USER MANUAL

SVAN 958A

FOUR CHANNELS SOUND & VIBRATION LEVEL METER & ANALYSER

Warsaw, 2023-03-03

Rev. 1.02

Note: *Because of continuous product improvement SVANTEK reserves the right to make changes to product specifications without notice. To download the most up to date User Manual please visit our website at www.svantek.com. This User Manual presents the firmware revision Ver. 4.01.x for* ***Level Meter*** *and Ver. 4.16.x for* ***Analyzer*** *(cf. the description of the* ***Unit Label*** *position of the* ***Display*** *list).*

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

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

Technical Support Contact Information:

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1 INTRODUCTION

SVAN 958A Class 1 Four-channel Sound & Vibration Analyser is dedicated for all applications that require simultaneous class 1 sound and vibration assessment. Each of four input channels can be independently configured for sound or vibration detection with different filters and RMS detector time constants giving users an enormous measurement flexibility. The real advantage of SVAN 958A is the capability to perform advanced analysis simultaneously to the level meter mode. In practise this allows the user to obtain broad-band results such as Leq, RMS, LMax, LMin, LPeak together with four-channel analysis like FFT or octave band analysis.

SVAN 958A as sound meter meets IEC 61672-1:2013 and as vibration meter meets ISO 8041-1:2017. All required weighting filters, transducers and adapters for triaxial Whole-Body and triaxial Hand-Arm vibration measurements (**VM**) are available with this instrument.

Additionally, in case of sound measurements (**SM**), each channel calculates simultaneously the results in three independent profiles.

Advanced time-history logging, provides very powerful measurement capability. The external USB Memory Stick extends this facility almost unlimitedly. Results can be easy downloaded to any PC using standard USB (or optional RS 232 and IrDA) interface and SvanPC software.

Reverberation Time measurements, noise dosimeter and rotation speed measurements are available as options for the SVAN 958A instrument.

The time-domain signal recording on the external USB memory stick is also available as an exceptional option.

Fast USB 1.1 interface (12 MHz) creates real time link for the PC "front-end" application of SVAN 958A. The measurement results can be downloaded to PC using the above mentioned interfaces.

The instrument is powered by four AA standard alkaline or rechargeable batteries (i.e. NiMH – separate charger is required). Powering the instrument from the external DC power source or the USB interface is also possible. Robust and lightweight design accomplishes the exceptional features of this new generation instrument.

The Whole-Body vibration measurement is now even easier thanks to the SV 38 seat-accelerometer which can be placed directly on the seat-cushion, on the floor or fixed to the back of the seat.

The SV 50 set with triaxial accelerometer enables Hand-Arm vibration measurements regardless of the type of evaluated tool.

Additionally, for measurements of very high impulse vibration the special adapter SA 55, with low pass mechanical filter protecting accelerometer from DC shift effect is available. Evaluation of the grip force will be possible with the dedicated “integrated adapter” SV 105 (under development).

1.1 SVAN 958A AS SOUND LEVEL METER & ANALYSER

- Noise measurements (**SPL**, **LEQ**, **SEL**, **Lden**, **Ltm3**, **Ltm5** and statistics) with Class 1 accuracy (IEC 61672-1:2013) in the frequency range 10 Hz ÷ 20 kHz (with the **SV 22** microphone)
- Two measurement ranges (**Low** and **High**) with total range 24 dBA RMS ÷ 194 dBA Peak (for the microphone with the sensitivity 50 mV/Pa)
- Internal noise level: less than 17 dBA RMS
- Simultaneous measurements in three profiles of any channel with the independent set of **IMPULSE**, **FAST** and **SLOW** detectors with standard **A**, **C**, **LIN** and **G** filters
- Digital True **RMS detector** with **Peak** detection, resolution 0.1 dB, Time Constants: **SLOW**, **FAST**, **IMPULSE**
- **1/1 Octave** and **1/3 Octave** real time analysis (optional) - fifteen 1/1-octave filters with the centre frequencies from 1 Hz to 16 kHz and forty-five 1/3-octave filters with the centre frequencies from 0.8 Hz to 20 kHz, Class 1 - IEC 1260
- **FFT** real time analysis with up to 1920 lines in 22.4 kHz band with **Hanning**, **Rectangle**, **Kaiser-Bessel** or **Flat Top** window (optional)
- Reverberation Time analysis (**RT 60**) in 1/3 octave bands (optional)
- **Dosimeter** function (optional)
- **Cross Spectrum** function (optional)
- **Sound Intensity** function (optional)
- **Wave** recorder function (optional)

1.2 SVAN 958A AS VIBRATION METER & ANALYSER

- Vibration measurements according to ISO 2631-1, 2 & 5 and ISO 5349-1 & 2 with Class 1 accuracy (ISO 8041-1:2017) in the frequency range 0.5 Hz÷3 kHz (with **SV 39A/L** accelerometer) or 2 Hz÷ 10 kHz (with **SV 3023 M2** accelerometer)
- Two measurement ranges (**Low** and **High**) with total range 0.003 ms^{-2} RMS ÷ 500 ms^{-2} Peak (for the accelerometer with the sensitivity 100 mV/g)
- Simultaneous **RMS**, **VDV**, **MTVV** or **MAX**, **PEAK**, **P–P** measurements in four channels with independent set of filters and detector constants
- Digital True **RMS** & **RMQ** detectors with **Peak** detection, resolution 0.1 dB, Time Constants: from 100 ms to 10 s
- $\mathbf{W_d}$, $\mathbf{W_k}$, $\mathbf{W_c}$, $\mathbf{W_j}$, $\mathbf{W_m}$, $\mathbf{W_b}$, $\mathbf{W_g}$ (ISO 2631), $\mathbf{W_h}$ (ISO 5439), **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10**, **KB** weighting filters
- **1/1 Octave** and **1/3 Octave** real time analysis (optional) - fifteen 1/1-octave filters with the centre frequencies from 1 Hz to 16 kHz and forty-five 1/3-octave filters with the centre frequencies from 0.8 Hz to 20 kHz, Class 1 - IEC 1260
- **FFT** real time analysis with up to 1920 lines in 22.4 kHz band with **Hanning**, **Rectangle**, **Kaiser-Bessel** or **Flat Top** window (optional)
- **RPM** rotation speed measurements parallel to the vibration measurement (1 ÷ 99999) (option)
- **Wave** recorder function (optional)
- **Ground Vibrations** function (optional)
- **Cross Spectrum** function (optional).

1.3 GENERAL FEATURES OF SVAN 958A

- Internal logger function for logging more than two weeks of 1-second **PEAK** / **MAX** / **MIN** / **RMS** results in the case of **SM** and **PEAK** / **P–P** / **MAX** (or **MTVV**) / **RMS** / **VDV** results in the case of **VM** (32 MB of non-volatile memory, optional USB memory stick)
- **USB** 1.1 **Client**, **USB Host**, **RS 232** (option, **SV 55** required) and **IrDA** (option) interfaces
- Powered by four **AA standard batteries** (operation time >10 hours) or four **AA rechargeable batteries** (e.g. **NiMH** - operation time > 16 hours), **SA 17A** external battery pack (operation time > 14 hours), external **DC power** source (6 V ÷ 15 V) or **USB** interface (500 mA)
- Acoustic dosimeter function (option)
- Integration time programmable up to 24 hours
- Time-domain signal recording on USB memory stick (option)
- Handheld and robust case
- Light weight (only 510 grams including batteries)

1.4 ACCESSORIES INCLUDED

- **SC 16** USB 1.1 cable
- **SC 61** integrated connector (TNC to BNC)
- **batteries** four AA standard (alkaline)

1.5 ACCESSORIES AVAILABLE

- **MK 255** Microtech Gefell prepolarised condenser microphone cartridge 1/2' (stainless steel microphone), 50 mV/Pa
- **SV 12L** microphone preamplifier
- **SC 26** extension cable for the microphone preamplifier (3 m or 10 m)
- **SC 27** TNC (plug) to TNC (plug) coil cable
- **SC 49** LEMO 4-pins to 3 x TNC sockets (0.7 m)
- **SA 06** microphone preamplifier holder
- **SA 21** tripod 1.5 meter high
- **SA 22** windscreen
- **SV 25** dosimeter ceramic ½” microphone with integrated preamplifier (Class 2)
- **SV 36** Class 1 Sound calibrator: 94/114 dB @ 1000 Hz
- **SC 49** LEMO 4-pins (plug) to 3 x TNC sockets (0.7 m)
- **SV 38** Whole-Body Seat accelerometer for SVAN 958A instrument
- **3143M1** DYTRAN IEPE type triaxial accelerometer with the nominal sensitivity 100 mV/g (**SC 38** cable required)
- **3023M2** DYTRAN IEPE type triaxial accelerometer with the nominal sensitivity 10 mV/g (**SC 38** cable required)
- **SC 38** 4-pins Microtech to LEMO 4-pins cable (2.7m) (for **3023M2**, **3143M1**)
- **SV 111** vibration calibrator for HVM

- **SV 110** vibration calibrator
- **SC 50Z** car cigarette plug to external power supply plug
- **SC 39P** LEMO 4-pins (plug) to 3 x BNC sockets cable (0.7 m)
- **SV 50** set for Hand-Arm measurements (**3023M2** accelerometer)
- **SV 55** RS 232 interface
- **SA 17A** external battery unit
- **SA 15** power supply unit
- **SC 09A** AC output (Lemo 1 to BNC) cable
- **SA 47** carrying bag (fabric material)
- **SA 48** carrying case (waterproof)

1.6 AVAILABLE FIRMWARE

SVAN 958A can be supplied with one of the below firmware options. The user can download the new firmware from the SVANTEK web-site and install it to the instrument.

- **SVAN 958A Firmware (supporting RT 60, Crosspectra, Intensity, not supporting modem)**

This firmware option is recommended for other than Building or Ground Vibration measurements or if you don't use the SV 258 PRO monitoring station.

- **SVAN 958A Firmware (supporting modem, not supporting RT 60, Crosspectra, Intensity)**

This firmware option is recommended for other than Building or Ground Vibration measurements but when you use the SV 258 PRO monitoring station.

- **SVAN 958AG Building Vibration Firmware for SVAN 958A**

This firmware option is recommended for Building or Ground Vibration measurements with or without using the SV 258AG PRO monitoring station. This firmware option is described in the SV 258AG PRO User Manual.

1.7 FIRMWARE OPTIONS

- **SVAN 958A_1** SVAN 958A including 1/1 & 1/3 octave analysis, FFT and Time domain signal recording
- **SV 958A_1** 1/1 octave analysis option
- **SV 958A_2** 1/3 octave analysis option
- **SV 958A_3** 1/1 & 1/3 octave analysis option
- **SV 958A_4** FFT analysis option
- **SV 958A_5** Reverberation time analysis (RT60) option
- **SV 958A_8** Rotation measurement option without Laser Tachometer
- **SV 958A_10** Acoustic dosimeter option (microphone not included)
- **SV 958A_15** Time domain signal recording option (to the USB Flash Disk, wav format)
- **SV 958A_17** Sound Intensity option, FFT base (Probe not included)
- **SV 958A_19** Cross-spectra option

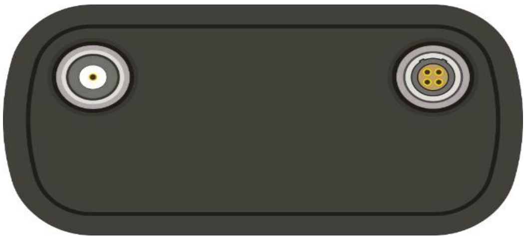
Note: *The firmware options for the instrument can be purchased at any time as only the introduction of a special unlock code is required for their activation in a specific instrument. Contact your local Svantek distributor for further information and costs for these options.*

2 GENERAL INFORMATION

2.1 INPUT AND OUTPUT SOCKETS OF THE INSTRUMENT

Top cover of the instrument

The measurement inputs are placed on the top cover of the instrument: 4-pins Lemo compatible socket type ENB.0B.304 for **Channels 1–3** and TNC for **Channel 4**, all with IEPE power supply for the accelerometers or microphone preamplifiers.



The microphone preamplifier **SV 12L** has the proper plug-in with the screw for direct connection with the instrument to the TNC connector (**Channel 4**) but it is recommended to use the preamplifier with any of the extension cables (i.e. **SC 26**) or the **SA 08** gooseneck. The same type of the connector should be used to attach one-channel accelerometer to **Channel 4**. The **SC 27** coiled cable is recommended in this case. In order to connect the **SV 12L** microphone preamplifier to **Channels 1–3** the user has to use the **SC 49** cable (LEMO 4-pins plug to 3 * TNC sockets, 0.7 meters long). The **SC 49** or **SC 39P** (LEMO 4-pins plug to 3 * BNC sockets, 0.7 meters long) cables should be used to connect one-channel accelerometer to any of the **Channels 1–3**. The triaxial accelerometers can be easy connected to **Channels 1–3** by means of the **SC 38** cable (4-pins Microtech to LEMO 4-pins, 2.7 meters long). It is recommended to attach the **SV 25** dosimeter microphone with the integrated preamplifier and a cable to **Channel 4**.

The full description of the signals connected to the sockets is given in the Appendix C.

Note: *Pay attention that the TNC connector should be always twisted to the light resistance but the LEMO connector is a push-pull only.*

Bottom cover of the instrument

In the bottom cover there are four sockets, placed from the right to the left as follows: **Ext. Pow.**, **USB Host**, **USB Device** and **I/O**.

The **USB** 1.1 Client interface (the **USB Device** socket) is the serial interface working with 12 MHz clock. Thanks to its speed, this interface is widely used in all PCs. In the instrument, the standard 4-pins socket is used described in details in Appendix C.

The **USB Host 1.1** interface can be used to connect the external storage, enabling the device to register virtually infinite sequence of measurement results.

The **Ext. Pow.** socket located on the bottom cover of the instrument is Marushin MJ-14 compatible socket, dedicated for the standard *Φ* 5.5 / 2.1 mm plug (the right one in the Fig. above). The user can connect the external mains adapter (110 V / 230 V) which furnishes the proper DC level. The instrument can be charged from the external DC source (6 V / 500 mA DC ÷ 15 V / 250 mA DC). The current consumption depends on the voltage of the power supplier.

The additional input / output socket, called **I/O**, is 1-pin LEMO compatible socket type ERN.00.250 (the left one in the Fig. above). The function of this socket can be selected from menu *(path: <Menu> / Setup / EXT. I/O Setup / Mode).* The socket can be used as:

- analogue output with the signal from the input of the analogue / digital converter (before the correction); this signal can be registered using magnetic recorder or observed on the oscilloscope (the **ANALOG** setting)
- digital input for external interrupt (the **DIGITAL IN** setting)
- digital output for external trigger (the **DIGITAL OUT** setting)

Note: *Switch the power off before connecting the instrument to any other device (e.g. a printer or a Personal Computer).*

Front panel of the SVAN 958A instrument

Rear panel of the SVAN 958A instrument

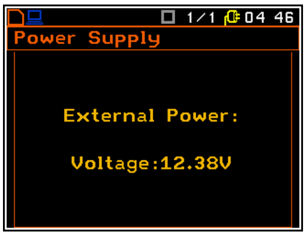
Control of the instrument has been developed in a fully interactive manner. The user can operate the instrument by selecting the appropriate position from the selected **Menu** list. Thanks to that, the number of the control keys of the instrument has been reduced to nine for ease of use and convenience.

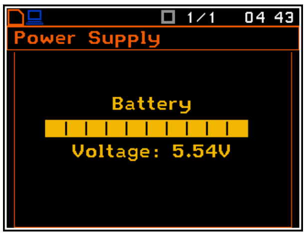
2.2 POWERING OF THE INSTRUMENT

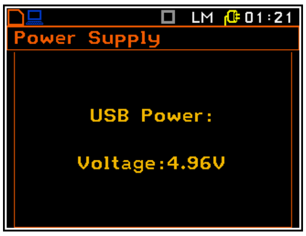
The **SVAN 958A** can be powered by one of the following sources:

- **External DC power** source, **SA 15** – 6 V DC ÷1 5 V DC (1.5 W)
- **SA 17A external battery pack** – operation time > 24 h (option)
- Four AA standard size internal batteries. In the case of alkaline type, a new fully charged set can operate more than 12 h (6.0 V / 1.6 Ah). Instead of the ordinary alkaline cells, four AA rechargeable batteries can be used (a separate external charger is required for charging them). In this case, using the best NiMH type, the operation time can be increased up to 16 h (4.8 V / 2.6 Ah)
- **USB** interface – 500 mA HUB

The **Power Supply** list (*path: Menu / Display / Power Supply*) looks differently, depending on the current powering source.







In the **Power Supply** list of the **Instrument** list the user can see the information about the current power source.

When the instrument is powered from its internal batteries, the **"Battery"** icon is presented on the top line of the display. When voltage of the batteries is too low for reliable measurements, the icon flashes and the instrument is trying to finish the measurement during 2 seconds, then within 5 seconds the **Low power** message occurs on the display and the instrument switches off by itself.

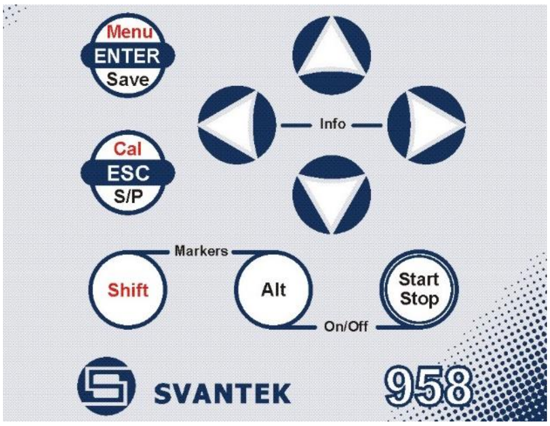
To change the batteries the user has to switch off the instrument, take off the black bottom cover of the instrument, unscrew battery cover, slide the battery tubes out, change the batteries taking care to observe the correct polarity and reassemble the parts of the instrument. Fully charged set of 4 batteries ensure more than 12 hours of continuous operation of the instrument (with the backlight off). The operation time is decreased about 20 % with the backlight switched on. The battery condition can be checked by means of the **Power Supply** function. It is also presented continuously on the top line of display by means of the **"Battery"** icon.

When there is a connection to the USB interface (USB Device socket is connected by means of the cable to a PC or a USB power supply), the **"Computer"** icon is presented on the top of the display and in the **Power Supply** list there is the message **USB Power: 0.00V**.

The external power (110 V / 230 V mains) adapter – **SA 15** – is available for the instrument but it is not included in the set. For the external power operation this adapter should be connected to the **Power** socket located on the bottom cover of the instrument. When the instrument is powered from the external power supply the red diode on the right corner of the front panel bottom of the device switches on and there is the **EXTERNAL POWER** message in the **Power Supply** list *(path: Menu / Display / Power Supply*).

Note: *In case when the **"Battery"** icon is flashing it is strongly recommended to use the external power adapter or USB interface as soon as possible. to ensure reliable operation. If no suitable external power source is provided the instrument will be switched off automatically after a short time!*

2.3 CONTROL KEYS ON THE FRONT PANEL



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

- <**ENTER**>, **(<Menu>)**, **[<Save>]**,
- <**ESC**>, **(<Cal.>)**, **[<S/P>]**,
- <**Shift**>, [Markers]
- <**Alt**>, [Markers]
- ▲,
- ◄,
- ►,
- ▼,
- <**Start/Stop**>.

The name given in (...) brackets denotes the second key function which is available after pressing it in conjunction (or in sequence) with the **<Shift>** key. For the first two keys the name given in square brackets […] denotes also the third key function which is available after pressing it in conjunction (or in sequence) with the **<Alt>** key.

<Shift> The second function of a key (written in red colour on a key) can be used when the **<Shift>** key is pressed. This key can be used in two different ways:

- as **Shift** like in a computer keyboard (e.g. while typing the filename); both **<Shift>** and the second key must be pressed together (two finger operation);
- as **2nd Fun**; this key can be pressed and released before pressing the second one or pressed in parallel (while operating in *“**2nd Fun**”* mode, see the following notice) with the second key (one finger operation).

The **<Shift>** key pressed in conjunction with **<Alt>** enables the user to enter the **Markers** on the plots during the measurement.

<Alt> This key enables the user to choose the third key function in case of **[<Save>]** and **[<Pause>]** keys. In order to select the third function the user must press the **<Alt>** and the second key simultaneously.

Note: *Simultaneously pressing the **<Alt>** and **<Start/Stop>** keys switches the instrument on or off.*

<Start/Stop> This key enables the user to start the measurement process when the instrument is not measuring or to stop it when the instrument is in course of the measurement. It is also possible to set the mode of this key such that in order to start or stop the measurements the user has to press it simultaneously with the **<Shift>** key.

Note: *Changing the **<Start/Stop>** key mode is performed in the **Keyboard Settings** list of the **Instrument** list (see description of the **Instrument** list).*

<ENTER> This key enables the user to enter the selected position shown on the screen Menu list or to confirm selected settings. Some additional functions of this key will be described in the following chapters of this manual.

(<Menu>) This key (pressed together with **<Shift>**) enables the user to enter the main list containing six sub-lists: **Function**, **Input**, **Display**, **File**, **Setup**, **Auxiliary Functions** and **Report**. Each of the mentioned above menu lists consists of sub-lists, elements and data lists. These main sub-lists will be described in detail in the following chapters of the manual. Double pressing the **<Menu>** key enters the **History** list containing the last eight opened sub-lists. It often speeds up control of the instrument as the user has faster access to the most frequently used sub-lists for easy navigation.

[<Save>] This key (pressed together with **<Alt>**) enables the user to save measurement results as a file in the instrument's internal memory or on the USB memory stick.

<ESC> This key closes the control lists, sub-lists or windows. It acts in an opposite manner to the **<ENTER>** key. When the list is closed after pressing the **<ESC>** key, any changes made in it are ignored in almost all cases.

([Cal.]) This key (pressed together with **<Shift>**) opens the **Calibration** sub-list.

[<Pause>] This key enables one to break temporary the measurement process. The subsequent pressing of the **<Pause>** key deletes the measurement result from the last one second. Up to fifteen last seconds of the measurement can be cancelled in this way.

◄ / ► These keys enable the user specifically to:

- select the parameter value in an active position (filter: **LIN**, **A** or **C**, Integration period: **1s**, **2s**, **3s**, … etc.);
- shift the cursor in **Spectrum**, **Logger** and **Statistics** modes of result's presentation
- select the position of the character in the text editing mode (in the **File Name** menu);
- select the column in a multi column parameter list;
- change the content of the active field in the result presentation modes (channel, profile, result function name etc.);
- activate markers 2 and 3;
- speed up changing the numerical values of the parameters when pressed and held.

(◄ / ►) The ◄ / ► key pressed in conjunction (or in sequence) with **<Shift>** enable the user specifically to:

- speed up the changing of the numerical values of the parameters (i.e. the step is increased from 1 to 10 in the setting of **Start Delay** - *path: Menu / Input / Measurement Setup / Start Delay*);
- to shift cursor from the first to the last position and back on the graphical presentation mode.

[◄ / ►] The ◄ / ► key pressed in conjunction (or in sequence) with **<Alt>** enable the user specifically to:

- change the statistics class (the number displayed after the letter **L**) in one-channel and multi-channel modes of result's presentation;
- change the parameter value in a multi column parameter list;
- insert or delete a character in the text edition modes.

▲, ▼ The ▲ / ▼ key enable the user specifically to:

- select line in the menu list,
- select the proper character from the list in the text edition mode;
- programme the Real Time Clock (**RTC**);
- switch on/off markers 1 and 4.

(▲, ▼) The ▲ / ▼ key pressed in conjunction (or in sequence) with **<Shift>** enable the user specifically to:

- change the relationship between the Y-axis and X-axis of all plots presented on the screen
- change the parameter values for the whole column in a multi column parameter list;
- shift the cursor from the first to the last position and back on the menu list;
- change the month in the current date setup screen.

[▲, ▼] The ▲ / ▼ key pressed in conjunction (or in sequence) with **<Alt>** enable the user specifically to:

- change the mode of result presentation;
- change the year in the current date setup screen

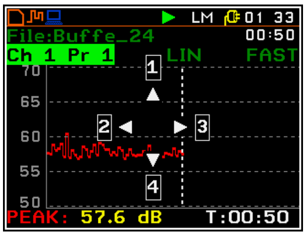
[Markers] The **Markers** enable the user to mark the special events, which occurred during the performed measurements (i.e. the airplane flight, the dog's barking, the train's drive etc.). In order to enter the markers the logger has to be switched on (*path: Menu / Input / Logger Setup / Logger Mode: On*) and one or more logger options (**PEAK**, **MAX**, **MIN**, **RMS** in the case of sound measurements and **PEAK**, **P–P**, **MAX**, **RMS**, **VDV** in the case of vibration measurements) in channels have to be chosen (*path: <Menu> / Input / Logger Setup / Channel x*).

In order to enter the marker mode the user must press **<Shift>** and **<Alt>** keys simultaneously during the measurement. The marker overlay with four available marker numbers appears on the screen. To choose marker number 1 the user must press ▲ push button (number 2 - ◄, number - 3 ► and number 4 - ▼).

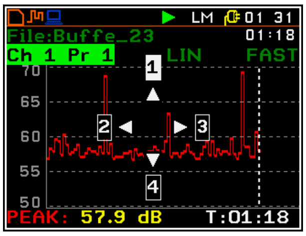
The marker overlay closes automatically and chosen marker is activated (after pressing **<Shift>** + **<Alt>** again active marker number will be highlighted). In order to switch off the marker, the user has to activate the marker overlay and press this key, which refers to the marker to be switched off. Up to four markers can be switched on at the same time.

The current state of the markers is indicated in the logger file (cf. App. B for details) and can be used to show them with the help of the dedicated presentation software.

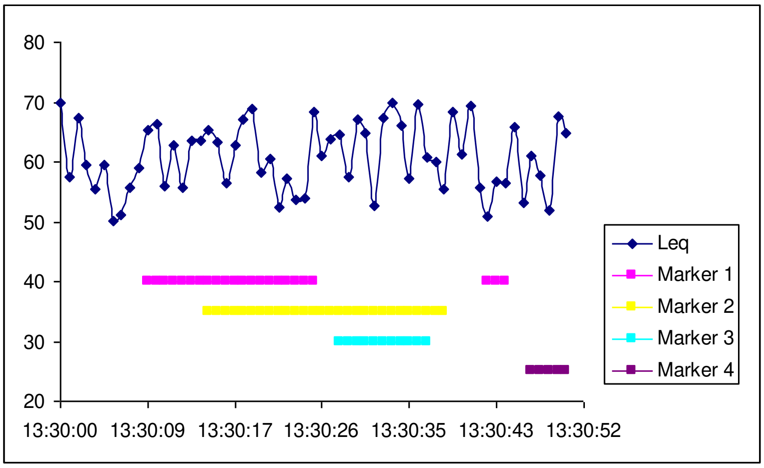
<Shift> / <Alt>



▲



An example presentation of the markers on the time history plot is shown below (to view a plot with markers the user has to transfer data to the appropriate software such as SvanPC++).



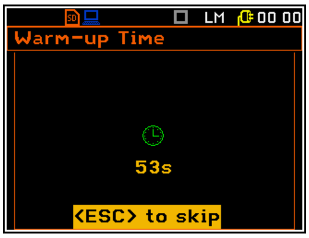
2.4 WORKING WITH THE INSTRUMENT

The instrument is controlled by means of nine keys on the keypad. Using these keys, one can access all available functions and change the value of all available parameters.

The instrument is equipped with the super contrast OLED colour display (320 x 240 pixels), which displays the measurement results and the configuration menu.

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

Turning instrument on



To turn the instrument on, press the **<Alt>** and **<Start/Stop>** keys at the same time. The instrument goes through the self-test routine after turning on, displaying during this time the manufacturer logo and the name of the instrument.

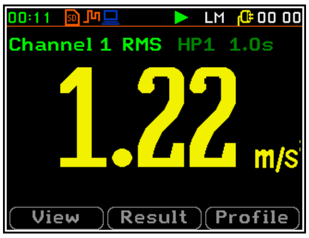
The instrument will warm up for one minute, then it enters one of the results view mode (depending on which mode was used during the instrument's switch off).

2.4.1 Measurement mode

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

Measurement results viewing

Measurement results can be presented in different views, so called display modes, some of which are always available, and some can be activated or deactivated.

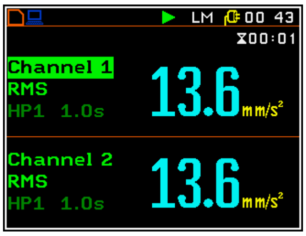


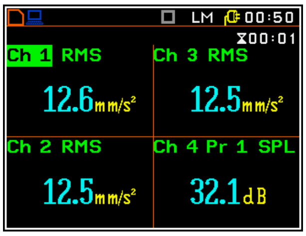
Display modes present some measurement results as well as additional information in the way of icons regarding:

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

All icons are described in Chapter 2.6, other fields and view control functions - in Chapter 5.

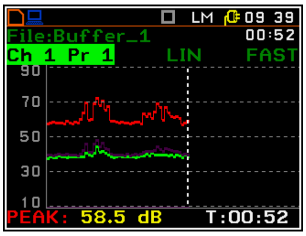
Numerical results can be presented in one, two or four channels views.

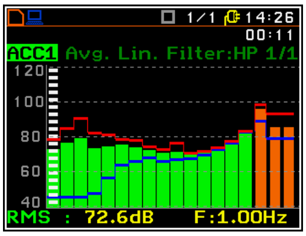




Some views present results in graphical form, like on the right-hand example: time-history plot and spectrum.

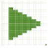
You can switch between views using the ▲ / ▼ keys pressed together with **<Alt>** or using soft-keys.

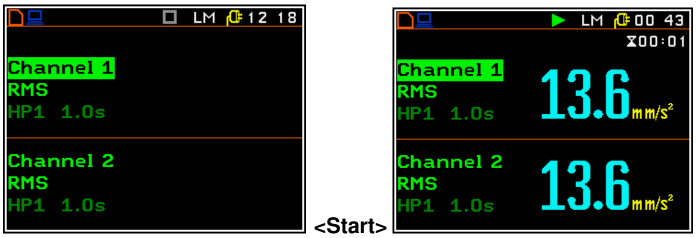




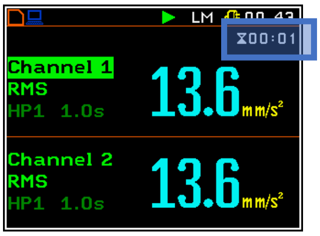
Starting measurement

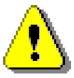
To start measurement, press the **<Start>** key.

The  icon will appear, and the measurement will be performed with the current instrument settings, which are stored in the instrument's internal memory.



The time passed from the measurement start (elapsed time) is displayed in the right upper corner of the measurement screen in the format ⌛ **mm:ss** in the range from 00:00 to 59:59. After this limit, the hours and minutes are shown (i.e. 00:59). Its maximum value is equal to the **Integration Period** and the elapsed time is zeroed when the new measurement cycle starts (see Chapter 4.1).





Note: *The real time clock is always displayed on the display in all measurement modes.*

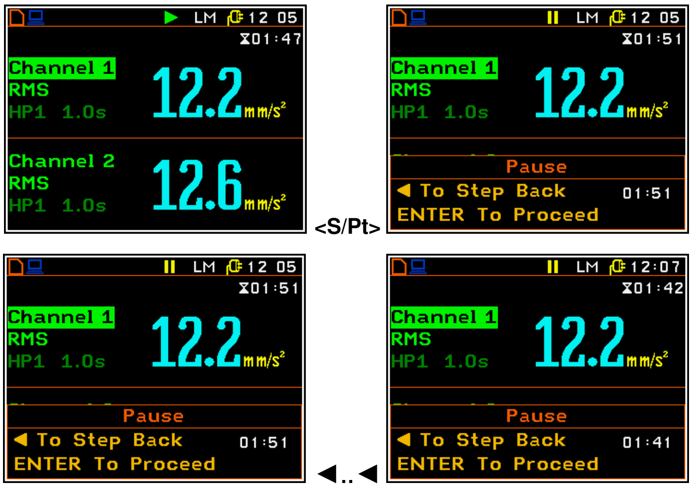
Pausing measurement

To pause a measurement, press the **<S/P>** key (**<Alt>+<ESC>**). The measurement will be paused and the  icon will appear together with the **Pause** section at the bottom of the screen.

The Pause mode allows you to erase up to 10 last seconds of the measurement with the ◄ key. One press deletes one second of the measurement and this reduces also the elapsed time.

It may be useful if, for example, the measurement is temporarily disturbed by some event that should not normally occur.

To continue the measurement, press **<ENTER>**.



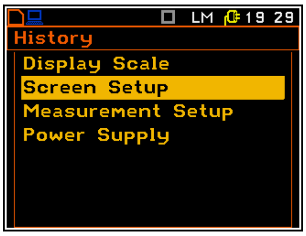
2.4.2 Configuration mode

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

Main menu

The main **Menu** contains the headers of several sections (sub-menu), which group configuration settings by feature. The main **Menu** is opened after pressing the **<Menu>** (**<Shift>** + **<ENTER>**) key. The main **Menu** list contains the following sections: **Function**, **Input**, **Display**, **File**, **Setup** and **Auxiliary Functions**.

Recent Items list



A double pressing of the **<Menu>** key opens the list of recently accessed menu items - **History**. This enables accessing most frequently used lists of parameters quickly, without the necessity of passing through the whole menu path.

Selecting position

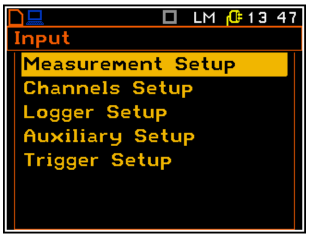
The desired position in the menu list is selected with the ▲ **/** ▼ key.

▼

Opening position

After selecting the desired position in the menu list, press the **<ENTER>** key to open it. After this operation, a new sub-menu, list of options, list of parameters or information screen appears on the display.

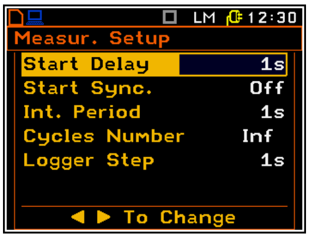
<ENT>



List of parameters

The list of parameters contains parameters the value of which is selected from the available range or set.

- The desired position in a list is accessed with the ▲ **/** ▼ key.
- Changing value in a selected position is performed with the ◄ / ► key.
- The **<ENTER>** key saves all performed changes in the list of parameters.

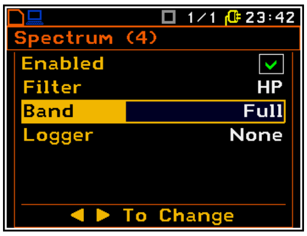


If the parameter has a numerical value, you can speed up a selection by pressing the ◄ / ► key and keeping it pressed by more than 2 seconds. In this case, the parameter value starts to change automatically until you release the pressed button.

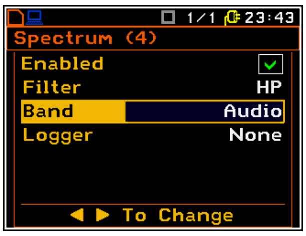
You may change the numerical parameter value with a larger step (usually 10) with the ◄ / ► key pressed together with **<Shift>**.

Inactive parameters

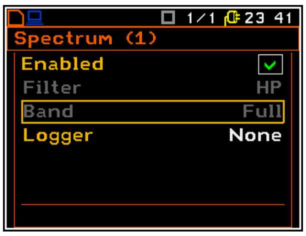
If some functions or parameters are not available, the positions in the menu or parameter lists linked with this function or parameter become inactive. For example, in the sound meter mode the **Band** parameter is active and can be changed (**Full** -> **Audio**).



►

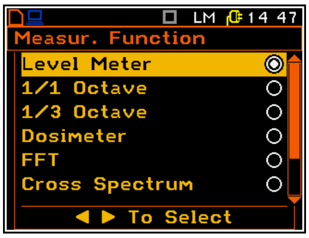


But in the vibration mode there is only one band value available (**Full**) and this position cannot be changed and is <u>not</u> active.



List of options

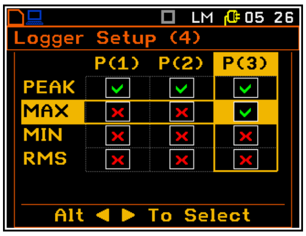
The option list consists of different options, from which only one may be selected. The selection of the option is performed in the following way. Highlight the desired option with the ▲ / ▼ key, mark it with the ► key and then press **<ENTER>**. This option becomes active and the list is closed. After re-entering this list again, the last selected option will be marked.



Matrix of parameters

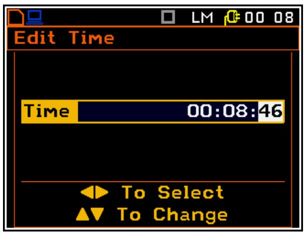
When the list of parameters consists of more than one column you may change:

- column with the ◄ / ► key
- line in the same column with the ▲ / ▼ key
- value in a selected position with the ◄ / ► and **<Alt>** or **<Shift>** keys pressed together.



Complex parameters

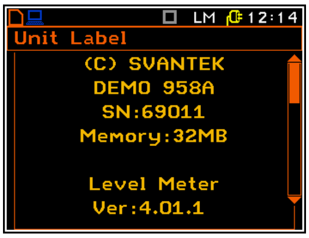
For complex parameters, consisting of more than one value field like **Time**, you should first select the field and then change the value of this field in accordance with the help information on the bottom of the screen.



In all cases the **<ENTER>** key is used for confirmation of the selection in a position and for closing the opened list of parameters. The list of parameters is closed, ignoring any changes made in it with the **<ESC>** key.

Information screen

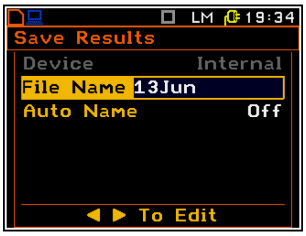
Some screens inform about the state of the instrument, available memory, standards fulfilled by the instrument, etc. You cannot change anything in such screens. To scroll through the screen, use the ▲ / ▼ key. To close such a screen, press **<ENTER>** or **<ESC>**.



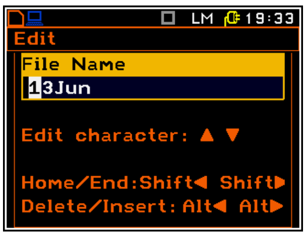
Text edition screen

There are also windows in which the user may edit some text (i.e. the name of the file, option code insertion). This window contains help information to guide the user on how to edit the text. The character that is displayed inversely may be edited.

- One can select the position of the character in the edited text using the ◄ / ► key.
- The available ASCII characters can be changed using the ▲ or ▼ key. The subsequent digits, underline, upper case letters and space appear on the display in the inversely displayed position after each press of the above mentioned keys.
- One can insert or delete the position in the edited text using the ◄ / ► key pressed together with **<Alt>**.



▶



Help information

In most screens, the last line or several lines at the bottom of the screen contain help information. It informs how to select or modify the parameter's value, change the character in the text line etc.

2.5 DEFAULT SETTINGS

The default settings (set up by the manufacturer) for the channels are as follows:

Channel 1 - **Vibration** mode; **316 m/s²** range; **HP1** weighting filter, **1.0 s** RMS detector;

Channel 2 - **Vibration** mode; **316 m/s²** range; **HP1** weighting filter, **1.0 s** RMS detector;

Channel 3 - **Vibration** mode; **316 m/s²** range; **HP1** weighting filter, **1.0 s** RMS detector;

Channel 4 - **Sound** mode; **High** range; no **Microphone Correction**; **Profile 1: A** weighting filter, **FAST** RMS detector; **Profile 2: C** weighting filter , **FAST** RMS detector; **Profile 3**: **LIN** weighting filter, **FAST** RMS detector.

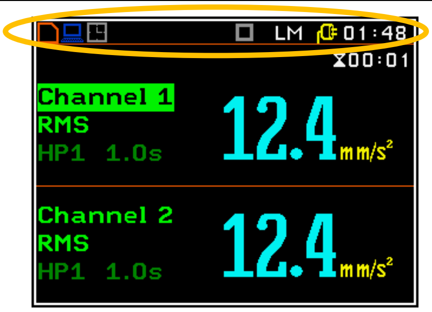
The user can change all the above mentioned settings using the **Channel x** lists (*path: Menu / Input Channels Setup / Channel x*). The instrument remembers all made changes. Return to the default settings (set up by the manufacturer) is possible after the execution of the **Factory Settings** position available in the **Auxiliary Setup** list.

2.6 DESCRIPTION OF ICONS

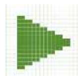
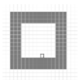
Description of the instrument state

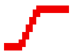
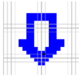
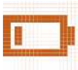
Additional information about the instrument's state is given by means of the row of icons visible in the top of the display.

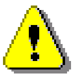
The type of measurement function and the measurement mode (**LM**, **1/1**, **1/3** etc.) as well as real time clock (RTC) is also displayed in the same line together with icons.



The meanings of the icons are as follows:

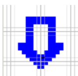
 	**"measurement"** icon is displayed when the measurement is running, and the icon shape is changing from self to contoured.		**"stop"** icon is displayed when the measurement is stopped.
	**"pause"** icon is displayed when the measurement is paused.		**„USB"** icon is displayed when there is a successful USB connection with the PC.
	**"plug"** icon is displayed if an external power is connected to the **7-16V** socket**.**		**"Internal memory"** icon is displayed when internal memory is assigned for file saving.
	**„logging"** icon is presented when current measurement results are logged into the logger file.		**„wave"** icon is displayed when the wave recording is active (wave files with extension WAV are saved automatically).
	**„level-"** icon is displayed when the "**Level-**" trigger is waiting for a condition fulfilment. The icon appears alternately with the „measurement", „logging" or „wave" icons.		**"level+"** icon is displayed when the "**Level+**" trigger is waiting for a condition fulfilment. The icon appears alternately with the „measurement", „logging" or „wave" icons.

	**"slope–"** icon is displayed when the "**Slope-**" trigger is waiting for a condition fulfilment. The icon appears alternately with the „measurement", „logging" or „wave" icons.		**"slope+"** icon is displayed when the "**Slope+**" trigger is waiting for a condition fulfilment. The icon appears alternately with the „measurement", „logging" or „wave" icons.
	**"gradient"** icon is displayed when the trigger condition is set up to „**Gradient**"		**"RS232"** icon is displayed when the RS232 port is activated.
	**„overload"** icon is displayed when an overload appears.		**„underrange"** icon is displayed when an underrange appears.
	**"alt"** icon is displayed when the **<Alt>** key is pressed.		**"shift"** icon is displayed when the **<Shift>** key is pressed.
	**"clock"** icon is displayed when the timer is **On**. It is active when the instrument is waiting for the measurement start-up to occur. When the measurement start is close, the icon changes its colour to green and starts blinking.	 	**"battery"** icon is displayed when the instrument is powered from the internal batteries. The icon corresponds to the status of the batteries (three, two, one or none vertical bars inside the icon). When voltage of batteries is too low, the icon becomes red.
	**"wireless"** icon is displayed when the wireless transmission is active (**GPRS** is enabled).		**"interface"** icon is displayed when USB disc is assigned for file saving. USB disc is connected and activated.



Note: *The* ***"battery"*** *icon is displayed if we use internal batteries (four AA batteries). When the meter is powered from an external power supply, the* ***"battery"*** *icon is not displayed.*

Limits of the signal causing the different icon's indication in the case of sound measurements:

INDICATOR	**Low range**	**High range**
	≥ 114.5 dB	≥ 37.5 dB
	< 24.0 dB A	< 44.0 dB A
	< 24.0 dB C	< 46.0 dB C
	< 30.0 dB	< 46.0 dB

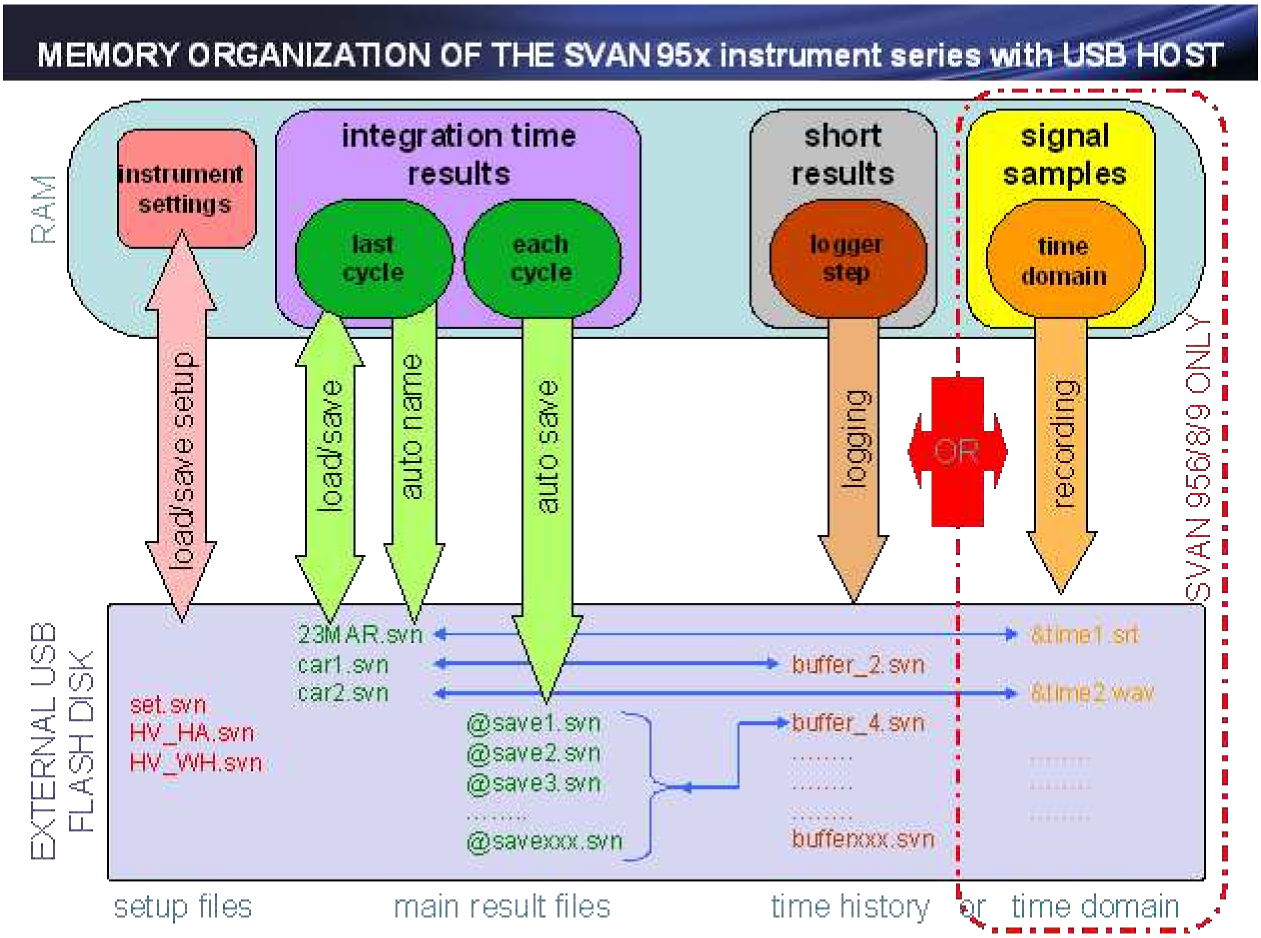
Limits of the signal causing the different icon's indication in the case of vibration measurements (values expressed in decibels are calculated with the assumption that the reference level is equal to 1 μm/s²):

INDICATOR	**VLM**, **1/1 Octave**, **1/3 Octave** or **FFT ANALYSIS**	
	Low range	**High range**
	≥ 53.1 m/s² ≥ 154.5 dB	≥ 750 m/s² ≥ 177.5 dB

2.7 MEMORY ORGANISATION

All available measurement results can be stored in the internal FLASH type memory of the instrument (32 MB) or on the external USB Memory Stick.

The internal memory of the instrument is divided into two separate parts. One part is dedicated for saving the **result** and **setup** files and its size is equal to 16 121 360 bytes. The second part is used for saving the logger files and its size is equal to 15 728 156 bytes. To save a **result file** the user has to choose one of the available options: **Save** / **Auto Name** (*path: <Menu> / File / Save*) or pressing **<ENTER>** and **<Alt>** together), **Save** / **File Name** (*path: Menu / File / Save*) or pressing **<ENTER>** and **<Alt>** together), **Auto Save** (*path: <Menu> / File / Save Options*) or **Direct Save** (*path: <Menu> / File / Save Options*). To save a setup file the user has to choose **Save Setup** option from the **File** list. The **logger files** are created automatically (the usage of the **Save** is not required). The scheme of the instrument's memory organisation is presented below.



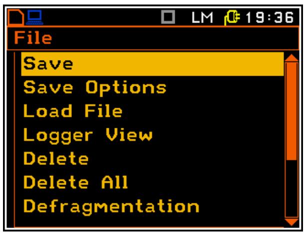
The instrument supports several file types: for main results, for logger results, for wave and for the instrument settings. More detailed the file sytem of the instrument is described in the **File** menu chapter.

Note: *The instrument's logger memory is independent from the results and setup memory. The capacity of the available memory is equal to 32 MB and is divided between logger (15 728 156 bytes) and results and setup settings (16 121 360 bytes).*

Note: *The* ***logger*** *files are created automatically (the usage of the* ***Save*** *is not required).*

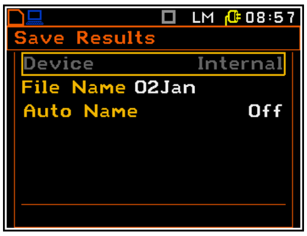
The **File** menu is used for checking the contents of the memory and for operating on files such as: save, load, delete, create new catalogue and perform defragmentation etc.

<ENT>

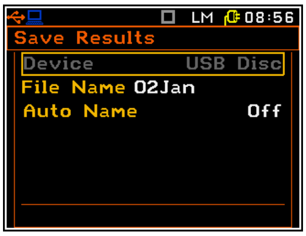


The **Device** position in the **Save** list (*path: <Menu> / File / Save*) shows the memory type currently active in the instrument.

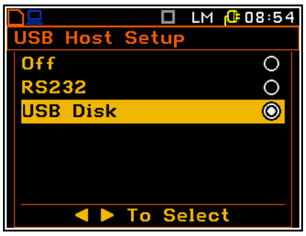
When the **USB memory stick** is connected to the instrument, the data storing in the internal instrument's memory is not available any more.



<=>



To activate the USB memory stich the user should switch on the **USB Disk** option in the **USB Host Setup** list (*path: <Menu> / Setup / USB Host Setup*).

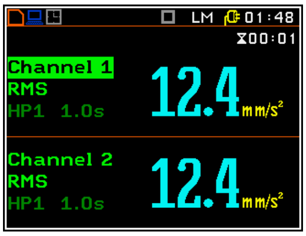


Note: *The USB disk when connected to the* ***USB Host*** *socket switches off the instrument's internal flash memory. All file functions and remote commands are redirected to the USB disk. The internal flash memory is activated after disconnecting the USB disk from the instrument.*

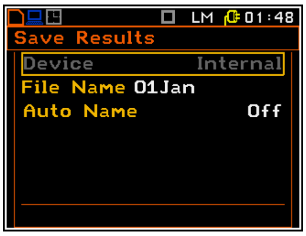
Note: *The disconnection of the USB disk during the data transmission can cause the lost of data saved in the USB disk as well as in the instrument's internal flash memory.*

There are two options for storing result data in the internal or external memory. One option is to press **<Save>** key immediately after the measurement. Another option is to create new file in the **Save** list.

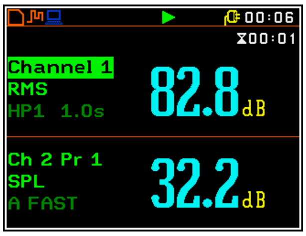
After pressing the **<Save>** key the **Save** list appears. In the **Save** list the user can enter a name for the result file or choose automatic name generation option.



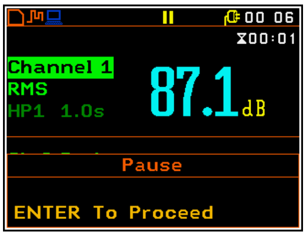
<Save>



The **<S/P>** key, pressed during the measurement run activates pause. To continue the measurement the user should press **<ENTER>**.



<S/P>

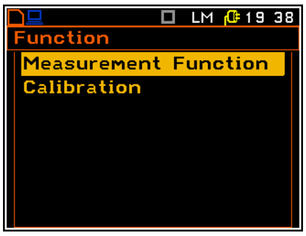


The setup files can be saved with the **<S/P>** key, or with the use of the **Setup Manager** list.

3 FUNCTIONS OF THE INSTRUMENT – Function

The **Function** list contains the elements that enable the user to select the measurement mode of the instrument and perform calibration of it's measurement channels. In order to select the **Function** list the user has to press the **<Menu>** key, select the **Function** text and press **<ENTER>**.

<ENT>



The **Function** list consists of:

Measurement Function enables the user to select the mode of the instrument;

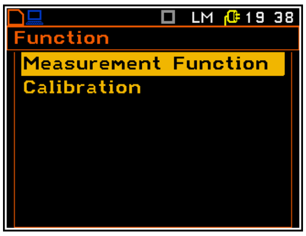
Calibration enables the user to perform a calibration of instrument's measurement channels.

3.1 MEASUREMENT FUNCTIONS OF THE INSTRUMENT – MEASUREMENT FUNCTION

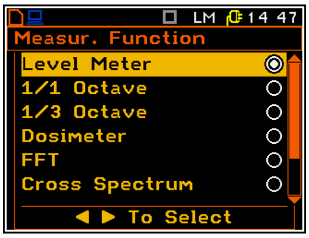
The main function of the instrument is the measurement of broad band Sound and Vibration level (**Level Meter**).

The **1/1 Octave**, **1/3 Octave**, acoustic **Dosimeter**, **Ground Vibrations**, **FFT**, **Cross Spectrum**, **Sound Intensity**, **RT60** and **Wave Recorder**, are the optional functions broadening the applications of the instrument.

In order to select the required function the user has to enter the **Measurement Function** list. After entering the **Measurement Function** list, the set of the available functions appears on the display. Currently active function is marked.



<ENT>



Note: *The type of measurement function and the measurement mode is displayed in the upper line of the screen.*

LM	***Level Meter**,*
1/1	***1/1 Octave**,*
1/3	***1/3 Octave**,*
Dos	***Dosimeter**,*
FFT	***FFT**,*
C-S	***Cross Spectrum**,*
INT	***Sound Intensity**,*
RT60	***RT60**,*
Wave	***Wave Recorder**.*

Optional measurement functions that broaden the applications of the instrument can be easily installed. These options can be initially supplied by the manufacturer or purchased later and added by the user.

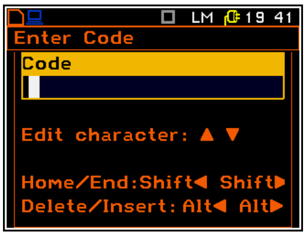
Note: *When the HAV/WBV dosimeter is enabled the* ***D*** *letter appears before the function abbreviations (e.g.* ***DLM**, **D1/1**, **DDos*** *etc.)*

Note: *It is not possible to change the measurement function during a measurement run. In this case all other functions are blocked. In order to change the mode of the instrument the current measurement in progress must be finished!*

3.2 ACTIVATION OF OPTIONAL FUNCTIONS

Optional measurement functions that broaden the application of the instrument can be easily installed. These options can be initially supplied by the manufacturer or purchased later and added by the user.

The function purchased later should be activated by the user by entering the access code to a function in a window, which is opened during the first execution (after pressing the **<ENTER>** key). The introduction of the access code is performed in the same way as the edition of the other text variables.



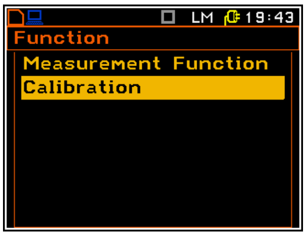
The verification is made after pressing the **<ENTER>** key. If the entered code was wrong, the message is displayed and the instrument waits for the reaction of the user. After pressing the **<ENTER>** or the **<ESC>** key the information that the function is not available is displayed and the instrument once more waits for the reaction of the user.

Note: *The number of attempts for the access code entering is limited. After three unsuccessful attempts, the possibility of entering the code is blocked.*

After successful verification of the access code, the windows described above are no more displayed. Once activated function is always available.

3.3 INSTRUMENT'S CALIBRATION – CALIBRATION

The instrument is factory calibrated with the supplied accelerometers and microphone for standard environmental conditions. In case of using other transducers calibration of the measurement channels should be performed by the user. Periodic calibration of standard transducers is also required. You can calibrate each channel individually selecting the required channel in the **Calibration** menu.

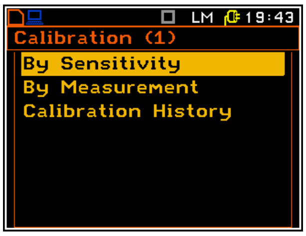


<ENT>

3.3.1 Calibration of the instrument channels – Channel x

The **Channel x** menu consists of positions for performing the calibration (**By Sensitivity**, **By Measurement**) and checking the parameters of previous calibrations **(Calibration History**).

<ENT>



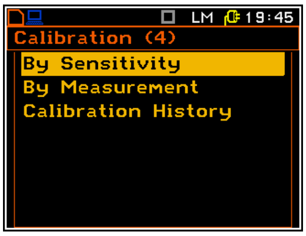
Note: *The calibration factor is always added to the results in all instrument function.*

Note: *The calibration level and the calibration result are expressed in different units depending on the settings of the instrument. The metric or non-metric Vibration units are set in the **Vibration Units** list (path: <Menu> / Setup / Vibration Units). Additionally, the linear or logarithmic units are set in the **Display Scale** list (path: <Menu> / Display / Display Setup / Channel x / Display Scale).*

Note: *It is not possible to calibrate the instrument during the execution of the measurements. It is possible to open different lists and sub-lists but the positions in these lists are not displayed inversely and so - not accessible. The "play" icon indicates that the instrument is in the measurement process. In order to change the sensitivity the current measurement in progress must be finished!*

3.3.2 Calibration by setting transducer's sensitivity – By Sensitivity

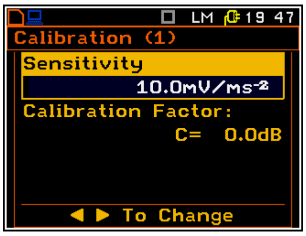
Calibration by setting the transducer's (microphone or accelerometer) sensitivity can be performed in the following way:

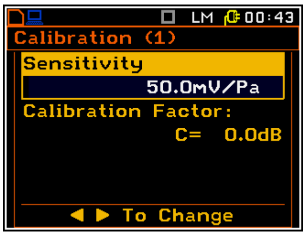


1. Select this type of the calibration (highlight the **By Sensitivity** text) from the **Calibration x** sub-list and press the **<ENTER>** key.

The sensitivity is indicated in units in accordance with the settings of the **Mode** for that channel made in the **Channels Setup** menu - **Vibration** or **Sound**.

2. Set the sensitivity of the transducer using information taken from its calibration certificate using the ◄ / ► key (or combination of the **<Shift>** and ◄ / ► key).

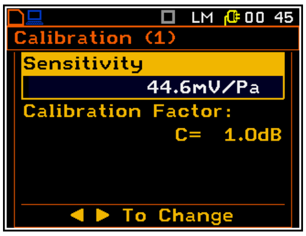




In case of accelerometer the calibration factor is calculated automatically, in the relation to **10.0mV/ms**$^{-2}$.

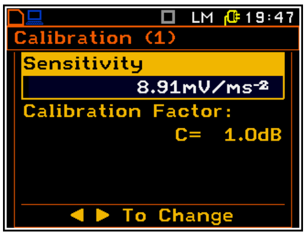
In case of microphone the calibration factor is calculated automatically in the relation to **50.0mV/Pa**.

For the sensitivity of the microphone smaller than **50.0mV/Pa**, the calibration factor is positive. For the sensitivity of the microphone greater than **50.0mV/Pa**, the calibration factor is negative.



The lowest applicable value of the sensitivity to be introduced is equal to **50.0µV/Pa** (it conforms to the calibration factor equal to **60.0dB**) and the greatest one – **50.0V/Pa** (calibration factor equal to **-60.0dB**).

For the sensitivity of the accelerometer lower than **10.0mV/ms**$^{-2}$ the calibration factor will always be positive. For the sensitivity of the accelerometer greater than **10.0mV/ms**$^{-2}$, the calibration factor is negative.

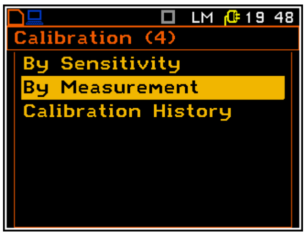


The lowest applicable value of the sensitivity to be introduced is equal to **10.0µV/ms**$^{-2}$ (it conforms to the calibration factor equal to **60.0dB**) and the highest one is equal to **10.0V/ms**$^{-2}$ (calibration factor equal to -**60.0dB**).

3. Press **<ENTER>** to save the selected calibration factor. Press **<ESC>** to return to the **Calibration** sub-list without saving any changes made in this list.

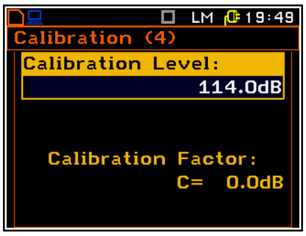
3.3.3 Calibration by measurement – By Measurement

Calibration by actual measurements can be done in the following way:



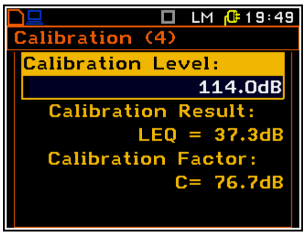
1. Select the calibration by measurement (highlight the **By Measurement** text) from the **Calibration/Channel x** sub-list and press **<ENTER>**.

2. Mount the the instrument's accelerometer to vibration calibrator or attach the acoustic calibrator SV 36 (or equivalent 114 dB @ 1000 Hz) to the instrument's microphone.
3. Switch on the calibrator and wait approximately 30 seconds before starting the calibration measurement.



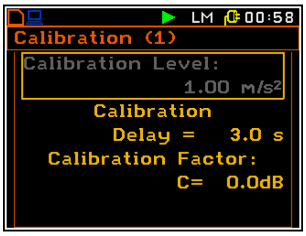
<Start>

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



Note: *It is also possible to use the pistonphone, which generates the signal ca 124 dB or different type of acoustic calibrator dedicated for ½" microphones. In any case, before starting the calibration measurement, the user has to set (by means of the ◄ / ► key) the level of the signal generated by the given calibrator (**Calibration Level** position in the **By Measurement** list), which is usually stated in the calibration certificate of the unit (the value of the **Calibration Level** set by the producer of **SVAN 958A** for sound is equal to 114 dB, and for vibration – to 1.00 m/s²).*

The measurement starts after 5 seconds delay. The calibration measurement time is also predefined to 5 seconds. During the calibration period the **<ESC>** and **<Pause>** keys do not operate but it is possible to stop the measurement using the **<Start/Stop>** key. Waiting for the calibration measurement to begin, a **Delay** is counted down. At the end of the measurement, its result is displayed on the display in the bottom line.



It is recommended to repeat the calibration measurement a few times to ensure the integrity of the calibration. The obtained results should be almost identical (with ±0.1 dB difference). Some possible reasons for unstable results are as follows:

- the calibrator is not properly attached to the transducer,
- there are external disturbances,
- the calibrator or the measurement channel (accelerometer, microphone or the instrument itself) are damaged.

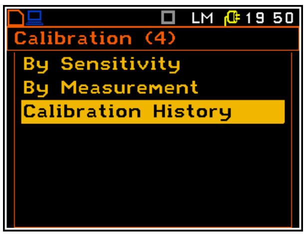
Note: *During the calibration measurement, the external disturbances (vibrations or acoustic noise) should not exceed a value of 100 dB.*

5. Press **<ENTER>** in order to accept the calibration measurement result.

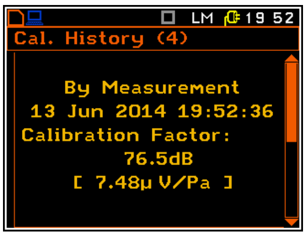
The calibration factor is calculated, stored and displayed after pressing the **<ENTER>** key.

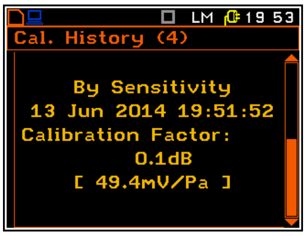
3.3.4 History of the calibrations – Calibration History

The **Calibration History** position opens the **Cal. History** list, which displays up to ten last calibration records for the selected channel.

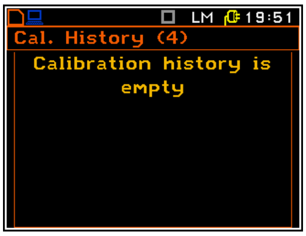


<ENT>





In order to review the calibration record, the user has to use the ▲ / ▼ key. The opened list will contain the date and time of the performed calibration measurement, the way the calibration was done (**By Sensitivity** or **By Measurement**) and the calibration factor (**Cal. Factor**) that was obtained.

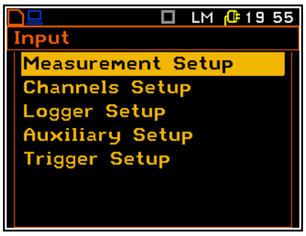


If calibration measurements were not performed the **Cal. History** list does not contain any records. The content of this list is cleared after the **Clear Setup** operation.

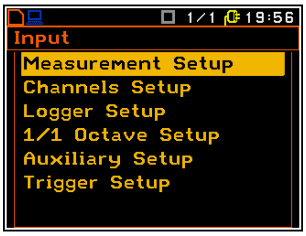
4 MEASUREMENT PARAMETERS SETTING – Input

The **Input** list contains the elements, which enable the user to programme the measurement parameters for all channels and profiles. The **Input** list appears after pressing the **<Menu>** key, selecting the **Input** text and pressing **<ENTER>**.

<ENT>



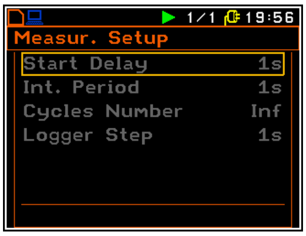
The **Input** list content depends on the function selected in the **Measurement Function** list and some additional positions appears if **1/1 Octave**, **1/3 Octave**, **Dosimeter**, **FFT** or **RT60** are selected respectively: **1/1 Octave Setup**, **1/3 Octave Setup**, **Dosimeter Setup**, **FFT Setup** or **RT60 Setup**.



The **Input** list consists of:

Measurement Setup	enables the user to select the general measurement parameters for all channels;
Channels Setup	enables the user to program the individual parameters for channels;
Logger Setup	enables the user to program the logger functions – measurements logging and signal recording;
1/1 Octave Setup	enables the user to set the parameters of the 1/1 octave analysis. Position appears only when the **1/1 Octave** function is selected;
1/3 Octave Setup	enables the user to set the parameters of the 1/3 octave analysis. Position appears only when the **1/3 Octave** function is selected;
FFT Setup	enables the user to set the parameters of the FFT analysis. Position appears only when the **FFT** function is selected;
Cross Spectrum Setup	enables the user to set the parameters of the cross-spectrum measurement. Position appears only when the **Cross Spectrum** function is selected;
Intensity Setup	enables the user to set the parameters of the sound intensity measurement. Position appears only when the **Sound Intensity** function is selected;
RT60 Results	enables the user to set the parameters of the reverberation time measurement. Position appears only when the **RT60** function is selected;
Dosimeter Setup	enables the user to set the parameters of the dosimeter function. Position appears only when the **Dosimeter** function is selected;
Wave Parameters	enables the user to set the parameters of the signal recording. Position appears only when the **Wave Recorder** function is selected;
Auxiliary Setup	enables the user to program auxiliary instrument functions;
Trigger Setup	enables the user to set the parameters of measure trigger.

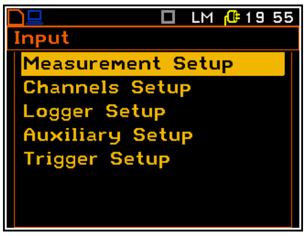
Note: *Any parameter in the lists of the **Input** menu can be changed only when the instrument is not making a measurement. The parameters are displayed in a frame and any change of it is impossible. The "**play**" icon in the top line indicates that the instrument is performing the measurements.*



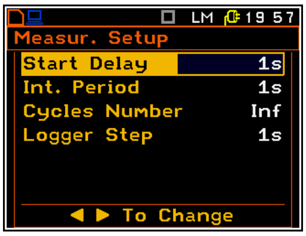
Note: *The vibration parameters can be presented in **Logarithmic** (decibels) or **Linear** (m/s²) units. It depends on the **Display Scale** position value (path: <Menu> / Display / Display Setup / Channel x / Display Scale), e.g. 10 m/s² can be presented as 140 dB.*

4.1 SELECTION OF MEASUREMENT PARAMETERS - MEASUREMENT SETUP

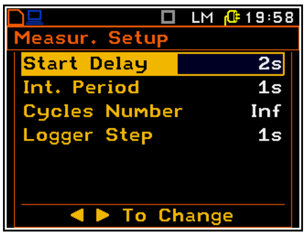
The **Measurement Setup** list consists of the following parameters: the delay of start of the measurements (**Start Delay**), the integration period / measurement run time (**Int. Period**), the repetition of the measurement cycles (**Cycles Number**) and logging period (**Logger Step**).



<ENT>



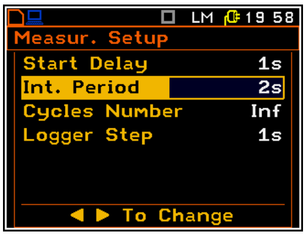
Time delay before the start of measurements



The **Start Delay** parameter defines the delay period from the moment the **<Start>** key is pressed to the start of the actual measurement (the digital filters of the instrument constantly analyse the input signal even when the measurement is stopped). This delay period can be set from **0 second** to **60 seconds**.

Note: *The minimum delay period is equal to 0 second. In the* ***Calibration*** *mode, the delay period is always equal to 5 seconds.*

Integration period



The **Int. Period** parameter defines the period during which the signal is being measured. The definitions of the measurement results in which the integration period is used is given in App. D.

The required value of this parameter can be set in the range of:

- from **1 s** to **59 s** (with **1 second** or **10 seconds** step),
- from **1 m** (min) to **59 m** (with **1 minute** or **10 minutes** step),
- from **1 h** to **24 h** (with **1 hour** or **10 hours** step).

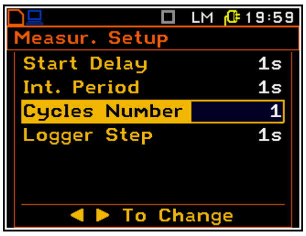
It is also possible to set **Inf** value. The **Inf** value denotes the infinite integration of the measurements (until the **<Start/Stop>** key is pressed again or after receiving the remote control code).

Additionally, the predefined periods: **1 m**, **5 m**, **15 m**, **1 h**, **8 h**, **24 h** and **Inf**, which are enumerated in the standards, are also available (by pressing the ◄ key or ◄ with **<Shift>**; these values are placed in the sequence mentioned above on the left in relation to **1 s**).

Note: *In the case of switching on the* ***Auto Save*** *function, the minimum value of the integration period should be equal to or longer than 10 seconds.*

If the user wants to switch on **Auto Save** option *(path: <Menu> / File / Save Options / Auto Save)* the integration period value has to be equal or greater than 10 seconds. When **Auto Save** option was switched on and new entered integration period value is less than 10 seconds, **Auto Save** option switches off and the warning message appears on the display.

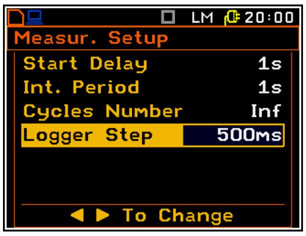
Number of repetition of measurement cycles



The **Cycles Number** parameter defines the number of cycles (with the measurement period defined by **Int. Period**) to be performed by the instrument. The **Cycles Number** number values are within the limits [1, 1000].

The **Inf** value denotes the infinite repetition of the measurements (until pressing the **<Start/Stop>** key or after receiving the remote control code).

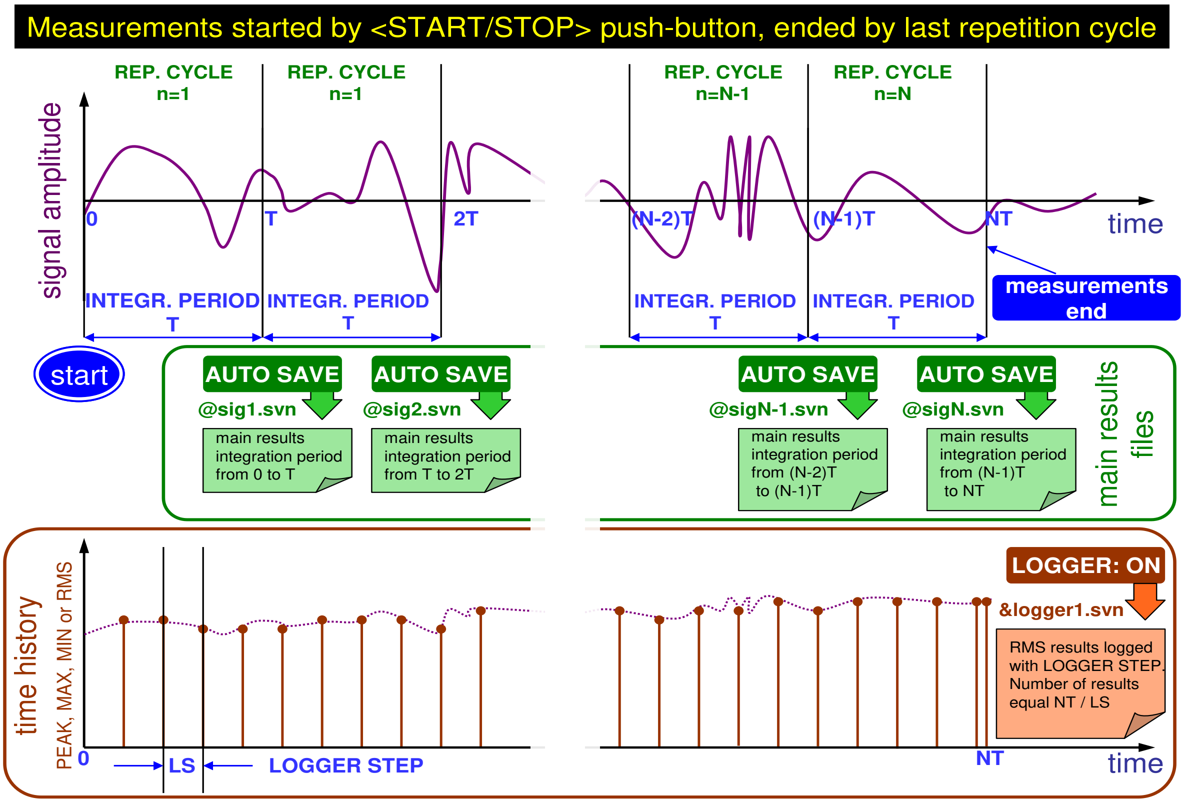
Time period between two writings to the logger's file



The **Logger Step** defines the period of the data logging in a file. It can be set from **10 ms** to **1 s** in 1, 2, 5 sequence, the values from 1 second to 59 seconds, the values from 1 minute to 59 minute and 1 hour.

The main measurement results (depending on the sound or vibration mode measurements) can be saved in the result files of the instrument's memory by means of the **Save** or **Auto Name** function (*path: <Menu> / File / Save*). The structure of the files is described in App. B. In case when **Int. Period** is greater than 25 seconds, it can be done also by means of the **Auto Save** function. The name of the file for that operation is set in the **File Name** list (*path: <Menu> / File / Save Options*). In case the **Cycles Number** is greater than one, the **Auto Save** operation will be performed after the period set in the **Int. Period**. The name of the file with the main results is changed after each saving.

In the same, when the **Logger** is **On**, the partial measurement results are calculated with the **Logger Step** period.



Relations between Measurement Cycle (Integration Period) and Logger Step

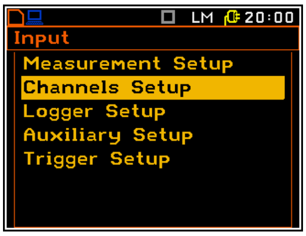
During measurements, from each profile of the Sound channel, the user can select up to four results (**PEAK** / **MAX** / **MIN** / **RMS**) to be logged with logger step down to 10 ms. From each Vibration channel, the user can select up to five results. (**PEAK** / **P–P** / **MAX** / **RMS** / **VDV**). Additionally, three **Auxiliary** results can be also logged in this mode, namely **Vector**, **RPM** and **Meteo**. These results are saved in one logger file of the instrument's memory in the Sound or Vibration **Level Meter** as well as for other functions.

The name of the logger file is predefined and consists of word "Buffer" and a number, but is limited to 8 characters. For example, "Buffer1" "Buf12345" "B1234567".

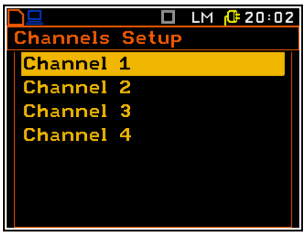
The registration in the logger's memory is stopped after the period, which is equal to **Int. Period** multiplied by **Cycles Number**, or after pressing the **<Stop>** key or after stopping the measurement remotely.

4.2 SETTING PARAMETERS FOR CHANNELS – CHANNELS SETUP

The **Channels Setup** position enables the user to program four channels of the instrument.



<ENT>

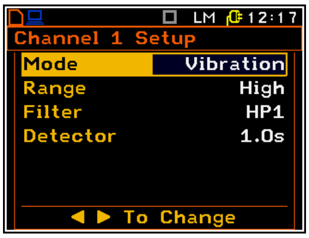


***Note:** Changing the channel parameters is not possible when the measurement is running. The user has to finish the current measurement.*

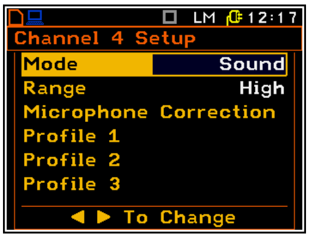
Measurement mode

The **Mode** position defines the type of measurement for this channel: **Vibration** or **Sound**.

In case of the vibration mode, you can select the measurement range (**Range**), weighting filter (**Filter**) and detector time constant (**Detector**) in the same list.



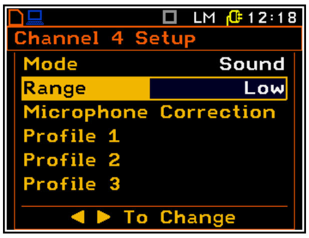
In case of the sound mode, you can select measurement range (**Range**), correction for used microphone (**Microphone Correction**) and to set weighting filter (**Filter**) and detector time constant (**Detector**) for three profiles (**Profile x**).



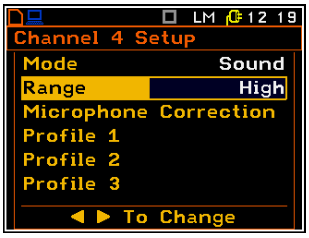
Measurement range

The **Range** is used to set one of the available measurement ranges in the instrument: **Low** and **High**.

More detailed the ranges are described in the Appendix C.



▶

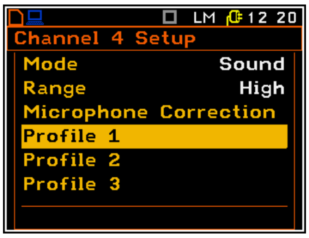


Weighting filter

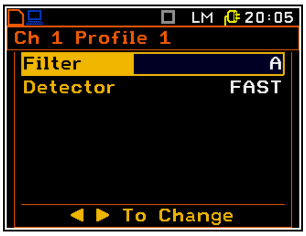
The weighting filters selection way differs for the sound and vibration measurement modes of the instrument.

In case of sound measurements the filter is selected in the **Profile x** list (*path: <Menu> / Input / Channels Setup / Channel x Setup / Profile x / Filter)* where the following filters are available:

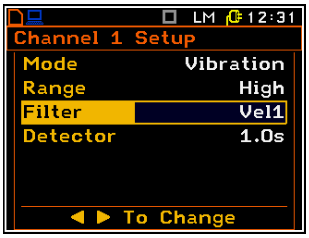
- **LIN** Class 1 according to the IEC 61672-1 standard for "Z" filters,
- **A** Class 1 according to the IEC 651 and IEC 61672-1 standards,
- **C** Class 1 according to the IEC 651 and IEC 61672-1 standards,
- **G** Class 1 according to the ISO 7196 standard.



<ENT>



In case of vibration measurements the following filters are available in the **Filter** position:



- **HP1**, **HP3**, **HP10**, **KB**, **Wk**, **Wd**, **Wc**, **Wj**, **Wm**, **Wh**, **Wg**, **Wb, Wv** and **Wz** (for acceleration);

- **Vel1**, **Vel3**, **Vel10** and **VelMF** (for velocity);

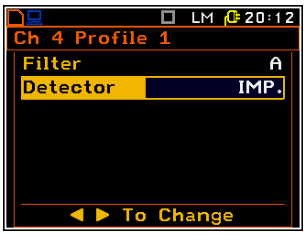
- **Dil1**, **Dil3** and **Dil10** (for displacement).

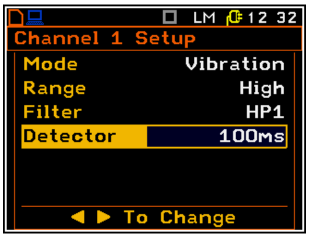
The characteristics of the filters are given in App. C.

RMS detector

The following RMS detectors are available:

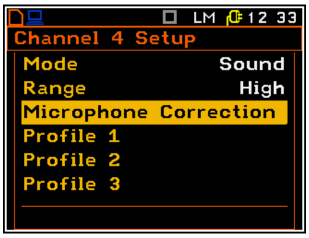
- **IMP.**, **FAST** and **SLOW** (in case of sound measurements) and
- **100ms**, **125ms**, **200ms**, **500ms**, **1.0s**, **2.0s**, **5.0s**, **10.0s** (in case of vibration measurements).



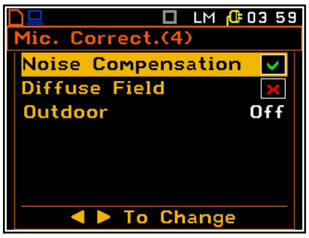


Microphone corrections

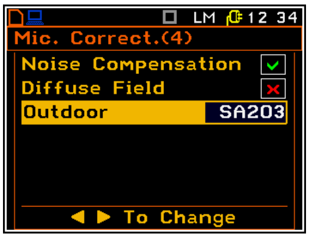
This position is available in **Sound** mode and opens a list which enables the user to enable **Noise Compensation**, **Diffuse Field** or in the <u>Channel 4</u> - the **Outdoor** correction.



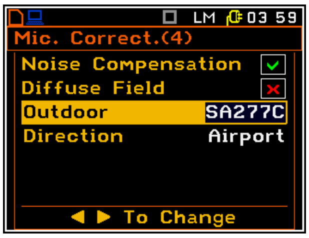
<ENT>



In the **Outdoor** position, you can disable the outdoor correction (**Off**) or select corrections if you use one of the outdoor microphone kit: **SA203**, **SA277C** or **SA277D**. In case of the **SA277C** or **SA277D** outdoor microphone kit you can also select the sound **Direction** for measuring the **Environment** (90 degree incidence angle) or **Airport** (0 degree incidence angle) noise.



▶

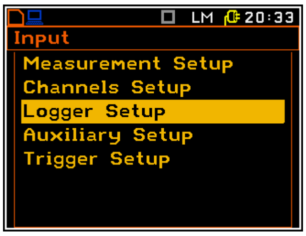


4.3 SETTING THE DATA LOGGING FUNCTIONALITY – LOGGER SETUP

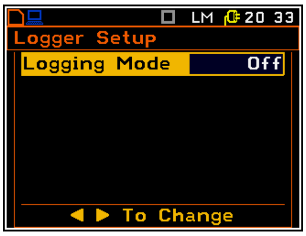
The **Logger Setup** list enables the user to select results to be saved in the logger memory or to set parameters of time-domain signal recording.

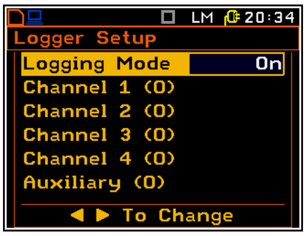
If the **Logger Mode** position is **Off** the logger functionality is switched off. When **On** is selected, it is possible to choose history results to be saved in the instrument memory.

Time mode activates low sampling rate time-domain signal recording to the logger file. This option is additional and usually requires a special activation code.

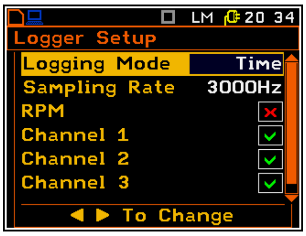


<ENT>





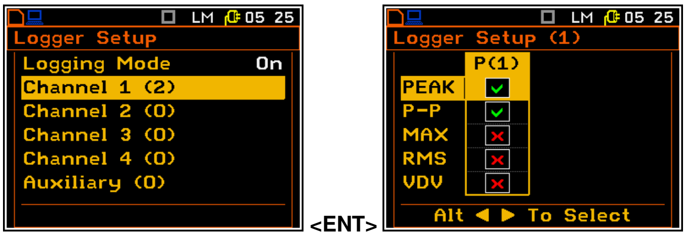
▶

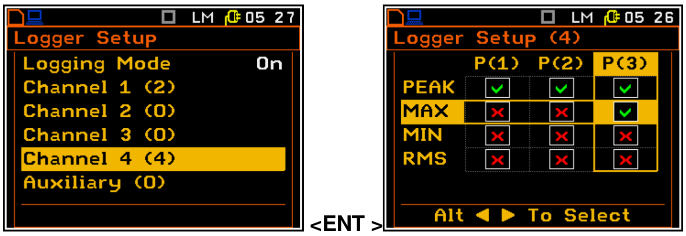


Selecting time-history results to be logged

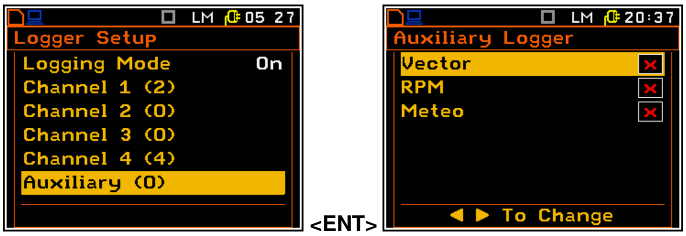
The **Channel x (y)** positions define results, which are to be saved in a logger file. The **(y)** value shows the number of selected results for each channel **x**.

Up to five measurement results: **PEAK**, **P–P**, **MAX**, **RMS**, **VDV** in case of vibration measurements and up to four results from each profile: **PEAK**, **MAX**, **MIN** and **RMS** in case of sound measurements can be saved in the logger's file of the instrument.



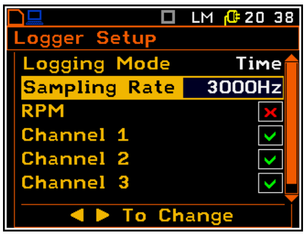


It is also possible to save **Vector** calculation, **RPM** measurement and **Meteo** results in a logger file. These parameters can be selected in the **Auxiliary** list



Selecting parameters of time-domain signal recording

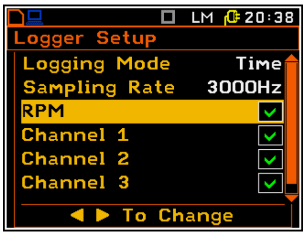
The **Sampling Rate** position defines the sampling rate with which the time-domain signal can be stored in the logger memory of the instrument. Available values are as follows: **3000 Hz**, **2400 Hz**, **1500 Hz**, **1200 Hz**, **750 Hz**, **600 Hz**, **375 Hz**, **300 Hz**, **187 Hz**, **150 Hz**.



