ICI | **INFRARED CAMERAS** INC

Industry

SOUND DETECT & SOUND DETECT PRO
USER MANUAL

PLEASE READ THIS MANUAL BEFORE SWITCHING THE UNIT ON.
IMPORTANT SAFETY INFORMATION INSIDE.
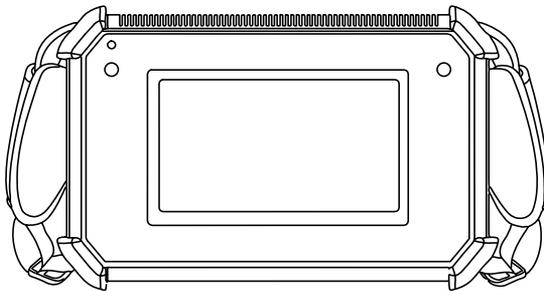
ICI cameras fall under US Federal Law and Export Control.

Revision History

| 03.2023-001 | Document created |
| 06.2023-001 | Expanded definitions of test frequency, dynamic range, and spectrum range |

Contents

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1.   Disclaimers

1-1   Terms and Conditions

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

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

1-2   U.S. Government Regulations

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

1-3   Copyright

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1-4   Quality Assurance

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

1-5   Customer Help

For customer help, visit:

https://infraredcameras.com/support/

E-mail:

support@infraredcameras.com

2.   User Notice

2-1   Calibration

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

2-2   Accuracy

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

2-3   Cybersecurity

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

2-4   Disposal of Electronic Waste

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

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

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

2-5   Intended Use

The Sound Detect & Sound Detect Pro is a standalone system for localizing audible and ultrasonic frequency sources as well as acoustic analysis. It uses 128 microphones to locate acoustic sounds and visualizes them on a 7" color touchscreen.

The device is not a measurement instrument for precise acoustic or other measurements. The dB readings produced by the device are not guaranteed to correspond to absolute sound pressure levels.

Environment of use: industrial and petrochemical buildings, electrical plants, environments with potential gas leaks, science labs, animal reserves as well as environmental conservatories, among others.

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

2-6   Manual Update

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

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

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

2-7   Scope of Application

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

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

2-8   Authoritative Versions

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

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

2-9 Training

To read about infrared training, visit:

https://infraredtraininginstitute.com/

3. Safety Information

- Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

- Use the product only for the specified usage.

- Do not disassemble or modify the device.

- The heat sinks will become hot when the device is on or has been on. Beware of touching them. Long term contact may cause burns.

- Do not use any damaged device, battery or cords.

- The device is not intended to be used while the battery is being charged.

- Please do not charge the device in a high temperature environment over 45°C (113°F). Charging the battery at temperatures outside this range can cause the battery to become hot or to explode. It can also decrease the performance or the life cycle of the battery.

- Do not continue to charge the battery if it does not become charged in the specified charging time. If you continue to charge the battery, it can become hot and cause an explosion or ignition. Injury to persons can occur.

- Do not attach the batteries directly to a car's cigarette lighter socket. Using the incorrect equipment can cause the battery to become hot or cause an explosion.

- Only use the correct equipment to discharge the battery. Using the incorrect equipment can decrease the performance or the life cycle of the battery. Using the incorrect equipment can cause the battery to become hot or cause an explosion.

- Do not connect the positive terminal and the negative terminal of the battery to each other with a metal object (such as wire). Damage to the batteries can occur.

- The battery contains safety and protection devices which, if they become damaged, can cause the battery to become hot, or cause an explosion or an ignition.

- Do not put holes in the battery with objects. Damage to the battery may occur.

- Do not hit the battery with a hammer or apply strong impacts or electric shocks to it. Damage to the battery may occur.

- Do not put the battery in or near a fire, stove or other high-temperature locations. Damage or ignition of the battery may occur.

- Do not put the battery in direct sunlight or other high-temperature locations. Damage or ignition of the battery may occur.

- Do not solder directly onto the battery. Damage to the battery may occur.

- Do not get water or salt water on the battery or device or permit the device or battery to get wet. Damage to the battery may occur.

- Remove any water or moisture on the battery before you install it. Damage to the battery may occur.

- If there is a leak from the battery and the fluid gets into the eyes, do not rub the eyes. Flush well with water and immediately get medical care.

- Always dispose of battery in accordance with local, state and federal regulations.

- Do not use the battery if, when used, charged, or placed in storage, there is an unusual smell from the battery, the battery feels hot, changes color, changes shape, or is in an unusual condition. Speak with a sales office if one or more of these problems occurs.

- Protect the camera lens and the microphone array from any kind of foreign objects, dust or liquids.

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

- Be careful when cleaning the camera lens. Do not clean the camera lens too vigorously. This can damage the lens.

- Avoid condensation. Taking the imager from cold to hot environments will cause condensation. To protect the device, power on the device and wait until it becomes warm enough for the condensation to evaporate.

- Keep device out of reach of children.

- Storage: If you do not use the imager for a long period of time, put the device in a cool and dry environment. Batteries should be stored in an ambient temperature of -20°C to 45°C (-4°F to 113°F). Lithium batteries will discharge time and should be fully charged before storage. It is recommended to fully recharge the batteries every 3 months to prevent damage. Store the device in an ambient temperature of -20°C to 45°C (-4°F to 113°F).

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

4.   Technical Specifications

Acoustic Measurement	128 MEMS microphones
Dynamic Range	0.5 dB - 12 dB, up to 132.5 dB
Bandwidth	kHz to 48 kHz, settings dependent
Bandwidth Air Leak Mode	20 kHz to 35 kHz
Distance	0.3 m (1.0 ft), up to ~120 m (394')
Operation Range	-20 °C to 50 °C (-4 °F to 122 °F)
Storage Range	-20 °C to 40 °C (-4 °F to 40 °F)
Humidity	10% to 95%, relative
Dimensions	272 mm x 174 mm x 42 mm (L x W x D ± 0.5 mm) (10.7" x 6.9" x 2.8" (L x W x H ± 0.02"))
Weight	1.7 kg (3.75 lbs)
Battery	Rechargeable Li-ion, 15 W; Power Bank available
Operation Time	4-6 hours (conditions dependent)
Charging Time	4-6 hours
External Battery Tracer	LiFePO4, 12V, 7A, 84 W, 985 g (2.2 lbs), 90 mm x 145 mm x 65 mm (3.5" x 5.7" x 2.6"), IP64
Power Management	Sleep/auto off
Interface	USB Type-C, 3.5 mm jack
Video Format	MP4, up to 5 minutes
Video Frame Rate:	25 fps (max)
Image Format	JPG
Image Polarity	3 options
Audio Format	WAV
Storage	8 GB SD (up to 256 GB)
Screen	7" color touchscreen, 1024 x 600
Brightness	Adjustable
Digital Camer	8 MP, 3 mm fixed focus, 62° FOV
Zoom	2x digital zoom
IP Rating	IP54
Language	Multi-language
Text annotation up to 5 notes	
Support leakage evaluation	
One-click report generation	
Real-time sound visualization	

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Health self-diagnostic test function
Template-based report building

Specifications subject to change without further notice. Models and accessories subject to regional market considerations. License procedures may apply. Products described herein may be subject to US Export Regulations. Please refer to support@infraredcameras.com with any questions.

5.   Package Includes
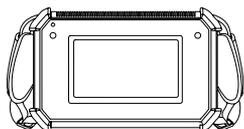
Sound Detect Device
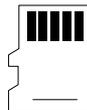
Memory Card
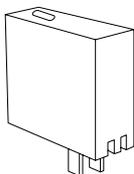
Charger
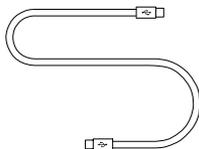
Type-C Cable
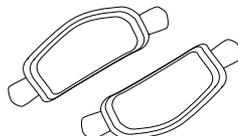
Hand Straps
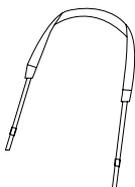
Neck Strap

Optional: Power Bank

ENSURE ALL SYSTEM EQUIPMENT AND COMPONENT ITEMS ARE PRESENT BEFORE CONTINUING.

6.　Structure

6-1　Appearance and Definitions of Interface

1.

2.
3.

4.

5.

3.
4.

5.

6.　　　　　7.　　8.　9. 10. 11.　12. 5.

1.

