Operating Manual

SONASCREEN
Acoustic camera for preventive maintenance

Translation of the German Original
Revision: 1.2 │ 2023-04-21

Content

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1 Introduction

This section is intended to explain function, structure and representations of this documentation to simplify handling of this documentation.

1.1 Notes on this documentation

Purpose

This documentation constitutes an integral part of the product and contains important advice on safe operation as well as all information on intended and efficient use. Thus, any person using the product must have read and understood this documentation.

Accessibility

The staff working with this product must have constant access to this documentation to prevent handling errors and guarantee trouble-free operation.

Up-to-dateness

Every effort has been made to ensure that the information contained in this documentation is complete and correct at the time of release. This documentation describes all units and functions known at the current point of time.

1.2 Representations in this documentation

Illustrations

Illustrations used in this documentation do not always contain all details or special cases. They only represent the relevant information.

Tips

Tips are marked as follows:

> ⓘ Tips describe specific information or particular features that might not be evident, even for experienced users. The neglect of a tip poses no direct safety risk. However, it can lead to workflow disruptions.

General icons

The following general icons are used for visual emphasis:

Icon	Function
⬈	Indicates a link to external content.

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1.3 Identification of warning instructions

Classes of danger, signal words and colors

This documentation contains warnings regarding hazards of different classifications. These classes are characterized by signal words and colors. They include the following:

⚠ DANGER

Warns of immediate danger, which, if ignored, may lead to death or serious injury.

⚠ WARNING

Warns of possible immediate danger, which, if ignored, may lead to lasting damage to health and/or property – including financial losses due to operational impairment.

⚠ CAUTION

Warns of dangers, which, if ignored, may lead to injury or damage to property – including damage to property due to operational interruptions.

ATTENTION

Warns of dangers, which, if ignored, may lead to damage to property – including damage to property due to operational interruptions.

2 Safety instructions

This section contains safety information relating to the protection of persons as well as safe and fault-free operation. All user groups of the product must be aware of and follow these safety provisions.

2.1 Introduction

Reliable and safe operation of the product depends on the careful handling and execution of operational and setting tasks.

Ignoring these safety instructions and warning information may lead to serious injury with lasting health consequences for personnel as well as damage or destruction of product components.

During handling of the product, please observe all safety instructions and warning information in all parts of this user documentation as well as the related codes of practice. Ensure that all those working with the product are also aware of these instructions.

Generally applicable safety regulations (such as accident prevention and environmental protection regulations, etc.) must also be observed.

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2.2 Basic hazards

Definition

Basic hazards are residual risks that remain even with safety-conscious intended use.

State of the art

The product meets the current state of the art and applicable safety rules. All components of the product are tested thoroughly before they leave the factory and are delivered in a condition for safe operation.

⚠ WARNING

Danger of injury!

Improper use of the product may lead to injuries.

- Do not open the product.
- Protect the product against extreme heat (excessive sunlight, immediate vicinity of open fire or heating devices) during operation and storage.
- Avoid strong impacts that could damage the device and/or its components.

ATTENTION

Possible damage of the device display!

Improper use may damage the device display.

- Do not use scratching or sharp objects to operate the device by touch screen. Commercially available pens for touch screens are suitable.

2.3 Personnel and qualifications

Basic requirements

The product must only be used by operators that have completely read and understood the safety instructions and all documents of the user documentation.

Personnel undergoing training or instructions or persons taking part in general vocational training programs may only operate the device under the continuous supervision of operating or technical personnel.

Responsibility of the operating company

Regarding the personnel authorized and/or trained by the operating company, the operating company carries the following responsibilities:

- The necessary training and instruction of personnel must be guaranteed.
- All personnel's competences and responsibilities must be clearly stated and documented.
- All user information on the product (operating manual, user documentation etc.) must be kept in the immediate vicinity of the product and must be accessible at all times.

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2.4 Safety-conscious working practices

Accident prevention and environmental protection

In addition to the instructions in this operating manual, please mind the generally applicable legal and other regulations on accident prevention and environmental protection.

This may include, for example:

- Handling of hazardous materials
- Wearing the required and mandatory personal protective clothing and safety equipment
- Observing of and complying with all national and regional industrial safety regulations
- Observing of and complying with all internal working, operating and safety regulations

2.5 Use of the product

Measures for personal safety

Improper use of the product may lead to injuries of operating personnel.

- During detection of ultrasonic signals on electrical equipment, make sure to keep the mandatory safety distance from detected electrical defects.
- Always make sure that both hands are free for self-protection, if necessary.
- Always make sure to keep your hands, the product and/or connected equipment within your field of vision.
- Carry the device by the carrying strap when climbing up and down ladders and stairs. Always carry the device by the carrying strap in such a way that the carrying strap does not get caught or entangled in moving parts.
- Use the torchlight functionality (LED light) of the product and/or additional lighting to illuminate test sites with poor visibility.
- Always use the product without distraction. Do not read messages on the display and/or operate the product while walking.

Measures for protection of the product and/or equipment

Improper use of the product may lead to product damage. Damaged components may affect or distort the measurement result quality.

- During use, charging and storage, protect the device against extreme, unusual heat (excessive sunlight, storage in heated cars or immediate vicinity of open fire or heating devices). It is critical to stay within the temperature ranges given in the technical specification.
- Do not use the product and its accessories if they display functional errors and/or visible damage.
- Only connect the product to approved equipment received from SONOTEC GmbH or its sales partners.
- The product adheres to the protection class given in the technical specification and is protected against splash water. Do not submerge the product in liquids.

- Handle the product with care and protect it against major shocks. Use the carrying case to transport and store the product.
- When using the product, always make sure that cables cannot get stuck and/or caught in moving parts.
- If you use the product on a tripod, make sure to place the tripod on a solid no-slip surface. The tripod must always stand safely and stable.
- Do not use the product within strong electromagnetic fields.
- Do not use scratching or sharp objects to operate the touchscreen. Apart from operation by finger touch, commercially available touchscreen pens or touchscreen gloves are suitable.

2.6 Modifications and alterations

No modifications on the product and/or accessories

The product and/or its accessories must not be opened or disassembled. The product does not contain any components to be cleaned, maintained or repaired by operators.

Unauthorized modifications of the product and/or its accessories are prohibited and lead to exclusion of liability by the manufacturer for resulting damage and consequences.

Spare parts and accessories

Spare parts and accessories must comply with the technical requirements specified by SONOTEC GmbH and its suppliers. Whenever original parts are used, compliance is given.

No alterations to the software

Do not alter the supplied software or commission software alterations to third parties. The software may not be disassembled, decrypted or decompiled in full or in part.

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2.7 Data security

Data loss

The loss of measurement data may lead to incomplete measuring chains or misinterpretations.

- Always make sure to backup measurement data regularly on external data media.
- Back up your measurement data before updating the software or resetting the device to factory settings.

Cyber security measures

Based on analysis of vulnerabilities according to IEC 62443-4-1 and IEC 62443-4-2, no cyber security measures are necessary for the product.

However, a cyber attack on the product and its environment can never be completely ruled out. Thus, we strongly recommend to implement safety measures (e.g. anti-virus programs, firewalls, access restrictions) against potential cyber attacks within the product environment.

3 Description of the device

This section describes the components, the operating elements and the software of the SONASCREEN acoustic camera.

3.1 Intended use

SONASCREEN is an acoustic camera with touch screen for indoor and outdoor detection, visualization and recording of sound signals up to 100 kHz. It must only be used in industrial environments.

The measurement data captured by SONASCREEN can be analyzed and evaluated either directly on the device or on a personal computer.

3.2 Prohibited use

Any use not approved by SONOTEC GmbH is prohibited and may lead to injury or damage to property.

SONOTEC GmbH accepts no liability for damage caused by prohibited use of the product.

Prohibited are in particular:

• Use of equipment and/or accessories with visible damage

• Use in wet rooms

• Use in potentially explosive environments

• Use in environmental conditions that do not adhere to the stipulated requirements

• Unauthorized modifications of the equipment, the software and/or accessories

• Use of unauthorized spare parts and/or unauthorized accessories

• Performing measurements while the device's power supply unit is connected to the power network (e.g. during charging).

• Opening the device for any other purpose than disposal.

Operating or using the product incorrectly and/or not in the sense of its intended use may lead to risk of death and personal injury.

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3.3 Scope of delivery

Set

The device is delivered in a set as follows:

Designation	Article number
SONASCREEN Acoustic Camera - Set	700 01 0416
SONASCREEN IR Acoustic Camera - Set	700 01 0419

Components

The delivered set contains the following components:

Designation	Article number
SONASCREEN acoustic camera (included in set 700 01 0416)	400 01 0233
SONASCREEN IR acoustic camera (included in set 700 01 0419)	400 01 0243
Charger/power supply for SONASCREEN acoustic camera	400 01 0235
Peltor earmuffs, noise protection headphones	400 01 0138
Audio cable for Peltor earmuffs, noise protection headphones	400 01 0139
Pelican hard shell case for SONASCREEN	400 01 0234
USB flash drive for SONASCREEN	026 00 0100
Short operating instructions "Quick start"	500 01 0214
Carrying strap SONASCREEN	400 01 0246
Calibration certificate	

3.4 Connections, interfaces, device elements

Structure

Figure 1: Measurement and operating side with connections, interfaces and device elements

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Description

No.	Connection/interface/device element
1	LEDs (torchlight functionality)
2	Camera for detection of optical signals
3	Infrared sensor ⓘ The infrared sensor is only available for the "SONASCREEN IR" model.
4	Microphones for detection of acoustic signals
5	Connection for tripod adapter plate
6	Connection for charger/power supply
7	Touch screen
8	Earphone connection (jack socket 3.5 mm)
9	Ethernet interface (RJ45 socket)
10	USB interface (USB type A)

3.5 Status display and device buttons

Structure

Figure 2: Operating side with status display and device buttons

Description

No.	Component	Description/function
1	Status LEDs state of charge	Show the current state of charge
2	Status LED SONASCREEN	Shows the current device status: • **Flashing:** device is starting up • **Green:** device is running
3	On/off button	• **Short pressing:** showing the state of charge by status LED • **Keeping pressed (3 s):** turning the device on or off
4	Function keys	May be customized with predefined functions within the software settings.

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3.6 Device labeling

Identification plate
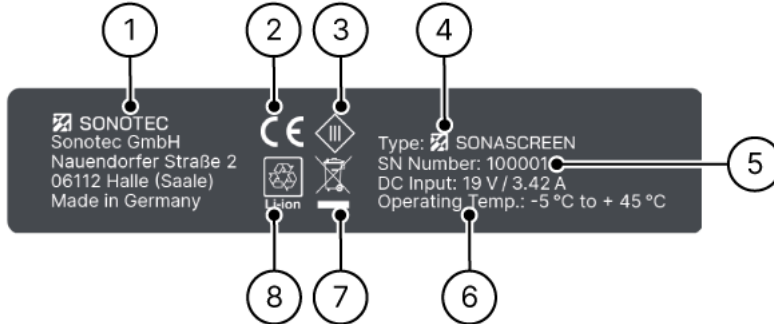
Figure 3: Identification plate with its components

No.	Identification
1	Manufacturer's address
2	CE marking
3	Symbol protection class
4	Device designation
5	Serial number
6	Power rating
7	Disposal symbol
8	Symbol Lithium-Ion battery

3.7 User interface

This section describes the software's screens. Depending on the use of the software (directly on the device or on a personal computer), individual functions may be activated or deactivated.

3.7.1 Start

Structure
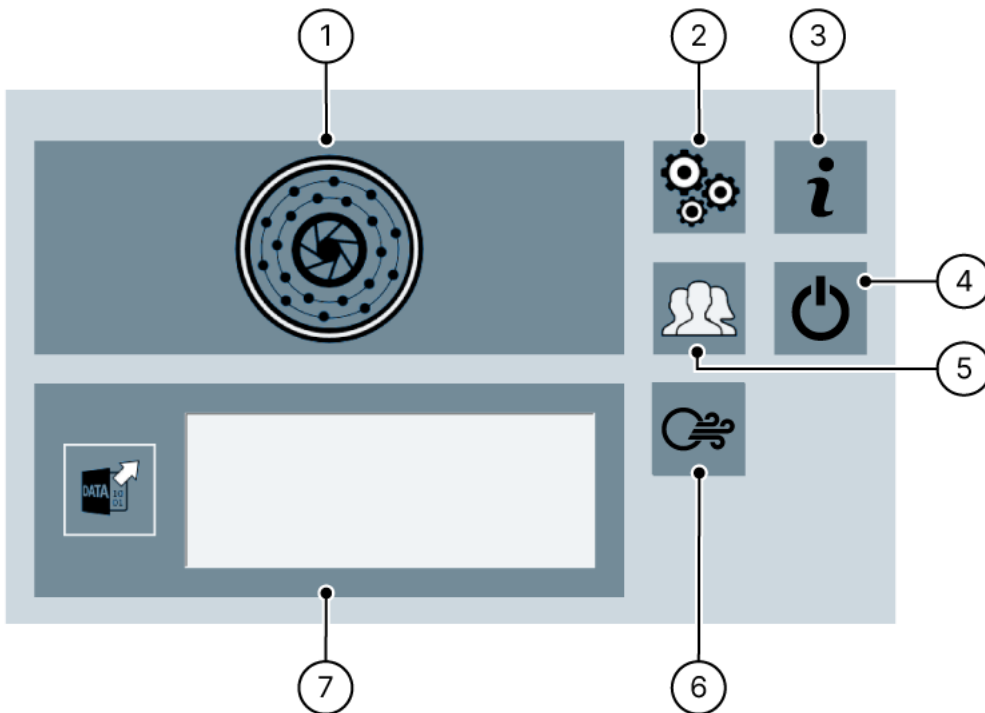
Figure 4: "Start" screen

Description

No.	Type	Description/function
1	Measurement	Opens the "Measurement" screen.
2	Configuration	Opens the "Configuration" screen.
3	Support information and update	Opens a screen with the manufacturer's contact information and a software button for updating the device software.
4	Turn off	Shuts down the device software and turns off the device.
5	Profile management	Opens a screen for user profile management.
6	Leakage measurement	Opens the "Measurement" screen with predefined functions for leakage measurement.

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No.	Type	Description/function
7	Open saved measurements	• List for selection of saved measurements • Icon for opening the selected measurement
		ⓘ The list shows up to 20 of the measurements last saved in the working directory.

3.7.2 Configuration

Description

The "Configuration" screen is organized in two sections. Swipe or tap the arrow symbols to switch between the sections.
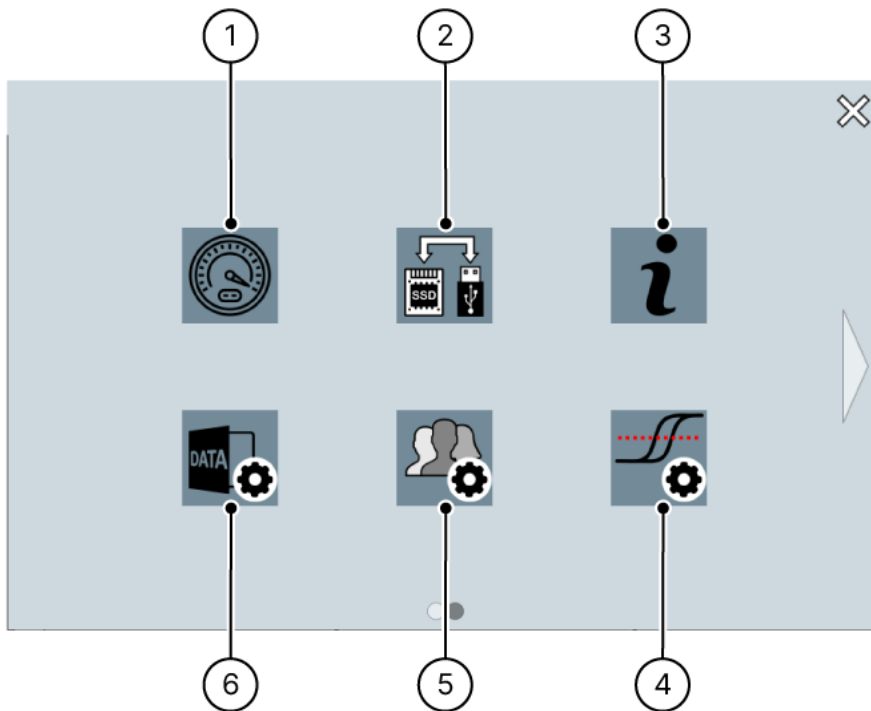
Section 1

Figure 5: "Configuration" screen (section 1)

No.	Type	Description/function
1	Recording options, date and time	Opens a screen for setting: • beam speed • camera resolution and speed • acoustic averaging • date and time

No.	Type	Description/function
2	Data management	Opens a screen for data management: • within the device's internal storage • on a connected USB storage medium
3	Support information and update	Opens a screen with the manufacturer's contact information and a software button for updating the device software.
4	Trigger	Opens a screen for setting the trigger for automatic recording of measurements.
5	Profile management	Opens a screen for user profile management.
6	Saving options	Opens a screen with the following options: • Setting a saving location for recorded measurements • Activation/deactivation of screenshot comments • Activation/deactivation of measurement series

Section 2
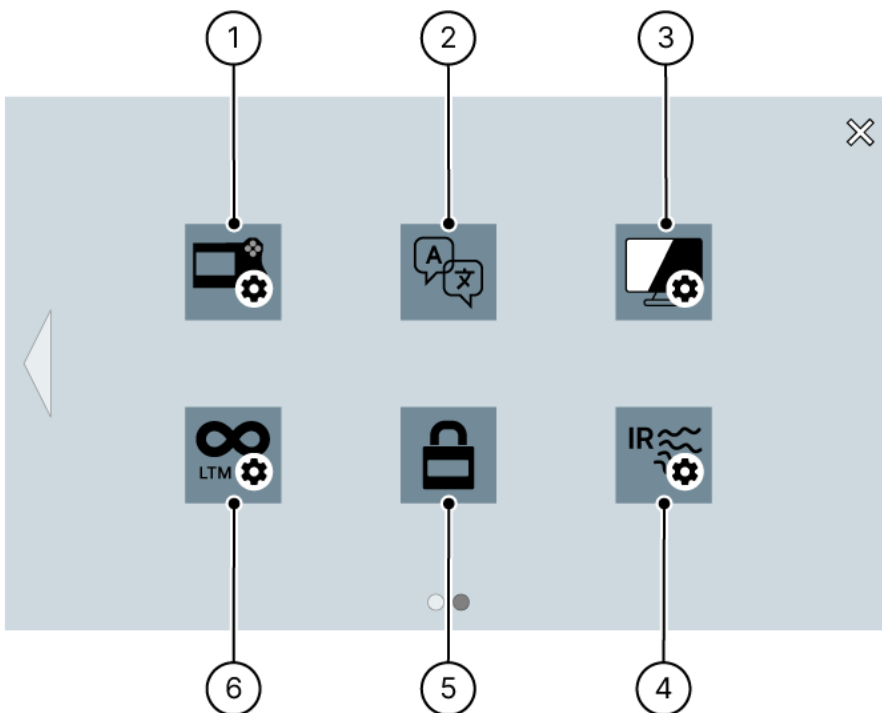
Figure 6: "Configuration" screen (section 2)

No.	Type	Description/function
1	Customization of function keys	Opens a screen for determining predefined functions for each function key.

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No.	Type	Description/function
2	Language	Opens a screen for customizing: • user interface language • layout of the virtual keyboard
3	Themes	Opens a screen for selection of the preferred theme (light or dark) for the user interface.
4	Infrared measurement	Opens a screen for setting the infrared measurement options: • Unit • Temperature range and resolution • Color palette ⓘ The infrared measurement options are only available for the "SONASCREEN IR" model.
5	Password protection	Opens a screen for activation/deactivation of password protection.
6	Long-term measurement	Opens a screen for activation/deactivation and settings of long-term measurements.

3.7.3 Measurement

Structure
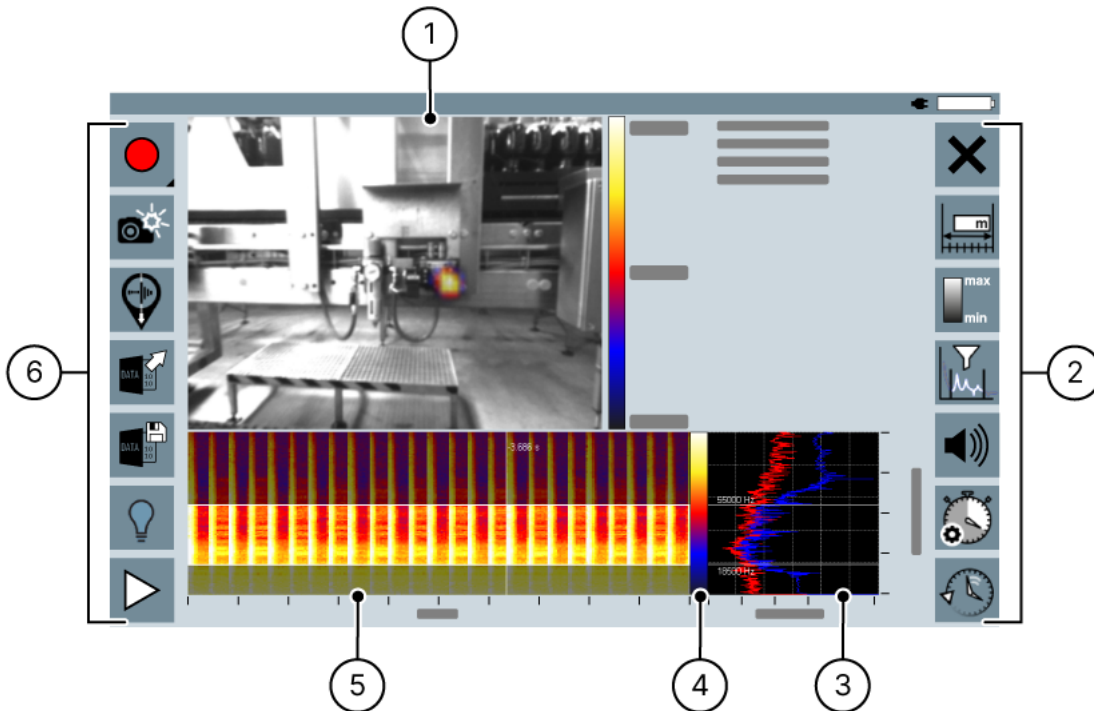
Figure 7: "Measurement" screen

Description

No.	Type	Description/function
1	Beam picture or infrared image	• Shows the camera image with visualized sound signals or the infrared image. • Allows for toggling averaged and peak hold images during long-term measurements. ⓘ The infrared image is only available for the "SONASCREEN IR" model.
2	"Measurement settings" toolbar	Contains tools for preparation and analysis of measurements. (see ""Measurement settings" toolbar", page 23)
3	Spectrum	Shows the following spectra depending on the current position (Y-cut) within the spectrogram: • **red:** global • **green:** averaged • **yellow:** Peak hold • **blue:** local Allows for scaling the Y-axis (frequency).
4	Amplitude scale	Maps the level values with specific colors (color ranges within the spectrogram).

