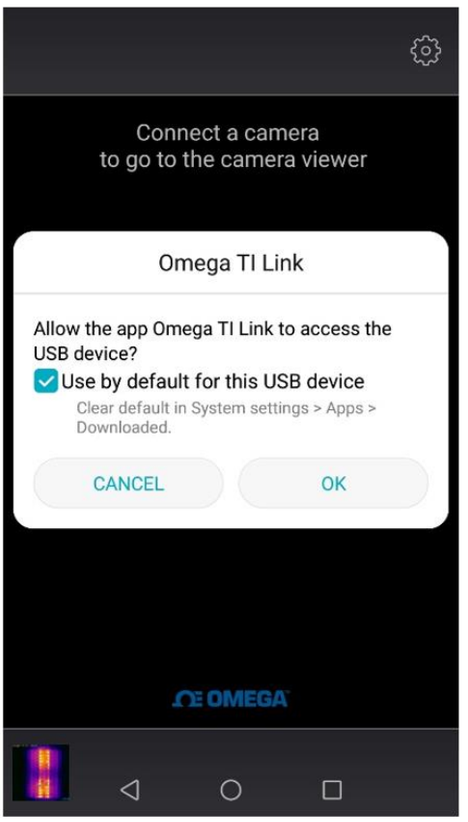
Note: it is very important to adjust the focus. Inappropriate focusing will affect imaging clarity and measurement accuracy.

4. Operational Guidelines

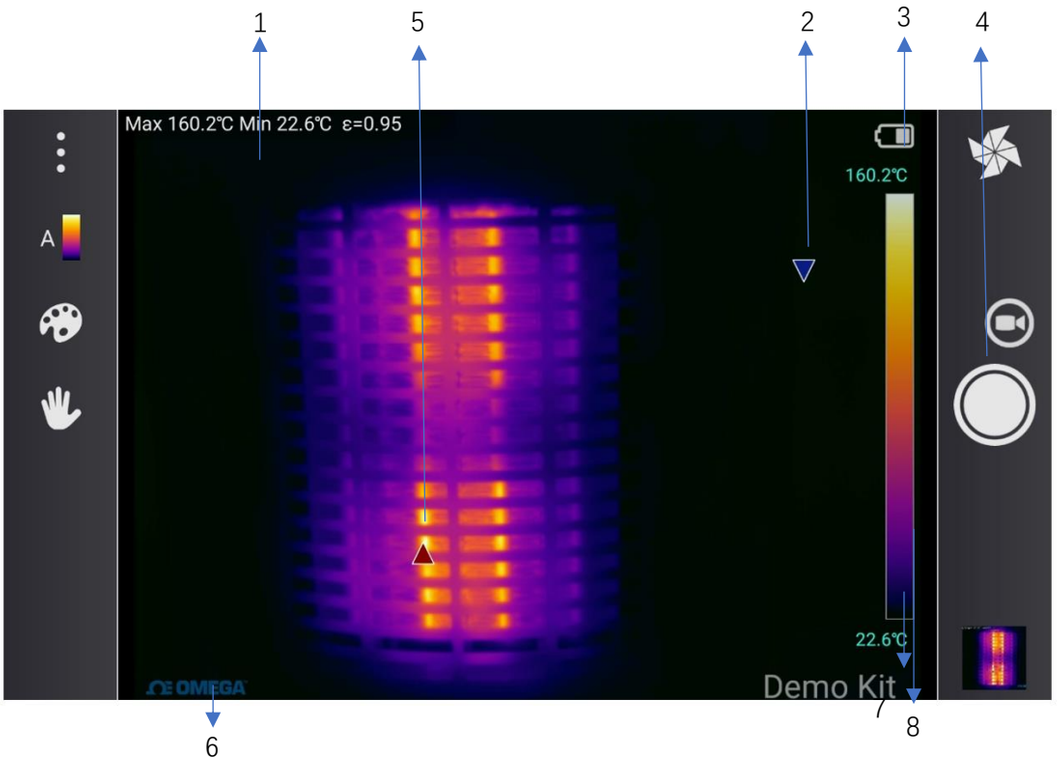
4.1 Summary of the Main Interface of Thermal Imager

4.1.1 Main Interface Information of TI Link

Turn on the thermal imager and connect to the smartphone. The following prompt will appear when you first open TI Link APP. Please check “Use by default for this USB device” and click “OK”.

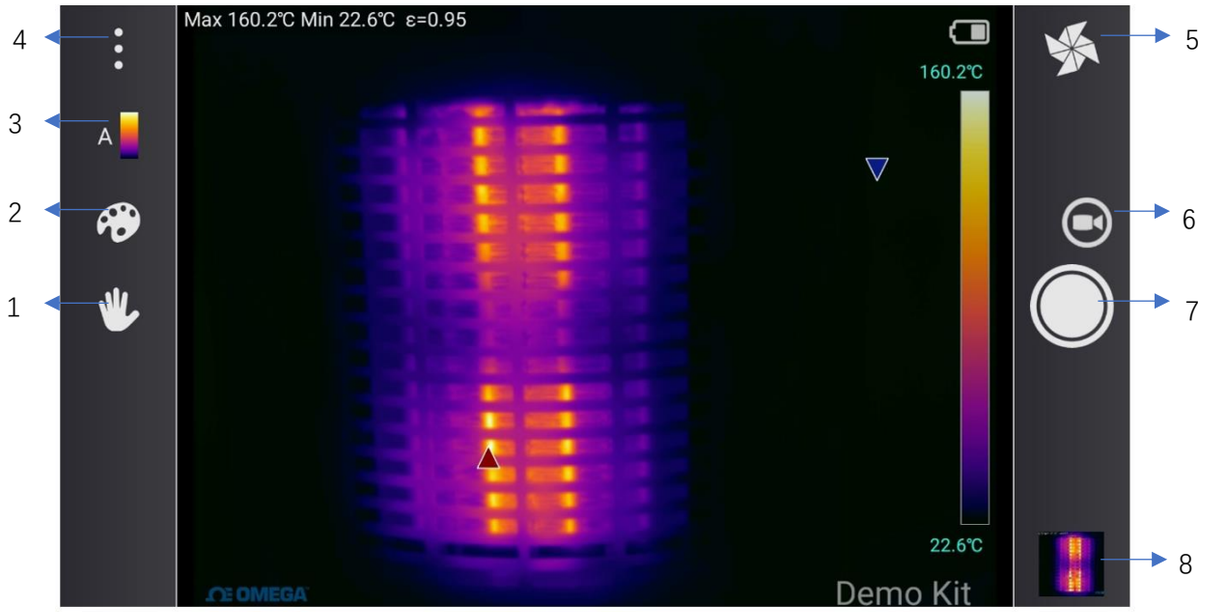


Start thermal imaging as follows:



1. Measurement area: according to the setting of the highest and lowest temperature points and emissivity of the whole picture, the highest and lowest temperature points and emissivity of the temperature measuring area or temperature measuring line are displayed, and the temperature and emissivity of the temperature measuring point are displayed
2. Blue inverted triangle icon: it represents the lowest temperature point of the whole screen, and automatically captures the location of the lowest temperature point of the area/whole picture
3. The upper limit of temperature and width: the upper limit of temperature and width of the palette ribbon can adjust the display effect of the screen
4. Electricity display: displaying the power of thermal imager
5. Red triangle icon: represents the highest temperature point of the full screen, and automatically captures the location of the highest temperature point of the region/full picture
6. LOGO
7. Lower temperature width limit: the lower temperature width limit of the palette ribbon can adjust the display effect of the screen
8. Palette ribbon: display the current palette, can intuitively display the corresponding relationship between temperature and color

4.1.2 Touch Screen Information

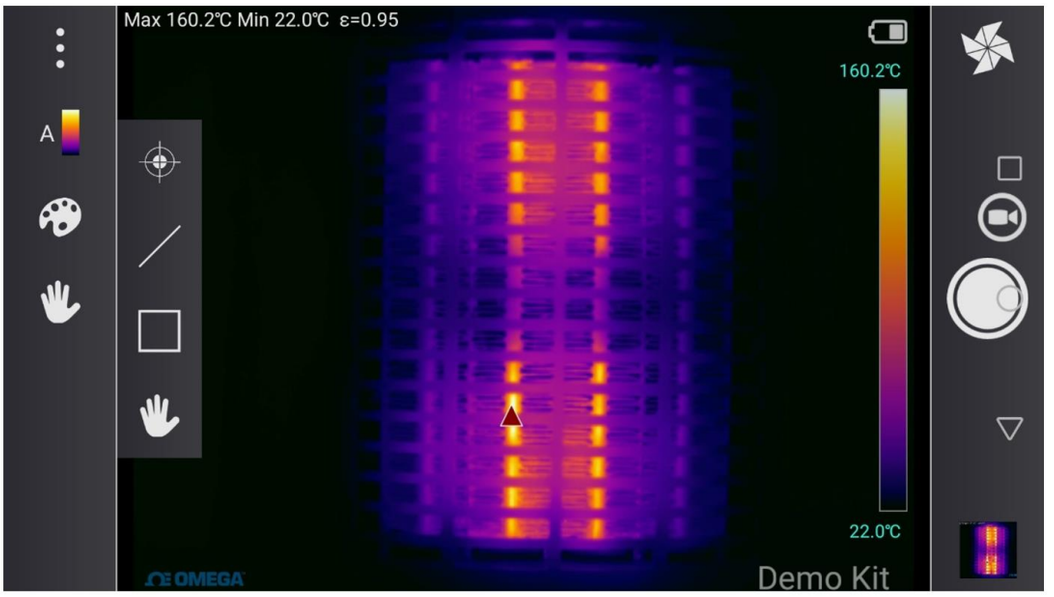


1. Measurement tool selection button (see 4.1.3 for detail)
2. Palette selection key (see 4.1.4 for detail)
3. Manual/Automatic temperature-width switching key (see 4.1.5 for detail)
4. System menu button (see 4.2 for detail)
5. Picture-in-picture/thermal picture switch button (see 4.1. 7 for detail)
6. Photo/full radiation video recording switching key (see 4.1.8 for detail)
7. Photo button (see 4.4 for detail)
8. Library button (see 4.1.10 for detail)

4.1.3 Measurement Tool Selection

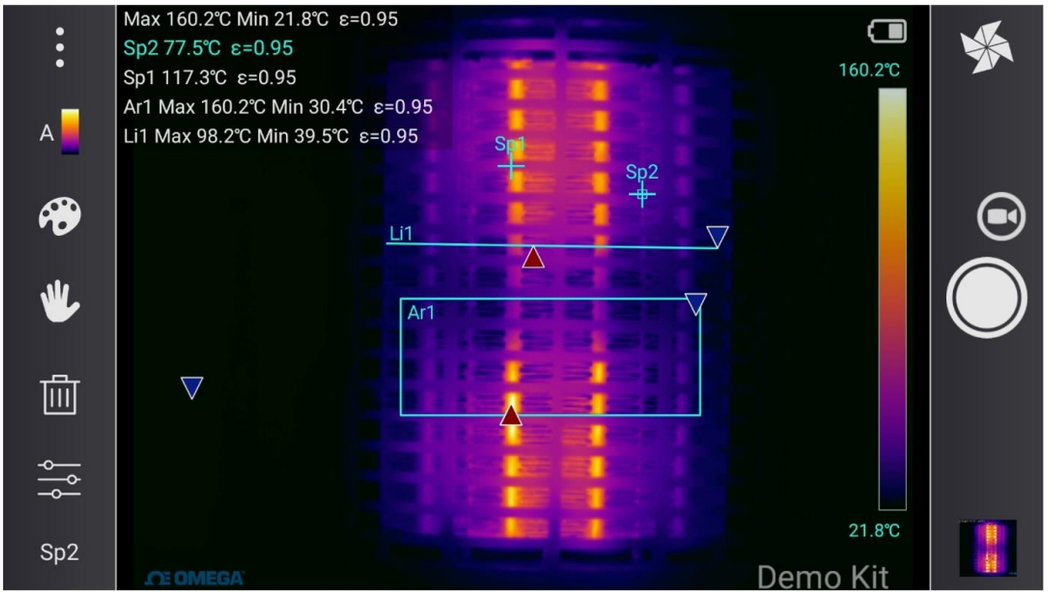
4.1.3.1 Add Measurement Tool

Selection of measuremet too, click for opetions



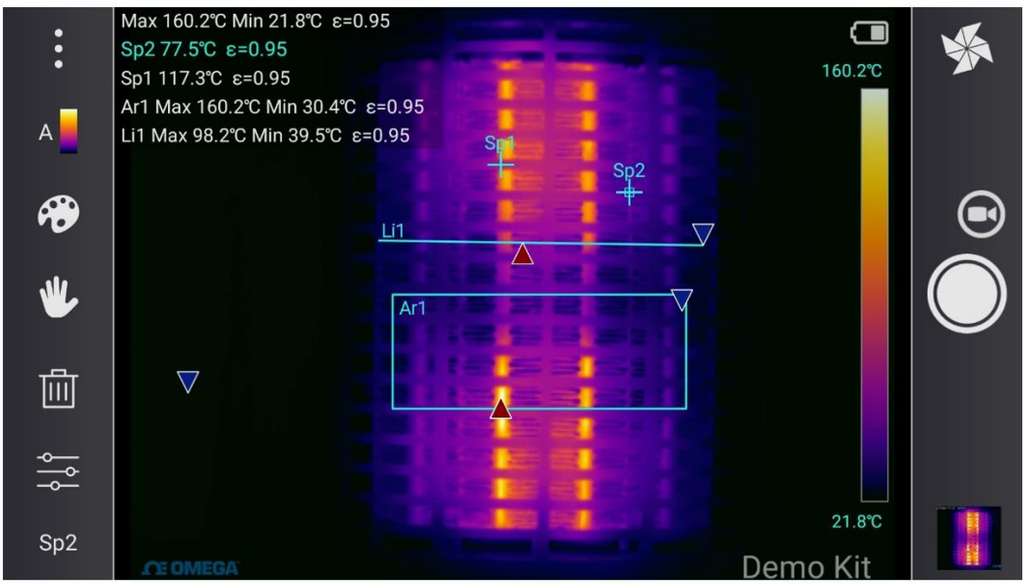
- Box measurement, click to add, move for appropriate position
- Line measurement, click to add, move for appropriate position
- Spot measurement, click to add, move for appropriate position

4.1.3.2 Movement / Zoom in(out) / Delete Measurement Tool

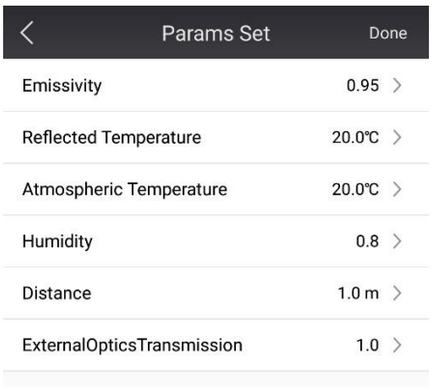


- Click on any added measurement mark to drag and drop
- Select added measurement box, drag the edge to zoom in/out of single side
- Select added measurement box, drag the corner to zoom in/out of relative edge
- Select added measurement line, drag to enlarge/narrow length
- delete, click any added measurement mark to delete

