SVANTEK

USER MANUAL

SV 307

NOISE

MONITORING TERMINAL

Warsaw, 2019-04-04

Rev.1.10

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 1.15.1 (see the* ***Unit Label*** *review 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.*

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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 61260:2014 and save results with the time history data. Additionally, it can record the audio signal as standard WAVE files for noise source recognition.

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 PC (with the provided SvanPC++ software) over the USB interface.

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's instruments (for example calculation of tonality).

1.1 SV 307 AS SOUND LEVEL METER & ANALYSER

- measured results: **OVL**, **Lpeak**, **Lmax**, **Lmin**, **L**, **Leq**, **LE**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **Lnn**, with Class 1 IEC 61672-1:2013 accuracy in the frequency range 20 Hz ÷ 20 kHz with **MEMS** microphone
- 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 ÷ 126 dB PEAK**
- **1/1 Octave** real-time analysis meeting Type 1 requirements of IEC 61260-1:2014 (option) 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 meeting Type 1 requirements of IEC 61260-1:2014 (option) 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** (option)

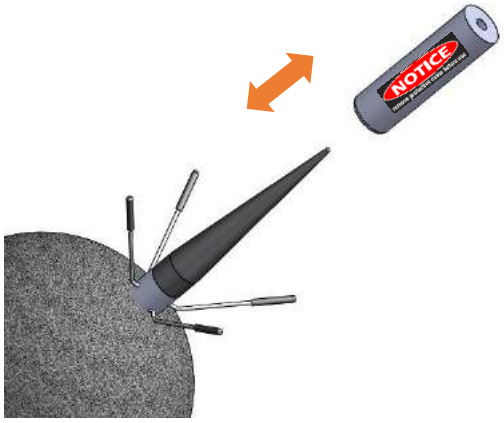
1.2 GENERAL FEATURES OF SV 307

- Noise measurements meeting Class 1 IEC 61672-1:2013 accuracy
- 1/1 & 1/3 octave real-time frequency analysis (option)
- Audio wave recording (option)
- SvanNET support for 3G connection
- Statistical analysis with up to 10 percentile values
- Time-history with two logging step intervals
- Automated system checking
- Integration measurement run time programmable up to 24 h
- Setup editor available with SvanPC++ software
- Super contrast colour OLED display
- Wide range of temperature operating conditions
- Protection rating IP 65 for use in the field
- Easy and friendly user interface for quick start and stop

1.3 ACCESSORIES INCLUDED

- **Microphone** 3 x MEMS microphones
- **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 - Kingston MicroSD HC Class 4
- **CD** with the user manual

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 ~ 305VAC)
- Rated power 40W
- Built-in active PFC function
- Class 2 power unit
- Protections: Short circuit / Over load / Over voltage / Over temperature
- Fully encapsulated with IP67 waterproof level
- Lemo connector for SV 307 15V/2A connector
- SC 270 mains cable

Note: *See also SB 274 User Manual*.

1.4 ACCESSORIES AVAILABLE

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

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.

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

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

1.4.2 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.

1.4.3 SA 206 – telescopic mast

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

1.4.4 SP 276 - weather station

SP 276 is a GIL GMX600 type weather station used optionally with SV 307. It is connected to SV 307 via serial RS 232C interface.

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 monitoring station every second.

SV 307 may save them in the logger file as a Summary Results with the **Integration Period** step (see Chapter 10.8.4) and as a time-history results with the **Logger Step** (see Chapters 10.8.4.2).

Note: *If your GIL 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.*

1.4.5 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: *It is necessary to charge the battery pack after discharge, otherwise the battery may lose its capacity*.

Note: *It is recommended to charge the battery at least every 6 months in the case it was not being used*.

1.5 OPTIONAL FUNCTIONS

- **SF 307_3** 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 - 1/3 octave real-time analysis

The option for 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

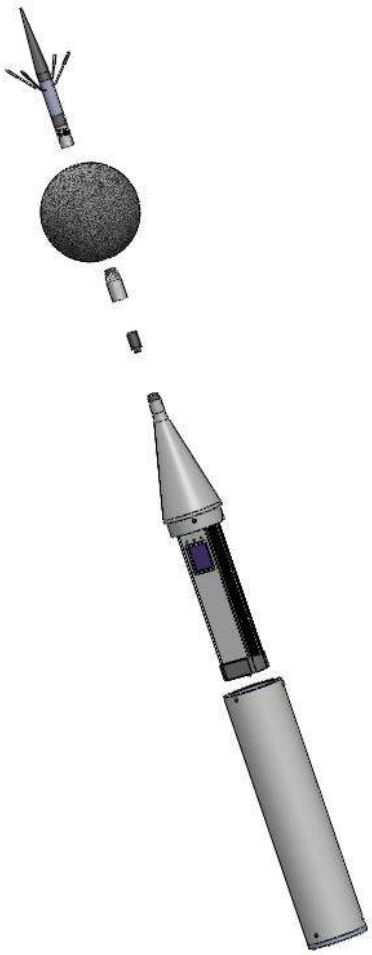
SvanPC++ Environmental Measurements module is designed for post-processing of data recorded by monitoring stations. The module offers a powerful calculator and an automated noise event finder for noise source identification. Thanks to its “Projects” functionality, SvanPC++_EM allows to combine and compare 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.

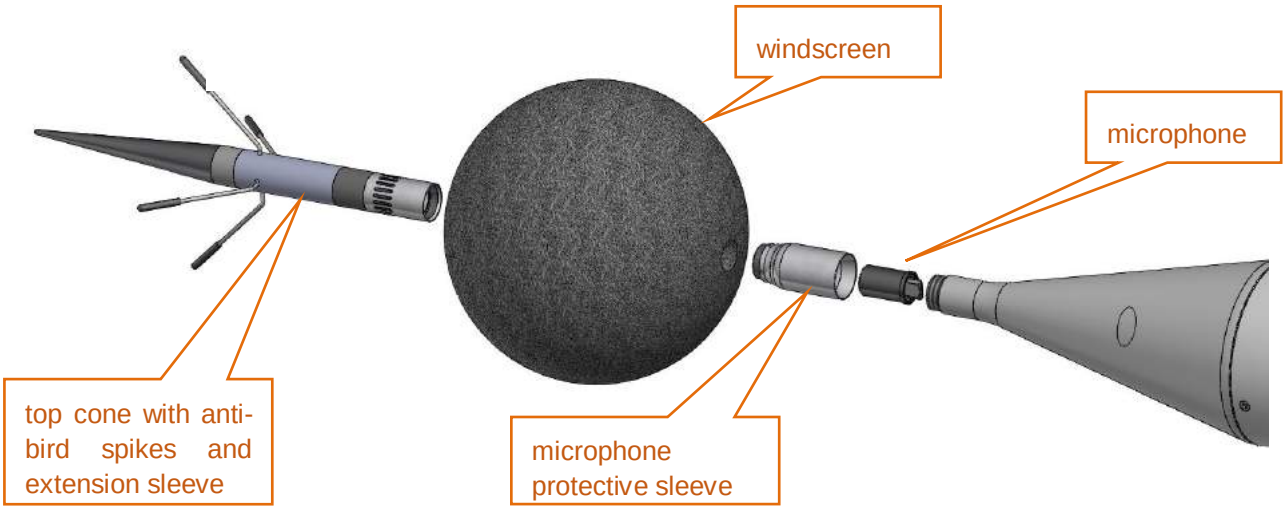
2 ASSEMBLING AND INSTALLING THE INSTRUMENT

2.1 SV 307 DELIVERY SET

The SV 307 delivery set consists of the following elements:

1. permanently integrated elements:
   - integrated, non-removable microphone preamplifier
   - Li-Ion rechargeable battery
   - 16 GB micro SD card
   - 3G 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
   - 3G antenna
   - lower cylinder 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 mas





2.2 ASSEMBLING/DISMANTLING SV 307

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

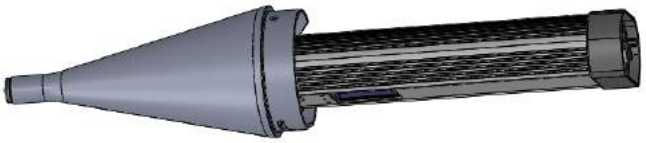
Recommended order of installation:

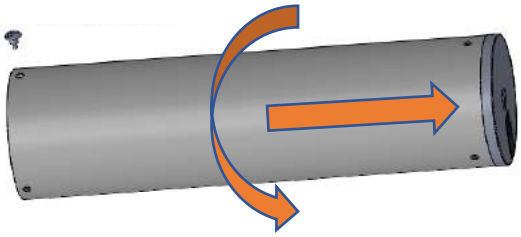
1. assembling of SV 307,
2. power supply installation,
3. mounting SV 307 on the mast,
4. arrangement of the cabling.

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

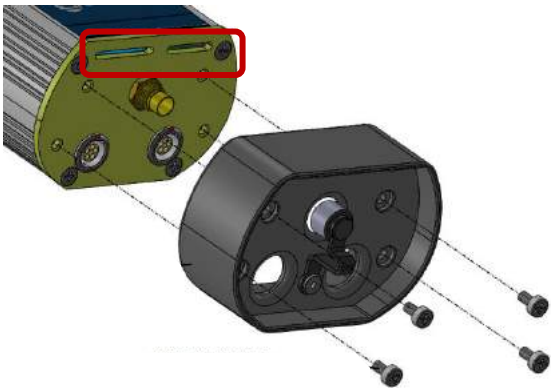
To complete the assembling, follow next steps:

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

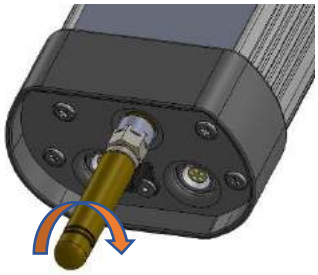




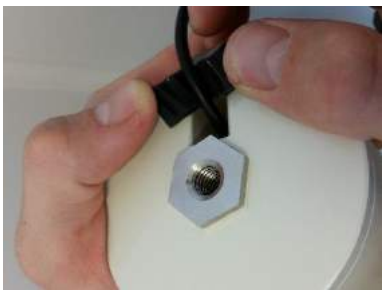
3. Unscrew four bolts and detach the bottom plastic cover of SV 307 to have access to the SIM card and micro SD card slots.
4. Insert SIM card (micro SD card is factory installed).
5. Attach the bottom cover and screw four bolts back.



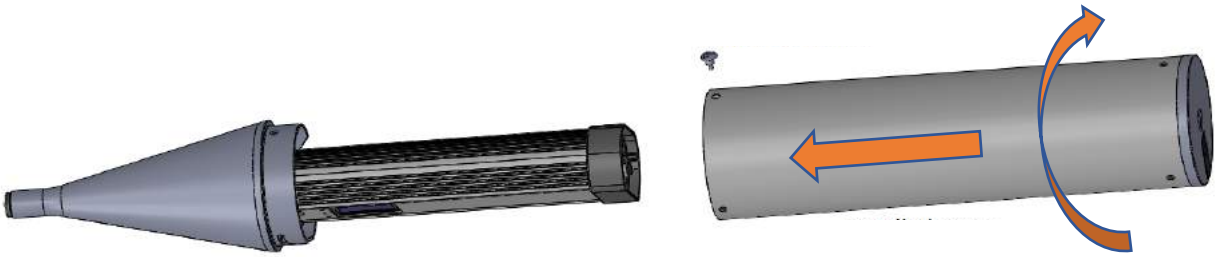
6. Connect the wireless antenna.
7. If necessary, connect the external power cable to the **15V/2A** connector and/or and the SC 316 cable to the **EXT.I/O** socket.



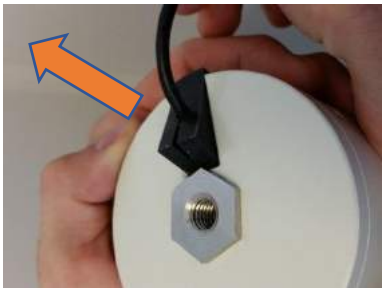
8. Release cables through the hole with the seal in the base of the lower casing.



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.

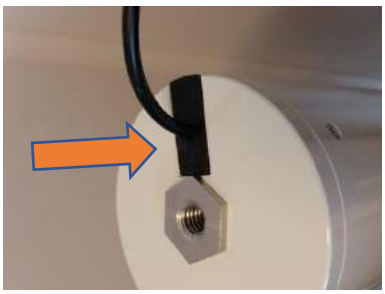


12. Pull the cable out of the lower casing.



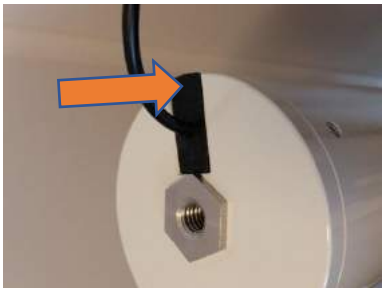
Note: *Pulling the cable out of the lower casing is an essential element of the station assembling, therefore the label with a reminder inscription is glued on the base.*

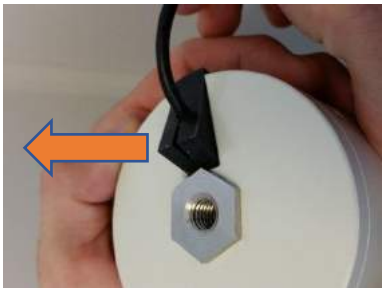
13. Insert the seal into the hole and press it.



To dismantle SV 307, follow next steps:

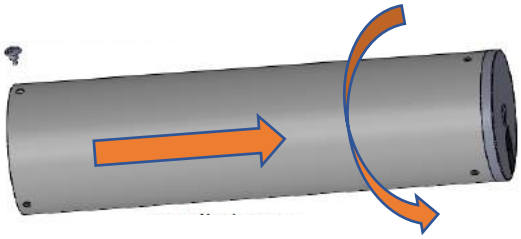
1. Press on the edge of the seal and pull it off the hole.





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.



2.3 MOUNTING SV 307 ON THE MAST

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

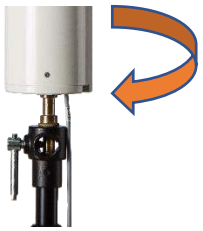
Note: *If other types of mounting than mounting on the mast is going to be applied, consult Svantek, since only recommended type of mounting assures declared acoustical characteristics of the station.*

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

Note: *The M14/3/8" adapter is intended for mounting SV 307 on photographic and light tripods. It should not be used for unattended environmental monitoring.*

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

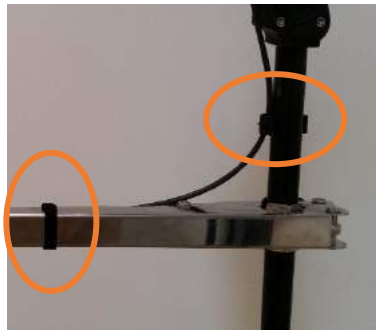
1. Screw the assembled instrument on the M14 thread of the mast rotating it clockwise.



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

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.

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.

Note: *For safety reasons do not leave the power supply unit on the ground to avoid it immerse in the rain water.*

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 cylinder 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.

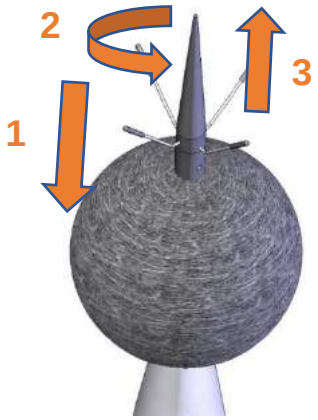
Note: *The windscreen forms declared free-field characteristics of the instrument, therefore it is important to check its condition regularly.*

Note: *If SV 307 is used continuously, it is recommended to replace SA 209 foam at least once a year.*

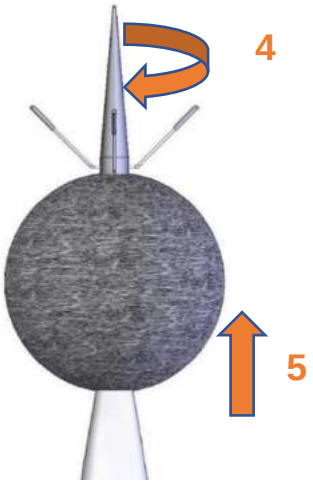
During continuous usage, the SA 209 foam is exposed to different weather conditions with possibility of causing mechanical damage to the foam's structure. Therefore, it is recommended, at least once a quarter (3 months), to check the condition of the foam by examining the surface for cracks by squeezing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

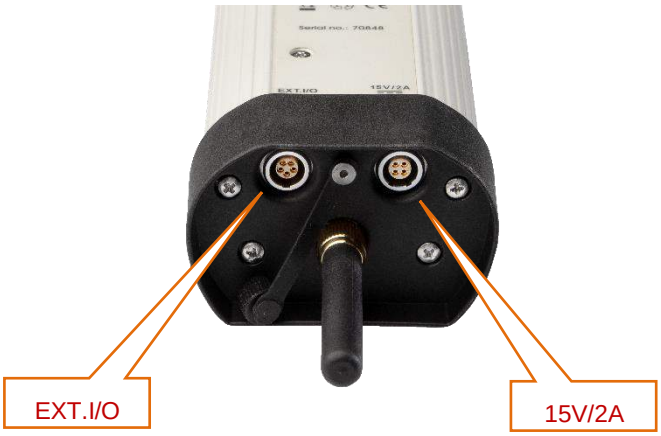
To have access to this panel you should disconnect the cylinder casing from the conical one and remove it.

The connectors panel has three sockets:

- for external power (**15V/2A**),
- for external communication (**EXT.I/O**) and
- for 3G antenna,

and two slots under the plastic cover:

- for SIM card and
- for 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: *Avoid deep battery discharge. If SV 307 is not in use for a long period of time, it should be charged every year.*

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.
- 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 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!*

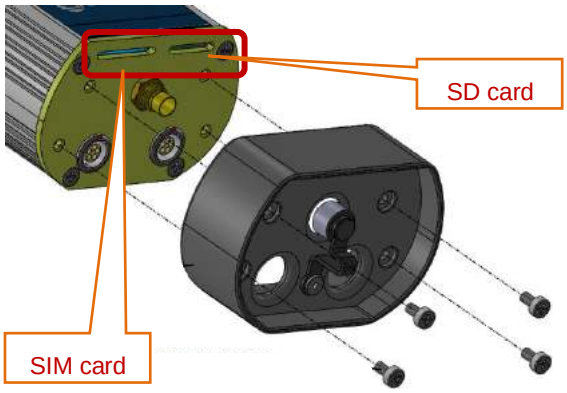
Antenna socket

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 3G connection can be found in Chapter 7 and 9.3.

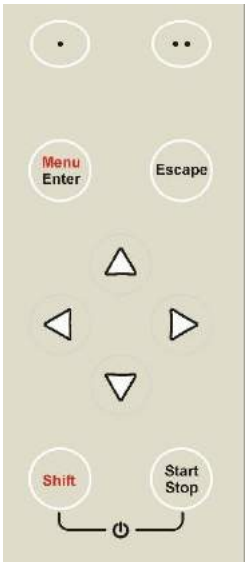
3.2 CONTROL PANEL

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 seven 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:

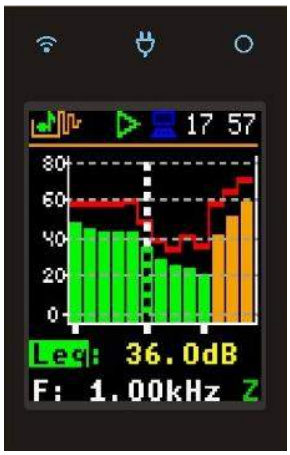
- select lines in the list;
- select the correct character from the list in the text editing mode;
- change the presentation mode of the results.

(▲ / ▼) 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 – 3G modem is off,
  - up to 4 days[1] – 3G 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

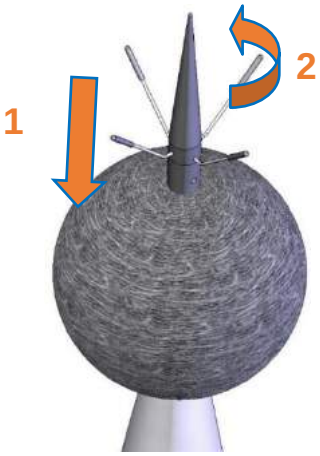
The instrument is factory calibrated with the supplied microphone for the reference environmental conditions (see Appendix C). The microphone sensitivity is a function of the temperature, ambient pressure and humidity, and when the absolute sound pressure level value is required, the absolute calibration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

If the instrument is assembled and needs calibration, 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.

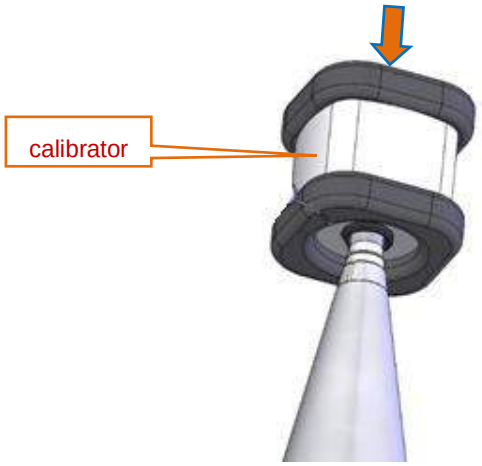


3. Disconnect the top cone with the anti-bird spikes and the extension sleeve with the windscreen foam from the microphone protective sleeve.

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 10.7.2.2 and 10.13.6.2).



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 cylinder casing) to have access to the control panel.*

7. Take the calibrator off after the calibration.

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 the calibration measurement, 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 viewing
- System checking/calibration
- Files downloading/uploading
- Instrument/measurement configuration
- Firmware upgrading.

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 cylinder 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 3G modem.

SVANTEK offers three tools which enable remote functionality: **SvanNET** web-service and **SvanPC++_RC** 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 SvanPC++ software for Windows 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 communication configuration, remote control, data retrieving, data processing and reporting.

SVANNET APP is the standard Svantek SvanPC++ 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.

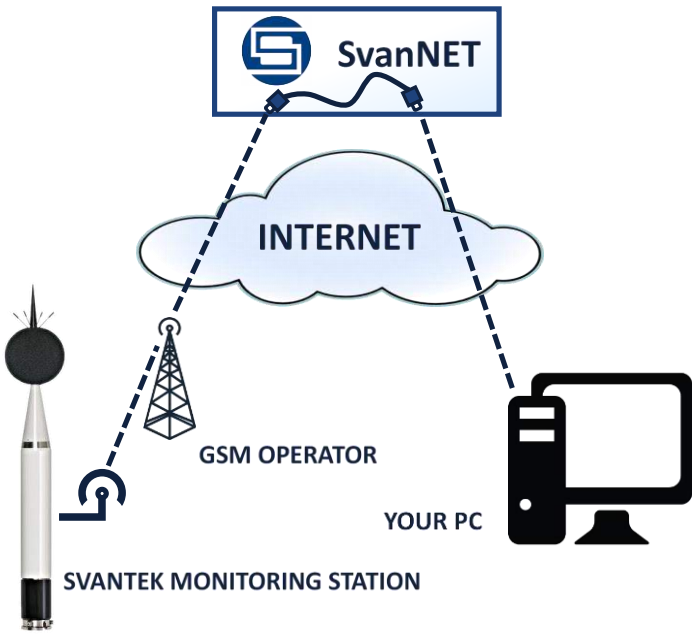
The description of the control panel user interface is presenter in Chapter 10.

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 3G 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,

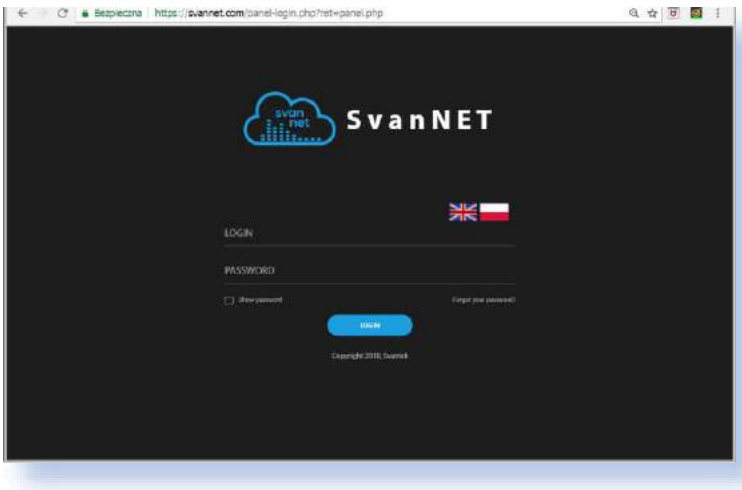


- use the SvanPC++_RC application based on MS Windows® for automatic control of monitoring stations, data archiving, automatic web publication, etc.

Note: *Establishing 3G 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 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 3G 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 3G modem enables the user a wide spectrum of interfacing capabilities using GSM based internet access.

The 3G 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.

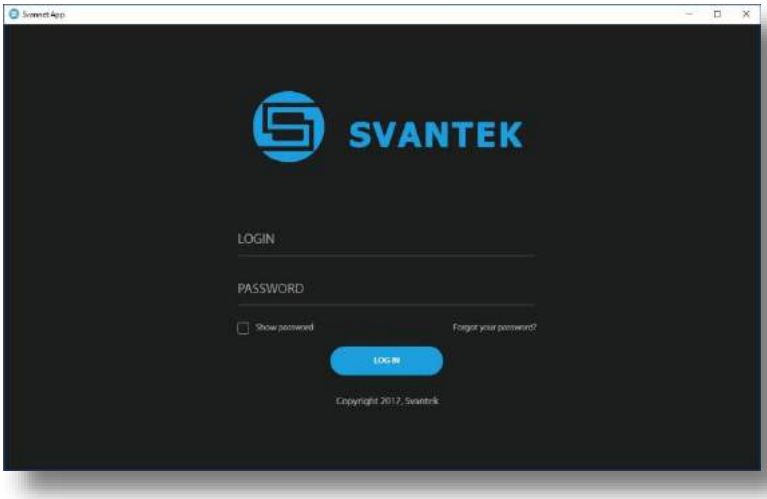
***Note: TCP Client** mode is used in the SvanNET web-service. SvanPC++_RC supports all modes of TCP/IP connection.*

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 3G 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 CONFIGURATION OF THE REMOTE CONNECTION – SVANNET APP

SVANNET APP is a tool that enables automatic configuration of the remote connection of your SV 307 with the SvanNET web-service and SvanPC++.

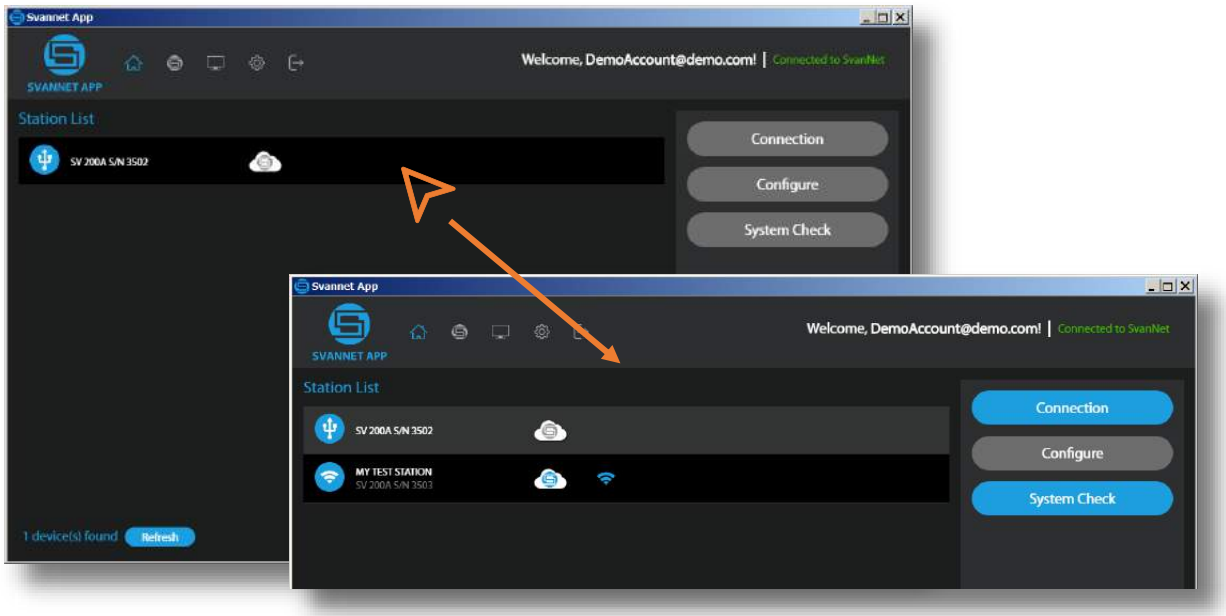
To start configuration, it is necessary to connect your SV 307 by means of the USB cable or connect to the Access Point with SSID "SV307_#xxxxx" to your PC and run the SVANNET APP program.



***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 connected Svantek instruments will appear.

Select the instrument you wish to connect by clicking on the left-hand box. 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 active status of the screen element (button, icon).

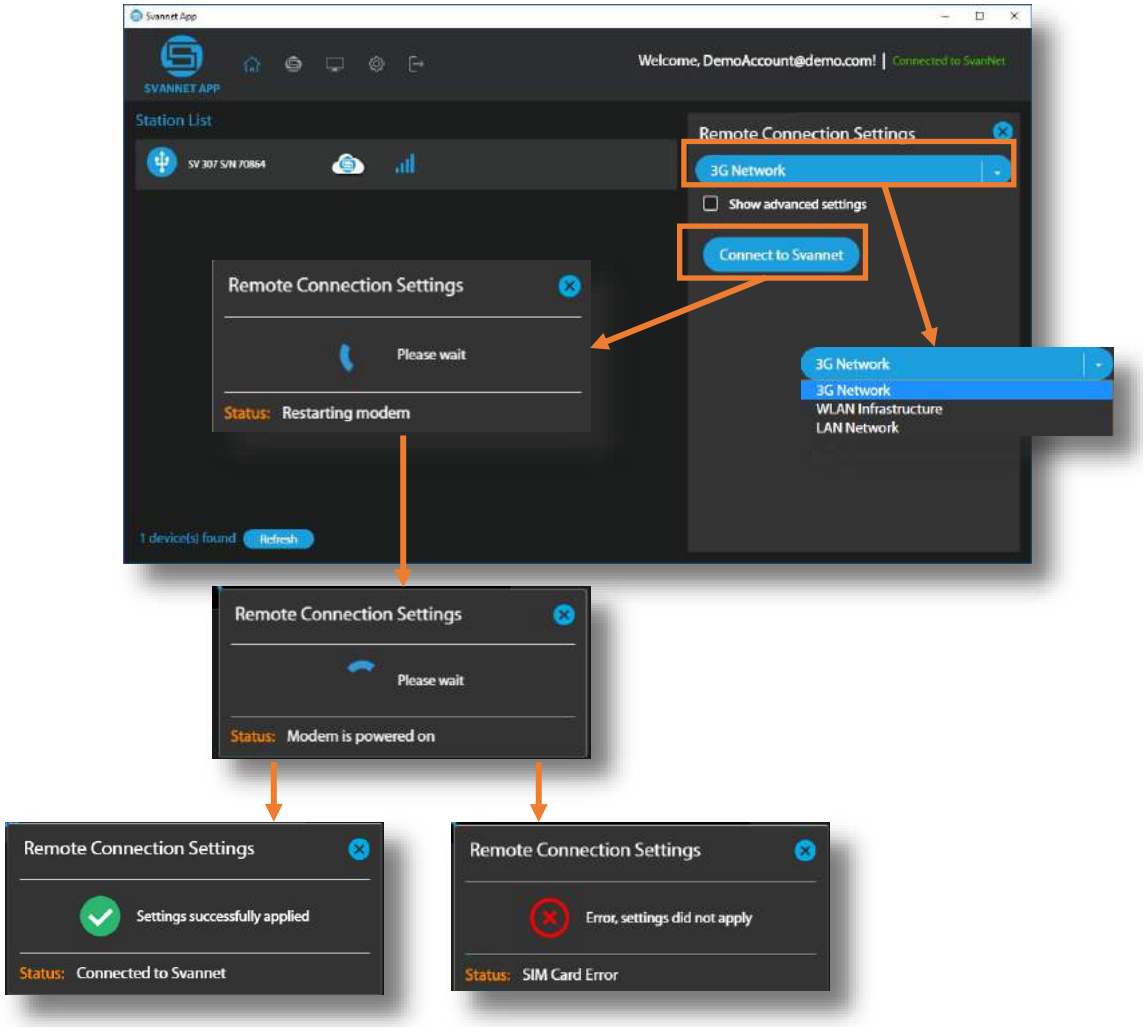


If your SV 307 is not connected to the SvanNET web-service by means of 3G the **Configure** button will not be active.

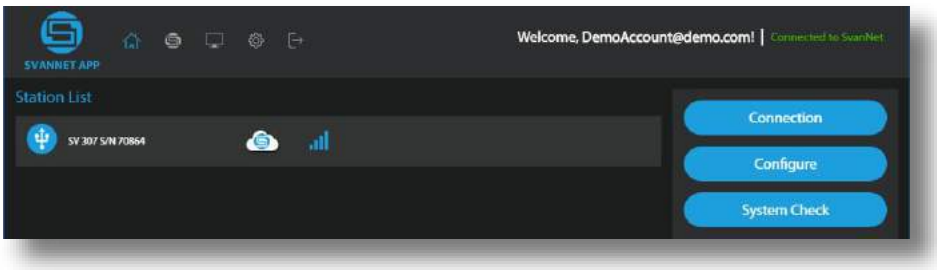
Refresh button is used for searching the stations connected to the PC by USB, WLAN or visible as Access Point. Searching lasts for 30 seconds and during searching the button is changed to **Stop**. You can stop searching at any time by clicking the **Stop** button.

7.1 CONFIGURATION OF THE SV 307 CONNECTIONS

Click the Connection button and the **Remote Connection Settings** sidebar will change its view, offering selection of the connection type - in the case of SV 307 only **3G Network** (with the use of the 3G modem), and the button that connects the station to the Internet (**Connect to Svannet** or **Connect to Other Server**).

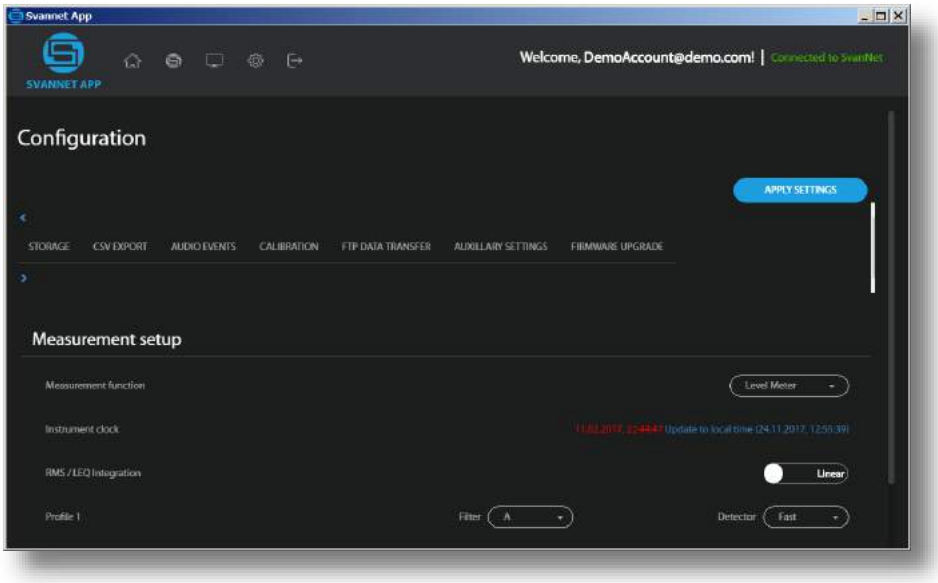


If connection is successful, the Configure button changes its colour to the blue one.



If you click the 

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

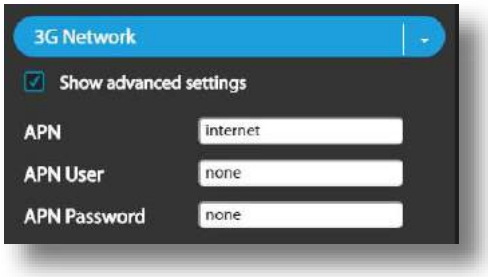


To return to SVANNET APP press the  icon or the SVANNET APP logo.

Remote Communication Settings

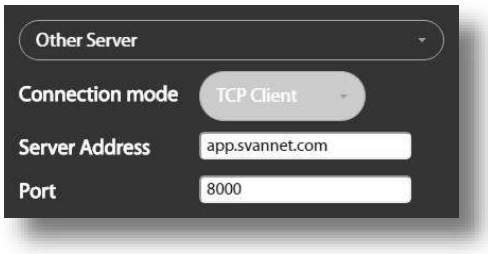
By default, the **3G Network** connection type and the connection to the SvanNet web-service configuration (**Connect to SvanNET**) is proposed. Clicking on the **Show Advanced settings** tick box additional settings appear below.

If **3G Network** connection is selected, advanced settings will consist of: **APN** name, **APN User** name and **APN Password**.



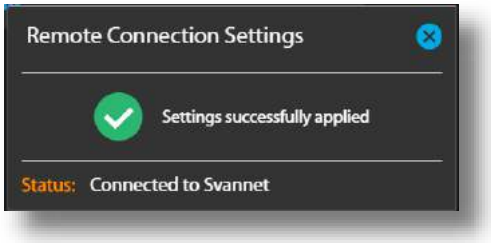
By selecting **Other Server** instead of **SvanNet**, the dropdown menu appears in which you can select: **TCP Server** or **TCP Client** (**Connection mode**), remote address for TCP/IP client connection (**Server Address**) and **Port** for this connection.

.



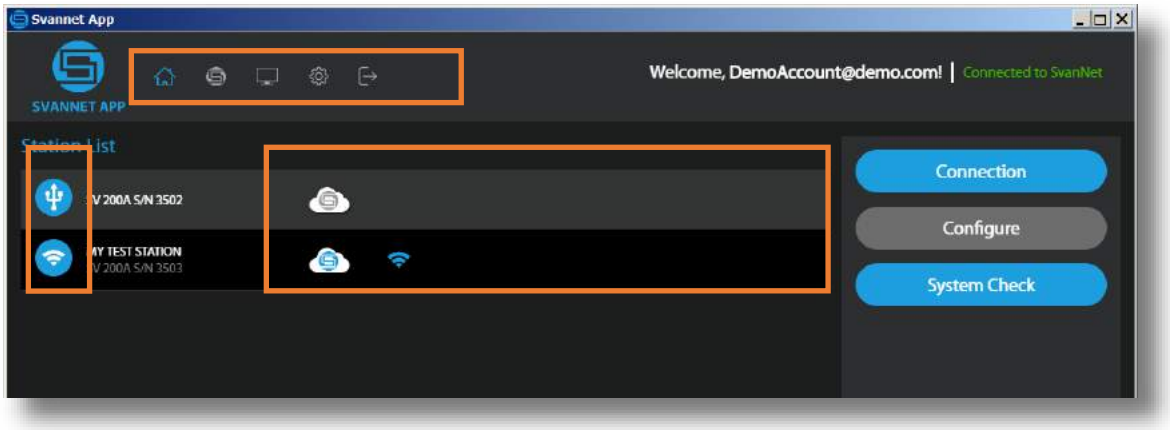
To set the selected connection press the 

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 icons-buttons, located in the upper line of the window.



 - returning to the main screen

 - opening the SvanPC++ program

 - opening the SvanNET web-service

 - 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 about state of connection with the SvanNET web-service:

- not connected,

- connected.

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

- 3G connection,

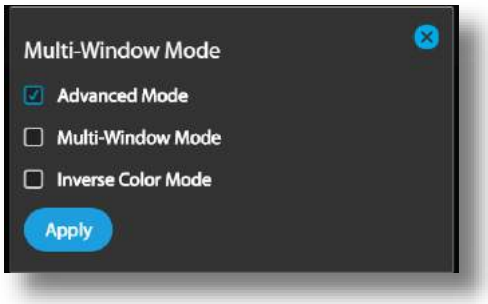
- WLAN connection,

- LAN connection.

7.3 ADVANCED MODE

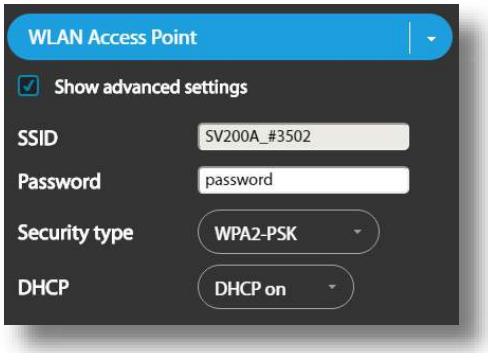
If you click the  button the pop-up window appears in which you can select the **Advanced Mode** of the application.

Advanced Mode allows additionally to three types of connection, described earlier, configure the forth one - **WLAN Access Point** connection.



If **WLAN Access Point** connection is selected, in advanced settings you will be asked to define: service set identifier (**SSID**), **Password**, **Security type** (**Open**, **WEP-64bit**, **WEP-128bit**, **WPA-PSK** or **WPA2-PSK**) and the Dynamic Host Configuration Protocol (**DHCP**).

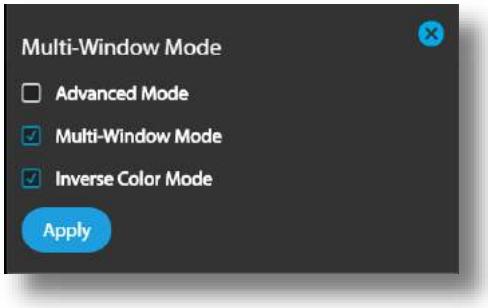
Usually **DHCP** should be **On**.



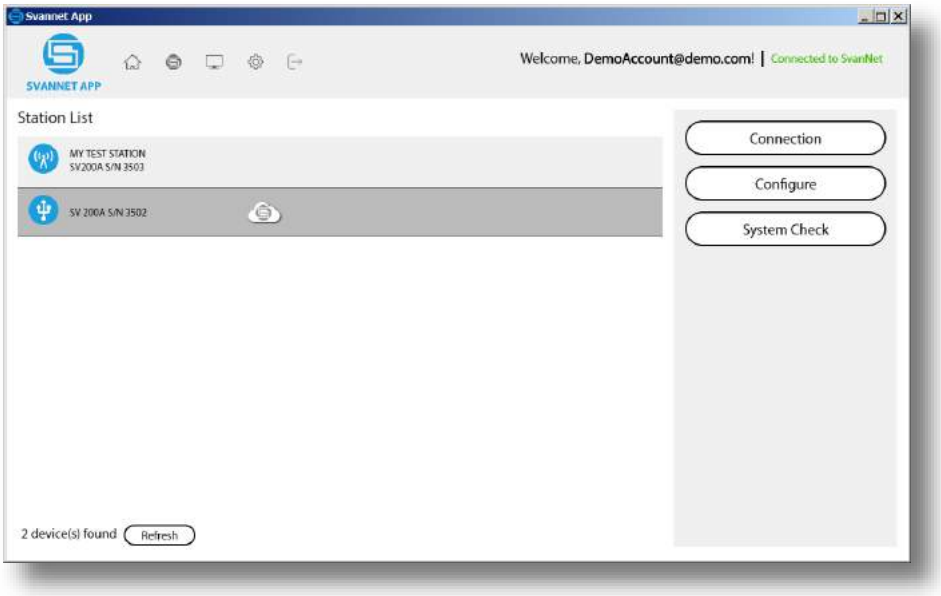
7.4 OTHER OPTIONS

Other positions in the application settings enable selecting **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 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:

Warning about emergency situations: blue - everything is OK, red – unregular event is happening.

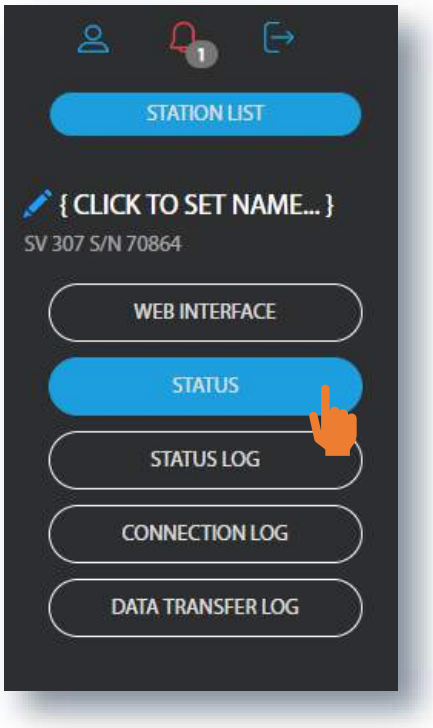
Information about the communication with the station: green - correct, in progress; yellow - the station doesn't respond to the command for a long time; red – the station is not connected to SvanNET.

Battery status. 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. When you click this icon, information about external source will be displayed.

Connection status. When you click this icon, information about connection status and signal strength will be displayed.

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



The blue **STATION LIST** button just informs you that you are in the Station view.

You can set the new station name instead of the default clicking  .

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.

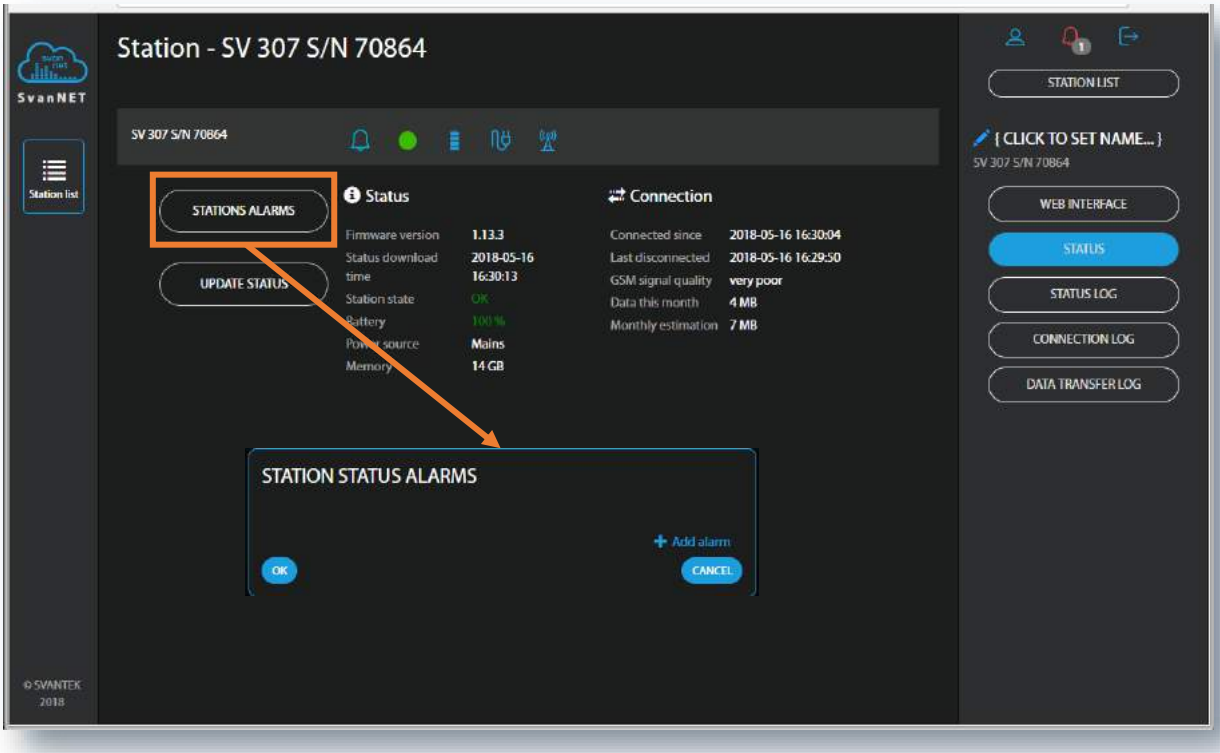
The **CONNECTION LOG** button switches you to the Connection log view (see Chapter 8.1.2) in which you can check the history of station connections.

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).

8.1.1 STATUS view

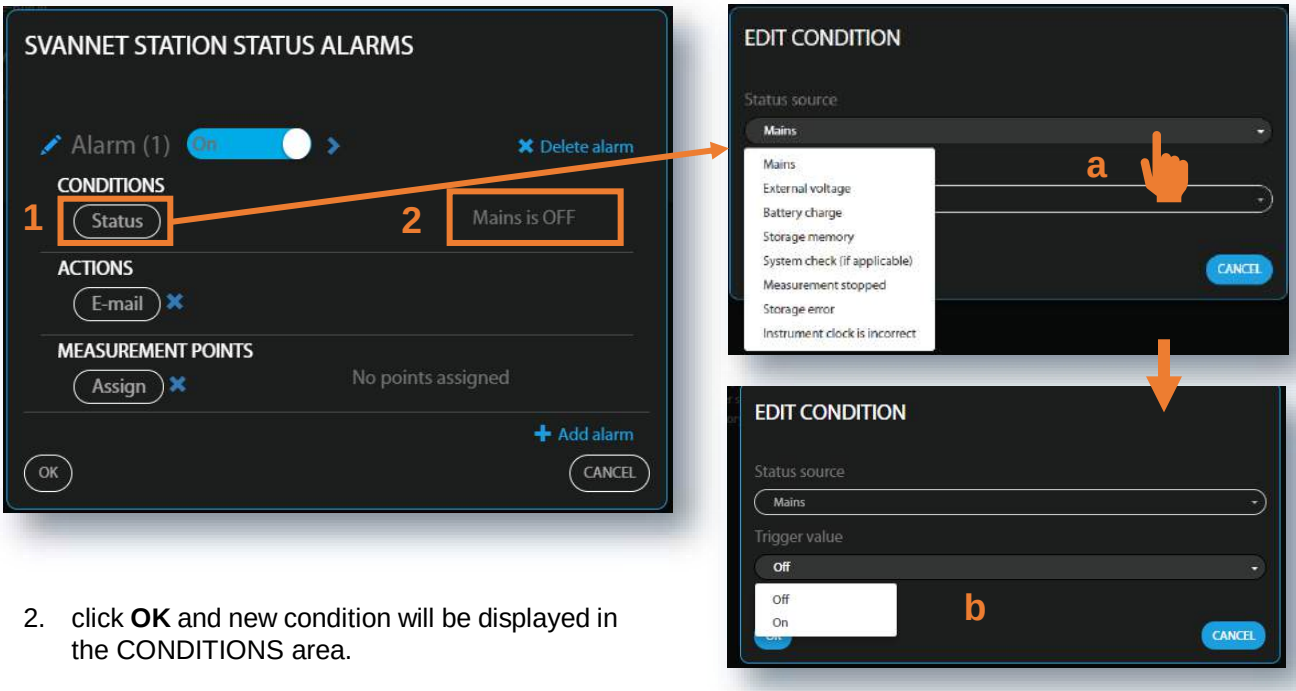
In the STATUS view you can check the station status and configure status alarms.

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



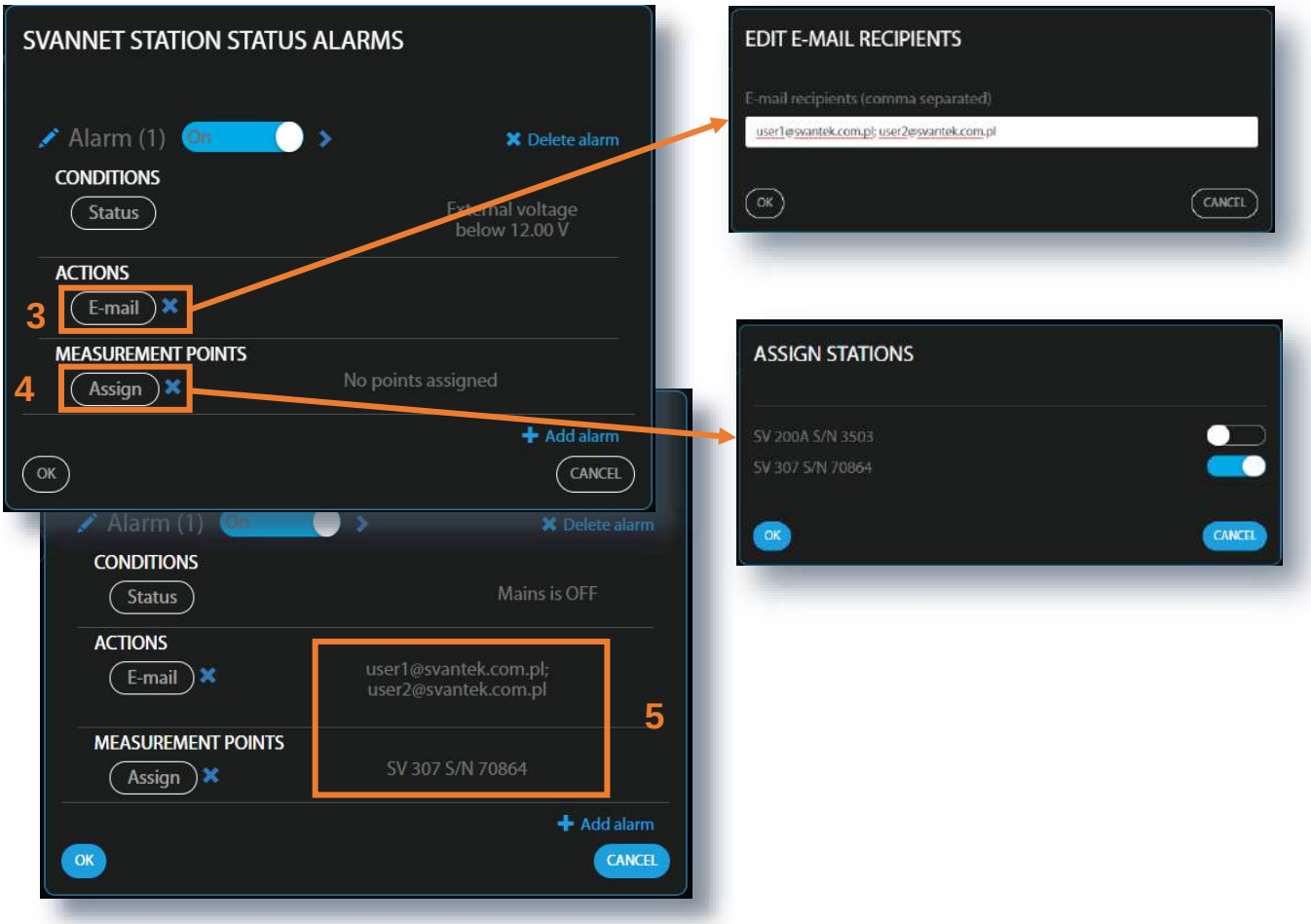
Click **+Add alarm** in the STATIONS STATUS ALARMS pop-up box and new Alarm with CONDITIONS, ACTIONS and MEASUREMENT POINTS areas will appear. Alarms are based on CONDITIONS and relate to ACTIONS, that are default e-mails to the specified recipients, and refer to MEASUREMENT POINTS. To configure Alarm:

1. click the **Status** button and in the EDIT CONDITIONS pop-up box:
   a. select **Status source**: **Mains**, **External voltage**, **Battery charge**, **Storage memory**, **System check** or other positions,
   b. click the **Trigger value** selector and choose the required threshold level for the selected **Status source**.



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

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



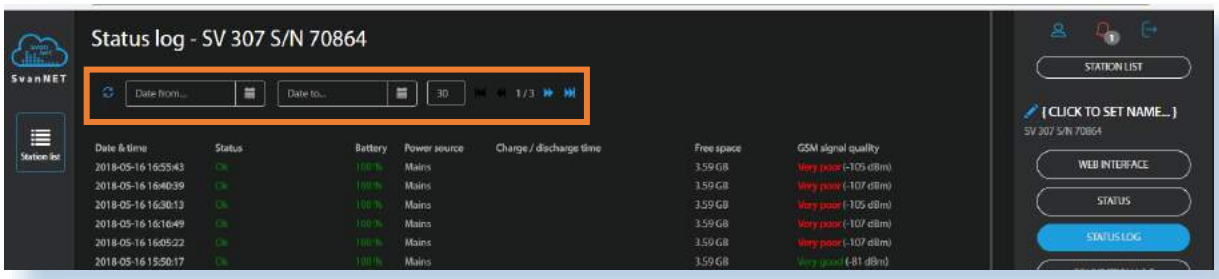
5. Made selections are displayed in the ACTIONS and MEASUREMENT POINTS areas.

8.1.2 LOG views

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

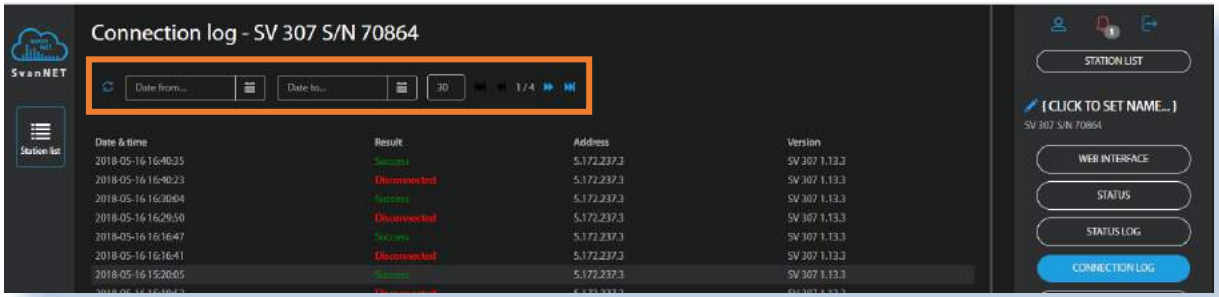
- Status log which registers power source (type and charge level), memory free space, GSM signal quality and system check history,

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



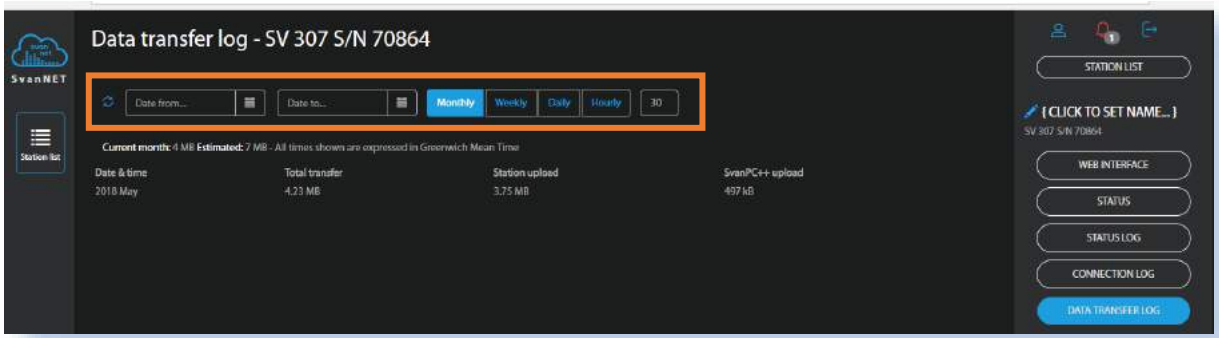
- **Data Connection log** which registers history of station connections.

