SVANTEK

USER MANUAL

SV 303

NOISE MONITORING TERMINAL

Warsaw, 2025-01-08

Rev.1.01

Note: *Due to our policy of continuous product improvement, SVANTEK reserves the right to change product specifications without notice. To download the latest user manual, please visit our website at www.svantek.com.*

*This manual refers to firmware revision named **1.02**.*

Subsequent software revisions (marked with higher numbers) may change the appearance of some of the displays described in this manual.

WEEE Notice: *Do not dispose of this product with unsorted municipal waste at the end of its life. Instead, return it to an authorised collection point for recycling. This will help to protect the environment.*

Technical Support Contact Information:

web: www.svantek.com/contact

IMPORTANT NOTES BEFORE USE

- ✓ *SV 303 should be installed vertically with the microphone pointing upwards! Incorrect installation may result in damage to the instrument due to possible water ingress and loss of warranty.*
- ✓ *The upper coniform housing is an integral part of the instrument and is not designed to be dismantled by the user.*
- ✓ *The microphone is fixed to the instrument and is not designed to be replaced by the user.*
- ✓ *Switch off the instrument before connecting it to another device (e.g., PC).*
- ✓ *When connecting your SV 303 to a PC with the SC 158 cable, first plug the USB-C connector into the instrument's USB-C socket and then plug the USB-A connector into a PC.*
- ✓ *SV 303 should not be stored for long periods with discharged batteries. Storage with discharged batteries may damage them. In this case the warranty for the Li-Ion battery is void.*
- ✓ *If SV 303 is to be stored for a long period, it is recommended that the battery is charged to 60% capacity. The battery should be charged at least once every 6 months.*
- ✓ *Before installing SV 303 at the measurement site, ensure that the protective caps on the four anti-bird spikes are removed. It is recommended to use the protective caps during transport and storage or other operations with the instrument such as laboratory calibration, etc. to avoid personal injury.*
- ✓ *The windscreen affects the Free Field characteristics of the instrument, so it is important to check its condition regularly. If there is any visible deterioration of the foam surface, it must be replaced with a new one.*
- ✓ *Tripod or pole with 3/8" thread is not recommended for permanent installation.*
- ✓ *The maximum sound pressure level that can affect the microphone without destroying it is 160 dB.*

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1 INTRODUCTION

The SV 303 is a state-of-the-art Noise Monitoring Terminal designed to revolutionize urban noise management in smart cities. Meeting Class 1 standards as per IEC 61672-1:2013 and IEC 61260-1:2014, it guarantees exceptional accuracy in noise measurement. Its extensive LAeq measurement range, from 30 to 130 dB, ensures comprehensive coverage of urban soundscapes, capturing everything from the quiet of nighttime to the bustling activity of daytime. With its robust environmental resilience, the SV 303 operates effectively in temperatures from -20°C to 60°C and up to 95% humidity, making it suitable for diverse urban conditions.

The SV 303 is an affordable solution, making it ideal for multipoint noise monitoring across urban areas. By providing precise, real-time noise data, it enables city planners and policymakers to develop effective strategies to mitigate noise pollution, significantly improving the quality of life for residents. Its seamless integration with existing urban monitoring systems via USB and UART interfaces ensures adaptability and ease of deployment, establishing the SV 303 as an essential tool for creating quieter, healthier, and more liveable cities.

Optionally, SV 303 can perform real-time frequency analysis in 1/1 octave and 1/3 octave bands and save the results of this analysis as a time history. It can also record an audio signal as a standard WAV file.

The instrument offers a huge time history logging capability for broadband results and spectra with adjustable logging steps. Audio recording on user selectable trigger conditions completes the logging functionality. Data is stored in the internal memory and can be easily downloaded to a PC.

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

The large windscreen effectively reduces wind noise, even at high wind speeds. Metal spikes protect the station from birds.

The *SvanPC++* software supports data download, instrument configuration, display of measurement results in text, table and graphic form, data export and report generation.

1.1 GENERAL FEATURES OF SV 303

- Noise measurements according to IEC 61672-1:2013 Class 1 accuracy
- 1/1 & 1/3 octave real-time frequency analysis according to IEC 61260-1:2014 Class 1 accuracy (option)
- Audio waveform recording (option)
- Automated system checking
- Programmable integration time up to 24 hours
- Easy and friendly user interface
- Extended alarm functionality
- Wide range of temperature operating conditions -20°C to +60°C
- Protection rating IP 54 for use in the field

1.2 SV 303 SOUND LEVEL METER & ANALYSER

- measured results: **Lpeak**, **Lmax**, **Lmin**, SPL (**L**), **Leq**, SEL (**LE**), **Lden**, **LEPd**, **Ltm3**, **LTeq**, Leq statistics (**Ln**), expected Leq value (**EX**), standard Leq deviation (**SD**), two rolling Leq (**LR1** and **LR2**), measurement time and overload time % (**OVL**) as well as noise criterium (**NC**) and noise ratio (**NR**) in case of 1/1 Octave option with Class 1 IEC 61672-1:2013 accuracy in the frequency range 20 Hz ÷ 20 kHz
- parallel **Impulse**, **Fast** and **Slow** detectors for the measurements with **A**, **B**, **C**, **Z** and **LF** frequency filters
- total linearity measurement range **30 dBA Leq ÷ 133 dBA Peak**
- **1/1 Octave** real-time analysis (optional) meeting Class 1 requirements of IEC 61260-1:2014 for 10 centre frequencies from 31.5 Hz to 16 kHz available simultaneously with three user definable profiles for broadband measurements (SLM), time history logging and audio recording
- **1/3 Octave** real-time analysis (optional) meeting Class 1 requirements of IEC 61260-1:2014 for 31 centre frequencies from 20 Hz to 20 kHz available simultaneously with three user definable profiles for broadband measurements (SLM), time history logging and audio recording
- **Audio recording** (optional)

1.3 ACCESSORIES INCLUDED

- **ST 30B** ½“ microphone capsule
- **SC 158/5** USB type C to USB type A cable, 5 m (includes one attached cable lock)
- **SA 209** foam windscreen with antibird spikes and cone protection
- **SA 309** extension tube for the tripod, 3/8", 260 mm
- 2 mm Allen wrench, 20 mm open-end wrench, two spare cable locks

1.4 ACCESSORIES AVAILABLE

- **SV 36** Class 1 Sound calibrator: 94/114 dB@1000 Hz
- **SA 206** 4 m telescopic mast
- **SV_USB32GB** USB memory 32 GB
- **SV_USB64GB** USB memory 64 GB
- **SL 30B_E** microphone electrical equivalent
- **SL 30B_S** symmetrizer for the SL 30B_E if used with the single ended voltage source
- **SL 30B_A** electrical adapter
- **SA 306** pole mounting bracket
- **SP 79** connecting interface with SV 803

1.5 OPTIONAL FUNCTIONS

- **SF 303_3** 1/1 octave and 1/3 octave real-time analysis
- **SF 303_15** time domain signal recording
- **SvanPC++_EM** environmental monitoring module for *SvanPC++* (hardware key, single license)

1.5.1 1/1 octave and 1/3 octave real-time analysis

The option for 1/1 octave and 1/3 octave real-time analysis (**SF 303_3**) allows the analysis of noise frequency contents and is used for verification of noise sources in the environment.

1.5.2 Time domain signal recording

The option of Time domain signal recording to WAVE format (**SF 303_15**) 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 Environmental Measurements module

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

1.6 EXTERNAL COMPLEMENTARY UNITS

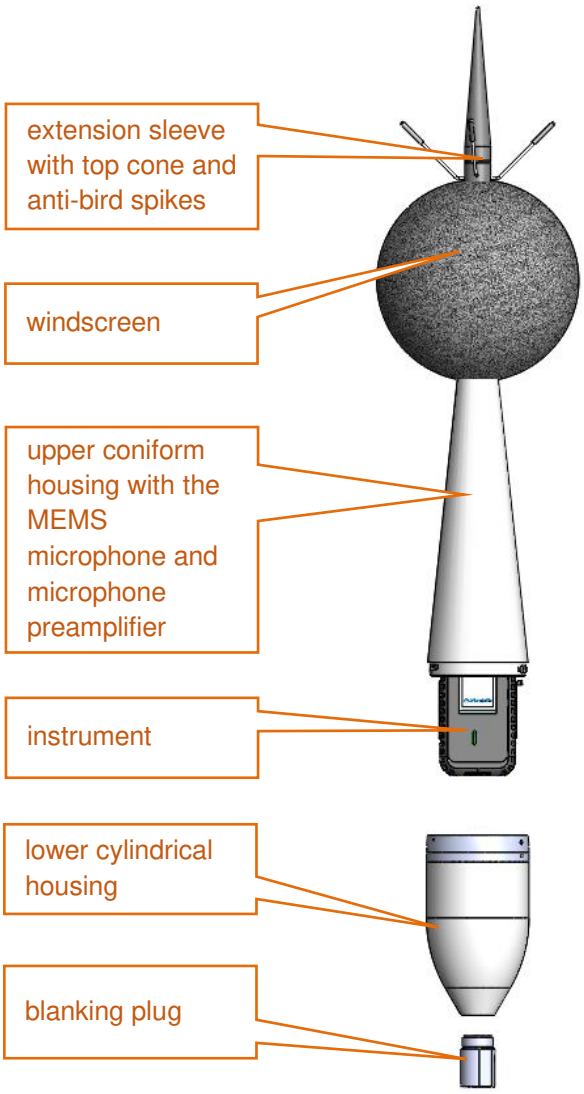
- SD 311 Monitoring System Controller to connect with the *SvanNET* web service and complement with the additional monitoring devices, such as weather station, dust monitor, etc.
- SV 803 Vibration Monitoring Terminal to connect with the *SvanNET* web service.

2 SV 303 DESCRIPTION

2.1 SV 303 DELIVERY SET

The SV 303 kit consists of the following elements:

- elements that are permanently integrated with the instrument:
  1. upper coniform housing with the MEMS microphone and microphone preamplifier
  2. Li-Ion rechargeable battery
  3. colour display and control panel
- and detachable elements:
  4. extension sleeve with top cone and anti-bird spikes
  5. SA209 5” foam windscreen
  6. lower cylindrical housing
  7. blanking plug with thread for the tripod and cable slit
- SC 158 cable for powering communication with a PC via USB interface



Ensure that the SC 158 cable is secured with the supplied cable lock to prevent accidental disconnection from the USB-C socket.

Note: *If required, the SA 309 extension tube can be fitted to the lower cylindrical housing. The blanking plug must then be fitted to the lower part of the extension tube.*

2.2 ASSEMBLING/DISMANTLING SV 303

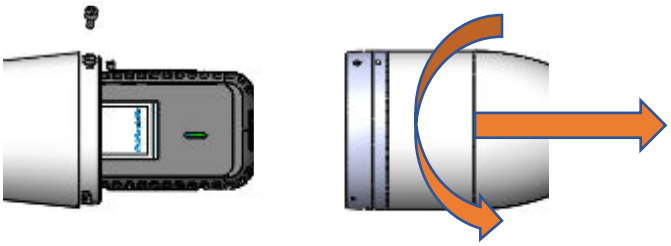
After unpacking, check that the kit is complete according to Chapter 2.1.

SV 303 is supplied fully assembled with the SC 158 USB cable connected. The user can configure the instrument via the USB connection to a PC with the *SvanPC++* software and then install it on a mast or on its own mounting system.

Note: *There is no need to switch on the instrument. It will switch on automatically when you connect the SC 158 cable to the USB power supply.*

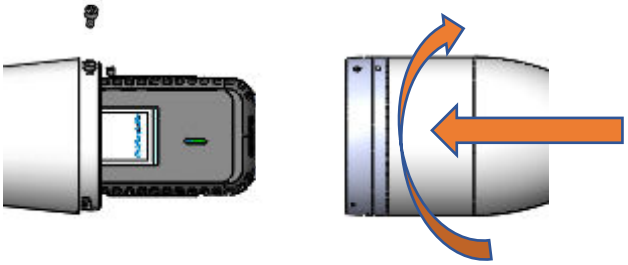
If you need to use the instrument keypad (for example, to calibrate the instrument), disassemble SV 303 by following the steps below:

1. Unscrew the fixing screw in the upper part of the lower housing using the 2 mm Allen wrench.
2. Grasp the upper conical housing with one hand, turn the lower housing counter-clockwise with the other hand in relation to the upper housing and separate them.



To assemble the SV 303, follow the steps below:

1. Insert the SC 158 cable through the hole in the lower housing and the slot in the blanking plug and tighten the blanking plug using the 20 mm open-end wrench.
2. Connect the SC 158 cable to the USB-C connector.
3. Connect the lower housing to the upper housing and fix it by turning it clockwise.
4. Screw the fixing screw into the upper part of the lower housing using the 2 mm Allen wrench.



Note: *Please make sure that the USB cable has a cable lock at a distance of 12 cm from the USB-C end. It prevents accidental disconnection from the USB-C socket.*

Note: *The upper coniform housing is an integral part of the instrument and is not designed to be dismantled by the use. Dismantling the upper coniform housing may damage the instrument!*

2.3 WINDSCREEN

The SA 209 foam protects the microphone from wind noise.

Note: *The windscreen affects the Free Field characteristics of the instrument, so it is important to check its condition regularly. If there is any visible deterioration of the foam surface, it must be replaced with a new one.*

During continuous use, the SA 209 foam is exposed to various weather conditions which may cause mechanical damage to the foam structure. It is therefore recommended to check the condition of the foam at least once every quarter (3 months) by squeezing the foam and checking the surface for cracks. If cracks or holes are found, the SA 209 foam must be replaced.

The SA 209 foam must be replaced if small pieces of its surface are torn off when it is squeezed.

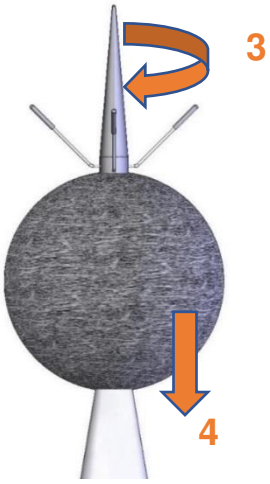
To replace the SA 209 windscreen foam, proceed as follows:

1. Unscrew the upper cone with the anti-bird spikes and the extension sleeve from the microphone sleeve by turning it counter-clockwise.

2. Remove the windscreen foam from the extension sleeve and fit the new windscreen foam.

3. Screw the top cone with the anti-bird spikes and the extension sleeve with the windscreen foam onto the microphone sleeve, turning it clockwise.

4. Adjust the position of the foam so that it lightly touches the anti-bird spikes.



2.4 MOUNTING THE SV 303 ON THE MAST

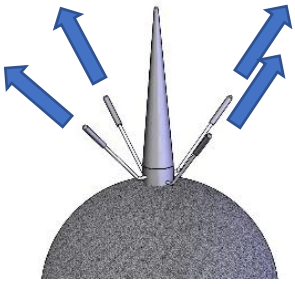
The installation described in this manual is based on the mast type systems recommended by Svantek.

Note: *If other types of installation than on the mast are to be used, Svantek must be consulted, as only the recommended type of installation guarantees the declared acoustic characteristics of SV 303.*

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

Note: *Before installing SV 303 at the measurement site, ensure that the protective caps on the four anti-bird spikes are removed.*

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



1. Screw the instrument onto the M14 thread of the mast, turning clockwise.

Note: *To mount SV 303 on the 3/8" thread, use the M14/3/8" adapter.*

Note: *The M14/3/8" adapter is intended for mounting SV 303 on photo tripod and light stand. Tripods or poles with a 3/8" threads are not recommended for permanent installation.*

2. Attach cables to the mast. It is recommended to use straps at intervals of no more than 50 cm (20") on the mast and the cable holders supplied with the kit (Velcro fasteners). Lay the cables so that they are loose at the ends. The loose cable should hang slightly lower than the connector to prevent rainwater from collecting.

Note: *It is important to secure the cables as loose cables can cause additional noise. An alternative is to wrap the cables around the mast.*

3. Connect the SV 303 to the USB power source via the SC 158 cable.

The device prepared this way is ready for measurements.

2.1 POWERING THE SYSTEM

The SV 303 has an internal battery that can operate for approximately 8 hours. To extend the operating time of the SV 303, it must be connected to the external USB power supply via the SC 158 cable.

When connected to the SD 311 Monitoring System Controller or the SV 803 Vibration Monitoring Terminal, the SV 303 is powered by these devices.

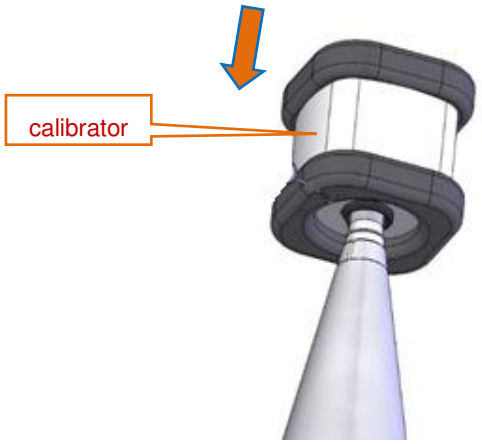
3 CALIBRATION, SYSTEM CHECK

SV 303 is factory calibrated with the supplied microphone for the reference environmental conditions (see Appendix C). The sensitivity of the microphone is a function of temperature, ambient pressure and humidity, and if the absolute value of the sound pressure level is required, the absolute calibration of the measurement channel should be performed periodically. Unlike calibration, a system check only provides information on calibration drift and doesn't change the calibration factor.

If the instrument is assembled and a calibration or system check is required using a sound calibrator, the SV 303 must be disassembled to gain access to the keypad (see Chapters 2.2) and the top cone with the windscreen foam removed to gain access to the microphone (see Chapters 2.3).

Note: *Calibration must be performed with the sound calibrator placed over the microphone and using the* ***Calibration*** *menu or the* ***Auto Calibration*** *function instead of the normal measurement mode.*

To perform a calibration or system check, follow next steps:



1. Attach the acoustic calibrator (SV 36 or equivalent 114 dB@1000 Hz) carefully on the microphone.
2. Switch on the calibrator and wait for the tone to stabilize (according to the calibrator specification) before starting the calibration measurement.
3. If the auto calibration function is activated, the SV 303 will perform the calibration measurement and calculate the calibration factor automatically. If not, perform the calibration measurement using the instrument control panel (see Chapter 4.9.2.2).
4. Accept or reject the new calibration factor.
5. Remove the calibrator after the calibration measurement.
6. Assemble the instrument and attach the top cone with the windscreen foam.

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

Note: *You can use another type of acoustic calibrator designed for ½" microphones. In any case, before starting the calibration measurement, set in the instrument the level of the signal, specified in the calibrator's certificate.*

4 USER INTERFACE

SV 303 can be controlled manually using the four keys on the keypad. With these keys you can access most of the available functions and change the value of most of the available parameters. The parameters are arranged in a system of lists and sub-lists displayed on the high-contrast colour graphic display.

The instrument is equipped with the super contrast OLED colour display (96 x 96 pixels), which shows the measurement results and the configuration menu.

4.1 CONTROL PANEL

The control keys on front panel of the SV 303 can have different functions, which are indicated in this manual by the following symbols:

Button	Direct function	Pressed with **<Shift>**	Long press
	▲	◄	
	▼	►	
	**<Enter>**	**<Esc>**	**<On/Off>**

<Shift> The second function of a key (e.g., **<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*):

- as on a computer keyboard, when both **<Shift>** and the second key must be pressed at the same time (**Direct** mode)
- as on a smartphone keyboard, when the first **<Shift>** key should be pressed and released and then the second key pressed (**2nd Function** mode).

<Start/Stop> This key (◄ and ►pressed together) allows you to start and stop the measurement.

<Enter> This key allows you to open the selected item in the menu list, confirm the selected settings or change the views of the result presentation modes.

Note: *A long press on the **<Enter>** key switches the unit on or off.*

(<Menu>) This key (▲ and **<Enter>** pressed together) allows you to enter the main **Menu**, which contains the following sections: **Function**, **Measurement**, **Display**, **File**, **Instrument** and **Auxiliary Setup**. Each section contains items, that open submenus or lists of configuration parameters. These sections are described in detail in the following chapters of the manual. Double pressing the **<Menu>** key opens the menu containing the last eight lists of parameters previously opened. This often speeds up control of the instrument by giving you quicker access to frequently used parameters for easy navigation.

<Esc> This key (**<Shift>** and **<Enter>** pressed together) returns to the parent list of the menu. It has the opposite effect to the **<Enter>** key. If the list of parameters is closed after the **<ESC>** key is pressed, any changes just made will be ignored.

▲ / ▼ These keys allow you in particular to:

- select the item in a list or matrix

- select the character in the text string to be edited in the editor screens
- move the cursor in the **Spectrum**, **Logger** and **Statistics** views
- select the result to be displayed in the **One profile** or **3 Profiles** views

◄ / ► These keys allow you in particular to:

- select the value of an active item (e.g., filter **Z**, **A**, **B**, **C** or **LF**, integration period: **1s**, **2s**, **3s**, … etc.)
- edit the selected character in the editor screens
- speed up the modification of the numerical values of the parameters by long press
- select the active profile in all views
- move the cursor to the first/last position in the **Spectrum**, **Logger** and **Statistics** views

Some additional functions of this key are described in the following chapters of this manual.

4.2 BASIS OF THE INSTRUMENT CONTROL

The instrument has two general modes of operation: measurement result preview mode and configuration mode using the Menu functionality.

Turning on the instrument

To switch the power on, connect the instrument to the USB power supply or press and hold the **<Enter>** key. The instrument will go through the self-test routine (during this time the manufacturer's logo and the instrument's type will be displayed) and then enter the Running SPL view, if it was enabled, otherwise it will enter the One Profile view.

4.2.1 Measurement mode

You can start the measurement from any mode, but once you start the measurement, the instrument will enter the measurement mode.

Measurement start

To start the measurement, press the **<Start>** key. The icon will appear, and the measurement will be taken using the current instrument settings stored in the instrument's internal memory. During the measurement the shape of the icon will change from self to contoured.

<Start>

The time passed from the start of the measurement (elapsed time) is displayed in the lower right corner of the measurement screen in the format **mm:ss** in the range from 00:00 to 59:59, or in the format **hh:mm:ss** in the range from 01:00:00 to 99:59:59, or in the format **xxxh** from 100h to 999h, and **>999h** if the elapsed time exceeds 999 hours. Its maximum value is equal to the integration time and the elapsed time is reset to zero at the start of a new measurement cycle.

Measurement stop

The measurement stops automatically at the end of the measurement cycle. If the number of cycles is infinite (see Chapter 4.10.1), you must stop the measurement manually. You can stop the measurement manually at any time.

To stop the measurement manually, press the **<Stop>** key.

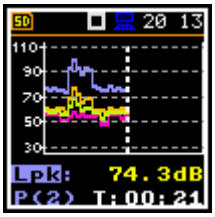
Viewing measurement results

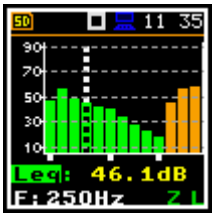
The measurement results can be viewed in different view modes, the set of which depend on the selected **Measurement Function** and which you can change and activate/deactivate. The view modes present the measurement results as well as additional information by means of icons regarding:

- 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.

Some views are always available, and some can be activated or deactivated using the Configuration mode.

Some views show numerical results and some show graphical results, as in the example on the right: time history plot and spectrum.





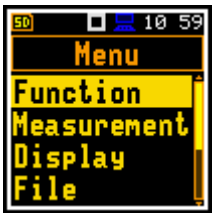
Icons are described in Chapter 4.4, other fields and view control functions - in Chapter 4.11.

4.2.2 Configuration mode

The menu is used to configure measurement or instrument parameters and is accessed using the <Menu> key. The menu consists of main Menu, submenus, lists of options, lists of parameters, text editors, information screens, etc.

Main Menu

The main **Menu** contains headings for six sections (submenus), grouping configuration settings according to their purpose.

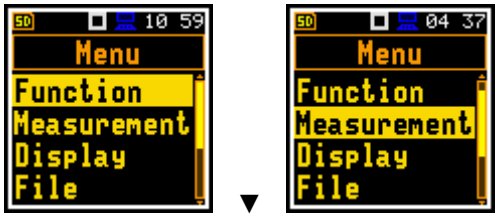


Recent Items list

A double press of the **<Menu>** key opens the list of recently used menu items. This allows quick access to the most frequently used lists of parameters and options without having to go through the entire menu.

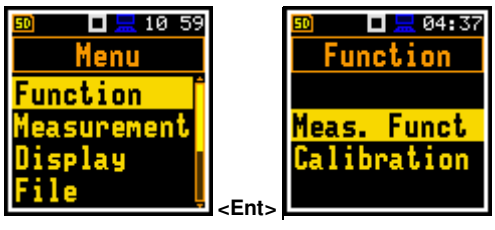
Selecting item

Use the ▲ / ▼ buttons to select the desired item in the list.



Opening item

After selecting the desired item in the menu list, press the **<Enter>** key to enter it. After this operation, a new submenu, list of options, list of parameter or information screen will appear on the display.

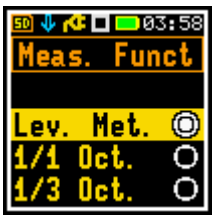


List of parameters

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

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

List of options



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

If the parameter has a numerical value, you can speed up the selection by pressing and holding the ◄ / ► keys. In this case, the parameter value will change automatically until you release the key.

Matrix of parameters

If the list of parameters consists of more than one column, you can:

- select the result for the profile in the matrix with the ▲ / ▼ key
- check/uncheck the result for the profile with the ► key
- check/uncheck the result for all profiles with the ◄ key
- when the cursor is on one of the Profile items, check/uncheck all results for the profile with the ► key

Complex parameters

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

In all cases the **<Enter>** key is used to confirm changes and to close the list. Pressing the **<ESC>** key will close the list, ignoring any changes made.

Information screen

Some screens provide information about the status of the instrument, available memory, standards met by the unit, etc. Use the ▲ / ▼ keys to scroll through the screens. To close such a screen, press **<ESC>**.

Text editor screen

The text editor screens allow you to edit lines of text (file names, directory names, etc.) The text editor screen is opened with the ► key when the item with the text parameter is selected.

- Use the ▲ / ▼ key to select the character in the text string.

- Use the ◄ / ► key to change the selected character with another ASCII character. The subsequent digits, underline, upper case letters and space appear in the inverted item each time this key is pressed.

Use space to delete one character.

Inactive items

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

4.3 DEFAULT SETTINGS

Factory setting

The instrument is supplied with default settings, which you can change but always return to by using the **Factory Settings** option in the **Auxiliary Setup** section.

The following chapters of the manual describe in detail what each parameter means and how to change the instrument's settings.

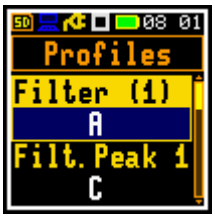
Main default settings

By default, the instrument is configured as a Sound Level Meter (**Measurement Function: Level Meter**) for measuring broadband sound pressure levels using three virtual meters, called profiles, with a one-second delay after the **<Start>** keystroke, infinite integration time (**Integration Period: Inf**), one repetition cycle (**Rep. Cycle: 1**), linear Leq integration (**LEQ Integration: Linear**), compensation of internal microphone noise (**Microphone Comp: On**), Free Field 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 one-second step (**Logger Step: 1s**) and all summary results.

Other functions such as measurement trigger, logger trigger, waveform recording, and timer are disabled.

The logger and summary results are automatically saved to the file with the name specified 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**);

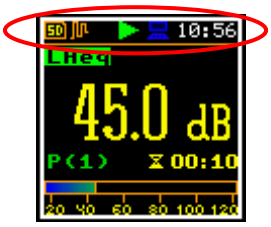
You can change all the default settings in the **Measurement** section. The instrument remembers all changes until the next time it is used.

4.4 DESCRIPTION OF ICONS

instrument status indicators

Additional information on the status of the instrument is provided by the icons on the top line of the display.

The Real Time Clock (RTC) is also displayed on the same line with icons.



Meanings of icons are as follows:

The „**measurement**" icon is displayed when the measurement is in progress and the icon shape changes from self to contoured.	The "**waiting**" icon is displayed when the instrument is waiting for the measurement to start after the **<Start>** key has been pressed, due to a start delay or a delay caused by a trigger.
The **"stop"** icon is displayed when the measurement is stopped.	The "**M**" icon is displayed in microphone service mode, indicating that the instrument has detected a microphone fault.
The „**logging**" icon is displayed when the current measurement results are being logged to the instrument's logger file. Grey means that the instrument is waiting for logging to start after the **<Start>** key has been pressed, due to a start delay or a trigger delay.	The „**wave**" icon is displayed during wave recording. Grey colour means that the instrument is waiting to start wave recording after the **<Start>** key has been pressed, due to a start delay or a trigger delay.
The "**overload**" icon is displayed if an overload was registered during the measurement.	The "**underrange**" icon is displayed if an underrange was registered during the measurement.
The **„level+"** icon is displayed when the trigger condition is set to „**Level +**". The icon will alternate with the „measurement", „logging" or „wave" icon.	The **"level-"** icon is displayed when the trigger condition is set to „**Level -**". The icon will alternate with the „measurement", „logging" or „wave" icon.
The **"slope+"** icon is displayed when the trigger condition is set to „**Slope+**". The icon will alternate with the „wave" icon.	The **"slope–"** icon is displayed when the trigger condition is set to „**Slope-**". The icon will alternate with the „wave" icon.
The **"trigger"** icon is displayed when a trigger other than Level or Slope is waiting for a condition to be met. The icon will alternate with the „measurement", „logging" or „wave" icon.	The **"clock"** icon is displayed when the timer is on. It is active when the instrument is waiting for the start of the measurement. When it is about to start, the icon turns green and starts flashing.
The **"battery"** icon is displayed when the instrument is powered by the internal batteries. The colour of the icon corresponds to the state of the batteries (green - 30÷100%, yellow – 10÷30%, red – less than 10%).	The "**SD card**" icon is displayed when the SD card memory is installed. The grey colour of the icon indicates that the card memory is full. The "**no SD card**" icon is displayed when no SD memory card is installed.

The "**plug**" icon is displayed when the instrument is powered from the USB socket without using the USB interface.	The „**USB**" icon is displayed when there is USB connection with the PC.
The **"bell'** icon is displayed when an alarm occurs.	The "**charging**" icon is displayed when the instrument is connected to the USB-C power source and the battery is charging.

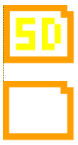
4.5 SAVING DATA

The instrument creates files of the following types:

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

Memory type

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



- SD card is inserted

- no SD card

The **SD card** memory is automatically activated when the card is inserted. The presence of the SD card is indicated by the icon with SD letters in the upper left corner of the display.

File manager

The **File Manager** is used to check the contents of memory and perform operations on files and directories such as renaming, deleting, viewing information, and creating new directories.

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

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

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

Automatic saving of Logger and Wave files

Logger and Wave files are automatically saved to the SD card. To enable automatic saving, several conditions should be met:

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

Files are stored in the directory that have been set up as the working directory. The default working directory (after using the **Factory Settings** function) is **SVANTEK**.

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

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

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

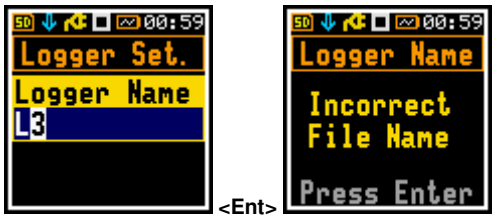
The instrument assigns an individual counter to each prefix of files created by the user has and stored in the working directory. This counter is equal to the maximum number in the set of files with the same prefix, increased by one. For example, if the working directory contains files named **L0**, **L1** and **L3**, the counter value will be 4.

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

You can change the automatically generated file name in the special screen that appears after pressing the ◄ / ► key.

If you change the number of file name without changing the prefix and press **<Enter>**, the counter will be automatically adjusted.

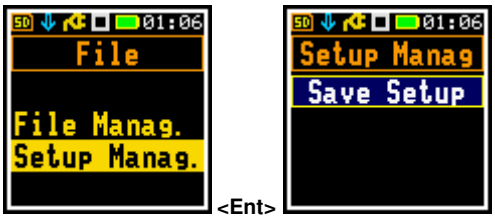
The instrument will only accept the name whose number is greater than the counter.



Saving setup files

Setup files can be created using the **Setup Manager.**

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



4.6 ARCHIVING FILES

SV 303 uses a file archiving mechanism. When the number of files stored in the working directory exceeds 5000 (together with deleted files), the backup procedure is started. At the specified time (by default at 1:59) the instrument stops the measurement, moves the entirety working directory to the ARCHIVE directory, automatically renames this directory to YYMMDD (current date) and creates a new working directory with the same name as before archiving. The instrument then starts the measurement.

The archiving time can be set via the *SvanPC++* software (see Chapter 5.3.4).

4.7 DOWNLOADING AND UPLOADING FILES

All measurement and setup files stored in the memory (micro-SD card) can be downloaded to the PC using the *SvanPC++* program which provide download and upload functions as well as data viewing and data processing options (see Chapter 5.3.1). The instrument should be connected to the PC using the SC 158 USB cable.

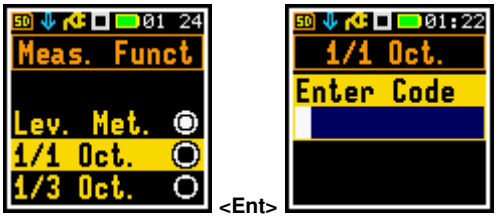
The same approach is used for uploading files (usually setup files).

4.8 ACTIVATING OPTIONAL FUNCTIONS

The standard instrument firmware contains all the basic functions to perform measurements according to most international standards and methods. For more complex tasks, additional functions can be added to the instrument. These functions include 1/1 octave and 1/3 octave analyser and waveform recording.

If additional functions are not included in the instrument kit and have not been enabled by the supplier, it is the responsibility of the user to purchase additional functions at a later date.

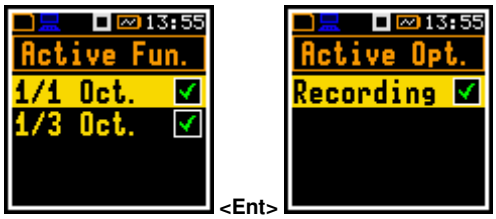
The optional function is activated the first time you try to use it. If, for example, **1/1 Oct.** was locked but is purchased later, the first time you try to switch it on, the instrument will require you to enter the special code that unlocks this option. Once unlocked, the option is permanently available.



The code is entered in the dedicated text editor screen.

Press the **<Shift>** ◄ and **<Enter>** keys simultaneously to check and lock early unlocked options.

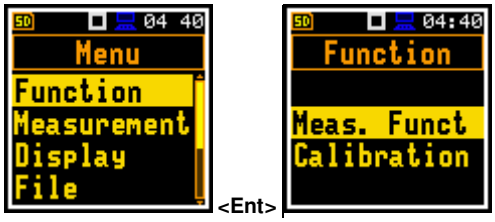
To select other options, press the **<Enter>** key, which opens another page of the **Active Functions**/**Options** list.



4.9 MEASUREMENT FUNCTIONS AND CALIBRATION – FUNCTION

The **Function** section allows you to select the measurement function (**Meas. Function**) and perform the instrument calibration or system check (**Calibration**).

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

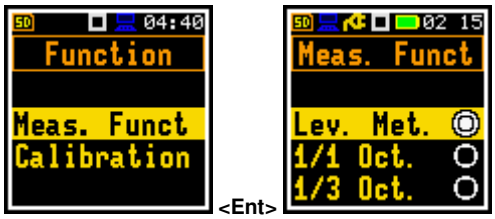


4.9.1 Measurement functions of the instrument – Measurement Function

The main function of the instrument is to measure the broadband sound pressure level (**Level Meter**). The Sound Level Meter (SLM) function provides the user with functions that meet the IEC 61672-1:2013 standard for Class 1 accuracy.

Real-time 1/1 octave and 1/3 octave band analysis options are also available. These options extend the main level meter functionality of the instrument by performing 1/1 octave and 1/3 octave analysis in parallel with the calculation of the broadband level meter results.

To activate a measurement function, open the **Meas. Function** list of options and use the ▲ / ▼ key to select the desired function: **Lev. Met.**, **1/1 Oct.** or **1/3 Oct.**.



Note: *The type of measurement function is not displayed on the screen, so the user should remember about the currently selected function!*

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 that opens after the first attempt to use it. Once unlocked, this option is permanently available.*

Note: *It is not possible to change the measurement function during a measurement. In this case, the instrument displays the text: "**Measurement in Progress**". To change the instrument function, the measurement must be stopped!*

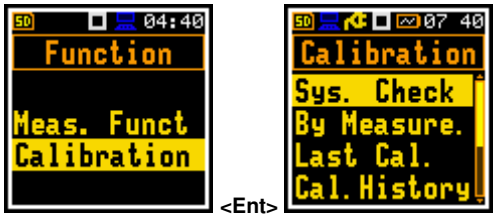
4.9.2 Instrument calibration and system check – Calibration

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

In addition to calibration, the instrument provides a system check.

All information about calibration and system check is recorded in a special log file (C.txt).

The **Calibration** list contains items that allow you to check the system (**System Check**), calibrate using the sound calibrator (**By Measurement**), view the previous calibration results (**Last Calibration**), view the history of calibrations (**Calibration History**), clear calibration records (**Clear History**), add post calibration results to the logger file (**Post Calibration**) and enable the auto calibration function (**Auto Calibration**).



Note: *When you start the calibration from the **Calibration** menu or using the **Auto Calibration** function, the Free Field compensation filter (**Airport** or **Environment**, see Appendix C.1, Table C.1.8), which compensates the acoustic reflection effect from the housing, top sleeve, anti-bird spikes and windscreen, is disabled.*

*Therefore, calibration must be performed with the sound calibrator placed over the microphone and using the **Calibration** menu or the **Auto Calibration** function instead of the normal measurement mode!*

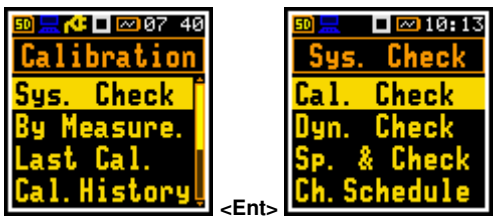
Note: *The calibration factor is always added to the results of the **Level Meter**, **1/1 Octave** and **1/3 Octave** functions.*

Note: *The recommended factory calibration interval is 12 months to ensure continued accuracy and compliance with the international specifications. Please contact your local Svantek representative for further details.*

4.9.2.1 Checking the measurement path - System Check

There are several ways for check the measurement path:

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

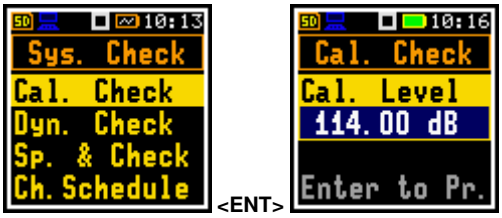


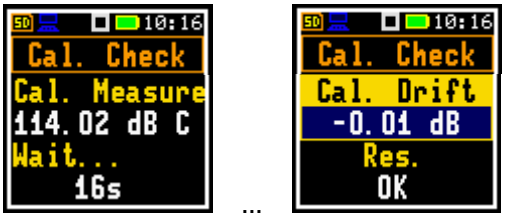
Note: *Unlike the calibration procedure, the system check does not change the calibration factor of the instrument.*

Calibration check

To perform the system check using the sound calibrator:

1. Set the reference calibration level (**Cal. Level**) to 114 dB (if this corresponds to the pressure level of the calibrator specified in its calibration chart, otherwise set the calibration level from the calibration chart).
2. Attach the sound calibrator (SV 36 or equivalent 114 dB/1000 Hz) carefully over the microphone of the instrument.
3. Switch on the calibrator and wait approximately 30 seconds before starting the system check measurement.
4. Start the measurement of the calibration signal with the **<Enter>** key.





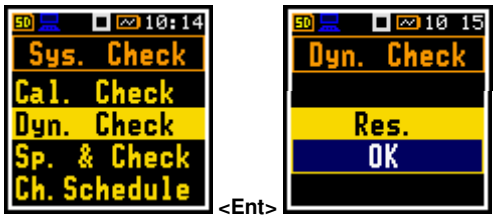
Calibration measurement lasts 15 seconds.

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

If the calibration drift is within ±0.5 dB, but the calibration check detects that one of the three MEMS microphones has failed, the check result is failed.

Dynamic check

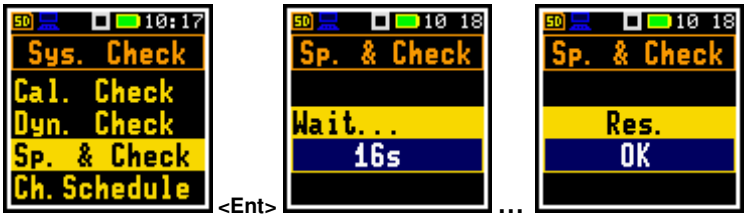
The instrument constantly compares the measurements of three MEMS microphones inside the microphone capsule. If the difference is within the tolerances, the dynamic check is considered successful (**Result: OK**). The **Dyn. Check** screen shows the status of this check: **OK**, **Failed**, **Not Performed**.



Speaker & check

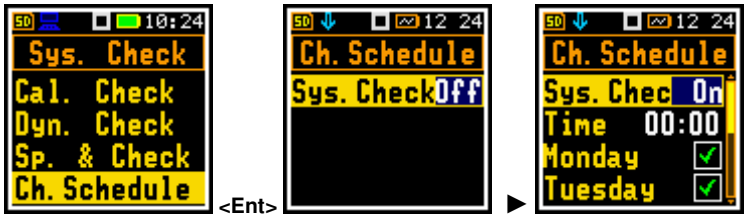
If you enter the **Speaker & check** item, the instrument starts the system check using the built-in speaker.

If the result is within tolerances the check is successful (**Result: OK**).



Scheduling the speaker check

You can schedule the automatic speaker check. To do this, switch on the **Sys. Check** item in the **Ch. Schedule** screen and select the time and days of the week when the check should be performed.



Note: *If any of the checks fail, you should calibrate* ***By Measurement****.*

Note: *During the system check, the instrument will pause the measurement and close the wave file if a signal is being recorded. Signal recording will be resume in a new wave file after a pause caused by the system check is released.*

4.9.2.2 Calibration - By Measurement

To calibrate the instrument:

1. Set the reference calibration level (**Cal. Level**) to 114 dB (if this corresponds to the pressure level of the calibrator specified in its calibration chart, otherwise set the calibration level from the calibration chart).
2. Carefully place the sound calibrator (SV 36 or equivalent 114 dB@1000 Hz) over the microphone of the instrument.
3. Switch on the calibrator (if the calibrator you are using doesn't have an auto run function) and wait about 30 seconds for the sound to stabilise before starting the calibration measurement.
4. Press the **<Enter>** key to start the calibration measurement.

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

During the calibration measurement, the level of the measured calibration signal is displayed. If the maximum difference between three consecutive 1-second readings (LCeq) is less than **0.05dB**, the calibration measurement is stopped, and the calibration factor is calculated. The measurement can be stopped at any time by pressing the **<Stop>** key.

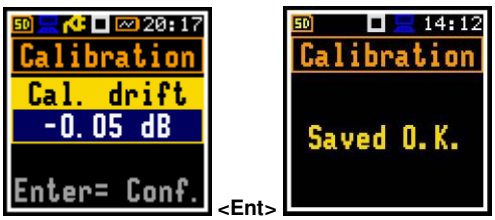
After stopping the calibration measurement, the **Calibration drift** (change in the calibration factor since the last calibration, calculated in dB) is displayed.

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

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

Note: *During the calibration measurement, external noise or vibration should not exceed 100 dB (using a 114 dB calibrator).*

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



If the calculated calibration factor is outside the ±3 dB range, the special warning “Microphone outside the tolerance. Accept?” will appear on the screen.

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

6. Disconnect the calibrator from the microphone.

Note: *If the calculated calibration factor is outside the range of ±20 dB with respect to the factory calibration factor, the special warning "Calibration factor out of range!" will be displayed. In this case, the calculated calibration factor is not accepted.*

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

4.9.2.3 Checking the last calibration - Last Calibration

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

<Ent>

4.9.2.4 History of calibrations performed – Calibration History

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

<Ent>

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

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

4.9.2.5 Erasing calibration records – Clear History

Open the **Clear Hist.** item to erase the calibration records.

<Ent>

4.9.2.6 Post measurement calibration – Post Calibration

Some regulations require that post-measurement calibration information be added to measurement files created prior to such calibration. The last calibration factor is for informational only, as it was not taken into account during the measurement.

The **Post Cal.** screen offers three options: no storage (**Off**), storage in the last file created (**Last File**) or storage in the files created after the last calibration (**After Cal.**).

<Ent>

4.9.2.7 Automatic calibration – Auto Calibration

The **Auto Cal.** item allows the user to perform automatic calibration when the sound calibrator is attached to the microphone. In this case, the "Calibration by measurement" screen will appear automatically. If **Auto Cal.** is Off, the user should access this screen from the menu.

<Ent>

The automatic calibration function has been implemented to make calibration as easy as possible and to allow the user to calibrate the instrument with a minimum of steps.

When Auto Calibration is enabled, the unit periodically compares the measured signal level (Running SPL for 1 second) with the reference calibration level while it's not performing a measurement and starts the calibration measurement if the stable SPL result is within ±5dB of the calibration level.

To perform the automatic calibration:

1. Switch on the instrument.
2. Attach the SV 36 (or equivalent 94/114 dB @ 1000 Hz) calibrator to the microphone and switch it on (if the calibrator you are using doesn't have an automatic switch-on feature).

Calibration starts automatically, and the calibration procedure is similar to that for calibration by measurement.

Note: *Automatic calibration is performed in relation to the calibration level set in the* ***By Measurement*** *screen.*

The SPL generated by the calibrator triggers the automatic calibration process if the difference between the Calibration Level value set in the Calibration screen and the measured SPL generated by the calibrator is within ±5 dB.

During the calibration measurement, the level of the measured calibration signal is displayed. When the maximum difference between three consecutive 1-second LCeq results is less than **0.05dB**, the calibration measurement is completed. The measurement can be stopped at any time with the **<Stop>** key.

When the calibration measurement is stopped, the **Calibration drift** (change in the calibration factor since the last calibration, calculated in dB) is displayed.

3. Press **<Enter>** to save the new calibration factor or **<Esc>** to discard it. In either case the instrument will exits the **Calibration** screen.
4. Detach the calibrator from the microphone.

4.9.2.8 Microphone service mode

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

If the instrument detects a malfunction in one of the three MEMS microphones, it enters the microphone service mode, indicated by the flashing "**M**" icon. This means that one of the three microphones has failed, and the results are taken from the other two.

When you are about to perform the Dynamic check, instead of the **Dynamic check** screen, the instrument displays a warning about the active microphone service mode.

In such a situation it is necessary to perform a calibration check.

If the **Calibration Drift** is acceptable, the measurement results obtained in the microphone service mode are correct.

The **Speaker & check** command performs a check of all MEMS microphones using the built-in speaker and will therefore normally give a negative result in the microphone service mode.

If the result of the check is that the microphones are working properly, the instrument will automatically switch off the service mode.

If you wish to calibrate your instrument in the microphone service mode, you should switch it off.

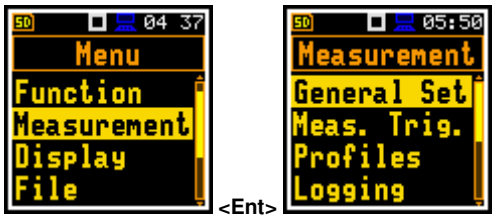
If the calibration is unsuccessful, the instrument will give a warning that the microphone has failed.

In this case you should replace the microphone or contact Svantek service.

If the calibration was successful, the instrument will automatically exit the microphone service mode.

4.10 CONFIGURING MEASUREMENT PARAMETERS – MEASUREMENT

The **Measurement** section groups together items relating to the configuration of measurement parameters. To access the **Measurement** section, press the **<Menu>** key, select the **Measurement** item and press **<Enter>**.

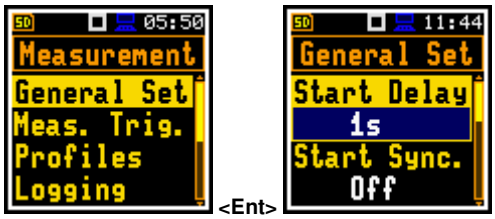


The **Measurement** section contains the following items, which allow you to:

General Set	set general measurement parameters,
Meas. Trig.	configure the measurement trigger,
Profiles	set parameters specific for the profile,
Logging	configure the logging function,
Spectrum	set spectrum parameters; this item becomes available only for the **1/1 Octave** and **1/3 Octave** functions,
Comp. Filter	switch required compensation filter,
Stat. Lev.	define 10 statistical levels,
Timer	program the internal timer,
Alarm	configure instrument's alarms.

4.10.1 Setting the main measurement parameters – General Settings

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



Measurement start delay

The **Start Delay** item allows you to set the delay time between pressing the **<Start>** key and the actual start of the measurement (the instrument's digital filters constantly analyse the input signal even when the measurement is stopped). This delay can be set from 0 seconds to 60 minutes. Default delay: **1 s**.

Measurement start synchronisation

The **Start Sync.** item allows you to set the synchronisation points with the instrument's RTC and can be set to **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 the next hour after the **<Start>** key is pressed and will be repeated from the first second of the next hour after the integration period has elapsed if the number of cycles is greater than one. Default value: **Off**.

Integration period

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

During the integration period, the instrument performs a series of 1-second measurements, averaging the 1-second results with the results averaged over n-1 seconds. The averaged results are updated and shown on the display every second for the elapsed measurement time (n seconds). At the end of the integration period, the averaged measurement results are stored in a logger file if such storage is enabled.

At the end of this period, the measurement is automatically stopped and restarted 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** item allows you to set the number of measurements (with the measurement period defined by the **Integr. Per** parameter) that the instrument will perform after the **<Start>** key is pressed. The values of **Rep. Cycles** are within the limits [Inf, 1÷1000]. Default value: **Inf**.

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

Note: *In the case of the infinite integration period or the infinite repetition cycles, the measurement should be stopped manually.*

Day time limits

The **Day Time Limits** item allows you to define the day and night time limits required by the local regulations. These limits are used to calculate **Lden** (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 Integr.** item allows you to set the detector type for the calculation of the **Leq**, **Lden**, **LEPd** and **Ln** results. Two options are available: **Exponential** and **Linear**. The formulae used to calculate **Leq** are given in Appendix D. Default detector: **Linear**.

Linear is required to obtain the true RMS value of the measured signal. When this option is selected values of the **Leq**, **Lden**, **LEPd** and **Ln** results are independent of the detector time constant (results are displayed without specifying the detectors selected in the profiles). In this case the **Lin.** (or **L**) is displayed in the different result display modes.

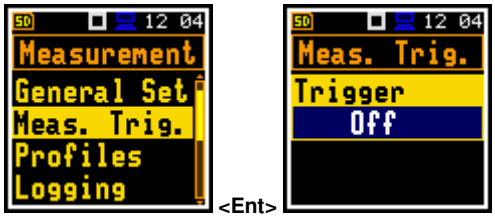
Exponential make it possible to meet the requirements of some standards for time averaged **Leq** measurements. When this option is selected, the value of the **Leq, Lden, LEPd** and **Ln** results depends on the detector time constant (**Fast**, **Slow** or **Impulse**). The results are displayed with the indicator of the detector type selected in the profile settings (*path: <Menu> / Measurement / Profiles*).

Rolling Leq

Integration periods for calculating **LR1** and **LR2** results can be defined in the two Rolling Time items (see Appendix D). The default values are 30 m and 60 m respectively.

4.10.2 Setting the measurement trigger – Measurement Trigger

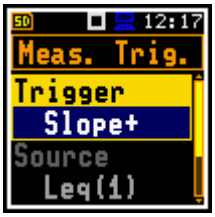
The **Meas. Trigger** item allows you to set the measurement trigger parameters. The **Meas. Trigger** is a context list of parameters where the trigger (**Trigger**) can be switched **Off** or on by selecting the trigger type (**Slope+**, **Slope-**, **Level +**, **Level –** or **Gradient +**). If the trigger is on, additional parameters can be defined: the measurement result to be checked for a trigger condition (**Source**), the trigger threshold level (**Level**) and the rate of change the source value changing (**Gradient**). Default mode: **Off**.



