HIKMICRO

Acoustic Imaging Camera

User Manual

Contact Us

Safety Instruction

These instructions are intended to ensure that user can use the product correctly to avoid danger or property loss.

Laws and Regulations

- Use of the product must be in strict compliance with the local electrical safety regulations.

Transportation

- Keep the device in original or similar packaging while transporting it.
- Keep all wrappers after unpacking them for future use. In case of any failure occurred, you need to return the device to the factory with the original wrapper. Transportation without the original wrapper may result in damage on the device and the company shall not take any responsibilities.
- DO NOT drop the product or subject it to physical shock. Keep the device away from magnetic interference.

Power Supply

- Please purchase the charger by yourself. Input voltage should meet the Limited Power Source (5 VDC, 2 A) according to the IEC61010-1 standard. Please refer to technical specifications for detailed information.
- Make sure the plug is properly connected to the power socket.
- DO NOT connect multiple devices to one power adapter, to avoid over-heating or fire hazards caused by overload.

Battery

- Improper use or replacement of the battery may result in explosion hazard. Replace with the same or equivalent type only. Dispose of used batteries in conformance with the instructions provided by the battery manufacturer.
- The built-in battery cannot be dismantled. Please contact the manufacture for repair if necessary.
- For long-term storage of the battery, make sure it is fully charged every three months to ensure the battery quality. Otherwise, damage may

occur.

- DO NOT charge other battery types with the supplied charger. Confirm there is no flammable material within 2 m of the charger during charging.
- DO NOT place the battery near heating or fire source. Avoid direct sunlight.
- DO NOT swallow the battery to avoid chemical burns.
- DO NOT place the battery in the reach of children.
- The lithium battery voltage is 3.6 V, and the battery capacity is 6230 mAh (22.43 Wh).

Maintenance

- DO NOT maintain the camera when it is powered on, or it may cause electric shock! If the product does not work properly, please contact your dealer or the nearest service center. We shall not assume any responsibility for problems caused by unauthorized repair or maintenance.
- Wipe the device gently with a clean cloth and a small quantity of ethanol, if necessary.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the device may be impaired.
- Please notice that the current limit of USB 3.0 PowerShare port may vary with the PC brand, which is likely to result in incompatibility issue. Therefore, it's advised to use regular USB 3.0 or USB 2.0 port if the USB device fails to be recognized by PC via USB 3.0 PowerShare port.

Using Environment

- Make sure the running environment meets the requirement of the device. The operating temperature shall be -20 °C to 50 °C (-4 °F to 122 °F), and the operating humidity shall be 95% or less.
- Place the device in a dry and well-ventilated environment.
- DO NOT expose the device to high electromagnetic radiation or dusty environments.
- DO NOT aim the lens at the sun or any other bright light.
- When any laser equipment is in use, make sure that the device lens is not exposed to the laser beam, or it may burn out.
- The level of protection is IP 54. The device is suitable for indoor and outdoor uses, but do not expose it in wet conditions.

Technical Support

The *https://www.hikmicrotech.com/en/contact-us/* portal will help you access to our support team, software and documentation, service contacts, etc.

Emergency

If smoke, odor, or noise arises from the device, immediately turn off the power, unplug the power cable, and contact the service center.

Limited Warranty

Scan the QR code for the product warranty policy.

Manufacture Address

Room 313, Unit B, Building 2, 399 Danfeng Road, Xixing Subdistrict, Binjiang District, Hangzhou, Zhejiang 310052, China

Hangzhou Microimage Software Co., Ltd

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
Danger	Indicates a hazardous situation which, if not avoided, will or could result in death or serious injury.
Caution	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance degradation, or unexpected results.
Note	Provides additional information to emphasize or supplement important points of the main text.

Contents

1 Overview

1.1 Camera Description

The HIKMICRO acoustic imaging camera is a professional product for sound source positioning. With its low-noise MEMS microphones and adjustable bandwidth range, it provides an easy and effective way to locate the pressurized gas leaks or partial discharge in industrial environments. By using a large 4.3" LCD touch screen, the results overlaying on a visual image allows you to quickly find the source of the problems. Adopting this lightweight and easy-to-use tool, you can discover the potential safety risks, minimize troubleshooting, and save extra costs of equipment failures and downtime.

1.2 Main Function

Acoustic Imaging

Camera detects the real-time sound intensity of the sources, and locates the sources in the scene.

Partial Discharge Detection (PD)

Camera detects partial discharge activities and estimates their types based on sound frequency, and displays the real-time estimation in live view for your reference.

Gas Leak Detection (LD)

Camera detects and estimates real-time gas leak rate, leak cost, and leak level for reference. Only some models in the series support this function. Please refer to your specific device.

Thermal Imaging (Optional)

Camera supports thermal imager connection via Type-C port to get thermal image mode for target temperature measurement.

Palettes

Camera supports multiple palettes to display the detected sound sources and their intensities.

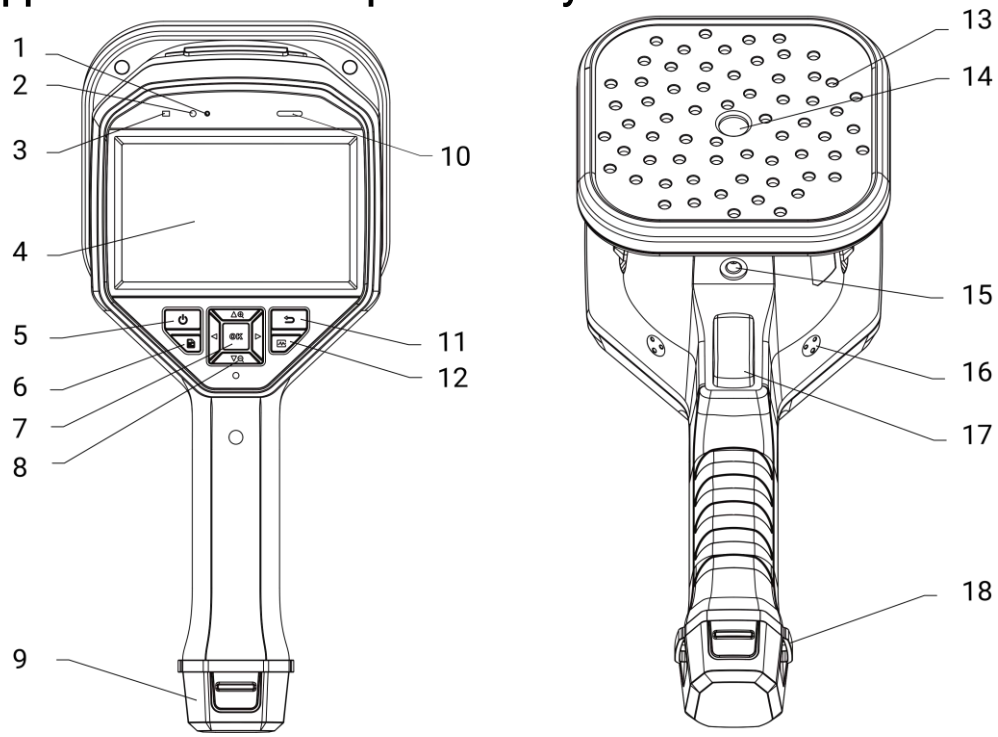
Record Videos & Capture Snapshots

Camera supports recording videos, capturing snapshots, and managing albums.

1.3 Appearance

There are two types of the acoustic imaging camera in this series with different microphone array (No.13 in the following figures).

1.3.1 Appearance: 64-Microphone Array



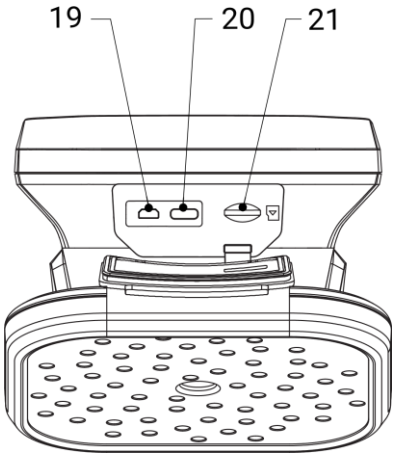


Figure 1-1 Appearance: 64-Microphone Array

1.3.2 Appearance: 136-Microphone Array

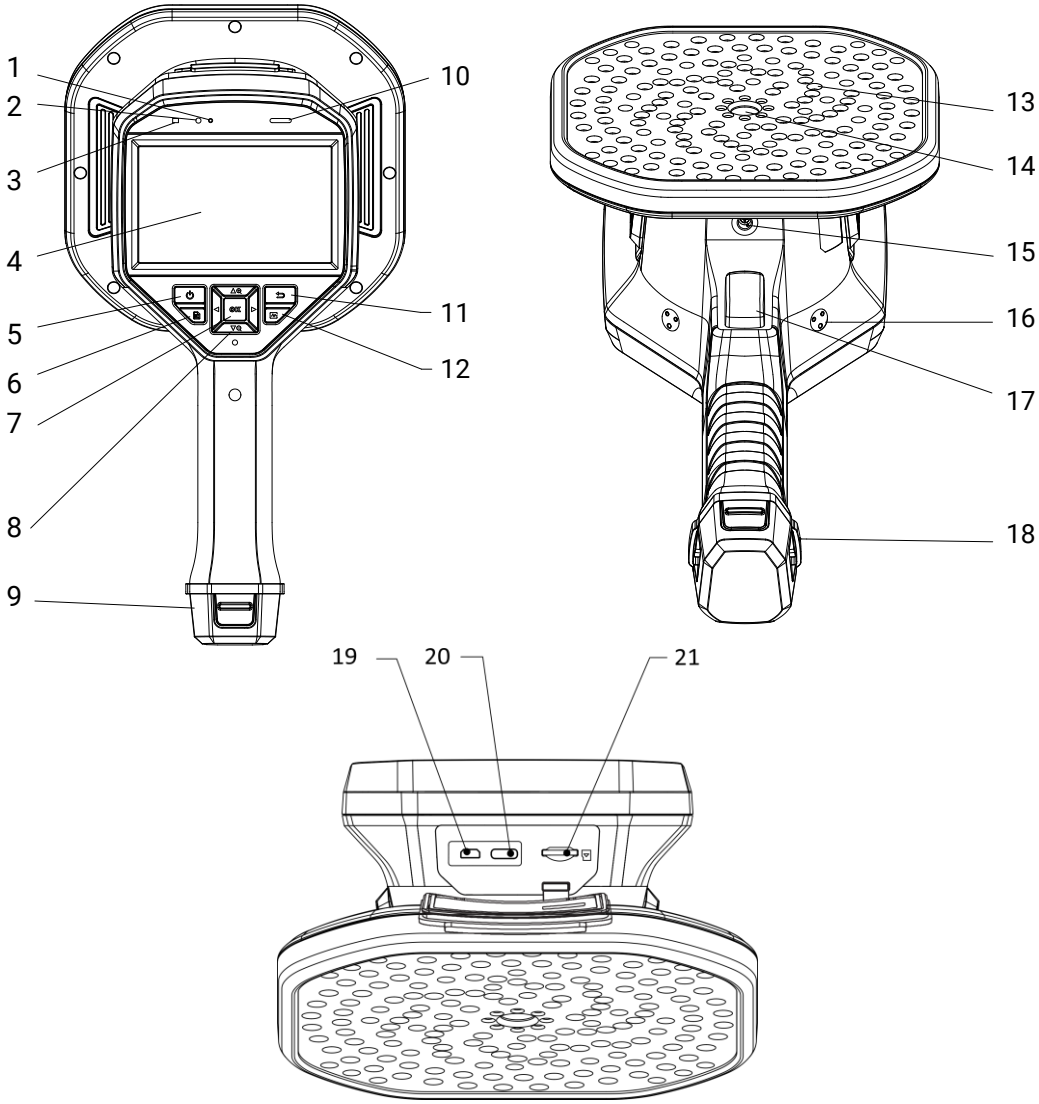


Figure 1-2 Appearance: 136-Microphone Array

1.3.3 Thermal Imager (Only supported by 136-Microphone array)

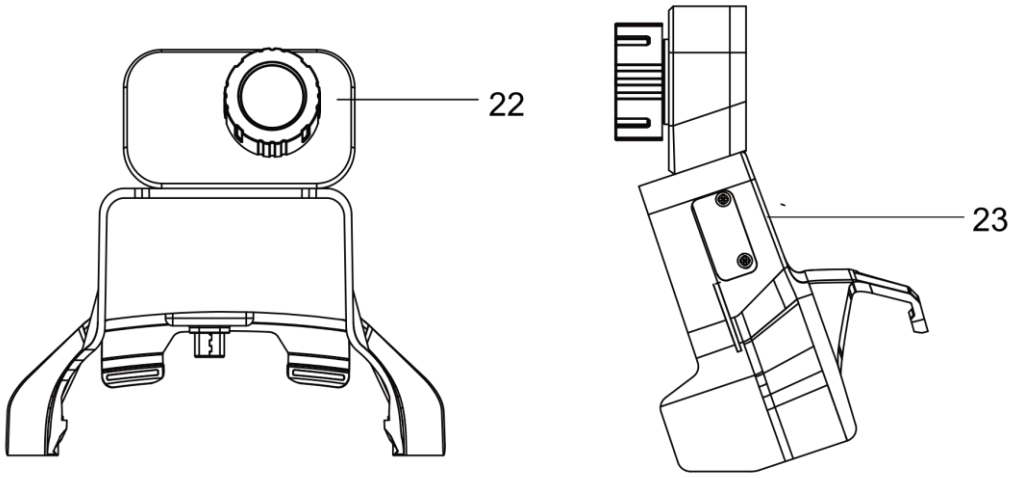


Table 1-1 Interface Description

No.	Component	Function
1	Light Sensor	Senses the ambient brightness.
2	Microphone	Records voice notes.
3	Power Indicator	Solid red: Charge normally. Solid green: Fully charged.
4	LCD Touch Screen	Allows live view and touch-screen operation.
5	Power Button	Holds ⏻ to power on/off. Presses ⏻ to enter/exit sleep mode.
6	File Button	Presses 🗎 to access the albums.
7	Confirm Button	Non-Menu Mode: Press OK to enter menu. Menu Mode: Press OK to confirm.
8	Navigation Button	Non-Menu Mode: ● Presses △⊕ or ▽⊖ to zoom in or zoom out by 0.1× continuously. ● Holds △⊕ or ▽⊖ to zoom in or zoom out by 1× continuously. Menu Mode: Presses △⊕, ▽⊖, ◁, and ▷ to select parameters.
9	Battery Compartment	For holding the battery.
10	Loudspeaker	Plays voice notes.