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



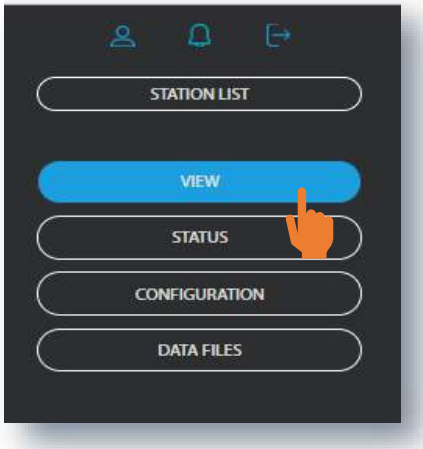
- **Data transfer log** which registers history of data transfers (uploads).

  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 task of this manual is not the presentation of all possible combinations of parameters, but an indication of the principles of working with SvanNET.*

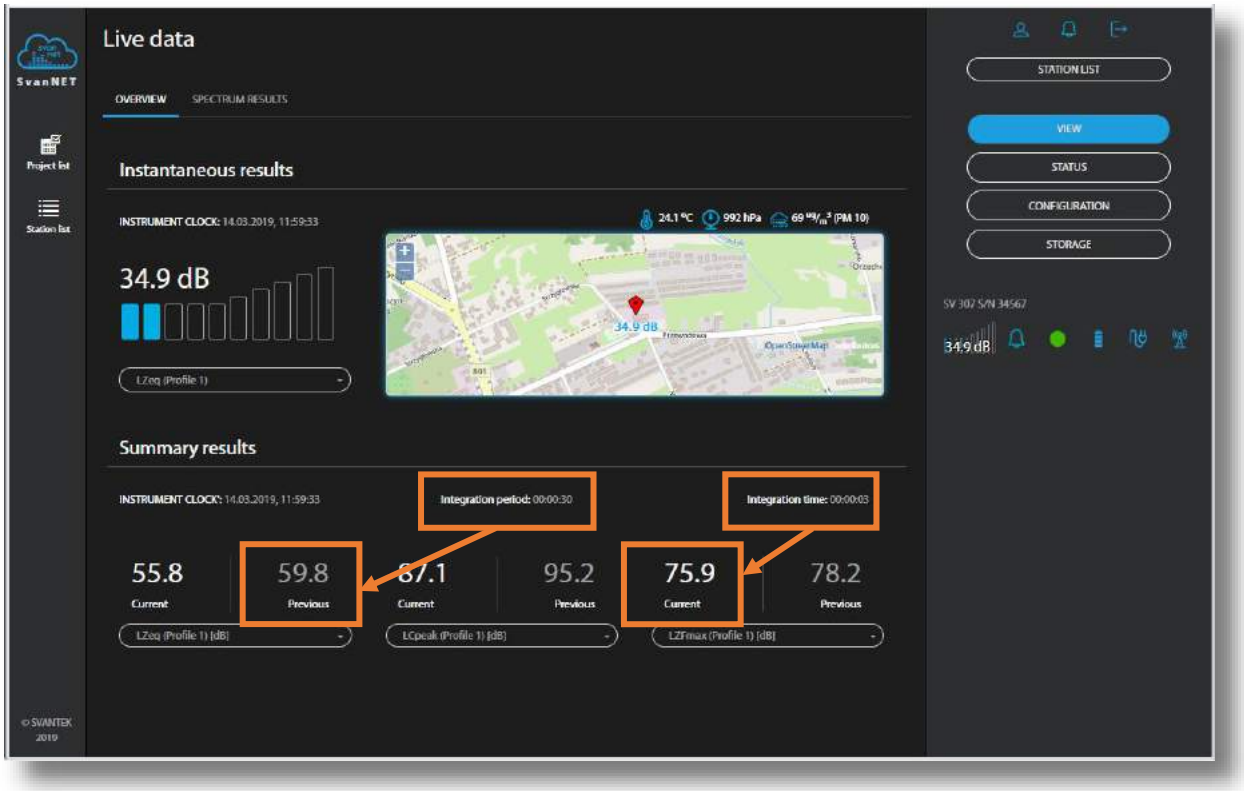
8.2.1 Live data view

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

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

- **Instantaneous Results**, measured by the 1-second period and
- **Summary Results** (**Current** and **Previous**) measured in the selected profiles by the "Integration Time" period.

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

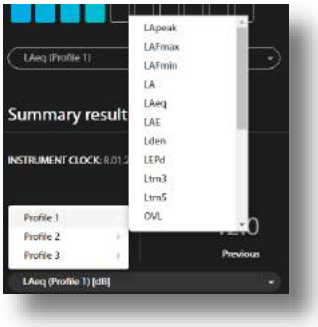


The **Current** Summary results are updated every second and present the result measured by **Integration time**. The **Previous** Summary results show result measured by **Integration period**.

The type of the measured result with its filter and detector as well as profile in which this result is measured is presented in the selector field below the result value. To change the displayed result, click the selector button and choose the profile and the result.

- 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**, **LA**, **Leq**, **LAE**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **OVL** and ten statistical level results (**Lnn**).



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

All results are described and formulaes are presented in Appendix D to 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.

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

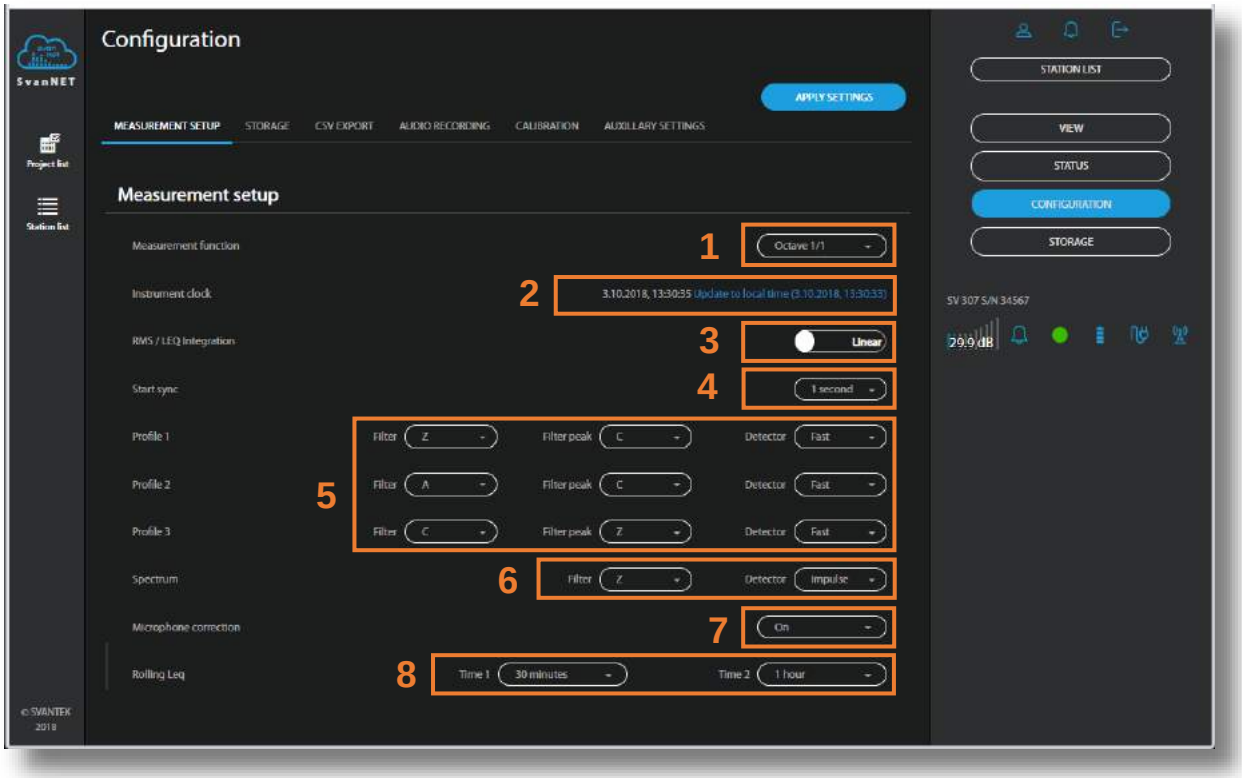
The **Configuration** view consists of several tabs that enable configuring the measurement parameters (**MEASUREMENT SETUP**), data saving (**STORAGE**), export of measurement data into CSV files (**CSV EXPORT**), audio recording (**AUDIO RECORDING**), calibration of the instrument (**CALIBRATION**) and auxiliary settings (**AUXILIARY SETTINGS**).

To send new configuration to the station, click the 

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**), **Peak filter** (**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 averaging periods for two **Rolling Leq** (**Time 1** and **Time 2**) results **LR(1)** and **LR(2)** results (see Appendix D).



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

Exponential integration is required in some standards for **Leq** measurements. When this option is selected values of the **Leq**, **LEPd**, **Lnn** and **SEL** measurement results depend on the detector time constant (**Fast**, **Slow** or **Impulse**), defined for profiles.

Such measurement results like **Lmax**, **Lmin**, **Ltm3** or **Ltm5** 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 functions are presented in Appendix D.*

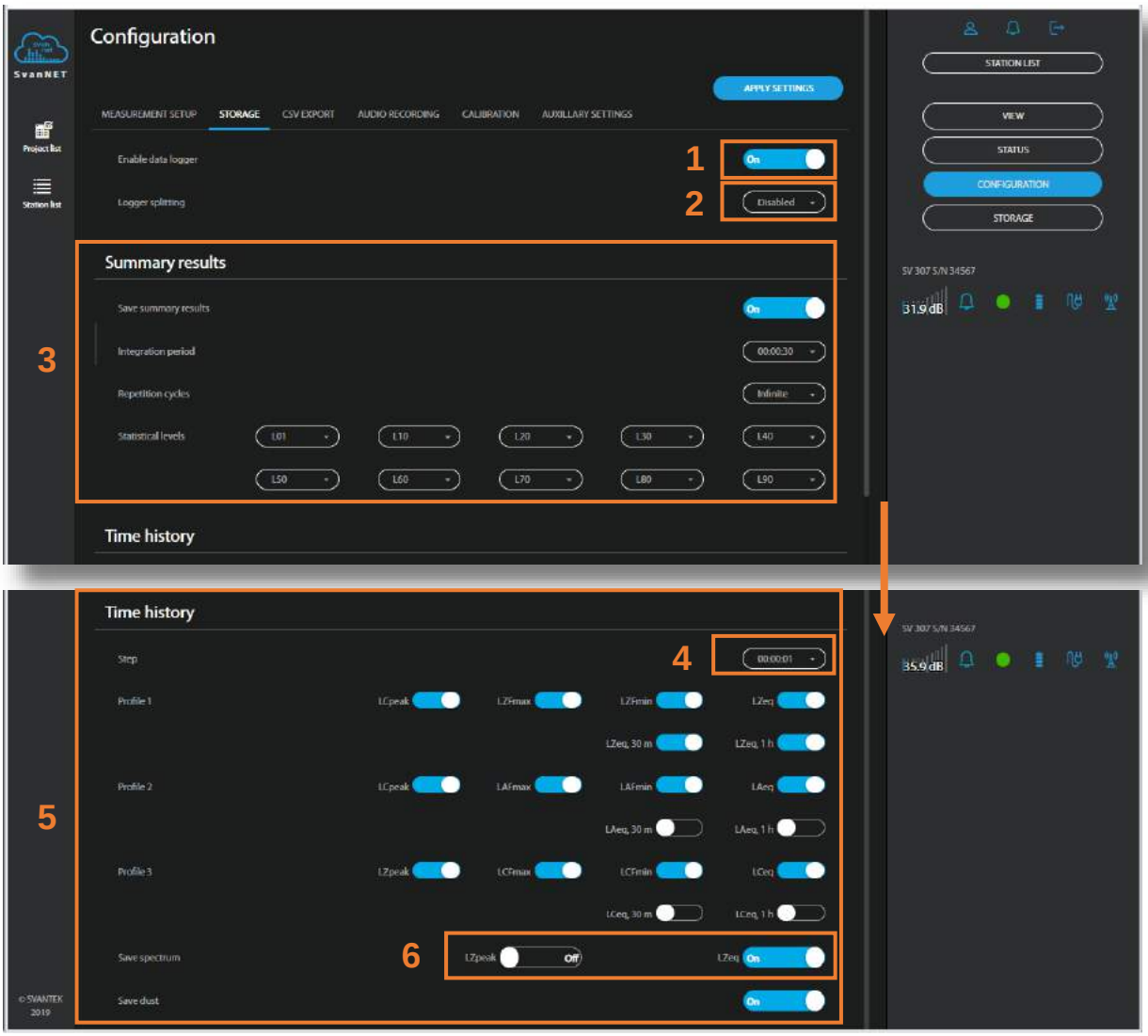
Filter means frequency weighting filter applied for all measurement results calculated for individual profiles or for the spectrum:

- 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.

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

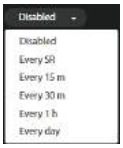
1. Enable data logging
2. Program splitting of the logger file
3. Configure the **Summary results** parameters: switch on/off saving of the Summary results in a file, measurement time and step of saving (**Integration period**), number of measurement repetitions (**Repetition cycles**) and 10 **Statistical levels**
4. Set **Step** of **Time history**
5. Select results to be saved as a Time history for three profiles: Lpeak, Lmax, Lmin and Leq
6. Switch on saving of **Leq** and/or **Lpeak** results for 1/1 or 1/3-octave bands in the logger file.



***Note**: To ensure saving of any results you should enable data logging. Summary results are saved in the same file with Time history results.*

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

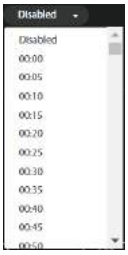
The **Logger splitting** position enables splitting of logger files and selecting the splitting mode: **Every SR** (with Integration period step), **Every 15 m**, **Every 30 m**, **Every 1 h** and **Every day**.



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

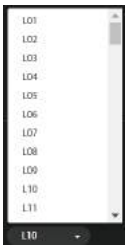
Integration period defines the period during which the signal is being measured (integrated) and recorded in the file as the set of Summary Results.

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



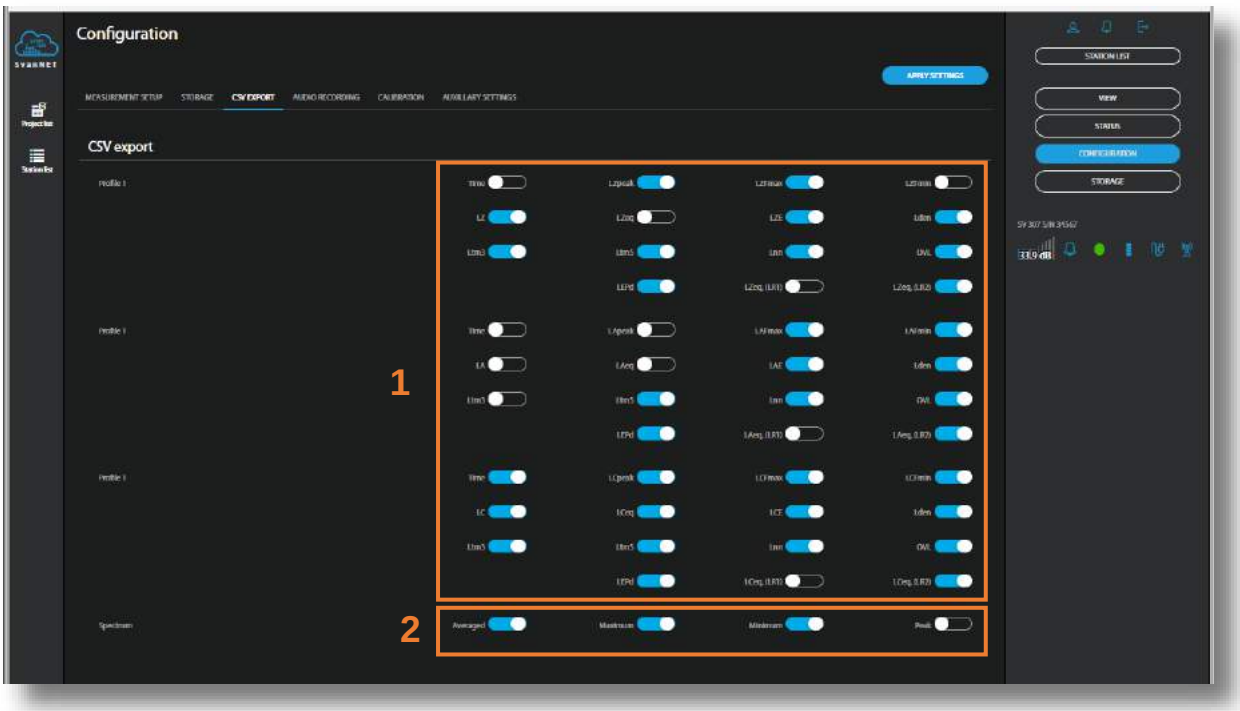
You can define ten statistical noise levels, named from **L01** to **L99**, to be calculated, displayed and saved in the file as Summary results.

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



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

The **CSV EXPORT** tab enables configuring direct export of measurement data into 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 the table below.

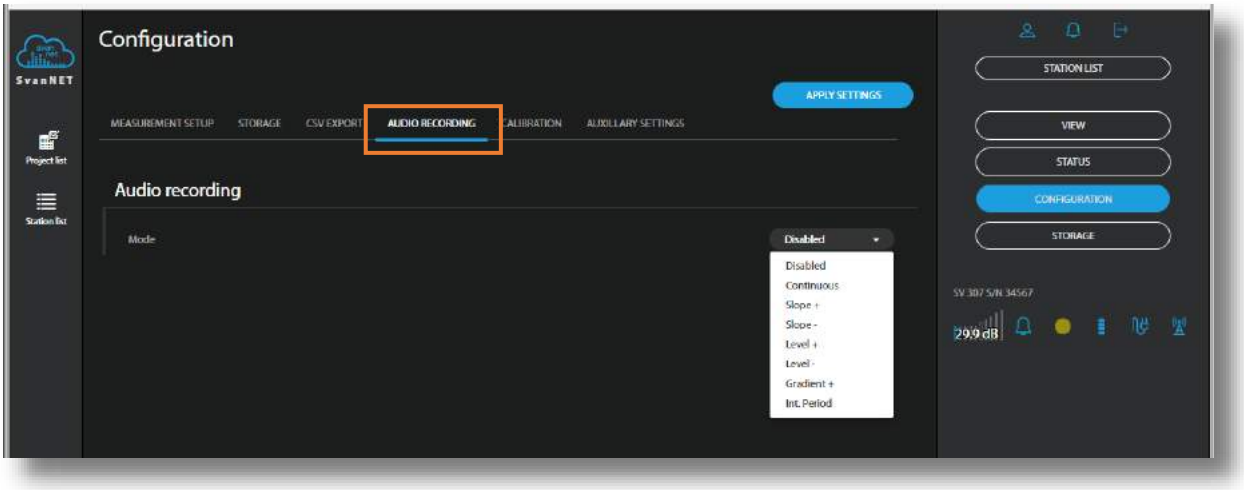
Section	File contents

File header	// **
	// CSV file version, 1.18
	// Created, 11/01/2015, 20:43:24
	// Unit, 200, SN, 26858
	// Firmware, 1.20.7, 14/11/2014
	// Corresponding logger file name, L1.SVL
	// Device function, SLM
	// Integration time, 00:00:01
	// Leq integration, linear
	// Outdoor filter, environmental
	// Profile 1, A, FAST
	// Profile 2, C, FAST
	// Profile 3, Z, FAST
	// Statistical levels, 1, 10, 20, 30, 40, 50, 60, 70, 80, 90
	// CSV save mask, 0FFF, 0FFF, 0FFF, 7
	// SLM results, profile 1, TIME, PEAK, MAX, MIN, SPL, LEQ, SEL, Lden, Ltm3, Ltm5, Lnn, OVL
	// SLM results, profile 2, TIME, PEAK, MAX, MIN, SPL, LEQ, SEL, Lden, Ltm3, Ltm5, Lnn, OVL
	// SLM results, profile 3, TIME, PEAK, MAX, MIN, SPL, LEQ, SEL, Lden, Ltm3, Ltm5, Lnn, OVL
	// **

Record number	// Record No, 1
Time sgnature	DT, 11/01/2015, 20:43:25
Measurement data	P1, 1, 56.0, 42.7, 39.6, 42.7, 41.5, 41.5, 46.5, 42.7, 42.7, 42.9, 42.8, 42.6, 42.4, 42.2, 42.0, 41.0, 40.5, 40.0, 38.5, 0 P2, 1, 62.3, 53.9, 47.8, 53.9, 49.8, 49.8, 54.8, 53.9, 53.9, 51.9, 51.5, 51.0, 50.5, 50.0, 49.5, 49.0, 48.5, 48.0, 47.5, 0 P3, 1, 66.7, 59.0, 47.3, 59.0, 57.5, 57.5, 62.5, 59.0, 59.0, 59.9, 59.0, 58.5, 58.0, 57.7, 57.5, 57.2, 57.0, 56.6, 56.3, 0
Record number	// Record No, 2
Time sgnature	DT, 11/01/2015, 20:43:26
Measurement data	P1, 1, 56.9, 45.4, 41.4, 45.4, 42.8, 42.8, 47.8, 45.4, 45.4, 46.9, 46.0, 43.0, 42.7, 42.5, 42.2, 42.0, 41.6, 41.3, 41.0, 0 P2, 1, 63.3, 52.6, 47.9, 52.6, 50.4, 50.4, 55.4, 52.6, 52.6, 53.9, 53.6, 53.3, 53.0, 48.7, 48.5, 48.2, 48.0, 47.6, 47.3, 0 P3, 1, 67.8, 59.2, 54.0, 59.2, 56.6, 56.6, 61.6, 59.2, 59.2, 59.9, 59.5, 59.0, 57.0, 55.6, 55.3, 55.0, 54.6, 54.3, 54.0, 0
Record number	// Record No, 3
Time sgnature	DT, 11/01/2015, 20:43:27
Measurement data	P1, 1, 57.6, 41.7, 37.6, 41.7, 39.1, 39.1, 44.1, 41.7, 41.7, 42.9, 42.0, 41.0, 39.0, 38.7, 38.5, 38.2, 38.0, 37.5, 37.0, 0 P2, 1, 62.9, 53.2, 49.6, 53.2, 50.9, 50.9, 55.9, 53.2, 53.2, 54.9, 54.0, 50.8, 50.7, 50.5, 50.4, 50.2, 50.1, 50.0, 49.5, 0 P3, 1, 68.9, 64.0, 56.9, 64.0, 61.9, 61.9, 66.9, 64.0, 64.0, 63.9, 63.6, 63.3, 63.0, 62.0, 61.6, 61.3, 61.0, 60.5, 60.0, 0
…	…

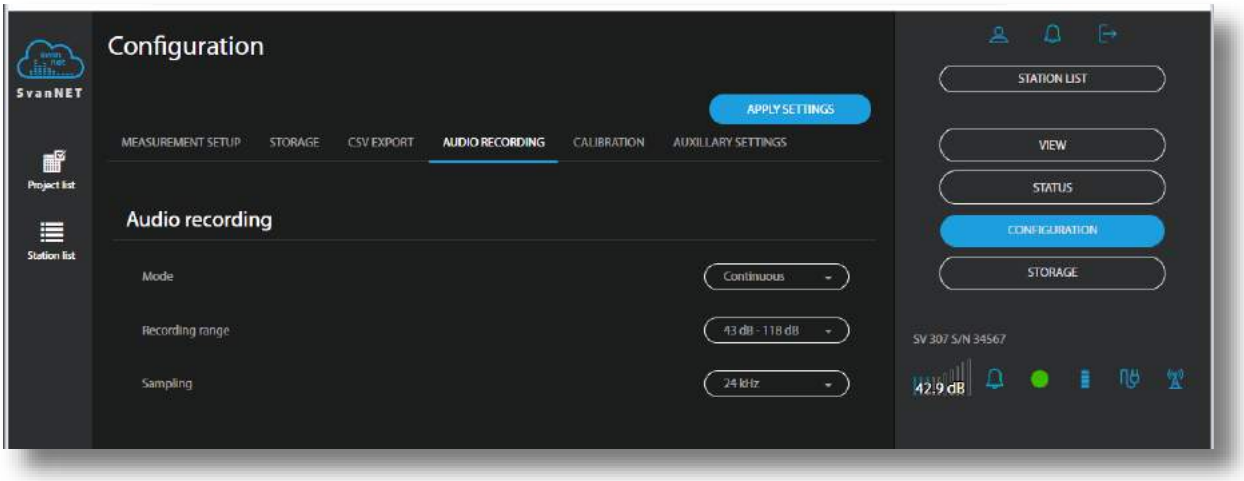
Note: *CSV files can be quite large, and it is advised to use this feature when absolutely necessary.*

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**. There are seven modes of signal recording differing by type of trigger: **Continuous**, **Slope +**, **Slope -**, **Level +**, **Leve -**, **Gradient +** and **Int. Period**. These modes require different sets of parameters and use different ways of signal recording (triggering) which are described below.

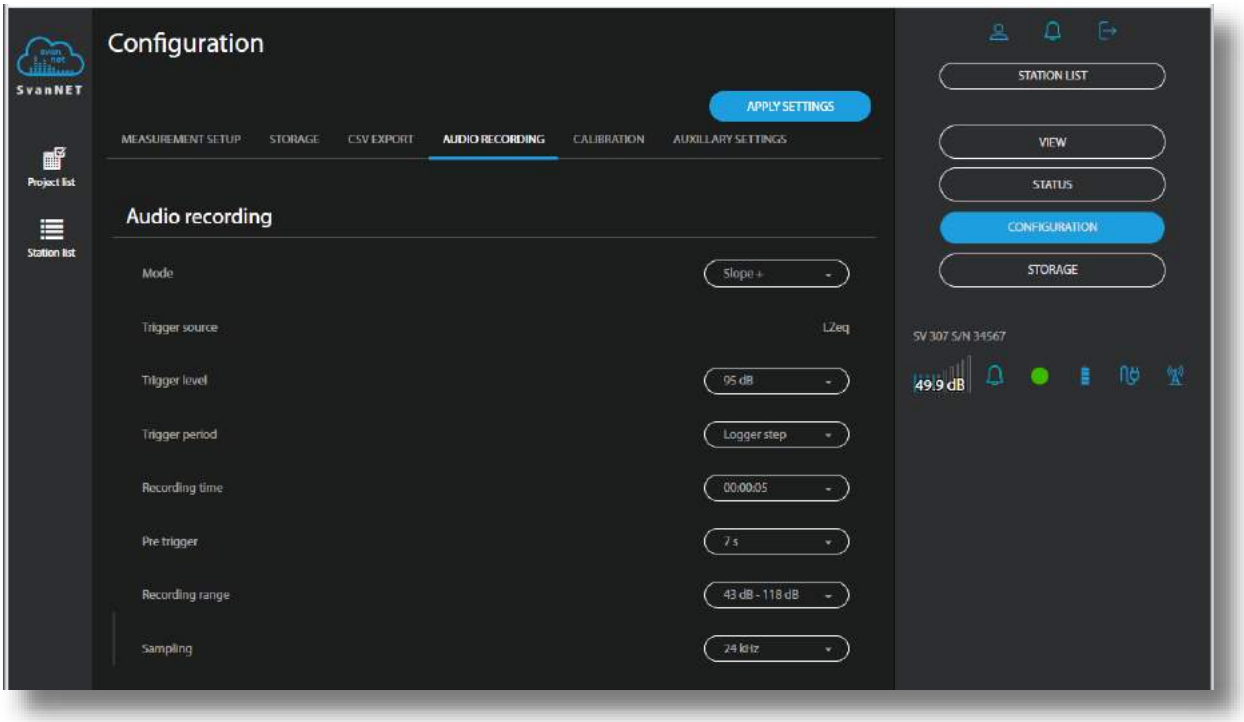


Continuous mode means that the audio recording starts with the measurement start and stops with the measurement stop.

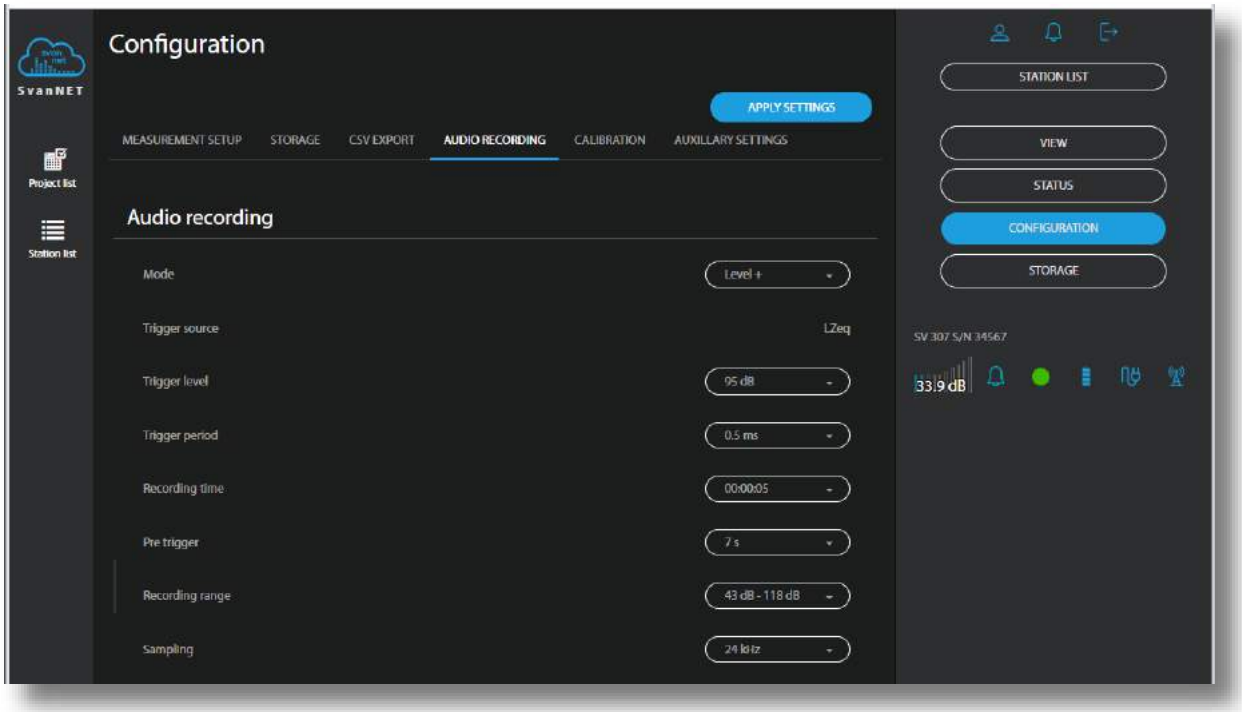
In this mode you can configure two parameters of audio recording: **Recording range** (from **21 dB – 96 dB** to **61 dB – 136 dB**) and **Sampling** frequency (**12kHz**, **24kHz** or **48kHz**).



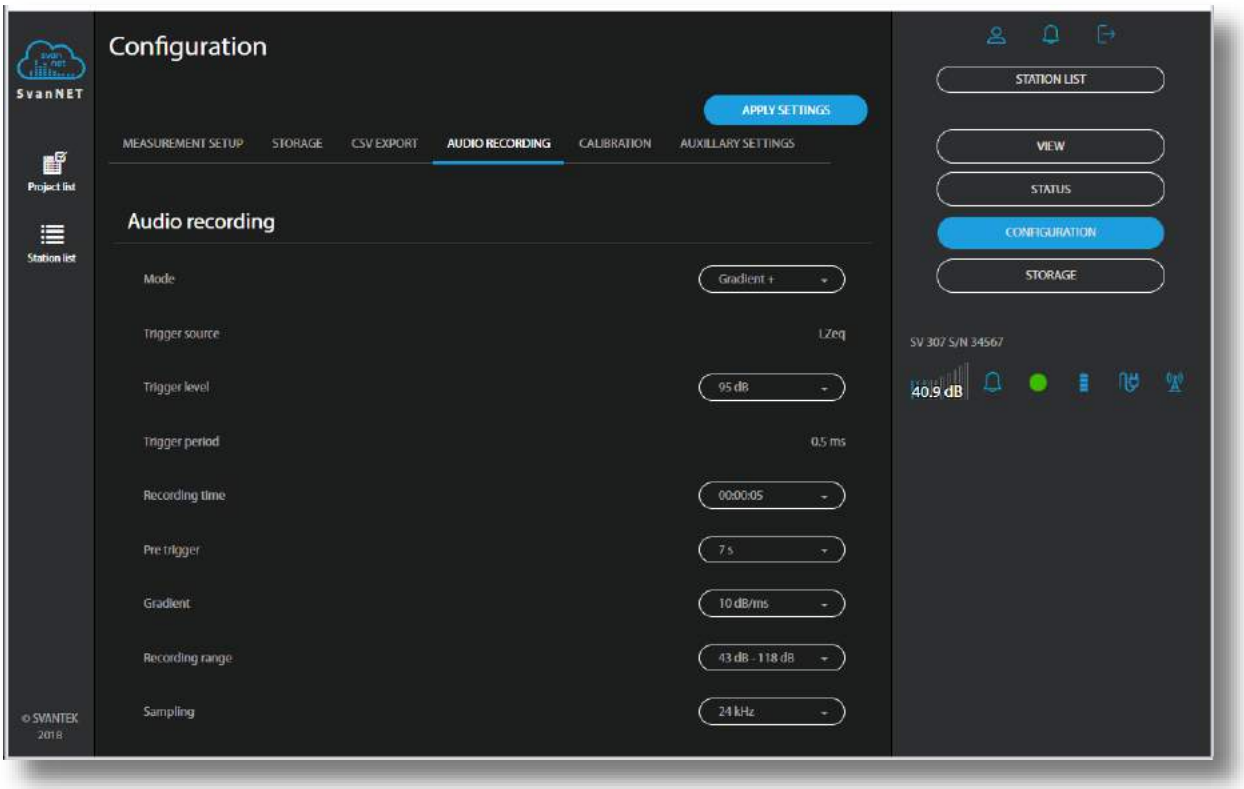
Slope + / **Slope –** modes mean that the audio recording starts when rising value of the **Trigger source** (**Leq**) measured in the first profile by **Trigger period** (with value equal to **Logger step**, **0.5 ms**, **0.1 seconds** or **1 second**) passes above/below the threshold level (**Trigger 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**.



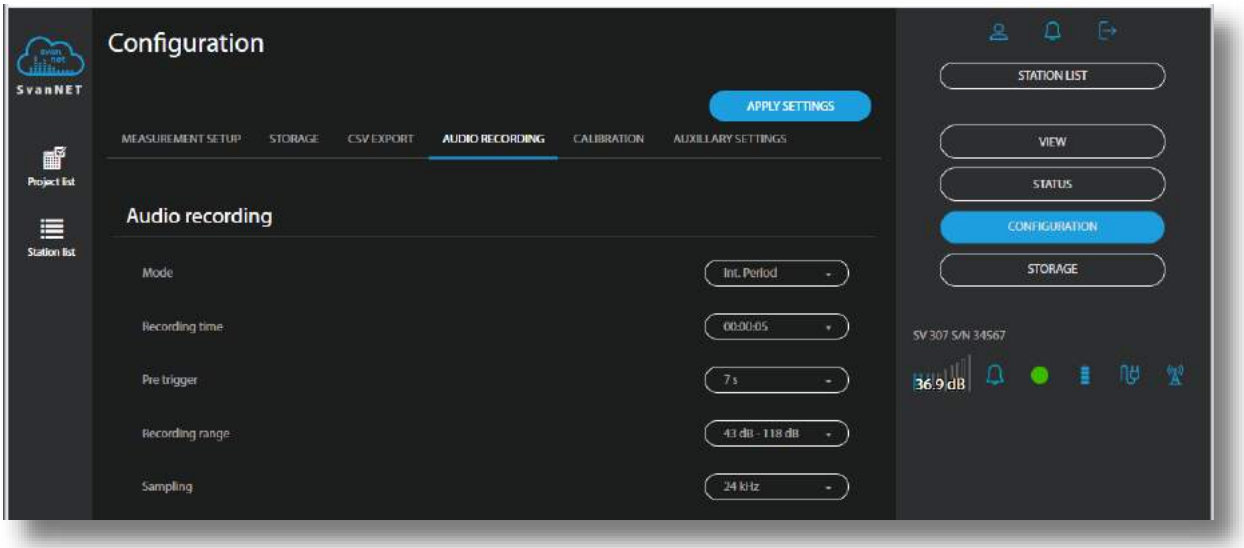
Level + / **Level –** modes mean that the audio recording starts when the value of the **Trigger source** (**Leq**) measured in the first profile by **Trigger period** (with value equal to **Logger step**, **0.5 ms**, **0.1 seconds** or **1 second**) is greater/lower than the threshold level (**Level**). 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**.



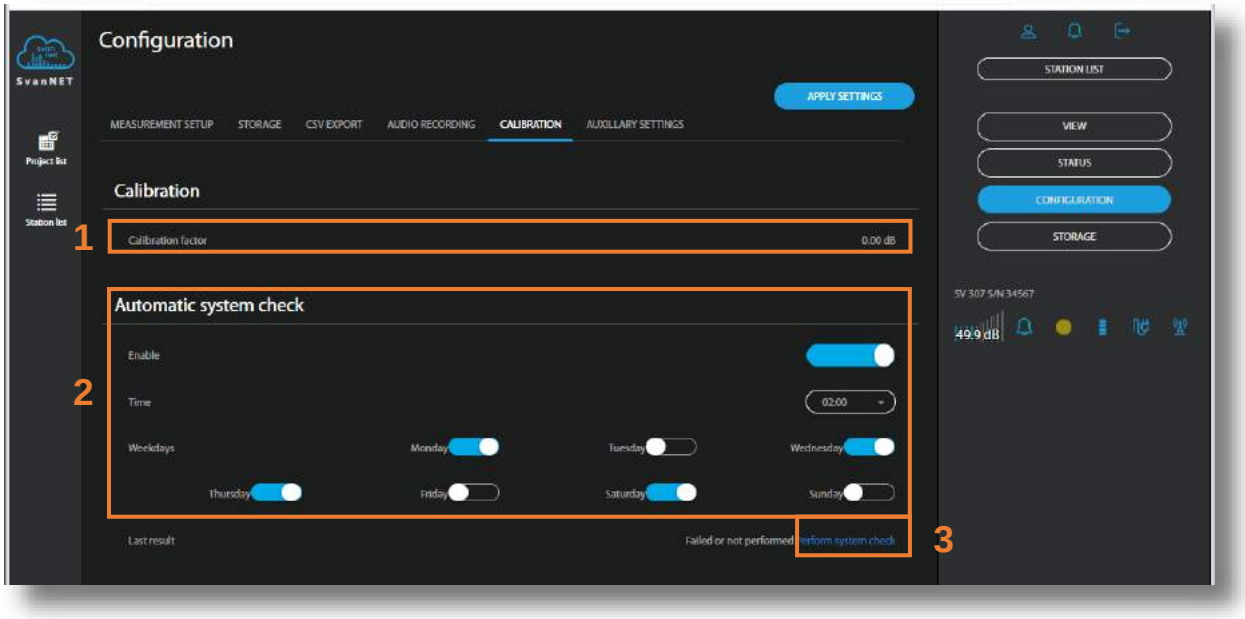
Int. Period mode means that the audio recording starts with the measurement start, and the recording will last minimum **Recording time**. If the triggering condition appears during the recording (when **Integration period** is shorter than **Recording time**), from this moment, the recording will be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



For the **Slope**, **Level**, **Gradient** and **Int. Period** modes, you can define recording time prior the trigger condition (**Pre trigger**) from **1 s** to **8 s**.

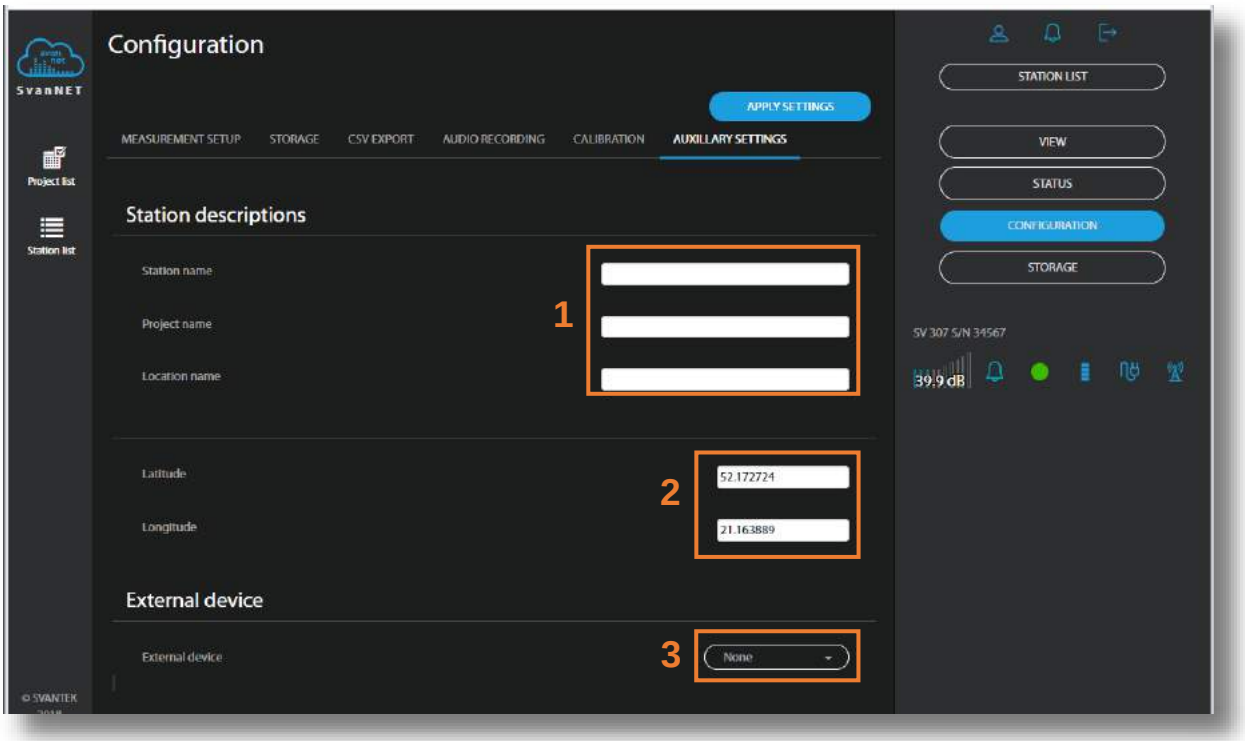
In the **CALIBRATION** tab, you can:

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 **Meteo – ES 642**.



8.2.3 STATUS view

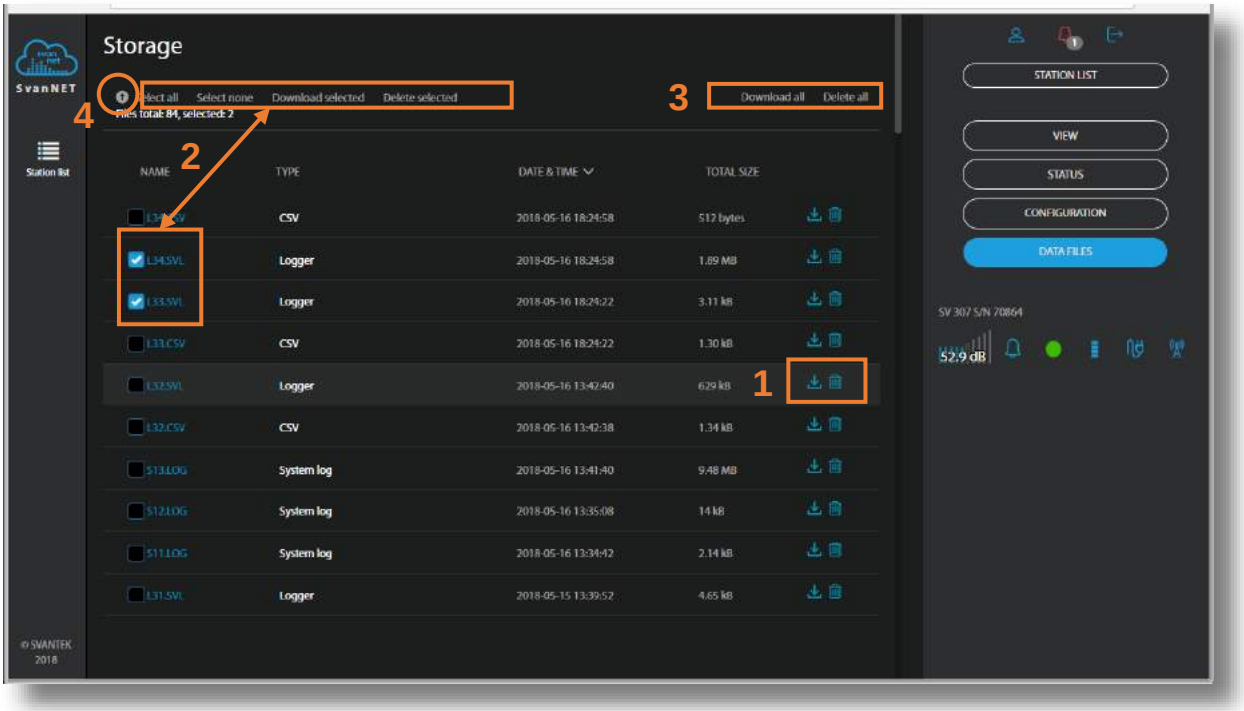
The **STATUS** view is similar to that described in the Chapter 8.1.1. The difference is that instead of STATUS ALARMS, in this view, you can start/stop measurements.

8.2.4 DATA FILES 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 **SvanPC++** software, which provides also wide spectrum of data post-processing and reporting functions.

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

SV 307 needs to be connected to the computer running SVAN PC++ either by an USB cable or a 3G connection. In the last case SvanPC++ should be supplemented with the **Remote Communication** module.

9.1 SVANPC++ SOFTWARE INSTALLATION AND ACTIVATION

To configure the SV 307 instrument for the first time you should use SvanPC++ software on his PC. It allows easy control of each function of the instrument and manage whole noise monitoring systems consisting of more than one SV 307 device.

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. On the Help menu click ***Enter Activation Keys…*** option and enter the key to activate the Remote Communication module.
5. Your SvanPC++ software is ready to 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 should be used for the first configuration of the wireless communication. The USB interface can also be used in emergency, when wireless configuration 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. Therefore, this manual will be concentrated mostly on wireless instrument control.

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:

- Manage the instruments' file structure (**SVAN files** button)
- Set the instruments' real-time clock to be equal with computer clock (**Update RTC** button)
- Manage the instrument remotely (**Remote Connection** button)
- Check the firmware updates (**Check for Updates** button)

9.3 CONFIGURING WIRELESS CONNECTION

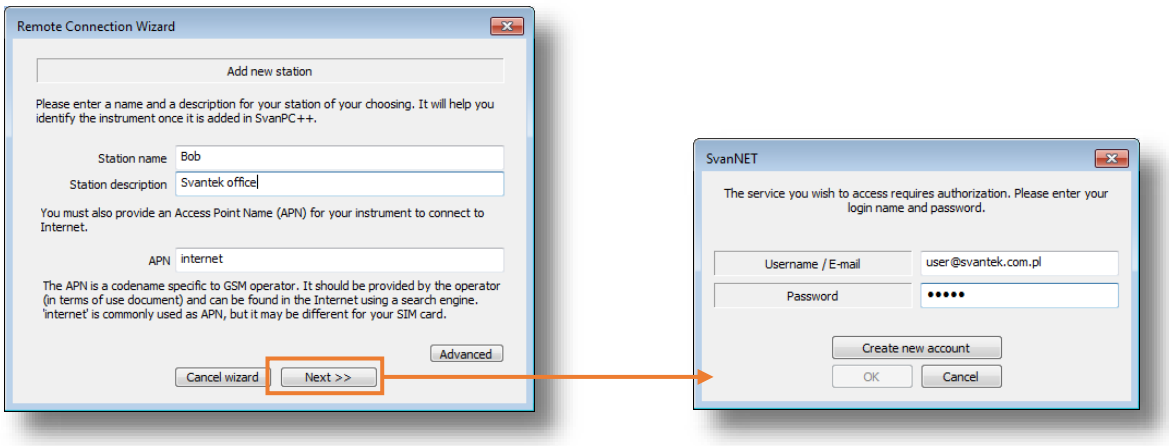
SV 307 is equipped with internal 3G modem which enable wireless remote control of the instrument and downloading measurement files, managing configuration, receiving alarm emails, etc. via the SvanNET web-service. The configuration of this type connection must be done via the USB connection.

The wireless connection can be configured via **SV 307 instrument wizard**, which is described below, or via the **Remote communication** tab (see Chapter 9.5.7) in the **Station(s) configuration** section.

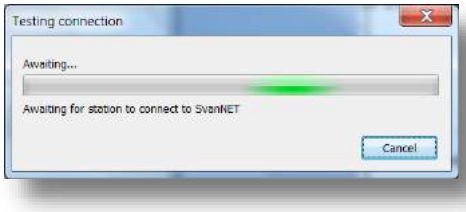
***Note**: SVANTEK does not provide a SIM card for the instrument. It is necessary to purchase the SIM card with **data plan**. If the instrument is intended for constant monitoring, choose service provider that ensures good reception at the measurement point.*

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

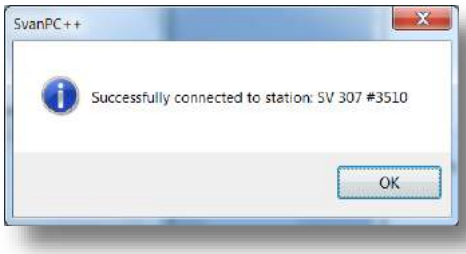
1. Connect the instrument to the PC with the SC 316 USB cable.
2. In the **SV 307 instrument wizard** dialog box click the **Remote Connection using SvanNET** button.
3. In the **Remote Connection Wizard** dialog box type the **Station name**, **Station description** and **APN** of the GSM provider. 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.

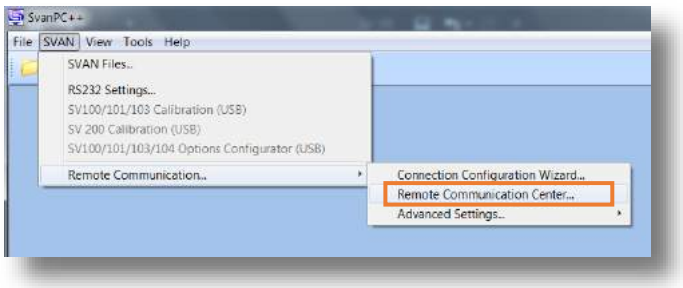


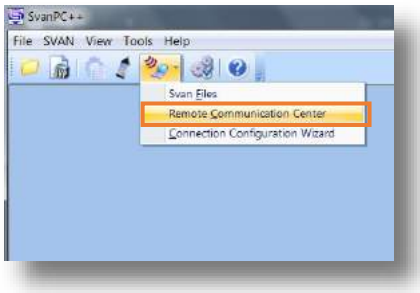
7. SvanPC++ will inform you about successful connection, the icon will be displayed on the instrument screen and the **Remote Connection using SvanNET** button will be changed to the **Remote Communication Center** button.



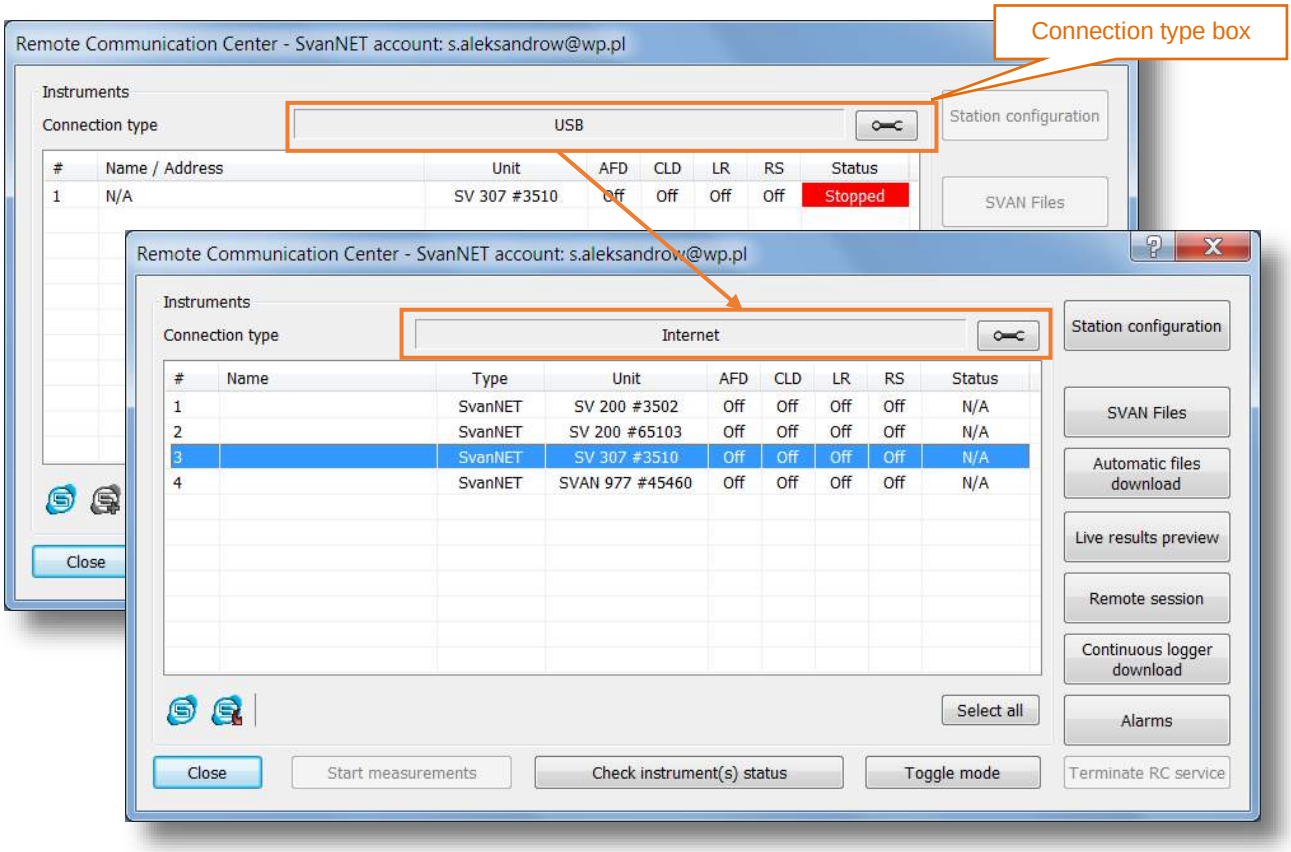
9.4 REMOTE COMMUNICATION CENTER

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 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 **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 if a station is active in Automatic Files Download, Continuous Logger Download, Live Results and Remote Session respectively.

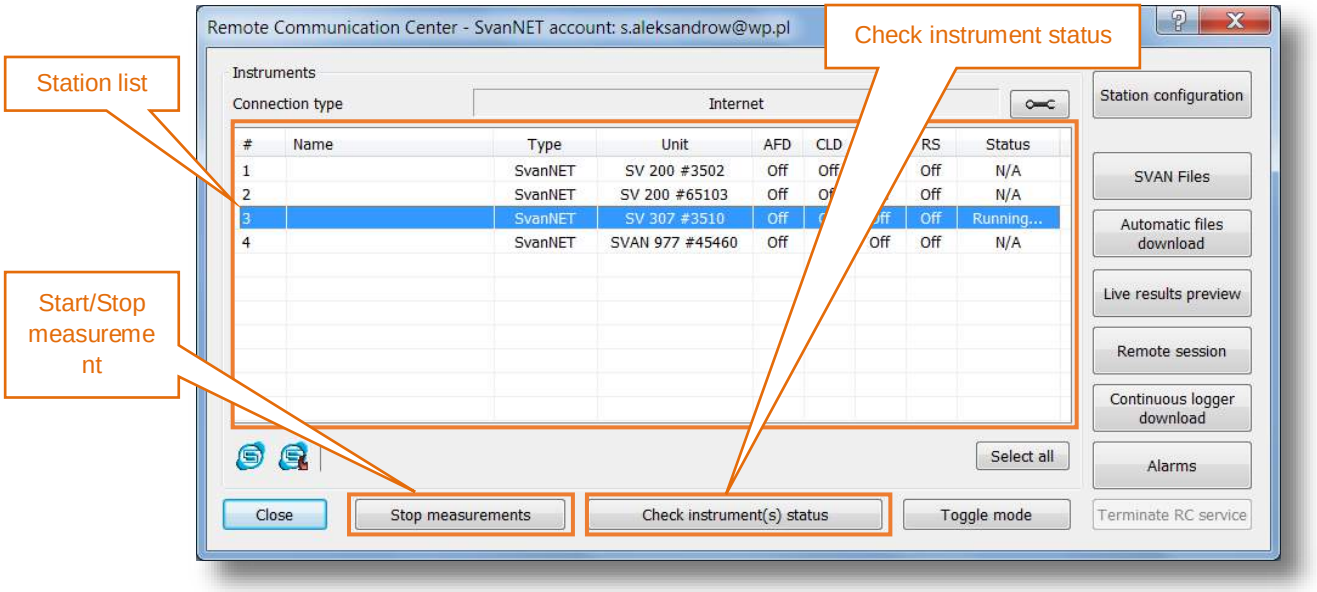
The **Toggle mode** button enables displaying more detailed information about connected instruments. An additional part of the **Remote Communication Center** dialog box is then opened, containing the values of several parameters such as free space, battery state etc. You can copy all the displayed data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

9.4.1 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:

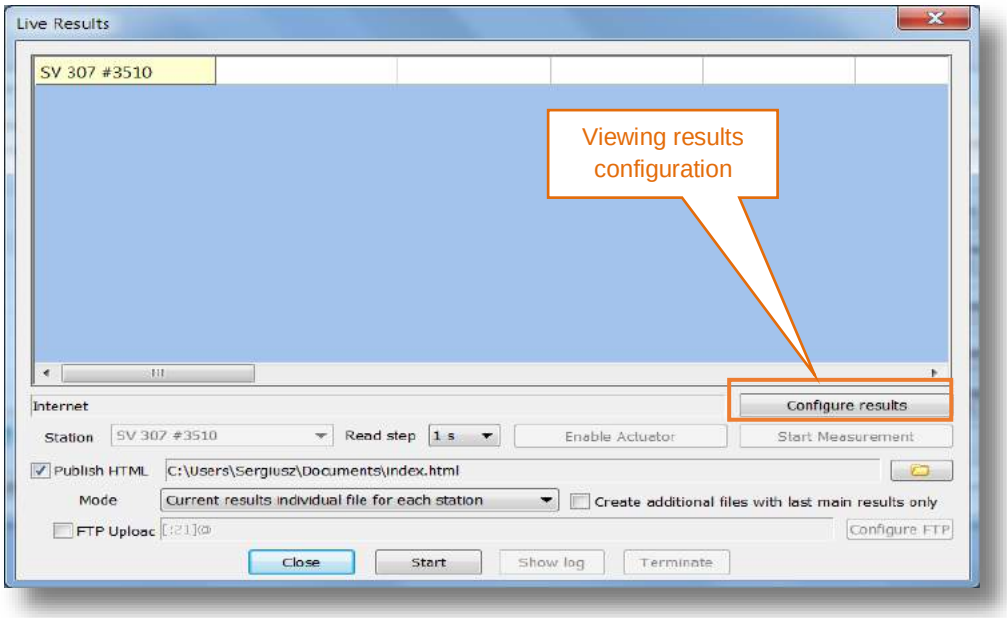
1. Select the station in the **Station list** box.
2. Check the state of the instrument by clicking **Check instrument(s) status**. When the instrument status is known, the **Start measurement** button becomes enabled.
3. Click the **Start measurement** button.



