CS INSTRUMENTS

Translation of the original operating instructions

EN

LeakCam 600

| LEAKAGE |

The completeness and accuracy of this documentation have been carefully checked. We reserve the right to make technical changes at any time. These changes may result in deviations from the information provided in this documentation.

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1 General information

For the sake of simplicity, this documentation refers to the product "LeakCam 600" simply as the **product**.

1.1 Documentation

This documentation provides important warnings, safety precautions, and instructions for the safe and proper operation of the product.

▷ Before operating the product, read this documentation carefully and ensure that you fully understand its contents.

▷ Always keep this documentation readily available for reference purposes.

1.2 Symbols and labels used

The following markings and symbols are used in this documentation:

Labeling/symbol	Usage
Text	Important text passages are highlighted
text	Control elements LeakCam 600
Text	User interface software
Text > Text > Text	User interface click path
2 Security	Cross-reference to text passage, figure or chapter
•	Enumeration, list element
▷	Call to action as part of an instruction. Can also be numbered.
✓	Final or intermediate result of an action instruction
✗	Final or intermediate result of an instruction that has not been achieved
	Note on an intermediate result

Table 1: Symbols and labels used

1.3 Safety instructions and notes

DANGER
Indicates an imminent danger.
Death or very serious injuries may result.

WARNING
Indicates a potentially dangerous situation.
Death or serious injury may result.

CAUTION
Indicates a potentially dangerous situation.
Slight or minor injuries may result.

NOTICE
Indicates a potentially dangerous situation.
Material or environmental damage may result.

NOTE
Indicates important information, application tips, and useful information for proper working.

2 Security

The product has been designed, manufactured, and functionally tested in accordance with applicable safety regulations.

To ensure operational safety, please observe the following:

- Chapter "Intended use"
- Chapter "Organizational measures to be taken by the operator"
- Chapter "Residual hazards"

Regardless of the instructions provided in this manual, all applicable country-specific occupational health and safety regulations must be observed.

2.1 Intended use

The operational safety of the product supplied is only guaranteed if it is used as intended.

The product is intended exclusively for detecting compressed air and compressed gas leaks. Leak detection is based on ultrasonic waves generated by the leaks, which are evaluated with consideration of distance and line pressure.

Reliable leak detection is generally possible when application-specific threshold values are met, such as a relative overpressure greater than 250 mbar **and** a leak flow rate exceeding 0.03 l/min at a test distance of 3 meters. It is important to note that measurement uncertainties and ambient noise (e.g., external sounds or pressure fluctuations) can affect detection performance.

Any use beyond or deviating from this is considered improper use. The manufacturer accepts no liability for any resulting damage.

Intended use also includes:

- Adherence to the supplied documentation
- Compliance with all inspection and maintenance requirements specified by the manufacturer

Reasonably foreseeable misuse or improper handling includes:

- Performing leak testing or leak detection involving flammable or toxic gases
- Conducting measurements on or near live components
- Operating the system outside the technical specifications
- Tampering with the product in any manner that deviates from the intended use or documented procedures
- Continuous operation outdoors in wet conditions or direct exposure to the weather
- Use in potentially explosive atmospheres

2.2 Organizational measures of the operator

The product may only be used if it is in perfect technical condition. It may no longer be used if it has been technically modified or damaged.

Instructions

The information on commissioning, operation, and maintenance provided in these instructions must be followed. These instructions should always be kept accessible with the product.

Personnel

People working on the product must read these instructions, particularly the chapter entitled "2 Security", before starting work. This also applies to people who only work occasionally.

2.3 Handling class 2 lasers

CAUTION

Laser radiation (class 2 laser)

Direct exposure of the eyes to the laser can cause injury. The natural eyelid closure reflex usually provides adequate protection during brief, unintentional exposure.

- ▷ Do not look directly into the laser beam or its reflection.
- ▷ Never point the laser beam at people or animals.
- ▷ Do not use any optical aids (e.g. magnifying glasses, binoculars) to view the beam.
- ▷ Mark or secure the laser work area appropriately.
- ▷ Always observe the warning and safety instructions provided with the product.

This product contains a class 2 laser. Lasers in this class have a maximum output power of 1 mW. In the case of short-term exposure (less than 0.25 s), the eyelid closure reflex usually provides adequate protection. Proper handling is essential to avoiding unintentional exposure and hazards.

- ▷ Observe all relevant accident prevention regulations.
- ▷ Switch off the product immediately if uncontrolled radiation is suspected.
- ▷ Mark defective products clearly and take them out of service.
- ▷ Have maintenance and repairs carried out by authorized specialist personnel only.

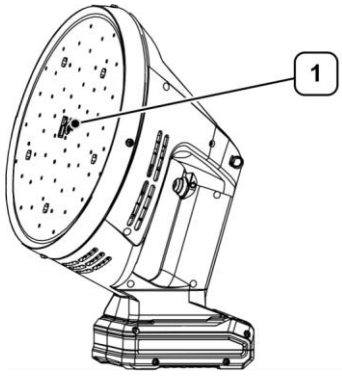

Figure 1: Laser exit point

1 Laser exit point

Figure 2: Product labeling "Class 2 laser"

2.4 Residual risks

CAUTION

General safety instructions

The product is intended exclusively for the described application.

- ▷ Maintain sufficient safety distance during leak detection on electrical systems to avoid dangerous electric shocks.
- ▷ Do not use the product in the vicinity of explosive gases, vapors, or in damp environments.
- ▷ Only use the product for its intended purpose and within the parameters specified in the technical data.
- ▷ Avoid any direct contact with hot and/or rotating parts.
- ▷ Observe the specified storage and operating temperatures.
- ▷ Any tampering with the product that does not comply with the intended or described procedures will void the warranty and release the manufacturer from any liability.

CAUTION

Lithium-ion battery

Lithium-ion batteries may only be used, charged, and stored in accordance with the manufacturer's instructions. Improper handling can lead to overheating, fire, or explosion.

- ▷ Follow the battery manufacturer’s safety instructions.
- ▷ Do not expose the battery to heat, direct sunlight, or open flames.
- ▷ Avoid physical damage, such as dropping, crushing, or piercing the device.
- ▷ Replace batteries immediately if they have been dropped from a height of more than one meter or exposed to significant impacts - even if the housing appears undamaged. Internal cell damage may have occurred and could pose a safety risk.
- ▷ Do not short-circuit the battery terminals or take the battery apart.
- ▷ Use only the charger supplied with the product or chargers explicitly approved by the manufacturer. Always follow the manufacturer’s recommended charging parameters to prevent product damage and ensure safe operation.
- ▷ Do not use the supplied charger to charge other devices.
- ▷ Dispose of damaged, leaking, or inflated batteries immediately.
- ▷ If chemicals get on the skin, wash the area with water and get medical help.
- ▷ Follow local regulations and dispose of lithium-ion batteries at approved collection sites.

3 LeakCam 600

3.1 Product overview

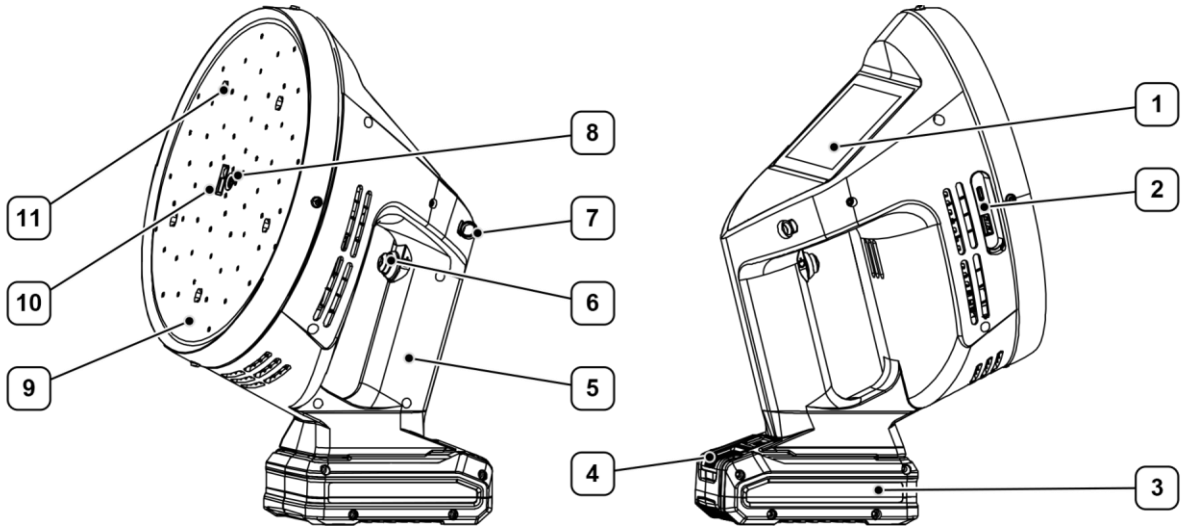

Figure 3: LeakCam 600 (example)

1	Touch screen	**7**	Attachment eyelet carrying strap (2x)
2	USB interface	**8**	Camera
3	Battery	**9**	Ultrasonic MEMS microphone (64x)
4	Battery capacity indicator	**10**	Laser distance module
5	Handle	**11**	LED light source (5x)
6	On/off switch / camera trigger		

3.2 Product description

NOTE

Further information on terminology in connection with the topic of "leakage" can be found in the chapter "12.5 Glossary".

LeakCam 600

The product detects, localizes and evaluates compressed air leaks in real time. In addition to compressed air leaks, the product detects leaks of nitrogen, argon, methane and CO_2. The possible detection range depends on the transmission power of the leak source and the surrounding ambient conditions. Under favorable conditions, even greater distances may be achieved.

