

# Basic Operating Instructions

## Professional Series

### Model P12 - P50 - P132 - P254

**Dear Customer,**

we would like to take this opportunity to thank you for purchasing the Seven Bel sound scanner (Professional Series). In order to maximize the outcome from your measurements, we ask you to read these instructions carefully before using this product.

The Seven Bel Team



A current version of the basic operating instructions can be downloaded from our homepage [www.sevenbel.com](http://www.sevenbel.com) in the user area.

## Contents

1	About this manual.....	4
2	Limitation of liability .....	4
3	Intended use / misuse .....	4
4	Operator qualification .....	5
5	Residual risks and safety measures .....	6
5.1	Personal protective equipment and organisational measures.....	6
5.2	What to do in an emergency .....	7
5.2.1	On the device .....	7
5.2.2	Safe handling and environmental conditions .....	7
6	Transportation, unboxing and storing .....	7
7	Cleaning and maintenance .....	8
8	Disassembly and disposal instructions .....	8
9	Scope of delivery.....	9
9.1	Sound Scanner P12 .....	9
9.2	Sound Scanner P50/P132.....	10
9.3	Sound Scanner P254 .....	11
9.4	Private Cloud Laptop.....	12
10	Getting started.....	13
10.1	Checking the compatibility of your mobile device .....	13
10.2	Charging the battery .....	13
10.3	Maintaining the software .....	13
10.4	User settings .....	14
10.5	Checking the data connection to the processing service .....	14
11	Measurement process .....	16
11.1	Best practice .....	16
11.2	Attach the sensor to the tripod .....	17
11.3	Mount the counterweight .....	20
11.4	Mount the mobile device.....	21
11.4.1	Smartphone holder.....	21
11.4.2	Tablet holder.....	23
11.5	Turn on sensor and check battery level.....	25
11.6	Record a measurement .....	26
11.6.1	Standard measurement mode.....	26
11.6.2	LIVE measurement mode .....	32

11.6.3	Reflection measurement mode (3D EchoTrack).....	35
11.6.4	High Speed measurement mode (Hi-Speed Capture) .....	37
11.7	Camera calibration.....	39
11.8	Deleting a measurement record.....	39
11.9	Managing projects .....	40
11.10	Exporting measurement records .....	42
11.11	Importing measurement records.....	42
12	Analyzing a measurement record.....	43
12.1	Viewing a measurement record .....	43
12.2	Understanding measurement values.....	44
12.3	Modifying acoustic image settings .....	44
12.4	Playback, fast forward and rewind audio/video.....	45
12.5	Analyzing the acoustic image in the frequency domain .....	46
12.6	Analyzing the acoustic image in the time domain.....	46
12.7	Analyzing the acoustic image in the time/frequency domain .....	49
12.8	Reporting .....	50
13	Appendix.....	52
13.1	Technical Specifications.....	52
13.2	Technical support.....	53
13.3	Safety instructions .....	54
14	Declaration of conformance – Sensor P12 / P50 / P132 / P254.....	58
15	Declaration of conformance - Accessories .....	60
15.1	Laser distance meter.....	60
15.2	Loudspeaker.....	61
15.3	USB AC Adapter .....	62
15.3.1	Type A (USA, Canada) .....	62
15.3.2	Type C (Europlug) .....	62
15.4	Ultrasound Transmitter .....	63

## 1 About this manual



These operating instructions contain information and important notes on commissioning and handling sound scanners of the Professional series (models P12, P50, P132 and P254). The operating instructions are part of the device and must not be removed.

Keep them for later use and enclose these instructions with the device if they are passed on to third parties!

Please observe the safety instructions!

Read these instructions carefully before commissioning. Proper handling is made easier for you, misunderstandings and possible damage are prevented. Follow the warning and safety information. Failure to do so can result in serious injury.

## 2 Limitation of liability



All the information and notes in these operating instructions have been compiled taking into account the applicable regulations, the state of the art and our many years of knowledge and experience. These operating instructions must be read carefully before starting any work on and with the device! The manufacturer assumes no liability for damage and malfunctions resulting from non-compliance with the operating instructions. The textual and pictorial representations do not necessarily correspond to the scope of delivery. The illustrations and graphics do not correspond to the scale 1: 1. In the case of customized designs, additional order options or latest technical changes, the actual scope of delivery may differ from the illustrations as well as the information described here. If you have any questions, please contact the manufacturer. We reserve the right to make technical changes to the product in the context of improving the usage properties and further development.

For better readability, there is no gender-specific distinction. Corresponding terms in the text refer to both genders according to country-specific Equal Treatment Acts.

This document is protected by copyright and serves exclusively the purpose contractually agreed between Seven Bel GmbH and the customer / product manufacturer (possibly the operator). Any use beyond this, including reproductions in any kind and form - even partially - as well as the exploitation, communication and / or transmission of its content or parts thereof are not permitted without written approval from the author. Violations oblige you to pay damages. We reserve the right to make further claims.



### Note

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## 3 Intended use / misuse



The sound scanner of the Professional series by Seven Bel is a precision measurement instrument for the visualization of sound. The device is only to be used in the area of observational measurement and analysis of noise emissions from products and

processes. Under no circumstances may the device be integrated into products as a sensor or used for existing monitoring systems in safety-critical processes.



**Warning: When making an electrical connection, all local electrical safety measures, standards and regulations must be observed. The use of a residual current circuit breaker is strongly recommended**

Type	Professional Series, models P12/P50/P132/P254
Electrical connection of sensor	1 x USB Micro AB
Electrical connection for charging	100-240V/AC, 50/60Hz
Maximum electrical power	10 W

## 4 Operator qualification



This manual contains the information required for the intended use of the described products. It is aimed at technically qualified personnel.

Qualified personnel are persons who, due to their training, experience and instruction as well as their knowledge of the relevant standards, regulations, accident prevention regulations and operating conditions, have been authorized by the person responsible for the safety of the system to carry out the required activities and can recognize and avoid possible dangers.

Operator qualification in the different product life phases of transport, normal operation, malfunction, cleaning:

Skilled workers with knowledge of electrical engineering or mechatronics, semi-skilled auxiliary staff with knowledge of electrical engineering, mechatronics and mechanical engineers.

The use of the device by young people under the age of 18 is not permitted. Apprentices and trainees aged 16 and over may only operate the device with a trainer who must always be present. Country specific Child and Youth Protection Acts, Vocational Training Acts, School Organization Acts and School Education Acts apply.

## 5 Residual risks and safety measures



### Warning!

Fire hazard.

Failure to observe can result in death, severe physical injury or physical damage.

The sensor unit contains a lithium polymer battery with a nominal capacity of 750mAh.

- Do not charge the sensor outside of the following environmental conditions:
  - Temperature: +5°C - +40°C
  - Relative humidity: 45% - 85%
- Do not operate the sensor outside of the following environmental conditions:
  - Temperature: -10°C - +60°C
  - Relative humidity: 45% - 85%
- Do not expose the sensor unit to rain, moisture or splashing
- Do not remove screws and covers.



### Warning!

Hazardous voltage.

Failure to observe can result in death, severe physical injury or physical damage. Before commissioning it must be checked whether the nominal voltage range of the charger corresponds to the local mains voltage.

### 5.1 Personal protective equipment and organisational measures

a. New employees or leasing personnel or the like must be instructed before the device is put into operation.



b. The operating instructions must be read before commissioning. In the case of third parties, training and instruction must be documented in written form. Third parties are people who are used to provide support. The instruction must include the workers safety regulations, the handling of the device, all possible dangers etc. The environmental conditions and peculiarities of the environment etc. must also be discussed. It is essential to explain all necessary protective measures and to indicate their location



c. The working environment must be free of any obstacles.

d. **Before each operation of the equipment, special attention must be paid to the condition and potential damage of the device. Contact the manufacturer in the event of obvious damage.**



- e. **Any repairs or manipulation of any part, especially the electronics unit, are prohibited and release the manufacturer from any liability and guarantee. This also applies to all mechanical and electrical changes to the device.**

## 5.2 What to do in an emergency

### 5.2.1 On the device

Not applicable.

### 5.2.2 Safe handling and environmental conditions

The sensor is a precision measuring instrument. Do not drop the sensor or subject it to shock.

The sensor is not waterproof. If you accidentally bring the sensor into contact with water, please contact the manufacturer.

If the sensor is suddenly moved from a cold to a warm environment, condensation may form on the sensor and its internal parts. To avoid condensation, first place the sensor in a sealed plastic bag and allow the sensor to adjust to the warmer temperature before removing it from the bag.

If condensation forms on the sensor, do not use it. This is to avoid any damage to the sensor.

The battery can be charged via the sensor's USB port. Do not charge the sensor using the supplied power adapter in the following situations:

- Rain in the open, free environment
- Wet conditions and moisture in interior spaces

Do not use any other USB connection cable and power supply than the supplied or original spare parts.

Please Note the environmental conditions in section 5.



### **Safety note:**

The operation of this device is associated with residual risks and dangers. It is essential that the operator complies with the operating instructions (see also intended use), operator qualifications, safety instructions and required protective equipment, the operating instructions of the operator and the national accident prevention regulations. **Any operation that affects safety is to be avoided.**

## 6 Transportation, unboxing and storing



The device may only be transported using the supplied carrying case.

## 7 Cleaning and maintenance



- Do not use aggressive cleaning agents, rubbing alcohol or other chemicals, as these could lead to the sensor's loss of function and destroy its enclosure.
- Disconnect the sensor from the charger before starting cleaning.
- Do not immerse the sensor in water.
- Maintenance and repair shall only be conducted by the manufacturer. There are no parts and components inside the sensor that require maintenance. Therefore, do not open or disassemble the sensor.
- A dry, soft and clean cloth should be used for cleaning. Do not press the cloth too firmly onto the enclosure parts as this may lead to scratch marks.
- Dust can be easily removed with a soft and clean brush.

## 8 Disassembly and disposal instructions



If the device is no longer usable and is to be scrapped, it must be deactivated and dismantled, i.e. it must be brought into a state in which it can no longer be used for the purposes for which it was designed. The scrapping process must keep an eye on the recovery of the basic materials of the device. These materials can possibly be reused in a recycling process.

The manufacturer declines any responsibility for any personal injury or damage to property that may result from the reuse of device parts if these parts are used for anything other than their original purpose.

Electronic devices are recyclable and do not belong to household waste. Dispose of the product at the end of its service life in accordance with the applicable legal regulations.

In doing so, you meet the legal obligations and make your contribution to the protection of the environment.



## 9 Scope of delivery

Make sure that the parts listed below are included in the measurement case. If something is missing or if you want to order spare parts in case of loss or damage, please contact Seven Bel, see section 13.2.

### 9.1 Sound Scanner P12

ID	Description	Quantity	Spare part number
01*	Carrying case P12	1	1000320
02*	Tape measure	1	N/A
03*	Mobile device (Smartphone)	1	1000210
04*	Accessories	1	1000077 (medium spacer) 1000078 (large spacer) 1000095 (USB AC Adapter) 1000214 (USB-C Adapter) 1000096 (USB Micro B cable) 1000084 (Allen key) 1000295 (Allen key) for tablet holder
05*	Laser distance meter	1	1000185
06	Sensor P12	1	1000302
09*	Sensor holder with grip handle	1	1000334
10*	Tripod	1	1000094
11*	Tripod case	1	1000335
12*	Loudspeaker	1	1000186
13*	Ultrasonic Transmitter	1	1000327

\* depending on actual order.

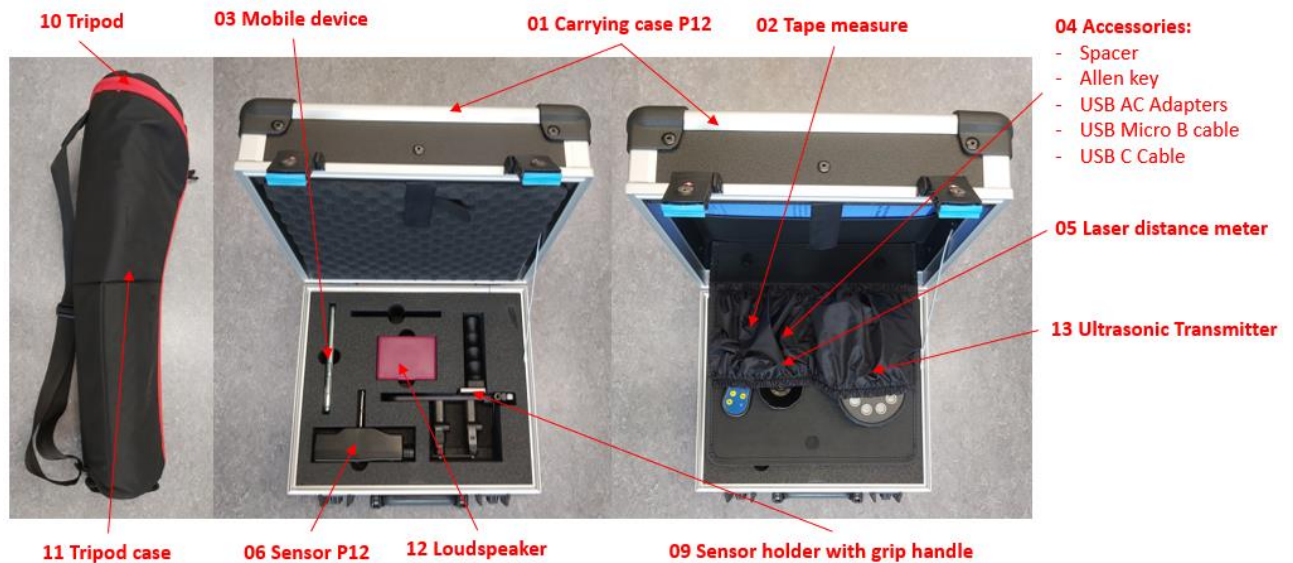


Figure 1 Scope of delivery.

## 9.2 Sound Scanner P50/P132

ID	Description	Quantity	Spare part number
01	Carrying case	1	1000089
02	Tape measure	1	N/A
03*	Mobile device (Smartphone or Tablet)	1	1000210 (Smartphone) 1000293 (Tablet)
04	Accessories	1	1000077 (medium spacer) 1000078 (large spacer) 1000095 (USB AC Adapter) 1000214 (USB-C Adapter) 1000096 (USB Micro B cable) 1000084 (Allen key) 1000295 (Allen key) for tablet holder
05	Laser distance meter	1	1000185
06*	Sensor P50	1	1000083
07*	Sensor P132	1	1000112
08*	Sensor counterweights	2	1000192 (P132) 1000193 (P50)
09*	Sensor holder	1	1000226 (for smartphone) 1000227 (for tablet)
10	Tripod	1	1000094
11	Loudspeaker	1	1000186

\* depending on actual order.