The measurement trigger condition is checked every 0.5 milliseconds.

Slope trigger

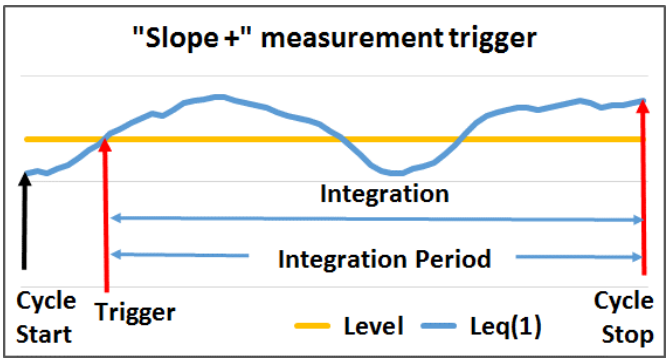
The **Slope +** / **Slope–** trigger starts the measurement with the duration of the **Integration Period** under the condition that the rising/falling value of the measured result (**Source**) integrated during 0.5 ms passes above/below the threshold value (**Level**).



At the start of a new measurement cycle (after pressing the **<Start>** key or automatically after stopping the previous measurement cycle) the instrument checks a trigger condition every 0.5 ms and if the condition is met, the instrument starts a continuous series of 1-second integrations, the number of which is equal to the number of seconds in the **Integration Period**.

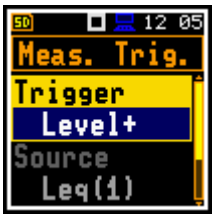
After ending the **Integration Period**, the new measurement cycle can start with above logic.

The measurement can be stopped manually at any moment with the **<Stop>** key.



Note: *When a measurement is waiting for the slope trigger, the flashing "slope" icon will overlay the „waiting" icon.*

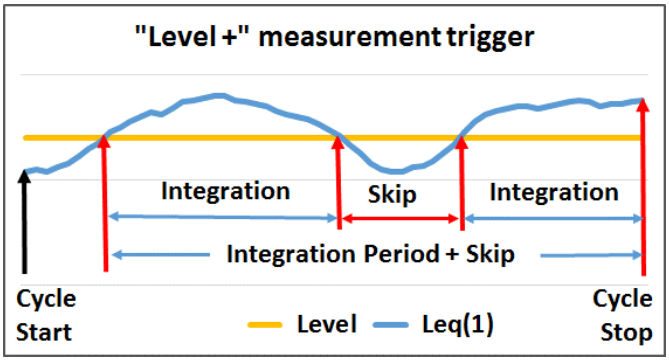
Level trigger



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

At the start of the new cycle (after pressing the **<Start>** key or automatically after stopping the previous cycle) the instrument checks the trigger condition every 0.5 ms and starts 1-second integration if the condition is met.

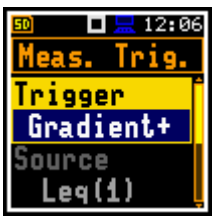
After each 1-second integration, the instrument repeats the trigger condition check every 0.5 ms and starts the next 1 second integration if the condition is met. The instrument repeats this as often as there are seconds in the integration period and stops the measurement cycle. Therefore, the series 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 time using the **<Stop>** key. Summary Results are calculated from a series of 1-second results measured during each measurement cycle and stored in a logger file.

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

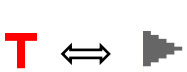
Gradient trigger



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

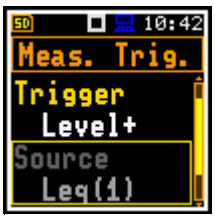
This type of trigger has the same logic as the **Level +** trigger, but the trigger condition also requires the gradient level to be exceeded.

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



Source

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

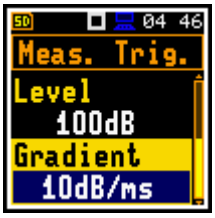


Threshold

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

Rate of change of Source value

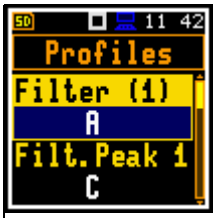
This item appears when the **Gradient+** trigger is selected. The rate of change of the **Source** value (**Gradient**) can be set in the range of **1 dB/ms** to **100 dB/ms**.



4.10.3 Setting parameters for profiles – Profiles

The **Profiles** item allows you to set the following parameters for each profile: weighting filter for non- peak results (**Filter**), weighting filter for peak results (**Filter Peak**) and LEQ detector type (**Detector**).

<Ent>



Weighting filters

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

- **Z** class 1 according to IEC 61672-1:2013,
- **A** class 1 according to IEC 61672-1:2013,
- **C** class 1 according to IEC 61672-1:2013,
- **B** class 1 according to IEC 60651,
- **LF** low frequency filter according to China requirements.

LEQ detector

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

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

4.10.4 Configuring data logging – Logging

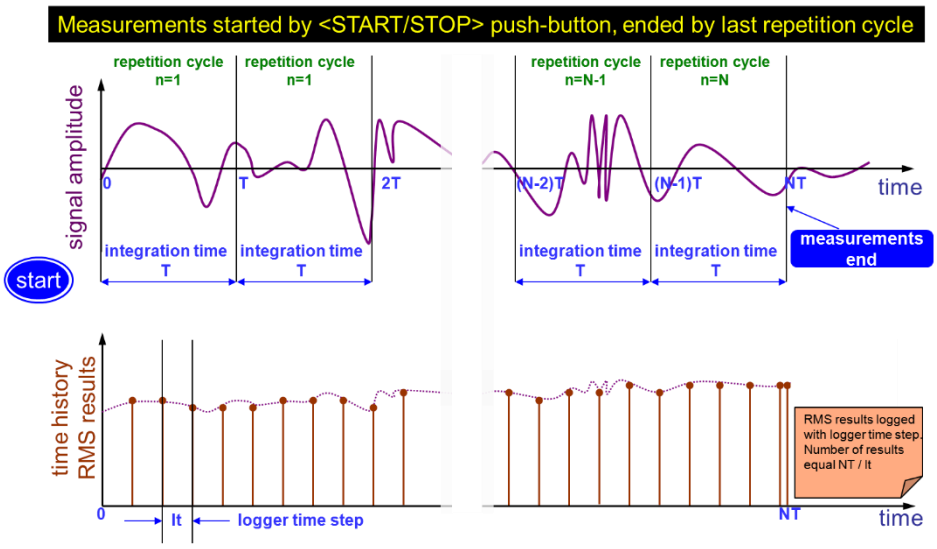
Summary results (**L** (SPL), **Leq**, **LE** (SEL), **Lden**, **LEPd**, **Ltm3**, **LTeq**, **Ln**, **OVL**, **Lpeak**, **Lmax**, **Lmin**, **LR**, **EX**, **SD**, **NC**, **NR**, statistics and spectra) are measured and recorded in the file with the step defined by the **Integration Period** item as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

The instrument also allows the additional recording of some results with a different step defined by the **Logger Step** item (*path: <Menu> / Measurement / Logging / Logger Setup*). It is therefore possible to store two sequences of measurement results in parallel – one for Summary results (SR) and another for Logger results or time history results (TH).

When **Logger** is switched on, selected logger results taken from three independent profiles are stored simultaneously with a time step down to **100 ms**. Recording of logger results to a file is stopped after a period equal to the **Integration Period** multiplied by the number of **Repetition Cycles**, or when the measurement is stopped manually.

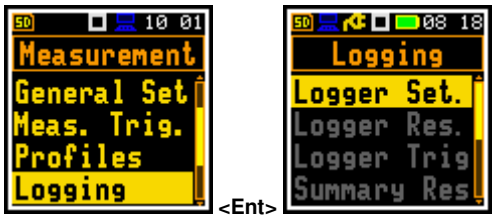
The Summary Results are stored in the same file as the Logger Results. Blocks of summary results are written to the file at the end of each measurement cycle.

The figure below illustrates the principles for saving measurement results.



Summary Results and Logger Results saving

The **Logging** list allows you to program the logging functions: recording of Summary and Logger results in a logger file, recording of audio signal in a WAV file and recording of Summary results in the CSV format.



4.10.4.1 Setting general logging parameters – Logger Setup

The **Logger Set.** item allows you to enable logging (**Logger**) and set the general logger parameters: split the logger file (**Logger Split**), set the logging step (**Logger Step**), edit the file name (**Logger Name**) and enable logging of Summary results (**Summary Results**).

The **Logger** item switches logging **On** or **Off**.

Switching the logger on activates other items in the **Logging** list.

Note: *If* ***Logger*** *is* ***Off****, logger files will not be created, logger results will not be measured, and summary results will not be stored!*

Note: *The* ***Wave Recording*** *function doesn't depend on the* ***Logger*** *status. Wave files have a different format and are created when* ***Wave Recording*** *is enabled, see Chapter 4.10.4.7.*

Logger file split

The **Log. Split** item allows the logging data to be split into separate files. If **Log. Split** is **Off**, the data will be logged in one logger file with the name defined in the **Logger Name** item. The default value is **Off**.

In other cases, the logging is done in separate files and the logging in the new file starts at the end of the integration period (**Integr. Per**), or at every quarter of the RTC (**Sync. to 15m**), or at every half an hour of the RTC (**Sync. to 30m**), or at every hour of the RTC (**Sync. to 1h**), or at user defined times (**Spec. Time**). Whenever the split time is reached, the logger file is closed, and a new file is opened with the number incremented by one for subsequent measurement data.

If **Spec. Time** is selected in the **Log. Split** item, you can set up to six split times (**Split Time1**, **Split Time2**, **Split Time3**, **Split Time4**, **Split Time5** and **Split Time6**) changing **Off** to the desired time of the day when splitting should occur.

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

Note: *For logger steps smaller than 1s, the running Leq results will be calculated with a step of 1s but stored to the logger file with the logger step. In such cases the logger curve for the running Leq results will be a stepped curve.*

Logger file name

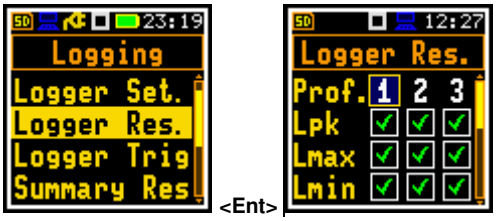
The **Logger Name** item allows you to define the logger file name. The default logger file name is **Lnn**, where **nn** is a number. The name can be up to eight characters long. Pressing the ◄ / ► key opens the special screen with the text editor. The edited name is accepted and saved when the **<Enter>** key is pressed.

Summary Results saving

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

If the **Summary Res** item is set to **Off**, the item associated with Summary Results in the **Logging** list will be inactive.

4.10.4.2 Selecting results for logging – Logger Results

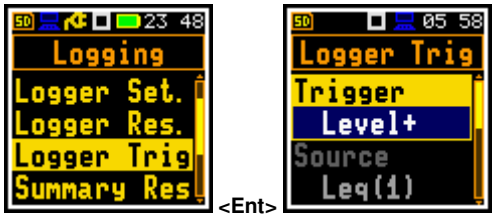


The **Logger Results** item allows you to select results for three independent profiles to be logged in the logger file during a measurement with the **Logger Step**.

For the **Level Meter** function, the following results can be logged: **Lpk**, **Lmax**, **Lmin**, **Leq**, **LR1** and **LR2**. For the **1/1 Octave** and **1/3 Octave** measurement functions, spectra can also be logged.

Note: *When the Logger is Off or no results have been selected for logging, the logger plot cannot be activated in* ***Display Modes*** *and will not appear on the display.*

4.10.4.3 Setting the logger trigger – Logger Trigger

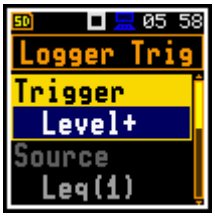


The **Logger Trigger** item allows you to define how the logger results are to be recorded in the logger file. The trigger can be disabled (**Off**) or enabled if you select the trigger type in the **Trigger** item. If the trigger is enabled, other parameters can be defined: the measurement result to be checked for a trigger condition (**Source**), the threshold (**Level**) and the number of readings to be stored in the logger before the trigger condition is met (**Pre Trigger**) and the number of readings to be stored in the logger after the last trigger during logging (**Post Trigger**).

Trigger deactivation

The logger trigger (**Trigger**) can be disabled with the ◄ key. The trigger is enabled when the **Level +** or **Level –** mode is selected with the ► key. Default logger trigger mode: **Off**.

Level trigger

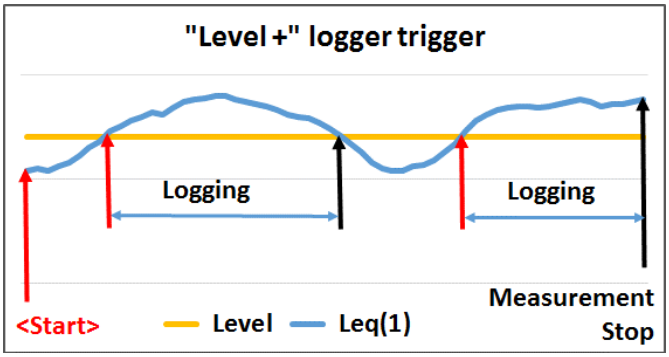


The **Level +** / **Level -** trigger enables the logging of logger results with the **Logger Step** under the condition: the value of the LEQ result (**Source**) measured by the **Logger Step** period is greater/less than the threshold (**Level**). In other cases, the logging is skipped.

This type of trigger makes it possible to separate the results related to the low/high noise level.

Logging can only be performed when the Summary results are being measured, i.e., from the start of the measurement to the end of the measurement.

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



Note: *When logging is waiting for a level trigger, the "level" icon will alternate with the „logging" icon.*

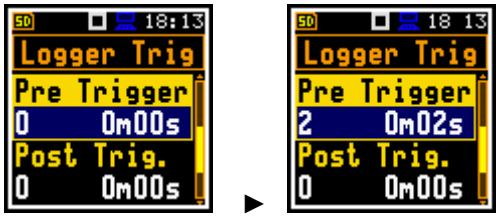
Source

Only the one measurement result (**Source**) can be used to check the trigger condition in the **Level Meter** mode, namely the instantaneous LEQ from the first profile (with appropriate filter and detector), denoted here as **Leq(1)**. This item cannot be changed.

Threshold

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

Pre and post trigger logging



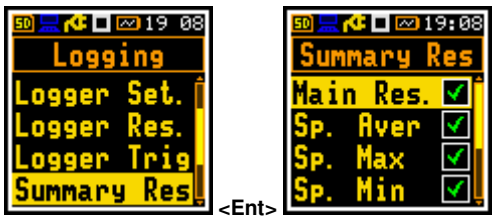
The **Pre Trigger** item allows you to define the number of reedings to be recorded in the logger file before the trigger condition is met. This number is limited to 0..10.

The **Post Trigger** item allows you to define the number of reedings to be recorded in the logger file after the last trigger condition is met. This number is limited to 0..200.

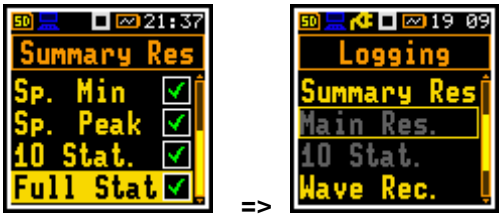
These parameters can serve a dual purpose. Firstly, if you want to collect data immediately after or before the event that triggered the logger. Secondly, when it is necessary to have continuous logging, but the source oscillates close to the threshold. Extending the logging window allows you to avoid the effects of pulsation.

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

4.10.4.4 Saving summary results – Summary Results

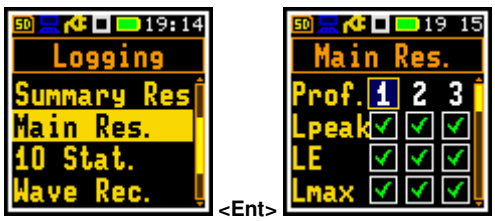


The **Summary Results** item allows you to activate storage in the logger file of **Main Results** (**Lpk**, **LE**, **Lmax**, **Lmin**, **L**, **Leq**, **Lden**, **Ltm3**, **LTeq**, **LR1**, **LR2**, **OVL**, **NR** and **NC**), **10 Statistics**, **Full Statistics** for the **Level Meter** function and the average, maximum, minimum and peak spectra (**Spectrum Aver**, **Spectrum Max**, **Spectrum Min** and **Spectrum Peak**) for the **1/1 Octave** and **1/3 Octave** functions.



Unchecking **Main Results** and **10 Statistics** will disable of the same items in the **Logging** list.

4.10.4.5 Saving main results – Main Results



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

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

4.10.4.6 Saving 10 statistical results – 10 Statistics

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

4.10.4.7 Configuring signal recording – Wave Recording

The **Wave Rec.** item allows you to enable and configure a recording of the signal waveform to a WAV file. Default mode: **Off**.

WAV files are saved automatically in the working directory of the instrument's memory.

***Note:** The **Wave Recording** function is optional and should be unlocked by entering the activation code in the text editor screen, opened with the ► key. Once unlocked, this function is always available.*

Waveform recording trigger

The **Recording** item, if it is not disabled (**Off**), defines the type of trigger for a signal recording: from the start and throughout the measurement period (**Continuous**), manual start using command #7,EW (**Trig.manual** – see Appendix A), from a slope, level or gradient trigger, from the start of a measurement with a given recording interval (**Integr. Period**) or when an alarm condition occurs (**Alarm**).

***Note:** The alarm trigger cannot be set manually. The recording item is automatically set to **Alarm** when **Wave Recording** is activated for one of the 10 events (path: <Menu> / Measurement / Alarm), see Chapter 4.10.9.*

The **File Name** item allows you to edit the name of the WAV file.

The **Format** item defines a type of the VAW file format: **PCM**, **Extensible** or **Compress. A** (A-law).

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

The **Audio Sampling** parameter defines the sampling frequency of wave recording: **48 kHz**, **24 kHz**, **12 kHz** or **6 kHz**.

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

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

***Note:** In the case of the **Compress. A-law** format, the bits per sample always is always 8. This format can be used for listening to the audio signal, but not for sound measurement.*

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

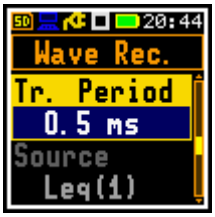
In **Continuous** mode, you can limit the length of the signal recording by selecting the duration in the **Length Limit** item.

When waveform recording on trigger is selected, the next items appear in 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 **Tr. Period** item allows you to set the time interval at which the trigger conditions are checked: **Logger Step**, **0.5 ms**, **100 ms** and **1 s**.



Source

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

Threshold

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

Gradient

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

Recording before trigger

If **Pre Trigger** item is set to a value other than **Off**, the instrument will start recording the waveform before the first trigger. You can select the duration of this recording, which depends on the selected sample frequency and bits per sample. The maximum pre-trigger periods are:

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

Time of signal recording

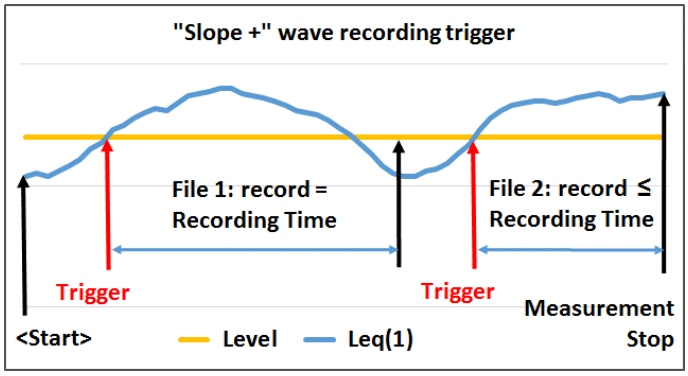
The **Recording Time** item allows you to set the time the signal is recorded after triggering. If the next trigger condition occurs during the **Recording Time**, the signal will be recorded for an additional **Recording Time**. The available values are from **1 s** to **8 h**, or **Inf**.

Slope trigger

The **Slope+** / **Slope–** trigger starts a signal recording on the condition: the rising value of the Leq result (**Source**), integrated by 0.5 ms, passes above/below the threshold level (**Level**).

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

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

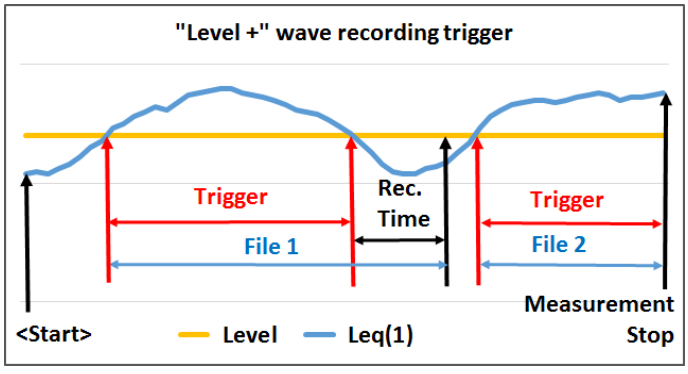


Note: *When a wave recording is waiting for the slope trigger, the "slope" icon will overlay on the grey „wave" icon.*

Level trigger

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

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



Note: *When the wave recording is waiting for the level trigger, the "trigger" icon will overlay on the grey „wave" icon.*

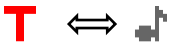
Gradient trigger

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

Integration period trigger

If the **Integr. Period** trigger is selected, the signal recording is triggered at the start of each measurement and the recording lasts for the minimum **Recording Time**. If the trigger condition occurs during recording (when the **Integration Period** is shorter than the **Recording Time**), the recording will continue from that moment for the next **Recording Time** and so on.

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



Wave files size control

The **Length Limit** item allows you to set the maximum time during which the recording to the one file is allowed. After this time, the current file is closed, but the signal recording continues in the new file. This limit can be disabled or defined as a time interval.

This parameter allows you to control the size of the wave files, which may need to be limited for various reasons.

Note: *Pausing the measurement, either manually or automatically (in the case of a programmed system check), will close the wave file at the start of the pause and open a new wave file when the pause is released.*

4.10.4.8 Recording of Summary Results in CSV format – CSV Recording

The **CSV Recording** item allows you to select Summary Results to be recorded in a CSV (*comma-separated values)* file.

CSV files are created automatically if the logger is enabled. The name of the CSV file is identical to the corresponding logger file name, with a CSV extension. These files are stored in the same directory as the logger files.

Two format options are available: **Multi-Line** or **Single-Line**. The CSV file structure is shown in Appendix B.5.

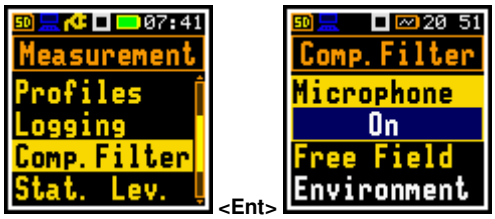
Note: *CSV files are created only when* ***Logger*** *is switched* ***On*** *(path: <Menu> / Measurement / Logging / Logger Setup).*

4.10.5 Switching on compensation filters – Compensation Filter

The **Comp. Filter** item allows you to switch on or off the compensation filters used in the instrument.

The **Microphone** filter (microphone internal noise compensation) is switched on by default but can be switched off for electrical measurements (e.g., for laboratory calibration.

The **Free Field** filter compensates for the effect of reflections form the instrument housing and diffraction around the microphone in Free Field conditions. In this item, you can switch off the compensation (**Off**) or select the **Environment** or **Airport** compensation.



Environment compensation should be used when an acoustic signal is parallel to the grid of the microphone.

Airport compensation should be used when an acoustic signal is perpendicular to the grid of the microphone.

The characteristics of the compensation filters are given in Appendix C.

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

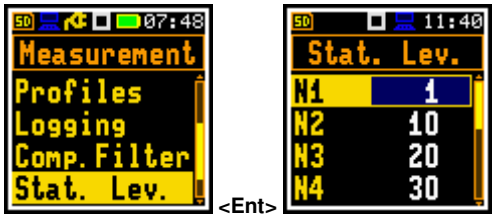
Note: *For the comparison coupler evaluation, the* ***Microphone Compensation*** *must be set to* ***On*** *and the* ***Free Field*** *compensation must be set to* ***Off*** *(see Appendix C).*

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

4.10.6 Setting statistical levels – Statistical Levels

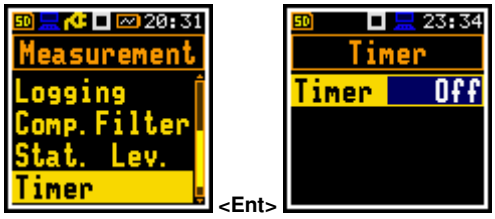
The **Stat. Levels** item allows you to define ten statistical levels, named from **N1** to **N10**, to be calculated, displayed, and stored in the files together with Summary Results (see Appendix D).

The default statistical levels have the 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.



4.10.7 Programming the instrument's internal timer – Timer

The **Timer** function is used to program the automatic start of the measurement (and switch on the instrument if it is switched off) at a given time and day of the week, and the automatic stop of the measurement and switch off the instrument. The measurement is performed with the parameters set in the **Measurement** section with one exception (see Note below).

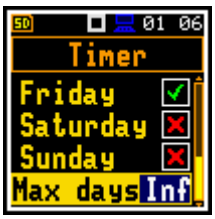


Note: *When the* ***Timer*** *is* ***On****, the measurements are performed from the defined* ***Start*** *to* ***Stop*** *times because the* ***Repetition Cycles*** *parameter is automatically set to* ***Inf*** *(path: <Menu> / Measurement / General Set.). The last integration can be truncated.*

Setting the start and stop of the measurement

The **Start (hh:mm)** and **Stop (hh:mm)** items define the start and stop times of measurement.

In the items: **Monday**, **Tuesday**, …, **Sunday**; you can select the days of the week on which the measurements are to start.



The timer can be programmed for a maximum number of days ahead (**Max days**) (up to 100) or without limit (**Inf**). During these days, the instrument refers to the time of the **R**eal **T**ime **C**lock (**RTC**). The measurements stop when the number of days in the day counter reaches **Max days**. If the **Inf** value is selected, the measurement series can only be stopped manually. If more than one day per week is selected, the day counter increases with each measurement day.

Note: *Before using the timer, check that the real time clock settings are correct.*

Note: *Ensure that there is sufficient internal battery power and memory for the instrument to perform the required measurements when it wakes up.*

4.10.8 Example of timer performance

Let us assume that you want to switch on the measurement on Monday at 8:00, measure the noise level for 20 minutes and save the results in the file named L4.

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

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

The measurement is carried out over a period of 20 minutes. The results are then automatically stored in a file named L4. The instrument will turn off at 8:20 and wait for the next Monday to start the next measurement at 8.00. The next file is automatically named L5, and so on.

Such cycle will be repeated as many times as is defined by **Max days** parameter. If more than one day in a week is selected, the day counter is increased with each measurement performed. The measurement cycle will stop when the day counter reaches the **Max days** value. If **Inf** value is selected, the measurement cycles can only be stopped by the user (if the power supply is guaranteed, of course).

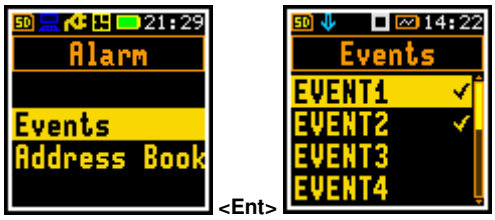
4.10.9 Configuring instrument's alarms – Alarm

The **Alarm** item allows you to configure the alarms that the instrument can generate. These alarms can be sent as SMS and/or e-mail notifications if SV 303 works with the device equipped with the modem (e.g., SD 310 Monitoring System Controller).

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

The **Events** item allows you to configure up to 10 events and define alarms, notification methods and recipients when an event occurs.

The **Events** screen displays a list of 10 events, each with its own name and indicator whether the event is active (√) or not.



The **Event x** screen, accessed by pressing **<Enter>**, allows you to configure the event and make it active or inactive.

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

Each event can be named for easier identification.

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

The **Trigger** item allows you to define the source of the trigger (**Source**) and the step at which the trigger condition is checked (**Step**). To edit this item, press the ► key and make selections in the **Trigger** screen.

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

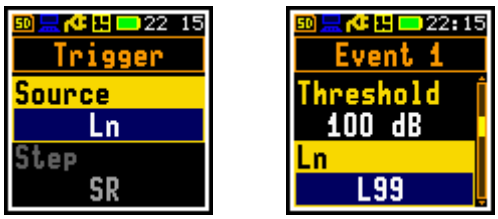
As a **Source**, you can select:

- **Leq**, **Lmax**, **Ln**, **LR(1)** or **LR(2)** from the first profile,
- projected Leq (**LeqPR**) or projected Leq with pre-set background noise (**LeqPR+LN**),
- system event (**System**).

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

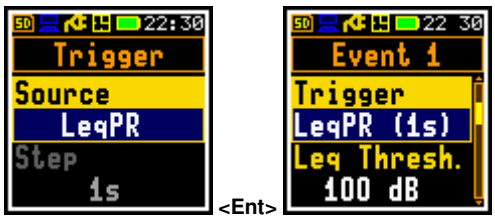
If the **Ln** result has been selected as the trigger source, only the integration time for the summary results (**SR**) can be used as the trigger step.

In the **Ln** item, use the ◄ / ► keys to set the statistical level.



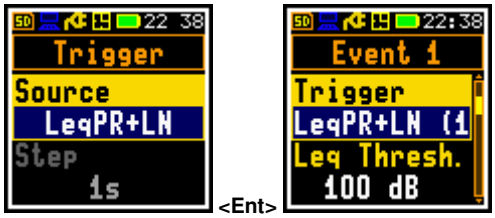
The selected result averaged over the time set by the **Step** parameter, is compared with the threshold set by the **Threshold** item.

The **LeqPR** trigger source option means that the trigger condition occurs when the predicted Leq is greater than the **Leq Threshold**.



LeqPR is calculated as *LeqPR = LAeq,T + 10log(T/T$_0$)*, where T is the current time from the start of the measurement, T$_0$ is the time between the **Start** and **Stop** of the **Time** parameter. It is assumed that from the moment the limit value is exceeded until the end of the period considered, the fixed level already reached will be maintained.

LeqPR+LN is calculated as *LeqPR = LAeq,t + LAeq,s + LAeq,LN (T$_0$-t-s)*, where s is the time for the reaction, t is the time from the start of the measurement to s, T$_0$ is the time between the **Start** and **Stop** of the **Time** parameter. It is assumed that the average level of the pre-set background noise will be maintained from the moment the limit value is exceeded until the end of the period under consideration.



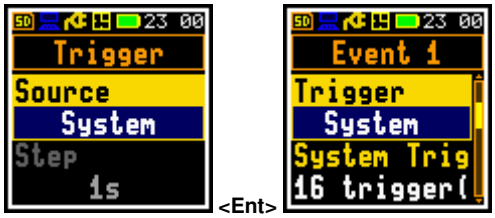
In the case of the **LeqPR** or **LeqPR+NL** option, the trigger condition – the actual value of the result from the start of the integration time - is checked with a step equal to 1 second.

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

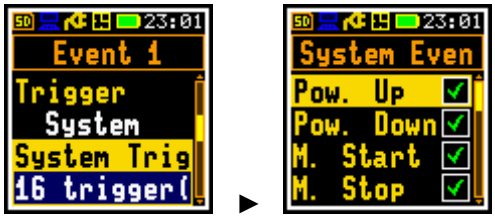
The background noise is defined in the **Background** item as a statistical level **Ln**.

The additional **Pre Trigger** option allows you to set the amount of time before the alarm is triggered to start the event.

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



You can select the system events in the **System Events** screen, which is opened by pressing the ► key from the **System Triggers** item.



The system events have the following meanings:

- **Pow. Up** - turning the instrument on
- **Pow. Down** - switching the instrument off (SMS or email will be sent just before switching off)
- **M. Start** - running the measurement
- **M. Stop** - measurement stopped

- **Mains On** - detection of external power connection
- **Mains Off** - detection of external power disconnection
- **Low Bat.** - low battery condition. The alarm will be generated when the instrument detects a low battery condition and when the low battery condition disappears (when it is charged). The threshold is 25%
- **Bat. OK** – restoration of the required battery level. The alarm will be generated after the **Low Battery** alarm

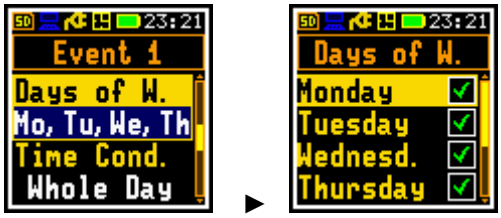
- **Low Stor.** – small space (less than 25%) of the instrument memory detected. The alarm will be generated when the memory space drops below the threshold and when there will be more memory space
- **StorageOK** – restoration of the required memory level. This alarm will be generated after the **Low Storage** alarm
- **Sys. Check** - microphone status after performing a system check with the loudspeaker
- **LiveCheck** - microphone status after performing a live check

- **Ins. Error** - instrument errors:
  - when an RTC reset is detected or when the GPS time deviates more than 1 minute to the time of the instrument
  - SD card error
  - temperature measurement error
- **Dev. Tilt** - inclination of the instrument deviating from the vertical more than 45 degrees
- **Dev. Ver.** - restoration of the instrument vertical item. The alarm will be generated after the **Device Tilt** alarm
- **Vibration** - excessive vibration detected

The **Days of Week** item allows you to set the days of the week when trigger conditions are to be checked, and alarms generated when events occur.

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

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



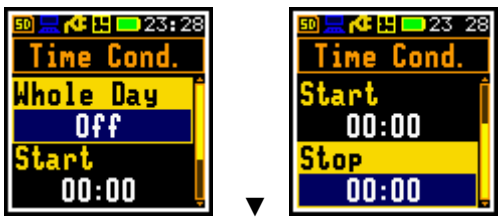
The **Time** item allows you to set periods of the day when trigger conditions are checked, and alarms are generated if the event occurs.

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

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

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

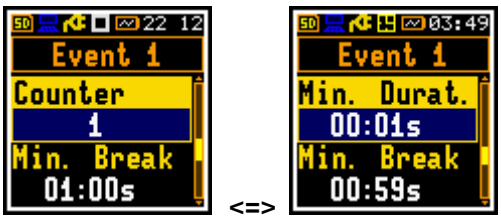
Press **<Enter>** to confirm the selection and return to the **Event x** screen.



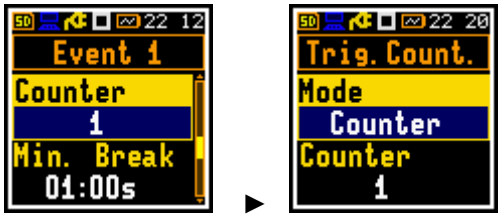
Note: *For these alarms, the time ranges for different events cannot partially overlap. They can overlap completely or occur one after the other. The interface does not allow illegal time ranges to be set.*

The **Counter/Min. Duration** item, which appears when you select **Leq**, **Lmax**, **LR(1)**, **LR(2)** or **Ln** as the **Trigger**, allows you to define additional conditions to be met for generating alarms.

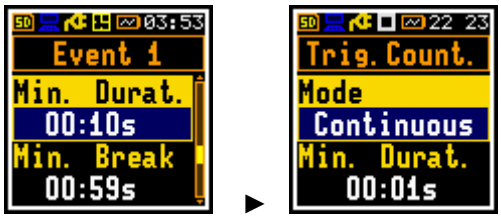
This item changes its name according to the mode selected in the **Trigger Counter** screen that opens after pressing the ► key.



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



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



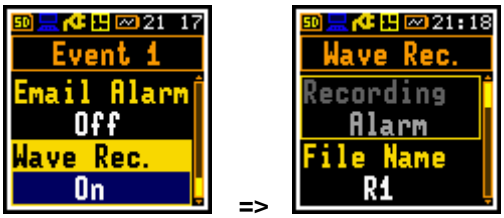
The **Min. Break** item allows you to set the minimum time between SMS or e-mail messages to limit the repetitions of the same alarms.

You can switch **On** or **Off** combinations of alarms in the form of SMS or e-mail notifications, or an audio signal recording in the following items: **SMS Alarm**, **Email Alarm**, **Wave Recording**.

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

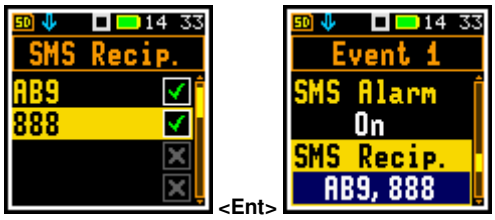
If **Wave Recording** is switched on for any of 10 events, the **Recording** item in the **Wave Recording** screen (*path: <Menu> / Measurement / Logging / Wave Recording*) is automatically set to **Alarm**.

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



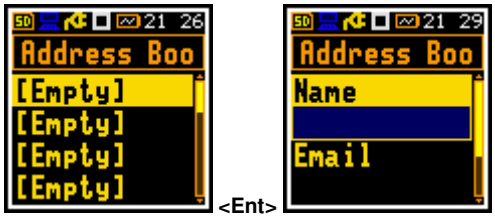
If **SMS Alarm** or **Email Alarm** is **On**, you should select recipients by opening the **SMS Recip.** or **Email Recip.** item that appears below.

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



The **Address Book** item allows you to edit the details of alarm recipients.

To enter/edit the new recipient's address, press the **<Enter>** key and enter the recipient's name, email address and phone number in the special screen.

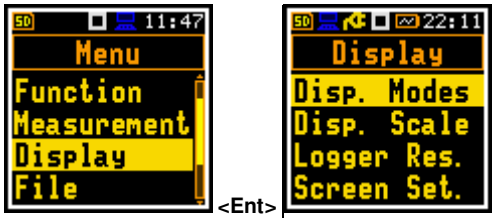


After entering recipient's details, press **<Enter>** to confirm.

4.11 DATA DISPLAY CONFIGURATION – DISPLAY

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

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



The **Display** section contains the items that allow you to:

Disp. Modes enable views in the measurement mode,

Disp. Scale adjust the **Logger** and **Spectrum** views,

Spect. View select the spectra to be viewed; this item becomes available only in the 1/1 octave and 1/3 octave analysis functions,

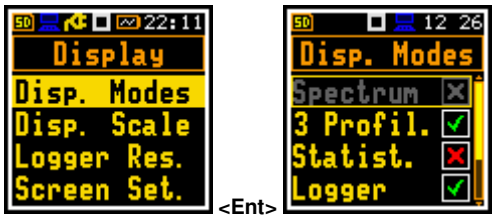
Logger Res. select time history results to be plotted,

Screen Set. enable/disable screen rotation and set the power save function.

4.11.1 Enabling views – Display Modes

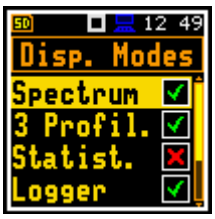
The One Result view is always enabled. Other views can be enabled or disabled using the **Disp. Modes** item.

You can switch between the views enabled in the **Disp. Modes** screen.



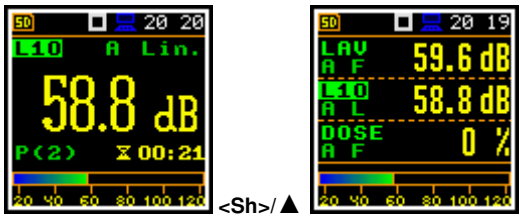
In the **Level Meter** function, the following views are available: **3 Profiles**, **Statistics**, **Logger**, **Running SPL** and **File Info**.

An additional view (**Spectrum**) is available in the **1/1 Octave** and **1/3 Octave** functions.



Changing views

Use the ▲ / ▼ key together with **<Shift>** to change the view.

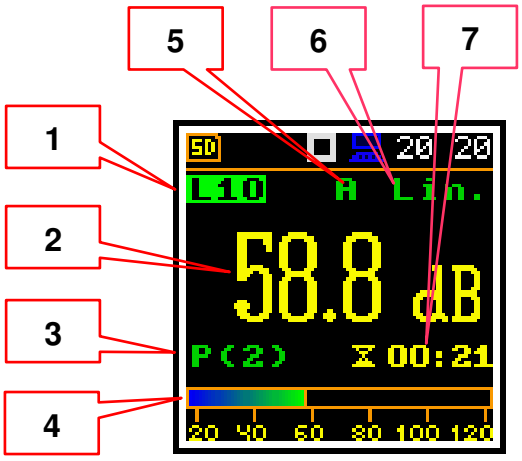


4.11.1.1 One Result view

In the One Result view, each measurement result from the Summary results can be viewed.

One Result view fields

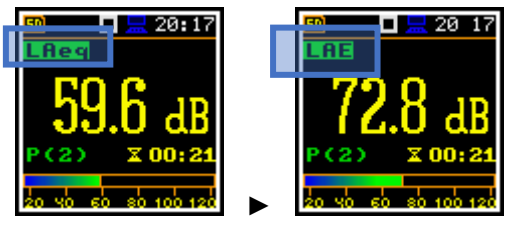
1. Result name: **OVL**, **Lpeak**, **Lmax**, **Lmin**, **L**, **Leq**, **LE**, **Lden**, **LEPd**, **Ltm3**, **LTeq**, **Ln**, **LR**, **EX**, **SD**, **NC**, **NR**;
2. Value of the measured result
3. Current profile number
4. Quasi analogue value indicator
5. Implemented weighting filter: **Z**, **A**, **C** or **B**
6. Detector time constant: **Imp.**, **Fast**, **Slow** for the exponential detector or **Lin.** for the linear detector
7. Elapsed time showing the current second of measurement in the range [**0**, **Integration Period**]



Note: *For some results, the weighting filter and detector type are shown 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 fields.*

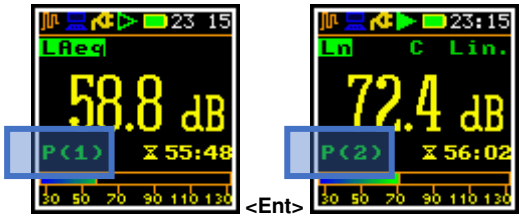
Changing the result for the current profile

Use the ◄ / ► key to change the measurement result for the current profile.



Changing current profile

Use the ▲ / ▼ key to change a current profile.

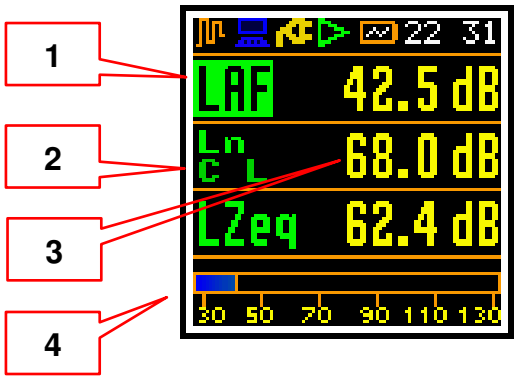


4.11.1.2 Three profiles view

In the **3 Profiles** view, any three measurement results from the Summary results can be displayed.

3 Profiles mode fields

1. Result name for the first profile
2. Weighting filter and detector time constant
3. Value of the measured result
4. Quasi analogue value indicator for the selected result

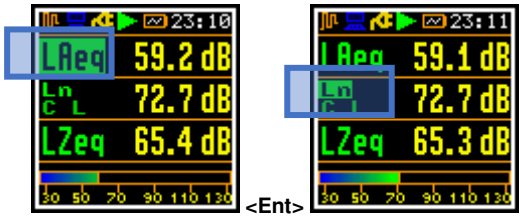


Changing the result for the current profile

Use the ◄ / ► key to change the measurement result for the current profile.

Changing current profile

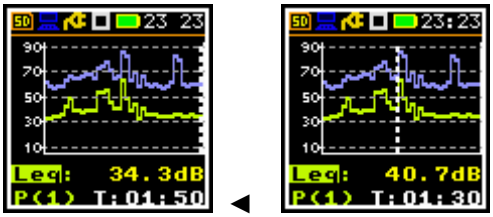
Press **<Enter>** to change a current profile.



4.11.1.3 Logger view

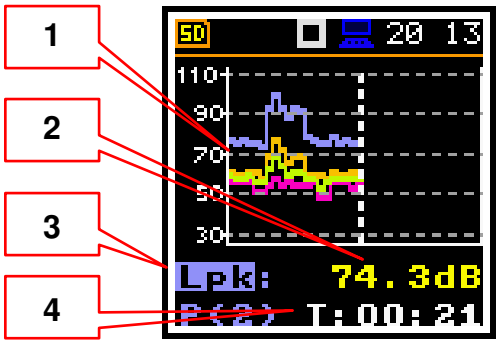
In the **Logger** view, the time history results, selected in the **Logger View** list, are displayed as a plot.

Use the ◄ / ► key to change the cursor position.

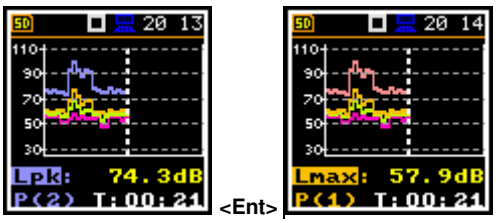


Logger view fields

1. Logger Plot
2. Result value for cursor position
3. Result name (Profile number)
4. Cursor time position



Press **<Enter>** to change the active plot for reading cursor values. The new measurement result name is displayed in field 3.



***Note:** If the **Logger** (path: <Menu> / Measurement / Logging /Logger Setup) is switched off, the **Logger** view is disabled! To use this view, switch the **Logger** on!*

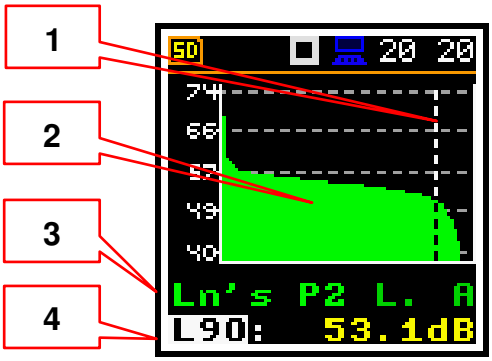
***Note:** If the **Logger** is switched on but no results have been selected for logging, the **Logger** view is disabled!*

4.11.1.4 Statistics view

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

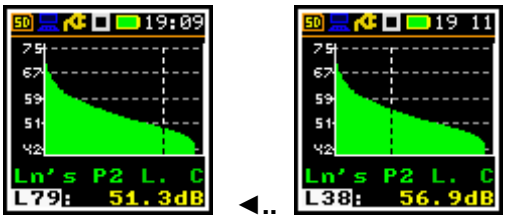
Statistics view fields

1. Cursor position
2. Statistics plot
3. Type of the plot **(Ln's**), active profile, LEQ detector (**L**inear, Fast, **S**low or **I**mpulse), used weighting filter name (**A**, **C**, **Z** or **B**)
4. Value (in dB) of the selected statistical level **Ln** for the cursor position



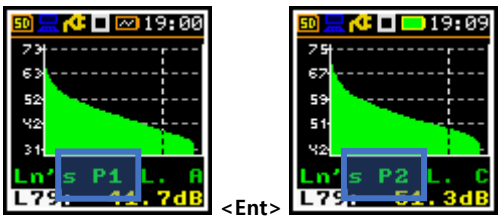
Changing the cursor position

Use the ◄ / ► key to change the cursor position.



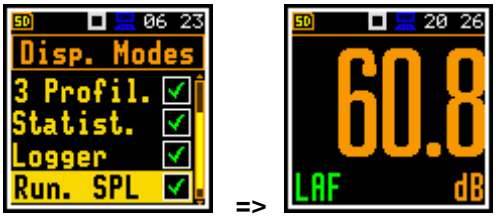
Changing current profile

Use **<Enter>** to change the active profile.



4.11.1.5 Running SPL view

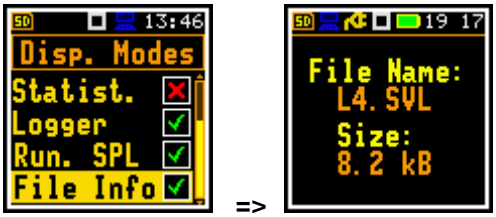
The **Running SPL** view shows the SPL result when the measurement is not currently running. In this view, the SPL result is calculated and displayed, but not stored in the instrument's memory. The purpose of this mode is to give the user an initial indication of the signal being measured.



4.11.1.6 File information view

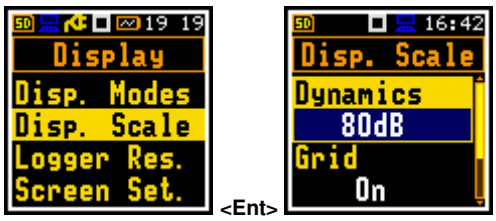
The **File Info** item provides the information about the last logger file saved.

The **File Info** view shows file name and size. When **Logger** is **Off** (*path: <Menu> / Measurement /Logging / Logger Setup*) the **File Info** item is disabled.



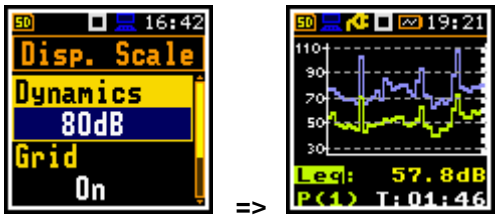
4.11.2 Adjusting plot scale – Display Scale

The **Display Scale** item allows you to adjust the scale of the plot and switch a grid on/off in the **Logger**, **Statistics** or **Spectrum** views.

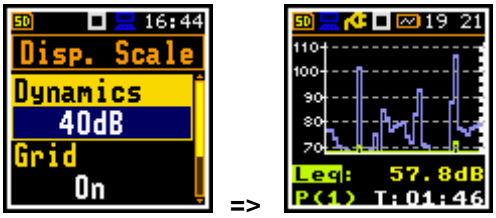


Scaling the vertical axis

The **Dynamics** item allows you to select the desired dynamic range scaling of the plot (Y-axis).

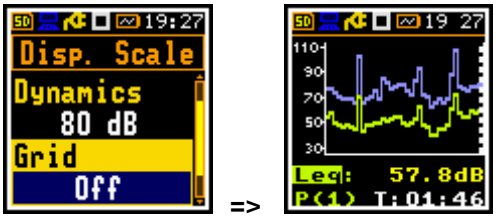


You can select the range from the set: **10 dB**, **20 dB**, **40 dB**, **80 dB** and **120 dB**.



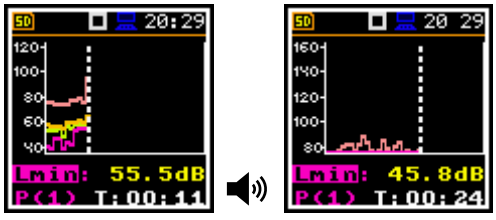
Switching grid on/off

The **Grid** item allows you to switch on or off the horizontal grid lines of the plot.



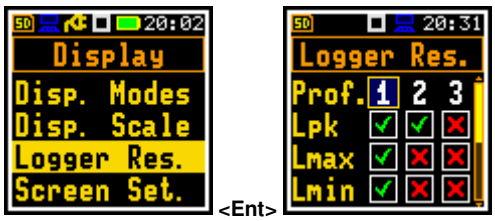
Automatic Y-scale adjustment

The **Autoscale** item allows you to switch on/off the automatic scale adjustment of the dynamic range of the Y-axis to the initial level of the input signal from the microphone as soon as the measurement is started. The example shows the changes in the scale after a sudden increase in sound pressure level.



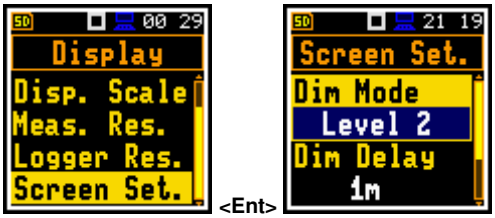
4.11.3 Selecting Logger results to be displayed – Logger Results

The **Logger Results** item allows you to select the Logger results (time history results) to be displayed in the **Logger** view.



4.11.4 Configuring power saver – Screen Setup

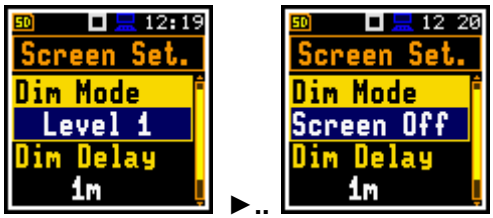
The **Screen Set.** item allows you to configure the power saver function (**Dim Mode**) and switching on the screen auto rotation.



