SYSTEMS INC
The ultrasound approach

UE SYSTEMS INC.

ULTRAVIEW MANUAL

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1. NOTICE TO USER

1.1 Legal

For warranty terms contact UE Systems.

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Names and marks appearing on the products herein are either registered trademarks or trademarks of UE Systems and/or its subsidiaries.

All other trademarks, trade names or company names referenced herein are used for identification only and are the property of their respective owners.

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

EXCEPT AS EXPRESSLY PROVIDED IN THIS SECTION OF THE MANUAL, UE SYSTEMS Inc. PROVIDES NO WARRANTY, EXPRESS, IMPLIED, STATUTORY OR OTHERWISE AND SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCT AND DOCUMENTATION.

1.2 Compliance

We caution the user that changes, or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device. It may cause interference with radio frequency receivers in residential areas and the user should correct the interference by themselves. The EMC conformity of the equipment is indicated by the CE marking which the equipment bears.

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.

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.

1.3 Markings

The physical device ID label, the CE- and the WEEE-markings are situated on the top left side of the UltraView (***Image 1***).

The ID label contains the following information: Product name, ISED certification label, Serial number, CMIIT ID, Country of origin, Company name and Approval markings.

The electronic ID-label or e-label containing all the regulatory information is the primary ID-plate of the UltraView. The e-label is available from the UltraView user interface. To open the e-label, press the ***Settings*** icon and choose ***Device info***.

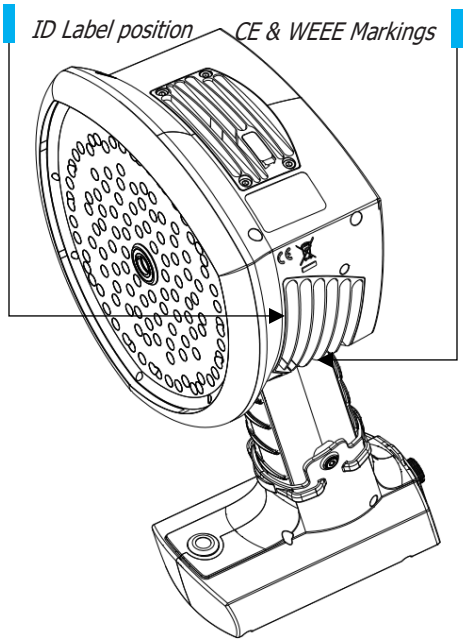


Image 1. *Label locations on the UltraView.*

ISED: The ISED certification label is a word mark consisting of the Company Number (CN) and the Unique Product Number (UPN). Serial number: the first four symbols of the serial number are the model number of the equipment and the last four are the running identification number:

	Serial number	
Model number	**AC13**xxxx	Device

1.4 Customer help

Do not hesitate to contact our Customer Support Centre if you experience problems or have any questions about your product. Please include the serial number of the device with your request.

For customer help, go to **www.uesystems.com**.

1.5 Intended use of the device

The UltraView is a solution for localizing sound sources and analyzing acoustic phenomena in compressed air systems and power grids.

The dB readings produced by the device are not guaranteed to correspond to absolute sound pressure levels.

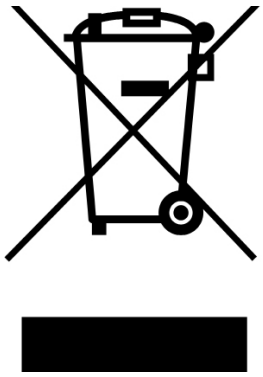
Follow all instructions. Please note that by using the device you agree to the terms of use. Misuse might cause device damage or false sensor readings.

1.6 Disposal of electronic waste

FOR EUROPEAN COMMUNITY USERS

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

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



For this purpose, all local authorities have established collection schemes under which residents can dispose of waste electrical and electronic equipment at a recycling center or other collection points, or WEEE will be collected directly from households. More detailed information is available from the technical administration of the relevant local authority.

2. INTRODUCTION

Thank you for choosing the UltraView. The UltraView is a standalone system for acoustic image measurements and signal analysis. The 124 microphones of the UltraView are used to form a precise acoustic image at a specific location. This acoustic image is transposed in real- time on top of a digital camera picture. The location of the sound source is shown on the camera screen. Sound sources of interest are separated from background noise. The details of each acoustic image can be saved onto the Cloud for further viewing and AI backed analysis.

The UltraView is much more sensitive and accurate than the human ear. The camera can locate sound sources that are inaudible to the human ear as well as sound sources that humans cannot reliably locate. The UltraView has a frequency range that extends to ultrasonic frequencies, which is a huge benefit since many interesting problems and phenomena can be located precisely using ultrasound. One of the core benefits of using the UltraView comes from being able to listen and analyze ultrasonic frequencies. Most maintenance and operational problems can be identified and located precisely at these frequencies.

2.1 User safety

Only parts from UE Systems should be used with the UltraView. The user should by no means use third-party parts.

Do not try to repair or open the enclosure of the UltraView or the batteries. Do not use any damaged device, battery, or cables.

Protect the device and accessories from dirt, dust, impacts, and liquids. Also protect the camera lens, the microphone array, and the USB port from any kind of foreign objects, dust, or liquids.

Charge the battery only when disconnected from the UltraView.

The UltraView is not intended to be used while the batteries are charging. Charge the batteries only when disconnected.

Charge the battery at temperatures between 0 °C and +40 °C (32 °F to 104 °F).

Do not leave the charging battery unattended.

Do not expose the batteries to flame or excessive heat.

Hold the UltraView firmly by the handle and fasten the safety strap to the wrist.

Do not touch the heat sinks when the device is on, the heat sinks become hot when the camera is on. Long- term contact may cause burns. For this reason, it is recommended that any USB flash drives are connected directly after starting the device.

Consult your safety officer in your facility or working environment about using the UltraView and, in case of using the external battery, the carrying bag with the strap. In case you are using a strap with your UltraView, special care should be taken to avoid getting tangled in your working environment.

Use only the USB flash drives provided with the UltraView. Using third-party mass storage drives may lead to loss of data or corruption.

2.2 Specifications

DEVICE

Manufacturer: UE Systems Inc.
Name: UltraView

MECHANICAL & ENVIRONMENTAL

Size: 273 x 170 x 125 mm (10.7 x 6.7 x 4.9 in)
Weight: 0.980 kg (2.2 lb).
Total weight with RRC2040 battery: 1.2 kg (2.7 lb).
Protection class: IP51
Operation & storage temperatures: -10 °C to +50 °C (14 °F to 122 °F) / -20 °C to +70 °C (4 °F to 158 °F)
Operation & storage humidity: 0 to 90 %RH
Charging temperature: 0°C to +40°C (32°F to 104°F)