11	Back Button	Presses ⮌ to save the parameters and returns to previous menu.
12	Frequency Button	Presses to select the frequency range frame edges and configures the frequency parameters.
13	Microphone Array	Detects sound in the scene.
14	Visual Camera	Views the visual images.
15	Tripod Attachment Point	Mounts the tripod.
16	Hand Strap Attachment Points	Mounts the hand strap.
17	Trigger	Non-Menu Mode: ● Presses: Capture snapshots. ● Holds: Record videos. Menu Mode: Presses to return to live view interface.
18	Hand Strap Attachment Holes	Fixes the lower part of the hand strap to the camera.
19	Micro HDMI Interface	Displays the image and menu interface via HDMI output.
20	Type-C Interface	Charges the camera or exports files with supplied cable.
21	MicroSD Card Slot	For holding the MicroSD card.
22 & 23	Thermal Imager	For thermal imaging after connecting to the acoustic imaging camera via the Type-C port.

2 Preparation

2.1 Mount Hand Strap

The hand straps aim at attaching to the camera and stabilizing it. Please make sure that your hands are wrapped with the hand straps to prevent the camera from accidental falling or bumping.

The upper part of the hand strap is attached to the camera by a buckle. There are two buckle attachment points on both sides of the camera. The lower part of the hand strap is threaded through the holes at the base of the camera.

Steps

1. Insert the upper part of the hand straps into the buckles.

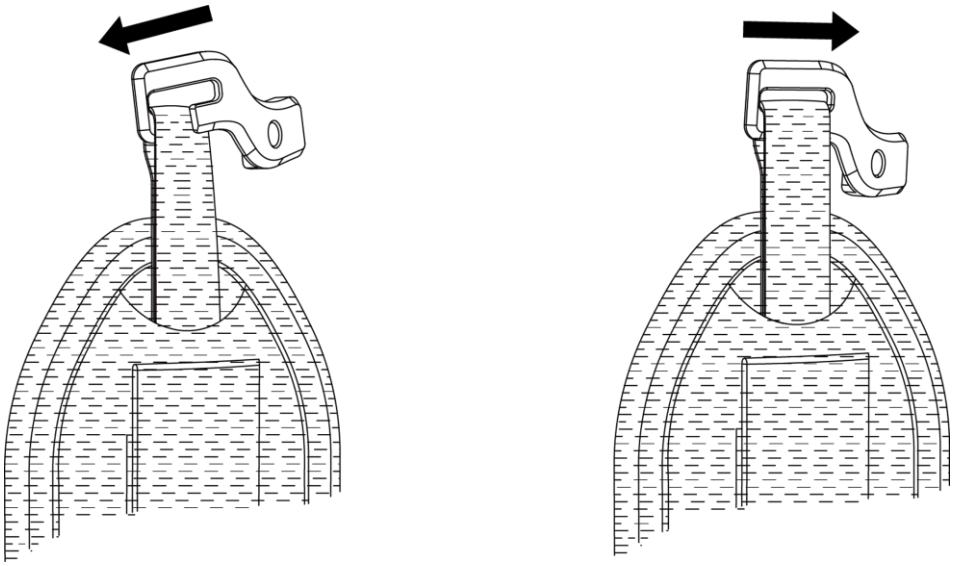


Figure 2-1 Insert Upper Part of Hand Strap

2. Fit the buckle on the camera and tighten the screw with the supplied wrench.
3. Thread the lower part of the hand strap through the hole at the base of the camera.

4. Secure the hand strap with the hook-and-loop fastener. Adjust the tightness according to your hands.

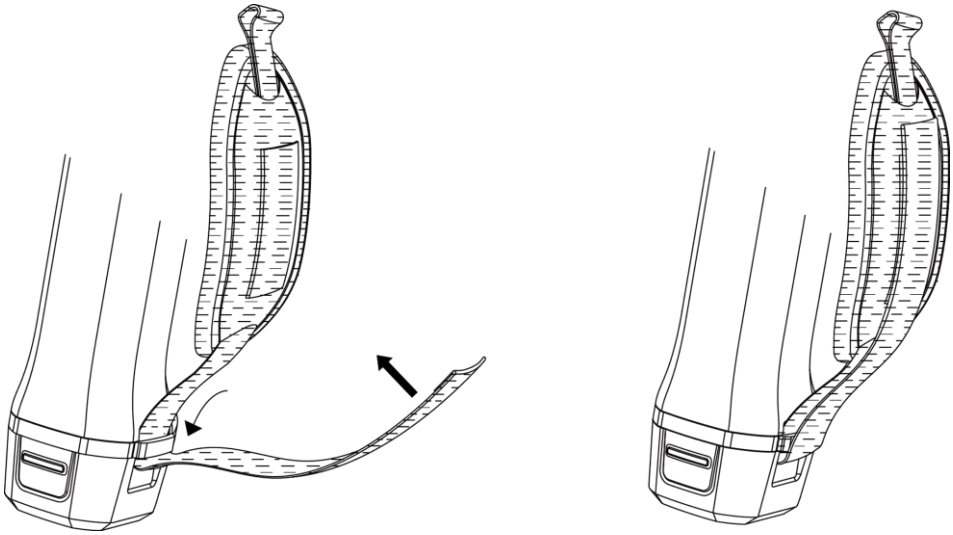


Figure 2-2 Secure Lower Part of Hand Strap

2.2 Mount Thermal Imager

Thermal imager can be connected to the acoustic imaging camera with 136-microphone array through Type-C port.

Thermal imager is not included in the packaging box. Users need to purchase separately.

Steps

1. Take off the charging port cover.
2. Align the bracket and the thermal imager according to the arrow direction (See *Figure 2-3*), making the bracket edge parallel to the camera frame.

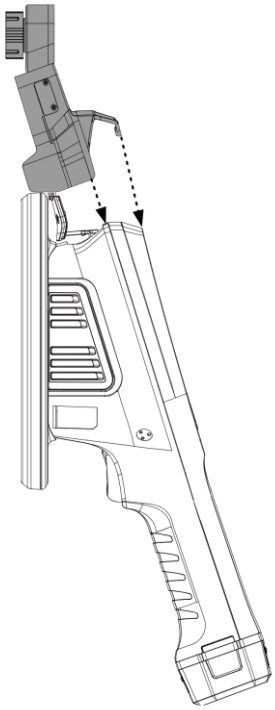


Figure 2-3 The Bracket and Thermal Imager Alignment

3. Push the thermal imager down until the bracket clip is securely fastened, which means the Type-C port of the camera is connected to the thermal imager connector.

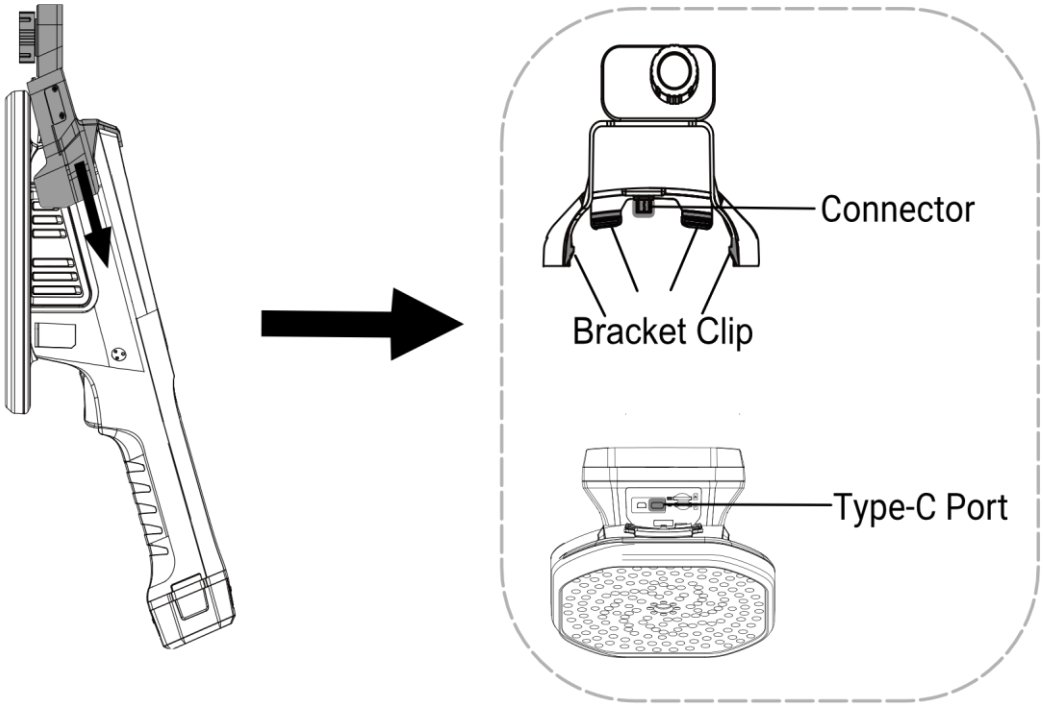


Figure 2-4 The Bracket and Thermal Imager Connection

2.3 Operation Method

The camera supports both touch-screen control and button control.

Touch-Screen Control

Tap on the screen to set parameters and configurations.

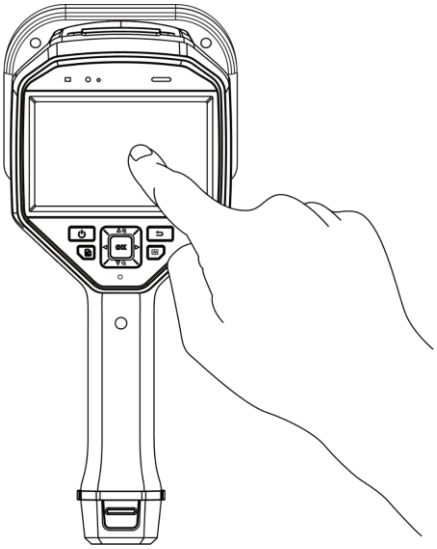


Figure 2-5 Touch-Screen Control

Button Control

Press the navigation buttons to set parameters and configurations.

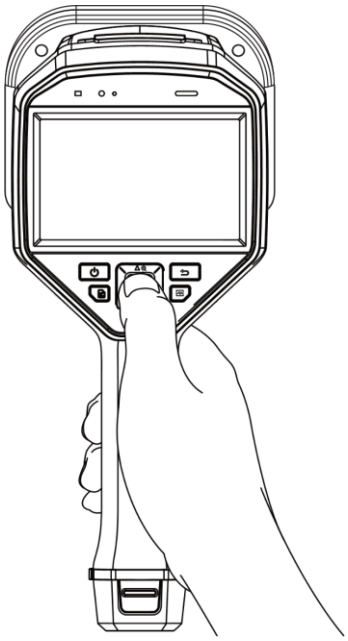


Figure 2-6 Button Control

2.4 Charge Camera

Please fully charge the camera before it is used for the first time or when it is in low battery.

2.4.1 Charge Camera via Cable Interface

Before You Start

Please make sure the battery is installed before charging via cables.

Steps

1. Open the connector cover of the camera.
2. Plug the Type-C male connector of the charging cable to the camera and the other type-A connector to power adapter.

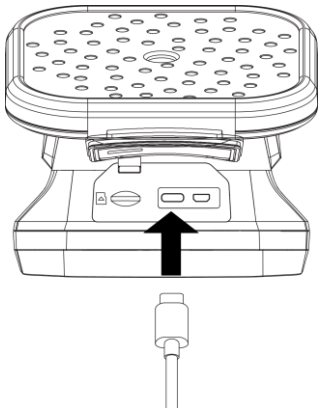


Figure 2-7 Charge via Type-C Cable

- For device with 64-Microphone Array, the power delivered by the charger must be between min 9 Watts required by the radio equipment, and max 10 Watts in order to achieve the maximum charging speed.
- For device with 136-Microphone Array, the power delivered by the charger must be between min 9 Watts required by the radio equipment, and max 15 Watts in order to achieve the maximum charging speed.

2.4.2 Charge Camera via Charging Base

You can take out the battery and insert it into the charging base for fast charging.

Before You Start

Please make sure the camera is power off before removing the battery.

Steps

1. Hold the camera, and press both battery lock catches of the camera.

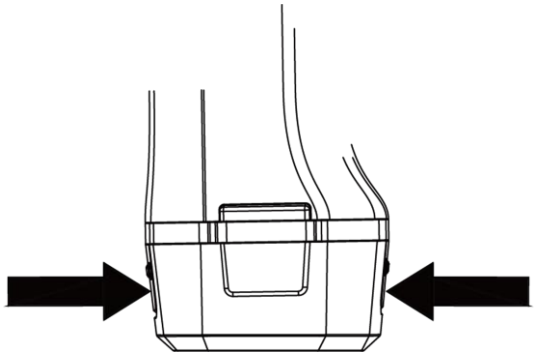


Figure 2-8 Remove Battery Base

2. Hold the lock catches, and draw the battery base to take out the battery.
3. Insert the battery into the charging base. You can see the charging status via the pilot lamp on the charging base.

The red indicating light is on if the battery is charging properly, and the green indicating light is on if the battery is fully charged.

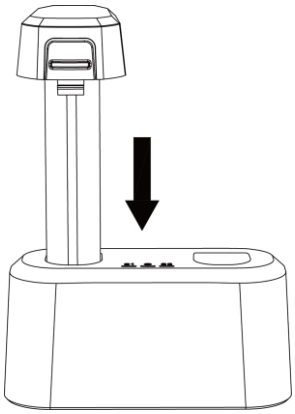


Figure 2-9 Charge Battery

4. When the battery is fully charged, draw the battery from the charging base.
5. Insert the battery into the camera and push it into the locked position.

2.5 Power On/Off

2.5.1 Power On

Hold ⏻ to turn on the camera. You can observe the target when the live view interface is stable.

If the battery of the camera is low, please charge it in time or replace it with a fully-charged standard battery, so as to ensure that the camera functions normally.

2.5.2 Power Off

When the camera is turned on, hold ⏻ to power off the camera.

2.5.3 Set Auto Power-off Countdown

Steps

1. Press OK in live view interface to show the menu.
2. Go to **Settings > Device Settings > Auto Power-off**.
3. Select **Auto Power-off** and press OK to enable auto power-off.
4. Set the automatic shutdown time for camera as required.
5. Press ⮌ to save and return to previous menu.

2.6 Sleep and Wake

Sleep and wake is used to save energy and increase battery time.

Sleep and Wake Manually

Press ⏻ to enter sleep mode and press again to wake camera up.

Set Auto Sleep

In live view, press OK to call the main menu. Go to **Settings > Device Settings > Auto Sleep** to set waiting time before auto sleep.

When there is no button pressing or screen tapping operation on camera for more than the set waiting time, camera enters sleep mode automatically.

Camera Sleep, Scheduled Capture and Video Recording

When the camera is recording a video clip or on scheduled capturing, auto sleep will not be triggered. However, press will stop the video recording or scheduled capture and force the camera into sleep mode.

2.7 Screen Lock

To protect your data security, the device supports setting a screen lock. After the screen lock is enabled, users have to input the preset four-digit password to unlock the screen.

2.7.1 Enable Screen Lock and Set Password

Steps

1. Tap , and go to **Device Settings** > **Screen Lock**.
2. Switch on **Screen Lock** button.
3. Enter a four-digit password with the soft keyboard.
4. Tap ✔ in the top right corner to confirm the setting, and the screen lock function is enabled.