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No.	Type	Description/function
5	Spectrogram	• Shows the intensity of the ultrasonic signal in spectra over time. • Allows for scaling the X-axis (timeline) and Y-axis as well as the amplitude scale.
6	"Control" toolbar	Contains tools for measurement control. (see ""Control" toolbar", page 24)

"Measurement settings" toolbar

The measurement settings tools may be used to prepare measurements or to analyze recorded/saved measurements. The available tools differ depending on the current application (Measurement recording, Leakage measurement, Measurement analysis).

Icon	Designation	Description/function	Availability
	Distance	Opens a field for setting the distance from the sound source by: • input field or • slider	• Measurement recording • Leakage measurement recording
	Video editing	Opens a field with functions for generating a video from a recorded measurement.	• Measurement analysis
	Scaling mode and dynamics	Opens a field for: • selection of the scaling mode • setting the dynamics by input fields and sliders (depending on the selected scaling mode)	• Measurement recording • Leakage measurement • Measurement analysis
	Frequency filter	Opens a field for setting the frequency range by differing means.	• Measurement recording
	Marker navigation	Opens a field with functions for navigation between markers set within measurements.	• Measurement analysis
	Audio output	Opens a field with functions for activation/deactivation and filtering of the audio output.	• Measurement recording • Leakage measurement recording • Measurement analysis
	Record time	Opens a field for setting the recording time.	• Measurement recording • Measurement analysis
	Timeline navigation	Opens a field for navigation within the spectrogram's timeline.	• Measurement analysis

"Control" toolbar

The control tools are used to manage measurements. The available tools differ depending on the current application (Measurement recording, Leakage measurement, Measurement analysis).

Icon	Designation	Description/function	Availability
	Start measurement	Starts a measurement recording in one of the following recording modes: • : measurement range up to 24 kHz • (Ultra): measurement range up to 100 kHz • (Ultra IR): measurement range up to 100 kHz including infrared measurement ⓘ For leakage measurements, only the "Ultra" and "Ultra IR" recording modes are available. ⓘ The "Ultra IR" recording mode is only available for the "SONASCREEN IR" model.	• Measurement recording • Leakage measurement recording
	Take a screenshot	Takes a screenshot of the "Measurement" screen. ⓘ Screenshots are saved in the working directory that has been set for the measurements (see "5.5 Creating screenshots", page 64).	• Measurement recording • Measurement analysis
	Save for report	Saves the current measurement for subsequent evaluation with the LeakReport software. ⓘ The measurement is saved with a duration of 1 s.	• Leakage measurements
	Add marker	Adds a marker on the spectrogram's timeline: • at the current position during recording a measurement. • at the selected playback position after ending a recording or an opened measurement.	• Measurement recording • Measurement analysis
	Open measurement	Opens a screen for opening a saved measurement.	• Measurement recording • Measurement analysis

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Icon	Designation	Description/function	Availability
	Save measurement	Opens a screen for saving a recorded measurement.	• Measurement analysis
	LEDs	Turns the device's LEDs on or off.	• Measurement recording • Measurement analysis • Leakage measurement
	Playback measurement	Starts the playback of a recorded or opened measurement from the current position on the timeline. Optionally, the playback speed may be set at: • regular • 0.5x • 0.25x	• Measurement analysis

3.7.4 Password protection

Structure
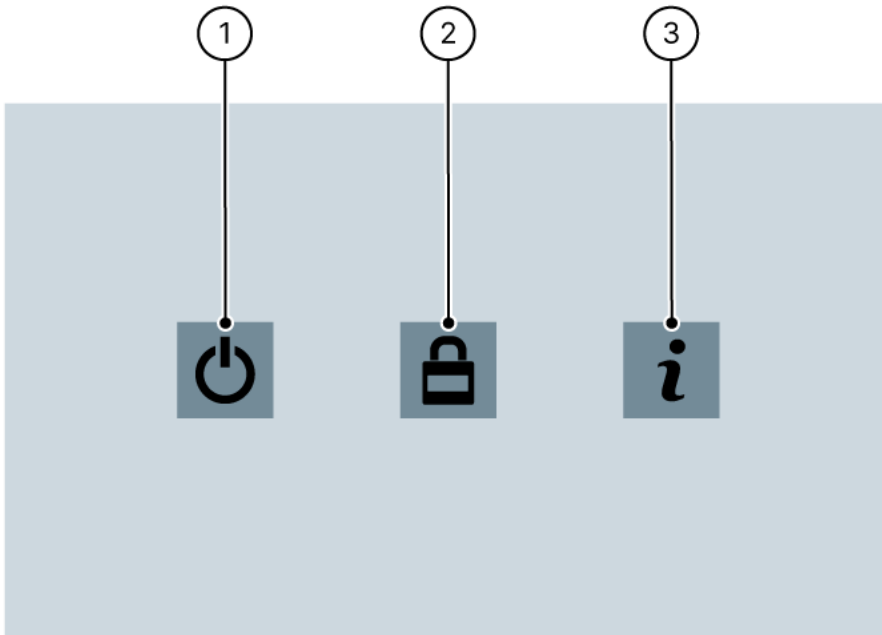
Figure 8: "Password protection" screen

Description

No.	Type	Description/function
1	Turn off	Shuts down the device software and turns off the device.
2	Unlock device	Opens the virtual keyboard for entering the password.
3	Password information	Opens a dialog window with hints on the procedure when the password has been forgotten.

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3.8 Computer software

For the device, two software applications are available that may be installed on Windows computers. This section describes the two software applications.

3.8.1 SONASCREEN software

Description

The software used on the device is also available as software for Microsoft Windows computers.

The "SONASCREEN" computer software may be used to control the device via a personal computer. Measurements recorded with the device may directly be saved on the personal computer.

By using the computer software, measurements with a recording time of more than 60 seconds are possible.

The computer software offers the same appearance and the same functions as the device software.

For using the computer software, the device must be connected to the computer via an Ethernet cable.

3.8.2 LeakReport software

Function

The "LeakReport" computer software is used to generate reports in XSLX (Microsoft Excel) and PDF formats from the measurement data of leakage measurements.

Structure

Figure 9: LeakReport user interface

Description

No.	Type	Description/function
1	Menu	Contains entries with the following options: • **Configuration:** Opens a dialog window for setting report metadata and loss calculation values • **Language:** Opens a dialog window for setting the user interface language • **Units and Currencies:** Opens a dialog window for setting units and currencies • **Excel report template:** Opens a dialog window for selection of the Excel report template
2	File path to measurement data folder	• Selection of the directory that contains the measurements to be analyzed. • Shows the number of measurements contained in the selected directory.
3	**Start analysis**	Starts the analysis of the measurements contained in the selected directory.

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No.	Type	Description/function
4	**Start report**	Opens a dialog window for: • Setting a report name and comment • Creating the report ⓘ The name will be displayed in the header of each report page. The comment will be displayed on the report's title page.
5	List of leakages	Shows a preview of all measurements contained in the selected directory including analysis results and metadata.
6	Result	Shows the calculated total result for all analyzed measurements contained in the directory.

4 Preparing a work order

This section describes preparations and settings that are necessary and/or useful before processing a work order to record reliable and assessable measurement data and to perform well-structured measurements.

4.1 Turning on the device

Description

To record measurement data or analyze measurements, the device needs to be turned on and fully started up.

Procedure

1. Press the On/off button and keep pressing for 3 seconds.
    → The status LED flashes, the device is started up, the software loads.

    ⓘ As soon as the status LED is permanently lit, the device is ready to use.

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4.2 Configuring the device

After turning on, the device's configuration needs to be checked and customized to the corresponding work order and/or the tester's requirements if necessary.
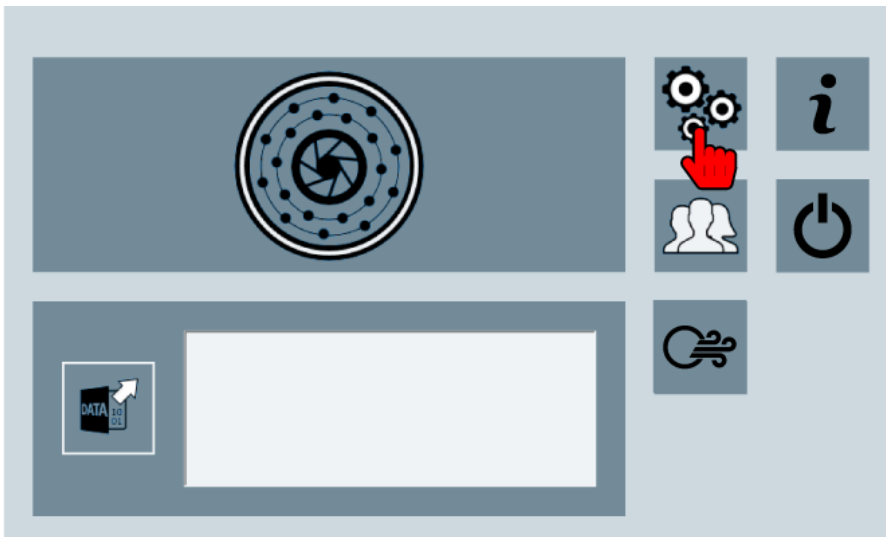
4.2.1   Setting user interface language, virtual keyboard and unit system
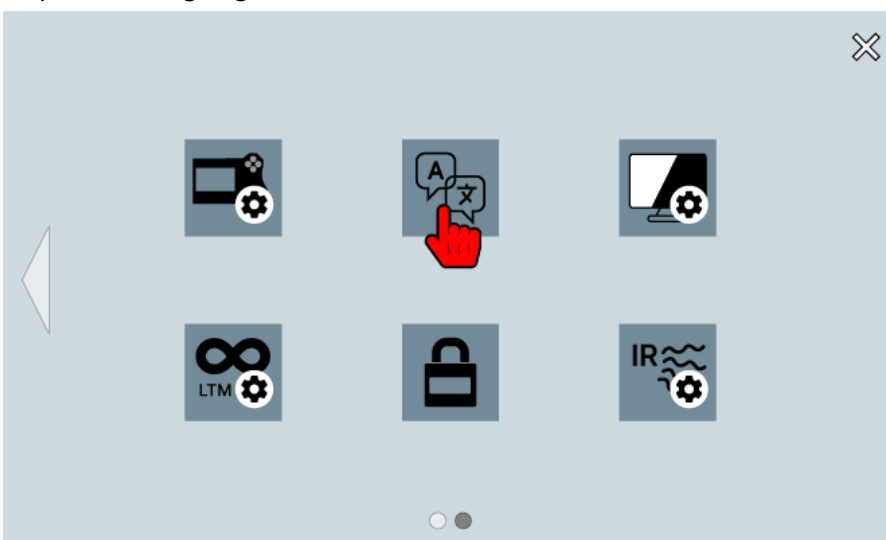
Description

The user interface language, the layout of the virtual keyboard and the unit system used for the measurements may be customized to the tester's requirements.
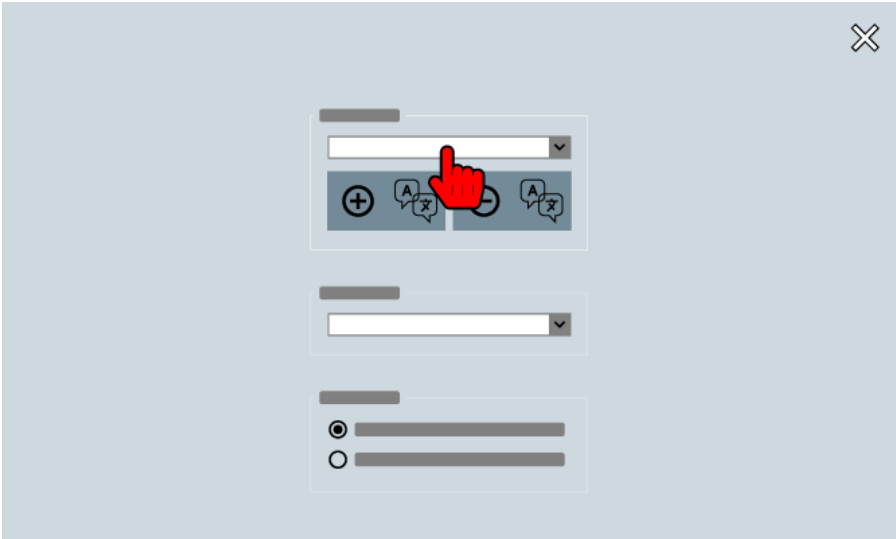
Procedure

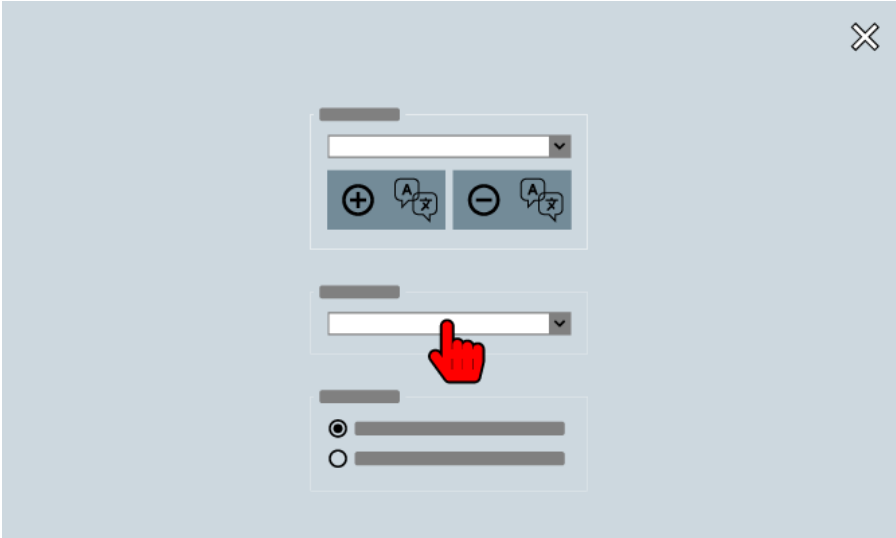1.   Open the "Configuration" screen.

2.   In the "Configuration" screen, switch to section 2.
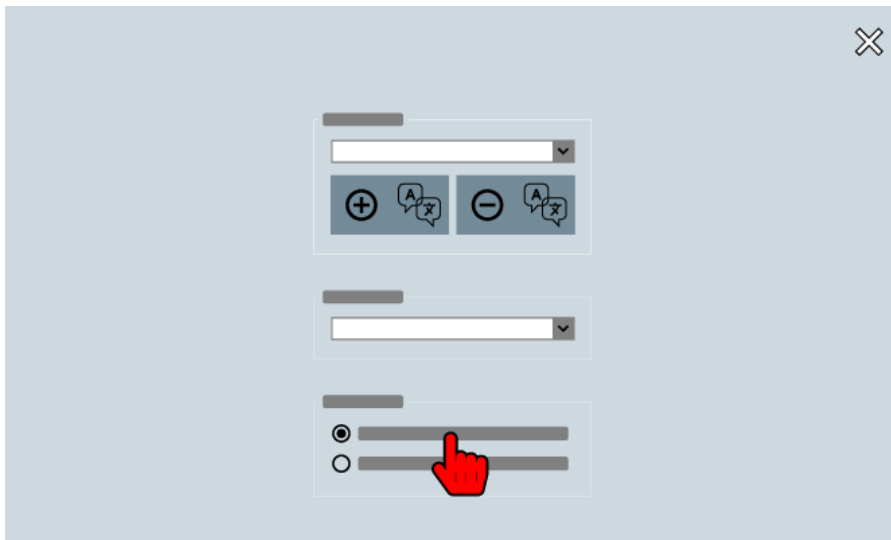3.   Tap the "Language" icon.

4.   In the **Language selection** field, select the particular user interface language.

5.   In the **Virtual keyboard** field, select the layout for the virtual keyboard.

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6.   In the **Unit system** field, select the unit system required for the measurement.

Further information

For setting the user interface language, the keyboard layout and the unit system, please also see the descriptions of the following screens:

- Start
- Configuration

4.2.2 Setting recording options, date and time

Description

The quality of the recorded measurements depends on the configuration of the acoustic recording and the camera capture. This configuration also influences the measurement data's memory size.

<div style="background-color: yellow;">
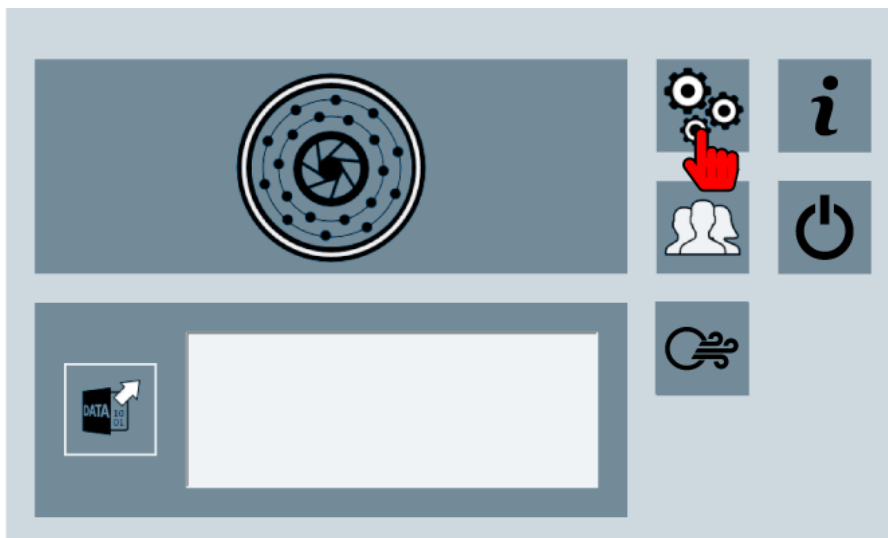
ATTENTION

</div>

Mind the correct configuration of date and time!

The date and time configured in the device will be used as filename when saving measurements and will be stored as metadata.
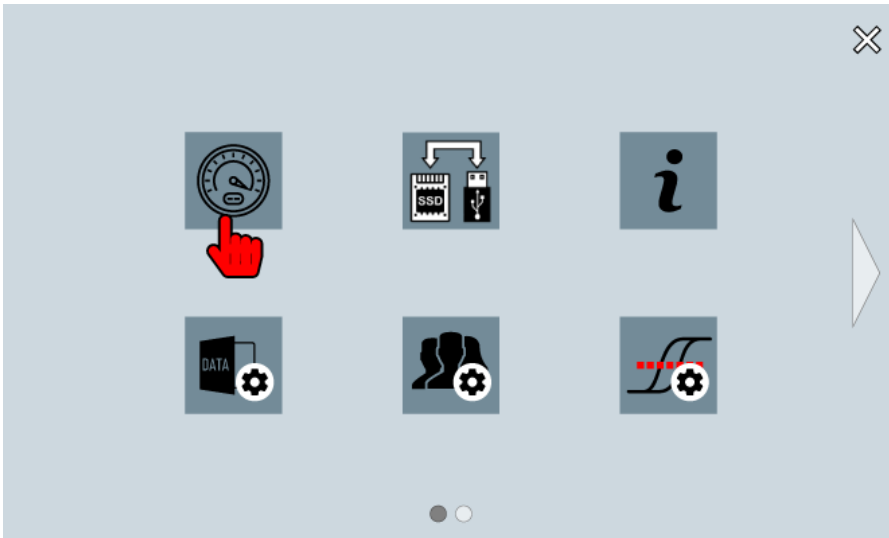
- Before each work order, check the correct setting of date and time within the device.

Procedure

1. Open the "Configuration" screen.

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2. Tap the "Recording options, date and time" icon.

3. Select beam speed, acoustic averaging as well as camera resolution and speed according to the guidelines or measurement requirements.

ⓘ All values will be saved automatically directly after selection.

4. In the field **Change date & time**, enter the current values.
5. Tap the "Accept" icon (✓).
   → All entered values for date and time will be accepted.

Further information

For setting recording options, date and time, please also see the description of the following screens:

- Start
- Configuration

4.2.3 Setting saving options

Description

For clearer representation, measurements will be organized in folders. For several or repeated measurements at an individual measuring point, measurement series may be defined. Each measurement series will have its own name. This name is used as saving location (directory) and within the file name of each measurement of a measurement series.

Procedure

1.   Open the "Configuration" screen.
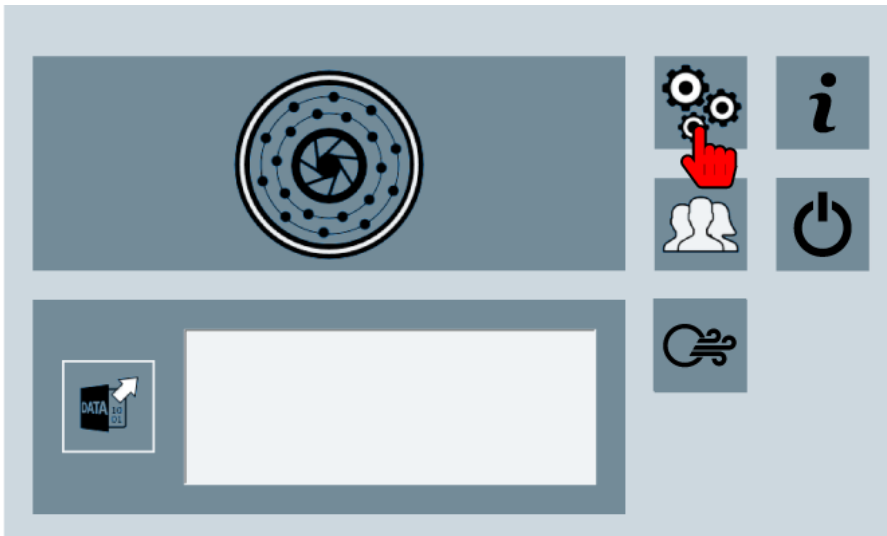
2.   Tap the "Saving options" icon.

3.   In the **Path to recordings** field, tap the directory icon and select a working directory as saving location for measurements.
4.   In the **Screenshots** field, activate/deactivate creation of comments when taking screenshots.