Power saver function

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

There are two options for **Dim Mode**. The screen can be switch off (**Screen Off**) or dimmed with different levels (**Level 1**, **2** or **3**). If one of these options is set, the screen will be dimmed or switched off after a delay set by the **Dim Delay** parameter when any key is pressed. Once this has happened, pressing any key will switch the screen back on.



If **Dim Mode** is **Off**, the screen always remains bright.

By default, **Dim Mode** is set to **Level 2** (medium dim).

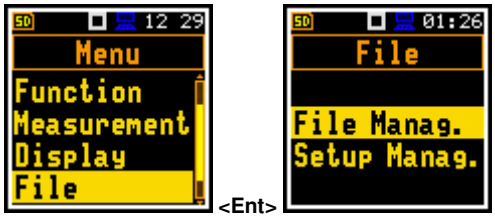
The power saver delay defines the delay time between the last use of any key and the start of the power saver mode. This delay period can be set from **5s** to **60m** with **Dim Mode** active.

Screen auto rotation

The **Auto Rotate** option enables the screen image to be adjusted according to the physical orientation of the instrument in space. If the unit is turned upside down, the screen will also change its orientation so that you can always see it in the normal upright position. The screen rotation also works when the instrument is in the horizontal position.

4.12 MANAGING FILES – FILE

The **File** section allows you to manage the data and setup files stored in the instrument's memory.



The **File** section contains the following items that allow you to:

File Manager manage measurement results files,

Setup Manager manage only setup files located in the predefined SETUP directory.

There are five types of files generated by the instrument:

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

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

The elements of the logger file structure depend on the selected function (**Level Meter**, **1/1 Oct.**, **1/3 Oct.**) and logging settings. These elements are as follows:

- main results, including statistical analysis results,
- time histories of the measurement results,
- 1/1 octave or 1/3 octave analysis results and
- audio waveform recordings.

A detailed description of the structures of all file types is given in Appendix B.

4.12.1 Managing measurement files – File Manager

The **File Manager** is used to check the contents of memory and to perform operations on the measurement files and directories such as: renaming, deleting, viewing information, creating a new directory/file, and clearing memory.

In the **File Manager**, all file and directory names are in upper case. Directory names are blue and file names are green. Measurement files have icons and no extensions, other files have no icons but extensions.

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

Pressing **<Enter>** on the highlighted directory/file will open the screen with the list of operations available for that directory/file.

Changing directories

To open a directory, select it and press the ► key.

To return to the upper directory, press the ◄ key.

Creating a new directory

The first item in the **File Manager** list is **New Dir.**, which allows you to create a new directory.

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

Memory properties

The last screen displayed after pressing the ◄ key shows information about the instrument's memory (**SD Card**): the disk name (**Disk Name**), the free space (**Free Space**) and the total memory (**Capacity**).

4.12.1.1 Assigning the directory for saving measurement files – Working Directory

You can specify a directory for automatic saving of the measurement files. To do this, select the required directory and press **<Enter>**. Select the **Work. Dir.** item in the command list and press **<Enter>**.

All logger and wave files are then stored in this directory.

***Note:** The working directory name is not displayed on the screen, so you should remember the selected working directory!*

4.12.1.2 Renaming file/directory – Rename

To rename a file or directory, select the file/directory to be renamed and press **<Enter>**. Select the **Rename** item from the command list and press **<Enter>**. The text editor screen will appear for you may to enter the new file/directory name.

4.12.1.3 Viewing information about file/directory – Info

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

4.12.1.4 Deleting file/directory – Delete

To delete a file/directory from the file/directory list, select the file/directory to be deleted and press **<Enter>**. Select the **Delete** item from the command list and press **<Enter>**. The instrument will ask you to confirm this action as it cannot be undone.

4.12.1.5 Erasing memory – Erase Disk

To erase all files and directories from memory, select any file and press the **<Enter>** key. Select the **Erase Disk** item from the command list and press **<Enter>**. You should confirm this action as it cannot be undone.

Once the disc has been erased, the default directories will be restored.

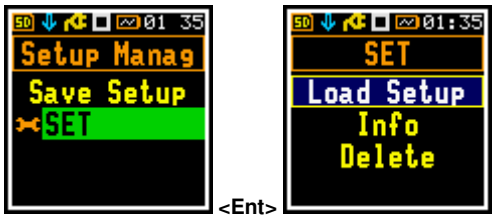
4.12.2 Managing setup files – Setup Manager

The **Setup Manager** allows you to save new setup files, load and delete them, and view file information.

All setup files are stored in the default **SETUP** directory.

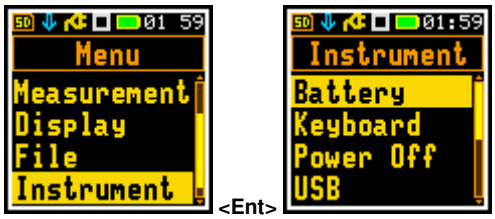
The screen with the list of available operations on the setup files opens when the **<Enter>** key is pressed on the highlighted setup file.

Loading the setup file means that the settings stored in the loaded file become the active settings of the instrument.



4.13 CONFIGURING HARDWARE PARAMETERS – INSTRUMENT

The **Instrument** section is mainly connected with configuring the hardware components of the instrument.



The **Instrument** section contains the following items that allow you to:

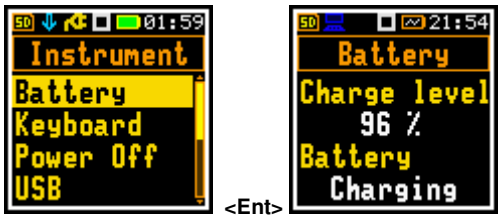
Battery	display information about the current power source,
Keyboard	program keyboard functions,
Power Off	switch off the power to the unit when inactive,
USB	configure the USB interface,
Serial Int.	configure the serial interface,
Self Vibr.	set the threshold for marker registration of instrument self-vibration,
RTC	set the Real Time Clock,
Unit Label	display instrument properties.

4.13.1 Checking power – Battery

The **Battery** item allows you to check the power supply to the instrument.

The **Battery** screen displays:

- **Charge level**: **xx %**,
- **Battery** status: **Not charging**, **Charging** or **Charge complete**.



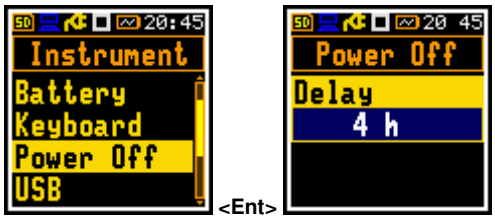
4.13.2 Programming keyboard functions – Keyboard

The **Keyboard** item allows you to set the mode of the **<Shift>** key.

<Shift> key mode

In the **Shift** item you can choose between **Direct** and **2nd Function**. If the **Direct** option is selected, the **<Shift>** key works like a computer keyboard – to achieve the desired result, the second key should be pressed at the same time as **<Shift>**. If the **2nd Function** option is selected, the **<Shift>** key works like the virtual keyboard on a smartphone – the **<Shift>** key should be pressed first and then the second key. This allows you to operate the instrument with one hand.

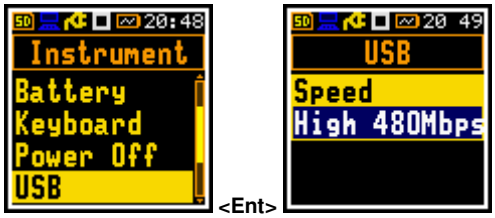
4.13.3 Automatic power off – Power Off



The **Power Off** item allows you to select the time after which the instrument automatically switches off if no key has been pressed during this time.

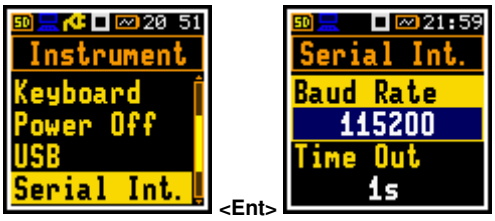
If **Inf** (infinitive) value is selected, the instrument will not switch off automatically, but only manually.

4.13.4 Configuring the USB interface – USB



The **USB** item allows you to select the transfer rate of the USB interface: **Full 12 Mbps** and **High 480 Mbps**.

4.13.5 Configuring serial interface – Serial Interface



The **Serial Int.** item allows you to program the serial interface.

You can set:

- the transmission speed (**Baud Rate: 1200**, **2400**, **4800**, **9600**, **19200**, **38000**, **57600** or **115200** bits/s) and
- the time limit for data transfer (**Time Out**). The default value of the **Time Out** parameter is equal to one second, but this may be too short for printers that are not fast enough. In such cases, the **Time Out** parameter should be increased.

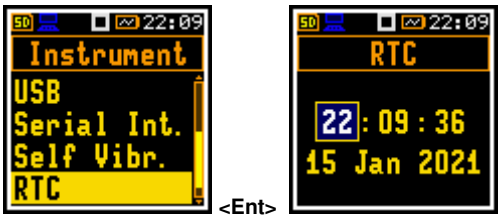
Other RS 232 transmission parameters are fixed to 8 bits for data, No parity & 1 Stop bit.

4.13.6 Self-vibration marker – Self Vibration

The **Self Vibration** item allows you to define the threshold for the instrument's own vibration for registration the marker. The special marker is written to the file when the instrument's own vibration is higher than that defined in the **Marker Threshold** item: 1 g ÷ 15 g.

4.13.7 Programming the internal Real Time Clock – RTC

The **RTC** item allows you to set the instrument's internal Real Time Clock. This clock is displayed at the top right of the icon bar.



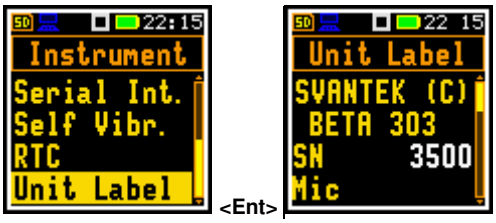
To edit the time or date, select the time or date field with the ▲ / ▼ key.

Use the ◄ / ► key to change the value in the selected field.

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

4.13.8 Checking the instrument properties – Unit Label

The **Unit Label** item allows you to check the instrument model, the instrument and microphone serial numbers, the current software version installed and the relevant standards that the instrument complies with.



Note: *The contents of the* ***Unit Label*** *should always be sent to Svantek service department or official representative in the event of any problems encountered by the user during the normal operation of the instrument.*

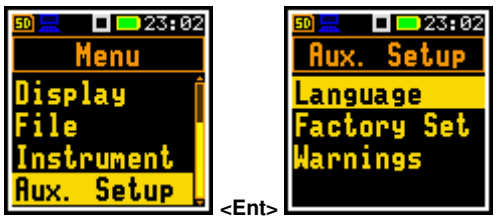
4.14 AUXILIARY SETTINGS – AUXILIARY SETUP

The **Aux. Setup** section contains the following items that allow you to:

Language select the language of the interface,

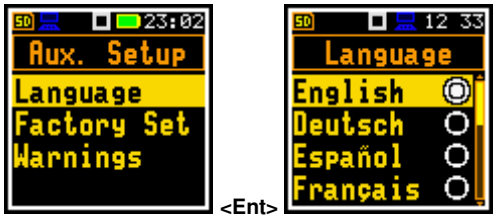
Factory Set restore the factory default settings,

Warnings enable/disable the warnings displayed during normal operation of the instrument.



4.14.1 Selecting the interface language – Language

The **Language** item allows you to select the language of the interface.



4.14.2 Restoring factory settings – Factory Settings

The **Factory Set** Item allows you to restore the default settings of the instrument.

<Ent>


Note: *The Factory Settings operation reinstalls the English default language.*

4.14.3 Activating warnings – Warnings

The **Warnings** item allows you to enable messages to be displayed during the normal operation of the instrument.

<Ent>


If **Logging** is enabled, the instrument will generate a warning if you start a measurement without logging the results to a file (i.e., if the **Logger** is disabled).

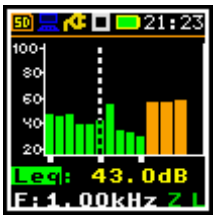
If **Power Off** is enabled, any attempt to switch off the instrument during a measurement will result in a "Measurement in progress" warning. You should stop the measurement to be able to switch off the instrument. When the measurement is complete, the "Power Off" warning will become active. You should then confirm that you wish to switch off the instrument.

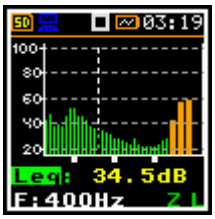
If **Changes** is enabled, the instrument will display the warning message if some parameters have been modified but the list of parameters has been exited with the **<ESC>** key.

4.15 1/1 OCTAVE AND 1/3 OCTAVE ANALYSER

The instrument operates as a real-time 1/1 octave or 1/3 octave analyser in a very similar way to the **Level Meter**. In addition, the 1/1 octave 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) and 1/3 octave (with 31 centre frequencies from 20 kHz down to 20 Hz) digital passband filters in the “base 10” system work in real time with the weighting filters (**Z**, **A**, **B** or **C**) and LEQ detector defined in the **Spectrum** screen (*path: Menu / Measurement / Spectrum / Filter*). This allows pre-weighting of the spectrum with one of the selected broadband frequency response curves if required by the application, e.g., to provide hearing protectors when controlling high noise levels in the workplace.

For each 1/1 octave or 1/3 octave band, the RMS, Min or Max result is calculated and displayed as a bar on the spectrum plot. The results of 1/1 octave and 1/3 octave analysis (spectra) can be viewed by the user on a display in the **Spectrum** view.





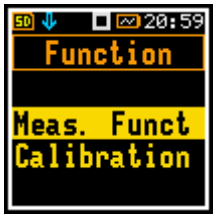
A vertical cursor can be used to read the spectrum value.

In addition to the results for the bands, three Total results are measured and displayed as three additional bars on the spectrum plot. Totals filters are set by default and cannot be changed.

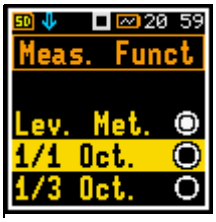
Note: *TOTAL LEQ results are measured with their own weighting filters (**A**, **C**, **Z**), regardless of the settings made in the Level Meter**.** Spectra are always averaged linearly. Therefore, **TOTAL** values from 1/1 octave or 1/3 octave analysis may differ from those obtained for profiles (if **LEQ Integration** is set to **Exponential**).*

4.15.1 Selecting 1/1 Octave or 1/3 Octave function

To select the 1/1 octave or 1/3 octave analysis function, open the **Meas. Funct** item, select the **1/1 Oct.** or **1/3 Oct.** option and press **<Enter>**.



<Ent>



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 that opens after the first attempt to select them. Once unlocked, these options are permanently available.*

Note: *It is not possible to change the current function during a measurement. In this case, the instrument displays the message "Measurement in Progress" for about 2 seconds. To change the current function, the measurement must be stopped!*

4.15.2 Configuring 1/1 octave and 1/3 octave analyser

4.15.2.1 General measurement settings for the 1/1 octave and 1/3 octave analysis – General Settings

The execution of 1/1 octave or 1/3 octave analysis depends on a set of parameters configured in the **Measurement** section.

The averaging of the results for each band is performed during the **Integration Period** and is repeated the number of times set in **Repetition Cycles**.

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

4.15.2.2 Logging of the 1/1 octave and 1/3 octave spectra

Spectra are always logged together with Summary results in a logger file with **Integration Period** step. The first requirement is that the **Logger** is switched on (*path: <Menu> / Measurement / Logging / Logger Setup / Logger: On).*

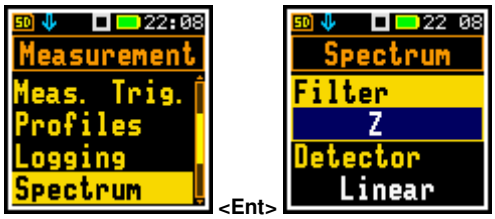
The **Leq** and **Lpeak** results of the 1/1 octave or 1/3 octave analysis can also be stored in the logger file with the step defined by the **Logger Step** parameter (*path: <Menu> / Measurement / Logging / Logger Setup*). Activation of spectrum storage in the logger file with the **Logger step** is done by checking the **Peak Spectrum** or **Leq Spectrum** item.

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

If the **1/1 Octave** or **1/3 Octave** functions are active, the additional item (**Spectrum**) appears in the **Measurement** list.

The **Spectrum** item allows you to select the pre-weighting broadband frequency filter and LEQ detector for the 1/1 octave or 1/3 octave analysis.

The **Detector** parameter can be set to **Linear**, **Fast** or **Slow**.



The following weighting filters are available for the 1/1 octave and 1/3 octave analysis in the **Filter** item:

- **A** class 1 according to IEC 61672-1:2013,
- **C** class 1 according to IEC 61672-1:2013,
- **Z** class 1 according to IEC 61672-1:2013,
- **B** class 1 according to IEC 60651.

Filter characteristics are given in Appendix C.

4.15.3 Configuring the 1/1 octave and 1/3 octave spectra view

The **Display** section is used to set various parameters, mainly to control of the spectrum view. The following items are used to set the presentation of 1/1 octave or 1/3 octave results that allows you to:

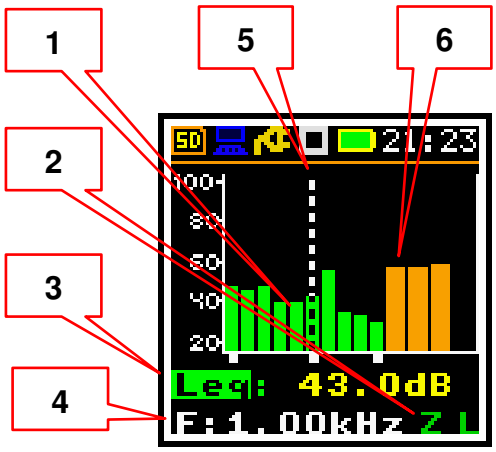
Display Modes switch on the **Spectrum** view,
Display Scale adjust the scale of the spectrum plot and switch the grid on/off,
Spectrum View select the spectra to be viewed: instantaneous, averaged, maximum or minimum.

4.15.3.1 Presentation of the 1/1 octave and 1/3 octave spectra

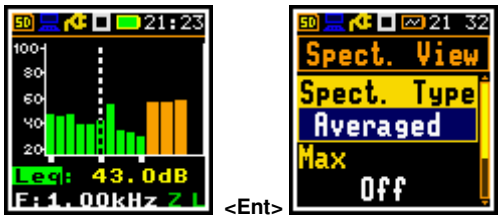
The **Spectrum** item in the **Display Modes** list becomes available for the **1/1 Octave** and **1/3 Octave** functions and allows you to enable the spectrum view (**Spectrum**).

Spectrum view fields

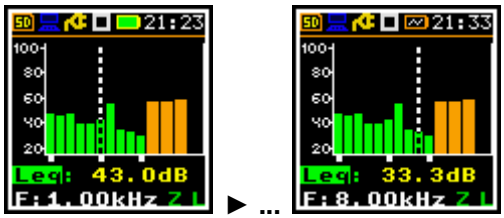
1. Spectrum plot
2. Type of filter and RMS detector
3. Type of result and its value for the cursor position
4. Central frequency for the cursor position
5. Cursor position
6. Total values



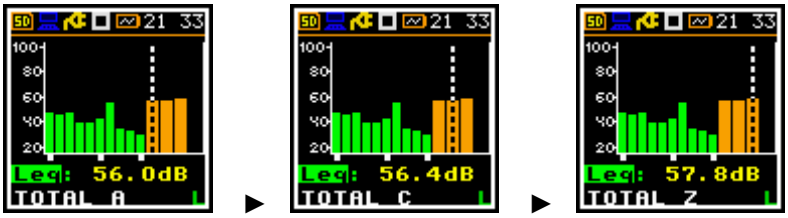
To change the spectrum type, press **<Enter>** and in the **Spectrum View** screen select the new spectrum type and press **<Enter>**.



To change the cursor position, use the ◄ / ► key. The frequency and corresponding dB value are displayed in the line below the graph.

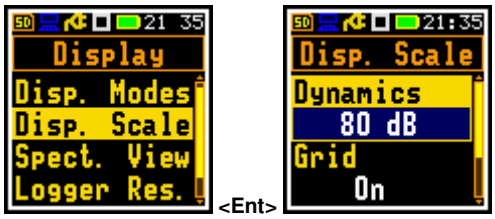


The **Total** values are calculated using the **A**, **C** and **Z** filters and their values are displayed at the bottom line of the screen when the cursor is placed on the corresponding orange bar.



4.15.3.2 Adjusting the spectrum plot scale – Display Scale

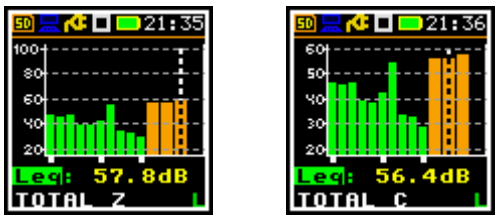
The **Display Scale** item allows you to change the scale of the spectrum plot and toggle the grid and automatic scale on/off.



Scaling vertical axis

The **Dynamics** item allows you to select the desired dynamic range of the spectrum plot: **10dB**, **20dB**, **40dB**, **80dB** and **120dB**.

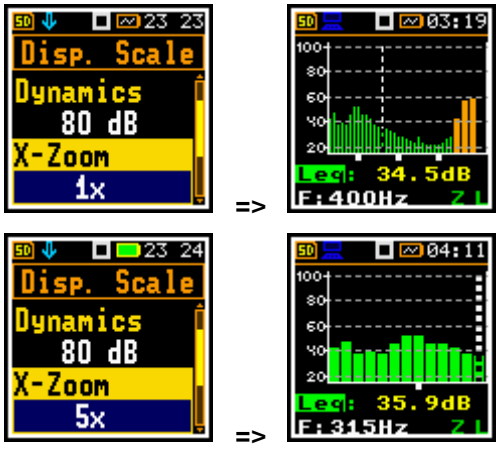
The attached example shows a spectrum view with 80 dB and 40 dB ranges.



Zooming horizontal axis for 1/3 octaves

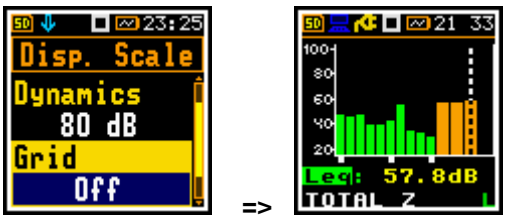
The **X-Zoom** item, displayed in the **1/3 Octave** mode, allows you to select the desired resolution (zoom) of the spectrum plot. It is possible to select from **1x** to **5x** zoom.

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



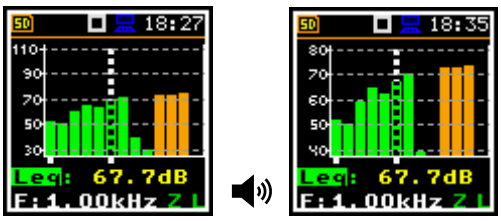
Switching the grid on/off

The **Grid** item allows you to switch the grid on/off in the spectrum view.



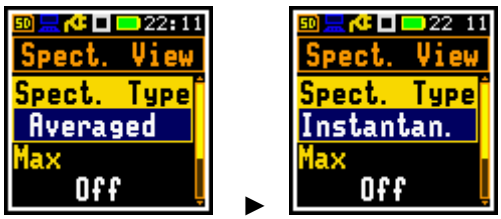
Automatic Y-scale adjustment

The **Autoscale** item switches on or off the automatic adjustment of the dynamic range of the Y-axis scale to the actual difference between the lowest and highest measured octave or third octave results. The example shows the changes in the scale after a sudden increase in sound pressure level.



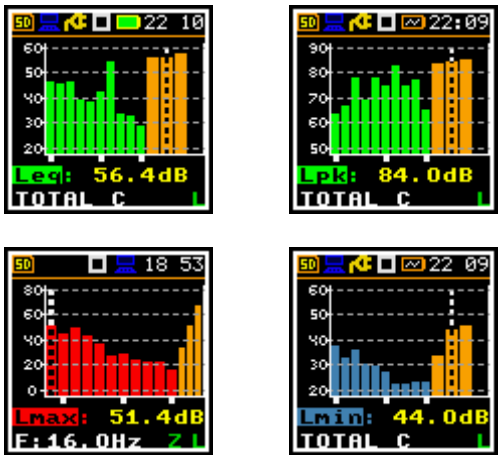
4.15.3.3 Selection of spectra to view – Spectrum View

The **Spectrum View** item, which appears in the **1/1 Octave** or **1/3 Octave** functions, allows you to select different spectra to be displayed in the **Spectrum** view.

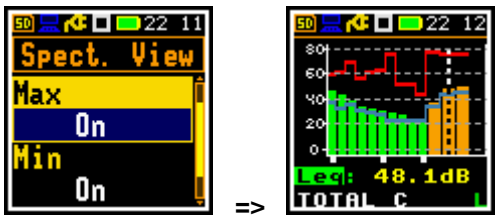


In the **Spectrum Type** item, you can select the type of spectrum to be displayed as a bar plot:

- **Instantaneous**, obtained for the Leq results integrated over 100 ms,
- **Averaged**, obtained by averaging the instantaneous spectra over the elapsed time [0, Integration Period],
- **Lp-k**, obtained for the Lpeak results for the elapsed time [0, Integration Period],
- **Max**, obtained as the maximum instantaneous spectrum for the elapsed time [0, Integration Period] or
- **Min**, obtained as the minimum instantaneous spectrum for the elapsed time [0, Integration Period].



Minimum and maximum spectra can be displayed in the same plot as the main spectrum if the **Max** and/or **Min** parameter are enabled.



5 SVANPC++ SOFTWARE

SvanPC++ is an advanced PC software supporting SVANTEK instruments. The basic software offers functions for editing instrument settings, downloading data files from the instrument as well as data preview and basic recalculation of Leq and RMS.

SvanPC++ is enriched with the Projects functionality. which allows to combine several data files into Sessions. The main advantage of using Projects is the ability to compare data from different measurements and easy report management. Reports are prepared in the form of panels (text, photos, tables, graphs, plots) and can be exported to the Excel spreadsheet or Word text editor applications.

Main features of *SvanPC++:*

- Support for all Svantek instruments
- USB interfaces compatible
- Download measurement results from instruments to PC
- Store and manage data files in project documents
- Configuration of instrument settings
- Easy direct data export to popular applications
- Report generation
- Data post-processing (e.g., spectrum comparison, time history and wave recalculation)
- Wave files playback
- Wireless remote communication with instruments equipped with modems (optional)

***Note:** The current manual introduces the most useful functionalities available for the USB connection. All other functionalities are well described in the SvanPC++ User Manual.*

5.1 SVANPC++ SOFTWARE INSTALLATION

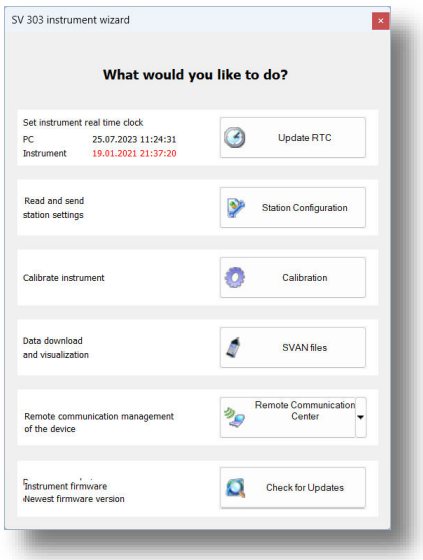
To download and install *SvanPC++* and Svantek *USB Drivers* go the website: SVANTEK Support and Service - Sound and Vibration.

SvanPC++ requires Windows operating system and minimum system parameters of the PC: 1GHz CPU, 1 GB RAM (2GB RAM for x64 system), 20 GB HDD, 1024x768 display.

5.2 INSTRUMENT VIZARD

After connecting the instrument to the PC with *SvanPC++* running via the USB cable, the **SV 303 instrument wizard** dialog box appears on the screen. It allows you to:

- Update the instrument's real time clock (**Update RTC**)
- Configure the settings (**Station Configuration**)
- Calibrate the instrument (**Calibration**)
- Download / upload files (**SVAN files**).
- Control the instrument remotely (**Remote Communication Center**).
- Compare the firmware version installed on the instrument with the latest available version (**Check for Updates**).



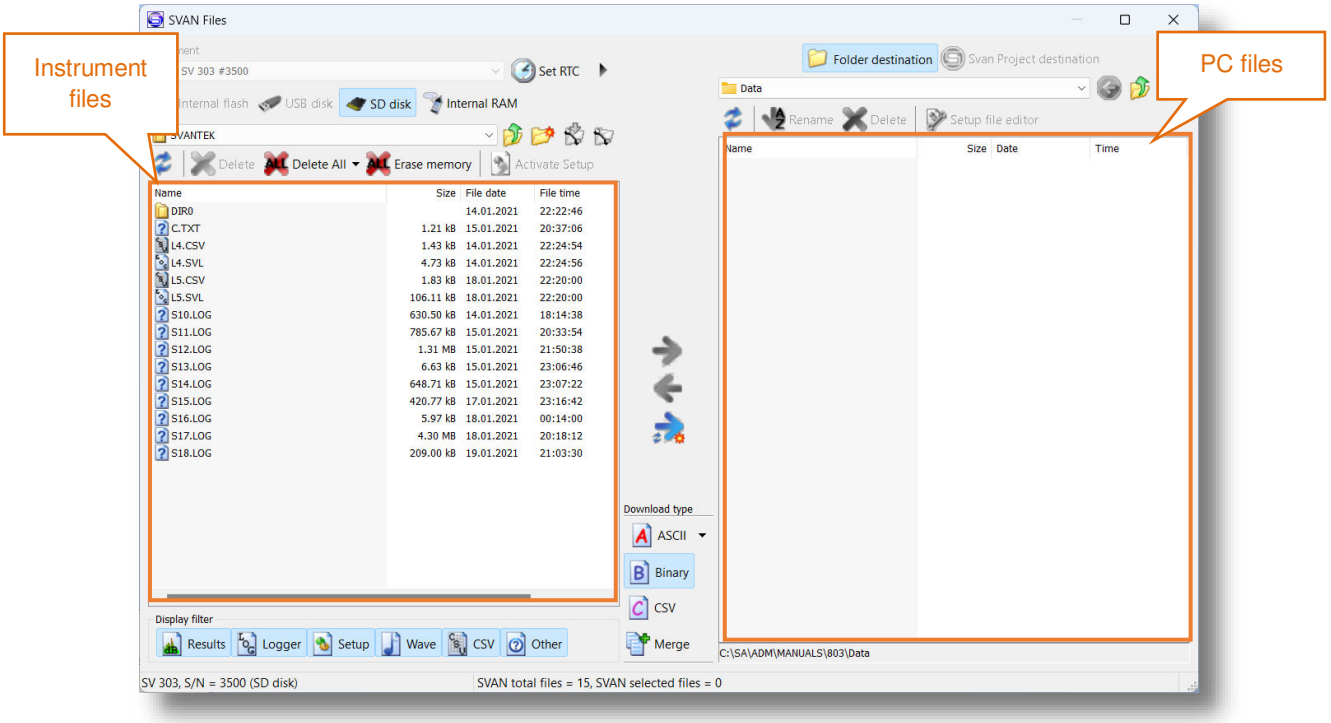
5.3 SVAN FILES

Instrument files are accessed from the **SVAN Files** dialogue box, which allows you to manage instrument files, open data files and configure setup files.

The **SVAN Files** dialogue box consists of two sections: instrument (left) and PC (right). Each section contains tools for managing files (selecting memory, directory and files, deleting files, creating directories, applying filters, etc.).

5.3.1 Download/upload files

The arrows in the centre section are used to download files from the instrument to the PC and upload files from the PC to the instrument.



To download files from the instrument to a PC:

1. Select the directory on a PC to download files (right section).
2. Select the instruments file to be download (left section) and
3. Press the right arrow button (centre section).

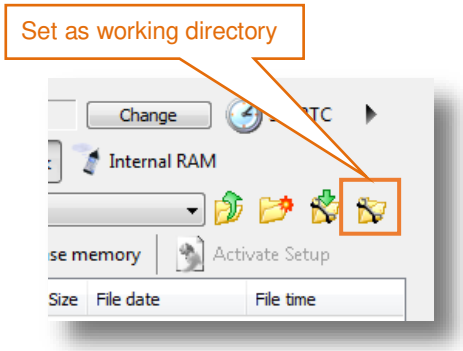
Double-click on the file name to open the **Viewer** module, which provides various tools for viewing the data. This module is described in detail in *SvanPC++ User Manual*.

5.3.2 Changing the working directory

The working directory is a folder in the instrument's memory where all the measurement files are stored. To change the working directory:

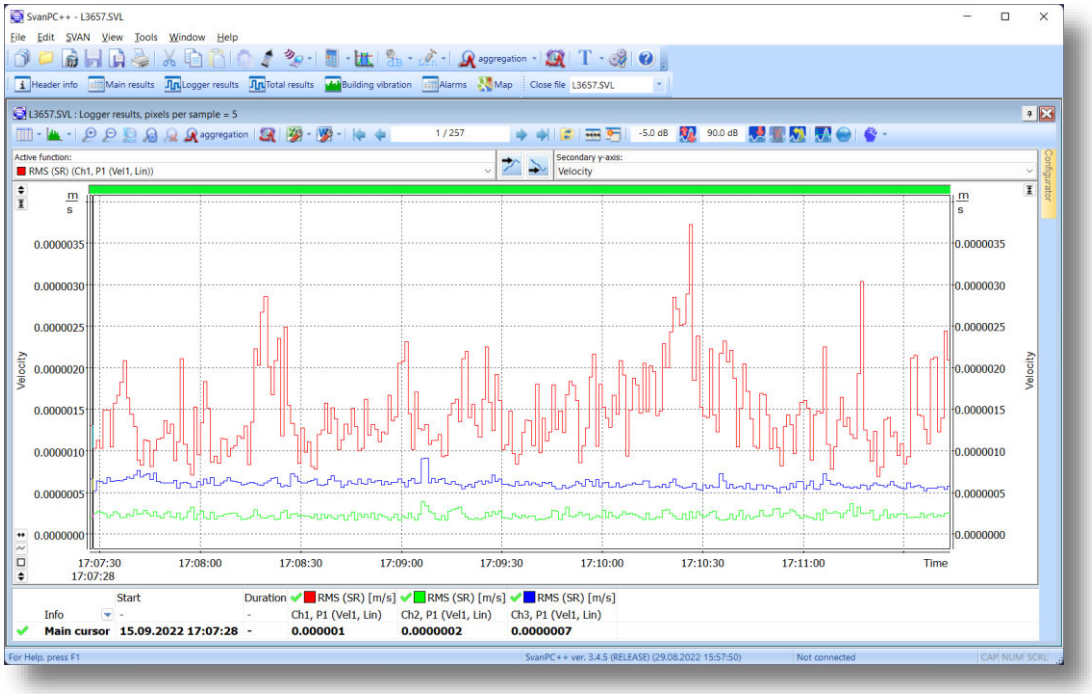
1. Select the desired working directory in the left section of the **SVAN Files** dialogue box.
2. Click the **Set as working directory** button.

From this point on, all results files will be stored in the selected directory.



5.3.3 Opening files

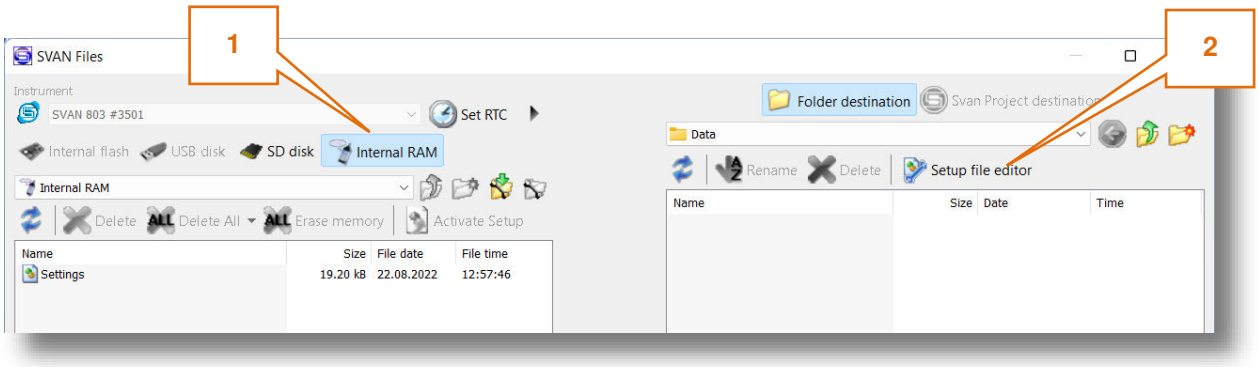
Double-click on the file name to open the **Viewer** module, which provides various tools for viewing the data. This module is described in detail in *SvanPC++ User Manual*.



5.3.4 Configuring instrument settings

The instrument settings can be configured with the use of *Setup file editor*, which can be also opened from the **SVAN Files** dialog box. For this:

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



The *Setup file editor* is available in two modes: *Standard* and *Extended*. The settings available in the *Setup file editor* correspond to those available via the SV 303 instrument's interface.

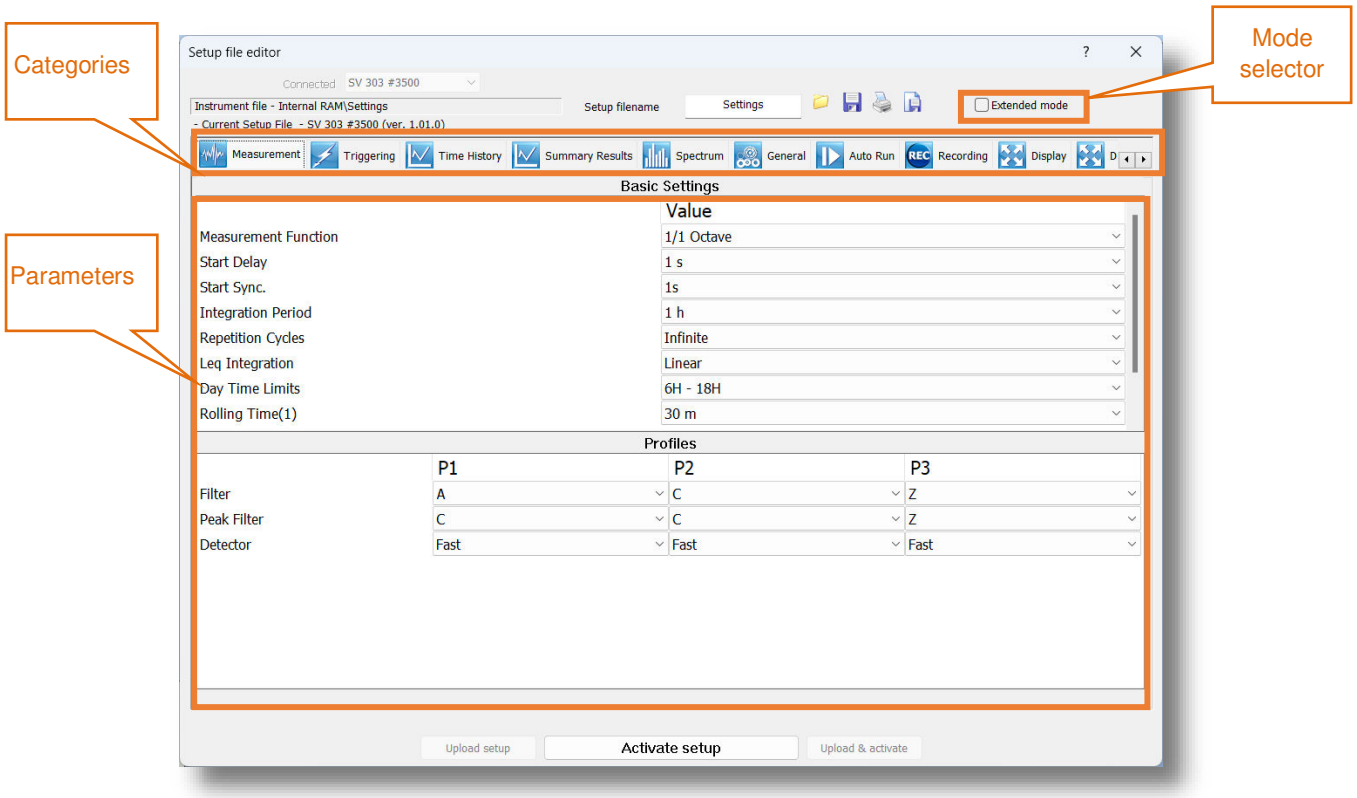
In *Standard* mode the *Setup file editor* allows you to view and edit the settings most likely to be modified, presented in a simple and intuitive way. Note that not all of the settings available in the connected instrument may be available in *Standard* mode.

The settings are divided into a number of categories, which can be selected using the tabs at the top of the *Setup file editor* window.

Settings can be easily edited using the following elements:

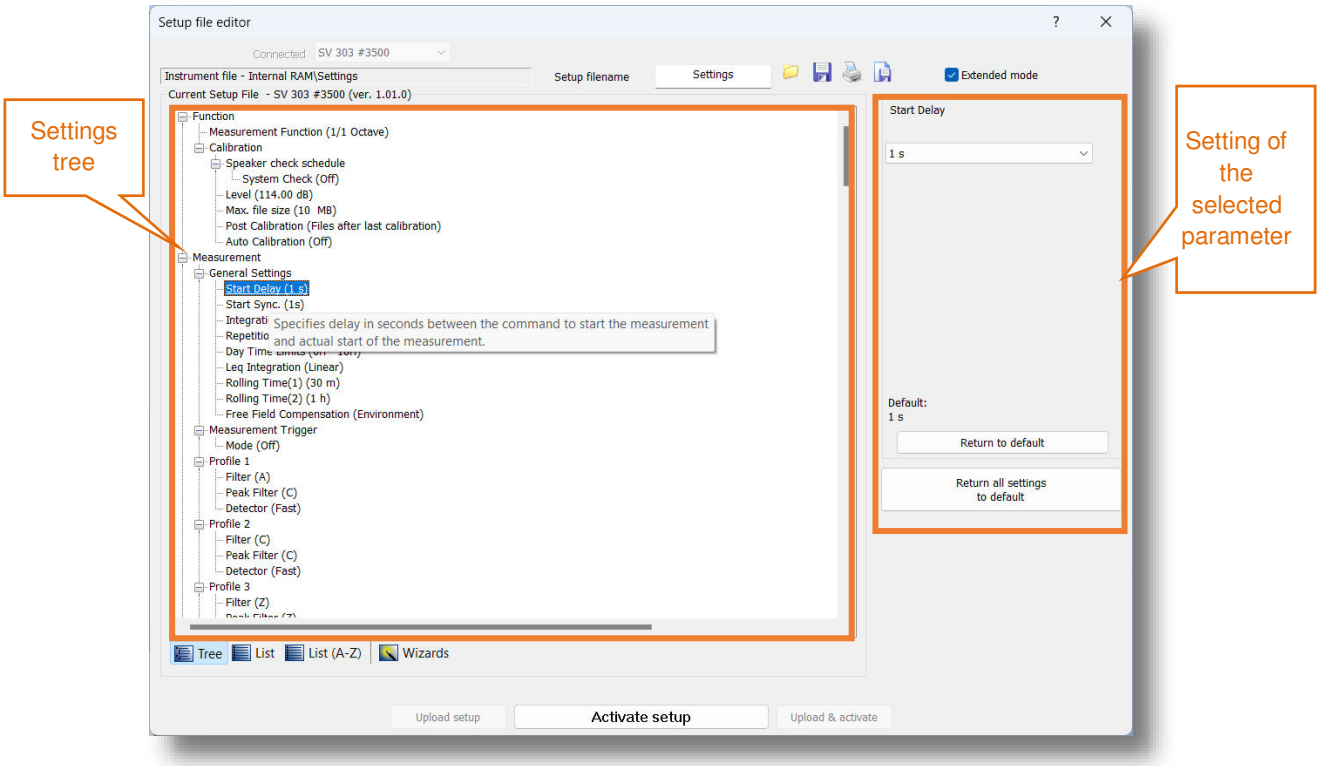
- check boxes – allowing you to select some out of several possibilities,
- list boxes – allowing you to select one out of several possibilities,
- text fields – allowing you to type in a value using keyboard,
- binary buttons – allowing you to enable or disable an option.

Standard mode:



In *Extended* mode, all instrument settings are visible and available for editing. The list of settings, located on the left side of the window, can be displayed in a tree view or a list view. You can change the view using the buttons at bottom of the window.

Extended mode:



To change settings in the *Extended* mode, use the controls that appear in the panel at the top right of the window after selecting parameter from the list.

The default, *Tree View*, offers the settings arranged in the form of a tree, similar to the structure of the instrument menu. The nodes represent menu sections, while the leafs represent parameter settings that can be edited in the top right corner of the window. The settings are sorted according to the menu structure accessible via the instrument's display panels.

Some of the settings are linked to each other, which means that one of them will only be available for editing if the other one is set to a certain value.

When you have finished configuring the settings, press the **Activate setup** button.

At the top of the *Setup file editor* window, next to the Setup filename field, there are several file management buttons that open a setup file stored on the PC, save the currently edited setup file to the PC, print the currently edited setup file, or save the contents of the currently edited setup file in a simple text format.

In *Extended* mode, you can restore the factory (default) settings by pressing the **Return all settings to default** button.

6 INSTRUMENT UPGRADE

There are three programmes loaded in the instrument memory: FIRMWARE BOOTSTRAP and HARDBOOT.

FIRMWARE is a program dedicated to the main processor of the instrument, which maintains functions related to the user interface, measurements, files and communication. SVANTEK is constantly improving the functionalities of its instruments, so it is recommended to install the lates firmware upgrade.

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

HARDBOOT is a non-erasable programme designed to carry out only the BOOTSTRAP upgrade or repair process.

The user can upgrade the FIRMWARE and BOOTSTRAP programmes of the instrument.

6.1 FIRMWARE UPGRADE

SVANTEK is committed to continuous innovation and development and therefore reserves the right to provide firmware improvements based on user feedback.

To update the instrument firmware:

- Unpack the updated firmware package (provided as a suitable compressed file).
- Make sure that the instrument is switched off.
- Press and hold the ► and **<Enter>** keys to switch on the instrument - the following message should appear on the instrument's screen: Bootstrap ver: 2.02 (or higher).
- Connect the SC 158 cable to the instrument and then to the PC.
- Wait for the "<USB>" message to appear on the instrument screen and run the *go-usb.bat* file on the PC.
- The changing number and final message "..... o.k." should appear on the PC screen.
- A successful firmware update will be indicated by the message "Program loaded!"
- Switch off the instrument.

Note: *Using the* ***SvanPC++*** *software it is very easy to check if there are any new firmware releases available for download.*

7 MAINTENANCE

7.1 REPLACING THE MICROPHONE

Note: *Replacement of the microphone should be carried out by an authorised Svantek service centre.*

7.2 RESETTING THE INSTRUMENT

- **SYSTEM RESET:** The internal software reset clears any setup configuration and restores the default factory settings (*path: <Menu> / Auxiliary Setup / Factory Settings*).

- **HARDWARE RESET:** The internal hardware reset does not change any user data. Make sure the battery is not flat and the instrument is switched off. Press and hold the **<Shift>** and **<Start/Stop>** keys for 10 seconds, then release them. Switch on the instrument in the normal way.

Note: *The hardware reset should only be used in extreme situations, such as when the instrument is hanging up.*

Note that a hardware reset:

- will stop any pre-programmed auto-run modes,

- will stop the measurement run.

7.3 PRESERVATION OF INTERNAL BATTERIES

- To prolong the life of the internal batteries, it is recommended that the instrument is switched off when stored.
- When the instrument is switched off, it still uses a small amount of battery power. It is therefore recommended that the battery is recharged every few months if it is not used regularly.

Note*: SV 303 should not be stored for a long period with the battery discharged. Storing with a discharged battery may damage the battery.*

Note*: If SV 303 is planned to be stored for a long period of time, it is recommended that the battery is charged to 60% capacity. The battery should be charged at least once every 6 months.*

7.4 TRANSPORTATION AND STORAGE

For transport or storage, we recommend using the packaging provided by the manufacturer.

7.5 CLEANING

Clean the surface of the instrument with a damp, soft cloth.

The instrument sockets should be cleaned with compressed air.

Note: *In case of major contamination, such as oil or grease, contact your local authorised distributor or Svantek Service Office.*

7.6 TROUBLESHOOTING

- If your instrument does not respond proceed with hardware reset of the instrument (see Chapter 7.2).
- If the reset does not help, contact your local authorized distributor or Svantek Service.

If your Svantek professional measuring equipment needs to be returned for repair or calibration, please contact the service office at the following number or contact via the Svantek website.

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

Office hours are 9:00 a.m. to 5:00 p.m. Central European Time.

Internet: www.svantek.com

Address: SVANTEK Sp. z o.o.
Strzygłowska 81
04-872 Warszawa,
Poland

APPENDIX A. REMOTE CONTROL CODES

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

Alternatively, all commands described in this appendix are valid for any other kinds of interfaces (if present) like **RS232**.

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

In order to program the serial interface, the user has to:
1. send a "function code",
2. get a response to the “function code”,
3. send/receive a data file (optionally)

A.1 INPUT / OUTPUT TRANSMISSION TYPES

The following basic input / output transmission types (called functions) are available:

FUNCTION #1 – GENERAL CONTROL FUNCTIONS

FUNCTION #2 – MEASUREMENT RESULTS READ-OUT IN THE SLM MODE

FUNCTION #3 – MEASUREMENT RESULTS READ-OUT IN 1/1 OCTAVE AND 1/3 OCTAVE MODES

FUNCTION #4 – SETUP FILE READ-OUT

FUNCTION #5 – STATISTICAL ANALYSIS RESULTS READ-OUT

FUNCTION #7 – SPECIAL CONTROL FUNCTIONS

FUNCTION #9 – SETUP FILE WRITE-IN

FUNCTION #D – DATA FILES ACCESS

FUNCTION #S – DIRECT SETUP ACCESS

A.2 FUNCTION #1 – GENERAL CONTROL FUNCTIONS

#1 function enables the user to send the control setting codes to the instrument and read out a file containing the current control state. A list of the control setting codes is given in A.11 ***Control setting codes***. The format of #1 function is defined as follows:

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

or

#1,Xccc,X?,Xccc,(...),X?,Xccc; **(2)**

or

#1,X?,X?,(...),X?; **(3)**

where:

X - group code, **ccc** – new code value,
X? - request to send the current X code setting.

In the first case (1) the instrument does not respond to a command, even if an error occurs.

In the second and third cases (2), (3) the instrument outputs control settings for all requests X? in the following format:

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

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

Note: *Changing settings using #1 functions during measurements running state (#1,S1;) is blocked. Stop the measurements (#1,S0;) before changing the settings.*

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

#1;

In this case the instrument outputs all control settings given in A.11 ***Control setting codes*** in the format:

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

Example: The instrument sends the following sequence of characters as an answer for the mentioned above request:

#1,U303,N1234,W1.22.6,Q0.18,M1,F2:1,F3:2,F1:3,J3:1,J3:2,J1:3,f1,C1:1,C1:2,C1:3,B0:1,B3:2,B15:3,b0,d1s,D1h,K5,L0,Y1,y-1,XT0,XL100,XQ0,Xq0,XA0,XD-1:1,XD-1:2,XD-1:3,XD-1:4,XD-1:5,XD-1:6,XXE1,XXB0,XXl0,XXm0,XXn24,XXu0,XXv100,XXx0,XXy10,XXz0,XXY0,XXZ10,XXo1,XXq0,XXr1,XXs1,XXw10,S0,T1,e480,m0,s0,l100,O10,o0,t0,E63;

means that:

- SV 303 is investigated (**U303**); see #7,US; command for unit subtype information
- its serial number is 1234 (**N1234**)
- software version number is 1.22.1 (**W1.22.6**)
- calibration factor is equal to 0.18 dB (**Q0.18**)
- **LEVEL METER** is selected as the measurement function (**M1**)
- **A** filter is selected in profile 1, SLM function (**F2:1**)
- **C** filter is selected in profile 2, SLM function (**F3:2**)
- **Z** filter is chosen in profile 3, SLM function (**F1:3**)
- **C** Peak filter is selected in profile 1, left channel, SLM function (J3:1)
- **C** Peak filter is selected in profile 2, left channel, SLM function (J3:2)
- **Z** Peak filter is selected in profile 3, left channel, SLM function (J1:3)
- **Z** filter is selected for **1/1 OCTAVE** or **1/3 OCTAVE** analysis (**f1**)
- **FAST** detector is selected in profile 1, SLM function (**C1:1**)
- **FAST** detector is chosen in profile 2, SLM function (**C1:2**)
- **FAST** detector is selected in profile 3, SLM function (**C1:3**)
- logger's buffer is not filled by the results from profile 1 (**B0:1**)
- **Lpeak** and **Lmax** values are stored in the files of the logger from profile 2 (**B3:2**)
- **Lpeak**, **Lmax**, **Lmin** and **Leq** values are stored in the files of the logger from profile 3 (**B15:3**)
- results of **1/1 OCTAVE** or **1/3 OCTAVE** analysis are not stored in the files of the logger (**b0**)
- results are stored in a logger's file every 1 second (**d1s**)
- integration period is equal to 1 hour (**D1h**)
- measurement has to be repeated 5 times (**K5**)
- linear detector is selected to the **Leq** calculations (**L0**)
- ... and so on.