2.7.2 Change Password

Steps

1. Tap , and go to **Device Settings** > **Screen Lock**.
2. Tap **Change Password** to set a new password with the soft keyboard.
3. Tap ✔ in the top right corner to confirm the setting, and the password is changed.

2.7.3 Reset Password

Password reset will restore the device and clear all data. Be careful to use this function

Steps

1. In **Enter Password** interface when you wake up the device, tap  in the top right corner.
2. Select **OK** in the pop-up conversation box to restore the password. Tap **Cancel** to cancel the operation.

   Result

   When restoring is completed, the device will reboot, and users need to set up all the basic information, such as system language, date and time.

2.8 Auto Microphone Check

Auto microphone check is a camera self-test on the microphone array.

Go to **Settings > Device Settings > Auto Microphone Check** for the test. If microphone error is detected, please contact your dealer or our technical support for help.

2.9 Live Interface and Menu

2.9.1 Live View Interface

After starting up, camera screen shows the live view interface with detected acoustic wave.

If connected to a thermal imager, the camera can switch to **Thermal** image mode and **PIP** (Picture in Picture) image mode by pressing the left/right navigation buttons.

Users need to purchase the thermal imager separately if required.

Acoustic Image Mode

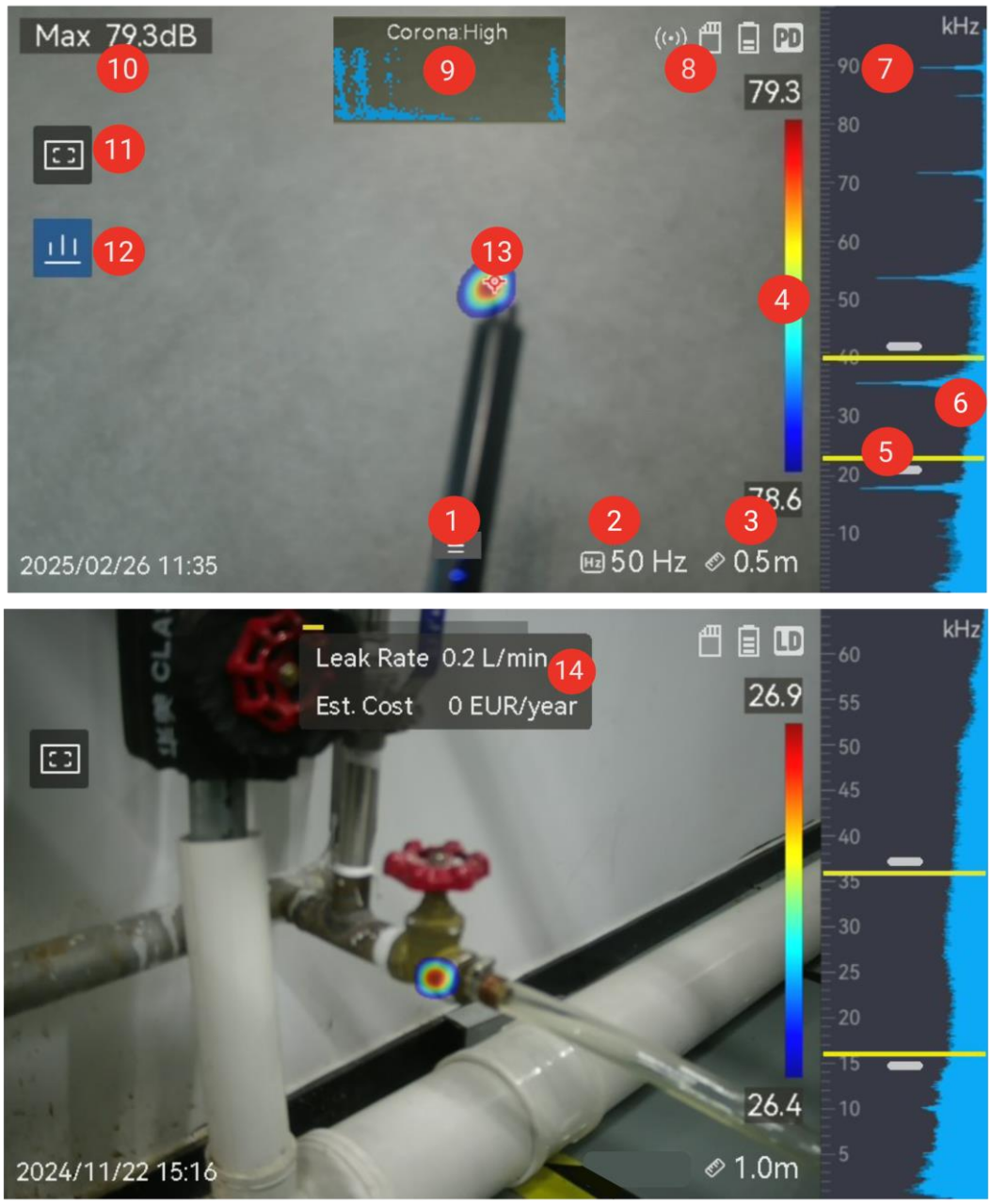


Figure 2-10 Live View Interface of Acoustic Image Mode

Table 2-1 Live View Interface Description of Acoustic Image Mode

No.	Part Name	Function
1	Menu Icon	Taps on the icon to call the main menu.
2	Industrial Frequency	Sets the industrial frequency of the target. See *5.2 Set Industrial Frequency*.
3	Sound Source Distance	Shows the set distance of sound source. See *5.3 Set Sound Source Distance*.

No.	Part Name	Function
4	Intensity Scale (Palette Bar)	Intensity scale (palette bar) shows the relation between displayed color and sound intensity. The value at the ends of the bar stands for the maximum and minimum intensity of the set frequency range. See *6.1.1 Set Palette Color* for setting instructions.
5	Selected (Target) Frequency Range	Sound intensity of this frequency band is detected and converted to acoustic palette. See *5.1 Set Frequency* for instructions.
6	Dynamic Intensity of All Frequencies	Shows the intensity change of supported frequencies.
7	Frequency Band	Shows the supported frequency band of the camera.
8	Status Bar	Displays the camera working status at the top right. Turn on/off the display from **Settings > Display Settings > Status Icons**.
9 & 12	PRPD and its Control Icon	Only available in PD mode. Taps on icon (12) to display phase resolved partial discharge (PRPD) diagram for better PD activity diagnosis. Taps on PRPD diagram (9) to enlarge the display.
10	Maximum Intensity	Stands for the detected maximum intensity of the scene. See *5.5.1 Mark and Display Peak Intensity* for setting instructions.
11	Regional Detection Frame	Taps on the icon to show a frame in the middle of the screen. The camera only displays sound sources in the frame to reduce interference from less interested areas. See *5.5.2 Regional Detection Frame* for more information.

No.	Part Name	Function
13	Acoustic Palette	The location and intensity of detected sound source are converted to palette colors overlaying on the visual image for easy observation. The size of palette stands for the intensity of the sound source. Bigger acoustic palette covered area means wider sound intensity range.
14	Gas Leak Info.	Only available in LD mode. Shows detected gas leak estimation. See *4 Gas Leak Detection (LD)* for more information.

Thermal Image Mode

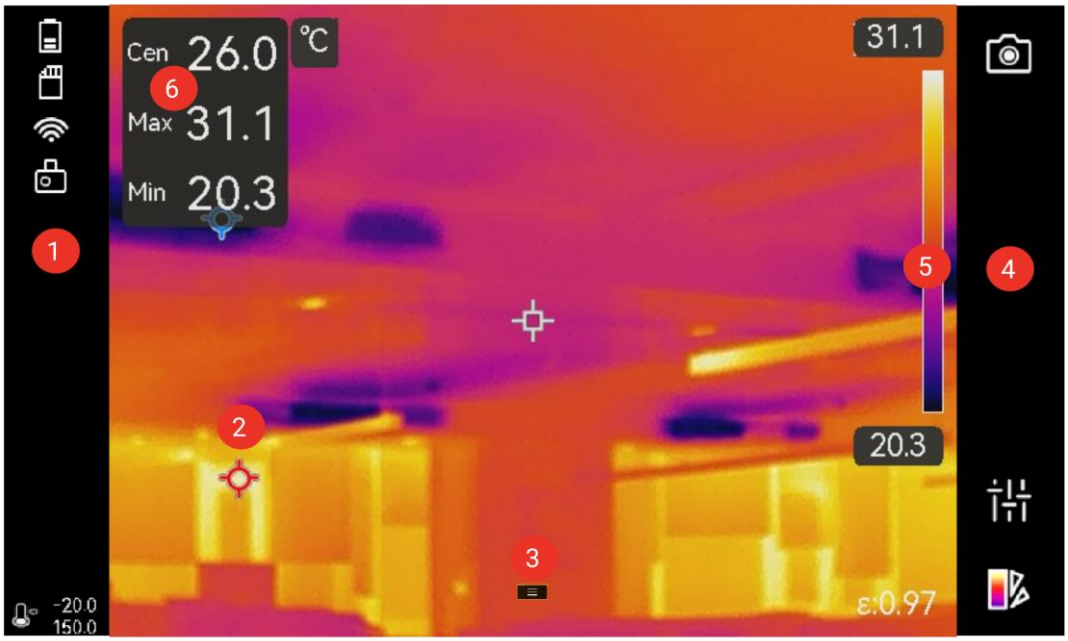


Figure 2-11 Live View Interface of Thermal Image Mode

Table 2-2 Live View Interface Description of Thermal Image Mode

No.	Part Name	Function
1	Status Bar	Displays the device working status.
2	Measurement Tools	Marks the highest/lowest/center temperature of the screen.
3	Menu Icon	Taps on the icon to call the main menu.

No.	Part Name	Function
4	Shortcut Keys	Displays shortcut keys, including Capture shortcut key, Level & Span shortcut key and Palettes shortcut key.
5	Temperature Scale	Displays the corresponding relations between temperature and color.
6	Temperature Reading Zone	Displays the highest/lowest/center temperature of the current observation area.

PIP Image Mode

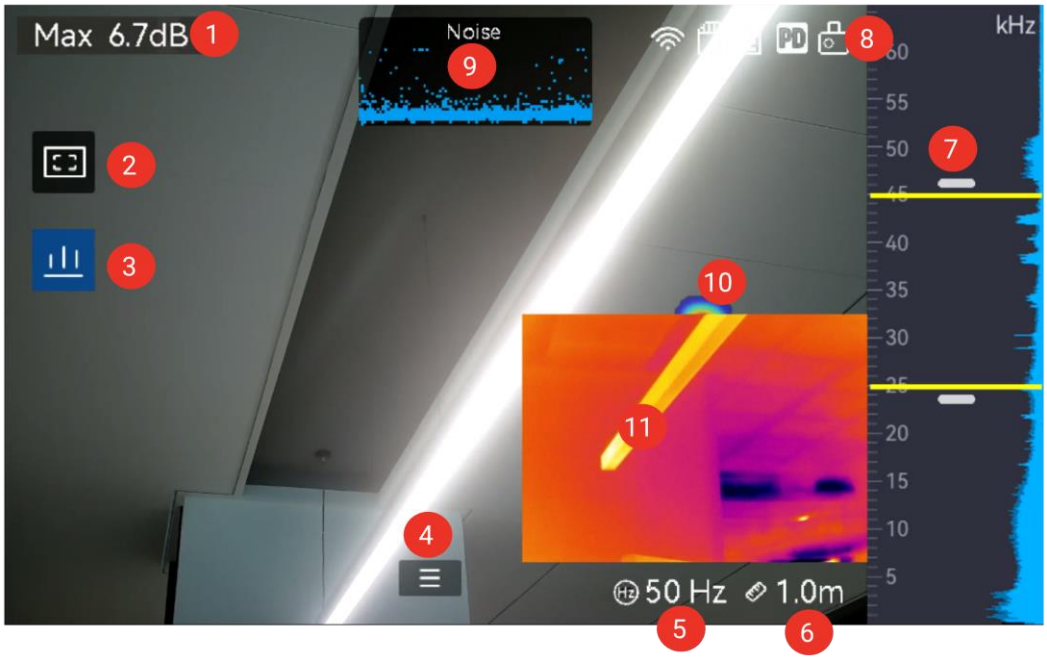


Figure 2-12 Live View Interface of PIP Image Mode

Table 2-3 Live View Interface Description of PIP Image Mode

No.	Part Name	Function
1	Maximum Intensity	Stands for the detected maximum intensity of the scene.
2	Regional Detection Frame	Taps on the icon to show a frame in the middle of the screen. The camera only displays sound sources in the frame to reduce interference from less interested areas.

No.	Part Name	Function
3 & 9	PRPD and its Control Icon	Only available in PD mode. Taps on icon (3) to display phase resolved partial discharge (PRPD) diagram for better PD activity diagnosis. Taps on PRPD diagram (9) to enlarge the display.
4	Menu Icon	Taps on the icon to call the main menu.
5	Industrial Frequency	Sets the industrial frequency of the target.
6	Sound Source Distance	Shows the set distance of sound source.
7	Frequency Band	Shows the supported frequency band of the camera.
8	Status Bar	Displays the camera working status at the top right.
10	Acoustic Palette	The location and intensity of detected sound source are converted to palette colors overlaying on the visual image for easy observation. The size of palette stands for the intensity of the sound source. Bigger acoustic palette covered area means wider sound intensity range.
11	Thermal image	Thermal image for the observed scene.

2.9.2 Main Menus

In live view interface, tap ☰ or press OK to show the main menu.

Figure 2-13 Main Menu for Acoustic and PIP Image Mode

Table 2-4 Menu Description of Acoustic and PIP Image Mode

Menu Icon	Function
*	Switches to Acoustic/Thermal/PIP (Picture in Picture) imaging mode.

Menu Icon	Function
	When the camera is connected to a thermal imager, it is available to change image modes.
	Detection mode switch. Partial Discharge Detection (PD) and Gas Leak Detection (LD) are supported.
	Adjusts detection sensitivity. Higher level means higher sensitivity. See *5.4 Set Detection Sensitivity* for setting instructions.
	Pre-defined target frequency ranges for quick switching.
	Distance to sound source.
	Local albums of captured images and videos. See *8.4 View and Manage Local Files* for setting instructions.
	Settings of all camera functions.

Figure 2-14 Main Menu for Thermal Image Mode

Table 2-5 Menu Description of Thermal Image Mode

Menu Icon	Function
	Switches to Acoustic/Thermal/PIP (Picture in Picture) imaging mode..
	Sets measurement tools (Spot, Line, Rectangle and Circle) to measure the real-time temperature of the target.
	Sets color palettes, and the display shows the corresponding colors.
	Sets a temperature range and the palette only works for targets within the temperature range. Manual and Auto modes are available.
	Local albums of captured images and videos. See *8.4 View and Manage Local Files* for setting instructions.
	Settings of all thermal imager functions.

2.9.3 Swipe-down Menu

Swipe down the screen from the top to call out the swipe-down menu.

