SVANTEK

USER MANUAL

SV 307 4G

NOISE

MONITORING TERMINAL

Warsaw, 2021-03-12

Rev.2.01

Note: *Because of continuous product improvement SVANTEK reserves the right to make changes to product specifications without notice. To download the most up to date user's manual please visit our web site at www.svantek.com. This user's manual presents the firmware revision named 1.22.1 (see the* ***Unit Label*** *screen to check version details).*

The succeeding software revisions (marked with the higher numbers) can change the view of some displays presented in the text of the manual.

WEEE Notice: *Do not throw the device away with the unsorted municipal waste at the end of its life. Instead, hand it in at an official collection point for recycling. By doing this you will help to preserve the environment.*

Technical Support Contact Information:

web: www.svantek.com

e-mail: support@svantek.com.pl

IMPORTANT NOTES BEFORE USE

- ✓ *Switch the instrument off before connecting it to any other device (e.g. PC) or fitting the microphone capsule.*
- ✓ *While connecting your SV 307 to a PC by the SC 316 cable, first insert the lemo plug into the instrument's EXT.I/O socket and then the USB plug into the PC!*
- ✓ *Even though the SB 274 power supply unit has a high IP index (Ingress Protection), it is still not recommended to leave it on the ground for safety reasons. Good practice is to mount it on the pole or mast.*
- ✓ *SV 307 should not be stored for a long time with discharged batteries. Storing with batteries in discharged condition may damage them. If so, warranty for Li-Ion battery is void.*
- ✓ *If SV 307 is planned to be stored for a long period of time, it is recommended to charge its battery to 60% capacity. The battery should be charged at least once per 6 months.*
- ✓ *The cone protection is used only during transportation of SV 307 inside the SA 307 transportation case. Always detach it after removing the instrument from the transportation case and put it on the anti-bird spikes cone before placing the instrument into the case!*
- ✓ *Before installing the station at the measurement site, make sure that the protective caps on the four anti-bird spikes are removed. It is recommended to use the protective caps during transportation and storage or other operations with the instrument like, laboratory calibration, etc. to avoid personal injury.*
- ✓ *The windscreen influences the free-field characteristics of the instrument, therefore it is important to check its condition regularly. In the case of visible degradation of the foam surface it must be replaced by the new one.*
- ✓ *Tripod or pole with 3/8" thread is not recommended for permanent installation.*
- ✓ *Maximum sound pressure level that can affect the microphone without destroying the microphone is 160 dB.*
- ✓ *The upper coniform casing is rigidly connected to the measuring device and is not intended for dismantling. Dismantling the upper coniform casing may damage the instrument!*

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1 INTRODUCTION

SV 307 Noise Monitoring Terminal is a new generation monitoring station dedicated for permanent noise monitoring with the community & airport characteristics available. SV 307 integrates Class 1 IEC 61672-1:2013 Sound Level Meter (SLM) with a modem in the removable waterproof housing. SV 307 is equipped with a new MEMS microphone with a life-time warranty.

As an option, SV 307 can perform real time frequency analysis in 1/1 and 1/3 octave bands in accordance with Class 1 IEC 61260-1:2014 and save results of this analysis as a time history. Additionally, it can record an audio signal as standard WAV files.

The instrument enables huge time history logging capability providing broad band results and spectra with adjustable logging steps. Audio recording on user selectable trigger conditions complete the logging functionality. Data are stored on a micro SD memory card and can be easily downloaded to a PC over the USB interface or the GSM connection.

The instrument can be easily calibrated in the field using an acoustic calibrator and can perform patented system check with a built-in sound source.

The large colour OLED display and 10 pushbuttons enable easy configuration of SV 307 in the field without connection to a PC.

The large windscreen is highly efficient in reduction of a wind noise effects even at high wind speeds. Metal spikes protects the station against birds.

The accurate GPS module provides information on the localization as well as measurement time synchronization.

The removable & weatherproof housing protects SV 307 against extreme weather conditions while fulfilling Class 1 accuracy.

The system is specially designed for easy installation – SV 307 is small, lightweight and easy to install by a single person.

SV 307 has an internal Li-Ion battery and interface for connecting solar panels. A waterproof mains adapter for charging the battery and powering the station is also included.

The GSM modem provides fast data transfer over the Internet to the PC with standard Internet connectivity. SV 307 comes with the SvanNET web-service and the SvanPC++ software for data downloading, visualization and remote control of the instrument.

SvanNET cloud service monitors the wireless communication, powering and access to the SV 307 data. The scope of the basic SvanNET can be extended with multipoint project management that offers data storage in the cloud, data sharing, advanced alarming and reporting features. SvanNET is an on-line solution which means it doesn't require software installation and is accessible through a web browser. The responsive design enables use of SvanNET on various devices such as smartphones or tablets.

SvanPC++ is a PC software supporting functions such as measurement data downloading from instruments to the PC, measurement setups creating, basic Leq/RMS recalculation, measurement results in text, table and graphical form of presentation, export data to a spread sheet or text editor applications. New version of SvanPC++ software also supports analysis of wave files from Svantek instruments (for example calculation of tonality).

1.1 SV 307 AS SOUND LEVEL METER & ANALYSER

- measured results: **Lpeak**, **Lmax**, **Lmin**, SPL (**L**), **Leq**, SEL (**LE**), **Lden**, **LEPd**, **Ltm3**, **LTeq**, Leq statistics (**Ln**), expected Leq value (**EX**), standard Leq deviation (**SD**), two rolling Leq (**LR1** and **LR2**), measurement time and overload time % (**OVL**) as well as noise criterium (**NC**) and noise ratio (**NR**) in case of 1/1 Octave option with Class 1 IEC 61672-1:2013 accuracy in the frequency range 20 Hz ÷ 20 kHz
- parallel **Impulse**, **Fast** and **Slow** detectors for the measurements with **A**, **B**, **C**, **Z** and **LF** frequency filters
- total linearity measurement range **30 dBA LEQ ÷ 128 dB PEAK**
- **1/1 Octave** real-time analysis (optional) meeting Class 1 requirements of IEC 61260-1:2014 for 10 centre frequencies from 31.5 Hz to 16 kHz available simultaneously with three user definable profiles for broadband measurements (SLM), time history logging and audio recording
- **1/3 Octave** real-time analysis (optional) meeting Class 1 requirements of IEC 61260-1:2014 for 31 centre frequencies from 20 Hz to 20 kHz available simultaneously with three user definable profiles for broadband measurements (SLM), time history logging and audio recording
- **Audio recording** (optional)

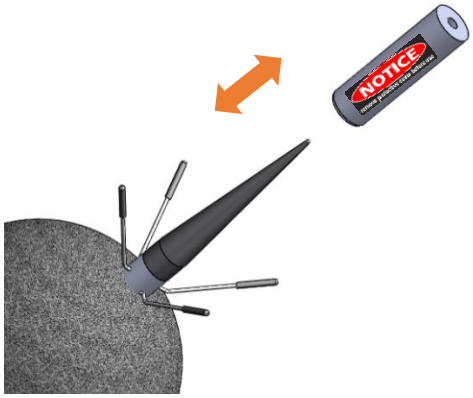
1.2 GENERAL FEATURES OF SV 307

- Noise measurements meeting IEC 61672-1:2013 Class 1 accuracy
- 1/1 & 1/3 octave real-time frequency analysis (option)
- Audio wave recording (option)
- Statistical analysis with up to 10 percentile values
- Time-history with two logging step intervals
- Automated system checking
- GSM modem enabling wireless remote control and data transfer via SvanNET web-service
- Integration measurement run time programmable up to 24 h
- Easy and friendly user interface for quick start and stop
- Extended alarm functionality
- Super contrast colour OLED display
- Wide range of temperature operating conditions
- Protection rating IP 65 for use in the field

1.3 ACCESSORIES INCLUDED

- **ST 30A** ½“ microphone capsule
- **SC 316** USB cable
- **SA 209** foam windscreen with antibird spikes and cone protection
- **SB 274** waterproof power supply with cable to SV 307
- **SA 307** carrying case for SV 307 and accessories
- **Memory** micro SD-card 16 GB or bigger
- **Antenna** GSM type

Note: *The cone protection is used only during transportation of SV 307 inside the SA 307 transportation case. Always detach it after removing the instrument from the transportation case and put it on the anti-bird spikes cone before placing the instrument into the case!*



Note: *Purchasing SV 307 entitles you to receive an access to SvanNET Connectivity, for which please contact your local distributor or SVANTEK sales department*.

1.3.1 SB 274 – waterproof power supply unit

SB 274 is waterproof single output switching power supply which is characterised by:

- Universal AC input / Full range (90 ~ 305V AC)
- Rated power 40W
- Built-in active PFC function
- Class 2 power unit
- Protections: Short circuit / Over load / Over voltage / Over temperature
- Fully encapsulated with IP 66 waterproof level
- Lemo connector for SV 307 15V/2A
- SC 270 mains cable

Note: *See also SB 274 User Manual*.

1.4 ACCESSORIES AVAILABLE

- **SV 36** Class 1 acoustic calibrator: 94/114 dB@1000 Hz
- **SB 275** external battery for monitoring stations, 33Ah
- **SB 371** solar panel (40 W)
- **SA 206** 4 m telescopic mast
- **SA 276** bracket for the SP 276 weather station

1.4.1 SV 36 – Class 1 Sound calibrator

For result verification purposes, most norms and standards impose the requirement to calibrate the measurement channel before and after each measurement or measurement session.

Sound calibrator is a device which produces an acoustic pressure of certain level and frequency.

SV 36 Sound calibrator produces an acoustic pressure of defined level 94/114 dB at a frequency of 1 kHz.

1.4.2 SB 275 – external rechargeable battery

SB 275 is an external source of DC power for the monitoring stations. SB 275 includes a Lead-Acid rechargeable battery (33 Ah, 12 V) and is dedicated for outdoor use because of its waterproof case.

The SB 275 set includes the SB 273 indoor charger and a cable for connection between SB 275 and SV 307.

SB 275 has one connector for charging and for power supply and therefore cannot be used as a power supply for the monitoring station and at the same time be charged itself.

Note: *To protect the SB 275 from full discharge, switch* ***On*** *the* ***External Battery*** *in the instrument's configuration Menu (path: <Menu> / Instrument / External Power) (see Chapter 10.12.2).*

Note: *SB 275 cannot be charged by the monitoring station SB 270 power supply.*

Note: *SB 275 is not restricted for air, surface and water transport. Classified as non-hazardous material (IATA/ICAO Special Provision A67, DOT-CFR Title 49 parts 171-189, IMDG amendment 27).*

Note: *It is necessary to charge SB 275 after any total discharge, otherwise the battery may lose its capacity.*

Note: *SB 275 should not be stored for a long time with a discharged battery. Storing SB 272 with a discharged battery may damage it.*

Note: *If SB 275 is planned to be stored for a long period of time, it is recommended to charge its battery to 100% capacity. The battery should be charged at least once per 6 months.*

Note: *If the storage period is longer than one year, a discharge/charge cycle must be performed. To do this, completely discharge the battery and then charge it to 100% capacity.*

1.4.3 SB 371 – solar panel

The **SB 371** solar panel (40 W, 17.5 V) extends the working time of monitoring stations. Size and weight of the panel enables easy transportation in the dedicated carrying bag.

SB 371 does not require additional batteries or external controllers.

Note: *If the instrument is powered from the SB 371 solar panel, switch* ***Off*** *the* ***External Battery*** *in the instrument's configuration Menu (path: <Menu> / Instrument / External Power) (see Chapter 10.12.2).*

1.4.4 SA 206 – telescopic mast

The **SA 206** is a Manfrotto 269BU mast with adjustable height from 1.5 meter to 4 meters.

1.5 OPTIONAL FUNCTIONS

- **SF 307_3** 1/1 and 1/3 octave real-time analysis
- **SF 307_15** time domain signal recording
- **SvanPC++_EM** environmental monitoring module for SvanPC++ (hardware key, single license)

1.5.1 SF 307_3 – 1/1- and 1/3-octave real-time analysis

The option for 1/1 and 1/3 octave real-time analysis allows the analysis of noise frequency contents and is used for verification of noise sources in the environment.

1.5.2 SF 307_15 – time domain signal recording

The option of Time domain signal recording to WAVE format works during measurement and is logged in parallel to a time history. Once downloaded to PC it can be played back. Settings such as triggers or recording time are adjustable. In addition to audio play-back, WAVE file can be post-processed by SvanPC++ software that provides calculation of overall results such as Leq, Lmax, Lmin, Lpeak as well as 1/3 octave and FFT calculations or tonality.

Note: *The software options listed above can be purchased at any time, as only the entry of a special unlocks code is required for their activation.*

1.5.3 SvanPC++ Environmental Measurements

SvanPC++ Environmental Measurements module is designed for post-processing of data recorded by monitoring stations. The module offers a powerful calculator and an automated noise event finder for noise source identification. Thanks to its “Projects” functionality, SvanPC++_EM allows you to combine and compare data from multiple measurements as well as create and save reports in MS Word™ templates. It can be activated at any time by ordering an activation code or hardware key.

1.6 EXTERNAL COMPLEMENTARY UNITS

- **SP 276** weather station GILL GMX600 (communication cable SC276 included)
- **ES-642** remote dust monitor (communication cable SC331 and power cable SC332 not included)

1.6.1 SP 276 – weather station

SP 276 is a GILL GMX600 type weather station used optionally with SV 307. It is connected to SV 307 via serial RS 232C interface (MULT.I/O socket) with the dedicated cable SC 276 and can be mounted on the mast with the use of the SA 276 bracket.

SP 276 measures 6 most essential weather parameters (barometric pressure, humidity, precipitation, temperature, wind speed and direction) and also rain. It is compact and light-weight, has no moving parts and can be easily installed with a one-bolt mounting method.

All measurement weather parameters (barometric pressure, humidity, temperature, wind speed and direction) are transferred from the SP 276 to the SV 307 monitoring station every second.

SV 307 may save them in the logger file as a Summary Results with the **Integration Period** step (see Chapter 10.9.4) and as a time-history results with the **Logger Step** (see Chapters 10.9.4.2).

Note: *If your GILL weather station is equipped with the wind sensor, then it is critical to set the correct sensor orientation. The North direction is marked at the bottom of the weather station. Use real-life compass or mobile app to determine North direction.*

Note: *See also GILL GMX600 User Guide.*

Note: *If you use SP 276 with your SV 307, select* ***SP276*** *in the* ***Serial Interface*** *position of the instrument's configuration Menu (path: <Menu> / Instrument / Serial Interf.) (see Chapter 10.12.9).*

1.6.2 ES-642 – remote dust monitor

ES-642 Remote Dust Monitor is an industrial air-quality sensor designed to provide real time particle concentration measurements in both indoor and outdoor environments. It is connected to SV 307 via serial RS 232C interface (MULT.I/O socket) with the dedicated cable SC331.

ES-642 measures particulate concentration using a highly sensitive forward scatter laser nephelometer, which has a measurement range of 0 to 100 mg/cubic meter (0 to 100,000 µg/cubic meter). As supplied, the ES-642 provides TSP particulate monitoring. Optional sharp-cut cyclones are available for PM1, PM2.5, or PM10.

ES-642 transfers measured data to the SV 307 monitoring station every second. SV 307 may save them in the logger file as a Summary Results with the **Integration Period** step (see Chapter 10.9.4) and as a time-history results with the **Logger Step** (see Chapters 10.9.4.2).

Note: *For installation, setup, and field calibrations please refer the ES-642 manual (https://metone.com/products/es-642/).*

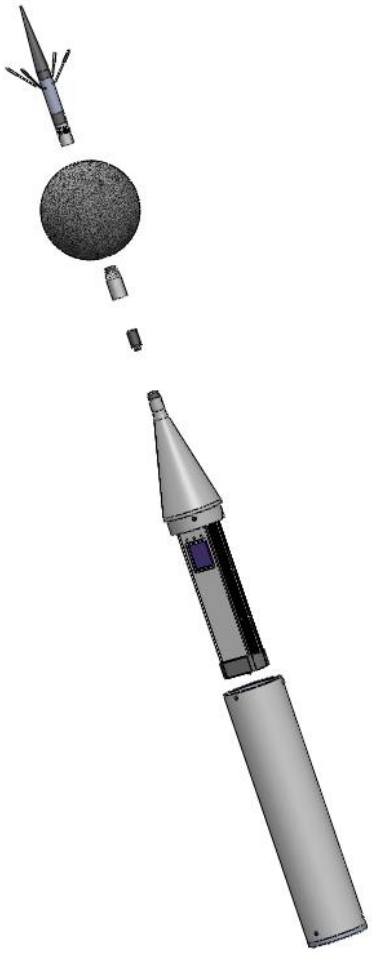
Note: *If you use ES-642 with your SV 307, select* ***ES-642*** *in the* ***Serial Interface*** *position of the instrument's configuration Menu (path: <Menu> / Instrument / Serial Interf.). Select the used sensor:* ***TSP****,* ***PM1****,* ***PM2.5*** *or* ***PM10*** *(see Chapter 10.12.9).*

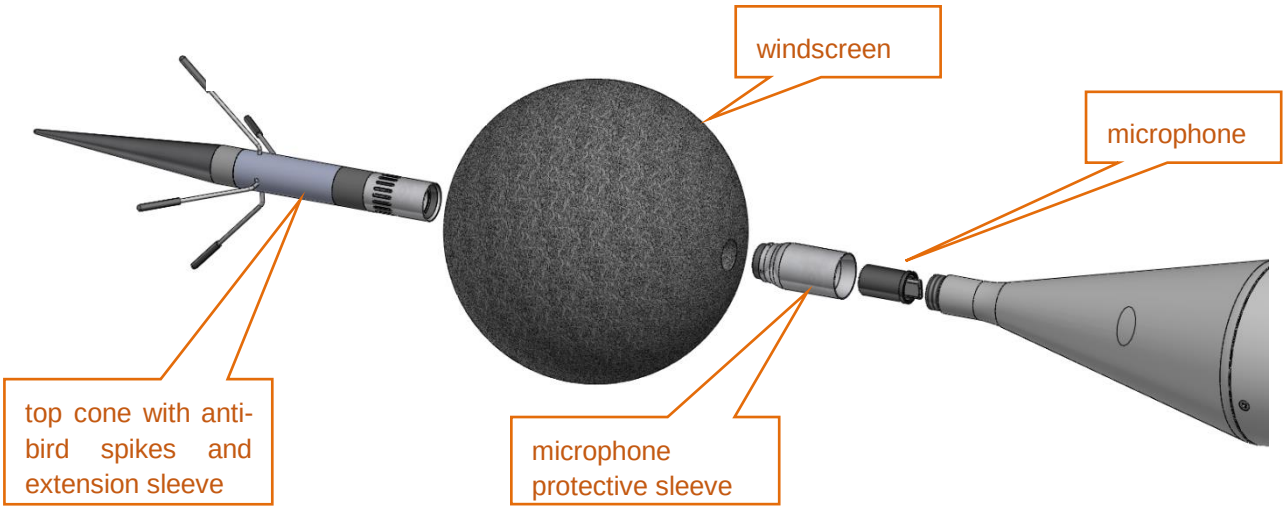
2 ASSEMBLING AND INSTALLING THE INSTRUMENT

2.1 SV 307 DELIVERY SET

The SV 307 delivery set consists of the following elements:

1. elements permanently integrated with the measuring device:
   - integrated, non-removable microphone preamplifier
   - Li-Ion rechargeable battery
   - GSM modem
   - colour display and control panel
   - upper coniform casing
2. and elements that can be disconnected:
   - MEMS microphone
   - top cone with anti-bird spikes
   - extension and microphone protective sleeve
   - SA209 5” foam windscreen
   - GSM antenna
   - lower cylindrical casing
   - bottom cup
3. SC 316 cable to communicate with PCs using USB interface
4. DC power supply kit:
   - weatherproof DC power unit of the type SB 274
   - set of 4 dowels Φ 10 mm (with screws) for mounting the power unit onto a wall
   - 2 band clips for mounting of the power supply on a mast





2.2 ASSEMBLING/DISMANTLING SV 307

After unpacking, check the completeness of the set according to Chapter 2.1.

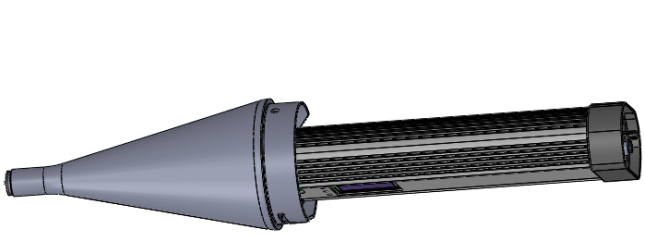
Recommended order of installation:

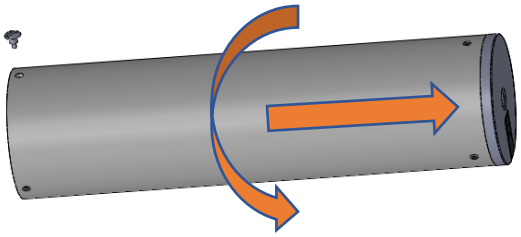
1. assembling of SV 307,
2. power supply installation,
3. mounting SV 307 on the mast,
4. arrangement of the cabling.

SV 307 is delivered pre-assembled, without antenna mounted, SIM card inside and cables connected.

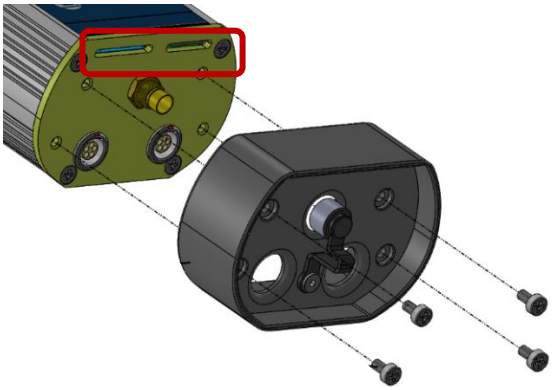
To complete the assembling, follow next steps:

1. Unscrew the fixing bolt in the upper part of the lower casing.
2. Grab one hand the upper coniform casing, turn the lower cylindrical casing with the other hand counter clock-wise in relation to the upper casing and disconnect them.

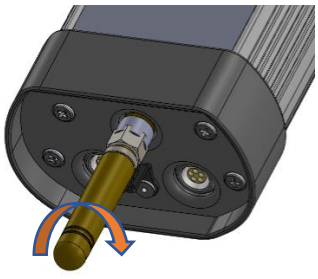




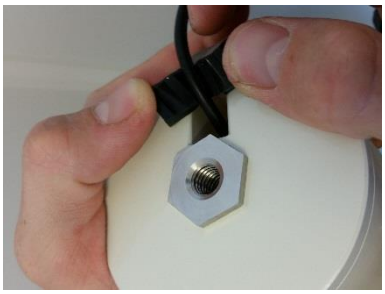
3. Unscrew four bolts and detach the bottom plastic cover of SV 307 to have access to the SIM card and micro SD-card slots.
4. Insert SIM card (micro SD-card is factory installed).
5. Attach the bottom cover and screw four bolts back.



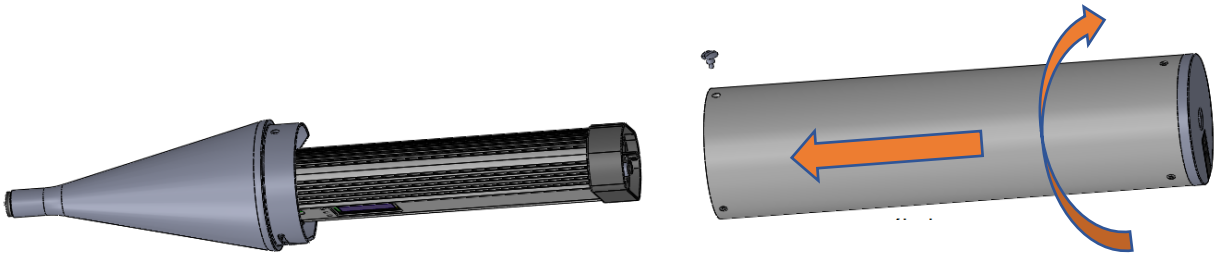
6. Connect the wireless antenna.
7. If necessary, connect the external power cable to the **15V/2A** connector and/or and the SC 316 cable to the **EXT.I/O** socket.



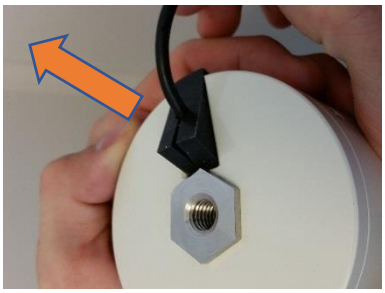
8. Release cables through the hole with the seal in the base of the lower casing.



9. Turn SV 307 on. If you use an external power source, you do not need to turn on the device. It will turn on automatically when the external power will be connected.
10. Connect the lower casing with the upper one and fix it by turning it clock-wise.
11. Screw in the fixing bolt in the upper part of the lower casing.

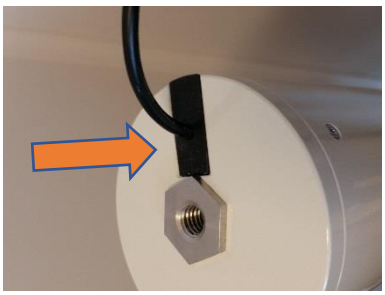


12. Pull the cable out of the lower casing.



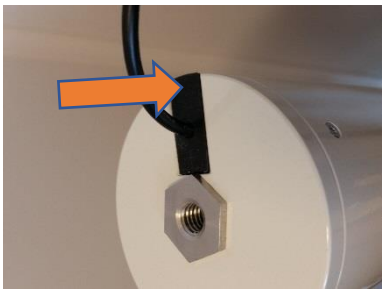
Note: *Pulling the cable out of the lower casing is an essential element of the station assembling, therefore the label with a reminder inscription is glued on the base.*

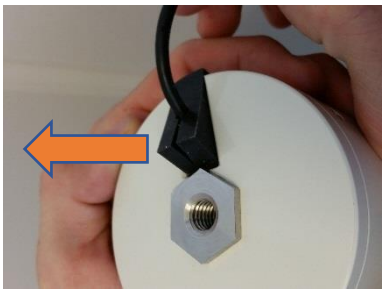
13. Insert the seal into the hole and press it.



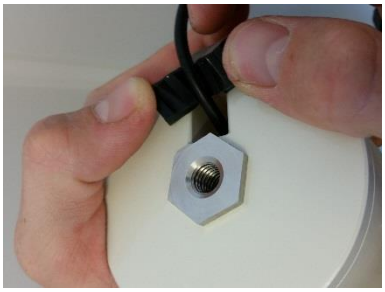
To dismantle SV 307, follow next steps:

1. Press on the edge of the seal and pull it off the hole.

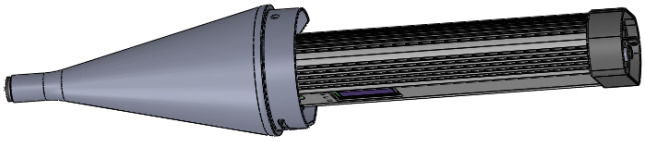


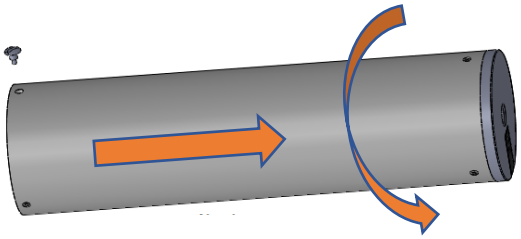


2. Release the cable from the seal.



3. Unscrew in the fixing bolt in the upper part of the lower casing.
4. Disconnect the lower casing from the upper one turning it counter clock-wise.





Note: *The upper coniform casing is rigidly connected to the measuring device and is not intended for dismantling. Dismantling the upper coniform casing may damage the instrument!*

2.3 MOUNTING SV 307 ON MAST

The mounting described in this manual is based on the mast type systems, that are recommended by Svantek.

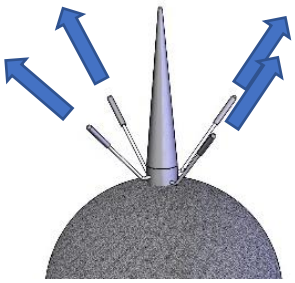
Note: *If other types of mounting than mounting on the mast is going to be applied, consult Svantek, since only recommended type of mounting assures declared acoustical characteristics of the station.*

Coaxial mounting of the device on the mast Φ45 mm ended with a bolt M14 is recommended.

Note: *Make sure SB 274 power supply unit is not connected to mains before full system installation.*

Note: *Before installing the station at the measurement site, make sure that the protective caps on the four anti-bird spikes are removed.*

It is recommended to use the protective caps during transportation and storage or other operations with the instrument like, laboratory calibration, etc. to avoid personal injury.



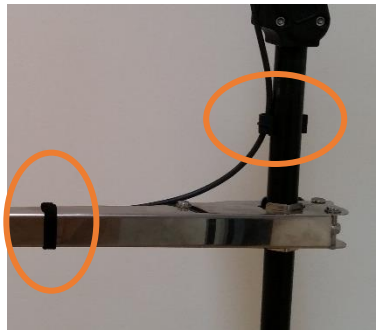
1. Screw the assembled instrument on the M14 thread of the mast rotating it clockwise.

Note: *To mount SV 307 on the 3/8" thread use the M14/3/8" adapter.*

Note: *The M14/3/8" adapter is intended for mounting SV 307 on photographic and light tripods. Tripod or pole with 3/8" thread is not recommended for permanent installation.*

2. Optionally mount the weather station on the beam that can be installed on the mast below SV 307. The distance from the beam to SV 307 should be as great as possible, but it is limited to the length of the SC 316 cable.

3. Attach cables to the mast. It is recommended to use band straps at intervals not greater than 50 cm (20") on the mast and the cable holders delivered with the kit (Velcro fasteners). Lay the cables so that they are loose at the ends. The loose cable should hang a bit lower than the connector to avoid accumulation of rainwater.



Note: *Fixation of cables is important because loosen cables may generate additional noise. As an alternative way, wrap the cables around the mast.*

Connect the power supply unit SB 274 to SV 307.

Note: *Even though the SB 274 power supply unit has a high IP index (Ingress Protection), it is still not recommended to leave it on the ground for safety reasons.*

It is recommended to install the power supply unit SB 274 on a mast, using 2 steel clamps and in the place not exposed to direct sun light.

The device prepared this way is ready for measurements.

2.4 ANTI-THEFT PROTECTION

SV 307 is equipped a ring at the bottom of the lower cylindrical casing, which can be used for anti-theft protection with the use of locking cable.

2.5 WINDSCREEN PROTECTION

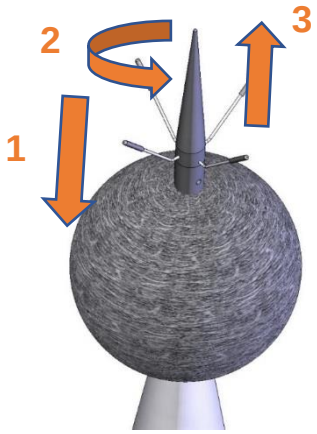
The SA 209 foam protects the microphone from the wind noise.

Note: *The windscreen influences the free-field characteristics of the instrument, therefore it is important to check its condition regularly. In the case of visible degradation of the foam surface it must be replaced by the new one.*

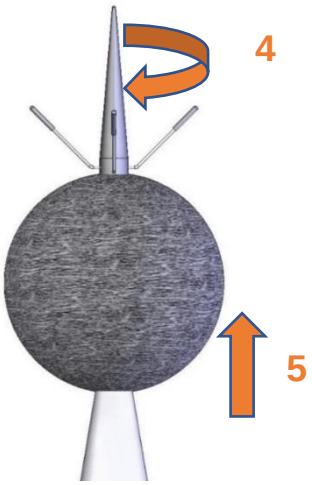
During continuous usage, the SA 209 foam is exposed to different weather conditions with possibility of causing mechanical damage to the foam's structure. Therefore, it is recommended, at least once a quarter (3 months), to check the condition of the foam by examining the surface for cracks by squeezing the foam. If cracks or holes are observed, the SA 209 foam must be replaced.

The SA 209 foam must be replaced whenever squeezing it causes severing of small pieces of its surface.

To exchange the SA 209 windscreen foam, do what follows:



1. Push the windscreen foam down the instrument until you will see the lateral hole.
2. Unscrew the top cone with the anti-bird spikes and the extension sleeve from the microphone protective sleeve, rotating it counter-clockwise.
3. Take the windscreen foam off the extension sleeve and put on the new windscreen foam.



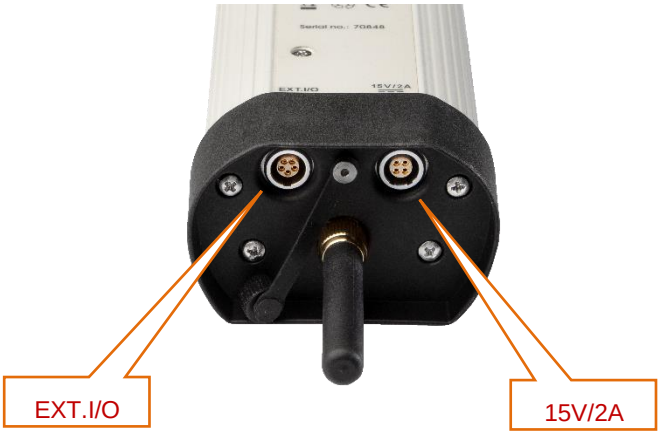
4. Screw the top cone with the anti-bird spikes and the extension sleeve with the windscreen foam on the microphone protective sleeve, rotating it clockwise.
5. Push the windscreen foam up the anti-bird spikes until it hides the lateral hole.

3 SV 307 CONNECTORS AND CONTROL PANELS

3.1 CONNECTORS PANEL

When the instrument is assembled access to the connectors panel is blocked by the cylindrical casing.

To have access to this panel you should disconnect the cylindrical casing from the conical one and remove it.



The connectors panel has three sockets for:

- external power (**15V/2A**),
- external communication (**EXT.I/O**) and
- GSM antenna,

and two slots under the plastic cover:

- SIM card and
- micro SD-card.

Note: *Switch the power off before connecting the instrument to any other device (e.g. PC) or fitting the microphone capsule.*

DC IN socket

The **DC IN** socket is used to connect external power source, i.e. provided power supply unit SB 274 using cable with Lemo connector, optional solar panel using **SC 333** cable or external DC source using **SC 334** cable.

Note: *SV 307 is equipped with the mechanism which protects the internal Li-Ion batteries from damage caused by critical discharge. When the battery is running flat, the instrument is automatically switched off.*

Note: *SV 307 should not be stored for a long time with discharged Li-Ion batteries. Storing with batteries in discharged condition may damage them. If so, warranty for Li-Ion battery is void.*

Note: *If SV 307 is planned to be stored for a long period of time, it is recommended to charge its battery to 60% capacity. The battery should be charged at least once per 6 months.*

External Communication Interface socket

The **EXT.I/O** socket (LEMO 5) enables connection of the instrument to one of the following devices:

- PC via USB using **SC 316** cable.
- SP 276 weather station via RS232 using **SC 276** cable.
- ES-462 dust monitor via RS232 using **SC 331** cable
- Alarm lamp (active type) using own cable.
- External trigger (digital input/output signal) using cable with LEMO 5 connector.

Note: *While connecting your SV 307 with the PC by the SC 316 cable, first insert the lemo plug into the instrument's EXT.I/O socket and then the USB plug into the PC!*

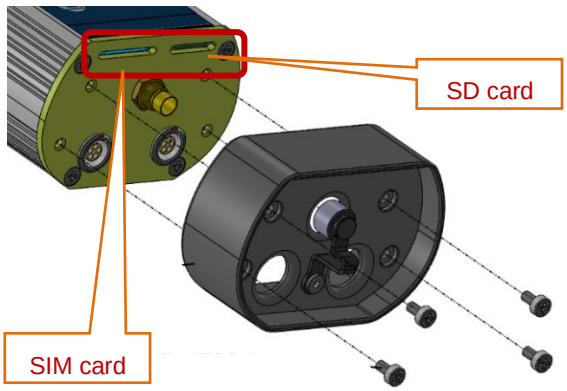
Antenna socket

After plugging the antenna into the socket, the screw should be tightened to light resistance only. Do not over tighten this connector.

To have access to the SIM card slot and SD-card slot you should unscrew four bolts and detach the bottom plastic cover of SV 307.

The SIM or SD-card should be inserted into the slot according to the drawing on the panel. Push the card in until you feel a click.

To remove the SIM or SD-card from the slot push it until you feel the click and pull the card out. Use tweezers to remove the SIM card from the slot.



Information on configuring GSM connection can be found in Chapter 7 and 0.

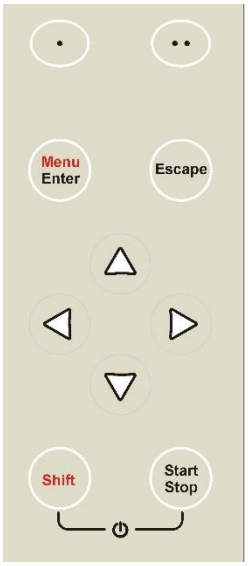
3.2 CONTROL PANEL

Control of the instrument has been developed in a fully interactive manner. You can configurate the instrument by selecting the appropriate position from the screen Menu. Thanks to that, the number of the control keys of the instrument has been reduced to ten for ease of use and convenience.

The following control keys are located on the front panel of the instrument:

- **<Enter>**, **(<Menu>)**
- **<Escape>**
- ▲,◄, ►, ▼
- **<Shift>**
- **<Start/Stop>**
- **<.>** and **<..>**.

The key name given in **(**...**)** brackets denotes the second key function which is available after pressing it together with **<Shift>**.



<Shift> The second function of a key (for example, **<Menu>**) can be used when the **<Shift>** key is pressed together with **<Enter>** or some other keys. This key can be used in two different modes, which can be configured in the **Keyboard** list (*path: <Menu> / Instrument / Keyboard*):

- like in a computer keyboard, when both **<Shift>** and the second key must be pressed simultaneously (**Direct** mode);
- like in a smartphone keyboard, when the first **<Shift>** key should be pressed and released and then the second key pressed (**2nd Function** mode).

Note: *Simultaneous pressing of the* ***<Shift>*** *and* ***<Start/Stop>*** *keys turning the instrument on or off.*

<Start/Stop> This key allows you to start and stop the measurement process.

<Enter> This key allows you to open the selected position on the Menu list, to confirm selected settings or to switch the views of the result presentation modes. Some additional functions of this key will be described in the following chapters of this manual.

(<Menu>) This key (pressed together with the **<Shift>**) allows you to enter the main **Menu** containing next sections: **Function**, **Measurement**, **Display**, **File**, **Instrument** and **Auxiliary Setup**. Each section contains positions, that open screens with submenu or lists of configuration parameters. These sections will be described in detail in the following chapters of the manual. These sections will be described in detail in the following chapters of the manual. Double pressing of the **<Menu>** key opens the list containing the last earlier opened eight lists of parameters. It often speeds up

the control of the instrument as you have faster access to the frequently used lists of parameters for easy navigation.

<ESC> This key closes the lists of parameters or other screens returning to the upper list of the menu. It acts in an opposite way to the **<Enter>** key. When the screen is closed after pressing the **<ESC>** key, any changes just made are ignored.

◄ / ► These keys allow you, in particular, to:

- select the column in a multi-column parameter list;
- select the parameter value in an active position (e.g. filter **Z**, **A**, **B**, **C** or **LF**, integration period: **1s**, **2s**, **3s**, … etc.);
- control the cursor in **Spectrum**, **Logger** and **Statistics** modes of result presentation;
- select the position of the character in the text edition screens;
- speed up the changing of numerical values of the parameters when pressed and held.

(◄ / ►) The ◄ / ► key pressed in together with **<Shift>** allow you, in particular, to:

- select the parameter value in an active position (e.g. filter **Z**, **A**, **B**, **C** or **LF**, integration period: **1s**, **2s**, **3s**, … etc.);
- shift cursor from the first to the last position and back on the graphical view mode.

▲ / ▼ These keys allow you, in particular, to:

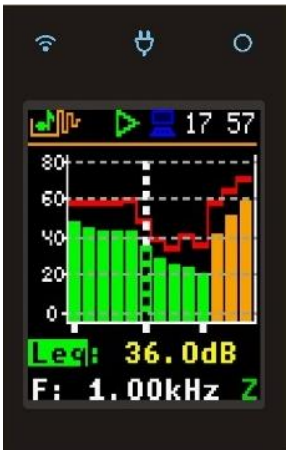
- select lines in the list;
- select the correct character from the list in the text editing mode;
- change the presentation mode of the results.

(▲ / ▼) The ▲ / ▼ key pressed together with **<Shift>** allow you, in particular, to:

- change the current result function in the measurement display mode,
- change the relationship between the Y-axis and X-axis of all plots presented on the screen,
- program the Real Time Clock (**RTC**) and delayed run **Timer**.

<.> and **<..>** These keys are used for selection of the required option during instrument's warning or request.

Display and control diodes



The instrument has super contrast colour OLED display which is equipped with three diodes in the form of icons, which go out when the screen is switched off.

The  diode reflects the modem and remote connection state: dark - the modem is switched off, red - the modem is switched on, but there is no connection with the SvanNet web-service, blue - there is connection with SvanNet.

The  diode reflects the state of charging of the internal batteries: dark - there is no external power connected to the instrument, red - the batteries are charging, green - the batteries are fully charged.

The  diode reflects the measurement state: dark - the measurement is not performed (stopped), green and flashing - the measurement is performing, yellow - the measurement is paused.

4 POWERING

SV 307 can be powered using one of the following power sources:

- Li-Ion batteries, fitted internally. Operation time with the internal Li-Ion batteries depends on the power consumption:
  - up to 7 days – GSM modem is off,
  - up to 4 days[1] – GSM modem is on,
- Provided AC power supply unit SB 274 using cable with Lemo connector. Input 90-305 VAC, output +15 VDC 2.7A, IP67 housing.
- Optional solar panel using **SC 333** cable. MPPV voltage 15-20 V, connected directly to SV 307, without using power conditioner.
- External DC source using **SC 334** cable. Voltage range 10.5 V – 24 V, e.g. 12 V or 24 V battery.

The internal battery is charged in a fully automatic cycle, when the instrument is connected to any external power source. SV 307 charges itself irrespectively of it being turned on or off. The weather conditions (i.e. temperature) are taken into account while charging to prevent any damage of the battery caused by charging in too high or too low temperature.

[1] One-minute data transmission with one-hour cycle

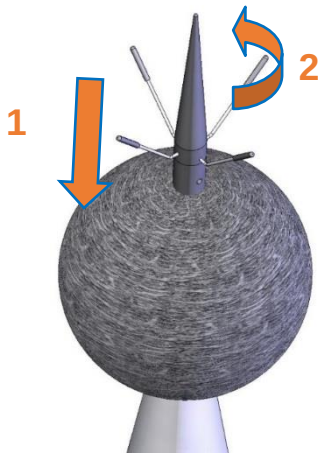
5 CALIBRATION, SYSTEM CHECK

The instrument is factory calibrated with the supplied microphone for the reference environmental conditions (see Appendix C). The microphone sensitivity is a function of the temperature, ambient pressure and humidity, and when the absolute sound pressure level value is required, the absolute calibration of the measurement channel should be performed periodically. Opposite to calibration, a system check only gives information about calibration drift and doesn't change a calibration factor.

If the instrument is assembled and needs a calibration or system check with the use of sound calibrator, it is necessary to disassemble following parts of SV 307:

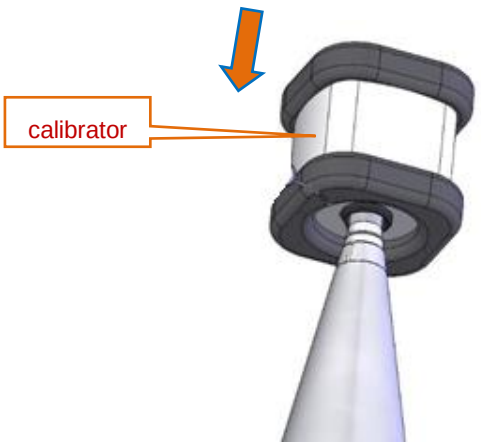
- top cone with anti-bird spikes and extension sleeve,
- SA 209 windscreen foam.

To access the microphone, do what follows:



1. Push the windscreen foam down the instrument until you see the lateral hole.
2. Unscrew the top cone with the anti-bird spikes and the extension sleeve from the microphone protective sleeve, rotating it counter-clockwise.

3. Disconnect the top cone with the anti-bird spikes and the extension sleeve with the windscreen foam from the microphone protective sleeve.



4. Attach the acoustic calibrator (SV 36 or equivalent 114 dB/1000 Hz) carefully on the microphone.
5. Switch on the calibrator and wait for the tone to stabilize (according to the calibrator specification) before starting the calibration measurement.
6. Perform the calibration measurement with the use of instrument control panel (see Chapter 10.8.2.2).

Note: *In the case of calibration with the use of instrument control panel you must disassemble the instrument (take it off from the mast and dismantle the cylindrical casing) to have access to the control panel.*

7. Take the calibrator off after the calibration measurement.

8. Screw the top cone with the anti-bird spikes and the extension sleeve with the windscreen foam on the microphone tube, rotating it clockwise.

9. Push the windscreen foam up the anti-bird spikes until it hides the lateral hole.

Note: *During calibration measurements, the level of external disturbances (acoustic noise or vibrations) should not exceed a value of 20 dB below the level of signal generated by the calibrator (94 dB when using a calibrator that generates 114 dB).*

Note: *It is also possible to use different type of acoustic calibrator dedicated for ½" microphones. In any case, before starting the calibration measurement, set in the instrument the level of the signal, which is stated in the certificate of the calibrator.*

6 OPTIONS OF THE INSTRUMENT CONTROL

Prior to start operating SV 307 it is necessary to assemble the instrument according to the instructions in Chapter 2, connect the power source if required and switch the instrument on by pressing simultaneously the **<Shift>** and **<Start/Stop>** keys and holding them for min 3 sec.

Basic control operations include:

- Measurements start/stop
- Measurement results view
- System check/calibration
- Files download/upload
- Instrument/measurement configuration
- Firmware upgrade.

Most of these operations can be performed manually using the instrument's **Control panel**. However, SV 307 is dedicated for the outdoor monitoring and the access to the control panel normally is blocked by the cylindrical casing.

Thus, control panel can be used in some special cases, like instrument testing or configuring in the laboratory environment, and the primary instrument control is remote control via mobile network with the use of internal GSM modem.

SVANTEK offers three tools which enable remote functionality: **SvanNET** web-service, **SvanPC++_RC** and **SVANNET APP** software.

SvanNET is a user-friendly web-service enabling most of basic operations for SV 307 remote control and data retrieving. This software doesn't require installation and can be used on any PC and mobile device.

SvanPC++_RC is the standard Svantek software for Windows (SvanPC++) augmented by Remote Communication module (**RC**). This software is dedicated to all types of communication channels of mobile network as well as for WLAN. SvanPC++ has also advanced capability of remote configuration control, data retrieving, data processing and reporting.

SVANNET APP is the standard Svantek software for Windows for configuration of the remote communication.

6.1 SV 307 CONTROL VIA THE CONTROL PANEL

The instrument can be fully controlled by means of ten keys on the keypad. Using these keys, one can access all available functions and change the value of all available parameters. The parameters are placed in a system of lists and grouped in the hierarchical structure menu shown on the high contrast graphic colour display.

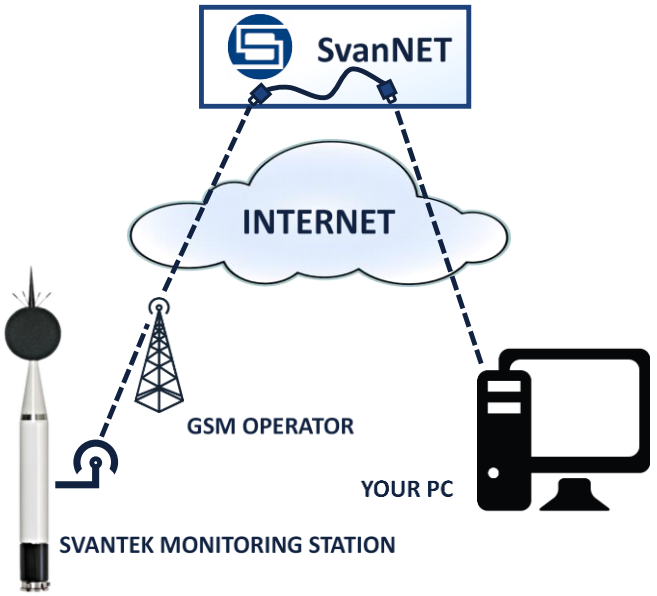
The instrument's menu consists of different type of screens, which include main menu list, sub-menu lists, lists of options, lists of parameters, text editor screen, information screen and file manager screen with file command list.

The description of the control panel user interface is presenter in Chapter 10.

6.2 SV 307 REMOTE CONTROL VIA SVANNET WEB-SERVICE

SvanNET is an Internet service that simplifies the remote connection between PC and Svantek monitoring stations.

SvanNET allows usage of all type of SIM cards with a GSM modem regardless of having a public or private IP. The connection over the SvanNET allows users to:

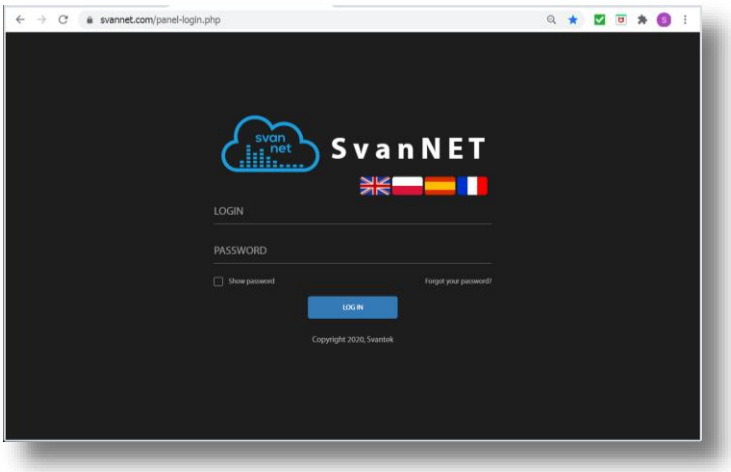


- use a mobile phone or tablet to watch real time measurement results,
- manually download files and reconfigure the station,
- manually download files and reconfigure the station using SvanPC++_RC module,
- use the SvanPC++_RC application based on MS Windows® for automatic control of monitoring stations, data archiving, automatic web publication, etc.

Note: *Establishing GSM connection requires usage of a SIM card with no PIN protection with activated Internet access. Installation of the SIM card is described in Chapter 2.2.*

Before start using the SvanNET web-service:

1. Check that your local distributor has created the SvanNET account for you and assigned your station to your SvanNET account.
2. Check the Access Point Name (APN). The default setting for the APN is "internet". It is possible that your Internet provider is using different APN. In this case, the APN must be entered manually via the Instrument control panel or via the SvanPC++ software.
3. Check the connection with SvanNET. Successful connection with SvanNET is indicated by the icon on the SV 307 display.
4. To access SvanNET, log in to your account at: https://www.svannet.com/panel-login.php



Before logging, select your language.

Once logged in, you can use the web interface to control monitoring stations.

SvanNET functionality is described in detail in Chapter 8.

6.3 SV 307 REMOTE CONTROL VIA SVANPC++_RC PROGRAM

SvanPC++ is a program that enables different remote-control options of SV 307 from your PC:

- with the use of USB connection or
- with the use of Internet connection via GSM modem.

SvanPC++ is free of charge program, that every user can download from SVANTEK web-site. SvanPC++ maintains USB connection with SV 307. Whereas all types of wireless connections require activation of the **Remote Communication** module (**RC**).

Remote control of SV 307 via SvanPC++_RC is described in Chapter 9.

6.4 REMOTE COMMUNICATION

The GSM modem enables the user a wide spectrum of interfacing capabilities using GSM based internet access.

The GSM modem offers the main communication channel, SvanNET e-mail functionalities and SMS alarms notifications.

6.4.1 Main communication channel

Main communication channel is a TCP/IP connection (a lossless data exchange protocol) that can be used to exchange commands as specified by Appendix A to the SV 307 User Manual. SvanPC++ assures this connection and provides data download, configuration, performance validation and measurement start/stop.

Main communication channel of SV 307 can be established by one of two available methods: TCP/IP Client or TCP/IP Server. The SV 307 firmware does not support SSL (Secure Socket Layer) connections.

The **TCP Client** is a mode of main communication channel in which SV 307 is configured to initiate connection to a designated address (***remote host***). SV 307 attempts to establish a TCP/IP connection to a designated address on a designated port (***Data Port***) automatically. Should the connection be established successfully, SV 307 can exchange commands with the remote server. Should the connection attempt fail or is broken by the ***remote host***, SV 307 will attempt to reconnect again. To prevent the connections from going *idle* (a state in which the TCP/IP connection seems to be active, but no data can be transferred), the station maintains the connection to the server by sending small packages of data at keep alive period (which by default is one minute). If the transfer is not properly acknowledged by the other party, the connection will be terminated.

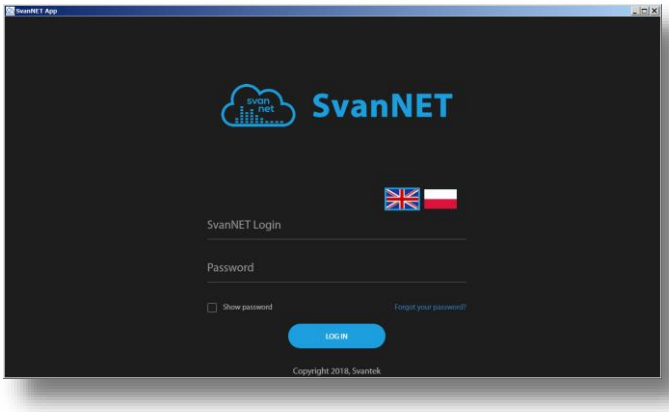
***Note: TCP Client** mode is used in the SvanNET web-service. SvanPC++_RC supports all modes of TCP/IP connection.*

SV 307 uses the **TCP Client** mode to connect to **SvanNET** (this is the default setting of the station) or another user defined server. The user also connects to SvanNET via web browser or SvanPC ++, and the service creates a "bridge" between the station and the user. In this case for GSM communication there are no restrictions on SIM card tariff (no public IP address is required) and simple internet access is enough. The essence of SvanNET is to simplify the procedures and requirements necessary for the connection.

7 CONFIGURING REMOTE CONNECTION – SVANNET APP

SvanNET App is an application for personal computers and mobile devices that enables easy access to the SvanNET web-service and SvanPC++ program. It also allows quick and simple automatic configuration of the remote connection of your SV 307 with the Internet.

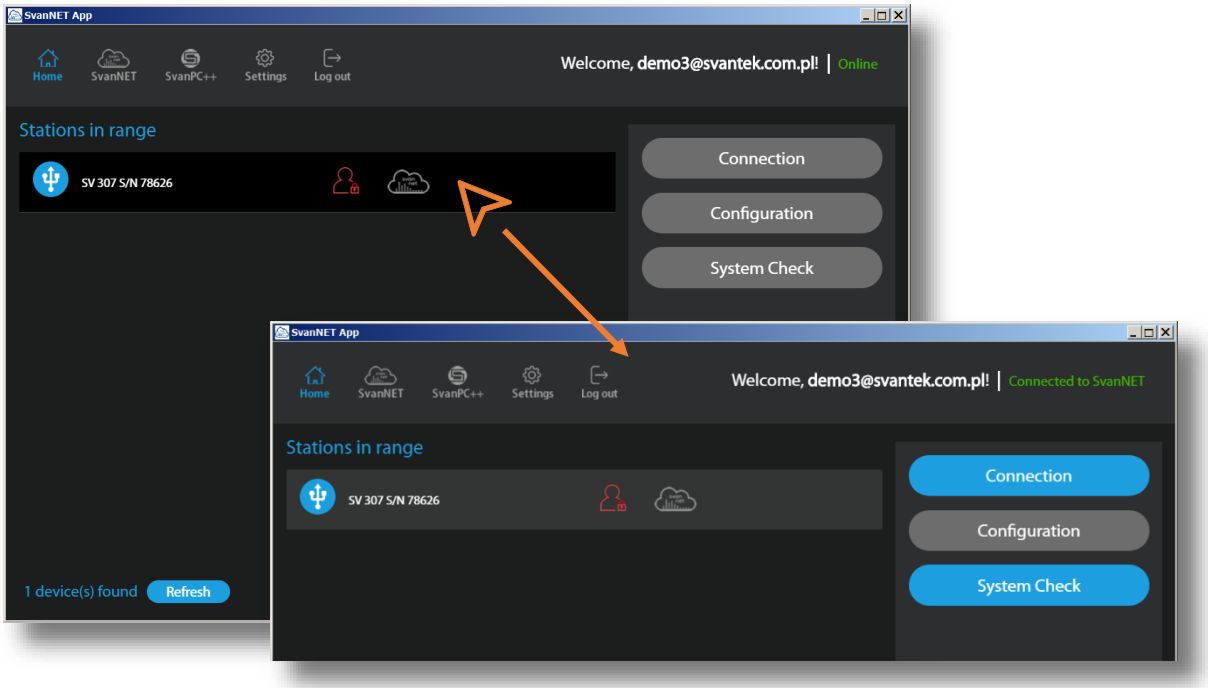
To start configuring a remote connection, it is necessary to connect your SV 307 to a PC by means of the USB cable and run the *SvanNET App* program.



Note: *To have access to* ***SvanNET App*** *the local SVANTEK distributer should create the user's account and assign monitoring stations to it.*

After logging, the screen with all Svantek instruments connected to a PC will appear.

Select the instrument you wish to communicate by clicking it in left section. Some buttons from the right side will change their colours from grey to blue depending on connection status with the SvanNET web-service. Blue colour means the active status of the screen element (button, icon).

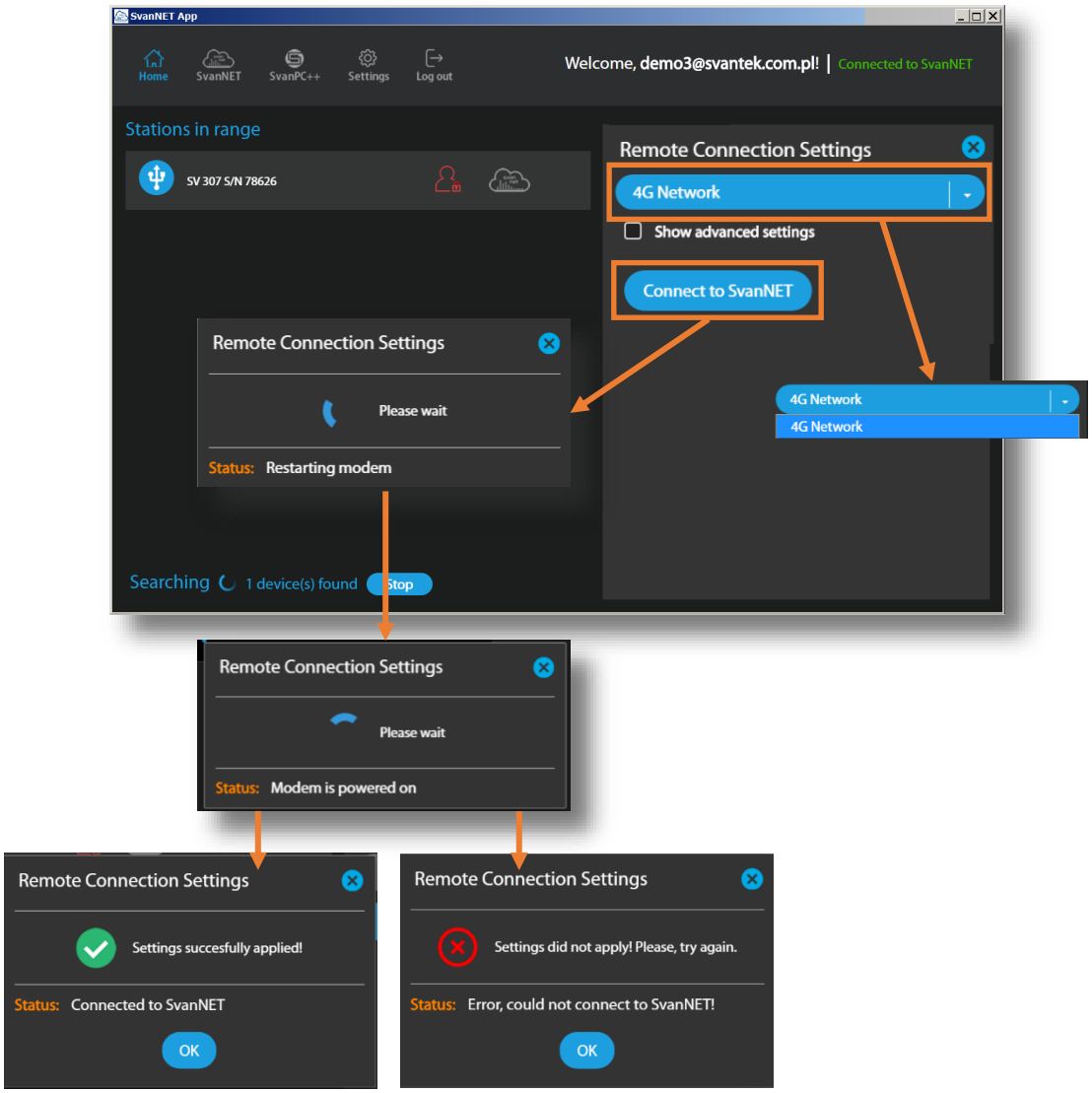


If your SV 307 is not connected to the SvanNET web-service, the **Configuration** button will not be active.

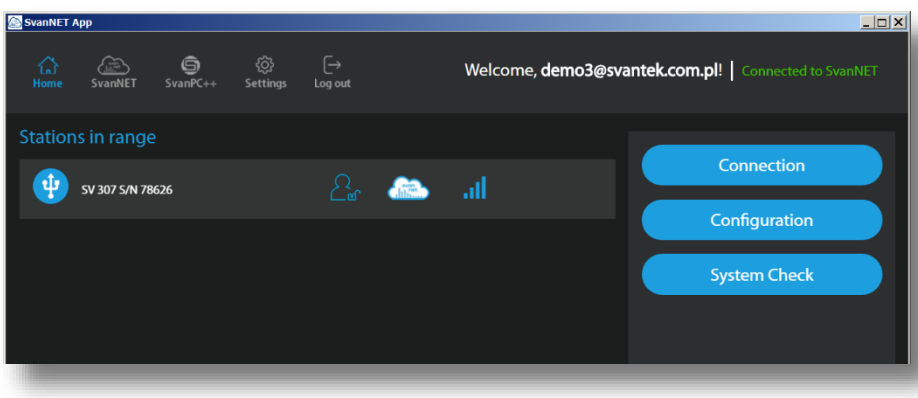
Refresh button is used for searching stations connected to the PC via USB, WLAN or visible as Access Point. Searching lasts 30 seconds and during searching the button is changed to **Stop**. You can stop searching at any time by clicking the **Stop** button.

7.1 CONFIGURING SV 307 CONNECTIONS

Click the Connection button and the **Remote Connection Settings** sidebar will appear, offering selection of the connection type - in the case of SV 307 only **GSM Network** (with the use of the GSM modem), and the button that connects the station to the Internet (**Connect to SvanNET** or **Connect to Other Server**).

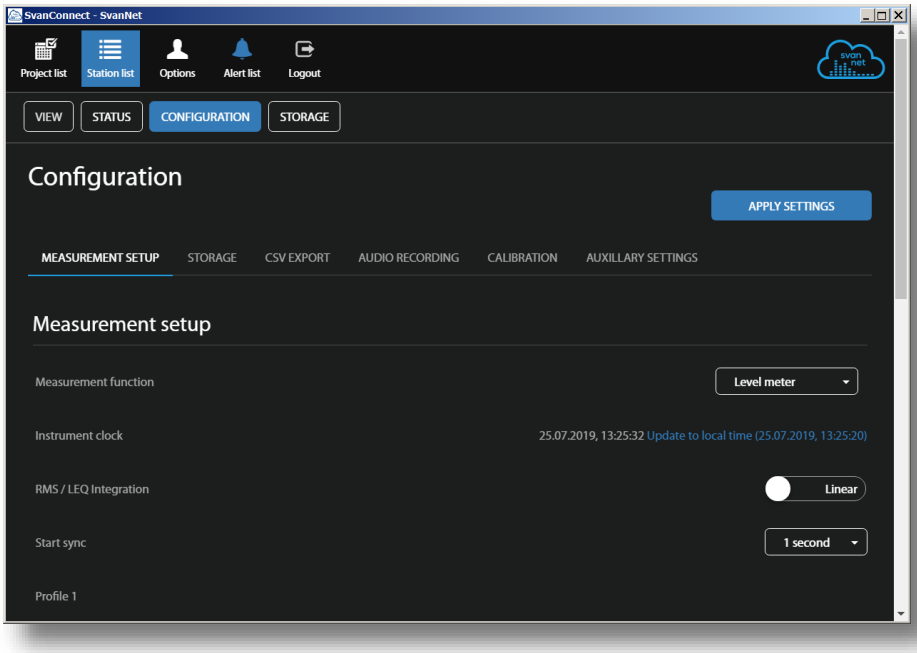


If connection is successful, the Configuration button turns blue.



If you click the 

button the program will open the SvanNET Configuration section where you can configure the SV 307 settings.



To return to SvanNET App click the 

icon or SvanNET App logo.

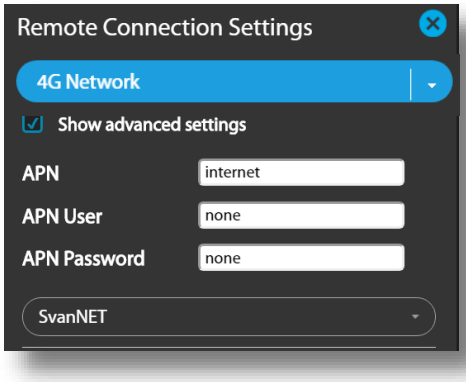
Remote Communication Settings

By default, the **4G Network** connection type and the connection to the **SvanNET** web-service configuration is proposed. Clicking the **Show Advanced settings** tick box will cause appearance of additional settings below.

In the case of **4G Network** connection, advanced settings will consist of **APN** name, **APN User** name and **APN Password**.

These settings will be applied while installing connectivity with the mobile network.

If the advanced settings are switched off the instrument will apply default network settings.



By selecting **Other Server** instead of **SvanNET**, the dropdown menu appears in which you can select **TCP Server** or **TCP Client** (**Connection mode**), remote address for TCP/IP client connection (**Server Address**) and **Port** for this connection.

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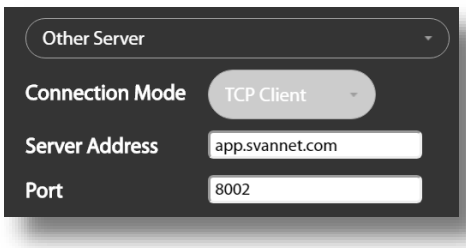
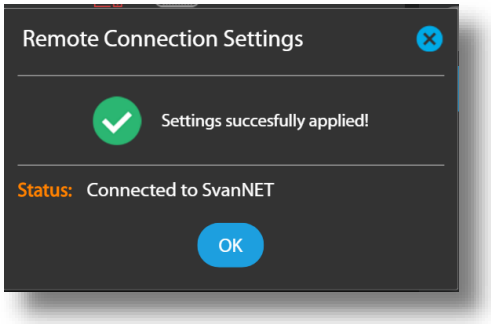


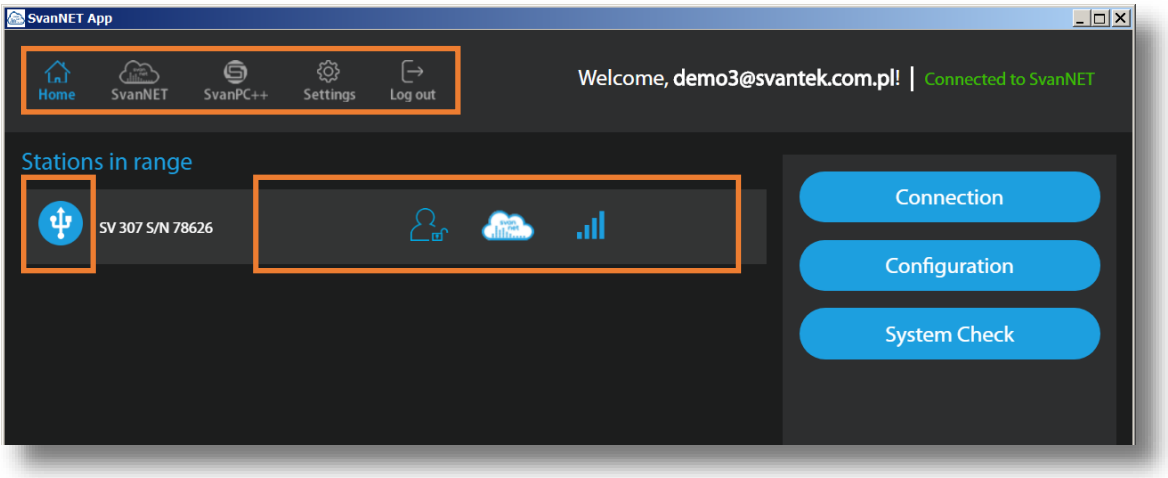
To set the selected connection press the 

button. In the case of successful connection, the message “Settings successfully applied!” appears.



7.2 ICONS OF SVANNET APP

Other functions of SvanNET App relate to the icons, located in the upper line of the window.



- returning to the main screen

- opening the SvanNET web-service

- opening the SvanPC++ program

- application settings

- exiting SvanNET APP

Icons in the instrument’s line have informative nature.

Icon located at the left side of the instrument’s bar informs about the instrument connection type with the PC:


- USB connection,


- WLAN connection,

 - LAN connection,

 - Access Point connection.

First icon at the right side of the bar line informs if the station is assigned to your account:

 - not assigned,

 - assigned.

Second icon at the right side of the bar line informs about state of connection with the SvanNET web-service:

 - not connected,

 - connected.

Third icon at the right side of the bar line informs about connection type with the SvanNET web-service:

 - GSM connection,

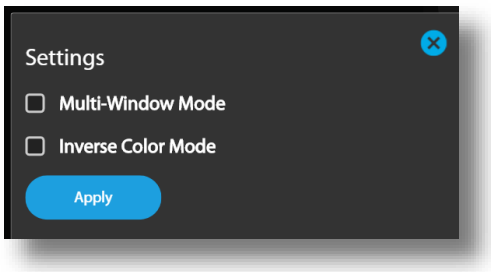
 - WLAN connection,

 - LAN connection.

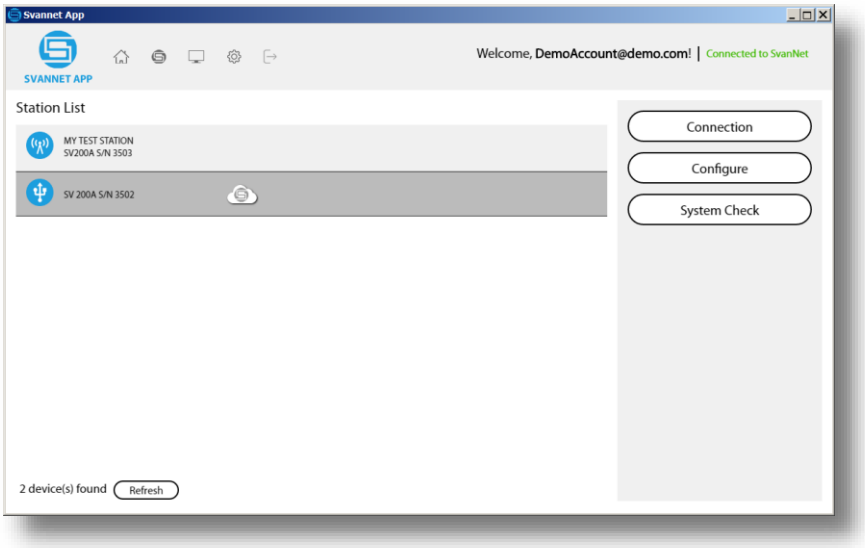
7.3 OTHER SETTINGS

If you click the  icon the pop-up window appears in which you can define additional **Settings**: **Multi-Window Mode** or **Inverse Color Mode**.

In the **Multi-Window Mode**, the SvanNET Configuration section will appear in the separate window.



The **Inverse Color Mode** screen is presented below.



8 SVANNET WEB-SERVICE

When enabled, and the instrument is properly configured, the **SvanNET** web-service offers you simple access to the instrument's settings, results and status information.

To start use SvanNET, browse https://svannet.com and log-in to it.

***Note:** To have access to the **SvanNET** web-service the local SVANTEK distributer should create the user's account and assign monitoring stations to it.*

The SvanNET interface depends on the package of tools assigned to your account and access level and includes:

– projects tools (**Project list**)

– individual stations tools (**Station list**).

If you have extended SvanNET package, you can use both tools. If you have standard SvanNET package, only Station list tool is available.

***Note**: This manual describes only the **Station list** tools. To get more information about **Project list** see SvanNET User Manual.*

8.1 STATION LIST VIEW

Station list displays all stations assigned to your account – turned on and off. When you click the station, it becomes active and the tools at the right panel will be dedicated to this particular station.

The station bar except station name with serial number includes five icons that indicate station state. When a station is disconnected from SvanNET all icons are of grey colour.

If you click the station name, station information will be displayed. If you click the icon, this icon status information will be displayed:

Alert status: blue - everything is OK, red – unregular event is happening.

Station connection status: green – online; grey – offline; yellow - the station doesn't respond to the command for a long time.

Battery state. When you click this icon, information about charging level will be displayed.

External power source status: blue – the instrument is powered by the external source, grey - there is no external power.

Connection status. When you click this icon, information about connection with SvanNET and a signal quality will be displayed.

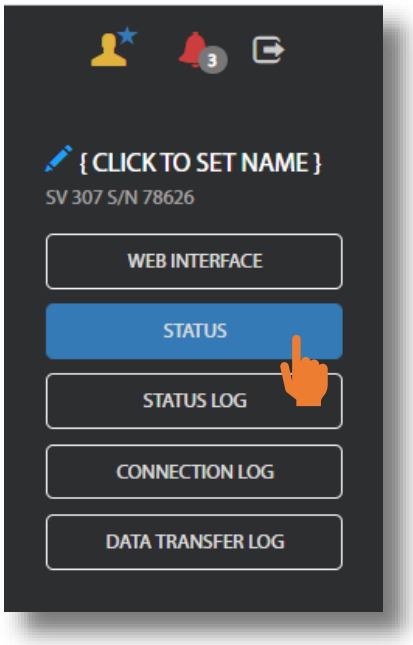
Three icons in the upper right-hand corner of the window allows you to:

manage the user account

display alarms for all stations

exit SvanNET.

The Tool panel provides some functions for station control. To switch the function, point a cursor on the appropriate button (it will change its colour to blue) and click it.



The **WEB INTERFACE** button switches you to the Live data view (see Chapter 8.2) in which you can view measurement results and use additional tools to configure station parameters, download data files, start/stop measurements and perform station checking. This button is available for the stations connected to SvanNET.

The **STATUS** button switches you to the Station status view (see Chapter 8.1.1) in which you can check the station status and configure status alarms.

The **STATUS LOG** button switches you to the Status log view (see Chapter 8.1.2) in which you can check the power source (type and charge level), memory free space, GSM signal quality and history of system checking.

The **CONNECTION LOG** button switches you to the Connection log view (see Chapter 8.1.2) in which you can check the history of station connections.

The **DATA TRANSFER LOG** button switches you to the Data transfer log view (see Chapter 8.1.2) in which you can check the history of data transfers (uploads).

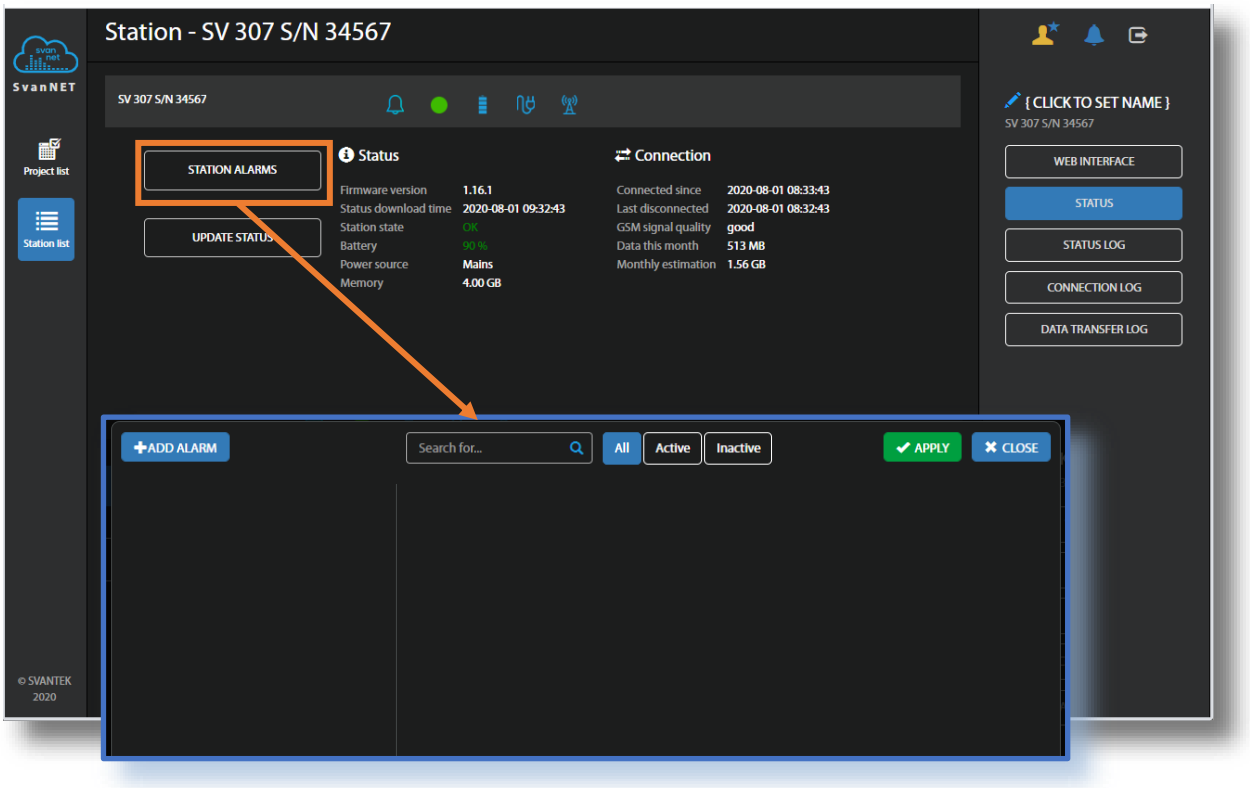
Clicking  you can set the new station name instead of the default.

8.1.1 STATUS view

In the STATUS view you can check the station status (firmware version, battery charging, memory, connection etc.) and configure SvanNET alarms.

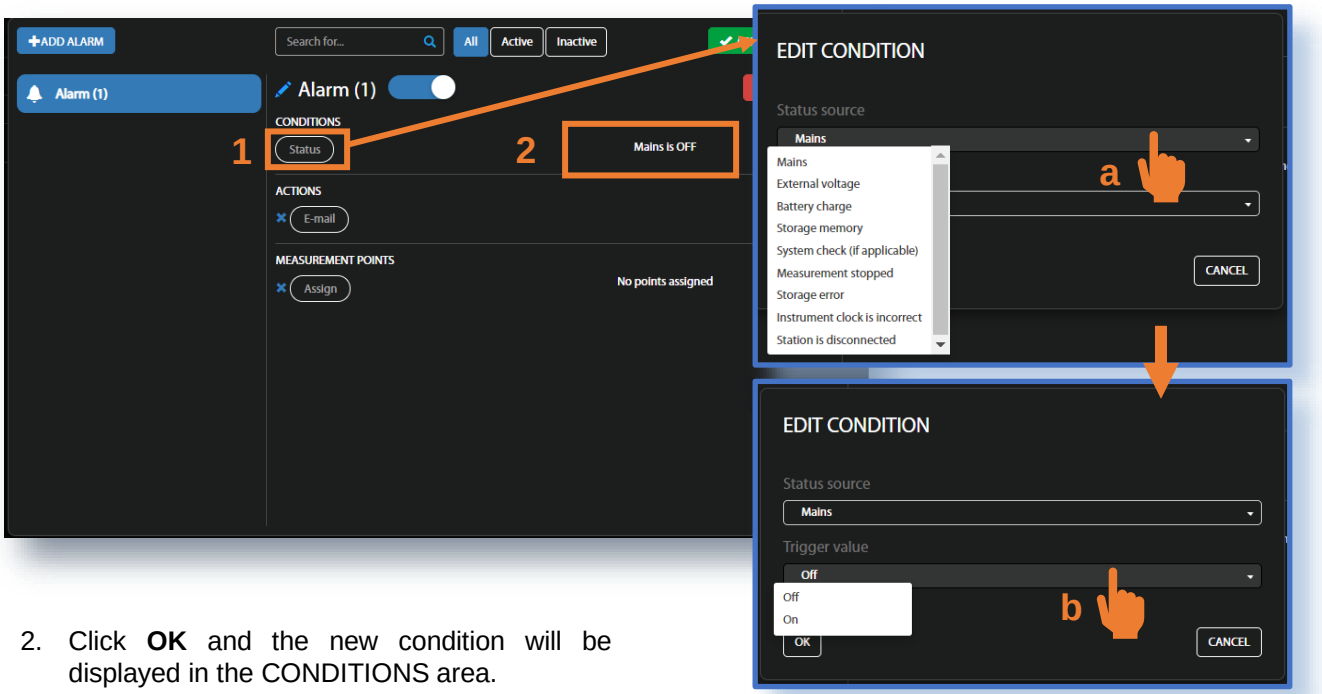
- To update instrument's status, click the **UPDATE STATUS** button.
- To configure SvanNET alarms conditions and related actions for the measurement points, click the **STATIONS ALARMS** button.

***Note**: In this section you can configure alarms generated by SvanNET based on data received from all stations belonged to your account. Some stations may also generate their own alarms which can be configured via WEB INTERFACE in the CONFIGURATION section – see Chapter 8.2.2.*



Click **+ADD ALARM** in the pop-up box and a new **Alarm(1)** with CONDITIONS, ACTIONS and MEASUREMENT POINTS settings will appear. Alarms are based on Conditions and relate to Actions, that are default e-mails to the specified recipients, and refer to Measurement points. To configure Alarm:

1. Click the **Status** button and in the EDIT CONDITIONS configuration box:
   a. select **Status source**: **Mains**, **External voltage**, **Battery charge**, **Storage memory**, **System check** etc.,
   b. click the **Trigger value** selector and choose the required value of the selected **Status source**.



2. Click **OK** and the new condition will be displayed in the CONDITIONS area.

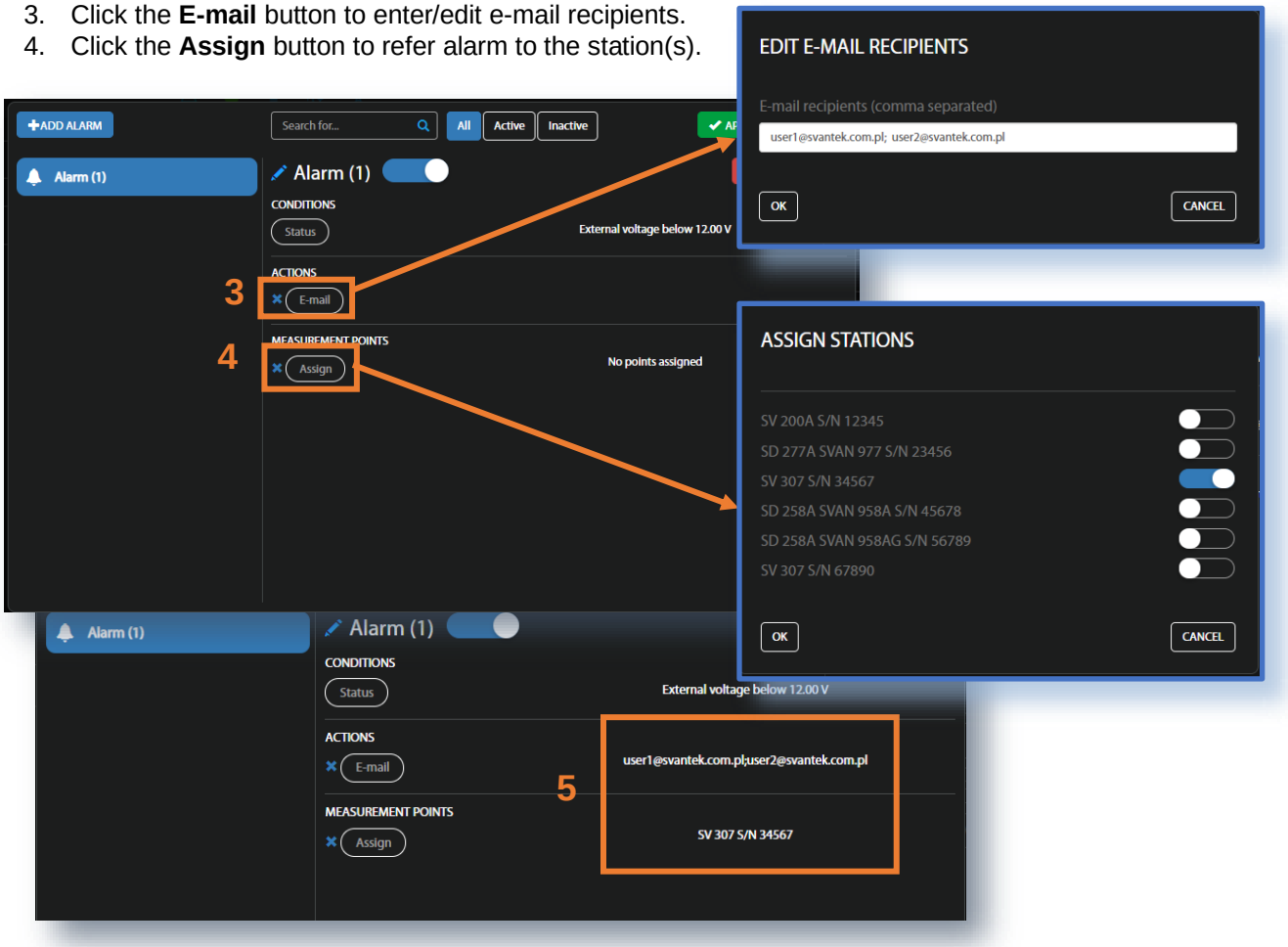
The SvanNET alarms have next meanings:

- **Mains**
  - Trigger Value: Off – alarm is generated when the system detects loss of power supply
  - Trigger Value: On – alarm is generated when the system detects appearance of power supply
- **External voltage**
  - Trigger Value: xx.xx V – alarm is generated when the system detects an external power drop below the selected value. In this case, external power means power supply and all various battery packs
- **Battery charge**
  - Trigger Value: xx % - alarm is generated when the system detects a decrease in the percentage of battery charge below the selected threshold.
- **Storage memory**
  - Trigger Value: xx MB/GB - alarm is generated when the system detects a decrease in the free storage memory below the selected threshold.
- **System check (if applicable)**
  - Alarm is generated when the system detects failure in execution of the system check procedure (not live check).
- **Measurement stopped**
  - Alarm is generated when the system detects luck of measurement. Applies only to stopped measurements - states such as start delay, waiting for synchronization and pause are treated as a running measurement
  - Instrument action: Start measurement
- **Storage error**
  - Alarm is generated when the system detects an SD-card error. The check assumes that a measurement is in progress and data are recorded; the writing of the logger file is checked by changing of the free space on the card (which means that the device is writing data).
  - Instrument action: Restart measurement

- **Instrument clock is incorrect**
  - Trigger value: xx seconds / xx minutes – alarm is generated if the RTC indication of the device is inconsistent with the current system time (based on owner's time zone) by ± of the selected value
  - Instrument action: Set instrument clock to server time (based on owner's time zone) – measurement is stopped, instrument clock is set (based on owner's time zone), measurement is resumed
- **Station is disconnected**
  - Trigger value: xx minutes / xx hours – alarm is generated when the station remains disconnected from SvanNET for a time equal to the selected value.

Alarms are reported once after the occurrence of an alarm condition. The occurrence of an alarm condition will generate selected actions (e.g. e-mail) at the moment of changing the status compared to the previous check (i.e. if at 8:15 there is power supply, at 8:30 mains is off, at 8:45 mains is still off, the system will generate an alarm at 8:30 and will be still until mains is on and off again).

3. Click the **E-mail** button to enter/edit e-mail recipients.
4. Click the **Assign** button to refer alarm to the station(s).



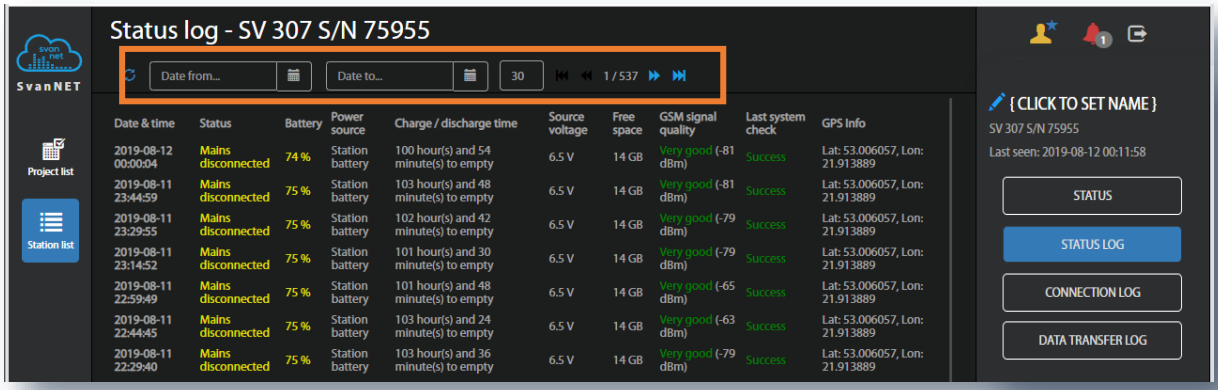
5. Made selections are displayed in the ACTIONS and MEASUREMENT POINTS sections.

8.1.2 LOG views

There are three station logs, that register system events, connections and data transfer:

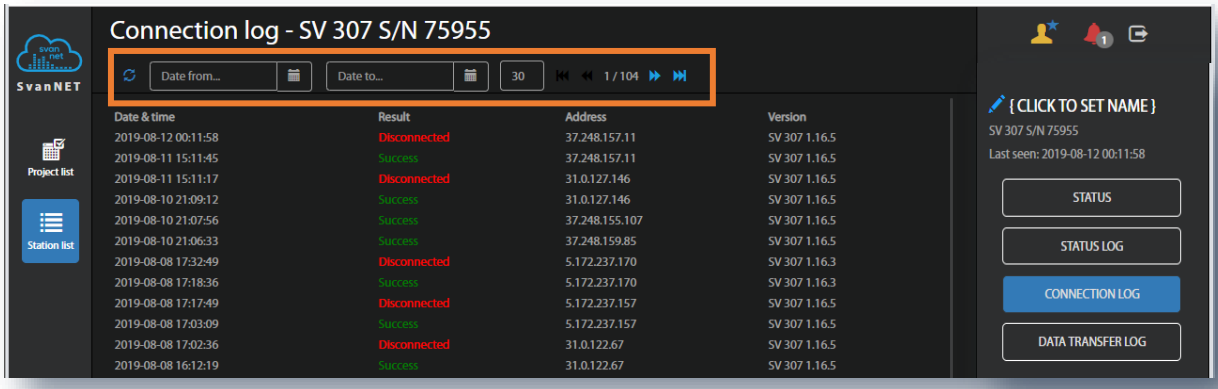
- **Status log** which registers power source (type and charge level), memory free space, GSM signal quality, system check history and GPS information.