The time-domain signal is always frequency weighted. If the sampling rate is selected as **3000 Hz** the signal in each channel is weighting with the filter, selected in the first profile of respective channel. If the sampling rate is another than **3000 Hz** the signal is weighting with the **HP1** filter.

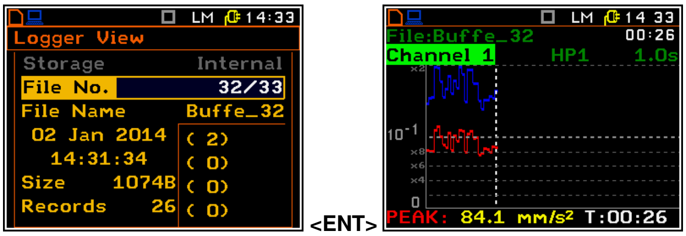
It is also possible to save **RPM** results switching on the **RPM** position.

To save **RPM** measurement results the user has to enable the **RPM** function in the **Auxiliary Setup** list (*path: Menu / Input / Auxiliary Setup / RPM Setup / Enabled: [x]*) and change **Ext.I/O** settings into **Digital In** (*path: <Menu> / Setup / Ext. I/O Setup / Mode: Digital In*).

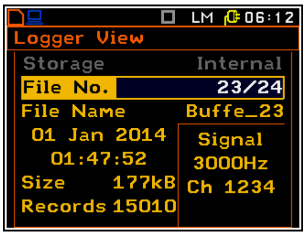


Positions **Channel x** enable the user to select the channels for which to record the time-domain signal.

The results from selected channels are recorded in the logger files, which can be viewed in the **Logger View** list (*path: <Menu> / File / Logger View*).



The results of the time-domain signal cannot be viewed in the instrument, but can be examined after downloading them to a PC using SvanPC software. The signal is saved in .svn format files.



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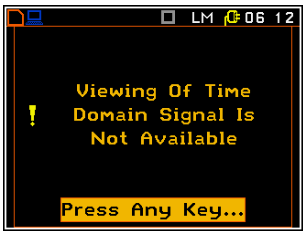
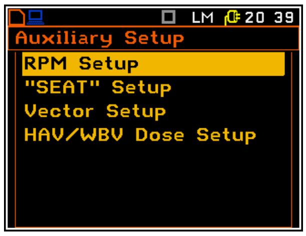


4.4 SETTING PARAMETERS OF AUXILIARY FUNCTIONS – AUXILIARY SETUP

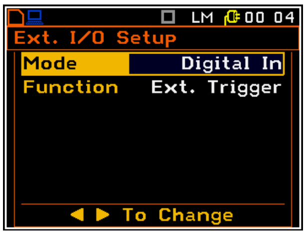
The **Auxiliary Setup** list consists of four positions, which enable the user to set the parameters of rpm measurement with the use of taho probe (**RPM Setup**); measurement of seat attenuation of vibration with the use of special transducer, placed on the vehicle seat (**"SEAT" Setup**); vector calculation (**Vector Setup**) and hand-arm and whole-body dose calculation (**HAV/WBV Dose Setup**).

<ENT>

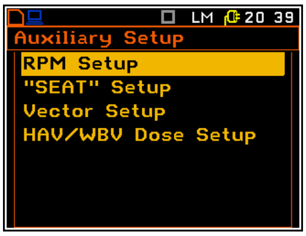


4.4.1 Setting the RPM measurement – RPM Setup

To perform the RPM measurement the RPM probe should be connected to the **I/O** socket and the I/O mode should be defined as **Digital In** (*path: <Menu> / Setup / Ext. I/O Setup / Mode*).



The **Enabled** position enables the user to switch on the **RPM** function.



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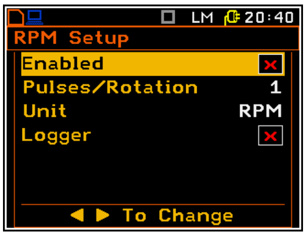
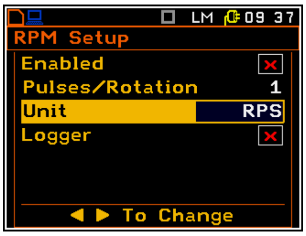
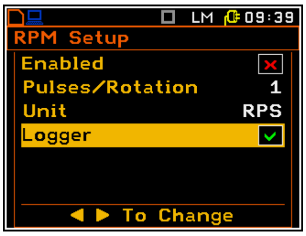


The **Pulses/Rotation** enables the user to select the number of pulses / rotations during **RPM** measurement. Available values are as follows: **1**, **2**, **.. 360**.

The **UNIT** enables the user to select the unit of the measurement. In this position two option are available **RPM** – revolutions per minute and **RPS** – revolutions per second.

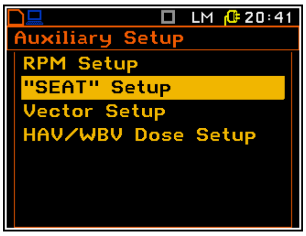


The **RPM** measurement results can be saved in the logger's file of the instrument. The activation is made by switching on the **Logger** position. The activation is possible when the **Logger** functionality is switched on in the **Measurement Setup** list *(path: <Menu> / Input / Measurement Setup / Logger)*. If the **Logger** functionality is switched off, the position is not accessible.



4.4.2 Setting the parameters of attenuation measurements – “SEAT” Setup

The **“SEAT” Setup** option may be used for measurements of attenuation of vibration. One of the channels (**Base Channel**) measures the signal before attenuation and other (**Seat Channel**) measures the signal after attenuation (e.g. as in the case of the seat suspension in vehicles).



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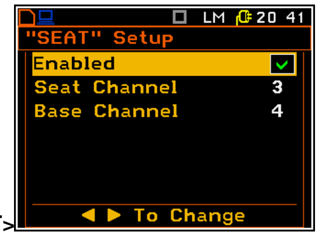
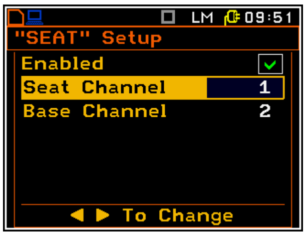


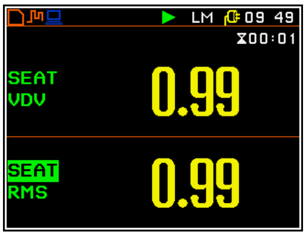
In the **Seat Channel** position the user can select the “seat” channel for attenuation measurements.

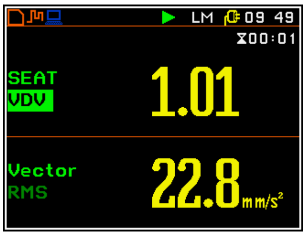
In the **Base Channel** position the user can select the base channel for attenuation measurements.



The **SEAT** results are presented in the double results presentation mode. The results are calculated by dividing **RMS** or **VDV** result from **Seat Channel** by **RMS** or **VDV** result from **Base Channel**.

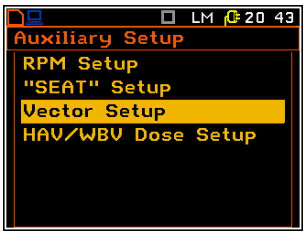
Additionally, the **Vector RMS** result can be viewed in parallel to the **SEAT** result.





4.4.3 Settings for vector calculations – Vector Setup

In the **Vector Setup** list the user may select the coefficients to calculate the vector. When the user needs to calculate it with other than standard coefficients, it is possible to select the coefficient within the values from **0.00** to **2.00**.



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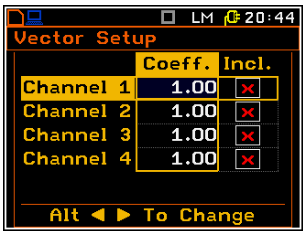


The values presented above are taken into account during the calculations of the measurement results. **Vector** is calculated according to the formulae:

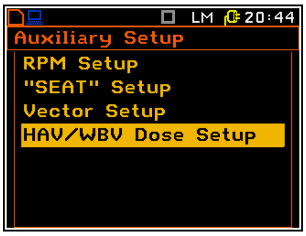
$$\mathrm{VECTOR} = \sqrt{k_1 x_1^2 + k_2 x_2^2 + k_3 x_3^2 + k_4 x_4^2}$$

Where k_1, k_2, k_3 and k_4 are the coefficients and x_1, x_2, x_3 and x_4 are RMS results for different channels. It is important that the user should choose only coefficients corresponding with the proper channels.

4.4.4 Setting the parameters for dose measurements – HAV/WBV Dose Setup

The **HAV/WBV Dose Setup** position enables the user to set the parameters of hand-arm and whole-body vibration dose measurements.

For the **HAV/WBV Dose** measurements the user should switch on **HAV/WBV Dose** option in the **Enabled** position, select channels for tri-axial accelerometer and select suitable filters in the **Channels Setup** list.



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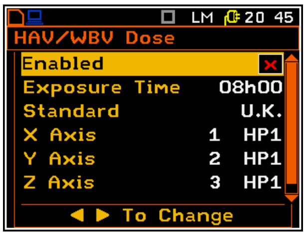
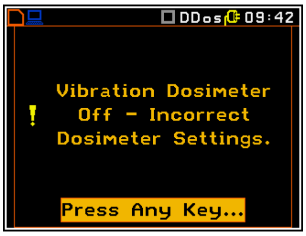


Note: *When the HAV/WBV dosimeter is enabled the **D** letter appears before the function abbreviations (e.g. **DLM**, **D1/1**, **DDos** etc.)*

If filters of different type of integration are selected (for example HP and Vel), the **"Vibration Dosimeter Off - Incorrect Dosimeter Settings"** message appears on the display and the vibration dosimeter is switched off automatically.



Commonly used filters for measurements of:

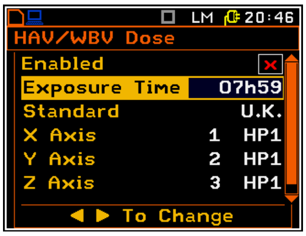
Hand-Arm vibration dose:

- **Wh** for **X** axis
- **Wh** for **Y** axis
- **Wh** for **Z** axis

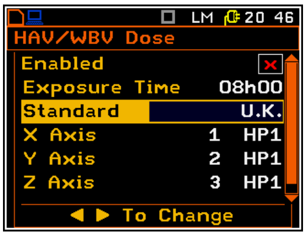
Whole-Body vibration dose:

- **Wd** for **X** axis
- **Wd** for **Y** axis
- **Wk** for **Z** axis.

The **Exposure Time** enables the user to set the desired value of the exposure time that is used for the calculation of **HAV/WBV Dose** results. The **Exposure Time** values are within the range [00h01, 24h00].

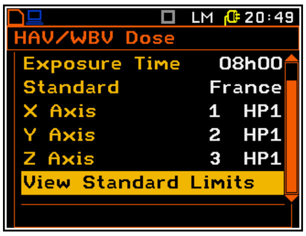


The **Standards** position enables the user to set the standards for the measurements of the **HAV/WBV Dose** results. The available values of this position are **U.K.**, **Italy**, **Poland**, **France** and **User**.



The **X Axis**, **Y Axis**, **Z Axis** positions enable setting of proper channels to be taken for calculation of the **HAV/WBW Dose** results.

The **View Standatd Limits** position enables the user to see what are the limits used by selected country standard.



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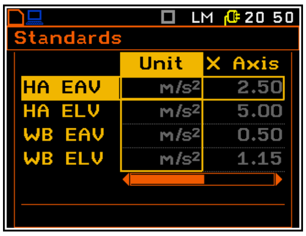
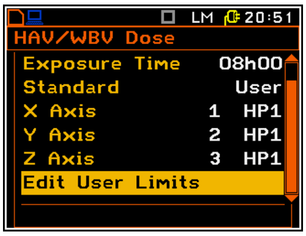


In case the **User** option it is possible to define the required limits.



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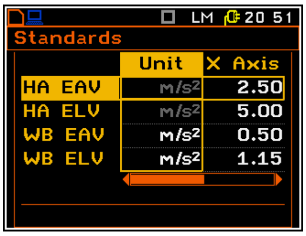
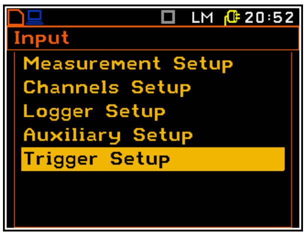


4.5 TRIGGERING MODE AND PARAMETERS SELECTION – TRIGGER SETUP

The **Trigger Setup** sub-list enables the user to set the triggering parameters.



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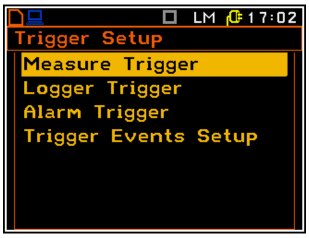
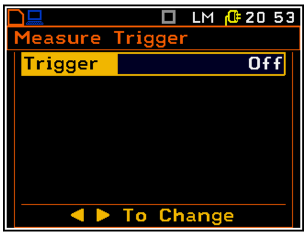


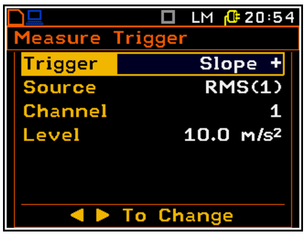
4.5.1 *Measurement trigger setup – Measure Trigger*

Switching the triggering on

The triggering is switched on if one of its seven modes is selected: **Slope +**, **Slope –**, **Level +**, **Level –**, **Grad +** or **RTC**.



▶



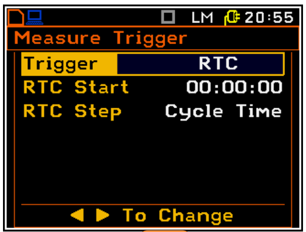
In case the **Slope +** is selected, the measurement starts when the arising signal will pass the level determined in the **Level** position. In case the **Slope –** is selected, the measurement starts when the falling down **Source** value passes the level determined in the **Level** position. The measurement is stopped when the conditions set in the **Measurement Setup** sub-list are fulfilled, after pressing the **<Start / Stop>** key or after receiving the proper control code remotely.

In case the **Level +** is selected, in each second of the measurement the triggering condition is checked; the measurement is registered only when the **Source** value has the greater level than this determined by the **Level** position and in other cases the measurement result is skipped.

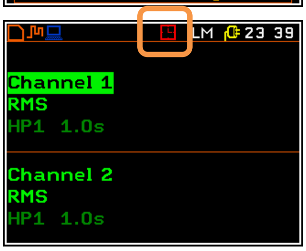
In case the **Level –** is selected, in each second of the measurement the triggering condition is checked; the measurement is registered only when the **Source** value has the lower level than this determined by the **Level** position and in other cases the measurement result is skipped.

In case the **Grad +** is selected, in each second of the measurement the triggering condition is checked; the measurement is registered only when the **Source** value has the greater level than this determined in the **Level** position and the speed of the signal changes is not less than that selected in the **Gradient** position. In other cases the measurement result is skipped.

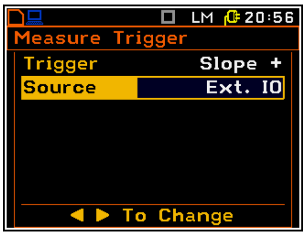
In case **RTC** (**R**eal **T**ime **C**lock) is selected, the trigger condition will appear in time set in the **RTC Start** position. The measurement is repeated with the step selected in the **RTC Step** position. The number of repetition is the number of cycles set in the **Cycles Number** (*path: <Menu> / Input / Measurement Setup*).



Note: *If the instrument works with the switched on triggering, the appropriate icon will appear in the upper the displayline and an icon will stay untill the triggering condition fulfilled.*



Selection of the triggering signal



In the **Source** position four options are available: **RMS(1)**, **Ext. IO** (in case of **Slope +** and **Slope –**), **VEC/SND**, **Vector**.

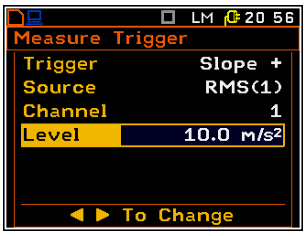
In case of **Grad +** mode only the output signal from the RMS detector coming from the first profile of the selected channel can be used as a source of triggering signal (**RMS(1)**).

In case of **Slope +** and **Slope –** as a source of the triggering signal can be used the signal connected to the extended input/output socked named **Ext. IO** .

Selection of channel for triggering condition

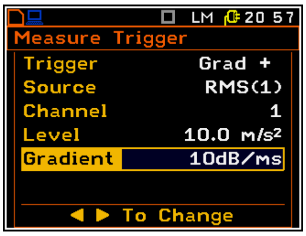
In the **Channel** position the user can select the channel of triggering signal.

Setting the level of the triggering signal



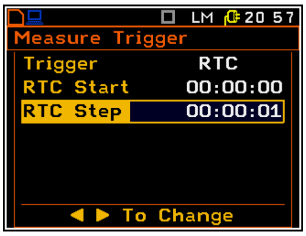
The level of the triggering signal (**Level**) can be set in the range **24 dB** to **136 dB** for acoustic signals or from **1 mm/s^2** to **10.0 km/s^2** for vibration signals.

Setting the speed of the triggering signal changes



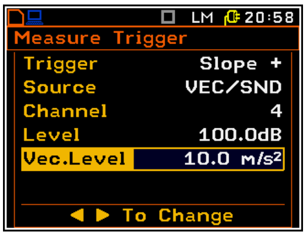
The speed of the triggering signal changes (**Gradient**) can be set in the range of **1 dB/ms** to **100 dB/ms**.

Setting the start time of triggered measurement



The measurement can be triggered with the time selected in **RTC Start**.

Time-triggered measurement can be repeated with the step selected in the **RTC Step**. The number of repetition is the number of cycles set in the **Cycles Number** (*path: <Menu> / Input / Measurement Setup*).

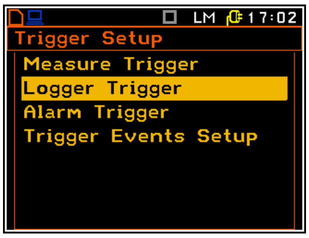


In case the **VEC/SND** is selected as a trigger **Source** the **Vec.Level** position defines the level of the triggering source.

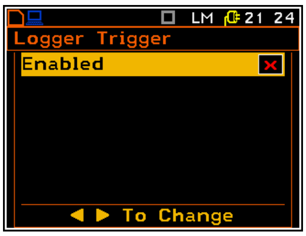
4.5.2 Logger trigger setup – Logger Trigger

The **Logger Trigger** switches on the result logging.

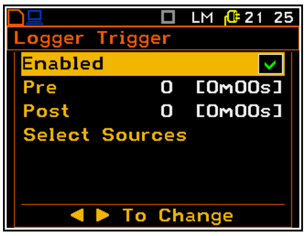
The **Logger Trigger** parameters define the way the measurement results are saved in the logger.



<ENT>



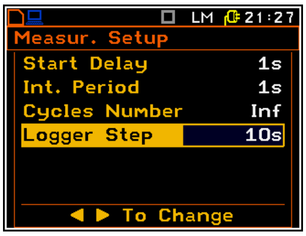
In the **Logger Trigger** sub-list the user may switch off or on (**Enabled**) the logger triggering, determine the parameters of the triggering signal (**Select Source**), select the number of the results saved in the logger before the fulfilment of the triggering condition (**Pre**) and the number of the results saved in the logger after the fulfilment of the triggering condition (**Post**). If the triggering condition is fulfilled, the logger contains:



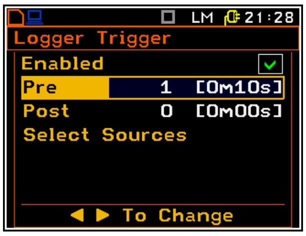
- the measurement results registered directly before the fulfilment of the triggering condition. Time of this recording can be calculated by multiplying the value set in the **Pre** position by the time period taken from the **Logger Step** position (*path: <Menu> / Input / Measurement Setup*);
- all measurement results up to the moment the triggering condition disappears;
- the results registered directly after the moment the triggering condition disappears. Time of this recording can be calculated by multiplying the value set in the **Post** position by the time period taken from the **Logger Step** position (*path: <Menu> / Input / Measurement Setup*).

Pre and post trigger recording

In the **Pre**/**Post** line the number of the results recorded in the logger's file before/after the fulfilment of the triggering condition can be set. This number is within the limit 0..20 for **Pre** trigger and 0..200 for **Post** trigger.

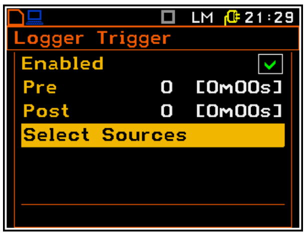


=>

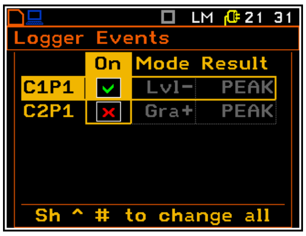


Triggerring conditions selection

The **Select Sources** position enables the user to define the logger events that can be used as a triggering conditions. The logger events are defined in the **Trigger Events Setup** list (*path: <Menu> / Input / Trigger Setup / Trigger Events Setup*). To open this position the user should select it and press **<ENTER>**.

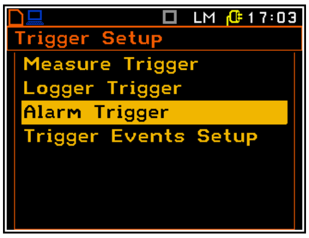


<ENT>

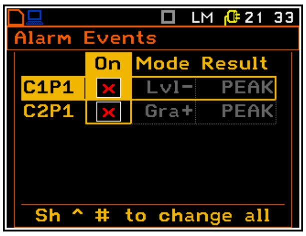


4.5.3 Alarm trigger setting – Alarm Trigger

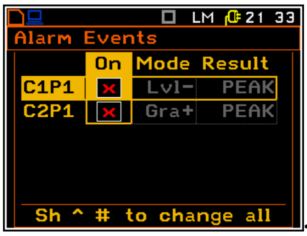
The **Alarm Trigger** position enables the user to program the trigger, which generates alarm pulse on the I/O socket, if the **Mode** parameter of the **Multifunction I/O** list is set to **Digital Out**.



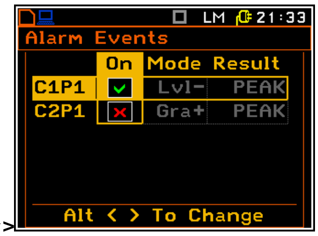
<ENT>



The **Alarm Trigger** position opens the list with alarm events that can be used as a triggering conditions for alarm pulse. The alarm events are defined in the **Trigger Events** setup list (*path: <Menu> / Input / Trigger Setup / Trigger Events Setup*).



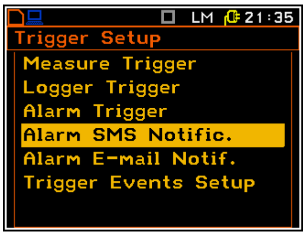
<Alt/>>



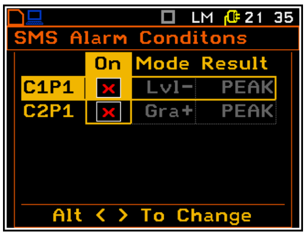
4.5.4 Alarm on SMS trigger setting – Alarm SMS Notification

The **Alarm SMS Notific.** position enables the user to program the trigger, which generates an alarm SMS. This position is available for the SVAN 958A Firmware supporting modem.

The **Alarm SMS Notific.** position opens the list with alarm events, defined in the **Trigger Events Setup** list, that can be used as a triggering conditions for an alarm SMS.



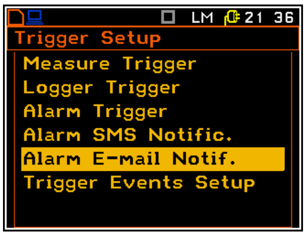
<ENT>



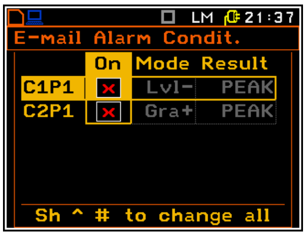
4.5.5 Alarm on e-mail trigger setting – Alarm E-mail Notification

The **Alarm E-mail Notif.** position enables the user to program the trigger, which generates an alarm on e-mail. This position is available for the SVAN 958A Firmware supporting modem.

The **Alarm E-mail Notif.** position opens the list with alarm events, defined in the **Trigger Events Setup** list, that can be used as a triggering conditions an alarm e-mail.

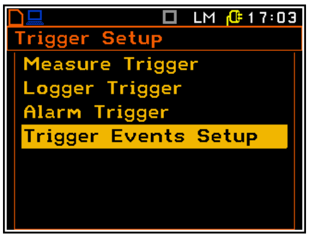


<ENT>



4.5.6 Definition of triggering conditions for logger and alarms – Trigger Events Setup

The **Trigger Events Setup** position opent the **Trigger Events** list, which enables the user to define events for logger trigger and alarm notification. These events can be defined based on the result, calculated for any channel and profile. Additionally it is possible to define the **Vector** condition.

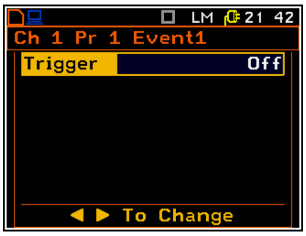


<ENT>

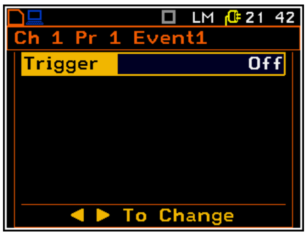
It is possible to define two trigger events for each profile (vibration input has only one profile!).

<ENT>

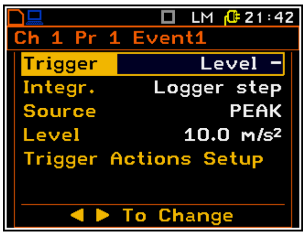
<ENT>



The **Trigger** position enables the user to switch the trigger on and select the trigger type: **Level -**, **Level +**, **Slope -**, **Slope +**, **Grad -** and **Grad +**. In each interval of the measurement, defined by **Trig. Step**, the triggering condition is checked and:



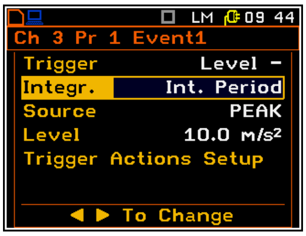
▶



- if **Level +** is selected, the triggering condition is fulfilled only when **Source** has the greater value than determined by **Level**, otherwise the triggering condition is not fulfilled.
- if **Level –** is selected, the triggering condition is fulfilled only when **Source** has the lower value than this determined by **Level**, otherwise the triggering condition is not fulfilled.

- if **Slope +** is selected, the triggering condition is fulfilled only when the rising value of **Source** is passing the level determined by **Level**.
- if **Slope –** is selected, the triggering condition is fulfilled only when the falling value of **Source** is passing the level determined by **Level**.
- if **Grad +** is selected, the triggering condition is fulfilled only when the signal has the greater level than determined by **Level** and the gradient of the signal is greater than determined by **Gradient**. Otherwise the triggering condition is not fulfilled.
- if **Grad -** is selected, the triggering condition is fulfilled only when the signal has the lower level than this determined by **Level** and the gradient of the signal is lower than determined by **Gradient**. Otherwise the triggering condition is not fulfilled.

Step for checking the triggering condition



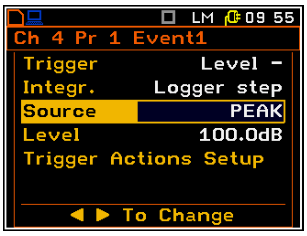
The **Integr.** position enables the user to select time (integration period) for condition evaluation: equal to **Logger step** (*path: <Menu> / Input / Measurement Setup*), **100ms**, **1.0s**, equal to **Int. Period** (*path: <Menu> / Input / Measurement Setup*) or current measurement time calculated from measurement start - **Meas. Time** (*path: <Menu> / Input / Measurement Setup*). If **Meas. Time** is selected the triggering condition is checked every second and RMS is averaged from the begining of the measurement (**Meas. Time** is displayed in the right upper corner of the display right under the real Time Clock).

Source for triggering condition

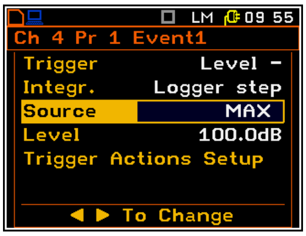
The **Source** position enables the user to select the type of source for triggering condition calculation – result calculated for the selected profile:

- **PEAK**, **MAX**, **MIN** or **RMS** for acoustic input and

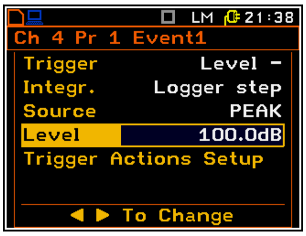
- **PEAK**, **P-P**, **MAX**, **MIN**, **RMS** or **VDV** for vibration input.



►

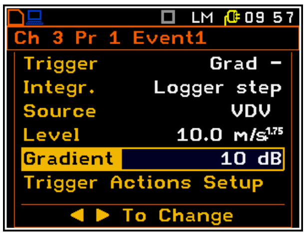


Threshold definition



The **Level** position enables the user to select the value of threshold for triggering condition in the range of **60 dB** to **200 dB** for Sound input and of **1.00 mm/s^2** to **10.0 km/ s^2** for vibration input. The vibration units can be set in the **Display Scale** window (*path: <Menu> / Display / Display Setup / Channel x / Display Scale).*

Speed of the triggering signal change



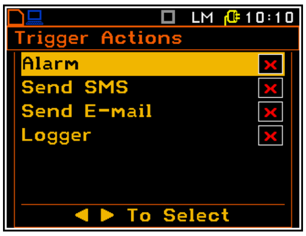
The **Gradient** position appears when the **Grad -** or **Grad +** trigger is chosen. The speed of the triggering signal changes can be set from **1 dB** to **100 dB** range. Speed is defined as **dB** per **Logger Step**.

Selecting trigger actions

The **Trigger Actions Setup** position enables the user to select the trigger actions for defined condition: **Alarm**, **Send SMS**, **Send E-mail** and **Logger**.

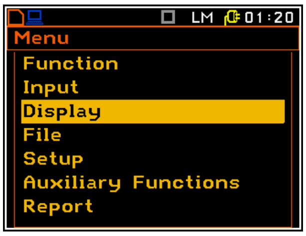
If selected the trigger action will appear in the **Logger Events**, **Alarm Events**, **SMS Alarm Conditions** and **E-mail Alarm Conditions** lists by default.

<ENT>

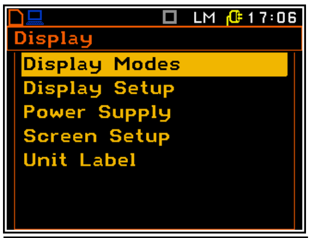


5 DATA AVAILABLE ON THE DISPLAY – Display

The **Display** list contains the elements that enable the independent programming of the display parameters. In order to open the **Display** list the user has to press the **<Menu>** key, select the **Display** text and press **<ENTER>**.



<ENT>



The **Display** list is used for setting the various parameters, which are mainly dedicated for the control of the screen display views. The list consists of:

Display Modes enables the user to select the mode of measurement results presentation;

Display Setup enables the user to change the scale in the graphical modes of result's presentation, to select the results presented as Total values, to choose the type of the presented spectrum for each channel separately;

Power Supply enables the user to check the power source of the instrument and current power supply voltage;

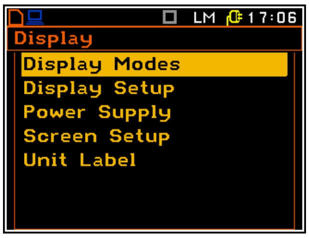
Screen Setup enables the user to set the brightness and the contrast of the display screen;

Modem Status enables the user to check the status of the modem. This position appears in the SVAN 958A Firmware supporting modem and when the GPRS function is switched on;

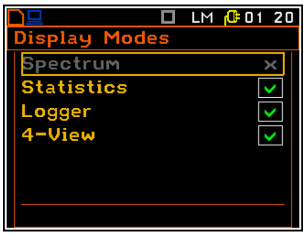
Unit Label enables the user to check the type of the instrument, its serial number and the current software version installed and the standards the instrument fulfils.

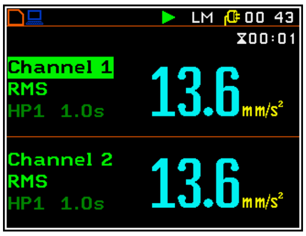
6.1 SELECTION OF THE MODES OF MEASUREMENT RESULTS PRESENTATION – DISPLAY MODES

The **Display Modes** list enables the user to switch on or off the currently available modes of displaying the results of measurement. The mode of the results presentation is related to the selection of the instrument's function: **Level Meter** (**LM**) or **1/1 Octave**, **1/3 Octave** or **FFT** analyser, etc.



<ENT>



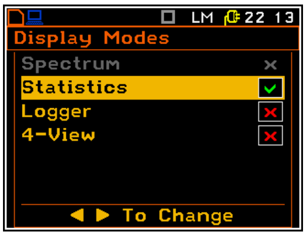


Two results of main presentation mode is always active and it is not possible to switch it off.

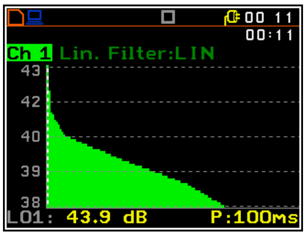
When all display modes in the **Display Modes** list are switch off only the main presentation mode with two results is available. Any attempt to switch to another mode by means of the **<Alt>** and ▲ / ▼ key gives no results.

Statistics presentation mode

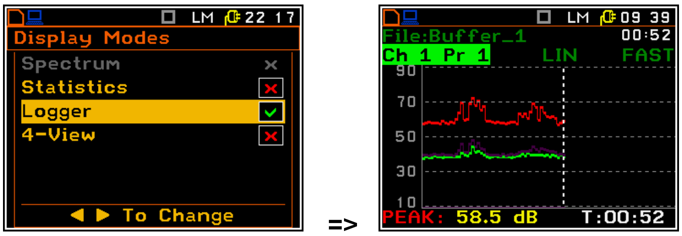
Statistics are calculated only for **Profile 1** of each sound channel.



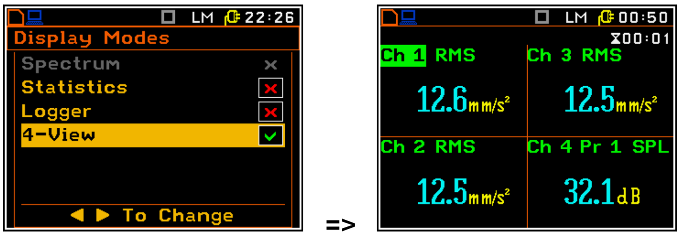
=>



The **Logger** presentation mode shows the time history of selected results.

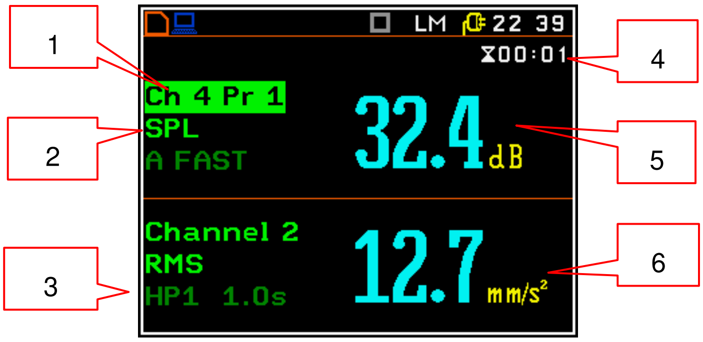


The **4-View** presentation mode shows simultaneously results for all four channels.



When all display modes in the **Display Modes** list are switched on they all are available and can be selected by means of the **<Alt>** and ▲ / ▼ key.

Fields description of the <u>two results</u> view



1. Channel and Profile number.
2. Function name: **RMS**, **VDV**, **CRF**, **OVL**, **PEAK**, **P–P**, **MTVV** for vibration input; **SPL**, **LEQ**, **SEL**, **Ln**, **Ltm3**, **Ltm5**, **L01**, **OVL**, **PEAK**, **MAX**, **MIN** for sound input.
3. The name of the implemented filter and detector time constant:

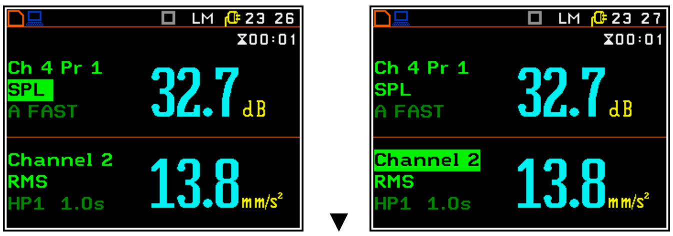
- for vibration input the used filters are: **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10**, **W-Bxy**, **W-Bz**, **H-A**, **W-Bc**, **KB**, **Wk**, **Wd**, **Wc**, **Wj**, **Wm**, **Wg**, **Wh**, **Wg**, **Wb**, **Wv**;

- for sound input the used filters are: **LIN**, **A**, **C**, **G**.

4. Elapsed time shows the current second of the measurement. The value presented there belongs to the range [**1**, **Int. Period**].
5. The value of measured function.
6. Units of measured value.

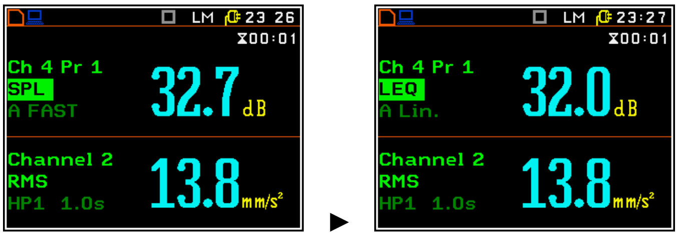
Changing the active fields

Jumping between positions is made by means of the ▲ or ▼ key.



Changing the field content

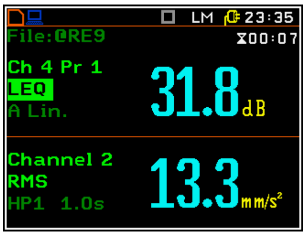
When Profile or Function position is chosen, then the profile number or function name is changed by means of the ◄ and ► keys.



Changing the presentation mode

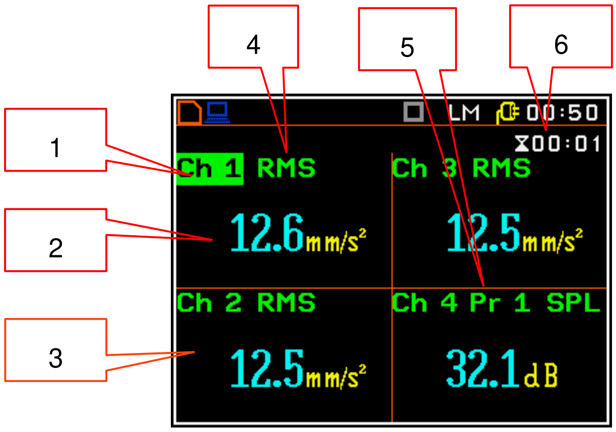
The presentation mode is changed after pressing the ▲ or ▼ key pressed together with **<Alt>**.

When **Auto Save** function is active the auto file name is indicated in the upper screen field.



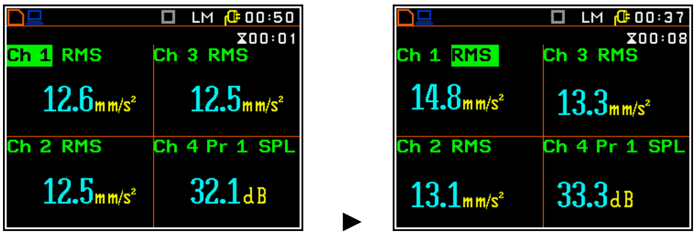
Presentation mode for <u>all channels</u>

1. Channel 1 abbreviation.
2. Result for Channel 1 and measurement units.
3. Channel 2 field.
4. Function name: **RMS**, **VDV**, **CRF**, **OVL**, **PEAK**, **P–P**, **MTVV** for vibration input; **SPL**, **LEQ**, **SEL**, **Ln**, **Ltm3**, **Ltm5**, **L01**, **OVL**, **PEAK**, **MAX**, **MIN** for sound input.
5. Profile 1 abbreviation.
6. Elapsed time shows the current second of the measurement in the range [**1**, **Meas. Period**].



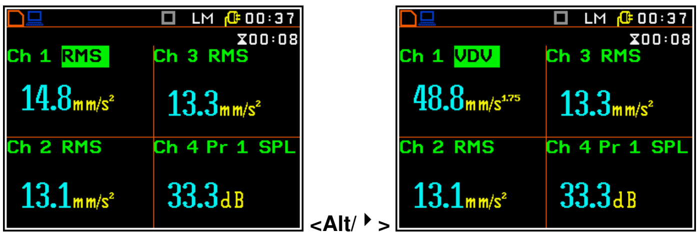
Changing the active fields

Jumping between positions is made by means of the ▲, ▼ or ◄ / ► key.



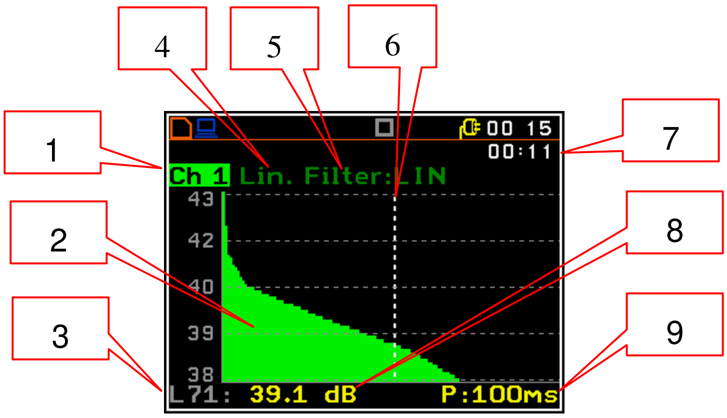
Changing the field content

When “Result” position is chosen, then the result name is changed by means of the ◄ or ► key pressed together with **<Alt>**.

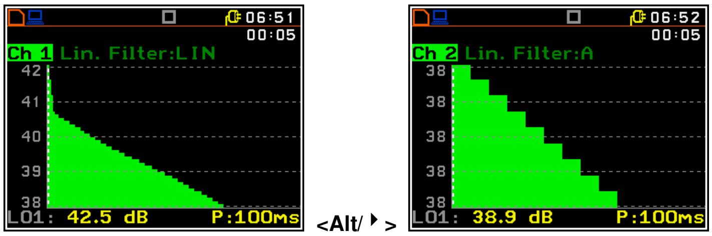


Field description of the Statistics view

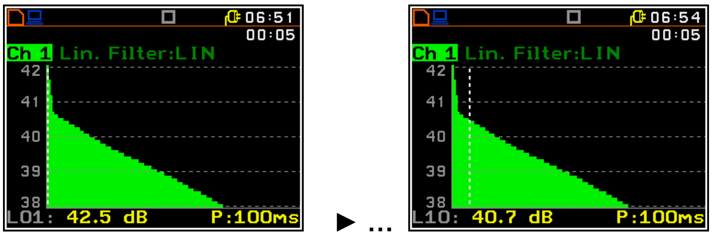
1. Channel number
2. Statistics plot
3. Statistical level (LN% percentile value) for the active cursor position
4. RMS detector (**Lin.**, or **Exp.**: **Fast**, **Slow** or **Imp.**)
5. Frequency filter used (**A**, **C** or **Z**)
6. Cursor position
7. Elapsed time shows the current second of the measurement in the range [**1**, **Meas. Period**]
8. Value of the selected statistical level **LN%** and units (dB)
9. The sampling interval for the LN% values calculated by the meter (0.1s).



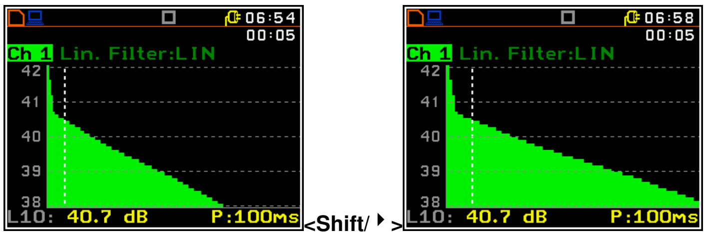
The channel is changed by pressing the ◄ and ► keys simultaneously with **<Alt>**.



The cursor position is changed using the ◄ / ► key. The statistical level (%) and appropriate (dB) value are presented in the line below the plot.



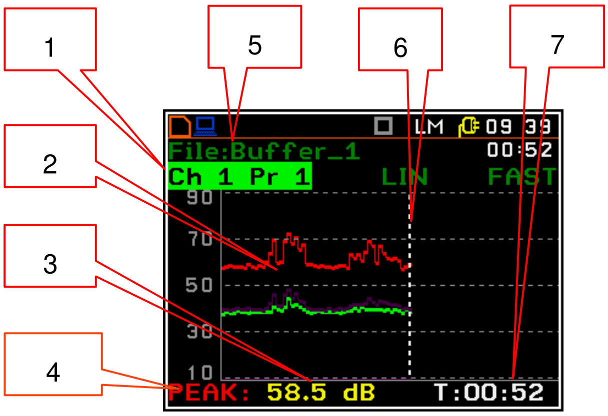
Press the ◄ / ► key with <**Shift**> to extend the X axis.



Presentation mode for logger view

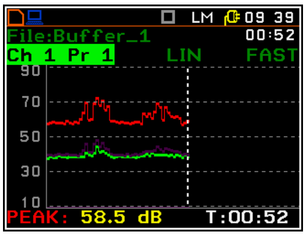
The time history of results saved in the logger can be presented in the special **Logger** mode. The **Logger** mode can be activated or deactivated in the **Display Modes** list.

1. Channel and Profile number
2. Logger plot
3. Result value for the cursor position
4. Name and colour of the logged result
5. Name of the logger file
6. Cursor
7. Cursor position value

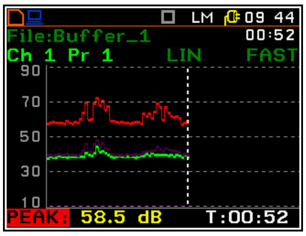


Changing the active fields

Jumping between positions is made by means of the ▲ or ▼ keys.

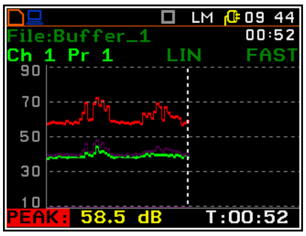


▼

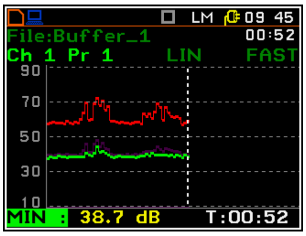


Changing the field content

When Profile or Function position is chosen, then the profile number or function name is changed by means of the ◄ / ► key pressed with <**Alt**>.

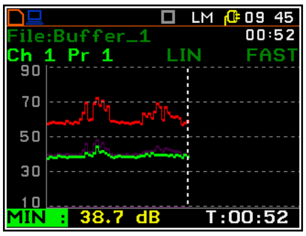


<Alt/►>

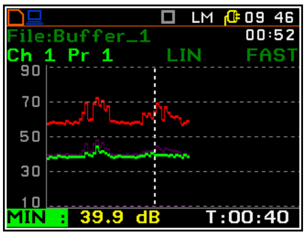


Changing the cursor position

The user may change the cursor position by means of the ◄ / ► key. The appropriate value is presented in the line below the plot.



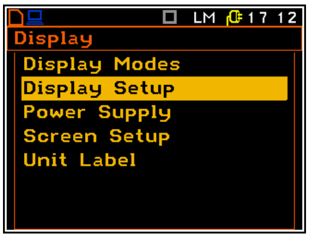
◄ …



6.2 SETTING THE PARAMETERS OF GRAPHICAL PRESENTATIONS – DISPLAY SETUP

The **Display Setup** position enables the user to change scale of the graphical results presentations for each channel separately.

In the **Display Scale** window, the user may adjust the scale in the available modes of graphical presentation of the measurement results (time-history in the **Logger** and spectra in the **Spectrum** mode).



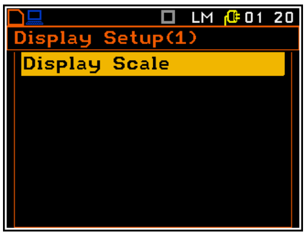
<ENT>

Setting the scale of the logger presentation

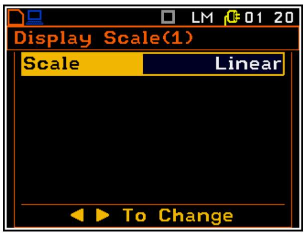
For Vibration input two options are available for the **Scale** position: **Linear**, and **Logarithm**.

For Sound input only **Logarithm** scale is possible.

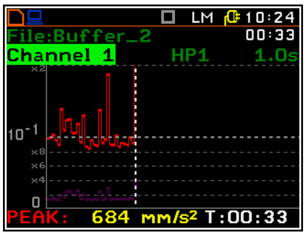
<ENT>



In case of **Linear** scale, the graphical presentation and the units are linear. In case of **Logarithm** scale the graphical presentation is given in the logarithmic scale and the measurement results are expressed in decibels (the results are related to the values set up in the **Reference Levels** sub-list (*path: <Menu> / Setup / Reference Levels*).

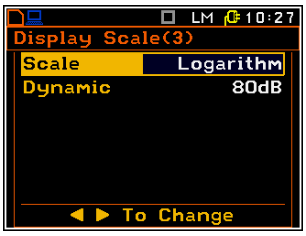


=>

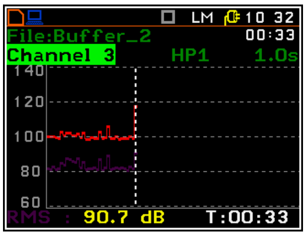


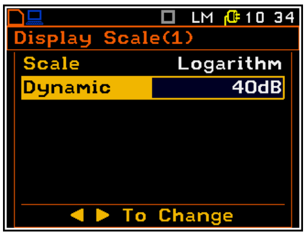
Scaling the vertical axis

If **Scale** is set to **Logarithmic** then the **Dynamic** position enables the user to select the required dynamic range scaling of the graphical presentation mode. The user can obtain double, four times and eight times expansion of the vertical axis (the default vertical axis corresponds to **80 dB**, after expansion it corresponds to **40 dB**, **20 dB** and **10 dB** – respectively).

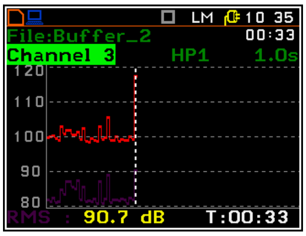


=>



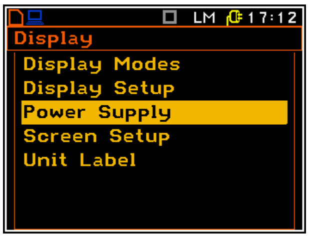


=>

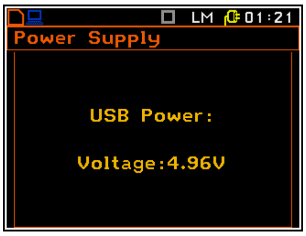


6.3 CHECKING THE INSTRUMENT POWERING – POWER SUPPLY

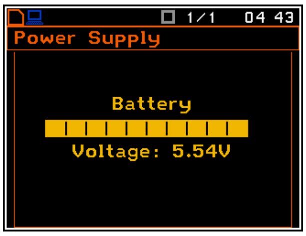
The **Power Supply** position enables the user to check the power source of the instrument: internal battery condition, source and voltage of the external power supply, and also set the battery type for checking their condition.



<ENT>



The instrument can be powered from four AA rechargeable or standard alkaline batteries or from the USB interface when its USB Device socket is connected by means of the cable to a PC or USB power supply such as the SA 54. The view presented on the display for each powering sources is different. The current battery voltage is displayed together with its approximate charging (in the graphical form).

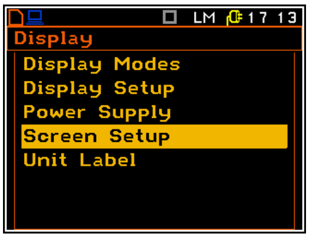


6.4 SETTING THE DISPLAY BRIGHTNESS AND POWER SAVER – SCREEN SETUP

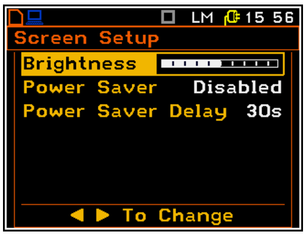
The **Screen Setup** list enables the user to set the brightness of the display and power saver function.

Display brightness

The **Brightness** enables the user to set the proper brightness of the display by means of the ◄ / ► key. The user can select 20 different values of this parameter.



<ENT>

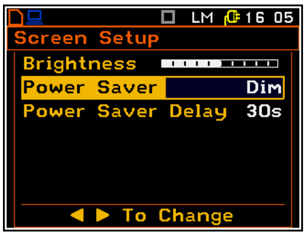


***Note:** The new value of the brightness is confirmed after each press of the ◄ / ► key (new value is selected without any confirmation from the **<ENTER>** key).*

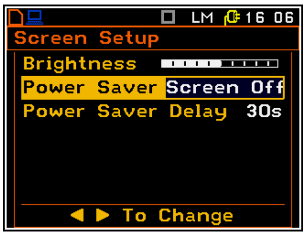
Power saver

Saving the internal source of the instrument's power can be achieved by reducing the brightness of the screen whenever possible.

There are two types of the **Power Saver** functions. The screen may be switched off (**Screen Off**) or dimmed (**Dim**). After a delay, set by **Power Saver Delay**, from pressing any key the screen is dimmed or switched off. If it has happend, the first press of any key will switch on the screen again.

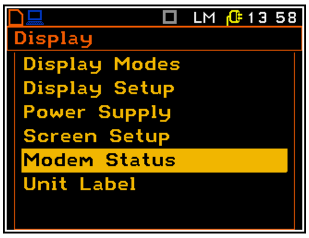


▶

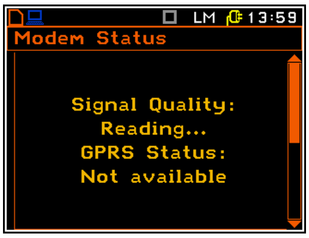


6.5 CHECKING THE MODEM STATUS – MODEM STATUS

The **Modem Status** position appears in the SVAN 958A Firmware supporting modem and when the GPRS function is switched on (*path: <Menu> / Setup / Wireless Com. / Network Setup / GPRS: on*). It enables the user to check the status of the modem. The displayed text is scrolled on the display after pressing ▲ and ▼.



<ENT>

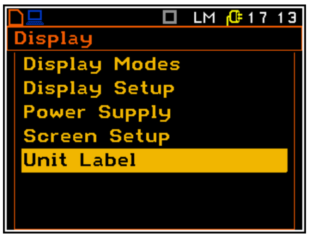


Note: *Before swith on the GPRS modem it is necessary to swith on the RS232 interface (path: <Menu> / Setup / USB Host Setup).*

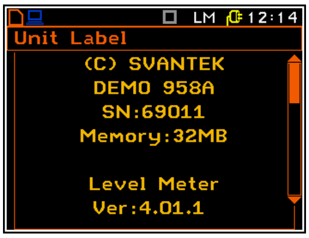
6.6 CHECKING THE SPECIFICATION OF THE INSTRUMENT – UNIT LABEL

The **Unit Label** position enables the user to check the model number of the instrument, its serial number, the current software version installed in it and the relevant standards, which the instrument fulfils.

The displayed text is scrolled on the display after pressing ▲ and ▼.



<ENT>



Note: *The contents of the **Unit Label** list should be always sent to Svantek local service department or official representative in case of any problems faced by the user during the instrument's normal operation in the field.*

6 SAVING THE MEASUREMENT RESULTS – File

The **File** list contains the elements that enable the user to manage the data files that are created and saved in the internal memory of the instrument.

There are two main ways for storing the measurement data in the instrument:

1. Saving files in the FLASH DISC using the **File** list.
2. Logging data in the logger files automatically.

Instrument's files contain data:

- measurement results from **Level Meter**;
- measurement results from **1/1 Octave** analysis; (available as option)
- measurement results from **1/3 Octave** analysis; (available as option)
- measurement results from **FFT** analysis; (available as option)
- logger results (measurement time history),
- wave recording (available as option),
- settings.

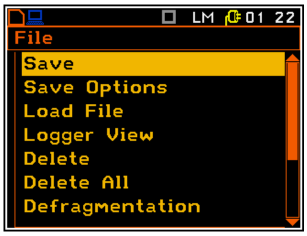
Note: *The instrument's logger memory is independent from the FLASH DISC memory. The capacity of available memory is equal to 32 MB.*

Result files can be saved manually or automatically, Setup files are saved manually, Logger and Wave files are saved automatically.

Each file consists of some elements, which are the same for all kind of files:

- file header;
- unit and software specification;
- user's text stored together with the measurement data;
- parameters and global settings;
- special settings for profiles;
- marker of the end of the file.

The **File** list contains the following items:



Save enables the user to save the measurement results as a file in the instrument's memory;

Save Options enables the user to set the saving's options;

Load File enables the user to load to the working space of the instrument's memory the measurement results saved as a file;

Logger View enables the user to select and present the results stored in the logger's files;

Delete enables the user to delete a selected file from the instrument's memory;

Delete All enables the user to delete all files from the instrument's memory;

Defragmentation enables the user to recover the memory, which was used by the deleted files;

Catalogue enables the user to check the content of the instrument's memory catalogue;

Free Space informs the user about the capacity of the instrument's memory still available for storing the measurement results;

Save Setup enables the user to save the configurations of the instrument;

Setup Options enables the user to save the user filter coefficients;

Load Setup enables the user to load saved configurations of the instrument;

USB Directory enables the user to create and select the catalogue of the USB memory disk. This position appears when the USB disc is attached and enabled.

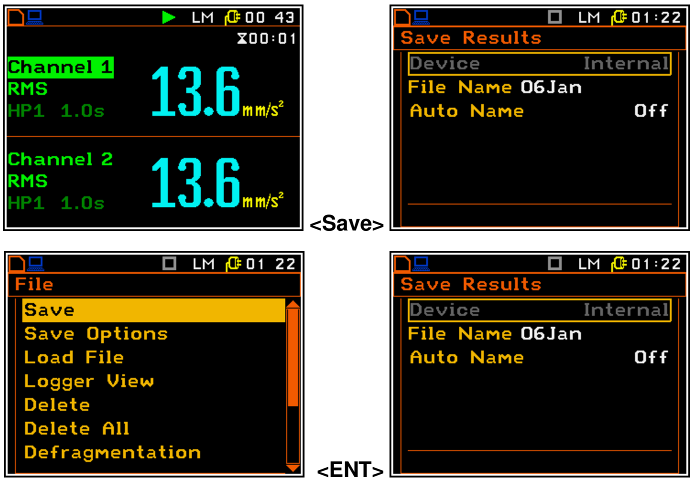
7.1 SAVING FILES IN THE INSTRUMENT'S MEMORY OR EXTERNAL MEMORY

There are two options for storing result data in the internal or external memory.

One option is to press the **<Save>** key right after the measurement stop.

Another option is to use **Save** position in the **File** list.

In both options the **Save Results** window appears.



There are two available options for saving files in the **Save Results** window: with the edited name, or with the name automatically changed with the name number increasing by one every time the save function is used. These options can be selected in the position **Auto Name**. If **Auto Nam**e is switched off (**Off**) the name of the saved file is as selected in the position **File Name**. This file name can be edited in the special window, which is opened using the ► key. When the **Auto Name** function is set on **Number**, then a file is saved with the name as displayed above, but after the last non-numeric letter of text there will be added digit 0. If there already exists any chain of digits on the end of the file text the number that these digits create will be increased by one.

The number can be changed from 0 to N. The only limitation of the N value is the length of the file name, which cannot be longer than eight characters. When such limitation is reached and the instrument cannot automatically change the file's name the only possibility is to use a new file name.

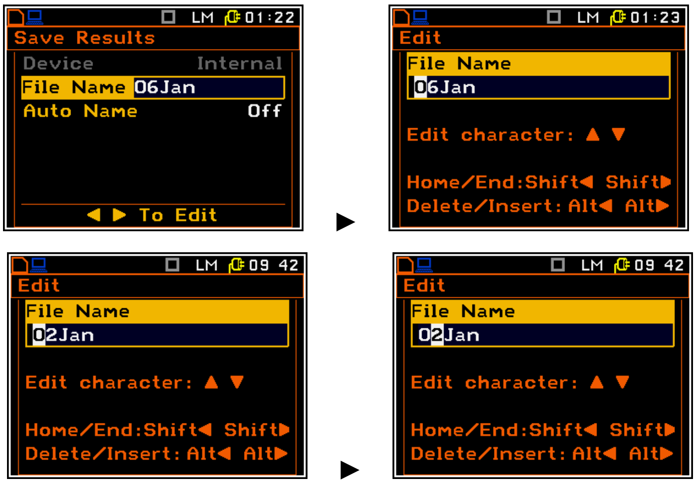
The default name for a file is displayed when first entering to this position (after power on). The default name consists of the day and the month's abbreviation and cannot exceed 8 characters.

The user can skip editing the file's name and start saving the file by pressing the **<ENTER>** key or return to the **File** list or measurement display by pressing **<ESC>**.

To start file editing the user has to select the File name position and to press ◄ or ► key. After that the special window with editing function opens. The editing process is presented on the Figure to the right.

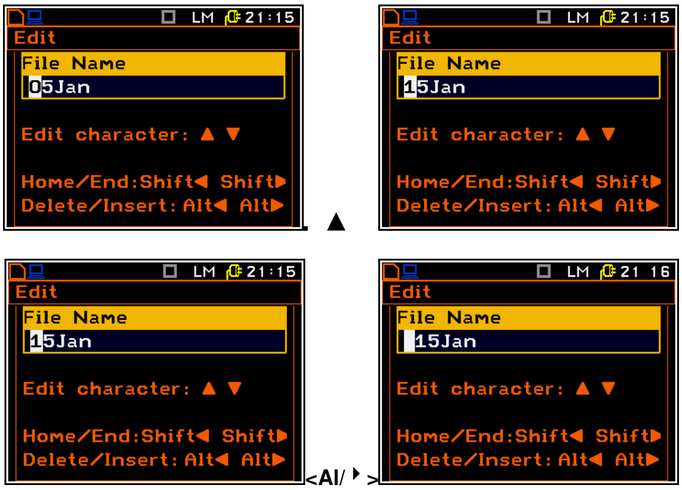
Selection of the character's position to be edited

Select the position of the character in the edited text using the ◄ / ► key. For the current position the character can be changed, position can be deleted or inserted.



Changing the edited character

The available ASCII characters can be changed using the ▲ / ▼ key. The subsequent digits, letters and other characters appear on the display in the inversely displayed position after each press of the above mentioned keys.



Position insertion, deletion

The user can delete or insert the position in the edited text using the ◄ / ► key, pressed together with **<Alt>**.

The edited name is accepted and the instrument returns to the **Save Results** list after pressing **<ENTER>**. Pressing the **<ENTER>** key again saves the file in the working directory. The special warning is displayed if a file with the same edited name already exists in the memory. The instrument waits then for a reaction from the user (any key should be pressed except **<Shift>** or **<Alt>**).

Note: *The files can be overwritten (using of the same file name) without any warning if the* ***Replace*** *option is switched on (path: <Menu> / File / Save Options).*

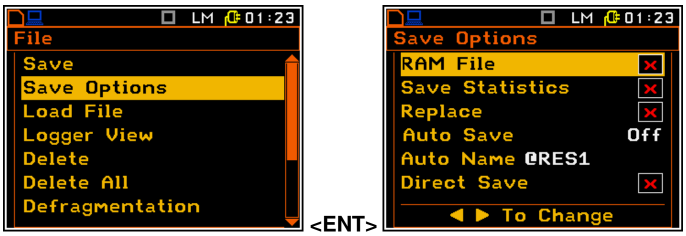
Saving is not possible when the instrument is measuring the signal. The message “Measurement in progress!” is displayed for about 3 seconds.

The message “No Results To Save” is displayed after trying to execute the save operation in the case when no measurements were performed and there are no results to be saved. The instrument then waits for the reaction of the user (any key should be pressed except **<Shift>** or **<Alt>**) and after pressing a key it returns to the **Save Results** list.

Note: *Direct access to the* ***Save Results*** *list is possible after pressing the* ***<ENTER>*** *and* ***<Alt>*** *keys simultaneously if the* ***Auto Save*** *option is switched off (path: Menu / File / Save Options). Otherwise (****Auto Save*** *option is switched on), the results are saved automatically, after pressing these keys, in the file with the incremented name.*

7.2 CONTROLLING DATA STORING IN THE INSTRUMENT’S MEMORY – SAVE OPTIONS

The **Save Options** sub-list is used for the selection of the options for storing data in the instrument's files.



Saving files in RAM memory

The **RAM File** enables the user to save the results of the measurement in the special file in the RAM memory (the name of the file is defined as “RAMfile”).

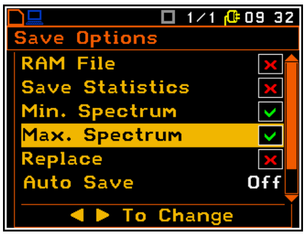
Saving statistics

The **Save Statistics** option is used to set saving, together with the sound measurement results, the statistics of the measurements. Together with the sound measurements, 100 statistics are calculated (the values named from **L01** to **L99**).

The statistics are not calculated for the vibration measurements.

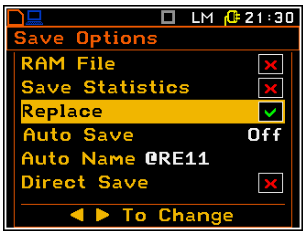
Note: *This position was created to save the memory of the instrument in the case when the knowledge of the statistics is not necessary. Each registration of the statistics requires 600 bytes of the memory!*

Saving minimum and maximum values in the spectrum



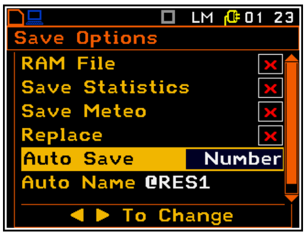
The **Min Spectrum** or/and **Max Spectrum** appears on the display in case of **1/1 Octave** and **1/3 Octave** mode and it enables the user to save the lowest or/and highest values of the instantaneous spectrum (calculated with 100-milliseconds time step), which occurred during the **Int. Period** set in the **Input** list (*path: <Menu> / Input / Measurement Setup*)

Replacing existing files



The result of the attempt to save the file with the name, which already exists in the memory, depends on the setting of the **Replace** parameter. It is possible to erase the old file and to save the new one with the same name if the position is active. The message is displayed that such operation is not available in case when this position is not active – see the description of the **Save** function.

Controlling measurement results savings

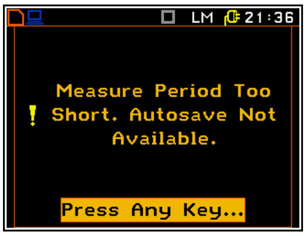


Using the **Auto Save** the user can set the self-saving of the measurement results or to switch off this possibility. This position was also established in order not to waste too much memory of the instruments when the self-saving is not necessary.

The window for the edition of the base name for the self-saved files is opened (the **Auto Name**) after pressing the **<ENTER>** key in the case when the **Auto Save** position is activated. The name of the **Auto Save** files is up to eight characters long starting with the special character @.

When **Auto Save** is switched to **Number** the **Save Meteo** position appears in the list. If this position is switched on the meteo results from meteo station will be saved by **Auto Save** function.

Note: *The* ***Auto Save*** *function can be performed only in case when the* ***Int. Period*** *value (path: <Menu> / Input / Measurement Setup) is not less than 25 seconds. If it is less than 25 seconds, the measurement results are not saved* and this is indicated with the message*! There is only one exception - when the* ***Repetition Cycles*** *number (path: <Menu> / Input / Measurement Setup) is equal to one, the* ***Auto Save*** *function is executed disregarding of the value of the integration period.*



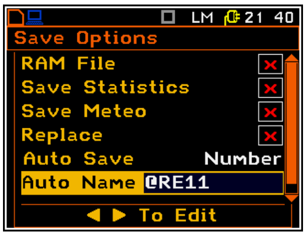
When the **Int. Period** is too short for the **Auto Save** option or the **Repetition No.** is not equal to one the following message appears on the display.

When the **Auto Save** option is active, after starting the measurements by pressing the **<Start/Stop>** key the results are saved in the file with the selected name.

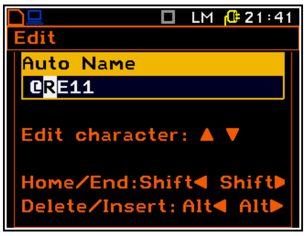
Another measurement is started after pressing the **<Start/Stop>** key again. The measurement is stopped after the selected **Meas. Cycle Time** (*path: <Menu> / Input / Measurement Setup*). The numbers of the next saved named files are automatically incremented by one. The same remarks are valid in this case as already stated in the description of the **Save Next** function.

Editing the name of the Auto Save file

The **Auto Name** enables the user to edit the name of the Auto Save file. To edit the file name the user has to press the ► key. The text editing window is opened.

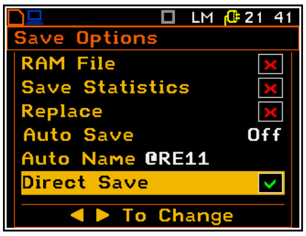


►



Direct access to the Save function

The **Direct Save** option enables saving the measurement results in a file with the name number increased by one by pressing the **<Alt>** and **<ENTER>** keys after the measurement stop. If this option is disabled, after pressing these keys, the instrument will switch you to the **Save Results** menu.



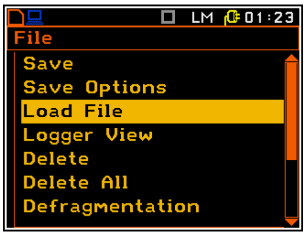
Press the **<ENTER>** and **<Alt>** keys during the execution of a measurement causes, disregarding the option set in the **Direct Save** position, the message "Measurement in Progress" to be displayed.

7.3 LOADING FILES WITH THE MEASUREMENT RESULTS – LOAD FILE

The **Load File** position is used for loading data file from the FLASH DISC (e.g. for verification or comparison).

The **Load File** window shows basic file information: the memory the file was saved in, current number of the file and total number of saved files, type of the current file (**Level Meter**, **1/1 Octave** etc.) and measure mode in each of four channels (**S**ound or **V**ibration), logger name, date and time of the **Save** operation and size of the loaded file.

To change the file the user has to press the ◄ / ► key. To jump to the first file the user has to press the ◄ with **<Shift>** key , and to the last one - the ► with **<Shift>** push.



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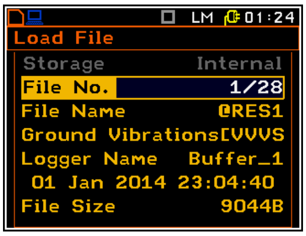

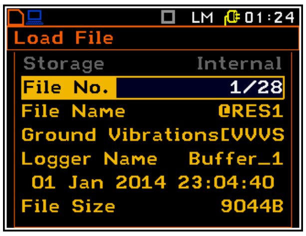

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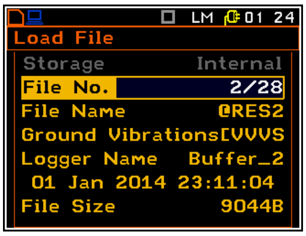
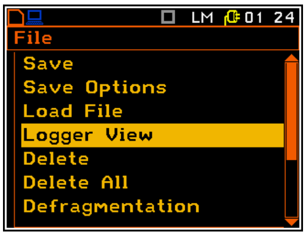


7.4 CHECKING THE CONTENTS OF THE LOADED FILE – LOGGER VIEW

The **Logger View** position enables the user to examine the contents of the logger files saved in the internal memory of the instrument.



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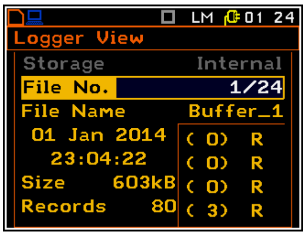
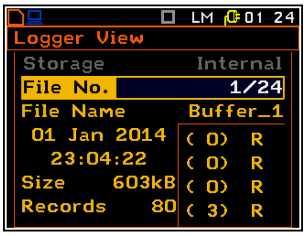
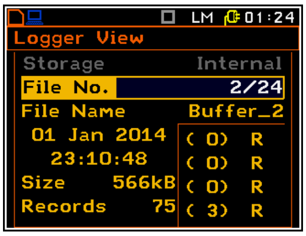


The **Logger View** window displays logger file basic information: in what memory file was saved, current number of the file and total number of the saved files, logger file name, date and time of the **Save** operation, size of the file, number of records (one record is saved after each period equal to logger step), number of saved logger results in each channel (e.g.: **(5)rvR** means that from the first channel all five available logger results are stored in memory and, additionally, **r**pm, **v**ector and spectrum (**R**MS) are also saved in the selected logger file).

To change the file the user has to press the ◄ / ► key. To jump to the first file the user has to press the ◄ with **<Shift>** key , and to the last one - the ► with **<Shift>** push.

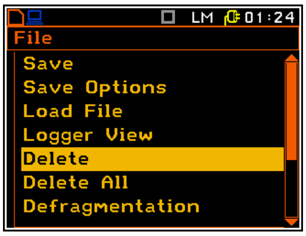


►



7.5 REMOVING FILE WITH THE MEASUREMENT RESULTS – DELETE

The **Delete** list consists of two elements: the **Result Files** with the measurement results and the **Setup Files** with the saved setups of the instrument.



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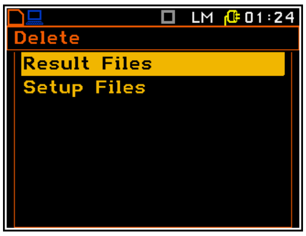
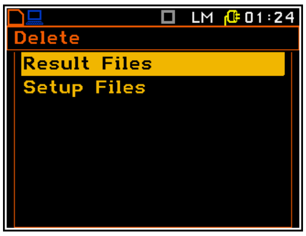


After entering the **Result Files** or **Setup Files** window the user has to select the file to be deleted and press **<ENTER>**.



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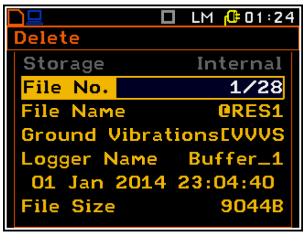
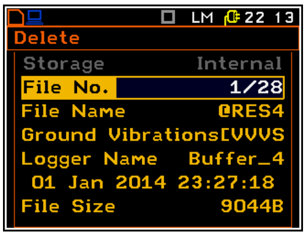


The delete function is then confirmed by the instrument.



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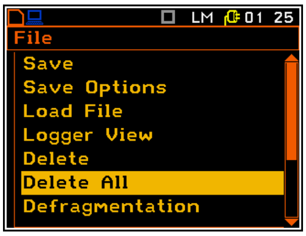
7.6 REMOVING ALL FILES WITH MEASUREMENT RESULTS FROM MEMORY – DELETE ALL

The **Delete All** position is used to remove all files of certain type (**Result Files**, **Logger Files** and **Setup Files**) from the memory.



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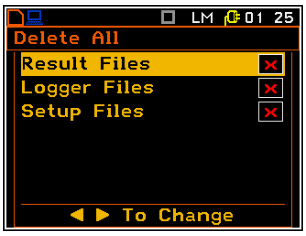
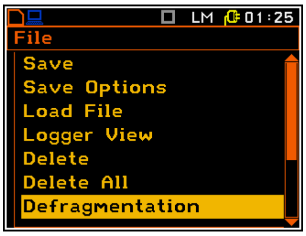


After selection files type and pressing **<ENTER>** the instrument will request confirmation of the operation.

7.7 MERGING RESULT AND SETUP FILES MEMORY – DEFRAGMENTATION

The **Defragmentation** option is used to make the **Internal** memory space contiguous. All new files are saved starting from the beginning of the free memory space. The memory occupied by the deleted file, assuming that the file was not the last one, remains unused for the next files saving.



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After the removing a file the memory space becomes discontinuous, with unused parts, which cannot be utilized in the future.

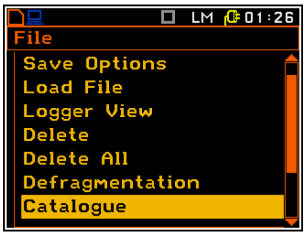
The situation changes after the process called defragmentation. During this process the files saved in the files memory are moved in order to obtain minimum continuous occupied space.

After pressing the **<ENTER>** key on the active **Yes** option, the instrument checks whether the used result and setup files memory is continuous or not. If this memory is continuous, the **Defragmentation** operation is not executed and the special message is displayed. The instrument waits for the reaction of the user (any key should be pressed except **<Shift>** and **<Alt>**) and after pressing a key it returns to the **Defragmentation** sub-list.

If there are conditions to execute the **Defragmentation** operation the current progress of defragmentation is shown on the display. After successful defragmentation, the special message is displayed and the instrument waits for the reaction of the user. Any key should be then pressed except **<Shift>** and **<Alt>**. After pressing a key, the instrument returns to the **Defragmentation** sub-list.

7.8 CHECKING THE CONTENTS OF THE MEMORY – CATALOGUE

The **Catalogue** position is used for checking the contents of the internal instrument's memory (the list of the files). The content of the **Catalogue** window is similar to the **Load File** and **Delete** one.



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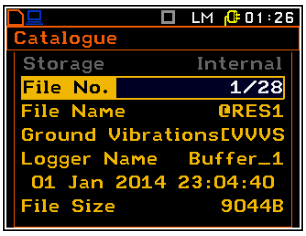

7.9 CHECKING THE FREE SPACE IN THE MEMORY – FREE SPACE

The **Free Space** position is used to read out the free space in the FLASH DISC memory of the instrument.

The memory of the instrument is divided into two separate parts. One part is dedicated for saving the result and setup files and its size is equal to 15616 Kbytes. The second part is used for saving the logger files and its size is equal to 15104 Kbytes

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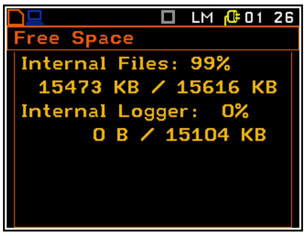

7.10 SAVING SETUP IN THE INSTRUMENT'S MEMORY – SAVE SETUP

The **Save Setup** position is used for storing setups in the FLASH DISC memory of the instrument as a file.

The **Save Setup** window content is similar to the **Save Results** one.

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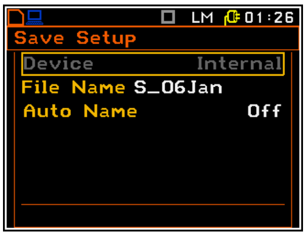

7.11 OPTIONS FOR SETUP FILES – SETUP OPTIONS

The **Setup Options** sub-list is used for the selection of the options for storing setup files.

The **Save User Filters** position is used for saving the user filters together in the setup files.

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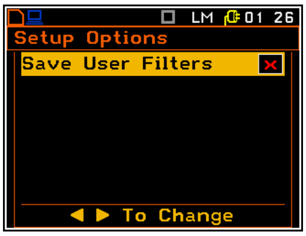

7.12 LOADING THE FILES WITH THE CONFIGURATION – LOAD SETUP

The **Load Setup** position is used for loading settings from the setup file to the instrument.

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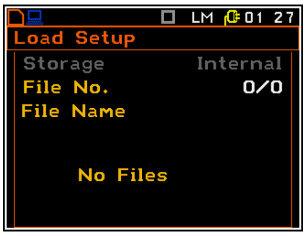
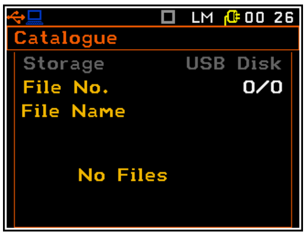


7.13 CHECKING THE CONTENTS OF THE USB MEMORY DISK – USB DIRECTORY

When **USB Disk** is connected and activated (*path: <Menu> / Setup / USB Host Setup*) the Internal memory became not active and all newly created files will be saved on the **USB Disk**. The **Storage** position in the **Load File**, **Catalogue**, **Delete** and **Load Setup** windows will be changed from **Internal** to **USB Disk**.



The **USB Directory** position is used for checking the contents of the USB memory disk, creating new catalogues and selecting the working catalogue for saving new created files.

To assigne the working catalogue for saving of newly created files the user should select the required **File No.** with the name in the **File Name** position (catalogue name) and then use **Action**: **Select**. From this time all newly created file will be saved in this USB Directory.

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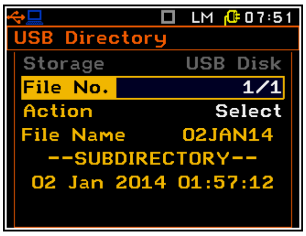
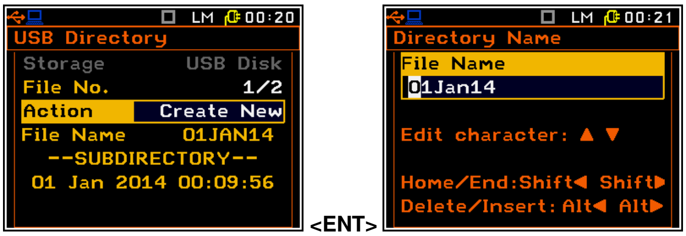
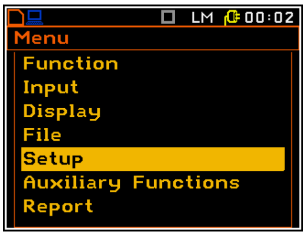


To create the new catalogue the user should use **Action**: **Create New**. After press **<ENTER>** the instrument will go to the **Directory Name** screen in which the user will be proposed edit the predefined catalogue name.



7 ADDITIONAL SETTINGS – Setup

The **Setup** list contains additional positions related with measurements or with the hardware components of the instrument. In order to open the **Auxiliary Setup** list the user has to press the **<Menu>** key, select the **Auxiliary Setup** position and press **<ENTER>**.



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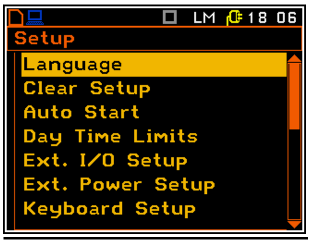


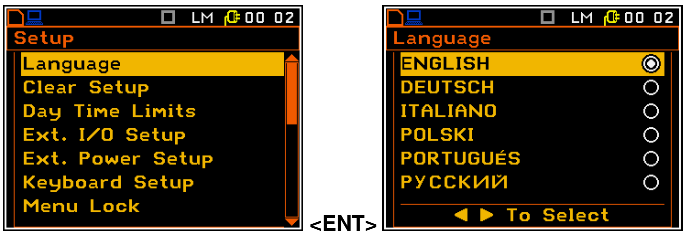
The **Setup** list includes the following items:

Language	enables the user to select the language of the user interface.
Clear Setup	enables the user to return to the default, factory settings.
Auto Start	enables the user to automatically start the measurement.
Day Time Limits	enables the user to select the hours limiting day and night for the calculation of the **Lden** result.
Ext. I/O Setup	enables the user to select the available functionality of the I/O port.
Ext. Power Setup	enables the user to select the minimum voltage of the external source, when the instrument should be switched off automatically.
Keyboard Setup	enables the user to set the operating mode of the **<Shift>** and the **<Start/Stop>** keys.
Menu Lock	enables the user to lock the menu and to reduce the access to the program functions of the instrument.
Reference Levels	enables the user to program the user filters.
Remote Control Setup	enables the user to activate or deactivate error confirmation function.
RMS Integration	enables the user to select the detector type for the calculations of the RMS function.
RS232 Setup	enables the user to set the transmission speed and the timeout in the RS232 interface.
RTC	enables the user to set the Real Time Clock.
Statistical Levels	enables the user to define 10 statistical LN% levels.
Timer	enables the user to program the internal delay start/stop timer.
USB Host Setup	enables the user to programme the functionality of the instrument’s socket named **USB Host**.
User Filters Setup	enables the user to select the Vibration units in which the results of the
Vibration Units	enables the user to select the Vibration units in which the results of the measurements are to be given.
Warnings	enables the user to switch the warnings on or off that can be displayed during the normal operation of the instrument.
Wireless Com.	enables the user to select the network type and set the parameters of the data transmission. This position is available for the SVAN 958A Firmware supporting modem.

7.1 SETTING THE LANGUAGE OF THE USER INTERFACE – LANGUAGE

The **Language** list enables the user to select the language of the user interface.

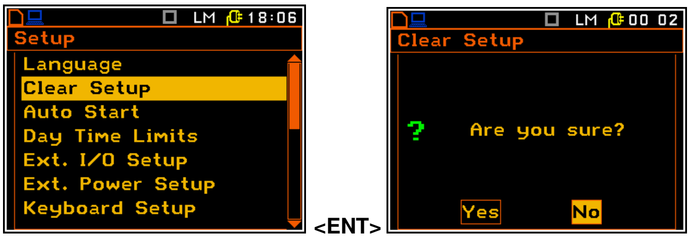
For activation of the Russian version of the user interface, a special code has to be entered.



7.2 RETURN TO THE FACTORY SETTINGS – CLEAR SETUP

The **Clear Setup** sub-list enables the user to return to the default (factory) setup of the instrument.

The factory setup can be install also by means of the four **<Shift/Enter>** and **<Alt/Start>** keys pressed together.

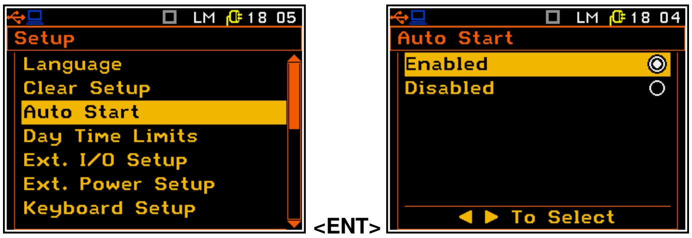


During the clearing process the message **WAIT...** is displayed. The following message is displayed after return to the default settings and the instrument waits for the user's reaction to press any key to continue.

7.3 AUTOMATIC MEASUREMENT START – AUTO START

The **Auto Start** position allows the user to enable/disable the automatic measurement start (**Auto start**) right after the turning the instrument on without pressing the **<Start>** key.

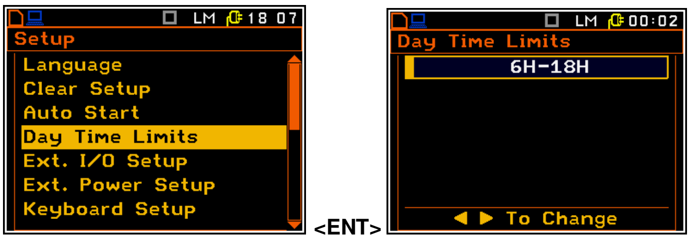
By default, this function is disabled.



7.4 DAY TIME LIMITS SELECTION – DAY TIME LIMITS

The **Day Time Limits** position enables the user to select the required by the local standards determination of the day and night. These limits are used for the calculation of the **Lden** function.

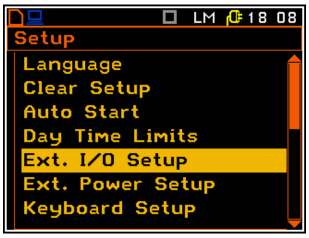
Two options are available: **6H–18H** and **7H-19H**.