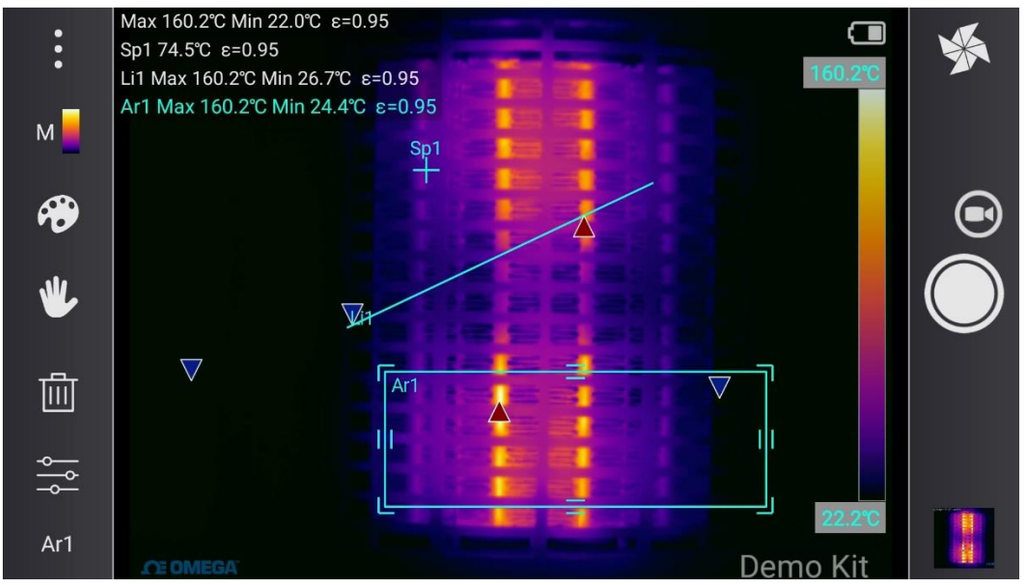
4.1.3.3 Individual Emissivity Settings – Area Emissivity



- Select added measurement mark
- Click main interface for parameter setting button , click to enter

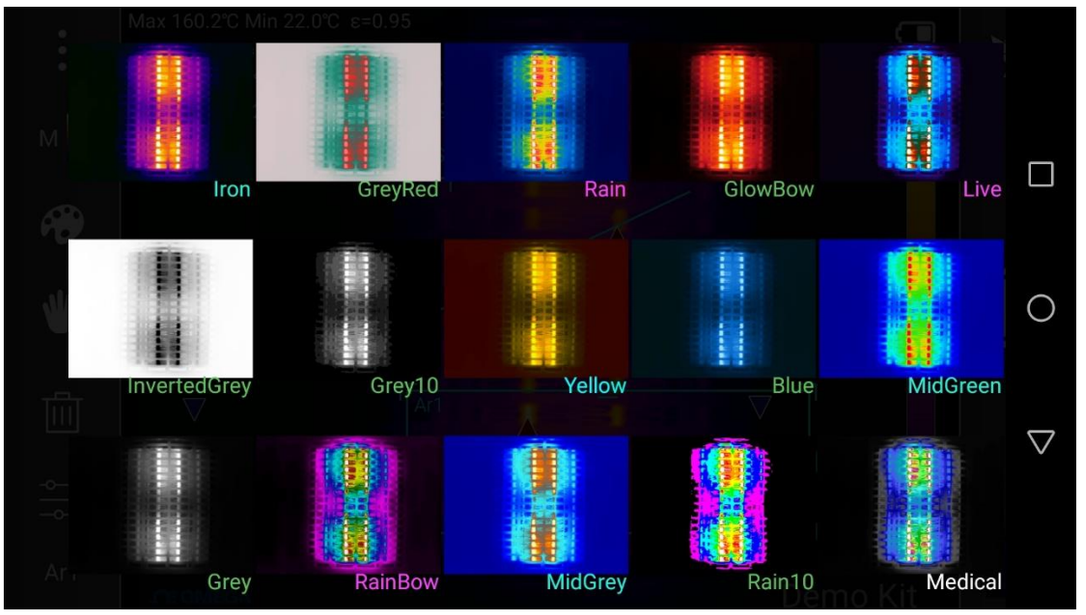


- Parameter setting interface, click-、+、scroll to adjust emissivity
- Select emissivity value for different material
- Click “set” to finish setting, the information display area will be shown accordingly



4.1.3.3 Palate Selection

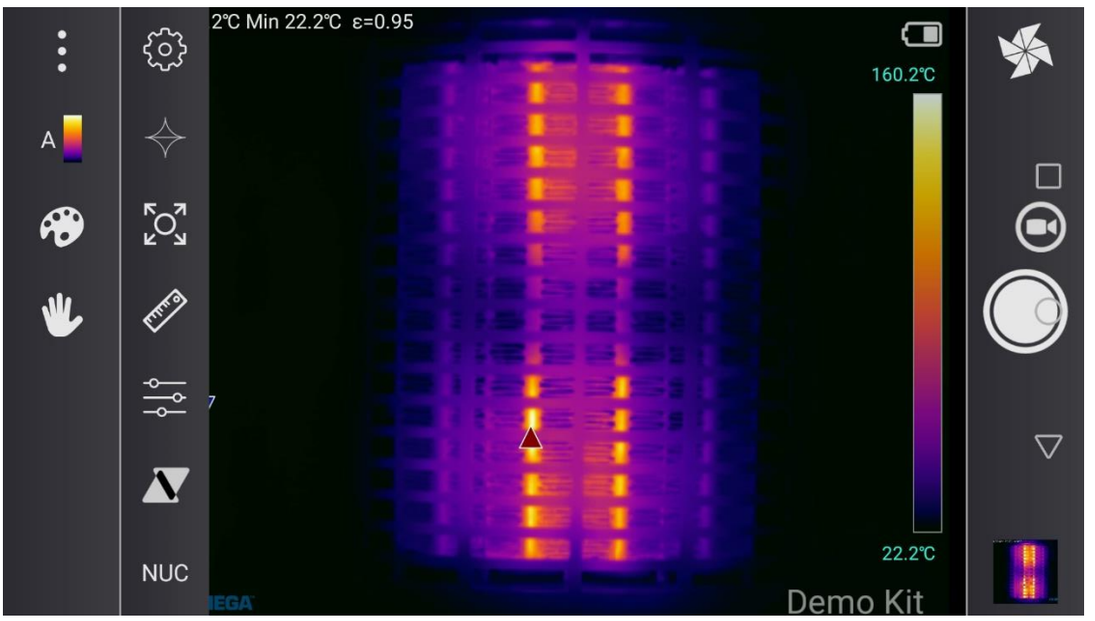
click to enter for palate preview



！ Note: Palate only changes image color, no effect on temperature accuracy

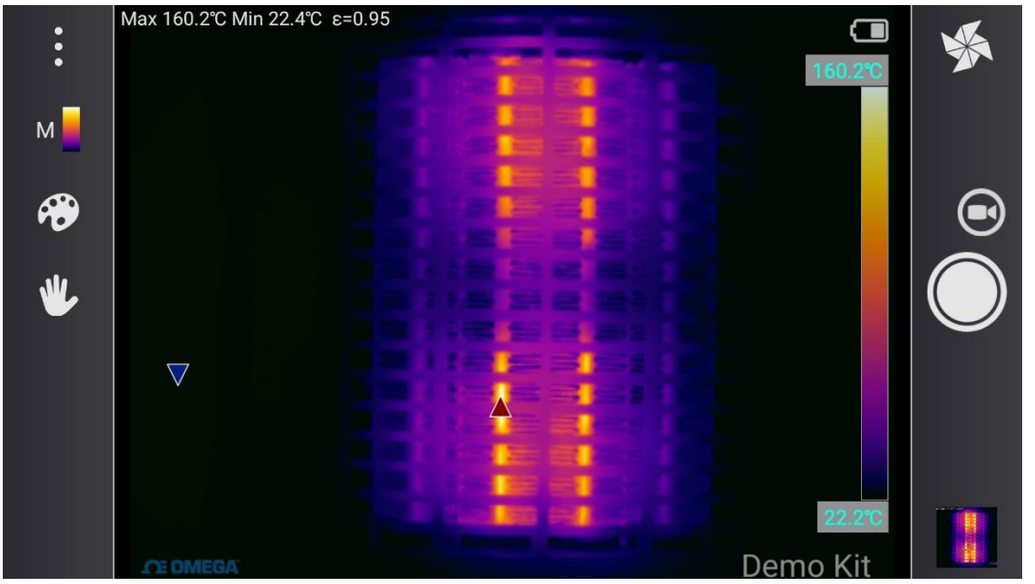
4.1.5 Manual / Auto Temperature Width Switch

Auto Temperature Width

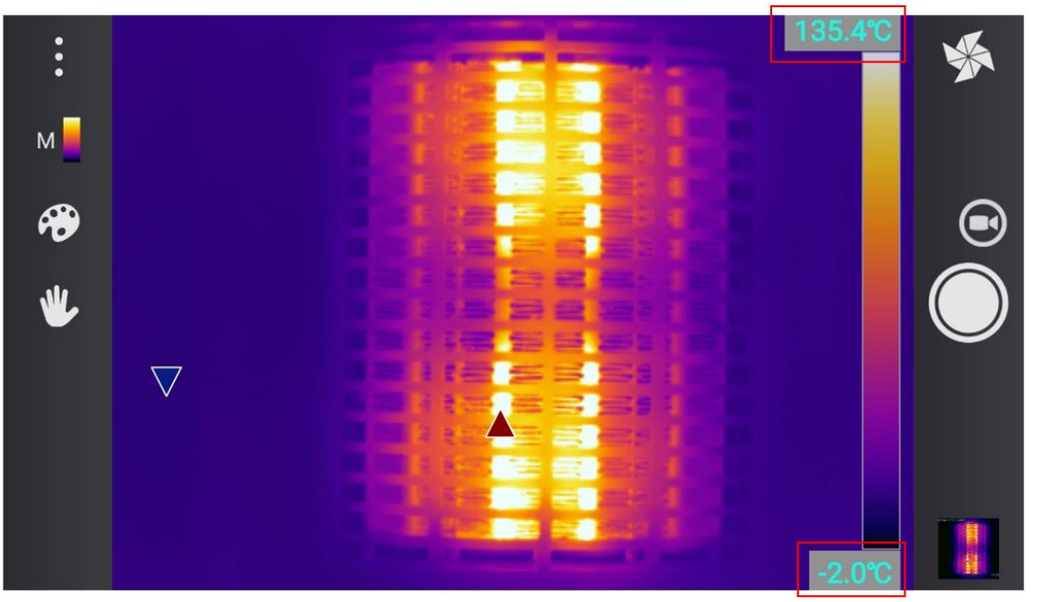


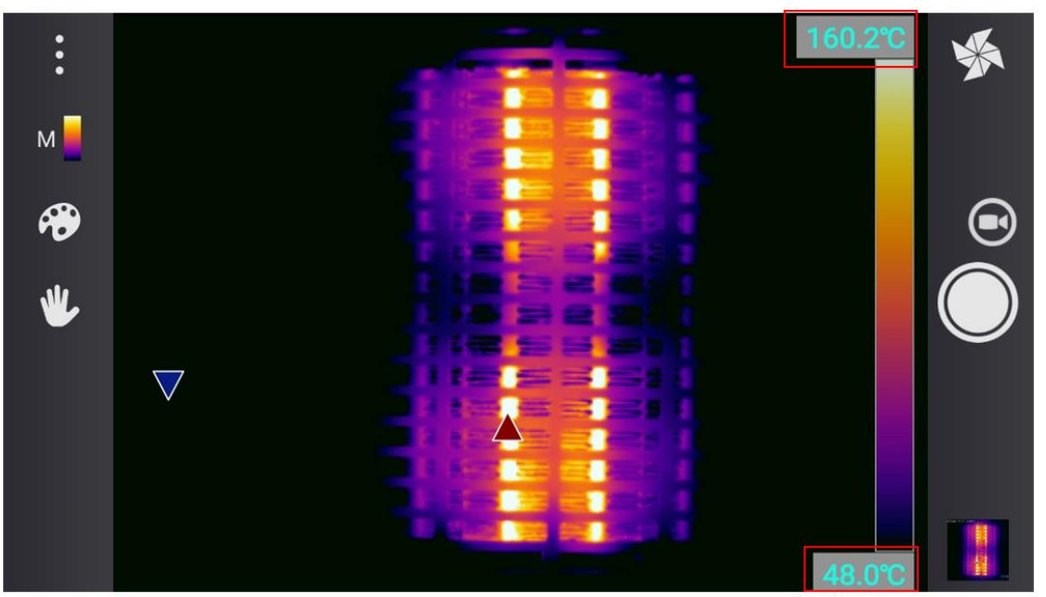
- Under Auto Temperature Width, the upper and lower limits of the temperature will be automatically adjusted

Manual Temperature Width



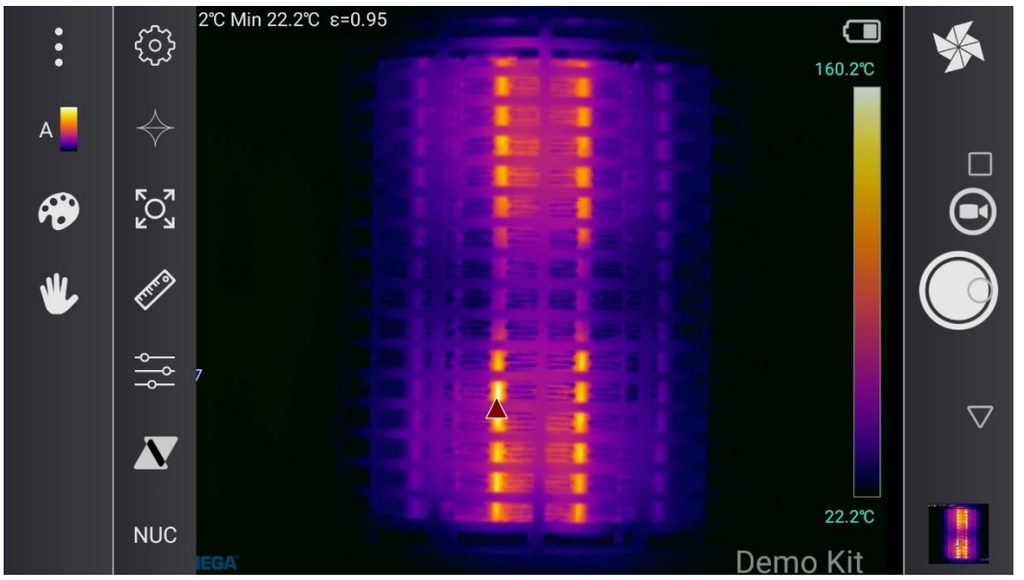
- Under Manual Auto Temperature Width, the upper/lower temperature values are in grey shades, slide the palette ribbon to adjust or click the value to lock