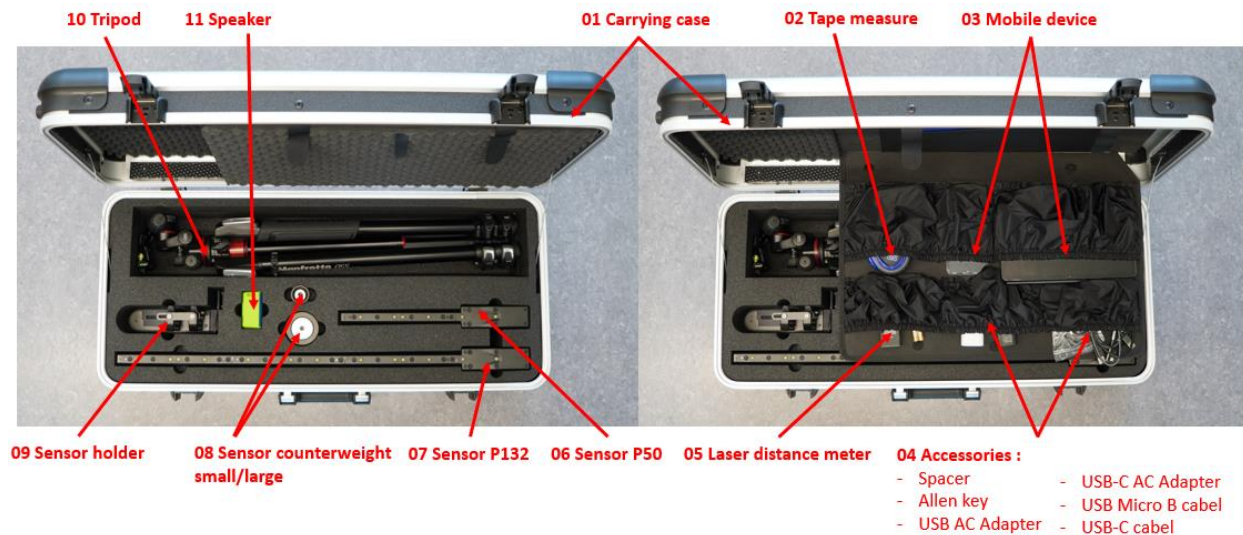


Figure 2 Scope of delivery (tablet device).

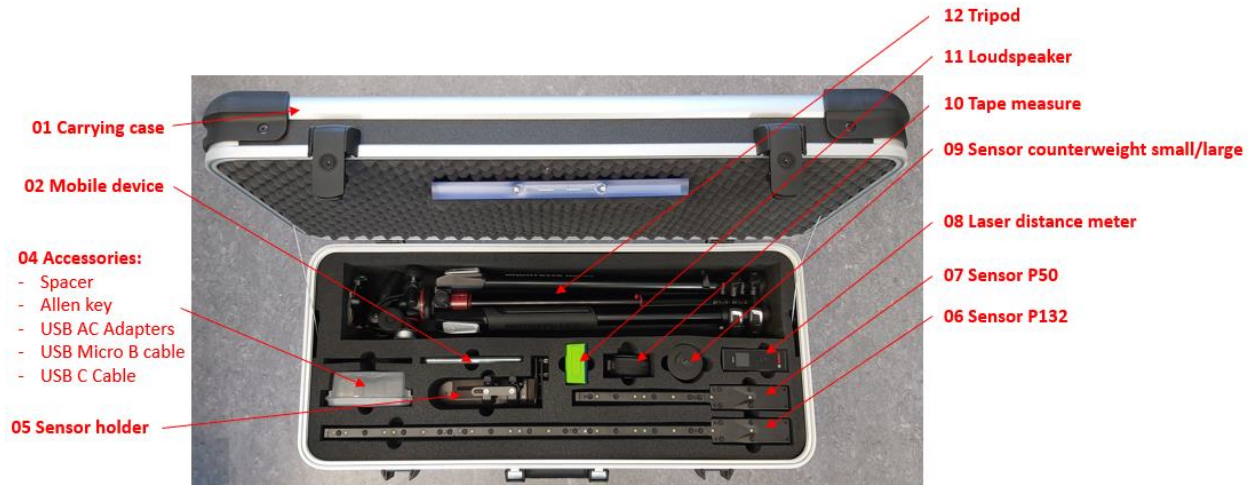


Figure 3 Scope of delivery (smartphone device).

### 9.3 Sound Scanner P254

ID	Description	Quantity	Spare part number
1	Carrying case P254	1	1000321
2	Counterweight bar	1	1000322
3	Sensor P254	1	1000306



Figure 4 Scope of delivery.



## 9.4 Private Cloud Laptop

ID	Description	Quantity	Spare part number
01	Private Cloud laptop incl. power supply	1	1000336
02	Private Cloud Wi-Fi router incl. power cord and Ethernet cable	1	1000337
03*	Laptop bag	1	1000338
04*	Laptop case incl. inlays for sensors P12 & P50 and accessories	1	1000376

\* depending on actual order.



Figure 5 Scope of delivery – Private Cloud laptop bag.

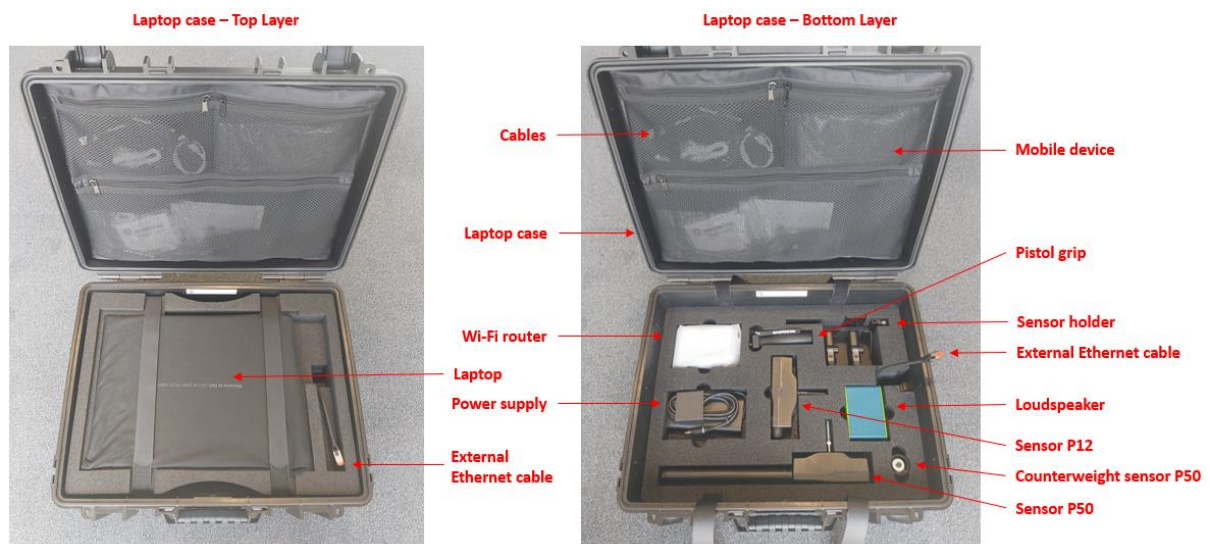


Figure 1 Scope of delivery – Private Cloud laptop case.

## 10 Getting started

### 10.1 Checking the compatibility of your mobile device

To operate the measurement system, you need a mobile device with the following specifications:

- Android OS version 10.0 or higher
- Availability of a back-facing optical camera
- Maximum width of 90mm for smartphones

### 10.2 Charging the battery

The sensor's battery is not charged initially. Charge the battery before use by connecting the USB micro-B plug to the USB port of the sensor and connecting the corresponding AC adapter to a wall socket. The orange indicator light on the control panel of the sensor lights up as soon as the battery is charged. The indicator light goes out when the battery is fully charged. When the battery is fully charged, the sensor can be operated for up to 4 hours.

### 10.3 Maintaining the software

The mobile app is an Android application that is compatible with mobile devices meeting the specifications in Section 10.1. The mobile app enables your mobile device to:

- acquire sensor data from the sensor unit,
- forward sensor data to the cloud for image processing and
- obtain results that can be visualized and analyzed.

You received a Software Maintenance Guide with instructions for maintaining all software components of your system. Depending on the ordered configuration, the following software components need to be maintained:

- Mobile App
- Desktop App (optional)
- Private Cloud Backend (optional)

If you have not received the guide, please contact Seven Bel, see section 13.2.

## 10.4 User settings

When you open the mobile app for the first time, a welcome message will be displayed on the main page.

Press the "Settings" icon (gear in the upper right corner of the main page) to navigate to the "Settings" page. On this page you can enter a username.

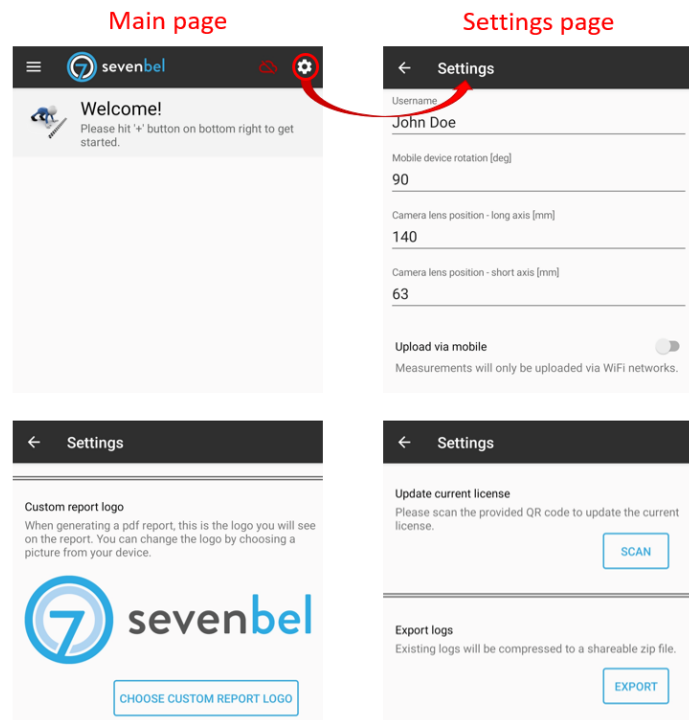
If you want to use a WiFi connection only for your cloud data exchange, deactivate the "Upload via mobile" option.

You can change the logo which is displayed in the automatically generated report by pointing to a file containing your own company logo.

In case you need to share error logs with our technical support, click on "Export logs" and use any of the connected apps to share the log file, e.g. file manager or email client.

**NOTE: Depending on your cellular plan, you may incur additional charges for transferring data between your mobile device and the cloud. The typical data volume for a 30-second video is in the range of ~ 300 MB.**

Return to the main page by clicking the back arrow in the top left corner.



## 10.5 Checking the data connection to the processing service

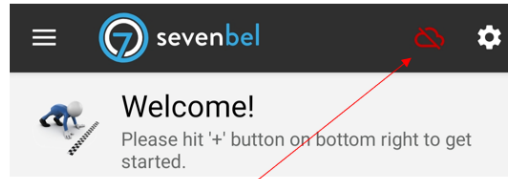
When you open the mobile app or finish a measurement, the mobile app tries to connect to the processing service.

If you use a public cloud configuration, the connection to the Internet is established via an Internet capable WiFi access point or the cellular network.

**NOTE: A connection to the cellular network is only established if an internet-capable WiFi access point is not available and you have authorized the mobile app to use the cellular network, see section 10.4.**

In case you use a private cloud configuration, the mobile app tries to connect to the non-Internet capable WiFi access point SEVEN BEL PRIVATE CLOUD. Please make sure that the router is powered up and properly connected to the private cloud laptop.

If a connection cannot be established, a red cloud icon appears in the top right corner of the screen. Press the red cloud icon and the app will ask you to establish the connection manually. To do this, press "CONNECT" to be forwarded to the Wi-Fi settings of your mobile device, or "NOT NOW" if you want to continue without a data connection.



**Request cloud connection**

*Figure 6 Request cloud connection by pressing red cloud icon.*

If you continue without a data connection, you can open the dialog again later by pressing the red cloud icon.

## 11 Measurement process

### 11.1 Best practice

In order to produce high quality acoustic images and to maximize the outcome of your measurements, there are a few basic principles that you should consider. The following list does not claim to be complete. However, following these simple rules will avoid situations in which measurement results might be misinterpreted.

#### 1. Focus on what you want to analyse

A typical industrial setting has multiple distributed noise sources, e.g. air conditioning, pass-by noise, conversations, noise from machines and / or processes outside the field of view of the optical camera, etc.

- Try to turn off noise sources that you know will not be of interest to your analysis, especially sources outside of the field of view.
- Do not have any conversations during the measurement. Not just you, but other people around you as well.

#### 2. Simplify the measurement task

Analyzing complex machines with many different processes and components can turn into a nightmare, even with the most modern analysis tools. Try to divide the analysis into several individual measurements, with each measurement focusing on a specific characteristic of your machine / device / process. Finally, compare the sound pressure level of the individual contributions in a defined frequency range.

E.g. a laptop PC makes noises due to vibrating control panels when operating the hard drive and fan. Disconnect the fan to see / hear the contributions from the hard drive.

#### 3. Assess the environment

An anechoic chamber is not available in most practical situations. However, avoid measuring in reverberant, narrow rooms, as the acoustic image may be overlaid by wall, ceiling and floor reflections that can lead to misinterpretations.

If you are faced with such a challenging measurement environment, distribute sound absorbers on the sides of the measurement scene and behind the sensor unit in order to dampen reflection paths.

#### 4. Find the right balance

The positioning of the measuring device is crucial in order to bring as many sources of interest as possible onto the image plane while maintaining a good signal-to-noise ratio. If you are too far away from your target, the audio signal becomes weaker, and the signal-to-noise ratio drops. If you are too close, you may only see part of your target.

- Ideally, you should have a sound pressure level of more than 40 dB (A) at a distance that covers the entire target.



- Try to have the measurement object and a small portion of its surroundings on the optical image. Some sources may appear in places that are initially unexpected, e.g. noise emanating from the underside of a machine due to leaks in floor panels.

## 11.2 Attach the sensor to the tripod

Perform the following steps to attach the sensor to the tripod and to remove it from the tripod after the measurement is complete:

### 1. Setting up the tripod

Unlock the clamps on the tripod legs and adjust the length of the extendable tripod legs so that the tripod rests stable on the floor. Pull out the extendable column of the tripod to its maximum height by loosening the corresponding clamping screw and press the red release button on the front. Then fold the stand column by 90 ° and fix it again with the clamping screw, see Figure 7.



Figure 7 Setting up the tripod.

Then swivel the tripod head upwards by loosening the locking screw and tightening it again as soon as the head is horizontal, see Figure 8.



Figure 8 Setting up the tripod.

**NOTE:** When setting up the tripod for the P254 sensor, please make sure that the tripod legs are fully extended and that the column is extended such that sufficient horizontal clearance is provided. Align and center the extendable column between the tripod legs when viewed from the top, see Figure 9.

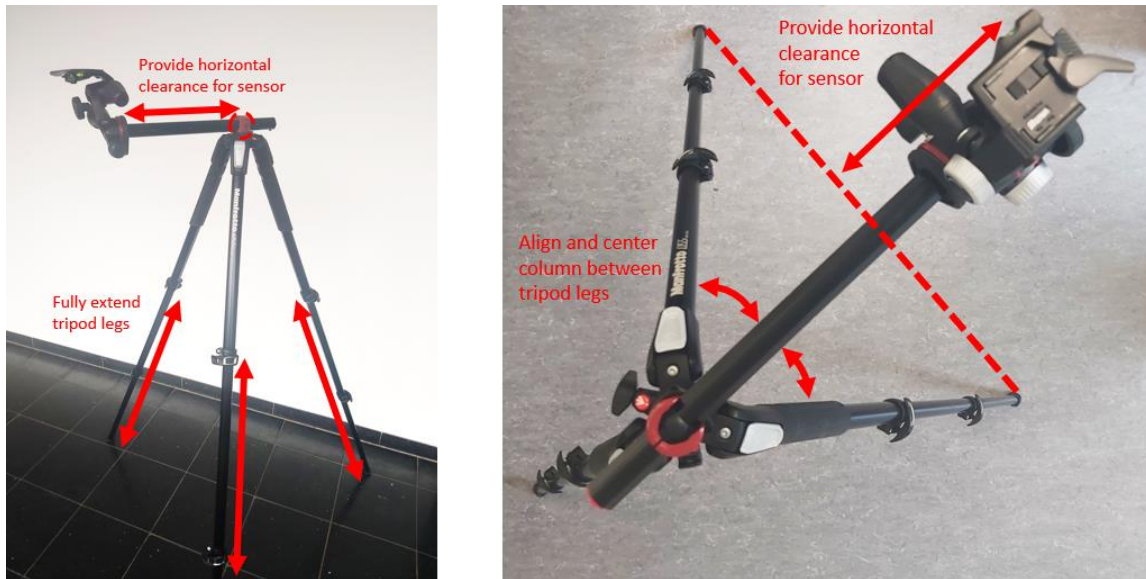


Figure 9 Fully extend tripod legs for sensor P254 and provide horizontal clearance by pulling out the extendable column (left), align extendable column between tripod legs (right).

