FLUKE®

TiX870, TiX875, TiX880, TiX885, TiX875U, TiX885U, TiX1060, TiX1080

Thermal Imagers

Users Manual

11/2023 (English)
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Table of Contents

Title **Page**

Introduction 1
- Product Overview 1
- How to Contact Fluke 1
- Safety Information 2

Product Familiarization 2
- Standard Packaging 2
- Features 4
  - Components and Controls 4
  - Connection and Power Supply 7
  - Rotatable Lens 8
  - Touch Screen 9
  - Main Display Area 10
  - Shortcut Menu Area 12
  - On-Screen Display 14
  - Non Uniformity Correction (NUC) 14

Basic Operation 20
- Turn On and Off the Imager 20
- Focus 21
- Capture and Save Images 21
- Digital Zoom 21

System Menu 22
- Capture Mode 26
  - Single-capture 26
  - Frame Interval 26
  - Timer 27
- Measurement Settings 28
  - Emissivity 29
  - Reflected Temperature 30
  - Environment Temperature 30

Humidity....31
Distance....31
Transmittance....32
Base Temperature....32
View Mode....33
PIP Mode....33
Measuring Tools....35
To add a ROI....36
ROI Operation....38
Temperature Difference Calculation....41
Audible Alarm....42
Non-Radiometric Videos....43
Settings....44
Regional Intelligent Temperature Span Adjustment....47
TWB Technology....47
TFocus Technology....49
Thermal Image/Video Analysis....50
Thermal Image....51
Picture-in-Picture (PIP)....53
Fully-Radiometric Videos....53
Automatically Name Scanned Files....54
Add an Annotation....54
Voice Annotation....54
Text Remark....55
Tag....55
SmartView™ IR Software....56
Download and Install the SmartView IR Software....56
Real-time View and Record Fully-Radiometric Video Streaming....57
Import and Save Thermal Image Files....58
Accessories....59
Optional Lenses....60
Maintenance....61
Clean the Product....61
Lens Care....61
Battery Care....62
Charge the Battery....62
Product Disposal....63
Radio Frequency....63
Specifications....64

Introduction

Product Overview

The TiX800/TiX1000 Series Thermal Imagers (the "Product" or "Imager") are diagnostic infrared imaging cameras for use in many applications including equipment troubleshooting, diagnosis, preventive and predictive maintenance, building diagnosis and energy efficiency assessment, and product development or scientific research in various industries.

The Imager displays thermal images on a high-visibility, industrial-quality OLED touch screen. The Imager can save images to internal memory or to a removable SD memory card. You can transfer the images and data stored in internal memory, or on the memory card, to a PC using the Type-C USB 2.0 high-speed interface on the Imager and the USB port on a PC. You can transfer fully-radiometric videos to a monitor, TV or other video display devices in real time with an HDMI interface.

The Imager includes a professional thermal image analysis software – SmartView™ IR. The SmartView IR is a high-performance, professional thermal image analysis software for thermal image analysis, fully-radiometric video analysis and professional thermal image reporting.

The Imagers are powered by smart rechargeable lithium-ion batteries.

How to Contact Fluke

Fluke Corporation operates worldwide. For local contact information, go to our website: cn.fluke.com (Chinese) or www.fluke.com (English)

To register your product, view, print, or download the latest manual or manual supplement, go to our website.

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Safety Information

General Safety Information is in the printed Safety Information document that ships with the Product and at www.fluke.com. More specific safety information is listed where applicable.

A **Warning** identifies conditions and procedures that are dangerous to the user. A **Caution** identifies conditions and procedures that can cause damage to the Product or the equipment under test.

⚠ Caution

Storage and/or continuously operating of the Imager in extreme ambient temperature may result in temporary interruption of operation. In this case, let the Imager stabilize (cool down or warm up) before you resume operation.

Product Familiarization

The manual explains functions and features for multiple models. Since different models have different functions and features, not all of the information in the manual applies to your Imager.

Standard Packaging

To prevent damage during shipment, the Product is shipped in a specially designed package. Check the Product carefully and inform the carrier of any damage.

When unpacking the Product, check the standard accessories listed in *Table 1* and other ordered parts listed on the packing list. If there is any shortage of parts, notify the nearest Fluke Technical Service Center or the Service Center located in the place of purchase.

Figure 1 and *Table 1* list the standard accessories for the Product. See *Accessories* for optional accessories.

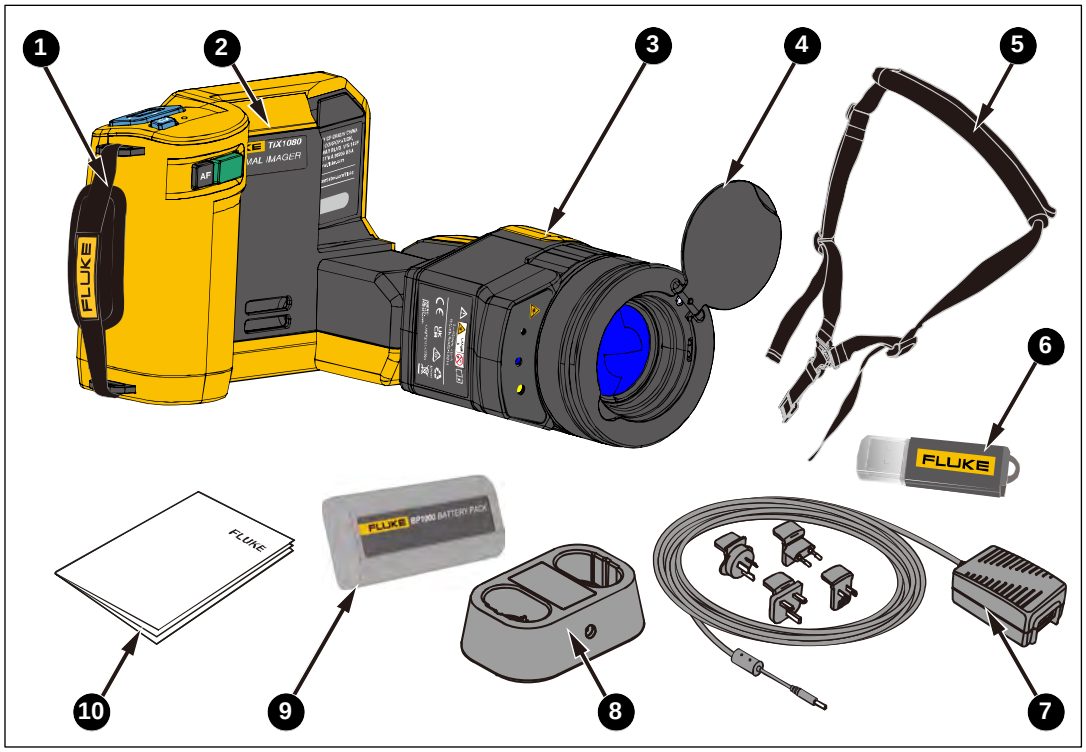


Figure 1. Standard Accessories

Table 1. Standard Accessories

No.	Description	Quantity
1	Hand strap	1
2	The Thermal Imager	1
3	Standard lens (installed)	1
4	Lens cover (removable)	1
5	Neck strap	1
6	USB-SD reader	1
7	AC adapter	1
8	2-bay battery charging base	1
9	Rechargeable Li-ion battery, BP1000	3
10	Included documentation, including a Safety Information, a Quick Reference Guide, a Quality Certificate, and a Warranty Card	1
Not shown	Type-C USB cable, 1 m	1
	HDMI video cable, 1 m	1
	High-speed SD card, 128 GB	1
	Hard carrying case	1

Features

This section describes each component of the Product and the display. Please read this section carefully before use.

Components and Controls

For the components and controls of the Imager, see *Figure 2*. *Table 2* lists the features and functions of each component.

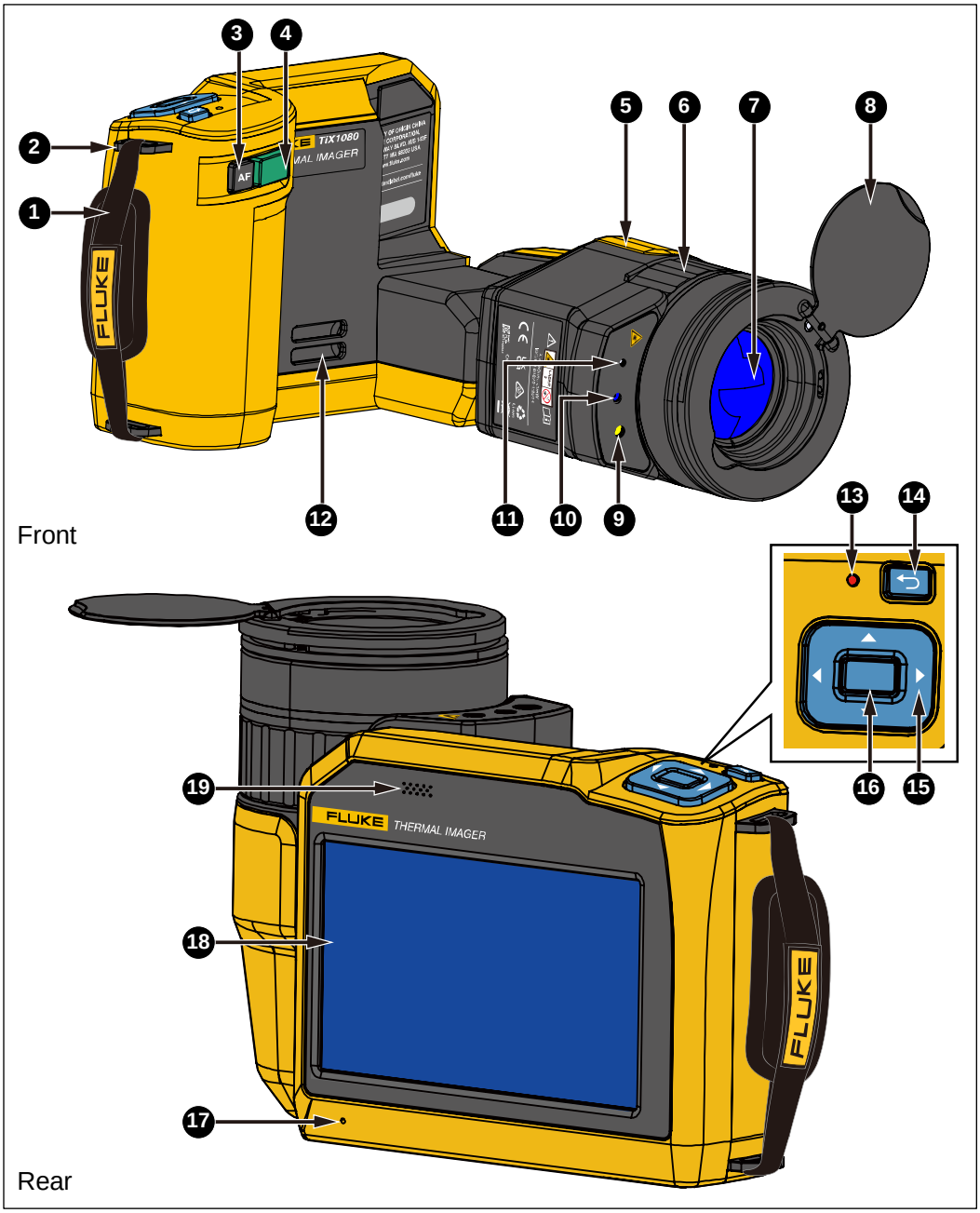


Figure 2. Components and Controls

Table 2. Components and Controls

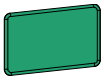
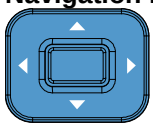
No.	Item	Description
1	Hand strap	Makes the Product easy to carry and comfortable to use.
2	Hand strap anchor	Use the anchor to secure the hand strap provided with the Product. The hand strap can improve handheld stability and comfort.
3	 AF (Auto Focus) button	For live image screen, push AF, the Imager will automatically focus and show a clear thermal image. See *Focus*.
4	 Image capture button	The function of the button depends on the capture mode: Single-frame mode: 1. In the live image screen, push  once to freeze the screen. 2. In the image freeze screen, push  once again to save the thermal image to the specified storage medium (see *Settings*). Frame Interval mode: 1. In the live image screen, push  once to start the recording of video at the frame rate you have set. 2. During recording a fully-radiometric video, push  once again to stop recording and freeze the screen. You can play back the video. 3. Push  once again or tap **Save** on the screen to save the video in the cache to the specified storage medium. In Timer mode: 1. Push  once to start the recording of the fully-radiometric video. Video frames are recorded to the timer you set. 2. Push  once again to stop the recording and freeze the screen. You can play back the video. 3. Push  once again or tap **Save** on the screen, to save the video in the cache to the specified storage medium (see *Settings*).
5	Rotatable lens Component	180° rotatable lens. See *Rotatable Lens*.
6	Manual focus control for infrared lens	The focus control can be manually rotated clockwise or counterclockwise to adjust the imaging clarity.
7	Infrared lens	Replaceable infrared lens assembly with standard lens. See *Accessories* for details.
8	Lens cover	Retractable lens cover.
9	LED torch/flashlight	Use to identify the target in dark environment.

Table 2. Components and Controls (cont.)

No.	Item	Description
10	Visual light camera lens	5 mega pixels
11	Laser pointer	Use to quickly aim at the target under test.
12	Neck strap anchor	Use the anchor to secure the neck strap provided with the Product.
13	Power indicator 	The power indicator goes off during normal operation. The power indicator shows yellow-green during sleep/shutdown process for reboot.
14	Power/Back button  	Power button - Push and hold  for 2 s to turn on the Product, turn off the Product, reboot the Product, or put the Product in Sleep mode according to on-screen prompt. - In Sleep mode, push  to wake up the Product. - In screen-off mode, briefly push  to wake up the screen. Back button Return to previous menu. In image freeze interface, push  to return to live image screen. Depending on the screen,  has the same function as  or  on the screen (in some cases, Back may need to be pressed twice). This button is invalid on video recording screen.
15	**Navigation keys** 	Push the arrow keys to move the cursor on the screen.
16	OK button	Push OK (the middle of the navigation arrow keys) to select the option where the cursor is located. - On the System Menu screen, push OK to bring up the corresponding sub-menu or activate the currently selected function. - On the Home screen, push OK to bring up System Menus (same function as ). See *System Menu* for more information. - On the Gallery screen, push OK to bring up the functions associated with the image where the cursor is located, including **Analyze File** (**Play** when a video is selected), **File Properties** and **Delete**. See *Gallery* for more information. This button is invalid on video recording screen.
17	Microphone	Used to record a voice annotation.
18	OLED touchscreen	Touchscreen
19	Speaker	Used to play back audio files or voice annotations, and to sound alarms for high/low temperature over-limit.

Connection and Power Supply

Figure 3 shows the bottom of the Imager. *Table 3* lists the features and functions of each component on the bottom panel.

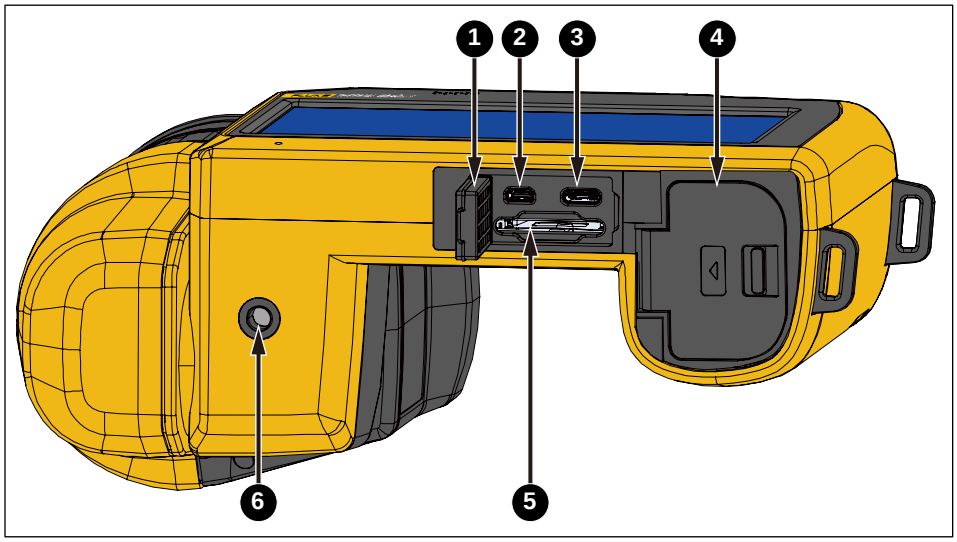


Figure 3. Bottom of The Product

Table 3. Bottom of The Product

No.	Item	Description
1	Interface protective cover	
2	HDMI interface	Mini HDMI interface
3	Type-C USB interface	Type-C USB 2.0 interface
4	Battery compartment cover	
5	SD card slot	Standard SD card slot
6	Tripod mount	Tripod standard threaded hole, UNC ¼"-20 mounting thread.

Rotatable Lens

The Imager features a 180° rotatable lens to capture images at any angle.

See *Figure 4* for how to adjust the lens.