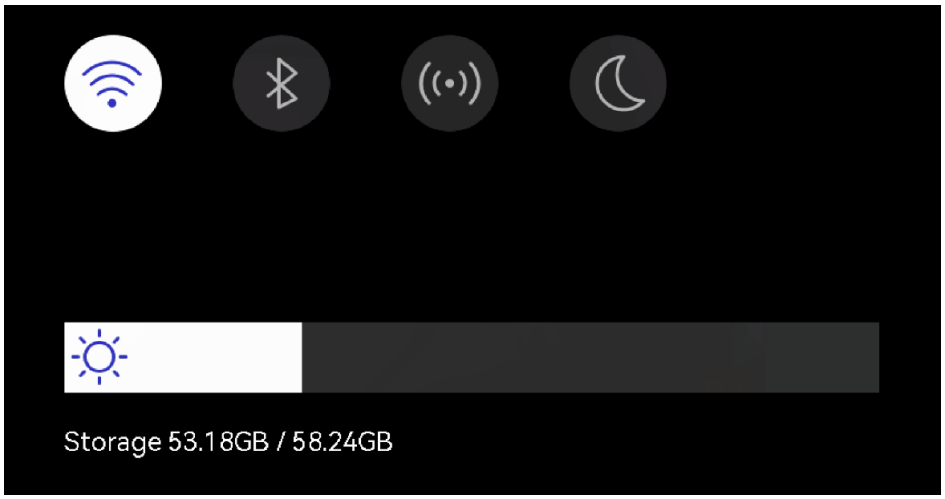


Figure 2-15 Swipe-down Menu

Table 2-6 Menu Description of Swipe-down Menu

Menu Icon	Function
	Taps to turn on/off camera Wi-Fi. See *9.1 Connect Camera to Wi-Fi* for setting instructions.
	Taps to turn on/off camera wireless connection function. See *9.3 Pairing Devices* for setting instructions.
	Taps to turn on/off camera hotspot. See *9.2 Set Camera Hotspot* for setting instructions.
	Taps to switch menu themes between dark and light.
	Swipes to adjust screen brightness.

3 Partial Discharge Detection (PD)

Partial discharge detection is often used in electrical equipment and facility inspection. It detects abnormal partial discharges faults and instructs maintenance activities.

3.1 Partial Discharge Detection Operation

Steps

1. In live view interface, tap ☰ or press OK to show the menu.
2. Select ⊙ to switch detection mode to PD.
3. Set industrial frequency of the target. Industrial Frequency refers to the working electrical frequency of the observed targets. It affects the accuracy of acoustic detection. See *5.2 Set Industrial Frequency*.
4. Set detection distance. Measure the distance between the microphone array to the target and input the data to the camera. See *5.3 Set Sound Source Distance*.
5. Hold and aim the microphone array to the target.
6. (Optional) If the target sound source intensity is weak and there is much interference around, enable the regional detection frame. See *5.5.2 Regional Detection Frame*.
7. (Optional) If you want to listen to the detected ultrasonic sound source (usually inaudible to human ears) for double confirm, enable **Ultrasonic to Audible** and connect your camera to a pair of low-power wireless headsets. See *5.5.4 Ultrasonic to Audible* and *9.3 Pair*.
8. Adjust the selected frequency range. See *5.1 Set Frequency*.
9. Adjust detection sensitivity. See *5.4 Set Detection Sensitivity*.
10. Check acoustic palettes position, maximum sound intensity position, PRPD diagram and the detection result on screen. To read the result, see *3.2 PD Types and Levels*.
11. Take snapshots or record videos of the suspected sound sources. See

8 Take Videos and Snapshots.

3.2 PD Types and Levels

When detecting a partial discharge sound source, camera automatically identifies the type and strength level, and displays the result on screen.

Due to potential environmental factors that may affect detection accuracy, PD type and strength level provided are approximate and for informational purposes only.

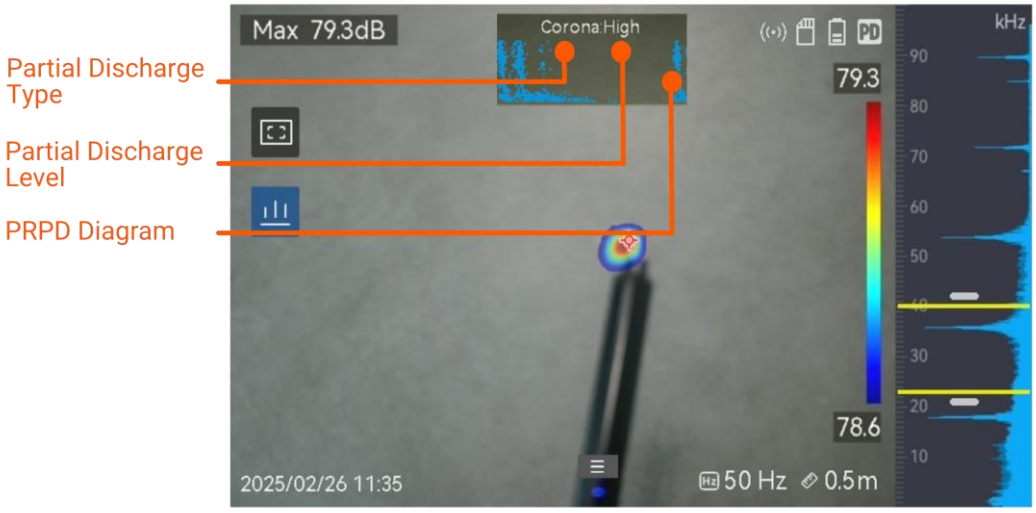


Figure 3-1 Partial Discharge Display

The explanation of screen display and the recommended handling are shown in the following tables.

Table 3-1 Partial Discharge Types

Partial Discharge Types	Description
Corona	Corona discharge occurs on the sharp surface of a conductor surrounded by gas. It usually happens in electrical systems like high-voltage power lines, transformers, or electrical motors.

Partial Discharge Types	Description
Floating	Floating discharge, one of arcing discharges, happens when the electrical current flows through the conducting path created by voltage difference between two conductors. It might occur in various situations, such as high-voltage power transmission systems, electrical switches, circuit breakers, and welding equipment.
Surface	Surface discharge refers to the electrical discharge travels along the surface of insulation. It is primarily caused by the contamination and weather conditions like high humidity, of the insulator surface. It often occurs in high-voltage equipment, such as transformers, cables, switchgear, and motors.
Particle	Particle discharge refers to the partial discharge of electrical energy that interacts with metallic particles and debris present in the electrical systems. It can result from loose particles or particles generated by mechanical wear, corrosion, or degradation of insulation materials.
Noise	Other detected sound.

If different types of partial discharges coexist in the scene, the most prominent partial discharge type shows in live view.

Table 3-2 Partial Discharge Severity and Handling

Partial Discharge Severity	Recommended Handling
Normal	No observable/measurable deterioration.
Low	Minor deterioration which requires attention. Shorten inspection period and take maintenance actions when necessary.
Medium	Moderate deterioration. Locate and clean the Item during routine maintenance, or carry out related electrical test of the item. Or use online monitor to monitor the discharge tendency.
High	Serious deterioration. Item can not be returned to service without shutdown or engineering advise.

4 Gas Leak Detection (LD)

LD mode is often used in gas leak detection of gas pipelines, tanks, valves, etc.

In LD, there are 2 gas leak modes with different calculations of leak cost. Select a leak mode according to the inspected target and the way of cost calculation.

Table 4-1 Gas Leak Modes

Gas Leak Mode	Description
Bottled Gas	Locate leak points and detect leak rate. Calculate estimated cost acorrding to the price of gas and leak rate. See *4.1.2 Estimated Cost Calculation for Bottled Gas Leak* for leak cost calculation.
Compressed Air	Locate leak points and detect leak rate. The leak cost is the cost of extra power that the air compressor consumed to maintain system pressure. The power waste can also be converted to CO2 emissions for display. See *4.1.1 Estimated Cost Calculation for Compressed Air Leak* for leak cost calculation.

This product is designed to assess gas leak to achieve cost savings. However, due to potential environmental factors that may affect detection accuracy, the estimations provided are approximate and for informational purposes only. It should be noted that the results presented by the camera are not a guarantee of actual cost savings or a recommendation, and may not accurately reflect the specific situation of your facilities.

4.1 Gas Leak Detection Operations

The following procedure is a general operation guide. Fine-tune the detection by adjusting frequency, distance, and sensitivity to find solid and stable leak points.

Steps

1. In live view interface, tap ☰ or press OK to show the menu.
2. Select ⊙ to switch detection mode to LD.
3. Go to **Settings > Acoustic Settings > Gas Leak Settings > Gas Leak Mode**, and set the mode as **Bottled Gas** or **Compressed Air**. See *Table 4-1* for mode difference.
4. (Optional) Set the pressure for the target, generally container or pipes. The parameter helps improve accuracy when detecting small leaks.
   1) Go to **Settings > Acoustic Settings > Gas Leak Settings > System Pressure**, and press OK to the setting interface.
   2) Enter the value with the soft keyboard.
   3) Press OK or tap ✓ in the top right corner to save and exit.
5. Set the parameters for result display and cost calculation.
- For cost calculation of compressed air leak, see *4.1.1 Estimated Cost Calculation for Compressed Air Leak* for details.
- For cost calculation of bottled gas leak, see *4.1.2 Estimated Cost Calculation for Bottled Gas Leak* for details.

6. Set leak level. Manually adjust the range of each level.
   1) Select ⚙, and go to **Acoustic Settings** > **Gas Leak Settings** > **Leak Level**.
   2) Press OK button, and choose a range in Leak Level interface.
   3) Press OK button, and input the value in the box with a soft keyboard on screen.
   4) Tap ✓ or press OK button to confirm the settings.
7. Set detection distance. Measure the distance between the microphone array to the target and input the data to the camera. See *5.3 Set Sound Source Distance.*
8. Hold and aim the microphone array to the target.

9. (Optional) If the target sound source is small and there is much interference around, enable the regional detection frame. See *5.5.2 Regional Detection Frame*.
10. (Optional) If you want to listen to the detected ultrasonic sound source (usually inaudible to human ears) for double confirm, enable Ultrasonic to Audible and connect your camera to a pair of low-power wireless headsets. See *5.5.4 Ultrasonic to Audible* and *9.3 Pair*.
11. Adjust the selected frequency range. See *5.1 Set Frequency*.
12. Adjust detection sensitivity. See *5.4 Set Detection Sensitivity*.
13. (Optional) Enable **Stabilization** to stabilize the value of **Leak Rate** at the center of live view interface.
    1) Select ⚙, and go to Acoustic Settings > Gas Leak Settings > Stabilization.
    2) Press OK button to turn on the function.
14. Check acoustic palettes position, maximum sound intensity position, and the detection result on screen.

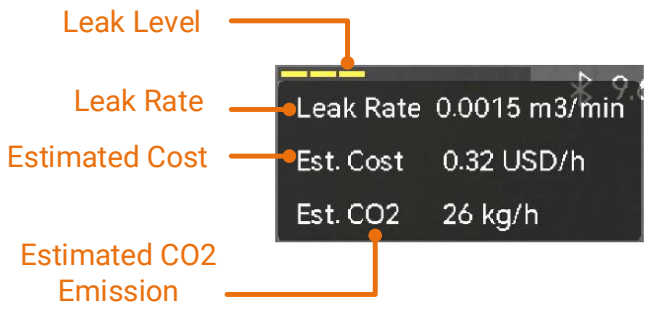


Figure 4-2 Gas Leak Estimation (Compressed Air)

15. (Optional) Calibrate the leak rate if you find it is deviated from the actual amount. See *4.2 Leak Rate Calibration*.
16. Take snapshots or record videos for the suspected sound sources. See *8 Take Videos and Snapshots.*

4.1.1 Estimated Cost Calculation for Compressed Air Leak

There are 3 formulas involving different air compressor parameters for you to calculate leak cost and CO2 emission. Select a formula in which the required air compressor parameters are easy to obtain.

The estimated cost and CO2 emission are displayed at the top center of live view.

Steps

1. Switch gas leak mode to **Compressed Air** by ⚙ > **Acoustic Settings** > **Gas Leak Settings > Gas Leak Mode.**
2. Set **Currency**, **Leak Rate Unit**, **Leak Cost Time Unit** and **Pressure** unit for your calculation by ⚙ > **Acoustic Settings** > **Gas Leak Settings > Unit Settings**.
3. Select a formula according to the required air compressor parameters already known or easily accessed, and input corresponding values for calculation.
   1) Select a formula. Select ⚙, and go to **Acoustic Settings > Gas Leak Settings > Compressed Air Settings > Formula**.

Table 4-2 Recommeded Formula for Compressed Air Leak

Already Known/Available Parameters	Recommended Formula
Air Compressor Specific Power (Y)	Formula One: Est. CO2= T*X*Y*B Est. Cost= T*X*Y*A
● Air Compressor Out Flow Rate (Q) ● Air Compressor Power Consumption (P)	Formula Two: Est. CO2= T*X*P*B/Q Est. Cost= T*X*P*A/Q
● Air Compressor Output Pressure (p) ● Air Compressor Motor Efficiency (η)	Formula Three: Est. CO2= T*(p*X*B)/(η*60) Est. Cost= T*(p*X*A)/(η*60)

Table 4-3 Parameters Description in Cost Calculation Formula

Formula	Parameter	Description
All formulas	T	Working hours of the air compressor per day/month/year. Its unit depends on **Leak Cost Time Unit**.
	X	Leak rate of the target. It is an automatic measured value. The unit depends on **Leak Rate Unit**.
	A	The price of 1 kWh electricity. Its unit depends on **Currency**.

Formula	Parameter	Description
	B	CO2 emissions per kWh (carbon emissions from electricity). It can be obtained by querying the carbon emission factor of the local power grid.
Formula one only	Y	Air compressor specific power, indicating the working efficiency of an air compressor, is the ratio of input power to compressed air flow rate at a given pressure. It can be found in the data sheet of the air compressor.
Formula two only	P	Air compressor power consumption (Unit: kW).
	Q	Air compressor out flow rate, indicating gas quantity output by air compressor.
Formula three only	p	Air compressor output pressure, indicating generated pressure of the compressed air ventilated through air compressor.
	η	Air compressor motor efficiency (Unit: %).

- The units of **Air Compressor Specific Power (Y)** and **Air Compressor Out Flow Rate (Q)** depend on **Leak Rate Unit**.
- The unit of **Air Compressor Output Pressure (p)** is consistent with **Pressure**.
- Tap ⓘ at the right side of the formula to get specific meaning of each parameter. Press OK or tap **Off** to hide the pop-up window.

2) Input corresponding parameter values.
   - Press ⮌ to return to **Compressed Air Settings** interface.
   - Select a parameter, and press OK to enter the setting interface.
   - Input the value with the soft keyboard.
   - Press OK or tap ✓ to confirm the settings.

4. Press ⮌ to return to live view interface, and browse gas leak information at the screen center.

Due to potential environmental factors that may affect detection accuracy, the estimations provided are approximate and for informational purposes only.

4.1.2 Estimated Cost Calculation for Bottled Gas Leak

The cost of bottled gas leak is equal to the leak rate multiplied by price of the gas.