  In the upper line you can: refresh the log, select the required period of records to be displayed and rewind records.



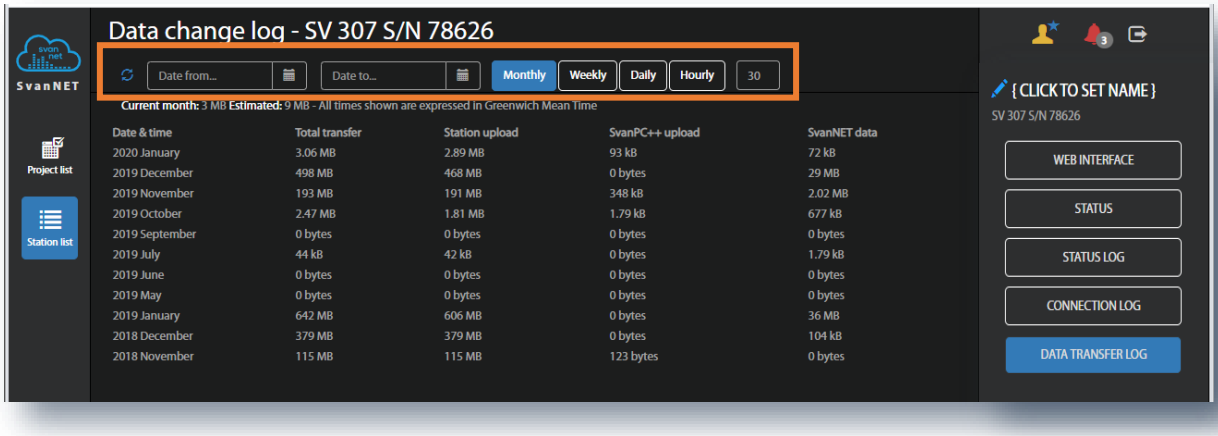
- **Connection log** which registers history of station connections.

  In the upper line you can: refresh the log, select the required period of records to be displayed and rewind records.



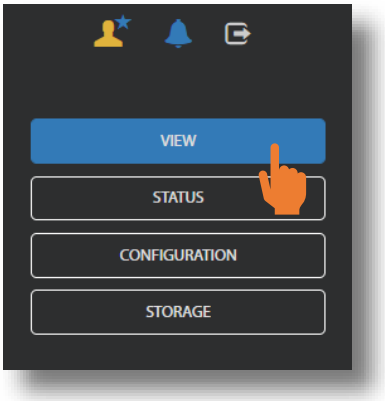
- **Data transfer log** which registers history of data transfers (uploads).

  In the upper line you can: refresh the log, select the required period of records to be displayed and select the period for data transfer presentation: Monthly, Weekly, Daily or Hourly.



8.2 WEB INTERFACE VIEW

The **WEB INTERFACE** view is available for the stations connected to SvanNET and enables measurement results viewing, station parameters configuring, data files downloading, measurements start/stop and station checking.



The **VIEW** button switches you to the **Live data** view (see Chapter 8.2.1) in which you can view broadband results and 1/1 or 1/3-octave spectra.

The **STATUS** button switches you to the station status view (see Chapter 8.2.3) in which you can check the station status and start/stop measurements.

The **CONFIGURATION** button switches you to the station **Configuration** view (see Chapter 8.2.2) in which you can configure measurement and instrument parameters.

The **DATA FILES** button switches you to the **Storage** view (see Chapter 8.2.4) in which you can download files manually.

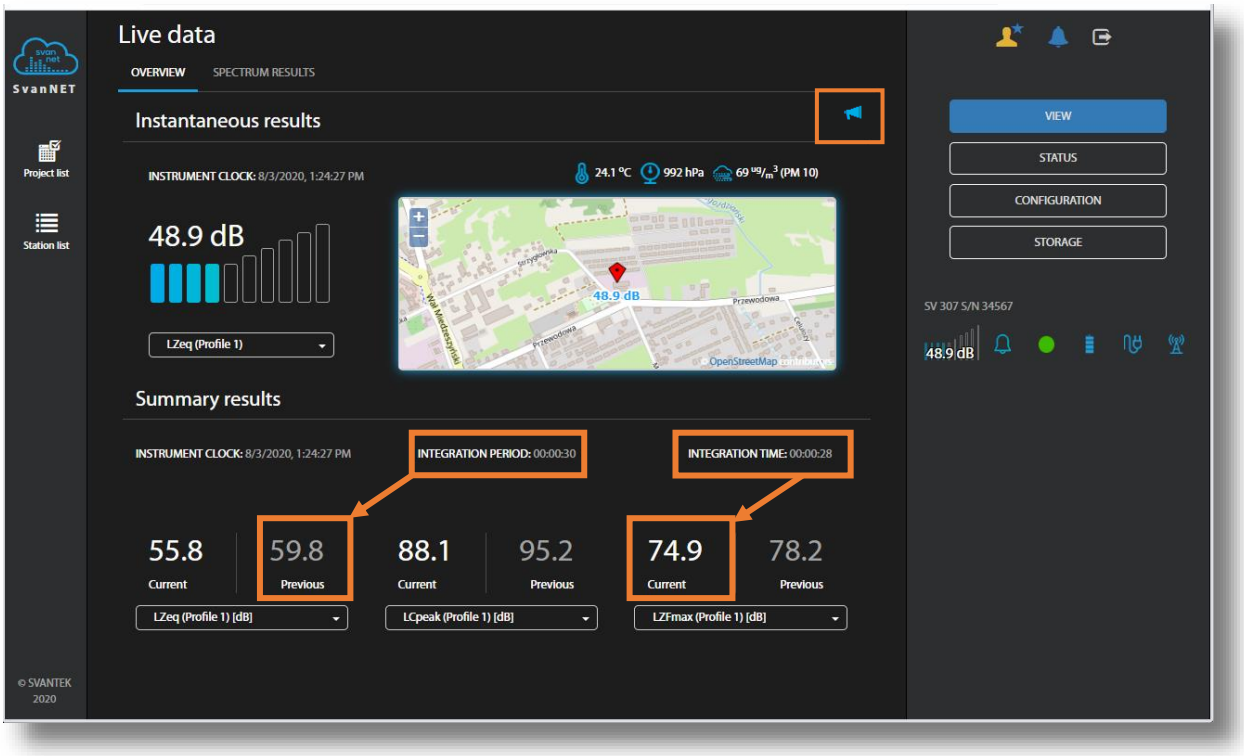
***Note**: Content of the **Configuration** tabs depends on the selected parameters. The objective of this manual is not to present all possible combinations of parameters, but to indicate the principles of working with SvanNET.*

8.2.1 Live data view

The **Live data** view includes two tabs: **OVERVIEW** and **SPECTRUM RESULTS**.

The **OVERVIEW** tab displays current broadband results:

- **Instantaneous Results**, measured/averaged by 1-second period and
- **Summary Results** (**Current** and **Previous**) measured/averaged in the selected profiles by the **Summary step** (*Summary step* is equal to *Integration Period* which is defined via the instrument Menu).



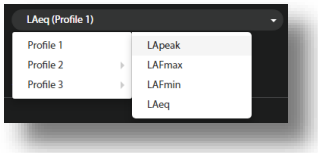
The map field is used to show the instrument's position and meteorological data.

The  icon allows you to play the live measured sound signal if you want to listen it.

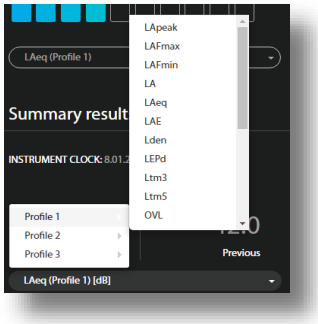
The **Current** results are updated every second and averaged by the INTEGRATION TIME. The **Previous** results present result measured by the INTEGRATION PERIOD (Summary step) before the current integration time.

The measured result with the used filter and detector as well as the profile in which this result is measured is presented in the selector field below the result value:

- for **Instantaneous results**, you can choose a result from the list: **Lpeak**, **Lmax**, **Lmin** or **Leq**.



- for **Summary results**, you can choose a result from the list: **Lpeak**, **Lmax**, **Lmin**, **L**, **Leq**, **LE**, **Lden**, **LEPd**, **Ltm3**, **LTeq**, **OVL**, ten statistical results (**Ln**) and two rolling Leq.

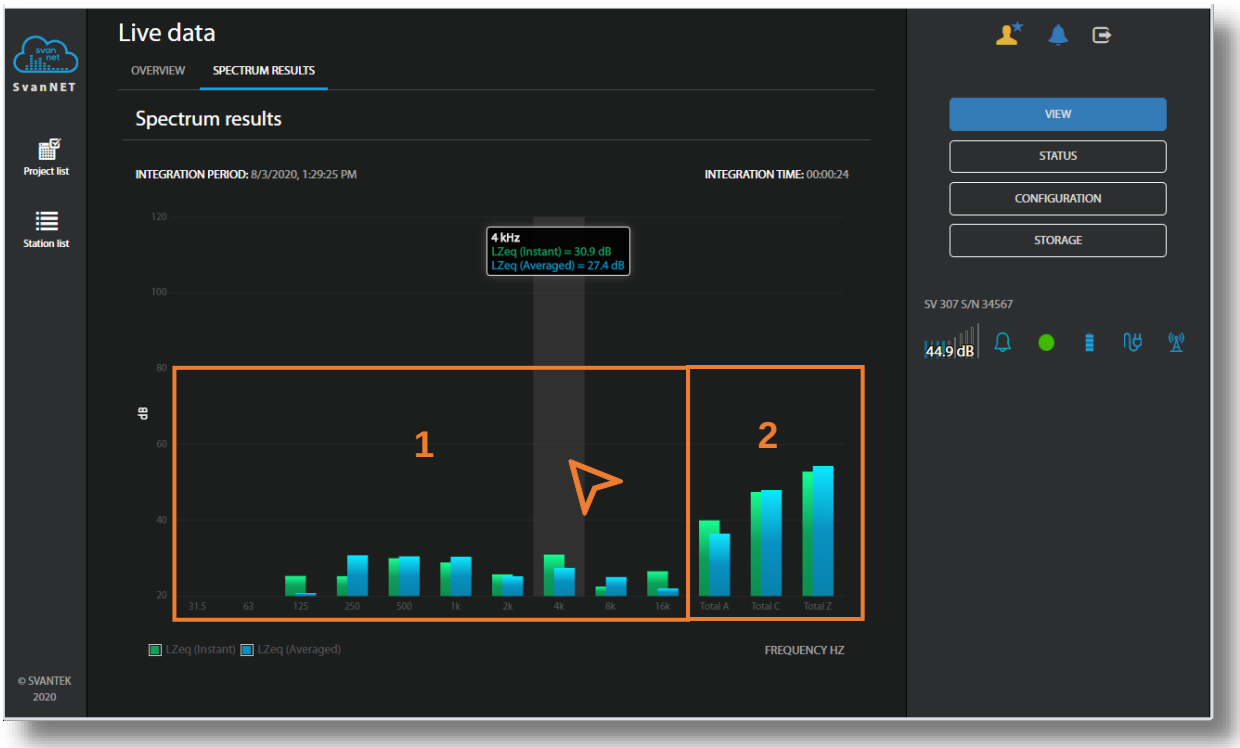


Such results as **Lpeak**, **Lmax**, **Lmin**, **Leq**, **L** and **LE** include in their names filter abbreviation (**A**, **C** or **Z**) and **Lmax**, **Lmin** and **LE** results include also detector type abbreviation (**F**=Fast, **S**=Slow, **I**=Impulse).

All results are described and formulas are presented in Appendix D for this manual.

***Note**: The Instantaneous results are not saved in the instrument's files, while the Summary results can be saved if the **Save summary results** option is switched on in the STORAGE tab.*

The **SPECTRUM RESULTS** tab displays current 1/1 or 1/3 octave Instant and Averaged results (**LZeq**) and three Total results.



In this tab, you can:

1. Point your mouse cursor on the plot to readout the values of instantaneous and averaged results for each 1/1 or 1/3-octave band.
2. Point your mouse cursor on the last three bars of the plot to readout the values of instantaneous and averaged three Total results.

***Note:** Spectra can only be displayed, when the **Octave 1/1** or **Octave 1/3** measurement function has been selected in the CONFIGURATION → MEASUREMENT SETUP tab.*

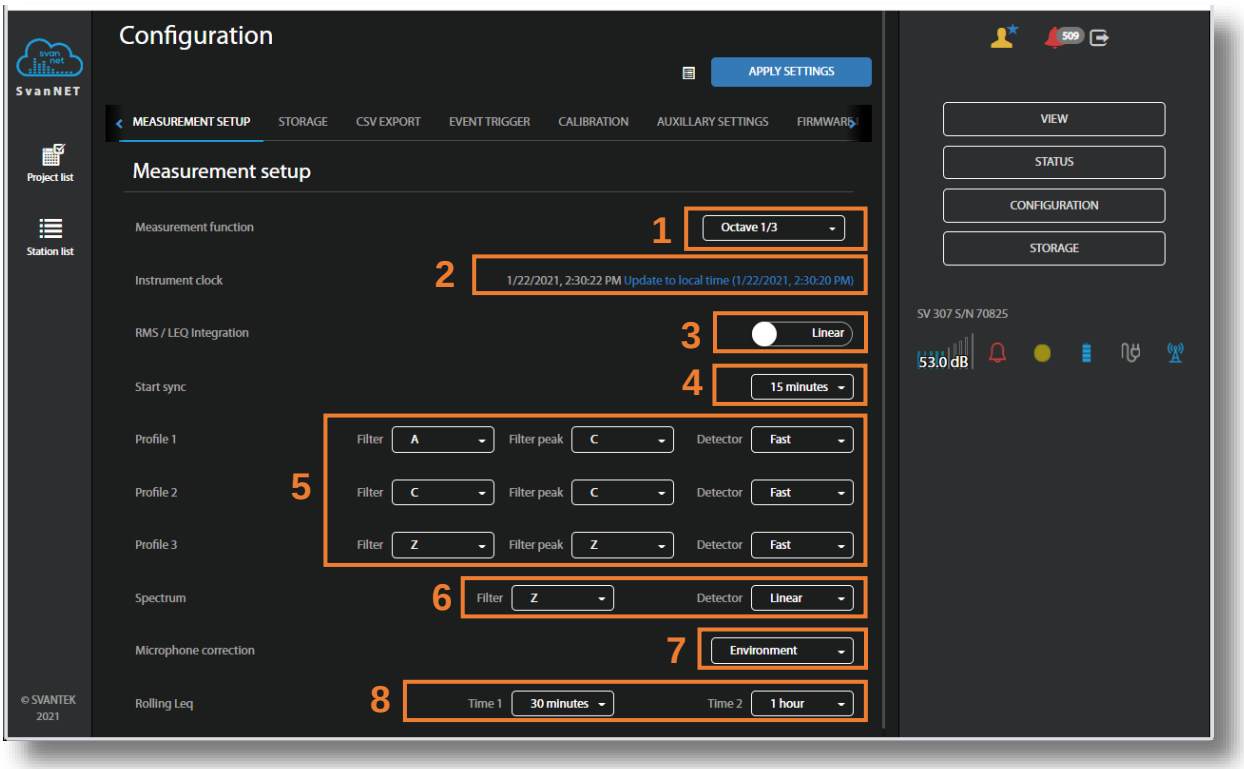
8.2.2 Configuration views

The **Configuration** view consists of several tabs that enable configuring measurement parameters (**MEASUREMENT SETUP**), data saving (**STORAGE**), export of measurement data as CSV files (**CSV EXPORT**), recording of audio signal (**AUDIO RECORDING**), events triggering (**EVENT TRIGGER**), automatic system check (**CALIBRATION**), auxiliary parameters (**AUXILIARY SETTINGS**) and performing firmware upgrade (**UPGRADE FIRMWARE**).

To send new configuration to the station, click the APPLY SETTINGS button.

In the **MEASUREMENT SETUP** tab, you can:

1. Select **Measurement function**: **Level Meter**, **Octave 1/1**, **Octave 1/3**
2. Update **Instrument clock**
3. Select type of **RMS/Leq Integration**: **Linear** or **Exponential**
4. Set synchronisation of the measurement start with the real-time clock (**Start sync**)
5. Select **Filter** (**Z**, **A**, **C**), **Filter peak** (**Z**, **A**, **C**) and **Detector** type (**Impulse**, **Fast**, **Slow**) for profiles
6. Select **Filter** and **Detector** type (**Impulse**, **Fast**, **Slow**) for the spectrum (position appears when the **Octave 1/1** or **Octave 1/3** function is selected)
7. Switch **Microphone correction On/Off** or select **Environment** or **Airport** compensation
8. Set time frames for averaging of the two **Rolling Leq** results (**Time 1** and **Time 2**).



RMS/Leq Integration defines the detector type for calculation of the **Leq**, **LEPd**, **Ln** and **SEL** measurement results. **Linear** integration is required when you want to get the true RMS value of the measured signal. When this option is selected, values of the **Leq**, **LEPd**, **Ln** and **SEL** results do not depend on the detector time constant (**Fast**, **Slow** or **Impulse**), defined for the profiles.

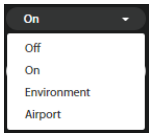
Exponential integration is required in some standards for **Leq** measurements. When this option is selected, values of the **Leq**, **LEPd**, **Ln** and **SEL** measurement results depend on the detector time constant (**Fast**, **Slow** or **Impulse**), defined for the profiles.
Such measurement results like **Lmax**, **Lmin**, **Ltm3** or **LTeq** are always calculated with the **Exponential** integration and selected time constants. And vice versa, such result as **Lpeak** doesn't use integration at all.

Note: *Definitions and formulae for measurement results are presented in Appendix D.*

Filter means frequency weighting filter applied for all measurement results calculated for individual profiles or for the spectrum:

- Z Class 1 according to IEC 61672-1:2013,
- A Class 1 according to IEC 651 and IEC 61672-1:2013,
- C Class 1 according to IEC 651 and IEC 61672-1:2013.

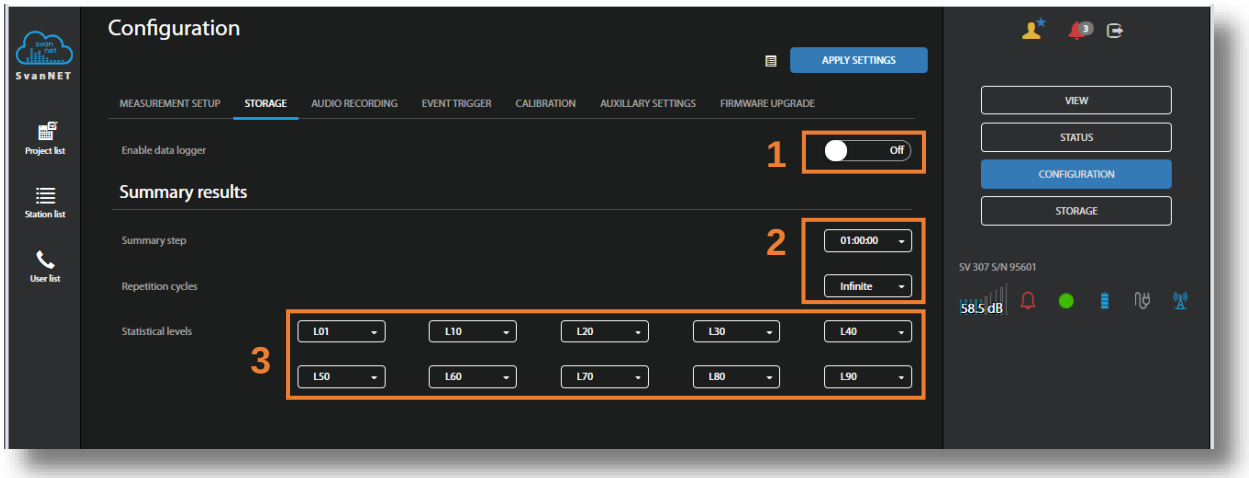
Environment compensation is used when an acoustic signal is parallel to the microphone's grid. **Airport** compensation is used when an acoustic signal is perpendicular to the microphone's grid. The characteristics of the compensation filters are given in Appendix C.



The **STORAGE** tab allows you to program which results and with what step will be saved in the logger file.

1. To start the configuration, you should enable data logging (**Enable data logger**).

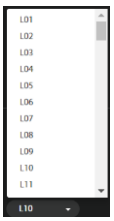
Note*: To ensure saving of any results you should enable data logger. Without enabling data logger no data files will be created and currently displayed results will be replaced by the new ones after each measurement cycle.*



Even if data logging is disabled you always you always can set some important parameters for **Summary results** such as:

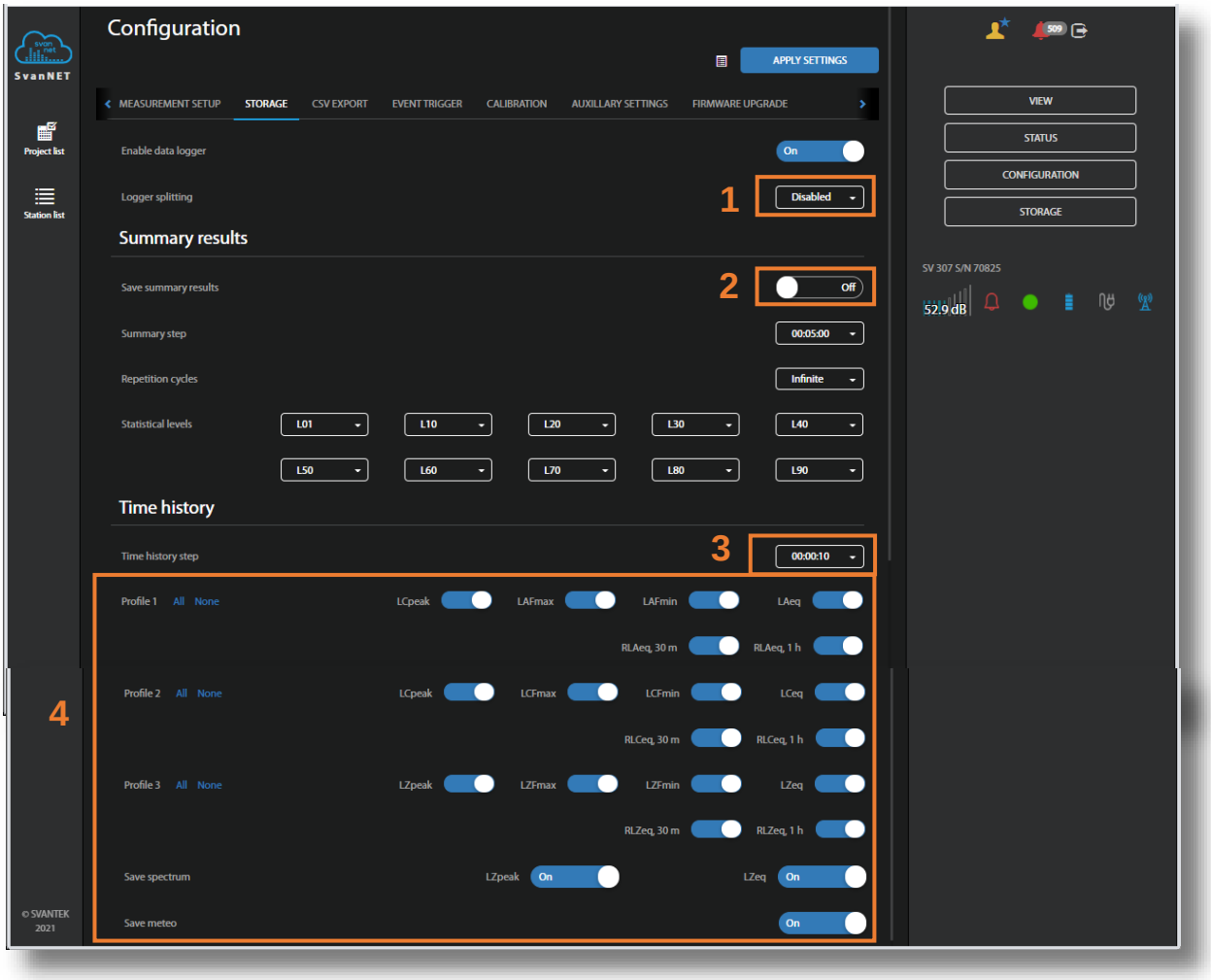
2. period of the Summary results measurement and, if logging is enabled, step with which all Summary results will be logged to a file (**Summary step** is equal to the *Integration Period* which is defined via the instrument Menu) and number of measurement repetitions (**Repetition cycles**),
3. ten **Statistical levels** to be calculated and saved with the Summary results.

Statistical noise level **Ln** is a level in dB which was exceeded during **n** percent of the Integration period. Statistical noise levels are calculated from a histogram, based on 100ms Leq results (see Appendix D).

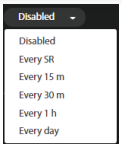


As soon as the data logging is switched on, you can:

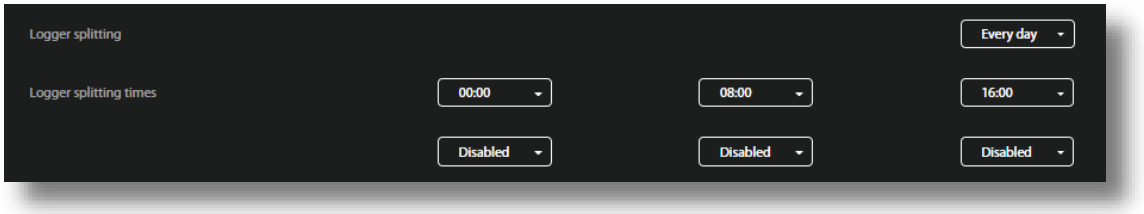
1. Program splitting of the logger file (**Logger splitting**)
2. Switch on/off saving of the summary results in a file (**Save summary results**),
3. Set the **Time history step**
4. Select results to be saved as a time history for three profiles: Lpeak, Lmax, Lmin, Leq and two rolling Leq, as well as Leq and/or Lpeak results for 1/1 or 1/3-octave bands (when the **Octave 1/1** or **Octave 1/3** function is selected) and results of weather station or dust monitor (**Save meteo** / **Save dust**).



The **Logger splitting** position enables splitting of logger files by selecting the splitting mode: **Every SR** (with the **Integration period** step), **Every 15 m**, **Every 30 m**, **Every 1 h** and **Every day**.

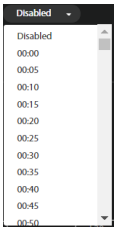


If **Every day** is selected, you can define up to six points during a day when splitting will take place.



Summary step (Integration period) defines the period during which Summary results are measured (integrated) with filters and time constant defined in the MEASUREMENT SETUP tab and saved in a file as the set of Summary Results.

The Summary step can be selected in the pop-up list in the range from 1s to 24h.



Repetition cycles defines the number of automatic repetition of measurements with the defined integration period. If you select **Infinite**, measurements will be repeated till the manual stop. If the number of cycles is defined, measurement cycles will be stopped after that number of measurements automatically or earlier manually.

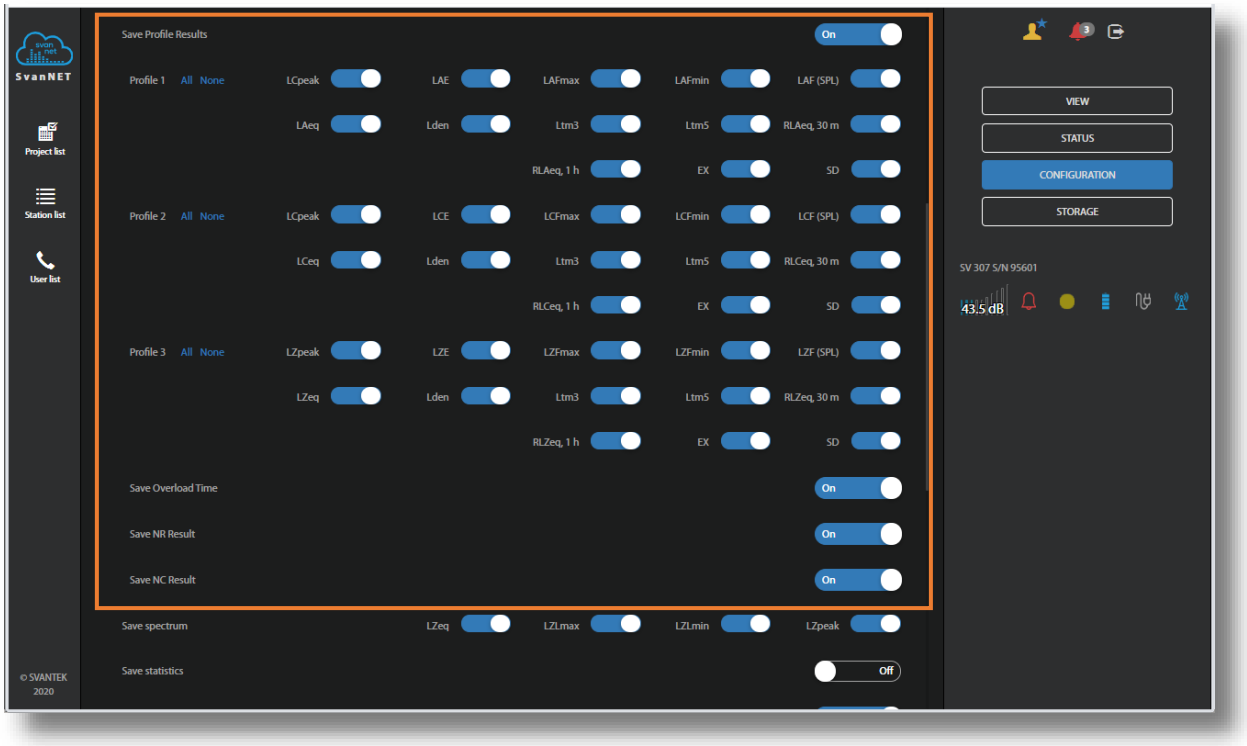
***Note**: For the monitoring purpose it is recommended to set the **Infinite** value which is also a default value of this parameter.*

Time history **Step** can be selected from the set: 10, 20, 50, 100, 200 and 500 milliseconds, from 1 second to 59 second, from 1 minute to 59 minutes and 1 hour.

If you switch on **Save summary results**, the Summary result section will be extended by additional sections enabling saving results for three profiles, Leq, Lmax, Lmin and Lpeak spectra, Leq statistics and histograms for three profiles, as well as meteo or dust results depending on the **External device** selected in the **AUXILIARY SETTINGS** tab.

If you switch on **Save Profile Results**, the Summary results section will be extended by main results toggles for three profiles (Lpeak, LE, Lmax, Lmin, L(SPL), Leq, Lden, Ltm3, LTeq, 2 x rolling Leq, expected value (EX) and square deviation (SD)) measured with filters and time constant defined in the MEASUREMENT SETUP tab.

For the **Octave 1/1** measurement function and selected **Z** filter for the spectrum, two additional results can be measured and saved in a file – **NR** and **NC**.



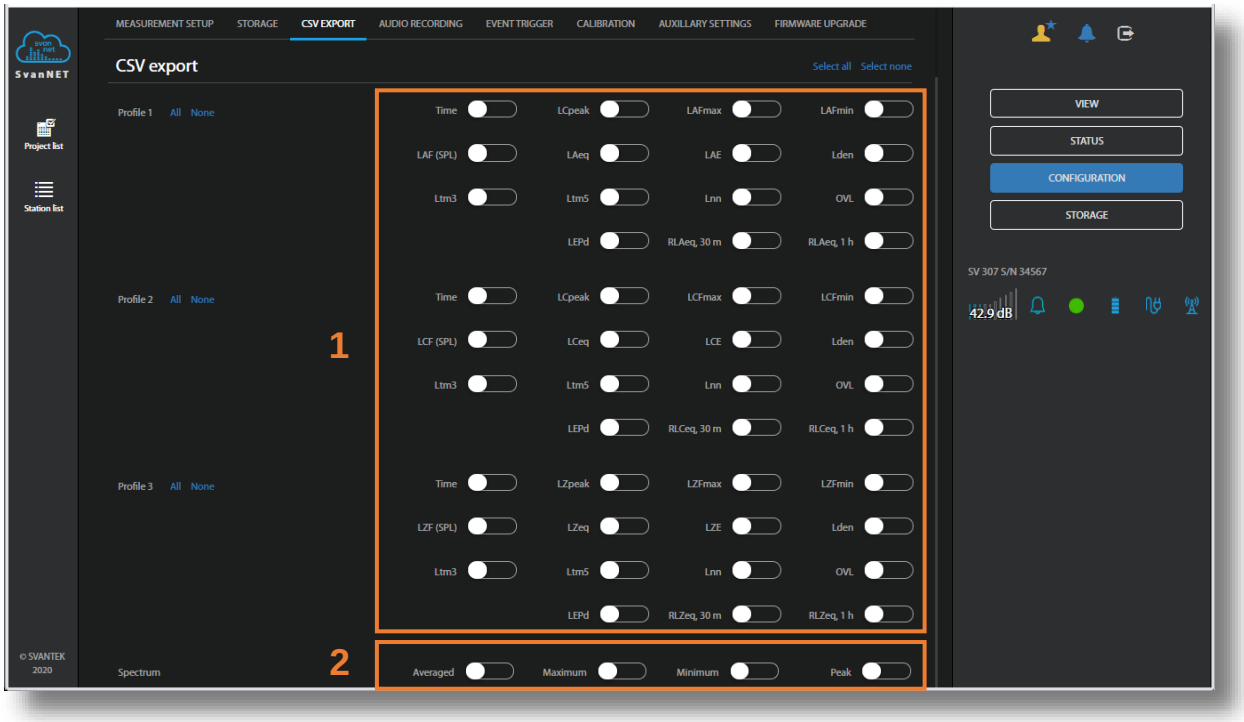
If you switch on **Save Statistics**, the Summary results section will be extended by toggles for Leq statistics defined above for the three profiles.

***Note**: All files with measurement result are automatically named in accordance with the rule: some prefix (string of letters) supplemented with a number (string of digits) increased by one for the new created file. Default prefix is "L" and it can be changed via SvanPC++.*

The **CSV EXPORT** tab enables selecting measurement data for direct export to CSV files (Comma Separated Values) and saving them on the instrument's SD-card.

In this tab, you can:

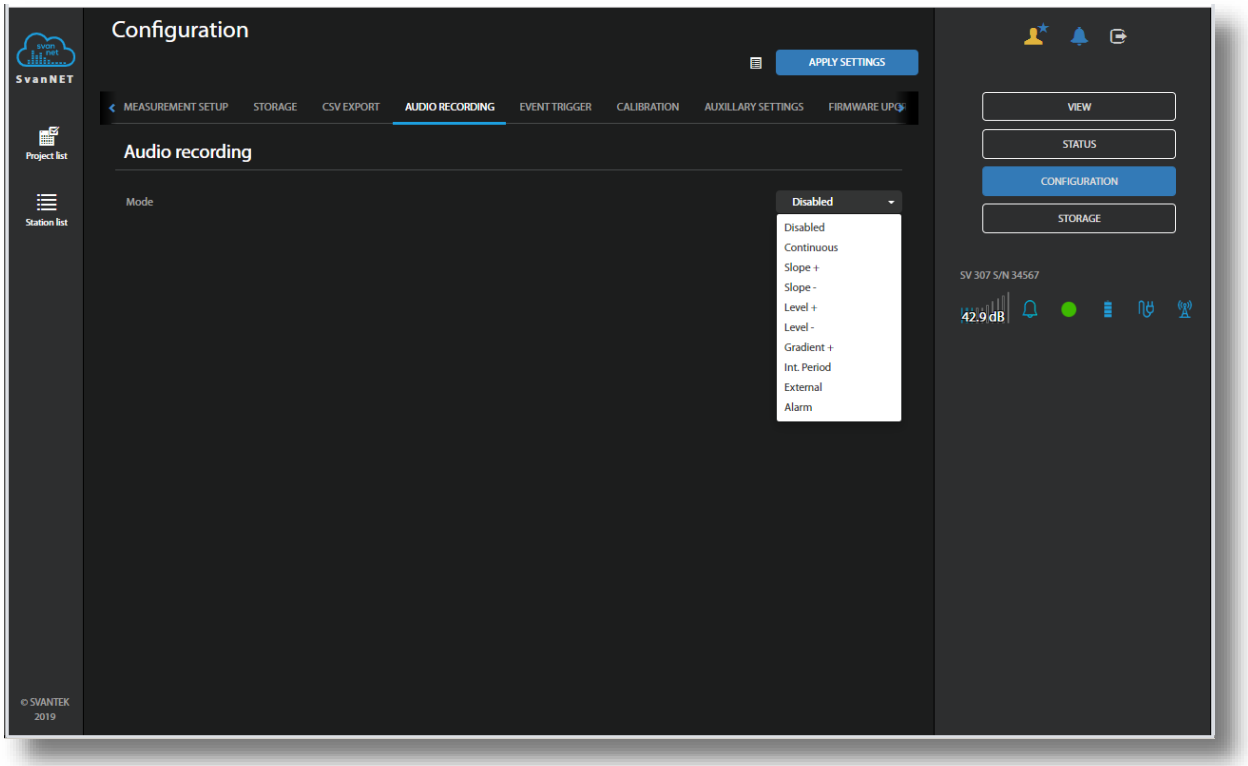
1. Select results to be exported for each profile individually.
2. Select **Maximum**, **Minimum** and **Averaged** spectra for each integration period if the **Octave 1/1** or **Octave 1/3** function is enabled.



The CSV file structure is presented in Appendix B.

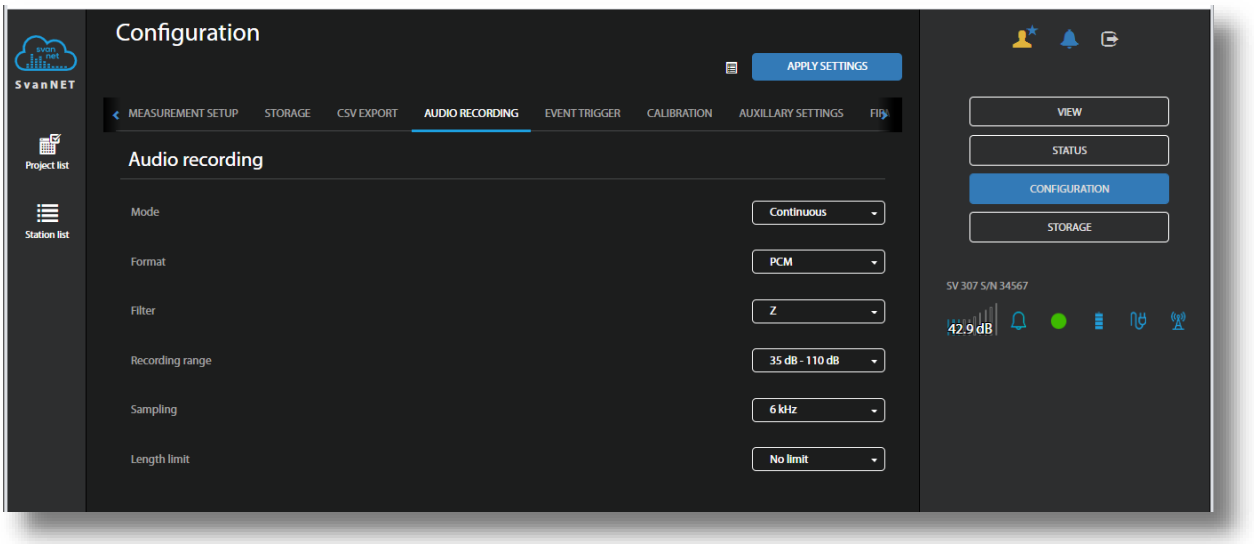
The audio recording function is optional and if not enabled, the **AUDIO RECORDING** tab will not be visible.

In the **AUDIO RECORDING** tab, you can configure an audio signal recording in a separate *.wav type file. For this purpose, select the **Mode** other than *Disabled*: *Continuous*, *Slope +, Slope -, Level +, Level -, Gradient +, Int. Period or External*. These modes require different sets of parameters and use different ways of signal recording (triggering) which are described below.



There are four basic parameters of audio recording available for all modes: **Format** (*PCM*, *Extensible* or *A-law compression*), **Filter** (*Z, A, C, B*), **Recording range** (from *21 dB – 96 dB* to *61 dB – 136 dB*), **Sampling** frequency (*12kHz, 24kHz* or *48kHz*) and **Length limit** (*No limit, 1m, 2m, .. 10m, 15m, 20m, 25m, 30m, .. 50m, 1h, .. 8h*).

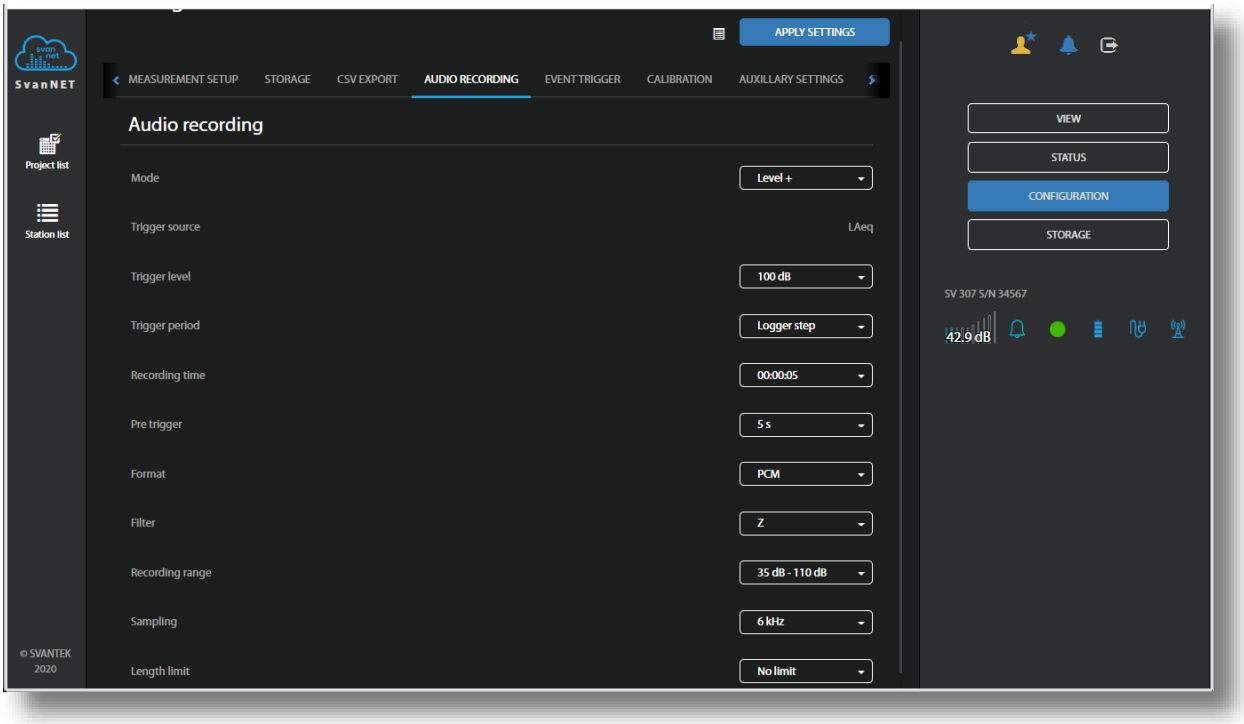
Continuous mode means that the audio recording starts with the measurement start and stops with the measurement stop.



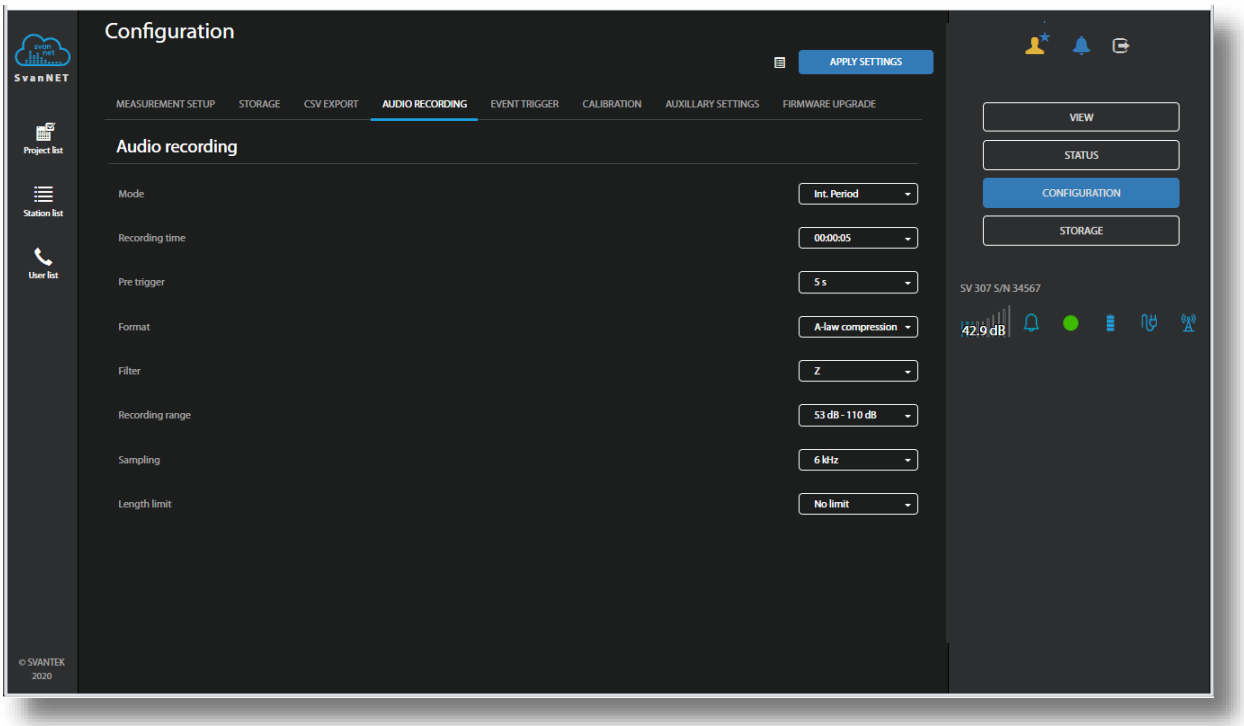
Slope + / ***Slope –*** modes mean that the audio recording starts when rising value of the **Trigger source** (*Leq*) measured in the first profile by **Trigger period** (with value equal to *Logger step*, *0.5 ms*, *0.1 seconds* or *1 second*) passes above/below the threshold level (**Trigger level**), which means for *Slope +* that the previous result was below the threshold level, and the next one became above the threshold level. The recording lasts for minimum time, defined by the **Recording time** parameter, and during this time the instrument continues to check the trigger condition with **Trigger period** interval. Provided that the **Trigger period** is shorter than the **Recording time,** if next trigger condition is met during **Recording time** the instrument triggers recording again, so it will be continued from this moment by additional **Recording time** and so on. If during next recording time there are no triggers, the recording will be stopped after the last trigger plus **Recording time**.

Level + / **Level –** modes mean that the audio recording starts when the value of the **Trigger source** (*Leq*) measured in the first profile by **Trigger period** (with value equal to *Logger step*, *0.5 ms*, *0.1 seconds* or *1 second*) is greater/lower than the threshold level (**Trigger level**). In other cases, the recording doesn't start, but if it has been already started it can be continued until the **Recording time** has elapsed. If during the **Recording time** a trigger condition appears, the recording will be prolonged for another **Recording time** from the moment of that trigger condition and so on. If during next recording time there are no triggers, the recording will be stopped after the last trigger plus **Recording time**.

Gradient + mode means that the audio recording starts when the value of the **Trigger source** (*Leq*) measured in the first profile by **Trigger period** (with value equal *0.5 ms*) is greater than the threshold level (**Level**) and the speed of this Leq result changing (gradient) is greater than the gradient threshold level (**Gradient**). In other cases, the recording doesn't start, but if it has been already started it can be continued until the **Recording time** has elapsed. If during the **Recording time** a trigger condition appears, the recording will be prolonged for another **Recording time** from the moment of that trigger condition and so on. If during next recording time there are no triggers, the recording will be stopped after the last trigger plus **Recording time**.



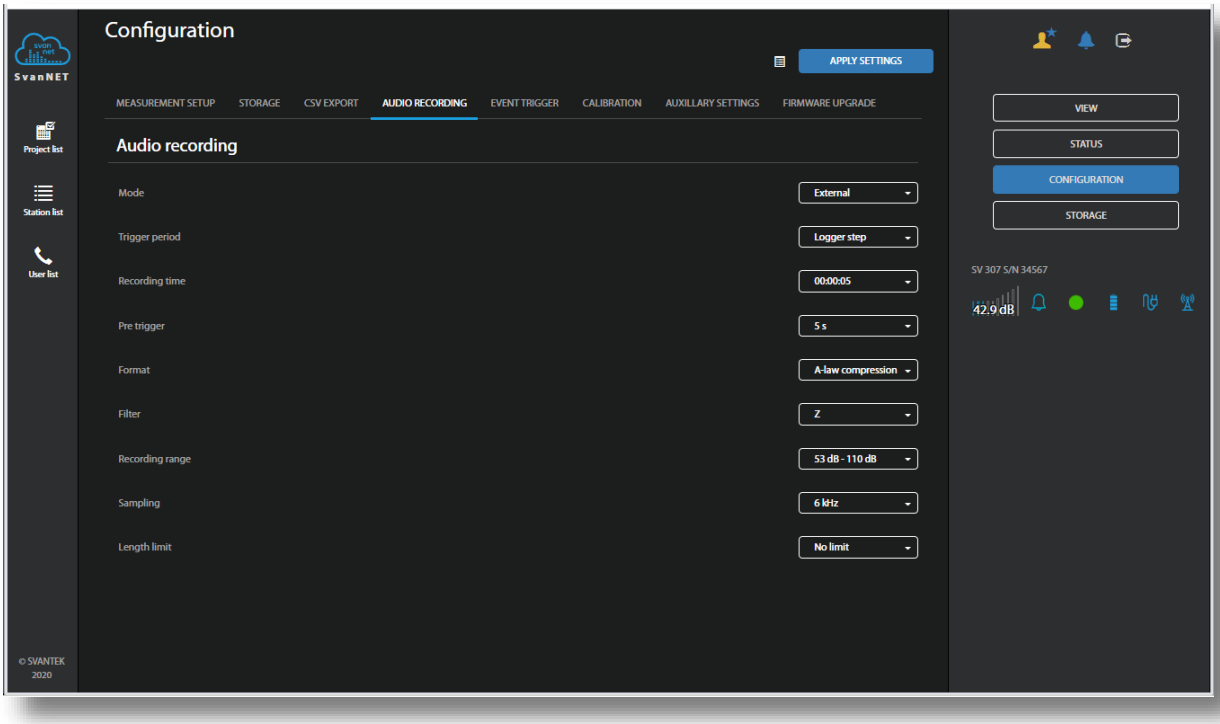
Int. Period mode means that the audio recording starts with the measurement start, and the recording will last minimum **Recording time**. If the triggering condition appears during the recording (when **Integration period** is shorter than **Recording time**), from this moment, the recording will be continued for the next **Recording time** and so on.



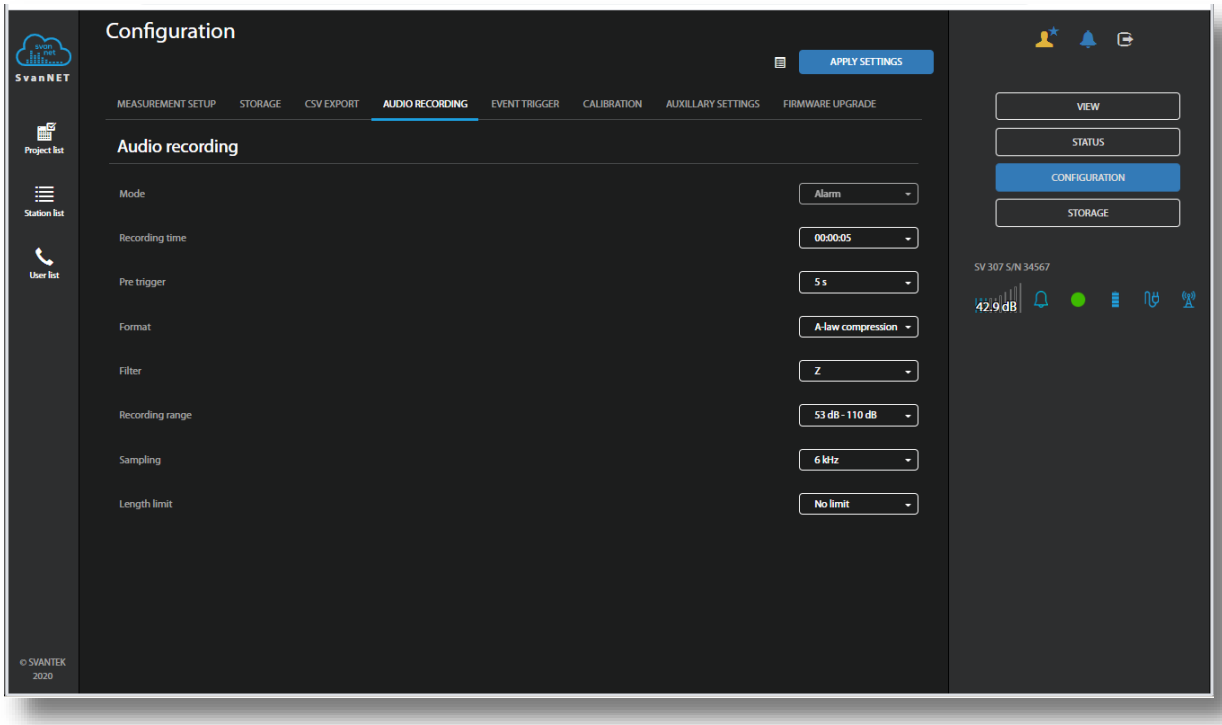
For modes **Slope**, **Level**, **Gradient** and **Int. Period** you can start recording time prior the trigger condition setting the **Pre trigger** parameter from *Off* to *1 s*, *2 s*, up to *8 s*.

When the **External** mode is selected, the recording starts from the external signal on the MULT.I/O socket.

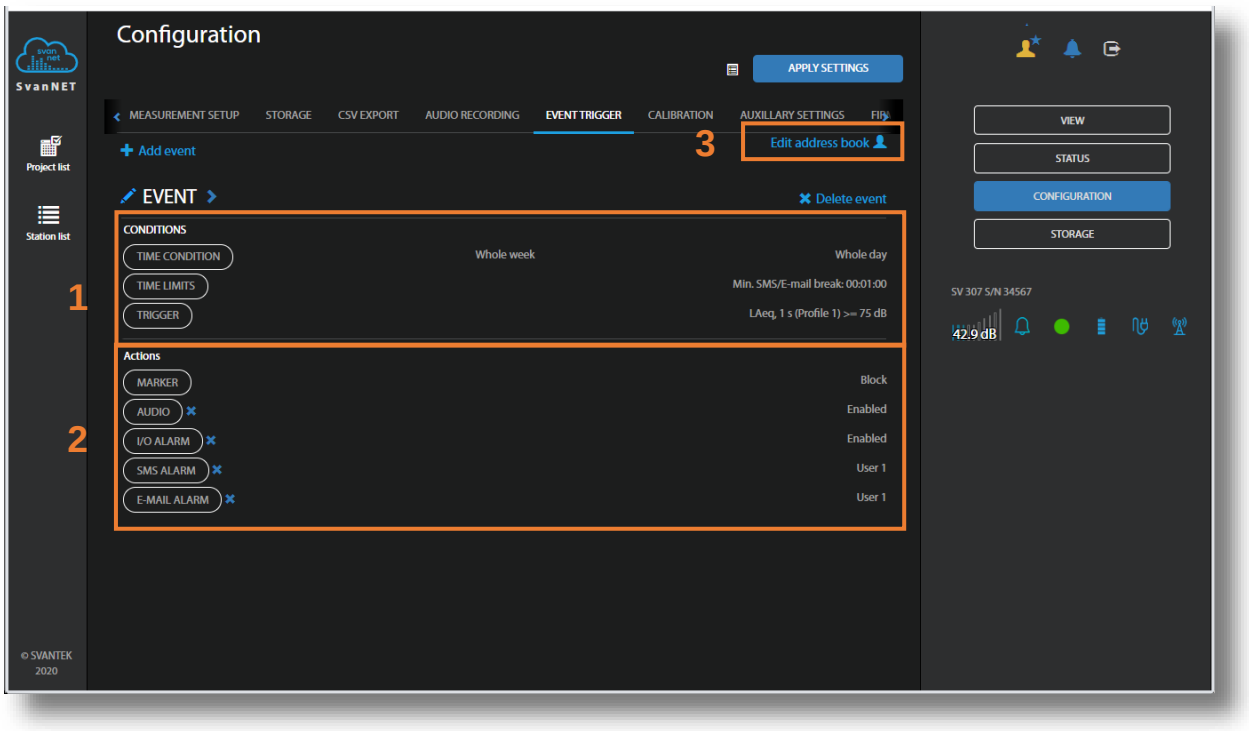
Note: *While using the* ***External*** *mode you should be aware that the external source of triggering signal is connected to the MULT.I/O socket, the* ***I/O Mode*** *parameter is set to* ***Digital In*** *in the instrument configuration Menu (path: <Menu> / Instrument / Multifunct. I/O) – see Chapter 10.12.5.*



Note: *The* ***Alarm*** *mode is switched on automatically when any Event action will be set to Audio (see EVENT TRIGGER tab).*



The **EVENT TRIGGER** tab enables configuring events for triggering audio recording and different alarms.



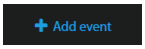
1. Events are specified as a combination of superimposed **CONDITIONS** (logical AND) such as specific time intervals (**TIME PERIODS**) in which measurement threshold levels are exceed or system events occur in logical OR (**TRIGGER**) taking into consideration minimum period of break between SMS and E-mail notifications (**TIME LIMITS**).

2. Each Event may be connected with special actions (**Actions**) such as: block marker recording to the logger file (**MARKER**), audio signal recording to the wave file (**AUDIO**), generation of an alarm signal on the I/O socket (**I/O ALARM**), sending SMS with alarm notification (**SMS ALARM**) or sending e-mail with alarm notification (**E-MAIL ALARM**).
3. There is an address book containing SMS and E-mail recipients addresses. You can edit this book clicking **Edit address book**.

You can configure **CONDITIONS** and **Actions** using the appropriate buttons. Settings are presented in the button line.

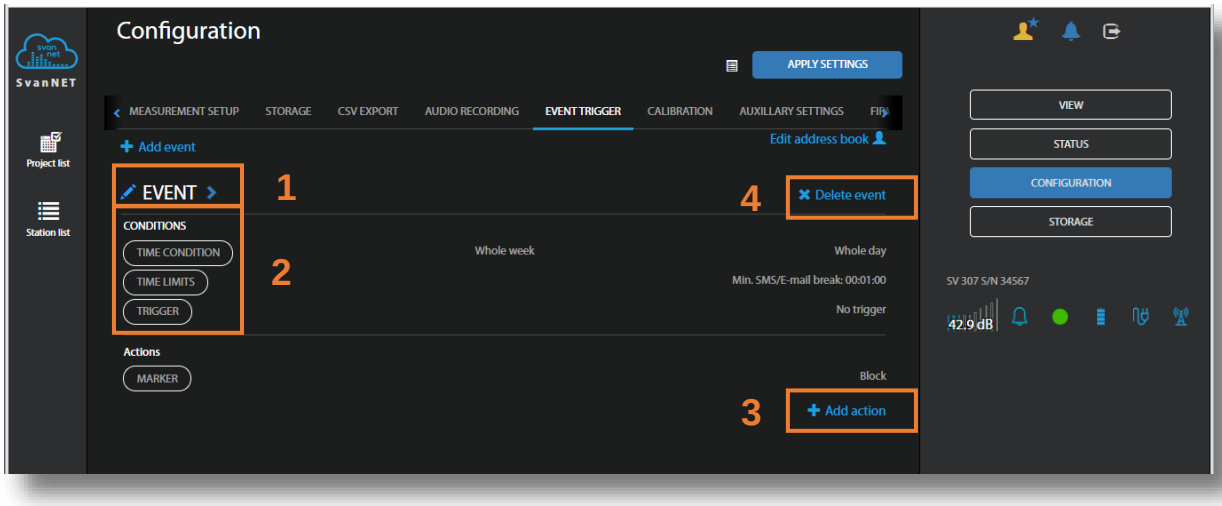
For example, the EVENT configuration in the above screen means that the event will appear when the LAeq value averaged by 1 second exceeds the threshold level of 75 dB. The occurrence of such an event will generate alarms throughout the week and will be accompanied by audio recording, an alarm signal at the I/O output of the instrument and sending SMS and E-mail with an alarm notification.

Creating Events

To create new event, click 

. The new **Event** section will appear, in which you can:

1. rename the event, if necessary, clicking  and hide the event settings clicking 
2. configure conditions, clicking the appropriate button (**TIME PERIODS**, **TIME LIMITS** and **TRIGGER**)
3. add actions clicking **+Add action**,
4. delete the event clicking **x Delete event**.

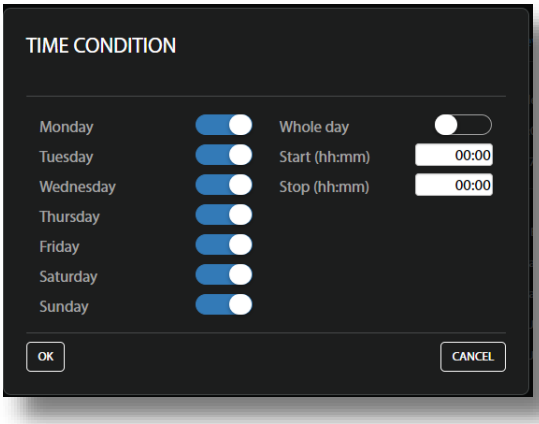


Configuring Conditions

If you click the **TIME PERIODS** button the TIME CONDITION configuration box will pop-up.

In this box, you can select days and periods for events registration.

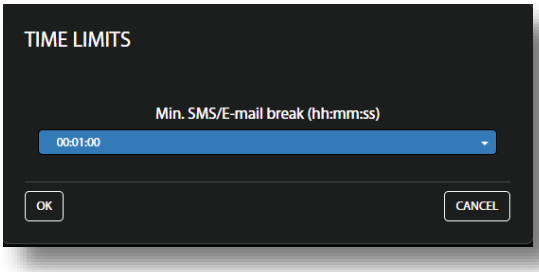
Press **OK** to confirm settings.



If you click the **TIME LIMITS** button the TIME LIMITS configuration box will pop-up.

In this box, you can select minimum period of break between SMS and E-mail notifications. This enables to avoid hail of alarms in case of frequently recurring events.

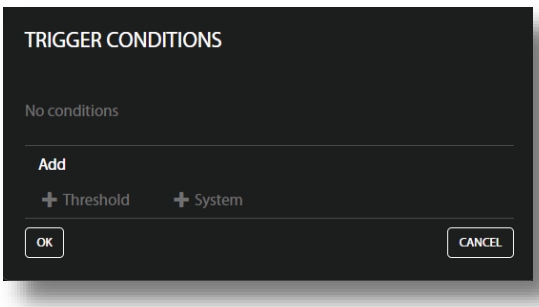
Press **OK** to confirm settings.



If you click the **TRIGGER** button, the TRIGGER CONDITIONS configuration box will pop-up.

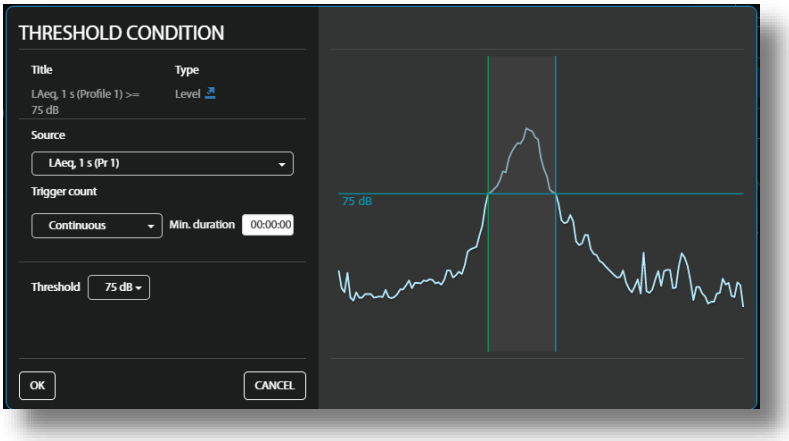
In this box, you can add the condition type: **Threshold** or **System**.

These conditions are mutually exclusive for the same event.



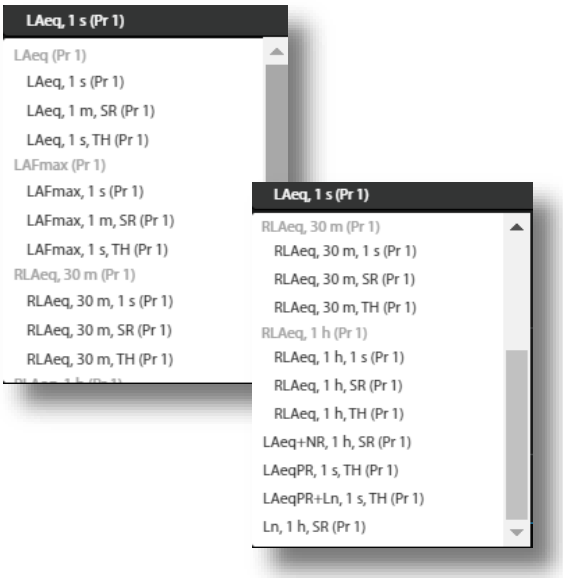
Threshold trigger condition

The **Threshold** type trigger activates the event when some result (**Source**) exceeds the **Threshold** level under **Trigger count** condition: if **Trigger count** is **Continuous**, exceeding the threshold level must last longer than **Min. duration** or such exceeding will be repeated at least several times (*1 time*, *2 times*, … *10 times*).



You can select as a **Source** different results measured in the first profile (**Pr 1**) by **1s** or by integration period (**SR**) or by time-history step (**TH**).

The source designation shows the actual settings of three parameters (for example**, LAeq, 1 m, SR (Pr1)** means that the LAeq result measured in the first profile (Pr1) ин the integration period (SR) of one minute is selected as the trigger source (see Chapter 10.9.9):

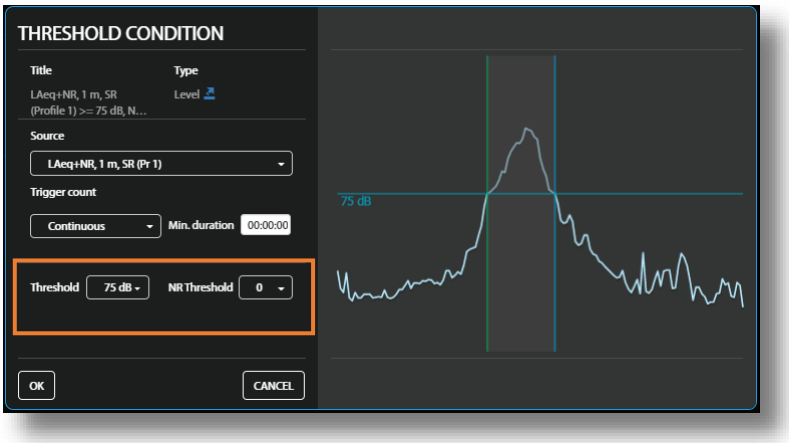


- **Leq**, **Lpeak**, **Lmax**, **Lmin**
- two rolling Leq (**RLeq**)
- superimposition of Leq and noise ratio for 1/1 octaves (**Leq+NR**)
- predicted Leq (**LeqPR**, **LeqPR+Ln**)
- statistical level **Ln**.

The selected result will be compared with the threshold level, defined in the **Threshold** position.

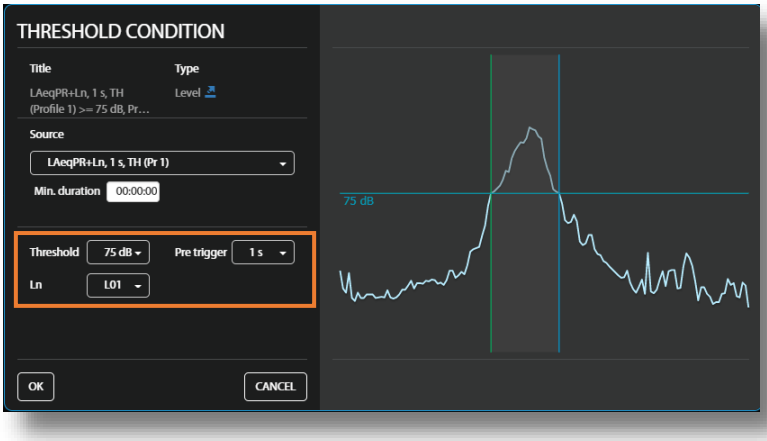
If **Leq+NR** is selected as a source, the trigger condition will be a superimposition of two conditions:

- **Leq** is higher than the **Threshold** level
- Noise ratio (**NR**) calculated for 1/1 octaves with Z filter is higher than the **NR Threshold** level.



If **LeqPR** or **LeqPr+Ln** is selected as a source, the additional **Pre trigger** position allows you to define the ahead time of triggering the alarm.

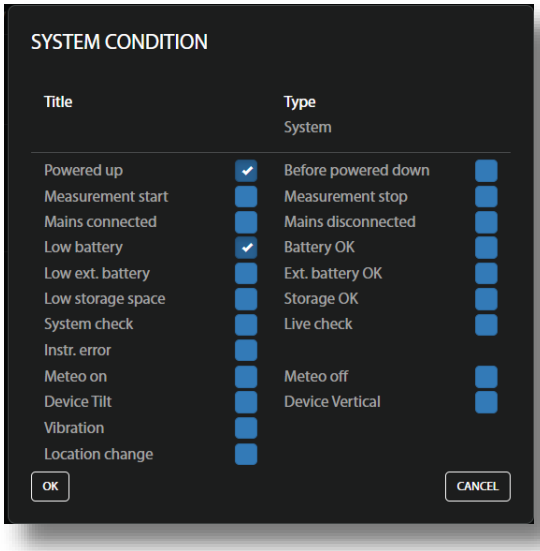
In case of **LeqPR+Ln**, the background noise should be defined in the **Ln** position as a statistical level (**L01** ÷ **L99**).



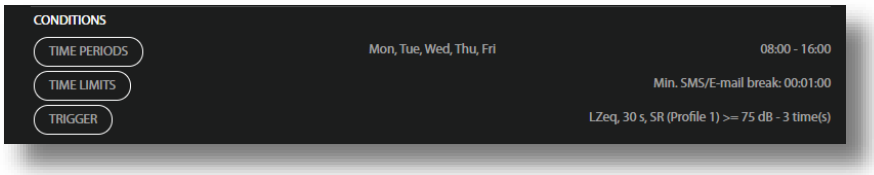
System trigger condition

The **System** type trigger activates the event when some of the system conditions appear.

You can select several or all conditions presented in the SYSTEM CONDITION configuration box (see description in Chapter 10.9.9).



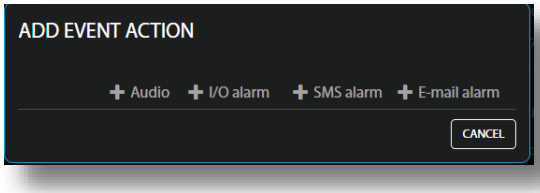
All **CONDITION** settings will be presented in the lines of appropriate buttons.



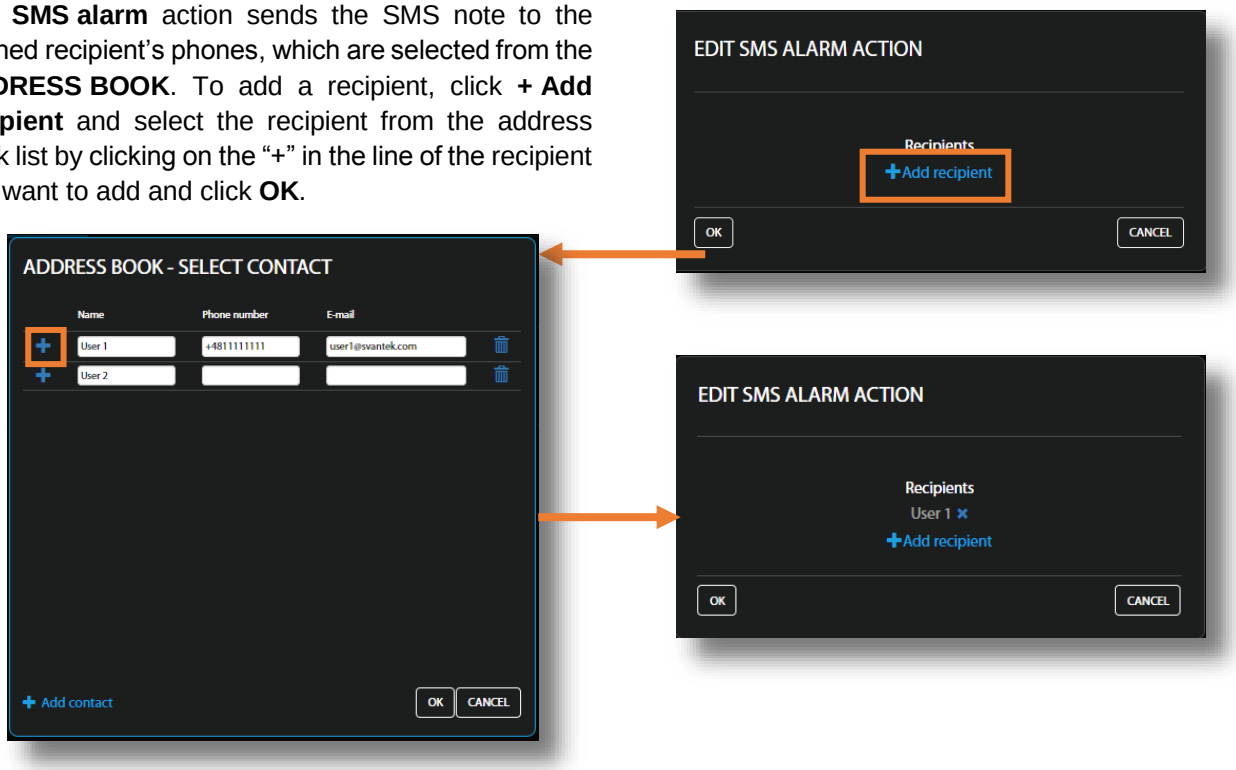
Creating Actions

To create new action, click **+Add action** and in the ADD EVENT ACTION pop-up box, click the action you wish to add and to configure: **Audio** (audio signal recording), **I/O alarm** (generation of the positive voltage at the MULT.I/O socket – see Appendix C), **SMS alarm** or **E-mail alarm**.

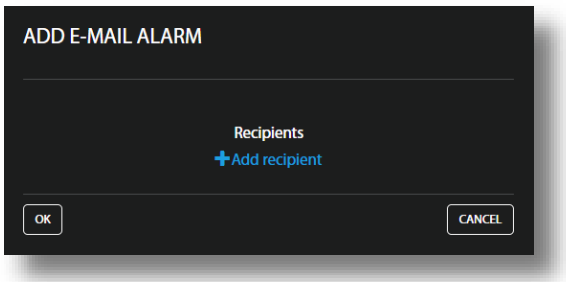
After occurrence of the event, **Audio** action will be performed during the time the event is active, other actions - at the event's beginning.



The **SMS alarm** action sends the SMS note to the defined recipient's phones, which are selected from the **ADDRESS BOOK**. To add a recipient, click **+ Add recipient** and select the recipient from the address book list by clicking on the "+" in the line of the recipient you want to add and click **OK**.



The **E-mail** action sends the e-mail note to the defined recipient's e-mail box, which are selected from the **ADDRESS BOOK**.

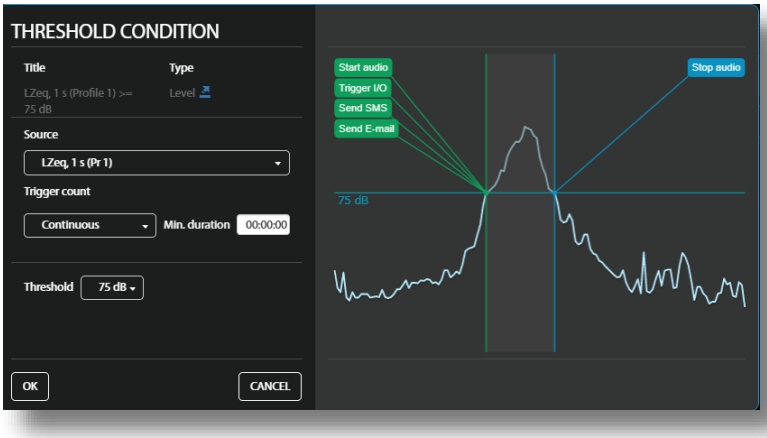


All **Actions** settings will be presented in the lines of appropriate buttons.

When actions are defined for the threshold trigger, the THRESHOLD CONDITION configuration box shows their start and stop at the illustrative graph.

As can be seen I/O, SMS and E-mail actions are performed at the event start. Audio record lasts from the beginning till the end of the threshold event.

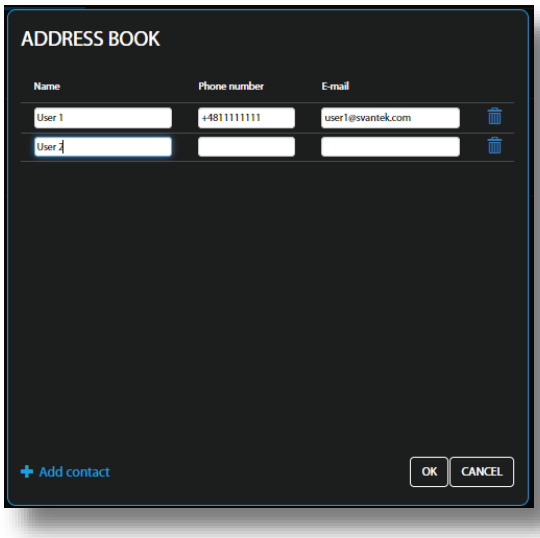
Actions defined for the System triggers start when the system events occur.



Address book

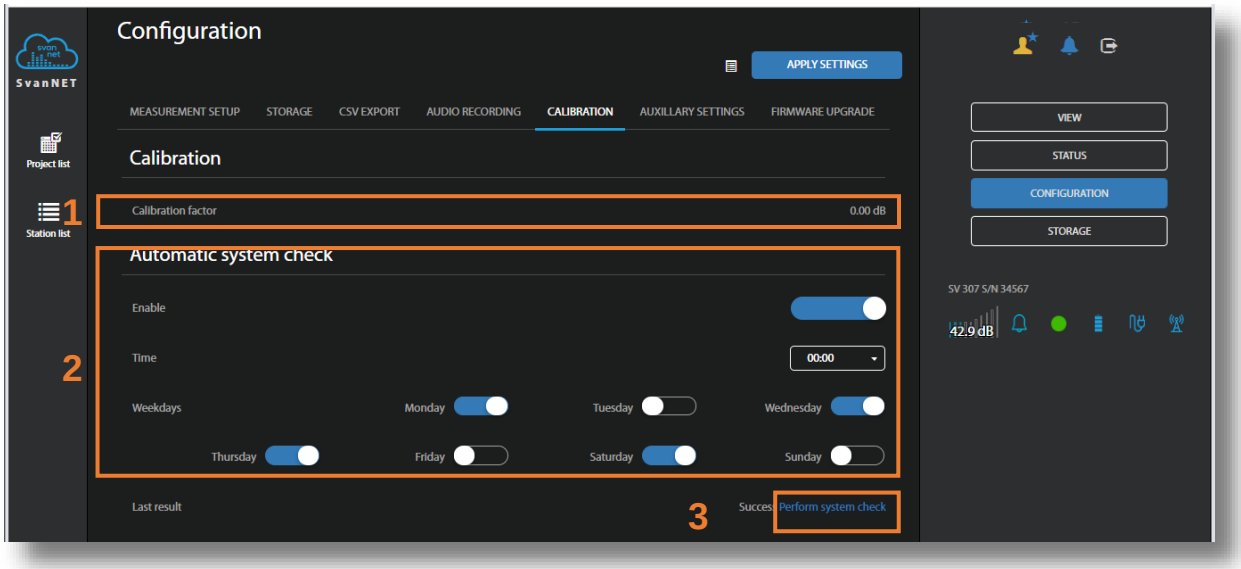
You can edit the address book clicking **Edit address book** from the **EVENT TRIGGER** tab of the **Configuration** view.

To add the address, click **+Add contact**. To remove the address, click the bin icon.



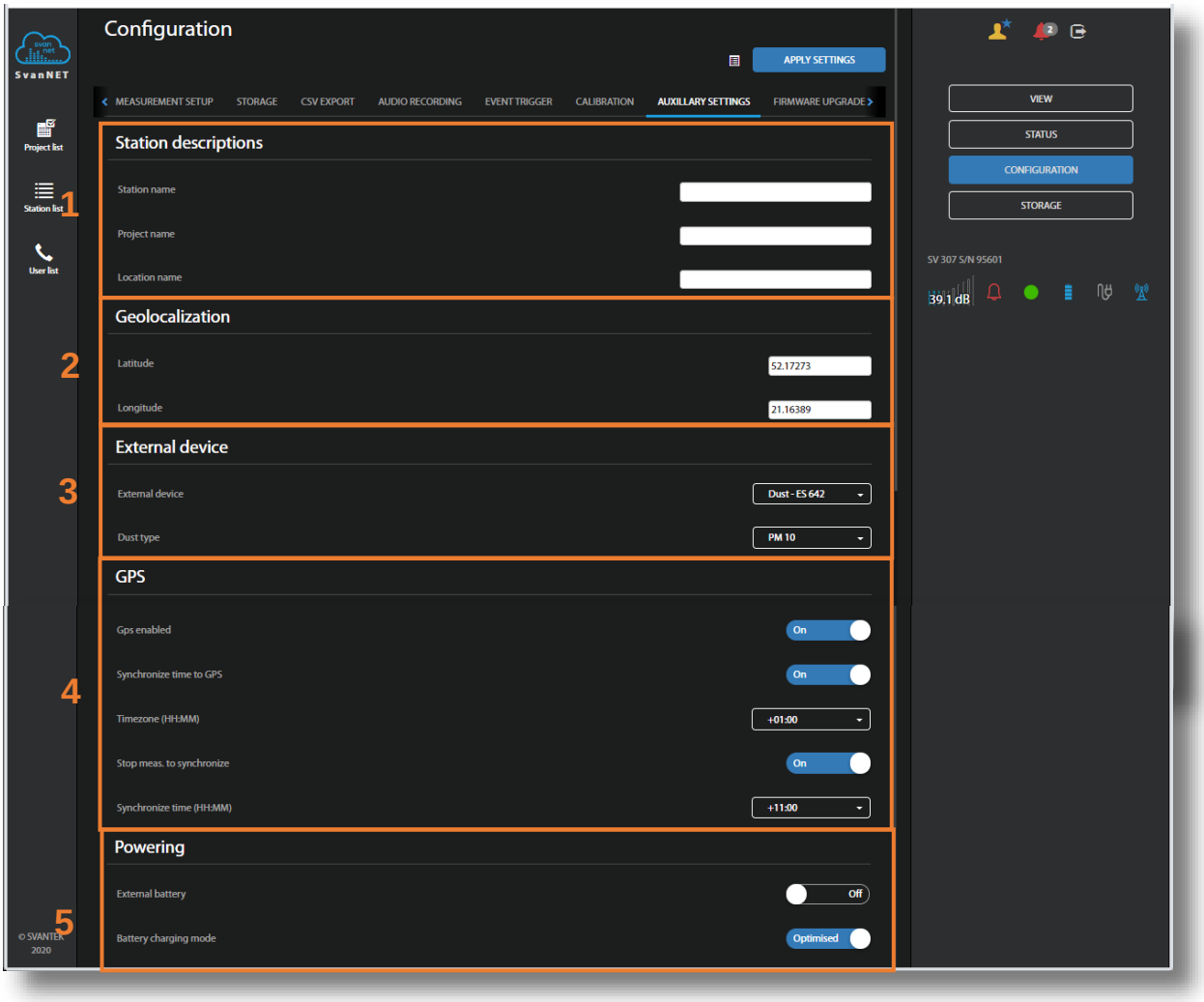
In the **CALIBRATION** tab, you can:

1. Check the calibration factor,
2. Program automatic checking of the system and
3. Perform manually the system check.



In the **AUXILIARY SETTINGS** tab, you can:

1. Enter **Station description**: **Station name**, **Project name** and **Location name**,
2. Enter the instrument's geographical location (**Latitude** and **Longitude**). If instrument's GPS is active Latitude and Longitude will be automatically read out from GPS,
3. Define **External device**: *None*, *Meteo - SP 276* or *Dust – ES 642*,
4. Configure GPS: switch on GPS (**GPS enabled**), switch on time synchronization to GPS time (**Synchronize time to GPS**), select **Timezone**, stop measurement for synchronization (**Stop meas. to synchronize**) and set **Synchronize time**.
5. Configure power mode: **External battery** (**On** or **Off**) and **Battery charging mode** (**Full capacity** or **Optimized**).

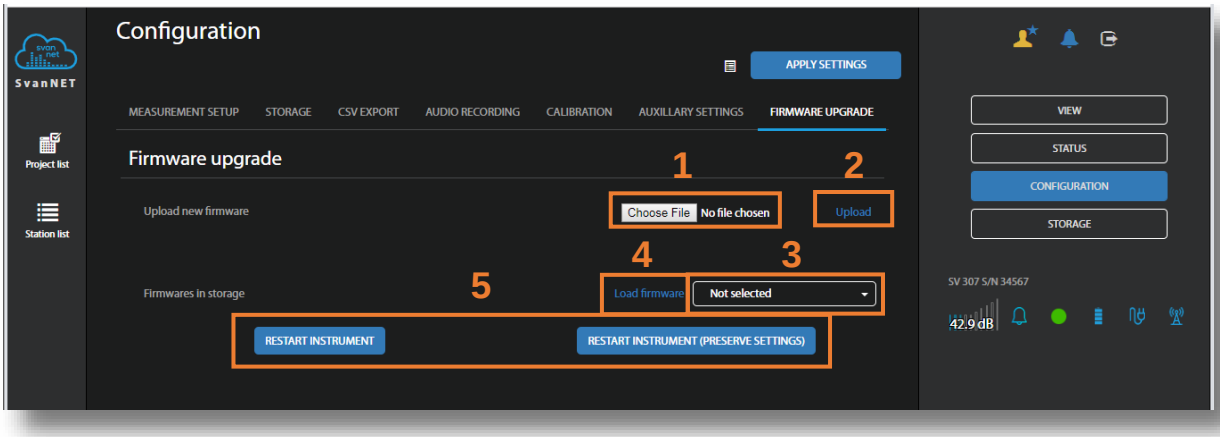


When the external battery is connected to SV 307 the **External battery** switcher should be **On**. In this case the external battery will not be discharged below the voltage 10.8 V. If the voltage reaches this level, the instrument stops to be powered from the external battery and system alarm is generated. This protects the external battery from damage.

In the **Full capacity** mode, the battery is charged to 100% of its capacity. In the **Optimized** mode, the battery is charged to about 85%. This option works only when the instrument is not powered by the solar or external battery. This option allows you to extend the life cycle of the battery.

In the **FIRMWARE UPGRADE** tab, you can upload new firmware on the instrument's SD-card and perform upgrade process remotely.

Before upgrading it is essential that the proper firmware file is downloaded from SVANTEK website to your PC.



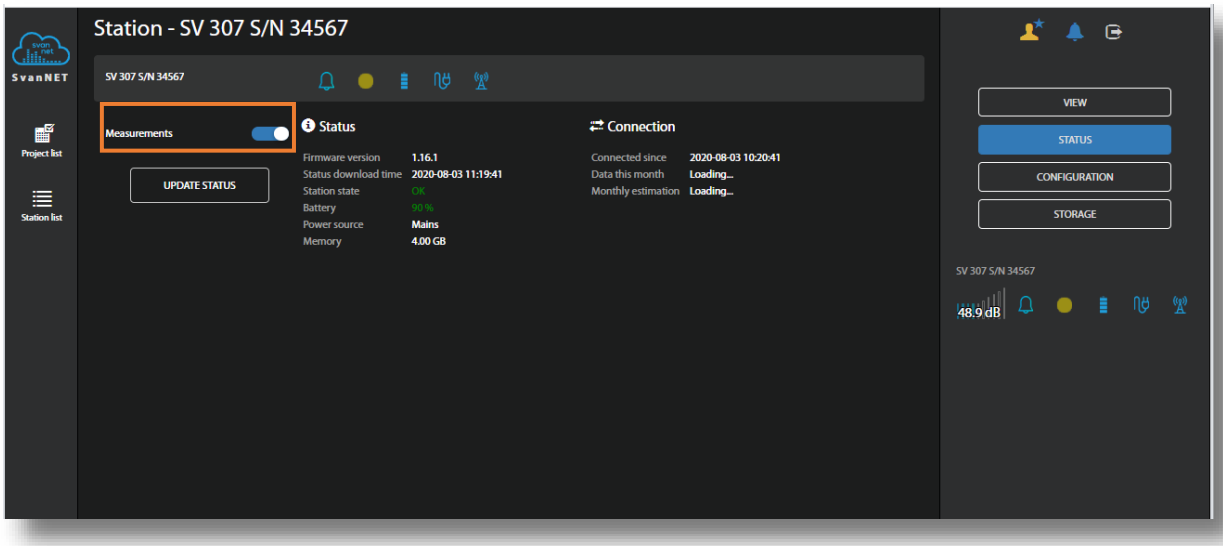
To load new firmware:

1. Click **Choose file** and locate firmware *.bin file on the PC.
2. Upload the selected file by clicking the **Upload** button.
3. After the upload is finished select new firmware package in the firmware selector.
4. Click the **Load firmware** button.
5. Click the **RESTART INSTRUMENT** or **RESTART INSTRUMENT (PRESERVE SETTINGS)** button to finalize the process and wait 60 seconds for the connection to renew. The measurements will start automatically.

***Note:** After **RESTART INSTRUMENT (PRESERVE SETTINGS)**, all previous instrument settings will be preserved. After **RESTART INSTRUMENT**, only the communication settings will remain, and all other parameters will be set to default.*

8.2.3 STATUS view

The **STATUS** view is similar to that described in the Chapter 8.1.1. The difference is that instead of STATUS ALARMS, in this view, you can start/stop measurements.