13.
14.
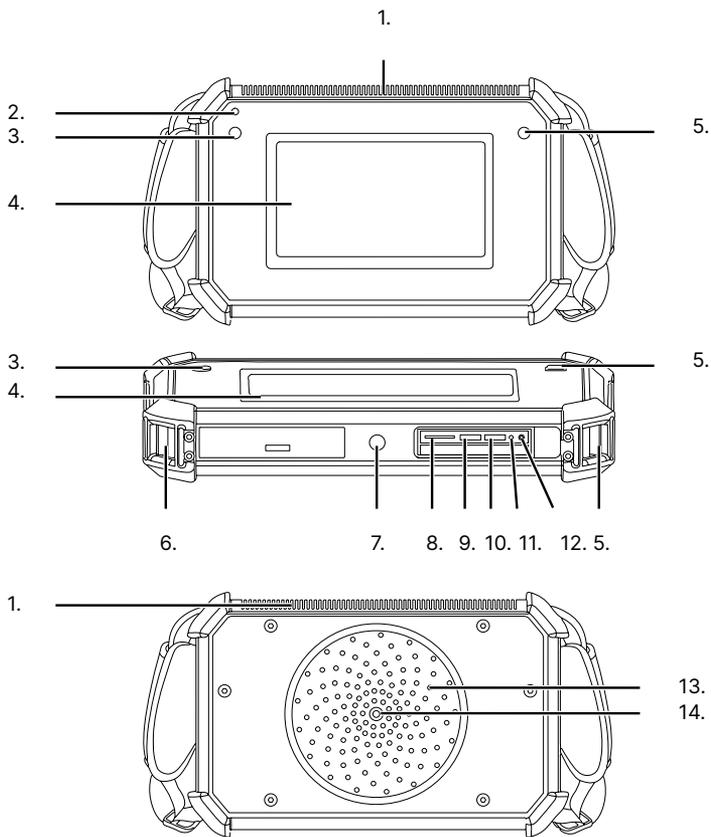
1.	Heat Sink	8.	Memory Card Slot
2.	Power	9.	Type-C Interface *
3.	LED Power Indicator	10.	Type-C Charging
4.	Image display Window	11.	LED Charging Indicator
5.	Capture/Select	12.	Microphone/Headphone Jack
6.	Tether Points	13.	Microphone Array
7.	1/4"-20 Mount	14.	Visible Camera

* **THE STANDARD TYPE-C INTERFACE CANNOT BE USED TO CHARGE THE DEVICE. USE THE TYPE-C CHARGING PORT TO CHARGE THE DEVICE.**

7.   Quick Start Instructions

7-1   Set up

A.

Mount the fully charged acoustic device to a tripod using the ¼"-20 mount located on the bottom of the acoustic device.

The Sound Detect is used as a handheld acoustic device.
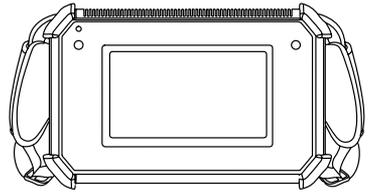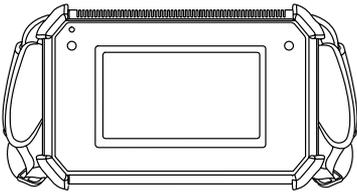
or
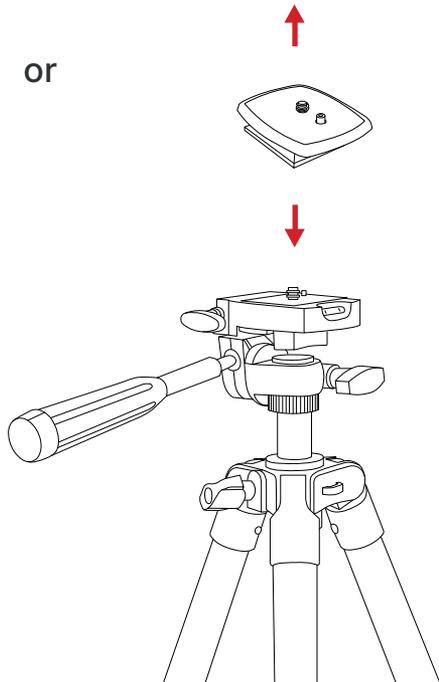
MAKE SURE TRIPODS DO NOT BLOCK THE DIRECT PATH OF PERSON(S) TO BE IMAGED TO ENSURE THE EQUIPMENT WILL NOT BE MOVED OR KNOCKED DOWN. USING A DIVIDING BARRIER WILL HELP KEEP TRIPODS SEPARATE FROM THE PATH.

TURN ON THE CAMERA BY PRESSING AND HOLDING THE POWER BUTTON FOR AT LEAST TWO SECONDS.

B.

Power on device.
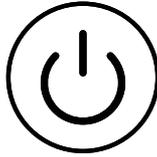
PRESS AND HOLD THE POWER BUTTON FOR MORE THAN 5 SECONDS TO SHUT DOWN THE CAMERA.

7-2   Charge via Power Adapter

A.

Plug one end of the Type-C cable into the power adapter.
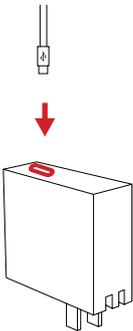
B.

Plug the other end of the Type-C cable into the acoustic device.
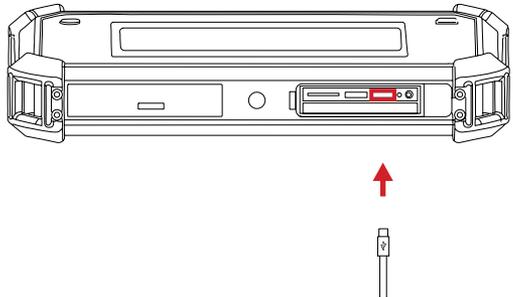
THE USER MUST USE THE DESIGNATED TYPE-C CHARGING PORT FOR CHARGING THE ACOUSTIC DEVICE. THE ACOUSTIC DEVICE CANNOT BE CHARGED FROM THE STANDARD TYPE-C INTERFACE PORT.

C.

Plug power adapter into a
110/120V electrical outlet.

IT TAKES 4-6 HOURS TO CHARGE AN EMPTY BATTERY TO FULL.

THE STATUS LED POWERS ON WHEN THE BATTERY IS BEING CHARGED. THE STATUS LED TURNS OFF WHEN CHARGING IS COMPLETE.

THE DEVICE IS NOT MEANT TO BE USED WHILE CHARGING. KEEP THE DEVICE POWER OFF WHEN CHARGING.

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

WHEN THE BATTERY IS FULLY CHARGED, THE DEVICE DISPLAYS 4 GRIDS OF ELECTRICITY AND CAN BE USED FOR UP TO 6 HOURS; 3 GRIDS CAN BE USED FOR ABOUT 2.5 TO 3 HOURS; 2 GRIDS CAN BE USED FOR ABOUT 1.5 TO 2 HOURS; 1 GRID CAN BE USED FOR ABOUT HALF AN HOUR TO 1 HOUR.

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

7-3   Charge via Power Bank

A.

Plug one end of the Type-C cable into the power bank.

B.
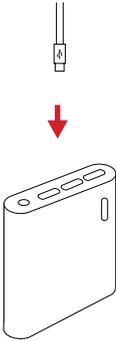
Plug the other end of the Type-C cable into the device.
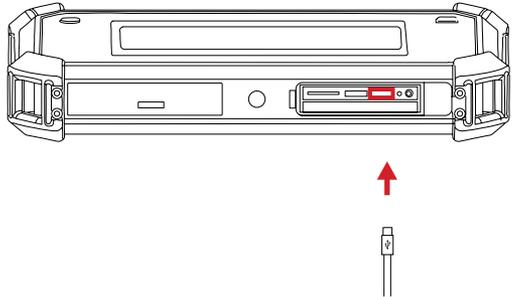
THE USER MUST USE THE DESIGNATED TYPE-C CHARGING PORT FOR CHARGING THE ACOUSTIC DEVICE. THE ACOUSTIC DEVICE CANNOT BE CHARGED FROM THE STANDARD TYPE-C INTERFACE PORT.

IT TAKES 4-6 HOURS TO CHARGE AN EMPTY BATTERY TO FULL.

THE STATUS LED POWERS ON WHEN THE BATTERY IS BEING CHARGED. THE STATUS LED TURNS OFF WHEN CHARGING IS COMPLETE.

THE DEVICE IS NOT MEANT TO BE USED WHILE CHARGING FROM THE POWER BANK. KEEP THE DEVICE POWER OFF WHEN CHARGING.

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

7-3   Charge the Power Bank

A.

Plug one end of the Type-C
cable into the power adapter.

B.
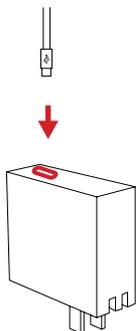
Plug the other end of the Type-C
cable into the power bank.

C.
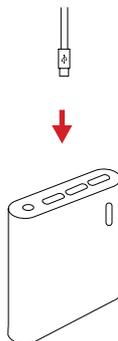
Plug power adapter into a
110/120V electrical outlet.
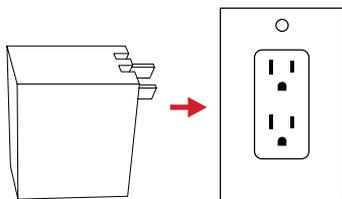
IT TAKES 4-6 HOURS TO CHARGE AN EMPTY POWER BANK TO FULL.

THE STATUS LED POWERS ON WHEN THE POWER BANK IS BEING CHARGED. THE STATUS LED TURNS OFF WHEN CHARGING IS COMPLETE.