The integrated ultrasonic MEMS microphones capture a detailed sound level spectrum. The recorded data is used to generate a frequency-dependent ultrasonic map within the defined frequency range, effectively suppressing noise outside this window. This allows for precise leak detection even in noisy or acoustically complex environments. For fast leak localization, the acoustic image is overlaid with the visual image on the touchscreen.

The integrated laser distance module automatically determines the distance to the leak. The measured data is directly incorporated into the evaluation process, enhancing the precision of the leak detection.

Multi-directional ultrasonic transmitter (optional)

A multi-directional ultrasonic transmitter can be used to detect leaks in unpressurized systems. The emitted ultrasonic signal passes through even the smallest openings, which are then detected by the leak detection camera.

Further information can be found in chapter "8.6 Multi-directional ultrasonic transmitter (optional)".

3.3 Type plate

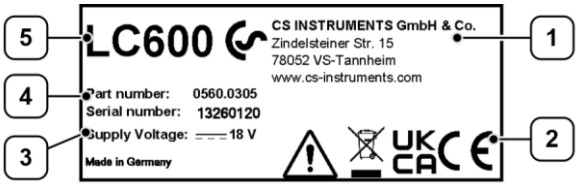

Figure 4: Type plate (example)

1	Manufacturer information	**4**	Material/serial number
2	Conformity/certification marking	**5**	Product designation
3	Electrical connection data		

3.4 Scope of delivery

The scope of delivery includes the following components:

- LeakCam 600
- Battery charger
- 18 V 2 Ah lithium-ion battery (incl. suitable battery holder)
- 18 V 4 Ah lithium-ion battery (incl. matching battery holder)
- Adjustable carrying strap
- Carrying case
- Leak tags
- Calibration certificate
- USB storage device
- USB-C to USB-A cable
- Multi-directional ultrasonic transmitter (optional)

3.5 Applicable documents

This Translation of the original operating instructions provides information on the operation of the product "**LeakCam 600**". It primarily covers the following topics:

- Installation and commissioning
- Leak detection
- Data record management
- Maintenance and servicing

NOTE

Data management and the creation of leak reports using the "**Leak Reporter**" reporting software are not included in this document.

Further information can be found in the "Operating instructions - Leak Reporter".

4 Transportation and storage

CAUTION

Danger due to improper transportation of the batteries

There is a risk of short circuit, mechanical damage or thermal reaction if the batteries supplied are transported incorrectly. Heat development, fire or explosion may occur.

- ▷ Only transport rechargeable batteries in designated transport containers with short-circuit protection.
- ▷ Cover the battery contacts and avoid mechanical stress (e.g. crushing, impacts).
- ▷ Follow the battery manufacturer's instructions and comply with legal regulations for transporting lithium-ion batteries.

NOTE

Improper transportation, storage and commissioning are accident-prone and can cause damage or malfunctions to the delivered product, for which the manufacturer (CS INSTRUMENTS) does not grant any liability or warranty.

4.1 Delivery

Transport damage

- ▷ Check the delivered components for any visible transportation damage.
- ▷ Report any transportation damage to the following parties immediately:
  - the carrier
  - the manufacturer's customer service (CS INSTRUMENTS)
- ▷ Ensure that the product is handled properly during transportation.

Packaging

- ▷ Keep the original packaging for any future transportation or storage.

4.2 Storage

CAUTION

Damage to battery cells due to incorrect storage

Incorrect storage can damage the battery cells in rechargeable batteries.

- ▷ Observe the safety instructions provided by the battery manufacturer.
- ▷ Store batteries only in a charged state (at least 40% charged).
- ▷ Keep batteries in a cool and dry place.
- ▷ Protect batteries from humidity and direct sunlight.
- ▷ Prevent batteries from freezing.
- ▷ Dispose of batteries that have been stored below 0°C for more than 60 minutes.

To avoid damage due to environmental influences, the product must be stored properly when not in use.

- ▷ If possible, store the product in its original packaging.
- ▷ Store the product in dry, dust-free rooms.
- ▷ Keep the product away from direct sunlight, heat sources, and corrosive or aggressive chemicals.

5 Installation and commissioning

CAUTION

Danger from commissioning a damaged product

If a damaged product is installed or put into operation, it may result in functional failures, electrical hazards, or mechanical risks.

- ▷ Before each commissioning, inspect the product, accessories, and all supply lines for visible damage, loose parts, or missing components.
- ▷ Immediately take any defective product out of operation immediately.

5.1 Fitting accessories (optional)

Fitting the battery holder

The battery holder enhances product stability and when used with the carrying strap, provides ergonomic support, especially when used at stomach height.

- ▷ Slide the battery into the battery holder.
  - ⓘ The battery can be charged in the battery holder when inserted.

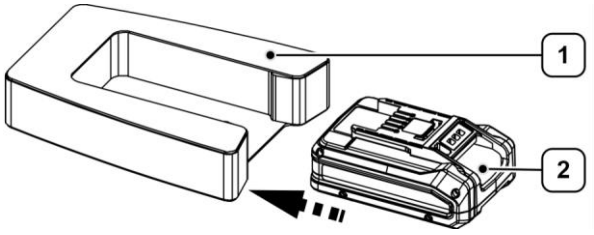

Figure 5: Fitting the battery holder (example)

1 Battery holder **2** Battery pack

Fitting the carrying strap

A carrying strap can be fitted to the device for ergonomic use.

- ▷ Attach the carrying strap to the two fastening eyelets.
- ▷ Adjust the carrying strap to the desired length.

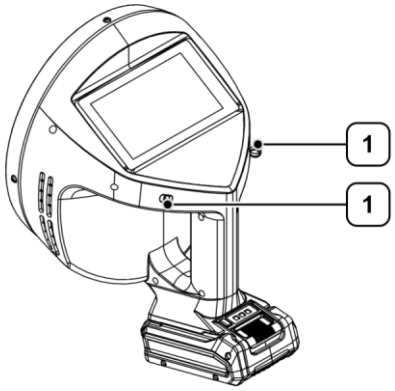

Figure 6: Fitting the carrying strap (example)

1 Fastening eyelet carrying strap

5.2 Initial commissioning

NOTE

The batteries are only charged to around 30% on delivery and must be fully charged before first use.

Further information can be found in chapter "10.2 Removing and charging the battery".

Putting the product into operation

The product and battery are shipped separately for transportation purposes.

- ▷ Push the battery into the handle of the product until it clicks into place.
  - ✓ The product is now ready to use.

Starting the installation wizard

The first time the product is switched on the installation wizard for basic configuration will launch automatically.

▷ Follow the instructions on the screen.

▷ Select the desired settings.

ⓘ All configurations can be edited via the system settings after commissioning.

5.3 Switching on and off

Switching on

▷ Press the on/off switch.

✓ The device will start up.

ⓘ This may take a moment.

Switching off

▷ Press and hold the on/off switch for approx. 3 seconds.

▷ Confirm the message.

✓ The device switches off.

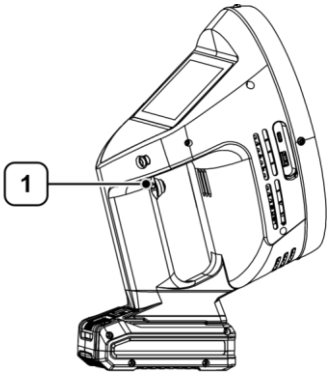

Figure 7: Switching the product on and off (example)

1 On/off switch

WARNING

Danger from removing the battery during operation

Removing the battery during operation can lead to data loss or electrical malfunctions. This can cause damage to the device and may lead to injury due to electrical discharge or uncontrolled system behavior.

▷ Ensure that the product is switched off properly before removing the battery.

6 Operation

6.1 Control elements

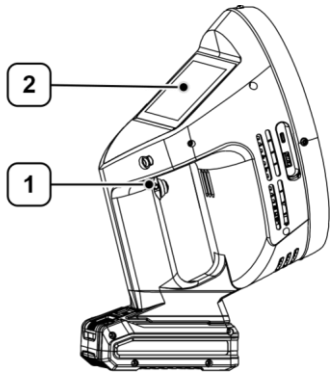

Figure 8: Operating elements (example)

1	Camera shutter release	**2**	Touch screen

Camera trigger

You can save a measurement using the camera trigger located on the handle.

▷ Press the camera trigger to capture and save the measurement.

ⓘ Alternatively, a measurement can also be saved using the Camera button on the user interface.

Touch screen

The user interface is operated via the touch screen.

▷ To navigate, tap menu items using your finger or a soft, rounded stylus.

CAUTION

Damage to the touchscreen

▷ Do not use pens or other sharp-edged objects to operate the touchscreen.

6.2 User interface

The following user interface is displayed each time the product is started.

Figure 9: User interface | Camera mode view (example)

1	Status bar	**6**	Camera trigger
2	Threshold (visible only in manual mode)	**7**	Target range with leakage rate
3	Configuration menu	**8**	Laser distance measurement
4	Zoom	**9**	LED light source
5	Measurement parameters		

The user interface is used to control measurement parameters, record measurements, and navigate between views.

The status bar displays the current measurement parameters and measured values:

- Frequency window (default setting: 40–55 kHz)
- Signal level (maximum value of the ultrasonic map)
- Threshold value (value is displayed when using manual focus)
- Focus
- Distance to the leak

The target circle marks the detection range for leak detection and is used to precisely locate the leak. If the leak is in the center of the target circle and the measured signal level exceeds the threshold value, the leak is recognized as a valid sound source.

Further information can be found in chapter "8 Leak detection".

7 Configuration

Opening the Configuration view

To switch from Camera mode view to Configuration view:

▷ Tap the Back button.
✓ The Configuration view will open.