See A.11 ***Control setting codes*** for more details.

Note: *Control settings presented in the instrument's response and not described in* A.11 ***Control setting codes*** *considered as reserved. Do not change these settings!*

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

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

#2 function has the format defined as follows:

#2 [,<aver>[<flags>]] [,<profile>] [[[,X?] ,X?] ,(...)];

where:

<aver> – type of results:

i – instantaneous results, i.e. results from the current cycle (default),

a – averaged results, i.e. results from the previous cycle,

c – 1 second results, i.e. results integrated for the last 1 second,

<flags> – flags:

s – measurements flags, i.e. measurements running,

<profile>– profile number:

1, 2 or 3 – one of the profile, i.e. only results from the given profile will be sent,

X – code of the specified result (see below); if no codes are specified all results will be sent.

In the case of **<profile> = 1, 2 or 3** the instrument sends results in the format defined as follows:

#2 [,<aver>[<flags>f]],<profile>,Xccc,(...);

where **f** is a flags value, e.g. 1 – measurements are running; **ccc** is the value of the result **X** or question mark (**?**) if result **X** is not available.

If no results are available, the instrument returns:

#2,?;

The **X** codes of the results from the **SLM** mode are defined as follows:

v under-range flag (ccc equals to 0 when the overload did not occur, 2 when the under-range took place during the last measurement period but did not occur in the last second of the measurement and 3 when the under-range took place during the last measurement period and it lasted in the last second of the measurement)

V overload flag (ccc equals to 0 or 1)

T time of the measurement (ccc – value in seconds)

x start date of the measurement in format ***dd/mm/yyyy*** (***dd*** – day, ***mm*** – month, ***yyyy*** - year)

t start time of the measurement in format ***hh/mm/ss*** (***hh*** – hour, ***mm*** – minute, ***ss*** - second)

P **Lpeak** value (ccc – the value in dB)

M **Lmax** value (ccc – the value in dB)

N **Lmin** value (ccc – the value in dB)

S **L** result (ccc – the value in dB)

R **Leq** result (ccc – the value in dB)

U **LE** result (ccc – the value in dB)

B(k) **Lden** result (ccc – the value in dB; k – flag determining the kind of the result)

I(nn) **LEPd** result (ccc – the value in dB, nn – the value of Exposure Time in minutes)

Y **Ltm3** result (ccc – the value in dB)

Z **LTeq** result (ccc – the value in dB)

L(nn) **L** result of the nn statistics (ccc – the value in dB)

g **LR1** result (ccc – the value in dB)
G **LR2** result (ccc – the value in dB)
s **SD** result (ccc – the value in dB)
k **EX** result (ccc – the value in dB)
O **NC** result
K **NR** result

Note: *In the case of* ***Lden****, the value k placed in the parenthesis after the code* ***B****, denotes the kind of the currently measured result. The kind of the* ***Lden*** *result depends on the time during which the measurements were performed (****d*** *denotes day,* ***e*** *denotes evening and* ***n*** *denotes night). The corresponding values of k parameter and the kind of the measured* ***Lden*** *result are presented below:*

k = 1 ***Ld*** *result,*
k = 2 ***Le*** *result,*
k = 3 ***Lde*** *result,*
k = 4 ***Ln*** *result,*
k = 5 ***Lnd*** *result,*
k = 6 ***Len*** *result,*
k = 7 ***Lden*** *result.*

The exemplary results of the instrument's response after sending to it the following sequence of characters: **#2,1;** coming from the first profile are given below:

#2,1,x17/03/2014,t13:44:28,v0,V0,T10,P79.97,M52.92,N38.50,S46.35,R43.91,U53.91,B(1)43.91,I(480)43.92,Y50.67,Z51.15,L(01)55.00,L(10)45.60,L(20)44.30,L(30)42.80,L(40)41.50,L(50)40.80,L(60)40.40,L(70)40.00,L(80)39.50,L(90)39.00 ,g?,G?;

Note: *The presented above order of the measurement results sent out by the instrument does not depend about the characters sent to the unit.*

Example: After sending to the instrument the string:

#2,1,T?,R?,V?,P?,L?;

the unit sends out the results of measurement coming from the first profile in predefined, described above, order:

#2,1,V0,T1,P65.80,R43.99,L(01)52.00,L(10)51.10,L(20)46.10,L(30)44.10,L(40)38.60,L(50)38.10,L(60)37.60,L(70)37.10,L(80)36.60,L(90)36.10;

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

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

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

#3 function format is defined as follows:

#3[,T]; - averaged spectrum
#3[,T],A; - averaged spectrum
#3[,T],I; - instantaneous spectrum
#3[,T],M; - max spectrum
#3[,T],N; - min spectrum

#3[,T],P; - peak spectrum

T - include measurement time in the instrument's response

The device responds, sending the last measured spectrum (when the instrument is in STOP state) or currently measured spectrum (when the instrument is in RUN state) in the following format:

#3[,T<time>];<Status Byte> <LSB of the transmission counter> <MSB of the transmission counter> <data byte> (...) <data byte>

<time> is the measurement time given in seconds

<Status Byte> gives the information about the current state of the instrument.

D7	D6	D5	D4	D3	D2	D1	D0

where:

D7 = 0 means that "overload does not happen",
= 1 means that "overload appeared",

D6 = 0 means that "spectrum is not averaged ",
= 1 means that "spectrum is averaged ",

D5 = 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,

D4, D1, D0 reserved bits.

Note: *ASCII part of the response ends with semicolon ";". Status byte, transmission counter and data bytes are coded in binary form.*

Note: *The measurement result is coded in binary form as dB•100 (e.g. 34.5 dB is sent as binary number 3450).*

A.5 FUNCTION #4 – SETUP FILE READ-OUT

#4 function enables the user to read-out a file from the internal Flash-disk or RAM memory. The data file formats are given in Appendix B.

#4 function formats are defined as follows:

#4,0,\; file containing the catalogue,

#4,0,?; count of the files,

#4,0,index,count; part of the file containing the catalogue,

where:

index - first record,

count - number of records in the catalogue.

The catalogue of the files is a set of the records containing 16 words (16 bits each). Each record describes one file saved in the instrument's Flash-disk or RAM. The record structure is as follows:

words 0 - 3 8 characters of the file name,
word 4 type (binary number),
word 5 reserved,
word 6 least significant word of the file size,
word 7 most significant word of the file size,
words 8 - 15 reserved.

#4,4; current setup file,

#4,4,?; size of the current setup file,

#4,4,offset,length; part of current setup file,

where:

offset - offset from the beginning of the current setup file,

length - number of bytes to read,

Note: *The "\" character is treated as the file name of the catalogue and must be sent to the instrument.*

All data words are sent **<LSB>** (least significant byte) first.

When an error is detected in the file specification or data, the instrument respond with:

#4,?;

Note: *Current setup file placed in RAM is serviced by this command in the SV 303 only. For data files access see* A.9 **Function #D – data files access**.

A.6 FUNCTION #5 – STATISTICAL ANALYSIS RESULTS READ-OUT

#5 function enables one to read out the statistical analysis results.

#5 function format is defined as follows:

#5,p;

where:

p - the number of the profile (1, 2 or 3)

The device responds, sending the current classes of the statistics in the following format:

#5,p;<Status Byte> <LSB of the transmission counter> <MSB of the transmission counter> <NofClasses><BottomClass><ClassWidth><Counter of the class> (...) <Counter of the class>

Status Byte gives the information about the current state of the instrument.

D7	D6	D5	D4	D3	D2	D1	D0

where:

D7 = 0 means "overload does not happen",

= 1 means "overload appeared",

D6 = 1 reserved,

D5 = 0 instantaneous current result (RUN State),

= 1 final result (STOP State),

D0 to D4 reserved bits.

Note: *There is no subsequent transmission in case the* ***Status Byte*** *is zero.*

The **transmission counter** is a two-byte word denoting the number of the remaining bytes to be transmitted. Its value is calculated from the formulae:

Transmission counter = 6+n * (4 * the number of the classes in the statistics)

where:

n is a number of the transmitted statistics. For p = 1, 2 or 3 only one statistic is transmitted (n = 1).

NofClasses is a two-byte word denoting the number of classes in the statistic.

BottomClass is a two-byte word denoting the lower limit of the first class (*100 dB).

ClassWidth is a two-byte word denoting the width of the class (*100 dB).

Counter of the class is a four-byte word containing the number of the measurements belonging to the current class.

Note: *The bytes in the words are sent* ***<LSB>*** *(least significant byte) first.*

Note: *ASCII part of the response ends with semicolon ";". Status byte, transmission counter and data bytes are coded in binary form.*

A.7 FUNCTION #7 – SPECIAL CONTROL FUNCTIONS

#7 function enables the user to perform special control functions. **Some of them should be used with the extreme care.**

#7 function format is defined as follows.

To read settings a query should be send to the device:

#7,<code>;

where **<code>** is a two ASCII letter code.

The device responds with a control settings:

#7,<code>,set1[,set2[,set3[,...[,setN]]]];

where **<code>** is the same code sent in the query and **set1, set2,... setN** are settings.

To write settings to the device follow the opposite procedure. Send to the device:

#7,<code>,set1[,set2[,set3[,...[,setN]]]];

In case of success the device responds with:

#7,<code>;

In case of an unknown function or error the device returns:

#7,?;

Codes and settings for #7 function are described in the A.11 ***Control setting codes***.

Note: *#7 function protocol consist of ASCII characters only.*

Note: *Some of the #7 functions are blocked during measurements running state (#1,S1;). Stop the measurements (#1,S0;) before changing these settings.*

A.8 FUNCTION #9 – SETUP FILE WRITE-IN

#9 function enables the user to write a configuration file into the instrument's storage or non-volatile memory. The data file formats are given in Appendix B.

#9 function formats are defined as follows:

#9,<FILE_TYPE>,<FILE_LENGTH>,<DATA>

where:

<FILE_TYPE>	type of the file
	2 - setup file (file is saved on SD card; does not change current setup),
	4 - current setup file,
<FILE_LENGTH>	length of the file in bytes,
<DATA>	binary content of the file.

Note: *#9 function is blocked during measurements running state (#1,S1;). Stop the measurements (#1,S0;) before using the function.*

A.9 FUNCTION #D – DATA FILES ACCESS

#D functions are used to access data files in the instrument's storage like microSD card or USB Flash Disc with FAT file system. A basic knowledge of FAT file system is necessary to use these functions.

#D functions take the following parameters:

<disk>	logical disk number: 0 – SD card, 1 – USB Disk (not implemented), 2 – Internal Memory (not implemented)
<address>	directory address (cluster number),
<offsetB>	offset of the first byte to read (an even number),
<nB>	number of bytes to read (an even number),
<data>	binary data,
<count>	directory size in bytes,
<name>	filename in the format XXXXXXXX.YYY (XXXXXXXX – filename, YYY- filename extension),
<dirName>	directory name,
<nBwr>	number of bytes to write.

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

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

2) **#D,d,?;** this function returns parameters of the working directory in format:

#D,d,<disk>,<address>,<count>;

3) **#D,d,<disk>,<address>;** this function enables to change the working directory.

Response:

#D,d; - command was executed

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

4) **#D,r,<disk>,<address>,<offsetB>,<nB>;** the function enables to read a file from the working directory.

Response:

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

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

Response:

#D,w; - command was executed

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

6) **#D,e,<name>;** function enables to delete a file in working directory.

Response:

#D,e; - command was executed

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

7) **#D,e;** function enables to delete all files in the working directory.

Response:

#D,e; - command was executed

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

8) **#D,m,<address>,<dirName>;** function enables to create a subdirectory in the directory defined by <address>.

Response:

#D,m; - command was executed

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

9) **#D,f,<address>;** function enables to delete directory and its contents (files and subdirectories).

Response:

#D,f; - command was executed

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

10) **#D,j,?;** this function returns parameters of the archive directory in format:

#D,j,<disk>,<address>;

11) **#D,s,?;** this function returns parameters of the setup directory in format:

#D,s,<disk>,<address>;

Note: *Only read functions are available during measurements running state (#1,S1;). Stop the measurements (#1,S0;) to unlock all the functions.*

A.10 FUNCTION #S – DIRECT SETUP ACCESS

#S function enables to read/write instrument's settings in a direct manner. Any settings changed by this command affect current setup, are written into non-volatile memory and are available on the next power up.

#S function format is defined as follows.

To read settings a query should be send to the device:

#S[,<code1>[,<code2>[,code3[,...]]]];

where **<codeN>** is a two to four ASCII letter setting code.

The device responds with a control settings:

#S[,<code1>:<set1>[,<code2>:<set2>[,<code3>:<set3>[,...]]]];

where **<codeN>** is the same settings code sent in the query and <**setN>** is a settings value.

To return all settings available send:

#S;

To write settings to the device follow the opposite procedure. Send to the device:

#S,<code1>:<set1>[,<code2>:<set2>[,<code3>:<set3>[,...]]];

In case of success the device responds with the same ASCII string:

#S,<code1>:<set1>[,<code2>:<set2>[,<code3>:<set3>[,...]]];

In case of an error (e.g. settings code does not exist or parameter value is out of range) the device respond with "?" instead of **<setN>** value:

#S,<codeN>:?;

For example, if three parameters are set and <set2> is out of range the device response is:

#S,<code1>:<set1>,<code2>:?,<code3>:<set3>;

Codes and settings for #S function are described in the A.11 ***Control setting codes***.

Note: *#S function protocol consist of ASCII characters only.*

Note: *Some of the #S functions are blocked during measurements running state (#1,S1;). Stop the measurements (#1,S0;) before changing these settings.*

A.11 CONTROL SETTING CODES

The control setting codes used in the SV 303 instrument are given in the below tables.

Table A.1 Unit information

Table A.2 Measurements settings and control

Table A.3 Calibration and microphone settings

Table A.4 Profile settings

Table A.5 Spectrum settings

Table A.6 Statistical settings

Table A.7 Audio settings

Table A.8 Logger settings

Table A.9 CSV export settings

Table A.10 System check settings

Table A.11 Display and keyboard settings

Table A.12 Setup settings

Table A.13 Alarms settings

Table A.14 General settings

Table A.15 Power settings

Table A.16 System log settings

Table A.17 Position and time settings

Notes:

*- function codes marked in green are **read only**!*

*- function codes marked in red are **locked during measurements run state**! Stop measurements before changing these settings.*

*- values in square brackets are **[optional]**!*

- values are written in the form of numbers or in the form of a bit number (prefix 'b') or hexadecimal (prefix '0x') e.g. the b5 is equal to the number 32 = 2^5 or hexadecimal 0x20.

Table A.1 Unit information

Group name	#1 code	#7 code	#S code	Code description
Unit type	U			303
Unit subtype		US		Returns unit subtype. 1 – SV 303 (standard version)
Serial number	N			xxxxxx
Software version	W			a.bb.c – firmware version a.bb.**0**c – beta firmware version
			AA	abbc - firmware version in hex format
Files system version		FS		a.bb - file system version
PIC version		PI		x.xx - version of auxiliary microcontroller
Hardboot version		VH		x.xx - version of hardboot program
Bootstrap version		VB		x.xx - version of bootstrap program

Table A.2 Measurements settings and control

Group name	#1 code	#7 code	#S code	Code description
Measurement function	M		BB	1 - **LEVEL METER** 2 - **1/1 OCTAVE** analyser 3 - **1/3 OCTAVE** analyser
Measurement state	S			0 - **STOP** 1 - **START** 2 - **PAUSE** 3 - **System Check** (read only) 4 - **Delay before START** (read only)
Start delay	Y		BD	nn - nn delay given in seconds ∈ (0 ÷ 59) and (60 ÷ 3600) with step 60s
Start synchronization	y		BN	0 - switched off (**OFF**) -1 - synchronization to full second 1 - synchronization to 1 min. 15 - synchronization to 15 min. 30 - synchronization to 30 min. 60 - synchronization to 1 hour.

Group name	#1 code	#7 code	#S code	Code description
Integration period	D			0 - infinity (measurement finished by pressing the **Stop** or remotely - by sending S0 control code) nns - nn number in seconds nnm - nn number in minutes nnh - nn number in hours
			BE	0 - infinity (measurement finished by pressing the **Stop** or remotely - by sending S0 control code) 1 - 24 hours 2 - 8 hours 3 - 1 hour 4 - 15 minutes 5 - 5 minutes 6 - 1 minute x ∈ (7 ÷ 65) - (x-6) seconds x ∈ (66 ÷ 124)- (x-65) minutes x ∈ (125÷148)- (x-124) hours 149 - infinity
Repetition number	K		BF	Repetition number of the measurement cycles. 0 - infinity (measurement finished by pressing the **Stop** or remotely - by sending S0 control code) nnnn - nnnn number of repetitions ∈ (1 ÷ 1000)
Detector type in the **LEQ** function	L		BG	0 - **LINEAR** 1 - **EXPONENTIAL**
Day time limits		DL	BH	0 - 6h-18h 1 - 7h-19h
Rolling time (1)	XXr		BT	nn- nn time in seconds ∈(1 ÷60) nn- nn time in minutes multiplied by 60 ∈(60 ÷3600)
Rolling time (2)	XXs		BU	nn- nn time in seconds ∈(1 ÷60) nn- nn time in minutes multiplied by 60 ∈(60 ÷3600)
Exposure Time	e		EA	x - time in minutes ∈ (1 ÷ 720)
Microphone compensation		MC	JD	0 - Off 1 - On
Free field compensation		FF	JP	0 - Off 1 - ENVIRONMENTAL 2 - AIRPORT
Measurement trigger mode	m		FA	0 - Off 2 - slope+ 3 - slope- 4 - level+ 5 - level- 6 - gradient+
Measurement trigger level	l		FI	x - level [dB] ∈(24 ÷ 136); default 100dB

Group name	#1 code	#7 code	#S code	Code description
Measurement trigger gradient	o		FK	x - gradient [dB] ∈(1 ÷ 100); default 10dB/(trigger period)
Auto-RunF		AS		#7,AS,<e>,<HH>,<MM>,<hh>,<mm>,<dW>,<mR>; where: <e> - On (e=1), Off (e=0), <HH> - hour of the measurement start, <MM> -minutes of the measurement start, <hh> - hour of the measurement stop, <mm> -minutes of the measurement stop, <dW> - day of week in which the measurement will be done defined as a sum of flags: b0 - Monday b1 - Tuesday b2 - Wednesday b3 - Thursday b4 - Friday b5 - Saturday b6 - Sunday <mR> - maximum number of the measurement days,
			MR	<e> - On (e=1), Off (e=0)
			MJ	<HH> - hour of the measurement start
			MK	<MM> -minutes of the measurement start
			ML	<hh> - hour of the measurement stop
			MM	<mm> -minutes of the measurement stop
			MN	<dW> - day of week
			MO	<mR> - maximum number of the measurement days

Table A.3 Calibration and microphone settings

Group name	#1 code	#7 code	#S code	Code description
Calibration factor	Q			nn.nn - calibration factor [dB] represented as real number ∈(-10.00 ÷ 10.00) *Read only for Unit Subtype 3 and 4*
			AJ	nnnn - calibration factor [dB] multiplied by 100 ∈ (-1000 ÷ 1000).
Last calibration type			AF	Previously performed calibration type 0 - none 1 - **BY MEASUREMENT** (manual) 2 - **REMOTE** 3 - **FACTORY CALIBRATION** 4 - **AUTOCAL CALIBRATION**

Group name	#1 code	#7 code	#S code	Code description
Last calibration date and time		CT		Function returns calibration date and time in the format: **#7,CT,DD-MM-YYYY,hh:mm:ss;** where **hh:mm:ss** denotes the time and **DD/MM/YYYY** gives the date

			AG	Last calibration date
				d - coded data ∈(0 ÷ 65535)
				Date decoding in C language:
				day = (d & 0x1F);
				month = ((d>>5) & 0x0F);
				year = ((d>>9) & 0x7F) + 2000;

			AH	Last calibration time
				t - t coded time ∈(0 ÷ 65535)
				Time decoding in C language:
				sec = (t%30);
				min = ((t/30)%60);
				hour = (t/1800);
				Note: time resolution is 2 seconds!

Last calibration ref. level	q			nnn.nn - calibration reference level [dB]
			AI	nnnn - calibration reference level [dB] multiplied by 100
Calibration history file version			AT	v - version of calibration history file "**C.TXT**"
Calibration history file split size	XXw		AW	s - a size limit of the calibration history "**C.TXT**" file [MB] ∈(0 ÷ 255) *Note: A new file is created after the size limit is reached.*
Auto calibration settings		AC	JF	0 - **Off** 1 - **On**
Post calibration settings			JA	0 - **Off** 1 - **Last file** 2 - **Files after last calibration**
Microphone TEDs type		TT		Returns type of microphone saved in TEDS memory. Where -1 - unknown, 30B - ST30B 31 - SL31
Microphone TEDs serial number		TS		Returns serial number of microphone saved in TEDS memory in format. #7,TS,<sn>[,<ver>]; Where <sn> - microphone serial number, <ver> - version of ST30B
Microphone TEDs calibration		TC		Returns calibration factor of microphone saved in TEDS memory.
Microphone TEDs factory calibration		TF		Returns factory calibration factor of microphone saved in TEDS memory.

Table A.4 Profile settings

Group name	#1 code	#7 code	#S code	Code description
Filter type in profile n	**F**			Fk:n - k filter in profile n k: 1 - **Z** filter, 2 – **A** filter, 3 – **C** filter, 5 – **B**, 6 – **LF** filter n: 1, 2, 3 – profile number*:* 1, 2 or 3
			BIn	k - k filter in profile n+1, n ∈(0 ÷ 2)
Peak Filter type in profile n	**J**			Fk:n - k filter in profile n k: 1 - **Z** filter, 2 – **A** filter, 3 – **C** filter, 5 – **B**, 6 – **LF** filter n: 1, 2, 3 – profile number*:* 1, 2 or 3
			BJn	k - k filter in profile n+1, n ∈(0 ÷ 2)
Detector type in profile n	**C**			Ck:n - k detector in profile n k: 0 - **IMPULSE**, 1 – **FAST**, 2 – **SLOW** n: 1, 2, 3 – profile number*:* 1, 2 or 3
			BKn	k - k detector in profile n+1, n ∈ (0 ÷ 2)

Table A.5 Spectrum settings

Group name	#1 code	#7 code	#S code	Code description
Filter type in **1/x OCTAVE** analysis	**f**		**BL**	1 - **Z** filter 2 - **A** filter 3 - **C** filter 5 - **B** filter
Detector type in **1/x OCTAVE** analysis	**XXB**		**BS**	0 - **LINEAR** 1 - **FAST** 2 - **SLOW**

Table A.6 Statistical settings

Group name	#1 code	#7 code	#S code	Code description
Statistical levels		**SL**		Reading (response from the instrument): #7,SL,<sl1>,<sl2>,<sl3>,<sl4>,<sl5>,<sl6>,<sl7>,<sl8>,<sl9>,<sl10>; Writing: #7,SL,<sl_index>,<sl_level>; This function sets statistical levels where <sl_index> is the statistical index ∈(1 ÷ 10), <sl_level> is the statistical level [%] ∈(1 ÷ 99)
			RA	<sl1> - statistical level 1
			RB	<sl2> - statistical level 2
			RC	<sl3> - statistical level 3
			RD	<sl4> - statistical level 4

Group name	#1 code	#7 code	#S code	Code description
			RE	<sl5> - statistical level 5
			RF	<sl6> - statistical level 6
			RG	<sl7> - statistical level 7
			RH	<sl8> - statistical level 8
			RI	<sl9> - statistical level 9
			RJ	<sl10> - statistical level 10

Table A.7 Audio settings

Group name	#1 code	#7 code	#S code	Code description
Wave file name			IB	xxxxxxxx – up to 8 characters (permitted characters: 0:9, A:Z, and '_'). Default name "R1"
Last wave file name		LW		a name of a previous wave file
Wave recording mode	XXu		IA	0 - Off 1 - continuous 2 - slope+ 3 - slope- 4 - level+ 5 - level- 6 - gradient+ 7 - manual 8 - integration period 11 - alarm
Format	XXm		IC	0 - PCM 1 - Extensible 2 - A-Law
Bits per sample	XXn		IR	16 - 16 bits 24 - 24 bits
Sampling	XXl		IE	0 - 48 kHz 1 - 24 kHz 2 - 12 kHz 3 - 6 kHz
Filter	XXo		ID	1 - **Z** filter 2 - **A** filter 3 - **C** filter 5 - **B** filter
Gain	XXx		IO	x - x gain [dB] used in 16 bit mode $\in(0 \div 40)$
Trigger level	XXv		II	x - x level [dB] $\in(24 \div 136)$; default 100dB
Trigger period	XXY		IJ	0 - logger step 5 - 0.5 ms 1000 - 100 ms 10000 - 1 s
Trigger gradient	XXZ		IK	x - x gradient [dB] $\in(1 \div 100)$; default 10dB/(trigger period)
Pre trigger	XXz		IL	x - x pre trigger time [s] (default 1s) $\in$

Group name	#1 code	#7 code	#S code	Code description
				(0 ÷ 60) - for 6 kHz sampling (0 ÷ 30) - for 12 kHz sampling (0 ÷ 15) - for 24 kHz sampling (0 ÷ 8) - for 48 kHz sampling
Recording time	XXy		IN	x - x recording time [s]; ∈ (1 ÷ 59), (60 ÷ 3600) with 60s steps and (3600 ÷ 28800) with 3600s steps
Length Limit	XXq		IP	0 - file size limit 4GB x - file size limit in minutes; ∈ (1 ÷ 480)
Manual recording		EW		This function allows remote manual triggering of the wave/event recording. Reading: #7,EW,<run>,<time>; where <run> - recording status 0 - not active 1 - active <time> - recording time [s] Writing: #7,EW,<mode>[,<time>]; <mode> - recording mode 0 - disabled 1 - enabled <time> - recording time [s] *Notes: function is active only during measurements running state.*

Table A.8 Logger settings

Group name	#1 code	#7 code	#S code	Code description
Logger file name			DC	xxxxxxxx – up to 8 characters (permitted characters: 0:9, A:Z, and '_'). Default name "L1"
Last logger file name		LB		a name of a previous logger file
Logger step	d			nn - nn number of milliseconds ∈ (100,200,500) nns - nn number of seconds ∈ (1 ÷ 60) nnm - nn number of minutes ∈ (1 ÷ 60)
			DB	nn - nn number of milliseconds ∈ (100,200,500), (1000 ÷ 60000) with 1000ms steps and (60000 ÷ 3600000) with 60000ms steps
Logger	T		DA	0 - Off 1 - On *Note: this setting must be on in order to create a logger data file!*
Logger results in profile n	B			Bx:n - x – sum of the following flags:

Group name	#1 code	#7 code	#S code	Code description
				b0 - logger with **Lpeak** values in profile n b1 - logger with **Lmax** values in profile n b2 - logger with **Lmin** values in profile n b3 - logger with **Leq** values in profile n b4 - reserved b5 - logger with **LR1** values in profile n b6 - logger with **LR2** values in profile n n – profile ∈ (1 ÷ 3)
			DDn	x - x logger results in profile n+1, n ∈(0 ÷ 2)
Summary results	**XXE**		**DG**	0 - Off 1 - On *Note: this is a main switch for all summary results.*
Summary results selection	**E**		**DF**	x - x – sum of the following flags: b0 - summary results for profiles, b1 - averaged 1/x OCTAVE spectrum, b2 - maximum 1/x OCTAVE spectrum, b3 - minimum 1/x OCTAVE spectrum b4 - peak 1/x OCTAVE spectrum b5 - statistical levels, b6 - sstatistical analysis in profiles, b7 - sstatistical analysis in 1/x octave, b8 - reserved, b9 - reserved, b10 - reserved
Summary result in profile n			**DNn**	summary results in profile n+1, n ∈(0 ÷ 2) x - x – sum of the following flags: b0 - save **Lpeak** summary results in profile b1 - save **LE** summary results in profile b2 - save **Lmax** summary results in profile b3 - save **Lmin** summary results in profile b4 - save **L** summary results in profile b5 - save **Leq** summary results in profile b6 - save **Lden** summary results in profile b7 - save **Ltm3** summary results in profile b8 - save **LTeq** summary results in profile b9 - save **LR1** summary results in profile b10 - save **LR2** summary results in profile b11 - save **EX** summary results in profile b12 - save **SD** summary results in profile
Summary results common			**DO**	x - x – sum of the following flags: b0 - save overload time for summary results b1 - save **NR** summary results b2 - save **NC** summary results
Summary results statistics			**DPn**	**Lnn** summary results in profile n+1, n ∈(0 ÷ 2) x - x – sum of the following flags: b0 - save 1st **Lnn** summary results in profile b1 - save 2nd **Lnn** summary results in profile

Group name	#1 code	#7 code	#S code	Code description
				b2 - save 3rd **Lnn** summary results in profile b3 - save 4th **Lnn** summary results in profile b4 - save 5th **Lnn** summary results in profile b5 - save 6th **Lnn** summary results in profile b6 - save 7th **Lnn** summary results in profile b7 - save 8th **Lnn** summary results in profile b8 - save 9th **Lnn** summary results in profile b9 - save 10th **Lnn** summary results in profile
1/x OCTAVE analysis results	**b**		**DE**	x - x – sum of the following flags: b0 - logger with **Lpeak** spectrum b3 - logger with **Leq** spectrum
Logger File Splitting Mode	**XA**		**DH**	0 switched off (**OFF**) -1 - file is created for each measurement cycle. 15 - file is created every 15 min, synchronized to RTC. 30 - file is created every 30 min, synchronized to RTC. 60 - file is created every 1 hour, synchronized to RTC. 1440 - file is created on the specified times, see next parameter *Note: for "-1" – integration period must be at least 60s*
Specified Time for Logger File Splitting	**XD**			XDx:n – x = -1 (switched off) x = 0 ÷ 1439 (time in minutes) n = 1 ÷ 6 (specified time number) *Note: valid only if Split Mode is equal to 1440*
			DI	Active split time number x - x – sum of the following flags b0 - split on time number 1 b1 - split on time number 2 b2 - split on time number 3 b3 - split on time number 4 b4 - split on time number 5 b5 - split on time number 6
			DJn	Split hour (0 ÷ 23) for time number n-1, n ∈(0÷ 5)
			DKn	Split minute (0÷59) for time number n-1,n ∈(0÷5)
User text			**BV**	text – to up to 128 characters of user text added each data file. Default text " ". Permitted characters: 0-9, a-z, A-Z, space and the following characters !"#$%&')(*+-./:<=>?@[\]^}_{`|~

Table A.9 CSV export settings

Group name	#1 code	#7 code	#S code	Code description
Summary results saved in CSV file		CV		Reading (response from the instrument): #7,CV,<prof1>,<prof2>,<prof3>,<spec>,<err>; Writing: #7,CV,<prof1>,<prof2>,<prof3>,<spec>; where <err> - CSV file error; 0 – no error <prof1>, <prof2>, <prof3> - profile summary results defined as a sum of the following flags: b0 - **Time**, b1 - **Lpeak**, b2 - **Lmax**, b3 - **Lmin**, b4 - **L**, b5 - **Leq**, b6 - **LE**, b7 - **Lden**, b8 - **LEPd**, b9 - **Ltm3**, b10 - **LTeq**, b11 - **Lnn**, b12 - **LR1**, b13 - **LR2**, b14 - **OVL** <spec> - spectrum results defined as a sum of the following flags: b0 - **averaged 1/x OCTAVE spectrum,** b1 - **maximum 1/x OCTAVE spectrum,** b2 - **minimum 1/x OCTAVE spectrum,** b3 - **peak 1/x OCTAVE spectrum** *Note: the command accepts values in hex format! E.g. If <prof1> = 1A (26 in decimal, sum of bits b1, b2, b4), it means that Lpeak, Lmin and L values from 1st profile are saved into CSV file.*
			ER	<prof1> - profile 1 summary results *Note: the command accepts values in decimal format!*
			ES	<prof2> - profile 2 summary results *Note: the command accepts values in decimal format!*
			ET	<prof3> - profile 3 summary results *Note: the command accepts values in decimal format!*
			EU	<spec> - spectrum results *Note: the command accepts values in decimal format!*
Logger trigger mode	XT		GA	0 - Off 4 - level+ 5 - level-
Logger trigger level	XL		GI	x - level [dB] ∈(24 ÷ 136); default 100dB

Group name	#1 code	#7 code	#S code	Code description
Logger pre-trigger	XQ		GL	x - number of the records taken into account before the fulfilment of the triggering condition ∈(0 ÷ 10); default 0
Logger post-trigger	Xq		GM	x - number of the records taken into account after the fulfilment of the triggering condition ∈(0 ÷ 200); default 0

Table A.10 System check settings

Group name	#1 code	#7 code	#S code	Code description
System check settings		RC		To read/write settings send #7,RC[,<sel>]; where <sel> is settings selector: 0 (or empty) - read system check status 1 - read/write system check settings 2 - start system check 3 - read live check status 4 - read live check status and write to calibration history file Reading status (response from the instrument): #7,RC,0,<active>,<result>,<hh>,<mm>,<ss>,<sm>; where <active> - status of the system check 0 - inactive 1 - active <result> - result of the last system check 0 - OK 1 - Failed 2 - Not performed 3 - Speaker failed 4 - Microphone disconnected 5 - Microphone connected 6 - Microphone damaged <hh> - hours left to the next system check <mm> -minutes left to the next system check <ss> - seconds left to the next system check <sm> - microphone service mode 0 - inactive 1 - active Reading/writing settings: #7,RC,1,<mode>[,<time>[,<wday>]]; where <mode> - automatic system check function enable 0 - Off 1 - On <time> - time of a day [min] when system check should be performed

Group name	#1 code	#7 code	#S code	Code description
				0 - Off 1...1439 –minutes since midnight <wday> - weekday mask; sum of the following flags representing week days b0 - **Monday** b1 - **Tuesday** b2 - **Wednesday** b3 - **Thursday** b4 - **Friday** b5 - **Saturday** b6 - **Sunday** *Notes: the mask value is given in hexadecimal. For example, 1F means working days of a week Monday-Friday.* Response from the #7,RC,3; and #7,RC,4; #7,RC,<x>,<result>,<sm>; <x> - 3 or 4 <result> - result of the live check <sm> - microphone service mode
			AX	<mode> - automatic system check function enable
			AY	<time> - time of a day [min] when system check should be performed
			AZ	<wday> - weekday mask *Notes: the mask value is given in decimal. For example 31 value means working days of a week Monday-Friday.*

Last system check date			**Aa**	d - coded data ∈(0 ÷ 65535)
				Date decoding in C language:
				day = (d & 0x1F);
				month = ((d>>5) & 0x0F);
				year = ((d>>9) & 0x7F) + 2000;

Last system check time			**Ab**	t - t coded time ∈(0 ÷ 65535)
				Time decoding in C language:
				sec = (t%30);
				min = ((t/30)%60);
				hour = (t/1800);
				Note: time resolution is 2 seconds!

Last system check result			**Ac**	<result> - result of the last system check

Table A.11 Display and keyboard settings

Group name	#1 code	#7 code	#S code	Code description
Key shift mode			**NA**	0 - 2nd function 1 - Direct
Spectrum View			**SA**	0 - Off 1 - On
3-profiles View			**SB**	0 - Off 1 - On
Statistics View			**SC**	0 - Off 1 - On
Time History View			**SD**	0 - Off 1 - On
Running SPL View			**SE**	0 - Off 1 - On
File Info View			**SF**	0 - Off 1 - On
Display **Time** result in the main and 3-profile views			**OA**	0 - Off 1 - On
Display **Lpeak** result in the main and 3-profile views			**OB**	0 - Off 1 - On
Display **Lmax** result in the main and 3-profile views			**OC**	0 - Off 1 - On
Display **Lmin** result in the main and 3-profile views			**OD**	0 - Off 1 - On
Display **L** result in the main and 3-profile views			**OE**	0 - Off 1 - On
Display **Leq** result in the main and 3-profile views			**OF**	0 - Off 1 - On
Display **LE** result in the main and 3-profile views			**OG**	0 - Off 1 - On
Display **Lden** result in the main and 3-profile views			**OH**	0 - Off 1 - On
Display **LEPd** result in the main and 3-profile views			**OI**	0 - Off 1 - On
Display **Ltm3** result in the main and 3-profile views			**OJ**	0 - Off 1 - On
Display **LTeq** result in the main and 3-profile views			**OK**	0 - Off 1 - On
Display **Ln** result in the main and 3-profile views			**OL**	0 - Off 1 - On
Display **LR1** result in the main and 3-profile views			**OM**	0 - Off 1 - On
Display **LR2** result in the main and 3-profile views			**ON**	0 - Off 1 - On
Display **EX** result in the main and 3-profile views			**OR**	0 - Off 1 - On

Group name	#1 code	#7 code	#S code	Code description
Display **SD** result in the main and 3-profile views			**OS**	0 - Off 1 - On
Display **NR** result in the main and 3-profile views			**OT**	0 - Off 1 - On
Display **NC** result in the main and 3-profile views			**OU**	0 - Off 1 - On
Display **OVL** result in the main and 3-profile views			**OO**	0 - Off 1 - On
Graph Y axis for 1/x OCTAVE			**SM**	0 - 10dB 1 - 20dB 2 - 40dB **3 - 80dB (default)** 4 - 120dB
Graph grid for 1/x OCTAVE			**SN**	0 - Off **1 - On (default)**
Spectrum type for 1/x OCTAVE			**SP**	0 - Averaged 1 - Instantaneous 2 - Max **3** - Min 4 - Peak
Spectrum view Min. for 1/x OCTAVE			**SR**	0 - Off 1 - On
Spectrum view Max. for 1/x OCTAVE			**SS**	0 - Off 1 - On
Chart auto-scale			**SO**	0 - Off **1 - On (default)**
Results displayed on the Time history view			**STn**	x - x logger results in profile n+1, n ∈(0 ÷ 2) x – sum of the following flags: b0 - logger with Lpeak values in profile n b1 - logger with Lmax values in profile n b2 - logger with Lmin values in profile n b3 - logger with Leq values in profile n b4 - reserved b5 - logger with LR1 values in profile n b6 - logger with LR2 values in profile n
Display dim timeout			**SU**	Screen saver mode: 0 - Off 1 - Level 1 2 - Level 1 3 - Level 1 4 - Screen Off (**default)** *Note: It is recommended to leave the default value!*
Display dim timeout			**SW**	nn - delay step timeout [s] for display screen server; nn given in seconds ∈ (5 ÷ 59) with 1s and ∈ (60 ÷ 3600) with 60s step; **default is 60s**
Display auto rotate			**SX**	0 - Off

Group name	#1 code	#7 code	#S code	Code description
				1 - On (default)
Warning: Logger Off			**TA**	0 - Off 1 - On (default)
Warning: Power Off			**TB**	0 - Off 1 - On (default)
Warning: Save changes			**TD**	0 - Off 1 - On (default)

Table A.12 Setup settings

Group name	#1 code	#7 code	#S code	Code description
Load setup		**LS**		name - a name of a setup file to be loaded (activated) *Notes:* *- name is given without "svt" extension* *- a setup file must be placed into the SETUP directory of the instrument's SD card prior using this command; see* A.8 *or* A.9 *on file upload*
Save setup		**SS**		name - a current instrument setup will be saved as a "name.svt" file in the SETUP directory of the instrument's SD card; 8 characters is a maximum name length *Notes:* *- name is given without "svt" extension*
Clear setup		**CS**		This command restores factory defaults of the instrument. To execute command send #7,CS[,<sel>]; where <sel> is settings selector: 0 (or empty) - clear measurements setup (preserve communication settings) 1 - clear all settings 2 - clear all settings and calibration history *Notes: it is not advised to use this function remotely via Internet with <sel>=1 or <sel>=2 since communication with the instrument may be lost!*
Delete setup		**DS**		name - a name of a setup file to be deleted from the SETUP directory of the instrument's SD card *Notes:* *- name is given without "svt" extension*

Table A.13 Alarms settings

Group name	#1 code	#7 code	#S code	Code description
nth address book **name**; nn ∈ (01 ÷ 16)			**QAnn**	Notes: - name has a maximum length of 16 characters
nth address book **email**; nn ∈ (1 ÷ 16)			**QBnn**	Notes: - email has a maximum length of 48 characters
nth address book **phone**; nn ∈ (1 ÷ 16)			**QCnn**	Notes: - phone has a maximum length of 15 characters
nth event **active**; nn ∈ (1 ÷ 10)			**WAnn**	0 - Off 1 - On
nth event **name**; nn ∈ (1 ÷ 10)			**WBnn**	Notes: - name has a maximum length of 16 characters
nth event **source**; n ∈ (1 ÷ 10)			**WCnn**	0 - **System** 1 - **Leq** 2 - **Lmax** 3 - **LR(1)** 4 - **LR(2)** 5 - **Leq+NR** 6 - **LeqPR** 7 – **LeqPR+LN** 8 – **Lnn**
nth event **integration**; nn ∈ (1 ÷ 10)			**WDnn**	0 - **1s** 1 - **SR** (summary step) 2 - **TH** (time history step)
nth event **threshold**; nn ∈ (1 ÷ 10)			**WEnn**	x - threshold level in dB ∈ (24 ÷ 136)
nth event **NR threshold**; nn ∈ (1 ÷ 10)			**WFnn**	x - NR ∈ (0 ÷ 130)
nth event **LN number**; nn ∈ (1 ÷ 10)			**WGnn**	x - LN ∈ (1 ÷ 99)
nth event **days of week**; nn ∈ (1 ÷ 10)			**WHnn**	x - sum of the following flags flags: b0 - Monday b1 - Tuesday b2 - Wednesday b3 - Thursday b4 - Friday b5 - Saturday b6 - Sunday
nth event **start hour**; nn ∈ (1 ÷ 10)			**WInn**	x - hour ∈ (0 ÷ 23)
nth event **start minutes**; nn ∈ (1 ÷ 10)			**WJnn**	x - minute ∈ (0 ÷ 59)
nth event **stop hour**; nn ∈ (1 ÷ 10)			**WKnn**	x - hour ∈ (0 ÷ 23)
nth event **stop minutes**; nn ∈ (1 ÷ 10)			**WLnn**	x - minute ∈ (0 ÷ 59)

Group name	#1 code	#7 code	#S code	Code description
nth event **trigger counter**; nn ∈ (1 ÷ 10)			**WVnn**	0 - Continuous 1 - Counter
nth event **duration**; nn ∈ (1 ÷ 10)			**WMnn**	x - duration in s ∈ (0 ÷ 3600) Valid for Continuous trigger counter
nth event **counter**; nn ∈ (1 ÷ 10)			**WWnn**	x - counter ∈ (0 ÷ 100) Valid for Counter trigger counter
nth event **min. break**; nn ∈ (1 ÷ 10)			**WNnn**	x - min. break in s ∈ (0 ÷ 3600)
nth event **SMS active**; nn ∈ (1 ÷ 10)			**WOnn**	0 - Off 1 - On
nth event **SMS number mask**; nn ∈ (1 ÷ 10)			**WPnn**	x - sum of the following flags b0 - user number 1 b1 - user number 2 ... B15 - user number 16
nth event **email active**; nn ∈ (1 ÷ 10)			**WQnn**	0 - Off 1 - On
nth event **email recipient mask**; nn ∈ (1 ÷ 10)			**WRnn**	x - sum of the following flags b0 - user number 1 b1 - user number 2 ... B15 - user number 16
nth event **audio active**; n ∈ (1 ÷ 10)			**WSnn**	0 - Off 1 - On
nth event **system mask**; nn ∈ (1 ÷ 10)			**WUnn**	b0 - Powered Up b1 - Powered Down b2 - Measurement Start b3 - Measurement Stop b4 - Mains On b5 - Mains Off b6 - Low Battery b7 - Battery OK b8 - reserved b9 - reserved b10 - Low Storage b11 - Storage OK b12 - System Check b13 - Live Check b14 - Instrument Error b15 - reserved b16 - reserved f b17 - Device Tilt b18 - Device Vertical b19 - Vibration
nth event **pretrigger time**; nn ∈ (1 ÷ 10)			**WXnn**	x - pretrigger time in s ∈ (0 ÷ 3600) Valid for LeqPR+LN

Table A.14 General settings

Group name	#1 code	#7 code	#S code	Code description
Language		**LA**	**JC**	0 - English (default) 1 - German 2 - Spanish 3 - French 4 - Hungarian 5 - Italian 6 - Dutch 7 - Polish 8 - Portuguese 9 - Russian 10 - Turkish 11 - Chinese
USB		**UF**	**JG**	0 - USB High Speed (480 MHz) (default) 1 - USB Full Speed (12 MHz)
Unit Name		**UN**		Up to 12 characters (permitted characters: 0:9, a:z, A:Z, space, and '_').
Instrument description		**AX**		To read settings send #7,AX;. Response: #7,AX,<station>,<res1>,<res2>; <station> - station name <res1>, <res2> - reserved values To write settings send #7,AX,<sel>,<text>;. where <sel> - value selector 0 - station name <text> - user text up to 128 characters in UNICODE format. Permitted characters: 0-9, a-f, A-F
			LI	<text> - user text for station name
SD card: erase disk		**ED**		Erase all files from SD card.
SD card: version of Fat file system		**FT**		-1 - SD disk not ready 1 - FAT16 2 – FAT32
SD card: number of sectors		**NS**		n - number of sectors. *Sector is 512 bytes in size*
SD card: number of free sectors		**NF**		n - number of free sectors. *Sector is 512 bytes in size*
Measurement files number		**BN**		n - number of "*.svl" files in the instrument's working directory
Microphone temperature		**TP**		xx.x - temperature of the instrument [°C]
Microphone temperature		**TA**		xx.x - temperature of the acquisition part of the instrument [°C]
Microphone temperature		**TM**		xx.x - temperature of the microphone [°C]
Firmware upgrade		**FU**		To read status of firmware upgrade send #7,FU;. Response: #7,FU,<stat>; To start firmware upgrade send: #7,FU,<name>.<ext>; where

Group name	#1 code	#7 code	#S code	Code description
				<name> - a name of a firmware binary to be used for upgrade; file must reside in the FIRMWARE directory of the instrument's SD card. <ext> - three characters extension of the firmware file; usually it is "BIN" <stat> - status of upgrade; negative value is an error 0 - not upgrading or upgrade finished successfully (if started with #7,FU,<name>.bin;) 1 - start of upgrade 2- checking a firmware image 3 - erasing Flash 4 - writing Flash 5 - checking a firmware after write 6 - finishing After 6 the state always comes to 0.
Firmware list		**FL**		Returns firmware file list in the FIRMWARE directory of the instrument's SD card. Response: #7,FL,<name1>,<len1>[,<name2>,<len2>[...]]; where <namex> - name of the firmware file with extension, e.g. "firmware.bin"; max 8 characters for name and 3 characters for extension <lenx> - length of the firmware filex [B]
Vibration threshold			**JJ**	x - vibration threshold in [g]
SPL on stop		**LL**		Reading (response from the instrument): #7,ll,<L1>,<L2>,<L3>; where <L1> - L value from profile 1 in [dB] <L2> - L value from profile 2 in [dB] <L3> - L value from profile 3 in [dB] *Notes: function is not available during measurements.*
Instrument orientation		**OR**		Returns orientation of the device in the format: **#7,OR,x<a.aa>,y<b.bb>,z<c.cc>;** where a.aa - gravitational acceleration in [g] for axes x b.bb - gravitational acceleration in [g] for axes y c.cc - gravitational acceleration in [g] for axes z
Station status		**II**		This function provides cumulative station status. Reading (response from the instrument): #7,ll,[<rms1>],[<rms2>],[<rms3>],Fx<flags>,B<bat>,D<disk>,ex<err>,wx<war>,Rx<rst>,fx<add>,O<dd:hh:mm:ss>;

Group name	#1 code	#7 code	#S code	Code description
				where <L1> - L value from profile 1 in [dB] (on STOP only) <L2> - L value from profile 2 in [dB] (on STOP only) <L3> - L value from profile 3 in [dB] (on STOP only) <flags> - station status flags defined in hexadecimal format as a sum of the following flags: b0 - measurements are running, b1 - pause is active, b2 - reserved, b3 - battery is charging, b4 - reserved, b5 - external power supply is present, b6 - reserved, b7 - reserved, b8 - reserved, b9 - reserved, b10 - reserved, b11 - reserved, b12 - reserved, b13 - reserved, b14 - reserved, b15 - battery charging is finished, b16 - microphone heater is on, b17 - battery heater is on, b18 - timer mode is active, <bat> - battery relative state of charge [%] <disk> - SD card occupation [%] <err> - error flags defined in hexadecimal format as a sum of the following flags: b0 - reserved, b1 - SD card is not ready, b2 - logger file error, b3 - reserved, b4 - reserved, b5 - reserved, b6 - reserved, b7 - reserved, b8 - reserved, b9 - external temperature sensor error, b10 - live check error, b11 - instrument is not standing upright, b12 - microphone disconnected, b13 - reserved, b14 - logger file name error, b15 - microphone damaged, b16 - reserved, b17 - battery pack temperatures greater than 60°C, b18 - reserved, b21 - incorrect firmware,

Group name	#1 code	#7 code	#S code	Code description
				b22 - speaker failed, b23 - incompatible microphone, b24 - file saving error, <war> - warning flags defined in hexadecimal format as a sum of the following flags: b0 - logging off, b1 - battery pack temperatures greater than 43°C, b2 - battery pack temperatures greater than 55°C, b3 - reserved, b4 - reserved, b5 - reserved, b6 - reserved, b7 - battery pack temperatures greater than 65°C, b8 - file saving error, <rst> - last instrument power on/off and reset cause b0 - hardware reset, b1 - watchdog reset, b2 - remote reset, b3 - reserved, b4 - reserved, b5 - reserved, b6 - reserved, b7 - reserved, b8 - system was on because of keyboard, b9 - system was on because of external power supply had been connected b10 - system was on because of RTC alarm, b11 - reserved, b12 - system was on because EXT I/O line had triggered, <add> - additional flags defined in hexadecimal format as a sum of the following flags: f0 - microphone service mode, <dd:hh:mm:ss> - system *on* time since last power-up where <dd> - days <hh> - hours <mm> - minutes <ss> - seconds

Table A.15 Power settings

Group name	#1 code	#7 code	#S code	Code description
Battery Charge mode			**JY**	0 - Full capacity 1 - Optimized
Power status		**BS**		To read settings send #7,BS;. Response: #7,BS,<bat>,<src>,<time>,<chrg>; where <bat> - battery state of charge [%]; -1 when state of charge cannot be read <src> - power source 0 - internal battery -5 - USB <time> - battery time [h]; either "time to full" if battery is charging or "time to empty" if battery is discharging <chrg> - charging indication 0 - not charging 1 - charging is finished 2 - charging is in progress
Battery voltage		**BV**		volt - battery voltage [mV] multiplied by 10;
USB voltage		**UV**		volt - USB power supply voltage [mV] multiplied by 10;
Power off		**PO**		Power off the instrument. *Notes: take care using this command remotely via Internet*
Reset		**XR**		Hardware reset of the instrument (power off and on). Send #7,XR[,<n>]; n - delay [s] before reset
Automatic power off		**ST**	**JK**	0 - disabled, display stays on all the time nn - timeout [s] for instrument power off; nn delay given in seconds ∈ (300 ÷ 3600) with 60s step and ∈ (3600 ÷ 14400) with 3600s step; **default is 14400s** *Note: instrument automatically power off only if doesn't measurement!* *Automatic power off is blocked when instrument is powered from external supply*

Table A.16 System log settings

Group name	#1 code	#7 code	#S code	Code description
System log file		**LG**		To read settings send #7,LG;. Response: #7,LG,<mask>,<time>,<size>,<totSize>,<err>; To write settings send: #7,LG,<mask>,<time>,<size>,<totSize>; where <mask> - events written to a system log file (S.LOG) defined in hex format as a sum of the following flags:

Group name	#1 code	#7 code	#S code	Code description
				0x0 - **Off** (logs are not saved), 0x0001 – log system events, 0x0002 – reserved, 0x0004 – reserved, 0x0008 – reserved, 0x0010 – log periodic battery status, 0x0020 – log periodic instrument status, 0x0040 – reserved, 0x0080 – reserved, 0x0100 – reserved, 0x0200 – reserved, 0x0400 – log remote commands events, 0x0800 – log advanced alarms events, 0x1000 – reserved, 0x2000 – reserved, 0x4000 – reserved, 0x8000 – reserved <time> - interval [s] for periodic logs, <size> - maximum size [MB] of a single S.LOG file, <sizeTot> - maximum size [MB] of all S.LOG files in the current working directory, <err> - S.LOG file error; 0 – no error. *Notes:* *- it is not advised to switch off the log file! This file is useful in case of support.* *- do not set reserved flags!*
			JL	<mask> - events written to a system log file "Sx.LOG"; see above
			JT	<time> - interval [s] for periodic logs
			JR	<size> - maximum size [MB] of a single "Sx.LOG" file
			JS	<sizeTot> - maximum size [MB] of all "Sx.LOG" files in the current working directory

Table A.17 Position and time settings

Group name	#1 code	#7 code	#S code	Code description
Position settings		**GL**		To read settings send #7,GL[,<sel>];. Response: #7,GL, <Latitude>,<Longitude>; To write settings send: #7,GL,<Latitude>,<Longitude>; where <sel> - 0 – automatic read mode. Coordinates are read from GPS if it is active and position is fixed or from the memory otherwise. 1 – coordinates are read from the memory <Latitude> - Latitude in degrees; value has '-' sign for South hemisphere,

Group name	#1 code	#7 code	#S code	Code description
				< Longitude > - Longitude in degrees; value has '-' sign west of Greenwich,
			LA	<LatDeg> - Latitude degrees; value has '-' sign for South hemisphere,
			LB	<LatMin> - Latitude minutes,
			LC	<LatSec> - Latitude seconds,
			LD	<LatmSec> - Latitude milliseconds,
			LE	<LongDeg> - Longitude degrees; value has '-' sign west of Greenwich,
			LF	<LongMin> - Longitude minutes,
			LG	<LongSec> - Longitude seconds,
			LH	<LongmSec> - Longitude milliseconds,
Real Time Clock (RTC)		**RT**		Current instrument's date/time settings. Reading (response from the instrument): #7,RT,<hour>,<min>,<sec>,<day>,<month>,<year>; Writing: #7,RT,<hour>,<min>,<sec>,<day>,<month>,<year>; where <hour> - hour ∈ (0 ÷ 23) <min> - min ∈ (0 ÷ 59) <sec> - sec ∈ (0 ÷ 59) <day> - day ∈ (1 ÷ 31) <month> - hour ∈ (1 ÷ 12) <year> - hour ∈ (2000 ÷ 2099) *Read only for Unit Subtype 3*
On time		**RO**		Time elapsed since last power up. Reading (response from the instrument): #7,RO,<dd>,<hh>,<mm>,<ss>; where <dd> - days <hh> - hours <mm> -minutes <ss> - seconds

APPENDIX B. DATA FILE STRUCTURES

B.1 GENERAL STRUCTURE OF THE SV 303 FILES

Each file containing data from the **SV 303** (internal file system rev. **1.20**) instrument consists of several groups of words. There are two different types of files containing:

- measuring results data (cf. App. B.2);
- setup data (cf. App. B.3).