THE POWER BANK IS NOT MEANT TO BE USED WHILE CHARGING. KEEP THE POWER BANK DISCONNECTED FROM THE ACOUSTIC DEVICE WHEN CHARGING.

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

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

7-4   Memory

A.

Align the USB drive and insert it into
the side of the acoustic device.
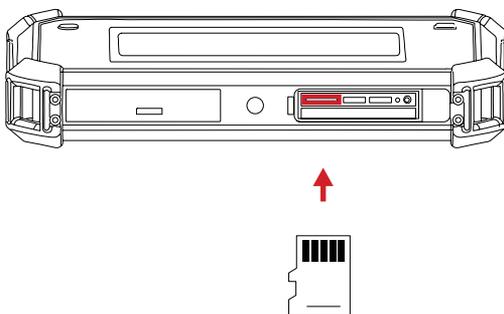
DO NOT FORCE THE MEMORY CARD INTO THE SLOT. THE SIDE OF THE CARD WITH CONTACT PINS MUST BE INSERTED FIRST. IF THERE IS RESISTANCE FLIP THE CARD AROUND AND TRY AGAIN. POWER OFF THE ACOUSTIC DEVICE BEFORE EJECTING THE MEMORY CARD FROM THE MEMORY SLOT.

DO NOT REMOVE OR INSERT THE MEMORY CARD WHEN VIDEO RECORDING.

AFTER TAKING PHOTOS AND RECORDING VIDEOS, PLEASE WAIT UNTIL THE DATA IS SAVED SUCCESSFULLY BEFORE INSERTING AND REMOVING THE MEMORY CARD.

DO NOT REMOVE OR INSERT THE MEMORY CARD WHEN BROWSING AND MARKING DATA UNDER THE PLAYBACK MENU.

WHEN READING MEMORY CARD DATA ON THE PC DO NOT CHANGE THE NAMES OF FILES AND FOLDERS IN THE MEMORY CARD. CHANGING FILE AND FOLDER NAMES MAY CAUSE TEST DATA TO BE INCORRECTLY IDENTIFIED AND DISPLAYED IN THE PLAYBACK MENU.

7-5   Attach the Neck Strap

A.

Ensure the strap feeds from the outside-
in and through the tether points.

B.

Feed the end of the strap
through the retainer piece
and up the back of the plastic
fastener on the acoustic device.
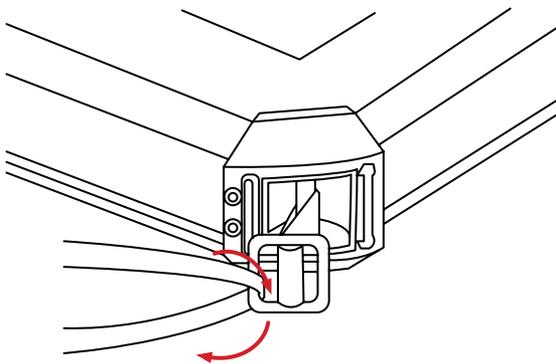
C.

Feed the strap from the inside-out
and through the tether points.
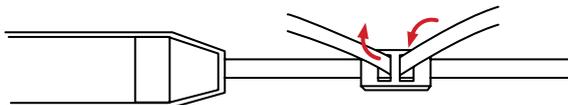
7-6   Attach the Hand Strap

A.

Feed one end of the strap from the outside-in and through the tether point.
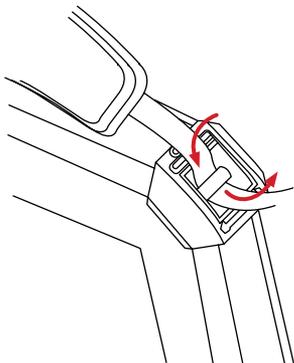
B.

Feed the other end of the strap from the outside-in and through the plastic fastener.
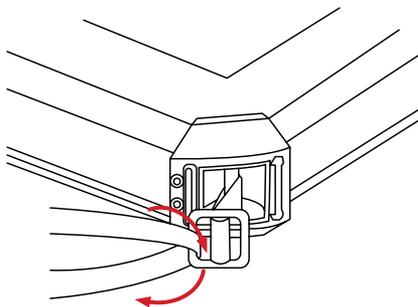
C.

Fold the straps into the strap cushion.
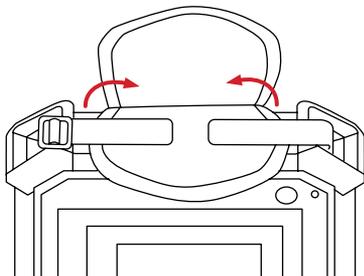
D.

Close the strap cushion.
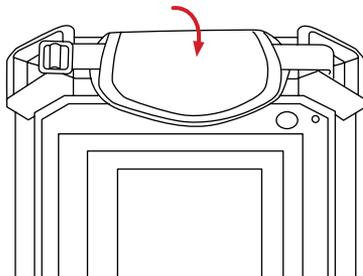
8.   Operation Instructions

8-1   Charging Instructions

8-1-1   How to Charge the Acoustic Device via Power Adapter

Charge the battery for a minimum of 3 hours before using the device for the first time. It takes 4-6 hours to charge an empty battery to full.

When the battery is fully charged, the device displays 4 grids of electricity and can be used for up to 6 hours; 3 grids can be used for about 2.5 to 3 hours; 2 grids can be used for about 1.5 to 2 hours; 1 grid can be used for about half an hour to 1 hour.

1.   Plug one end of th Type-C cable into the power adapter.

2.   Plug the other end of the Type-C Cable into the Type-C Charging port on the acoustic device.

3.   Plug the power adapter cord of the battery charging base into a 110v/120V electrical outlet.

THE USER MUST USE THE DESIGNATED TYPE-C CHARGING PORT FOR CHARGING THE ACOUSTIC DEVICE. THE ACOUSTIC DEVICE CANNOT BE CHARGED FROM THE STANDARD TYPE-C INTERFACE PORT.

IT TAKES 4-6 HOURS TO CHARGE AN EMPTY BATTERY TO FULL.

THE STATUS LED POWERS ON WHEN THE BATTERY IS BEING CHARGED. THE STATUS LED TURNS OFF WHEN CHARGING IS COMPLETE.

THE DEVICE IS NOT MEANT TO BE USED WHILE CHARGING. KEEP THE DEVICE POWER OFF WHEN CHARGING.

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

WHEN THE BATTERY IS FULLY CHARGED, THE DEVICE DISPLAYS 4 GRIDS OF ELECTRICITY AND CAN BE USED FOR UP TO 6 HOURS; 3 GRIDS CAN BE USED FOR ABOUT 2.5 TO 3 HOURS; 2 GRIDS CAN BE USED FOR ABOUT 1.5 TO 2 HOURS; 1 GRID CAN BE USED FOR ABOUT HALF AN HOUR TO 1 HOUR.

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

8-1-2   How to Charge the Acoustic Device via the Power Bank

1.   Plug one end of th Type-C cable into the power bank.

2.   Plug the other end of the Type-C Cable into the acoustic device.

THE USER MUST USE THE DESIGNATED TYPE-C CHARGING PORT FOR CHARGING THE ACOUSTIC DEVICE. THE ACOUSTIC DEVICE CANNOT BE CHARGED FROM THE STANDARD TYPE-C INTERFACE PORT.

IT TAKES 4-6 HOURS TO CHARGE AN EMPTY BATTERY TO FULL.

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

8-1-3   How to Charge the Power Bank

1.   Plug one end of th Type-C cable into the power adapter.

2.   Plug one end of th Type-C cable into the power bank.

3.   Plug the power adapter cord of the battery charging base into a 110v/120V electrical outlet.

IT TAKES 4-6 HOURS TO CHARGE AN EMPTY BATTERY TO FULL.

THE STATUS LED POWERS ON WHEN THE BATTERY IS BEING CHARGED. THE STATUS LED TURNS OFF WHEN CHARGING IS COMPLETE.

THE DEVICE IS NOT MEANT TO BE USED WHILE CHARGING FROM THE POWER BANK. KEEP THE DEVICE POWER OFF WHEN CHARGING.

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

8-2   Power On/Off the device

Power on the device by pressing the power button for at least 2 seconds. Wait until the head-ups display loads before taking measurements.

Press the power button for more than 5 seconds to power off the device. After powering off the device, wait until the Power LED also powers off before attempting to power the device on again.

AFTER POWERING OFF THE ACOUSTIC DEVICE, WAIT UNTIL THE POWER LED ALSO POWERS OFF BEFORE ATTEMPTING TO POWER THE DEVICE ON AGAIN.

DO NOT PACK THE ACOUSTIC DEVICE WHILE THE POWER LED IS ON.

DO NOT PACK THE ACOUSTIC DEVICE WHILE THE HEAT SINKS ARE HOT. BE CAREFUL WHEN TOUCHING THE HEAT SINKS AND PACKING THE ACOUSTIC DEVICE.

8-2-1   Sleep Mode

To conserve power the user may place the device in sleep mode. While in sleep mode the screen is powered off and the indicator light blinks red.