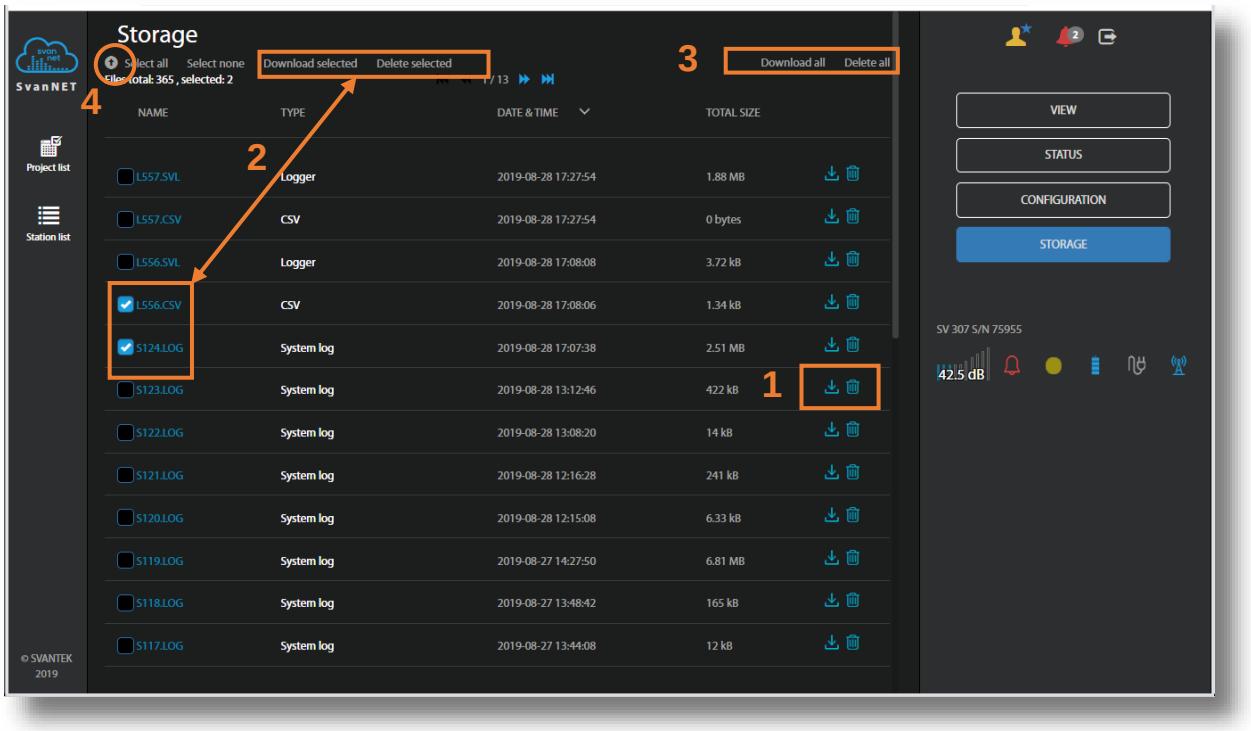


8.2.4 STORAGE view

The file storage window presents a list of files saved in the instrument's SD-card memory. The list includes only files from a single directory on the memory card and it initially shows the content of the current working directory.

In the **Storage** window, you can:

1. Download or delete individual files by clicking the righthand icons on the file line
2. Select several files and download or delete selected files
3. Download or delete all files
4. Navigate through the folder structure by clicking the "folder up" button



9 SVANPC++ SOFTWARE

SV 307 can be fully controlled via the **SvanPC++** software, which provides also wide spectrum of data post-processing and reporting functionalities.

Note: *All SvanPC++ functionalities are well described in SvanPC++ User Manual. In the current manual only most useful and instrument specific functionalities and screens are described.*

SV 307 needs to be connected to the computer running SvanPC++ either by an USB cable or a GSM connection. In the last case SvanPC++ should be supplemented with the *Remote Communication* module.

9.1 SVANPC++ SOFTWARE INSTALLATION AND ACTIVATION

To install the SvanPC++ software on your PC:

1. Make sure that your PC has active Internet connection if you wish to operate your SV 307 via the Internet. PC should have Windows operating system. Minimum system requirements: 1GHz CPU, 1 GB RAM (2GB RAM for x64 system), 20 GB HDD, 1024x768 display.
2. Download and install SvanPC++ software and Svantek *USB Drivers* from the website: http://svantek.com/lang-en/support/software.html.
3. Prepare the activation key for the *Remote Communication* (RC) module, that has been provided with the device.
4. In the **Help** menu click ***Enter Activation Keys…*** option and enter the key to activate the *Remote Communication* module.
5. Your SvanPC++ is ready for use with SV 307.

Note*: Remote Communication module should be activated for each individual SVANTEK device. Remember to enter activation key for any new device you wish to manage with RC module.*

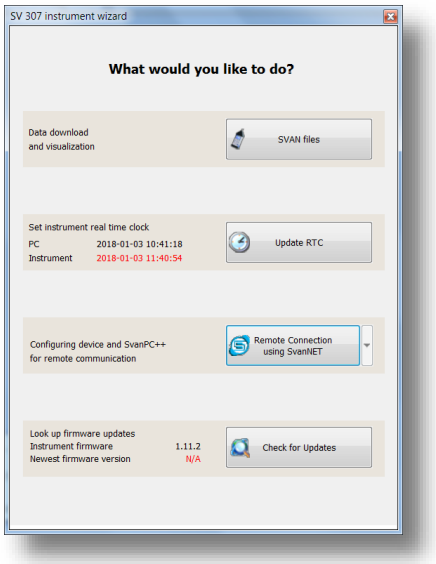
9.2 SV 307 CONTROL VIA USB INTERFACE

Although SV 307 is dedicated to wireless remote control it can be also easily configured and controlled via the USB interface. The USB interface mode can be used for the first configuration of the wireless communication. The USB interface can also be used in emergency, when wireless connection was broken or when for some reason wireless communication is not available or in situations when the measurement process doesn't require wireless control of the instrument.

The philosophy of the instrument control from SvanPC++ either via USB or via wireless communication is generally the same.

After connecting the instrument to the computer with running SvanPC++ by the SC 316 USB cable the **SV 307 instrument wizard** dialog box appears on the screen. It enables you to:

- Download or upload files (**SVAN files** button).
- Adjust the instrument real-time clock (**Update RTC** button).
- Configure the connection with SvanNET (**Remote Connection using SvanNET** button). Once the connection is configured, the **Remote Communication Center** button will be displayed instead.
- Compare the firmware version installed on the device with the latest available version (**Check for Updates** button).

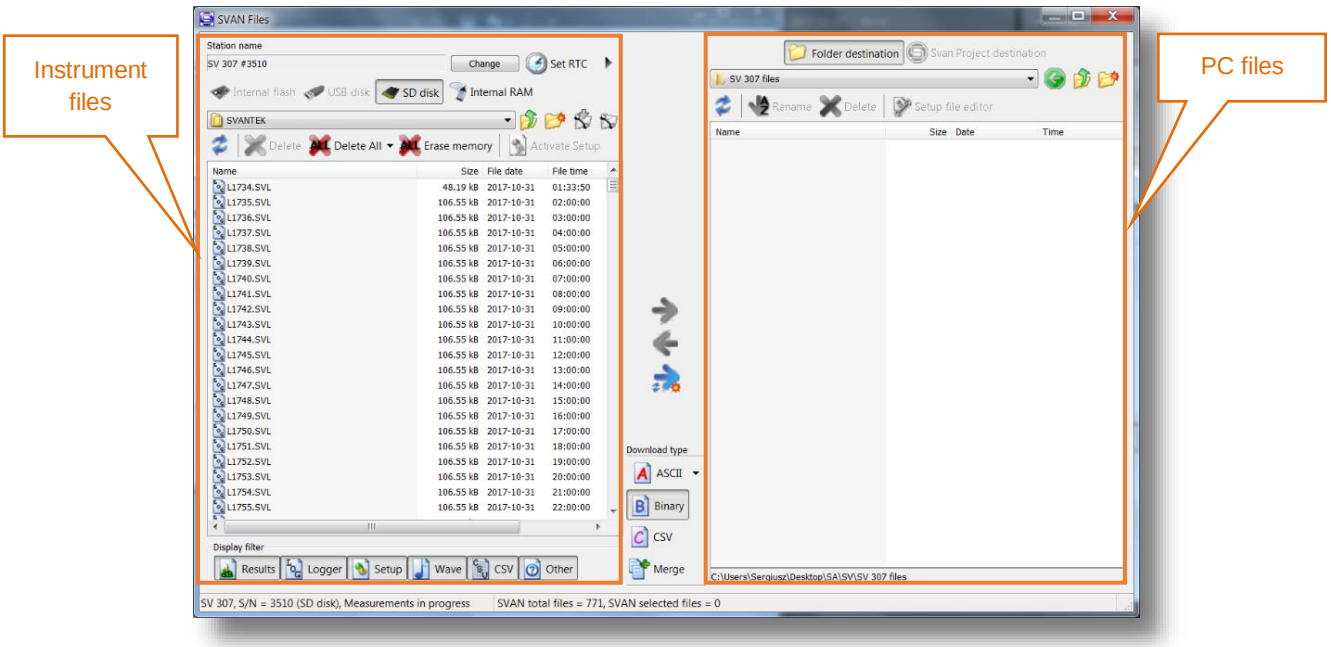


9.3 DOWNLOADING/UPLOADING FILES

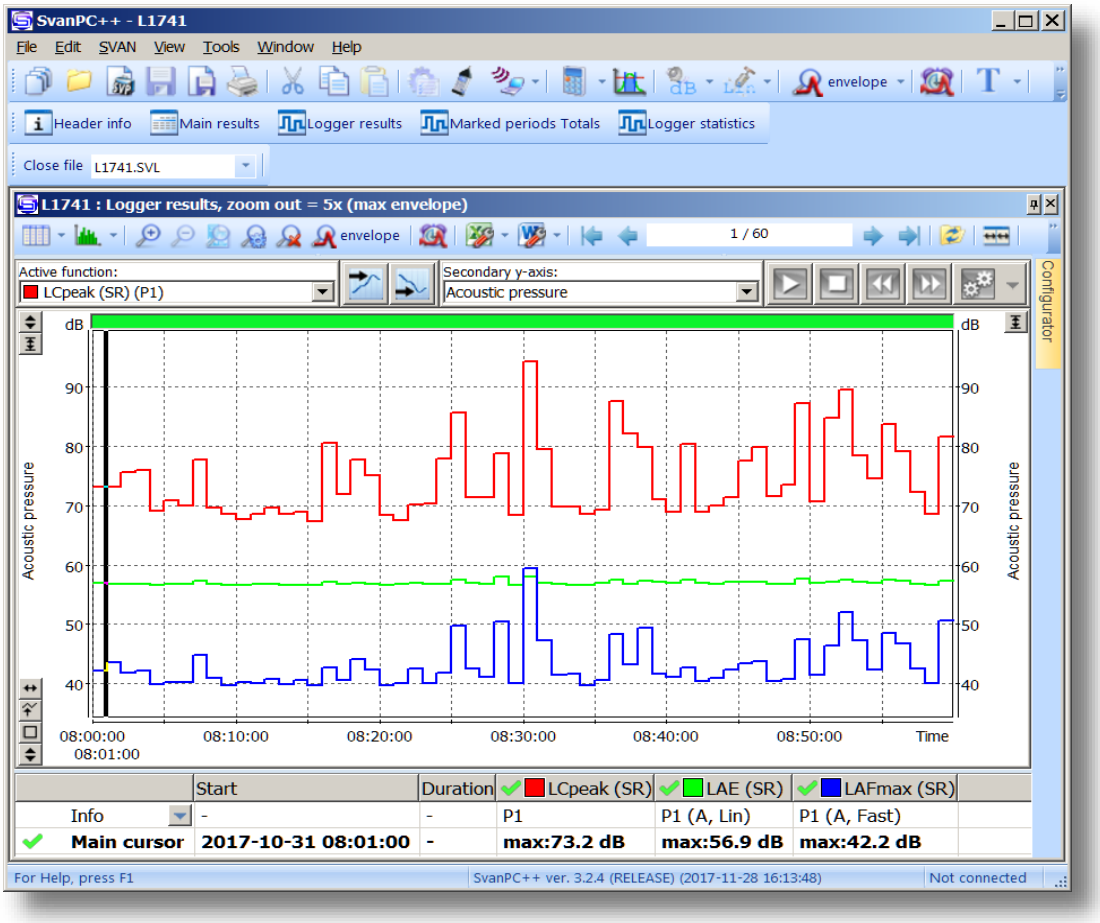
Access to the instrument's files is carried out from the **SVAN Files** dialog box.

The **SVAN Files** dialog box consists of two parts: instrument (left) and PC (right). Each part includes tools for files managing (selecting memory, directory and files, deleting files, creating directory, applying filters etc.).

Arrows in between serve to copy files from the instrument to the PC and from the PC to the instrument.



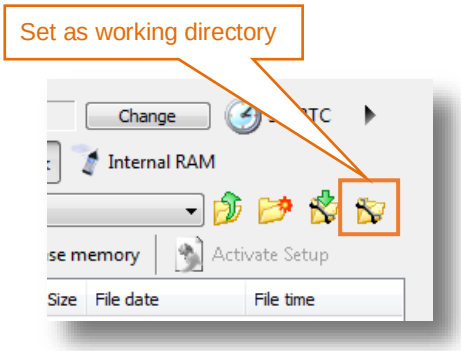
Double click the file name to open the **Viewer** module that enables different tools for data viewing. This module is described in details in the SvanPC++ User Manual.



9.3.1 Changing working directory

Working directory is a folder on the SD disc in which all the measurement files are stored. Changing the working directory can be done in the **SVAN Files** dialog box. For this:

1. Select the desired working directory in the left panel of the **SVAN Files** dialog box.
2. Click the **Set as working directory** button.



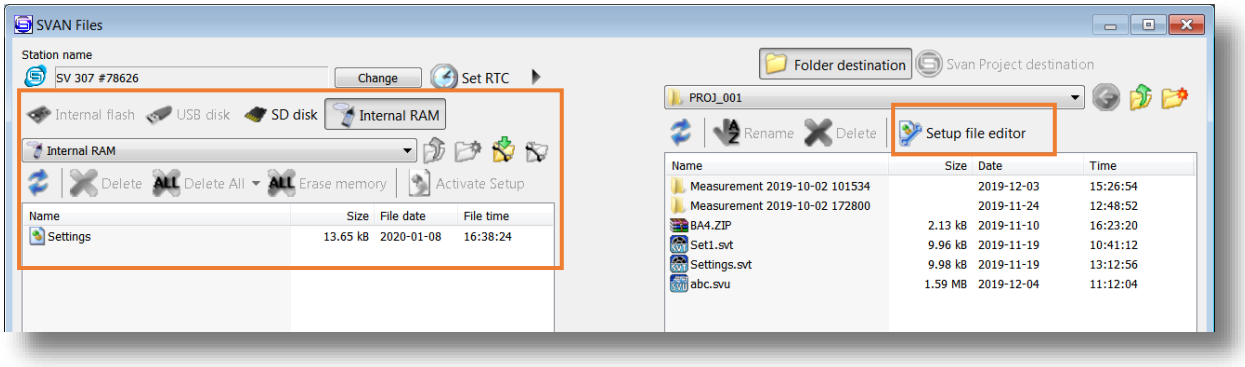
From this moment all result files will be stored in the selected directory.

9.3.2 Configuring instrument settings

The instrument settings can be configured with the use of *Setup file editor* opened from the **SVAN Files** dialog box.

In order to edit a setup file (*.svt*), you should either:

- press the **Internal RAM** button, select the *Settings* file and double click it or
- press the **Setup file editor** button, located in the top right corner of the window.



The *Setup file editor* is available in two modes: Standard and Extended. The settings available in the *Setup file editor* correspond to those available via the SV 307 instrument's interface.

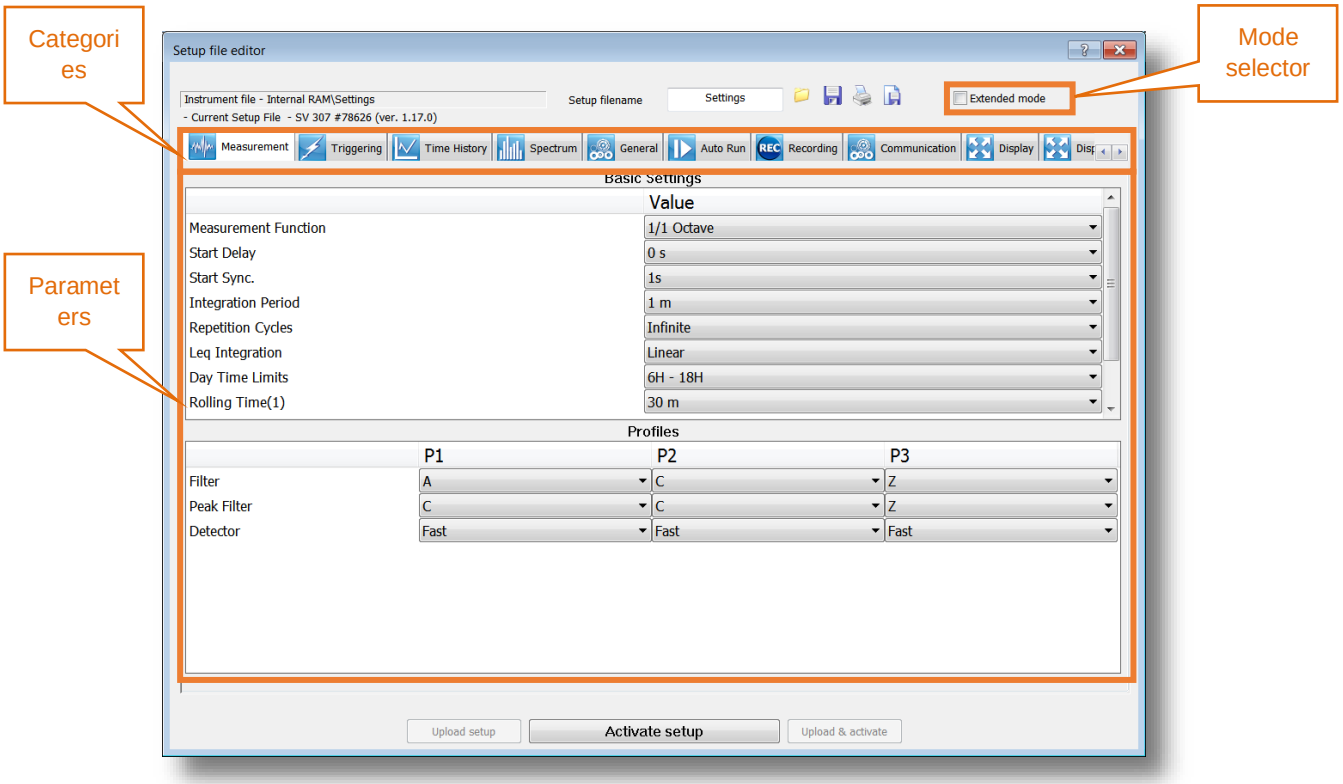
Setup file editor in the *Standard* mode allows for viewing the settings that are most likely to be modified, presented in a simple and intuitive way. Note that not all of the settings available in the connected instrument may be available in the Standard mode.

The settings are divided into several categories. You can select a category using the tabs located in the upper part of the *Setup file editor* window.

Settings can be easily edited using the following elements:

- check boxes – allowing to select some out of several possibilities,
- list boxes – allowing to select one out of several possibilities,
- text fields – allowing to type in a value using keyboard,
- binary buttons – allowing to enable or disable an option.

Standard mode:



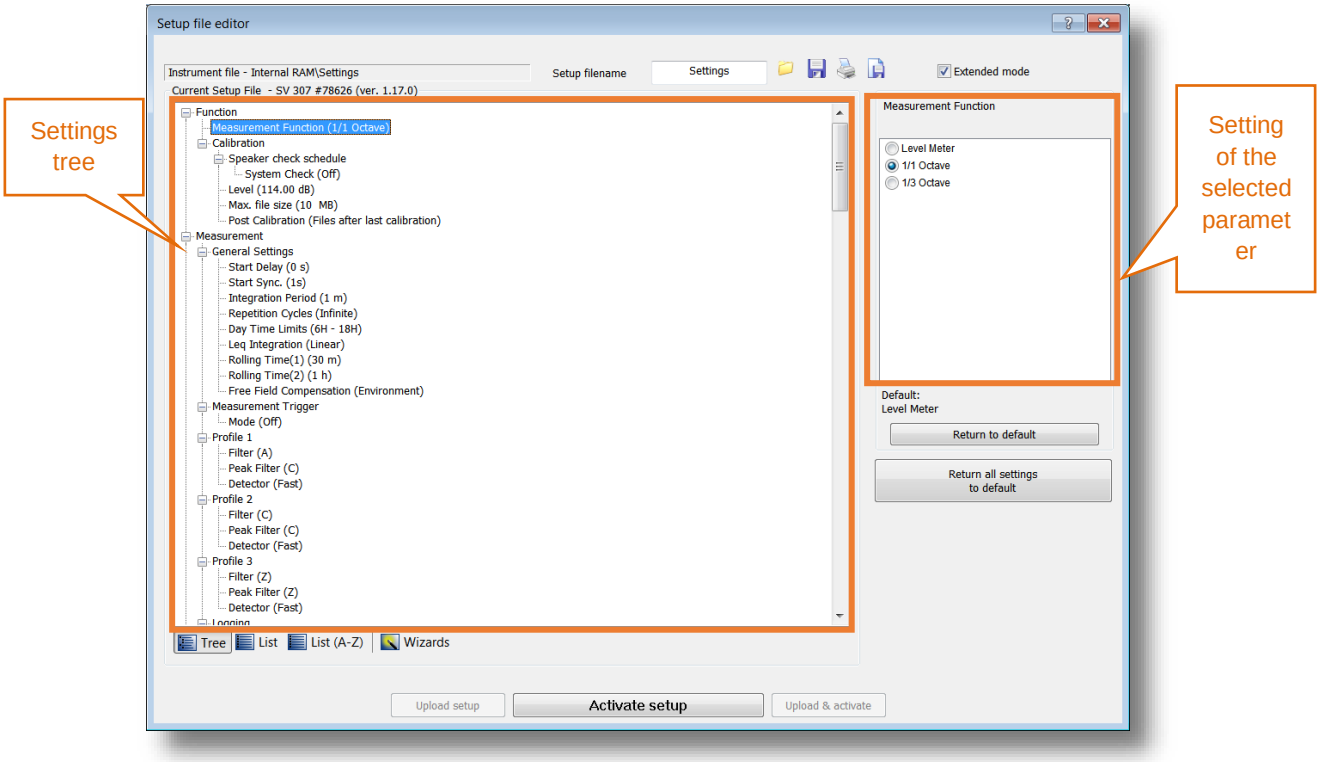
In the *Extended* mode, all the settings available in the SV 307 instrument are visible and available for editing. The list of settings, located at the left-hand side of the window, can be displayed in a tree view or a list view. You can switch the view using the buttons located in the lower part of the window.

In order to change some particular settings in the *Extended* mode, use the controls that appear in the panel at the top-right corner of the window after selecting parameter from the list.

The default, *Tree View*, offers the settings arranged in a form of a tree, resembling structure of settings in SV 307. The nodes denote menu sections, while the leafs – parameter's settings which can be edited at the top-right corner of the window. The settings are sorted in accordance with menu structure accessible through display panels of the instrument.

Some settings are related to each other. It means that one of them is available for editing only when the other is set to a certain value.

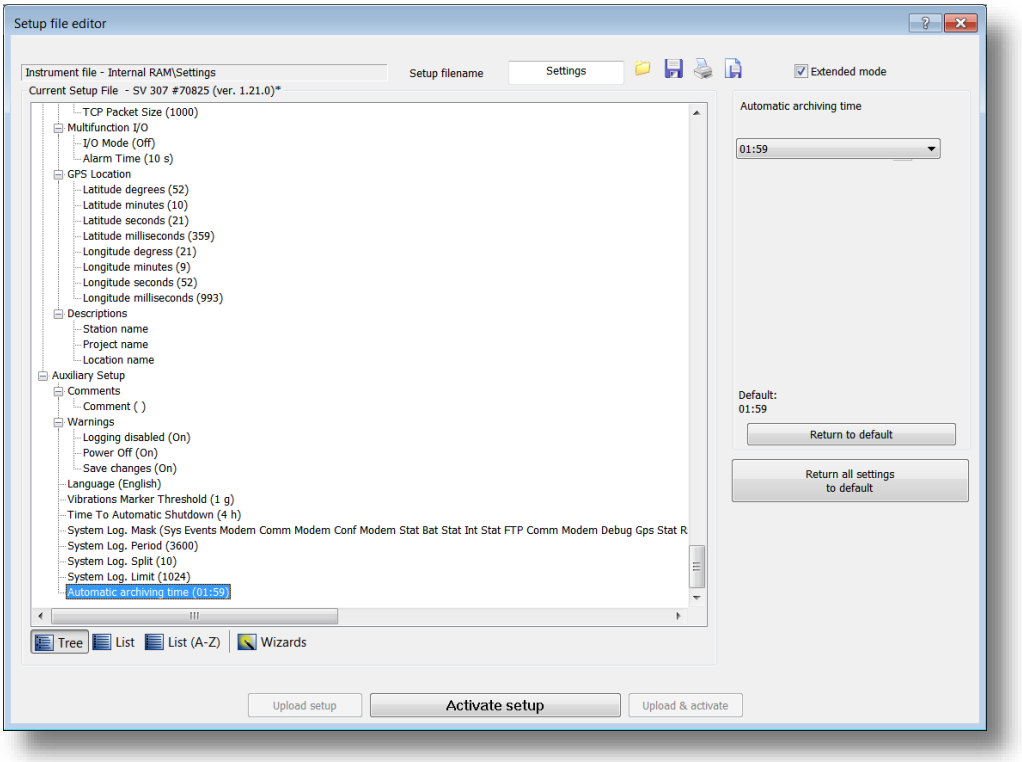
Extended mode:



After finishing the setup configuration, press the **Activate setup** button.

At the top of the Setup file editor window, next to the Setup filename field, there are several buttons responsible for the file management: opening a setup file stored on the PC, saving the currently edited setup file on the PC, printing currently edited setup file or saving the contents of the currently edited setup file in a simple text format.

Setup file editor of SvanPC++ enables edition of all settings. Some settings can be edited only via the *Setup file editor*. For example, you can set the time when the automatic archiving will be performed (see Chapter 10.5).



9.4 CONFIGURING WIRELESS CONNECTION

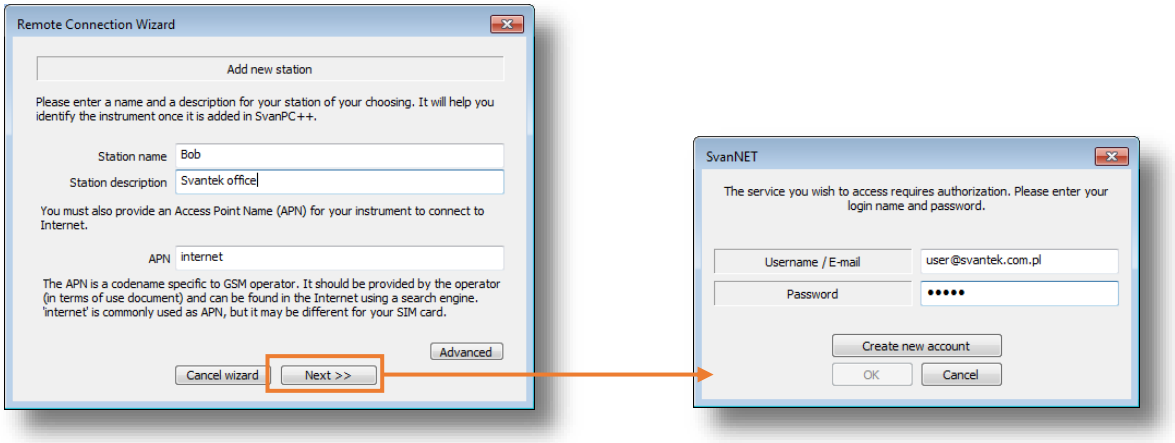
SV 307 is equipped with the internal GSM modem which enable wireless remote control of the instrument and downloading measurement files, managing configuration, receiving alarm emails, etc. via the SvanNET web-service. The configuration of this type connection must be done via the USB.

The wireless connection can be configured via **SV 307 instrument wizard**, which is described below.

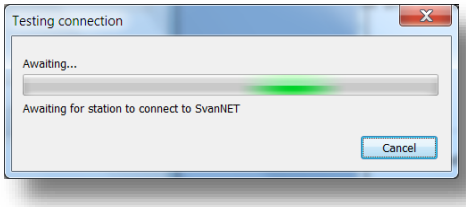
***Note**: SVANTEK does not provide a SIM card for the instrument. It is necessary to purchase the SIM card with **data plan**. If the instrument is intended for constant monitoring, choose service provider that ensures good reception at the measurement point.*

***Note**: Make sure the SIM card has deactivated PIN-code before insertion it into SV 307.*

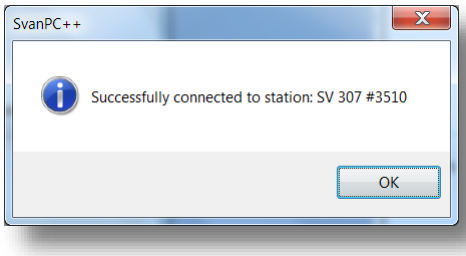
1. Connect SV 307 to the PC with the SC 316 USB cable.
2. In the **SV 307 instrument wizard** dialog box click the **Remote Connection using SvanNET** button.
3. In the **Remote Connection Wizard** dialog box type the **Station name**, **Station description** and **APN** of the GSM provider. If necessary, use the **Advanced** button to provide additional parameters required by the GSM provider.
4. After filling in the required fields in the **Remote Connection Wizard**, press the **Next>>** button and enter the login and the password of your registered account.



5. Press **OK** button and SvanPC++ will run connection settings.
6. After entering all the required information SvanPC++ will check connection settings. Wait until process is finished. It may take a few minutes.

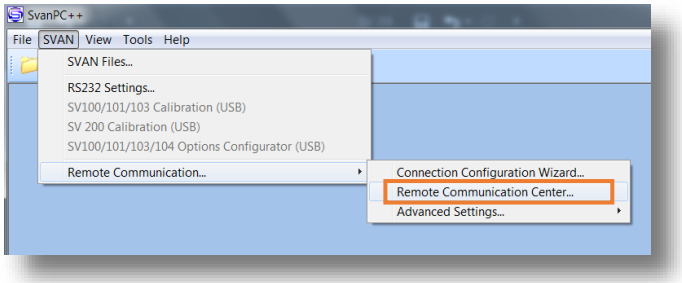


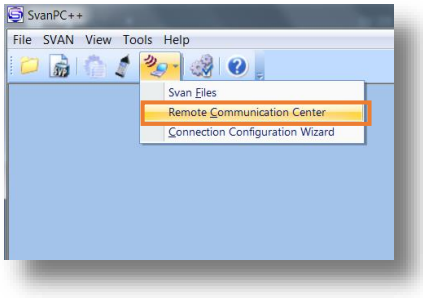
7. SvanPC++ will inform you about successful connection, the icon will be displayed on the instrument screen and the **Remote Connection using SvanNET** button will be changed to the **Remote Communication Center** button.

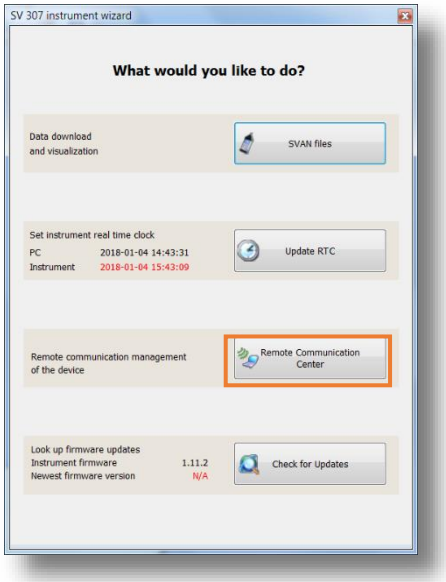


9.5 REMOTE COMMUNICATION CENTER

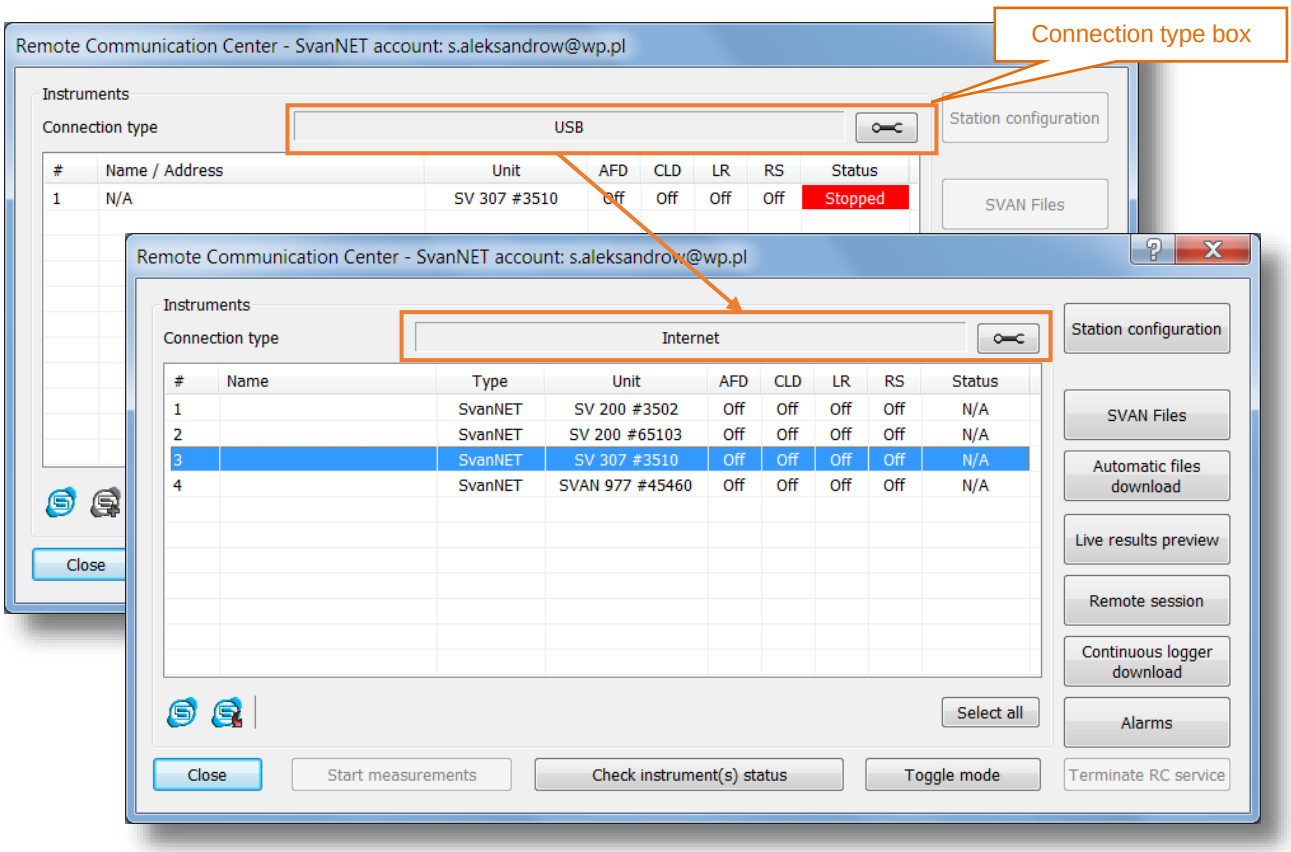
The **Remote Communication Center** serves for full remote control of the instruments connected to the SvanPC++.The **Remote Communication Center** dialog box can be opened from different places of the program:







Make sure that suitable **Connection type** is chosen. The default connection type is ***Internet***, however when the instrument is connected to the PC by the USB cable, connection type is automatically changed to ***USB***.



Choose the instrument in the station list you wish to control remotely and click the **Check instrument(s) status** button. After this the selected station can be fully controlled remotely with the use of buttons on the right panel.

The **Remote Communication Center** enables:

- starting/stopping the measurement (**Start/Stop measurement** button),
- checking the instrument status (**Check instrument(s) status** button),
- station configuring (**Station configuration** button),
- manual files downloading and uploading (**SVAN Files** button),
- communicating with instruments using various types of RC sessions (**Automatic files download**, **Live results preview**, **Remote session**, **Continuous logger download**)
- alarm setting (**Alarms** button),
- opening SvanNET web-service in the default browser (icon) and
- synchronizing the instruments list with the SvanNET account (icon).

Note: *The **Station configuration** mode is not available for the SV 307 firmware version 1.18.1 and higher.*

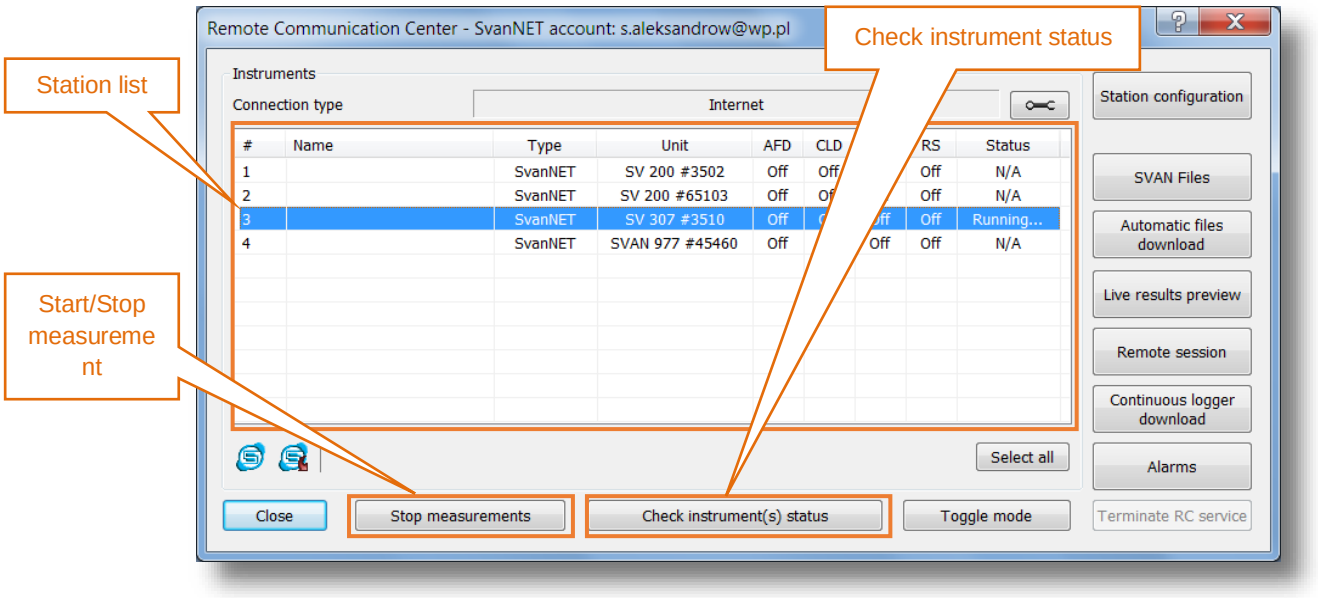
Note: *The **Remote session** mode is now obsolete and not supported. Using the **Remote session** mode is not recommended.*

In the Instrument list, the **AFD**, **CLD**, **LR** and **RS** columns denote status of respective RC sessions: Automatic files download, Continuous logger download, Live results preview and Remote session.

The **Toggle mode** button enables displaying more detailed information about connected instruments. An additional part of the **Remote Communication Center** dialog box is then opened, containing the values of several parameters such as free space, battery state etc. You can copy all the displayed data to the clipboard for later use pressing the **Copy to clipboard** button.

9.5.1 Starting/stopping measurements

***Note**: SV 307 provides AutoStart feature. If the instrument is idle for 60 s the measurement is automatically started. The AutoStart function is inactive in case: USB is connected, or logging is switched off.*



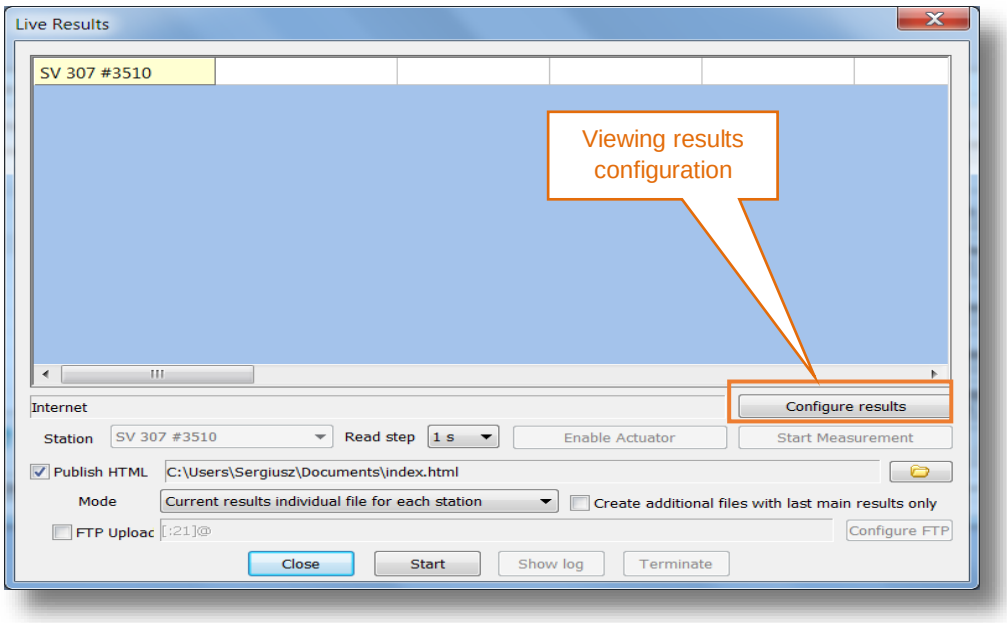
To start the measurement:

1. Select the station in the **Station list** box.
2. Check the state of the instrument by clicking **Check instrument(s) status**. When the instrument status is known, the **Start measurement** button becomes enabled.
3. Click the **Start measurement** button.

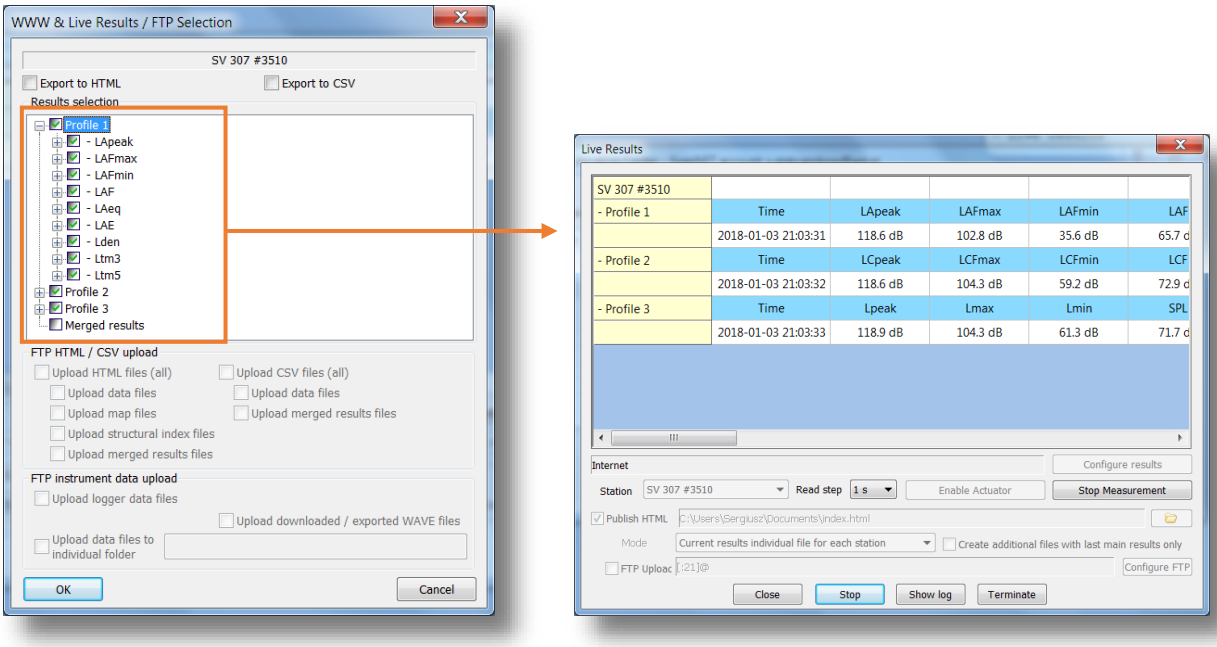
9.5.2 Viewing live results

To view live results:

1. Click the **Live results preview** button on the **Remote Communication Center** panel.



2. Click the **Configure results** button to select results for viewing in the **WWW & Live Results / FTP Selection** dialog box and return to the **Live Results** dialog box by clicking the **OK** button. Then click the **Start** button in the **Live Results** dialog box to start live results presentation.



In the **Live Results** dialog box, the user can also:
1. change the step of data readout (**Read step** button),
2. start or stop measurement (**Start/Stop Measurement** button),
3. view system log information (**Show log** button),
4. terminate the Live view session (**Terminate** button),

9.5.3 Manual files downloading and uploading

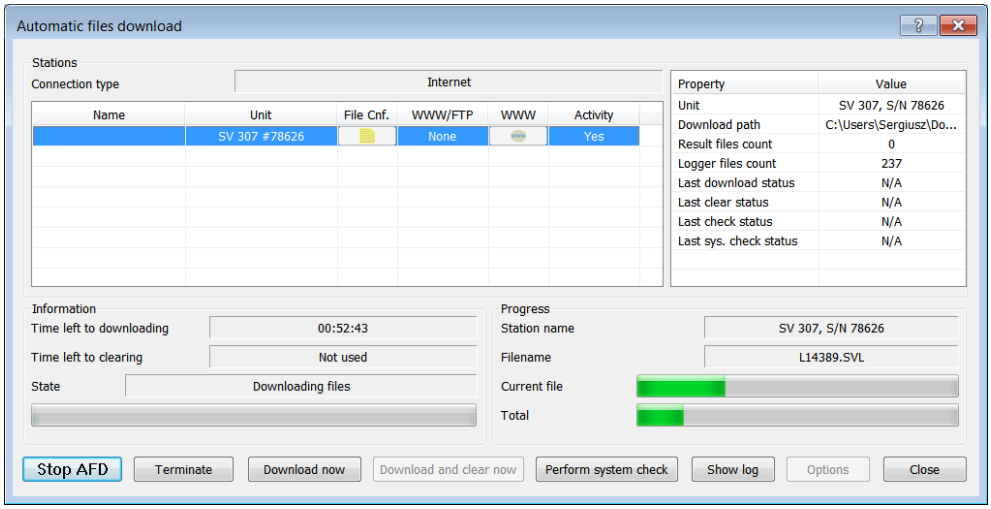
Access to the instrument files is carried out from the **SVAN Files** dialog box (see Chapter 9.3). To open the **SVAN Files** dialog box, press the **Svan Files** button on the Remote Communication Center panel.

9.5.4 Automatic files downloading

The basic functions of the *Automatic Files Download* tool are:

- Periodic logger files downloading with configurable period (hourly, daily, monthly or custom – with minimum step of 1 minute),
- System check functionalities,
- Periodic instruments' file storage clearing – with different period setting than for downloading,
- Log on all commands sent to the meter.

To open the **Automatic files download** dialog box, press the **Automatic files download** button on the Remote Communication Center panel.

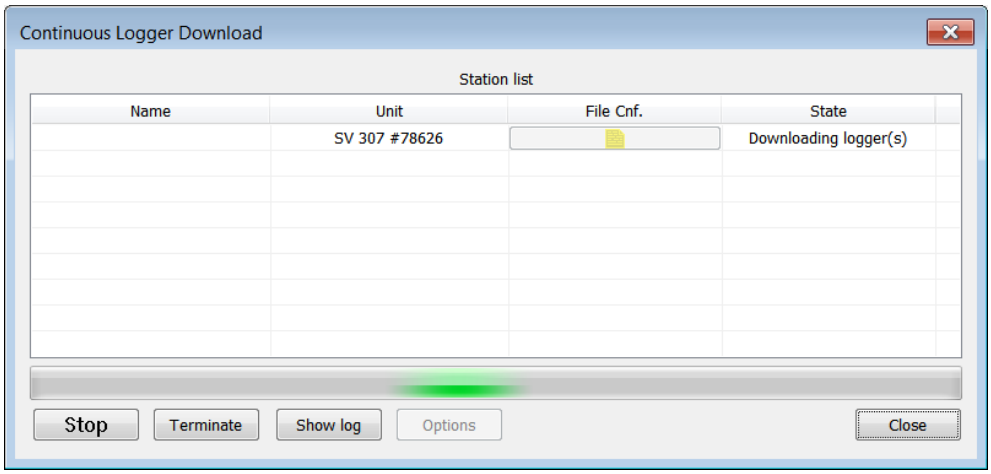


See detail description in SvanPC++ User Maual.

9.5.5 Continuous logger downloading

The *Continuous logger download* tool serves for short-period remote data acquisition from current logger, also enabling daily logger merging as well as verification of settings and system checking.

To use the *Continuous Logger Download* data acquisition method, press the **Continuous logger download** button in the Remote Communication Center. The **Continuous Logger Download** dialog box will be opened.



See detail description in SvanPC++ User Maual.

10 CONTROL PANEL USER INTERFACE

If necessary, SV 307 can be controlled manually by means of ten keys on the keypad. Using these keys, you can access most available functions and change the value of most available parameters. The parameters are placed in a system of lists and sub-lists shown on the high contrast graphic colour display.

The instrument is equipped with the super contrast OLED colour display (160 x 128 pixels), which displays the measurement results and the configuration menu.

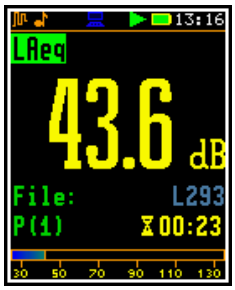
10.1 BASIS OF THE INSTRUMENT'S CONTROL

The instrument has two general modes of operation: measurement performance and results preview mode and configuration mode with the use of Menu functionality.

10.1.1 Measurement mode

The measurement results can be viewed in different view modes, the set of which depend on the selected **Measurement Function** and which you can change and activate/deactivate.

View modes present measurement results as well as additional information by means of icons regarding:



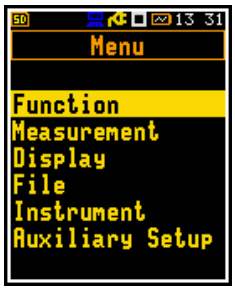
- instrument status: memory, power, real time, etc.;
- measurement status: measurement elapsed time, measurement start/stop/pause, trigger, logger etc.;
- measurement parameters: measured result, profile number, detector type, filter etc,
- file name.

10.1.2 Configuration mode

To configure a measurement or the instrument, use the menu mode, which is switched with the **<Menu>** key. The menu consists of different type of screens, which include main menu, sub-menu, lists of options, lists of parameters, text editor screens, information screens etc.

Main menu

The main **Menu** contains headers of six sections (sub-menu), which group configuration settings by some features.

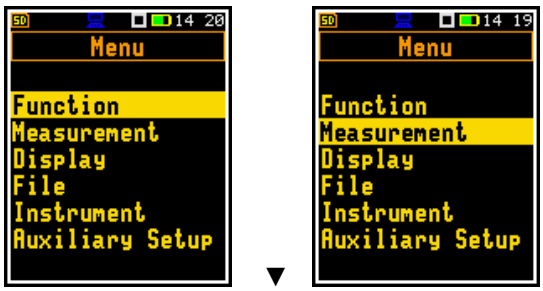


Recent Items list

Double-pressing of the **<Menu>** key opens the list of recently used menu items. This enables accessing most frequently used lists of parameters and lists of options quickly, without the necessity of passing through the whole menu.

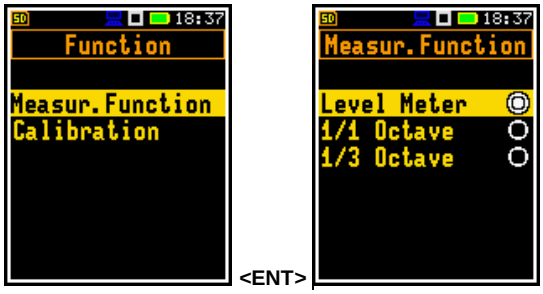
Position selection

The desired position in the list is selected with the ▲ / ▼ key.



Opening position

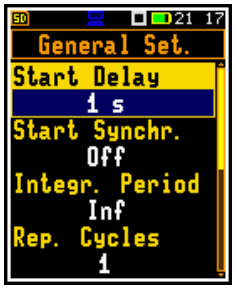
After selection of the desired position in the menu list, press the **<Enter>** key to open it. After this operation, a new sub-menu, list of option, list of parameter or information screen appears on the display.



List of parameters

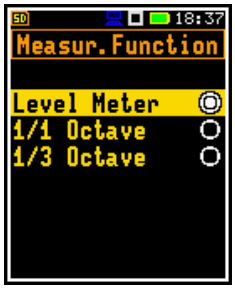
A list of parameters contains parameters for which you may select the value from the available set.

- Use the ▲ / ▼ key to select the parameter in the list.
- Use the ◄ / ► key to change the value of the selected parameter.
- Press **<Enter>** to saves all performed changes in the list of parameters.



List of options

In the list of options only one option can be selected. The selection of the option is performed in the following way. Select the desired option with the ▲ / ▼ key and press **<Enter>**. This option becomes active and the list is closed. After re-entering this list again, the last selected option will be marked.



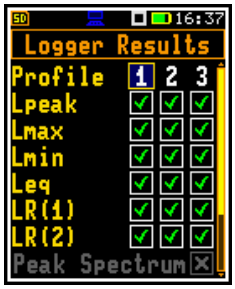
If the parameter has a numerical value, you can speed up a selection by pressing the ◄ / ► key and keeping it pressed by more than 2 seconds. In this case, the parameter value starts to change automatically until you release the pressed button.

You may change the numerical parameter value with a larger step (usually 10, 20) with the ◄ / ► key pressed together with **<Shift>**.

Matrix of parameters

When the list of parameters consists of more than one column you may:

- move the cursor to the other column with the ◄ / ► key
- move the cursor to the other line with the ▲ / ▼ key
- change the value of the selected position with the ◄ / ► key pressed together with **<Shift>**
- change all values in a line with the ▲ / ▼ key pressed together with **<Shift>**
- change all values in a column, if the cursor is on one of Profile positions, with the ◄ / ► key pressed together with **<Shift>**
- change all values in a matrix, if the cursor is on one of Profile positions, with the ▲ / ▼ key pressed together with **<Shift>**



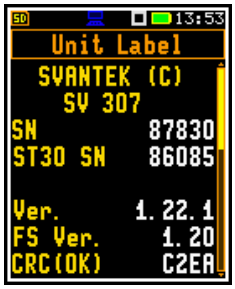
Complex parameters

For complex parameters, consisted of more than one value field like **RTC** or result screen, you should select the field with the ◄ / ►, ▲ / ▼ key and then select the value with the ◄ / ► key pressed together with **<Shift>**. The selection should be confirmed by **<Enter>**.

In all cases the **<Enter>** key is used for confirmation of changes and for closing the opened list. The list is closed, ignoring any made changes by pressing the **<ESC>** key.

Information screen

Some screens inform about the state of the instrument, available memory, standards fulfilled by the unit, etc. To scroll through the screen, use the ▲ / ▼ key. To close such a screen, press **<ESC>**.



Text editor screen

In the text editor screens, you may edit text lines (file names, directory name etc.) The text editor screen is opened with the ◄ / ► key when the position with the text parameter is selected.

These screens contain a virtual keyboard with available ASCII characters, and you can select the required key with the ◄ / ►, ▲ / ▼ keys.

►

The edited text is displayed in the upper line and the character, which is displayed inversely may be changed, deleted or a space may be inserted before it.

- You can select the position of the character in the edited text with the ◄ / ► key pressed together with **<Shift>** or by selecting the "**<**"/"**>**" key on the virtual keyboard and pressing **<Enter>**.

<Sh/►>

- You can insert or delete the position in the edited text by selecting the "**Ins**" or "**Del**" key on the keyboard and pressing **<Enter>**.

<ENT>

- You can exchange the character of the marked position by selecting the required character on the virtual keyboard and pressing **<Enter>**.

The text cursor will automatically shift to the next position of the edited string.

<ENT>

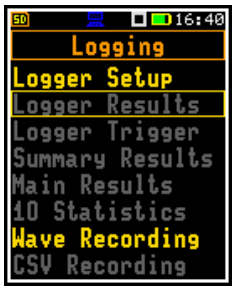
- To finish text edition, select **OK** key and press **<Enter>**.

A new text string appears at the position of the text parameter.

<ENT>

Inactive parameters

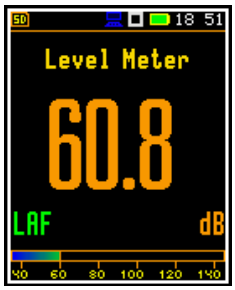
If some functions or parameters are not available, the positions in the menu or parameter lists linked with this function or parameter become inactive (the selected line field will be in the frame with black background, not yellow). For example, if **Logger** (*path: <Menu> / Measurement / Logging / Logger Setup)* is switched off, some other **Logging** positions become not active!



10.2 GETTING STARTED

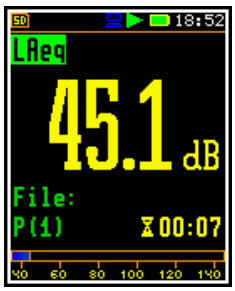
Turning the instrument on

To switch the power on, press the **<Shift>** and **<Start/Stop>** keys simultaneously. The instrument goes through the self-test routine (in this time the manufacturer's logo and the name of the instrument is displayed) and then it enters the basic SPL view mode.



Measurement start

To start a measurement, press the **<Start/Stop>** key. Results of the measurement are displayed in the view mode that was active before turning the instrument off. As an example, screen with one profile mode is presented.



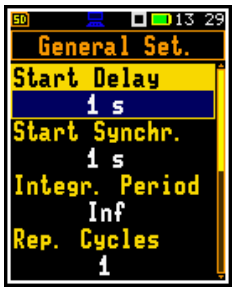
One profile mode is always available for most Functions of the instrument. The measurement results can also be presented in other display modes, which you may control - switch them on or off and adjust to your needs.

Setting measurement parameters

The instrument as sold has default settings which you may change, but always return to them with the use of the **Factory Settings** option in the **Auxiliary Setup** menu.

Next chapters of the manual will describe in detail what each parameter means and how to change the instrument settings.

Main default settings

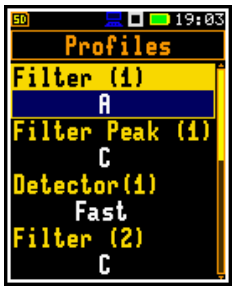


With default settings, the instrument is configured as the Sound Level Meter (**Measurement Function: Level Meter**) to measure broad-band sound pressure level by three virtual meters, so called profiles, with 1 second delay from the **<Start>** key pressure, infinite integration time (**Integration Period: Inf**), one repetition cycle (**Rep. Cycle: 1**), linear Leq integration (**LEQ Integration: Linear**), compensation of microphone internal noise (**Microphone Comp: On**), compensation for the 90 deg incidence angle (**Free Field: Environment**), active logging for all profiles of all logger results (**Lpeak**, **Lmax**, **Lmin**, **Leq**, **LR(1)** and **LR(2)**) with 1 second step (**Logger Step: 1s**) and all summary results.

Other functions are switched off, like measurement trigger, logger trigger, wave recording and timer.

The logger and summary results will be automatically saved in the file with the name presented in the **Logger Setup** list (**Logger Name: Lxxxx**).

Default Profile settings:



Profile 1 - **C** weighting filter for Peak results (**Filter Peak(1)=C**), **A** weighting filter for other results (**Filter(1)=A**), **Fast** for the LEQ detector (**Detector(1)=Fast**);

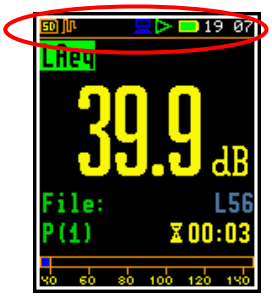
Profile 2 - **C** weighting filter for Peak results (**Filter Peak(2)=C**), **C** weighting filter for other results (**Filter(2)=C**), **Fast** for the LEQ detector (**Detector(2)=Fast**);

Profile 3 - **Z** weighting filter for Peak results (**Filter Peak(3)=Z**), **Z** weighting filter for other results (**Filter(3)=Z**), **Fast** for the LEQ detector (**Detector(3)=Fast**);

You can change all above-mentioned settings in the **Measurement** section. The instrument remembers all changes by the next time it is used. You can return to default settings (set up by the manufacturer) with the use of the **Factory Settings** position in the **Auxiliary Setup** section.

10.3 DESCRIPTION OF ICONS

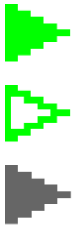
Indicators of the instrument state

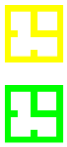


Additional information about the instrument's state gives the row of icons visible in the top line of the display.

The real-time clock (RTC) is also displayed in the same line together with icons.

Meanings of icons are as follows:

 „**measurement**" icon is displayed when the measurement is running, and the icon shape is changing from self to contoured. Grey colour means that the instrument waits for the measurement start after pressing the **<Start>** key due to a start or trigger delay.	 **"battery"** icon is displayed when the instrument is powered from the internal batteries. Icon colour corresponds to the charging status of the batteries (green - 30÷100%, yellow – 10÷30%, red – less than 10%).

 **“stop”** icon is displayed when the measurement is stopped.	 **“shift”** icon is displayed when the **<Shift>** key is pressed.
“pause” icon is displayed when the measurement is paused.	 “**vibration**” icon is displayed when high self-vibration level is registered
 „**logging**” icon is displayed when the current measurement results are logged into the instrument’s logger file. Grey colour means that the instrument waits for the logging start after pressing the **<Start>** key due to a start delay or a delay caused by a trigger.	 „**wave**” icon is displayed during wave recording. Grey colour means that the instrument waits for the wave recording start after pressing the **<Start>** key due to a start delay or a delay caused by a trigger.
 “**plug**” icon is displayed when the instrument is powered through the USB socket without using USB interface.	 „**USB**” icon is displayed when there is USB connection with the PC.
 **“trigger”** icon is displayed when other than Level or Slope trigger is waiting for condition fulfilment. The icon appears alternately with the „measurement”, „logging” or „wave” icons.	 **“level-”** icon is displayed when the trigger condition is set up to „**Level -**”. The icon appears alternately with the „measurement”, „logging” or „wave” icons.
 “**underrange**” icon is displayed when during the measurement the underrange was registered.	 **„level+”** icon is displayed when the trigger condition is set up to „**Level +**”. The icon appears alternately with the „measurement”, „logging” or „wave” icons.
 “**overload**” icon is displayed when during the measurement the overload was registered.	 **“slope+”** icon is displayed when the trigger condition is set up to „**Slope+**”. The icon appears alternately with the „wave” icons.
 “**SvanNET**” icon is displayed during internet connection with the SvanNET web-service	 **“slope–“** icon is displayed when the trigger condition is set up to „**Slope-**”. The icon appears alternately with the „wave” icons.
 **“clock”** icon is displayed when the timer is **On**. It is active when the instrument is waiting for the measurement start to occur. When the measurement start is close, the icon changes its colour to green and starts blinking.	 “**SD-card**” icon is displayed when the SD-card memory is installed. Grey colour of the icon means that the card memory is full. “**no SD-card**” icon is displayed when no SD memory card is installed.
 **“GPS”** icon is displayed when GPS is active. Colours of the icon define the state of the GPS: green – active, blue – searching, grey – disconnected.	**“umbrella”** icon is displayed when the Meteo or Dust monitor is connected to SV 307.
 **“bell’** icon is displayed when an alarm appears.	 Microphone service mode, meaning that the instrument has detected the microphone malfunction.

10.4 SAVING DATA

The instrument creates files of the next types:

- Logger files with measurement results (extension **.SVL**)
- Wave files with signal recording (extension **.WAV**)
- Setup files with measurement and instrument configuration (extension **.SVT**)
- CSV files with summary results (extension **.CSV**)
- System Log files (extension **.LOG**).

Memory type

All files are stored in the instrument's memory (micro SD-card) in the predefined or assigned directories. The setup files are stored in the predefined directory SETUP. The non-predefined directories can be changed by the user or renamed.

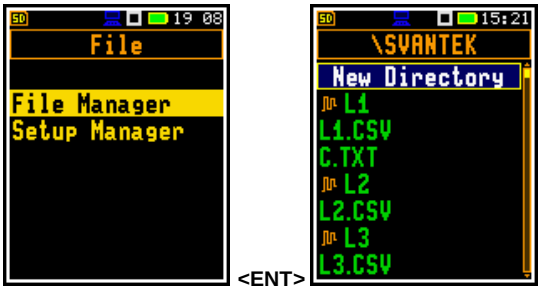
- SD-card is inserted

- no SD-card

The **SD-card** memory is activated automatically after insertion of the card. The presence of the SD-card is indicated by the icon with SD letters at the top left-hand corner of the display.

File manager

The **File Manager** is used for checking content of the memory and operations on files and directories such as: renaming, deleting, displaying information and creating of new directories.



The **SD-card** memory is organised as a standard memory with directories and sub-directories (FAT32 file system). It is possible to create or to delete directories.

There are four default directories: SETUP, FIRMWARE, ARCHIVE and SVANTEK.

To check SD-card properties, press the ◄ key few times to enter the **SD-card** directory.

Automatic logger and wave files saving

Logger and wave files are saved automatically to the SD-card. To enable automatic saving several conditions should be fulfilled:

1. SD-card should be inserted and there should be enough free space on it.
2. The **Logger** (*path: <Menu> / Measurement / Logging / Logger Setup*) and/or **Recording** (*path: <Menu> / Measurement / Logging / Wave Recording*) should be enabled.
3. The new file should be defined with a unique name (*path: <Menu> / Measurement / Logging / Logger Setup / Logger Name* and *path: <Menu> / Measurement / Logging / Wave Recording / Wave File Name*).

Files are saved in the directory, which was set up as a working directory. The default working directory (after using **Factory Settings** function) is called **SVANTEK**.

Note: *During the measurement run with data logging to the logger file, the „logging" icon is displayed.*

The file name (Logger or Wave) is generated automatically using the pattern **LLdd**, where **LL** is the string of letters (so called **prefix**) and **dd** is a string of digits that forms a number. Up to 8 characters can be used to name a file.

The default prefix for the logger files is **L** and for the wave files - **R**.

The instrument assigns an individual counter to each prefix of files the user has created and saved in the working directory. This counter is equal to the maximum number in the set of files with the same prefix. For example, if there are files with names: **L0**, **L5** and **L336**, the counter value is 336.

The number of the new automatically created file will have the value of the counter increased by one. So, for the above example, new file name will be **L337**.

You can change the automatically generated file name in the special screen, which is opened after pressing the ◄ / ► key.

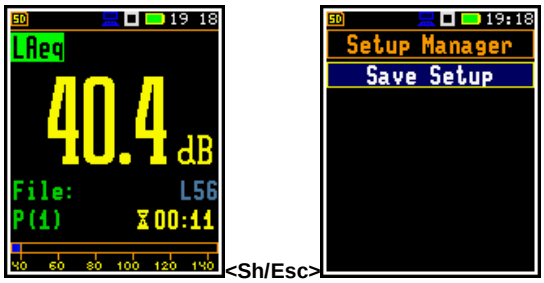
After changing the file name number without changing the prefix and pressing **<Enter>**, the counter will be automatically adjusted.

The instrument accepts only that name which number is higher than the counter of the prefix.

Saving setup files

Setup files can be created by means of the **Setup Manager** or from the measurement screen with the **<Shift>** key pressed together with **<ESC>**, when a measurement is not running.

All Setup files are stored in the default directory **SETUP** on the SD-card.



10.5 ARCHIVING FILES

SV 307 uses a file archiving mechanism. When the number of files saved in the working directory exceeds 5000 (together with deleted files), the backup procedure is started. At the specified time (by default at 1:59) the instrument stops the measurement, moves the working directory in its entirety to the ARCHIVE directory, automatically renaming this directory to YYMMDD (current date) and creates a new working directory with the name before archiving. Then the instrument starts the measurement.

The archiving time can be set via the SvanPC++ software (see Chapter 9.3.2).

10.6 DOWNLOADING AND UPLOADING FILES

All measurement and setup files stored in the memory (micro SD-card) can be downloaded to the PC. There are two ways to download files.

Since the file structure of the SD-card is the same as on most PC, you may extract the micro SD-card and use it directly in the PC. But it is not recommended.

We recommend using SvanPC++ software or SvanNET web-service, which enable downloading and uploading functions as well as data viewing and data processing options. In this case, the instrument should be connected to the PC via SC 316 USB cable or via Internet (see Chapter 8.2.4 and 9.5.5).

Same approach is used for uploading files (usually setup files).

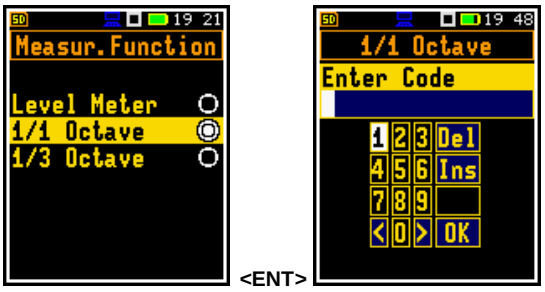
10.7 ACTIVATION OF OPTIONAL FUNCTIONS

Standard instrument firmware contains all basic functions to perform measurements in accordance with most international standards and methods. For more complex tasks you may expand the instrument with additional functions. These features include 1/1 and 1/3 octave analyser and wave recording.

If additional functions were not supplied in the instrument kit and were not unlocked by the supplier, such a task is in responsibility of the user who decides to buy additional functions later.

The optional function is activated when you try to use it for the first time. For example, if **1/1 Octave** was locked, but is purchased later, then during the first attempt to switch it on, the instrument requires entering the special code that will unlock this option. Once unlocked the option is available permanently.

The code is entered in the special screen with the use of the virtual keyboard.



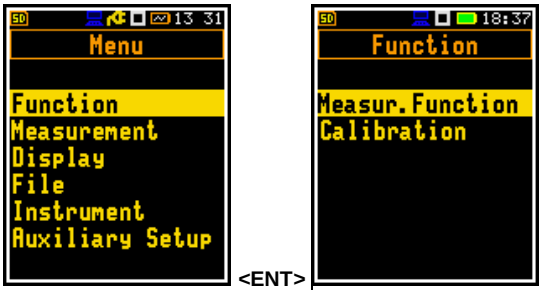
Press the **<Shift>** and ◄ keys right after turning on the instrument with the **<Shift>** and **<Start/Stop>** keys to check and lock early unlocked options.

To select other options, press the **<Enter>** key, which opens another page of the **Active Functions/Options** list.

10.8 MEASUREMENT FUNCTIONS AND CALIBRATION – FUNCTION

In the **Function** section, you can select the measurement function (**Measur. Function**) and perform the instrument calibration or system check (**Calibration**).

To select the **Function** section, press the **<Menu>** key, select the **Function** position and press **<Enter>**.

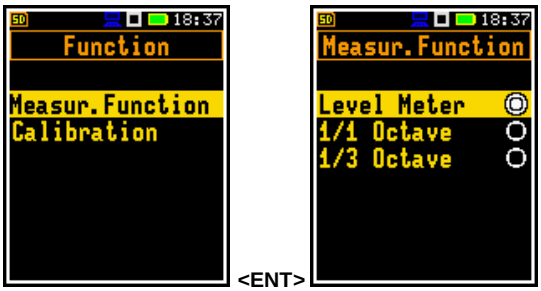


10.8.1 Measurement functions of the instrument – Measur. Function

The main function of the instrument is measurements of the broadband sound pressure level (**Level Meter**). The Sound Level Meter (SLM) function provides the user with functions meeting the standard IEC 61672-1:2013 for Class 1 accuracy. The instrument can also be used for medium to long-term acoustic monitoring using the huge capacity data logger in which all measurement results are stored.

You may also use 1/1 and 1/3 real time octave band analysis options. These options broaden the main Level Meter functionality of the instrument, because 1/1 and 1/3-octave analysis is performed in parallel with calculations of broadband Level Meter results.

To activate a measurement function, open the **Measur. Function** list of options and select with the ▲ / ▼ key the required function: **Level Meter**, **1/1 Octave** or **1/3 Octave**.



Note: *Type of the measurement function is displayed in the SPL view mode*.

Note: *The **1/1 Octave** and **1/3 Octave** functions are optional and should be unlocked by entering the activation code in the text editor screen, which is opened after first attempt to select it. Once unlocked, this option will be ready to use permanently.*

Note: *It is not possible to change the measurement function during a measurement run. In this case, the instrument displays for about 3 seconds the text: "**Measurement in Progress**". To change the mode of the instrument the current measurement in progress must be stopped!*

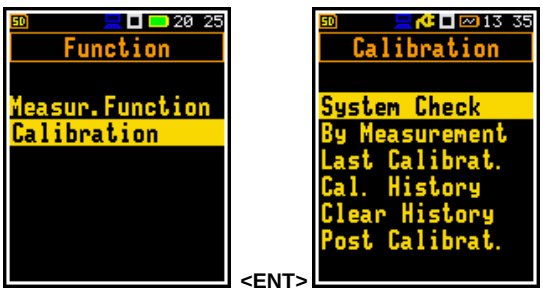
10.8.2 Instrument's calibration and system check – Calibration

The instrument is factory calibrated with the supplied microphone for the reference environmental conditions (see Appendix C). The microphone sensitivity is a function of the temperature, ambient pressure and humidity, and when the absolute sound pressure level value is required, the absolute calibration of the measurement channel should be performed.

In addition to the calibration, the instrument provides checking the measuring path (so called system check).

Whole information regarding calibration and system checking is registered in the special log file (C.txt).

The **Calibration** list comprises positions enabling: system checking (**System Check**), calibration with the use of the sound calibrator (**By Measurement**), checking the previous calibration (**Last Calibration**), checking the history of calibrations (**Calibration History**), erasing calibration records (**Clear History**) and adding current calibration results to the logger file (**Post Calibration**).



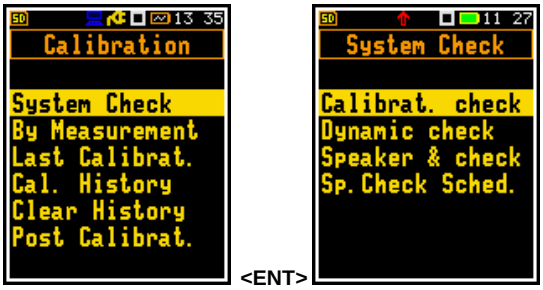
Note: *The calibration factor is always added to the results in the* ***Level Meter****,* ***1/1 Octave*** *and* ***1/3 Octave*** *functions.*

Note: *The recommended factory calibration interval is 12 months for instruments to be confident in their continuing accuracy and compliance with the international specifications. Please contact your local Svantek distributor for further details.*

10.8.2.1 Checking measuring path - System Check

There are several options for checking the measuring path:

- Using a sound calibrator (**Calibrat. check**),
- comparing measurements from three MEMS microphones (**Dynamic check**) or
- using the internal speaker (**Speaker & check**.

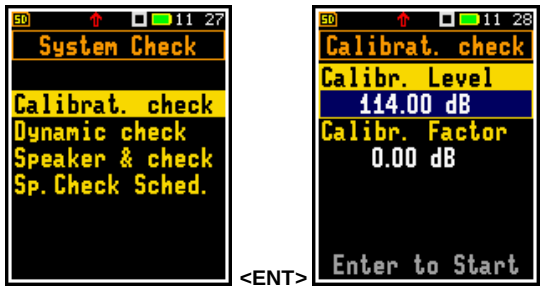


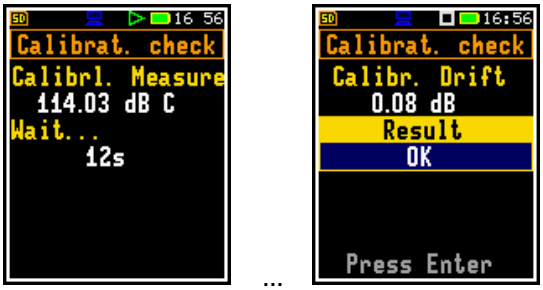
Note: *Unlike Calibration procedure, system check does not change the calibration factor of the instrument.*

Calibration check

To perform the system, check with the use of calibrator:

1. Set the reference calibration level (**Calibr. Level**) – see Appendix C, Chapter C.1, par. Calibration.
2. Attach the sound calibrator (SV 36 or equivalent 114 dB/1000 Hz) carefully over the microphone of the instrument.
3. Switch on the calibrator and wait approximately 30 seconds before starting the system check measurement.
4. Start the measurement of the calibration signal with the **<Enter>** key.





Calibration measurement lasts 15 seconds.

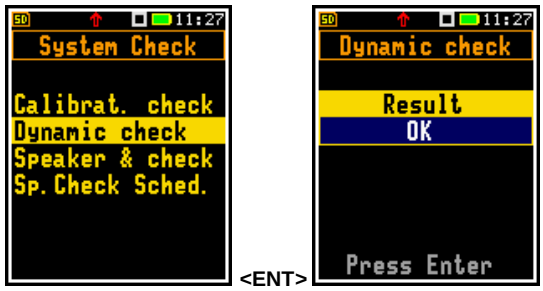
If the **Calibration Drift** is within ±0.5 dB, the check **Result** is **OK**. Otherwise **Result** is **Failed**.

If the calibration drift is within ±0.5 dB but the Calibration check detects that one of three MEMS microphones is failed, the check result will be **Failed**.

Dynamic check

The instrument constantly compares measurements from three MEMS microphones located in the microphone capsule. If difference is within tolerances the dynamic check is considered to be successful (**Result: OK**).

The **Dynamic check** screen shows the status of such check.



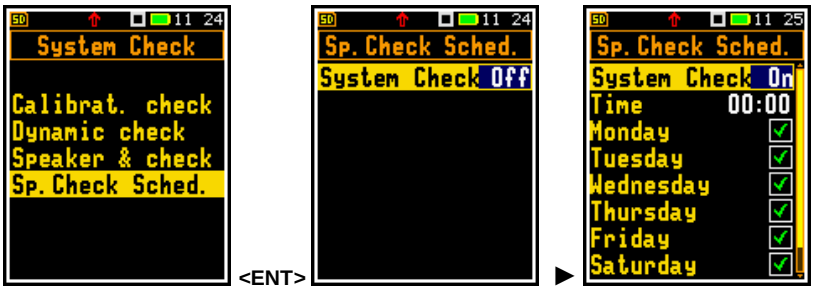
Speaker & check

If you enter the **Speaker & check** position the instrument starts system check with the use of built in speaker.

The instrument counting down the measurement time and if result is within tolerances the check is successful (**Result: OK**).

Speaker check schedule

You can schedule the automatic check using the speaker. For this, switch on the **System Check** parameter in the **Sp. Check Sched.** screen and select time and days of the week when checking will be performed.

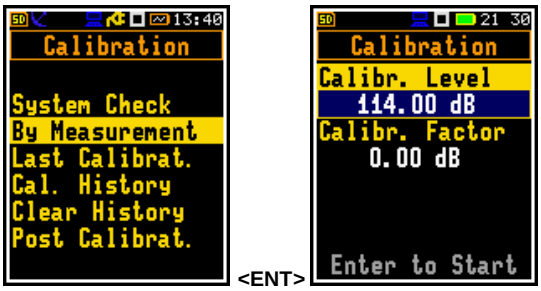


Note: *In case of any* ***Failed*** *check, you should perform calibration* ***By Measurement****.*

10.8.2.2 Calibration - By Measurement

To calibrate the instrument:

1. Set the calibration level (**Calibr. Level**) – see Appendix C, Chapter C.1, par. Calibration.
2. Attach the sound calibrator (SV 36 or equivalent 114 dB/1000 Hz) carefully over the microphone of the instrument.

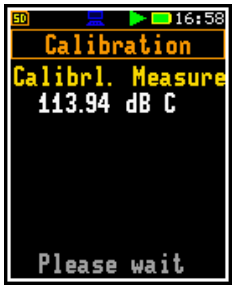


Note: *It is also possible to use different type of sound calibrator dedicated for ½" microphones. In any case, before starting the calibration measurement, you should set the level of the signal generated by the given calibrator (****Calibr. Level*** *position), which is stated in the calibrator's certificate considering free field microphone correction presented in Appendix C.*

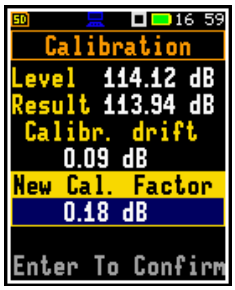
3. Switch on the calibrator (if the used calibrator doesn't have auto run function) and wait ca 30 seconds for the tone to stabilise before starting the calibration measurement.
4. Start the calibration measurement by pressing the **<Enter>** key.

The calibration delay time is set to 3 seconds. While waiting for the start of the measurements the **Delay** is counted down on the display.

During the calibration measurement, the level of the measured calibration signal is displayed. If the maximal difference between three 1-second consecutive results (LCeq) is less than **0.05dB**, the calibration measurement will be stopped, and the calibration factor will be calculated. The measurement can be always stopped by the **<Start/Stop>** key.



After calibration measurement stop, **Calibration drift** (difference between the previous and new calibration factor) and **New Calibration Factor** (difference between Calibration Level and Calibration Measurement) is calculated in dB.



It is recommended to repeat calibration measurements few times. Obtained results should be almost the same (with ±0.1 dB difference). Reasons for unstable results are as follows:

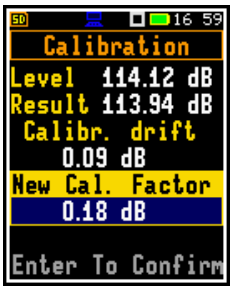
- calibrator is not properly attached to the instrument,
- there are external acoustic disturbances such as high noise levels nearby,
- calibrator or measurement channel (the microphone, the preamplifier or the instrument itself) are damaged.

Note: *During the calibration measurement, external disturbances (acoustic noise or vibrations) should not exceed a value of 100 dB (when using a calibrator that generates 114 dB).*

5. Press **<Enter>** to accept and save the new calibration factor.

   If calculated calibration factor is out of ±3 dB range the special warning appears on the screen “Microphone outside the tolerance. Accept?”.

   To quit the calibration procedure without saving the calibration factor, press **<ESC>**.



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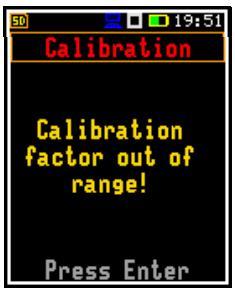
6. Detach the calibrator from the microphone.

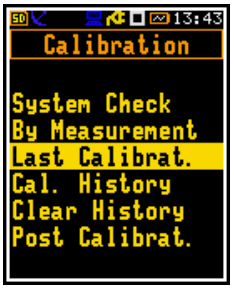
Note: *If the calculated calibration factor is out of the ±20 dB range with respect to the factory calibration factor the special warning appears on the screen “Calibration factor out of range!”. In such case the calculated calibration factor will not be accepted.*



Note: *The current calibration factor is always recorded to the header of the file with measurement results.*

10.8.2.3 Checking last calibration - Last Calibration

The **Last Calibrat.** screen displays the last calibration record: date and time of the calibration, type of calibration (factory or by measurement), calibration factor and calibration level.



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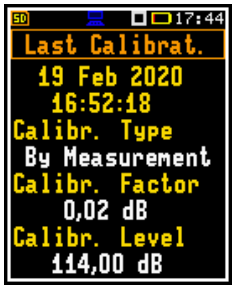
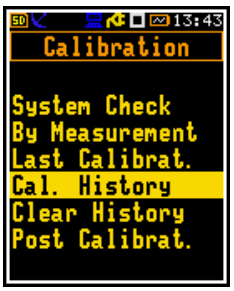


10.8.2.4 History of performed calibrations – Calibration History

The **Cal. History** screen displays records of performed calibrations.



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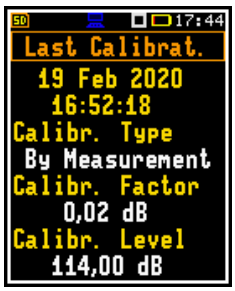
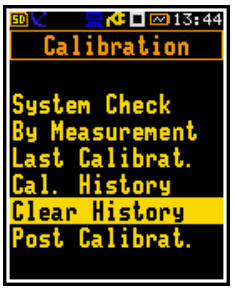
To review the calibration records, select the required line in the **Cal. History** screen and press **<Enter>**.

The calibration record screen contains the information regarding date and time of the calibration, type of calibration and calibration factor.



10.8.2.5 Erasing calibration records – Clear History

Open the **Clear History** position to erase the calibration records.



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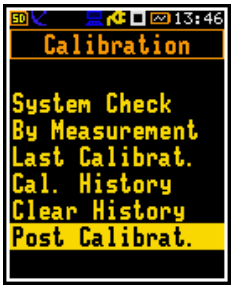
10.8.2.6 Post measurement calibration – Post Calibration

Some regulations require to add information about calibration performed after measurements to the files with measurement results created before such calibration. The latest calibration factor is for information purpose only since it was not considered during the measurement. The **Post Calibration** screen allows three options: not to save (**Off**), save in the last created file (**Last File**) or save in the files which were created after the previous calibration (**After LastCal.**).



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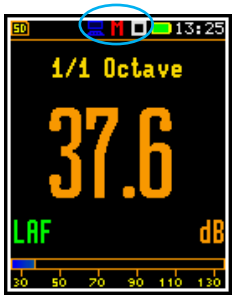
10.8.2.7 Microphone service mode

When the instrument is turned on it automatically compares the signal from three MEMS microphones, performs so called *Live check*, every minute.

If the instrument detects one of three MEMS microphones malfunction it triggers the “Microphone service mode” which is indicated by the blinking “**M**” icon. It means that one of three microphones is out of order and the results are obtained from the other two microphones.



If you would like to perform the Dynamic check, instead of the **Dynamic check** screen the instrument displays **Warning** about the active Microphone service mode.

In such situation it is required to perform **Calibration check**.

If **Calibration Drift** is acceptable the measurement results measured in the Microphone service mode are correct.

The **Speaker & check** command performs checking of all MEMS microphones with the use of the build-in speaker and therefore in the Microphone service mode it usually gives negative result.

If as a result of the check the microphones are functioning properly, the instrument automatically switches off the service mode.

If you would like to perform calibration of your instrument in the Microphone service mode, you should switch it off.

If the calibration was unsuccessful, the instrument gives the warning that the microphone is failed.

In this case you should change the microphone or contact the SVANTEK service.

If the calibration was successful, the instrument automatically switches off the service mode.

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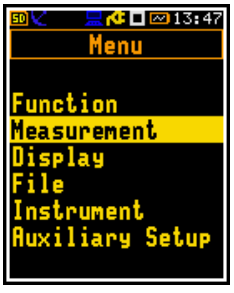
10.9 CONFIGURING MEASUREMENT PARAMETERS – MEASUREMENT

The **Measurement** section combines elements related to measurement parameters configuration. To open the **Measurement** section, press the **<Menu>** key, select the **Measurement** position and press **<Enter>**.



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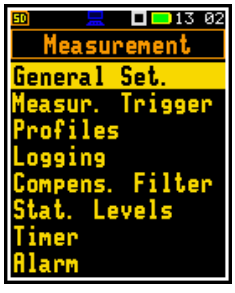
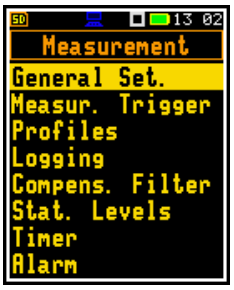


The **Measurement** section contains following positions:

General Set.	allowing to set general measurement parameters;
Measur. Trigger	allowing to configure the measurement trigger;
Profiles	allowing to set parameters specific for the profile;
Logging	allowing to configure the logging function;
Spectrum	allowing to set spectrum parameters. This position becomes available only in **1/1 Octave** and **1/3 Octave** modes;
Compens. Filter	allowing to switch required compensation filter;
Stat. Levels	allowing to define 10 statistical levels;
Timer	allowing to programme the internal timer;
Alarm	allowing to configure instrument's alarms.

10.9.1 Setting main measurement parameters – General Settings

The **General Set.** list allows you to programme general measurement parameters: delay of the measurement start (**Start Delay**), synchronisation of the measurement start with the instrument's RTC (**Start Synchr.**), integration period/measurement run time (**Integr. Period**), repetition of measurement cycles (**Rep. Cycles**), duration of day periods (**Day Time Limits**) and LEQ detector type (**Leq Integration**).



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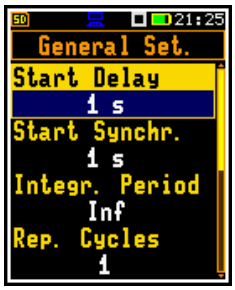
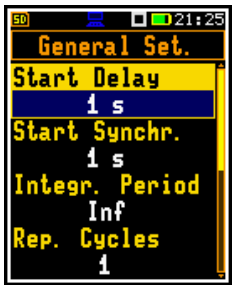


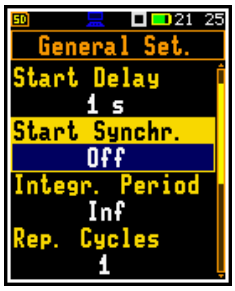
Measurement start delay

The **Start Delay** parameter defines the delay period from the **<Start/Stop>** keystroke to the real start of the measurement (digital filters of the instrument constantly analyse the input signal even when the measurements are stopped). This delay period can be set from 0 second to 60 minutes. Default delay: **1 s**.



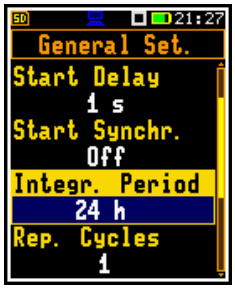
Measurement start synchronisation

The **Start Synchr.** parameter defines synchronisation points with the instrument's RTC. The **Start Synchr.** parameter can be set as: **Off**, **1 m**, **15 m**, **30 m** and **1 h**. For example, if **1 h** is selected, the measurement will start from the beginning of the first second of next hour after pressing the **<Start/Stop>** key, and then will be repeated also from the first second of the following hour after elapsing the integration period if the number of cycles is greater than one. Default value: **Off**.



Integration period

The **Integr. Period** parameter defines the period during which the signal is being measured (and for some results averaged/integrated) and measurement results are logged in a logger file as a **Summary Results** (see description of the **Logger Setup**). The integration period can be infinite (**Inf**) or selected from the set: **24 h**, **8 h**, **1 h**, **15 m**, **5 m**, **1 m**, from **1 s** to **59 s** with 1s step, from **1 m** to **59 m** with 1m step, from **1 h** to **24 h** with 1h step. Default value: **1 h**.



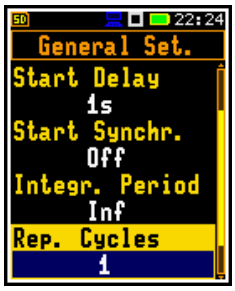
During the integration period, the instrument performs a series of 1-second measurements, averaging 1-second results with results averaged over n-1 seconds. The averaged results are updated and displayed on the display

every second for the elapsed measurement time (n seconds). At the end of the integration period, the averaged measurement results are stored in a logger file, provided that such storage is enabled.