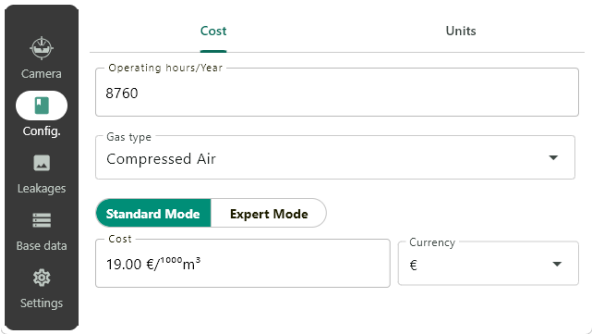

Figure 10: Configuration view (example)

7.1 Set up device settings

The Settings menu item is used to configure basic device parameters.

- Camera color setting
- Operating hand
- Measure distance using laser (laser always active or manual)
- LED light source (always on or manual)
- Display brightness
- Standby mode
- Date and time
- Language setting
- Resetting the product to factory defaults

▷ Tap on the Settings button.
▷ Select the Basic settings tab.
▷ Select the desired settings.

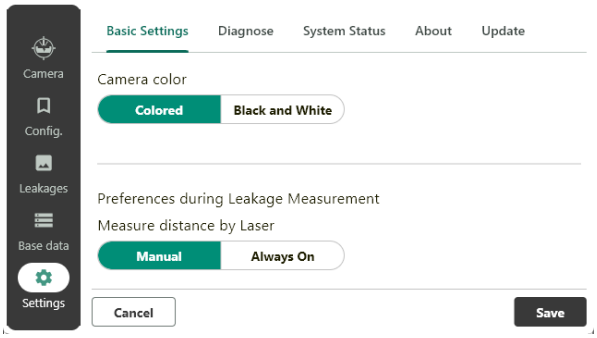

Figure 11: Adjusting the basic settings (example)

NOTE
Reducing screen brightness and setting a shorter screen timeout will help minimize energy consumption and extend the product's operating time.

7.2 Adjust configuration settings

Open configuration settings

▷ Tap on the Config. button.

Store parameters for cost calculation

To ensure the leak is quantified as accurately as possible, all parameters relevant to the cost calculation can be entered directly.

▷ Select the Cost tab.
▷ Select the desired settings.
▷ Tap the Save button.
✓ The product is now configured to calculate the annual leakage costs.

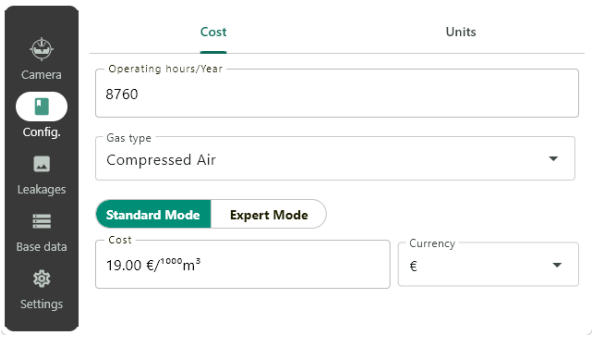

Figure 12: Storing parameters (example)

NOTICE

Expert mode

In Expert mode, you can individually set both the specific system output and the electricity price for the media types "Compressed air" and "Vacuum".

There are three preset values to choose from for the specific output - alternatively, you can enter your own value manually.

The estimation of the Total costs [100%] (life cycle costs) is broken down into 70 % energy costs, 20% installation costs and 10% maintenance costs.

▷ Tap on the Expert mode button.
▷ Select the desired settings.

Customize units

The system of units and measured variables can be adjusted to meet country-specific specifications or individual preferences.

▷ Select the Units tab.
▷ Select the desired settings.
✓ The display units are adopted according to the selection and displayed correctly in all relevant areas.

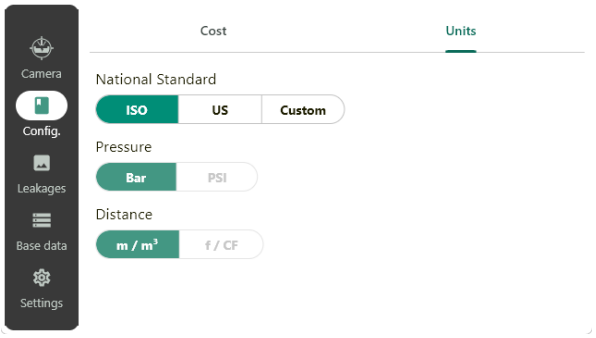

Figure 13: Customize units (example)

8 Leak detection

8.1 Checklist: Settings before starting leak detection

Before you start leak detection, ensure that all relevant settings have been configured. The following checklists will help you with structured preparation and in recording individual leaks.

Checklist: Preparation for leak detection

- Reset or continue leak tag
- Define company name
- Define building (include floor or area subdivisions if needed)
- Confirm and record compressed air costs
- Set operating hours for each area (required for the economic evaluation of leaks)
- Record operating pressure of each area (essential for calculating leak flow rate)
- Check other settings (e.g. language, units, time format, etc.)

The following information should also be documented separately for each identified leak:

Checklist: Details per leak

- Specify the leaks operating time
- Specify the operating pressure at the leak location
- Review measurement parameters and adjust if necessary

8.2 Adjust measurement parameters

NOTE

The system contains predefined values that serve as a suitable starting point for typical applications. Adjustments may be necessary depending on the acoustic conditions.

Adjusting measurement parameters

Various measurement parameters can be set for optimal detection and analysis of leaks. These include, among others, threshold value, measurement distance, focus range, and frequency window. Correct parameterization improves signal separation, reduces environmental influences, and increases the reproducibility of the measurement – especially under varying environmental conditions.

▷ Tap the Measurement parameters button.

✓ The configuration menu opens.

ⓘ Tapping again will deactivate the function.

▷ Select the desired settings.

ⓘ Upon restart, all user-defined settings are deleted and replaced with the factory settings.

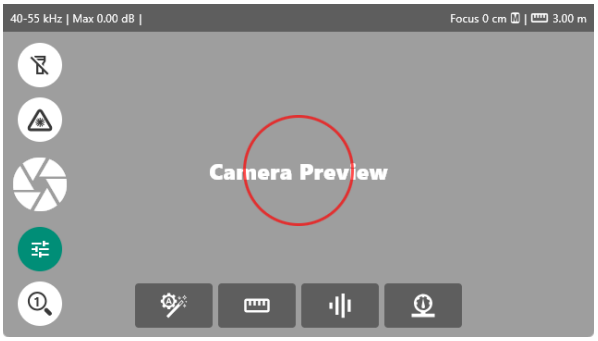

Figure 14: Adjusting measurement parameters (Example)

Parameter	Factory setting
Frequency window	40...55 kHz
Distance	3.0 m
Focus	Focus distance
Threshold	20 dB

Table 2: Factory settings for measurement parameters

8.2.1 Adjust threshold value

The threshold defines the minimum signal level at which a sound source is detected as a leak. By setting the threshold correctly, background noise is filtered out while weak leak signals are detected. A high threshold reduces sensitivity, while a low threshold increases it. The adjustment depends on ambient noise and the selected frequency window.

The threshold can be adjusted automatically (by the system) or manually in Expert Mode.

▷ Tap the Optimize button.

▷ Select Automatic Mode or Expert Mode.

Using Automatic Mode

In Automatic Mode, the system automatically determines the threshold and adjusts it to the current environmental conditions.

▷ Tap the Automatic Mode button.

✓ Automatic Mode is enabled.

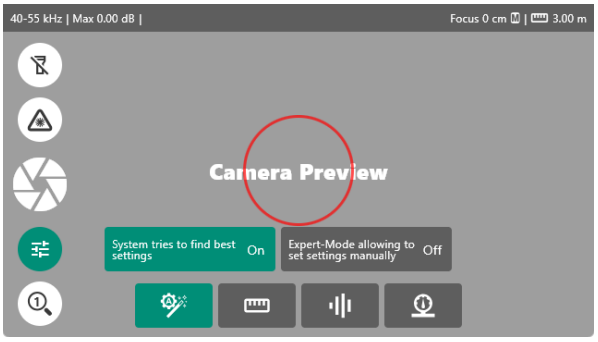

Figure 15: Using Automatic Mode (Example)

Manually adjust the threshold

In Expert Mode, the threshold value can be adjusted manually. The setting is adjusted continuously using the slider, with the ranges (Heavy Duty, Medium, High) serving as a guide. Additionally, buttons are available for fine-tuning, auto-calibration, and setting the maximum level.

▷ Tap the Expert Mode button.

✓ Expert Mode is activated.

▷ Select the desired threshold value using the slider.

✓ The currently set threshold value is displayed in the status bar.

ⓘ The higher the threshold is set, the less sensitive the system is to quiet signals.

▷ Tap the Measurement parameters button.

✓ The configuration menu closes.

ⓘ You can further adjust the threshold value using the buttons on the right side of the screen.

▷ Select the desired setting.

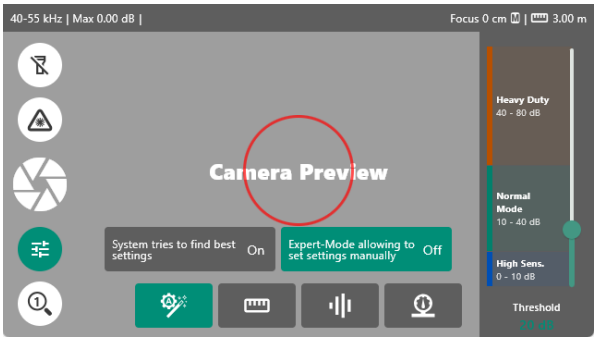

Figure 16: Adjusting the threshold manually (example)

Threshold	Environment type
40...80 dB	Heavy Duty (loud environments, lots of background noise)
10–40 dB	Medium (normal environments)
0–10 dB	High (quiet environments, e.g., in a laboratory)

Table 3: Recommended threshold ranges by environment type

Button	Description
	Auto-calibration: Automatic adjustment to ambient conditions Yellow button: Threshold above maximum sound pressure in the current frequency window; adjust threshold (special case: suppress interference signals).