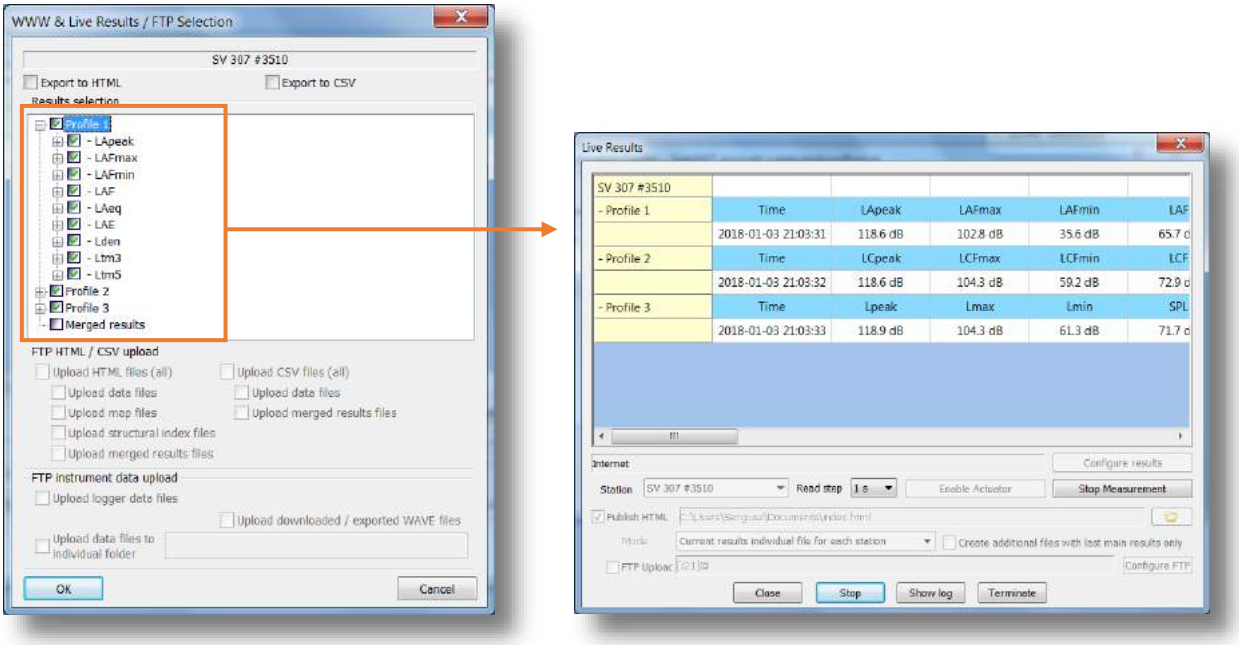
9.4.2 Viewing live results

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.

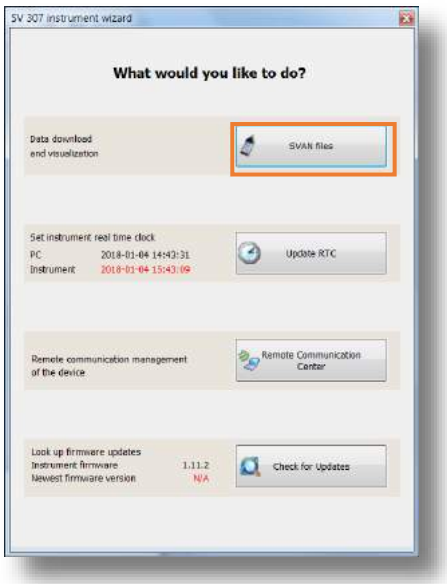


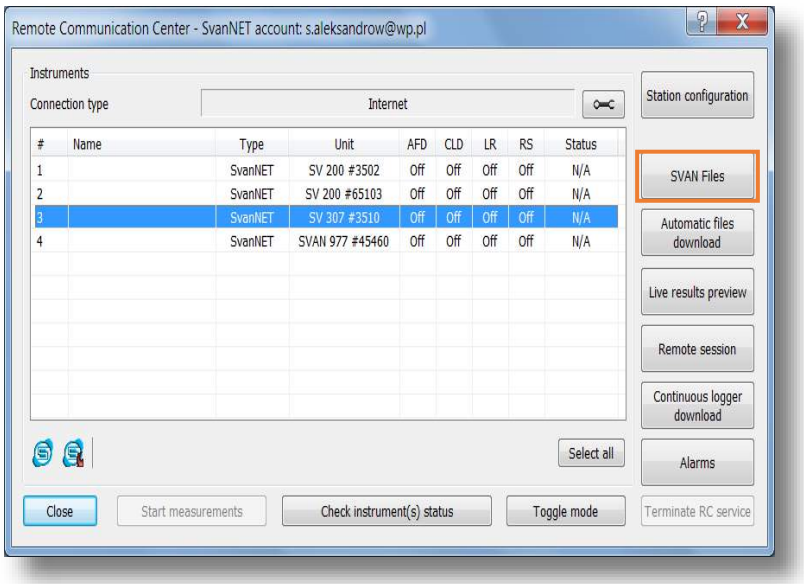
In the **Live Results** dialog box, the user can also:

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),

9.4.3 Downloading files from the station memory

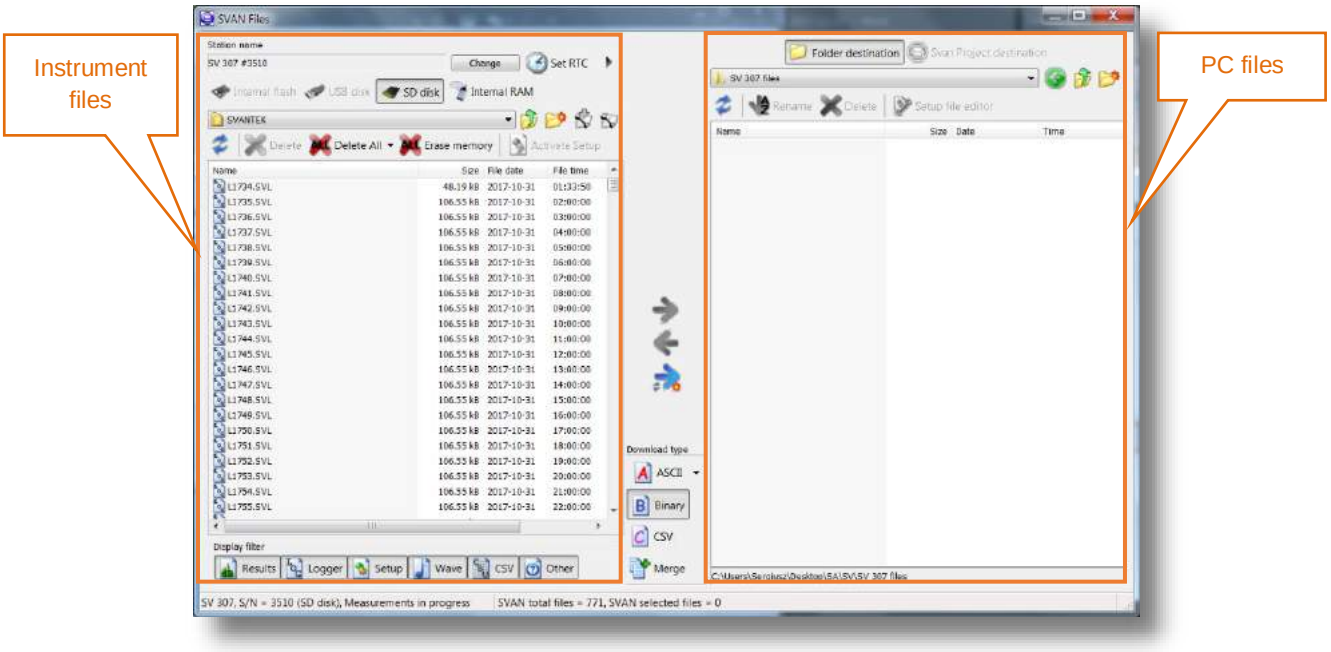
Access to the instrument's files is carried out by the **SVAN Files** tools of the SvanPC++ software either via **SV 307 Instrument wizard** or via **Remote Communication Center**.



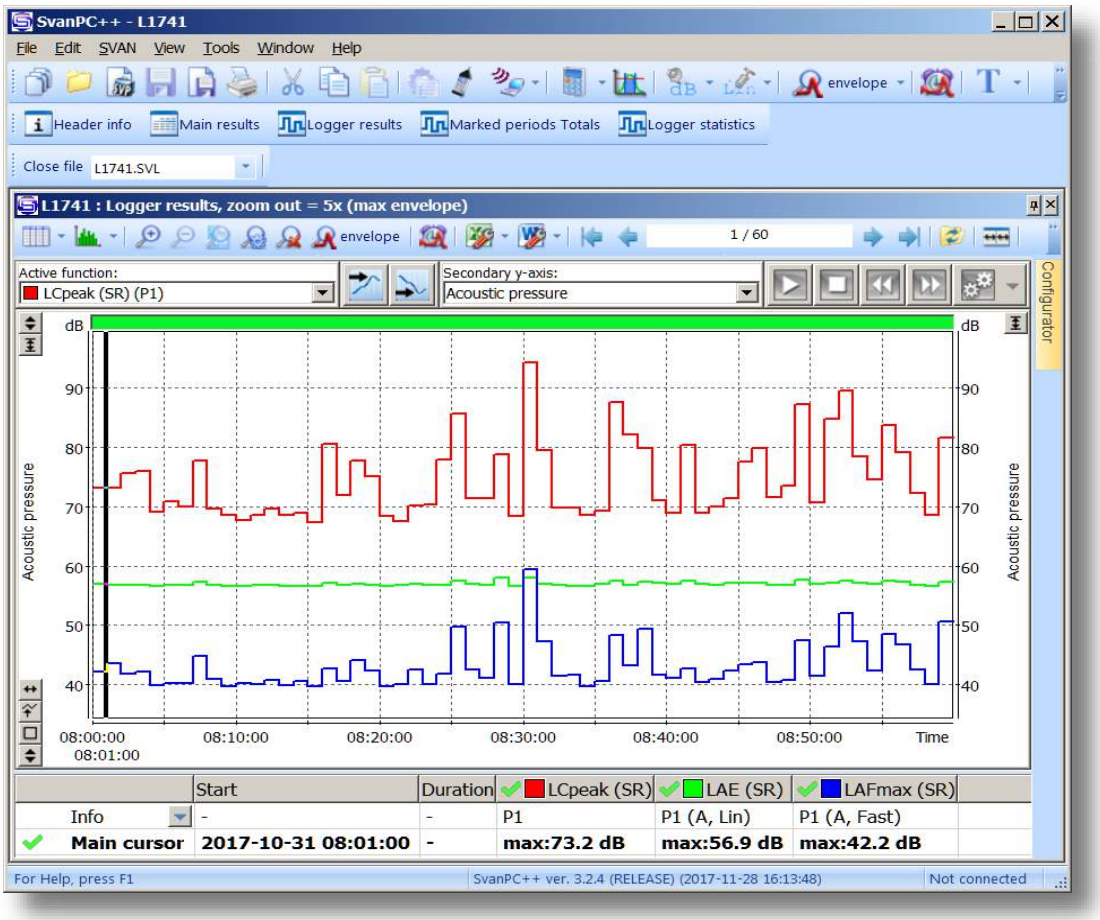


The **SVAN Files** dialog box consists of two parts: instrument (left) and PC (right). Each part includes tools for files managing (selecting memory, directory and files, deleting files, creating directory, applying filters etc.).

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.



9.4.4 Changing working directory

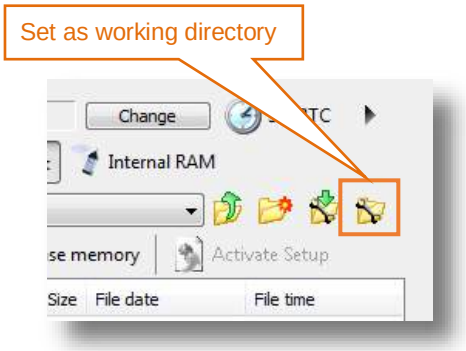
Working directory is a folder on the SD card in which all the measurement files are stored.

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.

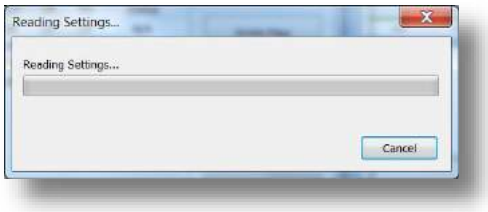
From this moment all result files will be stored in the selected directory.



9.5 STATION CONFIGURATION

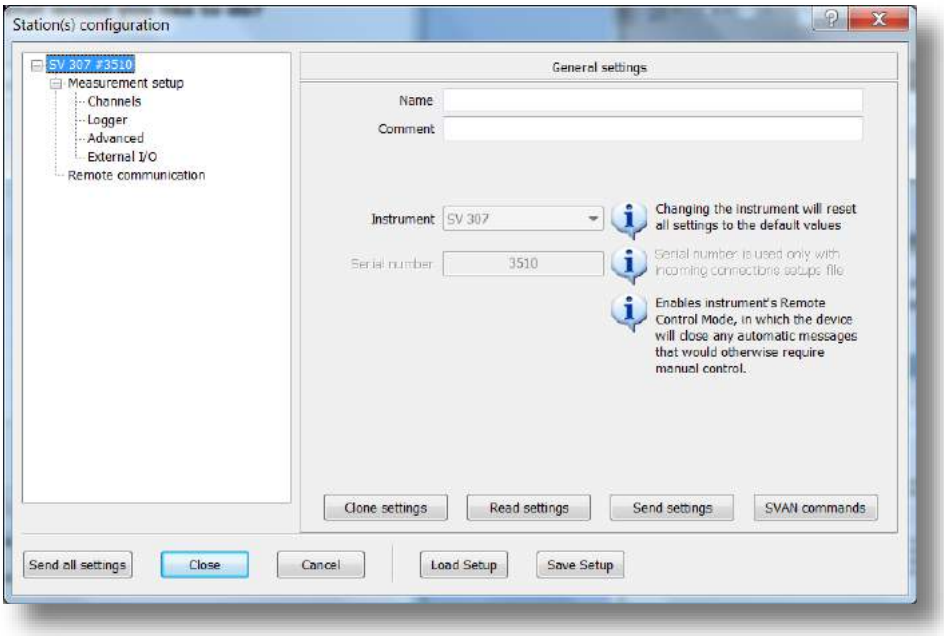
To configure the station or measurement parameters:

1. Activate **Remote Communication Center** panel
2. Select the station from the Station list and
3. Press the **Station configuration** button and wait until instrument's settings are downloaded and the **Station(s) configuration** dialog box is opened.



The **Station(s) configuration** dialog box enables the user to modify general instrument settings, measurement setup and remote communication settings.

To configure a connected station, choose it from the list on the left side of the dialog box and then select the type of settings you wish to modify. The settings available for configuration are grouped into several categories, described further.



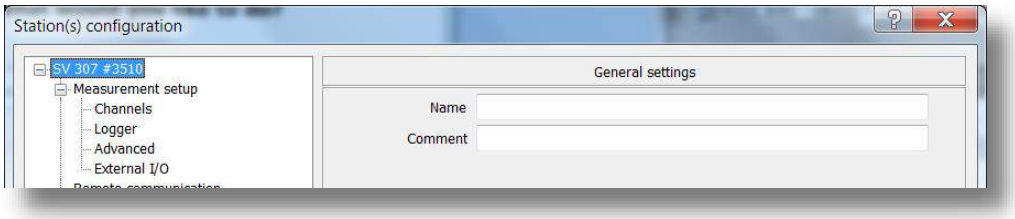
To communicate with stations, you can:

- send settings adjusted in the **Station(s) configuration** dialog box to all connected devices of the same type (**Clone settings** button),
- download current settings from the connected device (**Read settings** button),
- send settings adjusted in the **Station(s) configuration** dialog box to the selected device (**Send settings** button),
- open a dialog box which enables communication with the station manually sending commands in the SVAN protocol (**SVAN commands** button),
- send settings adjusted in the **Station(s) configuration** dialog box to all connected devices (**Send all settings** button).

***Note**: The **Station(s) configuration** dialog box enables configuring only general instrument settings. The **SVAN Files** dialog box with the use of **Svan file editor** function enables full range of settings – see "SvanPC++ User Manual".*

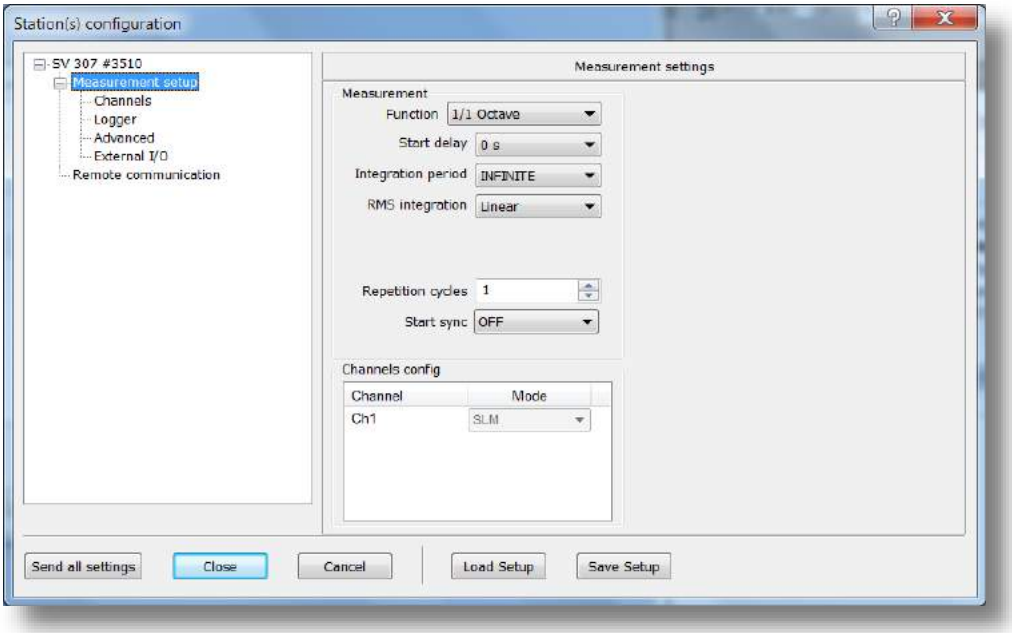
9.5.1 General settings

In the **General settings** tab you can enter **Name** and **Comment** to the station. This is useful if you have many instruments.



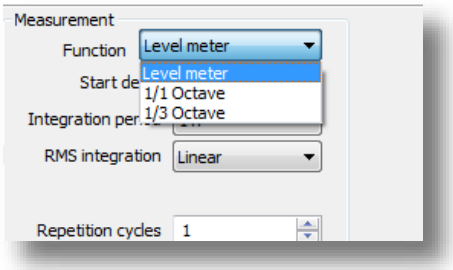
***Note**: **Name** appears on the Station list of the SvanNET web-service (see Chapter 8.1).*

9.5.2 Measurement setup



The **Measurement setup** tab consists of the following parameters: measurement function (**Function**), delay of the start of measurements (**Start delay**), integration period / measurement run time (**Integration period**), RMS detector type (**RMS integration**), number of repetitions of measurement cycles (**Repetition cycles**), synchronisation of the measurement start (**Start sync**) and configuration of channels input (**Channels config**), which in the case of SV 307 is set to sound measurement and cannot be changed.

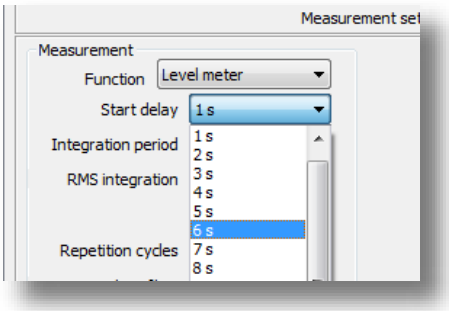
Measurement function



The main function of the instrument is the measurement of Sound pressure broad band level (**Level meter**). The **Level meter** function provides the user with functions meeting the standard IEC 61672:2013 for Class 1 accuracy.

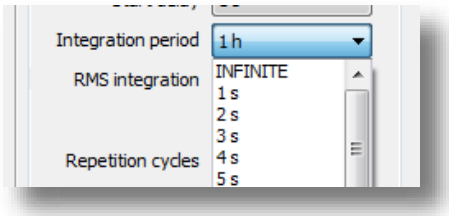
You may also use 1/1 and 1/3 real time octave band frequency analysis functions (**1/1 Octave** and **1/3 Octave**). These functions extend the main Level Meter functionality of the instrument, because the selected 1/1 and 1/3 octave analysis is performed along with all calculations that Level Meter performs.

Start delay



The **Start delay** parameter defines the delay period from the moment of clicking the Start measurement button to the measurement start (digital filters of the instrument constantly analyse the input signal even when the measurement is stopped). This delay period can be set from **0 s** to **60 s**.

Integration period

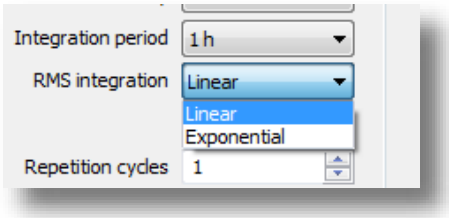


The **Integration period** parameter defines the period during which the signal is being measured (integrated) and stored as the set of Summary Results.

The measurement will stop automatically after this period. When the **Repetition cycle** is greater than one, the measurement will start again.

When **INFINITE** is selected, the measurement will run until the user stops it manually.

RMS Integration



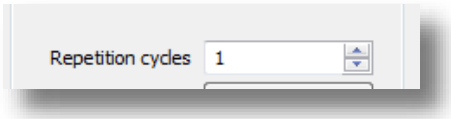
The **RMS Integration** parameter defines the detector type for calculations of the **Leq**, **LEPd**, **Lnn** and **SEL** results. Two options are available: **Linear** and **Exponential**. The formulae used for results calculation are given in Appendix D.

The **Linear** integration is used when it is required to obtain the true RMS value of the measured signal. When this option is selected the value of the **Leq**, **LEPd**, **Lnn** and **SEL** results do not depend on the detector time constant: **Fast**, **Slow** or **Impulse**.

The **Exponential** integration enables fulfilling the requirements of other standards for time averaged **Leq** measurements. When this option is selected value of the **Leq**, **LEPd**, **Lnn** and **SEL** results depends on the detector time constant: **Fast**, **Slow** or **Impulse**.

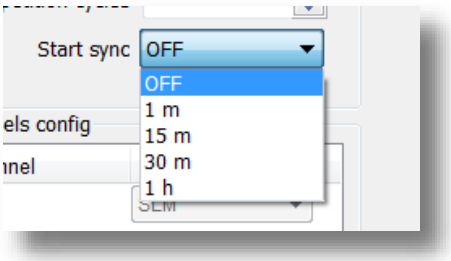
Repetition cycles

The **Repetition cycles** parameter defines the number of cycles (with the measurement period defined by **Integration period**) to be performed by the instrument. The **Repetition cycles** number values are within limits [1, 1000]. **INFINITE** means that the instrument will repeat the measurements until the user stops them manually.



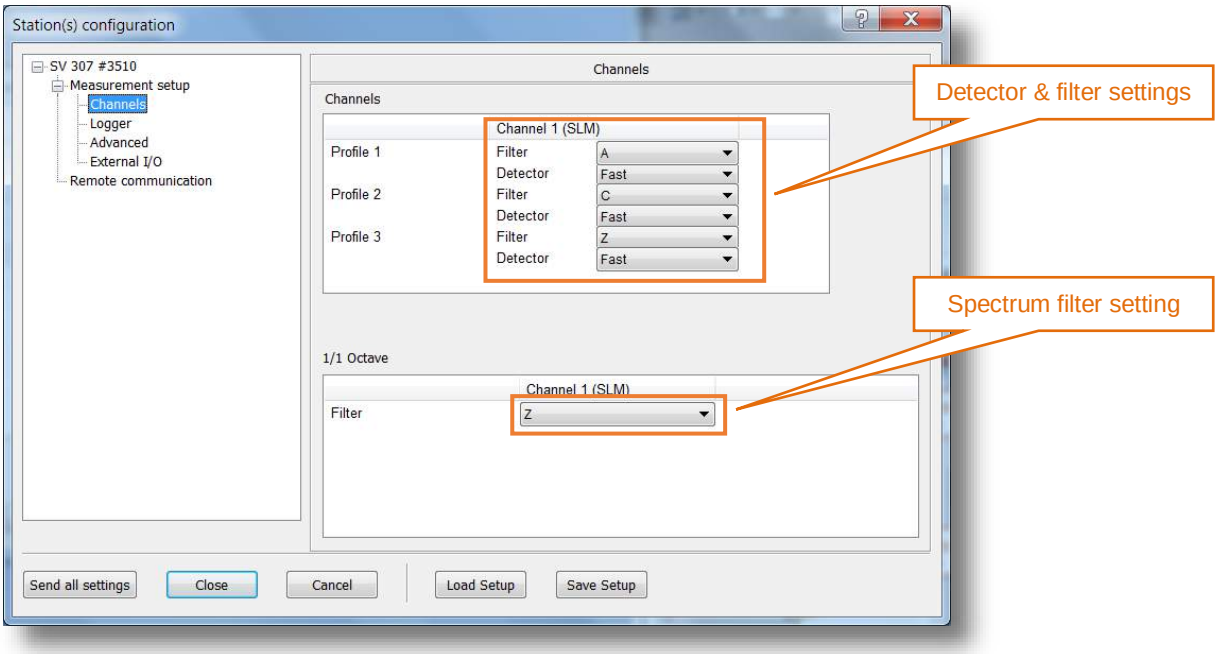
Synchronization of the measurement start

The **Start Sync** parameter defines maximum delay period from pressing the **Start measurement** button to the start of the measurements to allow synchronisation with the instrument's RTC. The **Start Sync** parameter can be set as: **OFF**, **1m**, **15m**, **30m** and **1h**. For example, if **1h** is selected, the measurement will start from the beginning of the first second of next hour after pressing the **Start measurement** button, and then will be repeated after the integration period has elapsed if the number of cycles is greater than one.



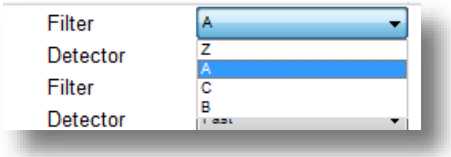
9.5.3 Channels

In this tab, filter and RMS detector can be selected for each acoustic profile individually. Due to this, three results with different filters and detectors can be obtained simultaneously. When ***1/1 Octave*** or ***1/3 Octave*** functions are selected, frequency weighting filter for the 1/1 & 1/3 octave analysis can also be defined.



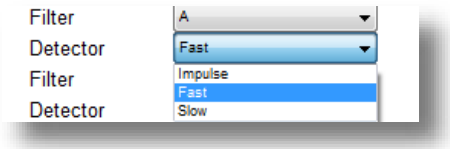
Weighting filter

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



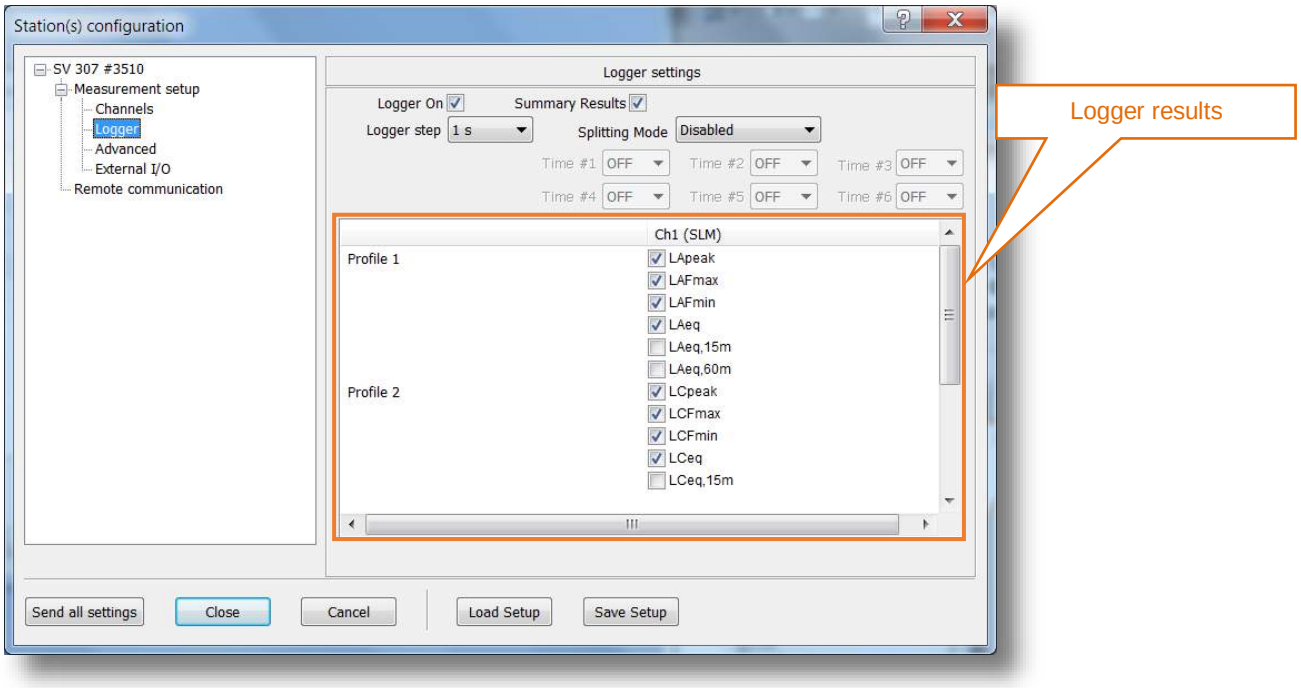
RMS detector

The following RMS detectors are available in the instrument: **Impulse**, **Fast** and **Slow**.



9.5.4 Logger settings

This tab enables setting logger parameters, e.g. recording of time history results, and consists of following parameters: time history recording activation (**Logger On**), time history step (**Logger step**), splitting of the logger records (**Splitting Mode**) and logged results selection.

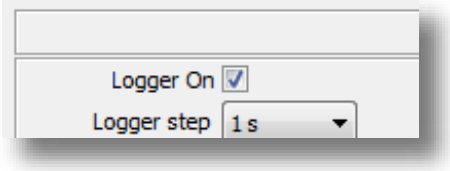


Time history results are saved in a file with automatically defined name, which consists of a prefix (a string of letters) and a number (string of digits). New time history is recorded in a new file, which name is generated on the inherit principle – the number of the new file name has the same prefix as the previous file, but its number is increasing by one.

***Note**: The **Station(s) configuration** dialog box doesn't allow to change the name of the logger files. But you can do it in the **SVAN Files** dialog box with the help of the **Setup file editor** function – see "SvanPC++ User Manual".*

Logger On

The **Logger On** position switches on and off the functionality, which enables saving selected results from the three user profiles with the **Logger step**.

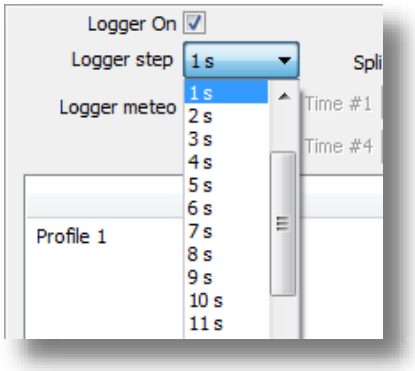


When the Logger is On, also Summary Results are saved in the same file. Summary Results are saved with the period specified by the **Integration period** parameter.

***Note**: When **Logger On** is deselected, no measurement results will be stored in the SV 307 memory. Usually this setting should be On.*

Logger step

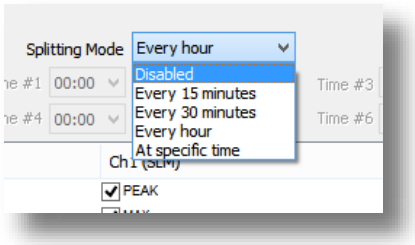
The **Logger step** defines the period of logging data in a file. It can be set from **100ms** to **1h**.



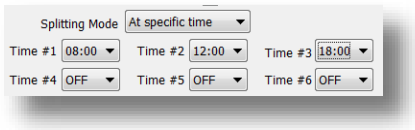
Splitting mode

The **Splitting Mode** position enables splitting the logger data registration into separate files. If the **Splitting Mode** parameter is **Disabled**, the registration of measurement results will be continuously made in one logger file.

In other cases, the registration will be made in separate files and the registration in the new file will start: every quarter of the RTC (**Every 15 minutes**), or every half an hour of the RTC (**Every 30 minutes**), or every hour of the RTC (**Every hour**), or at specified by the user times (**At specific time**). Every time when the split time is achieved the logger file is closed and new file with the increased by one number is opened for subsequent measurement data.

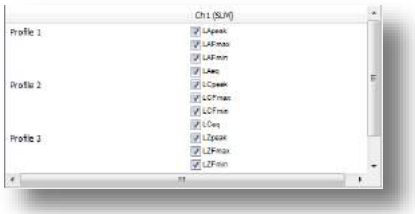


At specific time option splits files at a specified time of a day. It is possible to define up to six times.



Logger results

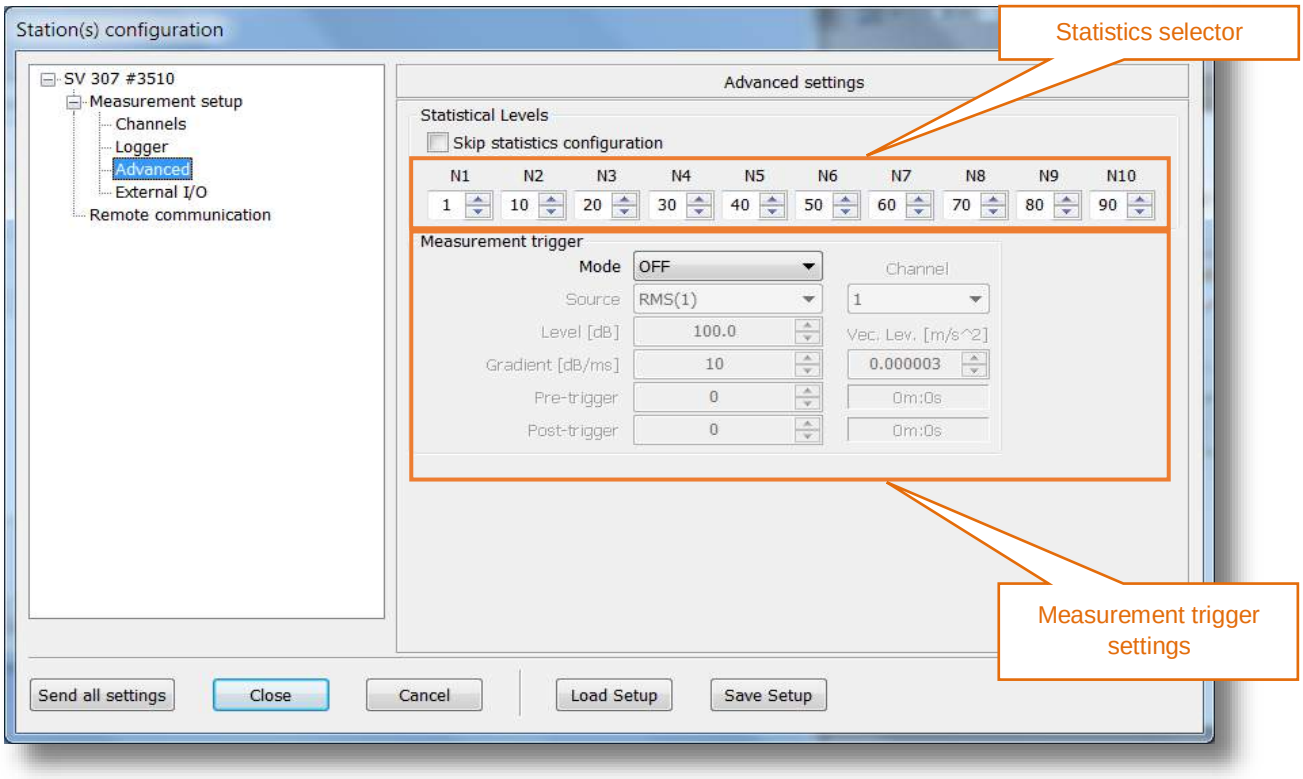
The **Logger Results** list enables selecting results for three profiles, which will be recorded to the logger file during the measurement. Measurement parameters for each profile are defined in the **Channels** section.



9.5.5 Advanced settings

The **Advanced settings** tab allows to define ten statistical levels, named from **N1** to **N10**, to be calculated and saved in measurement files, and setting the measurement trigger.

All **Statistical Levels** must be in the integer range of 1 to 99. Each value can be set independently from the others.



To switch on the **Measurement trigger**, click the **Mode** field and select one of the trigger modes: **Level +**, **Level –** or **Gradient +**.

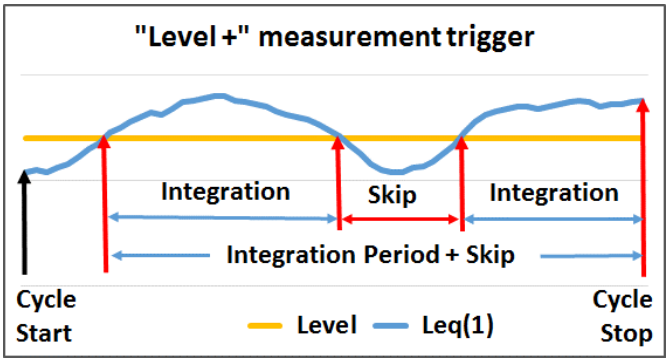
In the case the trigger is on, additional parameters can be defined: the measurement result that is checked for a trigger condition (**Source**), its threshold level (**Level**) and the threshold level for the speed of changing the source value (**Gradient**).

Level type trigger

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

When the new measurement cycle begins (after pressing the **<Start>** 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 the 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 can be longer than the **Integration Period**.



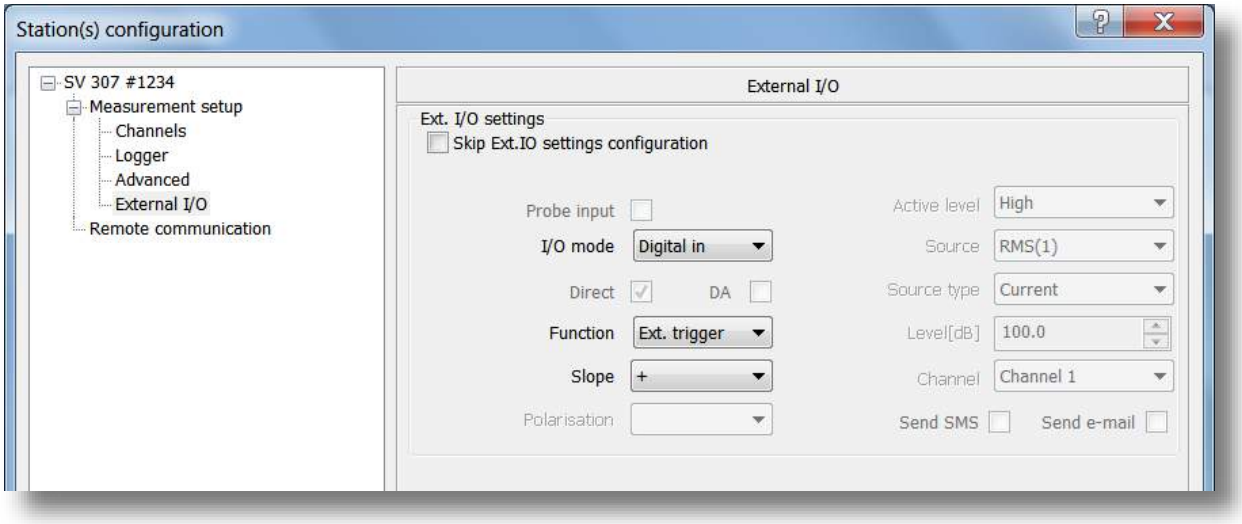
Gradient type trigger

The **Grad +** 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 (**Level**) and the gradient of this Source is greater than the gradient threshold level (**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.

9.5.6 External I/O

The **External I/O** tab allows you to select the functionality of the I/O port - the **EXT.I/O** socket.



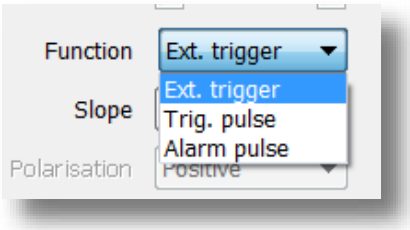
The **EXT.I/O** jack socket can be used as (**I/O mode**):

- the input of the digital signal used as an external trigger to start the measurements (**Digital in**). The instrument is acting in this case as so called “slave instrument”,
- the 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 the case of certain circumstances occurred during the measurements (i.e. the level of the input signal is higher than the alarm threshold).

More detailed description of the **I/O** port is given in Appendix C.

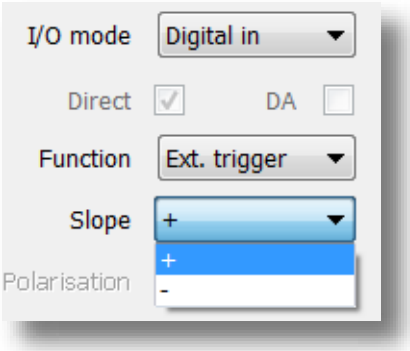
Function of the EXT.I/O socket

The **Function** position defines the function of the digital input/output of the **EXT.I/O** socket. The socket can be used as an external trigger (**Ext. trigger**), a source of the trigger pulse (**Trig. pulse**) which starts the measurement in another “slave instrument” linked to the “master instrument” or an alarm signal, which appears there after fulfilling certain measurement conditions (**Alarm pulse**).



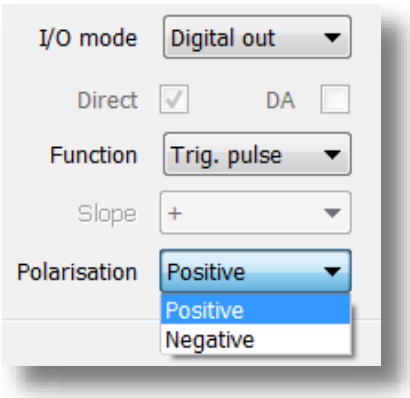
Trigger voltage slope

For the **Digital in** mode the trigger voltage **Slope**: **[+]** (uprising as default) or **[–]** (falling) can be selected.



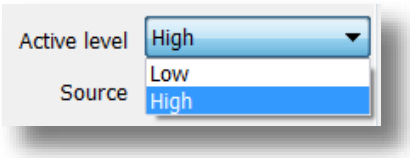
Polarisation of the trigger signal

The **Polarisation** position allows you to select which polarisation of the signal (**Negative** or **Positive**) will be applied to the output trigger pulse.



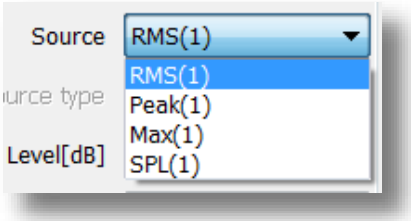
Active level for the alarm pulse generation

The **Active level** parameter defines which level of the signal should be treated as a valid one (with “negative” or “positive” logic): **Low** or **High**.



Source signal for the alarm pulse generation

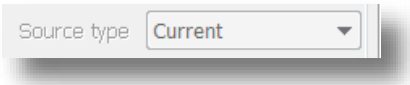
The **Source** parameter defines the measured result, the level of which should be checked for alarm generation. If the level of the Source is greater than the threshold **Level**, the instrument will generate alarm signal on the **EXT.I/O** socket. The results from the first profile: **RMS(1)**, **Peak(1)**, **Max(1)** or **SPL(1)** can be used for the purpose described above.



Alarm source type

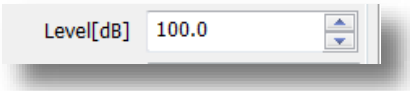
The **Source type** parameter defines the type of alarm source: **Current**.

Current means that the alarm pulse will be generated all the time when the Source measured with 1-second step is over the **Alarm Level** value.



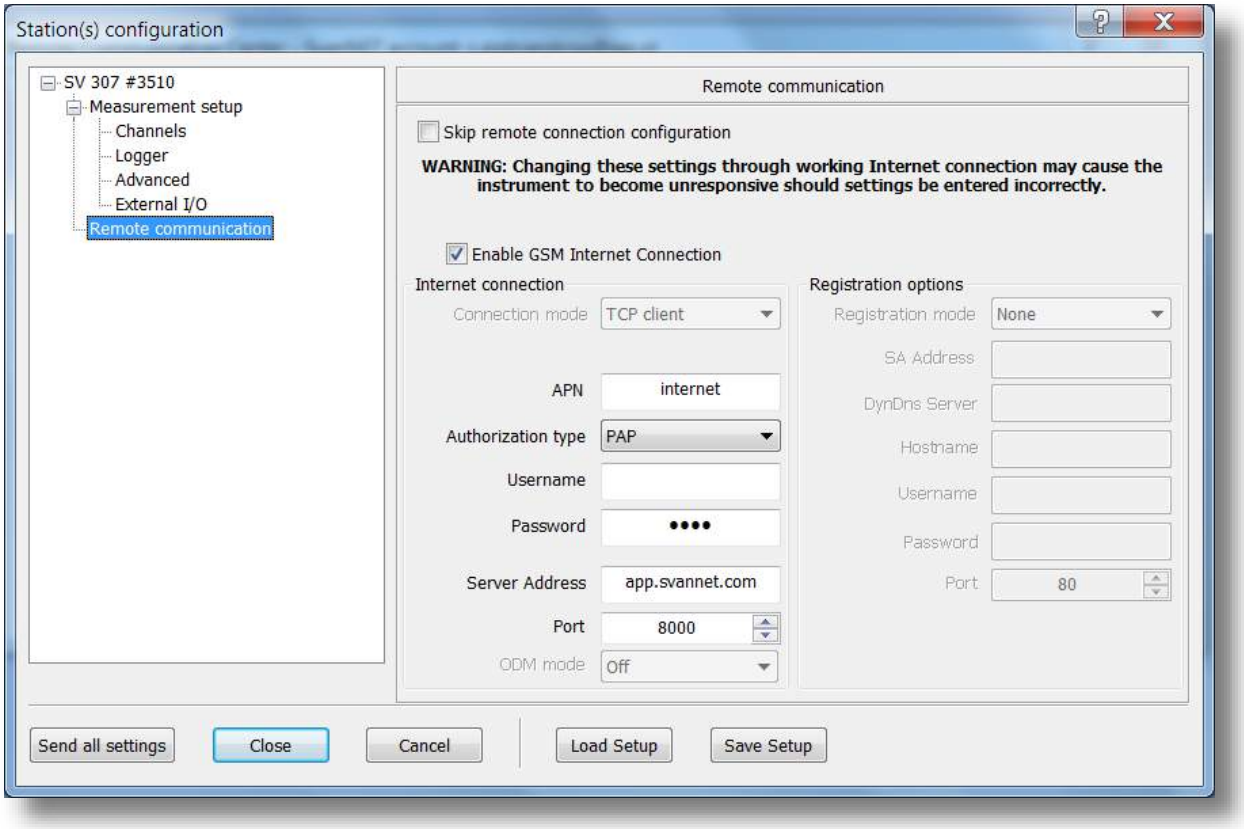
Alarm level

The **Level[dB]** parameter defines the threshold level of the result to be checked for the alarm purpose. If the Source is greater than the alarm threshold, the instrument will generate the alarm signal in the selected logic. The available levels are within the range [30.0 dB, 140 dB].



9.5.7 Remote communication

The **Remote communication** tab enables configuring a remote communication with SV 307 via the 3G modem.



Note: *Use this tab carefully, because improper changes sent to your SV 307 may destroy the Internet connection. And what is worse you will not be able to change them remotely!*

This tab enables configuring the 3G modem connection with the SvanNET web-service with pre-defined type of TCP/IP connection (**Connection mode**): **TCP client**.

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.

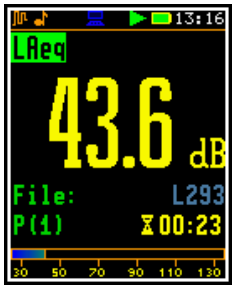
10.1 BASIS OF THE INSTRUMENT'S CONTROL

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:



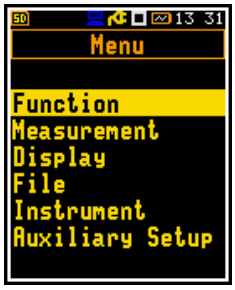
- instrument status: memory, power, real time, etc.;
- measurement status: measurement elapsed time, measurement start/stop/pause, trigger, logger etc.;
- measurement parameters: measured result, profile number, detector type, filter etc,
- file name.

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.

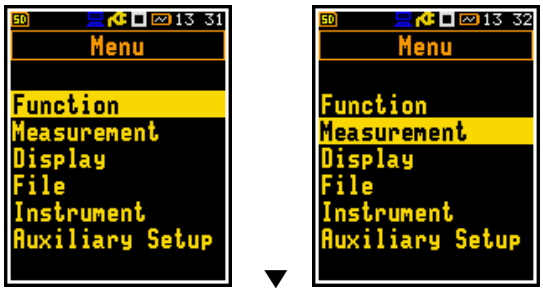


Recent Items list

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.

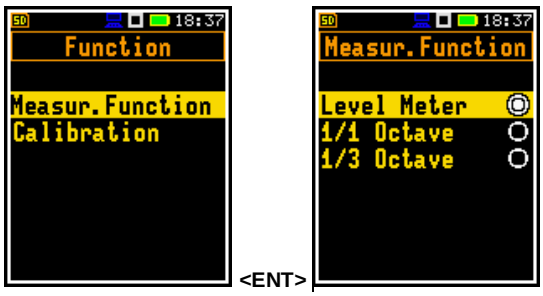
Position selection

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



Opening position

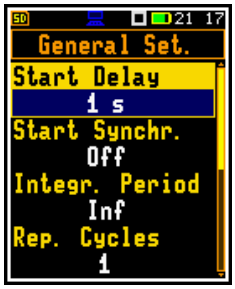
After selection of the desired position in the menu list, press the **<Enter>** key to open it. After this operation, a new sub-menu, list of option, list of parameter or information screen appears on the display.



List of parameters

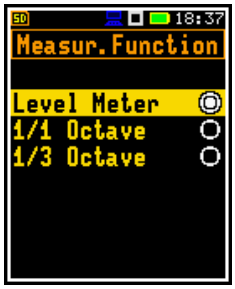
A list of parameters contains parameters for which you may select the value from the available set.

- 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 consists only one 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.



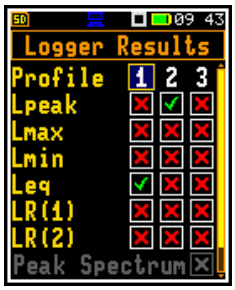
If the parameter has a numerical value, you can speed up a selection by pressing the ◄ / ► key and keeping it pressed by more than 2 seconds. In this case, the parameter value starts to change automatically until you release the pressed buttons.

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 change:

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



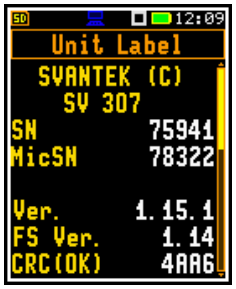
Complex parameters

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>**.

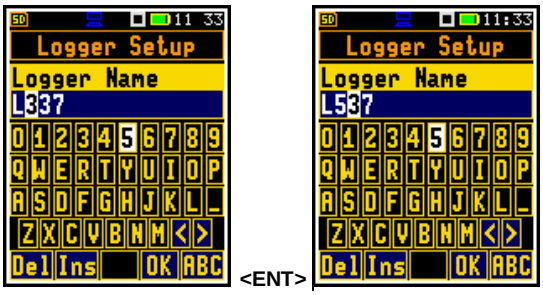
<Sh/►>

- 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.

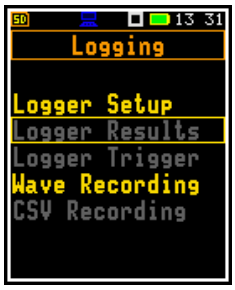


- To finish text edition, select **OK** key and press **<Enter>**.

The new name will be displayed in the **Logger Name** position.

Inactive parameters

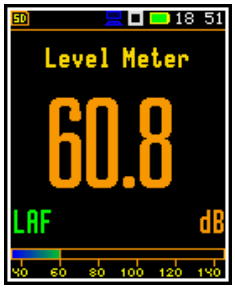
If some functions or parameters are not available, the positions in the menu or parameter lists linked with this function or parameter become inactive (the selected line field will be in the frame with black background, not yellow). For example, if **Logger** (*path: <Menu> / Measurement / Logging /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



10.2 GETTING STARTED

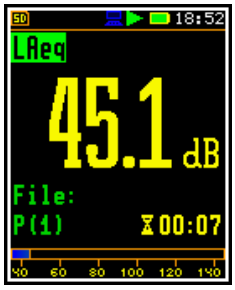
Turning the instrument on

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.



Starting measurements

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.



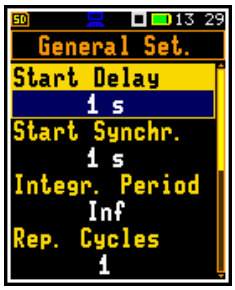
One profile mode is always available for most Functions of the instrument. The measurement results can also be presented in other display modes, which you may control - switch them on or off and adjust to your needs.

Setting up 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

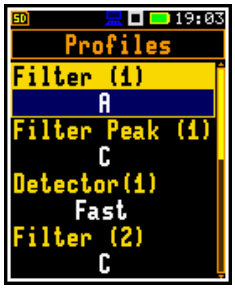


With default settings, the instrument is configured as the Sound Level Meter (**Measurement Function: Level Meter**) to measure broad-band sound pressure level by three virtual meters, so called profiles, with 1 second delay from the **<Start>** key pressure, infinite integration time (**Integration 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**);

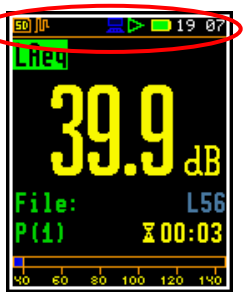
Profile 2 - **C** weighting filter for Peak results (**Filter Peak(2)=C**), **C** weighting filter for other results (**Filter(2)=C**), **Fast** for the LEQ detector (**Detector(2)=Fast**);

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

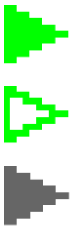
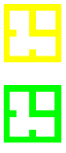
Indicators of the instrument state



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:

 “**play**” 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 delay or a delay caused by a trigger.	 **“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
 “**curve**” 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.	 “**note**” 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.	 **“trigger”** icon is displayed when other than Level or Slope trigger is waiting for condition fulfilment. The icon appears alternately with the “play”, “curve” or “note” icons.
 “**computer**” icon is displayed when there is USB connection with the PC.	 **“Level - trigger”** icon is displayed when the trigger condition is set up to „**Level -**”. The icon appears alternately with the „play”, “curve” or “note” icons.
 “**underrange**” icon is displayed when during the measurement the underrange was registered.	 **“Level + trigger”** icon is displayed when the trigger condition is set up to „**Level +**”. The icon appears alternately with the „play”, “curve” or “note” icons.
 “**overload**” icon is displayed when during the measurement the overload was registered.	 **“Slope + trigger”** icon is displayed when the trigger condition is set up to „**Slope+**”. The icon appears alternately with the “note” icons.
 “SvanNET” icon is displayed during internet connection with the SvanNET web-service	 **“Slope – trigger“** icon is displayed when the trigger condition is set up to „**Slope-**”. The icon appears alternately with the “note” 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.

10.4 DATA SAVING

Memory type

All available measurement results and settings can be stored in the instrument's memory (micro SD-card) as files 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.

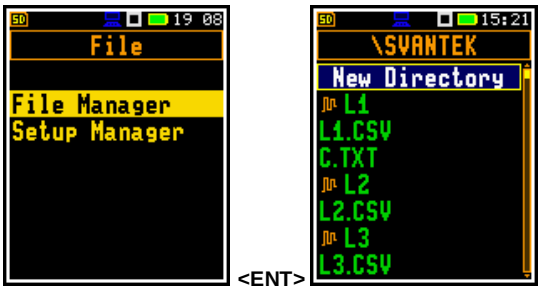

- SD card is inserted


- 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 files saving

Logger 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*) should be switched on.
3. The new file should be defined with a unique name (*path: <Menu> / Measurement / Logging / Logger Setup / Logger 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 "curve" icon is displayed.*

The file name (**Logger Name**) is generated automatically using a 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**.

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**, **L15** and **L16**, the counter value is 16.

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 **L17**.

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

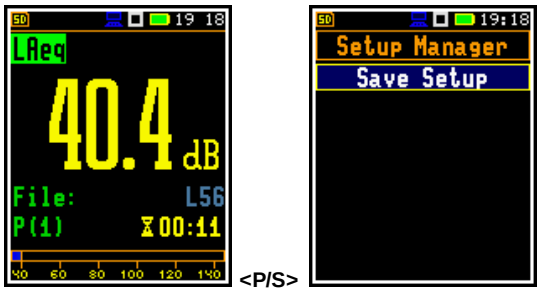
After changing the file name number without changing the prefix and pressing **<Enter>**, the counter will be automatically adjusted.

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

Saving setup files

Setup files can be stored by means of the **Setup Manager** or from the measurement screen with the **<P/S>** key (**<Shift>** 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 FILES DOWNLOADING AND UPLOADING

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 9.4.3).

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

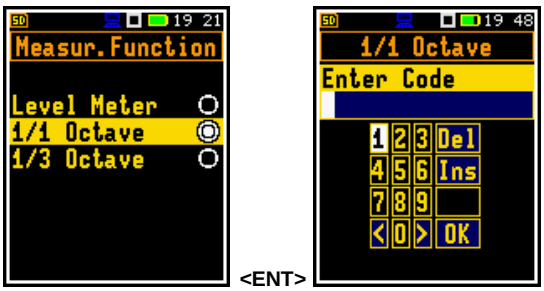
10.6 ACTIVATION OF OPTIONAL FUNCTIONS

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.