The measurement will stop automatically after this period and start again if the number of measurement repetitions (**Rep. Cycles**) is greater than one.

The definitions of the measurement results in which the integration period is used are given in Appendix D.

Number of measurement repetitions

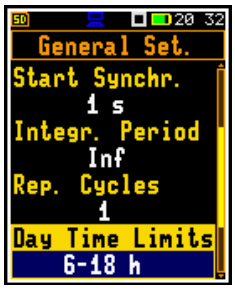


The **Rep. Cycles** parameter defines the number of measurements (with the measurement period defined in the **Integr. Per**) to be performed by the instrument after the **<Start/Stop>** keystroke. The **Rep. Cycles** number values are within the limits [Inf, 1÷1000]. Default value: **Inf**.

For example, if **Integr. Period** is equal to 8 hours and **Rep. Cycles** is equal to 2, the instrument performs first integration for the 8-hour period from the measurement start and second integration for the 8-hour period from the end of the first integration. At the end of each cycle the 8 hours LEQ will be saved in a logger file.

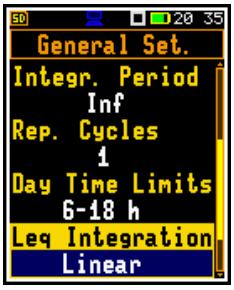
Note: *In case of the infinite integration period or the infinite repetition cycles the measurement should be stopped manually with the* ***<Start/Stop>*** *key*.

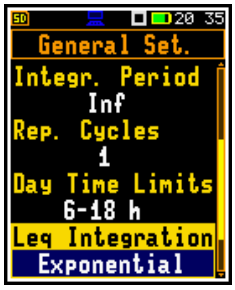
Day time limits



The **Day Time Limits** parameter defines the day and night time limits required by the local regulations. These limits are used for the calculation of the **Lden** function (see Appendix D for definition). Two options are available: **6-18 h** and **7-19 h**. Default option: **6-18 h**.

Detector type





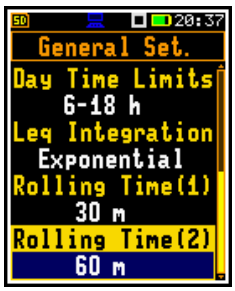
The **LEQ Integration** parameter defines the detector type for calculation of the **Leq**, **Lden**, **LEPd** and **Ln** results. Two options are available: **Exponential** and **Linear**. The formulae used for the **Leq** calculation are given in Appendix D. Default detector: **Linear**.

Linear is required for obtaining the true RMS value of the measured signal. When this option is selected values of the **Leq**, **Lden**, **LEPd** and **Ln** results do not depend on the detector time constant (results are displayed without indication of detectors selected in profiles). In this case, the indicator **Lin.** (or **L**) is displayed in different modes of the result presentation.

Exponential enables fulfilling the requirements of some standards for time averaged **Leq** measurements. When this option is selected the value of the **Leq, Lden, LEPd** and **Ln** results depend on the detector time constant (**Fast**, **Slow** or **Impulse**). Results are displayed with the indicator of the detector type selected in the profiles (*path: <Menu> / Measurement / Profiles*).

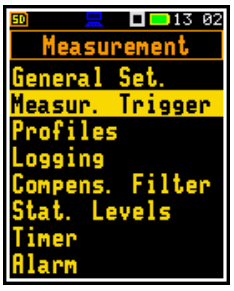
Rolling Leq

In the two **Rolling Time** positions, you can define integration periods for calculating the **LR(1)** and **LR(2)** results (see Appendix D). Default values respectively: **30 m** and **60 m**.



10.9.2 Setting measurement trigger – Measurement Trigger

The **Measur. Trigger** position enables setting parameters of the measurement trigger. The **Measur. Trigger** is a contexts list of parameters in which the trigger (**Trigger**) can be switched **Off** or can be switched on by selecting the trigger type (**Level +**, **Level –** or **Gradient +**). In case the trigger is on, additional parameters can be defined: the measurement result that is checked for a trigger condition (**Source**), trigger threshold level (**Level**) and the speed of the Source value changing (**Gradient**). Default mode: **Off**.



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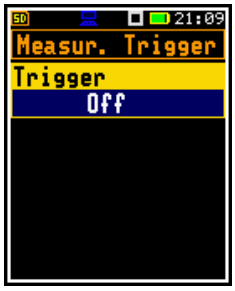
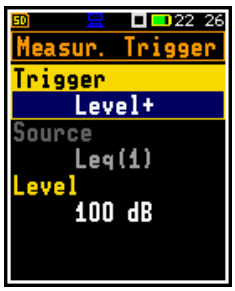


The measurement trigger condition is checked every 0.5 milliseconds.

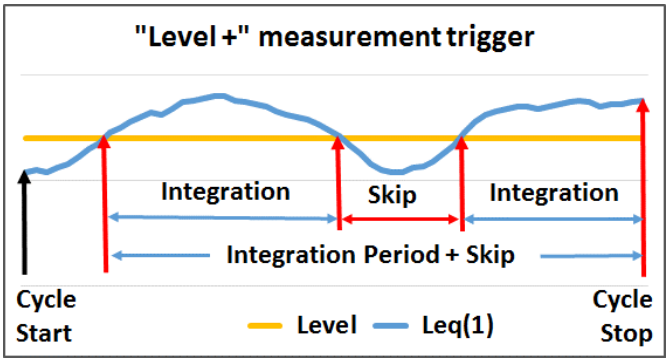
Level trigger

The **Level +** trigger starts the 1-second measurement/integration under the condition: value of the RMS result (**Source**) integrated by 0.5 ms is greater than the threshold (**Level**). In other cases, the instrument continues checking the trigger condition every 0.5 ms.



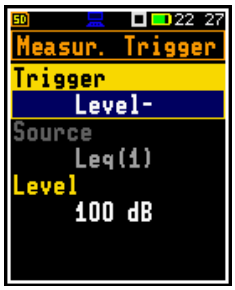
When the new measurement cycle begins (after pressing the **<Start/Stop>** key or automatically after stop of the previous measurement cycle) the instrument checks the trigger condition every 0.5 ms and starts 1-second integration if condition is met.

After 1-second integration, the instrument repeats trigger condition checking every 0.5 ms and starts next 1-second integration if condition is met. The instrument does it as many times as many seconds are within the Integration Period and stops the measurement cycle. Therefore, the series of 1-second measurements may not be continuous, and the duration of the measurement cycle may be longer than the Integration Period.



The measurement can be stopped manually at any moment with the **<Start/Stop>** key. Summary Results are calculated on the base of series of 1-second results measured during each measurement cycle and saved in a logger file.

The **Level -** trigger starts the 1-second measurement/integration under the condition: value of the RMS result (**Source**) integrated during 0.5 ms is lower than the threshold value (**Level**). In other cases, the instrument continues checking the trigger condition every 0.5 mc.

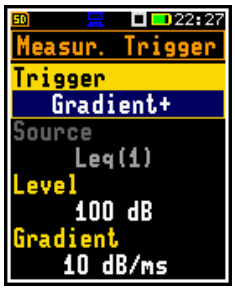


This is a mirrored trigger to the **Level +** trigger.

Note: *When a measurement is waiting for the level trigger, the flashing "level" icon superimposes on the „measurement" icon.*

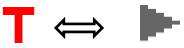
Gradient trigger

The **Gradient +** trigger starts the 1-second measurement/integration under the condition: value of the RMS result (**Source**) integrated during 0,5 ms is greater than the threshold (**Level**) and the gradient of the Source value is greater than the gradient threshold (**Gradient**). In other cases, the instrument continues checking the trigger condition every 0.5 mc.



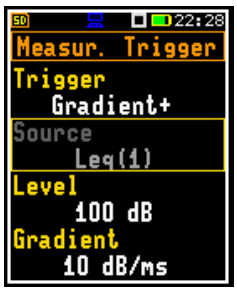
This type of trigger has the same logic as the **Level +** trigger, but the trigger condition requires also gradient level to be exceeded.

Note: *When a measurement is waiting for the gradient trigger, the flashing "trigger" icon superimposes on the „measurement" icon.*



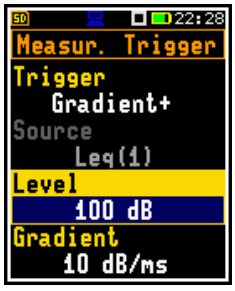
Source result

Only one measured result (**Source**) can be used for checking trigger condition in the **Level Meter** mode, namely the instantaneous LEQ from the first profile (with appropriate filter and detector), which is denoted here as **Leq(1)**. This position cannot be changed.



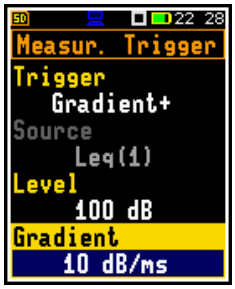
Threshold level

The threshold (**Level**) can be set in the range from **24 dB** to **136 dB**. The **Source** value compares with the **Level** value every 0.5 milliseconds.

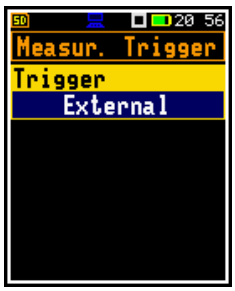


Speed of Source value changing

This position appears when the **Gradient+** trigger is chosen. The speed of the **Source** value changing (**Gradient**) can be set in the range from **1 dB/ms** to **100 dB/ms**.



External trigger

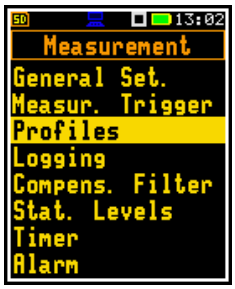


The **External** trigger starts the measurement/averaging when the trigger signal appears on the I/O socket of the instrument. After the measurement/ integration start from the trigger, the measurement/averaging will continue for additional **Integration Period**.

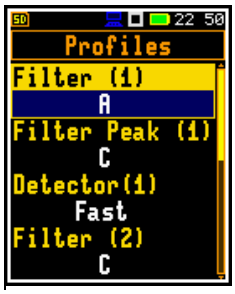
External trigger requires setting the **I/O Mode** as **Digital In** (*path: <Menu> / Instrument / Multifunction I/O*).

10.9.3 Setting parameters for profiles – Profiles

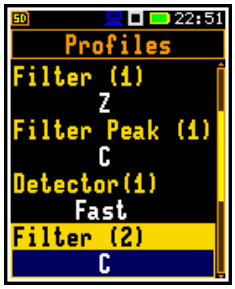
In the **Profiles** list following parameters can be programmed independently for each profile: weighting filters for other than peak results calculations (**Filter**), weighting filters for peak results calculations (**Filter Peak**) and LEQ detectors type (**Detector**).



<ENT>



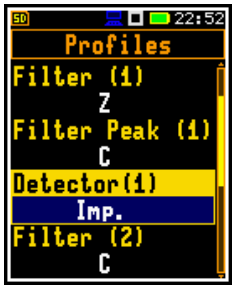
Weighting filters selection



Next weighting filters for both the **Filter** and **Filter Peak** positions can be selected:

- **Z** class 1 according to IEC 61672-1:2013,
- **A** class 1 according to IEC 651 and IEC 61672-1:2013,
- **C** class 1 according to IEC 651 and IEC 61672-1:2013,
- **B** class 1 according to IEC 651,
- **LF** low frequency filter according to China requirements.

LEQ detector selection



Following LEQ detectors (time constants) are available: **Impulse**, **Fast** and **Slow**.

Time constants are applied always to the **Lmax**, **Lmin**, **L**(SPL), **Ltm3** and **LTeq** results and to the **Leq**, **LE**(SEL), **LEPd** and **Lden** results if the **Exponential** LEQ detector was selected in the **General Settings** list (see Appendix D).

10.9.4 Configuring data logging – Logging

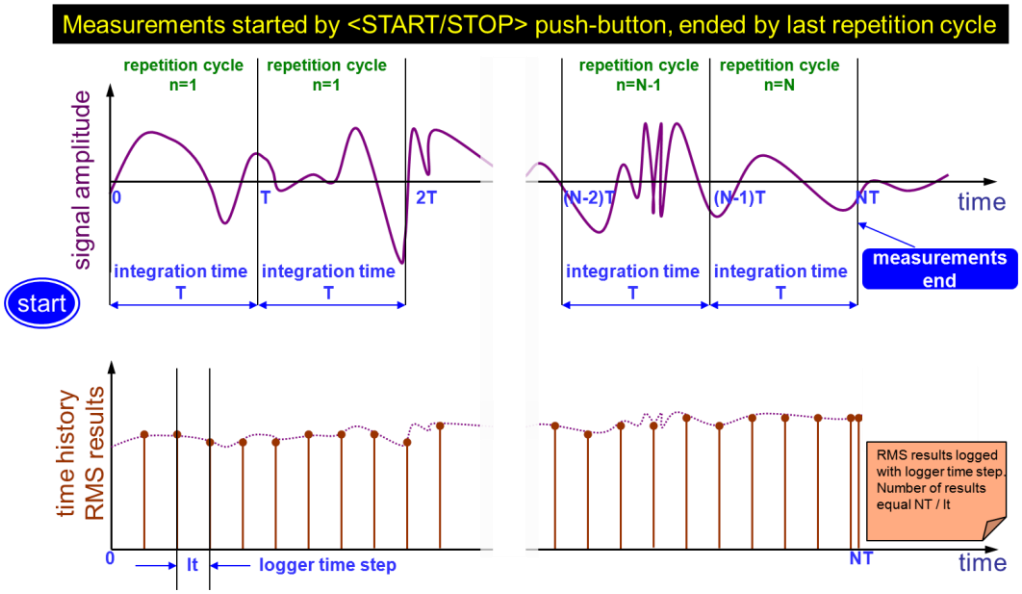
Summary Results (**L** (SPL), **Leq**, **LE** (SEL), **Lden**, **LEPd**, **Ltm3**, **LTeq**, **Ln**, **OVL**, **Lpeak**, **Lmax**, **Lmin**, **LR**, **EX**, **SD**, **NC**, **NR** and meteo or dust results and spectra) are measured and registered in the file with the step defined by the **Integration Period** parameter as many times as defined by the **Repetition Cycles** parameter (*path: <Menu> / Measurement / General Settings*).

The **instrument** enables also additional registration of some results with different step defined by the **Logger Step** parameter (*path: <Menu> / Measurement / Logging / Logger Setup*). Therefore, it is possible to save in parallel two sequences of measured results – one for Summary Results (SR) and another for so called Logger Results or Time History results (TH).

When **Logger** is switched on, selected logger results taken from three independent profiles will be saved simultaneously with time step down to **100 ms**. The recording of logger results to a file is stopped after the period, which is equal to **Integration Period** multiplied by **Repetition Cycles** or after stopping the measurement manually.

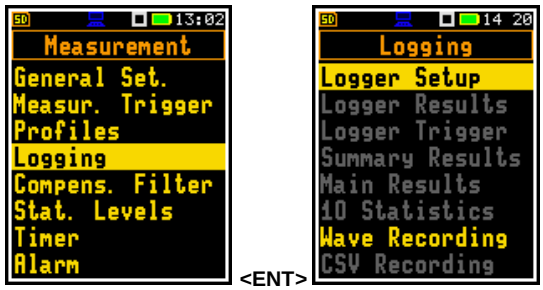
Summary Results are saved in the same file with Logger Results. Blocks of summary results are recorded to the file in the end of every measurement cycle.

The figure below illustrates described principles of saving measurement results.



Summary Results and Logger Results saving

The **Logging** list enables programming of the logging functions: summary and logger results recording in a logger file, audio signal recording in a WAV file and Summary Results recording in the CSV format. The **Logging** list includes positions: **Logger Setup**, **Logger Results**, **Logger Trigger**, **Summary Results**, **Main Results**, **10 Statistics**, **Wave Recording** and **CSV Recording**.

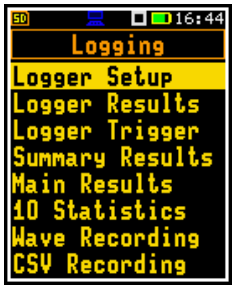


10.9.4.1 Setting general logging parameters – Logger Setup

The **Logger Setup** list enables activating the logging functionality (**Logger**), programming splitting of logger files (**Logger Splitting**), setting the step of data logging (**Logger Step**), editing the name of the logger file (**Logger Name**) and switching on/off the logging of summary results (**Summary Results**).

The **Logger** position switches **On** or **Off** the logging functionality.

Switching on the **Logger** (**On**) activates other positions in the **Logging** list.



Note: *If* ***Logger*** *is* ***Off****, logger files are not created, logger results are not measured, and summary results are not saved!*

Note: *The* ***Wave Recording*** *function doesn't depend on the* ***Logger*** *status. Wave files have different format and are created when* ***Wave Recording*** *is switched on – see Chapter 10.9.4.7.*

Splitting logger file

The **Logger Splitting** position enables splitting the logger data registration into separate files. If the **Logger Splitting** parameter is **Off** the registration of measurement results will be continuously made in one logger file with the name defined in the **Logger Name** position.

In other cases, the registration will be made in separate files and the registration in a new file will start after integration period time (**Integr. Period**), or at every quarter of the RTC (**Sync. to 15min.**), or at every half an hour of the RTC (**Sync. to 30min.**), or at every hour of the RTC (**Sync. to 1h**), or at specified by the user times (**Specified Time**). Whenever the split time is achieved the logger file is closed and the new file with the increased by one number is opened for subsequent measurement data.

If **Specified Time** is selected in the **Logger Splitting** position, you can set six split times (**Split. Time 1**, **Split. Time 2**, **Split. Time 3**, **Split. Time 4**, **Split. Time 5** and **Split. Time 6**) changing **Off** to the desired time of the day when splitting should occur.

The **Logger Step** defines the step for logger results recording in a file. It can be set from **100ms** to **1h**. Its value by default is set to **1s**.

Logger file name

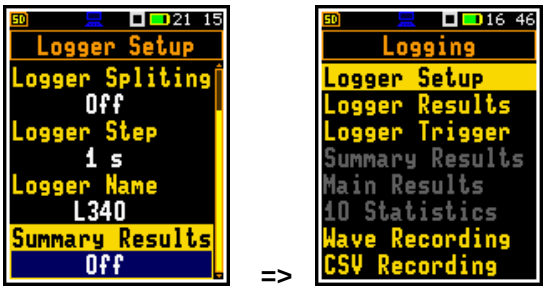
The **Logger Name** position enables defining the logger file name, which consists of a prefix and a number. The default logger file prefix is **L**. The name can be up to eight characters long. After pressing the ◄ / ► key, the special screen with the text editor is opened.

The edited name is accepted and saved after pressing the **<Enter>** key. The special warning is displayed in the case the file with the same name already exists in the memory “Incorrect File Name”.

If the new name is accepted the instrument shows it the **Logger Name** position.

Summary Results saving

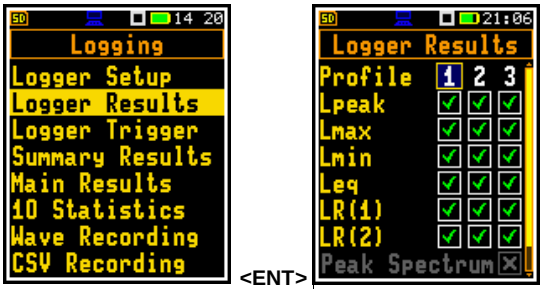
The **Summary Results** parameter switches on or off saving the full set of Summary results that the instrument measures with the **Integration Period** step: main results (L, Leq, LE, Lden, LEPd, Ltm3, LTeq, Ln, OVL, Lpeak, Lmax, Lmin, LR, EX, SD, NC, NR), meteo results, statistics and spectra.



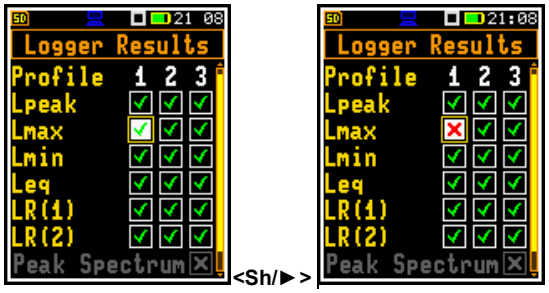
10.9.4.2 Selecting results for logging – Logger Results

In the **Logger Results** list you can select results for three independent profiles, which will be logged in the logger file during a measurement with the **Logger Step**.

For the **Level Meter** function, it is possible to log next results: **Lpeak**, **Lmax**, **Lmin**, **Leq**, **LR(1)** and **LR(2)**. For the **1/1 Octave** and **1/3 Octave** measurement functions, also spectra can be logged.

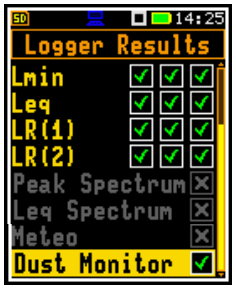


Activation/deactivation of the selected position can be done with the ◄ / ► key pressed together with **<Shift>**. The position is selected with the ◄ / ► or ▲ / ▼ key.



If the SP 276 weather station or ES-642 dust monitor is connected to SV 307, you can also log meteorological or dust results to the logger file with the **Logger Step**.

To enable logging, switch on the **Meteo** or **Dust Monitor** position.

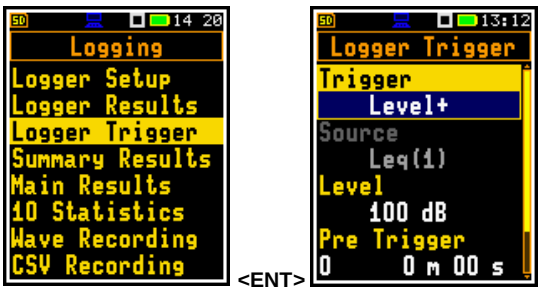


Note: *The **Meteo** or **Dust Monitor** position is active only if the appropriate peripheral device is set in the **Serial Interface** screen (path: <Menu> / Instrument / Serial Interf.) – see Chapter 10.12.9.*

Note: *When **Logger** is switched **Off** or no results for logging were selected, the logger plot cannot be activated in **Display Modes** and therefore doesn't appear on the display.*

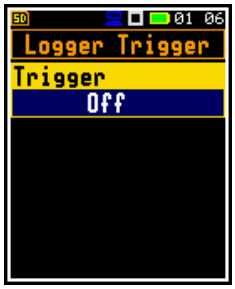
10.9.4.3 Logger trigger settings – Logger Trigger

The **Logger Trigger** parameters define the way the logger results are to be registered in the logger file. It is a context list of parameters in which the trigger can be switched **Off** or On by selecting its type in the **Trigger** position. If it is On, other parameters can be defined: measured result that will be checked for a trigger condition (**Source**), threshold (**Level**) as well as number of results saved in the logger before the trigger condition is met (**Pre Trigger**) and number of results saved in the logger after the last trigger is met during logging (**Post Trigger**).



Trigger disabling

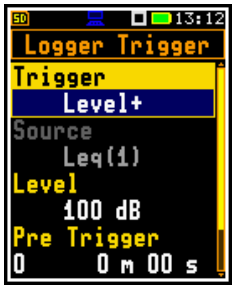
The logger trigger (**Trigger**) can be switched off with the ◄ key. The trigger is switched on if the **Level +** or **Level –** mode is selected with the ► key. Default mode: **Off**.



Level trigger

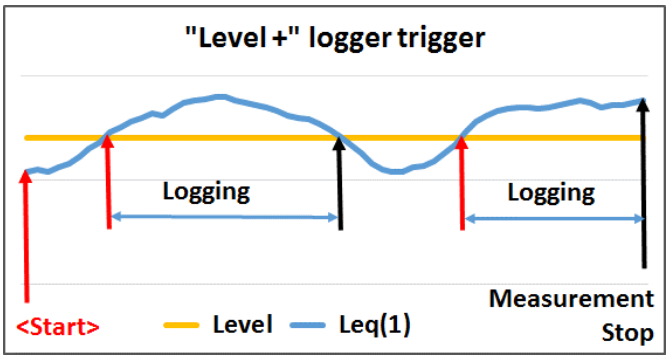
The **Level +/Level -** trigger enables logging time-history results (**Logger Results**) with the **Logger Step** under the condition: the value of the LEQ result (**Source**) measured by the **Logger Step** period is greater/lower than the threshold (**Level**). In other cases, the logging is skipped.

Due to this type of trigger it is possible to separate results related to the low/high noise level.



The logging can be performed only when the summary results are measured, i.e. from the measurement start till the measurement stop.

This means, for example, that when the measurement is waiting for a trigger condition, logging is skipped, even if the logger trigger condition is met.



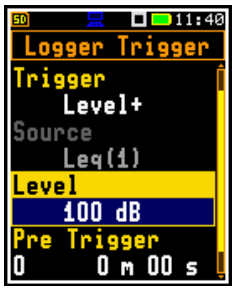
***Note:** When logging is waiting for the level trigger the "level" icon appears alternatively with the „logging" icon.*

Source result

Only one measured result (**Source**) can be used for checking trigger condition in the **Level Meter** mode, namely the instantaneous LEQ from the first profile (with appropriate filter and detector), which is denoted here as **Leq(1)**. This position cannot be changed.

Threshold level

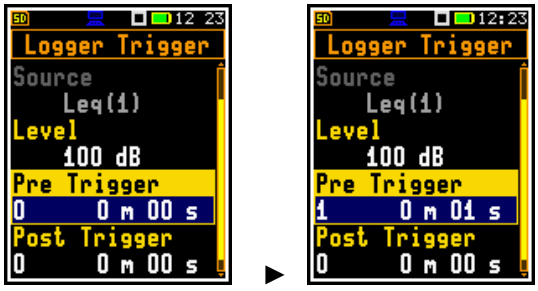
The threshold (**Level**) can be set in the range from **24 dB** to **136 dB**. The **Source** value compares with the **Level** value every 0.5 milliseconds.



Pre and post trigger logging

In the **Pre Trigger** position, you can define the number of results which will be registered in the logger file before the fulfilment of the triggering condition. This number is limited to 0..10.

In the **Post Trigger** position, you can define the number of results which will be registered in the logger file after the fulfilment of the triggering condition. This number is limited to 0..200.



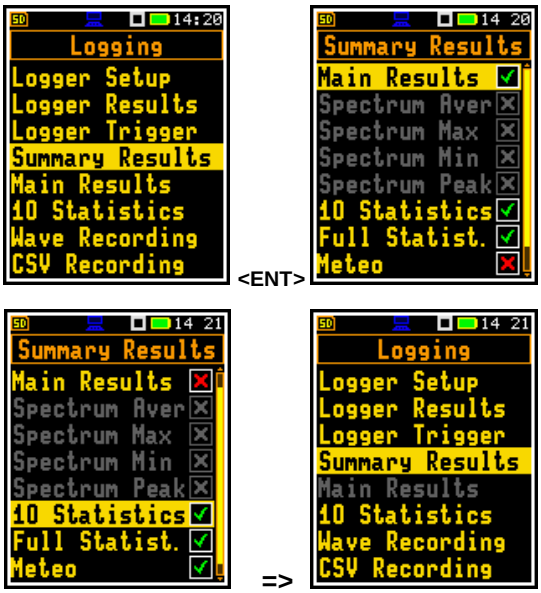
These parameters can perform double role. Firstly, when you wish to collect data right after or before the event that caused logger trigger. Secondly, when it is necessary to have continuous logging, but the source is oscillating near the threshold level. The extension of the registration window allows you to avoid the effect of pulsation.

Periods of logging before or after fulfilment of the trigger condition are shown to the right of the number in minutes and seconds (in the format **0 m 00 s**) as a result of multiplication of number of results by the **Logger Step**.

10.9.4.4 Saving summary results – Summary Results

The **Summary Results** list allows you to activate saving in the logger file **Main Results** (**Lpeak**, **LE**, **Lmax**, **Lmin**, **L**, **Leq**, **Lden**, **Ltm3**, **LTeq**, **LR(1)**, **LR(2)**, **OVL**, **NR** and **NC**), **10 Statistics**, **Full Statistics**, results obtained from the weather station (**Meteo**) and/or dust monitor (**Dust Monitor**) for the **Level Meter** function and additionally averaged, maximum, minimum and peak spectra (**Spectrum Aver**, **Spectrum Max**, **Spectrum Min** and **Spectrum Peak**) for the **1/1 Octave** and **1/3 Octave** functions.

Unchecking **Main Results** and **10 Statistics** cause deactivations of the same positions in the **Logging** list.

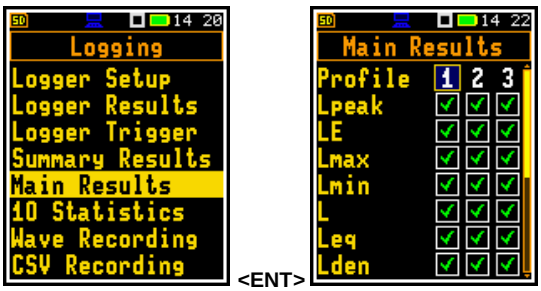


Note: *The **Meteo** or **Dust Monitor** position is active only if the appropriate peripheral device is set in the **Serial Interface** screen (path: <Menu> / Instrument / Serial Interf.) – see Chapter 10.12.9.*

10.9.4.5 Saving main results – Main Results

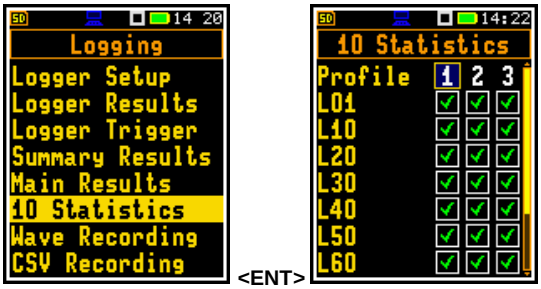
The **Main Results** list allows you to activate saving in the logger file next results for three profiles: **Lpeak**, **LE**, **Lmax**, **Lmin**, **L**, **Leq**, **Lden**, **Ltm3**, **LTeq**, **LR(1)**, **LR(2)**, **EX**, **SD**, **OVL**, **NR** and **NC** measured with the **Integration Period** step.

When the result is unchecked, it is still calculated by the instrument and can be displayed but will not be saved in the logger file.



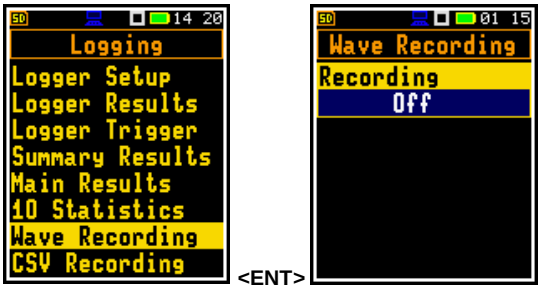
10.9.4.6 Saving 10 statistical results – 10 Statistics

The **10 Statistics** list allows you to activate saving in the logger file 10 statistical results defined for three profiles in the **Stat. Levels** list (*path: <Menu> / Measurement / Stat. Levels*) with the **Integration Period** step.



10.9.4.7 Configuring signal recording – Wave Recording

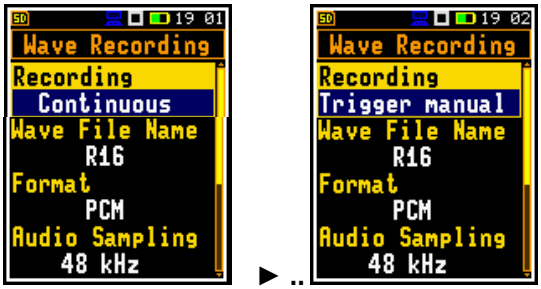
The **Wave Recording** position enables activating and configuring a waveform signal recording in the WAV type file. Default mode: **Off**.



***Note:** The **Wave Recording** function is optional and should be unlocked by entering the activation code in the text editor screen, which is opened at the first attempt to switch this function on. Once unlocked this function will be ready to use permanently.*

Wave recording trigger

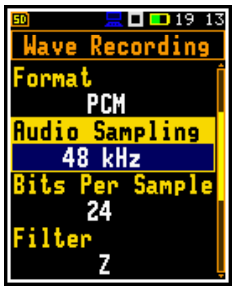
The **Recording** position, if it is not switched off (**Off**), sets the type of trigger for a signal recording: from start and throughout the measurement time (**Continuous**), manual start with the use of the command #7,EW (**Trigger Manual** – see Appendix A), from the trigger of the **Slope**, **Level** or **Gradient** type, from the start of measurement with a given recording interval (**Integr. Period**), from an external signal applied to the I/O connector (**External**) or when an alarm condition occurs (**Alarm**).



The **Wave File Name** position enables editing the name of the WAV file.

***Note:** You cannot set the **Alarm** type manually. The **Recording** position is set automatically to **Alarm** if **Wave Recording** will be activated for any of 10 events (path: <Menu> / Measurement / Alarm) – see Chapter 10.9.9.*

The **Format** parameter defines a type of the VAW files format: **PCM**, **Extensible** or **Compress. A-law**.



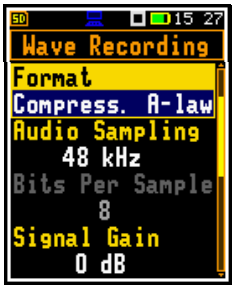
The PCM and Extensible formats have different headers. The A-law format uses data compression.

The **Audio Sampling** parameter defines the sampling frequency of wave recording: **48 kHz**, **24 kHz**, **12 kHz** or **6 kHz** in case 16 bits per sample.

The **Bits Per Sample** parameter defines the number of bits recorded per sample: **16** or **24**.

When 16 bits per sample is selected, the **Signal Gain** position appears in the list. This parameter defines the gain of the recorded signal: **0dB** … **40dB**.

Note: *In case of the* ***Compress. A-law*** *format Bits per Sample always is 8. This format can be used for listening of the audio signal, but not for sound measuring purposes.*



The **Filter** parameter defines the broadband frequency filter used during wave recording: **Z**, **A**, **C** or **B**.

In case of the **Continuous** mode, you can limit the length of the signal recording by selecting the duration in the **Length Limit** position.

If the wave recording on trigger is selected, next positions appear on the **Wave Recording** list:

- **Trigger Period** (for trigger type: **Slope+**, **Slope-**, **Level+**, **Level-**),
- **Source** and **Level** (for trigger type: **Slope+**, **Slope-**, **Level+**, **Level-**, **Gradient+**),
- **Gradient** (for trigger type: **Gradient+**),
- **Pre Trigger** and **Recording Time** (for all trigger types).

Trigger Period

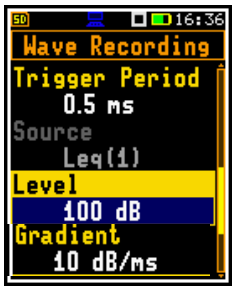
The **Trigger Period** parameter defines the time interval of checking the triggering conditions. This parameter can be set as: **Logger Step**, **0.5 ms**, **100 ms** and **1 s**.

Source result

Only one measured result (**Source**) can be used for checking trigger condition in the **Level Meter** mode, namely the instantaneous LEQ from the first profile (with appropriate filter and detector), which is denoted here as **Leq(1)**.

Threshold level

The threshold (**Level**) can be set in the range from 24 dB to 136 dB. The **Source** value compares with the **Level** value every 0.5 milliseconds.



Speed of source value changing

Speed of triggering signal changing (**Gradient**) can be set in the range from **1 dB/ms** to **100 dB/ms**.

Recording before trigger

When **Pre Trigger** is value is other than **Off** the wave signal starts to be recorded before the first trigger. You can select the period of such recording, but it is limited for the selected sample frequency and bits per sample. The maximum pre-trigger periods are:

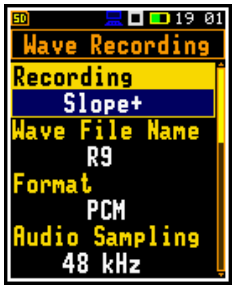
- for 24 bits per sample: 5 s for 48 kHz, 10 s for 24 kHz and 15 s for 12 kHz.
- for 16 bits per sample: 8 s for 48 kHz, 15 s for 24 kHz, 30 s for 12 kHz and 60 s for 6 kHz.

Time of signal recording

The **Recording Time** parameter defines the time of signal recording after triggering. If next trigger condition appears during the **Recording Time**, the signal will be recorded for additional **Recording Time**. The available values are from **1 s** to **8 h**, or **Inf**.

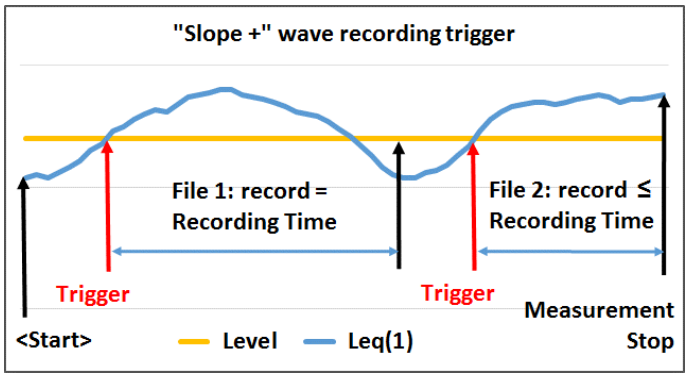
Slope trigger

The **Slope+** trigger starts a wave recording under the condition: rising value of the Leq result (**Source**) integrated by 0.5 ms passes above the threshold level (**Level**).



After pressing the **<Start>** key the instrument checks the trigger condition with steps, defined by the **Trigger Period** parameter, and if condition is met starts the wave recording. The recording lasts minimum **Recording Time**, and during this time the instrument continues to check the trigger condition with the **Trigger period** step. Provided that **Trigger Period** is shorter than **Recording Time,** if next trigger condition is met during **Recording Time** the instrument triggers recording again, so it will be continued from this moment by additional **Recording Time** and so on. If during next recording time there are no triggers, the recording will be stopped after the last trigger plus **Recording Time**. Assuming, that after first recording trigger conditions continue to be checked, new wave recording may start during the same measurement time.

The attached example shows that between measurement start and stop two records were created. The first record is equal to **Recording Time**, because during this period no second trigger condition has been met. During the second recording the measurement was stopped, and the record is shorter than **Recording Time**.



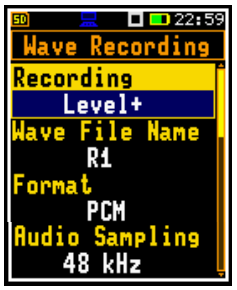
The **Slope -** trigger starts a wave recording under the condition: falling value of the RMS result (**Source**) integrated by 0.5 ms passes below the threshold level (**Level**).

This is a mirrored trigger to the **Slope +** trigger.

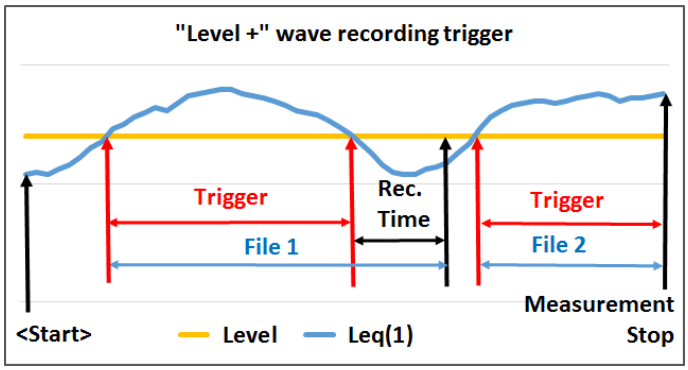
Note: *When a wave recording is waiting for the slope trigger the "slope" icon superimposes on the grey „wave" icon.*

Level trigger

The **Level +/Level -** trigger starts a wave recording which will last the **Recording Time** under the condition: the value of the Leq result (**Source**) integrated by 0.5 ms is greater/lower than the threshold (**Level**). In other cases, the recording doesn't start, but if it has been already started it can be continued until the **Recording Time** has elapsed.



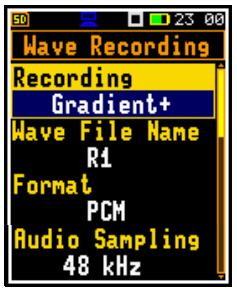
If during **Recording Time** a trigger condition appears, the recording will be prolonged for another **Recording Time** from the moment of that trigger condition and so on.



Note: *When the wave recording is waiting for the level trigger the "trigger" icon appears alternatively with the grey „wave" icon.*

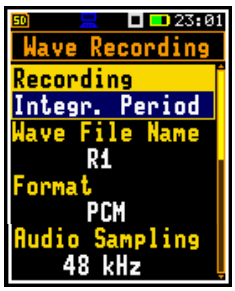
Gradient trigger

The **Gradient +** trigger starts a wave recording for the **Recording Time** under the condition: the value of the Leq result (**Source**) averaged by 0.5 ms is greater than the threshold (**Level**) and the speed of this Source result changing (gradient) is greater than the gradient threshold (**Gradient**). In other cases, the recording doesn't start, but if it has been already started it can be continued until **Recording Time** has elapsed. The instrument checks the trigger condition also during the recording and if the condition is met the recording will be prolonged for another **Recording Time**.



Integration period trigger

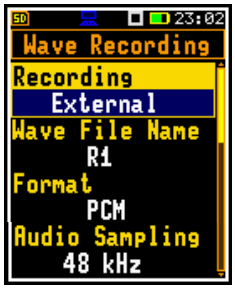
When the **Integr. Period** trigger is selected, the signal recording is triggering every time the measurement starts, and the recording will last minimum **Recording Time**. If the trigger condition appears during the recording (when **Integration Period** is shorter than **Recording Time**), from this moment, the recording will be continued for the next **Recording Time** and so on.



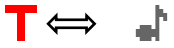
External trigger

The **External** trigger starts the recording when the trigger signal appears on the I/O socket of the instrument. After the recording start from the trigger, the recording will be continued for additional **Recording Time**.

External trigger requires setting the **I/O Mode** as **Digital In** (*path: <Menu> / Instrument / Multifunction I/O*).



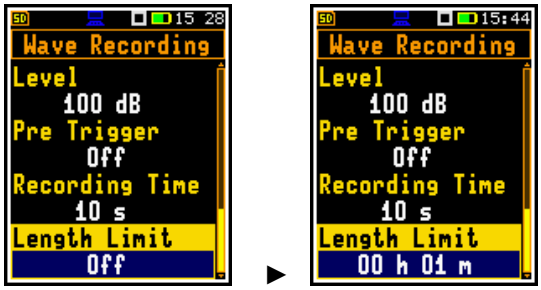
Note: *When a wave recording is waiting for the gradient, external or integration period trigger, the flashing "trigger" icon superimposes on the grey „wave" icon.*



Wave files size control

The **Length Limit** parameter defines maximum time during which the recording to one file is allowable. After this time the current file is closed but signal recording is continued into the new file. This limit can be switched off or defined as a time interval.

This parameter allows you to control the size of the wave record files which should be limited due to different reasons.

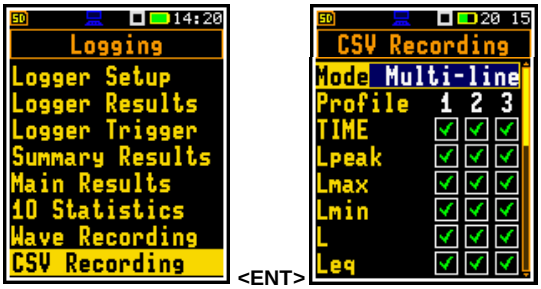


10.9.4.8 Summary Results recording in CSV format – CSV Recording

The **CSV Recording** position enables selecting Summary Results to be recorded in the CSV type file (*comma-separated values)*.

CSV files are created automatically provided that the logger is enabled. The name of the CSV file is identical to the associated logger file name, with the extension **.CSV**. These files are saved in the same directory as logger files.

There are two format options available: **Multi-line** or **Single-line**. The CSV file structure is presented in Appendix B.5.



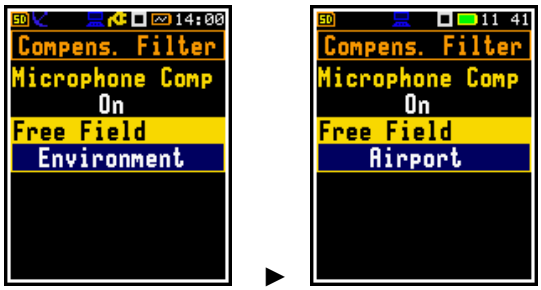
Note: *CSV files are created only when* ***Logger*** *is switched* ***On*** *(path: <Menu> / Measurement / Logging / Logger Setup).*

10.9.5 Switching on compensation filters – Compensation Filter

The **Compens. Filter** position enables to switch on or off compensation filters applied in the instrument.

The **Microphone Comp** filter (microphone inner noise compensation) is switched on by default, however it is possible to switch it off for electrical measurements (e.g. for laboratory calibration measurements).

Use **Environment** compensation when an acoustic signal is parallel to the microphone's grid, or **Airport** compensation when an acoustic signal is perpendicular to the microphone's grid. The characteristics of the compensation filters are given in Appendix C.



Note: *For the conformance of electrical tests, the* ***Microphone Compensation*** *must be set to* ***Off*** *(see Appendix C).*

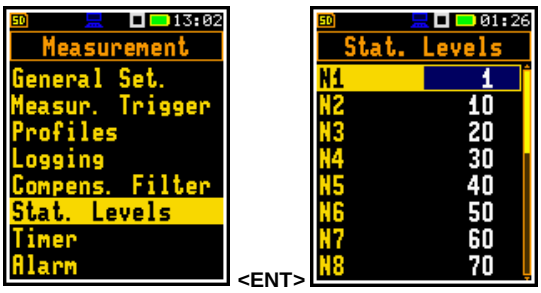
Note: *For the comparison coupler evaluation the* ***Microphone Compensation*** *must be set to* ***On*** *and the* ***Free Field*** *compensation must be set to* ***Off*** *(see Appendix C).*

Note: *For the free filed evaluation the* ***Microphone Compensation*** *must be set to* ***On*** *and the* ***Free Filed*** *compensation must be set to* ***Environment*** *or* ***Airport*** *(see Appendix C).*

10.9.6 Setting statistical levels – Statistical Levels

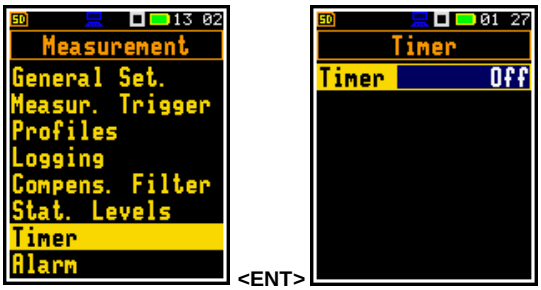
In the **Stat. Levels** list, you can define ten statistical levels, named from **N1** to **N10**, to be calculated, displayed and saved in the files together with Summary Results (see Appendix D).

Default statistical levels have following settings: **1**, **10**, **20**, **30**, **40**, **50**, **60**, **70**, **80** and **90**. All values should be within the integer range [1, 99]. Each value can be set independently from others.



10.9.7 Programming instrument's internal timer – Timer

The **Timer** function is used for programming the automatic measurement start (and turning the instrument on if it was turned off) at a given time and day of a week and automatic measurement stop and turning the instrument off. Measurement will be performed with the parameters set in the **Measurement** section with one exception (see below Note).



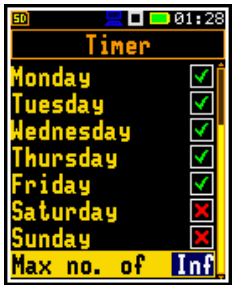
Note: *When* ***Timer*** *is* ***On****, measurements will be performed from defined* ***Start*** *to* ***Stop*** *times because the* ***Repetition Cycles*** *parameter will be changed to* ***Inf*** *(path: <Menu> / Measurement / General Set.). The last integration may be cut.*

Setting measurement's start and stop

The **Start (hh:mm)** and **Stop (hh:mm)** positions determines times of measurement's start and stop.

In the positions: **Monday**, **Tuesday**, …, **Sunday**; you can select days in a week when measurements should start.

The timer can be programmed for **Max no. of** days ahead (up to 100) or without limitation (**Inf**) and during these days, the instrument refers to the time of the **R**eal **T**ime **C**lock (**RTC**).



Note: *Make sure to check that the real-time clock settings are correct before using the timer.*

Note: *Make sure that there is sufficient internal batteries power and memory available for the instrument to carry out the required measurements when it wakes up.*

10.9.8 Example of timer performance

Let us assume that you wish to switch on the measurement on Monday at 8:00, to measure the noise level for 20 minutes and save results in the file with the name L58.

To do this, you should configure the **Timer** function as on the attached screen and to set the measurement parameters (*path: <Menu> / Measurement / General Settings*) and define the file name (*path: <Menu> / Measurement / Logging / Logger Setup*).

The instrument will start to warm up during 30 seconds before the measurement start time at 8:00 on the nearest Monday.

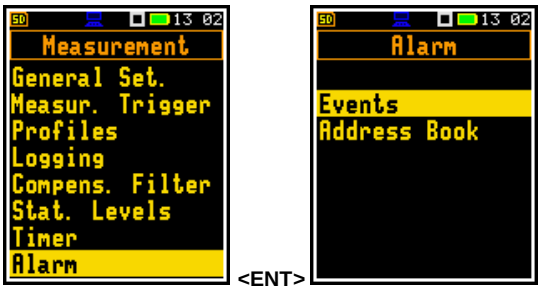
The measurement will be performed by a period of 20 minutes. Then, results will be saved in the file with the name L58 automatically. The instrument will turn off at 8:20 and will be waiting for the next Monday to start next measurement at 8.00. Next file will be automatically named L59 and so on.

Such cycle will be repeated so many times as is defined by **Max no. of** parameter. If more than one day in a week is selected, every performed measurement will increase the day-counter. The measurement cycle stops when the day-counter number is equal to **Max. no. of**. If **Inf** value is selected the measurement cycles can be stopped only by the user (of course, if the power is assured).

10.9.9 Configuring instrument's alarms – Alarm

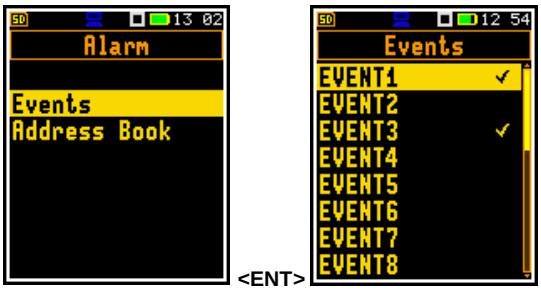
The **Alarm** position allows you to configure the instrument's alarms which may be sent as SMS and/or e-mail notification or via the EXT.I/O socket to the Alarm lamp or other device.

The **Alarm** screen consists of two positions: **Events** and **Address Book**.



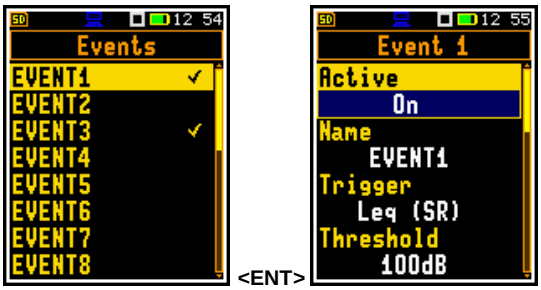
The **Events** position allows you to configure up to 10 events and define alarms, notification ways and recipients in case of event occurrence.

The **Events** screen presents a list of 10 events which may have their specific name and indicator whether the event is active (**On**) or not (**Off**).



You can configure the event and make it active or not active in the **Event x** screen which is opened by pressing **<Enter>**.

In the **Event x** screen, you can activate the event (**On** or **Off**) in the **Active** position, name the event in the **Name** position and configure trigger, alarms, notification ways and recipients.



Each event can be named for better identification.

To name the event press the ► key and in the text editor screen enter the name.

Using the **Trigger** position, you may define the source of the trigger (**Source**) and the step with which the trigger condition will be checked (**Step**). To edit this position, press the ► key and make selections in the **Trigger** screen.

Press **<Enter>** to confirm selection and return to the **Event x** screen.

As a **Source** you can select:

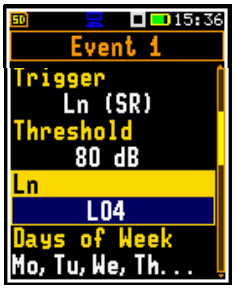
- **Leq**, **Lmax**, **Ln**, **LR(1)** or **LR(2)** from the first profile,
- superimposition of Leq and Noise ratio for 1/1 octaves with Z filter (**Leq+NR**),
- projected Leq (**LeqPR**) or projected Leq with pre-set background noise (**LeqPR+LN**),
- dust level (**Dust**) or
- system event (**System**).

If as a trigger source the **Leq**, **Lmax**, **LR(1)** or **LR(2)** result was selected, then as a trigger step you can select either integration period applied for the summary results (**SR**) defined in the **General Settings** screen (*path: <Menu> / Measurement / General Set.*), the logger step applied for the time-history results (**TH**) defined in the **Logger Setup** screen (*path: <Menu> / Measurement / Logging / Logger Setup*) or 1 second step (**1s**).

►

If as a trigger source the **Ln** result was selected, then as a trigger step only integration period for the summary results (**SR**) can be applied.

In the **Ln** position you can set the statistical level with the ◄ / ► key.



The selected result averaged with the time defined by the **Step** parameter will be compared with the threshold level, defined in the **Threshold** position.

If as a trigger source the **Leq+NR** option was selected, then the trigger step you can select only integration period applied for the summary results (**SR**) defined in the **General Settings** screen (*path: <Menu> / Measurement / General Set.*).

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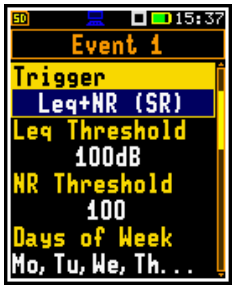

The **Leq+NR** trigger source option means that the trigger condition is a superimposition of two conditions:

- **Leq** is higher than the **Leq Threshold** level and
- Noise ratio (**NR**) calculated for 1/1 octaves with Z filter is higher than the **NR Threshold** level.

▼

The **LeqPR** trigger source option means that the trigger condition occurs when the predicted Leq will be higher than the **Leq Threshold** level.

LeqPR is calculated as $LeqPR = LAeq,T + 10log(T/T_0)$, where T is the current duration from the measurement start, T_0 - period between **Start** and **Stop** of the **Time** parameter. It assumes that from the moment the limit is exceeded to the end of the period under consideration, the fixed level that has been already reached will be maintained.

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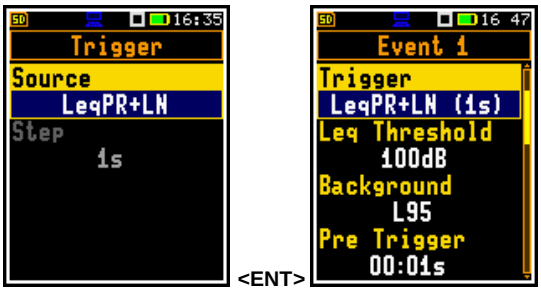
LeqPR+LN is calculated as *LeqPR = LAeq,t + LAeq,s + LAeq,LN (T_0-t-s)*, where s-time for the reaction, t-time from the beginning of the measurement to s, T_0 - period between **Start** and **Stop** of the **Time** parameter. It is assumed that from the moment the limit is exceeded to the end of the period under consideration, the average level of the pre-set background noise will be maintained.



In the case of the **LeqPR** or **LeqPR+NL** option, the trigger condition – the actual value of the result from the beginning of integration time - is checked with the step equal to 1 second.

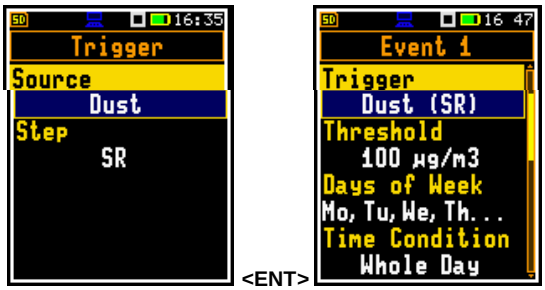
Also **Logger Splitting** (*path: <Menu> / Measurement / Logging / Logger Setup*) is set to **Alarm** meaning that logger splitting will be done at the beginning and end of the alarm period and **Integration Period** (*path: <Menu> / Measurement / General Set.*) is set to **Inf**.

The background noise is defined by the **Background** position as a statistical level **Ln**.

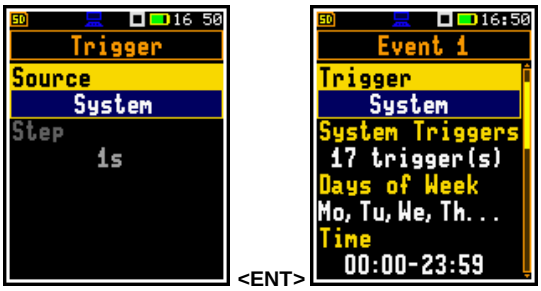
The additional **Pre Trigger** position allows you to define the ahead time of triggering the alarm.

The **Dust** result triggers an alarm based on the dust level from the dust meter. The alarm based on this result is available when the dust monitor is selected in the Serial Interface settings (see Chapter 10.12.9).

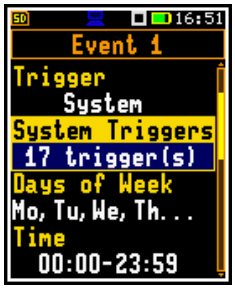
You can select as a trigger step either integration period applied for the summary results (**SR**) defined in the **General Settings** screen (*path: <Menu> / Measurement / General Set.*), the logger step applied for the time-history results (**TH**) defined in the **Logger Setup** screen (*path: <Menu> / Measurement / Logging / Logger Setup*) or 1 second step (**1s**).

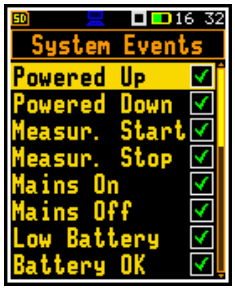


The **System** trigger source option means that the trigger condition occurs when the one of the system events will appear. The system trigger conditions are checked with 1 second step.



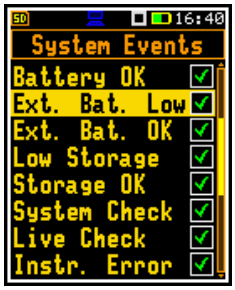
You can select the system events in the **System Events** screen , opened by the ► key pressed from the **System Triggers** position.



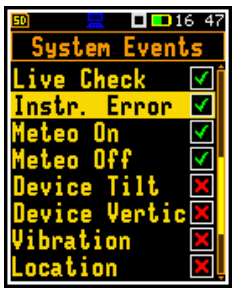


The meanings of the system events are as follows:

- **Powered Up** - turning the instrument on
- **Powered Down** - switching the instrument off (SMS or email will be sent just before switching off)
- **Measur. Start** - running the measurement
- **Measur. Stop** - measurement stopped
- **Mains On** - detection of external power connection
- **Mains Off** - detection of external power disconnection
- **Low Battery** - low battery condition. The alarm will be generated when the instrument detects a low battery condition and when the low battery condition disappears (when it is charged). The threshold is 25%
- **Battery OK** – restoration of the required battery level. The alarm will be generated after the **Low Battery** alarm



- **Ext. Bat. Low** - low external battery condition. An alarm will be generated when the low external battery condition is detected and the power from the external battery is cut off. The alarm will also be sent when the low battery condition disappears
- **Ext. Bat. OK** – restoration of the required battery level. The alarm will be generated after the **Ext. Bat. Low** alarm
- **Low Storage** – small space (less than 25%) of the instrument memory detected. The alarm will be generated when the memory space drops below the threshold and when there will be more memory space
- **Storage OK** – restoration of the required memory level. This alarm will be generated after the **Low Storage** alarm
- **System Check** - microphone status after performing a system check with the loudspeaker
- **Live Check** - microphone status after performing a live check
- **Instr. Error** - instrument errors:
  - when an RTC reset is detected or when the GPS time deviates more than 1 minute to the time of the instrument
  - SD-card error
  - temperature measurement error

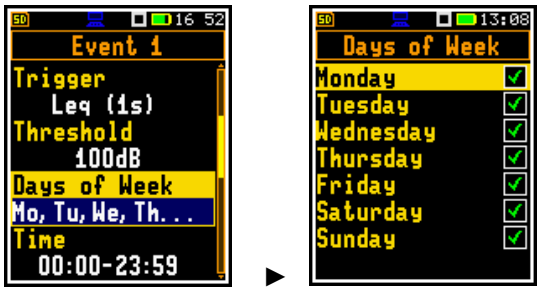


- **Meteo On** - meteo or dust meter is connected (only when one of these options is selected in the settings)
- **Meteo Off** - meteo or dust meter is disconnected (only when one of these options is selected in the settings)
- **Device Tilt** - inclination of the instrument deviating from the vertical more than 45 degrees
- **Device Vertic** - restoration of the instrument vertical position. The alarm will be generated after the **Device Tilt** alarm
- **Vibration** - excessive vibration detected
- **Location** - movement of the instrument detected (based on GPS data) by more than 1.5" (geographical seconds, about 30 meters in Poland)

The **Days of Week** position defines the days of the week when trigger conditions will be checked, and alarms will be generated in case of event occurrence.

Press the ► key and in the **Days of Week** screen select days.

Press **<Enter>** to confirm selection and return to the **Event x** screen.



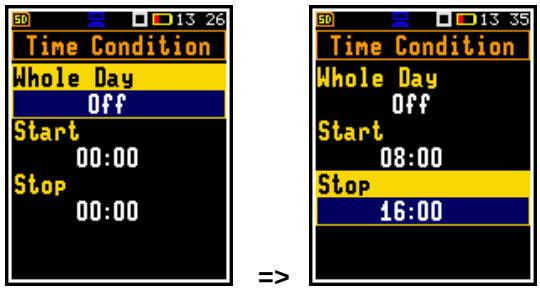
The **Time** position defines periods of the day when trigger conditions will be checked, and alarms will be generated in case of event occurrence.

It is possible to select **Whole Day** (**On**) period or define **Start** and **Stop** times (set **Whole Day** to **Off**).

In the case of the **LeqPR** or **LeqPR+LN** trigger source option the **Start** and **Stop** times define the prediction period T_0.

Press the ► key and in the **Time** screen select the period **Start** and **Stop**.

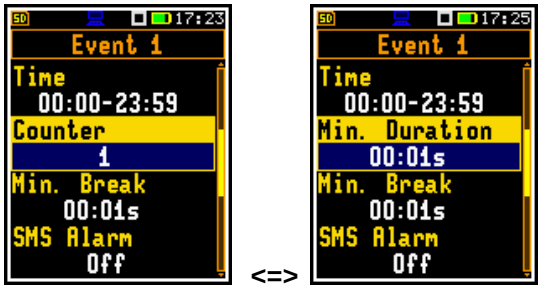
Press **<Enter>** to confirm selection and return to the **Event x** screen.



Note: *For these alarms, time ranges cannot partially overlap for different events. They can overlap completely or appear one after another. The interface does not allow setting illegal time ranges.*

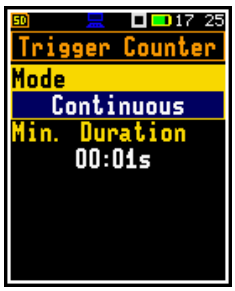
In the **Counter/Min. Duration** position you may define additional conditions that should be met for generating alarms.

This position changes its name depending on the mode selected in the **Trigger Counter** screen which is opened after pressing the ► key.



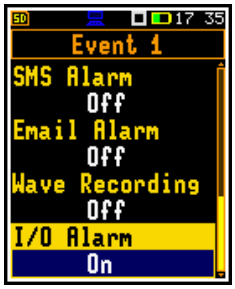
In the **Counter** mode you can define how many trigger events must occur during the **Time** period (**Counter** position) to start alarm. If **Counter** is set, for example, to 2 the alarm will start when the second trigger occurs.

In the **Continuous** mode you can define the minimal duration (**Min. Duration**) of the event that occurred during the **Time** period to start alarm. If **Min. Duration** is set, for example, to 10 s the alarm will start when the event lasts at least 10 seconds.



The **Min. Break** position defines minimum time between SMS or e-mail messages to limit the repetitions of the same alarms.

You can switch **On** or **Off** combinations of alarms in the way of SMS or e-mail notifications, audio signal or alarm pulse generated on the I/O socket in the positions: **SMS Alarm**, **Email Alarm**, **Wave Recording** and **I/O Alarm**.



If **Wave Recording** is **On**, the instrument starts Wave recording when event conditions are fulfilled.

If **Wave Recording** is switched on for any of 10 events, the **Recording** position in the **Wave Recording** screen (*path: <Menu> / Measurement / Logging / Wave Recording*) will be set to **Alarm** automatically.

If you wish to change the way of signal recording, you should switch off audio alarms for all events.

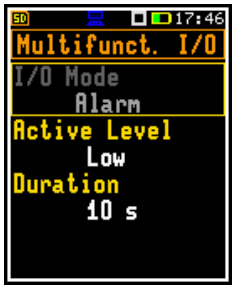
=>

If **I/O Alarm** is **On**, the instrument generates alarm signal on the **EXT.I/O** instrument's socket with defined **Active Level** (**High** or **Low**) when event conditions are fulfilled.

If **I/O Alarm** is switched on for any of 10 events, the **I/O Mode** position in the **Multifunction I/O** screen (*path: <Menu> / Instrument / Multifunct. I/O*) will be set to **Alarm** automatically.

If you wish to program the functionality of the EXT.I/O port for other purpose, you should switch off I/O alarms for all events.

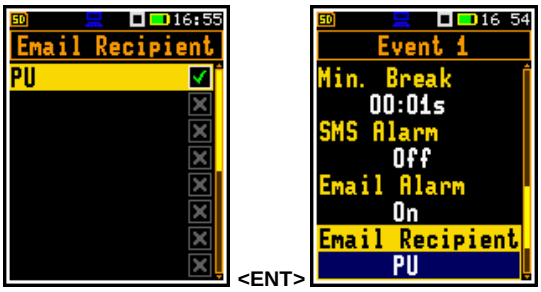
=>



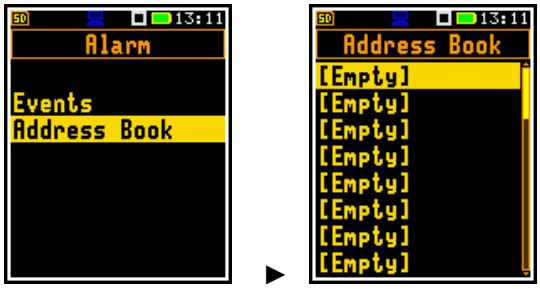
***Note:** If **I/O Alarm** is **On**, set two parameters in the **Multifunct. I/O** screen: level of the signal which is treated as a valid one (**Active Level**: **Low** or **High**) and time of generating the alarm signal (**Duration**).*

If **SMS Alarm** or **Email Alarm** is **On**, you should select recipients by opening the position which appears under the **SMS Alarm** or **Email Alarm** position.

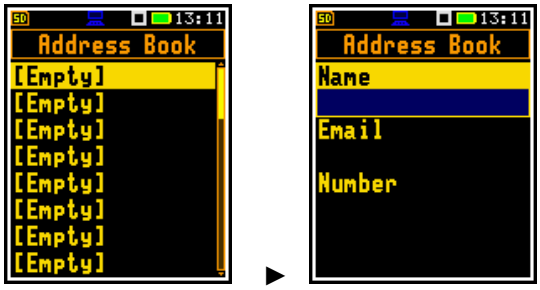
After selecting recipient(s), press **<Enter>** to confirm selection.



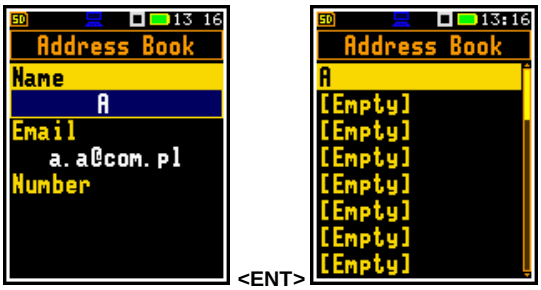
The **Address Book** position allows you to edit addresses of alarm recipients.



To enter/edit the new recipient address, press the ► and in the new screen enter **Name**, **Email** and phone **Number** of the recipient.



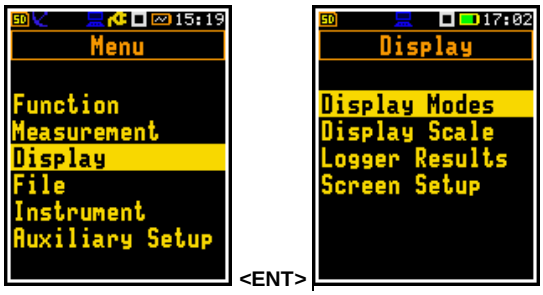
After entering recipient's data, press **<Enter>** to confirm them.



10.10 CONFIGURING DATA VIEWING – DISPLAY

The **Display** section contains the elements for programming measurement result views and display parameters.

The content of the **Display** list depends on the selected measurement function.



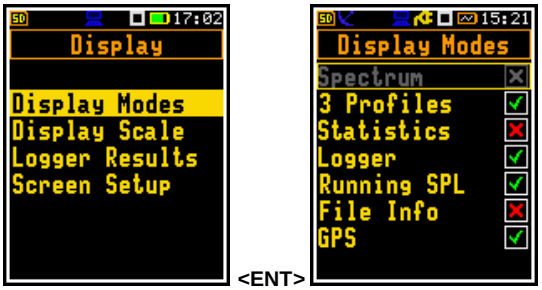
The **Display** section contains following items:

Display Modes	allowing to enable modes of the measurement results presentation (views);
Display Scale	allowing to adjust the scale in graphical modes of results presentation;
Spectrum View	allowing to select spectra to be viewed. This position only becomes available in the **1/1 Octave** and **1/3 Octave** modes;
Logger Results	allowing to select the Time history results to be viewed as a plot;
Screen Setup	allowing to switch rotation of the screen on/off and set the energy saver function.

10.10.1 Enabling views – Display Modes

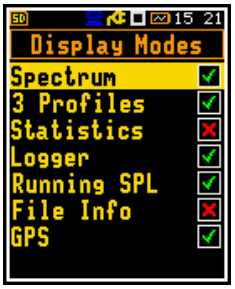
The One Result view is always enabled. Other views can be enabled or disabled in the **Display Modes** list.

You may switch in the measurement mode between those views, that were enabled in the **Display Modes** screen.



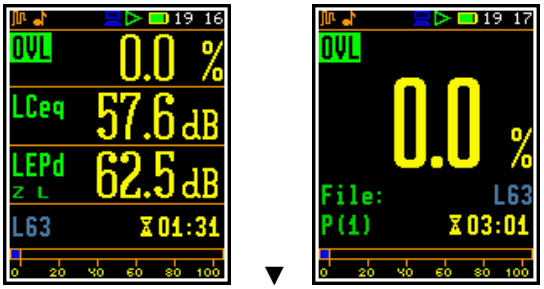
In the **Level Meter** function, the following display modes are available on the list: **3 Profiles**, **Statistics**, **Logger**, **Running SPL**, **File Info** and **GPS**.

In the **1/1 Octave** and **1/3 Octave** functions, additional mode (**Spectrum**) becomes available.



Changing views

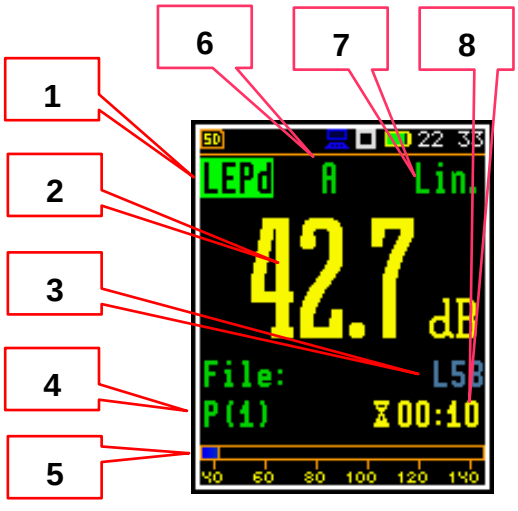
The view is changed with the ▲ / ▼ key.



10.10.1.1 One Result view

In the One Result view, any measurement result from Summary results may be viewed.

One Result view fields



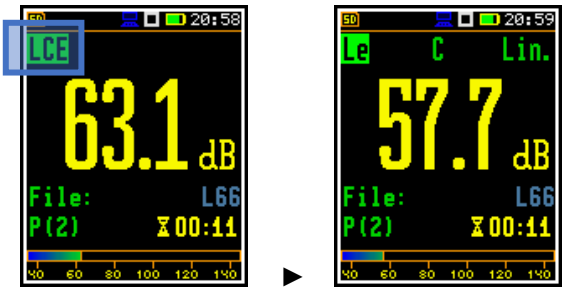
1. Result name: **OVL**, **Lpeak**, **Lmax**, **Lmin**, **L**, **Leq**, **LE**, **Lden**, **LEPd**, **Ltm3**, **LTeq**, **Ln**, **LR**, **EX**, **SD**, **NC**, **NR**;
2. Value of the measured result
3. File name
4. Profile number
5. Quasi analogue value indicator
6. Implemented weighting filter: **Z**, **A**, **C** or **B**
7. Detector time constant: **Imp.**, **Fast**, **Slow** for the exponential detector or **Lin** for the linear detector
8. Elapsed time.

Elapsed time shows the current second of the measurement. The value presented there belongs to the range [**1**, **Integration Period**].

Note: *For some results, weighting filters and detector type are presented in the result name. For example, the **Lmax** result with **A** filter and **Fast** detector will be presented as **LAFmax**. For such results, there is no indication in the filter and detector field.*

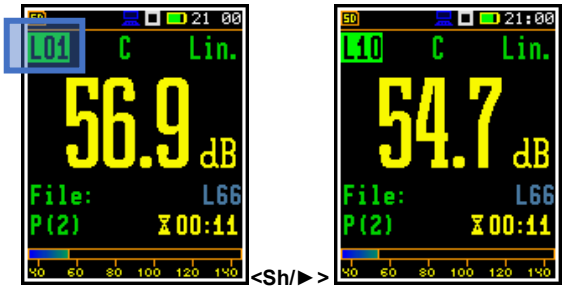
Changing measurement results

The measurement result displayed in this mode can be changed with the ◄ / ► key.



Changing statistical levels (Ln)

The statistical levels (**Ln**), which are defined in the **Stat. Levels** list (*path: <Menu> / Measurement / Stat. Levels*), can be changed with the ◄ / ► key pressed together with **<Shift>**.

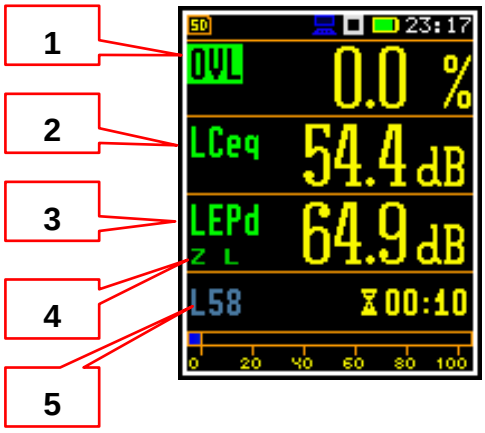


10.10.1.2 Three profiles display mode

In the **3 Profiles** mode any three measurement results from Summary results may be presented for three profiles altogether.

3 Profiles mode fields

1. Result for the first profile
2. Result for the second profile
3. Result for the third profile
4. Implemented weighting filter: **A**, **C**, **Z** or **B** and detector time constant: **I** (Impulse), **F** (Fast), **S** (Slow) when the detector is exponential or **L** when the detector is linear
5. File name and elapsed time.

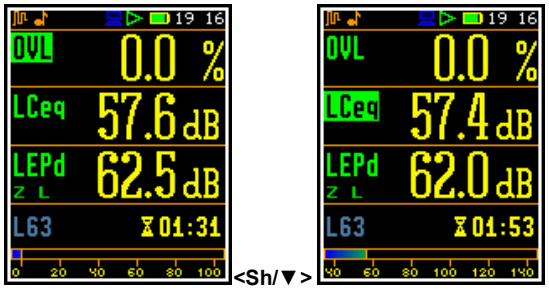


Changing active profiles

You can change an active profile by pressing the ▲ / ▼ key together with **<Shift>**.

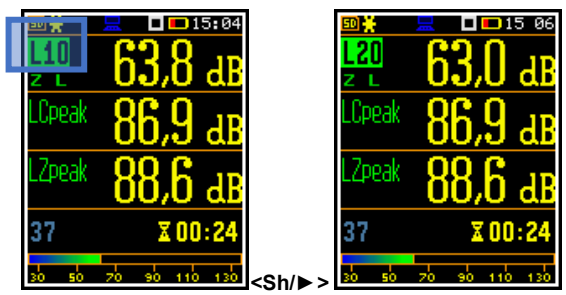
Changing measurement results

The measurement result displayed in this mode can be changed with the ◄ / ► key.



Changing statistical levels (Ln)

Statistical levels (**Ln**), which are defined in the **Stat. Levels** list (*path: <Menu> / Measurement / Stat. Levels*), can be changed with the ◄ / ► key pressed together with **<Shift>**.

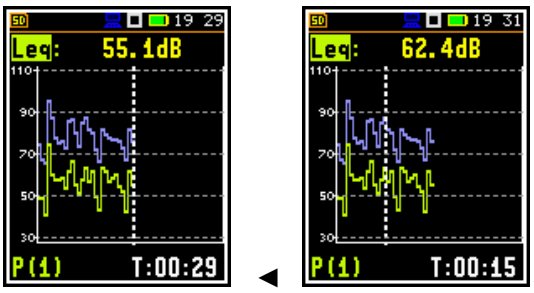


10.10.1.3 Logger view

In the **Logger** view, the time history results, selected in the **Logger View** list, are displayed as a plot.

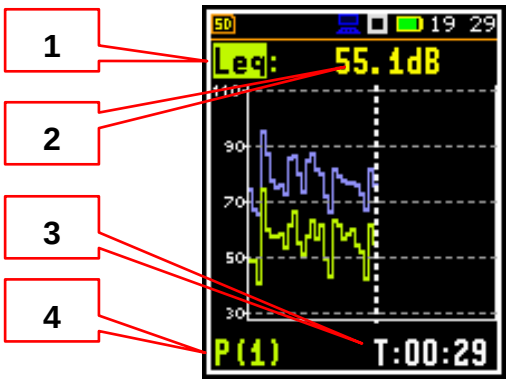
The cursor position can be changed with the ◄ / ► key.

The cursor can be moved to the first or the last position of the plot with the ◄ / ► key pressed together with **<Shift>**.

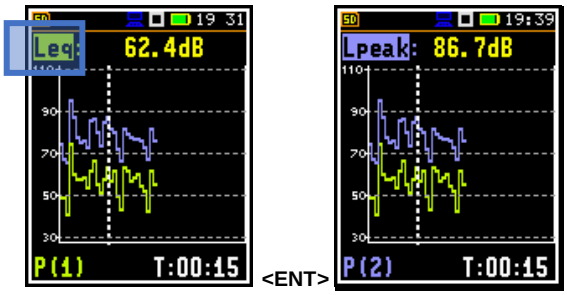


Logger view fields

1. Result of the active plot
2. Result value for the cursor position
3. Cursor time position
4. Profile number



You can change the active plot for reading cursor values with the **<Enter>** key. New result will be displayed in the field 1.



Note: *If* ***Logger*** *(path: <Menu> / Measurement / Logging /Logger Setup) is switched off the* ***Logger*** *presentation mode is disabled! Therefore, to have this presentation mode, switch the* ***Logger*** *on!*

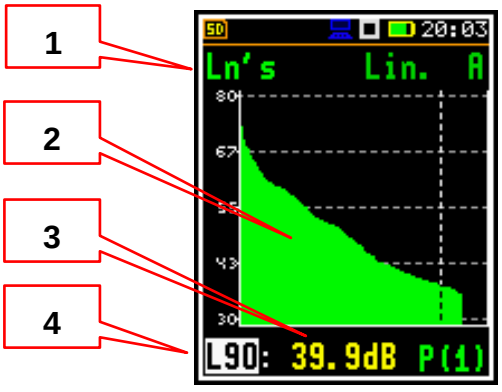
Note: *When* ***Logger*** *is switched on, but results were not selected for logging the* ***Logger*** *presentation mode is disabled!*

10.10.1.4 Statistics view

"Statistics" is the cumulative probability density function of exceeding the noise level during the measurement period. The X axis defines the probability of exceeding the noise level, statistical level **Ln**, and the axis Y defines the calculated noise level in dB.

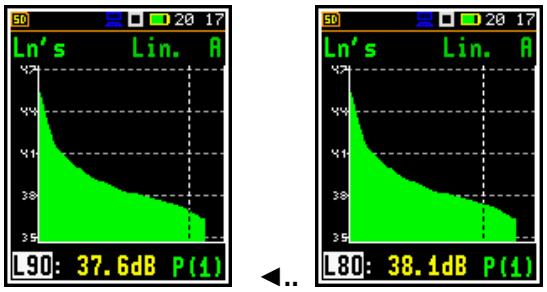
Statistics view fields

1. Result for the active profile, LEQ detector (**Lin**ear, **F**ast, **S**low or **I**mpulse) and used weighting filter (**A**, **C**, **Z** or **B**)
2. Cursor position
3. Value of the noise level in dB for the selected statistical level (cursor position)
4. Value of the selected statistical level **Ln** (cursor position)

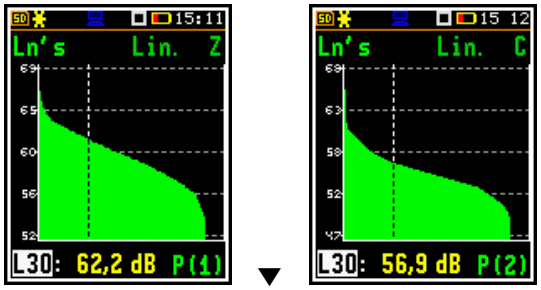


The cursor position can be changed with the ◄ / ► key.

The cursor can be moved to the first or the last position of the plot with the ◄ / ► key pressed together with **<Shift>**.

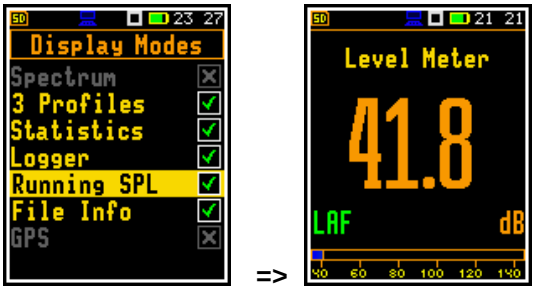


The profile can be changed with the ▲ / ▼ key pressed together with **<Shift>**.



10.10.1.5 Running SPL view

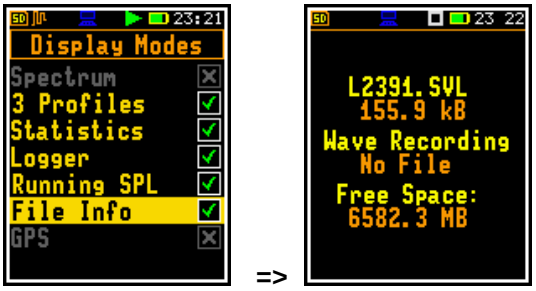
The **Running SPL** view shows the SPL result when measurement is not currently running. In this view, the SPL result is calculated and displayed, but not stored in the instrument's memory. The purpose of this mode is to give the user a first indication about the signal to be measured.



10.10.1.6 File information view

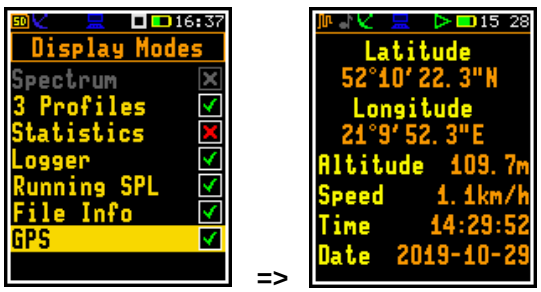
The **File Info** position enables additional view with information about the last saved logger file.

The **File Info** view indicates file names, their sizes and free space on the SD-card. When **Logger** is **Off** (*path: <Menu> / Measurement /Logging / Logger Setup*) the **File Info** position is disabled.



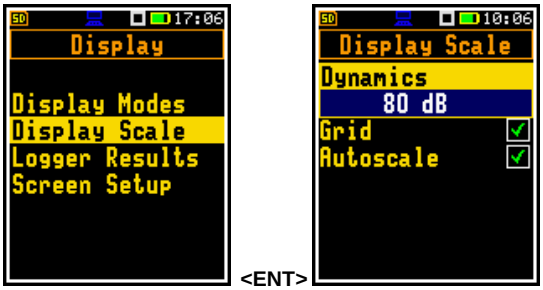
10.10.1.7 GPS view

The **GPS** view shows the instrument geographical coordinates, speed and GPS time. This mode is active when GPS is switched on (*path: <Menu> / Instrument / GPS*).



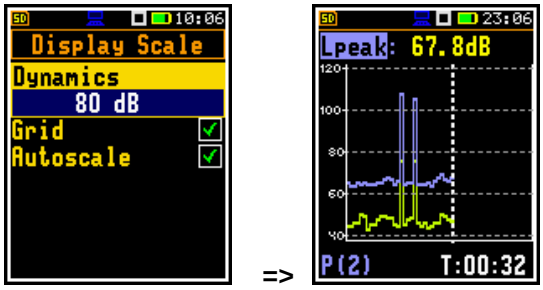
10.10.2 Adjusting plot scale – Display Scale

The **Display Scale** list of parameters enables adjusting the scale of the plot and switching a grid on/off in the **Logger**, **Statistics** or **Spectrum** display modes.

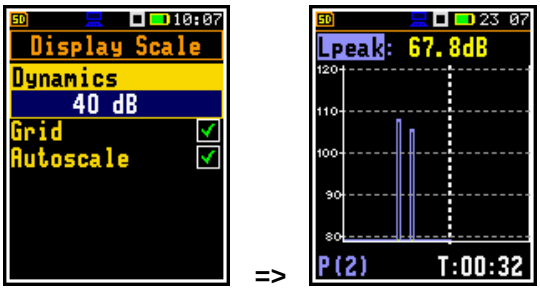


Scaling vertical axis

The **Dynamics** position enables selecting the required dynamic range scaling of the plot (Y axis).

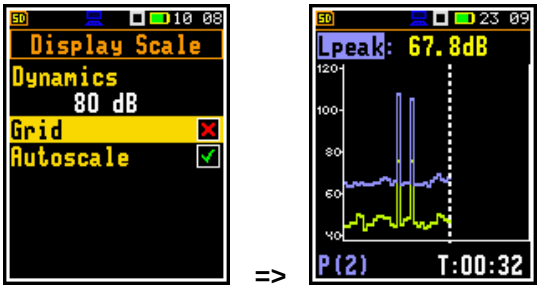


It is possible to select the range from the set: **10 dB**, **20 dB**, **40 dB**, **80 dB** and **120 dB**.



Switching grid on/off

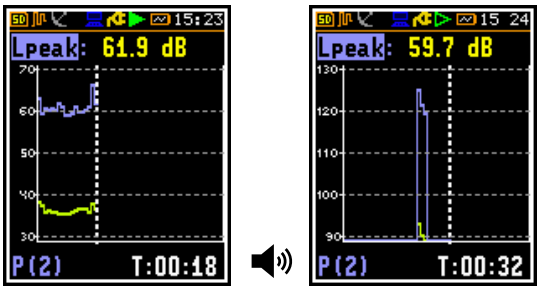
The **Grid** position enables switching on or off the horizontal grid lines of the plot.



Switching automatic Y-scale adjustment on/off

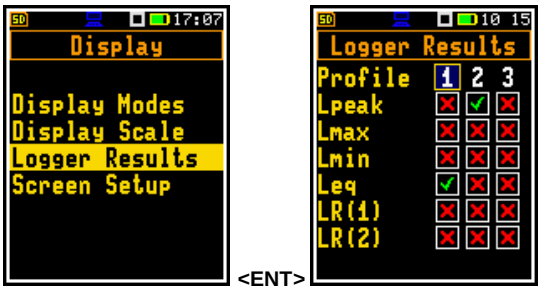
The **Autoscale** position switches on the automatic scale adjustment of the Y axis. The adjustment is performed automatically right after the start of the measurement to suit the initial level of the input signal from the microphone.

The example shows scale changes after sudden increase of the sound pressure level.



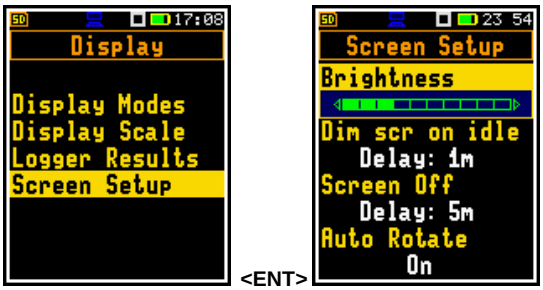
10.10.3 Selecting Logger results for presentation – Logger Results

The **Logger Results** position enables choosing the Logger Results (time-history results), saved in the logger file, which will be displayed in the **Logger** display mode. The results are selected with the ◄ / ► key pressed together with **<Shift>**.



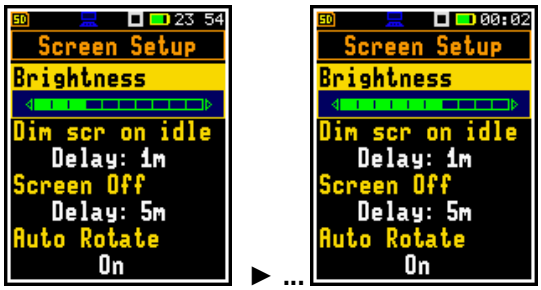
10.10.4 Configuring power saver – Screen Setup

The **Screen Setup** position enables configuring brightness of the display, the power saver function and screen auto rotation.



Brightness of the display

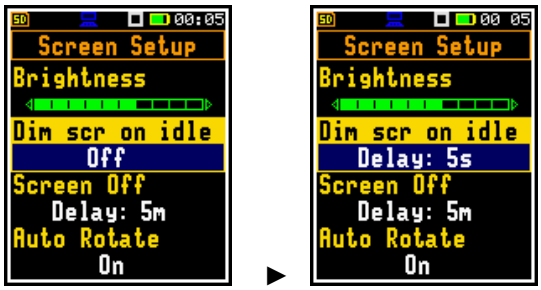
The **Brightness** position enables setting the proper brightness of the display with the ◄ / ► key. You can select 10 levels. The new level of the brightness is confirmed after each press of the ◄ / ► key.



Power saver function

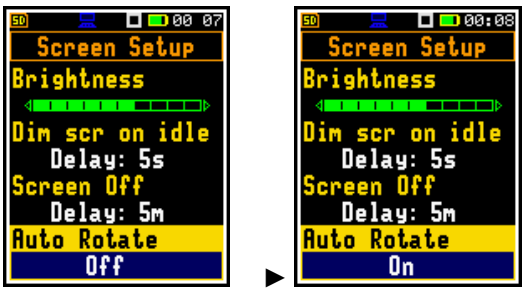
Consumption of the instrument's internal source of power can be minimising by reducing the brightness of the screen when possible.

There are two options for saving power. The screen may be switched off (**Screen Off**) and/or dimmed (**Dim scr on idle**). When either of these options are on, after a certain delay from pressing any key, the screen is switched off or dimmed. If it has happened, the first press of any key will cause the screen to switch back on again.