4.1.6 System Menu

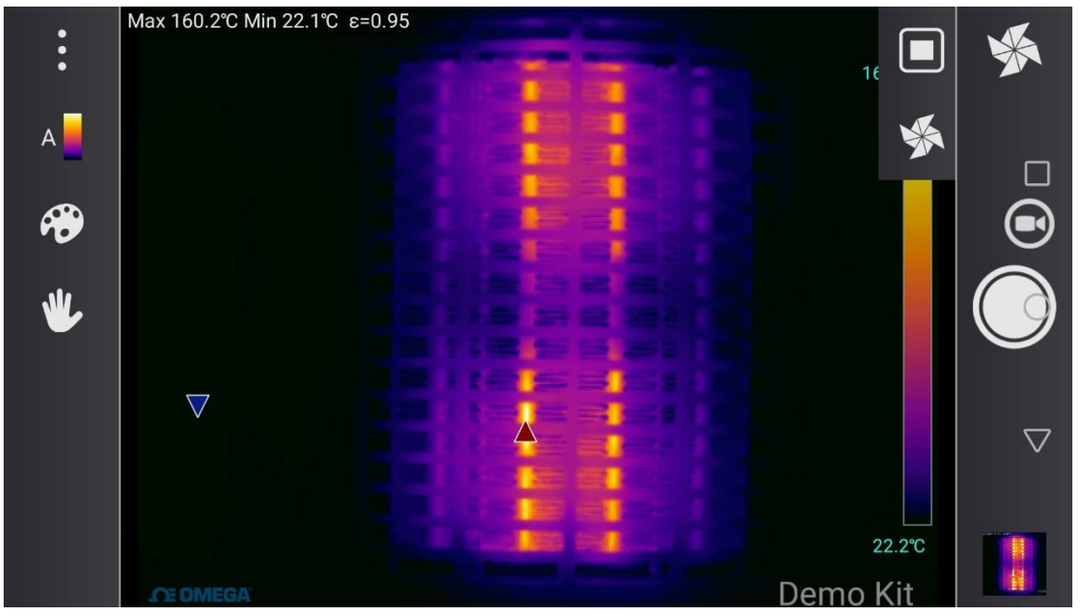
System Menu



❕ Note: for detailed instruction, please follow 4.2 for detail

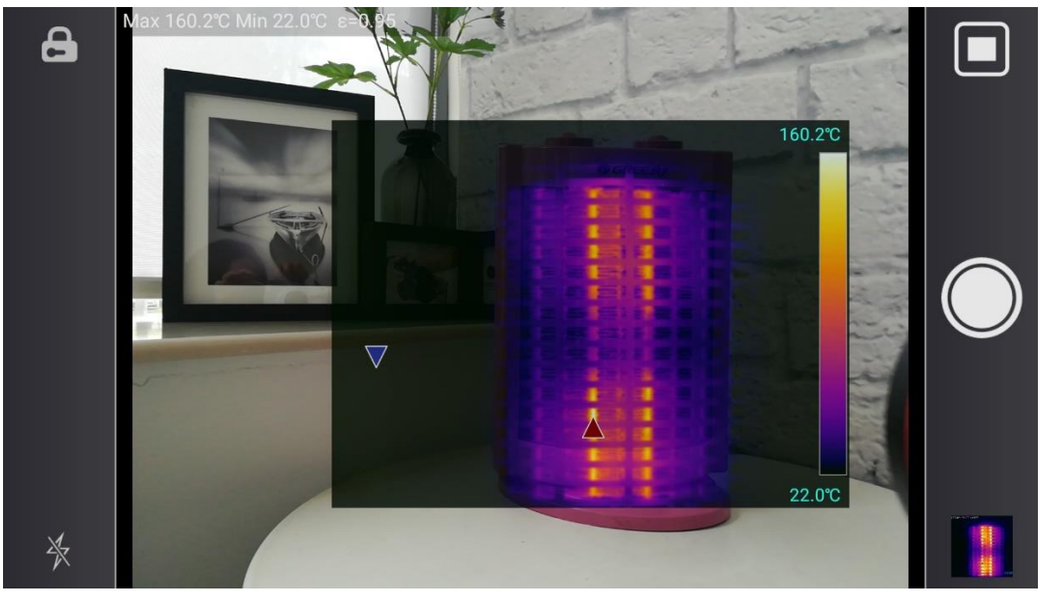
4.1.7 Picture in Picture / Infrared Thermal Image Switch

Picture in picture/ infrared thermal image switch



infrared thermal image mode

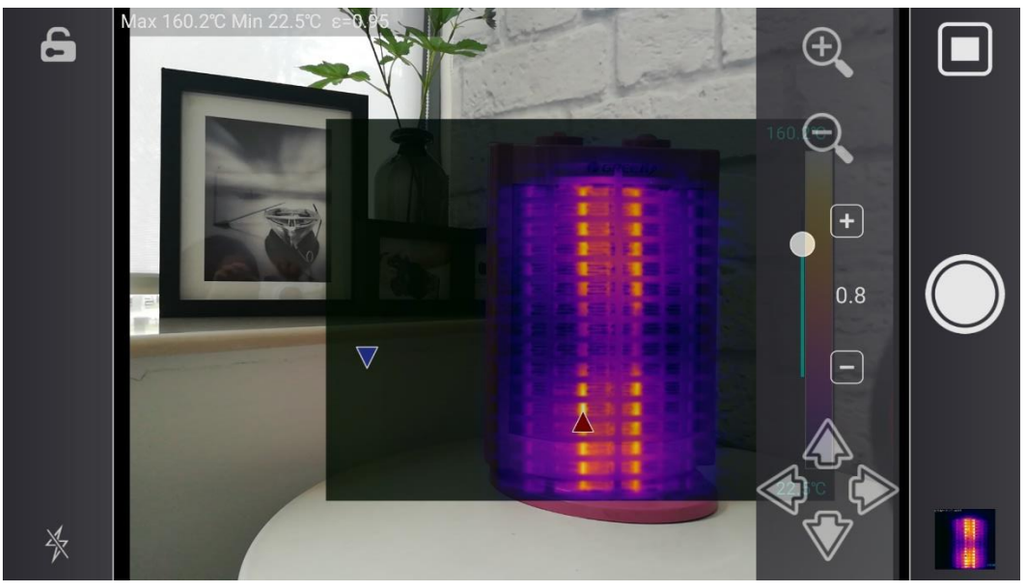
picture in picture mode



- LED fill light button
- locked; , unlocked to adjust with size, position and transparency (see 4.1.7.1 for detail)
- picture-in-picture/thermal image switch button
- photo shutting button, click to freeze (see 4.4.2 for detail)
- gallery, click to enter (see 4.1.10 for detail)

4.1.7.1 Adjust the Coincidence and Transparency

click to unlock, control menu in detail

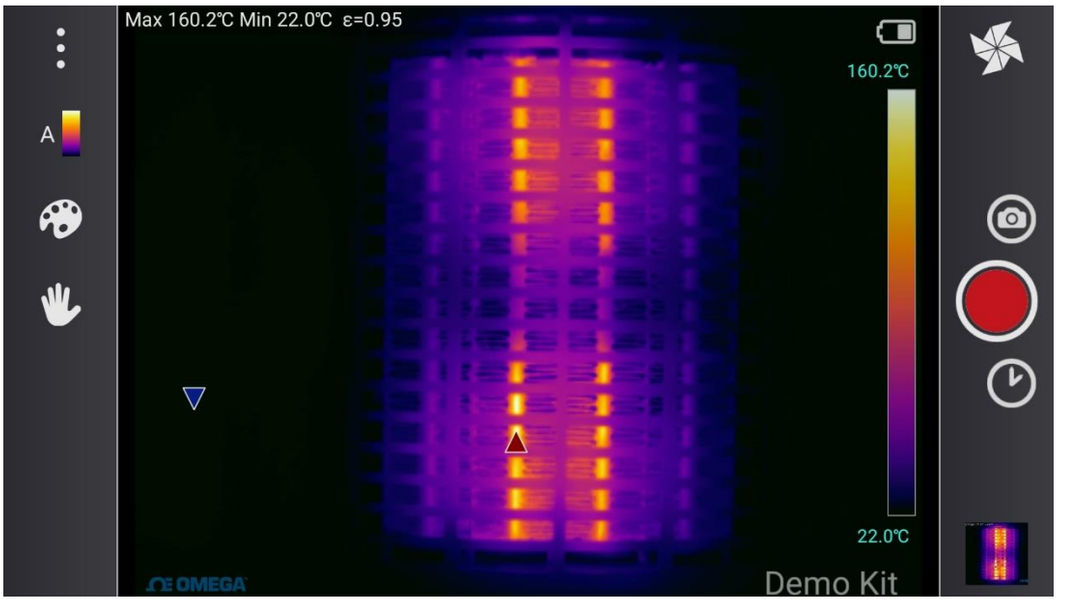


- adjust thermal image position
- adjust transparency
- zoom in thermal image zoom out thermal image

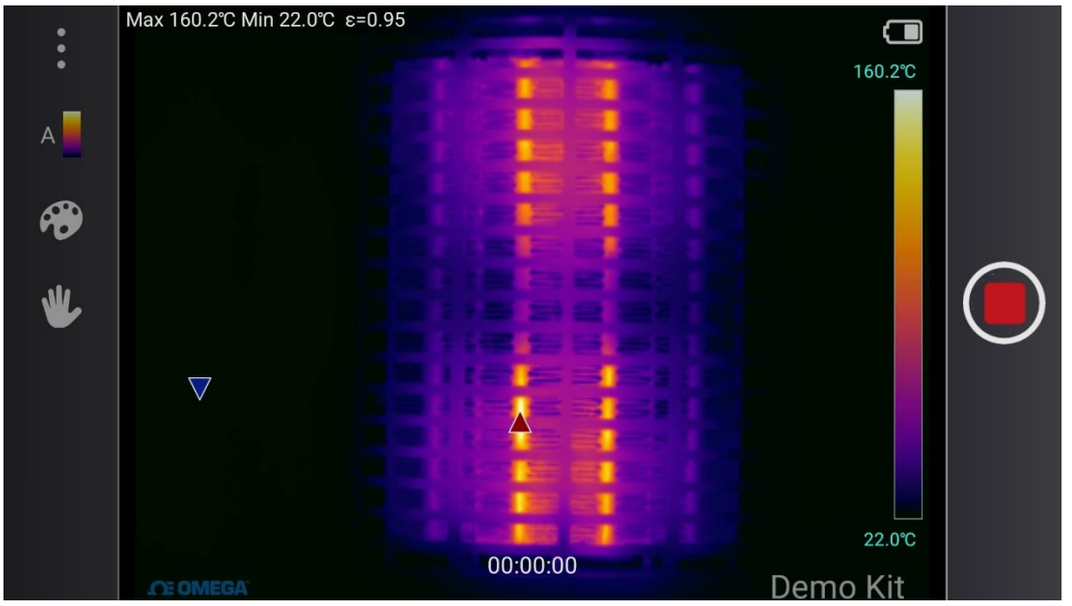
4.1.8 Thermal Image / Full Radiation Thermal Video

thermal image shooting mode

full radiation thermal video recording mode



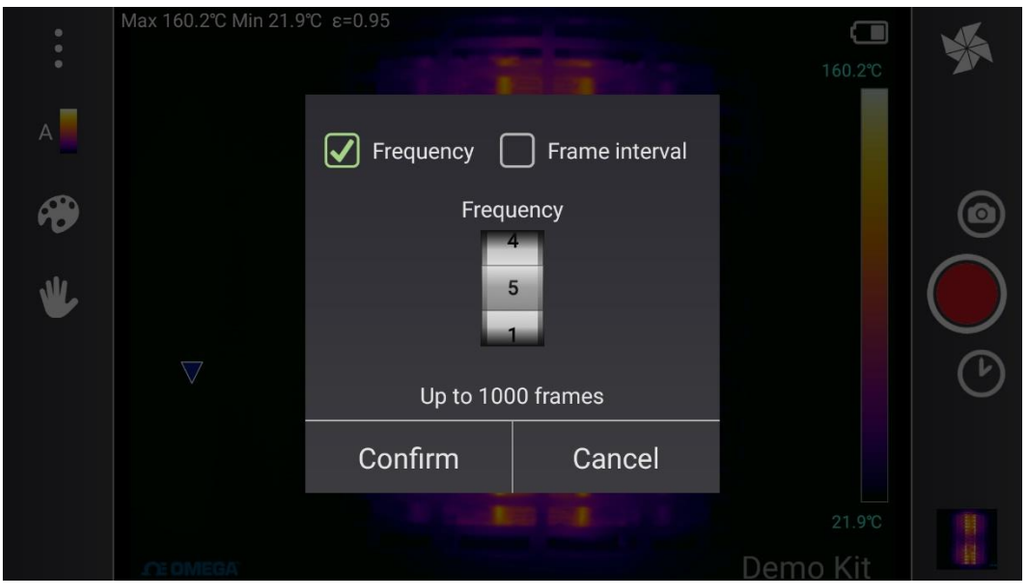
➢ start to record stop to record

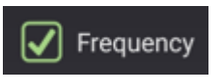


➢ when recording is in progress, click to freeze frame (see 4.4.3 for detail)

4.1.8.1 Customized Full Radiation Video Recording Frame Frequency

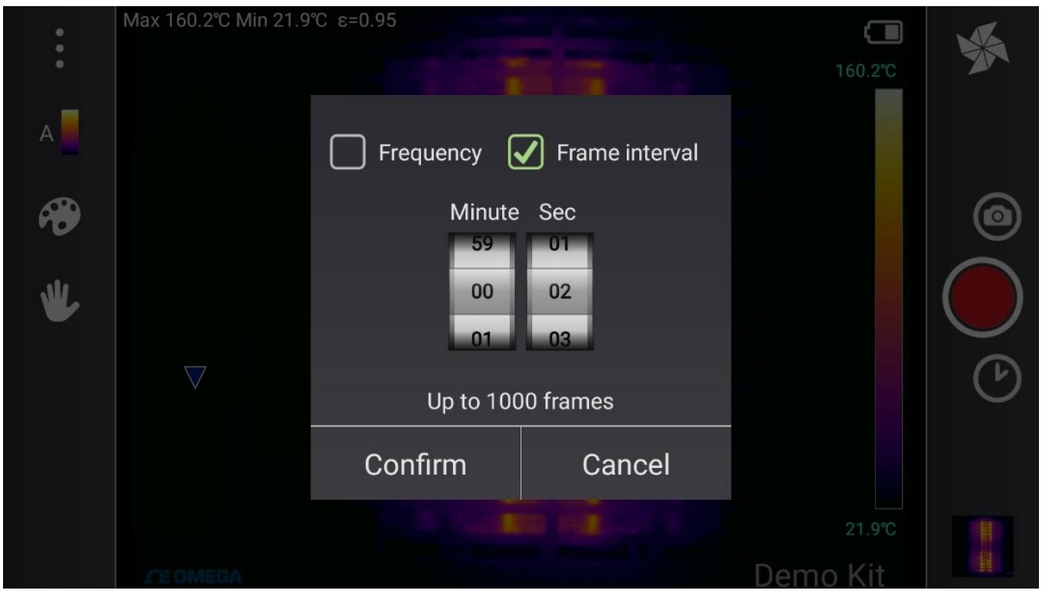
Frame frequency / interval setting button for customization

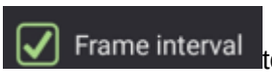


➢ Tick  to scroll for frame frequency from 1fps to 5 fps

4.1.8.2 Customized Full Radiation Video Recording Interval

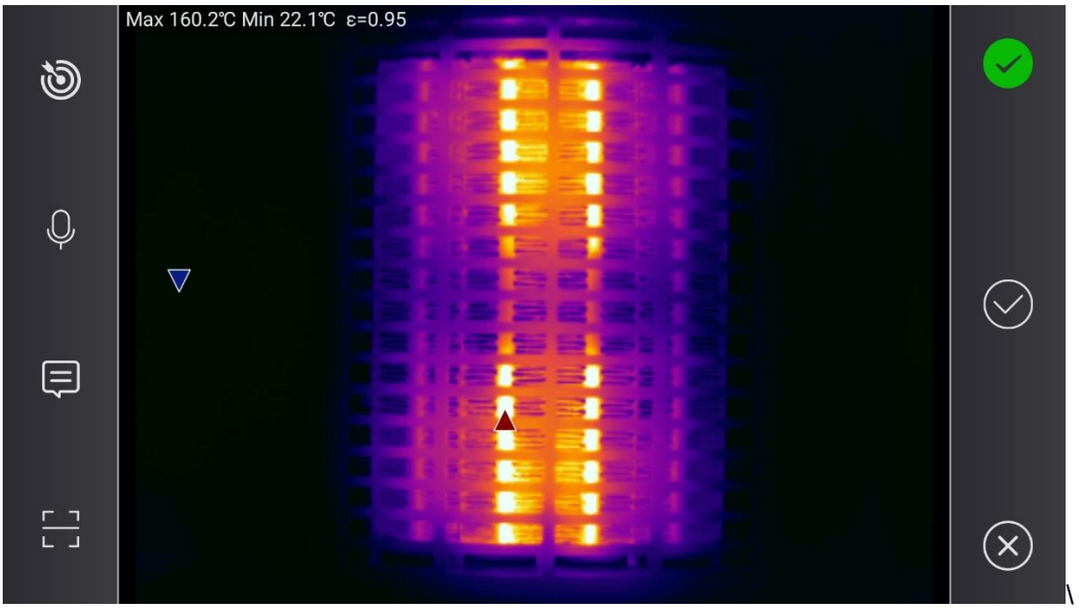
Frame frequency / interval setting button for customization