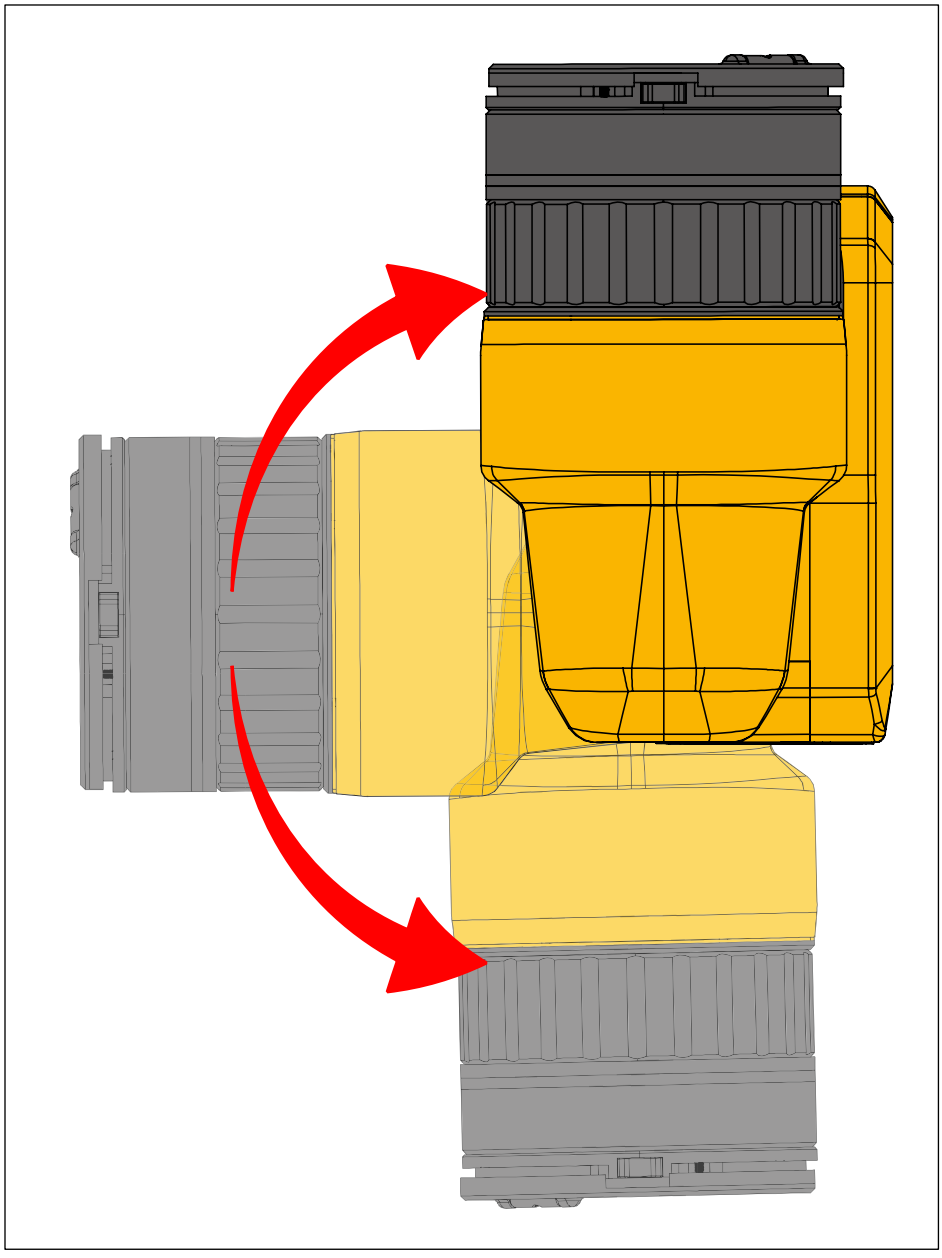


Figure 4. 180° Rotatable Lens

Note

Adjust the view to suit your working posture.

Touch Screen

The screen is divided into: the **Main Display Area** in the middle, the **Shortcut Menu Area** containing touch buttons on the left and right sides, and the **System Menu Area** superimposed on the bottom of the Main Display Area, as shown in *Figure 5*.

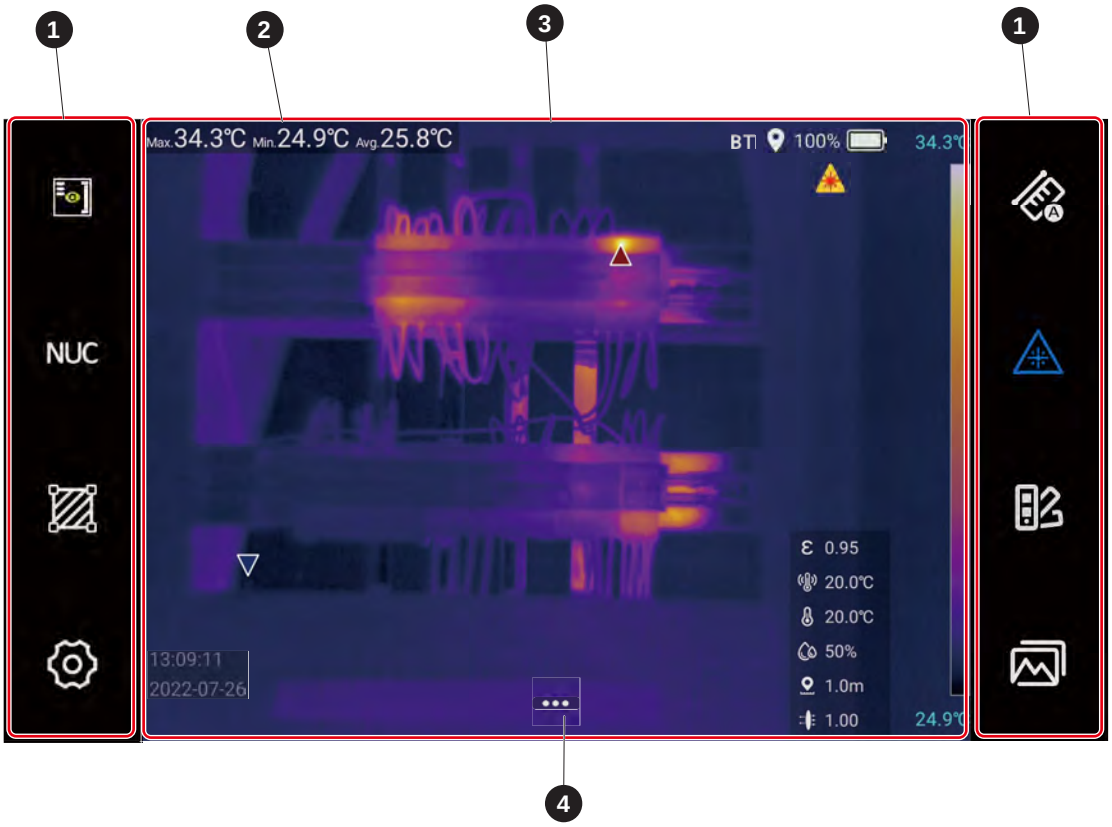


Figure 5. Screen

Table 4. Screen

No.	Item	Description
1	Shortcut Menu Area	Shortcuts to the most used settings for changing parameters or selecting functions and options.
2	On-Screen Display	See *System Menu*.
3	Main Display Area	Shows videos/images. In addition, current measurements, environmental data and equipment status show as **On-Screen Display**. The Main Display Area displays different content depending on the current operating mode and screen, as detailed in the relevant sections below.
4	System Menu Area	Shows when you tap system menu button, a system menu shows depending on the operating environment. For more information, see *System Menu*.

Main Display Area

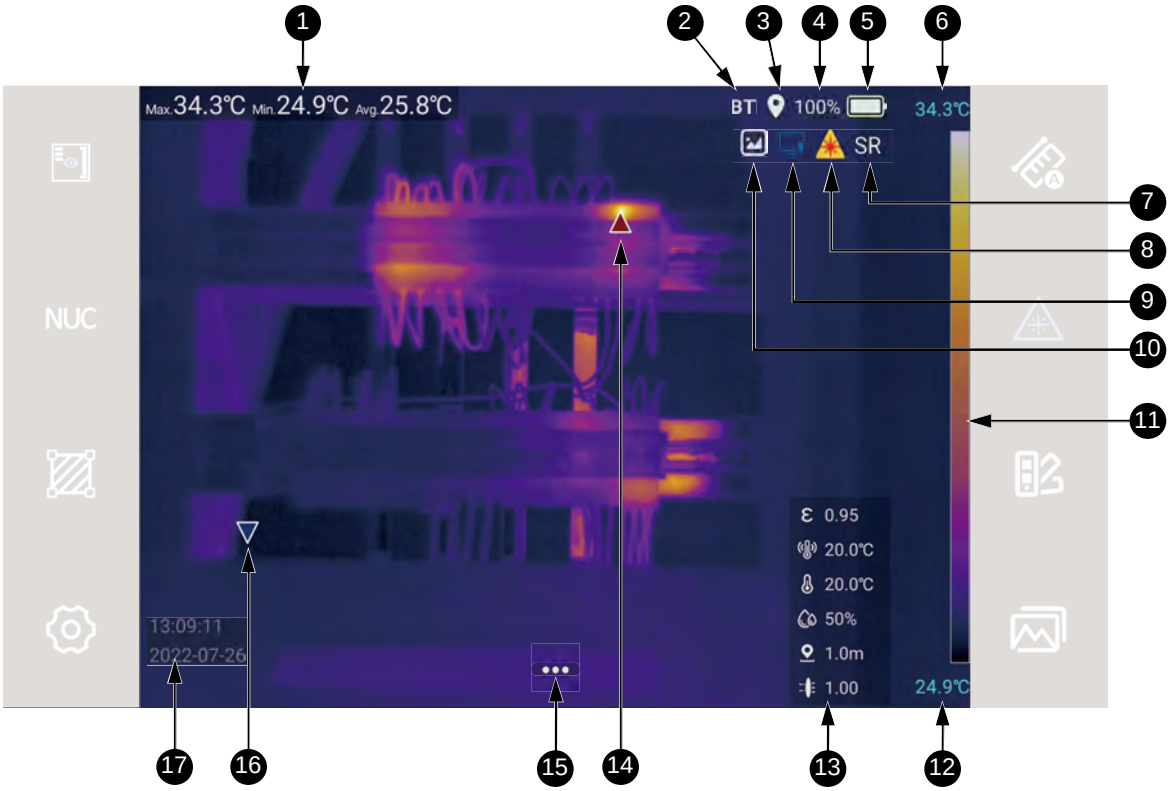


Figure 6. On-Screen Display

Note

Not all information is always shown on screen, to customize the information that shows, see Settings*.*

Table 5. On-Screen Display

No.	Description
1	On-Screen Display The global maximum (Max), minimum (Min) and average (Avg) temperatures as well as point, line and area temperatures for measurement and analysis are displayed based on system settings.
2	Bluetooth Indicator Bluetooth status. When enabled, if a Bluetooth headset is connected, the Bluetooth headset icon (with a Bluetooth symbol in the middle of the headset) shows.
3	GPS Indicator GPS status. See *Settings* for details.
4	Battery Percentage See *Battery Care* and *Charge the Battery* for details on batteries.

Table 5. On-Screen Display (cont.)

No.	Description
❺	Battery Indicator Shows the remaining battery power (the icon is red when the power is lower than 20 %). See *Battery Care* and *Charge the Battery* for details on batteries.
❻	Upper Temperature Limit of Color Band The highest temperature shown on the color band. See *Settings* for details.
❼	Super-Resolution Indicator Super-resolution function status
❽	Laser Pointer Indicator Laser pointer status
❾	HDMI Indicator HDMI interface status
❿	Digital Camera Indicator Digital camera status
⓫	Temperature Span of Color Band Color band representation (shows the relationship between temperature and color)
⓬	Lower Temperature Limit of Color Band The lowest temperature shown on the color band.
⓭	Temperature Measuring Parameters Relevant temperature measuring parameters are shown. See *Measurement Settings* for details.
⓮	Location of the Maximum Temperature Point Location of the maximum temperature point on full screen (a triangle cursor in red)
⓯	System Menu Buttons Open the System Menu, where you can set capture mode, view mode, measurement settings, alarms, and system settings. See *System Menu* for more information on system settings.
⓰	Location of the Minimum Temperature Point Location of the minimum temperature point on full screen (an inverted triangle cursor in blue).
⓱	Time and Date Current clock date and time

Shortcut Menu Area

Use the Touch keys in the Shortcut Menu Area to change parameters or select functions and options. *Figure 7* and *Table 6* the features and functions of each component of the **Shortcut Menu Area**.

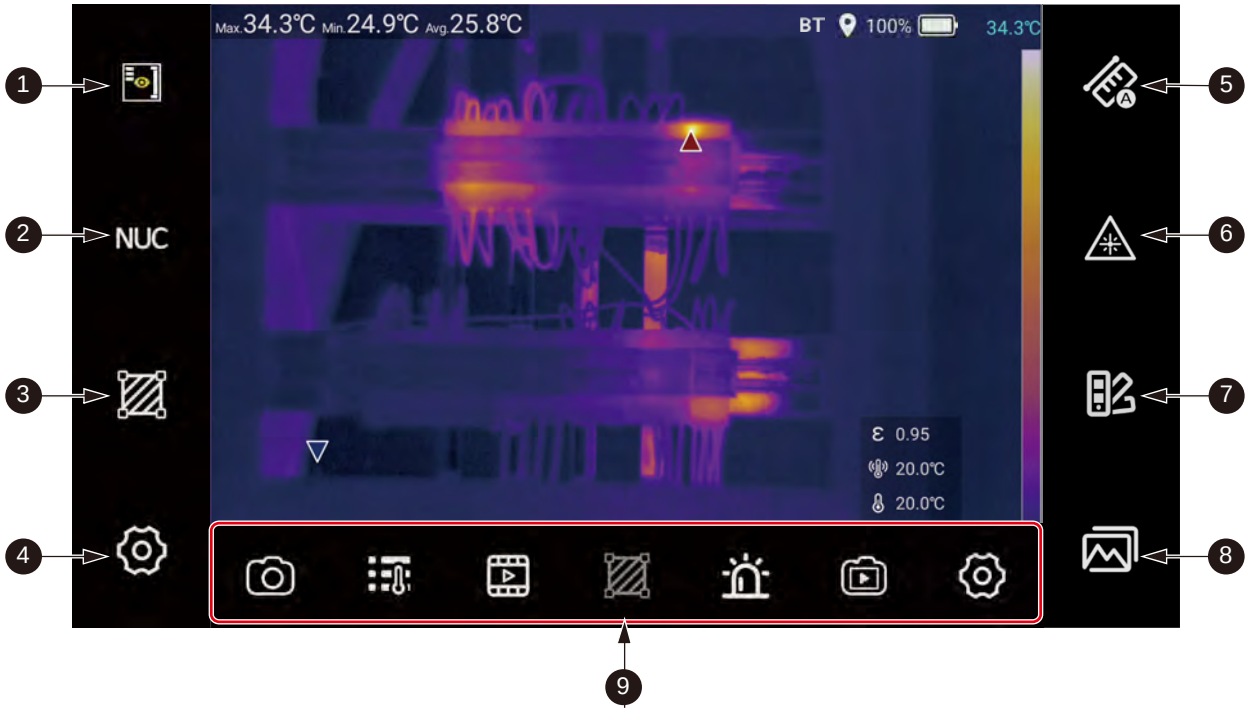


Figure 7. Shortcut Menu Area

Table 6. Touch Key Functions

No.	Description
1	 On-Screen Display Show or hide the on-screen display. See *Figure 6* and *Table 5* for details.
2	 Non Uniformity Correction (NUC) Tap NUC icon to execute the Non Uniformity Correction function. See *Non Uniformity Correction (NUC)* for details.
3	 Measuring Tools The Imager comes with measuring and analysis tools. See *Measuring Tools* for details.

Table 6. Touch Key Functions (cont.)

No.	Description
4	 System Settings Tap  to enter the System Settings interface. For more information, see *Settings*.
5	 Temperature Span Mode Switches between Auto Span and Manual Span modes. For more information, see *Temperature Span Mode*.
6	 Laser Pointer Tap and hold  to turn on the Laser Pointer and release the icon to turn off the Laser Pointer. For more information, see *Laser Pointer*.
7	 Color Palettes Tap to enter the submenu for quickly switching palettes, you can choose palettes, and set color alarms (isotherm). For more information, see *Color Palettes*.
8	 Gallery Tap to enter the Gallery to browse or analyze thermal images or fully-radiometric videos. For more information, see *Gallery*.
9	 System Menu Keys On the System Menu Area, you can set up the capture mode, measurement settings, view mode, temperature measurement area, audio alarm, non-radiometric videos, and system settings. For more information, see *System Menu*.

On-Screen Display

Enable or Disable On-screen Display

Tap  to display or hide all on-screen display.

When the center of the on-screen display icon on the screen is yellow (), the on-screen display shows in real time; when the center of the icon is white (), the information on the screen is hidden.

You can customize the on-screen display, see *Settings* for specific operations.

Non Uniformity Correction (NUC)

Non Uniformity Correction (NUC) is used to adjust for small detector drift that occurs when the application scenario and environment changes. In general, the Imager's heat will interfere with its temperature readings. To improve accuracy, the Imager measures the temperature of its own optics and then adjusts the image based on these readings. The NUC adjusts the gain and offset for each pixel to create higher quality, more accurate images.

The NUC is automatically done at startup, when the measurement range is changed, or when the ambient temperature changes.

You can do NUC manually when you take critical measurements. For example, you may need to perform manual calibration to improve temperature measurement accuracy before starting to record a fully-radiometric video.

Temperature Span Mode

The Imager provides these modes: Auto Span () and Manual Span ().

In Auto Span mode, the upper or lower limit of the temperature span is the global maximum or minimum temperature, and the temperature span is automatically adjusted.