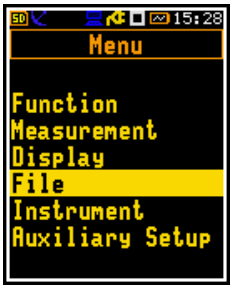
Screen auto rotation

The **Auto Rotate** position enables switching on the adjustment of the screen image on the display according to the instrument's physical orientation in space. If the unit is rotated upside down then the display also changes its image orientation accordingly, so you can always see it in normal upright view. The screen rotation also works if the meter is in the horizontal position.



10.11 MANAGING FILES – FILE

The **File** section contains the elements that enable managing the data and setup files saved in the instrument's memory – micro SD-card.



<ENT>

The **File** section contains following items:

File Manager	allowing to manage measurement results files;
Setup Manag.	allowing to manage setup files.

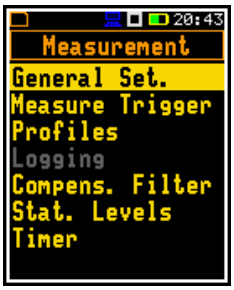
Note: *Positions in the* ***File*** *list are active only when an SD-card is inserted into the card slot.*

There are five types of files that the instrument generates:

- Logger files with measurement results (extension **.SVL**)
- Wave files with signal recording (extension **.WAV**)
- Setup files with measurement and instrument configuration (extension **.SVT**)
- CSV files with summary results (extension **.CSV**)
- System Log files (extension **.LOG**)

Detailed description of structures of all file types is given in Appendix B.

Note: *Data and setup files can be saved only on the SD-card. So, if there is no SD-card in the instrument there is no any possibility to create any such file. In such cases the* ***Logging*** *position in the* ***Measurement*** *list is not active and not available.*



Logger, Wave, CSV and System Log files are created and saved automatically with default names. For logger and wave files you may define specific file names in the **Logger Name** position (*path: <Menu> / Measurement / Logging / Logger Setup*) and in the **Wave File Name** position (*path: <Menu> / Measurement / Logging / Wave Recording*).

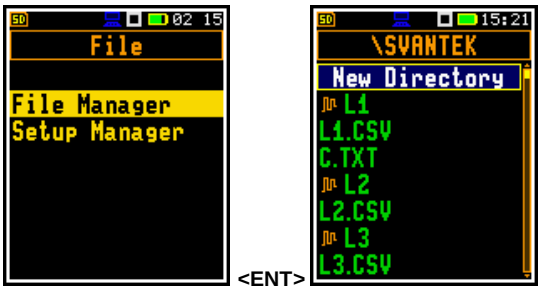
Elements of the logger file structure depend on the selected function (**Level Meter**, **1/1 Octave**, **1/3 Octave**) and logging settings. These elements are as follows:

- main results, including statistical analysis results,
- time histories of measured results,
- results of the 1/1 or 1/3 octave analysis
- audio waveform recordings.

10.11.1 Managing logger and wave files – File Manager

The **File Manager** is used for checking contents of the memory and performing operations on logger/wave files and directories, such as: renaming, delete, displaying information, creating new directory/file and erasing memory.

In the **File Manager** all file and directory names are of upper-case letters and files have no visible extensions. Directory names are of blue colour and file names are of green colour with additional icon.



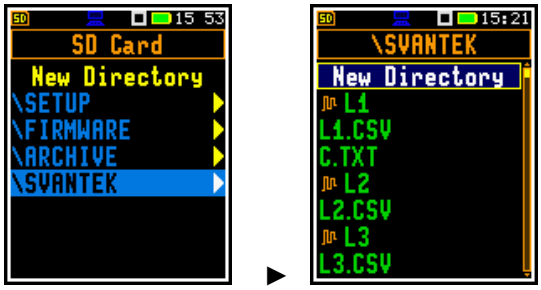
The list of files and directories is presented in the **File Manager** screen. Files are stored in directories organised hierarchically.

By pressing **<Enter>** on the marked (highlighted) directory/file the screen with the list of available operations for this directory/file is opening.

Changing directories

To open a directory, select it and press the ► key.

To return to the upper directory press the ◄ key.



Creating new directory

First position of the **File Manager** list is **New Directory**, which enables creating the new directory.

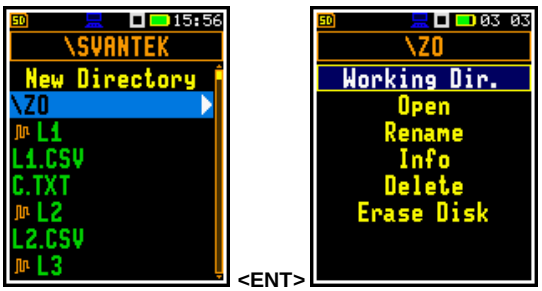
To create the new directory, enter the directory in which the new one will be created, select the **New Dir.** position and press **<Enter>**. The screen with the text editor will appear for entering new directory name.

SD-card properties

The last screen after pressing the ◄ key, contains information about the **SD-card**: memory name (**Disk Name**), memory free space (**Free Space**) and total memory space (**Capacity**).

10.11.1.1 Assigning directory for data files – Working Directory

You can assign a directory for automatic saving of logger/wave files. To do this, choose the required directory and press **<Enter>**. Select the **Working Dir.** position in the command list and press **<Enter>**.



Note: *The working directory name is not displayed on the screen, so you should remember about the selected working directory!*

10.11.1.2 Renaming file/directory – Rename

To rename a file/directory, select the file/directory you wish to rename and press **<Enter>**. Select the **Rename** position in the command list and press **<Enter>**. The screen with the text editor function in which you may enter the new file/directory name will appear.

10.11.1.3 Information about file/directory – Info

To get information about a file/directory, select the file/directory and press **<Enter>**. Select the **Info** position in the command list and press **<Enter>**. The instrument will display the information about the selected file/directory.

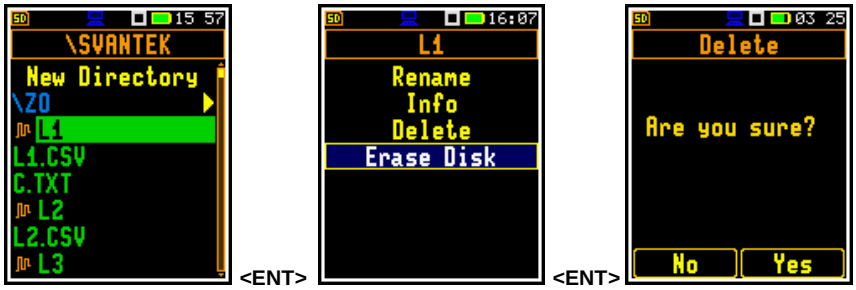
10.11.1.4 Deleting file/directory – Delete

To delete a file/directory from the file/directory list, select the file/directory to be deleted and press **<Enter>**. Select the **Delete** position in the command list and press **<Enter>**. The instrument will ask for confirmation of this action since it cannot be undone.

10.11.1.5 Erasing memory – Erase Disk

To delete all files and directories from the SD-card, select any directory and press the **<Enter>** key. Select the **Erase Disk** position in the command list and press **<Enter>**. You should confirm this action since it cannot be undone.

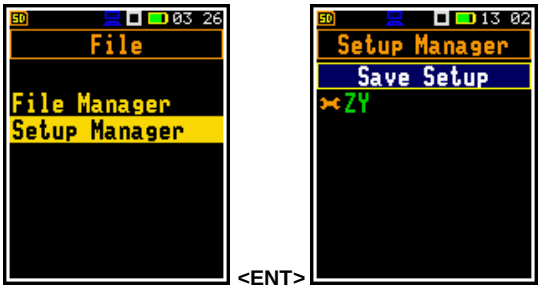
After disk erasing the default directories will be recreated.



10.11.2 Managing setup files – Setup Manager

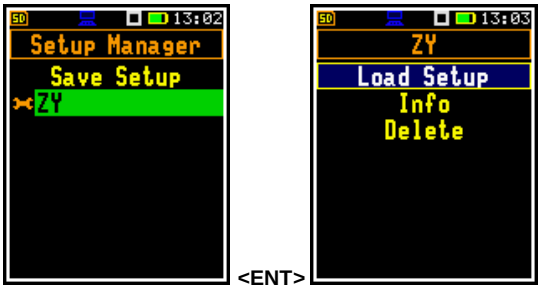
The **Setup Manager** enables saving new setup files, loading and deleting them and displaying file information.

All setup files are stored in the default directory **SETUP** on the SD-card.



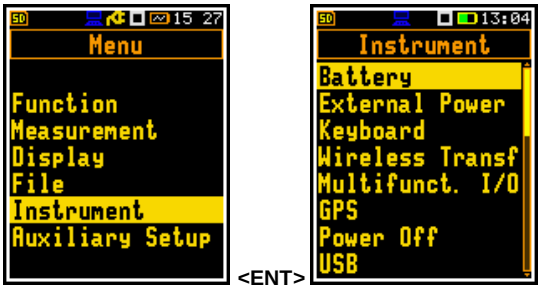
The screen with the list of available operations on the setup files is opened after pressing the **<Enter>** key on the marked (highlighted) setup file.

Loading the setup file means that the settings stored in the loaded file become the active settings of the measurement and the instrument.



10.12 CONFIGURING HARDWARE PARAMETERS – INSTRUMENT

The **Instrument** section is mainly related to the configuration of the hardware components of the instrument.



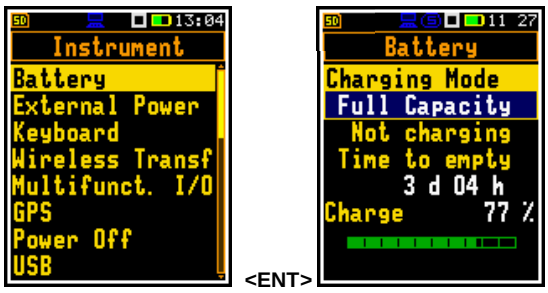
The **Instrument** section contains following items:

Battery	allowing to display information about current power source;
External Power	allowing to switch on the mode of operation with the external battery SB 275;
Keyboard	allowing to program some keyboard functions;
Wireless Transf	allowing to switch on/off the GSM modem and to configure the wireless connection;
Multifunct. I/O	allowing to select available functionality of the I/O port;
GPS	allowing to switch on GPS and synchronize the real-time clock;
Power Off	allowing to switch off the instrument power in case of inactivity;
USB	allowing to configure the USB interface;

Serial Interface allowing to configure the serial interface;
Self Vibration allowing to set the threshold for marker registration of instrument self-vibration;
RTC allowing to set the Real Time Clock;
Unit Label allowing to display instrument properties.

10.12.1 Checking power – Battery

The **Battery** position enables checking the instrument powering condition.

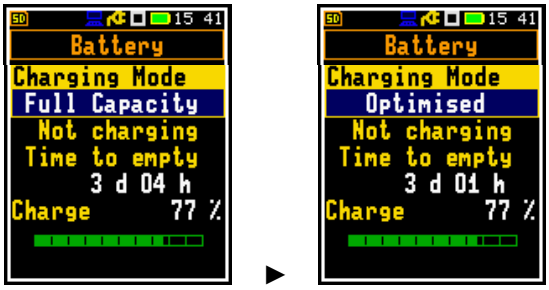


The **Battery** screen presents:

- current charging state: **Not charging**, **Battery charging** or **Charge complete**
- **Time to empty** (**xx d yy h**) or **Time to full** (**xx h yy m**) the battery
- **Charge** condition: **xx %**.

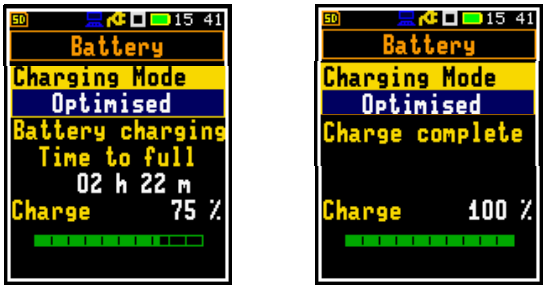
Battery charging mode

In the **Full capacity** mode, the battery is charged to 100% of its capacity. In the **Optimized** mode, the battery is charged to about 85%. This option works only when the instrument is not powered by the solar or external battery. This option allows you to extend the life cycle of the battery.



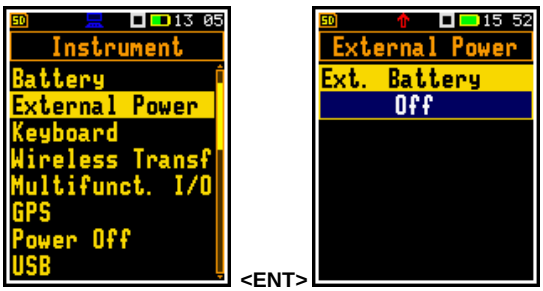
The presented screens show next powering conditions:

- **Not charging** - external power is not connected,
- **Battery charging** - external power is connected and charging is performing,
- **Charge complete** - external power is still connected, but charging is not performing.



10.12.2 Operation with external power – External Power

The **External Power** position enables switching on the mode of operation with the external battery SB 275 which protects from full discharging of that battery (**External Battery: On**). Protection works when the voltage of the external battery drops below 10.5 V. In such a case the instrument cut the power from the external battery and switch it to the internal one.

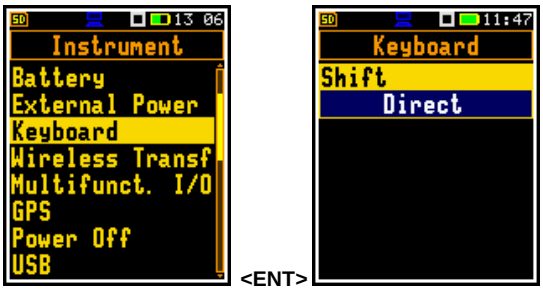


If the instrument is powered from the SB 274 power supply, **External Battery** may be switched **On** or **Off**. This parameter doesn't affect the instrument powering.

Note: *If the instrument is powered from the SB 371 solar panel,* ***External Battery*** *must be* ***Off****!*

10.12.3 Programming keyboard functions – Keyboard

The **Keyboard** position enables programming the operation mode of the **<Shift>** key.

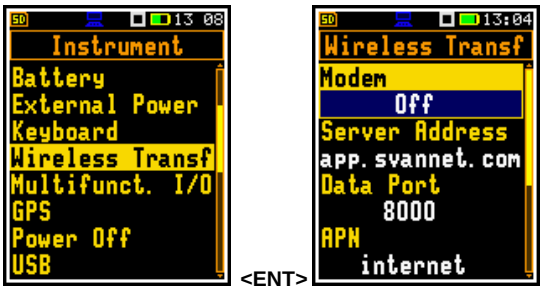


<Shift> key mode

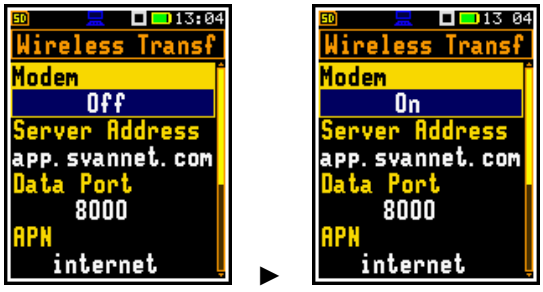
In the **Shift position** you can choose between **2nd Function** and **Direct**. When the **Direct** option is selected, the **<Shift>** key operates as in the keyboard of a computer – to achieve the desired result, the second key should be pressed at the same with **<Shift>**. When the **2nd Fun.** option is selected the **<Shift>** key operates as in the smartphone virtual keyboard – the **<Shift>** key should be pressed first, and then the second key should be pressed. Due to this you can operate the instrument with one hand.

10.12.4 Configuring GSM modem – Wireless Transfer

The **Wireless Transf** position allows you to switch on/off the GSM modem and to configure the wireless connection.

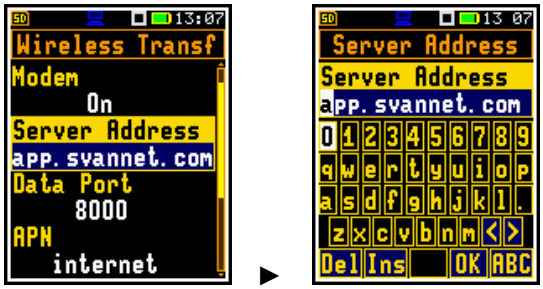


You can switch the wireless transmission on/off in the **Modem** position.



In the **Server Address** position you can define the server address, which by default is **app.svannet.com**. All other settings, presented in this chapter, are default settings, which enable connecting with the SvanNET server.

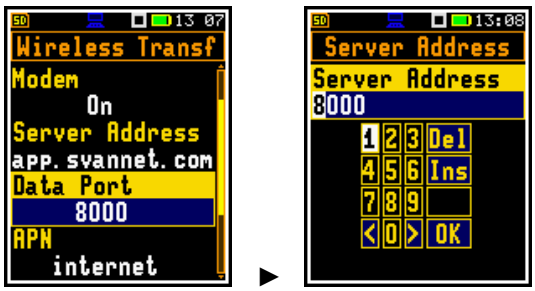
You can edit **Server Address** in the text editor screen which is opened after pressing the ► key.



In the **Data Port** position you can define the number of the port for data exchange between the remote host and the station.

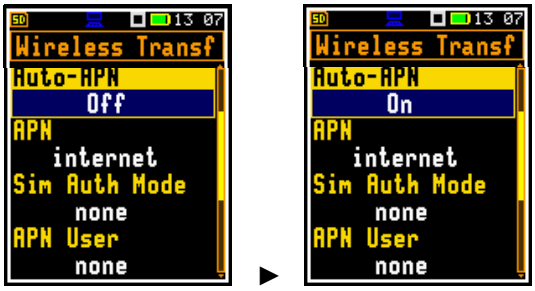
In the **APN** position you can define the APN name of the SIM card. Its use depends on the **Auto-APN** settings.

You can edit **Data Port** and **APN** in the text editor screen which is opened after pressing the ► key.



In case of 4G modem the **Auto-APN** position appears in the **Wireless Transfer** list.

The name set in the **APN** position is taken into consideration if **Auto-APN** is **Off** or the modem is connecting with the 3G network.



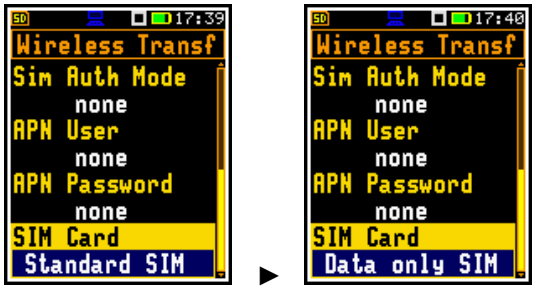
In the **Sim Auth Mode** position you can select the method of user verification by SIM card: without verification (**none**) or with **PAP**.

In the **APN User** position, you can define the user name used for verification by the SIM card.

In the **APN Password** position, you can define the password used for verification by the SIM card.

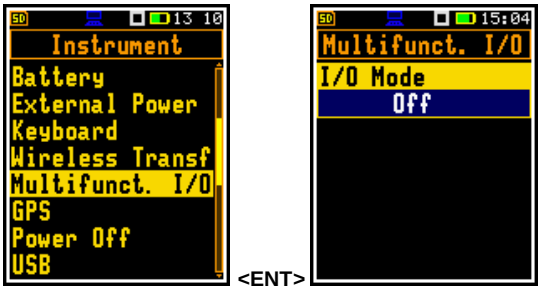
You can edit **APN User** and **APN Password** in the text editor screen which is opened after pressing the ► key.

In the **SIM Card** position, you can define type of the SIM card: **Standard SIM** or **Data only SIM**.



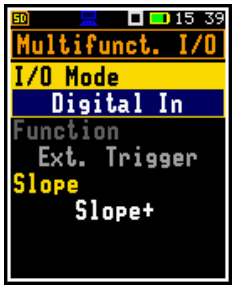
10.12.5 Configuring I/O port – Multifunction I/O

The **Multifunct. I/O** position allows you to select the available functionality of the I/O port.



The I/O lemo socket can be used as (**I/O Mode**):

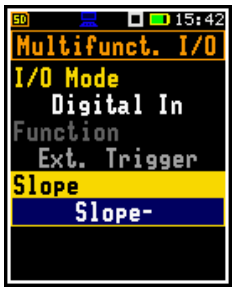
- input of the digital signal as an external trigger to start signal recording (**Digital In**). The instrument is acting in this case as so called “slave instrument”,
- digital output (**Digital Out**) used for triggering other “slave instrument(s)” (the instrument is acting in this case as a “master instrument”), or as a source of any alarm signal in case of certain circumstances occurred during the measurements (i.e. level of the input signal is higher than a user selected trigger alarm setting) or
- source of an alarm signal (**Alarm**) in case of some Events have switched on **I/O Alarm** parameters (*path: <Menu> / Measurement / Alarm*) (see Chapter 10.9.9).



More detailed description of the EXT.I/O port is given in Appendix C.

Note: *You cannot set the **Alarm** mode manually. The **I/O Mode** position is set automatically to **Alarm** if I/O alarm will be switched on for any of 10 events (path: <Menu> / Measurement / Alarm).*

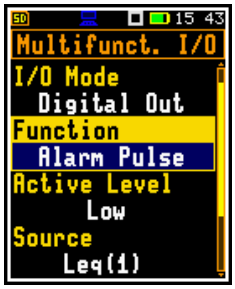
Digital In mode (Ext.Trigger function)



In the **Digital In** mode the signal appeared on the **I/O** socket will be treated as the external trigger for the Wave recording if the **External** signal recording trigger was chosen (*path: <Menu> / Measurement / Logging / Wave Recording / Recording: External*).

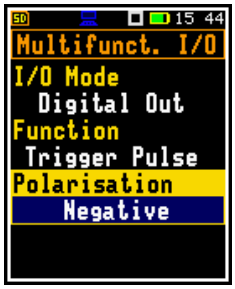
In the **Digital In** mode the **Function** parameter may only be set to **Ext.Trigger**. It is possible to set up with the ◄ / ► key the trigger voltage **Slope**: **Slope+** (uprising as default) or **Slope–** (falling).

Function of the Digital Out mode



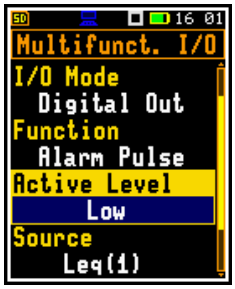
The **Function** position allows you to select the function of the digital output of the **EXT.I/O** instrument's socket. The socket can be used as the source of the trigger pulse (**Trigger Pulse**) which starts the measurement in another "slave instrument" linked to the "master instrument" or as the alarm signal, which appears there after fulfilment of certain conditions (**Alarm Pulse**).

Polarisation of digital output signal



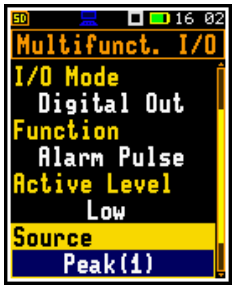
The **Polarisation** parameter defines which polarisation of the signal (**Negative** or **Positive**) will be applied to the output trigger pulse.

Active level for alarm pulse generation



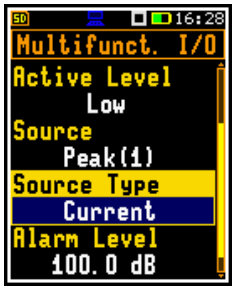
The **Active Level** parameter defines which level of the signal should be treated as a valid one: **Low** or **High** ("negative" or "positive" logic).

Measured result for alarm pulse generation



The **Source** parameter defines the measured result, the level of which should be checked for the alarm generation. If the measured result level is greater than the threshold level (**Alarm Level**), the instrument will generate alarm signal on the I/O socket. The results from the first profile: **Peak(1)**, **Spl(1)**, **Max(1)** or **Leq(1)** can be selected as an alarm source.

Type of Alarm source



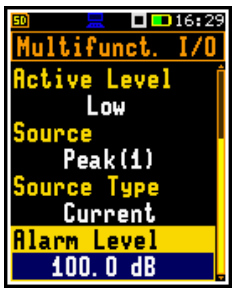
The **Source Type** parameter defines the type of alarm source: **Current** or **Periodic**.

Current means that the alarm pulse will be generated all the time when the Source result averaged with 1-second step is over the **Alarm Level** value.

Periodic means that the alarm pulse will be generated all the time when the Source result averaged with Integration Period step is over the **Alarm Level** value.

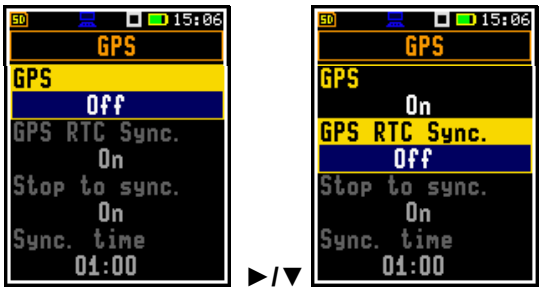
Alarm threshold level

The **Alarm Level** parameter defines the threshold level for the alarm pulse generation. If **Source** is greater than the **Alarm Level**, the instrument will generate the alarm signal with the selected logic. The available levels are within the range [30.0 dB, 140 dB].

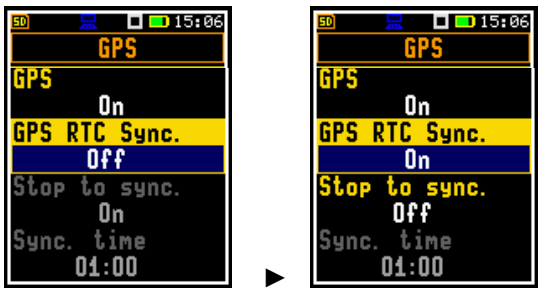


10.12.6 Configuring GPS – GPS

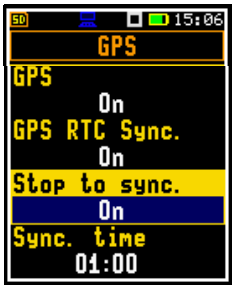
The **GPS** position enables switching on the internal GPS and synchronizing the real-time clock with the GPS time.



If **GPS RTC Synchronization** is **On** and **Stop to sync.** is **Off**, then the RTC clock will be synchronized to the GPS clock when there is no measurement and the deviation is greater than 1 second.



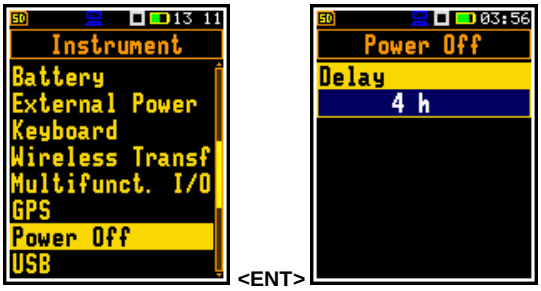
If **GPS RTC Synchronization** is **On** and **Stop to sync.** is **On**, then if the RTC clock deviates more than 10 seconds from the GPS clock, the measurement at the set time of a day (**Sync. time**) will be stopped in order to synchronize the RTC clock.



10.12.7 Automatic power off – Power Off

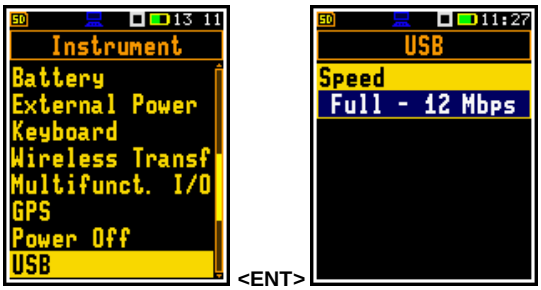
The **Power Off** position enables selecting the period after which the instrument will automatically turn itself off in the case there no key was pressed during this period.

If the **Inf** (infinitive) value is selected the instrument will not be turned off automatically, only manually.



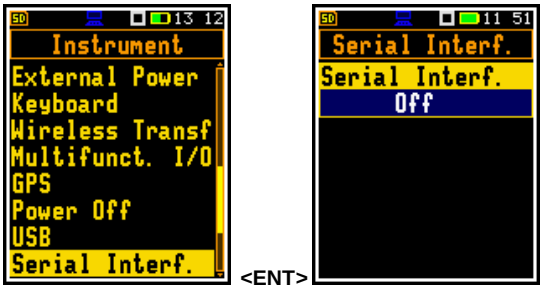
10.12.8 Configuring USB interface – USB

The **USB** position enables selecting the transmission speed of the USB interface. There are two options: **Full – 12 Mbps** and **High – 480 Mbps**.



10.12.9 Configuring serial interface – Serial Interface

In the **Serial Interface** position, you can switch off the serial interface or select the device from which SV 307 will receive additional data, such as meteorological or dust measurement results.

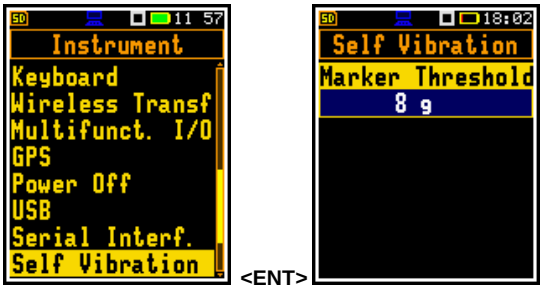


You can select the weather station (**SP276**), dust monitoring terminal (**ES-642**) or another external device (**External Device**).

The **ES-642** may have three modes according to used sensors: **PM1**, **PM2.5**, **PM10** or **TSP**.

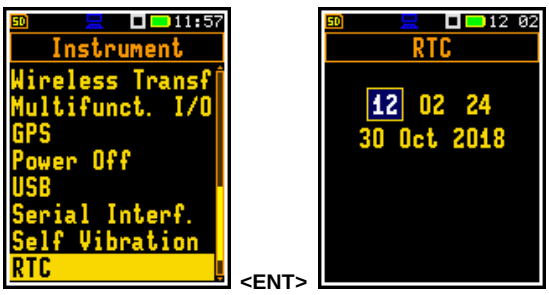
10.12.10 Self-vibration marker – Self Vibration

The **Self Vibration** position enables defining the threshold for self-vibration of the instrument for marker registration. The special marker will be written to the file when self-vibration of the instrument is higher than defined in the **Marker Threshold** position: 1 g ÷ 15 g.



10.12.11 Programming internal Real Time Clock – RTC

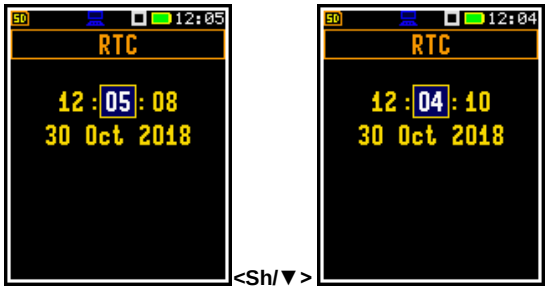
The **RTC** position enables programming the internal Real Time Clock of the instrument. This clock is displayed in the top right-hand position of the icons line.



To edit time or date, select the time or date field with the ◄ / ► or ▲ / ▼ keys.

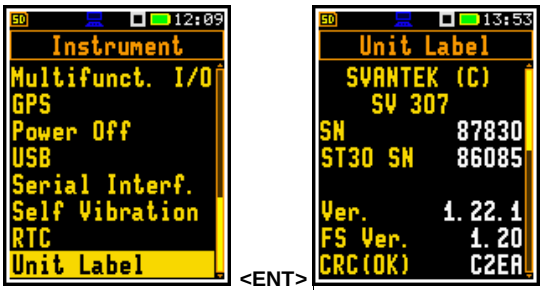
To change the value in the selected field, press the ◄ / ► or ▲ / ▼ keys together with **<Shift>**.

Press **<Enter>** to confirm the selection. If you exit this screen with **<ESC>** the new time will also be saved.



10.12.12 Checking instrument properties – Unit Label

The **Unit Label** position enables checking the model of the instrument, it's serial number, the current software version installed and the appropriate standards, which the instrument fulfils.



Note: *The contents of the* ***Unit Label*** *should be always sent to Svantek service department or official representative in case of any problems faced by the user during the instrument's normal operation.*

10.13 AUXILIARY SETTINGS – AUXILIARY SETUP

The **Auxiliary Setup** section contains following items:

Language allowing to select the language of the user interface.

Factory Set. allowing to restore default, factory settings.

Warnings allowing to enable/disable warnings to be displayed during the normal operation of the instrument.

10.13.1 Selecting user interface language – Language

The **Language** position enables selecting the language of the user interface.

If, after power on an unknown language interface appears on the display, the user can reset the instrument with three **<Shift/Enter>** keys pressed together during the turning the instrument on. After this, the instrument will go back to the default setup with the English interface.

10.13.2 Restoring factory settings – Factory Settings

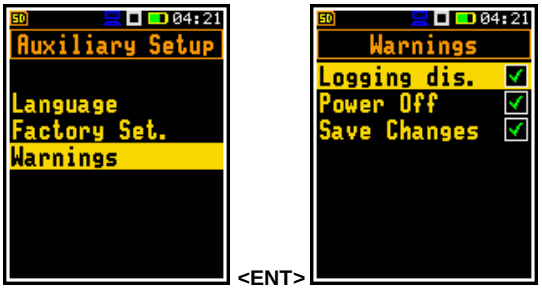
The **Factory Set.** position enables restoring default settings of the instrument.

Factory settings can be installing also with three **<Shift/Enter>** keys pressed together during the turning the instrument on.

Note: *The Factory Settings operation reinstalls the English language.*

10.13.3 Warnings selection – Warnings

The **Warnings** position allows you to activate messages, which will be displayed during the normal operation of the instrument.



If **Logging** is active, the instrument will generate a warning if you start a measurement without logging results to a file (i.e. when **Logger** is disabled).

If **Power Off** is active, then in the case the measurement is in progress, any attempt to switch off the instrument will be warned "Measurement in progress". You should stop the measurement to be able to turn off the unit. When the measurement is completed the warning "Power Off" becomes active. Then, if you would like to turn off the instrument, you should confirm this.

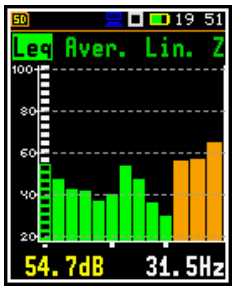
If **Save Changes** is active, the instrument displays the warning message in the case when some parameters were changed, but the list of parameters was exit with the **<ESC>** key.

10.14 1/1- AND 1/3-OCTAVE ANALYSER

The instrument operates as a real time 1/1 or 1/3-octave analyser (RTA) in a very similar way to the **Level Meter**. Moreover, 1/1 or 1/3-octave analysis is performed in parallel with the Level Meter measurements. All 1/1-octave (with 10 centre frequencies from 16 kHz down to 31.5 Hz; in base two system) and 1/3-octave (with 31 centre frequencies from 20 kHz down to 20 Hz; in base two system) digital pass-band filters are working in real-time with weighting filters (**Z**, **A**, **B** or **C**) and LEQ detector defined in the **Spectrum** screen (*path: Menu / Measurement / Spectrum / Filter*). This enables a spectrum pre-weighting with one of the selected broadband frequency curves if required for the application such as the provision of hearing protectors during the control of high workplace noise levels.

Note: *TOTAL LEQ results are measured with their own weighting filters (**A**, **C**, **Z**) regardless of settings made in profiles for Level Meter calculations. Spectra are always linearly averaged. Thus, **TOTAL** values from 1/1 or 1/3-octave analysis can be different from those obtained for profiles (if the **LEQ Integration** was set as **Exponential**).*

For each octave or one-third octave band, the RMS, Min or Max result is calculated and presented as a bar on the spectrum plot. Results of 1/1 and 1/3-octave analysis (spectra) can be examined by the user on a display in the **Spectrum** presentation mode.

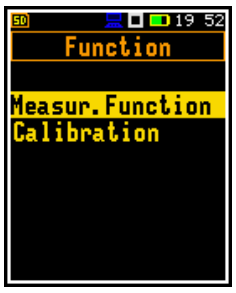


Besides results for bands three **Total** values are measured and displayed as an additional three bars on the spectrum plot. Parameters for Total values (e.g. filters) are set by default and cannot be changed.

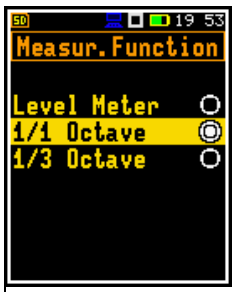
The read-out of the spectrum value can be done using a vertical cursor.

10.14.1 Selecting 1/1 Octave or 1/3 Octave function

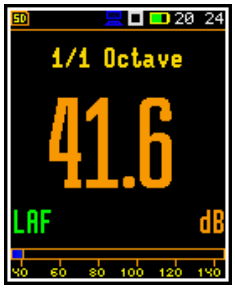
To select the 1/1 or 1/3-octave analysis function, open the **Measur. Function** position, select the **1/1 Octave** or **1/3 Octave** position and press **<Enter>**.



<ENT>



The information about the selection of the 1/1 or 1/3-octave analysis is displayed in the Running SPL mode (if this mode is switched on).



Note: *The **1/1 Octave** and **1/3 Octave** functions are optional and should be unlocked by entering the activation code in the text editor screen, which is opened after first attempt to select them. Once unlocked these options will be ready to use permanently.*

Note: *It is not possible to change the current function during a running measurement. In this case, the instrument displays for about 2 seconds the message: "Measurement in Progress". To change the current function, the measurement must be stopped!*

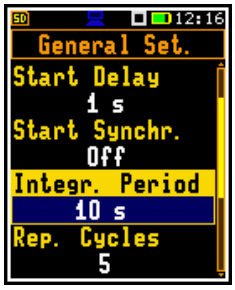
10.14.2 Configuring 1/1- and 1/3-octave analyser

10.14.2.1 General measurement settings for 1/1- and 1/3-octave analysis – General Settings

Execution of 1/1 or 1/3-octave analysis depends on certain set of parameters, configured in the **Measurement** section.

The averaging of results for each spectrum band is performed during the **Integration Period** and is repeated the **Repetition Cycles** times.

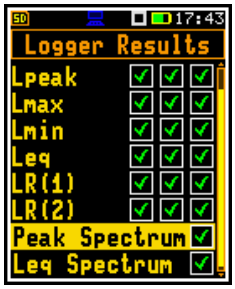
Both parameters are defined in the **General Settings** list.



10.14.2.2 Logging 1/1- and 1/3-octave spectra

Spectra are always logged together with Summary results in a logger file with **Integration Period** step. The first condition should be fulfilled, namely the **Logger** must be switched on (*path: <Menu> / Measurement / Logging / Logger Setup / Logger: On).*

The **Leq** and **Lpeak** results of 1/1 or 1/1-octave analysis can also be saved in the logger file with the step defined by the **Logger Step** parameter (*path: <Menu> / Measurement / Logging / Logger Setup*). The enabling of spectrum saving in the logger file with the **Logger step** is made by checking the **Peak Spectrum** or **Leq Spectrum** position with the ◄ / ► key.

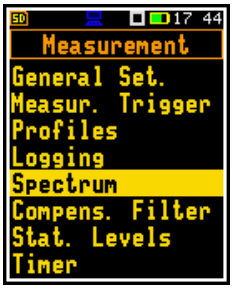


10.14.2.3 Setting parameters of 1/1- and 1/3-octave analysis - Spectrum

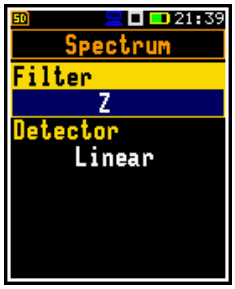
For active **1/1 Octave** or **1/3 Octave** functions the additional position (**Spectrum**) appears on the **Measurement** list.

The **Spectrum** position enables selecting the pre-weighting broadband frequency filter and LEQ detector for the octave or third octave analysis.

The **Detector** parameter can be set to **Linear**, **Fast** or **Slow**.



<ENT>



Following weighting filters are available for the 1/1 and 1/3-octave analysis in the **Filter** position:

- **A** class 1 according to the IEC 651 and IEC 61672-1:2013,
- **C** class 1 according to the IEC 651 and IEC 61672-1:2013,
- **Z** class 1 according to the IEC 61672-1:2013,
- **B** class 1 according to the IEC 651.

Filter characteristics are given in Appendix C.

10.14.3 Configuring 1/1- and 1/3-octave spectra view

The **Display** section is used for setting various parameters, which are mainly dedicated for control of the spectrum view. Following positions are used for setting up the presentation of 1/1 or 1/3-octave results:

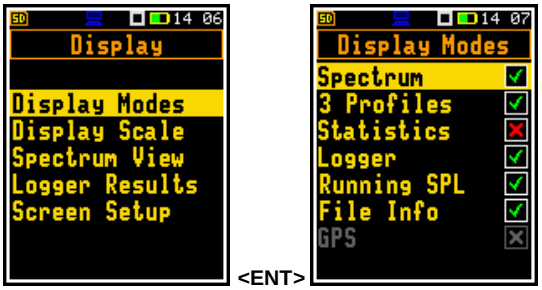
Display Modes allowing to switch on the **Spectrum** display mode;

Display Scale allowing to adjust scales of the spectrum plot and switch on/off the grid;

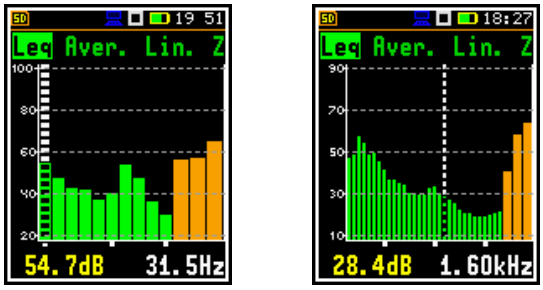
Spectrum View allowing to select spectra to be viewed: instantaneous, averaged, maximum or minimum.

10.14.3.1 Presentation of 1/1- and 1/3-octave spectra

The **Spectrum** position in the **Display Modes** list becomes available for the **1/1 Octave** and **1/3 Octave** functions and this position switches on or off the spectrum view.

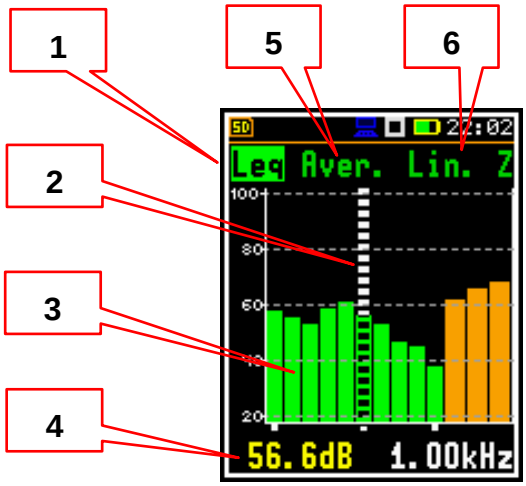


When **Spectrum** display mode is switched on, measurement screens in the **Spectrum** display mode became available.

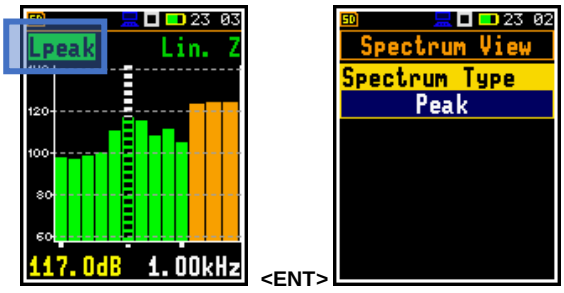


Spectrum mode fields

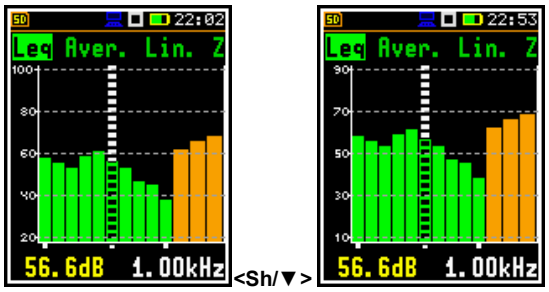
1. Spectrum type: **Leq**, **Lpeak**, **Lmin** or **Lmax**
2. Cursor position
3. Spectrum plot with three Total bars
4. Value and central frequency for the cursor position
5. Leq spectrum type: **Averaged** or **Instantaneous**
6. LEQ averaging and filter



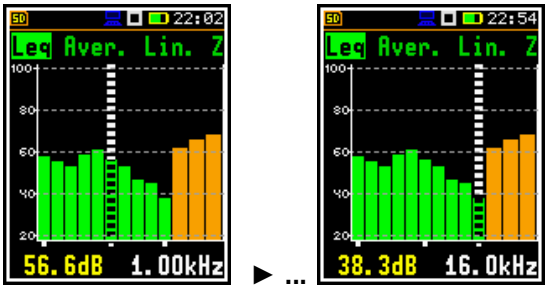
You may change the spectrum type in the **Spectrum** view by pressing the **<Enter>** key and entering the **Spectrum View** screen. In this screen, select new spectrum type and press **<Enter>**.



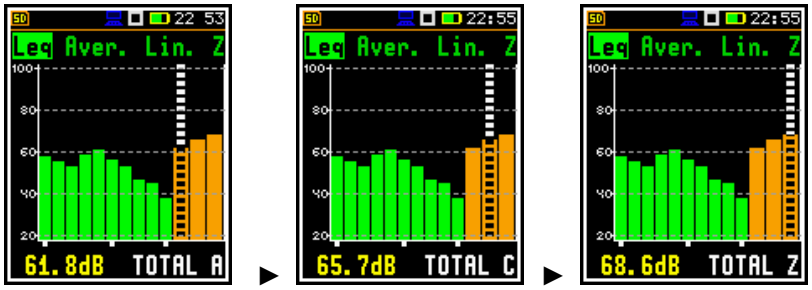
You can shift the Y-axis up or down during the spectrum presentation by pressing together the **<Shift>** and the ▲ / ▼ key.



You can change the cursor position with the ◄ / ► key. The frequency and appropriate dB value are presented in the line below the plot.

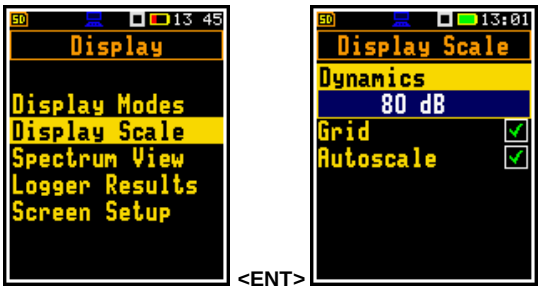


Total values are calculated with the filters **A**, **C** and **Z**, and are displayed at the bottom line of the screen when the cursor has been placed on the appropriate orange bar.



10.14.3.2 Adjusting spectrum plot scales – Display Scale

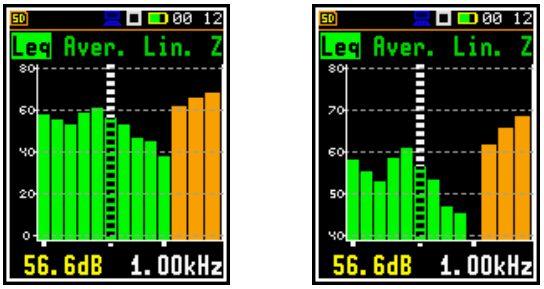
The **Display Scale** position enables changing the scale of the spectrum plot and switching the grid and automatic scale adjustment on/off.



Scaling vertical axis

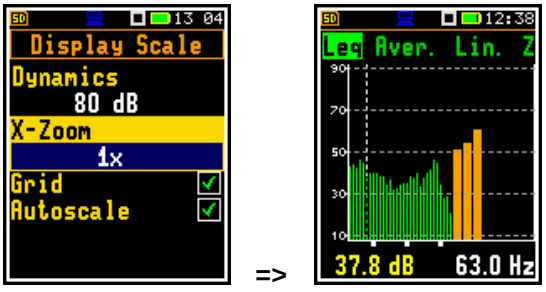
The **Dynamics** position enables selecting the required scale dynamic range of the spectrum plot. It is possible to select the range from the set: **10dB**, **20dB**, **40dB**, **80dB** and **120dB**.

The attached example shows spectrum view with 80dB and 40dB dynamics.

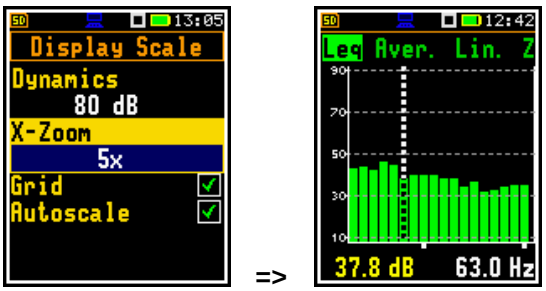


Zooming horizontal axis for 1/3-octaves

The **X-Zoom** position, appeared in the **1/3 Octave** mode, enables selecting the required resolution (zoom) of the spectrum plot. It is possible to select from **1x** to **5x** zoom.

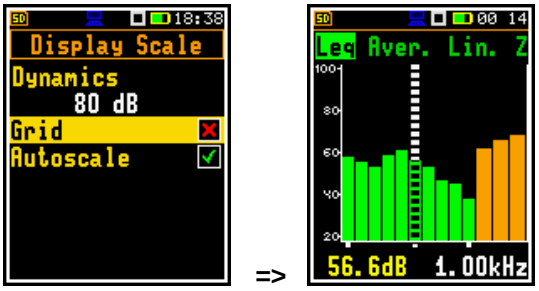


The example shows spectrum view with **1x** and **5x** zoom.



Switching grid on/off

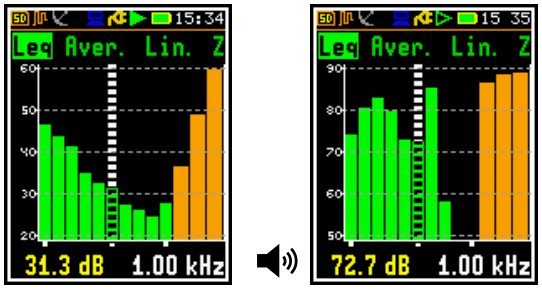
The **Grid** position switches on or off the grid in the spectrum view.



Switching on/off automatic Y-scale adjustment

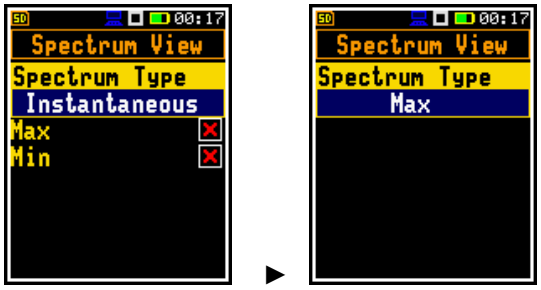
The **Autoscale** position switches on or off the automatic adjustment of the Y-axis scale dynamic range to the current spread between lowest and highest measured octave or third octave results.

The example shows scale changes after sudden increase of the sound pressure level.

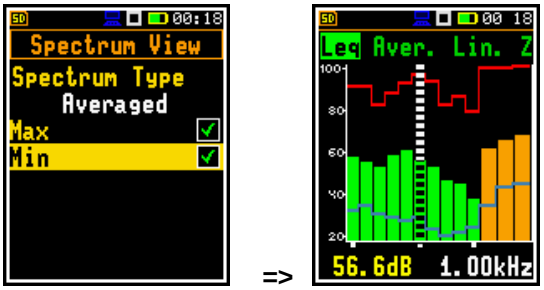


10.14.3.3 Selection of spectra to be viewed – Spectrum View

In the **Spectrum View** screen, which appears in the **1/1 Octave** or **1/3 Octave** functions, you can select different spectra to be visible on the display: **Averaged**, **Instantaneous**, **Peak**, **Max** or **Min**.



Minimum and maximum spectra can be presented at the same plot as main spectrum when the **Max** and/or **Min** parameter is switched on.



11 INSTRUMENT UPGRADE

There are three separate programs loaded into the instrument's memory: FIRMWARE BOOTSTRAP,and HARDBOOT.

FIRMWARE is a program dedicated for the main processor of the instrument which maintains functions in relation to the user interface, measurements, files and communication. SVANTEK constantly improves functionalities of their instruments, so it is recommended to install the most recent firmware upgrade.

BOOTSTRAP is a program for the main processor dedicated for the **FIRMWARE** upgrade.

HARDBOOT is inerasable program designed to conduct the upgrade or repair process of **BOOTSTRAP** only.

The user can upgrade **FIRMWARE** and **BOOTSTRAP** programs of the SV 307 instrument.

11.1 INSTRUMENT UPGRADE VIA USB

To upgrade the **FIRMWARE** program the **BOOTSTRAP** mode should be entered.

1. Switch the instrument off if it is switched on.
2. Connect **SV 307** to the PC using SC 316 cable.
3. Press and hold simultaneously the ◄ and ► keys and switch on the instrument, shortly pressing simultaneously the **<Shift>** and the **<Start/Stop>** keys. That boots the instrument into the **BOOTSTRAP** mode.
4. Run batch file from the upgrade package on your PC.

Note: *Downloading of new firmware does not erase communication settings such as APN, SSID, password, etc. Other measurement settings like measurement function, integration time, filters, detectors in profiles etc. are set to default values.*

11.2 INSTRUMENT UPGRADE VIA SVANNET

To load new firmware from SvanNET, go to **CONFIGURATION** view and in the **FIRMWARE UPGRADE** tab (see Chapter 8.2.2).

12 MAINTENANCE

12.1 MEMORY CARD EXTRACTION AND INSERTION

SV 307 is delivered with 16 GB micro SD-card - Kingston MicroSD HC Class 4 or equivalent.

Note: *The originally supplied Kingston MicroSD HC Class 4 memory card has been tested by SVANTEK and is strongly recommended for use when it is replaced.*

You may exchange it with the higher capacity card (up to 128 GB), but before insertion the card must be formatted as FAT32.

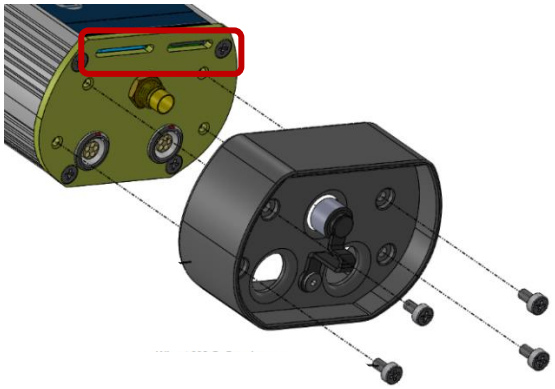
Note: *If you would like to use the card with higher capacity, consult this with the local distributer.*

To exchange the memory card, switch off the instrument, unscrew four bolts and detach the bottom plastic cover of SV 307 to have access to the micro SD-card slot.

To extract the card from the card-slot, push on the card and then pull it out of the slot.

While insertion the SD-card, a click sound indicates that the card is inserted properly. If necessary, use a tool (e.g. pen) to push the card right in.

Attach the bottom cover and screw four bolts back.



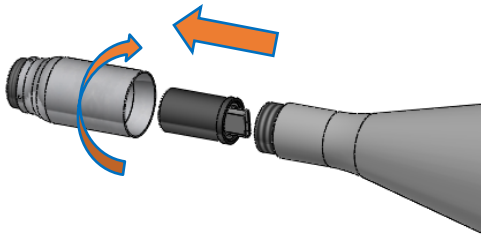
12.2 DISCONNECTING MICROPHONE

When the microphone requires service or you want to store it separately from the instrument, you can disconnect the microphone yourself.

To disconnect the microphone, switch off the instrument, unscrew the top cone with the anti-bird spikes and the extension sleeve from the microphone tube, rotating it counter-clockwise.

After that, unscrew the microphone protective sleeve and pull the microphone to remove it from the micro USB type C connector.

To reinstall the microphone, insert it into the micro USB type C connector and screw on the microphone protective sleeve.



Note: *The instrument set includes a protective microphone cap, which is recommended to have always on the microphone, when the instrument is not used for measurements!*

12.3 RESETTING THE INSTRUMENT

- **SYSTEM RESET:** internal software reset clears any setup configuration and brings back the default factory settings. See **Factory Settings** (*path: <Menu> / Auxiliary Setup*).

- **HARDWARE RESET:** internal hardware reset, no user data is changed. Make sure the battery is not exhausted, and the unit is turned off. Hold down the **<Shift>** and **<Start/Stop>** keys for 10 seconds, and then release them. Turn on the instrument as usually.

Note: *Hardware reset is only to be used in extreme situations such as an instrument hang-up.*

Be aware, that a hardware reset:

- will stop any pre-programmed auto-run modes,

- will stop measurement run!

12.4 PRESERVATION OF INTERNAL BATTERIES

- To preserve the life of the internal batteries, it is recommended that the instrument is turned off when it is stored.
- When the instrument is turned off, it still draws a small amount of battery power. Therefore, it is recommended to charge the cell every few months if it is not going to be used regularly.

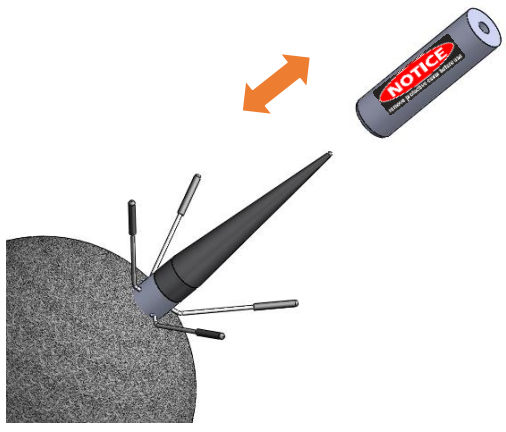
Note*: SV 307 should not be stored for a long time with discharged battery. Storing with the battery in discharged condition may damage it.*

Note*: If SV 307 is planned to be stored for a long period of time, it is recommended to charge its battery to 60% capacity. The battery should be charged at least once per 6 months.*

12.5 TRANSPORTATION AND STORAGE

For transportation or storage purpose, we recommend using the packaging provided by the manufacturer. In a potentially dirty industrial environment, it is advisable to use the carrying case provided by the manufacturer, which ensures excellent mechanical and environmental protection and long-term storage conditions.

Use the cone protection and the protective caps on the four anti-bird spikes during transportation and storage.



12.6 CLEANING

Clean the surface of the instrument with damp soft cloth.

The instrument sockets should be cleaned with the use of compressed air.

Note: *In cases of larger dirt, such as oil or grease, contact your Local Authorized Distributor or Svantek Service Office.*

12.7 TROUBLESHOOTING

- In case your instrument does not respond proceed with hardware reset of the instrument (see Chapter 12.3).
- In case the reset does not help call your Local Authorized Distributor or Svantek Service Office.

Should your SVANTEK professional measurement equipment need to be returned for repair or for calibration, please contact the service office at the following number or contact via the SVANTEK website.

Service Office: +48 (22) 51-88-320 or +48 (22) 51-88-322.

Office hours are 9:00 a.m. to 5:00 p.m. Central European Time.

E-mail: support@svantek.com.pl
office@svantek.com.pl

Internet: www.svantek.com

Address: SVANTEK Sp. z o.o.
Strzygłowska 81
04-872 Warszawa,
Poland

APPENDIX A. REMOTE CONTROL CODES

USB 2.0 interface is a serial interface working with 480 MHz clock which enables one to control remotely the device. Its speed is relatively high, and it ensures the common usage of USB in all produced nowadays Personal Computers.

Alternatively, all commands described in this appendix are valid for any other kinds of interfaces (if present) like **mobile (3G/4G)** communication **or RS232**. Mobile use TCP/IP or UDP communication protocols to exchange data with the instrument. Some of the instruments can also be controlled via SMS.

Functions, which are developed in order to control data flow in the serial interfaces, ensure:
- Bi-directional data transmission,
- Remote control of the instrument.

In order to program the serial interface, the user has to:
1. send a "function code",
2. get a response to the “function code”
3. send/receive a data file (optionally)

A.1 INPUT / OUTPUT TRANSMISSION TYPES

The following basic input / output transmission types (called functions) are available:

FUNCTION #1 – GENERAL CONTROL FUNCTIONS

FUNCTION #2 – MEASUREMENT RESULTS READ-OUT IN THE SLM MODE

FUNCTION #3 – MEASUREMENT RESULTS READ-OUT IN 1/1- AND 1/3-OCTAVE MODES

FUNCTION #4 – SETUP FILE READ-OUT

FUNCTION #5 – STATISTICAL ANALYSIS RESULTS READ-OUT

FUNCTION #7 – SPECIAL CONTROL FUNCTIONS

FUNCTION #9 – SETUP FILE WRITE-IN

FUNCTION #D – DATA FILES ACCESS

FUNCTION #S – DIRECT SETUP ACCESS

A.2 FUNCTION #1 – GENERAL CONTROL FUNCTIONS

#1 function enables the user to send the control setting codes to the instrument and read out a file containing the current control state. A list of the control setting codes is given in A.11 ***Control setting codes***. The format of #1 function is defined as follows:

#1,Xccc,Xccc,(...),Xccc; **(1)**

or

#1,Xccc,X?,Xccc,(...),X?,Xccc; **(2)**

or

#1,X?,X?,(...),X?; **(3)**

where:

X - group code, **ccc** – new code value,

X? - request to send the current X code setting.

In the first case (1) the instrument does not respond to a command, even if an error occurs.

In the second and third cases (2), (3) the instrument outputs control settings for all requests X? in the following format:

#1,Xccc,Xccc,(...),Xccc;

Note: *All bytes of that transmission are ASCII characters.*

Note: *Changing settings using #1 functions during measurements running state (#1,S1;) is blocked. Stop the measurements (#1,S0;) before changing the settings.*

In order to read out all current control settings the user should send to the device the following sequence of characters:

#1;

In this case the instrument outputs all control settings given in A.11 ***Control setting codes*** in the format:

#1,Xccc,Xccc,(...),Xccc;

Example: The instrument sends the following sequence of characters as an answer for the mentioned above request:

#1,U307,N1234,W1.22.1,Q0.18,M1,F2:1,F3:2,F1:3,J3:1,J3:2,J1:3,f1,C1:1,C1:2,C1:3,B0:1,B3:2,B15:3,b0,d1s,D1h,K5,L0,Y1,y-1,XT0,XL100,XQ0,Xq0,XA0,XD-1:1,XD-1:2,XD-1:3,XD-1:4,XD1:5,XD1:6,XH300,Xlapp.svannet.com,XJ8000,XK0,XNinternet,XOnone,XUnone,XV0.0.0.0,XXa,XXb,XXd,XXe,XXf,XXg,XXh,XXi,XXj,XXC0,XXE1,XXF,XXG,XXH,XXI,XXJ0,XXK,XXL,XXM,XXN0,XXO0,XXP,XXQ0,XXR0,XXS0,XXT,XXU,XXV0,XXW0,XXB0,XXl0,XXm0,XXn16,XXu0,XXv100,XXx0,XXy10,XXz0,XXY0,XXZ10,XXo1,XXq0,XXr1800,XXs3600,XXw10,Xi0,Xk0,Xw0,XB1,XZ1,XF0,XG1,Xx0,Xz0,Xc0,Xs0,Xt0,Xo1000,Xn1000,Xg0,Xh0,Xy2,S1,T1,e480,m0,s0,l100,O10,o0,t0,p1,u1,h2,E1663;

means that:

- SV 307 is investigated (**U307**); see #7,US; command for unit subtype information;
- its serial number is 1234 (**N1234**);
- software version number is 1.22.1 (**W1.22.1**);
- calibration factor is equal to 0.18 dB (**Q0.18**);
- **LEVEL METER** is selected as the measurement function (**M1**);
- **A** filter is selected in profile 1, SLM function (**F2:1**);
- **C** filter is selected in profile 2, SLM function (**F3:2**);
- **Z** filter is chosen in profile 3, SLM function (**F1:3**);
- **C** Peak filter is selected in profile 1, left channel, SLM function (J3:1);
- **C** Peak filter is selected in profile 2, left channel, SLM function (J3:2);
- **Z** Peak filter is selected in profile 3, left channel, SLM function (J1:3);
- **Z** filter is selected for **1/1 OCTAVE** or **1/3 OCTAVE** analysis (**f1**);
- **FAST** detector is selected in profile 1, SLM function (**C1:1**);
- **FAST** detector is chosen in profile 2, SLM function (**C1:2**);
- **FAST** detector is selected in profile 3, SLM function (**C1:3**);
- logger's buffer is not filled by the results from profile 1 (**B0:1**);
- **Lpeak** and **Lmax** values are stored in the files of the logger from profile 2 (**B3:2**);
- **Lpeak**, **Lmax**, **Lmin** and **Leq** values are stored in the files of the logger from profile 3 (**B15:3**);
- results of **1/1 OCTAVE** or **1/3 OCTAVE** analysis are not stored in the files of the logger (**b0**);
- results are stored in a logger's file every 1 second (**d1s**);
- integration period is equal to 1 hour (**D1h**);
- measurement has to be repeated 5 times (**K5**);

- linear detector is selected to the **Leq** calculations (**L0**);
- ... and so on.

See A.11 ***Control setting codes*** for more details.

Note: *Control settings presented in the instrument's response and not described in* A.11 ***Control setting codes*** *considered as reserved. Do not change these settings!*

A.3 FUNCTION #2 – MEASUREMENT RESULTS READ-OUT IN THE SLM MODE

#2 function enables one to read out the current measurement results from the selected profile.

#2 function has the format defined as follows:

#2 [,<aver>[<flags>]] [,<profile>] [[[,X?] ,X?] ,(...)];

where:

<aver> – type of results:

i – instantaneous results, i.e. results from the current cycle (default),

a – averaged results, i.e. results from the previous cycle,

c – 1 second results, i.e. results integrated for the last 1 second,

<flags> – flags:

s – measurements flags, i.e. measurements running,

<profile>– profile number:

1, 2 or 3 – one of the profile, i.e. only results from the given profile will be sent;

X – code of the specified result (see below); if no codes are specified all results will be sent;

In the case of **<profile> = 1, 2 or 3** the instrument sends results in the format defined as follows:

#2 [,<aver>[<flags>f]],<profile>,Xccc,(...);

where **f** is a flags value, e.g. 1 – measurements are running; **ccc** is the value of the result **X** or question mark (**?**) if result **X** is not available;

If no results are available, the instrument returns:

#2,?;

The **X** codes of the results from the **SLM** mode are defined as follows:

v under-range flag (ccc equals to 0 when the overload did not occur, 2 when the under-range took place during the last measurement period but did not occur in the last second of the measurement and 3 when the under-range took place during the last measurement period and it lasted in the last second of the measurement);

V overload flag (ccc equals to 0 or 1);

T time of the measurement (ccc – value in seconds);

x start date of the measurement in format ***dd/mm/yyyy*** (***dd*** – day, ***mm*** – month, ***yyyy*** - year)

t start time of the measurement in format ***hh/mm/ss*** (***hh*** – hour, ***mm*** – minute, ***ss*** - second)

P **Lpeak** value (ccc – the value in dB);

M **Lmax** value (ccc – the value in dB);

N **Lmin** value (ccc – the value in dB);

S **L** result (ccc – the value in dB);

R **Leq** result (ccc – the value in dB).

U **LE** result (ccc – the value in dB);
B(k) **Lden** result (ccc – the value in dB; k – flag determining the kind of the result);
I(nn) **LEPd** result (ccc – the value in dB, nn – the value of Exposure Time in minutes);
Y **Ltm3** result (ccc – the value in dB);
Z **LTeq** result (ccc – the value in dB);
L(nn) **L** result of the nn statistics (ccc – the value in dB).
g **LR1** result (ccc – the value in dB);
G **LR2** result (ccc – the value in dB);
s **SD** result (ccc – the value in dB);
k **EX** result (ccc – the value in dB);
O **NC** result;
K **NR** result;

Note: *In the case of* ***Lden****, the value k placed in the parenthesis after the code* ***B****, denotes the kind of the currently measured result. The kind of the* ***Lden*** *result depends on the time during which the measurements were performed (****d*** *denotes day,* ***e*** *denotes evening and* ***n*** *denotes night). The corresponding values of k parameter and the kind of the measured* ***Lden*** *result are presented below:*

k = 1 ***Ld*** *result,*
k = 2 ***Le*** *result,*
k = 3 ***Lde*** *result,*
k = 4 ***Ln*** *result,*
k = 5 ***Lnd*** *result,*
k = 6 ***Len*** *result,*
k = 7 ***Lden*** *result.*

The exemplary results of the instrument's response after sending to it the following sequence of characters: **#2,1;** coming from the first profile are given below:

#2,1,x17/03/2014,t13:44:28,v0,V0,T10,P79.97,M52.92,N38.50,S46.35,R43.91,U53.91,B(1)43.91,I(480)43.92, Y50.67,Z51.15,L(01)55.00,L(10)45.60,L(20)44.30,L(30)42.80,L(40)41.50,L(50)40.80,L(60)40.40,L(70)40.00,L (80)39.50,L(90)39.00 ,g?,G?;

Note: *The presented above order of the measurement results sent out by the instrument does not depend about the characters sent to the unit.*

Example: After sending to the instrument the string:

#2,1,T?,R?,V?,P?,L?;

the unit sends out the results of measurement coming from the first profile in predefined, described above, order:

#2,1,V0,T1,P65.80,R43.99,L(01)52.00,L(10)51.10,L(20)46.10,L(30)44.10,L(40)38.60,L(50)38.10,L(60)37. 60,L(70)37.10,L(80)36.60,L(90)36.10;

Note: *All bytes of that transmission are ASCII characters.*

A.4 FUNCTION #3 – MEASUREMENT RESULTS READ-OUT IN 1/1- AND 1/3-OCTAVE MODES

#3 function enables one to read out the current measurement results in **1/1 OCTAVE** or **1/3 OCTAVE** modes, depends on device function selected.

#3 function format is defined as follows:

#3[,T]; - averaged spectrum

#3[,T],A; - averaged spectrum

#3[,T],I; - instantaneous spectrum

#3[,T],M; - max spectrum

#3[,T],N; - min spectrum

#3[,T],P; - peak spectrum

T - include measurement time in the instrument's response

The device responds, sending the last measured spectrum (when the instrument is in STOP state) or currently measured spectrum (when the instrument is in RUN state) in the following format:

#3[,T<time>];<Status Byte> <LSB of the transmission counter> <MSB of the transmission counter> <data byte> (...) <data byte>

<time> is the measurement time given in seconds

<Status Byte> gives the information about the current state of the instrument.

D7	D6	D5	D4	D3	D2	D1	D0

where:

D7 = 0 means that "overload does not happen",
= 1 means that "overload appeared",

D5 = 0 means that "spectrum is not averaged ",
= 1 means that "spectrum is averaged ",

D4 = 0 the instantaneous current result (RUN State),
= 1 the final result (STOP State),

D3 = 1 results in **1/3 OCTAVE** mode,

D2 = 1 results in **1/1 OCTAVE** mode,

D6, D1, D0 reserved bits.

Note: *ASCII part of the response ends with semicolon ";". Status byte, transmission counter and data bytes are coded in binary form.*

Note: *The measurement result is coded in binary form as dB•100 (e.g. 34.5 dB is sent as binary number 3450).*

A.5 FUNCTION #4 – SETUP FILE READ-OUT

#4 function enables the user to read-out a file from the internal Flash-disk or RAM memory. The data file formats are given in Appendix B.

#4 function formats are defined as follows:

#4,0,\; file containing the catalogue,

#4,0,?; count of the files,

#4,0,index,count; part of the file containing the catalogue,

where:

index - first record,

count - number of records in the catalogue.

The catalogue of the files is a set of the records containing 16 words (16 bits each). Each record describes one file saved in the instrument's Flash-disk or RAM. The record structure is as follows:

words 0 - 3	8 characters of the file name,
word 4	type (binary number),
word 5	reserved,
word 6	least significant word of the file size,
word 7	most significant word of the file size,
words 8 - 15	reserved.

#4,4; current setup file,

#4,4,?; size of the current setup file,

#4,4,offset,length; part of current setup file,

where:

offset - offset from the beginning of the current setup file,

length - number of bytes to read,

Note: *The "\" character is treated as the file name of the catalogue and must be sent to the instrument.*

All data words are sent **<LSB>** (least significant byte) first.

When an error is detected in the file specification or data, the instrument respond with:

#4,?;

Note: *Current setup file placed in RAM is serviced by this command in the SV 307 only. For data files access see* A.9 **Function #D – data files access***.*

A.6 FUNCTION #5 – STATISTICAL ANALYSIS RESULTS READ-OUT

#5 function enables one to read out the statistical analysis results.

#5 function format is defined as follows:

#5,p;

where:

p - the number of the profile (1, 2 or 3)

The device responds, sending the current classes of the statistics in the following format:

#5,p;<Status Byte> <LSB of the transmission counter> <MSB of the transmission counter> <NofClasses><BottomClass><ClassWidth><Counter of the class> (...) <Counter of the class>

Status Byte gives the information about the current state of the instrument.

D7	D6	D5	D4	D3	D2	D1	D0

where:

D7 = 0 means "overload does not happen",
= 1 means "overload appeared",
D6 = 1 reserved,
D5 = 0 instantaneous current result (RUN State),
= 1 final result (STOP State),
D0 to D4 reserved bits.

***Note:** There is no subsequent transmission in case the **Status Byte** is zero.*

The **transmission counter** is a two-byte word denoting the number of the remaining bytes to be transmitted. Its value is calculated from the formulae:

Transmission counter = 6+n * (4 * the number of the classes in the statistics)

where:

n is a number of the transmitted statistics. For p = 1, 2 or 3 only one statistic is transmitted (n = 1).

NofClasses is a two-byte word denoting the number of classes in the statistic.

BottomClass is a two-byte word denoting the lower limit of the first class (*100 dB).

ClassWidth is a two-byte word denoting the width of the class (*100 dB).

Counter of the class is a four-byte word containing the number of the measurements belonging to the current class.

***Note:** The bytes in the words are sent **<LSB>** (least significant byte) first.*

***Note:** ASCII part of the response ends with semicolon ";". Status byte, transmission counter and data bytes are coded in binary form.*

A.7 FUNCTION #7 – SPECIAL CONTROL FUNCTIONS

#7 function enables the user to perform special control functions. **Some of them should be used with the extreme care.**

#7 function format is defined as follows.

To read settings a query should be send to the device:

#7,<code>;

where **<code>** is a two ASCII letter code.

The device responds with a control settings:

#7,<code>,set1[,set2[,set3[,...[,setN]]]];

where **<code>** is the same code sent in the query and **set1, set2,... setN** are settings.

To write settings to the device follow the opposite procedure. Send to the device:

#7,<code>,set1[,set2[,set3[,...[,setN]]]];

In case of success the device responds with:

#7,<code>;

In case of an unknown function or error the device returns:

#7,?;

Codes and settings for #7 function are described in the A.11 ***Control setting codes***.

Note: *#7 function protocol consist of ASCII characters only.*

Note: *Some of the #7 functions are blocked during measurements running state (#1,S1;). Stop the measurements (#1,S0;) before changing these settings.*

A.8 FUNCTION #9 – SETUP FILE WRITE-IN

#9 function enables the user to write a configuration file into the instrument's storage or non-volatile memory. The data file formats are given in Appendix B.

#9 function formats are defined as follows:

#9,<FILE_TYPE>,<FILE_LENGTH>,<DATA>

where:

<FILE_TYPE>	type of the file
	2 - setup file (file is saved on SD card; does not change current setup),
	4 - current setup file,
<FILE_LENGTH>	length of the file in bytes,
<DATA>	binary content of the file.

Note: *#9 function is blocked during measurements running state (#1,S1;). Stop the measurements (#1,S0;) before using the function.*

A.9 FUNCTION #D – DATA FILES ACCESS

#D functions are used to access data files in the instrument's storage like microSD card or USB Flash Disc with FAT file system. A basic knowledge of FAT file system is necessary to use these functions.

#D functions take the following parameters:

<disk>	logical disk number:
	0 – SD-card,
	1 – USB Disk (not implemented),
	2 – Internal Memory (not implemented)
<address>	directory address (cluster number),
<offsetB>	offset of the first byte to read (an even number),
<nB>	number of bytes to read (an even number),
<data>	binary data,
<count>	directory size in bytes,
<name>	filename in the format XXXXXXXX.YYY (XXXXXXXX – filename, YYY- filename extension),
<dirName>	directory name,

<nBwr> number of bytes to write.

1) **#D,c,?;** this function returns a list of available disks in format:

#D,c,<disk1>[,<disk2>[,<disk3>]];

2) **#D,d,?;** this function returns parameters of the working directory in format:

#D,d,<disk>,<address>,<count>;

3) **#D,d,<disk>,<address>;** this function enables to change the working directory.

Response:

#D,d; - command was executed

#D,d,?; - command cannot be executed

4) **#D,r,<disk>,<address>,<offsetB>,<nB>;** the function enables to read a file from the working directory.

Response:

#D,r,<disk>,<address>,<offsetB>,<nB>;[<data>]

5) **#D,w,<name>,<nBwr>;<data>** the function enables to write a file to the working directory.

Response:

#D,w; - command was executed

#D,w,?; - command cannot be executed

6) **#D,e,<name>;** function enables to delete a file in working directory.

Response:

#D,e; - command was executed

#D,e,?; - command cannot be executed

7) **#D,e;** function enables to delete all files in the working directory.

Response:

#D,e; - command was executed

#D,e,?; - command cannot be executed

8) **#D,m,<address>,<dirName>;** function enables to create a subdirectory in the directory defined by <address>.

Response:

#D,m; - command was executed

#D,m,?; - command cannot be executed

9) **#D,f,<address>;** function enables to delete directory and its contents (files and subdirectories).

Response:

#D,f; - command was executed

#D,f,?; - command cannot be executed

10) **#D,j,?;** this function returns parameters of the archive directory in format:

#D,j,<disk>,<address>;

11) **#D,s,?;** this function returns parameters of the setup directory in format:

#D,s,<disk>,<address>;

Note: *Only read functions are available during measurements running state (#1,S1;). Stop the measurements (#1,S0;) to unlock all the functions.*

A.10 FUNCTION #S – DIRECT SETUP ACCESS

#S function enables to read/write instrument's settings in a direct manner. Any settings changed by this command affect current setup, are written into non-volatile memory and are available on the next power up.

#S function format is defined as follows.

To read settings a query should be send to the device:

#S[,<code1>[,<code2>[,code3[,...]]]];

where **<codeN>** is a two to four ASCII letter setting code.

The device responds with a control settings:

#S[,<code1>:<set1>[,<code2>:<set2>[,<code3>:<set3>[,...]]]];

where **<codeN>** is the same settings code sent in the query and <**setN>** is a settings value.

To return all settings available send:

#S;

To write settings to the device follow the opposite procedure. Send to the device:

#S,<code1>:<set1>[,<code2>:<set2>[,<code3>:<set3>[,...]]];

In case of success the device responds with the same ASCII string:

#S,<code1>:<set1>[,<code2>:<set2>[,<code3>:<set3>[,...]]];

In case of an error (e.g. settings code does not exist or parameter value is out of range) the device respond with "?" instead of **<setN>** value:

#S,<codeN>:?;

For example, if three parameters are set and <set2> is out of range the device response is:

#S,<code1>:<set1>,<code2>:?,<code3>:<set3>;

Codes and settings for #S function are described in the A.11 ***Control setting codes***.

Note: *#S function protocol consist of ASCII characters only.*

Note: *Some of the #S functions are blocked during measurements running state (#1,S1;). Stop the measurements (#1,S0;) before changing these settings.*

A.11 CONTROL SETTING CODES

The control setting codes used in the SV 307 instrument are given in the below tables.

Table A.1 Unit information

Table A.2 Measurements settings and control

Table A.3 Calibration and microphone settings

Table A.4 Profile settings

Table A.5 Spectrum settings

Table A.6 Statistical settings

Table A.7 Audio settings

Table A.8 Logger settings

Table A.9 CSV export settings

Table A.10 System check settings

Table A.11 Display and keyboard settings

Table A.12 Setup settings

Table A.13 Alarms settings

Table A.14 General settings

Table A.15 Power settings

Table A.16 System log settings

Table A.17 Position and time settings

Table A.18 Extended I/O

Table A.19 Mobile network settings and status

Table A.20 Local network settings and status

Notes:

*- function codes marked in green are **read only**!*

*- function codes marked in red are **locked during measurements run state**! Stop measurements before changing these settings.*

*- values in square brackets are **[optional]**!*

- values are written in the form of numbers or in the form of a bit number (prefix 'b') or hexadecimal (prefix '0x') e.g. the b5 is equal to the number 32 = 2^5 or hexadecimal 0x20.

Table A.1 Unit information

Group name	#1 code	#7 code	#S code	Code description
Unit type	U			307
Unit subtype		US		Returns unit subtype. 2 – SV 307 (standard version) 3 – SV 307 (Spanish Welmec version) 4 – SV 307 (German Welmec version)
Serial number	N			xxxxxx
Software version	W			a.bb.c – firmware version a.bb.**0**c – beta firmware version
			AA	abbc - firmware version in hex format
Files system version		FS		a.bb - file system version
PIC version		PI		x.xx - version of auxiliary microcontroller
Hardboot version		VH		x.xx - version of hardboot program
Bootstrap version		VB		x.xx - version of bootstrap program

Table A.2 Measurements settings and control

Group name	#1 code	#7 code	#S code	Code description
Measurement function	M		BB	1 - **LEVEL METER** 2 - **1/1 OCTAVE** analyser 3 - **1/3 OCTAVE** analyser
Measurement state	S			0 - **STOP** 1 - **START** 2 - **PAUSE** 3 - **System Check** (read only) 4 - **Delay before START** (read only)
Start delay	Y		BD	nn - nn delay given in seconds ∈ (0 ÷ 59) and (60 ÷ 3600) with step 60s
Start synchronization	y		BN	0 - switched off (**OFF**) -1 - synchronization to full second 1 - synchronization to 1 min. 15 - synchronization to 15 min. 30 - synchronization to 30 min. 60 - synchronization to 1 hour.
Integration period	D			0 - infinity (measurement finished by pressing the **Stop** or remotely - by sending S0 control code) nns - nn number in seconds nnm - nn number in minutes nnh - nn number in hours
			BE	0 - infinity (measurement finished by pressing the **Stop** or remotely - by sending S0 control code)

Group name	#1 code	#7 code	#S code	Code description
				1 - 24 hours 2 - 8 hours 3 - 1 hour 4 - 15 minutes 5 - 5 minutes 6 - 1 minute x ∈ (7 ÷ 65) - (x-6) seconds x ∈ (66 ÷ 124)- (x-65) minutes x ∈ (125÷148)- (x-124) hours 149 - infinity
Repetition number	**K**		**BF**	Repetition number of the measurement cycles. 0 - infinity (measurement finished by pressing the **Stop** or remotely - by sending S0 control code) nnnn - nnnn number of repetitions ∈ (1 ÷ 1000)
Detector type in the **LEQ** function	**L**		**BG**	0 - **LINEAR** 1 - **EXPONENTIAL**
Day time limits		**DL**	**BH**	0 - 6h-18h 1 - 7h-19h
Rolling time (1)	**XXr**		**BT**	nn- nn time in seconds ∈(1 ÷60) nn- nn time in minutes multiplied by 60 ∈(60 ÷3600)
Rolling time (2)	**XXs**		**BU**	nn- nn time in seconds ∈(1 ÷60) nn- nn time in minutes multiplied by 60 ∈(60 ÷3600)
Exposure Time	**e**		**EA**	x - time in minutes ∈ (1 ÷ 720)
Microphone compensation		**MC**	**JD**	0 - Off 1 - On
Free field compensation		**FF**	**JP**	0 - Off 1 - ENVIRONMENTAL 2 - AIRPORT
Measure trigger mode	**m**		**FA**	0 - Off 2 - slope+ 3 - slope- 4 - level+ 5 - level- 6 - gradient+ 10 - external I/O
Measure trigger level	**l**		**FI**	x - level [dB] ∈(24 ÷ 136); default 100dB
Measure trigger gradient	**o**		**FK**	x - gradient [dB] ∈(1 ÷ 100); default 10dB/(trigger period)
Auto-Run		**AS**		#7,AS,<e>,<HH>,<MM>,<hh>,<mm>,<dW>,<mR>; where: <e> - On (e=1), Off (e=0), <HH> - hour of the measurement start, <MM> -minutes of the measurement start, <hh> - hour of the measurement stop,

Group name	#1 code	#7 code	#S code	Code description
				<mm> -minutes of the measurement stop, <dW> - day of week in which the measurement will be done defined as a sum of flags: b0 - Monday b1 - Tuesday b2 - Wednesday b3 - Thursday b4 - Friday b5 - Saturday b6 - Sunday <mR> - maximum number of the measurement days,
			MR	<e> - On (e=1), Off (e=0)
			MJ	<HH> - hour of the measurement start
			MK	<MM> -minutes of the measurement start
			ML	<hh> - hour of the measurement stop
			MM	<mm> -minutes of the measurement stop
			MN	<dW> - day of week
			MO	<mR> - maximum number of the measurement days

Table A.3 Calibration and microphone settings

Group name	#1 code	#7 code	#S code	Code description
Calibration factor	Q			nn.nn - calibration factor [dB] represented as real number ∈(-10.00 ÷ 10.00) *Read only for Unit Subtype 3 and 4*
			AJ	nnnn - calibration factor [dB] multiplied by 100 ∈ (-1000 ÷ 1000).
Last calibration type			AF	Previously performed calibration type 0 - none 1 - **BY MEASUREMENT** (manual) 2 - **REMOTE** 3 - **FACTORY CALIBRATION** 4 - **AUTOCAL CALIBRATION**
Last calibration date and time		CT		Function returns calibration date and time in the format: **#7,CT,DD-MM-YYYY,hh:mm:ss;** where **hh:mm:ss** denotes the time and **DD/MM/YYYY** gives the date
			AG	Last calibration date d - coded data ∈(0 ÷ 65535) Date decoding in C language: day = (d & 0x1F);

Group name	#1 code	#7 code	#S code	Code description
				month = ((d>>5) & 0x0F); year = ((d>>9) & 0x7F) + 2000;

			AH	Last calibration time
				t - t coded time ∈(0 ÷ 65535)
				Time decoding in C language:
				sec = (t%30);
				min = ((t/30)%60);
				hour = (t/1800);
				Note: time resolution is 2 seconds!

Last calibration ref. level	q			nnn.nn - calibration reference level [dB]
			AI	nnnn - calibration reference level [dB] multiplied by 100
Calibration history file version			AT	v - version of calibration history file "**C.TXT**"
Calibration history file split size	XXw		AW	s - a size limit of the calibration history "**C.TXT**" file [MB] ∈(0 ÷ 255) *Note: A new file is created after the size limit is reached.*
Auto calibration settings		AC	JF	0 - **Off** 1 - **On**
Post calibration settings			JA	0 - **Off** 1 - **Last file** 2 - **Files after last calibration**
Microphone TEDs type		TT		Returns type of microphone saved in TEDS memory. Where -1 - unknown, 30 - ST30 71 - SL3071
Microphone TEDs serial number		TS		Returns serial number of microphone saved in TEDS memory in format. #7,TS,<sn>[,<ver>]; Where <sn> - microphone serial number, <ver> - version of ST30
Microphone TEDs calibration		TC		Returns calibration factor of microphone saved in TEDS memory.
Microphone TEDs factory calibration		TF		Returns factory calibration factor of microphone saved in TEDS memory.