## 2. Mounting the sensor holder

Open the quick-release lever of the tripod head by pressing the locking aid down with your thumb and turning the quick-release lever counter-clockwise with your index finger. As soon as the quick release lever cannot be moved any further, release the locking aid first and then the quick release lever. The sensor holder has a removable plate on the underside. Insert the sensor holder into the tripod head. You will hear a clicking sound as soon as the quick-release lever engages, see Figure 10. Verify that the sensor holder sits firmly on the tripod head.



Figure 10 Mounting the sensor holder.

### 3. Mounting the sensor

Insert the sensor shaft into the sensor holder. The sensor shaft and the sensor holder both have an orientation key. Turn and slide the shaft in the direction of the sensor holder until the orientation keys interlock and the sensor is fully inserted, see Figure 11.

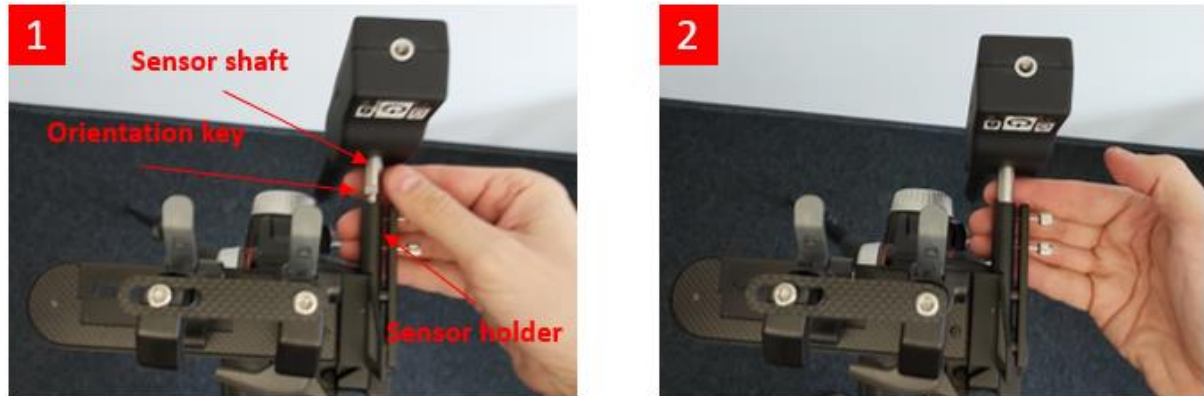


Figure 11 Mounting the sensor.

Fasten the two captive screws to secure the position of the sensor shaft, see Figure 12.



Figure 12 Fasten the captive screws to secure the position of the sensor.

### 4. Removing the sensor

Remove the sensor shaft from the sensor holder by pulling

- loosening the two captive screws so that they are not in contact with the sensor axis, and
- pull the sensor out of the sensor holder.

### 5. Removing the sensor holder

Open the quick release lever of the tripod head and remove the sensor holder from the tripod.

### 11.3 Mount the counterweight

The counterweight is used to manually put the sensor in motion and to allow for a dynamically balanced rotation. Screw the counterweight into the female thread located at the short end of the sensor, see Figure 13.

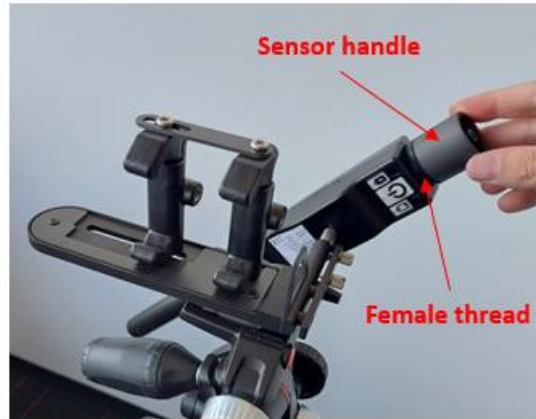


Figure 13 Mounting the counterweight.

**NOTE:** When fastening the counterweight of the P254 sensor, gently screw the counterweight bar into the female thread with the sensor vertically aligned. Eventually tighten the connection by holding the sensor housing and turning the counterweight bar, see Figure 14.



Figure 14 Tighten the connection by holding the sensor housing and turning the counterweight bar.



## 11.4 Mount the mobile device

Perform the following steps to attach / remove your mobile device to / from the device holder:

### 11.4.1 Smartphone holder

#### 1. Insert smartphone

Mount the smartphone in the holder by lifting the clamps (gray levers in the unlocked position) and insert the smartphone in a horizontal orientation (landscape), see Figure 15. The camera lens on the back of the smartphone is pointing at the object to be measured. Check that the reference point specified in Section **Fehler! Verweisquelle konnte nicht gefunden werden.** is in contact with the horizontal mechanical stop of the sensor bracket, see Figure 15.

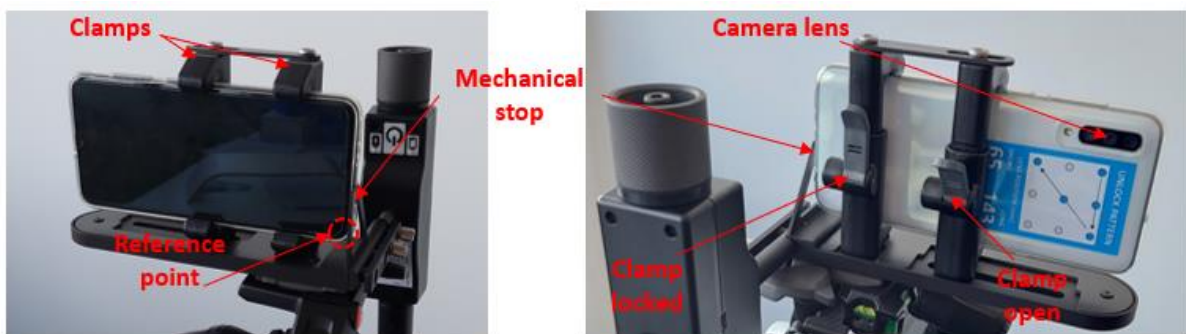


Figure 15 Insert the mobile device in the holder and check its orientation.

Push the gray levers on the device holder into their locking position, see Figure 15 on the right.

#### 2. Remove smartphone

Remove your mobile device from the device holder by opening the gray levers and lifting the clamps.

If the clamps on the top and / or bottom overlap the control buttons on your mobile device, follow the step below to reposition the movable clamp:

#### 3. Loosen the movable clamp

Use the supplied Allen key and loosen the screw of the movable clamp on the underside of the device holder, see Figure 16.



Figure 16 Loosen the screws on the movable clamp

Use the supplied Allen key to remove the two screws that connect the spacer to the two clamps, see Figure 17.

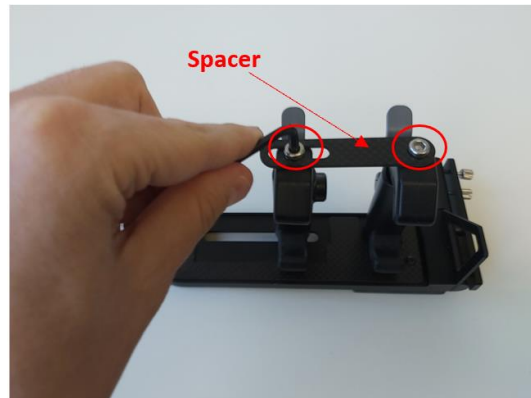


Figure 17 Loosen the screws to remove the spacer from the clamps.

#### 4. Reposition the movable clamp

Slide the movable clamp into a position where it no longer overlaps with the control buttons on your mobile device.

#### 5. Fasten the movable clamp

Tighten the screw of the movable clamp on the underside of the holder. Use one of the supplied spacers that are suitable for the new distance between the two clamps and attach it to the clamps with the two screws you removed earlier.

## 11.4.2 Tablet holder

### 1. Insert tablet

Loosen the two locking screws and the fixation screw. Lift the clamps and move the tablet fastener outward. Insert the tablet with portrait orientation and the camera lens position at the bottom right when looked at from the front, see Figure 18 on the right. Place the tablet in the holder such that it is in contact with the horizontal mechanical stop, see Figure 18, on the left. As a precautionary measure, always use the tablet fastener to prevent the tablet from slipping and tighten the fixation screw firmly.



Figure 18 Insert the Tablet and verify its orientation.

Make sure the screws are properly tightened and the tablet is securely fastened.

### 2. Remove Tablet

Remove the tablet from the holder by loosening the locking screws and the fixation screw, then lift the clamps and remove the tablet.

If the clamps on the top and / or bottom overlap the control buttons of your mobile device or if the camera field of view is impaired, proceed as follows to reposition the movable clamp:

### 3. Loosen the movable clamp

Use the enclosed Allen key and loosen the screw of the sliding clamp on the underside of the device holder, see Figure 19.



Figure 19 Loosen the screw of the sliding clamp.

### 4. Remove spacer

Use the supplied Allen key to loosen the screw that connects the spacer to the clamp, see Figure 20.

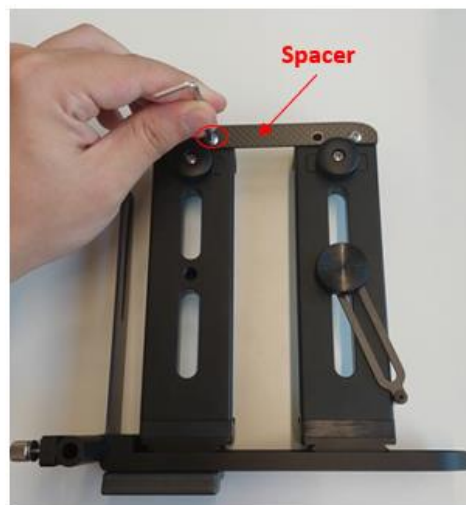


Figure 20 Loosen spacer by loosen the screws.

### 5. Reposition the moveable clamp

Slide the movable clamp into a position where it no longer overlaps with the control buttons on your mobile device.

### 6. Fasten the moveable clamp

Tighten the screw of the sliding clamp on the underside of the holder, see Figure 19 and fasten the screw that connects the spacer to the clamp, see Figure 20.



### 11.5 Turn on sensor and check battery level

Press the On / Off button on the control panel of the sensor, see Figure 21 Control panel of the sensor. A green indicator light above the On / Off button lights up. If this is not the case, the battery is probably empty and needs to be charged, see 10.2.

If the battery level is low, a red indicator light above the "Battery level low" symbol lights up when the sensor is switched on, see Figure 21 Control panel of the sensor.. You should charge the battery, if you continue with performing measurements in this state, the measurement can be aborted, and associated measurement data gets lost.

**NOTE: If the on/off indicator light does not light up when you repeatedly press the on/off button and the indicator light does not light up when charging the battery, please contact Seven Bel, see Section 13.2.**

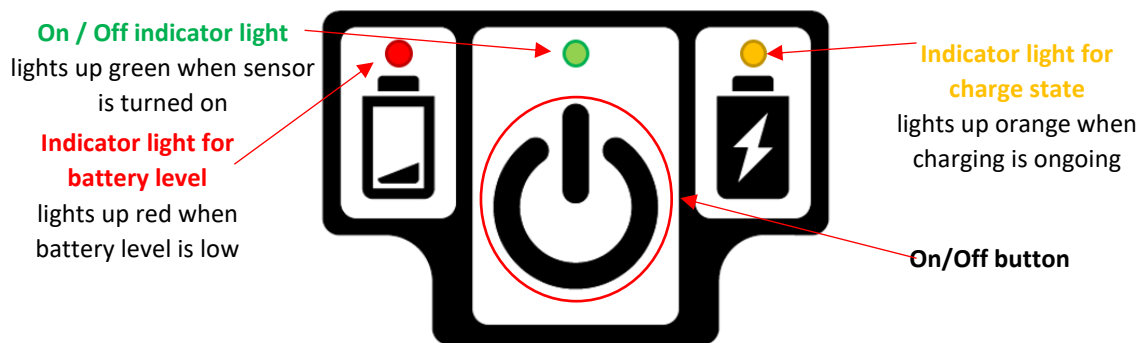



Figure 21 Control panel of the sensor.

## 11.6 Record a measurement

Press  on the main page of the mobile app to select one of the available measurement modes:

- Standard (includes LIVE mode)
- Reflection (3D EchoTrack)
- High Speed (Hi-Speed Capture)

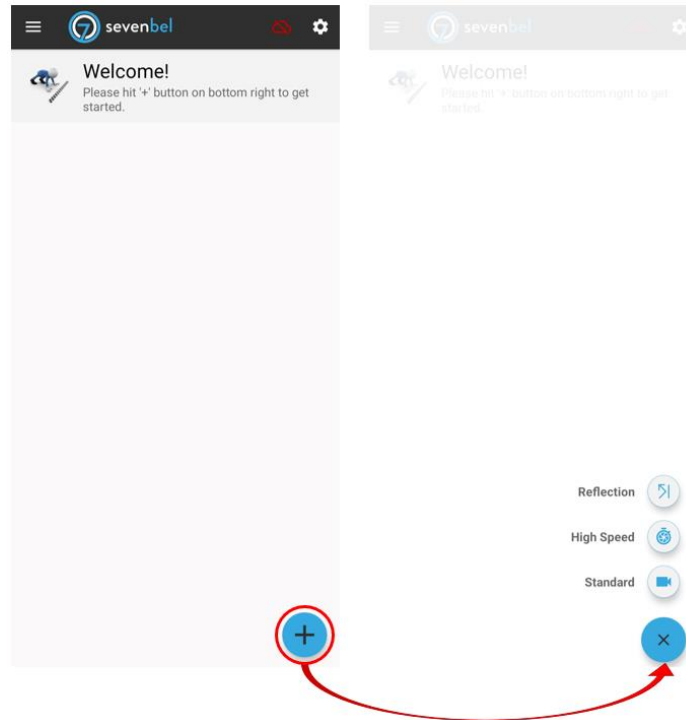


Figure 22 Press the '+' icon to start a new measurement and select from one of the available measurement modes.

**NOTE: The Standard measurement mode is always available while other specialty measurement modes may be available depending on your software license.**

### 11.6.1 Standard measurement mode

Select the sensor you want to connect to in the corresponding dialogue.

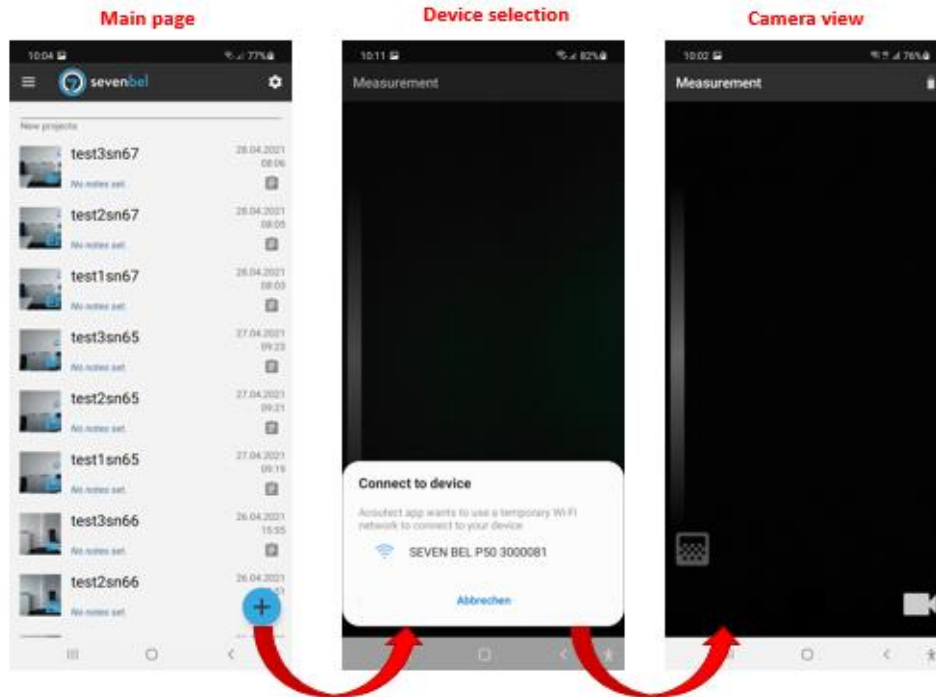


Figure 23 Press the ,+' button to start a new measurement.