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5.   In the **Measurement series** field, activate/deactivate saving measurements in a measurement series.

> ⓘ If Measurement series is activated, a name for the measurement series must be entered.

Further information

For setting saving options, please also see the description of the following screens:

- Start
- Configuration

4.2.4 Infrared measurement – setting options

Description

Infrared measurement quality and representation depend on the following customizable options:

- Unit for measurement data representation (Kelvin, Celsius or Fahrenheit)

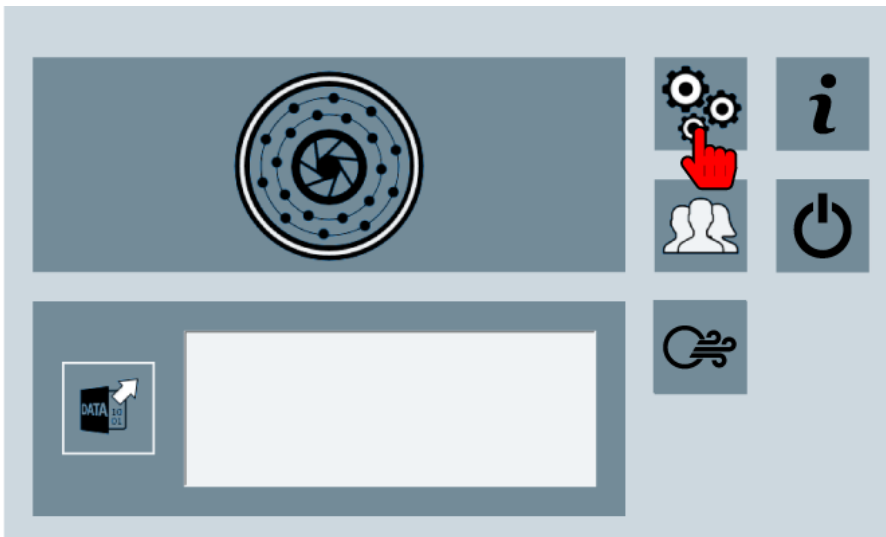 > ⓘ The unit may also be set after measurement recording.

- Temperature range and resolution for the measurement
- Color palette for assigning a color to the measured values

> ⓘ **Availability**
> The infrared measurement options are only available for the "SONASCREEN IR" model.
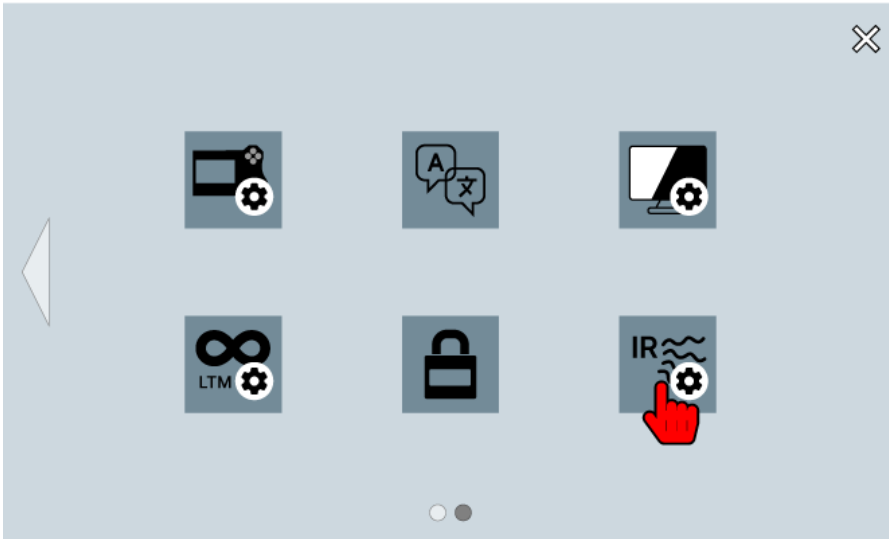
Procedure

1.   Open the "Configuration" screen.

2.   In the "Configuration" screen, switch to section 2.

3. Tap the "Infrared measurement" icon.

4. In the **Unit** field, select the particular unit.

5. In the **Temperature range and resolution** field, select the particular temperature range.

> ⓘ The resolution depends on the selected temperature range.

6. In the **Color palette** field, select the particular color palette for assigning colors to the measurement values.

Further information

For setting infrared measurement options, please also see the description of the following screens:

- Start
- Configuration
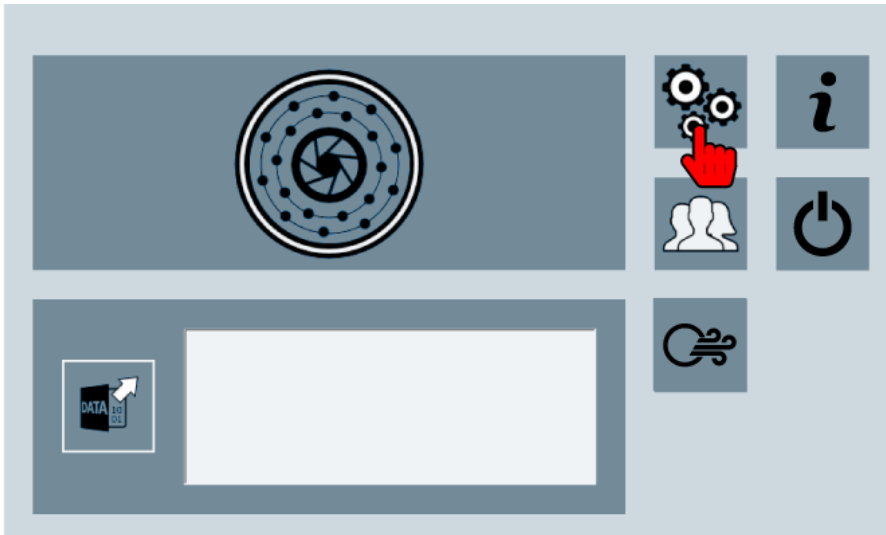
4.2.5 Customizing function keys

Description

All eight function keys of the device offer functions preconfigured by the manufacturer. Each function key may be customized with predefined functions. Generally, the following functions are available:

- Start/Stop Measurement
- Led On/Off
- Sound (Un)Mute
- Sound Volume Up
- Sound Volume Down
- Set Marker
- Next Marker
- Previous Marker
- Next BeamPic
- Previous BeamPic
- Play/stop Recording
- Screenshot
- Photo

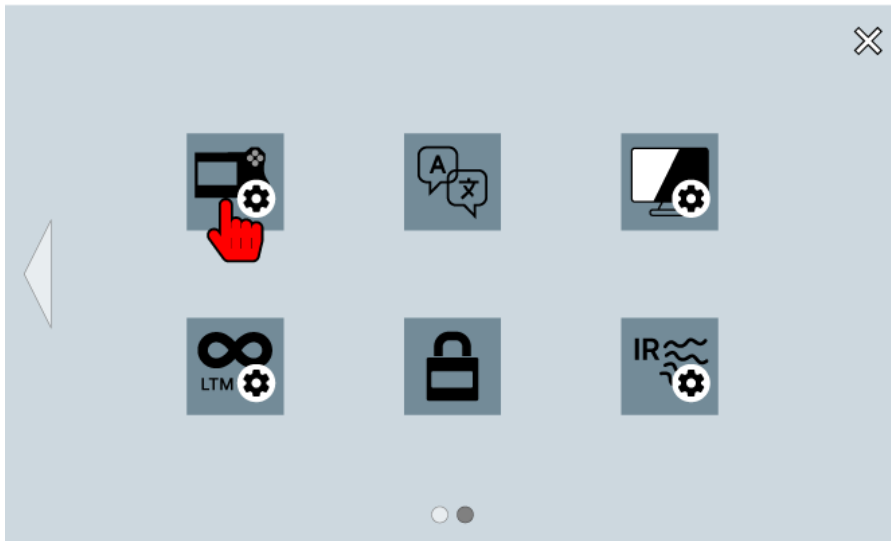> ⓘ Availability of the functions depends on the used application.

Procedure

1. Open the "Configuration" screen.

2. In the "Configuration" screen, switch to section 2.

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3.   Tap the "Function key customization" icon.

4.   Select the preferred function for each function key.

Further information

For customization of the function keys, please also see the description of the following screens:
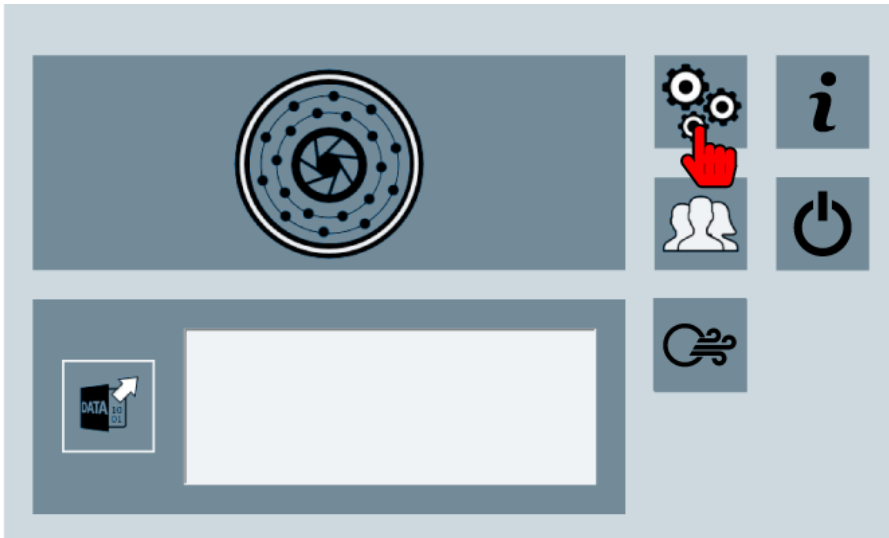
- Start
- Configuration

4.2.6 Selecting a theme
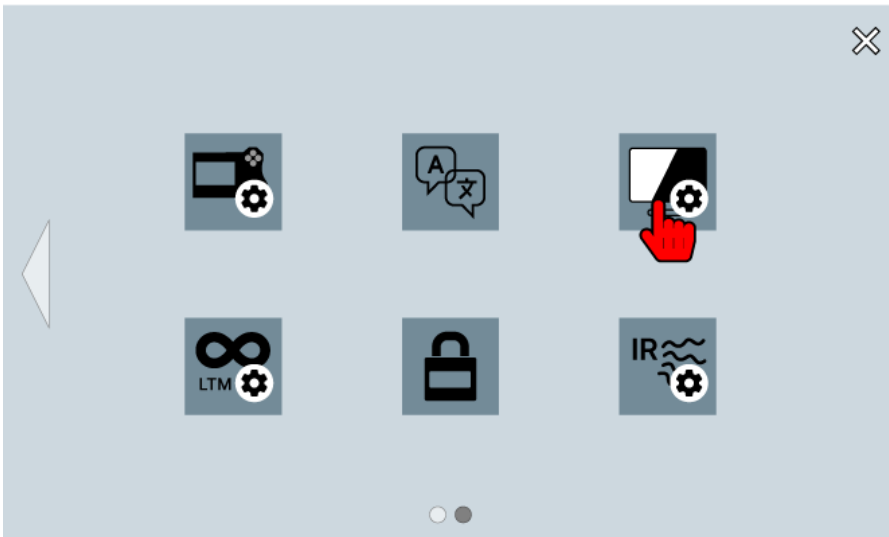
Description

The device offers two different themes to display the user interface in a light or dark design.

Procedure

1.   Open the "Configuration" screen.

2.   In the "Configuration" screen, switch to section 2.
3.   Tap the "Themes" icon.

4.   Select the preferred theme.

Further information

For the selection of a theme, please also see the description of the following screens:
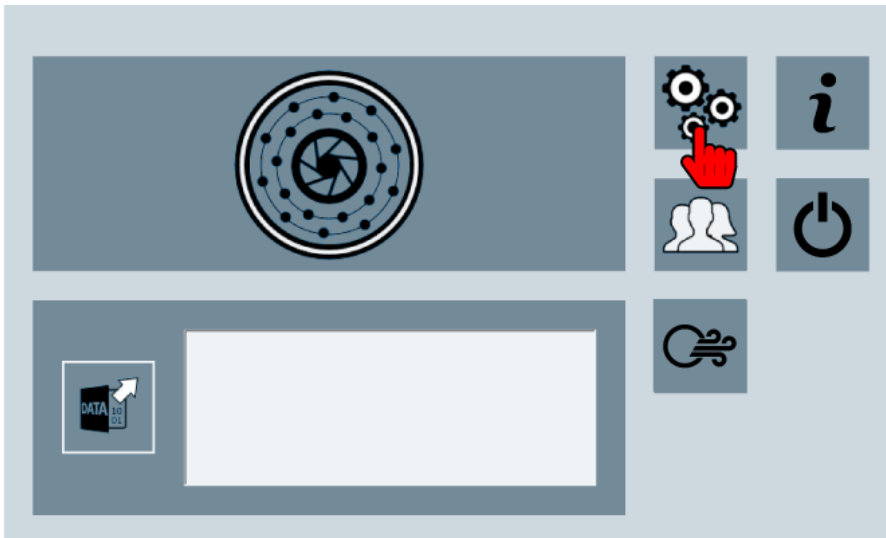
- Start
- Configuration

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4.2.7 Using password protection

Description

To limit misuse of the device or the measurement data saved therein, the device may be protected by password. If password protection has been set, the device must be unlocked by password after each startup.

Setting up password protection

1.   Open the "Configuration" screen.

2.   In the "Configuration" screen, switch to section 2.
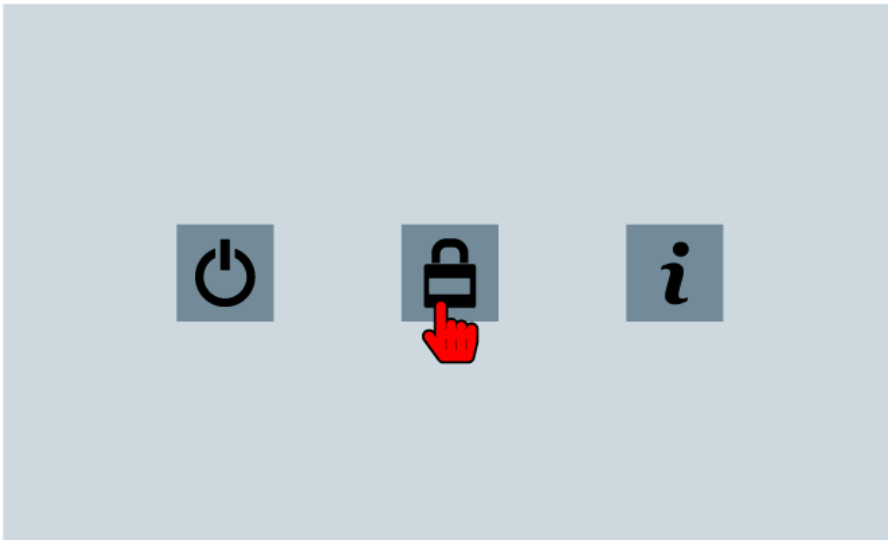3.   Tap the "Password protection" icon.
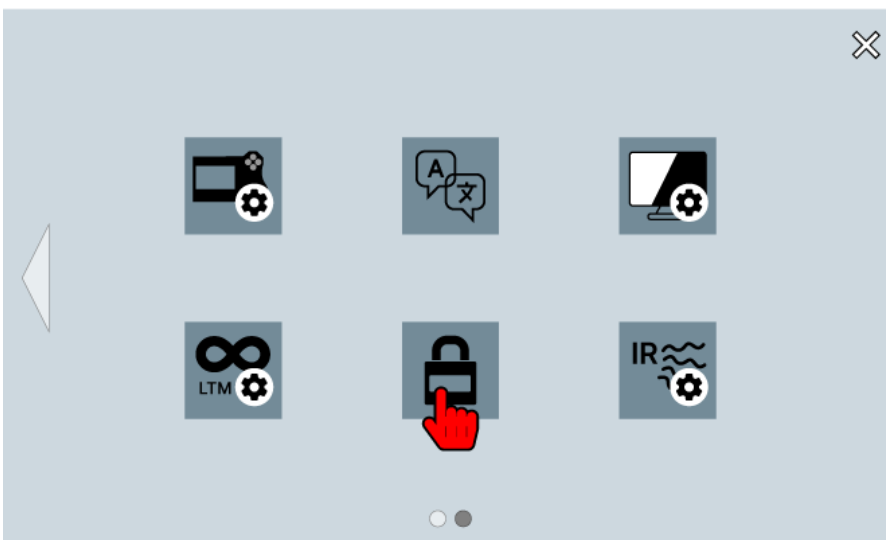
4.   Activate the "use password" option.
5.   Enter the particular password.
6.   Tap the on-screen "Return" key.
7.   Enter the password again.

8.   Tap the on-screen "Return" key.
     → Password protection is activated.

Unlocking the device

If the device has been secured by password, the "Password protection" screen will be displayed when turning on the device.

1.   In the "Password protection" screen, tap the "Unlock device" screen.

2.   Enter the password.
3.   Confirm the entry by pressing the Return key.

Deactivating password protection

1.   Open the "Configuration" screen.
2.   In the "Configuration" screen, switch to section 2.
3.   Tap the "Password protection" icon.
4.   Deactivate the "use password" option.
5.   Enter the current password.
6.   Tap the on-screen "Return" key.
   → Password protection is deactivated.

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Resetting the password

If no password is available anymore, the device may either be:

- reset (see "7.2 Resetting the device", page 103)or
- unlocked by a master password.

The master password may be requested from SONOTEC GmbH. For requesting a master password, some details are necessary for identity verification. They can be retrieved as follows:

1. In the "Password protection" screen, tap the "Password information" icon.
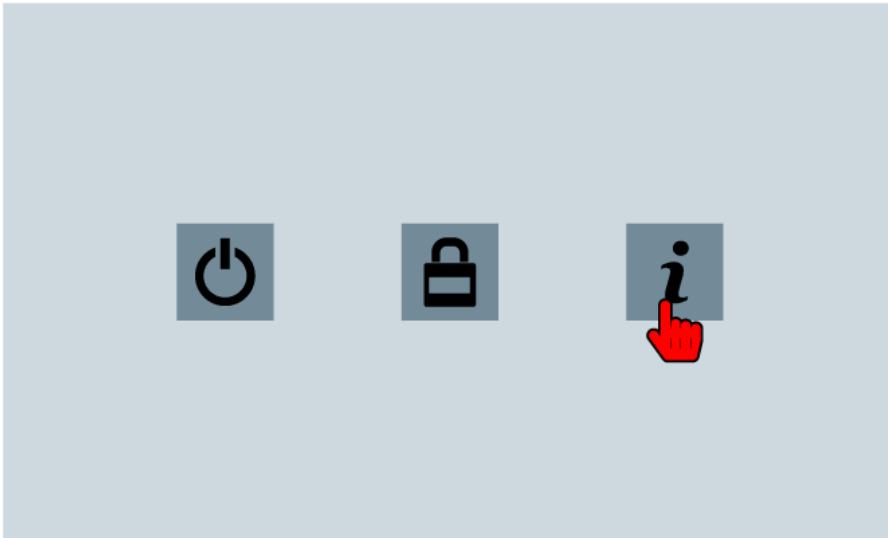
→ A dialog windows with hints for recovering the password and the following details for identity verification opens:
- Mac Address
- Date

Further information

For using password protection, please also see the description of the following screens:

- Start
- Configuration
- Password protection

4.3 Setting the trigger

Description

Triggers are used for automated saving of measurement sections during measurement recording. Triggers for saving may be customized. This is possible with two different methods.

> ⓘ **Availability**
> Automated recording of measurement data with triggers is only available in the "Measurement recording" mode.

Trigger method "BeamPic"

In the "BeamPic" trigger method, the trigger is determined within the beam picture. The following parameters may be set:

| Parameter	Description/function
Pre-trigger time	Duration in seconds before triggering a recording. This duration is part of the section of the current measurement that is to be saved.
Post-trigger time	Duration in seconds after triggering a recording. This duration is part of the section of the current measurement that is to be saved.
Data to store	Determination of data that are to be saved automatically: • **Measurement:** the measurement data of the set recording time will be saved • **Screenshot:** a screenshot of the current beam picture will be created and saved • **Measurement + Screenshot:** the measurement data of the measurement duration and a screenshot of the current beam picture will be saved
Trigger level	Limit value for triggering the recording, in dB. > ⓘ Since the beam picture is the basis of the trigger, the limit value must be within the frequency band defined by minimum and maximum frequency.

The recording starts as soon as the defined trigger level is reached or exceeded during the current measurement. A marker is automatically set at the start of the recording.

After the defined post-trigger time, a section of the current measurement will automatically be saved. This section contains all data to be saved within the defined pre- and post-trigger time.
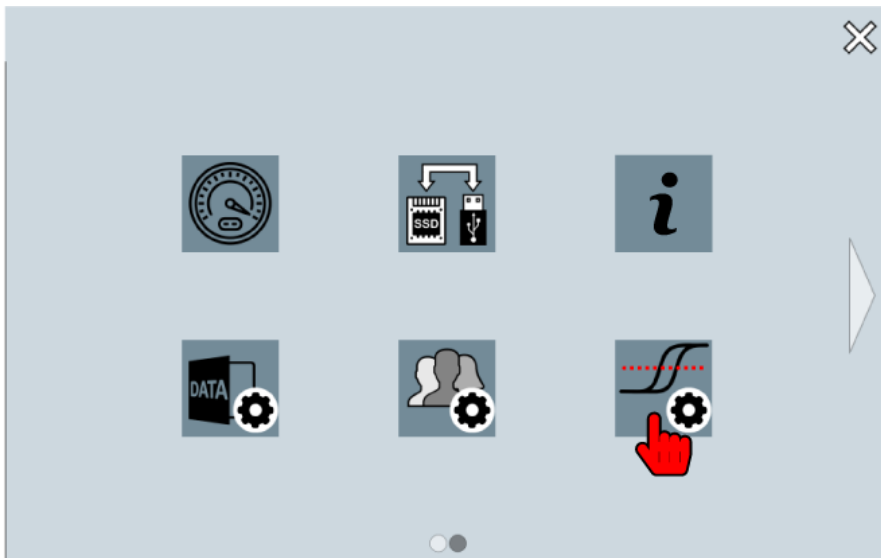
> ⓘ The appropriate trigger level may for instance be determined in a previous measurement.