➢ Tick  to scroll for frame interval from 1 seconds to 59 minutes and 59 seconds

4.1.9 Thermal Image Shooting

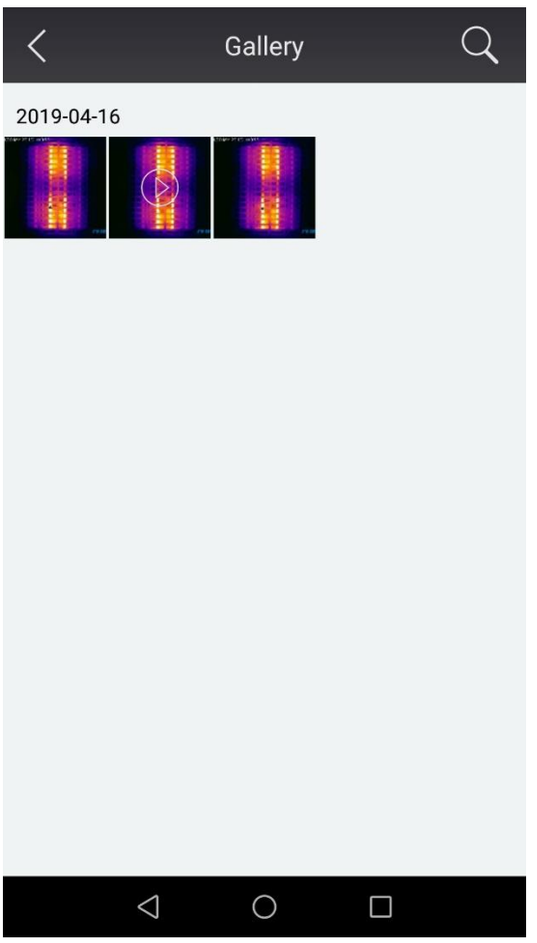
Shooting button, click to freeze frame (see 4.4 for detail)



\

4.1.10 Gallery

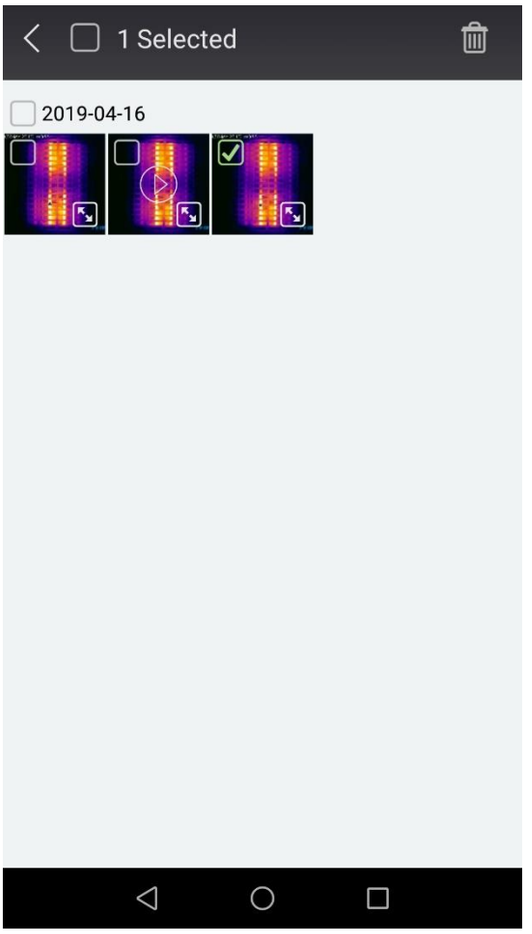
click to view

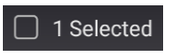
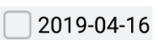


- Click selected image for preview (see 4.1.10.3 for detail)
- click to return
- image with “play” icon video
- abnormal image for faulty diagnose of the objective
- click to search gallery (see 4.1.10.2 for detail)
- refresh

4.1.10.1 Images for Multi-selection

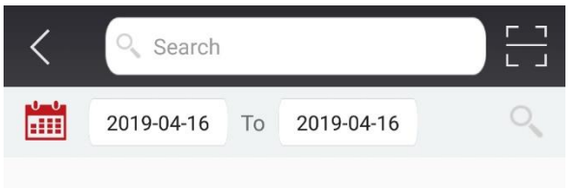
Press and hold for multi-selection mode

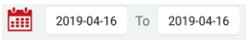


- selected images
- unselected images
- Tick  for all selected
- Tick  for date selected
- return, click to cancel multi-selection
- delete

4.1.10.2 Image Search

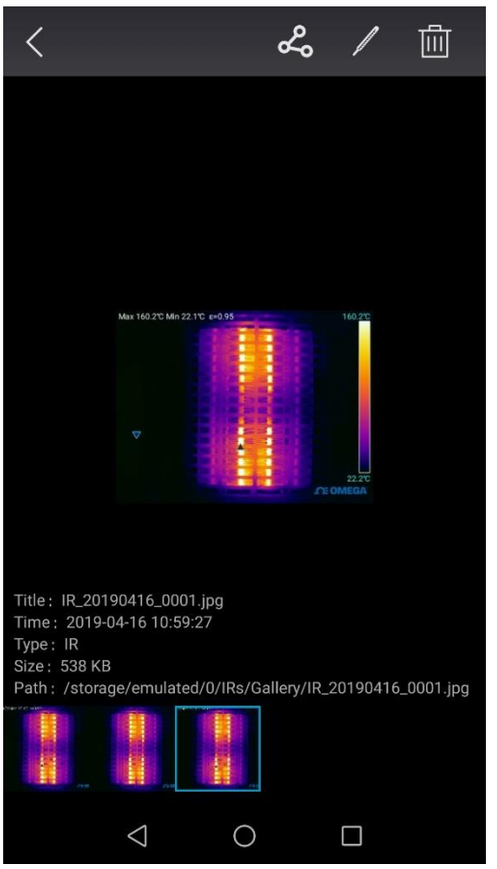
click to search images



-  select by date
- select by scan
- search

4.1.10.3 Image Preview

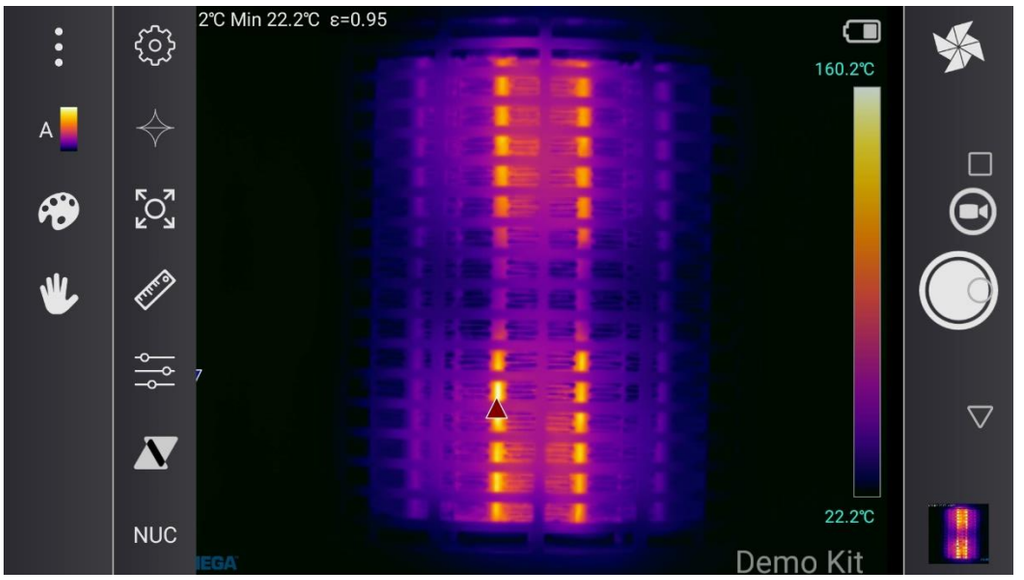
Click image from gallery to preview



- Scroll left-right for more images
- share images (see 4.1.10.4 for detail)
- on-site analyze mode, can analyze selected image (see 4.7 for detail)
- report, click to save report (see 4.8.1 for detail)
- delete

4.2 System Menu

4.2.1 System Menu Brief Introduction



1 . nonuniformity correction;

2 . to capture the highest and lowest temperature on the full screen

3 . to correct the measurement parameters

4 . for temperature measurement range selection

5 . screen digital enlargement

6 . color alarm

7 . system setting

4.2.2 Nonuniformity Correction

nonuniformity correction

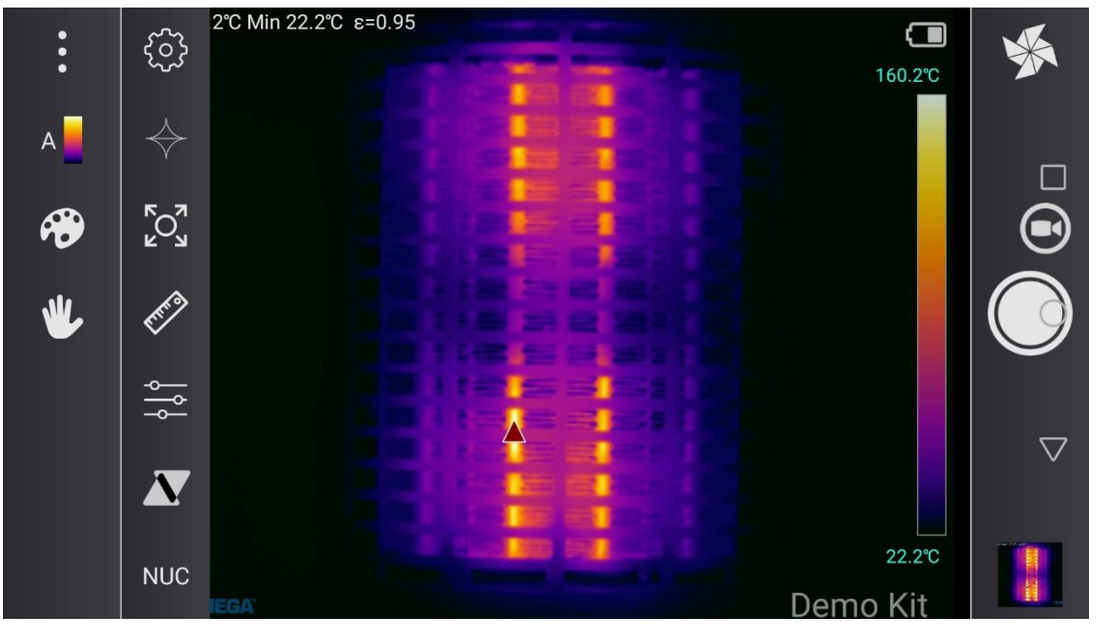
This function can eliminate the temperature drift of the thermal imager caused by environmental changes. When click this button, the thermal imager will make a sound of ‘click’ for calibration.

NUC can be executed automatically, when startup, measuring range changes, or ambient temperature changes;

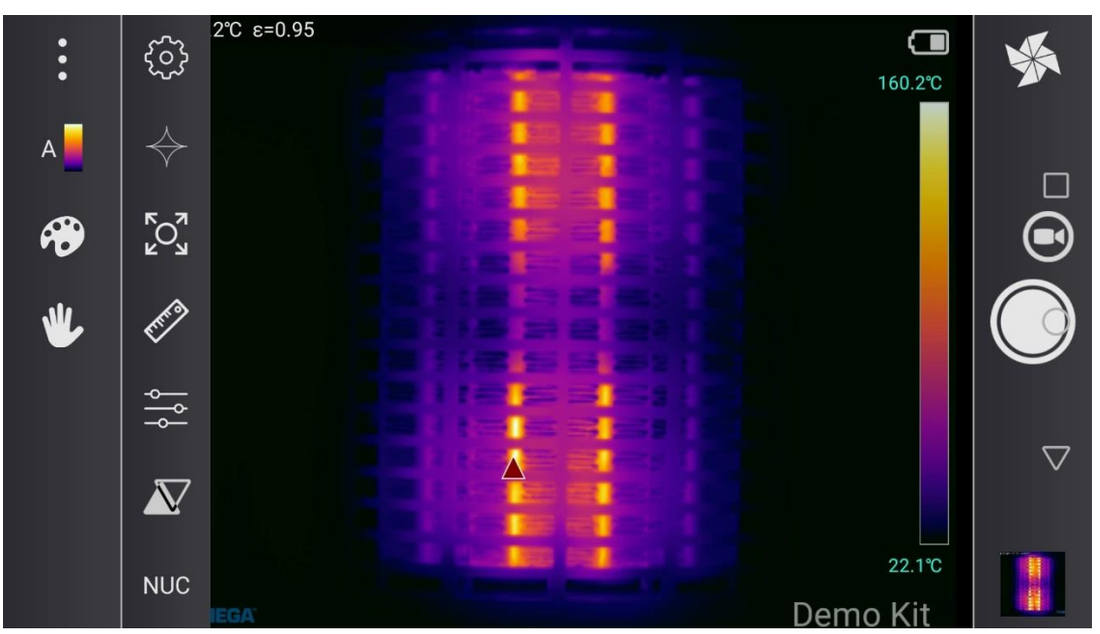
NUC can be executed manually. This is important to minimize image interference during critical measurements, for example, you may need to perform manual calibration to improve the accuracy of temperature measurements before you start recording full-radiation thermography videos

4.2.3 Full Screen Highest/Lowest Temperature Capture

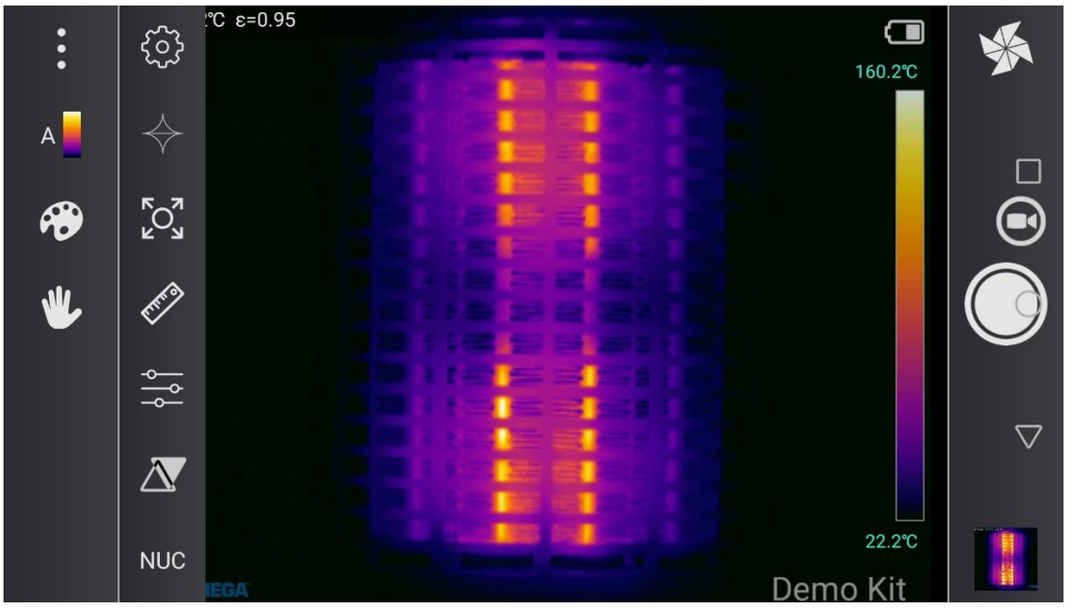
triangle icon shows the highest temperature point, inverted triangle icon shows the lowest temperature position of the full screen