While the device is powered on, press the power button; then, using the touchscreen, tap Sleep to power off the screen. Press the power button again to wake the device.

8-3   User Interface

The device interface appearance:
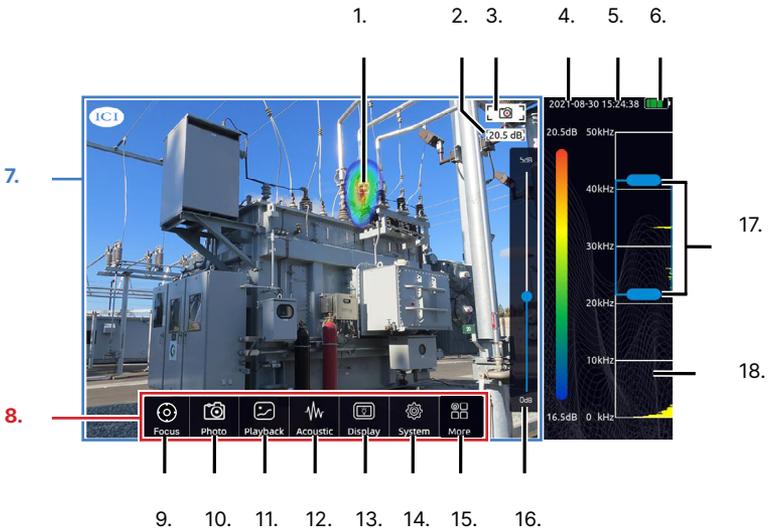
1. Heat Map
2. Decibel Reading
3. Mode Indicator
4. Date
5. Time
6. Battery
7. **Display Window**
8. **Main Menu**
9. Focus Tool

10. Photo/Video Mode
11. Playback
12. Acoustic
13. Display Settings
14. System Settings
15. More Options
16. Dynamic Range
17. Test Frequency
18. Spectrum Range

8-3-1   Open the Main Menu

Using the touchscreen, tap the Display Window to open the main menu.

8-3-2   Close the Main Menu

Using the touchscreen, close the main menu by tapping the Display Window. Alternatively, wait a few seconds and the menu closes automatically due to inactivity.

8-4   Digital Zoom

The device is equipped with a 2x digital zoom, which can be used for close-up snapshots.

8-5   Media Management

8-5-1   Capture an Image

Capture an image as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Photo/Video Mode icon to change between camera mode and video mode. The icon in the upper right corner of the Display Window shows the current media mode.

3.   Close the main menu by tapping the Display Window. Alternatively, wait a few seconds and the menu closes automatically due to inactivity.

4.   Press the Capture button to capture an image. Saving occurs automatically.
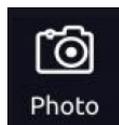
WAIT FOR SAVING TO FULLY COMPLETE BEFORE EJECTING THE MEMORY CARD. REMOVING THE CARD FROM THE ACOUSTIC DEVICE BEFORE SAVING IS COMPLETE MAY CORRUPT THE FILE OR DAMAGE THE MEMORY CARD.

8-5-2   Record a Video

Record a video as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Photo/Video Mode icon to change between camera mode and video mode. The icon in the upper right corner of the Display Window shows the current media mode.

3.   Close the main menu by tapping the Display Window. Alternatively, wait a few seconds and the menu closes automatically due to inactivity.

4.   Press the Capture button to begin recording a video. Press again to stop recording. Videos automatically stop recording after 5 minutes. Saving occurs automatically.

8-5-3   Record a Sound

By default any sound detected by the acoustic device is recorded when videos are recorded. Sounds cannot be recorded by themselves.

Disable/enable sound recording as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Acoustic icon. A window appears.

3.   Toggle Record on Video-shooting to the OFF position by tapping the switch. The switch turns gray when inactive. Enable sound recording by tapping the switch again. The switch turns blue when active.

4.   Tap the Display Window to close the window.

5.   Press the Capture button to begin recording a video. Press again to stop recording. Videos automatically stop recording after 5 minutes. Saving occurs automatically.

8-5-4   Review Media

8-5-4-1   View Images

Review images as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Playback icon to open the gallery.

3.   Tap an image to review in full screen mode. Double tap to zoom in; then, double tap again to zoom out. When enlarged, press-and-hold on the touchscreen; then drag to pan the image.

4.   Press < or > to scroll through the gallery.

5.   Tap ←] repeatedly to exit the gallery.

8-5-4-2   Play Videos

Review videos as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Playback icon to open the gallery.

3.   Tap a video to review in full screen mode. Tap the Play icon to review the video. Tap again to stop playback. Press-and-hold on the progress bar below the video; then, drag to scroll through the timeline.

4.   Press < or > to scroll through the gallery.

5.   Tap ←] repeatedly to exit the gallery.

8-5-5   Labels and Annotations

In the Playback gallery, expanding media shows 1 label icon and 5 annotation tags, represented by flag icons, at the bottom of the screen. Use the Label feature to define gas leak and partial discharge information. Use the Flag feature to mark media with an image, audio, and text annotation.

Label

Annotation Tags

8-5-5-1   Labels

Use the Label feature to define gas leak and partial discharge information.

8-5-5-1-1   Gas Leak Label

Add a label with gas leak information as follows:

1. Capture an image or record a video.

2. Using the touchscreen, tap the Display Window to open the main menu.

3. Tap the Playback icon to open the gallery.

4. Tap media to review in full screen mode.

5. Tap the Label icon.

6. Tap the drop-down menu and select Gas.

7. Tap the drop-down box next to Air Pressure; then, tap to select a unit.

8. Tap the drop-down box next to Air Type; then, tap to select a type.

9. Enter information as follows:

    •   Tap on an input box. A keyboard appears.

    •   Use the keyboard by tapping the touchscreen.

    •   Press the Close Keyboard icon to close keyboard.

10. Tap the Save icon to save label. Tap ←] to cancel changes.

11. Tap ←] repeatedly to save and exit the gallery.

8-5-5-1-2   Partial Discharge Label

Add a label with partial discharge information as follows:

1. Capture an image or record a video.

2. Using the touchscreen, tap the Display Window to open the main menu.

3. Tap the Playback icon to open the gallery.

4. Tap media to review in full screen mode.

5. Tap the Label icon.

6. Tap the drop-down menu and select Electricity.

7. Tap the drop-down box next to Voltage; then, tap to select a voltage.

8. Enter information as follows:

   • Tap on an input box. A keyboard appears.

   • Use the keyboard by tapping the touchscreen.

   • Press the Close Keyboard icon to close keyboard.

9. Tap the Save icon to save label. Tap ←] to cancel changes.

10. Tap ←] repeatedly to save and exit the gallery.
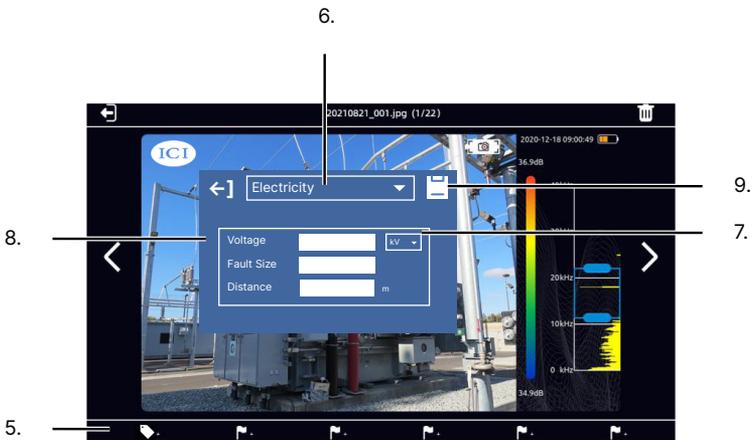
THE DISTANCE CAN ONLY BE MEASURED IN METERS.

THERE CAN ONLY BE ONE LABEL TYPE PER MEDIA.

LABELS CAN BE CHANGED BUT NOT DELETED.

8-5-5-2   Annotations

8-5-5-2-1   Image Annotation

A image annotations allows the user to capture an image and use it as tagging content. The picture content can be a nameplate or other useful imagery. Images are saved in the JPG format.

Add annotations to an media as follows:

1.   Capture an image or record a video.

2.   Using the touchscreen, tap the Display Window to open the main menu.

3.   Tap the Playback icon to open the gallery.

4.   Tap media to review in full screen mode.

5.   Tap a tag and select Image.

6.   Tap the Capture button to capture an image. Tap the Redo icon to try again.

7.   Tap the Save icon to save. Tap ←] to cancel changes.

8.   Tap ←] repeatedly to exit the gallery.

8-5-5-2-2   Audio Annotation

Record audio clips such as a human voice, sound sample, or other live audio as annotations. The audio is single channel. To improve sound recording place the microphone array close to the sound source or speaker. Audio files are saved in WAV format.

Add annotations to an media as follows:

1.   Capture an image or record a video.

2.   Using the touchscreen, tap the Display Window to open the main menu.

3.   Tap the Playback icon to open the gallery.

4.   Tap media to review in full screen mode.

5.   Tap a annotation tag and select Audio.

6.   Tap the Capture button to begin recording. Press the Capture button again to end recording. Pressing the Capture button again erases the previous recording and starts a new recording.