**NOTE:** If your mobile device cannot make a connection to the sensor unit, the app informs you of the failed attempt. You will be asked to try again or to cancel. If the connection still fails, please contact Seven Bel, see section 13.2.

## 1. Select the measurement mode

You can set the following measurement configurations by pressing the control buttons at the bottom of the screen, see Figure 24 Control buttons for single image/video mode and Table 2.

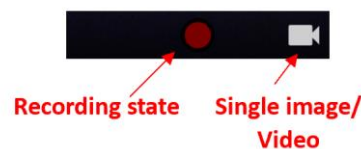


Figure 24 Control buttons for single image/video mode.




Button	Mode	Description
	Single image	As soon as enough measurement data is available for the computing a single acoustic image, data recording stops automatically.
	Video	The camera of your mobile device records a video. Depending on the speed of the sensor and the number of overlapping images between two successive revolutions, several acoustic images are computed and superimposed synchronously with the video.

Table 1 Available measurement settings.

## 2. Evaluating sound events

Press  to display the real time audio signal of the reference microphone at the center of the sensor both in the time and frequency domain.

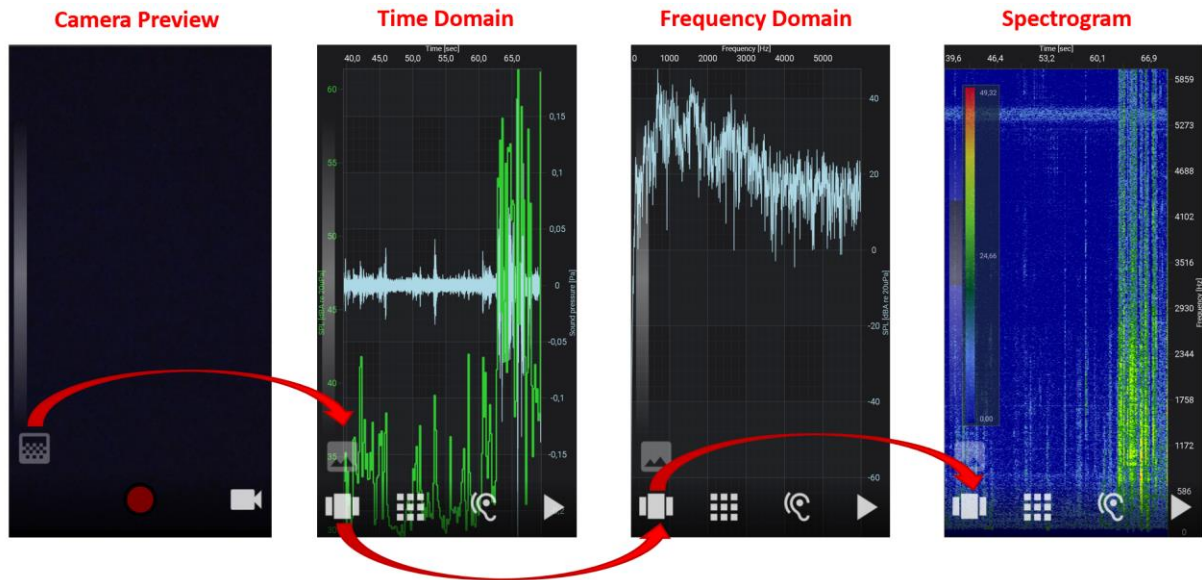







Figure 25 Switch between time and frequency representations of the live audio signal.

The buttons at the bottom of the screen have the following functions:

Button	Function
	Change between the different representations of the live audio signal in the time and frequency domain.
	Pause/start real time data stream.
	Display the time / frequency calipers (green icon = calipers visible). The position of the time calipers is used in video mode to crop the recorded data to the area of interest.
	Playback of the audio signal limited by the time calipers (green symbol = audio playback active).
	Return to camera preview.

## 3. Recording a measurement

Measurement data is recorded as soon as you put the sensor in continuous motion. The recording indicator light changes from flashing to being permanently red. If you have selected single image mode, the recording of measurement data is stopped once enough data is available to compute an acoustic image. In video mode, stop the recording by pressing the red recording indicator light. After that, buttons to confirm or discard the recorded measurement appear.

**NOTE: It is good practice to check whether the camera preview is focused. In case the image appears blurry, double tap on the center of the camera preview to trigger the autofocus.**

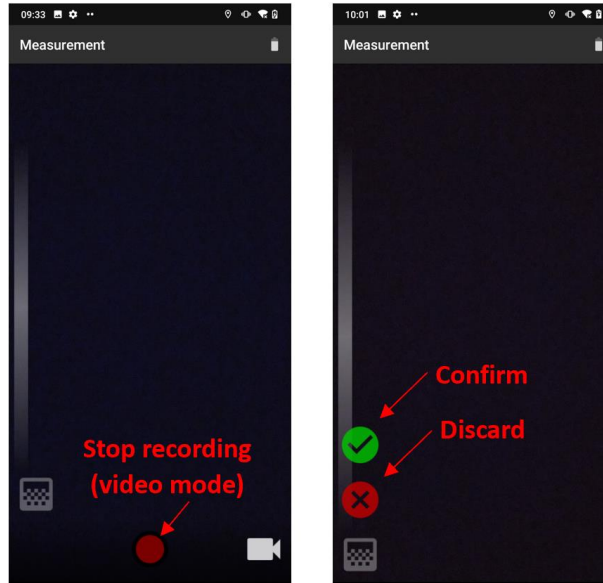





Figure 26 Stop recording in video mode (left) and options displayed after a successfully recorded measurement (right).

#### 4. Viewing the recorded audio signal

At this point you can analyze the recorded data. Press  to display the time / frequency domain of the recorded audio signal (reference microphone at the center of the sensor).

#### 5. Confirm/discard a recorded measurement

Discard the recorded measurement by pressing . If you want to process the recorded measurement, press  and fill in the fields in the dialog box.

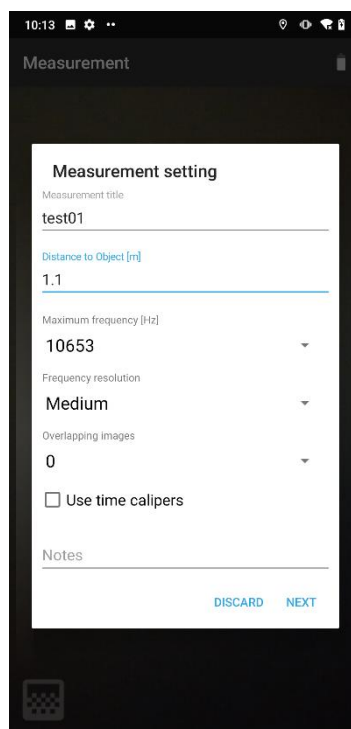
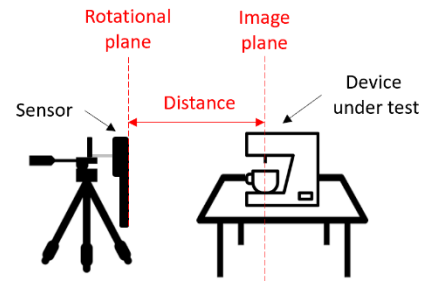


Figure 27 Filling in the fields of the dialog box.

Assign a meaningful name for the measurement record.

The value in the "Distance to Object [m]" field is given in units of meters and defines the distance between the rotational plane of the sensor and a parallel plane where the distribution of sound sources is computed. Use a period to enter decimal values, e.g. 1.1.



Determine the maximum frequency in Hz in the "Maximum Frequency [Hz]" field that should be taken into account.

**NOTE: In many situations, the dominating or interesting frequency components are in the low-frequency range. If you do not need a result for higher frequency components, select a lower, more suitable frequency and thus reduce the computation time.**

As far as frequency resolution is concerned, you should preferably select "high" in order to be able to resolve well harmonic sounds in the frequency spectrum or choose "low" if you assess sound events with predominantly white noise components.

**NOTE: The amount of data produced is twice or 4x as large in the "medium" and "high" settings as in the "low" setting.**

The item "Overlapping images" in the measurement settings box allows you to specify the number of interpolated images between two successive sensor revolutions. In video mode, select a large number of overlapping images in order to better localize the evolution of transient acoustic events over time. Adding overlapping images increases the computation time.

**NOTE: We recommend taking notes on your measurement, e.g. significant environmental conditions or specific operating conditions of the device under test. The notes can be viewed and edited later when analyzing your measurement.**

Confirm the measurement setting by pressing "NEXT" or "DISCARD" the measurement.




## 6. Saving the optical image

You will be asked to take a picture of the device under test. Please make sure that the sensor does not block the camera's field of view. Confirm by pressing "NEXT" or "DISCARD" the measurement.

## 7. Leaving the measurement mode

At this point, you can now continue with step 1 to perform a new measurement, or press the Back button to return to the main page of the mobile app.

The measurement records carried out appear as entries in the list. A status indicator in the preview image of the measurement record provides the following information:

-  Processing of the measurement record is pending; data is about to be uploaded and processed in the cloud.
-  The data connection to the cloud is being established, is interrupted or the cloud service is not available.
-  Progress bar: Data is being processed and downloaded from the cloud.

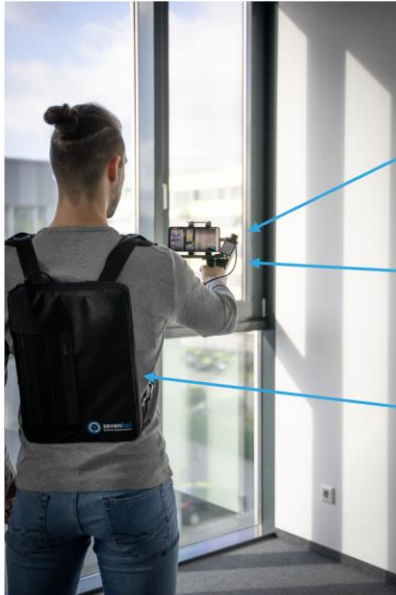
As soon as the status indicator is no longer visible in the preview image of the measurement record, the record can be opened by pressing the record name.



### 11.6.2 LIVE measurement mode

The LIVE measurement mode requires an Ethernet connection between the mobile device and private cloud laptop. Connect the USB port of the mobile device with the Ethernet port of the private cloud laptop using the supplied USB/Ethernet adapter.

#### P12 & P50 MOBILE SETUP



#### P132 & P254 STATIONARY SETUP



SOUND SCANNER

USB ETHERNET ADAPTER FROM LAPTOP TO MOBILE DEVICE

CUSTOM BACKPACK WITH PRIVATE CLOUD LAPTOP

PRIVATE CLOUD LAPTOP IN CUSTOM CARRYING CASE

Figure 28 Hardware setup for mobile and stationary LIVE mode measurements.

Use the LIVE mode for quick in-situ localization of sound events with known frequency characteristics.

Typical applications are:

- Preview of main sources for optimal setup of field of view and orientation for recording,
- Localization of harmonic sources in a defined search area,
- Search for broadband ultrasound events, e.g. compressed air leaks or partial discharge events.

## 1. Select the LIVE measurement mode

Start a measurement and select the Standard measurement mode as described in Section 11.6.1 and enable the LIVE mode by pressing the LIVE button at the bottom left of the screen.

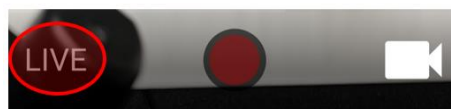



Figure 29 Press the LIVE button at the bottom left of the screen to switch to the LIVE measurement mode.



## 2. Set parameters

Press  to set the following parameters using the associated sliders:

- Distance
- Bandwidth
- Dynamic range
- Opacity

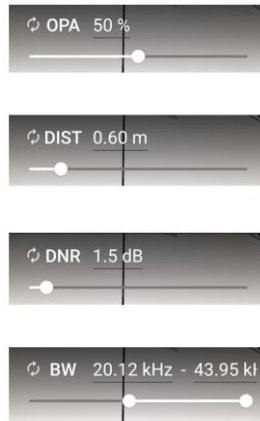


Figure 30 The available sliders at the top of the screen for modifying distance, bandwidth, dynamic range and opacity.


Press  next to the colorbar to fix the maximum value of the scale, i.e. the maximum sound pressure level in the acoustic image. Any acoustic image with a maximum sound pressure level which is less than the threshold minus the selected dynamic range will not be displayed.



Figure 31 Press the pin icon to fix the maximum sound pressure level in the acoustic image.

## 3. Start LIVE stream of acoustic images

Put the sensor in motion. It takes 2-3 seconds before the LIVE stream of acoustic images starts. The acoustic images and the camera preview are synchronized with respect to time.

Press the AVG button to start the subsequent time averaging of acoustic images. Averaging acoustic images may be helpful in a noisy environment to get more robust results or when evaluating the time-averaged sound emissions in a complex acoustic environment.



Figure 32 Press AVG for time averaging acoustic images from the LIVE stream.

#### 4. Freeze and resume LIVE stream of acoustic images

The LIVE stream can be frozen and resumed by pressing the blue indication light. When the snowflake icon appears, the LIVE stream is frozen and a screenshot can be taken by pressing the volume and power buttons of the mobile device at the same time.



Figure 33 Press the blue indicator light to freeze and resume the LIVE stream of acoustic images.

#### 5. Leave LIVE measurement mode

Press the LIVE button at the bottom left of the screen to return to the Standard measurement mode for recording and processing the sound event for further analysis.

### 11.6.3 Reflection measurement mode (3D EchoTrack)

The Reflection measurement mode is based on a Sound Scanner recording of periodic pulses emitted by a co-located omnidirectional source and enables localization of anomalies in the reverberation time signal measured in an acoustically complex environment. The acoustic images are computed using a focal plane (parallel to the measurement surface) which is synchronized in time with the onset of the pulse and moving away from the measurement surface at the speed of sound in air.

## 1. Measurement setup

The Sound Scanner and the omnidirectional source shall be setup close to each other at a distance of about 30cm or less from the source to the reference microphone of the Sound Scanner.



Figure 34 Sound Scanner and omnidirectional speaker located in close vicinity for conducting a reflection measurement.

The omnidirectional speaker shall be excited with a periodic impulse-like signal. Select the repetition frequency of the impulse to meet the reverberation properties and/or size of the room.

**NOTE: A good indication is the decay of the maximum sound pressure level of the initial impulse by at least 20dB before the next impulse is emitted.**

## 2. Recording a measurement

Measurement data is recorded as soon as you put the sensor in continuous motion. The recording indicator light changes from flashing to being permanently red.

Make sure that at least ten impulses have been acquired. Stop the recording by pressing the red recording indicator light or manually stopping the sensor motion.

Next, you will be asked to select a representative impulse with the time calipers per drag & drop.