POWER SUPPLY

Max input rating: 15 VDC, 2.5 A
Internal system backup battery: Li-Ion, 6 Wh

BATTERY OPTIONS

Battery RRC2040: Li-Ion, 10.80 V_{DC}, 3.35 Ah, 36.20 Wh, 0.170 kg (0.37 lb), 85 x 59 x 22 mm (3.34 × 2.31 × 0.86 in), IP40, Usage time up to 2.5 h (depending on conditions), Charging time 2 to 3 h.
Battery charger RRC2040: Input 19 to 26 V_{DC}, 2.8 A max, Output: 17.4 V_{DC}/4A max, 120 x 64 x 43 mm (4.72 × 2.51 × 1.69 in), 0.110 kg (0.24 lb), Operating temperature: 0 °C to +40 °C (32 °F to 104 °F).
Charger power supply RRC2040: Input 100 to 240 V_{AC} / 50-60 Hz, Output 19 V_{DC} ± 5% / 3.4 A, Maximum Power 65 W, 95 x 50 x 25.4 mm (3.74 × 1.96 × 1 in), 0.270 kg (0.59 lb), Operating temperature: 0 °C to +40 °C (32 °F to 104 °F).
External battery Tracer: LiFePO4, 12 V_{DC}, 7 Ah, 84 Wh, 985 g (2.2 lb), 90 x 145 x 65 mm (3.5 × 5.7 × 2.6 in), IP64, Usage 6 h (depending on ambient conditions), Charging time 4 to 6 h.
Tracer battery cord length: 0.9 m (3.0 ft), extended 2 m (6.6 ft).
Battery charger Tracer: Input 100 to 240 V_{AC} ~50/60Hz, 1.3 to 1.5 A; Max output 13.8 to 14.6VDC, 4.0 A depends on the charger provided, see the documentation or the ID-plate of the charger.

USER INTERFACE AND DISPLAY

Display: Size: 5 in, 800x480; Colour: 24-bit RGB.
Brightness: 1000 cd/m2 (adjustable)
Input device: Resistive touchscreen
Power on indicator: Red LED
Image resolution: 800x480 Video frame rate: 25 fps (max) Acoustic image framerate: 30 fps
Directional resolution: 0.5°
Field of view (FOV): 62.2° x 48.8°
Zoom: 2x digital zoom

ACOUSTIC SPECIFICATIONS

Acoustic measurement: 124 low-noise MEMS microphones, real-time sound visualization.
Dynamic range, low limit: Below -15 dB
Dynamic range, high limit: More than 120 dB
Bandwidth: 2 kHz to 65 kHz
Distance: From 0.3 m (1.0 ft) up to and above 130 m (430 ft)
Leak rate: Typical industrial environments:
>0.032 l/min @ 3 bar from 3 m (9.8 ft)
>0.05 l/min @ 3 bar from 10 m (32.8 ft)
Minimum detection: 0.016 l/min @ 1.2 bar from 0.3 m (1.0 ft)

COMMUNICATION & STORAGE

Wireless data transfer: 2.4 GHz and 5 GHz IEEE 802.11b/g/n/ac secured wireless LAN.
Data transfer: USB / Direct WiFi transfer / WiFi
Data storge: USB / Cloud
Storage, internal: 32 GB SD card, non-removable.
Storage, external: 8 GB USB mass storage, provided with device.

STANDARDS & COMPLIANCE

RED: ETSI EN 300 328, ETSI EN 301 893
EMC: ETSI EN 301 489-1/17, EN55032: Class A, FCC CFR 47 Part 15 Subpart B: Class A,
Canada: ICES 003 : Class A.
RoHS: EN 50581:2012
Safety: IEC 62368-1:2014, IEC 61010-1, EN 62311:2008 (RF Exposure)

CE

2.3 Package contents

The UltraView with the **RRC2040** external battery, the product packaging consists of:

1. UltraView
2. Two batteries
3. Battery housing
4. Charger
5. Charger power supply and a country-specific power cable
6. Mass storage
7. Shoulder strap

The UltraView with the **Tracer** external battery, the product packaging consists of:

1. UltraView
2. Battery
3. Battery cable
4. Charger with a detachable mains cable
5. Carrying bag
6. Mass storage
7. Shoulder strap

2.4 Camera parts

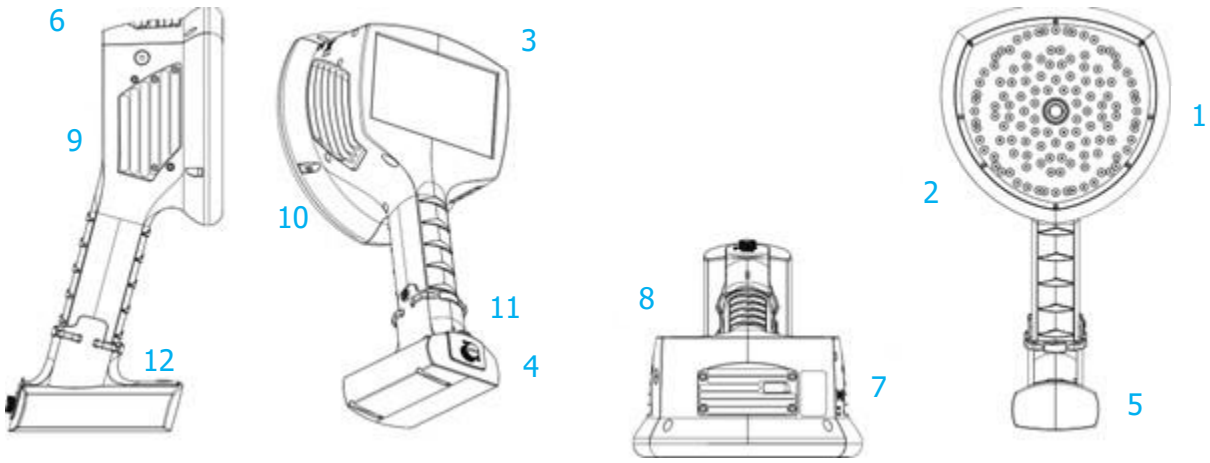


Image 2. *Different UltraView parts.*

1. Video Camera
2. Microphone Array
3. LCD Screen
4. Battery Cover
5. Battery Housing or Battery Cable (with the Tracer external battery), Camera side connector
6. Power LED
7. Mass Storage Port
8. Top Heatsink
9. Right Side Heat Sink
10. Left Side Heat Sink
11. Lanyard Fastening Point
12. On/off button

!! NOTE: REFRAIN FROM TOUCHING THE HEAT SINKS (ITEMS 8, 9 AND 10 IN IMAGE 2) AS THEY WILL BECOME HOT IN USE. LONG-TERM CONTACT MAY CAUSE BURNS!!

The front side of the UltraView consists of a video image sensor (item 1 in Image 2) and the microphone array (***item 2 in Image 2***). The camera screen displays a monochromatic (black and white) image and the acoustic colored heatmap overlayed on top.

The UltraView has a resistive touch screen (***item 3 in Image 2***). The screen can be used with or without gloves. Do not use the touch screen with anything sharp or with hard objects, which may damage the surface. Exerting excessive force will affect the durability of the touch screen.

The status of the internal power supply unit is indicated by the power LED (***item 6 in Image 2***), which turns red when the power is on. While the power is on, the UltraView dissipates heat through the three heatsinks (***items 8, 9 and 10 in Image 2***) that are located on both sides and the top of the camera. While operating the UltraView, the heat sinks must be not be covered. Do not enclose the device while the power is turned on.

The camera has a USB port located under the cover on top of the device (***item 7 in Image 2***).

Using a lanyard will protect the UltraView from sustaining damage from falling (***item 11 in Image 2***). Do not carry the UltraView by the lanyard only.