Each file has the following elements:

- SvanPC file header (cf. Tab. B.1.1)
- file header (cf. Tab. B.1.2)
- unit and internal software specification (cf. Tab. B.1.3)
- calibration settings (cf. Tab. B.1.4)
- user's text (a header) stored together with the measurement data (cf. Tab. B.1.5)
- Unit text info (cf. Tab. B.1.6)
- parameters and global settings, common for all profiles (cf. Tab. B.1.7)
- parameters for measurement trigger (cf. Tab. B.1.8)
- parameters for logger trigger (cf. Tab. B.1.9)
- parameters for Wav recording (cf. Tab. B.1.10)
- special settings for profiles (cf. Tab. B.1.12)
- display settings of the main results (cf. Tab. B.1.13)
- header of the statistical analysis (cf. Tab. B.1.14)
- header of the logger file (cf. Tab. B.1.15)
- contents of the logger file (cf. Tab. B.1.16)

Other elements of the file structure are not obligatory for each file type stated above. They depend on the file type (**SLM**, logger file) and on the setting of the **FULL STAT.** These elements are as follows:

- Header of the Summary Results Record (saved in Summary Results Record) (cf. Table B.1.17)
- main results (saved in Summary Results Record) (cf. Tab. B.1.18_SLM)
- statistical levels (saved in Summary Results Record) (cf. Tab. B.1.19)
- 1/1 OCTAVE analysis results (saved in Summary Results Record) (cf. Tab. B.1.20)
- 1/3 OCTAVE analysis results (saved in Summary Results Record) (cf. Tab. B.1.21)
- results of the statistical analysis (saved in Summary Results Record) (cf. Tab. B.1.22);
- 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: 303 – **SV 303**
3	SoftwareVersion	software version: 122
4	SoftwareIssueDate	software issue date
5	DeviceMode	mode of the instrument
6	UnitSubtype	subtype of the unit: 1 – **SV 303**
7	FileSysVersion	file system version: 120
8	reserved	Reserved
9	SoftwareSubversion	software subversion: 01
10	UnitNumberH	unit number (MSB word)
10	MicSN_L	microphone number (LSB word)
10	MicSN_H	microphone number (MSB word)
…		…

Table B.1.4. Calibration settings

Word number	Name	Comment
0	0xnn47	[47, nn=header's length]
1	PreCalibrType	type of calibration performed prior to measurement: 0 - none 1 - **BY MEASUREMENT** (manual) 2 - **REMOTE** 3 - **FACTORY CALIBRATION** 4 - **AUTOCALIBRATION**
2	PreCalibrDate	date of calibration performed prior to measurement (cf. App. B.4)
3	PreCalibrTime	time of calibration performed prior to measurement (cf. App. B.4)
4	PreCalibrFactor	factor (*100 dB) of calibration performed prior to measurement
5	PostCalibrType	type of calibration performed after the measurement: 0 - none 1 - **BY MEASUREMENT** (manual) 2 - **REMOTE** 3 - **FACTORY CALIBRATION** 4 – **AUTOCALIBRATION** 0xFFFF - **Calibration not performed**
6	PostCalibrDate	date of calibration performed after the measurement (cf. App. B.4)
7	PostCalibrTime	time of calibration performed after the measurement (cf. App. B.4)
8	PostCalibrFactor	factor (*100 dB) of calibration performed after the measurement
…	…	…

Table B.1.5. USER's text

Word number	Name	Comment
0	0xnn03	[03, nn=specification's length]
1…	title text	the user's text (two characters in a word) finished with one or two null bytes

Table B.1.6. Unit text info

Word number	Name	Comment
0	0xnn58	[58, nn=block's length]
1	"UN"	Unit name header
2..8	UnitName	Unit name
.....	.....	.....

Table B.1.7. Parameters and global settings

Word number	Name	Comment
0	0xnn04	[04, nn=block's length]
1	MeasureStartDate	measure start date (cf. App. B.4)
2	MeasureStartTime	measure start time (cf. App. B.4)
3	DeviceFunction	device function: 1 - **SOUND LEVEL METER**, 2 - **1/1 OCTAVE** analyser, 3 - **1/3 OCTAVE** analyser,
4	MeasureInput	measurement input type: 2 - **Microphone**
5	Range	measurement range: 2 - **SINGLE**
6	UnitFlags	calibration flags: b0 - if set to 1: calibration coefficient is used b3 - if set to 1: overload occurred b7,b6,b5: type of the result **Lden** 000 – **Lden** result is not available 001 – **Ld** result 010 – **Le** result 011 – **Lde** result 100 – **Ln** result 101 – **Lnd** result 110 – **Len** result 111 – **Lden** result b9 - if set to 1: measurement start synchronized with GPS
7	RepCycle	repetition cycle: 0 - infinity nnnn - number of repetitions $\in(1 \div 1000)$
8	NofChannel	number of channels (1)
8	NofProf	number of profiles (3)
10	StartDelay	start delay time
11..12	IntTimeSec	integration time specified in seconds
13	InterfaceMode	reserved
14	LeqInt	detector's type in the **Leq** function: **0 - LINEAR,** 1 - **EXPONENT.**
15	SpectrumFilter	**1/1 octave or 1/3 octave** analysis filter: 1 - **Z**, 2 - **A**, 3 - **C** 5 – **B** in other cases: Reserved

16	SpectrumBuff	**1/1 octave or 1/3 octave** logger: sum of the following flags: 1 - logger with **Lpeak** values 8 - logger with **Leq** values in other cases: reserved
17	ExposureTime	exposure time: 1..720 (min)
18	Leq & Lav	reserved
19	MicComp	compensating filter for microphones: 0 - switched off, 1 - switched on
20	SpectrumRMSDetector	spectrum RMS detector type: 0 - **LINEAR**, 1 - **FAST**, 2 - **SLOW**
21	MicFrqCorr	reserved
22..23	MeasureStartTimeMS	measure start time in ms (cf. App. B.4)
24	RollLeq1	rolling time (1) in seconds
25	RollLeq2	rolling time (2) in seconds
26	LoggerMeteo	reserved
27	UartMode	reserved
28	LoggerDust	reserved
29	ES642Mode	reserved
30	Reserved	reserved
31	MainResBuff	Summary results. Contents defined as a sum of flags: b0 - **Main Results** b1 - **Spectrum** b2 - **Spectrum MAX** b3 - **Spectrum MIN** b4 - **Spectrum PEAK** b5 - **Statistical levels** b6 - **Statistical analysis in profiles** b7 - **Statistical analysis in 1/1 octave or 1/3 octave mode**
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	reserved
40	GpsLastSyncTime	reserved
41	Reserved	reserved
42	SplitMode	Logger files splitting mode: 0 - off. -1 - The file is created for each measurement cycle. 15 - The file is created every 15 min synchronized to RTC. 30 - The file is created every 30 min synchronized to RTC. 60 - The file is created every 1 hour synchronized to RTC. 1440 - The file is created on the specified times.
43	SplitTime[1]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is 1440.
44	SplitTime[2]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is 1440.
45	SplitTime[3]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is 1440.
46	SplitTime[4]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is 1440.
47	SplitTime[5]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is 1440.
48	SplitTime[6]	Logger files splitting time: -1 - off. 0:1439 - Time in minutes. Valid only if SplitMode is 1440.
49	Logger_main_prof[1]	Main results in the 1st profile saved in the file. Contents defined as a sum of flags: b0 - Lxpeak[1] value (*100 dB) b1 - LxyE[23] value (*100 dB) b2 - maximal value (Lxymax[2]) (*100 dB) b3 - minimal value (Lxymin[2]) (*100 dB) b4 - Lxy[2] value (*100 dB) b5 - Lxyeq[23] value (*100 dB) b6 - **Lden** value (*100 dB) b7 - **Ltm3** value (*100 dB)

		b8 - **Ltm5** value (*100 dB) b9 - **LR1** value (*100 dB) b10 - **LR2** value (*100 dB) b11 - **EX** value (*100 dB) b12 - **SD** value (*100 dB)
50	Logger_main_prof[2]	Main results in the 2nd profile saved in the file. Contents defined the same as in Logger_main_prof[1].
51	Logger_main_prof[3]	Main results in the 3rd profile. Contents defined the same as in Logger_main_prof[1].
52	Logger_main_common	Main common results saved in the file. Contents defined as a sum of flags: b0 - overload time (sec) b1 - NR value b2 - NC value
53	Logger_stat_prof[1]	Statistical results in the 1st profile saved in the file. Contents defined as a sum of flags from b1 to N_stat_level defined in table B1.27.
54	Logger_stat_prof[2]	Statistical results in the 2nd profile saved in the file. Contents defined as a sum of flags from b1 to N_stat_level defined in table B1.27.
55	Logger_stat_prof[3]	Statistical results in the 3rd profile saved in the file. Contents defined as a sum of flags from b1 to N_stat_level defined in table B1.27.
56	Reserved	reserved
57	Reserved	reserved
58	Reserved	reserved
59	Reserved	reserved
60	Reserved	reserved
61	Reserved	reserved
62	Reserved	reserved
63	Reserved	reserved
…		

Table B.1.8. Measurement trigger parameters

Word number	Name	Comment
0	0xnn2B	[2B, nn=block's length]
1	TriggerMode	trigger mode: 0 - **OFF**, 2 - measurement on trigger **SLOPE+** 3 - measurement on trigger **SLOPE–** 4 - measurement on trigger **LEVEL+** 5 - measurement on trigger **LEVEL–** 6 - measurement on trigger **GRAD+**
2	TriggerSource	source of the triggering signal: 0 - **Leq(1)** the **Leq** result from the first profile
3	TriggerLevel	level of triggering:

		24 ÷ 136 dB (*10)
4	TriggerGrad	gradient of triggering: 1 dB/ms ÷ 100 dB/ms (*10)
5	TriggerPre	reserved
6	TriggerPost	reserved
7	TriggerSampling	reserved
8	TriggerRecTime	reserved
9	TriggerStep	trigger period given in 0.1 ms. If zero Step is equal to logger time-step (cf. Tab. B.1.15)
10	TriggerFilter	reserved
11	BitsPerSample	reserved
12	Range	reserved
13	Gain	reserved
14	LengthLimit	reserved
…		

Table B.1.9. Logger trigger parameters

Word number	Name	Comment
0	0xnn2C	[2C, nn=block's length]
1	TriggerMode	trigger mode: 0 - **OFF**, 4 - measurement on trigger **LEVEL+**, 5 - measurement on trigger **LEVEL–**
2	TriggerSource	source of the triggering signal: 0 - **Leq(1)** the **Leq** result from the first profile
3	TriggerLev	level of triggering: 24 ÷ 136 dB (*10)
4	TriggerGrad	reserved
5	TriggerPre	number of the records taken into account before the fulfilment of the triggering condition ∈(1 ÷ 10)
6	TriggerPost	number of the records taken into account after the fulfilment of the triggering condition ∈(1 ÷ 200)
7	TriggerSampling	reserved
8	TriggerRecTime	reserved
9	TriggerStep	trigger period given in 0.1 ms. If zero Step is equal to logger time-step (cf. Tab. B.1.15)
10	TriggerFilter	reserved
11	BitsPerSample	reserved
12	Range	reserved
13	Gain	reserved
14	LengthLimit	reserved
…		

Table B.1.10. Wave-file recording parameters

Word number	Name	Comment
0	0xnn2D	[2D, nn=block's length]
1	TriggerMode	trigger mode: 0 - **OFF**, 1 - recording whole measurement 2 - recording on trigger **SLOPE+** 3 - recording on trigger **SLOPE–** 4 - recording on trigger **LEVEL+** 5 - recording on trigger **LEVEL–** 6 - recording on trigger **GRAD+** 7 - recording on trigger **MANUAL** 8 - recording on trigger **INTEGRATION PERIOD** 9 **-** reserved 10 - reserved 11 - recording on trigger **ALARM**
2	TriggerSource	source of the triggering signal: 0 - **Leq(1)** the **Leq** result from the first profile
3	TriggerLevel	level of triggering: 24 ÷ 136 dB (*10)
4	TriggerGrad	gradient of triggering: 1 dB/ms ÷ 100 dB/ms (*10)
5	TriggerPre	pretrigger time given in 10ms
6	TriggerPost	reserved
7	TriggerSampling	sampling frequency given in 10Hz
8	TriggerRecTime	recording time of single data block: 0 - recording to the end of measurement 1..28800 (sec)
9	TriggerStep	trigger period given in 0.1 ms. If zero Step is equal to logger time-step (cf. Tab. B.1.15)
10	TriggerFilter	filter type: 1 - **Z**, 2 - **A**, 3 - **C** 5 - **B**
11	BitsPerSample	bits/sample: 16, 24
12	Range	Full scale signal range in 0.01dB
13	Gain	Signal gain in dB
14	LengthLimit	Wave file length limit in minutes
…		

Table B.1.12. 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 - Lxymax[2] 4 - Lxymin[2] 8 - Lxyeq[2,3] 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 - Lxymax[2] 4 - Lxymin[2]

		8 - Lxyeq[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 - Lxymax[2] 4 - Lxymin[2] 8 - Lxyeq[23] 16 - **LAV** 32 - **LR1** 64 - **LR2**
18	FilterPeakP[3]	filter type for Peak result calculation in the 3rd profile: 1 - **Z**, 2 - **A**, 3 - **C** 5 - **B** 6 - **LF**
19	reserved	reserved
…		

[1] x - depends of the filter type for Peak result calculation in selected profile: A, C, Z, B (cf. Tab. B.1.12)

[2] x - depends of the filter type in selected profile: A, C, Z, B, LF (cf. Tab. B.1.12)
y - depends of the detector type in selected profile: I (imp.), F (fast), S (slow) (cf. Tab. B.1.12)

[3] y - only for exponential detector's type (cf. Tab. B.1.6)

Table B.1.13. Display settings of the main results

Word number	Name	Comment
0	0xnn48	[48, nn=header's length]
1	TIME	0 – TIME result not displayed, 1 - TIME result displayed
2	Lpeak	0 – Lxpeak[1] result not displayed, 1 – Lxpeak[1] result displayed
3	Lmax	0 – Lxymax[2] result not displayed, 1 – Lxymax[2] result displayed
4	Lmin	0 – Lxymin[2] result not displayed, 1 – Lxymin[2] result displayed
5	L	0 – Lxy[2] result not displayed, 1 – Lxy[2] result displayed
6	DOSE	0 – DOSE result not displayed, 1 - DOSE result displayed
7	D_8h	0 – D_8h result not displayed, 1 - D_8h result displayed
8	LAV	0 – LAV result not displayed, 1 - LAV result displayed
9	Leq	0 – Lxyeq[23] result not displayed, 1 – Lxyeq[23] result displayed
10	LE	0 – LxyE[23] result not displayed, 1 - LxyE[23] result displayed
11	SEL8	0 – SEL8 result not displayed, 1 - SEL8 result displayed
12	E	0 – E result not displayed, 1 – E result displayed
13	E_8h	0 – E_8h result not displayed, E_8h 1 - result displayed
14	Lden	0 – Lden result not displayed, 1 - Lden result displayed
15	LEPd	0 – LEPd result not displayed, 1 - LEPd result displayed
16	PSEL	0 – PSEL result not displayed, 1 - PSEL result displayed
17	Ltm3	0 – Ltm3 result not displayed, 1 - Ltm3 result displayed
18	LTeq	0 – LTeq result not displayed, 1 - LTeq result displayed
19	Ln	0 – Ln result not displayed, 1 - Ln result displayed
20	PTC	0 – PTC result not displayed, 1 - PTC result displayed
21	PTP	0 – PTP result not displayed, 1 - PTP result displayed
22	ULT	0 – ULT result not displayed, 1 - ULT result displayed
23	TWA	0 – TWA result not displayed, 1 - TWA result displayed
24	PrDOSE	0 – PrDOSE result not displayed, 1 - PrDOSE result displayed
25	PrTWA	0 – PrTWA result not displayed, 1 - PrTWA result displayed
26	LR1	0 – LR1 result not displayed, 1 - LR1 result displayed
27	LR2	0 – LR2 result not displayed, 1 – LR2 result displayed
28	LCA	0 – Lc-a result not displayed, 1 – Lc-a result displayed
29	OVL	0 – OVL result not displayed, 1 - OVL result displayed
30	LeqLF	0 – LeqLF result not displayed, 1 - LeqLF result displayed
…	…	…

[1] x - depends of the filter type for Peak result calculation in selected profile: A, C, Z, B (cf. Tab. B.1.12)

[2] x - depends of the filter type in selected profile: A, C, Z, B, LF (cf. Tab. B.1.12)
y - depends of the detector type in selected profile: I (imp.), F (fast), S (slow) (cf. Tab. B.1.12)

[3] y - only for exponential detector's type (cf. Tab. B.1.6)

Table B.1.14. Header of the statistical analysis

Word number	Name	Comment
0	0xnn09	[09, nn=block's length]
1	0x0307	[03=number of profiles, 07=active profiles mask]
2	0xmm0A	[0A, mm=sub-block's length]
3	NofClasses[1]	number of classes in the first profile (120)
4	BottomClass[1]	bottom class boundary (*10 dB) in the first profile
5	ClassWidth[1]	class width (*10 dB) in the first profile
6	0xmm0A	[0A, mm=sub-block's length]
7	NofClasses[2]	number of classes in the second profile (120)
8	BottomClass[2]	bottom class boundary (*10 dB) in the second profile
9	ClassWidth[2]	class width (*10 dB) in the second profile
10	0xmm0A	[0A, mm=sub-block's length]
11	NofClasses[3]	number of classes in the third profile (120)
12	BottomClass[3]	bottom class boundary (*10 dB) in the third profile
13	ClassWidth[3]	class width (*10 dB) in the third profile
…	…	…

Table B.1.15. Header of the file from the logger

Word number	Name	Comment
0	0xnn0F	[0F, nn=header's length]
1	BuffTSec	logger time step - full seconds part
2	BuffTMilisec	logger time step - milliseconds part
3	LowestFreq	the lowest **1/1 OCTAVE** or **1/3 OCTAVE** frequency (*100 Hz)
4	NOctTer	number of **1/1 OCTAVE** or **1/3 OCTAVE** results
5	NOctTerTot	number of **TOTAL** values
6..7	BuffLength	logger length (bytes)
8..9	RecsInBuff	number of records in the logger
10..11	RecsInObserv	number of records in the observation period equal to: number of records in the logger + number of records not saved
12..13	AudioRecords	number of audio records in the logger
…	…	…

Note: *The current logger time step in seconds can be obtained from the formulae:*

T = BuffTSec + BuffTMillisec / 1000

Table B.1.16. Contents of the file from the logger

Word number	Name	Comment
0..(BuffLength/2-1)		result#1, result#2, ... result#(BuffLength/2-1)

Table B.1.17. Header of the Summary Results Record (saved in Summary Results Record)

Word number	Name	Comment
0	0xnn59	[59, nn=header's length]
1..2	RecNumber	Summary Results Record number: 1..
3..4	MeasureTime	Time of the measurement
5	Flags	Measurement flags. Contents defined as a sum of flags: b0 - if set to 1: calibration coefficient is used b3 - if set to 1: overload occurred b7, b6, b5: type of the result **Lden** 000 – **Lden** result is not available 001 – **Ld** result 010 – **Le** result 011 – **Lde** result 100 – **Ln** result 101 – **Lnd** result 110 – **Len** result 111 – **Lden** result b9 - if set to 1: measurement start synchronized with GPS b10 - if set to 1: under-range occurred in the 1st profile b11 - if set to 1: under-range occurred in the 2nd profile b12 - if set to 1: under-range occurred in the 3rd profile b13 - if set to 1: Microphone service mode b14 - if set to 1: Microphone damaged
…	…	…

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

Word number	Name	Comment
0	0xnn66	[66, nn=block's length]
1st profile results. Presence depending on the value of Logger_main_prof[1] (cf. Tab. B.1.6)		
	Result[1][1]	L_{xpeak}[1] value in the 1st profile (*100 dB)
	Result[1][2]	L_{xyE}[23] value in the 1st profile (*100 dB)
	Result[1][3]	maximal value (L_{xymax}[2]) in the 1st profile (*100 dB)
	Result[1][4]	minimal value (L_{xymin}[2]) in the 1st profile (*100 dB)
	Result[1][5]	L_{xy}[2] value in the 1st profile (*100 dB)
	Result[1][6]	L_{xyeq}[23] value in the 1st profile (*100 dB)
	Result[1][7]	**Lden** value in the 1st profile (*100 dB)
	Result[1][8]	**Ltm3** value in the 1st profile (*100 dB)

	Result[1][9]	**Ltm5** value in the 1st profile (*100 dB)
	Result[1][10]	**LR1** value in the 1st profile (*100 dB)
	Result[1][11]	**LR2** value in the 1st profile (*100 dB)
	Result[1][12]	**EX** value in the 1st profile (*100 dB)
	Result[1][13]	**SD** value in the 1st profile (*100 dB)
2nd profile results. Presence depending on the value of Logger_main_prof[2] (cf. Tab. B.1.6)		
	Result[2][1]	Lxpeak[1] value in the 2nd profile (*100 dB)
	Result[2][2]	LxyE[23] value in the 2nd profile (*100 dB)
	Result[2][3]	maximal value (Lxymax[2]) in the 2nd profile (*100 dB)
	Result[2][4]	minimal value (Lxymin[2]) in the 2nd profile (*100 dB)
	Result[2][5]	Lxy[2] value in the 2nd profile (*100 dB)
	Result[2][6]	Lxyeq[23] value in the 2nd profile (*100 dB)
	Result[2][7]	**Lden** value in the 2nd profile (*100 dB)
	Result[2][8]	**Ltm3** value in the 2nd profile (*100 dB)
	Result[2][9]	**Ltm5** value in the 2nd profile (*100 dB)
	Result[2][10]	**LR1** value in the 2nd profile (*100 dB)
	Result[2][11]	**LR2** value in the 2nd profile (*100 dB)
	Result[2][12]	**EX** value in the 2nd profile (*100 dB)
	Result[2][13]	**SD** value in the 2nd profile (*100 dB)
3rd profile results. Presence depending on the value of Logger_main_prof[3] (cf. Tab. B.1.6)		
	Result[3][1]	Lxpeak[1] value in the 3rd profile (*100 dB)
	Result[3][2]	LxyE[23] value in the 3rd profile (*100 dB)
	Result[3][3]	maximal value (Lxymax[2]) in the 3rd profile (*100 dB)
	Result[3][4]	minimal value (Lxymin[2]) in the 3rd profile (*100 dB)
	Result[3][5]	Lxy[2] value in the 3rd profile (*100 dB)
	Result[3][6]	Lxyeq[23] value in the 3rd profile (*100 dB)
	Result[3][7]	**Lden** value in the 3rd profile (*100 dB)
	Result[3][8]	**Ltm3** value in the 3rd profile (*100 dB)
	Result[3][9]	**Ltm5** value in the 3rd profile (*100 dB)
	Result[3][10]	**LR1** value in the 3rd profile (*100 dB)
	Result[3][11]	**LR2** value in the 3rd profile (*100 dB)
	Result[3][12]	**EX** value in the 3rd profile (*100 dB)
	Result[3][13]	**SD** value in the 3rd profile (*100 dB)
Common results. Presence depending on the value of Logger_main_common (cf. Tab. B.1.6)		
	OVL	Overload time in seconds. (results written in 2 words)
	NR	NR value
	NC	NC value

[1] x - depends of the filter type for Peak result calculation in selected profile: A, C, Z, B (cf. Tab. B.1.12)

[2] x - depends of the filter type in selected profile: A, C, Z, B (cf. Tab. B.1.12)
y - depends of the detector type in selected profile: I (imp.), F (fast), S (slow) (cf. Tab. B.1.12)

[3] y - only for exponential detector's type (cf. Tab. B.1.6)

Table B.1.19. Statistical levels (saved in Summary Results Record)

Word number	Name	Comment
0	0xnn65	[65, nn=block's length]
	Lnn[i,p]	Value of the **Lnn** statistics for profile p (p=1..pp) (*100 dB) i=0.. N_stat_level -1, (cf. Tab. B.1.27) Presence depending on the value of Logger_stat_prof[p] (cf. Tab. B.1.6) Number of the **Lnn** statistics defined in Tab. B.1.27

Table B.1.20. 1/1 OCTAVE analysis results (saved in Summary Results Record)

Word number	Name	Comment
0	0xnn0E, 0xnn26, 0xnn27, 0xnn30	[block_id, nn=block_length] 0xnn**0E** - averaged spectrum results, 0xnn**26** - min. spectrum results, 0xnn**27** - max. spectrum results 0xnn**30** - peak spectrum results
1	0x0101	[used_profile, profile's mask]
2	LowestFreq	the lowest **1/1 OCTAVE** frequency (*100 Hz): 3150 (**AUDIO BAND**)
3	NOct	number of **1/1 OCTAVE** values: 10 (**AUDIO BAND**)
4	NOctTot	number of **TOTAL** values: 3
5÷20	Octave[i]	1/1 octave[i] value (*100 dB); i=1÷NOct+NoctTot (1÷13)
…	…	…

Table B.1.21. 1/3 OCTAVE analysis results (saved in Summary Results Record)

Word number	Name	Comment
0	0xnn10, 0xnn28, 0xnn29, 0xnn32	[block_id, nn=block_length] 0xnn**10** - averaged spectrum results, 0xnn**28** - min. spectrum results, 0xnn**29** - max. spectrum results 0xnn**32** - peak spectrum results
1	0x0101	[used_profile, profile's mask]
2	LowestFreq	the lowest **1/3 OCTAVE** frequency (*100 Hz): 2000 (**AUDIO BAND**)
3	NTer	number of **1/3 OCTAVE** values: 31 (**AUDIO BAND**)
4	NTerTot	number of **TOTAL** values: 3
5÷50	Tercje[i]	1/3 octave[i] value (*100 dB); i=1÷NTer+NTerTot (1÷34)
…	…	…

Table B.1.22. Results of the statistical analysis in profiles (saved in Summary Results Record)

Word number	Name	Comment
0	0x010B	[0B, prof_mask#1]
1	SubblockLength	2 * number of classes in the first profile + 2
2..3	Histogram[1][1]	the first counter in the first profile
4..5	Histogram[1][2]	the second counter in the first profile
.....	.....	.....
0	0x020B	[0B, prof_mask#2]
1	SubblockLength	2 * number of classes in the second profile + 2
2..3	Histogram[2][1]	the first counter in the second profile
4..5	Histogram[2][2]	the second counter in the second profile
.....	.....	.....
0	0x040B	[0B, prof_mask#3]
1	SubblockLength	2 * number of classes in the third profile + 2
2..3	Histogram[3][1]	the first counter in the third profile
4..5	Histogram[3][2]	the second counter in the third profile
.....	.....	.....

Table B.1.24. SETUP file

Word number	Name	Comment
0	0x0020	[20, 00=block's length in the second word]
1	BlockLength	length of the block
2..BlockLength-1	SetupTextData	saved setup values

Table B.1.25. File-end-marker

Word number	Name	Comment
0	0xFFFF	file end marker

Table B.1.27. Statistical levels settings

Word number	Name	Comment
0	0xnn64	[64, nn=block's length]
1	N_stat_level	number of statistical levels = N
2+i	nn[i]	number of the **Lnn** statistics; i=0..N-1
…	…	…

Table B.1.28. Alarm parameters settings

Word number	Name	Comment
0	0x0060	[**60** = id, 00 = block's length in the second word]
1	BlockLength	block length in words
2	EventCount	
+[0]	0xmm67	[67, mm=sub-block's length]
+[1]	EventId[i]	
+[2]	Active[i]	event active: 0 - switched off, 1 - switched on
+[3..10]	Name[i]	
+[11]	Source[i]	event source: 0 – System 1 – Leq 2 – Lmax 3 – LR(1) 4 – LR(2) 5 – Leq+NR 6 – LeqPR 7 – LeqPR+LN 8 – Lnn
+[12]	Integration[i]	event integration time 0 – 1s, 1 – SR, 2 – TH,
+[13..14]	SysEventMask[i]	system event mask defined as a sum of: b0 - Powered Up b1 - Powered Down b2 - Measurement Start b3 - Measurement Stop b4 - Mains On b5 - Mains Off b6 - Low Battery b7 - Battery OK b8 - reserved b9 - reserved b10 - Low Storage b11 - Storage OK b12 - System Check b13 - Live Check b14 - Instrument Error b15 - reserved

		b16 - reserved b17 - Device Tilt b18 - Device Vertical b19 - Vibration b20 - Location b31 - Microphone service mode (valid only with b12 or b13)
+[15]	Threshold1[i]	value in dB
+[16]	Threshold2[i]	in case of Leq+NR **source**: NR in case of LeqPR+LN or Lnn **source**: LN in other cases: reserved
+[17]	StartHour[i]	
+[18]	StartMinute[i]	
+[19]	StopHour[i]	
+[20]	StopMinute[i]	
+[21]	Weekday	weekday mask defined as a sum of: b0 – Mo, b1 – Tu, b2 – We, b3 – Th, b4 – Fr, b5 – Sa, b6 – Su,
+[22]	TriggerMode[i]	trigger mode: 0 – Continuous, 1 – Counter,
+[23]	MinDuration[i]	value in seconds
+[24]	Counter[i]	value without unit
+[25]	MinBreak[i]	min. break between successive events in seconds
+[26]	SMSActive[i]	sms active: 0 - switched off, 1 - switched on
+[27]	SMSRecipMask[i]	
+[28]	Email Active[i]	email active: 0 - switched off, 1 - switched on
+[29]	EmailRecipMask[i]	
+[30]	AudioActive[i]	audio active: 0 - switched off,

		1 - switched on
+[31]	IOActive[i]	reserved
+[32]	PreTrigger[i]	value in seconds (only for LeqPR+LN)
…	…	…

B.2 STRUCTURE OF THE FILE CONTAINING RESULTS FROM LOGGER'S FILE

SvanPC file header - cf. Tab. B.1.1.
File header - cf. Tab. B.1.2.
Unit and software specification - cf. Tab. B.1.3.
Calibration settings - cf. Tab. B.1.4.
USER'S text - cf. Tab. B.1.5.
Unit text info - cf. Tab. B.1.6.
Parameters and global settings - cf. Tab. B.1.7.
MEASUREMENT TRIGGER settings - cf. Tab. B.1.8.
LOGGER TRIGGER settings - cf. Tab. B.1.9.
Wave-file recording parameters - cf. Tab. B.1.10.
Special settings for profiles - cf. Tab. B.1.12.
Display settings of the main results - cf. Tab. B.1.13.
Header of the statistical analysis - cf. Tab. B.1.14.
Header of the logger file - cf. Tab. B.1.15.
Contents of the logger file - cf. Tab. B.1.16. and the description in B.2.1.

B.2.1. The contents of the files in the logger

The records with the results and the records with the state of the markers as well as the records with the breaks in the results registration are saved in the files in the logger. All results are written in dB*100.

B.2.1.1. Record with the results

The contents of the record with the results depends on the selected measurement function and the value set in the **LOGGER** position of the **PROFILE x** and **SPECTRUM** sub-lists. The following elements can be present (in the given sequence):

(1) flag record

< flags > :

- b0: 1- the overload detected, 0 - the overload not detected
- b1: 1- the excessive self-vibration detected, 0 - the excessive self-vibration overload not detected
- b13: 1 - Microphone service mode
- b14: 1 - Microphone damaged

(2) results of the measurement from the first profile if the corresponding **LOGGER** position was active *(paths: Measurement / Logging / Logger Res. / Prof. 1*); up to seven words are written:

<result1> - **Lxpeak**[1] result, depending on the value of BufferP[1] (cf. Tab. B.1.12)
<result2> - **Lxymax**[2] result, depending on the value of BufferP[1] (cf. Tab. B.1.12)
<result3> - **Lxymin**[2] result, depending on the value of BufferP[1] (cf. Tab. B.1.12)
<result4> - **Lxyeq**[23] result, depending on the value of BufferP[1] (cf. Tab. B.1.12)
<result5> - **LAV** result, depending on the value of BufferP[1] (cf. Tab. B.1.12)
<result5> - **LR1** result, depending on the value of BufferP[1] (cf. Tab. B.1.12)
<result6> - **LR2** result, depending on the value of BufferP[1] (cf. Tab. B.1.12)

(3) results of the measurement from the second profile if the corresponding **LOGGER** position was active *(paths: Measurement / Logging / Logger Res. / Prof. 2*); up to five words are written:

<result1> - **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 the comment file name

The format of the data frame is as follows:

HS	D	HE

where:

HS starting header (1 word)

D The full name of the comment file (e.g. “REC62.WAV”).

HE ending header (1 word), which differs from the HS only on b11 bit (thanks to it, it is possible to analyse the recorded file starting from its end)

The HEADER format is as follows:

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0

where:

b15 - 1
b14 - 1
b13 - 0
b12 - 0,
b11 - header type:
0 - HS
1 - HE
b10 - 1
b9 - 0
b8 - 0
b15÷b8 – HS (0xC4), HE (0xCC)
b7÷b0 – length of the block

B.2.1.8. Record with GPS data

The value equal to -12288 (0xd000) denotes the undefined value.

Word number	Name	Comment
0	0xC703	record ID (start)
1	Length	length of the block together with IDs, [words]
2	Quality	Signal quality: 0 - GPS_NOT_FIX (no signal) 1 - GPS_FIX 2 - GPS_FIX_DIF
3	Time.Sec	Seconds part of time
4	Time.Min	Minutes part of time
5	Time.Hour	Hours part of time
6	Date.Day	Day
7	Date.Month	Month
8	Date.Year	Year
9	Latitude.Deg	Degree part of latitude
10	Latitude.Min	Minutes part of latitude
11	Latitude.Sec	Seconds part of latitude
12	Latitude.MiliSec	Milliseconds part of latitude
13	Latitude.Dir	Latitude direction: N, S
14	Longitude.Deg	Degree part of longitude
15	Longitude.Min	Minutes part of longitude
16	Longitude.Sec	Seconds part of longitude
17	Longitude.MiliSec	Milliseconds part of longitude
18	Longitude.Dir	Longitude direction: E, W
19	Altitude	Altitude (meters)
20	Altitude.10	Decimal part of altitude
21	Speed	Speed * 100 (km/h)
22	Length	length of the block together with IDs, [words]
23	0xCF03	record ID (end)
…	…	….

B.2.1.12. Block of marker for alarm

Word number	Name	Comment
0	0xC708	0xC708 = block start identifier
1	0xnnnn	block length in words
2	Marker	number of marker defined in Tab. B.1.28 (1..
3	AlarmDate	Alarm date (cf. App. B.4)
4	AlarmTime	Alarm time (cf. App. B.4)
5	AlarmTimeMs	milliseconds part of time (0..1999)
6	Value[1]	cf. Tab. B.1.28 in case of "System **"source**: LSW of system event defined in SysEventMask in other cases: Value of exceeding the alarm threshold. Type depends of AlarmThreshold 1
7	Value[2]	cf. Tab. B.1.28 in case of "System **"source**: MSW of system event defined in SysEventMask in other cases: Value of exceeding the alarm threshold. Type depends of AlarmThreshold 2
8	Value[3]	in case of "System **"source**: Instrument Error (valid only with Instrument Error flag) x - sum of the following flags flags: b0 - RTC error b1 - SD card error b2 - Temperature sensor error b3 - Battery error b4 - Battery temperature too high in other cases: reserved
9	Value[4]	in case of "System **"source**: MSB: System Check (valid only with System Check flag) LSB: Live Check (valid only with Live Check flag) x - sum of the following flags flags: 0 - OK 1 - Failed 2 - Not performed 3 - Speaker failed 4 - Microphone disconnected 5 - Microphone connected 6 - Microphone damaged in other cases: reserved
..		
nn-2	0xnnnn	block length in words
nn-1	0xCF08	0xCF08 = block end identifier

B.3 STRUCTURE OF THE SETUP FILE

SvanPC file header - cf. Tab. B.1.1.
File header - cf. Tab. B.1.2.
Unit and software specification - cf. Tab. B.1.3.
SETUP DATA - cf. Tab. B.1.23.
File-end-marker - cf. Tab. B.1.24.

B.4 DATE AND TIME

Following function written in C explain how the date and time are coded:

```
void ExtractDateTime(int date, unsigned int time, int dt[])
{
      dt[0] = time % 30;                  /* sec */
      dt[1] = (time/30) % 60;             /* min */
      dt[2] = time/1800;                  /* hour */

      dt[3] = date & 0x001F;              /* day */
      dt[4] = (date>>5) & 0x000F;         /* month */
      dt[5] = (date>>9) & 0x007F + 2000;  /* year */
}

void ExtractTimeMs(long timeMs, int dt[])
{
      long time = timeMs/1000L;

      dt[0] = time % 60L;                 /* sec */
      dt[1] = (time/60L) % 60L;           /* min */
      dt[2] = time/3600L;                 /* hour */
      dt[3] = timeMs % 1000L;             /* ms */
}
```

B.5 STRUCTURE OF THE CSV FILE

CSV files can be recorded in two formats, depending on the settings (see Chapter 4.10.4.8).

B.5.1. Structure of the CSV file for the Multi-line format

Section	File contents
File header	// **********
	// CSV file version, 1.19
	// Created, 15/07/2020, 15:49:27
	// Unit, 303, SN, 78626, MicSN, 79044
	// Firmware, 1.19.2, 30/06/2020
	// Corresponding logger file name, L15749.SVL
	// Device function, 1/3 octave
	// Integration time, 01:00:00
	// Leq integration, Linear
	// Profile 1, A, Fast
	// Profile 2, C, Fast
	// Profile 3, Z, Fast
	// Statistical levels, 1, 10, 20, 30, 40, 50, 60, 70, 80, 90
	// Spectrum filter, Z

	// Spectrum detector, Linear
	// CSV save mask, 7FFF, 7FFF, 7FFF, 15
	// SLM results, profile 1, TIME, Lpeak, Lmax, Lmin, L, Leq, LE, Lden, LEPd, Ltm3, LTeq, Ln, LR30m, LR60m, OVL
	// SLM results, profile 2, TIME, Lpeak, Lmax, Lmin, L, Leq, LE, Lden, LEPd, Ltm3, LTeq, Ln, LR30m, LR60m, OVL
	// SLM results, profile 3, TIME, Lpeak, Lmax, Lmin, L, Leq, LE, Lden, LEPd, Ltm3, LTeq, Ln, LR30m, LR60m, OVL
	// Spectrum results, AVER, MAX, MIN, PEAK
	// **********
Record number	// Record No, 1
Time sgnature	DT, 15/07/2020, 16:49:27
Measurement data	P1, 3600, 102.2, 80.9, 31.2, 37.3, 51.6, 87.1, 51.6, 51.6, 60.0, 61.5, 64.1, 47.4, 42.4, 38.9, 37.5, 36.4, 35.4, 34.6, 33.9, 33.2, 52.8, 51.6, 0
	P2, 3600, 102.2, 84.8, 43.9, 47.2, 56.8, 92.3, 56.8, 56.8, 64.6, 66.2, 69.2, 54.8, 52.0, 50.7, 49.7, 48.9, 48.3, 47.7, 47.1, 46.3, 57.3, 56.8, 0
	P3, 3600, 102.6, 90.2, 50.2, 59.3, 61.6, 97.1, 61.6, 61.6, 69.1, 71.1, 71.1, 61.4, 59.7, 58.7, 57.8, 57.0, 56.3, 55.4, 54.4, 53.1, 60.9, 61.6, 0
	SA, 50.6, 49.7, 43.5, 45.1, 41.6, 37.7, 38.1, 37.4, 41.3, 44.4, 43.0, 43.6, 45.3, 47.2, 49.5, 45.6, 41.8, 39.5, 38.7, 35.8, 33.5, 34.6, 35.1, 32.0, 30.1, 29.2, 26.4, 23.0, 21.2, 22.2, 25.7, 51.6, 56.8, 61.6
	SM, 48.7, 34.1, 26.8, 38.1, 34.6, 25.5, 29.5, 24.5, 31.8, 38.1, 35.7, 35.2, 34.3, 32.5, 36.6, 30.6, 31.8, 30.0, 23.1, 22.5, 23.8, 23.7, 22.6, 21.3, 20.7, 20.7, 18.3, 17.1, 17.3, 18.5, 22.0, 40.5, 49.8, 59.4
	SN, 45.9, 34.1, 26.8, 27.8, 28.2, 21.6, 29.4, 24.5, 27.5, 33.0, 34.4, 34.1, 34.3, 32.5, 36.6, 30.6, 31.8, 27.7, 23.0, 22.5, 23.0, 23.6, 22.4, 20.8, 20.6, 20.4, 18.1, 17.0, 17.0, 18.3, 21.9, 39.6, 49.0, 54.4
	SP, 86.4, 87.0, 80.8, 80.4, 81.4, 82.9, 83.0, 78.3, 80.5, 81.8, 83.7, 85.4, 87.1, 91.9, 87.1, 85.0, 84.2, 89.7, 91.5, 92.1, 84.0, 85.0, 91.1, 90.7, 87.9, 87.4, 85.0, 78.6, 77.3, 84.8, 91.0, 101.7, 102.2, 102.6
Record number	// Record No, 2
Time sgnature	DT, 15/07/2020, 17:49:27
Measurement data	P1, 3600, 95.8, 82.5, 26.1, 57.1, 58.8, 94.4, 58.8, 58.8, 66.6, 67.7, 71.3, 61.0, 55.2, 49.7, 43.5, 37.8, 34.8, 32.3, 30.4, 29.1, 59.6, 58.8, 0
	P2, 3600, 95.8, 84.0, 40.0, 63.7, 63.0, 98.6, 63.0, 63.0, 70.2, 71.4, 75.3, 65.8, 60.7, 55.7, 51.5, 49.2, 47.9, 46.9, 45.9, 44.5, 63.8, 63.0, 0
	P3, 3600, 98.8, 91.2, 48.9, 64.3, 64.5, 100.0, 64.5, 64.5, 71.7, 72.9, 75.8, 66.7, 62.8, 60.5, 59.0, 57.9, 56.9, 55.8, 54.6, 53.1, 64.9, 64.5, 0
	SA, 48.9, 50.1, 41.5, 42.7, 39.0, 34.0, 38.3, 45.5, 46.3, 49.2, 48.7, 51.0, 51.9, 56.2, 58.0, 54.1, 47.1, 43.1, 41.3, 37.8, 35.9, 37.6, 37.6, 36.0, 33.3, 32.1, 31.2, 28.7, 23.8, 23.4, 24.9, 58.8, 63.0, 64.4
	SM, 26.8, 37.6, 37.9, 39.3, 32.9, 25.9, 30.1, 34.7, 46.9, 49.2, 38.1, 48.1, 48.2, 48.3, 45.5, 45.6, 41.2, 41.1, 31.5, 24.4, 21.8, 22.9, 23.0, 24.9, 25.4, 20.9, 20.4, 19.0, 17.0, 18.4, 22.1, 52.8, 59.9, 62.6
	SN, 26.8, 37.6, 33.7, 37.7, 32.9, 25.9, 30.1, 29.2, 46.9, 49.2, 38.1, 48.1, 45.3, 48.3, 45.5, 43.5, 41.2, 41.1, 28.1, 23.2, 21.1, 22.4, 21.1, 19.9, 19.5, 18.9, 18.7, 17.4, 16.6, 17.8, 21.9, 51.5, 59.5, 61.5
	SP, 85.2, 88.9, 80.1, 78.7, 77.7, 71.7, 79.4, 74.4, 75.4, 82.5, 84.7, 83.7, 85.8, 89.7, 92.4, 89.0, 90.6, 84.9, 86.7, 86.2, 80.7, 84.0, 86.5, 87.6, 81.6, 77.1, 75.4, 75.1, 73.1, 73.9, 79.7, 97.1, 95.8, 98.8
...	

B.5.2. Structure of the CSV file for the Single-line format

Section	File contents
File header	// **********
	// CSV file version, 1.20
	// Created, 12/02/2021, 11:20:00
	// Unit, 307, SN, 70825, MicSN, 78322
	// Firmware, 1.21.0, 08/02/2021
	// Corresponding logger file name, L34098.SVL
	// Device function, SLM
	// Integration time, 00:01:00
	// Leq integration, Linear
	// Profile 1, A, Impulse
	// Profile 2, C, Fast
	// Profile 3, Z, Slow
	// CSV save mask, 7FFF, 7FFF, 7FFF, 15
	// **********

Record header	Record, Date, Record End Time, SLM results profile 1, TIME, Lpeak, Lmax, Lmin, L, Leq, LE, Lden, LEPd, Ltm3, LTeq, L(01), L(10), L(20), L(30), L(40), L(50), L(60), L(70), L(80), L(90), LR30m, LR60m, OVL, SLM results profile 2, TIME, Lpeak, Lmax, Lmin, L, Leq, LE, Lden, LEPd, Ltm3, LTeq, L(01), L(10), L(20), L(30), L(40), L(50), L(60), L(70), L(80), L(90), LR30m, LR60m, OVL, SLM results profile 3, TIME, Lpeak, Lmax, Lmin, L, Leq, LE, Lden, LEPd, Ltm3, LTeq, L(01), L(10), L(20), L(30), L(40), L(50), L(60), L(70), L(80), L(90), LR30m, LR60m, OVL
Record data	1, 12/02/2021, 11:21:00, P1, 60, 80.4, 62.5, 41.3, 44.5, 47.1, 64.9, 47.1, 47.1, 53.9, 55.3, 54.8, 50.6, 47.4, 45.8, 44.7, 44.1, 43.6, 43.0, 42.3, 41.5, 46.1, , 0, P2, 60, 80.4, 73.1, 55.6, 57.1, 63.7, 81.4, 63.7, 63.7, 66.7, 67.2, 72.5, 67.6, 64.6, 62.6, 61.5, 60.6, 59.8, 59.0, 58.3, 57.3, 63.9, , 0, P3, 60, 82.5, 72.6, 61.4, 61.5, 66.3, 84.1, 66.3, 66.3, 67.8, 68.0, 74.0, 69.4, 67.6, 66.1, 65.2, 64.4, 63.7, 63.0, 62.1, 61.1, 66.5, , 0
…	

APPENDIX C. TECHNICAL SPECIFICATIONS

C.1 SPECIFICATION OF SV 303 AS SOUND LEVEL METER (SLM) IN THE STANDARD CONFIGURATION

Statement of performance

SV 303 working as SLM with all listed below accessories meets requirements of the IEC 61672-1:2013 for the Class 1 Group X instruments.

Configuration of the complete SLM

SV 303	including the ST 30B microphone (1/2", nominal sensitivity 36 mV/Pa) and the SA 209 windscreen with the antibird spike
Recommended calibrator:	
SV 36	Class 1 sound calibrator 94/114 dB @ 1000 Hz or equivalent (not included in the standard set)

Accessories included in the SV 303 instrument set

SC 158	USB cable

Accessories available

SA 206	4 m telescopic mast
SL 30B_E with **SL 30B_S**	microphone electrical equivalent (in the case of the single ended voltage source the SL 30B_E should be connected through the SL 30B_S symmetrizer)

Measured quantities

$L_X$peak, **L_{XY}max**, **L_{XY}min**, **L_{XY}**, **Leq$_X$**, **LE$_X$**, **Lden**, **LEPd**, **Ltm3**, **LTeq**, **Ln** (Leq statistics), **EX** (expected Leq value), **SD** (standard Leq deviation), **LR1** and **LR2** (rolling Leq), **OVL** (overload time %).

Definitions for measured quantities are given in Appendix D.

Additional features

- Overload indication
- Under-range indication
- Battery state indication
- Temperature sensors
- Speaker for system check

Normal operating mode

The **SV 303** complete instrument including the ST 30B microphone and the SA 209 windscreen with the antibird spike and with following settings: **Microphone** compensation - **On**, **Field Compensation** – **Environment** or **Airport** (path: *<Menu> / Measurement / Comp. Filter*), see Chapter 4.10.5).

Conformance testing

This chapter contains the information needed to conduct conformance testing according to the specified standards. During these tests, the microphone or equivalent SL30B_E with SL30B_S must be mounted on the instrument.