Table A.4 Profile settings

Group name	#1 code	#7 code	#S code	Code description
Filter type in profile n	F			Fk:n - k filter in profile n

Group name	#1 code	#7 code	#S code	Code description
				k: 1 - **Z** filter, 2 – **A** filter, 3 – **C** filter, 5 – **B**, 6 – **LF** filter n: 1, 2, 3 – profile number: 1, 2 or 3
			BIn	k - k filter in profile n+1, n ∈(0 ÷ 2)
Peak Filter type in profile n	**J**			Fk:n - k filter in profile n k: 1 - **Z** filter, 2 – **A** filter, 3 – **C** filter, 5 – **B**, 6 – **LF** filter n: 1, 2, 3 – profile number: 1, 2 or 3
			BJn	k - k filter in profile n+1, n ∈(0 ÷ 2)
Detector type in profile n	**C**			Ck:n - k detector in profile n k: 0 - **IMPULSE**, 1 – **FAST**, 2 – **SLOW** n: 1, 2, 3 – profile number: 1, 2 or 3
			BKn	k - k detector in profile n+1, n ∈ (0 ÷ 2)

Table A.5 Spectrum settings

Group name	#1 code	#7 code	#S code	Code description
Filter type in **1/x OCTAVE** analysis	**f**		**BL**	1 - **Z** filter 2 - **A** filter 3 - **C** filter 5 - **B** filter
Detector type in **1/x OCTAVE** analysis	**XXB**		**BS**	0 - **LINEAR** 1 - **FAST** 2 - **SLOW**

Table A.6 Statistical settings

Group name	#1 code	#7 code	#S code	Code description
Statistical levels		**SL**		Reading (response from the instrument): #7,SL,<sl1>,<sl2>,<sl3>,<sl4>,<sl5>,<sl6>,<sl7>,<sl8>,<sl9>,<sl10>; Writing: #7,SL,<sl_index>,<sl_level>; This function sets statistical levels where <sl_index> is the statistical index ∈(1 ÷ 10), <sl_level> is the statistical level [%] ∈(1 ÷ 99)
			RA	<sl1> - statistical level 1
			RB	<sl2> - statistical level 2
			RC	<sl3> - statistical level 3
			RD	<sl4> - statistical level 4
			RE	<sl5> - statistical level 5
			RF	<sl6> - statistical level 6

Group name	#1 code	#7 code	#S code	Code description
			RG	<sl7> - statistical level 7
			RH	<sl8> - statistical level 8
			RI	<sl9> - statistical level 9
			RJ	<sl10> - statistical level 10

Table A.7 Audio settings

Group name	#1 code	#7 code	#S code	Code description
Wave file name			IB	xxxxxxxx – up to 8 characters (permitted characters: 0:9, A:Z, and '_'). Default name "R1"
Last wave file name		LW		a name of a previous wave file
Wave recording mode	XXu		IA	0 - Off 1 - continuous 2 - slope+ 3 - slope- 4 - level+ 5 - level- 6 - gradient+ 7 - manual 8 - integration period 10 - external I/O 11 - alarm
Format	XXm		IC	0 - PCM 1 - Extensible 2 - A-Law
Bits per sample	XXn		IR	16 - 16 bits 24 - 24 bits
Sampling	XXl		IE	0 - 48 kHz 1 - 24 kHz 2 - 12 kHz 3 - 6 kHz
Filter	XXo		ID	1 - **Z** filter 2 - **A** filter 3 - **C** filter 5 - **B** filter
Gain	XXx		IO	x - x gain [dB] used in 16 bit mode $\in(0 \div 40)$
Trigger level	XXv		II	x - x level [dB] $\in(24 \div 136)$; default 100dB
Trigger period	XXY		IJ	0 - logger step 5 - 0.5 ms 1000 - 100 ms 10000 - 1 s
Trigger gradient	XXZ		IK	x - x gradient [dB] $\in(1 \div 100)$; default 10dB/(trigger period)
Pre trigger	XXz		IL	x - x pre trigger time [s] (default 1s) $\in$ $(0 \div 60)$ - for 6 kHz sampling $(0 \div 30)$ - for 12 kHz sampling

Group name	#1 code	#7 code	#S code	Code description
				(0 ÷ 15) - for 24 kHz sampling (0 ÷ 8) - for 48 kHz sampling
Recording time	XXy		IN	x - x recording time [s]; ∈ (1 ÷ 59), (60 ÷ 3600) with 60s steps and (3600 ÷ 28800) with 3600s steps
Length Limit	XXq		IP	0 - file size limit 4GB x - file size limit in minutes; ∈ (1 ÷ 480)
Manual recording		EW		This function allows remote manual triggering of the wave/event recording. Reading: #7,EW,<run>,<time>; where <run> - recording status 0 - not active 1 - active <time> - recording time [s] Writing: #7,EW,<mode>[,<time>]; <mode> - recording mode 0 - disabled 1 - enabled <time> - recording time [s] *Notes: function is active only during measurements running state.*

Table A.8 Logger settings

Group name	#1 code	#7 code	#S code	Code description
Logger file name			DC	xxxxxxxx – up to 8 characters (permitted characters: 0:9, A:Z, and '_'). Default name "L1"
Last logger file name		LB		a name of a previous logger file
Logger step	d			nn - nn number of milliseconds ∈ (100,200,500) nns - nn number of seconds ∈ (1 ÷ 60) nnm - nn number of minutes ∈ (1 ÷ 60)
			DB	nn - nn number of milliseconds ∈ (100,200,500), (1000 ÷ 60000) with 1000ms steps and (60000 ÷ 3600000) with 60000ms steps
Logger	T		DA	0 - Off 1 - On *Note: this setting must be on in order to create a logger data file!*
Logger results in profile n	B			Bx:n - x – sum of the following flags:

Group name	#1 code	#7 code	#S code	Code description
				b0 - logger with **Lpeak** values in profile n b1 - logger with **Lmax** values in profile n b2 - logger with **Lmin** values in profile n b3 - logger with **Leq** values in profile n b4 - reserved b5 - logger with **LR1** values in profile n b6 - logger with **LR2** values in profile n n – profile ∈ (1 ÷ 3)
			DDn	x - x logger results in profile n+1, n ∈(0 ÷ 2)
Logger meteo data	**p**		**DL**	0 - Off 1 - On
Logger dust monitor data	**u**		**DM**	0 - Off 1 - On
Summary results	**XXE**		**DG**	0 - Off 1 - On *Note: this is a main switch for all summary results.*
Summary results selection	**E**		**DF**	x - x – sum of the following flags: b0 - summary results for profiles, b1 - averaged 1/x OCTAVE spectrum, b2 - maximum 1/x OCTAVE spectrum, b3 - minimum 1/x OCTAVE spectrum b4 - peak 1/x OCTAVE spectrum b5 - statistical levels, b6 - sstatistical analysis in profiles, b7 - sstatistical analysis in 1/x octave, b8 - reserved, b9 - meteo, b10 - dust monitor data,
Summary result in profile n			**DNn**	summary results in profile n+1, n ∈(0 ÷ 2) x - x – sum of the following flags: b0 - save **Lpeak** summary results in profile b1 - save **LE** summary results in profile b2 - save **Lmax** summary results in profile b3 - save **Lmin** summary results in profile b4 - save **L** summary results in profile b5 - save **Leq** summary results in profile b6 - save **Lden** summary results in profile b7 - save **Ltm3** summary results in profile b8 - save **LTeq** summary results in profile b9 - save **LR1** summary results in profile b10 - save **LR2** summary results in profile b11 - save **EX** summary results in profile b12 - save **SD** summary results in profile
Summary results common			**DO**	x - x – sum of the following flags: b0 - save overload time for summary results b1 - save **NR** summary results b2 - save **NC** summary results

Group name	#1 code	#7 code	#S code	Code description
Summary results statistics			**DPn**	**Lnn** summary results in profile n+1, n ∈(0 ÷ 2) x - x – sum of the following flags: b0 - save 1st **Lnn** summary results in profile b1 - save 2nd **Lnn** summary results in profile b2 - save 3rd **Lnn** summary results in profile b3 - save 4th **Lnn** summary results in profile b4 - save 5th **Lnn** summary results in profile b5 - save 6th **Lnn** summary results in profile b6 - save 7th **Lnn** summary results in profile b7 - save 8th **Lnn** summary results in profile b8 - save 9th **Lnn** summary results in profile b9 - save 10th **Lnn** summary results in profile
1/x OCTAVE analysis results	**b**		**DE**	x - x – sum of the following flags: b0 - logger with **Lpeak** spectrum b3 - logger with **Leq** spectrum
Logger File Splitting Mode	**XA**		**DH**	0 switched off (**OFF**) -1 - file is created for each measurement cycle. 15 - file is created every 15 min, synchronized to RTC. 30 - file is created every 30 min, synchronized to RTC. 60 - file is created every 1 hour, synchronized to RTC. 1440 - file is created on the specified times, see next parameter *Note: for "-1" – integration period must be at least 60s*
Specified Time for Logger File Splitting	**XD**			XDx:n – x = -1 (switched off) x = 0 ÷ 1439 (time in minutes) n = 1 ÷ 6 (specified time number) *Note: valid only if Split Mode is equal to 1440*
			DI	Active split time number x - x – sum of the following flags b0 - split on time number 1 b1 - split on time number 2 b2 - split on time number 3 b3 - split on time number 4 b4 - split on time number 5 b5 - split on time number 6
			DJn	Split hour (0 ÷ 23) for time number n-1, n ∈(0 ÷ 5)
			DKn	Split minute (0 ÷ 59) for time number n-1, n ∈(0 ÷ 5)
User text			**BV**	text – to up to 128 characters of user text added each data file. Default text " ". Permitted characters: 0-9, a-z, A-Z, space and the following characters !"#$%&')(*+-./:<=>?@[\]^}_{`|~

Table A.9 CSV export settings

Group name	#1 code	#7 code	#S code	Code description
Summary results saved in CSV file		CV		Reading (response from the instrument): #7,CV,<prof1>,<prof2>,<prof3>,<spec>,<err>; Writing: #7,CV,<prof1>,<prof2>,<prof3>,<spec>; where <err> - CSV file error; 0 – no error <prof1>, <prof2>, <prof3> - profile summary results defined as a sum of the following flags: b0 - **Time**, b1 - **Lpeak**, b2 - **Lmax**, b3 - **Lmin**, b4 - **L**, b5 - **Leq**, b6 - **LE**, b7 - **Lden**, b8 - **LEPd**, b9 - **Ltm3**, b10 - **LTeq**, b11 - **Lnn**, b12 - **LR1**, b13 - **LR2**, b14 - **OVL** <spec> - spectrum results defined as a sum of the following flags: b0 - **averaged 1/x OCTAVE spectrum,** b1 - **maximum 1/x OCTAVE spectrum,** b2 - **minimum 1/x OCTAVE spectrum,** b3 - **peak 1/x OCTAVE spectrum** *Note: the command accepts values in hex format! E.g. If <prof1> = 1A (26 in decimal, sum of bits b1, b2, b4), it means that Lpeak, Lmin and L values from 1st profile are saved into CSV file.*
			ER	<prof1> - profile 1 summary results *Note: the command accepts values in decimal format!*
			ES	<prof2> - profile 2 summary results *Note: the command accepts values in decimal format!*
			ET	<prof3> - profile 3 summary results *Note: the command accepts values in decimal format!*
			EU	<spec> - spectrum results *Note: the command accepts values in decimal format!*
Logger trigger mode	XT		GA	0 - Off 4 - level+ 5 - level-
Logger trigger level	XL		GI	x - level [dB] $\in(24 \div 136)$; default 100dB

Group name	#1 code	#7 code	#S code	Code description
Logger pre-trigger	XQ		GL	x - number of the records taken into account before the fulfilment of the triggering condition ∈(0 ÷ 10); default 0
Logger post-trigger	Xq		GM	x - number of the records taken into account after the fulfilment of the triggering condition ∈(0 ÷ 200); default 0

Table A.10 System check settings

Group name	#1 code	#7 code	#S code	Code description
System check settings		RC		To read/write settings send #7,RC[,<sel>]; where <sel> is settings selector: 0 (or empty) - read system check status 1 - read/write system check settings 2 - start system check 3 - read live check status 4 - read live check status and write to calibration history file Reading status (response from the instrument): #7,RC,0,<active>,<result>,<hh>,<mm>,<ss>,<sm>; where <active> - status of the system check 0 - inactive 1 - active <result> - result of the last system check 0 - OK 1 - Failed 2 - Not performed 3 - Speaker failed 4 - Microphone disconnected 5 - Microphone connected 6 - Microphone damaged <hh> - hours left to the next system check <mm> -minutes left to the next system check <ss> - seconds left to the next system check <sm> - microphone service mode 0 - inactive 1 - active Reading/writing settings: #7,RC,1,<mode>[,<time>[,<wday>]]; where <mode> - automatic system check function enable 0 - Off 1 - On <time> - time of a day [min] when system check should be performed

Group name	#1 code	#7 code	#S code	Code description
				0 - Off 1...1439 –minutes since midnight <wday> - weekday mask; sum of the following flags representing week days b0 - **Monday** b1 - **Tuesday** b2 - **Wednesday** b3 - **Thursday** b4 - **Friday** b5 - **Saturday** b6 - **Sunday** *Notes: the mask value is given in hexadecimal. For example, 1F means working days of a week Monday-Friday.* Response from the #7,RC,3; and #7,RC,4; #7,RC,<x>,<result>,<sm>; <x> - 3 or 4 <result> - result of the live check <sm> - microphone service mode
			AX	<mode> - automatic system check function enable
			AY	<time> - time of a day [min] when system check should be performed
			AZ	<wday> - weekday mask *Notes: the mask value is given in decimal. For example 31 value means working days of a week Monday-Friday.*

Last system check date			**Aa**	d - coded data ∈(0 ÷ 65535)
				Date decoding in C language:
				day = (d & 0x1F);
				month = ((d>>5) & 0x0F);
				year = ((d>>9) & 0x7F) + 2000;

Last system check time			**Ab**	t - t coded time ∈(0 ÷ 65535)
				Time decoding in C language:
				sec = (t%30);
				min = ((t/30)%60);
				hour = (t/1800);
				Note: time resolution is 2 seconds!

Last system check result			**Ac**	<result> - result of the last system check

Table A.11 Display and keyboard settings

Group name	#1 code	#7 code	#S code	Code description
Key shift mode			**NA**	0 - 2nd function 1 - Direct
Spectrum View			**SA**	0 - Off 1 - On
3-profiles View			**SB**	0 - Off 1 - On
Statistics View			**SC**	0 - Off 1 - On
Time History View			**SD**	0 - Off 1 - On
Running SPL View			**SE**	0 - Off 1 - On
File Info View			**SF**	0 - Off 1 - On
GPS View			**SG**	0 - Off 1 - On
Display **Time** result in the main and 3-profile views			**OA**	0 - Off 1 - On
Display **Lpeak** result in the main and 3-profile views			**OB**	0 - Off 1 - On
Display **Lmax** result in the main and 3-profile views			**OC**	0 - Off 1 - On
Display **Lmin** result in the main and 3-profile views			**OD**	0 - Off 1 - On
Display **L** result in the main and 3-profile views			**OE**	0 - Off 1 - On
Display **Leq** result in the main and 3-profile views			**OF**	0 - Off 1 - On
Display **LE** result in the main and 3-profile views			**OG**	0 - Off 1 - On
Display **Lden** result in the main and 3-profile views			**OH**	0 - Off 1 - On
Display **LEPd** result in the main and 3-profile views			**OI**	0 - Off 1 - On
Display **Ltm3** result in the main and 3-profile views			**OJ**	0 - Off 1 - On
Display **LTeq** result in the main and 3-profile views			**OK**	0 - Off 1 - On
Display **Ln** result in the main and 3-profile views			**OL**	0 - Off 1 - On
Display **LR1** result in the main and 3-profile views			**OM**	0 - Off 1 - On
Display **LR2** result in the main and 3-profile views			**ON**	0 - Off 1 - On

Group name	#1 code	#7 code	#S code	Code description
Display **EX** result in the main and 3-profile views			**OR**	0 - Off 1 - On
Display **SD** result in the main and 3-profile views			**OS**	0 - Off 1 - On
Display **NR** result in the main and 3-profile views			**OT**	0 - Off 1 - On
Display **NC** result in the main and 3-profile views			**OU**	0 - Off 1 - On
Display **OVL** result in the main and 3-profile views			**OO**	0 - Off 1 - On
Graph Y axis for 1/x OCTAVE			**SM**	0 - 10dB 1 - 20dB 2 - 40dB **3 - 80dB (default)** 4 - 120dB
Graph grid for 1/x OCTAVE			**SN**	0 - Off **1 - On (default)**
Spectrum type for 1/x OCTAVE			**SP**	0 - Averaged 1 - Instantaneous 2 - Max **3** - Min 4 - Peak
Spectrum view Min. for 1/x OCTAVE			**SR**	0 - Off 1 - On
Spectrum view Max. for 1/x OCTAVE			**SS**	0 - Off 1 - On
Chart auto-scale			**SO**	0 - Off **1 - On (default)**
Results displayed on the Time history view			**STn**	x - x logger results in profile n+1, n ∈(0 ÷ 2) x – sum of the following flags: b0 - logger with Lpeak values in profile n b1 - logger with Lmax values in profile n b2 - logger with Lmin values in profile n b3 - logger with Leq values in profile n b4 - reserved b5 - logger with LR1 values in profile n b6 - logger with LR2 values in profile n
Display dim timeout		**SD**	**SW**	0 - disabled, display stays on all the time nn - timeout [s] for display dim; nn delay given in seconds ∈ (5 ÷ 59) with 1s step and ∈ (60 ÷ 3600) with 60s step; **default is 60s** *Note: it is not recommended to disable this feature!*
Display off timeout		**SO**	**SV**	0 - disabled, display stays on all the time nn - timeout [s] for display to turn off; nn delay given in seconds ∈ (5 ÷ 59) with 1s

Group name	#1 code	#7 code	#S code	Code description
				step and ∈ (60 ÷ 3600) with 60s step; **default is 300s** *Note: it is not recommended to disable this feature!*
Display auto rotate			**SX**	0 - Off 1 - On (default)
Warning: Logger Off			**TA**	0 - Off 1 - On (default)
Warning: Power Off			**TB**	0 - Off 1 - On (default)
Warning: Save changes			**TD**	0 - Off 1 - On (default)

Table A.12 Setup settings

Group name	#1 code	#7 code	#S code	Code description
Load setup		**LS**		name - a name of a setup file to be loaded (activated) *Notes:* *- name is given without "svt" extension* *- a setup file must be placed into the SETUP directory of the instrument's SD card prior using this command; see* A.8 *or* A.9 *on file upload*
Save setup		**SS**		name - a current instrument setup will be saved as a "name.svt" file in the SETUP directory of the instrument's SD card; 8 characters is a maximum name length *Notes:* *- name is given without "svt" extension*
Clear setup		**CS**		This command restores factory defaults of the instrument. To execute command send #7,CS[,<sel>]; where <sel> is settings selector: 0 (or empty) - clear measurements setup (preserve communication settings) 1 - clear all settings 2 - clear all settings and calibration history *Notes: it is not advised to use this function remotely via Internet with <sel>=1 or <sel>=2 since communication with the instrument may be lost!*
Delete setup		**DS**		name - a name of a setup file to be deleted from the SETUP directory of the instrument's SD card *Notes:* *- name is given without "svt" extension*

Table A.13 Alarms settings

Group name	#1 code	#7 code	#S code	Code description
nth address book **name**; nn ∈ (01 ÷ 16)			**QAnn**	Notes: - name has a maximum length of 16 characters
nth address book **email**; nn ∈ (1 ÷ 16)			**QBnn**	Notes: - email has a maximum length of 48 characters
nth address book **phone**; nn ∈ (1 ÷ 16)			**QCnn**	Notes: - phone has a maximum length of 15 characters
nth event **active**; nn ∈ (1 ÷ 10)			**WAnn**	0 - Off 1 - On
nth event **name**; nn ∈ (1 ÷ 10)			**WBnn**	Notes: - name has a maximum length of 16 characters
nth event **source**; n ∈ (1 ÷ 10)			**WCnn**	0 - **System** 1 - **Leq** 2 - **Lmax** 3 - **LR(1)** 4 - **LR(2)** 5 - **Leq+NR** 6 - **LeqPR** 7 – **LeqPR+LN** 8 – **Lnn** 9 – **Dust**
nth event **integration**; nn ∈ (1 ÷ 10)			**WDnn**	0 - **1s** 1 - **SR** (summary step) 2 - **TH** (time history step)
nth event **threshold**; nn ∈ (1 ÷ 10)			**WEnn**	x - threshold level in dB ∈ (24 ÷ 136)
nth event **dust threshold**; nn ∈ (1 ÷ 10)			**WYnn**	x - threshold level in µg/m^3∈ (1 ÷ 50000)
nth event **NR threshold**; nn ∈ (1 ÷ 10)			**WFnn**	x - NR ∈ (0 ÷ 130)
nth event **LN number**; nn ∈ (1 ÷ 10)			**WGnn**	x - LN ∈ (1 ÷ 99)
nth event **days of week**; nn ∈ (1 ÷ 10)			**WHnn**	x - sum of the following flags flags: b0 - Monday b1 - Tuesday b2 - Wednesday b3 - Thursday b4 - Friday b5 - Saturday b6 - Sunday
nth event **start hour**; nn ∈ (1 ÷ 10)			**WInn**	x - hour ∈ (0 ÷ 23)
nth event **start minutes**; nn ∈ (1 ÷ 10)			**WJnn**	x - minute ∈ (0 ÷ 59)
nth event **stop hour**; nn ∈ (1 ÷ 10)			**WKnn**	x - hour ∈ (0 ÷ 23)

Group name	#1 code	#7 code	#S code	Code description
nth event **stop minutes**; nn ∈ (1 ÷ 10)			**WLnn**	x - minute ∈ (0 ÷ 59)
nth event **trigger counter**; nn ∈ (1 ÷ 10)			**WVnn**	0 - Continuous 1 - Counter
nth event **duration**; nn ∈ (1 ÷ 10)			**WMnn**	x - duration in s ∈ (0 ÷ 3600) Valid for Continuous trigger counter
nth event **counter**; nn ∈ (1 ÷ 10)			**WWnn**	x - counter ∈ (0 ÷ 100) Valid for Counter trigger counter
nth event **min. break**; nn ∈ (1 ÷ 10)			**WNnn**	x - min. break in s ∈ (0 ÷ 3600)
nth event **SMS active**; nn ∈ (1 ÷ 10)			**WOnn**	0 - Off 1 - On
nth event **SMS number mask**; nn ∈ (1 ÷ 10)			**WPnn**	x - sum of the following flags b0 - user number 1 b1 - user number 2 ... B15 - user number 16
nth event **email active**; nn ∈ (1 ÷ 10)			**WQnn**	0 - Off 1 - On
nth event **email recipient mask**; nn ∈ (1 ÷ 10)			**WRnn**	x - sum of the following flags b0 - user number 1 b1 - user number 2 ... B15 - user number 16
nth event **audio active**; n ∈ (1 ÷ 10)			**WSnn**	0 - Off 1 - On
nth event **I/O active**; nn ∈ (1 ÷ 10)			**WTnn**	0 - Off 1 - On
nth event **system mask**; nn ∈ (1 ÷ 10)			**WUnn**	b0 - Powered Up b1 - Powered Down b2 - Measurement Start b3 - Measurement Stop b4 - Mains On b5 - Mains Off b6 - Low Battery b7 - Battery OK b8 - Low External Battery b9 - External Battery OK b10 - Low Storage b11 - Storage OK b12 - System Check b13 - Live Check b14 - Instrument Error b15 - Meteo On b16 - Meteo Off b17 - Device Tilt b18 - Device Vertical

Group name	#1 code	#7 code	#S code	Code description
				b19 - Vibration b20 - Location
n^{th} event **pretrigger time**; nn ∈ (1 ÷ 10)			**WXnn**	x - pretrigger time in s ∈ (0 ÷ 3600) Valid for LeqPR+LN

Table A.14 General settings

Group name	#1 code	#7 code	#S code	Code description
Language		**LA**	**JC**	0 - English (default) 1 - German 2 - Spanish 3 - French 4 - Hungarian 5 - Italian 6 - Dutch 7 - Polish 8 - Portuguese 9 - Russian 10 - Turkish 11 - Chinese
USB		**UF**	**JG**	0 - USB High Speed (480 MHz) 1 - USB Full Speed (12 MHz) (default)
UART interface mode	**Xy**		**VL**	0 - none 1 - monitoring station SP 276 2 – External Device 3 – dust monitoring station ES-642
ES-642 mode	**h**		**JW**	0 - PM1 1 - PM2.5 2 – PM10 3 – TSP
Unit Name		**UN**		Up to 12 characters (permitted characters: 0:9, a:z, A:Z, space, and '_').
Instrument description		**AX**		To read settings send #7,AX;. Response: #7,AX,<station>,<res1>,<res2>; <station> - station name <res1>, <res2> - reserved values To write settings send #7,AX,<sel>,<text>;. where <sel> - value selector 0 - station name <text> - user text up to 128 characters in UNICODE format. Permitted characters: 0-9, a-f, A-F
			LI	<text> - user text for station name
SD card: erase disk		**ED**		Erase all files from SD card.
SD card: version of Fat file system		**FT**		-1 - SD disk not ready 1 - FAT16 2 – FAT32
SD card: number of sectors		**NS**		n - number of sectors. *Sector is 512 bytes in size*

Group name	#1 code	#7 code	#S code	Code description
SD card: number of free sectors		**NF**		n - number of free sectors. *Sector is 512 bytes in size*
Measurement files number		**BN**		n - number of "*.svl" files in the instrument's working directory
Microphone temperature		**TM**		xx.x - temperature of the microphone [°C]
External meteo or dust monitor results		**MR**		Read external meteo or dust station results. To read settings send #7,MR[,I];. Response: #7,MR,<time>,<status>,[<res1>,…, <resN>]; where I - integrated results for last integration period <time> - integration time for the results <resN> Results, Type of results depends on the prefix: S - status in hexadecimal (e.g. S8000), defined as the sum of the flags b0 - Dust Sensor Calibration Error: Zero reading to low b1 - Dust Sensor Calibration Error: Zero reading to high b4 - Dust IOP Error (Laser) b5 - Dust Counter Error (Sensor) b6 - Dust Flow Regulation Error b6 - Dust Flow Regulation Error b14 - meteo or dust station not detected b15 - UART interface incorrect configuration for meteo or dust monitor T - temperature [°C] P - absolute pressure [hPa] H - relative humidity [%] V - wind velocity [m/s] D - wind direction [°] R - rain intensity [mm] F - flow [lpm] A - PM1 dust [µg/m^3] B - PM2.5 dust [µg/m^3] C - PM10 dust [µg/m^3] E - TSP dust [µg/m^3]
Firmware upgrade		**FU**		To read status of firmware upgrade send #7,FU;. Response: #7,FU,<stat>; To start firmware upgrade send: #7,FU,<name>.<ext>; where <name> - a name of a firmware binary to be used for upgrade; file must reside in the FIRMWARE directory of the instrument's SD card. <ext> - three characters extension of the firmware file; usually it is "BIN"

Group name	#1 code	#7 code	#S code	Code description
				<stat> - status of upgrade; negative value is an error 0 - not upgrading or upgrade finished successfully (if started with #7,FU,<name>.bin;) 1 - start of upgrade 2- checking a firmware image 3 - erasing Flash 4 - writing Flash 5 - checking a firmware after write 6 - finishing After 6 the state always comes to 0.
Firmware list		**FL**		Returns firmware file list in the FIRMWARE directory of the instrument's SD card. Response: #7,FL,<name1>,<len1>[,<name2>,<len2>[...]]; where <namex> - name of the firmware file with extension, e.g. "firmware.bin"; max 8 characters for name and 3 characters for extension <lenx> - length of the firmware filex [B]
Vibration threshold			**JJ**	x - vibration threshold in [g]
SPL on stop		**LL**		Reading (response from the instrument): #7,ll,<L1>,<L2>,<L3>; where <L1> - L value from profile 1 in [dB] <L2> - L value from profile 2 in [dB] <L3> - L value from profile 3 in [dB] *Notes: function is not available during measurements.*
Instrument orientation		**OR**		Returns orientation of the device in the format: **#7,OR,x<a.aa>,y<b.bb>,z<c.cc>;** where a.aa - gravitational acceleration in [g] for axes x b.bb - gravitational acceleration in [g] for axes y c.cc - gravitational acceleration in [g] for axes z
Station status		**II**		This function provides cumulative station status. Reading (response from the instrument): #7,ll,[<rms1>],[<rms2>],[<rms3>],Fx<flags>,B<bat>,D<disk>,ex<err>,wx<war>,Rx<rst>,fx<add>,O<dd:hh:mm:ss>; where <L1> - L value from profile 1 in [dB] (on STOP only) <L2> - L value from profile 2 in [dB] (on STOP only)

Group name	#1 code	#7 code	#S code	Code description
				<L3> - L value from profile 3 in [dB] (on STOP only) <flags> - station status flags defined in hexadecimal format as a sum of the following flags: b0 - measurements are running, b1 - pause is active, b2 - reserved, b3 - battery is charging, b4 - reserved, b5 - external power supply is present, b6 - time is synchronized with GPS, b7 - reserved, b8 - reserved, b9 - reserved, b10 - reserved, b11 - reserved, b12 - reserved, b13 - reserved, b14 - solar panel is connected, b15 - battery charging is finished, b16 - microphone heater is on, b17 - battery heater is on, b18 - timer mode is active, <bat> - battery relative state of charge [%] <disk> - SD card occupation [%] <err> - error flags defined in hexadecimal format as a sum of the following flags: b0 - battery pack error, b1 - SD card is not ready, b2 - logger file error, b3 - reserved, b4 - reserved, b5 - reserved, b6 - reserved, b7 - meteo module error, b8 - reserved, b9 - external temperature sensor error, b10 - live check error, b11 - instrument is not standing upright, b12 - microphone disconnected, b13 - external battery is low, b14 - logger file name error, b15 - microphone damaged, b16 - communication with battery pack, b17 - battery pack temperatures greater than 60°C, b18 - SIM not detected for more than an hour, <war> - warning flags defined in hexadecimal format as a sum of the following flags: b0 - logging off, b1 - battery pack temperatures greater than 43°C,

Group name	#1 code	#7 code	#S code	Code description
				b2 - battery pack temperatures greater than 55°C, b3 - SIM not detected for more than 5 minutes, <rst> - last instrument power on/off and reset cause b0 - hardware reset, b1 - watchdog reset, b2 - remote reset, b3 - reserved, b4 - reserved, b5 - reserved, b6 - reserved, b7 - reserved, b8 - system was on because of keyboard, b9 - system was on because of external power supply had been connected b10 - system was on because of RTC alarm, b11 - reserved, b12 - system was on because EXT I/O line had triggered, <add> - additional flags defined in hexadecimal format as a sum of the following flags: f0 - microphone service mode, <dd:hh:mm:ss> - system *on* time since last power-up where <dd> - days <hh> - hours <mm> - minutes <ss> - seconds

Table A.15 Power settings

Group name	#1 code	#7 code	#S code	Code description
Battery Charge mode		**SB**	**JY**	0 - Full capacity 1 - Optimized
External Battery mode		**EB**	**JU**	0 - Off 1 - On
Power status		**BS**		To read settings send #7,BS;. Response: #7,BS,<bat>,<src>,<time>,<chrg>; where <bat> - battery state of charge [%]; -1 when state of charge cannot be read <src> - power source 0 - internal battery -1 - external power supply, e.g. SB274 -2 - solar panel (battery is charging) -3 - solar panel (battery is not charging)

Group name	#1 code	#7 code	#S code	Code description
				<time> - battery time [h]; either “time to full” if battery is charging or “time to empty” if battery is discharging <chrg> - charging indication 0 - not charging 1 - charging is finished 2 - charging is in progress
Battery voltage		**BV**		volt - battery voltage [mV] multiplied by 10;
External power voltage		**EV**		volt - external power supply voltage [mV] multiplied by 10;
Power off		**PO**		Power off the instrument. *Notes: take care using this command remotely via Internet*
Reset		**XR**		Hardware reset of the instrument (power off and on). Send #7,XR[,<n>]; n - delay [s] before reset
Automatic power off		**ST**	**JK**	0 - disabled, display stays on all the time nn - timeout [s] for instrument power off; nn delay given in seconds ∈ (300 ÷ 3600) with 60s step and ∈ (3600 ÷ 14400) with 3600s step; **default is 14400s** *Note: instrument automatically power off only if doesn't measurement!* *Automatic power off is blocked when instrument is powered from external supply*
Battery pack information		**BM**		To read settings send #7,BM;. Response: #7,BM,<err>,<manuf>,<date>,<sn>,<dev>,<chem>,<chemId>,<designV>,<designC>; where <err> - error reading battery pack 0 - no error, the settings are valid (<manuf>, <date>, etc.) not 0 - read error, the settings are not valid; repeat command <manuf> - manufacture name, “Svantek sp. z o.o.” <date> - manufacture date, “dd.mm.yyyy” <sn> - serial number of packet (production code) <dev> - device name <chem> - chemistry of the battery, “LION” <chemId> - internal chemistry ID <designV> - design voltage [mV] <designC> - design capacity [mAh]
Battery status		**BT**		To read settings send #7,BT;. Response: #7,BT,<err>,<temp>,<volt>,<curr>,<Merr>,<soc>,<fcc>,<cell1>,<cell2>,<tte>,<ttf>; where <err> - error reading battery pack 0 - no error, the settings are valid (<temp>, <volt>, etc.)

Group name	#1 code	#7 code	#S code	Code description
				not 0 - error, the settings are not valid; repeat read command <temp> - temperature of the battery pack [°C] <volt> - voltage of the battery pack [mV] <curr> - actual current of the battery pack [mA]; negative value means discharging <Merr> - maximum error [%] of the gauging algorithm <soc> - state of charge [%] <fcc> - actual full charge capacity of the battery pack [mAh] <cellx> - voltage of battery pack cellx [mV]; cells connected in serial with cell1 most close to ground <tte> - “time to empty” [min]; value of 65353 means, that battery pack is not discharging <ttf> - “time to full” [min]; value of 65353 means, that battery pack is not charging

Table A.16 System log settings

Group name	#1 code	#7 code	#S code	Code description
System log file		**LG**		To read settings send #7,LG;. Response: #7,LG,<mask>,<time>,<size>,<totSize>,<err>; To write settings send: #7,LG,<mask>,<time>,<size>,<totSize>; where <mask> - events written to a system log file (S.LOG) defined in hex format as a sum of the following flags: 0x0 - **Off** (logs are not saved), 0x0001 – log system events, 0x0002 – log modem communication events, 0x0004 – log modem configuration, 0x0008 – log periodic modem status, 0x0010 – log periodic battery status, 0x0020 – log periodic instrument status, 0x0040 – reserved, 0x0080 – log modem debug (off by default), 0x0100 – log periodic GPS status, 0x0200 – reserved, 0x0400 – log remote commands events, 0x0800 – log advanced alarms events, 0x1000 – reserved, 0x2000 – reserved, 0x4000 – reserved, 0x8000 – reserved <time> - interval [s] for periodic logs,

Group name	#1 code	#7 code	#S code	Code description
				<size> - maximum size [MB] of a single S.LOG file, <sizeTot> - maximum size [MB] of all S.LOG files in the current working directory, <err> - S.LOG file error; 0 – no error. *Notes:* *- it is not advised to switch off the log file! This file is useful in case of support.* *- do not set reserved flags!*
			JL	<mask> - events written to a system log file “Sx.LOG”; see above
			JT	<time> - interval [s] for periodic logs
			JR	<size> - maximum size [MB] of a single “Sx.LOG” file
			JS	<sizeTot> - maximum size [MB] of all “Sx.LOG” files in the current working directory

Table A.17 Position and time settings

Group name	#1 code	#7 code	#S code	Code description
GPS		**GH**	**JN**	0 - **Off** 1 - **On**
Position settings		**GL**		To read settings send #7,GL[,<sel>];. Response: #7,GL, <Latitude>,<Longitude>; To write settings send: #7,GL,<Latitude>,<Longitude>; where <sel> - 0 – automatic read mode. Coordinates are read from GPS if it is active and position is fixed or from the memory otherwise. 1 – coordinates are read from the memory <Latitude> - Latitude in degrees; value has ‘-‘ sign for South hemisphere, < Longitude > - Longitude in degrees; value has ‘-‘ sign west of Greenwich,
			LA	<LatDeg> - Latitude degrees; value has ‘-‘ sign for South hemisphere,
			LB	<LatMin> - Latitude minutes,
			LC	<LatSec> - Latitude seconds,
			LS	<LatmSec> - Latitude milliseconds,
			LE	<LongDeg> - Longitude degrees; value has ‘-‘ sign west of Greenwich,
			LF	<LongMin> - Longitude minutes,
			LG	<LongSec> - Longitude seconds,
			LH	<LongmSec> - Longitude milliseconds,

Group name	#1 code	#7 code	#S code	Code description
GPS last data		GP		Reading (response from the instrument): #7,GP,<qq>,<YY>,<MM>,<DD>,<hh>,<mm>,<ss>,<LaD>,<LaM>,<LaS>,<LaS10>,<Ladir>,<LoD>,<LoM>,<LoS>,<LoS10>,<Lodir>; Where: <qq> - Fix (qq>0), Not fix (qq=0), <YY> - Year, <MM> - month, <DD> - day, <hh> - hour, <mm> - minute, <ss> - seconds, <LaD> - Latitude degree, <LaM> - Latitude minutes, <LaS> - Latitude seconds, <LaS10> - Latitude fraction of seconds, <Ladir> - Latitude direction (N- north, S- south), <LoD> - Longitude degree, <LoM> - Longitude minutes, <LoS> - Longitude seconds, <LoS10> - Longitude fraction of seconds, <Lodir> - Longitude direction (E- east, W- west)
RTC synchronization with GPS		GS	JO	0 - **Off** 1 - **On** *Read only for Unit Subtype 3*
Stop measurement to synchronize RTC with GPS			JZ	0 - **Off** 1 - **On** *Read only for Unit Subtype 3*
Synchronization time			JV	time of a day [min] when synchronization should be performed *Read only for Unit Subtype 3*
Synchronization threshold			JX	Minimum time difference between RTC and GPS in seconds to perform synchronization Default: 10s *Read only for Unit Subtype 3*
Real Time Clock (RTC)		RT		Current instrument's date/time settings. Reading (response from the instrument): #7,RT,<hour>,<min>,<sec>,<day>,<month>,<year>; Writing: #7,RT,<hour>,<min>,<sec>,<day>,<month>,<year>; where <hour> - hour ∈ (0 ÷ 23) <min> - min ∈ (0 ÷ 59) <sec> - sec ∈ (0 ÷ 59) <day> - day ∈ (1 ÷ 31) <month> - hour ∈ (1 ÷ 12) <year> - hour ∈ (2000 ÷ 2099) *Read only for Unit Subtype 3*
Time zone		TZ		x - time zone [min] ∈ (-720 ÷ 840) in 15 minutes step

Group name	#1 code	#7 code	#S code	Code description
				Read only for Unit Subtype 3
			JM	x - time zone [min] ∈ (-720 ÷ 840) in 15 minutes step *Not valid for Unit Subtype 3 or 4*
On time		**RO**		Time elapsed since last power up. Reading (response from the instrument): #7,RO,<dd>,<hh>,<mm>,<ss>; where <dd> - days <hh> - hours <mm> -minutes <ss> - seconds

Table A.18 Extended I/O

Group name	#1 code	#7 code	#S code	Code description
Mode	**Xx**		**VA**	0 - Off 1 - Digital IN 2 - Digital OUT 3 - Alarm
Pin Digital Out Function	**Xz**		**VC**	0 - Trigger pulse 1 - Alarm pulse
Digital Out Active Level	**Xc**		**VD**	0 - Low 1 - High
Digital Out Source	**Xs**		**VE**	0 - Leq(1) 1 - LPeak(1) 2 - LMax(1) 3 - L(1)
Digital Out Source Type	**Xt**		**VF**	0 - Current 1 - Periodic
Digital Out Alarm Level	**Xn**		**VG**	x - x alarm level [dB] ∈ (300 ÷ 1400) multiplied by 10;
Digital Input Polarization	**Xg**		**VH**	0 - Positive 1 - Negative
Digital Input Slope	**Xh**		**VI**	0 - Slope+ 1 - Slope-
Alarm time			**VP**	0 - infinity (measurement finished by pressing the **Stop** or remotely - by sending S0 control code) x - x time in seconds ∈ (1 ÷ 59) with 1s steps, (60 ÷ 3600) with 60s steps and (3600 ÷ 28800) with 3600s steps

Table A.19 Mobile network settings and status

Group name	#1 code	#7 code	#S code	Code description
Communication Module (3G or LTE) On/Off	**Xk**		**KA**	0 - Off 1 - On
Access Point Name	**XN**		**KE**	Access Point Name is a gateway to the operator's Internet; default "internet" or empty ""; (permitted characters: 0:9, a:z, '.', '-' and '_').
Authentication mode	**XF**		**KB**	Authentication mode to be used during Internet connection 0 - Off 1 - PAP
Username	**XO**		**KG**	Username to be used during Internet connection
Password	**XU**		**KH**	Password to be used during Internet connection
Domain Name Server	**XV**			Domain Name Server (DNS) address Ipv4 in dot notation
			KI	Domain Name Server (DNS) address written as single number x x=<aa>*2^{24}+<bb>*2^{16}+<cc>*2^{8}+<dd> Where: x - DNS written as single number <aa>.<bb>.<cc>.<dd> - DNS in dot notation (e.g. 192.168.1.1 written as 3232235777 = 192*2^{24}+168*2^{16}+1*2^{8}+1)
Connection type	**XB**		**KL**	Connection type 0 - TCP server (listener) mode 1 - TCP client mode (default)
Remote address	**XI**		**KD**	Remote address of TCP/UDP connection; default "app.svannet.com" *Note: the setting can be a name to be resolved by DNS or Ipv4 address in dot notation, e.g. "192.168.1.1"*
Remote port	**XJ**		**KC**	Remote port of TCP/UDP connection ∈ (0 ÷ 65535); default 8000 *Note: it is not advised to use ports < 1024!*
SIM mode	**Xw**		**KJ**	0 - data + SMS mode 1 - data only mode
Default settings for LTE			**KU**	0 - user defined settings for LTE 1 - use modem's default settings for LTE
Modem firmware			**KT**	Some LTE modems has selectable firmware for different operators LE910Cx-NF modem supports firmwares: 0 - AT&T Config 1 - Verizon Config 2 - T-Mobile Config LE910Cx-AP modem supports firmwares: 10 - NTT Docomo Config 11 - Telstra Config 12 - KDDI Config 13 - Softbank Config

Group name	#1 code	#7 code	#S code	Code description
				LE910Cx-CN modem supports 20 - China Mobile Config 21 - China Unicom Config 22 - China Telecom Config
Mobile information		GI		To read settings send #7,GI,<sel>; where <sel> is a settings selector: 0 - mobile equipment information 1 - mobile network information 2 - mobile connection information Reading mobile equipment information: **#7,GI,0,<manuf>,<model>,<rev>,<id>;** where <manuf> - modem's manufacture name <model> - model of the modem <rev> - modem's firmware revision <id> - modem's IMEI number Reading mobile network information: **#7,GI,1,0x<flags>,<oper>,<simId>,<reg1>,<reg2>,<rssi>,<ber>,<act>;** where <flags> - modem state in hex format defined as a sum of flags: 0x00000001 - modem is powered on, 0x00000002 - mode m is initialized, 0x00000004 - modem is connected to the operator's network, 0x00000008 - modem is connected to the Internet, 0x00000010 - modem has established a TCP/IP connection, 0x00000020 - modem is connected to SvanNET, 0x02000000 - modem is requesting a SIM PUK, 0x04000000 - modem is requesting a SIM PIN, 0x08000000 - SIM error, e.g. SIM not inserted, *Notes: all other flags are reserved!* <oper> - ID of the network operator defined as Mobile Country Code (MCC – 3 digits) and Mobile Network Code (MNC – 2 or 3 digits) <simId> - MCC + MNC read from a SIM card <reg1> - GSM network registration indicator; 0 – not registered, 1 – registered <reg2> - GPRS/UMTS/LTE network registration indicator; 0 – not registered, 1 – registered <rssi> - Received Signal Strength Indicator

Group name	#1 code	#7 code	#S code	Code description
				0 – (-113) dBm or less 1 – (-111) dBm 2..30 – (-109)dBm..(-53)dBm / 2 dBm per step 31 – (-51)dBm or greater 99 – not known or not detectable <ber> - Bit Rate Error [%] (2G) 0 – less than 0.2% 1 – 0.2% to 0.4% 2 – 0.4% to 0.8% 3 – 0.8% to 1.6% 4 – 1.6% to 3.2% 5 – 3.2% to 6.4% 6 – 6.4% to 12.8% 7 – more than 12.8% 99 – not known or not detectable Signal Quality [dBm] (4G) 0: (-4) to (-3) 1: (-6) to (-5) 2: (-8) to (-7) 3: (-10) to (-9) 4: (-13) to (-11) 5: (-15) to (-14) 6: (-17) to (-16) 7: (-19) to (-18) 99 – not known or not detectable <act> - Access Technology 0, 3 – 2G (GSM) 2, 4, 5, 6 – 3G (UMTS) 7, 8, 9 – 4G (LTE) Reading mobile connection information: **#7,GI,2,0x<flags>,<serviceIP>,<trafficUp>,<trafficDown>,<dataUp>,<dataDown>;** where <flags> - modem state in hex format, see <flags> for definition. <serviceIP> - IP address of the remote side in dot notation, e.g. 192.168.0.1 <trafficUp> - amount of raw data [kB] sent out from the instrument to the Internet <trafficDown> - amount of raw data [kB] received by the instrument from the Internet <dataUp> - amount of user data [kB] sent out from the instrument to the Internet

Group name	#1 code	#7 code	#S code	Code description
				<dataDown> - amount of user data [kB] received by the instrument from the Internet *Notes:* *- "user data" means any commands sent to the instrument and any responses received from the instrument, e.g.* *#7,GI,2; – command sent to the instrument is 8 bytes of <dataDown>* *#7,GI,2,0x3F,100.101.102.1,229373,26494,11885,1254; - response received from the instrument is 51 bytes of <dataUp>* *- raw data means user data + protocols overhead*
Modem reset		**RM**		Force modem reset. 0 (or empty) - software reset 1 - hardware reset (power off and on)
Signal quality		**SQ**		Modem signal quality, see <rssi>

APPENDIX B. DATA FILE STRUCTURES

B.1 GENERAL STRUCTURE OF THE SV 307 FILES

Each file containing data from the **SV 307** (internal file system rev. **1.20**) instrument consists of several groups of words. There are two different types of files containing:

- measuring results data (cf. App. B.2);
- setup data (cf. App. B.3).

Each file has the following elements:

- SvanPC file header (cf. Tab. B.1.1)
- file header (cf. Tab. B.1.2);
- unit and internal software specification (cf. Tab. B.1.3);
- calibration settings (cf. Tab. B.1.4)
- user's text (a header) stored together with the measurement data (cf. Tab. B.1.5);
- Unit text info (cf. Tab. B.1.6);
- parameters and global settings, common for all profiles (cf. Tab. B.1.7);
- parameters for measurement trigger (cf. Tab. B.1.8);
- parameters for logger trigger (cf. Tab. B.1.9);
- parameters for Wav recording (cf. Tab. B.1.10);
- extended I/O parameters (cf. Tab. B.1.11);
- special settings for profiles (cf. Tab. B.1.12);
- display settings of the main results (cf. Tab. B.1.13)
- header of the statistical analysis (cf. Tab. B.1.14);
- header of the logger file (cf. Tab. B.1.15)
- contents of the logger file (cf. Tab. B.1.16)

Other elements of the file structure are not obligatory for each file type stated above. They depend on the file type (**SLM**, logger file) and on the setting of the **FULL STAT.** These elements are as follows:

- Header of the Summary Results Record (saved in Summary Results Record) (cf. Table B.1.17)
- main results (saved in Summary Results Record) (cf. Tab. B.1.18_SLM)
- statistical levels (saved in Summary Results Record) (cf. Tab. B.1.19)
- 1/1 OCTAVE analysis results (saved in Summary Results Record) (cf. Tab. B.1.20)
- 1/3 OCTAVE analysis results (saved in Summary Results Record) (cf. Tab. B.1.21)
- results of the statistical analysis (saved in Summary Results Record) (cf. Tab. B.1.22);
- results from the weather station (Meteo data), saved in Summary Results Record (cf. Tab. B.1.23)
- settings of the instrument saved in the setup file (cf. Tab. B.1.24);
- file-end-marker (cf. Tab. B.1.25);

Below, all file structure groups are described separately in Tab. B.1.1 – Tab. B.1.25. The format used in the columns, named **Comment** with the square parenthesis ([xx, yy]), means the contents of the word with; **xx** is the most significant byte (MSB) and **yy** the lowest significant byte (LSB) of the word. The format 0xnnnn means that the nnnn is four-digit number in hexadecimal form.

Table B.1.1. SvanPC file header

Word number	Name	Comment
0..2	“SvanPC”	reserved
3	26	reserved
4	32	reserved
5	71	reserved
6..15	Reserved	reserved
…	…	…

Table B.1.2. File header

Word number	Name	Comment
0	0xnn01	[01, nn=header’s length]
1..4	FileName	name of the file (8 characters)
5	Reserved	Reserved
6	CurrentDate	file creation date (cf. App. B.4)
7	CurrentTime	file creation time (cf. App. B.4)
8..13	Reserved	Reserved
…		…

Table B.1.3. Unit and software specification

Word number	Name	Comment
0	0xnn02	[02, nn=specification’s length]
1	UnitNumberL	unit number (LSB word)
2	UnitType	type of the unit: 307 – **SV 307**
3	SoftwareVersion	software version: 122
4	SoftwareIssueDate	software issue date
5	DeviceMode	mode of the instrument
6	UnitSubtype	subtype of the unit: 1 – **SV 307** 2 – **SV 307** (second hardware revision) 3 – **SV 307 (**Spanish Welmec version) 4 – **SV 307 (**German Welmec version)
7	FileSysVersion	file system version: 120
8	reserved	Reserved
9	SoftwareSubversion	software subversion: 01
10	UnitNumberH	unit number (MSB word)
10	MicSN_L	microphone number (LSB word)
10	MicSN_H	microphone number (MSB word)
…		…

Table B.1.4. Calibration settings

Word number	Name	Comment
0	0xnn47	[47, nn=header's length]
1	PreCalibrType	type of calibration performed prior to measurement: 0 - none 1 - **BY MEASUREMENT** (manual) 2 - **REMOTE** 3 - **FACTORY CALIBRATION** 4 - **AUTOCALIBRATION**
2	PreCalibrDate	date of calibration performed prior to measurement (cf. App. B.4)
3	PreCalibrTime	time of calibration performed prior to measurement (cf. App. B.4)
4	PreCalibrFactor	factor (*100 dB) of calibration performed prior to measurement
5	PostCalibrType	type of calibration performed after the measurement: 0 - none 1 - **BY MEASUREMENT** (manual) 2 - **REMOTE** 3 - **FACTORY CALIBRATION** 4 – **AUTOCALIBRATION** 0xFFFF - **Calibration not performed**
6	PostCalibrDate	date of calibration performed after the measurement (cf. App. B.4)
7	PostCalibrTime	time of calibration performed after the measurement (cf. App. B.4)
8	PostCalibrFactor	factor (*100 dB) of calibration performed after the measurement
…	…	…

Table B.1.5. USER's text

Word number	Name	Comment
0	0xnn03	[03, nn=specification's length]
1…	title text	the user's text (two characters in a word) finished with one or two null bytes

Table B.1.6. Unit text info

Word number	Name	Comment
0	0xnn58	[58, nn=block's length]
1	"UN"	Unit name header
2..8	UnitName	Unit name
.....	.....	.....

Table B.1.7. Parameters and global settings

Word number	Name	Comment
0	0xnn04	[04, nn=block's length]
1	MeasureStartDate	measure start date (cf. App. B.4)
2	MeasureStartTime	measure start time (cf. App. B.4)
3	DeviceFunction	device function: 1 - **SOUND LEVEL METER**, 2 - **1/1 OCTAVE** analyser, 3 - **1/3 OCTAVE** analyser,
4	MeasureInput	measurement input type: 2 - **Microphone**
5	Range	measurement range: 2 - **SINGLE**
6	UnitFlags	calibration flags: b0 - if set to 1: calibration coefficient is used b3 - if set to 1: overload occurred b7,b6,b5: type of the result **Lden** 000 – **Lden** result is not available 001 – **Ld** result 010 – **Le** result 011 – **Lde** result 100 – **Ln** result 101 – **Lnd** result 110 – **Len** result 111 – **Lden** result b9 - if set to 1: measurement start synchronized with GPS
7	RepCycle	repetition cycle: 0 - infinity nnnn - number of repetitions $\in(1 \div 1000)$
8	NofChannel	number of channels (1)
8	NofProf	number of profiles (3)
10	StartDelay	start delay time
11..12	IntTimeSec	integration time specified in seconds
13	InterfaceMode	Reserved
14	LeqInt	detector's type in the **Leq** function: **0 - LINEAR,** 1 - **EXPONENT.**
15	SpectrumFilter	**1/1** or **1/3 OCTAVE** analysis filter: 1 - **Z**, 2 - **A**, 3 - **C** 5 – **B** in other cases: Reserved

16	SpectrumBuff	**1/1** or **1/3 OCTAVE** logger: sum of the following flags: 1 - logger with **Lpeak** values 8 - logger with **Leq** values in other cases: reserved
17	ExposureTime	exposure time: 1..720 (min)
18	Leq & Lav	Reserved
19	MicComp	compensating filter for microphones: 0 - switched off, 1 - switched on
20	SpectrumRMSDetector	spectrum RMS detector type: 0 - **LINEAR**, 1 - **FAST**, 2 - **SLOW**
21	MicFrqCorr	reserved
22..23	MeasureStartTimeMS	measure start time in ms (cf. App. B.4)
24	RollLeq1	rolling time (1) in seconds
25	RollLeq2	rolling time (2) in seconds
26	LoggerMeteo	Recording meteo data to the logger
27	UartMode	UART interface mode: 0 - none 1 - monitoring station SP 276 2 – External Device 3 – dust monitoring station ES-642
28	LoggerDust	Recording dust data to the logger.
29	ES642Mode	ES-642 dust monitor – type of measured dust: 0 – **PM1** 1 – **PM2.5** 2 – **PM10** 3 – **TSP (Total Suspended Particulate)**
30	Reserved	reserved
31	MainResBuff	Summary results. Contents defined as a sum of flags: b0 - **Main Results** b1 - **Spectrum** b2 - **Spectrum MAX** b3 - **Spectrum MIN** b4 - **Spectrum PEAK** b5 - **Statistical levels** b6 - **Statistical analysis in profiles** b7 - **Statistical analysis in 1/1 or 1/3 OCTAVE mode** b8 - **RPM** b9 – **Meteo** b10 – **Dust monitor data**

32	StartSync	Synchronization the start of measurement with RTC 0 - switched off. -1 - synchronization to **1 sec**. 1 - synchronization to **1 min**. 15 - synchronization to **15 min**. 30 - synchronization to **30 min**. 60 - synchronization to **1 hour**.
33	DiffuseField	reserved
34	Windscreen	reserved
35	FreeField	Free field: 0 - Off, 1 - Environment. 2 - Airport.
36	CalMic10	reserved
37	CalMic10_M12	reserved
38	CalMic10_M13	reserved
39	GpsTimeZone	GPS Time Zone in 15 min.
40	GpsLastSyncTime	The time between clock synchronization from GPS module and the start of measurement in seconds. 0xffff - no synchronization
41	Reserved	reserved
42	SplitMode	Logger files splitting mode: 0 - off. -1 - The file is created for each measurement cycle. 15 - The file is created every 15 min synchronized to RTC. 30 - The file is created every 30 min synchronized to RTC. 60 - The file is created every 1 hour synchronized to RTC. 1440 - The file is created on the specified times.
43	SplitTime[1]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is 1440.
44	SplitTime[2]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is 1440.
45	SplitTime[3]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is 1440.
46	SplitTime[4]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is 1440.
47	SplitTime[5]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is 1440.

48	SplitTime[6]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is 1440.
49	Logger_main_prof[1]	Main results in the 1st profile saved in the file. Contents defined as a sum of flags: b0 - Lxpeak[1] value (*100 dB) b1 - LxvE[23] value (*100 dB) b2 - maximal value (Lxvmax[2]) (*100 dB) b3 - minimal value (Lxvmin[2]) (*100 dB) b4 - Lxv[2] value (*100 dB) b5 - Lxveq[23] value (*100 dB) b6 - **Lden** value (*100 dB) b7 - **Ltm3** value (*100 dB) b8 - **Ltm5** value (*100 dB) b9 - **LR1** value (*100 dB) b10 - **LR2** value (*100 dB) b11 - **EX** value (*100 dB) b12 - **SD** value (*100 dB)
50	Logger_main_prof[2]	Main results in the 2nd profile saved in the file. Contents defined the same as in Logger_main_prof[1].
51	Logger_main_prof[3]	Main results in the 3rd profile. Contents defined the same as in Logger_main_prof[1].
52	Logger_main_common	Main common results saved in the file. Contents defined as a sum of flags: b0 - overload time (sec) b1 - NR value b2 - NC value
53	Logger_stat_prof[1]	Statistical results in the 1st profile saved in the file. Contents defined as a sum of flags from b1 to N_stat_level defined in table B1.27.
54	Logger_stat_prof[2]	Statistical results in the 2nd profile saved in the file. Contents defined as a sum of flags from b1 to N_stat_level defined in table B1.27.
55	Logger_stat_prof[3]	Statistical results in the 3rd profile saved in the file. Contents defined as a sum of flags from b1 to N_stat_level defined in table B1.27.
56	Reserved	Reserved
57	Reserved	Reserved
58	Reserved	Reserved
59	Reserved	Reserved
60	Reserved	Reserved
61	Reserved	Reserved
62	Reserved	Reserved
63	Reserved	Reserved
…		

Table B.1.8. Measurement trigger parameters

Word number	Name	Comment
0	0xnn2B	[2B, nn=block's length]
1	TriggerMode	trigger mode: 0 - **OFF**, 2 - measurement on trigger **SLOPE+** 3 - measurement on trigger **SLOPE–** 4 - measurement on trigger **LEVEL+** 5 - measurement on trigger **LEVEL–** 6 - measurement on trigger **GRAD+** 10 - measurement on trigger **EXTERNAL**
2	TriggerSource	source of the triggering signal: 0 - **Leq(1)** the **Leq** result from the first profile
3	TriggerLevel	level of triggering: 24 ÷ 136 dB (*10)
4	TriggerGrad	gradient of triggering: 1 dB/ms ÷ 100 dB/ms (*10)
5	TriggerPre	reserved
6	TriggerPost	reserved
7	TriggerSampling	reserved
8	TriggerRecTime	reserved
9	TriggerStep	trigger period given in 0.1 ms. If zero Step is equal to logger time-step (cf. Tab. B.1.15)
10	TriggerFilter	reserved
11	BitsPerSample	reserved
12	Range	reserved
13	Gain	reserved
14	LengthLimit	reserved
…		

Table B.1.9. Logger trigger parameters

Word number	Name	Comment
0	0xnn2C	[2C, nn=block's length]
1	TriggerMode	trigger mode: 0 - **OFF**, 4 - measurement on trigger **LEVEL+**, 5 - measurement on trigger **LEVEL–**
2	TriggerSource	source of the triggering signal: 0 - **Leq(1)** the **Leq** result from the first profile
3	TriggerLev	level of triggering: 24 ÷ 136 dB (*10)

4	TriggerGrad	reserved
5	TriggerPre	number of the records taken into account before the fulfilment of the triggering condition ∈(1 ÷ 10)
6	TriggerPost	number of the records taken into account after the fulfilment of the triggering condition ∈(1 ÷ 200)
7	TriggerSampling	reserved
8	TriggerRecTime	reserved
9	TriggerStep	trigger period given in 0.1 ms. If zero Step is equal to logger time-step (cf. Tab. B.1.15)
10	TriggerFilter	reserved
11	BitsPerSample	reserved
12	Range	reserved
13	Gain	reserved
14	LengthLimit	reserved
…		

Table B.1.10. Wave-file recording parameters

Word number	Name	Comment
0	0xnn2D	[2D, nn=block's length]
1	TriggerMode	trigger mode: 0 - **OFF**, 1 - recording whole measurement 2 - recording on trigger **SLOPE+** 3 - recording on trigger **SLOPE–** 4 - recording on trigger **LEVEL+** 5 - recording on trigger **LEVEL–** 6 - recording on trigger **GRAD+** 7 - recording on trigger **MANUAL** 8 - recording on trigger **INTEGRATION PERIOD** 9 **-** reserved 10 - recording on trigger **EXTERNAL** 11 - recording on trigger **ALARM**
2	TriggerSource	source of the triggering signal: 0 - **Leq(1)** the **Leq** result from the first profile
3	TriggerLevel	level of triggering: 24 ÷ 136 dB (*10)
4	TriggerGrad	gradient of triggering: 1 dB/ms ÷ 100 dB/ms (*10)
5	TriggerPre	pretrigger time given in 10ms
6	TriggerPost	reserved
7	TriggerSampling	sampling frequency given in 10Hz
8	TriggerRecTime	recording time of single data block: 0 - recording to the end of measurement 1..28800 (sec)

9	TriggerStep	trigger period given in 0.1 ms. If zero Step is equal to logger time-step (cf. Tab. B.1.15)
10	TriggerFilter	filter type: 1 - **Z**, 2 - **A**, 3 - **C** 5 - **B**
11	BitsPerSample	bits/sample: 16, 24
12	Range	Full scale signal range in 0.01dB
13	Gain	Signal gain in dB
14	LengthLimit	Wave file length limit in minutes
…		

Table B.1.11. Extended I/O parameters

Word number	Name	Comment
0	0xnn2E	[2E, nn=block's length]
1	Mode	mode: 0 – **Off** 1 – **DIGITAL IN** 2 – **DIGITAL OUT** 3 – **ALARM**
2	Function	in case of **DIGITAL IN**: 0 – **EXTERNAL TRIGGER** in case of **DIGITAL OUT**: 0 – **TRIG. PULSE**, 1 – **ALARM PULSE** in other cases: reserved
3	ActiveLevel	in case of **DIGITAL OUT** and **ALARM PULSE**: or in **ALARM** mode 0 – **LOW**, 1 – **HIGH** in other cases: reserved
4	Source	Source in case of **DIGITAL OUT** and **ALARM PULSE**: 0 – **Leq(1) / RMS(1)**, in other cases: reserved
5	SourceType	Source type in case of **DIGITAL OUT** and **ALARM PULSE**: 0 – **CURRENT**, 1 – **PERIODIC** in other cases: reserved
6	AlarmLevel	in case of **DIGITAL OUT** and **ALARM PULSE**: level (*10 dB) in other cases: reserved

Word number	Name	Comment
7	Polarisation/Slope	in case of **DIGITAL OUT** and **TRIG. PULSE**: Polarisation: 0 – **POSITIVE**, 1 – **NEGATIVE** in case of **DIGITAL IN**: Slope: 0 – **POSITIVE**, 1 – **NEGATIVE** in other cases: reserved
8	AlarmTime	in case of **ALARM mode**: activity time (sec) in other cases: reserved
…		

Table B.1.12. Special settings for profiles

Word number	Name	Comment
0	0xnn05	[05, nn=block's length]
1	0x0307	[used_profile, profile's mask]
2	0xmm06	[06, mm=sub-block's length]
3	DetectorP[1]	detector type in the 1st profile: 0 - **IMP.**, 1 - **FAST**, 2 - **SLOW**
4	FilterP[1]	filter type in the 1st profile: 1 - **Z**, 2 - **A**, 3 - **C** 5 - **B** 6 - **LF**
5	BufferP[1]	logger contents in the 1st profile defined as a sum of: 0 - none, 1 - Lxpeak[1] 2 - Lxvmax[2] 4 - Lxvmin[2] 8 - Lxveq[23] 16 - **LAV** 32 - **LR1** 64 - **LR2**
6	FilterPeakP[1]	filter type for Peak result calculation in the 1st profile: 1 - **Z**, 2 - **A**, 3 - **C** 5 - **B** 6 - **LF**

7	reserved	Reserved
8	0xmm06	[06, mm=sub-block's length]
9	DetectorP[2]	detector type in the 2nd profile: 0 - **IMP.**, 1 - **FAST**, 2 - **SLOW**
10	FilterP[2]	filter type in the 2nd profile: 1 - **Z**, 2 - **A**, 3 - **C** 5 - **B** 6 - **LF**
11	BufferP[2]	logger contents in the 2nd profile defined as a sum of: 0 - none, 1 - Lxpeak[1] 2 - Lxvmax[2] 4 - Lxvmin[2] 8 - Lxveq[23] 16 - **LAV** 32 - **LR1** 64 - **LR2**
12	FilterPeakP[2]	filter type for Peak result calculation in the 2nd profile: 1 - **Z**, 2 - **A**, 3 - **C** 5 - **B** 6 - **LF**
13	reserved	reserved
14	0xmm06	[06, mm=sub-block's length]
15	DetectorP[3]	detector type in the 3rd profile: 0 - **IMP.**, 1 - **FAST**, 2 - **SLOW**
16	FilterP[3]	filter type in the 3rd profile: 1 - **Z**, 2 - **A**, 3 - **C** 5 - **B** 6 – **LF**
17	BufferP[3]	logger contents in the 3rd profile defined as a sum of: 0 - none, 1 - Lxpeak[1] 2 - Lxvmax[2] 4 - Lxvmin[2] 8 - Lxveq[23] 16 - **LAV** 32 - **LR1** 64 - **LR2**

18	FilterPeakP[3]	filter type for Peak result calculation in the 3rd profile: 1 - **Z**, 2 - **A**, 3 - **C** 5 - **B** 6 - **LF**
19	reserved	reserved
…		

[1] x - depends of the filter type for Peak result calculation in selected profile: A, C, Z, B (cf. Tab. B.1.12)

[2] x - depends of the filter type in selected profile: A, C, Z, B, LF (cf. Tab. B.1.12)
y - depends of the detector type in selected profile: I (imp.), F (fast), S (slow) (cf. Tab. B.1.12)

[3] y - only for exponential detector's type (cf. Tab. B.1.6)

Table B.1.13. Display settings of the main results

Word number	Name	Comment
0	0xnn48	[48, nn=header's length]
1	TIME	0 – TIME result not displayed, 1 - TIME result displayed
2	Lpeak	0 – Lxpeak[1] result not displayed, 1 – Lxpeak[1] result displayed
3	Lmax	0 – Lxymax[2] result not displayed, 1 – Lxymax[2] result displayed
4	Lmin	0 – Lxymin[2] result not displayed, 1 – Lxymin[2] result displayed
5	L	0 – Lxy[2] result not displayed, 1 – Lxy[2] result displayed
6	DOSE	0 – DOSE result not displayed, 1 - DOSE result displayed
7	D_8h	0 – D_8h result not displayed, 1 - D_8h result displayed
8	LAV	0 – LAV result not displayed, 1 - LAV result displayed
9	Leq	0 – Lxyeq[23] result not displayed, 1 – Lxyeq[23] result displayed
10	LE	0 – LxyE[23] result not displayed, 1 - LxyE[23] result displayed
11	SEL8	0 – SEL8 result not displayed, 1 - SEL8 result displayed
12	E	0 – E result not displayed, 1 – E result displayed
13	E_8h	0 – E_8h result not displayed, E_8h 1 - result displayed
14	Lden	0 – Lden result not displayed, 1 - Lden result displayed
15	LEPd	0 – LEPd result not displayed, 1 - LEPd result displayed
16	PSEL	0 – PSEL result not displayed, 1 - PSEL result displayed
17	Ltm3	0 – Ltm3 result not displayed, 1 - Ltm3 result displayed
18	LTeq	0 – LTeq result not displayed, 1 - LTeq result displayed
19	Ln	0 – Ln result not displayed, 1 - Ln result displayed
20	PTC	0 – PTC result not displayed, 1 - PTC result displayed
21	PTP	0 – PTP result not displayed, 1 - PTP result displayed
22	ULT	0 – ULT result not displayed, 1 - ULT result displayed
23	TWA	0 – TWA result not displayed, 1 - TWA result displayed
24	PrDOSE	0 – PrDOSE result not displayed, 1 - PrDOSE result displayed
25	PrTWA	0 – PrTWA result not displayed, 1 - PrTWA result displayed
26	LR1	0 – LR1 result not displayed, 1 - LR1 result displayed

27	LR2	0 – LR2 result not displayed, 1 – LR2 result displayed
28	LCA	0 – Lc-a result not displayed, 1 – Lc-a result displayed
29	OVL	0 – OVL result not displayed, 1 - OVL result displayed
30	LeqLF	0 – LeqLF result not displayed, 1 - LeqLF result displayed
…	…	…

[1] x - depends of the filter type for Peak result calculation in selected profile: A, C, Z, B (cf. Tab. B.1.12)

[2] x - depends of the filter type in selected profile: A, C, Z, B, LF (cf. Tab. B.1.12)
y - depends of the detector type in selected profile: I (imp.), F (fast), S (slow) (cf. Tab. B.1.12)

[3] y - only for exponential detector's type (cf. Tab. B.1.6)

Table B.1.14. Header of the statistical analysis

Word number	Name	Comment
0	0xnn09	[09, nn=block's length]
1	0x0307	[03=number of profiles, 07=active profiles mask]
2	0xmm0A	[0A, mm=sub-block's length]
3	NofClasses[1]	number of classes in the first profile (120)
4	BottomClass[1]	bottom class boundary (*10 dB) in the first profile
5	ClassWidth[1]	class width (*10 dB) in the first profile
6	0xmm0A	[0A, mm=sub-block's length]
7	NofClasses[2]	number of classes in the second profile (120)
8	BottomClass[2]	bottom class boundary (*10 dB) in the second profile
9	ClassWidth[2]	class width (*10 dB) in the second profile
10	0xmm0A	[0A, mm=sub-block's length]
11	NofClasses[3]	number of classes in the third profile (120)
12	BottomClass[3]	bottom class boundary (*10 dB) in the third profile
13	ClassWidth[3]	class width (*10 dB) in the third profile
…	…	…

Table B.1.15. Header of the file from the logger

Word number	Name	Comment
0	0xnn0F	[0F, nn=header's length]
1	BuffTSec	logger time step - full seconds part
2	BuffTMilisec	logger time step - milliseconds part
3	LowestFreq	the lowest **1/1 OCTAVE** or **1/3 OCTAVE** frequency (*100 Hz)
4	NOctTer	number of **1/1 OCTAVE** or **1/3 OCTAVE** results
5	NOctTerTot	number of **TOTAL** values
6..7	BuffLength	logger length (bytes)
8..9	RecsInBuff	number of records in the logger
10..11	RecsInObserv	number of records in the observation period equal to: number of records in the logger + number of records not saved

12..13	AudioRecords	number of audio records in the logger
14..15	DustMeteoUnitNumber	serial number of the monitoring station (if the parameter value is equal to 0xFFFFFFFF this parameter is irrelevant)
16	DustMeteoUnitType	type of the monitoring station: - 276 (SP 276) - 642 (ES-642 Dust Monitor) (if the parameter value is equal to 0xFFFF this parameter is irrelevant)
17..18	DustMeteoSoftwareVersion	firmware version number of the monitoring stations (if the parameter value is equal to 0xFFFFFFFF this parameter is irrelevant) Format of version in case of SP276: A.BB.CC where CC = version %100 (two characters) BB = (version / 100)%100 (two characters) A = version / 10000 e.g. 0x00004E2E mean 2.00.14
…	…	…

Note: *The current logger time step in seconds can be obtained from the formulae:*

T = BuffTSec + BuffTMillisec / 1000

Table B.1.16. Contents of the file from the logger

Word number	Name	Comment
0..(BuffLength/2-1)		result#1, result#2, ... result#(BuffLength/2-1)

Table B.1.17. Header of the Summary Results Record (saved in Summary Results Record)

Word number	Name	Comment
0	0xnn59	[59, nn=header's length]
1..2	RecNumber	Summary Results Record number: 1..
3..4	MeasureTime	Time of the measurement
5	Flags	Measurement flags. Contents defined as a sum of flags: b0 - if set to 1: calibration coefficient is used b3 - if set to 1: overload occurred b7, b6, b5: type of the result **Lden** 000 – **Lden** result is not available 001 – **Ld** result 010 – **Le** result 011 – **Lde** result 100 – **Ln** result 101 – **Lnd** result 110 – **Len** result 111 – **Lden** result

		b9 - if set to 1: measurement start synchronized with GPS b10 - if set to 1: under-range occurred in the 1st profile b11 - if set to 1: under-range occurred in the 2nd profile b12 - if set to 1: under-range occurred in the 3rd profile b13 - if set to 1: Microphone service mode b14 - if set to 1: Microphone damaged
6..7	WelmecRec	Welmec data record number (Only in welmec version).
…	…	…

Table B.1.18_SLM. Main results in SLM mode (saved in Summary Results Record)

Word number	Name	Comment
0	0xnn66	[66, nn=block's length]
1st profile results. Presence depending on the value of Logger_main_prof[1] (cf. Tab. B.1.6)		
	Result[1][1]	Lxpeak[1] value in the 1st profile (*100 dB)
	Result[1][2]	LxyE[23] value in the 1st profile (*100 dB)
	Result[1][3]	maximal value (Lxymax[2]) in the 1st profile (*100 dB)
	Result[1][4]	minimal value (Lxymin[2]) in the 1st profile (*100 dB)
	Result[1][5]	Lxy[2] value in the 1st profile (*100 dB)
	Result[1][6]	Lxyeq[23] value in the 1st profile (*100 dB)
	Result[1][7]	**Lden** value in the 1st profile (*100 dB)
	Result[1][8]	**Ltm3** value in the 1st profile (*100 dB)
	Result[1][9]	**Ltm5** value in the 1st profile (*100 dB)
	Result[1][10]	**LR1** value in the 1st profile (*100 dB)
	Result[1][11]	**LR2** value in the 1st profile (*100 dB)
	Result[1][12]	**EX** value in the 1st profile (*100 dB)
	Result[1][13]	**SD** value in the 1st profile (*100 dB)
2nd profile results. Presence depending on the value of Logger_main_prof[2] (cf. Tab. B.1.6)		
	Result[2][1]	Lxpeak[1] value in the 2nd profile (*100 dB)
	Result[2][2]	LxyE[23] value in the 2nd profile (*100 dB)
	Result[2][3]	maximal value (Lxymax[2]) in the 2nd profile (*100 dB)
	Result[2][4]	minimal value (Lxymin[2]) in the 2nd profile (*100 dB)
	Result[2][5]	Lxy[2] value in the 2nd profile (*100 dB)
	Result[2][6]	Lxyeq[23] value in the 2nd profile (*100 dB)
	Result[2][7]	**Lden** value in the 2nd profile (*100 dB)
	Result[2][8]	**Ltm3** value in the 2nd profile (*100 dB)
	Result[2][9]	**Ltm5** value in the 2nd profile (*100 dB)
	Result[2][10]	**LR1** value in the 2nd profile (*100 dB)
	Result[2][11]	**LR2** value in the 2nd profile (*100 dB)
	Result[2][12]	**EX** value in the 2nd profile (*100 dB)
	Result[2][13]	**SD** value in the 2nd profile (*100 dB)
3rd profile results. Presence depending on the value of Logger_main_prof[3] (cf. Tab. B.1.6)		
	Result[3][1]	Lxpeak[1] value in the 3rd profile (*100 dB)
	Result[3][2]	LxyE[23] value in the 3rd profile (*100 dB)
	Result[3][3]	maximal value (Lxymax[2]) in the 3rd profile (*100 dB)
	Result[3][4]	minimal value (Lxymin[2]) in the 3rd profile (*100 dB)
	Result[3][5]	Lxy[2] value in the 3rd profile (*100 dB)
	Result[3][6]	Lxyeq[23] value in the 3rd profile (*100 dB)

	Result[3][7]	**Lden** value in the 3rd profile (*100 dB)
	Result[3][8]	**Ltm3** value in the 3rd profile (*100 dB)
	Result[3][9]	**Ltm5** value in the 3rd profile (*100 dB)
	Result[3][10]	**LR1** value in the 3rd profile (*100 dB)
	Result[3][11]	**LR2** value in the 3rd profile (*100 dB)
	Result[3][12]	**EX** value in the 3rd profile (*100 dB)
	Result[3][13]	**SD** value in the 3rd profile (*100 dB)
Common results. Presence depending on the value of Logger_main_common (cf. Tab. B.1.6)		
	OVL	Overload time in seconds. (results written in 2 words)
	NR	NR value
	NC	NC value
[1] x - depends of the filter type for Peak result calculation in selected profile: A, C, Z, B (cf. Tab. B.1.12) [2] x - depends of the filter type in selected profile: A, C, Z, B (cf. Tab. B.1.12) y - depends of the detector type in selected profile: I (imp.), F (fast), S (slow) (cf. Tab. B.1.12) [3] y - only for exponential detector's type (cf. Tab. B.1.6)		

Table B.1.19. Statistical levels (saved in Summary Results Record)

Word number	Name	Comment
0	0xnn65	[65, nn=block's length]
	Lnn[i,p]	Value of the **Lnn** statistics for profile p (p=1..pp) (*100 dB) i=0.. N_stat_level -1, (cf. Tab. B.1.27) Presence depending on the value of Logger_stat_prof[p] (cf. Tab. B.1.6) Number of the **Lnn** statistics defined in Tab. B.1.27

Table B.1.20. 1/1 OCTAVE analysis results (saved in Summary Results Record)

Word number	Name	Comment
0	0xnn0E, 0xnn26, 0xnn27, 0xnn30	[block_id, nn=block_length] 0xnn**0E** - averaged spectrum results, 0xnn**26** - min. spectrum results, 0xnn**27** - max. spectrum results 0xnn**30** - peak spectrum results
1	0x0101	[used_profile, profile's mask]
2	LowestFreq	the lowest **1/1 OCTAVE** frequency (*100 Hz): 3150 (**AUDIO BAND**)
3	NOct	number of **1/1 OCTAVE** values: 10 (**AUDIO BAND**)
4	NOctTot	number of **TOTAL** values: 3
5÷20	Octave[i]	1/1 octave[i] value (*100 dB); i=1÷NOct+NoctTot (1÷13)

…	…	…

Table B.1.21. 1/3 OCTAVE analysis results (saved in Summary Results Record)

Word number	Name	Comment
0	0xnn10, 0xnn28, 0xnn29, 0xnn32	[block_id, nn=block_length] 0xnn**10** - averaged spectrum results, 0xnn**28** - min. spectrum results, 0xnn**29** - max. spectrum results 0xnn**32** - peak spectrum results
1	0x0101	[used_profile, profile's mask]
2	LowestFreq	the lowest **1/3 OCTAVE** frequency (*100 Hz): 2000 (**AUDIO BAND**)
3	NTer	number of **1/3 OCTAVE** values: 31 (**AUDIO BAND**)
4	NTerTot	number of **TOTAL** values: 3
5÷50	Tercje[i]	1/3 octave[i] value (*100 dB); i=1÷NTer+NTerTot (1÷34)
…	…	…

Table B.1.22. Results of the statistical analysis in profiles (saved in Summary Results Record)

Word number	Name	Comment
0	0x010B	[0B, prof_mask#1]
1	SubblockLength	2 * number of classes in the first profile + 2
2..3	Histogram[1][1]	the first counter in the first profile
4..5	Histogram[1][2]	the second counter in the first profile
.....	.....	.....
0	0x020B	[0B, prof_mask#2]
1	SubblockLength	2 * number of classes in the second profile + 2
2..3	Histogram[2][1]	the first counter in the second profile
4..5	Histogram[2][2]	the second counter in the second profile
.....	.....	.....
0	0x040B	[0B, prof_mask#3]
1	SubblockLength	2 * number of classes in the third profile + 2
2..3	Histogram[3][1]	the first counter in the third profile
4..5	Histogram[3][2]	the second counter in the third profile
.....	.....	.....

Table B.1.23. Meteo Data (saved in Summary Results Record)

Word number	Name	Comment
0	0x002A	[**2A** = id, 00 = block's length in the second word]
1	BlockLength	block length in words

2..3	UnitNumber	serial number of the monitoring station (if the parameter value is equal to 0xFFFFFFFF this parameter is irrelevant)
4	UnitType	type of the monitoring station: - 276 (SP 276) (if the parameter value is equal to 0xFFFF this parameter is irrelevant)
5..6	SoftwareVersion	firmware version number of the monitoring stations (if the parameter value is equal to 0xFFFFFFFF this parameter is irrelevant) Format of version in case of SP276: A.BB.CC where CC = version %100 (two characters) BB = (version / 100)%100 (two characters) A = version / 10000 e.g. 0x00004E2E mean 2.00.14
7..8	IntTimeSec	meteorological results averaging time used in the monitoring station
9	Temperature	temperature measurement result in format 0,1°C
10	Pressure	atmospheric pressure measurement result in hectopascals
11	Humidity	relative humidity measurement result in format 0,1%
12	AvgWindSpeed	average wind speed measurement result in the format 0,1 m/s
13	WindDirection	wind direction in degrees for maximum wind speed (if the parameter value is equal to 0FFFFh the direction is undefined)
14	MaxWindSpeed	maximum wind speed measurement result in the format 0,1 m/s
15..16	WindDirTotalPuffs	number of wind measurement samples
17	N	number of directions of wind direction distribution
18..	WindDir[N]	wind direction distribution table - values in the format 0.1%
18+N	M	number of directions of measurement of maximum wind speed
...	WindMax[M]	table of maximum wind speeds - values in 0.1 m / s format
18+N+M	V	number of directions for measuring average wind speeds
...	WindAvg[V]	table of average wind speeds - values in the format 0,1 m/s
16+N+M+V	RainDetection	flag of precipitation: Note: if the flag is zero, the next 5 words of precipitation parameters are not present in this block
+[0]	[RainIntensity]	rainfall intensity in 0.1 mm / h format (It is the sum of the last sixty lots of 1 minute accumulated Rain data. A new sum measurement is generated every minute.)
+[1..2]	[RainAccumulation]	sum of rainfall in 0.01 mm format
+[3..4]	[RainDuration]	duration of precipitation in seconds
.....	.....	.....

Table B.1.24. SETUP file

Word number	Name	Comment

0	0x0020	[20, 00=block's length in the second word]
1	BlockLength	length of the block
2..BlockLength-1	SetupTextData	saved setup values

Table B.1.25. File-end-marker

Word number	Name	Comment
0	0xFFFF	file end marker

Table B.1.26. Dust Monitor Data (saved in Summary Results Record)

Word number	Name	Comment
0	0x0063	[**63** = id, 00 = block's length in the second word]
1	BlockLength	block length in words
2..3	UnitNumber	serial number of the monitoring station (if the parameter value is equal to 0xFFFFFFFF this parameter is irrelevant)
4	UnitType	type of the monitoring station: - 642 (ES-642) (if the parameter value is equal to 0xFFFF this parameter is irrelevant)
5..6	SoftwareVersion	firmware version number of the monitoring stations (if the parameter value is equal to 0xFFFFFFFF this parameter is irrelevant) Format of version in case of SP276: A.BB.CC where CC = version %100 (two characters) BB = (version / 100)%100 (two characters) A = version / 10000 e.g. 0x00004E2E mean 2.00.14
7..8	IntTimeSec	dust results averaging time used in the monitoring station
9	StatusFlags	sum of the following flags: 0 – Sensor Calibration Error: Zero reading to low 1 – Sensor Calibration Error: Zero reading to high 4 – IOP Error (Laser) 5 – Counter Error (Sensor) 6 – Flow Regulation Error 12 – PM1 result calculated. 13 – PM2.5 result calculated. 14 – PM10 result calculated. 15 – TSP result calculated.

		If bits 0 and 1 are set simultaneously, this means Sensor Calibration Error: Stability error, too many retries
10..11	PM1	PM1 in µg/m^3 (valid only if bit 12 in StatuFlags is set)
12..13	PM2.5	PM2.5 in µg/m^3 (valid only if bit 13 in StatuFlags is set)
14..15	PM10	PM10 in µg/m^3 (valid only if bit 14 in StatuFlags is set)
16..17	TSP	TSP in µg/m^3 (valid only if bit 15 in StatuFlags is set)
18	Temperature	temperature measurement result in format 0,1°C
19	Pressure	atmospheric pressure measurement result in hectopascals
20	Humidity	relative humidity measurement result in format 0,1%
21	Flow	air flow measurement result in format 0,1 lpm
.....	.....	.....

Table B.1.27. Statistical levels settings

Word number	Name	Comment
0	0xnn64	[64, nn=block's length]
1	N_stat_level	number of statistical levels = N
2+i	nn[i]	number of the **Lnn** statistics; i=0..N-1
…	…	…

Table B.1.28. Alarm parameters settings

Word number	Name	Comment
0	0x0060	[**60** = id, 00 = block's length in the second word]
1	BlockLength	block length in words
2	EventCount	
+[0]	0xmm67	[67, mm=sub-block's length]
+[1]	EventId[i]	
+[2]	Active[i]	event active: 0 - switched off, 1 - switched on
+[3..10]	Name[i]	
+[11]	Source[i]	event source: 0 – System 1 – Leq

		2 – Lmax 3 – LR(1) 4 – LR(2) 5 – Leq+NR 6 – LeqPR 7 – LeqPR+LN 8 – Lnn 9 – Dust
+[12]	Integration[i]	event integration time 0 – 1s, 1 – SR, 2 – TH,
+[13..14]	SysEventMask[i]	system event mask defined as a sum of: b0 - Powered Up b1 - Powered Down b2 - Measurement Start b3 - Measurement Stop b4 - Mains On b5 - Mains Off b6 - Low Battery b7 - Battery OK b8 - Low External Battery b9 - External Battery OK b10 - Low Storage b11 - Storage OK b12 - System Check b13 - Live Check b14 - Instrument Error b15 - Meteo On b16 - Meteo Off b17 - Device Tilt b18 - Device Vertical b19 - Vibration b20 - Location b31 - Microphone service mode (valid only with b12 or b13)
+[15]	Threshold1[i]	in case of Dust **source**: value in µg/m^3, in other cases: value in dB
+[16]	Threshold2[i]	in case of Leq+NR **source**: NR in case of LeqPR+LN or Lnn **source**: LN in case of Dust **source**: type of Dust according to ES642Mode (cf. Tab. B.1.6)

		in other cases: reserved
+[17]	StartHour[i]	
+[18]	StartMinute[i]	
+[19]	StopHour[i]	
+[20]	StopMinute[i]	
+[21]	Weekday	weekday mask defined as a sum of: b0 – Mo, b1 – Tu, b2 – We, b3 – Th, b4 – Fr, b5 – Sa, b6 – Su,
+[22]	TriggerMode[i]	trigger mode: 0 – Continuous, 1 – Counter,
+[23]	MinDuration[i]	value in seconds
+[24]	Counter[i]	value without unit
+[25]	MinBreak[i]	min. break between successive events in seconds
+[26]	SMSActive[i]	sms active: 0 - switched off, 1 - switched on
+[27]	SMSRecipMask[i]	
+[28]	Email Active[i]	email active: 0 - switched off, 1 - switched on
+[29]	EmailRecipMask[i]	
+[30]	AudioActive[i]	audio active: 0 - switched off, 1 - switched on
+[31]	IOActive[i]	IO active: 0 - switched off, 1 - switched on
+[32]	PreTrigger[i]	value in seconds (only for LeqPR+LN)
…	…	…

B.2 STRUCTURE OF THE FILE CONTAINING RESULTS FROM LOGGER'S FILE

SvanPC file header - cf. Tab. B.1.1.

File header - cf. Tab. B.1.2.

Unit and software specification - cf. Tab. B.1.3.

Calibration settings - cf. Tab. B.1.4.

USER'S text - cf. Tab. B.1.5.

Unit text info - cf. Tab. B.1.6.

Parameters and global settings - cf. Tab. B.1.7.

MEASUREMENT TRIGGER settings - cf. Tab. B.1.8.

LOGGER TRIGGER settings - cf. Tab. B.1.9.

Wave-file recording parameters - cf. Tab. B.1.10.

External I/O parameters - cf. 0;

Special settings for profiles - cf. Tab. B.1.12.

Display settings of the main results - cf. Tab. B.1.13.

Header of the statistical analysis - cf. Tab. B.1.14.

Header of the logger file - cf. Tab. B.1.15.

Contents of the logger file - cf. Tab. B.1.16. and the description in B.2.1.

B.2.1. The contents of the files in the logger

The records with the results and the records with the state of the markers as well as the records with the breaks in the results registration are saved in the files in the logger. All results are written in dB*100.

B.2.1.1. Record with the results

The contents of the record with the results depends on the selected measurement function and the value set in the **LOGGER** position of the **PROFILE x** and **SPECTRUM** sub-lists. The following elements can be present (in the given sequence):

(1) flag record

< flags > :

- b0: 1- the overload detected, 0 - the overload not detected
- b1: 1- the excessive self-vibration detected, 0 - the excessive self-vibration overload not detected
- b13: 1 - Microphone service mode
- b14: 1 - Microphone damaged

(2) results of the measurement from the first profile if the corresponding **LOGGER** position was active *(paths: Measurement / Logging / Logger Res. / Prof. 1*); up to seven words are written:

<result1> - **Lxpeak**[1] result, depending on the value of BufferP[1] (cf. Tab. B.1.12)
<result2> - **Lxymax**[2] result, depending on the value of BufferP[1] (cf. Tab. B.1.12)
<result3> - **Lxymin**[2] result, depending on the value of BufferP[1] (cf. Tab. B.1.12)
<result4> - **Lxyeq**[23] result, depending on the value of BufferP[1] (cf. Tab. B.1.12)
<result5> - **LAV** result, depending on the value of BufferP[1] (cf. Tab. B.1.12)
<result5> - **LR1** result, depending on the value of BufferP[1] (cf. Tab. B.1.12)
<result6> - **LR2** result, depending on the value of BufferP[1] (cf. Tab. B.1.12)

(3) results of the measurement from the second profile if the corresponding **LOGGER** position was active *(paths: Measurement / Logging / Logger Res. / Prof. 2*); up to five words are written:

<result1> - **L<u>x</u>peak**[1] result, depending on the value of BufferP[2] (cf. Tab. B.1.12)
<result2> - **L<u>xy</u>max**[2] result, depending on the value of BufferP[2] (cf. Tab. B.1.12)
<result3> - **L<u>xy</u>min**[2] result, depending on the value of BufferP[2] (cf. Tab. B.1.12)
<result4> - **L<u>xy</u>eq**[23] result, depending on the value of BufferP[2] (cf. Tab. B.1.12)
<result5> - **LAV** result, depending on the value of BufferP[2] (cf. Tab. B.1.12)
<result5> - **LR1** result, depending on the value of BufferP[2] (cf. Tab. B.1.12)
<result6> - **LR2** result, depending on the value of BufferP[2] (cf. Tab. B.1.12)

(4) results of the measurement from the third profile if the corresponding **LOGGER** position was active *(paths: Measurement / Logging / Logger Res. / Prof. 3*); up to five words are written:

<result1> - **L<u>x</u>peak**[1] result, depending on the value of BufferP[3] (cf. Tab. B.1.12)
<result2> - **L<u>xy</u>max**[2] result, depending on the value of BufferP[3] (cf. Tab. B.1.12)
<result3> - **L<u>xy</u>min**[2] result, depending on the value of BufferP[3] (cf. Tab. B.1.12)
<result4> - **L<u>xy</u>eq**[23] result, depending on the value of BufferP[3] (cf. Tab. B.1.12)
<result5> - **LAV** result, depending on the value of BufferP[3] (cf. Tab. B.1.12)
<result5> - **LR1** result, depending on the value of BufferP[3] (cf. Tab. B.1.12)
<result6> - **LR2** result, depending on the value of BufferP[3] (cf. Tab. B.1.12)

1	x - depends of the filter type for Peak result calculation in selected profile: A, C, Z, B (cf. Tab. B.1.12)
2	x - depends of the filter type in selected profile: A, C, Z, B (cf. Tab. B.1.12) y - depends of the detector type in selected profile: I (imp.), F (fast), S (slow) (cf. Tab. B.1.12)
3	y - only for exponential detector's type (cf. Tab. B.1.6)

(5) results of **1/1 OCTAVE** analysis or **1/3 OCTAVE** analysis if **1/1 OCTAVE** analysis or **1/3 OCTAVE** analysis was selected as the measurement function and the **LOGGER** was active *(paths: Measurement / Logging / Logger Res. / Peak Sp. [√] and Leq Sp. [√]*); the sequence of words is written:

<Octave Peak[1]> <Octave Peak [2]> ... <Octave Peak [Noct+NOctTot]> <Octave Leq[1]> <Octave Leq[2]> ... <Octave Leq[NOct+NOctTot]>

where:

Octave Peak[i] - the result of **1/1 OCTAVE** or **1/3 OCTAVE** Peak analysis (*100 dB); i = 1..NOct+NOctTot

Octave Leq[i] - the result of **1/1 OCTAVE** or **1/3 OCTAVE** Leq analysis (*100 dB); i = 1..NOct+NOctTot

B.2.1.2. Record with the state of the markers

The record with the state of the markers consists of one word:

<0x8nnn>

in which 12 bits nnn denote the state of the markers:

b11 = state of #12 marker
b10 = state of #11 marker
...
b1 = state of #2 marker
b0 = state of #1 marker

B.2.1.3. Record with the breaks in the results registration

The record with the breaks in the results registration consists of four words:

<0xB0ii> <0xB1jj> <0xB2kk> <0xB3nn>

in which ii, jj, kk, nn bytes denote 4-bytes counter of left or skipped records: nnkkjjii (ii is the least significant byte, nn – the most significant byte).

B.2.1.4. Record with the breaks account PAUSE in the results registration

The record with the breaks in the results registration consists of four words:

<0xA0ii> <0xA1jj> <0xA2kk> <0xA3nn>

in which ii, jj, kk, nn bytes denote 4-bytes counter duration of PAUSE in milliseconds:

nnkkjjii (ii is the least significant byte, nn - the most significant byte).

B.2.1.5. Record with the wave file name

The record with the wave file name consists of six words:

<0xC2aa>
<0xccbb>
<0xeedd>
<0xggff>
<0xiihh>
<0xCAaa>

in which:

aa - size of records,

bb cc dd ee ff gg hh ii - 8-bytes name of wave file name

B.2.1.6. Record with Summary Results

The format of the data frame is as follows:

HS	L (optional)	D	L (optional)	HE

where:

HS starting header (1 word)
L length of the block (field is optional and occurs only when b7..b0 in header are set to zero)
D Summary Data:
- Main results (cf. Tab. B.1.17_SLM)
- Statistical levels (optional, cf. Tab. B.1.18)
- 1/1 OCTAVE analysis results (optional, cf. Tab. B.1.19)
- 1/3 OCTAVE analysis results (optional, cf. Tab. B.1.20)
- The results of the statistical analysis in profiles (optional, cf. Tab. B.1.21)

HE ending header (1 word), which differs from the HS only on b11 bit (thanks to it, it is possible to analyse the recorded file starting from its end)

The HEADER format is as follows:

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0

where:

b15 - 1
b14 - 1

b13 - 0
b12 - 0,
b11 - header type:
0 - HS
1 - HE
b10 - 0
b9 - 1
b8 - 1
b15÷b8 – HS (0xC3), HE (0xCB)
b7÷b0 – length of the block (if zero length of the block is saved in additional word L)

B.2.1.7. Record with the comment file name

The format of the data frame is as follows:

HS	D	HE

where:
HS starting header (1 word)
D The full name of the comment file (e.g. “REC62.WAV”).
HE ending header (1 word), which differs from the HS only on b11 bit (thanks to it, it is possible to analyse the recorded file starting from its end)

The HEADER format is as follows:

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0

where:

b15 - 1
b14 - 1
b13 - 0
b12 - 0,
b11 - header type:
0 - HS
1 - HE
b10 - 1
b9 - 0
b8 - 0
b15÷b8 – HS (0xC4), HE (0xCC)
b7÷b0 – length of the block

B.2.1.8. Record with GPS data

The value equal to -12288 (0xd000) denotes the undefined value.