7.   Tap the Save icon to save. Tap ←] to cancel changes.

8.   Tap ←] repeatedly to exit the gallery.

ANNOTATION MUST BE SAVED BEFORE LISTENING IS AVAILABLE. CLICK ON A VOICE ANNOTATION TO REVIEW IT. HEADPHONES ARE REQUIRED.

8-5-5-2-3   Text Annotation

Input a paragraph of text using keyboard input or QR code scanning.

Add annotations to an media as follows:

1.   Capture an image or record a video.

2.   Using the touchscreen, tap the Display Window to open the main menu.

3.   Tap the Playback icon to open the gallery.

4.   Tap media to review in full screen mode.

5.   Tap a annotation tag and select Text.

6.   Choose an option:

- Keyboard input:

    ○ Tap the keyboard icon. A keyboard appears.

    ○ Use the keyboard by tapping the touchscreen to input preferred text.

    ○ Tap the Save icon to save changes and close the keyboard. Tap ←] to cancel changes.

- QR Code:

    ○ Tap the QR Code icon.

    ○ Scan a QR Code. The contained text displays on the screen.

    ○ Tap the Save icon to save. Tap ←] to cancel changes. Users may also rescan the QR Code.

7.   Tap ←] repeatedly to exit the gallery.

8-5-5-2-4   Review Annotations

Delete an annotation as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Playback icon to open the gallery.

3.   Tap media to review in full screen mode.

4.   Tap an annotation tag to select it.

- Images open for viewing and cannot be edited.

- Tap the play icon to listen to recorded audio clip; headphones are required. Pressing the Capture button erases the recording and starts a new recording.

- Tap modify to edit text. A keyboard appears. Use the keyboard by tapping the touchscreen to input preferred text. Tap the Save icon to save changes and close the keyboard. Tap the Save icon to save changes and close the keyboard. Tap ←] to cancel changes.

5.   Tap ←] repeatedly to exit the gallery.

8-5-5-2-5   Delete an Annotation

Delete an annotation as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Playback icon to open the gallery.

3.   Tap media to review in full screen mode.

4.   Tap an annotation tag to select it.

5.   Tap the trash can icon.

6.   Tap OK to confirm deletion. Tap Cancel to cancel deletion.

7.   Tap ←] repeatedly to exit the gallery.

DELETED ANNOTATIONS CANNOT BE RECOVERED.

8-5-6   Export Media

The device has internal and external memory via a memory card.

8-5-6-1   Internal Memory

The acoustic device has ~6 GB of internal storage. While sufficient for most projects, ICI recommends using a memory card for more storage. Media stored to the internal memory must be recovered using a computer.

Export internal media as follows:

1.   Plug one end of th Type-C cable into the standard Type-C Port of the acoustic device.

2.   Plug the other end of the Type-C Cable into the Type-C on a computer.

3.   Power on the acoustic device.

4.   On the computer, navigate to the DCIM folder containing the media.

THE USER MUST USE THE DESIGNATED STANDARD TYPE-C PORT FOR EXPORTING MEDIA FROM THE ACOUSTIC DEVICE TO A COMPUTER.

DO NOT PLUG THE ACOUSTIC DEVICE INTO A COMPUTER USING THE TYPE-C CHARGING PORT AS THIS CAN SHORT THE FUSE OF THE TYPE-C PORT ON THE COMPUTER.

DO NOT REMOVE OR INSERT THE TYPE-C CABLE WHILE MEDIA IS BEING EXPORTED. REMOVING OR INSERTING THE TYPE-C CABLE WHILE MEDIA IS BEING EXPORTED MAY CAUSE LOSS OF DATA OR FILE CORRUPTION.

WHEN READING INTERNAL DATA ON THE COMPUTER DO NOT CHANGE THE NAMES OF FILES AND FOLDERS IN THE DCIM DIRECTORY. CHANGING FILE AND FOLDER NAMES MAY CAUSE TEST DATA TO BE INCORRECTLY IDENTIFIED AND DISPLAYED IN THE PLAYBACK MENU.

USE ONLY THE MEMORY CARD PROVIDED WITH THE DEVICE. OTHER MEMORY CARDS ARE NOT GUARANTEED TO WORK AND MAY LEAD TO LOSS OF DATA.

8-5-6-2   Memory Card

Use the memory card to export media to a computer.

Export media as follows:

1. Power on the device.

2. Insert a memory card memory card slot of the device. The device should automatically detect the memory card.

3. Media automatically saves to the memory card on capture.

4. Power off the device.

5. Eject the memory card.

6. Insert the memory card into a memory card slot on a computer and navigate to the containing folder.

DO NOT FORCE THE MEMORY CARD INTO THE SLOT. THE SIDE OF THE CARD WITH CONTACT PINS MUST BE INSERTED FIRST. IF THERE IS RESISTANCE FLIP THE CARD AROUND AND TRY AGAIN. POWER OFF THE ACOUSTIC DEVICE BEFORE EJECTING THE MEMORY CARD FROM THE MEMORY SLOT.

DO NOT REMOVE OR INSERT THE MEMORY CARD WHEN VIDEO RECORDING.

DO NOT REMOVE OR INSERT THE MEMORY CARD WHILE MEDIA IS BEING EXPORTED. REMOVING OR INSERTING THE MEMORY CARD WHILE MEDIA IS BEING EXPORTED MAY CAUSE LOSS OF DATA OR FILE CORRUPTION.

WHEN READING MEMORY CARD DATA ON THE COMPUTER DO NOT CHANGE THE NAMES OF FILES AND FOLDERS IN THE MEMORY CARD. CHANGING FILE AND FOLDER NAMES MAY CAUSE TEST DATA TO BE INCORRECTLY IDENTIFIED AND DISPLAYED IN THE PLAYBACK MENU.

USE ONLY THE USB DRIVE PROVIDED WITH THE DEVICE. OTHER MEMORY DRIVES ARE NOT GUARANTEED TO WORK AND MAY LEAD TO LOSS OF DATA.

8-5-7   Delete Media

8-5-7-1   Delete Single Media

Delete media as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Playback icon to open the gallery.

3.   Tap media to review in full screen mode.

4.   Tap the trashcan icon.

5.   Tap OK to delete media. Tap Cancel to cancel deletion.

6.   Tap ←] to exit the gallery.

8-5-7-2   Delete All Media

Delete all media as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Playback icon to open the gallery.

3.   Choose an option:

•   Tap the Multi-Select tool at the bottom of the screen; then, select items for deletion.

•   Tap the Multi-Select tool followed by the Select All icon at the bottom of the screen. All items are selected for deletion.

4.   Tap the trashcan icon.

5.   Tap OK to delete media. Tap Cancel to cancel deletion.

6.   Tap ←] to exit the gallery.

8-5-8   Storage Information

Check usage information of current storage space as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Playback icon to open the gallery.

3.   Tap the information icon: ⓘ

4.   Tap ←] to exit the gallery.

8-5-8-1   Directories

By default there is only one directory; however, users can create new directory folders to separate projects.

8-5-8-1-1   Create a Directory

Create a new directory as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Playback icon to open the gallery.

3.   Tap the + icon. A window appears.

4.   Tap on an input box. A keyboard appears.

5.   Use the keyboard by tapping the touchscreen to input the preferred text.

6.   Press the Close Keyboard icon to close keyboard.

7.   Tap the Calendar icon; then, select a date.

8.   Tap the Save icon to save. Tap ←] to cancel changes.

9.   Tap ←] to exit the gallery.

THE DEFAULT DIRECTORY CANNOT BE DELETED OR RENAMED.

8-5-8-1-2   Select a Directory

Select a directory as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Playback icon to open the gallery.

3.   Tap the drop-down box next to + icon; then, select a directory. The directory opens and shows any containing media.

4.   Tap ←] to exit the gallery.

8-5-8-1-3   Edit a Directory

Edit an existing directory as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Playback icon to open the gallery.

3.   Tap the Edit icon. A window appears.

4.   Tap on an input box. A keyboard appears.

5.   Use the keyboard by tapping the touchscreen to input the preferred text.

6.   Press the Close Keyboard icon to close keyboard.

7.   Tap the Calendar icon; then, select a date.

8.   Tap the Save icon to save. Tap ←] to cancel changes.

9.   Tap ←] to exit the gallery.

8-5-8-1-4   Delete a Directory

Delete an existing directory as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Playback icon to open the gallery.

3.   Tap the drop-down box next to + icon; then, select a directory. The directory opens and shows any containing media.

4.   Tap the trash can icon next to the directory name.

5.   Tap OK to confirm deletion. Tap No to cancel deletion.

6.   Tap ←] to exit the gallery.

THE DEFAULT DIRECTORY CANNOT BE DELETED OR RENAMED.

8-6   Application Modes

The device supports the following application modes:

• Gas Leak Mode: used for localization of compressed air leaks. It has a reduced response speed to signal and is great for monitoring stable sounds.