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

2.5 External battery parts

The battery parts depend on whether you have purchased the UltraView with the **RRC2040** external battery or with the **Tracer** external battery. See the battery parts below.

2.5.1 RRC2040 EXTERNAL BATTERY PARTS

The main parts of the RRC2040 set are the battery housing and the RRC2040 batteries.

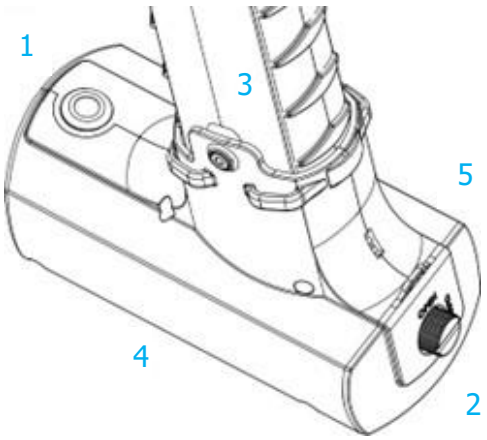


Image 3. *RRC2040 battery housing.*

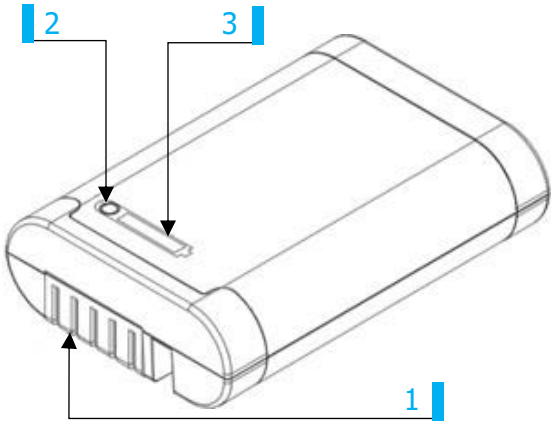


Image 4. *RRC2040 battery.*

1. Power button
2. Battery cover
3. Fixing screw
4. Battery housing
5. Lanyard attachment point

1. Battery connectors
2. Charge gauge button
3. Battery charge indicator

2.5.2 RRC2040 EXTERNAL BATTERY CHARGER

The RRC2040 charger has two parts: the charger unit and the power supply. The charger unit has connectors for the battery in the charging bay and a DC barrel input for power supply. The power supply has universal mains input where **the power cable can be chosen depending on the region.**

2.5.3 TRACER EXTERNAL BATTERY PARTS

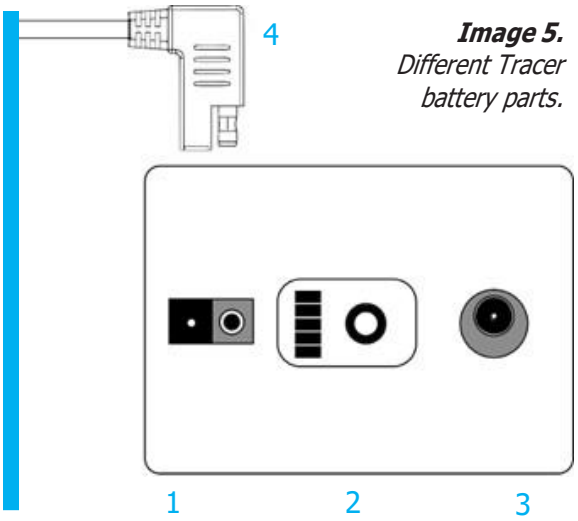


Image 5.
Different Tracer battery parts.

Bottom: The main battery of the UltraView
1. Output connector for the Battery Cable
2. Charge Gauge
3. Battery Charger connector

Top:
4. The battery end of the Battery Cable

2.5.4 TRACER EXTERNAL BATTERY CHARGER

The charger for the Tracer battery is an AC/DC converter with an output capable of charging LiFePO4 chemistry batteries. The charger has a universal single-phase mains input, a status LED and a charging output. The charger is provided with a mains power cable including a plug compatible for your regional mains output. For charging the battery, the charger has a DC barrel plug at the end of the output cord. Do not use any chargers other than UE Systems approved chargers.

2.6 Spare parts and accessories

Please ask your UE Systems for the available spare parts information: www.uesystems.com

3. GETTING STARTED

Before every use, make sure that all the parts are in good condition. Due to supplier storage time and transportation regulations the charge of the batteries may be low. To ensure a long lifetime for the batteries, charge the batteries fully before the first use. During first operation, **power on the UltraView for at least 45 minutes, according to intended use, to optimize the battery life.**

3.1 Spare parts and accessories

The main power source of the UltraView is either RRC2040 or the Tracer external battery. The batteries should be charged fully before operating the device. Please note that the batteries should also be fully charged before storage.

!! NOTE: THE ULTRAVIEW IS NOT INTENDED TO BE USED WHILE THE BATTERIES ARE CHARGING. CHARGE THE BATTERIES ONLY WHEN DISCONNECTED!!

!! NOTE: CHARGE THE BATTERIES AT TEMPERATURES BETWEEN 0 °C AND +40 °C (32 °F TO 104 °F)!!

3.1.1 CHARGING THE RRC2040 BATTERY

Before using the batteries, remember to charge them first. To fully charge an empty RRC2040 battery usually takes about 2 hours. Please note that the battery should be charged at temperatures between 0 °C and +40 °C (32 °F to 104 °F). A new RRC2040 battery used in optimal environmental conditions yields over 2.5 hours of usage.

The RRC2040 batteries and the charger are delivered with the UltraView. Only use the provided battery charger. To charge the battery, please follow these instructions:

1. Plug the DC barrel connector of the power supply to the RRC Charger.
2. Plug the mains cable of the charger into the wall socket.
3. Ensure that the connectors of the battery and the charger bay are aligned when inserting the battery. When inserted correctly, the battery stands firmly and straight. The charger light starts blinking when the battery **is connected properly**.

When the battery starts charging, the charger light turns orange. When the battery is full, the light turns green. You can **see how much the battery has charge by pressing the charge gauge**.

COLOUR OF THE CHARGING STATUS LED	EXPLANATION
OFF	Not powered or no battery
GREEN	Ready
YELLOW	Charging
RED	Malfunction / Temperature limits exceeded
FLASHING / CHANGING	Setting up

NUMBER OF LEDS ON	STATE OF CHARGE [%]
4	100 - 76
3	51 - 75
2	26 - 50
1	10 -25
1 (flashing)	< 10

CHARGE GAUGE

The front side of the RRC2040 battery has the battery connectors and the top side of the battery has the charge gauge button and the battery charge display. To check the state of charge of the battery, press the charge gauge button (***item 2 in Image 4***) and the battery charge display will show the charge percentage through the 4 LEDs.

3.1.2 CHARGING THE TRACER BATTERY

To fully charge an empty Tracer battery usually takes between 4 to 6 hours. Please note that the battery should be charged at temperatures between 0 °C and +40 °C (32 °F to 104 °F). A new Tracer battery used in optimal environment conditions yields up to 7 hours of usage. This depends on multiple variables which may decrease the usage time. These are the cell **temperatures, the load, and the age (cycles) of the battery.**

The Tracer battery and the charger are delivered with the UltraView. Only use the provided battery charger.