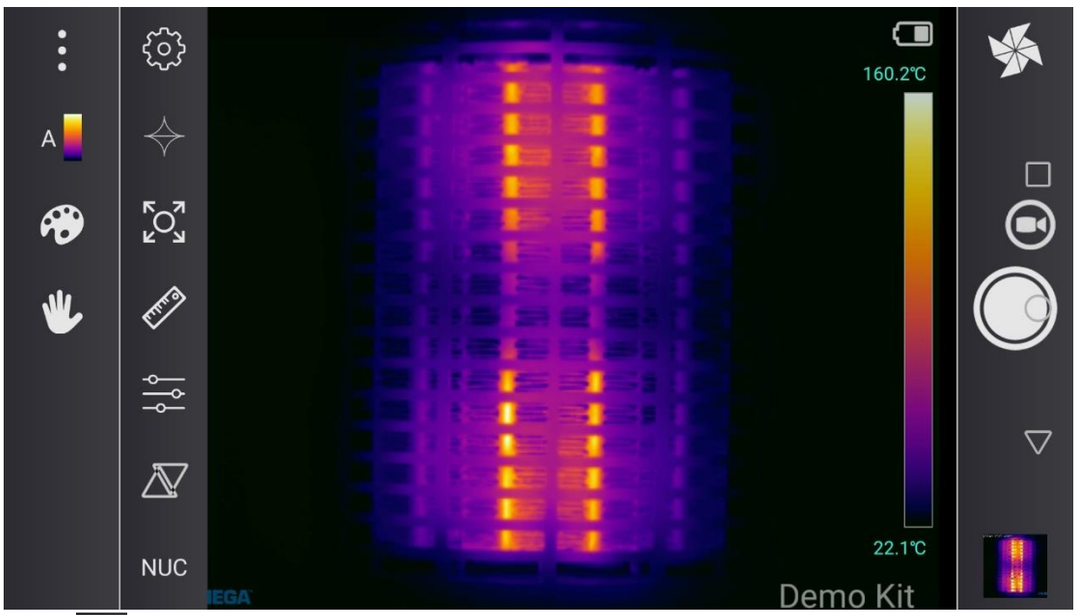
Click to , to capture highest temperature point



Click to , to capture highest temperature point



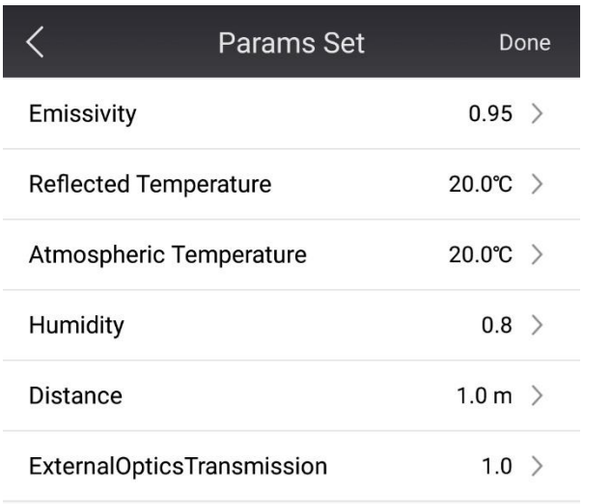
Click to , no temperature point will be captured



Click to , recover for highest/lowest temperature points capture

4.2.4 Measurement Parameter Correction

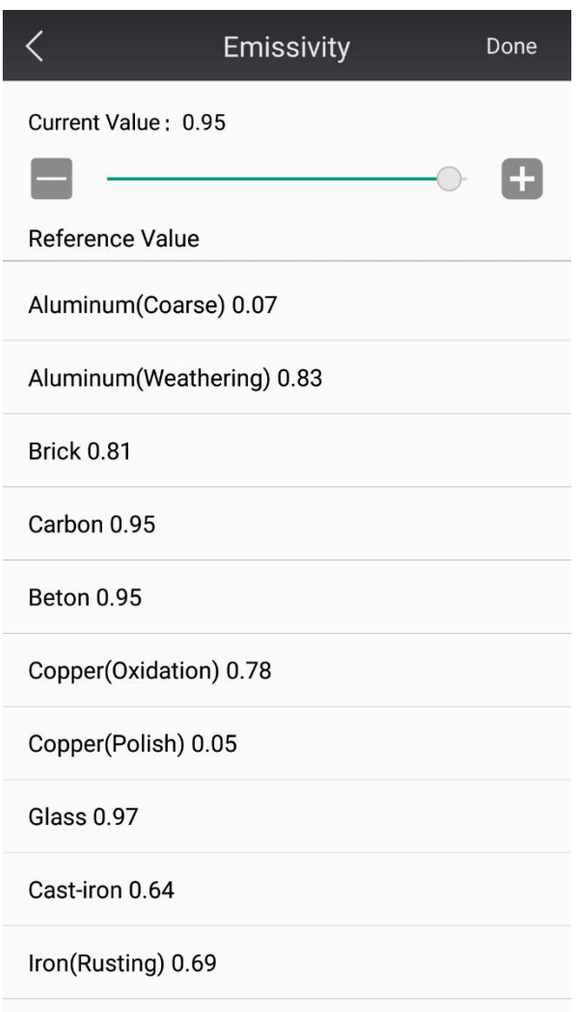
Measurement Parameter Correction



4.2.4.1 Emissivity

Emissivity is the ratio of the energy radiated by the measured object to the energy radiated by the blackbody at the same temperature and wavelength. The value is between 0 and 1.

❗ **Note:** the emissivity of materials is one of the important parameters that affect whether the thermal imagercan accurately measure the temperature of the measured object



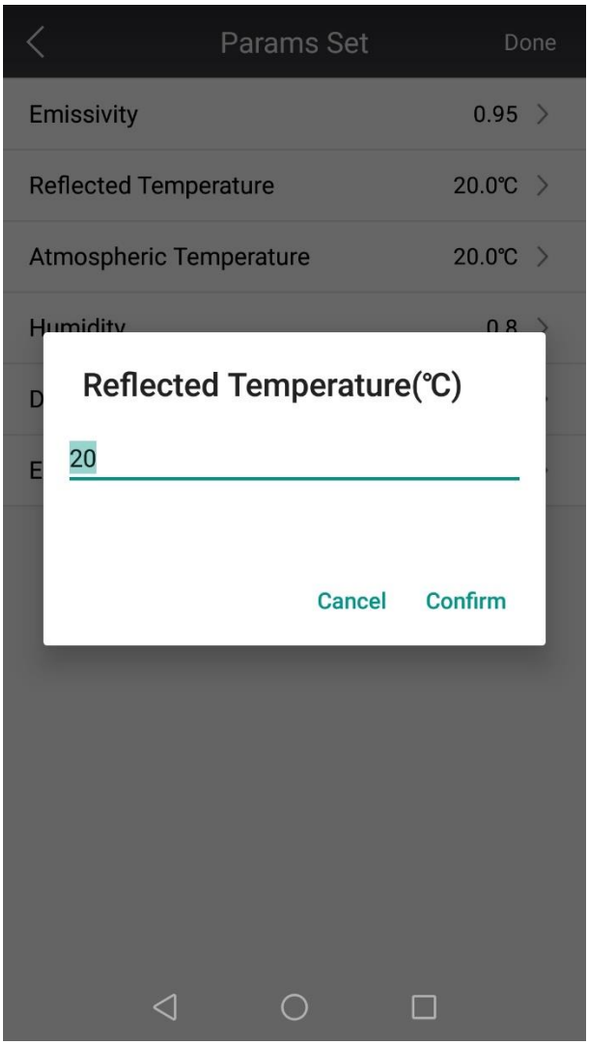
Emissivity for OMEGA TI-120 series includes full screen setting and regional setting.

1. Click on Emissivity icon
2. For customized material emissivity setting, click and and or scroll to adjust (0.01-1.0)
3. For known material, scroll menu to select emissivity value accordingly
4. For unknown material, refer to “Emissivity List” in this manual for detail
5. For unknown material and which not included in this manual, refer to 13. for instruction

❗ **Note:** Regional Emissivity Setting refer to 4.1.3.3 for detail

4.2.4.2 Reflection Tempreature

Reflection temperature is used to compensate or correct the thermal radiation reflected from the measured target
When there is an interference source near the measured target which is higher than the temperature of the measured target, it is very important to set the reflection temperature parameters correctly for accurate temperature measure

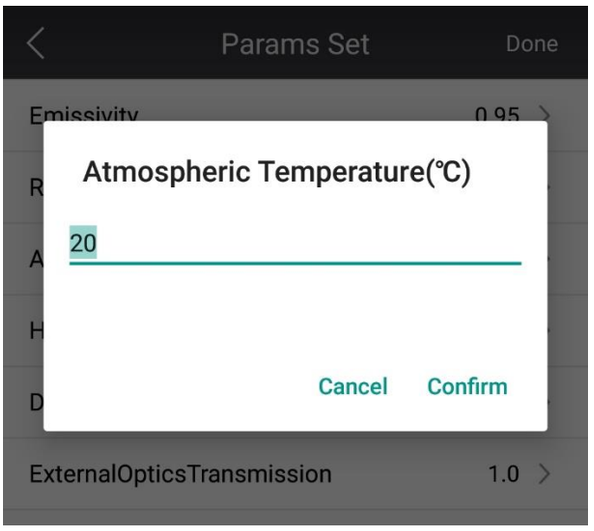


Click to enter appopriate value to save

❗ **Note:** Always avoid reflection interference if possible to improve measurement accuracy

4.2.4.3 Environmental Temperature

Environmental temperature refers to the atmospheric temperature

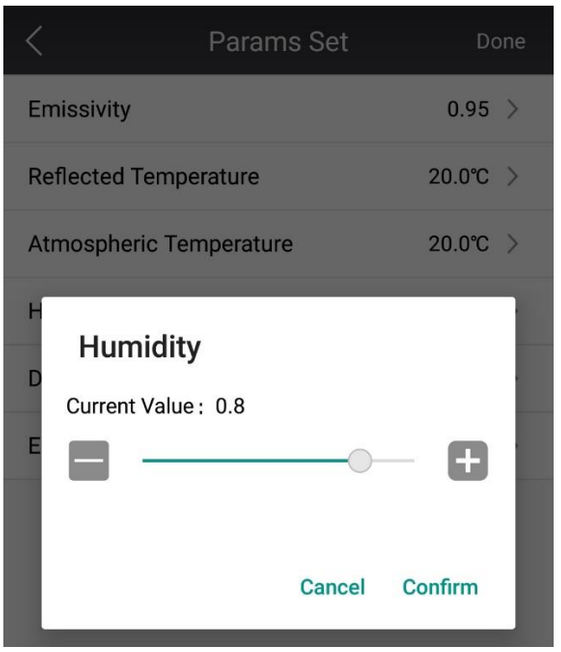


Click to enter appopriate value to save

！Note： The environmental temperature value is usally default , set only when the value is higher than the actual ambient temperature

4.2.4.4 Relative Humidity

Thermal imager can properly compensate the measurement error caused by humidity, setting relative humidity correctly is important

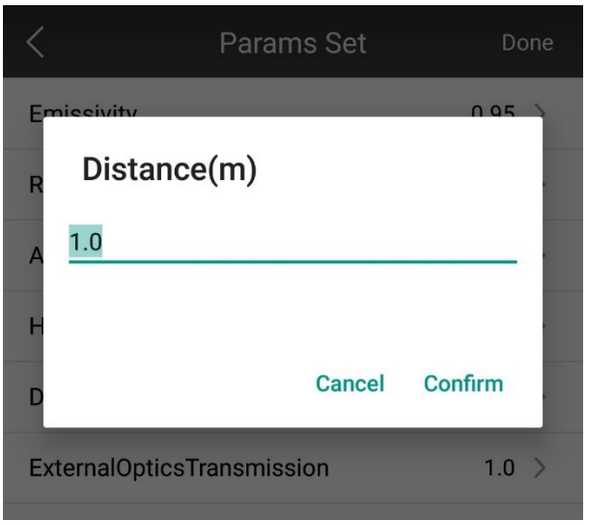


Click and or scrool to adjust (0.1—1.0)

！Note： for short distance and normal humidity, the relative humidity value is usually set as default

4.2.4.5 Measurement Distance

Measuring distance refers to the distance between the target being measured and the lens of the thermal imager. This parameter is mainly used to compensate for the thermal radiation absorbed by the atmosphere between the target and the lens of the thermal imager.

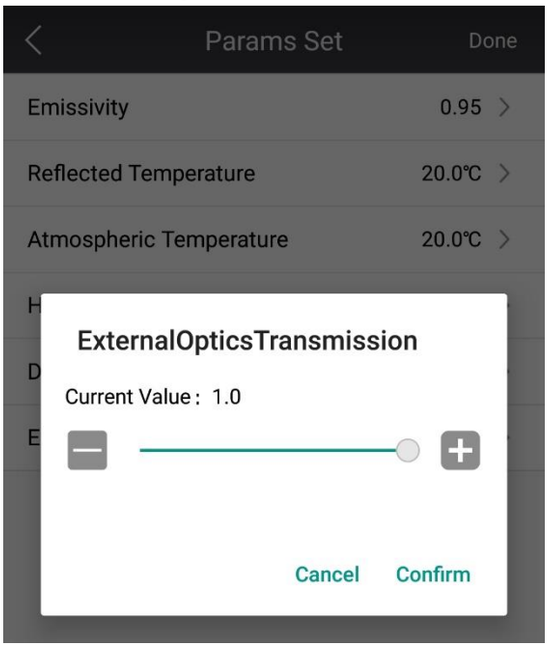


Click to enter appopriate distance value to save

！Note： for short distance and less than the furthest accurate measurement distance, the relative distance value is usually set as default

4.2.4.6 Outer Optical Transmittance

1. External optical transmittance refers to the transmittance of any external lens or infrared window used in front of the lens of a thermal imager.