7.5 SELECTION OF THE EXTENDED MODE – EXT. I/O SETUP

The **Ext. I/O Setup** enables the user to select the function of the instrument's socket named as **I/O**. This socket can be used as:

- the output of the analogue signal (**Analog**) transmitted from the input of the instrument to its output without any digital processing (i.e. frequency filtering);
- the input of the digital signal used as an external trigger to start the measurements (**Digital In**) in the instrument, acting in this case as a so called "slave instrument";
- the digital output (**Digital Out**) used for triggering another "slave instrument" (the instrument is acting in this case as a "master instrument"), or as a source of any alarm signal in the case of certain circumstances occurred during the measurements (i.e. the level of the input signal was higher than selected one).



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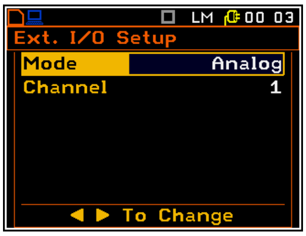

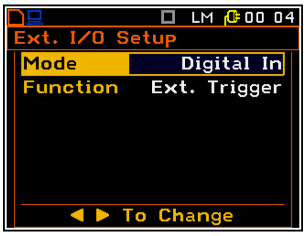

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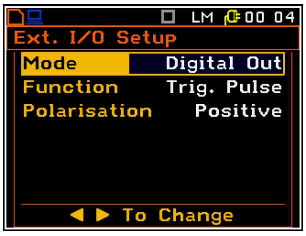
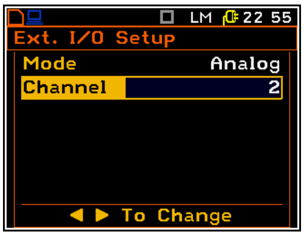
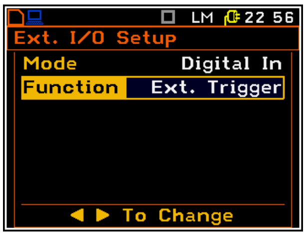


In the **Analog** mode, the meter can send signals to the output device. For example, the signal can be observed on the oscilloscope from the selected **Channel**. The user has the opportunity to choose between **Channel 1**, **2**, **3** and **4**.

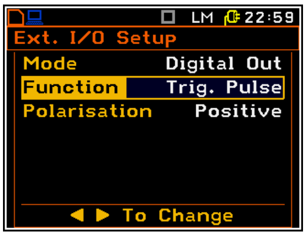


In the **Digital In** mode, the signal that appeared on the **I/O** socket will be treated as the external trigger which starts the measurement. In this mode the **Ext. I/O** function is set to **Ext. Trigger**.



In the **Digital Out** mode, the instrument generates a signal on the **I/O** socket will be treated as an external device trigger pulse or as an alarm pulse.

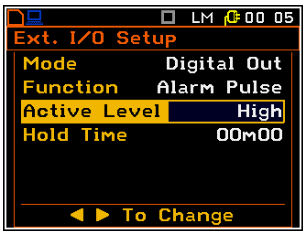
The **Function** item allows selecting the function in the **Digital Out** mode of the **I/O** socket. The socket can be used as a source of the trigger pulse (**Trig. Pulse**) which triggers so called "slave" device or as an alarm signal (**Alarm Pulse**), which appears there after fulfilment of certain conditions.



In case of **Trig. Pulse**, the **Polarisation** item appears, in which you can select which polarisation of the signal (negative or positive) will be applied.

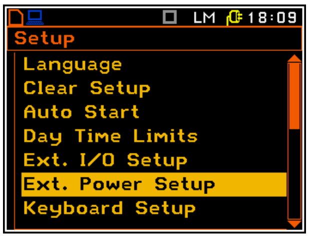
In case of **Alarm Pulse** the **Active Level** position appears, which enables the user to select which level of the signal should be treated as a valid one ("negative" or "positive" logic): **Low** or **High**.

The **Hold Time** position defines the minimum duration of alarm signal.



7.6 TURNING OFF INSTRUMENT DUE TO LOW EXTERNAL VOLTAGE – EXT. POWER SETUP

The **Ext. Power Setup** item allows setting the minimum voltage of the external DC power source, when the instrument should be switched off automatically (**Power Off**) when the voltage of the external DC power source will be below the **Limit** level.



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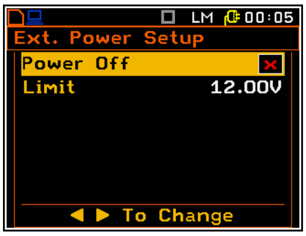
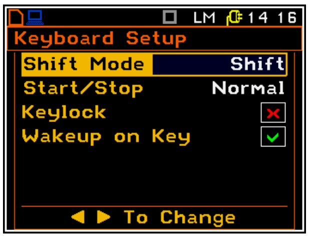


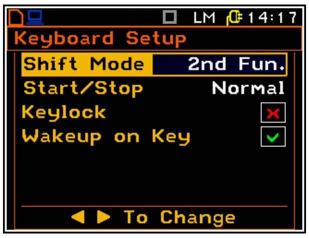
7.7 PROGRAMMING KEYBOARD – KEYBOARD SETUP

The **Keyboard Setup** sub-list enables the user to programme the operation mode of the **<Shift>**, **<Alt>** and **<Start/Stop>** keys and to set the **Keylock** option.

<ENT>

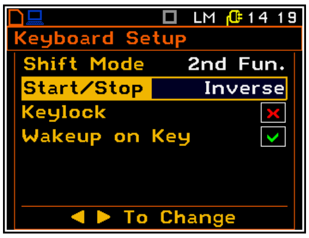


<Shift> / <Alt> key mode



In the **Shift Mode** position the user can choose between **2nd Fun.** and **Shift**. When the **Shift** option is selected, the **<Shift>** and **<Alt>** keys operate as in the keyboard of a computer – in order to achieve the desired result, the second key has to be pressed at the same time as with **<Shift>**/**<Alt>**. When the **2nd Fun.** option is selected the **<Shift>**/**<Alt>** keys operate in the sequence with the other one. This enables the user to use only one hand to operate the instrument.

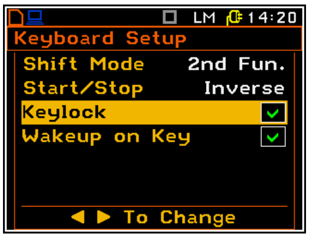
<Start/Stop> key working mode selection



In the **Start**/**Stop** position the user can choose between **Normal** and **Inverse**. When the **Normal** option is selected the instrument reacts on each of the **<Start/Stop>** key pressing, starting or stopping the measurements.

When the **Inverse** option is selected the **<Start/Stop>** key operates in conjunction or in a sequence with **<Shift>**. The measurements are started or stopped after pressing both keys.

Keylock option



If you check the **Keylock** position you will be able to lock / unlock the keyboard with the ▲ and ▼ keys pressed simulntaneously.

Wakeup on Key option

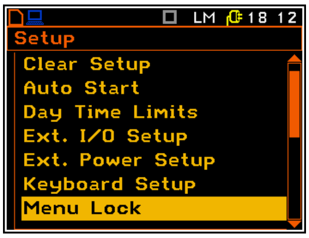
If you check the **Wakeup on Key** position, then pressing any key will deactivate the screensaver.

If you uncheck the **Wakeup on Key** position, pressing any key will have the same meaning as when the screensaver is off.

7.8 Locking the menu – Menu Lock

The **Menu Lock** sub-list enables the user to lock (**Partial** or **Full Lock**) and unlock the menu.

In the case of default **No Lock** option all available positions in the menu are accessible due to the settings, which were made.



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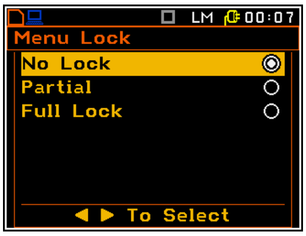
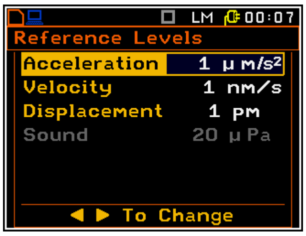


The activation of **Partial** results in locking access to the **Menu** options, which are responsible for measurement parameters. In the case of **Full Lock** no one position from the **Menu** lists is accessible and after attempt of enter **Menu** the **Menu Lock** list appears on the display. The **Menu** is available after unlocking it.

7.9 Reference signal in vibration measurements – Reference Levels

The **Reference Levels** sub-list enables the user to set the reference level of the vibration signal. The values, which are set here, are taken into account during the calculations of the measurement results expressed in the **Logarithmic** scale (with the **dB** as the units).

<ENT>

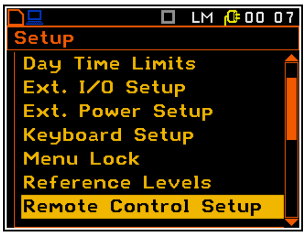


In the **Acceleration** position the user can set the reference level of the acceleration signal from **1 μms^{-2}** to **100 μms^{-2}**. In the **Velocity** position the user can set the reference level of the velocity signal. It is possible to set this level from **1 nms^{-1}** to **100 nms^{-1}**. In the **Displacement** position the user can set the reference level of the displacement signal. It is possible to set this level from **1 pm** to **100 pm**.

The reference level for sound measurements cannot be changed.

7.10 Activating the remote control error confirmation – Remote Control Setup

The **Remote Control Setup** position enables the user to activate or deactivate error confirmation function. If **Remote Control Setup** function is **Enabled** then the instrument confirms warnings after 5 seconds and the user reaction is not required. This function is very useful when the instrument is working as remote controlled. If **Remote Control Setup** function is **Disabled** then the instrument waits for the user reaction. This mode is used in normal mode.



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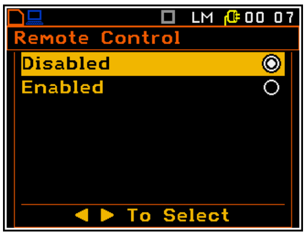
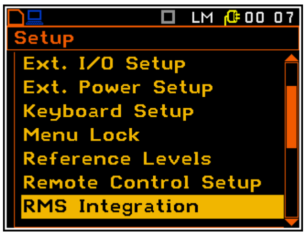


7.11 Selection of detector's type in the LEQ (RMS) calculations – RMS Integration

The **RMS Integration** enables the user to select the detector type for the calculations of the **LEQ** function (in the case of sound measurements) or the **RMS** function (in the case of vibration measurements).

Two options are available: **Linear** and **Exponential**.



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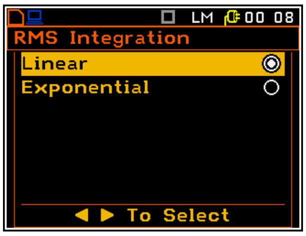
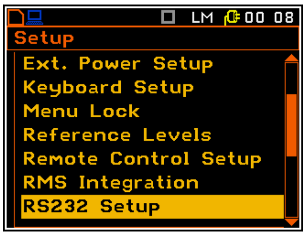


The **Linear** option means that the values of LEQ or RMS based results don't depend on the detector time constant (**Detector**). The **Exponential** option means that all LEQ or RMS based results will be measured with the selected detector time constant (**Detector**) – see Chapter 4.2.

7.12 Setting the parameters of the serial interface – RS232 Setup

The **RS232** position enables the user to programme the RS 232 interface transmission speed (**Baud Rate**) and to set the time limit during which the communication operation should be performed (**Time Out**).

This position appears when the **RS232** option was selected in the **USB Host Setup** list.



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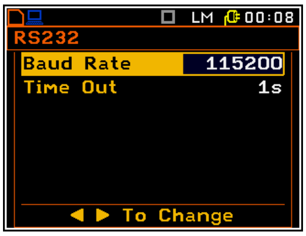


Setting the transmission speed of the serial interface

The RS 232 interface transmission (**Baud Rate**) speed can be selected from the following available values: **1200** (bits / second), **2400** (bits / s), **4800** (bits / s), **9600** (bits / s), **19200** (bits / s), **38000** (bits / s), **57600** (bits / s) or **115200** (bits / s). The selection is made by means of the ◄ / ► key. The setting here should be the same as in the connected instrument or computer to ensure successful data transfer.

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

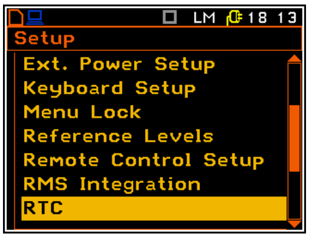
Setting time limit for the performance of serial interface operation

The default value of the parameter **Time Out** is equal to one second but this may be too short for some slower printers, which may not be fast enough. In such cases, the **Time Out** parameter may have to be increased to a higher value.

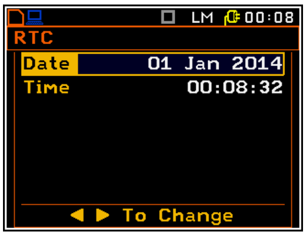
7.13 Programming the instrument's internal Real Time Clock – RTC

The **RTC** enables the user to programme the internal **Real Time Clock**. This clock is displayed in the different places depending on the selected presentation mode.

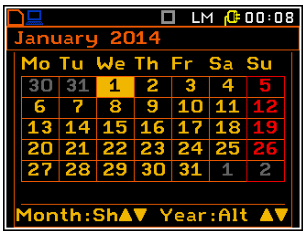
The window is closed and the instrument returns to the **Instrument** list after pressing the **<ENTER>** or **<ESC>** key.



<ENT>

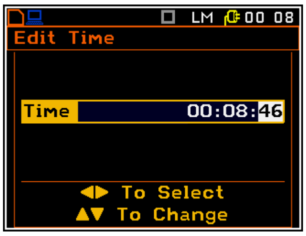


The required date can be selected in a special window, which is opened after pressing the ◄ / ► key when the **Start Day** text is displayed inversely in the **Timer** sub-list.



In order to set data the user has to select its position by means of the ◄ , ► and ▲, ▼ push button and then press **<ENTER>** to set the chosen value.

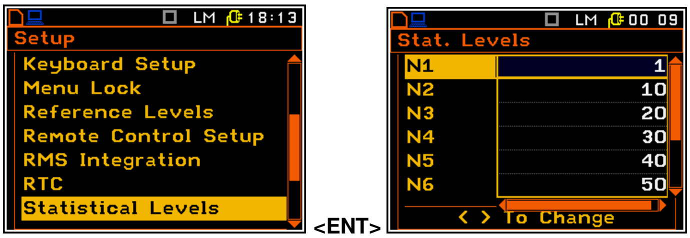
Editing the time is performed in the special window, which is opened after pressing the ► key. The selection of the correct parameter (hour, minute, second, and also day, month and year) is performed using the ◄ / ► key and the change of its value – using the ▲ / ▼ key pressed together with **<Alt>**.



7.14 SELECTION OF STATISTICS LEVELS TO BE SAVED IN A FILE – STATISTICAL LEVELS

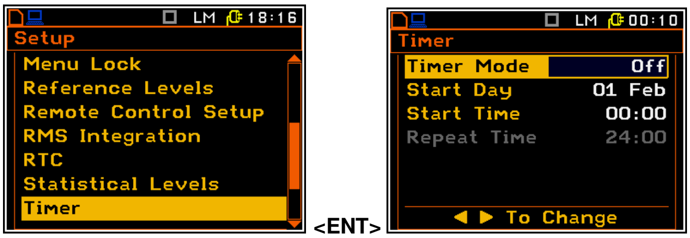
The **Statistical Levels** enables the user to select ten statistics from one hundred calculated in the instrument, which are to be displayed and saved in a file together with the main results of the measurements.

The next ststistical levels are defined by default: **1**, **10**, **20**, **30**, **40**, **50**, **60**, **70**, **80** и **90**.All values should be in the range [1, 99]. Each statistical level can be set independently from others.



7.15 PROGRAMMING THE INSTRUMENT'S INTERNAL TIMER – TIMER

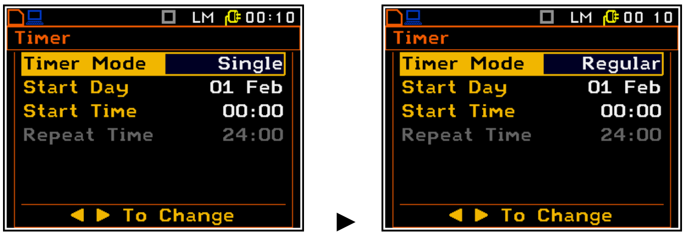
The **Timer** enables the user to programme the internal real time clock trigger to act as a delayed start timer. The instrument can be switched on automatically (up to 1 month ahead) at a pre-programmed time and perform the measurement with the same settings used before the instrument was switched off.



***Note:** After starting by the timer and performing series of measurements the instrument is not switched off automatically. The instrument should be turned off manually!*

Selecting the mode of the timer function

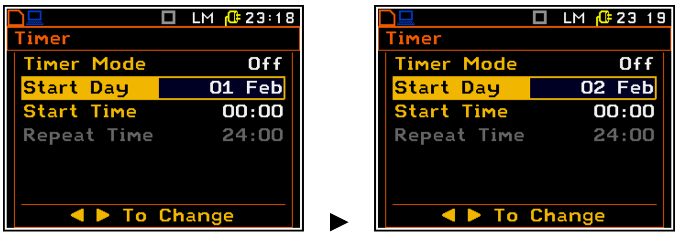
The timer can be switched off (**Off**), switched on only once (**Single**), or switched on many times regularly (**Regular**) with the period between two consecutive measurements set in the **Repeat Time** line as 24 hours. It means that the instrument will be switched on once a day at the same time until the user disables the timer function.



If the instrument is switched on by means of Timer then the "**clock**" icon appears on the screen.

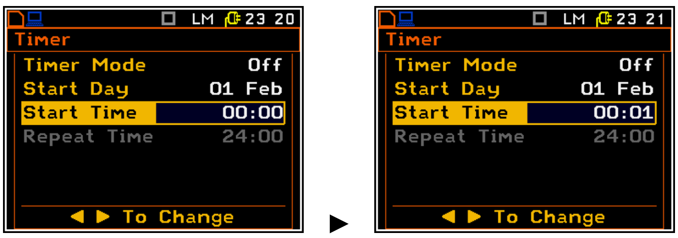
Day of the measurement start

The **Start Day** position determines the date for the measurement to start. The timer can be programmed up to one month ahead and during the date setting the current state of the **R**eal **T**ime **C**lock is taken into account. The required date can be selected by means of the ◄ / ► key.

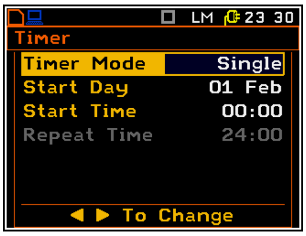


Time of the measurement start

The **Start Time** position determines the time for the measurement to start. The required hour and minute can be selected by means of the ◄ / ► key.

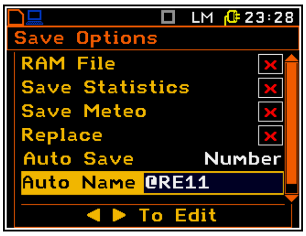


Example of Timer execution



Let’s assume that you wish to switch on the instrument on the 1st of February, at 00:00, make measurement during 10 seconds without using logger and save the results in a file named @RE11.

In order to do this the user has to set the parameters of the **Timer** function (*path: <Menu> / Setup / Timer*), the measurement parameters (*path: <Menu> / Input / Measurement Setup*), activate the **Auto Save** function (*path: <Menu> / File / Save Options*), name the file (the **File Name** list is opened after switching on the **Auto Save** function) and finally – switch off the instrument.



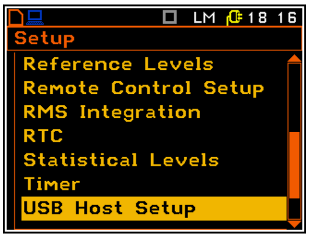
The instrument will be switched on the 1st of February at 00:00 and will be warmed up for the period of 60 seconds decrementing the counter visible on the display by one after each second.

After warming up the instrument and the pre-set **Start Delay** time, the measurements will be performed for a period of ten seconds. Then, the results will be saved in the previously named file and finally – the instrument will switch off.

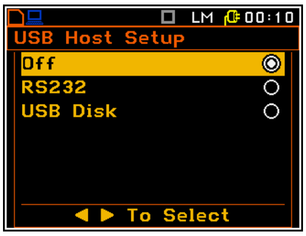
7.16 Programming the instrument’s socket named USB Host – USB Host Setup

The **USB Host Setup** enables the user to programme the functionality of the instrument’s socket named **USB Host**.

This position is hidden when the **Wave Recorder** function was activated.



<ENT>

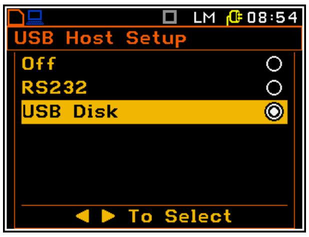


The socket **USB Host** can be used to serve as the input of the different interfaces: **RS 232** or **USB Disk**. The **RS 232** interface in the **SVAN 95x** instrument is available as a hardware option (a special interface, named as the **SV 55**, with a dedicated microprocessor has to be attached to the socket **USB Host**). An error occurs in the case of the connection to the socket the peripheral device of the different type than the selected one.

Note: *The converter **SV 55** serves as the RS 232 interface. The **SV 55** connection to the **USB Host** socket is detected and after successful detection the headphone icon is switched on. The transmission using the **SV 55** is possible only in the case when the instrument is not connected to a PC with the **USB Device** port.*

The USB host interface can be used to control the external USB memory disk (**USB Disk**) with the FAT16 or FAT32 file systems.

To activate the USB memory stich the user should switch on the **USB Disk** option in the **USB Host Setup** list (*path: <Menu> / Setup / USB Host Setup*).

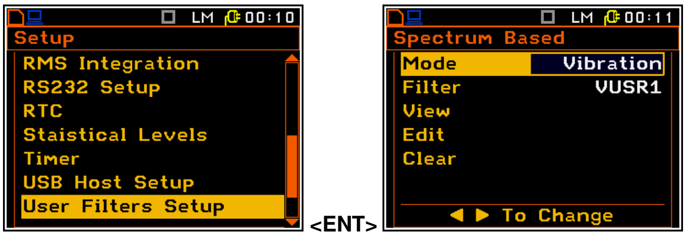


Note: *The USB disk when connected to the **USB Host** socket switches off the instrument’s internal flash memory. All file functions and remote commands are redirected to the USB disk. The internal flash memory is activated after disconnecting the USB disk from the instrument.*

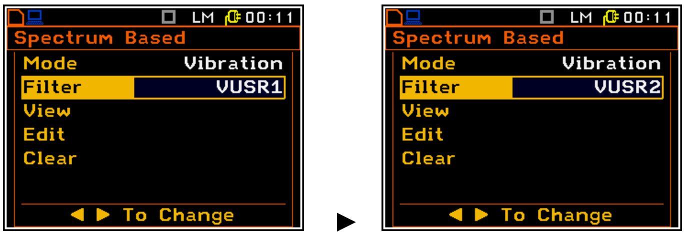
7.17 SETTING USER FILTER COEFFICIENTS FOR 1/1 OCTAVE AND 1/3 OCTAVE ANALYSIS – USER FILTERS

The **User Filters** sub-list enables the user to introduce the values of the coefficients of the user defined frequency filters. This position is active only in **1/1 Octave** and **1/3 Octave** modes. This sub-list is described in Chapter 10.

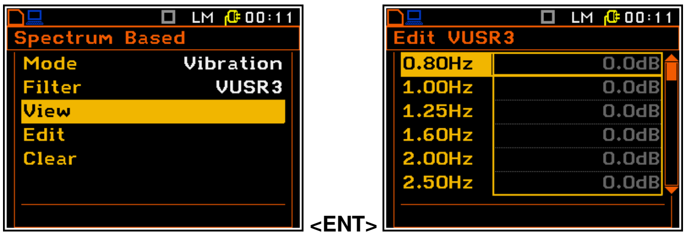
In the **Mode** position it is possible to select signal type: **Vibration** or **Sound**.



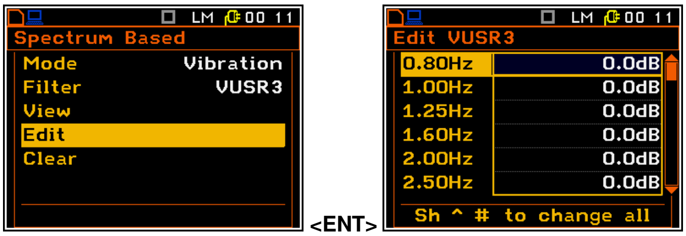
In the **Filter**, there are **VUSR1**, **VUSR2**, **VUSR3** in the case of vibration measurements and **SUSR1**, **SUSR2**, **SUSR3** in the case of sound measurements.



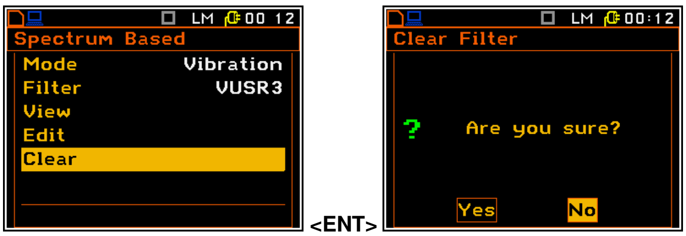
The **View** position opens the window with the table of filter coefficients.



The **Edit** position opens the window with the table of filter coefficients. All positions in this table can be edited by the user.



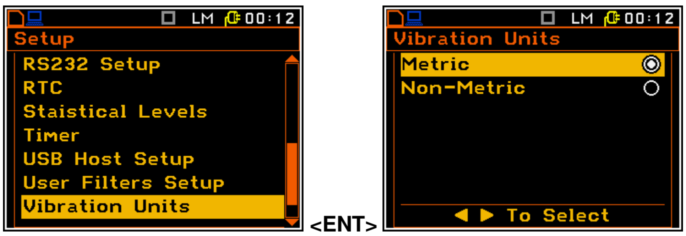
The **Clear** position opens the window with a warning before deleting the user filter coefficients. In case of a positive answer, all coefficients of the selected filter will be zeroed.



7.18 SELECTION OF THE VIBRATION UNITS – VIBRATION UNITS

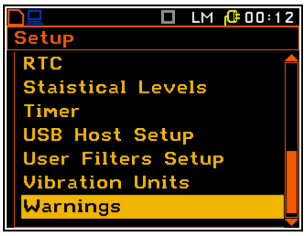
The **Vibration Units** sub-list enables the user to select the units for the Vibration measurements.

It is possible to select the **Non-Metric** units (e.g. g, ips, mil etc.) or **Metric** units (e.g. m/s^2, m/s, m etc.).

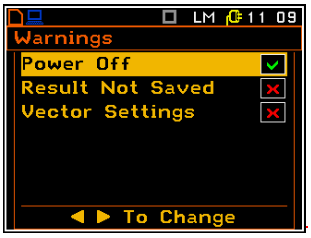


7.19 WARNINGS SELECTION – WARNINGS

The **Warnings** sub-list enables the user to select the messages, which could be displayed during the normal operation of the instrument.

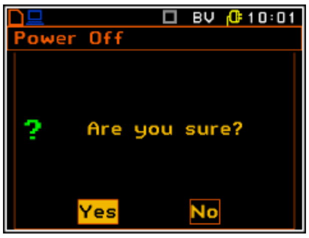


<ENT>

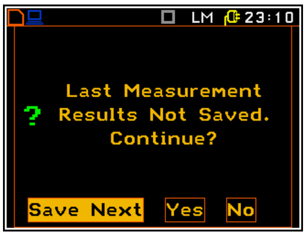


If the **Power Off** parameter is switched on, the special warning is displayed in case you attempt to turn the instrument off.

You should select **Yes** or **No** and press **<ENTER>**.



When the **Results Not Saved** position is swithed on the special warning is displayed after pressing the **<Start/Stop>** key if the result of the previous measurement was not saved in a file.

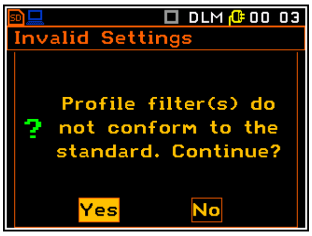


The question **Continue?** appears with the warning message. There are three options: **Yes**, **No** or **Save Next**. If **Yes** is chosen, the instrument returns to the active mode of result presentation starting the new measurement process. If **No** is chosen, the instrument returns to the active mode of measurement result's presentation without starting the new measurement process.

If **Save Next** option is chosen, then the measurement results are saved with the previous name with increased by one number.

The vector settings warning

When the **Vector Settings** position is swithed on the special warning is displayed if the **Mode** parameter, selected in the **Vector 1-3** or **Vector 4-6** lists, do not conformed to the standard.

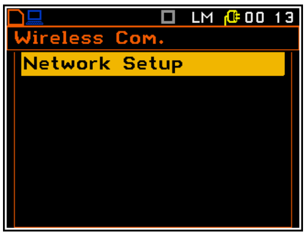


7.20 PARAMETERS OF REMOTE COMMUNICATION – WIRELESS COMMUNICATION

The **Wireless Com.** position enables the user to select the network type and set the parameters of the data transmission.

This position appears in the SVAN 958A Firmware supporting modem**.**

<ENT>



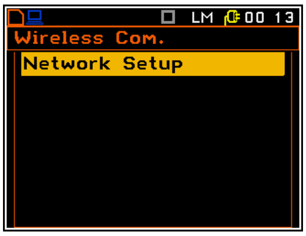
7.20.1 *Selection of the network type – Network Setup*

In the **Network Setup** window the user may select one of the three options: **Off**, **GPRS** and **Modbus**.

Depending on the settings in the **Network Setup** list the **Wireless Com.** screen has different sets of positions.

If the **Off** parameter was selected the **Network Setup** window has only one position - **Network Setup**.

If the **GPRS** network was selected the **Wireless Com.** window will have five positions: **Network Setup**, **Modem Setup**, **Modem Connection**, **SMS Options** and **E-mail Settings**.



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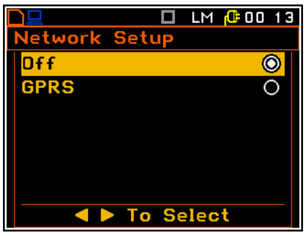

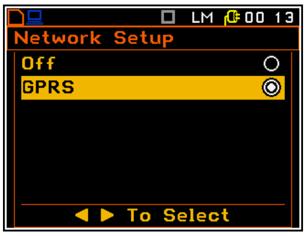

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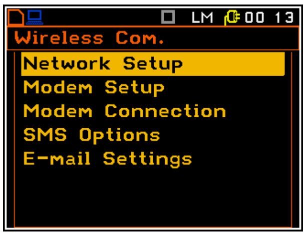
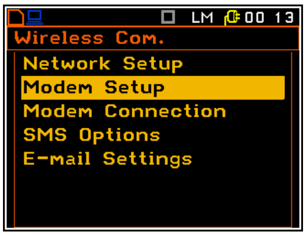


7.20.2 *Configuration of modem basic settings – Modem Setup*

The **Modem Setup** position enables the user to configure modem basic settings, such as modem type and connection types.

The **Modem Setup** window contains the following options:



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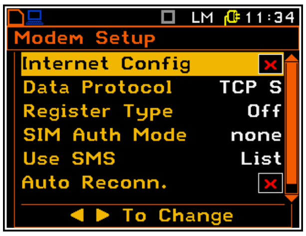
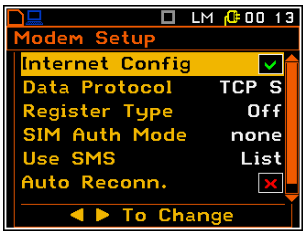
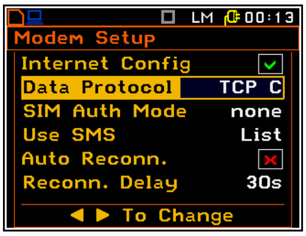
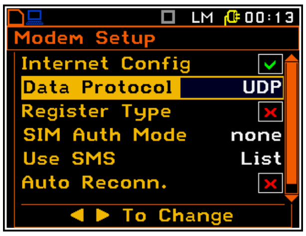


- **Internet Config** – selecting this option ensures that the device is set to automatically configure the modem. When the device is turned off with this option set, it will attempt to configure the modem after the next turn on.

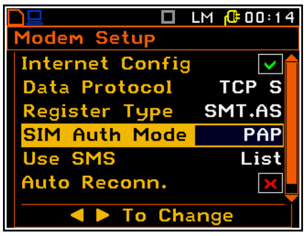


- **Data Protocol** – defines connection type for data exchange. Available types are **TCP S** (server mode), **TCP C** (client mode) and **UDP**.

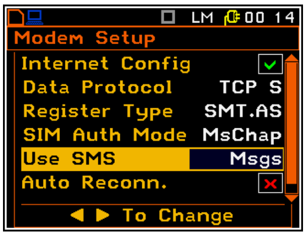




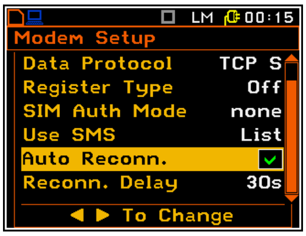
- **Register Type** – selecting this option ensures that the device instantly attempts to register the station provided the modem is already configured. Depending on selected **Data Protocol** type the values of this parameter are different. In case when **Data Protocol** type is **TCP S** the values of this parameter are: **Off**, **On** (registration using Connection Request Packets), **AS** (periodic registration on Svantek Server Address), **SMT.AS** (registration on Svantek Server Address – performed each time internet connection is initialized by the modem). In case when **Data Protocol** type is **TCP C** the **Register Type** position does not appear. In the case when **Data Protocol** type is **UDP** the **Register Type** is limited to **Off** and **On**.



- **SIM Auth Mode** – defines the method of user verification by the SIM card. Depending on the SIM card, several options are possible, some of them are recognized by the modem:
  - **none** – no verification required.
  - **PAP**
  - **CHAP**
  - **MsChap** – denotes MsChap in version 1.
- **Use SMS** – selecting this option will configure SMS service by the modem.



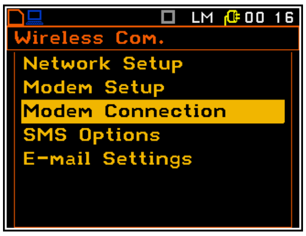
- **Auto Reconn.** – selecting this option will make the device attempt to reconnect the modem in the case of errors or sudden disconnection.
- **Reconn. Delay** – time between each reconnection attempt.



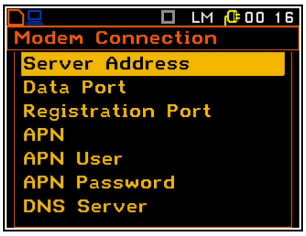
7.20.3 Setting of support modem options – Modem Connection

The **Modem Connection** position enables the user to configure several supporting options required by SIEMENS modem to establish internet connection.

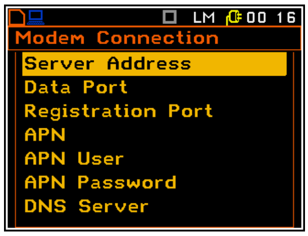
The **Modem Connection** window contains the following positions, which can be edited after pressing the **<ENTER>** key:



<ENT>



- **Server Address** – allows the user to enter up to 32 characters of either IP or domain address, where the registration data will be sent during the registration process (**Data Protocol: TCP S** or **UDP**) or to which the modem will connect to (**Data Protocol: TCP C)**.



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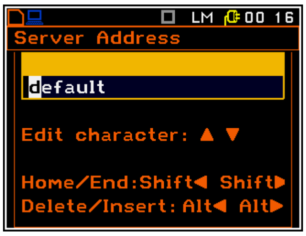
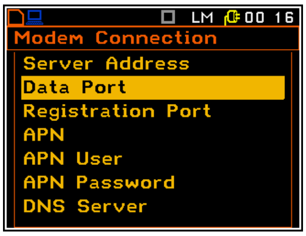
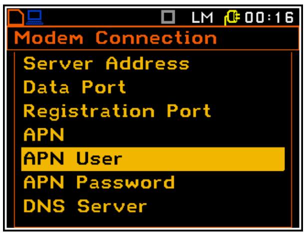


- **Data Port** – allows the user to enter up to 5 characters for the port number. This number denotes a port on which a communication socket will be configured for data exchange between remote host and the station.
- **Registration Port** – allows the user to enter up to 5 characters for the port number. This number denotes a port on which a communication socket will be configured to transmit registration packet (Register Mode: On) or exchange Http data (Register Mode: AS or SMT. AS).

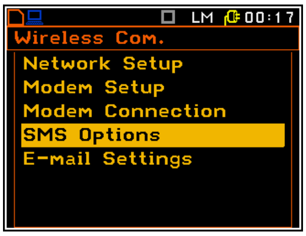




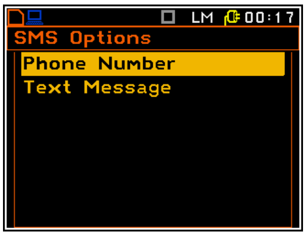
- **APN** – allows the user to enter up to 20 characters of APN name of the SIM card used with the modem.
- **APN User** – allows the user to enter up to 20 characters of user name used for verification by the SIM card used with the modem.
- **APN Password** – allows entering up to 20 characters of password used for verification by the SIM card used with the modem.
- **DNS Server** – allows the user to enter up to 15 characters of IP address of DNS server used for establishing connection with the internet. In most cases, leaving the default value of “0.0.0.0” will be sufficient, but some SIM cards may require a specific address to be entered.

7.20.4 Configuration of SMS service – SMS Option

The **SMS Options** position allows the user to configure SMS service used for alarm notification.



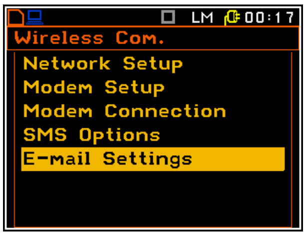
The **SMS Options** window contains the following positions, which can be edited after pressing the **<ENTER>** key:



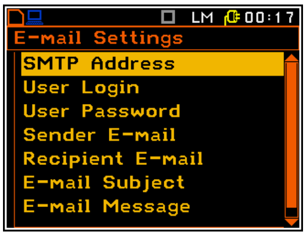
- **Phone Number** – allows the user to enter up to 20 characters of the phone number where the text messages will be sent.
- **Text Message** – allows the user to enter up to 20 characters of additional text, which will be appended into a standard alarm message template.

7.20.5 Configuration of e-mail service – E-mail Settings

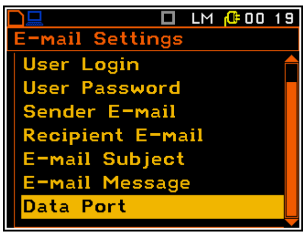
The **E-mail Settings** position allows the user to configure the e-mail service used for alarm notification.



The **E-mail Settings** window contains the following positions, which can be edited after pressing the **<ENTER>** key:



- **SMTP Address** – allows the user to enter up to 32 characters of SMTP server address which will be used to send e-mail messages.
- **User Login** – allows the user to enter up to 20 characters of user login text used to establish verified connection with SMTP server.
- **User Password** – allows the user to enter up to 20 characters of user password text used to establish verified connection with SMPT server.



- **Sender e-mail** – allows the user to enter up to 48 characters of e-mail address from which the e-mail message will be sent.
- **Recipient e-mail** – allows the user to enter up to 48 characters of e-mail address to which the e-mail message will be sent.
- **E-mail Subject** – allows the user to enter up to 20 characters of the message's subject.
- **E-mail Message** – allows the user to enter up to 20 characters of additional text which will be appended to standard e-mail message

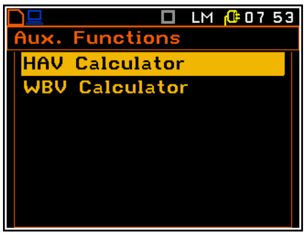
template used for alarm notification.

- **Data Port** – allows the user to enter up to 5 characters for the port number. This number denotes a port on which a communication socket will be configured for data exchange between remote host and the station.

8 CALCULATION OF DOSE PARAMETERS – Auxiliary Functions

The **Auxiliary Functions** list is used to calculate the various parameters, which are mainly dedicated for the control of the vibration measurements. This sub-list contains two positions: **HAV Calculator** and **WBV Calculator**, which are used to calculate the characteristic parameters for Hand-arm and Whole-body measurements.

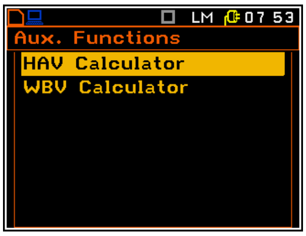
<ENT>



It enables to calculate the **HAV** and **WBV** value, **Partial Results** (partial exposure) and **Daily Results** (daily exposure).

8.1 CALCULATION OF HAND-ARM OR WHOLE-BODY VIBRATION DOSE

The **HAV Calculator** / **WBV Calculator** list is used to calculate the various Hand–Arm / Whole-Body parameters which are mainly dedicated for the control of the vibration dose. There are calculated: the **Partial EAV/ELV**, **Partial Exposure** and **Daily Exposure** of vibration. All results are calculated according to the standard selected in the **Standard** position (*path: <Menu> / Input / Auxiliary Setup / HAV/WBV Dose Setup).*

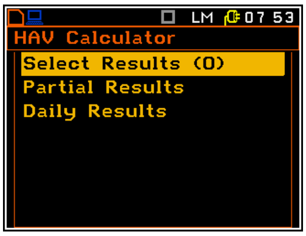


The **HAV Calculator** / **WBV Calculator** list consists of the following positions:

Select Results that enables the user to select files of measurement results with hand-arm / whole-body data;

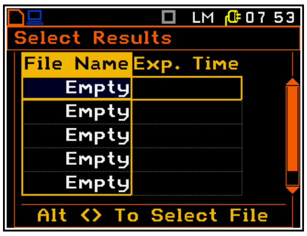
Partial Results that displays the result of exposure;

Daily Results that displays the result of daily exposure.

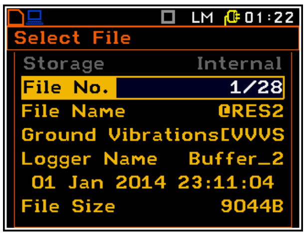


Selection of the file with result of measurement

The **Select Results** list is used to load data file from the FLASH DISC (memory of the instrument). By pressing at the same time **<Alt>** and ► keys the user can select the files to be used for calculation of the dose value.



<Alt>/►

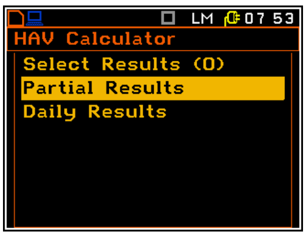


It is possible to select 6 files with hand-arm / whole-body results. The **Exp. Time** defines the period during which the measurement results are extrapolated.

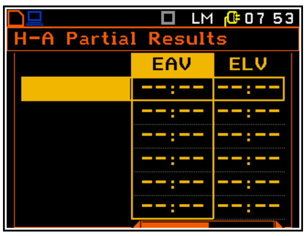
The figure in the brackets on the right side of the **Select Results** indicates the number of selected files.

Selection of the partial results

The **Partial Results** position is used to display partial results, for each file. The results are displayed in two columns – the first column for **EAV** results and the second for **ELV** results.

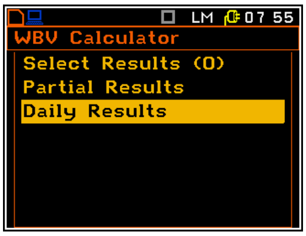


<ENT>



Selection of the daily exposure

The **Daily Results** position is used to display **Daily Exposure** results, calculated from all partial results, saved in selected files. The result is calculated relatively to **Exposure Time**.



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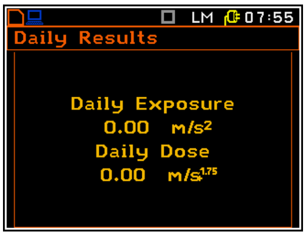

9 PRINTING REPORTS – Report

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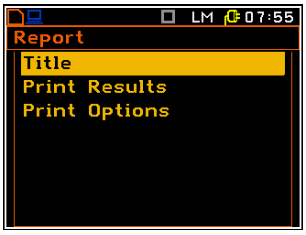


The printed reports of the Sound or Vibration measurement results in the predefined format can be obtained by means of the **Report** list. The **Report** list contains the following elements:

Title enables the user to edit the text added to the file and to the report to be printed;

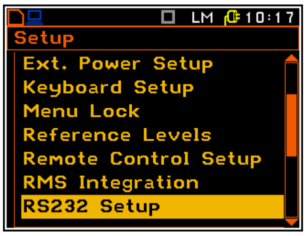
Print Results enables the user to print out the measurement results on the default printer or to send the measurement results to a PC using SvanPC software and USB interface;

Print Options enables the user to determine the options of the report.

In order to obtain the report the user has to connect the instrument to the printer's RS 232 port using the **SV 55** RS 232 interface. This hardware interface is hidden in the Cannon type, 9-pin RS 232 plug-in. On the other end of the **SV 55** interface, which itself looks like a cable, there is the USB Host plug-in. This plug-in should be placed in the USB Host socket of the instrument.

It is also possible to connect the instrument to the USB port of a PC using the proper cable. Measurement results can be easy downloaded to any PC (using the **SC 16** USB interface cable and SvanPC software) and printed out on the printer attached to a PC.

Note: *The converter* ***SV 55*** *serves as the RS 232 interface. The* ***SV 55*** *connection to the* ***USB Host*** *socket is detected and after successful detection the headphone icon is switched on. The transmission with the use of* ***SV 55*** *is possible only when the instrument is not connected to a PC with the* ***USB Device*** *port.*



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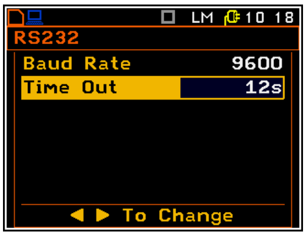


In the **RS232** list (*path: <Menu> / Instrument / RS232*) the user has to select the proper speed of the transmission (**Baud Rate**) and the parameter called **Time Out**.

The RS 232 interface transmission (**Baud Rate**) speed can be selected from the following available values: **1200** (bits / second), **2400** (bits / s), **4800** (bits / s), **9600** (bits / s), **19200** (bits / s), **38000** (bits / s), **57600** (bits / s) or **115200** (bits / s).

The transmission speed should correspond to the same one selected in a printer. The other RS 232 transmission parameters are fixed to **8 bits for data**, **No parity** & **1 Stop bit**. The default value of the **Time Out** parameter is equal to one but it can be too short period for the printers, which are not fast enough. In such cases this parameter may have to be increased.

The description of the **SV 55** pin-outs is given in App. C. Printers with the different connections on the RS 232 socket require the special, individual RS 232 – RS 232 cable that should fulfil the suitable wiring crossover connections.

Printers, in which only the Centronics interface is available instead of the RS 232, can be connected to the instrument by means of the **SV 52** RS 232 – Centronics interface.

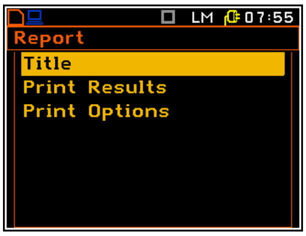
Printers, which have only a USB interface, are currently not driven by the instrument.

Note: *Switch the power off before connecting the instrument to any external device (e.g. a printer or a Personal Computer).*

Note: *All reports are printed in the character format using the ASCII set on either A4 or A5 size paper.*

9.1 EDIT THE USER TITLE OF THE REPORT – TITLE

The **Title** position enables the user to edit the text added to the file and to the report to be printed. The text editing is performed in the special window which is opened by pressing the **<ENTER>** key.



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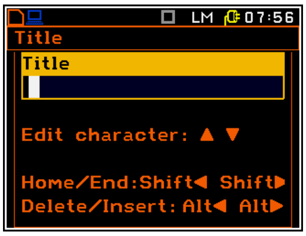
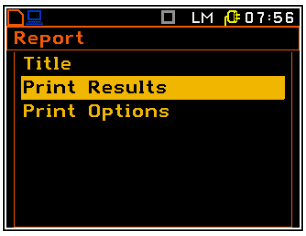


9.2 PRINTING THE MEASUREMENT RESULTS – PRINT RESULTS

The **Print Results** position enables the user to print the report on the attached printer or to send out the report to a PC using the SvanPC software and the USB interface.

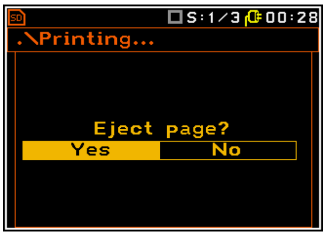


After pressing the **<Enter>** key the instrument checks its current state. If the measurements are running, printing is not possible and the appropriate message is displayed. If no results were recorded the next message is displayed.

If a measurement has been already performed and results are available, the presented message is displayed.

The data are transferred from the instrument to the attached printer, while the message is displayed. The instrument returns to the **Report** list after transferring all data.

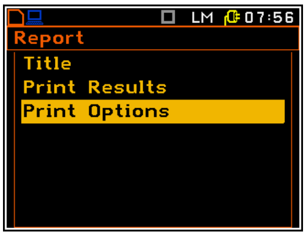
The following confirmation question is displayed after the printing, if the **Prompt** parameter was selected in the **Eject Page** position (*path: <Menu> / Report / Options*). The user has to answer in this case if the paper in the printer has to be ejected to the new page.



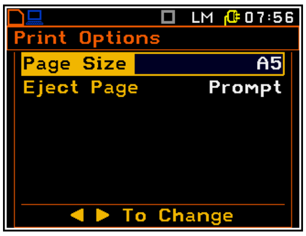
The message about the time limit is displayed if the printer (or a PC) is not connected or there is any other reason that it does not receive the data. The instrument waits for the reaction of the user (any key should be pressed except **<Shift>** and **<Alt>**) and after pressing a key it returns to the **Report** list.

9.3 SELECTION THE PRINTING OPTIONS – PRINT OPTIONS

The **Options** list enables the user to select the format of the listing (**Page Size**) and the way the paper is ejected in the printer (**Eject Page**).



<ENT>



Selection of the format of the print out

The **Format** position enables the user to select the format of the listing (**A4** and **A5** options are available).

Controlling the paper ejection after print out

The **Eject Page** position enables the user to control the ejection of the paper after the listing is done. The following options are available: **Prompt** (the instrument asks whether to eject the page after printing report, statistics or catalogue), **Auto** (after printing, the paper is ejected automatically) and **None** (the paper is not ejected after printing). In particular, it is possible to have one result after another using the **None** or **Prompt** options.

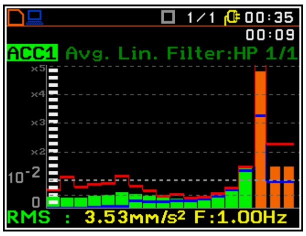
The request is displayed after printing the measurement results if the **Prompt** parameter was selected in the **Eject Page** position. The user has to answer in this case if the paper in the printer has to be ejected to the new page. After pressing **<ENTER>** the instrument returns to the **Report** list.

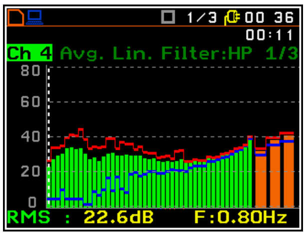
The message about the time limit is displayed if the printer is not connected or there is any other reason that it does not eject a paper. The instrument waits for the reaction of the user (any key should be pressed except **<Shift>**) and after pressing a key it returns to the **Report** list.

10 1/1 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 and, in addition, 1/1-octave or 1/3-octave analysis is performed in parallel with the level meter measurements. All digital band-pass filters (fifteen 1/1-octave filters with centre frequencies from 16 kHz down to 1 Hz and forty five 1/3-octave filters with centre frequencies from 20 kHz down to 0.80 Hz; in base two system) work in real-time with the weighting filters (**LIN**, **A**, **B**, **C** or **HP**) and the linear RMS detector.

The results of 1/1-octave and 1/3-octave analysis (also called spectrum analysis) can be examined by the user on a display in the **Spectrum** presentation mode. The availability of this mode can be switched on or off by the user (*path: <Menu> / Display / Display Modes*).



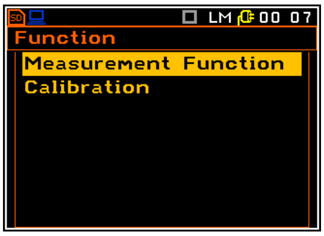


1/1-octave and 1/3-octave spectrum for all centre frequencies of pass-band filters together with three **Total** values measured with weighting filters selected by the user are presented in the **Spectrum** view.

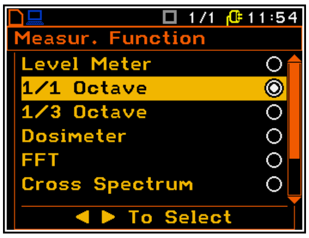
Note: *Total RMS (LEQ) results are measured with their own weighting filters regardless of settings made for channels in the* ***Input*** *section (path: <Menu> / Input / Channels Setup / Channel x)****.*** *Additionally, spectra are always linearly averaged. Thus, the Total values for the 1/1-octave or 1/3-octave analysis can be different from similar main results (if* ***RMS Integration*** *was set as* ***Exponential****).*

10.1 SELECTING 1/1 OCTAVE OR 1/3 OCTAVE ANALYSIS FUNCTION

In order to select the **1/1 Octave** or **1/3 Octave** analysis function the user has to enter the **Function** list by pressing the **<Menu>** key, then select the **Measurement Function** position and open it by pressing **<ENTER>**. In the **Measur. Function** list the user has to highlight the **1/1 Octave** or **1/3 Octave** option, mark it by ► key and then press **<ENTER>**.



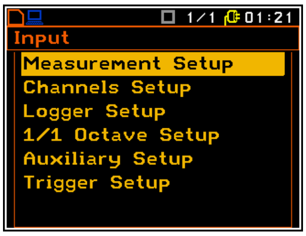
<ENT>



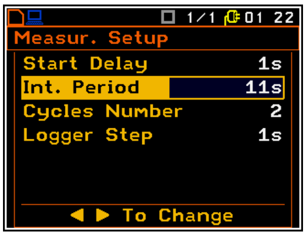
Note: *It is not possible to change the current function while a measurement is taking place. In this case the instrument displays for about 2 seconds the text* ***"Measurement in Progress"****. In order to change the current measurement function the instrument must be stopped!*

10.2 CONFIGURING 1/1- OR 1/3-OCTAVE ANALYSER

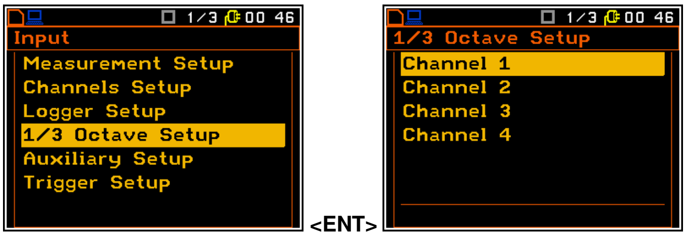
The execution of **1/1 Octave** or **1/3 Octave** analysis depends on settings made in the **Measurement Setup** list. The Spectra are averaged during the period defined by **Int. Period** and repeated as defined in the **Cycles Number** position.



<ENT>



The **1/1 Octave Setup** (**1/3 Octave Setup**) position appears in the **Input** list when the **1/1 Octave** (**1/3 Octave**) function is selected in the **Measurement Function** list and enales the user to select the parameters for 1/1 and 1/3 octave spectrum calculation for each channel: weigting filter and frequency band.

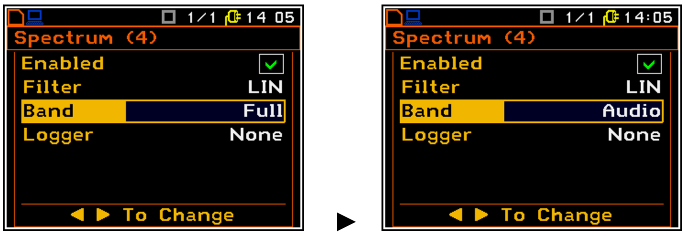


The activation of spectrum calculation is made by switching on the **Enabled** position.

In case of **Vibration** input the **Filter** and **Band** parameters cannot be changed and the default values are **HP** and **Full** accordingly.

In case of **Sound** input the **Filter** position can be set as: **HP**, **LIN**, **A** and **C**. In case of **Vibration** input only **HP** filter is available.

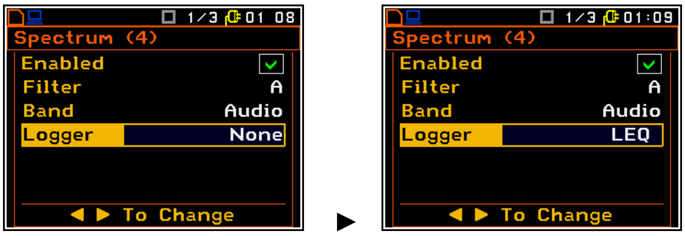
The frequency characteristics of the filters mentioned above are given in Appendix C.



The **Band** position enables the user to select the band in which **1/1 Octave** or **1/3 Octave** analysis of the signal has to be performed. Available values of the bands of the analysis are as follows: **Audio**, **Full** in case of sound measurements, **Full** in case of vibration measurements.

The results of **1/1 Octave** or **1/3 Octave** analysis (spectrum) can be saved in the logger's file of the instrument.

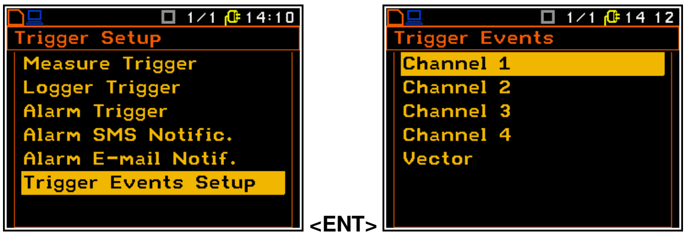
The **Logger** position enables the user to save the spectrum if **RMS** value is selected in case of **Vibration** input, and **RMS** or **LEQ** (with **A** filter) value is selected in case of **Sound** input.



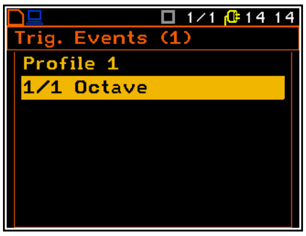
10.3 Selection of 1/1 Octave and 1/3 Octave bandpass results as triggering source

For the **1/1 Octave** or **1/3 Octave** functions it is possible to define trigger condition for logger, event, wave and alarm triggers, based on the selected spectrum band levels.

The trigger conditions for the above applications can be programmed in the **Trigger Events Setup** list, which enables the user to define "events" for: **Logger Trigger**, **Alarm Trigger**, **Alarm SMS Notific.** and **Alarm E-mail Notif.**, using the result of 1/1 or 1/3 analysys for any channel and profile as well as **Vector**.



For the **1/1 Octave** or **1/3 Octave** functions additional **1/1 Octave** or **1/3 Octave** position appears in the **Trigger Events** list. These positions enable the user to define additional trigger events with the use of result of 1/1 or 1/3 analysys.



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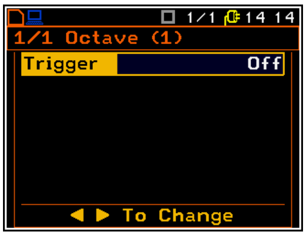
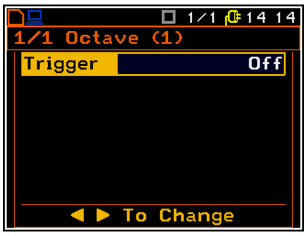
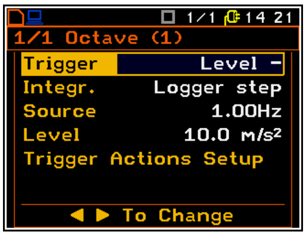


The **Trigger** position enables the user to switch the trigger on and select the trigger type: **Level -**, **Level +**, **Slope -**, **Slope +**, **Grad -** and **Grad +**.

In each interval of the measurement, defined by **Integr**, the triggering condition is checked and:



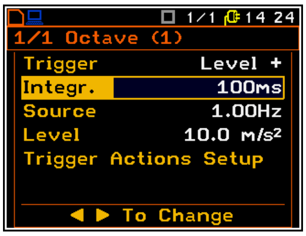
▶



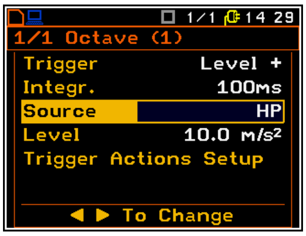
- if **Level +** is selected, the triggering condition is fulfilled only when **Source** has the greater value than determined by **Level**, otherwise the triggering condition is not fulfilled.
- if **Level –** is selected, the triggering condition is fulfilled only when **Source** has the lower value than this determined by **Level**, otherwise the triggering condition is not fulfilled.
- if **Slope +** is selected, the triggering condition is fulfilled only when the rising value of **Source** is passing the level determined by **Level**.
- if **Slope –** is selected, the triggering condition is fulfilled only when the falling value of **Source** is passing the level determined by **Level**.
- if **Grad +** is selected, the triggering condition is fulfilled only when the signal has the greater level than determined by **Level** and the gradient of the signal is greater than determined by **Gradient**. Otherwise the triggering condition is not fulfilled.
- if **Grad -** is selected, the triggering condition is fulfilled only when the signal has the lower level than this determined by **Level** and the gradient of the signal is lower than determined by **Gradient**. Otherwise the triggering condition is not fulfilled.

Step for checking the triggering condition

The **Integr.** position enables the user to select time (integration period) for condition evaluation: equal to **Logger step** (*path: <Menu> / Input / Data Logging / Logger Setup*), **100ms**, **1.0s**, and equal to current measurement time calculated from measurement start - **Meas. Time** (*path: <Menu> / Input / Measurement Setup*) and **Int. Period** (*path: <Menu> / Input / Measurement Setup*). If **Meas. Time** is selected the triggering conditio is checked every second and RMS is averaged from the begining of the measurement (**Meas. Time** is displayed in the right upper corner of the display right under the real Time Clock).

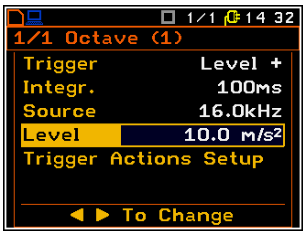


The trigger condition can be defined for the selected RMS result in the **Source** position calculated for **1/1 Octave** filters (**1.00 Hz**, **2.00 Hz**, **4.00 Hz**, **8.00 Hz**, **16.0 Hz**, **31.5 Hz**, **63.0 Hz**, **125 Hz**, **250 Hz**, **500 Hz**, **1.00 kHz**, **2.00 kHz**, **4.00 kHz**, **8.00 kHz** and **16.00 kHz**), or **1/3 Octave** filters (**0.80 Hz**, **1.00 Hz**, **1.25 Hz**, **1.60 Hz**, **2.00 Hz**, **2.50 Hz**, **3.15 Hz**, **4.00 Hz**, **5.00 Hz**, **6.30 Hz**, **8.00 Hz**, **10.0 Hz**, **12.5 Hz**, **16.0 Hz**, **20.0 Hz**, **25.0 Hz**, **31.5 Hz**, **40.0 Hz**, **50.0 Hz**, **63.0 Hz**, **80.0 Hz**, **100 Hz**, **125 Hz**, **160 Hz**, **200 Hz**, **250 Hz**, **315 Hz**, **400 Hz**, **500 Hz**, **630 Hz**, **800 Hz**, **1.00 kHz**, **1.25 kHz**, **1.60 kHz**, **2.00 kHz**, **2.50 kHz**, **3.15 kHz**, **4.00 kHz**, **5.00 kHz**, **6.30 kHz**, **8.00 kHz**, **10.0 kHz**, **12.5 kHz**, **16.0 kHz** and **20.0 kHz**), and also **Total Level** results with appropriate filters: **A**/**C**/**Lin** for Sound channel and **HP**/filter of Profil(1)/filter of Profil(1) for Vibration channel.



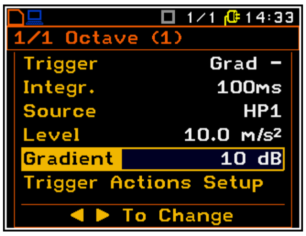
Threshold definition

The **Level** position enables the user to select the value of threshold for triggering condition in therange of **60 dB** to **200 dB** for Sound input and of **1.00 mm/s²** to **10.0 km/ s²** for vibration input. The vibration units can be set in the **Display Scale** window (*path: <Menu> / Display / Display Setup / Channel x / Display Scale).*



Speed of the triggering signal change

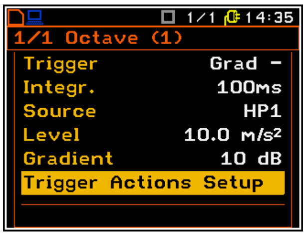
The **Gradient** position appears when the **Grad -** or **Grad +** trigger is chosen. The speed of the triggering signal changes can be set from **1 dB** to **100 dB** range. Speed is defined as **dB** per **Logger Step**.



Selecting trigger actions

The **Trigger Action Setup** position enables the user to select the trigger actions for defined condition: **Alarm**, **Send SMS**, **Send E-mail** and **Logger**.

If selected the trigger action will appear in the **Logger Events**, **Alarm Events**, **SMS Alarm Conditions** and **E-mail Alarm Conditions** lists by default.



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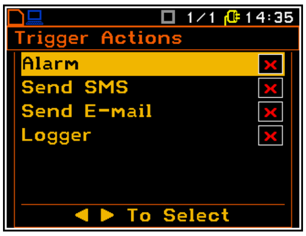

10.4 DISPLAY OPTIONS IN 1/1 OCTAVE AND 1/3 OCTAVE ANALYSIS MODE

The **Display Setup** list is used for setting the various parameters which are mainly dedicated for the control of the spectrum view. The following lists contain the elements that influence the presentation of the results of **1/1 Octave** and **1/3 Octave** analysis:

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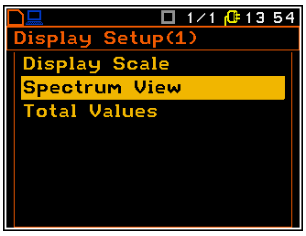
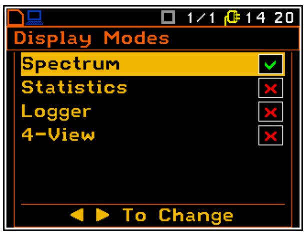


Display Modes	enables the user to switch on the spectrum presentation mode;
Display Setup / **Channel x**	enables the user to select options for spectrum presentation:
Display Scale	to change the scale of the vertical axis of the graphical presentation;
Spectrum View	to choose the type of the spectrum to be presented;
Total Values	to select parameters for **Total Values** presentation.

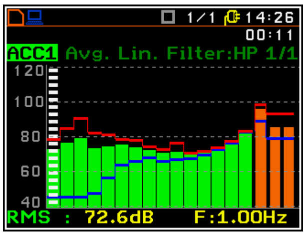
10.5 PRESENTATION OF 1/1 OCTAVE AND 1/3 OCTAVE ANALYSIS RESULTS

The **Spectrum** position of the **Display Modes** list is accessible with **1/1 Octave** and **1/3 Octave** functions.

When **Spectrum** mode is switched on the measurement screen in **Spectrum** visualisation mode is as shown here.

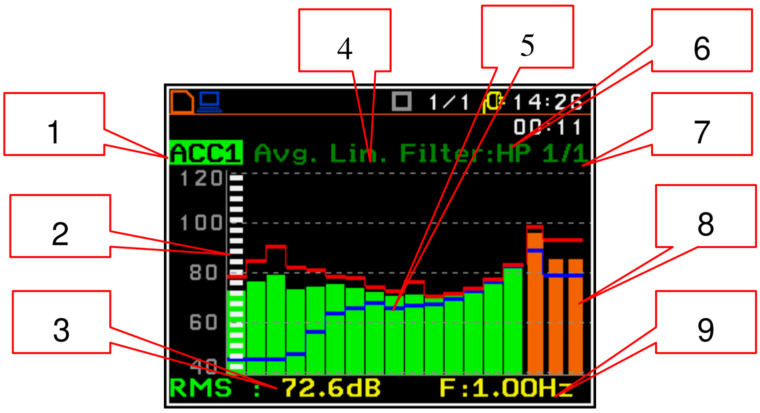


=>

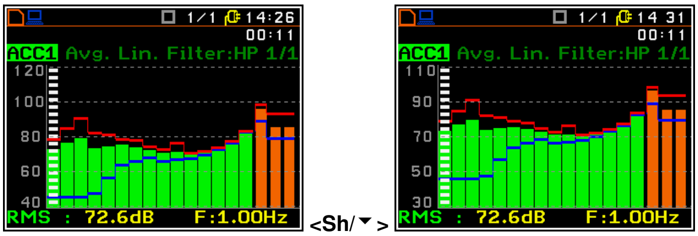


Field description of the Spectrum view

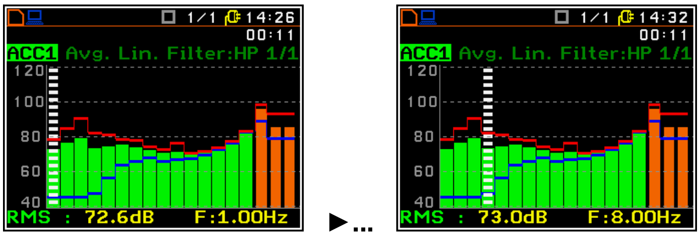
1. Spectrum type/Channel number
2. Cursor position
3. Value for the cursor position
4. Used averaging
5. Spectrum plot
6. Frequency weighting filter
7. Type of spectrum
8. Total values
9. Central frequency for the cursor position.



The user may shift the Y-axis during the spectrum presentation by means of the **<Shift>** and ▲ (or the **<Shift>** and ▼) keys.

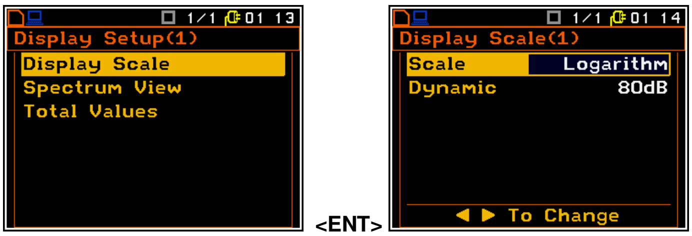


The user may change the cursor position by means of the ◄ / ► key. The frequency and appropriate value are presented in the line below the plot.



10.6 Setting the scale of the spectrum results presentation – Display Scale

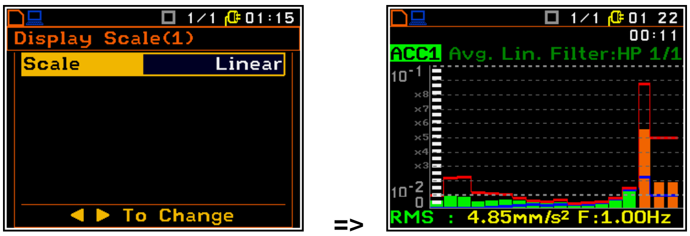
The **Display Scale** sub-list enables the user to change the Y-axis scale in the spectrum presentation mode for each channel separately.



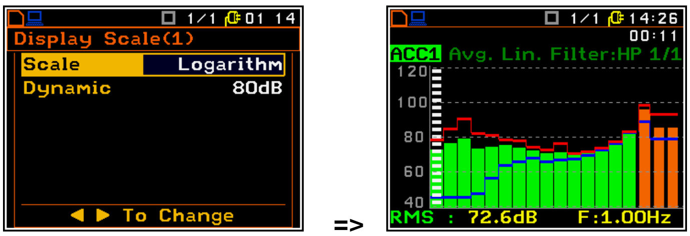
Scale of the measurement results presentation

Two options are available for the **Scale** position: **Linear** and **Logarithm**.

In case of **Linear** the Y-scale of spectrum presentation is linear.

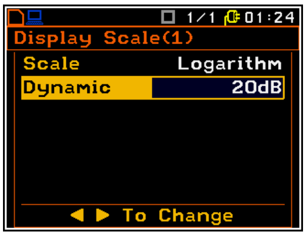


In case of **Logarithm** the Y-scale of spectrum presentation is logarithmic and the measurement results are expressed in decibels (the results are related to the values set up in the **Reference Level** sub-list (*path: <Menu> / Auxiliary Setup / Reference Levels*).

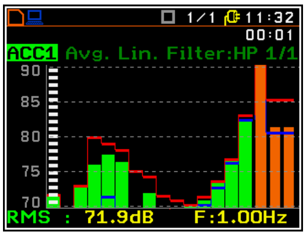


Scaling the vertical axis

If **Scale** is set to **Logarithmic** then the **Dynamic** position enables the user to select the required dynamic range scaling of the graphical presentation mode. The user can obtain double, four and eight times expansion of the vertical axis (the default vertical axis corresponds to **80 dB**, after expansion it corresponds to **40 dB**, **20 dB** and **10 dB** – respectively).

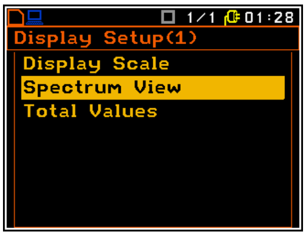


=>



10.7 SETTING PARAMETERS OF THE SPECTRUM PRESENTATION – SPECTRUM VIEW

In the **Spectrum View** list the user can set up the screen view in the spectrum presentation mode and to set: spectrum type to view (**View**), type of spectrum for vibration input (**Type**), applied filter (**Filter**), minimum and maximum spectrum (**Minimum** and **Maximum**).



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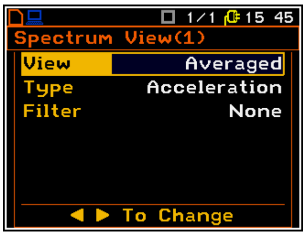
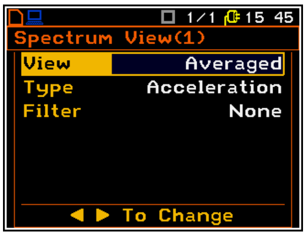
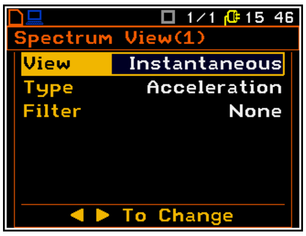


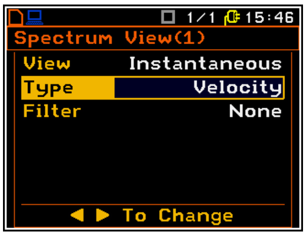
In the **View** position the user can select the different type of spectrum such as: **Averaged** or **Instantaneous**.

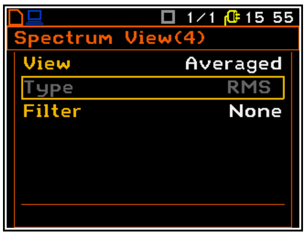




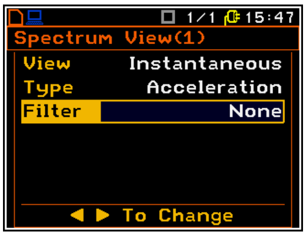
The spectrum **Type** can be selected only for vibration inputs and available values are: **Acceleration**, **Velocity** and **Displacement**.

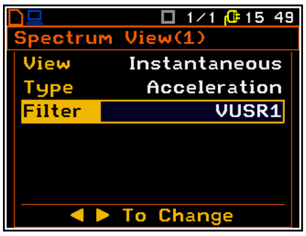
For sound input this position cannot be changed and is always **RMS**.





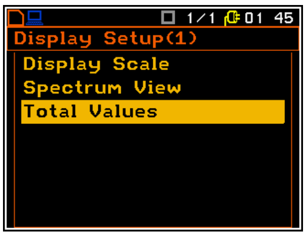
Filter position defines additional user defined weighting filter to be imposed on spectrum, measured with defined **HP**, **LIN**, **A** or **C** filters. As soon as any user filter is defined for **Total Values** calculation (*path: <Menu> / Display / Display Setup / Channel x / Total Values*) this user filter can be selected in the **Filter** position.



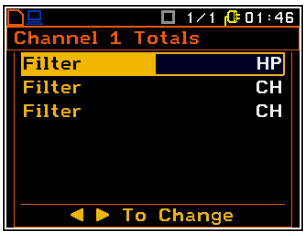


10.8 SETTING PARAMETERS FOR TOTAL VALUES – TOTAL VALUES

The **Total Values** position enables the user to program parameters for the calculation of total values. There are three total values calculated for each channel and for all three total values it is possible to define weighting filter, type of signal measurement (acceleration, velocity or displacement) as well as calibration factor.

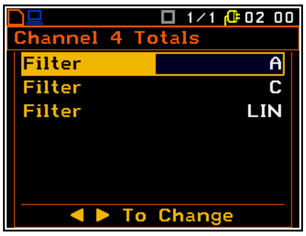


<ENT>

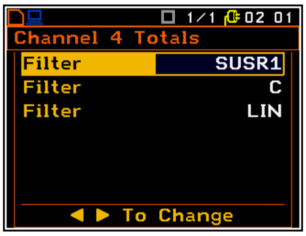


By default:

- For vibration input **HP** filter is denote for the first Total value. Second and third Totals have same filters as were set up for channel (**CH**) in the **Channels** list (*path: <Menu> / Measurement / Channels*).
- For sound input **A** filter is assigned to the first Total value, **C** filter – for the second Total value and **LIN** – for the third Total value.



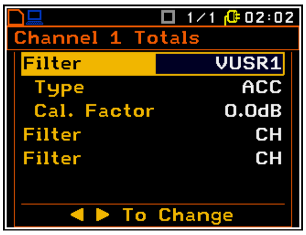
It is also possible to select three user filters: **FUSR1**, **FUSR2** and **FUSR3** for vibration input as well as **SUSR1**, **SUSR2** and **SUSR3** for sound input. When user filter for vibration input is selected, two additional positions appear: **Type** and **Cal. Factor**.



In the position **Type** the user can define the type of integration to present the measured signal as acceleration (**ACC**), velocity (**VEL**) or displacement (**DIL**).

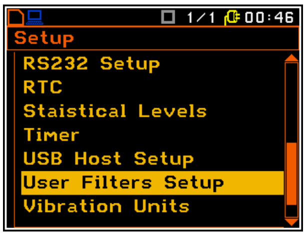
In the **Cal. Factor** position the user can define any additional calibration factor which will be applied to the calculation of Total value.

The same settings can be performed for Total 2 and Total 3 values.

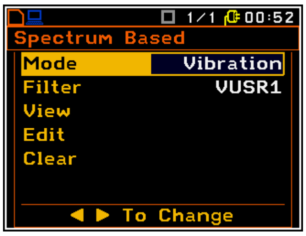


10.9 Setting user filter coefficients for 1/1 and 1/3 Octave – User Filters Setup

The **User Filters Setup** position enables the user to introduce the values of the user frequency filters coefficients. This position is active only in **1/1 Octave** and **1/3 Octave** modes. The **User Filters Setup** position opens the list in which the user can view, edit or clear the filter coefficients for selected user filter **VUSR1**, **VUSR2** and **VUSR3** for vibration inpun (**Mode**=**Vibration**) or **SUSR1**, **SUSR2** and **SUSR3** for sound inpun (**Mode**=**Sound**).



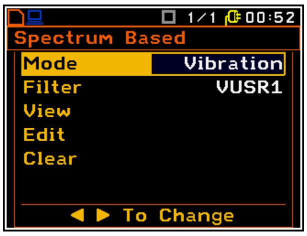
<ENT>



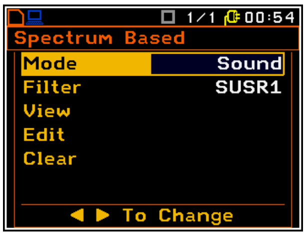
The **Mode** position enables the user to select the measurement mode of the instrument: **Vibration** or **Sound**.

With each mode a three user defined filters (**Filter**) are connected:

- **VUSR1**, **VUSR2** and **VUSR3** for vibration inpun and
- **SUSR1**, **SUSR2** and **SUSR3** for sound inpun.

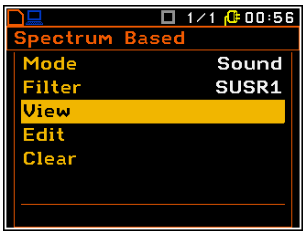


►



The **View** position opens the window with the table of filter coefficients.

The values of these positions cannot be changed.



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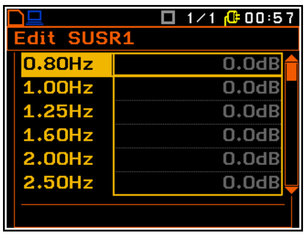
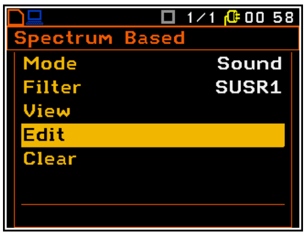
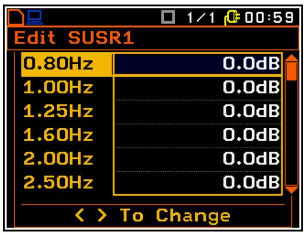


The **Edit** position opens the list with the table of filter coefficients. All positions in this table can be edited by the user.



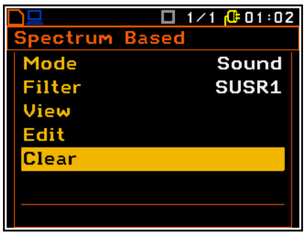
<ENT>



The opened list contains the centre frequencies of the filters and their coefficients:

- **0.80 Hz:** available values for 0.8 Hz centre frequency filter: **-100.0dB ... 100.0dB**
- **1.00 Hz:** available values for 1Hz centre frequency filter: **-100.0dB ... 100.0dB**
- **...**
- **20.0kHz:** available values for 20.0 kHz centre frequency filter: **-100.0dB ... 100.0dB**

The **Clear** position opens the window with a warning before deleting the user filter coefficients. In case of a positive answer, all coefficients of the selected filter will be zeroed.



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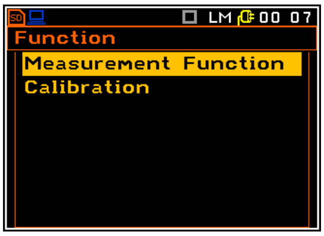
11 DOSIMETER

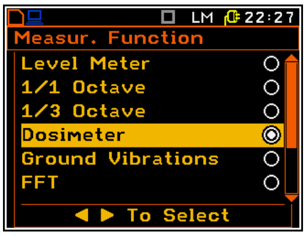
The instrument can operates as an acoustic **Dosimeter**, which function is supplementary to the **Level Meter** function. In the **Dosimeter** mode, basic dose results (**DOSE**, **D_8h** and **LAV**, **E**, **E_8h**) are calculated in parallel with the **Level Meter** results for channels with the Sound inputs.

11.1 SELECTING DOSIMETER FUNCTION

To select the **Dosimeter** function, open the **Measurement Function** screen, select the **Dosimeter** item, mark it with the ► key and press **<ENTER>**.



<ENT>

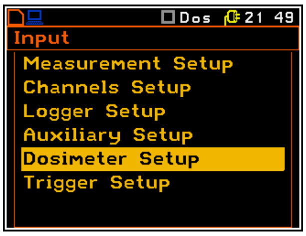


***Note:** It is not possible to change the current function while a measurement is taking place. In this case the instrument displays for about 2 seconds the text **"Measurement in Progress"**. In order to change the current measurement function the instrument must be stopped!*

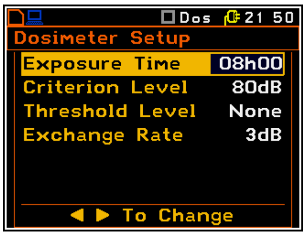
11.2 SELECTING DOSIMETER PARAMETERS – DOSIMETER SETUP

The **Dosimeter Setup** is accessible in the **Input** when the acoustic **Dosimeter** function is selected.

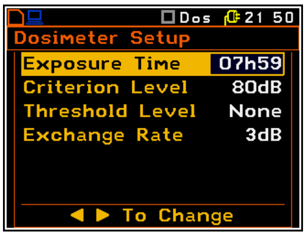
The **Dosimeter Setup** consists of the parameters, which influence the calculation of the dosimeter results: **Exposure Time**, **Criterion Level**, **Threshold Level** and **Exchange Rate** (the definitions of the dosimeter results are given in App. D).



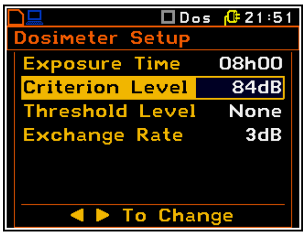
<ENT>



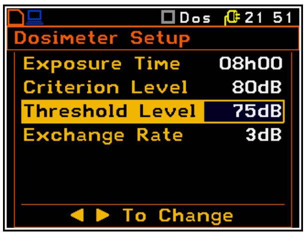
The **Exposure Time** position enables the user to set the desired value of the exposure time that is used for the calculation of different **Dosimeter** functions as well as **LEPd** that is also calculated in the **Level Meter** mode (cf. App. D for the definitions of the functions). The **Exposure Time** values are within the range [00h01, 08h00].



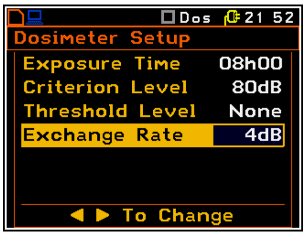
The criterion sound level influences the calculations of the **DOSE** and **D_8h** results. The **Criterion Level** line is accessible after pressing the ▲, ▼ key in the **Dosimeter Setup** list. The available values are as follows: **80 dB**, **84 dB**, **85 dB** or **90 dB**.



The threshold level influences the calculations of the dosimeter results, namely **DOSE**, **D_8h** and **LAV**. The **Threshold Level** line is accessible after pressing the ▲ / ▼ key in the **Dosimeter Setup** list. The available values are as follows: **None**, **75 dB**, **80 dB**, **85 dB** or **90 dB**.



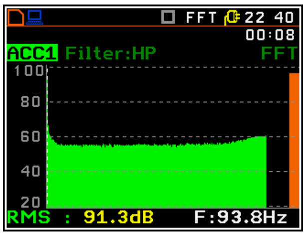
The exchange rate influences the calculations of the dosimeter results, namely **DOSE**, **D_8h** and **LAV**. The exposure rate equal to three complies with ISO R 1999 “Assessment of Occupational Noise Exposure for Hearing Conservation Purposes”, while equal to five - complies with the American “Occupational Safety and Health Act” – OSHA. The **Exchange Rate** line is accessible after pressing the ▼ key in the **Dosimeter Setup** widow. The available values are as follows: **2**, **3**, **4** or **5**.



12 FFT ANALYSER

The instrument operates as the **FFT** analyser in a very similar way to the level meter. Moreover, the **FFT** analysis is performed in parallel with the level meter measurements.

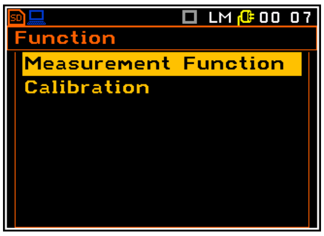
The results of **FFT** analysis (spectra) can be examined by the user on a display in the **Spectrum** presentation mode. The availability of this mode can be switched on or off by the user (*path: <Menu> / Display / Display Modes)*.



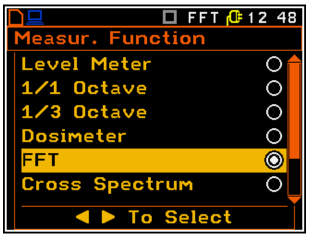
FFT spectra with the single **Total** overall value measured with preselected frequency weighting filter and windowing are presented in the **Spectrum** mode. The read-out of the value of interest in the spectrum can be done using the vertical cursor.

12.1 SELECTING FFT ANALYSIS MODE

In order to select the **FFT** function the user has to enter the **Function** list by pressing the **<Menu>** key, then select the **Measurement Function** position and open it by pressing **<ENTER>**. In the **Measur. Function** list the user has to highlight the **FFT** option, mark it by ► key and then press **<ENTER>**.