1. Disconnect the battery cable from the battery output connector (***item 1 in Image 5***) first.
2. Plug the mains cable of the charger into the wall socket.
3. Plug the DC barrel connector to the charging connector of the battery (***item 3 in Image 5***).

When the status LED of the charger is red/yellow the battery is charging. When the status LED of the charger is green while the DC barrel connector is connected to the battery the charge is complete. The status LED is also green when the DC barrel **connector is disconnected.**

!! NOTE: DO NOT LEAVE THE BATTERY CHARGING UNATTENDED!!

MAINS CABLE CONNECTED	CHARGE CABLE CONNECTED	STATUS LED ON BATTERY
NO	**NO**	OFF
YES	**NO**	Green
YES	**YES**	Red or yellow, charging
YES	**YES**	Green, fully charged

LEDS	STATE OF CHARGE
3 greens, 2 reds	Full
2 greens, 2 reds	Over 50%
1 green, 2 red	Over 20%
2 reds	Less than 20 % (recharge soon)
1 red	Less than 10 % (nearing auto switch-off)
No lights	Empty (recharge within 12 hours)

CHARGE GAUGE

Press the charge gauge button (***item 2 in Image 5***) to test the state of the battery charge. This is approximate only and the most accurate results are after 2 minutes of no load.

3.2 Startup

For startup, please see the below sections that instruct you on using either the RRC2040 battery or Tracer.

3.2.1 STARTUP WITH RRC2040 BATTERY

The RRC2040 battery set for the UltraView includes two batteries, a charger, a charger power supply, and a country-specific power cable.

To start using the battery, and in case you need to attach the battery housing to the UltraView, please follow the instructions below and see ***Image 6***.

After you have attached the battery housing to the UltraView, by open the lid (***item 3 in Image 7***) by turning the knob of the battery housing counterclockwise and insert the battery in to the battery housing with the connectors at the front and the charge gauge (***item 2 in Image 7***) facing upwards. Ensure the battery is inserted all the way inside the housing. Close the cover of the battery and turn the knob clockwise to lock the cover. Press the on/ off button (**item 1 in Image 7**) at the front of the battery housing to turn on the camera. The LED located on the top

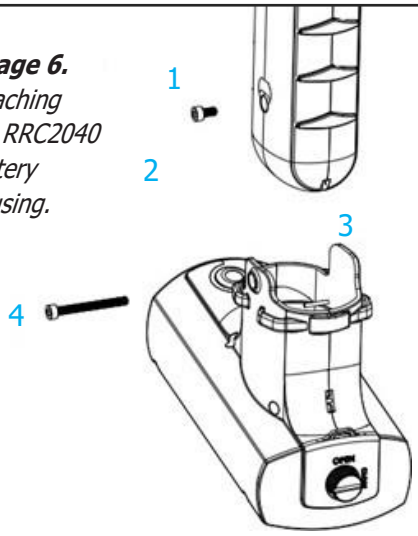
side of the camera turns red. The camera is now ready for use! If the power LED of the UltraView blinks, your battery has depleted its charge before startup.

When the power is on, the red Power LED is lit. The system starts after approximately 10 to 15 seconds. The UE Systems logo will appear on the screen. **When the system setup is complete, the UltraView's user interface will start automatically, and you are ready to make sound visible!**

The UltraView has internal system backup batteries which are charged by the main battery while in use. **At the first system start up**, it is recommended that the camera stays powered by the main battery for at least 45 minutes, so the internal backup batteries are charged fully.

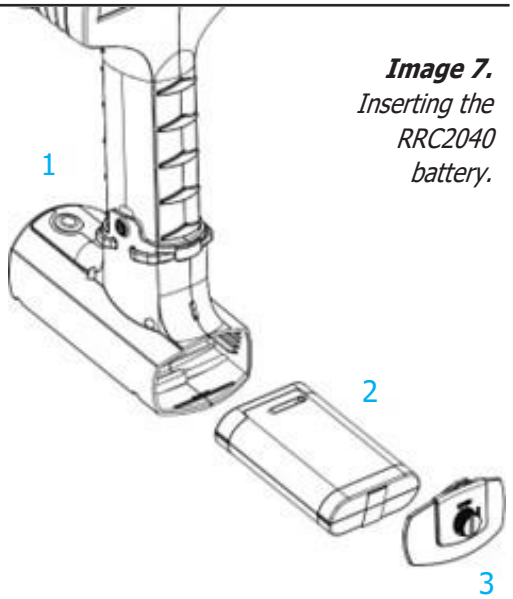
If you wish to attach the wrist lanyard that comes with the camera in the battery housing, you can find the point of attachment on top of the battery housing lid.

Image 6. *Attaching the RRC2040 battery housing.*



1. Unscrew and remove the lowest screw of the camera handle. (Tool: 2.5 mm Hex socket screwdriver)
2. Insert the support spacer in the screw hole.
3. Insert the battery housing into the camera handle. The housing is in its correct place when the screw hole of the battery housing is aligned with the lowest screw hole of the camera handle.
4. Screw the 30 mm hex screw through the housing into the handle. Tighten firmly.

Image 7. *Inserting the RRC2040 battery.*



1. Power switch button
2. RRC2040 Battery in the correct position when inserting in the housing.
3. Battery Cover

3.2.2 STARTUP WITH TRACER EXTERNAL BATTERY

1. Attach the battery cable to the battery. The connector of the battery cable can be attached to the battery output connector only one way. Push the connector downwards all the way.

2. Attach the connector to the UltraView by following instructions in ***Image 8***, with the orientation markings facing the same way:

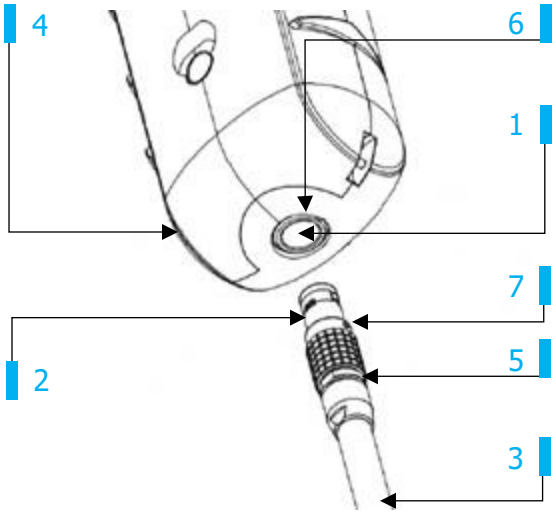


Image 8.
Different parts to consider when starting the UltraView.

1. Input Connector
2. Battery Cable Connector
3. Battery Cable
4. Camera's Handle
5. Connector Lock Ring
6. Input Orientation Marking
7. Cable Orientation Marking

Both the UltraView and the battery cable have **red orientation markings** (***Image 8***). They indicate the position of the key and the slot of the connectors which ensures the proper connection orientation. **Hold the battery cable connector by the locking ring** (***Image 8***) and make sure that the orientation markings of both connectors are aligned before inserting the battery cable. **Then carefully insert the battery cable connector into the UltraView**. The connectors should lock audibly.

When the power is on, the red Power LED is lit. The system starts after approximately 10 to 15 seconds. The UE Systems logo will appear on the screen. When the system setup is complete, the UltraView's interface will start automatically, and you are ready to make sound visible!