Button	Description
	+1 dB: Decrease sensitivity (quieter sounds are suppressed)
	−1 dB: Increase sensitivity (quieter sounds also become visible)
	Set maximum level: Suppress unwanted noise and make artifacts from a source visible Example: Ultrasonic source is located just outside the camera's field of view

Table 4: Threshold buttons

8.2.2 Select focus area

CAUTION

Laser radiation (class 2 laser)

Direct exposure of the eyes to the laser can cause injury. The natural eyelid closure reflex usually provides adequate protection during brief, unintentional exposure.

- ▷ Do not look directly into the laser beam or its reflection.
- ▷ Never point the laser beam at people or animals.
- ▷ Do not use any optical aids (e.g. magnifying glasses, binoculars) to view the beam.
- ▷ Mark or secure the laser work area appropriately.
- ▷ Always observe the warning and safety instructions provided with the product.

The focus determines the delay times for the internal calculation of the ultrasound map. For optimum image sharpness, the measuring distance and focus range should match as closely as possible.

NOTICE

Inaccurate focusing at a short distance from the leak

The distance to the leak should be **at least 0.3 m** to ensure reliable detection. Incorrect focusing can affect the detection results.

- ▷ If the distance to the leak is short, pay particular attention to determining the distance as precisely as possible.

Using autofocus

Autofocus uses the distance to the leak, as measured by the laser distance sensor, as the basis for focus calculation. It is available only at user-defined frequencies and when the zoom function is enabled.

▷ Tap on the Laser button.

ⓘ Tapping again will deactivate the function.

▷ Aim the laser at a light-reflecting surface.

ⓘ Do not use glass or deep black objects as target objects.

✓ The focus range is automatically selected based on the distance determined.

ⓘ The available focus ranges are 0.3 m, 0.6 m, and 1.0 m. At distances of 3 m or more, the system automatically switches to the long-range focus.

✓ Both the measured distance and the automatically assigned focus range are displayed in the status bar.

▷ Increase or decrease the distance to the leak to ensure optimal measurement within the selected focus range.

✗ If no stable measured value can be recorded via the laser distance module - e.g. due to strong movements of the leakage camera during the measurement - a warning symbol appears in the status bar. In this case, enter the distance manually.

Adjusting the focus manually

If distance measurement via the laser distance module is not possible, the distance to the leak must be set manually.

▷ Tap the Distance button.

▷ Select the desired settings.

ⓘ If the distance is entered manually, the laser distance module is automatically deactivated.

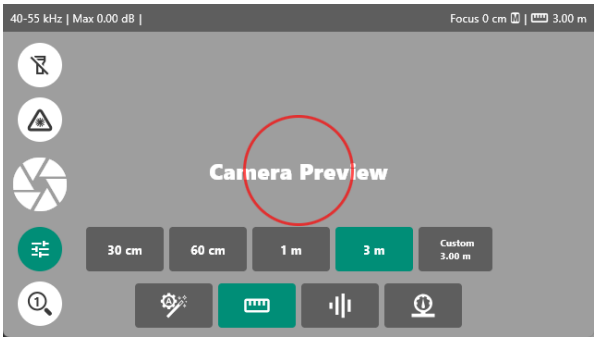

Figure 17: Adjusting the focus manually (example)

8.2.3 Select frequency window (expert knowledge)

FFT-based analysis (Fast Fourier Transform) reveals the frequency components present in the measurement environment and enables their targeted analysis. By setting lower and upper limits, a so-called frequency window can be defined within which relevant signals are examined. Frequencies outside the frequency window are filtered out.

NOTICE

Difference between frequency window and threshold

▷ The frequency window determines **where** to search (which frequencies).

▷ The threshold determines **when** the conclusion is reached: "There is a leak here."

Criterion	Frequency window	Threshold value
Function	Defines the frequency range to be analyzed	Defines the minimum signal level for detecting a leak
Target	Fade out irrelevant or interfering frequency components	Avoidance of false alarms / detection of significant signals
Influencing factor	Ambient conditions, typical leakage frequencies	Background level, sensitivity of the system
Example of	Analysis of 25-40 kHz or 40-55 kHz	A leak is detected when the level is > 70 dB within the selected frequency range
Setting option	Freely selectable via slider or via presets (max. 20 kHz)	Via Adjust threshold value buttons
Typical application benefits	Increases signal quality by focusing on relevant frequencies	Decides whether the measured signal represents a leak

Table 5: Function and role of frequency window and threshold value

Select frequency window

Leaks of pressurized gases generate broadband ultrasound. The frequency range with the highest intensity can vary depending on the type of leak.

The frequency window can be adjusted for the analysis of leak sounds. By setting the cutoff frequencies, relevant frequency components are specifically captured and disruptive ambient noise is reduced.

NOTICE

Avoiding dominant spectral peaks (masking of leak signals)

Leaks are broadband sound sources. Interference sources such as frequency converters, electric motors, or lighting, on the other hand, are usually narrowband and appear in the FFT spectrum as dominant spectral peaks. If such peaks are within the frequency window, they can overlap the leak signal (masking) and distort the analysis.

By carefully selecting the frequency window, narrowband disturbances can be filtered out of the analyzed range.

- ▷ Select the frequency window so that it does not contain any dominant spectral peaks from interference sources.
- ▷ Check multiple frequency ranges, as different interference signals can occur in different frequency ranges.

- ▷ Tap on the Frequency window button.
- ▷ Select the frequency window so that the broadband leakage signal is fully captured and no dominant narrowband spectral peaks from interference sources are included.

  ⓘ The frequency window can be selected from three preconfigured standard frequency ranges or customized using a slider.

Figure 18: Frequency window without interference source (example)

1	Upper frequency limit	**3**	Lower cutoff frequency
2	Leakage signal (broadband)		

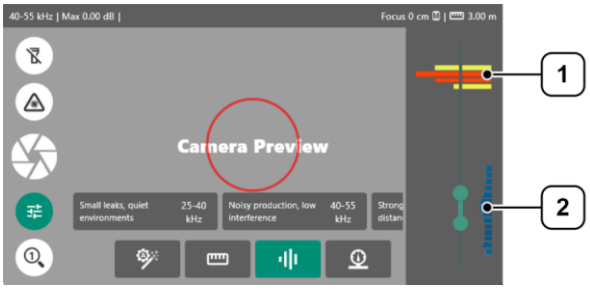

Figure 19: Frequency window with interference source (example)

1	Interference source (spectral peak)	**2**	Leakage signal (broadband)

Characteristic	Mode 1 (25...40 kHz)	Mode 2 (40–55 kHz)	Mode 3 (85–90 kHz)
Attenuation over distance	Low	Medium	High
Sensitivity ultrasonic microphone	High	High	Low
Selectivity / multiple leak detection	Medium	High	Very high
Immunity to interference (audible range)	Medium	Low	Very low

Characteristic	Mode 1 (25...40 kHz)	Mode 2 (40–55 kHz)	Mode 3 (85–90 kHz)
Typical application	Quiet environment, small leaks from a distance (e.g., leak tests)	Small to medium leaks from a greater distance in production environments (ideal for compressed air)	Medium to large leaks in highly automated areas at distances < 6 m

Table 6: Preconfigured standard frequency ranges

NOTICE

Leak rate available only in the standard frequency range

When using a custom frequency, automatic leak rate estimation is not available because the level values in open frequency windows are frequency-dependent and cannot be unambiguously assigned to a flow rate. In this mode, the device displays only the sound pressure level (dB) and the visual signal.

A standard frequency range must be used to save a leak, including the estimated leak rate.

▷ If a leak is located using a user-defined frequency, briefly switch to a standard frequency range before saving to activate the leak rate estimation.

8.2.4 Set operating pressure

The system's operating pressure can be stored to enable optimal quantification of the leaks.

▷ Tap on the Pressure button.

▷ Select the desired settings.

✓ The stored operating pressure is factored into the calculation of annual leak costs.

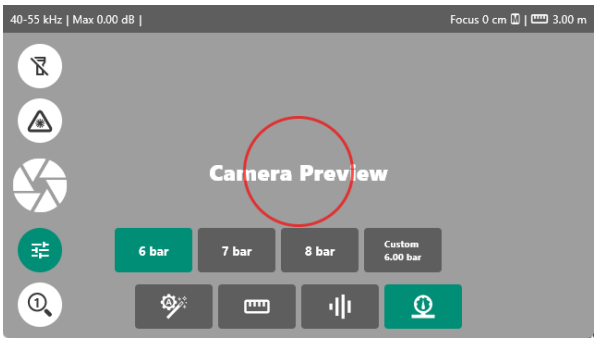

Figure 20: Setting the operating pressure (example)

8.3 Carry out leak detection

DANGER

Injuries or death from touching live parts

Touching live parts can lead to death.

▷ Work on electrical systems or equipment may only be performed by qualified electricians or by instructed personnel under the direction and supervision of a qualified electrician in accordance with applicable electrical engineering regulations.

▷ When locating leaks in electrical systems, maintain a sufficient safety distance to avoid dangerous electric shocks.

Opening the Camera mode view

To switch from Configuration view to Camera mode view

▷ Tap the Camera trigger button.

✓ The Camera mode view opens.

Preparing for leak detection

▷ Check whether there is safe and unobstructed access to the measurement area.

▷ Pressurize all relevant system components, provided this can be done safely.

▷ Hold the product in your preferred operating hand and stabilize it with your other hand.

ⓘ For ergonomic operation: Put on the carrying strap and insert the battery into the battery holder.