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Setting the "BeamPic" trigger method

1. Open the "Configuration" screen.
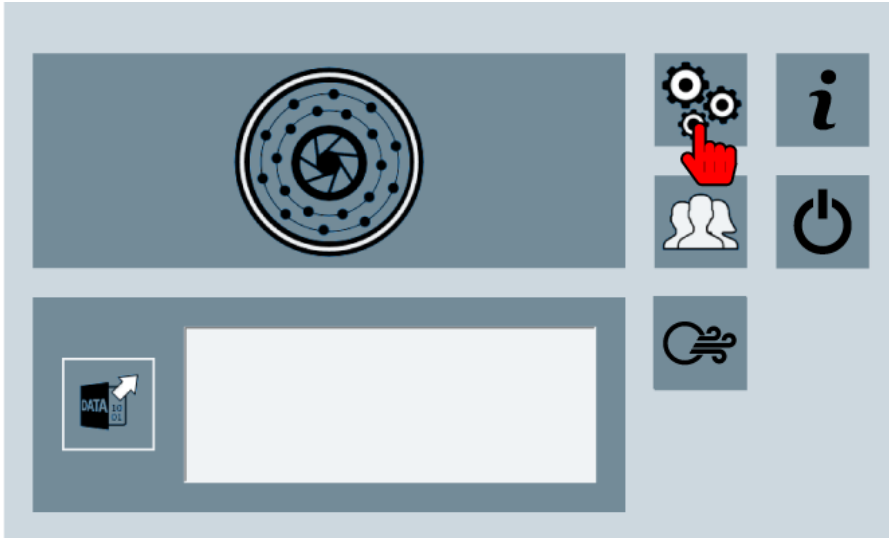
2. Tap the "Trigger" icon.

3. Activate the **enabled** checkbox.
4. Enter the particular values in the **Pre-trigger time**, **Post-trigger time** and **Trigger level** fields.
5. In the **Data to store** picklist, select the data you want to save.
6. In the **Trigger method** picklist, select the **beampicture** option.
7. Close all screens to switch to the "Start" screen.
   → The trigger settings will be used starting with the next measurement.

"Spectrum" trigger method

In the "Spectrum" trigger method, multiple grid points may be defined as triggers within the spectrum. Each grid point contains values for frequency and trigger level. A reference spectrum is generated from the grid points.

The following basic parameters are defined for the trigger method:

Parameter	Description/function
Pre-trigger time	Duration in seconds before triggering a recording. This duration is part of the section of the current measurement that is to be saved.
Post-trigger time	Duration in seconds after triggering a recording. This duration is part of the section of the current measurement that is to be saved.
Data to store	Determination of data that are to be saved automatically: • **Measurement:** the measurement data of the set recording time will be saved • **Screenshot:** a screenshot of the current beam picture will be created and saved • **Measurement + Screenshot:** the measurement data of the measurement duration and a screenshot of the current beam picture will be saved

The recording starts as soon as at least one value of the current measurement's spectrum is larger than or equal to the corresponding value in the reference spectrum. A marker is automatically set at the start of the recording.

After the defined post-trigger time, a section of the current measurement will automatically be saved. This section contains all data to be saved within the defined pre- and post-trigger time.
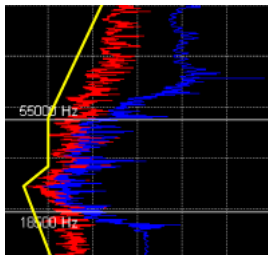
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Setting the "Spectrum" trigger method

1. Open the "Configuration" screen.
2. Tap the "Trigger" icon.
3. Activate the **enabled** checkbox.
4. Enter the particular values in the **Pre-trigger time** and **Post-trigger time** fields.
5. In the **Data to store** picklist, select the data you want to save.
6. In the **Trigger method** picklist, select the **spectrum** option.
7. Tap the "Trigger" icon.

→ The previous measurement or the currently loaded measurement will be displayed in the "Spectrum" screen.

8. Tap the particular position within the spectrum.

→ The frequency and level values of the selected position will be shown in the entry fields.

9. Tap the "Add grid point" (+) icon.

→ A grid point will be added to the position selected in the spectrum.

10. Repeat steps 7 and 8 for each further grid point to be added.
11. Close all screens to switch to the "Start" screen.

→ The trigger settings will be used starting with the next measurement. A yellow indicator line ("trigger curve") is shown in the spectrum. This indicator line indicates the reference spectrum and that the "Spectrum" trigger method is activated.
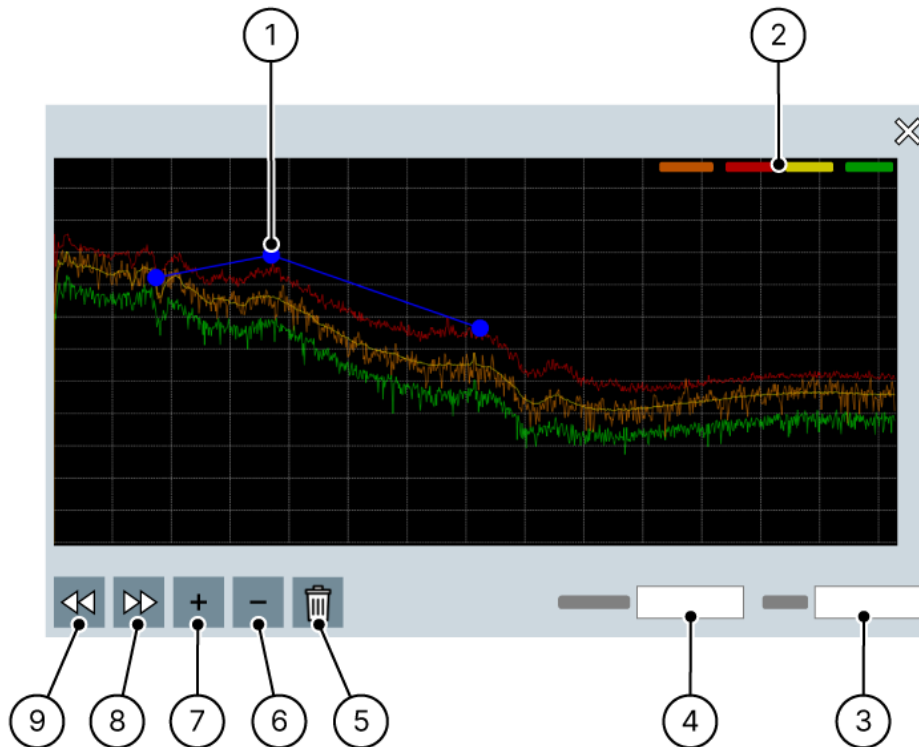
"Spectrum" screen

Figure 10: "Spectrum" screen

No.	Type	Description/function
1	Grid point	• Defines frequency and level on a determined position within the spectrum. • May be moved to a different position by tapping and pulling or by entering different values for frequency and level.
2	Legend	• Shows the designation of the depicted curves. • By tapping a designation, the corresponding curve may be unhidden or hidden within the spectrum.
3	Level	• Shows the level value of the selected position within the spectrum in dB. • A different level value may be entered by tapping the entry field.
4	Frequency	• Shows the frequency value of the selected position within the spectrum in Hz. • A different frequency value may be entered by tapping the entry field.
5	Delete all grid points	• Deletes all grid points within the spectrum.
6	Remove grid point	• Removes the grid point selected in the spectrum.
7	Add grid point	• Adds a grid point at the position selected in the spectrum.

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No.	Type	Description/function
8	Next grid point	• Switches to the grid point after the selected grid point.
9	Previous grid point	• Switches to the grid point before the selected grid point.

5 Performing measurements

The device may be used to record measurement data with two differing methods. Apart from measurements suited for differing applications, the devices offers the possibility to specifically record measurement data for leakage measurements.

Depending on the recording method, different controls and measurements settings are available (see "3.7.3 Measurement", page 22).

This section contains instructions on performing measurements with the available recording methods.

5.1 Starting a measurement

Description

Measurements that are started with the recording method "Measurement recording" may be used for differing applications. Recording. For these measurements, all controls and measurement settings are available.

Procedure

> **ATTENTION**
>
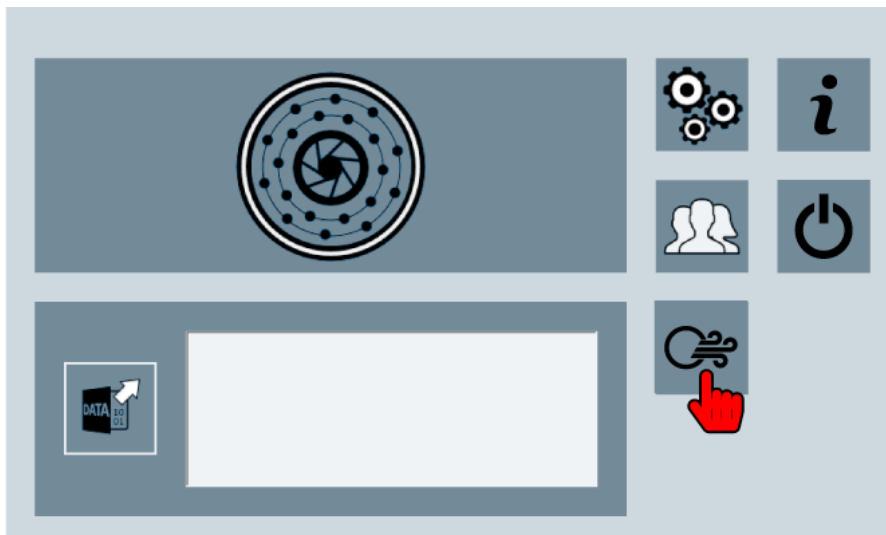> **Faulty measurement results with connected power supply!**
>
> Performing measurements with connected power supply may lead to faulty measurement results.
>
> •   Before starting a measurement, please make sure that the device is not connected to the power supply.

1.   Open the "Measurement" screen.

  → As soon as the "Start measurement" icon is activated, the device is ready for recording.

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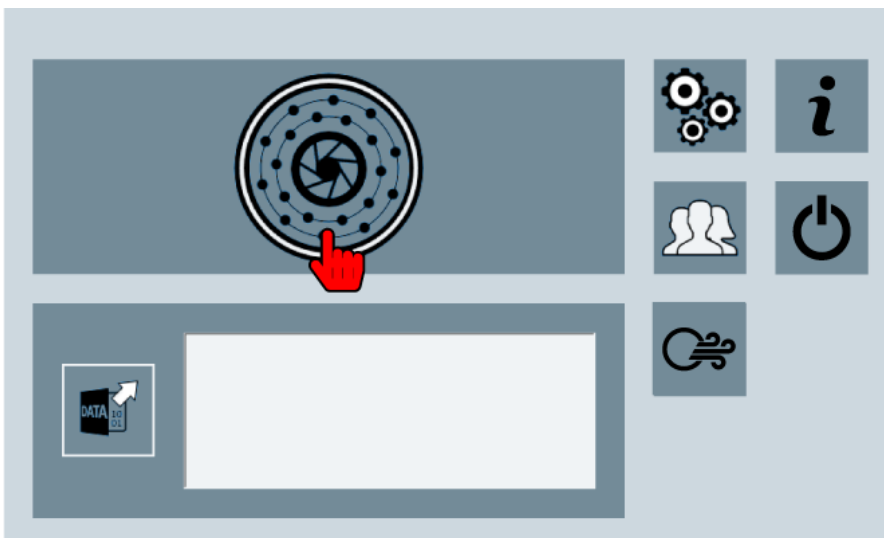
2.   Tap the "Start measurement" icon and keep pressing.
     → A menu with the following recording modes opens:
          🔴 = Measurement range up to 24 kHz
          🔴 (Ultra) = measurement range up to 100 kHz
          🔴 (Ultra IR) = measurement range up to 100 kHz with infrared measurement

> ⓘ The "Ultra IR" recording mode is only available for the "SONASCREEN IR" model.

3.   Tap the required recording mode.
     → The measurement is started with the selected recording mode.
     → The beam picture, the spectrogram and the spectrum are displayed.

Further information

For starting a measurement, please also see the description of the following screens:

* Start
* Measurement

5.2 Starting a leakage measurement

Description

Measurements that are started with the "Leakage measurement" recording method are used for detection and documentation of compressed air leakage.

Due to the measurement data that are required for this kind of detection, different controls and measurement settings have to be predefined by the manufacturer and cannot be customized.

Measurements recorded with the "Leakage measurement" recording method may be processed with the "LeakReport" computer software to generate a leakage report.

Using LeakReport software

Procedure

ATTENTION

Faulty measurement results with connected power supply!

Performing measurements with connected power supply may lead to faulty measurement results.

- Before starting a measurement, please make sure that the device is not connected to the power supply.

1. Open the "Leakage measurement" screen.

→ As soon as the "Start measurement" icon is activated, the device is ready for recording.

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2. Tap the "Start measurement" icon and keep pressing.
    → A menu with the following recording modes opens:

    🔴 (Ultra) = measurement range up to 100 kHz

    🔴 (Ultra IR) = measurement range up to 100 kHz with infrared measurement

    > ⓘ The "Ultra IR" recording mode is only available for the "SONASCREEN IR" model.

3. Tap the required recording mode.
    → The leakage measurement is started in the selected recording mode.
    → The beam picture, the spectrogram and the spectrum are displayed.

Further information

For starting a leakage measurement, please also see the description of the following screens:

*   Start
*   Measurement

5.3 Starting an infrared measurement

> ⓘ **Availability**
> Infrared measurements may only be performed with the "SONASCREEN IR" model.

Procedure

ATTENTION

Faulty measurement results with connected power supply!

Performing measurements with connected power supply may lead to faulty measurement results.

- Before starting a measurement, please make sure that the device is not connected to the power supply.

1. Open the "Measurement" screen or the "Leakage measurement" screen.
   → As soon as the "Start measurement" icon is activated, the device is ready for recording.
2. Tap the "Start measurement" icon and keep pressing.
   → A menu with the available recording modes opens.
3. Tap the "Ultra IR" recording mode.
   → The infrared measurement is started.
   → The beam picture, the spectrogram and the spectrum are displayed.

Further information

For starting an infrared measurement, please also see the description of the following screens:

- Start
- Measurement

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5.4 Customizing measurement settings

Depending on the work order, differing measurement settings in the "Measurement" screen may be required or useful for optimized analysis and evaluation of measurement data.

5.4.1 Setting the distance from the sound source

Description

For identification of sound sources with unknown origin, precise distance designation is not essential.

For precise detection of an identified sound source, the distance from the sound source must be set as accurately as possible. Values may be chosen within a range from 10 cm to ≥ 2000 cm.

For sound sources at a distance of more than 20 m, the maximum value (≥ 2000 cm) must always be set.

Procedure

1   In the "Measurement" screen, tap the "Distance" icon.
2.   Set the required distance either by the slider or by directly entering it in the input field.

Further information

For setting the distance from the sound source, please also see the description of the following screen:

•   Measurement

5.4.2 Setting scaling mode and dynamics

Description

The beam picture or the infrared image support the detection, analysis and evaluation of sound signals or infrared signals. Scaling mode and dynamics may be used to determine the representation of the sound signals or infrared signals.

The following scaling modes are available to provide the selectivity required depending on the quality of the received/recorded signals:

Scaling mode	Description
Auto	In "Auto" scaling mode, the sound source is represented that generates the strongest level within the set frequency band.
	Depending on the set dynamic range, the following colors are assigned to the image areas:
	• White = Upper limit (maximum level from measurement)
	• Black = Lower limit (maximum level from measurement minus dynamics)
Smart	The "Smart" scaling mode allows to suppress background noise that might lead to a diffused image.
	The background noise level is continuously determined and increased by the Crest value (configurable between 5 and 15 dB). This leads to the dynamic threshold value.
	As soon as the level within the selected frequency range exceeds the dynamic threshold value, the beam picture is displayed according to the set dynamic range as is the case in the "Auto" scaling mode. Otherwise, the dynamic threshold value is interpreted as maximum level.
	Subtracting the set dynamic range leads to the threshold below which the signal is not visible within the beam picture.
	ⓘ To make sure that the represented dynamic range does not protrude into the background noise, the Crest value should always be higher than the dynamic value.
Off	The "Off" scaling mode allows for comparisons with a reverence level. The maximum reference level may be set manually or determined automatically as follows:
	• Measurement recording: maximum value of the last 10 seconds
	• Measurement analysis: maximum value of the complete measurement

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Scaling mode	Description
Auto (IR)	In "Auto (IR)" scaling mode, the detected temperatures are displayed depending on the set color palette. Color-to-temperature assignment is shown in the scale next to the infrared image. • **Auto dynamics:** The temperature minimum and maximum values are determined from the infrared data, and the dynamics are automatically adjusted: Dynamics = maximum value minus minimum value All minimum and maximum values shown in the scale correspond to the real minimum and maximum value of the used infrared data. • **Manual dynamics with slider:** The maximum value is determined from the infrared data. The particular dynamics is set by slider. The minimum value is calculated: Minimum value = maximum value minus dynamics The maximum value shown on the scale corresponds to the real maximum value of the used infrared data. Temperatures below the calculated minimum value are displayed in black in the infrared image. ⓘ The "Auto (IR)" scaling mode is only available for the "SONASCREEN IR" model.
Off (IR)	The "Off (IR)" scaling mode allows for comparisons with a reference temperature. The reference temperature maximum value may be set manually. ⓘ The "Off (IR)" scaling mode is only available for the "SONASCREEN IR" model.

Procedure

1 In the "Measurement" screen, tap the "Scaling" icon.
2. Tap the Scaling mode button and select the scaling mode.
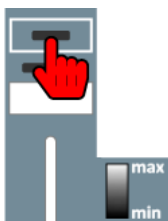
3. Set the available values by slider and/or enter them in the input fields depending on the selected scaling mode.

Further information

For setting scaling mode and dynamics, please also see the description of the following screen:

• Measurement

5.4.3 Setting the frequency filter

Description

Low-frequency sound sources create large color areas. These color areas may overlap the areas of high-frequency sound sources that are easier to detect.

For separation and representation of the high-frequency sound sources, a frequency filter is available to set or select frequency bands. The following filter modes are available for the frequency filter:

Filter mode	Description
Manual	Lower and upper cutoff frequency may be entered in the input fields or set by moving the two left-side handles of the slider. Moving the right-side handle of the slider will move the cutoff frequencies simultaneously while keeping the relative difference between lower and upper cutoff.
Octave	In the picklist, a particular frequency may be selected as mid-band frequency. The frequency band will cover one octave around the selected mid-band frequency. The frequency band may be extended by selecting several frequencies in the picklist. In that case, the frequency band will start half an octave below the smallest selected frequency and end half an octave above the largest selected frequency.
3rd Octave	In the picklist, a particular frequency may be selected as mid-band frequency. The frequency band will cover one-third octave around the selected mid-band frequency. The frequency band may be extended by selecting several frequencies in the picklist. Then, the frequency band will start one-sixth octave below the smallest selected frequency and end one-sixth octave above the largest selected frequency.

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Procedure

1   In the "Measurement" screen, tap the "Frequency filter" icon.

2.   Tap the Filter mode button and select the filter mode.
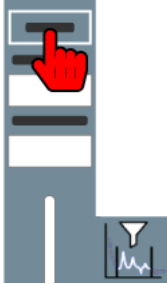
3.   Set the values by moving sliders or selecting values in the picklists depending on the selected filter mode.

Further information

For setting the frequency filter, please also see the description of the following screen:

- Measurement

5.4.4 Setting the recording time

Description

The recording time sets the recording duration for a measurement. The longer the recording time, the more storage space is needed per measurement.

The device's internal storage offers 32 GB. This memory size is sufficient for approximately 400 measurements with a duration of 10 seconds or 80 measurements of 60 seconds.

The recording time of SONASCREEN is limited to 60 seconds. If the device is controlled via the computer software, measurements of 180 seconds are possible.

> ⓘ **Availability**
> Recording time may only be set in the "Measurement recording" mode.
> For leakage measurements, the measurement time is automatically limited to 1 second.

Procedure

1   In the "Measurement" screen, tap the "Record time" icon.

2.   In the picklist, select the particular recording time.

Further information

For setting the recording time, please also see the description of the following screen:

- Measurement

5.4.5 Adjusting the audio output
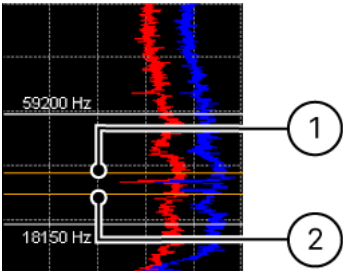
Description

The detected sound signals are visualized in the beam picture and may additionally be output as sound via the device's headphone socket. Playback allows for distinction of the sound sources and detection of a particular sound source.

Audio output focuses on the center of the field of view in the beam picture. The sound signals occurring at this position are distinguished from the ambient noise.

The following customizations are available:

Icon	Description/function	Availability
	Audio output activated	• Measurement recording • Leakage measurement recording • Measurement analysis
	Audio output deactivated	• Measurement recording • Leakage measurement recording • Measurement analysis
	Audio output and the local spectrum are filtered according to the set lower and upper cutoff frequency.	• Measurement recording (recording modes up to 24 kHz, "Ultra" and "Ultra IR")
	No filtering of audio output and local spectrum.	• Measurement recording (recording modes up to 24 kHz, "Ultra" and "Ultra IR")
	Activate/deactivate the audibility of the ultrasonic signal by frequency modulation with an 8 kHz band-pass filter. After activation, the band-pass filter may be set in the required section by moving the right-hand slider. For visualization, the upper (1) and lower (2) cutoff frequency are shown in the spectrum by lines. 	• Measurement recording (recording modes "Ultra" and "Ultra IR") • Leakage measurement recording (recording modes "Ultra" and "Ultra IR")

> ⓘ Further information on the audio modes of the ultrasonic signal may be found in the FAQs on sonotec.eu under: ⧉ FAQ-G2

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Procedure

1   In the "Measurement" screen, tap the "Audio output" icon.

2.   Activate audio output.

3.   Set the volume by moving the slider.
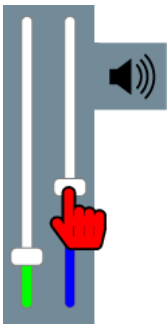
In recording mode up to 24 kHz

Activate/deactivate audio output filtering.