!! NOTE: Hold the UltraView firmly by the handle!!

The UltraView has internal system backup batteries which are charged by the main battery while in use. **At the first system start up**, it is recommended that the camera stays powered by the main battery for at least 45 minutes, so the internal backup batteries are charged fully.

3.3 Device setup wizard

The first time the UltraView is powered up, the device setup wizard is shown. The wizard will help you set up the settings needed for using the device. These settings can be changed later through the settings menu. Please see section ***4.7 Settings*** for more details.

3.3.1 DEVICE REGISTRATION

To be able to upload snapshots to the Cloud and browse them, the device must first be registered with the cloud service. Please follow the on-screen instructions during the setup wizard in order to

register the device. You can also register the device later in the network settings (***section 4.7.1 Network settings***).

3.4 Shutdown

For shutdown, please see the below sections that instruct you on using either RRC2040 or the Tracer battery.

3.4.1 SHUTDOWN WITH RRC2040

To turn off the UltraView, **simply press the on/off button. While in off state, the button is in the up position**.

1. Press down the on/off button until it clicks and rises up. The power is now switched off.
   Alternatively, you can pull the battery out of the battery housing.
2. A logo will appear, and the system will safely perform a shutdown.
3. The camera's red power LED will turn off when the shutdown is complete.

If you encounter a problem with the system, you can perform a hard shutdown by disconnecting the battery power and waiting until the camera's power LED turns off. If the shutdown takes more than 5 to 10 minutes after disconnecting the battery, contact UE Systems for service.

3.4.2 SHUTDOWN WITH TRACER EXTERNAL BATTERY

To turn off the UltraView, **simply disconnect the battery connector from the UltraView**.

1. Hold the battery cable connector by the lock ring and pull it outwards. The lock ring will slide until it releases the connection.
   Alternatively, disconnect the cable from the battery.
2. A logo will appear, and the system will safely perform a shutdown.
3. The red power LED will turn off when the shutdown is complete.

If you encounter a problem with the system disconnect the battery power and wait until the power LED turns off. If the shutdown takes more than 5 to 10 minutes after disconnecting the battery, contact UE Systems for service.

!! NOTE: DO NOT PULL BY THE CABLE OR USE ANY KIND OF PLIERS OR TOOLS TO DISCONNECT CABLES!!

4. USER INTERFACE

The UltraView supports the following application modes, depending on the camera version.

- **Air mode** is used for localizing compressed air leaks.
- **Power mode** is used for localizing and classifying high-voltage and medium-voltage partial discharges.

4.1 Heatmap

The main view of the user interface shows the camera image with a heatmap overlay. The heatmap shows the location of the strongest sound source (***single-source mode***) or multiple sound sources (***multi-source mode***). There are two different types of color modes for displaying the heatmap:

1. The location color mode.
2. The strength color mode.

The location color mode (***Image 10***) shows each sound source with several different colors, ranging from blue to red. The center of the sound sources is shown with red, while the color gradually changes via yellow, green, and cyan to blue outwards from the center of the sound source. The location color mode is active in the Power application mode. The strength color mode (***Image 11***) shows each sound source with a single color according to the intensity of the sound source. The strength color mode is active in the Air application mode.

In addition to the heatmap, the location of the strongest sound source is shown with a small crosshair. When taking a snapshot, the sound arriving from the direction of the crosshair will be recorded. The sound from this direction will be used for the application-specific analysis (***section 5: Application-specific features for more details***). The dB level of the sound from this direction is shown at the top of screen.

Image 10. *The Location color mode.*

Image 11. *The Strength color mode.*

4.2 Take a snapshot

Press the ***Snapshot*** button to take a snapshot that contains the current camera image and heatmap. The snapshot includes a short video (4 seconds) and an audio clip of the strongest sound source, which can be useful in the analytics. The video and audio clip are from the preceding 4 seconds before you press the ***Snapshot*** button. For this reason, you should keep the camera steady for a few seconds before taking a snapshot, in order to get a clear signal from the source of interest. The direction of the strongest sound source is shown with a crosshair.

After you have taken a snapshot, the camera shows a screen where you can enter comments and adjust the distance to the sound source. The distance is used for the analytics in the Cloud, UltraView Viewer or UltraView Viewer Pro. In the power mode version of the UltraView, you can also enter the line voltage of the electrical system under inspection.

After entering these pieces of information, press the Save button to save the snapshot. If you at this stage choose not to save the snapshot, press the rubbish bin button in the bottom left corner instead. Please note, in case you use the camera to photograph people, remember to ask consent before capturing images.

4.3 Record a video

Press the ***Video Recording*** button on the right-hand side of the ***Snapshot*** button to start recording. Note that the video length is limited to 5 minutes. To stop recording, tap the video recording button again. After you have finished recording, you can enter additional information as when taking a snapshot. You are also given the choice to save or erase the recorded video clip. You can erase the clip by tapping the ***Rubbish Bin*** button.

You can view the saved videos later only in the Cloud, third-party video software reproduction is not supported. Similarly, the recorded videos cannot be replayed directly on the ***camera***.

4.4 Snapshot browser

The number of snapshots currently saved on the UltraView is shown to the right of the ***Snapshot Browser*** button. If there are two dots visible next to the number, snapshots are currently being uploaded to the Cloud.

Press the ***Snapshot Browser*** button to view the captured snapshots. Thumbnails of the snapshots are shown on the bottom of the screen, and can be scrolled horizontally. When you press a thumbnail, the snapshot will be shown together with some additional information.

Note that snapshots are not available in the snapshot browser after they have been uploaded to the cloud service.

4.4.1 SNAPSHOT UPLOAD OPTIONS

To access automatic cloud upload settings, trigger manual cloud upload or direct data transfer, press the Upload button.

Enable/disable the cloud upload:	**Manually triggered cloud upload:**
Upload to cloud	*Upload to cloud now*
With this functionality, you can enable or disable automatic data upload to the Cloud. ***See section 4.10: Cloud upload for more information***.	If you have disabled the automatic data upload, you can manually trigger data upload to the Cloud. ***See section 4.10: Cloud upload for more information.***

4.5 Zoom

The UltraView is equipped with a 2x digital zoom, which can be used for close-up snapshots. Press the ***Zoom Buttons*** to zoom in or zoom out.

4.6 Quick settings

Press the ***Quick Settings*** button to show the available quick settings. The possible settings are listed below.

4.6.1 SCREEN BRIGHTNESS

The brightness of the display can be adjusted by pressing the ***Brightness*** button. This is useful to make the display readable under different lighting conditions (indoors/outdoors).

4.6.2 SINGLE-SOURCE / MULTI-SOURCE MODE

Press the ***Single-source*** / ***Multi-source*** button to toggle between the two modes. In single-source mode, the UltraView shows only the sound source with the highest intensity (with a crosshair on top). If there are multiple sound sources, the strongest sound source in the Field of View will be shown on the camera.

In multi-source mode, the UltraView shows multiple sound sources with different intensities. The sound source with the highest intensity will be shown with a crosshair on top. Not all sound sources will be shown. If there is a very strong dominant sound source, very weak sound sources will not be visible at the same time.

To see weaker sound sources in either single-source or multi-source mode, position and

rotate the camera so that stronger sound sources are outside the field of view displayed on the camera. You can also use the zoom button to limit the field of view.