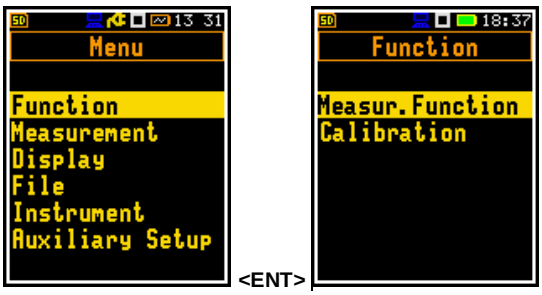
Press the **<Shift>** and ◄ keys right after turning on the instrument with the **<Shift>** and **<Start/Stop>** keys to check and lock early unlocked options.

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

10.7 MEASUREMENT FUNCTIONS AND CALIBRATION – FUNCTION

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

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

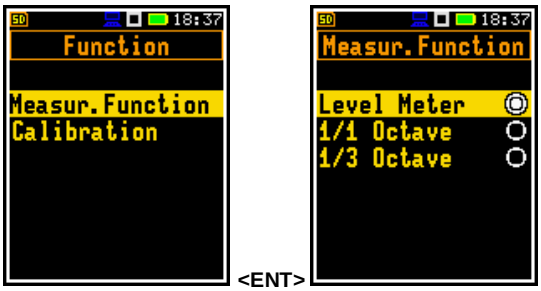


10.7.1 Measurement functions of the instrument – Measur. Function

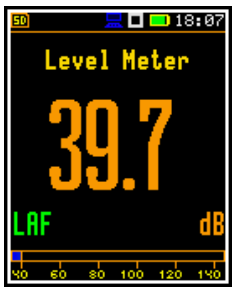
The main function of the instrument is measurements of the broadband sound pressure level (**Level Meter**). The Sound Level Meter (SLM) function provides the user with functions meeting the standard IEC 61672-1:2013 for Class 1 accuracy. The instrument can also be used for medium to long-term acoustic 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 measurements are performed together with all calculations of the 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** and **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!*

10.7.2 Instrument's calibration – Calibration

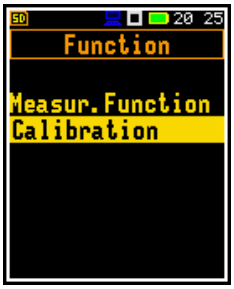
The instrument is factory calibrated with the supplied microphone for the reference environmental conditions (see Appendix C). The microphone sensitivity is a function of the temperature, ambient pressure and humidity, and when the absolute sound pressure level value is required, the absolute calibration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

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

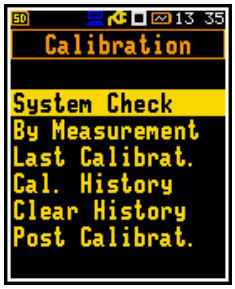
Whole information regarding calibration and system checking is registered in the special log file (C.txt).

To select the calibration function, open the **Calibration** list.

The **Calibration** list comprises positions enabling: 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**).



<ENT>



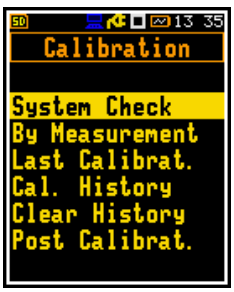
Note: *The calibration factor is always added to the results in the **Level Meter**, **1/1 Octave** and **1/3 Octave** functions.*

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.*

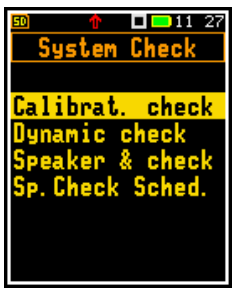
10.7.2.1 Checking the measuring path - System Check

There are several options for checking the measuring path:

- with the use of sound calibrator (**Calibrat. check**),
- by comparison of measurements from three MEMS microphones (**Dynamic check**) or
- with the use of internal speaker (**Speaker & check**) scheduled in the **Sp. Check Sched.** position.



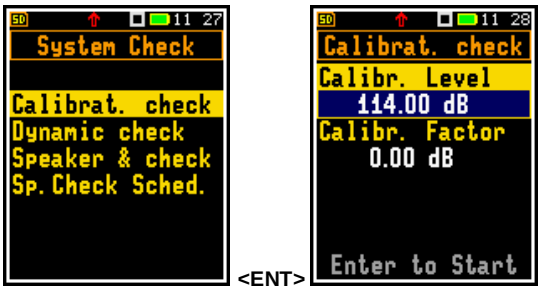
<ENT>



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

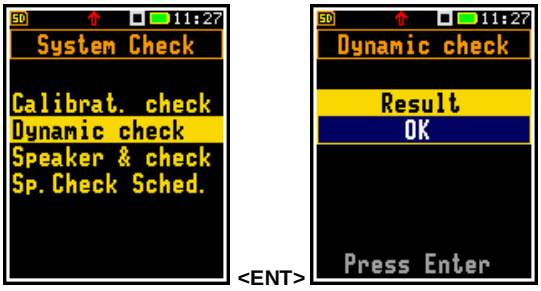
To perform the system check with the use of calibrator:

1. Select the calibrator signal level (**Calibr. Level**).
2. Attach the sound calibrator to the instrument's microphone.
3. Switch on the calibrator and wait approximately 30 seconds before starting the system check measurement.
4. Start the calibration measurement with the **<Enter>** key.



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

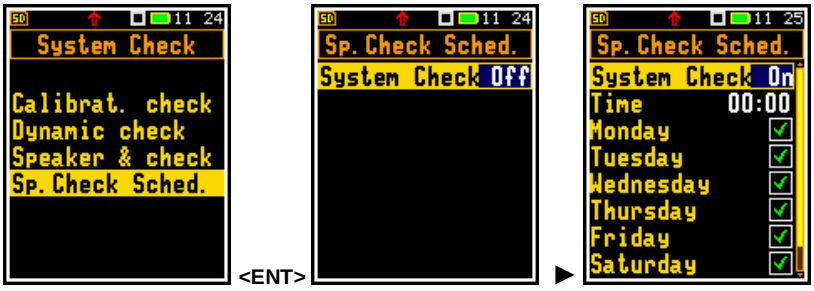
The **Dynamic check** screen shows the status of such check.



If you open 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 checking is considered as successful (**Result: OK**).

You can schedule the checking with the use of speaker. For this purpose, 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.

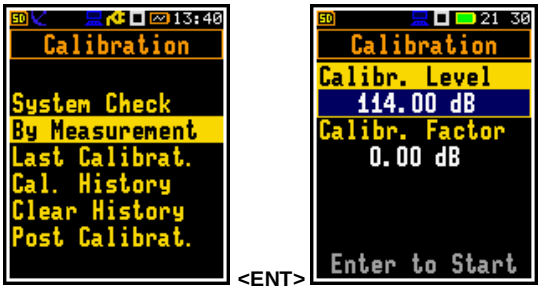


10.7.2.2 Calibration - By Measurement

To calibrate the instrument:

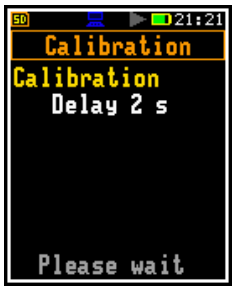
1. Set the calibration level (**Calibr. Level**) appropriate to the used calibrator. The default level is 114 dB at 1000 Hz. Remember to change this level if using an alternative reference sound signal source.

Attach the sound calibrator (SV 36 or equivalent 114 dB/1000 Hz) carefully over the microphone of the instrument.



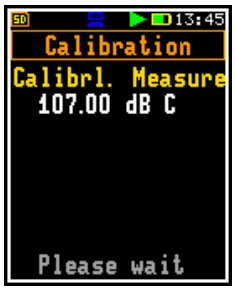
Note: *It is also possible to use different type of acoustic calibrator dedicated for ½" microphones. In any case, before starting the calibration measurement, you should set the level of the signal generated by the given calibrator (**Calibr. Level** position), which is stated in the calibrator's certificate (the value of the **Calibr. Level** set by the manufacturer of SV 307 is equal to 114 dB).*

2. 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.
3. Start the calibration measurement by pressing the **<Start/Stop>** key.

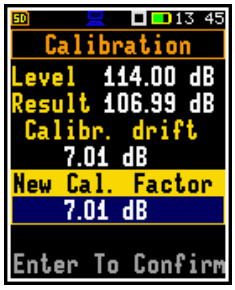


The calibration delay time is set to 3 seconds. While waiting for the start of the measurements the **Delay** is counted down on the display.

During the calibration measurement, the level of the measured calibration signal is displayed. If the maximal difference between three 1-second consecutive results (Leq(C)) 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, the **New Factor** (difference between Calibration Level and Calibration Measurement, calculated in dB) is displayed and it will be proposed to save the new calibration factor by pressing **<Enter>** (**Enter To Confirm**), or reject it by pressing **<Esc>**. In both cases the instrument exits the **Calibration** screen.

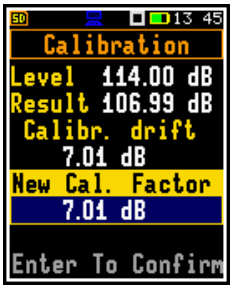


It is recommended to repeat calibration measurements few times. Obtained results should be almost the same (with ±0.1 dB difference). Reasons for unstable results are as follows:

- 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).*

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



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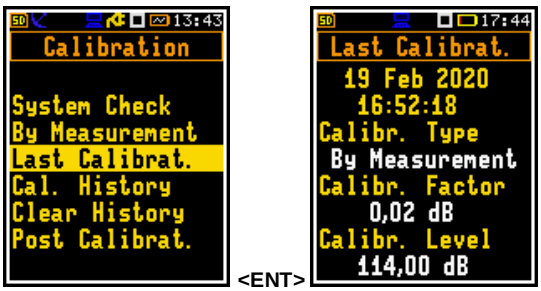
If calculated calibration factor is out of the ±3 dB range the special warning appears on the screen "Microphone outside the tolerance. Accept?". If the calibration factor is out of the ±20 dB range the calibration factor is not accepted.

5. Detach the calibrator from the microphone.

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

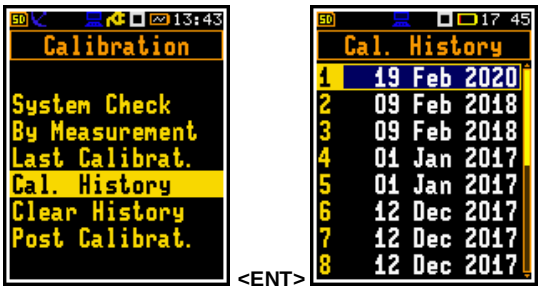
10.7.2.3 Checking the last calibration - Last Calibration

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.



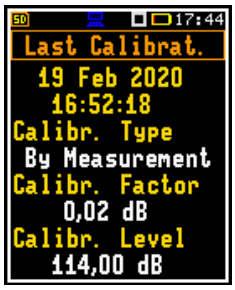
10.7.2.4 History of performed calibrations – Calibration History

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



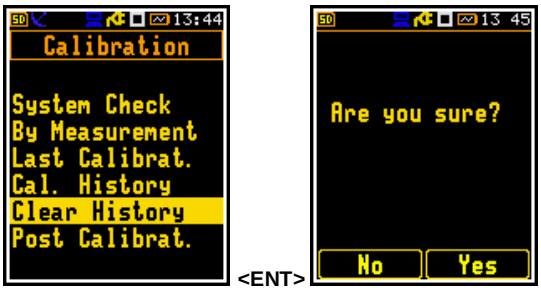
To review the calibration records, select the required line in the **Cal. History** screen and press **<Enter>**.

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



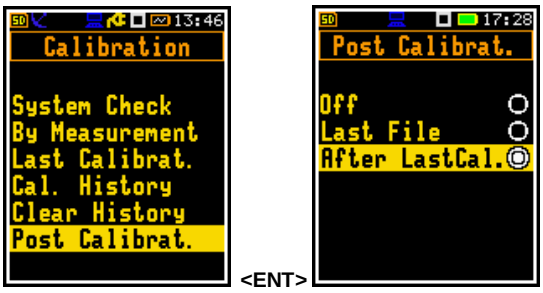
10.7.2.5 Erasing calibration records – Clear History

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



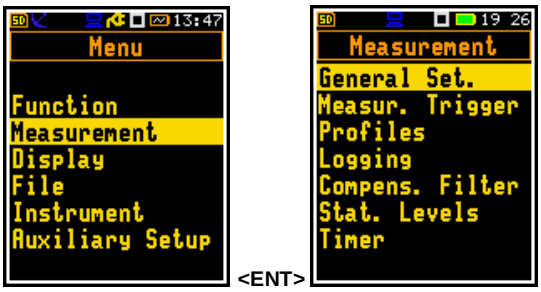
10.7.2.6 Post measurement calibration – Post Calibration

Sometimes it is required to perform a so-called post-calibration of the instrument. The **Post Calibration** position allows you to perform additional calibration after measurement session and add its results to the data file. In the opened screen, there are three options for saving calibration results: not to save (**Off**), save in the last file (**Last File**) or save in the files which will be created after the last calibration (**After LastCal.**).



10.8 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>**.

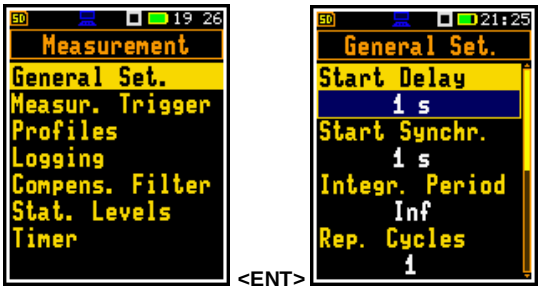


The **Measurement** section contains following positions:

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.

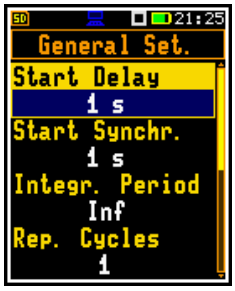
10.8.1 Setting up the main measurement parameters - General Settings

The **General Set.** list allows to programme general measurement parameters: delay of the measurement start (**Start Delay**), synchronisation 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**).



Delay of measurement start

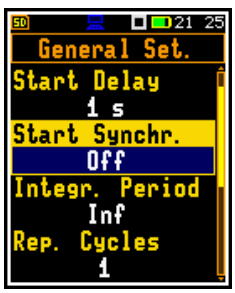
The **Start Delay** parameter defines the delay period from the **<Start/Stop>** keystroke to the real start of the measurement (digital filters of the instrument constantly analyse the input signal even when the measurements are stopped). This delay period can be set from 0 second to 60 minutes. Default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



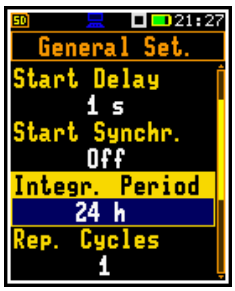
Note: *The minimum delay period is equal to 0 second. In the* ***Calibration*** *mode, the delay period is always equal to 3 seconds.*

Synchronisation of measurement start

The **Start Synchr.** parameter defines maximum delay period from the **<Start/Stop>** keystroke to the start of measurements to allow synchronisation 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



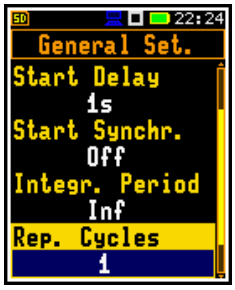
The **Integr. Period** parameter defines the period during which the signal is being measured (and for some results averaged/integrated) and measurement results are logged in the logger file as a **Summary Results** (see description of the **Logger Setup**). The integration period can be infinite (**Inf**) 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: **Inf**.

During the **Integration Period**, the instrument performs series of 1-second measurements/integrations, and every second averages 1-second results with the results averaged for n-1 seconds. These averaged results are displayed and renewed every second for the elapsed measurement time (n seconds). In the end of the Integration Period the averaged measurement results are saved in the logger file providing that such saving is switched on.

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

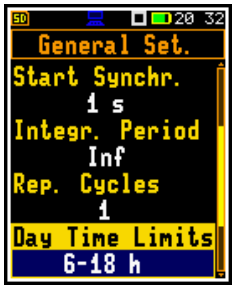


The **Rep. Cycles** parameter defines the number of measurements (with the measurement period defined in the **Integr. Per**) to be performed by the instrument after the **<Start/Stop>** keystroke. The **Rep. Cycles** number values are within the limits [Inf, 1÷1000]. Default value: **1**.

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 the file.

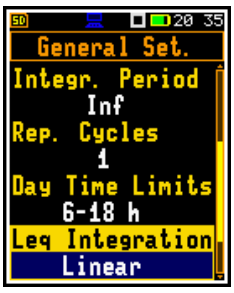
Note: *In case of the infinite integration period or the infinite repetition cycles the measurement should be stopped manually with the* ***<Start/Stop>*** *key*.

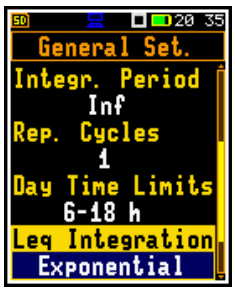
Day time limits



The **Day Time Limits** parameter defines the day and night time limits required by the local standards. 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





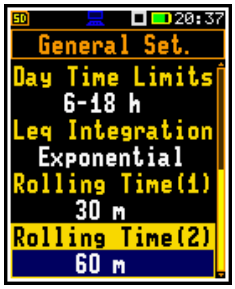
The **LEQ Integration** parameter defines the detector type for calculation of the **Leq**, **Lden**, **LEPd** and **Lnn** results. Two options are available: **Exponential** and **Linear**. The formulae used for the **Leq** calculation are given in Appendix D. Default detector: **Linear**.

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 **Lnn** results do not depend on the detector time constant: **Fast**, **Slow** or **Impulse** (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 another standard for time averaged **Leq** measurements. When this option is selected the value of the **Leq, Lden, LEPd** and **Lnn** results depend on the detector time constant. Results are displayed with the indicator of the detector type selected in the profiles (*path: <Menu> / Measurement / Profiles*).

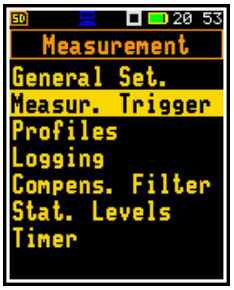
Rolling Time

In the two 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**.

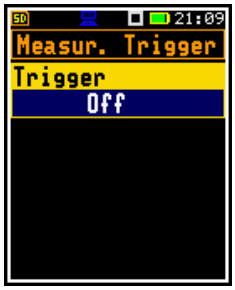


10.8.2 Setting up the measurement trigger – Measurement Trigger

The **Measur. Trigger** position enables setting up 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 the case when trigger is on, additional parameters can be defined: the measurement result that is checked for a trigger condition (**Source**), its threshold level (**Level**) and the speed of the Source value changing (**Gradient**). Default mode: **Off**.



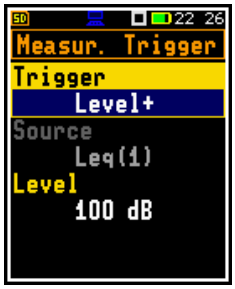
<ENT>



The trigger condition is checked every 0,5 milliseconds.

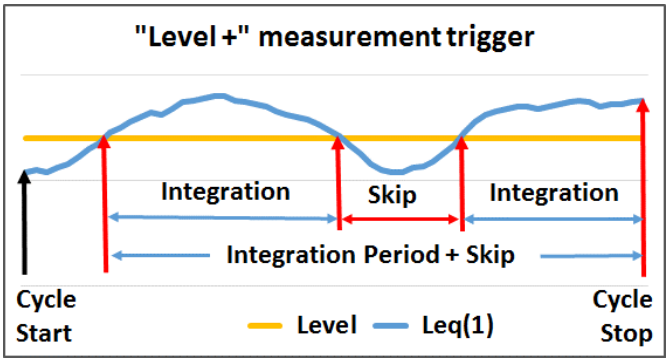
Level type trigger

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 value (**Level**). In other cases, the instrument continues checking the trigger condition every 0,5 ms.



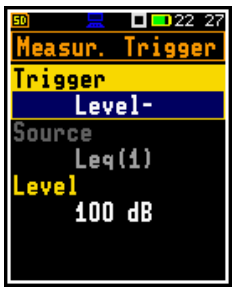
When the new measurement cycle begins (after pressing the **<Start/Stop>** key or automatically after stop of the previous measurement cycle) the instrument checks the trigger condition every 0,5 ms and starts 1-second integration if condition is met.

After 1-second integration, the instrument repeats the 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 the results file.

The **Level -** type 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.

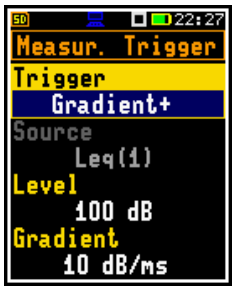


This is a mirrored trigger to the **Level +** trigger.

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

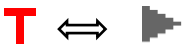
Gradient type trigger

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 (**Level**) and the gradient of the Source value is greater than the gradient threshold level (**Gradient**). In other cases, the instrument continues checking the trigger condition every 0,5 mc.



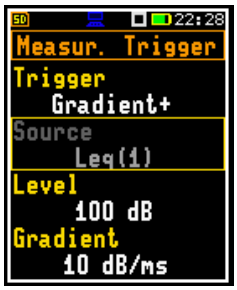
This type of trigger has the same logic as the **Level +** trigger, but the trigger condition requires also gradient level to be exceeded.

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



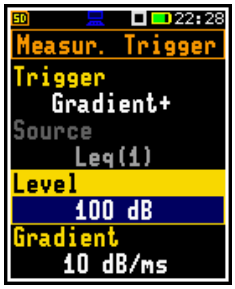
Source result

Only one measured result can be used as a source (**Source**) for checking of trigger conditions in the **Level Meter** mode, namely the output signal from the LEQ detector coming from the first profile, which is denoted here as **Leq(1)**. This position does not become active (it is not displayed inversely) and the text stated here remains unchanged.



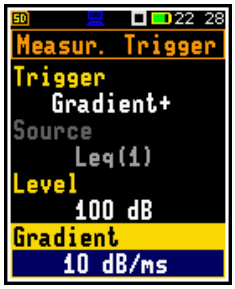
Threshold level

The threshold level of the triggering signal (**Level**) can be set in the range from 24 dB to 136 dB. The instantaneous value of the LEQ result measured with the **Filter** and the **Detector** constant selected for the first profile (*path: <Menu> / Measurement / Profiles*) compares with the **Level** value every 0,5 milliseconds.

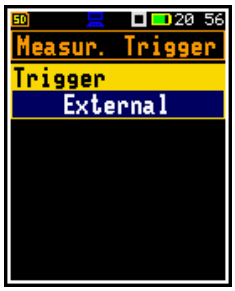


Speed of Source value changing

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 type trigger



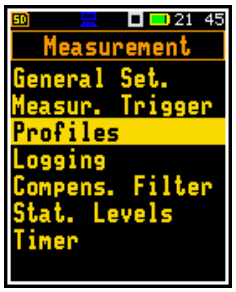
When **External** is selected, the trigger condition is the existence of the external signal on the I/O socket. In this case, it is necessary to set up the **I/O Mode** parameter as **Digital In** (*path: <Menu> / Instrument / Multifunction I/O*).

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 the **Integration Period**.

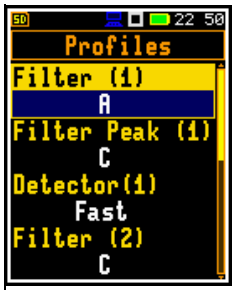
10.8.3 Setting parameters for profiles – Profiles

Parameters for three profiles can be set in the **Profiles** list of parameters.

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**).



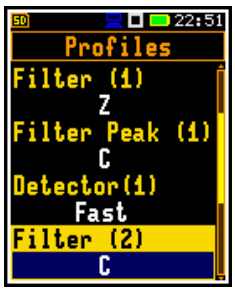
<ENT>



Weighting filters selection

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

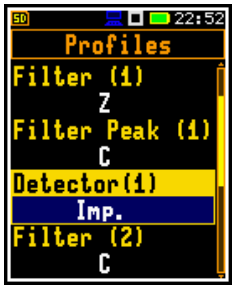
- **Z** class 1 according to IEC 61672-1:2013,
- **A** class 1 according to IEC 651 and IEC 61672-1:2013,
- **C** class 1 according to IEC 651 and IEC 61672-1:2013,
- **B** class 1 according to IEC 651,
- **LF** low frequency filter according to China requirements.



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 **Ltm5** results and to the **Leq**, **LE**(SEL), **LEPd** and **Lden** results in the case the **Exponential** LEQ detector is selected in the **General Settings** list (see Appendix D).



10.8.4 Setting up the data logging – Logging

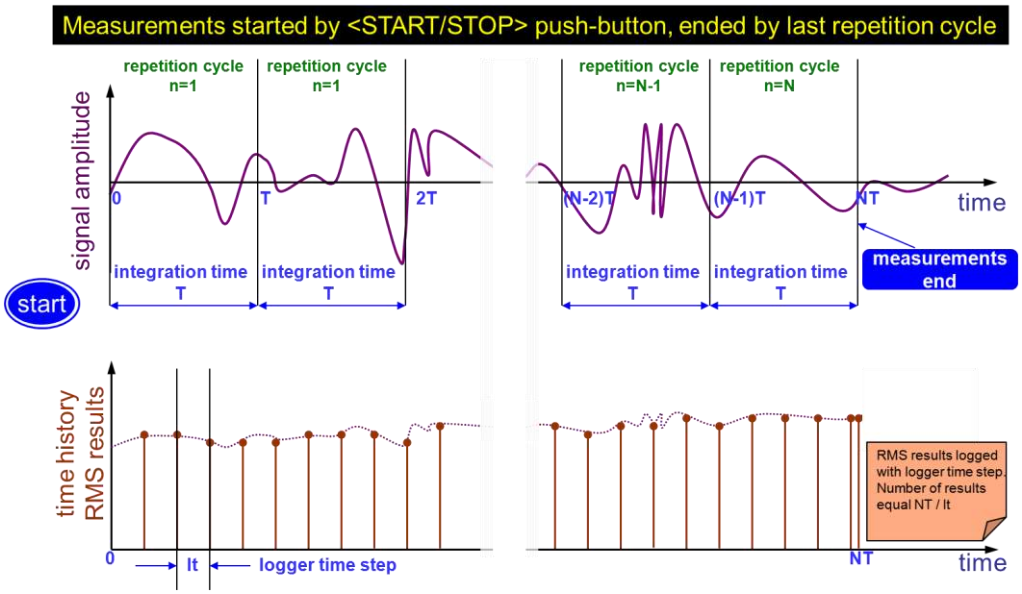
Main measurement results or Summary Results (**L** (SPL), **Leq**, **LE** (SEL), **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **Lxx**, **OVL**, **Lpeak**, **Lmax**, **Lmin**, meteo results and spectra) are measured and registered in the file with the step defined by the **Integration Period** parameter as many times as defined by the **Repetition Cycles** parameter.

The **Logging** function enables also additional registration of some results with different step defined by the **Logger Step** parameter. Therefore, it is possible to save in parallel two sequences of measured results – one for Summary Results and another for so called Logger Results.

When the **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 pressing the **<Start/Stop>** key or after stopping the measurement remotely.

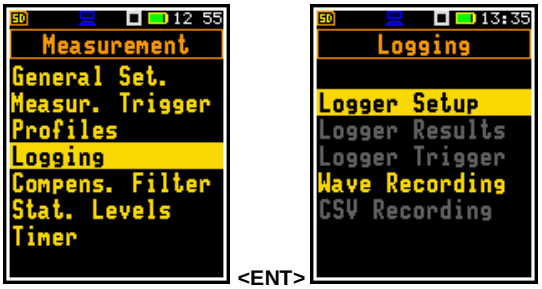
Summary Results are saved in the same file with Logger Results. Blocks of summary results are recorded to the file in the end of every measurement cycle.

The figure below illustrates described principles of saving results of the measurement.



Summary Results and Logger Results saving

The **Logging** list enables programming of the logging functions: recording of summary and logger results (measurement history), recording of an audio signal in a WAV file and saving Summary Results to the CSV format. The **Logging** list consists of four positions: **Logger Setup**, **Logger Results**, **Logger Trigger**, **Wave Recording** and **CSV Recording**.

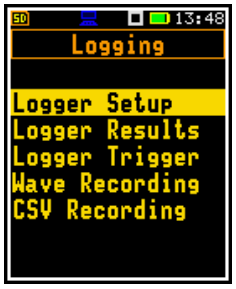


10.8.4.1 Setting up the logger general parameters – Logger Setup

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**, result files are not created, and measurement results (both summary and logger) are not saved!*

Splitting of the 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 the new file will start: after integration period time (**Integr. Period**), or every quarter of the RTC (**Sync. to 15min.**), or every half an hour of the RTC (**Sync. to 30min.**), or 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, then six additional positions (**Split. Time 1**, **Split. Time 2**, **Split. Time 3**, **Split. Time 4**, **Split. Time 5** and **Split. Time 6**) appear in the list. The position is switched off if **Off** was selected.

Pressing the ► key changes the **Off** to the time format value. Further use of the ► key enables setting the desired time of the day when splitting should occur.

►

The **Logger Step** defines the step for logger results logging 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 text editor function is opened for the file name editing.

►

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. The instrument informs with the message “Incorrect File Name” and waits for the **<Enter>** key to be pressed.

If the name is new the instrument changes the **Logger Name** in the **Logger Setup** list.

<ENT>

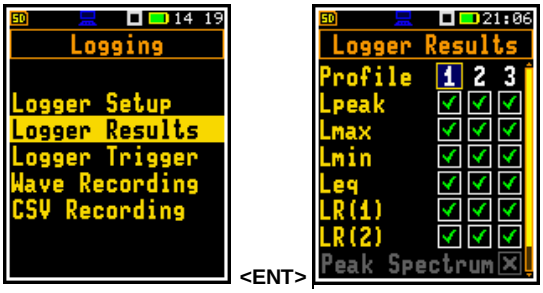
Summary Results saving

The **Summary Results** parameter switches on or off saving the full set of Summary results that the instrument measures with the **Integration Period** step: **L**, **Leq**, **LE**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **Lxx**, **OVL**, **Lpeak**, **Lmax**, **Lmin**.

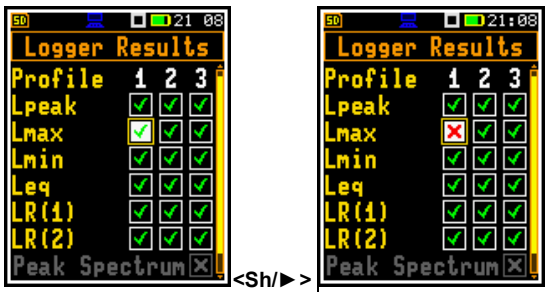
10.8.4.2 Selection of results for logging – Logger Results

The **Logger Results** list you can select results for three independent profiles, which will be logged in the logger file during 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 other measurement functions, also spectra can be logged.

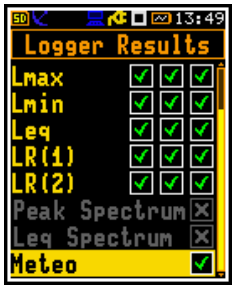


Activation/deactivation can be done with the ◄ / ► key pressed together with **<Shift>**. The position is changed with the ◄ / ► or ▲ / ▼ key.



If you use SP 276 weather station, you can log meteo results to the logger file with the **Logger Step**.

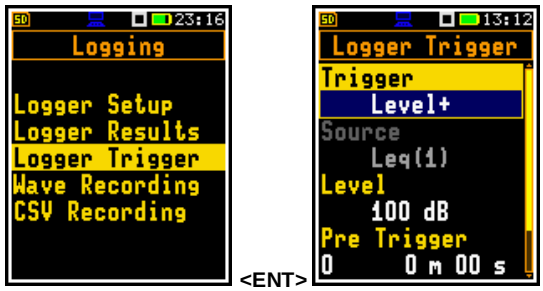
To enable this, switch on the **Meteo** position.



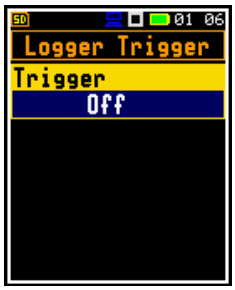
***Note:** When **Logger** is switched **Off** or no results for logging were selected, the logger plot cannot be activated in **Display Modes** and therefore doesn't appear on the display.*

10.8.4.3 Logger trigger settings – Logger Trigger

The **Logger Trigger** parameters define the way the history 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**), the threshold level (**Level**) as well as the number of results saved in the logger before the trigger condition is met (**Pre Trigger**) and the number of results saved in the logger after the last trigger is met during logging (**Post Trigger**).

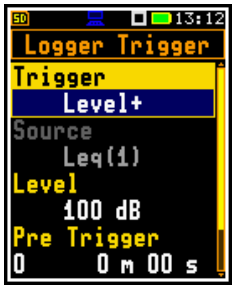


Trigger disabling



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 type trigger

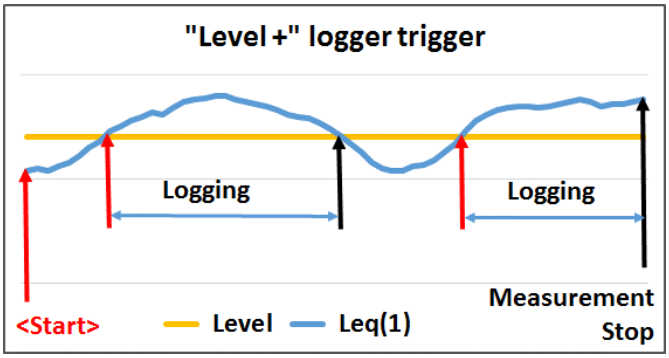


The **Level +/Level -** type trigger enables logging of the time-history results (**Logger Results**) averaged by the **Logger Step** period under the condition: the value of the LEQ result (**Source**) integrated by the **Logger Step** period is greater/lower than the threshold level (**Level**). In 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 measurement is performing (e.g. the instrument performs a series of 1-second averages), from the measurement start till the measurement stop.

This means, for example, that when the measurement is skipped because the measurement trigger condition is not met, logging is also skipped, even if the logger trigger condition is met.

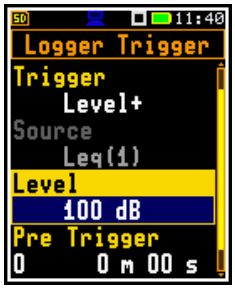


Note: *When logging is waiting for the level trigger the "Level trigger" icon appears alternatively with the „curve" icon.*

Source result

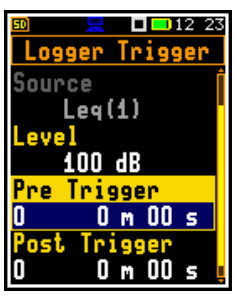
Only one measured result can be used as a source (**Source**) for checking trigger condition in the **Level Meter** mode, namely the output signal from the LEQ detector coming from the first profile, which is denoted here as **Leq(1)**. This position does not become active (it is not displayed inversely) and the text stated here remains unchanged.

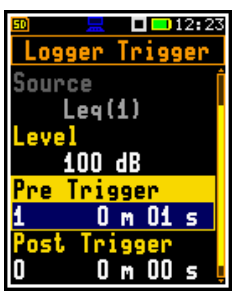
Threshold level



The threshold level for the logger trigger (**Level**) can be set in the range from 24 dB to 136 dB range. An instantaneous value of the LEQ result calculated with selected **Filter** and **Detector** constant for the first profile (*path: <Menu> / Measurement / Profiles*) compares with the **Level** value every 0,5 milliseconds.

Pre and post trigger recording





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

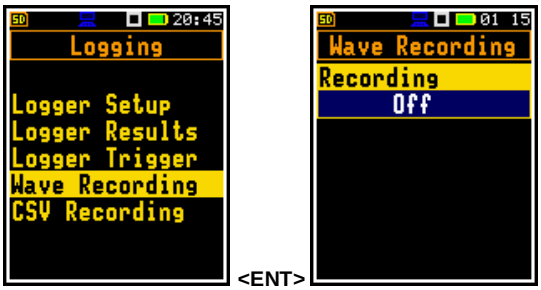
In the **Post Trigger** position, the number of the results registered in the logger file after the fulfilment of the triggering condition can be set. This number is limited to 0..200.

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

Periods of measurements that are saved in the logger before or after fulfilment of the trigger condition can be calculated by multiplying the value set in the **Pre Trigger** or **Post Trigger** positions by the value set in the **Logger Step** position (*path: <Menu> / Measurement / Logging / Logger Setup*). The result of such calculation is presented in the same line in the format **0m00s**.

10.8.4.4 Signal recording setup – Wave Recording

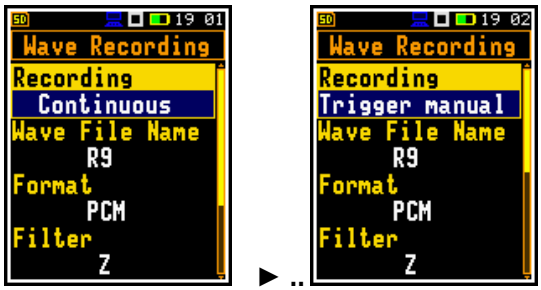
The **Wave Recording** position enables activating and configuring of waveform signal recording in the WAV type file. Default mode: **Off**.



***Note:** The **Wave Recording** function is optional and should be unlocked by entering the activation code in the text editor screen, opened by the ► key. Once unlocked this option will be ready to use permanently.*

Definition of record triggering

The **Recording** position, if it is not **Off**, defines the way a signal recording should be done, continuously during the measurement (**Continuous**) or on the trigger of type: **Slope +**, **Slope -**, **Level +**, **Level -**, **Gradient +**, **Integr. Period** and **External**.



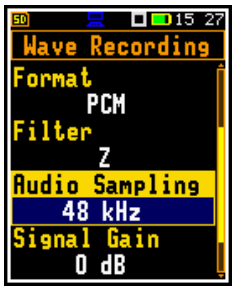
The **Wave File Name** position enables editing the name of the WAV file.

The **Format** parameter defines a format of the wave file header: **PCM** or **Extensible**.

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

The **Sampling** parameter defines the sampling frequency of event recording: **48 kHz**, **24 kHz** or **12 kHz**.

The **Signal Gain** parameter defines the gain of the recorded signal: **0 dB** … **40 dB**.



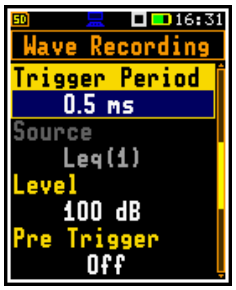
You can limit the length of the signal recording by selecting the duration in the **Length Limit** position.

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).

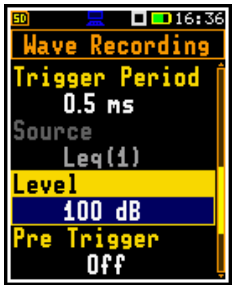
Trigger Period

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



Source result

The **Source** position indicates the triggering source. Only one measured result can be used as a triggering source in all modes, namely the output of the LEQ detector of the first profile, which is denoted here as **Leq(1)**.



Threshold level

The threshold level for the source (**Level**) can be set in a range from 24 dB to 136 dB.

Speed of triggering signal 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 the **Pre Trigger** parameter is switched on, the event signal will be recorded before the trigger condition moment. The interval of such recording depends on the sample frequency. For 12 kHz, the time interval can be selected from **1 s** to **30 s**, for 24 kHz - from **1 s** to **15 s**, for 48 kHz – from **1 s** to **8 s**.

Time of signal recording

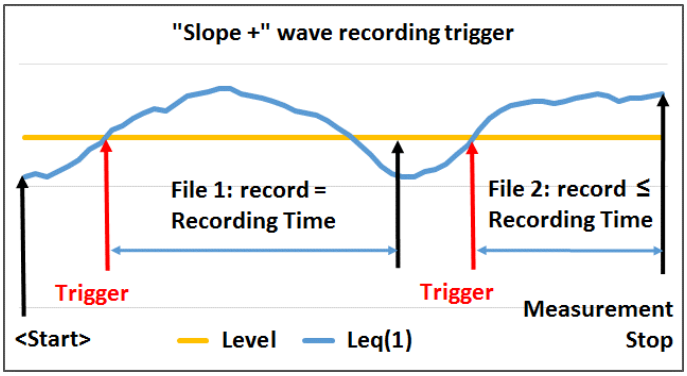
The **Recording Time** parameter defines the time of signal recording after triggering. If next trigger condition appears during the **Recording Time**, the signal will be recorded for additional **Recording Time**. The available values are from **1s** to **8h**, or **Inf**.

Slope type trigger

The **Slope +** trigger starts a wave recording under the condition: rising value of the RMS 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 intervals, defined by the **Trigger Period** parameter, and if condition is met starts the event recording. 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**. Assuming, that after first recording the trigger conditions continue to be checked, and new event recording may start during the same measurement time.

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



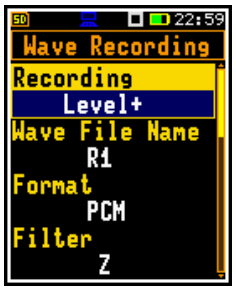
The **Slope -** trigger starts a wave recording under the condition: falling value of the RMS result (**Source**) integrated by 0,5 ms passes below the threshold level (**Level**).

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

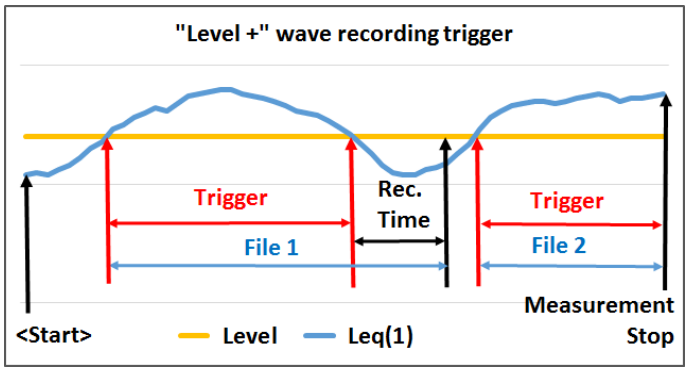
Note: *When a wave recording is waiting for the slope trigger the "slope trigger" icon superimposes on the grey „note" icon.*

Level type 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 (**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.



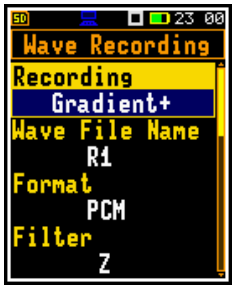
If during the **Recording Time** a trigger condition appears, the recording will be prolonged for another **Recording Time** from the moment of that trigger condition and so on.



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

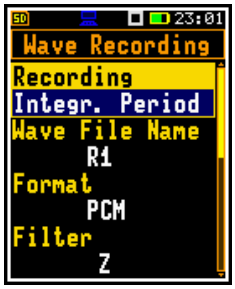
Gradient type trigger

The **Gradient +** trigger starts an event 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 (**Level**) and the speed of this Source 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. 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 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.



External type trigger

When the **External** trigger is selected, the recording starts from the external signal on the **I/O** socket. In this case, it is necessary to set up the **I/O Mode** parameter as **Digital In** (*path: <Menu> / Instrument / Multifunct. I/O*).

After triggering the recording will last the **Recording Time** and if during this time new external trigger appears the instrument will prolong the recording for another **Recording Time**.

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

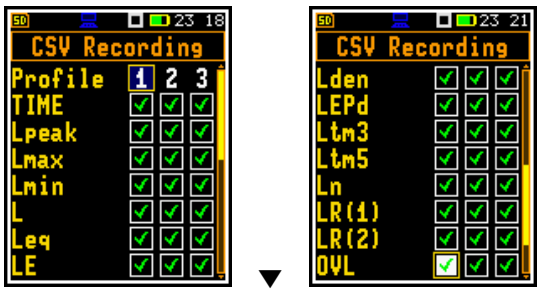
Wave files size control

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

10.8.4.5 Summary Results recording in the csv format – CSV Recording

The **CSV Recording** position enables selecting Summary Results to be recorded in the CSV type file (*comma-separated values)*. The CSV file structure is presented in Chapter 8.2.2.



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

10.8.5 Switching on the microphone compensation – Compensation Filter

The **Compens. Filter** position allows you to switch on/off the microphone compensation (**Microphone Comp**) and, if the microphone compensation is **On**, select the compensation for the **Free Field** monitoring.

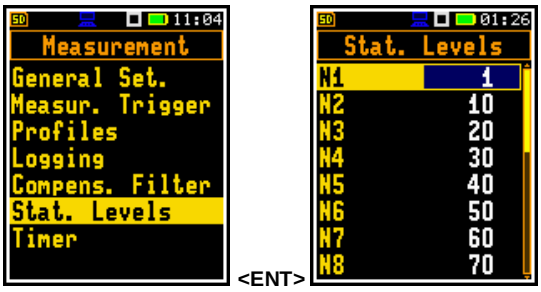
The microphone inner noise compensation (**Microphone Comp**) is switched on by default, however it is possible to switch it off for electrical measurements (e.g. for laboratory calibration measurements).

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.

10.8.6 Statistical levels settings – Statistical Levels

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

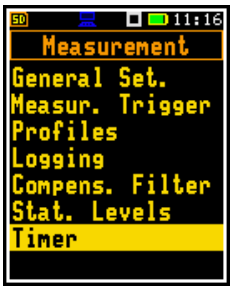
Default statistical levels have following settings: **1**, **10**, **20**, **30**, **40**, **50**, **60**, **70**, **80** and **90**. All values should be within the integer range [1, 99]. Each value can be set independently from others.



10.8.7 Programming the instrument's internal timer – Timer

The **Timer** function is used to programme the automatic start-up of the measurement at a given time and day of a week and with the parameters set in the **Measurement** section.

The **Timer** position enables programming the internal real-time clock to act as a delayed start and stop timer. The instrument will be switched on by itself at the programmed time and will perform measurements with the same settings that were used before the instrument was turned off.



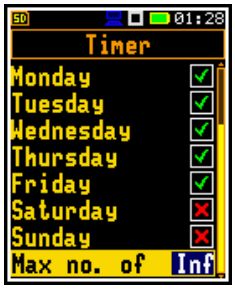
<ENT>

Setting hour and day of the measurement's start

The **Start (hh:mm)** and **Stop (hh:mm)** positions determines the time for the measurement to start and to stop automatically.

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**). 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 available for the instrument to carry out the required measurements when it wakes up.*

10.8.8 Example of timer execution

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 the 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 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.

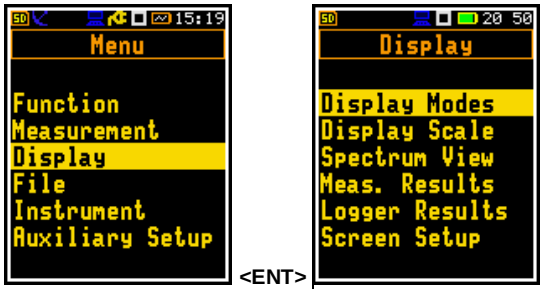
The measurement will be performed by a period of 20 minutes. Then, the results will be saved in the file with the name L58 automatically and the instrument will be waiting for the next Monday to start next measurement at 8.00. Next file will be automatically named L59 and so on.

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 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.



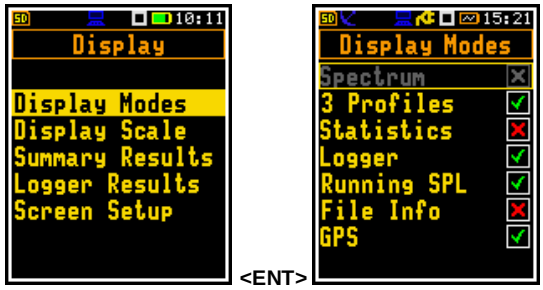
The **Display** section contains following items:

Display Modes	allowing to define active modes of the measurement results presentation;
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;
Summary Results	allowing to select the Summary results to be displayed;
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.

10.9.1 Enabling display modes – Display Modes

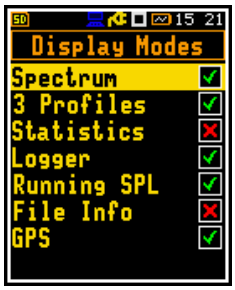
The One Result display mode is always enabled. Other display modes can be enabled or disabled in the **Display Modes** list.

You may switch between those display modes, that were enabled in the **Display Modes** list.



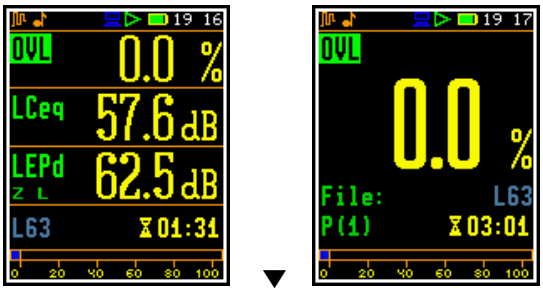
In the **Level Meter** function, the following display modes are available on the list: **3 Profiles**, **Statistics**, **Logger**, **Running SPL**, **File Info** and **GPS**.

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



Changing display modes

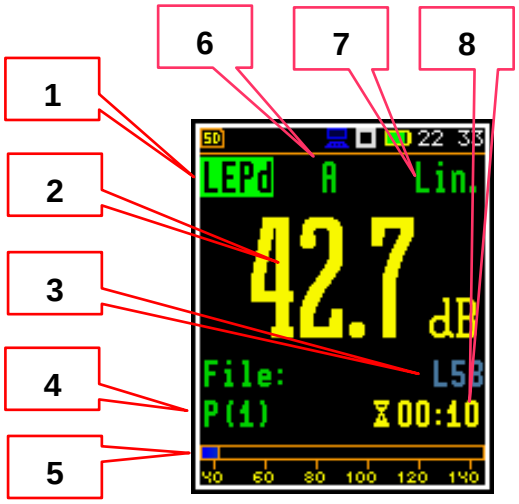
The display mode is changed with the ▲ / ▼ key.



10.9.1.1 One Result display mode

In the One Result display mode, any measurement result, selected in the **Meas. Results** list (*path: <Menu> / Display*), may be viewed.

Field description of the One Result mode



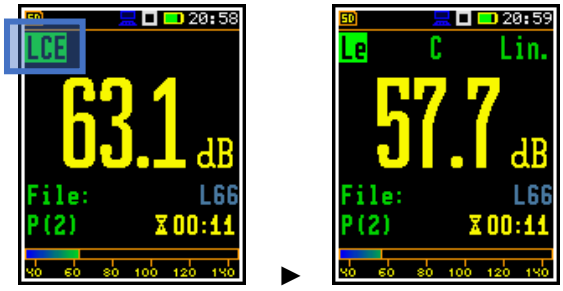
1. Result name: **OVL**, **Lpeak**, **Lmax**, **Lmin**, **L**, **Leq**, **LE**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **Lnn**;
2. Value of the measured result
3. File name
4. Profile number
5. Quasi analogue value indicator
6. Implemented weighting filter: **Z**, **A**, **C** or **B**
7. Detector time constant, when the detector is exponential: **Imp.**, **Fast**, **Slow** or **Lin** when the detector is linear
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.*

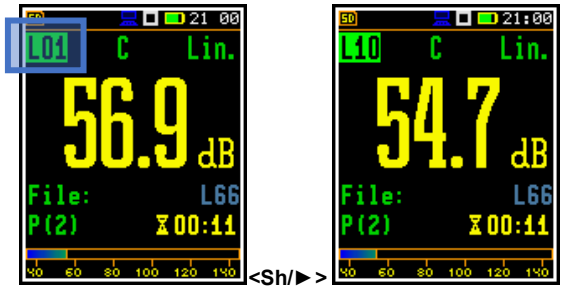
Changing measurement results

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



Changing statistical levels (Lnn)

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

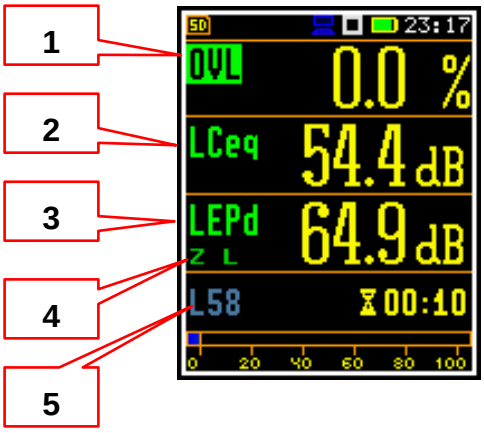


10.9.1.2 Three profiles display mode

In the **3 Profiles** mode any three measurement results, selected in the **Meas. Results** list, may be presented for three profiles altogether.

Field description of the 3 Profiles mode

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.

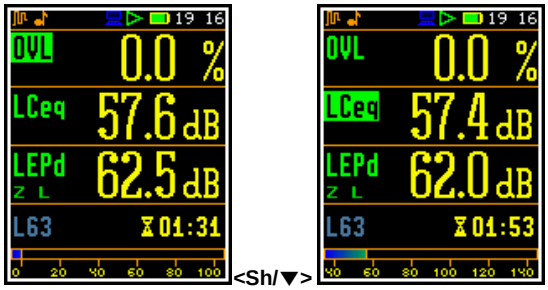


Changing active profiles

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

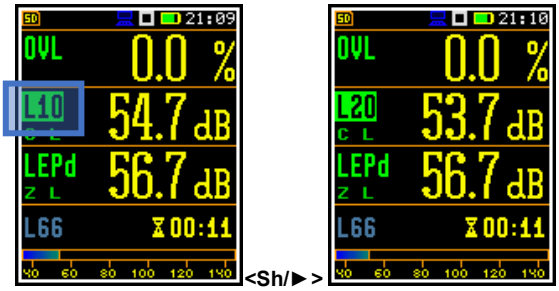
Changing measurement results

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



Changing statistical levels (Lnn)

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

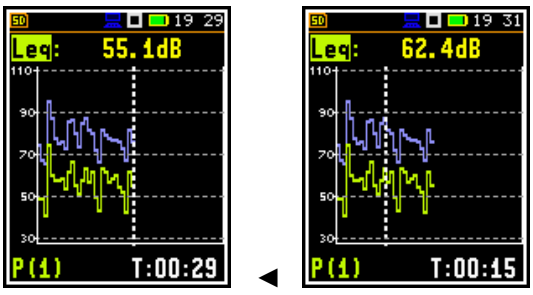


10.9.1.3 Logger display mode

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

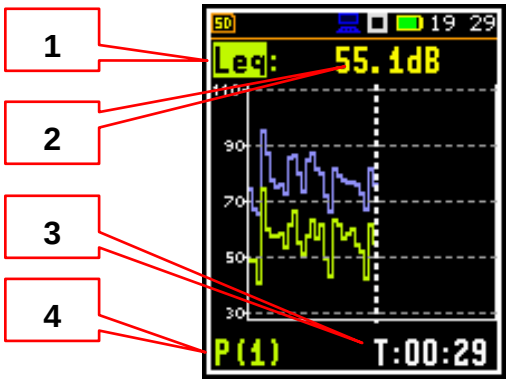
The cursor position can be changed with the ◄ / ► key.

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

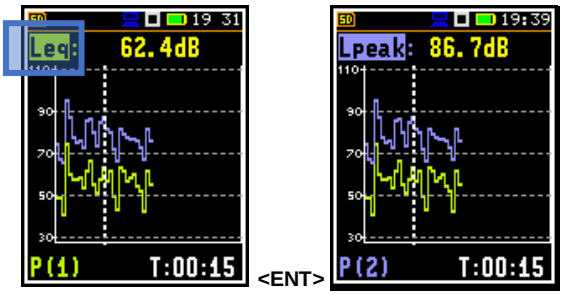


Field description of the Logger mode

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!*

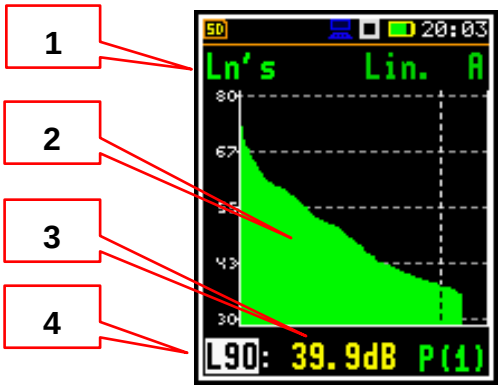
Note: *When* ***Logger*** *is switched on, but results were not selected for logging the* ***Logger*** *presentation mode is disabled!*

10.9.1.4 Statistics presentation mode

"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 **Lnn**, and the axis Y defines the calculated noise level in dB.

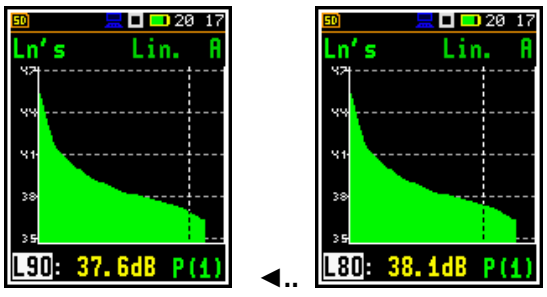
Field description of the Statistics mode

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 **Lnn** (cursor position)

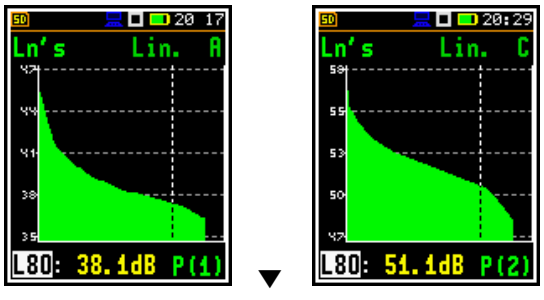


The cursor position can be changed with the ◄ / ► key.

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



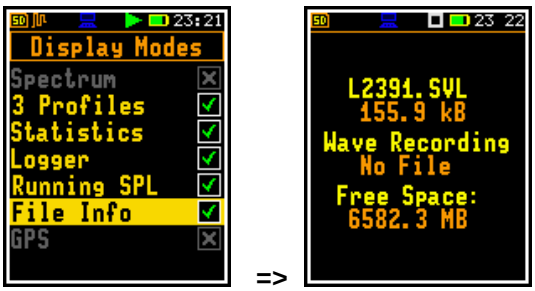
The profile can be changed with the ▲ / ▼ key pressed together with **<Shift>**.



10.9.1.5 File information display mode

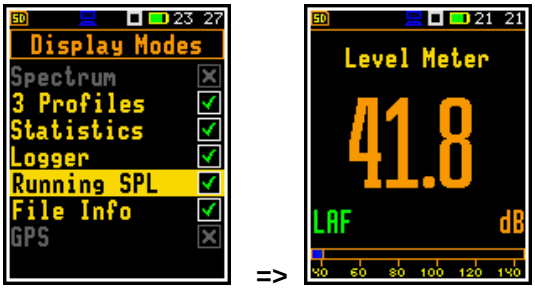
The **File Info** position enabling additional display mode with information about the data files and memory free space.