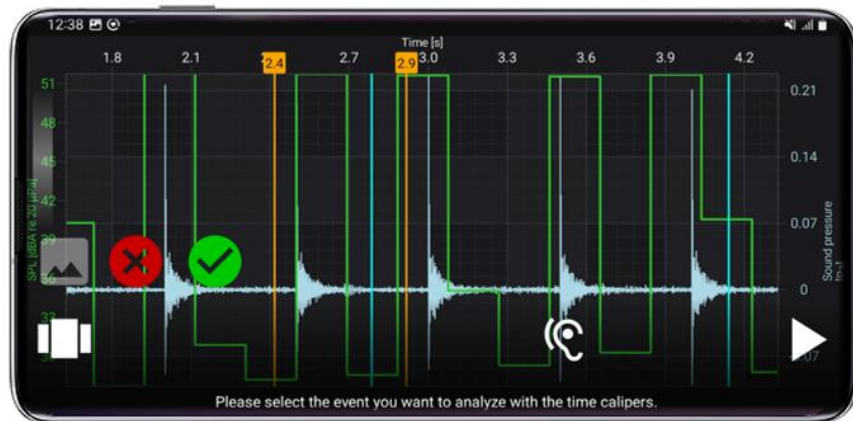




Figure 35 Selection of representative impulse after measurement has been recorded.

After that, buttons to confirm or discard the recorded measurement appear.

### 3. Confirm/discard a recorded measurement

Discard the recorded measurement by pressing  . If you want to process the recorded measurement, press  and fill in the fields in the dialog box.

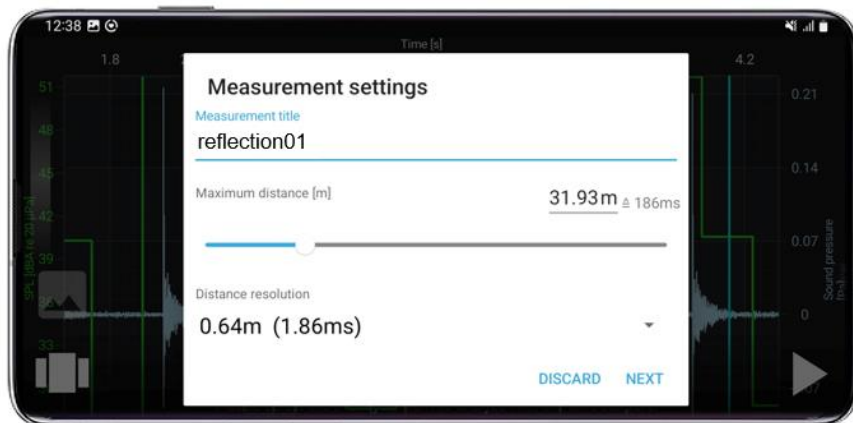


Figure 36 Selection of settings for reflection measurement mode.

Select the maximum distance of reflection to be considered. A good selection of the maximum distance of reflection is twice the maximum distance of interest. If, for instance, the distance to the reflective boundary (wall, ceiling, etc.) which is the farthest away from the measurement location, is 16m, then select 32m as maximum distance. This translates into a time interval of  $2 \times 32\text{m} : 343\text{m/s} = 186\text{ms}$  starting from the main impulse. This selection eventually enables you to track primary and potential secondary reflections.

**NOTE: The maximum value of the distance of reflection is 500m or 1.45 seconds in signal length.**

Finally, select the distance or depth resolution. Three depth resolutions are available, namely 1/20th, 1/50th or 1/100th of selected time interval.

**NOTE: A high depth resolution enables separation of reflection events in time at the cost of frequency resolution.**

The remainder of the process is exactly the same as for the Standard measurement described in section 11.6.1.

#### 11.6.4 High Speed measurement mode (Hi-Speed Capture)

The Hi-Speed Capture mode is based on a Sound Scanner recording of repeating similar short-time sound events emitted by a device under test and enables localization and separation of ultra-short sound events with a time resolution of up to 1/100th of the selected time interval.

Alternatively, the high speed measurement mode can be used for tracking sound propagation paths in rooms, e.g. concert hall, production floor or large office space.

### 1. Measurement setup

When localizing transient sound emissions from a device under test, the Sound Scanner shall be positioned as close as possible to the device so that the ratio of direct sound vs. room reflections is in favor of the direct and secondary sound emissions from the device.

When tracking sound propagation paths, the omnidirectional speaker shall be set up in one location and the Sound Scanner in another location.



Figure 37 Sound Scanner and omnidirectional speaker located at different locations for tracking sound propagation .

The omnidirectional speaker shall be excited with a periodic impulse-like signal. Select the repetition frequency of the impulse to meet the reverberation properties and/or size of the room.

**NOTE: A good indication is the decay of the maximum sound pressure level of the initial impulse by at least 20dB before the next impulse is emitted.**

### 2. Recording a measurement

Measurement data is recorded as soon as you put the sensor in continuous motion. The recording indicator light changes from flashing to being permanently red.

Make sure that at least ten impulses have been acquired. Stop the recording by pressing the red recording indicator light or manually stopping the sensor motion.

Next, you will be asked to select a representative impulse with the time calipers per drag & drop.

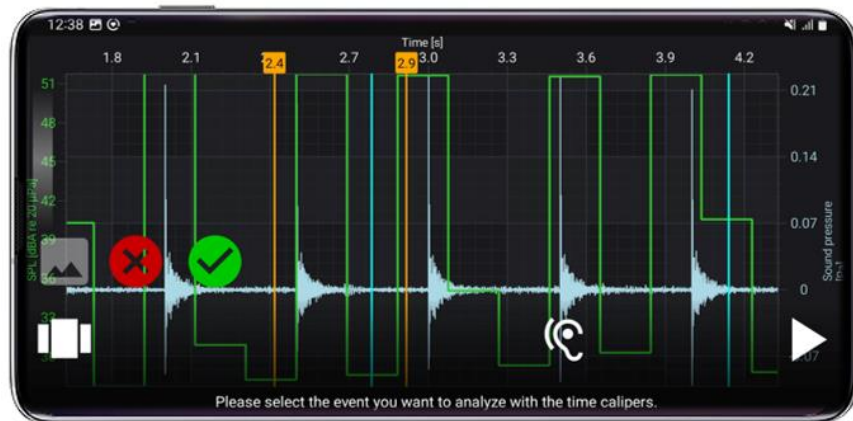




Figure 38 Selection of representative impulse after measurement has been recorded.

**NOTE: The minimum selectable time interval is 10ms.**

After that, buttons to confirm or discard the recorded measurement appear.

### 3. Confirm/discard a recorded measurement

Discard the recorded measurement by pressing  . If you want to process the recorded measurement, press  and fill in the fields in the dialog box.

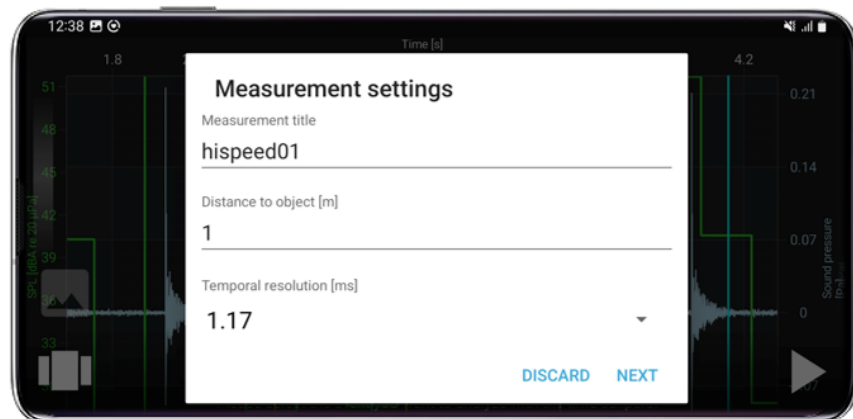


Figure 39 Selection of settings for high speed measurement mode.

Select the distance to either the device under test or the omnidirectional speaker.

Select the time resolution where three time resolutions are available: 1/20th, 1/50th or 1/100th of the selected time interval.

**NOTE: The maximum time resolution is 0.2ms. A high time resolution enables separation of short-time sound events at the cost of frequency resolution.**

The remainder of the process is exactly the same as for the Standard measurement described in section 11.6.1.



### 11.7 Camera calibration

In order to precisely align the acoustic image with respect to the optical image, a calibration must be carried out after the measurement system has been set up. Position the miniature loudspeaker in the center of the camera's field of view at a defined distance of about 1m and carry out the measurement in single image mode as described in Section 11.6. Then perform the following steps:

1. Open the project with the calibration measurement on the main page of the mobile app.
2. Activate the calibration controls in the overflow menu under the menu item "Show Calibration Controls".
3. Use the displayed cursor keys to align the acoustic source and the optical image of the loudspeaker, see Figure 40.

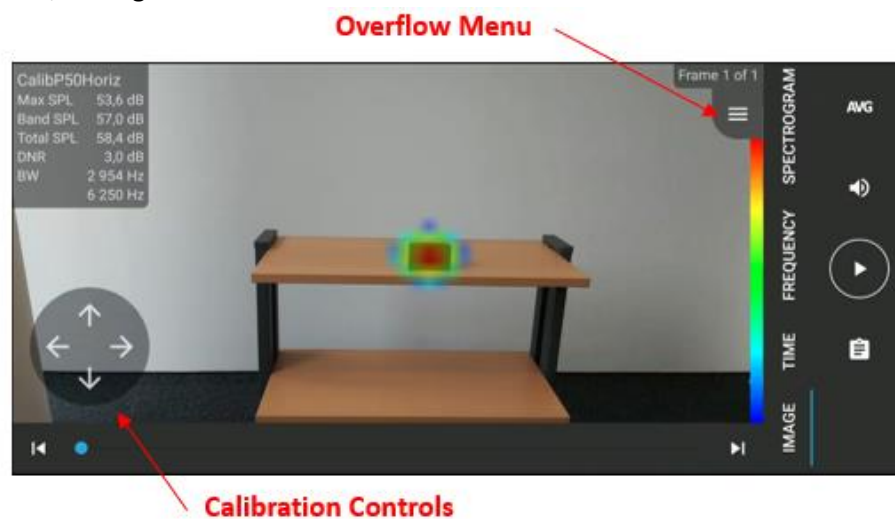


Figure 40 Aligning the acoustic source and the optical image of the loudspeaker.

4. Return to the list of measurement records on the main page. A confirmation appears at the bottom of the screen that this record is now used for camera calibration.

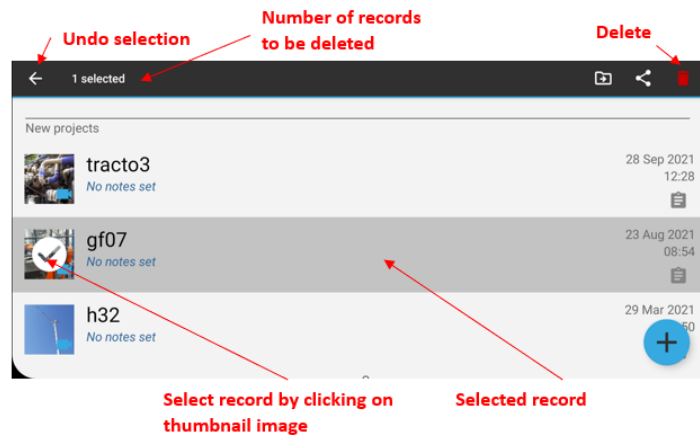
### 11.8 Deleting a measurement record

You can remove processed and unprocessed measurement records from the list of records at any time.


**WARNING:** When you perform the following steps, all data associated with the selected measurement records (images, videos, measurement data) will be permanently deleted.

## 1. Selecting the measurement records

You can select multiple measurement records for deletion by pressing the corresponding thumbnail images. The selected measurement record is highlighted in gray and shows a checkmark above the image. Press the preview image again to deselect the measurement record.



## 2. Deleting selected measurement records

As soon as at least one measurement has been selected for deletion, the  icon is displayed at the top of the screen. Press the icon to permanently delete the selected measurements. A dialog box appears to confirm or discard the deletion of the selected measurements

### 11.9 Managing projects

To manage your measurement records, you can assign records to a project. All new records are assigned to the "New Projects" project by default.

#### 1. Adding a project

Open the overflow menu on the top left of the main page and enter a project name. Confirm by pressing the "Add New Project" button, see Figure 41.

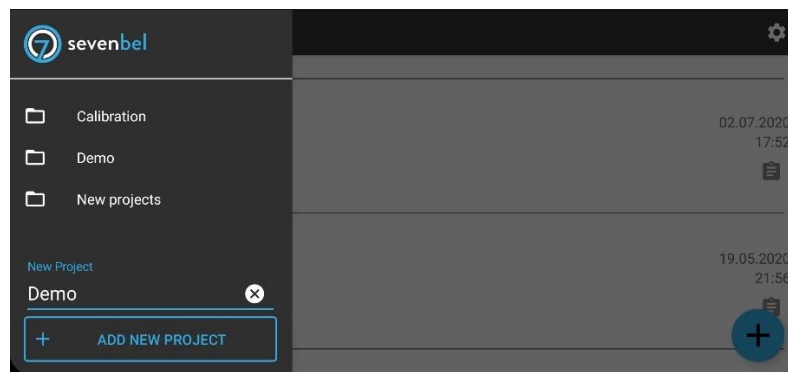



Figure 41 Adding a new project.



## 2. Assigning measurement records to a project

Select one or more measurement records by pressing the associated thumbnail images and select the “Export” icon  from the overflow menu on the top right of the main page, see Figure 42.

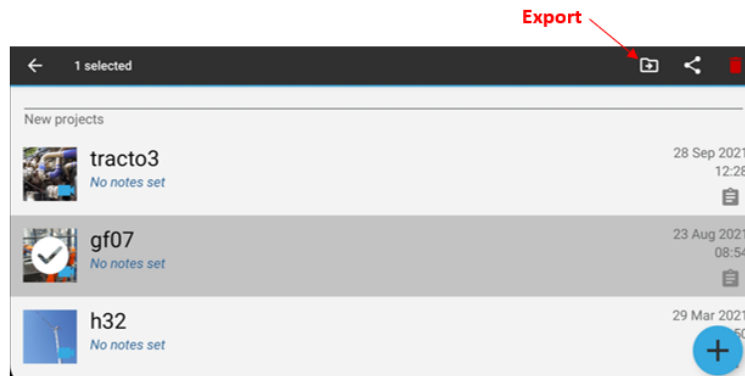


Figure 42 Assigning a measurement record to a project.

## 3. Displaying the measurement records of a project

Open the overflow menu on the top left of the main page and select the desired project in the list. The list view of the measurement records is updated and the measurement records for the associated project are displayed at the top.

## 4. Delete a project

Open the overflow menu on the top left of the main page and press the “X” next to the project you want to delete, see Figure 43. A window will appear to inform you how many measurements will be deleted depending on how many are assigned to that project. Conform with “DELETE” or cancel with “CANCEL”.

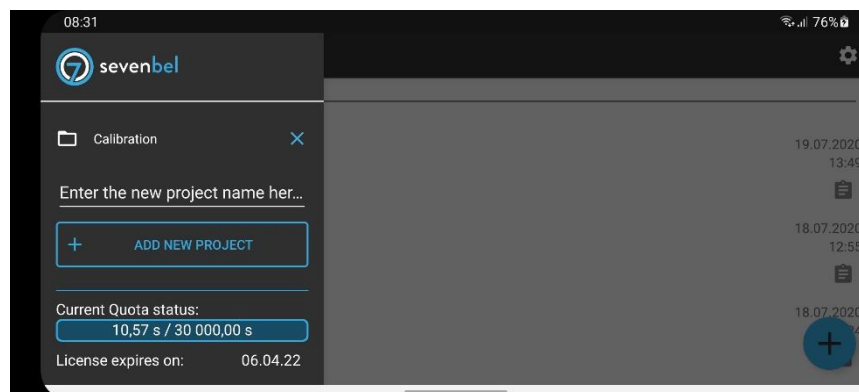


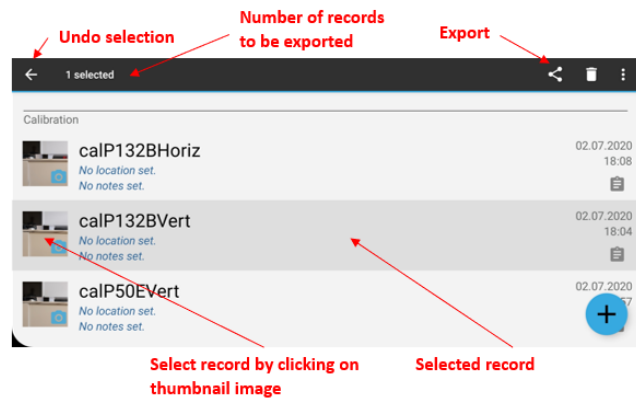
Figure 43 Overflow menu.