In Manual Span mode, the background of the upper and lower temperature limits on the color band is gray, and the span is adjustable. When there is no gray background on the upper and lower temperature limits on the color band, the span is locked. Tap the temperature limit to switch between locked and adjustable states, as shown in *Figure 8*.

Note

In Manual Range () mode, if the wheel does not appear on the screen, check the on-screen display settings, and make sure on-screen display is enabled (). For on-screen display settings, see Shortcut Menu Area*.*

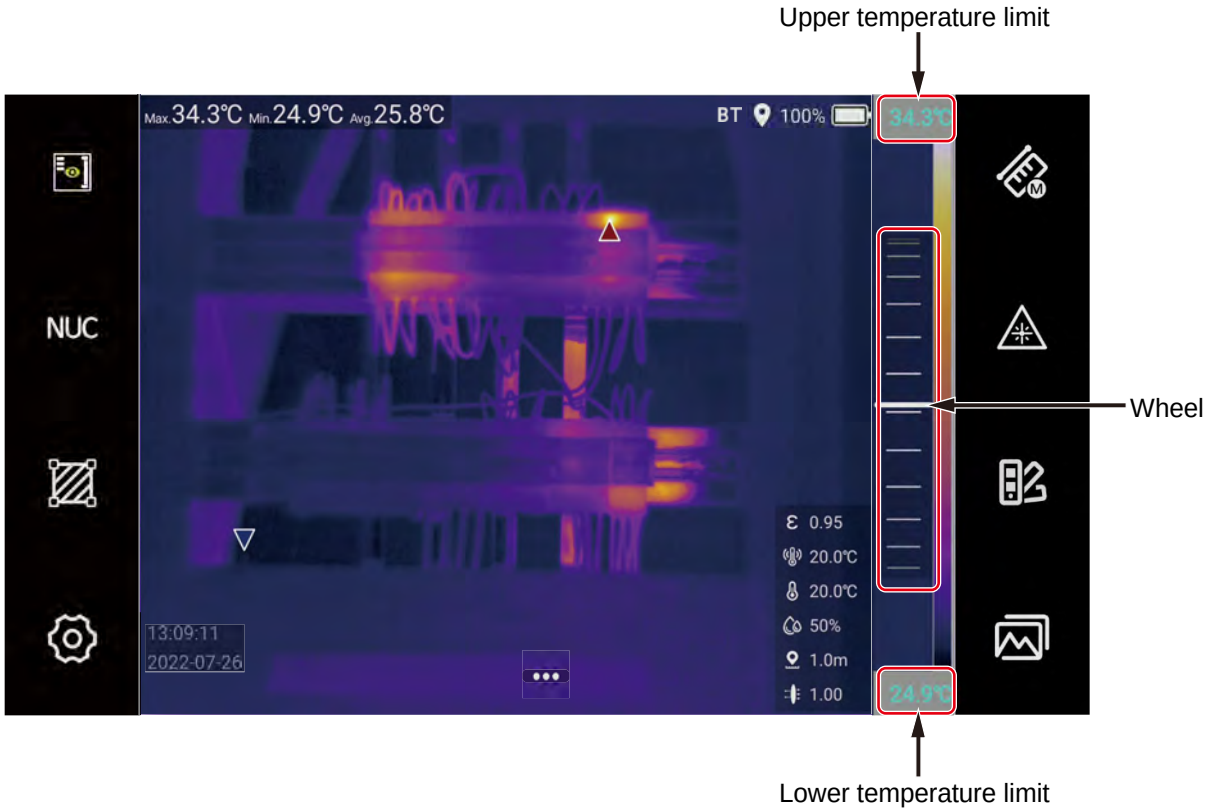


Figure 8. Adjust Temperature Span Manually

To adjust temperature span manually**:**

1. Tap temperature span icon so that it appears as  to switch to Manual Range mode.
2. Tap the upper and lower temperature limits as needed so that their backgrounds are grayed out.
3. Scroll the wheel up or down to adjust the limits.
4. When the upper and lower temperature limits on the color band both have gray background, both limits can be adjusted at the same time.
5. When the upper temperature limit of the color band has gray background and the lower limit has no background color, the upper limit can be adjusted, and the lower limit remains unchanged.
6. When the lower temperature limit of the color band has gray background and the upper limit has no background color, the lower limit can be adjusted, and the upper limit remains unchanged.
7. When there is no gray background both for the upper and lower temperature limits on the color band, they are locked, and the upper and lower limits cannot be adjusted.

See *Specifications* for more information on minimum temperature span.

Laser Pointer

Tap and hold Laser Pointer key to turn on the Laser Pointer to locate the target to be measured; release the key to turn off the Laser Pointer.

When the laser is on, the laser icon is blue ( ), and the laser indicator ( ) is shown on the screen; when the laser is off, the icon is white ( ).

⚠⚠ Warning

To prevent eye damage or personal injury:

- **Do not look into the laser. Do not point laser directly at persons or animals or make it reflected indirectly from reflective surfaces.**
- **Do not disassemble the Product. The laser beam is dangerous to eyes. Have the Product repaired only through an approved technical service.**

Color Palettes

With the palette function, you can select palettes and set color alarms (isotherms).

To choose a palette:

1. Tap (right Shortcut Menu Area). The palette menu shows and includes:
   - Iron ( )
   - Rainbow ( )
   - Grey ( )
   - Blue ( ).

Note

A hint for each button shows on the display. To view hints, use navigation keys to move the cursor between the icons. The function/status prompts for the button, as shown below.



2. Tap an icon to select a palette directly or tap . All palette options are shown.

3. To invert palette colors, tap  in the upper-right corner of the screen. All palette colors will be inverted.
4. Directly tap the palette to return to the Home screen or tap  in the upper left corner of the screen.

Enable / Disable Isotherm Function

Use the Isotherm (color alarm) function to set color alarm modes of high temperature and low temperature.

To set color alarms:

1. Tap palette icon  (right Shortcut Menu Area).
2. In the Palette menu, tap  to activate Color Alarms mode.
3. Tap  to switch between the alarm modes: high temperature and low temperature, or to turn off the Color Alarm mode.
4. When the icon becomes , the high temperature color alarm mode is turned on, as shown in *Figure 9*.

   Slide the temperature scale on the right to adjust the threshold of the high temperature alarm. The area where the temperature is higher than the temperature threshold shows in a fixed color by default (depending on the currently selected palette).
5. When the icon becomes , the color alarm mode of low temperature is turned on.

   Slide the wheel on the right to adjust the threshold of low temperature alarm. The area where the temperature is below the temperature threshold is displayed in green by default.
6. Touch any other area of the screen to exit the Palette Settings menu.
7. Tap the Color Alarm button when the icon is hollow () to exit Color Alarm mode.



Figure 9. High Temperature Color Alarm

Note

When the isothermal alarm is enabled, you cannot change the temperature span mode. If you tap  *or* *, the screen prompts you to confirm whether to disable the isothermal mode. Select* ***Isotherm Off*** *to exit isotherm mode and you can change the temperature span mode. Select* ***Cancel*** *to return, you cannot change temperature span mode.*

Gallery

Browse or analyze thermal images or fully-radiometric videos in the Gallery.

The thermal image files saved in the Gallery are identified by their names below the thumbnails on the left side of the Gallery, the types are;

- IR Thermal Image: IR_Date_Serial Number.jpg
- PIP Image: Mix_Date_Serial Number. jpg
- Visible Light Image: IMG_Date_Serial Number. png
- Visible Light Video: VD_Date_Serial Number. mp4
- Fully-Radiometric Video: Video_Date_Serial Number.is5
- Non-radiometric Video: VD_Date_Serial Number.mp4

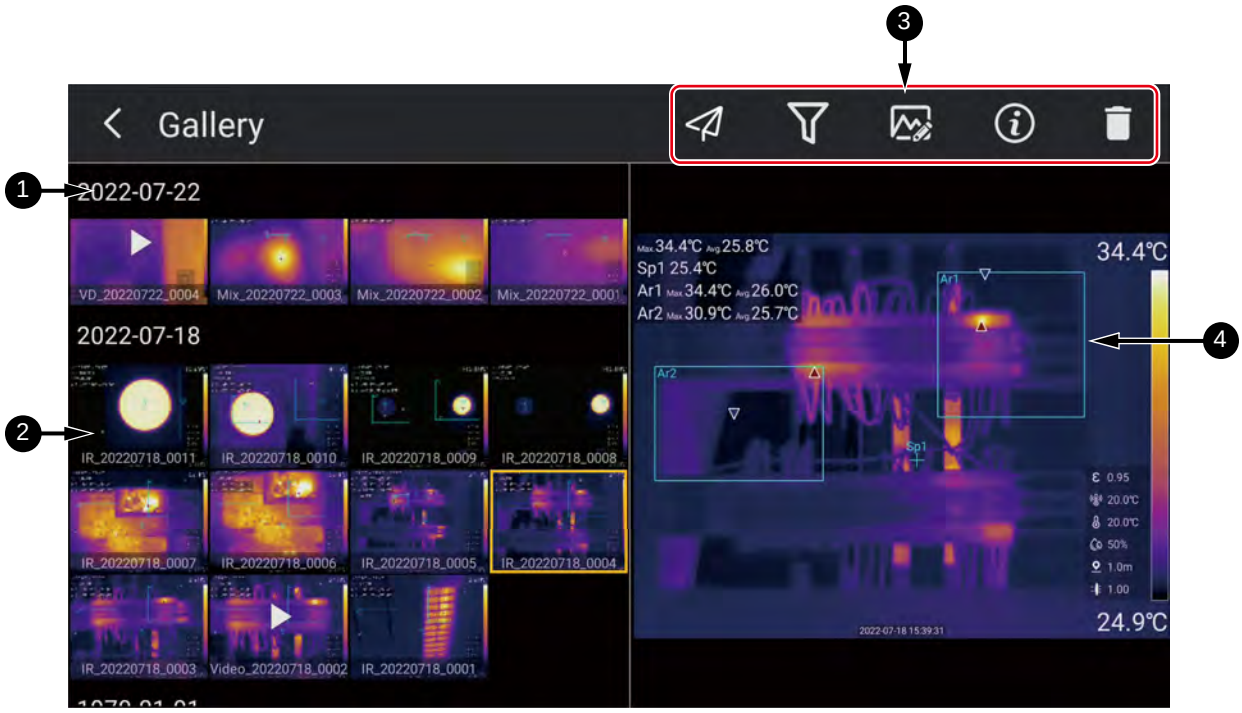


Figure 10. Gallery

Table 7. Gallery Operations

No.	Description
❶	Capture Date The images and videos in the Gallery are sorted by when they were taken.
❷	Thumbnails Images and videos show as thumbnails.
❸	Action Buttons Depending on the type of image and video currently selected, some of these actions are available: - **Bluetooth Transfer** - **Filter by Tags** - **Analysis** - **Information** - **Delete** - **Visible Light Images** - **Play**
❹	A preview of the currently selected image or video.

To browse and select images:

1. Tap (right Shortcut Menu Area). The Gallery shows as in *Figure 10*.
2. On the left side of the Gallery, is the preview and selection area. Tap the preview to select a thermal image file or use the left and right navigation keys on the Imager to select the thermal image file to be analyzed and edited. On the preview on the right, you can enlarge and shrink the image by spreading or pinching with two fingers.

Gallery Operation

In the Gallery, you can do these operations (the available options depend on the thermal image file selected):

- **Bluetooth Transfer.** Tap the icon to send the currently selected thermal image/video to other Bluetooth devices. This function requires that Bluetooth is enabled, and the Bluetooth headset is not connected, see *Settings*.
- **Filter by Tags**. Tap the icon to go to the Search page where you can select one or more tags. The Gallery automatically filters out thermal image files with the tag(s). This helps to quickly find the desired thermal image file. See *Tag* for adding and editing tags.
- **Analysis**. The images are analyzed in the Imager. For more information, see *Thermal Image/Video Analysis*.

- **Information.** Display image details, including capture time, file type, file size, resolution, and storage path.
- **Delete.** Delete the original files stored in the Imager.
  - Delete one file: Select a file thumbnail from the Gallery, tap at the upper right corner of the Gallery, and a prompt box appears. Tap **OK**, to delete the selected file.
  - Delete multiple files: Tap and hold thumbnails in the Gallery to select multiple images; tap at the top of the screen, a prompt box appears. Tap **OK**, to delete the selected files.
- **Visible Light Images.** Tap , and a visible light image shows immediately.
- **Play.** Tap to play a fully-radiometric or non-radiometric video directly.

Basic Operation

Turn On and Off the Imager

Before you use the Imager for the first time, charge the battery for a minimum of 2.5 hours. See *Charge the Battery*.

To turn on or turn off the Imager, push ⏻ and hold for 2 seconds.

To maximize the life of the battery, use the Power Save and Auto Off functions. See *Settings* for more information about how to set these functions.

After the Product is turned on, push ⏻, the Power menu shows. The menu includes options:

- **Reboot:** The Imager will be turned off and then restarted.
- **Sleep:** Set the Imager to Sleep mode. In Sleep mode, the screen is off and only the Power button is available; the Imager remains powered on and warmed up.
- **Power off:** Turn off the Imager.

In Sleep mode, push ⏻, the Imager quickly enters the operating state.

Note

All thermal imagers need sufficient warm-up time for accurate temperature measurements and best image quality. Warm-up time may vary by models and environmental conditions. Wait at least 20 minutes if the most accurate temperature measurement is important to your application. When you move an Imager between environments where the ambient temperature varies widely, allow for additional adjustment time.

Focus

Correct focus makes sure that the infrared energy is correctly directed onto the pixels of the detector. Without correct focus, the thermal image can be blurry, and the radiometric data may be inaccurate.

To focus with the advanced manual focus system, rotate the Manual Focus Control (❻ in *Figure 2*) until the object is in proper focus.

Capture and Save Images

To capture an image:

1. Aim the Imager at the target and focus on it.
2. Push and release  to capture and freeze the image. The image is saved in the memory buffer, and you can save or edit the image.

   To edit an image, see *Thermal Image/Video Analysis*.
3. Push  again to save the image.

To take thermal images in different modes, see *View Mode*. To take fully-radiometric videos, see *Capture Mode*. To take non-radiometric videos, see *Non-Radiometric Videos*.

Digital Zoom

Use the Digital Zoom function to enlarge/shrink the live image or the thermal image being viewed.

In the image display area:

- **Enlarge**: Tap the screen with two fingers and spread them outward.
- **Shrink**: Tap the screen with two fingers and pinch them together.
- You can also slide the wheel at the bottom of the screen to enlarge/shrink.

In Live View mode, a digital zoom factor shows at the bottom of the screen, see *Figure 11*.



Figure 11. Enlarge/Shrink Images

System Menu

Use the System Menu to change and view settings.

Tap ••• on the Home screen, the Main System menu shows at the bottom of the Main Display Area, as shown in *Figure 12*. *Table 8* lists a brief description of each menu icon.



Figure 12. Main System Menu

Note

A hint for each button shows on the Imager's screen. To view hints, use navigation keys on the top of the Imager to move the cursor between the buttons. The function/status prompts for the current button shown on the screen.

Note

If the corresponding icon is grayed out or the button icon does not appear on the screen, make sure On-Screen Display is enabled ( ). For On-Screen Display settings, see Shortcut Menu Area*.*

Table 8. System Menu

No.	Description
❶	**Capture mode** The available modes include: - Single-capture - Frame Interval (push navigation button to see) - Timer (Set the frame rate/second.)
❷	**Measurement settings** The correction parameters that can be set include: - Emissivity (default = 0.95) - Reflected Temperature (default = 20 °C) - Environment Temperature (default = 20 °C) - Humidity (default = 50 %) - Distance (default = 1.0 m) - Optical Transmittance (default 1.0) - Base Temperature 20 °C (default = Off)
❸	**View mode** View modes supported include: - IR Mode - DC Mode (visible image mode) - PIP Mode (picture-in-picture mode) Including: Distance Adjustment and Transparency Adjustment PIP Distance Adjustment Transparency Adjustment

Table 8. System Menu (cont.)

No.	Description
❹	**Measuring tools** The temperature measuring tools provided include: - Region of Interest (ROI) Selection Display set Move Adjust Emissivity Delete - Add Circle (Ar) - Add Rectangle (Ar) - Add Line (Li) - Add Spot (Sp) - Temperature Difference - Delete
❺	**High/Low-temperature alarm** Enable/disable the alarm and limit settings.
❻	**Record video** Record non-radiometric videos. Non-radiometric videos include non-radiometric infrared videos and visible light videos.
❼	**System settings** For more information, see *Settings*.

Capture Mode

The Imager provides a variety of capture modes to choose from. The Capture Mode selection menu is shown in *Figure 13*.

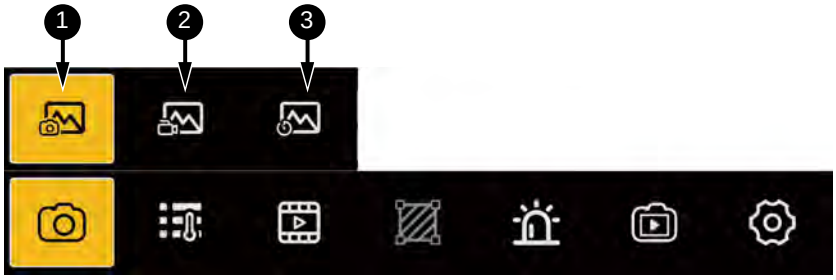


Figure 13. Capture Mode Menu

Table 9. Capture Mode Menu

No.	Description
1	**Single capture**
2	**Frame Interval**
3	**Timer** Set the time interval between shots.