The **File Info** screen 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.



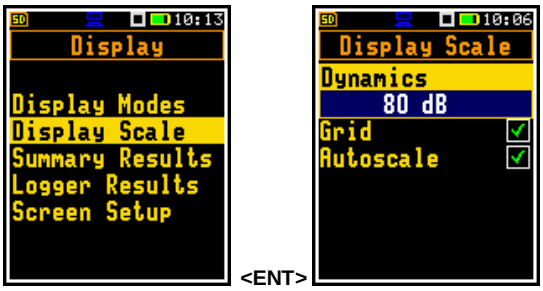
10.9.1.6 Running SPL display mode

The **Running SPL** display mode shows the SPL result when measurement is not currently running. In this mode, 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.



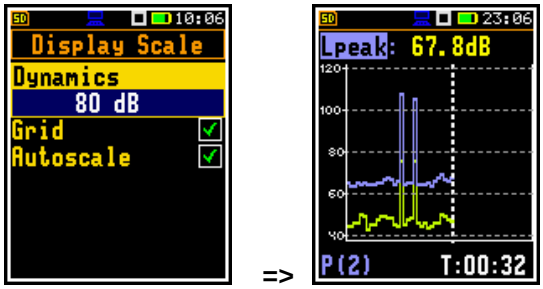
10.9.2 Adjusting scale and grid of the plot – Display Scale

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.

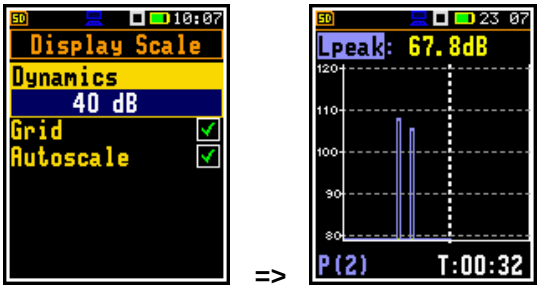


Scaling the vertical axis of the plot

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

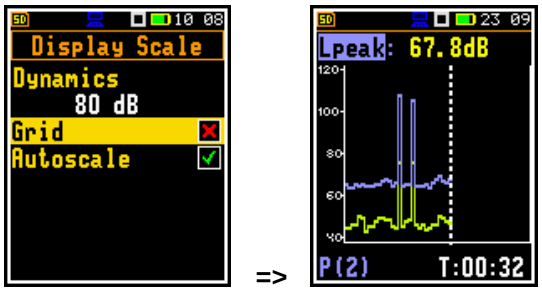


It is possible to select the range from the set: **10 dB**, **20 dB**, **40 dB**, **80 dB** and **120 dB**.



Switching the grid on/off

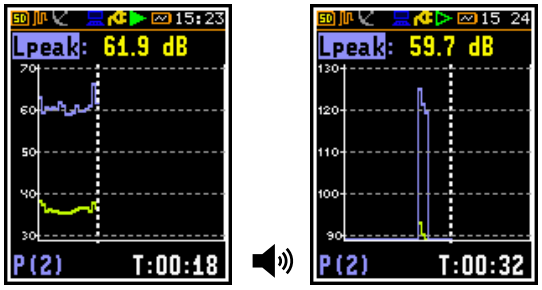
The **Grid** position enables switching on or off the horizontal grid lines of the plot.



Switching the automatic Y-scale adjustment on/off

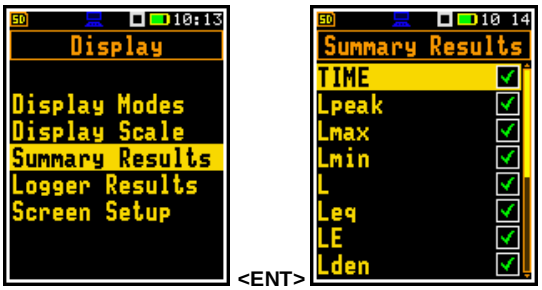
The **Autoscale** position switches on the automatic scale adjustment of the Y axis. The adjustment is performed automatically right after the start of the measurement to suit the initial level of the input signal from the microphone.

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



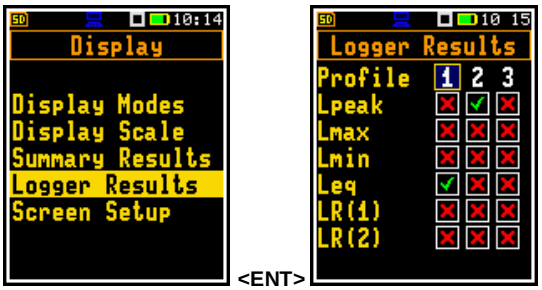
10.9.3 Selection of Summary Results for presentation – Summary Results

The **Summary Results** position enables choosing the Summary Results, which will be presented in the different display modes: **TIME**, **Lpeak**, **Lmax**, **Lmin**, **L**, **Leq**, **LE**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **Ln** and **OVL**.



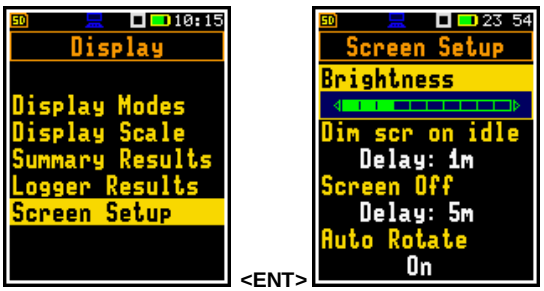
10.9.4 Selection of Logger Results for presentation - Logger Results

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>**.



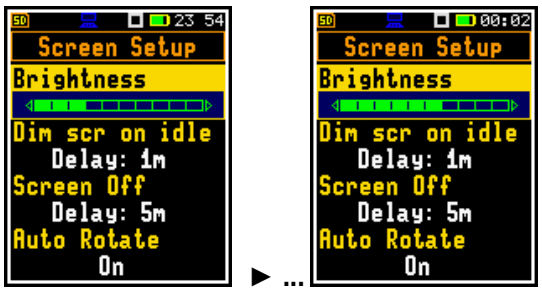
10.9.5 Setting the power saver- Screen Setup

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



Brightness of the display

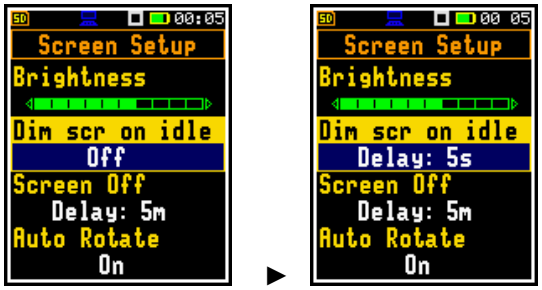
The **Brightness** position enables setting the proper brightness of the display with the ◄ / ► key. You can select 10 levels. The new level of the brightness is confirmed after each press of the ◄ / ► key.



Power saver function

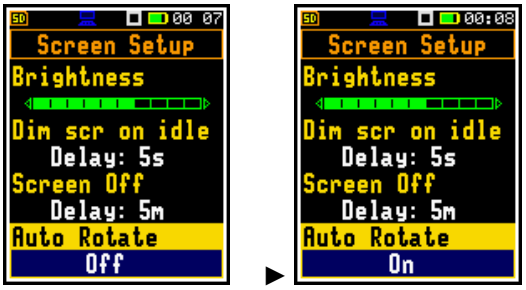
Consumption of the instrument's internal source of power can be minimising by reducing the brightness of the screen when possible.

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.

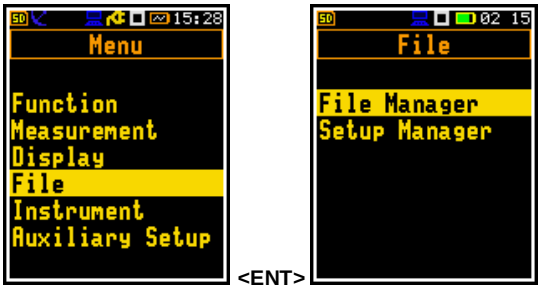


10.10 MANAGING FILES – FILE

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

The **File** section contains following items:

File Manager allowing to manage result files;
Setup Manag. allowing to manage setup files.



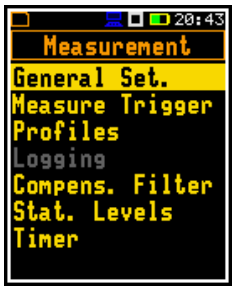
Note: *Positions in the **File** list are active only when an SD card is inserted into the card slot.*

There are five types of files that the instrument generates:

- Logger files with measured data (extension **.SVL**)
- Wave recording files (extension **.WAV**)
- Setup files with measurement configuration setups (extension **.SVT**)
- CSV files (extension **.CSV**)
- System Log files (extension **.LOG**)

Detailed description of structures of all file types is given in Appendix B.

Note: *Data 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 file. In such cases the* ***Logging*** *position in the* ***Measurement*** *list is not active and not available.*



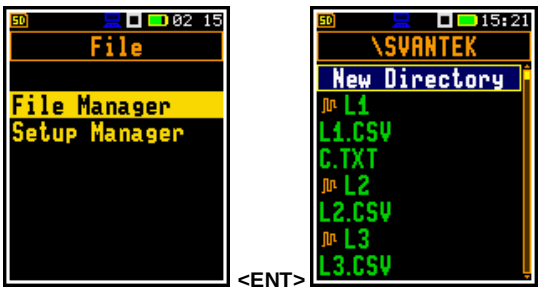
Logger, Wave and System Log files are created and saved automatically. For logger and wave files you may define file names in the **Logger Name** position (*path: <Menu> / Measurement / Logging / Logger Setup*) and in the **Wave File Name** position (*path: <Menu> / Measurement / Logging / Wave Recording*).

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.

10.10.1 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 and erasing memory.



In the **File Manager** all file and directory names are of upper-case letters and have no extensions. Directory names are of blue colour and file names are of green colour with additional icon.

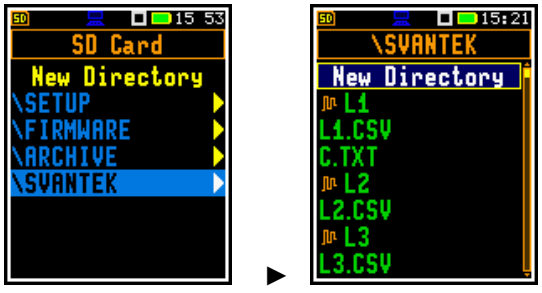
The list of files and directories is presented in the **File Manager** screen. Files are stored in directories organised hierarchically.

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.

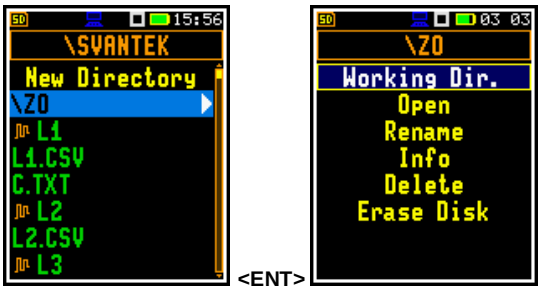
To create the new directory, enter the directory in which the new one will be created, select the **New Dir.** position and press **<Enter>**. The screen with the text editor will appear for entering new directory name.

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**).

10.10.1.1 Assigning a directory for logger/wave files saving – 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!*

10.10.1.2 Renaming a 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.

10.10.1.3 Information about a file/directory – Info

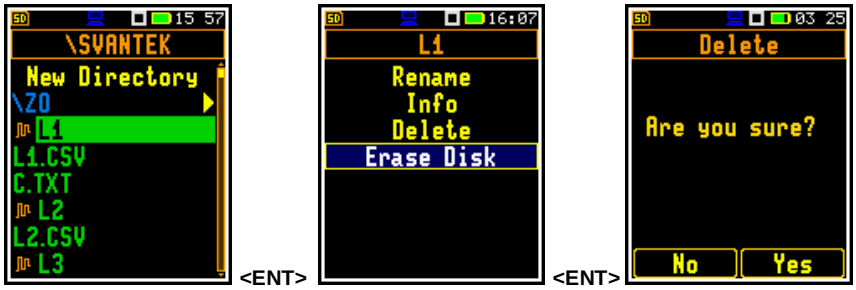
To get information about a file/directory, select the file/directory and press **<Enter>**. Select the **Info** position in the command list and press **<Enter>**. The instrument will display the information about the selected file/directory.

10.10.1.4 Deleting a 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.

10.10.1.5 Erasing memory – Erase Disk

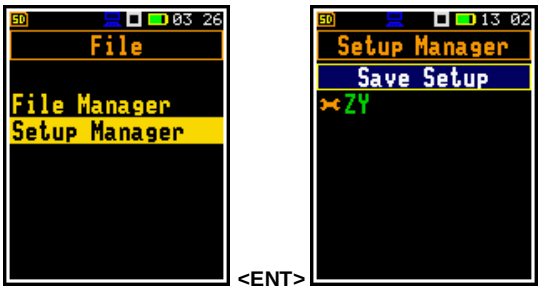
To delete all files or directories from the SD-card, select any directory and press the **<Enter>** key. Select the **Erase Disk** position in the command list and press **<Enter>**. The instrument will ask for confirmation of this action since it cannot be undone.



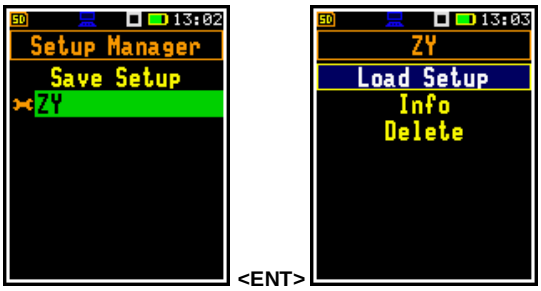
10.10.2 Managing setup files – Setup Manager

The **Setup Manager** enables saving new setup files, deleting them and displaying file information.

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

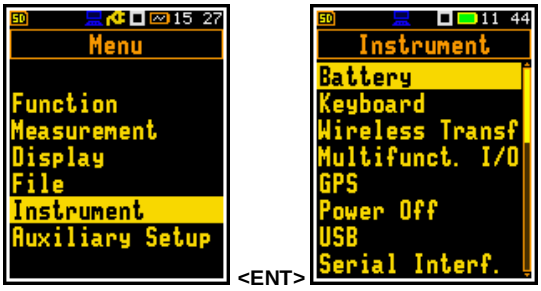


The screen with the list of available operations on the setup files is opened after pressing the **<Enter>** key on the marked (highlighted) setup file.



10.11 CONFIGURING INSTRUMENT PARAMETERS – INSTRUMENT

The **Instrument** section is related mostly with configuring of hardware components of the instrument.



The **Instrument** section contains following items:

Battery	allowing to display information about current power source;
Keyboard	allowing to program some keyboard functions;
Wireless Transf	allowing to switch on/off the 3G modem;
Multifunct. I/O	allowing to select available functionality of the I/O port;
GPS	allowing to synchronize the real-time clock;
Power Off	allowing to switch off the instrument power in luck of activity;
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.

10.11.1 Checking power – Battery

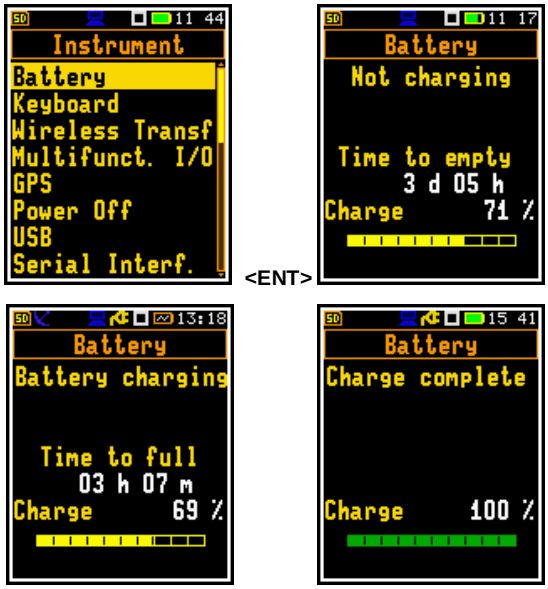
The **Battery** position enables checking the instrument powering condition.

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 %**.

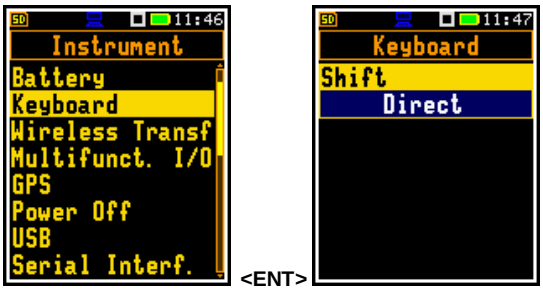
The presented screens show next powering conditions:

- **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.



10.11.2 Programming keyboard functions – Keyboard

The **Keyboard** position enables **programming** the operation mode of the **<Shift>** key (**Shift**).

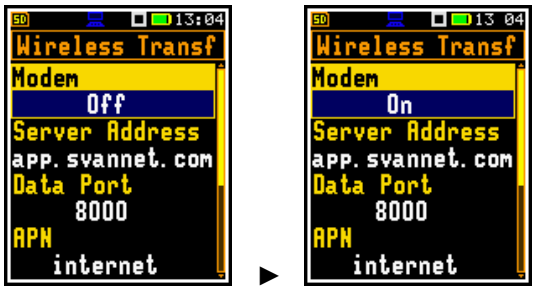


<Shift> key mode

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.

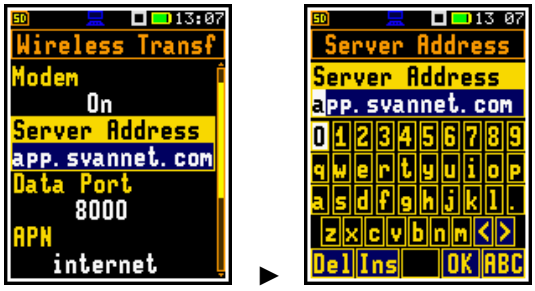
10.11.3 Switching on/off the 3G modem – Wireless Transfer

The **Wireless Transf** position allows you to switch on/off the 3G modem and to configure the wireless connection.



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.

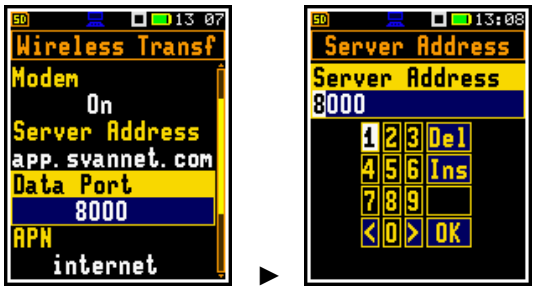
You can edit **Server Address** in the text editor screen which is opened after pressing the ► key.



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 APN name of the SIM card used with the modem.

You can edit **Data Port** and **APN** in the text editor screen which is opened after pressing the ► key.

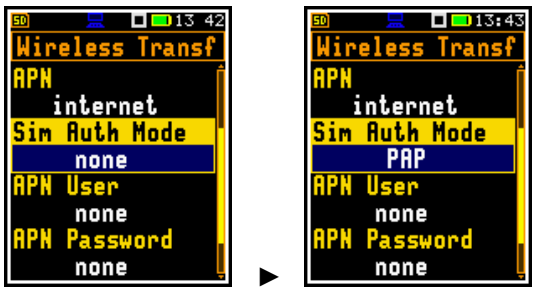


In the **Sim Auth Mode** position you can select the method of user verification by SIM card: without verification (**none**) or with **PAP**.

In the **APN User** position, you can define the user name used for verification by the SIM card.

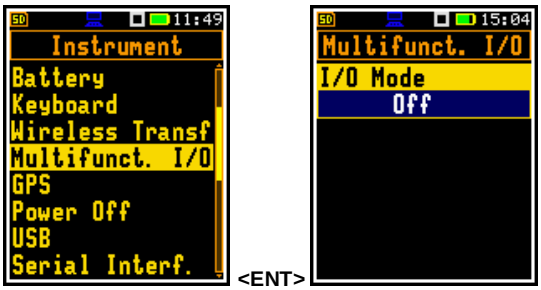
In the **APN Password** position, you can define the password used for verification by the SIM card.

You can edit **APN User** and **APN Password** in the text editor screen which is opened after pressing the ► key.



10.11.4 Setting up parameters of the I/O port - Multifunction I/O

The **Multifunct. I/O** position allows you to select the available functionality of the I/O port.



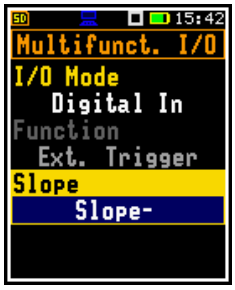
The I/O lemo socket can be used as (**I/O Mode**):

- input of the digital signal used as an external trigger to start measurements (**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).

More detailed description of the **I/O** port is given in Appendix C.

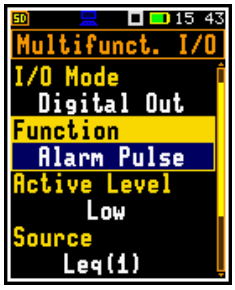
Digital In mode (Ext.Trigger function)

In the **Digital In** mode the signal appeared on the **I/O** socket will be treated as the external trigger if the external measurement trigger was chosen (*path: <Menu> / Measurement / Measurement Trigger / Trigger: 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: **[+]** (uprising as default) or **[–]** (falling).



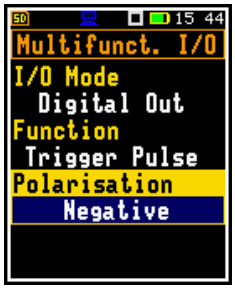
Function of the Digital Out mode

The **Function** position allows you to select the function of the digital output of the **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**).



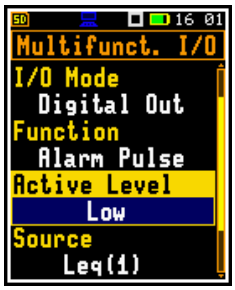
Polarisation of the digital output signal

The **Polarisation** parameter defines which polarisation of the signal (**Negative** or **Positive**) will be applied to the output trigger pulse.



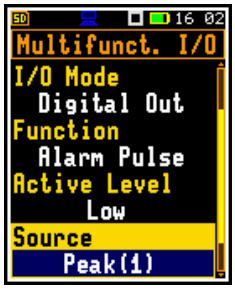
Active level for the alarm pulse generation

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 the 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.

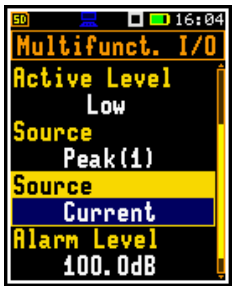


Type of Alarm source

The **Source** type parameter defines the type of alarm source: **Current** or **Periodic**.

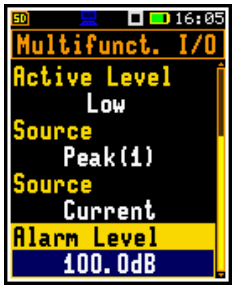
Current means that the alarm pulse will be generated all the time when the Source result averaged with 1-second step is over the **Alarm Level** value.

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.



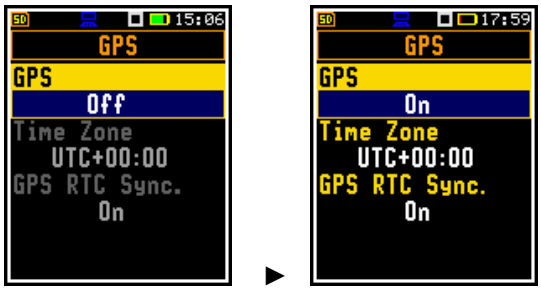
Alarm threshold level

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] in Sound mode and [60.0 dB, 180 dB] in Vibration mode.



10.11.5 Switching on the GPS – GPS

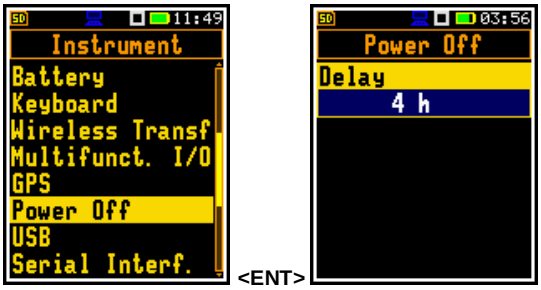
The **GPS** position enables switching on the internal GPS and synchronizing the real-time clock with the GPS time.



10.11.6 Automatic power off – Power Off

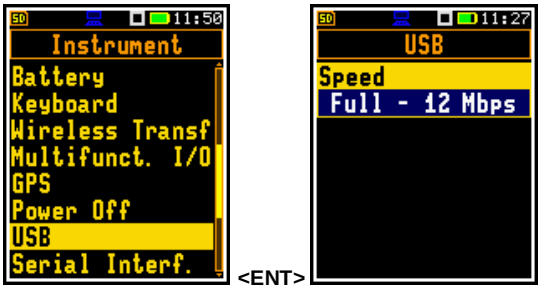
The **Power Off** position enables selecting the period after which the instrument will automatically turn itself off in the case there was no any key pressed during this period.

If the **Inf** (infinitive) value is selected the instrument will not be turned off automatically, only manually.



10.11.7 Configuring the 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**.

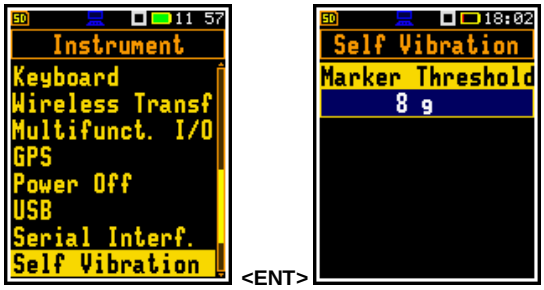


10.11.8 Configuring the serial interface – Serial Interf.

The **RS232** position enables data transmission between SV 307 and SP 276 weather station (**SP276**) or another external device (**External Device**).

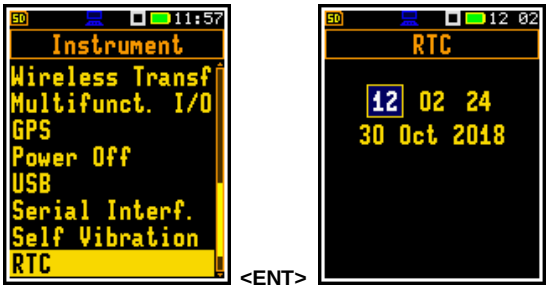
10.11.9 Self-vibration marker – Self Vibration

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.

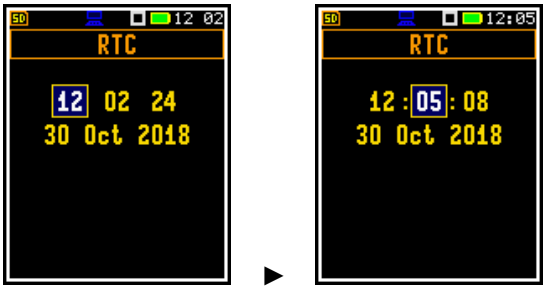


10.11.10 Programming the instrument's internal Real Time Clock – RTC

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.

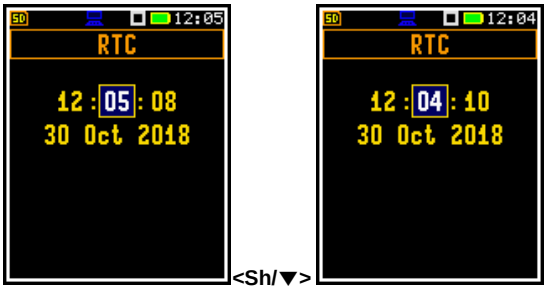


To edit time or date, select the **Time** or **Date** field with the ◄ / ► or ▲ / ▼ keys.



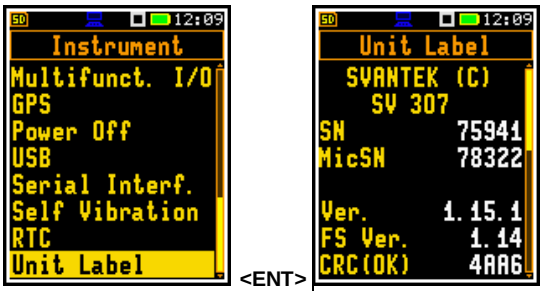
To change the value in the selected field, press the ◄ / ► or ▲ / ▼ keys together with **<Shift>**.

Press **<Enter>** to confirm the selection. If you exit this screen with **<ESC>** the new time will also be saved.



10.11.11 Checking the instrument properties - Unit Label

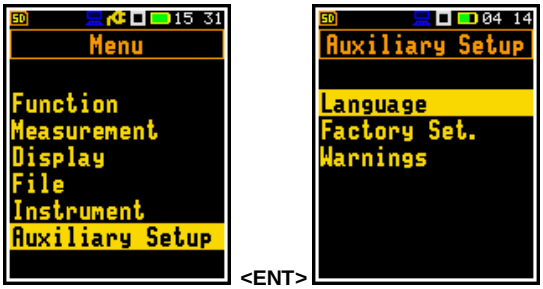
The **Unit Label** position enables checking the model of the instrument, it's serial number, the current software version installed and the appropriate standards, which the instrument fulfils.



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.*

10.12 AUXILIARY SETTINGS – AUXILIARY SETUP

The **Auxiliary Setup** section provides the user with additional features that allow, for instance, customize the device interface to a specific user and are not directly related to the hardware components of the instrument. To open the **Auxiliary Setup** list, press the **<Menu>** key, select the **Auxiliary Setup** text and press the **<Enter>** key.



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.

10.12.1 Selecting the language of the user interface – 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/Start>** keys pressed together during the switching on of the device. After this, the instrument will go back to the default setup with the English interface.

10.12.2 Restoring factory settings – Factory Settings

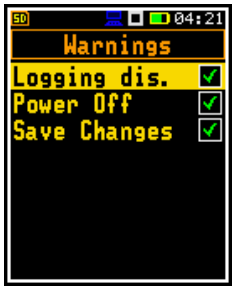
The **Factory Set.** position enables restoring default settings of the instrument.

Factory settings can be installing also with three **<Shift/Enter/Start>** keys pressed together.

10.12.3 Warnings selection – Warnings

The **Warnings** position allows to activate messages, which will be displayed during the normal operation of the instrument.

<ENT>



If **Logging disabled** is active, the instrument will generate a warning if the user tries to start a measurement without logging the previous results. The user can continue working without saving the measurement results or activate the saving through the **File Manager**.

If **Power Off** is active, then in case the measurement is in progress, any attempt to switch off the instrument will be warned "Measurement in progress". The user then 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 the user would like to turn off the unit, he will be asked to confirm this.

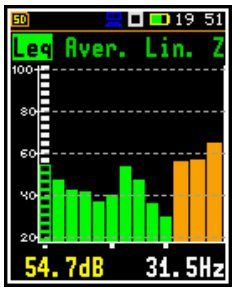
If **Save Changes** is active, the instrument displays the warning message in the case when some parameters were changed, but the list of parameters was exit with the **<ESC>** key.

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**) selected in the **Spectrum** screen (*path: Menu / Measurement / Spectrum / Filter*) and the linear LEQ detector. 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.

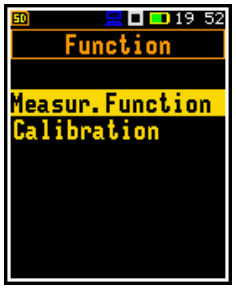


Besides results for bands three **Total** values are measured and displayed as an additional three bars on the spectrum plot. Parameters for Total values (e.g. filters) are set by default and cannot be changed.

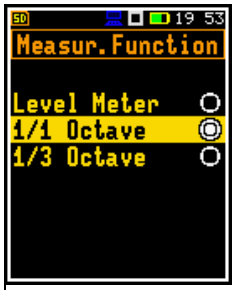
The read-out of the spectrum value can be done using a vertical cursor.

10.14.1 Selection of the 1/1 Octave or 1/3 Octave function

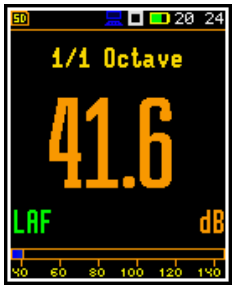
To select the 1/1 or 1/3-octave analysis function, open the **Measur. Function** position, select the **1/1 Octave** or **1/3 Octave** position and press **<Enter>**.



<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!*

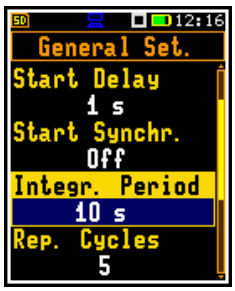
10.14.2 Configuring the 1/1 or 1/3-octave analyser

10.14.2.1 General measurement settings for the 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.

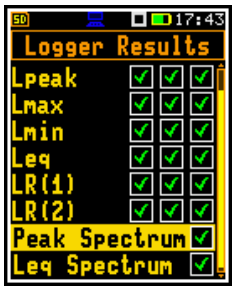
Both parameters are defined in the **General Settings** list.



10.14.2.2 Logging of 1/1 and 1/3-octave spectra – Logging

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 from 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 is made by checking the **Peak Spectrum** or **Leq Spectrum** position with the ◄ / ► key.

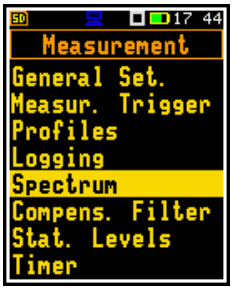


10.14.2.3 Setting up the parameters of 1/1 and 1/3-octave analysis - Spectrum

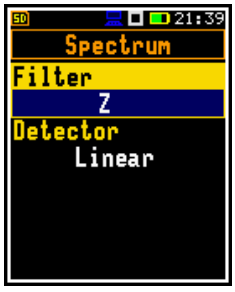
For active **1/1 Octave** or **1/3 Octave** functions the additional position (**Spectrum**) appears on the **Measurement** list.

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 the 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:

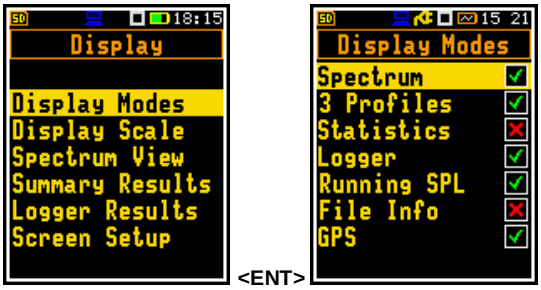
Display Modes allowing to switch on the **Spectrum** display mode;

Display Scale allowing to adjust scales of the spectrum plot and switch on/off the grid;

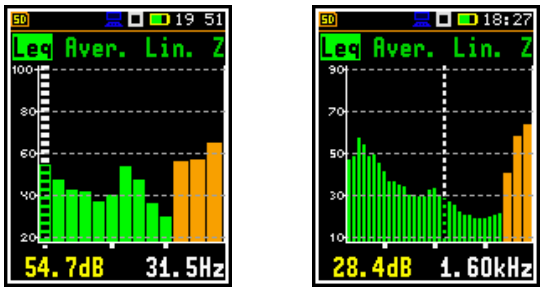
Spectrum View allowing to select spectra to be viewed: instantaneous, averaged, maximum or minimum.

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 switches on or off the spectrum view (**Spectrum**).

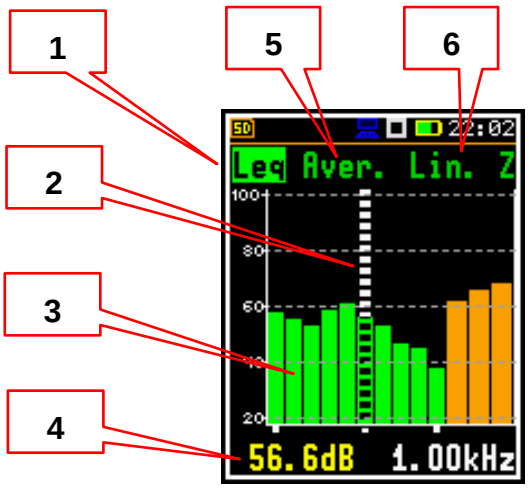


When **Spectrum** display mode is switched on, measurement screens in the **Spectrum** display mode became available.

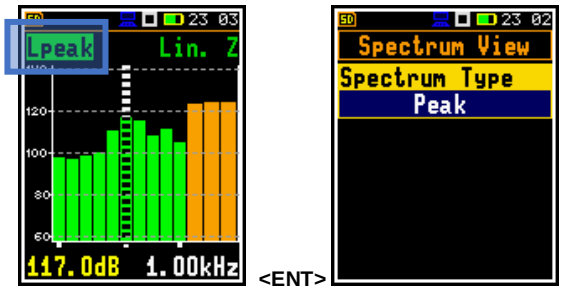


Field descriptions of the Spectrum mode

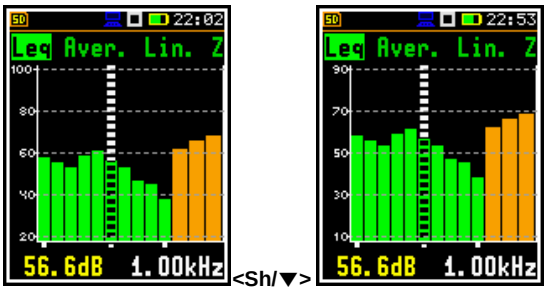
1. Spectrum type: **Leq**, **Lpeak**, **Lmin** or **Lmax**
2. Cursor position
3. Spectrum plot with three Total bars
4. Value and central frequency for the cursor position
5. Leq spectrum type: **Averaged** or **Instantaneous**
6. LEQ averaging and filter



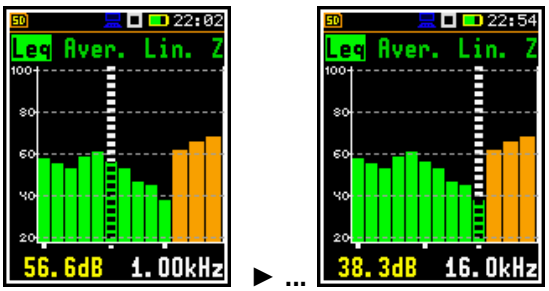
You may change the spectrum type in the **Spectrum** view by pressing the **<Enter>** key and entering the **Spectrum View** screen. In this screen, select new spectrum type and press **<Enter>**.



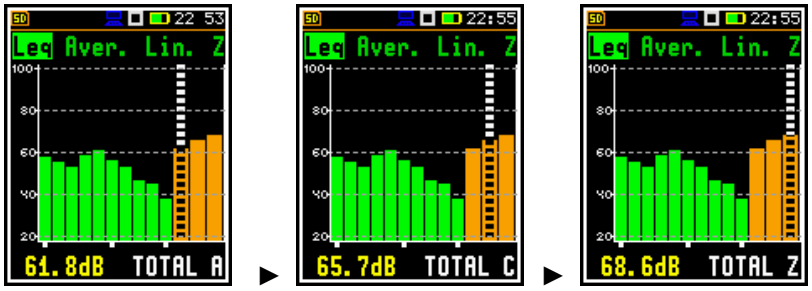
You can shift the Y-axis up or down during the spectrum presentation by pressing together the **<Shift>** and the ▲ / ▼ key.



You can change the cursor position with the ◄ / ► key. The frequency and appropriate dB value are presented in the line below the plot.

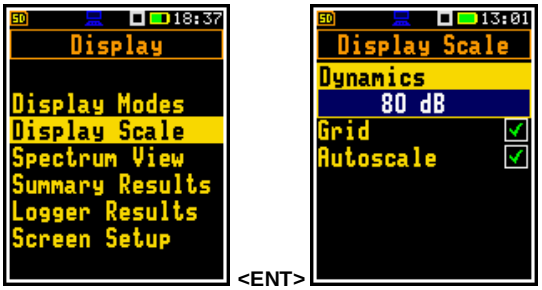


Total values are calculated with the filters **A**, **C** and **Z**, and are displayed at the bottom line of the screen when the cursor has been placed on the appropriate orange bar.



10.14.3.2 Adjusting scales of the spectrum plot – Display Scale

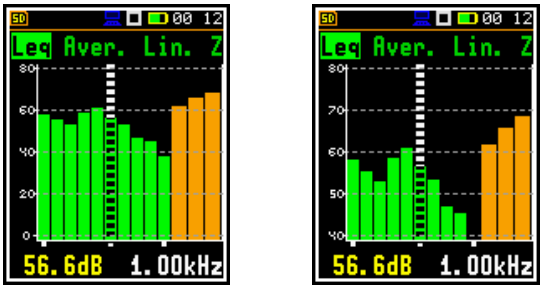
The **Display Scale** position enables changing the scale of the spectrum plot and switching the grid and automatic scale adjustment on/off.



Scaling the vertical axis

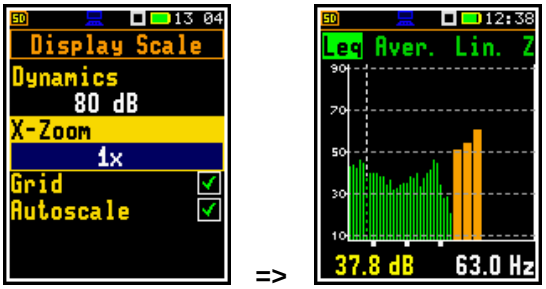
The **Dynamics** position enables selecting the required scale dynamic range of the spectrum plot. It is possible to select the range from the set: **10dB**, **20dB**, **40dB**, **80dB** and **120dB**.

The example shows spectrum view with 80dB and 40dB dynamics.

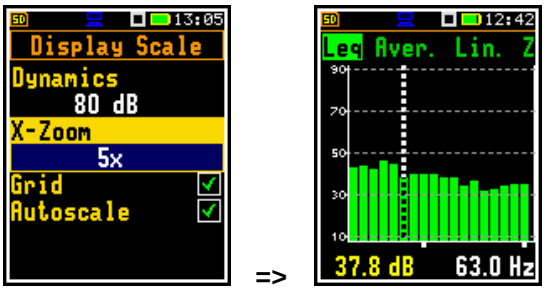


Zooming the horizontal axis for 1/3-octaves

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.

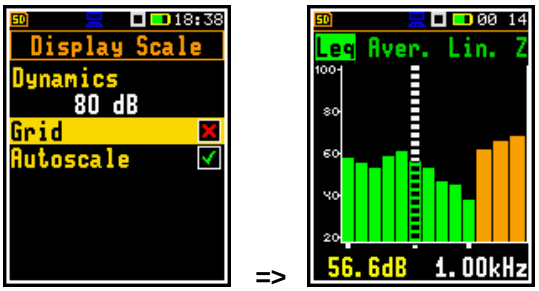


The example shows spectrum view with **1x** and **5x** zoom.



Switching the grid on/off

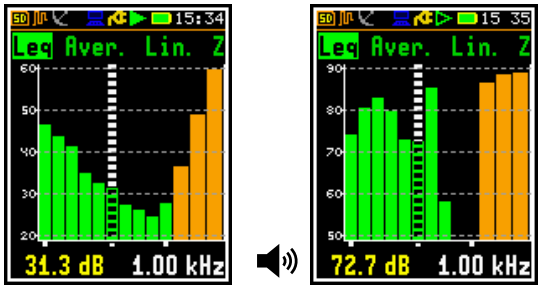
The **Grid** position switches on or off the grid in the spectrum view.



Switching on/off the automatic Y-scale adjustment

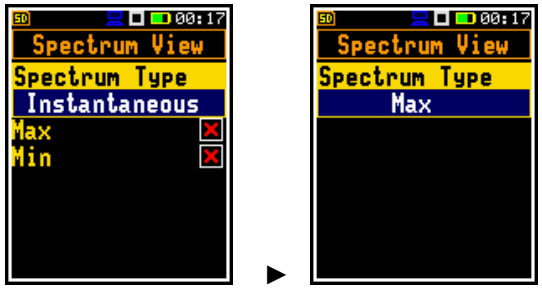
The **Autoscale** position switches on or off the automatic adjustment of the Y-axis scale dynamic range to the current spread between lowest and highest measured octave or third octave results.

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

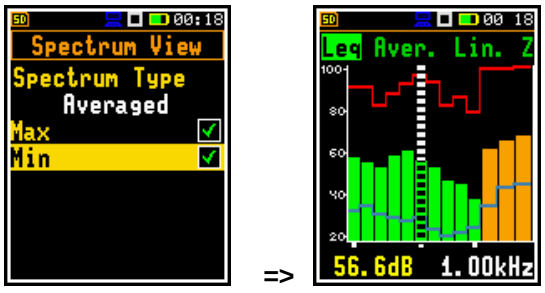


10.14.3.3 Selection of spectra to be viewed – Spectrum View

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,
- HARDBOOT.

The **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.

The **BOOTSTRAP** is a program for the main processor dedicated for the **FIRMWARE** upgrade.

The **HARDBOOT** is inerasable program designed to conduct the upgrade or repair process of the **BOOTSTRAP** only.

The user can upgrade **FIRMWARE** and **BOOTSTRAP** programs of the SV 307 instrument.

11.1 INSTRUMENT UPGRADE VIA USB CABLE

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 **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.*

12 MAINTENANCE

12.1 MEMORY CARD EXTRACTION AND INSERTION

SV 307 is delivered with 16 GB micro SD card - Kingston MicroSD HC Class 4.

You may exchange it with the high capacity card (up to 128 GB), but before insertion the card must be formatted as FAT32.

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.*

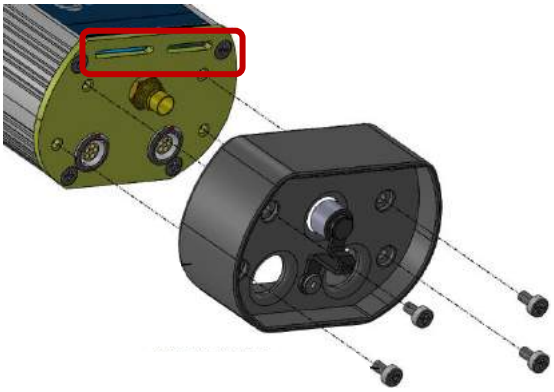
Note: *If you would like to use the card with higher capacity, consult this with the local distributer.*

To exchange the memory card from the card-slot, 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, 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.

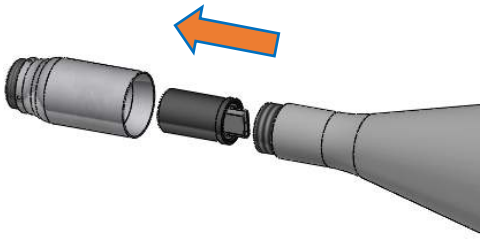


12.2 MICROPHONE REPLACEMENT

To replace 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 this unscrew the microphone protective sleeve and pull the microphone to extract it from the type C micro USB.

Insert the new microphone to the type C micro USB socket and screw 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.

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.

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's website.

Service Office: +48 (22) 51-88-320 or +48 (22) 51-88-322.

Office hours are 8:00 a.m. to 4:00 p.m. Central European Time.

- E-mail at office@svantek.com
- Internet at www.svantek.com
- Address:

SVANTEK Sp. z o.o.

Strzygłowska 81

04-872 Warszawa,

Poland

APPENDIX A. REMOTE CONTROL CODES

The USB 2.0 interface is the serial one working with 480 MHz clock which enables one to control remotely the unit. Its speed is relatively high, and it ensures the common usage of USB in all produced nowadays Personal Computers.

The functions, which are developed in order to control data flow in the serial interfaces, ensure:
- Bi-directional data transmission,
- Remote control of the instrument.

The user, in order to programme the serial interface, has to:
1. send "the function code",
2. send an appropriate data file

or
3. receive a data file.

A.1 INPUT / OUTPUT TRANSMISSION TYPES

The following basic input / output transmission types (called functions) are available:
#1 input/output of the control setting codes,
#2 read out of the measurement results in the **SLM** mode,
#3 read out of the measurement results in the **1/1 OCTAVE** analysis or **1/3 OCTAVE** analysis mode,
#4 read out of the data file from the internal Flash-disc or RAM memory,
#5 read out of the statistical analysis results,
#7 special control functions,
#9 writing the data file into the internal flash-disk.
#D read/write the data file from the external memory (SD-card),

A.2 FUNCTION #1 - INPUT/OUTPUT OF THE CONTROL SETTING CODES

#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 Tab. A.1. The format of #1 function is defined as follows:

#1,Xccc,Xccc,(...),Xccc;

or

#1,Xccc,X?,Xccc,(...),X?,Xccc;

where:

X - group code, **ccc** - code value,

X? - request to send the current X code setting.

The instrument outputs in this case a control settings file for all requests X? in the following format:

#1,Xccc,Xccc,(...),Xccc;

In order to read out all current control settings the user should send to the device the following sequence of characters:

#1;

The instrument outputs in this case a file containing all control settings given in Tab. A1 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,W1.13.1,Q0.01,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,D10s,K5,L0,Y3,y0,XT0,XL100,XQ0,Xq0,XA0,XD-1:1,XD-1:2,XD-1:3,XD-1:4,XD-1:5,XD-1:6,XH300,XIapp.svannet.com,XJ8000,XK80,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,XXQ1,XXR0,XXS0,XXT,XXU,XXV0,XXW0,XXB0,XXl0,XXm0,XXu0,XXv80,XXx40,XXy28800,XXz0,XXY10000,XXZ20,XXo2,XXq0,XXr3,XXs36,XXw10,Xi0,Xk1,Xw1,XB1,XZ1,XF0,XG0,Xx0,Xz0,Xc0,Xs0,Xt0,Xn1000,Xg0,Xh0,S0,T1,e480,m0,s0,l100,O10,o0,t0;

means that:

- SV 307 is investigated (U307);
- its number is 1234 (N1234);
- software version number is 1.14.1 (W1.14.1);
- calibration factor is equal to 0.01 dB (Q0.01);
- **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 10 seconds (D10s);
- measurement has to be repeated 5 times (K5);
- linear detector is selected to the **Leq** calculations (L0);
- delay of the start of the measurements is equal to 3 seconds (Y3);
- synchronization the start of measurement with RTC is switched off (y0);
- logger triggering mode is switched off (XT0);
- logger triggering level is set to 100 dB (XL100);
- number of the records before the triggering saved in a file of the logger is equal to 0 (XQ0);
- number of records registered, after the moment in which the measured signal does not fulfil any longer the condition of the triggering, is equal to 0 (Xq0);
- logger splitting is disabled (XA0);
- logger splitting time 1 is disabled (XD-1:1);
- logger splitting time 2 is disabled (XD-1:2);
- logger splitting time 3 is disabled (XD-1:3);
- logger splitting time 4 is disabled (XD-1:4);
- logger splitting time 5 is disabled (XD-1:5);
- logger splitting time 6 is disabled (XD-1:6);

- 3G TCP listen socket idle reconnection time is 300 seconds (XH300);
- 3G TCP socket connection remote address is **app.svannet.com** (XIapp.svannet.com);
- 3G TCP socket connection remote port is 8000 (XJ8000);
- 3G IP registration port is 80 (XK80);
- 3G APN setting is **internet** (XNinternet);
- 3G internet connection username is **none** (XOnone);
- 3G internet connection password is **none** (XUnone);
- 3G interget connection DNS is **0.0.0.0** (XV0.0.0.0);
- 3G SMS destination telephone number is undefined (XXa);
- 3G SMS text message is undefined (XXb);
- 3G e-mail SMTP server address is undefined (XXd);
- 3G e-mail account username is undefined (XXe);
- 3G e-mail account password is undefined (XXf);
- 3G e-mail sender's name is undefined (XXg);
- 3G e-mail receiver's address is undefined (XXh);
- 3G e-mail subject is undefined (XXi);
- 3G e-mail message is undefined (XXj);
- reserved (XXC0);
- summary results are stored in the logger (XXE1);
- 3G DynDNS address is undefined (XXF);
- 3G DynDNS hostname is undefined (XXG);
- 3G DynDNS account login is undefined (XXH);
- 3G DynDNS account password is undefined (XXI);
- reserved (XXJ0);
- 3G FTP server address is undefined (XXK);
- 3G FTP account username is undefined (XXL);
- 3G FTP account password is undefined (XXM);
- 3G FTP server control port is 0 (XXN0);
- 3G FTP server data port is 0 (XXO0);
- 3G FTP remote catalogue is undefined (XXP);
- 3G FTP mode is FTP push mode (XXQ1);
- 3G FTP push period is 0 minute (XXR0);
- 3G FTP pull period is 0 minute (XXS0);
- 3G FTP pull filename is undefined (XXT);
- 3G FTP pull result filename is undefined (XXU);
- 3G e-mail port is 0 (XXV0);
- 3G FTP push file mask is undefined (XXW0);
- linear detector is selected to spectrum calculations (XXB0);
- 48kHz audio sampling frequency id selected (XXl0),
- PCM wave file format is selected (XXm0),
- wave recording is switched off (XXu0),
- wave recording triggering level is set to 80 dB (XXv80);
- wave recording signal gain is set to 40dB (XXx40);
- 8 hours recording time is selected in wave recording (XXy28800);
- wave recording pre-trigger time is set to 0s (XXz0);
- wave recording trigger step is set to 1s (XXY10000);

- wave recording trigger gradient is set to 20 dB/ms (XXZ20);
- **A** filter is selected in wave recording (XXo2);
- wave recording length limit is switched off (XXq0);
- 3s first rolling time is selected (XXr3);
- 36s second rolling time is selected (XXs36);
- 10MB max. calibration history file size is selected (XXw10);
- 3G communication **ODM mode** is off (Xi0);
- communication module (either 3G or LTE) is on (Xk1);
- 3G IP registration mode is set to DynDNS (Xw1);
- 3G TCP socket connection type is TCP server (XB1);
- Modem type is 3G (XZ1);
- 3G internet connection authorization type is off (XF0);
- reserved (XG0);
- External I/O pin mode is off (Xx0);
- External I/O pin digital out function is set to trigger pulse (Xz0);
- External I/O pin digital out active level is LOW (Xc0);
- External I/O pin digital out source is LEQ(1) (Xs0);
- External I/O pin digital out source type CURRENT (Xt0);
- External I/O pin digital out alarm level is set to 100.00dB (Xn1000)
- External I/O pin digital input polarization is POSITIVE (Xg0);
- External I/O pin digital input slope is PLUS (Xh0);
- instrument is in the Stop state (S0);
- logger is active (T1);
- exposition time is set to 8 hours (e480);
- measure triggering mode is switched off (m0);
- **LEQ** result from the first profile is used as the measure triggering signal (s0);
- measure triggering level is set to 100 dB (l100);
- gradient in measure trigger is equal to 10 dB/ms (O10)
- **LEQ** result from the first profile for **1/1 OCTAVE** is used as the measure triggering signal (o0);
- **LEQ** result from the first profile for **1/3 OCTAVE** is used as the measure triggering signal (t0);

Note: *All bytes of that transmission are ASCII characters.*

A.3 FUNCTION #2 - MEASUREMENT RESULTS READ-OUT IN THE SLM MODE

#2 function enables one to read out the current measurement result from the selected profile.

#2 function has the format defined as follows:

#2 [,<aver>] [,<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.

<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 code 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>],<profile>,Xc,(...);

where **c** is the value of the result **X** or question mark (**?**) if result **X** is not available;

If no results are available, the instrument will send:

#2,?;

The 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 **Ltm5** result (ccc – the value in dB);

L(nn) value L 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);

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:

a) for the case of the **SLM** mode:

#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,T7,P124.39,R85.86,L(01)100.30,L(10)89.50,L(20)78.60,L(30)68.50,L(40)60.30,L(50)54.00,L(60) 51.00,L(70)46.50,L(80)44.00,L(90)42.40;

Note: *All bytes of that transmission are ASCII characters.*

A.4 FUNCTION #3 - READ-OUT OF MEASUREMENT RESULTS IN 1/1 OCTAVE AND 1/3 OCTAVE MODE

#3 function enables one to read out the current measurement results in **1/1 OCTAVE** or **1/3 OCTAVE** modes.

#3 function format is defined as follows:

#3; - displayed spectrum

#3,A; - averaged spectrum

#3,I; - instantaneous spectrum

#3,M; - max spectrum

#3,N; - min spectrum

#3,P; - peak spectrum

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;<Status Byte> <LSB of the transmission counter> <MSB of the transmission counter> <data byte> (...) <data byte>

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: *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 - READ-OUT OF THE DATA FILE FROM THE INTERNAL FLASH-DISK OR RAM MEMORY

#4 function enables the user to read-out the data 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.

#4,1,fname; file containing the measurement results,
#4,1,fname,?; size,
#4,1,fname,offset,length; part of the file containing the measurement results,
where:
fname - name containing not more than eight characters,
offset - offset from the beginning of the file,
length - number of bytes to read,

#4,4; current settings file,
#4,4,?; size of the current settings file,
#4,4,offset,length; part of current settings file,
where:
offset - offset from the beginning of the current settings 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 as **<LSB>**,**<MSB>**.

When an error is detected in the file specification or data, the instrument will send:

#4,?;

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-disc 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.

Note: *#4 commands unlocks access to files and results.*

A.6 FUNCTION #D – READ / WRITE THE DATA FILES FROM THE EXTERNAL MEMORY (SD-CARD)

<disk>	logical disk number: 0 – SD-card, 1 – USB Disk (not implemented), 2 – Internal Memory (not implemented)
<address>	directory address (cluster numer) – for internal memory 0
<offsetB>	offset 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>	file name in format XXXXXXXX.YYY (XXXXXXXX – file name, YYY- file name extension)
<dirName>	directory name
<nBwr>	number of bytes to write

1) #D,c,?; this function returns the list of available disks in format:

   #D,c,<disk1>[,<disk2>[,<disk3>]];

2) #D,d,?; this function returns the 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>; function enables the user to read the file (except of internal memory):

   Response:

   #D,r,<disk>,<address>,<offsetB>,<nB>; [<data>]

5) #D,w,<name>,<nBwr>;<data> function enables the user to write the file to working directory:

   Response:

   #D,w; - command was executed

   #D,w,?; - command cannot be executed

6) #D,e,<name>; function enables the user to delete the file in working directory:

   Response:

   #D,e; - command was executed

#D,e,?; - command cannot be executed

7) #D,e; function enables the user 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 the user 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 the user to delete directory and its contents (files and subdirectories):

Response:

#D,f; - command was executed

#D,f,?; - command cannot be executed

A.7 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 not any succeeding transmission in the case when the* ***Status Byte*** *is equal to 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 (*10 dB).

ClassWidth is a two-byte word denoting the width of the class (*10 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 according to the scheme* ***<LSByte>..<MSByte>****.*

A.8 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 formats are defined as follows:

#7,AS;

Get settings for the Auto-Run function.

Response format:

#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,
mm	– minutes of the measurement stop,
dW	– day of week in which the measurement will be done:
	bit:0 – Monday,
	...
	bit:6 – Sunday
mR	– maximum number of the measurement days,

Response format:

#7,AS;

#7,BN;

This function returns the number of logger files created to the current time in the format: **#7,BN,ddddd;** (**ddddd** - number of logger files in decimal format).

#7,BS;

This function returns battery state in %. If the instrument is powered from from the usb interface – the function returns (-1).

#7,BV;

This function returns battery voltage in 10 mV.