In "Ultra" or "Ultra IR" recording modes

1.   Activate the ultrasound signal's audibility with the **FM** function.
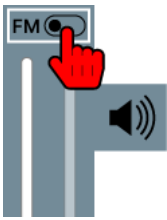
2.   Position the band pass filter in the required section by moving the right-hand slider.

Further information

For adjustment of the audio output, please also see the description of the following screen:

•   Measurement

5.5 Creating screenshots

Description

During recording or analyzing measurements, screenshots may be taken. These screenshots may be used for documentation of measurements and/or procedures.

A screenshot saves the display view with its current layout.

Screenshots are saved in PNG format within the working directory and may be transferred from the device to a personal computer by using a USB storage medium.

> ⓘ **Availability**
> It is not possible to create screenshots of leakage measurements.

Procedure

1   In the "Measurement" screen, tap the "Take a screenshot" icon.
       → The current layout of the display view is saved as screenshot in the working directory.
       → Saving progress is displayed in the title bar.

Further information

For the creation of screenshots, please also see the following descriptions and/or instructions:

- Configuration
- Measurement
- Setting saving options
- Customizing the display
- Starting a measurement

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5.6 Ending a measurement

Description

During recording a measurement, all measurement data will be cached in the device for the duration of the set recording time. The cached time period is displayed in the spectrogram. This allows for checking and/or analyzing the measurement data either directly during or after ending a measurement.

Recording of a measurement may be stopped at any point in time.

Procedure

1.   Tap the "End measurement" icon.
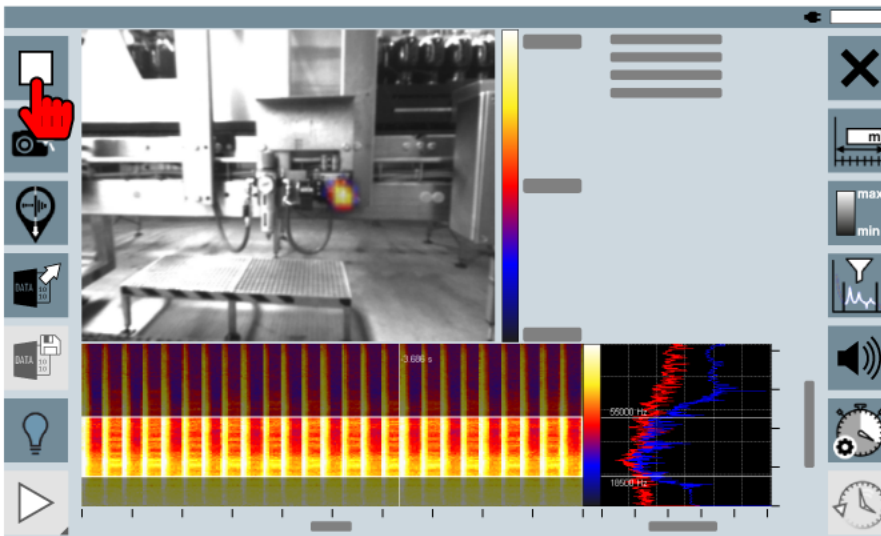
5.7 Saving a measurement

Description

All measurement data cached after ending a measurement may be saved in a measurement data file in the device. Each saved measurement data file may be opened again at any point in time. This allows for subsequent review and/or analysis of measurement data.

Procedure

1. Tap the "Save measurement" icon.

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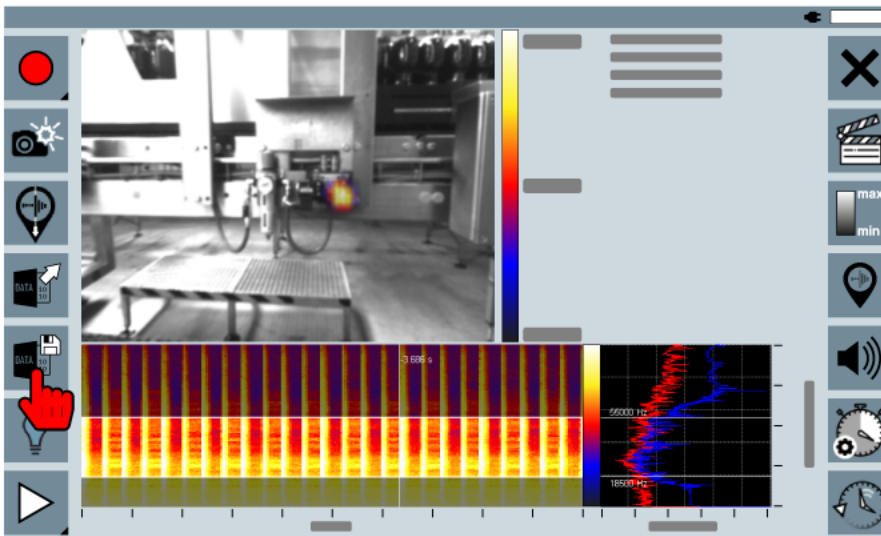
5.8 Saving a leakage measurement for report

Description

Reports of measurement data from leakage measurements may be generated with the "Using LeakReport software" computer software.

Regardless of the recording time set in the device, leakage measurements will always be saved with a recording time of one second.

Procedure

1. Tap the "Save for report" icon.
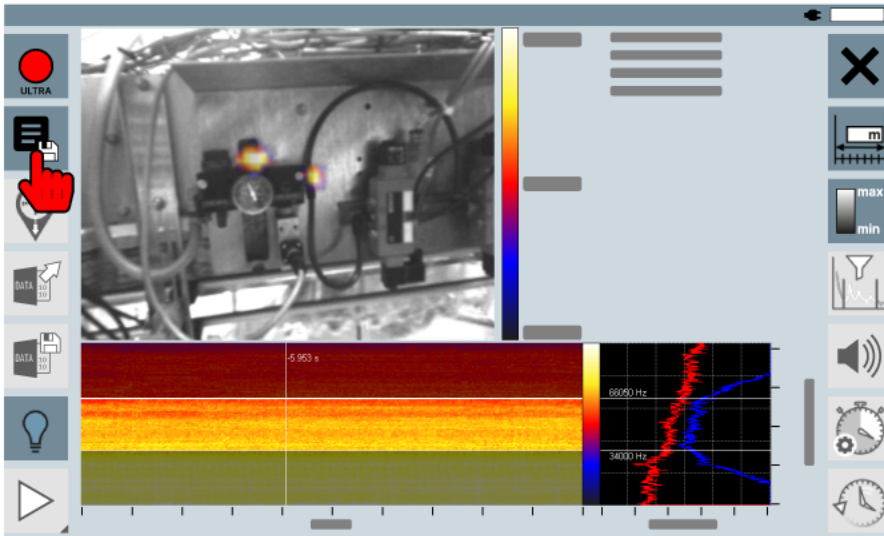
5.9 Managing user profiles

Description

User profiles may be used to save configurations and measurement settings. Thus, settings that have been defined for a specific measurement may be used again for similar or repeated measurements.

The following configurations and measurement settings may be saved in a user profile:

Configurations

- Acoustic resolution
- Camera resolution and speed
- Measurement series

Measurement settings

- Distance
- Scaling
- Frequency filter
- Recording time
- Audio output

Opening the "Choose profile" screen

1. On the "Start" screen, tap the "Choose profile" icon.

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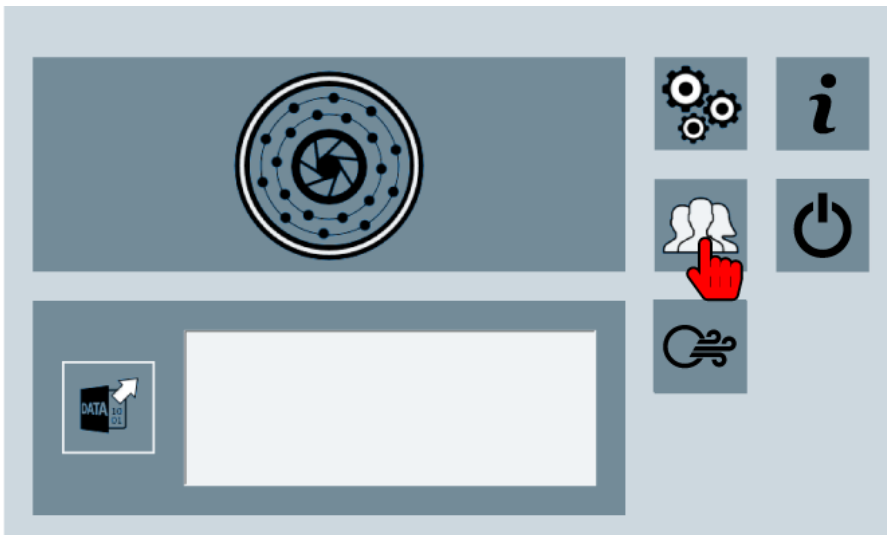
Creating a user profile

1. In the "choose profile" screen, tap the **new Profile** button.
    → The `new profile` window opens.
2. Enter a name and description for the user profile.
3. Tap the **OK** button.
    → The user profile is saved with the currently used configurations and measurement settings.

Loading a user profile

1. In the "choose profile" screen, select a saved user profile from the picklist.
    → The saved settings of the user profile are displayed.
2. Tap the **load Profile** button.
    → The selected user profile is loaded.
3. Close the "choose profile" screen.

Deleting a user profile

ATTENTION

Data loss during deletion

During deletion of a user profile, all saved configurations and measurement settings will be deleted as well.

*   Before deleting a user profile, please make sure that these data may indeed be deleted.

1. In the "choose profile" screen, select the particular user profile.
2. Tap the **delete Profile** button.
    → A window with a confirmation prompt for the user profile deletion opens.
3. Tap the **Yes** button.
    → The user profile is deleted.

Restoring defaults

When restoring defaults, all currently loaded configurations and measurement settings will be deleted from the device's internal storage.

All created user profiles remain saved and may be loaded again.

After restoring defaults, the following device defaults will be reset:

Configuration/measurement setting	Value
Distance	100 cm
Frequency filter	Measurements up to 24 kHz: • Min: 3 kHz • Max: 10 kHz
Scaling	• Mode: Smart • Dynamic: 3.0 dB
Audio output	mute
Recording time	10 s
Beam speed	100 fps
Camera resolution and speed	320 × 240 (50 fps)
Working directory	device's root directory
Measurement series	deactivated
Function keys	standard configuration

Procedure

ATTENTION

Direct reset to factory settings

The device will be reset to factory settings without confirmation prompt.

1.	In the "Choose profile" screen, tap the **restore Defaults** button.
	→ The device is reset to factory settings.

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5.10 Using long-term measurement

Description

In a long-term measurement, the following measurement data will be recorded and saved for a configurable time interval:

- Averaged beam picture (averaged values of the individual beam pictures)
- Acoustic peak hold image (maxima of the individual beam pictures)
- Averaged spectrum
- Peak hold spectrum (maxima)
- Camera image

The representation of the measurement data in the beam picture and the spectrum may be customized. The time interval may be set for a range between 10 to 900 seconds.

A measurement data file will be created for a long-term measurement. All measurement data recorded during the time intervals will be saved in the measurement data file.

Measurement data files are restricted to a file size of 300 MB. As soon as this file size is reached, further measurement data will be written into a new file with the original file name extended by a counter (_01, _02, ...).

Configuring a long-term measurement

1. Open the "Configuration" screen.
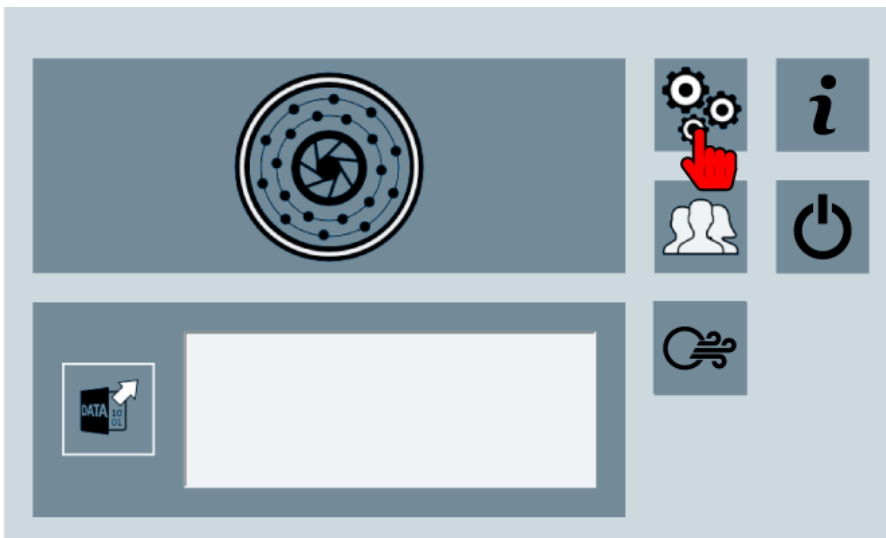
2. In the "Configuration" screen, switch to section 2.

3. Tap the "Long-term measurement" icon.
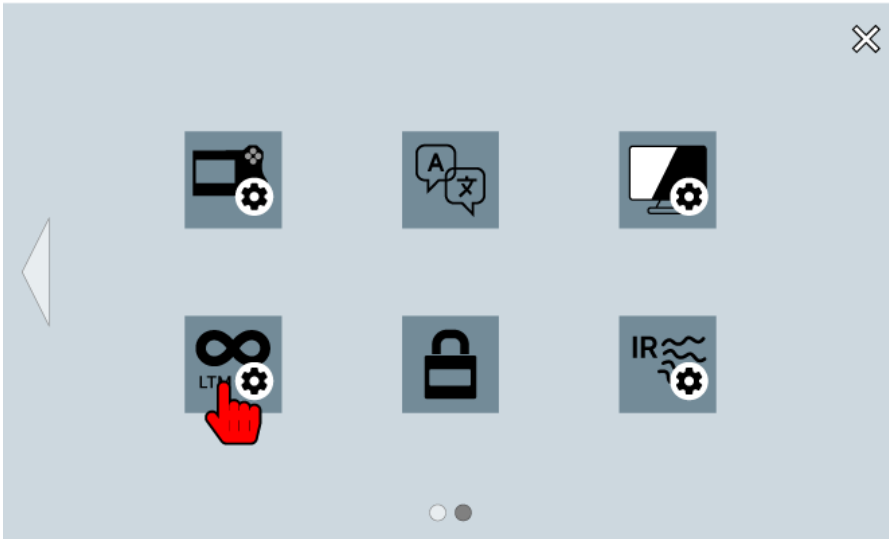
4. Activate the **activate** checkbox.
5. Enter the particular value for the time interval in the Interval field.

> ⓘ The value must be between 10 and 900.

Recording a long-term measurement

1. Start a measurement with the particular recording method.
    → All measurement data are displayed and saved in a measurement data file for the set time interval.

> ⓘ Stopping the recording ends the long-term measurement.

Customizing measurement data representation

For a long-term measurement, the representation of the recorded measurement data in the beam picture and/or the spectrum may be customized.

1. During the long-term measurement, press the beam picture or the spectrum and keep pressing for about 2 seconds.
    → A context menu with representation options will open.

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Additional display options in the beam picture

Option	Description/function
	Indicates that the averaged image is displayed. Tapping this icon switches to the peak hold image.
	Indicates that the peak hold image is displayed. Tapping this icon switches to the averaged image.

> ⓘ **Standard display options**
> Apart from the additional display options for long-term measurements, further standard display options are available. (see "Customizing beam picture representation", page 82)

Additional display options in the spectrum

Option	Description/function
	Hiding or unhiding the averaged spectrum (green curve)
	Hiding or unhiding the peak hold spectrum (yellow curve)

> ⓘ **Standard display options**
> Apart from the additional display options for long-term measurements, further standard display options are available. (see "Customizing spectrum representation", page 83)

Further information

For customizing and recording long-term measurements, please also see the following descriptions and/or instructions:

- Start
- Configuration
- Measurement
- Customizing the display

6 Concluding a work order

After performing and saving all measurements, these may subsequently be analyzed on the device or edited for further applications (e.g. videos, reports or editing on the personal computer).

6.1 Opening saved measurements

Description

The measurements saved in the currently selected working directory may be opened for subsequent analysis.

Procedure

1. On the "Start" screen, mark the particular measurement in the list.
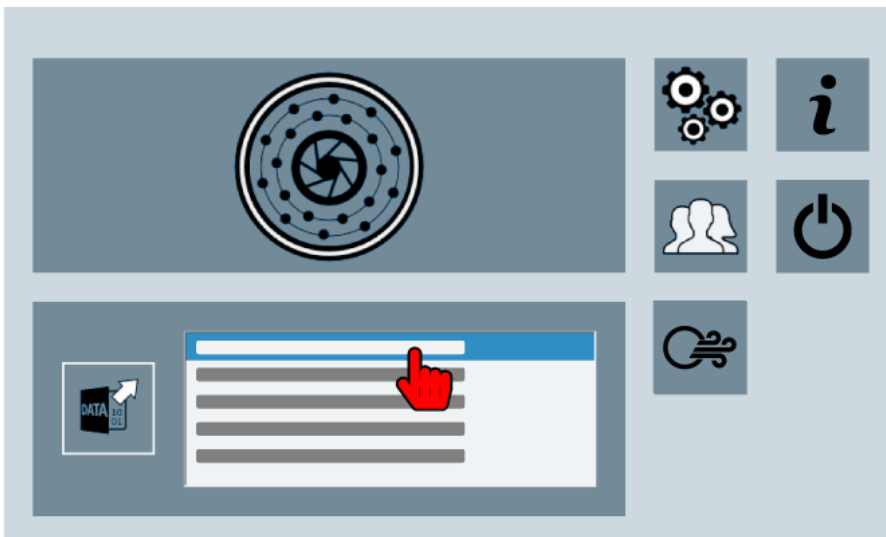
> ⓘ The list shows up to 20 of the measurements last saved in the currently selected working directory.

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2. Tap the "Open measurement" icon.
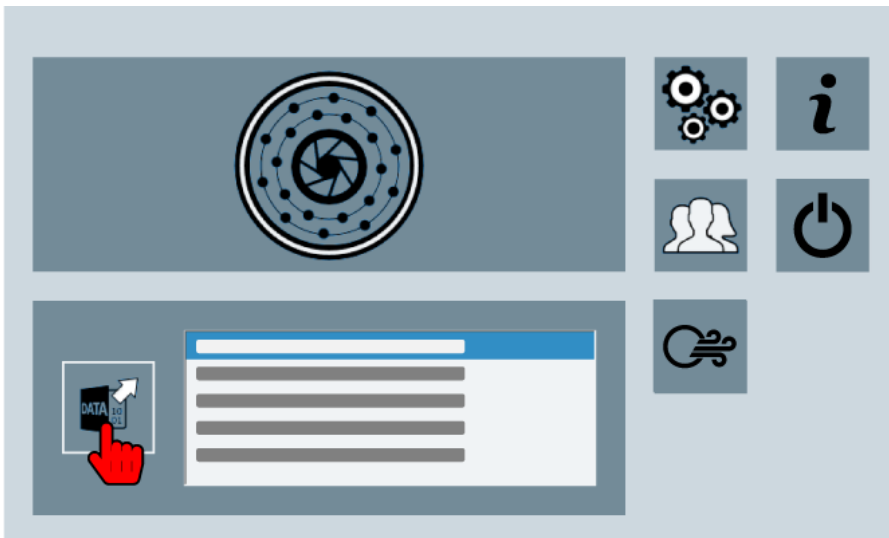
→ The selected measurement is opened in the "Measurement" screen.

Further information

For opening saved measurements, please also see the following descriptions and/or instructions:

- Start
- Setting saving options

6.2 Evaluating measurement results

Measurement results may be evaluated either directly after ending a measurement or subsequently as saved measurement.

6.2.1 Playing back a measurement

Description

Measurements can be played back in a range of speeds or in single image steps. This may be helpful for:

• a preliminary evaluation directly after ending a measurement or

• subsequent analysis and evaluation after opening a saved measurement.

Procedure

1. In the "Measurement" screen, tap the "Playback measurement" icon and keep pressing.
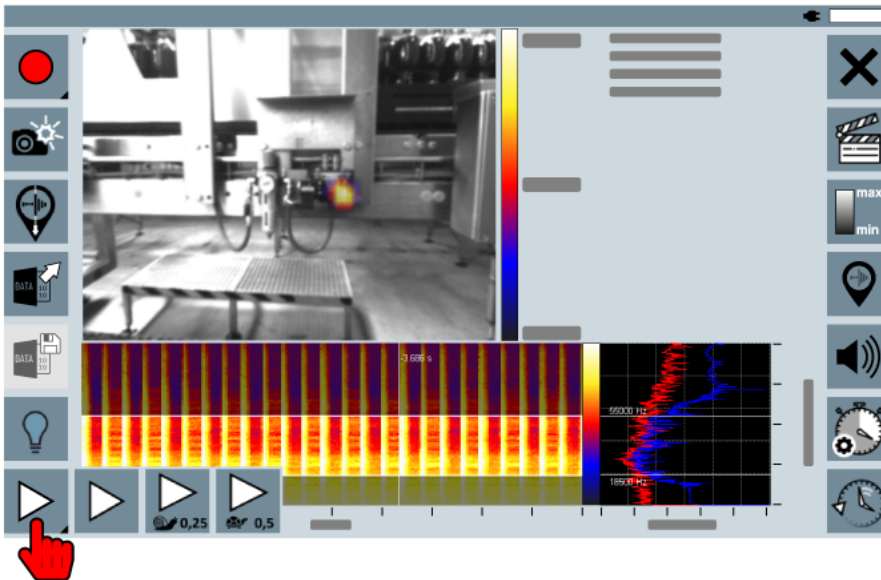
→ A menu with the following playback modes opens:

▷ = regular speed

▷ (0,25) = 0.25x regular speed

▷ (0,5) = 0.5x regular speed

2. Tap the icon of the particular playback mode.

→ The measurement is played back with the selected speed.

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Using timeline navigation

Using the timeline navigation, each single image of a completed or saved measurement may be accessed directly.