**WARNING: When you delete a project, all data associated in that project will be permanently deleted.**

### 11.10 Exporting measurement records

You can export one or more measurement records by selecting the records and pressing the export icon. A list of supported apps for data export will be presented to you.

The destination of the data export depends on the apps installed on the mobile device such as Google Drive, Gmail, File Explorer etc. Install the required app on the mobile device to save the data at the desired destination.



**NOTE: The selected measurement records are saved as zip file. This process can take up to several minutes depending on the file size.**

### 11.11 Importing measurement records

You can import one or more measurement records by clicking on the desired zip file using a file viewer app, e.g. File Manager Plus or similar. Then press the icon of the Seven Bel mobile app which is suggested for importing the records.

**NOTE: This process can take up to several minutes depending on the file size.**

## 12 Analyzing a measurement record

The mobile app enables fast and easy analysis of acoustic images and videos.

### 12.1 Viewing a measurement record

On the main page, press the name of the measurement record. The analysis mode with the IMAGE, TIME, FREQUENCY and SPECTROGRAM tabs is now opened. The acoustic image is displayed with default settings, see Figure 44.

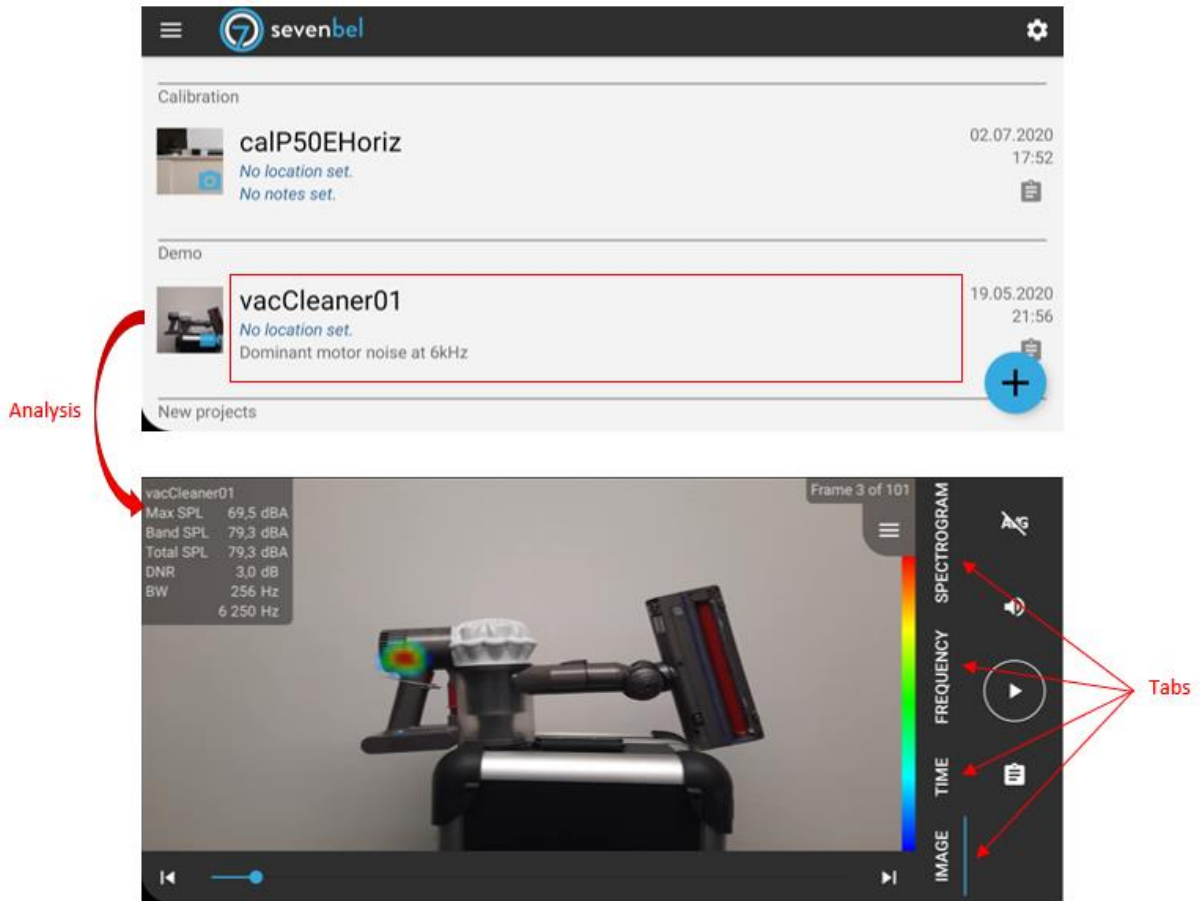


Figure 44 Analysis of a selected measurement record.

## 12.2 Understanding measurement values

The measurement values displayed in the IMAGE tab are explained in Figure 45.

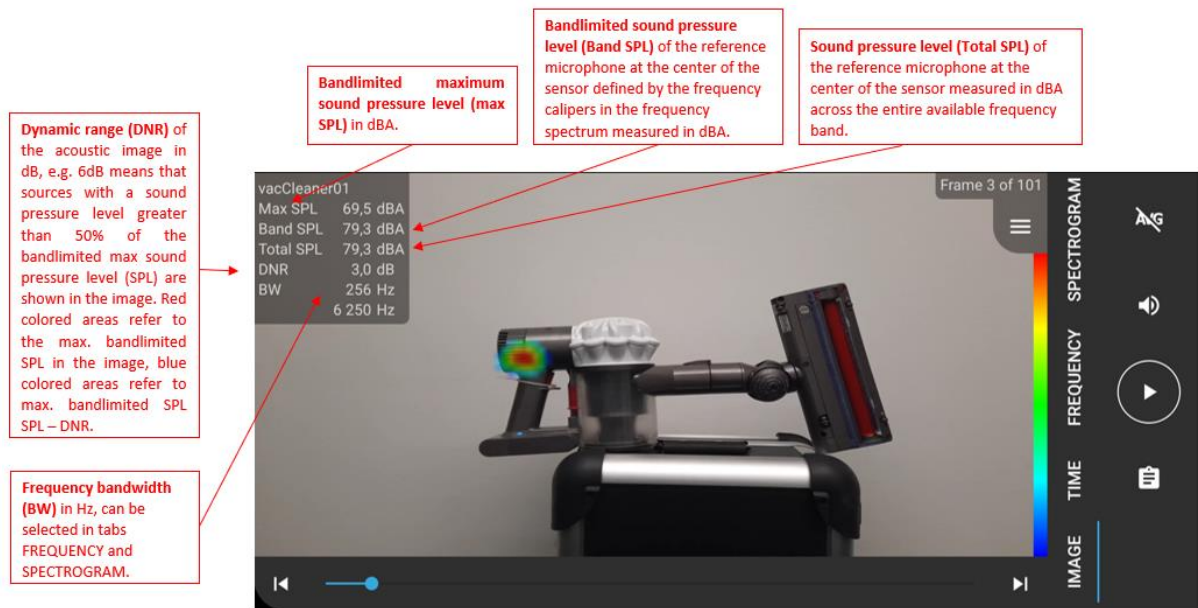


Figure 45 Displayed measurement values in IMAGE tab.

## 12.3 Modifying acoustic image settings

You can modify the appearance of the acoustic image in terms of transparency of the acoustic image overlay and dynamic range, see Figure 46.

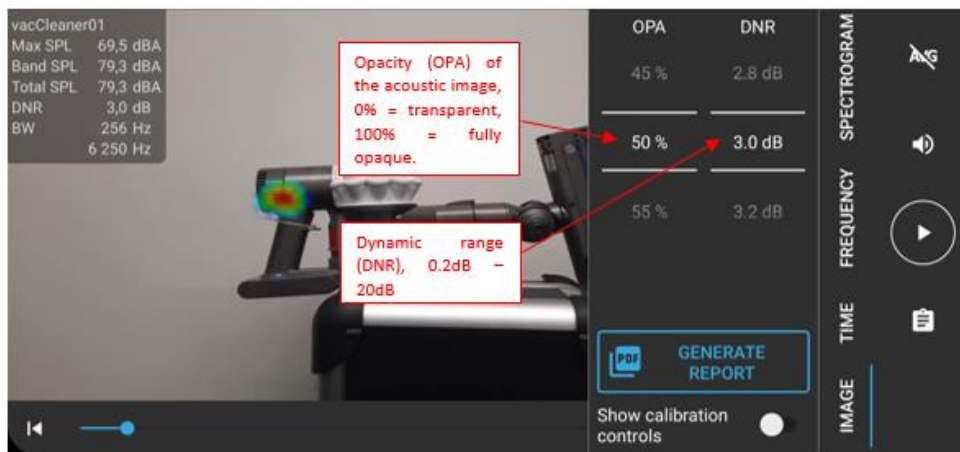


Figure 46 Modifying the appearance of the acoustic image.

### 12.4 Playback, fast forward and rewind audio/video

When you have recorded a video, you can use the slider panel on the bottom of each tab to navigate through the video recording, see Figure 47.

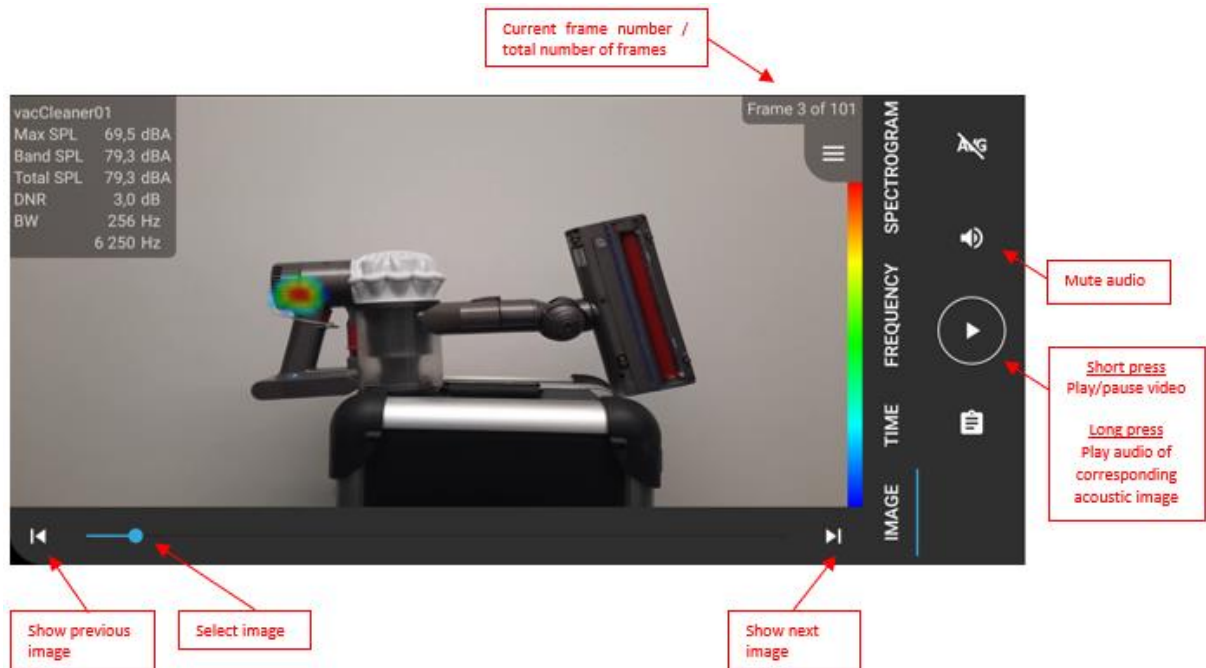


Figure 47 Controls for navigating through video.

## 12.5 Analyzing the acoustic image in the frequency domain

Press the FREQUENCY tab to view the frequency spectrum of the reference microphone signal used for the currently selected acoustic image.

To select the frequency band of interest, press the numeric field of the frequency slider and move it to the desired position by dragging the white half-circle, see. As soon as you drop the frequency slider, the acoustic image will be updated.

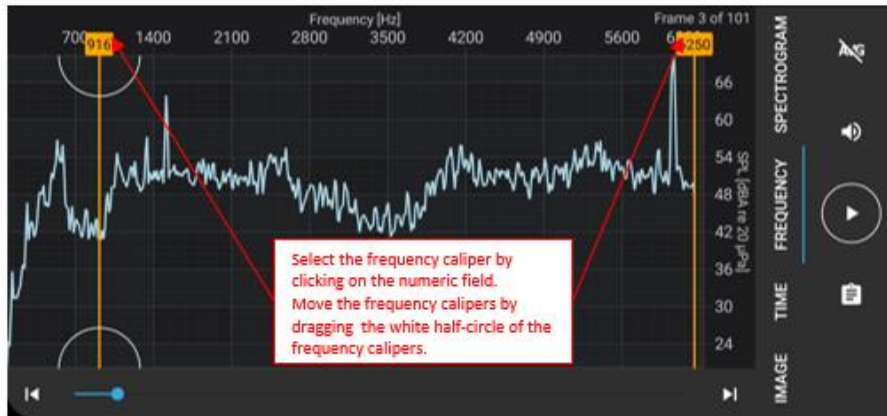


Figure 48 Selecting the frequency band of interest.

### 1. Modifying the view of the diagram

The following finger gestures are available for adjusting the view:

- Drag: Moving the diagram in the vertical and horizontal directions
- Pinch zoom: Zoom in/out
- Double-click: adjust the diagram to the optimum size

**NOTE:** Depending on the mobile device manufacturer and the operating system version, a magnification lens can be activated for zooming into portions of the screen, e.g. through clicking on a corresponding icon in the lower right corner of the screen.

## 12.6 Analyzing the acoustic image in the time domain

Press the TIME tab to view the audio signal of the reference microphone signal. By default, the recorded signal is displayed in gray, while the portion of the audio signal that is used for the currently selected acoustic image is highlighted in light blue.

**NOTE:** When analyzing a measurement which has been recorded using the reflection measurement mode, the values of the X axis of the time domain diagram are expressed as a distance from the measurement plane in meters.



### 1. Selecting a signal section of interest

Use the slider of the seek bar at the bottom of the diagram to select a signal section of interest, see Figure 49.

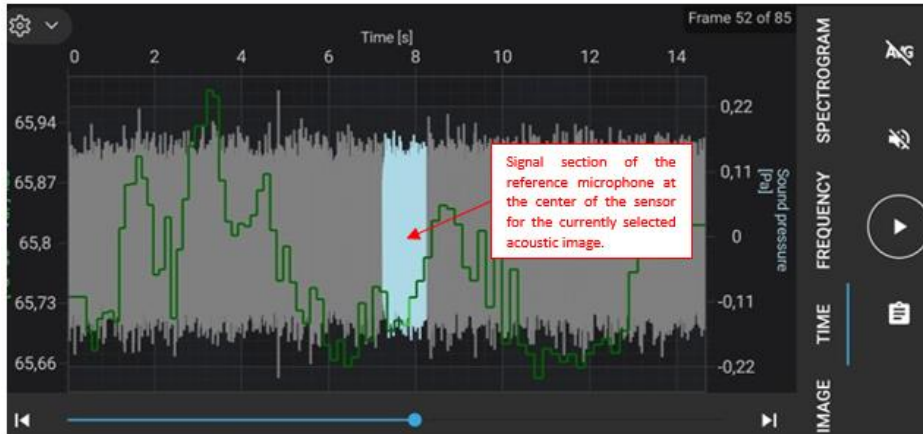


Figure 49 Audio signal of the reference microphone at the center of the sensor for the currently selected acoustic image.