#7,CS;

This function restores the factory settings.

#7,CT;

This 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.

#7,DL;

This function returns day time limits in format **#7,DL,x;**

#7,DL,x;

This function enables (x = 1) or disables (x = 0) day time limits and returns the following sequence of characters: **#7,DL;**

#7,DS,file_name;

This function deletes setup file in SETUP directory specified by **file_name**.

#7,ED;

This function deletes all files on SD-card. The function returns **#7,ED;**

This function is not accepted while the instrument is in the RUN state.

#7,EV;

This function returns external voltage in 10 mV.

#7,FF;

This function returns free field compensation in the format **#7,FF,x;** where **x** denotes 0: Off, 1: Environment, 2: Airport.

#7,FF,x;

This function set free field compensation and returns the following sequence of characters: **#7,FF;**

#7,FS;

This function returns file system version.

#7,FT;

This function returns file system on sd card in the format **#7,FT,x;**.where **x** denotes -1: no sd card, 1: FAT16, 2: FAT32, 3: FAT12.

#7,GH;

This function returns gps power state **#7,GH,x;**

#7,GH,x;

This function enables (x = 1) or disables (x = 0) the gps power and returns the following sequence of characters: **#7,GH;**

#7,GP;

Get position of the instrument from the GPS module.

Response format:

#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),

#7,GS,x;

This function enables or disables GPS Synchronization:

x = 0 – disables GPS Synchronization
x = 1 – enables GPS Synchronization

#7,GS;

This function returns the state of GPS Synchronization in format **#7,GS,x;**

x = 0 – disabled
x = 1 – enabled

#7,LA;

This function returns current language in the format: **#7,LA,xx;** where **xx** is language codes: **GE** (German), **EN** (English), **IT** (Italian), **PL** (Polish), **RU** (Russian), **HU** (Hungarian), **TU** (Turkish), **NL** (Flemish), **FR** (French), **SP** (Spanish).

#7,LB;

This function returns the name of last logger in format **#7,LB,logger_name;**

#7,LS,setup_name;

This function loads setup and writes settings into EEPROM. The selected file must exist. The function returns **#7,LS;**

#7,LT;

This function reloads microphone parameters from TEDS.

#7,LW;

This function returns the name of last wave file in format **#7,LW,wave_file_name;**

#7,MC;

This function returns microphone compensation in the format **#7,MC,x;**

#7,MC,x;

This function enables (x = 1) or disables (x = 0) the microphone compensation and returns the following sequence of characters: **#7,MC;**

#7,NS;

This function returns number of sectors on sd card (-1 denotes no sd card). Sector size is 512B.

#7,NF;

This function returns number of free sectors on sd card (-1 denotes no sd card). Sector size is 512B.

#7,OR;

This function returns spatial orientation of the device in the format: **#7,OR,xa.aa,yb.bb,zc.cc;** where **a.aa, b.bb, c.cc** denotes the gravitational acceleration on the x, y and z axes, respectively.

#7,PI;

This function returns PIC version.

#7,PO;

This function powers off the instrument.

#7,RT;

This function returns current real time clock settings in the format: **#7,RT,hh,mm,ss,DD,MM,YYYY;** where **hh:mm:ss** denotes the time and **DD/MM/YYYY** gives the date.

#7,RT,hh,mm,ss,DD,MM,YYYY;

This function sets the current real time clock and returns the following sequence of characters: **#7,RT;**

#7,SS;

This function creates setup file based on the current settings. The function returns **#7,SS;**

#7,SL;

This function returns all statistical levels in the format **#7,SL,sl1,sl2,sl3,sl4,sl5,sl6,sl7,sl8,sl9,sl10;**

#7,SL,sl_index,sl_level;

This function sets statistical levels where **sl_index** is the statistical index, **sl_level** is the statistical level and returns the following sequence of characters: **#7,SL;**

#7,TC;

This function returns TEDS calibration factor**;**

#7,TS;

This function returns TEDS microphone serial number**;**

#7,TE;

This function returns the external temperature.

#7,TF;

This function returns TEDS factory calibration factor**;**

#7,TM;

This function returns the microphone temperature.

#7,TR;

This function returns the temperature differences (microphone temperature - external temperature).

#7,TT;

This function returns type of microphone saved in TEDS memory. Value of -1 means unknown TEDS, value of 30 means ST27 microphone;

#7,TZ;

This function returns GPS time zone in minutes.

#7,TZ,x;

This function sets time zone in minutes and returns the following sequence of characters: **#7,TZ;**

#7,UF;

This function returns usb speed in the format **#7,UF,x;**

#7,UF,x;

This function sets usb full speed (12Mbps, x = 1) or sets usb high speed (480Mbps, x = 0) and returns the following sequence of characters: **#7,UF;**

#7,UN;

This function returns unit name.

#7,UN,name;

This function sets unit name.

#7,US;

This function returns unit subversion.

#7,UV;

This function returns usb voltage in 10 mV.

#7,VB;

This function returns the Bootstrap software version.

#7,VH;

This function returns the Hardboot software version.

#7,XR;

This function restarts the instrument.

For the unknown function and/or in the case of the other error, all these functions return the following sequence of characters: **#7,?;**

A.9 FUNCTION #9 - WRITE-IN THE DATA FILE INTO THE INTERNAL FLASH-DISC

#9 function enables the user to write-in the data file into the internal Flash-disc 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, 4 - current settings file,
FILE_LENGTH	length of the file in bytes,
DATA	binary content of the file.

A.10 CONTROL SETTING CODES

The control setting codes used in the SVAN 971 instrument (the internal software revision 1.10.2) are given in the table below.

Table A.1. Control setting codes

Group name	Group code	Code description
Unit type	**U**	U971 (read only)
Serial number	**N**	Nxxxx (read only)
Software version	**W**	Wyyy yyy - revision number (read only)
Calibration factor	**Q**	Qnnnn:c nnnn - real number with the value of the calibration factor ∈(-99.9 ÷ 99.9) c: 0 - left channel, 1 - right channel
Measurement function	**M**	M1 - **LEVEL METER** M2 - **1/1 OCTAVE** analyser M3 - **1/3 OCTAVE** analyser M4 - **DOSE METER** M7 - **RUNNING LEQ**
Range	**R**	R1 - **LOW** R2 - **HIGH**
Filter type in profile n	**F**	F1:n - **Z** filter for profile n F2:n - **A** filter for profile n F3:n - **C** filter for profile n **SLM, 1/1OCTAVE, 1/3OCTAVE, RUNNING LEQ functions:** n: 1, 2, 3 – Profile Number*:* 1, 2 or 3 **DOSE functions:** n: 4, 5, 6 – Profile Number*:* 1, 2 or 3
Peak Filter type in profile n	**J**	J1:n - **Z** filter for profile n J2:n - **A** filter for profile n J3:n - **C** filter for profile n **SLM, 1/1OCTAVE, 1/3OCTAVE, RUNNING LEQ functions:** n: 1, 2, 3 – Profile Number*:* 1, 2 or 3 **DOSE functions:** n: 4, 5, 6 – Profile Number*:* 1, 2 or 3
Detector type in profile n	**C**	C0:n - **IMPULSE** detector in profile n C1:n - **FAST** detector in profile n C2:n - **SLOW** detector in profile n **SLM, 1/1OCTAVE, 1/3OCTAVE, RUNNING LEQ functions:**

		n: 1, 2, 3 – Profile Number: 1, 2 or 3 **DOSE functions:** n: 4, 5, 6 – Profile Number: 1, 2 or 3
Filter type in **1/1 OCTAVE** analysis and **1/3 OCTAVE** analysis	**f**	f1 - **Z** filter f2 - **A** filter f3 - **C** filter
Logger type in profile n	**B**	Bx:n - x - sum of the following flags flags: 1:n - logger with **Lpeak** values in profile n 2:n - logger with **Lmax** values in profile n 4:n - logger with **Lmin** values in profile n 8:n - logger with **Leq** values in profile n 16:n - logger with **LAV** values in profile n 32:n - logger with **LR15** values in profile n 64:n - logger with **LR60** values in profile n
Storing the results of **1/1 OCTAVE** analysis and **1/3 OCTAVE** analysis in logger's file	**b**	bx - x - sum of the following flags flags: 1 - logger with **Lpeak** values 8 - logger with **Leq** values
Logger step	**d**	dnns - nn number in seconds $\in(1 \div 60)$ dnnm - nn number in minutes $\in(1 \div 60)$
Integration period	**D**	D0 - infinity (measurement finished by pressing the **Stop** or remotely - by sending S0 control code) Dnns - nn number in seconds Dnnm - nn number in minutes Dnnh - nn number in hours
Repetition of the measurement cycles (RepCycle)	**K**	K0 - infinity (measurement finished by pressing the **Stop** or remotely - by sending S0 control code) ..... Knnnn - nnnn number of repetitions $\in(1 \div 1000)$
Detector type in the **LEQ** function	**L**	L0 - **LINEAR** L1 - **EXPONENTIAL**
Measure Triggering mode (TriggerMode)	**m**	m0 - switched off (**OFF**) m2 - **SLOPE +** m3 - **SLOPE –** m4 - **LEVEL +** m5 - **LEVEL –** m6 - **GRAD+**
Source of the measure triggering signal for measurement functions: M1, M4, M7 (TriggerSource)	**s**	s0 - **LEQ** result from the 1st profile

Source of the measure triggering signal for measurement function M2 (TriggerOctSource)	**o**	o0 - **LEQ** result from the 1st profile
Source of the measure triggering signal for measurement function M3 (TriggerTerSource)	**t**	t0 - **LEQ** result from the 1st profile
Measure Triggering level (TriggerLev)	**l**	lnnn - nnn level in dB ∈ (24 ÷ 136)
Measure Triggering gradient	**O**	Onnn - nnn gradient in dB/ms ∈ (1 ÷ 100)
Exposure Time	**e**	ennn - nnn time in minutes ∈ (1 ÷ 720)
Criterion Level	**c**	c1:p - 80 dB c2:p - 84 dB c3:p - 85 dB c4:p - 90 dB c5:p - 60 dB c6:p - 65 dB c7:p - 70 dB c8:p - 75 dB c9:p - 87 dB p: 1, 2, 3 - profile number
Threshold Level	**h**	h0:p - None h1:p - 70 dB h2:p - 75 dB h3:p - 80 dB h4:p - 85 dB h5:p - 90 dB h6:p - 60 dB h7:p - 65 dB p: 1, 2, 3 - profile number
Exchange Rate	**x**	x2:p - 2 x3:p - 3 x4:p - 4 x5:p - 5 x6:p - 6 p: 1, 2, 3 - profile number
Logger	**T**	T0 - switched off (**[ ]**) T1 - switched on (**[√]**)
Delay in the start of measurement	**Y**	Ynn - nn delay given in seconds ∈ (0 ÷ 59) and (60 ÷ 3600) with step 60s
Synchronization the start of measurement with RTC	**y**	y0 - switched off (**OFF**) y1 - synchronization to 1 min. y15 - synchronization to 15 min.

		y30 - synchronization to 30 min. y60 - synchronization to 1 hour.
State of the instrument (Stop, Start or Pause)	**S**	S0 - **STOP** S1 - **START** S2 - **PAUSE**
Threshold level for ULT calculation	**Xl**	Xlnnn:p - nnn level in dB ∈ (70 ÷ 140) p: 1, 2, 3 - profile number
Logger Triggering mode (TriggerMode)	**XT**	XT0 - switched off (OFF) XT4 - **LEVEL +** XT5 - **LEVEL –**
Logger Triggering level (TriggerLev)	**XL**	XLnnn -nnn level in dB ∈ (24 ÷ 136)
Logger Triggering - Number of records taken into account before the fulfilment of the triggering condition (TriggerPre)	**XQ**	XQnn - nn number of records saved in the logger before the triggering condition; nn ∈ (0 ÷ 10)
Logger Triggering - Number of records taken into account after the fulfilment of the triggering condition (TriggerPost)	**Xq**	Xqnnn - nnn number of records saved in the logger after the fulfilment of the triggering condition; nn ∈ (0 ÷ 200)
Threshold level for PTC calculation	**XC**	XCnnn:p - nnn level in dB ∈ (70 ÷ 140) p: 1, 2, 3 - profile number
Logger File Splitting Mode	**XA**	XA0 switched off (**OFF**) XA-1 - The file is created for each measurement cycle. XA15 - The file is created every 15 min. synchronized to RTC. XA30 - The file is created every 30 min synchronized to RTC. XA60 - The file is created every 1 hour synchronized to RTC. XA1440 - The file is created on the specified times.
Specified Time for Logger File Splitting	**XD**	XDnnn:p – nnn: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is equal 1440. p: 1 … 6 – specified time number

APPENDIX B. DATA FILE STRUCTURES

B.1 GENERAL STRUCTURE OF THE SV 307 FILES

Each file containing data from the **SV 307** instrument consists of several groups of words. In the case of the **SV 307** (the internal file system rev. **1.14**), there are two different types of files containing:

- the results stored in the file in the instrument's logger (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 Wave-file 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 file from the logger (cf. Tab. B.1.15)
- contents of the file from the logger (cf. Tab. B.1.16)

The other elements of the file structure are not obligatory for each file type stated above. They depend on the file type (**SLM**, file from the logger) 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: 114
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)
7	FileSysVersion	file system version: 114
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.1.6. 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	Reserved	reserved
27	Reserved	reserved
23	Reserved	reserved
29	Reserved	reserved
30	Reserved	reserved
31	MainResBuff	Summary results. Contents defined as a sum of: 0 - none 1 - **Main Results** 2 - **Spectrum** 4 - **Spectrum MAX** 8 - **Spectrum MIN** 16 - **Spectrum PEAK** 32 - **Statistical levels** 64 - **Statistical analysis in profiles** 128 - **Statistical analysis in 1/1 or 1/3 OCTAVE mode** 256 - **RPM** 512 - **Meteo**
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 equal 1440.
44	SplitTime[2]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is equal 1440.
45	SplitTime[3]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is equal 1440.
46	SplitTime[4]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is equal 1440.
47	SplitTime[5]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is equal 1440.
48	SplitTime[6]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is equal 1440.
49	Pause[1]	reserved
50	PauseBegin[1]	reserved
51	PauseEnd[1]	reserved
52	Pause[2]	reserved
53	PauseBegin[2]	reserved
54	PauseEnd[2]	reserved
55	Pause[3]	reserved
56	PauseBegin[3]	reserved

57	PauseEnd[3]	reserved
58	Pause[4]	reserved
59	PauseBegin[4]	reserved
60	PauseEnd[4]	reserved
61	Pause[5]	reserved
62	PauseBegin[5]	reserved
63	PauseEnd[5]	reserved
…		

Table B.1.8. MEASURE 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** 10 - recording 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	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** 6 - **LF**
11	BitsPerSample	bits/sample: 16
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. External 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**,
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**: 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

Word number	Name	Comment
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
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
…		

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 – Lxvmax[2] result not displayed, 1 – Lxvmax[2] result displayed
4	Lmin	0 – Lxvmin[2] result not displayed, 1 – Lxvmin[2] result displayed
5	L	0 – Lxv[2] result not displayed, 1 – Lxv[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 – Lxveq[23] result not displayed, 1 – Lxveq[23] result displayed
10	LE	0 – LxvE[23] result not displayed, 1 - LxvE[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	Ltm5	0 – Ltm5 result not displayed, 1 - Ltm5 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	MeteoUnitNumber	serial number of the monitoring station (if the parameter value is equal to 0xFFFFFFFF this parameter is irrelevant)
16	MeteoUnitType	type of the monitoring station: - 276 (SP 276) (if the parameter value is equal to 0xFFFF this parameter is irrelevant)
17..18	MeteoSoftwareVersion	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..
…	…	…

Table B.1.18_SLM. Main results in SLM mode (saved in Summary Results Record)

Word number	Name	Comment
0	0xnn07	[07, nn=block's length]
1	0x0307	[used_profile, profile's mask]
2	0xmm08	[08, mm=sub-block's length]
3..4	MeasureTime	time of the measurement
5	Result[1][1]	Lxpeak[1] value in the 1st profile (*100 dB)
6	Result[1][2]	LxyE[23] value in the 1st profile (*100 dB)
7	Result[1][3]	maximal value (Lxymax[2]) in the 1st profile (*100 dB)
8	Result[1][4]	minimal value (Lxymin[2]) in the 1st profile (*100 dB)
9	Result[1][5]	Lxy[2] value in the 1st profile (*100 dB)
10	Result[1][6]	Lxyeq[23] value in the 1st profile (*100 dB)
11	Result[1][7]	**Lden** value in the 1st profile (*100 dB)
12	Result[1][8]	**Ltm3** value in the 1st profile (*100 dB)
13	Result[1][9]	**Ltm5** value in the 1st profile (*100 dB)
14	Result[1][10]	**LR1** value in the 1st profile (*100 dB)
15	Result[1][11]	**LR2** value in the 1st profile (*100 dB)
16	UnderRes[1]	under-range value in the 1st profile
17..18	ULTime[1]	reserved
19..20	PTC[1]	reserved
21	UnitFlags	flags word for measurement cycle (definition in table B.1.6)
22	0xmm08	[08, mm=sub-block's length]
23..24	OVL	overload time
25	Result[2][1]	Lxpeak[1] value in the 2nd profile (*100 dB)
26	Result[2][2]	LxyE[23] value in the 2nd profile (*100 dB)
27	Result[2][3]	maximal value (Lxymax[2]) in the 2nd profile (*100 dB)
28	Result[2][4]	minimal value (Lxymin[2]) in the 2nd profile (*100 dB)
29	Result[2][5]	Lxy[2] value in the 2nd profile (*100 dB)
30	Result[2][6]	Lxyeq[23] value in the 2nd profile (*100 dB)
31	Result[2][7]	**Lden** value in the 2nd profile (*100 dB)
32	Result[2][8]	**Ltm3** value in the 2nd profile (*100 dB)
33	Result[2][9]	**Ltm5** value in the 2nd profile (*100 dB)
34	Result[2][10]	**LR1** value in the 2nd profile (*100 dB)
35	Result[2][11]	**LR2** value in the 2nd profile (*100 dB)
36	UnderRes[2]	under-range value in the 2nd profile
37..38	ULTime[2]	reserved
39..40	PTC[2]	reserved
41	UnitFlags	flags word for measurement cycle (definition in table B.1.6)
42	0xmm08	[08, mm=sub-block's length]
43..44	Reserved	reserved
45	Result[3][1]	Lxpeak[1] value in the 3rd profile (*100 dB)

46	Result[3][2]	$L_{xy}E^{23}$ value in the 3rd profile (*100 dB)
47	Result[3][3]	maximal value ($L_{xy}max^{2}$) in the 3rd profile (*100 dB)
48	Result[3][4]	minimal value ($L_{xy}min^{2}$) in the 3rd profile (*100 dB)
49	Result[3][5]	L_{xy}^{2} value in the 3rd profile (*100 dB)
50	Result[3][6]	$L_{xy}eq^{23}$ value in the 3rd profile (*100 dB)
51	Result[3][7]	**Lden** value in the 3rd profile (*100 dB)
52	Result[3][8]	**Ltm3** value in the 3rd profile (*100 dB)
53	Result[3][9]	**Ltm5** value in the 3rd profile (*100 dB)
54	Result[3][10]	**LR1** value in the 3rd profile (*100 dB)
55	Result[3][11]	**LR2** value in the 3rd profile (*100 dB)
56	UnderRes[3]	under-range value in the 3rd profile
57..58	ULTime[3]	reserved
59..60	PTC[3]	reserved
61	UnitFlags	flags word for measurement cycle (definition in table B.1.6)
…	…	…

[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	0xnn17	[17, nn=block's length]
1	0xpprr	[pp=used_profile, rr=profile's mask]
2	N_stat_level	number of statistical levels = N
3+i*(pp+1)	nn[i]	number of the **Lnn** statistics; i=0..N-1
3+i*(pp+1)+p	**Lnn**[i,p]	value of the **Lnn** statistics for profile p (p=1..pp) (*100 dB)
…	…	…

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.1.24. File-end-marker

Word number	Name	Comment
0	0xFFFF	file end marker

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 file from the logger - cf. Tab. B.1.15.
Contents of the file from the logger - 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

(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> - **Lxpeak**[1] result, depending on the value of BufferP[2] (cf. Tab. B.1.12)
<result2> - **Lxymax**[2] result, depending on the value of BufferP[2] (cf. Tab. B.1.12)
<result3> - **Lxymin**[2] result, depending on the value of BufferP[2] (cf. Tab. B.1.12)
<result4> - **Lxyeq**[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> - **Lxpeak**[1] result, depending on the value of BufferP[3] (cf. Tab. B.1.12)
<result2> - **Lxymax**[2] result, depending on the value of BufferP[3] (cf. Tab. B.1.12)
<result3> - **Lxymin**[2] result, depending on the value of BufferP[3] (cf. Tab. B.1.12)
<result4> - **Lxyeq**[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 name of the comment file