1   In the "Measurement" screen, tap the "Timeline navigation" icon.
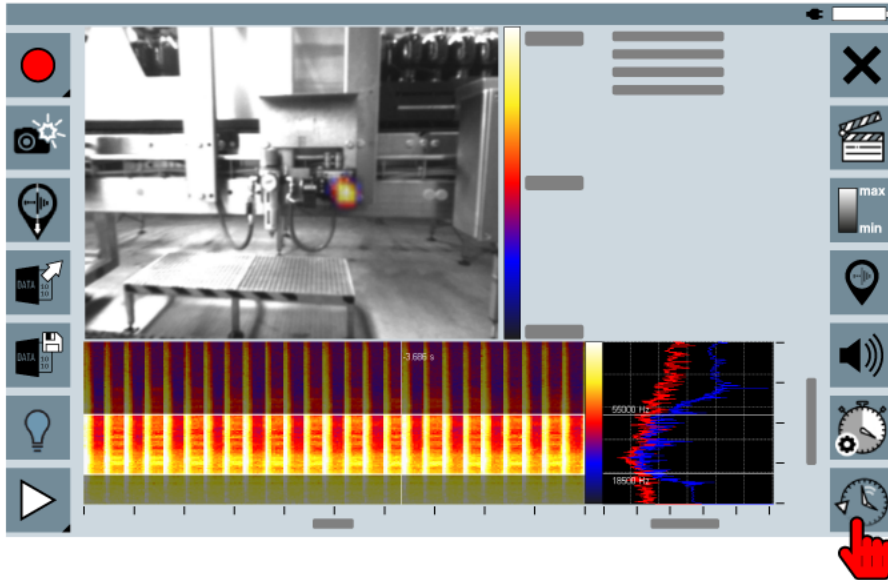
2.   Move the slider (3) to the particular position within the measurement.
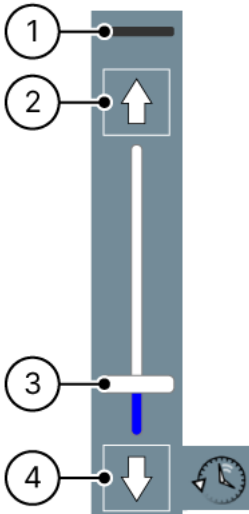
3.   Optional: Navigate between the single images with the "Next image" (2) or "Previous image" (4) icons.

> ⓘ The number of the currently selected single image is displayed in the header (1) of the timeline navigation.

6.2.2 Adding a marker in the spectrogram

Description

Markers may be used to indicate acoustic events within a measurement. Markers may be added in the spectrogram:

- during recording of a measurement or
- subsequently in completed or saved measurements.

Adding a marker

1. Playback a completed or opened measurement.
2. Tap the "Add marker" icon.
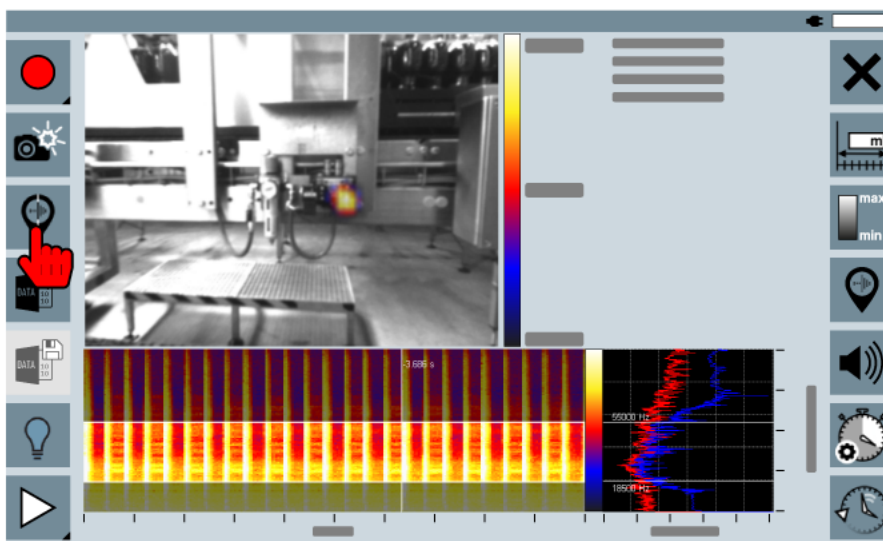
→ A marker is added at the current playback position.

Navigating between markers

If measurements contain markers, it is possible to navigate between markers. It is also possible to delete existing markers.

1. Tap the "Marker navigation" icon.
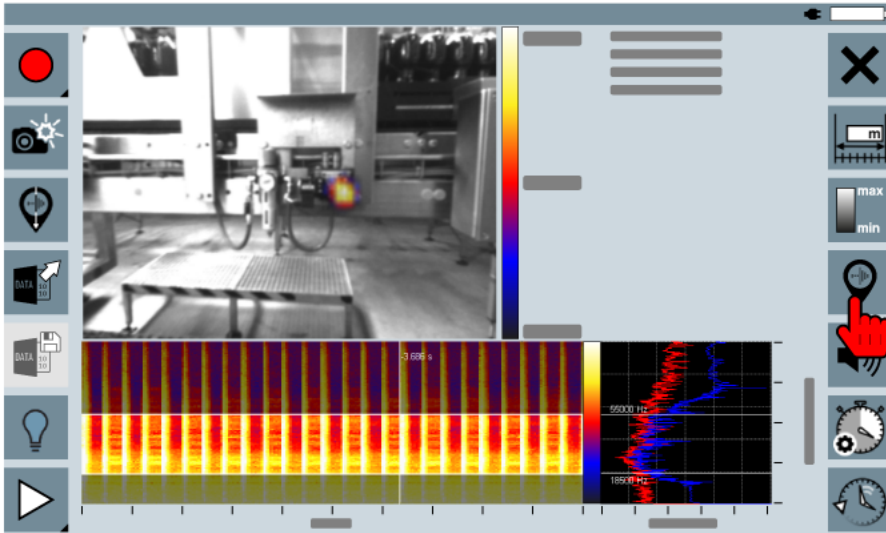
2. Use the "Next marker" (1) or "Previous marker" (2) icons to navigate between markers.
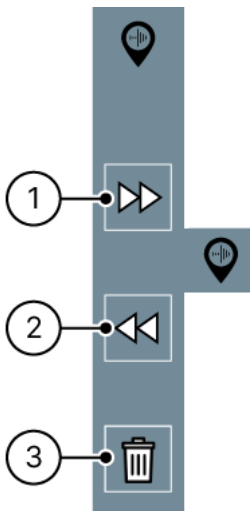
3. Optional: Tap the "Delete" (3) icon to delete the currently selected marker.

Further information

For adding markers in the spectrogram, please also see the following descriptions and/or instructions:

*   Ending a measurement
*   Opening saved measurements
*   Playing back a measurement

6.2.3 Customizing the display

Description
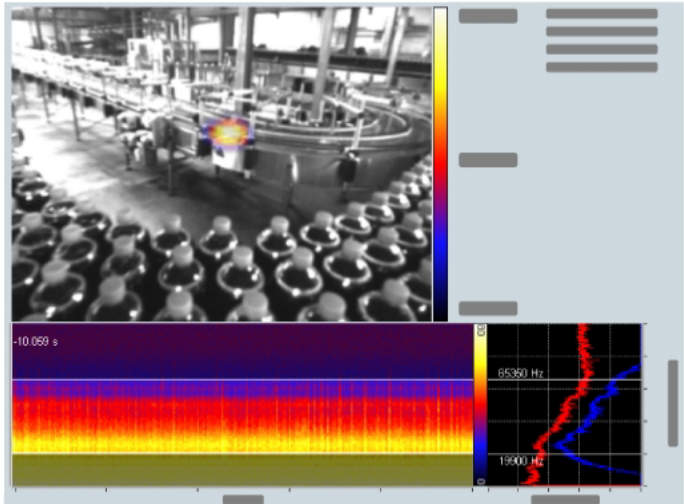
The display view and its individual areas may be customized to:
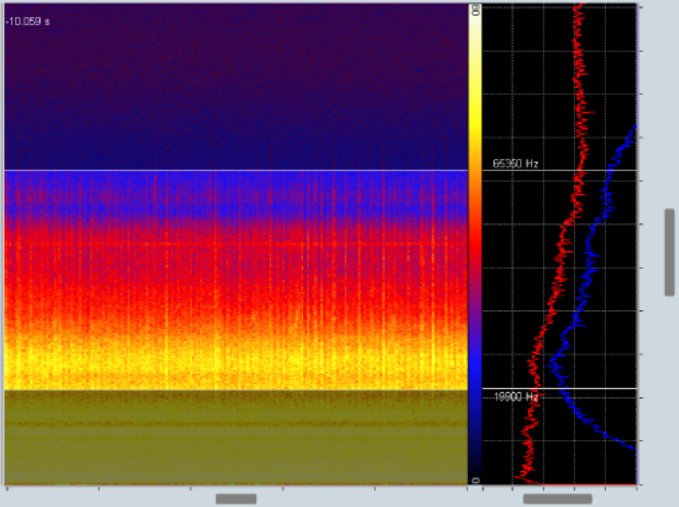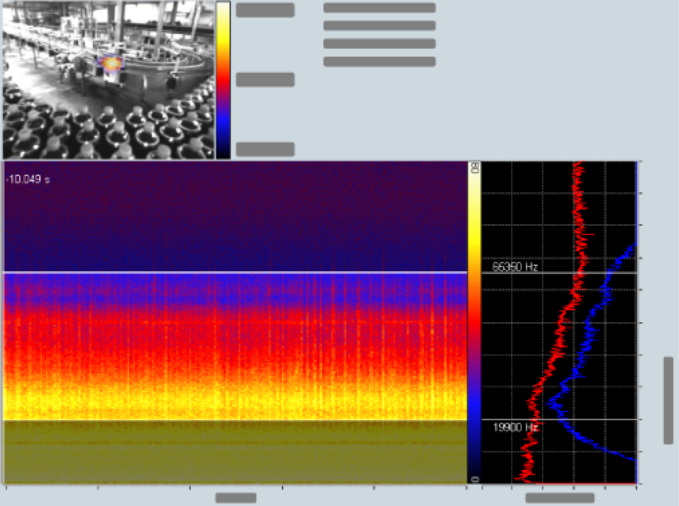
- enhance evaluations during measurement recording and/or
- provide more accurate analyses of completed or saved measurements.

Changing the display view layout

Beam picture, spectrogram and spectrum may either be displayed as full screen or in a combined view. The combined view offers two different layouts.

1. During recording or analysis, double-tap the display view (beam picture, spectrogram or spectrum).
   → The layout of the display view changes. Each subsequent double-tap changes the display view according to the following order:

Order	View	Image
1	Combined view with zoomed-in beam picture	

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Order	View	Image
2	Beam picture as full screen	
3	Spectrogram and spectrum as full screen	
4	Combined view with zoomed-out beam picture	

Customizing beam picture representation

1. In the "Measurement" screen, tap the beam picture and keep pressing for about 2 seconds.

    → A context menu with the following display options will open:

Option	Description/function
	Opens a slider to set video camera brightness. ⓘ Video camera brightness may only be adjusted during measurement recording.
	Activates/deactivates crosshairs in the center of the beam picture.
	Opens a menu for activation/deactivation and settings of the "Low-Cut" function.

> ⓘ **Additional display options**
> For long-term measurements, additional display options are available (see "Additional display options in the beam picture", page 73).

"Low-Cut" function

With the "Low-Cut" function, all levels below a customizable cutoff level will be hidden in the beam picture.
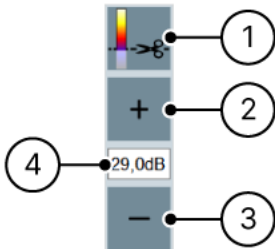

Figure 11: "Low-Cut" function menu

No.	Description/function
1	Activates/deactivates "Low-Cut" function.
2	Raises the cutoff level by 1 dB.
3	Lowers the cutoff level by 1 dB.
4	Shows the currently set cutoff level in dB. Tapping the value opens a dialog window for entering a value.

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Customizing spectrum representation

1. Tap the spectrum and keep pressing for about 2 seconds.
    → A context menu with the following display options will open:

Option	Description/function
	Hiding or unhiding the global spectrum (red curve)
	Hiding or unhiding the local spectrum (blue curve)

> ⓘ **Additional display options**
> For long-term measurements, additional display options are available. (see "Additional display options in the spectrum", page 73)

Scaling the spectrogram and spectrum axes

1. In the "Measurement" screen, tap the spectrogram and keep pressing for about 2 seconds.
    → A context menu with the following scaling options will open:

Scaling option	Description/function
X	Opens an input field for setting the timeline scaling. Minimum and maximum values in s may be entered.
Y	Opens an input field for setting the frequency axis scaling. Minimum and maximum values in Hz may be entered.
Z	Opens an input field for setting the amplitude scale scaling. Minimum and maximum values in dB may be entered.

6.3 Creating video or audio files

Description

A complete measurement or a selectable measurement section may be exported as video or audio file.

Completed or saved measurements may be exported as video file in WebM file format with or without audio content. In the exported video, the visual representations (beam picture, spectrogram and spectrum) are saved in the current layout of the display view.
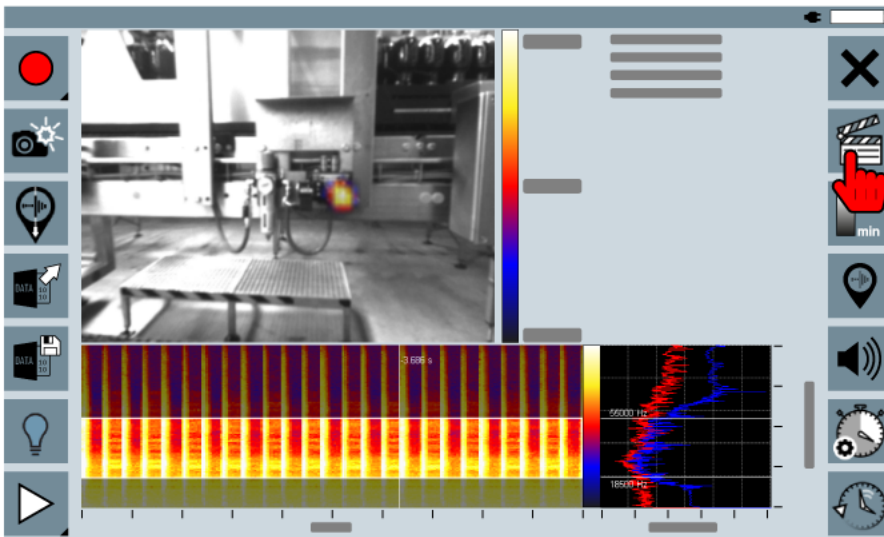
Completed or saved measurements with activated audio output may be exported as audio file. The following file formats are possible:

- Opus (*.webm)
- Vorbis (*.ogg)
- Wav (*.wav)

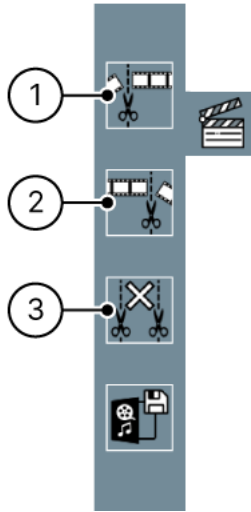> ⓘ It is not possible to export leakage measurements as video or audio file.

Preparing a measurement for export

1   In the "Measurement" screen, tap the "Video editing" icon.

2.   Optional: In the spectrogram, tap the requested beginning of the export file.

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3. Optional: Tap the "Set beginning" (1) icon.

→ The beginning is marked with a green line in the spectrogram.

4. Optional: In the spectrogram, tap the required end of the export file.

5. Optional: Tap the "Set end" (2) icon.

→ The end is marked with a green line in the spectrogram.

6. Optional: Tap the "Delete markings" (3) icon to set a new beginning and end.
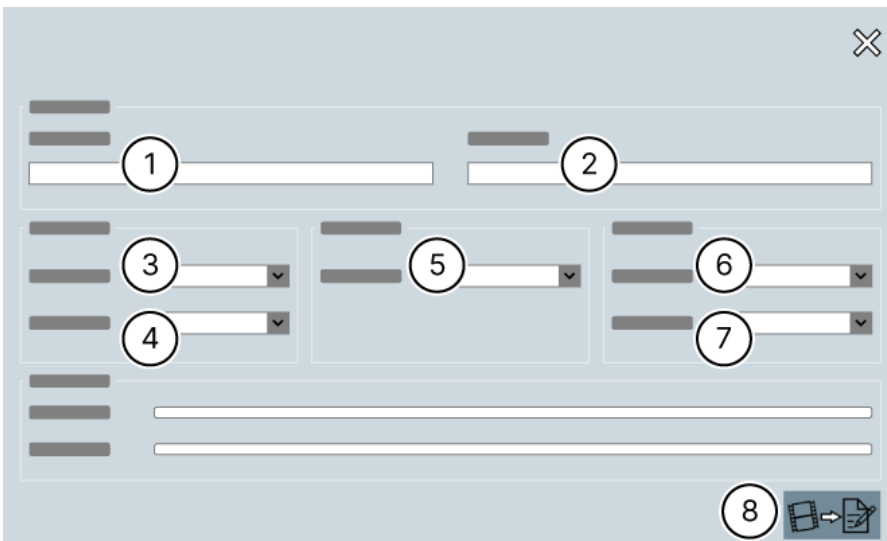
Exporting a measurement

1.   Tap the "Export data" icon.
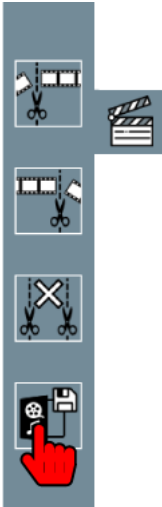
   → The selected area is used for export. If no beginning and end are set, the whole measurement will be used for export.

   → A screen for setting the export options opens.

2.   Tap the **File path** (1) icon and select the saving location.
3.   Tap the **File name** (2) icon and enter the particular file name.
4.   In the **Output** (3) field, select the required output type (audio or video).
5.   In the **Speed** (4) field, select the playback speed for the output.
6.   In the **Quality** (5) field, select the video output quality.
7.   In the **Format** (6) field, select the container format of the audio output.
8.   In the **Gain** (7) field, select the audio output gain.
9.   Tap the "Start export" (8) icon.
      → The data are exported with the set options.
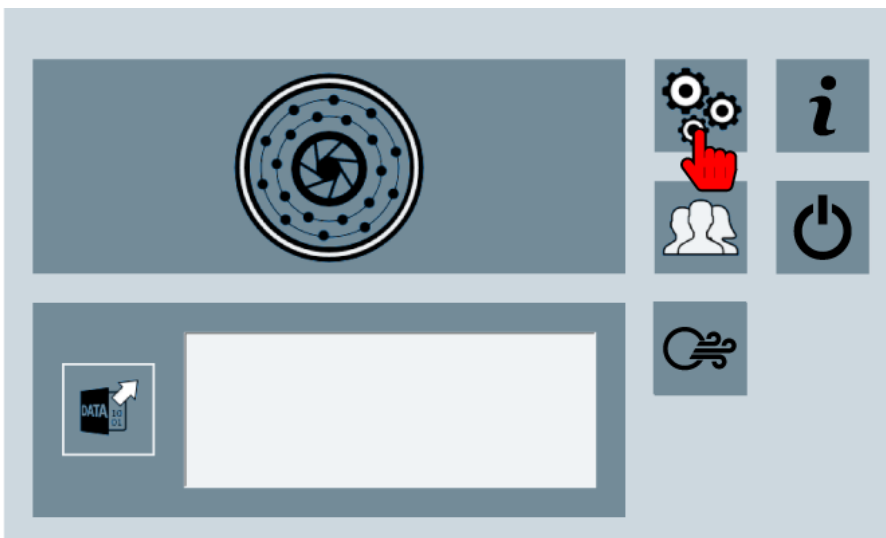
6.4 Managing measurements

Description

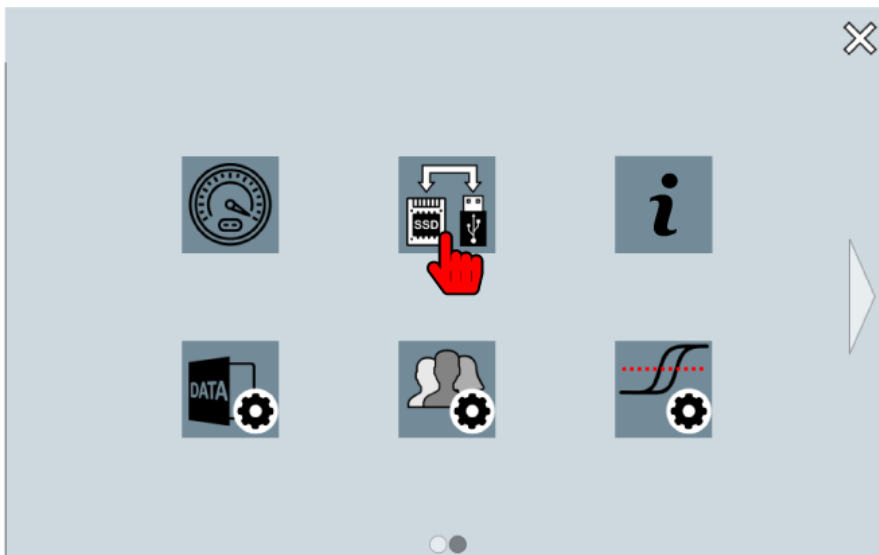Using the integrated data management functions, the measurements and/or directories saved on the device may be:

* copied to a USB storage medium for further evaluation or
* deleted from the device.