Word number	Name	Comment
0	0xC703	record ID (start)
1	Length	length of the block together with IDs, [words]
2	Quality	Signal quality: 0 - GPS_NOT_FIX (no signal) 1 - GPS_FIX

		2 - GPS_FIX_DIF
3	Time.Sec	Seconds part of time
4	Time.Min	Minutes part of time
5	Time.Hour	Hours part of time
6	Date.Day	Day
7	Date.Month	Month
8	Date.Year	Year
9	Latitude.Deg	Degree part of latitude
10	Latitude.Min	Minutes part of latitude
11	Latitude.Sec	Seconds part of latitude
12	Latitude.MiliSec	Milliseconds part of latitude
13	Latitude.Dir	Latitude direction: N, S
14	Longitude.Deg	Degree part of longitude
15	Longitude.Min	Minutes part of longitude
16	Longitude.Sec	Seconds part of longitude
17	Longitude.MiliSec	Milliseconds part of longitude
18	Longitude.Dir	Longitude direction: E, W
19	Altitude	Altitude (meters)
20	Altitude.10	Decimal part of altitude
21	Speed	Speed * 100 (km/h)
22	Length	length of the block together with IDs, [words]
23	0xCF03	record ID (end)
…	…	….

B.2.1.9. Block of marker for meteorological data block calculated with the logger step

Word number	Name	Comment
0	0xC704	0xC704= block start identifier,
1	0xnnnn	block length in words
2	N_1s	number of averaged 1 second results
3	Temperature	temperature measurement result in format 0,1°C
4	Pressure	atmospheric pressure measurement result in hectopascals
5	Humidity	relative humidity measurement result in format 0,1%
6	WindDirTotalPuffs	number of non-zero wind sample
7	AvgWindSpeed	average wind speed measurement result in the format 0,1 m/s
8	WindDirection	wind direction in degrees for maximum wind speed (if the parameter value is equal to 0FFFFh the direction is undefined)
9	MaxWindSpeed	maximum wind speed measurement result in the format 0,1 m/s
…		Reserved
…	0xnnnn	block length in words
...	0xCF04	0xCF04 = block end identifier,

B.2.1.10. Block of marker for meteorological rainfall calculated with the logger step

Word number	Name	Comment
0	0xC705	0C705h= block start identifier,

1	0xnnnn	block length in words
2	RainIntensity	rainfall intensity in 0.1 mm / h format (It is the sum of the last sixty lots of 1 minute accumulated Rain data. A new sum measurement is generated every minute.)
3..4	RainAccumulation	sum of rainfall in 0.01 mm format
5..6	RainDuration	duration of precipitation in seconds
…		Reserved
…	0xnnnn	block length in words
...	0xCF05	0xCF05 = block end identifier

B.2.1.11. Block of marker for dust monitor data block calculated with the logger step

Word number	Name	Comment
0	0xC707	0xC707= block start identifier,
1	0xnnnn	block length in words
2	N_1s	number of averaged 1 second results
3	StatusFlags	sum of the following flags: 0 – Sensor Calibration Error: Zero reading to low 1 – Sensor Calibration Error: Zero reading to high 4 – IOP Error (Laser) 5 – Counter Error (Sensor) 6 – Flow Regulation Error 12 – PM1 result calculated 13 – PM2.5 result calculated 14 – PM10 result calculated 15 – TSP result calculated If bits 0 and 1 are set simultaneously, this means Sensor Calibration Error: Stability error, too many retries
4..5	PM1	PM1 in µg/m^3 (skipped if bit 12 in StatuFlags is not set)
+ 2*(if PM1)	PM2.5	PM2.5 in µg/m^3 (skipped if bit 13 in StatuFlags is not set)
+ 2*(if PM2.5)	PM10	PM10 in µg/m^3 (skipped if bit 14 in StatuFlags is not set)
+ 2*(if PM10)	TSP	TSP in µg/m^3 (skipped if bit 15 in StatuFlags is not set)
+ 2*(if TSP)	Temperature	temperature measurement result in format 0,1°C
+1	Pressure	atmospheric pressure measurement result in hectopascals
+1	Humidity	relative humidity measurement result in format 0,1%
+1	Flow	air flow measurement result in format 0,1 lpm
+1	0xnnnn	block length in words
+1	0xCF04	0xCF07 = block end identifier,

B.2.1.12. Block of marker for alarm

Word number	Name	Comment
0	0xC708	0xC708 = block start identifier
1	0xnnnn	block length in words
2	Marker	number of marker defined in Tab. B.1.28 (1..
3	AlarmDate	Alarm date (cf. App. B.4)
4	AlarmTime	Alarm time (cf. App. B.4)
5	AlarmTimeMs	milliseconds part of time (0..1999)
6	Value[1]	cf. Tab. B.1.28 in case of "System **"source**: LSW of system event defined in SysEventMask in other cases: Value of exceeding the alarm threshold. Type depends of AlarmThreshold 1 In case of Dust alarm value 0xFFFF means level greater than 65534 µg/m^3
7	Value[2]	cf. Tab. B.1.28 in case of "System **"source**: MSW of system event defined in SysEventMask in other cases: Value of exceeding the alarm threshold. Type depends of AlarmThreshold 2
8	Value[3]	in case of "System **"source**: Instrument Error (valid only with Instrument Error flag) x - sum of the following flags flags: b0 - RTC error b1 - SD card error b2 - Temperature sensor error b3 - Battery error b4 - Battery temperature too high in other cases: reserved
9	Value[4]	in case of "System **"source**: MSB: System Check (valid only with System Check flag) LSB: Live Check (valid only with Live Check flag) x - sum of the following flags flags: 0 - OK 1 - Failed 2 - Not performed 3 - Speaker failed 4 - Microphone disconnected 5 - Microphone connected 6 - Microphone damaged in other cases: reserved
..		
nn-2	0xnnnn	block length in words
nn-1	0xCF08	0xCF08 = block end identifier

B.3 STRUCTURE OF THE SETUP FILE

SvanPC file header - cf. Tab. B.1.1.

File header - cf. Tab. B.1.2.

Unit and software specification - cf. Tab. B.1.3.

SETUP DATA - cf. Tab. B.1.23.

File-end-marker - cf. Tab. B.1.24.

B.4 DATE AND TIME

Following function written in C explain how the date and time are coded:

```
void ExtractDateTime(int date, unsigned int time, int dt[])
{
      dt[0] = time % 30;                  /* sec */
      dt[1] = (time/30) % 60;             /* min */
      dt[2] = time/1800;                  /* hour */

      dt[3] = date & 0x001F;              /* day */
      dt[4] = (date>>5) & 0x000F;         /* month */
      dt[5] = (date>>9) & 0x007F + 2000;  /* year */
}

void ExtractTimeMs(long timeMs, int dt[])
{
      long time = timeMs/1000L;

      dt[0] = time % 60L;                 /* sec */
      dt[1] = (time/60L) % 60L;           /* min */
      dt[2] = time/3600L;                 /* hour */
      dt[3] = timeMs % 1000L;             /* ms */
}
```

B.5 STRUCTURE OF THE CSV FILE

CSV files can be recorded in two formats, depending on the settings (see Chapter 10.9.4.8).

B.5.1. Structure of the CSV file for the Multi-line format

Section	File contents

File header	// **********
	 // CSV file version, 1.19
	 // Created, 15/07/2020, 15:49:27
	 // Unit, 307, SN, 78626, MicSN, 79044
	 // Firmware, 1.19.2, 30/06/2020
	 // Corresponding logger file name, L15749.SVL
	 // Device function, 1/3 octave
	 // Integration time, 01:00:00
	 // Leq integration, Linear
	 // Profile 1, A, Fast
	 // Profile 2, C, Fast
	 // Profile 3, Z, Fast

	// Statistical levels, 1, 10, 20, 30, 40, 50, 60, 70, 80, 90
	// Spectrum filter, Z
	// Spectrum detector, Linear
	// CSV save mask, 7FFF, 7FFF, 7FFF, 15
	// SLM results, profile 1, TIME, Lpeak, Lmax, Lmin, L, Leq, LE, Lden, LEPd, Ltm3, LTeq, Ln, LR30m, LR60m, OVL
	// SLM results, profile 2, TIME, Lpeak, Lmax, Lmin, L, Leq, LE, Lden, LEPd, Ltm3, LTeq, Ln, LR30m, LR60m, OVL
	// SLM results, profile 3, TIME, Lpeak, Lmax, Lmin, L, Leq, LE, Lden, LEPd, Ltm3, LTeq, Ln, LR30m, LR60m, OVL
	// Spectrum results, AVER, MAX, MIN, PEAK
	// **********

Record number	// Record No, 1
Time sgnature	DT, 15/07/2020, 16:49:27
Measurement data	P1, 3600, 102.2, 80.9, 31.2, 37.3, 51.6, 87.1, 51.6, 51.6, 60.0, 61.5, 64.1, 47.4, 42.4, 38.9, 37.5, 36.4, 35.4, 34.6, 33.9, 33.2, 52.8, 51.6, 0 P2, 3600, 102.2, 84.8, 43.9, 47.2, 56.8, 92.3, 56.8, 56.8, 64.6, 66.2, 69.2, 54.8, 52.0, 50.7, 49.7, 48.9, 48.3, 47.7, 47.1, 46.3, 57.3, 56.8, 0 P3, 3600, 102.6, 90.2, 50.2, 59.3, 61.6, 97.1, 61.6, 61.6, 69.1, 71.1, 71.1, 61.4, 59.7, 58.7, 57.8, 57.0, 56.3, 55.4, 54.4, 53.1, 60.9, 61.6, 0 SA, 50.6, 49.7, 43.5, 45.1, 41.6, 37.7, 38.1, 37.4, 41.3, 44.4, 43.0, 43.6, 45.3, 47.2, 49.5, 45.6, 41.8, 39.5, 38.7, 35.8, 33.5, 34.6, 35.1, 32.0, 30.1, 29.2, 26.4, 23.0, 21.2, 22.2, 25.7, 51.6, 56.8, 61.6 SM, 48.7, 34.1, 26.8, 38.1, 34.6, 25.5, 29.5, 24.5, 31.8, 38.1, 35.7, 35.2, 34.3, 32.5, 36.6, 30.6, 31.8, 30.0, 23.1, 22.5, 23.8, 23.7, 22.6, 21.3, 20.7, 20.7, 18.3, 17.1, 17.3, 18.5, 22.0, 40.5, 49.8, 59.4 SN, 45.9, 34.1, 26.8, 27.8, 28.2, 21.6, 29.4, 24.5, 27.5, 33.0, 34.4, 34.1, 34.3, 32.5, 36.6, 30.6, 31.8, 27.7, 23.0, 22.5, 23.0, 23.6, 22.4, 20.8, 20.6, 20.4, 18.1, 17.0, 17.0, 18.3, 21.9, 39.6, 49.0, 54.4 SP, 86.4, 87.0, 80.8, 80.4, 81.4, 82.9, 83.0, 78.3, 80.5, 81.8, 83.7, 85.4, 87.1, 91.9, 87.1, 85.0, 84.2, 89.7, 91.5, 92.1, 84.0, 85.0, 91.1, 90.7, 87.9, 87.4, 85.0, 78.6, 77.3, 84.8, 91.0, 101.7, 102.2, 102.6
Record number	// Record No, 2
Time sgnature	DT, 15/07/2020, 17:49:27
Measurement data	P1, 3600, 95.8, 82.5, 26.1, 57.1, 58.8, 94.4, 58.8, 58.8, 66.6, 67.7, 71.3, 61.0, 55.2, 49.7, 43.5, 37.8, 34.8, 32.3, 30.4, 29.1, 59.6, 58.8, 0 P2, 3600, 95.8, 84.0, 40.0, 63.7, 63.0, 98.6, 63.0, 63.0, 70.2, 71.4, 75.3, 65.8, 60.7, 55.7, 51.5, 49.2, 47.9, 46.9, 45.9, 44.5, 63.8, 63.0, 0 P3, 3600, 98.8, 91.2, 48.9, 64.3, 64.5, 100.0, 64.5, 64.5, 71.7, 72.9, 75.8, 66.7, 62.8, 60.5, 59.0, 57.9, 56.9, 55.8, 54.6, 53.1, 64.9, 64.5, 0 SA, 48.9, 50.1, 41.5, 42.7, 39.0, 34.0, 38.3, 45.5, 46.3, 49.2, 48.7, 51.0, 51.9, 56.2, 58.0, 54.1, 47.1, 43.1, 41.3, 37.8, 35.9, 37.6, 37.6, 36.0, 33.3, 32.1, 31.2, 28.7, 23.8, 23.4, 24.9, 58.8, 63.0, 64.4 SM, 26.8, 37.6, 37.9, 39.3, 32.9, 25.9, 30.1, 34.7, 46.9, 49.2, 38.1, 48.1, 48.2, 48.3, 45.5, 45.6, 41.2, 41.1, 31.5, 24.4, 21.8, 22.9, 23.0, 24.9, 25.4, 20.9, 20.4, 19.0, 17.0, 18.4, 22.1, 52.8, 59.9, 62.6 SN, 26.8, 37.6, 33.7, 37.7, 32.9, 25.9, 30.1, 29.2, 46.9, 49.2, 38.1, 48.1, 45.3, 48.3, 45.5, 43.5, 41.2, 41.1, 28.1, 23.2, 21.1, 22.4, 21.1, 19.9, 19.5, 18.9, 18.7, 17.4, 16.6, 17.8, 21.9, 51.5, 59.5, 61.5 SP, 85.2, 88.9, 80.1, 78.7, 77.7, 71.7, 79.4, 74.4, 75.4, 82.5, 84.7, 83.7, 85.8, 89.7, 92.4, 89.0, 90.6, 84.9, 86.7, 86.2, 80.7, 84.0, 86.5, 87.6, 81.6, 77.1, 75.4, 75.1, 73.1, 73.9, 79.7, 97.1, 95.8, 98.8
...	

B.5.2. Structure of the CSV file for the Single-line format

Section	File contents

File header	// **********
	// CSV file version, 1.20
	// Created, 12/02/2021, 11:20:00
	// Unit, 307, SN, 70825, MicSN, 78322
	// Firmware, 1.21.0, 08/02/2021
	// Corresponding logger file name, L34098.SVL
	// Device function, SLM
	// Integration time, 00:01:00
	// Leq integration, Linear
	// Profile 1, A, Impulse

	// Profile 2, C, Fast
	// Profile 3, Z, Slow
	// CSV save mask, 7FFF, 7FFF, 7FFF, 15
	// **********

Record header	Record, Date, Record End Time, SLM results profile 1, TIME, Lpeak, Lmax, Lmin, L, Leq, LE, Lden, LEPd, Ltm3, LTeq, L(01), L(10), L(20), L(30), L(40), L(50), L(60), L(70), L(80), L(90), LR30m, LR60m, OVL, SLM results profile 2, TIME, Lpeak, Lmax, Lmin, L, Leq, LE, Lden, LEPd, Ltm3, LTeq, L(01), L(10), L(20), L(30), L(40), L(50), L(60), L(70), L(80), L(90), LR30m, LR60m, OVL, SLM results profile 3, TIME, Lpeak, Lmax, Lmin, L, Leq, LE, Lden, LEPd, Ltm3, LTeq, L(01), L(10), L(20), L(30), L(40), L(50), L(60), L(70), L(80), L(90), LR30m, LR60m, OVL
Record data	1, 12/02/2021, 11:21:00, P1, 60, 80.4, 62.5, 41.3, 44.5, 47.1, 64.9, 47.1, 47.1, 53.9, 55.3, 54.8, 50.6, 47.4, 45.8, 44.7, 44.1, 43.6, 43.0, 42.3, 41.5, 46.1, , 0, P2, 60, 80.4, 73.1, 55.6, 57.1, 63.7, 81.4, 63.7, 63.7, 66.7, 67.2, 72.5, 67.6, 64.6, 62.6, 61.5, 60.6, 59.8, 59.0, 58.3, 57.3, 63.9, , 0, P3, 60, 82.5, 72.6, 61.4, 61.5, 66.3, 84.1, 66.3, 66.3, 67.8, 68.0, 74.0, 69.4, 67.6, 66.1, 65.2, 64.4, 63.7, 63.0, 62.1, 61.1, 66.5, , 0
…	

APPENDIX C. TECHNICAL SPECIFICATIONS

C.1 SPECIFICATION OF SV 307 IN THE STANDARD CONFIGURATION

Statement of performance

SV 307 working as the SLM with all listed below accessories meets requirements of the IEC 61672-1:2013 for the Class 1 Group X instruments.

The configuration of the complete SLM and with its normal mode of operation

SV 307	including, ST 30A microphone (1/2", nominal sensitivity 36 mV/Pa) and SA 209 windscreen with antibird spike
Recommended calibrator	
SV 36	Class 1 sound calibrator 94/114 dB@1000 Hz or equivalent (not included in the standard set)

Accessories included in the SV 307 instrument set

SB 274	power supply unit (IP 66)
SC 316	USB cable
Antenna	GSM

Accessories available

SB 371	solar panel (40 W)
SA 206	4 m telescopic mast
SB 275	external battery for monitoring stations, 33Ah

External complementary units

SP 276	weather station based on GILL module
ES-642	remote dust monitor with SC 331 cable

Measured quantities

$L_X$peak, **L_{XY}max**, **L_{XY}min**, **L_{XY}**, **Leq$_X$**, **LE$_X$**, **Lden**, **LEPd**, **Ltm3**, **LTeq**, **Ln** (Leq statistics), **EX** (expected Leq value), **SD** (standard Leq deviation), **LR1** and **LR2** (rolling Leq), **OVL** (overload time %).

Definitions for measured quantities are given in Appendix D.

Additional features

- Overload indication
- Under-range indication
- Battery state indication
- GPS positioning and time synchronization
- Temperature sensors
- Speaker for system check
- GSM modem

Conformance testing

This chapter contains the information needed to conduct conformance testing according to the specified standards.

Mounting for acoustical tests — The microphone must be mounted on the instrument.

Electrical substitute for the microphone — To obtain a BNC Class electrical input, the microphone must be replaced by the microphone electrical equivalent SL 3071 **before turning the instrument on**.

Note: *For the conformance electrical tests, the* ***Microphone*** *compensation must be set to* ***Off*** *(path: <Menu> / Measurement / Compens. Filter).*

Note: *For the comparison coupler or multifrequency calibrator evaluation, the* ***Microphone*** *compensation must be set to* ***On*** *and the* ***Free Field*** *compensation must be set to* ***Off*** *(path: <Menu> / Measurement / Compens. Filter).*

Note: *For the free filed evaluation, the* ***Microphone*** *compensation must be set to* ***On*** *and the* ***Free Filed*** *compensation must be set to* ***Environment*** *or* ***Airport*** *(path: <Menu> / Measurement / Compens. Filter).*

Periodical test upper frequency — 8 kHz

Linear Operating Range

Table C.1.1. Linear operating ranges - for 0 deg incidence angle (Airport filter), for the sinusoidal signal and microphone sensitivity 36 mV/Pa

[dB]	$L_{AS/F}$		$L_{BS/F}$		$L_{CS/F}$		$L_{ZS/F}$		L_{AeqT}		L_{BeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	30	85	40	109	40	119	50	125	30	85	40	109	40	129	33	95	60	125
500 Hz	30	121	40	124	40	125	50	125	30	121	40	124	40	125	33	124	60	128
1 kHz	30	125	40	125	40	125	50	125	30	125	40	125	40	125	33	128	60	128
4 kHz	30	123	40	124	40	124	50	125	30	123	40	124	40	124	33	126	60	128
8 kHz	30	124	40	122	40	122	50	125	30	124	40	122	40	122	33	127	60	125
12.5 kHz	30	120	40	119	40	118	50	125	30	120	40	119	40	118	33	123	60	122

Table C.1.2. Linear operating ranges - for 90 deg incidence angle (Environmental filter), for the sinusoidal signal and microphone sensitivity 36 mV/Pa

[dB]	$L_{AS/F}$		$L_{BS/F}$		$L_{CS/F}$		$L_{ZS/F}$		L_{AeqT}		L_{BeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	30	85	40	109	40	119	50	125	30	85	40	109	40	129	33	95	60	125
500 Hz	30	121	40	124	40	125	50	125	30	121	40	124	40	125	33	124	60	128
1 kHz	30	125	40	125	40	125	50	125	30	125	40	125	40	125	33	128	60	128
4 kHz	30	123	40	124	40	124	50	125	30	123	40	124	40	124	33	126	60	128
8 kHz	30	124	40	122	40	122	50	125	30	124	40	122	40	122	33	127	60	125
12.5 kHz	30	120	40	119	40	118	50	125	30	120	40	119	40	118	33	123	60	122

Note: *For the signals with the crest factor* ***n >1.41*** *upper measuring range of the RMS (****LEQ*** *and* ***SPL****) is reduced. The valid upper limit can be calculated according to the below given formula:* $A_n = 125 - 20\log(n/\sqrt{2})$, *where* ***A*** *is the upper limit for the sinusoidal signal.*

Example: For the crest factor ***n = 10*** *the upper limit is* A_{10} = ***108 dB****.*

The starting point at which tests of level linearity shall begin is	94.0 dB (74 dB for A filter @ 31.5 Hz).
Measuring frequency range of the acoustic pressure	20 Hz ÷ 20 000 Hz.
Basic measurement error of the acoustic pressure	< 0.7 dB (measured for the reference conditions, see below).

Weighting filters (see C.3)

- **Z** meeting requirements of the IEC 61672-1:2013 standard for the Class 1 "**Z**" filter
- **A** meeting requirements of the IEC 651 and IEC 61672-1:2013 standard for the Class 1 "**A**" filter
- **C** meeting requirements of the IEC 651 and IEC 61672-1:2013 standard for the Class 1 "**C**" filter
- **B** meeting requirements of the IEC 651 standard for the Class 1 "**B**" filter

Table C.1.3. Self-generated noise for different weighting filters

	Electrical			Acoustical, compensated		
Weighting filter	**A**	**C**	**Z**	**A**	**C**	**Z**
Noise	< 18 dB	< 23 dB	< 33 dB	< 23 dB	< 33 dB	< 43 dB

Special filters

Frequency response of SV 307 is compensated by means of two digital filters:

- **Environmental** compensation filter improving the complete instrument frequency response in the free field for the reference acoustic wave incidence angle 90 deg
- **Airport** compensation filter improving the complete instrument frequency response in the free field for the reference acoustic wave incidence angle 0 deg

RMS detector

- Digital "True RMS" with Peak detection,
- Resolution 0.1 dB
- Range 327.7 dB
- Crest Factor unlimited (for signals in 20 kHz band).

Overload detector

The instrument has the built-in overload detectors. Both A/D converter and input amplifier overload conditions are detected. The overload in the measurement channel (in its analogue part) and the overload of the analogue / digital converter are both detected. The "overload" indication appears when the input signal amplitude is 0.5 dB above the declared "Peak measurement range".

Underrange detector

The instrument has the built-in under-range detector. The “underrange” indication appears when the Leq value for the elapsed time or the last second L_{XY} value is below the lower linear operating range.

Time weighting characteristics (Exponential averaging)

Slow	“**S**“ according to IEC 61672-1:2013 Class 1, Equivalent Time Constant 1000 ms
Fast	“**F**” according to IEC 61672-1:2013 Class 1, Equivalent Time Constant 125 ms
Impulse	“**I**” according to IEC 60804:2000 Class 1, Equivalent Time Constant 35 ms, Hold Time 1500 s

Reference conditions as per IEC 61672-1:2013

• Class of the acoustic field	Free field
• Reference acoustic pressure	114.0 dB (related to 20 μPa)
• Reference frequency	1000 Hz
• Reference temperature	+23°C
• Reference relative humidity	50 %
• Reference static pressure	1013.25 hPa
• Reference incidence direction	perpendicular to the microphone diaphragm.

Warm-up time / Auto-start delay	1 minute (for 0.1 dB accuracy)
Typical stabilization time after change in environmental conditions	1 minute
Time shift after completion of a measurement, before a measurement is shown	< 1 sec

Note: *When the instrument is moved from a warm environment with high humidity, to a colder environment, care should be taken not to produce condensation inside the instrument. In this case, much longer stabilization periods may be necessary.*

Environmental, electrostatic and radio frequency criteria

Effect of humidity	< 0.5 dB (for 30%<RH<90% at 40°C and 1000 Hz)
Effect of magnetic field	< 15 dB (A) or < 25 dB (Z) (for 80 A/m and 50 Hz)
Effect of radio frequency fields	< +/-0.5 dB @ 74 dB and 10V/m electromagnetic field

The greatest susceptibility (the least immunity) is achieved when the SLM is placed parallel to the radio frequency field and **A** filter and time weighting **F** are selected and the SPL measurements are considered.

Effect of electrostatic discharge meets requirements of IEC 61672-1:2013

During electrostatic discharge, the influence of the displayed results could be observed. No changes in instrument operation state, configuration or stored data corruption were found out.

Effect of ambient pressure	< 0.01 dB/kPa
Effect of temperature	< 0.5 dB (from -10°C to + 50°C)
Operating temperature range	from -20°C to + 50°C

Storage temperature range	from -40°C to + 60°C
Humidity	99% RH (not-condensed)
Battery state indication	0-100% of the battery state of charge

Calibration

Acoustical **-** with the SV 36 sound calibrator (or equivalent):

- Calibration level — 114.0 dB (equal to the calibrator pressure level - see calibration chart of the used calibrator)

Note: *The above levels correspond to 114 dB of calibrator's sound pressure. If the calibrator has different sound pressure than 114 dB, the calibration levels must be accordingly adjusted.*

Microphone

ST 30A	MEMS type (½" housing)
Nominal sensitivity	36 mV/Pa (corresponding to app. -29 dBV/Pa re 1 V/Pa)
Impedance	350 Ohm.

Note: *Maximum sound pressure level that can be applied to a microphone without destroying it: 160 dB.*

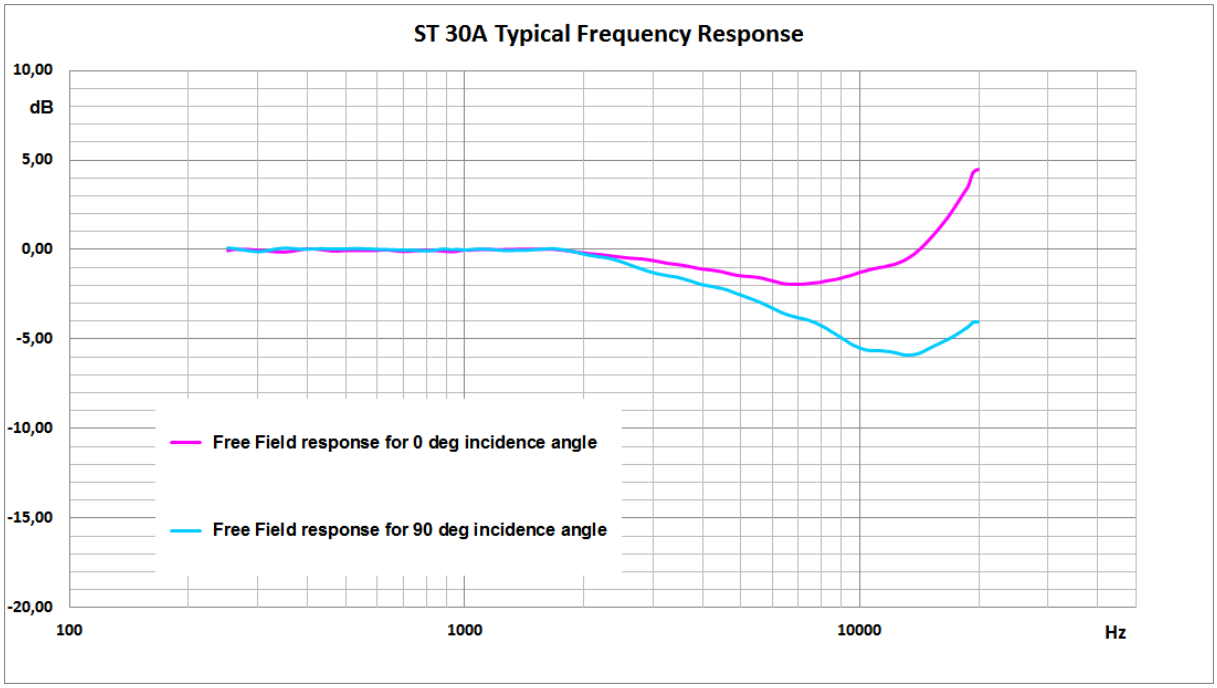


Table C.1.4. ST 30A typical Free Field response for 0 deg and 90 deg incidence angle

Frequency	0 deg incidence angle	90 deg incidence angle	Frequency	0 deg incidence angle	90 deg incidence angle
[Hz]	[dB]	[dB]	[Hz]	[dB]	[dB]
251.19	-0.04	0.07	**2304.09**	-0.31	-0.48
258.52	0.02	0.05	**2371.37**	-0.35	-0.55
266.07	0.03	0.01	**2440.62**	-0.38	-0.64
273.84	0.03	-0.03	**2511.89**	-0.41	-0.72
281.84	0.03	-0.07	**2585.23**	-0.44	-0.82
290.07	0.01	-0.11	**2660.73**	-0.47	-0.92
298.54	-0.01	-0.13	**2738.42**	-0.48	-1.02
307.26	-0.03	-0.12	**2818.38**	-0.50	-1.11
316.23	-0.05	-0.07	**2900.68**	-0.54	-1.21
325.46	-0.08	-0.02	**2985.38**	-0.58	-1.29
334.97	-0.11	0.03	**3072.56**	-0.63	-1.36
344.75	-0.12	0.06	**3162.28**	-0.68	-1.41
354.81	-0.10	0.07	**3254.62**	-0.74	-1.46
365.17	-0.07	0.05	**3349.65**	-0.78	-1.50
375.84	-0.03	0.02	**3447.47**	-0.81	-1.55
386.81	0.03	0.01	**3548.13**	-0.85	-1.62
398.11	0.06	0.01	**3651.74**	-0.90	-1.71
409.73	0.07	0.01	**3758.37**	-0.95	-1.79
421.70	0.04	0.03	**3868.12**	-1.01	-1.88
434.01	0.01	0.03	**3981.07**	-1.06	-1.96
446.68	-0.02	0.03	**4097.32**	-1.09	-2.02
459.73	-0.06	0.02	**4216.97**	-1.12	-2.06
473.15	-0.07	0.01	**4340.10**	-1.16	-2.12
486.97	-0.05	0.01	**4466.84**	-1.21	-2.17
501.19	-0.03	0.02	**4597.27**	-1.28	-2.25
515.82	-0.03	0.04	**4731.51**	-1.34	-2.35
530.88	-0.04	0.04	**4869.68**	-1.41	-2.45
546.39	-0.04	0.04	**5011.87**	-1.44	-2.55
562.34	-0.04	0.02	**5158.22**	-1.47	-2.66
578.76	-0.04	0.02	**5308.84**	-1.49	-2.76
595.66	-0.03	0.00	**5463.87**	-1.52	-2.86
613.06	-0.01	0.00	**5623.41**	-1.56	-2.97
630.96	0.00	-0.01	**5787.62**	-1.62	-3.10
649.38	-0.02	-0.03	**5956.62**	-1.70	-3.23
668.34	-0.05	-0.03	**6130.56**	-1.77	-3.36
687.86	-0.07	-0.03	**6309.57**	-1.84	-3.50
707.95	-0.08	-0.04	**6493.82**	-1.89	-3.60
728.62	-0.08	-0.05	**6683.44**	-1.90	-3.69
749.89	-0.05	-0.06	**6878.60**	-1.91	-3.76
771.79	-0.03	-0.07	**7079.46**	-1.91	-3.83
794.33	-0.02	-0.09	**7286.18**	-1.89	-3.89
817.52	-0.02	-0.08	**7498.94**	-1.86	-3.98
841.40	-0.03	-0.04	**7717.92**	-1.83	-4.08
865.96	-0.05	0.00	**7943.28**	-1.80	-4.22
891.25	-0.08	0.02	**8175.23**	-1.73	-4.36
917.28	-0.10	-0.02	**8413.95**	-1.69	-4.53
944.06	-0.09	-0.02	**8659.64**	-1.65	-4.70
971.63	-0.05	-0.01	**8912.51**	-1.59	-4.88
1000.00	-0.01	-0.04	**9172.76**	-1.50	-5.04

Frequency	0 deg incidence angle	90 deg incidence angle	Frequency	0 deg incidence angle	90 deg incidence angle
[Hz]	[dB]	[dB]	[Hz]	[dB]	[dB]
1029.20	-0.02	-0.01	**9440.61**	-1.43	-5.23
1059.25	0.01	0.00	**9716.28**	-1.35	-5.37
1090.18	0.02	0.01	**10000.00**	-1.25	-5.48
1122.02	0.02	0.01	**10292.01**	-1.17	-5.58
1154.78	0.02	0.00	**10592.54**	-1.10	-5.63
1188.50	0.02	-0.02	**10901.84**	-1.04	-5.63
1223.21	0.01	-0.05	**11220.18**	-0.98	-5.63
1258.93	0.02	-0.07	**11547.82**	-0.94	-5.66
1295.69	0.03	-0.07	**11885.02**	-0.87	-5.68
1333.52	0.03	-0.06	**12232.07**	-0.81	-5.74
1372.46	0.04	-0.05	**12589.25**	-0.70	-5.80
1412.54	0.04	-0.05	**12956.87**	-0.59	-5.88
1453.78	0.04	-0.05	**13335.21**	-0.42	-5.88
1496.24	0.04	-0.02	**13724.61**	-0.24	-5.86
1539.93	0.05	0.00	**14125.38**	-0.01	-5.79
1584.89	0.05	0.01	**14537.84**	0.25	-5.67
1631.17	0.04	0.03	**14962.36**	0.55	-5.52
1678.80	0.03	0.04	**15399.27**	0.85	-5.39
1727.83	0.01	0.01	**15848.93**	1.17	-5.25
1778.28	-0.02	-0.02	**16311.73**	1.51	-5.12
1830.21	-0.05	-0.08	**16788.04**	1.87	-4.99
1883.65	-0.09	-0.13	**17278.26**	2.27	-4.84
1938.65	-0.13	-0.19	**17782.79**	2.69	-4.67
1995.26	-0.16	-0.26	**18302.06**	3.13	-4.49
2053.53	-0.20	-0.32	**18836.49**	3.56	-4.31
2113.49	-0.23	-0.36	**19386.53**	4.31	-4.06
2175.20	-0.25	-0.41	**19952.62**	4.47	-4.04
2238.72	-0.28	-0.44			

Free field corrections for ST 30A

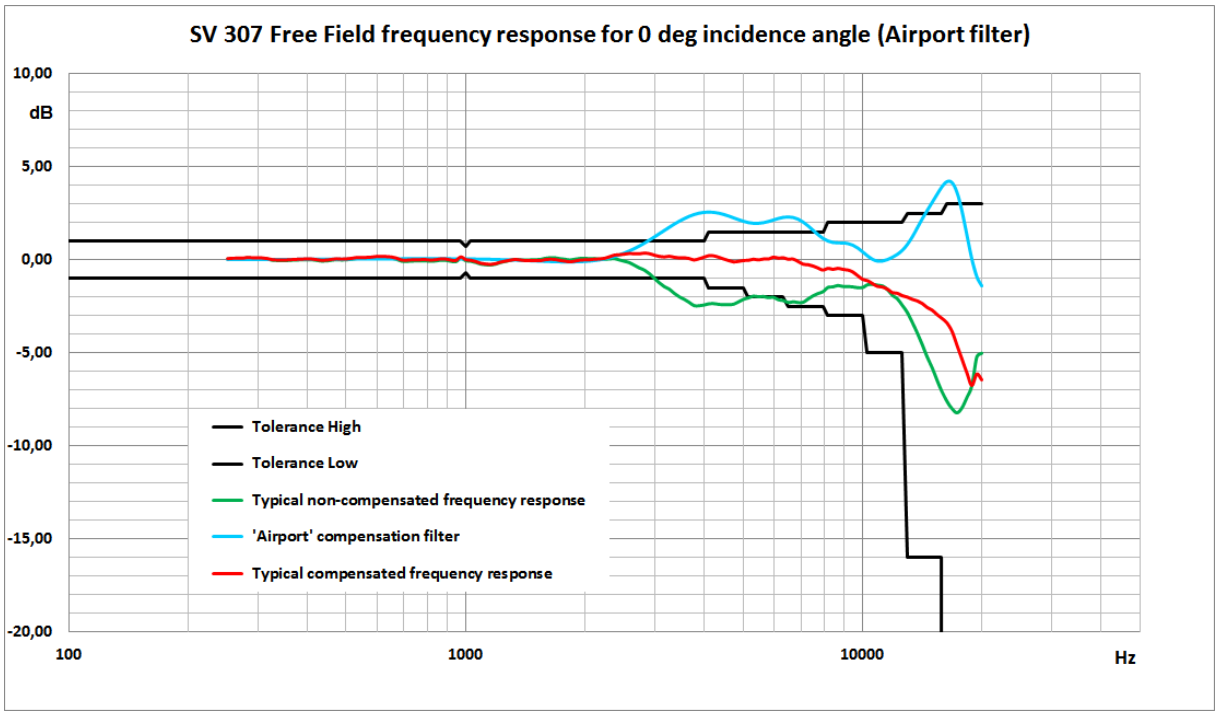
Table C.1.5. ST 30A free field corrections for the 0 and 90 deg incidence angle with the use of the Bruel & Kjaer 4226 sound calibrator

[dB]	Frequency [Hz]									
	31.5	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**16000**
Pressure response	0.29	0.24	0.16	0.17	0.12	0.00	-0.49	-1.86	-4.54	-5.89
Free Field corrections 0 deg	0.00	0.00	0.00	-0.21	-0.15	0.00	0.33	0.80	2.74	7.06
Free Field corrections 90 deg	0.00	0.00	0.00	-0.09	-0.10	0.00	0.24	-0.10	0.32	0.63
Uncertainty (IEC 62585)	--	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.35	0.50

Table C.1.6. ST 30A free field corrections for the 0 and 90 deg incidence angle with the use of the G.R.A.S. 51AB comparison coupler and reference 1/2“ microphone B&K 4134

[dB]	Frequency [Hz]										
	31.5	63	125	250	500	1000	2000	4000	8000	12500	16000
Pressure response	-0.16	-0.07	0.05	0.11	0.11	0.00	-0.58	-2.18	-5.74	-9.13	-10.09
Free Field corrections 0 deg	0.00	0.00	0.00	-0.16	-0.14	0.00	0.42	1.12	3.94	8.43	11.26
Free Field corrections 90 deg	0.00	0.00	0.00	-0.04	-0.09	-0.04	0.33	0.22	1.52	3.33	4.84
Uncertainty (IEC 62585)	--	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.35	0.50	0.50

Free Field Frequency response of SV 307



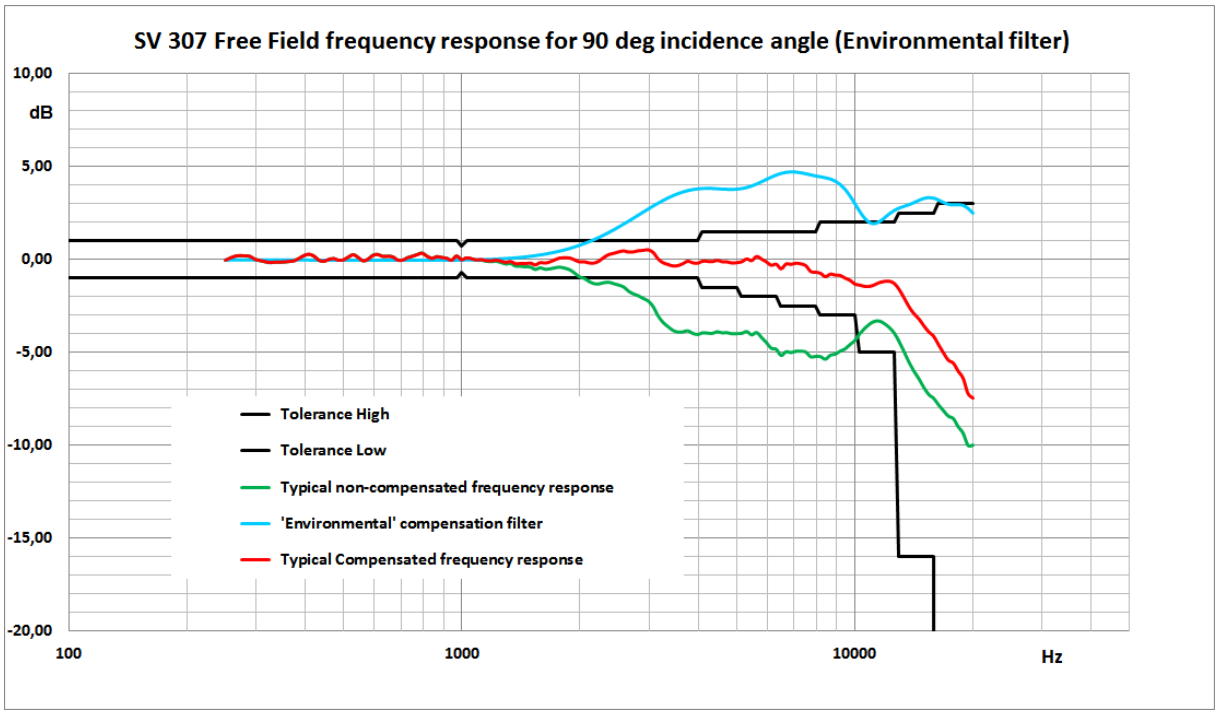


Table C.1.7. SV 307 Free Field frequency response

Frequency	Typical non-compensated frequency response	Compensation filter 'Airport'	Typical compensated frequency response	Typical non-compensated frequency response	Compensation filter 'Environmental'	Typical compensated frequency response
	0 deg incidence angle			90 deg incidence angle		
[Hz]	[dB]			[dB]		
251.19	0.04	0.01	0.05	-0.03	-0.01	-0.04
258.52	0.06	0.01	0.07	0.09	-0.01	0.08
266.07	0.06	0.01	0.07	0.19	-0.01	0.18
273.84	0.06	0.01	0.07	0.22	-0.01	0.21
281.84	0.10	0.01	0.11	0.21	-0.01	0.20
290.07	0.08	0.02	0.10	0.18	-0.01	0.17
298.54	0.07	0.02	0.09	0.02	-0.01	0.01
307.26	0.07	0.02	0.09	-0.04	-0.01	-0.05
316.23	0.04	0.02	0.06	-0.10	-0.01	-0.11
325.46	-0.02	0.02	0.00	-0.15	-0.01	-0.16
334.97	-0.04	0.02	-0.02	-0.13	-0.01	-0.14
344.75	-0.05	0.02	-0.03	-0.13	-0.01	-0.14
354.81	-0.04	0.02	-0.02	-0.12	-0.01	-0.13
365.17	-0.02	0.02	0.00	-0.09	-0.01	-0.10
375.84	-0.01	0.02	0.01	-0.05	-0.01	-0.06
386.81	0.00	0.02	0.02	0.08	-0.01	0.07
398.11	0.01	0.03	0.04	0.23	-0.01	0.22
409.73	0.00	0.03	0.03	0.30	-0.01	0.29
421.70	-0.03	0.03	0.00	0.20	-0.02	0.19
434.01	-0.07	0.03	-0.04	-0.02	-0.02	-0.04
446.68	-0.06	0.03	-0.03	-0.08	-0.02	-0.10
459.73	-0.02	0.03	0.01	0.02	-0.02	0.00
473.15	0.01	0.03	0.04	0.07	-0.02	0.05
486.97	-0.01	0.04	0.03	-0.02	-0.02	-0.04
501.19	0.00	0.04	0.04	0.00	-0.02	-0.02
515.82	0.03	0.04	0.07	0.15	-0.02	0.13

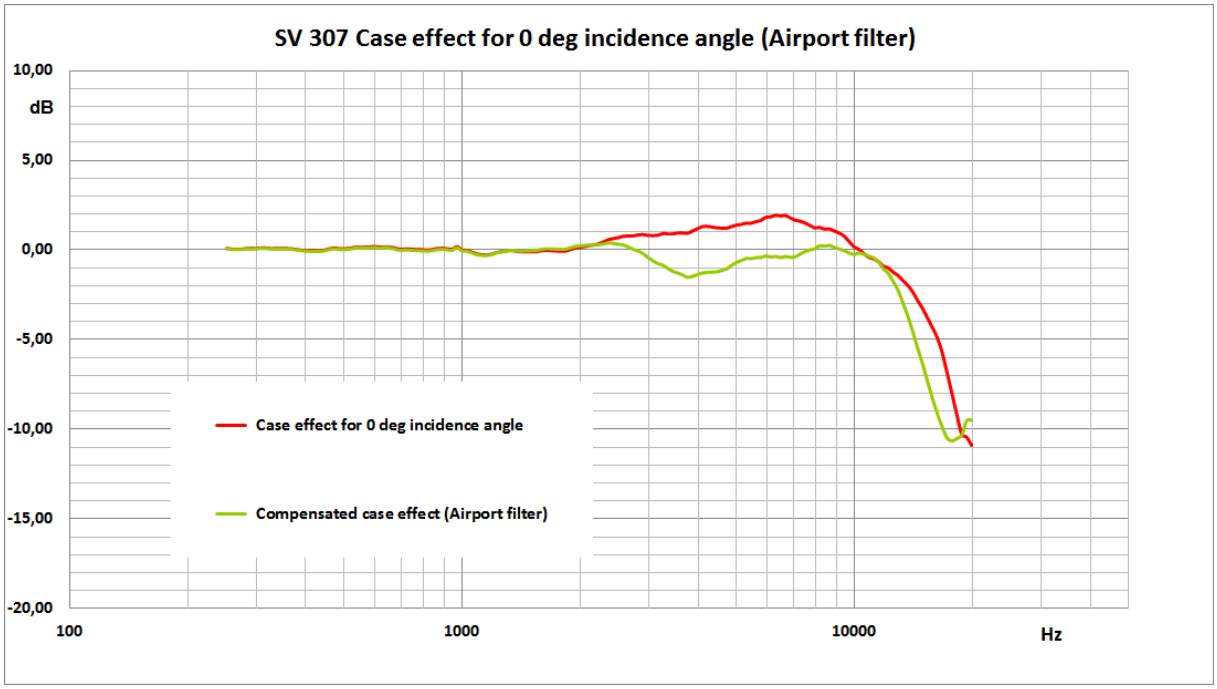
Frequency	Typical non-compensated frequency response	Compensation filter 'Airport'	Typical compensated frequency response	Typical non-compensated frequency response	Compensation filter 'Environmental'	Typical compensated frequency response
	0 deg incidence angle			90 deg incidence angle		
[Hz]	[dB]			[dB]		
530.88	0.07	0.04	0.11	0.28	-0.02	0.26
546.39	0.07	0.04	0.11	0.13	-0.02	0.11
562.34	0.07	0.04	0.11	-0.05	-0.02	-0.07
578.76	0.09	0.04	0.13	0.04	-0.02	0.02
595.66	0.12	0.05	0.17	0.25	-0.03	0.23
613.06	0.12	0.05	0.17	0.29	-0.03	0.27
630.96	0.11	0.05	0.16	0.19	-0.03	0.16
649.38	0.09	0.05	0.14	0.20	-0.03	0.17
668.34	0.03	0.05	0.08	0.17	-0.03	0.14
687.86	-0.07	0.05	-0.02	0.00	-0.03	-0.03
707.95	-0.09	0.05	-0.04	-0.01	-0.03	-0.04
728.62	-0.07	0.06	-0.02	0.12	-0.03	0.09
749.89	-0.06	0.06	-0.01	0.20	-0.03	0.17
771.79	-0.06	0.06	0.00	0.29	-0.03	0.26
794.33	-0.06	0.06	0.00	0.37	-0.03	0.34
817.52	-0.08	0.06	-0.02	0.20	-0.03	0.17
841.40	-0.06	0.06	0.00	0.09	-0.03	0.06
865.96	-0.02	0.06	0.04	0.18	-0.03	0.15
891.25	-0.03	0.06	0.03	0.13	-0.03	0.11
917.28	-0.08	0.05	-0.03	0.09	-0.02	0.07
944.06	-0.10	0.05	-0.05	-0.02	-0.02	-0.04
971.63	0.09	0.05	0.14	0.21	-0.02	0.19
1000.00	-0.05	0.05	0.00	0.00	-0.01	-0.01
1029.20	-0.08	0.04	-0.03	0.10	-0.01	0.09
1059.25	-0.14	0.04	-0.10	0.05	0.00	0.05
1090.18	-0.23	0.04	-0.20	-0.02	0.00	-0.02
1122.02	-0.27	0.03	-0.24	-0.01	0.01	0.00
1154.78	-0.28	0.02	-0.26	-0.08	0.02	-0.06
1188.50	-0.24	0.02	-0.22	-0.10	0.03	-0.07
1223.21	-0.14	0.01	-0.13	-0.08	0.04	-0.04
1258.93	-0.08	0.00	-0.08	-0.14	0.06	-0.08
1295.69	-0.02	-0.01	-0.03	-0.22	0.07	-0.15
1333.52	0.02	-0.02	0.01	-0.20	0.09	-0.11
1372.46	0.00	-0.03	-0.03	-0.34	0.11	-0.23
1412.54	-0.02	-0.04	-0.05	-0.35	0.13	-0.21
1453.78	-0.01	-0.05	-0.06	-0.38	0.16	-0.22
1496.24	0.01	-0.06	-0.05	-0.39	0.19	-0.19
1539.93	0.01	-0.07	-0.06	-0.52	0.23	-0.29
1584.89	0.08	-0.08	0.00	-0.43	0.27	-0.17
1631.17	0.11	-0.09	0.02	-0.50	0.31	-0.19
1678.80	0.11	-0.10	0.01	-0.48	0.36	-0.13
1727.83	0.06	-0.11	-0.05	-0.43	0.41	-0.01
1778.28	0.03	-0.11	-0.08	-0.39	0.47	0.08
1830.21	-0.01	-0.11	-0.12	-0.45	0.54	0.09
1883.65	0.03	-0.11	-0.08	-0.53	0.62	0.08
1938.65	0.07	-0.10	-0.03	-0.72	0.70	-0.02
1995.26	0.08	-0.09	-0.01	-0.92	0.79	-0.13
2053.53	0.06	-0.07	-0.01	-1.01	0.88	-0.12
2113.49	0.06	-0.04	0.02	-1.17	0.99	-0.19
2175.20	0.03	0.00	0.03	-1.29	1.10	-0.19
2238.72	0.02	0.05	0.07	-1.30	1.22	-0.08

Frequency	Typical non-compensated frequency response	Compensation filter 'Airport'	Typical compensated frequency response	Typical non-compensated frequency response	Compensation filter 'Environmental'	Typical compensated frequency response
	0 deg incidence angle			90 deg incidence angle		
[Hz]	[dB]			[dB]		
2304.09	0.04	0.11	0.15	-1.23	1.35	0.12
2371.37	0.06	0.18	0.24	-1.21	1.49	0.27
2440.62	-0.01	0.27	0.26	-1.29	1.63	0.34
2511.89	-0.08	0.37	0.29	-1.36	1.78	0.42
2585.23	-0.16	0.48	0.33	-1.47	1.93	0.47
2660.73	-0.30	0.61	0.31	-1.70	2.09	0.40
2738.42	-0.44	0.75	0.31	-1.84	2.26	0.42
2818.38	-0.55	0.90	0.35	-1.95	2.42	0.48
2900.68	-0.75	1.06	0.32	-2.09	2.59	0.50
2985.38	-1.00	1.23	0.24	-2.23	2.75	0.52
3072.56	-1.24	1.41	0.17	-2.54	2.91	0.37
3162.28	-1.44	1.58	0.14	-3.04	3.06	0.03
3254.62	-1.58	1.76	0.18	-3.38	3.21	-0.17
3349.65	-1.80	1.92	0.12	-3.61	3.34	-0.27
3447.47	-1.99	2.08	0.09	-3.81	3.46	-0.35
3548.13	-2.12	2.22	0.10	-3.90	3.57	-0.33
3651.74	-2.29	2.35	0.06	-3.89	3.66	-0.23
3758.37	-2.47	2.45	-0.02	-3.83	3.74	-0.09
3868.12	-2.48	2.52	0.04	-3.97	3.79	-0.18
3981.07	-2.44	2.57	0.13	-4.03	3.83	-0.20
4097.32	-2.37	2.58	0.21	-3.94	3.85	-0.09
4216.97	-2.36	2.56	0.20	-3.96	3.86	-0.10
4340.10	-2.40	2.52	0.12	-3.97	3.85	-0.12
4466.84	-2.42	2.45	0.03	-3.88	3.84	-0.05
4597.27	-2.42	2.37	-0.05	-3.94	3.82	-0.12
4731.51	-2.39	2.27	-0.12	-3.93	3.81	-0.13
4869.68	-2.26	2.17	-0.09	-3.99	3.80	-0.19
5011.87	-2.13	2.08	-0.05	-3.98	3.82	-0.17
5158.22	-2.05	2.01	-0.04	-3.97	3.85	-0.12
5308.84	-1.96	1.97	0.02	-3.87	3.91	0.03
5463.87	-1.99	1.97	-0.02	-4.05	3.99	-0.06
5623.41	-1.98	2.01	0.03	-3.93	4.09	0.16
5787.62	-2.04	2.07	0.03	-4.19	4.21	0.03
5956.62	-2.02	2.15	0.13	-4.47	4.34	-0.13
6130.56	-2.15	2.23	0.08	-4.78	4.47	-0.31
6309.57	-2.20	2.29	0.10	-4.83	4.58	-0.25
6493.82	-2.30	2.32	0.02	-5.17	4.67	-0.50
6683.44	-2.26	2.29	0.03	-4.96	4.73	-0.24
6878.60	-2.30	2.20	-0.11	-5.01	4.75	-0.26
7079.46	-2.29	2.04	-0.25	-4.94	4.74	-0.20
7286.18	-2.11	1.83	-0.28	-4.94	4.70	-0.24
7498.94	-1.94	1.60	-0.35	-4.98	4.65	-0.33
7717.92	-1.81	1.36	-0.45	-5.24	4.59	-0.65
7943.28	-1.72	1.16	-0.56	-5.22	4.53	-0.68
8175.23	-1.49	1.02	-0.47	-5.23	4.48	-0.75
8413.95	-1.46	0.94	-0.52	-5.36	4.43	-0.93
8659.64	-1.38	0.92	-0.47	-5.15	4.36	-0.79
8912.51	-1.43	0.91	-0.53	-5.09	4.25	-0.84
9172.76	-1.44	0.88	-0.56	-4.93	4.07	-0.86
9440.61	-1.46	0.79	-0.66	-4.81	3.80	-1.01
9716.28	-1.50	0.64	-0.86	-4.57	3.45	-1.12

Frequency	Typical non-compensated frequency response	Compensation filter 'Airport'	Typical compensated frequency response	Typical non-compensated frequency response	Compensation filter 'Environmental'	Typical compensated frequency response
	0 deg incidence angle			90 deg incidence angle		
[Hz]	[dB]			[dB]		
10000.00	-1.49	0.43	-1.06	-4.36	3.03	-1.33
10292.01	-1.34	0.21	-1.14	-3.99	2.60	-1.39
10592.54	-1.32	0.03	-1.29	-3.69	2.24	-1.45
10901.84	-1.37	-0.07	-1.44	-3.46	2.01	-1.45
11220.18	-1.41	-0.06	-1.47	-3.32	1.96	-1.36
11547.82	-1.60	0.02	-1.59	-3.31	2.07	-1.24
11885.02	-1.91	0.14	-1.77	-3.45	2.27	-1.18
12232.07	-2.11	0.30	-1.81	-3.66	2.49	-1.17
12589.25	-2.46	0.52	-1.94	-3.96	2.67	-1.29
12956.87	-2.84	0.83	-2.01	-4.42	2.80	-1.63
13335.21	-3.37	1.24	-2.13	-4.97	2.89	-2.08
13724.61	-3.94	1.72	-2.22	-5.54	2.98	-2.56
14125.38	-4.56	2.21	-2.35	-6.02	3.09	-2.93
14537.84	-5.24	2.67	-2.57	-6.42	3.21	-3.21
14962.36	-5.81	3.10	-2.71	-6.89	3.32	-3.58
15399.27	-6.49	3.54	-2.95	-7.27	3.36	-3.91
15848.93	-7.11	3.96	-3.16	-7.48	3.33	-4.15
16311.73	-7.63	4.23	-3.40	-7.83	3.23	-4.60
16788.04	-8.02	4.17	-3.85	-8.15	3.10	-5.05
17278.26	-8.24	3.65	-4.59	-8.44	3.00	-5.44
17782.79	-7.98	2.65	-5.33	-8.57	2.97	-5.60
18302.06	-7.42	1.34	-6.08	-9.02	2.98	-6.04
18836.49	-6.79	0.05	-6.74	-9.37	2.94	-6.43
19386.53	-5.23	-0.91	-6.14	-10.02	2.77	-7.25
19952.62	-5.04	-1.41	-6.45	-10.01	2.52	-7.49

Case effect

Effect of reflections and diffraction of the acoustic plane wave from the case of SV 307 ("case effect").



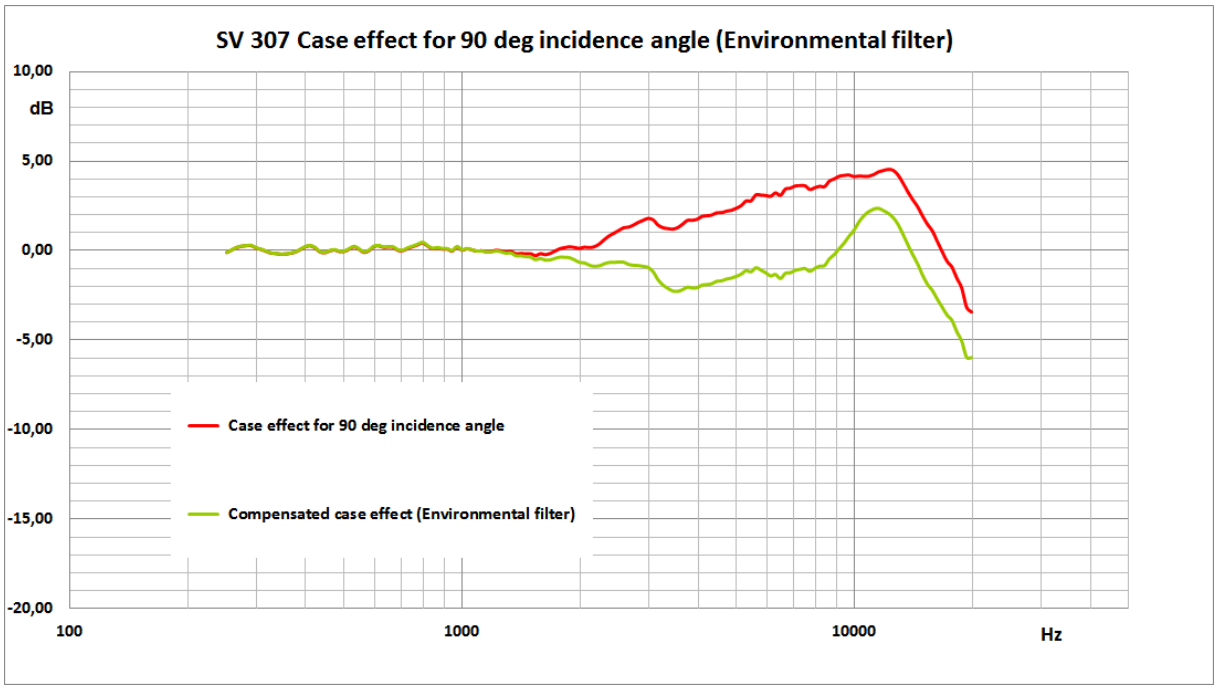


Table C.1.8. SV 307 case effect

Frequency	Case effect	Compensated case effect (Airport)	Case effect	Compensated case effect (Environmental)	Uncertainty (IEC 62585:2012)
	0 deg incidence angle		90 deg incidence angle		
[Hz]	[dB]		[dB]		[dB]
251.19	0.09	0.08	-0.11	-0.10	0.25
258.52	0.05	0.04	0.03	0.04	0.25
266.07	0.05	0.03	0.17	0.18	0.25
273.84	0.04	0.03	0.24	0.25	0.25
281.84	0.09	0.07	0.28	0.28	0.25
290.07	0.08	0.07	0.28	0.29	0.25
298.54	0.09	0.08	0.14	0.15	0.25
307.26	0.12	0.10	0.07	0.08	0.25
316.23	0.11	0.09	-0.04	-0.03	0.25
325.46	0.08	0.06	-0.14	-0.13	0.25
334.97	0.09	0.07	-0.17	-0.16	0.25
344.75	0.09	0.07	-0.20	-0.19	0.25
354.81	0.08	0.06	-0.20	-0.19	0.25
365.17	0.07	0.05	-0.15	-0.14	0.25
375.84	0.04	0.02	-0.08	-0.07	0.25
386.81	0.00	-0.03	0.06	0.07	0.25
398.11	-0.03	-0.05	0.21	0.22	0.25
409.73	-0.04	-0.07	0.27	0.29	0.25
421.70	-0.05	-0.07	0.16	0.17	0.25
434.01	-0.05	-0.08	-0.07	-0.05	0.25
446.68	0.00	-0.04	-0.12	-0.11	0.25
459.73	0.07	0.04	-0.01	0.00	0.25
473.15	0.11	0.08	0.04	0.06	0.25
486.97	0.08	0.04	-0.05	-0.03	0.25
501.19	0.07	0.03	-0.04	-0.02	0.25
515.82	0.10	0.06	0.09	0.11	0.25
530.88	0.15	0.11	0.21	0.24	0.25
546.39	0.15	0.11	0.07	0.09	0.25

Frequency	Case effect	Compensated case effect (Airport)	Case effect	Compensated case effect (Environmental)	Uncertainty (IEC 62585:2012)
	0 deg incidence angle		90 deg incidence angle		
[Hz]	[dB]		[dB]		[dB]
562.34	0.15	0.11	-0.10	-0.07	0.25
578.76	0.17	0.13	0.00	0.02	0.25
595.66	0.20	0.15	0.22	0.25	0.25
613.06	0.18	0.13	0.27	0.29	0.25
630.96	0.16	0.11	0.18	0.20	0.25
649.38	0.16	0.11	0.20	0.23	0.25
668.34	0.13	0.08	0.17	0.20	0.25
687.86	0.06	0.00	0.01	0.03	0.25
707.95	0.05	-0.01	0.01	0.03	0.25
728.62	0.06	0.01	0.14	0.17	0.25
749.89	0.04	-0.01	0.23	0.26	0.25
771.79	0.02	-0.03	0.33	0.36	0.25
794.33	0.02	-0.04	0.43	0.46	0.25
817.52	0.00	-0.06	0.25	0.28	0.25
841.40	0.03	-0.03	0.11	0.13	0.25
865.96	0.09	0.03	0.15	0.18	0.25
891.25	0.10	0.05	0.09	0.11	0.25
917.28	0.07	0.02	0.08	0.11	0.25
944.06	0.04	-0.01	-0.02	0.00	0.25
971.63	0.19	0.14	0.20	0.22	0.25
1000.00	0.00	-0.04	0.03	0.04	0.25
1029.20	-0.02	-0.06	0.11	0.12	0.25
1059.25	-0.11	-0.15	0.04	0.05	0.25
1090.18	-0.22	-0.25	-0.03	-0.03	0.25
1122.02	-0.26	-0.29	-0.01	-0.02	0.25
1154.78	-0.28	-0.30	-0.06	-0.08	0.25
1188.50	-0.24	-0.25	-0.05	-0.08	0.25
1223.21	-0.14	-0.15	0.02	-0.02	0.25
1258.93	-0.10	-0.10	-0.02	-0.07	0.25
1295.69	-0.06	-0.05	-0.08	-0.15	0.25
1333.52	-0.03	-0.01	-0.05	-0.14	0.25
1372.46	-0.06	-0.04	-0.18	-0.29	0.25
1412.54	-0.10	-0.06	-0.16	-0.29	0.25
1453.78	-0.09	-0.04	-0.18	-0.34	0.25
1496.24	-0.10	-0.03	-0.17	-0.37	0.25
1539.93	-0.10	-0.03	-0.29	-0.51	0.25
1584.89	-0.05	0.03	-0.18	-0.44	0.25
1631.17	-0.02	0.07	-0.23	-0.54	0.25
1678.80	-0.03	0.07	-0.16	-0.52	0.25
1727.83	-0.05	0.05	-0.02	-0.44	0.25
1778.28	-0.06	0.05	0.11	-0.37	0.25
1830.21	-0.07	0.04	0.17	-0.38	0.25
1883.65	0.01	0.12	0.21	-0.40	0.25
1938.65	0.10	0.20	0.17	-0.52	0.25
1995.26	0.15	0.24	0.12	-0.66	0.25
2053.53	0.19	0.26	0.19	-0.69	0.25
2113.49	0.25	0.29	0.17	-0.82	0.25
2175.20	0.28	0.28	0.22	-0.88	0.25
2238.72	0.35	0.30	0.36	-0.86	0.25
2304.09	0.47	0.36	0.60	-0.74	0.25
2371.37	0.59	0.41	0.82	-0.66	0.25

Frequency	Case effect	Compensated case effect (Airport)	Case effect	Compensated case effect (Environmental)	Uncertainty (IEC 62585:2012)
	0 deg incidence angle		90 deg incidence angle		
[Hz]	[dB]		[dB]		[dB]
2440.62	0.64	0.37	0.97	-0.65	0.25
2511.89	0.70	0.33	1.13	-0.65	0.25
2585.23	0.77	0.29	1.29	-0.65	0.25
2660.73	0.78	0.17	1.32	-0.77	0.25
2738.42	0.79	0.04	1.44	-0.82	0.25
2818.38	0.85	-0.05	1.59	-0.84	0.25
2900.68	0.86	-0.21	1.70	-0.88	0.25
2985.38	0.82	-0.41	1.81	-0.94	0.25
3072.56	0.80	-0.60	1.73	-1.18	0.25
3162.28	0.83	-0.76	1.44	-1.63	0.25
3254.62	0.92	-0.84	1.29	-1.92	0.25
3349.65	0.90	-1.02	1.24	-2.11	0.25
3447.47	0.90	-1.18	1.21	-2.26	0.25
3548.13	0.95	-1.28	1.29	-2.28	0.25
3651.74	0.96	-1.39	1.48	-2.18	0.25
3758.37	0.93	-1.51	1.69	-2.05	0.25
3868.12	1.05	-1.47	1.71	-2.09	0.25
3981.07	1.19	-1.38	1.76	-2.07	0.25
4097.32	1.30	-1.28	1.92	-1.93	0.35
4216.97	1.32	-1.24	1.96	-1.89	0.35
4340.10	1.28	-1.24	2.00	-1.85	0.35
4466.84	1.24	-1.21	2.13	-1.71	0.35
4597.27	1.22	-1.14	2.13	-1.69	0.35
4731.51	1.22	-1.05	2.22	-1.59	0.35
4869.68	1.31	-0.86	2.26	-1.54	0.35
5011.87	1.39	-0.69	2.38	-1.44	0.35
5158.22	1.43	-0.58	2.53	-1.31	0.35
5308.84	1.51	-0.47	2.79	-1.12	0.35
5463.87	1.50	-0.47	2.80	-1.19	0.35
5623.41	1.59	-0.42	3.13	-0.96	0.35
5787.62	1.65	-0.42	3.12	-1.09	0.35
5956.62	1.83	-0.32	3.10	-1.24	0.35
6130.56	1.85	-0.38	3.05	-1.42	0.35
6309.57	1.94	-0.35	3.25	-1.33	0.35
6493.82	1.90	-0.41	3.10	-1.56	0.35
6683.44	1.93	-0.36	3.45	-1.27	0.35
6878.60	1.80	-0.40	3.51	-1.24	0.35
7079.46	1.67	-0.37	3.63	-1.11	0.35
7286.18	1.61	-0.22	3.65	-1.05	0.35
7498.94	1.51	-0.09	3.65	-1.00	0.35
7717.92	1.37	0.01	3.43	-1.15	0.35
7943.28	1.24	0.08	3.54	-1.00	0.35
8175.23	1.26	0.25	3.61	-0.87	0.35
8413.95	1.17	0.23	3.60	-0.84	0.35
8659.64	1.18	0.26	3.91	-0.45	0.35
8912.51	1.06	0.15	4.03	-0.22	0.35
9172.76	0.94	0.06	4.18	0.11	0.35
9440.61	0.77	-0.02	4.22	0.42	0.35
9716.28	0.48	-0.16	4.25	0.80	0.35
10000.00	0.19	-0.24	4.16	1.13	0.35
10292.01	0.04	-0.17	4.20	1.59	0.35

Frequency	Case effect	Compensated case effect (Airport)	Case effect	Compensated case effect (Environmental)	Uncertainty (IEC 62585:2012)
	0 deg incidence angle		90 deg incidence angle		
[Hz]	[dB]		[dB]		[dB]
10592.54	-0.19	-0.22	4.18	1.94	0.35
10901.84	-0.40	-0.33	4.18	2.17	0.35
11220.18	-0.49	-0.43	4.27	2.31	0.35
11547.82	-0.65	-0.66	4.42	2.36	0.35
11885.02	-0.91	-1.05	4.50	2.23	0.35
12232.07	-1.00	-1.30	4.56	2.08	0.35
12589.25	-1.24	-1.75	4.51	1.84	0.35
12956.87	-1.42	-2.25	4.25	1.45	0.35
13335.21	-1.71	-2.95	3.80	0.91	0.35
13724.61	-1.98	-3.70	3.30	0.32	0.35
14125.38	-2.35	-4.56	2.86	-0.23	0.35
14537.84	-2.82	-5.49	2.46	-0.75	0.35
14962.36	-3.26	-6.36	1.94	-1.37	0.35
15399.27	-3.80	-7.34	1.48	-1.89	0.35
15848.93	-4.33	-8.28	1.10	-2.23	0.35
16311.73	-4.91	-9.14	0.52	-2.71	0.35
16788.04	-5.72	-9.89	-0.06	-3.16	0.35
17278.26	-6.86	-10.51	-0.60	-3.60	0.35
17782.79	-8.02	-10.67	-0.93	-3.90	0.35
18302.06	-9.20	-10.54	-1.55	-4.53	0.35
18836.49	-10.30	-10.35	-2.12	-5.06	0.35
19386.53	-10.45	-9.54	-3.19	-5.96	0.35
19952.62	-10.92	-9.51	-3.45	-5.97	0.35

Combined free field corrections for SV 307

Table C.1.9. Sum of the free field ST 30A microphone corrections and compensated case effect for the 0 and 90 deg incidence angle with the use of the Bruel & Kjaer 4226 sound calibrator

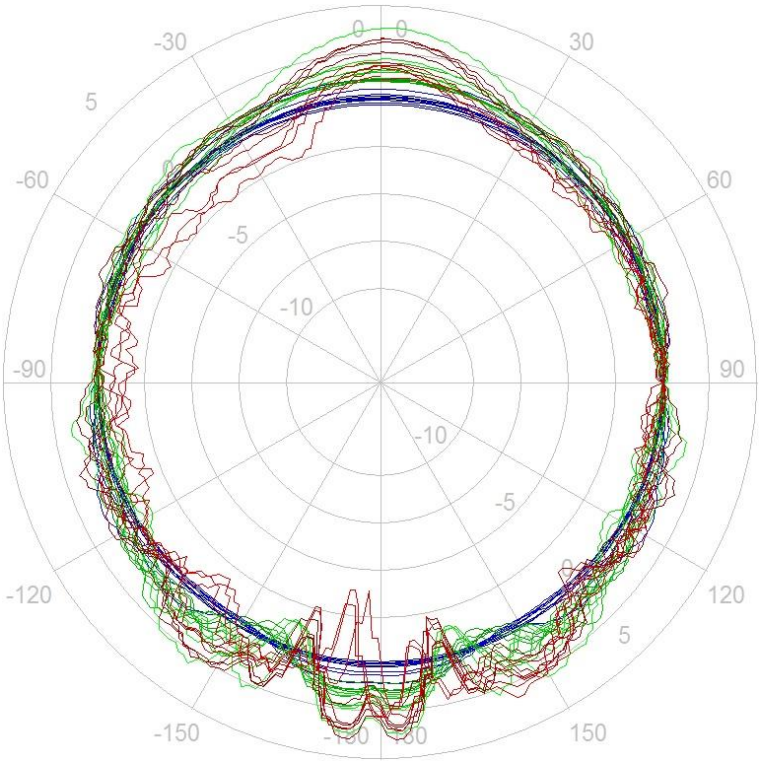
Correction	Frequency [Hz]									
[dB]	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**16000**
0 deg	0.00	0.00	0.00	-0.13	-0.12	0.00	0.57	-0.58	2.82	-1.23
90 deg	0.00	0.00	0.00	-0.20	-0.11	0.00	-0.43	-2.17	-0.68	-1.59
Uncertainty (IEC 62585)	--	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.49	0.61

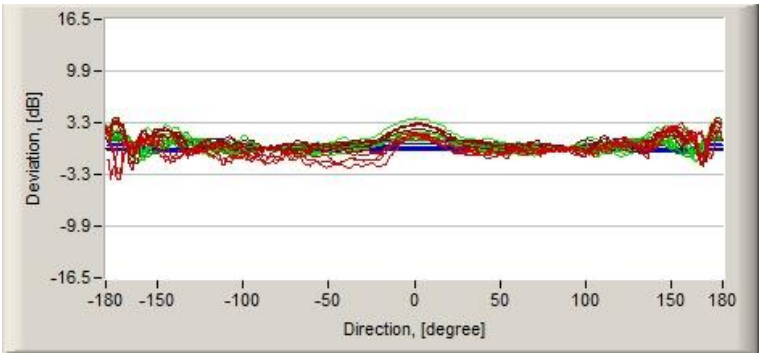
Table C.1.10. Sum of the free field ST 30A microphone corrections and compensated case effect for the 0 and 90 deg incidence angle with the use of the G.R.A.S. 51AB comparison coupler and reference 1/2“ microphone B&K 4134

Correction	Frequency [Hz]										
[dB]	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**12500**	**16000**
0 deg	0.00	0.00	0.00	-0.07	-0.11	0.00	0.67	-0.26	4.02	6.67	2.98
90 deg	0.00	0.00	0.00	-0.14	-0.11	0.00	-0.33	-1.86	0.52	5.17	2.61
Uncertainty (IEC 62585)	--	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.49	0.61	0.61

Directional characteristics of SV 307

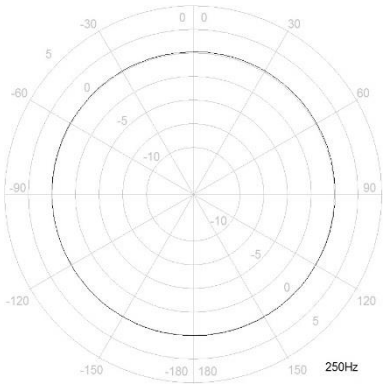
Combined directional characteristics (for 90 deg)



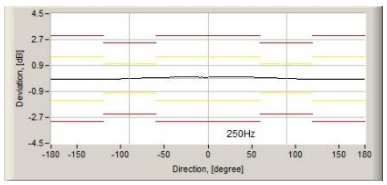


Below the directional characteristics and tolerances for 90 degree an 0 degree incidental angles are presented.

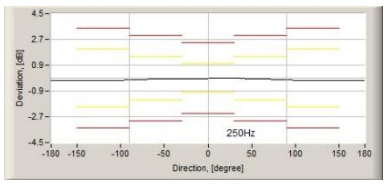
250 Hz



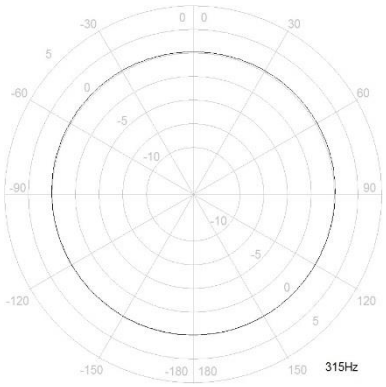
90 deg



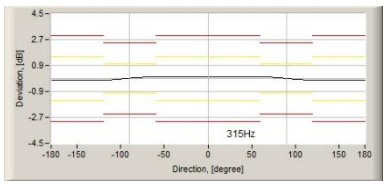
0 deg



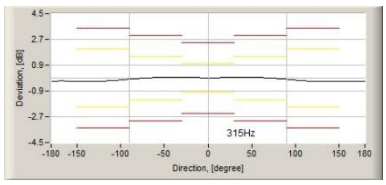
315 Hz



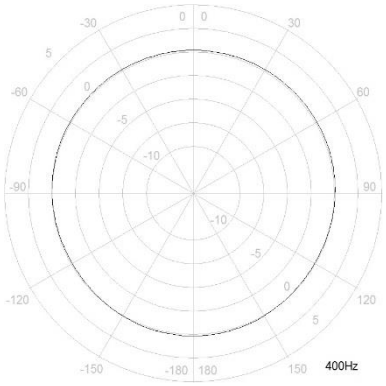
90 deg



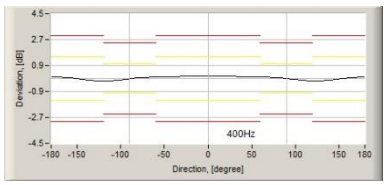
0 deg



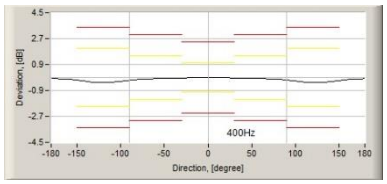
400 Hz



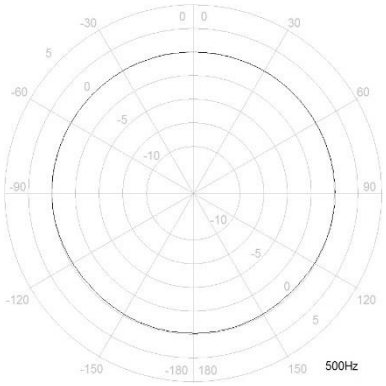
90 deg



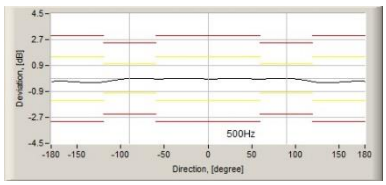
0 deg



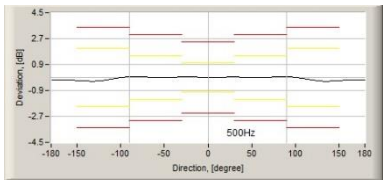
500 Hz



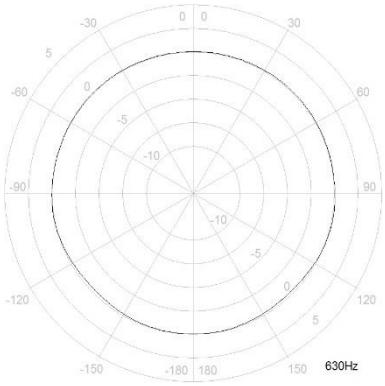
90 deg



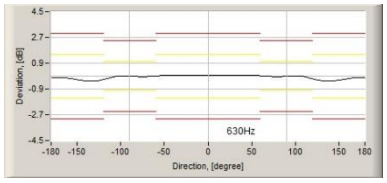
0 deg



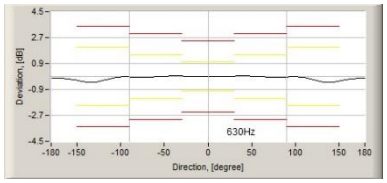
630 Hz



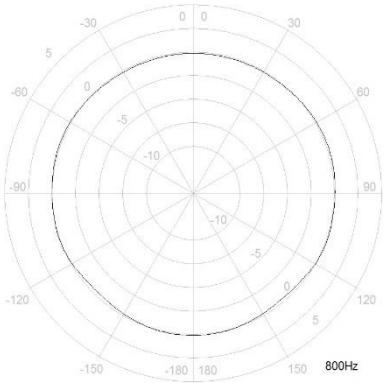
90 deg



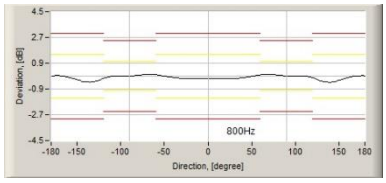
0 deg



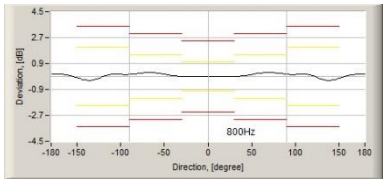
800 Hz



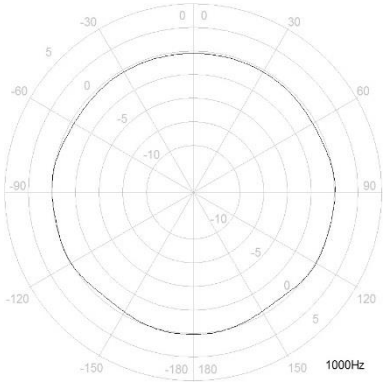
90 deg



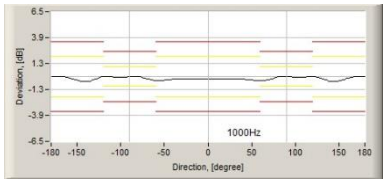
0 deg



1000 Hz



90 deg



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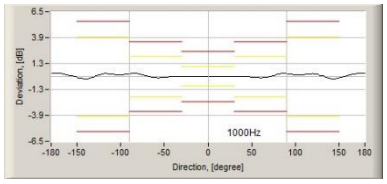
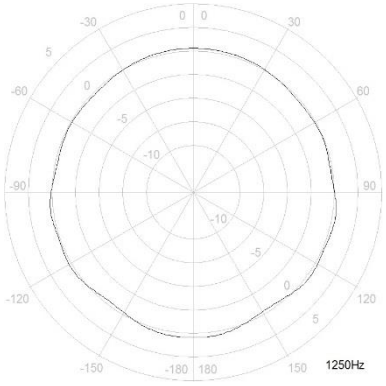


1250 Hz



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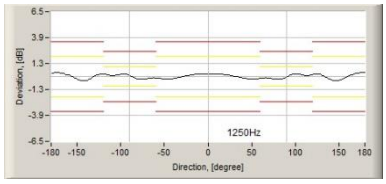

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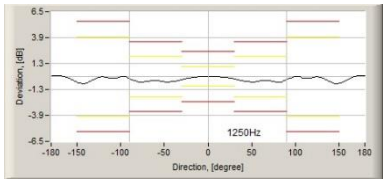
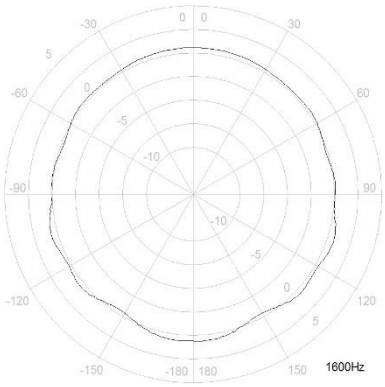


1600 Hz



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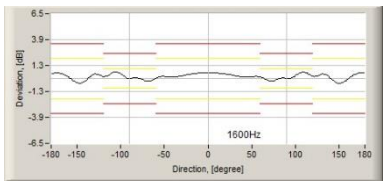

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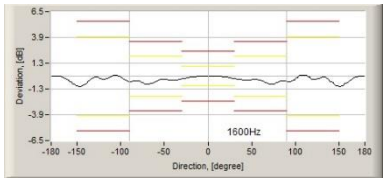

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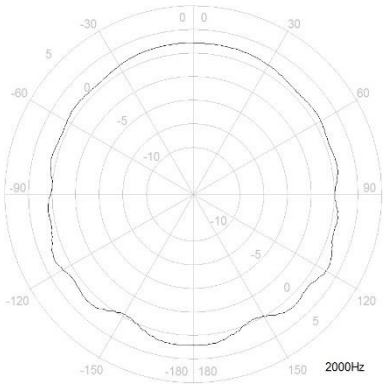

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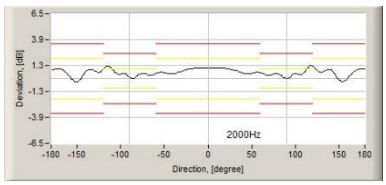

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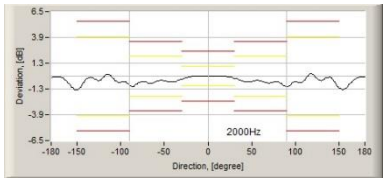

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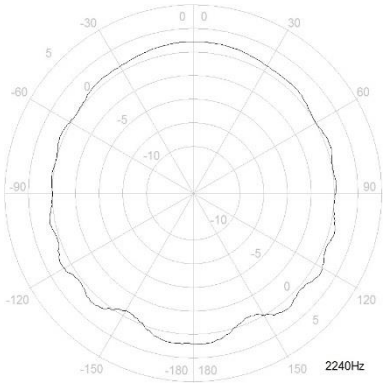

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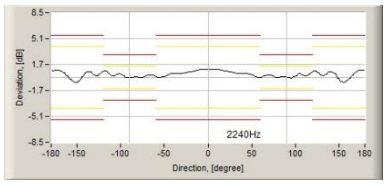

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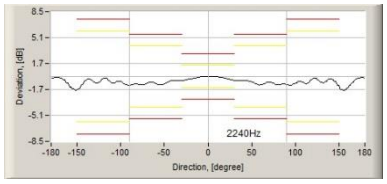
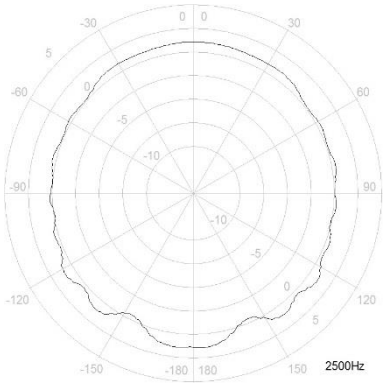


2500 Hz



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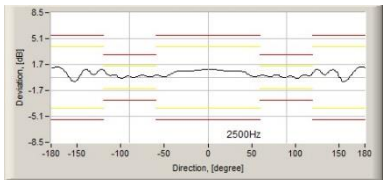

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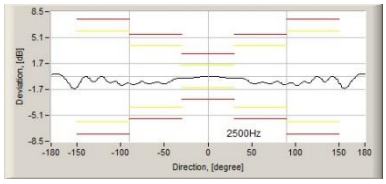
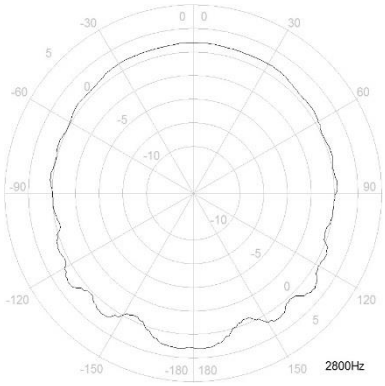


2800 Hz



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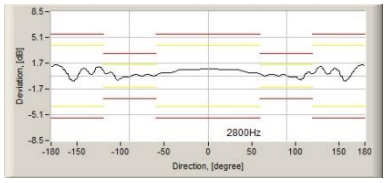

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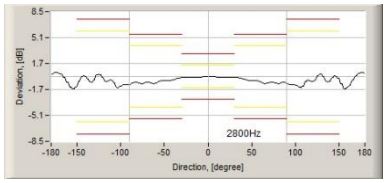

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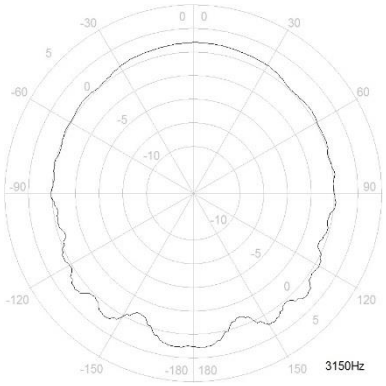

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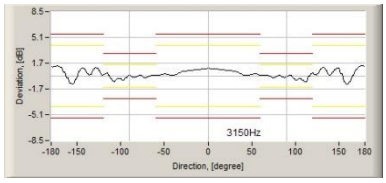

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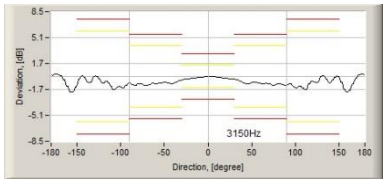

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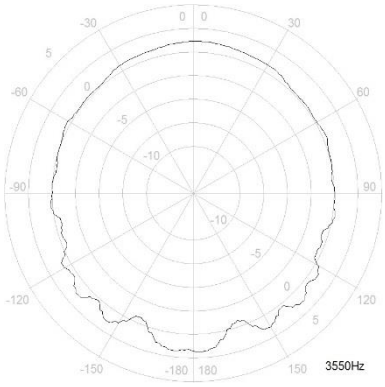

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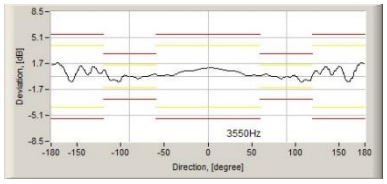

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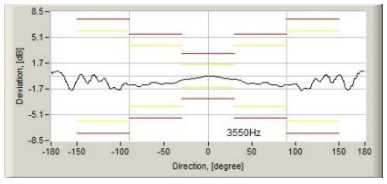

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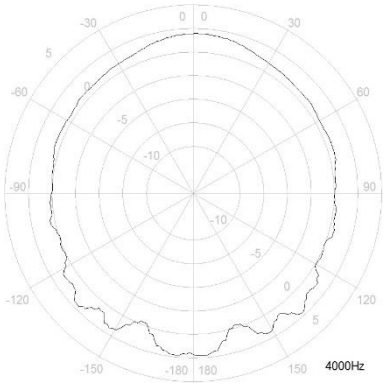

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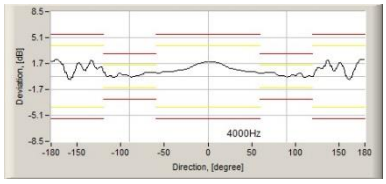

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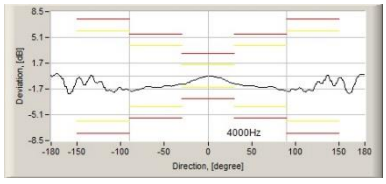

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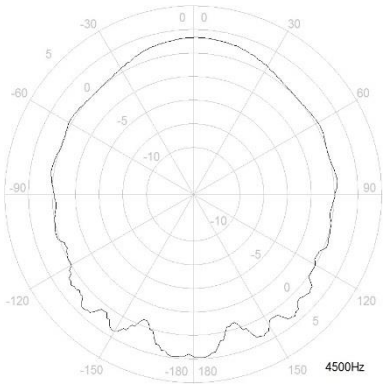