Note: *For the comparison coupler or multifrequency calibrator evaluation, the* ***Microphone*** *compensation must be set to* ***On*** *and the* ***Free Field*** *must be set to* ***Off*** *(path: <Menu> / Measurement / Comp. Filter).*

Note: *For the free filed evaluation, the* ***Microphone*** *compensation must be set to* ***On*** *and the* ***Free Field*** *must be set to* ***Environment*** *or* ***Airport*** *(path: <Menu> / Measurement / Comp. Filter).*

To obtain a BNC type electrical input, the microphone must be replaced by the microphone electrical equivalent SL 30B_E with SL 30B_S **before turning the instrument on**.

Maximum input voltage:

SV 303	meets the requirements of IEC 61010-1 for the Class 1 devices; the input voltage shall not exceed the limits between 0 V and +5 V referred to the instrument ground.
SL 30B_E with **SL 30B_S**	input voltage shall not exceed the limits between -5 V and +5 V referred to the equivalent ground.

Impedance:

SV 303	three differential inputs: ≥ 10 kΩ, ≤ 30 pF each.
SL 30B_E with SL 30B_S	≥ 16 GΩ, ≤ 530 pF, differential input.

Note: *For conformance electrical tests, the* ***Microphone*** *compensation must be* ***Off*** *(path: <Menu> / Measurement / Compens. Filter).*

Periodical test upper frequency 8 kHz

Linear operating range

The starting point at which tests of level linearity shall begin is 94.0 dB for the frequencies specifies below. For the A weighting linearity test at 31.5 Hz, the starting point is 74 dB.

Table C.1.1. Linear operating ranges for 0 deg incidence angle (**Airport** filter), for the sinusoidal signal and microphone sensitivity 36 mV/Pa

[dB]	$L_{AS/F}$		$L_{BS/F}$		$L_{CS/F}$		$L_{ZS/F}$		L_{AeqT}		L_{BeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	30	90	30	113	30	127	40	130	30	90	30	113	30	127	33	94	65	130
500 Hz	30	127	30	129	30	130	40	130	30	127	30	129	30	130	33	130	65	133
1 kHz	30	130	30	130	30	130	40	130	30	130	30	130	30	130	33	133	65	133
4 kHz	30	131	30	129	30	129	40	130	30	131	30	129	30	129	33	134	65	132
8 kHz	30	129	30	127	30	127	40	130	30	129	30	127	30	127	33	132	65	130
12.5 kHz	30	126	30	124	30	124	40	130	30	126	30	124	30	124	33	129	65	127

Table C.1.2. Linear operating ranges for 90 deg incidence angle (**Environment** filter), for the sinusoidal signal and microphone sensitivity 36 mV/Pa

[dB]	$L_{AS/F}$		$L_{BS/F}$		$L_{CS/F}$		$L_{ZS/F}$		L_{AeqT}		L_{BeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	30	90	30	113	30	127	40	130	30	90	30	113	30	127	33	94	65	130
500 Hz	30	127	30	129	30	130	40	130	30	127	30	129	30	130	33	130	65	133
1 kHz	30	130	30	130	30	130	40	130	30	130	30	130	30	130	33	133	65	133
4 kHz	30	131	30	129	30	129	40	130	30	131	30	129	30	129	33	134	65	132
8 kHz	30	129	30	127	30	127	40	130	30	129	30	127	30	127	33	132	65	130
12.5 kHz	30	126	30	124	30	124	40	130	30	126	30	124	30	124	33	129	65	127

Note: *For the signals with the crest factor* ***n >1.41*** *upper measuring range of the RMS (****LEQ*** *and* ***SPL****) is reduced. The valid upper limit can be calculated according to the below given formula:* $A_n = 125 - 20\log(n/\sqrt{2})$*, where* ***A*** *is the upper limit for the sinusoidal signal.*

Example: For the crest factor ***n = 10*** *the upper limit is* A_{10} *=* ***108 dB****.*

Measuring frequency range of the acoustic pressure — 20 Hz ÷ 20 000 Hz.

Basic measurement error of the acoustic pressure — < 0.7 dB (measured for the reference conditions, see below).

Weighting filters (see C.3)

- **Z** meeting requirements of IEC 61672-1:2013 for the Class 1 "**Z**" filters
- **A** meeting requirements of IEC 61672-1:2013 for the Class 1 "**A**" filters
- **C** meeting requirements of IEC 61672-1:2013 for the Class 1 "**C**" filters
- **B** meeting requirements of IEC 60651 for the Class 1 "**B**" filters

Table C.1.3. Self-generated noise for different weighting filters

	Electrical *)			Acoustical, compensated		
Weighting filter	**A**	**C**	**Z**	**A**	**C**	**Z**
Noise	< 18 dB	< 18 dB	< 28 dB	< 23 dB	< 23 dB	< 33 dB

*) measured with the SL 30B_E with SL 30B_S microphone electrical equivalent

Special filters

Frequency response of SV 303 is compensated by means of two digital filters:

- **Environment** compensation filter that improves the complete instrument frequency response in the free field for the reference acoustic wave incidence angle 90 deg
- **Airport** compensation filter that improves the complete instrument frequency response in the free field for the reference acoustic wave incidence angle 0 deg

RMS detector

- Digital "True RMS" with Peak detection,
- Resolution 0.1 dB
- Range 327.7 dB
- Crest Factor unlimited (for signals in 20 kHz band).

Overload detector

The instrument has the built-in overload detectors. Both A/D converter and input amplifier overload conditions are detected. The overload in the measurement channel (in its analogue part) and the overload of the analogue / digital converter are both detected. The "overload" indication appears when the input signal amplitude is 0.5 dB above the declared "Peak measurement range".

Underrange detector

The instrument has the built-in under-range detector. The "underrange" indication appears when the Leq value for the elapsed time or the last second L_{XY} value is below the lower linear operating range.

Time weighting characteristics (Exponential averaging)

Slow "**S**" according to IEC 61672-1:2013 Class 1, Equivalent Time Constant 1000 ms
Fast "**F**" according to IEC 61672-1:2013 Class 1, Equivalent Time Constant 125 ms
Impulse "**I**" according to IEC 60804:2000 Class 1, Equivalent Time Constant 35 ms, Hold Time 1500 s

Reference conditions as per IEC 61672-1:2013

- Class of the acoustic field — Free Field
- Reference acoustic pressure — 114.0 dB (related to 20 μPa)
- Reference frequency — 1000 Hz
- Reference temperature — +23°C
- Reference relative humidity — 50 %
- Reference static pressure — 1013.25 hPa
- Reference incidence direction — perpendicular to the microphone diaphragm.

Warm-up time / **Auto-start delay**	1 minute (for 0.1 dB accuracy)
Typical stabilization time after change in environmental conditions	1 minute
Time shift after completion of a measurement, before a measurement is shown	< 1 sec

Note: *When the instrument is moved from a warm environment with high humidity, to a colder environment, care should be taken not to produce condensation inside the instrument. In this case, much longer stabilization periods may be necessary.*

Environmental, electrostatic and radio frequency criteria

Effect of humidity — < 0.5 dB (for 30%<RH<90% at 40°C and 1000 Hz)

Effect of magnetic field — < 15 dB (A) or < 25 dB (Z) (for 80 A/m and 50 Hz)

Effect of radio frequency fields — < +/-0.5 dB @ 74 dB and 10V/m electromagnetic field

The greatest susceptibility (the least immunity) is achieved when the SLM is placed parallel to the radio frequency field and **A** filter and time weighting **F** are selected and the SPL measurements are considered.

Effect of electrostatic discharge — meets requirements of IEC 61672-1:2013

During electrostatic discharge, the influence of the displayed results could be observed. No changes in instrument operation state, configuration or stored data corruption were found out.

Effect of ambient pressure — < 0.01 dB/kPa

Effect of temperature — < 0.5 dB (from -10°C to + 50°C)

Operating temperature range — from -20°C to + 50°C

Storage temperature range — from -40°C to + 60°C

Humidity — 99% RH (not-condensed)

Battery state indication — 0-100% of the battery state of charge

Ingres Protection — IP54 - significant protection from dust, protection from rain, spraying and splashing

Calibration

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

- Calibration level for the pressure field — 114.0 dB (equal to the calibrator pressure level - see calibration chart of the used calibrator)
- Calibration level for the free field and 0 deg incidence angle — 114.0 dB (equal to the calibration level for the pressure field)
- Calibration level for the free field and 90 deg incidence angle — 114.0 dB (equal to the calibration level for the pressure field)

Note: *The above levels correspond to 114 dB of calibrator's sound pressure. If the calibrator has different sound pressure than 114 dB, the calibration levels must be accordingly adjusted.*

Note: *When calibrating the instrument using an acoustic calibrator (e.g. SV36 or equivalent), the microphone is exposed to the precise acoustic* ***Pressure Field****, tunning the whole measurement channel sensitivity at 1 kHz. This functionality is available in the* ***Calibration*** *menu (see Chapter 4.9.2.2)*

In ***normal measurement mode****, the microphone is exposed to the* ***Free Field*** *conditions rather than* ***Pressure Field*** *conditions. In addition, there are diffraction effects caused by the instrument housing, top sleeve, anti-bird spikes and windscreen. To compensate these effects, the instrument is equipped with* ***Compensation Filters*** *(see Chapter 4.10.5). These filters also correct the* ***Free Field over-pressure effect*** *of the microphone at 1 kHz.*

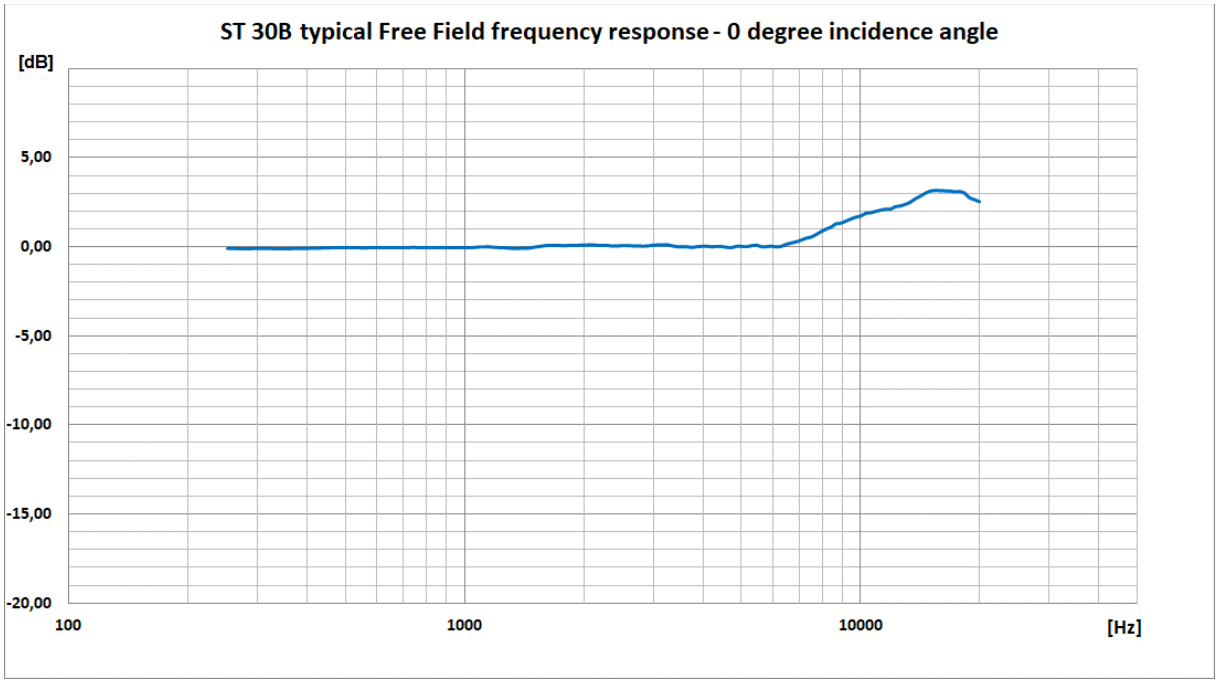
It's important to note that when an acoustic calibrator is used in ***normal measurement mode*** *instead of* ***calibration mode****, there is a slight difference in the level displayed:*

- ***0.4 dB*** *for the* ***Airport*** *compensation filter,*
- ***0.3 dB*** *for the* ***Environment*** *compensation filter.*

Microphone

ST 30B	MEMS type (½" housing)
Nominal sensitivity	36 mV/Pa (corresponding to app. -29 dBV/Pa re 1 V/Pa)
Impedance	350 Ohm.

Note: *Maximum sound pressure level that can be applied to a microphone without destroying it: 160 dB.*



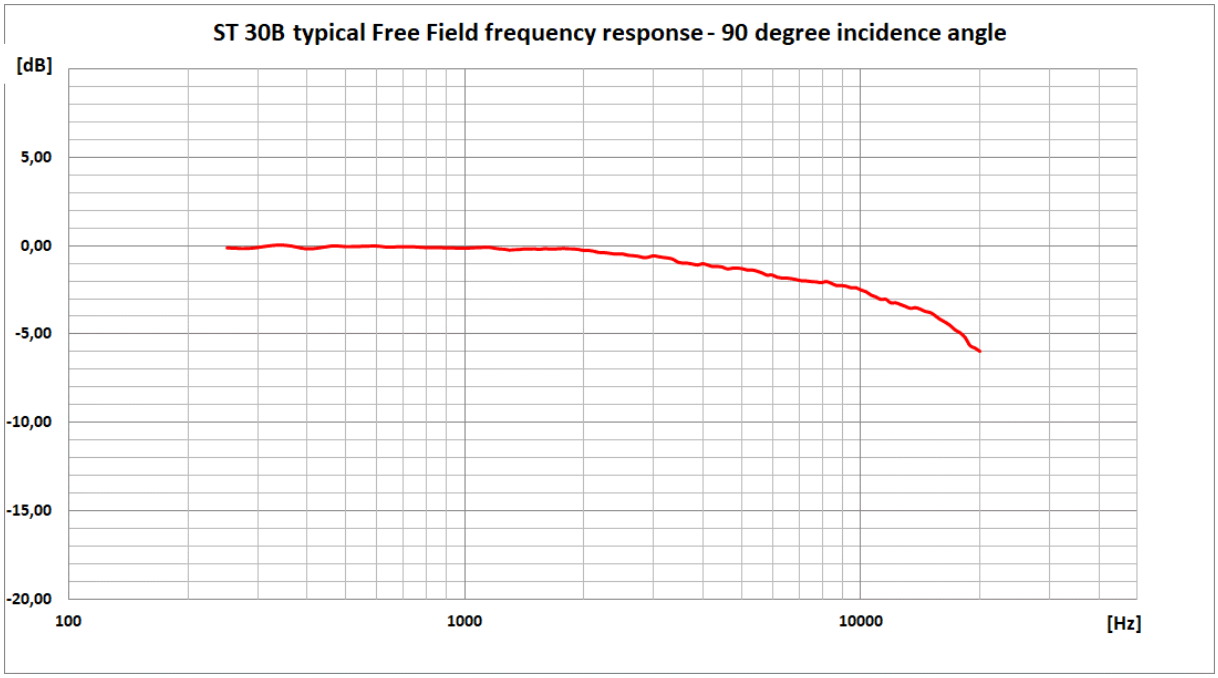


Table C.1.4. ST 30B typical Free Field frequency response for 0 deg and 90 deg incidence angle

Frequency	0 deg incidence angle	90 deg incidence angle	Frequency	0 deg incidence angle	90 deg incidence angle
[Hz]	[dB]	[dB]	[Hz]	[dB]	[dB]
251	0.00	-0.08	2 304	0.16	-0.38
259	0.00	-0.10	2 371	0.13	-0.42
266	-0.01	-0.11	2 441	0.14	-0.43
274	-0.02	-0.12	2 512	0.16	-0.44
282	-0.02	-0.12	2 585	0.16	-0.50
290	-0.01	-0.10	2 661	0.14	-0.52
299	0.00	-0.07	2 738	0.14	-0.56
307	0.01	-0.03	2 818	0.13	-0.63

Frequency	0 deg incidence angle	90 deg incidence angle	Frequency	0 deg incidence angle	90 deg incidence angle
[Hz]	[dB]	[dB]	[Hz]	[dB]	[dB]
316	0.00	0.01	2 901	0.14	-0.62
325	-0.01	0.05	2 985	0.18	-0.53
335	-0.02	0.07	3 073	0.20	-0.57
345	-0.03	0.07	3 162	0.20	-0.62
355	-0.02	0.06	3 255	0.20	-0.66
365	-0.01	0.02	3 350	0.14	-0.72
376	0.00	-0.04	3 447	0.09	-0.89
387	-0.01	-0.10	3 548	0.09	-0.95
398	0.00	-0.14	3 652	0.08	-0.95
410	0.01	-0.14	3 758	0.06	-1.00
422	0.02	-0.11	3 868	0.10	-1.05
434	0.02	-0.07	3 981	0.12	-0.98
447	0.03	-0.02	4 097	0.12	-1.05
460	0.04	0.02	4 217	0.09	-1.14
473	0.04	0.03	4 340	0.12	-1.13
487	0.04	0.01	4 467	0.10	-1.17
501	0.04	-0.01	4 597	0.06	-1.28
516	0.04	-0.01	4 732	0.05	-1.24
531	0.04	-0.01	4 870	0.12	-1.22
546	0.03	0.00	5 012	0.11	-1.26
562	0.03	0.01	5 158	0.10	-1.33
579	0.04	0.02	5 309	0.16	-1.33
596	0.05	0.02	5 464	0.18	-1.40
613	0.05	0.00	5 623	0.09	-1.50
631	0.05	-0.03	5 788	0.10	-1.63
649	0.05	-0.04	5 957	0.12	-1.61
668	0.05	-0.03	6 131	0.09	-1.73
688	0.04	-0.02	6 310	0.12	-1.79
708	0.04	-0.02	6 494	0.24	-1.79
729	0.05	-0.02	6 683	0.31	-1.82
750	0.05	-0.03	6 879	0.37	-1.88
772	0.04	-0.05	7 079	0.47	-1.94
794	0.04	-0.06	7 286	0.58	-1.96
818	0.03	-0.07	7 499	0.64	-1.99
841	0.04	-0.07	7 718	0.78	-2.00
866	0.05	-0.07	7 943	0.94	-2.05
891	0.05	-0.08	8 175	1.08	-1.98
917	0.04	-0.09	8 414	1.19	-2.09
944	0.04	-0.09	8 660	1.37	-2.21
972	0.04	-0.10	8 913	1.42	-2.21
1 000	0.04	-0.10	9 173	1.53	-2.25
1 029	0.04	-0.09	9 441	1.65	-2.34
1 059	0.06	-0.08	9 716	1.75	-2.33
1 090	0.08	-0.07	10 000	1.81	-2.47
1 122	0.08	-0.05	10 292	1.96	-2.56
1 155	0.08	-0.05	10 593	1.99	-2.75
1 189	0.07	-0.11	10 902	2.07	-2.86
1 223	0.05	-0.14	11 220	2.13	-3.00
1 259	0.04	-0.16	11 548	2.19	-2.99
1 296	0.01	-0.21	11 885	2.20	-3.19
1 334	0.00	-0.19	12 232	2.33	-3.19

Frequency	0 deg incidence angle	90 deg incidence angle	Frequency	0 deg incidence angle	90 deg incidence angle
[Hz]	[dB]	[dB]	[Hz]	[dB]	[dB]
1 372	0.01	-0.18	12 589	2.37	-3.29
1 413	0.01	-0.14	12 957	2.46	-3.40
1 454	0.02	-0.15	13 335	2.58	-3.50
1 496	0.07	-0.14	13 725	2.77	-3.47
1 540	0.11	-0.17	14 125	2.92	-3.55
1 585	0.15	-0.13	14 538	3.08	-3.68
1 631	0.17	-0.14	14 962	3.20	-3.74
1 679	0.16	-0.15	15 399	3.24	-3.92
1 728	0.17	-0.13	15 849	3.23	-4.13
1 778	0.15	-0.12	16 312	3.22	-4.28
1 830	0.16	-0.13	16 788	3.21	-4.47
1 884	0.17	-0.14	17 278	3.17	-4.72
1 939	0.18	-0.18	17 783	3.18	-4.88
1 995	0.18	-0.23	18 302	3.09	-5.15
2 054	0.20	-0.23	18 836	2.83	-5.60
2 113	0.19	-0.27	19 387	2.73	-5.75
2 175	0.17	-0.34	19 953	2.61	-5.93
2 239	0.17	-0.35			

ST 30B Free Field corrections

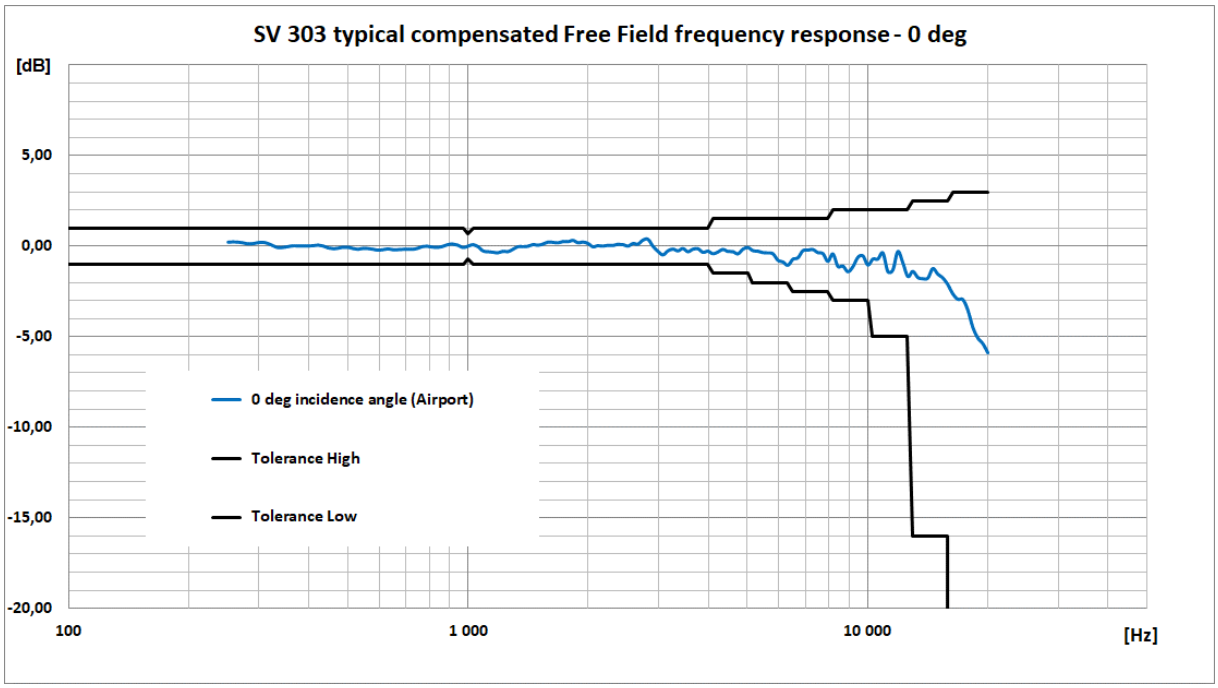
Table C.1.5. ST 30B Free Field corrections for the 0 and 90 deg incidence angle with the use of the Bruel & Kjaer 4226 sound calibrator

[dB]	Frequency [Hz]										
	31.5	63	125	250	500	1000	2000	4000	8000	12500	16000
Typical pressure response	-0.19	-0.11	-0.05	0.00	0.00	0.02	-0.25	-0.76	-1.74	-1.99	-1.76
Free Field corrections 0 deg	0.00	0.00	0.00	0.00	0.03	0.02	0.43	0.88	2.68	4.37	4.99
Free Field corrections 90 deg	0.00	0.00	0.00	-0.08	-0.02	-0.12	0.03	-0.22	-0.31	-1.29	-2.37
Uncertainty (IEC 62585)	--	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.35	0.50	0.50

Table C.1.6. ST 30B Free Field corrections for the 0 and 90 deg incidence angle with the use of the G.R.A.S. 51AB comparison coupler and reference 1/2“ microphone B&K 4192

[dB]	Frequency [Hz]										
	31.5	63	125	250	500	1000	2000	4000	8000	12500	16000
Typical pressure response	-0.49	-0.20	-0.12	0.00	0.00	-0.01	-0.30	-1.20	-3.31	-4.50	-5.62
Free Field corrections 0 deg	0.00	0.00	0.00	0.00	0.04	0.05	0.48	1.32	4.25	6.87	8.85
Free Field corrections 90 deg	0.00	0.00	0.00	-0.08	-0.01	-0.09	0.08	0.22	1.26	1.21	1.49
Uncertainty (IEC 62585)	--	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.35	0.50	0.50

SV 303 Free Field frequency response



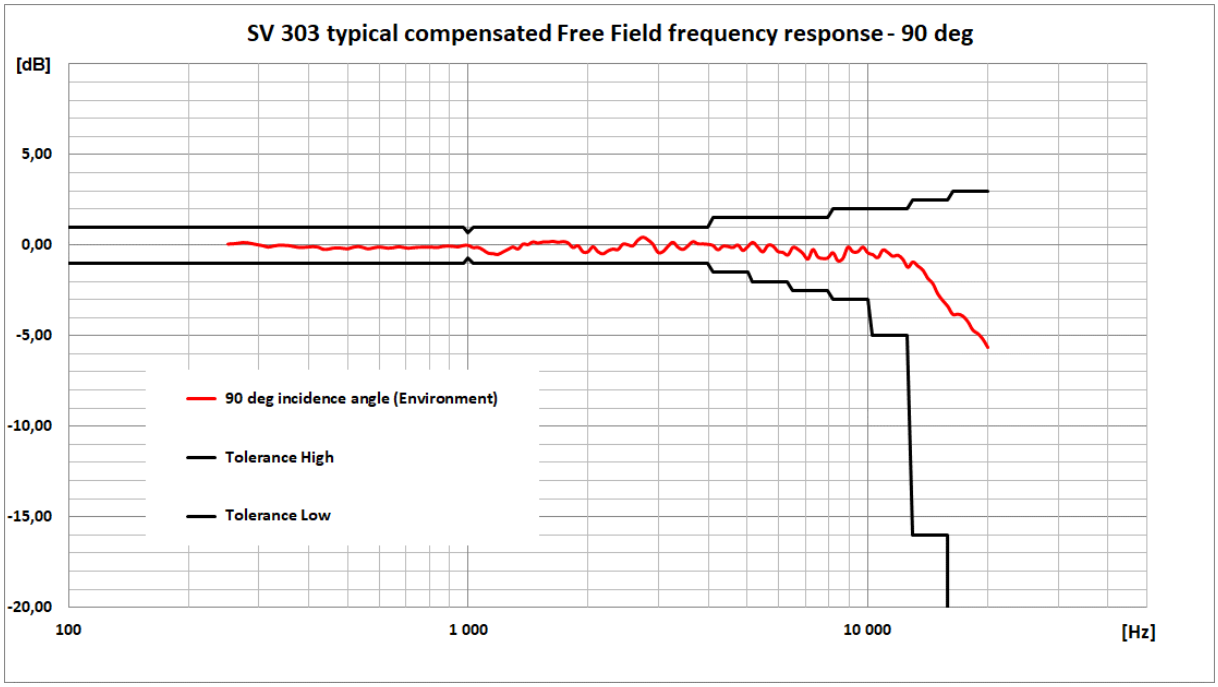


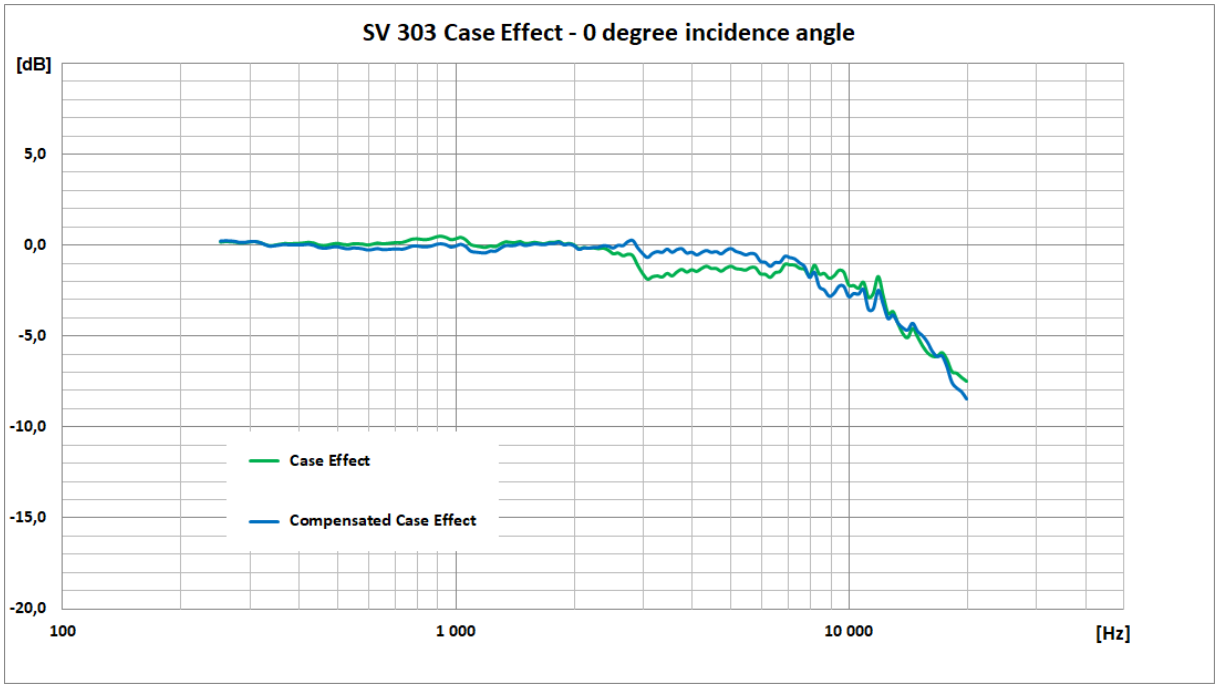
Table C.1.7. SV 303 with ST 30B typical Free Field frequency response

Frequency	0 deg incidence angle	90 deg incidence angle	Frequency	0 deg incidence angle	90 deg incidence angle
[Hz]	[dB]	[dB]	[Hz]	[dB]	[dB]
251	0.22	0.07	2 304	0.04	-0.21
259	0.24	0.08	2 371	0.10	-0.23
266	0.22	0.12	2 441	0.09	0.07
274	0.18	0.16	2 512	0.00	0.03

Frequency	0 deg incidence angle	90 deg incidence angle	Frequency	0 deg incidence angle	90 deg incidence angle
[Hz]	[dB]	[dB]	[Hz]	[dB]	[dB]
282	0.12	0.14	2 585	0.14	-0.02
290	0.14	0.08	2 661	0.11	0.29
299	0.20	0.03	2 738	0.33	0.45
307	0.21	-0.02	2 818	0.38	0.31
316	0.14	-0.09	2 901	-0.01	0.05
325	0.02	-0.04	2 985	-0.29	-0.39
335	-0.08	0.00	3 073	-0.48	-0.35
345	-0.07	0.00	3 162	-0.25	-0.05
355	-0.02	-0.01	3 255	-0.16	0.17
365	0.02	-0.06	3 350	-0.26	-0.10
376	0.01	-0.11	3 447	-0.13	-0.23
387	0.00	-0.11	3 548	-0.31	-0.03
398	0.01	-0.09	3 652	-0.17	0.20
410	0.02	-0.07	3 758	-0.14	0.08
422	0.06	-0.10	3 868	-0.34	0.08
434	0.01	-0.22	3 981	-0.28	0.06
447	-0.09	-0.21	4 097	-0.42	-0.01
460	-0.14	-0.15	4 217	-0.32	-0.25
473	-0.11	-0.13	4 340	-0.18	-0.05
487	-0.06	-0.17	4 467	-0.29	-0.06
501	-0.06	-0.19	4 597	-0.30	-0.12
516	-0.13	-0.11	4 732	-0.43	0.02
531	-0.17	-0.07	4 870	-0.17	-0.28
546	-0.12	-0.12	5 012	-0.08	-0.06
562	-0.13	-0.19	5 158	-0.25	0.16
579	-0.17	-0.14	5 309	-0.28	-0.10
596	-0.22	-0.09	5 464	-0.36	-0.36
613	-0.19	-0.12	5 623	-0.37	0.00
631	-0.15	-0.15	5 788	-0.42	-0.04
649	-0.20	-0.13	5 957	-0.78	-0.34
668	-0.19	-0.08	6 131	-0.87	-0.39
688	-0.17	-0.11	6 310	-1.05	-0.53
708	-0.16	-0.15	6 494	-0.72	-0.11
729	-0.17	-0.13	6 683	-0.64	-0.22
750	-0.11	-0.11	6 879	-0.25	-0.44
772	-0.02	-0.10	7 079	-0.22	-0.76
794	-0.01	-0.10	7 286	-0.19	-0.23
818	-0.05	-0.11	7 499	-0.36	-0.64
841	-0.06	-0.11	7 718	-0.41	-0.72
866	-0.01	-0.05	7 943	-0.83	-0.70
891	0.09	-0.04	8 175	-0.42	-0.41
917	0.11	-0.05	8 414	-1.11	-0.85
944	0.05	-0.08	8 660	-1.09	-0.72
972	-0.07	-0.01	8 913	-1.41	-0.10
1 000	0.00	0.00	9 173	-1.13	-0.36
1 029	0.08	-0.12	9 441	-0.62	-0.35
1 059	-0.03	-0.11	9 716	-0.54	-0.10
1 090	-0.26	-0.25	10 000	-1.04	-0.41
1 122	-0.31	-0.43	10 292	-0.71	-0.51
1 155	-0.33	-0.46	10 593	-0.71	-0.68
1 189	-0.37	-0.50	10 902	-0.38	-0.26

Frequency	0 deg incidence angle	90 deg incidence angle	Frequency	0 deg incidence angle	90 deg incidence angle
[Hz]	[dB]	[dB]	[Hz]	[dB]	[dB]
1 223	-0.28	-0.36	11 220	-1.40	-0.39
1 259	-0.30	-0.22	11 548	-1.32	-0.60
1 296	-0.17	-0.09	11 885	-0.30	-0.55
1 334	-0.03	-0.20	12 232	-0.92	-0.77
1 372	-0.03	0.07	12 589	-1.67	-1.21
1 413	-0.01	0.04	12 957	-1.39	-0.92
1 454	0.09	0.19	13 335	-1.72	-1.14
1 496	0.05	0.12	13 725	-1.79	-1.37
1 540	0.12	0.19	14 125	-1.76	-1.83
1 585	0.22	0.18	14 538	-1.23	-2.11
1 631	0.21	0.22	14 962	-1.54	-2.69
1 679	0.18	0.17	15 399	-1.75	-3.06
1 728	0.25	0.21	15 849	-2.12	-3.38
1 778	0.24	0.14	16 312	-2.63	-3.81
1 830	0.32	-0.12	16 788	-2.93	-3.80
1 884	0.19	-0.02	17 278	-2.94	-3.91
1 939	0.22	-0.36	17 783	-3.52	-4.21
1 995	0.15	-0.36	18 302	-4.47	-4.68
2 054	-0.03	-0.08	18 836	-5.05	-4.88
2 113	0.03	-0.35	19 387	-5.36	-5.18
2 175	0.00	-0.47	19 953	-5.87	-5.64
2 239	0.05	-0.30			

SV 303 Case Effect



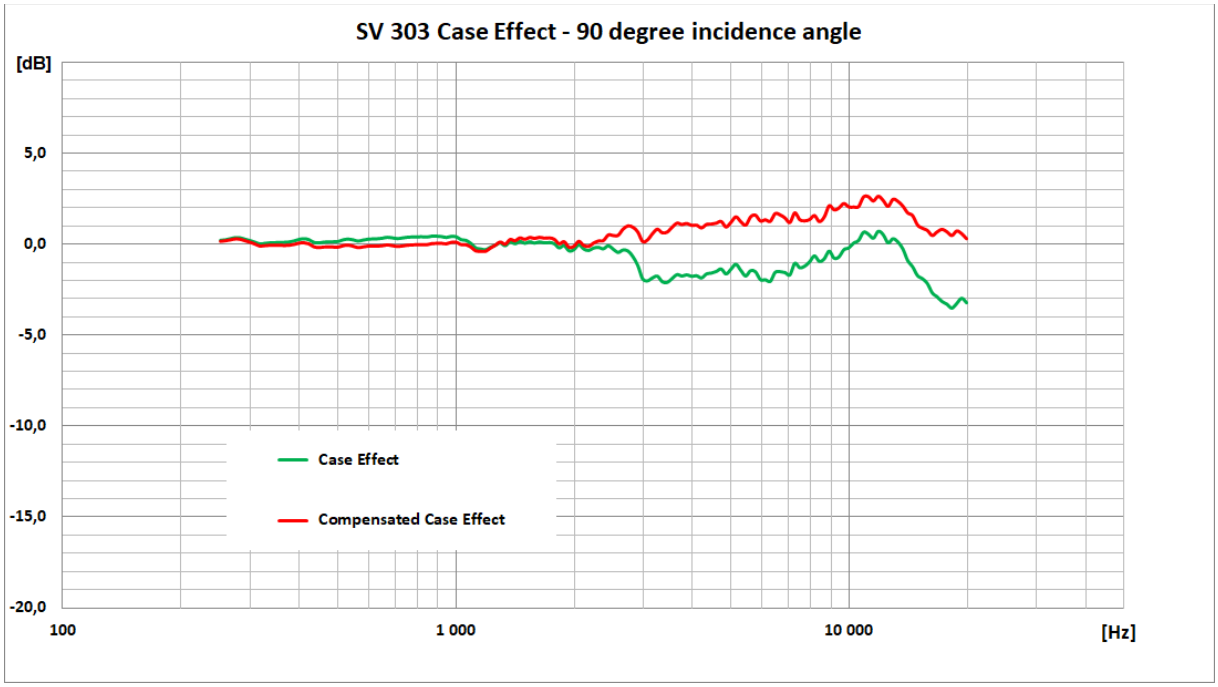


Table C.1.8. SV 303 compensated Case Effect

Frequency	SV 303 Case Effect	Compensation filter Airport	SV 303 compensated Case Effect	SV 303 Case Effect	Compensation filter Environment	SV 303 compensated Case Effect	Uncertainty (IEC 62585:2012)
	0 deg incidence angle			90 deg incidence angle			
	A	B	A+B	A	B	A+B	
[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
251	0.17	0.05	0.22	0.23	-0.08	0.15	0.25
259	0.20	0.04	0.24	0.26	-0.09	0.18	0.25
266	0.19	0.04	0.23	0.32	-0.10	0.23	0.25
274	0.17	0.03	0.20	0.38	-0.11	0.28	0.25
282	0.12	0.02	0.14	0.37	-0.11	0.26	0.25
290	0.14	0.01	0.15	0.29	-0.12	0.18	0.25
299	0.18	0.01	0.19	0.22	-0.13	0.10	0.25
307	0.20	0.00	0.20	0.13	-0.14	0.00	0.25
316	0.15	-0.01	0.14	0.03	-0.15	-0.11	0.25
325	0.05	-0.02	0.03	0.06	-0.16	-0.09	0.25
335	-0.03	-0.03	-0.06	0.09	-0.17	-0.07	0.25
345	0.00	-0.04	-0.04	0.10	-0.19	-0.07	0.25
355	0.05	-0.05	0.00	0.12	-0.20	-0.07	0.25
365	0.09	-0.06	0.03	0.12	-0.21	-0.08	0.25
376	0.08	-0.07	0.01	0.14	-0.22	-0.07	0.25
387	0.09	-0.08	0.01	0.20	-0.23	-0.02	0.25
398	0.10	-0.09	0.01	0.28	-0.25	0.05	0.25
410	0.13	-0.11	0.02	0.32	-0.26	0.07	0.25
422	0.16	-0.12	0.04	0.27	-0.27	0.01	0.25
434	0.12	-0.13	-0.01	0.12	-0.28	-0.15	0.25
447	0.01	-0.14	-0.13	0.09	-0.30	-0.19	0.25
460	-0.02	-0.16	-0.18	0.13	-0.31	-0.17	0.25
473	0.02	-0.17	-0.15	0.15	-0.32	-0.16	0.25
487	0.08	-0.18	-0.10	0.15	-0.34	-0.17	0.25

Frequency	SV 303 Case Effect	Compensation filter Airport	SV 303 compensated Case Effect	SV 303 Case Effect	Compensation filter Environment	SV 303 compensated Case Effect	Uncertainty (IEC 62585:2012)
	0 deg incidence angle			90 deg incidence angle			
	A	B	A+B	A	B	A+B	
[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
501	0.10	-0.20	-0.10	0.17	-0.35	-0.17	0.25
516	0.04	-0.21	-0.17	0.26	-0.36	-0.09	0.25
531	0.02	-0.23	-0.21	0.30	-0.38	-0.06	0.25
546	0.08	-0.24	-0.16	0.26	-0.39	-0.12	0.25
562	0.08	-0.25	-0.17	0.19	-0.40	-0.20	0.25
579	0.06	-0.27	-0.21	0.24	-0.41	-0.16	0.25
596	0.01	-0.28	-0.27	0.29	-0.43	-0.12	0.25
613	0.06	-0.30	-0.24	0.31	-0.44	-0.12	0.25
631	0.12	-0.31	-0.19	0.32	-0.44	-0.12	0.25
649	0.08	-0.33	-0.25	0.35	-0.45	-0.09	0.25
668	0.10	-0.34	-0.24	0.40	-0.46	-0.05	0.25
688	0.13	-0.35	-0.22	0.37	-0.46	-0.09	0.25
708	0.15	-0.36	-0.21	0.33	-0.47	-0.13	0.25
729	0.15	-0.38	-0.23	0.36	-0.47	-0.11	0.25
750	0.23	-0.39	-0.16	0.40	-0.47	-0.07	0.25
772	0.33	-0.39	-0.06	0.42	-0.46	-0.05	0.25
794	0.35	-0.40	-0.05	0.42	-0.46	-0.04	0.25
818	0.32	-0.41	-0.09	0.43	-0.45	-0.03	0.25
841	0.31	-0.41	-0.10	0.41	-0.44	-0.04	0.25
866	0.37	-0.42	-0.05	0.46	-0.42	0.02	0.25
891	0.46	-0.42	0.04	0.46	-0.40	0.04	0.25
917	0.49	-0.42	0.07	0.44	-0.38	0.04	0.25
944	0.42	-0.41	0.01	0.39	-0.36	0.01	0.25
972	0.30	-0.41	-0.11	0.45	-0.33	0.09	0.25
1 000	0.36	-0.40	-0.04	0.43	-0.30	0.10	0.25
1 029	0.43	-0.39	0.04	0.27	-0.27	-0.03	0.25
1 059	0.29	-0.38	-0.09	0.23	-0.23	-0.04	0.25
1 090	0.03	-0.37	-0.34	0.06	-0.19	-0.17	0.25
1 122	-0.04	-0.35	-0.39	-0.19	-0.15	-0.38	0.25
1 155	-0.09	-0.33	-0.42	-0.25	-0.11	-0.40	0.25
1 189	-0.12	-0.31	-0.43	-0.29	-0.07	-0.40	0.25
1 223	-0.04	-0.29	-0.33	-0.15	-0.02	-0.22	0.25
1 259	-0.08	-0.26	-0.34	-0.04	0.02	-0.06	0.25
1 296	0.06	-0.24	-0.18	0.09	0.06	0.11	0.25
1 334	0.18	-0.21	-0.03	-0.07	0.10	-0.01	0.25
1 372	0.16	-0.19	-0.03	0.15	0.14	0.25	0.25
1 413	0.14	-0.16	-0.02	0.04	0.17	0.18	0.25
1 454	0.20	-0.14	0.06	0.17	0.19	0.34	0.25
1 496	0.10	-0.12	-0.02	0.07	0.21	0.26	0.25
1 540	0.11	-0.10	0.01	0.15	0.23	0.36	0.25
1 585	0.16	-0.09	0.07	0.08	0.23	0.31	0.25
1 631	0.11	-0.07	0.04	0.14	0.23	0.37	0.25
1 679	0.08	-0.06	0.02	0.09	0.23	0.32	0.25
1 728	0.15	-0.06	0.09	0.11	0.22	0.34	0.25
1 778	0.15	-0.06	0.09	0.04	0.20	0.26	0.25
1 830	0.20	-0.05	0.15	-0.19	0.19	0.01	0.25
1 884	0.06	-0.05	0.01	-0.06	0.17	0.13	0.25
1 939	0.10	-0.05	0.05	-0.35	0.16	-0.18	0.25

Frequency	SV 303 Case Effect	Compensation filter Airport	SV 303 compensated Case Effect	SV 303 Case Effect	Compensation filter Environment	SV 303 compensated Case Effect	Uncertainty (IEC 62585:2012)
	0 deg incidence angle			90 deg incidence angle			
	A	B	A+B	A	B	A+B	
[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
1 995	0.02	-0.05	-0.03	-0.29	0.16	-0.13	0.25
2 054	-0.19	-0.05	-0.24	-0.01	0.17	0.15	0.25
2 113	-0.13	-0.03	-0.16	-0.25	0.20	-0.08	0.25
2 175	-0.16	-0.01	-0.17	-0.33	0.25	-0.13	0.25
2 239	-0.15	0.02	-0.13	-0.20	0.33	0.05	0.25
2 304	-0.19	0.07	-0.12	-0.16	0.43	0.17	0.25
2 371	-0.16	0.13	-0.03	-0.24	0.57	0.19	0.25
2 441	-0.27	0.21	-0.06	-0.07	0.73	0.50	0.25
2 512	-0.47	0.31	-0.16	-0.26	0.92	0.47	0.25
2 585	-0.43	0.42	-0.01	-0.44	1.13	0.48	0.25
2 661	-0.58	0.55	-0.03	-0.31	1.36	0.82	0.25
2 738	-0.50	0.69	0.19	-0.36	1.60	1.00	0.25
2 818	-0.58	0.83	0.25	-0.67	1.83	0.93	0.25
2 901	-1.11	0.96	-0.15	-1.16	2.05	0.67	0.25
2 985	-1.56	1.09	-0.47	-1.91	2.25	0.14	0.25
3 073	-1.87	1.19	-0.68	-2.02	2.43	0.23	0.25
3 162	-1.74	1.28	-0.46	-1.86	2.58	0.57	0.25
3 255	-1.69	1.33	-0.36	-1.76	2.69	0.82	0.25
3 350	-1.75	1.35	-0.40	-2.07	2.77	0.62	0.25
3 447	-1.55	1.33	-0.22	-2.11	2.81	0.66	0.25
3 548	-1.69	1.29	-0.40	-1.89	2.83	0.92	0.25
3 652	-1.47	1.22	-0.25	-1.68	2.83	1.15	0.25
3 758	-1.33	1.13	-0.20	-1.75	2.82	1.08	0.25
3 868	-1.48	1.04	-0.44	-1.69	2.80	1.13	0.25
3 981	-1.35	0.96	-0.39	-1.77	2.78	1.03	0.25
4 097	-1.44	0.90	-0.54	-1.74	2.75	1.04	0.35
4 217	-1.28	0.87	-0.41	-1.86	2.72	0.89	0.35
4 340	-1.16	0.86	-0.30	-1.64	2.69	1.08	0.35
4 467	-1.28	0.88	-0.40	-1.59	2.65	1.10	0.35
4 597	-1.28	0.92	-0.36	-1.50	2.61	1.15	0.35
4 732	-1.43	0.95	-0.48	-1.36	2.58	1.25	0.35
4 870	-1.26	0.97	-0.29	-1.64	2.57	0.94	0.35
5 012	-1.16	0.97	-0.19	-1.37	2.60	1.20	0.35
5 158	-1.29	0.94	-0.35	-1.10	2.67	1.50	0.35
5 309	-1.32	0.89	-0.43	-1.44	2.79	1.23	0.35
5 464	-1.37	0.83	-0.54	-1.75	2.95	1.04	0.35
5 623	-1.23	0.77	-0.46	-1.45	3.11	1.50	0.35
5 788	-1.24	0.72	-0.52	-1.52	3.23	1.59	0.35
5 957	-1.58	0.68	-0.90	-1.96	3.30	1.27	0.35
6 131	-1.60	0.65	-0.95	-1.96	3.30	1.34	0.35
6 310	-1.77	0.60	-1.17	-2.05	3.23	1.25	0.35
6 494	-1.51	0.55	-0.96	-1.55	3.12	1.68	0.35
6 683	-1.44	0.49	-0.95	-1.51	3.00	1.61	0.35
6 879	-1.05	0.43	-0.62	-1.56	2.88	1.44	0.35
7 079	-1.08	0.39	-0.69	-1.69	2.77	1.19	0.35
7 286	-1.10	0.34	-0.76	-1.05	2.64	1.72	0.35
7 499	-1.27	0.28	-0.99	-1.29	2.49	1.35	0.35
7 718	-1.33	0.14	-1.19	-1.21	2.32	1.28	0.35

Frequency	SV 303 Case Effect	Compensation filter Airport	SV 303 compensated Case Effect	SV 303 Case Effect	Compensation filter Environment	SV 303 compensated Case Effect	Uncertainty (IEC 62585:2012)
	0 deg incidence angle			90 deg incidence angle			
	A	B	A+B	A	B	A+B	
[Hz]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
7 943	-1.68	-0.10	-1.78	-0.97	2.20	1.35	0.35
8 175	-1.10	-0.40	-1.50	-0.63	2.18	1.57	0.35
8 414	-1.59	-0.71	-2.30	-0.94	2.29	1.24	0.35
8 660	-1.55	-0.92	-2.47	-0.80	2.48	1.49	0.35
8 913	-1.82	-1.00	-2.82	-0.37	2.65	2.11	0.35
9 173	-1.69	-0.97	-2.66	-0.76	2.68	1.89	0.35
9 441	-1.38	-0.89	-2.27	-0.69	2.53	1.99	0.35
9 716	-1.49	-0.79	-2.28	-0.29	2.24	2.24	0.35
10 000	-2.20	-0.64	-2.84	-0.19	1.96	2.05	0.35
10 292	-2.22	-0.45	-2.67	0.08	1.84	2.04	0.35
10 593	-2.37	-0.33	-2.70	0.23	1.92	2.07	0.35
10 902	-2.04	-0.41	-2.45	0.68	2.04	2.60	0.35
11 220	-2.87	-0.67	-3.54	0.57	2.03	2.61	0.35
11 548	-2.65	-0.86	-3.51	0.35	1.91	2.38	0.35
11 885	-1.72	-0.77	-2.49	0.73	1.86	2.64	0.35
12 232	-2.77	-0.48	-3.25	0.55	1.99	2.41	0.35
12 589	-3.77	-0.28	-4.05	0.09	2.15	2.08	0.35
12 957	-3.65	-0.20	-3.85	0.32	2.22	2.47	0.35
13 335	-4.30	0.00	-4.30	0.14	2.34	2.36	0.35
13 725	-4.86	0.30	-4.56	-0.24	2.61	2.10	0.35
14 125	-5.09	0.41	-4.68	-0.89	2.81	1.72	0.35
14 538	-4.58	0.27	-4.31	-1.24	2.78	1.57	0.35
14 962	-5.04	0.29	-4.75	-1.73	2.77	1.05	0.35
15 399	-5.53	0.54	-4.99	-1.90	2.92	0.87	0.35
15 849	-5.91	0.57	-5.34	-2.17	3.16	0.75	0.35
16 312	-6.11	0.26	-5.85	-2.69	3.58	0.47	0.35
16 788	-6.12	-0.02	-6.14	-2.91	3.98	0.67	0.35
17 278	-5.91	-0.20	-6.11	-3.17	3.99	0.81	0.35
17 783	-6.30	-0.40	-6.70	-3.32	4.01	0.67	0.35
18 302	-6.96	-0.60	-7.56	-3.54	4.00	0.47	0.35
18 836	-7.05	-0.83	-7.88	-3.28	3.56	0.72	0.35
19 387	-7.29	-0.80	-8.09	-2.99	3.53	0.57	0.35
19 953	-7.49	-0.99	-8.48	-3.24	3.55	0.29	0.35

SV 303 combined Free Field corrections

Table C.1.9. SV 303 compensated case effect

[dB]	Frequency [Hz]										
	31.5	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**12500**	**16000**
Compensated Case Effect - 0 deg	0.00	0.00	0.00	0.22	-0.10	-0.04	-0.03	-0.39	-1.78	-4.05	-5.34
Compensated Case Effect - 90 deg	0.00	0.00	0.00	0.15	-0.17	0.10	-0.13	1.03	1.35	2.08	0.75
Uncertainty (IEC 62585)	--	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.35	0.35	0.35

Table C.1.10. Sum of the ST 30B microphone Free Field corrections and SV 303 compensated Case Effect for the 0 and 90 deg incidence angle with the use of the Bruel & Kjaer 4226 sound calibrator

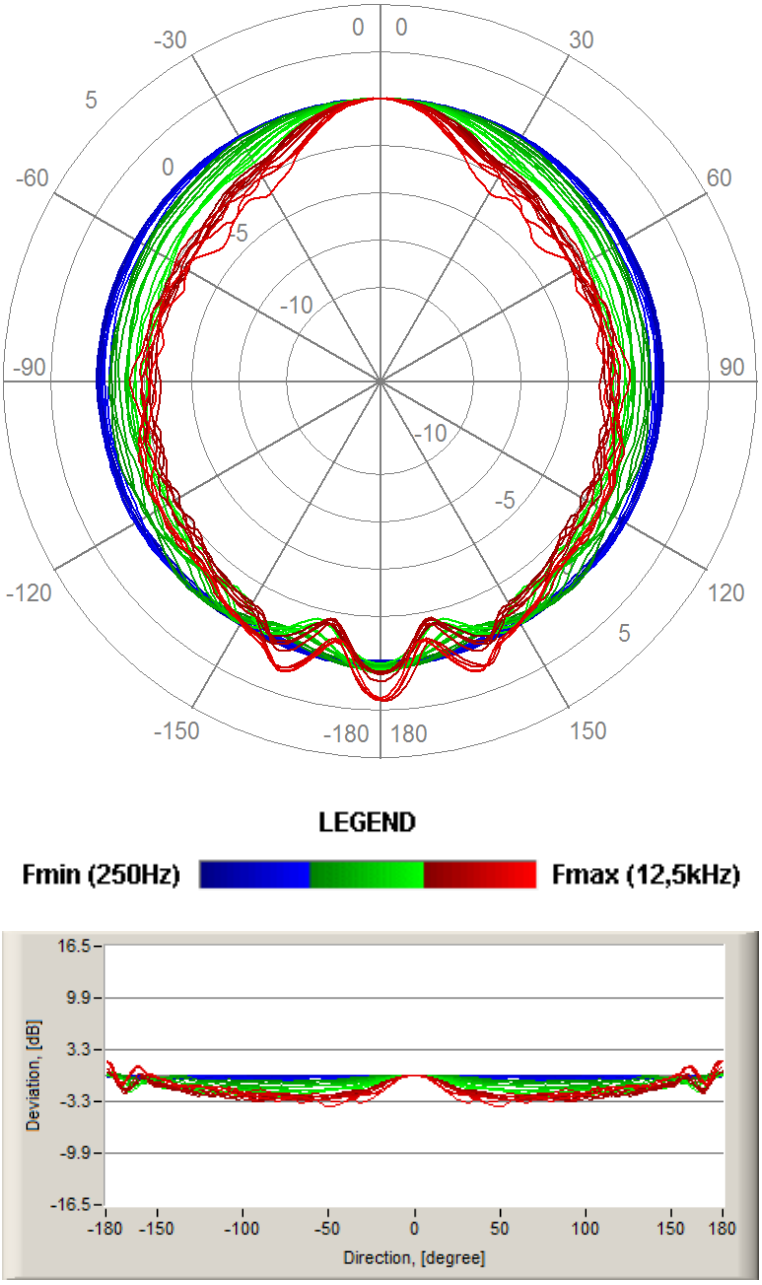
[dB]	Frequency [Hz]										
	31.5	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**12500**	**16000**
Free Field corrections - 0 deg	0.00	0.00	0.00	0.22	-0.07	-0.02	0.40	0.49	0.90	0.32	-0.35
Free Field corrections - 90 deg	0.00	0.00	0.00	0.07	-0.19	-0.02	-0.10	0.81	1.04	0.79	-1.62
Uncertainty (IEC 62585)	--	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.49	0.61	0.61

Table C.1.11. Sum of the ST 30B microphone Free Field corrections and SV 303 compensated Case Effect for the 0 and 90 deg incidence angle with the use of the G.R.A.S. 51AB comparison coupler and reference 1/2“ microphone B&K 4192

[dB]	Frequency [Hz]										
	31.5	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**12500**	**16000**
Free Field corrections - 0 deg	0.00	0.00	0.00	0.22	-0.06	0.01	0.45	0.93	2.47	2.82	3.51
Free Field corrections - 90 deg	0.00	0.00	0.00	0.07	-0.18	0.01	-0.05	1.25	2.61	3.29	2.24
Uncertainty (IEC 62585)	--	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.49	0.61	0.61

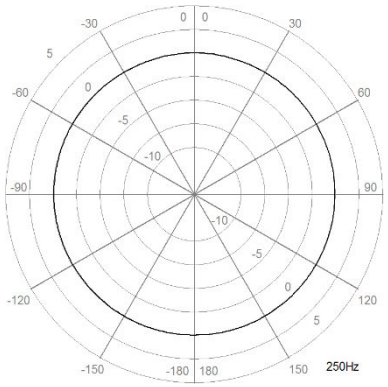
SV 303 directional characteristics

Combined typical directional characteristics

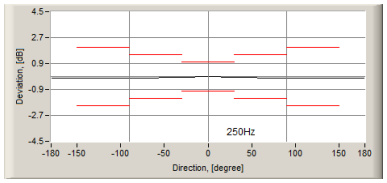


Below the typical directional characteristics and tolerances for 90 degree and 0 degree incidental angles are presented.