Single-capture

In Single-capture mode, only an infrared thermal image or a picture-in-picture image (an infrared thermal image superimposed on a digital photo) is saved for each image capture.

See *View Mode* for information on view mode. See *Capture and Save Images* for how to capture images.

Frame Interval

In Fully-Radiometric Video mode, push , the Imager starts to record a fully-radiometric video; push again, to stop the recording.

To preset the frame rate of video recording tap the buttons, the frame rate of video recording can be set between 1 Hz and 12 Hz.

To set frame rate:

1. On the Main System Menu, tap .
2. In the menu, tap .
3. Slide the wheel shown above the icon to select an appropriate frame rate, as shown in *Figure 14*.
4. In Capture mode, you can take a maximum of 1000 frames, and manually push  to stop the recording.

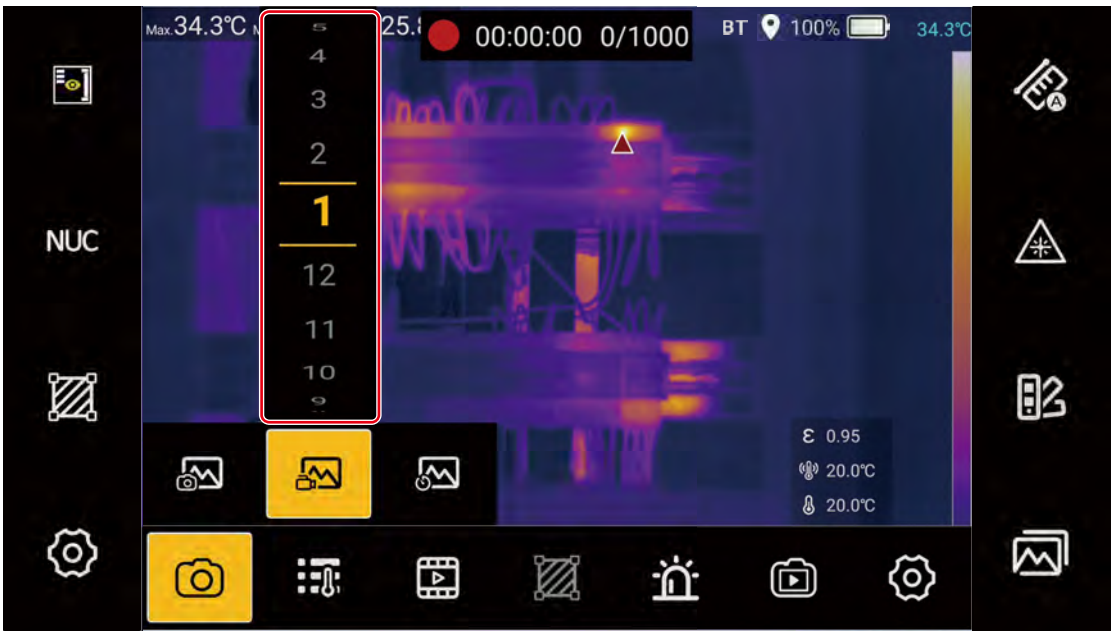


Figure 14. Set Frame Rate

Timer

Before starting the Timer function, you can set the interval in advance. Set the Timer between 1 s and 60 m 59 s.

To set timer:

1. On the Main System Menu, tap .
2. In the menu, tap .
3. Slide on the wheel shown above the icon to select the corresponding minute and second values. See *Figure 15*.

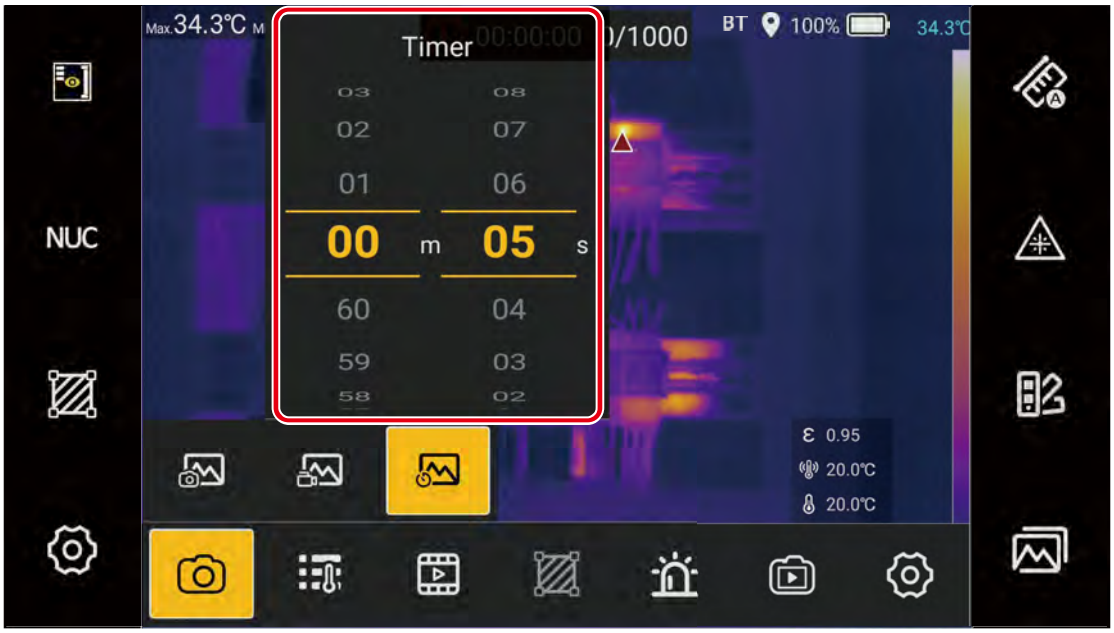


Figure 15. Timer

Measurement Settings

The Measurement Parameter Setting Menu is shown in *Figure 16*. The description of each icon is shown in *Table 10.*

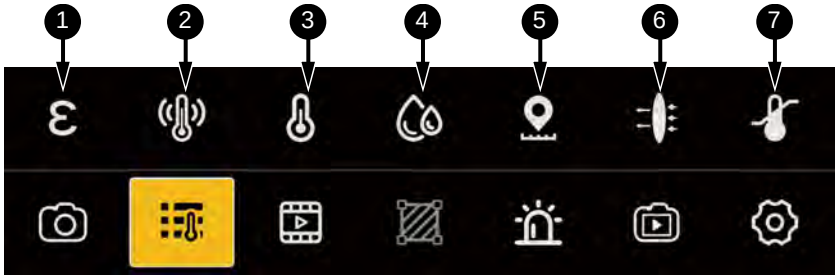


Figure 16. Correction Parameter Configuration

Table 10. Correction Parameters

No.	Description
❶	**Emissivity** The actual emissivity of the target under measurement.
❷	**Reflected Temperature** Change background temperature to compensate for or correct the background thermal radiation reflected from the target under measurement.

Table 10. Correction Parameters (cont)

No.	Description
❸	**Environment Temperature**
❹	**Humidity**
❺	**Distance**
❻	**Optical Transmittance**
❼	**Base Temperature**

Emissivity

Emissivity refers to the ratio of the energy radiated by the object under measurement to the energy radiated by a black body at the same temperature and wavelength, and it is between 0 and 1.

All objects radiate infrared energy. The actual surface temperature and emissivity of the target affects the quantity of energy radiated. The Imager senses the infrared energy from the surface of the target and uses the data to calculate an estimated temperature value. Many common materials such as wood, water, skin, cloth, and painted surfaces, including metal, radiate energy well and have a high emissivity factor of ≥90 % (or 0.90). The Imager can accurately measure the temperature of targets with high emissivity.

Shiny surfaces or unpainted metals do not radiate energy well and have a low emissivity factor of <0.60. Adjust the emissivity settings for the Imager to accurately measure targets with low emissivity.

⚠⚠ Warning

To prevent personal injury, see emissivity information for actual temperatures. Reflective objects result in the temperature reading to be lower than it actually is. These objects pose a burn hazard.

The Imager emissivity settings include Full-Screen Emissivity Correction and Area Emissivity Correction. For Area Emissivity Correction settings, see *ROI Operation*.

To set full-screen emissivity:

1. In **Measurement Settings** menu, tap .
2. To customize material emissivity, slide up and down the emissivity values (0.01 to 1.0) on the left side of the screen.
3. If the material of the object under measurement is known, you can slide up and down the Material Emissivity Reference Table on the right side of the screen to select the corresponding material.
4. Tap the screen outside the pop-up window or push  to return.

Reflected Temperature

Reflected temperature is used to compensate or correct the thermal radiation reflected from the target under measurement. When the target is surrounded by very hot or very cold objects, the measurement accuracy can be affected, especially when the surface emissivity of the target is low. Adjust reflected background temperature to improve measurement accuracy.

To set reflected temperature:

1. First use the Imager to test the actual temperature of the reflector near the target.
2. Tap .
3. Slide the screen up and down to set the Reflected Temperature to the temperature of the reflector measured by the Imager.
4. Tap other areas of the thermal image screen or push  to complete the Reflected Temperature settings.

Environment Temperature

Environment temperature refers to the air temperature between the Imager and the target.

To set environment temperature:

1. Tap .
2. Slide the screen up and down to set Environment Temperature value to the actual air temperature.
3. Tap other areas of the thermal image screen or push  to complete the Environment Temperature settings.

Note

Environment Temperature is usually a default value, set the Environment Temperature only when the air temperature is higher than the actual temperature of the target under measurement.

Humidity

The Imager can compensate for the local effects of air humidity on thermal radiation transmission. Make sure to set the humidity correctly.

To set humidity:

1. Tap .
2. Slide the screen up and down to set the humidity percentage to the actual value.
3. Tap other areas of the thermal image screen or push  to complete the settings.

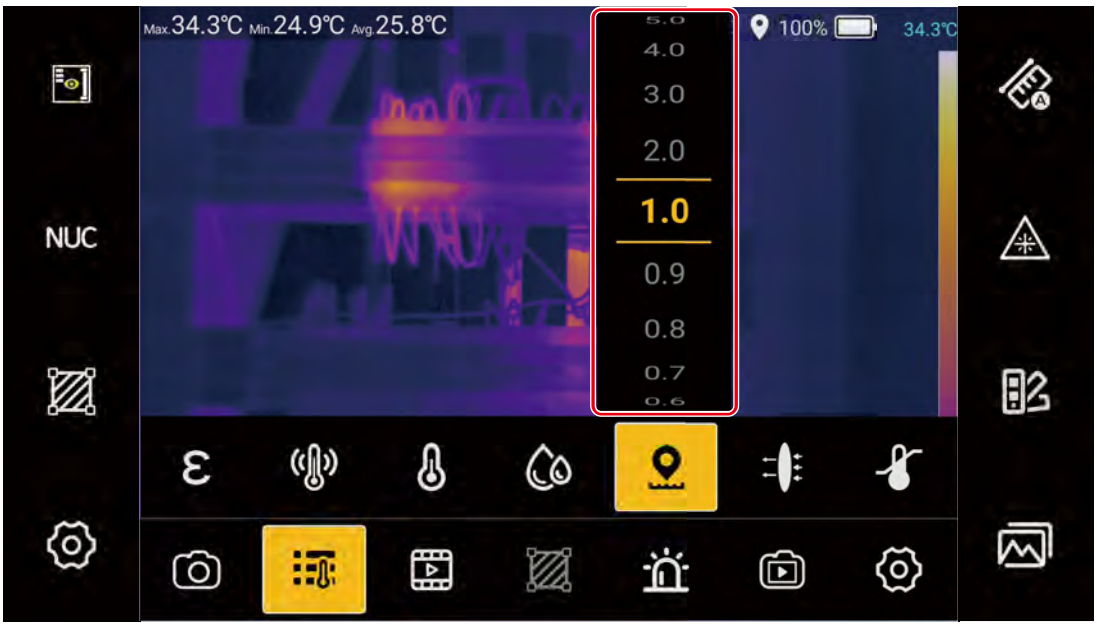
Note

For short distances and normal humidity, humidity is usually a default value for the Imager.

Distance

The Distance refers to the distance between the target under measurement and the Imager lens. Use distance to compensate for:

- The thermal radiation from the target being measured absorbed by the air between the target and the lens.
- Thermal radiation from the air itself detected by the Imager.



To set distance:

1. Tap .
2. Slide the distance value on the screen up and down to set the distance value to the actual distance between the target under measurement and the Imager lens.
3. Tap other areas of the thermal image screen or push  to complete the settings.

Transmittance

Optical transmittance refers to the transmittance of external lens or IR window used in front of the Imager lens.

When IR inspection is performed through an IR window, not all of the IR energy emitted by the target is transmitted through the optical material of the window. If the transmittance of the window is known, the transmittance percentage can be adjusted in the Image or the SmartView IR software to improve measurement accuracy.

To set transmittance:

1. Obtain the actual transmittance of the external lens or external IR window.
2. Tap .
3. Slide up and down the transmittance values on the screen (0.01 to 1.0) to set it to the actual values measured.
4. Tap other areas of the thermal image screen or push  to complete the settings.

Note

If optional external optical lens has been calibrated at the factory, or there is no external infrared window, optical transmittance is usually the default value of the Imager.

Base Temperature

After Base Temperature is enabled, the temperature value displayed on the full screen (including full screen temperature and marker temperature) is the difference between the actual temperature and the reference temperature. *Figure 17* shows a comparison of measurement readings before and after applying base temperature.



Before After

Figure 17. Before and After Applying Base Temperature

View Mode

The view modes supported by the Imager include IR, DC and Picture-in-Picture (PIP) mode.

The View Mode Settings menu is as shown in *Figure 18*, and the meaning of each icon is shown in *Table 11*.

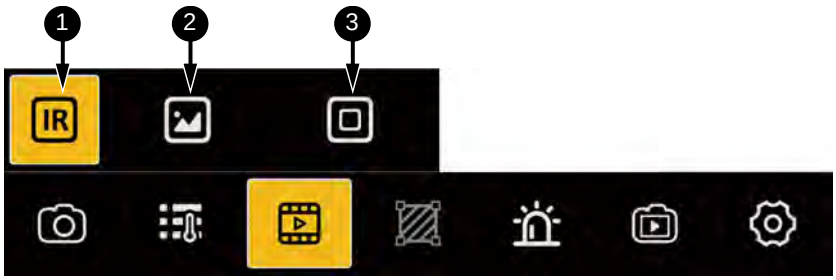


Figure 18. View Mode Selection

Table 11. View Mode Selection

No.	Tool	Description
❶	IR	**IR Mode** In this mode, the screen shows infrared images; push to save a single-frame thermal image.
❷		**DC Mode** In this mode, the screen shows visible light images shot by the digital camera.
❸		**PIP Mode** In this mode, an infrared thermal image is superimposed on a digital photo. You can adjust the position and transparency of infrared images. See *PIP Mode* for details.

PIP Mode

In Picture-in-Picture (PIP) mode, an infrared thermal image is superimposed on a visible digital photo, as shown in *Figure 19*.

When you select Picture-in-Picture ( ) mode, the PIP menu appears so you can adjust the image.

In PIP mode, push to save a thermal image and a visible photo associated with it.

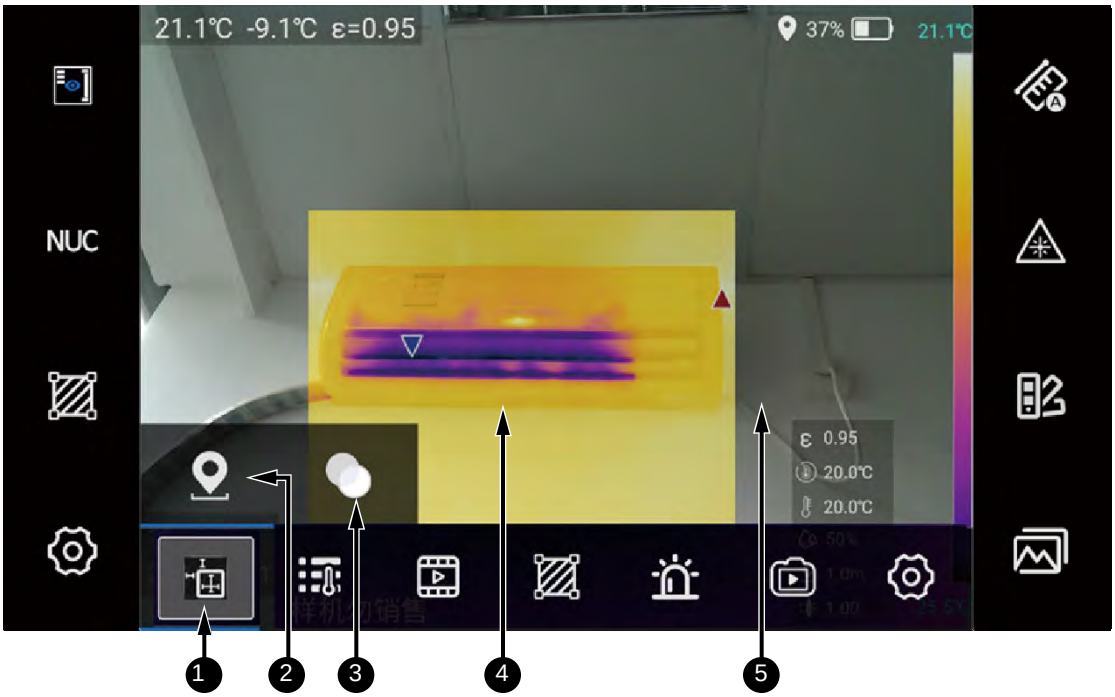


Figure 19. PIP Mode

Table 12. PIP Mode

No.	Tool	Description
❶		**Adjustment Menu**
❷		**Position** Adjust the position so the infrared image is in the desired position.
❸		**Transparency** Adjust the transparency of infrared images.