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.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 */
}
```

APPENDIX C. TECHNICAL SPECIFICATIONS

C.1 SPECIFICATION OF SV 307 IN THE STANDARD CONFIGURATION

SV 307 with all listed below accessories meets requirements of the IEC 61672:2013 for the Class 1 instruments.

The configuration of the complete SLM and its normal mode of operation:

SV 307	including, ST30 microphone (1/2", nominal sensitivity 36 mV/Pa) and SA 209 windscreen

Accessories included in SV 307 instrument set:

SB 274	power supply unit (IP67)
SC 316	USB cable
Antenna	GSM

Accessories available:

SV 36	acoustic calibrator (**B&K 4231** or equivalent)
SA 209	windscreen
SB 371	solar panel
SA 206	Manfrotto telescopic mast

Measured quantities

The measured quantities in the sound meter mode are: **L**, **Leq**, **LE**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **Lpeak**, **Lmax**, **Lmin, Lnn**.

Definitions for measured quantities are given in Appendix D.

Additional features (see Chapter C.1)

Overload indication
Under-range indication
Battery state indication
GPS positioning and time synchronization
Temperature sensors
Speaker for system check
3G 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 an electrical microphone impedance adapter SL 307.

Note: *For the conformance of electrical tests, the Microphone Compensation and Free Field Compensation must be set to "Off"!*

Note: *For the acoustic calibrator or coupler evaluation the Microphone Compensation must be set to "On" and Free Field compensation must be set to "Off".*

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"!*

Periodical test upper frequency 8 kHz

Linear Operating Range

Table C.1.1. Linear operating range: for the sinusoidal signal and microphone sensitivity 36 mV/Pa for the 90 deg incidence angle (Environmental filter)

[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	83	30	107	30	117	40	123	30	83	30	107	30	127	33	93	50	123
500 Hz	30	119	30	122	30	123	40	123	30	119	30	122	30	123	33	122	50	126
1 kHz	30	123	30	123	30	123	40	123	30	123	30	123	30	123	33	126	50	126
4 kHz	30	121	30	122	30	122	40	123	30	121	30	122	30	122	33	124	50	126
8 kHz	30	122	30	120	30	120	40	123	30	122	30	120	30	120	33	125	50	123
12.5 kHz	30	118	30	117	30	116	40	123	30	118	30	117	30	116	33	121	50	120

Table C.1.2. Linear operating range: for the sinusoidal signal and microphone sensitivity 36 mV/Pa for the 0 deg incidence angle (Airport filter)

[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	80	30	104	30	114	40	120	30	80	30	104	30	124	33	90	50	120
500 Hz	30	116	30	119	30	120	40	120	30	116	30	119	30	120	33	119	50	123
1 kHz	30	120	30	120	30	120	40	120	30	120	30	120	30	120	33	123	50	123
4 kHz	30	118	30	119	30	119	40	120	30	118	30	119	30	119	33	121	50	123
8 kHz	30	119	30	117	30	117	40	120	30	119	30	117	30	117	33	122	50	120
12.5 kHz	30	115	30	114	30	113	40	120	30	115	30	114	30	113	33	118	50	117

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:* $A_n = 123 - 20\log(n/\sqrt{2})$, *where* ***A*** *is the upper limit for the sinusoidal signal.*

Example: For the crest factor ***n = 10*** *the upper limit is* A_{10} = ***106 dB****.*

The starting point at which tests of level linearity shall begin is 94.0 dB.

Measuring frequency range of the acoustic pressure (-3 dB) 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 60651 and IEC 61672-1:2013 standard for the Class 1 "**A**" filter
- **C** meeting requirements of the IEC 60651 and IEC 61672-1:2013 standard for the Class 1 "**C**" filter
- **B** meeting requirements of the IEC 60651 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	< 15 dB	< 15 dB	< 23 dB	< 20 dB	< 20 dB	< 30 dB

Special filters (see Section C.1)

Frequency response of SV 307 is compensated by means of the digital filter:

- **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. The overload in the measurement channel (in its analogue part) and the overload of the analogue / digital converter are both detected. The "overload" indication is when the input signal amplitude **is 0.5 dB above** the declared "Peak measurement range".

Underrange detector

The instrument has the built-in underrange detector. The "underrange" indication appears when the minimum value of the RMS detector output goes below the specified lower linear operating range.

Time weighting characteristics (Exponential averaging)

Slow "**S**" according to IEC 61672 Class 1, Equivalent Time Constant 1000 ms
Fast "**F**" according to IEC 61672 Class 1, Equivalent Time Constant 125 ms
Impulse "**I**" according to IEC 60804 Class 1, Equivalent Time Constant 35 ms, Hold Time 1500 s

Reference conditions

- Class of the acoustic field — Free field
- Reference acoustic pressure — 114.0 dB (related to 20 μPa)
- Reference frequency — 1000 Hz
- Reference temperature — +20°C
- Reference relative humidity — 65 %
- Reference static pressure — 1013 hPa
- Reference incidence direction — perpendicular to the microphone diaphragm.

Calibration

Acoustical **-** with the SV 36 acoustic calibrator (or equivalent):

- Calibration level for the free field — 113.9 dB (see ST30 free field correction table below)

Auto-start time — 1 min. (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 instruments. 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 in the SLM the **Z** filter and time weighting **F** are selected, and the SPL measurements are considered.

The greatest susceptibility is achieved when the SLM is placed parallel to the radio frequency field. In addition, if there is an extension cable, the greatest susceptibility is achieved when the SLM and cable is placed along field and the cable is coil as solenoid.

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 range	from -20°C to + 50°C
Storage	from -40°C to + 60°C
Humidity	99% RH (not-condensed)
Battery state indication	0-100% of the battery state of charge

Microphone

ST 30	free-field condenser microphone **MEMS (**½" housing)
Nominal sensitivity	36 mV/Pa (corresponding to app. -29 dBV/Pa re 1 V/Pa)
Impedance	350 Ohm.

Note: *Maximum level of sound pressure, which can be affect the microphone without destruction the microphone: 160 dB.*

Free field response of ST 30

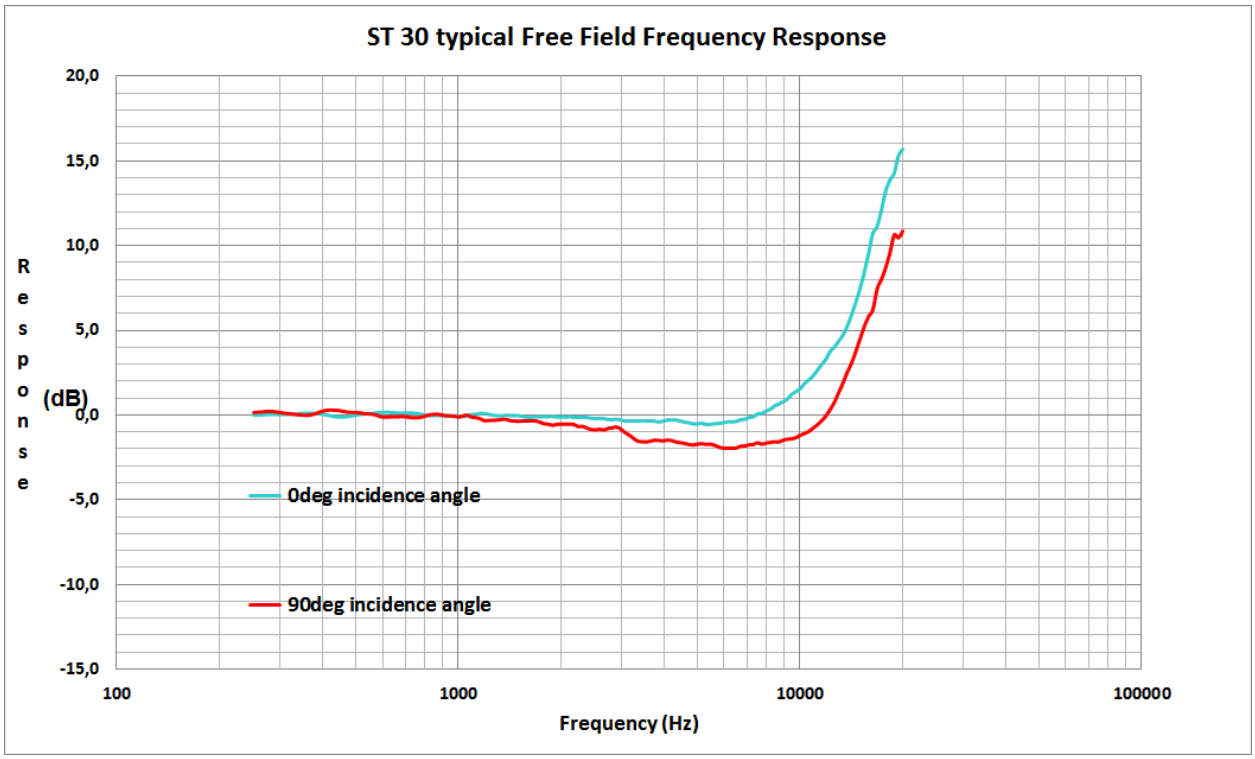


Table C.1.4. ST 30 free field response for 0 deg and 90 deg incidence angle

f [Hz]	0 deg incidence angle	90 deg incidence angle	f [Hz]	0 deg incidence angle	90 deg incidence angle
251.19	-0.03	0.12	**2304.09**	-0.17	-0.68
258.52	-0.02	0.15	**2371.37**	-0.17	-0.79
266.07	-0.01	0.17	**2440.62**	-0.21	-0.87
273.84	0.01	0.20	**2511.89**	-0.23	-0.89
281.84	0.02	0.20	**2585.23**	-0.23	-0.86
290.07	0.01	0.18	**2660.73**	-0.24	-0.90
298.54	0.01	0.14	**2738.42**	-0.28	-0.80
307.26	0.01	0.10	**2818.38**	-0.30	-0.77
316.23	0.02	0.07	**2900.68**	-0.26	-0.73
325.46	0.03	0.04	**2985.38**	-0.32	-0.86
334.97	0.05	0.01	**3072.56**	-0.38	-1.06
344.75	0.07	-0.02	**3162.28**	-0.37	-1.21
354.81	0.08	-0.03	**3254.62**	-0.36	-1.41
365.17	0.08	-0.03	**3349.65**	-0.37	-1.57
375.84	0.08	0.02	**3447.47**	-0.36	-1.59
386.81	0.06	0.11	**3548.13**	-0.37	-1.61
398.11	0.03	0.20	**3651.74**	-0.36	-1.56
409.73	-0.02	0.26	**3758.37**	-0.39	-1.50
421.70	-0.07	0.28	**3868.12**	-0.43	-1.52
434.01	-0.11	0.27	**3981.07**	-0.37	-1.54
446.68	-0.14	0.24	**4097.32**	-0.32	-1.49
459.73	-0.14	0.19	**4216.97**	-0.31	-1.54

f [Hz]	0 deg incidence angle	90 deg incidence angle	f [Hz]	0 deg incidence angle	90 deg incidence angle
473.15	-0.11	0.14	**4340.10**	-0.32	-1.62
486.97	-0.07	0.13	**4466.84**	-0.39	-1.66
501.19	-0.02	0.13	**4597.27**	-0.45	-1.70
515.82	0.02	0.10	**4731.51**	-0.49	-1.77
530.88	0.04	0.06	**4869.68**	-0.54	-1.79
546.39	0.06	0.04	**5011.87**	-0.54	-1.74
562.34	0.08	0.02	**5158.22**	-0.51	-1.71
578.76	0.12	-0.05	**5308.84**	-0.58	-1.76
595.66	0.13	-0.13	**5463.87**	-0.57	-1.74
613.06	0.14	-0.15	**5623.41**	-0.54	-1.81
630.96	0.13	-0.12	**5787.62**	-0.52	-1.92
649.38	0.11	-0.12	**5956.62**	-0.47	-1.98
668.34	0.10	-0.11	**6130.56**	-0.43	-1.98
687.86	0.10	-0.11	**6309.57**	-0.42	-1.98
707.95	0.10	-0.14	**6493.82**	-0.40	-1.97
728.62	0.10	-0.17	**6683.44**	-0.29	-1.85
749.89	0.08	-0.18	**6878.60**	-0.27	-1.85
771.79	0.03	-0.15	**7079.46**	-0.17	-1.78
794.33	-0.02	-0.09	**7286.18**	-0.12	-1.76
817.52	-0.04	-0.01	**7498.94**	0.05	-1.66
841.40	-0.06	0.02	**7717.92**	0.07	-1.74
865.96	-0.06	0.03	**7943.28**	0.21	-1.67
891.25	-0.05	-0.02	**8175.23**	0.33	-1.63
917.28	-0.05	-0.07	**8413.95**	0.52	-1.59
944.06	-0.07	-0.06	**8659.64**	0.64	-1.62
971.63	-0.07	-0.09	**8912.51**	0.77	-1.50
1000.00	-0.09	-0.13	**9172.76**	0.93	-1.44
1029.20	-0.11	-0.07	**9440.61**	1.21	-1.42
1059.25	-0.06	-0.03	**9716.28**	1.37	-1.36
1090.18	0.00	-0.14	**10000.00**	1.55	-1.21
1122.02	0.02	-0.16	**10292.01**	1.85	-1.11
1154.78	0.06	-0.24	**10592.54**	2.05	-0.98
1188.50	0.07	-0.35	**10901.84**	2.30	-0.79
1223.21	0.02	-0.34	**11220.18**	2.63	-0.59
1258.93	-0.03	-0.33	**11547.82**	2.97	-0.36
1295.69	-0.06	-0.32	**11885.02**	3.28	-0.07
1333.52	-0.07	-0.29	**12232.07**	3.74	0.31
1372.46	-0.03	-0.27	**12589.25**	4.01	0.74
1412.54	-0.05	-0.35	**12956.87**	4.36	1.31
1453.78	-0.05	-0.37	**13335.21**	4.71	1.87
1496.24	-0.06	-0.39	**13724.61**	5.24	2.50
1539.93	-0.10	-0.37	**14125.38**	5.91	3.04
1584.89	-0.15	-0.37	**14537.84**	6.65	3.73

f [Hz]	0 deg incidence angle	90 deg incidence angle	f [Hz]	0 deg incidence angle	90 deg incidence angle
1631.17	-0.16	-0.37	**14962.36**	7.49	4.47
1678.80	-0.13	-0.37	**15399.27**	8.43	5.21
1727.83	-0.13	-0.44	**15848.93**	9.55	5.79
1778.28	-0.13	-0.53	**16311.73**	10.73	6.19
1830.21	-0.12	-0.56	**16788.04**	11.14	7.40
1883.65	-0.10	-0.62	**17278.26**	12.12	7.99
1938.65	-0.14	-0.57	**17782.79**	13.24	8.67
1995.26	-0.14	-0.56	**18302.06**	13.90	9.55
2053.53	-0.14	-0.57	**18836.49**	14.30	10.60
2113.49	-0.12	-0.56	**19386.53**	15.32	10.44
2175.20	-0.16	-0.58	**19952.62**	15.71	10.82
2238.72	-0.16	-0.70			

Free field corrections for ST 30

Table C.1.5. ST 30 free field corrections for the 0 and 90 deg incidence angle with the use of Bruel & Kjaer 4226 calibrator

Correction	Frequency [Hz]										
[dB]	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**12500**	**16000**
0 deg	0.00	0.00	0.00	0.00	-0.18	-0.06	0.27	0.9	2.33	4.86	7.74
90 deg	0.00	0.00	0.00	0.00	-0.03	-0.1	-0.15	-0.27	0.45	1.59	3.98

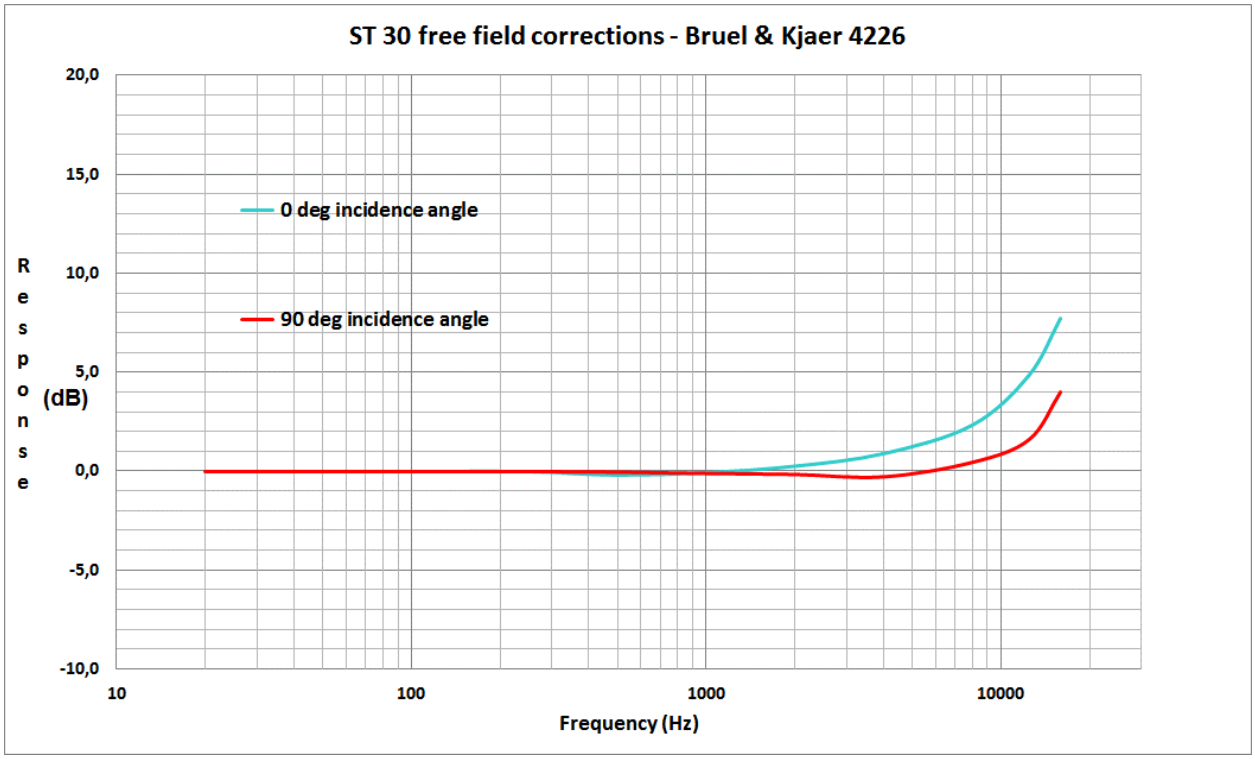
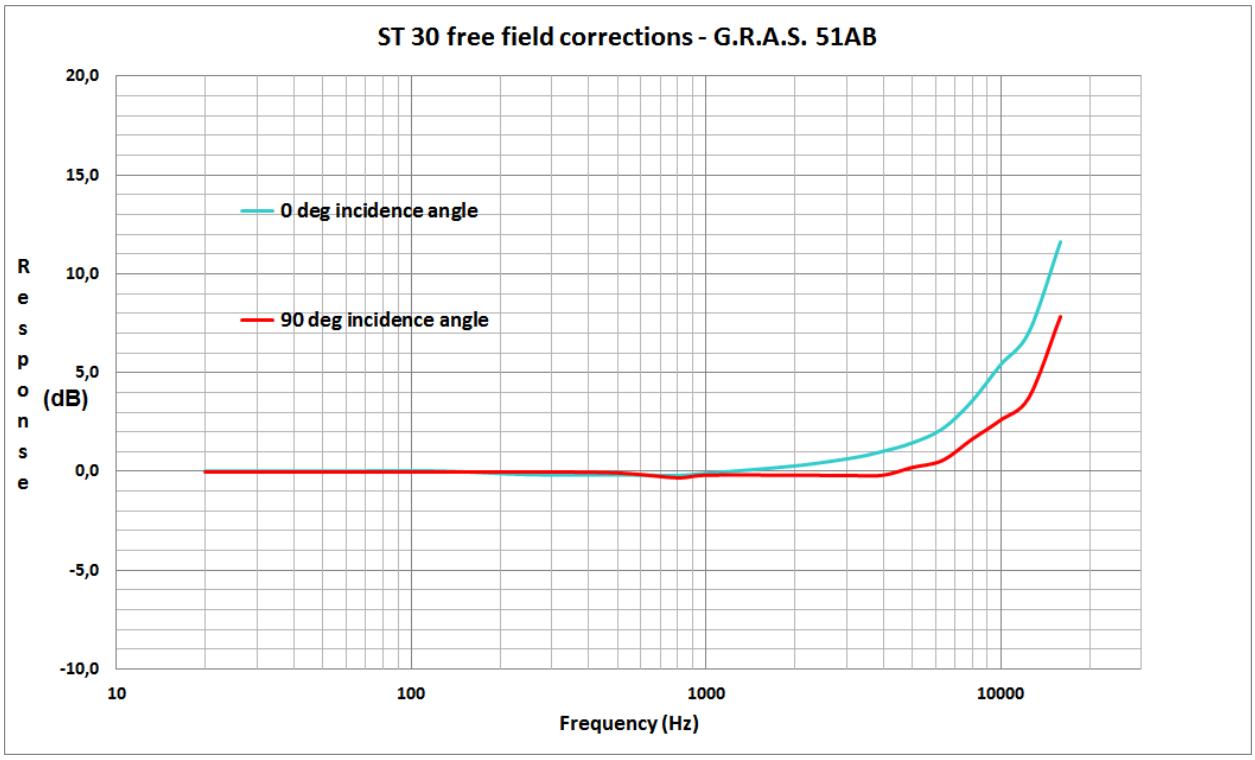
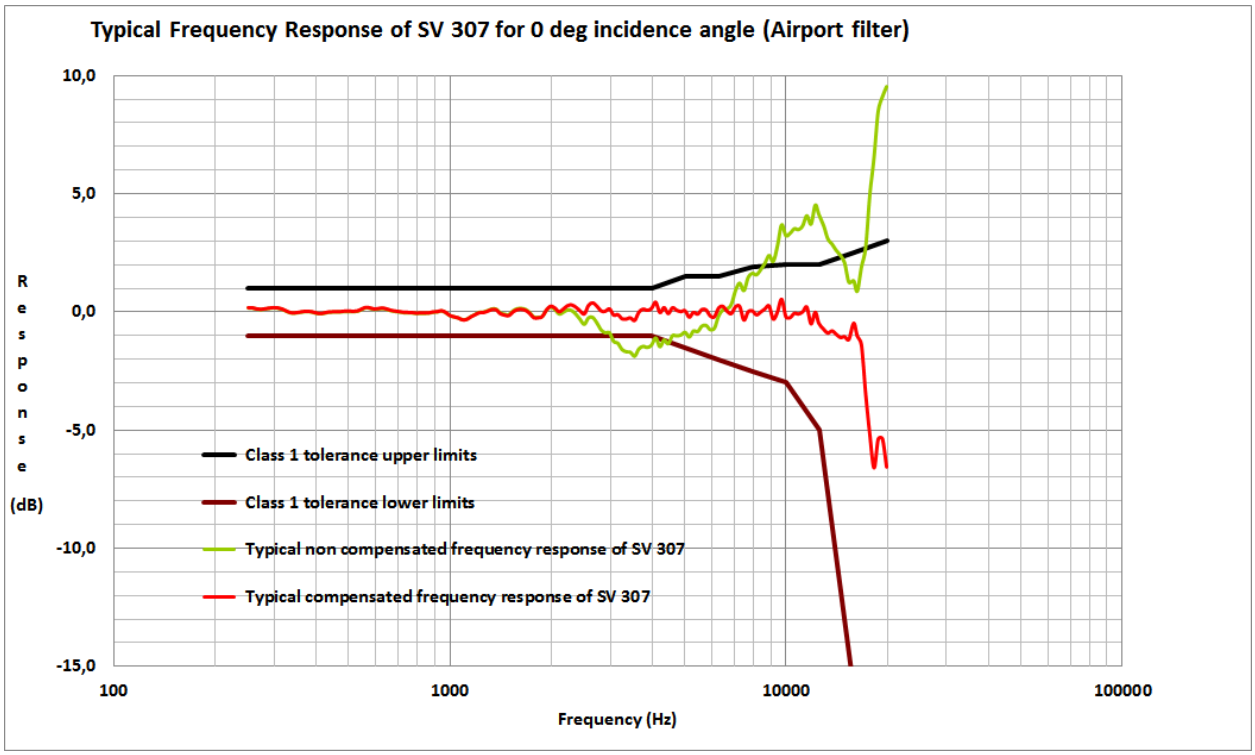


Table C.1.6. ST 30 free field corrections for the 0 and 90 deg incidence angle with the use of G.R.A.S. 51AB coupler and reference microphone ¼“ BK 4136

Correction	Frequency [Hz]											
[dB]	20.0	31.5	63	125	250	500	800	1000	2000	3150	4000	5000
0 deg	0.00	0.00	0.00	0.00	0.00	-0.20	-0.23	-0.12	0.25	0.66	1.00	1.41
90 deg	0.00	0.00	0.00	0.00	0.00	-0.05	-0.30	-0.17	-0.17	-0.18	-0.17	0.22
Correction	**Frequency [Hz]**											
[dB]	**6300**	**8000**	**10000**	**12500**	**16000**							
0 deg	2.13	3.53	5.38	7.04	11.61							
90 deg	0.58	1.65	2.61	3.77	7.86							



Free Field Frequency response of SV 307



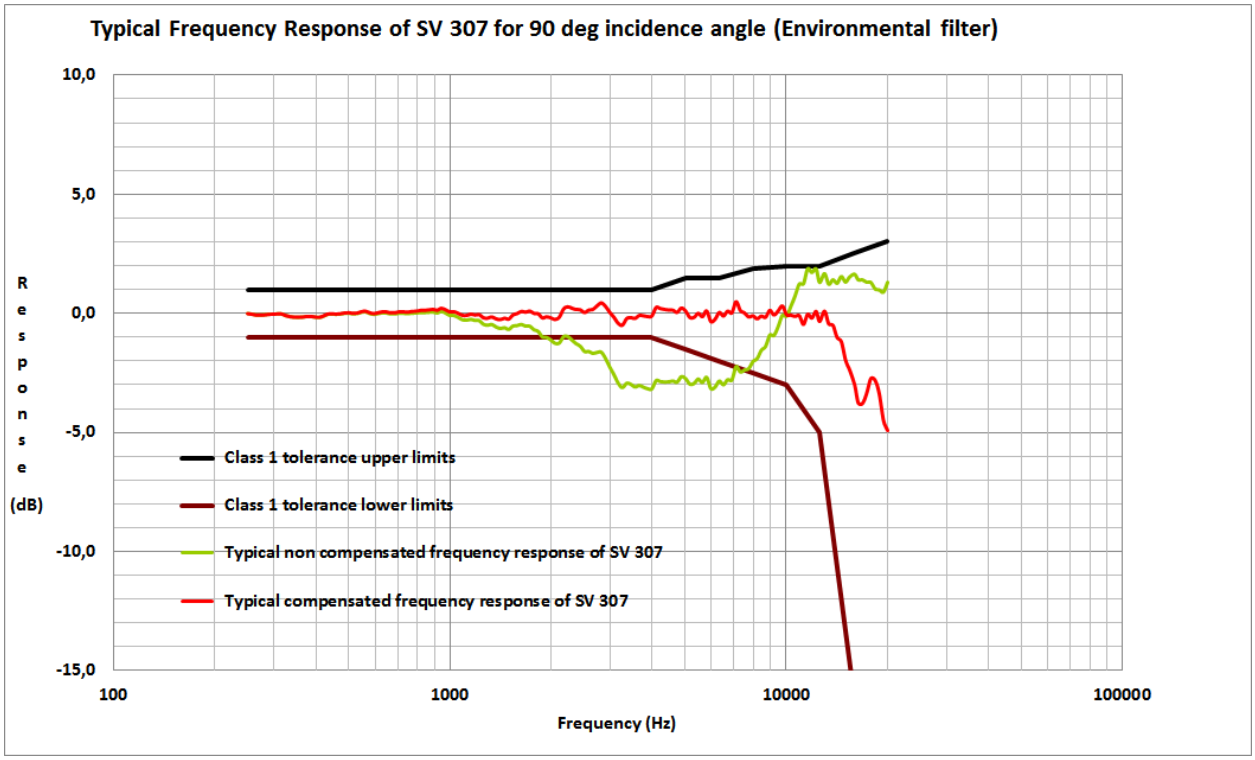


Table C.1.7. SV 307 frequency response

f [Hz]	Typical non-compensated frequency response	Typical compensated frequency response (Airport)	Typical non-compensated frequency response	Typical compensated frequency response (Environmental)
	0 deg incidence angle		90 deg incidence angle	
251.19	0.16	0.17	-0.01	0.00
258.52	0.15	0.16	-0.04	-0.03
266.07	0.11	0.12	-0.07	-0.06
273.84	0.09	0.10	-0.08	-0.06
281.84	0.11	0.12	-0.06	-0.05
290.07	0.15	0.15	-0.04	-0.03
298.54	0.16	0.17	-0.04	-0.02
307.26	0.15	0.16	-0.03	-0.01
316.23	0.11	0.11	-0.03	-0.01
325.46	0.02	0.03	-0.09	-0.08
334.97	-0.05	-0.04	-0.14	-0.12
344.75	-0.06	-0.05	-0.17	-0.15
354.81	-0.04	-0.03	-0.17	-0.15
365.17	-0.01	0.00	-0.16	-0.14
375.84	0.01	0.02	-0.14	-0.12
386.81	-0.01	0.00	-0.14	-0.11
398.11	-0.06	-0.05	-0.16	-0.14
409.73	-0.09	-0.08	-0.18	-0.15
421.70	-0.07	-0.06	-0.12	-0.10
434.01	-0.03	-0.02	-0.05	-0.02
446.68	-0.02	-0.01	-0.03	0.00
459.73	-0.02	-0.01	-0.05	-0.02
473.15	-0.01	0.00	-0.03	0.00
486.97	0.01	0.02	0.00	0.03
501.19	0.01	0.02	0.00	0.04
515.82	0.00	0.01	-0.03	0.01
530.88	0.02	0.03	-0.02	0.02
546.39	0.10	0.11	0.04	0.08
562.34	0.17	0.18	0.06	0.10
578.76	0.14	0.15	-0.01	0.04
595.66	0.10	0.11	-0.05	0.00
613.06	0.12	0.13	-0.01	0.04
630.96	0.14	0.15	0.02	0.08
649.38	0.10	0.11	0.01	0.07
668.34	0.04	0.05	-0.03	0.03
687.86	0.01	0.02	-0.03	0.04
707.95	-0.01	0.00	0.00	0.08
728.62	-0.04	-0.03	0.00	0.07
749.89	-0.05	-0.04	-0.02	0.07
771.79	-0.05	-0.04	0.00	0.09
794.33	-0.07	-0.06	0.01	0.10

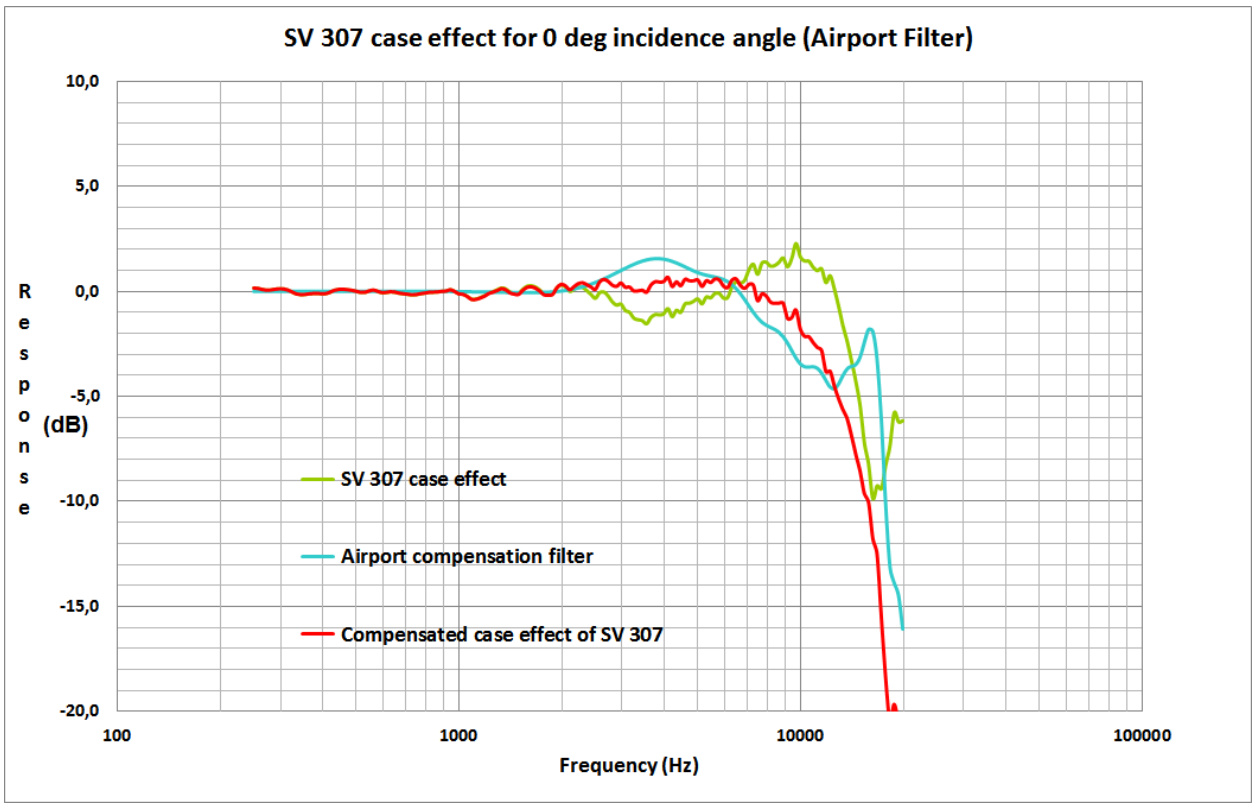
f [Hz]	Typical non-compensated frequency response	Typical compensated frequency response (Airport)	Typical non-compensated frequency response	Typical compensated frequency response (Environmental)
	0 deg incidence angle		90 deg incidence angle	
817.52	-0.06	-0.05	0.03	0.13
841.40	-0.07	-0.06	0.03	0.14
865.96	-0.06	-0.05	0.04	0.16
891.25	-0.02	-0.01	0.05	0.18
917.28	-0.01	0.00	0.01	0.14
944.06	0.04	0.04	0.08	0.22
971.63	-0.04	-0.03	0.01	0.16
1000.00	-0.17	-0.17	-0.09	0.07
1029.20	-0.22	-0.22	-0.09	0.08
1059.25	-0.26	-0.27	-0.18	0.01
1090.18	-0.34	-0.35	-0.27	-0.07
1122.02	-0.32	-0.33	-0.29	-0.07
1154.78	-0.20	-0.22	-0.25	-0.02
1188.50	-0.11	-0.13	-0.31	-0.06
1223.21	-0.03	-0.05	-0.31	-0.04
1258.93	-0.01	-0.04	-0.46	-0.17
1295.69	0.05	0.02	-0.50	-0.19
1333.52	0.12	0.09	-0.47	-0.14
1372.46	0.11	0.07	-0.58	-0.22
1412.54	-0.05	-0.09	-0.64	-0.25
1453.78	-0.10	-0.15	-0.61	-0.19
1496.24	-0.12	-0.17	-0.68	-0.23
1539.93	0.03	-0.02	-0.54	-0.05
1584.89	0.13	0.08	-0.52	0.00
1631.17	0.14	0.09	-0.47	0.09
1678.80	0.10	0.05	-0.54	0.06
1727.83	-0.04	-0.08	-0.55	0.11
1778.28	-0.22	-0.26	-0.69	0.01
1830.21	-0.24	-0.26	-0.76	-0.01
1883.65	-0.20	-0.21	-0.99	-0.18
1938.65	0.07	0.07	-1.01	-0.14
1995.26	0.20	0.23	-1.12	-0.18
2053.53	0.09	0.15	-1.26	-0.24
2113.49	-0.10	-0.01	-1.25	-0.15
2175.20	-0.02	0.10	-0.98	0.19
2238.72	0.07	0.25	-0.97	0.29
2304.09	0.05	0.28	-1.12	0.23
2371.37	-0.11	0.18	-1.27	0.17
2440.62	-0.33	0.03	-1.38	0.16
2511.89	-0.53	-0.10	-1.60	0.05
2585.23	-0.26	0.26	-1.60	0.15
2660.73	-0.24	0.37	-1.68	0.18

f [Hz]	Typical non-compensated frequency response	Typical compensated frequency response (Airport)	Typical non-compensated frequency response	Typical compensated frequency response (Environmental)
	0 deg incidence angle		90 deg incidence angle	
2738.42	-0.47	0.23	-1.64	0.33
2818.38	-0.77	0.03	-1.63	0.45
2900.68	-0.89	0.01	-1.90	0.30
2985.38	-0.89	0.12	-2.26	0.05
3072.56	-1.26	-0.15	-2.58	-0.16
3162.28	-1.34	-0.13	-2.93	-0.41
3254.62	-1.61	-0.31	-3.11	-0.49
3349.65	-1.70	-0.31	-2.93	-0.21
3447.47	-1.72	-0.27	-2.97	-0.17
3548.13	-1.89	-0.37	-3.09	-0.20
3651.74	-1.58	-0.03	-3.02	-0.07
3758.37	-1.47	0.10	-3.10	-0.09
3868.12	-1.52	0.05	-3.16	-0.12
3981.07	-1.42	0.13	-3.17	-0.10
4097.32	-1.11	0.39	-2.82	0.26
4216.97	-1.48	-0.04	-2.86	0.21
4340.10	-1.20	0.17	-2.88	0.18
4466.84	-1.36	-0.08	-2.87	0.15
4597.27	-1.01	0.16	-2.84	0.15
4731.51	-1.02	0.06	-2.89	0.05
4869.68	-0.99	0.00	-2.66	0.24
5011.87	-0.87	0.03	-2.74	0.11
5158.22	-1.07	-0.24	-2.97	-0.16
5308.84	-0.81	-0.03	-2.94	-0.16
5463.87	-0.85	-0.11	-2.76	0.02
5623.41	-0.61	0.09	-2.90	-0.13
5787.62	-0.58	0.07	-2.68	0.11
5956.62	-0.76	-0.18	-3.15	-0.33
6130.56	-0.69	-0.22	-3.10	-0.24
6309.57	-0.18	0.15	-2.84	0.05
6493.82	0.09	0.22	-3.00	-0.10
6683.44	0.12	0.02	-2.78	0.10
6878.60	0.30	-0.09	-2.80	0.03
7079.46	0.90	0.20	-2.24	0.50
7286.18	1.21	0.22	-2.46	0.13
7498.94	0.89	-0.36	-2.38	0.03
7717.92	1.44	-0.02	-2.32	-0.14
7943.28	1.64	0.03	-2.02	-0.09
8175.23	1.57	-0.14	-1.90	-0.22
8413.95	1.78	-0.02	-1.55	-0.10
8659.64	2.05	0.11	-1.39	-0.15
8912.51	2.39	0.24	-0.92	0.14

f [Hz]	Typical non-compensated frequency response	Typical compensated frequency response (Airport)	Typical non-compensated frequency response	Typical compensated frequency response (Environmental)
	0 deg incidence angle		90 deg incidence angle	
9172.76	2.14	-0.32	-0.93	-0.06
9440.61	2.80	-0.01	-0.55	0.12
9716.28	3.69	0.52	-0.09	0.32
10000.00	3.23	-0.22	-0.12	-0.05
10292.01	3.33	-0.26	0.29	-0.06
10592.54	3.53	-0.08	0.72	-0.12
10901.84	3.49	-0.10	1.23	-0.08
11220.18	3.65	-0.01	1.23	-0.45
11547.82	4.08	0.19	1.86	-0.03
11885.02	3.72	-0.52	1.71	-0.19
12232.07	4.52	-0.03	1.86	0.09
12589.25	4.14	-0.49	1.29	-0.33
12956.87	3.65	-0.75	1.66	0.10
13335.21	3.10	-0.90	1.22	-0.43
13724.61	2.87	-0.81	1.40	-0.49
14125.38	2.60	-0.96	1.26	-1.00
14537.84	2.39	-1.09	1.54	-1.18
14962.36	2.07	-1.06	1.30	-1.95
15399.27	1.26	-1.17	1.53	-2.39
15848.93	1.31	-0.49	1.63	-2.99
16311.73	0.87	-1.03	1.40	-3.75
16788.04	1.89	-1.39	1.40	-3.78
17278.26	2.73	-3.46	1.30	-3.36
17782.79	4.96	-5.18	1.29	-2.73
18302.06	6.56	-6.58	1.02	-2.80
18836.49	8.53	-5.37	0.98	-3.37
19386.53	9.13	-5.36	0.89	-4.49
19952.62	9.56	-6.55	1.30	-4.92

Case effect

Effect of reflections and diffraction of the acoustic plane wave from the case of SV 307 (“case effect”).



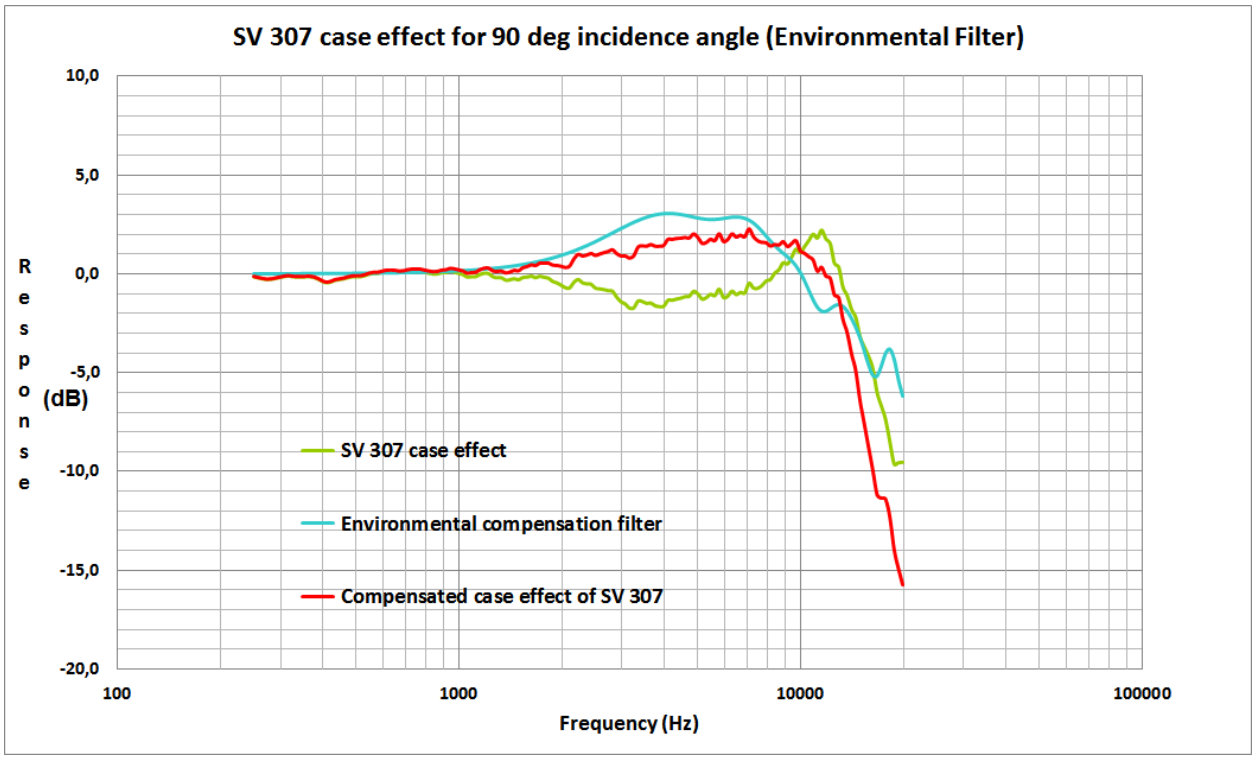


Table C.1.8. SV 307 case effect

f [Hz]	SV 307 Case effect	Compensation filter (Airport)	SV 307 Compensated case effect	SV 307 Case effect	Compensation filter (Environmental)	SV 307 Compensated case effect
	0 deg incidence angle			90 deg incidence angle		
251.19	0.19	0.00	0.20	-0.13	0.01	-0.12
258.52	0.17	0.00	0.17	-0.19	0.01	-0.18
266.07	0.12	0.00	0.12	-0.24	0.01	-0.23
273.84	0.08	0.00	0.09	-0.27	0.01	-0.26
281.84	0.10	0.01	0.10	-0.26	0.01	-0.25
290.07	0.13	0.01	0.14	-0.22	0.01	-0.21
298.54	0.15	0.01	0.16	-0.17	0.01	-0.16
307.26	0.14	0.01	0.15	-0.13	0.01	-0.11
316.23	0.09	0.01	0.09	-0.10	0.02	-0.08
325.46	0.00	0.01	0.00	-0.13	0.02	-0.11
334.97	-0.10	0.01	-0.09	-0.15	0.02	-0.13
344.75	-0.13	0.01	-0.12	-0.15	0.02	-0.13
354.81	-0.12	0.01	-0.11	-0.14	0.02	-0.12
365.17	-0.09	0.01	-0.08	-0.13	0.02	-0.11
375.84	-0.07	0.01	-0.06	-0.16	0.02	-0.14
386.81	-0.07	0.01	-0.07	-0.25	0.02	-0.23
398.11	-0.09	0.01	-0.08	-0.37	0.02	-0.34
409.73	-0.07	0.01	-0.07	-0.44	0.02	-0.41
421.70	0.00	0.01	0.01	-0.40	0.03	-0.37
434.01	0.08	0.01	0.09	-0.32	0.03	-0.29
446.68	0.12	0.01	0.13	-0.28	0.03	-0.25
459.73	0.13	0.01	0.14	-0.24	0.03	-0.21
473.15	0.10	0.01	0.11	-0.18	0.03	-0.15
486.97	0.07	0.01	0.09	-0.14	0.03	-0.10
501.19	0.03	0.01	0.04	-0.13	0.04	-0.09
515.82	-0.02	0.01	-0.01	-0.13	0.04	-0.09
530.88	-0.02	0.01	-0.01	-0.08	0.04	-0.04
546.39	0.04	0.01	0.06	-0.01	0.04	0.04
562.34	0.09	0.01	0.10	0.04	0.05	0.08
578.76	0.03	0.01	0.04	0.04	0.05	0.09
595.66	-0.03	0.01	-0.02	0.08	0.05	0.14
613.06	-0.03	0.01	-0.01	0.13	0.06	0.19
630.96	0.01	0.01	0.02	0.14	0.06	0.20
649.38	-0.01	0.01	0.00	0.13	0.06	0.19
668.34	-0.06	0.01	-0.04	0.08	0.07	0.15
687.86	-0.09	0.01	-0.07	0.08	0.07	0.15
707.95	-0.11	0.01	-0.10	0.14	0.07	0.21
728.62	-0.14	0.01	-0.13	0.17	0.08	0.25
749.89	-0.13	0.01	-0.12	0.16	0.08	0.25
771.79	-0.08	0.01	-0.07	0.16	0.09	0.25
794.33	-0.06	0.01	-0.04	0.10	0.10	0.19
817.52	-0.02	0.01	-0.01	0.05	0.10	0.15
841.40	-0.01	0.01	0.00	0.01	0.11	0.12
865.96	0.00	0.01	0.01	0.01	0.12	0.13

f [Hz]	SV 307 Case effect	Compensation filter (Airport)	SV 307 Compensated case effect	SV 307 Case effect	Compensation filter (Environmental)	SV 307 Compensated case effect
	0 deg incidence angle			90 deg incidence angle		
891.25	0.03	0.01	0.03	0.07	0.13	0.20
917.28	0.04	0.01	0.05	0.08	0.13	0.21
944.06	0.11	0.00	0.11	0.14	0.14	0.29
971.63	0.03	0.00	0.03	0.10	0.15	0.25
1000.00	-0.08	0.00	-0.08	0.04	0.16	0.21
1029.20	-0.10	0.00	-0.11	-0.03	0.18	0.15
1059.25	-0.21	-0.01	-0.21	-0.15	0.19	0.04
1090.18	-0.34	-0.01	-0.35	-0.13	0.20	0.07
1122.02	-0.34	-0.01	-0.35	-0.12	0.22	0.09
1154.78	-0.27	-0.02	-0.28	-0.01	0.23	0.22
1188.50	-0.18	-0.02	-0.20	0.05	0.25	0.30
1223.21	-0.05	-0.02	-0.07	0.03	0.27	0.29
1258.93	0.02	-0.03	-0.01	-0.13	0.29	0.16
1295.69	0.10	-0.03	0.07	-0.18	0.31	0.13
1333.52	0.20	-0.03	0.16	-0.18	0.33	0.15
1372.46	0.14	-0.04	0.11	-0.31	0.36	0.05
1412.54	0.00	-0.04	-0.04	-0.29	0.39	0.10
1453.78	-0.05	-0.05	-0.10	-0.23	0.42	0.18
1496.24	-0.06	-0.05	-0.11	-0.29	0.45	0.16
1539.93	0.13	-0.05	0.09	-0.17	0.48	0.31
1584.89	0.28	-0.05	0.23	-0.15	0.52	0.37
1631.17	0.30	-0.05	0.25	-0.10	0.56	0.46
1678.80	0.23	-0.05	0.18	-0.18	0.60	0.43
1727.83	0.09	-0.04	0.04	-0.11	0.65	0.54
1778.28	-0.10	-0.04	-0.13	-0.16	0.70	0.54
1830.21	-0.12	-0.03	-0.14	-0.20	0.76	0.55
1883.65	-0.09	-0.01	-0.11	-0.37	0.82	0.45
1938.65	0.21	0.01	0.21	-0.44	0.88	0.43
1995.26	0.34	0.03	0.37	-0.56	0.95	0.39
2053.53	0.24	0.06	0.29	-0.69	1.02	0.33
2113.49	0.02	0.09	0.11	-0.69	1.09	0.40
2175.20	0.13	0.13	0.26	-0.40	1.17	0.77
2238.72	0.23	0.17	0.40	-0.27	1.26	0.99
2304.09	0.22	0.23	0.44	-0.44	1.35	0.91
2371.37	0.06	0.29	0.35	-0.49	1.45	0.96
2440.62	-0.12	0.36	0.24	-0.51	1.54	1.03
2511.89	-0.30	0.43	0.13	-0.71	1.65	0.94
2585.23	-0.03	0.52	0.49	-0.74	1.75	1.01
2660.73	0.00	0.61	0.61	-0.78	1.86	1.08
2738.42	-0.19	0.70	0.51	-0.84	1.97	1.14
2818.38	-0.48	0.80	0.33	-0.86	2.09	1.22
2900.68	-0.63	0.91	0.28	-1.17	2.20	1.03
2985.38	-0.57	1.01	0.44	-1.40	2.31	0.91
3072.56	-0.88	1.11	0.23	-1.51	2.42	0.91
3162.28	-0.97	1.21	0.24	-1.72	2.53	0.81
3254.62	-1.25	1.30	0.06	-1.71	2.63	0.92

f [Hz]	SV 307 Case effect	Compensation filter (Airport)	SV 307 Compensated case effect	SV 307 Case effect	Compensation filter (Environmental)	SV 307 Compensated case effect
	0 deg incidence angle			90 deg incidence angle		
3349.65	-1.33	1.39	0.06	-1.37	2.72	1.36
3447.47	-1.36	1.46	0.09	-1.39	2.81	1.42
3548.13	-1.52	1.51	-0.01	-1.48	2.89	1.41
3651.74	-1.22	1.55	0.33	-1.47	2.95	1.49
3758.37	-1.08	1.57	0.49	-1.60	3.00	1.40
3868.12	-1.09	1.57	0.48	-1.64	3.04	1.40
3981.07	-1.05	1.55	0.50	-1.63	3.07	1.44
4097.32	-0.80	1.51	0.71	-1.33	3.08	1.75
4216.97	-1.18	1.44	0.27	-1.32	3.07	1.75
4340.10	-0.87	1.37	0.49	-1.26	3.06	1.79
4466.84	-0.97	1.28	0.31	-1.22	3.03	1.81
4597.27	-0.57	1.18	0.61	-1.14	2.99	1.84
4731.51	-0.54	1.08	0.54	-1.12	2.94	1.82
4869.68	-0.44	0.99	0.54	-0.87	2.89	2.02
5011.87	-0.33	0.91	0.58	-1.00	2.85	1.85
5158.22	-0.56	0.84	0.27	-1.26	2.81	1.55
5308.84	-0.23	0.78	0.55	-1.19	2.78	1.60
5463.87	-0.28	0.74	0.46	-1.02	2.77	1.76
5623.41	-0.07	0.70	0.62	-1.09	2.78	1.69
5787.62	-0.06	0.65	0.58	-0.76	2.80	2.03
5956.62	-0.29	0.58	0.29	-1.18	2.82	1.65
6130.56	-0.26	0.48	0.22	-1.12	2.86	1.74
6309.57	0.24	0.33	0.57	-0.86	2.89	2.03
6493.82	0.48	0.14	0.62	-1.03	2.90	1.87
6683.44	0.42	-0.11	0.31	-0.93	2.89	1.96
6878.60	0.57	-0.39	0.18	-0.95	2.83	1.88
7079.46	1.07	-0.70	0.37	-0.46	2.74	2.28
7286.18	1.33	-0.99	0.34	-0.70	2.59	1.89
7498.94	0.84	-1.25	-0.41	-0.72	2.40	1.69
7717.92	1.37	-1.46	-0.09	-0.58	2.18	1.60
7943.28	1.43	-1.61	-0.18	-0.35	1.93	1.58
8175.23	1.23	-1.71	-0.47	-0.27	1.68	1.41
8413.95	1.27	-1.81	-0.54	0.04	1.45	1.49
8659.64	1.42	-1.94	-0.53	0.22	1.24	1.46
8912.51	1.62	-2.16	-0.53	0.58	1.05	1.63
9172.76	1.20	-2.46	-1.25	0.51	0.87	1.39
9440.61	1.60	-2.82	-1.22	0.87	0.67	1.54
9716.28	2.32	-3.17	-0.85	1.27	0.41	1.68
10000.00	1.68	-3.45	-1.76	1.09	0.07	1.17
10292.01	1.48	-3.58	-2.11	1.40	-0.35	1.04
10592.54	1.47	-3.60	-2.13	1.70	-0.84	0.87
10901.84	1.19	-3.59	-2.40	2.02	-1.31	0.71
11220.18	1.02	-3.66	-2.64	1.83	-1.69	0.14
11547.82	1.11	-3.89	-2.78	2.23	-1.89	0.34
11885.02	0.45	-4.24	-3.79	1.78	-1.90	-0.11

f [Hz]	SV 307 Case effect	Compensation filter (Airport)	SV 307 Compensated case effect	SV 307 Case effect	Compensation filter (Environmental)	SV 307 Compensated case effect
	0 deg incidence angle			90 deg incidence angle		
12232.07	0.78	-4.55	-3.77	1.55	-1.77	-0.22
12589.25	0.13	-4.63	-4.50	0.55	-1.62	-1.06
12956.87	-0.71	-4.40	-5.10	0.35	-1.56	-1.21
13335.21	-1.62	-4.00	-5.62	-0.66	-1.65	-2.30
13724.61	-2.37	-3.68	-6.05	-1.09	-1.90	-2.99
14125.38	-3.30	-3.56	-6.86	-1.78	-2.26	-4.05
14537.84	-4.26	-3.48	-7.74	-2.19	-2.72	-4.91
14962.36	-5.42	-3.13	-8.54	-3.17	-3.26	-6.43
15399.27	-7.17	-2.43	-9.60	-3.68	-3.91	-7.59
15848.93	-8.24	-1.80	-10.04	-4.16	-4.62	-8.78
16311.73	-9.86	-1.90	-11.77	-4.79	-5.15	-9.94
16788.04	-9.25	-3.28	-12.53	-6.00	-5.18	-11.18
17278.26	-9.39	-6.19	-15.58	-6.69	-4.66	-11.35
17782.79	-8.28	-10.13	-18.41	-7.38	-4.02	-11.40
18302.06	-7.34	-13.14	-20.48	-8.52	-3.82	-12.35
18836.49	-5.77	-13.90	-19.67	-9.62	-4.35	-13.97
19386.53	-6.20	-14.48	-20.68	-9.55	-5.38	-14.93
19952.62	-6.15	-16.10	-22.26	-9.53	-6.21	-15.74

Combined free field corrections for SV 307

Table C.1.9. Sum of the free field ST 30 microphone corrections and compensated case effect for the 0 and 90 deg incidence angle with the use of calibrator Bruel & Kjaer 4226

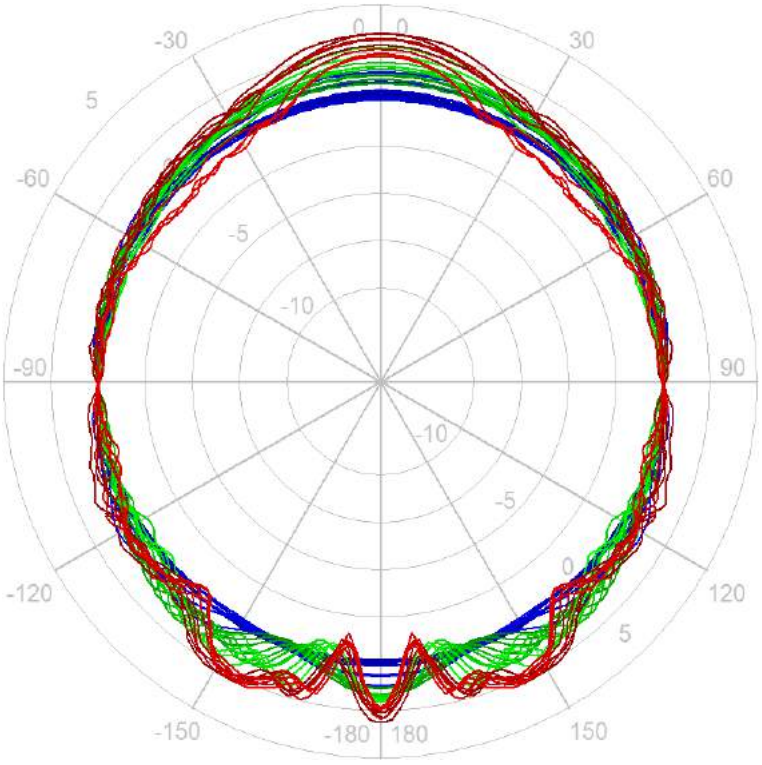
Correction	Frequency [Hz]										
[dB]	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**12500**	**16000**
0 deg	0.00	0.00	0.00	0.00	-0.14	-0.14	0.64	1.40	2.15	0.36	-2.30
90 deg	0.00	0.00	0.00	0.00	-0.12	0.10	0.23	1.17	2.03	0.52	-4.80

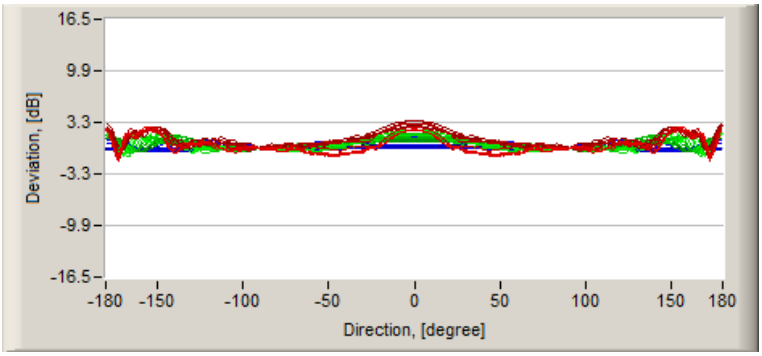
Table C.1.10. Sum of the free field ST 30 microphone corrections and compensated case effect for the 0 and 90 deg incidence angle with the use of G.R.A.S. 51AB coupler and reference ¼“ microphone BK 4136

Correction	Frequency [Hz]											
[dB]	**20.0**	**31.5**	**63**	**125**	**250**	**500**	**800**	**1000**	**2000**	**3150**	**4000**	**5000**
0 deg	0.00	0.00	0.00	0.00	0.00	-0.16	-0.27	-0.20	0.62	0.90	1.50	1.99
90 deg	0.00	0.00	0.00	0.00	0.00	-0.14	-0.10	0.04	0.22	0.62	1.27	2.07
Correction	**Frequency [Hz]**											
[dB]	**6300**	**8000**	**10000**	**12500**	**16000**							
0 deg	2.70	3.35	3.61	2.54	1.57							
90 deg	2.60	3.23	3.78	2.70	-0.92							

Directional characteristics of the SV 307

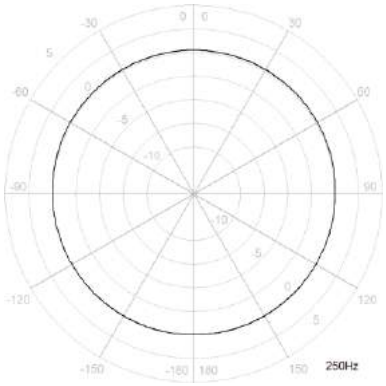
Combined directional characteristics (for 90 deg)



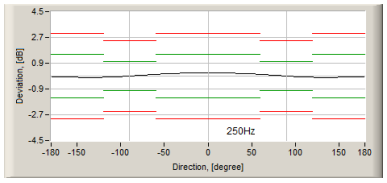


Below the directional characteristics and tolerances for 90 degree an 0 degree incidental angles are presented.

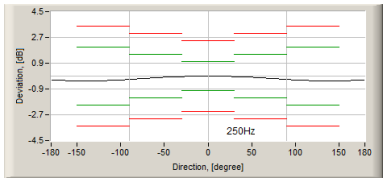
250 Hz



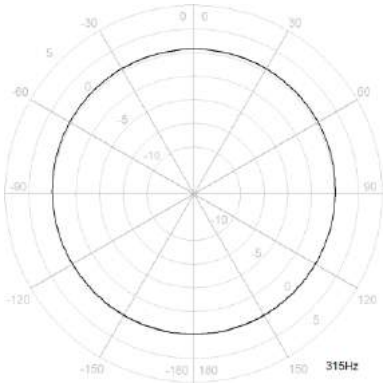
90 deg



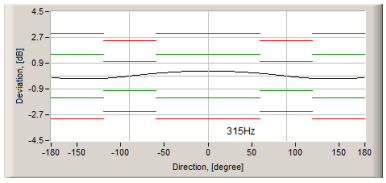
0 deg



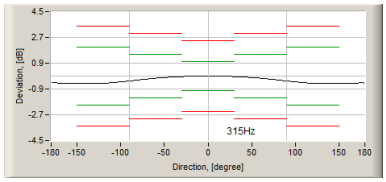
315 Hz



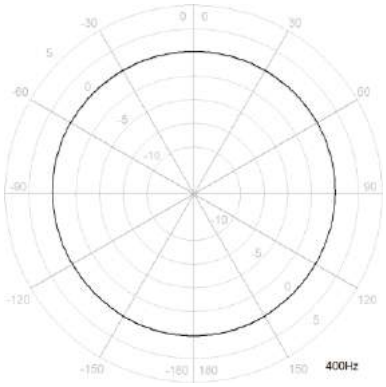
90 deg



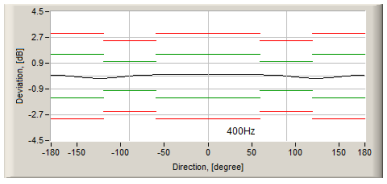
0 deg



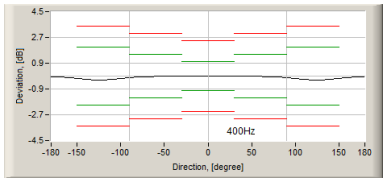
400 Hz



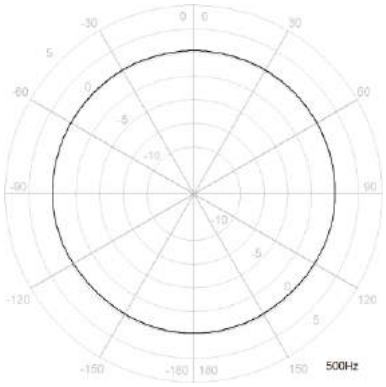
90 deg



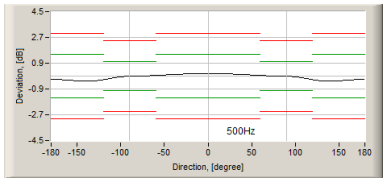
0 deg



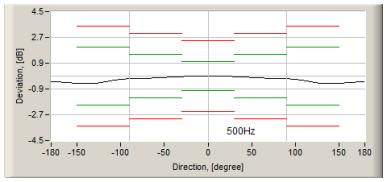
500 Hz



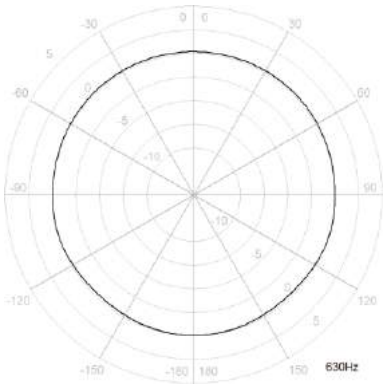