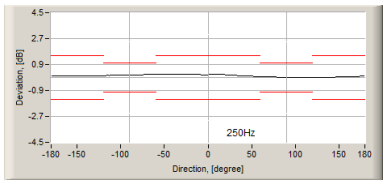
250 Hz



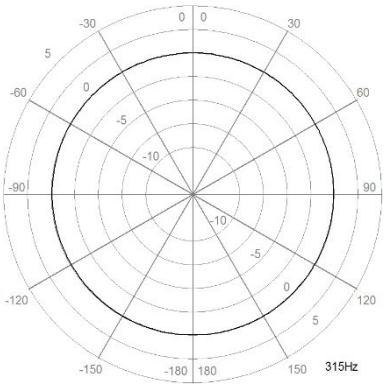
0 deg



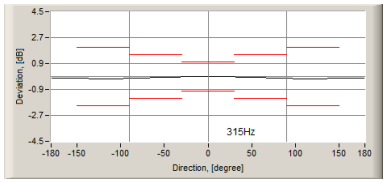
90 deg



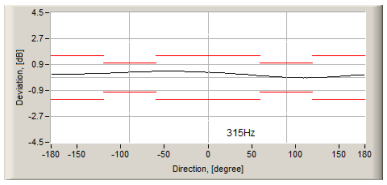
315 Hz



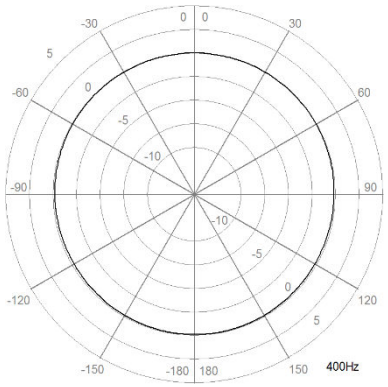
0 deg



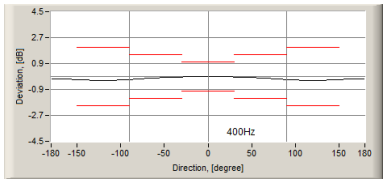
90 deg



400 Hz



0 deg



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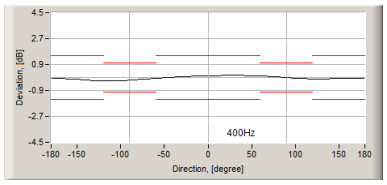
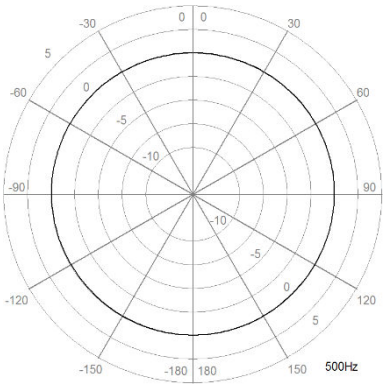
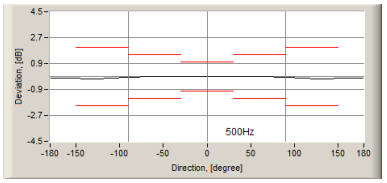


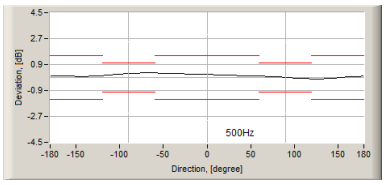
500 Hz



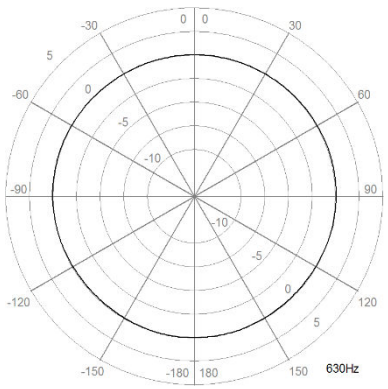
0 deg



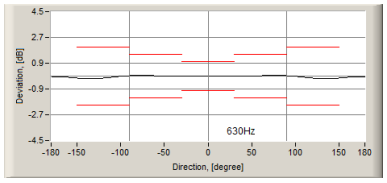
90 deg



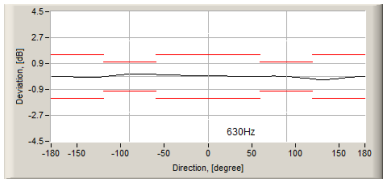
630 Hz



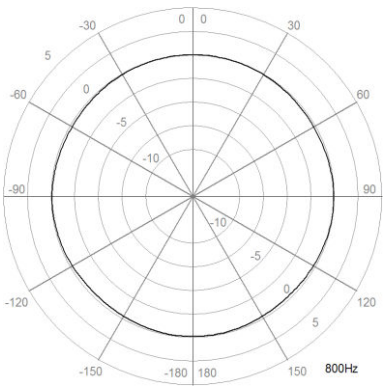
0 deg



90 deg



800 Hz



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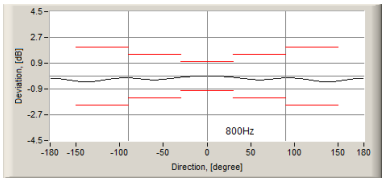

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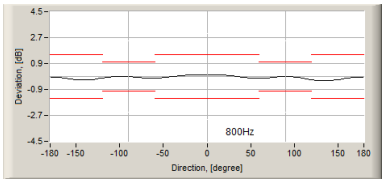
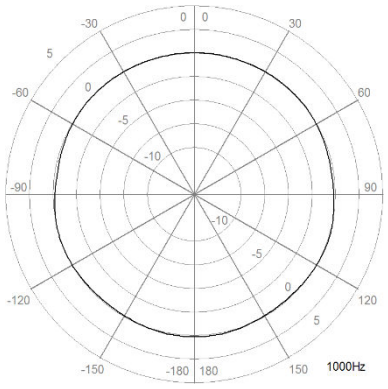


1000 Hz



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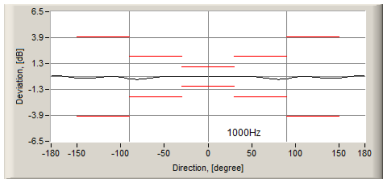

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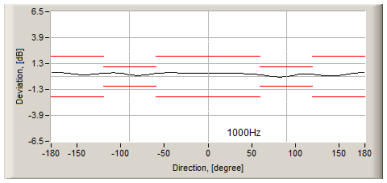
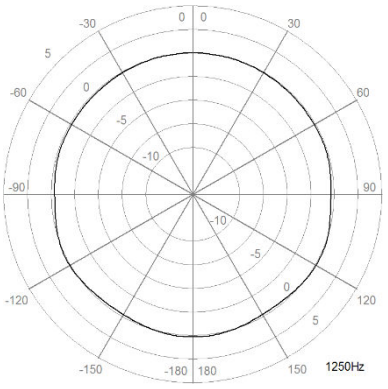


1250 Hz



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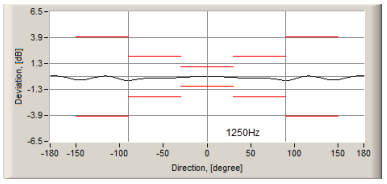

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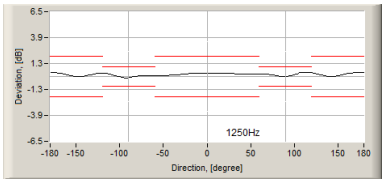
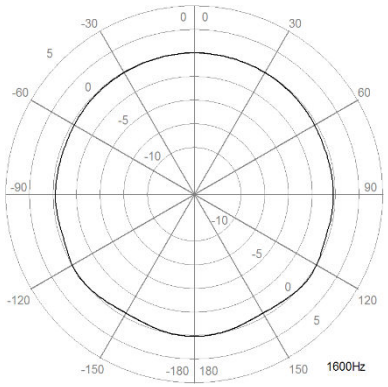


1600 Hz



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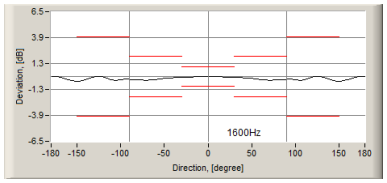

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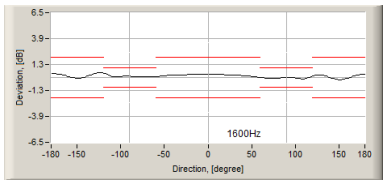
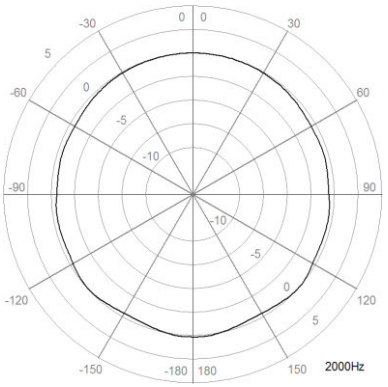


2000 Hz



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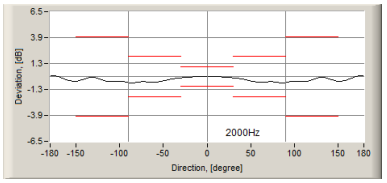

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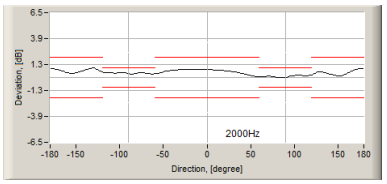
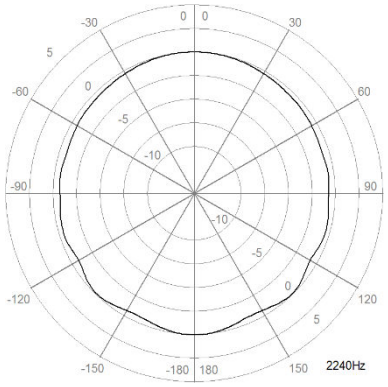


2240 Hz



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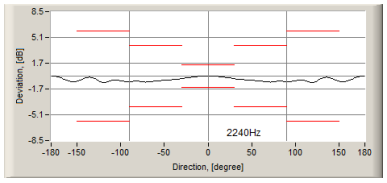
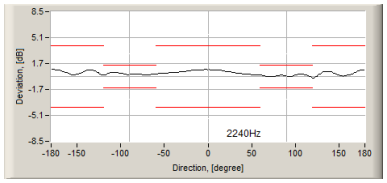
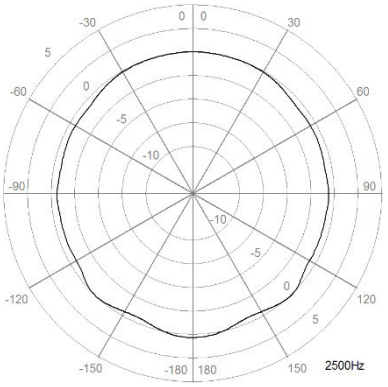


90 deg



2500 Hz



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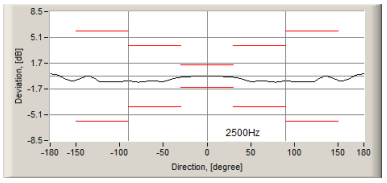
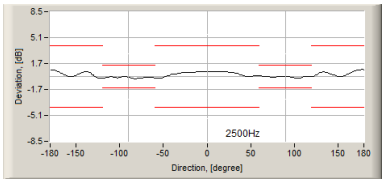
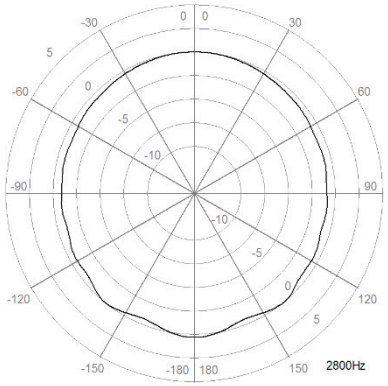


90 deg



2800 Hz



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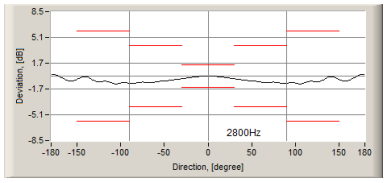

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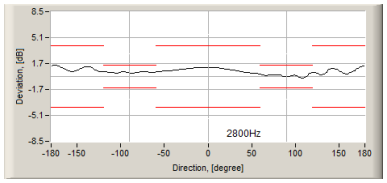
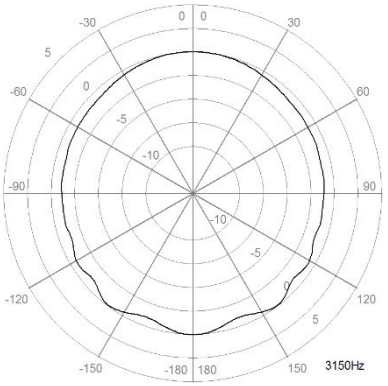


3150 Hz



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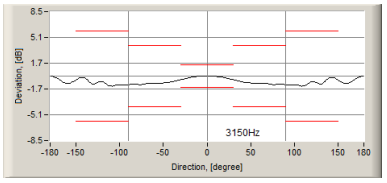

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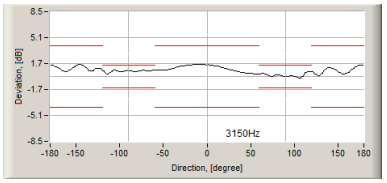

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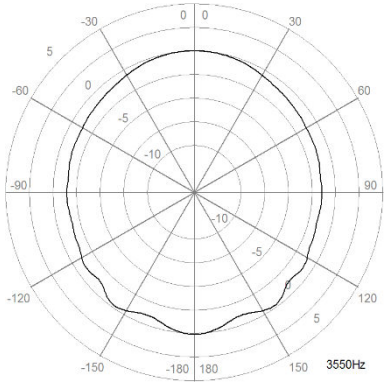

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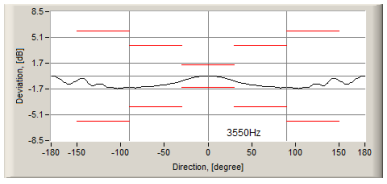

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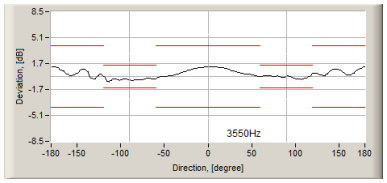
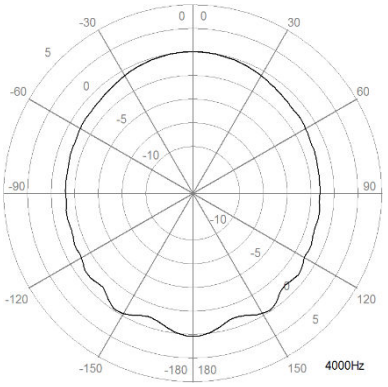


4000 Hz



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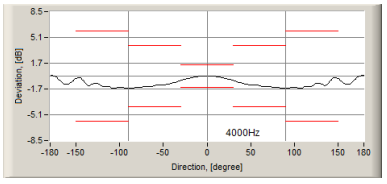
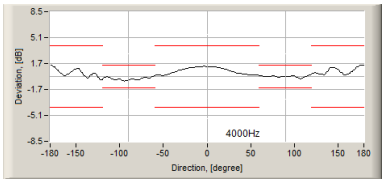
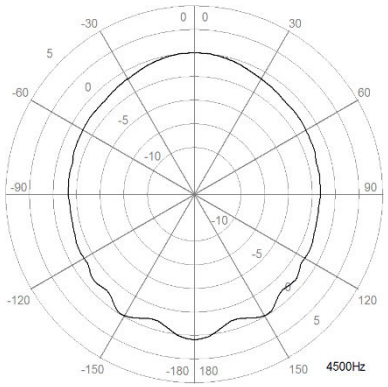


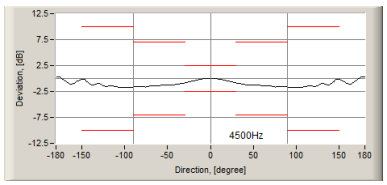
90 deg



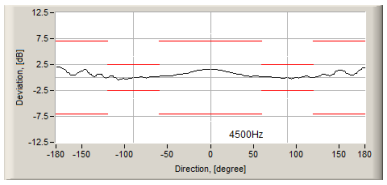
4500 Hz



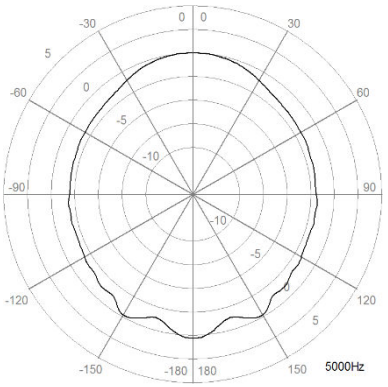
0 deg



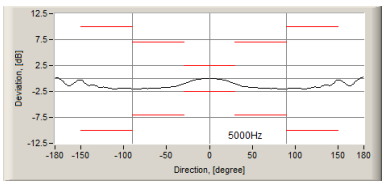
90 deg



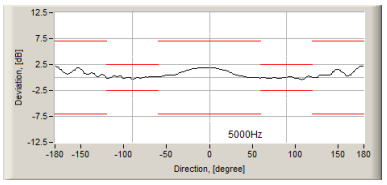
5000 Hz



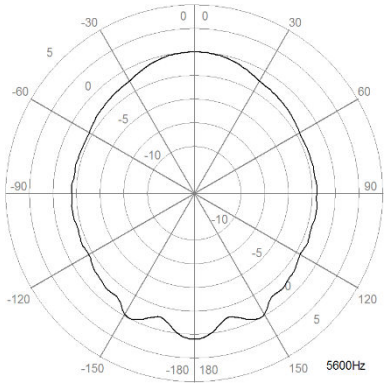
0 deg



90 deg



5600 Hz



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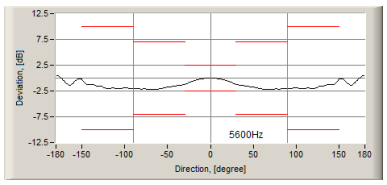

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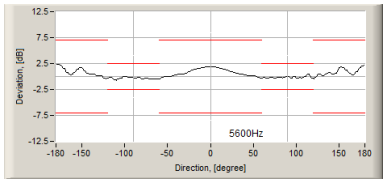
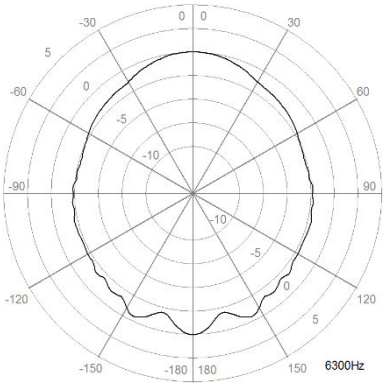
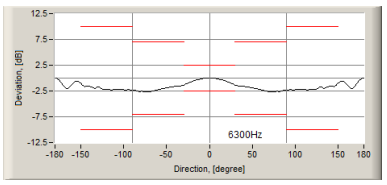


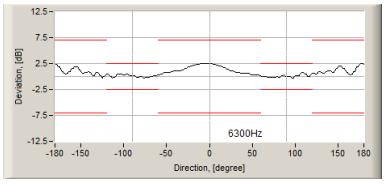
6300 Hz



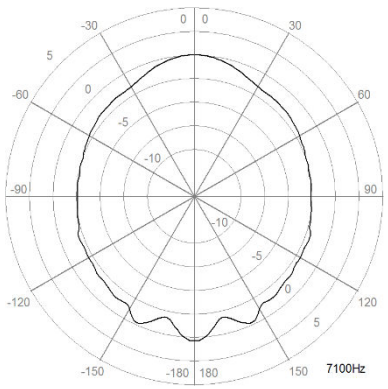
0 deg



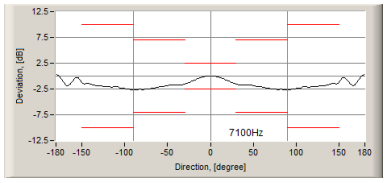
90 deg



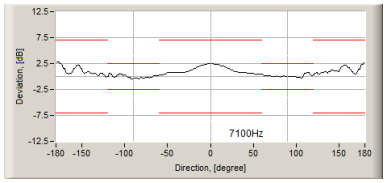
7100 Hz



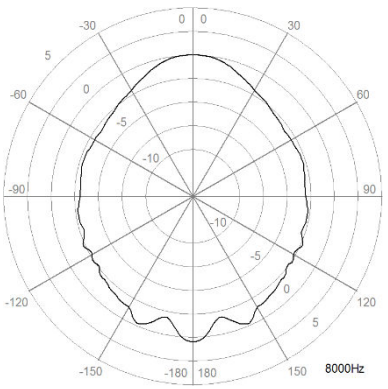
0 deg



90 deg



8000 Hz



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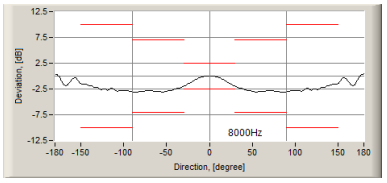

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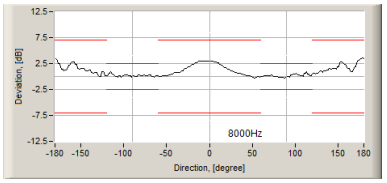
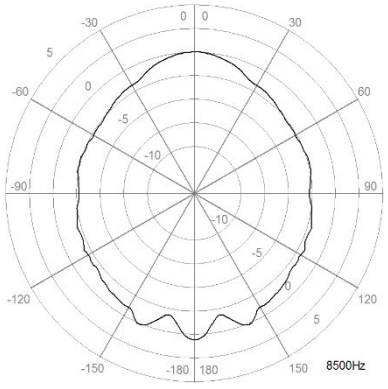
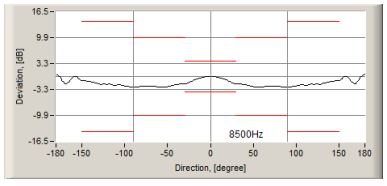


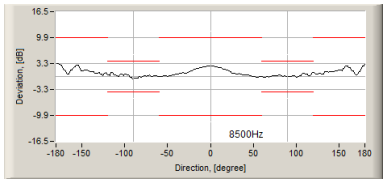
8500 Hz



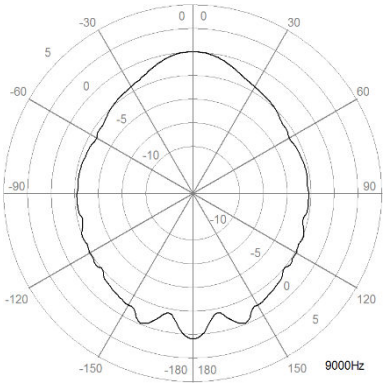
0 deg



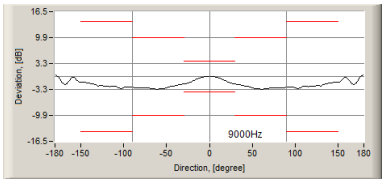
90 deg



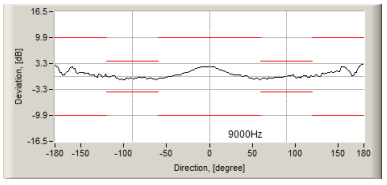
9000 Hz



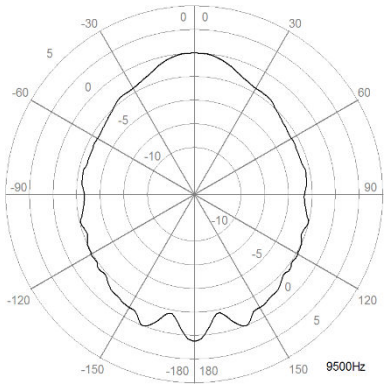
0 deg



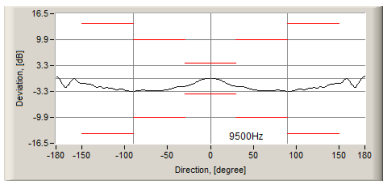
90 deg



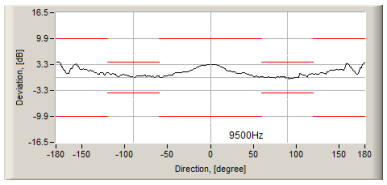
9500 Hz



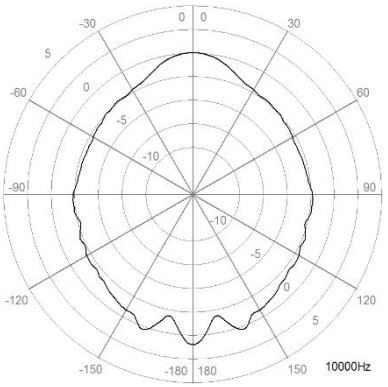
0 deg



90 deg



10000 Hz



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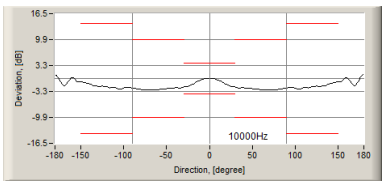

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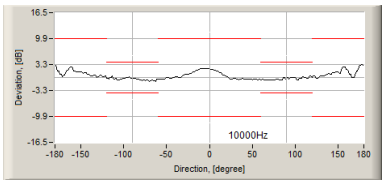
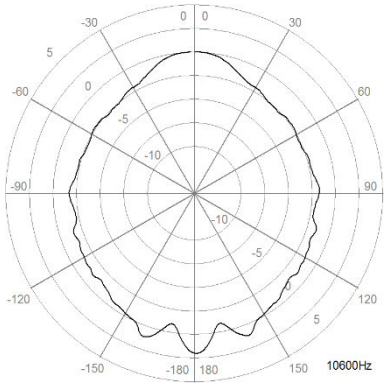


10600 Hz



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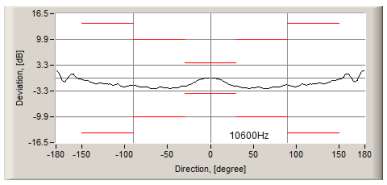

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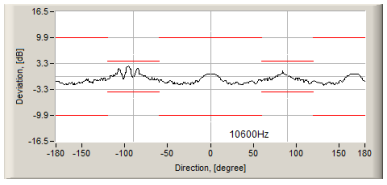
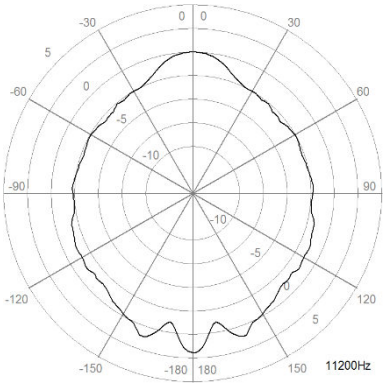
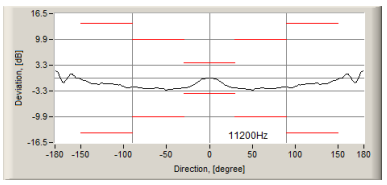


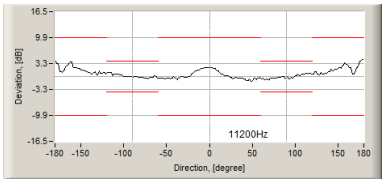
11200 Hz



0 deg



90 deg



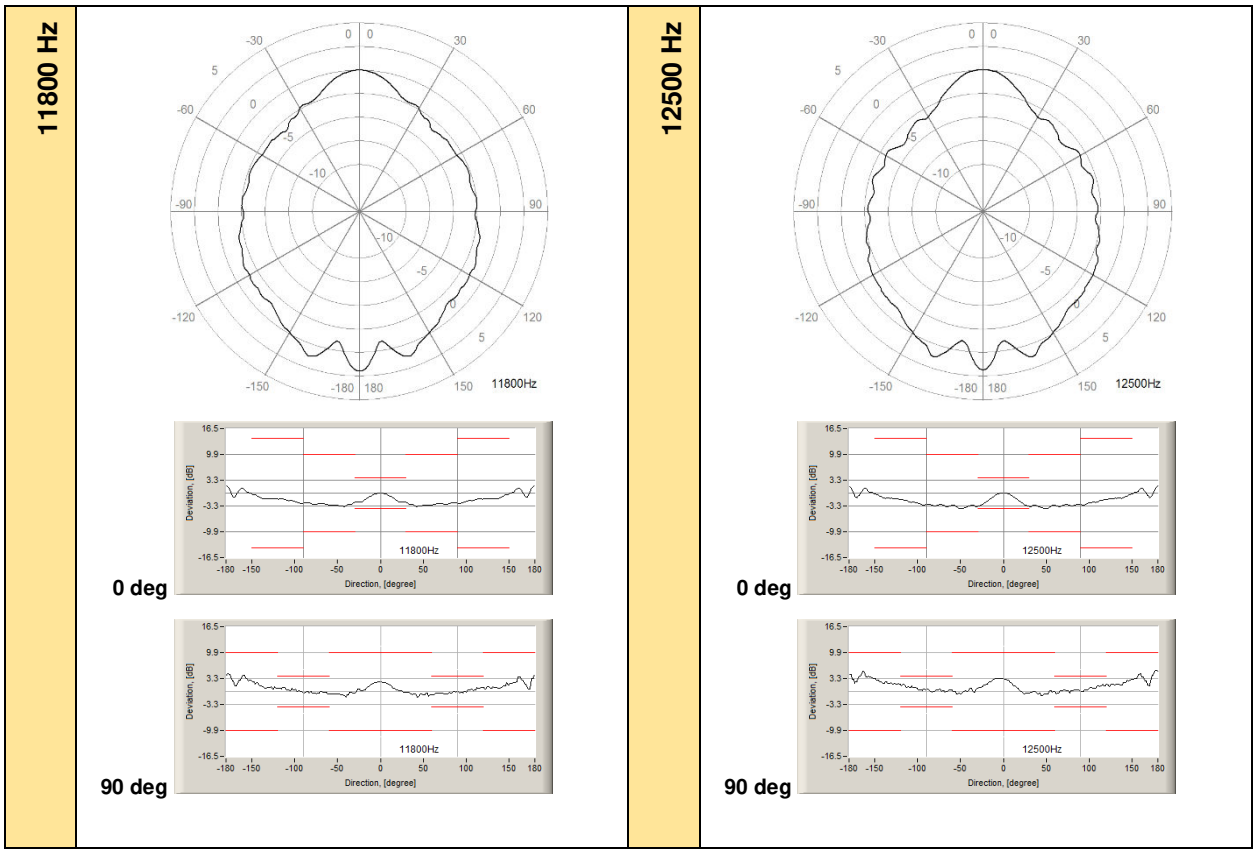


Table C.1.12. Typical directional response for SV 303

[Hz] \ [deg]	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
250	-0.04	-0.07	-0.10	-0.13	-0.15	-0.18	-0.20	-0.22	-0.23	-0.23
315	-0.04	-0.08	-0.12	-0.17	-0.22	-0.26	-0.30	-0.33	-0.34	-0.35
400	0.01	0.02	0.03	0.03	0.03	0.02	-0.02	-0.05	-0.10	-0.14
500	-0.02	-0.04	-0.06	-0.08	-0.10	-0.12	-0.15	-0.19	-0.23	-0.26
630	-0.01	-0.03	-0.04	-0.05	-0.05	-0.04	-0.03	-0.03	-0.07	-0.12
800	0.01	-0.04	-0.09	-0.18	-0.24	-0.27	-0.27	-0.22	-0.15	-0.16
1 000	-0.01	-0.02	-0.03	-0.04	-0.08	-0.19	-0.30	-0.38	-0.37	-0.27
1 250	0.01	-0.01	-0.04	-0.09	-0.12	-0.13	-0.13	-0.20	-0.34	-0.35
1 600	-0.03	-0.07	-0.11	-0.16	-0.27	-0.38	-0.46	-0.46	-0.36	-0.46
2 000	-0.06	-0.12	-0.27	-0.41	-0.67	-0.74	-0.73	-0.81	-0.84	-0.74
2 240	-0.07	-0.25	-0.44	-0.58	-0.68	-0.81	-0.92	-0.92	-0.94	-0.94
2 500	0.00	-0.02	-0.10	-0.39	-0.63	-0.62	-0.66	-0.70	-0.70	-0.75
2 800	-0.14	-0.30	-0.48	-0.69	-0.78	-1.02	-1.06	-1.10	-1.21	-1.34
3 150	-0.11	-0.45	-0.72	-1.02	-1.12	-1.24	-1.28	-1.50	-1.54	-1.54
3 550	-0.05	-0.31	-0.71	-0.91	-1.11	-1.23	-1.25	-1.33	-1.41	-1.58
4 000	-0.09	-0.33	-0.73	-0.97	-1.15	-1.20	-1.36	-1.36	-1.41	-1.32
4 500	-0.15	-0.62	-0.91	-1.27	-1.36	-1.40	-1.55	-1.67	-1.75	-1.85
5 000	-0.13	-0.67	-1.26	-1.70	-1.96	-1.99	-2.10	-2.09	-2.08	-2.00
5 600	-0.18	-0.68	-1.23	-1.55	-1.71	-2.08	-2.14	-2.11	-2.12	-2.12
6 300	-0.28	-0.88	-1.54	-1.83	-2.12	-2.38	-2.68	-2.67	-2.61	-2.71
7 100	-0.36	-0.89	-1.68	-1.72	-1.98	-2.13	-2.45	-2.57	-2.50	-2.58
8 000	-0.42	-1.47	-2.25	-2.75	-2.98	-3.32	-3.07	-3.20	-3.33	-3.19
8 500	-0.40	-1.45	-1.93	-2.17	-2.67	-2.83	-2.78	-2.40	-2.61	-2.81

9 000	-0.45	-1.50	-2.04	-2.44	-2.95	-3.27	-3.23	-2.96	-2.76	-2.54
9 500	-0.52	-1.74	-2.26	-2.55	-3.12	-3.26	-3.39	-3.54	-3.65	-3.50
10 000	-0.65	-2.14	-2.66	-2.86	-2.75	-2.96	-2.86	-2.91	-2.85	-2.56
10 600	-0.52	-1.74	-2.37	-2.83	-2.76	-2.70	-2.72	-2.38	-2.03	-2.18
11 200	-0.82	-2.04	-2.81	-2.74	-3.45	-3.06	-3.08	-2.74	-2.56	-2.79
11 800	-1.15	-2.25	-2.67	-3.74	-3.74	-3.56	-2.90	-2.95	-2.88	-2.80
12 500	-1.05	-2.82	-3.81	-3.67	-4.22	-3.90	-3.86	-3.58	-3.13	-3.27

[deg] / [Hz]	100-110	110-120	120-130	130-140	140-150	150-160	160-170	170-180	180-190	190-200
250	-0.23	-0.22	-0.20	-0.18	-0.16	-0.14	-0.12	-0.11	-0.10	-0.09
315	-0.34	-0.33	-0.30	-0.25	-0.21	-0.17	-0.13	-0.11	-0.09	-0.08
400	-0.18	-0.21	-0.22	-0.22	-0.21	-0.19	-0.18	-0.16	-0.17	-0.19
500	-0.28	-0.29	-0.28	-0.24	-0.20	-0.15	-0.12	-0.10	-0.10	-0.11
630	-0.19	-0.25	-0.26	-0.26	-0.21	-0.16	-0.08	-0.04	-0.04	-0.07
800	-0.25	-0.35	-0.41	-0.43	-0.42	-0.35	-0.25	-0.18	-0.20	-0.26
1 000	-0.10	-0.12	-0.23	-0.27	-0.26	-0.19	0.06	0.09	0.09	-0.05
1 250	-0.17	0.08	-0.12	-0.30	-0.33	-0.30	-0.13	0.09	0.09	-0.13
1 600	-0.50	-0.37	-0.16	-0.45	-0.58	-0.54	-0.27	0.04	-0.08	-0.33
2 000	-0.65	-0.66	-0.36	-0.50	-0.65	-0.61	-0.32	0.12	-0.12	-0.37
2 240	-0.72	-1.08	-0.91	-0.40	-0.83	-0.85	-0.53	-0.09	-0.24	-0.64
2 500	-0.85	-0.73	-0.66	-0.15	-0.55	-0.66	-0.45	0.28	0.26	-0.47
2 800	-1.40	-0.83	-1.02	-0.64	-0.76	-0.86	-0.59	0.25	-0.25	-0.59
3 150	-1.79	-1.54	-1.41	-1.34	-0.70	-1.21	-1.11	-0.31	-0.50	-0.86
3 550	-1.64	-1.40	-1.15	-1.12	-0.56	-1.07	-0.97	-0.16	-0.56	-1.14
4 000	-1.59	-1.38	-0.99	-1.09	-0.38	-1.11	-1.03	-0.22	-0.49	-1.18
4 500	-1.63	-1.59	-1.47	-1.19	-0.96	-1.09	-1.10	0.41	0.39	-1.10
5 000	-2.34	-2.27	-1.91	-1.50	-1.49	-1.52	-1.58	0.26	-0.95	-1.27
5 600	-2.10	-2.26	-1.98	-1.33	-1.39	-1.21	-1.46	0.50	-1.07	-1.44
6 300	-2.27	-2.47	-2.03	-1.92	-1.71	-1.64	-2.18	-0.99	-1.54	-1.99
7 100	-2.77	-2.33	-1.94	-1.74	-1.50	-0.72	-1.90	-1.00	-1.88	-2.01
8 000	-3.10	-2.91	-2.54	-2.18	-1.60	-1.15	-2.16	-1.12	-1.69	-1.93
8 500	-2.38	-2.40	-2.08	-1.62	-1.29	-1.18	-2.18	-1.34	-1.67	-1.93
9 000	-2.98	-2.65	-2.58	-2.34	-1.60	-1.32	-2.27	-1.42	-2.19	-2.19
9 500	-3.03	-3.03	-2.56	-2.40	-1.47	-1.37	-2.44	-1.83	-2.28	-2.35
10 000	-2.81	-2.41	-2.39	-1.93	-1.51	-1.20	-2.34	1.05	-2.03	-1.71
10 600	-2.30	-1.70	-1.75	-1.53	-0.77	1.32	-1.39	2.03	1.84	1.28
11 200	-2.05	-1.65	-1.78	-1.69	-1.07	1.26	-1.64	1.99	1.77	1.38
11 800	-2.23	-1.76	-1.52	-1.58	-0.85	1.25	-1.65	2.11	1.97	1.79
12 500	-2.53	-2.12	-1.94	-1.65	-1.10	1.14	-1.70	2.05	1.80	1.92

[deg] / [Hz]	200-210	210-220	220-230	230-240	240-250	250-260	260-270	270-280	280-290	290-300
250	-0.08	-0.08	-0.07	-0.07	-0.05	-0.04	-0.03	-0.01	-0.01	0.01
315	-0.07	-0.06	-0.04	-0.02	0.03	0.07	0.09	0.11	0.12	0.12
400	-0.24	-0.27	-0.31	-0.35	-0.36	-0.36	-0.35	-0.32	-0.29	-0.25
500	-0.11	-0.11	-0.08	-0.04	0.05	0.09	0.11	0.12	0.12	0.12
630	-0.12	-0.13	-0.13	-0.09	0.05	0.10	0.13	0.13	0.13	0.11
800	-0.34	-0.38	-0.38	-0.33	-0.23	-0.15	-0.12	-0.18	-0.24	-0.26
1 000	-0.14	-0.15	-0.13	-0.04	0.05	0.04	-0.17	-0.21	-0.19	-0.07
1 250	-0.31	-0.35	-0.30	-0.15	-0.07	-0.33	-0.48	-0.48	-0.34	-0.26
1 600	-0.41	-0.39	0.11	0.13	-0.27	-0.29	-0.22	-0.27	-0.29	-0.29
2 000	-0.38	-0.25	0.14	-0.30	-0.34	-0.37	-0.46	-0.47	-0.40	-0.45

2 240	-0.67	-0.48	-0.41	-0.70	-0.50	-0.55	-0.65	-0.61	-0.69	-0.63
2 500	-0.66	-0.52	-0.42	-0.89	-0.89	-0.81	-0.78	-0.92	-0.92	-0.77
2 800	-0.56	-0.14	-0.52	-0.65	-0.80	-0.80	-0.76	-0.75	-0.69	-0.71
3 150	-0.81	-0.14	-0.82	-0.62	-1.20	-0.91	-0.94	-0.88	-0.86	-0.80
3 550	-1.07	-1.04	-1.61	-1.90	-1.96	-1.76	-1.76	-1.77	-1.69	-1.60
4 000	-1.05	-1.20	-1.48	-1.79	-1.58	-1.79	-1.91	-1.77	-1.75	-1.55
4 500	-0.89	-1.31	-1.35	-1.72	-1.99	-1.99	-1.89	-1.65	-1.72	-1.43
5 000	-0.73	-1.32	-1.77	-1.80	-2.14	-2.00	-2.17	-2.17	-1.99	-1.77
5 600	-0.65	-1.40	-1.67	-2.32	-2.54	-2.33	-2.21	-2.33	-2.28	-2.29
6 300	-1.19	-1.80	-2.27	-2.75	-2.74	-2.32	-2.38	-2.70	-2.79	-2.57
7 100	-1.54	-1.78	-2.24	-2.53	-2.52	-2.39	-2.93	-2.84	-2.80	-2.40
8 000	-1.61	-1.98	-2.33	-3.01	-2.85	-3.15	-3.13	-3.10	-2.91	-3.12
8 500	-1.15	-1.46	-1.96	-2.48	-2.54	-2.54	-3.15	-3.11	-2.54	-2.64
9 000	-1.63	-1.94	-2.80	-2.71	-2.84	-3.33	-3.39	-3.10	-3.14	-3.40
9 500	-1.23	-1.67	-2.53	-2.64	-3.11	-3.11	-3.37	-3.09	-3.14	-3.28
10 000	-0.86	-1.39	-2.17	-2.13	-2.62	-2.93	-2.46	-2.77	-3.28	-3.21
10 600	0.75	-0.97	-1.52	-1.58	-2.07	-2.34	-2.36	-2.56	-2.78	-2.73
11 200	0.49	-1.27	-1.78	-1.78	-1.98	-2.19	-2.30	-2.41	-2.79	-2.60
11 800	0.85	-1.14	-1.56	-1.82	-1.98	-2.29	-2.79	-2.83	-3.08	-3.03
12 500	0.73	-1.05	-1.22	-1.49	-2.23	-2.37	-3.04	-3.43	-3.30	-3.57

[deg] / [Hz]	300-310	310-320	320-330	330-340	340-350	350-360				
250	0.01	0.01	-0.01	-0.02	0.05	0.03				
315	0.12	0.11	0.09	0.08	0.05	0.04				
400	-0.20	-0.16	-0.12	-0.08	-0.05	-0.02				
500	0.10	0.09	0.07	0.05	0.03	0.02				
630	0.07	0.05	0.04	0.03	0.03	0.02				
800	-0.26	-0.21	-0.14	-0.07	-0.02	0.00				
1 000	0.05	0.05	0.05	0.03	0.02	0.01				
1 250	-0.26	-0.25	-0.21	-0.14	-0.06	-0.02				
1 600	-0.20	-0.11	-0.08	-0.06	-0.02	0.00				
2 000	-0.37	-0.19	-0.04	0.01	0.02	0.01				
2 240	-0.49	-0.43	-0.34	-0.22	-0.04	0.01				
2 500	-0.84	-0.79	-0.35	-0.20	-0.09	-0.04				
2 800	-0.54	-0.46	-0.31	-0.18	-0.05	0.01				
3 150	-0.71	-0.71	-0.49	-0.20	0.04	0.04				
3 550	-1.30	-1.20	-0.89	-0.59	-0.19	-0.05				
4 000	-1.19	-1.19	-0.84	-0.45	-0.20	-0.02				
4 500	-1.25	-1.22	-0.96	-0.73	-0.29	-0.03				
5 000	-1.75	-1.48	-1.38	-0.74	-0.26	-0.02				
5 600	-1.98	-1.84	-1.41	-1.11	-0.38	-0.03				
6 300	-2.21	-1.70	-1.34	-1.08	-0.34	0.03				
7 100	-2.11	-1.69	-1.64	-1.43	-0.66	-0.10				
8 000	-3.00	-2.80	-2.31	-1.70	-0.65	-0.06				
8 500	-2.54	-2.31	-1.84	-1.61	-0.60	-0.14				
9 000	-3.23	-2.66	-2.23	-1.70	-0.91	-0.07				
9 500	-3.28	-2.67	-2.12	-1.78	-0.79	-0.11				
10 000	-2.75	-2.43	-2.18	-1.64	-0.84	0.09				
10 600	-2.47	-2.70	-2.47	-2.03	-0.62	-0.07				
11 200	-2.80	-2.90	-2.97	-2.49	-1.41	-0.22				
11 800	-3.29	-3.81	-2.82	-2.23	-1.10	-0.11				
12 500	-3.90	-3.87	-3.42	-2.43	-1.35	-0.27				

C.2 SPECIFICATION OF SV 303 AS 1/1 OCTAVE AND 1/3 OCTAVE ANALYSER

Statement of performance

SV 303 can operate as 1/1 octave or 1/3 octave analyser with all listed below accessories meeting requirements of the IEC 61260-1:2014 standard for the pass band filters for the Class 1 Group X instruments.

Note: *Simultaneously to the frequency analysis, SV 303 operates as a Sound Level Meter - see Chapter C.1 for specification.*

Configuration of the complete analyser

SV 303	without the ST 30B microphone and the SA 209 windscreen
SL 30B_A	electrical adapter for measurements in the frequency range from 1 Hz to 100 kHz

Normal operating mode

SV 303 in configuration with the **SL 30B_A** electrical adapter with following settings: **Microphone** compensation - **Off**, **Field Compensation** - **Off** (path: *<Menu> / Measurement / Compensation Filter* – see Chapter 4.10.5).

Note: *When the 1/1 octave or 1/3 octave analyser is used with the microphone installed (for acoustic signals), the* ***Microphone*** *compensation must be* ***On*** *(path: <Menu> / Measurement / Compensation Filter).*

Conformance testing

This chapter contains the information needed to conduct conformance electrical tests according to the specified standards.

To obtain a BNC type electrical input, the microphone must be replaced by the electrical adapter SL 30B_A **before turning the instrument on**.

Note: *For the conformance electrical tests, the* ***Microphone*** *compensation must be* ***Off*** *(path: <Menu> / Measurement / Compensation Filter).*

Note: *When the 1/1 octave or 1/3 octave analyser is used with the microphone installed (for acoustic signals), the* ***Microphone*** *compensation must be* ***On*** *(path: <Menu> / Measurement / Compensation Filter).*

Signal input

SV 303 microphone input throughout the microphone equivalent/adapter:

Maximum input voltage:

SV 303 meets the requirements of IEC 61010-1 for the Class 1 devices; the input voltage shall not exceed the limits between 0 V and +5 V referred to the instrument ground.