Steps

1. Switch gas leak mode to **Bottled Gas** by ⚙ > **Acoustic Settings** > **Gas Leak Settings > Gas Leak Mode.**
2. Set leak rate unit and currency unit by ⚙ > **Acoustic Settings** > **Gas Leak Settings > Unit Settings.**

The unit of **Price of Gas** depends on **Leak Rate Unit** and **Currency**. For example, if users choose “L/min” as gas flow unit and “USD” as currency, the unit of gas price is “USD/L”.

3. Input the value of **Price of Gas**.
   1) Select ⚙, and go to **Acoustic Settings > Gas Leak Settings > Bottled Gas Settings** > **Price of Gas**.
   2) Press OK to enter the setting interface.
   3) Input the value with the soft keyboard on screen.
   4) Press OK or tap ☑ to confirm the settings.
4. Press ⮌ to return to live view interface.

Due to potential environmental factors that may affect detection accuracy, the estimations provided are approximate and for informational purposes only.

4.2 Leak Rate Calibration

If you find the leak rate is deviated from the actual amount, set a calibration factor for each leak rate range.

Calibrated leak rate = the detected leak rate × the set calibration factor.

You can set different calibration factors for different leak rate ranges. Calibration factor is a number from 0.000000 to 10.000000, up to 6 decimal places allowed.

Steps

1. In live view interface, tap ☰ or press OK to show the menu.
2. Select to switch detection mode to LD.
3. Go to **Settings > Acoustic Settings > Gas Leak Settings > Leak Rate Calibration**.
4. Press OK to enable the function.
5. Select a range to calibrate, and input a factor number by the soft keyboard for the range.

   Leak rate ranges are camera provided, and set a calibration factor for each range in use.

6. Press OK to confirm the settings and set factors for other ranges.

5 Basics of Acoustic Wave Detection

The camera supports acoustic wave detection among different frequency ranges. Detected sound source is marked with shaped acoustic palettes to show its dynamic location and intensity.

5.1 Set Frequency

Steps

1. The camera supports sound detection of two configurable frequency bands with different upper limit. Choose the one that better covers possible target frequencies from **Settings > Acoustic Settings > Frequency Band**.
2. Select a target frequency band, and sound of which is visualized to acoustic palettes in the display for easy observation. You can switch among pre-defined frequency ranges or adjust manually.

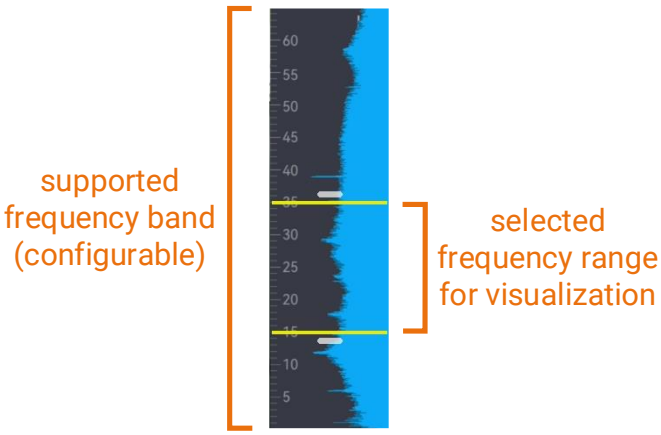


Figure 5-1 Frequency

Frequency modes are different in PD mode and LD mode.

5.1.1 Switch among Pre-defined Target Frequency Ranges

Switch Auto Frequency

Steps

1. Tap ☰ or press OK in live view to show the main menu.
2. Select .
3. Press OK to switch to auto frequency, including low, middle and high levels.

Manual adjustment to the selected frequency band is not allowed in this mode.

Customize the frequency range

Steps

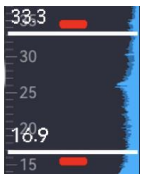
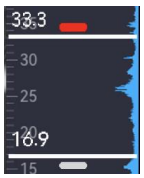
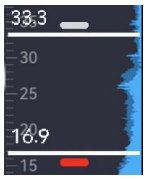
1. Tap ☰ or press OK in live view to show the main menu.
2. Select .
3. Press OK and switch to .
4. Customize the frequency band and set it as a predefined one.
   1) Adjust the value of the selected frequency band on the right side. See *5.1.2 Set Target Frequency Range Manually.*
   2) Press OK or ⮌ to finish editing.

5.1.2 Set Target Frequency Range Manually

Steps

1. Tap ☰ or press OK in live view to show the main menu
2. Select .
3. Press OK and switch to .
4. Press ⮌ to save and exit.
5. Select a subject for adjustment.

Table 5-1 Selected Frequency Adjustment

Objective	Operation	Operation Result
Adjust the upper and lower limits together.	Press once or tap the area between the lines.	
Adjust the upper limit only.	Press twice or tap on the upper line.	
Adjust the lower limit only.	Press three times or tap on the lower line.	

6. Press/hold navigation buttons to adjust values.
7. Press to save and exit.

5.2 Set Industrial Frequency

Due to different working frequency of the target, generally the electrical equipment, users can adjust industrial frequency to improve inspection accuracy.

- ONLY PD mode supports industrial frequency function.
- If **Video Standard** is switched, the value of industrial frequency is changed simultaneously. The default values of industrial frequency in PAL and NTSC are 50 Hz and 60 Hz respectively. See *6.4 Set Video Standard* for instructions.

Steps

1. Tap > **Acoustic Settings** > **Industrial Frequency**.
2. Press OK to **Industrial Frequency** setting interface.
3. Set a value with up/down navigation buttons or by scrolling the wheel.
4. Press or to save and exit.

5.3 Set Sound Source Distance

Distance to sound source helps to increase the acoustic wave detection accuracy.

ONLY LD mode supports **Auto Ranging**.

5.3.1 Set Manual Ranging

Steps

1. In live view, tap ☰ or press OK to show the menu.
2. Select .
3. Adjust the distance value.
   - PD mode: Press/hold ◁ and ▷, or tap ❮ and ❯.
   - LD mode: Choose , and then press/hold ◁ and ▷ or tap ❮ and ❯.
4. Press ⮌ to save and exit.

5.3.2 Set Auto Ranging

Steps

1. Turn off multiple sources mode from ⚙ > **Acoustic Settings** > **Multiple Sources**.
2. In live view, tap ☰ or press OK to show the menu.
3. Switch to LD mode.
4. Select > Ⓐ, and the device automatiocally calculate the source distance.

- If there is no acoustic palette, "~" is displayed on the bottom right in live view.
- Set distance unit from ⚙ > **Device Settings** > **Unit** > **Distance**.

5.4 Set Detection Sensitivity

Higher sensitivity means that sound source of lower intensity can be detected. Higher sensitivity also means that interferences are more easily to be detected and displayed.

Steps

1. In live view interface, tap ☰ or press OK to show the menu.
2. Select .
3. Press ◁ and ▷ or tapping on screen to select a level. Higher level means better sensitivity.
4. Press ⮌ to save and exit.

5.5 More Tools

5.5.1 Mark and Display Peak Intensity

Mark peak intensity point with ⌖ and display the peak intensity value on screen.

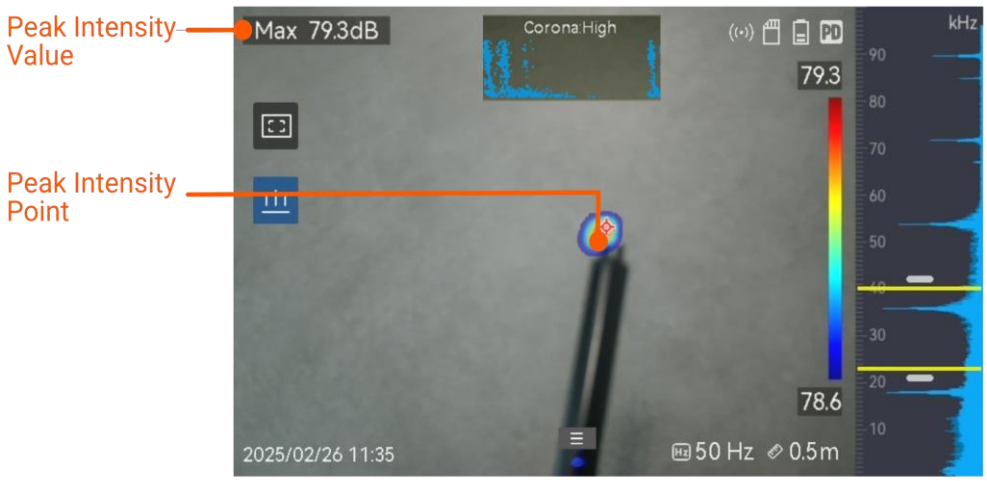


Figure 5-2 Mark Peak Intensity

Steps

1. In live view interface, tap ☰ or press OK to show the menu.
2. Go to **Settings** > **Display Settings** > **Sound Intensity**.
3. Enable **Peak**.

4. Press ⮌ to save and exit.

5.5.2 Regional Detection Frame

If the target sound source is small and there is sound interference around, enable the regional detection frame and aim the frame to the target. Sound detection only carries out in the framed area.

Tap ⛶ once to turn on regional detection frame.

Tap again to switch to ⛶/⛶ for resizing the regional detection frame.

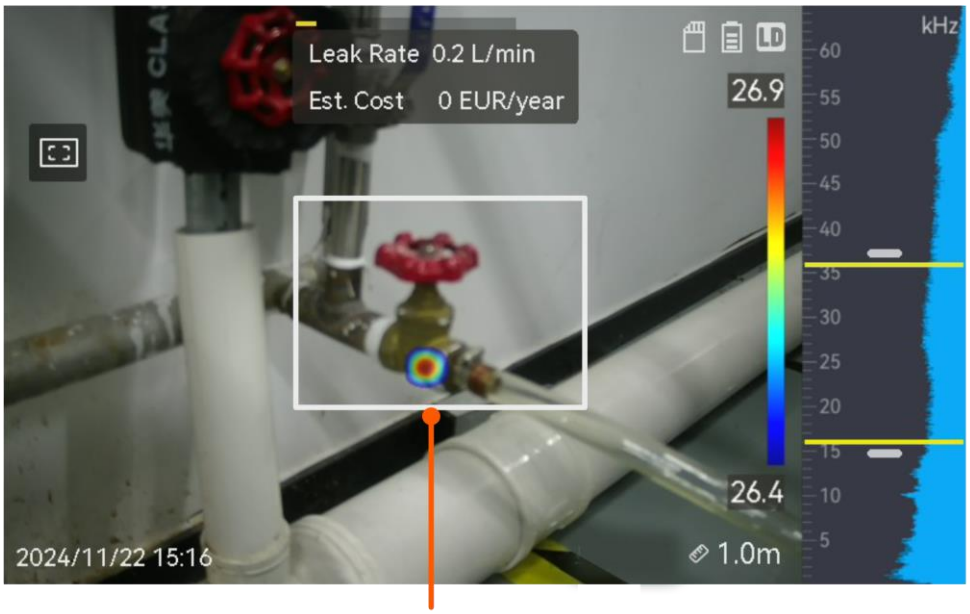


Figure 5-3 Regional Detection Frame

5.5.3 Show Multiple Sound Sources

Usually, camera only displays acoustic palettes at the strongest sound source. If you want to see other sound sources in the scene, turn on **Multiple Sources** from **Settings** > **Acoustic Settings** > **Multiple Sources**.

In practice, multiple sound source mode is hard to avoid the influence of reflected sound sources. In cases that pipes for inspection are close to ceiling or wall, detected multiple sources are likely several reflections of

one leak point. Thus, we are not recommended to use the mode in scenarios with strong reflection.

5.5.4 Ultrasonic to Audible

Normally, human ear can hear sound with its frequency ranges from about 20 to 20,000 Hz. Sound of higher frequency should be converted to audible sound for hearing.

Camera supports **Ultrasonic to Audible** function for the conversion. Connect the camera to low-power wireless headphones for listening to real-time ultrasonic sound sources.

- Users should prepare a pair of low-power wireless headphones.
- After enabling **Ultrasonic to Audible**, ultrasonic sound in recorded videos is also converted.
- Converted sound source can not be played with the camera speaker.
- **Ultrasonic to Audible** function is paused when other audio files (voice note and audio in video clips) are played.

Steps

1. Connect your camera to a pair of low-power wireless headsets. See *9.3 Pair*.
2. Enable **Ultrasonic to Audible** function.
   1) In live view interface, tap ☰ or press OK to show the menu.
   2) Go to **Settings > Acoustic Settings > Ultrasonic to Audible**.
   3) Enable the function and an ear icon shows in the live image.
3. Listen to the real-time audio and adjust volume.
   1) Tap on the 🔊 on the screen.
   2) Slide the volume bar for adjustment.

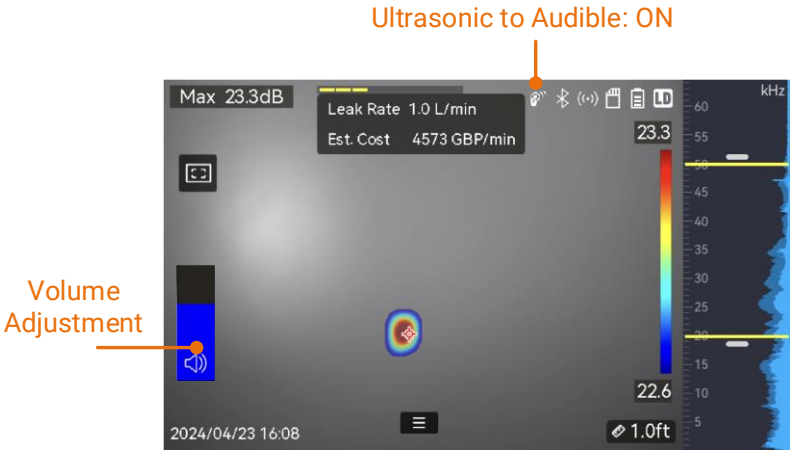


Figure 5-4 Ultrasonic to Audible and Volume Adjustment

6 Acoustic Display Settings

6.1 Set Acoustic Palettes

Acoustic palettes are the shaped colors overlaying on visual image indicating the location and strength of detected sound sources. Palette color, opacity and intensity range of palettes are adjustable.

6.1.1 Set Palette Color

Steps

1. Press OK in live view interface to show the menu.
2. Select ⚙ from the main menu, go to **Acoustic Settings** > **Palettes**, and select a desired color combination.
3. Press ⮌ to save and exit.

Result

Acoustic palette overlaid above the sound source and palette bar changes to the selected palette.