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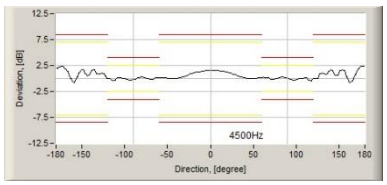

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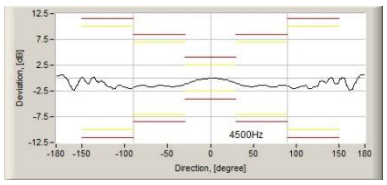

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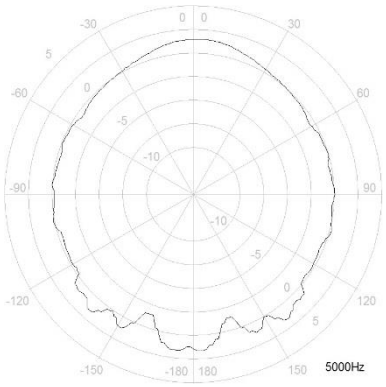

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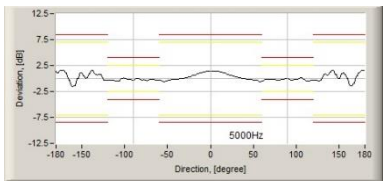

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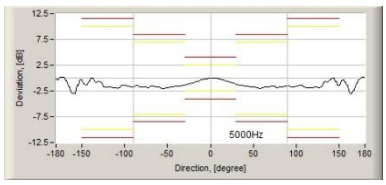

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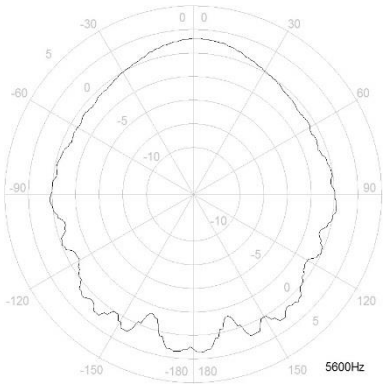

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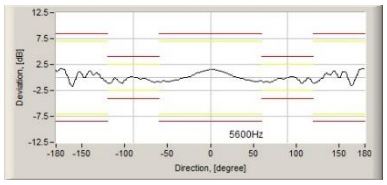

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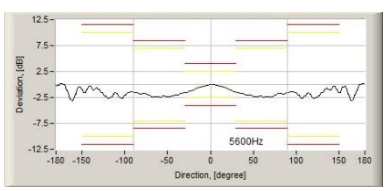

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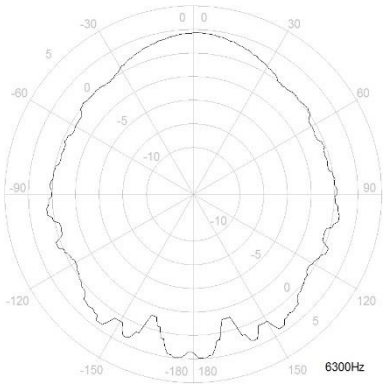

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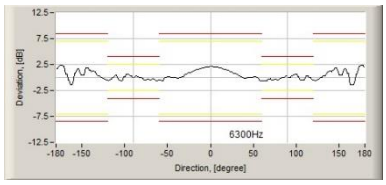

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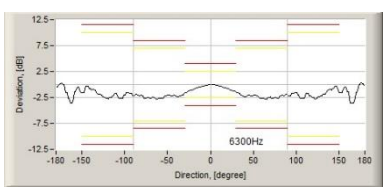

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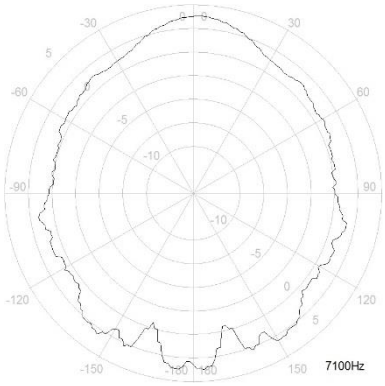

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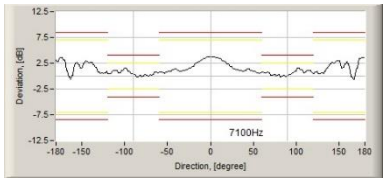

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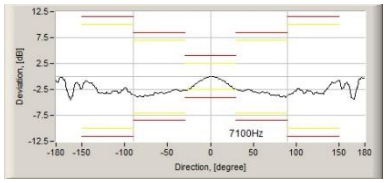

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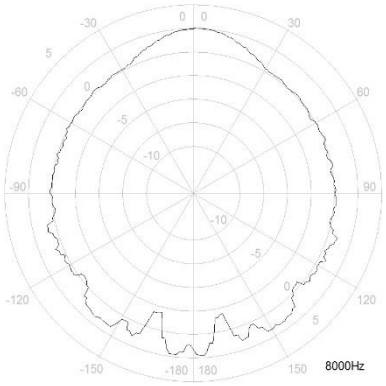

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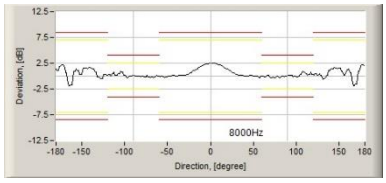

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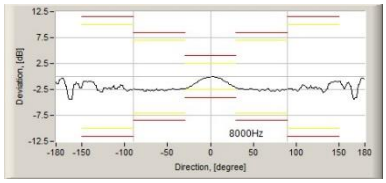

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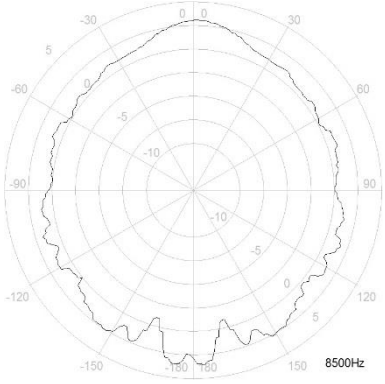

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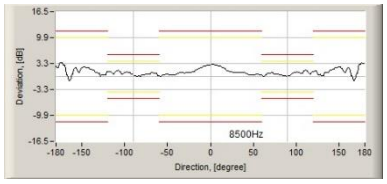

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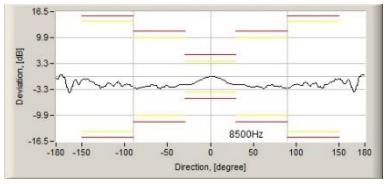

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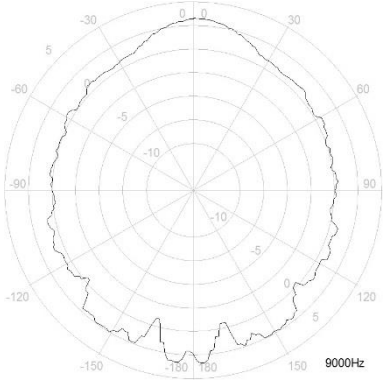

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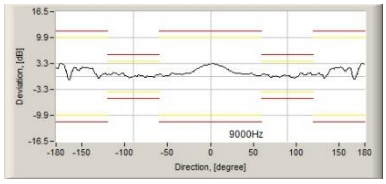

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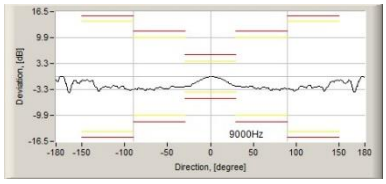

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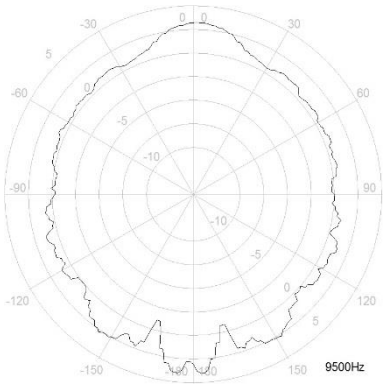

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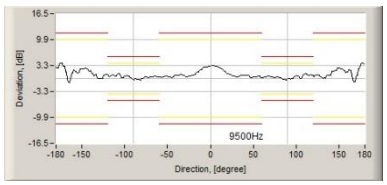

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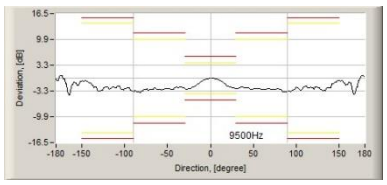

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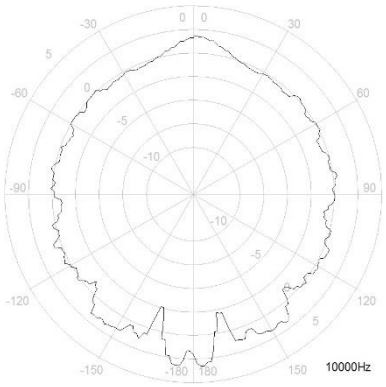

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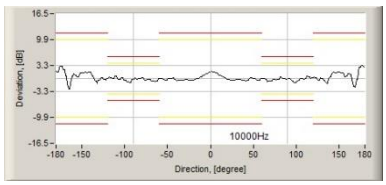

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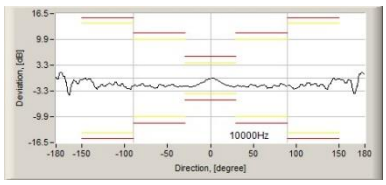

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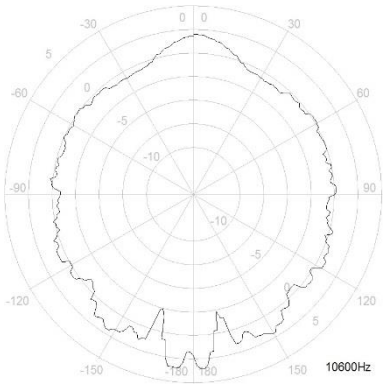
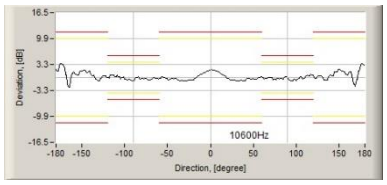
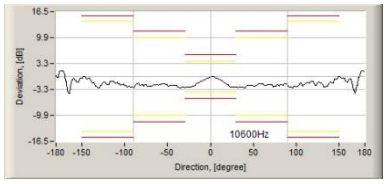


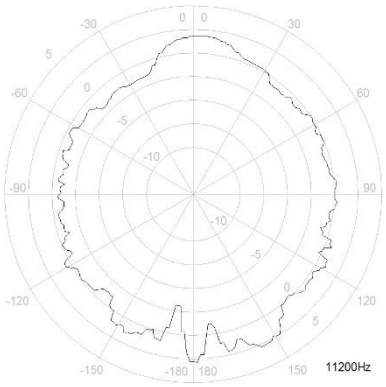
90 deg



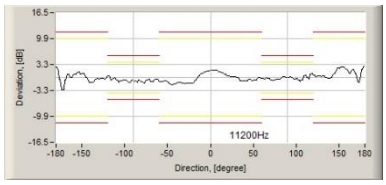
0 deg



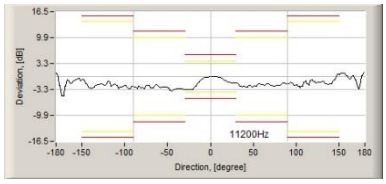
11200 Hz



90 deg



0 deg



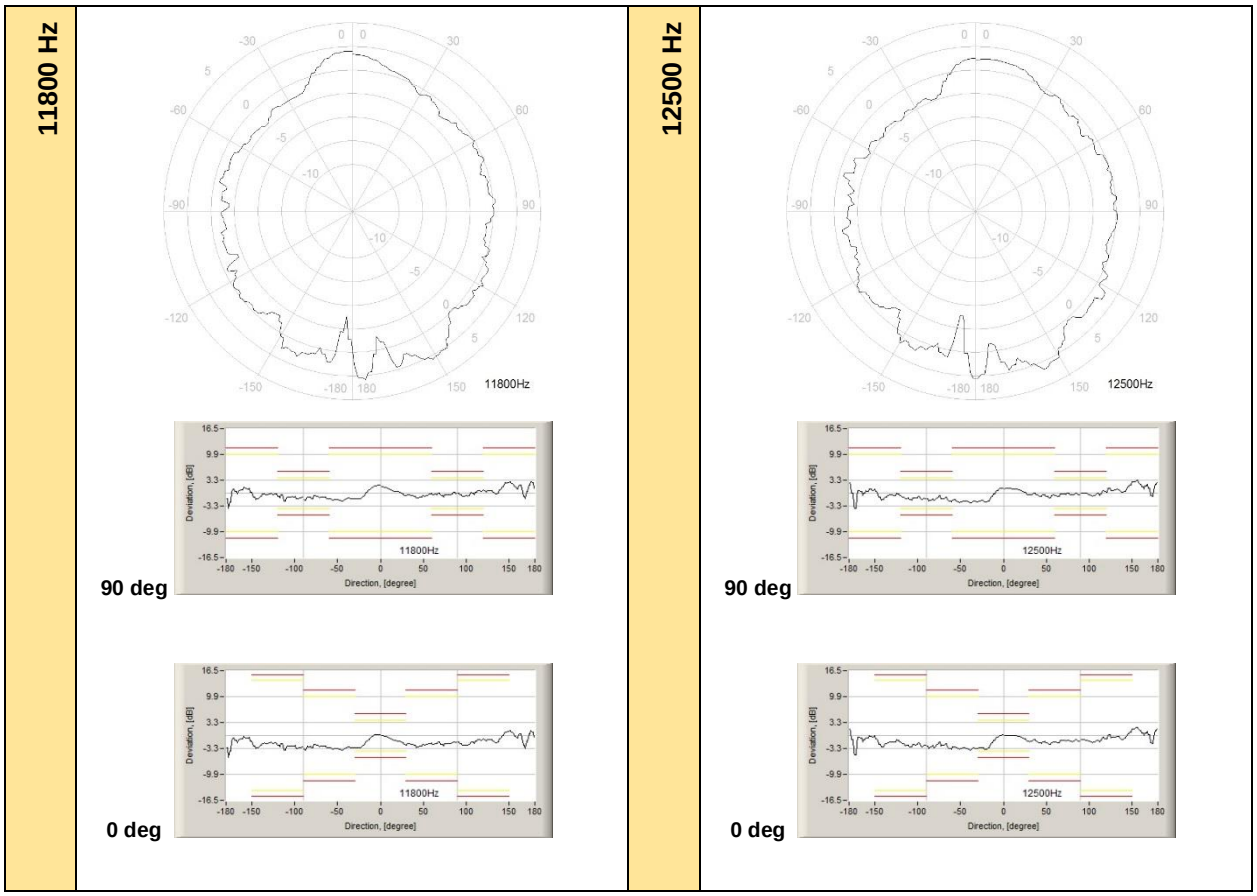


Table C.1.11. Directional response for SV 307 (for 90 deg)

f [Hz]	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
250	0.13	0.12	0.12	0.11	0.1	0.09	0.07	0.04	0.02	-0.02
315	0.11	0.13	0.14	0.14	0.14	0.14	0.12	0.09	0.05	-0.05
400	0.18	0.17	0.16	0.15	0.13	0.12	0.1	0.08	0.05	-0.07
500	-0.04	-0.02	-0.01	-0.02	-0.03	-0.03	-0.03	-0.02	0.01	-0.03
630	0.03	0.04	0.05	0.06	0.06	0.05	0.01	-0.03	-0.03	0.02
800	-0.17	-0.17	-0.17	-0.16	-0.12	0.09	0.11	0.11	0.05	-0.02
1000	-0.28	-0.26	-0.25	-0.27	-0.35	-0.41	-0.4	-0.27	-0.03	-0.1
1250	0.28	0.24	0.16	-0.14	-0.26	-0.26	-0.15	-0.28	-0.27	0.28
1600	0.55	0.52	0.43	0.28	0.19	0.21	-0.24	-0.27	0.07	0.29
2000	1.06	1.05	0.99	0.79	0.49	0.62	0.5	0.52	0.43	0.48
2240	1.09	1.01	0.8	0.58	0.54	0.3	0.35	0.35	0.13	0.26
2500	1.04	0.99	0.85	0.87	0.7	0.28	0.29	0.36	0.28	0.19
2800	0.97	0.88	0.85	0.85	0.6	0.47	0.24	0.23	0.25	-0.15
3150	1.01	0.9	0.76	0.61	0.23	0.27	0.11	-0.19	-0.17	-0.48
3550	1.13	0.98	0.77	0.69	0.23	0.17	0.33	0.12	-0.29	0.18
4000	1.95	1.76	1.3	0.91	0.72	0.66	0.52	0.54	0.15	0.2
4500	1.64	1.48	1.08	0.48	0.06	0.21	0.24	0.17	0.28	-0.38
5000	1.47	1.22	0.67	0.2	-0.24	-0.61	-0.48	-0.39	-0.3	-0.26
5600	1.55	1.22	0.62	-0.47	-0.79	-0.84	-0.96	-0.8	-0.36	0.2
6300	2.16	1.8	1.25	0.57	-0.12	-0.55	-0.69	-0.51	0.25	0.62
7100	3.82	3.22	2.12	1.21	1.34	0.88	0.82	0.25	-0.19	1.54
8000	2.52	1.98	1.02	0.19	0.15	-0.26	-0.27	-0.32	-0.28	-0.22
8500	3.06	2.42	1.3	1.08	0.76	0.67	0.88	0.94	0.5	1.28

9000	3.26	2.59	1.5	0.84	0.81	0.62	0.62	-0.22	0.36	-0.35
9500	3.24	2.46	0.97	0.91	0.86	0.62	0.63	0.51	-0.33	0.88
10000	1.77	0.63	-0.46	-0.58	-0.58	-0.49	-0.82	-0.64	0.32	-1.05
10600	1.98	0.92	-0.73	-0.82	-0.49	-0.45	-0.33	-0.64	-0.39	-0.84
11200	1.84	1.5	0.33	-0.91	-0.81	-0.67	-0.57	-0.76	-0.39	-0.46
11800	1.69	0.8	-0.71	-0.82	-1.34	-0.77	-0.67	-0.96	-0.41	-0.83
12500	1.18	1.11	-0.49	-0.7	-0.86	-1.17	-0.77	-0.5	-0.41	-0.39
f [Hz]	**100-110**	**110-120**	**120-130**	**130-140**	**140-150**	**150-160**	**160-170**	**170-180**	**180-190**	**190-200**
250	-0.04	-0.05	-0.05	-0.04	-0.04	-0.03	-0.04	-0.06	-0.05	-0.04
315	-0.09	-0.12	-0.14	-0.14	-0.13	-0.12	-0.11	-0.14	-0.12	-0.11
400	-0.14	-0.18	-0.18	-0.16	-0.09	0.04	0.08	0.1	0.1	0.09
500	-0.11	-0.23	-0.29	-0.3	-0.29	-0.25	-0.2	-0.2	-0.2	-0.21
630	-0.04	-0.22	-0.34	-0.36	-0.36	-0.26	-0.16	-0.11	-0.11	-0.15
800	-0.01	-0.13	-0.35	-0.43	-0.41	-0.27	-0.1	0.03	0.03	-0.09
1000	-0.11	-0.06	-0.23	-0.49	-0.51	-0.39	-0.15	0.03	0.03	-0.16
1250	0.28	0.22	0.24	-0.32	-0.44	-0.33	0.3	0.38	0.38	0.34
1600	0.64	0.6	0.41	0.45	-0.49	-0.47	0.5	0.56	0.56	0.48
2000	0.67	1.26	1.08	0.93	0.86	-0.32	0.83	1	0.99	0.88
2240	0.49	0.84	0.9	0.75	0.77	-0.68	0.73	0.97	0.98	0.9
2500	0.37	0.62	1.07	0.99	1.05	-0.56	1.08	1.37	1.38	1.13
2800	-0.5	0.51	1.29	0.99	1.03	-0.62	1.09	1.46	1.46	1.3
3150	-0.72	-0.72	0.98	1.15	1.07	-1.02	0.81	1.33	1.34	1.12
3550	-0.74	-0.56	0.77	1.3	1.33	1.28	1.18	1.77	1.77	1.53
4000	0.45	-0.13	1.22	2.09	1.79	1.79	1.44	2.21	2.22	1.59
4500	-0.19	-0.44	1.13	1.78	1.63	1.75	1.38	2.29	2.29	1.83
5000	-0.42	-0.48	-0.4	1.18	1.52	1.08	-1.47	1.59	1.58	-1.53
5600	-1.04	-1.04	-1.06	0.88	1.25	1.16	-1.61	1.72	1.72	-1.65
6300	-0.54	-0.4	-0.61	1.23	1.87	1.73	-1.42	2.41	2.4	-1.46
7100	1.53	1.1	0.87	2.3	2.97	2.76	2.32	3.66	3.65	1.55
8000	0.96	0.76	-0.57	1.4	1.65	1.58	-1.88	2.2	2.15	-1.92
8500	1.7	1.38	1.38	1.63	2.53	2.53	2.24	3.5	3.47	1.92
9000	0.82	0.97	0.79	1.8	2.34	2.39	2.37	3.29	3.25	2.29
9500	1.28	1.28	0.98	0.83	2.66	2.55	2.2	3.95	3.95	2.24
10000	-0.66	0.54	-0.34	-1.2	1.73	1.44	-2.24	3.21	3.16	-2.64
10600	-0.46	0.76	0.49	-0.72	1.97	1.8	-2.34	3.51	3.46	-2.41
11200	-1.08	1.02	0.55	0.49	2.42	2.71	2.02	2.79	-3.1	0.88
11800	-0.8	0.9	0.67	1.3	2.7	2.86	2.16	2.86	-3.95	1.41
12500	-0.75	0.59	1.33	0.93	2.82	3.23	2.19	2.73	-3.89	0.66
f [Hz]	**200-210**	**210-220**	**220-230**	**230-240**	**240-250**	**250-260**	**260-270**	**270-280**	**280-290**	**290-300**
250	-0.04	-0.04	-0.05	-0.05	-0.05	-0.04	-0.02	0.02	0.04	0.06
315	-0.12	-0.13	-0.13	-0.13	-0.11	-0.07	-0.02	0.06	0.1	0.12
400	0.05	-0.09	-0.15	-0.18	-0.18	-0.15	-0.07	0.05	0.08	0.1
500	-0.25	-0.29	-0.3	-0.29	-0.23	-0.11	-0.03	0.01	-0.01	-0.03
630	-0.26	-0.35	-0.36	-0.35	-0.21	-0.07	0.02	-0.03	-0.03	-0.02
800	-0.27	-0.41	-0.43	-0.35	-0.09	0.01	-0.02	0.05	0.11	0.11
1000	-0.41	-0.51	-0.51	-0.21	-0.06	-0.11	-0.1	0.02	-0.23	-0.4
1250	-0.33	-0.44	-0.38	0.24	0.22	0.27	0.27	-0.25	-0.28	-0.17
1600	-0.44	-0.49	0.45	0.44	0.56	0.65	0.39	0.08	-0.27	-0.26
2000	-0.33	0.79	0.93	0.99	1.25	0.78	0.49	0.38	0.52	0.53
2240	-0.69	0.74	0.78	0.88	0.88	0.5	0.34	0.14	0.27	0.36

2500	-0.55	1.05	1.02	1.08	0.71	0.37	0.19	0.24	0.37	0.29
2800	-0.63	1.04	0.92	1.3	0.52	-0.48	-0.16	0.26	0.24	0.24
3150	-1.05	1.08	1.15	1.05	-0.65	-0.74	-0.48	-0.17	-0.19	-0.12
3550	0.86	1.35	1.32	1.05	0.8	-0.72	0.17	-0.28	-0.25	0.33
4000	1.65	1.82	2.08	1.25	0.5	0.46	0.21	0.12	0.54	0.53
4500	1.76	1.76	1.78	1.15	-0.47	0.17	-0.39	0.28	0.25	0.23
5000	-1.47	1.42	1.5	0.72	-0.42	-0.49	-0.27	-0.27	-0.4	-0.34
5600	1.15	1.25	0.91	-1.06	-1.06	-1.04	-0.44	-0.37	-0.81	-0.97
6300	1.74	1.86	1.22	-0.62	-0.4	-0.55	0.62	0.25	-0.51	-0.69
7100	2.73	3.04	2.59	0.87	1.05	1.59	1.59	0.28	0.28	0.77
8000	1.46	1.66	1.38	-0.48	0.76	0.93	-0.26	0.17	-0.29	-0.3
8500	2.26	2.5	1.64	1.34	1.48	1.74	1.27	0.46	0.98	0.98
9000	2.44	2.36	2.13	0.76	0.98	0.79	-0.32	0.32	-0.18	0.65
9500	2.56	2.71	1.34	1.05	0.99	1.22	0.8	-0.38	0.5	0.68
10000	1.39	1.68	-1.18	-0.37	0.72	-0.48	-1.02	0.28	-0.54	-0.82
10600	1.6	1.95	-0.87	0.48	0.7	0.61	-0.89	-0.89	-0.57	-0.42
11200	1.37	-1.34	-1.17	0.51	-0.69	-1.27	-1.23	-1.27	-1.37	-1.04
11800	1.31	-1.58	-0.74	-0.84	-2.03	-1.07	-1.58	-1.94	-1.22	-1.45
12500	1.1	-1.87	-1.3	-0.65	-1.72	-1.88	-1.69	-2.13	-1.48	-2.31
f [Hz]	**300-310**	**310-320**	**320-330**	**330-340**	**340-350**	**350-360**				
250	0.07	0.09	0.09	0.09	0.09	0.09				
315	0.14	0.14	0.14	0.14	0.13	0.11				
400	0.12	0.13	0.15	0.16	0.17	0.18				
500	-0.03	-0.02	-0.02	-0.01	-0.02	-0.03				
630	0.04	0.06	0.06	0.05	0.04	0.03				
800	0.07	-0.12	-0.16	-0.17	-0.17	-0.16				
1000	-0.41	-0.35	-0.27	-0.25	-0.26	-0.27				
1250	-0.25	-0.25	-0.17	0.14	0.24	0.28				
1600	0.22	0.2	0.27	0.43	0.53	0.57				
2000	0.62	0.56	0.76	0.99	1.06	1.07				
2240	0.15	0.55	0.57	0.79	1.01	1.1				
2500	0.29	0.68	0.88	0.87	0.97	1.05				
2800	0.47	0.58	0.86	0.86	0.89	0.98				
3150	0.28	0.25	0.6	0.76	0.89	1.01				
3550	0.15	0.17	0.63	0.76	0.97	1.13				
4000	0.65	0.66	0.87	1.26	1.73	1.93				
4500	0.23	-0.03	0.48	1.09	1.44	1.62				
5000	-0.62	-0.35	0.13	0.56	1.14	1.46				
5600	-0.91	-0.79	-0.46	0.48	1.11	1.53				
6300	-0.55	-0.11	0.57	1.27	1.8	2.15				
7100	0.88	1.36	1.17	1.94	3.08	3.76				
8000	-0.26	0.15	0.17	1.06	2.01	2.44				
8500	0.69	0.57	1.05	1.19	2.27	2.99				
9000	0.65	0.77	0.78	1.32	2.51	3.16				
9500	0.63	0.87	0.94	0.89	2.35	3.16				
10000	-0.5	-0.6	-0.5	-0.46	0.48	1.62				
10600	-0.52	-0.52	-0.82	-0.76	0.79	1.81				
11200	-1.16	-1.81	-1.6	-1.53	1.08	1.81				
11800	-1.77	-2.06	-1.49	-1.46	1.44	1.98				
12500	-2.41	-2.56	-2.56	-2.34	-2.03	1.25				

C.2 SPECIFICATION OF SV 307 AS 1/1- AND 1/3-OCTAVE ANALYSER

SV 307 can analyse sound in 1/1 or 1/3 octave bands. Built in filters operate in real time meeting the international IEC 61260-1:2014 standard.

Note: *Simultaneously to the frequency analysis SV 307 operates as Sound Level Meter! See Chapter C.1 for specification.*

Signal input

SV 307 microphone input throughout SL 3071 adapter

Maximum input voltage:

SV 307	meets the requirements of IEC 348 for the 1-st Class devices. The input voltage shall not exceed the limits between 0 V and +3 V.
SL 3071	the input voltage shall not exceed the limits between -3 V and +3 V.

Impedance:

SV 307	three differential inputs: ≤ 94 kΩ, ≤ 30 pF each.
SL 3071	≤ 10900 Ω, ≤ 30 pF, single ended input.

Linear Operating Range

Table C.2.1. Linear operating range

Weighting	**Linear operating range** (with 10 dB margin from noise) (**RMS** for the sinusoidal signal at reference conditions @ 1 kHz, 0.0 dB calibration factor)	
A	from 6.3 μV_{RMS}	to 355 mV_{RMS}
B	from 20.0 μV_{RMS}	to 355 mV_{RMS}
C	from 20.0 μV_{RMS}	to 355 mV_{RMS}
Z	from 63.0 μV_{RMS}	to 355 mV_{RMS}

Table C.2.2. Peak for the sinusoidal signal 1 kHz, at reference conditions (@ 128 dB Peak indication)

Peak for the sinusoidal signal **1 kHz**, at reference conditions @ 1 kHz (0.0 dB calibration factor)	
Weighting	**Max Peak value**
A	0.502 V
B	0.502 V
C	0.502 V
Z	0.502 V

Measuring frequency range	5.0 Hz ÷ 22.4 kHz with the **Z** filter (-3 dB)
Centre Frequency Ranges for 1/1 Octave	31.5 Hz ÷ 16 kHz
Centre Frequency Ranges for 1/3 Octave	20 Hz ÷ 20 kHz

RMS detector

• Digital	"True RMS" with Peak detection
• Resolution	0.1 dB
• Range	327.7 dB
• Crest Factor	unlimited (for signals in 20 kHz band)

Reference conditions as per EN 61252

• Reference frequency	1000 Hz
• Reference level	114dB
• Reference temperature	+20°C
• Reference relative humidity	65 %

Calibration (electrical)

Calibration level	100 mV_{RMS} (@ 114 dB indication) with SL3071
Basic accuracy	< ± 0.2 dB (for the temperature T=+23°C ± 5°C for the sinusoidal signal 114 dB_{RMS} in the band 10 Hz ÷ 20 kHz with the **Z** input filter)
Measurement error in the full temperature range	< ± 0.1 dB (when the temperature is from -10°C to +50°C for the sinusoidal signal 114 dB_{RMS} in the band 10 Hz ÷ 20 kHz with the **Z** input filter).

Overload detector

The instrument has the built-in overload detectors. Both A/D converter and input amplifier overload conditions are detected. The overload in the measurement channel (in its analogue part) and the overload of the analogue / digital converter are both detected. The "overload" indication appears when the input signal amplitude is 0.5 dB above the declared "Peak measurement range".

Warm-up time / Auto-start delay	1 min. (for 0.1 dB accuracy).
Effect of humidity	< 0.5 dB (for 30%<RH<90% at 40°C and Reference conditions).
Effect of magnetic field	< 15 dB (A) or < 25 dB (Z) (for 80 A/m and 50 Hz).
Effect of Vibration	< 0.1 dB (from 20 Hz to 1000 Hz at 1 m/s^2).

Antialiasing filter

Built-in antialiasing filter. On-chip digital filter of the analogue-to-digital converter, ensuring correct sampling of the measured signal.

Pass band (-1 dB)	21.980 kHz
Pass band (-3 dB)	22.340 kHz
Stop band	26.780 kHz
Attenuation in the stop band	> 80 dB.
Sampling frequency	48 kHz
Analogue to digital converter	3 x 24 bit resolution
Input attenuator accuracy	± 0.1 dB (for f = 1 kHz and T = +23°C)
Internal oscillator accuracy	0.01 % (for f = 1 kHz and T = +23°C).

Digital Filters

Weighting filters

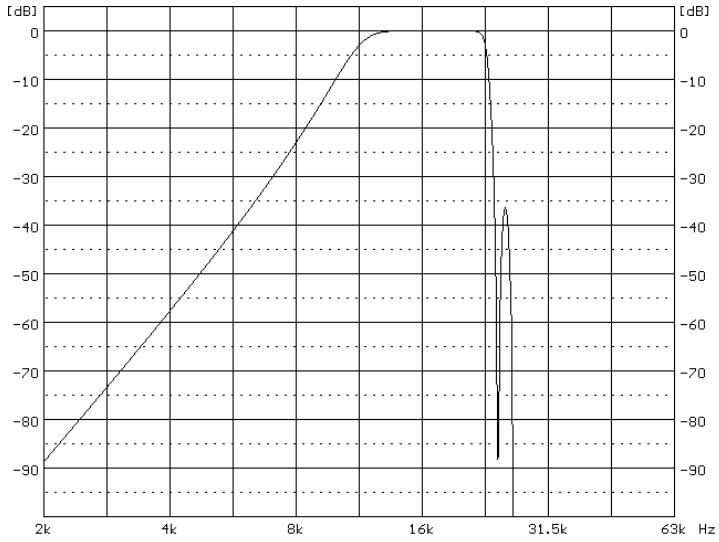
- A meeting requirements of the IEC 61672-1:2013 standard for the Class 1 “A” filter,
- C meeting requirements of the IEC 61672-1:2013 standard for the Class 1 “C” filter,
- Z meeting requirements of the IEC 61672-1:2013 standard for the Class 1 “Z“ filter,
- B meeting IEC 60651 for the Class 1 filter

See part C.3 for the A, C, B and Z filters characteristics.

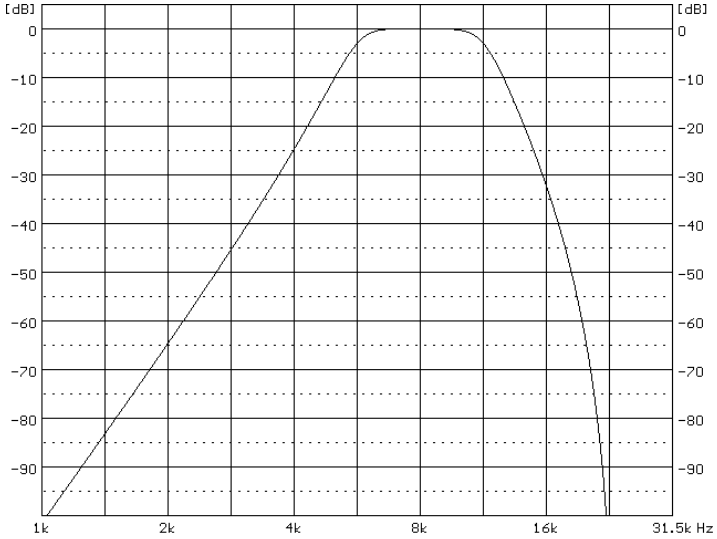
Noise levels (measured with the SL 3071 adapter and source impedance 50 Ω, **Microphone** compensation switched-off):

- ”A” weighting < 1.6 μV_{RMS}
- “B” weighting < 2.8 μV_{RMS}
- ”C” weighting < 2.8 μV_{RMS}
- ”Z” weighting < 8.9 μV_{RMS}

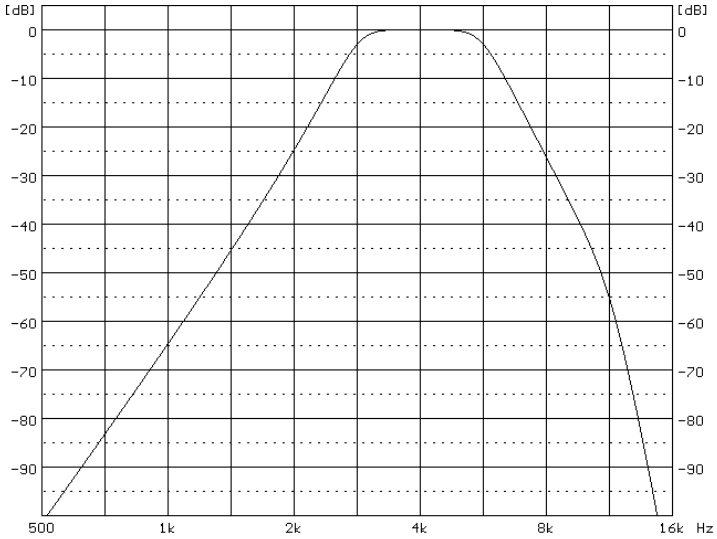
1/1 Octave filters 10 filters with centre frequencies from 31.5 Hz to 16 kHz (base 10), meeting IEC 61260-1:2014 standard for Class 1



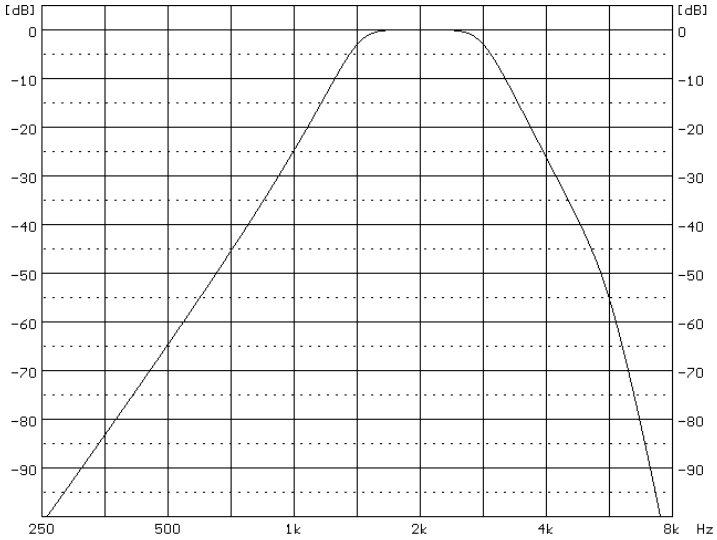
16.0 kHz 1/1 octave filter



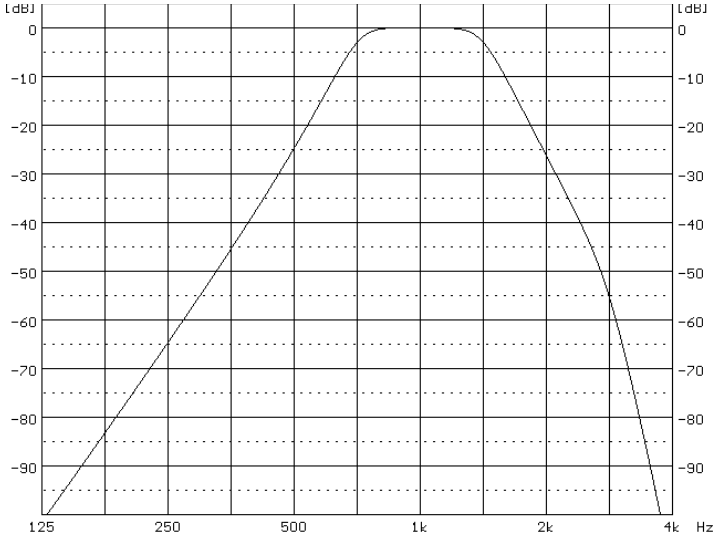
8.0 kHz 1/1 octave filter



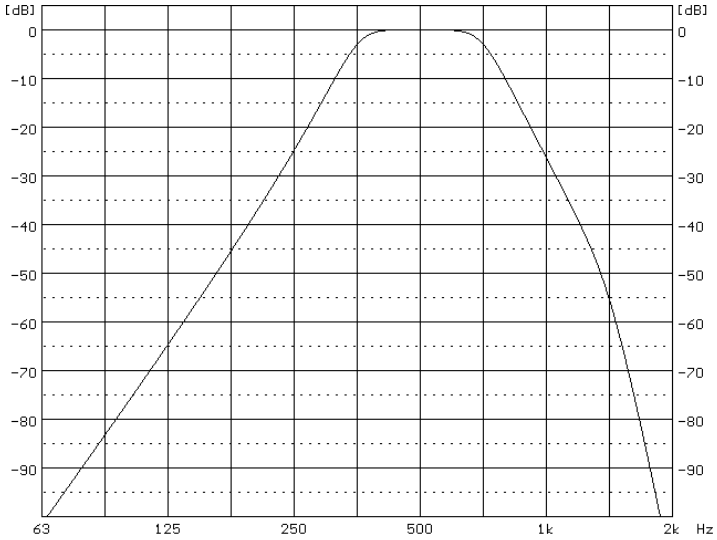
4.0 kHz 1/1 octave filter



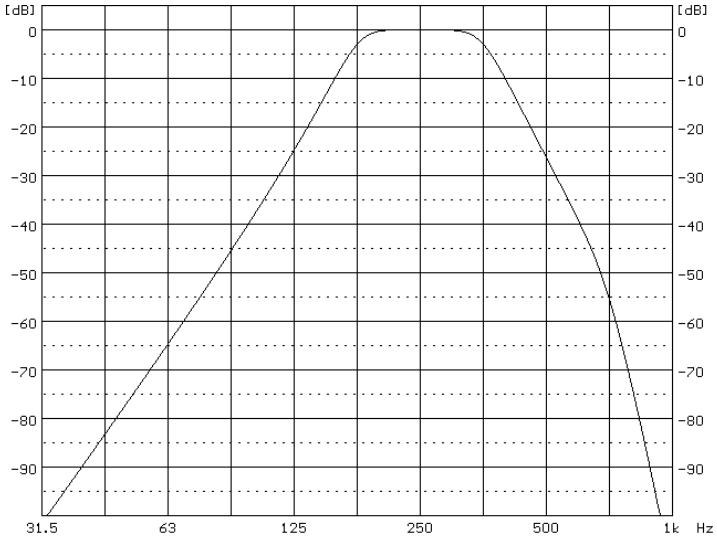
2.0 kHz 1/1 octave filter



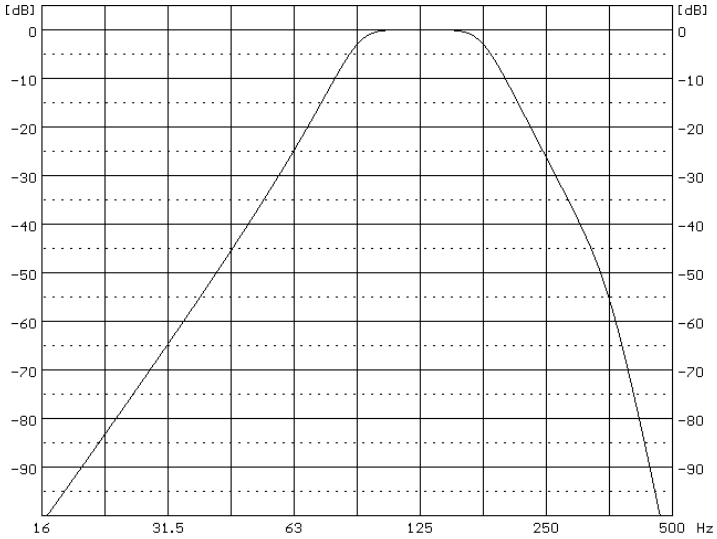
1.0 kHz 1/1 octave filter



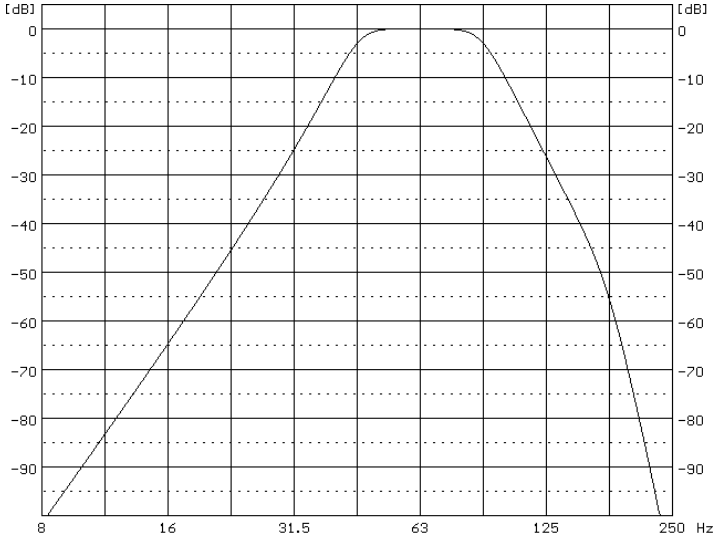
500 Hz 1/1 octave filter



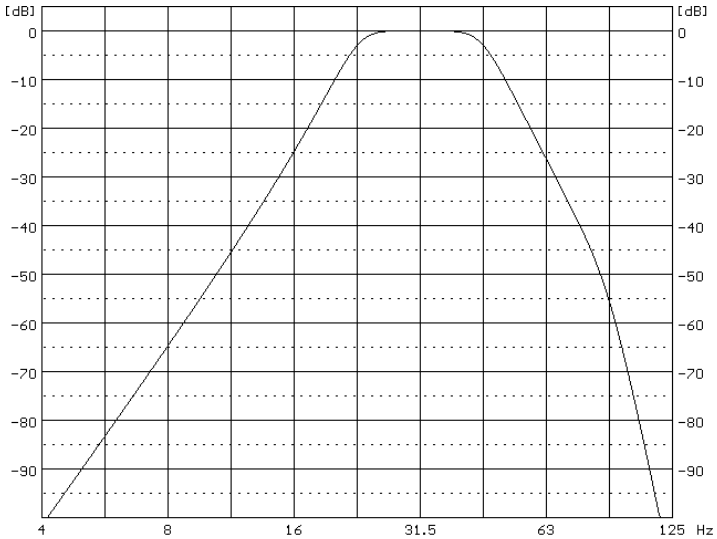
250 Hz 1/1 octave filter



125 Hz 1/1 octave filter

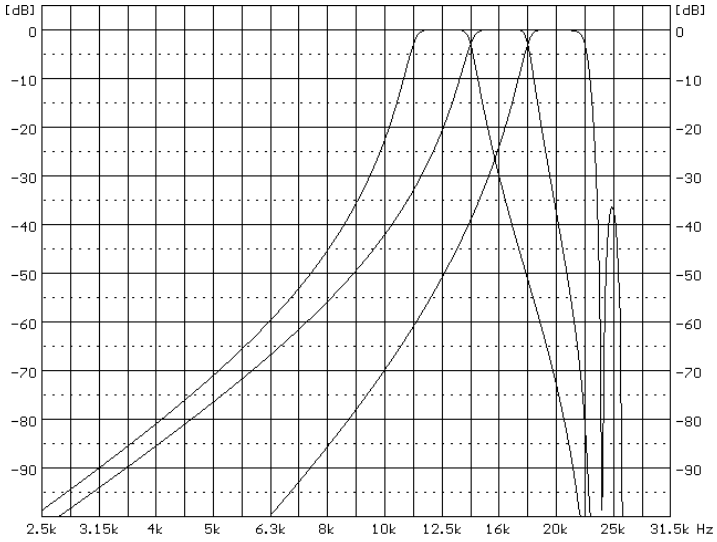


63.0 Hz 1/1 octave filter

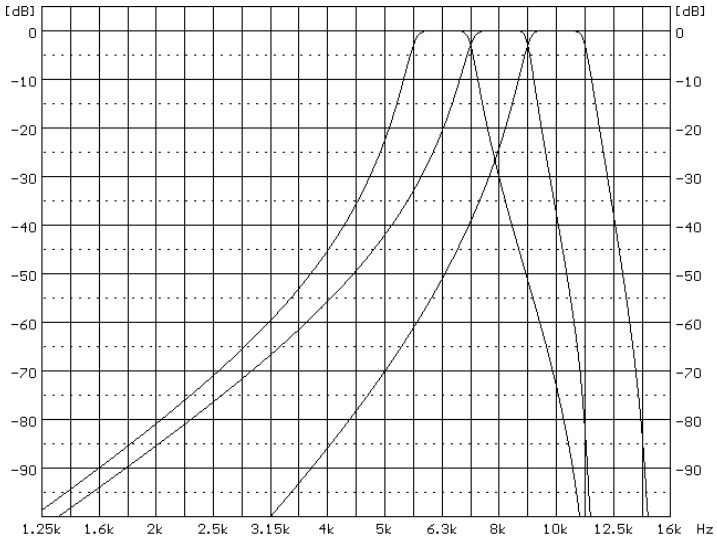


31.5 Hz 1/1 octave filter

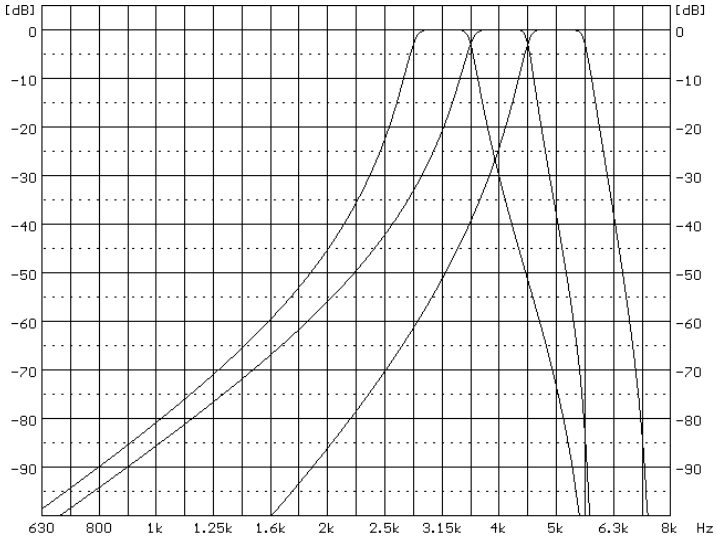
1/3 Octave filters 31 filters with centre frequencies from 20 Hz to 20 kHz (base 10), meeting IEC 61260-1:2014 standard for Class 1



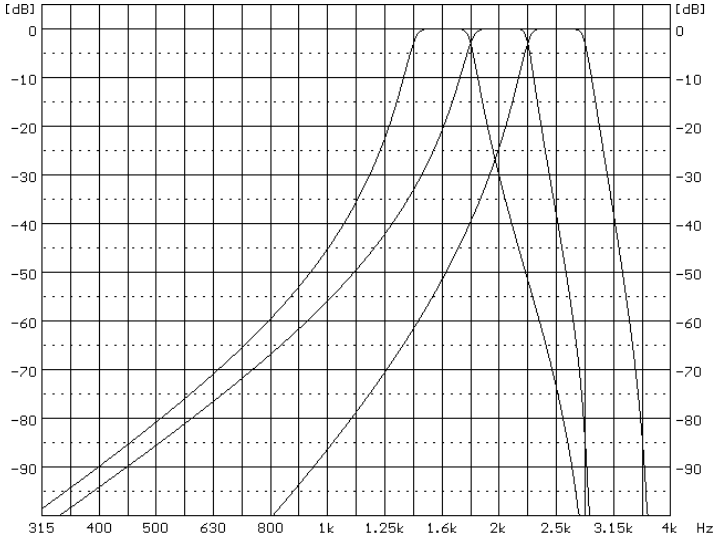
1/3 octave filters for 16.0 kHz 1/1 octave filter



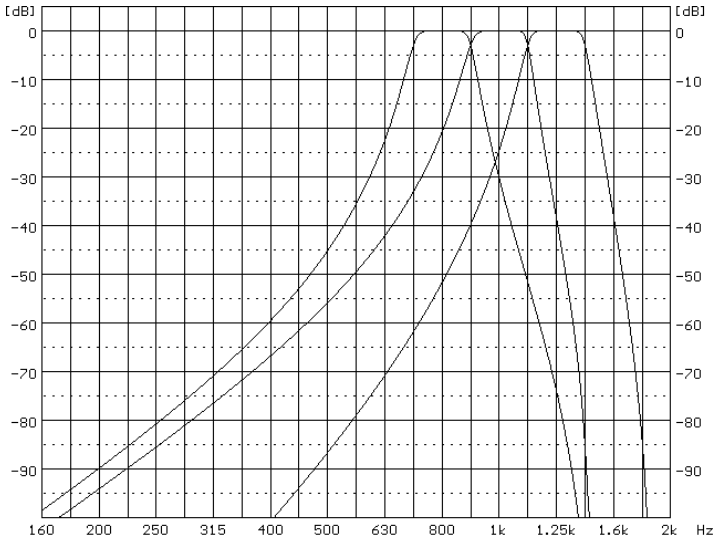
1/3 octave filters for 8.0 kHz 1/1 octave filter



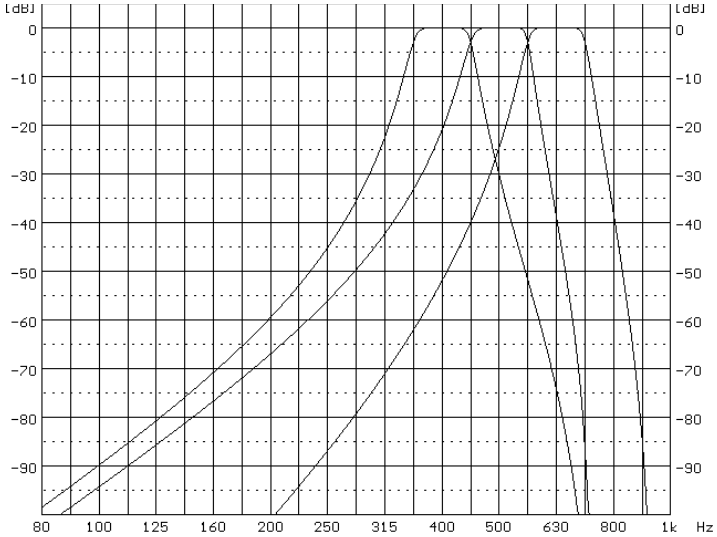
1/3 octave filters for 4.0 kHz 1/1 octave filter



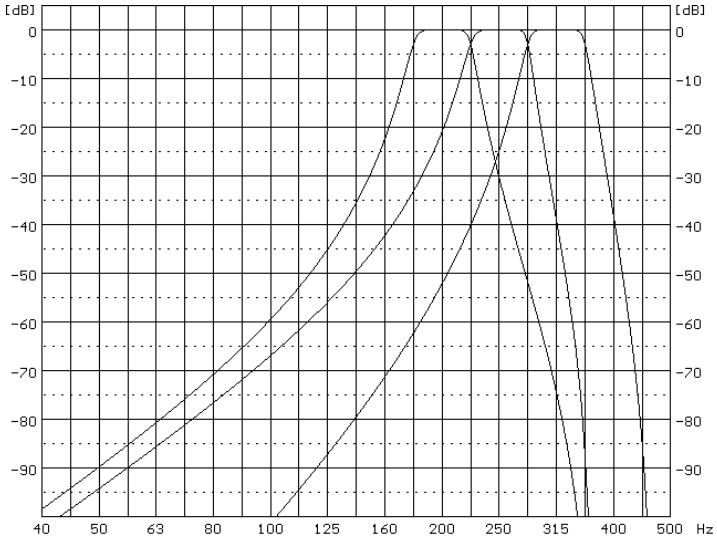
1/3 octave filters for 2.0 kHz 1/1 octave filter



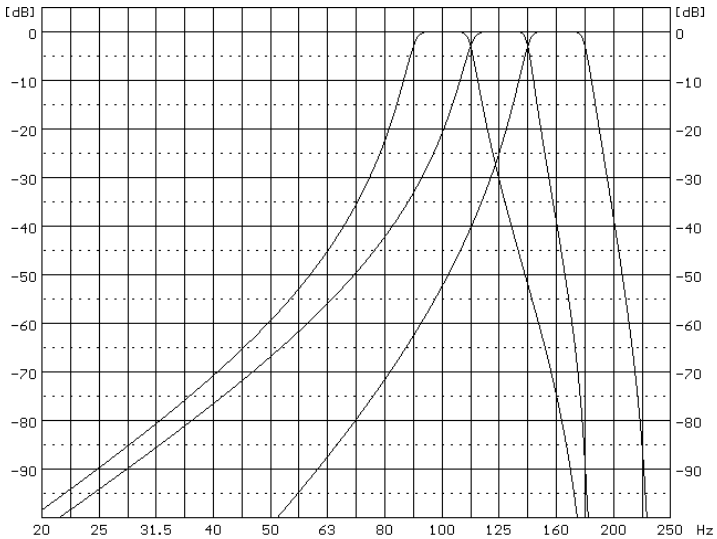
1/3 octave filters for 1.00 kHz 1/1 octave filter



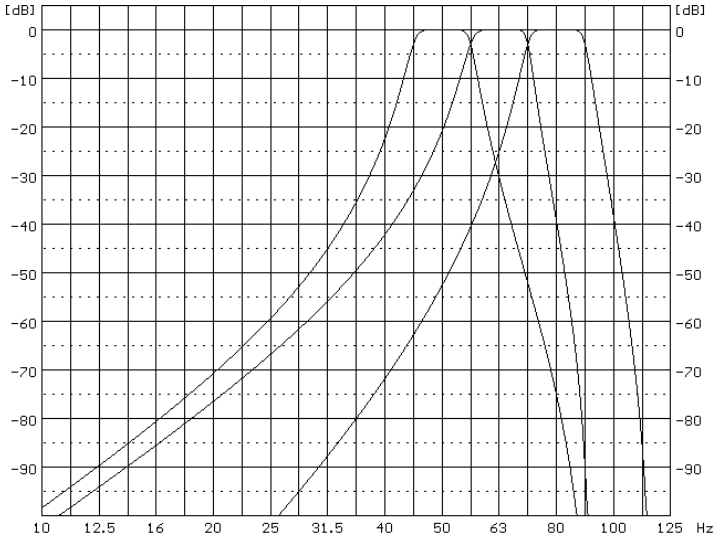
1/3 octave filters for 500 Hz 1/1 octave filter



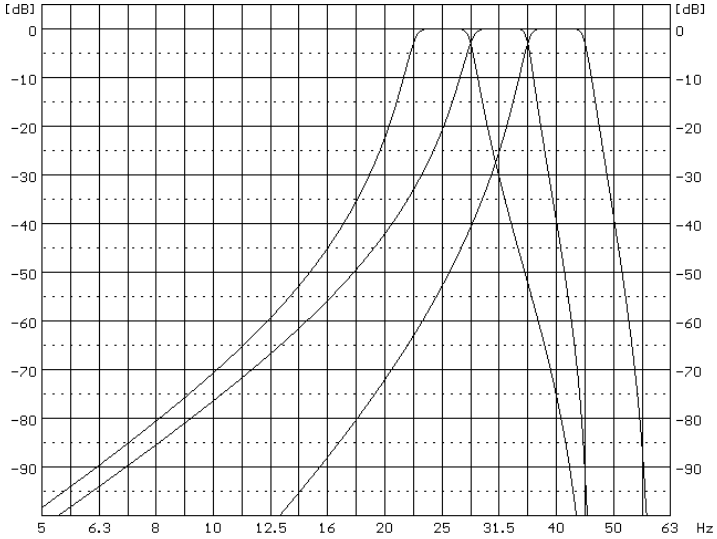
1/3 octave filters for 250 Hz 1/1 octave filter



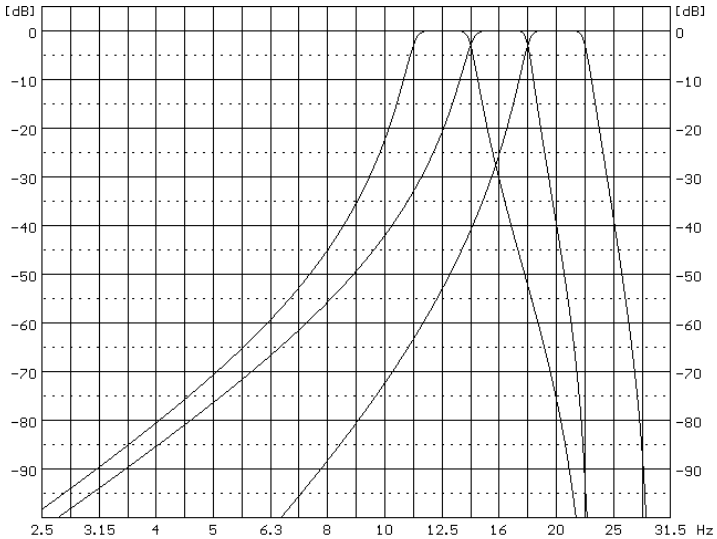
1/3 octave filters for 125 Hz 1/1 octave filter



1/3 octave filters for 63.0 Hz 1/1 octave filter



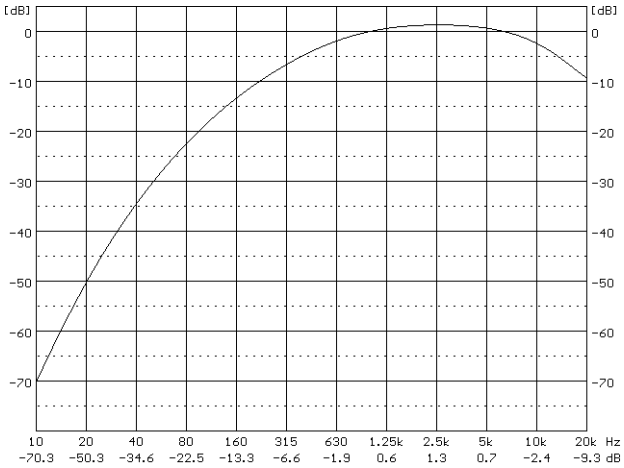
1/3 octave filters for 31.5 Hz 1/1 octave filter



1/3 octave filters for 16.0 Hz 1/1 octave filter

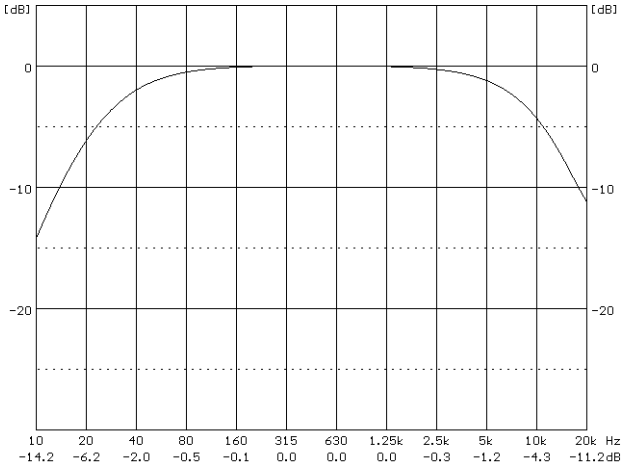
C.3 FREQUENCY CHARACTERISTICS OF THE IMPLEMENTED BROADBAND DIGITAL FILTERS

"A" filter Class 1 according to the IEC 60651 and IEC 61672-1:2013 standard.



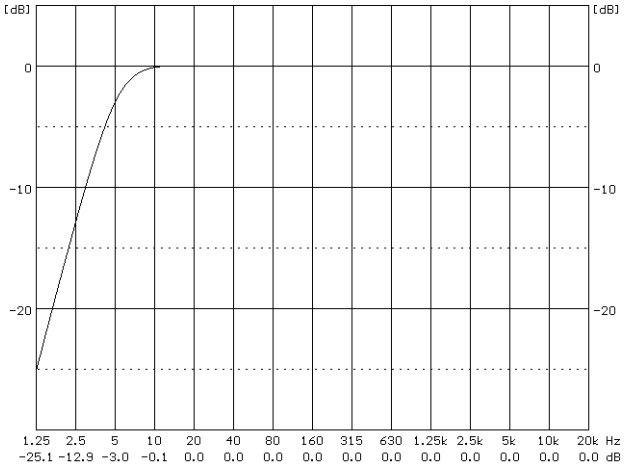
"A" filter characteristic

"C" filter Class 1 according to the IEC 60651 and IEC 61672-1:2013 standard.



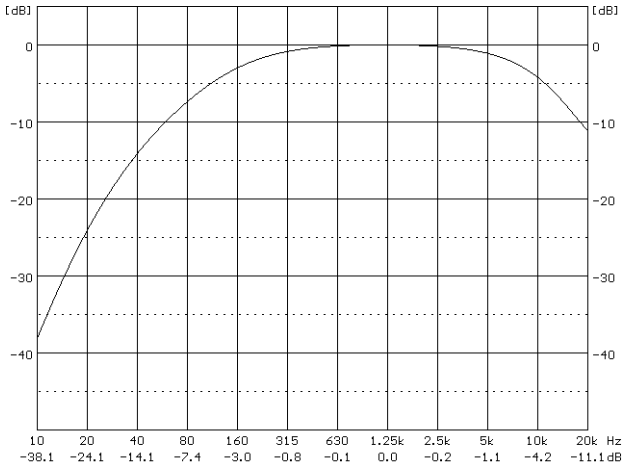
"C" filter characteristic

"Z" filter Class 1 according to the IEC 61672-1:2013 standard



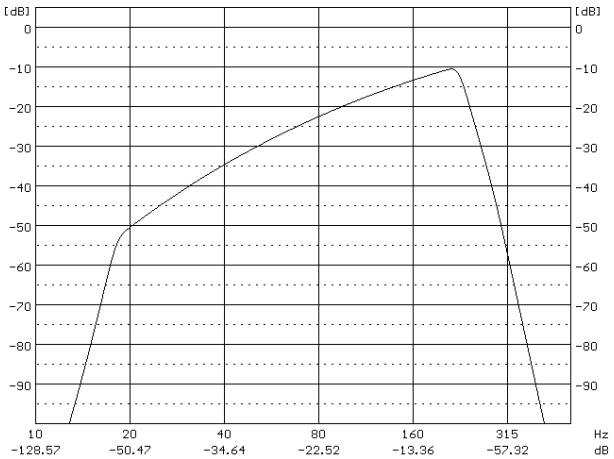
"Z" filter characteristic

“B” filter Class 1 according to the IEC 60651



“B” filter characteristic

“LF” filter according to EPA-93-F105-02-104 Low Frequency Noise Control Regulations



“LF” filter characteristic

C.4 MISCELLANEOUS SPECIFICATION OF SV 307

Display

Super contrast OLED colour display (160 x 128 pixels).

Memory

2 MB of the RAM memory.
4 MB of the FLASH memory allocated to the program.
16 GB, removable micro SD or SDHC card (supported for up to 128 GB).

Internal sensors

Temperature	measurement range: -30° to +100°
Build-in acoustic system check	> 100 dBA reference signal

Internal battery (non-removable)

Li-Ion rechargeable battery	7.2V, 10.0 Ah / 72.0 Wh, electronically protected (short circuit / over load / over voltage / over temperature)

Table C.4.1. SV 307 operation time with a fully charged battery *)

SV 307 operation mode		Power consumption mW	Operation time	
			hours	days
All transmission modules are switched off		463	155	6.5
GSM modem	always on 1/60 **)	800	90	3.7
	periodic on 1/24 ***)	500	144	6.0

*) Measurement conditions: nominal battery capacity (72.0 Wh), T=20ºC, measurements are running, Logger Step=1s, Integration Period=1s (no matter which Function is selected), USB is disconnected, OLED display is off, microphone heater is off, battery heater is off

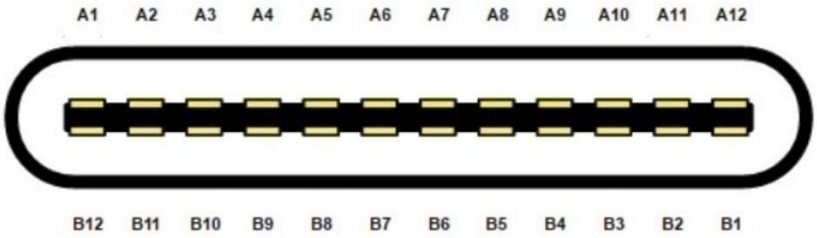
**) Modem is constantly switched on, one minute data transmission in one hour

***) Modem is normally switched off, and is switched on for an hour in a day

Note: *Above given operating periods are calculated without any external devices powered from SV307. Connecting and powering an external device can reduce operating time significantly! For example, using the SP 276 meteo station reduces this time by 50%.*

Microphone input

The SV 307 microphone input uses USB C connector:



Microphone connector

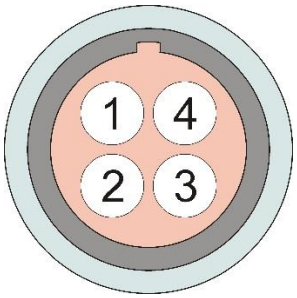
Table C.4.2. Pin out of the microphone connector

ST 30A connector		SV 307 connector		Signal name	Description
Contact no.		Contact no.			
A1	B1	A1	B1	VA_TEDS	MEMS Microphones Supply Voltage / TEDS I/O
A2	B2	A2	B2	MIC_TMP	MEMS Microphones Temperature Measurement
A3	B3	A3	B3	S3_N	MEMS 3 Differential Signal Output, phase N
A4	B4	A4	B4	S3_P	MEMS 3 Differential Signal Output, phase P
A5	B5	A5	B5	SPKR_TMP	Speaker Signal / External Temperature Measurement
A6	B6	A6	-	S2_P	MEMS 2 Differential Signal Output, phase P
A7	B7	A7	-	S2_N	MEMS 2 Differential Signal Output, phase N
A8	B8	A8	B8	MIC_GND	Ground / Shell
A9	B9	A9	B9	S1_N	MEMS 1 Differential Signal Output, phase N
A10	B10	A10	B10	S1_P	MEMS 1 Differential Signal Output, phase P
A11	B11	A11	B11	HEAT_N	MEMS Heater, N
A12	B12	A12	B12	HEAT_P	MEMS Heater, P

Note: *This connector is dedicated to the microphone. Do not connect standard USB C cables!*

Power supply (15V/2A connector)

SV 307 is intended to work with the external power supply unit SB 274 or solar panel SB 371 for permanent noise monitoring.



15V/2A connector (front view)

Table C.4.3. Pin-out of the 15V/2A connector

Pin number	Signal name	SB 274 power supply	SB 371 solar panel	external DC connection (e.g. 12V acc.)
1	DC_IN+	"+15V"	V+	V+
2	-	-	-	-
3	GND	GND	GND	GND
4	SOL_ID-	-	GND	-

Alternative power sources (not included)

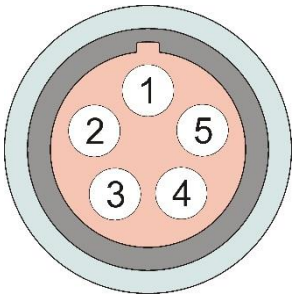
- Solar panel MPPT voltage 15.0V ÷ 20.0V, OCV < 28V

Note: *Solar panel must have enough power to supply system continuously (all seasons)! For example, to supply SV 307 continuously a minimum 130W solar panel is necessary for use in Warsaw, Poland. Please contact Svantek while planning to use solar panel power supply.*

- External DC source voltage range 10.5V – 24V, e.g. 12V or 24V accumulator

External interface (MULTI I/O connector)

MULTI I/O connector has several interfaces, such as: USB 2.0, UART (TTL level) and digital I/O pin.



MULTI I/O connector (front view)

Table C.4.4. Pin-out of the MULTI I/O connector

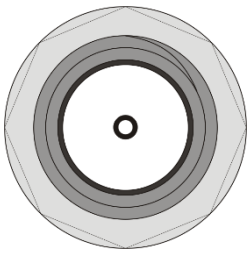
Pin number	Signal	SC 316 (USB)	SP 276 (meteo)	Alarm lamp	External trigger
1	GND	GND	GND	GND	GND
2	USB_POW	USB+5V	VCC*	-	-
3	RXB_D+	D+	RxD	-	-
4	EXT_INT	D-	TxD	-	-
5	TXB_D-	-	-	OUT	EXT_INT-

*) Power supply delivered from the SV 307 to a device 3.8V, 300mA max

Note: *While connecting your SV 307 with the PC or other device by the SC 316 cable, first insert the lemo plug into the instrument's EXT.I/O socket and then the USB plug into the PC or other device!*

GSM/UMTS/LTE antenna connector

The recommended LTE antenna for 4G modem LE910C1-xx: frequency range 617-3800 MHZ or according to the frequency bands supported by particular model (contact Svantek for details), gain 3.0 dBi max, impedance 50Ω, recommended VSWR ≤ 2:1, omni-directional. SV 307 is equipped with Pulse W1696-M monopole stick antenna of Pulse Finland Oy.



GSM/UMTS/LTE antenna connector – SMA (front view)

Real Time Clock

Built-in real time clock. Accuracy better than 1 minute/month.

Environmental parameters

- Working temperature range -20°C ÷ +50°C
- Storing temperature range -20°C ÷ +60°C
- Humidity 99% RH in 40°C (uncondensed vapour)
- Protection Code IP 65

Weight, dimensions

Weight with the battery	Approx. 1.8 kg (3.96 lbs.)
Dimensions	680 mm length; 80 mm diameter (26.8 in; 3.15 in), excluding windscreen (windscreen diameter 130 mm)

GSM modem

The LE910C1-EU is a 4G European module that features Long-Term Evolution LTE connectivity, high-speed HSUPA/HSDPA connectivity while still leveraging backwards compatibility with GSM/GPRS and EDGE networks.

Some of the module features are:
• GSM bands: B3, B8 (1800/900 MHz)
• UMTS/HSPA bands: B1, B3, B8 (2100/1800/900 MHz)

• LTE FDD bands: B1, B3, B7, B8, B20, B28A (2100/1800/2600/900/800/700 MHz)

• Output power:
2G:
- Class 4 (2W, 33dBm) @ LB, GSM
- Class 1 (1W, 30dBm) @ HB, GSM
- Class E2 (0.5W, 27dBm) @ LB, EDGE
- Class E2 (0.4W, 26dBm) @ HB, EDGE
3G:
- Class 3 (0.25W, 24dBm), WCDMA
4G:
- Class 3 (0.2W, 23dBm), LTE-FDD

• Sensitivity:
- 106 dBm @ 2G
- 111 dBm @ 3G
- 101 dBm @ 4G FDD (BW=5MHz)

Approvals of the module:
• RED (CE)

• RoHS

Note: *2G GPRS/EDGE network support of LE910C1-EU modem embedded in the SV 307 monitoring terminal is blocked.*

GPS

The instrument has a built-in GPS module A2235-H produced by Maestro Wireless Solutions Ltd. intended for logging position and time definition.

GPS is an antenna module with SiRF Star IV ROM based chip and an on-board integrated antenna.

- Position Accuracy (horizontal): < 2.5 m CEP (autonomous),
- Tracking Sensitivity: -163dBm
- Time accuracy: <1μs (directly depends on position deviation)

Compliance with EU Directives (see Chapter C.5)

CE mark indicates compliance with:

- RED Directive 2014/53/EU

Note: *EMC compatibility is guaranteed only with the original accessories supplied by SVANTEK!*

C.5 CE DECLARATION OF CONFORMITY

Manufacturer:	**SVANTEK Sp. z o. o**
Address:	Strzyglowska 81 04-872 Warszawa Poland
Kind of product:	NOISE MONITORING TERMINAL
Type:	**SV 307**
Directive:	**Directive 2014/53/EU** of The European Parliament and of The Council of 16 April 2014 on the harmonization of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC (OJ L 153/62 of 22.5.2014).
Standards:	
Art 3.1a: Safety	EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements
Art 3.1b: EMC	ETSI EN 301 489-1 V2.2.3. Electromagnetic compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU. Draft ETSI EN 301 489-52 V1.1.0. Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 52: Specific conditions for Cellular Communication Mobile and portable (UE) radio and ancillary equipment; Harmonised standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU. EN 55032:2015. Electromagnetic compatibility of multimedia equipment -Emission Requirements. EN 61000-4-2:2009. Electromagnetic compatibility (EMC). Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test. EN 61000-4-8:2010. Electromagnetic compatibility (EMC). Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test.

EN 61000-4-11:2004+A1:2017. Electromagnetic compatibility (EMC). Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests.

EN 61000-4-20:2010. Electromagnetic compatibility (EMC). Part 4-20: Testing and measurement techniques – Emission and immunity testing in traverse electromagnetic (TEM) waveguides.

Art 3.2: Radio

ETSI EN 301 908-1 V13.1.1. IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 1: Introduction and common requirements.

ETSI EN 301 908-2 V11.1.2. IMT cellular networks; Harmonised standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 2: CDMA Direct Spread (UTRA FDD) User Equipment (EU).

Directive: **Restriction of Hazardous Substances** (ROHS II) 2011/65/EU

Standards: EN 50581:2012 *Assessment of electronic products with respect to RoHS*

Auxiliary industry standards:

IEC 61672-1:2013.Electroacoustics - Sound level meters – Part 1:Specifications.

IEC 61260-1:2014. Octave-band filters

APPENDIX D. DEFINITIONS AND FORMULAE OF MEASURING VALUES

D.1 BASIC TERMS AND DEFINITIONS

T — Current time period of the measurement in seconds.

T_1 — Last second of the measurement.

T_e — Exposure time in seconds (time period during which a person is exposed to the action of noise). This parameter is set in the **Exposure Time** screen of the **Measurement** menu. The available values are from 1 minute to 12 hours.

T_{8h} — Time period equal to 8 hours (28 800 seconds).

τ — Exponential time constant in seconds for the given time-weighting: **Slow** (1000 ms), **Fast** (125 ms), **Impulse** (35 ms, but on falling values a longer time constant of 1500 ms is applied).

W — Frequency-weighting filter: **A**, **C, B** or **Z**.

$p_W(t)$ — Instantaneous frequency-weighted sound pressure with the weighting filter **W**. Sound pressure is expressed in pascals (Pa).

$p_{W\tau}(t)$ — Instantaneous frequency and time-weighted sound pressure with the weighting filter **W** and time constant τ

$$p_{W\tau}(t) = \sqrt{\frac{1}{\tau}\int_{-\infty}^{t} p_W^2(\xi)\ e^{-(t-\xi)/\tau}\, d\xi}$$

where: ξ – integration variable.

$r(t)$ — Instantaneous sound pressure depended on the **RMS Integration** parameter:

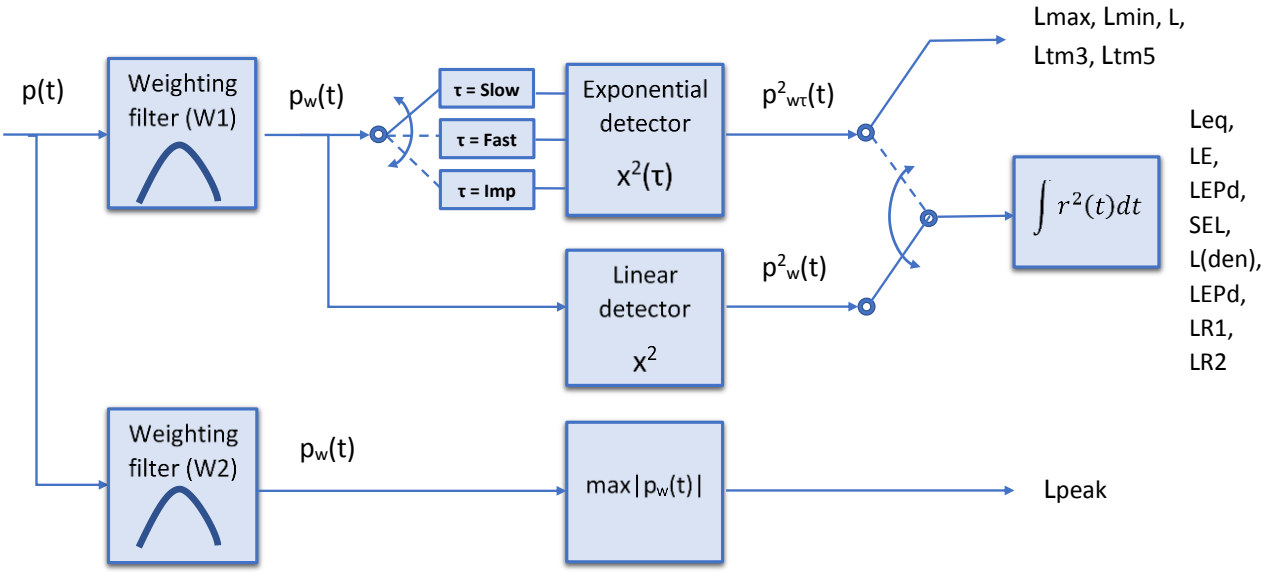
$$r(t) = \begin{cases} p_W(t) & Lin\ RMS\ Integration \\ p_{W\tau}(t) & Exp\ RMS\ Integration \end{cases}$$

p_0 — Reference value (20 μPa).

$log(x)$ — Logarithm of x to the base 10.

D.2 DEFINITIONS AND FORMULAE OF SLM RESULTS

The instrument calculates the sound measurement results for three profiles. The calculation flow diagram for one profile is presented below:



OVL Percentage of the overloaded input signal, which occurred within a stated time interval **T**

L(A/C/Z)peak Peak sound level of the frequency weighted signal (**LApeak**, **LCpeak** and **LZpeak**) within a stated time interval **T**. Expressed in dB.

$$Peak = 10\ log\ \left(max_T \frac{p_W^2(t)}{p_0^2}\right)$$

L(A/C/Z)(S/F/I)max The highest sound level of the frequency- and time-weighted signal (**LAFmax**, **LASmax**, **LCFmax**, **LCSmax** etc.) within a stated time interval **T**. Expressed in dB.

$$Max = 10\ log\ \left(max_T \frac{p_{W\tau}^2(t)}{p_0^2}\right)$$

L(A/C/Z)(S/F/I)min The lowest sound level of the frequency- and time-weighted signal (**LAFmin**, **LASmin**, **LCFmin**, **LCSmin** etc.) within a stated time interval **T**. Expressed in dB.

$$Min = 10\ log\ \left(min_T \frac{p_{W\tau}^2(t)}{p_0^2}\right)$$

L(A/C/Z)(S/F/I) Instantaneous time and frequency weighted sound level (**LAF**, **LAS**, **LCF**, **LCS** etc.) Expressed in dB.

$$L = 10\ log\ \left(\frac{p^2_{W\tau}(t)}{p_0^2}\right)$$

L(A/C/Z)eq Equivalent continuous sound level of the frequency weighted signal (**LAeq**, **LCeq** and **LZeq**.) averaged for the time **T**. In principle time weighting is not involved in a determination of time averaged sound level. Expressed in dB.

$$Leq = 10\ log\ \left(\frac{1}{T}\int_0^T (\ r(t)/p_0)\ ^2 dt\right)$$

L(A/C/Z)E Sound Exposure Level (**SEL**) frequency weighted (**LAE**, **LCE** and **LZE**). **SEL** is essentially the subset of the **Leq** result. Its value is equal to the **Leq** result referred to the integration time equal to one second (so, for the Integration time equal to 1 s, **SEL** is always equal to **Leq**). Expressed in dB.

$$SEL = 10\,log\ \left(\int_0^T (\ r(t)/p_0)\ ^2 dt\right)$$
$$= Leq + 10\,log\frac{T}{1s}$$

L(den) Only one result from: **Lday**, **Leve**, **Lnight**, **Lde**, **Len**, **Lnd**, and **Lden** is available in the instrument. It depends on the day and night time in which the measurement was performed. Day and night time depend on the **<Day Time Limits>** option (**6h-18h** or **7h-19h**).

If **<6h-18h>** option is selected for the <**Day Time Limits>** in the instrument then:

T_d (day-time) starts from 6 am and ends at 6 pm,

T_e (evening-time) starts from 6 pm and ends at 10 pm,

T_n (night-time) starts at 10 pm and ends at 6 am.

If **<7h-19h>** option is selected for the <**Day Time Limits>** in the instrument then:

T_d (day-time) starts from 7 am and ends at 7 pm,

T_e (evening-time) starts from 7 pm and ends at 11 pm,

T_n (night-time) starts at 11 pm and ends at 7 am.

Lday **Lday** is calculated for: **$T_d \neq 0$**, **$T_e = 0$**, **$T_n = 0$**.

$$Ld = 10\ log\ \left(\frac{1}{T_d}\int_{T_d}(r_W(t)/p_0)\ ^2 dt\right)$$

Leve **Leve** is calculated for: **$T_d = 0$**, **$T_e \neq 0$**, **$T_n = 0$**.

$$Le = 5\ dB + 10\,log\ \left(\frac{1}{T_e}\int_{T_e}(r_W(t)/p_0)\ ^2 dt\right)$$

Lnight **Lnight** is calculated for: **$T_d = 0$**, **$T_e = 0$**, **$T_n \neq 0$**.

$$Ln = 10\ dB + 10\,log\ \left(\frac{1}{T_n}\int_{T_n}(r_W(t)/p_0)\ ^2 dt\right)$$

Lde — **Lde** is calculated for: $T_d \neq 0$, $T_e \neq 0$, $T_n = 0$.

$$Lde = 10log\left[\frac{1}{12+4}\left(12 \cdot 10^{Ld/10} + 4 \cdot 10^{Le/10}\right)\right]$$

Len — **Len** is calculated for: $T_d = 0$, $T_e \neq 0$, $T_n \neq 0$.

$$Len = 10log\left[\frac{1}{4+8}\left(4 \cdot 10^{Le/10} + 8 \cdot 10^{Ln/10}\right)\right]$$

Lnd — **Lnd** is calculated for: $T_d \neq 0$, $T_e = 0$, $T_n \neq 0$.

$$Lnd = 10log\left[\frac{1}{12+8}\left(12 \cdot 10^{Ld/10} + 8 \cdot 10^{Ln/10}\right)\right]$$

Lden — **Lden** is calculated for: $T_d \neq 0$, $T_e \neq 0$, $T_n \neq 0$.

$$Lden = 10log\left[\frac{1}{12+4+8}\left(12 \cdot 10^{Ld/10} + 4 \cdot 10^{Le/10} + 8 \cdot 10^{Ln/10}\right)\right]$$

LEPd — Daily Personal Noise Exposure is the noise exposure level for a nominal 8-hour working day. The **LEPd** result is calculated on the base of the **LEQ**

$$LEPd = Leq + 10\ log\frac{T_e}{T_{8h}}$$

Ltm3 and **LTeq** — The **Ltm3** and **LTeq** results (Takt-Maximal Levels) are calculated according to the German standard TA Lärm.

Ln — Statistical level is the certain boundary level surpassed by the temporary noise level values in not more than **n%** of the observation period. Calculated on the basis of 100ms RMS results.

Example: Let us assume that **L35** is equal to 76.8 dB. It means that during the measurements the noise level 76.8 dB was exceeded in not more than 35% of the observation period.

EX — Expected value. Calculated on the basis of 100ms RMS results.

SD — Standard deviation. Calculated on the basis of 100ms RMS results.

NR — Noise Rating, measured noise level that takes into account the frequency content of the noise.

NR is calculated if 1/1 Octave function is active.

To calculate the NR value, the noise level in each 1/1 octave band (from 31.5Hz to 8kHz) is compared to the “NR curves” for each corresponding band. The NR curve number which applies to each frequency band is the highest numerical value that is not exceeded in that band. The overall NR value is the highest of the individual NR values for the frequency bands.

NC

Noise Criterion, measured noise level that takes into account the frequency content of the noise.

NC is calculated if 1/1 Octave function is active.

To calculate the NC value, the noise level in each 1/1 octave band (from 63Hz to 8kHz) is compared to the "NC curves" for each corresponding band. The NC curve number which applies to each frequency band is the lowest numerical value that is not exceeded by each individual frequency band. The overall NC value is the highest of the individual NC values for the frequency bands.

D.3 DEFINITIONS AND FORMULAE OF ADDITIONAL LEQ RESULTS

LR

Rolling Leq measured in the time window for the last **Tw** seconds of the measurement. LR window is moving with 1 second step.

$$LR(Tw) = 10\,log\,\left(\frac{1}{Tw}\int_{T-Tw}^{T}(\,r(t)/p_0)^{\,2}dt\right)$$

Note: *If the current period of the measurement **T** is less than **Tw** the **LR** result is undefined.*

LeqPR

Projected Leq result is calculated based on the Leq,T measured for the T period from starting hour of the period of projection T_0.

The LeqPR calculation function assumes that from the moment the Leq limit is exceeded to the end of the period of projection, the same noise level will be maintained.

$$LeqPR = Leq,T + 10\;\;log\frac{T}{T_0}$$

LeqPR+LN

The LeqPR+LN calculation function assumes that from the moment the Leq limit is exceeded to the end of the period of projection, the estimated background noise level (LN) will be maintained.

$$LeqPR + NR = Leq,t + Leq,s + Leq,LN(T_0 - t - s)$$

where s-time for the reaction, t - time from the beginning of the measurement to s, T_0 - period of projection.

D.4 STATISTICAL LEVELS – LN DEFINITION

The noise level **L(t)** is the continuous random variable. The probability that the temporary noise level **L(t)** belongs to the interval $\langle L_k,\ L_k + \Delta L\rangle$ is called the class density and it can be expressed by the equation:

$$P_k[L_k \le L(t) \le L_k + \Delta L] = \sum_{i=1}^{n}\Delta t_i/P$$

where: Δt_i - time intervals, in which the noise level $L(t) \in \langle L_k,\ L_k + \Delta L\rangle$ occurs,

ΔL - so-called class interval or distribution class of the series,

P - total observation period.

In case when the class interval approaches infinity, the probability of **L(t)** tends to the probability of L_k. In practice, ΔL value is strictly determined, and it depends mainly on the dynamics of the measurements performed in the instrument. There are 120 classes in the instrument and the width of each class is equal to 1 dB. The histogram is the set of the class density values calculated for all classes.

The statistical distribution function, which determines the probability (expressed in %) of the noise occurrence on the level equal or less than $L_k + \Delta L$ is given by the formulae:

$$P\left[L(t) \leq L_j\right] = \sum_{k=1}^{j} P_k(L)$$

The cumulative density function expressed by the equation:

$$P\left[L(t) > L_j\right] = 1 \ - P\left[L(t) \leq L_j\right]$$

is directly used to determine so-called statistical levels **Ln** or position parameters of the distribution.

The **Ln** is the certain boundary level surpassed by the temporary noise level values in not more than **nn** of the observation period.

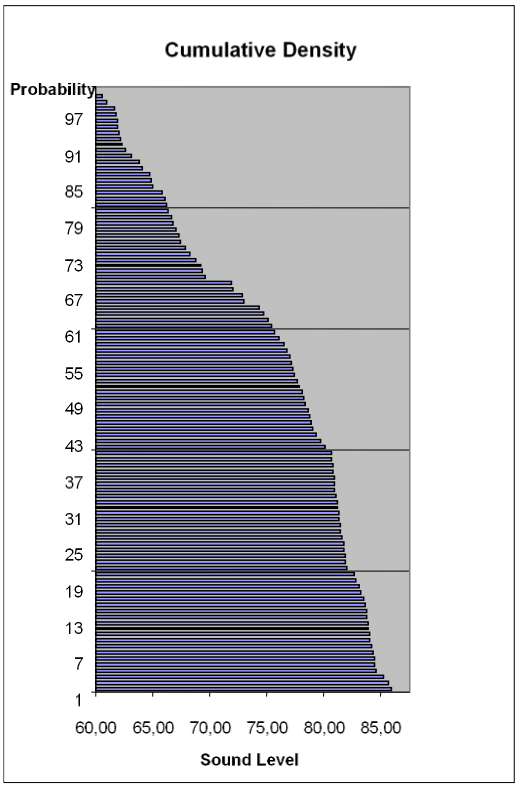
Example:

Let us assume that **L35** is equal to 76.8 dB. It means that during the measurements the noise level 76.8 dB was exceeded in not more than 35% of the observation period.

The cumulative density function for the exemplary data is presented in Figure on the right side. In order to determine the **Ln** level one has to draw the horizontal cursor and find out the crossing point between the cumulative density function and the cursor. In the instrument the user can determine 10 statistical levels - from **L01** to **L99** (1% step of observation period).

The display in the instrument presents only first statistical level N1 (set to: L01 up to L99).

The statistical level **Ln** value, the profile's number the statistics are taken from, the RMS detector (**Lin.**, or **Exp.**: **Fast**, **Slow** or **Imp**.), the filter's name (**A**, **C** or **Z**) and real time are displayed in the top-right side of the display in one-result view mode.



Exemplary cumulative density