• Partial Discharge Mode: used for localization and classification of high-voltage and medium-voltage partial discharges. It has a very fast response speed and quickly responds to a rapidly changing sound sources.

8-6-1   Switching Application Modes

By default, the device is set to Gas Leak Mode and automatically detects and localizes compressed air leaks. Change the device to Partial Discharge Mode when attempting to scan for partial discharges.

Change the application mode as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the More; then, select a mode. A window appears and the user gains access to mode settings.

3.   Tap outside window to exit the mode settings window. The main menu closes automatically due to inactivity.

THE USER SHOULD ENSURE THE PROPER MODE IS CHOSEN FOR THE USE APPLICATION. GAS LEAK MODE IS FOR FINDING COMPRESSED AIR LEAKS. PARTIAL DISCHARGE MODE IS FOR FINDING VOLTAGE PARTIAL DISCHARGES.

CHOOSE THE CORRECT SETTINGS FOR PROPER DETECTION OF AIR AND PARTIAL DISCHARGES.

SETTING THE DISTANCE IS IMPORTANT FOR OBTAINING ACCURATE GAS LEAK READINGS AND SOUND DISSIPATES OVER DISTANCE.

THE DISTANCE CAN ONLY BE MEASURED IN METERS.

8-6-2   Gas Mode Settings

8-6-2-1   Gas Mode Head-up Display (HUD)

Enable the Gas Mode HUD as follows:

1. Using the touchscreen, tap the Display Window to open the main menu.

2. Tap More; then, select Gas Leak. A window appears and the user gains access to mode settings.

3. Toggle the Gas Leak HUD to the On position by tapping the switch. The switch turns blue and HUD is seen on the Display Window when active. Disable the settings by tapping the switch again. The switch turns gray and HUD disappears when inactive.

4. Tap outside window to exit the mode settings window. The main menu closes automatically due to inactivity.

8-6-2-2   Leak Cost Estimator

The acoustic device has a built-in algorithm to estimate the cost of compressed air leaks. To obtain an accurate measurement the energy cost must be known. Typically, this means the local price (per kWh). Be sure the currency and energy cost are updated in tandem to obtain accurate results.

Leak cost display on the screen via the HUD.

Enable the cost estimator as follows:

1. Using the touchscreen, tap the Display Window to open the main menu.

2. Tap More; then, select Gas Leak. A window appears and the user gains access to mode settings.

3. Toggle the Gas Leak HUD to the On position by tapping the switch. The switch turns blue and HUD is seen when active. Disable the settings by tapping the switch again. The switch turns gray and HUD disappears when inactive.

    •   Tap on an input box. A keyboard appears.

    •   Use the keyboard by tapping the touchscreen to input the preferred numerical values.

    •   Press the Close Keyboard icon to close keyboard.

4. Tap the drop-down box next to Gas Value; then, tap to select a unit.

5. Tap outside window to exit the mode settings window. The main menu closes automatically due to inactivity.

8-6-2-3   Estimation of Gas Leak

Turn on the function of leak cost estimator in the equipment. The acoustic device automatically enables the focusing function by default to avoid interference. At the same time, it fixes the test frequency band to the 25kHz-40kHz to ensure leak calculation accuracy.

There are options of air pressure and distance on the left side of the software. The user needs to input the air pressure (unit: kPa) and distance (unit: cm) of the leaking gas according to the parameters of the site. The built-in calculator calculates the leakage level and the approximate range of gas leakage according to the gas pressure, distance, and calculated leakage energy (for reference).

The gas leakage levels are divided into 7 classes and the corresponding leakage ranges are shown below:

Leakage Level	Leakage Range (Unit: ml / min, for reference)
0	<10ml/min
1	>10ml/min to <200ml/min
2	>200ml/min to <500ml/min
3	>500ml/min to <1000ml/min
4	>1000ml/min to <1500ml/min
5	>1500ml/min to <2000ml/min
6	>2000ml/min

CHART IS FOR REFERENCE ONLY

8-6-2-4   Gas Pressure

Change the gas pressure setting as follows:

1.   Enable the Gas Mode HUD (see Section 8-6-2-1 Gas Mode Head-up Display (HUD)).

2.   Tap on the Gas Pressure input box on the Display Window. A keyboard appears.

3.   Use the keyboard by tapping the touchscreen to input the preferred numerical value.

4.   Press the Close Keyboard icon to close keyboard.

5.   Tap the drop-down box next to Gas Pressure; then, tap to select a unit.

8-6-2-5   Distance

The intensity of sound is reduced over distance traveled; therefore, setting the distance is useful in order to counter this phenomenon and estimate the correct size of a leak.

Change the distance setting as follows:

1.   Enable the Gas Mode HUD (see Section 8-6-2-1 Gas Mode Head-up Display (HUD)).

2.   Tap on the Distance input box on the Display Window. A keyboard appears.

3.   Use the keyboard by tapping the touchscreen to input the preferred numerical value.

4.   Press the Close Keyboard icon to close keyboard.

THE DISTANCE CAN ONLY BE MEASURED IN METERS.

8-6-2-6   Gas Unit

By default, the measurement unit for leaks is ml/s (milliliters per second); however, l/min (liters per minute) is also an option. Other options may be available upon request.

Change the unit setting as follows:

1.   Enable the Gas Mode HUD (see Section 8-6-2-1 Gas Mode Head-up Display (HUD)).

2.   Tap on the Gas Unit drop-down box on the Display Window; then, select a unit.
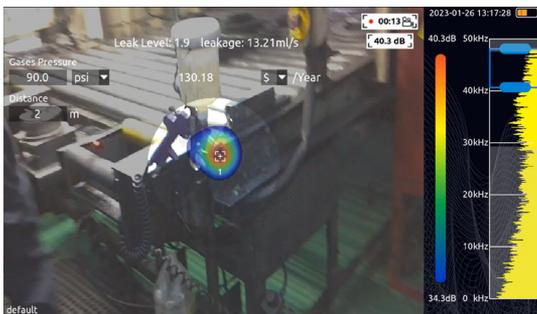
8-6-3   Partial Discharge Settings

8-6-3-1   PRPD Graph

A PRPD pattern is a visual representation of partial discharge (PD) activity relative to the 360 degrees of an AC cycle and is often critical to understanding partial discharge in high voltage (HV) insulation systems.

The PRPD plot shows the amplitude of each discharge event (y-axis) plotted against their phase angle (x-axis). As the primary voltage on a power system rises and falls over time, the voltage applied across each defect also rises and falls over time – causing the defect to discharge only at certain times and amplitudes. This is what creates the PRPD pattern.

Each PRPD pattern will be unique as each discharging defect will be slightly different to one another as the physical defect will be of a certain type and certain physical shape. Although each pattern is unique, common trends can be seen for each defect type.

These defect types include corona, internal void, poor contact, floating metal work etc. The severity of discharge can also be determined from the PRPD patterns.

Enable the PRPD pattern graph as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap More; then, select Partial Discharge. A window appears and the user gains access to mode settings.

3.   Toggle the PRPD Graph to the On position by tapping the switch. The switch turns blue and graph is seen on the Display Window when active. Disable the settings by tapping the switch again. The switch turns gray and graph disappears when inactive.

4.   Tap outside window to exit the mode settings window. The main menu closes automatically due to inactivity.
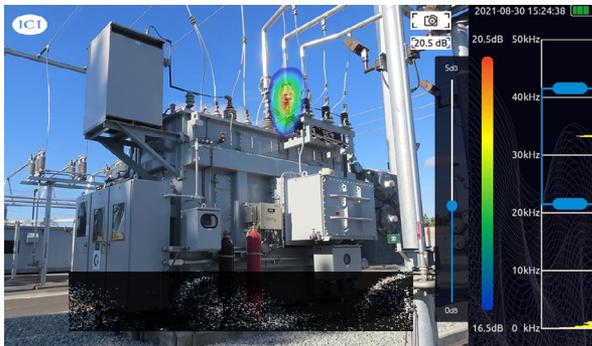
8-6-3-2   Sync Frequency

Adjust the sync frequency as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap More; then, select Partial Discharge. A window appears and the user gains access to mode settings.

3.   Tap the drop-down box next to Sync Frequency; then, tap to select a frequency.

4.   Tap outside window to exit the mode settings window. The main menu closes automatically due to inactivity.

8-7   Heatmap

The display window shows the camera image with a heatmap overlay. Each sound source shows with colors ranging across a palette.

8-7-1   Heatmap Polarity

3 heatmap palettes are available: rainbow, ironbow, and grayscale.

Change the heatmap polarity as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Display icon.

3.   Tap a palette scale to select it.

4.   Tap outside window to exit the display settings window. The main menu closes automatically due to inactivity.

8-8 Focus Tool

The acoustic device has a focus feature to help eliminate background noise and reflected sound from the Display Window. Enabling the feature can help inspectors focus on the key area of a scene.

When enabled a transparent overlay appears over the Display Window with a circular hole in the middle. Acoustics, noise and reflected sound outside of the circle does not displayed on screen.