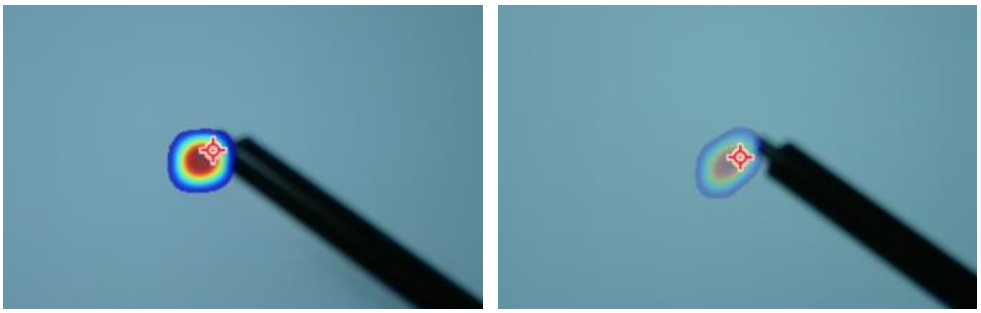
6.1.2 Set Palette Opacity

You can view the acoustic palette and the visual images at the same time if the opacity is properly set.

Steps

1. In live view interface, tap ☰ or press OK to show the menu.
2. Go to **Settings > Acoustic Settings** > **Palettes Opacity**, and select a desired level.
3. Press ⮌ to save and exit.

The opacity level ranges from 0% to 100%. The lower the value is, the more transparent the acoustic palette is.



Level: 75% vs Level: 25%

6.1.3 Set Intensity Range for Palettes

Colors in palettes stand for different sound intensity values. Usually, camera automatically calculates intensity range for palettes. You can also manually set a fixed range if the auto palette display is not satisfactory.

- **Auto (default)**: Camera calculates the upper limit, lower limit, and the intensity delta automatically.
- **Manual**: Camera calculates the upper limit and lower limit of intensity according to the set intensity delta and actual intensity of target sound source.

Steps

1. In live view interface, tap ☰ or press OK to show the menu.
2. Go to **Settings > Acoustic Settings > Intensity Range**, and press OK to switch to **Manual**.
3. Select **Intensity Delta** and press OK.
4. Press/hold △⊕ and ▽⊖ to adjust values.
5. Press ⮌ to save and exit.

6.2 Adjust Digital Zoom

The camera supports 1× to 16× digital zoom.

- In live view interface, hold △⊕ or ▽⊖ to zoom in or zoom out by 1× continuously.
- In live view interface, press △⊕ or ▽⊖ to zoom in or zoom out by 0.1× precisely.

6.3 Set Grayscale of Visual Image

The colored live view image turns to black and white if grayscale image is enabled. The black and white image makes colored acoustic palettes more prominent for observation.

Steps

1. In live view interface, tap ☰ or press OK to show the menu.
2. Go to **Settings > Display Settings**.
3. Enable **Grayscale Image**.
4. Press ⮌ to save and exit.

6.4 Set Video Standard

Video standard refers to the standard used in the visual camera. Set it according to the mains frequency in your country/region. PAL and NTSC are selectable.

Striped image may occur if wrong video standard is in use.

Go to **Settings > Device Settings > Video Standard** to switch standards. It takes effect after camera restart.

6.5 Set Screen Brightness

Steps

1. In live view interface, tap ☰ or press OK to show the menu.

2. Select from the main menu, go to **Device Settings** > **Screen Brightness**.
   - Auto: The camera adjusts screen brightness automatically according to the ambient brightness.
   - Manual: Drag the brightness adjustment slider to the left or right to manually adjust screen brightness.

You can also manually adjust brightness from swipe-down menu.

Figure 6-1 Brightness Adjustment Slider

6.6 On-Screen Display Info.

On-Screen Display (OSD) information informs you the status, time and date, and other information of the camera in live view interface.

Steps

1. In live view interface, tap or press OK to show the menu.
2. Go to **Settings > Display Settings**.
3. Tap or press OK to select the on-screen information.
4. Press to save and exit.

7 Use Thermal Imager

Certain models in this series support thermal imagers.

User can switch to **Acoustic**/**Thermal**/**PIP** (Picture in Picture) image modes after the thermal image is connected to the camera. Press left/right navigation buttons in live view.

In **Thermal** image mode, users can view highest/lowest/average temperatures of observed targets with set measurement tools, as well as highest/lowest/center temperatures of the observation scene.

In **PIP** image mode, users can browse the additional thermal image overlaid on the acoustic image, showing more details for users to enhance target observation and anomaly detection.

7.1 Connect Acoustic Imaging Camera and Thermal Imager

Before You Start

Check firmware version of the camera. If it is lower than V5.5.118, please upgrade the camera first. See *11.4 Upgrade Camera* for instructions.

Steps

1. Connect the acoustic imaging camera's Type-C port to the thermal imager's connector. For detailed installation, see *2.2 Mount Thermal Imager*.

If the thermal imager's firmware is incompatible with that of the camera, please upgrade the imager according to the instructions on screen.

2. Press OK to comfirm the upgrade process.

Do not pull out the imager during the upgrade. The imager will automatically reboot and re-connect to the camera after the upgrade is completed.

7.2 Thermal Image Mode

In this mode, users can view the highest, lowest, center temperature of the scene, configure measurement rules (point, line, rectangle, circle) for the targets, enable high-temperature alarms and set various palettes.

Switch to **Thermal** image mode as follows:

- In live view interface, press OK to call out the main menu. Switch to with left/right navigation buttons, press OK and choose **Thermal** image mode.
- Tap > > .

7.2.1 Image Adjustments in Thermal Image Mode

Set Frame Rate

Higher frame rate means clearer display in live view, richer imaging details and more fluent videos. However, the storage is also enlarged.

Steps

1. Press OK in live view interface to call out the main menu.
2. Select > **Capture Settings** > **Thremal Frame Rate** with navigation buttons.
3. Press OK and set the value as “25 fps” or “50 fps”.
4. Press to save and exit.

Set Palettes

Palettes are used to display more details of the observed targets, and the image will be marked in different palette colors based on the temperature.

Steps

1. Press OK in live view interface to call out the main menu.
2. Switch to with left/right navigation buttons, and perss OK to confirm the setting.
3. Choose the desired palettes with left/right navigation buttons, and perss OK to confirm the setting.
4. Press to save and exit.

In live view, tap the shortcut key to quick switch to other palettes.

Set Level & Span

Set a temperature range and the palette only works for targets within the temperature range. You can adjust the temperature range in manual or automatic mode.

Steps

1. Press OK in live view interface to call out the main menu.
2. Switch to with left/right navigation buttons, and perss OK to confirm the setting.
3. Select **Auto** or **Manual** adjustment.

- **Auto**: The device adjusts temperature range parameters automatically.
- **Manual**: Adjust the range manually.
  1) Tap an interest area on screen. A circle is displayed around the area, and the temperature range re-adjusts to show as many details of the area as possible.
  2) Press left or right navigation buttons or tap / on screen to lock or unlock a value.

3) Press up or down navigation buttons, or scroll the adjustment wheel on screen to fine-tune the max. temperature and the min. temperature respectively.
4) Press ⮌ to save and exit.

Tap in the shortcut bar to quickly switch between auto and manual level & span.

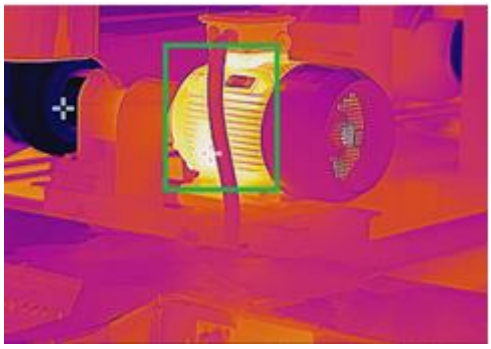
Set Color Distribution

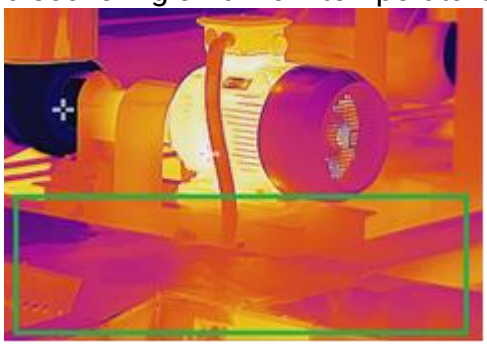
Color distribution function provides different image display effects in auto level & span. Liner and histogram color distribution modes can be selected for different application scenes.

Steps

1. Press OK in live view interface to call out the main menu.
2. Select ⚙, and go to **Temp Measurement Settings** > **Color Distribution**.
3. Select a color distribution mode.

Table 7-1 Color Distribution

Mode	Description
Linear	Linear mode is used to detect small high temperature targets in low temperature background. Linear color distribution enhances and displays more details of high temperature targets, which is good for checking small high temperature defective areas such as cable connectors. 

Mode	Description
Histogram	Histogram mode is used to detect temperature distribution in large areas. Histogram color distribution enhances high temperature targets and remains some details of low temperature objects in the area, which is good for discovering small low temperature targets such as cracks. 

4. Press ⮌ to exit.

Set Thermal Image Brightness and Contrast (Optional)

The higher the brightness value is, the brighter the thermal image will be. The higher the contrast value is, the richer details in the thermal image.

High temperature areas in the thermal image may be potentially overexposed.

Steps

1. Press OK in live view interface to call out the main menu.
2. Go to ⚙ > **Display Settings**, and select **Thermal Image Brightness** or **Thermal Image Contrast** with up/down navigation buttons.
3. Press OK to enter to setting interface.
4. Set values with up/down navigation buttons.
5. Press ⮌ to save and exit.

Set Digital Zoom

In the live view interface, zoom in or zoom out the image as follows:

- Press △⊕ and ▽⊖ to zoom in or zoom out by 0.1× continuously.
- Hold △⊕ and ▽⊖ to zoom in or zoom out by 1×, 2×, etc.

7.2.2 Set Temperature Measurement Parameters

You can set measurement parameters to improve the accuracy of temperature measurement.

Steps

1. Press OK in live view interface to call out the main menu.
2. Select ⚙, and go to **Temp Measurement Settings**.
3. Set temperature measurement parameters as needed.

Table 7-2 Description of Temperature Measurement Parameters

Parameters	Description
Temperature Range	Select the temperature measurement range. The device can detect the temperature and switch temperature range automatically in Auto Switch mode.
Emissivity	Set the emissivity of your target.
Distance	The distance between the target and the device. You can customize the target distance or select the target distance as **Near**, **Middle**, or **Far**.
Alarm Settings	The temperature of the targets in the observed scene exceeding the set value will trigger the alarm, and be marked in red or yellow. See *7.2.4 Set High Temperature Alarms*.
Unit	Set the unit for the temperature and distance.

4. Press ⮌ to save the settings.

7.2.3 Set Measurement Tools

You can set temperature measurement parameters to improve the accuracy of temperature measurement.

Before You Start

Set parameters such as **Temperature Range, Emissivity, Distance**. For detailed explanations, see *7.2.2 Set Temperature Measurement Parameters*.

Steps

1. Press OK in live view interface to call out the main menu.
2. Select to call the measurement tool bar.
3. Select a temperature measurement tool.

Table 7-3 Measurement Tools

Tool Name	Descriptions
Spot	For configuring custom spot tools, see *Measure by Custom Spot.*
Line	For the configuring line tools, see *Measure by Line*.
Rectangle	For the configuring rectangle tools, see *Measure by Rectangle*.
Circle	For the configuring circle tools, see *Measure by Circle*.

4. **Optional:** Tap to clear all the set measurement tools.

Measure by Custom Spot

The device can detect the temperature of a custom spot.

Steps

1. Tap to add a default spot.
2. Move the spot with the navigation buttons, or tap on the touch-screen to select a spot and move it.
3. Tap to modify temperature measurement parameters.

Table 7-4 Measurement Parameters of Custom Spot

Parameters	Description
Emissivity	Set the emissivity of your target.
Distance	Set the distance between the target and the device.
Temp.	Tap to display or hide the temperature measurement result.

4. Press .

The temperature of custom spot (e.g. P1) displays P1: XX.

If the tool-specific emissivity and distance are set, the measurement is conducted based on the parameters. Otherwise, the parameters set from **Temp Measurement Settings** are used for measurements.

5. Tap to add more custom spots.

At most ten custom spots are supported.

6. Optional: Modify the set custom spot tools, hide or display the tools and measurement results, etc.

	Tap to enter the editing interface and modify temperature measurement parameters such as emissivity and distance.
/	Tap to hide or display the tool and measurement results.
	Tap to delete the tool.

7. Press to save and exit.

Measure by Line

Steps

1. Tap .to generate a default line.

Only one line tool is supported.

2. Move the line to the required position.
   - Tap the line, and press navigation buttons to move the line.
   - Tap the line on touch-screen and drag it to the required position.
3. Adjust the length of the line.
   - Tap the end of the line, and press navigation buttons to extend or shorten the line.
   - Tap and drag the end of the line to extend or shorten it.
4. Tap to modify temperature measurement parameters.

Table 7-5 Measurement Parameters of Line Tool

Parameters	Description
Emissivity	Set the emissivity of your target.
Distance	Set the distance between the target and the device.
Max./Min./Average Temperature	Tap to enable the temperature types to display. The max. temperature, min. temperature, and average temperature of the line can be displayed on the left of the screen.

5. Press .

If the tool-specific emissivity and distance are set, the measurement is conducted based on the parameters. Otherwise, the parameters set from **Temp Measurement Settings** are used for measurements.

6. Modify the set line tool, hide or display the tool and measurement results, etc.

	Tap to enter the editing interface and modify temperature measurement parameters such as emissivity and distance.
/	Tap to hide or display the tool and measurement results.
	Tap to delete the tool.

7. Press to save and exit.

Measure by Rectangle

Steps

1. Tap to generate a default rectangle.
2. Move the rectangle to the required position.
   - Tap the rectangle, and press navigation buttons to move the rectangle up/down/left/right.
   - Tap and drag the rectangle on touch-screen to move it to the required position.
3. Adjust the size of the rectangle.
   - Tap one corner of the rectangle, and press navigation buttons to enlarge or contract the rectangle.

- Tap and drag the corner of the rectangle on touch-screen to enlarge or contract it.

4. Tap to modify temperature measurement parameters.

Table 7-6 Measurement Parameters of Rectangle Tool

Parameters	Description
Emissivity	Set the emissivity of your target.
Distance	Set the distance between the target and the device.
Max./Min./Average Temperature	Tap to enable the temperature types to display. The max. temperature, min. temperature, and average temperature of the rectangle can be displayed on the left of the screen.

5. Press to save the settings.

If the tool-specific emissivity and distance are set, the measurement is conducted based on the parameters. Otherwise, the parameters set from **Temp Measurement Settings** are used for measurements.

6. Tap to add more rectangle tools.

At most five rectangle tools are supported.

7. Optional: Modify the rectangle tools, hide or display the tools and measurement results, etc.

Tap to enter the editing interface and modify temperature measurement parameters such as emissivity and distance.

Tap to hide or display the tool and measurement results.

Tap to delete the tool.

8. Press to save and exit.

Measure by Circle

Steps

1. Tap to generate a default circle.

2. Move the circle to the required position.
   - Tap the circle, and press navigation buttons to move the circle up/down/left/right.
   - Tap and drag the circle on touch-screen to move it to the required position.
3. Adjust the size of the circle.
   - Tap one point on the circle, and press navigation buttons to enlarge or contract the circle.
   - Tap and drag one point of the circle on touch-screen to enlarge or contract it.
4. Tap to modify temperature measurement parameters.