4.7 Settings

Press the ***Settings*** button to show the available settings. Please see the different settings in the sections below and note that the available settings depend on the UltraView version.

4.7.1 NETWORK SETTINGS

Press the ***Enable WiFi*** button to show the available ***WiFi settings***.

To be able to scan for and select a WiFi network, first specify your location. Do this by pressing the ***Location*** button. You will then see a list of locations to choose from. Connecting the device to a network is neccessary to save snapshots and to ac cloud analytics.

When pressing the ***Select WiFi*** button, the camera will scan for nearby WiFi networks. After the scan, a list of the found networks will be shown. In case the WiFi network you wish to connect to does not show up, try moving closer to the WiFi access point. Once you find and select the desired network, you will be asked to enter the WiFi password. Please note that only secure, non-public WiFi networks are supported. The camera accepts WiFi networks that require password input, not networks that require both a username and password.

An icon representing the WiFi connection status and strength is shown to the right of the settings button:

Excellent WiFi connection strength.

Good WiFi connection strength.

Satisfactory WiFi connection strength.

Poor WiFi connection strength.

No WiFi connection.

Device registration
If you have not completed the device registration in the setup wizard, you must first register the device with the cloud service to be able to upload snapshots to the Cloud. Please follow the on-screen instructions in order to register the device.

4.7.2 TIME SETTINGS

The current time and date are shown under the time settings. Choose the correct time zone to see the correct local time. The time and date are automatically synchronised when connected to WiFi.

4.7.3 CHANGE MODE

Depending on the version of the UltraView, the device can have two different modes available:

- Air mode is used for localizing compressed air leaks.
- Power mode is used for localizing and classifying high-voltage and medium-voltage partial discharges.

If you have a camera that supports both modes, you can change the mode by pressing ***Change mode***.

4.7.4 ADVANCED SETTINGS

Language
This option allows you to choose the desired user interface language. The following languages are supported:

- CZECH
- DANISH
- DUTCH
- ENGLISH
- ESTONIAN
- FINNISH
- FRENCH
- GERMAN
- GREEK
- HUNGARIAN
- INDONESIAN
- ITALIAN
- JAPANESE
- KOREAN
- NORWEGIAN
- POLISH
- PORTUGUESE
- RUSSIAN
- SIMPLIFIED CHINESE
- SPANISH
- SWEDISH
- THAI
- TRADITIONAL CHINESE
- TURKISH
- VIETNAMESE

Distance unit
The distance unit can be changed here to either meters (m) or feet (ft).

Reset settings
All settings can be reset to their default value by choosing ***Reset settings***. Please note that doing a settings reset will not remove any snapshots, revert to any previous software version or remove the device registration.

Remove all data
All user data and settings can be removed from the device by pressing ***Remove all data***. The snapshots and device registration will be removed, and the camera can then be registered with a new user. Please note that the software will **not** be reverted to any previous version.

Calibration mode
For periodically checking the accuracy of the UltraView, a Sonic Tester is sold separately. For more information, please contact UE Systyems. For details about the calibration mode, please see the documentation provided with the Sonic Tester.

4.7.5 AIR MODE SETTINGS

Please see ***section 5: Application-specific features*** for the Air mode specific settings.

4.7.6 POWER MODE SETTINGS

Please see ***section 5: Application-specific features*** for the Power mode specific settings.

4.8 Filters

Ultr Press the filter button on the top right corner of the camera's screen to switch between different filters. The available filters depend on the camera's application mode, you can choose to activate the relevant optimal filters for finding leaks of partial discharges,For more information on the filters and optimization, see ***section 5.1.1 as well as 5.2.1***.

4.9 Real-time analysis

Real-time analysis results are shown at the top of the camera's screen. This includes the dB levels from the strongest source, the location of the sound source is shown with a crosshair as well as some analytics for the sound source. For details, see ***section 5: Application - specific features***.

4.10 Cloud upload

When connected to the Internet via WiFi, the UltraView will automatically upload any snapshots on the device to the Cloud as long as ***Upload snapshots*** is turned on under ***Snapshot browser (section 4.4: Snapshot Browser)***. Snapshot upload can also be triggered manually, if the automatic snapshot upload is turned off. Next to the ***Snapshot Browser*** button, the number of snapshots currently on the device is shown. Two dots next to the number indicate that snapshots are currently being uploaded to the cloud.

4.11 USB export

Snapshots in the UltraView can be exported to a USB flash drive. Open the cover on top of the UltraView (***Image 12***) and insert the memory stick in the USB port. Check that the orientation of the memory stick and the port is correct before inserting the stick.

!! NOTE: USE ONLY THE USB FLASH DRIVES PROVIDED WITH THE ULTRAVIEW. OTHER FLASH DRIVES ARE NOT GUARANTEED TO WORK AND MAY LEAD TO LOSS OF DATA!!

The UltraView will recognize the inserted flash drive and ask if you want to transfer snapshots to the USB device. If you press Yes, the transfer will begin. During the transfer, the progress will be displayed, and the transfer can be aborted by pressing the Stop button. Snapshots already transferred to the USB flash drive

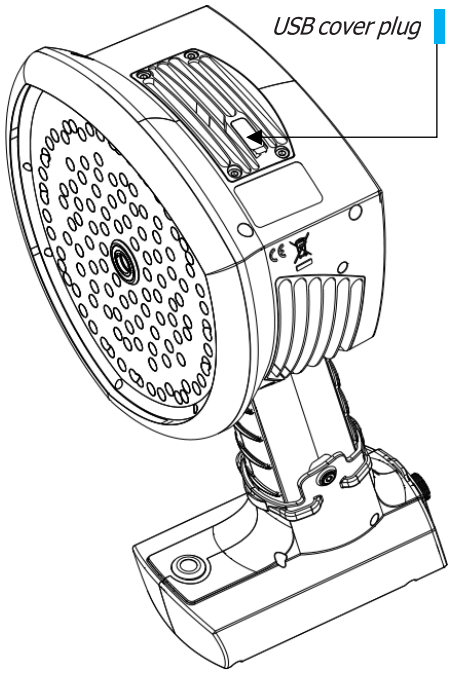


Image 12. *The location of the USB cover*

will remain on the flash drive and snapshots not transferred will remain on the UltraView. **Do not remove the flash drive from the USB port while the transfer is in progress**, as this may corrupt the flash drive. Once the transfer has been successfully completed or aborted by pressing the Stop button, the main view of the user interface is shown, and the flash drive can be removed from the USB port. Remember to put the USB port cover back in place.

The snapshots transferred to the flash drive can be browsed on a PC by using a web browser and the UltraView Cloud (ultraview.uesystems.com). The snapshot .nlz files can be uploaded from the flash drive or other storage location using the ***Import files*** upload feature in the UltraView Cloud.

5. APPLICATION SPECIFIC FEATURES

The applications for the UltraView are leak detection (locating and estimating the size of compressed air leaks) and partial discharge detection (locating and analyzing partial discharges in power grids). The features specific to these two **applications are described below**.

5.1 Compressed air leak detection

The UltraView detects compressed air leaks based on the sound the leak emits. The different filters available on the UltraView filter out background noise and can dampen industrial sound disturbances.