The Infrared lens and the visible lens use two independent optical paths. When you change the distance to the target under measurement, the picture-in-picture can overlap and misalign. Use the Position Adjustment function for fine-tuning.

To adjust position:

1. In the PIP mode menu, tap .

   The System menu is replaced by the Position Adjustment wheel.

2. Use your finger to slide the wheel left and right and observe the changes of the image on the screen. Adjust the position of the infrared image and the visible image to coincide with each other.

3. Tap **X** or push  to complete the PIP position adjustment.

To adjust transparency:

1. In the PIP mode menu, tap .

   The System menu is replaced by the Transparency Adjustment icon and the current value is shown. The adjustment range is 0 to 1.0.

2. Tap  to reduce the transparency of an infrared image or  to increase the transparency of an infrared image according to field measurement requirements. 0 indicates the infrared image is completely transparent, 1.0 indicates the infrared image is completely opaque.

3. Tap **X** to complete the transparency adjustment settings.

Note

In the picture-in-picture (PIP) mode, make sure that the Imager is accurately focused. Otherwise, the temperature measurement accuracy of the Imager is affected.

Measuring Tools

The Imager has a set of measuring and analysis tools, such as the measurement of maximum/average/minimum temperatures and temperature differences in a specific area.

To access the Measuring Tools menu, tap  (left Shortcut Menu Area) of the Home screen, or tap  from the System menu, as shown in *Figure 20*.

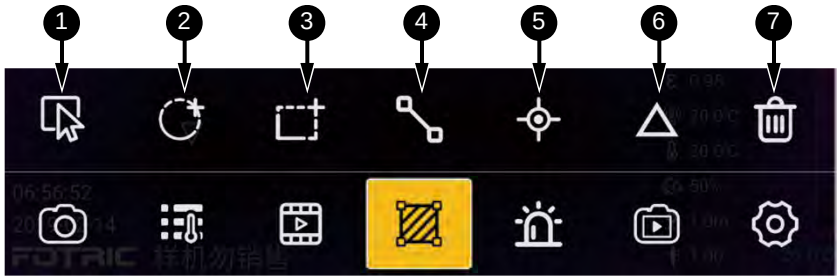


Figure 20. Measuring Tools

Table 13. Measuring Tools

No.	Tool	Description
❶		**Select** Select an appropriate ROI.
❷		Circle (Ar) Add a measurement area of circle.
❸		**Rectangle (Ar)** Add a measurement area of rectangle.
❹		**Line (Li)** Add a line measurement.

Table13. Measuring Tools (cont.)

No.	Tool	Description
5		**Spot (Sp)** Add a point measurement.
6		**Temperature Difference** A temperature difference calculation tool that can calculate temperature difference between temperature measurement markers or between temperature measurement markers and fixed temperature values.
7		**Delete** Delete all ROIs.

ROI stands for Region of Interest.

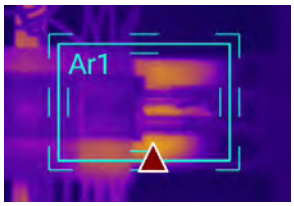
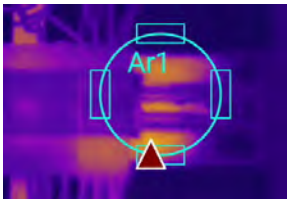
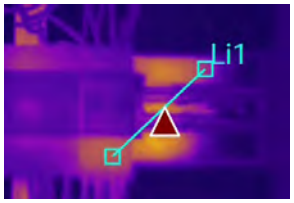
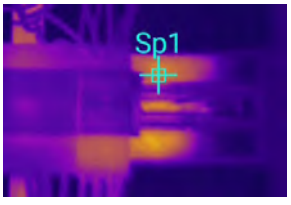
ROI can be a circle, a rectangle, a line or a spot. The name of a circle is prefixed with **Ar**, that of a rectangle is **Ar**, that of a line is **Li**, and that of a point is **Sp**.

On-screen display shows the ROI shape, name, the highest temperature point and its temperature value, the lowest temperature point and its temperature value, and the emissivity of different ROIs.

To add a ROI

1. On the live image screen, the image freeze screen, or the image screen in the Gallery, tap .
2. Tap to select a measuring tool from the menu at the bottom of the screen.
3. Draw a ROI in the corresponding area of an image. The method for drawing a ROI varies slightly depending on the tool selected, see *Table 14*.

Table 14. Draw a ROI

Tool	Methods
	Rectangle (Ar) Tap to automatically add a rectangle to the image area. The rectangle has control points at each corner. Tap other positions in the thermal image, and the control point marks of the rectangle disappear, indicating that the rectangle is not currently selected. The default name of the ROI is in the form of "Ar+number", where the number refers to the serial number of the rectangular area. 
	Circle (Ar) Tap to automatically add a circle to the image area to designate a circular temperature measurement area.  The name of the circle is prefixed with Ar.
	Line Tap the icon to add a line to the image area.  The name of the line is prefixed with Li.
	Spot Tap the icon to add a cross mark to the thermal image.  Its name is prefixed with Sp.

ROI Operation

After a ROI is established, you can do a series of operations.

To select a ROI:

1. In the Measuring Tool menu, tap .

   A list of all current ROIs appear above the tool icon, as shown in *Figure 21*.

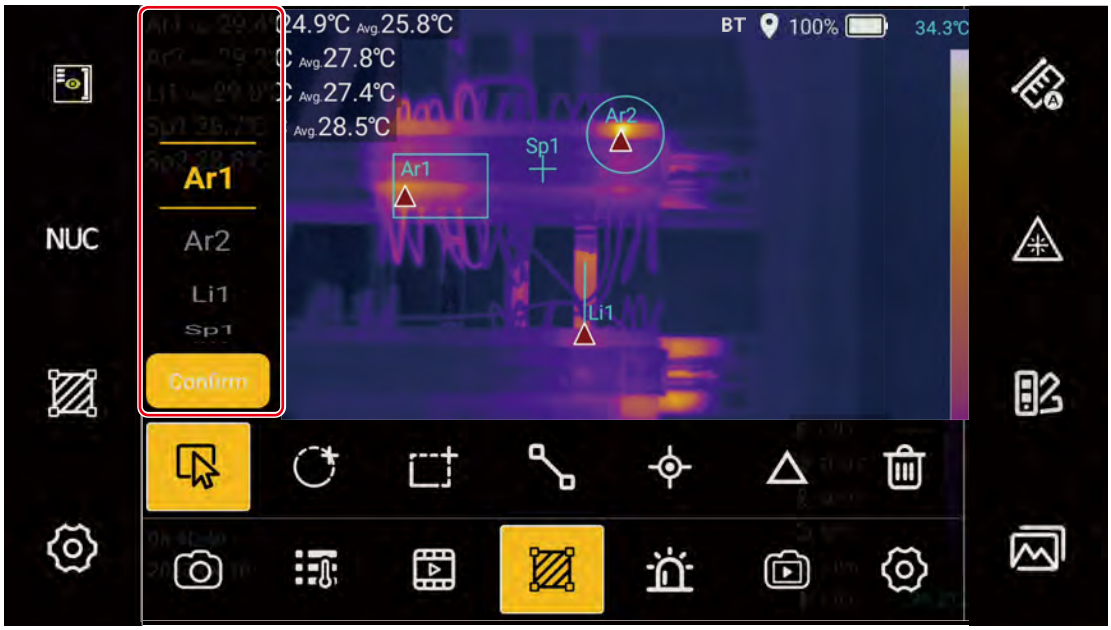


Figure 21. Select a ROI

2. Swipe up and down in the ROI selection area on the left side of the screen to select the ROI to be adjusted.
3. Tap **Confirm**.

   The temperature information of the selected ROI show in green at the top left of the screen and the outline of the selected ROI is highlighted.

   A series of ROI tools show at the bottom of the screen, as shown in *Figure 22*, where the ROI Ar2 is selected.

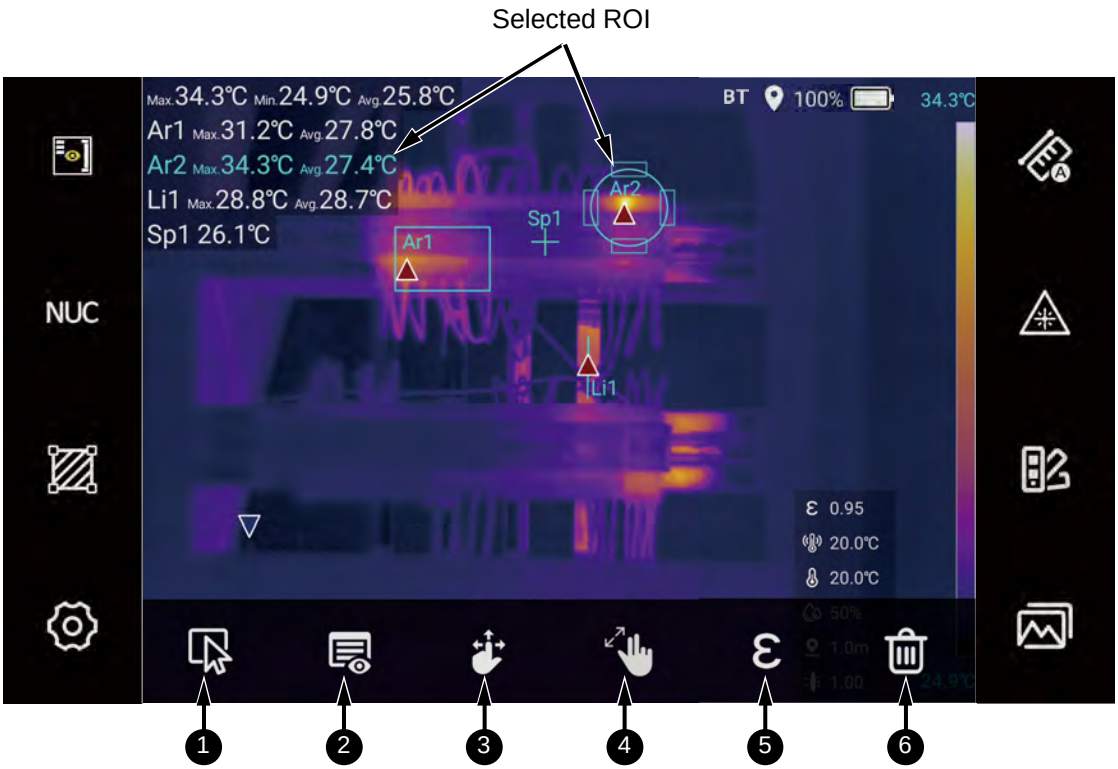


Figure 22. ROI Adjustment Tools

Table 15. Adjustment Tools

No.	Tool	Description
❶		**Select** Select an ROI.
❷		**Display set** Customize the ROI information of the On-screen Display including Max, Min, Avg, Marker, and Emissivity.
❸		**Move** Move an ROI.
❹		**Resize** Adjust the ROI size
❺		**Emissivity** Set the emissivity of a ROI.
❻		**Delete ROI** Delete the ROI selected.

To move an ROI:

1. Tap  in the menu area.
2. Use  to move the selected ROI in 4 directions.

Or

Tap and hold the ROI and move the ROI to the position you want to observe.

To adjust an ROI:

1. Tap  in the menu area.
2. Use  to adjust the selected ROI in 4 directions.

   Or

   Tap and hold the ROI outline, and swipe up, down, left, and right to adjust the size of the ROI.

To set the emissivity of an ROI:

1. Tap  in the menu area.

   An interface for customizing emissivity values and an emissivity table shows on the screen. You can customize the emissivity values or set the values in the emissivity table.
2. Set the emissivity for this ROI. The procedure for setting emissivity of ROI is like that for setting emissivity of full screen, see *Emissivity* for details.

To set the ROI display

1. Tap  in the menu area.

   The display set interface is shown in *Figure 23*.
2. Tap a switch button to enable or disable the display of the corresponding information.

   When the button is on the right (colored), the information is shown. When the button is to the left (gray), the information does not show.

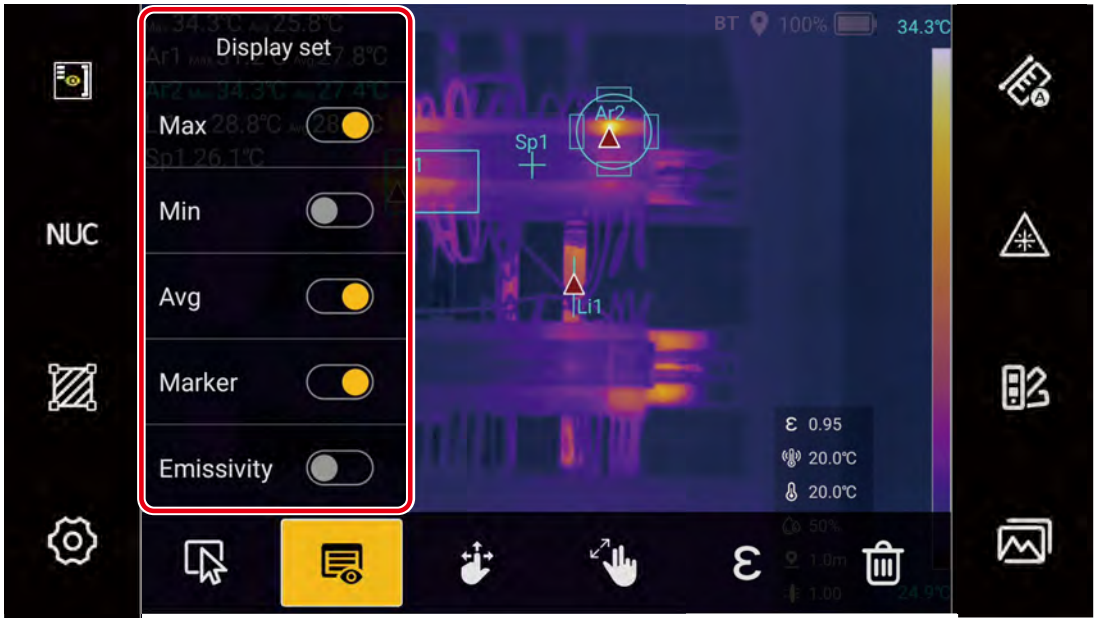


Figure 23. ROI Display Set

To delete an ROI:

1. Select an ROI and tap  in the menu area.

   To delete all ROIs, see *Table 13*.

2. When you are done, tap other area of the screen, or push .

Temperature Difference Calculation

You can set temperature difference calculation between temperature measurement markers or between a temperature measurement marker and a fixed temperature value.

To set temperature difference calculation:

1. In the Measuring Tools menu, tap .

   The interface for temperature difference calculation settings show on the screen, see *Figure 24*.

   In the interface of temperature difference calculation settings, the first column is function switch, followed by **Condition1**, **Condition2** and **TREF**.

   The temperature difference is calculated as: **Temperature Difference = Condition1 – Condition2**.

2. Turn on the function switch.

3. Select **Condition1** and **Condition2** as required.

   The options for **Condition1** and **Condition2** includes, if applicable, the maximum temperature, the minimum temperature, and the average temperature of each ROI. The **Condition 2** also includes TREF.

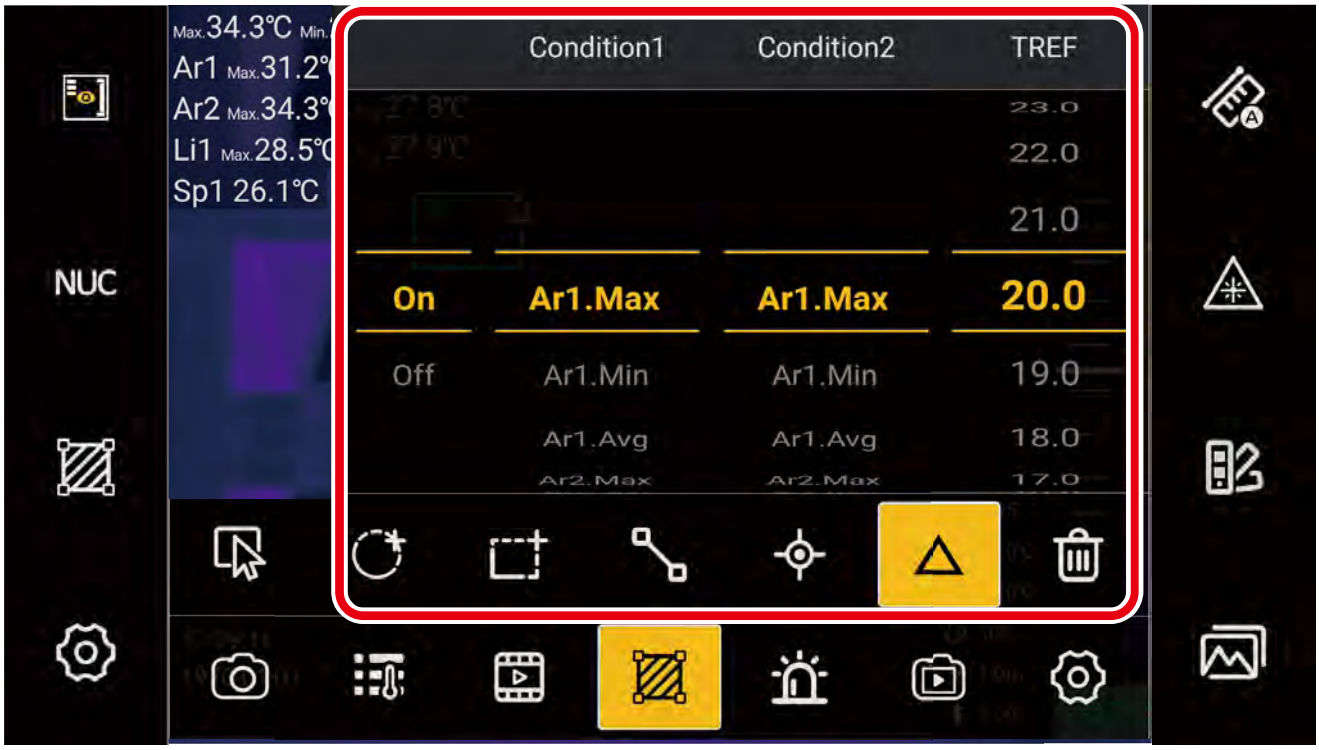


Figure 24. Temperature Difference Calculation Settings

4. If **Condition2** is selected with **TREF**, you must set TREF correctly.
5. After completing all settings, tap other areas of the screen, or push . The temperature difference calculation formula and the temperature difference value show on the Home screen.