### 2. Selecting the time interval of interest

Alternatively, you can average over multiple acoustic images by enabling the AVG button (AVG = time averaging enabled, ~~AVG~~ = single image is displayed). Press on the numeric field of the time slider and move it to the desired position by dragging the white half-circle, see Figure 50. As soon as the time slider is repositioned, the associated acoustic image is updated.



Figure 50 Audio signal of the reference microphone at the center of the sensor for the currently selected averaged acoustic image.

### 3. Switching between Sound Pressure Level and Acoustic Annoyance

By clicking on the  symbol in the left upper corner, you open the dialog for switching between sound pressure level and acoustic annoyance, see Figure 51.

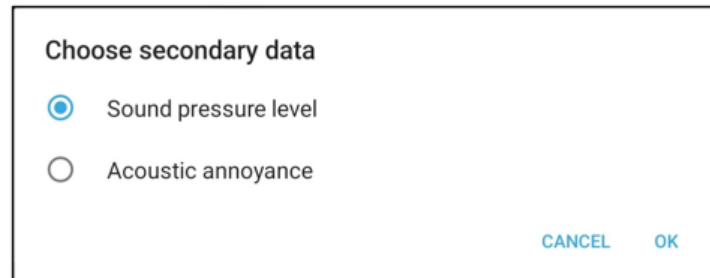


Figure 51 Dialog for choosing between sound pressure level and acoustic annoyance.

The annoyance value can be read from the Y-axis, see Figure 52.

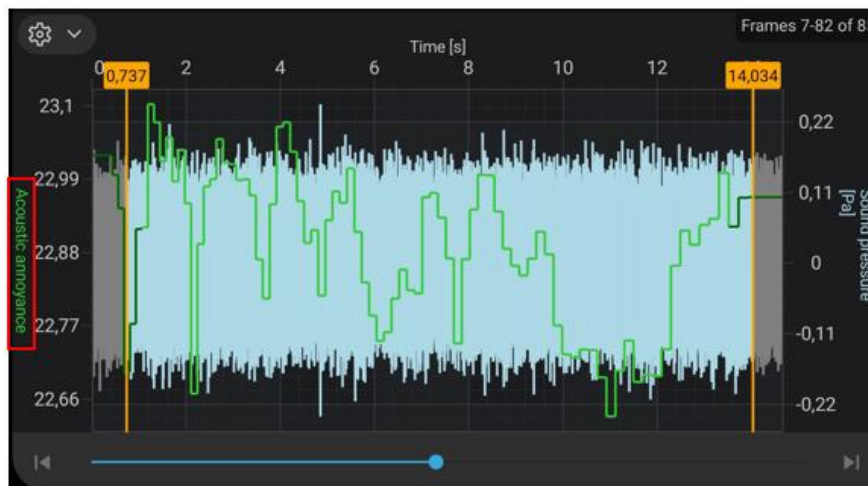


Figure 52 Time evolution of the acoustic annoyance.

### 4. Modifying the view of the diagram

The following finger gestures are available for adjusting the view:

- Drag: Moving the diagram in the vertical and horizontal directions
- Pinch zoom: Zoom in/out
- Double-click: adjust the diagram to the optimum size

**NOTE:** Depending on the mobile device manufacturer and the operating system version, a magnification lens can be activated for zooming into portions of the screen, e.g. through clicking on a corresponding icon in the lower right corner of the screen.

## 12.7 Analyzing the acoustic image in the time/frequency domain

Press the SPECTROGRAM tab to view the time / frequency plot of the reference microphone signal used for the currently selected acoustic image.

### 1. Selecting the time interval/frequency band of interest

In single image mode, press the frequency field of the desired frequency slider and move it to the desired position by dragging the white half-circle. In time averaging mode (AVG button enabled) you can also select the time interval used for averaging multiple acoustic images by positioning the time sliders accordingly, see Figure 53.

As soon as the time or frequency sliders are repositioned, the associated acoustic image is updated.

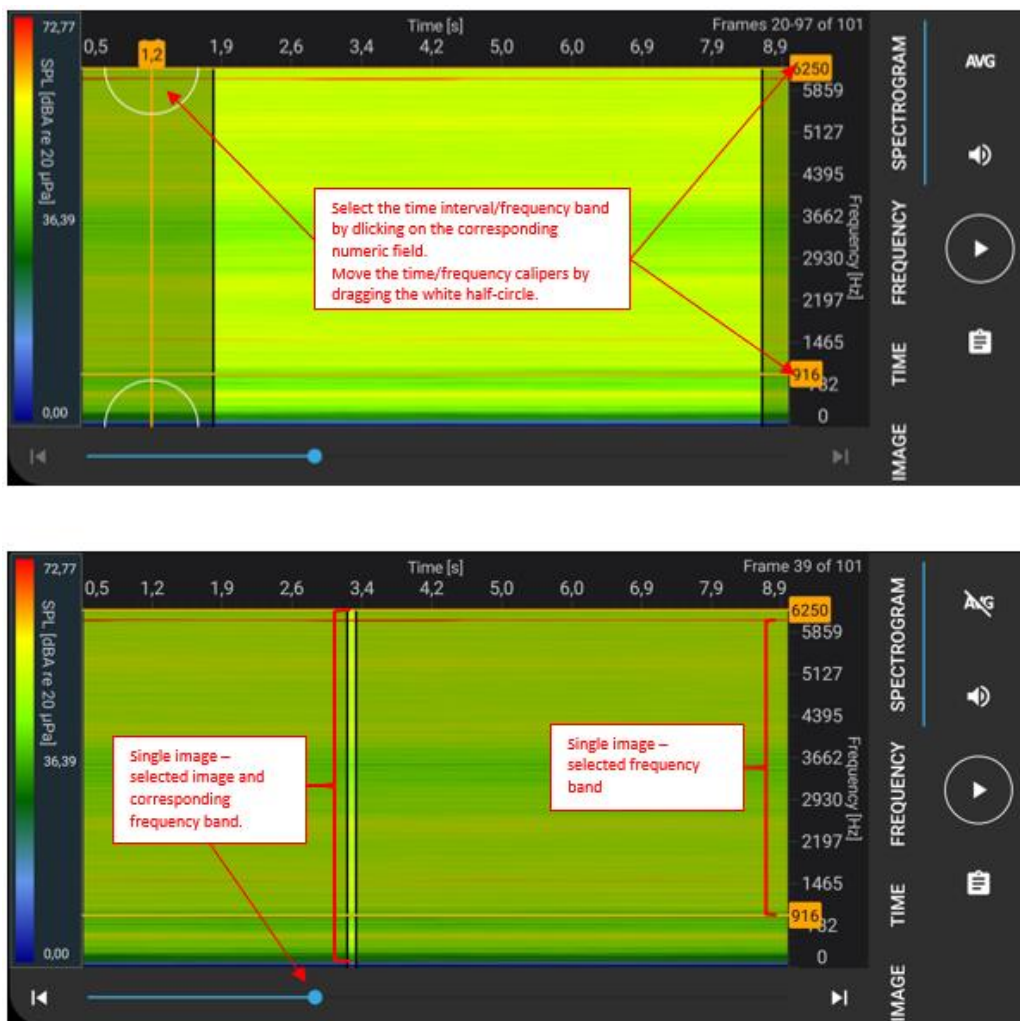


Figure 53 Selected time interval/frequency band in time averaging mode (top) and selected frequency band in single image mode (bottom).

### 2. Modifying the view of the diagram

The following finger gestures are available for adjusting the view:

- Drag: Moving the diagram in the vertical and horizontal directions
- Pinch zoom: Zoom in/out
- Double-click: adjust the diagram to the optimum size

**NOTE:** Depending on the mobile device manufacturer and the operating system version, a magnification lens can be activated for zooming into portions of the screen, e.g. through clicking on a corresponding icon in the lower right corner of the screen.

## 12.8 Reporting

You have the option of adding notes to the measurement record and generating a standardized report with the current image settings. Also, you can leverage the pre-installed screen recorder app to record an mp4 video including audio of a measurement recorded in video mode.

### 1. Adding notes

Press the button to start viewing the notes and adding notes to the measurement record, see Figure 54.

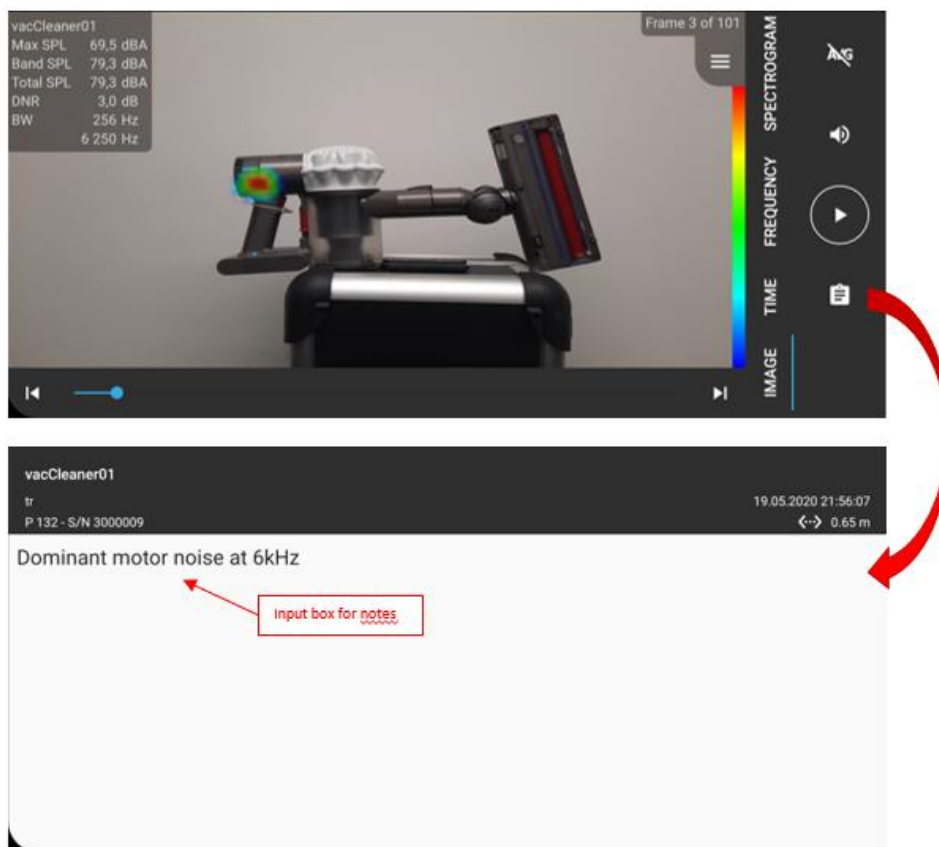


Figure 54 Adding notes to a measurement record.

Furthermore, the notes section gives a summary of the following information:

- Username (person performing the measurement)
- Sensor type and serial number
- Distance to the device under test
- Date and time at the time of measurement

## 2. Generating a report

Open the overflow menu and press “Generate Report” to produce a standardized report in PDF format with the current settings for time interval/ frequency range, image transparency and dynamic range. Upon request, the report is sent to an email address or to a local / decentralized storage location via pre-installed apps, see Figure 55.

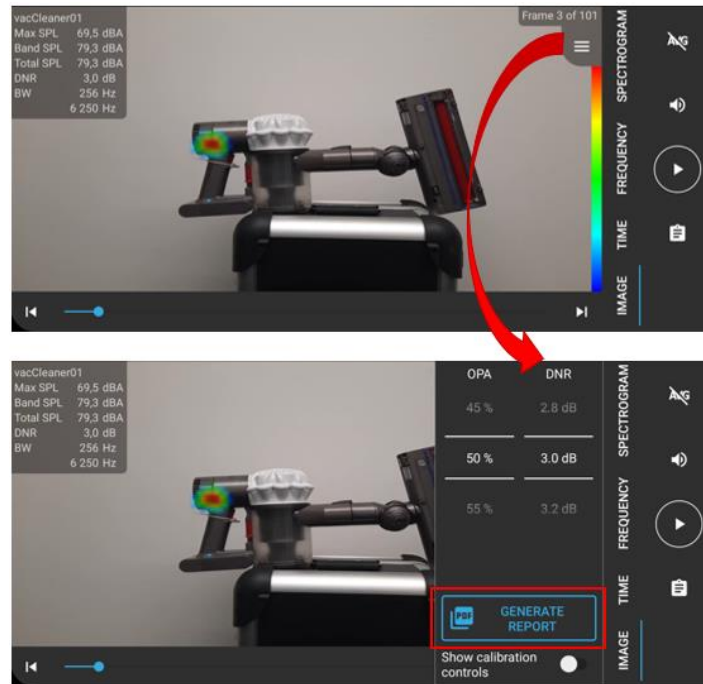


Figure 55 Generating a report using current acoustic image settings.

## 3. Generating a video from a measurement

Using the pre-installed screen recorder app, your mobile device is capable of recording an mp4 video including audio from a measurement recorded in video mode. The corresponding steps are as follows:

- Swipe down from the top of the screen and select the screen recorder app from the menu.
- You are requested to grant the screen recorder app access to video and audio functions.
- You are requested to define settings for audio recording. Choose “Media Sounds” in order to save the audio track along with the video.
- Once you start recording, a countdown timer appears on the screen (3-2-1). After that, all user actions on the mobile device will be recorded.
- Start the video in the Seven Bel app and when finished, stop the screen recording using the provided controls of the screen recorder app.
- Your screen recording will be saved to the “Videos” folder on your mobile device. Use the pre-installed “File Manager +” app to navigate to this folder.

**NOTE: You can use the desktop app Vysor or install any other screen recording app to make equivalent screen recordings.**

## 13 Appendix

### 13.1 Technical Specifications

The Sound Scanner from the Professional series by Seven Bel (models P12, P50, P132 and P254) is a precision measurement instrument for the visualization of sound. The rotating sensor comprises five (P50/P132/P254) or eight (P12) radially distributed digital microphones with a signal-to-noise ratio of 65dB and a maximum measurable sound pressure level of up to 117dB (P50/P132/P254) or 132dB (P12), respectively. The aperture size of the models P50, P132 and P254 describes a circular disk with a diameter of 120mm (P12) up to 2540mm, respectively. This enables the localization of sound events in a frequency range from 125Hz (P254) up to 44kHz (P12).

The sensor together with your mobile device and a powerful cloud computing infrastructure in the background produce high-resolution images and videos with excellent dynamic range. The frame rate of acoustic images in the case of video recording depends on the speed of the sensor (typically less than five revolutions per second). A mobile app that runs on mobile devices with an Android operating system (version 10.0 or higher) offers basic functions for recording, analyzing and managing acoustic images and videos.