Table 7-7 Measurement Parameters of Circle Tool

Parameters	Description
Emissivity	Set the emissivity of your target.
Distance	Set the distance between the target and the device.
Max./Min./Average Temperature	Tap to enable the temperature types to display. The max. temperature, min. temperature, and average temperature of the circle can be displayed on the left of the screen.

5. Press to save the settings.

If the tool-specific emissivity and distance are set, the measurement is conducted based on the parameters. Otherwise, the parameters set from **Temp Measurement Settings** are used for measurements.

6. Tap to add more circle tools.

At most five circle tools are supported.

7. Optional: Modify the circle tools, hide or display the tools and measurement results, etc.

	Tap to enter the editing interface and modify temperature measurement parameters such as emissivity and distance.
/	Tap to hide or display the tool and measurement results.
	Tap to delete the tool.

8. Press ⮌ to save and exit

7.2.4 Set High Temperature Alarms

Alarms will be triggered when the targets exceed the set value.

Steps

1. Press OK in live view interface to call out the main menu.
2. Set high temperature alarms.
   1) Go to ⚙ > **Temp Measurement Settings** > **Alarm Settings**.
   2) Switch on the button **Temperature Alarm**.
   3) Set a specific value for **Alarm Threshold** by scrolling the wheel on screen or pressing navigation buttons.
   4) Press ⮌ to save and exit.

- If the target temperature exceeds the set value of **Alarm Threshold, Max** in the temperature reading zone will be marked in red.
- When the measurement tools are set, the high temperature alarm of the whole scene will not be triggered even if its maximum temperature exceeds the set threshold.

7.3 PIP Image Mode

In this mode, users can view the acoustic image and thermal image of the observation scene at the same time. It is available to adjust the location and the size of the thermal image. It is convenient for users to quickly locate the anomalies.

Steps

1. Press OK in live view interface to call out the main menu.
2. Select **PIP** image mode via  >  >  .
3. **Optional:** Adjust location and size of the thermal image overlaid on the acoustic image.

- Adjust the location: Tap any place on the thermal image and drag it to the desired location.
- Adjust the size: Tap one of the four endpoints of the thermal image, and drag it to the desired size.

4. **Optional:** Set digital zoom to zoom in or zoom out the acoustic image and thermal image simultaneously.

- In live view, hold △⊕ or ▽⊖ to zoom in or zoom out the acoustic image and thermal image simultaneously by 1x.
- In live view, press △⊕ or ▽⊖ to precisely zoom in or zoom out the acoustic image and thermal image simultaneously by 0.1x.

8 Take Videos and Snapshots

Take snapshots or record videos of inspections or suspected targets for further analysis or other purposes. Snapshots and videos saved in the camera can be exported to PC via USB cable.

- Camera does not support capturing or recording when the menu is shown.
- When the camera is connected to your PC, it does not support capturing or recording.
- Go to **Settings** > **Device Settings** > **Device Initialization** to initialize the memory card if needed.

8.1 Capture Snapshot

Operate the camera to capture live images and save the snapshots in local albums.

Before You Start

Make sure that there is a working memory card mounted in your camera. See *1.3 Appearance* to locate the memory card slot of your camera.

Steps

1. Set a capture mode and pull **Trigger** in live view interface to capture snapshots. There are 3 modes available. Each mode requires different operations.
   1) Go to **Settings > Capture Settings > Capture Mode**.
   2) Select a mode.
      - **Capture One Image:** Pull **Trigger** once to capture one snapshot.
      - **Scheduled Capture:** Set the capture **Interval** and **Number**. Pull **Trigger** in live view, and the camera captures snapshots according

to the set interval and amount. Pull **Trigger** again or press ⮌ to stop capturing.

3) Press ⮌ to return to the live view interface.
4) Aim the lens to your target and pull **Trigger** to capture snapshots.

In **Thermal** image mode, you can also tap 📷 in the shortcut key bar to capture an image.

2. **Optional**: After capturing, you can tap the thumbnail of the captured snapshot to view and edit the image.

- The format of images captured in **Acoustic** and **PIP** image mode is .ld.jpeg or .pd.jpeg depending on Detection Mode.
- The format of images captured in **Thermal** image mode is .jpeg.

What to do next

- Go to albums to view and manage files and album folders. See *8.4.1 Manage Albums* and *8.4.2 Manage Files* for operation instructions.
- To edit saved images, see *8.4.3 Edit Files* for operation instructions.
- You can connect your camera to PC to export local files for further use. See *8.5 Export Files*.

8.2 Record Video

You can record videos of the target. The recorded video and audio are saved in the memory card.

Steps

1. **Optional**: Set frame rate value for videos. Higher frame rate means more fluency and richer details, while larger data storage.

Only thermal image mode supports setting frame rate for videos.

2. **Optional**: In **Thermal** image mode, set thermal video format. Go to **Settings > Capture Settings >Thermal Video Type, and Press** OK to choose .mp4 or .hrv format.
3. In live view interface, hold the trigger to start recording. The recording status icon and time icon appear.

In **Thermal** image mode, hold in the shortcut key bar to record a video.

4. When you finish, pull the trigger again to stop recording. The recorded video will be saved automatically and exit.

You can also press OK or to stop recording.

5. Refer to *8.5 Export Files* to export videos.

- The video format in **Acoustic** or **PIP** image mode is MP4 format. You can play videos on the camera or export to the compatible players to play.
- The video format in **Thermal** image mode is MP4 or .hrv format. Videos in .hrv format don't support playing in the device album, and they need to be exported to the compatible players to play.

8.3 File Naming Rule

Naming rule of captured pictures and videos is allowed to change. Go to **Settings > Capture Settings** to set **Filename Header** and **File Naming**.

Table 8-1 File Naming Rule

Element	Description
Filename Header	File name starts with the set header.
File Naming	Time Stamp or Numbering are selectable. Time stamp includes year, month, day, hour, minute, and second.

8.4 View and Manage Local Files

Camera captured snapshots and videos are saved in local albums. You can create, delete, rename and set an album as the default saving album. For files, operations, such as browsing, moving and deleting, are available.

Steps

1. Enter album.
   - In live view, press to enter albums.
   - In live view, press OK to call the main menu, and select to enter albums.
2. To create, rename, delete and set an album as the default saving album, see *8.4.1 Manage Albums* for instructions.
3. For file operations, such as, moving or deleting a file, see *8.4.2 Manage Files* for instructions.
4. To modify an image, for example, editing the text or voice notes saved with the images, see *8.4.3 Edit Files* for instructions.

8.4.1 Manage Albums

You can create several albums to manage captured snapshots and video files on your camera. Newly captured snapshots and videos are saved in the **Default Saving Album** .

Steps

1. Enter albums.
   - In live view, press to enter albums.
   - In live view, press OK to call the main menu, and select to enter albums.
2. Create an album.
   1) Tap + in upper right corner to add an album.
   2) Edit the album name.
   3) Press to save the album.
3. Rename, delete or set an album as the default saving album.
   1) Select an album and press OK.
   2) Tap ••• in upper right corner of the screen.

3) Select Set as Default Saving Album, Rename or Delete as required.
4) The album icon turns to when it is set as the default saving album.

8.4.2 Manage Files

Steps

1. Enter albums.
   - In live view, press to enter albums.
   - In live view, press OK to call the main menu, and select to enter albums.
2. Select an album and press OK.
3. Browse the image and video files.
   1) Select a file and press OK.
   2) Press ◁ and ▷ to browse the previous or the next file.
   3) Press OK to call the operation menu to check more available operations. File formats and their supported operations are shown below.

Table 8-2 File Formats and Operations in Acoustic / PIP Image Mode

File Type	Format	Descriptions
Images	File Name.pd.jpeg File Name.ld.jpeg	Editing text and voice notes, moving files, checking basic information, and deleting files are supported on camera.
Videos	File Name.pd.mp4 File Name.ld.mp4	Playing, moving and deleting video files are supported on camera.

Table 8-3 File Formats and Operations in Thermal Image Mode

File Type	Format	Descriptions
Images	File Name.jpeg	Images in .jpeg format support adding sketch and notes, browsing basic information, moving / deleting operations.
Videos	File Name.mp4 File Name.hrv	Videos in .mp4 format support playing, browsing basic information, moving and deleting operations.

File Type	Format	Descriptions
		Videos in .hrv format support browsing basic information, moving and deleting operations.

4. Moving or deleting several files.
   1) In an album, tap in the upper right corner of the screen.
   2) Press ◁ and ▷ to select a file and press OK. If you want to select all files, tap in the upper right corner. If you want to cancel all selection, tap .

      A selected file displays with a in its upper right corner.
   3) Tap Delete or Move.
      - If you tap delete, files are deleted after confirmation.
      - If you tap move, select a target album to start moving.

8.4.3 Edit Files

Editing the text, voice or tag notes saved with the images.

Steps

1. Enter albums.
   - In live view, press to enter albums.
   - In live view, press OK to call the main menu, and select to enter albums.
2. Select an album and press OK.
3. Select a file and press OK to call the editing menu.
4. Select an option and complete corresponding operations.

Table 8-4 Editing and Managing Images

Icon	Description
	Editing text note. Add a new text note or change the existed note, and press OK to save the settings.
	Editing voice note. You can add a new voice note, play or delete an existed voice note. If the file already has a voice note, tap to play or delete the note. If the file has no voice note attached, press OK or tap to record one.

Icon	Description
	Editing tag notes. Tag notes are predefined texts that can be added to the images quickly. Tag note template should be imported to the camera before you can use it. See *8.4.4 Import and Manage Tag Note Templates.* 1. Select **Tag Note**. 2. Select a tag name. 3. Select tag an option or multiple options, and press OK. 4. Press ◁ and ▷ to switch to the previous or next tag for configuration.
	Move the file to other albums. Select a target album and press OK to confirm the moving.
	Show basic information of the file, for example, the saving time and resolution.
	Delete file.
	Play video.

8.4.4 Import and Manage Tag Note Templates

Tag note templates contains the predefined tag name and options. With the template imported and activated, users can quick add tags to captured snapshots.

Tag note templates are generated on the client software HIKMICRO Analyzer Acoustic. Copy the templates of .json format to the storage of your camera, then you can use and manage the templates.

Steps

1. Generate tag note templates on HIKMICRO Analyzer Acoustic.

- Download HIKMICRO Analyzer Acoustic client software from our website. See *8.6 Analyze Snapshot* for more information.
- Click on ⓘ at the upper right corner of the software window to get operation guide.
- Software generated templates are saved in the path of PC: Public\HIKMICRO Analyzer Acoustic\TextRemarkTemplate.

2. Connect your camera to PC by the supplied cable. Copy and paste the template files to the TextNote folder of the camera storage.

If more than one templates are imported, the first template is the active one by default. Up to 10 templates can be imported.

3. Go to **Settings > Capture Settings > Tag Note Template** to manage templates.
   1) Select a template.
   2) Tap on ••• at the upper right corner of screen.
   3) Set the template as the default template or delete the template.

8.5 Export Files

Connecting the camera to your PC with supplied cable, you can export the recorded videos and captured snapshots.

- Plug the Type-C male connector of USB cable to the camera and the other type-A connector to PC.
- You can export the files using USB cable while the camera is turned off.
- You can export the files by inserting the memory card to your PC which has a card slot.

Steps

1. Open the cover of cable interface.
2. Connect the camera to your PC with cable and open the detected disk.
3. Select and copy the videos or snapshots to PC to view the files.
4. Disconnect the camera from your PC.

You can play the recorded videos using the default players.

8.6 Analyze Snapshots

Captured snapshots in **Acoustic** / **PIP** image mode (.ld.jpeg/.pd.jpeg) can be imported to HIKMICRO Analyzer Acoustic PC client for analysis and report generating.

Captured snapshots in **Thermal** image mode (.thm.jpeg) can be imported to HIKMICRO Analyzer PC client for analysis and report generating

Visit our website ***http://www.hikmicrotech.com***, or contact us to get the software.

Click on ⓘ at the upper right corner of the software window to get operation guide.

9 Connections

9.1 Connect Camera to Wi-Fi

Steps

1. Enable **Network Access** service on camera, because it is a prerequisite for WLAN connection. Tap ⚙ , and go to **Connections > Network Access.**
2. In **WLAN** interface, tap ◯ to enable Wi-Fi, and the searched Wi-Fi will be listed.

Tap and hold (wifi) from the swipe-down menu can quick enter the Wi-Fi setting interface.

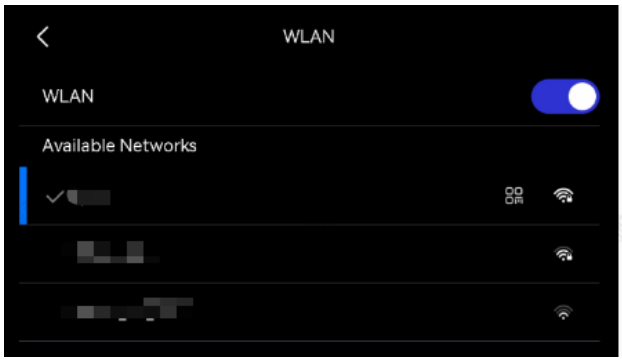


Figure 9-1 Wi-Fi List

3. Set and Join a Wi-Fi.

Using Wi-Fi password

1. Tap an available Wi-Fi, and a soft keyboard is displayed.
2. Set the Wi-Fi password with the soft keyboard.
3. Tap ✔ to save. shows in live view interface and shows on the right side of the connected Wi-Fi when the connection is completed.
4. Enable the Wi-Fi function of other equipment and search the Wi-Fi that the camera is in to join.

DO NOT tap **space**, or the password may be incorrect.

Using Wi-Fi QR code

1. Scan the QR code using HIKMICRO Viewer to quickly join the Wi-Fi and connect the camera to the APP. For more information about the APP, see *9.4 Connect to HIKMICRO Viewer APP*.

9.2 Set Camera Hotspot

When the camera's hotspot is on, other equipment with Wi-Fi function can join the camera for data transmission.

Steps

1. Enable **Network Access** service on camera, because it is a prerequisite for hotspot connection. Tap ⚙ , and go to **Connections > Network Access.**

2. In **Hotspot** interface, tap to enable hotspot function, and the searched Wi-Fi will be listed.

Tap and hold from the swipe-down menu can quick enter the hotspot setting interface

3. Set and join the hotspot.

Using hotspot password

1. Tap **Set Password**. A soft keyboard is displayed.
2. Set the password for the hotspot with the soft keyboard.
3. Tap to save.
4. Enable the Wi-Fi function of other equipment and search the camera hotspot to join.

Using hotspot QR code

1. Scan the QR code using HIKMICRO Viewer to quickly join the hotspot and connect the camera to the APP. For more information about the APP, see *9.4 Connect to HIKMICRO Viewer APP*.