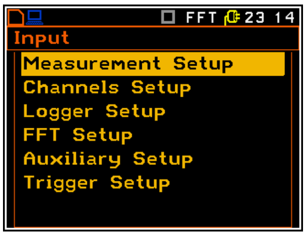
<ENT>



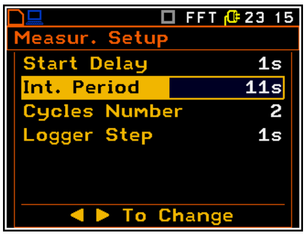
Note: *It is not possible to change the current function while a measurement is taking place. In this case the instrument displays for about 2 seconds the text* ***"Measurement in Progress"****. In order to change the current measurement function the instrument must be stopped!*

12.2 SELECTING FFT ANALYSIS PARAMETERS – FFT SETUP

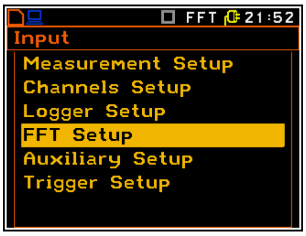
The execution of the **FFT** analysis depends on settings made in the **Measurement Setup** list. The Spectra are averaged during the period defined by **Int. Period** and repeated as defined in the **Cycles Number** position.



<ENT>



The **FFT Setup** position appears in the **Input** list for the **FFT** function and enables the user to select the parameters of FFT spectrum calculation for each channel: filter, frequency band, window type and number of spectrum lines.



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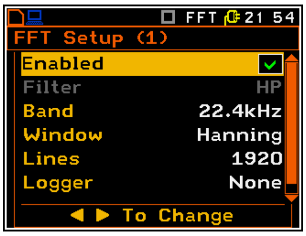
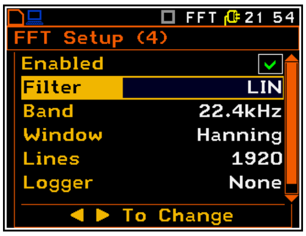
Activavting FFT in the channel

The activation of spectrum calculation is made by switching on (**[√]**) the **Enabled** position.



Weighting filter

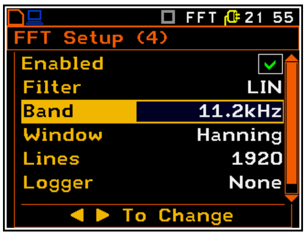


In the case of sound measurements there are **HP**, **LIN**, **A** and **C** filters available.

In the case of vibration measurements, only **HP** filter is available and the position is not accessible after entering the **FFT Setup** list.

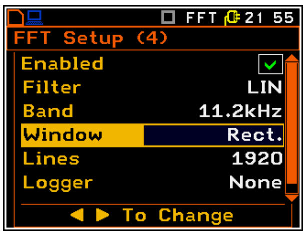
The frequency characteristics of the filters mentioned above are given in Appendix C.

Band



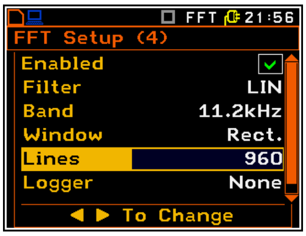
The **Band** position enables the user to select the band in which the narrow-band analysis of the signal has to be performed. The user has the following possibilities: **22.4 kHz**, **11.2 kHz**, **5.6 kHz**, **2.8 kHz**, **1.4 kHz**, **700 Hz**, **350 Hz**, **175 Hz** and **87.5 Hz**.

Time window for the FFT analysis



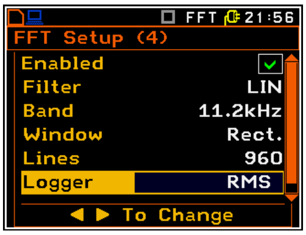
The **Window** position enables the user to select the coefficients of time window, which are used in the **FFT** analysis. Available time windows of the **FFT** analysis are as follows: **Hanning**, **Rect.**, **Flattop**, **Kais-Bes**.

Number of the lines in FFT spectra



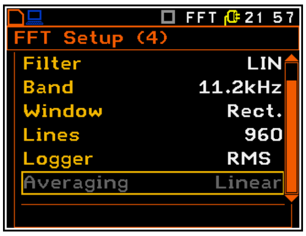
The **Lines** enables the user to select the number of lines in the FFT analysis. There are three values available: **1920**, **960** and **480**.

Enabling the FFT spectra logging



The **RMS** result of **FFT** analysis can be saved in the logger's file of the instrument. The activation of this option is made by selecting the **RMS** text in the **Logger** position. (If the **Logger** functionality has been switched off, the position is not accessible).

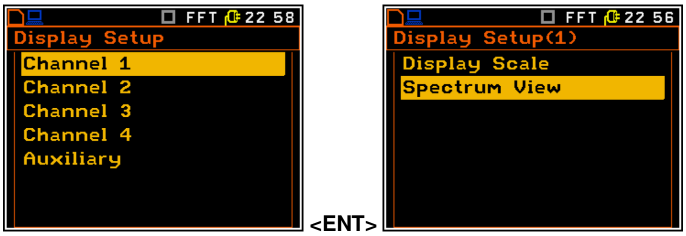
Type of averaging



The **Averaging** position informs about one type of averaging applied in the instruments with **FFT** function – **Linear**.

12.3 DISPLAY OPTIONS IN FFT ANALYSIS MODE

The **Display Setup** list is used for setting the various parameters which are mainly dedicated for the control of the spectrum view. The following lists contain the elements that influence the presentation of the results of **FFT** analysis:



Display Modes enables the user to switch on the spectrum presentation mode;

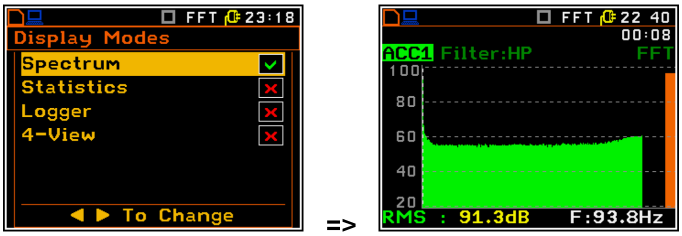
Display Setup / Channel x enables the user to select options for spectrum presentation:

- **Display Scale** to change the scale of the vertical axis of the graphical presentation;
- **Spectrum View** to choose the type of the spectrum to be presented.

12.4 PRESENTATION OF FFT ANALYSIS RESULTS

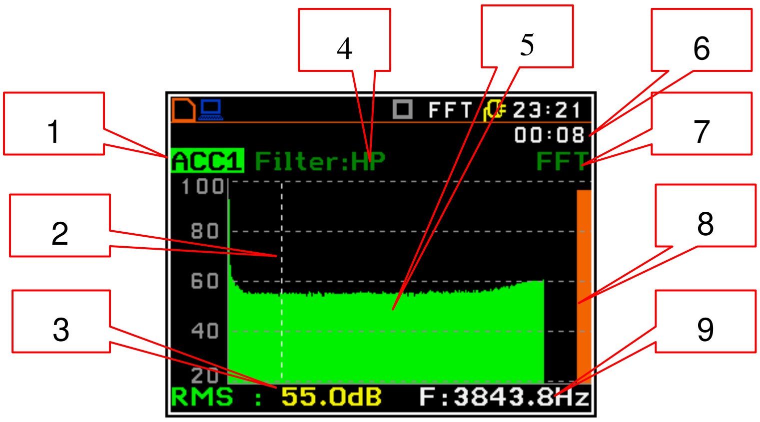
The **Spectrum** position of the **Display Modes** list is accessible with **FFT** function.

When **Spectrum** mode is switched on the measurement screen in **Spectrum** visualisation mode is as shown here.

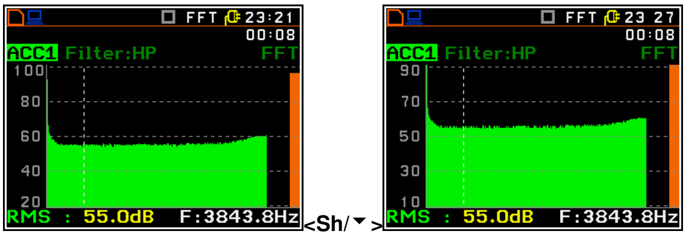


Field description of the Spectrum view

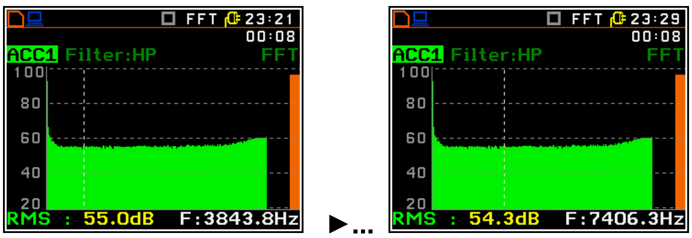
1. Channel numer and sygnal type
2. Cursor position
3. Value for the cursor position
4. Used weighting filter
5. Spectrum plot
6. Elapsed time, the current second of the measurement
7. Type of spectrum
8. Total value
9. Central frequency for the cursor position



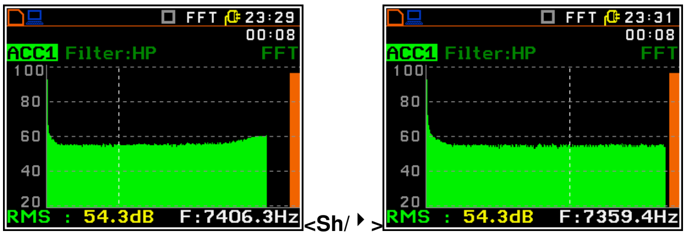
The user may shift the Y-axis during the spectrum presentation by means of the **<Shift>** and ▲ (or the **<Shift>** and ▼) keys.



The user may change the cursor position by means of the ◄ / ► key. The frequency and appropriate value are presented in the line below the plot.

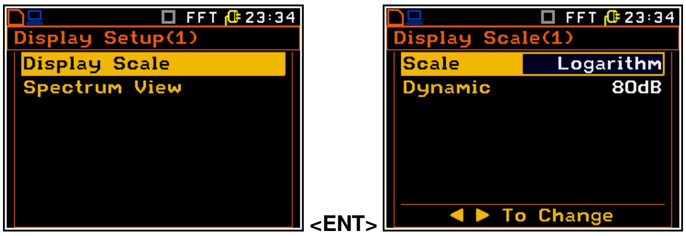


The user may zoom in/out the frequency scale at the cursor position by means of the ◄ / ► key, pressed with **<Shift>**.



12.5 SETTING THE SCALE OF THE SPECTRUM RESULTS PRESENTATION – DISPLAY SCALE

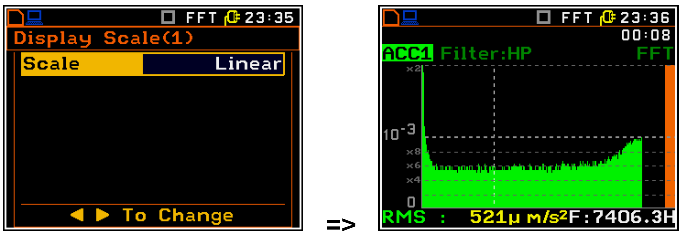
The **Display Scale** sub-list enables the user to change the Y-axis scale in the spectrum presentation mode for each channel separately.



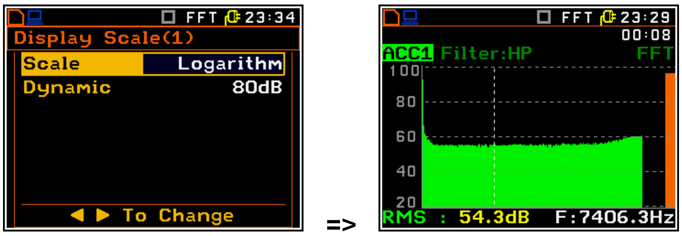
Scale of the measurement results presentation

Two options are available for the **Scale** position: **Linear** and **Logarithm**.

In case of **Linear** the Y-scale of spectrum presentation is linear.

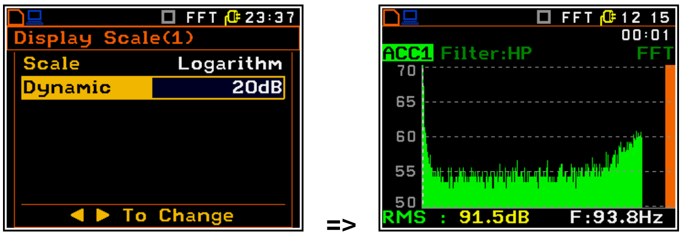


In case of **Logarithm** the Y-scale of spectrum presentation is logarithmic and the measurement results are expressed in decibels (the results are related to the values set up in the **Reference Level** sub-list (*path: <Menu> / Setup / Reference Levels*).



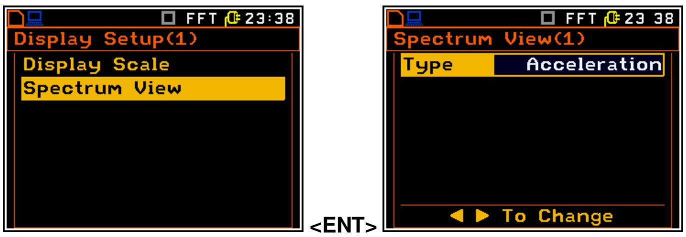
Scaling the vertical axis

If **Scale** is set to **Logarithmic** then the **Dynamic** position enables the user to select the required dynamic range scaling of the graphical presentation mode. The user can obtain double, four and eight times expansion of the vertical axis (the default vertical axis corresponds to **80 dB**, after expansion it corresponds to **40 dB**, **20 dB** and **10 dB** – respectively).



12.6 SETTING PARAMETERS OF THE SPECTRUM PRESENTATION – SPECTRUM VIEW

In the **Spectrum View** list the user can select the spectrum type for vibration input (**Acceleration**, **Velocity** or **Displacement**) or to view type of spectrum for sound input (**RMS**).



13 CROSS-SPECTRUM

If the **Cross Spectrum** function is selected the instrument operates as the **FFT** analyser and the **Level Meter** and in addition performs calculation of cross-spectra.

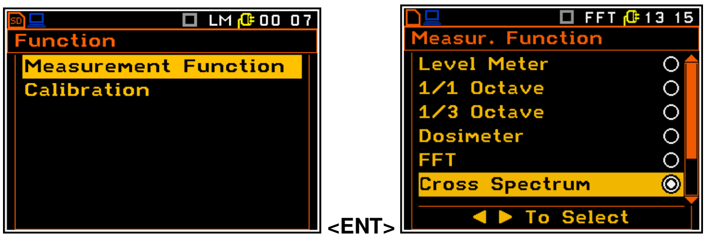
A cross spectrum is calculated for two signals measured in separate channels. In this function, the instrument calculates and presents on the display:

- transfer function, which shows how the signal amplitude is changed between two channels,
- phase function, which shows how the signal phase is changed between two channels,
- gamma function (or correlation), which shows how trustworthy the result of the transfer function is.

To calculate all above mentioned functions you should select the reference channel, in which the source signal is measured, and the channels, for which the cross-spectra will be calculated.

13.1 SELECTING CROSS SPECTRUM FUNCTION

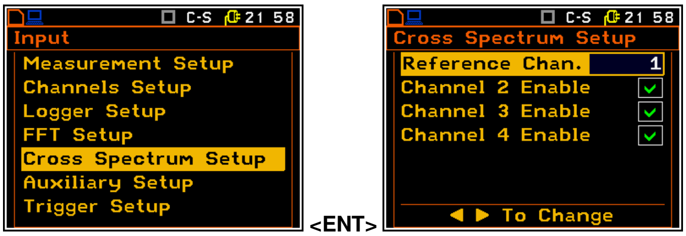
To select the **Cross Spectrum** function, open the **Measurement Function** screen, select the **Cross Spectrum** option, mark it with the ► key and press **<ENTER>**.



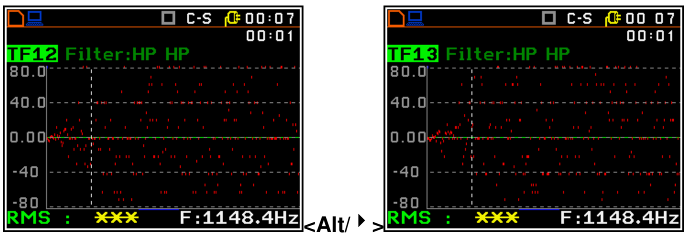
Note: *It is not possible to change the current function while a measurement is taking place. In this case the instrument displays for about 2 seconds the text* ***"Measurement in Progress"****. In order to change the current measurement function the instrument must be stopped!*

13.2 SELECTING CHANNELS FOR CROSS-SPECTRUM ANALYSIS – CROSS SPECTRUM SETUP

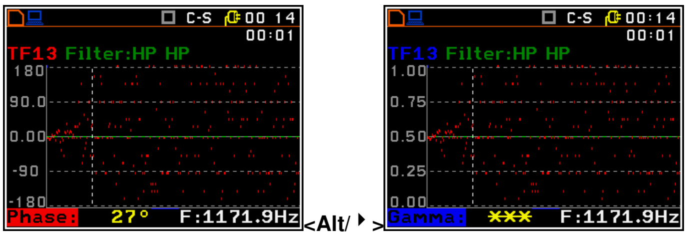
When the **Cross Spectrum** function is selected in the **Measurement Function** list (*path: <Menu> / Function / Measurement Function*) the **Cross Spectrum Setup** position appears in the **Input** list. This position enales the user to select the reference channel and channels, for which the cross-spectra will be calculated.



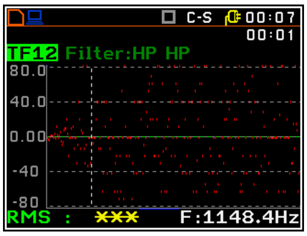
To change presentation of transfer function (**TF**) calculated for another channels the user has to activate the TF field and then press the ◄ / ► key with **<Alt>**.



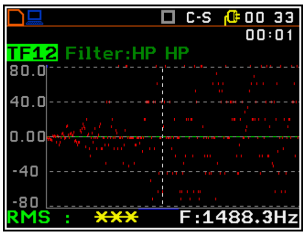
To display another than RMS transfer function the user has to change the active **RMS**/**Phase**/**Gamma** field by means of ▲ or ▼ keys and change the function by means of the ◄ / ► key, pressed with **<Alt>**.



The cursor position can be change by means of the ◄ / ► key.



►



14 SOUND INTENSITY

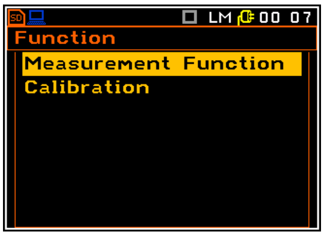
If the **Sound intensity** function is selected the instrument operates as the **FFT** analyser and the Level Meter and in addition performs calculation of crosspower spectrum.

The sound intensity measurement involves the use of two microphones located close to each other, normal to the direction of sound energy flow. A signal analyser is used to compute the crosspower between the measured pressures and the sound intensity is derived from (proportional to) the imaginary part of the crosspower.

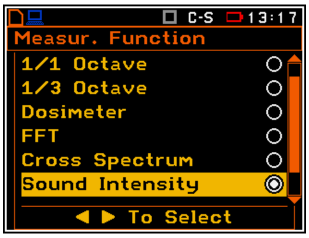
The special probe with 2 microphones is used for Sound intensity measurement. Microphones are usually named as A and B. The distance between microphones is an important parameter.

14.1 SELECTION OF SOUND INTENSITY FUNCTION

To select the **Sound Intensity** function, open the **Measurement Function** screen, select the **Sound Intensity** option, mark it with the ► key and press **<ENTER>**.



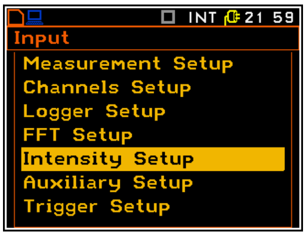
<ENT>



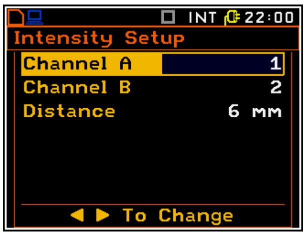
Note: *It is not possible to change the current function while a measurement is taking place. In this case the instrument displays for about 2 seconds the text **"Measurement in Progress"**. In order to change the current measurement function the instrument must be stopped!*

14.2 SELECTION OF PARAMETERS FOR SOUND INTENSITY ANALYSIS – INTENSITY SETUP

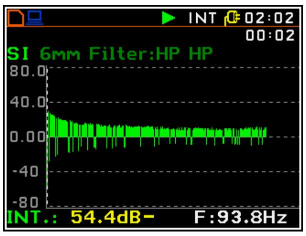
When the **Sound Intensity** function is selected in the **Measurement Function** list (*path: <Menu> / Function / Measurement Function*) the **Intensity Setup** position appears in the **Input** list. This position enales the user to select the channel for A and B microphones and to define the distance between the microphones.



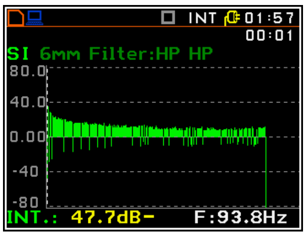
<ENT>



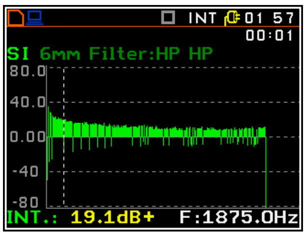
The result of the Sound intensity is presented in the way of FFT spectrum. The value of sound power is presented in dB, positive or negative depending on the direction of flow.



The cursor position can be change by means of the ◄ / ► key.



►



15 REVERBERATION TIME

The **reverberation time** analysis (**RT60**) is an optional function of the SVAN 958A instrument, which provides reverberation time calculation for 1/3 octave bands (from 31.5 Hz to 10 kHz) and three total RMS levels (**A**, **C** and **Z** weighted). Whole measurement process and calculations implemented in the SVAN 958A instrument fulfil the ISO 3382 standard.

The reverberation time of the room can be obtained with the use of the SVAN 958A instrument by two measurement methods: **Impulse** (Impulse Response Method) and **Decay** (Interrupted Noise Method). The selection of the method depends on the type of the sound source utilized by the user. The **Impulse** method is designed for measurement utilizing the impulse sound source (like pistol shot, petard explosion), whereas the **Decay** method is intended for measurements when room is excited by broad or narrow band sound noise source (usually pink noise). For more details about the measurement and calculation process see Appendix E.

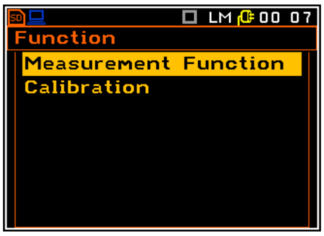
The reverberation time analysis applied in the instrument consists of two parts:

1. The measurement part during which the acoustic response of the room is registered.
2. The calculation part during which the reverberation time (**EDT**, **RT 20**, **RT 30** and **RT User**) is calculated for the measured room response.

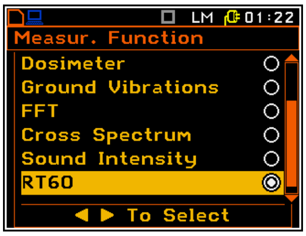
Note: *It is recommended to familiarize with the Appendix E before proceeding. This chapter describes only the navigation of the instruments, whereas Appendix E depicts the definitions and description of the reverberation time measurement.*

15.1 SELECTING RT60 FUNCTION

In order to select the **RT 60** function the user has to enter the **Function** list by pressing the **<Menu>** key, then select the **Measurement Function** position and open it by pressing **<ENTER>**. In the **Measurement Function** list the user has to highlight the **RT 60** option, mark it by ► key and then press **<ENTER>**.



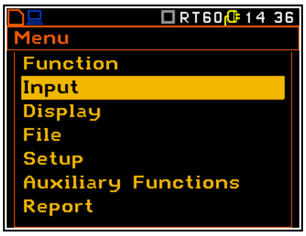
<ENT>



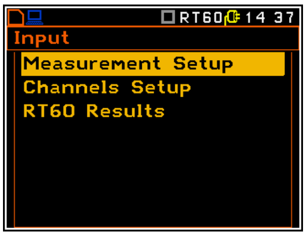
Note: *It is not possible to change the current function while a measurement is taking place. In this case the instrument displays for about 2 seconds the text* ***"Measurement in Progress"****. In order to change the current measurement function the instrument must be stopped!*

15.2 SETTING RT 60 PARAMETERS

The execution of the **RT 60** analysis depends on settings made in the **Input** list, which consists of three positions: **Measurement Setup**, **Channels Setup** and **RT60 Results**.



<ENT>

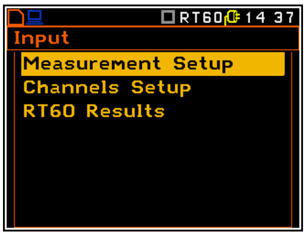


The reverberation time analysis applied in the instrument consists of two parts:

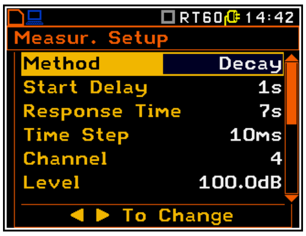
1. The measurement part during which the acoustic response of the room is registered.
2. The calculation part during which the reverberation time (**EDT**, **RT 20**, **RT 30** and **RT User**) is calculated for the measured room response.

The **Measurement Setup** list enables the User to select the method for **RT60** calculation, and other parameters for **RT60** calculation.

The **Method** position enables the user to choose the method for **RT60** calculation: **Decay** or **Impulse**.

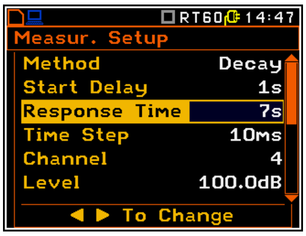


<ENT>



The **Start Delay** position defines the delay period from the moment the **<Start/Stop>** key is pressed to the start of the actual measurement.

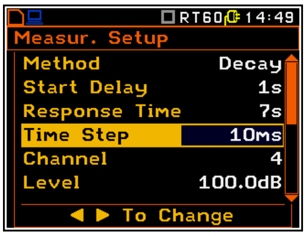
The **Response Time** position defines the recording time of the measurement data (sound pressure level decay curve). The data acquiring starts in the moment of the trigger condition appearance. The recording time can be set in the range **1** ÷ **30 s**.



The **Time Step** position defines the time-step of data registeration (sound pressure level) in the logger. The parameter value can be selected from the raw: **10**, **20**, **50**, **100 ms**.

The **Channel** position defines the channel for triggering the measurement.

The **Level** position defines the level for triggering the measurement.

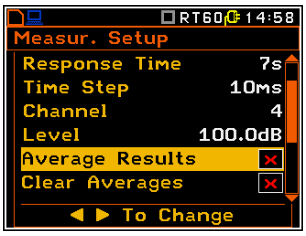


In the **Impulse** method the trigger condition appears when the **TOTAL** sound pressure level exceeds the defined by the user threshold **Level** value. The parameter can be set in the range **24** ÷ **136 dB** with **1 dB** step (**100 dB** default value).

In the **Decay** method the **Leq** level defined by the **Level** parameter must be reached to start time history recording. The **RT60** measurement starts when the 1 second **Leq** (**A** weighted) level value decreases by **10 dB**. The RT60 Decay algorithm uses 50 samples pre-trigger, defined by “10 dB drop point” (see Appenix H).

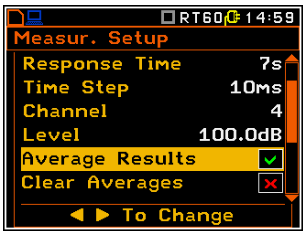
The **Averaging Results** position enables the user to activate the averaging of the reverberation time results from several measurements.

When this option is swithed off the initial RT screen will inform the user about used method.



=>

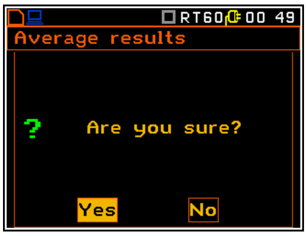
When this option is swithed on the initial RT screen will inform the user also about number of averaged results and the user will be able to average new results with the previous one or to clear averages.

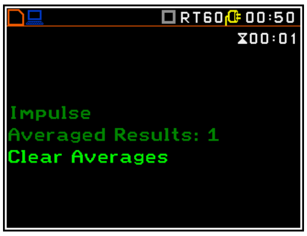


=>

To make averaging of the measurement results with the calculated before averaged results the user should select the field **Averaged Results**, press the **<ENTER>** key, select in the confirmation window **Yes** and press **<ENTER>** again. In the field **Averaged Results: x** the value **x** will be increased by one.

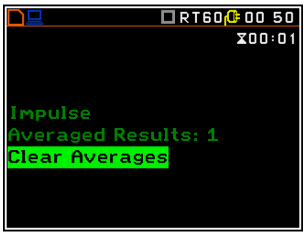
<Start>

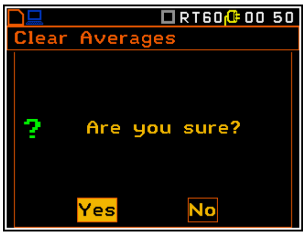

<ENT>


<ENT>


The **Clear Averages** position enables the user to clear all previous averages and the averaging will start from next measurement.

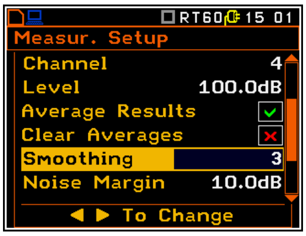
To clear averaging the user should select the field **Clear Averages: x** and press the **<ENTER>** key, select in the confirmation window **Yes** and press **<ENTER>** again.



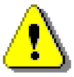
<ENT>


<ENT>


The **Smoothing** position enables the user to set the number of samples, which are taken to averaging process of the sound pressure level decay curve. **Note: this parameter influences the reverberation time results.** The parameter can be set in the range **0 ÷ 15** with **1** sample step (default value is **3** samples).

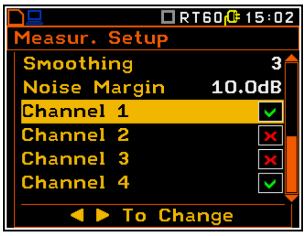


The **Noise Margin** position enables the user to set the margin value to the calculated noise level. This parameter can be set in the range **0 ÷ 20 dB** with **0.1 dB** step (default value is **10 dB**).

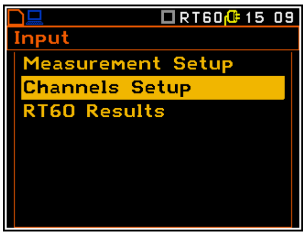


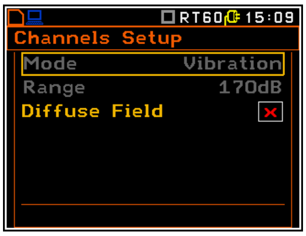
***Note:** If the measurement have to fulfilled the **ISO 3382** standard requirements the noise margin is required to be set to 10 dB (or greater value).*

The **Channel** positions activate channels for **RT60** analysis.

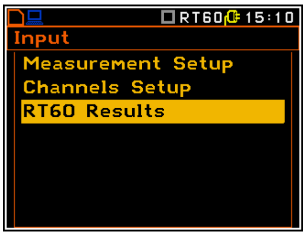


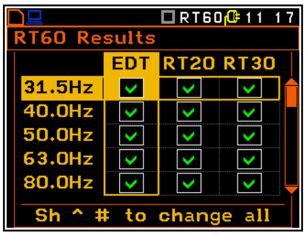
The **Channels Setup** list enables the user to swith the **Diffuse Field** correction filter.



<ENT>


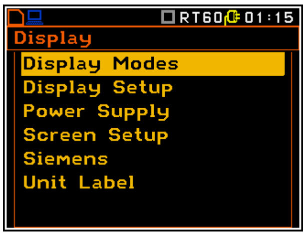
The **RT60 Results** list enables the user to select which reverberation time results: **EDT**, **RT20** or **RT30** and to which 1/3 octave bands will be calculated and presented on the display after measurement.



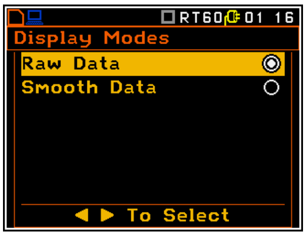
<ENT>


15.3 CONFIGURING RESULTS VIEW

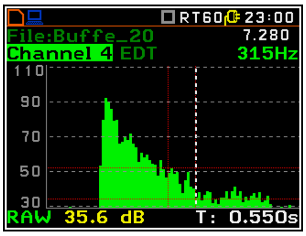
The **Display Modes** list of the **Display** menu enables the user to select the type of data displayed during the **RT60** calculation.

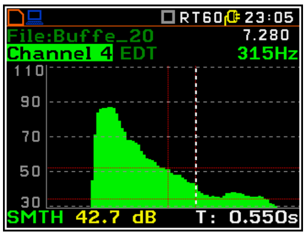


<ENT>



Time data can be viewed as a **Raw Data**, **Smooth Data** (or **Integrated Data** in case of **Impulse** method).

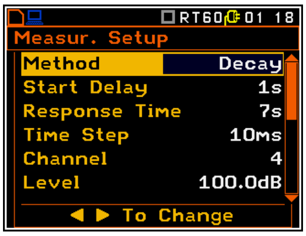


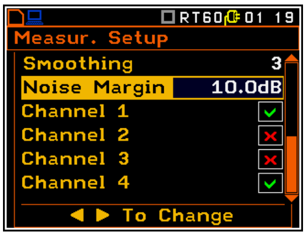


15.4 STARTING RT60 MEASUREMENT

Measurements with the use of Decay method

1. Set parameters for **Decay** RT60 measurements. Most used setup is presented below.
   - **Method:** **Decay**
   - **Response Time:** **7s**
   - **Time Step:** **10ms**
   - **Averaging:** **On**
   - **Smoothing:** **3**
   - **Noise Margin:** **10.0dB**

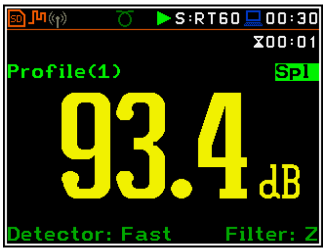




2. Place the sound power source in the measured room (for the sound power source location - see the reverberation time measurement ISO standard).
3. Place the microphone in one of the selected measurement points (for the measurement points location see the reverberation time measurement ISO standard).

Note: *The default measurement time of the decay curve registering (**Recording Time**) is 7 seconds. It can be insufficient in some applications. It is recommended to set this value to be at least two times longer than expected reverberation time.*

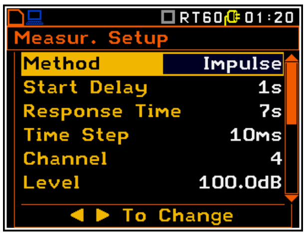
4. Switch on the sound power source.
5. Start the measurement process by pressing the **<Start/Stop>** key. While the instrument is waiting for the trigger condition fulfilment the **Spl** result is displayed.



6. Switch off the sound power source (the source should work enough long to obtain the acoustic field stabilisation). After the trigger condition fulfilment the instrument starts to collect data.
7. After the data recording process ends, the instrument starts the calculation of the reverberation time results.
8. To save results press the **<Save>** key or use the **File** menu option.

Note: It is necessary to switch on the sound source before starting the measurement because of the trigger requirements. If there it is necessary to start the instrument before switching on the sound source it is recommended to use the higher ***Start Delay*** *value.*

Measurements with the use of Impulse method



1. Set parameters for **Impulse** RT60 measurements. Most used setup is presented below.
   - **Method:** **Impulse**
   - **Response Time:** **7s**
   - **Time Step:** **10ms**
   - **Level:** **100dB**
   - **Averaging:** **On**
   - **Smoothing:** **3**
   - **Noise Margin:** **10.0dB**

*Note: The default measurement time of the decay curve registering (**Recording Time**) is 7 seconds. It can be insufficient in some applications. It is recommended to set this value to be at least two times longer than expected reverberation time.*

Note: The proper value of the sound level trigger threshold should be set well above the background noise and significantly below the maximum sound level emitted by the impulse source.

2. Place the microphone in one of the selected measurement points (for the measurement points location see the reverberation time measurement ISO standard).
3. Start the measurement process by pressing the **<Start/Stop>** key. The display indicates that the instrument is waiting for the trigger condition fulfilment.
4. Fire the impulse sound power source. If the trigger condition is fulfilled the instrument starts to collect data.
5. After the data recording process ends, the instrument starts the calculation of the reverberation time results.
6. To save results press the **<Save>** key or use the **File** menu option.

Note: During the data collections in the investigated room all other sources of sound should be suppressed to not affect the measurements.

15.5 VISUALIZATION OF THE RT 60 MEASUREMENTS RESULTS

The **RT60** measurement results for all 1/3 octave bands and three Total values can be viewed in three different presentation modes:

1. Table of **EDT**, **RT20**, **RT30** and **User** results;
2. Bar plot of **EDT**, **RT20**, **RT30** and **User** results;
3. Plot of sound pressure level decay curves.

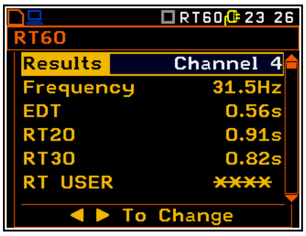
The user may switch between the presentation modes by means of the **<Alt>** and ▲ / ▼ key.

Table of RT60 results

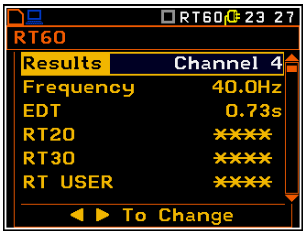
The table presents the results of reverberation time for different **RT60** results:

- **EDT** - early decay time;
- **RT 20** - reverberation time calculated with 20 dB dynamics;
- **RT 30** - reverberation time calculated with 30 dB dynamics;
- **User** - reverberation time, calculated with the user defined dinamics.

The user may scroll all results of the RT60 analysis with the use of ▲ / ▼ key.



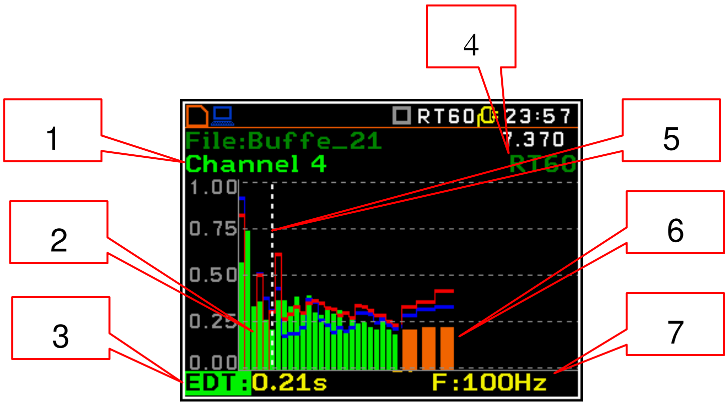
▼



***Note:** If "* * *" text appears in the RT indicator field it means that for this 1/3 octave band with the selected parameters (**Noise Mar.**) the required measurement conditions were not fulfilled to obtain the results.*

Bar plot of RT60 results

1. Number of channel
2. RT 1/3 octave plot
3. Name of the RT result and its value
4. Used RT60 calculation method
5. Cursor position
6. RT results for Total values
7. Cursor position value (central 1/3 octave band frequency)

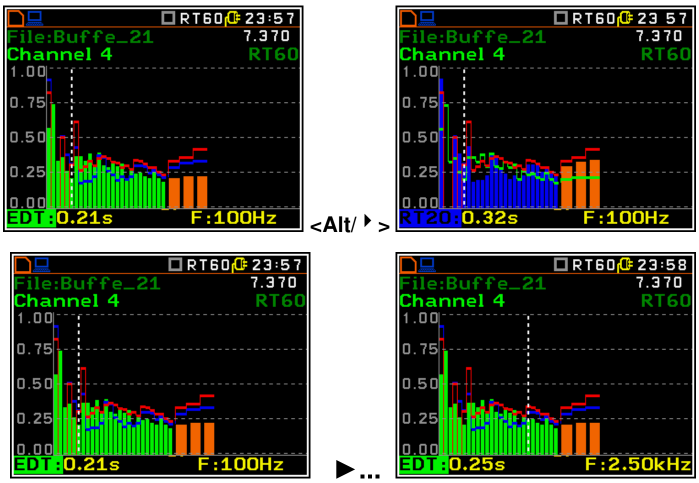


Changing the RT result

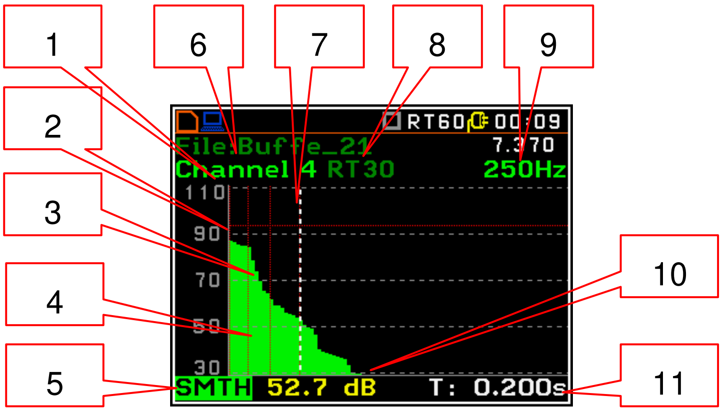
When the field 3 is active the **RT60** analisys result can be changed after pressing the ◄ and ► keys together with **<Alt>**.

Changing the cursor position

The user may change the cursor position by means of the ◄ / ► key.



Sound pressure decay curve plot



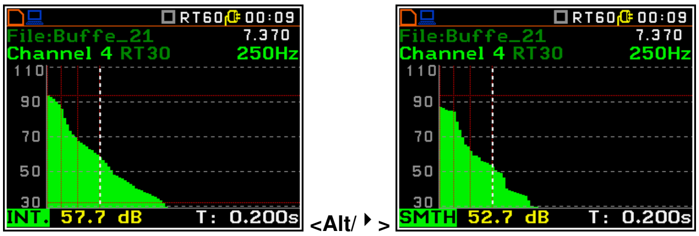
1. Channel number
2. T0 marker position
3. Decay curve plot
4. T1 marker position
5. Type of data displayed: **RAW**, **SMNH** or **INT.**
6. Name of the logger file
7. Cursor position
8. RT result (**RT30**, **RT20**, **EDT** and **RT User**) with calculated reverberation time
9. Central frequency of selected by cursor 1/3 octave band
10. Result value (SPL) for the cursor position
11. Cursor measurement time position

T0 marker position is used as a starting point to all three (and the **RT User** also) reverberation time calculations.

On the display T1 marker position is labelled (indicator **A7**) as **EDT**, **RT 20** or **RT 30** according to which the most restricted definition of the RT condition is fulfilled.

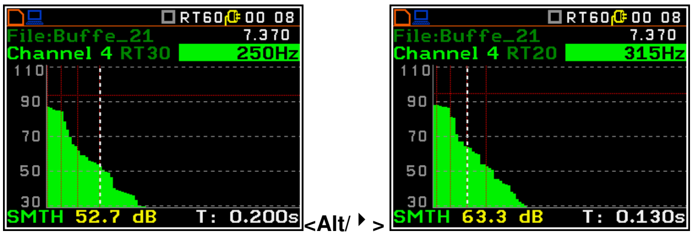
Changing the data type

When the field 5 is active the type of data displayed (**RAW**, **SMTH** or **INT.**) can be changed after pressing the ◄ and ► keys together with **<Alt>**.



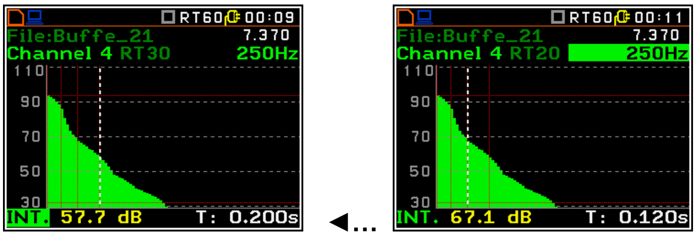
Changing the 1/3 octave band

When the field 9 is active the central frequency of 1/3 octave band can be changed after pressing the ◄ and ► keys together with **<Alt>**.



Changing the cursor position

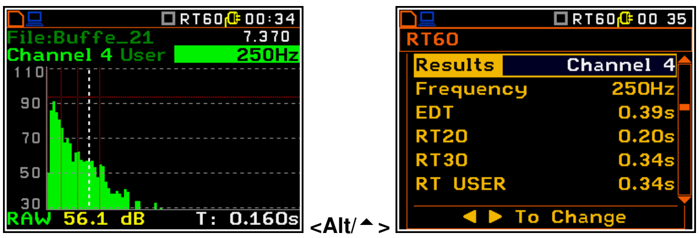
The user may change the cursor position by means of the ◄ / ► key.



RT User reverberation time calculation

The user reverberation time is calculated for the cursor positions at each Sound pressure decay curve plots.

For example, if cursor is set to T: 0.160s for the 1/3 octave band with 250Hz center frequency, the RT User result will be presented in the table of RT result for 250Hz band.

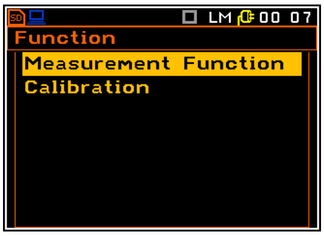


16 WAVE RECORDER

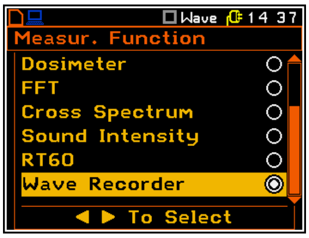
The **Wave Recorder** mode is an optional function of the **SVAN 958A** instrument, which is working in parallel with the Level Meter and additionally provides signal recording directly on the USB disc in the common used file format.

16.1 SELECTING WAVE RECORDER FUNCTION

In order to select the **Wave Recorder** function the user has to enter the **Function** list by pressing the **<Menu>** key, then select the **Measurement Function** position and open it by pressing **<ENTER>.** In the **Measurement Function** list the user has to highlight the **Wave Recorder** option, mark it by ► key and then press **<ENTER>**.



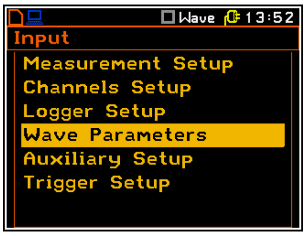
<ENT>



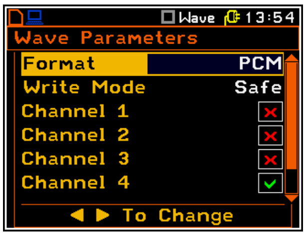
Note: *It is not possible to change the current function while a measurement is taking place. In this case the instrument displays for about 2 seconds the text **"Measurement in Progress"**. In order to change the current measurement function the instrument must be stopped!*

16.2 CONFIGURING WAVE RECORDING PARAMETERS – WAVE PARAMETERS

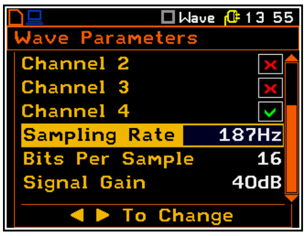
When **Wave Recorder** function is selected in the **Measurement Function** list the position **Wave Parameters** is available in the Input list.



<ENT>



The **Wave Parameters** position opens the list, where it is possible to define the format of wave recording (**PCM** or **Extensible**), select channels of signal recording (**Channel x**), select the frequency of sampling (**Sampling Rate**: **187Hz**, **375Hz**, **750Hz**, **1500Hz**, **3000Hz**, **6000Hz**, **12kHz**, **48kHz**) and **Bits Per Sampling** parameter (**16** or **24**). In case of **16** bits per sampling it is possible to define also **Signal Gain** value (from **0dB** to **40dB**).



Appendix A. REMOTE CONTROL (v4.16.2)

The **USB 1.1** interface is the serial one working with 12 MHz clock. Its speed is relatively high and it ensures the common usage of USB in all produced nowadays Personal Computers.

The **HOST USB** functionality is also available. The USB HOST controller installed in the instrument enables the user to connect to this meter the USB memory sticks, USB hard disks, USB printers etc.

The **RS 232 interface** is also available but as an option. In order to activate this option the user has to by a special cable with a programmed processor. This interface complies with CCIT V.24 standard. Practically all Personal Computers can be linked to the instrument by means of this interface. The maximum available transmission speed is equal to 115200 bits / sec.

The functions which are developed in order to control data flow in the serial interface ensure:

- bi-directional data transmission,
- remote control of the instrument.

The user, in order to programme the serial interface, has to:

1. send "the function code",
2. send an appropriate data file

or

receive a data file.

A.1. INPUT / OUTPUT TRANSMISSION TYPES

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

#1 input / output of the control setting codes,

#2 output of the measurement data in the sound level meter (**SLM**) or vibration level meter (**VLM**) mode,

#3 output of the measurement data in **1/1 OCTAVE** or **1/3 OCTAVE** mode,

#4 read out the data file from the internal Flash-disc and/or the special file located in the RAM memory,

#5 read out the statistical analysis results,

#6 remote setting of the user filters,

#7 special control functions,

#9 send the setup file to the internal Flash-disc.

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

Function #1 enables the user to send the control setting codes to the instrument and read out a file of the current control state. A list of the control setting codes is given in Tab. A.1.

The format of **#1** is defined as follows:

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

or

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

where:

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

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

The instrument will output a control settings file for all requests **X?** in the following format:

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

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

#1;

The instrument will output a control settings file in the format:

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

Example: The following sequence of characters:

#1,U958,N4000,Z0:1,Z0:2,Z0:3,Z1:4,M3,Y1000,Xa1,Xv1,Xd1,XA0,XR0,S0;

means that:

- the **SVAN 958** is investigated (U958),
- the unit's number is **4000** (N4000),
- the **Vibration Level Mode** is selected in channel 1 (Z0:1),
- the **Vibration Level Mode** is selected in channel 2 (Z0:2),
- the **Vibration Level Mode** is selected in channel 3 (Z0:3),
- the **Sound Level Mode** is selected in channel 4 (Z1:4),
- the **1/3 OCTAVE analyser** function is selected (M3),
- the measurement start delay is equal to **1000** milliseconds (Y1000),
- the reference level for acceleration measurement is set to **1 μms^{-2}** (Xa1),
- the reference level for velocity measurement is set to **1 nms^{-1}** (Xv1),
- the reference level for displacement measurement is set to **1 pm** (Xd1),
- the AutoSave option is switched off (XA0),
- the RAM file will not be created (XR0),
- the instrument is in the **STOP** state (S0).

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

Note: Any setting can be changed only when the instrument is in the STOP state (S0).

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

Function **#2** enables one to read out the current measurement data in the **SLM** or **VLM** Mode.

Note: *This function can also be programmed while measurements are taking place. In this case, the values measured at the moment of command execution will be sent out.*

#2 function has a format defined as follows:

#2,t,p,X?,X?,X?,(...),X?;

where:

t - result timestep code. Can be one of:

s 100ms

l logger step

c 1s

If no code is provided, current measurement time is assumed

X - the code of the result,

p - the number of the results set

0 – for reading vibration dose results

1,2,3,..,12 – for reading profile results

(calculated from the formulae: *ChannelNumber + 4 * (ProfileNumber - 1)*

The results timestep codes are defined as follows:

Note: *After entering the **STOP** condition, #2 function is no longer active and has to be reprogrammed in order to read-out successive measurements.*

The instrument will send the values of the results in the format defined as follows:

#2,p,Xccc,Xccc,Xccc,(...),Xccc; (where **p** - the number of the results set)

or

#2,?; (when the results are not available).

The codes of the results in the case of **SLM** mode are defined as follows:

T time of the measurement (ccc – value in seconds);
V the overload flag (ccc equals to 0 or 1);
P the **PEAK** value (ccc – the value in dB);
M the **MAX** value (ccc – the value in dB);
N the **MIN** value (ccc – the value in dB);
S the **SPL** value (ccc – the value in dB);
R the **LEQ** value (ccc – the value in dB);
U the **SEL** result (ccc – the value in dB);

B(k) the **Lden** result (ccc – the value in dB);
Y the **Ltm3** result (ccc – the value in dB);
Z the **Ltm5** result (ccc – the value in dB);
L(nn) the value **L** of the **nn** statistics (ccc – the value in dB);
r the underrange flag (ccc equals to 0 or 1);

In case of results timestep other than measurement time, only **VPMNR** subset of results is available

Note: *The value displayed on the screen during the result's presentation will be sent out from the instrument in the case when after the **X** code the **nn** is not given.*

Note: *For profiles 2 and 3 the **L(nn)** result is not calculated.*

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

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.*

Example: After sending to the instrument the following string:

#2,1,T?,V?,B?,P?,M?,R?,L50?;

one should receive the answer given below:

#2,1,T3,V0,P66.91,M64.55,R61.70,B(2)66.70,L(50)54.95;

The codes of the results in the case of **SOUND DOSIMETER** mode are defined as follows:
T time of the measurement (ccc – value in seconds);
V the overload flag (ccc equals to 0 or 1);
P the **PEAK** value (ccc – the value in dB);
M the **MAX** value (ccc – the value in dB);
N the **MIN** value (ccc – the value in dB);

S the **SPL** value (ccc – the value in dB);
D the **DOSE** value (ccc – the value in %);
d the **DOSE8h** value (ccc – the value in %);
A the **LAV** value (ccc – the value in dB);
R the **LEQ** value (ccc – the value in dB);
U the **SEL** result (ccc – the value in dB);
u the **SEL8** value (ccc – the value in dB);
E the **E** value (ccc – the value in Pa^2h);
e the **E8h** value (ccc – the value in Pa^2h);
l the **LEPd** value (ccc – the value in dB);
J the **PSEL** value (ccc – the value in dB);
Y the **Ltm3** result (ccc – the value in dB);
Z the **Ltm5** result (ccc – the value in dB);
L(nn) the value **L** of the **nn** statistics (ccc – the value in dB).
r the underrange flag (ccc equals to 0 or 1);

The codes of the results in the case of **VLM** mode are defined as follows:
T time of the measurement (ccc – value in seconds);
V the overload flag (ccc equals to 0 or 1);
P the **P–P** value (ccc – the value in dB);
Q the **PEAK** value (ccc – the value in dB);
M the **MTVV** value (ccc – the value in dB);
R the **RMS** value (ccc – the value in dB);
H the **VDV** value (ccc – the value in dB);
v the **VEC** value (ccc – the value in dB).
r the underrange flag (ccc equals to 0 or 1);

Example: After sending to the instrument the string:

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

one should receive the following answer:

#2,1,T3,V0,P76.92,R64.50;

The codes of the results in the case of **Vibration Dose** mode are defined as follows:
a the **Current Dose** value (ccc – the value in dB);
b the **Daily Dose value** (ccc – the value in dB);
c the **Current Exposure** value (ccc – the value in dB);
f the **Daily Exposure** value (ccc – the value in dB);
g the **EAV Time** value (ccc – value in seconds);
h time left to reach **EAV** value (ccc – value in seconds);
i the **ELV Time** value (ccc – value in seconds);
j time left to reach **ELV** value (ccc – value in seconds).

Example: After sending to the instrument the string:

#2,0,c?,f?,g?,h?;

one should receive the following answer:

#2,0,c-27.89,f-13.44,g172800,h172800,i172800,j172800;

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

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

Function **#3** enables one to read out the current measurement data in **1/1 OCTAVE**, **1/3 OCTAVE and FFT**.

#3 function format is defined as follows:

#3,t,n;

n – the number of channel (1, 2, 3, or 4)

t - result timestep code. Can be one of:

l logger step

c 1s

If no code is provided, current measurement time is assumed

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

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

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

D7	D6	D5	D4	D3	D2	D1	D0

where:

D7 = 1denotes "overload indicator",
D6 = 1denotes "averaged spectrum",
D5 = 0the instantaneous current result (RUN State),
= 1the final result (STOP State),
D0 to D4 reserved bits.

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

A.5. FUNCTION #4 – READ-OUT OF THE DATA FILE FROM THE INTERNAL FLASH-DISC AND/OR THE SPECIAL FILE LOCATED IN THE RAM MEMORY

Function **#4** enables the user to read-out the data file from the internal Flash-disc memory. The data file formats are given in Appendix B.

#4 function formats are defined as follows:

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

where:

index - first catalogue record

count - numbers of catalogue records

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

words 0 - 3	8 character file name,
word 4	file type (binary number),
word 5	reserved,
word 6	least significant word of the file size,
word 7	most significant word of the file size,
word 8	least significant word of the file logical address,
word 9	most significant word of the file logical address,
word 10	measurement start date,
word 11	measurement start time,
words 12 - 15	reserved.

For the RAMfile the **logical address** is always set to 0.
For the files on the USB drive **logical address** is always set to 0xFFFFFFFF.

For files containing saved setup measurement or logger data the start date and time are always set to file creation date and time.

#4,1,FILE NAME;	the file containing the measurement results or saved setup,
#4,1,FILE NAME,?;	file size
#4,1,FILE NAME,offs,len;	part of the file containing the measurement results or saved setup,
#4,1,<addr,len;	part of the file containing the measurement results or saved setup,

where:

FILE NAME	not longer than eight-character file name,
addr	absolute internal address,
offs	offset from the beginning of the file
len	number of bytes to read.

#4,2,Bnnn; the file in internal memory containing logger, where **nnn** is the number of the logger file (one or more digits - depends on requirements).

#4,3; the special file contained in the RAM memory (**RAMfile**),
#4,3,?; size of the RAM file
#4,3,offs,len; the part of RAM file

where:

offs offset from the beginning of the file
len number of bytes to read.

#4,5,'\'; the file containing the catalogue of USB DISK,
#4,5,?; the count of files on USB DISK
#4,5,idx,count; the part of the file containing the catalogue of USB DISK

where:

idx first record
count number of records to read.

The catalogue of the files on USB DISK is a set of the records containing 32 bytes. Each record describes one file saved in the USB DISK. The record structure is as follows:

bytes 0-10 - file name with extension
byte 11 - reserved
bytes 12-15 - file length in bytes
bytes 16-19 - number of file in catalogue
bytes 20-21 - file creation date
bytes 22-23 - file creation time
bytes 24-31 - reserved

#4,6,fname,?; file size,

#4,6,fname,offs,len; the part of the file on USB DISK

where:

fname - name and extension containing not more than 11 characters

offs - offset from the beginning of the file (an even number)

len - number of bytes to read (an even number)

Note: The "\" character is the obligatory catalogue file name *(it must be sent to the instrument).*

The device will respond sending the specified file/catalogue in the following format:

#4,k;<4 bytes giving the file size (in binary form)><data byte>...<data byte>

All data words are sent as **<LSB>**,**<MSB>**.

When an error is detected in the file specification or data, the instrument will send: **#4,?;**

Note: *If the **DEFRAGMENTATION** function is performed after the read out of the files catalogue the logical addresses of the files could be wrong.*

The measurement **start date** is coded as a word with bits:

b15 ... b3 b2 b1 b0

where:

b15 b14 b13 b12 b11 b10 b9	is a year minus 2000.
b8 b7 b6 b5	is a month (1..12),
b4 b3 b2 b1 b0	is a day (1..31).

The measurement **start time** is coded as number of seconds counted from 00:00:00 divided by 2.

The structure of the files containing the measurement results, saved setups and/or logger files is described in details in Appendix B.

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

Function **#5** enables one to read out the statistical analysis results. This function is available only for channels in sound level meter mode.

#5 function format is defined as follows:

#5,p;

where:

p the number of the channel (1, 2, 3 or 4) or the number of channel plus 4 (5, 6, 7 or 8) for the read out of the statistics in **1/1 OCTAVE** or **1/3 OCTAVE** analysis.

Note: *Statistical analysis is always performed in profile 1.*

The device will respond, sending the current 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 = 1denotes "overload indicator",

D6 = 1reserved,

D5 = 0the instantaneous current result (RUN State),

= 1the final result (STOP State),

D0 to D4 reserved bits.

Note: *There is not any succeeding transmission in the case when the* ***Status Byte*** *is equal to 0.*

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 histogram)

where:

n the number of the transmitted histograms. For p = 1, 2, 3 or 4 only one histogram is transmitted (n = 1). For p between 5 and 8 the number of the transmitted histograms depends on the measurement function and

- in the case of **1/1 OCTAVE** analysis n is equal to the number of the analysis results (NOct – cf. App. B) plus the number of the TOTAL values for this type of analysis (NOctTot);
- in the case of **1/3 OCTAVE** analysis n is equal to the number of the analysis results (NTer – cf. App. B) plus the number of the TOTAL values for this type of analysis (NTerTot);

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

BottomClass is a two-byte word denoting the lower limit of the first class (*10 dB).

ClassWidth is a two-byte word denoting the width of the class (*10 dB).

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

Note: *The bytes in the words are sent according to the scheme <LSByte>..<MSByte>.*

A.7. FUNCTION #6 – REMOTE SETTING OF THE USER FILTERS

Function **#6** enables one to send to the instrument the coefficients of the user filters. In the available formats description of **#6** functions the following symbols are used:

type	- 0 for the vibration filters,
	- 1 for the acoustic filters,
name, **$name_1$**, **$name_2$**	- filter names given by the user,
v	- real type value, expressed in [dB],
first	- integer type value (number of the coefficient in the user filter),
pos	- integer type value (Total value number),
avd	- for the vibration filters: 0 - Acc, 1- Vel, 2 - Dil,
	- for the acoustic filters this parameter is always equal to 0,
cal	- the calibration coefficient given as the real number expressed in [dB].
chn	- channel number (1, 2, 3 or 4).

#6 function formats are defined as follows:

#6,type,L;

This function returns the list of the defined (existing in the instrument) filters in the following format: **#6,type,n,name$_1$, ... ,name$_n$;**

#6,type,W,name,v,v,...,v;

This function sets the coefficients of the new user filter named as **name**. The **name** parameter should be unique (in the instrument there is not any other filter with the same name, otherwise it will be an error). The function answers in the format: **#6;**

#6,type,R,name;

This function returns the coefficients of the user filter named as **name**. If the **name** filter does not exist, an error occurs. The function returns in the following format: **#6,type,n,v$_1$,v$_2$, ... ,v$_n$;**

#6,type,D,name;

This function deletes from the instrument the user filter named as **name**. If the **name** filter does not exist, an error occurs. The function answers in the format: **#6;**

#6,type,S,name,v,v,...,v;

This function sets the user filter named as **name**. If the **name** filter already exists, its coefficients are redefined. If the **name** filter does not exist, the filter is created. The function answers in the format: **#6;**

#6,type,C,name,first,v,v,...,v;

This function sets the coefficients in the user filter named as name starting from the first position. If the **name** filter does not exist, an error occurs. The function answers in the format: **#6;**

#6,type,N, name$_1$, name$_2$;

This function changes the name of the user filter from **name$_1$** to **name$_2$**. The function answers in the format: **#6;**

#6,type,@,chn,L;

This function returns the names of the user filters, assigned to the channel **chn** consecutive **TOTAL** values, in the following format: **#6,type,chn,3,name$_1$,name$_2$,name$_3$;**

#6,type,@,chn,pos,?;

This function returns the description record of the user filter assigned to the **pos TOTAL** value of channel **chn** in the following format: **#6,type,@,chn,pos,name,avd,cal;** (the description record contains: the name of the filter, its type and the calibration coefficient).

#6,type,@,chn,pos,*;

This function recovers the predefined filter for the **pos TOTAL** value of channel **chn** and returns the following format: **#6,type,@,chn,pos,name,avd,cal;**

#6,type,@,chn,pos,name,avd,cal;

This function sets the description record of the user filter assigned to the **pos TOTAL** value of channel **chn** in the following format: **#6,type,@,chn,pos,name,avd,cal;**

The returned parameters: **name**, **avd** and **cal** are set in the description record after the execution of the function. In the case of an error they can differ from the current parameters of the function.

Note:** In the case of an error all these functions return the following sequence of the characters:* ***#6?;

A.8. FUNCTION #7 – SPECIAL CONTROL FUNCTIONS

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

#7 function formats are defined as follows:

#7,CB;

This function clears the logger memory - all logger files will be deleted. The function returns **#7,CB;** This function is not accepted while the instrument is in the RUN state.

#7,BF;

This function returns internal logger memory free space in the format:

#7,BF,ddddd; (**ddddd** - number of bytes in decimal format).

#7,BN;

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

#7,RT;

This function returns current real time clock settings in the format:

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

where **hh:mm:ss** denotes the time and **DD**/**MM**/**YYYY** gives the date.

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

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

#7,AS;

This function returns current real time and date settings for the AutoStart function in the format: **#7,AS,e,hh,mm,ss,DD;** where e=1 if AutoStart function is switched ON or 0 if it is switched OFF, **hh:mm:ss** gives the time and **DD** gives the day for the current date.

#7,AS,e,hh,mm,DD;

This function uses the given time and date settings for AutoStart function and returns the following sequence of characters: **#7,AS;**

#7,DA;

This function deletes all files containing measurement results and instrument's settings from the internal flash memory. The function returns the following sequence of characters: **#7,DA;**

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

#7,LP;

This function returns last internal files flash page.

#7,ME;

This function returns total storage capacity in MB.

#7,BP;

This function returns last internal buffer flash page.

#7,SS;

This function saves the current settings of the instrument in the EEPROM memory. The function returns the following sequence of characters: **#7,SS;**

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

#7,DF;

This function deletes all files containing measurement results from the internal flash memory. The function returns the following sequence of characters: **#7,DF;**

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

#7,DF,fileName;

This function deletes file named **fileName** containing measurement results from the internal flash memory. The function returns the following sequence of characters: **#7,DF;**

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

#7,DF,fileName<iAddr;

This function deletes file located at internal address **iAddr** containing measurement results from the internal flash memory. The function returns the following sequence of characters: **#7,DF;**

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

#7,DS;

This function deletes all files containing instrument’s settings from the internal flash memory. The function returns the following sequence of characters: **#7,DS;**

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

#7,DS,fileName;

This function deletes file named **fileName** containing instrument's settings from the internal flash memory. The function returns the following sequence of characters: **#7,DS;**

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

#7,DS,fileName<iAddr;

This function deletes file containing instrument's settings located at internal address **iAddr** from the internal flash memory. The function returns the following sequence of characters: **#7,DS;**

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

#7,AN,FName;

This function sets the name of the file for the Autosave function as the **FName**. The given name has to start with the '@' character and contain no more than 8 characters. The function returns the following sequence of characters: **#7,AN;**

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

#7,AN;

This function returns current file name used by Autosave function in the format: **#7,AN,FName;**.

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

#7,AV;

This function returns analyser firmware version in the format **#7,AV,XX.XX.XXC;** where XX.XX.XX is firmware version, C – firmware subversion.

#7,US;

This function returns unit subtype in the format **#7,US,XX;**.

#7,BS;

This function returns battery charge level in the format **#7,BS,nn;** where nn is a percent value. When battery state is not available (i.e. unit is powered from external source) function returns **#7,BS,-1;**.

#7,AL,?;

This function returns list of activated triggers as following sequence of characters: **#7,AL,a1,...,an;** where a1,..,an are numerical indexes of activated triggers. Returned sequence **#7,AL,0;** means no activated triggers.

#7,AL,x;

This function returns text information about activated trigger in form it would be sent in sms/email message and removes trigger **x** from **#7,AL,?;** response list. If trigger **x** isn't on the response list **#7,AL,-1;** is returned

#7,AL,R;

This function clears all triggers settings. Returns **#7,AL,R1;** upon completion

#7,LB;

This function returns current logger file name in the format: **#7,LB,FName;**.

#7,UH;

This function returns usb host port status in the format: **#7,UH,XX;**

where XX:

0 - not ready

1 - RS232

3 - USB DISC

5 - WAVE RECORDING

#7,UH,XX;

This function sets usb host port mode to XX, where XX:

0 - OFF

1 - RS232

3 - USB DISC

5 - WAVE RECORDING

#7,UP;

This function returns usb host port mode in the format: **#7,UP,XX;**

where XX:

0 - OFF

1 - RS232

3 - USB DISC

5 - WAVE RECORDING

#7,UP,XX;

This function sets usb host port mode to XX, where XX:

0 - OFF

1 - RS232

3 - USB DISC

5 - WAVE RECORDING

#7,RC;

This function returns state of remote control mode in the format **#7,RC,x;** where:

x=0 - disabled

x=1 - enabled

#7,RC,x;

This function sets remote control mode:

x=0 - disabled

x=1 - enabled

#7,CS;

This function performs reset to factory settings. The function returns the following sequence of characters: **#7,CS;** after completion of operation

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

#7,PO;

This function switches off the instrument:

#7,PI;

This function returns PIC firmware versions

#7,XP;

This function returns state of automatic instrument shutdown function in case of low level of external power. **#7,XP,1;** is returned if function is active, **#7,XP,0;** otherwise. Function returns **#7,XP;** in case of success.

#7,XP,n;

This function sets state of automatic instrument shutdown function in case of low level of external power. n = 1 activates function, n = 0 disables this function

#7,XL;

This function returns triggering level for automatic instrument shutdown function in case of low level of external power in the format **#7,XL,nn;** where nn - level in **V*100**.

#7,XL,nn;

This function sets the triggering level for automatic instrument shutdown function in case of low level of external power, where nn - triggering level in **V*100**. Function returns **#7,XL;** in case of success.

#7,BV;

This function returns battery voltage in **V**

#7,UV;

This function returns usb voltage in **V**

#7,EV;

This function returns external voltage in **V**

#7,FF;

This function returns internal timesignal memory free space in the format:

#7,FF,ddddd; (**ddddd** - number of bytes in decimal format).

#7,SL;

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

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

A.9. FUNCTION #9 – WRITING SETUP FILES TO THE INTERNAL FLASH-DISC

Function #9 allows uploading files containing instrument setup to the internal Flash-disc. The function expects files in format described in Appendix B, paragraph B.9. **Function should be used with extreme care.**

The #9 function format is defined as follows:

#9,2,Len,<data byte> ... <data byte>

where:

Len - length of transferred file in bytes as ASCII,

<data byte> - byte of data in binary form.

Function responds with “**#9,1;**” on success and with “**#9,0;**” on failure.

A.10. CONTROL SETTING CODES

The control setting codes used in the **SVAN 958** instrument (starting from the internal software version 3.6.1) are given in the table below.

Table A.1. Control setting codes

Group name	Group code	Code description
Unit type	**U**	U958 (read only)
Serial number	**N**	Nxxxx (read only)
Software version number * 100	**W**	WLxxx xxx - Meter version number * 100 (read only) Wxxx xxx - Analyzer version number * 100 (read only)
Microphone field correction	**H**	H0:n - **Free** field in channel n H1:n - **Diffuse** field in channel n
Channel mode	**Z**	Z0:n - Vibration LM / Analyzer for channel n Z1:n - Sound Level Meter / Analyzer for channel n
Calibration factor	**Q**	Qnnnn:c nnnn - real number with the value of the calibration factor for channel c in dB ∈(-99.9 ÷ 99.9)
Measurement function	**M**	M1 - **Level Meter** M2 - **1/1 OCTAVE analyser** M3 - **1/3 OCTAVE analyser** M4 - **Sound dosimeter** M6 - **FFT analyser** M8 - **Reverberation Time (RT60)** M13 - **FFT Cross-Spectrum** M14 - **FFT Intensity** M17 - **Wave recorder**

Execution of **1/1 OCTAVE**, **1/3 OCTAVE** or **FFT** analysis in channel n	**e**	e0:n - Spectrum analysis in channel n disabled e1:n - Spectrum analysis in channel n enabled
Range of channel n	**R**	R1:n - **Low** (**SLM**) or **Low** (**VLM**) R2:n - **High** (**SLM**) or **High** (**VLM**)
Results displayed on the screen	**P**	P1 - **CHANNEL 1, PROFILE 1** (read only) P2 - **CHANNEL 2, PROFILE 1** (read only) P3 - **CHANNEL 3, PROFILE 1** (read only) P4 - **CHANNEL 4, PROFILE 1** (read only) P5 - **CHANNEL 1, PROFILE 2** (read only) P6 - **CHANNEL 2, PROFILE 2** (read only) P7 - **CHANNEL 3, PROFILE 2** (read only) P8 - **CHANNEL 4, PROFILE 2** (read only) P9 - **CHANNEL 1, PROFILE 3** (read only) P10- **CHANNEL 2, PROFILE 3** (read only) P11 - **CHANNEL 3, PROFILE 3** (read only) P12 - **CHANNEL 4, PROFILE 3** (read only)
Filter type in profile for **SLM**	**F**	F1:m **LIN** filter for profile m F2:m **A** filter for profile m F3:m **C** filter for profile m F4:m **G** filter for profile m m = ChannelNo + 4 * (ProfileNo - 1)
Filter type in **1/1 OCTAVE** or **1/3 OCTAVE** analysis in channel n for **SLM**	**f**	f0:n - **HP** filter in channel n f1:n - **LIN** filter in channel n f2:n - **A** filter in channel n f3:n - **C** filter in channel n
Filter type in **FFT** analysis in channel n for **SLM**	**j**	j0:n - **HP** filter in channel n j1:n - **LIN** filter in channel n j2:n - **A** filter in channel n j3:n - **C** filter in channel n
Filter type in **1/1 OCTAVE** or **1/3 OCTAVE** analysis in channel n for **VLM**	**i**	i0:n - **HP** filter in channel n (read only)
Filter type in **FFT** analysis in channel n for **VLM**	**k**	k0:n - **HP** filter in channel n (read only)

Filter type in profile for **VLM**	**I**	I1:m **HP1** filter for profile m I2:m **HP3** filter for profile m I3:m **HP10** filter for profile m I4:m **Vel1** filter for profile m I5:m **Vel3** filter for profile m I6:m **Vel10** filter for profile m I7:m **VelMF** filter for profile m I8:m **Dil1** filter for profile m I9:m **Dil3** filter for profile m I10:m **Dil10** filter for profile m I11:m **W–Bxy** filter for profile m I12:m **W–Bz** filter for profile m I13:m **H–A** filter for profile m I14:m **W–Bc** filter for profile m I15:m **KB** filter for profile m I16:m **Wk** filter for profile m I17:m **Wd** filter for profile m I18:m **Wc** filter for profile m I19:m **Wj** filter for profile m I20:m **Wm** filter for profile m I21:m **Wh** filter for profile m I22:m **Wg** filter for profile m I23:m **Wb** filter for profile m I25:m **Wv** filter for profile m I28:m **Wz** filter for profile m m = ChannelNo + 4 * (ProfileNo - 1) (read only for 2nd and 3rd profile)
Detector type in profile for **SLM**	**C**	C0:m - **IMPULSE** detector in profile m C1:m - **FAST** detector in profile m C2:m - **SLOW** detector in profile m m = ChannelNo + 4 * (ProfileNo - 1)
Detector type in profile for **VLM**	**E**	E0:m - **100 ms** detector in profile m E1:m - **125 ms** detector in profile m E2:m - **200 ms** detector in profile m E3:m - **500 ms** detector in profile m E4:m - **1 s** detector in profile m E5:m - **2 s** detector in profile m E6:m - **5 s** detector in profile m E7:m - **10 s** detector in profile m m = ChannelNo + 4 * (ProfileNo - 1) (read only for 2nd and 3rd profile)

Logger type in profile in the case of **SLM**	**B**	B0:m - **None** logger in profile m Bxx:m - xx - sum of values for profile m: 1 – logger with **PEAK** values 2 – logger with **MAX** values 4 – logger with **MIN** values 8 – logger with **RMS** values m = ChannelNo + 4 * (ProfileNo - 1)
Storing the results of **1/1 OCTAVE** or **1/3 OCTAVE** analysis in channel n in logger file in the case of **SLM**	**b**	b0:n - switched off (**None**) in channel n b4:n - switched on (**RMS/LEQ**) in channel n
Storing the results of **FFT** analysis in channel n in logger file	**v**	v0:n - switched off (**none**) in channel n v4:n - switched on (**RMS**) in channel n (read only)
Logger type in profile in the case of **VLM**	**G**	G0:m - **None** logger in profile Gxx:m - xx - sum of values for profile m: 1 – logger with **PEAK** values 2 – logger with **P–P** values 4 – logger with **MAX** values 8 – logger with **RMS** values 16 – logger with **VDV** values m = ChannelNo + 4 * (ProfileNo - 1)
Storing the results of **1/1 OCTAVE** or **1/3 OCTAVE** analysis in channel n in logger file	**g**	g0:n - switched off (**none**) in channel n g4:n - switched on (**RMS**) in channel n
Logger time step	**d**	dnnnn - nnnn number in milliseconds ∈(**10**, **20**, **50**, **100**, **200**, **500**, **1000**) dnns - nn number in seconds ∈(1 ÷ 60) dnnm - nn number in minutes ∈(1 ÷ 60)
Integration time	**D**	D0 “infinite” number Dnns nn number in seconds Dnnm nn number in minutes Dnnh nn number in hours
Repetition cycle	**K**	K0 - infinity (measurement stopped when the STOP button is pressed or when remote setting S0 is received) Knnnn -nnnn number of repetitions ∈(1 ÷ 1000)
Detector type in the **LEQ** (for **SLM**) and/or **RMS** (for **VLM**) function	**L**	L0 - **LINEAR** L1 - **EXPONENTIAL**
Band of the **FFT** analysis in channel n	**r**	r1:n - **22.4 kHz** band of **FFT** analysis in channel n r2:n - **11.2 kHz** band of **FFT** analysis in channel n r3:n - **5.6 kHz** band of **FFT** analysis in channel n r4:n - **2.8 kHz** band of **FFT** analysis in channel n r5:n - **1.4 kHz** band of **FFT** analysis in channel n r6:n - **700 Hz** band of **FFT** analysis in channel n r7:n - **350 Hz** band of **FFT** analysis in channel n r8:n - **175 Hz** band of **FFT** analysis in channel n r9:n - **87.5 Hz** band of **FFT** analysis in channel n

Lines in **FFT** analysis in channel n	**u**	u0:n - **1920** lines in channel n u1:n - **960** lines in channel n u2:n - **480** lines in channel n
Window in the **FFT** analysis in channel n	**w**	w0:n - **HANNING** in channel n w1:n - **RECTANGLE** in channel n w2:n - **FLAT TOP** in channel n w3:n - **KAISER–BESSEL** in channel n
Averaging in the **FFT** analysis in channel n	**a**	a0:n - **LINEAR** in channel n
Trigger Mode (TriggerMode)	**m**	m0 - **OFF** m1 - **SLOPE +** m2 - **SLOPE –** m3 - **LEVEL +** m4 - **LEVEL –** m6 - **GRAD +** m7 - **RTC**
Source of the triggering signal for measurement functions: M1 and M6 (TriggerSource)	**s**	s0 - Vector value s1 - Vector and sound value s2 - **RMS** value from profile 1 s3 - External trigger
Channel of the triggering signal	**c**	c1 - channel 1 c2 - channel 2 c3 - channel 3 c4 - channel 4
Source of the triggering signal for measurement function M2 with the selection TriggerMode=LOGGER (TriggerOctSource)	**o**	o0 - Vector value o1 - Vector and sound value o2 - **RMS** from profile 1 value o3 - External trigger onn - nn number of the filter in **1/1 OCTAVE** spectra ∈(8 ÷ NOct), respectively: 8 - 125 Hz, 9 - 250 Hz, ..., 15 - 16 kHz; NOct = 15 - number of filters in **1/1 OCTAVE** analysis
Source of the triggering signal for measurement function M3 with the selection TriggerMode=LOGGER (TriggerTerSource)	**t**	t0 - Vector value t1 - Vector and sound value t2 - **RMS** from profile 1 value t3 - External trigger tnn - nn filter's number in **1/3 OCTAVE** spectra ∈ (23 ÷ NTer), respectively: 23 - 125 Hz, 24 - 160 Hz, , 45 - 20 kHz; NTer = 45 - number of filters in **1/3 OCTAVE** analysis
SLM's trigger level (TriggerLev)	**l**	lxxx - xxx level given in dB ∈(24 ÷ 136)
VLM's trigger level (TriggerLev)	**n**	nxxx - xxx level given in dB ∈(60 ÷ 200)
VLM's vector trigger level (VecTriggerLev)	**h**	hxxx - xxx level given in dB ∈(60 ÷ 200)
Number of the records from the logger taken into account before the fulfilment of the triggering condition (TriggerPre)	**p**	pnn - nn number of the records taken into account before the fulfilment of the triggering condition ∈(0 ÷ 20)

Number of the records from the logger taken into account after the fulfilment of the triggering condition (TriggerPost)	**q**	qnn - number of the records taken into account after the fulfilment of the triggering condition ∈(0 ÷ 200)
Delay in the start of measurement	**Y**	Ynn nn delay given in milliseconds ∈(0 ÷ 60000)
Reference level for acceleration (RefLev_a)	**Xa**	Xannn nnn reference level for acceleration given in μms^{-2} ∈(1 ÷ 100)
Reference level for velocity (RefLev_v)	**Xv**	Xvnnn nnn reference level for velocity given in nms^{-1} ∈(1 ÷ 100)
Reference level for displacement (RefLev_d)	**Xd**	Xdnnn nnn reference level for displacement given in pm ∈(1 ÷ 100)
AutoSave option	**XA**	XA0 - switched OFF XA1 - switched ON, file names are numbered
Saving results of statistical analysis	**XS**	XS0 - switched off XS1 - switched on
Using the RAMfile instead of the flash disk while storing results with the AutoSave option switched on	**XR**	XR0 - switched OFF XR1 - switched ON
External I/O Mode	**x**	x0 - **AC/Int.** in **Analogue** mode x1 - **AC/Int.** in **Digital In** mode x2 - **AC/Int.** in **Digital Out** mode
External I/O Channel for analogue **AC/Int.** mode	**y**	yn - n - channel number between 1 and 4
State of the instrument (Stop or Start)	**S**	S0 - **STOP** S1 - **START/CONTINUE** S2 - PAUSE S3 - waiting for trigger (read only)
Menu lock mode	**Xb**	Xb0 - menu unlocked Xb1 - menu partially locked Xb2 - menu fully locked
Channel selection for vibration vector calculation	**XB**	XB0:n - channel n is not included in vector XB1:n - channel n is included in vector
Channel coefficient for vector calculation	**XC**	XCxx:n - xx - value of coefficient *100 ∈(0 ÷ 200) - n - channel number
Storing vector in logger file	**XD**	XD0 - switched OFF XD1 - switched ON
Measurement of vibration dose	**XE**	XE0 - switched OFF XE1 - switched ON
Vibration dose exposure time	**XF**	XFnn nn - time in minutes ∈(0 ÷ 1440)

Vibration dose standard	**XG**	XG0 - Great Britain XG1 - Italy XG2 - Poland XG3 - French XG4 - user defined XG5 - Germany XG6 - China
X axis for vibration dose measurement	**XH**	XHn n - channel number (1..4)
Y axis for vibration dose measurement	**XI**	XIn n - channel number (1..4)
Z axis for vibration dose measurement	**XJ**	XJn n - channel number (1..4)
Outdoor microphone correction for channel n	**XK**	XK0:n - outdoor correction is OFF XK1:n - outdoor correction for SA203 kit (channel 4 only) XK2:n - outdoor correction for SA277C kit (channel 4 only) XK3:n - outdoor correction for SA277D kit (channel 4 only)
Expose time for dosimeter	**XL**	XLnn nn - time given in minutes
Criterion Time level for dosimeter	**XM**	XM0 - 80 dB XM1 - 84 dB XM2 - 85 dB XM3 - 90 dB
Threshold level for dosimeter	**XN**	XN0 - none XN1 - 75 dB XN2 - 80 dB XN3 - 85 dB XN4 - 90 dB
Exchange Rate level for dosimeter	**XO**	XOnn nn - level given in dB ∈ [2,5]
Spectrum **MAX** store	**XT**	XT0 spectrum **MAX** switched OFF XT1 spectrum **MAX** switched ON
Spectrum **MIN** store	**Xt**	Xt0 spectrum **MIN** switched OFF Xt1 spectrum **MIN** switched ON
Trigger gradient level for **SLM**	**Xg**	Xgnn - nn – gradient level in dB/ms ∈ [1,100]
Trigger gradient level for **VLM**	**Xh**	Xgnn - nn – gradient level in dB/ms ∈ [1,100]
RTC trigger start time	**Xr**	Xrnn - nn – time in seconds ∈ [0,86399]
RTC trigger step time	**Xs**	Xs0 - use integration time for step Xsnn - nn – step in seconds ∈ [1,86400]

Function for Digital In **AC/Int.** mode	**XP**	XP0 - trigger pulse
Function for Digital Out **AC/Int.** mode	**XQ**	XQ0 - trigger pulse XQ1 - alarm pulse
AC/Int. polarization	**XU**	XU0 - positive XU1 - negative
AC/Int. active level	**XV**	XV0 - active low XV1 - active high
Vector alarm mode	**Xc**	Xc0:0 - **OFF** Xc1:0 - **LEVEL -** Xc2:0 - **LEVEL +** Xc3:0 - **SLOPE -** Xc4:0 - **SLOPE +** Xc5:0 - **GRADIENT -** Xc6:0 - **GRADIENT +**
Vector alarm step	**Xe**	Xe0:0 - logger step Xe1:0 - 100 ms Xe2:0 - 1 s Xe3:0 - current Xe4:0 - integration period
Vector alarm level	**Xf**	Xfnnn:0 - nnn alarm level in dB*10
Profile alarm mode for **VLM**	**Xi**	Xi0:P:K - **OFF** Xi1:P:K - **LEVEL -** Xi2:P:K - **LEVEL +** Xi3:P:K - **SLOPE -** Xi4:P:K - **SLOPE +** Xi5:P:K - **GRADIENT -** Xi6:P:K - **GRADIENT +** P - profile number K - number of alarm in profile
Profile alarm mode for **SLM**	**Xj**	Xj0:P:K - **OFF** Xj1:P:K - **LEVEL -** Xj2:P:K - **LEVEL +** Xj3:P:K - **SLOPE -** Xj4:P:K - **SLOPE +** Xj5:P:K - **GRADIENT -** Xj6:P:K - **GRADIENT +** P - profile number K - number of alarm in profile

Integration period for **VLM** profile alarm	**Xk**	Xk0:P:K - logger step Xk1:P:K - 100 ms Xk2:P:K - 1 s Xk3:P:K - current Xk4:P:K - integration period P - profile number K - number of alarm in profile
Integration period for **SLM** profile alarm	**Xl**	Xl0:P:K - logger step Xl1:P:K - 100 ms Xl2:P:K - 1 s Xl3:P:K - current Xl4:P:K - integration period P - profile number K - number of alarm in profile
Profile alarm source for **VLM**	**Xm**	Xm1:P:K - **PEAK** Xm2:P:K - **P–P** Xm3:P:K - **MAX** Xm4:P:K - **MIN** Xm5:P:K - **RMS** Xm6:P:K - **VDV** P - profile number K - number of alarm in profile
Profile alarm source for **SLM**	**Xn**	Xn7:P:K - **PEAK** Xn8:P:K - **MAX** Xn9:P:K - **MIN** Xn10:P:K - **RMS** P - profile number K - number of alarm in profile
Profile alarm level for **VLM**	**Xo**	XoN:P:K - N – level in dB*10 P - profile number K - number of alarm in profile
Profile alarm level for **SLM**	**Xp**	XpN:P:K - N – level in dB*10 P - profile number K - number of alarm in profile

1/1 OCTAVE alarm mode for **VLM**	**XXa**	XXa0:P:K - **OFF** XXa1:P:K - **LEVEL -** XXa2:P:K - **LEVEL +** XXa3:P:K - **SLOPE -** XXa4:P:K - **SLOPE +** XXa5:P:K - **GRADIENT -** XXa6:P:K - **GRADIENT +** P - channel number K - number of alarm in channel
1/1 OCTAVE alarm mode for **SLM**	**XXb**	XXb0:P:K - **OFF** XXb1:P:K - **LEVEL -** XXb2:P:K - **LEVEL +** XXb3:P:K - **SLOPE -** XXb4:P:K - **SLOPE +** XXb5:P:K - **GRADIENT -** XXb6:P:K - **GRADIENT +** P - channel number K - number of alarm in channel
1/1 OCTAVE alarm period for **VLM**	**XXc**	XXc0:P:K - logger step XXc1:P:K - 100 ms XXc2:P:K - 1 s XXc3:P:K - current XXc4:P:K - integration period P - channel number K - number of alarm in channel
1/1 OCTAVE alarm period for **SLM**	**XXd**	XXd0:P:K - logger step XXd1:P:K - 100 ms XXd2:P:K - 1 s XXd3:P:K - current XXd4:P:K - integration period P - channel number K - number of alarm in channel
1/1 OCTAVE alarm source for **VLM**	**XXe**	XXe11:P:K - 1 Hz band ... XXe25:P:K - 16 kHz band P - channel number K - number of alarm in channel

1/1 OCTAVE alarm source for **SLM**	**XXf**	XXf11:P:K - 1 Hz band ... XXf25:P:K - 16 kHz band P - channel number K - number of alarm in channel
1/1 OCTAVE alarm level for **VLM**	**XXg**	XXgN:P:K - N – level in dB*10 P - channel number K - number of alarm in channel
1/1 OCTAVE alarm level for **SLM**	**XXh**	XXhN:P:K - N – level in dB*10 P - channel number K - number of alarm in channel
1/3 OCTAVE alarm mode for **VLM**	**XXA**	XXA0:P:K - **OFF** XXA1:P:K - **LEVEL -** XXA2:P:K - **LEVEL +** XXA3:P:K - **SLOPE -** XXA4:P:K - **SLOPE +** XXA5:P:K - **GRADIENT -** XXA6:P:K - **GRADIENT +** P - channel number K - number of alarm in channel
1/3 OCTAVE alarm mode for **SLM**	**XXB**	XXB0:P:K - **OFF** XXB1:P:K - **LEVEL -** XXB2:P:K - **LEVEL +** XXB3:P:K - **SLOPE -** XXB4:P:K - **SLOPE +** XXB5:P:K - **GRADIENT -** XXB6:P:K - **GRADIENT +** P - channel number K - number of alarm in channel
1/3 OCTAVE alarm period for **VLM**	**XXC**	XXC0:P:K - logger step XXC1:P:K - 100 ms XXC2:P:K - 1 s XXC3:P:K - current XXC4:P:K - integration period P - channel number K - number of alarm in channel

1/3 OCTAVE alarm period for **SLM**	**XXD**	XXD0:P:K - logger step XXD1:P:K - 100 ms XXD2:P:K - 1 s XXD3:P:K - current XXD4:P:K - integration period P - channel number K - number of alarm in channel
1/3 OCTAVE alarm source for **VLM**	**XXE**	XXE11:P:K - 0.8 Hz band ... XXE55:P:K - 20 kHz band P - channel number K - number of alarm in channel
1/3 OCTAVE alarm source for **SLM**	**XXF**	XXF11:P:K - 0.8 Hz band ... XXF55:P:K - 20 kHz band P - channel number K - number of alarm in channel
1/3 OCTAVE alarm level for **VLM**	**XXG**	XXGN:P:K - N – level in dB*10 P - channel number K - number of alarm in channel
1/3 OCTAVE alarm level for **SLM**	**XXH**	XXHN:P:K - N – level in dB*10 P - channel number K - number of alarm in channel
GROUND VIBRATIONS FFT mode	**XXXk**	XXXk0 - CONTINUOUS XXXk1 - SINGLE
GROUND VIBRATIONS FFT pretrigger	**XXXl**	XXXlN - N - pretrigger time in ms ∈ [0;250]
GROUND VIBRATIONS Band	**XXXm**	XXXm6 - **1.4 kHz** band XXXm8 - **700 Hz** band XXXm10 - **350 Hz** band XXXm12 - **175 Hz** band
GROUND VIBRATIONS 2nd profile filter	**XXXn**	XXXn4 **Vel1** filter XXXn5 **Vel3** filter XXXn6 **Vel10** filter

GROUND VIBRATIONS 2nd profile detector	**XXXo**	XXXo0 - **100 ms** detector XXXo1 - **125 ms** detector XXXo2 - **200 ms** detector XXXo3 - **500 ms** detector XXXo4 - **1 s** detector XXXo5 - **2 s** detector XXXo6 - **5 s** detector XXXo7 - **10 s** detector
GROUND VIBRATIONS spectrum type	**XXXp**	XXXp0 - no spectrum analysis XXXp2 - 1/1 octave velocity analysis XXXp6 - FFT velocity analysis
Spectrum enabled	**e**	e0:c - spectrum measurement disabled in channel c e1:c - spectrum measurement enabled in channel c
VecTrgAct	**Xq**	Vector trigger actions Xq0:0 - None XqNN:0 - NN - sum of values: 1 – alarm signal 2 – start logging 4 – start wave recording 8 – send SMS 16 – send e-mail
vProfTrgAct	**Xu**	Profile trigger actions in VLM mode Xu0:P:K - **None** logger in profile XuNN:P:K - NN - sum of values: 1 – alarm signal 2 – start logging 4 – start wave recording 8 – send SMS 16 – send e-mail P - profile number K - number of alarm in profile
sProfTrgAct	**Xw**	Profile trigger actions in SLM mode Xw0:P:K - **None** logger in profile XwNN:P:K - NN - sum of values: 1 – alarm signal 2 – start logging 4 – start wave recording 8 – send SMS 16 – send e-mail P - profile number K - number of alarm in profile
vProfTrgGradLvl	**Xy**	XyN:P:K - N – gradient level in dB P - profile number K - number of alarm in profile
sProfTrgGradLvl	**Xz**	XzN:P:K - N – gradient level in dB P - profile number K - number of alarm in profile

vOctTrgAct	**XXi**	1/1 octave trigger actions in VLM mode XXi0:P:K - **None** logger in profile XXiNN:P:K - NN - sum of values: 1 – alarm signal 2 – start logging 4 – start wave recording 8 – send SMS 16 – send e-mail P - channel number K - number of alarm in profile
vTerTrgAct	**XXI**	1/3 octave trigger actions in VLM mode XXI0:P:K - **None** logger in profile XXINN:P:K - NN - sum of values: 1 – alarm signal 2 – start logging 4 – start wave recording 8 – send SMS 16 – send e-mail P - channel number K - number of alarm in profile
sOctTrgAct	**XXj**	1/1 octave trigger actions in SLM mode XXj0:P:K - **None** logger in profile XXjNN:P:K - NN - sum of values: 1 – alarm signal 2 – start logging 4 – start wave recording 8 – send SMS 16 – send e-mail P - channel number K - number of alarm in profile
sTerTrgAct	**XXJ**	1/3 octave trigger actions in SLM mode XXJ0:P:K - **None** logger in profile XXJNN:P:K - NN - sum of values: 1 – alarm signal 2 – start logging 4 – start wave recording 8 – send SMS 16 – send e-mail P - channel number K - number of alarm in profile
Logger on trigger	**XXk**	Logging on trigger XXk0 - OFF XXk1 - ON
Wave on trigger	**XXl**	Writing wave on trigger XXl:0 - OFF XXl:1 - ON
Logger mode	**XXm**	XXm0 - logging disabled XXm1 - logger XXm2 - timesignal
modem enabled	**XXn**	XXn0 - OFF XXn1 - GPRS

modem autoconf	**XXo**	modem autoconfiguration XXo0 - OFF XXo1 - ON
SIM auth mode	**XXr**	XXr0 - none XXr1 - PAP XXr2 - CHAP XXr3 - MsCHAP
modem connType	**XXq**	modem connection type XXq0 - TCP server XXq1 - TCP client XXq2 - UDP client
modem auto registration	**XXp**	XXp0 - OFF XXp1 - ON XXp2 - AS XXp3 - smart AS XXp4 - DynDNS
modem autorecon	**XXs**	modem automatic reconnection XXs0 - OFF XXs1 - ON
modem reconnection delay	**XXt**	XXtnns nn number in seconds XXtnnm nn number in minutes XXtnnh nn number in hours
SMS recipient	**XXK**	XXKsss - sss - recipient phone number string
SMS text	**XXL**	XXLsss - sss - constant part of message
SMS mode	**XXM**	XXM0 - list all triggers XXM1 - single message per trigger
server address	**XXN**	XXNsss - sss - address string
server data port	**XXO**	XXOsss - sss - data port number string
server registration port	**XXP**	XXPsss - sss - registration port number string
DNS address	**XXQ**	XXNsss - sss - DNS server address string
SIM Apn	**XXR**	XXRsss - sss - Apn string
SIM user	**XXS**	XXSsss - sss - user string
SIM pass	**XXT**	XXTsss - sss - SIM password string
vOctTrgGradLvl	**XXy**	1/1 octave trigger gradient level in VLM mode XXyN:P:K - N – gradient level in dB P - channel number K - number of alarm in channel
vTerTrgGradLvl	**XXY**	1/3 octave trigger gradient level in VLM mode XXYN:P:K - N – gradient level in dB P - channel number K - number of alarm in channel
sOctTrgGradLvl	**XXz**	1/1 octave trigger gradient level in SLM mode XXzN:P:K - N – gradient level in dB P - channel number K - number of alarm in channel

sTerTrgGradLvl	**XXZ**	1/3 octave trigger gradient level in SLM mode XXZN:P:K - N – gradient level in dB P - channel number K - number of alarm in channel
email server address	**XXXa**	XXXasss - sss - address string
email server login	**XXXb**	XXXbsss - sss - login name string
email server password	**XXXc**	XXXcsss - sss - password string
email sender	**XXXd**	XXXdsss - sss - email sender name string
email recipient	**XXXe**	XXXesss - sss - email recipient address string
email subject	**XXXf**	XXXfsss - sss - subject string
email text	**XXXg**	XXXgsss - sss - email fixed text part string
email server port	**XXXh**	XXXhsss - sss - email server port string
save meteo	**XXXi**	XXXi0 - OFF XXXi1 - save meteo results in results file
meteo logger	**XXXj**	XXXj0 - OFF XXXj1 - save meteo results in the logger file
modem alphabet	**XXXA**	XXXA0 XXXA1
keepalive	**XXXq**	Modem connection keep alive XXXq0 - OFF XXXq1 - reopen XXXq2 - ping XXXq3 - ping and reopen
email flags	**XXXr**	
extIO alarm hold time	**XXXs**	XXXsN - minimum time alarm will be signalled N - number of seconds [0,900]
startSync	**XXXt**	Measurement start synchronization XXXt0 - OFF XXXt60 - 1 minute XXXt900 - 15 minutes XXXt1800 - 30 minutes XXXt3600 - 1 hour
DynDNS address	**XXXF**	XXXFsss sss - address string
DynDNS hostname	**XXXG**	XXXGsss sss - name string
DynDNS login	**XXXH**	XXXGsss sss - login string
DynDNS password	**XXXI**	XXXIsss sss - password string
MicNoise	**XXXu**	Microphone noise compensation XXXu0 - OFF XXXu1 - ON
pwrOnStart	**XXXv**	Measurement autostart on device power on XXXv0 - OFF XXXv1 - ON
Outdoor microphone direction correction	**XXXw**	XXXw0:n - airport XXXw1:n - environment

Appendix B. DATA FILE STRUCTURES (v4.16)

B.1. STRUCTURE OF THE SVAN 958A FILE

Each file containing data from the SVAN 95x instrument consists of several groups of words. In the case of the **SVAN 958A** there are some different types of files that contain:

- the measurement results from the **L**evel **M**eter mode (cf. App. B.2);
- the results from **1/1 OCTAVE** analysis (cf. App. B.3);
- the results from **1/3 OCTAVE** analysis (cf. App. B.4);
- the results from the **FFT** analysis (cf. App. B.5);
- the results from the **L**evel **M**eter mode stored in the file in the instrument's logger (cf. App. B.6 and App. B.10);
- the results from **1/1 OCTAVE** or **1/3 OCTAVE** analysis stored in the file in the instrument's logger (cf. App. B.7 and App. B.10);
- the results from the **FFT** analysis stored in the file in the instrument's logger (cf. App. B.8 and App. B.10);
- the setup data of the instrument (cf. App.B.9);
- the results coming from **RT60** measurement (cf. App. B.10);
- the averaged results of **RT60** measurements (cf. App. B.11);
- time-domain signal saved in the logger file of the instrument (cf. App. B.12 and App. B.14).