Click and or scrool to adjust (0.1—1.0)

！Note： If the selected external optical lens has been calibrated at the factory, or there is no external infrared window, the external optical transmittance is usually set as default

4.2.4.7 Recommended Measurement Parameters

If you are not sure which values to use for measuring parameters, the following values are recommended:

Emissivity: 0.90

Reflection Temperature: 20℃

Environmental Temperature: 20℃

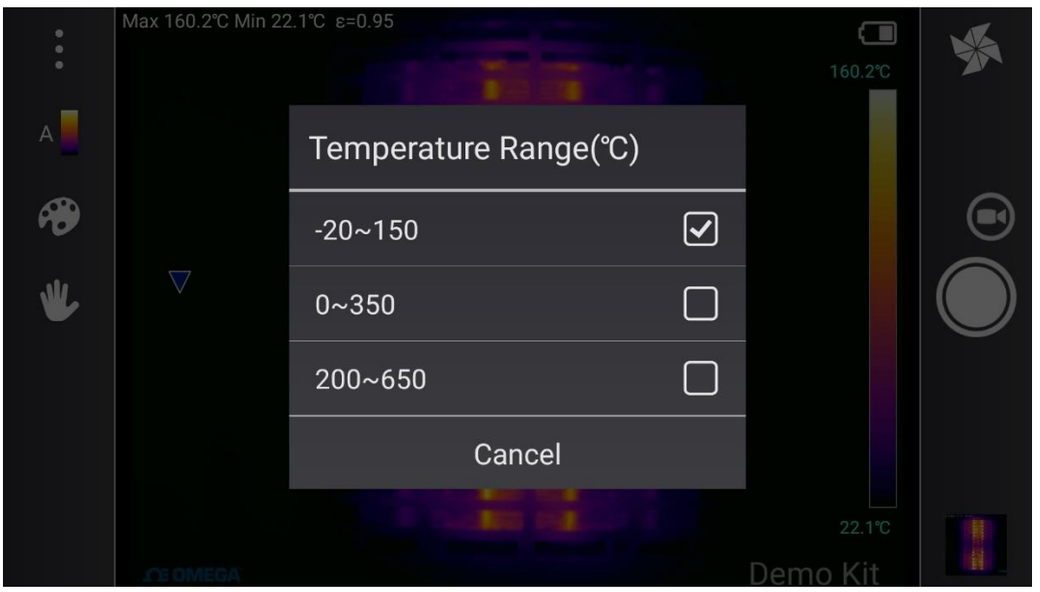
Relative Humidity: 50%

Measuring Distance: 1.0m

External Optical Transmittance: 1.0

4.2.5 Temperature Measurement Range Selection

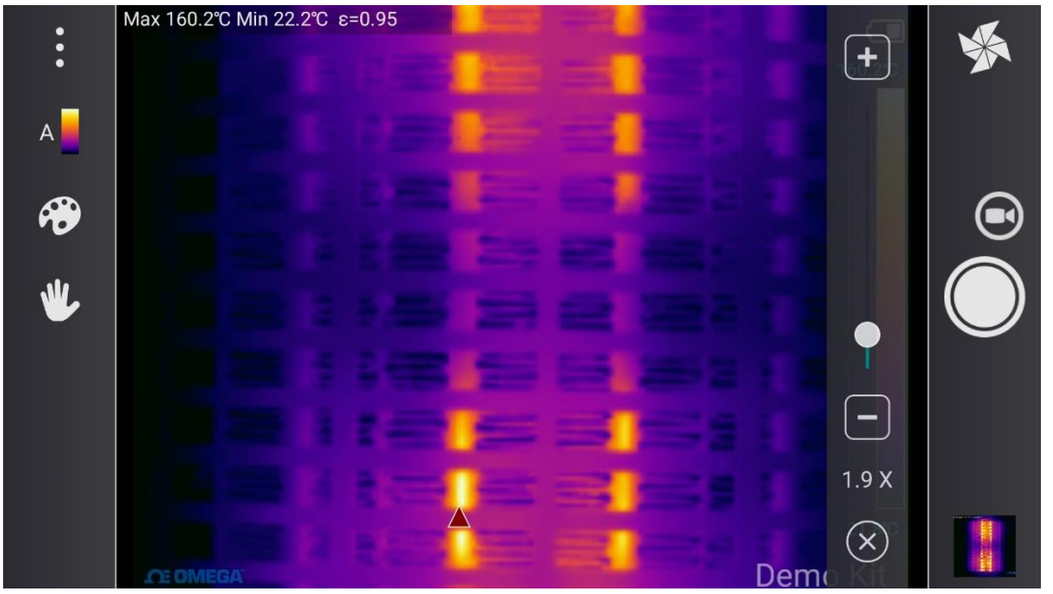
Click to select the temperature range to enter sub-menu.



! Note: The most appropriate measurement range is the closest to the object temperature, which result a more accurate measurement and better image quality.

4.2.6 Display Image Enlargement

Click for display image enlargement menu

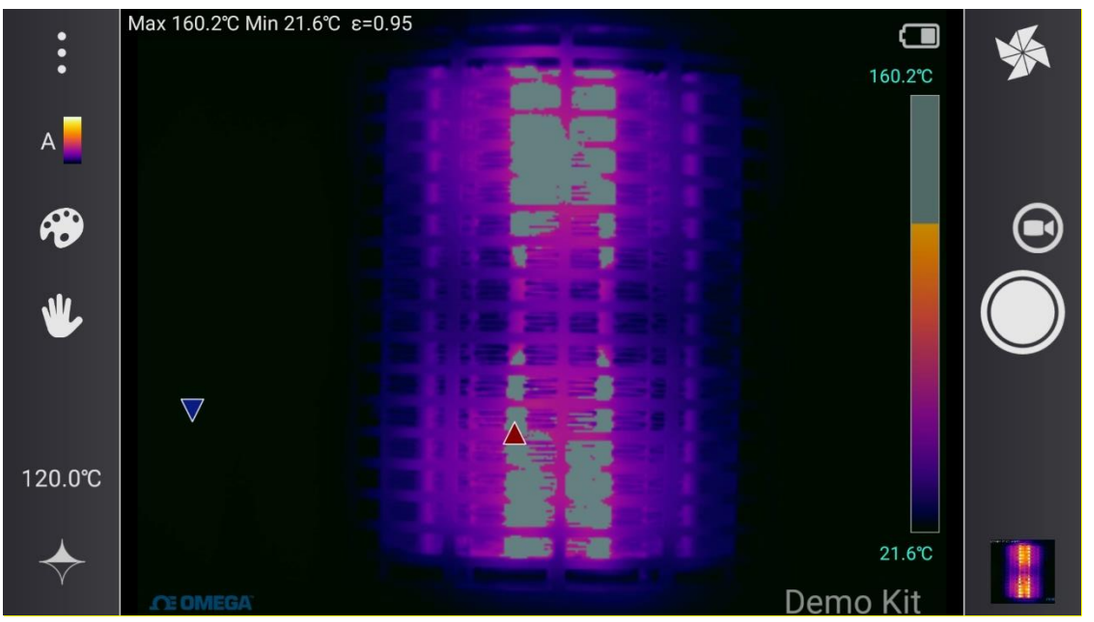


- Zoom In
- Zoom Out
- Drag for quick zoom
- Close digital zoom function

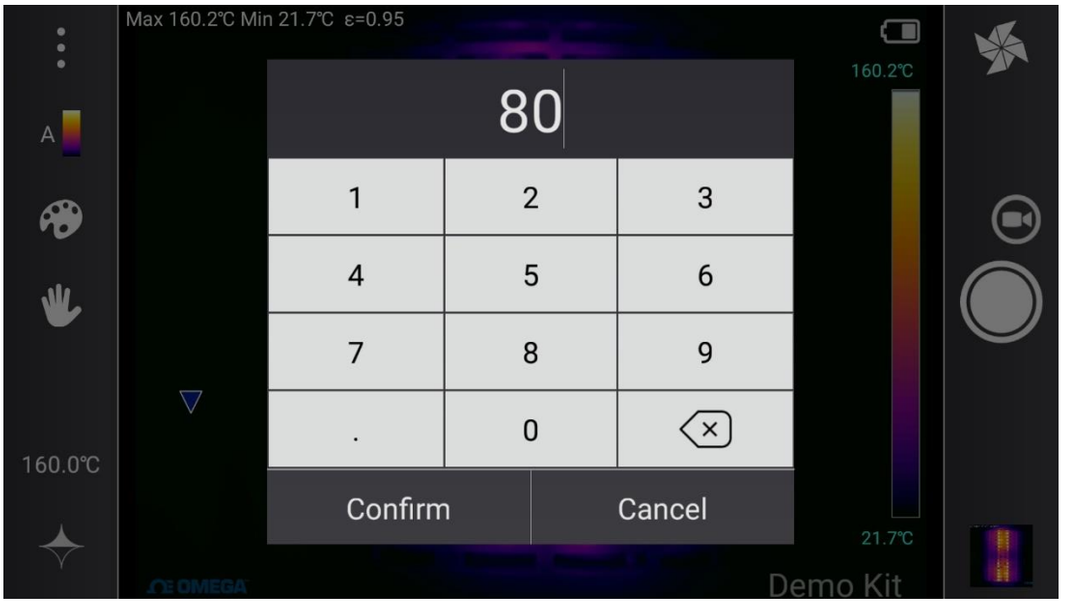
4.2.7 Color Alarm (Isotherm)

can set high/low temperature alarm

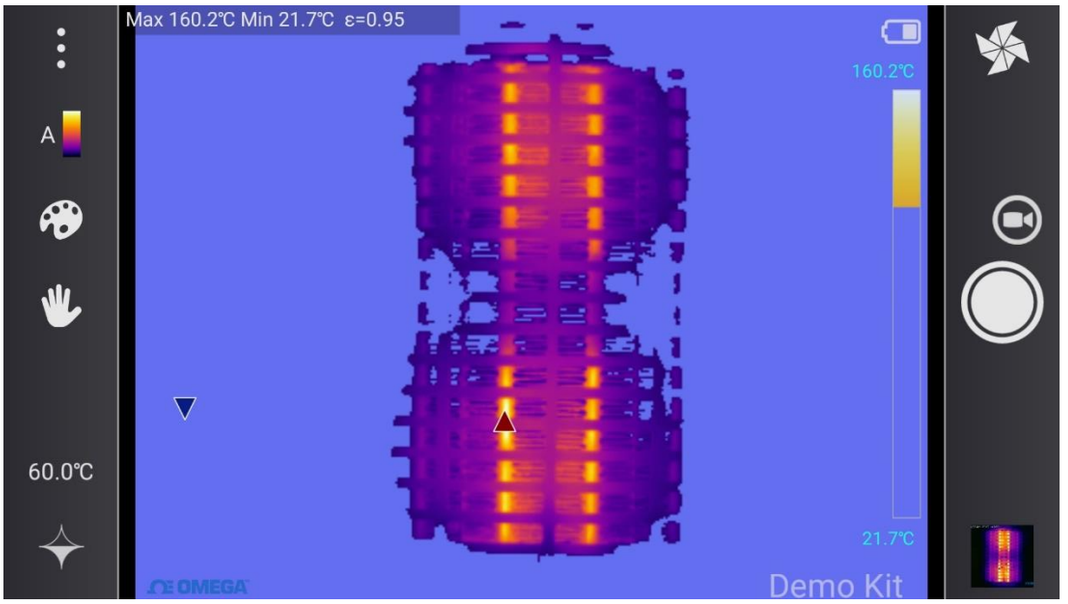
1. Click color alarm button to enter
2. Continuous click for high/low/close isotherm mode
3. high temperature color alarm mode turns on



Click to adjust alarm temperature, color shown grey as default when the value is above set temperature



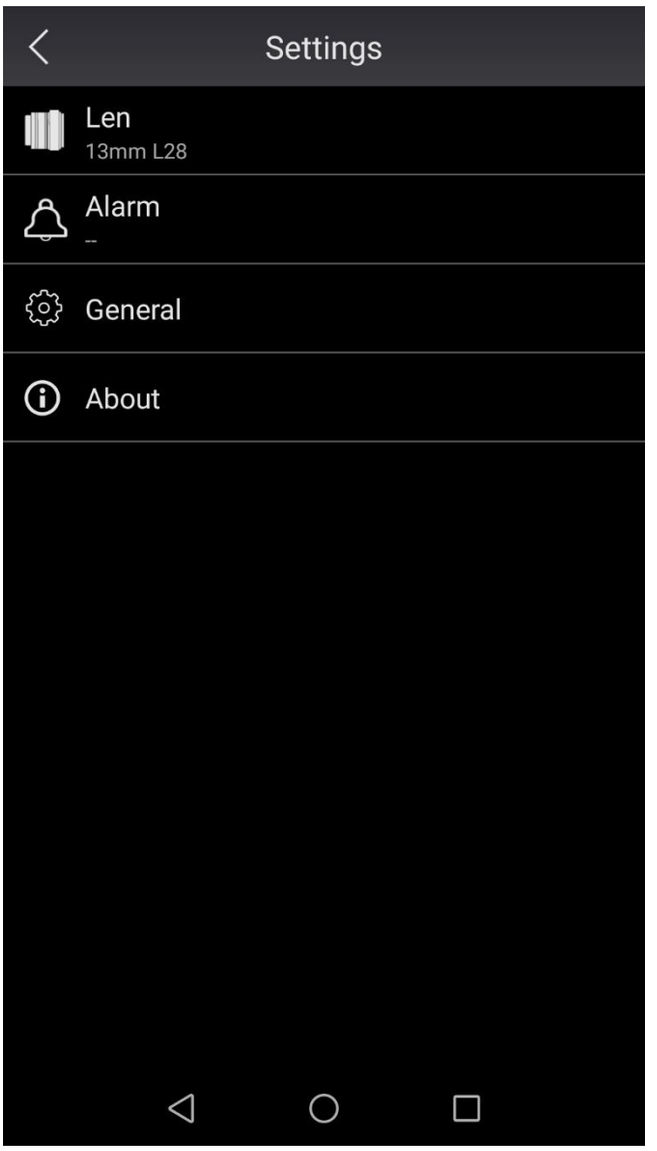
4. low temperature color alarm mode turns on



Click to adjust alarm temperature, color shown blue as default when the value is lower set temperature

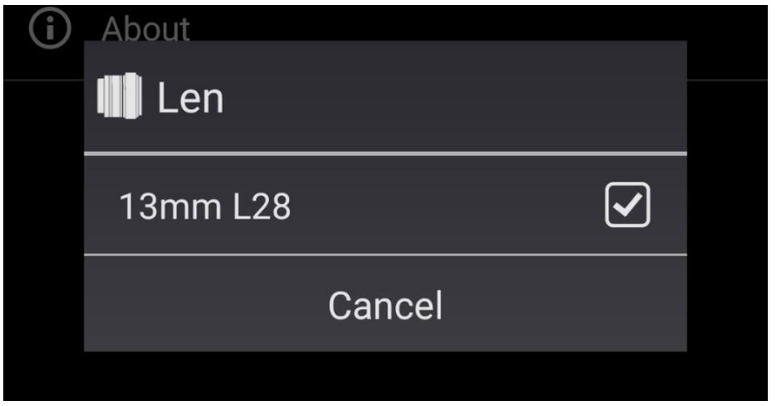
5. close color alarm mode

4.3 System Setting

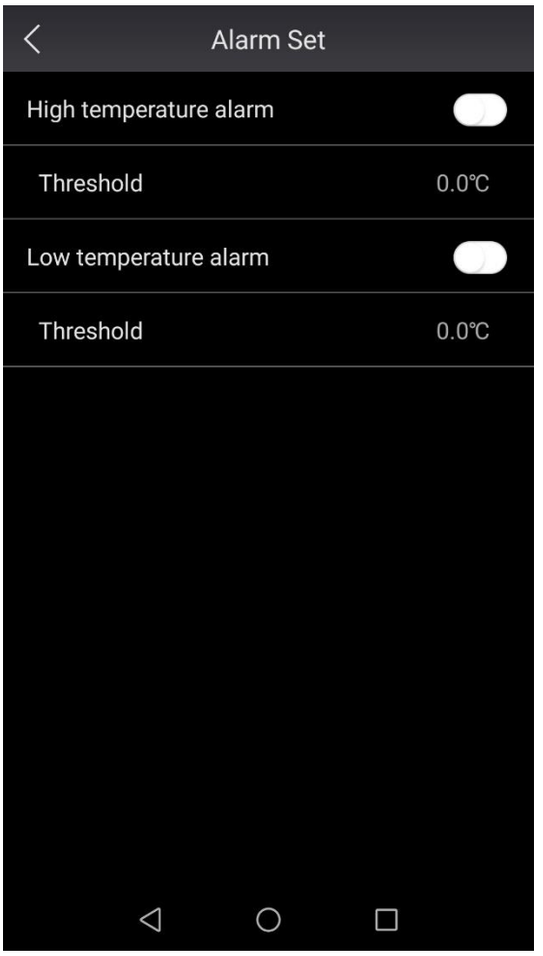


4.3.1 Lens Choice

For more lens choice, click to adjust for accurate measurement and appropriate temperature range