Audible Alarm

The Imager provides high and low temperature audible alarms, so you can set an upper and/or lower temperature limit. When the measured temperature is higher than the upper limit or lower than the lower limit, a sharp and rapid beep is triggered to alert users.

To set an audible alarm:

1. Tap in the System menu to display the interface for audible alarm settings on the screen.
2. Set the **High Temperature** and/or **Low Temperature** to **On**.
3. In the **High Temperature** and/or **Low Temperature** column, slide up and down to select a temperature value.
4. After completing all settings, tap other areas of the screen, or push .

Non-Radiometric Videos

The Imager can record non-radiometric videos, including non-radiometric IR videos and non-radiometric visible light videos. The type of video recorded depends on view mode settings, see *View Mode*.

To record a non-radiometric video:

1. Tap  in the system menu and the Imager prompts to start recording. Push **OK**.
2. Tap **Start Now** in the pop-up dialog box. If you do not want to be prompted next time, check N**o prompt any more** option.

   The Imager immediately starts recording a non-radiometric video and the recording indicator and duration of recording show at the top of the screen.
3. To stop video recording, push  once, the Imager will stop recording and save the recorded video immediately, and briefly display the saved file name and thumbnail at the bottom of the screen, as shown in *Figure 25*.

   A non-radiometric video is named `VD_date_SequenceNumber.mp4`.

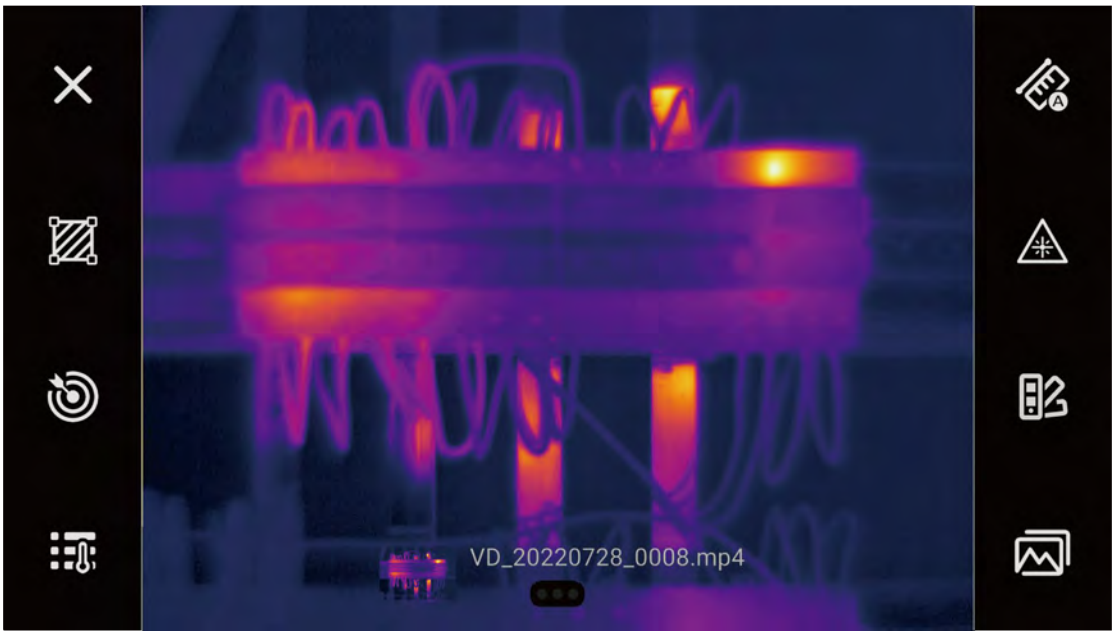


Figure 25. Record a Non-radiometric Video - Pause

The Imager restores the live image screen and you can continue recording a video or perform other operations.

Settings

The Settings menu mainly contains some system settings of the Imager itself. When necessary, use this menu to restore the Imager to the factory settings.

To enter Settings menu:

1. On the Menu screen, tap  at the bottom of the screen.

   The options show on the main display area of the Imager. For details, see *Table 16*.

Table 16. Settings Menu

Item	Options	Description
Language & DateTime	**Language**	Select the language for the interface.
	Time Zone	Select the local time zone. The default time zone is GMT+08:00 Hong Kong/China.
	Date	Set the year, month, and day of the built-in calendar in the Imager.
	Time	Set the time for the built-in clock in the Imager.
Unit	**Temperature Unit**	The Imager offers a wide selection of temperature units.
	Distance Unit	The Imager offers a wide selection of distance units.
Image & Display	**TFocus**	Choose to enable or disable TFocus. See *TFocus Technology* for details. The default setting is: Off.
	TWB	Choose to enable or disable the high temperature differential imaging technology (TWB). See *TWB Technology* for details. The default setting is: Off.
	Information displayed on an image	Set the information that shows on an image: • Global maximum temperature • Global minimum temperature • Global average temperature • Emissivity • Reflected temperature • Environment temperature • Humidity • Test distance • Optical transmittance *Note* *The emissivity shown here is the full screen emissivity displayed at the bottom right, see* ROI Operation *for emissivity of ROIs*

Table 16. Settings Menu (cont.)

Item	Options	Description
Accessibility	**Location Services**	Enable or disable the GPS function. The default setting is: Off
	Sounds	Adjust the sound volume. The default setting is: 70 %
	Screen brightness	Adjust the screen brightness. The default setting is: 50 %
	Screen-off time	Enable or disable the auto screen-off function and adjust the time before screen turns off. The default setting is: Never (The screen-off function is disabled.)
	Auto sleep	Enable or disable the auto sleep function of the Imager. If the function is enabled, the Imager will automatically enter sleep mode after the screen is off for 5 minutes. The default setting is: Off.
	Flashlight	Turn on or off the LED Flashlight function. The default setting is: Off
	HDMI	Enable or disable the video streaming output of the HDMI video interface. The default setting is: Off
	AI NUC	Enable or disable the AI NUC.
	Eyepiece	An external electronic eyepiece can be connected to the HDMI interface.
Bluetooth	**Bluetooth On/Off**	Tap the Bluetooth button to enter the sub-menu for Bluetooth connection. When Bluetooth is enabled, the button shows in yellow. The default setting is: Off.
	Headset	When Bluetooth is enabled, tap Headset, select the Bluetooth headset that can be searched to complete the pairing of Bluetooth devices. When the pairing is successful, “Connected” shows.
Temperature Range	**Select**	When measuring temperature, an appropriate temperature range should be set in advance. If the displayed temperature value exceeds the selected range, a < or > symbol shows in front of the value.
Storage & Save	**Image format**	General format/State grid format
	SuperResolution	Turn on/off the SuperResolution function that can increase the pixels of the captured thermal image by 4 times. The default setting is: Off.
	Visible light camera	Turn on/off the visible light camera. When the visible light camera is turned on, the current visible light image will be saved. The default setting is: Off.

Table 16. Settings Menu (cont.)

Item	Options	Description
	Prompts when saving	Set the prompts when saving images: • **Floating window**. (default) After a thermal image file is captured and saved, the current interface shows the file information for 1 to 2 seconds. • **None**. There are no prompts when a thermal image is captured and saved. • **Dialog**. After a thermal image file is captured and saved, the file information shows in a dialog box. Tap other areas of the screen, or push , to close the dialog box.
	Storage location	The storage location can be set to the internal storage or an external SD card. When there is no memory card, this option is grayed out and cannot be modified.
	Internal storage	Display the current internal storage usage.
	External storage	Display the current storage usage of the SD card.
	Uninstall the SD card	To remove the SD card from the Imager, tap **Uninstall SD card**, to prevent data loss and damage to the SD card.
Reset	**Restore to factory defaults**	Parameters are reset to factory default settings.
	Delete all files	Delete all saved files
The Imager information	**Model**	Model information
	Serial Number	Serial number
	Software version	Software version information
	System version	System version information
	The Imager version	Version information for the Imager
	Lens	Lens focal length.
	Status information	Status information.
	System upgrade...	Upgrade the system (upgrade package file is required).

Note

*If you forget to modify some parameters during the test and it affects the imaging and temperature measurement accuracy, use **Restore to factory defaults** to reset the parameters to factory defaults. The Imager automatically restarts after the parameters are restored to default settings.*

Note

*To delete all test data from the Imager, use **Delete all files**, the Imager deletes all the files in the storage and the files cannot be recovered, then the Imager automatically restarts.*

Regional Intelligent Temperature Span Adjustment

Use the regional intelligent temperature span adjustment function if you take a thermal image on site and need to adjust the temperature span of some specific areas in the thermal image. In addition to the manual temperature span adjustment function, Fluke recommends you use the regional intelligent temperature span adjustment function, to detect abnormal phenomena and small temperature differences in the relevant images. You can get correct diagnosis conclusion quickly on site.

To use the regional intelligent temperature span adjustment function:

1. Tap ••• on the Home screen to show the additional system function buttons.
2. Tap ⚙ of the Imager to enter the main interface of the system settings.
3. Tap **Image & Display** to enter the Image & Display sub-menu.
4. Tap **TFocus** in the System menu to disable it.
5. Push ▭ once to enter the image freeze screen.
6. Tap ◎ to use the regional intelligent temperature span adjustment function.

   The Target ROI appears in the middle of the screen. After the Target ROI is enabled, the suitable temperature span of the ROI is calculated automatically and the threshold is adjusted, and the ROI is highlighted.
7. You can move, enlarge, or shrink the ROI to select the area to adjust. See *ROI Operation*.
8. You can enable or disable the function on the Analysis interface, see *Settings*.

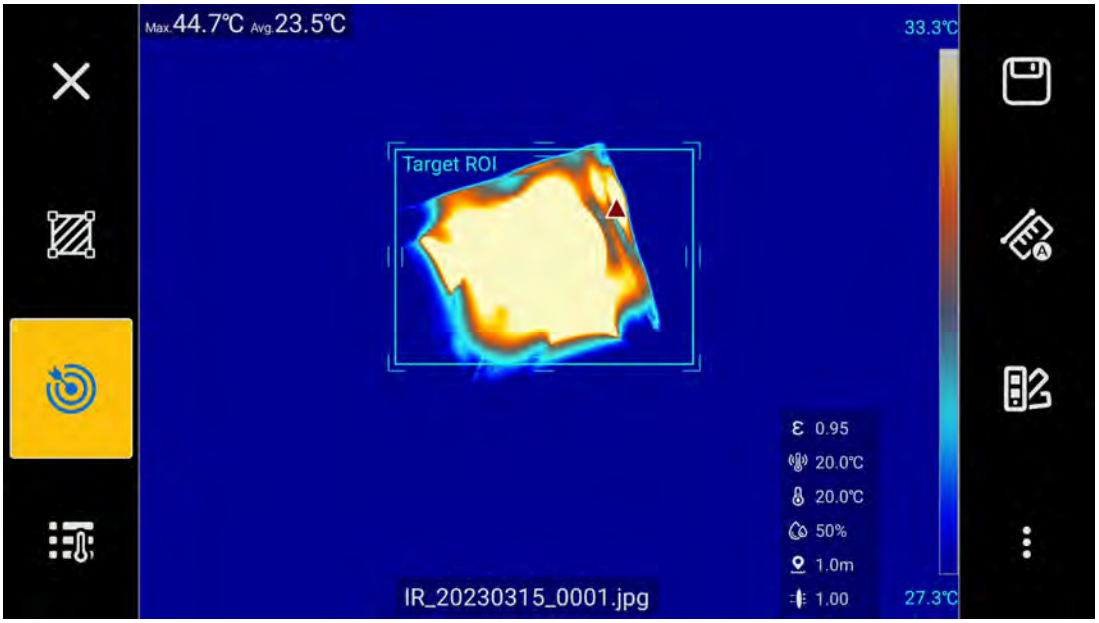


Figure 26. Regional Intelligent Temperature Span Adjustment

TWB Technology

In general, the thermal image color is uniformly distributed in a linear way (linear color distribution) from the lowest to the highest temperature.

If there are many high-temperature interference sources on site, and the interference and the target under measurement all appear in the same field of view, then the greater the temperature difference between them. This makes it more difficult for the linear color distribution to clearly show the thermal gradient of the target under measurement. An example of such case is shown in *Figure 27*.



Figure 27. The Image Before TWB Technology

The TWB technology can help you clearly display the thermal gradient details of all target objects in high temperature difference scenario, as shown in the *Figure 28*.

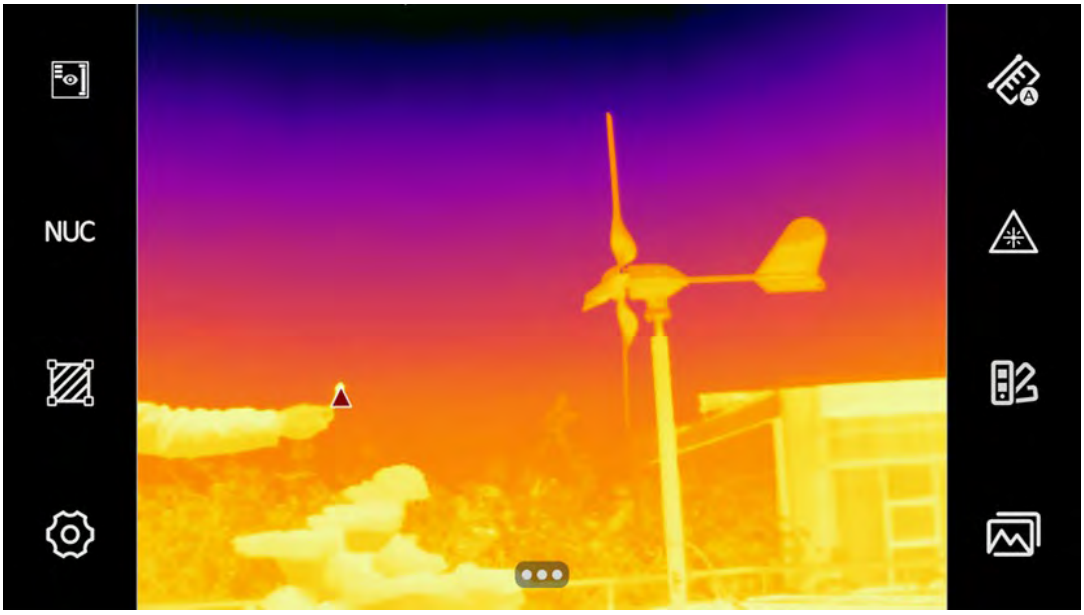


Figure 28. The Image After TWB Technology

To use the TWB technology:

1. Tap ••• on the Home screen.

2. Tap  to enter the main interface of the system settings.
3. Tap **Image & Display** to enter the Image & Display sub-menu.
4. Tap **TWB** in the view mode sub-menu to enable the TWB function.
5. Push , then the Imager will distribute colors based on the thermal imaging content of the image (histogram color assignment). The temperature scale on the right side of the screen shows the maximum and minimum temperatures for the current temperature span.

TFocus Technology

If the target under measurement is in a very complex scenario, you must distinguish the thermal gradient details of the target. Fluke recommends you use the TFocus technology to enhance the display of specific targets and automatically shield background interference sources. TFocus analyzes the subtle temperature difference of specific targets in complex scenario to get the correct diagnosis conclusion quickly on site.

To use TFocus technology:

1. Tap  on the Home screen of the Imager to call up the hidden system function.
2. Tap  to enter the main interface of the system settings.
3. Tap **Image & Display** to enter the Image & Display sub-menu.
4. Tap **TFocus** in the View Mode sub-menu to enable the TFocus function.
5. Push  once to enter the image freeze screen.
6. Tap  to use the TFocus technology.

   The ROI appears in the middle of the screen, and the temperature values at the top and bottom of the color band on the right side of the Imager screen automatically show the highest and lowest temperatures in the ROI.
7. You can move, enlarge, or shrink the ROI to select the target under measurement for enhanced display. See *ROI Operation* for ROI operations.

   The image in the selected target ROI is enhanced with the color of the current palette and the color of the rest of the thermal image displays in gray.