Each file has the following elements:

- a file header (cf. Tab. B.1.1);
- the unit and internal software specification (cf. Tab. B.1.2);
- the marker for the end of the file (cf. Tab. B.1.25).

The other elements of the file structure are not obligatory for each file type stated above. They depend on the file type (**LM**, **1/1 OCTAVE**, **1/3 OCTAVE**, **RT60** or **FFT** analysis, file from the logger, setup file). These elements are as follows:

- the parameters and global settings, common for all channels (cf. Tab. B.1.3);
- the hardware settings for channels (cf. Tab. B.1.4);
- the software settings for channels (cf. Tab. B.1.5);
- the **VECTOR** measurement settings (cf. Tab. B.1.6);
- the **1/1 OCTAVE** or **1/3 OCTAVE** analysis header (cf. Tab. B.1.7);
- the hand-arm and whole-body vibration dose measurement settings (cf. Tab. B.1.9);
- the main results (cf. Tab. B.1.10);
- the selected statistical levels in channels (cf. Tab. B.1.11);
- the results coming from **1/1 OCTAVE** analysis (cf. Tab. B.1.12);
- the results coming from **1/3 OCTAVE** analysis (cf. Tab. B.1.13);
- the totals description in **1/1 OCTAVE** or **1/3 OCTAVE** analysis (cf. Tab. B.1.16);
- the user-defined filter description (cf. Tab. B.1.17);
- the header of the **FFT** analysis (cf. Tab. B.1.8);
- the results of the **FFT** analysis (cf. Tab. B.1.14);
- the header of the statistical analysis (cf. Tab. B.1.18);
- the results of the statistical analysis (cf. Tab. B.1.19);
- the statistical analysis results performed in **1/1 OCTAVE** or **1/3 OCTAVE** mode (cf. Tab. B.1.20);

- the logger header (cf. Tab. B.1.22);
- the **1/1 OCTAVE** or **1/3 OCTAVE** logger header (cf. Tab. B.1.23);
- the data stored during the measurements in the logger (cf. Tab. B.1.24);
- the setup data of the instrument (cf. Tab. B.1.26);
- the user-defined filters (cf. Tab. B.1.27);
- the **1/3 OCTAVE** analysis header in **RT60** mode (cf. Tab. B.1.28);
- the **RT60** measurement parameters (cf. Tab. B.1.29);
- the results coming from **RT60** measurement in a channel (cf. Tab. B.1.30);
- the averaged results from **RT60** measurement in a channel (cf. Tab. B.1.31);
- the results coming from **RT60** measurements averaged between the channels (cf. Tab. B.1.32);
- the averaged results coming from **RT60** measurements averaged between channels (cf. Tab. B.1.33);
- the results coming from rotation measurements (cf. Tab. B.1.34);
- the time-domain logger header (cf. Tab. B.1.35);
- the **SEAT** measurements settings (cf. Tab. B.1.36);
- the Max results coming from **1/1 OCTAVE** analysis (cf. Tab. B.1.37);
- the Min results coming from **1/1 OCTAVE** analysis (cf. Tab. B.1.38);
- the Max results coming from **1/3 OCTAVE** analysis (cf. Tab. B.1.39);
- the Min results coming from **1/3 OCTAVE** analysis (cf. Tab. B.1.40);
- the trigger settings (cf. Tab. B.1.41, Tab.B.1.42);
- the settings for **CROSS SPECTRUM** analysis (cf. Tab.B.1.43);
- the results of **CROSS SPECTRUM** analysis (cf. Tab.B.1.44);
- the results of **SOUND INTENSITY** analysis (cf. Tab.B.1.45).
- the Peak results coming from **1/1 OCTAVE** analysis (cf. Tab. B.1.46);
- the Peak results coming from **1/3 OCTAVE** analysis (cf. Tab. B.1.47);

Below, all file structure groups are described separately in Tab. B.1.1 ÷ Tab. B.1.47. 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 least significant byte (LSB) of the word. The format **0xnnnn** means that the **nnnn** is four-digit number in hexadecimal form.

Table B.1.1. File header

Word number	Name / Value	Comment
0	0xnn01	[01, nn=header_length]
1..4	FileName	file or logger name (8 characters) if the name starts with two '@' characters, following 6 bytes contain measurement date and time coded as BCD (each saved digit is increased by one)
5	FileType	0x0000 - file containing results from logger's file 0x01nn - file containing measurements results 0x0200 - file containing instrument's setup data 0x4000 - file containing time-domain signal
6	CurrentDate	file creation date
7	CurrentTime	file creation time
8..11	AssBufFileName	name of the associated logger or file (8 bytes)
…	…	…

Table B.1.2. Unit and software specification

Word number	Name / Value	Comment
0	0xnn02	[02, nn=specification_length]
1	UnitNumber	unit number. If 0 unit number is in the UnitNumber32 field
2	UnitType	unit type: 958
3	SoftwareVersion	software version * 100
4	SoftwareIssueDate	software issue date
5	UnitSubtype	unit subtype: 4
6	FilesystemVersion	file system version * 100
7	LevelMeterVersion	meter software version * 100
8	0xmmcc	[mm=software minor version, cc=software subversion char]
9..10	UnitNumber32	unit number
…	…	…

Table B.1.3. Parameters and global settings

Word number	Name / Value	Comment
0	0xnn04	[04, nn=block_length]
1	CycleStartDate	measurement cycle start date
2	CycleStartTime	measurement cycle start time
3	DeviceFunction	1 - **LEVEL METER**, 2 - **1/1 OCTAVE** analyser, 3 - **1/3 OCTAVE** analyser, 4 - sound **DOSE METER**, 6 - **FFT** analyser, 8 - **RT60** meter, 13 - **CROSS-SPECTRUM**, 14 - **SOUND INTENSITY**, 17 - **WAVE RECORDER**

4	UnitFlags	flags word (16 bits): b15 ... b3 b2 b1 b0 **b0** - if set to 1: calibration coefficient is used **b1** - if set to 1: overload occurred b2 - if set to 1: "Human vibrations" excluded (0 - means "Human vibrations" included and then **VDV** result is present) **b5,b4,b3: type of the result** Result[p][7] (p = 1,2,3,4) 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 b6 - if set to 1: overload occurred in the 4th channel b7 - if set to 1: overload occurred in the 3rd channel b8 - if set to 1: overload occurred in the 2nd channel b9 - if set to 1: overload occurred in the 1st channel b10, ..., b15 - reserved
5	RepCycle	0 - infinity nnnn - number of repetitions $\in(1 \div 1000)$
6	StartDelay	start delay time specified in milliseconds $\in(1 \div 60000)$
7..8	IntTimeSec	0 - infinity integration time specified in seconds
9	MeasureTriggerChannel	source channel of the triggering signal: 0 (the 1st channel) .. 3 (the 4th channel)
10	MeasureTriggerMode	trigger mode: 0 - **OFF**, 1 - **SLOPE+**, 2 - **SLOPE–** , 3 - **LEVEL+**, 4 - **LEVEL–**, 6 - **GRADIENT+**, 7 - **RTC**
11	MeasureTriggerSource	source of the triggering signal: 0 - the **VEC** result 1 - the **VEC** result and **RMS(1)** result from selected channel 2 - the **RMS(1)** result from the selected channel 3 - the External trigger in the case of **1/1 OCTAVE** analyser: nn - number of **1/1 OCTAVE** filter $\in(8 \div$ NOct) in the case of **1/3 OCTAVE** analyser nn - number of **1/3 OCTAVE** filter $\in(23 \div$ NTer) in the case of **RT60** analyser: nn - number of **TOTAL LIN** result (48)
12	MeasureTriggerLev	level of triggering: 24..136 dB in the case of source channel set in Sound Meter mode, 60..200 dB in the case of source channel in Vibration Meter mode negative value [dB] in **RT60** - DECAY mode
13	MeasureVecTriggerLev	level of triggering for **VEC** result: 60..200 dB

14	LoggerTriggerPre	number of the records taken into account before the fulfilment of the triggering condition ∈(1 ÷ 20)
15	LoggerTriggerPost	number of the records taken into account after the fulfilment of the triggering condition ∈(1 ÷ 200)
16	LeqInt	detector's type in the **LEQ** function: 0 - **LINEAR**, 1 - **EXPONENTIAL**
17	Reserved	reserved
18	RefLev_a	reference level for acceleration given in μms^{-2} ∈(1 ÷ 100)
19	RefLev_v	reference level for velocity given in nms^{-1} ∈(1 ÷ 100)
20	RefLev_d	reference level for displacement given in pm ∈(1 ÷ 100)
21	NofChannels	number of channels (4)
22	NofProfiles	number of profiles (12)
23	NotSpect	number of spectrum (4)
24	LowesTerFreq	the lowest possible 1/3 octave frequency (*100Hz)
25	CalibrType	calibration type: 0 - calibration not performed 1 - calibration by measurement 2 - calibration by sensitivity
26	CalibrDate	date of the last calibration
27	CalibrTime	time of the last calibration
28	MeasureTriggerGrad	the gradient level for gradient trigger mode
29	DoseExposureTime	exposure time for dosimeter function (min.)
30	DoseCriterionLev	criterion level (*100dB)
31	DoseTresholdLev	threshold level (*100dB)
32	DoseExchangeRate	exchange rate (dB)
33	RPM_On	RPM measurement: 0 - switched off; 1 - switched on
34	RPM_Pulse	pulses per rotation ∈(1 ÷ 360)
35	RPM_Buffer	RPM results logging: 0 - switched off; 1 - switched on
36	CycleMeasurementStartDate	measure start date
37..38	CycleMeasurementStartTime	measure start time
39..40	reserved	
41..42	startSync	measurement start synchronization point in seconds
43	reserved	
…	…	…

Table B.1.4. Hardware settings for channels

Word number	Name / Value	Comment
0	0xnn05	[05, nn=block_length]
1	0x0806	[06, 08=sub-block_length]

2	ChannelMode[1]	mode of the 1st channel 0 - Vibration Level Meter / Analyser 1 - Sound Level Meter / Analyser
3	CalibrFactor[1]	calibration factor (*10 dB) in the 1st channel
4	Range[1]	range in the 1st channel in the case of **SLM**: 1 - **Low**, 2 - **High** in the case of **VLM**: 1 - **Low**, 2 - **High**
5	MicComp	microphone noise compensation: 1-enabled in the case of **SLM**
6	MicFieldCorr[1]	field correction: 0 - **FREE**, 1 - **DIFFUSE** in the case of **SLM**
7	MicOutdoorType[1]	outdoor microphone kit correction in the case of **SLM**: 0 - disabled 1 - **SA203** 2 - **SA277C** 3 - **SA277D**
8	MicOutdoorDir[1]	outdoor correction of direction: 0 - airport 1 - environment
9	0x0706	[06, 08=sub-block_length]
10	ChannelMode[2]	mode of the 2nd channel: 0 - Vibration Level Meter / Analyser 1 - Sound Level Meter / Analyser
11	CalibrFactor[2]	calibration factor (*10 dB) in the 2nd channel
12	Range[2]	range in the 2nd channel: in the case of **SLM**: 1 - **Low**, 2 - **High** in the case of **VLM**: 1 - **Low**, 2 - **High**
13	MicComp	microphone noise compensation: 1-enabled in the case of **SLM**
14	MicFieldCorr[2]	field correction: 0 - **FREE**, 1 - **DIFFUSE** in the case of **SLM**
15	MicOutdoorType[2]	outdoor microphone kit correction in the case of **SLM**: 0 - disabled 1 - **SA203** 2 - **SA277C** 3 - **SA277D**
16	MicOutdoorDir[2]	outdoor correction of direction: 0 - airport 1 - environment
17	0x0706	[06, 08=subblock_length]
18	ChannelMode[3]	mode of the 3rd channel: 0 - Vibration Level Meter / Analyser 1 - Sound Level Meter / Analyser
19	CalibrFactor[3]	calibration factor (*10 dB) in the 3rd channel
20	Range[3]	range in the 3rd channel: in the case of **SLM**: 1 - **Low**, 2 - **High** in the case of **VLM**: 1 - **Low**, 2 - **High**
21	MicComp	microphone noise compensation: 1-enabled in the case of **SLM**
22	MicFieldCorr[3]	field correction: 0 - **FREE**, 1 - **DIFFUSE** in the case of **SLM**
23	MicOutdoorType[3]	outdoor microphone kit correction in the case of **SLM**: 0 - disabled 1 - **SA203** 2 - **SA277C** 3 - **SA277D**

24	MicOutdoorDir[3]	outdoor correction of direction: 0 - airport 1 - environment
25	0x0706	[06, 08=subblock_length]
26	ChannelMode[4]	mode of the 4th channel: 0 - Vibration Level Meter / Analyser 1 - Sound Level Meter / Analyser
27	CalibrFactor[4]	calibration factor (*10 dB) in the 4th channel
28	Range[4]	range in the 4th channel: in the case of **SLM**: 1 - **Low**, 2 - **High** in the case of **VLM**: 1 - **Low**, 2 - **High**
29	MicComp	microphone noise compensation: 1-enabled in the case of **SLM**
30	MicFieldCorr[4]	field correction: 0 - **FREE**, 1 - **DIFFUSE** in the case of **SLM**
31	MicOutdoorType[4]	outdoor microphone kit correction in the case of **SLM**: 0 - disabled 1 - **SA203** 2 - **SA277C** 3 - **SA277D**
32	MicOutdoorDir[4]	outdoor correction of direction: 0 - airport 1 - environment
…	…	…

Table B.1.5. Software settings for channels

Word number	Name / Value	Comment
0	0xnn07	[07, nn=block_length]
1	0x040C	[used_channel, used profile]
2..7	ProfileSett[1]	the 1st profile settings for the 1st channel, defined in the case of **SLM** mode - in Table **B.1.5_SLM** and in the case of **VLM** mode - in Table **B.1.5_VLM**
8..13	ProfileSett[2]	the 1st profile settings for the 2nd channel, defined in the case of **SLM** mode - in Table **B.1.5_SLM** and in the case of **VLM** mode - in Table **B.1.5_VLM**
14..19	ProfileSett[3]	the 1st profile settings for the 3rd channel, defined in the case of **SLM** mode - in Table **B.1.5_SLM** and in the case of **VLM** mode - in Table **B.1.5_VLM**
20..25	ProfileSett[4]	the 1st profile settings for the 4th channel, defined in the case of **SLM** mode - in Table **B.1.5_SLM** and in the case of **VLM** mode - in Table **B.1.5_VLM**
26..31	ProfileSett[5]	the 2nd profile settings for the 1st channel, defined in the case of **SLM** mode - in Table **B.1.5_SLM** and in the case of **VLM** mode - in Table **B.1.5_VLM**

32..37	ProfileSett[6]	the 2nd profile settings for the 2nd channel, defined in the case of **SLM** mode - in Table **B.1.5_SLM** and in the case of **VLM** mode - in Table **B.1.5_VLM**
38..43	ProfileSett[7]	the 2nd profile settings for the 3rd channel, defined in the case of **SLM** mode - in Table **B.1.5_SLM** and in the case of **VLM** mode - in Table **B.1.5_VLM**
44..49	ProfileSett[8]	the 2nd profile settings for the 4th channel, defined in the case of **SLM** mode - in Table **B.1.5_SLM** and in the case of **VLM** mode - in Table **B.1.5_VLM**
50..55	ProfileSett[9]	the 3rd profile settings for the 1st channel, defined in the case of **SLM** mode - in Table **B.1.5_SLM** and in the case of **VLM** mode - in Table **B.1.5_VLM**
56..61	ProfileSett[10]	the 3rd profile settings for the 2nd channel, defined in the case of **SLM** mode - in Table **B.1.5_SLM** and in the case of **VLM** mode - in Table **B.1.5_VLM**
62..67	ProfileSett[11]	the 3rd profile settings for the 3rd channel, defined in the case of **SLM** mode - in Table **B.1.5_SLM** and in the case of **VLM** mode - in Table **B.1.5_VLM**
68..73	ProfileSett[12]	the 3rd profile settings for the 4th channel, defined in the case of **SLM** mode - in Table **B.1.5_SLM** and in the case of **VLM** mode - in Table **B.1.5_VLM**
…	…	…

Note: *In **RT60** measurements mode the whole block exists but the values in that table have no interpretation (they are meaningless).*

Table B.1.5_SLM. Software settings for a channel in the case of SLM mode

Word number	Name / Value	Comment
0	0xnn08	[08, nn=block_length]
1	ChannelNo	number of channel: 0 - first channel
2	FilterP	filter type in the channel: 1 - **LIN**, 2 - **A**, 3 - **C**, 4 = **G**
3	DetectorP	detector type in the channel: 0 - **IMP.**, 1 - **FAST**, 2 - **SLOW**
4	BufferP	logger contents in the channel defined as a sum of : 1 - for **PEAK** results, 2 - for **MAX** results, 4 - for **MIN** results, 8 - for **RMS** results,
5	ProfileFlags	flags word (16 bits): b15 ... b3 b2 b1 b0 **b0** - if set to 1: profile results have been calculated b1 ... b15 - reserved
…	…	…

Table B.1.5_VLM. Software settings for a channel in the case of VLM mode

Word number	Name / Value	Comment
0	0xnn08	[08, nn=sub-block_length]
1	ChannelNo	channel number: 0 - the 1st channel
2	FilterP	filter type in the channel: 1 - **HP1**, 2 - **HP3**, 3 - **HP10**, 4 - **Vel1**, 5 - **Vel3**, 6 - **Vel10**, 7 - **VelMF**, 8 - **Dil1**, 9 - **Dil3**, 10 - **Dil10**, 15 - **KB**, 16 - **Wk**, 17 - **Wd**, 18 - **Wc**, 19 - **Wj**, 20 - **Wm**, 21 - **Wh**, 22 - **Wg**, 23 - **Wb**, 25 - **Wv**, 28 - **Wz**
3	DetectorP	detector type in the channel: 0 - **100 ms**, 1 - **125 ms**, 2 - **200 ms**, 3 - **500 ms**, 4 - **1 s**, 5 - **2 s**, 6 - **5 s**, 7 - **10 s**
4	BufferP	logger contents in the channel defined as a sum of: 1 - for **PEAK** results, 2 - for **P–P** results, 4 - for **MAX** results, 8 - for **RMS** results, 16 - for **VDV** results
5	ProfileFlags	flags word (16 bits): b15 ... b3 b2 b1 b0 **b0** - if set to 1: profile results have been calculated b1 ... b15 - reserved
…	…	…

Table B.1.6. Vector measurement settings

Word number	Name / Value	Comment
0	0xnn1E	[1E, nn=sub-block_length]
1	VectorBufferP	vector result logging: 0 - **OFF**, 1 – **ON**
2	VectorCoeff[1]	vector coefficient for the 1st channel (*100)
3	VectorCoeff[2]	vector coefficient for the 2nd channel (*100)
4	VectorCoeff[3]	vector coefficient for the 3rd channel (*100)
5	VectorCoeff[4]	vector coefficient for the 4th channel (*100)
6	VectorOn[1]	1st channel used for calculation: 0 - no, 1 - yes
7	VectorOn[2]	2nd channel used for calculation: 0 - no, 1 - yes
8	VectorOn[3]	3rd channel used for calculation: 0 - no, 1 - yes
9	VectorOn[4]	4th channel used for calculation: 0 - no, 1 - yes
10	VectorResult	**VECTOR** result value (*100 dB)
…	…	…

Table B.1.7. Octave analysis header

Word number	Name / Value	Comment
0	0xnn09	[09, nn=block_length]
1	0xkknn	[nn=spectrum_mask, kk=used_spectrum]
2..5	OctaveHead[1]	header of the first enabled octave analysis, defined in the case of **SLM** mode - in Table **B.1.7_SLM** and in the case of **VLM** mode - in Table **B.1.7_VLM**
…	…	…
2+4*used_spectrum.. 5+4*used_spectrum	OctaveHead[used_spectrum]	header of the last enabled octave analysis, defined in the case of **SLM** mode - in Table **B.1.7_SLM** and in the case of **VLM** mode - in Table **B.1.7_VLM**
…	…	…

Table B.1.7_SLM. Octave analysis header in the case of SLM mode

Word number	Name / Value	Comment
0	0xnn0A	[0A, nn=sub-block length]
1	SpectrumChannel	spectrum channel
2	SpectrumFilter	**1/1** or **1/3 OCTAVE** analysis filter: 0 - **HP**, 1 - **LIN**, 2 - **A**, 3 - **C**
3	SpectrumBuff	**1/1** or **1/3 OCTAVE** logging: 0 - **OFF**,4 - **RMS**
…	…	…

Table B.1.7_VLM. Octave analysis header in the case of VLM mode

Word number	Name / Value	Comment
0	0xnn0A	[0A, nn=sub-block length]
1	SpectrumChannel	spectrum channel
2	SpectrumFilter	**1/1** or **1/3 OCTAVE** analysis filter: 0 - **HP**, 3 - filter from second profile
3	SpectrumBuff	**1/1** or **1/3 OCTAVE** logging: 0 - **OFF,** 4 - **RMS**
…	…	…

Table B.1.8. Header of the FFT analysis

Word number	Name / Value	Comment
0	0xnn0B	[0B, nn=block_length] nn=2+NumberOfEnabledFFTs*12
1	0xkkmm	[mm=spectrum_mask,kk=spectrum_count]

2..13	FFTHeader[1]	header of the first enabled **FFT** analysis, defined in the case of **SLM** mode - in Table **B.1.8_SLM** and in the case of **VLM** mode - in Table **B.1.8_VLM**
…	…	…
2+spectrum_count*12..13+spectrum_count*12	FFTHeader[spectrum_count]	header of the last enabled **FFT** analysis, defined in the case of **SLM** mode - in Table **B.1.8_SLM** and in the case of **VLM** mode - in Table **B.1.8_VLM**
	reserved	
	reserved	
…	…	…

Table B.1.8_SLM. Header of the FFT analysis in one-channel SLM mode

Word number	Name / Value	Comment
0	0xnn0C	[0C, nn=block_length]
1	FFTChannel	channel of **FFT** analysis
2	FFTFilter	**FFT** analysis filter: 0 - **HP**, 1 - **LIN**, 2 - **A**, 3 - **C**
3	FFTBuff	**FFT** logging: 0 - **OFF,** 4 - **RMS**
4	LowestFreqNo	number of the first line in the **FFT** spectrum = 0
5	NFft	number of lines in the spectrum = 1921, 961 or 481
6	NFftTot	number of TOTAL lines in the spectrum = 1
7	FftBand	band of the **FFT** analysis: 1 - **22.4 kHz**, 2 - **11.2 kHz**, 3 - **5.6 kHz**, 4 - **2.8 kHz**, 5 - **1.4 kHz**, 6 - **700 Hz**, 7 - **350 Hz**, 8 - **175 Hz**, 9 - **87.5 Hz**
8	FftWindow	window in the **FFT** analysis: 0 - **HANNING**,1 - **RECTANGLE**, 2 - **FLAT TOP**, 3 - **KAISER-BESSEL**
9	FftAverag	type of averaging in the **FFT** analysis: 0 - **LINEAR**
10..11	FftSampFreq	sampling frequency
12	FftWFactor	window coefficient
13	FftLines	number of lines: 0 - 1920 lines, 1 - 960 lines, 2 - 480 lines
14	FFTCounter	number of averaged FFTs
…	…	…

Table B.1.8_VLM. Header of the FFT analysis in one-channel VLM mode

Word number	Name / Value	Comment
0	0xnn0C	[0C, nn=block_length]
1	FFTChannel	channel of **FFT** analysis
2	FFTFilter	**FFT** analysis filter: 0 - **HP**, 3 - 2nd profile filter
3	FFTBuff	**FFT** logging: 0 - **OFF,** 4 - **RMS**
4	LowestFreqNo	number of the first line in the **FFT** spectrum = 0
5	NFft	number of lines in the spectrum = 1921, 961 or 481

6	NFftTot	number of TOTAL lines in the spectrum = 1
7	FftBand	band of the FFT analysis: 1 - **22.4 kHz**, 2 - **11.2 kHz**, 3 - **5.6 kHz**, 4 - **2.8 kHz**, 5 - **1.4 kHz**, 6 - **700 Hz**, 7 - **350 Hz**, 8 - **175 Hz**, 9 - **87.5 Hz**
8	FftWindow	window in the **FFT** analysis: 0 - **HANNING**, 1 - **RECTANGLE**, 2 - **FLAT TOP**, 3 - **KAISER-BESSEL**
9	FftAverag	type of averaging in the **FFT** analysis: 0 - **LINEAR**
10..11	FftSampFreq	sampling frequency
12	FftWFactor	window coefficient
13	FftLines	number of lines: 0 - 1920 lines, 1 - 960 lines, 2 - 480 lines
14	FFTCounter	number of averaged FFTs
…	…	…

Table B.1.9. Settings for vibration dose measurement

Word number	Name / Value	Comment
0	0xnn1F	[1F, nn=block_length]
1	Xxyy	[yy=channel of Y axis-1 ,xx=channel of X axis-1]
2	Nnzz	[zz=channel of Z axis-1, nn] nn=1 for Hand-Arm measurement, nn=2 for Whole-Body measurement
3	ExposureTime	exposure time in minutes
4	Standard	standard: 0 - **UK**, 1 - **Italy**, 2 - **Poland**, 3 - **French**, 4 - **User**, 5 - **German**, 6 - **China**
5	HAV_EAV[x]	Hand-Arm action value*100 for x axis
5	HAV_EAV[y]	Hand-Arm action value*100 for y axis
5	HAV_EAV[z]	Hand-Arm action value*100 for z axis
6	HAV_ELV[x]	Hand-Arm limit value*100 for x axis
6	HAV_ELV[y]	Hand-Arm limit value*100 for y axis
6	HAV_ELV[z]	Hand-Arm limit value*100 for z axis
7	WBV_EAV[x]	Whole-Body action value*100 for x axis
7	WBV_EAV[y]	Whole-Body action value*100 for y axis
7	WBV_EAV[z]	Whole-Body action value*100 for z axis
8	WBV_ELV[x]	Whole-Body limit value*100 for x axis
8	WBV_ELV[y]	Whole-Body limit value*100 for y axis
8	WBV_ELV[z]	Whole-Body limit value*100 for z axis
9	Unit[0]	type of HAV_EAV value (0 - RMS based, 1-VDV based)
10	Unit[1]	type of HAV_ELV value (0 - RMS based, 1-VDV based)
11	Unit[2]	type of WBV_EAV value (0 - RMS based, 1-VDV based)
12	Unit[3]	type of WBV_ELV value (0 - RMS based, 1-VDV based)
…	…	…

Table B.1.10. Main results

Word number	Name / Value	Comment
0	0xnn0D	[0D, nn=sub-block_length]
1	0x040C	[used_channel, used profiles]

2..15	MainResults[1]	main results from the 1st profile of the 1st channel, defined in the case of **SLM** mode - in Table **B.1.10_SLM** and in the case of **VLM** mode - in Table **B.1.10_VLM**
16..29	MainResults[2]	main results from the 1st profile of the 2nd channel, defined in the case of **SLM** mode - in Table **B.1.10_SLM** and in the case of **VLM** mode - in Table **B.1.10_VLM**
30..43	MainResults[3]	main results from the 1st profile of the 3rd channel, defined in the case of **SLM** mode - in Table **B.1.10_SLM** and in the case of **VLM** mode - in Table **B.1.10_VLM**
44..57	MainResults[4]	main results from the 1st profile of the 4th channel, defined in the case of **SLM** mode - in Table **B.1.10_SLM** and in the case of **VLM** mode - in Table **B.1.10_VLM**
58..71	MainResults[5]	main results from the 2nd profile of the 1st channel, defined in the case of **SLM** mode - in Table **B.1.10_SLM** and in the case of **VLM** mode - in Table **B.1.10_VLM**
72..85	MainResults[6]	main results from the 2nd profile of the 2nd channel, defined in the case of **SLM** mode - in Table **B.1.10_SLM** and in the case of **VLM** mode - in Table **B.1.10_VLM**
86..99	MainResults[7]	main results from the 2nd profile of the 3rd channel, defined in the case of **SLM** mode - in Table **B.1.10_SLM** and in the case of **VLM** mode - in Table **B.1.10_VLM**
100..113	MainResults[8]	main results from the 2nd profile of the 4th channel, defined in the case of **SLM** mode - in Table **B.1.10_SLM** and in the case of **VLM** mode - in Table **B.1.10_VLM**
114..127	MainResults[9]	main results from the 3rd profile of the 1st channel, defined in the case of **SLM** mode - in Table **B.1.10_SLM** and in the case of **VLM** mode - in Table **B.1.10_VLM**
128..141	MainResults[10]	main results from the 3rd profile of the 2nd channel, defined in the case of **SLM** mode - in Table **B.1.10_SLM** and in the case of **VLM** mode - in Table **B.1.10_VLM**
142..155	MainResults[11]	main results from the 3rd profile of the 3rd channel, defined in the case of **SLM** mode - in Table **B.1.10_SLM** and in the case of **VLM** mode - in Table **B.1.10_VLM**
156..169	MainResults[12]	main results from the 3rd profile of the 4th channel, defined in the case of **SLM** mode - in Table **B.1.10_SLM** and in the case of **VLM** mode - in Table **B.1.10_VLM**
…	…	…

Table B.1.10_SLM. One-profile main results in the case of SLM mode

Word number	Name / Value	Comment
0	0xnn0E	[0E, nn=sub-block_length]
1..2	MeasureTime	time of the measurement in the channel (if the channel's 1st profile) overload time in the channel (if the 2nd profile in a channel)
3	Result[1]	**PEAK** value in the profile (*100 dB)
4	Result[2]	reserved
5	Result[3]	minimal value (**MIN**) in the profile (*100 dB)
6	Result[4]	**SPL** value in the profile (*100 dB)
7	Result[5]	maximal value (**MAX**) in the profile (*100 dB)

8	Result[6]	**Lden** value in the profile (*100 dB) (depends on UnitFlags bits: b3, b4, b5)
9	Result[7]	**LEQ** value in the profile (*100 dB)
10	Result[8]	**Ltm3** value in the profile (*100 dB)
11	Result[9]	**Ltm5** value in the profile (*100 dB)
12	Result[10]	**Lav** value in the profile (*100dB), (the result enable only in dosimeter function)
13	Result[11]	**TLav** value in the profile (*100dB), (the result enable only in dosimeter function)
…	…	…

Table B.1.10_VLM. One-profile main results in the case of VLM mode

Word number	Name / Value	Comment
0	0xnn0E	[0E, nn=sub-block_length]
1..2	MeasureTime	time of the measurement in the channel (if the 1st profile in channel) overload time in the channel (if second profile in channel)
3	Result[1]	**PEAK** value in the profile (*100 dB)
4	Result[2]	**P–P** value in the profile (*100 dB)
5	Result[3]	reserved
6	Result[4]	reserved
7	Result[5]	**MTVV** (or **MAX**) value in the profile (*100 dB)
8	Result[6]	**VDV** value in the profile (if UnitFlags bit b2 is set to 0) (*100 dB)
9	Result[7]	**RMS** value in the profile (*100 dB)
10	Result[8]	reserved
11	Result[9]	reserved
12	Result[10]	reserved
13	Result[11]	reserved
…	…	…

Table B.1.11. Selected statistical levels in channels

Word number	Name / Value	Comment
0	0xnn19	[19, nn=block_length]
1	0xccmm	[mm=channel_mask,cc= used_channels]
2	NStatLevs	number of statistical levels per channel = 10
3	N1	N1 value for the LN1 statistics $\in(1 \div 99)$
4	N2	N2 value for the LN2 statistics $\in(1 \div 99)$
5	N3	N3 value for the LN3 statistics $\in(1 \div 99)$
6	N4	N4 value for the LN4 statistics $\in(1 \div 99)$
7	N5	N5 value for the LN5 statistics $\in(1 \div 99)$
8	N6	N6 value for the LN6 statistics $\in(1 \div 99)$
9	N7	N7 value for the LN7 statistics $\in(1 \div 99)$

10	N8	N8 value for the LN8 statistics ∈(1 ÷ 99)
11	N9	N9 value for the LN9 statistics ∈(1 ÷ 99)
12	N10	N10 value for the LN10 statistics ∈(1 ÷ 99)
13	LN1[1]	value of the LN1 statistics (*10 dB) for the 1^{st} channel
14	LN2[1]	value of the LN2 statistics (*10 dB) for the 1^{st} channel
…	…	…
22	LN10[1]	value of the LN10 statistics (*10 dB) for the 1^{st} channel
23	LN1[2]	value of the LN1 statistics (*10 dB) for the 2^{nd} channel
...	...	...
block_ length-1	LN10[used_channels]	value of the LN10 statistics (*10 dB) for the last channel
…	…	…

Table B.1.12. One-channel 1/1 OCTAVE analysis results

Word number	Name / Value	Comment
0	0xnn0F	[0F, nn=block_length]
1	LowestFreq	the lowest **1/1 OCTAVE** frequency (*100 Hz)
2	Noct	number of **1/1 OCTAVE** values
3	NoctTot	number of **TOTAL** values = 3
4… block_ length	Octave[i]	1/1 octave[i] value (*100 dB); i=1..NOct+NOctTot
…	…	…

Note: *The **TOTAL** values, calculated in the case of sound measurements, correspond to the **A**, **C** and **LIN** filters – respectively. The **TOTAL** values, calculated in the case of vibration measurements, correspond to the **HP**, **CH** and **CH** filters – respectively, where **CH** denotes the filter used in the channel for Level Meter measurement.*

Table B.1.13. One-channel 1/3 OCTAVE analysis results

Word number	Name / Value	Comment
0	0xnn10	[10, nn=block_length]
1	LowestFreq	the lowest **1/3 OCTAVE** frequency (*100 Hz)
2	Nter	number of **1/3 OCTAVE** values
3	NterTot	number of **TOTAL** values = 3
4... block_ length	Tercje[I]	1/3 octave[i] value (*100 dB); i=1..NTer+NTerTot
…	…	…

Note: *The **TOTAL** values, calculated in the case of sound measurements, correspond to the **A**, **C** and **LIN** filters – respectively. The **TOTAL** values, calculated in the case of vibration measurements, correspond to the **HP**, **CH** and **CH** filters – respectively, where **CH** denotes the filter used in the channel for Level Meter measurement.*

Table B.1.14. One-channel FFT analysis results

Word number	Name / Value	Comment
0	0x0011	[11, 0 (block is longer than 256 words, the length is given in the second word)]
1	FftBlockLength	2 + NFft + NFftTot
2..2+NFft + NFftTot	FFT[i]	value of the FFT line (*100 dB); i = 1..1..NFft + NFftTot
…	…	…

Table B.1.15. One-channel TOTALS description

Word number	Name / Value	Comment
0	0xnn1B	[1B, nn=block_length = 1 + Ntotal*4 (words)]
1	SpectChannel	spectrum channel
2	FilterNo[1]	logical filter no. for the first total value 0, 1, 2 - standard filters 3,… - user-defined filters
3	FilterType[1]	for sound: 0 for vibration: 0 - **ACC**., 1 - **VEL**., 2 - **DIL**.
4	calFactor[1]	calibration factor used to modify the computed **TOTAL** value
5	TotValue[1]	**TOTAL** value computed for the filter with logical no. FilterNo or zero value for standard filter
…	…	…
nn-4	FilterNo[Ntotal]	logical filter no. for the last total value 0, 1, 2 - standard filters 3,… - user-defined filters
nn-3	FilterType[Ntotal]	for sound: 0 for vibration: 0 - **ACC**., 1 - **VEL**., 2 - **DIL**.
nn-2	calFactor[Ntotal]	calibration factor used to modify the computed **TOTAL** value
nn-1	TotValue[Ntotal]	**TOTAL** value computed for the filter with logical no. FilterNo or zero value for standard filter
…	…	…

Table B.1.16. TOTALS description

Word number	Name / Value	Comment
0	0xnn1A	[1A, nn=block_length = 1+(1 + Ntotal*4)*k (words)]
1... 1+4*Ntotal	OneChnlTotDesc[1]	one-channel totals description block for the first channel with **TOTALS** in user filters (Table **B.1.15.**)
…	…	…
	OneChnlTotDesc[k]	one-channel totals description block for the last channel with **TOTALS** in user filters (Table **B.1.15.**)
…	…	…

*. **Note:** This data block is created only in the case when the file was saved for **1/1 OCTAVE** or **1/3 OCTAVE** analysis and the **TOTAL** values were calculated for the filters selected by the user (**USER FILTERS**). The **TOTAL** values corresponding to those filters are given in the TotValue positions and the definitions of the proper filters are presented in the Table B.1.17.*

Table B.1.17. Description of user-defined filter

Word number	Name / Value	Comment
0	0xnn1D	[1D, nn=block_length = 5 + NTer (words)]
1	FilterNo	FilerNo as saved in one-channel description (Table **B.1.15**)
2..4	FilterName	filter name (up to 5 letters, zero-ending string)
5..49	FilterVal[i]	filter value (*10 dB) corresponding to the 1/3 octave[i] position; i=1..NTer (1..45)
…	…	…

*. **Note:** Such data block is created for each filter with the logical number FilterNo greater or equal to 3, expressed in the TOTALS DESCRIPTION block (cf. Tab. B.1.15 and Tab B.1.16). The description of the filter with the logical number FilterNo is given only once, disregarding the number of FilterNo repetition in Tab. B.1.15.*

Table B.1.18. Statistics in channels header

Word number	Name / Value	Comment
0	0xnn12	[12, nn=block_length=2+4*used_channels]
1	0xccmm	[mm=channels_mask, cc=used_channels]
2	0x0413	[13, 04=sub-block_length]
3	NofClasses[1]	number of classes in the 1st channel (100)

4	BottomClass[1]	bottom class boundary (*10 dB) in the 1st channel
5	ClassWidth[1]	class width (*10 dB) in the 1st channel
…	…	…
block_ length-4	0x0413	[13, 04=sub-block_length]
block_ length-3	NofClasses[used_ channels]	number of classes in the last channel
block_ length-2	BottomClass[used_ channels]	bottom class boundary (*10 dB) in the last channel
block_ length-1	ClassWidth[used_ channels]	class width (*10 dB) in the last channel
…	…	…

Table B.1.19. Results of the statistical analysis in one channel

Word number	Name / Value	Comment
0	0x0014	[14, 00=block length in next word]
1	SubblockLength	2 * number of classes in the channel + 3
2	ChannelNo	channel number minus 1
3..4	Histogram[1]	the 1st counter in the channel
5..6	Histogram[2]	the 2nd counter in the channel
...	...	...

Table B.1.20. Results of the statistical analysis performed in 1/1 OCTAVE or 1/3 OCTAVE mode

Word number	Name / Value	Comment
0	0x0015	[15, 00=block length in the next word]
1	BlockLength	block length
2	0xccmm	[mm=spectrum_mask, cc=used_spectrum]
3..	OctStatRes[1]	results of the statistical analysis performed in the 1st channel (defined in Table **B.1.21.**)
...	…	....
	OctStatRes[used_ spectrum]	results of the statistical analysis performed in the last channel (defined in Table **B.1.21.**)
…	…	…

Table B.1.21. Results of statistical analysis performed in 1/1 or 1/3 OCTAVE mode in one-channel

Word number	Name / Value	Comment
0	0x0016	[16, 00=block length in next word]
1	BlockLength	BlockLength=2*NofHist*NofClass+6
2	NofHist	number of histogramms (number of **1/1 OCTAVE** or **1/3 OCTAVE** filters and **TOTAL** values (3))
3	NofClasses	number of classes in the histogramm (100)
4	BottomClass	bottom class boundary (*10 dB)
5	ClassWidth	class width (*10 dB)
6..7	Histogram[1][1]	the 1st counter for the first **1/1 OCTAVE** or **1/3 OCTAVE** filter
8..9	Histogram[1][2]	the 2nd counter for the 1st **1/1 OCTAVE** or **1/3 OCTAVE** filter
...	...	...
6+2 * Nof Classes… 7+2 * Nof Classes	Histogram[2][1]	the 1st counter for the 2nd **1/1 OCTAVE** or **1/3 OCTAVE** filter
...	Histogram[2][2]	the 2nd counter for the 2nd **1/1 OCTAVE** or **1/3 OCTAVE** filter
...	...	...
...	...	...
...	Histogram[NofHist][1]	the 1st counter for the last **1/1 OCTAVE** or **1/3 OCTAVE** filter
…	Histogram[NofHist][2]	the 2nd counter for the last **1/1 OCTAVE** or **1/3 OCTAVE** filter
...	...	...

Table B.1.22. Header of the file from the logger

Word number	Name / Value	Comment
0	0xnn18	[18, nn=header_length]
1	BufResOffs	position of the first saved result
2	BuffTSec	logger time-step - full seconds part
3	BuffTMilisec	logger time-step - milliseconds part
4..5	BuffLength	logger length (bytes)
6..7	RecsInBuff	number of records in the logger
8..9	RecsInObserv	number of records in the observation period equal to: number of records in the logger + number of records not saved
10	SUnitNo	monitoring station unit number
11	SType	type of the monitoring station
12	SSoftVer	monitoring station software version
13..14	SIntPeriod	integration period of meteo results in seconds
…	…	…

Note: *The current logger time step in seconds can be obtained from the formulae:*
T = BuffTSec + BuffTMilisec / 1000*.*

Table B.1.23. Spectrum header of the file from the logger

Word number	Name / Value	Comment
0	0xnn21	[21, nn=block_length=1+4*NumberOfBufferedSpectrums]
1	ChannelNo	channel number of the first logged spectrum minus 1
2	LowestFreq	the lowest **1/1 OCTAVE** or **1/3 OCTAVE** frequency (*100 Hz) of the first logged spectrum or 0 in the case of **FFT**
3	NSpectRes	number of **1/1 OCTAVE** or **1/3 OCTAVE** or **FFT** results of the first logged spectrum
4	NTotal	number of **TOTAL** values of the first logged spectrum
…	…	…
block_ length-4	ChannelNo	channel number of the last logged spectrum minus 1
block_ length-3	LowestFreq	the lowest **1/1 OCTAVE** or **1/3 OCTAVE** frequency (*100 Hz) of the last logged spectrum or 0 in the case of **FFT**
block_ length-2	NSpectRes	number of **1/1 OCTAVE** or **1/3 OCTAVE** or **FFT** results of the last logged spectrum
block_ length-1	NTotal	number of **TOTAL** values of the last logged spectrum
…	…	…

Table B.1.24. Contents of the file from the logger

Word number	Name / Value	Comment
0..(BuffLength/2-1)		result#1, result#2, ... result#(BuffLength/2-1)

Table B.1.25. File end marker

Word number	Name / Value	Comment
0	0xFFFF	file end marker

Table B.1.26. Data block of instrument's setup

Word number	Name / Value	Comment
0	0x0020	[20, 00=block length in the next word]
1	BlockLength	block length
2..BlockLength-1	SetupData	saved setup values
…	…	…

Table B.1.27. User filters block in data file of instrument's setup

Word number	Name / Value	Comment
0	0x0027	[27, 00=block length in the next word]
1	BlockLength	block length
2..BlockLength-1	FilterData	saved user-filters values
…	…	…

Table B.1.28. Header of 1/3 OCTAVE analysis in RT60 mode

Word number	Name / Value	Comment
0	0xnn22	[22, nn=block length]
1	0xkknn	kk = channels number, nn = channels mask
2	RT60Method	measurement method: 1 - decay, 2 - impulse
3	0x0423	[23, 04 = sub-block length]
4	Spectrum channel	channel of the first spectrum
5	Spectrum Filter	**1/1** or **1/3 OCTAVE** analysis filter: 0 - **HP**, 1 - **LIN**, 2 - **A**, 3 - **C**
6	Spectrum Buff	logging results of analysis: 0 - OFF
…	…	…
nn-4	0x0423	[23, 24 = sub-block length]
nn-3	SpectrumChannel	channel of the last spectrum
nn-2	SpectrumFilter	**1/1** or **1/3 OCTAVE** analysis filter: 0 - **HP**, 1 - **LIN**, 2 - **A**, 3 - **C**
nn-1	SpectrumBuff	logging results of analysis: 0 - OFF
…	…	…

Table B.1.29. Settings for RT60 measurement

Word number	Name / Value	Comment
0	0xnn24	[24, nn=block length]
1	Reserved	reserved
2	RT60Method	measurement method: 1 - decay, 2 - impulse
3	RT60Spectrum	2 - **1/3 OCTAVE** analysis
4	Buffer step	time resolution of the logger results [ms]
5	RT60ResponseTime	response time [s]
6	TriggerLevMin	minimal level of saturation for decay method (*10 dB)
7	RT60DispSmooth	smoothing level
8	RT60NoiseMargin	noise level margin (*10 dB)
9	RT60Averaging	averaging of consecutive measurements: 0 - OFF, 1 - ON
10	RT60MeasureNo	number of averaged measurements
…	…	…

Table B.1.30. Results of the RT60 measurement in one channel

Word number	Name / Value	Comment
0	0x0025	[25, 00=block length in the next word]
1	BlockLen	block length
2	Channel	channel number - 1
3	LowestFreq	the lowest 1/3 octave frequency (*100 Hz)
4	NTer	1/3 octave analysis results number
5	NTot	TOTAL results number
6	FirstRT60Freq	number of first calculated 1/3 octave band - 1
7	LastRT60Freq	number of last calculated 1/3 octave band - 1
8	Calc(FirstRT60Freq)	flag indicates calculation results for FirstRT60Freq octave band
9	Edt(FirstRT60Freq)	EDT result in ms
10	rt20(FirstRT60Freq)	RT 20 result in ms
11	rt30(FirstRT60Freq)	RT 30 result in ms
12	rt_user(FirstRT60Freq)	RT USER result in ms
13	cor_edit(FirstRT60Freq)	EDT correlation ratio
14	cor_rt20(FirstRT60Freq)	RT 20 correlation ratio
15	cor_rt30(FirstRT60Freq)	RT 30 correlation ratio
16	cor_rt_user(FirstRT60Freq)	RT USER correlation ratio
...	...	...
BlockLen-9	Calc[LastRT60Freq+NTot]	Flag indicates calculation results for LastRT60Freq+NTot octave band
BlockLen-8	edt[LastRT60Freq+NTot]	EDT result in ms
BlockLen-7	rt20[LastRT60Freq+NTot]	RT 20 result in ms
BlockLen-6	rt30[LastRT60Freq+NTot]	RT 30 result in ms
BlockLen-5	rt_user[LastRT60Freq+NTot]	RT USER result in ms

BlockLen-4	cor_edt[LastRT60Freq+NTot]	EDT correlation ratio
BlockLen-3	cor_rt20[LastRT60Freq+NTot]	RT 20 correlation ratio
BlockLen-2	cor_rt30[LastRT60Freq+NTot]	RT 30 correlation ratio
BlockLen-1	cor_rt_user[LastRT60Freq+NTot]	RT USER correlation ratio
…	…	…

Table B.1.31. Averaged RT60 measurement results in one channel

Word number	Name / Value	Comment
0	0x0026	[26, 00=block length in the next word]
1	BlockLen	block length
2	Channel	channel number - 1
3	LowestFreq	the lowest 1/3 octave frequency (*100 Hz)
4	NTer	1/3 octave analysis results number
5	NTot	TOTAL results number
6	FirstRT60Freq	number of first calculated 1/3 octave band - 1
7	LastRT60Freq	number of last calculated 1/3 octave band - 1
8	Calc[FirstRT60Freq]	flag indicates calculation results for FirstRT60Freq octave band
9	edt[FirstRT60Freq]	EDT result in ms
10	rt20[FirstRT60Freq]	RT 20 result in ms
11	rt30[FirstRT60Freq]	RT 30 result in ms
12	rt_user[FirstRT60Freq]	RT USER result in ms
13	n_edt[FirstRT60Freq]	number of averaged EDT results
14	n_rt20[FirstRT60Freq]	number of averaged RT 20 results
15	n_rt30[FirstRT60Freq]	number of averaged RT 30 results
16	n_rt_user[FirstRT60Freq]	number of averaged RT USER results
...	...	...
BlockLen-9	Calc[LastRT60Freq+NTot]	flag indicates calculation results for LastRT60Freq+NTot octave band
BlockLen-8	edt[LastRT60Freq+NTot]	EDT result in ms
BlockLen-7	rt20[LastRT60Freq+NTot]	RT 20 result in ms
BlockLen-6	rt30[LastRT60Freq+NTot]	RT 30 result in ms
BlockLen-5	rt_user[LastRT60Freq+NTot]	RT USER result in ms
BlockLen-4	n_edt[LastRT60Freq+NTot]	number of averaged EDT results
BlockLen-3	n_rt20[LastRT60Freq+NTot]	number of averaged RT 20 results
BlockLen-2	n_rt30[LastRT60Freq+NTot]	number of averaged RT 30 results
BlockLen-1	n_rt_user[LastRT60Freq+NTot]	number of averaged RT USER results
…	…	…

Table B.1.32. Results of one RT60 measurement averaged between channels

Word number	Name / Value	Comment
0	0x0028	[28, 00=block length in the next word]
1	BlockLen	block length
2	LowestFreq	the lowest 1/3 octave frequency (*100 Hz)
3	NTer	1/3 octave analysis results number
4	NTot	TOTAL results number
5	FirstRT60Freq	number of first calculated 1/3 octave band - 1
6	LastRT60Freq	number of last calculated 1/3 octave band - 1
7	Calc[FirstRT60Freq]	flag indicates calculation results for FirstRT60Freq octave band
8	edt[FirstRT60Freq]	EDT result in ms
9	rt20[FirstRT60Freq]	RT 20 result in ms
10	rt30[FirstRT60Freq]	RT 30 result in ms
11	rt_user[FirstRT60Freq]	RT USER result in ms
12	n_edt[FirstRT60Freq]	number of averaged EDT results
13	n_rt20[FirstRT60Freq]	number of averaged RT 20 results
14	n_rt30[FirstRT60Freq]	number of averaged RT 30 results
15	n_rt_user[FirstRT60Freq]	number of averaged RT USER results
...	...	…
BlockLen-9	Calc[LastRT60Freq+NTot]	flag indicates calculation results for LastRT60Freq+NTot octave band
BlockLen-8	edt[LastRT60Freq+NTot]	EDT result in ms
BlockLen-7	rt20[LastRT60Freq+NTot]	RT 20 result in ms
BlockLen-6	rt30[LastRT60Freq+NTot]	RT 30 result in ms
BlockLen-5	rt_user[LastRT60Freq+NTot]	RT USER result in ms
BlockLen-4	n_edt[LastRT60Freq+NTot]	number of averaged EDT results
BlockLen-3	n_rt20[LastRT60Freq+NTot]	number of averaged RT 20 results
BlockLen-2	n_rt30[LastRT60Freq+NTot]	number of averaged RT 30 results
BlockLen-1	n_rt_user[LastRT60Freq+NTot]	number of averaged RT USER results
…	…	...

Table B.1.33. Averaged RT60 measurements results averaged between channels

Word number	Name / Value	Comment
0	0x0029	[29, 00=block length in the next word]
1	BlockLen	block length
2	LowestFreq	the lowest 1/3 octave frequency (*100 Hz)
3	NTer	1/3 octave analysis results number
4	NTot	TOTAL results number
5	FirstRT60Freq	number of first calculated 1/3 octave band - 1
6	LastRT60Freq	number of last calculated 1/3 octave band - 1
7	Calc(FirstRT60Freq)	flag indicates calculation results for FirstRT60Freq octave band
8	Edt(FirstRT60Freq)	EDT result in ms

9	rt20(FirstRT60Freq)	RT 20 result in ms
10	rt30(FirstRT60Freq)	RT 30 result in ms
11	rt_user[FirstRT60Freq]	RT USER result in ms
12	n_edt[FirstRT60Freq]	number of averaged EDT results
13	n_rt20[FirstRT60Freq]	number of averaged RT 20 results
14	n_rt30[FirstRT60Freq]	number of averaged RT 30 results
15	n_rt_user[FirstRT60Freq]	number of averaged RT USER results
…	…	…
BlockLen-9	Calc[LastRT60Freq+NTot]	flag indicates calculation results for LastRT60Freq+NTot octave band
BlockLen-8	edt[LastRT60Freq+NTot]	EDT result in ms
BlockLen-7	rt20[LastRT60Freq+NTot]	RT 20 result in ms
BlockLen-6	rt30[LastRT60Freq+NTot]	RT 30 result in ms
BlockLen-5	rt_user[LastRT60Freq+NTot]	RT USER result in ms
BlockLen-4	cor_edt[LastRT60Freq+NTot]	number of averaged EDT results
BlockLen-3	cor_rt20[LastRT60Freq+NTot]	number of averaged RT 20 results
BlockLen-2	cor_rt30[LastRT60Freq+NTot]	number of averaged RT 30 results
BlockLen-1	cor_rt_user[LastRT60Freq+NTot]	number of averaged RT USER results
…	…	…

Table B.1.34. Results of rotation speed measurement

Word number	Name / Value	Comment
0	0xnn2A	[2A, nn=block length]
1	rpm[0]	RPM[0]
2	rpm[1]	RPM[1]
3	rpm_max[0]	RPM MAX[0]
4	rpm_max[1]	RPM MAX[1]
5	rpm_min[0]	RPM MIN[0]
6	rpm_min[1]	RPM MIN[1]
…	…	…

Table B.1.35. Time-domain header of the file from the logger

Word number	Name / Value	Comment
0	0xnn2B	[2B, nn=block length]
1	TimeSignalBuffer	flags (16 bit): b15…b3 b2 b1 b0 b0 - if set to 1: samples from channel 1 are saved b1 - if set to 1: samples from channel 2 are saved b2 - if set to 1: samples from channel 3 are saved b3 - if set to 1: samples from channel 4 are saved b4,…, b15 - reserved

2	SampleRate	sampling rate: 0 - 3000 Hz 1 - 2400 Hz 2 - 1500 Hz 3 - 1200 Hz 4 - 750 Hz 5 - 600 Hz 6 - 375 Hz 7 - 300 Hz 8 - 187 Hz 9 - 150 Hz
3..4	BuffLength	logger length in bytes
5..6	RecsInBuff	records number in logger
7..8	RecsInObserv	records number in observation time equal: records number in logger + records number not remember
…	…	…

Table B.1.36. Seat measurement

Word number	Name / Value	Comment
0	0xnn2C	[2C, nn=block length]
1	SEATBaseChannel	base channel
2	SEATSeatChannel	seating channel
…	…	…

Table B.1.37. Maximum results of 1/3 OCTAVE analysis in one channel

Word number	Name / Value	Comment
0	0xnn2D	[2D, nn=block length]
1	LowestFreq	the lowest **1/1 OCTAVE** frequency (*100 Hz)
2	Noct	number of **1/1 OCTAVE** values
3	NoctTot	number of **TOTAL** values = 3
…	…	…
4 - length block	MaxOctave[i]	maximum result of the 1/1 octave analysis (*100 dB); i = 1…NOct + NOctTot
…	…	…

Note: *The* ***TOTAL*** *values, calculated in the case of sound measurements, correspond to the* ***A****,* ***C*** *and* ***LIN*** *filters – respectively. The* ***TOTAL*** *values, calculated in the case of vibration measurements, correspond to the* ***HP****,* ***CH*** *and* ***CH*** *filters – respectively, where* ***CH*** *denotes the filter used in the channel for Level Meter measurement.*

Table B.1.38. Minimum results of 1/1 OCTAVE analysis in one channel

Word number	Name / Value	Comment
0	0xnn2E	[2E, nn=block length]
1	LowestFreq	the lowest **1/1 OCTAVE** frequency (*100 Hz)
2	Noct	number of **1/1 OCTAVE** values
3	NoctTot	number of **TOTAL** values = 3
…	…	…
4 - length block	MinOctave[i]	minimum result of the 1/1 octave analysis (*100 dB); i = 1…NOct + NOctTot
…	…	…

Table B.1.39. Maximum results of 1/3 OCTAVE analysis in one channel

Word number	Name / Value	Comment
0	0xnn2F	[2F, nn=block length]
1	LowestFreq	the lowest **1/3 OCTAVE** frequency (*100 Hz)
2	Nter	number of **1/3 OCTAVE** values
3	NterTot	number of **TOTAL** values = 3
…	…	…
4 - length block	MaxTercje[I]	maximum result of the 1/3 octave analysis (*100 dB); i = 1…NTer + NterTot
…	…	…

Table B.1.40. Minimum results of 1/3 OCTAVE analysis in one channel

Word number	Name / Value	Comment
0	0xnn30	[30, nn=block length]
1	LowestFreq	the lowest **1/3 OCTAVE** frequency (*100 Hz)
2	Nter	number of **1/3 OCTAVE** values
3	NterTot	number of **TOTAL** values = 3
…	…	…
4 - length block	MinTercje[I]	minimum result of the 1/3 octave analysis (*100 dB); i = 1…NTer + NterTot
…	…	…

***Note:** The **TOTAL** values, calculated in the case of sound measurements, correspond to the **A**, **C** and **LIN** filters – respectively. The **TOTAL** values, calculated in the case of vibration measurements, correspond to the **HP**, **CH** and **CH** filters – respectively, where **CH** denotes the filter used in the channel for Level Meter measurement.*

Table B.1.41. Trigger settings

Word number	Name / Value	Comment
0	0x0031	[31, 00=block length in the next word]
1	BlockLen	block length
2	NProfileTriggers	number of trigger conditions per profile
3	NSpectTriggers	number of trigger conditions per spectrum channel
4	VectorCondidtion	vector trigger block (table B.1.42)
...	ProfTriggCond1	trigger condition block for the 1st profile (table B.1.42)
…	…	…
	ProfTrigCondN	trigger condition block for the last profile (table B.1.42)
	SpectTrigCond1	trigger condition block for the 1st spectrum (table B.1.42)
	...	
	SpectTrigCondN	trigger condition block for the last spectrum (table B.1.42)
…	…	…

Table B.1.42. Trigger condition block

Word number	Name / Value	Comment
0	0xnn32	[32, nn=block length]
1..2	Flags	b0 - active flag b1 - logger integration step b2 - 100ms integration step b3 - 1s integration step b4 - current time integration step b9 - trigger action: alarm b12 - trigger action: logger b17 - trigger action: wave b19 - trigger action: SMS b21 - trigger action: E-MAIL b23 - integration period step
3	Mode	0 - **OFF**, 1 - **LEVEL -**, 2 - **LEVEL +**, 3 - **SLOPE -**, 4 - **SLOPE +**, 5 - **GRADIENT -**, 6 - **GRADIENT +**, 7 - **DECAY**
4	Source	0 - **VECTOR**, 1 - **PEAK**, 2 - **P-P**, 3 - **MAX**, 4 - **MIN**, 5 - **RMS**, 6 - **VDV**, 7 - **PEAK**, 8 - **MAX**, 9 - **MIN**, 10 - **RMS**, 11..59 - spectrum frequency
5	primaryLevel	triggering level in dB*100
6	secondaryLevel	in the case of **GRADIENT** mode: gradient level in dB*100 in the case of **DECAY** mode: signal drop level in dB*100
…	…	…

Table B.1.43. FFT cross-spectrum settings

Word number	Name / Value	Comment
0	0xnn34	[34, nn=block length]
1	RefChannel	reference channel
2	Nval	number of spectrum values
3..6	CSEnabled	cross-spectrum enabled for channel from 1 to 4
7..8	CSTabPopr1	correction value for the 1st channel in dB*100
9..10	CSTabPopr2	correction value for the 2nd channel in dB*100
11..12	CSTabPopr3	correction value for the 3rd channel in dB*100
13..14	CSTabPopr4	correction value for the 4th channel in dB*100
15..19	MinValTab	minimum limit values for channels from 1 to 4 in dB*100
…	…	…

Table B.1.44. FFT cross-spectrum results from one channel

Word number	Name / Value	Comment
0	0x0035	[35, 00=block length in the next word]
1	BlockLen	block length
2..	FirstCSVal	complex cross-spectrum value for the 1st frequency line as 2 (real and imag.) floating point values: 24-bits mantissa, 8-bits exponent
...	...	...
..	LastCSVal	complex cross-spectrum value for the last frequency line as 2 (real and imag.) floating point values: 24-bits mantissa, 8-bits exponent
…	…	…

Table B.1.45. Sound Intensity analysis

Word number	Name / Value	Comment
0	0x0036	[36, 00=block length in next word]
1	BlockLen	block length
2	channelA	channel of intensity probe input A
3	channelB	channel of intensity probe input B
4	Distance	probe microphones distance in mm
5	Int_n_val	number of results
6.. int_n_val+6	intVal[i]	intensity result for i-th FFT frequency line in dB*100
…	…	…

Table B.1.46. Peak results of 1/1 OCTAVE analysis in one channel

Word number	Name / Value	Comment
0	0xnn38	[38, nn=block length]
1	LowestFreq	the lowest **1/1 OCTAVE** frequency (*100 Hz)
2	Noct	number of **1/1 OCTAVE** values
3	NoctTot	number of **TOTAL** values = 3
…	…	…
4 - length block	PeakOctave[i]	Peak result of the 1/1 octave analysis (*100 dB); i = 1…NOct + NOctTot
…	…	…

Table B.1.47. Peak results of 1/3 OCTAVE analysis in one channel

Word number	Name / Value	Comment
0	0xnn39	[39, nn=block length]
1	LowestFreq	the lowest **1/3 OCTAVE** frequency (*100 Hz)
2	Nter	number of **1/3 OCTAVE** values
3	NterTot	number of **TOTAL** values = 3
…	…	…
4 - length block	PeakTercje[I]	Peak result of the 1/3 octave analysis (*100 dB); i = 1…NTer + NterTot
…	…	…

B.2. STRUCTURE OF THE BLOCK WITH METEOROLOGICAL DATA

In the case when the instrument is working in a monitoring station which contains also the components for the meteorological measurements (temperature, pressure, humidity, wind speed and its direction), the data coming from them are added by SvanPC+ software to all files with the data from SVAN 958. The structure of such data block is presented in the Tab. B.2.1.

Table B.2.1. METEO data from monitoring station

Word number	Name / Value	Comment
0	0x0033	[33, 00=block length in the next word]
1	BlockLen	block length
2	UnitNumber	unit number
3	UnitType	unit type
4	SoftVersion	software version
5..6	IntTimeSec	integration time specified in seconds
7	Temperature	temperature [*10°C]

8	Pressure	pressure [hPa]
9	Humidity	humidity [*10%]
10	WindSpeed	wind speed [*10m/s^2]
11	WindDirection	wind direction [degrees]. 0xFFFF if direction is unavailable
12..13	WindDirTotalPuffs	number of total wind puffs in distribution vector of wind direction
14	NofWindDir	number of elements in distribution vector of wind direction
15.. 15+NofWindDir-1	WindDir[i]	WindDir[i] value [*10 %]
15+NofWindDir	NofWindMax	number of elements in distribution vector of max wind speed
16+NofWindDir.. 16+NofWindDir+ NofWindMax-1	WindMax[i]	WindMax[i] value [*10 m/s]
16+NofWindDir+ NofWindMax	NofWindAvg	number of elements in distribution vector of avg wind speed
17+NofWindDir+ NofWindMax... 17+NofWindDir+ NofWindMax+ NofWindAvg-1	WindAvg[i]	WindAvg[i] value [*10 m/s]
…	…	…

B.3. STRUCTURE OF THE FILE WITH THE RESULTS FROM LEVEL METER AND WAVE RECORDER MODES

File header - cf. Tab. B.1.1.
Unit and software specification - cf. Tab. B.1.2.
Parameters and global settings - cf. Tab. B.1.3.
Hardware settings for channels - cf. Tab. B.1.4.
Software settings for channels - cf. Tab. B.1.5.
Trigger settings (cf. Tab. B.1.41, Tab.B.1.42).
Vector measurement settings - cf. Tab. B.1.6.
Settings for vibration dose measurement (the presence depends on the **MEASURE DOSE** and channel filter settings) - cf. Tab. B.1.9.
Main results - cf. Tab. B.1.10.
RPM results (present if RPM measurement was enabled) - cf. Tab. B.1.34.
SEAT measurements settings (cf. Tab. B.1.36).
Selected statistical levels in channels - cf. Tab. B.1.11.
Header of the statistical analysis in channels (the presence depends on the **SAVE STAT.** setting) - cf. Tab. B.1.18.
Results of the statistical analysis in one channel (the presence depends on the **SAVE STAT.** setting) - cf. Tab. B.1.19.

File end marker - cf. Tab. B.1.25.

B.4 STRUCTURE OF THE FILE WITH 1/1 OCTAVE ANALYSIS RESULTS

File header - cf. Tab. B.1.1.
Unit and software specification - cf. Tab. B.1.2.
Parameters and global settings - cf. Tab. B.1.3.
Hardware settings for channels - cf. Tab. B.1.4.
Software settings for channels - cf. Tab. B.1.5.
Trigger settings (cf. Tab. B.1.41, Tab.B.1.42).
Vector measurement settings - cf. Tab. B.1.6.
Octave analysis header - cf. Tab.B.1.7.
Settings for vibration dose measurement (the presence depends on the **MEASURE DOSE** and channel filter settings) - cf. Tab. B.1.9.
Main results - cf. Tab. B.1.10.
RPM results (present if RPM measurement was enabled) - cf. Tab. B.1.34.
SEAT measurements settings (cf. Tab. B.1.36).
Selected statistical levels in channels - cf. Tab. B.1.11.
One-channel 1/1 Octave analysis results (one for each channel with spectrum analysis enabled) - cf. Tab. B.1.12.
TOTALS description (if needed) - cf. Tab. B.1.16.
Description of user-defined filter (if needed) - cf. Tab. B.1.17.
Maximum 1/1 Octave analysis results in one channel (one for each channel with spectrum analysis enabled, presence depends on the **MAX. SPECT.** setting) - cf. Tab. B.1.37.
Minimum 1/1 Octave analysis results in one channel (one for each channel with spectrum analysis enabled, presence depends on the **MIN. SPECT.** setting) - cf. Tab. B.1.38.
Peak results coming from **1/1 OCTAVE** analysis (one for each channel with spectrum analysis enabled) -cf. Tab. B.1.46.
Header of the statistical analysis in channels (the presence depends on the **SAVE STAT.** setting) - cf. Tab. B.1.18.
Results of the statistical analysis in one channel (the presence depends on the **SAVE STAT.** setting) - cf. Tab. B.1.19.
Results of the statistical analysis performed in 1/1 Octave mode (the presence depends on the **SAVE STAT.** setting) - cf. Tab. B.1.20.

File end marker - cf. Tab. B.1.25.

B.5. STRUCTURE OF THE FILE WITH 1/3 OCTAVE ANALYSIS RESULTS

File header - cf. Tab. B.1.1.
Unit and software specification - cf. Tab. B.1.2.
Parameters and global settings - cf. Tab. B.1.3.
Hardware settings for channels - cf. Tab. B.1.4.
Software settings for channels - cf. Tab. B.1.5.
Trigger settings (cf. Tab. B.1.41, Tab.B.1.42).
Vector measurement settings - cf. Tab. B.1.6.
Octave analysis header - cf. Tab.B.1.7.

Settings for vibration dose measurement (the presence depends on the **MEASURE DOSE** and channel filter settings) - cf. Tab. B.1.9.
Main results - cf. Tab. B.1.10.
RPM results (present if RPM measurement was enabled) - cf. Tab. B.1.34.
SEAT measurements settings (cf. Tab. B.1.36).
Selected statistical levels in channels - cf. Tab. B.1.11.
One-channel 1/3 OCTAVE analysis results (one for each channel with spectrum analysis enabled) - cf. Tab. B.1.13.
Maximum 1/3 OCTAVE analysis results in one channel (one for each channel with spectrum analysis enabled, presence depends on the **MAX. SPECT.** setting) - cf. Tab. B.1.39.
Minimum 1/3 OCTAVE analysis results in one channel (one for each channel with spectrum analysis enabled, presence depends on the **MIN. SPECT.** setting) - cf. Tab. B.1.40.
Peak results coming from **1/3 OCTAVE** analysis (one for each channel with spectrum analysis enabled) -cf. Tab. B.1.47.
TOTALS description (if needed) - cf. Tab. B.1.16.
Description of user-defined filter (if needed) - cf. Tab. B.1.17.
Header of the statistical analysis in channels (the presence depends on the **SAVE STAT.** setting) - cf. Tab. B.1.18.
Results of the statistical analysis in one channel (the presence depends on the **SAVE STAT.** setting) - cf. Tab. B.1.19.
Results of the statistical analysis performed in **1/3 OCTAVE** mode (the presence depends on the **SAVE STAT.** setting) - cf. Tab. B.1.20.

File end marker - cf. Tab. B.1.25.

B.6. STRUCTURE OF THE FILE WITH FFT ANALYSIS RESULTS

File header - cf. Tab. B.1.1.
Unit and software specification - cf. Tab. B.1.2.
Parameters and global settings - cf. Tab. B.1.3.
Hardware settings for channels - cf. Tab. B.1.4.
Software settings for channels - cf. Tab. B.1.5.
Trigger settings (cf. Tab. B.1.41, Tab.B.1.42).
Vector measurement settings - cf. Tab. B.1.6.
FFT analysis header - cf. Tab.B.1.8.
Settings for vibration dose measurement (the presence depends on the **MEASURE DOSE** and channel filter settings) - cf. Tab. B.1.9.
Main results - cf. Tab. B.1.10.
RPM results (present if RPM measurement was enabled) - cf. Tab. B.1.34.
SEAT measurements settings (cf. Tab. B.1.36).
Selected statistical levels in channels - cf. Tab. B.1.11.
One-channel FFT analysis results (one for each channel with spectrum analysis enabled) - cf. Tab.B.1.13.
Header of the statistical analysis in channels (the presence depends on the **SAVE STAT.** setting) - cf. Tab. B.1.18.
Results of the statistical analysis in one channel (the presence depends on the **SAVE STAT.** setting) - cf. Tab. B.1.19.

File end marker - cf. Tab. B.1.25.

B.7. STRUCTURE OF THE FILE CONTAINING LM RESULTS FROM LOGGER'S FILE

File header - cf. Tab. B.1.1.
Unit and software specification - cf. Tab. B.1.2.
Parameters and global settings - cf. Tab. B.1.3.
Hardware settings for channels - cf. Tab. B.1.4.
Software settings for channels - cf. Tab. B.1.5.
Trigger settings (cf. Tab. B.1.41, Tab.B.1.42).
Vector measurement settings - cf. Tab. B.1.6.

Header of the file from the logger - cf. Tab.B.1.22.
Contents of the file from the logger - cf. Tab.B.1.24.

File end marker - cf. Tab. B.1.25.

B.8. STRUCTURE OF THE FILE CONTAINING 1/1 OR 1/3 OCTAVE ANALYSIS RESULTS FROM LOGGER'S FILE

File header - cf. Tab. B.1.1.
Unit and software specification - cf. Tab. B.1.2.
Parameters and global settings - cf. Tab. B.1.3.
Hardware settings for channels - cf. Tab. B.1.4.
Software settings for channels - cf. Tab. B.1.5.
Trigger settings (cf. Tab. B.1.41, Tab.B.1.42).
Vector measurement settings - cf. Tab. B.1.6.

Header of the file from the logger - cf. Tab.B.1.22.
Octave analysis header - cf. Tab.B.1.7.
Spectrum analysis header of the file from the logger - cf. Tab.B.1.23.
Contents of the file from the logger - cf. Tab.B.1.24.

File end marker - cf. Tab. B.1.25.

B.9. STRUCTURE OF THE FILE CONTAINING FFT ANALYSIS RESULTS FROM LOGGER'S FILE

File header - cf. Tab. B.1.1.
Unit and software specification - cf. Tab. B.1.2.
Parameters and global settings - cf. Tab. B.1.3.
Hardware settings for channels - cf. Tab. B.1.4.
Software settings for channels - cf. Tab. B.1.5.
Trigger settings (cf. Tab. B.1.41, Tab.B.1.42).
Vector measurement settings - cf. Tab. B.1.6.

Header of the file from the logger - cf. Tab.B.1.22.
FFT analysis header - cf. Tab.B.1.8.
Spectrum analysis header of the file from the logger - cf. Tab.B.1.23.

Contents of the file from the logger - cf. Tab.B.1.24.

File end marker - cf. Tab. B.1.25.

B.10. STRUCTURE OF THE FILE CONTAINING SAVED INSTRUMENT'S SETUP

File header - cf. Tab. B.1.1.
Unit and software specification - cf. Tab. B.1.2.
Data block of instrument's setup - cf. Tab.B.1.26.
User filters (the presence depends on the **SAVE FILT.** setting) - cf. Tab.B.1.28.

File end marker - cf. Tab. B.1.25.

B.11. STRUCTURE OF THE FILE CONTAINING RESULTS FROM RT60 FUNCTION

File header - cf. Tab. B.1.1.
Unit and software specification - cf. Tab. B.1.2.
Parameters and global settings - cf. Tab. B.1.3.
Hardware settings for channels - cf. Tab. B.1.4.
Software settings for channels - cf. Tab. B.1.5. (all data are meaningless!)
Trigger settings (cf. Tab. B.1.41, Tab.B.1.42).
Vector measurement settings - cf. Tab. B.1.6.

RT60 mode 1/3 OCTAVE analysis header - cf. Tab. B.1.28.

RT60 measurements parameters - cf. Tab. B.1.29.

One-channel RT60 measurement results - cf. Tab. B.1.30

RT60 measurement results averaged between channels - cf. Tab. B.1.32

File end marker - cf. Tab. B.1.25.

B.12. STRUCTURE OF THE FILE CONTAINING AVERAGED RT60 MEASUREMENT RESULTS

File header - cf. Tab. B.1.1.
Unit and software specification - cf. Tab. B.1.2.
Parameters and global settings - cf. Tab. B.1.3.
Hardware settings for channels - cf. Tab. B.1.4.
Software settings for channels - cf. Tab. B.1.5. (all data are meaningless!)
Trigger settings (cf. Tab. B.1.41, Tab.B.1.42).
Vector measurement settings - cf. Tab. B.1.6.

RT60 mode 1/3 OCTAVE analysis header - cf. Tab. B.1.28.

RT60 measurements parameters - cf. Tab. B.1.29.

Averaged RT60 measurement results in one channel - cf. Tab. B.1.31

Averaged RT60 measurement results averaged between channels - cf. Tab. B.1.33

File end marker - cf. Tab. B.1.25.

B.13. STRUCTURE OF THE LOGGER FILE CONTAINING TIME-DOMAIN SIGNAL

File header - cf. Tab. B.1.1.
Unit and software specification - cf. Tab. B.1.2.
Parameters and global settings - cf. Tab. B.1.3.
Hardware settings for channels - cf. Tab. B.1.4.

Time-domain header of the file from the logger - cf. Tab. B.1.35.
Trigger settings (cf. Tab. B.1.41, Tab.B.1.42).
Contents of the file from the logger - cf. Tab.B.1.24.

File end marker - cf. Tab. B.1.25.

B.14. STRUCTURE OF THE FILE WITH THE RESULTS OF FFT CROSS-SPECTRUM ANALYSIS

File header - cf. Tab. B.1.1.
Unit and software specification - cf. Tab. B.1.2.
Parameters and global settings - cf. Tab. B.1.3.
Hardware settings for channels - cf. Tab. B.1.4.
Software settings for channels - cf. Tab. B.1.5.
Trigger settings (cf. Tab. B.1.41, Tab.B.1.42).
Vector measurement settings - cf. Tab. B.1.6.
FFT analysis header - cf. Tab.B.1.8.
FFT cross-spectrum settings - cf. Tab.B.1.43.
FFT cross-spectrum results - cf. Tab.B.1.44.
Settings for vibration dose measurement (the presence depends on the **MEASURE DOSE** and channel filter settings) - cf. Tab. B.1.9.
Main results - cf. Tab. B.1.10.
RPM results (present if RPM measurement was enabled) - cf. Tab. B.1.34.
SEAT measurements settings (cf. Tab. B.1.36).
Selected statistical levels in channels - cf. Tab. B.1.11.
One-channel FFT analysis results (one for each channel with spectrum analysis enabled) - cf. Tab.B.1.13.
Header of the statistical analysis in channels (the presence depends on the **SAVE STAT.** setting) - cf. Tab. B.1.18.
Results of the statistical analysis in one channel (the presence depends on the **SAVE STAT.** setting) - cf. Tab. B.1.19.