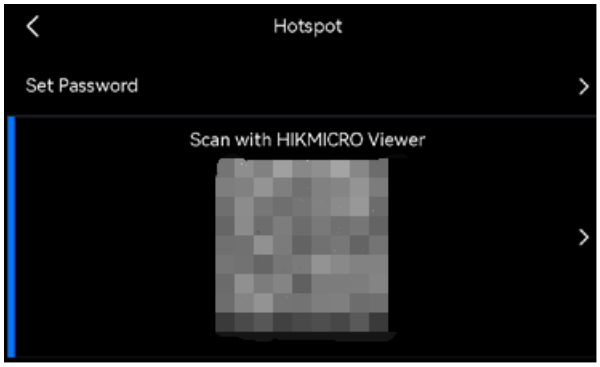


Figure 9-2 Hotspot

- When setting password, do not tap **space**, or the password may be incorrect.
- The password should be at least 8 digits, consisting of numbers and characters.

9.3 Pairing Devices

Pair your camera with an external low-power wireless player (speaker or headsets) to play the recorded audios or converted live ultrasonic sound sources.

Steps

1. Enter configuration page. Choose from the following ways.
   - Tap  from swipe-down menu.
   - Select  from the main menu. Go to **Settings** > **Connections**.
2. Tap on  to enable the wireless connection function. The camera searches and displays available nearby low-power wireless devices.

Make sure the external low-power wireless device is in discoverable mode.

3. Select an external low-power wireless device to start automatic pairing and connecting.

The wireless connection function is for audio play only. If you want to exporting local files, see *8.5 Export Files* for instructions.

9.4 Connect to HIKMICRO Viewer APP

HIKMICRO Viewer is a mobile APP working with the camera. With the APP, you can:

- View camera live image.
- Visit camera local album, download snapshots and videos.
- Upgrade camera firmware.

Follow the steps to connect the camera to the APP.

Before You Start

Download and install HIKMICRO Viewer to your phone. Search the APP name in your APP store, or scan the following QR code.


Steps

1. Add your camera and your phone to the same local network.
   - –Use camera Wi-Fi, see *9.1 Connect Camera to Wi-Fi*.
   - –Use camera Hotspot, see *9.2 Set Camera Hotspot*.
2. (Ignore this step if camera is added via Wi-Fi/hotspot QR code) Connect your camera to the APP:
   1) Launch HIKMICRO Viewer.
   2) Tap on + > **Scan QR Code** to aim the scanning frame at the code.
   3) Tap **Join** in the pop-up window on your phone.
   4) Verify the consistency between code on device and code on your phone.
   5) Tap **OK** in conversion box on camera screen to confirm the connection authentication.

Please confirm and proceed within 30 seconds, otherwise connection may fail due to timed-out operation.

What to do next

Tap on **Live View**, **On-Device File**, or **Device Upgrade** to perform other functions.

10 Cast Screen

The device supports casting screen to PC by software clients compliant with UVC protocol.

Before You Start

Download and install a software client compliant with UVC protocol on your PC.

Steps

1. Launch the software client on your PC.
2. Use a USB cable to connect your device with the PC.

Make sure that your camera is on and with sufficient power.

3. In pop-up window of your device, select **USB Cast Screen**. will be displayed in the device status bar.
4. Click “connect” or “refresh” in the software client.

Results

The live image of your device is displayed in the PC.

11 Maintenance

11.1 View Camera Information

Go to **Settings** > **Device Settings** > **Device Information** to view the camera information.

11.2 Set Language

Go to **Settings** > **Device Settings** > **Language** to set system language.

11.3 Set Time and Date

Steps

1. Press OK to show the menu in live view interface.
2. Go to **Settings > Device Settings > Time and Date.**
3. Set the date and time.
4. Press ⮌ to save and exit.

Go to **Settings** > **Display Settings** to enable or disable time and date on-screen display.

11.4 Upgrade Camera

Upgrade the camera via an upgrade file, or via HIKMICRO Viewer APP.

11.4.1 Upgrade with HIKMICRO Viewer APP

Connect your camera to HIKMICRO Viewer APP and tap on **Device Upgrade** to check camera firmware version and proceed online upgrading. See *9.4 Connect to HIKMICRO Viewer APP* for more details.

11.4.2 Upgrade with an Upgrade File

Before You Start

- Please download the upgrade file from the official website *http://www.hikmicrotech.com* or contact the customer service and technical support to get the upgrade file first.
- Make sure that the camera battery is fully charged.
- Make sure that Auto Power-off function is turned-off to avoid accidental suspension during upgrading.
- Make sure that a memory card has been installed to camera.

Steps

1. Connect the camera to your PC with a Type-C to type A cable and open the detected disk.
2. Copy the upgrade file and paste it to the root directory of the camera.
3. Disconnect the camera from your PC.
4. Reboot the camera and then it will upgrade automatically. The upgrading process will be displayed in the main interface.

After upgrading, the camera reboots automatically. You can view the current version in **Settings** > **Device Settings** > **Device Information**.

11.5 Restore Camera

You can default the camera to the factory settings.

This function should be used with caution.

Steps

1. Press OK to show the menu in live view interface.

2. Go to **Settings > Device Settings > Device Initialization**.
3. Select **Restore Device**. A prompt appears.
   - **OK**: Tap **OK** to initialize the device.
   - **Cancel**: Tap **Cancel** to exit and return to the previous menu.

11.6 Record Sound Source for Trouble Shooting

Record sound source function is to save original audio files for trouble shooting when microphone error occurs.

Steps

1. Go to **Settings > Capture Settings > Record Sound Source** to enable the function.
2. Return to live view, aim the microphone array to a sound source and hold the trigger to start video recording.
3. Pull the trigger to stop recording. Or the recording stops when it reaches the maximum length (20 seconds).
4. Export the audio file and send the file to your dealer or our technical support for trouble shooting.

- The audio files are not available in the local album. Connect your camera to a PC, then check and export the files, see *8.5 Export Files* for instructions.
- The audio files are saved in DCIM folder. The file name is the same as the video file, and the format is *.sonic.

11.7 Save Log

Camera supports saving operation logs for trouble shooting. The logs are saved in log folder under the root directory of the camera storage/memory card. Connect the camera to a PC to export the logs.

Steps

1. Go to **Settings > Device Settings > Save Log** to enable the function.

2. Camera starts saving operation logs. It stops when you turn off the function or when the camera restarts or powers off.

You need to enable the function again if you need the camera to save logs after a restart.

3. Visit the device storage/memory card and copy the log files (*.tar) to your PC and send the file to our technical support. See *8.5 Export Files* for instructions.

12 More Information

Scan the following QR code to get device common FAQ.

Legal Information

About this Manual

The Manual includes instructions for using and managing the Product. Pictures, charts, images and all other information hereinafter are for description and explanation only. The information contained in the Manual is subject to change, without notice, due to firmware updates or other reasons. Please find the latest version of this Manual at the HIKMICRO website (*http://www.hikmicrotech.com*).

Please use this Manual with the guidance and assistance of professionals trained in supporting the Product.

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IN THE EVENT OF ANY CONFLICTS BETWEEN THIS MANUAL AND THE APPLICABLE LAW, THE LATTER PREVAILS.

Regulatory Information

These clauses apply only to the products bearing the corresponding mark or information.

FCC Compliance Statement

Please take attention that changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
This device complies with part 15 of the FCC Rules. 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.
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

For models with 64 microphone array:
Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

EU Conformity Statement

CE This product and - if applicable - the supplied accessories too are marked with "CE" and comply therefore with the applicable harmonized European standards listed under the Directive 2014/30/EU (EMC), Directive 2014/35/EU (LVD), Directive 2011/65/EU (RoHS).

Hereby, Hangzhou Microimage Software Co., Ltd. declares that this device (refer to the label) is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: https://www.hikmicrotech.com/en/support/download-center/declaration-of-conformity/

Restrictions in the 5 GHz band:

According to Article 10 (10) of Directive 2014/53/EU, when operating in the 5150 to 5350 MHz frequency range, this device is restricted to indoor use in: Austria (AT), Belgium (BE), Bulgaria (BG), Croatia (HR), Cyprus (CY), the Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (EL), Hungary (HU), Iceland (IS), Ireland (IE), Italy (IT), Latvia (LV), Liechtenstein (LI), Lithuania (LT), Luxembourg (LU), Malta (MT), Netherlands (NL), Northern Ireland (UK(NI)), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH), and Turkey (TR).

RF Exposure Information

This device has been tested and meets applicable limits for Radio Frequency (RF) exposure.

Frequency Bands and Power

The frequency bands and modes and transmitting power (radiated and/or conducted) nominal limits applicable to the following radio equipment are as follows:

Wi-Fi: 2.4 GHz (2.4 GHz to 2.4835 GHz): 20 dBm; 5 GHz (5.15 GHz to 5.25 GHz): 23 dBm; 5 GHz (5.25 GHz to 5.35 GHz): 23 dBm; 5 GHz (5.47 GHz to 5.725GHz): 23 dBm; 5 GHz (5.725 GHz to 5.875 GHz): 14 dBm

5G indoors use only.

Use the power adapter provided by a qualified manufacturer. Refer to the product specification for detailed power requirements.

Use the battery provided by a qualified manufacturer. Refer to the product specification for detailed battery requirements.

For models with 64 microphone array:

Warning: This is a class A product. In a domestic environment this product may cause radio interference, in which case, the user may be required to take adequate measures.

Directive 2012/19/EU (WEEE Directive): Products marked with this symbol cannot be disposed of as unsorted municipal waste in the European Union. For proper recycling, return this product to your local supplier upon the purchase of equivalent new equipment, or dispose of it at designated collection points. For more information see: www.recyclethis.info

Regulation (EU) 2023/1542 (Battery Regulation): This product contains a battery and it is in conformity with the Regulation (EU) 2023/1542. The battery cannot be disposed of as unsorted municipal waste in the European Union. See the product documentation for specific battery information. The battery is marked with this symbol, which may include lettering to indicate cadmium (Cd), or lead (Pb). For proper recycling, return the battery to your supplier or to a designated collection point. For more information see: www.recyclethis.info.

Industry Canada ICES-003 Compliance/Conformité Industrie Canada ICES-003

For models with 136 microphone array:
This device meets the CAN ICES-003 (B) / NMB-003 (B) standards requirements.
Cet appareil répond aux exigences des normes CAN ICES-003 (B)/NMB-003 (B).

For models with 64 microphone array:
This device meets the CAN ICES-003 (A) / NMB-003 (A) standards requirements.

Cet appareil répond aux exigences des normes CAN ICES-003 (A)/NMB-003 (A).

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:
(1) this device may not cause interference, and
(2) this device must accept any interference, including interference that may cause undesired operation of the device.
This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment.
For this device, please pay attention to the following notes when the device is operating in 5 GHz:
(i) The device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
(ii) The maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall comply with the e.i.r.p. limit; and
(iii) The maximum antenna gain permitted for devices in the band 5725-5875 MHz shall comply with the e.i.r.p. limits specified for point-to-point and non point-to-point operation as appropriate.
Users should also be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radioexempts de licence. L'exploitation est autorisée aux deux conditions suivantes :
(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.
ce matériel est conforme aux limites de dose d'exposition aux rayonnements, CNR-102 énoncée dans un autre environnement.
(i)Les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.
(ii) Le gain d'antenne maximal autorisé pour les appareils dans les

bandes 5250-5350 MHz et 5470-5725 MHz doivent respecter le pire limiter; et
(iii) Le gain d'antenne maximal autorisé pour les appareils dans la bande 5725-5875 MHz doivent respecter le pire limites spécifiées pour le point-à-point et l'exploitation non point à point, le cas échéant.
Les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5250-5350 MHz et 5650-5850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.

KC

For models with 136 microphone array:
B 급 기기: 이 기기는 가정용(B 급) 전자파적합기기로써 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

For models with 64 microphone array:
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INFORMATIONEN FÜR PRIVATE HAUSHALTE

1. Getrennte Erfassung von Altgeräten: 1. Getrennte Erfassung von Altgeräten:
Elektro- und Elektronikgeräte, die zu Abfall geworden sind, werden als Altgeräte bezeichnet. Besitzer von Altgeräten haben diese einer vom unsortierten Siedlungsabfall getrennten Erfassung zuzuführen. Altgeräte gehören insbesondere nicht in den Hausmüll, sondern in spezielle Sammel- und Rückgabesysteme.
2. Batterien und Akkus sowie Lampen:
Besitzer von Altgeräten haben Altbatterien und Altakkumulatoren, die nicht vom Altgerät umschlossen sind, die zerstörungsfrei aus dem Altgerät entnommen werden können, im Regelfall vor der Abgabe an einer Erfassungsstelle vom Altgerät zu trennen. Dies gilt nicht, soweit Altgeräte einer Vorbereitung zur Wiederverwendung unter Beteiligung eines öffentlich-rechtlichen Entsorgungsträgers zugeführt werden.

3. Möglichkeiten der Rückgabe von Altgeräten:
Besitzer von Altgeräten aus privaten Haushalten können diese bei den Sammelstellen der öffentlich-rechtlichen Entsorgungsträger oder bei den von Herstellern oder Vertreibern im Sinne des ElektroG eingerichteten Rücknahmestellen unentgeltlich abgeben. Rücknahmepflichtig sind Geschäfte mit einer Verkaufsfläche von mindestens 400 m² für Elektro- und Elektronikgeräte sowie diejenigen Lebensmittelgeschäfte mit einer Gesamtverkaufsfläche von mindestens 800 m², die mehrmals pro Jahr oder dauerhaft Elektro- und Elektronikgeräte anbieten und auf dem Markt bereitstellen. Dies gilt auch bei Vertrieb unter Verwendung von Fernkommunikationsmitteln, wenn die Lager- und Versandflächen für Elektro- und Elektronikgeräte mindestens 400 m² betragen oder die gesamten Lager- und Versandflächen mindestens 800 m² betragen. Vertreiber haben die Rücknahme grundsätzlich durch geeignete Rückgabemöglichkeiten in zumutbarer Entfernung zum jeweiligen Endnutzer zu gewährleisten. Die Möglichkeit der unentgeltlichen Rückgabe eines Altgerätes besteht bei rücknahmepflichtigen Vertreibern unter anderem dann, wenn ein neues gleichartiges Gerät, das im Wesentlichen die gleichen Funktionen erfüllt, an einen Endnutzer abgegeben wird.
4. Datenschutz-Hinweis:
Altgeräte enthalten häufig sensible personenbezogene Daten. Dies gilt insbesondere für Geräte der Informations- und Telekommunikationstechnik wie Computer und Smartphones. Bitte beachten Sie in Ihrem eigenen Interesse, dass für die Löschung der Daten auf den zu entsorgenden Altgeräten jeder Endnutzer selbst verantwortlich ist.
5. Bedeutung des Symbols „durchgestrichene Mülltonne“:

Das auf Elektro- und Elektronikgeräten regelmäßig abgebildete Symbol einer durchgestrichenen Mülltonne weist darauf hin, dass das jeweilige Gerät am Ende seiner Lebensdauer getrennt vom unsortierten Siedlungsabfall zu erfassen ist.

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