Opening data management

1. Open the "Configuration" screen.

2. Tap the "Data management" icon.

Selecting measurements

With the data management function, all measurements and/or directories saved in the device may be selected for further procedure.
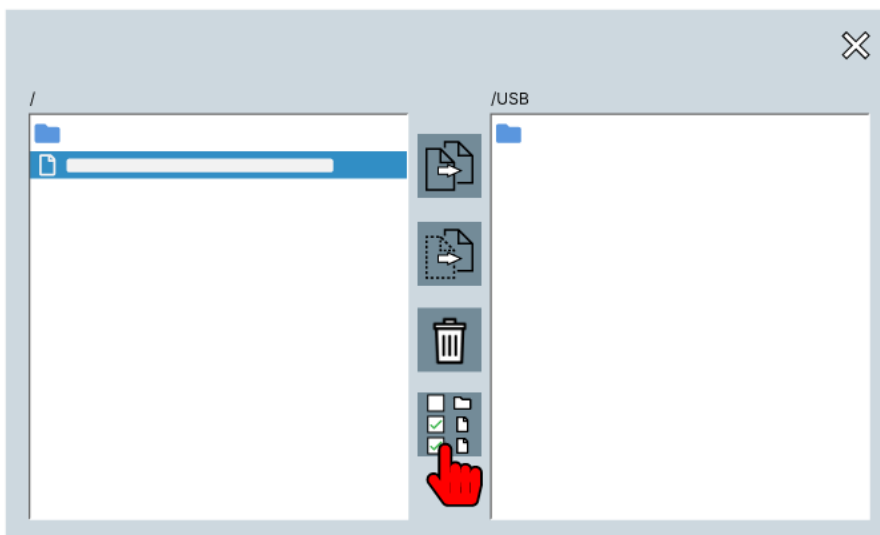
Single measurements or directories

1. In the left-side column (device internal storage), tap the particular measurements or directories.
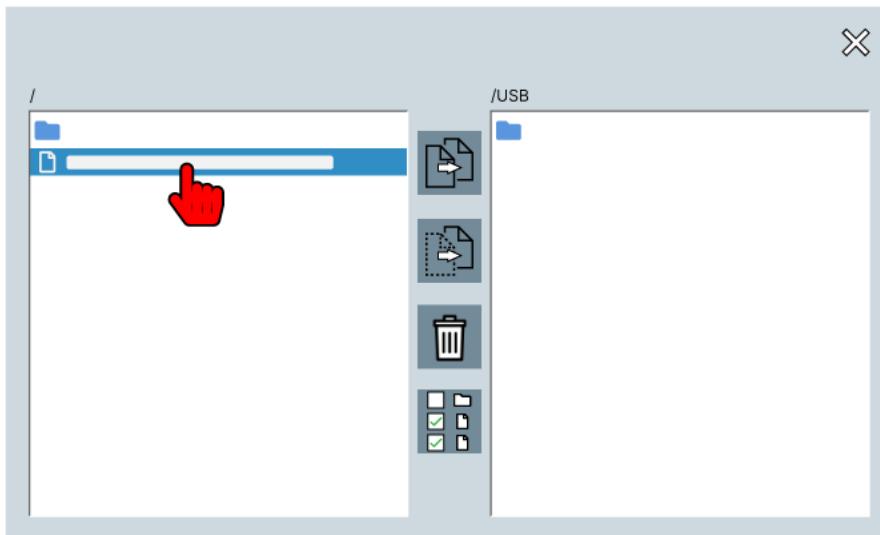
All measurements and directories

1. Tap the "Select objects" icon.

→ Repeated tapping of the icon changes the function in the following order:

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Icon	Description/function
	Select all measurements.
	Select all measurements and directories.
	Cancel current selection.

Transferring measurements to a USB storage medium

For further evaluation and/or processing, the measurements and/or directories saved on the device may be transferred to a personal computer via a USB storage medium.

1. Connect a USB storage medium to the device.
2. Open Data management.
3. Double-tap the root directory of the USB storage medium in the right-side column.
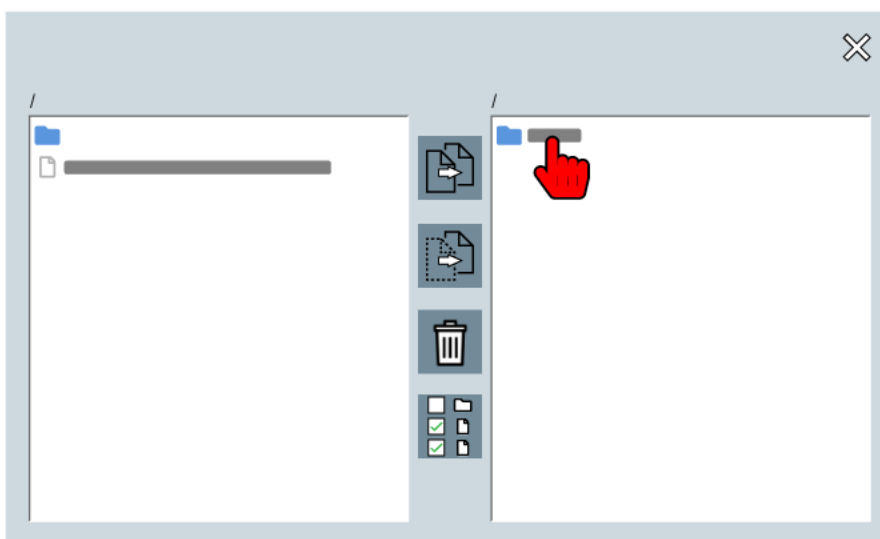
→ The USB storage medium is opened.

4. Select the particular measurements and/or directories in the left-side column (device internal storage).

5.   Tap the "Copy" icon.
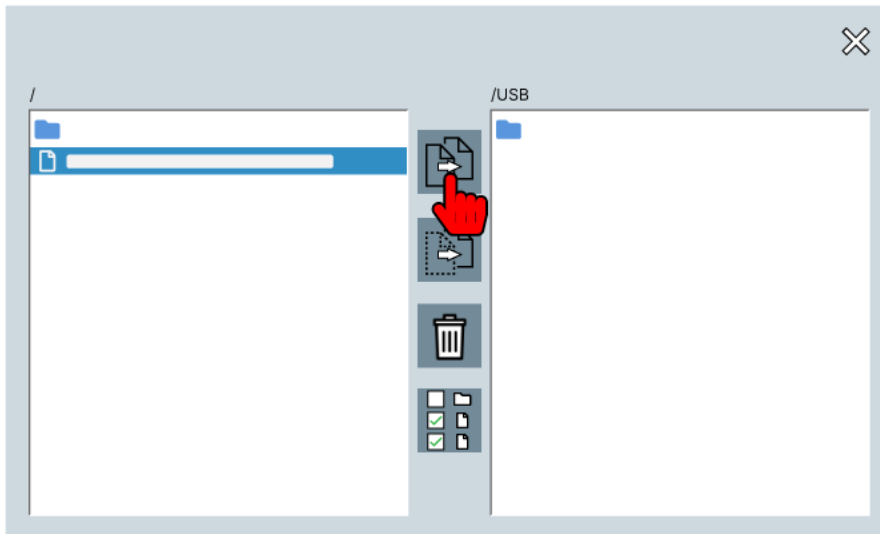
Deleting measurements

All measurements and devices saved in the device's internal storage or on a connected USB storage medium may be deleted via Data management.

1.   Select the particular measurements and/or directories.
2.   Tap the "Delete objects" icon.
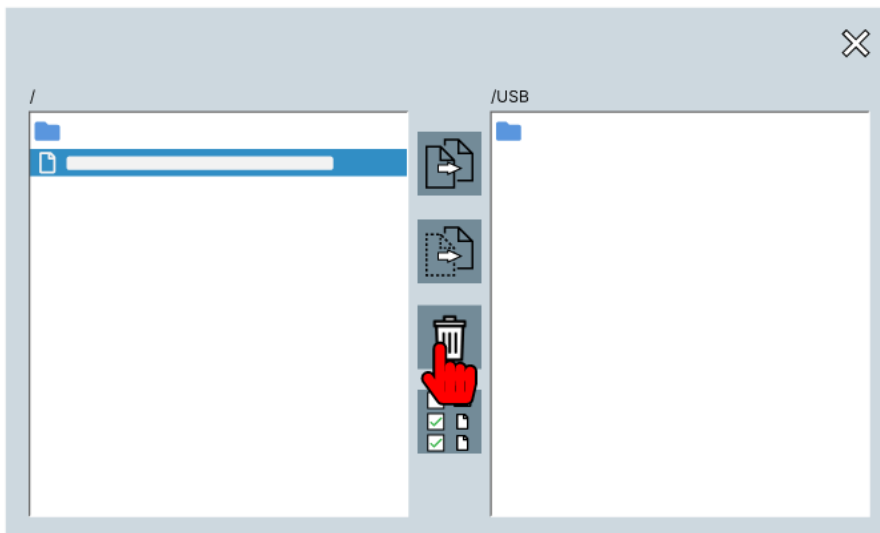
→ The `Delete files` dialog window with a confirmation prompt for deletion of the selected data opens.

3.   Tap the **Yes** button.

→ The selected data are deleted.

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6.5 Using computer software

Description

Optionally available computer software for "Microsoft Windows" computers allows to:

- control the device via a personal computer,
- save device measurements on the personal computer and
- create leakage measurement reports.

This section contains descriptions and instructions for using the optionally available computer software.

6.5.1 Using SONASCREEN software

Installing the SONASCREEN software

1. Download the software as ZIP file to the computer.

   ⓘ The download link of the installation file is available in the mysonaphone.com web portal after registration.

2. Extract the ZIP file to the preferred saving location on the personal computer.
3. In the software's directory, double-click the "SONASCREEN.exe" file.
   → The computer software is started.

   ⓘ **Mind the security settings of the operating system**
   Starting the computer software depends on the security settings of the operating system. If it is not possible to start the computer software, please contact your system administrator.

6.5.2 Using LeakReport software

ⓘ For leakage reports, only measurements may be used that were recorded using the "Leakage measurement" recording method. ()

Installing

1. Download the software as ZIP file to the computer.

   ⓘ The download link for the software is available in the mysonaphone.com web portal after registration.

2. Extract the ZIP file on the personal computer.
   → During extraction, the directory "LeakReport Installer" and a "LeakReport Config Installer.exe" file are created.
3. In the "LeakReport Installer" directory, execute the "setup.exe" file.

   ⓘ **Installation with administrator rights**
   The "setup.exe" file may only be executed with administrator rights.

   → The Installation Wizard opens.

4.   Execute all steps in the Installation Wizard until the installation is completed.

5.   Execute the "LeakReport Config Installer.exe" file.

> ⓘ **Installation with administrator rights**
> The "LeakReport Config Installer.exe" file may only be executed with administrator rights.

→ The Installation Wizard opens.

6.   In the Installation Wizard, click the **Install** button.

→ During installation, the `Confirm file replace` dialog window opens.

7.   In the dialog window, click the **Yes to All** button.

Setup

Setting the user interface language

1.   In the menu, click the **Language** item.

→ A dialog window opens for setting the user interface language.

2.   Click the particular language.

3.   Click the **OK** button.

→ The user interface language is switched to the selected language.

Setting units and currencies

Units and currencies will be used for the representation of measured and calculated values on the user interface and in reports.

1.   In the menu, click the **Units and Currencies** item.

→ A dialog window opens for setting the unit and currency used in the report.

2.   Click the **Unit system** field and select the particular unit.

3.   Click the **Currency** field and select the particular currency.

4.   Click the **OK** button.

→ The selected unit and currency are set.

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Setting meta data, loss calculation and priorities

1.   In the menu, click the **Configuration** item.
     → A dialog window opens for setting the meta data, the loss calculation values and the priority limit values.


2.   Enter the particular report meta data (1).
3.   Enter the particular loss calculation values (2).
4.   Enter the particular priority limit values (3).
5.   Click the **OK** button.
     → The entered values are saved and used for creation of the subsequent reports.

Selecting an Excel report template

The Excel report template determines the report layout and data structure.

1.   In the menu, click the **Excel report template** item.
     → A dialog window opens for selection of the saving location of the particular Excel report template.
2.   Click the "Open" icon.
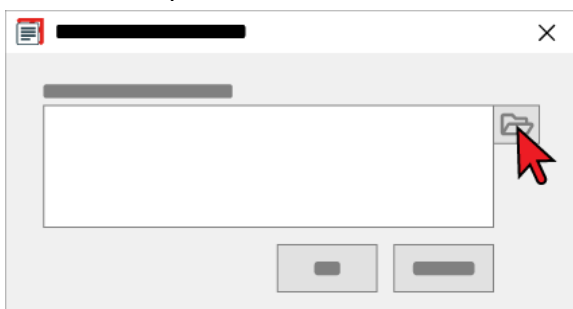
3.   Navigate to the saving location of the particular Excel report template.
4.   Select the particular Excel report template.
5.   Click the **OK** button.
     → The selected Excel report template is saved and used for the subsequent reports.
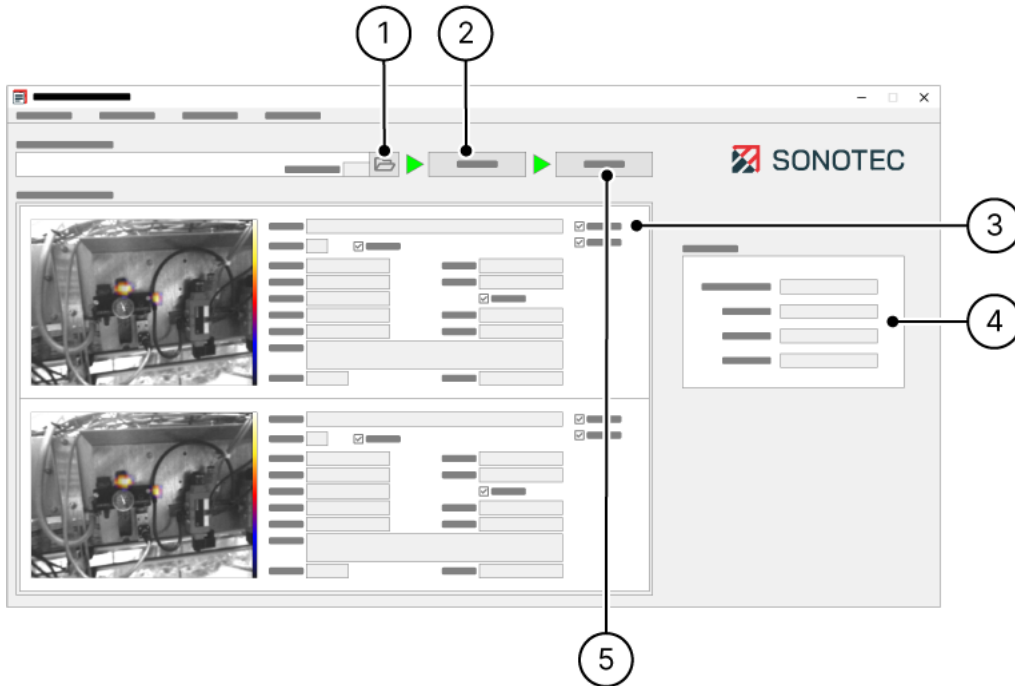
Creating a Report

Figure 12: User interface of the "LeakReport" computer software

1.   Select the directory with the particular measurements (1).
2.   Start the analysis (2).
3.   Check the measurement data of the individual measurements and if necessary, adjust them (3).
4.   View and evaluate the analysis result (4).
5.   Start report creation (5).
6.   Edit or enter the required report data (name and comment).
7.   Create the report.
      → The report is created as an Excel file and saved in the Excel template's directory.
      → The Excel file of the report is exported as PDF file and saved in the Excel template's directory.

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Report evaluation

SONOTEC has developed a process for classifying and estimating the total leakage losses of a system to the best of its knowledge and ability, based on flow acoustics methods. SONOTEC shall in no way be held liable for the results generated through the application of this process, nor for any decisions made on the basis of such results. All actions taken by the end user based on the results are the sole responsibility of the end user, who accepts full liability for any such actions.

Report content and layout are defined as follows in the Excel report template's worksheets:

Title page (CoverPage)	Content
	Report summary including: • meta data • loss calculation values (calculated according to the loss calculation settings) • outline of the measurements contained in the report according to the calculated priority including the determined leakage rate • diagram view of the measurements sorted by calculated priority • diagram view of the measurements sorted by determined leakage rate
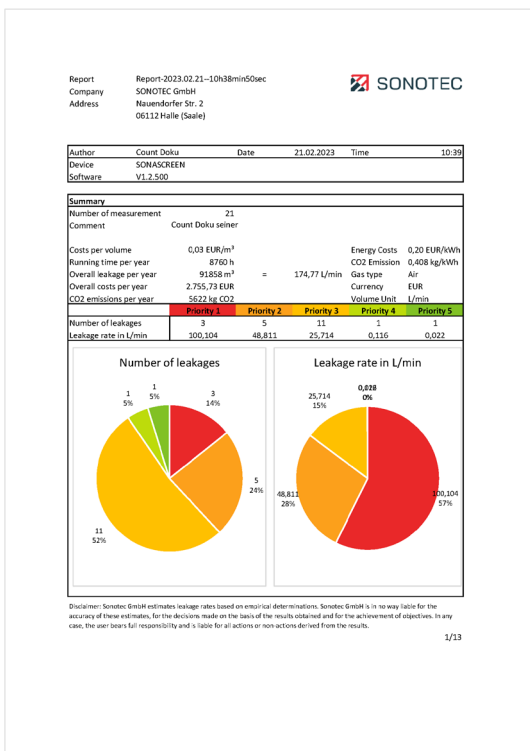
Summary page (Table)	Content

Summary of all measurements contained in the report including:

- name of measurement data file
- leakage rate in l/min
- loss in €/year (calculated according to loss calculation settings)
- priority level (calculated according to priority limit values settings)
- repair state (settings in the particular individual measurement)
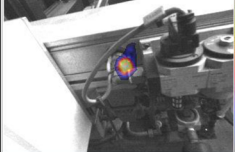
Detail page (Measurement)	Content
	Detailed view of individual measurements including the determined/set measurement data Per page, two individual measurements will be shown.

6.6 Turning off the device

Description

The device may be shut down and turned off either by the software or the On/off button.

Automatic turn off

If the turned-on device has not been in use for approximately 5 minutes, it will automatically turn off. Before automatic turn off, a dialog window appears with which the turn-off process may be confirmed or canceled.

Turning off by software

1. On the "Start" screen, tap the "Turn off" icon.
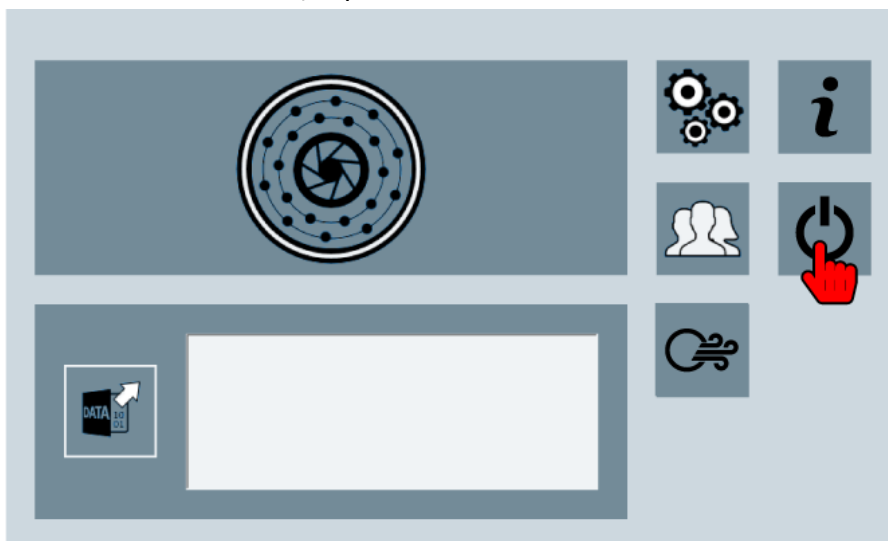
    → The device is shut down and turned off.

Turning off by On/off button

1. Press the On/off button and keep pressing for 3 seconds.
    → The device is shut down and turned off.

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7 Maintaining the system

This section contains instructions for maintenance and servicing of the device and the device software.

7.1 Updating the device software

Description

Updates of the device software may be downloaded from the mysonaphone.com web portal. For portal access, a registration is required.

Downloading the update file

1. Sign in to the mysonaphone.com web portal with your personal login details.
    → After successful sign-in, your personalized portal start page opens.
2. On the personalized start page, scroll down to the "Updates" section.
3. From the list of available update files, download the file with the "swupd" file extension to your personal computer.

Transferring the update file to the device

1. Transfer the downloaded update file from the personal computer to a USB storage medium.
2. Connect the USB storage medium to the device.
3. Open the "Configuration" screen.
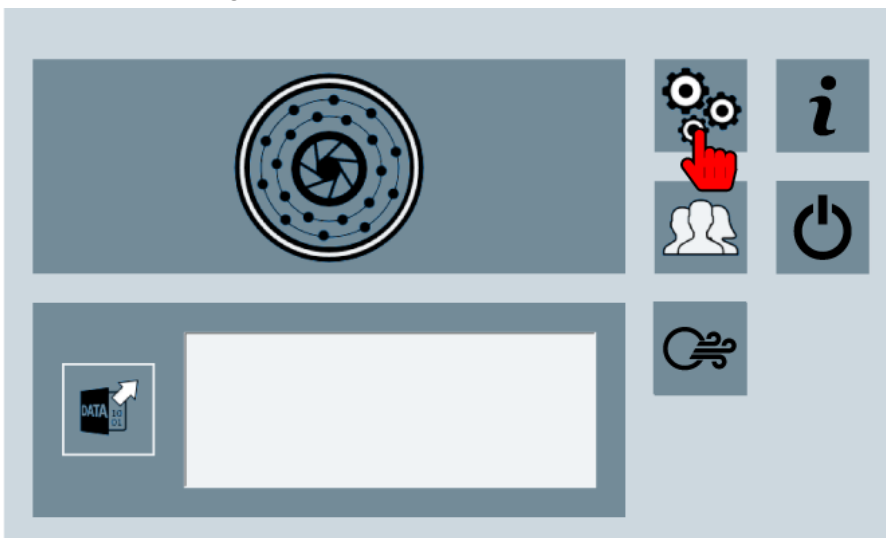
4. Tap the "Data management" icon.
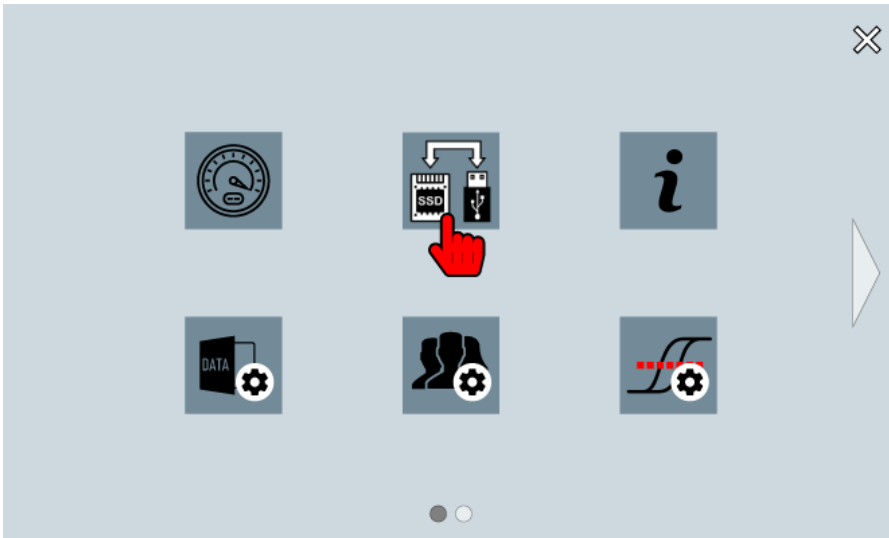
5. In the "Data management" screen, navigate to the update file in the right-side column (USB storage medium).