File end marker - cf. Tab. B.1.25.

B.15. STRUCTURE OF THE FILE WITH THE RESULTS OF SOUND INTENSITY ANALYSIS

File header - cf. Tab. B.1.1.
Unit and software specification - cf. Tab. B.1.2.
Parameters and global settings - cf. Tab. B.1.3.
Hardware settings for channels - cf. Tab. B.1.4.
Software settings for channels - cf. Tab. B.1.5.

Trigger settings (cf. Tab. B.1.41, Tab.B.1.42).
Vector measurement settings - cf. Tab. B.1.6.
FFT analysis header - cf. Tab.B.1.8.
Settings for vibration dose measurement (the presence depends on the **MEASURE DOSE** and channel filter settings) - cf. Tab. B.1.9.
Main results - cf. Tab. B.1.10.
RPM results (present if RPM measurement was enabled) - cf. Tab. B.1.34.
SEAT measurements settings (cf. Tab. B.1.36).
Selected statistical levels in channels - cf. Tab. B.1.11.
One-channel FFT analysis results (one for each channel with spectrum analysis enabled) - cf. Tab.B.1.13.
Header of the statistical analysis in channels (the presence depends on the **SAVE STAT.** setting) - cf. Tab. B.1.18.
Results of the statistical analysis in one channel (the presence depends on the **SAVE STAT.** setting) - cf. Tab. B.1.19.
Sound Intensity analysis results - cf. Tab. B.1.45
File end marker - cf. Tab. B.1.25.

B.16. CONTENTS OF THE FILE 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.

B.16.1. Record with the results

The contents of the record with the results depends on the measurement function, selected channels modes, values set in the **LOGGER SETUP** menu and its sub-lists, channels selected for spectrum analysis and values set in the **LOGGER MODE** (*path: MENU / INPUT / 1/1 OCTAVE or 1/3 OCTAVE or FFT SETUP / CHANNEL x / LOGGER:RMS*). All results are written in dB*10. Profile results are written on 15 most significant bits, while least significant bit is used for overload indication flag. The following elements can be present (in the given sequence):

- results of the measurement from the 1st profile of the 1st channel if the **LOGGER** list was marked and **LOGGER MODE** was set to **ON** (*path: MENU / INPUT / LOGGER SETUP / LOGGER MODE:ON)* and if any position in **CHAN. 1 PROF. 1** (*path: MENU / INPUT / LOGGER SETUP / CHANNEL 1 / CHAN. 1 PROF. 1*) sub-list was selected, up to five words are written in the given sequence:

<result1> - **PEAK** result in the case of **VLM** or in the case of **SLM** if the first position was marked, else no value is written;
<result2> - **P–P** result in the case of **VLM** or **MAX** result in the case of **SLM** if the second position was marked, else no value is written;
<result3> - **MAX** result in the case of **VLM** or **MIN** result in the case of **SLM** if the third position was marked, else no value is written;
<result4> - **RMS** result in the case of **VLM** or in the case of **SLM** if the fourth position was marked, else no value is written;
<result5> - **VDV** result in the case of **VLM** if the fifth position was marked, else no value is written;

- results of the measurement from the 1st profile of the 2nd channel if the **LOGGER MODE** was set to **ON** (*path: MENU / INPUT / LOGGER SETUP / LOGGER MODE:ON)*; and if any position in **CHAN. 2**

PROF. 1 (*path: MENU / INPUT / LOGGER SETUP / CHANNEL 2 / CHAN. 2 PROF. 1*) sub-list was selected, up to five words are written in the given sequence:

<result1> - **PEAK** result in the case of **VLM** or in the case of **SLM** if the first position was marked, else no value is written;
<result2> - **P–P** result in the case of **VLM** or **MAX** result in the case of **SLM** if the second position was marked, else no value is written;
<result3> - **MAX** result in the case of **VLM** or **MIN** result in the case of **SLM** if the third position was marked, else no value is written;
<result4> - **RMS** result in the case of **VLM** or in the case of **SLM** if the fourth position was marked, else no value is written;
<result5> - **VDV** result in the case of **VLM** if the fifth position was marked, else no value is written;

- results of the measurement from the 1st profile of the 3rd channel if the **LOGGER MODE** was set to **ON** (*path: MENU / INPUT / LOGGER SETUP / LOGGER MODE:ON)* and if any position in **CHAN. 3 PROF. 1** (*path: MENU / INPUT / LOGGER SETUP / CHANNEL 3 / CHAN. 3 PROF. 1*) sub-list was selected, up to five words are written in the given sequence:

<result1> - **PEAK** result in the case of **VLM** or in the case of **SLM** if the first position was marked, else no value is written;
<result2> - **P–P** result in the case of **VLM** or **MAX** result in the case of **SLM** if the second position was marked, else no value is written;
<result3> - **MAX** result in the case of **VLM** or **MIN** result in the case of **SLM** if the third position was marked, else no value is written;
<result4> - **RMS** result in the case of **VLM** or in the case of **SLM** if the fourth position was marked, else no value is written;
<result5> - **VDV** result in the case of **VLM** if the fifth position was marked, else no value is written;

- results of the measurement from the 1st profile of the 4th channel if the **LOGGER MODE** was set to **ON** (*path: MENU / INPUT / LOGGER SETUP / LOGGER MODE:ON)* and if any position in **CHAN. 4 PROF. 1** (*path: MENU / INPUT / LOGGER SETUP / CHANNEL 4 / CHAN. 4 PROF. 1*) sub-list was selected, up to five words are written in the given sequence:

<result1> - **PEAK** result in the case of **VLM** or in the case of **SLM** if the first position was marked, else no value is written;
<result2> - **P–P** result in the case of **VLM** or **MAX** result in the case of **SLM** if the second position was marked, else no value is written;
<result3> - **MAX** result in the case of **VLM** or **MIN** result in the case of **SLM** if the third position was marked, else no value is written;
<result4> - **RMS** result in the case of **VLM** or in the case of **SLM** if the fourth position was marked, else no value is written;
<result5> - **VDV** result in the case of **VLM** if the fifth position was marked, else no value is written;

- results of the measurement from the 2nd profile of the 1st channel if the **LOGGER** list was marked and **LOGGER MODE** was set to **ON** (*path: MENU / INPUT / LOGGER SETUP / LOGGER MODE:ON)* and if any position in **CHAN. 1 PROF. 2** (*path: MENU / INPUT / LOGGER SETUP / CHANNEL 1 / CHAN. 1 PROF. 2*) sub-list was selected, up to four words are written in the given sequence:

<result1> - **PEAK** result in the case of **VLM** or in the case of **SLM** if the first position was marked, else no value is written;
<result2> - **P–P** result in the case of **VLM** or **MAX** result in the case of **SLM** if the second position was marked, else no value is written;
<result3> - **MAX** result in the case of **VLM** or **MIN** result in the case of **SLM** if the third position was marked, else no value is written;
<result4> - **RMS** result in the case of **VLM** or in the case of **SLM** if the fourth position was marked, else no value is written;

<result5> - **VDV** result in the case of **VLM** if the fifth position was marked, else no value is written;

- results of the measurement from the 2nd profile of the 2nd channel if the **LOGGER MODE** was set to **ON** (*path: MENU / INPUT / LOGGER SETUP / LOGGER MODE:ON)*; and if any position in **CHAN. 2 PROF. 2** (*path: MENU / INPUT / LOGGER SETUP / CHANNEL 2 / CHAN. 2 PROF. 2*) sub-list was selected, up to four words are written in the given sequence:

<result1> - **PEAK** result in the case of **VLM** or in the case of **SLM** if the first position was marked, else no value is written;
<result2> - **P–P** result in the case of **VLM** or **MAX** result in the case of **SLM** if the second position was marked, else no value is written;
<result3> - **MAX** result in the case of **VLM** or **MIN** result in the case of **SLM** if the third position was marked, else no value is written;
<result4> - **RMS** result in the case of **VLM** or in the case of **SLM** if the fourth position was marked, else no value is written;
<result5> - **VDV** result in the case of **VLM** if the fifth position was marked, else no value is written;

- results of the measurement from the 2nd profile of the 3rd channel if the **LOGGER MODE** was set to **ON** (*path: MENU / INPUT / LOGGER SETUP / LOGGER MODE:ON)* and if any position in **CHAN. 3 PROF. 2** (*path: MENU / INPUT / LOGGER SETUP / CHANNEL 3 / CHAN. 3 PROF. 2*) sub-list was selected, up to four words are written in the given sequence:

<result1> - **PEAK** result in the case of **VLM** or in the case of **SLM** if the first position was marked, else no value is written;
<result2> - **P–P** result in the case of **VLM** or **MAX** result in the case of **SLM** if the second position was marked, else no value is written;
<result3> - **MAX** result in the case of **VLM** or **MIN** result in the case of **SLM** if the third position was marked, else no value is written;
<result4> - **RMS** result in the case of **VLM** or in the case of **SLM** if the fourth position was marked, else no value is written;
<result5> - **VDV** result in the case of **VLM** if the fifth position was marked, else no value is written;

- results of the measurement from the 2nd profile of the 4th channel if the **LOGGER MODE** position was set to **ON** (*path: MENU / INPUT / LOGGER SETUP / LOGGER MODE:ON)* and if any position in **CHAN. 4 PROF. 2** (*path: MENU / INPUT / LOGGER SETUP / CHANNEL 4 / CHAN. 4 PROF. 2*) sub-list was selected, up to four words are written in the given sequence:

<result1> - **PEAK** result in the case of **VLM** or in the case of **SLM** if the first position was marked, else no value is written;
<result2> - **P–P** result in the case of **VLM** or **MAX** result in the case of **SLM** if the second position was marked, else no value is written;
<result3> - **MAX** result in the case of **VLM** or **MIN** result in the case of **SLM** if the third position was marked, else no value is written;
<result4> - **RMS** result in the case of **VLM** or in the case of **SLM** if the fourth position was marked, else no value is written;
<result5> - **VDV** result in the case of **VLM** if the fifth position was marked, else no value is written;

- results of the measurement from the 3rd profile of the 1st channel if the **LOGGER** list was marked and **LOGGER MODE** was set to **ON** (*path: MENU / INPUT / LOGGER SETUP / LOGGER MODE: ON)* and if any position in **CHAN. 1 PROF. 3** (*path: MENU / INPUT / LOGGER SETUP / CHANNEL 1 / CHAN. 1 PROF. 3*) sub-list was selected, up to four words are written in the given sequence:

<result1> - **PEAK** result in the case of **SLM** if the first position was marked, else no value is written;
<result2> - **MAX** result in the case of **SLM** if the second position was marked, else no value is written;
<result3> - **MIN** result in the case of **SLM** if the third position was marked, else no value is written;
<result4> - **RMS** result in the case of **SLM** if the fourth position was marked, else no value is written;

- results of the measurement from the 3rd profile of the 2nd channel if the **LOGGER MODE** was set to **ON** (*path: MENU / INPUT / LOGGER SETUP / LOGGER MODE:ON)*; and if any position in **CHAN. 2 PROF. 3** (*path: MENU / INPUT / LOGGER SETUP / CHANNEL 2 / CHAN. 2 PROF. 3*) sub-list was selected, up to four words are written in the given sequence:

<result1> - **PEAK** result in the case of **SLM** if the first position was marked, else no value is written;
<result2> - **MAX** result in the case of **SLM** if the second position was marked, else no value is written;
<result3> - **MIN** result in the case of **SLM** if the third position was marked, else no value is written;
<result4> - **RMS** result in the case of **SLM** if the fourth position was marked, else no value is written;

- results of the measurement from the 3rd profile of the 3rd channel if the **LOGGER MODE** was set to **ON** (*path: MENU / INPUT / LOGGER SETUP / LOGGER MODE:ON)* and if any position in **CHAN. 3 PROF. 3** (*path: MENU / INPUT / LOGGER SETUP / CHANNEL 3 / CHAN. 3 PROF. 3*) sub-list was selected, up to four words are written in the given sequence:

<result1> - **PEAK** result in the case of **SLM** if the first position was marked, else no value is written;
<result2> - **MAX** result in the case of **SLM** if the second position was marked, else no value is written;
<result3> - **MIN** result in the case of **SLM** if the third position was marked, else no value is written;
<result4> - **RMS** result in the case of **SLM** if the fourth position was marked, else no value is written;

- results of the measurement from the 3rd profile of the 4th channel if the **LOGGER MODE** was set to **ON** (*path: MENU / INPUT / LOGGER SETUP / LOGGER MODE:ON)* and if any position in **CHAN. 4 PROF. 3** (*path: MENU / INPUT / LOGGER SETUP / CHANNEL 4 / CHAN. 4 PROF. 3*) sub-list was selected, up to four words are written in the given sequence:

<result1> - **PEAK** result in the case of **SLM** if the first position was marked, else no value is written;
<result2> - **MAX** result in the case of **SLM** if the second position was marked, else no value is written;
<result3> - **MIN** result in the case of **SLM** if the third position was marked, else no value is written;
<result4> - **RMS** result in the case of **SLM** if the fourth position was marked, else no value is written;

- **VECTOR** measurement result if in the **LOGGER MODE** (*path: MENU / INPUT / LOGGER SETUP / LOGGER MODE:ON*) and **VECTOR** (*path: MENU / INPUT / LOGGER SETUP / VECTOR:ON*) are set to **ON** and **VECTOR** measurement was enabled; one word is written.

- **RPM** measurement result if the **LOGGER MODE** (*path: MENU / INPUT / LOGGER SETUP / LOGGER MODE:ON*) and **RPM** (*path: MENU / INPUT / LOGGER SETUP / AUXILIARY/ RPM:[√]*) are set to **ON** and **RPM** measurement was enabled; two word are written.

- results of **1/1 OCTAVE** analysis from the 1st channel if **1/1 OCTAVE** analysis was selected as the measurement function and in the **LOGGER** (*path: MENU / INPUT / 1/1 OCTAVE SETUP / CHANNEL 1: ENABLED[√]; LOGGER:RMS*) other then **None** value was selected; the sequence of words is written:

<flags> <Octave[1]> <Octave[2]> ... <Octave[NOct+NOctTot]>
where:
flags = 1 - the overload detected, 0 - the overload not detected
Octave[i] - the result of **1/1 OCTAVE** analysis (*10 dB); i = 1..NOct+NOctTot (1..18)

- results of **1/1 OCTAVE** analysis from the 2nd second channel if **1/1 OCTAVE** analysis was selected as the measurement function and in the **LOGGER** (*path: MENU / INPUT / 1/1 OCTAVE SETUP / CHANNEL 2 / ENABLED[√]; LOGGER:RMS*) other then **None** value was selected; the sequence of words is written:

<flags> <Octave[1]> <Octave[2]> ... <Octave[NOct+NOctTot]>
where:
flags = 1 - the overload detected, 0 - the overload not detected

Octave[i] - the result of **1/1 OCTAVE** analysis (*10 dB); i = 1..NOct+NOctTot (1..18)

- results of **1/1 OCTAVE** analysis from the 3rd channel if **1/1 OCTAVE** analysis was selected as the measurement function and in the **LOGGER** (*path: MENU / INPUT / 1/1 OCTAVE SETUP / CHANNEL 3 / ENABLED[√]; LOGGER:RMS*) other then **None** value was selected; the sequence of words is written:

<flags> <Octave[1]> <Octave[2]> ... <Octave[NOct+NOctTot]>
where:
flags = 1 - the overload detected, 0 - the overload not detected
Octave[i] - the result of **1/1 OCTAVE** analysis (*10 dB); i = 1..NOct+NOctTot (1..18)

- results of **1/1 OCTAVE** analysis from the 4th channel if **1/1 OCTAVE** analysis was selected as the measurement function and in the **LOGGER** (*path: MENU / INPUT / 1/1 OCTAVE SETUP / CHANNEL 4 / ENABLED[√]; LOGGER:RMS*) other then **None** value was selected; the sequence of words is written:

<flags> <Octave[1]> <Octave[2]> ... <Octave[NOct+NOctTot]>
where:
flags = 1 - the overload detected, 0 - the overload not detected
Octave[i] - the result of **1/1 OCTAVE** analysis (*10 dB); i = 1..NOct+NOctTot (1..18)

- results of **1/3 OCTAVE** analysis from the 1st channel if **1/3 OCTAVE** analysis was selected as the measurement function and in the **LOGGER** (*path MENU / INPUT / 1/3 OCTAVE SETUP / CHANNEL 1 / ENABLED[√]; LOGGER:RMS*) other then **None** value was selected; the sequence of words is written:

<flags> <Terave[1]> <Terave [2]> ... <Terave[NT]>
where:
flags = 1 - the overload detected, 0 - the overload not detected
Terave[i] - the result of **1/3 OCTAVE** analysis (*10 dB); i = 1..NT (1..48 or 1..33)

- results of **1/3 OCTAVE** analysis from the 2nd channel if **1/3 OCTAVE** analysis was selected as the measurement function and in the **LOGGER** (*path: MENU / INPUT / 1/3 OCTAVE SETUP / CHANNEL 2 / ENABLED[√]; LOGGER:RMS*) other then **None** value was selected; the sequence of words is written:

<flags> <Terave[1]> <Terave [2]> ... <Terave[NT]>
where:
flags = 1 - the overload detected, 0 - the overload not detected
Terave[i] - the result of **1/3 OCTAVE** analysis (*10 dB); i = 1..NT (1..48 or 1..33)

- results of **1/3 OCTAVE** analysis from the 3rd channel if **1/3 OCTAVE** analysis was selected as the measurement function and in the **LOGGER** (*path: MENU / INPUT / 1/3 OCTAVE SETUP / CHANNEL 3 / ENABLED[√]; LOGGER:RMS*) other then **None** value was selected; the sequence of words is written:

<flags> <Terave[1]> <Terave [2]> ... <Terave[NT]>
where:
flags = 1 - the overload detected, 0 - the overload not detected
Terave[i] - the result of **1/3 OCTAVE** analysis (*10 dB); i = 1..NT (1..48 or 1..33)

- results of **1/3 OCTAVE** analysis from the 4th channel if **1/3 OCTAVE** analysis was selected as the measurement function and in the **LOGGER** (*path: MENU / INPUT / 1/3 OCTAVE SETUP / CHANNEL 4 / ENABLED[√]; LOGGER:RMS*) other then **None** value was selected; the sequence of words is written:

<flags> <Terave[1]> <Terave [2]> ... <Terave[NT]>
where:

flags = 1 - the overload detected, 0 - the overload not detected
Terave[i] - the result of **1/3 OCTAVE** analysis (*10 dB); i = 1..NT (1..48 or 1..33)

- results of **FFT** analysis from the 1st channel if **FFT** analysis was selected as the measurement function and in the **LOGGER** (*path MENU / INPUT / FFT SETUP / CHANNEL 1: ENABLED[√]; LOGGER:*) other than **None** value was selected; the sequence of words is written:

<flags> <FFTave[1]> <FFTave [2]> ... <FFTave[NL]>
where:
flags = 1 - the overload detected, 0 - the overload not detected
FFTave[i] - the result of **FFT** analysis (*10 dB); i = 1..NL (1..481 or 1..961)

- results of **FFT** analysis from the 2nd channel if **FFT** analysis was selected as the measurement function and in the **LOGGER** (*path: MENU / INPUT / FFT SETUP / CHANNEL 2: ENABLED[√]; LOGGER:RMS*) other then **None** value was selected; the sequence of words is written:

<flags> <FFTave[1]> <FFTave [2]> ... <FFTave[NL]>
where:
flags = 1 - the overload detected, 0 - the overload not detected
FFTave[i] - the result of **FFT** analysis (*10 dB); i = 1..NL (1..481 or 1..961)

- results of **FFT** analysis from the 3rd channel if **FFT** analysis was selected as the measurement function and in the **LOGGER** (*path: MENU / INPUT / FFT SETUP / CHANNEL 3: ENABLED[√]; LOGGER:RMS*) other then **None** value was selected; the sequence of words is written:

<flags> <FFTave[1]> <FFTave [2]> ... <FFTave[NL]>
where:
flags = 1 - the overload detected, 0 - the overload not detected
FFTave[i] - the result of **FFT** analysis (*10 dB); i = 1..NL (1..481 or 1..961)

- results of **FFT** analysis from the 4th channel if **FFT** analysis was selected as the measurement function and in the **LOGGER** (*path: MENU / INPUT / FFT SETUP / CHANNEL 4: ENABLED[√]; LOGGER:RMS*) other then **None** value was selected; the sequence of words is written:

<flags> <FFTave[1]> <FFTave [2]> ... <FFTave[NL]>
where:
flags = 1 - the overload detected, 0 - the overload not detected
FFTave[i] - the result of **FFT** analysis (*10 dB); i = 1..NL (1..481 or 1..961)

The value of NT parameter depends on the **LOGGER STEP** selection (*path: MENU / INPUT / MEASUREMENT SETUP / LOGGER STEP*). For the logger steps greater than 10 ms the value of NT is equal to NTer+NTerTot: the outputs from all **1/3 OCTAVE** filters from 0.8 Hz up to 20 kHz and the TOTAL values are written (45 + 3 = 48). For the logger step equal to 10 ms the value of NT is equal to 33: the outputs from **1/3 OCTAVE** filters from 25 Hz up to 20 kHz and the TOTAL value are written (30 + 3 = 33).

The value of NL parameter depends on the **LINES** selection (*path: MENU / INPUT / FFT / CHANNEL x / LINES).*

B.16.2. 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.16.3. 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.16.4. 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).

Pause duration means time passed between pressing **<PAUSE>** key and measurement continuation key. Start delay after pressing continuation key isn't added to the counter.

B.17. CONTENTS OF THE FILES IN THE LOGGER CONTAINING TIME-DOMAIN SIGNAL

Records with samples and RPM value are kept in the logger file. The records with the state of the markers, breaks in the results and pause are not saved in the file. Time-domain is saved when the option **LOGGER MODE** in menu *path: MENU / INPUT / LOGGER SETUP* was set to the TIME value.

B.17.1. Samples record

Record form depends on the selection of channels, from which samples are saved, (*path*: *MENU / INPUT / LOGGER SETUP / CHANNEL x*), state of the RPM measurement (*path: MENU / INPUT / AUXILIARY SETUP / RPM SETUP / ENABLED:[√])* and RPM logging option *(path: MENU / INPUT / AUXILIARY SETUP / RPM SETUP / LOGGER: [√])* or *MENU / INPUT / LOGGER SETUP / AUXILIARY / RPM:[√]*). The following elements can be present (in the given sequence):

- Sample from the 1st channel if **CHANNEL 1** was set to **ON** (*path: MENU / INPUT / LOGGER SETUP / CHANNEL 1).* The sample is written on three consecutive bytes from least to most significant byte.
- Sample from the 2nd channel if **CHANNEL 2** was set to **ON** (*path: MENU / INPUT / LOGGER SETUP / CHANNEL 2).* The sample is written on three consecutive bytes from least to most significant byte.

- Sample from the 3rd channel if **CHANNEL 3** was set to **ON** (*path: MENU / INPUT / LOGGER SETUP / CHANNEL 3).* The sample is written on three consecutive bytes from least to most significant byte.
- Sample from the 4th channel if **CHANNEL 4** was set to **ON** (*path: MENU / INPUT / LOGGER SETUP / CHANNEL 4).* The sample is written on three consecutive bytes from least to most significant byte.
- Zero byte if the samples are saved from one or three channels.
- **RPM** measurement result if RPM measurement (*path*: *MENU / INPUT / AUXILIARY SETUP / RPM / RPM)* and **RPM** logging (*path*: *MENU / INPUT / AUXILIARY SETUP / RPM SETUP / LOGGER: [√])* or (*path*: *MENU / INPUT / LOGGER SETUP / AUXILIARY / RPM:[√])* are set to **ON**; two word are written.

B.18. DATE AND TIME

Following function written in C explains how the date and time are coded:

```
void ExtractDateTime(int date, int time, int dt[])
{
      int sec,year;

      sec = ((0xffff&time)<<1); /* time<<1; */
      dt[0] = sec%60; /* sec */
      dt[1] = (sec/60)%60; /* min */
      dt[2] = sec/3600; /* hour */

      dt[3] = date&0x1F; /* day */
      dt[4] = (date>>5)&0x0F; /* month */
      year = (date>>9) & 0x07F;
      dt[5] = year+2000; /* year */
}
```

Appendix C. SVAN 958A TECHNICAL SPECIFICATIONS

C.1. SPECIFICATION OF SVAN 958A AS SOUND LEVEL METER (SLM)

C.1.1 Specification of SVAN 958A as SLM in the standard configuration

Statement of performance

SVAN 958A working as the SLM with all listed below accessories meets requirements of the IEC 61672-1:2013 for the Class 1 Group X instruments. SLM function is provided by the TNC/IEPE inputs using the SC 26 cable for Channel 4 and the SC 49 cable providing LEMO 4-pins to 3 x TNC connection for Channels 1-3.

Configuration of the complete SLM and its normal mode of operation

SVAN 958A	sound & vibration level meter and analyser
MK 255	prepolarised free-field microphone (1/2", nominal sensitivity 50 mV/Pa)
SV 12L	microphone preamplifier
SC 26	extension cable for SV 12L
SC 49	LEMO 4-pins to 3 x TNC socket adapter
Recommended calibrator:	
SV 36	Class 1 sound calibrator: 94/114 dB@1000 Hz or equivalent (not included in the standard set)

Accessories included

SC 16	USB cable
SC 61	TNC to BNC integrated connector

Accessories available:

MK 255	prepolarised free-field microphone (1/2", nominal sensitivity 50 mV/Pa)
SV 12L	microphone preamplifier
SC 26	preamplifier extension cable (3 m or 10 m)
SC 49	LEMO 4-pins to 3 x TNC sockets (0.7 m)
SA 06	microphone preamplifier holder
SA 21	tripod 1.5 meter high
SA 22	windscreen
SV 36	Class 1 Sound calibrator: 94/114 dB @ 1000 Hz
SA 208C	Sound measurements set: Microtech Gefell Prepolarised condenser microphone (**MK 255**), microphone preamplifier (**SV 12L**), outdoor microphone kit (**SA 277C**), desiccator (**SA 270D**), preamplifier cable (**SC 277**), carrying case (**SA 250)**
SC 09A	AC output (Lemo 1 to BNC) cable
SA 15	power supply unit for SVAN 958A

Measured quantities

The measured quantities for SLM mode are **PEAK**, **SPL**, **MAX**, **MIN**, **LEQ**, **RMS**, **SEL**, **Ltm3**, **Ltm5**, **LEPd**, **OVL**, **Ln** and additional, for **DOSE METER** modes are: **DOSE**, **D8_h**, **LAV**, **TLAV**, **SEL8**, **PSEL**, **E**, **E_8h**. Definitions for parameters are given in Appendix D.

Additional features

- Overload indication
- Underrange indication
- Battery state indication

Normal operating mode

SVAN 958A in configuration with the **SV 12L** microphone preamplifier, **MK 255** microphone for each channel and the **SC 26** extension cable for Channel 4 or **SC 49** cable for Channels 1-3 and with following settings: **High** or **Low** measurement range, microphone compensation set to **Free Field** (*path: <Menu> / Channel Setup / Channel x* – see Chapter 4.2)

Conformance testing

This chapter contains the information needed to conduct conformance testing according to the specified standards.

Mounting for acoustical tests

The microphone with the preamplifier should be placed on a tripod (i.e. the **SA 21**) and connected to the SLM using the **SC 26** (Channel 4) or **SC 49** (Channels 1-3) extension cable.

The operator shall stand in proper distance from the tripod in order not to disturb acoustic field around the microphone.

Periodical test upper frequency	8 kHz

Measurement ranges

Reference measurement range of the acoustic pressure	**High**
Measurement frequency range of the acoustic pressure	3 Hz ÷ 20 000 Hz (-3 dB)
Basic measurement error of the acoustic pressure	< 0.7 dB (measured for the reference conditions, see below).

Weighting filters (see part C.4)

- **LIN** meeting requirements of IEC 61672-1:2013 for the Class 1 “Z“ filters
- **A** meeting requirements of IEC 651 and IEC 61672-1:2013 for the Class 1 “A“ filters
- **C** meeting requirements of IEC 651 and IEC 61672-1:2013 for the Class 1 “C“ filters

Linear operating ranges for LEQ measurements with the **Free Field** compensation

Two measuring ranges are available: **Low** and **High**.

The starting point at which tests of level linearity shall begin is 94.0 dB for the frequencies specifies below. For the **Low** measurement range and A weighting linearity test at 31.5 Hz, the starting point is 69 dB.

Table C.1.1. Linear operating ranges for the **Free Field** filter and **Low** measurement range (for the sinusoidal signal and microphone sensitivity 50 mV/Pa)

[dB]	$L_{AS/F}$		$L_{CS/F}$		$L_{LINS/F}$		L_{AeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	24	75	24	112	30	115	24	75	24	112	27	78	50	115
500 Hz	24	115	24	115	30	115	24	115	24	115	27	118	50	118
1 kHz	24	116	24	114	30	115	24	116	24	114	27	119	50	117
4 kHz	24	114	24	112	30	115	24	114	24	112	27	117	50	115
8 kHz	24	110	24	109	30	115	24	110	24	109	27	113	50	112
12.5 kHz	24	75	24	112	30	115	24	75	24	112	27	78	50	115

Table C.1.2. Linear operating ranges for the **Free Field** filter and **High** measurement range (primary) (for the sinusoidal signal and microphone sensitivity 50 mV/Pa)

[dB]	$L_{AS/F}$		$L_{CS/F}$		$L_{LINS/F}$		L_{AeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	44	97	44	134	46	137	44	97	44	134	47	100	70	137
500 Hz	44	137	44	137	46	137	44	137	44	137	47	140	70	140
1 kHz	44	138	44	136	46	137	44	138	44	136	47	141	70	139
4 kHz	44	136	44	134	46	137	44	136	44	134	47	139	70	137
8 kHz	44	132	44	131	46	137	44	132	44	131	47	135	70	134
12.5 kHz	44	97	44	134	46	137	44	97	44	134	47	100	70	137

Note: *For the signals with the crest factor n > 1.41 upper measuring range of the RMS (LEQ) is reduced. The valid upper limit can be calculated according to the below given formula:*

$A_n = 137 - 20\log\left(n/\sqrt{2}\right)$, *where A is the upper limit for the sinusoidal signal*

Example: For the crest factor n = 10 the upper limit is A_{10} = 120 dB.

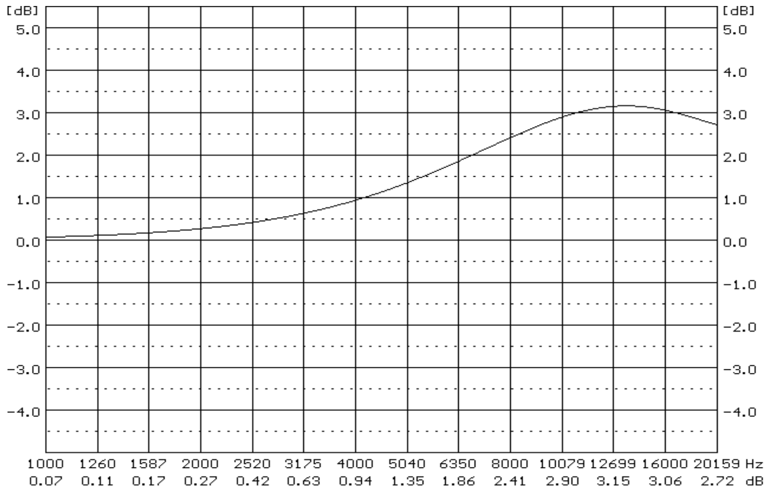
Table C.1.3. Self-generated noise for different weighting filters

	Electrical *)			Acoustical compensated		
Weighting filter / Range	**A**	**C**	**LIN**	**A**	**C**	**LIN**
Low	< 13 dB	< 13 dB	< 19 dB	< 17 dB	< 17 dB	< 23 dB
High	< 33 dB	< 33 dB	< 35 dB	< 37 dB	< 37 dB	< 39 dB

*) measured with the **ST 02** microphone equivalent impedance **18 pF ± 10%**

Special filters

- **G** filter for infrasound measurements from 1 Hz to 100 Hz; conforms to the ISO / DIS 7196 standard.
- **Diffuse field** compensation filter that improves the complete instrument frequency response in the diffuse acoustic field (see below)



SV 958A diffuse field compensation filter

- **Environment** compensation filter that improves the instrument frequency response in the free acoustic field when using with the Outdoor microphone kit SA 277C for the 90 deg incidence angle (see sections C.7 and C.8)
- **Airport** compensation filter that improves the instrument frequency response in the free acoustic field when using with the Outdoor microphone kit SA 277C for the 0 deg incidence angle (see sections C.7 and C.8)

Note: *SVAN 958A and the MK 255 microphone are used to perform the measurements in the free field. In order to measure in the diffuse field or with the use of the SA 277C outdoor microphone kit, the user should select the appropriate compensation filter (see Chapter 4.2).*

Note: *Using special filters might change the frequency response and measuring ranges of SVAN 958A. Please check the below given specification.*

Linear operating ranges for LEQ measurements with the **Diffuse** compensation

The starting point at which tests of level linearity shall begin is 94.0 dB for the frequencies specifies below. For the **Low** measurement range and A weighting linearity test at 31.5 Hz, the starting point is 74 dB.

Table C.1.4. Linear operating ranges for the **Diffuse** filter and **Low** measurement range (for the sinusoidal signal and microphone sensitivity 50 mV/Pa)

[dB]	$L_{AS/F}$		$L_{CS/F}$		$L_{LINS/F}$		L_{AeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	25	80	25	117	33	120	25	80	25	117	28	83	50	115
500 Hz	25	120	25	120	33	120	25	120	25	120	28	123	50	118
1 kHz	25	121	25	119	33	120	25	121	25	119	28	124	50	117
4 kHz	25	119	25	117	33	120	25	119	25	117	28	122	50	115
8 kHz	25	115	25	114	33	120	25	115	25	114	28	118	50	112
12.5 kHz	25	80	25	117	33	120	25	80	25	117	28	83	50	115

Table C.1.5. Linear operating ranges for the **Diffuse** filter and **High** measurement range (primary) (for the sinusoidal signal and microphone sensitivity 50 mV/Pa)

[dB]	$L_{AS/F}$		$L_{CS/F}$		$L_{LINS/F}$		L_{AeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	45	97	45	134	47	137	45	97	45	134	48	100	70	137
500 Hz	45	137	45	137	47	137	45	137	45	137	48	140	70	140
1 kHz	45	138	45	136	47	137	45	138	45	136	48	141	70	139
4 kHz	45	136	45	134	47	137	45	136	45	134	48	139	70	137
8 kHz	45	132	45	131	47	137	45	132	45	131	48	135	70	134
12.5 kHz	45	97	45	134	47	137	45	97	45	134	48	100	70	137

***Note:** Linear operating ranges for Peak value do not change when using the **Diffuse** filter.*

Linear operating ranges with the **SA 22** windscreen

The SA 22 windscreen doesn't change the linear operating ranges.

RMS detector

- Digital "True RMS" with Peak detection,
- Resolution 0.1 dB
- Range 213.7 dB
- Crest Factor > 100 (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 SPL value is below the lower linear operating range.

Time weighting characteristics (Exponential averaging)

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

Reference conditions 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.

Maximum peak voltage	30 V Peak-Peak (Maximum peak voltage of input sinusoidal signal, which can be lead to the SLM without destruction the meter)
Warm-up time	1 min. (for 0.1 dB accuracy)
Typical stabilization time after change in environmental conditions by 20°C	1 hour
Time shift after completion of a measurement, before a measurement is shown	≤ 1 sec
Nominal delay between operating of the **<Start>** (Reset) key and beginning of a new measurement	≥ 1 sec

Note: *When SVAN 958A 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 for all channels

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 the **Z** filter and time weighting **Fast** are selected and the SPL measurements are considered.

The instrument produces greatest radio-frequency emission when an extension cable is connected. The cable placed as a solenoid may produce unexpected emission depending on its physical dimensions. Any configuration w/o extension cable reduces emission below 30 dBuV/m.

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	from -10°C to + 50°C
Storage temperature	from -20°C to + 60°C
Effect of Vibration	< 71 dB (from 20 Hz to 1000 Hz at 1 m/s^2) – see Chapter C.1.4

Calibration

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

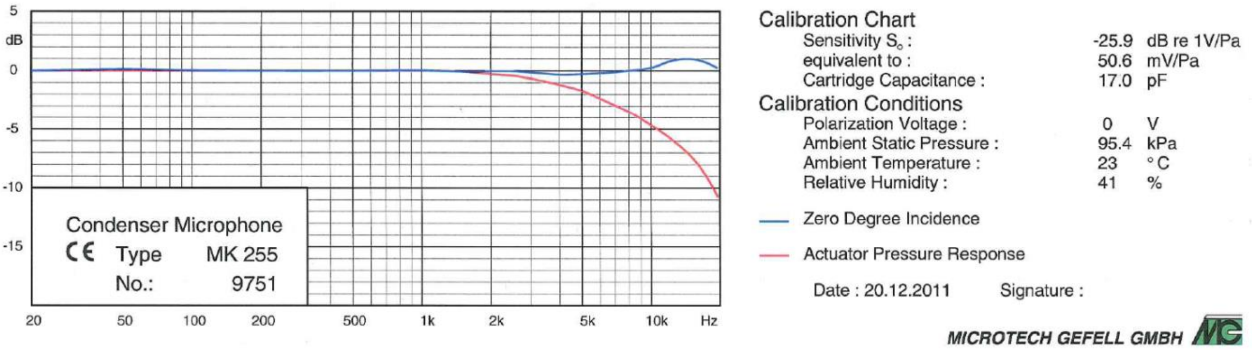
• Calibration level	114.0 dB (equal to the calibrator pressure level - see calibration chart of the used calibrator)
• Calibration level for the free field and 0 deg incidence angle	114.04 dB (equal to the calibration level for the pressure field minus free field correction of MK 255 at 1000 Hz – see Table C.1.6)

Note: *The above levels correspond to 114 dB of calibrator's sound pressure. If the calibrator has a different sound pressure than 114 dB, the calibration levels must be accordingly adjusted.*

Microphone

MK 255	prepolarised free-field ½" condenser microphone
Nominal sensitivity	50 mV/Pa (corresponding to -26 dBV/Pa re 1 V/Pa)
Capacitance	17 pF
Reference point	geometric centre of the microphone diaphragm.

Note: *Maximum sound pressure level that can be applied to a microphone without destroying it: 146 dB.*

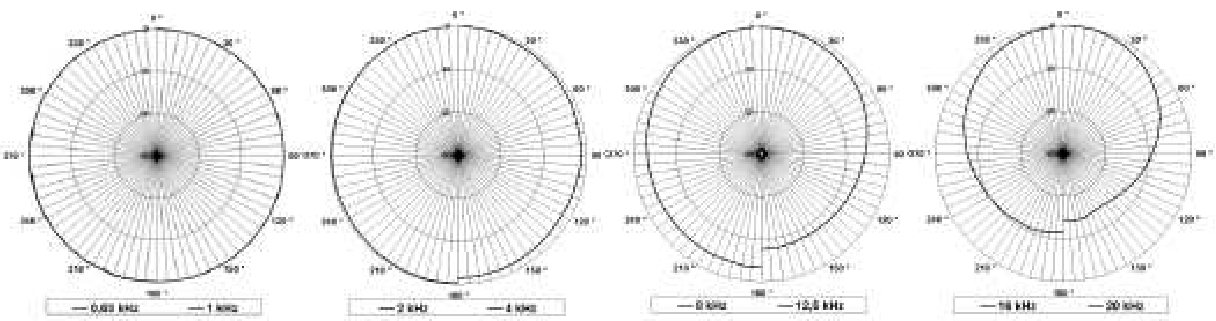


Typical MK 255 Free Field frequency response (source: Microtech Gefell Gmbh)

Table C.1.6. MK 255 free field corrections using the electrostatic actuator for 0 deg incidence angle

[dB]	Frequency [Hz]																
	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800
Correction factors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.05	-0.07	-0.07	-0.06	-0.04
Uncertainty (IEC 62585)	--	--	--	--	--	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25

[dB]	Frequency [Hz]													
	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	12500	16000	20000
Correction factors	-0.04	-0.03	0.02	0.13	0.30	0.55	1.00	1.55	2.21	3.35	4.83	6.94	9.16	11.59
Uncertainty (IEC 62585)	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.35	0.35	0.35	0.35	0.50	0.50	0.50

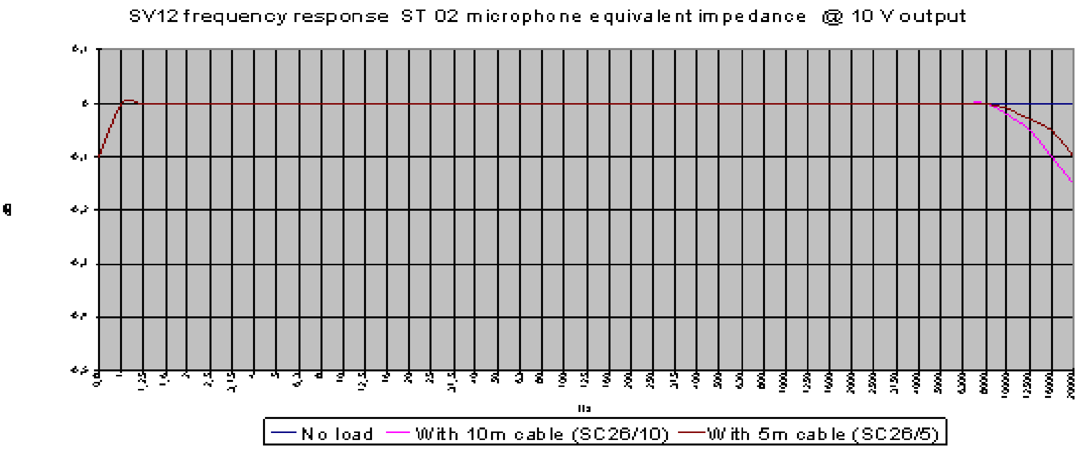


Directional characteristics of MK 255 (source: Microtech Gefell Gmbh)

Preamplifier

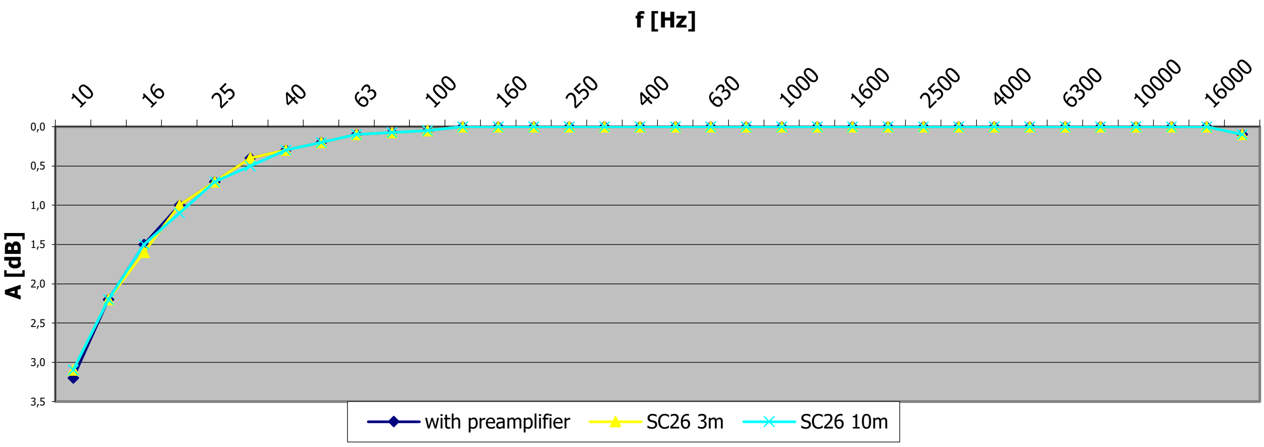
SV 12L nominal preamplifier attenuation: 0.7 dB;

IEPE Type – power supply 1.5 mA@30 V



SV12L typical frequency response

Effect of the SC26 extension cable of 3- and 10-meters length



Effect of extension cable for measurement filter LIN for Uin=1 V_{RMS}

Note: *Using of the extension cable has no effect on the linearity operation ranges.*

C.1.2 Effect of Vibration

1. Mechanical vibration with an acceleration of 1 m/s² perpendicular to the membrane of the microphone for the frequencies 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 630 Hz, 800 Hz and 1000 Hz increases the low level of the linear operation range according to the Table C.1.7.
2. Mechanical vibration with an acceleration of 1 m/s² parallel to the membrane of the microphone for the frequencies 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 630 Hz, 800 Hz and 1000 Hz increases the low level of the linear operation range according to the Table C.1.8.

Test conditions:

The microphone type **MK 255** and the preamplifier type **SV 12L** connected to SVAN 958A were mounted on the shaker.

Ref 1. Vibration is applied in a direction perpendicular to the plane of the microphone diaphragm.

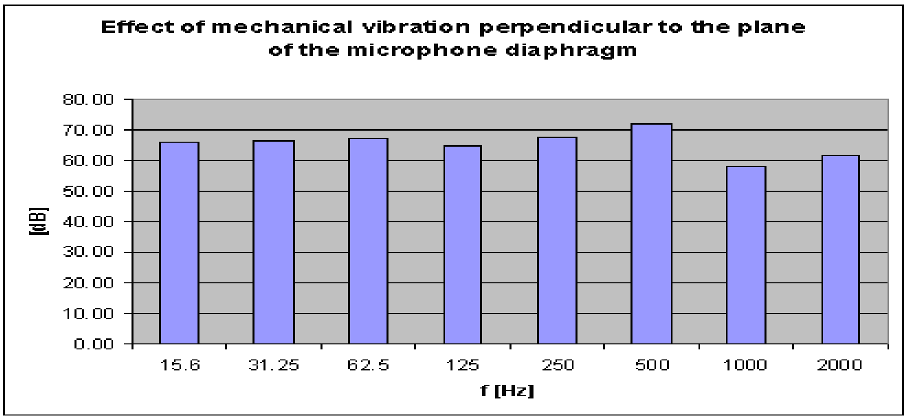
Ref 2. Vibration is applied in a direction parallel to the plane of the microphone diaphragm.

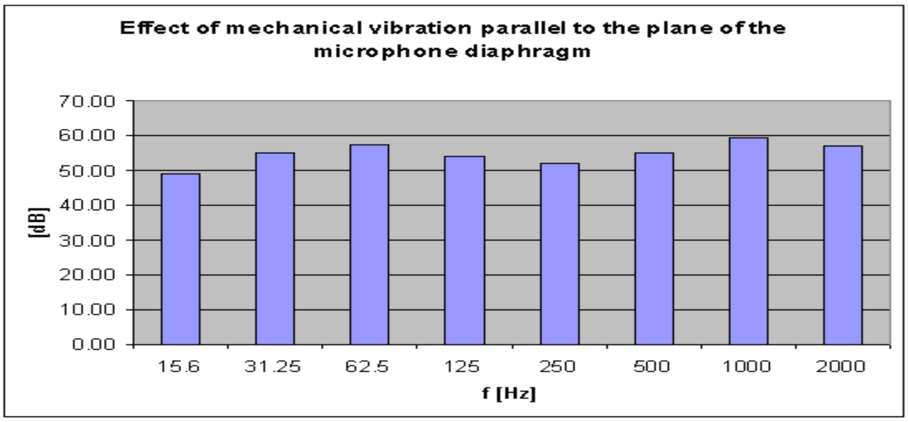
Table C.1.7. Typical effect of vibration perpendicular to the plane of microphone diaphragm

f (Hz)	15.6	31.25	62.5	125	250	500	1000	2000
Typical effect of vibration [dB]	66.13	66.36	67.03	64.55	67.46	71.66	57.59	61.58

Table C.1.8. Typical effect of vibration parallel to the plane of microphone diaphragm

f (Hz)	15.6	31.25	62.5	125	250	500	1000	2000
Typical effect of vibration [dB]	48.99	54.98	57.19	54.25	52.11	54.89	59.60	57.07





C.1.3. Effect of the SA 277C outdoor microphone kit (Channel 4 only)

See Chapter C.7 for the details related to using of the SA 277C outdoor microphone kit.

C.1.4. Effect of the SA 277D outdoor microphone kit (Channel 4 only)

See Chapter C.8 for the details related to using of the SA 277D outdoor microphone kit.

C.2. SPECIFICATION OF SVAN 958A AS VIBRATION LEVEL METER (VLM)

VLM function is provided by the BNC/IEPE inputs using the SC 61 TNC to BNC connector for Channel 4 and cables providing LEMO 4-pins to 3 x BNC connection for Channels 1-3 or special cables dedicated for triaxial accelerometers (e.g. SC 282S, SC 38).

Configuration of the complete VLM and its normal mode of operation

SVAN 958A	sound & vibration analyser
3143M1	triaxial accelerometer, 100 mV/g (10 mV/ms^{-2}),
3023M2	triaxial accelerometer, 10 mV/g (1 mV/ms^{-2}),
SC 38	cable for the triaxial accelerometer (4 pin Microtech to LEMO 4 pin, 2.7 m)

Accessories included

SC 16	USB cable,
SC 61	integrated connector (TNC to BNC)

Accessories available

SV 111	Vibration Calibrator for HVM
SV 110	Vibration Calibrator
SA 17A	External battery unit (6 x AA batteries) for the SVAN 95x instruments
SC 09A	LEMO 1 pin to BNC cable, AC OUT cable

***Note:** System conforms to the ISO 8041-1:2016, ISO 2631-1:1997, ISO 2631-2:2003, DIN 45669-1:2010 standards.*

Normal operating mode

SVAN 958A in configuration with the supplied accelerometer with following settings: **High** or **Low** measurement range (*path: <Menu> / Channel Setup / Channel x* – see Chapter 4.2)

Measured quantities

The measured quantities in the vibration meter mode are: **RMS**, **VDV**, **OVL**, **PEAK**, **P–P**, **MTVV** or **MAX**. The definitions for mentioned parameters are given in Appendix D.

Additional features

- Overload indication
- Underrange indication
- Battery state indication

Conformance testing

This chapter contains the information needed to conduct conformance testing according to the specified standards.

Mounting for vibration tests

The accelerometer can be connected with the VLM using proper cable provided by the manufacturer.
The accelerometer can be mounted on the plate in various ways:

- using threaded stud onto a flat, smooth surface,
- using thin layer of beeswax for sticking the accelerometer into the plate,
- using mica washer and isolates stud, where the body of accelerometer should be electrically isolated from the measuring object,
- using permanent magnet, which also electrically isolates the accelerometer.

Digital filters

High-pass filters (see Chapter C.5 for frequency response characteristics)

- **HP**
- **HP1**
- **HP3**
- **HP10**

Frequency weighting filter (filter includes Band Limiting filter).

Conforms with ISO 8041-1:2017 (see Chapter C.5 for frequency response characteristics)

- **Wk** from 0.1 Hz to 400 Hz
- **Wd** from 0.1 Hz to 400 Hz
- **Wc** from 0.1 Hz to 400 Hz
- **Wj** from 0.1 Hz to 400 Hz
- **Wm** from 0.1 Hz to 400 Hz
- **Wb** from 0.1 Hz to 400 Hz
- **Wg** from 0.8 Hz to 100 Hz
- **Wh** from 0.8 Hz to 4000 Hz

Integrating filters (see Chapter C.5 for frequency response characteristics):

- **Vel1** from 0.2 Hz to 4100 Hz
- **Vel3** from 0.2 Hz to 4100 Hz
- **Vel10** from 0.2 Hz to 4100 Hz
- **Dil1** from 0.1 Hz to 260 Hz
- **Dil3** from 0.2 Hz to 510 Hz
- **Dil10** from 1 Hz to 2050 Hz

Special filter

Filter for the evaluation of the machinery condition:

- **VelMF** from 0.2 Hz to 4100 Hz; conforms with ISO 10816 (see Chapter C.5 for the frequency response characteristics)

Linear operating ranges (for acceleration)

SVAN 958A uses two measurement ranges: **Low** and **High**.

Values of the measured acceleration using the accelerometer with the nominal sensitivity equal to 10 mV/ms^{-2} (e.g. the SV 39A/L seat accelerometer):

- Linear measurement with the **Wc**, **Wd**, **Wj**, **Wk** and **Wm** filters:

  the linear operating ranges for the distance from noise > 6 dB
  from 0.001 ms^{-2} to 352 ms^{-2} (the sinusoidal signal RMS)
  from 0.01 ms^{-2} to 500 ms^{-2} (PEAK)

Table C.2.1. Linear operating ranges with the Wc, Wd, Wj, Wk and Wm filters

Range	Linear operating ranges	
Low	from 1.0 mms^{-2} (60.0 dB)	to 56.2 ms^{-2} (155.0 dB)
High	from 10.0 mms^{-2} (80.0 dB)	to 352 ms^{-2} (171.0 dB)

- Linear measurement with the **HP1** filter:

  the linear operating ranges for the distance from noise > 6 dB
  from 0.003 ms^{-2} to 352 ms^{-2} (the sinusoidal signal RMS)
  from 0.03 ms^{-2} to 500 ms^{-2} (PEAK)

Table C.2.2. Linear operating ranges with the HP1 filter

Range	Linear operating ranges	
Low	from 3.16 mms^{-2} (70.0 dB)	to 56.2 ms^{-2} (155.0 dB)
High	from 31.6 mms^{-2} (90.0 dB)	to 352 ms^{-2} (171.0 dB)

- Linear measurement with the **HP3** filter:

  the linear operating ranges for the distance from noise > 6 dB
  from 0.001 ms^{-2} to 352 ms^{-2} (the sinusoidal signal RMS)
  from 0.01 ms^{-2} to 500 ms^{-2} (PEAK)

Table C.2.3. Linear operating ranges with the HP3 filter

Range	Linear operating ranges	
Low	from 1.0 mms^{-2} (60.0 dB)	to 56.2 ms^{-2} (155.0 dB)
High	from 10.0 mms^{-2} (80.0 dB)	to 352 ms^{-2} (171.0 dB)

- Linear measurement with the **HP10** filter:

  the linear operating ranges for the distance from noise > 6 dB
  from 0.0005 ms^{-2} to 352 ms^{-2} (the sinusoidal signal RMS)
  from 0.01 ms^{-2} to 500 ms^{-2} (PEAK)

Table C.2.4. Linear operating ranges with the HP10 filter

Range	Linear operating ranges	
Low	from 0.5 mms^{-2} (54.0 dB)	to 56.2 ms^{-2} (155.0 dB)
High	from 10 mms^{-2} (80.0 dB)	to 352 ms^{-2} (171.0 dB)

Values of the measured acceleration using the accelerometer with the nominal sensitivity equal to 1 mV/ms^{-2} (e.g. 3023M2):

- Linear measurement with the **Wh** filter:
  the linear operating ranges for the distance from noise > 6 dB
  from 0.01 ms^{-2} to 3520 ms^{-2} (the sinusoidal signal RMS)
  from 0.1 ms^{-2} to 5000 ms^{-2} (PEAK)

Table C.2.5. Linear operating ranges with the Wh filter

Range	Linear operating ranges	
Low	from 10 mms^{-2} (80.0 dB)	to 562 ms^{-2} (175.0 dB)
High	from 100 mms^{-2} (100.0 dB)	to 3520 ms^{-2} (191.0 dB)

- Linear measurement with the **HP1** filter:
  the linear operating ranges for the distance from noise > 6 dB
  from 0.03 ms^{-2} to 3520 ms^{-2} (the sinusoidal signal RMS)
  from 0.3 ms^{-2} to 5000 ms^{-2} (PEAK)

Table C.2.6. Linear operating ranges with the HP1 filter

Range	Linear operating ranges	
Low	from 31.6 mms^{-2} (90.0 dB)	to 562 ms^{-2} (175.0 dB)
High	from 316 mms^{-2} (110.0 dB)	to 3520 ms^{-2} (191.0 dB)

- Linear measurement with the **HP3** filter:
  the linear operating ranges for the distance from noise > 6 dB
  from 0.01 ms^{-2} do 3520 ms^{-2} (the sinusoidal signal RMS)
  from 0.1 ms^{-2} do 5000 ms^{-2} (PEAK)

Table C.2.7. Linear operating ranges with the HP3 filter

Range	Linear operating ranges	
Low	from 10 mms^{-2} (80.0 dB)	to 562 ms^{-2} (175.0 dB)
High	from 100 mms^{-2} (100.0 dB)	to 3520 ms^{-2} (191.0 dB)

- Linear measurement with the **HP10** filter:
  the linear operating ranges for the distance from noise > 6 dB
  from 0.005 ms^{-2} to 3520 ms^{-2} (the sinusoidal signal RMS)
  from 0.1 ms^{-2} to 5000 ms^{-2} (PEAK)

Table C.2.8. Linear operating ranges with the HP10 filter

Range	Linear operating ranges	
Low	from 5 mms^{-2} (74.0 dB)	to 562 ms^{-2} (175.0 dB)
High	from 100 mms^{-2} (100.0 dB)	to 3520 ms^{-2} (191.0 dB)

Note: *In the measurement of the signal with the* ***crest factor n > 1.41 the upper linear operating range for the RMS value is reduced****. Its value can be calculated from the equation:* $A_n = A + 10 - 20\log(n / \sqrt{2})$ *[m], where* ***A*** *is the given range for the sinusoidal signal. E.g. for* ***n = 10*** *and* ***A = 140*** *the value of* A_{10} *is equal to* ***= 133 dB****.*

Frequency range (for acceleration)

Frequency range for the acceleration measurement (± 3 dB): 0.2 Hz ÷ 3 700 Hz in the linear measurements with the **HP1** filter

Note: *With the application of another vibration transducer, the frequency range given above for the **HP1** filter can be different (i.e. wider).*

Basic error for the acceleration measurement < ± 0.5 dB

Pre-heating time 1 minute

Calibration

Direct: by measurement of the standard signal generated by the external vibration calibrator.
Indirect: by declaration of the transducer's sensitivity (according to the calibration chart).

Note: *Calibration procedure is given in Chapter 3.3.3 of this Manual.*

Accelerometer inputs

Connector	1 x LEMO 4-pins ENB.0B.304 CLM pin (for triaxial accelerometer) and 1 x TNC for auxiliary transducer
Impedance (each channel)	40 kΩ / 100 pF (typical)
Vibration transducers powering	28 V / 2.5 mA current source

Range of the measured voltage Lower level - filter depended (see below)
Upper level - 7.5 V_{RMS} (137 dB related to 1 μV_{RMS} or 177 dB related to 1 $\mu m/s^2_{RMS}$)

Maximum input voltage SVAN 958A is the instrument with the 2nd security class according to the international standard IEC 348.
The input voltage should be within the interval from 0 V to 28 V.

RMS detector

• Digital	"True RMS" with Peak detection,
• Resolution	0.1 dB
• Range	327.7 dB
• Crest Factor	> 100 (for signals in 20 kHz band).
• Time weighting filters:	100 ms, 125 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s and 10 s

PEAK and P–P detectors Digital with 0.1 dB sampling step

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 underrange detector. The “underrange” indication appears when the minimum value of the RMS detector output goes below the specified lower linear operating range.

Analogue / Digital conversion	24 bits resolution
Sampling frequency	48 kHz (internal only)

Antialiasing filters

Built-in antialiasing filter ensuring correct sampling of the measured signal.

Pass band (-1 dB):	22.4 kHz
Stop band	27.1 kHz
Attenuation in the stop band	> 70 dB

Reference conditions

• Reference temperature (DIN 45669)	+23°C
• Reference relative humidity (DIN 45669)	40 %
• Reference range	170 dB

Pre-heating time	1 minute (for 0.1 dB accuracy)

Typical stabilisation time after he change in environmental conditions is 1 minute.

Note: *When the instruments are moved from a warm environment with high humidity, to a colder environment, care should be taken not to produce condensation inside the instruments. In this case, much longer stabilisation periods may be necessary.*

Noise levels

Typical noise levels from the combination of the vibration transducer and the VLM for the frequency-weighted response:

Table C.2.9. Typical noise level of the VLM with accelerometers

Filter	Type 3143M1, nominal sensitivity 10 mV/ms^{-2}	Type 3023M2, nominal sensitivity 1 mV/ms^{-2}
HP1	8,4 mm/s^2	107,0 mm/s^2
HP3	8,1 mm/s^2	84,5 mm/s^2
HP10	8,0 mm/s^2	77,7 mm/s^2
Wk	2,1 mm/s^2	56,2 mm/s^2
Wd	2,5 mm/s^2	41,1 mm/s^2
Wc	2,9 mm/s^2	70,8 mm/s^2
Wj	4,5 mm/s^2	59,0 mm/s^2
Wm	2,0 mm/s^2	51,0 mm/s^2
Wb	2,1 mm/s^2	48,6 mm/s^2
Wg	1,7 mm/s^2	50,4 mm/s^2
Wh	1,7 mm/s^2	28,2 mm/s^2
Vel1	180,0 μm/s	10,8 mm/s
Vel3	51,2 μm/s	2,1 mm/s
Vel10	16,5 μm/s	445,0 μm/s
Dil1	44,0 μm	1,9 mm
Dil3	4,2 μm	160,0 μm
Dil10	320 nm	10,2 μm
VelMF	12,0 μm/s	323,0 μm/s

Environmental, electrostatic and radio frequency criteria

Note: *In the measurement conditions with the strong electromagnetic disturbances (e.g. near the high-voltage transmission lines) the lower measurement limit can be drastically shifted as the result of the external field influence on the measurement cables. In such cases, the careful shielding of the measurement cables is strongly recommended. It is worth to underline the estimation of the external influence can be performed in-site by the observations of the measurement signal spectrum.*

Effect of humidity <± 0.5 dB (for 30% < RH < 90% at 40°C and 1000 Hz)

Effect of magnetic field < 25 dB (for 80 A/m and 50 Hz)

Effect of radio frequency fields (meets requirements of the ISO 8041-1:2017)

The greatest susceptibility (the least immunity) is achieved when in the VLM the **HP1** weighting filter is selected and the RMS measurements are considered.

The greatest susceptibility is achieved when the VLM and accelerometer with cable is placed along field and the cable is coil as solenoid.

Effect of electrostatic discharge (meets requirements of the ISO 8041-1:2017)

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 temperature:	< 0.5 dB (from -10°C to + 50°C)
Effect of Vibration	< 0.1 dB (measured at the instrument vibration 1 m/s^2 in the 2 kHz band)

Temperature range

Operating	from -10°C to + 50°C
Storage and transportation	from -20°C to + 60°C

C.3. SPECIFICATION OF SVAN 958A AS 1/1, 1/3 OCTAVE AND FFT ANALYSER

C.3.1. Specification of SVAN 958A as 1/1 octave, 1/3 octave and FFT analyser in the standard configuration for sound inputs

Statement of performance

SVAN 9758A 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. SLM function is provided by the TNC/IEPE inputs using the SC 26 cable for Channel 4 and the SC 49 cable providing LEMO 4-pins to 3 x TNC connection for Channels 1-3.

Note: *Simultaneously to the frequency analysis, SVAN 958A operates as a Sound Level Meter - see Chapter C.1 for specification.*

Configuration of the complete analyser

SVAN 958A	sound & vibration level meter and analyser
SV 12L	microphone preamplifier
SC 26	extension cable for SV 12L
SC 49	LEMO 4-pins to 3 x TNC socket adapter
ST 02	adapter (input impedance 18 pF)

Normal operating mode

SVAN 958A in configuration with the **SV 12L** microphone preamplifier, **ST 02** adapter for all channels and the additional **SC 49** cable for Channels 1-3 and with following settings: **High** or **Low** measurement range, microphone compensation set to **Free Field** (*path: <Menu> / Channel Setup / Channel x* – see Chapter 4.2).

Signal input

- SV 12L preamplifier throughout the ST 02 adapter and the **SC 49** cable for Channels 1-3
- Maximum input voltage: SVAN 958A meets the requirements IEC 348 for the 2nd class device. The input voltage shall not exceed the limits between 0 V and +28 V.
- Impedance: 18 pF.

Digital filters

Weighting filters

- **LIN** according to IEC 61672-1:2013 for Class 1 for "Z" filters
- **A** according to IEC 651 and IEC 61672-1:2013 for Class 1
- **C** according to IEC 651 and IEC 61672-1:2013 for Class 1
- **HP** high-pass filter

See Chapter C.4 for filters characteristics.

1/1 octave and 1/3 octave filters

1/1 Octave 15 filters with centre frequencies from 1 Hz to 16 kHz (base 2). meeting DIN 45651. IEC 1260 (Annex B) and ANSI S1.11-1986 for Type 1

1/3 Octave 45 filters with centre frequencies from 0.8 Hz to 20 kHz (base 2). meeting DIN 45651. IEC 1260 (Annex B) and ANSI S1.11-1986 for Type 1

See Chapter C.3.3 for filters characteristics.

Linear operating ranges

Two measurement ranges are available (for all available channels): **Low** and **High**

Table C.3.1. Linear operating ranges with SV 12L preamplifier and ST 02 adapter

Range	**Linear operating ranges** (with the error < 0.7 dB) (**RMS** for the sinusoidal signal at reference conditions @ 1 kHz, 0.0 dB calibration factor and microphone sensitivity 50 mV/Pa)	
Low	from 24 dB “A” - weighting	to 115 dB “A” - weighting
	from 24 dB “C” - weighting	to 115 dB “C” - weighting
	from 30 dB “LIN” - weighting	to 115 dB “LIN” - weighting
High	from 44 dB “A” - weighting	to 137 dB “A” - weighting
	from 42 dB “C” - weighting	to 137 dB ”C” - weighting
	from 46 dB “LIN” - weighting	to 137 dB “LIN” - weighting

Table C.3.2. Linear operating ranges with different filters in analyser modes for PEAK value

Range	**Linear operating range PEAK** (for the microphone sensitivity 50 mV/Pa)
	Max PEAK value
Low	118 dB “A” - weighting
	118 dB “C” - weighting
	118 dB “LIN” - weighting
High	140 dB “A” - weighting
	140 dB “C” - weighting
	140 dB “LIN” - weighting

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:* $A_n = 137 - 20\log\left(n/\sqrt{2}\right)$, *where A is the upper limit for the sinusoidal signal.*

Example: For the crest factor ***n = 10*** *the upper limit is* A_{10} = ***120 dB***.

Maximum input voltage	SVAN 958A meets the requirements IEC 348 for the 2nd class device. The input voltage shall not exceed the limits between 0 V and 28 V.

RMS detector

Digital	"True RMS" with PEAK detection
Resolution	0.1 dB
Range	213.7 dB
Crest Factor	>100 dB (for signals in the 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	0.5 V_{RMS} (114 dB re 1 µV)
Basic accuracy	< ± 0.2 dB (for the temperature T=+23°C ± 5°C for sinusoidal signal 1 V_{RMS} in the band 5 Hz ÷ 20 kHz with the LIN filter)
Measurement deviation	< ± 0.3 dB (when the temperature is from -10°C to +50°C for the sinusoidal signal 1 V_{RMS} in the band 5 Hz ÷ 20 kHz with the LIN 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	1 min. (for 0.1 dB accuracy)
Effect of humidity	< 0.5 dB (for 30%<RH<90% at 40°C re Reference conditions)
Effect of temperature	< 0.5 dB (from -10°C to + 50°C)
Effect of magnetic field	< 5 µV_{RMS} (A) or < 20 µV_{RMS} (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 ensuring correct sampling of the measured signal.

Pass band (-1 dB)	22.4 kHz
Stop band	27.1 kHz
Attenuation in the stop band	> 70 dB.

Sampling frequency	48 kHz (internal only)
Analogue to digital converter	4 x 20 bit
Reference range	**High**
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)
Crosstalk between channels	< 80 dB @ 1 kHz

C.3.2 Specification of SVAN 958A as 1/1, 1/3 octave and FFT analyser in the standard configuration for vibration inputs

SVAN 958A performs the 1/1, 1/3 and FFT analysis for the VLM function in the configuration and with the parameters presented in Chapter C.2.

Note: *Simultaneously to the frequency analysis, SVAN 958A operates as a Sound Level Meter - see Chapter C.2 for specification.*

Configuration of the complete analyser

SV 958A	sound & vibration level meter and analyser
SV 48C	four-channeladapter Voltage to IEPE converter with common voltage input (5.1 kOmh resistance in each IEPE channel)

Normal operating mode

SV 958A in configuration with the **SV 48C** adapter connected with the dedicated cables (**SC84** Lemo/Lemo and **SC85** TNC/TNC) with following settings: **High** or **Low** measurement range (*path: <Menu> / Channel Setup / Channel x* – see Chapter 4.2).

Signal input

- TNC type input throughout the SV 48C adapter
- Maximum input voltage: SV 958A meets the requirements IEC 348 for the 2nd class device. The input voltage shall not exceed the limits between 0 V and +28 V
- Resistance: 5.1 kOmh

1/1 octave and 1/3 octave digital filters

1/1 Octave	15 filters with centre frequencies from 1 Hz to 16 kHz (base 2). meeting DIN 45651. IEC 1260 (Annex B) and ANSI S1.11-1986 for Type 1
1/3 Octave	45 filters with centre frequencies from 0.8 Hz to 20 kHz (base 2). meeting DIN 45651. IEC 1260 (Annex B) and ANSI S1.11-1986 for Type 1

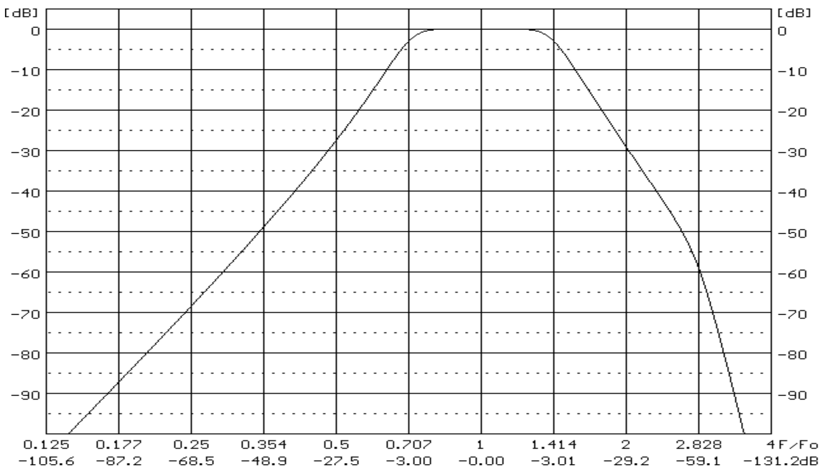
Antialiasing filter

Built-in antialiasing filter ensuring correct sampling of the measured signal.

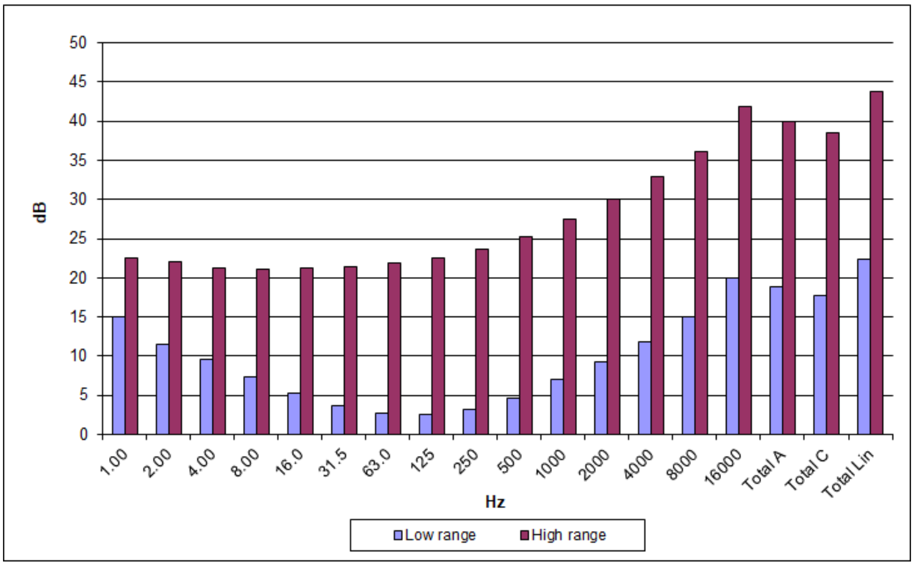
Pass band (-1 dB)	22.4 kHz
Stop band	27.1 kHz
Attenuation in the stop band	> 70 dB.
Sampling frequency	48 kHz (internal only).
Analogue to digital converter	4 x 20 bit
Reference range	**High**
Input attenuator accuracy	± 0.1 dB (for f = 1 kHz and T = +23°C)
Internal oscillator accuracy	0.01 % (for f = 1 kHz and T = +23°C)
Crosstalk between channels:	< 80 dB @ 1 kHz

C.3.3 1/1 and 1/3 octave filters characteristics

1/1 Octave 15 filters with centre frequencies from 1 Hz to 16 kHz (base 2). meeting DIN 45651, IEC 61260:1995 and ANSI S1.11-1986 for Class 1

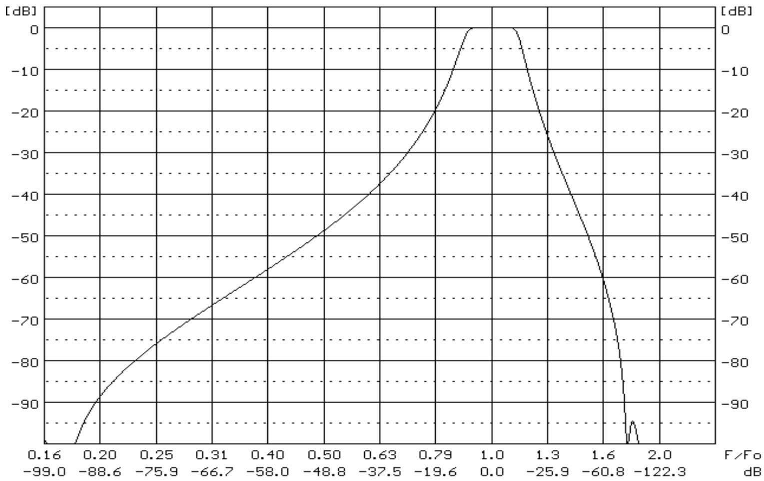


SVAN 958A 1/1 octave filters characteristic

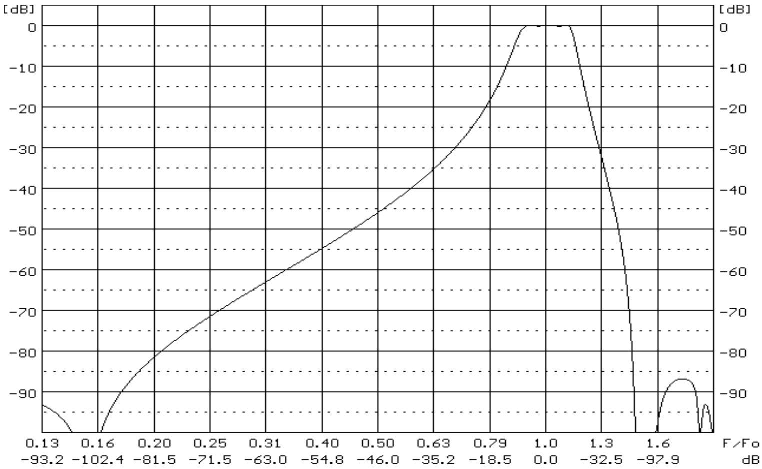


Typical electrical noise floor for the 1/1 octave filters

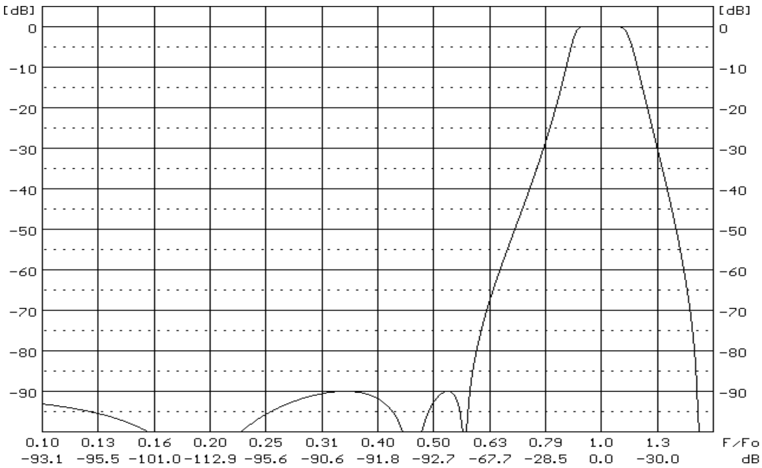
1/3 octave filters 45 filters with centre frequencies from 0.8 Hz to 20 kHz (base 2), meeting DIN 45651, IEC 61260:1995 and ANSI S1.11-1986 for Class 1



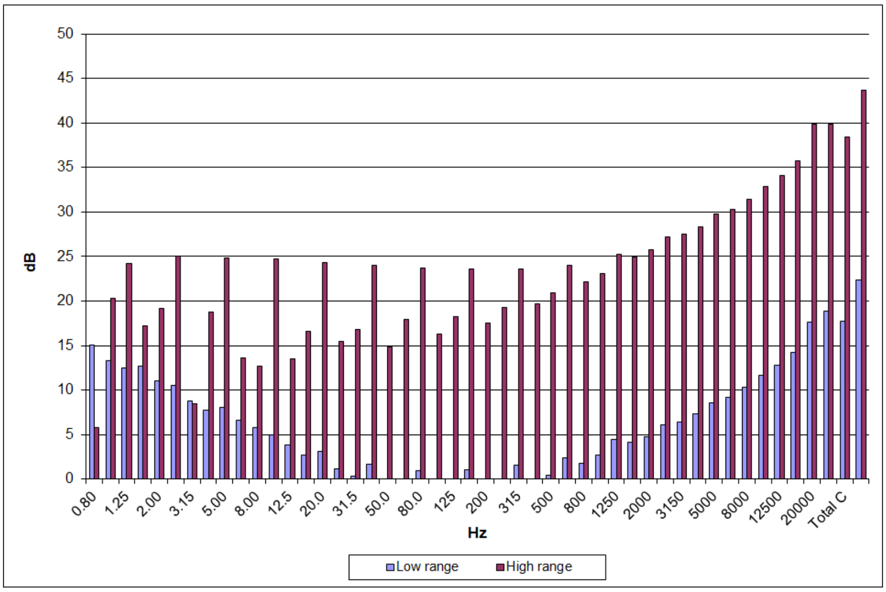
1/3 octave filters characteristic – "lower" filter for each octave band



1/3 octave filters characteristic – "middle" filter for each octave band

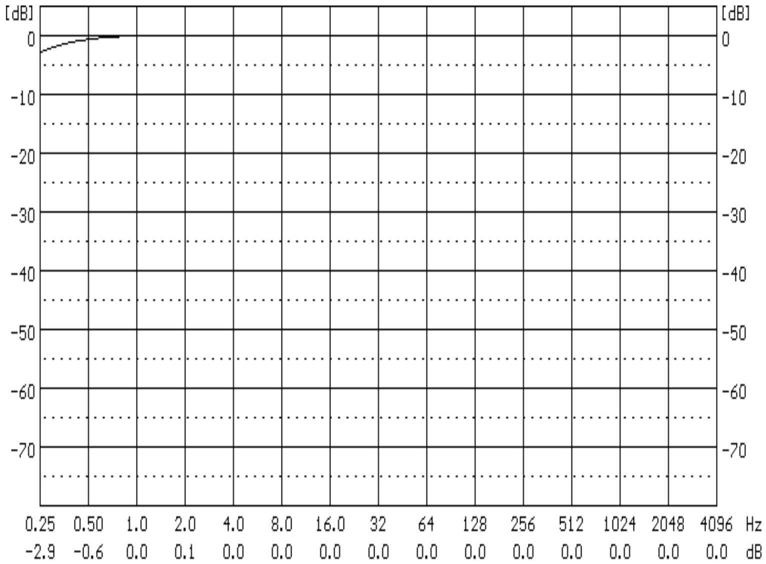


1/3 octave filters characteristic – "upper" filter for each octave band



Typical electrical noise floor for the 1/3 octave filters

C.3.4. Digital HP filter implemented in 1/1 & 1/3 OCTAVE and FFT analysis



"HP" filter characteristics

C.3.5. FFT analysis specification

1920, 960 or 480 lines of the power spectrum calculated in **real time.**

Sampling frequency	48 kHz (internal only)
Time window	Hanning, Rectangle, Flat Top, Kaiser-Bessel
Averaging	Linear
FFT calculation time step (no logging)	
for 1920 lines,	80 ms
for 960 lines,	40 ms
for 480 lines.	20 ms

Table C.3.3. FFT analysis for the 480 lines spectrum (no-logging)

FFT bandwith [Hz}	Record length (samples)	Frequency resolution [Hz]	Overlapping factor %
22 400	1024	46.875	6
11 200	1024	23.4375	53
5 600	1024	11.71875	76
2 800	1024	5.859375	88
1 400	1024	2.9296875	94
700	1024	1.46484375	97
350	1024	0.732421875	98
175	1024	0.366210938	99
87.5	1024	0.183105469	>99

Table C.3.4. FFT analysis Table for the 960 lines spectrum (no-logging)

FFT bandwith [Hz}	Record length (samples)	Frequency resolution [Hz]	Overlapping factor %
22 400	2048	23.4375	6
11 200	2048	11.71875	53
5 600	2048	5.859375	76
2 800	2048	2.9296875	88
1 400	2048	1.46484375	94
700	2048	0.732421875	97
350	2048	0.366210938	98
175	2048	0.183105469	99
87.5	2048	0.091552734	>99

Table C.3.5. FFT analysis for the 1920 lines spectrum (no-logging)

FFT bandwith [Hz}	Record length (samples)	Frequency resolution [Hz]	Overlapping factor %
22 400	4096	11.71875	6
11 200	4096	5.859375	53
5 600	4096	2.9296875	76
2 800	4096	1.46484375	88
1 400	4096	0.732421875	94
700	4096	0.366210938	97
350	4096	0.183105469	98
175	4096	0.091552734	99
87.5	4096	0.045776367	>99

FFT calculation time step (with spectra logging)

for 1920 lines,	100 ms
for 960 lines,	50 ms
for 480 lines.	20 ms

Table C.3.6. FFT analysis for the 480 lines spectrum (with logging)

FFT bandwith [Hz}	Record length (samples)	Frequency resolution [Hz]	Overlapping factor %
22 400	1024	46.875	6
11 200	1024	23.4375	53
5 600	1024	11.71875	76
2 800	1024	5.859375	88
1 400	1024	2.9296875	94
700	1024	1.46484375	97
350	1024	0.732421875	98
175	1024	0.366210938	99
87.5	1024	0.183105469	>99

Table C.3.7. FFT analysis Table for the 960 lines spectrum (with logging)

FFT bandwith [Hz}	Record length (samples)	Frequency resolution [Hz]	Overlapping factor %
22 400	2048	23.4375	-17
11 200	2048	11.71875	41
5 600	2048	5.859375	70
2 800	2048	2.9296875	85
1 400	2048	1.46484375	92
700	2048	0.732421875	96
350	2048	0.366210938	98
175	2048	0.183105469	99
87.5	2048	0.091552734	>99

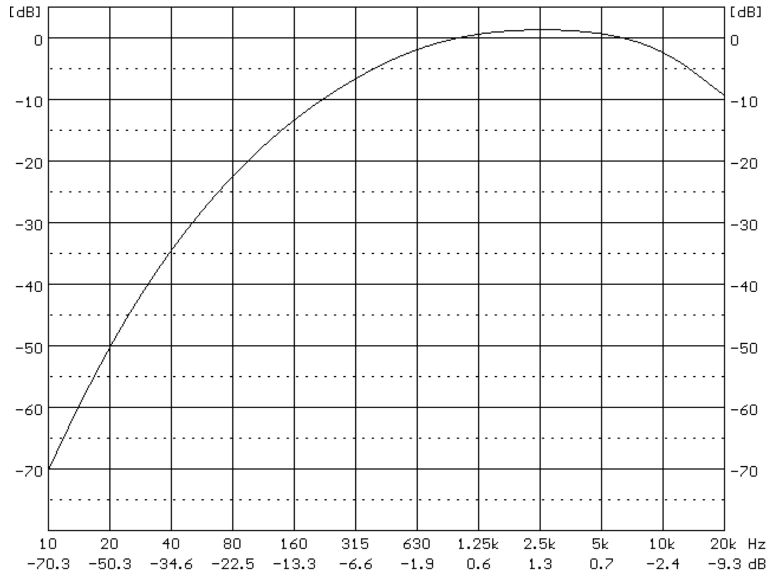
Table C.3.8. FFT analysis for the 1920 lines spectrum (with logging)

FFT bandwith [Hz}	Record length (samples)	Frequency resolution [Hz]	Overlapping factor %
22 400	4096	11.71875	-17
11 200	4096	5.859375	41
5 600	4096	2.9296875	70
2 800	4096	1.46484375	85
1 400	4096	0.732421875	92
700	4096	0.366210938	96
350	4096	0.183105469	98
175	4096	0.091552734	99
87.5	4096	0.045776367	>99

C.4. FREQUENCY CHARACTERISTICS OF IMPLEMENTED BROADBAND DIGITAL FILTERS

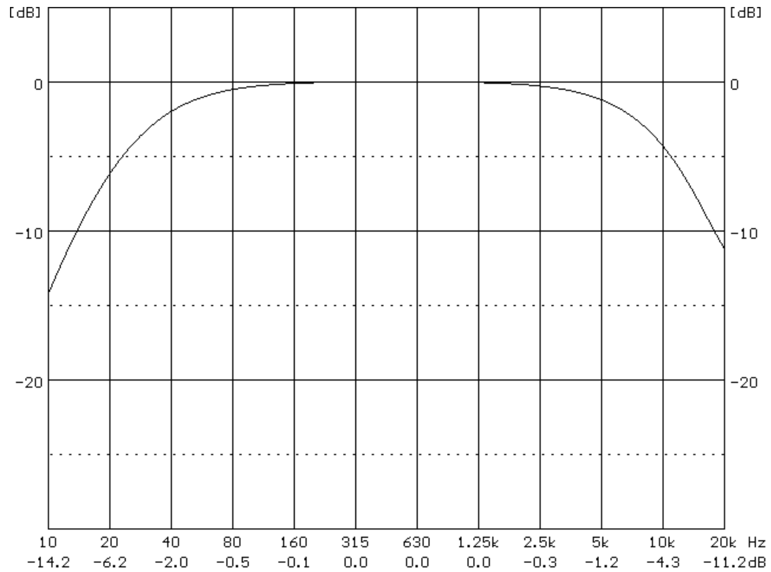
C.4.1. Digital weighting filters dedicated for sound input

"A" filter Class 1 according to IEC 651 and IEC 61672-1:2013



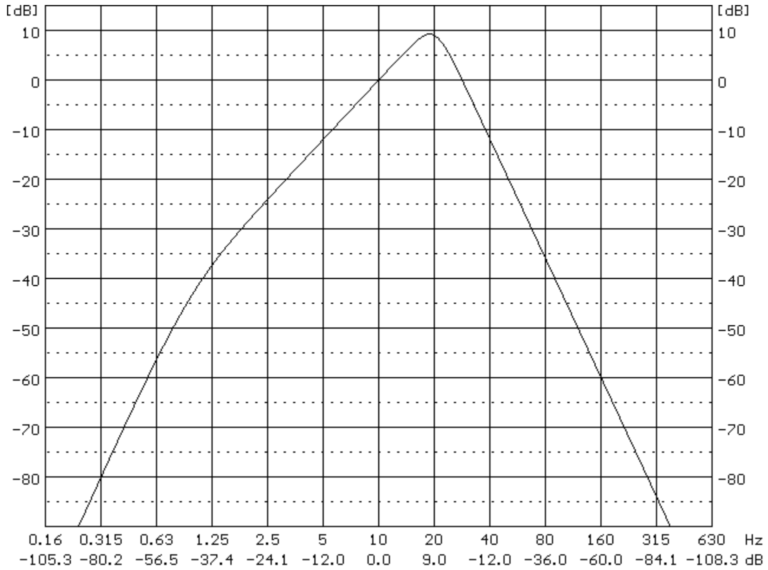
"A" filter characteristics

"C" filter Class 1 according to IEC 651 and IEC 61672-1:2013



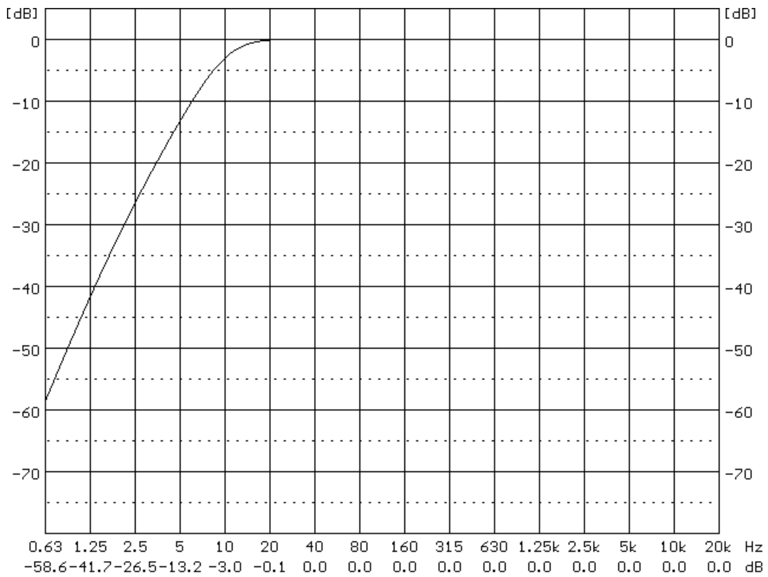
"C" filter characteristics

"G" filter Class 1 according to ISO 7196



"G" filter characteristics

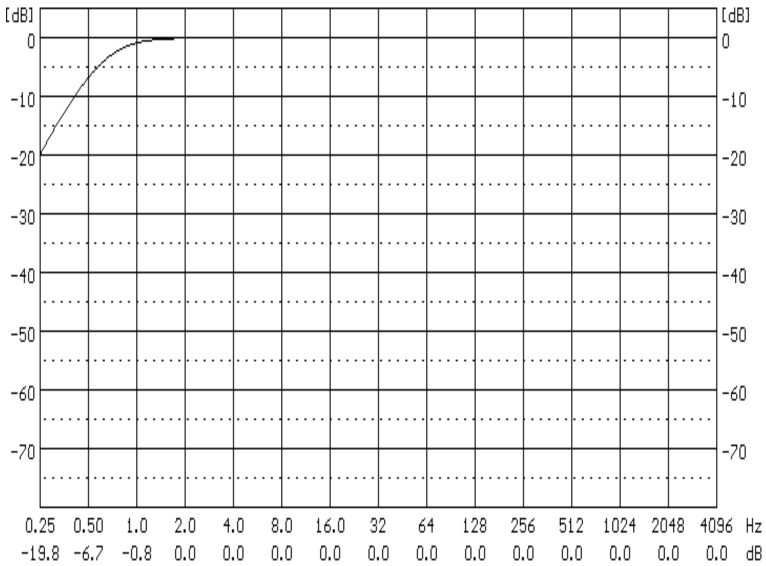
LIN: cut-off frequency: 10.0 Hz / -3.0 dB.