Enable the Focus Tool as follows:

1. Using the touchscreen, tap the Display Window to open the main menu.

2. Tap Focus to enable the focus tool. Tap again to disable the focus tool. Double-tap the center of the circle to change the size of the focus tool.

3. Close the main menu by tapping the Display Window. Alternatively, wait a few seconds and the menu closes automatically due to inactivity.

8-9 Spectrum Range & Test Frequency

The Spectrum Range covers the full frequency scope of the device, and the test frequency allows users to set the ratio between the largest and smallest values to eliminate non-essential data. Users should observe whether there are prominent spikes in the Spectrum Range. If there are, move the blue test frequency area to include the spectrum range where the prominent spikes occur; then, observe if any sound source appears.

Adjust the test frequency as follows:

1. Press-and-hold on the blue test frequency box; then, drag up or down to adjust the range without changing the distance between the upper and lower limits; or

2. Press-and-hold on the upper or lower slider to increase or narrow the range.

Adjusting the dynamic range to a larger value may simultaneously capture more than one sound source. When the SPL of multiple sources in the scene differ significantly, a relatively small dynamic range parameter may cause larger sources to drown out smaller ones. Adjust accordingly.

8-10   Dynamic Range

Quickly adjust the dynamic range by tapping the palette bar; a quick slider appears. Press-and-hold on the slider; then, drag up or down to adjust the dynamic range.

The dynamic range can also be adjusted as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Acoustic icon. A window appears.

3.   Press-and-hold on the dynamic range slider; then, drag left or right to adjust the value.

4.   Tap outside window to exit the Acoustic window. The main menu closes automatically due to inactivity.

Adjusting the dynamic range to a larger value may help users capture more than one sound source. When the SPL of multiple sources in the scene differ significantly, a relatively small dynamic range parameter may cause larger sources to drown out smaller ones. Adjust accordingly.

8-11   Cursors & Sound Pressure Levels (SPLs)

The cursor function can be enabled or disabled. When the cursor and sound pressure level function is enabled, a cursor shows on the Display Window and the cursor number shows below the cursor. Data collected by the cursor displays below the photo/video mode indicator in the upper right corner of the Display Window. If three cursors are set, the SPLs shown by the cursors are shown sequentially from top to bottom.

Enable/disable cursors and SPLs as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Acoustic icon. A window appears.

3.   Tap the drop-down box next to Cursor & SPL; then, tap to select a number up to 3.

4.   Tap outside window to exit the Acoustic window. The main menu closes automatically due to inactivity.
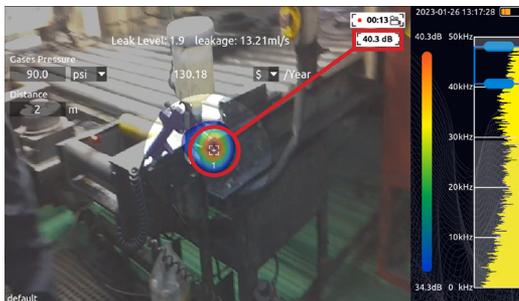
8-12   Transient/Steady-state Modes

In the transient mode, the equipment has a very fast response speed to the transient signal and can quickly respond to the change of sound source. It is suitable for locating rapidly changing sound source models, such as partial discharge sound source.

In the steady-state mode, the equipment will reduce the response speed to the signal, and the cloud image will be relatively stable. It is suitable for the observation of stable signals.

By default, the acoustic device is in the steady-state mode.

Change the mode as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Acoustic icon. A window appears.

3.   Toggle Steady to the OFF position by tapping the switch to enter Transient mode. The switch turns gray when in Transient mode. Enable Steady mode by tapping the switch again. The switch turns blue when Steady-state mode is active.

4.   Tap outside window to exit the Acoustic window. The main menu closes automatically due to inactivity.

8-13   Ultrasonic Monitoring

The equipment can modulate the signal in the ultrasonic frequency band to the audible frequency band, and can monitor the signal with headphones.

Ultrasonic modulation is uses superheterodyne receiver to convert signals to a fixed intermediate frequency which can be more conveniently processed than the original carrier frequency. The reference frequency of modulation can be set by the user. ICI recommends a frequency band of about 38.6khz for near modulation and monitoring.

Change the monitoring frequency as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Acoustic icon. A window appears.

3.   Tap Monitor.

4.   Toggle Switch to the On position by tapping the switch. The switch turns blue when enabled. Disable the feature by tapping the switch again. The switch turns gray when inactive.

5.   Press-and-hold on the slider; then, drag left or right to adjust the frequency.

6.   Tap outside window to exit the Acoustic window. The main menu closes automatically due to inactivity.

8-14   Real-time Acoustic Analysis

Real-time analysis results are shown at the top right of the Display Window. The level in decibels of sound arriving from the strongest sources, up to 3, are presented (see Section **8-11 Cursors & Sound Pressure Levels (SPLs))**. The Display Window also provides additional information about problems related to the specific application.

Generally, the device is used for either leak detection (locating and estimating the size of compressed air leaks) or partial discharge detection (locating and analyzing partial discharges in electrical applications).

8-14-1   Air Leak Detection

The device must be set to Gas Leak Mode to detect compressed air leaks (see **Section 8-6 Application Modes and Section 8-6-2 Gas Mode Settings**).

The device detects compressed air leaks based on the sound emitted by the leak. When a leak is detected, the device estimates the size of the leak. The user must enable the gas leakage level calculation in the equipment.

SELECT THE APPROPRIATE MODE BEFORE CAPTURING MEDIA OR PERFORMING ACOUSTIC ANALYSIS.

8-14-1-1   Exclude Reflected Sound

Background noise can disrupt acoustic inspections. Users should test inspection areas from different angles. If a sound source is steady, then it is most likely an actual sound source. Reflected sound appears to drift or disappear when be captured from different positions.

8-14-1-2   Exclude Noise

Environmental noise in the low frequency band can cause false positives. To find the true sound source, ICI recommends using middle or high frequency to capture the position of sound sources. A relatively narrow band range is also suggested as it can eliminate interference noise.

Users may also use the focus tool to eliminate environmental interference noise, reflection noise, multi-source interference, etc. (see **Section 8-12 Focus Tool**).

8-14-1-3   Specific Power

The specific power is a measure of how much energy is needed to produce a certain amount of compressed air. The unit is measured in kW/m³/min.

8-14-2   Partial Discharge Detection

The device must be set to Partial Discharge to detect compressed air leaks (see **Section 8-6 Application Modes & Section 8-6-3 Partial Discharge Settings**)

The device detects partial discharges based on the sound they emit and will determine AC frequencies based off of 50 Hz or 60 Hz.

When a possible partial discharge has been detected, its PRPD (phase-resolved partial discharge) pattern shows at the bottom of the screen.

8-15   Settings

8-15-1   Language Settings

English is the default language of the device. Change the device language as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the System icon.

3.   Tap the Language icon.

4.   Tap the drop-down list to display a list of available languages. Press-and-hold on the slider; then, drag up or down to view more languages.

5.   Tap a language to select it: Simplified Chines, Traditional Chinese, English, Korean, French, Japanese, Russian, or German.

6.   Tap outside window to exit the settings window. The main menu closes automatically due to inactivity.

8-15-2   Date/Time Settings

Change the time settings as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the System icon.

3.   Tap the Time icon.

4.   Press-and-hold on a dial; then, drag up or down to adjust.

5.   Tap Update Time to save changes and close the settings window. The main menu closes automatically due to inactivity.

8-15-3 Display Brightness Settings

Users can change the brightness settings as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the Display icon.

3.   Press-and-hold on the brightness slider; then, drag left or right to adjust the level of brightness by 5%.

4.   Tap outside window to exit the display settings window. The main menu closes automatically due to inactivity.

8-15-4 Power Management Settings

8-15-4-1 Sleep Mode

To conserve power the user may place the device in sleep mode. While in sleep mode the screen is powered off and the indicator light blinks red.

While the device is powered on, press the power button; then, using the touchscreen, tap Sleep to power off the screen. Press the power button again to wake the device.

8-15-4-2 Auto Sleep Settings

To save power users can set auto sleep mode settings. The device can be set to sleep after 5 minutes, 10 minutes, 15 minutes, or 30 minutes. Auto sleep mode also be disabled.

Change power management settings as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the System icon.

3.   Tap the Lock icon.

4.   Tap the drop-down list next to Auto Sleep; then, select and option: 5 minutes, 10 minutes, 15 minutes, or 30 minutes. Selecting never disables automatic sleep settings.

5.   Tap outside window to exit the display settings window. The main menu closes automatically due to inactivity.

IN SLEEP MODE THE POWER INDICATOR LIGHT FLASHES RED TO LET THE USER KNOW IT IS IN STANDBY MODE. POWER ON THE DEVICE BY PRESSING THE POWER BUTTON. PERFORM A PROPER SHUTDOWN BEFORE STORING THE ACOUSTIC DEVICE.

8-15-4-3   Auto Shutdown Settings

Automatic sleep settings must be enabled in order for automatic shutdown settings to function (see **Section 8-15-4-2 Auto Sleep Settings**).