ⓘ Double-tap a folder to open it.

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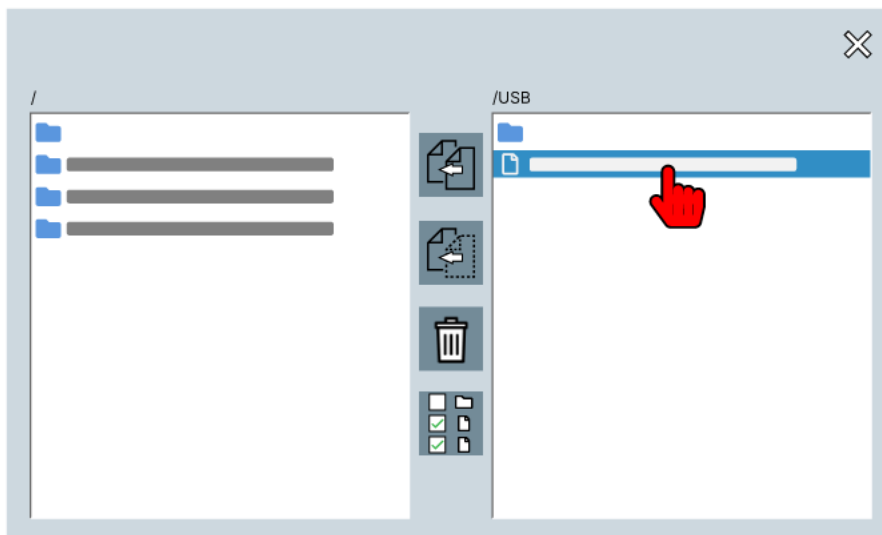
6.   Tap the "Copy" icon.
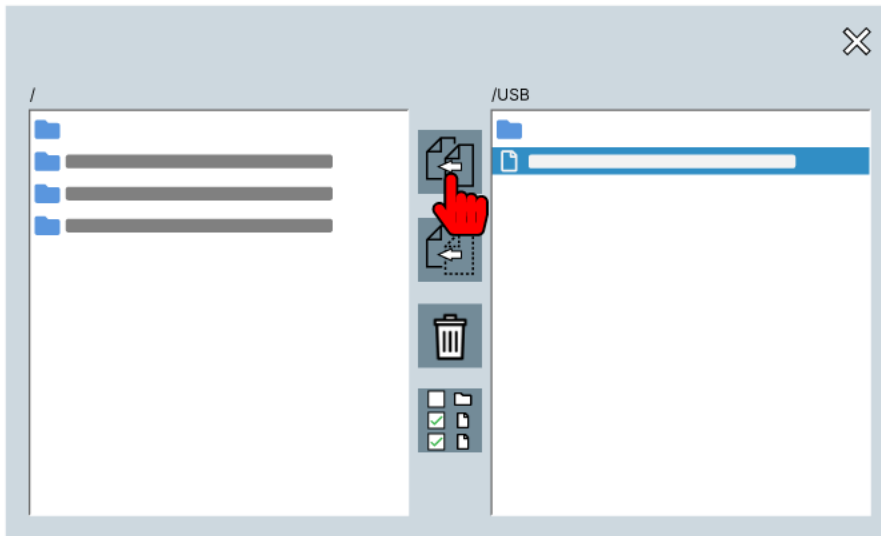
Installing the update on the device

1.   Connect the device to the power supply with the power supply unit.

> ⓘ **Mind the battery's state of charge!**
> For updating the device software, the battery's state of charge must be at least 20 %.

2.   Turn on the device.

3.   Open the "Support information and update" screen.
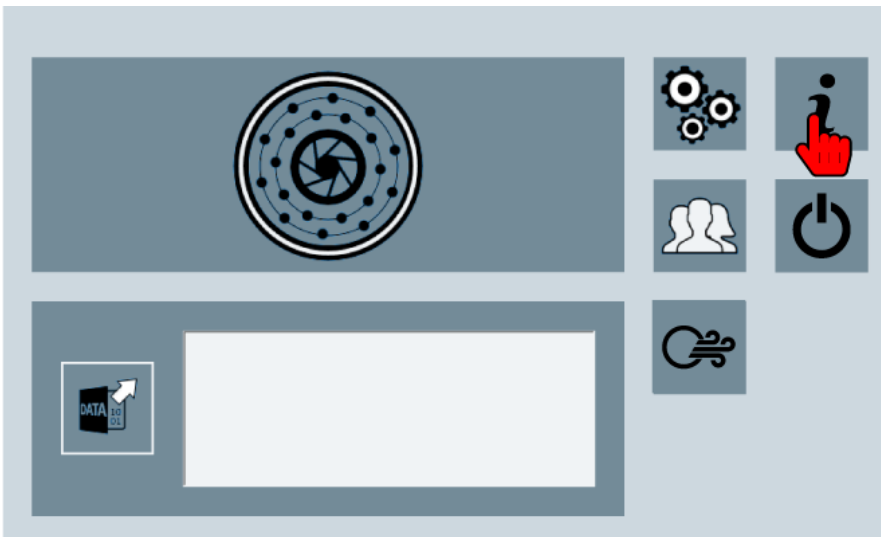
4. Tap the "Software update" icon.
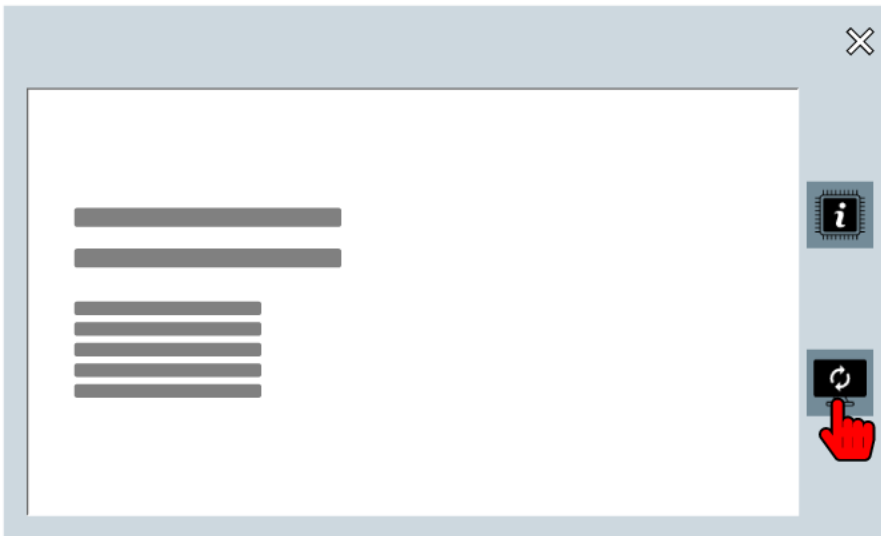
5. In the "File selection" window, navigate to the update file.
6. Mark the update file.
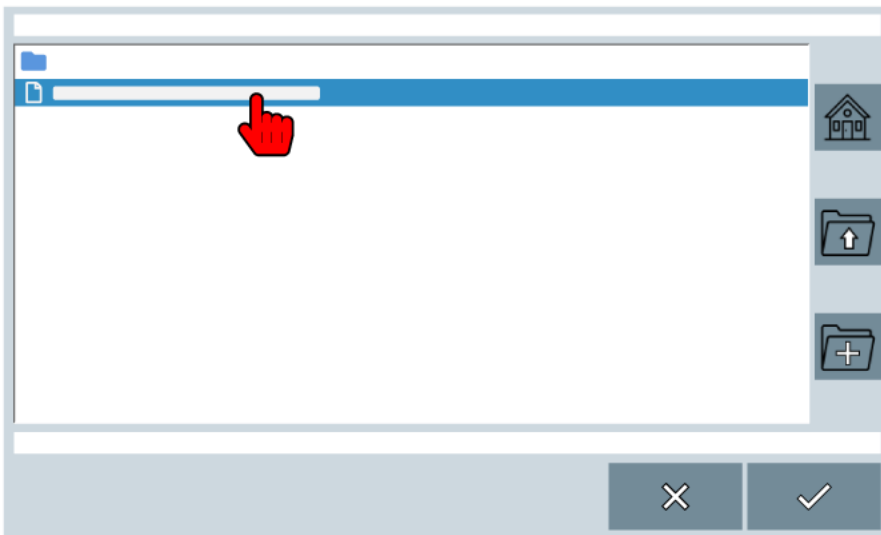
7. Tap the "Confirm" (✓) icon.
   → The update process is started.
   → After successful completion of the update process, a notification window opens.
8. In the notification window, tap the **Restart** button.

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7.2 Resetting the device

Description

If the device software cannot be executed, you need to reset the device to factory settings or the password has been forgotten, the device software may be reset with an integrated recovery program.

The recovery program:

- starts automatically if the device software has stopped being executable or
- may be started manually.

Starting the recovery program manually

1. Turn on the device.
2. During device start-up, keep the upper left function key pressed until the "Recovery" screen appears.
3. Tap the corresponding button to execute one of the following functions:

Function	Description/function
Shutdown	Ends the recovery program and turns off the device.
Full Reset	Replaces the installed device software and deletes all data saved on the device. These data include: • Configurations (including password) • User profiles • Measurement data • Screenshots
Partial Reset	Replaces the installed device software. Data saved on the device will remain.

7.3 Cleaning and maintenance

7.3.1 Cleaning

Guidelines

Do not open the product! The product contains no parts to be cleaned by the operator.

Suitable cleaning products

Only clean the product on the outside with soft, lint-free cloth.

ATTENTION

Check the compatibility of used cleaning agents!

The compatibility of all cleaning agents with used materials and colors must be confirmed and approved by SONOTEC GmbH or the respective supplier.

Unsuitable cleaning agents

Do not clean the product with:
*   scratchy, aggressive, solvent-containing or benzine-containing cleaning agents,
*   pressured air, high-pressure cleaner or other kinds of cleaning machine.

After cleaning

After cleaning the device, make sure that:
*   cables, connectors and fittings are free of cleaning agents and
*   cables, wires, connectors and electrical components are dry.

7.3.2 Maintenance

Guidelines

Do not open the device! The device contains no parts to be maintained or repaired by the operator.

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8 Storage

Specifications for storing the device

Store the device in a dry and clean place.

Observe the storage temperatures as specified under .

Only store the device with a fully charged battery.

Storage regulations

Battery charge	Storage time
100 %	200 days
10 %	20 days

Avoid deep discharge of the battery

If the battery of the device is not charged for a long period of time, it can become deeply discharged due to self-discharge. Since lithium-ion batteries must never become deeply discharged for safety reasons, the battery of the device is equipped with an irreversible protection circuit.

CAUTION

Chargeable repair of the device by the manufacturer required!

The irreversible protection circuit permanently deactivates the battery in case of deep discharge. This leads to the chargeable repair of the device.

- Make sure that the battery of the device is never deeply discharged.
- Make sure that the device is only stored with a charged battery.
- Regularly check the battery charge while storing the device.
- The device's battery may only be replaced by the manufacturer.

Rectifying deep discharge

If the battery is deeply discharged, please contact SONOTEC GmbH or its distribution partners to initiate appropriate repair.

ⓘ Please note that the repair of deeply discharged batteries is not covered under our warranty.

9 Troubleshooting

Potential error	Possible cause	Troubleshooting
After full reset, the "Leakage measurement" icon is not shown on the "Start" screen.	After full reset, all parameters and connections of the device software have been reset. The information that leakage measurements are possible with the device is stored in the device's hardware.	After full reset, the device software must connect again to the device hardware to receive and store all information required for leakage measurements. 1. Open the "Measurement" screen. 2. Start a measurement. 3. End the measurement. 4. Switch to the "Start" screen.

10 Technical data

General data	
Article number	SONASCREEN: 400 01 0233 SONASCREEN IR: 400 01 0243
Dimensions (L × W × H)	12.2 × 6.3 × 2.2 inch
Weight	3.3 lb

Electrical data	
Power supply	Charger (19 V, 4.7 A, 90 W max.)
Battery	Lithium-Ion battery (48 Wh)
Runtime	approx. 3.5 h (continuous operation)
Charging time	1,5 h (typical)

Connections and interfaces	
Data export	Socket USB 2.0 Type-A
Headphones	Jack socket 3.5 mm
Charger	Socket Binder M9
Control system	Socket Ethernet RJ45

Hardware	
Processor	ARM A53, 4 × 1.2 GHz
RAM	1 GB RAM
Device storage	32 GB
Display	Type: 10-point multi-touch capacitive Dimension: 7" Resolution: 800 × 480 Pixel

Hardware	
Sensor system (acoustic)	Microphones: 72 digital MEMS microphones
	Frequency range: up 100 kHz
	Sampling rate: 200 kHz
	Sound pressure level: 120 dB max.
	Resolution: 24 bit
Sensor system (optical)	Camera: digital
	Resolution: 320 × 240 pixels (at 50 fps) or 640 × 480 pixels (at 16 fps)
	Aperture angle: 70 °

Infrared sensor (in SONASCREEN IR)	
Spectral range	Longwave infrared, 8 ... 14 µm
Resolution	160 × 120 Pixel
Effective frame rate	8.7 Hz
Thermal sensitivity	< 50 mK
Measuring range	High Gain Mode: -10 ... 140 °C
	Low Gain Mode: -10 ... 400 °C (at room temperature) -10 ...450 °C (typical)

Software	
Device software	Linux
Computer software	Microsoft Windows (from Windows 7)

Ambient conditions	
Operating temperature	-4 ... +122 °F
Storage temperature	-22 ... +140 °F
Charging temperature	32 ... +113 °F
Protection type	IP54

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11 Disposal

Recycling and taking back of used equipment

Electrical and electronic devices may pose a risk to health and the environment if disposed of incorrectly. They cannot therefore be disposed of as domestic waste according to WEEE Directive 2012/19/EU (Waste Electrical and Electronic Equipment Directive). Instead they must be taken to designated collecting points or returned to the manufacturer.

The following symbol indicates the legal duty to dispose of electronic devices as stipulated.
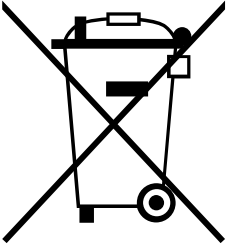
They must undergo specified recycling processes (e. g., with respect to batteries or circuit boards) which enable safe, environmentally compatible re-use or separate disposal of different device elements.

The return of used devices is regulated differently in different places. Find out from your local council about the return conditions for commercially used electronic devices. The device, including rechargeable battery, contains no toxic substances requiring separate identification for disposal such as mercury (Hg), cadmium (Cd), lead (Pb) or chrome 6 (e. g., in plated parts or circuit boards).

Removing the battery

According to legal requirements, batteries must be disposed of separated from their electrical devices. For self-dependent disposal at designated collection points, the batteries must be removed from the device.

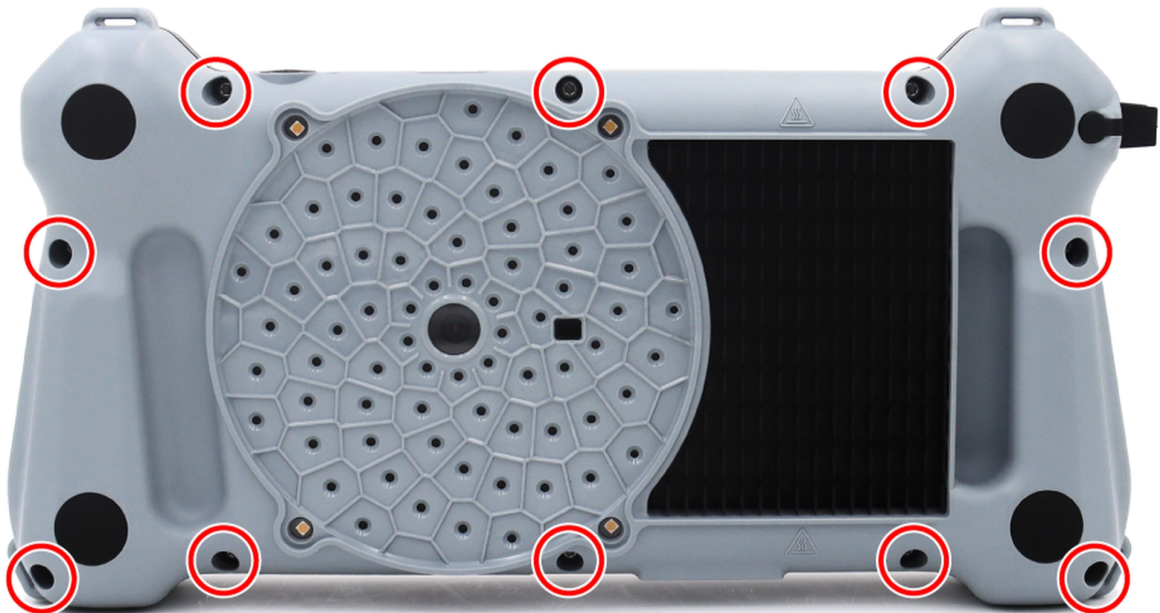**CAUTION**

Device damage and warranty voidance by opening the device!

Opening the device will damage it and render it unusable. This will void all warranty claims.

- Remove the battery only for the purpose of device disposal.

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1. Remove the ten screws from the housing cover.
   🔧 Screwdriver Torx TX10

2. Remove the housing cover.

   CAUTION – Do not tear off the cable.

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3. Remove the four screws of the microphone array.

🔧 Screwdriver Torx TX8
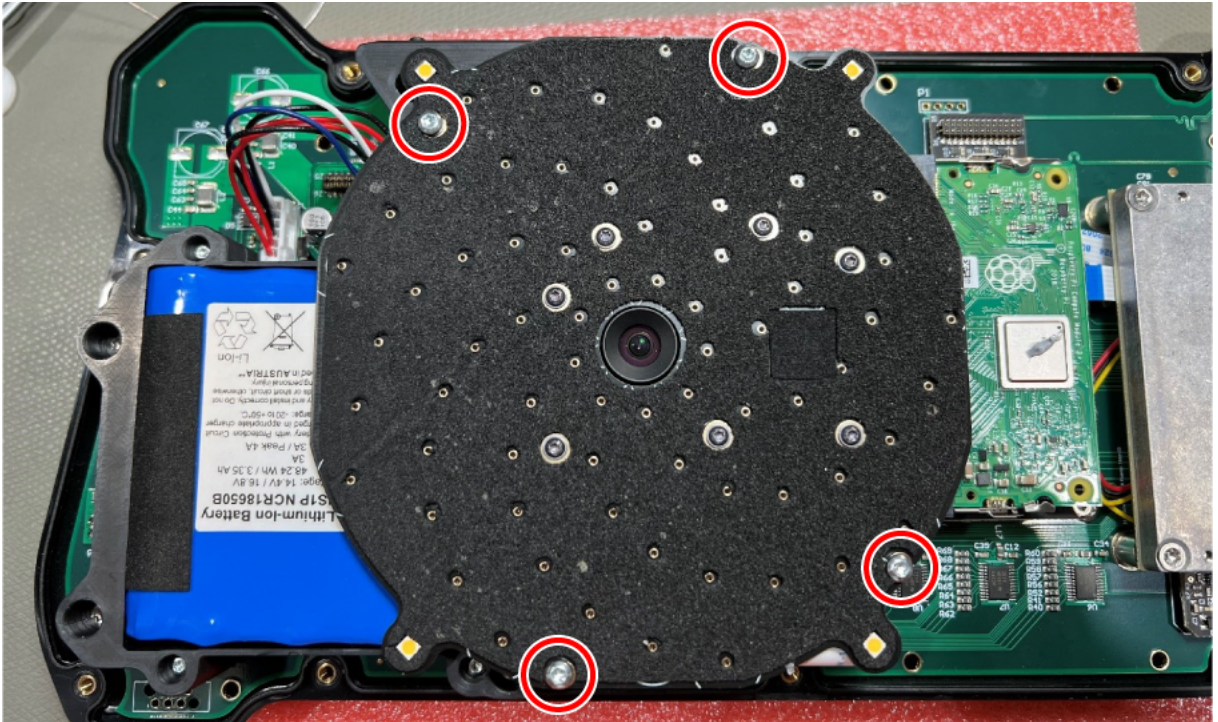
4. Fold the microphone array down.

> **CAUTION** – Do not tear off the cable.

5. Remove four screws of the battery holder.

🔧 Screwdriver Torx TX10

6. Remove the four remaining screws of the battery holder.
    🔧 Screwdriver Torx TX6

7. Remove the battery with holder from the device.
8. Remove the battery from the holder.
9   Dispose of the battery and device separately according to legal requirements.

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12 Warranty

Condition at delivery

All products and accessories have been tested thoroughly before they leave the factory, are state-of-the-art products at the time of delivery and adhere to all applicable safety regulations.

Warranty

During the warranty period, SONOTEC GmbH will eliminate all deficiencies caused by material or manufacturing faults free of charge. SONOTEC GmbH will at its own discretion offer warranty by reparation or replacement of faulty products.

Exceptions

Internal accumulators as well as damage caused by unintended use, by wear or by manipulation of the product are exempt from warranty. The warranty also does not cover those faults that affect value or usability of the product to a negligible amount.

Responsibility of the user/operator

It lies within the responsibility of the users to ensure that the product has been installed and set-up properly and is used in a manner that does not impair safe operation.

Operating errors

Operating errors can never be completely ruled out by the manufacturer. SONOTEC GmbH is in no way liable for any direct or indirect damage caused by operating errors (e.g. damage on software and/or hardware, damage by downtime, damage by malfunction as well as damage or loss of measurement and test data).

Quality of captured data

The determination of valid test results, their interpretation and the actions derived therefrom are exclusively subject to the personal responsibility of the users. SONOTEC GmbH does not guarantee the correctness of determined test values and/or test results. SONOTEC GmbH does not assume liability for any faults or damages that might occur due to further use of determined test and measurement values.

13 Manufacturer information

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Certifications and registrations

- Quality management according to ISO 9001:2015
  (Certificate Registration No.: 091006014)
- Registration according to ElektroG at the 'stiftung elektro-altgeräte register' (ear): WEEE Reg. No. DE 22125904

Contact

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