"LIN" filter characteristics

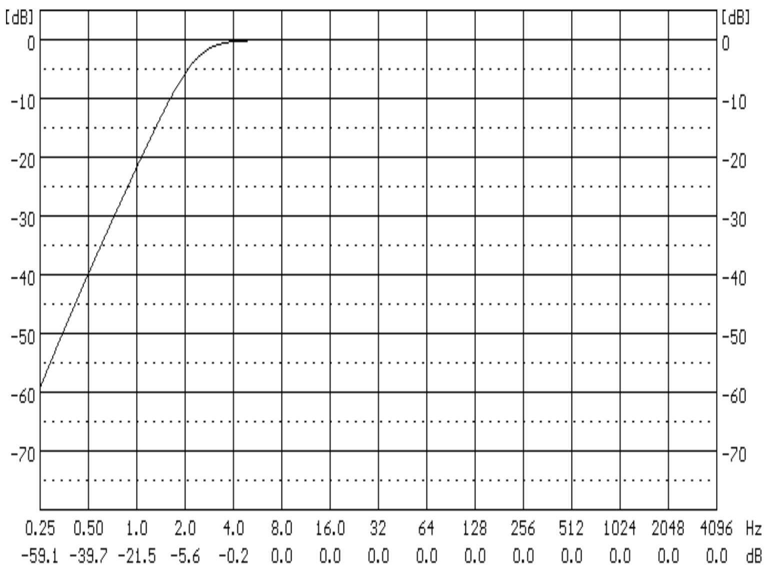
C.4.2 Digital weighting filters dedicated for vibration inputs

HP1 filter is used for the acceleration measurements (the vibration signal) in the frequency range from 1 Hz to 20 kHz.



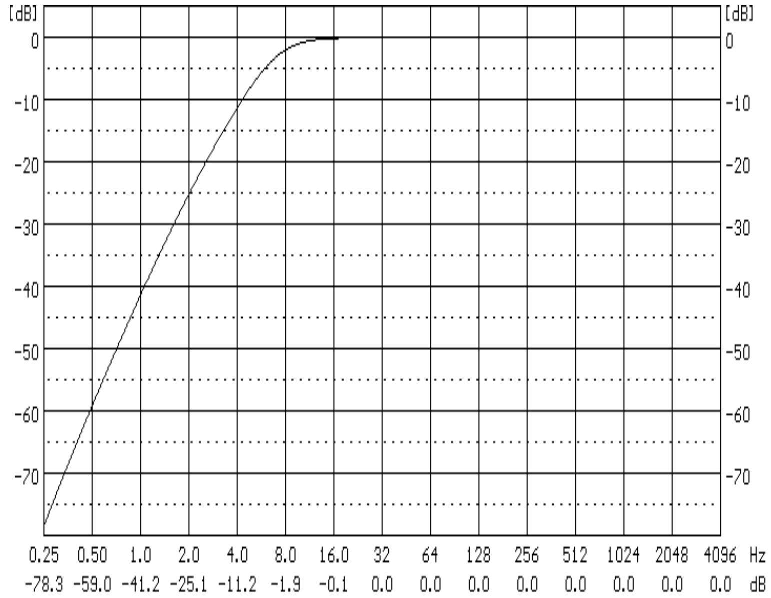
"HP1" filter characteristics

HP3 filter is used for the acceleration measurements (the vibration signal) in the frequency range from 3.5 Hz to 20 kHz.



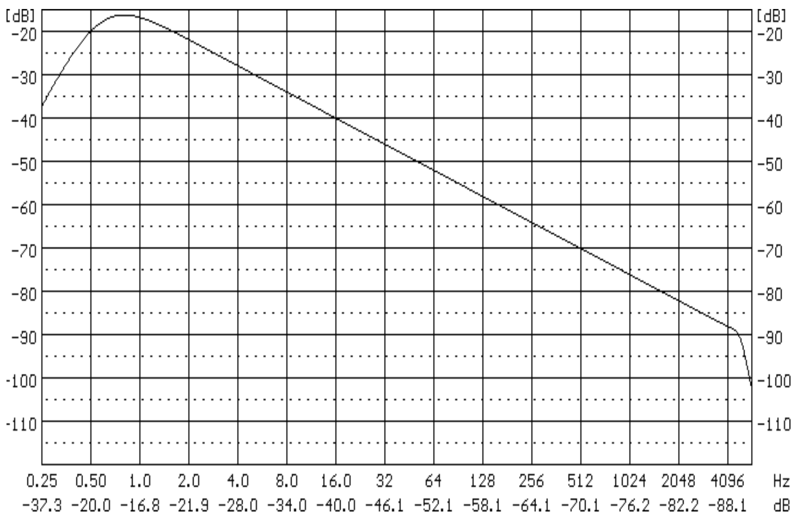
"HP3" filter characteristics

HP10 filter is used for the acceleration measurements (the vibration signal) in the frequency range from 10 Hz to 20 kHz.



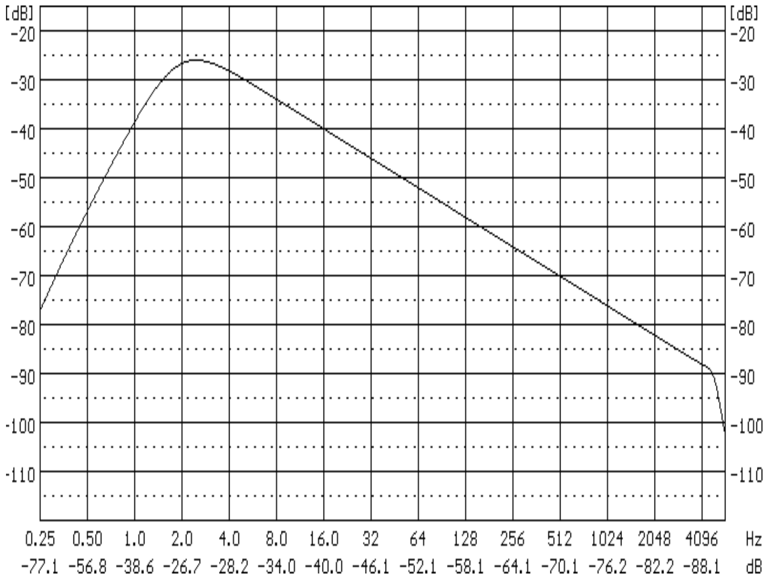
"HP10" filter characteristics

"**Vel1" filter** is used for the velocity measurements (vibration signal) in the frequency range from 1 Hz to 20 kHz



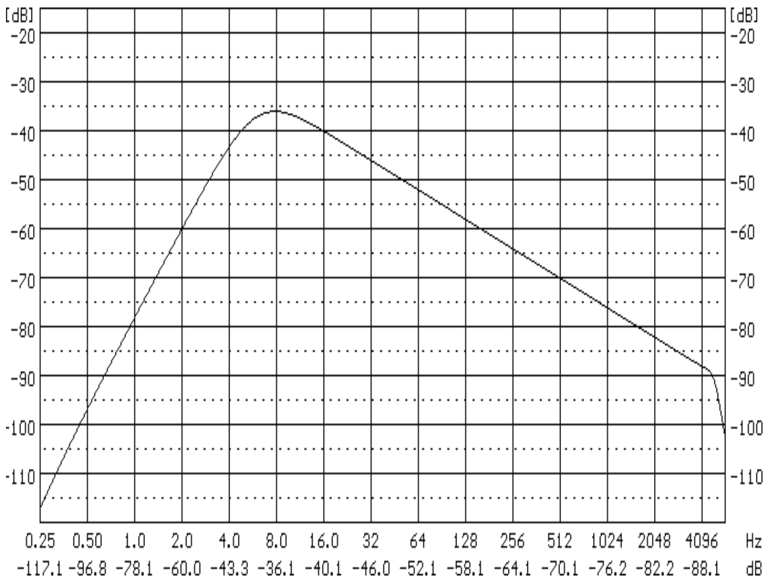
"Vel1" filter characteristics

Vel3 filter is used for the velocity measurements in the frequency range from 1 Hz to 20 kHz.



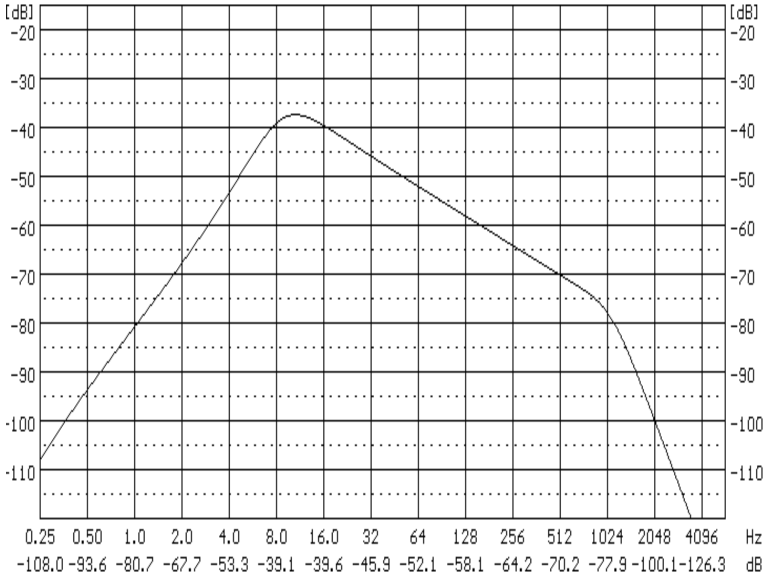
"Vel3" filter characteristics

Vel10 filter is used for the velocity measurements in the frequency range from 1 Hz to 20 kHz.



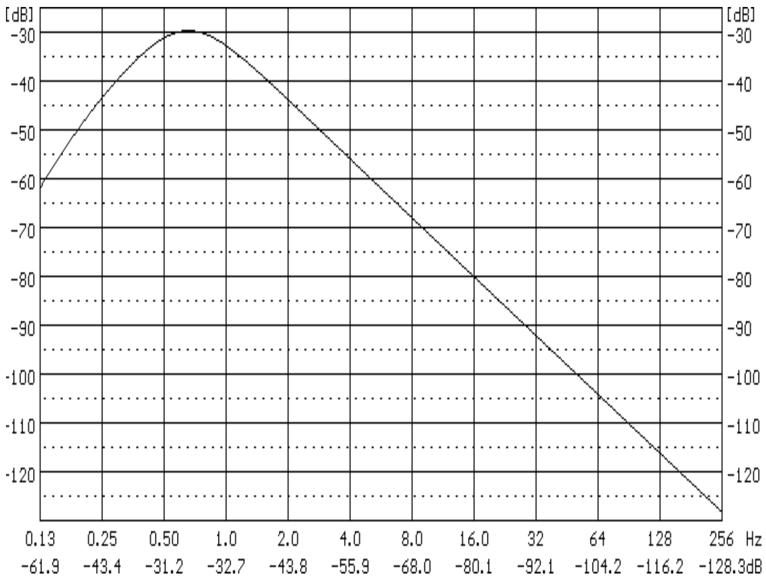
"Vel10" filter characteristics

VelMF filter is used for the evaluation of the state of the machines. This filter is used for the measurements in the frequency range from 10 Hz to 1000 Hz and conforms to the ISO 10816 standard.



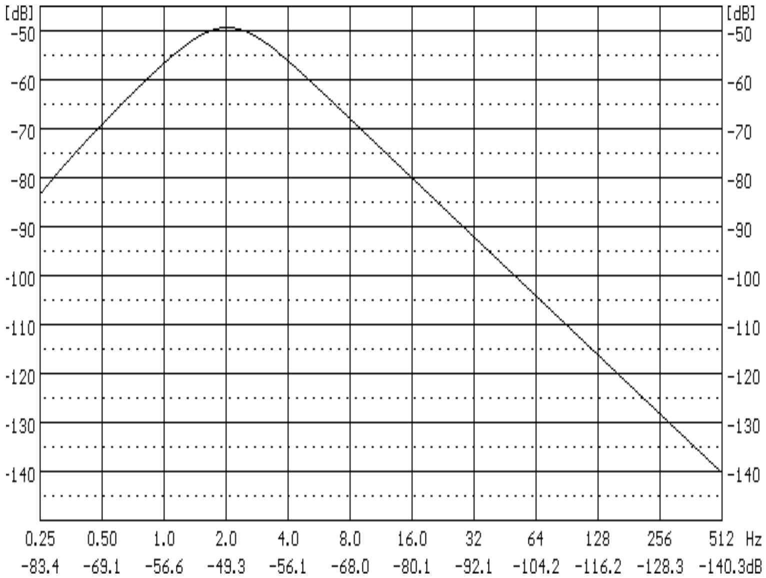
"VelMF" filter characteristics

Dil1 filter is used for the displacement measurements in the frequency range [1 Hz to 20 kHz].



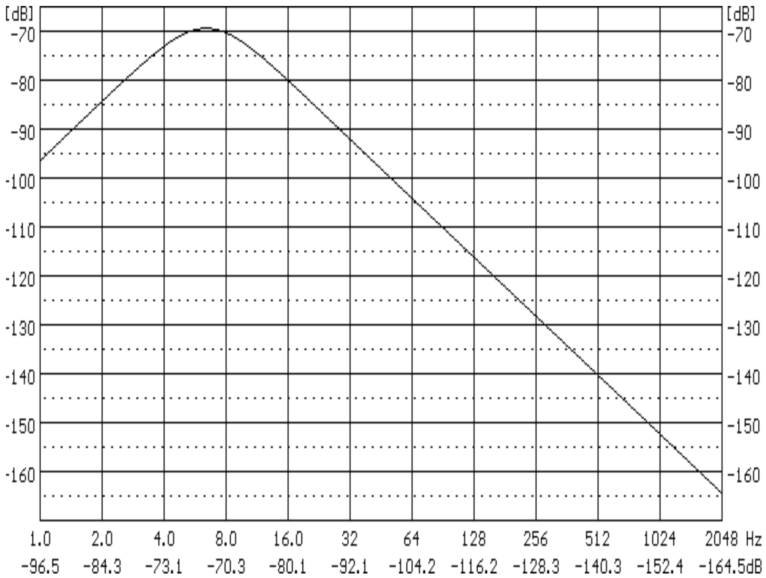
"Dil1" filter characteristics

Dil3 filter is used for the displacement measurements in the frequency range [1 Hz to 20 kHz].



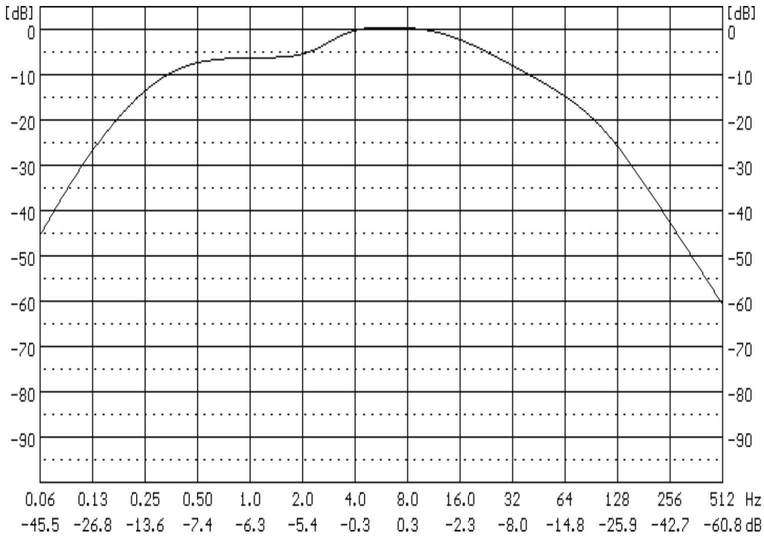
"Dil3" filter characteristics

Dil10 filter is used for the displacement measurements in the frequency range [1 Hz to 20 kHz].



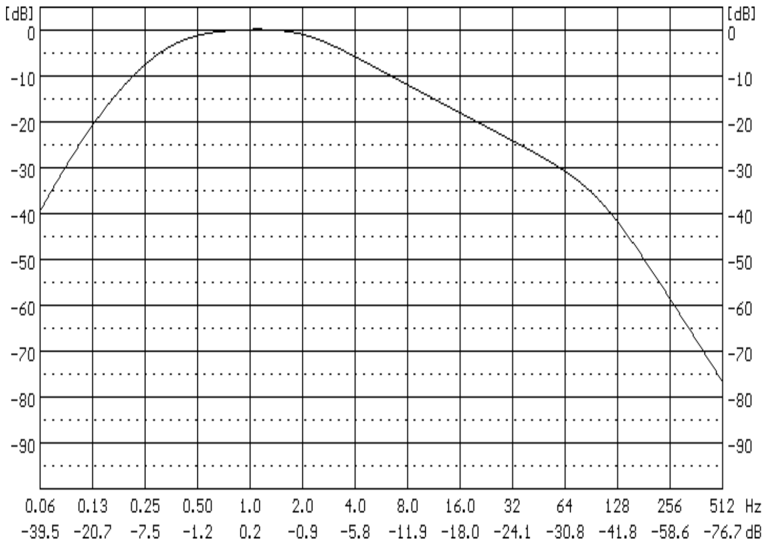
"Dil10" filter characteristics

Wk filter is used for the assessment of the influence of the vibration signal on the human body in the ***z*** direction and for vertical recumbent direction. It conforms with ISO 2631-1-97 and ISO 8041-1:2017



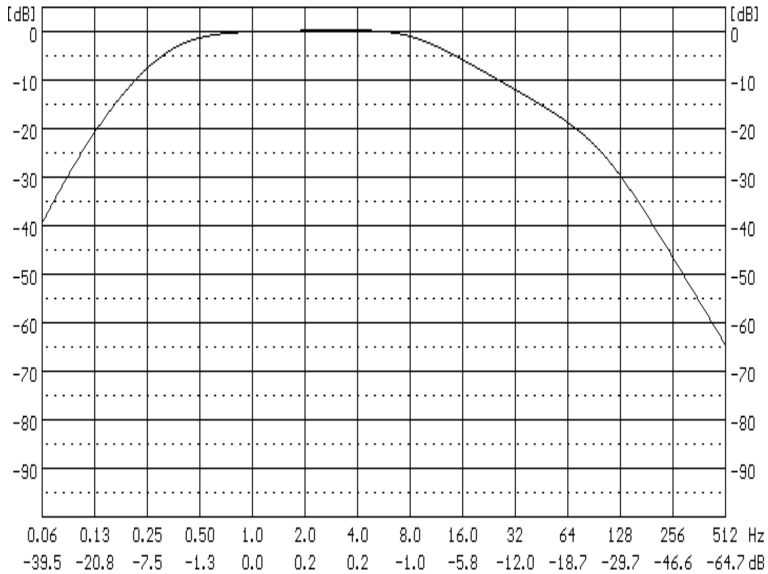
"Wk" filter characteristics

Wd filter is used for the assessment of the influence of the vibration signal on the human body in the x and y directions and for horizontal recumbent direction. It conforms with ISO 2631-1-97 and ISO 8041-1:2017



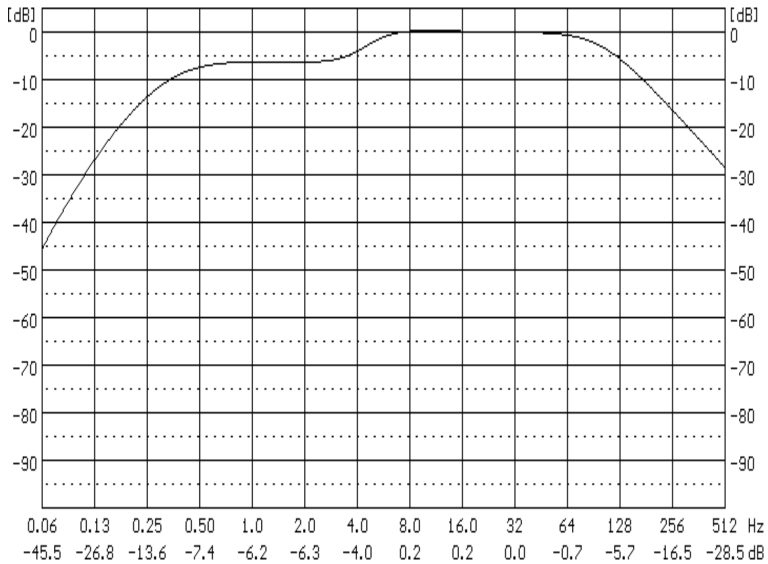
"Wd" filter characteristics

Wc filter is used for the assessment of the influence of the vibration signal on the human body during the seat-back measurements. It conforms with ISO 2631-1-97 and ISO 8041-1:2017



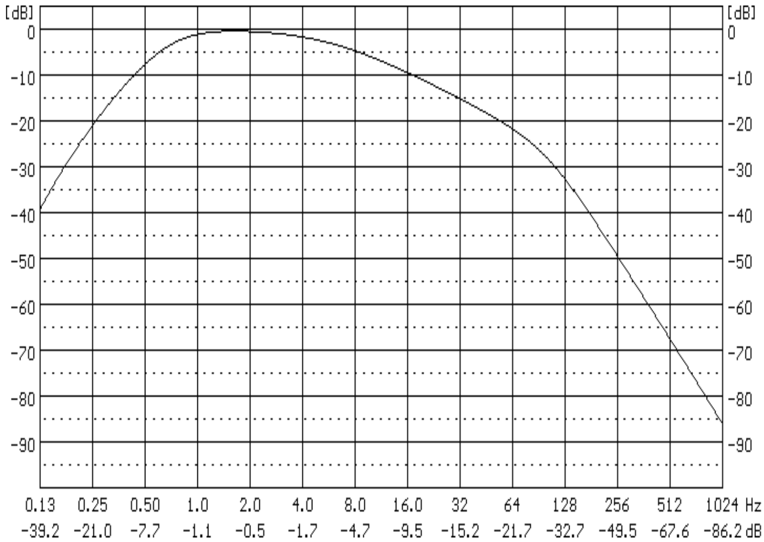
"Wc" filter characteristics

Wj filter is used for the assessment of the influence of the vibration signal under the head of the recumbent person. It conforms with ISO 2631-1-97 and ISO 8041-1:2017



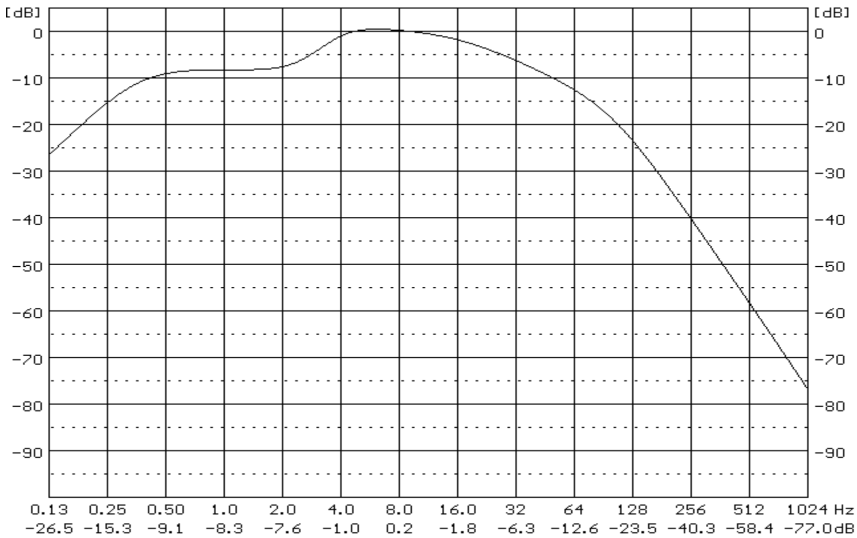
"Wj" filter characteristics

Wm filter is used for the assessment of the influence of the vibration signal on the human body. It conforms with ISO 2631-1-97 and ISO 8041-1:2017



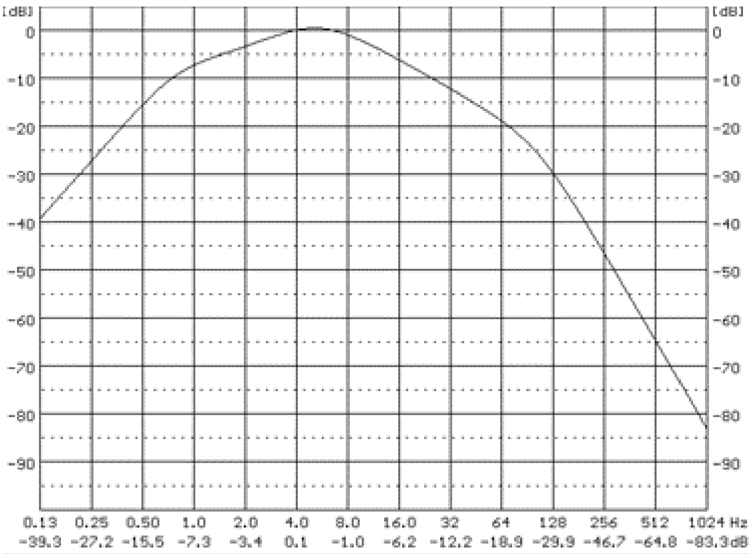
“Wm” filter characteristics

Wg filter is used for the assessment of the influence of the vibration signal on the human body. It conforms with BS 6841:1987



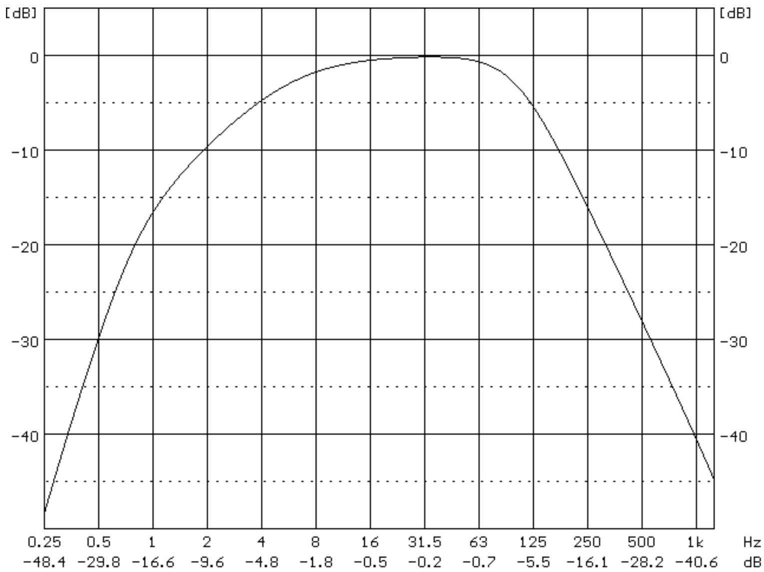
“Wg” filter characteristics

Wb filter is used for the assessment of the influence of the vibration signal on the human body. It conforms with ISO/FDIS 8041:2004(E)



"Wb" filter characteristics

KB filter is used for the building vibration measurements) according DIN 4150 standard



"KB" filter characteristics

C.5. MISCELLANEOUS SPECIFICATION OF SVAN 958A

Display

Super contrast (10000:1) OLED 2.4” colour display (320 x 240 pixels).

Memory

32 MB flash memory and 96 kB of the RAM memory.

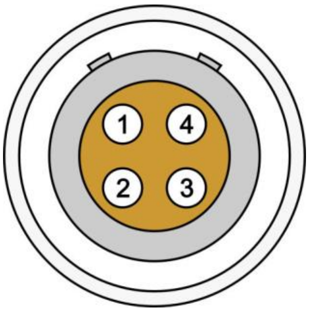
Flash memory divided between:

- buffer for the registration of the time history and spectra (ca. 50 % of the installed memory)
- FLASH-disk for storing the measurement data files (ca. 40 % of the installed memory)

Signal input

Channel 1,2,3:

The input of the measured signal (taken from the vibration transducer):



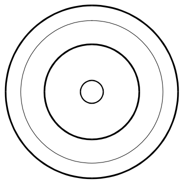
LEMO type ENB.OB.304 compatible socket (external view)

Table C.8.1. Pin-out of the TNC connector

Pin number	ENB.OB.304
1	Input for channel 1
2	Input for channel 2
3	Input for channel 3
4	Signal ground for channels 1 - 3
Shield	Ground connected to pin number 4

Channel 4:

The input of the measured signal (taken from the microphone preamplifier):



TNC connector (external view)

Table C.8.2. Pin-out of the TNC connector

Pin number	TNC
Central	Input
Shield	Ground

Power supply (Ext. Pow.)

Instrument is dedicated for the operation from the internal replaceable battery.

Instrument autonomy is operating mode depending.

Power consumption from 6 V source: < 200 mA@6V (at + 20°C)

So Typical operating time from 4 x AA alkaline batteries ensures will be about 10 and 8 hours respectively. For the temperatures below 0°C operating time can decree (depending on the batteries).

Instrument can be also powered from the external source (e.g. SA 17 or car battery) with the DC Voltage from 6 V to 24 V connected to **Ext. Power** socket. The red-colour indicator named as EXT. POWER and placed on the bottom of instrument's keyboard. should be switched on after connecting the external power source to the instrument.

Voltage ripple should not exceed ± 5%.

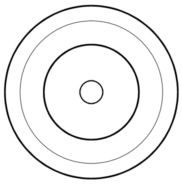
Power requirement is voltage dependant:

Meter Mode - < 90 mA@12V (at + 20°C)

Analyser Mode - < 110 mA@12V (at + 20°C)

Meter Mode - < 50 mA@24V (at + 20°C)

Analyser Mode - < 60 mA@24V (at + 20°C)



Power Supply connector 5.5 / 2.1 mm (external view)

Table C.8.3. Pin-out of 5.5 / 2.1 connector

Internal Pin	5.5/2.1
Shield	Ground
1	+ 8 V ÷ 24 V

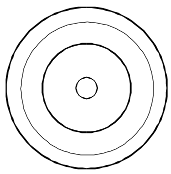
Instrument can be also powered from the USB port of a PC. however following conditions and limitations should be considered:

- Till the internal battery voltage is higher than approx. 4.6 V. the instrument operates from internal battery.
- When the internal battery voltage decreases below 4.6 V and the USB is connected to a PC. the instrument switches to operate from the USB (that is indicated by the removal of the "Battery" icon from the display).
- current capability of the USB port should be as high as 250 mA. in the case of battery-powered PCs this additional current requirement should be considered by the user.
- when an external power supply (e.g. SA 17 or car battery) is connected to **Ext. Power** terminal no supply current is drawn from the USB. as well as from internal battery.

I/O connector

User programmable Input / Output connector

AC Out (Analogue Output) - standardized output of the measured input signal **from user-programmable one of four channels** (no weightings)



LEMO type ERN.00.250 compatible socket (external view)

Table C.8.4. Pin-out of the LEMO type ERN.00.250 connector

Pin Number	ERN.00.250
1	Output/Input
Shield	Ground
Chassis	Ground

Socket LEMO type ERN.00.250 compatible

Output Voltage 0.2 $V_{\mathbf{RMS}}$ (± 5 %) at input level 105 dB (dB related to 1 µV) for Low range

0.2 $V_{\mathbf{RMS}}$ (± 5 %) at input level 130 dB (dB related to 1 µV) for High range

Frequency Band (-3 dB) - 0.6 Hz ÷ 22.6 kHz

Output impedance 51 Ω / 1%

I / **O** (Input/Output) digital Input / Output pin - 3.3 V input & output levels.

The user may set-up the I/O mode in the instrument's screen <***Menu> / System / Ext. I/O Setup***:

1. If the instrument is switched off, the **I** / **O** port is ready to turn on the instrument (cf. the requirements for the switching signal stated in 3.1 below).

2. If the instrument is turned on, three options are available:

   a) **Analog** as standardized Output of the measured signal; one from four channels selected by the user.

   b) **Digital In** as Input (SLAVE mode) used for the external triggering of the instrument (the parameters of the triggering signal are stated in 3.2 below).

   c) **Digital Out** as Output (MASTER mode) used for the external instruments triggering (the parameters of the signal of the external triggering is stated in 3.3 below).

3. Specification of the external signals:

   3.1. Parameters of the voltage impulse of the signal (**Analog**) for turning on the instrument:

   a) recommended voltage range is +/- 12V (abs. max +/- 15V; the TRANSIL type internal limit of the absolute voltage higher than 15V). If necessary higher voltage up to 30 V can be used. In this case a serial resistor (from 5 to 10 kOhm) should be applied to the source of trigger signal

   b) triggering level +1 V

   c) triggering slope - uprising

   d) minimal duration of the triggering signal - 100 msec (it means that the input signal higher than +1 V should be applied for at least 100 msec).

   e) input impedance - ca. 10 kOhm / 100pF. ESD type safety.

   3.2. The slave input signal (**Digital In**) as the voltage impulse has the following parameters:

   a) voltage range. level. impedance as in 3.1; it is not recommended to use the voltage higher than +/- 12 V (+/-1 V). additional serial resistances are not recommended either

   b) minimal duration of the triggering impulse: 10 μsec

   c) the triggering is done on the slope (falling or rising) of the triggering signal set by the user by passing through +1 V threshold

   d) next triggering is possible after 100 μsec from the end of the previous measurement

   3.3. The master output signal (**Digital Out**) as the output impulse has the following parameters:

   a) voltage: 0 V or 3 V

   b) triggering slope: uprising or falling down set by the user

   c) input impedance: 50 Ohm

   d) duration of the impulse: ca. 10 μsec

4. The **Digital Out** mode has two different functions:

   4.1. **Function: Trigger Pulse**. When this function is selected, the terminal [1] is set as output, which enables one to trigger another instrument (one instrument or more with trigger inputs connected together in parallel). The output trigger impulse meets specification given below:

   a) trigger impulse is generated before every measurement,

   b) output voltage range from 0 V or 3 V,

   c) triggering slope: rising or falling,

   d) output impedance: 51 Ω,

   e) duration of the impulse: ca. 30 μsec.

   4.2. **Function: Alarm Pulse**. When this function is selected, the terminal [1] is set as an output, which changes its output level, when current result of measurement exceeds user-programmable threshold level. In this case the terminal [1] output operates as an output of analogue comparator with user-programmable threshold. This feature enables one to control an external device as alarm-indicator or similar:

a) electrical specification of this output are as follows: 0 V to 3 V voltage range, 51 Ω output impedance,
b) output produces a voltage level (not impulse),
c) **Active Level** setting may be selected by the user in menu as **Low** or **High**. When **High** is selected, the output alternates from 0 V to 3 V till measurement result is greater than threshold value,

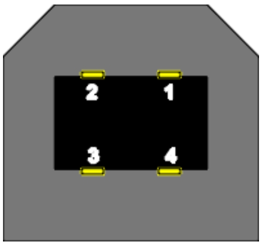
USB interface

The SVAN 958 USB interface enables remote control of the instrument and data transfer up to attainable with 12 MHz clock.

There are two USB ports available on the SVAN 958 bottom panel.

USB Device port

It meets **USB** requirements and enables remote control of the instrument and data transfer up to attainable with 12 MHz clock.

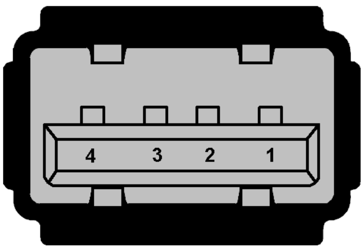


USB socket (external view)

Table C.8.5. Pin-out of the USB-Device connector

Pin number	USB
1	Vbus
2	D-
3	D+
4	GND
Shield	Ground

USB Host port



USB socket (external view)

Table C.8.6. Pin-out of the USB-Host connector

Pin number	USB
1	Vbus
2	D-
3	D+
4	GND
Shield	Ground

Real-time clock

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

Weight with the battery: 510 grams (without accelerometer. cable and microphone preamplifier).

Dimensions: 44x84x145 mm (without accelerometer. cable and microphone preamplifier)

RS 232 interface (optional)

The RS 232 interface option for the SVAN 958A is provided by means of the SV 55 interface. It conforms to the EIA Standard RS 232C. It enables the user to programme remotely all instrument functions and the transmissions to and from the analyser with the speed from 300 bit/s to 115200 bit/s.

The SV 55 must be connected to the SVAN 958A USB Host port and proper operation of this port has to be set-up in the instrument's SETUP Menu before!

Below, the SV 55 - DB 09 F - pin female connector pin-out is given.

Table C.8.7. SV 55 interface description

PC RS 232, 9 - pin connector Signal name	SV 55 connector (DB 09 F) Pin number
1 – LSD	1 (not connected)
2 – RXD	3
3 – TXD	2
4 – DTR	6 connected to pin 4
5 – GND	5
6 – DSR	4 connected to pin 6
7 – RTS	8
8 – CTS	7
9 – GND	9 (not connected)

Electromagnetic Compatibility (EMC)

The product described above is compliant with the following EMC standards:

1. For the EMC emissions specification, according to IEC 61672-1 (chapter 5.18) and IEC 61672-2 (chapter 9), with test methods applied according to CISPR 22:1997 and CISPR 16:1999
2. For the EMC immunity specification, according to IEC 61672-1 (chapter 6.5 and 6.6) and IEC 61672-2 (chapter 7.9 and 7.10), with test methods applied according to IEC 61000-4-2 and IEC 61000-4-3:2002.

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

Safety

The product described above is compliant with following standards:

EN 61010-1:2001 and IEC 61010-1:2001

Compliance with EU Directives

CE mark indicates compliance with EMC Directive 89/336/EEC and Low Voltage Directive 2006/95/EC

C.6. SPECIFICATION OF THE ACCELEROMETERS

Dytran 3143M1

Physical

Weight	16 Grams
Size, Dia x Height	2.08 X 2.08 X 0.86 cm
Mounting provision	Thru hole for 4mm x 0.7
Mounting screw	Insulated D2-56 X .437 long SS
Connector	Radially mounted, 4-PIN
Material, housing & connector	Titanium

Performance

Sensitivity, ± 5% [1]	10.2 mV/ms-2
Range F.S. (± 5 V Output)	± 50 G's
Frequency range	± 5% 0.5 to 3 000 Hz
Resonant frequency	Nom. 25 kHz
Linearity	1% FS
Transverse sensitivity	MAX. 5 %
Strain sensitivity	012 G's/μσ @ 250 μσ

Environmental

Maximum vibration/shock	400/1500 ± G's/G's PEAK
Temperature range	-50 to +120 oC
Seal	EPOXY
Coefficient of thermal sensitivity	0.054 %/ °C

Electrical

Supply current/compliance voltage range	2 to 20/+18 to +30 mA/Volts
Output impedance	typ. 100 Ohms
Output voltage range	+11 to +13 VDC
Output signal polarity for acceleration toward top	Positive
Electrical isolation, case ground to mounting surface	10 Megohms, min.

Dytran 3143M1

Physical

Weight	4 Grams
Size, Dia x Height	1.24 X 0.91 X 0.91 cm
Mounting	M3x0.5 TAPPED HOLE IN BASE
Connector	4-PIN
Material, housing & connector	Titanium Alloy

Performance

Sensitivity, -10 +15% [1]	1.2 mV/ms-2
Range F.S.	± 500 G
Frequency response	-5 / +15%, 1.5 to 10 000 Hz
Natural frequency, mounted	Nom. 40 kHz
Linearity	1% FS
Transverse sensitivity	MAX. 5 %

Environmental

Maximum vibration/shock	± 600/ 5000 G
Temperature range	-50 to +120 oC
Seal	HERMETIC
Coefficient of thermal sensitivity	0.054 %/ °C

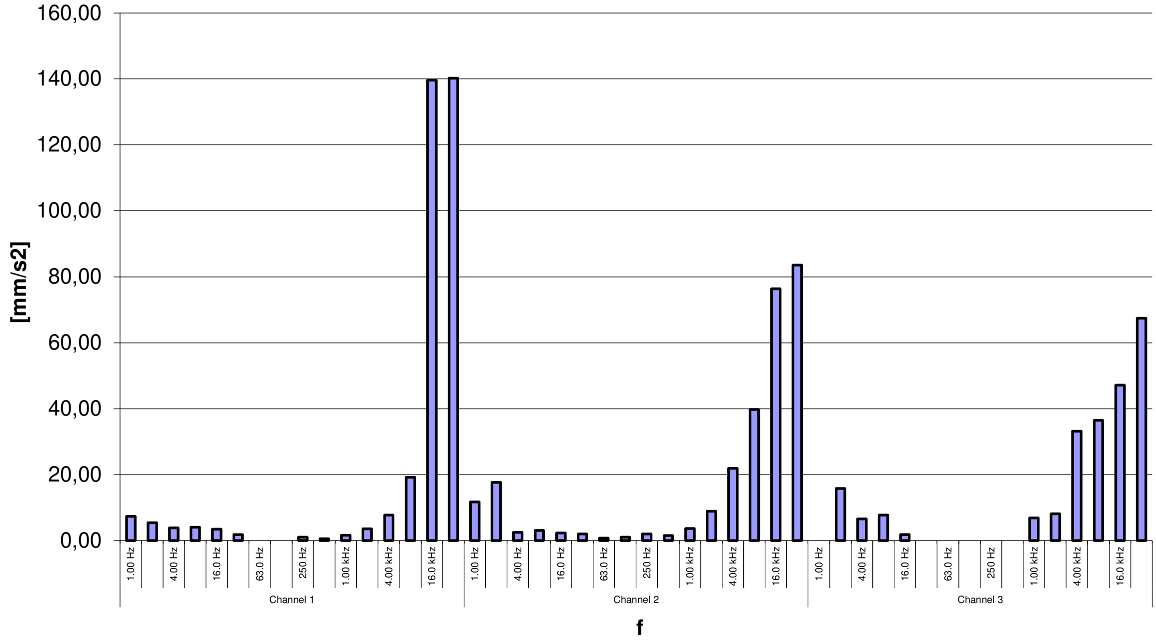
Electrical

Supply current/compliance voltage range	2 to 20/+18 to +30 mA/Volts
Output impedance	typ. 100 Ohms
Output bias voltage	+10 VDC
Ground isolation	CASE GROUNDED

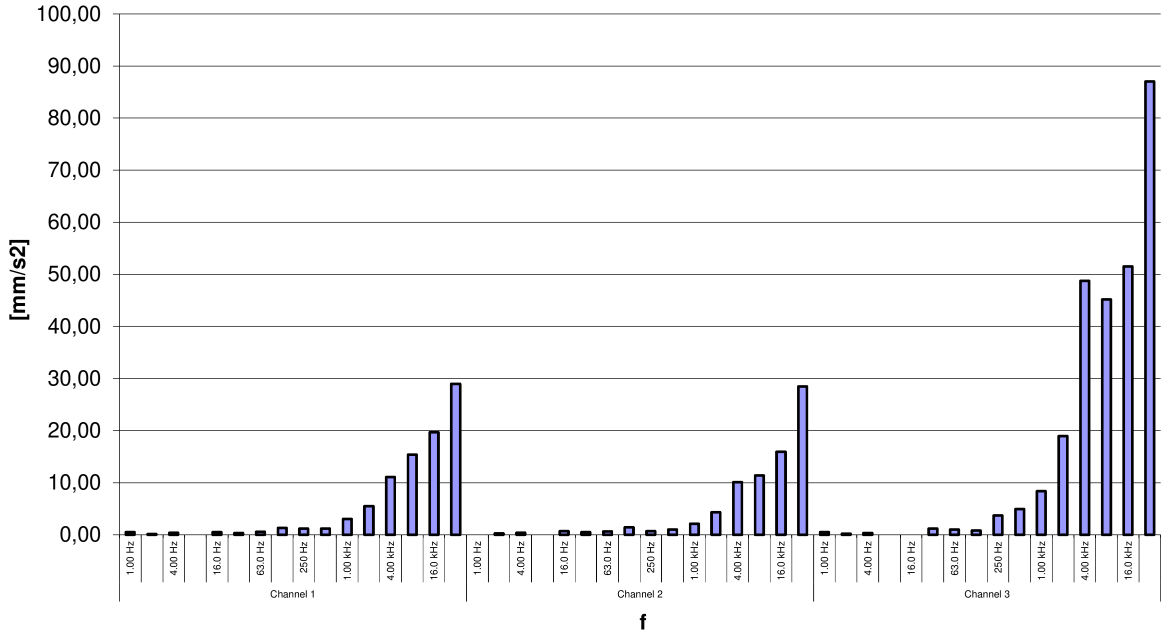
Effect of acoustic signal

Effect of the acoustic signal on the SVAN 958A with the vibration transducer was measured using the random noise acoustic signal approx. 100 dB. The transducer axis was perpendicular to the direction of propagation of the sound wave from the loudspeaker.

Effect of the acoustic signal on the SVAN 958A with 3023M2 accelerometer the acoustic wave perpendiculat to the x axis of the accelerometer for filter HP



Effect of the acoustic signal on the SVAN 958A with 3143M1 accelerometer the acoustic wave perpendiculat to the z axis of the accelerometer for filter HP



Typical effect measured noise level from the combination of the vibration transducer and SVAN 958A for the “Human Vibration” frequency-weighted response Wb, Wd and Wk.

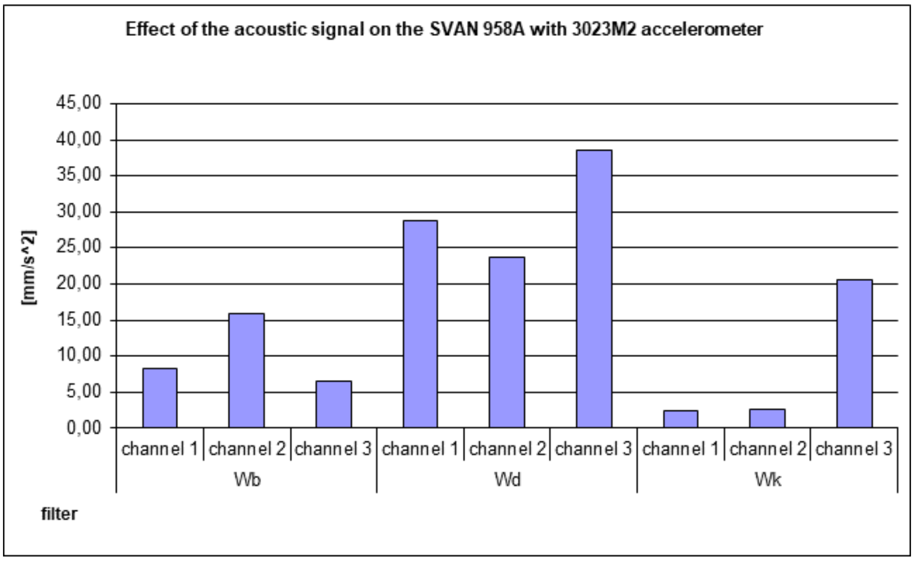


Table C.8.8. Typical effect of acoustic signal perpendicular to the Z axis of the 3023M2 accelerometer

Filter	Wb			Wd			Wk		
	Ch 1	Ch 2	Ch 3	Ch 1	Ch 2	Ch 3	Ch 1	Ch 2	Ch 3
Typical effect of acoustic signal [mms^{-2}]	8,29	15,94	6,56	28,81	23,68	38,56	2,38	2,69	20,68

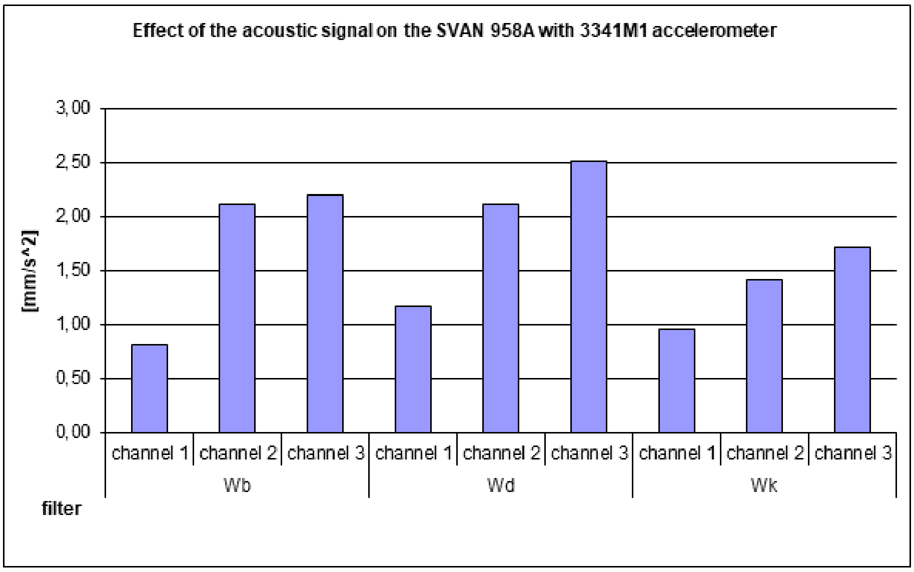
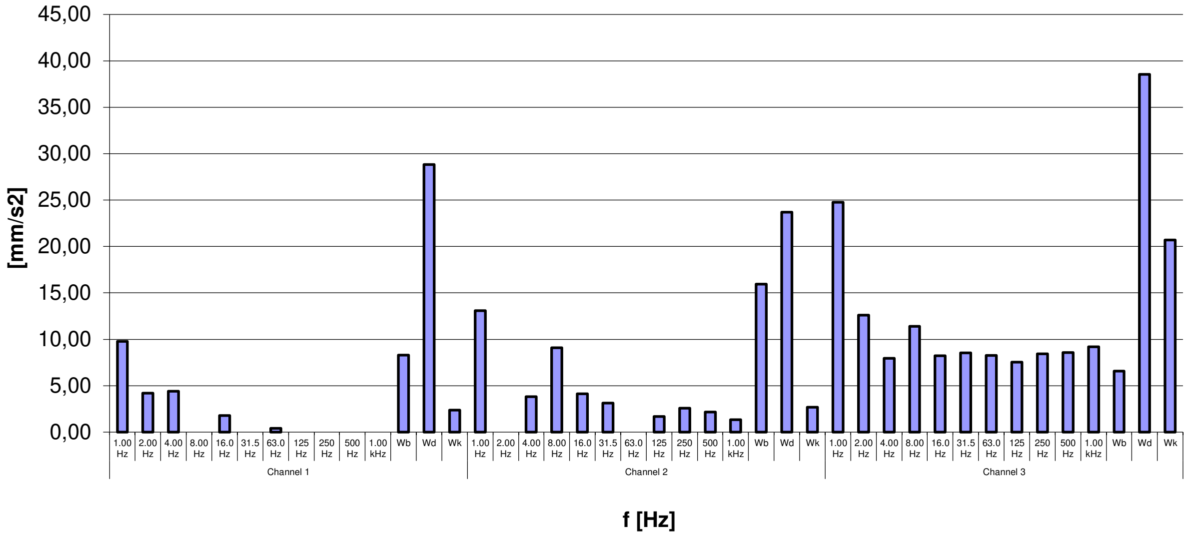


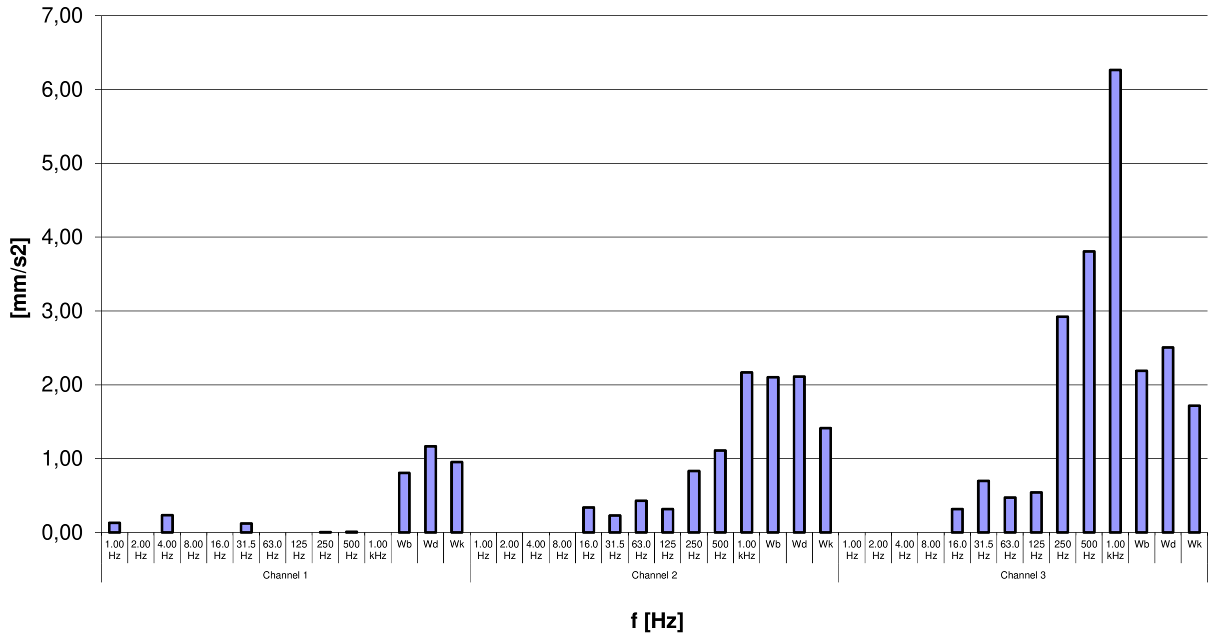
Table C.8.9. Typical effect of acoustic signal perpendicular to the Z axis of the 3143M1 accelerometer

Filter	Wb			Wd			Wk		
	Ch 1	Ch 2	Ch 3	Ch 1	Ch 2	Ch 3	Ch 1	Ch 2	Ch 3
Typical effect of acoustic signal [mms^{-2}]	0,80	2,10	2,19	1,17	2,11	2,51	0,95	1,41	1,71

Effects of the acoustic signal on the SVAN 958A with 3023M2 accelerometer for 1/1 octave filters in the frequency range 1Hz-1kHz and RMS value for filters Wb, Wd, Wk (the acoustic wave perpendiculat to the z axis of the accelerometer)



Effects of the acoustic signal on the SVAN 958A with 3143M1 accelerometer for 1/1 octave filters in the frequency range 1Hz-1kHz and RMS value for filters Wb, Wd, Wk (the acoustic wave perpendiculat to the z axis of the accelerometer)



C.7. USING THE SA 277C OUTDOOR MICROPHONE KIT (CHANNEL 4)

The **SA 277C** outdoor microphone kit protects the preamplifier and microphone from weather conditions. The use of the outdoor microphone kit requires an extension cable between the instrument or the monitoring station and the preamplifier. SA 277C is made of lightweight materials and is easy to install on a tripod. This solution is recommended for short term outdoor noise measurements.

The outdoor microphone kit has ¾" screw on its bottom which enables the use of standard tripods or other user specific mountings.

As an option the user may use desiccator – Silica gel. Desiccator absorbs moisture commonly contained in the air.

Note: *SA 277C should be connected to the Channel 4 of SVAN 958A.*

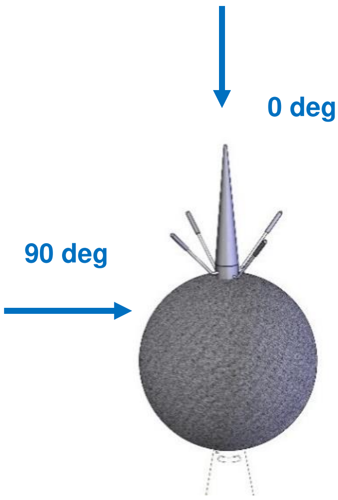
Note*: Desiccator should be regenerated after some period of use, when it changes colour to light grey, by drying it for 3 hours in a temperature of 150°C. Desiccator should be inspected at least every 2 weeks, and more often when used in conditions of high air humidity.*

Note: *Using SA 277C changes the frequency response and measuring ranges of SVAN 977C. Please check the below given specification.*

Note*: See SA 277C User Manual to learn how to assemble and disassemble the outdoor microphone kit.*

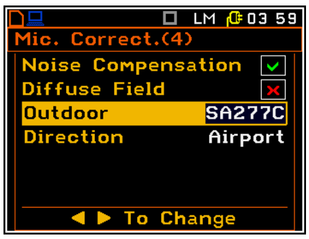
Depending on the measurement task SA 277C can be used in two operational modes:

1. With reference incidence angle 90 deg – so called "Environment" mode.
2. With reference incidence angle 0 deg – so called "Airport" mode.



The wave incidence angle is oriented to the microphone membrane surface. 0 deg means direction orthogonal to the membrane surface. 90 deg means direction parallel to the membrane surface.

Frequency response of SVAN 958A with the SA 277C outdoor microphone kit is compensated by means of two digital filters which can be set in the **Microphone Correction** screen (*path: <Menu> / Input / Channels Setup / Channel x / Microphone Correction*):



- **SA277C Environment** compensation filter that improves the complete instrument frequency response in the free field for the reference acoustic wave incidence angle 90 deg
- **SA277C Airport** compensation filter that improves the complete instrument frequency response in the free field for the reference acoustic wave incidence angle 0 deg

Note: *For the conformance of acoustical tests with SA 277C, the* ***Environment*** *or* ***Airport*** *compensation must be switched on.*

Statement of performance

SVAN 958A working as the SLM with SA 277C meets requirements of IEC 61672:2013 for the Class 1 Group X instruments.

Linear operating ranges with the SA277C Environment filter

The starting point at which tests of level linearity shall begin is 94.0 dB for the frequencies specifies below. For A weighting linearity test at 31.5 Hz and 12.5 kHz, the starting point is 69 dB.

Table C.8.1. Linear operating ranges for the **Low** measurement range and the **SA277C Environment** filter (for the sinusoidal signal and microphone sensitivity 50 mV/Pa)

[dB]	$L_{AS/F}$		$L_{CS/F}$		$L_{LINS/F}$		L_{AeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	26	75	26	112	32	115	26	75	26	112	29	78	52	115
500 Hz	26	115	26	115	32	115	26	115	26	115	29	118	52	118
1 kHz	26	116	26	114	32	115	26	116	26	114	29	119	52	117
4 kHz	26	114	26	112	32	115	26	114	26	112	29	117	52	115
8 kHz	26	110	26	109	32	115	26	110	26	109	29	113	52	112
12.5 kHz	26	75	26	112	32	115	26	75	26	112	29	78	52	115

Table C.8.2. Linear operating ranges for the **High** measurement range and the **SA277C Environment** filter (for the sinusoidal signal and microphone sensitivity 50 mV/Pa)

[dB]	$L_{AS/F}$		$L_{CS/F}$		$L_{LINS/F}$		L_{AeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	46	97	46	134	48	137	46	97	46	134	49	100	72	137
500 Hz	46	137	46	137	48	137	46	137	46	137	49	140	72	140
1 kHz	46	138	46	136	48	137	46	138	46	136	49	141	72	139
4 kHz	46	136	46	134	48	137	46	136	46	134	49	139	72	137
8 kHz	46	132	46	131	48	137	46	132	46	131	49	135	72	134
12.5 kHz	46	97	46	134	48	137	46	97	46	134	49	100	72	137

Table C.8.3. Self-generated noise for different weighting filters

Weighting filter / Range	Electrical *) A	Electrical *) C	Electrical *) LIN	Acoustical compensated A	Acoustical compensated C	Acoustical compensated LIN
Low	< 15 dB	< 15 dB	< 21 dB	< 19 dB	< 19 dB	< 25 dB
High	< 35 dB	< 35 dB	< 37 dB	< 39 dB	< 39 dB	< 41 dB

*) measured with the **ST 02** microphone equivalent impedance 18 pF +/-10%

MK 255 Free Field frequency response for 90 deg incidence angle

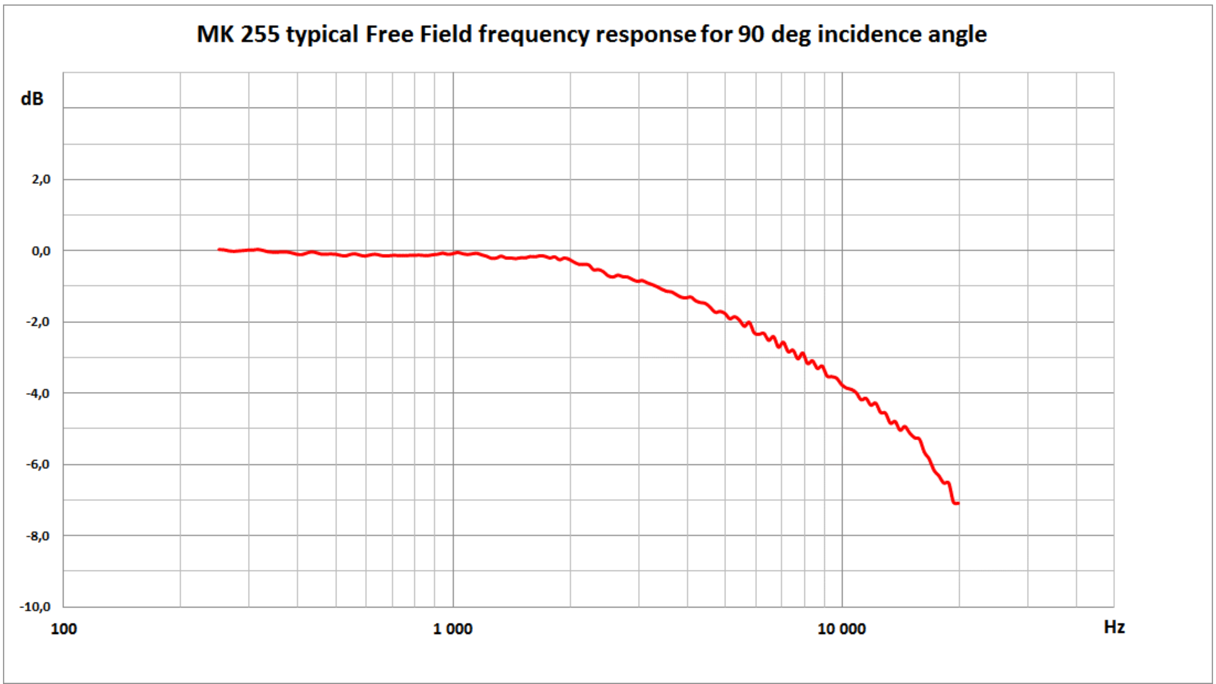


Table C.8.4. MK 255 typical Free Field frequency response for 90 deg incidence angle

Frequency [Hz]	MK 255 typical Free Field response [dB]	Frequency [Hz]	MK 255 typical Free Field response [dB]	Frequency [Hz]	MK 255 typical Free Field response [dB]
251	0.03	1 090	-0.11	4 732	-1.73
259	0.02	1 122	-0.09	4 870	-1.71
266	-0.01	1 155	-0.07	5 012	-1.76
274	-0.02	1 189	-0.12	5 158	-1.91
282	-0.01	1 223	-0.16	5 309	-1.85
290	0.00	1 259	-0.21	5 464	-1.95
299	0.02	1 296	-0.21	5 623	-2.13
307	0.02	1 334	-0.15	5 788	-2.01
316	0.03	1 372	-0.21	5 957	-2.31
325	0.01	1 413	-0.21	6 131	-2.35
335	-0.03	1 454	-0.22	6 310	-2.32

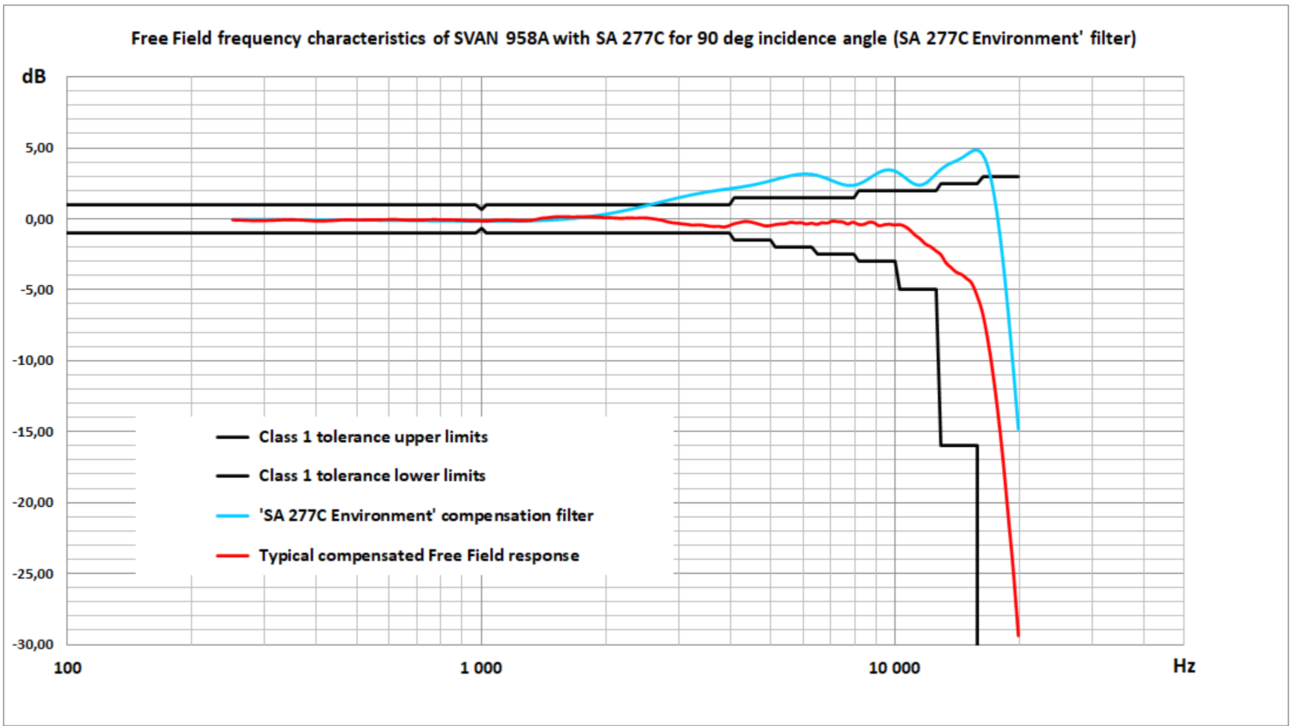
Frequency	MK 255 typical Free Field response	Frequency	MK 255 typical Free Field response	Frequency	MK 255 typical Free Field response
[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]
345	-0.04	1 496	-0.20	6 494	-2.52
355	-0.04	1 540	-0.20	6 683	-2.41
365	-0.04	1 585	-0.16	6 879	-2.71
376	-0.04	1 631	-0.17	7 079	-2.57
387	-0.07	1 679	-0.14	7 286	-2.84
398	-0.10	1 728	-0.16	7 499	-2.80
410	-0.11	1 778	-0.20	7 718	-3.04
422	-0.07	1 830	-0.17	7 943	-2.87
434	-0.03	1 884	-0.26	8 175	-3.17
447	-0.06	1 939	-0.20	8 414	-3.09
460	-0.10	1 995	-0.25	8 660	-3.31
473	-0.10	2 054	-0.32	8 913	-3.24
487	-0.09	2 113	-0.38	9 173	-3.52
501	-0.10	2 175	-0.39	9 441	-3.54
516	-0.13	2 239	-0.40	9 716	-3.59
531	-0.15	2 304	-0.54	10 000	-3.77
546	-0.10	2 371	-0.53	10 292	-3.86
562	-0.09	2 441	-0.59	10 593	-3.90
579	-0.13	2 512	-0.71	10 902	-3.99
596	-0.15	2 585	-0.74	11 220	-4.19
613	-0.12	2 661	-0.69	11 548	-4.15
631	-0.10	2 738	-0.73	11 885	-4.34
649	-0.12	2 818	-0.74	12 232	-4.28
668	-0.15	2 901	-0.81	12 589	-4.54
688	-0.14	2 985	-0.86	12 957	-4.56
708	-0.13	3 073	-0.84	13 335	-4.85
729	-0.14	3 162	-0.90	13 725	-4.80
750	-0.14	3 255	-0.95	14 125	-5.04
772	-0.13	3 350	-1.01	14 538	-4.94
794	-0.13	3 447	-1.08	14 962	-5.12
818	-0.12	3 548	-1.14	15 399	-5.26
841	-0.13	3 652	-1.16	15 849	-5.29
866	-0.14	3 758	-1.23	16 312	-5.66
891	-0.11	3 868	-1.31	16 788	-5.85
917	-0.10	3 981	-1.32	17 278	-6.17
944	-0.07	4 097	-1.30	17 783	-6.33
972	-0.10	4 217	-1.41	18 302	-6.53
1 000	-0.09	4 340	-1.46	18 836	-6.53
1 029	-0.05	4 467	-1.48	19 387	-7.07
1 059	-0.08	4 597	-1.60	19 953	-7.10

Table C.8.5. MK 255 Free Field corrections for 90 deg incidence angle with the use of the electrostatic actuator

[dB]	Frequency [Hz]																
	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800
Correction factors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.05	-0.12	-0.17	-0.16	-0.14
Uncertainty (IEC 62585)	--	--	--	--	--	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25

[dB]	Frequency [Hz]													
	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	12500	16000	20000
Correction factors	-0.09	-0.18	-0.23	-0.17	-0.20	-0.10	0.16	0.35	0.56	1.12	1.68	2.71	3.76	4.71
Uncertainty (IEC 62585)	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.35	0.35	0.35	0.35	0.50	0.50	0.50

Free Field frequency response of SVAN 958A with SA 277C for 90 deg incidence angle



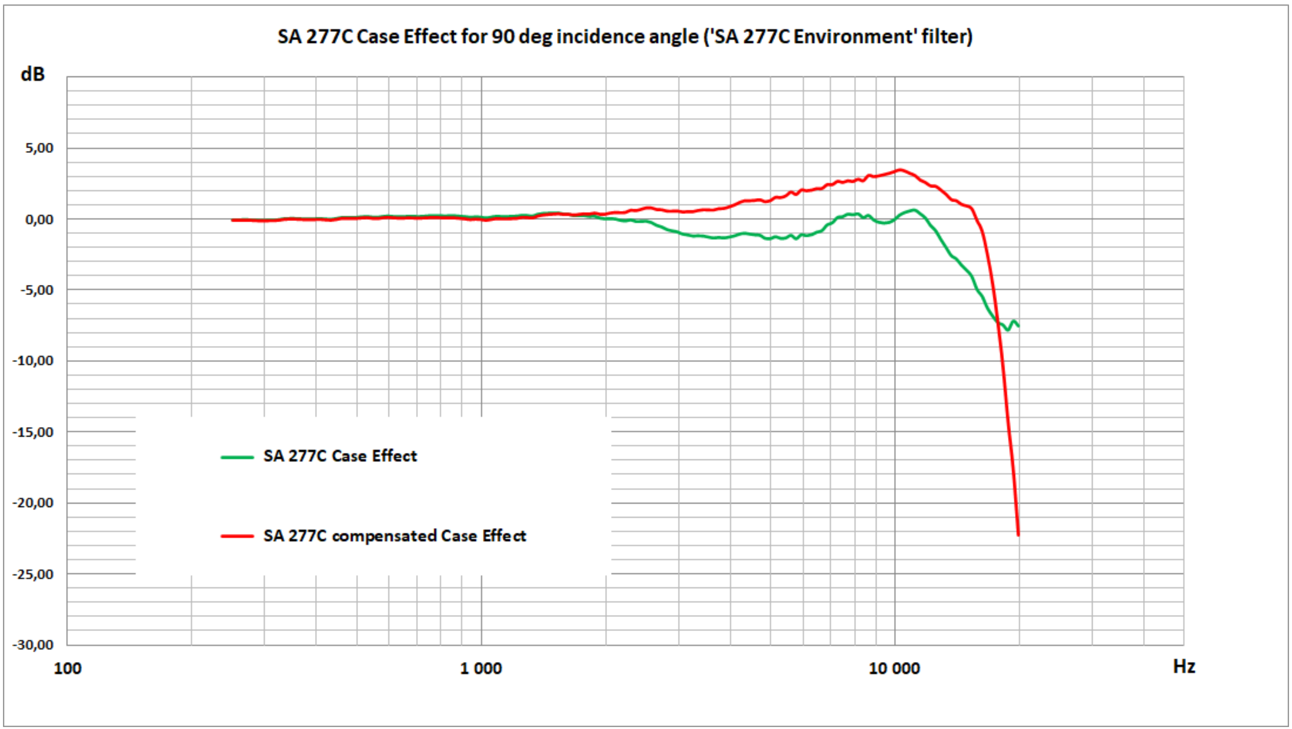


Table C.8.6. Typical Free Field frequency characteristics of SVAN 958A with SA 277C for 90 deg incidence angle

Frequency	Compensation filter for 90 deg incidence angle "SA277C Environment"	Typical compensated response of SVAN 958A with SA 277C for 90 deg incidence angle	Compensated Case Effect of SA 277C for 90 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
251	-0.02	-0.04	-0.07	0.25
259	-0.02	-0.05	-0.07	0.25
266	-0.02	-0.06	-0.05	0.25
274	-0.02	-0.08	-0.06	0.25
282	-0.02	-0.09	-0.08	0.25
290	-0.02	-0.10	-0.10	0.25
299	-0.02	-0.09	-0.11	0.25
307	-0.03	-0.08	-0.10	0.25
316	-0.03	-0.06	-0.10	0.25
325	-0.03	-0.05	-0.06	0.25
335	-0.03	-0.03	0.00	0.25
345	-0.03	-0.03	0.02	0.25
355	-0.03	-0.03	0.01	0.25
365	-0.04	-0.04	0.00	0.25
376	-0.04	-0.06	-0.03	0.25
387	-0.04	-0.09	-0.03	0.25
398	-0.04	-0.12	-0.02	0.25
410	-0.04	-0.12	-0.01	0.25
422	-0.05	-0.11	-0.04	0.25

Frequency	Compensation filter for 90 deg incidence angle “SA277C Environment”	Typical compensated response of SVAN 958A with SA 277C for 90 deg incidence angle	Compensated Case Effect of SA 277C for 90 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
434	-0.05	-0.09	-0.06	0.25
447	-0.05	-0.07	-0.01	0.25
460	-0.05	-0.04	0.05	0.25
473	-0.06	-0.03	0.07	0.25
487	-0.06	-0.03	0.06	0.25
501	-0.06	-0.04	0.06	0.25
516	-0.07	-0.03	0.10	0.25
531	-0.07	-0.03	0.12	0.25
546	-0.07	-0.04	0.07	0.25
562	-0.08	-0.04	0.05	0.25
579	-0.08	-0.02	0.10	0.25
596	-0.08	-0.01	0.14	0.25
613	-0.09	-0.02	0.10	0.25
631	-0.09	-0.02	0.08	0.25
649	-0.10	-0.04	0.08	0.25
668	-0.10	-0.05	0.10	0.25
688	-0.10	-0.05	0.09	0.25
708	-0.11	-0.05	0.08	0.25
729	-0.11	-0.05	0.09	0.25
750	-0.12	-0.02	0.12	0.25
772	-0.12	-0.01	0.12	0.25
794	-0.13	-0.02	0.12	0.25
818	-0.13	-0.03	0.10	0.25
841	-0.13	-0.03	0.10	0.25
866	-0.14	-0.04	0.10	0.25
891	-0.14	-0.05	0.06	0.25
917	-0.15	-0.07	0.03	0.25
944	-0.15	-0.09	-0.02	0.25
972	-0.15	-0.09	0.01	0.25
1 000	-0.15	-0.10	-0.02	0.25
1 029	-0.15	-0.12	-0.07	0.25
1 059	-0.16	-0.09	-0.01	0.25
1 090	-0.16	-0.06	0.05	0.25
1 122	-0.15	-0.06	0.03	0.25
1 155	-0.15	-0.04	0.03	0.25
1 189	-0.15	-0.07	0.05	0.25
1 223	-0.15	-0.09	0.07	0.25
1 259	-0.14	-0.08	0.13	0.25
1 296	-0.13	-0.09	0.12	0.25
1 334	-0.12	-0.06	0.09	0.25
1 372	-0.11	0.02	0.23	0.25
1 413	-0.10	0.09	0.30	0.25
1 454	-0.08	0.12	0.34	0.25
1 496	-0.06	0.17	0.36	0.25
1 540	-0.04	0.19	0.39	0.25

Frequency	Compensation filter for 90 deg incidence angle "SA277C Environment"	Typical compensated response of SVAN 958A with SA 277C for 90 deg incidence angle	Compensated Case Effect of SA 277C for 90 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
1 585	-0.01	0.19	0.35	0.25
1 631	0.02	0.18	0.35	0.25
1 679	0.05	0.16	0.30	0.25
1 728	0.09	0.19	0.34	0.25
1 778	0.13	0.18	0.39	0.25
1 830	0.18	0.20	0.37	0.25
1 884	0.23	0.18	0.43	0.25
1 939	0.28	0.15	0.36	0.25
1 995	0.34	0.11	0.35	0.25
2 054	0.40	0.11	0.44	0.25
2 113	0.47	0.10	0.48	0.25
2 175	0.54	0.07	0.46	0.25
2 239	0.62	0.09	0.49	0.25
2 304	0.69	0.10	0.64	0.25
2 371	0.78	0.08	0.61	0.25
2 441	0.86	0.11	0.70	0.25
2 512	0.95	0.10	0.81	0.25
2 585	1.04	0.06	0.80	0.25
2 661	1.13	0.01	0.69	0.25
2 738	1.22	-0.06	0.67	0.25
2 818	1.31	-0.16	0.58	0.25
2 901	1.40	-0.24	0.57	0.25
2 985	1.48	-0.27	0.59	0.25
3 073	1.57	-0.32	0.52	0.25
3 162	1.65	-0.36	0.54	0.25
3 255	1.72	-0.41	0.54	0.25
3 350	1.79	-0.39	0.62	0.25
3 447	1.86	-0.41	0.67	0.25
3 548	1.92	-0.48	0.66	0.25
3 652	1.98	-0.51	0.65	0.25
3 758	2.03	-0.49	0.74	0.25
3 868	2.09	-0.54	0.76	0.25
3 981	2.14	-0.45	0.87	0.25
4 097	2.19	-0.30	1.00	0.35
4 217	2.24	-0.23	1.18	0.35
4 340	2.30	-0.15	1.30	0.35
4 467	2.36	-0.17	1.31	0.35
4 597	2.43	-0.26	1.33	0.35
4 732	2.51	-0.35	1.38	0.35
4 870	2.60	-0.46	1.24	0.35
5 012	2.69	-0.44	1.32	0.35
5 158	2.79	-0.37	1.55	0.35
5 309	2.89	-0.32	1.54	0.35
5 464	2.98	-0.30	1.65	0.35
5 623	3.06	-0.20	1.92	0.35

Frequency	Compensation filter for 90 deg incidence angle “SA277C Environment”	Typical compensated response of SVAN 958A with SA 277C for 90 deg incidence angle	Compensated Case Effect of SA 277C for 90 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
5 788	3.13	-0.26	1.75	0.35
5 957	3.17	-0.24	2.07	0.35
6 131	3.18	-0.33	2.01	0.35
6 310	3.15	-0.26	2.06	0.35
6 494	3.08	-0.35	2.17	0.35
6 683	2.98	-0.24	2.18	0.35
6 879	2.85	-0.27	2.44	0.35
7 079	2.70	-0.12	2.45	0.35
7 286	2.56	-0.16	2.67	0.35
7 499	2.44	-0.19	2.61	0.35
7 718	2.37	-0.32	2.72	0.35
7 943	2.37	-0.20	2.67	0.35
8 175	2.45	-0.35	2.82	0.35
8 414	2.62	-0.37	2.72	0.35
8 660	2.83	-0.22	3.09	0.35
8 913	3.07	-0.23	3.01	0.35
9 173	3.29	-0.46	3.07	0.35
9 441	3.43	-0.38	3.16	0.35
9 716	3.48	-0.34	3.25	0.35
10 000	3.40	-0.40	3.36	0.35
10 292	3.21	-0.37	3.49	0.35
10 593	2.94	-0.49	3.41	0.35
10 902	2.66	-0.75	3.24	0.35
11 220	2.45	-1.11	3.08	0.35
11 548	2.39	-1.38	2.77	0.35
11 885	2.52	-1.74	2.60	0.35
12 232	2.80	-1.92	2.36	0.35
12 589	3.16	-2.21	2.33	0.35
12 957	3.50	-2.50	2.07	0.35
13 335	3.77	-3.08	1.77	0.35
13 725	3.95	-3.41	1.39	0.35
14 125	4.11	-3.74	1.31	0.35
14 538	4.30	-3.89	1.05	0.35
14 962	4.54	-4.18	0.94	0.35
15 399	4.78	-4.53	0.73	0.35
15 849	4.86	-5.39	-0.10	0.35
16 312	4.58	-6.53	-0.86	0.35
16 788	3.77	-8.33	-2.48	0.35
17 278	2.29	-10.70	-4.52	0.35
17 783	0.05	-13.54	-7.22	0.35
18 302	-2.91	-16.89	-10.36	0.35
18 836	-6.49	-20.83	-14.30	0.35
19 387	-10.50	-24.75	-17.68	0.35
19 953	-14.78	-29.39	-22.30	0.35

Table C.8.7. SVAN 958A with SA 277C combined Free Field correction with the use of the electrostatic actuator for 90 deg incidence angle (microphone corrections + compensated Case Effect)

[dB]	Frequency [Hz]																
	20	**25**	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**	**200**	**250**	**315**	**400**	**500**	**630**	**800**
Correction factors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.07	-0.15	-0.14	-0.11	-0.08	-0.02
Complex uncertainty	--	--	--	--	--	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35

[dB]	Frequency [Hz]													
	1000	**1250**	**1600**	**2000**	**2500**	**3150**	**4000**	**5000**	**6300**	**8000**	**10000**	**12500**	**16000**	**20000**
Correction factors	-0.11	-0.05	0.12	0.18	0.61	0.44	1.03	1.67	2.62	3.79	5.04	5.04	3.66	-17.59
Complex uncertainty	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.49	0.49	0.49	0.49	0.61	0.61	0.61

Linear operating ranges with the **SA277A Airport** filter

The starting point at which tests of level linearity shall begin is 94.0 dB for the frequencies specifies below. For the **Low** measurement range and A weighting linearity test at 31.5 Hz, the starting point is 74 dB.