8. You can enable or disable the function on the Analysis interface, see *Settings*.

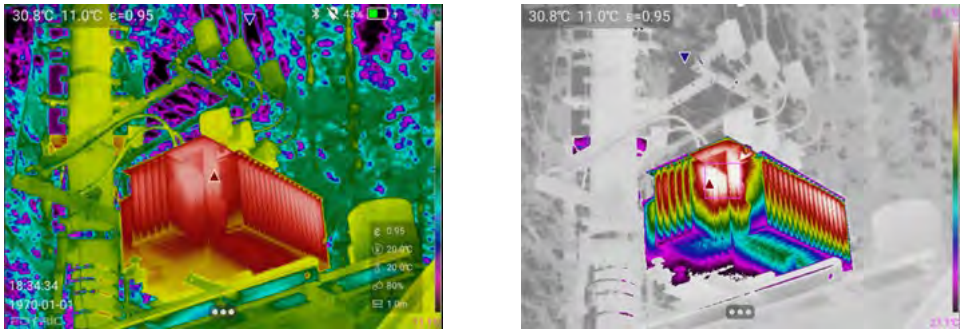


Figure 29. Image Comparison Before and After TFocus Technology

Thermal Image/Video Analysis

The Imager has measuring and analysis tools in the Image Freeze and Gallery View interfaces. The Imager can accurately diagnose and analyze the target at the test site without analysis software for PC.

Depending on different capture modes, the images that can be analyzed include:

- Fully-Radiometric Thermal Images
- PIP Images
- Fully-Radiometric Videos

The analysis operation of a thermal image/video is similar whether it is an image/video in the image freeze interface during shooting or an existing file opened from the Gallery.

The following takes an image/video in the image freeze interface during shooting as an example to introduce the thermal image/video analysis. For the analysis of a thermal image/video in the Gallery, the differences, if any, are presented in the form of notes.

Thermal Image

The Image Freeze interface in Thermal Image mode is as shown in *Figure 30*. See *Table 17* for the function and description of each button.



Figure 30. Thermal Image Freeze Screen

Table 17. Thermal Image Freeze Screen

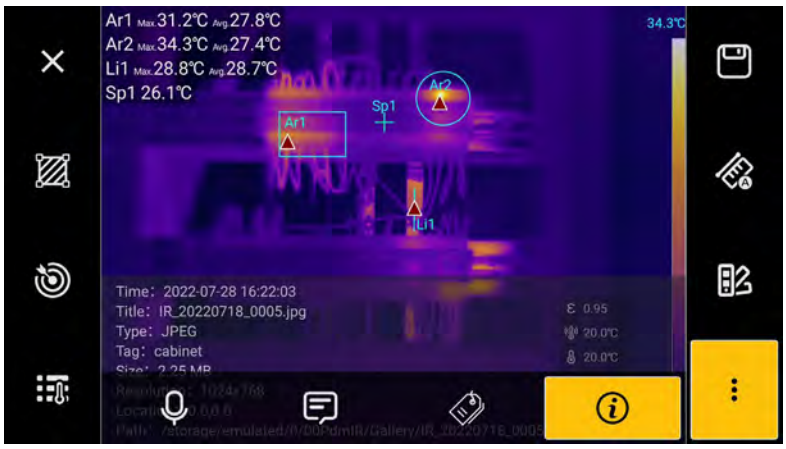
No.	Tool	Description
1		**Close** Tap to exit the current interface or menu bar.
2		**Measuring Tools** Tap to enter the measuring tool sub-menu. See *Measuring Tools*.
3		**ROI** Use to select an ROI that includes **TFocus** and **TWB** functions. See *TWB Technology* and *TFocus Technology* for details.
4		**Measurement Parameters** Use to select full-screen measurement parameters. Tap to enter the sub-menu for modifying full-screen measurement parameters. See *Measurement Settings*.
5		**Save** Tap to automatically save the currently displayed file to the Imager.
6		**Temperature Span** The shortcut button for switching between Auto Span and Manual Span. See *Temperature Span Mode*.

Table 18. Thermal Image Freeze Screen (cont.)

No.	Tool	Description
❼		**Color Palettes** Use to set color palettes. Tap to enter the sub-menu for quickly switching palettes. See *Color Palettes* for details.
❽		**More** Tap to open more function buttons.
❾		**Voice Annotation** Tap to open the sub-menu for voice annotation. You can directly record/play a voice annotation and automatically associate it with a thermal image. See *Voice Annotation* for details.
❿		**Text Remark** Tap to open the sub-menu for text remark. You can directly add and edit text information and automatically associate it with a thermal image. See *Text Remark* for details.
⓫		**Tag** Tap to open the sub-menu for editing tags. You can directly add/delete/manage tag information and automatically associate it with a thermal image. See *Tag* for details.
⓬		**Scanning** Tap to enable the scanning function. You can scan and read the information of a QR code/barcode and automatically associate it with a thermal image. See *Automatically Naming the Thermal Image Files Scanned*.

Note

When opening a thermal image file from the Gallery for analysis, instead of displaying ***Scan*** , ***Info***  *shows in the interface. Tap*  *to see information about the thermal image/video at the bottom of the screen as shown below.*



Picture-in-Picture (PIP)

The image freeze interface in PIP is the same as that of the Thermal Image Freeze mode, see *Table 17*.

Fully-Radiometric Videos

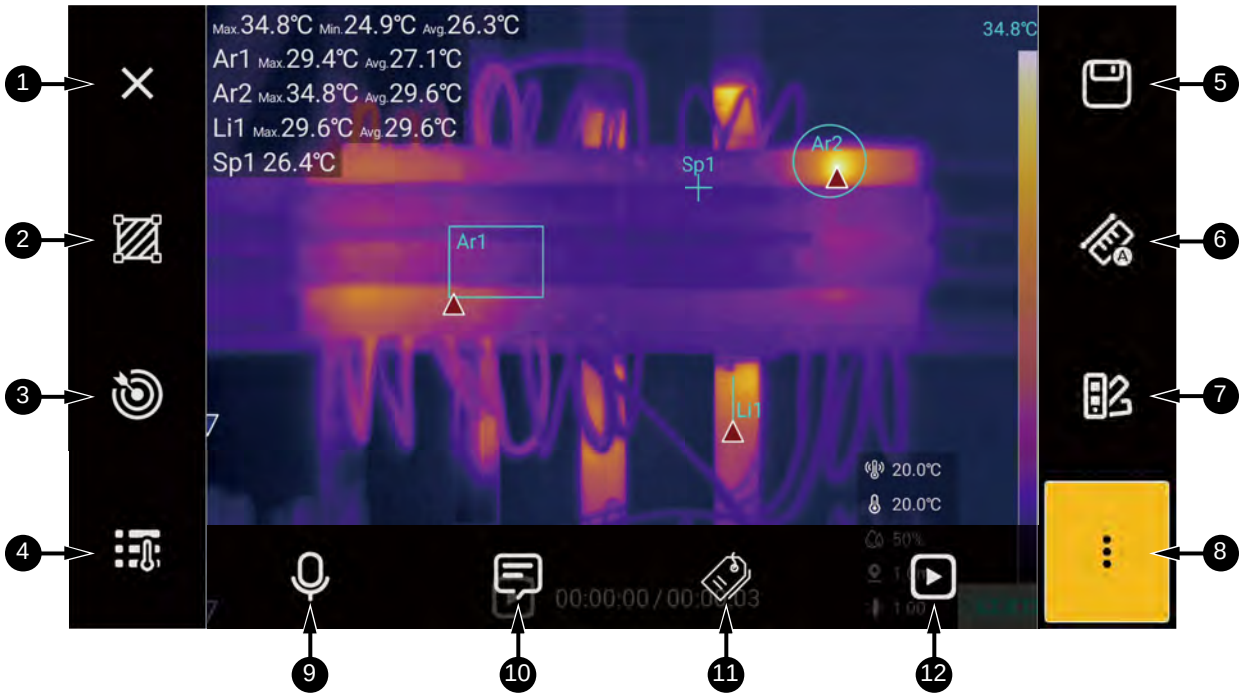


Figure 31. Fully-radiometric Video Freeze Screen

Table 19. Fully-radiometric Video Freeze Screen

No.	Description
1 to 11	 See 1 to 11 in *Figure 30*. See *Thermal Image*.
12	 Use to control videos. Tap  to play thermal videos on the current screen. Tap  to pause the thermal video that is playing on the current screen. When previewing and playing thermal videos, the Play button changes to the Pause button.

Automatically Name Scanned Files

The thermal image files can be automatically named with the information contained in the QR code. The files are saved in the Imager.

When the screen is frozen:

1. Tap .
2. Aim at the QR code to be scanned, the QR code information is read automatically, and a dialog box containing the QR code information will automatically show.
3. Tap **OK**, the name of a thermal image file shows at the bottom of the Imager screen.
   - In IR mode, the name format of the thermal image file: IR_Date_Sequence Number_QR code content.file format.
   - In PIP mode, the name format of the thermal image file: Mix_Date_Sequence Number_QR code content.file format.
4. Push  or tap **Save**, the Imager will automatically name a thermal image file with the QR code information and save it.

Note

The QR code used for scanning must be clear, otherwise the Imager may not be able to read it.

Add an Annotation

You can save additional annotation with the thermal image file. Annotation can provide important information about an image (for example, conditions and information about where the image was captured), for reports and post-processing.

Annotation information are added to a thermal image file and can be viewed and edited both in the Gallery and the thermal image analysis software for PC.

Note

Adding annotation to saved thermal image files in the Gallery is similar.

Voice Annotation

You can add voice annotation to thermal image files. With this function, you can record a voice annotation through a connected Bluetooth headset or the Imager microphone.

To add a voice annotation:

1. Tap  to enter the sub-menu for voice annotation.
2. Tap  to start recording. You can also tap to re-record a voice annotation which automatically overwrites and replaces the existing annotation.
3. Tap  to stop recording.
4. Tap  to play the recorded voice annotation.

5. Tap to delete the currently recorded voice and record again.
6. After recording, tap to close the voice annotation interface, and save the annotation to a thermal image file.

Text Remark

You can add a text remark to thermal image files by entering text on the Imager screen.

To add text remark:

1. Tap to enter the sub-menu for text remark.
2. Tap the text box, a soft keyboard will automatically pop up at the bottom of the touch screen.
3. After inputting the text remark, tap the blank area on the screen to exit the soft keyboard.
4. Tap to automatically save the text in a thermal image file.

Tag

You can add a tag to a thermal image file to quickly filter and search the thermal image files in the Gallery.

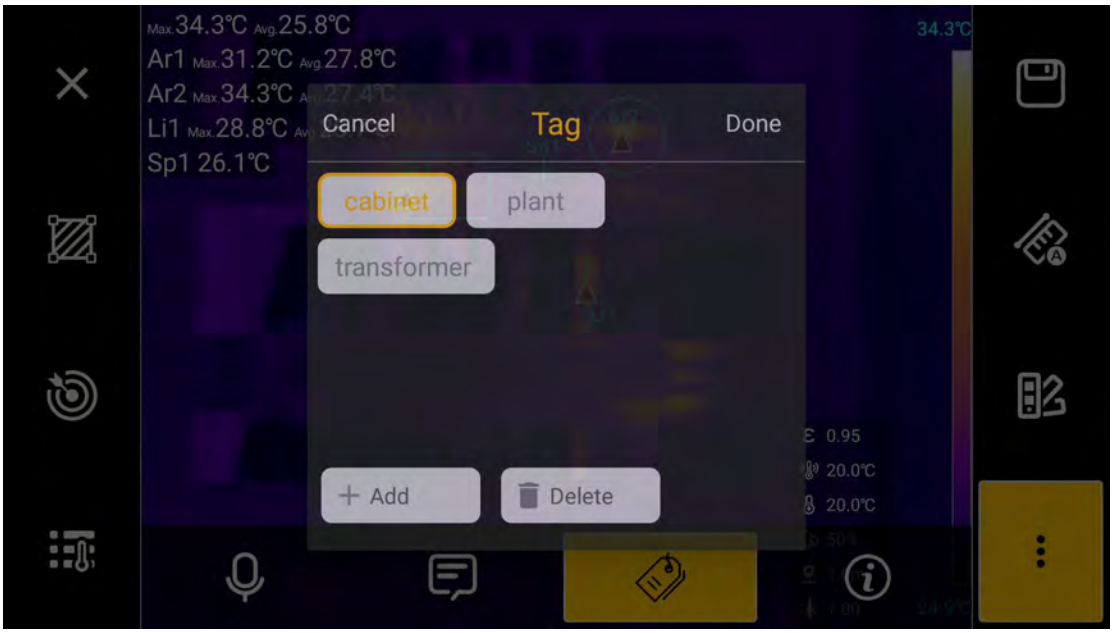


Figure 32. Add a Tag

To select a tag:

1. Tap  to enter the sub-menu for tags.
2. Tap **Add** and tap the text box, a soft keyboard will automatically show, and an appropriate text input method will be applied.
3. After you input a tag, save the tag to the list. Tap the down arrow on the soft keyboard to exit the soft keyboard.
4. Tap **Done** to save the tag; select the tag to be added (highlighted) and tap **Done** to automatically save the tag in a thermal image file.
5. To detach the tag from an image, deselect the tag (not highlighted) and tap **Done**.
6. To delete a tag, select the tag (highlighted in yellow) in the tag list and tap **Delete** and then tap **Done**.

SmartView™ IR Software

You can use the Fluke SmartView *IR* software with the Imager. The software contains functions for analyzing images, organizing data and information, and generating professional reports.

Use the SmartView IR software to:

- Stream fully-radiometric videos
- Create fully-radiometric videos/images
- Analyze images
- Plot data trends
- Export data
- Customize reports

Download and Install the SmartView IR Software

On the PC, go to: https://www.fluke.com/smartview-ir。

1. Download the SmartView *IR* software to the PC according to the instructions on the Product page.
2. On the PC, follow the instructions to install the software. (Administrator privileges are required for the installation.)

For details on remote viewing and control of the Product connected to the SmartView *IR* software, please see the instructions of the software.

Note

Before connecting the Imager to the analysis software for PC, turn off the visible light camera of the Imager. For details, see Settings*.*

Real-time View and Record Fully-Radiometric Video Streaming

To view and record in real-time a fully-radiometric video streaming taken by the Imager on a PC via the Fluke SmartView *IR* software:

1. Turn off the visible light camera on the Imager. See *Settings*.

> Storage & Save >DC Camera>

2. Use the Type-C USB cable provided with the Product, connect the Imager to a PC by plugging the Type-C end into the Type-C interface on the bottom of the Imager and the Type-A end into the PC, as shown in *Figure 33*.

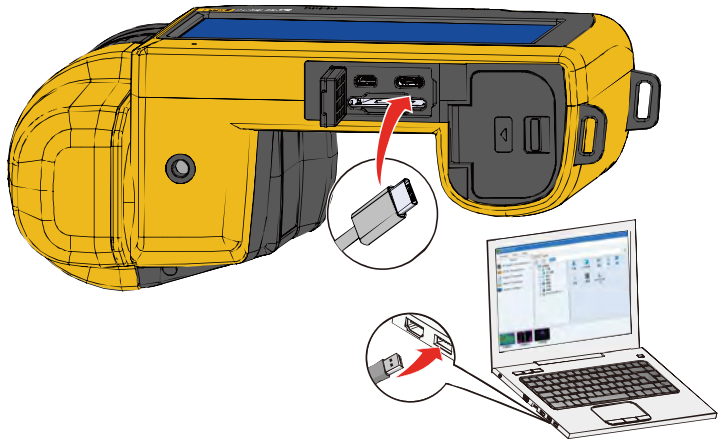
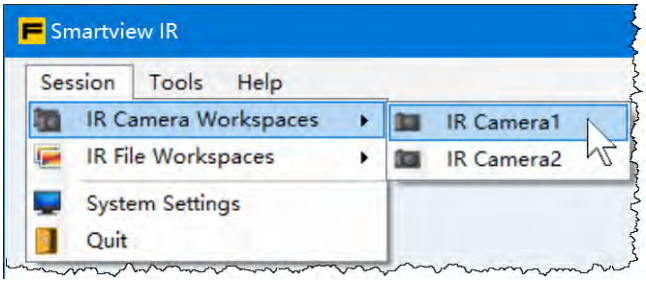


Figure 33. Live Video Streaming Connection

3. On the PC, run SmartView *IR*.
4. In the upper left corner of the Main Window of the SmartView *IR*, click **IR Camera Workspaces** and then select **IR Camera1** or **IR Camera2** from the pop-up menu, as shown below.



5. In the **IR Camera** window of the **IR Camera Workspace** interface, click (**Connect**) in the upper right corner.



6. In the **Connect** dialog box, set **Camera Type** to **zUSB**. Then click **OK** button.
7. Next, follow the instructions in the user manual for SmartView *IR* to view and record the fully-radiometric video stream in real time.

Import and Save Thermal Image Files

To import images captured by the Imager to a PC, use the removable memory card included with the system, or connect the Imager directly to the PC.

To transfer thermal image files to a PC using the removable memory card, use the card reader included with the system or a universal card reader, and copy the files to the appropriate folder on the PC.

The location of the thermal image file on the SD memory card: `SD Card\00PdmIR\Gallery`.

Note

When using a card reader, you may need to install the necessary drivers. Follow the instructions that came with the card reader.

To connect the Imager to a PC

1. Turn off the visible light camera on the Imager. See *Settings*.

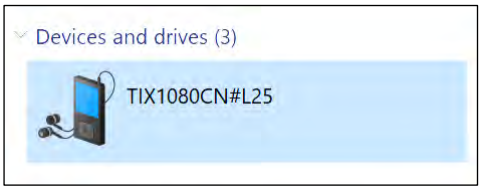


2. Use the Type-C USB cable provided with the Product, connect the Imager to a PC by plugging the Type-C end into the Type-C interface on the bottom of the Imager and the Type-A end into the PC, as shown in *Figure 33*.