Performing leak detection

Prerequisite

- The system is in operating condition or pressurized (depending on the measurement method used).
- All safety requirements are known and are being followed.

Materials

- LeakCam 600
- Leak Tags (for physically marking detected leaks)
- Personal protective equipment

To determine whether a displayed sound source is an original source or a reflection, the source should be viewed from multiple angles. True sound sources remain stable and visible, while reflections change position or disappear completely.

▷ Systematically check along compressed air lines, connections, valves, and other typical leak locations.

▷ Position the product near the area to be inspected.

▷ Observe the visual indicators on the user interface.

NOTICE

Adjust the threshold

If the "Threshold" value is displayed in yellow in the status bar, signal detection should be optimized by adjusting the threshold.

▷ Threshold too high: quiet leaks may remain undetected

▷ Threshold too low: Interference sources outside the field of view can dominate and distort the analysis

NOTICE

Minimize background noise

To minimize environmental influences, it is recommended to perform leak detection in the mid-to-high frequency range (e.g., Mode 2: 40–55 kHz).

▷ Additionally, select the smallest possible frequency window to filter out adjacent interference signals.

▷ In noisy environments, select a higher frequency window to better distinguish leakage noise from interference signals.

8.4 Estimating leakage

Estimating leakage

The estimated leakage flow rate (l/min) is calculated from the parameters of pressure, distance, and ultrasonic level (dB). Distance has a significant influence here, as signal intensity decreases with increasing distance and the source appears correspondingly quieter.

Measurement accuracy can be affected by ambient ultrasound in the target frequency range, reflections, sealed leak points, and an unfavorable measurement angle relative to the airflow.

Therefore, the calculated leakage flow rate is an approximation and is used to evaluate and prioritize leaks.

- ▷ If possible, detect only one leak within the target circle to enable an accurate calculation.
- ▷ If necessary, pan the device or zoom in closer to the area being examined to improve the positioning of the leak within the target circle.
  - ✓ The target circle changes from red to green when the leak is in the center and the measured maximum value exceeds the specified threshold.
  - ✓ The target circle displays the signal level (maximum measured value within the camera's field of view), the leakage rate estimate, and the cost estimate.
  - ⓘ The leakage rate estimate is only available in the standard frequency range.
  - ⓘ Further information can be found in chapter "8.2.3 Select frequency window (expert knowledge)".
- ▷ If there is no color change, adjust the measurement parameters accordingly.
  - ⓘ Further information can be found in chapter "8.2 Adjust measurement parameters".

Figure 21: Leakage optimally detected (example)

1 Target circle

8.5 Document leakage

Document the leak

For optimal analysis, the leak should be positioned in the center of the target circle.

- ▷ Place the leak in the center of the target circle.
  - ✓ If the leak is in the center of the target circle, this is indicated by a color change.
- ▷ Tap the Camera trigger button or press the button on the handle.
  - ✓ The leak documentation menu opens.
- ▷ If necessary, tap the Add photo button to add another image of the leak.
- ▷ Fill in the form fields accordingly.
  - ⓘ All entries are stored in an internal database and can be accessed or reused at any time. A selection of predefined suggestions is already included with the product delivery.

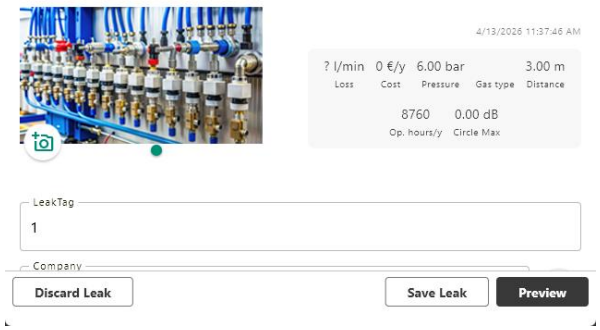

Figure 22: Document leakage (example)

The following fields are available to describe a leak:

- Leak Tag
- Company, building and measuring point
- Measure and leak element
- Spare part and manufacturer
- Reporting person
- Estimated repair time and repair status (leak repaired on site, repair possible under pressure?)

Save the leak

Before saving the measurement to the internal SD card, a summary can be generated and the accuracy can be verified again for safety.

▷ Tap the Preview button to view an overview of the entered data.

▷ Tap the Edit leak button to correct values if necessary.

▷ Tap the Save leak button to store the data on the internal SD card.

ⓘ The Leak Tag number automatically increases by one after each saved measurement.

✓ All entries are saved in an internal database and are permanently available for evaluations, reports and follow-up processes.

▷ Or tap the Discard leak button to delete the leak without saving it.

▷ Attach a leak tag to the leakage point for physical identification.

✓ The leak has been systematically identified, localized and fully documented.

8.6 Multi-directional ultrasonic transmitter (optional)

Leak detection in unpressurized systems

A multi-directional ultrasonic transmitter can be used to detect leaks in unpressurized systems. The device is powered by a rechargeable battery.

Prerequisite

- The multi-directional ultrasonic transmitter is available as an accessory.

Commissioning and use

▷ Push the rechargeable battery into the bottom of the transmitter until it clicks into place.

▷ Switch the ultrasonic transmitter on using the on/off button.

✓ The LED lights up green.

▷ Align the transmitter so that the ultrasonic signal is optimally coupled into the pipe system.

✓ The emitted ultrasonic signal penetrates even the smallest openings in the system. These leaks can then be detected with the leakage camera.

▷ Carry out the leak detection as usual.

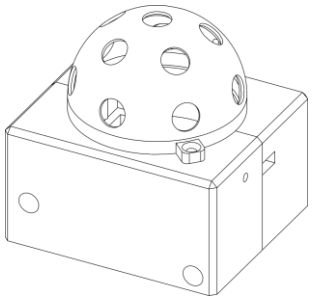

Figure 23: Multi-directional ultrasonic transmitter (example)

9 Data Management

9.1 Manage leakage data

In data record management, all recorded leaks can be systematically displayed, exported, deleted, and restored if required. This area serves as a central administration point for the structured documentation of leaks and the associated measures and repair information.

Open data record management

▷ Tap on the Leakages button.

✓ The leakage data overview opens.

ⓘ Use the filter function to narrow down the data records (e.g. by company, building, or status).

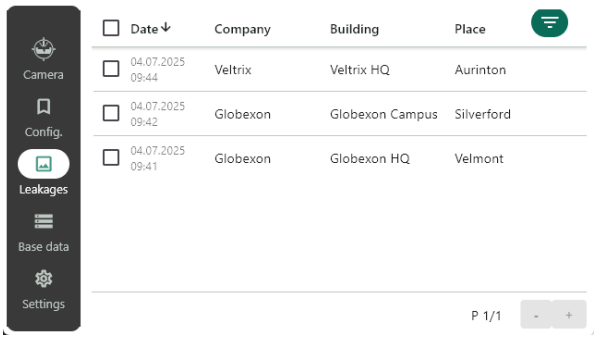

Figure 24: Open record management (Example)

Show leakage (detailed view)

The details of a data record are displayed in the preview, depending on the context.

▷ Tap and hold the desired data record.

✓ All associated information (e.g. leak tag, measuring point, measure, repair status) is displayed in the preview.

▷ Tap the Next button to switch to the next leakage.

ⓘ Individual leaks can be selected by ticking their checkboxes to add them to a temporary selection for subsequent actions such as export or deletion.

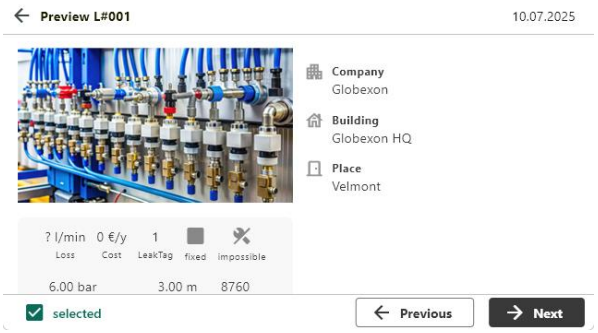

Figure 25: View leak (example)

Delete leakage (soft delete)

When data records are deleted, they are moved to the recycle bin (soft delete) and removed from the standard view but can still be restored if needed.

▷ Choose one or more data records.

✓ Selected data records are marked with a tick.

▷ Tap the x button in the trash bin.

▷ Confirm by tapping Yes.

✓ The selected data records are moved to the recycle bin.

Restore leakage

Deleted data records can be completely restored from the recycle bin.

▷ Tap on the Filter button.

▷ Select Only deleted leaks.

▷ Tap on the Apply button.

▷ Select one or more data records

✓ Selected data records are marked with a tick.

▷ Tap on the Restore x leaks button.

✓ The selected data records are restored.

Permanently delete leaks

Data records that are no longer required can be permanently removed from the internal memory.

▷ Tap on the Filter button.
▷ Select Only deleted leaks.
▷ Tap the Apply button.
▷ Select one or more data records
  ✓ Selected data records are marked with a tick.
▷ Tap the Delete selected leaks button.
  ✓ The selected data records are **irrevocably** deleted.

Export leakage

Further information can be found in chapter "9.3 Transfer data".

9.2 Manage master data

Many input fields use suggestion lists that can be customized, exported, and imported

▷ Select the Base data command.

Edit default values

▷ Select the corresponding tab to edit existing entries or to add new ones:
  • Measuring point: Company, building, location
  • Repair: Leak element, measure, spare part, manufacturer
  • People

▷ Tap on the desired entry to edit or delete it.

NOTICE

Deleting entries

Entries can only be deleted if they have not yet been used. This is to avoid inconsistent data.

Exporting and importing default values

The master data lists can be exported and re-imported for archiving, editing or forwarding.

Further information can be found in chapter "9.3 Transfer data".