Change power management settings as follows:

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the System icon.

3.   Tap the Lock icon.

4.   Tap the drop-down list next to Auto Sleep; then, select and option: 5 minutes, 10 minutes, 15 minutes, or 30 minutes. Selecting never disables automatic sleep settings.

5.   Tap the drop-down list next to Auto Shutdown; then, select and option: 5 minutes, 10 minutes, or 15 minutes. Selecting never disables automatic shutdown settings.

6.   Tap outside window to exit the display settings window. The main menu closes automatically due to inactivity.

8-15-4-4   Manual Shutdown

While the device is powered on, press the power button; then, using the touchscreen, tap Shutdown to power off the acoustic device. Press Cancel to cancel shutdown.

8-15-5   Export Log

The equipment operation log is used by the manufacturer to assist users in diagnosing equipment status. During a service support call a customer support representative or IT specialist may ask for an export log. The user generally does not need to use it.

1.   Using the touchscreen, tap the Display Window to open the main menu.

2.   Tap the System icon.

3.   Tap the Lock icon.

4.   Tap Export.

5.   Tap OK to confirm export. Tap Cancel to cancel log export.

6.   The settings window and main menu close automatically due to inactivity.

8-15-6 Threshold

The system threshold is used to set the minimum sensitivity which limits the heatmap energy show that is higher than the sensitivity value.

1. Using the touchscreen, tap the Display Window to open the main menu.

2. Tap the System icon.

3. Tap the Tool icon.

4. Toggle Switch next to Threshold to the On position by tapping the switch. The switch turns blue when enabled. Disable the feature by tapping the switch again. The switch turns gray when inactive.

5. Press-and-hold on the slider; then, drag left or right to set a threshold.

6. Tap outside window to exit the display settings window. The main menu closes automatically due to inactivity.

8-15-7 Device Information

See device informations as follows:

1. Using the touchscreen, tap the Display Window to open the main menu.

2. Tap the System icon.

3. Tap the About icon. Information is shown on screen.

4. Tap outside window to exit the display settings window. The main menu closes automatically due to inactivity.

8-15-8 Device Software Upgrade

The device may periodically need a software upgrade or patch. The upgrade process takes about 15 minutes. Ensure the device is charged before upgrading. If the device loses power during the upgrade it will need to be restarted.

1. Contact customer service to receive the latest software upgrade or patch.

2. Place the software update file provided by customer support in the root directory of the memory card (i.e., not in any folder). Do not rename the file.

3. Insert a memory card into the memory card slot of the device.

4. Using the touchscreen, tap the Display Window to open the main menu.

5. Tap the System icon.

6. Tap the About icon.

7. Tap Update.

8. Tap a package to select it.

9. Tap OK to update. Tap Cancel to cancel update process.

9   Device Usage Techniques

9-1   General Usage

Do not use the device when charging. Do not use the device when charging from the Power Bank.

CONSULT YOUR SAFETY OFFICER ABOUT USING THE ACOUSTIC DEVICE IN YOUR FACILITY OR WORKING ENVIRONMENT. THE HAND STRAPS ARE RIGID AND DO NOT HAVE A SEPARATE SAFETY RELEASE MECHANISM, SO SPECIAL CARE SHOULD BE USED AROUND HEAVY MACHINERY.

When not in use the device should always be placed securely inside the carrying case to prevent it from falling. Always put the device inside the carrying case when both hands are need for other tasks, such as climbing ladders. Ensure that the camera is placed in such a way inside the case that it does not fall out.

Use the lanyard and hands straps to prevent accidentally drops. Do not carry or lift the device by the lanyard or hand straps. Always carry the device by the chassis.

Always keep the interface ports covered. Water must not enter the device, as this may damage the electronics inside.

Protect the microphone array at all times.

Do not touch the video camera lens or the conical microphone holes.

9-2   Inspection Techniques

9-2-1   Modes

Modes are useful for locating different types of sound sources by limiting the frequency range of sound sources displayed on screen. Background noise, e.g. traffic or factory noise, is often dominant at low frequencies, while many interesting phenomena have higher frequencies. Typically, the higher the frequency range is, the more local the sources of interest are - even in the presence of a lot of background noise.

The device marks the highest frequency, up to 3, with a crosshair. It is best practice to do more in-depth analysis on the marked region as this can indicate a leak or discharge.

For air leak detection, use the Gas Leak Mode.

For Partial discharge inspections, use the Partial Discharge Mode.

Users should test the inspection area from different angles to assist in eliminating reflected sounds and noise.

9-2-2   Weak and Strong Sounds

The device shows the strongest sound source in the field of view with a crosshair, up to 3. The strongest sources depend on the selected mode; different modes might display different sound sources.

When the focal tool is disabled the device shows not only the strongest sound source, but also weaker sound sources. The strongest sound source is the field of view is still marked with a crosshair. Sound sources will not be shown outside the focal tool when it is enabled. Disable the focal tool when locating weaker sound sources.

In order to see weaker sound sources in the presence of a strong sound source, move or rotate the camera so that the strong sound source is clearly outside the field of view.

Always keep in mind that any analysis is derived from the location marked by the crosshair on the display.

9-2-3   Actual versus Reflected Sound

The device shows not only actual physical sound sources, but also sound reflections. In order to verify a source shown on the display is an actual sound source and not a reflection, move around to look at the source from different directions. If the location of the source remains consistent, the source is an actual sound source. If the location of the source moves along a surface or completely disappears, the source is probably a reflection.

As the focus tools narrows the sound sources visible on screen, it can be useful for finding actual and reflected sound sources. By moving the device around the user may be able to tell which of the sources on screen are reflections.

If an actual sound source is large, e.g. a large vibrating surface, the source shown on the display might be smaller than the actual source. The source might in this case also move around as you move around the surface, depending on which point of the surface is closest to the device. Be sure to adjust the frequencies on the device to get an accurate picture of the sound source.

It is possible to adjust the dynamic range of the heatmap with the available quick slider. By increasing the dynamic range, the user might be able to tell the actual size of the sound source.

9-2-4   Directional Sound

It is often useful to take snapshots of interesting sound sources from several different directions. The exact location of the source is easier to determine when viewed from different angles. Sound sources can also be directional, meaning that the sound level will differ depending on the direction.

9-2-5   Sound Saving

The the capture button is pressed the sound coming from the direction of the crosshair is saved. The default is to save 2 seconds of sound, from the moment the capture button is pressed backwards. Keep the camera steady for a few seconds before taking a snapshot, in order to get a clear signal from the source of interest.

If there is a sporadic event, take a snapshot right when or right after the event is observed in order to record the signal of the event.

9-2-6   Recommended Distance

The minimum recommended sound source distance for the device is approximately 0.3 meters (1.0 ft). If the distance is shorter than this, the location of sound sources may not be accurately displayed. In addition, the optical camera will not be focused at such short distances.

There is no specific upper limit for the distance at which the device can be used. In practical cases, the distance is often limited to approximately 120 meters (394 ft), but strong sound sources in an otherwise quiet environment can be detected at even larger distances. Respectively, weak sound sources usually require closer proximity.

10   Cleaning and Maintenance

CONTACT CUSTOMER SERVICE TO SCHEDULE REGULAR MAINTENANCE.

10-1   Cleaning the device

Dust, grease, and fingerprints produce harmful substances and can lead to a decline in performance, or cause scratches. However, cleaning of the microphone array is not suggested to be performed by the user, as this may damage the device. Contact customer service to schedule maintenance.

If the user decides to clean the microphone array: indirect low pressure air from a distance can be used to blow partials away from the conical holes of the microphones. No direct and/or highly compressed air should be applied to the microphone array. If the suggested method doesn't work and the microphone array is still badly soiled, contact customer service to schedule maintenance. ICI is not responsible for any damage caused by the user in an attempt to clean the microphone array.

Do not use corrosive chemicals on the device.

10-2   Disinfecting the Camera Surface

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

10-3   Device Calibration

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

10-4   Maintenance

Do not try to repair or open the enclosure of the device or the battery. Do not use any damaged devices, batteries or cords. Protect the device and accessories from dirt, dust, impacts and liquids.

The intended usage conditions and instructions are described in this user manual. Please read and follow the instructions carefully in order to avoid damage to the device and accessories. If problems occur, contact your distributor for support.

10-5   Storage

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

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

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

11-7   Camera out of focus

- Move closer to the object

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

11-8   Unclear or dark visible images

- Turn on lights in the imaging area

- Use a flashlight

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

11-8   Data is missing or has strange readings

- Turn off the device; then, turn it back on

- To ensure the accuracy of measurements, you are recommended to wait for 5 to 10 minutes after turning on the device before taking measurements.

- Ensure the correct mode is selected:

  - Gas Leak Mode: used for localization of compressed air leaks.

  - Partial Discharge Mode: used for localization and classification of high-voltage and medium-voltage partial discharges.

- Device is at proper height

- Send the device in for recalibration

12   About ICI

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

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

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

Thank you for your dedicated and continued support.

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