Note

Operation on the PC may vary slightly depending on its operating system, but the instructions are similar. See the specific information on the screen for operation.

3. Open File Explorer and click **This PC** in the left column.
4. In **Devices and drives** on the right side of File Explorer window, look for an icon of a multimedia device and the name of the Image below or next to it, for example, TIX1080CN#L25, as shown below.



5. Double click the icon.

   There can be 1 or 2 mobile storage devices, for example, **SD card** and **Internal storage**, that correspond to the external memory card and internal flash memory of the Imager, as shown below.



6. Copy the thermal image files from the SD card or the Imager internal flash memory to a folder on your PC. You can create the target folder according to your standards.

   The location of thermal image files in the SD card (for example): `This PC\TIX1080CN#L25\SD Card\00PdmIR\Gallery`.
   The location of thermal image files in the internal memory is (for example): `This PC\TIX1080CN#L25\ Internal storage\00PdmIR\Gallery`.

Accessories

Table 19 is a list of the accessories available for the Imager.

Table 20. Optional Accessories

Imager Model	Lens	Field of View (FOV)	Spatial Resolution (IFOV)	Minimum Focus Distance	Focal Length
TiX1000 Series	Standard lens	25.0° x 19.0°	0.43 mrad	0.5 m	39.6 mm
	Wide-angle lens	50.0° x 36.9°	0.85 mrad	0.1 m	20.6 mm
	2x telephoto lens	12.0° x 9.1°	0.20 mrad	1.3 m	81.3 mm
	4x telephoto lens	9.5° x 7.2°	0.16 mrad	3 m	102.6 mm
	Macro lens	50 µm	/	97 mm	/
TiX800 Series	Standard lens	25° x 19°	0.68 mrad	0.5 m	25 mm
	Wide-angle lens	50° x 39°	1.36 mrad	1 m	13 mm
	2x telephoto lens	12° x 9°	0.34 mrad	2 m	50 mm
	4x telephoto lens	8° x 6°	0.22 mrad	3 m	-77.4 mm
	Macro lens	50 µm	/	77.5 mm	/
		20 µm	/	9.4 mm	/

Optional Lenses

Use optional telephoto and wide-angle lenses for more infrared inspection applications. For details on how to install or replace a lens, see *Figure 34*.

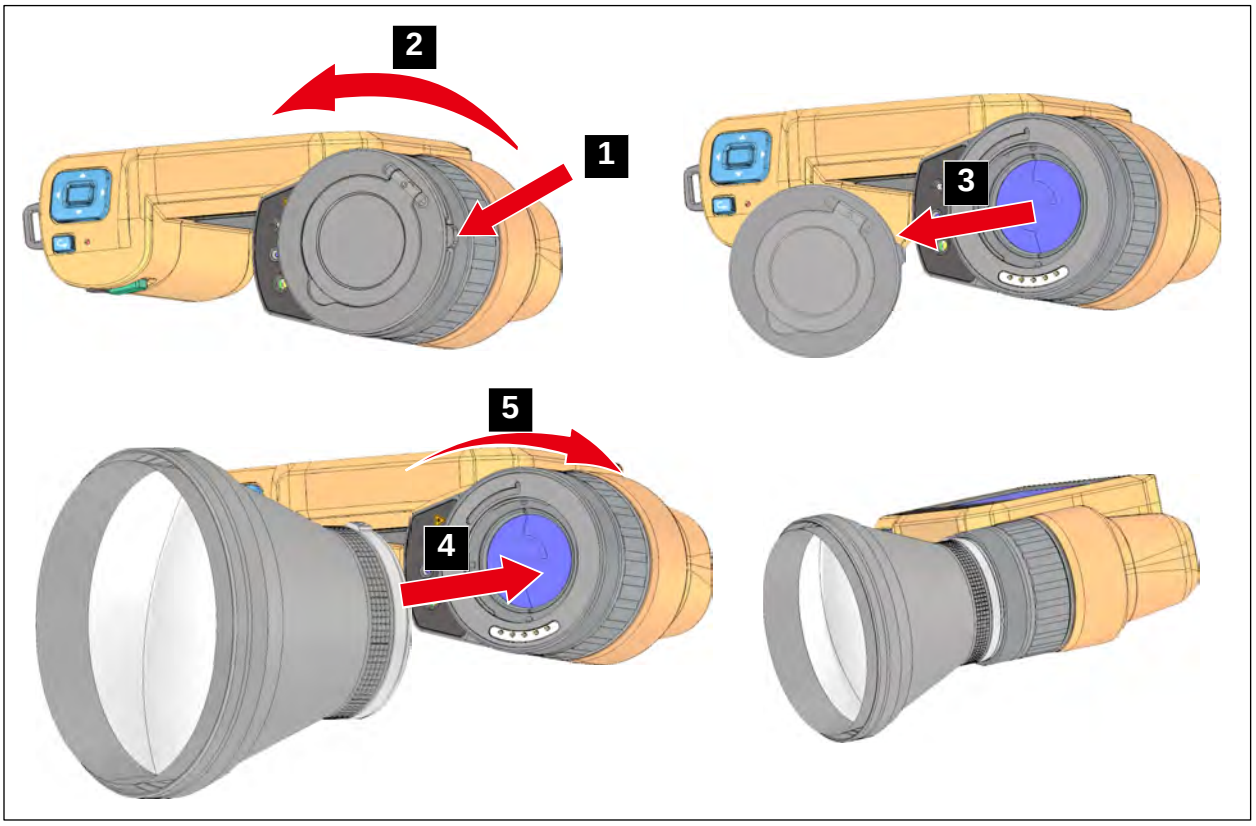


Figure 34. Change Lens

To change the optional lens:

1. Push and hold the buckle on the side of the Imager lens cover.
2. Rotate the lens cover counterclockwise.
3. Remove the lens cover.
4. Pick up the optional lens to be installed, press the buckle on the side of the lens, and align it with the lens mount of the Imager.
5. Rotate the optional lens clockwise and the optional lens is installed when you hear a click.

Maintenance

There are no parts inside the Product requiring repair and maintenance and no special maintenance is needed. Only cleaning and lens care, battery replacement and battery charging are required.

Warning

To prevent eye damage and personal injury, do not open the Product. The laser beam is dangerous to eyes.

Have the Product repaired only through an approved technical service.

Clean the Product

Clean the case with damp cloth and weak soap solution. Do not use abrasives, isopropyl alcohol, or solvents to clean the case or lens.

Lens Care

Caution

To prevent damage to the infrared lens:

- **Carefully clean the infrared lens. The lens has a delicate anti-reflective coating.**
- **Do not clean the lens too vigorously because this can damage the anti-reflective coating.**

To clean the lens:

1. Use a pressurized can of air or a dry nitrogen-ion gun, if available, to blow off the particulates from the lens surface.
2. Soak a lint-free cloth in commercially available lens cleaning neutral solvent.
3. Squeeze the cloth to remove excess liquid.
4. Wipe the lens surface in a circular motion and discard the cloth.
5. If needed, repeat with new lint-free cloth.

Battery Care

⚠ Warning

To prevent personal injury and for safe operation of the Product:

- **Do not put battery cells and packs near heat or fire. Do not put in sunlight.**
- **Do not disassemble or crush battery cells and packs.**
- **Remove the battery to prevent battery leakage and damage to the Product if it is not used for an extended period.**
- **Connect the battery charger to the mains power outlet.**
- **Use only Fluke approved power adapters to charge the battery.**
- **Keep the battery pack clean and dry. Clean dirty connectors with dry, clean cloth.**

⚠ Caution

To prevent damage, do not expose the Product to heat sources or high-temperature environments such as an unattended vehicle in the sun.

To get the best performance from the lithium-ion battery:

- Do not put the battery on the charger for more than 24 hours as reduced battery life may result.
- Charge the battery for at least two hours every six months for maximum battery life. When not in use, the battery will self-discharge in approximately six months. Batteries stored for long periods will need 2 to10 charging cycles for full capacity.

Charge the Battery

Before you use the Imager for the first time, charge the battery for a minimum of two and one half hours.

To charge the battery:

1. Push down the release button on the battery compartment cover.
2. Open the battery compartment cover.
3. Unlock the lock button in the battery compartment and take out the battery.
4. Close the battery compartment cover.
5. Put the removed lithium battery into the bays of the battery charger base.
6. Put one or two lithium batteries into the bays of the charger base.
7. Connect the power cable to the power socket on the back of the charger base.
8. Connect the power cable plug to the power socket.
9. When the battery is fully charged, unplug the power cable and place the charger in the carrying case.

⚠ Warning

Wipe off any water or moisture from the battery with clean, dry cloth before putting the battery into the Imager.

Note

Do not charge lithium batteries in an ambient temperature higher than 40°C or lower than 0°C. If the battery is charged under extreme temperatures, the capacity may be reduced.

⚠ Caution

Do not incinerate the Product and/or the battery.

Product Disposal

Dispose of the Product in a professional and environmentally appropriate manner:

- Delete personal data on the Product before disposal.
- Remove batteries that are not integrated into the electrical system before disposal and dispose of batteries separately.
- If this Product has an integral battery, put the entire Product in the electrical waste.

Radio Frequency

To view the Radio Frequency Data Class A Instruction Sheet, visit http://www.fluke.com/en-us/support and search for “Radio Frequency Data Class A”.

Specifications

Model	**TiX1060**	**TiX1080**	**TiX870**	**TiX875**	**TiX880**	**TiX885**	**TiX875U**	**TiX885U**
Temperature								
Operating	-10 °C to 50 C							
Storage	-40 °C to 70 °C (without battery)							
Relative Humidity	＜90 % RH, non-condensing							
Altitude								
Operating	2000 m							
Storage	12000 m							
Screen	5.5-inch OLED touchscreen, 100000:1 contrast, 170° visual range 1920x1080 pixels, 1080p UHD display							
Power								
Battery	Li-ion battery, BP1000 (3 pcs)							
Battery life	>3.5 hours continuous use time at 25 °C ambient							
Battery charge time	2.5 hours to full charge							
Battery charge temperature	0 °C to 40 °C							
Battery charge mode	Ti SBC1K Battery Charger Base							
Safety	IEC 61010-1: pollution degree 2							
Wireless								
Frequency	2400 MHz to 2483.5 MHz							
Output power	<100 mW							

Model	**TiX1060**	**TiX1080**	**TiX870**	**TiX875**	**TiX880**	**TiX885**	**TiX875U**	**TiX885U**
Laser								
Wavelength	650 nm							
Maximum output power	<1 mW							
Electromagnetic Compatibility (EMC)								
International IEC 60326-1: Industrial Electromagnetic Environment CISPR 11 Group 1, Class A Group 1: Equipment has intentionally generated and/or uses conductively-coupled radio frequency energy that is necessary for the internal function of the equipment itself. Class A: Equipment is suitable for use in all establishments other than domestic and those directly connected to a low-voltage power supply network that supplies buildings used for domestic purposes. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted and radiated disturbances. Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments. **Korea (KCC)** Class A Equipment (Industrial Broadcasting & Communication Equipment Class A: Equipment meets requirements for industrial electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and not to be used in homes.								
Drop Test	1 meter (with standard lens)							
Dimensions (L x W x H)	151 mm x 214 mm x 92 mm		148 mm x 204 mm x 86 mm					
Weight (includes battery)	1822 g		1550 g					
Ingress Protection	IEC 60529-1: IP52 (with protective cover)							
Tripod Mounting Base	UNC ¼"-20 Standard Tripod Mounting Thread, which can be used to connect a tripod							
Calibration Period	2 years (assumes normal operation and aging)							
Supported Languages	Simplified Chinese and English							

Model	TiX1060	TiX1080	TiX870	TiX875	TiX880	TiX885	TiX875U	TiX885U
Temperature Measurement and Analysis								
Temperature Measurement Range	-40 °C to 700 °C (-40 °C to 150 °C；0 °C to 350 °C；0 °C to 700 °C）							
Extended temperature range	300°C to 2000°C				1200 °C			1200 °C
Accuracy	±1 °C or 1 % of rdg., whichever is greater @ -10 °C to 150 °C； ±2 °C or ±2 %, whichever is greater @ other temperature ranges	±2 °C or ± 2 % of rdg., whichever is greater						
High/low temperature capture	Yes							
Reference temperature compensation	Yes. The full-screen and measurement mark temperature are displayed as the difference between the actual temperature and the fixed temperature							
Automatic temperature difference calculation	Calculation of the difference between measurement markers or between a measurement marker and the fixed TREF							
Temperature measurement methods	The highest and lowest temperature can be set within an area, and the highest/lowest temperature point can be automatically located							
Correction settings	Emissivity, Reflected Temperature, Humidity, Ambient Temperature, Test Distance, Transmittance							
Full-screen emissivity correction	0.01 to 1.00, built-in emissivity table							
Area emissivity correction	Yes							
Analysis in the Imager	Perform point, area, and line temperature analysis on saved images							
Analysis software	SmartView IR							
Supported languages	Simplified Chinese/English							

Model	**TiX1060**	**TiX1080**	**TiX870**	**TiX875**	**TiX880**	**TiX885**	**TiX875U**	**TiX885U**
Area Temperature Measurement								
Point	10	20	10	20	10	20	10	20
Temperature measurement region (Rectangle and circle)	5	10	10	20	10	20	10	20
Temperature measurement line	10	20	10	20	10	20	10	20
Image capture frequency	13 Hz @ full window; 25 Hz @ 1/2 window		9 Hz	30 Hz	9 Hz	30 Hz		
Detector type	Focal Plane Array (FPA), uncooled infrared detector							
Detector pixel spacing	17 µm							
Detector resolution	1024 x 768		640 x 480					
Total pixels	786 432		307 200					
SuperResolution	2048 x 1536		N/A		1280 x 960		N/A	1280 x 960
Thermal sensitivity (NETD)	＜30 mk @ 30 °C		<35 mK @ 30 °C	<30 mK @ 30 °C	<25 mK @ 30 °C			
Field of View (FOV)	25° x 19°		25° x 19°					
Spatial resolution	0.43 mrad		0.68 mrad					
Spectral response	7 µm to 14 µm							
Lens aperture	F 1.0							
Focus system	Auto/Manual							
Lens recognition	Auto							
Digital zoom (continuous zooming)	1 to 35x		1 to 25x		1 to 35x		1 to 25x	1 to 35x

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Image Display								
Digital image enhancement	Yes							
Settings for On-Screen Display (OSD)	Yes. Users can set OSD, such as the maximum, minimum, average, full-screen emissivity and reflected temperature							
Settings for Information Display of Temperature Measurement Mark	Yes. Each temperature measurement marker can be set separately, displaying information such as emissivity of a temperature marker							
Built-in digital camera	5.0 MP, auto focus							
LED torch/flashlight	Yes							
Picture-in-Picture (PIP)	Yes							
Standard palettes	30 palettes (15 standard palettes, 15 inverted palettes)							
Manual image adjustment	Yes							
Auto image adjustment	Yes							
Minimum temperature span (manual mode)	2 °C							
Minimum temperature span (auto mode)	4 °C							
Color alarm (Isotherm)	Yes							
Automatically naming thermal images	QR code		QR code	N/A	QR code	QR code	N/A	QR code
Voice annotation	Yes. 200 s of voice annotation for each image							
Text annotation	Yes. Simplified Chinese/English/Numbers							

Model	**TiX1060**	**TiX1080**	**TiX870**	**TiX875**	**TiX880**	**TiX885**	**TiX875U**	**TiX885U**
Visible image associated	Yes							
Image Capture and Data Storage								
Image viewing	Thumbnail navigation and selection							
Internal flash memory	Built-in 16 G flash memory							
SD card	High-speed SD card, 128 GB Caution: Fluke recommends the memory card that is supplied with the Imager or available from Fluke. Fluke does not warrant the use or reliability of aftermarket memory cards of different brands or capacities.							
IR image file format	Standard JPEG, including measurement data, which meets the data format verification requirements of the State Grid for Infrared Imagers							
Fully-radiometric infrared video file format file format	.IS5		N/A	.IS5		N/A	.IS5	N/A
Non-radiometric video file format.	.MP4		N/A	.MP4		N/A	.MP4	N/A
Visible light images	Standard JPEG, automatically associated with thermal images							
Audio	Yes							
Transfer interface	Connect to the SmartView *IR* on a PC via USB, or connect to a display terminal via HDMI							
Bluetooth transfer	Yes. The saved files can be transferred to a PC via Bluetooth.							
GPS	Yes			N/A	Yes		N/A	Yes
Remote display viewing	Yes. View the Imager's thermal video stream on a PC or a display terminal							
Remote control Operation	Yes. Through the Smart View IR							
USB	USB 2.0. Transfer fully-radiometric thermal image video stream to a PC; read the Imager's internal flash memory data; read SD card data							
Antenna	Internal							

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Fully-radiometric infrared video recording	Recorded into the Imager or a PC		N/A	Recorded into the Imager or a PC	N/A	Recorded into the Imager or a PC	N/A	
Fully-radiometric infrared video recording (frame rate adjustable)	To the Imager: 1 Hz to 7 Hz To a PC: 12 Hz		N/A	1 Hz to 12 Hz	N/A	1 Hz to 12 Hz	N/A	
Fully-radiometric infrared video streaming	USB 2.0		N/A	USB 2.0	N/A	USB 2.0	N/A	
Non-radiometric infrared video streaming	Transfer via HDMI							
Video output	Digital video output							
Auto capture	Interval of 1 s to 60 min 59 s							