90 deg



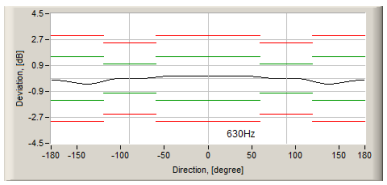
0 deg



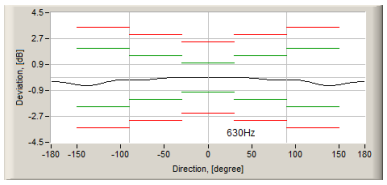
630 Hz



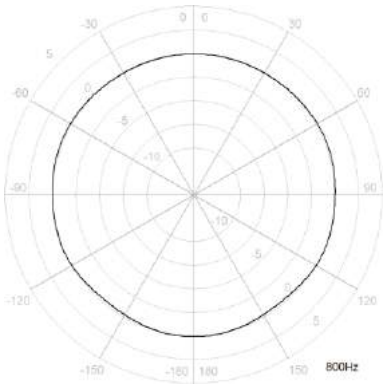
90 deg



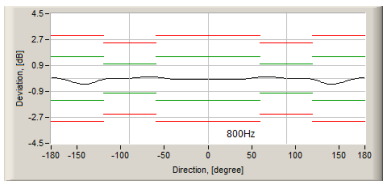
0 deg



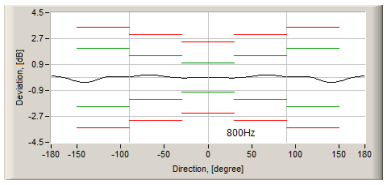
800 Hz



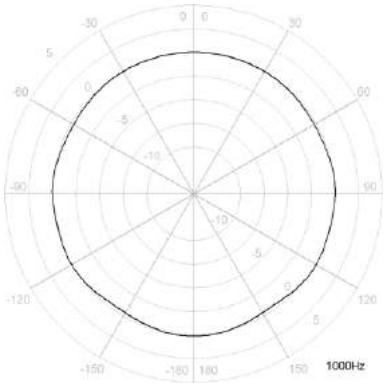
90 deg



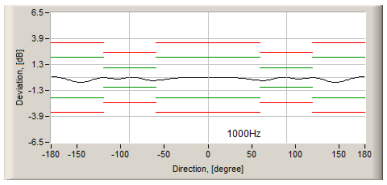
0 deg



1000 Hz



90 deg



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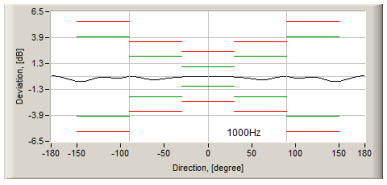
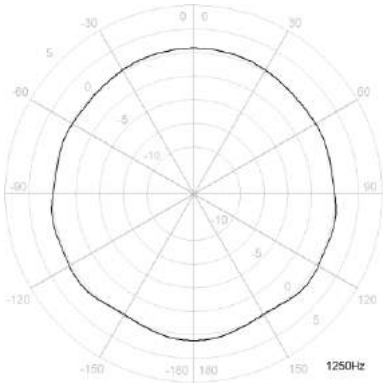
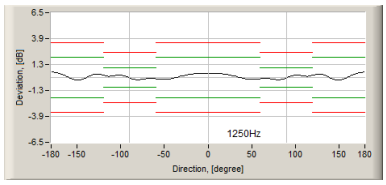


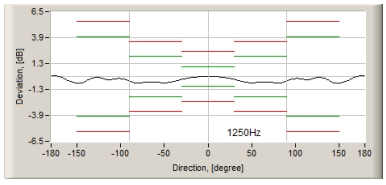
1250 Hz



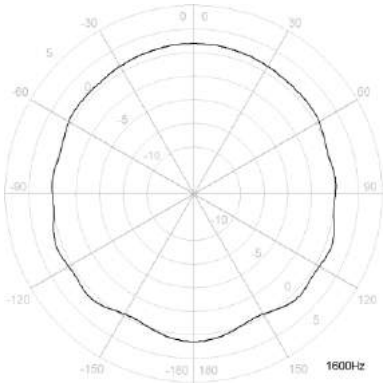
90 deg



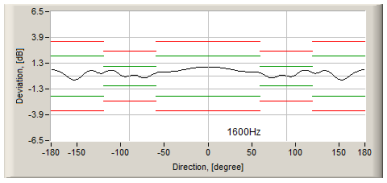
0 deg



1600 Hz



90 deg



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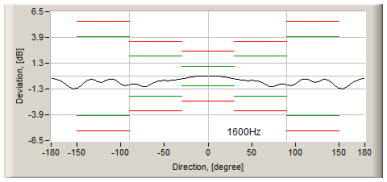
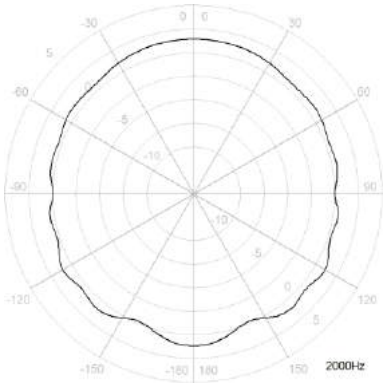
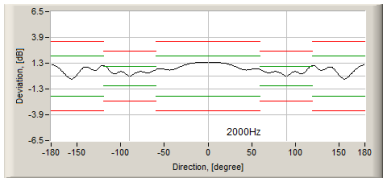


2000 Hz



90 deg



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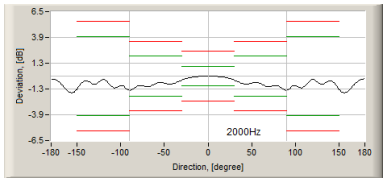
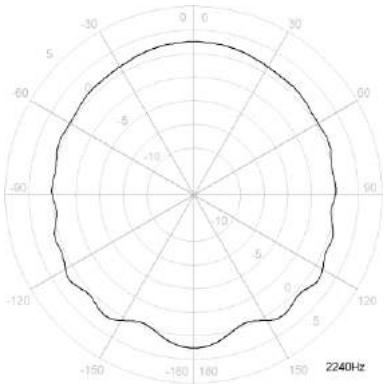


2240 Hz



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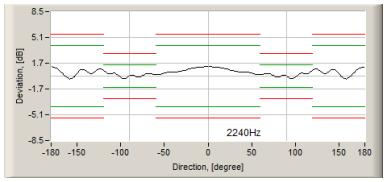
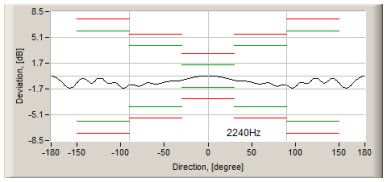
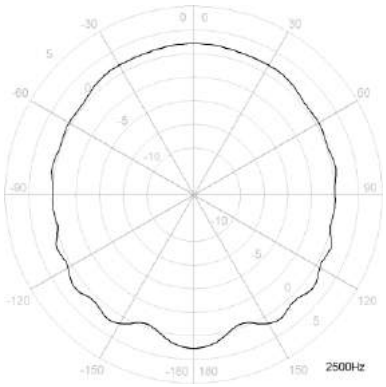


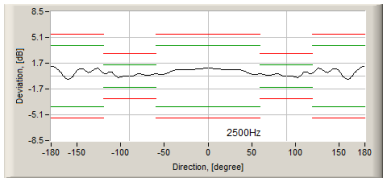
0 deg



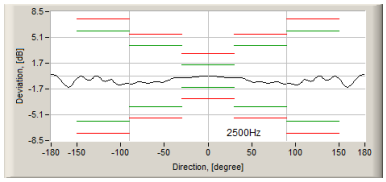
2500 Hz



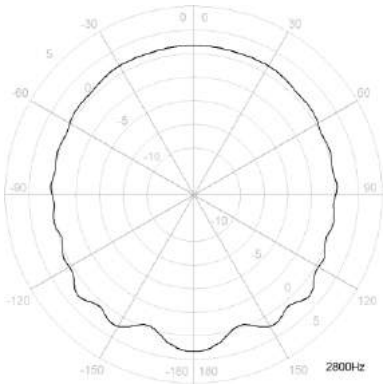
90 deg



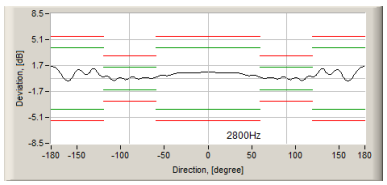
0 deg



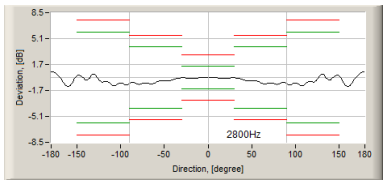
2800 Hz



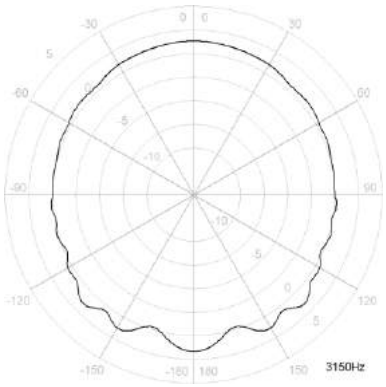
90 deg



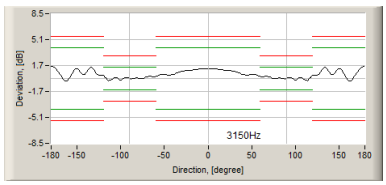
0 deg



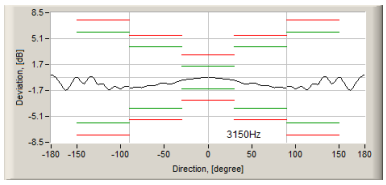
3150 Hz



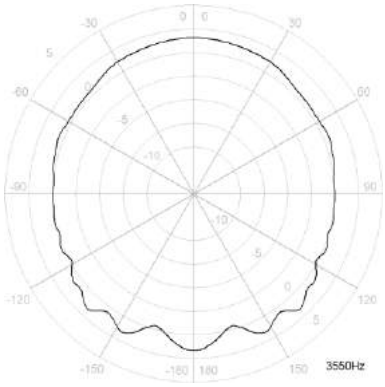
90 deg



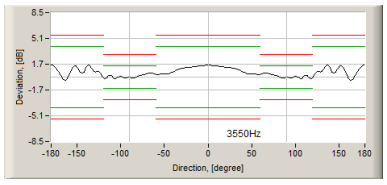
0 deg



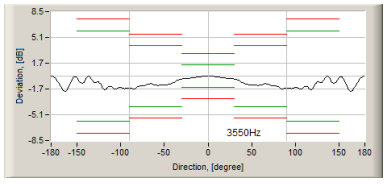
3550 Hz



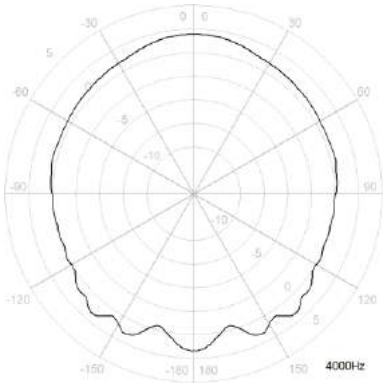
90 deg



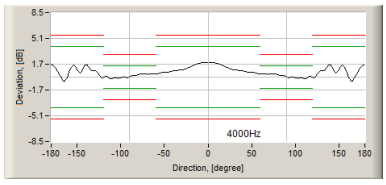
0 deg



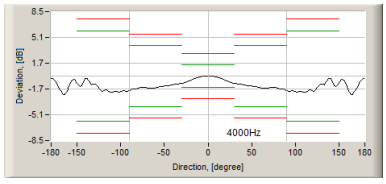
4000 Hz



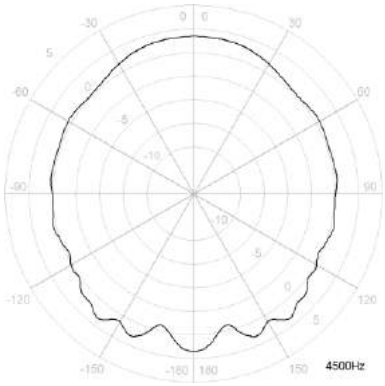
90 deg



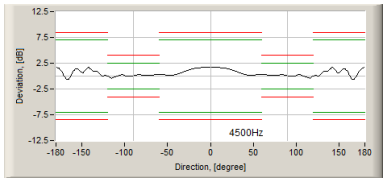
0 deg



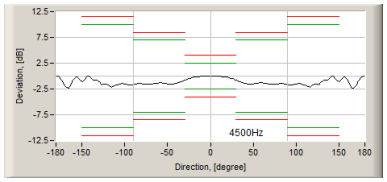
4500 Hz



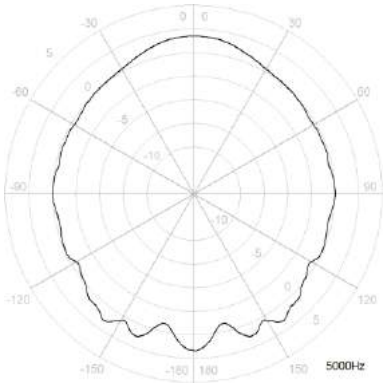
90 deg



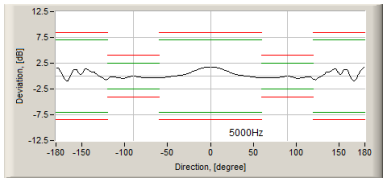
0 deg



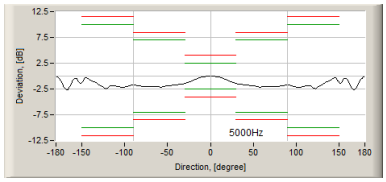
5000 Hz



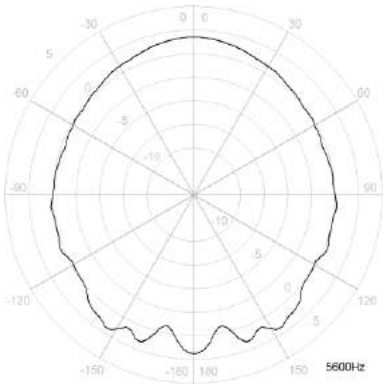
90 deg



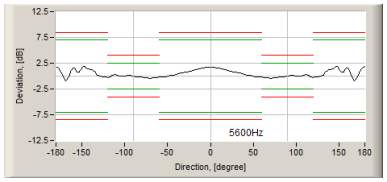
0 deg



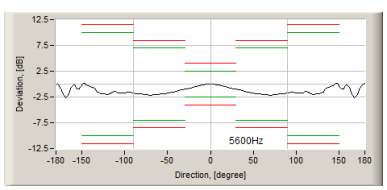
5600 Hz



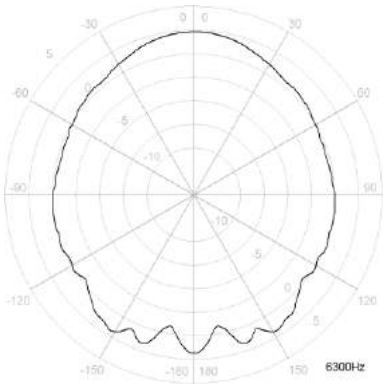
90 deg



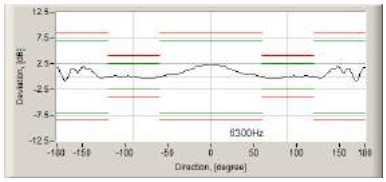
0 deg



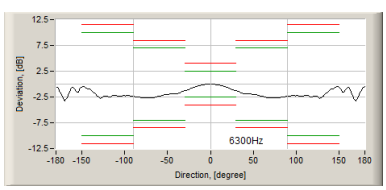
6300 Hz



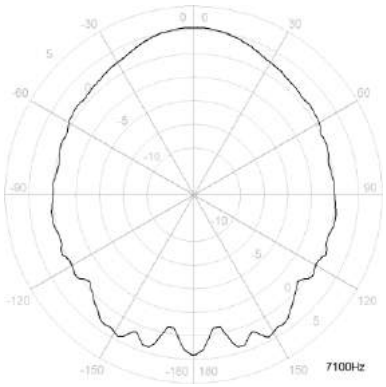
90 deg



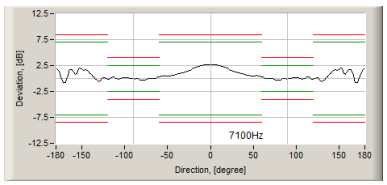
0 deg



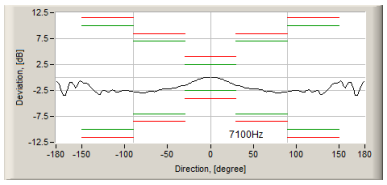
7100 Hz



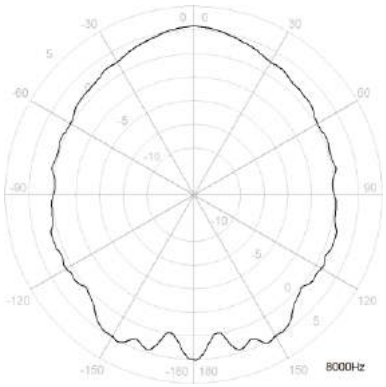
90 deg



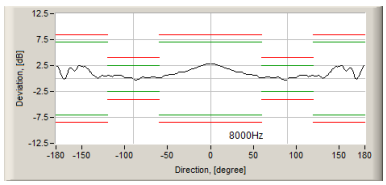
0 deg



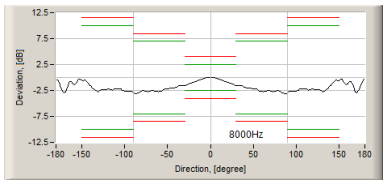
8000 Hz



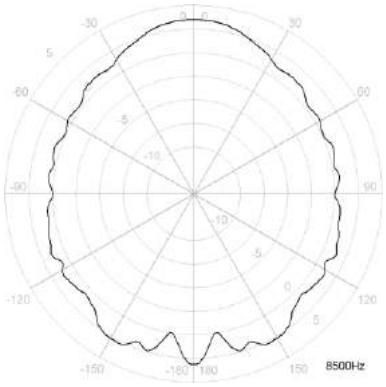
90 deg



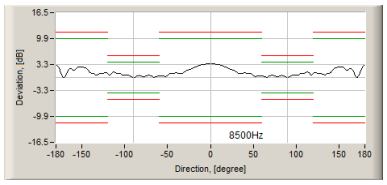
0 deg



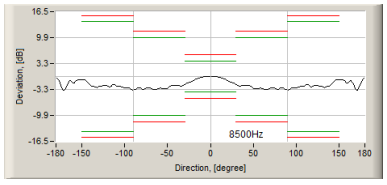
8500 Hz



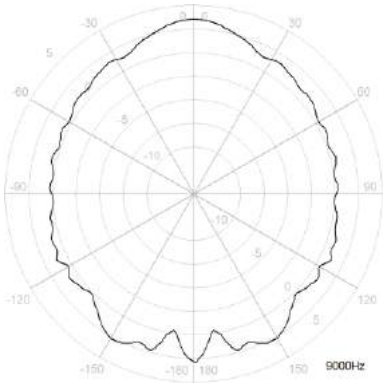
90 deg



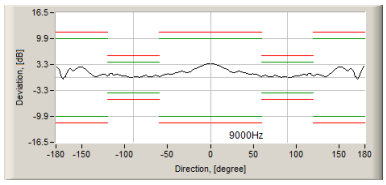
0 deg



9000 Hz



90 deg



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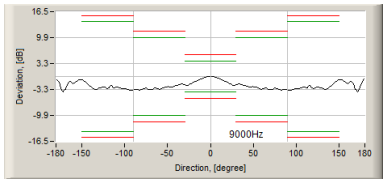
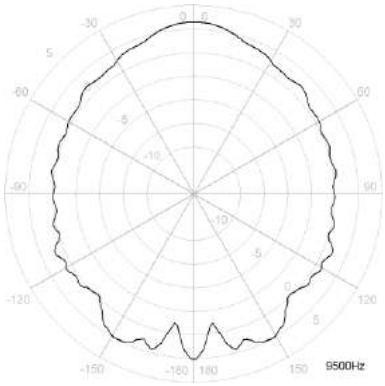
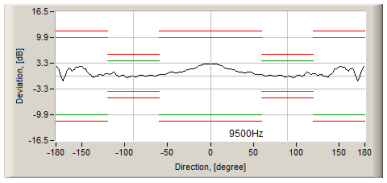


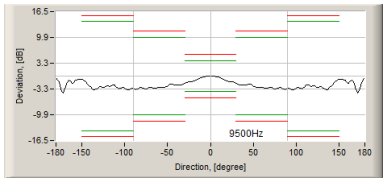
9500 Hz



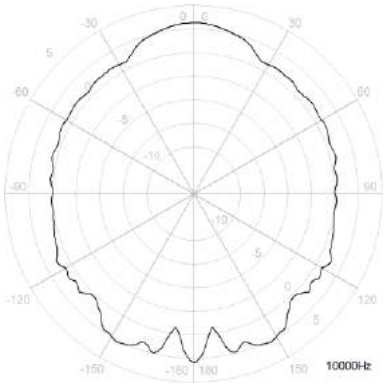
90 deg



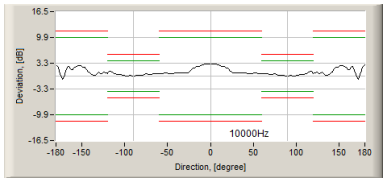
0 deg



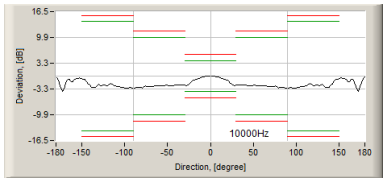
10000 Hz



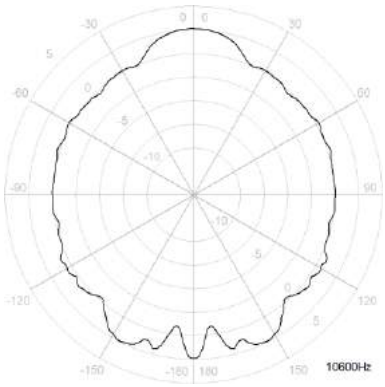
90 deg



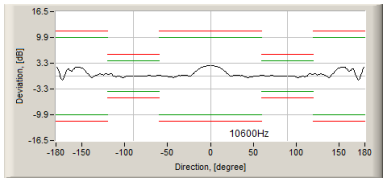
0 deg



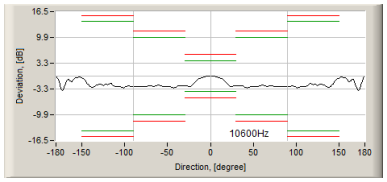
10600 Hz



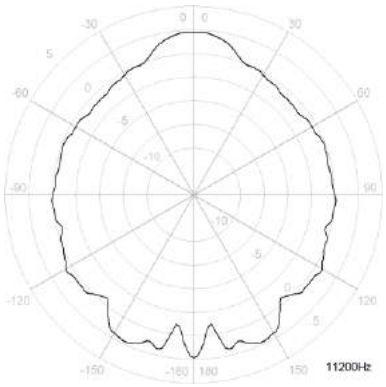
90 deg



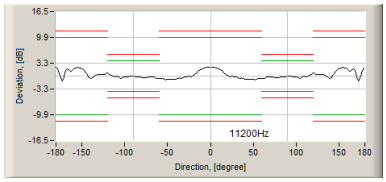
0 deg



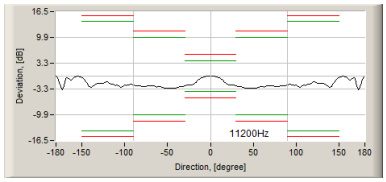
11200 Hz



90 deg



0 deg



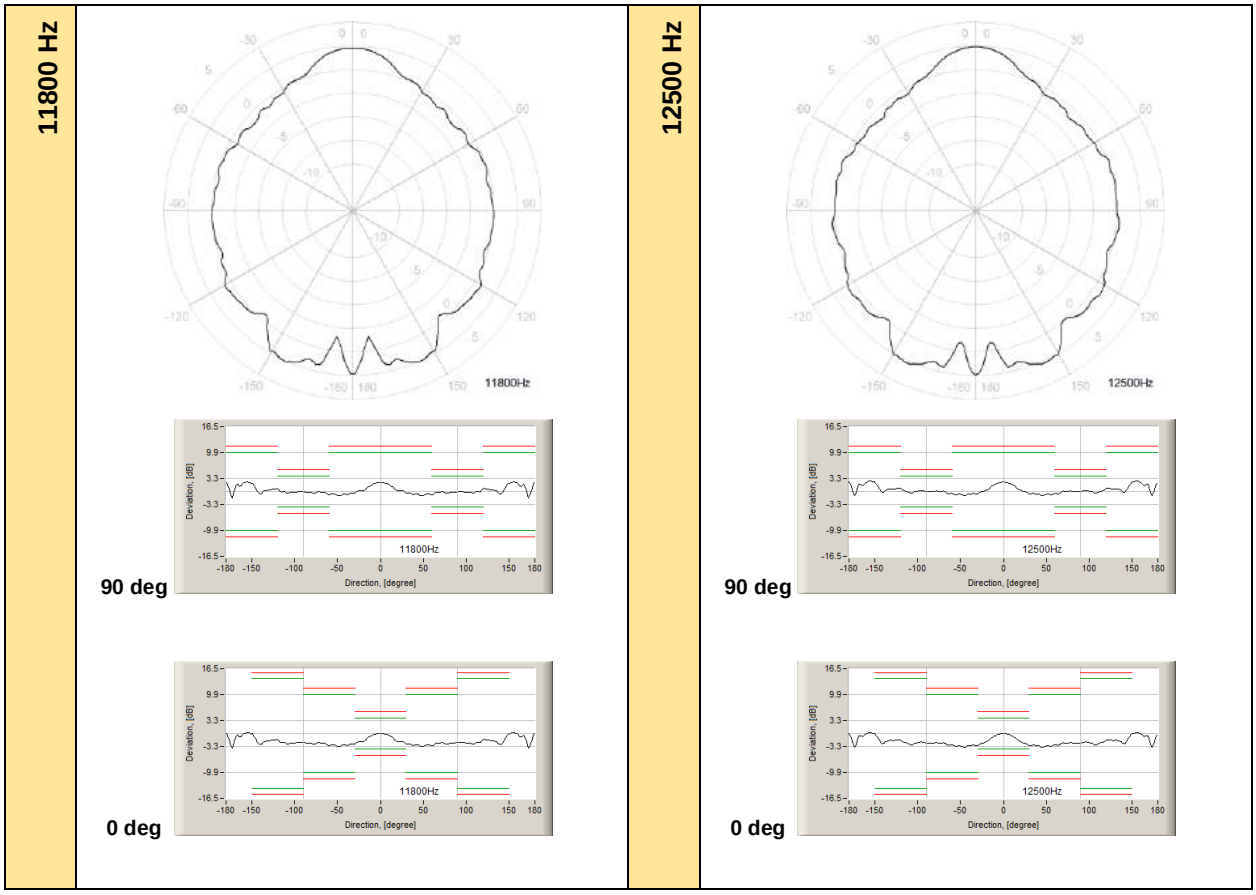


Table C.1.11. Directional response for SV 307 (for 90 deg)

f [Hz]	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
250	0.3	0.29	0.27	0.24	0.2	0.17	0.12	0.08	0.04	-0.05
315	0.58	0.55	0.51	0.45	0.4	0.32	0.23	0.16	0.06	-0.06
400	-0.03	-0.02	0.01	0.02	0.03	0.04	0.04	0.04	0.03	-0.06
500	0.29	0.26	0.23	0.2	0.15	0.11	0.06	0.02	0.01	-0.06
630	0.2	0.2	0.2	0.19	0.17	0.14	0.08	-0.02	-0.02	0.01
800	-0.11	-0.12	-0.12	-0.12	-0.08	0.07	0.09	0.09	0.04	-0.01
1000	0.15	0.13	0.09	-0.05	-0.17	-0.27	-0.28	-0.24	0.02	-0.13
1250	0.4	0.37	0.27	-0.09	-0.22	-0.22	-0.13	-0.2	-0.2	0.21
1600	0.98	0.92	0.78	0.6	0.46	0.45	0.22	-0.2	0.11	-0.09
2000	1.76	1.65	1.41	1.03	0.79	0.82	0.58	0.51	0.33	0.56
2240	1.24	1.15	0.92	0.57	0.51	0.32	0.29	-0.19	-0.16	-0.37
2500	1.09	0.95	0.82	0.8	0.49	0.18	0.14	0.19	-0.14	-0.31
2800	0.81	0.76	0.78	0.75	0.44	0.42	0.16	0.14	0.31	-0.23
3150	1.18	1.06	0.94	0.76	0.46	0.46	0.11	-0.19	-0.22	-0.42
3550	1.45	1.35	1.17	0.98	0.47	0.33	0.45	0.18	-0.23	-0.15
4000	2.16	1.91	1.41	1.06	0.87	0.74	0.54	0.61	0.35	0.19
4500	1.68	1.61	1.27	0.69	0.1	0.34	0.31	0.2	0.21	0.15
5000	2.08	1.71	1.01	0.27	0.24	-0.29	-0.25	-0.44	-0.06	-0.55
5600	2.09	1.81	1.23	0.98	0.44	0.27	-0.35	-0.2	-0.19	0.21
6300	2.6	2.35	1.49	0.96	0.56	0.37	-0.34	-0.39	-0.24	0.21
7100	2.83	2.54	1.54	1.07	0.5	0.29	-0.27	-0.41	-0.23	0.14
8000	3.04	2.64	2.04	1.59	1.03	0.92	0.38	0.28	-0.67	-0.33
8500	3.3	3	1.86	1.16	0.98	0.3	0.45	0.45	0.43	0.52

9000	3.79	3.04	1.71	1.8	1.34	1.09	0.75	0.78	0.32	0.95
9500	3.01	2.42	1.66	0.86	0.87	-0.21	-0.46	-0.42	-0.45	-0.47
10000	3.61	3.21	2.11	1.72	1.05	1.13	1.11	1.02	0.65	-0.31
10600	3.35	2.72	1.19	0.96	0.78	0.97	0.89	0.89	0.37	0.3
11200	2.32	1.8	-0.54	-1.02	-1.02	-0.86	-0.71	-0.69	-0.5	-0.42
11800	2.62	2.2	0.59	-0.87	-1	-0.66	-0.4	-0.42	-0.3	0.23
12500	2.77	2.2	0.59	-0.73	-1.23	-0.88	-0.72	-0.32	-0.09	0.35
f [Hz]	**100-110**	**110-120**	**120-130**	**130-140**	**140-150**	**150-160**	**160-170**	**170-180**	**180-190**	**190-200**
250	-0.07	-0.08	-0.08	-0.07	-0.06	-0.04	-0.03	-0.01	-0.01	0.01
315	-0.1	-0.1	-0.1	-0.07	-0.03	0.06	0.09	0.1	0.11	0.12
400	-0.12	-0.2	-0.23	-0.23	-0.22	-0.17	-0.13	-0.09	-0.1	-0.14
500	-0.14	-0.24	-0.31	-0.32	-0.31	-0.26	-0.2	-0.15	-0.12	-0.14
630	-0.04	-0.17	-0.32	-0.38	-0.38	-0.31	-0.21	-0.12	-0.11	-0.16
800	-0.01	-0.05	-0.21	-0.41	-0.43	-0.35	-0.18	-0.05	-0.06	-0.21
1000	-0.14	-0.06	-0.12	-0.39	-0.43	-0.34	0.13	0.22	0.21	0.1
1250	0.24	0.25	0.38	0.36	-0.3	-0.28	0.35	0.5	0.5	0.33
1600	0.62	0.62	0.53	0.61	0.38	-0.32	0.49	0.72	0.71	0.39
2000	0.5	1.24	1.2	1.19	1.18	0.26	1.17	1.48	1.45	0.85
2240	0.37	0.85	0.96	0.77	0.91	-0.35	0.7	1.24	1.23	-0.4
2500	0.45	0.45	0.92	0.85	0.96	-0.49	0.93	1.35	1.33	-0.38
2800	-0.32	0.36	1.29	1.25	1.16	0.88	1.01	1.58	1.57	-0.45
3150	-0.4	-0.55	1.1	1.38	1.22	1.12	0.88	1.51	1.47	-0.58
3550	-0.23	-0.39	0.66	1.46	1.37	1.37	-0.56	1.49	1.48	-0.61
4000	0.2	0.39	1.19	1.91	1.58	1.86	0.91	1.9	1.86	1.06
4500	0.22	-0.47	0.3	1.45	1.69	1.58	-0.7	1.72	1.67	-0.87
5000	-0.42	-0.6	-0.48	1.15	1.93	1.77	-0.68	2.01	1.68	1.66
5600	0.38	-0.44	0.24	1.5	2.19	1.9	1.38	2.3	1.83	2.18
6300	0.34	0.41	-0.35	1.65	2.27	2.03	1.4	2.26	1.82	2.2
7100	-0.23	0.5	-0.71	1	2.12	2.21	2.09	2.09	1.94	2.2
8000	0.95	0.84	0.43	1.58	2.44	2.65	2.37	2.78	2.28	2.73
8500	1.16	0.97	0.94	1.17	2.66	2.74	2.4	3.1	2.84	2.33
9000	0.98	1.45	1.33	1.63	2.87	2.82	2.64	3.21	2.51	2.75
9500	0.85	0.85	0.72	-0.72	2.32	2.23	1.99	2.51	2.17	2
10000	1.05	1.79	1.42	1.53	3.3	3.18	3.3	3.43	2.57	2.92
10600	0.74	1.28	1.36	0.68	3.02	3.02	2.83	3.35	2.94	2.73
11200	-0.89	0.59	0.27	-0.97	1.89	2.36	2.1	2.39	2.31	2.14
11800	-0.56	1.23	0.75	0.51	2.51	2.84	2.34	2.79	2.23	2.55
12500	-0.64	1.24	1.01	0.77	2.88	3.21	2.6	2.9	2.71	2.65
f [Hz]	**200-210**	**210-220**	**220-230**	**230-240**	**240-250**	**250-260**	**260-270**	**270-280**	**280-290**	**290-300**
250	0.01	0.02	0.03	0.04	0.07	0.1	0.14	0.18	0.21	0.25
315	0.13	0.15	0.21	0.26	0.34	0.42	0.48	0.54	0.58	0.6
400	-0.21	-0.29	-0.37	-0.4	-0.41	-0.39	-0.33	-0.27	-0.21	-0.18
500	-0.17	-0.19	-0.18	-0.14	0.08	0.17	0.22	0.23	0.23	0.23
630	-0.28	-0.35	-0.35	-0.32	-0.15	0.03	0.04	0.03	0.07	0.13
800	-0.39	-0.5	-0.5	-0.36	-0.16	-0.12	-0.13	-0.1	0.04	0.04
1000	-0.28	-0.31	-0.19	0.21	0.2	0.12	0.28	0.28	0.16	-0.07
1250	-0.3	-0.31	0.23	0.25	0.1	0.19	0.19	-0.34	-0.33	-0.18
1600	-0.31	0.52	0.65	0.52	0.73	0.61	0.17	0.23	0.06	0.46
2000	0.62	1.39	1.34	1.62	1.55	1.06	1.07	1.13	1.12	1.32
2240	0.46	0.91	0.6	1.01	0.53	0.47	-0.37	0.19	0.41	0.42

2500	1.11	1.24	1.29	1.33	0.85	0.27	0.32	0.58	0.54	0.54
2800	1.17	1.17	1.28	1.04	-0.37	-0.22	-0.23	-0.23	-0.12	0.17
3150	1.32	0.91	1.44	0.46	-0.45	-0.28	-0.26	-0.18	0.24	0.25
3550	1.48	1.25	1.53	0.72	-0.41	-0.41	-0.3	-0.27	0.41	0.48
4000	1.82	1.95	1.65	1.01	0.44	0.28	0.57	0.74	0.82	0.74
4500	1.55	1.79	1.32	0.56	-0.49	0.39	-0.05	0.28	0.25	0.39
5000	1.69	1.99	1.2	-0.4	0.4	0.32	0.76	0.69	0.47	0.3
5600	2.6	2.6	1.8	0.59	0.96	0.79	0.93	0.57	0.28	0.32
6300	2.47	2.15	1.03	0.57	0.66	0.57	0.7	0.36	0.26	0.43
7100	2.15	1.83	0.77	-0.65	0.71	0.68	0.59	0.26	0.41	0.81
8000	2.99	2.79	0.88	1.41	1.41	0.96	1.08	1.02	0.88	0.88
8500	2.66	2.31	1.07	1.48	1.66	1.22	0.94	0.43	0.65	0.36
9000	3.09	2.66	1.14	1.4	1.66	1.64	0.87	0.93	1.12	1.07
9500	2.37	1.92	-0.83	0.67	0.92	0.62	-0.73	-0.52	-0.26	0.49
10000	3.17	2.68	1.64	2.06	2.06	1.12	1.3	1.06	1.3	1.42
10600	3.27	2.7	1.56	1.81	1.95	1.23	1.44	1.28	1.27	1.25
11200	2.54	1.92	0.74	1.39	0.58	-0.52	0.55	-0.28	-0.31	-0.42
11800	3.22	2.71	0.98	1.39	0.53	0.47	0.74	0.54	0.4	0.56
12500	3.39	1.75	1.34	1.59	0.97	0.6	1.06	1.06	1.02	1.02
f [Hz]	**300-310**	**310-320**	**320-330**	**330-340**	**340-350**	**350-360**				
250	0.26	0.27	0.29	0.3	0.3	0.31				
315	0.62	0.63	0.63	0.63	0.61	0.61				
400	-0.15	-0.13	-0.11	-0.1	-0.07	-0.05				
500	0.26	0.28	0.29	0.3	0.3	0.3				
630	0.18	0.2	0.21	0.21	0.21	0.21				
800	-0.05	-0.12	-0.16	-0.16	-0.14	-0.13				
1000	-0.05	0.12	0.17	0.18	0.17	0.17				
1250	-0.24	-0.24	-0.09	0.27	0.38	0.4				
1600	0.58	0.61	0.73	0.9	0.98	0.99				
2000	1.38	1.25	1.57	1.76	1.79	1.78				
2240	0.51	0.62	0.72	1	1.22	1.25				
2500	0.5	1.04	1.06	1.01	1.09	1.1				
2800	0.35	0.6	0.76	0.75	0.76	0.81				
3150	0.46	0.5	0.82	0.99	1.14	1.18				
3550	0.34	0.7	1.06	1.17	1.37	1.44				
4000	0.92	1.22	1.27	1.65	2.12	2.17				
4500	0.43	0.48	0.88	1.5	1.65	1.68				
5000	0.48	0.54	0.88	1.39	2.02	2.09				
5600	0.4	0.87	1.14	1.56	1.93	2.09				
6300	0.82	1.04	1.59	2.07	2.5	2.59				
7100	1.06	1.24	1.47	2.24	2.72	2.85				
8000	0.87	1.35	1.46	2.14	2.83	3.05				
8500	0.8	1.1	1.32	2.43	3.1	3.29				
9000	1.24	1.76	1.99	2.4	3.42	3.8				
9500	1.05	1.06	1.24	1.94	2.74	3.02				
10000	1.48	1.53	1.53	2.19	3.27	3.61				
10600	1	0.96	1.05	1.38	3.01	3.35				
11200	-1.06	-0.97	-0.45	-0.39	1.8	2.31				
11800	-0.71	-0.48	-0.19	0.69	2.12	2.61				
12500	-0.43	-0.55	-0.37	0.5	2.14	2.75				

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 307 adapter

Maximum input voltage:

SV 307: meets the requirements IEC 348 for the 1-st Class device. The input voltage shall not exceed the limits between 0 V and +3 V.

SL 307: the input voltage shall not exceed the limits between -3 V and +3 V.

Impedance:

SV307: three differential inputs: ≤ 94 kΩ, ≤ 30 pF each.

SL 307: ≤ 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 22.7 µVRMS	to 1015 mVRMS
B	from 22.7 µVRMS	to 1015 mVRMS
C	from 22.7 µVRMS	to 1015 mVRMS
Z	from 40.0 µVRMS	to 1015 mVRMS

Table C.2.2. Peak for the sinusoidal signal 1 kHz, at reference conditions (@ 126 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	1.435 V
B	1.435 V
C	1.435 V
Z	1.435 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

- Reference frequency — 1000 Hz
- Reference level — 114dB
- Reference temperature — +20°C
- Reference relative humidity — 65 %

Calibration (electrical)

Calibration level	0.36 V_{RMS} (@ 114 dB indication)
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. The overload in the measurement channel (in its analogue part) and the overload of the analogue / digital converter are both detected. The "overload" indication is 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 re 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

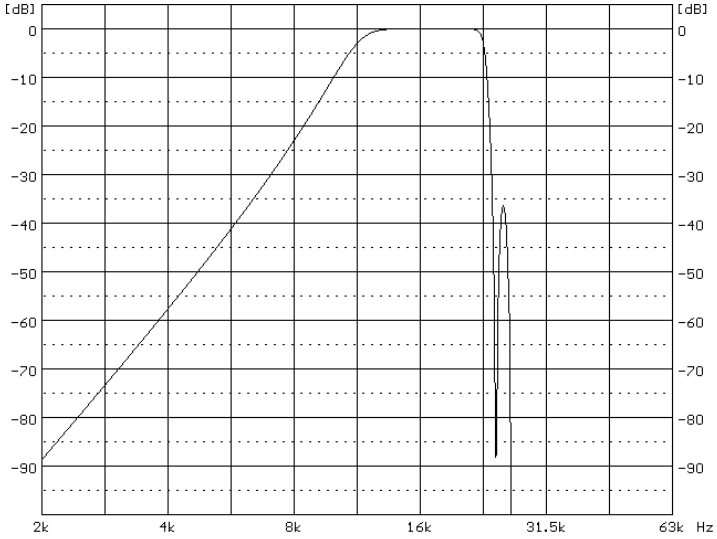
- A meeting requirements of the IEC 61672-1:2013 standard for the Class 1 “A” filter,
- C meeting requirements of the IEC 61672-1:2013 standard for the Class 1 “C” filter,
- Z meeting requirements of the IEC 61672-1:2013 standard for the Class 1 “Z“ filter,
- B meeting IEC 60651 for the Class 1 filter

See part C.3 for the A, C, B and Z filters characteristics.

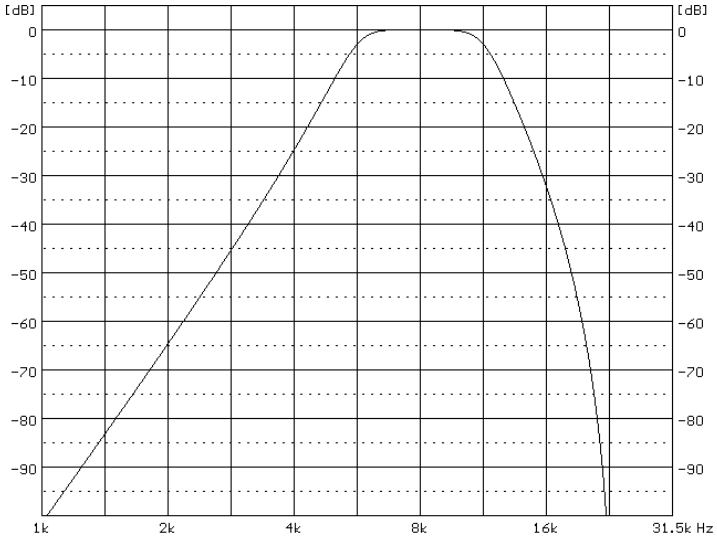
Noise voltage measured, equivalent impedance -adapter Class of SL 307 and 50 Ω input impedance, 20 kHz Bandwidth.

- ”A” weighting < 3.9 μV_{RMS}
- “B” weighting < 3.9 μV_{RMS}
- ”C” weighting < 3.9 μV_{RMS}
- ”Z” weighting < 9.9 μV_{RMS}

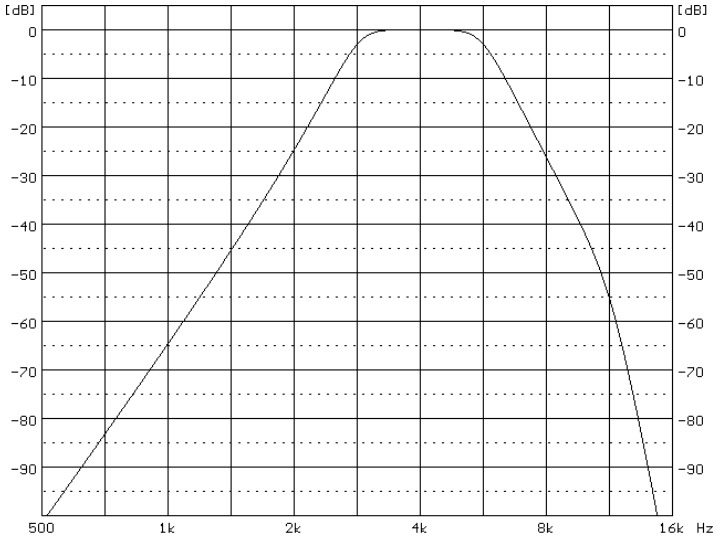
1/1 Octave filters 10 filters with centre frequencies from 31.5 Hz to 16 kHz (base 10), meeting IEC 61260-1:2014 standard for Class 1



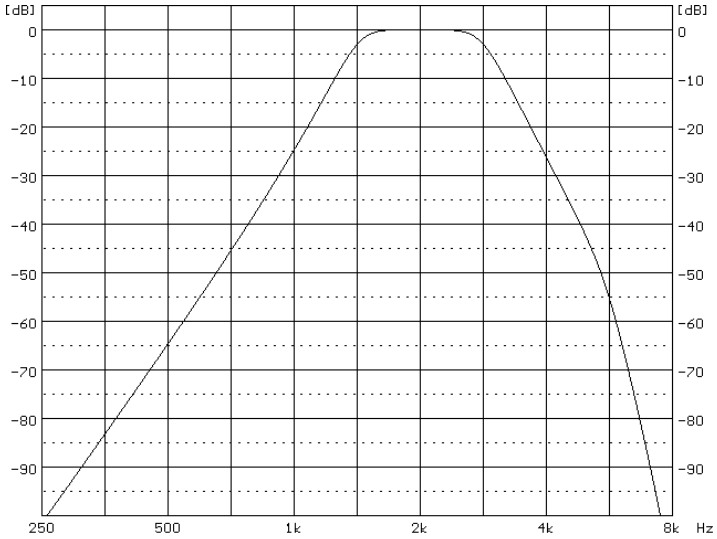
16.0 kHz 1/1 octave filter



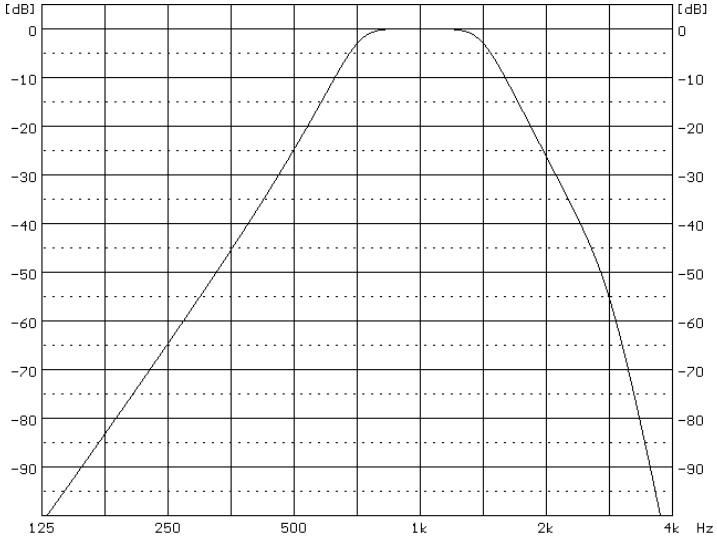
8.0 kHz 1/1 octave filter



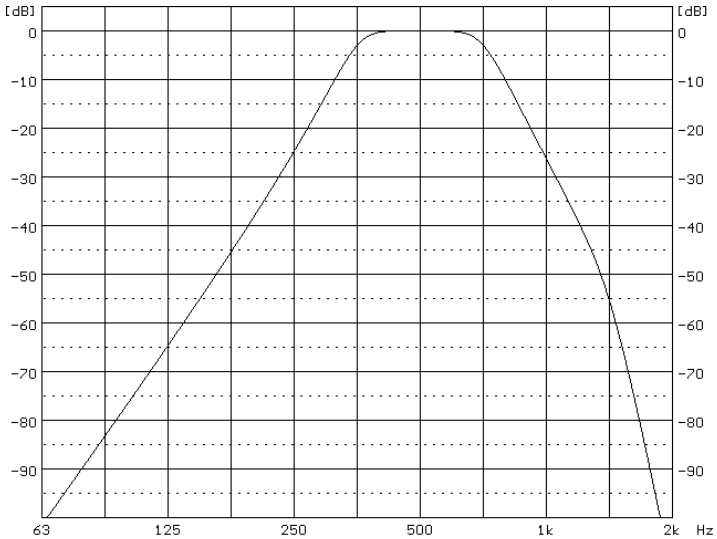
4.0 kHz 1/1 octave filter



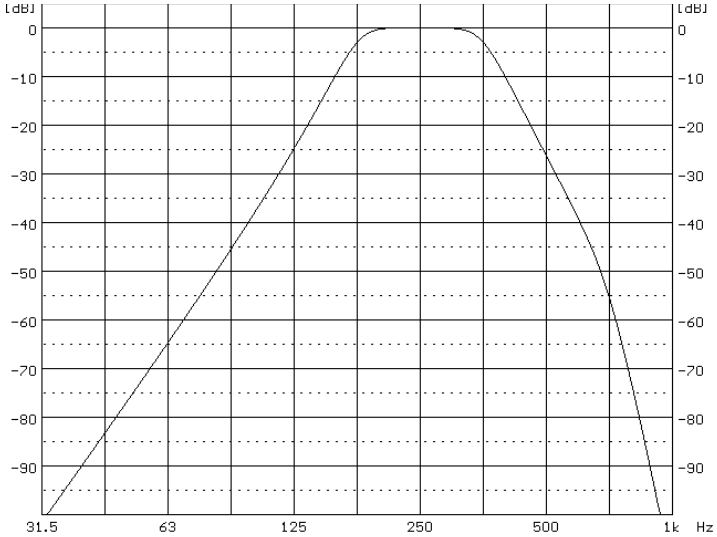
2.0 kHz 1/1 octave filter



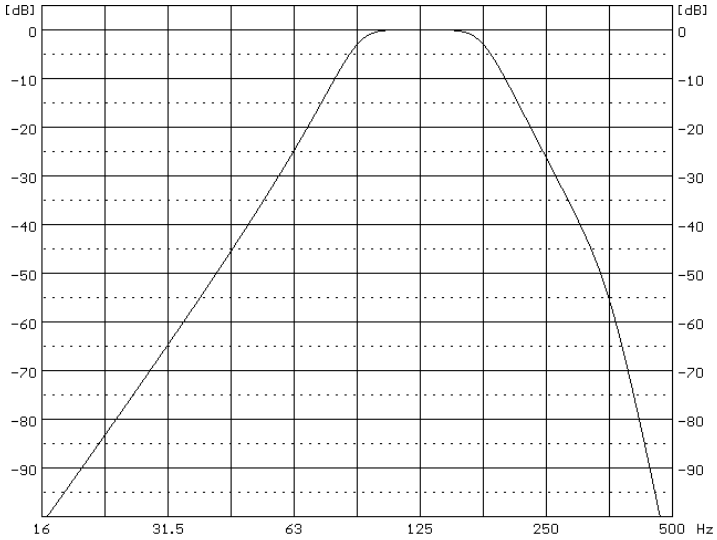
1.0 kHz 1/1 octave filter



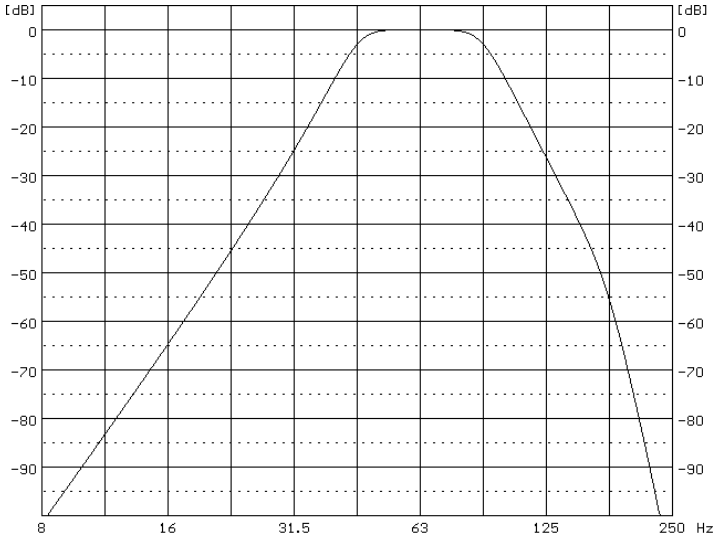
500 Hz 1/1 octave filter



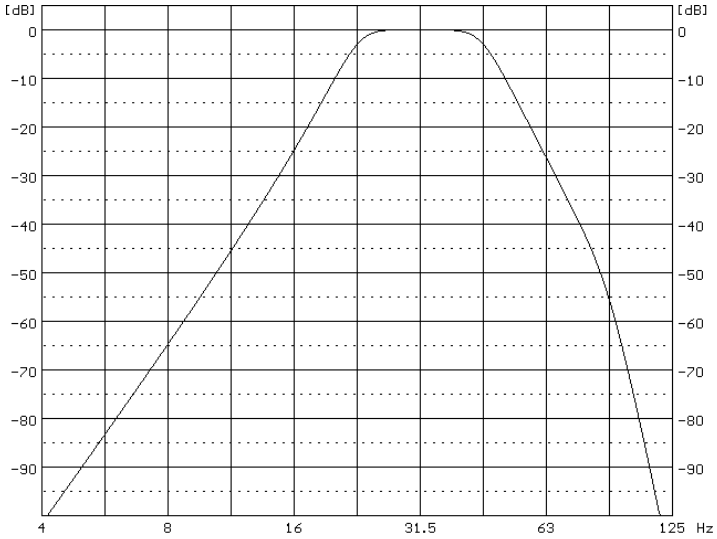
250 Hz 1/1 octave filter



125 Hz 1/1 octave filter

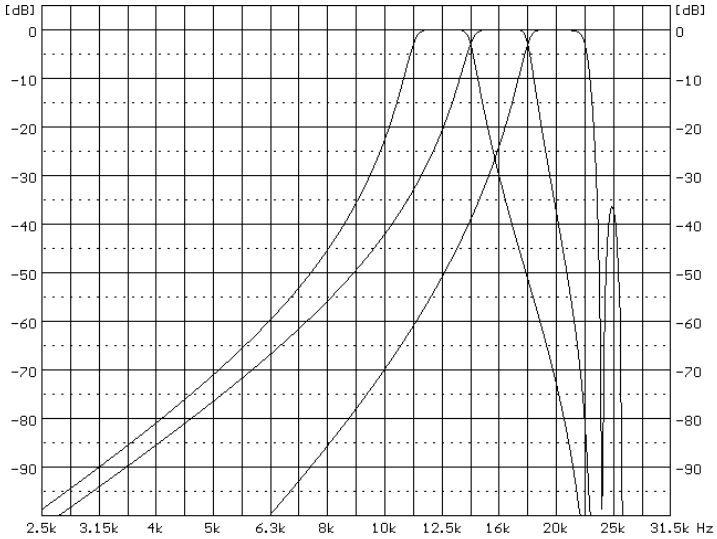


63.0 Hz 1/1 octave filter

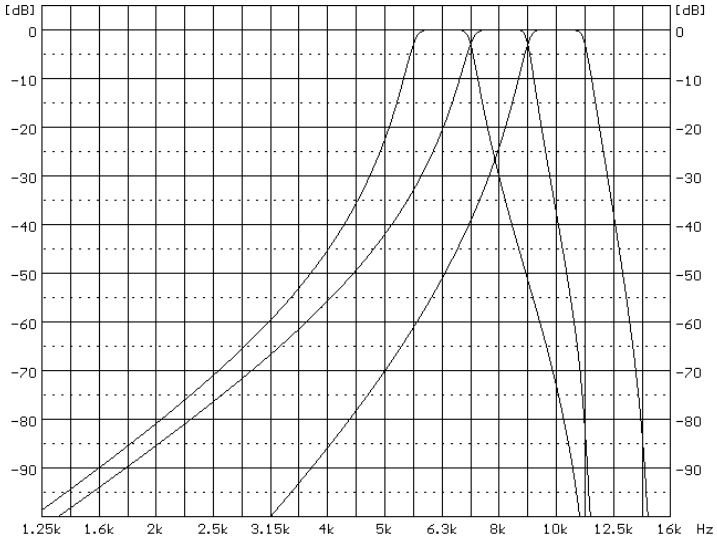


31.5 Hz 1/1 octave filter

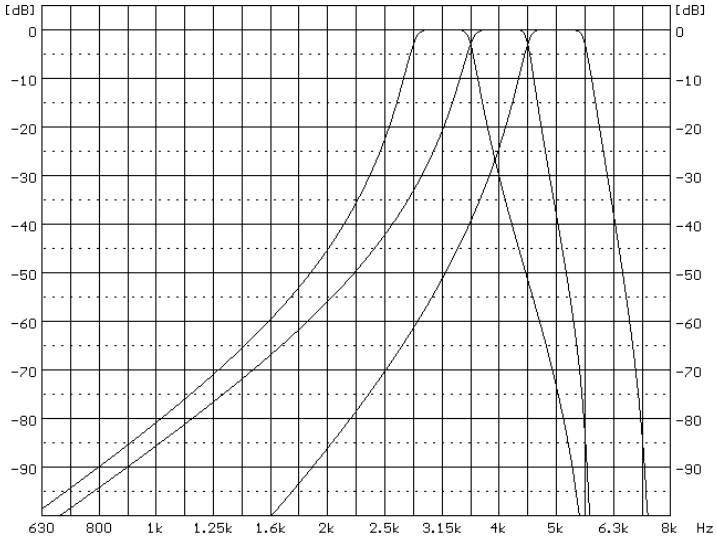
1/3 Octave filters 31 filters with centre frequencies from 20 Hz to 20 kHz (base 10), meeting IEC 61260-1:2014 standard for Class 1



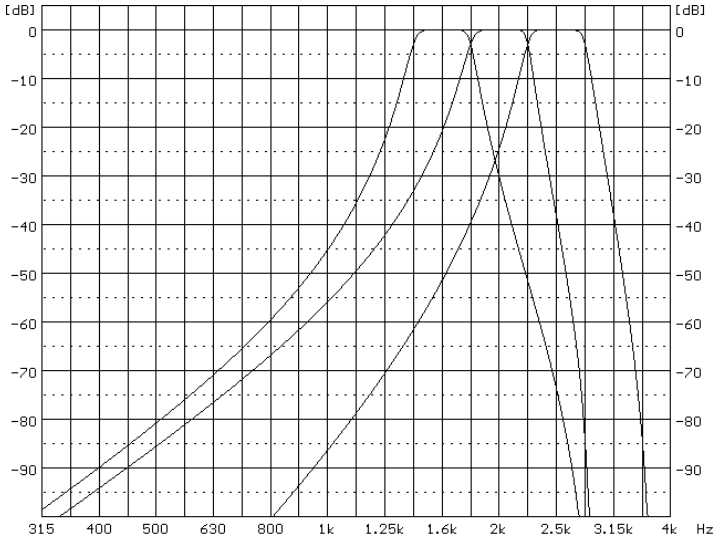
1/3 octave filters for 16.0 kHz 1/1 octave filter



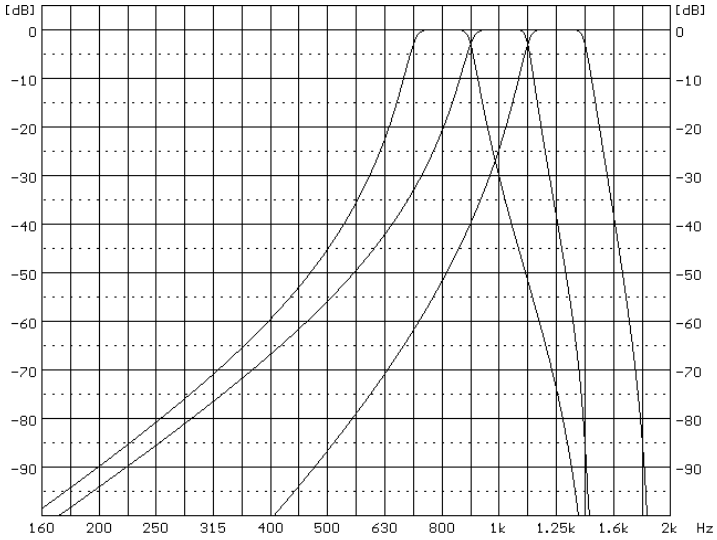
1/3 octave filters for 8.0 kHz 1/1 octave filter



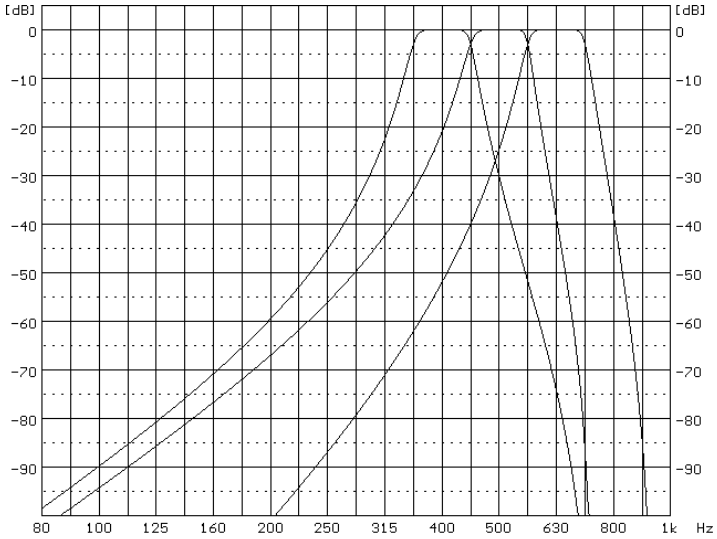
1/3 octave filters for 4.0 kHz 1/1 octave filter



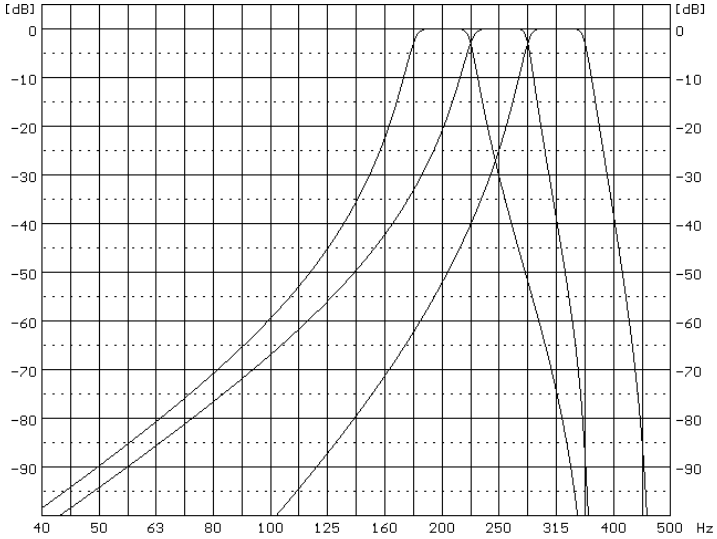
1/3 octave filters for 2.0 kHz 1/1 octave filter



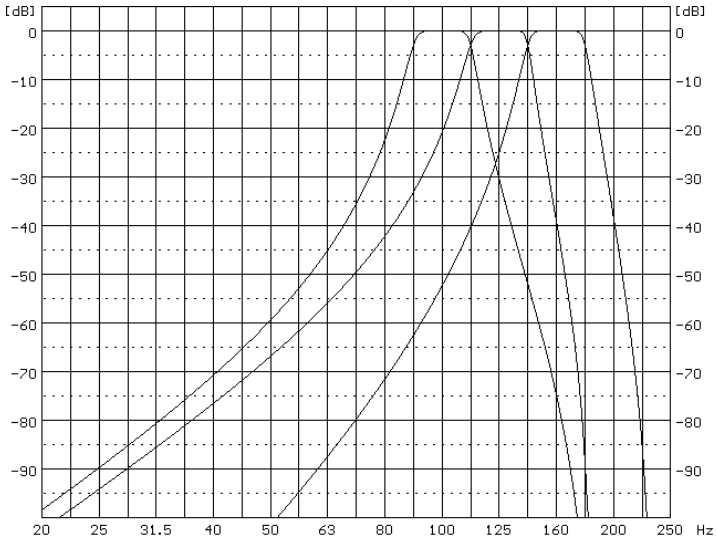
1/3 octave filters for 1.00 kHz 1/1 octave filter



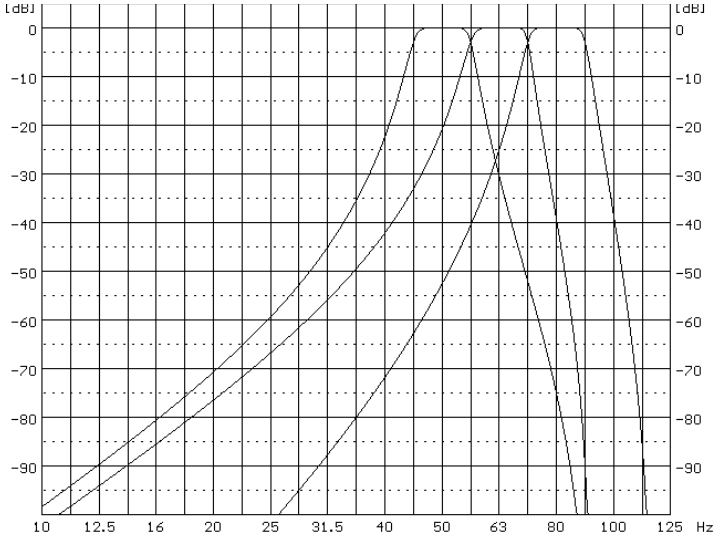
1/3 octave filters for 500 Hz 1/1 octave filter



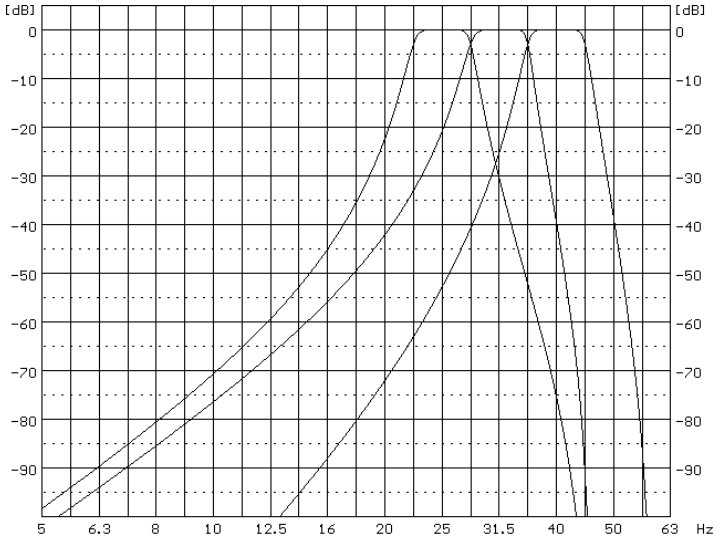
1/3 octave filters for 250 Hz 1/1 octave filter



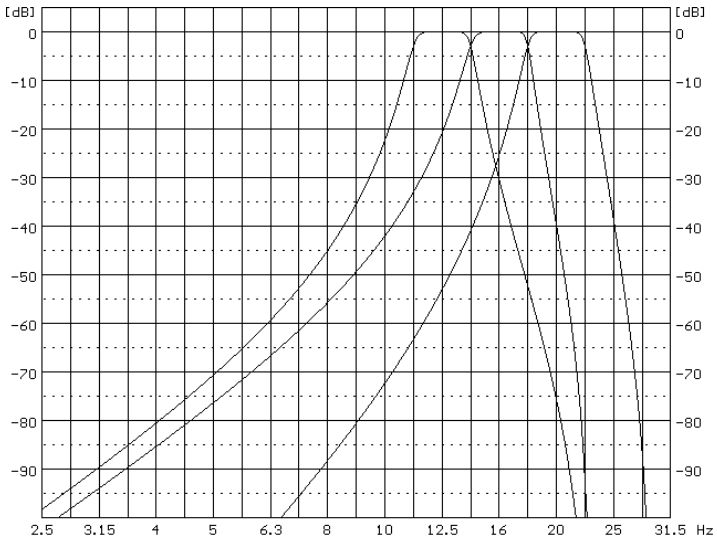
1/3 octave filters for 125 Hz 1/1 octave filter



1/3 octave filters for 63.0 Hz 1/1 octave filter



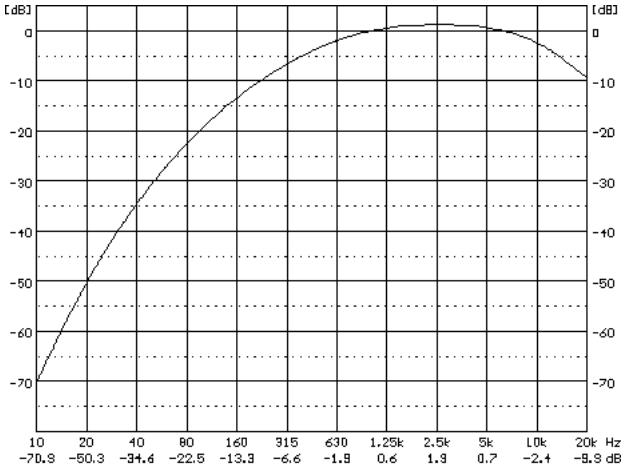
1/3 octave filters for 31.5 Hz 1/1 octave filter



1/3 octave filters for 16.0 Hz 1/1 octave filter

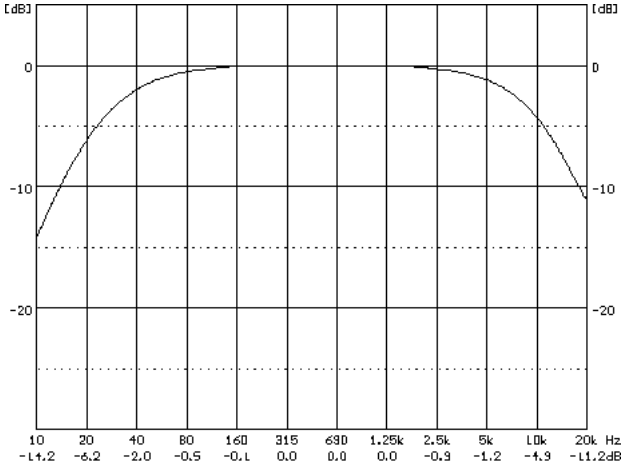
C.3 FREQUENCY CHARACTERISTICS OF THE IMPLEMENTED BROADBAND DIGITAL FILTERS

"A" filter Class 1 according to the **IEC 60651** and **IEC 61672-1:2013** standard.



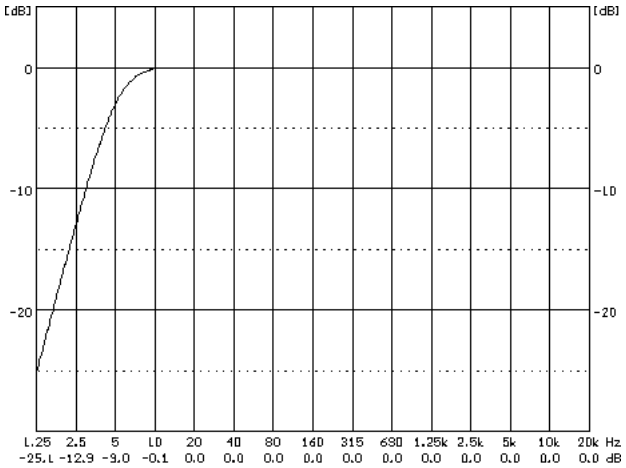
"A" filter characteristic

"C" filter Class 1 according to the **IEC 60651** and **IEC 61672-1:2013** standard.



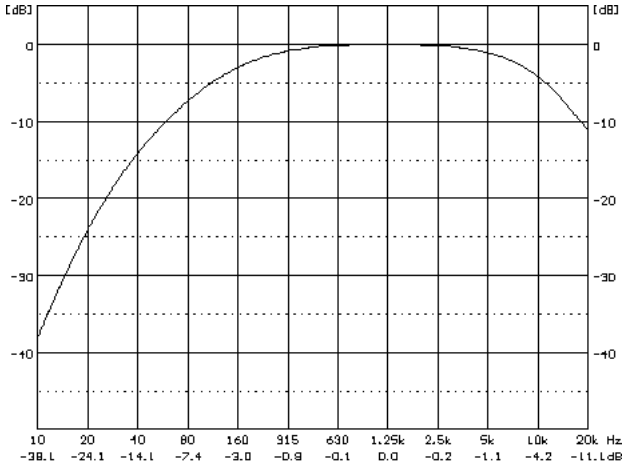
"C" filter characteristic

"Z" filter Class 1 according to the **IEC 61672-1:2013** standard.



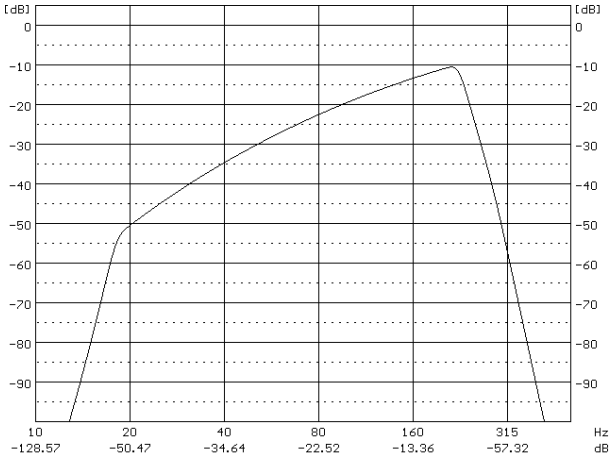
"Z" filter characteristic

“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

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
3G 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=20°C, 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

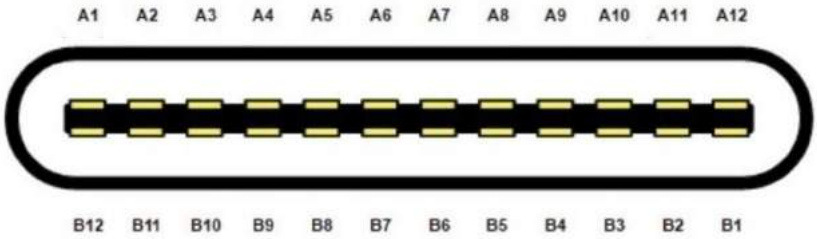
**) Modem is constantly switched on, one minute data transmission in one hour

***) 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

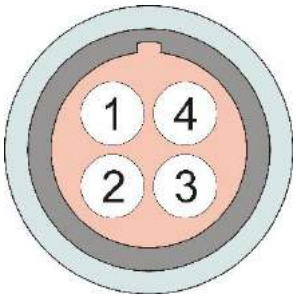
Table C.4.2. Pin out of the microphone connector

ST 30 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)

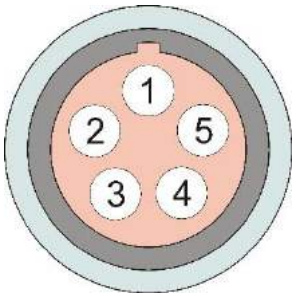
- Solar panel MPPT voltage 15.0V ÷ 20.0V, OCV < 28V

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

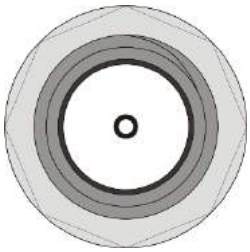
Pin number	Signal	SC 316 (USB)	SP 276 (meteo)	Alarm lamp	External trigger
1	GND	GND	GND	GND	GND
2	USB_POW	USB+5V	VCC*	-	-
3	RXB_D+	D+	RxD	-	-
4	EXT_INT	D-	TxD	-	-
5	TXB_D-	-	-	OUT	EXT_INT-

*) 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 antenna connector

The recommended GSM antenna: bands 850 / 900 / 1800 / 1900/ 2100 MHz, gain 1.0-2.5 dBi max, impedance 50Ω, omni-directional, dipole configuration. SV 307 is equipped with Pulse W1910 antenna.



GSM antenna connector – SMA (front view)

Real Time Clock

Built-in real time. Accuracy better than 1 minute/month.

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)

Compliance with EU Directives

CE mark indicates compliance with:

- Low Voltage Directive 2014/35/EU
- RED Directive 2014/53/EU

The SV 307 Noise Monitoring Terminal set containing the SV 307 unit, microphone type ST 30, Li-Ion rechargeable battery 8,2 V / 10 Ah with external AC/DC Power Supply type SB 274 with standard supply cables, is compliant with following standards:

Safety

- EN 61010-1:2010 and IEC 61010-1:2010: Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements

Electromagnetic Compatibility (EMC)

- EN 301 489-1 V2.1.1, clause 8.4: Conducted emission – AC mains power input/output port, test method according to EN 55032,
- EN 61672-1:2013, clause 6.6, item 6.6.4: Immunity to RF electromagnetic field 26 MHz to 80 MHz (AM, 1 kHz, 80%, 10 V/m), test method according to EN 61000-4-3, EN 61000-4-20,
- EN 301 489-1 V2.1.1, clause 9.2: Immunity to RF electromagnetic field 80 MHz to 6 GHz (AM, 1 kHz, 80%, 3 V/m), test method according to EN 61000-4-3, EN 61000-4-20,
- EN 301 489-1 V2.1.1, clause 9.3: Immunity to electrostatic discharge (air discharge: ±8 kV, contact discharge: ±4 kV), test method according to EN 61000-4-2,
- EN 61672-1:2013, clause 6.6, item 6.6.2: Immunity to AC power frequency fields magnetic field (50 Hz / 60 Hz, 80 A/m), test method according to EN 61000-4-8,
- EN 301 489-1 V2.1.1, clause 9.7: Immunity to voltage dips and interruptions (100% voltage dip for 10 ms, 100% voltage dip for 20 ms, 30% voltage dip for 500 ms, 100% voltage interruption for 5 s), test method according to EN 61000-4-11,
- EN 61672-1:2013, clause 6.6, item 6.6.8: Immunity to voltage dips and interruptions (60% voltage dip for 200 ms), test method according to EN 61000-4-11.

Note: *EMC compatibility is guaranteed only with the original accessories supplied by SVANTEK!*

GSM modem

SV 307 has a built-in Telit HE910-D modem. The HE910-D is a 3G global module that features high-speed HSUPA/HSDPA connectivity while still leveraging backwards compatibility with GSM/GPRS and EDGE networks.

Some of the module features are:

- Quad Band GSM: 850/900/1800/1900 MHz
- UMTS/HSPA bands: 800/850/900/AWS1700/1900/2100 MHz
- HSPA+ data up to 21.0 Mbps downlink / 5.76 Mbps uplink
- WCDMA up to 384kbps downlink/uplink
- Advanced E-GPRS/WCDMA/HSDPA/HSUPA Software protocol stack (Layer 1 to 3) – Version: 3GPP Release 7
- Control via AT commands according to 3GPP TS27.005, 27.007 and Telit customized AT commands
- Embedded TCP/IP stack, including TCP, IP, UDP, and FTP protocols
- Output power
  - Class 4 (2W) @ 850 / 900 MHz, GSM
  - Class 1 (1W) @ 1800 / 1900 MHz, GSM
  - Class E2 (0.5W) @ 850/900 MHz, EDGE
  - Class E2 (0.4W) @ 1800/1900 MHz, EDGE
  - Class 3 (0.25W) @ 850/900/1700/1900/2100 MHz, WCDMA
- Sensitivity:
  - 109 dBm (typ.) @ 850 / 900 MHz (GSM)
  - 110 dBm (typ.) @ 1800 / 1900 MHz (GSM)
  - 111 dBm (typ.) @ 850/900/1700/1900 / 2100 MHz (WCDMA)

Approvals of the module:

- Fully type approved confirming with R&TTE directive
- CE, GCF (Global and EUx variants)
- FCC, IC, PTCRB (NAx variants)
- RoHS and REACH (all versions)

FCC and IC

This product contains an FCC and Industry Canada certified 2.5G, 3.5G wireless transmission module:

- **FCC ID: RI7HE910**
- **Industry Canada ID: 5131A-HE910**
- Producer: Telit Communications S.p.A.
- Model: HE910-D

GSM antenna

SV 307 is equipped with W1910 external antenna, produced by Pulse Finland Oy.

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)

APPENDIX D. DEFINITIONS AND FORMULAE OF MEASURED 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 can be set in the **Exposure Time** setup (**Measurement** menu). The available values are from 1 minute to 12 hours with 1-minute step.

T_{8h} — Time period equal to 8 hours (28 800 seconds).

τ — Exponential time constant in seconds for the giving time-weighting. Three time constants are available: **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 calculated from the equation:

$$p_{W\tau}(t) = \sqrt{\frac{1}{\tau}\int_{-\infty}^{t} p_W^2(\xi)\, e^{-(t-\xi)/\tau}\, d\xi}$$

where: ξ – variable of integration.

$r(t)$ — Instantaneous sound pressure depends on the <**RMS Integration**> parameter:

$$r(t) = \begin{cases} p_W(t) & \text{RMS Integration = Lin} \\ p_{W\tau}(t) & \text{RMS Integration = Exp} \end{cases}$$

p_0 — Reference value (20 μPa).

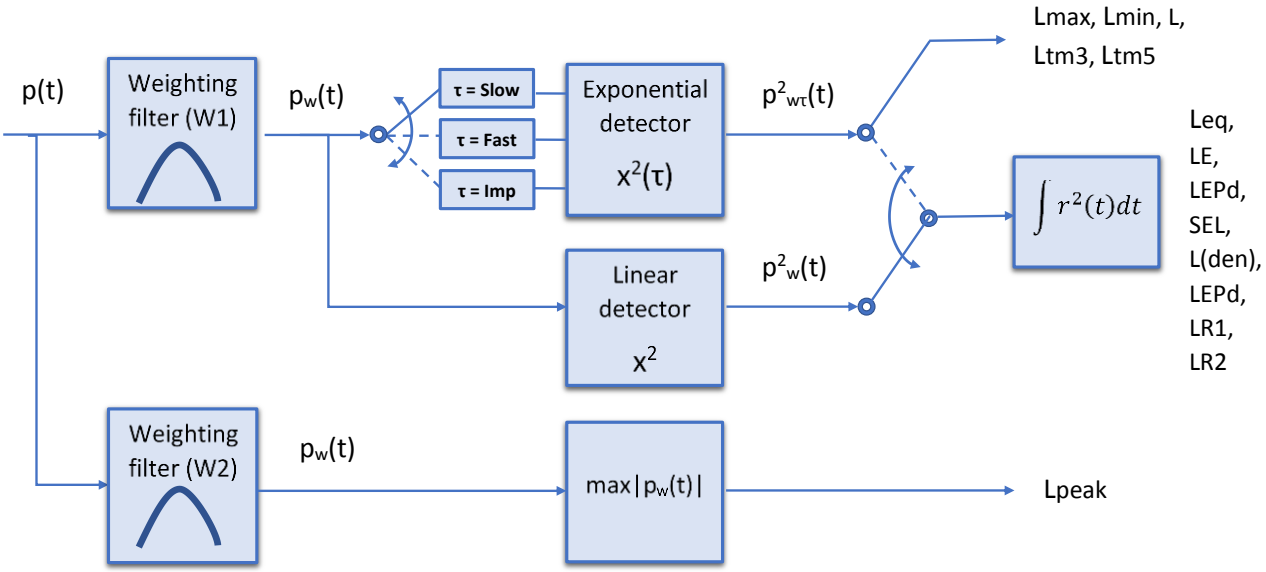
$\log(x)$ — Logarithm of x to the base 10.

L(t) — Sound level (a function of time) measured with the selected time constant (**IMPULSE**, **FAST** or **SLOW**) and the weighting filter (equal to **A**, **C** or **Z**)

$$L(t) = 20 \log \frac{p_W(t)}{p_0}$$

D.2 DEFINITIONS AND FORMULAS OF THE SLM RESULT

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 during the current time period of the measurement (**T**)

L(A/C/Z)peak Peak sound level expressed in dB, for frequency weightings A, C, Z, symbols are **LApeak**, **LCpeak** and **LZpeak**. Peak sound level is calculated for the given **T**.

$$\mathbf{Peak} = 10 \log \left(\max_T \frac{p_w^2(t)}{p_0^2} \right)$$

L(A/C/Z)(S/F/I) max The highest time weighted sound level (**Max**) expressed in dB, within a stated time interval, for frequency weightings A, C, Z and time weightings F, S, I symbols are LAFmax, LASmax, LCFmax, LCSmax etc.

$$\mathbf{Max} = 10 \log \left(\max_T \frac{p_{w\tau}^2(t)}{p_0^2} \right)$$

L(A/C/Z)(S/F/I) min The lowest time weighted sound level (**Min**) expressed in dB, within a stated time interval, for frequency weightings A, C, Z and time weightings F, S, I symbols are LAFmin, LASmin, LCFmin, LCSmin etc.

$$\mathbf{Min} = 10 \log \left(\min_T \frac{p_{w\tau}^2(t)}{p_0^2} \right)$$

L(A/C/Z)(S/F/I) Time weighted sound level expressed at observation time, expressed in dB, for frequency weightings A, C, Z and time weightings F, S, I symbols are LAF, LAS, LCF, LCS etc.

$$L = 10 \log \left(\frac{p_{W\tau}^2(t)}{p_0^2} \right)$$

L(A/C/Z)eq Time averaged equivalent continuous sound level (**Leq**) expressed in dB, for frequency weightings A, C, Z symbols are LAeq, LCeq and LZeq. In principle time weighting is not involved in a determination of time averaged sound level. Time-averaged sound level is calculated for current time period of the measurement (**T**).

$$Leq = 10 \log \left(\frac{1}{T} \int_0^T \left(r(t)/p_0 \right)^2 dt \right)$$

L(A/C/Z)E Sound Exposure Level (**SEL**) expressed in dB, for frequency weightings A, C, Z, symbols are 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**).

$$SEL = 10 \log \left(\int_0^T \left(r(t)/p_0 \right)^2 dt \right) = Leq + 10 \log \frac{T}{1s}$$

L(den) Only one result from: **Ld**, **Le**, **Ln**, **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.

Ld **Ld** is calculated for: $T_d \neq 0$, $T_e = 0$, $T_n = 0$.

$$Ld = 10 \log \left(\frac{1}{T_d} \int_{T_d} \left(r_w(t)/p_0 \right)^2 dt \right)$$

Le **Le** is calculated for: $T_d = 0$, $T_e \neq 0$, $T_n = 0$.

$$Le = 5\ dB + 10 \log \left(\frac{1}{T_e} \int_{T_e} \left(r_w(t)/p_0 \right)^2 dt \right)$$

Ln **Ln** is calculated for: $T_d = 0$, $T_e = 0$, $T_n \neq 0$.

$$Ln = 10\ dB + 10 \log \left(\frac{1}{T_n} \int_{T_n} \left(r_w(t)/p_0 \right)^2 dt \right)$$

Lde — **Lde** is calculated for: $T_d \neq 0$, $T_e \neq 0$, $T_n = 0$.

$$Lde = 10 \log\left[\frac{1}{12+4}\left(12 \cdot 10^{Ld/10} + 4 \cdot 10^{Le/10}\right)\right]$$

Len — **Len** is calculated for: $T_d = 0$, $T_e \neq 0$, $T_n \neq 0$.

$$Len = 10 \log\left[\frac{1}{4+8}\left(4 \cdot 10^{Le/10} + 8 \cdot 10^{Ln/10}\right)\right]$$

Lnd — **Lnd** is calculated for: $T_d \neq 0$, $T_e = 0$, $T_n \neq 0$.

$$Lnd = 10 \log\left[\frac{1}{8+12}\left(8 \cdot 10^{Ln/10} + 12 \cdot 10^{Ld/10}\right)\right]$$

Lden — **Lden** is calculated for: $T_d \neq 0$, $T_e \neq 0$, $T_n \neq 0$.

$$Lden = 10 \log\left[\frac{1}{12+8+4}\left(12 \cdot 10^{Ld/10} + 4 \cdot 10^{Le/10} + 8 \cdot 10^{Ln/10}\right)\right]$$

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 **Ltm5** — The **Ltm3** and **Ltm5** results (Takt-Maximal Levels) are calculated according to the German standard TA Lärm.

Lnn — Statistical level is the certain boundary level surpassed by the temporary noise level values in not more than **n%** 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.

D.3 DEFINITIONS AND FORMULAS OF THE ADDITIONAL RUNNING LEQ FUNCTION RESULTS

LR — mm-minutes running Leq is the rolling (sliding) Leq window for the last mm minutes of measurement (**ss** = mm x 60 seconds) moving with 1 second step

$$LR = 10log\left(\frac{1}{ss}\int_{T-ss}^{T}(r(t)/p_0)^2\,dt\right)$$

Note: *If the current period of the measurement **T** is less than mm minutes the **LR** result is undefined.*

D.4 STATISTICAL LEVELS – LNN 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:

$$P_k\left[L_k \le L(t) \le L_k + \Delta L\right] = \sum_{i=1}^{n} \Delta t_i \Big/ P$$

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:

$$P\left[L(t) \le L_j\right] = \sum_{k=1}^{j} P_k(L)$$

The cumulative density function expressed by the equation:

$$P\left[L(t) > L_j\right] = 1 - P\left[L(t) \le L_j\right]$$

is directly used to determine so-called statistical levels **Lnn** or position parameters of the distribution.

The **Lnn** is the certain boundary level surpassed by the temporary noise level values in not more than **nn** of the observation period.

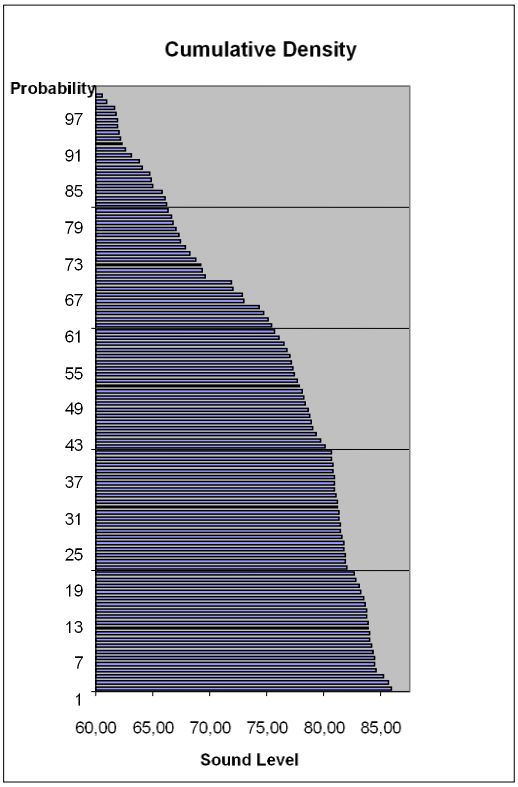
Example:

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 **Lnn** 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 **Lnn** 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