9.3 Transfer data

9.3.1 Establish connection

Data can be transferred using one of two methods: via a connection to a computer or via a USB storage device.

Removing the USB protective cover

▷ Remove the USB protective cover.

▷ Select the desired USB interface for data transfer.

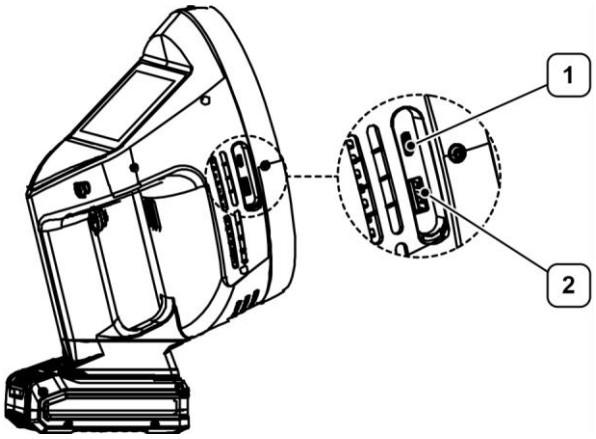

Figure 26: USB interfaces (example)

1 USB-C interface **2** USB-A interface

WARNING

Malfunctions or damage to the device

After data transfer, the USB protective cover must be completely replaced. This prevents dust, moisture or foreign objects from entering the device.

▷ Replace the USB protective cover after the data transfer.

Connection to a computer (via USB-C to USB-A cable)

▷ Insert the USB-C plug of the USB-C to USB-A cable into the USB-C port on the product.

✓ The system automatically recognizes the product and mounts it as two drives.

ⓘ **Export drive** ("LD-export"): Read only (read-only -> for data export)

ⓘ **Import drive** ("LD-import"): Read and write possible (read-write -> for software update)

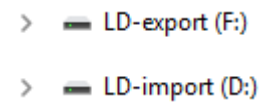

Figure 27: Export and import drive (example)

NOTICE

Avoidance of inconsistent data

The product is locked during an active connection with the computer. This prevents changes to the product and protects against inconsistent or incomplete data transfers.

▷ Do not disconnect manually during data transfer.

Connection with a USB storage device

▷ Insert the USB storage device into the product via the USB-A port.

✓ The product automatically recognizes the storage device.

ⓘ When exporting data, a directory with the name "**DEV0007**" is automatically created on the USB storage device. The exported files are stored in this directory.

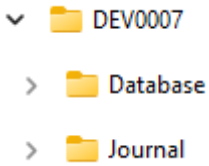

Figure 28: "DEV0007" directory (example)

NOTICE

Updating the data to be exported

Changes to data on the internal memory are not automatically transferred to the USB storage device while it is connected.

▷ To export the latest data, briefly disconnect the USB storage device and then reconnect it.

9.3.2 Start transfer

NOTICE

Special feature for data transfer via USB-C to USB-A cable

Changes to data on the internal memory are not automatically transferred to the export drive while the product remains connected to the computer.

▷ First export the desired data to the internal SD card.

▷ Then connect the product to the computer using the USB-C to USB-A cable.

▷ Copy the data from the "**LD-export**" export drive.

NOTE

Data management and the creation of leak reports using the "**Leak Reporter**" reporting software are not included in this document.

Further information can be found in the "Operating instructions - Leak Reporter".

Export leakage

Data records can be exported for documentation, archiving or forwarding.

▷ Tap on the Leakags button.

✓ The leakage data overview opens.

▷ Select one or more data records.

✓ Selected data records are marked with a tick.

▷ Tap on the Export x button.

▷ Select the desired storage device.

ⓘ When transferring data via USB-C to USB-A cable, first export the desired data to the internal SD card.

▷ Tap on the Next button.

▷ Tap on the Export button.

✓ The selected data records are exported to the desired storage device.

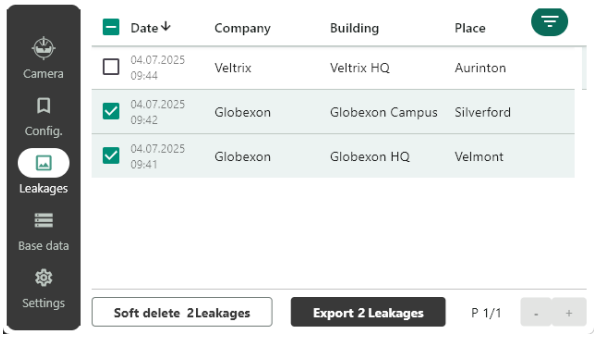

Figure 29: Export leakage (example)

Exporting and importing default values

The base data lists can be exported and re-imported for archiving, editing or forwarding.

▷ Select the Base data command.

▷ Select the Import / Export tab.

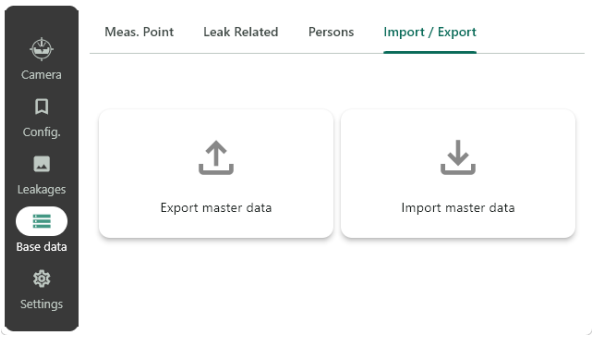

Figure 30: Transferring master data (example)

To export the master data:

▷ Tap on the Export master data button.

▷ Select the desired storage device.

ⓘ When transferring data via USB-C to USB-A cable, first export the desired data to the internal SD card.

▷ Select the desired entries.

▷ Tap on the Export button.

✓ The data is exported in XML format.

▷ Tap on the Finish button.

To import the master data:

▷ Create an XML file in the required format.

ⓘ Only valid XML files in the intended format can be imported.

ⓘ When transferring data via USB-C to USB-A cable, the required data must first be copied to the "**LD-import**" import drive.

▷ Tap the Import master data button.

▷ Select the desired storage device.

▷ Select the entries to be imported.

▷ Tap on the Import button.

✓ The internal database is expanded with the new entries.

10 Maintenance and servicing

10.1 Clean product

Prerequisite

- The product is switched off.

Cleaning the housing

If the housing is dirty, clean it using solvent-free cleaning agents.

▷ Remove the battery before cleaning.

▷ Use a slightly damp, lint-free cloth to clean the housing regularly.

Cleaning ultrasonic MEMS microphones

WARNING

Risk of damage to the ultrasonic MEMS microphones

The microphones are sensitive and must not be handled improperly.

▷ Never insert objects into the microphone openings.

▷ Do not use compressed air to clean the microphone openings.

▷ Do not apply water or cleaning agents directly to the microphones.

▷ Do not use damp or wet cloths.

▷ Keep the microphone inputs clean.

▷ Vacuum the microphones carefully using a vacuum cleaner with a brush attachment fitted.

10.2 Removing and charging the battery

WARNING

Danger from removing the battery during operation

Removing the battery during operation can lead to data loss or electrical malfunctions. This can cause damage to the device and may lead to injury due to electrical discharge or uncontrolled system behavior.

▷ Ensure that the product is switched off properly before removing the battery.

CAUTION

Damage to the battery cells due to deep discharge

The most common cause of deep discharge of battery packs is extended storage or prolonged non-use of partially discharged batteries.

▷ Do not use or charge batteries that were last charged more than 12 months ago.

▷ Only store batteries in a charged state (at least 40% charged).

▷ Recharge the battery in a timely manner.

CAUTION

Safety risk due to aged lithium-ion batteries

Lithium-ion batteries undergo a natural aging process. Over time, cell performance declines. Aged or weakened batteries may no longer meet the required performance standards and can pose a safety risk.

▷ Replace batteries when their capacity falls below 80% of the original rated capacity.

▷ Dispose of damaged or defective batteries in accordance with applicable regulations and environmental standards.

CAUTION

Lithium-ion battery

Lithium-ion batteries may only be used, charged, and stored in accordance with the manufacturer's instructions. Improper handling can lead to overheating, fire, or explosion.

- ▷ Follow the battery manufacturer’s safety instructions.
- ▷ Do not expose the battery to heat, direct sunlight, or open flames.
- ▷ Avoid physical damage, such as dropping, crushing, or piercing the device.
- ▷ Replace batteries immediately if they have been dropped from a height of more than one meter or exposed to significant impacts - even if the housing appears undamaged. Internal cell damage may have occurred and could pose a safety risk.
- ▷ Do not short-circuit the battery terminals or take the battery apart.
- ▷ Use only the charger supplied with the product or chargers explicitly approved by the manufacturer. Always follow the manufacturer’s recommended charging parameters to prevent product damage and ensure safe operation.
- ▷ Do not use the supplied charger to charge other devices.
- ▷ Dispose of damaged, leaking, or inflated batteries immediately.
- ▷ If chemicals get on the skin, wash the area with water and get medical help.
- ▷ Follow local regulations and dispose of lithium-ion batteries at approved collection sites.

Display battery capacity

The battery capacity indicator provides information on the battery charge status using a 3-stage LED display.

- ▷ Press the battery capacity indicator button.
  - ✓ The charge status is displayed via the status LEDs.
- ▷ Recharge the battery at regular intervals, even when not in use.
  - ⓘ This extends the service life of the battery and ensures that it is ready for use.