The UltraView will determine if a detected sound source is likely to be a leak. On the camera, the detected leak's size is shown in real-time. Also, the UltraView will also display an estimate of how much the detected leak costs annually. For more precise measurements and estimation, the user should set the distance to the leak (***section 5.1.2: Distance***) as well as the environment temperature and relative humidity (***section 5.1.3: Air mode-specific settings***).

5.1.1 FILTERS

The most appropriate filter might vary from case to case. Test the different available filters to see which filter gives the best results.

SLM (20 to 30 kHz): Specifically for compressed air leaks, it dampens unwanted noise in challenging environments and offers a good detection distance.

Ultr (30 to 65 kHz): The best choice for cases with strong background noise. Typically, only to be used at short distances.

High (20 to 30 kHz): Filters out most background noise sources with a good detection distance.

Full (2 to 65 kHz): This filter is only available when enabling all available filters from the advanced settings. It utilizes the full frequency range of 2 to 65 kHz and has a flat frequency response. This filter is not ideal for finding leaks, since it will be affected by low frequency background noise and might not be able to pick up very silent sound sources.

5.1.2 DISTANCE

The camera screen includes buttons to select the distance to the sound source. Use the + and - buttons to select the distance that you estimate to be the most accurate. The distance setting allows the UltraView to properly compensate for the reduction or increase in sound intensity due to the location of the sound source. The UltraView uses this information to estimate the size of the leak.

5.1.3 AIR MODE SPECIFIC SETTINGS

The following settings specific to leak detection are available:

LEAK UNIT: Adjust the unit used to display the leak size estimate. The available options are l/min (litres per minute) and CFM (cubic feet per minute).

CURRENCY: Select the currency for the leak cost estimate from the available options.

ENERGY COST: For the camera to estimate the cost of compressed air leaks, you must enter the energy cost. This usually means the local price per kWh of electricity. Please note that if the currency is changed, the energy cost must be updated accordingly.

ENV. TEMP.: The environmental temperature affects how the sound from a leak propagates through air. Specify the temperature to get the most accurate leak size estimate. The temperature can be entered either in °C or °F.

REL. HUMIDITY: The relative humidity of the environment affects how the sound from a leak propagates through air. Specify the relative humidity to get the most accurate leak size estimate.

Leak corr.: The UltraView's leak size estimate is based on a large set of different measured leaks If the leak size estimate systematically differs from your own observations, you can adjust it by setting the leak correction (leak corr.) factor. The final leak size estimation on the screen will be multiplied by the specified leak correction factor.

SPECIFIC POWER: The specific power is a measure of how much energy is needed to produce a certain amount of compressed air. The unit is either kW/m³/min or kW/100 CFM. This option is recommended for advanced users only; leave it at the default value if you do not know the specific power of your compressed air system.

5.2 Partial discharge detection

The UltraView detects partial discharges based on the sound they emit. The different filters available on the UltraView filter out background noise and concentrate on the high and ultrasonic frequencies where the sound of partial discharges typically is much stronger than the background noise.

The UltraView will automatically determine when a detected sound source is likely to be a partial discharge. This autodetection works for AC frequencies of 50 and 60 Hz.

When the camera has detected a possible partial discharge, the camera will show a PRPD (phase-resolved partial discharge) pattern for it on the top of the screen. By default, the pattern is shown in a small window. Press the window to enlarge it. Press once more to make it small again. The Cloud and UltraView Viewer Pro use the PRPD pattern to classify the partial discharge and assess its severity. For this to be accurate, the user needs to set the distance to the partial discharge (***section 5.2.2 Distance***).

5.2.1 FILTERS

The available filters depend on the camera's application mode, you can choose to activate the relevant optimal filters for finding leaks of partial discharges.

Norm (10 to 30 kHz): The best alternative for all cases with little background noise. Offers the best detection distance.

High (20 to 30 kHz): Offers good detection distance while filtering out most background noise sources.

Ultr (30 to 65 kHz): Effectively filters out background noise at the expense of reduced detection distance. Typically only to be used at short distances.

Full (2 to 65 kHz): This filter is only available when enabling all available filters from the advanced settings. It utilises the full frequency range of 2 to 65 kHz and has a flat frequency response. This filter is not ideal for finding partial discharges, since it will be affected by low-frequency background noise and might not be able to pick up very silent sound sources.

5.2.2 DISTANCE

The camera screen includes buttons for setting the distance to the detected partial discharge. Use the + and - buttons to select the distance that you estimate to be the most accurate. The distance setting allows the UltraView to properly compensate for the reduction or increase in sound intensity due to the location of the sound source. The UltraView uses this information to estimate the severity of the partial discharge.

6. USAGE TECHNIQUES

See the following sections for tips on how to get the most out of your UltraView.

6.1 General usage

If you are using the UltraView with the RRC 2040 battery, use the wrist lanyard to ensure that you do not accidentally drop the UltraView. Do not carry or lift the UltraView by the lanyard. Always carry it by the handle or the body. Always keep the USB port covered. Water must not enter the UltraView, as this will damage the electronics inside. Do not touch the video camera lens or the conical microphone holes.

Tracer battery, keep the battery inside the included carrying bag and carry the bag with the strap over your shoulder to free your hands for using the UltraView (***Image 13***).

Image 13. *Using the UltraView.*

Always put the UltraView inside the carrying bag when you need both hands for other tasks, such as climbing ladders. Ensure that the camera is placed in such a way inside the bag that it does not fall out.

6.2 Locating sound sources

In the single-source mode, the UltraView will always show the strongest sound source in the field of view. The strongest source will depend on the currently selected filter; different filters might display different sound sources. In order to see weaker sound sources in the presence of a strong sound source, move or rotate the camera so that the strong sound source is clearly outside the field of view. You can also use the zoom button to limit the field of view.

In the ***multi-source*** mode, the UltraView will show not only the strongest sound source, but also

weaker sound sources. Note that sound sources considerably weaker than the strongest source will not be shown. The ***multi- source*** mode is useful for locating weaker sound sources. If you want to examine these sources more closely, you can move and rotate the camera as well as use the ***Zoom*** buttons. Always keep in mind that any analysis is done in the direction of the crosshair on the display.

Note, that if an actual sound source is large (for example, a large vibrating surface), the source shown on the display might be smaller than the actual source. The source might in this case also move around as you move around the surface, depending on which point of the surface is closest to the UltraView. In this case, taking a snapshot and viewing it in the Cloud might help. In the Cloud, it is possible to adjust the dynamic range of the heatmap with the slider below the image. By increasing the dynamic range, you might be able to tell how large the sound source actually is.

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

6.3 Reflections

The UltraView can sometimes show reflections of sound sources. To tell a reflection apart from an actual sound source, move around the object you are inspecting and examine it with the camera from different directions. If the sound moves around or completely disappears, it is most likely a reflection or interference. If the source stays in one place when you move the camera, you have located an actual sound source.

The ***multi-source*** mode might also be useful when trying to determine whether a sound source the camera displays is an actual sound source or a reflection. With the multi-source mode, you might be able to see both the actual sound source and one or several reflections, and by moving the UltraView around the object you are inspecting, you might be able to tell which of the sources are reflections (***Image 14***).