SL 30B_A input voltage shall not exceed the limits between -5 V and +5 V referred to the adapter ground.

Impedance:

SV 303 three differential inputs: ≥ 10 kΩ, ≤ 30 pF each.

SL 30B_A ≥ 10,9 kΩ, ≤ 30 pF, single ended input.

Linear operating range

Table C.2.1. Linear operating ranges

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 μV_{RMS}	to 2271 mV_{RMS}
B	from 22.7 μV_{RMS}	to 2271 mV_{RMS}
C	from 22.7 μV_{RMS}	to 2271 mV_{RMS}
Z	from 71.8 μV_{RMS}	to 2271 mV_{RMS}

Table C.2.2. Peak for the sinusoidal signal 1 kHz, at reference conditions (@ 133 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	3.209 V
B	3.209 V
C	3.209 V
Z	3.209 V

Measurement frequency range 5.0 Hz ÷ 22.4 kHz with the **Z** filter (-3 dB)

Centre Frequency range for 1/1 octaves 31.5 Hz ÷ 16 kHz

Centre Frequency range for 1/3 octaves 20 Hz ÷ 20 kHz

RMS detector

- Digital — "True RMS" with Peak detection
- Resolution — 0.1 dB
- Range — 327.7 dB
- Crest Factor — unlimited (for signals in 20 kHz band)

Reference conditions as per IEC 61260-1:2014

- Reference temperature — +23°C
- Reference relative humidity — 50%
- Static pressure — 101.325 kPa

Calibration (electrical)

Calibration level — 100 mV_{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. Both A/D converter and input amplifier overload conditions are detected. The overload in the measurement channel (in its analogue part) and the overload of the analogue / digital converter are both detected. The "overload" indication appears when the input signal amplitude is 0.5 dB above the declared "Peak measurement range".

Warm-up time / Auto-start delay — 1 min. (for 0.1 dB accuracy).

Effect of humidity — < 0.5 dB (for 30%<RH<90% at 40°C and Reference conditions).

Effect of magnetic field — < 15 dB (A) or < 25 dB (Z) (for 80 A/m and 50 Hz).

Effect of Vibration — < 0.1 dB (from 20 Hz to 1000 Hz at 1 m/s^2).

Antialiasing filter

Built-in antialiasing filter. On-chip digital filter of the analogue-to-digital converter, ensuring correct sampling of the measured signal.

Pass band (-1 dB) — 21.980 kHz

Pass band (-3 dB) — 22.340 kHz

Stop band — 26.780 kHz

Attenuation in the stop band	> 80 dB.
Sampling frequency	48 kHz
Analogue to digital converter	3 x 24 bit resolution
Input attenuator accuracy	± 0.1 dB (for f = 1 kHz and T = +23°C)
Internal oscillator accuracy	0.01 % (for f = 1 kHz and T = +23°C).

Digital Filters

Weighting filters

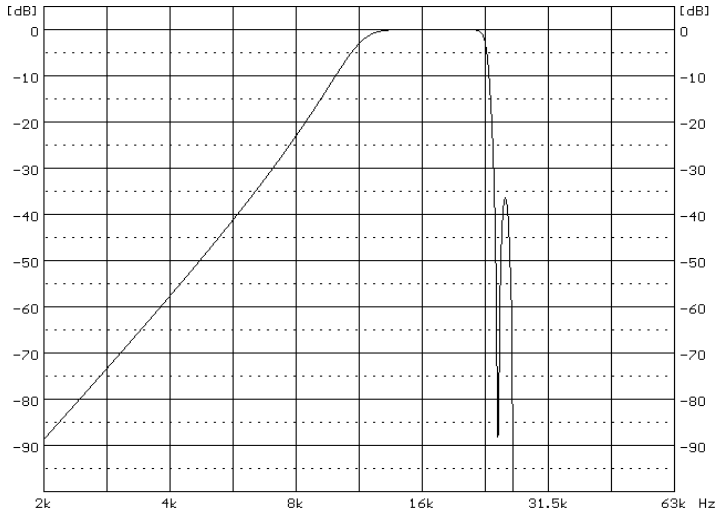
- **A** meeting requirements of IEC 61672-1:2013 for the Class 1 “A” filters,
- **C** meeting requirements of IEC 61672-1:2013 for the Class 1 “C” filters,
- **Z** meeting requirements of IEC 61672-1:2013 for the Class 1 “Z“ filters,
- **B** meeting requirements o IEC 60651 for the Class 1 “B” filters

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

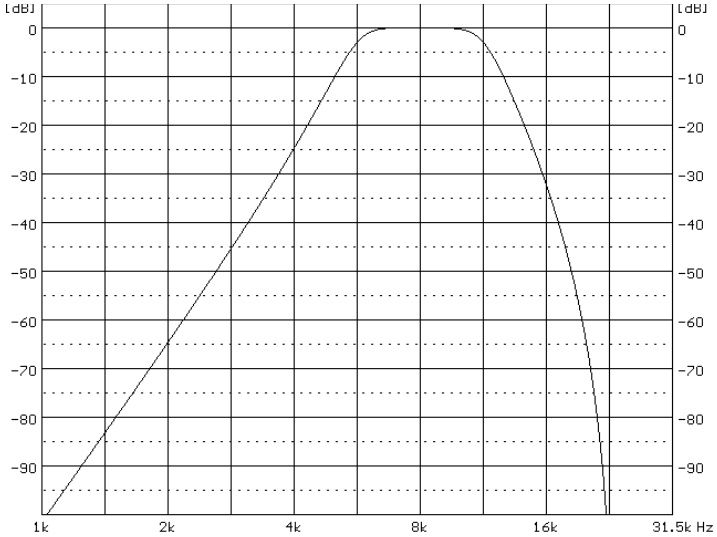
Noise levels (measured with the SL 30B_E with SL 30B_S microphone equivalent and source impedance 50 Ω, **Microphone** compensation - Off):

- ”A” weighting < 1.6 μV_{RMS}
- “B” weighting < 2.8 μV_{RMS}
- ”C” weighting < 2.8 μV_{RMS}
- ”Z” weighting < 8.9 μV_{RMS}

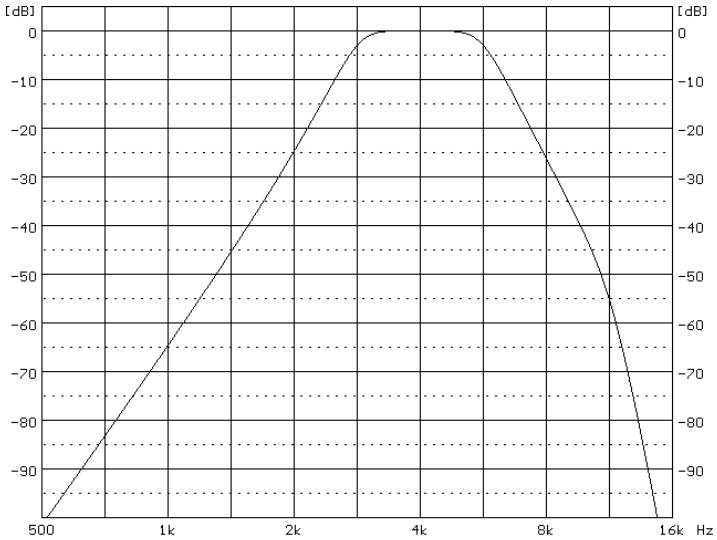
1/1 octave filters 10 filters with centre frequencies from 31.5 Hz to 16 kHz (base 10), meeting IEC 61260-1:2014 standard for Class 1



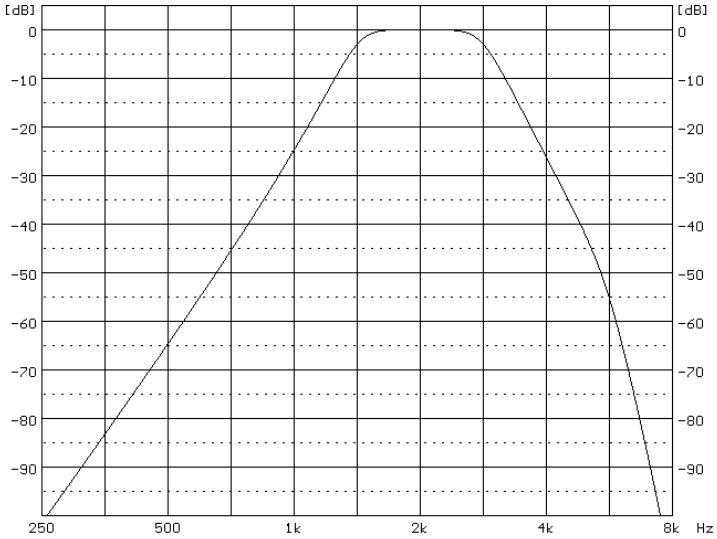
16.0 kHz 1/1 octave filter



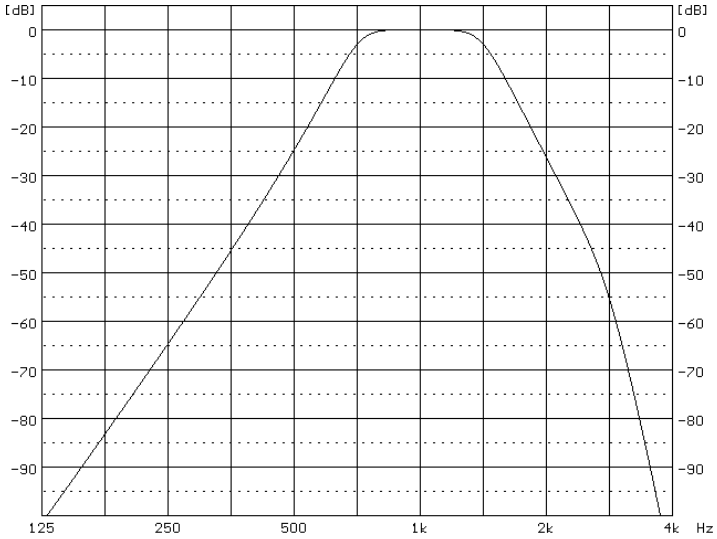
8.0 kHz 1/1 octave filter



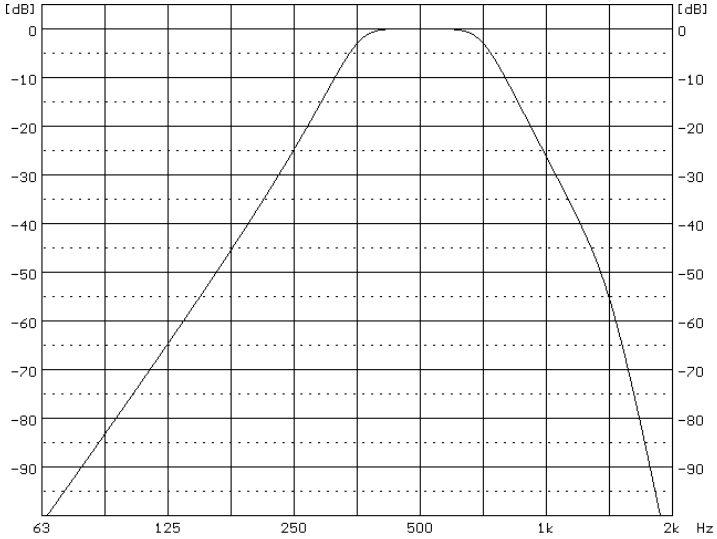
4.0 kHz 1/1 octave filter



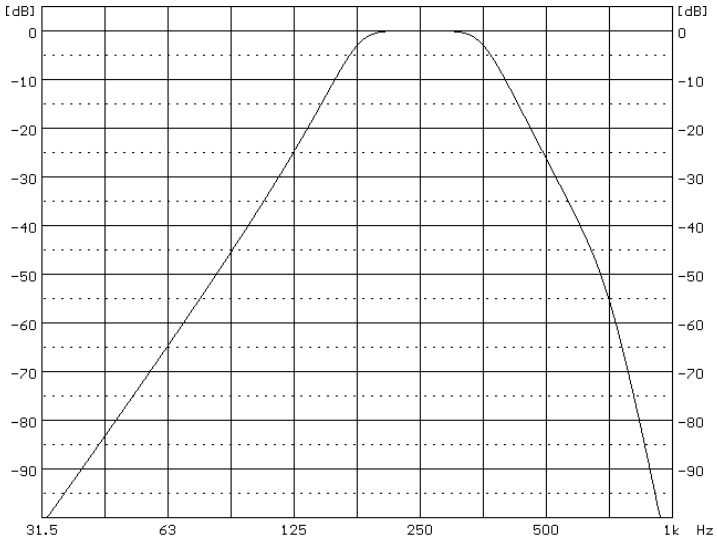
2.0 kHz 1/1 octave filter



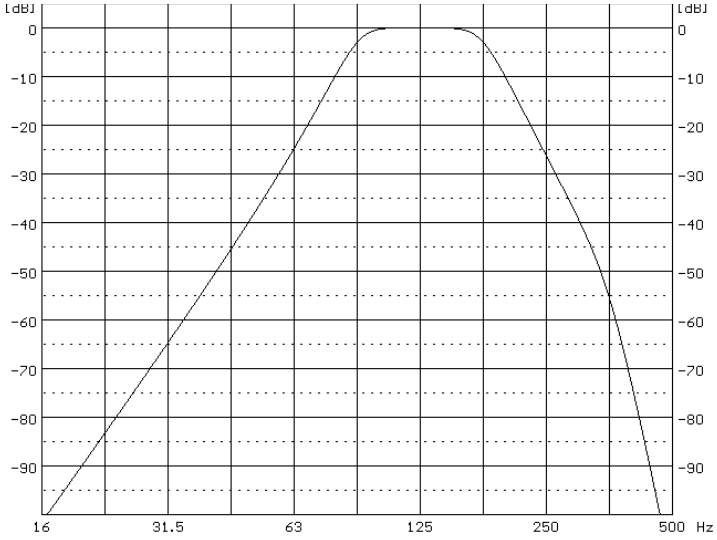
1.0 kHz 1/1 octave filter



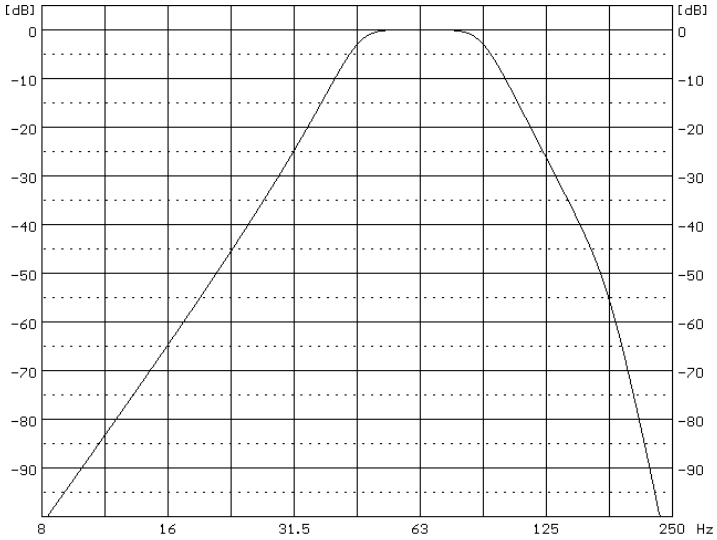
500 Hz 1/1 octave filter



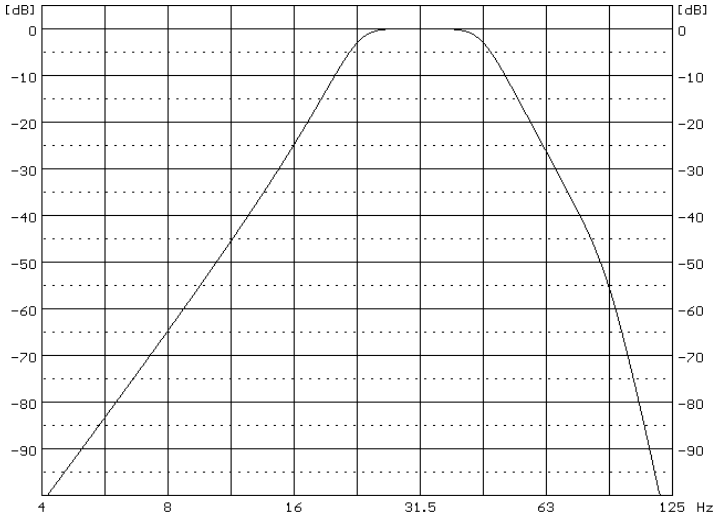
250 Hz 1/1 octave filter



125 Hz 1/1 octave filter

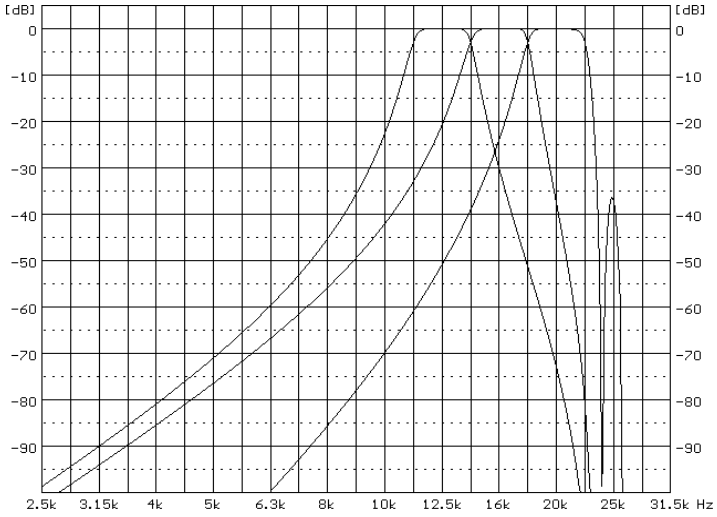


63.0 Hz 1/1 octave filter

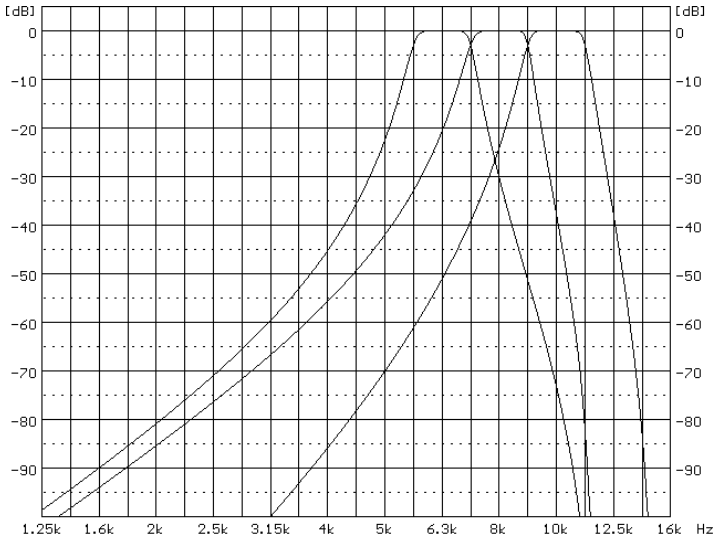


31.5 Hz 1/1 octave filter

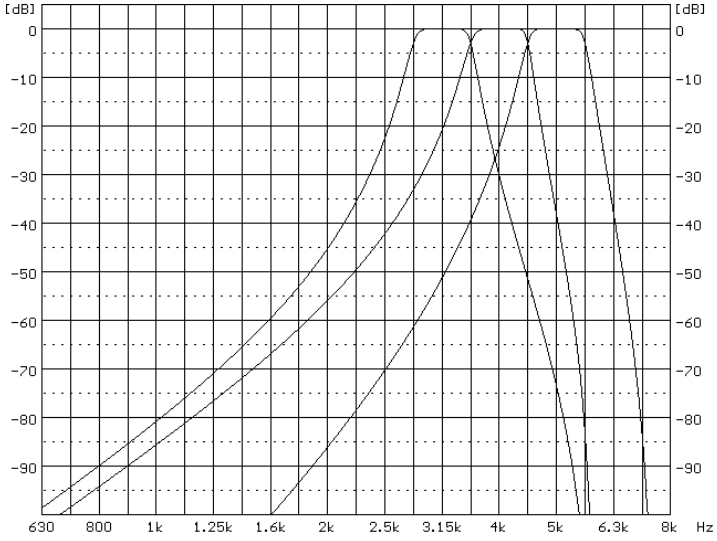
1/3 Octave filters 31 filters with centre frequencies from 20 Hz to 20 kHz (base 10), meeting IEC 61260-1:2014 standard for Class 1



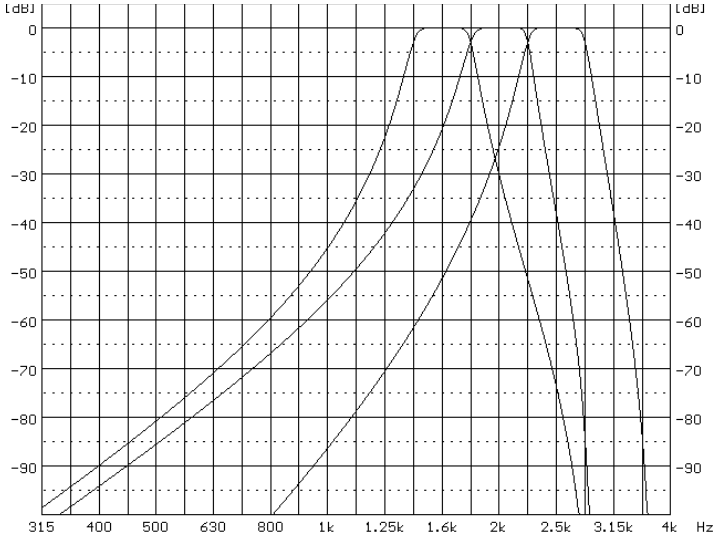
1/3 octave filters for 16.0 kHz octave



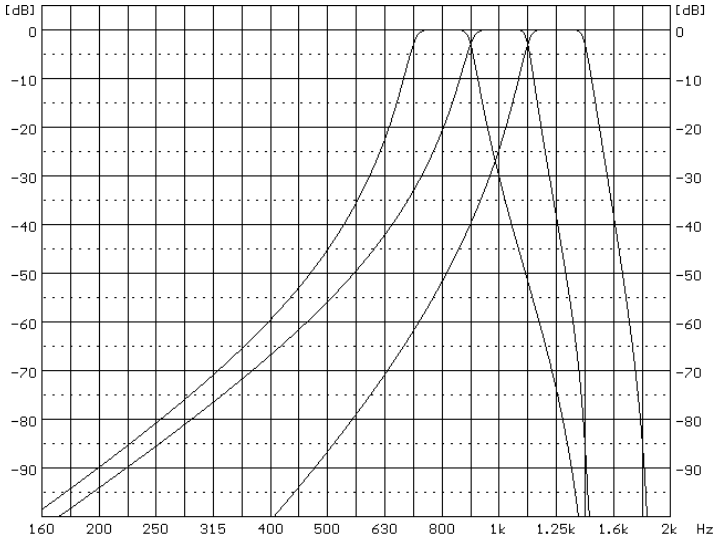
1/3 octave filters for 8.0 kHz octave



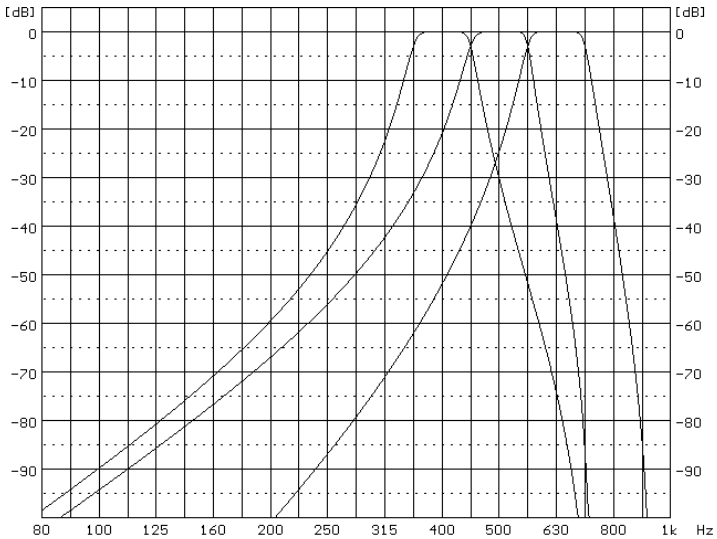
1/3 octave filters for 4.0 kHz octave



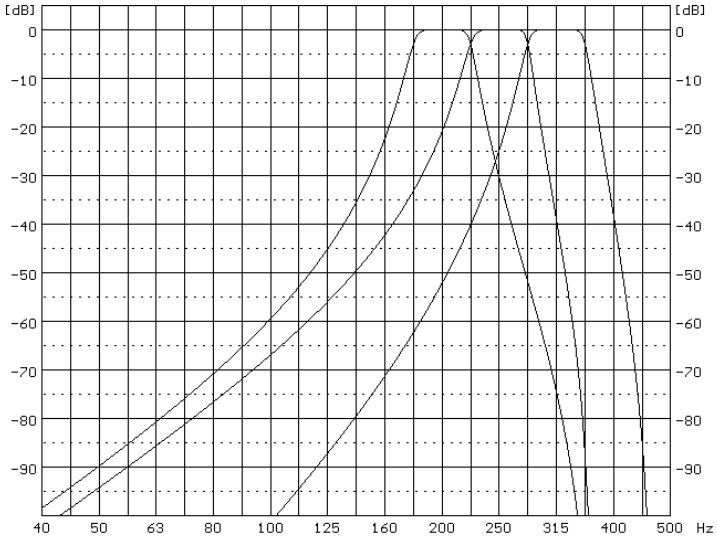
1/3 octave filters for 2.0 kHz octave



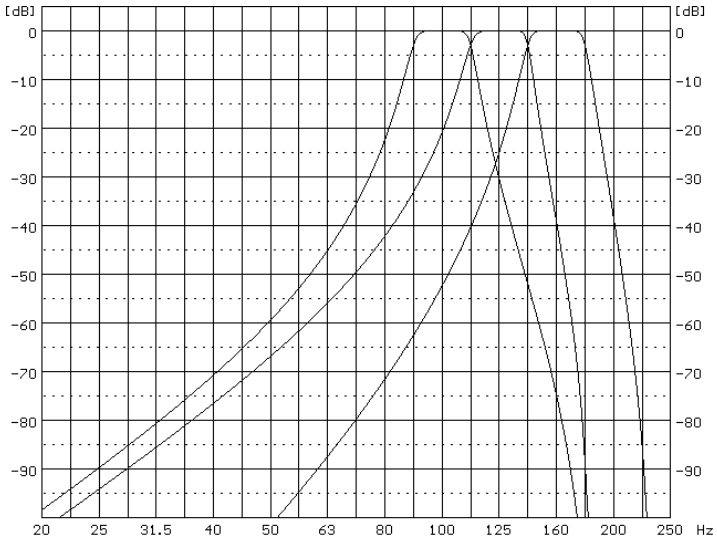
1/3 octave filters for 1.00 kHz octave



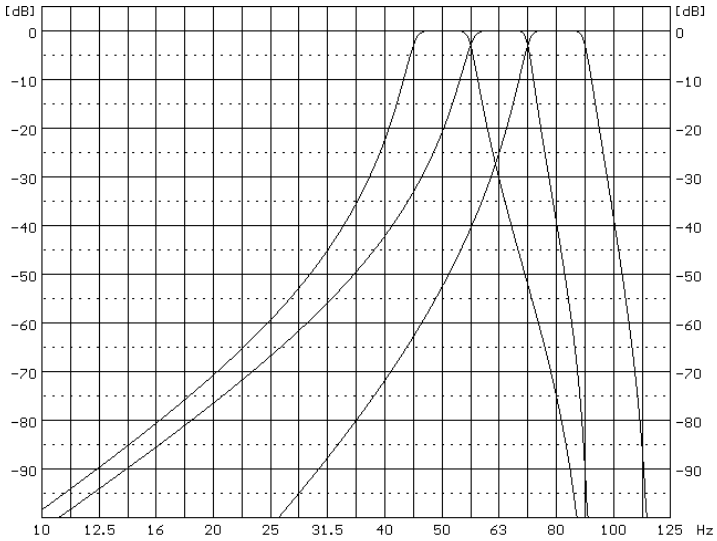
1/3 octave filters for 500 Hz octave



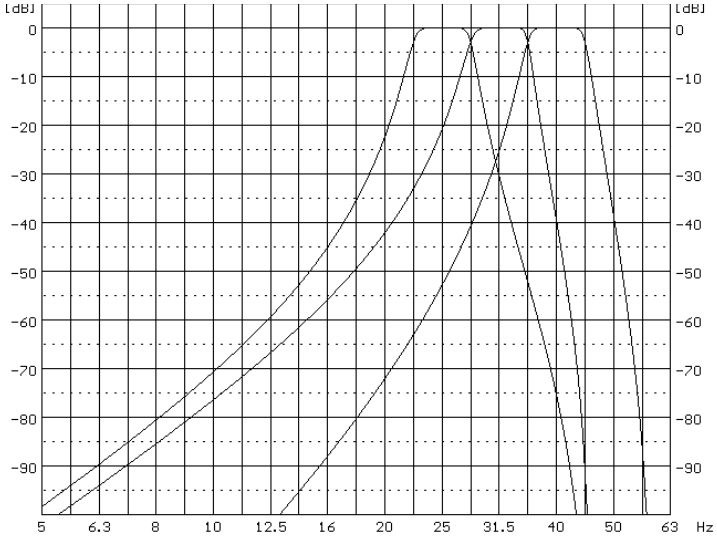
1/3 octave filters for 250 Hz octave



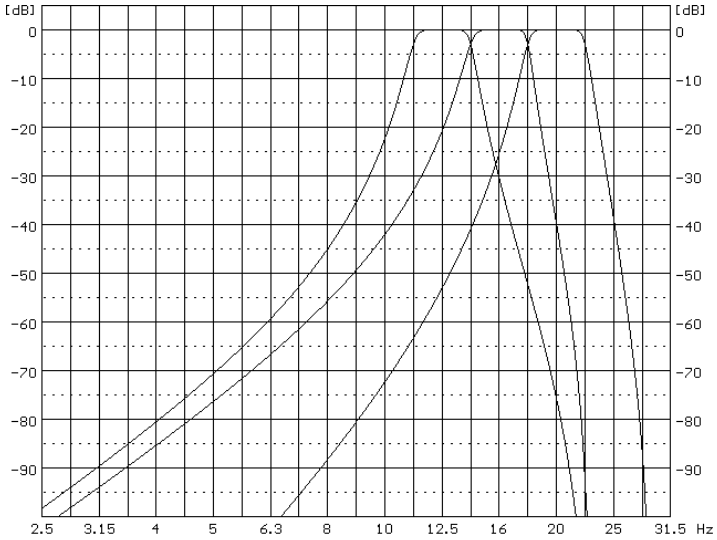
1/3 octave filters for 125 Hz octave



1/3 octave filters for 63.0 Hz octave



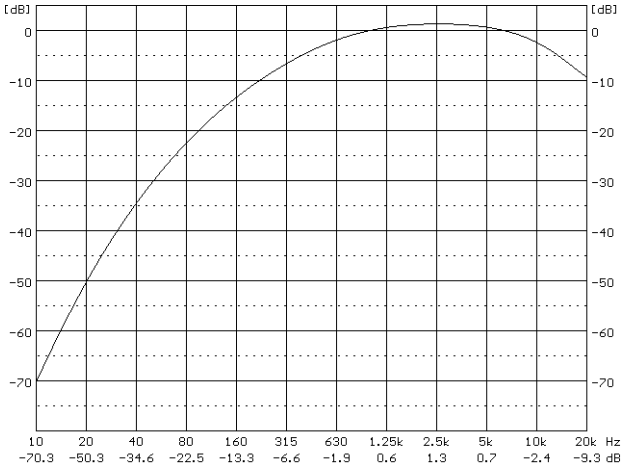
1/3 octave filters for 31.5 Hz octave



1/3 octave filters for 16.0 Hz octave

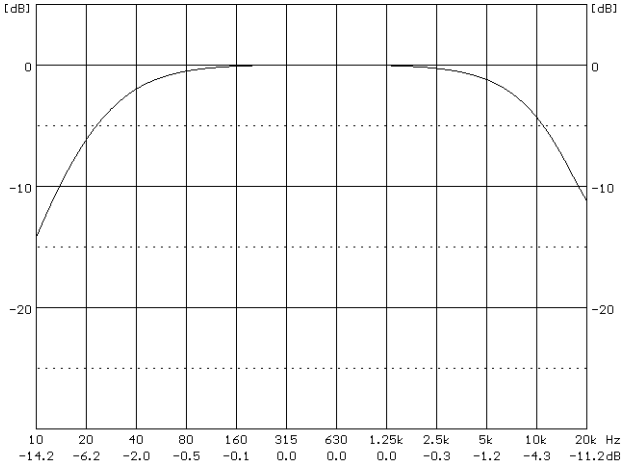
C.3 FREQUENCY CHARACTERISTICS OF THE IMPLEMENTED BROADBAND DIGITAL FILTERS

"A" filter Class 1 according to IEC 61672-1:2013



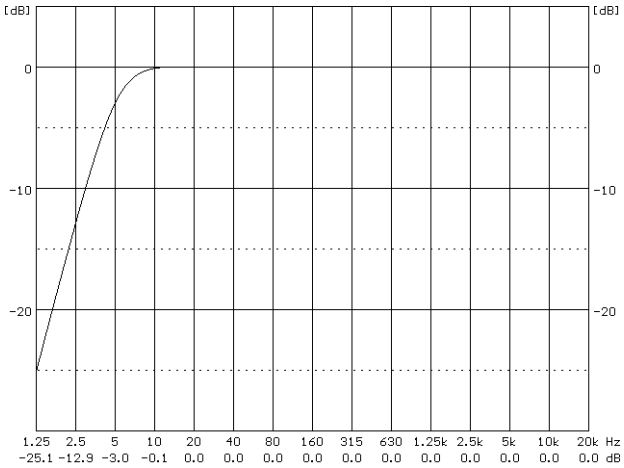
"A" filter characteristic

"C" filter Class 1 according to IEC 61672-1:2013



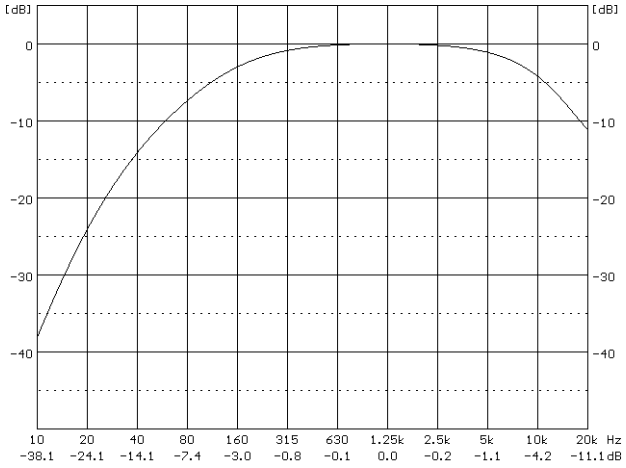
"C" filter characteristic

"Z" filter Class 1 according to IEC 61672-1:2013



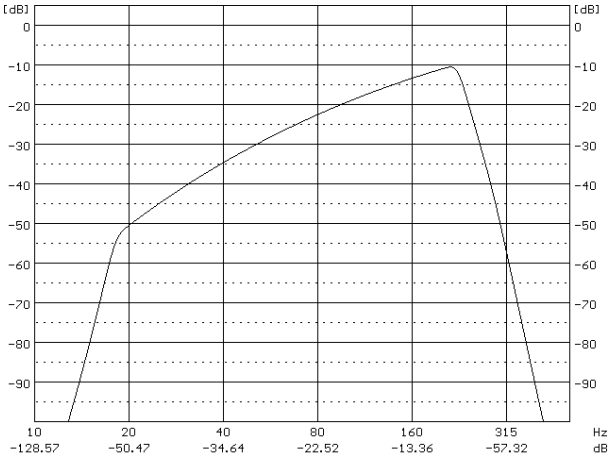
"Z" filter characteristic

“B” filter Class 1 according to 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 303

Display

Super contrast OLED colour display (96 x 96 pixels).

Memory

2 MB of the RAM memory.
4 MB of the FLASH memory allocated to the program.
8 GB, non-removable e-MMC card.

Internal sensors

Temperature	measurement range: -30° to +100°
Build-in acoustic system check	> 100 dBA reference signal

Internal battery (non-removable)

Power consumption 14 mA[1] under measurement run from 3.7V internal Li-ion cells.

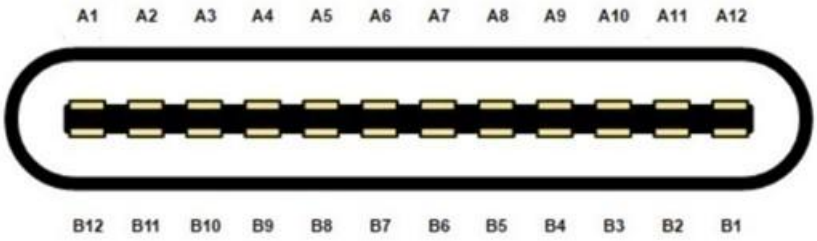
Typical operating time from the internal battery with the switched off display is about **8 hours**.

Internal rechargeable battery is protected against overcurrent and overvoltage conditions. Safety Maximum Charging Current for Li-ion cells used in SV 303 is 725 mA and Maximum Charging Voltage is 4.4 VDC.

Note: *For the temperatures below 0°C operating time may be shortened!*

Microphone input

The SV 303 microphone input uses USB-C connector:



Microphone connector

[1] display off, octave/one-third analysis off

Table C.4.1. Pin out of the microphone connector

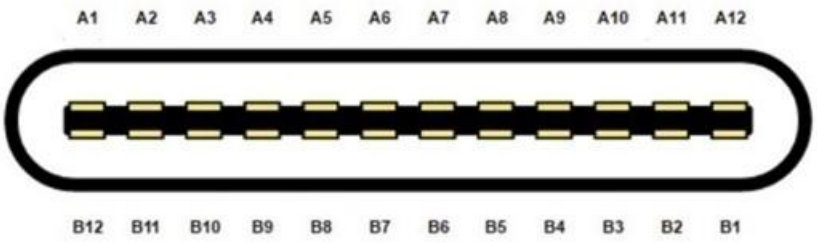
ST 30B connector		SV 303 connector		Signal name	Description
Contact no.		Contact no.			
A1	B1	A1	B1	VA_TEDS	MEMS Microphones Supply Voltage / TEDS I/O
A2	B2	A2	B2	MIC_TMP	MEMS Microphones Temperature Measurement
A3	B3	A3	B3	S3_N	MEMS 3 Differential Signal Output, phase N
A4	B4	A4	B4	S3_P	MEMS 3 Differential 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!*

USB interface

The SV 303 USB-C 2.0 interface enables remote control of the instrument and data transfer with the speed up to that attainable with 480 MHz clock.

The USB-C interface can work as external power source for the meter.



USB-C socket (external view)

Table C.6.1. Pin-out of the USB-C device connector

Contact no.		Signal name	Description
A1	B1	GND	Ground return
A2	B2	SSTXp1	UART TX
A3	B3	SSTXn1	UART RX
A4	B4	V_{BUS}	Bus power (5VDC ±0.5V)
A5	B5	CC1	Configuration channel (5.1kΩ to ground as UFP receiver)
A6	B6	Dp1	USB 2.0 differential pair, position 1, positive
A7	B7	Dn1	USB 2.0 differential pair, position 1, negative
A8	B8	SBU1	Fused out for supplying external device (750mA, 3.3VDC ±0.5V)
A9	B9	V_{BUS}	Bus power (5VDC ±0.5V)
A10	B10	SSRXn2	UART CTS
A11	B11	SSRXp2	UART RTS
A12	B12	GND	Ground return

Power consumption from the external ⎓6V source is approx. 190 mA (250mA max) at + 20°C under battery charging.

Real Time Clock

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

Environmental parameters

- Working temperature range -20°C ÷ +60°C
- Storing temperature range -20°C ÷ +60°C
- Humidity 99% RH in 40°C (uncondensed vapour)
- Ingress Protection Code IP 54

Weight, dimensions

Weight with the battery Approx. 1.2 kg

Dimensions 600 mm length, 66 mm diameter, excluding windscreen (windscreen diameter 130 mm)

APPENDIX D. DEFINITIONS AND FORMULAE OF MEASURING VALUES

D.1 BASIC TERMS AND DEFINITIONS

T Current time period of the measurement in seconds.

T_1 Last second of the measurement.

T_e Exposure time in seconds (time period during which a person is exposed to the action of noise). This parameter is set in the **Exposure Time** screen of the **Measurement** menu. The available values are from 1 minute to 12 hours.

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

τ Exponential time constant in seconds for the given time-weighting: **Slow** (1000 ms), **Fast** (125 ms), **Impulse** (35 ms, but on falling values a longer time constant of 1500 ms is applied).

W Frequency-weighting filter: **A**, **C, B** or **Z**.

$p_W(t)$ Instantaneous frequency-weighted sound pressure with the weighting filter **W**. Sound pressure is expressed in pascals (Pa).

$p_{W\tau}(t)$ Instantaneous frequency and time-weighted sound pressure with the weighting filter **W** and time constant τ

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

where: ξ – integration variable.

$r(t)$ Instantaneous sound pressure depended on the **RMS Integration** parameter:

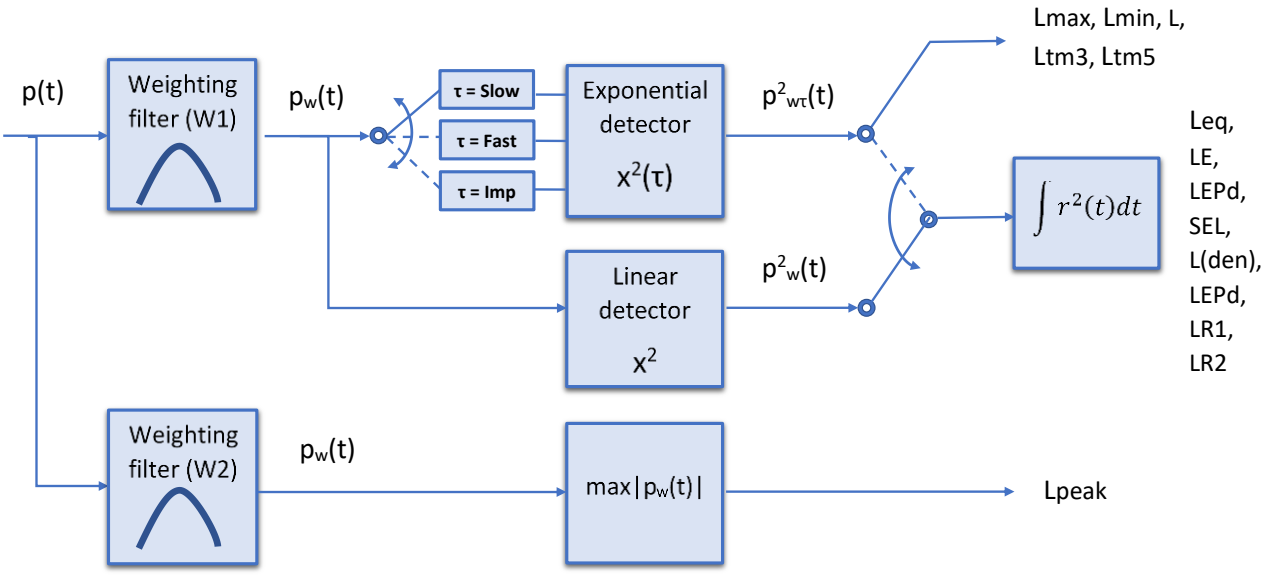
$$r(t) = \begin{cases} p_W(t) & Lin\ RMS\ Integration \\ p_{W\tau}(t) & Exp\ RMS\ Integration \end{cases}$$

p_0 Reference value (20 μPa).

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

D.2 DEFINITIONS AND FORMULAE OF SLM RESULTS

The instrument calculates the sound measurement results for three profiles. The calculation flow diagram for one profile is presented below:



OVL Percentage of the overloaded input signal, which occurred within a stated time interval **T**

L(A/C/Z)peak Peak sound level of the frequency weighted signal (**LApeak**, **LCpeak** and **LZpeak**) within a stated time interval **T**. Expressed in dB.

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

L(A/C/Z)(S/F/I)max The highest sound level of the frequency- and time-weighted signal (**LAFmax**, **LASmax**, **LCFmax**, **LCSmax** etc.) within a stated time interval **T**. Expressed in dB.

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

L(A/C/Z)(S/F/I)min The lowest sound level of the frequency- and time-weighted signal (**LAFmin**, **LASmin**, **LCFmin**, **LCSmin** etc.) within a stated time interval **T**. Expressed in dB.

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

L(A/C/Z)(S/F/I) Instantaneous time and frequency weighted sound level (**LAF**, **LAS**, **LCF**, **LCS** etc.) Expressed in dB.

$$L = 10\ log\ \left(\frac{p^2_{W\tau}(t)}{p^2_0}\right)$$

L(A/C/Z)eq Equivalent continuous sound level of the frequency weighted signal (**LAeq**, **LCeq** and **LZeq**.) averaged for the time **T**. In principle time weighting is not involved in a determination of time averaged sound level. Expressed in dB.

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

L(A/C/Z)E Sound Exposure Level (**SEL**) frequency weighted (**LAE**, **LCE** and **LZE**). **SEL** is essentially the subset of the **Leq** result. Its value is equal to the **Leq** result referred to the integration time equal to one second (so, for the Integration time equal to 1 s, **SEL** is always equal to **Leq**). Expressed in dB.

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

L(den) Only one result from: **Lday**, **Leve**, **Lnight**, **Lde**, **Len**, **Lnd**, and **Lden** is available in the instrument. It depends on the day and night time in which the measurement was performed. Day and night time depend on the **<Day Time Limits>** option (**6h-18h** or **7h-19h**).

If **<6h-18h>** option is selected for the <**Day Time Limits>** in the instrument then:

- $\mathbf{T_d}$ (day-time) starts from 6 am and ends at 6 pm,
- $\mathbf{T_e}$ (evening-time) starts from 6 pm and ends at 10 pm,
- $\mathbf{T_n}$ (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:

- $\mathbf{T_d}$ (day-time) starts from 7 am and ends at 7 pm,
- $\mathbf{T_e}$ (evening-time) starts from 7 pm and ends at 11 pm,
- $\mathbf{T_n}$ (night-time) starts at 11 pm and ends at 7 am.

Lday **Lday** is calculated for: $\mathbf{T_d} \neq 0$, $\mathbf{T_e} = 0$, $\mathbf{T_n} = 0$.

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

Leve **Leve** is calculated for: $\mathbf{T_d} = 0$, $\mathbf{T_e} \neq 0$, $\mathbf{T_n} = 0$.

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

Lnight **Lnight** is calculated for: $\mathbf{T_d} = 0$, $\mathbf{T_e} = 0$, $\mathbf{T_n} \neq 0$.

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

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

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

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

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

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

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

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

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

LEPd — Daily Personal Noise Exposure is the noise exposure level for a nominal 8-hour working day. The **LEPd** result is calculated on the base of the **LEQ**

$$LEPd = Leq + 10\ log\frac{T_e}{T_{8h}}$$

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

Ln — Statistical level is the certain boundary level surpassed by the temporary noise level values in not more than **n%** of the observation period. Calculated on the basis of 100ms RMS results.

see Chapter D.4

EX — Expected value. Calculated on the basis of 100ms RMS results.

SD — Standard deviation. Calculated on the basis of 100ms RMS results.

NR — Noise Rating, measured noise level that takes into account the frequency content of the noise.

NR is calculated if 1/1 Octave function is active.

To calculate the NR value, the noise level in each 1/1 octave band (from 31.5Hz to 8kHz) is compared to the “NR curves” for each corresponding band. The NR curve number which applies to each frequency band is the highest numerical value that is not exceeded in that band. The overall NR value is the highest of the individual NR values for the frequency bands.

NC

Noise Criterion, measured noise level that takes into account the frequency content of the noise.

NC is calculated if 1/1 Octave function is active.

To calculate the NC value, the noise level in each 1/1 octave band (from 63Hz to 8kHz) is compared to the "NC curves" for each corresponding band. The NC curve number which applies to each frequency band is the lowest numerical value that is not exceeded by each individual frequency band. The overall NC value is the highest of the individual NC values for the frequency bands.

D.3 DEFINITIONS AND FORMULAE OF ADDITIONAL LEQ RESULTS

LR

Rolling Leq measured in the time window for the last **Tw** seconds of the measurement. LR window is moving with 1 second step.

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

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

LeqPR

Projected Leq result is calculated based on the Leq,T measured for the T period from starting hour of the period of projection T_0.

The LeqPR calculation function assumes that from the moment the Leq limit is exceeded to the end of the period of projection, the same noise level will be maintained.

$$LeqPR = Leq,T + 10\ \ log\frac{T}{T_0}$$

LeqPR+LN

The LeqPR+LN calculation function assumes that from the moment the Leq limit is exceeded to the end of the period of projection, the estimated background noise level (LN) will be maintained.

$$LeqPR + NR = Leq,t + Leq,s + Leq,LN(T_0 - t - s)$$

where s-time for the reaction, t - time from the beginning of the measurement to s, T_0 - period of projection.

D.4 STATISTICAL LEVELS – LN DEFINITION

The noise level **L(t)** is the continuous random variable. The probability that the temporary noise level **L(t)** belongs to the interval $\langle L_k,\ L_k + \Delta L\rangle$ is called the class density and it can be expressed by the equation:

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

where: Δt_i - time intervals, in which the noise level $L(t) \in \langle L_k,\ L_k + \Delta L\rangle$ occurs,

ΔL - so-called class interval or distribution class of the series,

P - total observation period.

In case when the class interval approaches infinity, the probability of **L(t)** tends to the probability of $\mathbf{L_k}$. In practice, $\mathbf{\Delta L}$ value is strictly determined for the measuring instrument. For SV 303, there are 240 classes and the width of each class is 0.5 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:

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

The cumulative density function expressed by the equation:

$$P[L(t) > L_j] = 1 - P[L(t) \leq L_j]$$

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

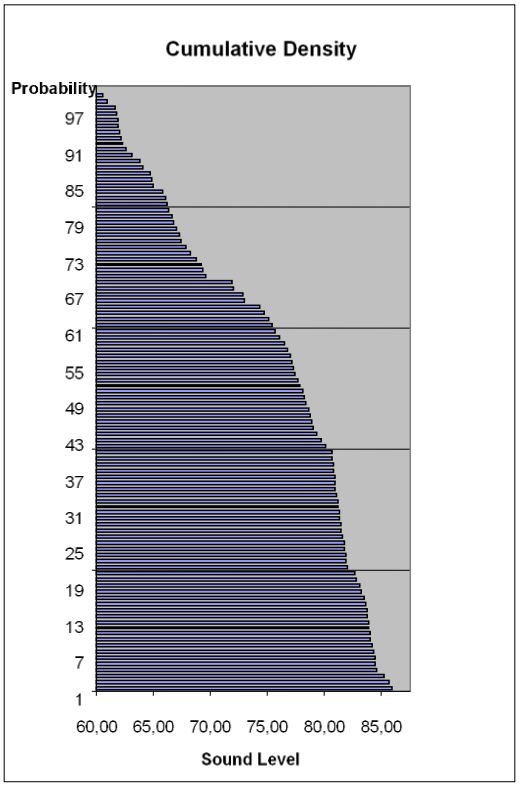
The **Ln** is the certain boundary level surpassed by the temporary noise level values in not more than **n** of the observation period.

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.

The cumulative density function for the exemplary data is presented in Figure on the right side. In order to determine the **Ln** level, one must 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 statistical level **Ln** value, the profile's number the statistics are taken from, the RMS detector (**Lin.**, or **Exp.**: **Fast**, **Slow** or **Imp**.), the filter's name (**A**, **C** or **Z**) and real time are displayed in the top-right side of the display in one-result view mode.



Exemplary cumulative density