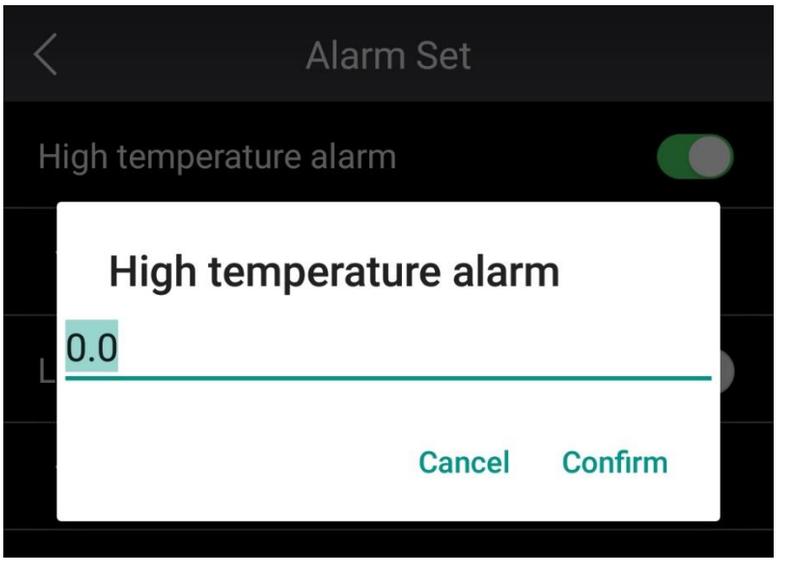
4.3.2 Sound Alarm



4.3.2.1 High Temperature Alarm

High Temperature Alarm: when temperature is higher than the set value threshold, sound alert is triggered

closed open

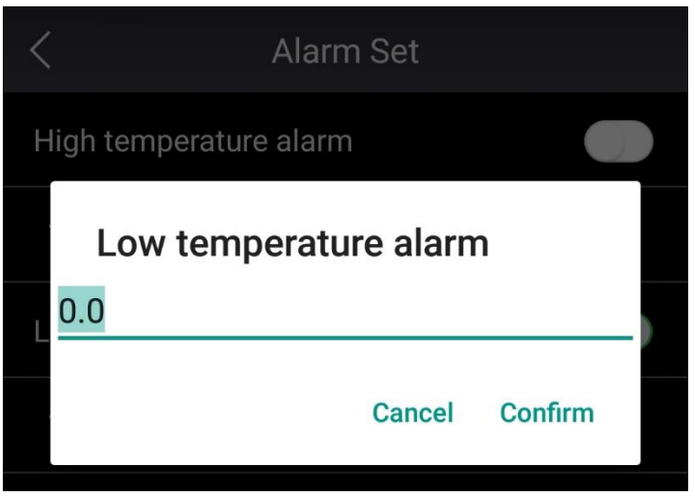


Click to enter appropriate value to save

4.3.2.2 Low Temperature Alarm

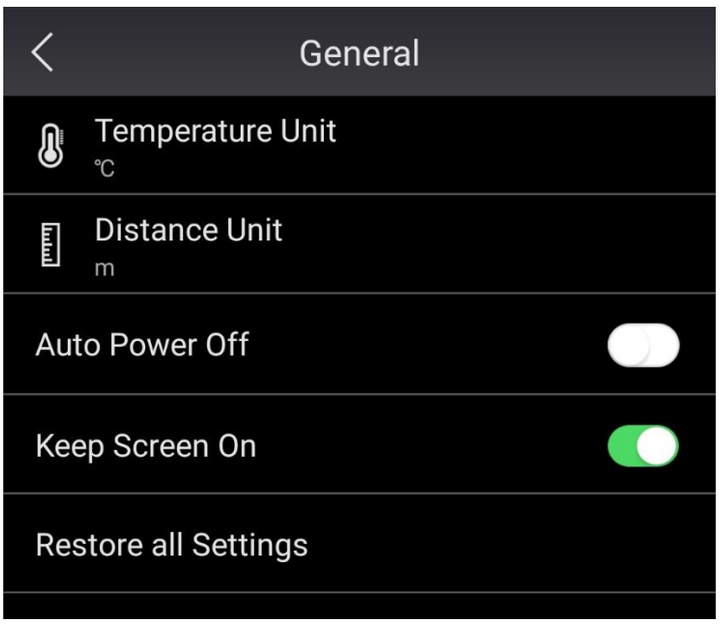
Low Temperature Alarm: when temperature is lower than the set value threshold, sound alert is triggered

closed open



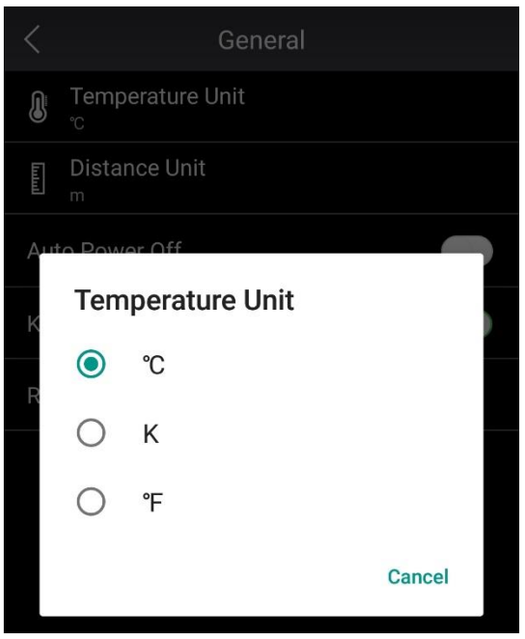
Click to enter appropriate value to save

4.3.3 General



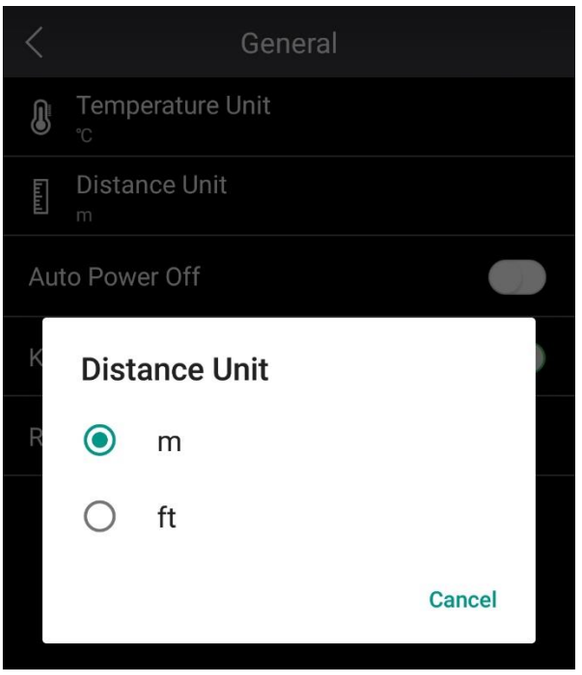
4.3.3.1 Temperature Unit

Click to enter



4.3.3.2 Test Distance Unit

Click to enter



4.3.3.3 Super Resolution

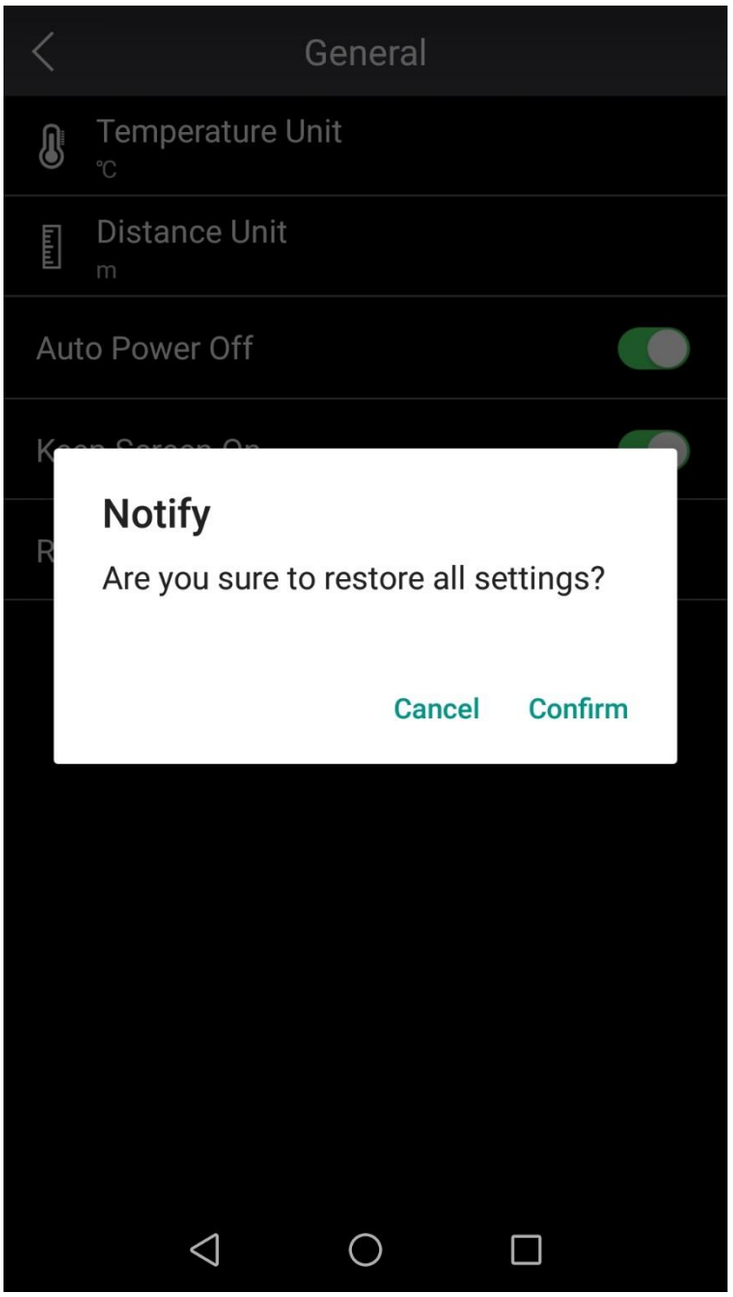
❗ **Note:** OMEGA TI-120 series partial model support this function, see specification for detail

4.3.3.4 Automatic Power Off

When turned on, thermal imager will be automatically shut down after 8 minutes standby

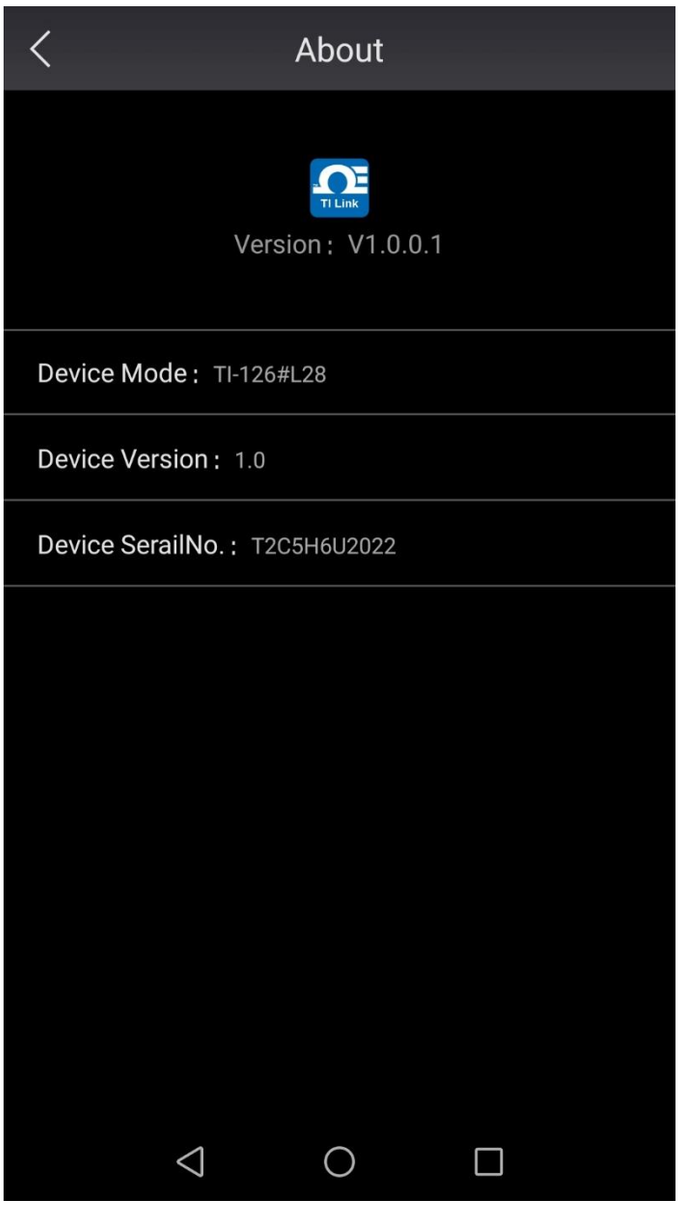
4.3.3.5 Keep Screen On

4.3.3.6 Restore All Settings



！Note: If you forget to modify the parameters somewhere during the testing process and affect the imaging effect and temperature measurement accuracy, you can use this method to restore the parameters to the factory default settings, which can immediately restore the parameters in the equipment to the factory default state.