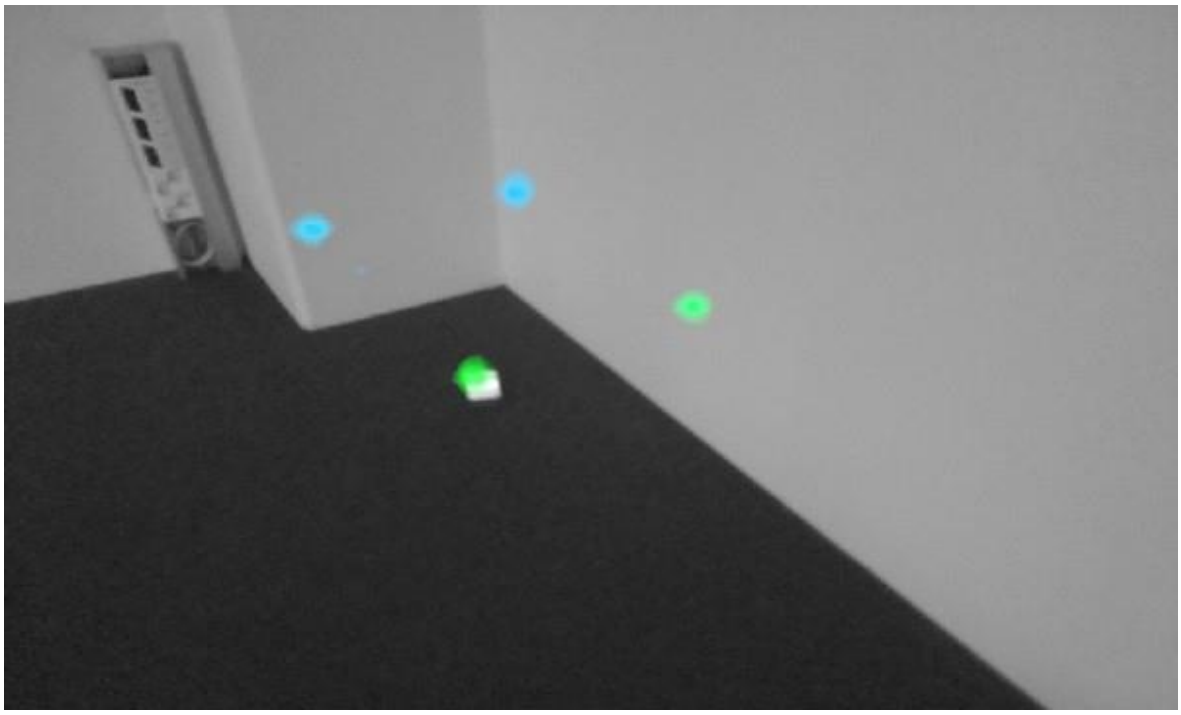
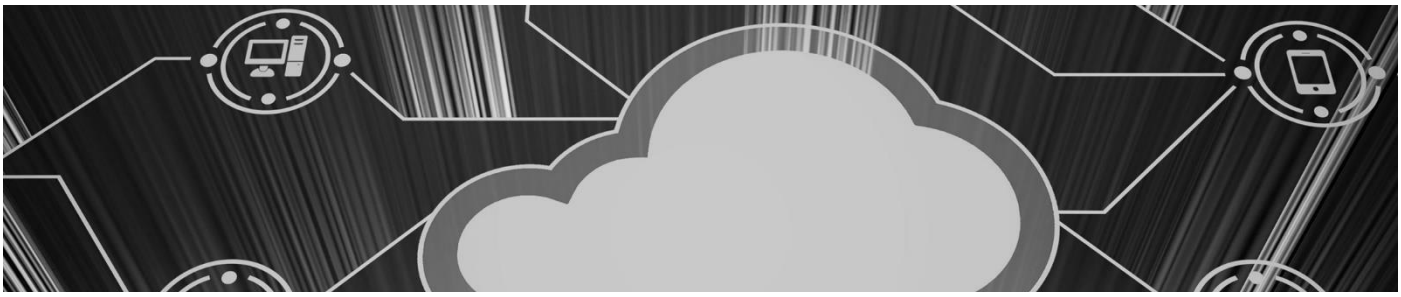


Image 14. *An example of an actual sound source and three reflections shown by the UltraView in multi-source mode. The actual sound source is on the floor, while the three reflections are visible on the walls. When the camera is moved around, the location of the actual sound source remains the same, while the reflections move around on the walls and are not visible from all angles.*

6.4 Distance

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

There is no specific upper limit for the distance at which the UltraView can be used. In practical cases, the distance is often limited to approximately 130 meters (430 ft), but strong sound sources in an otherwise quiet environment can be detected at even larger distances. Respectively, weak sound sources usually require closer proximity.



7. CLOUD

The Cloud expands your sound imaging experience by offering various analysis methods for the sound image and the signal. It also serves as a storage for snapshots taken and can be used for generating reports.

Use a modern web browser (e.g. Google Chrome, Microsoft Edge, Mozilla Firefox) and go to the following address: ultraview.uesystems.com

To use the cloud service, you must first register as user and register the device to the cloud service (***Device registration under 4.6.1: Network settings***).

To see further instructions, please click the question mark icon when you view a specific snapshot in the Cloud.

8. MAINTENANCE

!! NOTE: DO NOT TRY TO REPAIR OR OPEN THE ENCLOSURE OF THE ULTRAVIEW OR THE BATTERY. DO NOT USE ANY DAMAGED DEVICES, BATTERIES OR CABLES. PROTECT THE DEVICE AND ACCESSORIES FROM DIRT, DUST, IMPACTS AND LIQUIDS!!

The intended usage conditions and instructions are described in this user manual. Please

read and follow the instructions carefully in order to avoid damage to the device and accessories. If problems occur, contact UE Systems for support.

8.1 Storage

Store the equipment in a dry location at room temperature. Store the batteries fully charged and recharge once every three months. Start up the UltraView at least once every three months. These actions ensure the camera's operational reliability.

8.2 Cleaning

Do not use any strong cleaning solutions. Do not use running or dripping water or other liquids. Do not immerse any part of the device.

Before cleaning the UltraView, disconnect all the cables and make sure that no part of the equipment is powered. For surface cleaning **of the chassis, the screen, and cables**, use a damp cloth with water or mild soap water. Make sure that the cloth is not dripping wet.

Contact UE Systems for the cleaning of **the microphone array**, as this part is sensitive to damage. However, if you decide to clean the microphone array yourself, you can use indirect, **low-pressure air** from a distance to blow particles away from the conical holes of the microphones. If this does not work and the microphone array is still dirty, contact UE Systems. UE Systems is not responsible for any damage caused by an attempt to clean the microphone array.

For **the batteries and the chargers** use a dry-cleaning cloth only.

Bags and cases can be vacuum cleaned or brushed. Make sure that the bag or case is completely empty first.

8.3 Visual and/or permanent damage

BROKEN ACCESSORIES: Contact UE Systems for replacing any broken accessories with the official UE Systems spare parts. Properly dispose of and/or recycle broken equipment.

ULTRAVIEW UNIT: Contact UE Systems for repairs.

Recycle and properly dispose of all broken devices and packaging material. Contact your local authorities for instructions for the proper disposal.

Need further support?
Want information regarding products or training?

CONTACT:

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T: +31 546 725 125 | E: info@uesystems.eu | W: www.uesystems.eu

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The ultrasound approach