	P12	P50	P132	P254
<b>General</b>				
Diameter of scan area	120mm	500 mm	1320mm	2540mm
Weight (excl. sensor mount and tripod)	200g	500g	1400g	900g
Rotation frequency (min/typ/max)	0,2/2/5 revs/sec	0,2/2/5 revs/sec	0,2/1/2 revs/sec	0,2/0,5/1 revs/sec
<b>Microphone</b>				
Number of microphones	8	5		
Sample frequency	89kHz	21.5 kHz		
Resolution	24 bit			
Frequency range	20Hz – 160kHz	50 Hz – 20 kHz		
Sensitivity tolerance	+/-1 dB			
Maximum measurable sound pressure level	132dB	117 dB		
Absolute maximum sound pressure level	N/A	160 dB		
Signal-to-noise ratio	66dBA	65dBA		
<b>Acoustic image</b>				
Frequency range	2,8kHz – 44kHz	700 Hz – 10,5 kHz	250Hz – 10,5 kHz	125Hz – 4kHz
Number of images per revolution	Up to 6			
Spatial resolution at 5 kHz (3 dB dynamic range)	28°	6,7°	2,6°	1,4°
Dynamic range	> 13 dB			



Measuring distance	0,5 m - ∞
<b>Analysis</b>	
Audio signal	<ul style="list-style-type: none"> <li>• Real time display of time signal, sound pressure level in dB(A), frequency spectrum and spectrogram</li> <li>• Selection of time intervals</li> <li>• Stream/Pause mode</li> <li>• Playback</li> </ul>
Acoustic image/video	<ul style="list-style-type: none"> <li>• Selection of frequency band</li> <li>• Audio playback</li> <li>• Single frame or time averaged frames</li> <li>• Video playback</li> </ul>
Data management	<ul style="list-style-type: none"> <li>• Automated pdf report generation of single acoustic image or timed averaged images including meta data (time, location, notes, etc.), time signal, spectrum and spectrogram</li> <li>• Export and import of measurements in zip format via installed file sharing apps (e.g. Google Drive)</li> </ul>
<b>Environmental conditions</b>	
Operating temperature	-10°C - 60°C
Relative humidity	45% - 85%
<b>Mobile device requirements</b>	
Operating system	Android OS Version 10.0 or higher

### 13.2 Technical support

Please use the contact information below to obtain technical support. Feel free to contact us if you have any questions:

**Seven Bel GmbH**  
 Hafenstrasse 47-51  
 4020 Linz, Austria

Tel.: +43 664 38 22 458  
 E-Mail: [techsupport@seven-bel.com](mailto:techsupport@seven-bel.com)

### 13.3 Safety instructions

Safety instructions are identified by an icon and a signal word. The signal word describes the severity of the impending danger.

**Imminent** danger to life and health of people (severe injuries or death).

**Warning!** **Possibly** imminent danger for life and health of people (severe injuries or death).



**Attention!** **Possibly** dangerous situation (minor injuries or property damage)

**Danger!** **Imminent** danger to life and health of people (severe injuries or death).

**Note!** **Tips and particularly useful information**



## Mandatory signs

General mandatory sign



Use foot protection



Use eye protection



Use hand protection



Use head protection



Use face protection



Use ear protection



Pull out the mains plug



Ground before use



Follow the instructions

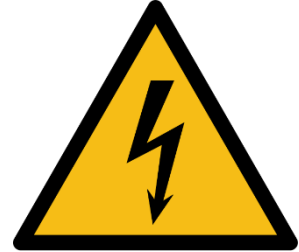


## Warning signs

General warning sign



Warning of high voltage



Warning of flammable substances



Warning of a suspended load



Warning of hand injuries



Warning of the risk of crushing



Warning of danger of slipping



Warning of obstacles on the ground



Warning of corrosive substances



Warning of hot surfaces



Warning of toxic  
substances



Warning of material  
handling vehicles



## 14 Declaration of conformance – Sensor P12 / P50 / P132 / P254

### EG-Konformitätserklärung

im Sinne der EG-Maschinenrichtlinie 2006/42/EG, Anh. II 1. A

#### Hersteller

Seven Bel GmbH  
 Forsthausstraße 12e  
 AT - 4060 Leonding

#### Beschreibung und Identifizierung der Maschine

Produkt / Erzeugnis	Präzisions-Messinstrument für die Visualisierung von Schall
Typ	Sound Scanner Professional
Seriennummer	3.000.0001 – 3.999.999
Handelsbezeichnung	Sound Scanner Professional
Modell	P12, P50, P132, P254
Funktion	Die akustische Kamera „Sound Scanner Professional“ ist ein Präzisions-Messinstrument für die Visualisierung von Schall.

**Es wird ausdrücklich erklärt, dass die Maschine allen einschlägigen Bestimmungen der folgenden EG Richtlinien bzw. Verordnungen entspricht:**

2001/95/EG	Richtlinie 2001/95/EG des Europäischen Parlaments und des Rates vom 3. Dezember 2001 über die allgemeine Produktsicherheit Veröffentlicht in L 11/4 vom 15.01.2002
2014/35/EU	Richtlinie 2014/35/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen auf dem Markt Veröffentlicht in 2014/L 96/357 vom 29.03.2014
96/58/EG	Richtlinie 96/58/EG des Europäischen Parlaments und des Rates vom 3. September 1996 zur Änderung der Richtlinie 89/686/EWG zur Angleichung der Rechtsvorschriften der Mitgliedstaaten für persönliche Schutzausrüstungen
2014/53/EU	Richtlinie 2014/53/EU des Europäischen Parlaments und des Rates vom 16. April 2014 über die Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung von Funkanlagen auf dem Markt und zur Aufhebung der Richtlinie 1999/5/EG Veröffentlicht in L 153/62 vom 22.05.2014
2014/30/EU	Richtlinie 2014/30/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit (Neufassung) Veröffentlicht in 2014/L 96/79 vom 29.03.2014
2011/65/EU	Richtlinie 2011/65/EU des Europäischen Parlaments und des Rates vom 8. Juni 2011 zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten Veröffentlicht in 2011/L 174/88 vom 01.07.2011

#### Fundstelle der angewandten harmonisierten Normen entsprechend Artikel 7 Absatz 2:

ÖNORM EN ISO 12100	Sicherheit von Maschinen - Allgemeine Gestaltungsgrundsätze – Risikobeurteilung und Risikominderung
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Seite 1 von 2



## EG-Konformitätserklärung

im Sinne der EG-Maschinenrichtlinie 2006/42/EG, Anh. II 1. A

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### Fundstelle der angewandten harmonisierten Normen entsprechend Artikel 7 Absatz 2:

DIN VDE 0620-1 VDE 0620-1	Stecker und Steckdosen für den Hausgebrauch und ähnliche Anwendungen
EN ISO 13857:2008	Sicherheit von Maschinen - Sicherheitsabstände gegen das Erreichen von Gefährdungsbereichen mit den oberen und unteren Gliedmaßen (ISO 13857:2008)
EN 300 386 VI .6.1	Elektromagnetische Verträglichkeit und Funkspektrumangelegenheiten (ERM); Einrichtungen des Telekommunikationsnetzes; Anforderungen zur Elektromagnetischen Verträglichkeit (EMV)
EN 61643-11:2012	Überspannungsschutzgeräte für Niederspannung - Teil 11: Überspannungsschutzgeräte für den Einsatz in Niederspannungsanlagen - Anforderungen und Prüfungen IEC 61643-11:2011 (modifiziert)

### Fundstelle der angewandten sonstigen technischen Normen und Spezifikationen:

ÖNORM EN ISO 13920:1996-10-01	Schweißen - Allgmeintoleranzen für Schweißkonstruktionen - Längen- und Winkelmaße - Form und Lage (ISO 13920:1996)
ÖNORM EN 22768-2:1993-08-01	Allgemeintoleranzen - Teil 2: Toleranzen für Form und Lage ohne einzelne Toleranzeintragung (ISO 2768-2:1989)
ÖNORM EN 22768-1 :1993-08-01	Allgemeintoleranzen - Teil I: Toleranzen für Längen- und Winkelmaße ohne einzelne Toleranzeintragungen (ISO 2768-1:1989)
ÖNORM B 1991-14:2019-07-15	Eurocode 1: Einwirkungen auf Tragwerke - Teil 1-4: Allgemeine Einwirkungen - Windlasten – Nationale Festlegungen zu ÖNORM EN 1991-1-4 und nationale Ergänzungen
ÖNORM EN 139212007-09-01	Persönliche Schutzausrüstung - Ergonomische Grundsätze
ÖNORM EN ISO 12100:2013-10-15	Sicherheit von Maschinen - Allgemeine Gestaltungsleitsätze - Risikobeurteilung und Risikominderung (ISO 12100:2010)
OVE EN 55035:2018-05-01	Elektromagnetische Verträglichkeit von Multimediageräten - Anforderungen zur Störfestigkeit (deutsche Fassung)
OVE EN 61643-11/AC:2019-07-01	Überspannungsschutzgeräte für Niederspannung - Teil II : Überspannungsschutzgeräte für den Einsatz in Niederspannungsanlagen - Anforderungen und Prüfungen (Berichtigung) (deutsche Fassung)

Leonding, 01. März 2022

Ort, Datum



Unterschrift  
Dr. Thomas Rittenschober  
CEO

Seite 2 von 2

## 15 Declaration of conformance - Accessories

### 15.1 Laser distance meter

Power Tools



To whom it may concern

Robert Bosch GmbH  
Postfach 10 01 56  
70745 Leinfelden-  
Echterdingen  
Visitors:  
Max-Lang-Straße 40-46  
70771 Leinfelden  
Tel 0711 758-0  
www.bosch.com

Article 33 of the European Regulation No. 1907/2006 (REACH)  
Compliance of Bosch Power Tools

24 October 2014

Ladies and Gentlemen,

We are pleased providing you an answer to your request for information on Article 33 of Regulation (EC) No. 1907/2006 (REACH).

We follow-up the Candidate list and we are well aware of our obligations derived from Article 33 of the Regulation (EC) No. 1907/2006 (REACH), that we have to give our customers the information about substances of the Candidate list in the products we supply in accordance with applicable law. We follow-up **Annex XIV** and **Annex XVII** of the Regulation (EC) No. 1907/2006 (REACH) on restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles. Where required, we undertake the necessary actions to ensure compliance with the REACH regulation.

Yours sincerely

  
Berni Reisser

Head of Quality Management  
Division Power Tools

  
Volker Biermann

Head of Engineering  
Environmental Issues  
Division Power Tools

Registered Office: Stuttgart, Registration Court: Amtsgericht Stuttgart, HRB 14000;  
Chairman of the Supervisory Board: Franz Fehrenbach; Managing Directors: Dr. Volkmar Denner,  
Dr. Stefan Asenkerschbaumer, Dr. Rolf Bulander, Dr. Stefan Hartung, Dr. Dirk Hoheisel, Christoph Kübel,  
Uwe Raschke, Wolf-Henning Scheider, Dr. Werner Struth, Peter Tyroller

15.2 Loudspeaker



2017A

**EU DECLARATION OF CONFORMITY**  
(According to ISO/IEC 17050-1 and EN 17050-1)

**Manufacturer's Name:** Creative Labs Pte. Ltd.  
**Manufacturer's Address:** 31 International Business Park,  
#03-01 Creative Resource,  
Singapore 609921

declares under our sole responsibility that the product

**Product Name:** Creative MUVO 2c  
**Product Model Number:** MF8250

Conforms to the following harmonized standards or Specifications:

**EMC: Class B**  
EN 55032:2012/AC:2013                      EN 61000-3-2:2014  
EN 55020:2007+A11:2011                  EN 61000-3-3:2013  
EN 55024:2010                                  Draft EN301489-17 V3.2.0  
Draft EN301489-1 V2.2.0

**Health & Safety:**  
EN 60065:2014/AC:2016  
EN 62479:2010

**Radio:**  
EN 300 328 V2.1.1

**RoHS:**  
EN 50581:2012

The object of the declaration described above is in conformity with the relevant Union harmonization legislation:

RE Directive 2014/53/EU, RoHS Directive 2011/65/EU and carries the CE mark accordingly

**Supplementary Information:**

RoHS compliance covers all electrical accessories bundled within this product model  
Product image is available at <http://sg.creative.com/p/speakers>

Singapore  
Location

12-Jun-2017  
Date



Low Long Chye  
Director

On Behalf of the Company

31 INTERNATIONAL BUSINESS PARK #03-01 CREATIVE RESOURCE SINGAPORE 609921 TEL: (65) 6895 4000 FAX: (65) 6895 4999  
COMPANY REG NO: 199905094R

### 15.3 USB AC Adapter

#### 15.3.1 Type A (USA, Canada)

The **UL file number** for the supplied AC adapter (manufacturer: HomeSpot, www.homespotdigital.com) is **E178074**.

#### 15.3.2 Type C (Europlug)

## **KONFORMITÄTSERKLÄRUNG DECLARATION OF CONFORMITY**

CEI Conrad Electronic International (HK) Limited  
18th Floor, Tower 2, Nina Tower, No. 8 Yeung Uk Road,  
Tsuen Wan, New Territories, Hong Kong

**Erklärt in alleiniger Verantwortung, dass das(die) Produkt(e)  
Declares on our own responsibility, that the product(s)**

<b>Bestell Nr. Order No</b>	<b>Bezeichnung Description</b>	<b>Modell Nr. Model No</b>
518397	USB switching adaptor 1A, black, Voltcraft SPS 1000 USB	SPS-1000 USB

**konform ist (sind) mit folgenden Richtlinien, Normen und/oder Verordnungen.  
is (are) in conformity with following directives, norms and/or regulations.**

**Verantwortlich für Europa: Responsible for Europe:**  
Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau

**EMCD Richtlinie 2014/30/EU / EMCD directive 2014/30/EU**  
EN 61204-3:2000

**LVD Richtlinie 2014/35/EU / LVD directive 2014/35/EU**  
EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013

**ErP Richtlinie 2009/125/EG / ErP directive 2009/125/EC**  
Verordnung (EG) Nr. / Regulation (EC) No 278/2009

**RoHS Richtlinie 2011/65/EU / RoHS directive 2011/65/EU**

**CE Zeichen auf dem Produkt / CE marking on product**



Hong Kong, 17.03.2017

CEI Conrad Electronic International (HK) Limited  
18th Floor, Tower 2, Nina Tower, No. 8 Yeung Uk Road,  
Tsuen Wan, New Territories, Hong Kong



Mr. Christian Liestl  
Bevollmächtigter Vertreter des Herstellers  
Authorized representative of manufacturer



## 15.4 Ultrasound Transmitter

**Manufacturer's Declaration of Conformity « CE »** (conform to ISO 17050-1)  
**Déclaration de Conformité "CE" par le Fabricant** (suivant ISO 17050-1)  
**"CE" Conformiteitsverklaring door de Fabrikant** (in conformiteit met ISO 17050-1)  
**Hersteller Konformitätserklärung « CE »** (nach ISO 17050-1)

SDT International nv sa  
 415 Boulevard de l'Humanité  
 B-1190 Brussels, BELGIUM

Declares, under its own responsibility that the SDT products:  
 Déclare, sous sa propre responsabilité, que les appareils SDT:  
 Verklaart, op eigen verantwoordelijkheid, dat volgende SDT producten:  
 Erklärt unter eigener Verantwortung, dass die SDT Produkte:

Code Article – Article-nr. – Artikel-Nr.	Description – Beschrijving – Beschreibung
FS.TS09.001	T-Sonic 9 US Emitter device
FS.TS01.001	T-Sonic 1 US Emitter device

are built in conformity with the following European Directives:  
 sont fabriqués en conformité avec les Directives Européennes suivantes :  
 werden geproduceerd conform volgende Europese Richtlijnen:  
 unter Übereinstimmung der folgenden Richtlinien Hergestellt wurden:

Directive – Richtlijn – Richtlinie	Title
2011/65/EU	Restriction of Hazardous Substances (RoHS)
2014/30/EU	Electromagnetic Compatibility Directive (EMC)

Standards applied – Normes appliquées – De normen van toepassing zijn – Normen:

Norm – Norme	Title
EN 63000:2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
EN 61326-1:2013	Electrical equipment for measurement, control and laboratory use, EMC requirements - Part 1: General requirements
EN 55011: 2016 + A1:2017	Industrial, scientific, and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement
EN 61000-4-2:2009	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques. Section 2: Electrostatic discharge immunity test
EN 61000-4-3:2006 + A1:2008 + IS1:2009 + A2:2010	Electromagnetic compatibility (EMC) – Part 4: Electrostatic discharge immunity test



March 14, 2022, André DEGRAEVE, Managing Director