4.3.4 About



This interface displays the flowing contents:

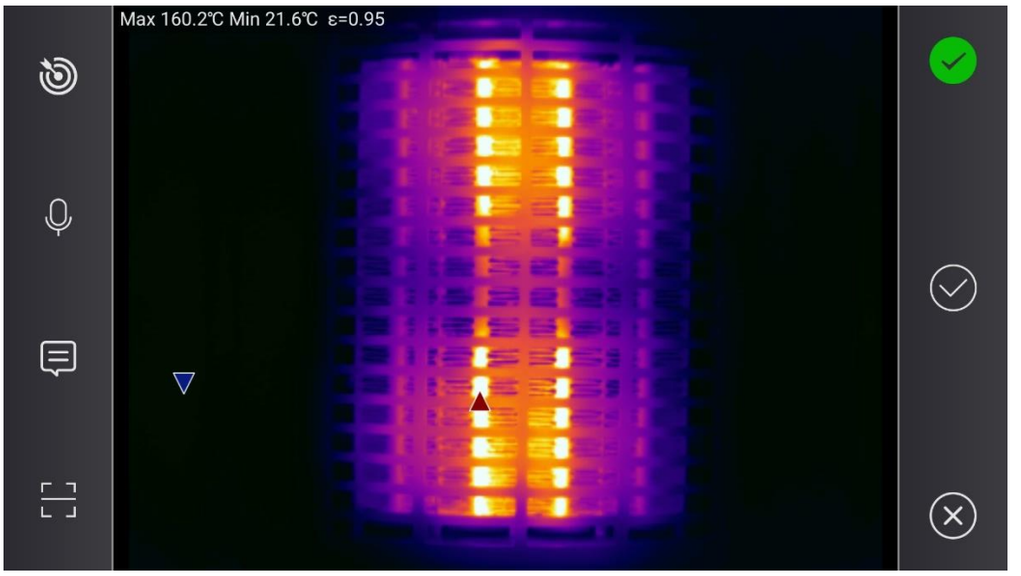
1. Current version of TI Link
2. APP upgrade
3. Current connected thermal imager model
4. Current connected thermal imager firmware version
5. Current connected thermal imager serial number

4.4 Image Freeze

The operation of image freezing interface includes the following 3 modes:

1. Freeze in thermal imaging mode
2. Freeze in picture-in-picture mode
3. Freeze in full radiation thermal video mode

4.4.1 Freeze in Thermal Imaging Mode



target area selection for intelligent temperature and width adjustment function, see 4.6 for detail

voice annotation, click to record/play, directly link to select thermal image, see 4.5.1 for detail

text annotation, click to add/edit, directly link to select thermal image, see 4.5.2 for detail

label editing, click to scan QR code to link, see 4.5.3 for detail

object is under normal condition object is defect

save close or return

4.4.2 Freeze in Picture-in-Picture Mode

target area selection for intelligent temperature and width adjustment function, see 4.6 for detail

voice annotation, click to record/play, directly link to select thermal image, see 4.5.1 for detail

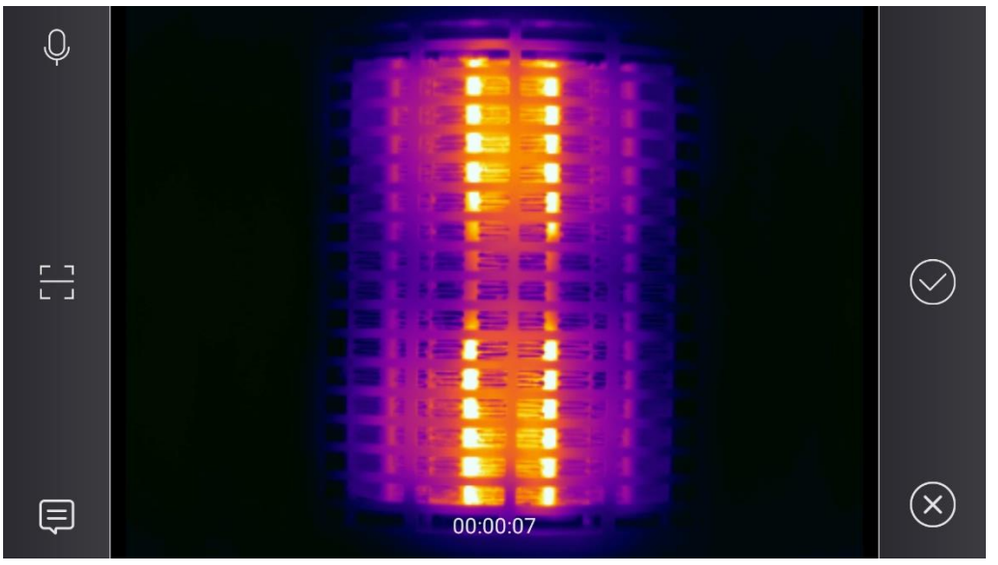
text annotation, click to add/edit, directly link to select thermal image, see 4.5.2 for detail

label editing, click to scan QR code to link, see 4.5.3 for detail

object is under normal condition object is defect

save close or return

4.4.3 Freeze in Full-Radiation Thermal Video Mode



voice annotation, click to record/play, directly link to select thermal image, see 4.5.1 for detail

text annotation, click to add/edit, directly link to select thermal image, see 4.5.2 for detail

label annotation, click to scan QR code to link, see 4.5.3 for detail

save close or return

4.5.1 Voice Annotation

voice annotation

Support earphone, Bluetooth or microphone for voice annotation

Press and hold to speak, click “Confirm” to save or “Cancel” to delete

4.5.2 Text Annotation

text annotation

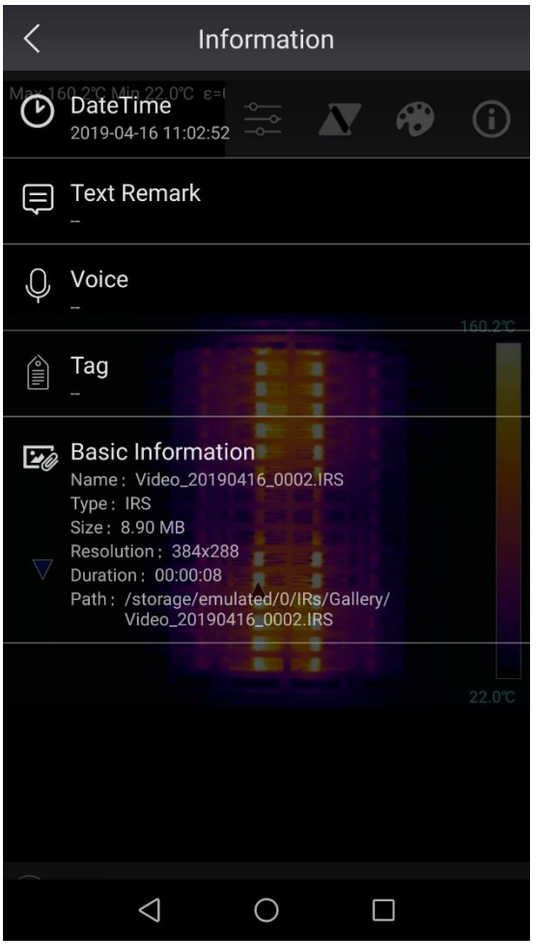
4.5.3 Label Annotation

label annotation

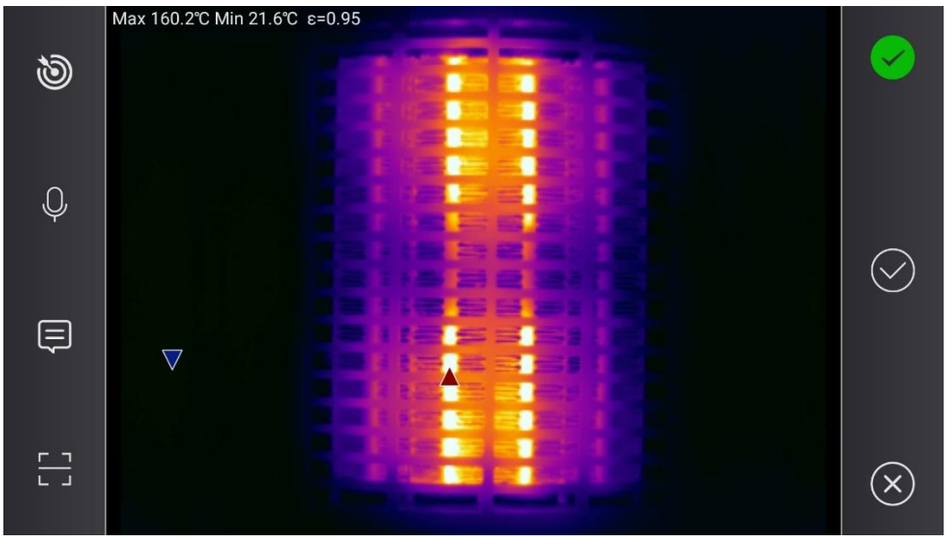
Add label annotation to quick search thermal images in gallery

4.5.4 View Annotation

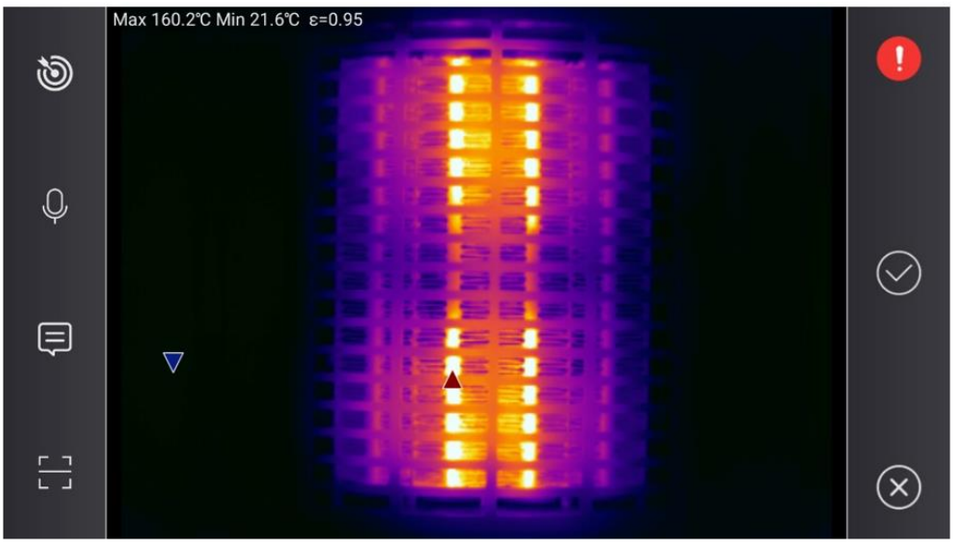
Click to enter (when in Analysis Interface) for detail



4.5.5 Defect Mark



normal mode, click to turn in defect mark ;



defect mark of selected image

All images with defect mark will be shown in gallery

4.6 Regional Intelligent Temperature Width Function

To adjust temperature width for specific area, use manual temperature width adjustment function, or, use intelligent temperature width adjustment function, which can quickly display the defect part and small temperature difference, gives quick diagnosis result

1. Press photo shooting button to freeze image, click to show ROI
2. Move, zoom in/out ROI to adjust

4.7 Analysis Interface

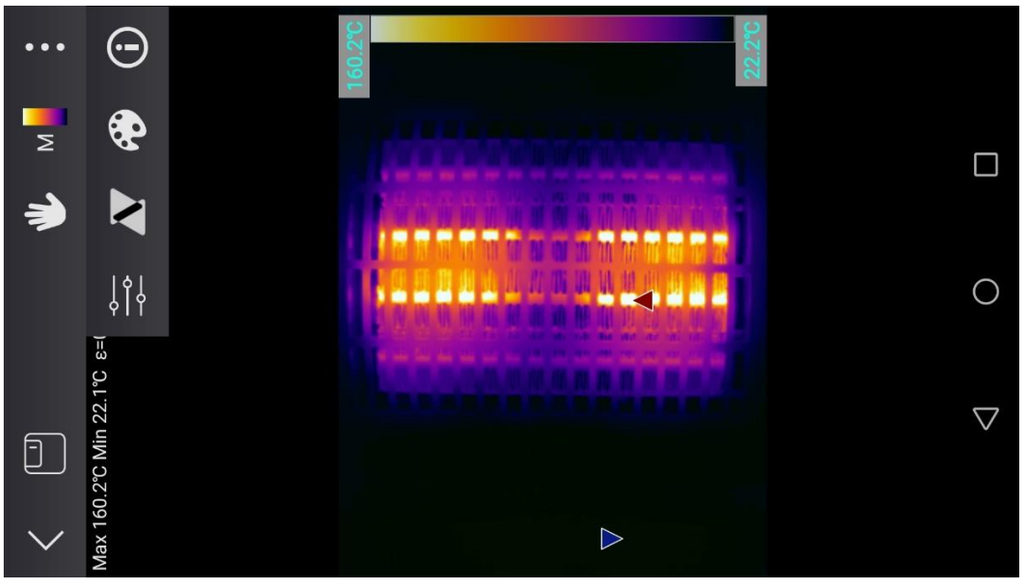
Images can be analyzed directly on TI Link APP, it is helpful for on-site diagnosis

The operation of analysis interface includes the following 3 modes:

4. Analysis in thermal imaging mode
5. Analysis in picture-in-picture mode
6. Analysis in full radiation thermal video mode

4.7.1 Analysis in Thermal Image Mode

Click to enter



Go Back, click to return

save

Measurement tool, see 4.1.3 for detail

color palette, see 4.1.4 for detail

auto/manual temperature width adjustment, see 4.1.5 for detail

measurement parameter, see 4.2.4 for detail

highest/lowest temperature capture for full screen, see 4.2.3 for detail

image annotation, see 4.5.1, 4.5.2, 4.5.3 for detail

4.7.2 Analysis in Picture-in-Picture Mode

Click to enter

Go Back, click to return

save

Measurement tool, see 4.1.3 for detail

color palette, see 4.1.4 for detail

auto/manual temperature width adjustment, see 4.1.5 for detail

measurement parameter, see 4.2.4 for detail

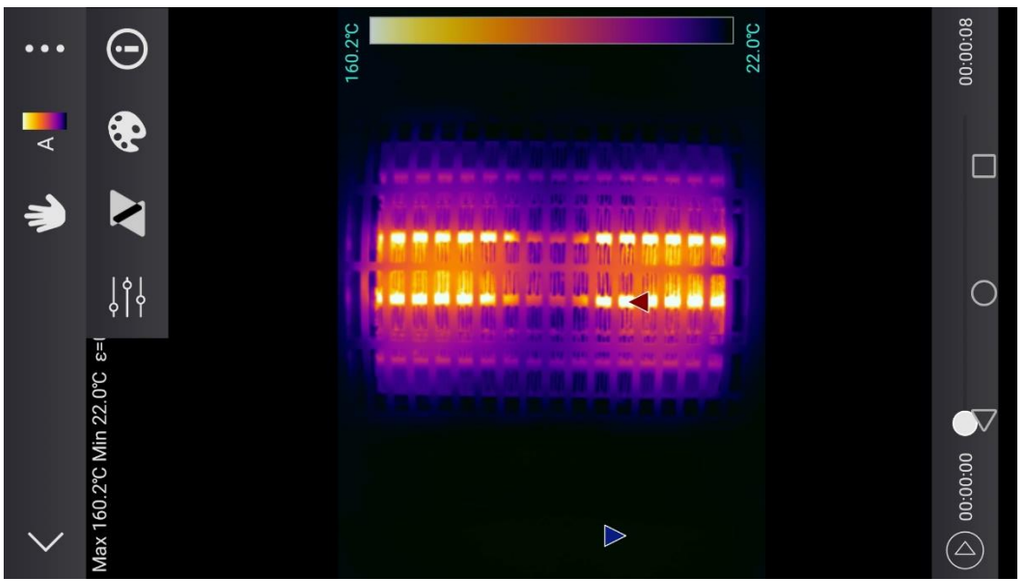
highest/lowest temperature capture for full screen, see 4.2.3 for detail

image annotation, see 4.5.1, 4.5.2, 4.5.3 for detail

lock/unlock picture-in-picture, see 4.1.7.1 for detail

4.7.3 Analysis in Full-Radiation Thermal Video Mode

Click to enter



Go Back, click to return

save

Measurement tool, see 4.1.3 for detail

color palette, see 4.1.4 for detail

auto/manual temperature width adjustment, see 4.1.5 for detail

measurement parameter, see 4.2.4 for detail

highest/lowest temperature capture for full screen, see 4.2.3 for detail

image annotation, see 4.5.1, 4.5.2, 4.5.3 for detail

Play/Stop

Video playback progress bar

4.8 TI Analyzer Professional Analysis Software

4.8.1 How to Download

Please find on www.omega.com

4.8.2 How to Install

Please refer to ***TI Analyzer Installation Manual***

4.8.3 How to Use

Please refer to ***TI Analyzer User Manual***

4.8.4 How to Record Long Time Full-Radiation Thermal Video

Please refer to ***TI Analyzer User Manual***

4.8.5 How to Transfer Data from Thermal Imager to TI Analyzer

❗ **Note:** when thermal imager is working with TI Link APP, images are stored in smartphone under file//IRs/Gallery

1. start PC and connect thermal imager with USB cable
2. click “notice menu” from smartphone, select “USB connection for file transfer”
3. Click “computer” on PC, double click on smartphone folder
4. Enter IRs folder → “Gallery”
5. Move/copy images in “Gallery” to PC
6. Double click “TI Analyzer” software to operate

❗ **Note: p**lease refer to ***TI Analyzer User Manual*** for detail

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 25 **months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **two (2) years product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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