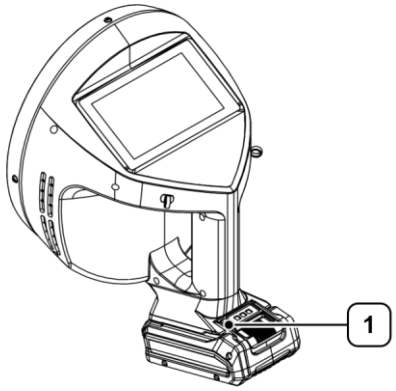

Figure 31: Display battery capacity (example)

1 Battery capacity display

Battery status	Description
All 3 LEDs light up	Battery is fully charged
1 or 2 LEDs light up	Sufficient remaining charge available
1 LED flashes	Battery is empty and must be charged
All LEDs flash	Battery temperature is below the permissible range. • Remove battery and store at room temperature for at least 24 hours. • If the error occurs again, the battery is deeply discharged and defective. • Defective batteries must not be reused and must be disposed of properly.

NOTE

To protect the lithium-ion battery, the product issues a warning message when the supply voltage drops to ≤ 15,5 V and then shuts down automatically.

Removing and charging the battery

Prerequisite

- The product is switched off.

For optimal battery performance, avoid deep discharge cycles and charge the battery in a timely manner.

▷ Ensure that the product has been switched off properly before removing the battery.

▷ Press the release switch downwards.

▷ Pull the battery out of the handle of the product.

ⓘ The battery can be charged in the battery holder when inserted.

▷ Check whether the mains voltage specified on the charger matches the local mains voltage.

▷ Connect the mains plug of the charger to the power supply.

✓ The green LED starts to flash.

✓ The charger is ready for use.

▷ Insert the battery onto the charger until it clicks into place.

✓ The red LED lights up continuously. The charging process is active.

ⓘ A fully discharged battery is fully charged in a maximum of 12 hours.

▷ Remove the fully charged battery from the charger.

▷ Insert the battery into the handle of the product until it clicks into place.

✓ The product is ready for use.

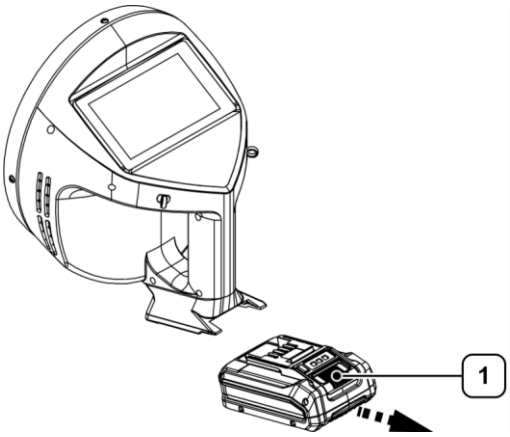

Figure 32: Changing the battery (example)

1 Release switch

10.3 Perform a diagnosis

Defective sensors or microphones can interfere with the product's operation and lead to inaccurate measurement results.

▷ Select Settings > Diagnostics.

✓ The Diagnostics menu opens.

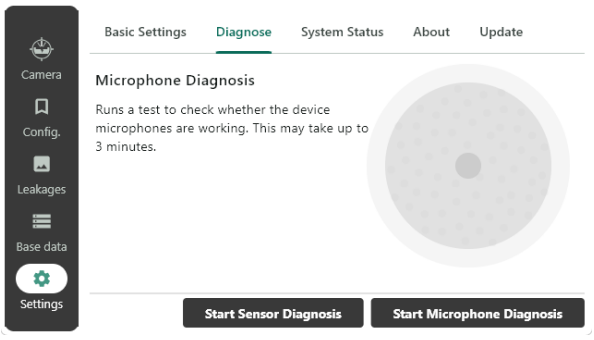

Figure 33: Performing Diagnostics (Example)

Perform sensor diagnostics

▷ Tap the Start Sensor Diagnosis button.

✓ The sensor test runs automatically.

▷ Check whether the test was completed successfully.

▷ Contact customer service if necessary.

Perform microphone diagnostics

▷ Tap the Start Microphone Diagnosis button.

✓ The microphone test runs automatically and may take up to three minutes.

▷ Clean the microphone inputs if necessary.

ⓘ Further information can be found in chapter "10.1 Clean product".

▷ Perform the microphone test again after cleaning.

▷ If necessary, contact customer service.

10.4 Update software

10.4.1 Download software package

▷ Visit the manufacturer's homepage at (CS INSTRUMENTS).

▷ Download the appropriate software package.

ⓘ The current hardware and software versions along with the serial number are displayed under the About tab.

▷ Save the software package in the desired target directory or on the desired USB storage device.

10.4.2 Establish connection

Removing the USB protective cover

▷ Remove the USB protective cover.

▷ Select the desired USB interface for data transfer.

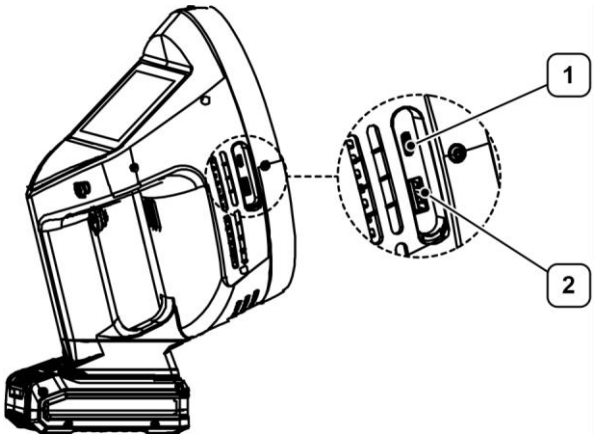

Figure 34: USB interfaces (example)

1 USB-C interface **2** USB-A interface

WARNING

Malfunctions or damage to the device

After data transfer, the USB protective cover must be completely replaced. This prevents dust, moisture or foreign objects from entering the device.

▷ Replace the USB protective cover after the data transfer.

Connection to a computer (via USB-C to USB-A cable)

▷ Insert the USB-C plug of the USB-C to USB-A cable into the USB-C port on the product.

✓ The system automatically recognizes the product and mounts it as two drives.

ⓘ **Export drive** ("LD-export"): Read only (read-only -> for data export)

ⓘ **Import drive** ("LD-import"): Read and write possible (read-write -> for software update)

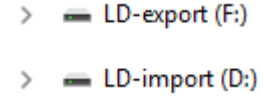

Figure 35: Export and import drive (example)

NOTICE

Avoidance of inconsistent data

The product is locked during an active connection with the computer. This prevents changes to the product and protects against inconsistent or incomplete data transfers.

▷ Do not disconnect manually during data transfer.

Connection with a USB storage device

▷ Insert the USB storage device into the product via the USB-A port.

✓ The product automatically recognizes the storage device.

ⓘ When exporting data, a directory with the name "**DEV0007**" is automatically created on the USB storage device. The exported files are stored in this directory.

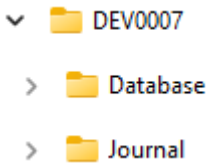

Figure 36: "DEV0007" directory (example)

10.4.3 Performing a software update

CAUTION

Data loss or malfunction due to interrupted update

The update may take several minutes.

▷ Fully charge the battery before starting the update.

▷ Do not interrupt the process.

▷ Do not switch off the product.

▷ Do not remove the battery.

Prepare data transfer

Option 1: Via USB storage device

▷ Insert the USB storage device into the product via the USB-A port.

✓ The software update can now be carried out.

Option 2: Via computer

▷ Copy the software package to the "**LD-import**" import drive.

✓ The software update can now be carried out.

Installing the software update

▷ Select the Settings > Update command.

▷ Tap the Update button.

✓ The system compares the versions of the available and the currently installed software package.

✓ If a newer software package is available, the installation button is activated.

▷ Tap the Install update button.

✓ The installation of the software package is started.

ⓘ The installation can take up to five minutes.

✓ The product restarts automatically once it is complete.

10.5 Error states

10.5.1 Correct error states

CAUTION

Data loss

Unsaved data may be lost during a forced restart.

If the device no longer responds (e.g. in the event of a system crash or frozen screen), a restart can be carried out as follows:

Option 1: Restarting the device using the on/off switch

▷ Press and hold the on/off switch for at least 10 seconds until the device restarts.

Option 2: Remove the battery

▷ Remove the battery.
▷ Wait a moment then reinsert the battery.
▷ Start the device as usual.

10.5.2 Restore factory settings

CAUTION
Data loss
All saved data and user-defined settings will be deleted when you reset the device.
▷ Back up all important data before continuing with the process.

If necessary, the product can be reset to the factory settings to restore the delivery status.

▷ Tap on the Settings button.
▷ Select the Basic settings tab.
▷ Tap the Reset Device button.
✓ The device resets all settings and restarts.

10.6 Customer service

For rapid processing by customer service

Prerequisite

- Material number (product rating plate)
- Serial number (product rating plate)

▷ Describe the problem as precisely as possible.
▷ Make a note of any error messages displayed.
▷ Inform customer service about:
  - When does the problem occur?
  - How often does it occur?
  - What changes were last made to the product, the configuration, or the environment?

11 Decommissioning and disposal

CAUTION

Improper disposal of the lithium-ion battery

This product contains a lithium-ion battery that must not be disposed of with regular household waste.

▷ Dispose of defective batteries in an environmentally responsible manner, in accordance with local regulations, or through a certified disposal company.

Decommissioning

Decommissioning is defined as an extended period of non-use of the components. The components must then be protected from external influences.

▷ If necessary, disconnect the components from the power supply.

▷ Properly package the components if they will not be used for an extended period.

▷ Store the components in a manner that prevents exposure to significant temperature fluctuations. Resulting condensation can lead to moisture buildup and cause corrosion.

Disposal

Parts and components that have reached the end of their service life, e.g. due to wear, corrosion and mechanical stress, must be properly disposed of after disassembly, in accordance with national regulations.

The product and packaging contain recyclable materials that must not be disposed of with residual waste.

▷ Separate the components after recycling.

ⓘ Disposal code according to the European Waste Catalog (EWC) 16 02 14, electrical and electronic devices and their components.

▷ Dispose of the components in an environmentally responsible manner, in accordance with local regulations or through a certified disposal company.

NOTE

Information on environmentally responsible disposal can be obtained from local authorities, or certified disposal companies.

▷ Alternatively, you can return the product to the manufacturer (CS INSTRUMENTS) at the end of its service life.

12 Appendix

12.1 Technical data

Parameters	Specification	Unit
Weight	1,13	kg
Power supply	18	V DC
Frequency range	2...130	kHz
Measuring range	• Operating pressure: > 250 mbar • Detection range: 0.3–120 m (depending on environmental conditions and sound source power) • Sensitivity: 0.03 l/min (at a distance of 3 m)	
Laser class	2 (wavelength 630-660 nm, output power < 1 mW)	
Camera	• Resolution: 13 MP; Image format: 16:9 • Field of view (FOV): 77.3° diagonal • Zoom: 8x; autofocus; High Dynamic Range (HDR) • Illumination: 5 LEDs	
Touch screen	• Size: 5" • Resolution: 1280 x 720 pixels • Touchscreen: capacitive (multi-touch)	
USB interface	A + C	
SD memory card capacity	128	GB
Area of use	Indoor use	
Degree of soiling	2	
Operating temperature	+10...+40	°C
Storage temperature	0...+40	°C
Air humidity	10 to 90% relative humidity, non-condensing	
Altitude clearance	up to 4000 m above sea level	
Protection class	IP 20	

Table 7: Technical Specifications | LeakCam 600

Parameters	Specification	Unit
Battery weight	0,30	kg
Input voltage	200-250 (EU) / 100-120 (US)	V AC
Output voltage	20	V DC
Output current	3	A
Operating temperature	+10...+40	°C
Storage temperature	0...+40	°C
Air humidity	5 to 85% relative humidity	

Table 8: Technical Specifications | Battery Charger

Parameters	Specification	Unit
Battery weight	0,41	kg
Battery capacity	2	Ah
Voltage	18	V DC
Charging time	~2,5	h
Operating temperature	+10...+40	°C
Storage temperature	0...+40 (Recommended: +20…+30)	°C
Air humidity	5 to 85% relative humidity	

Table 9: Technical Specifications | Battery (18 V 2 Ah)

Parameters	Specification	Unit
Battery weight	0,58	kg
Battery capacity	4	Ah
Voltage	18	V DC
Charging time	~5,0	h
Operating temperature	+10...+40	°C
Storage temperature	0...+40 (recommended: +20…+30)	°C
Air humidity	5 to 85% relative humidity	

Table 10: Technical Specifications | Battery (18 V 4 Ah)

12.2 Dimensions

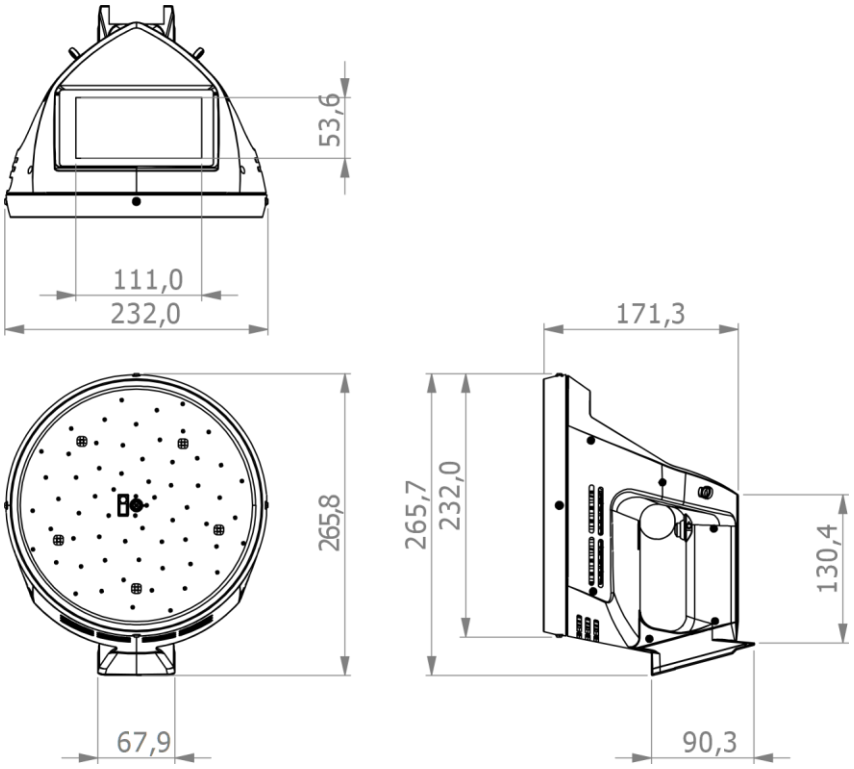

Figure 37: Dimensions LeakCam 600

12.3 Declaration of conformity

CS INSTRUMENTS GmbH & Co. KG

KONFORMITÄTSERKLÄRUNG

DECLARATION OF CONFORMITY

Wir / We: CS INSTRUMENTS GmbH & Co.KG
Zindelsteiner Straße 15, D-78052 VS-Tannheim

Erklären in alleiniger Verantwortung, dass das Produkt
Declare under our sole responsibility that the product

Leckage-Suchgerät LeakCam 600 (LC 600)
Leak meter LeakCam 600 (LC600)

den Anforderungen folgender Richtlinien entsprechen:
We hereby declare that above mentioned components comply with requirements of the following EU directives:

Elektromagnetische Verträglichkeit Electromagntic compatibility	2014/30/EU
Niederspannungsrichtlinie Low Volatage Directive	2014/35/EU
Künstliche optische Strahlung Artificial optical radiation	2006/25/EC
RoHS (Restriction of certain Hazardous Substances)	2011/65/EU – (EU) 2015/863

Angewandte harmonisierte Normen:
Harmonised standards applied:

EMV-Anforderungen EMC requirements	**EN 55011: 2016 + A1:2017+A11:2020** **EN 61326-1: 2013**
Lasersicherheitsnorm Safety of laser products	**IEC 60825-1:2014**
RoHS RoHS	**EN IEC 63000: 2018**

Das Produkt ist mit dem abgebildeten Zeichen gekennzeichnet.
The product is labelled with the indicated mark.

CE

Tannheim, den 23.06.2025

Wolfgang Blessing Geschäftsführer

12.4 Practical examples: Effects of incorrect parameterization

Error	Graphical effect	Solution
Focusing not possible Deviation between set and actual distance		Correct the set distance **Note:** Use laser distance module for correct distance detection
Visualization not possible Selected setting is outside the valid frequency window - Leakage frequency is above or below the set range		Correct upper and lower limit frequency
Incorrect threshold value Threshold value too high: quiet leaks may remain undetected Threshold value too low: sources of interference outside the field of view can dominate and distort the analysis		Correct threshold value **Note:** Analyze each leak individually for correct quantification

12.5 Glossary

Term	Description
Distance adjustment	Manual or automatic focusing of the measuring device on the area to be examined. Important if there is no laser support.
Echo reflection	A signal generated by sound reflection and bounced back from solid surfaces (e.g., walls, machinery). May be mistaken for a genuine leak source during detection.
Frequency window	Defined range within the audible or ultrasound-based frequency spectrum that is used for the targeted analysis of sound signals - e.g. to differentiate between leakage noise and ambient noise. Medium to high frequency windows (ultrasound) are particularly suitable for reducing background noise.
Background noise	Noise level from the environment that is not caused by a leak (e.g. machines, air movements, voices). In general, background noise increases at lower frequencies. In noisy environments, a higher frequency window should be selected to better distinguish leakage noise from interference signals.
Leakage	Unintended escape of compressed air, gases, or vacuum, which typically generates a high-frequency ultrasonic noise. Leads to energy losses, increased consumption, and additional costs.
Detection distance	Detection range depends on the intensity of the leak as well as environmental conditions. Under favorable conditions, longer distances are also possible. Typically, up to 20 m for medium leakages.
Reflection	Reflected sound that is visible or invisible depending on the viewing angle. Can be identified by movement or change of perspective.
Sound pressure level [dB]	Measure of the strength of a sound signal, given in decibels [dB]. When visualizing ultrasonic leaks, the sound pressure level serves as a measured variable for the leakage intensity - in the audible or ultrasonic range - and can be used for colour representation in the image (e.g. via an adjustable threshold value).

Term	Description
Sound source	Signal origin in the ultrasonic range, e.g. a leakage, a valve or a machine. Real sound sources remain visible when the position changes.
Fast Fourier transformation (FFT)	Efficient algorithm for breaking down a signal into its frequency components. An ultrasonic signal is broken down into individual frequency components using the FFT to identify leakage sources.
Threshold value	Defines the signal level above which the image is displayed in colour. • Too high: Quiet leaks go unnoticed. • Too low: Sources of interference can overlay the analysis.
Ultrasound	Sound with frequencies above the human hearing range (> 20 kHz). A range between 20 kHz and 80 kHz is typically used in leak detection. Ultrasound is generated by compressed air leaks, electrical discharges, or mechanical friction, among other things, and can be used specifically to locate such sources of interference. The high frequency enables pinpoint localization but is also more sensitive to attenuation by air and obstacles.
Ultrasonic map	Combination of acoustic sound image (signal distribution in the ultrasonic frequency spectrum) and optical visual image (visual representation of the signal source). Displays the detected sound intensity using color coding (blue = low, white = high) and is used for the precise localization of leaks.
Ultrasonic level [dB]	Measured value for the intensity of ultrasonic signals. Serves as the basis for evaluating the signal strength of a possible leak.
Target Circle	Circular marker in the user interface that indicates the detection range for leak detection. Changes color as soon as a leak is detected in the center.

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