Table C.8.8. Linear operating ranges for the **Low** measurement range and the **SA277C Airport** filter (for the sinusoidal signal and microphone sensitivity 50 mV/Pa)

[dB]	$L_{AS/F}$		$L_{CS/F}$		$L_{LINS/F}$		L_{AeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	26	75	26	112	32	115	26	75	26	112	29	78	52	115
500 Hz	26	115	26	115	32	115	26	115	26	115	29	118	52	118
1 kHz	26	116	26	114	32	115	26	116	26	114	29	119	52	117
4 kHz	26	114	26	112	32	115	26	114	26	112	29	117	52	115
8 kHz	26	110	26	109	32	115	26	110	26	109	29	113	52	112
12.5 kHz	26	75	26	112	32	115	26	75	26	112	29	78	52	115

Table C.8.9. Linear operating ranges for the **High** measurement range and the **SA277C Airport** filter (for the sinusoidal signal and microphone sensitivity 50 mV/Pa)

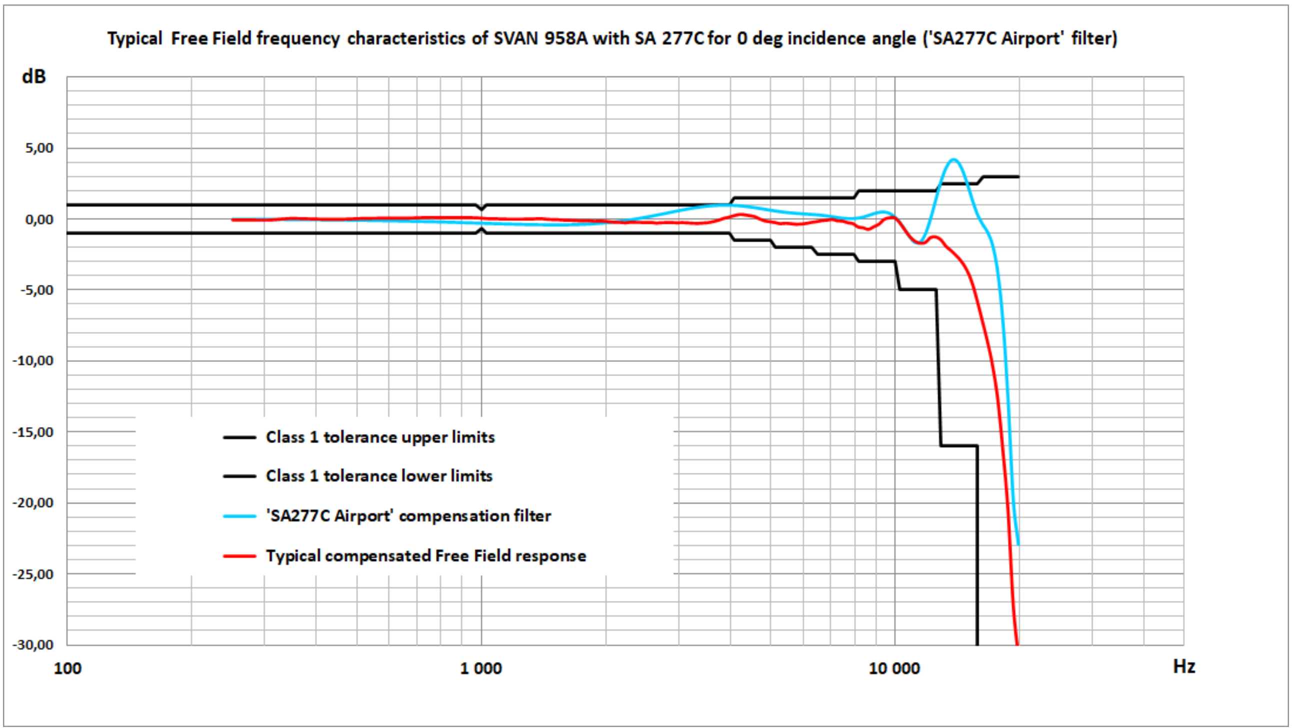
[dB]	$L_{AS/F}$		$L_{CS/F}$		$L_{LINS/F}$		L_{AeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	46	97	46	134	48	137	46	97	46	134	49	100	72	137
500 Hz	46	137	46	137	48	137	46	137	46	137	49	140	72	140
1 kHz	46	138	46	136	48	137	46	138	46	136	49	141	72	139
4 kHz	46	136	46	134	48	137	46	136	46	134	49	139	72	137
8 kHz	46	132	46	131	48	137	46	132	46	131	49	135	72	134
12.5 kHz	46	97	46	134	48	137	46	97	46	134	49	100	72	137

Table C.8.10. Self-generated noise for different weighting filters

Range \ Weighting filter	Electrical *)			Acoustical compensated		
	A	C	LIN	A	C	LIN
Low	< 15 dB	< 15 dB	< 21 dB	< 19 dB	< 19 dB	< 25 dB
High	< 35 dB	< 35 dB	< 37 dB	< 39 dB	< 39 dB	< 41 dB

*) measured with the **ST 02** microphone equivalent impedance 18 pF +/-10%

Free Field Frequency response of SVAN 958A with SA 277C for 0 deg incidence angle



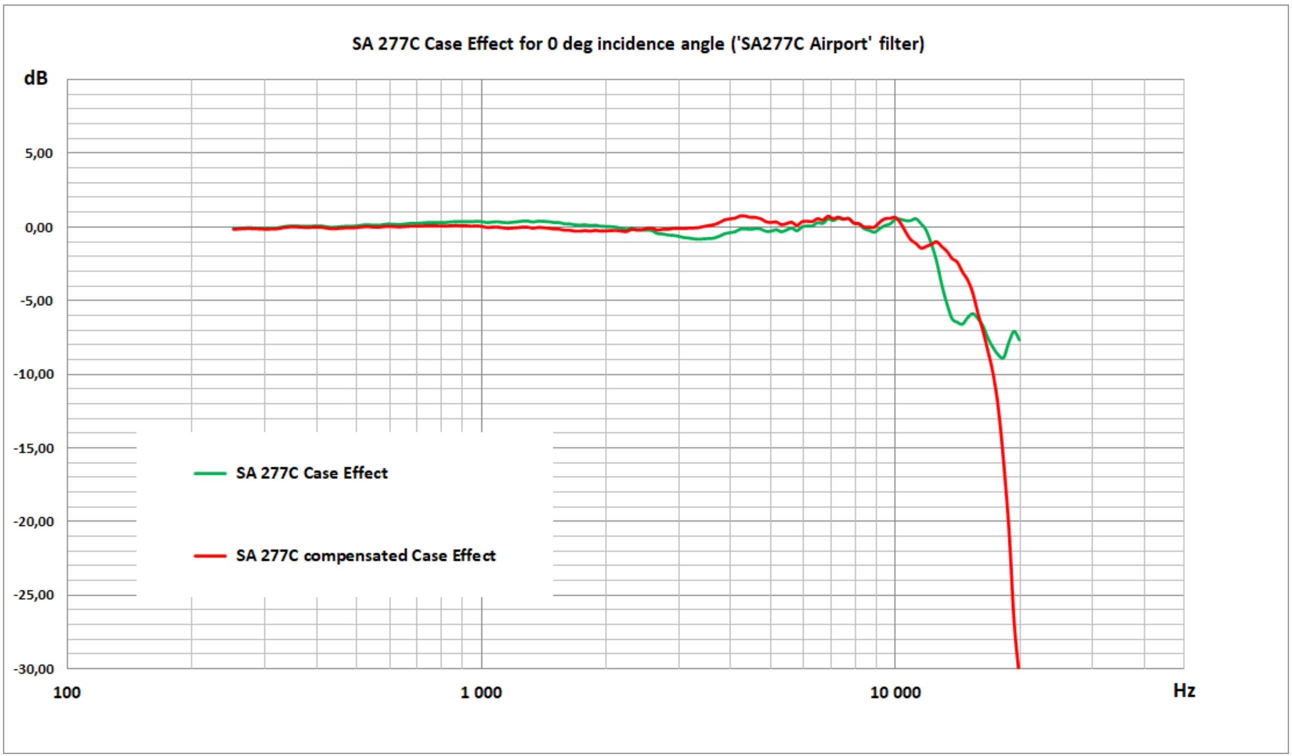


Table C.8.11. Typical Free Field frequency characteristics of SVAN 958A with SA 277C for 0 deg incidence angle

Frequency	Compensation filter for 0 deg incidence angle "SA277C Airport"	Typical compensated response of SVAN 958A with SA 277C for 0 deg incidence angle	Compensated Case Effect of SA 277C for 0 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
251	-0.03	-0.08	-0.11	0.25
259	-0.03	-0.08	-0.10	0.25
266	-0.03	-0.08	-0.07	0.25
274	-0.03	-0.08	-0.06	0.25
282	-0.03	-0.09	-0.08	0.25
290	-0.03	-0.09	-0.09	0.25
299	-0.04	-0.10	-0.11	0.25
307	-0.04	-0.09	-0.11	0.25
316	-0.04	-0.07	-0.10	0.25
325	-0.04	-0.04	-0.05	0.25
335	-0.04	-0.01	0.01	0.25
345	-0.05	0.01	0.04	0.25
355	-0.05	0.02	0.04	0.25
365	-0.05	0.01	0.02	0.25
376	-0.06	0.00	0.00	0.25
387	-0.06	-0.01	0.01	0.25

Frequency	Compensation filter for 0 deg incidence angle "SA277C Airport"	Typical compensated response of SVAN 958A with SA 277C for 0 deg incidence angle	Compensated Case Effect of SA 277C for 0 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
398	-0.06	-0.02	0.03	0.25
410	-0.07	-0.03	0.02	0.25
422	-0.07	-0.04	-0.04	0.25
434	-0.07	-0.04	-0.08	0.25
447	-0.08	-0.04	-0.07	0.25
460	-0.08	-0.04	-0.03	0.25
473	-0.09	-0.03	-0.02	0.25
487	-0.09	-0.01	-0.02	0.25
501	-0.10	0.00	0.00	0.25
516	-0.10	0.02	0.04	0.25
531	-0.11	0.02	0.07	0.25
546	-0.11	0.03	0.03	0.25
562	-0.12	0.03	0.02	0.25
579	-0.13	0.04	0.06	0.25
596	-0.13	0.04	0.09	0.25
613	-0.14	0.04	0.06	0.25
631	-0.15	0.04	0.04	0.25
649	-0.15	0.04	0.06	0.25
668	-0.16	0.04	0.09	0.25
688	-0.17	0.06	0.10	0.25
708	-0.18	0.07	0.10	0.25
729	-0.19	0.08	0.12	0.25
750	-0.20	0.09	0.12	0.25
772	-0.21	0.09	0.12	0.25
794	-0.22	0.08	0.11	0.25
818	-0.23	0.07	0.10	0.25
841	-0.24	0.08	0.12	0.25
866	-0.25	0.09	0.14	0.25
891	-0.26	0.09	0.13	0.25
917	-0.27	0.09	0.12	0.25
944	-0.28	0.08	0.09	0.25
972	-0.29	0.07	0.11	0.25
1 000	-0.30	0.04	0.08	0.25
1 029	-0.32	0.01	0.01	0.25
1 059	-0.33	0.00	0.02	0.25
1 090	-0.34	0.00	0.03	0.25
1 122	-0.35	-0.02	-0.01	0.25
1 155	-0.36	-0.03	-0.05	0.25
1 189	-0.37	-0.03	-0.03	0.25
1 223	-0.38	-0.03	-0.01	0.25
1 259	-0.39	-0.03	0.03	0.25
1 296	-0.40	-0.02	0.02	0.25
1 334	-0.41	-0.02	-0.05	0.25

Frequency	Compensation filter for 0 deg incidence angle “SA277C Airport”	Typical compensated response of SVAN 958A with SA 277C for 0 deg incidence angle	Compensated Case Effect of SA 277C for 0 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
1 372	-0.41	0.00	0.00	0.25
1 413	-0.42	-0.01	-0.02	0.25
1 454	-0.42	-0.04	-0.05	0.25
1 496	-0.42	-0.06	-0.10	0.25
1 540	-0.42	-0.07	-0.11	0.25
1 585	-0.42	-0.10	-0.18	0.25
1 631	-0.41	-0.11	-0.19	0.25
1 679	-0.41	-0.12	-0.24	0.25
1 728	-0.39	-0.14	-0.25	0.25
1 778	-0.38	-0.15	-0.21	0.25
1 830	-0.36	-0.15	-0.25	0.25
1 884	-0.34	-0.18	-0.20	0.25
1 939	-0.31	-0.16	-0.24	0.25
1 995	-0.28	-0.18	-0.23	0.25
2 054	-0.25	-0.22	-0.21	0.25
2 113	-0.21	-0.25	-0.20	0.25
2 175	-0.17	-0.26	-0.24	0.25
2 239	-0.12	-0.29	-0.28	0.25
2 304	-0.06	-0.25	-0.12	0.25
2 371	-0.01	-0.26	-0.17	0.25
2 441	0.06	-0.26	-0.14	0.25
2 512	0.12	-0.27	-0.06	0.25
2 585	0.19	-0.26	-0.05	0.25
2 661	0.26	-0.31	-0.17	0.25
2 738	0.33	-0.28	-0.12	0.25
2 818	0.41	-0.27	-0.12	0.25
2 901	0.48	-0.27	-0.07	0.25
2 985	0.55	-0.29	-0.05	0.25
3 073	0.62	-0.27	-0.07	0.25
3 162	0.69	-0.29	-0.04	0.25
3 255	0.75	-0.32	-0.03	0.25
3 350	0.81	-0.32	0.00	0.25
3 447	0.86	-0.30	0.08	0.25
3 548	0.90	-0.27	0.13	0.25
3 652	0.93	-0.20	0.20	0.25
3 758	0.95	-0.11	0.34	0.25
3 868	0.96	0.02	0.52	0.25
3 981	0.96	0.11	0.59	0.25
4 097	0.95	0.21	0.63	0.35
4 217	0.92	0.29	0.79	0.35
4 340	0.89	0.28	0.77	0.35
4 467	0.84	0.22	0.69	0.35
4 597	0.79	0.15	0.69	0.35

Frequency	Compensation filter for 0 deg incidence angle “SA277C Airport”	Typical compensated response of SVAN 958A with SA 277C for 0 deg incidence angle	Compensated Case Effect of SA 277C for 0 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
4 732	0.73	-0.03	0.60	0.35
4 870	0.67	-0.16	0.39	0.35
5 012	0.61	-0.21	0.35	0.35
5 158	0.55	-0.28	0.38	0.35
5 309	0.50	-0.35	0.20	0.35
5 464	0.46	-0.32	0.27	0.35
5 623	0.42	-0.35	0.36	0.35
5 788	0.39	-0.39	0.15	0.35
5 957	0.36	-0.37	0.40	0.35
6 131	0.34	-0.33	0.42	0.35
6 310	0.31	-0.26	0.41	0.35
6 494	0.29	-0.20	0.60	0.35
6 683	0.25	-0.13	0.51	0.35
6 879	0.20	-0.10	0.77	0.35
7 079	0.15	-0.05	0.61	0.35
7 286	0.10	-0.15	0.70	0.35
7 499	0.05	-0.17	0.57	0.35
7 718	0.02	-0.28	0.61	0.35
7 943	0.02	-0.34	0.30	0.35
8 175	0.06	-0.58	0.26	0.35
8 414	0.13	-0.64	0.03	0.35
8 660	0.24	-0.75	0.03	0.35
8 913	0.36	-0.56	0.03	0.35
9 173	0.46	-0.39	0.36	0.35
9 441	0.48	-0.05	0.60	0.35
9 716	0.40	0.06	0.62	0.35
10 000	0.16	0.08	0.69	0.35
10 292	-0.23	-0.26	0.32	0.35
10 593	-0.74	-0.77	-0.29	0.35
10 902	-1.28	-1.27	-0.83	0.35
11 220	-1.66	-1.58	-1.08	0.35
11 548	-1.64	-1.72	-1.40	0.35
11 885	-1.07	-1.67	-1.29	0.35
12 232	0.00	-1.32	-1.14	0.35
12 589	1.33	-1.28	-0.97	0.35
12 957	2.61	-1.49	-1.30	0.35
13 335	3.59	-1.95	-1.62	0.35
13 725	4.11	-2.25	-2.11	0.35
14 125	4.10	-2.60	-2.35	0.35
14 538	3.56	-3.02	-3.02	0.35
14 962	2.59	-3.59	-3.56	0.35
15 399	1.42	-4.46	-4.45	0.35
15 849	0.38	-5.73	-5.83	0.35

Frequency	Compensation filter for 0 deg incidence angle "SA277C Airport"	Typical compensated response of SVAN 958A with SA 277C for 0 deg incidence angle	Compensated Case Effect of SA 277C for 0 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
16 312	-0.35	-7.17	-7.07	0.35
16 788	-0.91	-8.62	-8.49	0.35
17 278	-1.84	-10.32	-10.06	0.35
17 783	-3.75	-12.68	-12.44	0.35
18 302	-7.21	-16.31	-16.06	0.35
18 836	-12.73	-20.59	-20.54	0.35
19 387	-19.71	-27.17	-26.78	0.35
19 953	-22.89	-30.75	-30.54	0.35

Table C.8.12. SVAN 958A with SA 277C combined Free Field corrections with the use of the electrostatic actuator for 0 deg incidence angle (microphone corrections + compensated Case Effect)

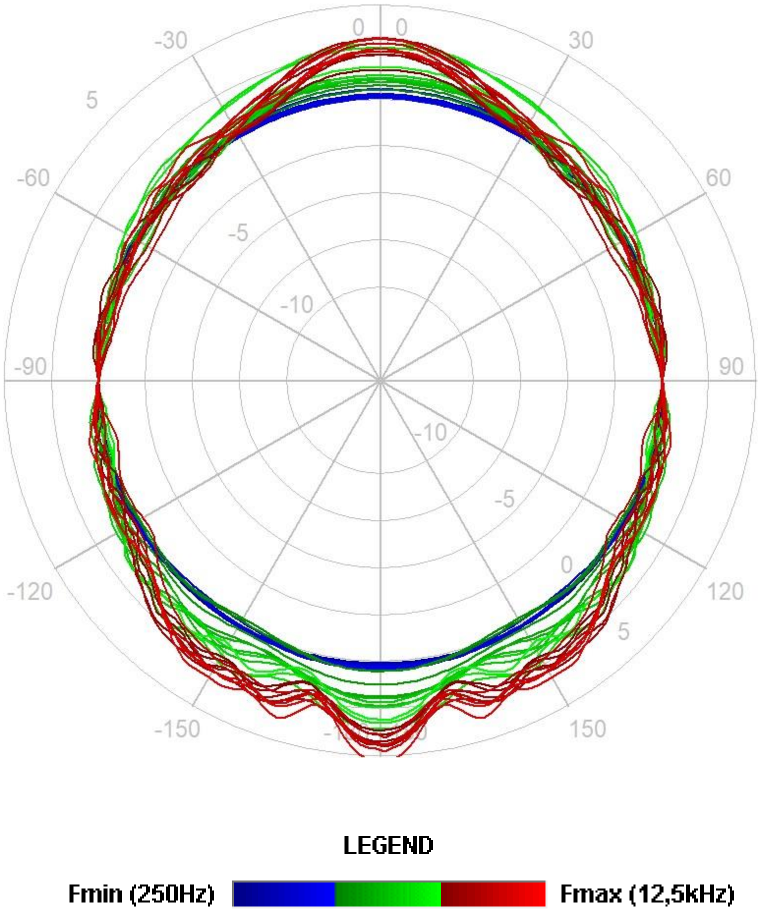
[dB]	Frequency [Hz]																
	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800
Correction factors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.16	-0.10	0.00	-0.07	-0.13	0.01
Complex uncertainty	--	--	--	--	--	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35

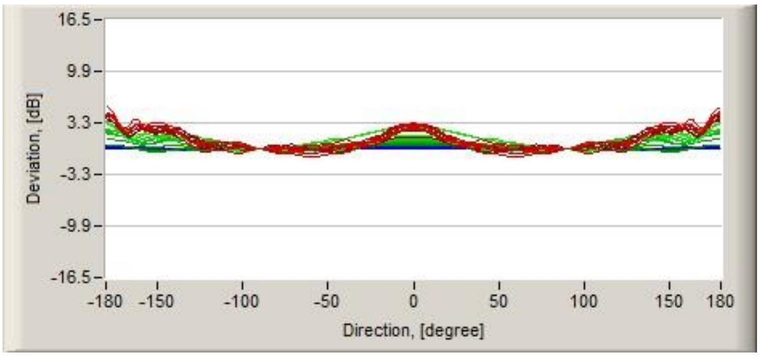
[dB]	Frequency [Hz]													
	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	12500	16000	20000
Correction factors	0.21	0.24	-0.48	0.06	-0.13	0.64	1.56	1.81	2.89	3.70	5.90	5.92	3.39	-18.72
Complex uncertainty	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.49	0.49	0.49	0.49	0.61	0.61	0.61

Free Field directional characteristics of SVAN 958A with SA 277C

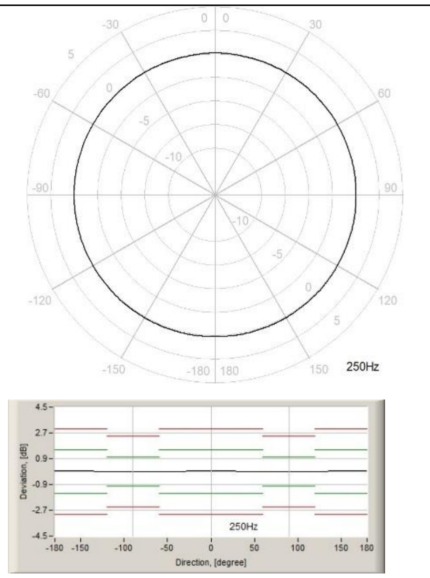
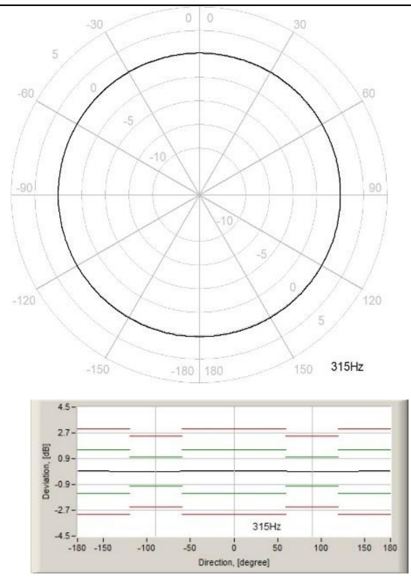
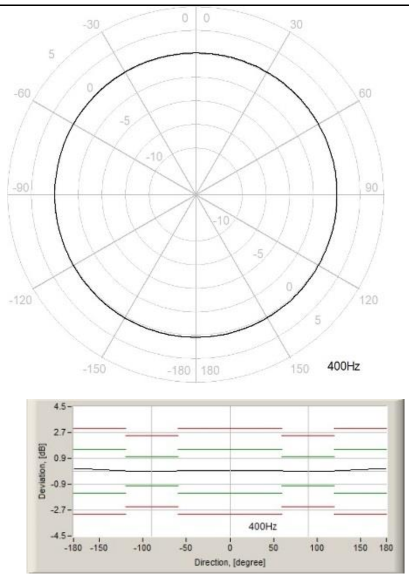
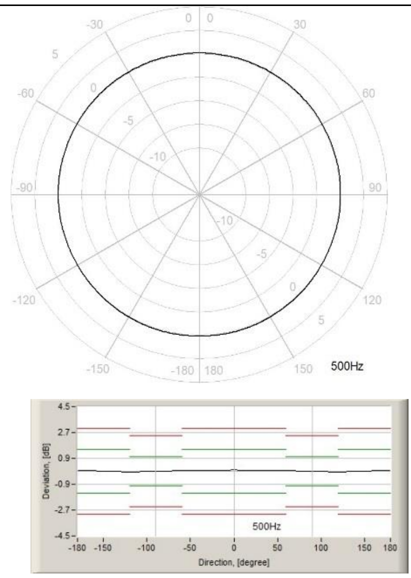
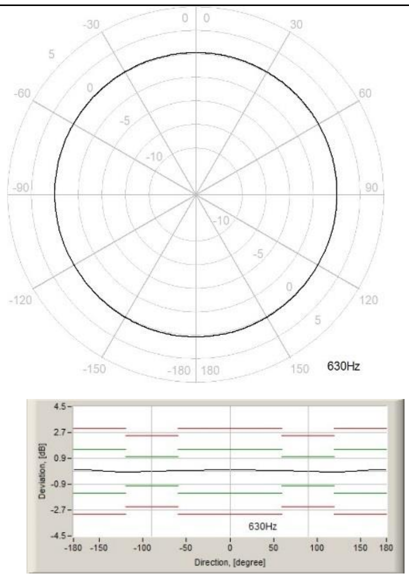
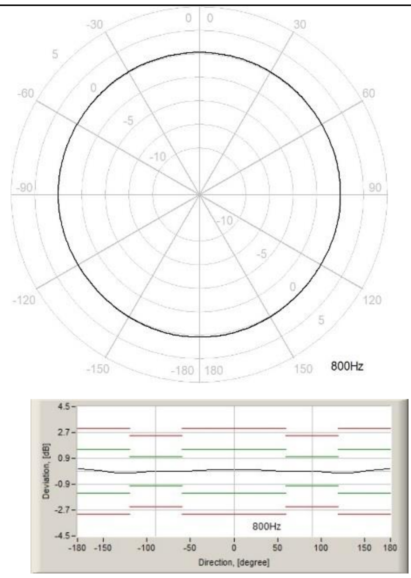
Directional response of SVAN 958A with the MK 255 microphone, SV 12L preamplifier and SA 277C outdoor microphone kit for specified frequencies:

Combined typical directional characteristics

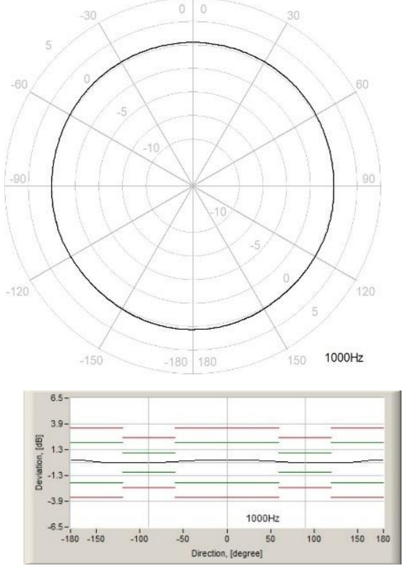




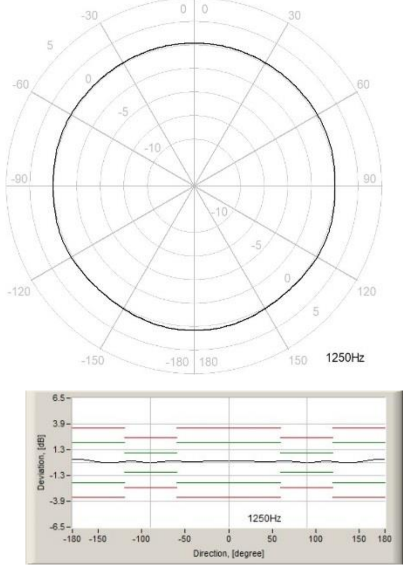
Below the directional characteristics for 90 degree and tolerances for 90 degree and 0 degree incidental angles are presented.

250 Hz		**315 Hz**	
400 Hz		**500 Hz**	
630 Hz		**800 Hz**	

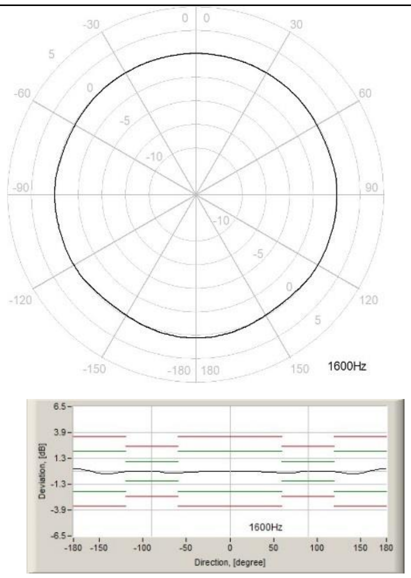
1000 Hz



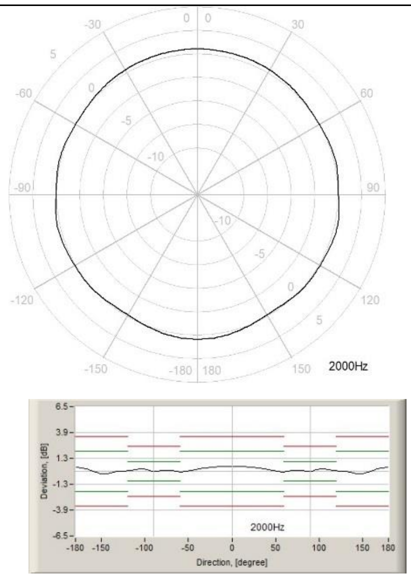
1250 Hz



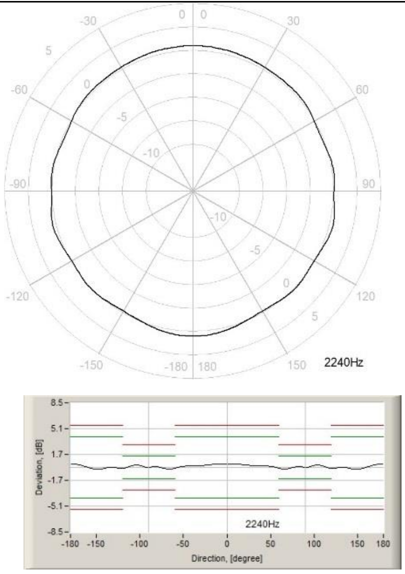
1600 Hz



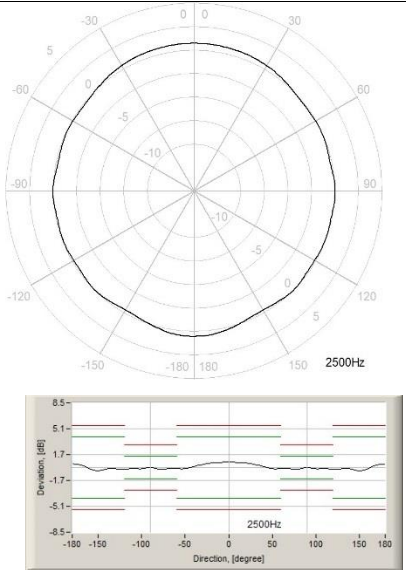
2000 Hz



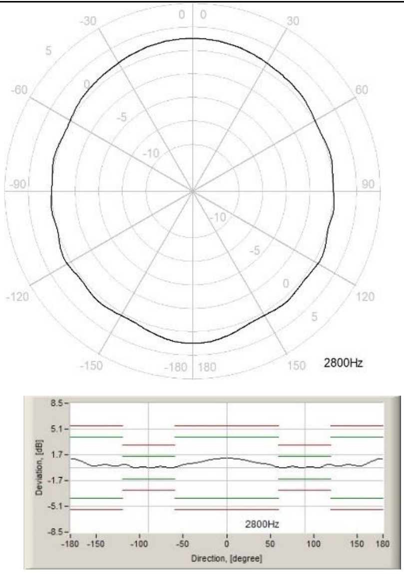
2240 Hz



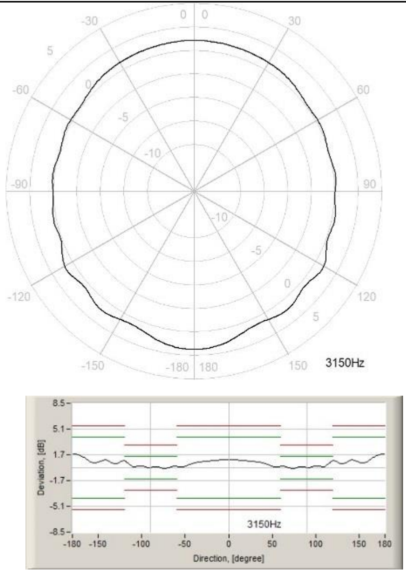
2500 Hz



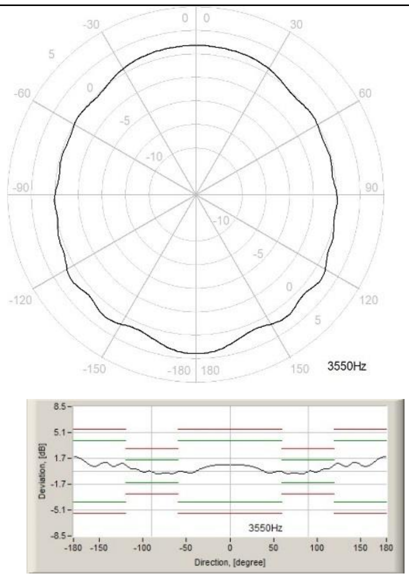
2800 Hz



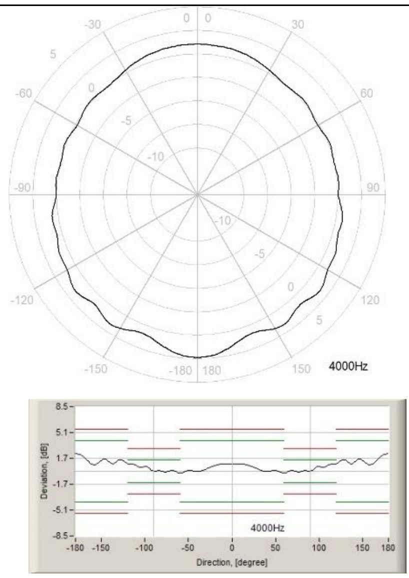
3150 Hz



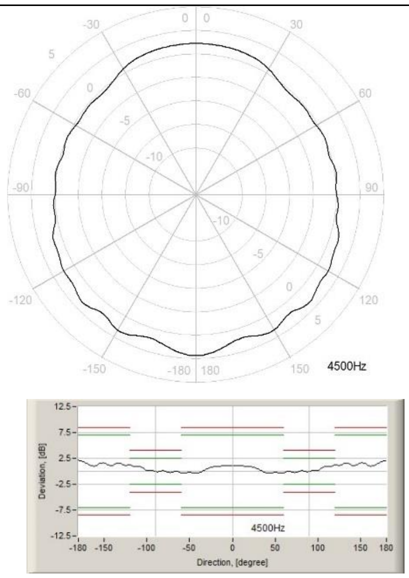
3550 Hz



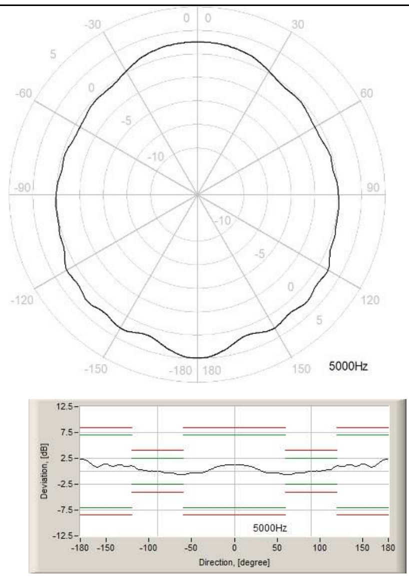
4000 Hz



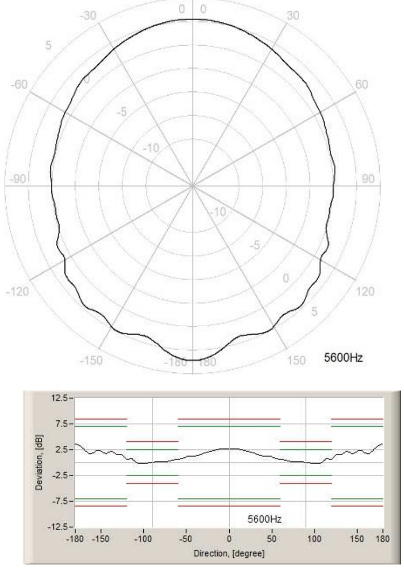
4500 Hz



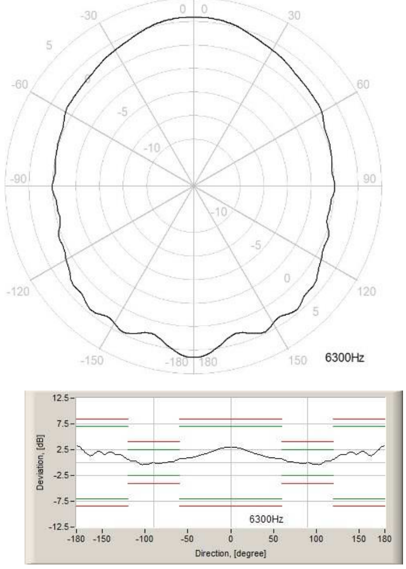
5000 Hz



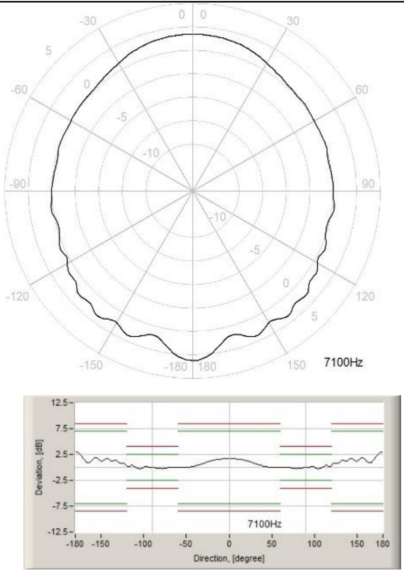
5600 Hz



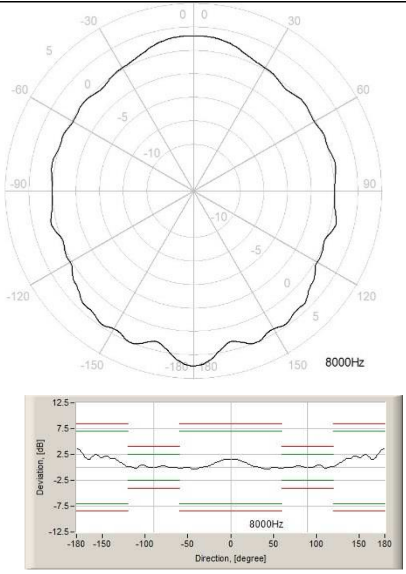
6300 Hz



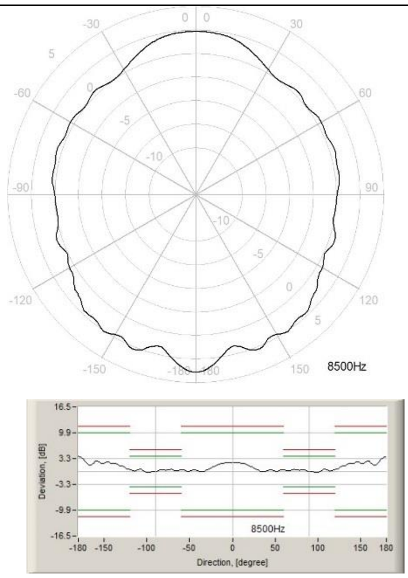
7100 Hz



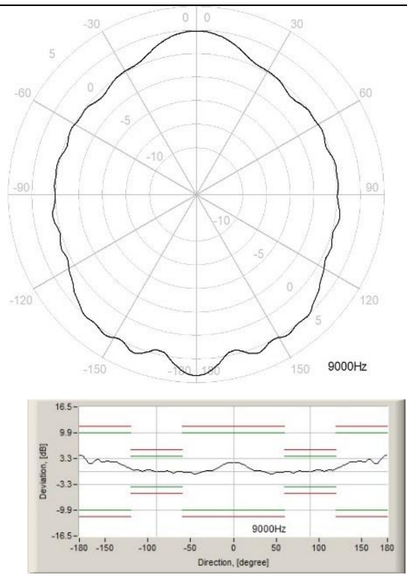
8000 Hz



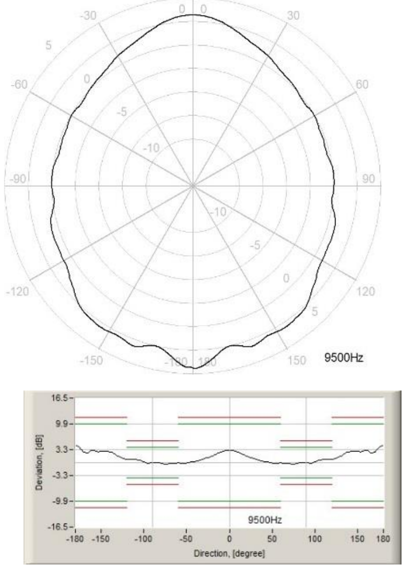
8500 Hz



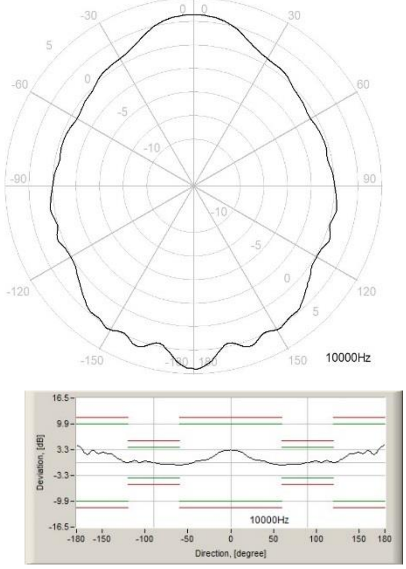
9000 Hz



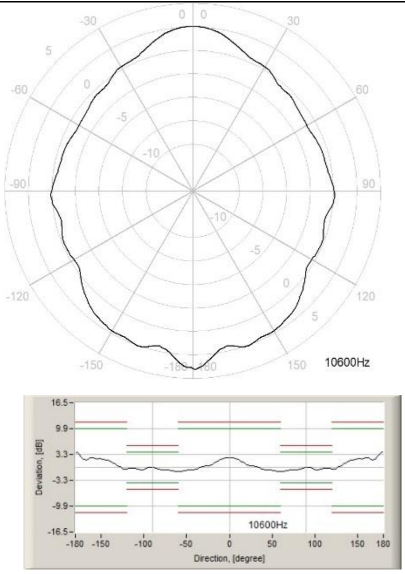
9500 Hz



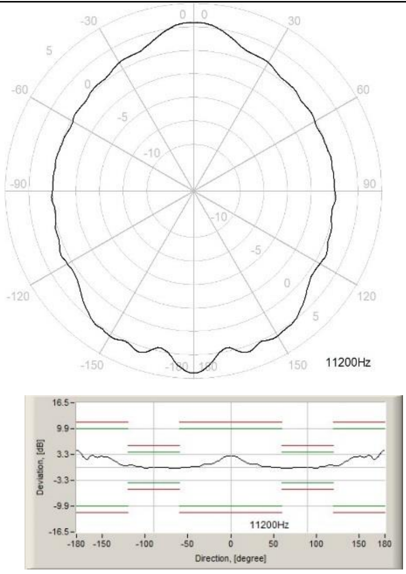
10000 Hz



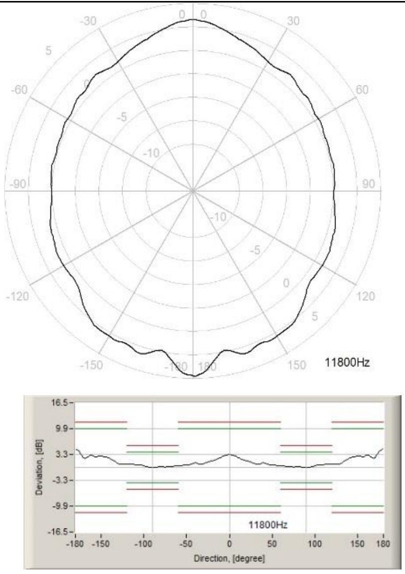
10600 Hz



11200 Hz



11800 Hz



12500 Hz

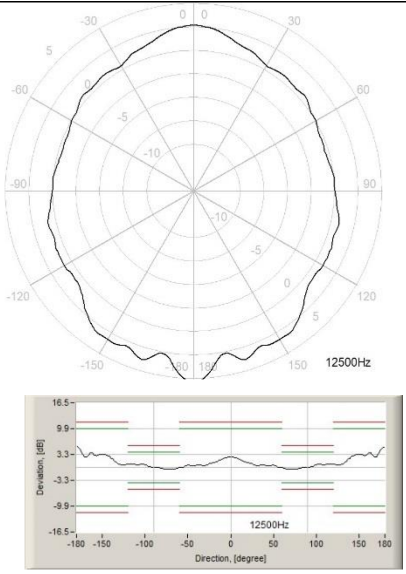


Table C.8.13. Typical directional response of SVAN 958A with SA 277C

Frequency [Hz]	Angle [°]									
	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
250	0.08	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.00
315	0.01	0.03	0.03	0.04	0.04	0.03	0.03	0.01	0.01	-0.02
400	0.05	0.06	0.06	0.06	0.06	0.05	0.04	0.02	0.01	-0.01
500	0.04	0.04	0.05	0.05	0.04	0.04	0.03	0.02	-0.01	-0.03
630	0.08	0.08	0.08	0.07	0.06	0.05	0.04	0.03	0.02	-0.03
800	0.10	0.10	0.09	0.07	0.04	0.02	-0.01	-0.01	0.01	-0.03
1 000	0.25	0.24	0.24	0.23	0.21	0.17	0.13	0.07	0.01	0.03
1 250	0.16	0.16	0.14	0.12	0.13	0.16	0.16	0.12	0.05	0.07
1 600	0.03	-0.01	-0.03	-0.05	-0.09	-0.17	-0.19	-0.15	0.04	-0.02
2 000	0.52	0.50	0.44	0.35	0.22	0.05	0.10	0.15	0.10	0.21
2 240	0.46	0.42	0.31	0.21	0.17	0.14	-0.25	-0.16	0.11	0.28
2 500	0.69	0.66	0.57	0.38	-0.16	-0.18	-0.13	-0.25	-0.21	-0.18
2 800	1.29	1.26	1.10	0.80	0.60	0.44	0.08	0.24	0.19	0.23
3 150	1.08	1.03	0.93	0.81	0.57	0.22	0.22	0.15	0.20	0.31
3 550	0.79	0.75	0.65	0.34	-0.34	-0.18	-0.40	-0.48	-0.48	-0.24
4 000	1.06	0.99	0.71	0.20	0.19	-0.23	-0.19	0.09	0.17	0.73
4 500	1.05	1.02	0.88	-0.34	-0.38	-0.36	-0.26	-0.31	-0.19	0.19
5 000	1.25	1.15	0.76	-0.33	-0.33	-0.61	-0.62	-0.38	-0.24	0.11
5 600	2.68	2.57	2.20	1.73	1.26	0.94	0.62	0.21	0.26	-0.28
6 300	2.82	2.67	2.07	1.48	0.97	0.74	0.49	-0.18	-0.41	-0.50
7 100	1.67	1.54	1.19	0.57	0.15	-0.09	-0.09	-0.32	-0.18	0.33
8 000	1.45	1.26	0.46	-0.50	-0.56	-0.38	-0.31	-0.22	0.23	-0.26
8 500	2.36	2.17	1.41	0.30	0.51	0.45	0.50	0.67	0.42	-0.16
9 000	2.43	1.83	0.59	-0.37	-0.50	0.17	-0.32	-0.31	0.17	0.47
9 500	3.10	2.24	1.20	0.45	-0.35	-0.17	-0.19	-0.35	0.25	0.53
10 000	2.85	2.39	0.71	0.34	-0.38	-0.98	-0.54	-0.73	-0.27	0.36
10 600	2.15	1.30	0.14	-1.10	-1.37	-1.37	-1.58	-0.98	-0.56	-1.25
11 200	2.40	1.52	0.39	-0.33	-0.75	-0.80	-0.82	-0.58	-0.49	-0.61
11 800	2.90	1.92	1.20	1.14	0.89	0.68	0.54	0.37	0.18	1.06
12 500	2.43	1.71	0.80	0.47	0.55	-0.26	-0.66	-0.53	0.26	0.96
f [Hz]	**100-110**	**110-120**	**120-130**	**130-140**	**140-150**	**150-160**	**160-170**	**170-180**	**180-190**	**190-200**
250	0.00	0.00	0.01	0.02	0.03	0.03	0.04	0.05	0.04	0.04
315	-0.03	-0.04	-0.04	-0.03	-0.03	-0.02	-0.01	-0.01	-0.01	-0.03
400	-0.02	-0.02	-0.01	0.04	0.07	0.09	0.11	0.12	0.12	0.12
500	-0.05	-0.06	-0.07	-0.07	-0.05	-0.04	-0.01	0.01	0.01	-0.02
630	-0.06	-0.08	-0.08	-0.07	-0.04	0.04	0.07	0.08	0.08	0.06
800	-0.07	-0.12	-0.14	-0.13	-0.09	0.04	0.09	0.11	0.11	0.09
1 000	0.05	0.05	-0.03	-0.03	0.06	0.16	0.24	0.27	0.27	0.25
1 250	0.14	0.14	0.08	-0.06	0.06	0.20	0.30	0.33	0.33	0.27
1 600	-0.04	-0.03	-0.17	-0.28	-0.27	-0.17	0.20	0.26	0.25	0.17
2 000	0.29	0.21	0.07	-0.13	-0.24	-0.20	0.28	0.41	0.41	0.29
2 240	0.34	0.17	-0.16	-0.09	-0.26	-0.25	0.33	0.46	0.45	0.28

2 500	-0.18	-0.24	-0.26	-0.15	-0.41	-0.42	0.32	0.48	0.47	0.25
2 800	0.14	0.52	0.49	0.49	0.49	0.41	0.96	1.25	1.25	1.05
3 150	0.30	1.01	1.00	1.08	1.08	0.93	1.62	1.88	1.86	1.48
3 550	0.22	0.82	1.00	1.08	1.12	0.73	1.56	1.86	1.83	1.31
4 000	1.02	1.05	1.67	1.38	1.69	1.14	1.98	2.39	2.35	1.70
4 500	0.94	1.26	1.47	1.68	1.67	1.67	1.62	2.13	2.08	1.29
5 000	0.29	1.13	1.23	1.36	1.43	1.30	2.09	2.44	2.40	1.52
5 600	-0.28	0.93	1.66	2.24	2.45	2.45	2.83	3.56	3.56	2.28
6 300	-0.60	0.63	1.55	2.11	2.02	2.23	1.82	3.15	3.06	1.52
7 100	0.58	0.98	1.22	1.62	1.87	1.96	1.95	3.07	2.97	1.79
8 000	0.58	-0.43	1.06	1.90	2.34	2.55	2.36	3.57	3.57	2.29
8 500	0.69	0.77	1.61	2.34	2.75	2.90	2.45	3.92	3.92	2.71
9 000	0.47	1.02	1.98	2.91	3.13	3.27	2.81	4.36	4.34	3.39
9 500	0.96	0.92	1.96	3.09	3.31	3.33	3.14	4.49	4.05	3.64
10 000	0.49	-0.84	-0.84	2.31	2.57	2.97	2.72	4.19	4.07	2.99
10 600	-0.96	-1.17	-0.87	1.95	2.28	2.62	2.30	3.83	3.28	2.52
11 200	-0.39	0.37	0.56	1.63	2.62	2.85	2.85	3.98	3.81	2.84
11 800	0.86	1.13	1.17	2.72	3.04	3.30	3.30	4.69	3.95	3.38
12 500	1.15	1.31	0.88	2.47	3.39	3.37	3.73	5.21	5.01	3.90

f [Hz]	200-210	210-220	220-230	230-240	240-250	250-260	260-270	270-280	280-290	290-300
250	0.04	0.03	0.02	0.01	-0.02	-0.03	-0.03	-0.04	-0.04	-0.03
315	-0.04	-0.07	-0.09	-0.11	-0.13	-0.14	-0.14	-0.14	-0.13	-0.12
400	0.10	0.07	0.04	-0.03	-0.06	-0.08	-0.09	-0.10	-0.09	-0.08
500	-0.03	-0.06	-0.09	-0.11	-0.12	-0.11	-0.11	-0.09	-0.08	-0.06
630	0.03	-0.06	-0.11	-0.13	-0.13	-0.13	-0.12	-0.10	-0.08	-0.07
800	-0.03	-0.13	-0.18	-0.20	-0.19	-0.15	-0.12	-0.09	-0.10	-0.10
1 000	0.18	0.10	-0.03	-0.03	0.02	0.03	0.02	-0.02	-0.02	0.07
1 250	0.12	-0.07	-0.07	0.08	0.10	0.08	-0.06	-0.05	0.08	0.08
1 600	-0.21	-0.27	-0.25	-0.09	-0.03	-0.02	0.02	-0.06	-0.18	-0.18
2 000	-0.20	-0.24	-0.14	0.07	0.20	0.29	0.23	0.10	0.15	0.11
2 240	-0.26	-0.26	-0.04	-0.16	0.17	0.34	0.21	0.12	-0.20	-0.24
2 500	-0.42	-0.41	-0.16	-0.26	-0.21	-0.18	-0.15	-0.25	-0.26	-0.13
2 800	0.51	0.49	0.50	0.42	0.53	0.16	0.23	0.13	0.24	0.07
3 150	0.81	1.08	0.85	1.02	0.86	0.31	0.23	0.19	-0.12	0.22
3 550	0.91	1.10	0.69	0.99	0.44	-0.25	-0.23	-0.50	-0.40	-0.42
4 000	1.63	1.69	1.65	1.65	1.04	0.72	0.69	0.17	0.17	-0.23
4 500	1.65	1.55	1.67	1.32	1.13	0.94	0.18	-0.20	-0.31	-0.36
5 000	1.44	1.38	1.36	1.13	0.85	0.28	0.10	-0.38	-0.52	-0.63
5 600	2.46	2.07	2.21	1.63	0.88	-0.30	-0.27	0.23	0.28	0.64
6 300	2.22	2.10	1.95	1.51	0.48	-0.66	-0.53	-0.44	-0.21	0.60
7 100	1.96	1.92	1.64	1.05	0.65	-0.39	0.35	-0.25	-0.34	-0.12
8 000	2.53	2.30	1.83	1.03	-0.42	0.60	-0.26	-0.21	-0.22	-0.40
8 500	2.89	2.75	2.38	1.59	0.69	0.69	-0.16	0.40	0.63	0.43
9 000	3.27	3.12	2.81	1.57	0.96	0.78	0.63	0.33	-0.31	-0.22
9 500	3.33	3.00	2.25	1.38	1.38	0.87	-0.38	-0.69	-0.77	-0.91
10 000	2.64	2.62	1.60	-0.59	-0.87	-0.43	-0.70	-1.32	-1.16	-1.46
10 600	2.29	1.77	0.74	-1.34	-0.91	-1.62	-0.60	-1.49	-1.68	-1.80

11 200	2.54	2.18	1.20	-0.39	-0.72	-1.05	-1.10	-1.10	-0.98	-1.13
11 800	2.93	2.63	1.51	0.83	0.52	-0.85	-0.86	-0.63	-0.60	-0.55
12 500	3.23	3.13	1.77	0.54	0.66	-0.44	-0.66	-0.93	-0.95	-0.79
f [Hz]	**300-310**	**310-320**	**320-330**	**330-340**	**340-350**	**350-360**				
250	-0.03	-0.02	-0.01	0.02	0.04	0.06				
315	-0.10	-0.08	-0.06	-0.04	-0.02	-0.01				
400	-0.07	-0.05	-0.03	-0.02	0.01	0.02				
500	-0.04	-0.03	-0.01	0.02	0.03	0.04				
630	-0.05	-0.04	-0.02	0.02	0.04	0.05				
800	-0.09	-0.07	-0.03	0.04	0.07	0.09				
1 000	0.12	0.17	0.20	0.22	0.23	0.24				
1 250	0.06	0.04	0.06	0.09	0.13	0.14				
1 600	-0.14	-0.06	-0.02	0.02	0.05	0.06				
2 000	0.05	0.23	0.36	0.46	0.52	0.55				
2 240	0.15	0.18	0.24	0.35	0.45	0.47				
2 500	-0.18	-0.12	0.39	0.60	0.68	0.70				
2 800	0.39	0.61	0.81	1.07	1.25	1.30				
3 150	0.32	0.71	0.86	0.96	1.05	1.07				
3 550	-0.33	-0.35	0.47	0.69	0.76	0.79				
4 000	-0.23	0.16	0.46	0.86	1.03	1.05				
4 500	-0.36	-0.39	0.49	0.91	1.02	1.05				
5 000	-0.57	-0.34	-0.28	0.99	1.23	1.24				
5 600	1.17	1.27	1.80	2.25	2.60	2.68				
6 300	0.75	1.13	1.58	2.16	2.71	2.80				
7 100	-0.08	0.27	0.77	1.34	1.63	1.65				
8 000	-0.39	-0.58	-0.39	0.58	1.31	1.41				
8 500	0.43	0.48	0.42	1.54	2.21	2.35				
9 000	-0.37	-0.56	0.18	0.76	2.11	2.49				
9 500	-0.72	0.12	1.18	1.88	2.97	3.18				
10 000	-1.19	-1.02	0.17	1.30	2.67	2.85				
10 600	-1.66	-1.19	-0.65	0.84	2.05	2.24				
11 200	-0.83	-0.60	-0.45	0.62	2.11	2.40				
11 800	0.38	0.90	0.60	1.54	2.70	3.02				
12 500	0.48	0.49	0.48	1.14	2.10	2.45				

C.8. USING THE SA 277D OUTDOOR MICROPHONE KIT (CHANNEL 4)

The **SA 277D** outdoor microphone kit protects the instrument's preamplifier and microphone from weather conditions. Using an outdoor microphone kit requires an extension cable between the instrument and its preamplifier (**SC 277**).

SA 277D is made of lightweight materials and is easy to install on a tripod. This solution is recommended for short term outdoor noise measurements.

The outdoor microphone kit has ¾" screw on its bottom which allows the use of standard tripods or other user specific mounts.

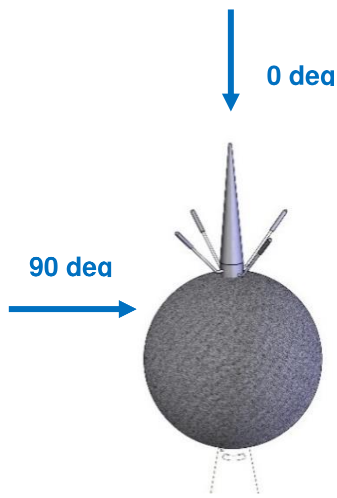
As an option the user may use desiccator – Silica gel. Desiccator absorbs moisture commonly contained in the air.

Note: *SA 277D should be connected to the Channel 4 of SVAN 958A.*

Note*: Desiccator should be regenerated after some period of use, when it changes colour to light grey, by drying it for 3 hours in a temperature of 150°C. Desiccator should be inspected at least every 2 weeks, and more often when used in conditions of high air humidity.*

Note*: See also SA 277D User Manual to learn how to assemble and disassemble the outdoor microphone kit.*

Note: *Using SA 277D changes the frequency response and measuring ranges of SVAN 958A. Please check the below given specification.*

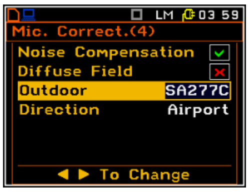


Depending on the measurement task SA 277D can be used in two operational modes:

1. With reference incidence angle 90 deg – so called "Environment" mode.
2. With reference incidence angle 0 deg – so called "Airport" mode.

The wave incidence angle is oriented to the microphone membrane surface. 0 deg means direction orthogonal to the membrane surface. 90 deg means direction parallel to the membrane surface.

Frequency response of SVAN 958A with the SA 277D outdoor microphone kit is compensated by means of two digital filters which can be set in the **Microphone Correction** screen (*path: <Menu> / Input / Channels Setup / Channel x / Microphone Correction*):



- **SA277D Environment** compensation filter that improves the complete instrument frequency response in the free field for the reference acoustic wave incidence angle 90 deg
- **SA277D Airport** compensation filter that improves the complete instrument frequency response in the free field for the reference acoustic wave incidence angle 0 deg

Note: *For the conformance of acoustical tests with SA 277D, the* ***Environment*** *or* ***Airport*** *compensation must be switched on.*

Statement of performance

SVAN 958A working as the SLM with SA 277D meets requirements of IEC 61672:2013 for the Class 1 Group X instruments.

Linear operating ranges with the **SA277D Environment** filter

The starting point at which tests of level linearity shall begin is 94.0 dB for the frequencies specifies below. For A weighting linearity test at 31.5 Hz and 12.5 kHz, the starting point is 69 dB.

Table C.8.1. Linear operating ranges for the **Low** measurement range and the **SA277D Environment** filter (for the sinusoidal signal and microphone sensitivity 50 mV/Pa)

[dB]	$L_{AS/F}$		$L_{CS/F}$		$L_{LINS/F}$		L_{AeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	26	75	26	112	32	115	26	75	26	112	29	78	52	115
500 Hz	26	115	26	115	32	115	26	115	26	115	29	118	52	118
1 kHz	26	116	26	114	32	115	26	116	26	114	29	119	52	117
4 kHz	26	114	26	112	32	115	26	114	26	112	29	117	52	115
8 kHz	26	110	26	109	32	115	26	110	26	109	29	113	52	112
12.5 kHz	26	75	26	112	32	115	26	75	26	112	29	78	52	115

Table C.8.2. Linear operating ranges for the **High** measurement range and the **SA277D Environment** filter (for the sinusoidal signal and microphone sensitivity 50 mV/Pa)

[dB]	$L_{AS/F}$		$L_{CS/F}$		$L_{LINS/F}$		L_{AeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	46	97	46	134	48	137	46	97	46	134	49	100	72	137
500 Hz	46	137	46	137	48	137	46	137	46	137	49	140	72	140
1 kHz	46	138	46	136	48	137	46	138	46	136	49	141	72	139
4 kHz	46	136	46	134	48	137	46	136	46	134	49	139	72	137
8 kHz	46	132	46	131	48	137	46	132	46	131	49	135	72	134
12.5 kHz	46	97	46	134	48	137	46	97	46	134	49	100	72	137

Table C.8.3. Self-generated noise for different weighting filters

Range \ Weighting filter	Electrical *)			Acoustical compensated		
	A	**C**	**LIN**	**A**	**C**	**LIN**
Low	< 15 dB	< 15 dB	< 21 dB	< 19 dB	< 19 dB	< 25 dB
High	< 35 dB	< 35 dB	< 37 dB	< 39 dB	< 39 dB	< 41 dB

*) measured with the **ST 02** microphone equivalent impedance 18 pF +/-10%

MK 255 Free Field frequency response for 90 deg incidence angle

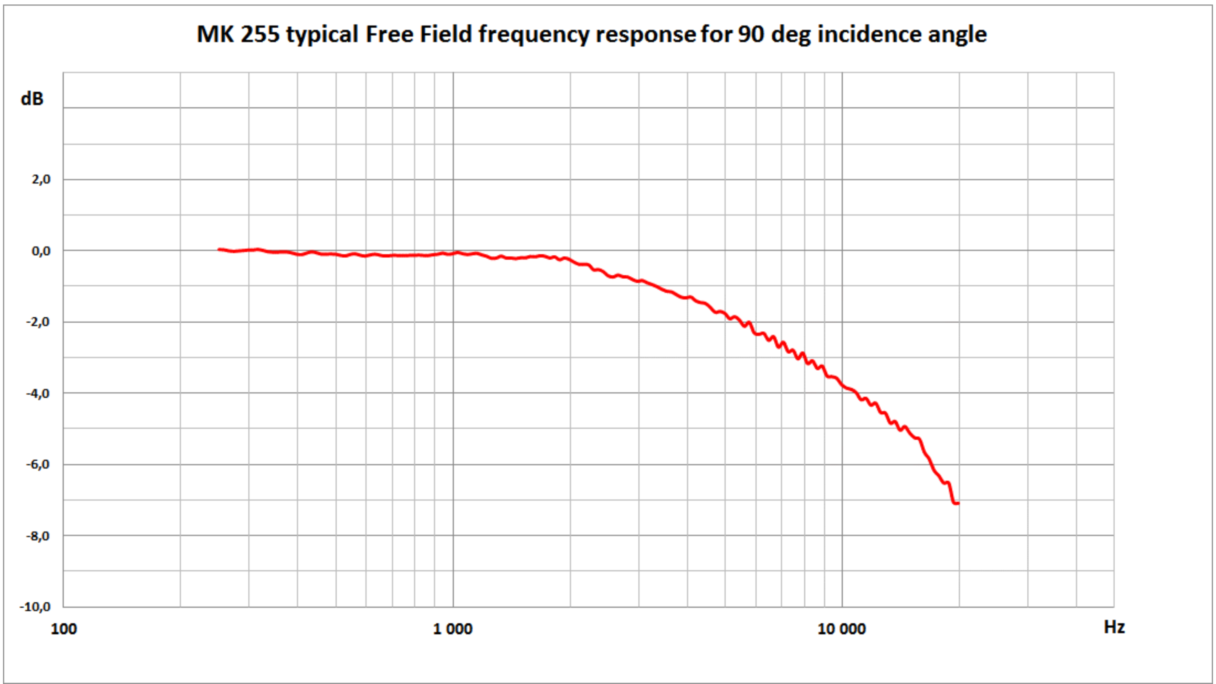


Table C.8.4. MK 255 typical Free Field frequency response for 90 deg incidence angle

Frequency	MK 255 typical Free Field response	Frequency	MK 255 typical Free Field response	Frequency	MK 255 typical Free Field response
[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]
251	0.03	1 090	-0.11	4 732	-1.73
259	0.02	1 122	-0.09	4 870	-1.71
266	-0.01	1 155	-0.07	5 012	-1.76
274	-0.02	1 189	-0.12	5 158	-1.91
282	-0.01	1 223	-0.16	5 309	-1.85
290	0.00	1 259	-0.21	5 464	-1.95
299	0.02	1 296	-0.21	5 623	-2.13
307	0.02	1 334	-0.15	5 788	-2.01
316	0.03	1 372	-0.21	5 957	-2.31
325	0.01	1 413	-0.21	6 131	-2.35
335	-0.03	1 454	-0.22	6 310	-2.32

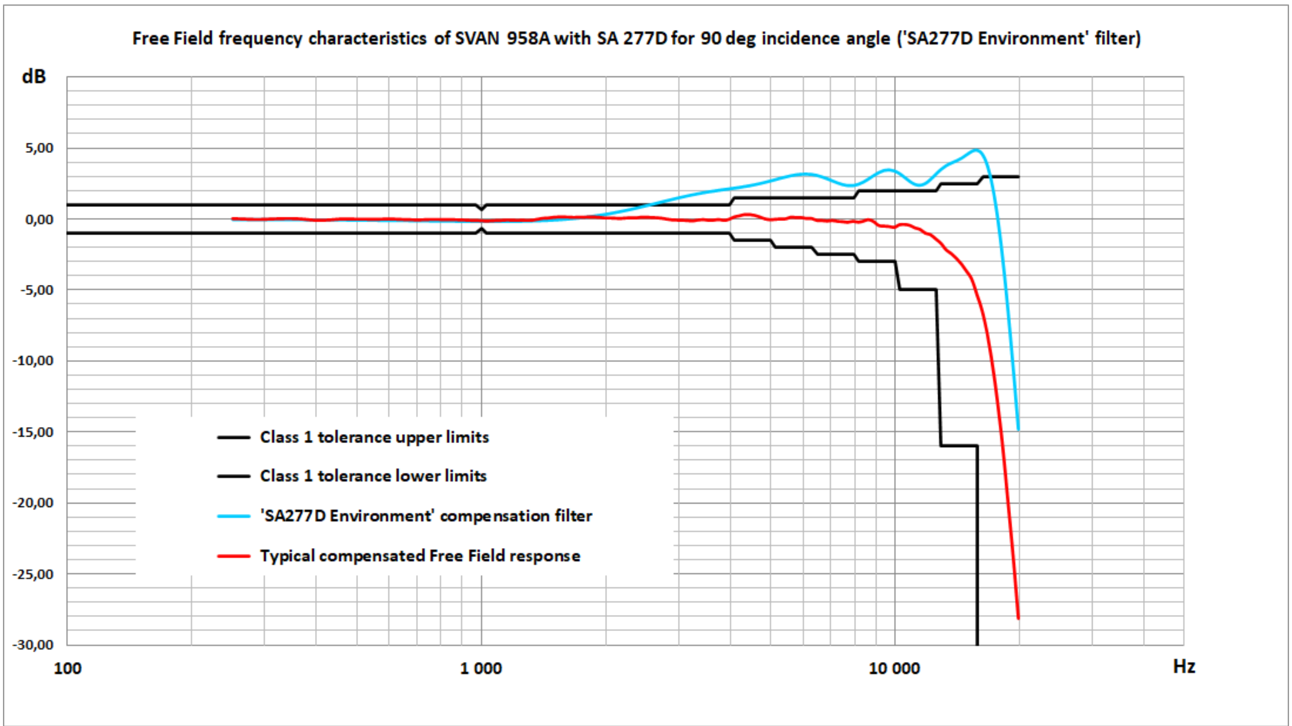
Frequency	MK 255 typical Free Field response	Frequency	MK 255 typical Free Field response	Frequency	MK 255 typical Free Field response
[Hz]	[dB]	[Hz]	[dB]	[Hz]	[dB]
345	-0.04	1 496	-0.20	6 494	-2.52
355	-0.04	1 540	-0.20	6 683	-2.41
365	-0.04	1 585	-0.16	6 879	-2.71
376	-0.04	1 631	-0.17	7 079	-2.57
387	-0.07	1 679	-0.14	7 286	-2.84
398	-0.10	1 728	-0.16	7 499	-2.80
410	-0.11	1 778	-0.20	7 718	-3.04
422	-0.07	1 830	-0.17	7 943	-2.87
434	-0.03	1 884	-0.26	8 175	-3.17
447	-0.06	1 939	-0.20	8 414	-3.09
460	-0.10	1 995	-0.25	8 660	-3.31
473	-0.10	2 054	-0.32	8 913	-3.24
487	-0.09	2 113	-0.38	9 173	-3.52
501	-0.10	2 175	-0.39	9 441	-3.54
516	-0.13	2 239	-0.40	9 716	-3.59
531	-0.15	2 304	-0.54	10 000	-3.77
546	-0.10	2 371	-0.53	10 292	-3.86
562	-0.09	2 441	-0.59	10 593	-3.90
579	-0.13	2 512	-0.71	10 902	-3.99
596	-0.15	2 585	-0.74	11 220	-4.19
613	-0.12	2 661	-0.69	11 548	-4.15
631	-0.10	2 738	-0.73	11 885	-4.34
649	-0.12	2 818	-0.74	12 232	-4.28
668	-0.15	2 901	-0.81	12 589	-4.54
688	-0.14	2 985	-0.86	12 957	-4.56
708	-0.13	3 073	-0.84	13 335	-4.85
729	-0.14	3 162	-0.90	13 725	-4.80
750	-0.14	3 255	-0.95	14 125	-5.04
772	-0.13	3 350	-1.01	14 538	-4.94
794	-0.13	3 447	-1.08	14 962	-5.12
818	-0.12	3 548	-1.14	15 399	-5.26
841	-0.13	3 652	-1.16	15 849	-5.29
866	-0.14	3 758	-1.23	16 312	-5.66
891	-0.11	3 868	-1.31	16 788	-5.85
917	-0.10	3 981	-1.32	17 278	-6.17
944	-0.07	4 097	-1.30	17 783	-6.33
972	-0.10	4 217	-1.41	18 302	-6.53
1 000	-0.09	4 340	-1.46	18 836	-6.53
1 029	-0.05	4 467	-1.48	19 387	-7.07
1 059	-0.08	4 597	-1.60	19 953	-7.10

Table C.8.5. MK 255 Free Field corrections for 90 deg incidence angle with the use of the electrostatic actuator

[dB]	Frequency [Hz]																
	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800
Correction factors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.05	-0.12	-0.17	-0.16	-0.14
Uncertainty (IEC 62585)	--	--	--	--	--	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25

[dB]	Frequency [Hz]													
	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	12500	16000	20000
Correction factors	-0.09	-0.18	-0.23	-0.17	-0.20	-0.10	0.16	0.35	0.56	1.12	1.68	2.71	3.76	4.71
Uncertainty (IEC 62585)	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.35	0.35	0.35	0.35	0.50	0.50	0.50

Free Field frequency response of SVAN 958A with SA 277D for 90 deg incidence angle



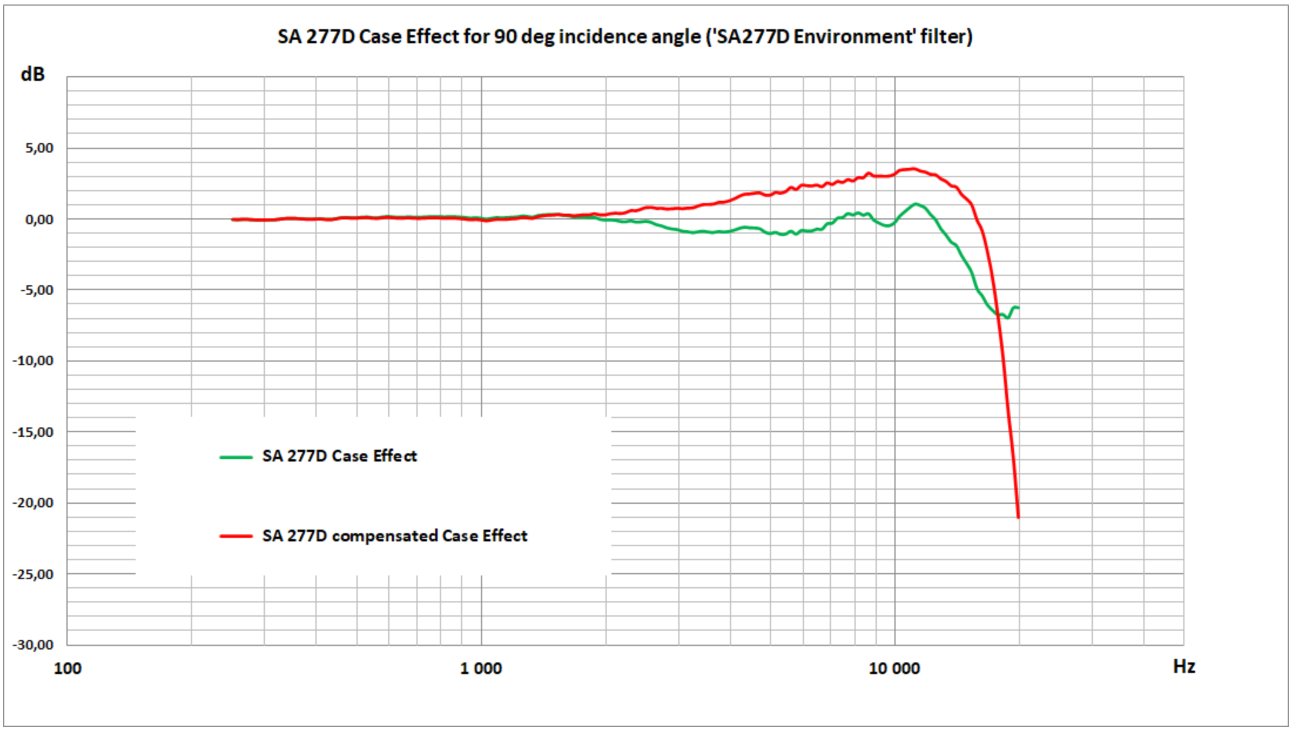


Table C.8.6. Typical Free Field frequency characteristics of SVAN 958A with SA 277D for 90 deg incidence angle

Frequency	Compensation filter for 90 deg incidence angle " SA277D Environment"	Typical compensated response of SVAN 958A with SA 277D for 90 deg incidence angle	Compensated Case Effect of SA 277D for 90 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
251	-0.02	0.00	-0.03	0.25
259	-0.02	-0.01	-0.04	0.25
266	-0.02	-0.02	-0.02	0.25
274	-0.02	-0.04	-0.02	0.25
282	-0.02	-0.05	-0.05	0.25
290	-0.02	-0.06	-0.06	0.25
299	-0.02	-0.05	-0.07	0.25
307	-0.03	-0.03	-0.05	0.25
316	-0.03	-0.02	-0.05	0.25
325	-0.03	-0.01	-0.01	0.25
335	-0.03	0.01	0.03	0.25
345	-0.03	0.01	0.05	0.25
355	-0.03	0.00	0.04	0.25
365	-0.04	-0.02	0.02	0.25
376	-0.04	-0.05	-0.01	0.25

Frequency	Compensation filter for 90 deg incidence angle “ SA277D Environment”	Typical compensated response of SVAN 958A with SA 277D for 90 deg incidence angle	Compensated Case Effect of SA 277D for 90 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
387	-0.04	-0.08	-0.02	0.25
398	-0.04	-0.11	-0.01	0.25
410	-0.04	-0.11	0.00	0.25
422	-0.05	-0.10	-0.03	0.25
434	-0.05	-0.08	-0.05	0.25
447	-0.05	-0.05	0.01	0.25
460	-0.05	-0.02	0.07	0.25
473	-0.06	-0.02	0.08	0.25
487	-0.06	-0.03	0.06	0.25
501	-0.06	-0.04	0.06	0.25
516	-0.07	-0.04	0.09	0.25
531	-0.07	-0.04	0.11	0.25
546	-0.07	-0.05	0.06	0.25
562	-0.08	-0.04	0.04	0.25
579	-0.08	-0.03	0.10	0.25
596	-0.08	-0.02	0.13	0.25
613	-0.09	-0.03	0.09	0.25
631	-0.09	-0.04	0.06	0.25
649	-0.10	-0.06	0.06	0.25
668	-0.10	-0.07	0.08	0.25
688	-0.10	-0.08	0.06	0.25
708	-0.11	-0.08	0.04	0.25
729	-0.11	-0.08	0.06	0.25
750	-0.12	-0.06	0.08	0.25
772	-0.12	-0.06	0.08	0.25
794	-0.13	-0.06	0.07	0.25
818	-0.13	-0.07	0.06	0.25
841	-0.13	-0.07	0.07	0.25
866	-0.14	-0.07	0.06	0.25
891	-0.14	-0.08	0.03	0.25
917	-0.15	-0.10	0.00	0.25
944	-0.15	-0.12	-0.05	0.25
972	-0.15	-0.13	-0.02	0.25
1 000	-0.15	-0.15	-0.06	0.25
1 029	-0.15	-0.17	-0.12	0.25
1 059	-0.16	-0.16	-0.08	0.25

Frequency	Compensation filter for 90 deg incidence angle “ SA277D Environment”	Typical compensated response of SVAN 958A with SA 277D for 90 deg incidence angle	Compensated Case Effect of SA 277D for 90 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
1 090	-0.16	-0.13	-0.02	0.25
1 122	-0.15	-0.12	-0.03	0.25
1 155	-0.15	-0.09	-0.02	0.25
1 189	-0.15	-0.11	0.01	0.25
1 223	-0.15	-0.12	0.04	0.25
1 259	-0.14	-0.11	0.11	0.25
1 296	-0.13	-0.12	0.08	0.25
1 334	-0.12	-0.11	0.05	0.25
1 372	-0.11	-0.04	0.17	0.25
1 413	-0.10	0.02	0.23	0.25
1 454	-0.08	0.05	0.27	0.25
1 496	-0.06	0.09	0.29	0.25
1 540	-0.04	0.12	0.32	0.25
1 585	-0.01	0.12	0.28	0.25
1 631	0.02	0.11	0.28	0.25
1 679	0.05	0.09	0.23	0.25
1 728	0.09	0.11	0.26	0.25
1 778	0.13	0.10	0.30	0.25
1 830	0.18	0.12	0.30	0.25
1 884	0.23	0.12	0.37	0.25
1 939	0.28	0.09	0.29	0.25
1 995	0.34	0.05	0.29	0.25
2 054	0.40	0.05	0.37	0.25
2 113	0.47	0.03	0.41	0.25
2 175	0.54	0.01	0.40	0.25
2 239	0.62	0.04	0.44	0.25
2 304	0.69	0.06	0.60	0.25
2 371	0.78	0.05	0.58	0.25
2 441	0.86	0.10	0.69	0.25
2 512	0.95	0.11	0.81	0.25
2 585	1.04	0.08	0.82	0.25
2 661	1.13	0.07	0.75	0.25
2 738	1.22	0.03	0.76	0.25
2 818	1.31	-0.04	0.70	0.25
2 901	1.40	-0.09	0.72	0.25
2 985	1.48	-0.10	0.76	0.25

Frequency	Compensation filter for 90 deg incidence angle " SA277D Environment"	Typical compensated response of SVAN 958A with SA 277D for 90 deg incidence angle	Compensated Case Effect of SA 277D for 90 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
3 073	1.57	-0.11	0.73	0.25
3 162	1.65	-0.13	0.77	0.25
3 255	1.72	-0.16	0.79	0.25
3 350	1.79	-0.09	0.92	0.25
3 447	1.86	-0.06	1.02	0.25
3 548	1.92	-0.11	1.03	0.25
3 652	1.98	-0.10	1.05	0.25
3 758	2.03	-0.06	1.17	0.25
3 868	2.09	-0.12	1.19	0.25
3 981	2.14	-0.05	1.28	0.25
4 097	2.19	0.12	1.42	0.35
4 217	2.24	0.20	1.61	0.35
4 340	2.30	0.29	1.74	0.35
4 467	2.36	0.29	1.77	0.35
4 597	2.43	0.23	1.82	0.35
4 732	2.51	0.12	1.85	0.35
4 870	2.60	-0.02	1.69	0.35
5 012	2.69	-0.08	1.69	0.35
5 158	2.79	-0.04	1.87	0.35
5 309	2.89	-0.02	1.83	0.35
5 464	2.98	-0.01	1.94	0.35
5 623	3.06	0.10	2.23	0.35
5 788	3.13	0.07	2.08	0.35
5 957	3.17	0.08	2.38	0.35
6 131	3.18	0.01	2.36	0.35
6 310	3.15	0.01	2.33	0.35
6 494	3.08	-0.12	2.40	0.35
6 683	2.98	-0.13	2.28	0.35
6 879	2.85	-0.17	2.55	0.35
7 079	2.70	-0.13	2.44	0.35
7 286	2.56	-0.19	2.65	0.35
7 499	2.44	-0.21	2.58	0.35
7 718	2.37	-0.25	2.78	0.35
7 943	2.37	-0.19	2.68	0.35
8 175	2.45	-0.25	2.92	0.35
8 414	2.62	-0.18	2.92	0.35

Frequency	Compensation filter for 90 deg incidence angle " SA277D Environment"	Typical compensated response of SVAN 958A with SA 277D for 90 deg incidence angle	Compensated Case Effect of SA 277D for 90 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
8 660	2.83	-0.07	3.24	0.35
8 913	3.07	-0.21	3.03	0.35
9 173	3.29	-0.49	3.04	0.35
9 441	3.43	-0.53	3.01	0.35
9 716	3.48	-0.56	3.03	0.35
10 000	3.40	-0.61	3.15	0.35
10 292	3.21	-0.43	3.43	0.35
10 593	2.94	-0.41	3.49	0.35
10 902	2.66	-0.48	3.52	0.35
11 220	2.45	-0.65	3.54	0.35
11 548	2.39	-0.76	3.39	0.35
11 885	2.52	-1.02	3.32	0.35
12 232	2.80	-1.13	3.15	0.35
12 589	3.16	-1.43	3.12	0.35
12 957	3.50	-1.73	2.83	0.35
13 335	3.77	-2.19	2.65	0.35
13 725	3.95	-2.46	2.34	0.35
14 125	4.11	-2.79	2.25	0.35
14 538	4.30	-3.21	1.73	0.35
14 962	4.54	-3.72	1.40	0.35
15 399	4.78	-4.29	0.97	0.35
15 849	4.86	-5.38	-0.08	0.35
16 312	4.58	-6.51	-0.85	0.35
16 788	3.77	-8.15	-2.30	0.35
17 278	2.29	-10.35	-4.17	0.35
17 783	0.05	-13.04	-6.71	0.35
18 302	-2.91	-16.20	-9.66	0.35
18 836	-6.49	-20.01	-13.49	0.35
19 387	-10.50	-23.86	-16.79	0.35
19 953	-14.78	-28.15	-21.05	0.35

Table C.8.7. SVAN 958A with SA 277D combined Free Field correction with the use of the electrostatic actuator for 90 deg incidence angle (microphone corrections + compensated Case Effect)

[dB]	Frequency [Hz]																
	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800
Correction factors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.03	-0.10	-0.13	-0.11	-0.10	-0.07
Complex uncertainty	--	--	--	--	--	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35

[dB]	Frequency [Hz]													
	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	12500	16000	20000
Correction factors	-0.15	-0.07	0.05	0.12	0.61	0.67	1.44	2.04	2.89	3.80	4.83	5.83	3.68	-16.34
Complex uncertainty	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.49	0.49	0.49	0.49	0.61	0.61	0.61

Linear operating ranges with the **SA277D Airport** filter

The starting point at which tests of level linearity shall begin is 94.0 dB for the frequencies specifies below. For the **Low** measurement range and A weighting linearity test at 31.5 Hz, the starting point is 74 dB.

Table C.8.8. Linear operating ranges for the **Low** measurement range and the **SA277D Airport** filter (for the sinusoidal signal and microphone sensitivity 50 mV/Pa)

[dB]	$L_{AS/F}$		$L_{CS/F}$		$L_{LINS/F}$		L_{AeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	26	75	26	112	32	115	26	75	26	112	29	78	52	115
500 Hz	26	115	26	115	32	115	26	115	26	115	29	118	52	118
1 kHz	26	116	26	114	32	115	26	116	26	114	29	119	52	117
4 kHz	26	114	26	112	32	115	26	114	26	112	29	117	52	115
8 kHz	26	110	26	109	32	115	26	110	26	109	29	113	52	112
12.5 kHz	26	75	26	112	32	115	26	75	26	112	29	78	52	115

Table C.8.9. Linear operating ranges for the **High** measurement range and the **SA277D Airport** filter (for the sinusoidal signal and microphone sensitivity 50 mV/Pa)

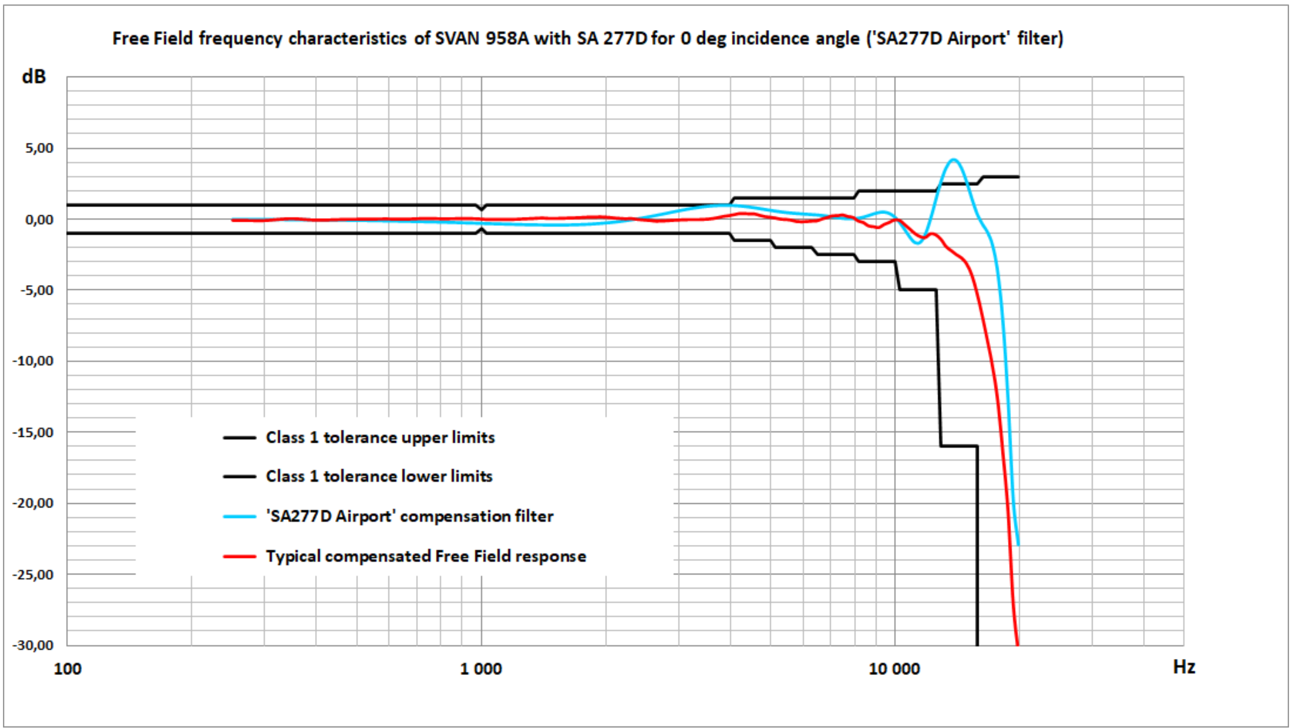
[dB]	$L_{AS/F}$		$L_{CS/F}$		$L_{LINS/F}$		L_{AeqT}		L_{CeqT}		L_{AE} (t_{int} = 2 s)		L_{Cpeak}	
	from	to	from	to	from	to	from	to	from	to	from	to	from	to
31.5 Hz	46	97	46	134	48	137	46	97	46	134	49	100	72	137
500 Hz	46	137	46	137	48	137	46	137	46	137	49	140	72	140
1 kHz	46	138	46	136	48	137	46	138	46	136	49	141	72	139
4 kHz	46	136	46	134	48	137	46	136	46	134	49	139	72	137
8 kHz	46	132	46	131	48	137	46	132	46	131	49	135	72	134
12.5 kHz	46	97	46	134	48	137	46	97	46	134	49	100	72	137

Table C.8.10. Self-generated noise for different weighting filters

	Electrical *)			Acoustical compensated		
Weighting filter / Range	A	C	LIN	A	C	LIN
Low	< 15 dB	< 15 dB	< 21 dB	< 19 dB	< 19 dB	< 25 dB
High	< 35 dB	< 35 dB	< 37 dB	< 39 dB	< 39 dB	< 41 dB

*) measured with the **ST 02** microphone equivalent impedance 18 pF +/-10%

Free Field Frequency response of SVAN 958A with SA 277D for 0 deg incidence angle



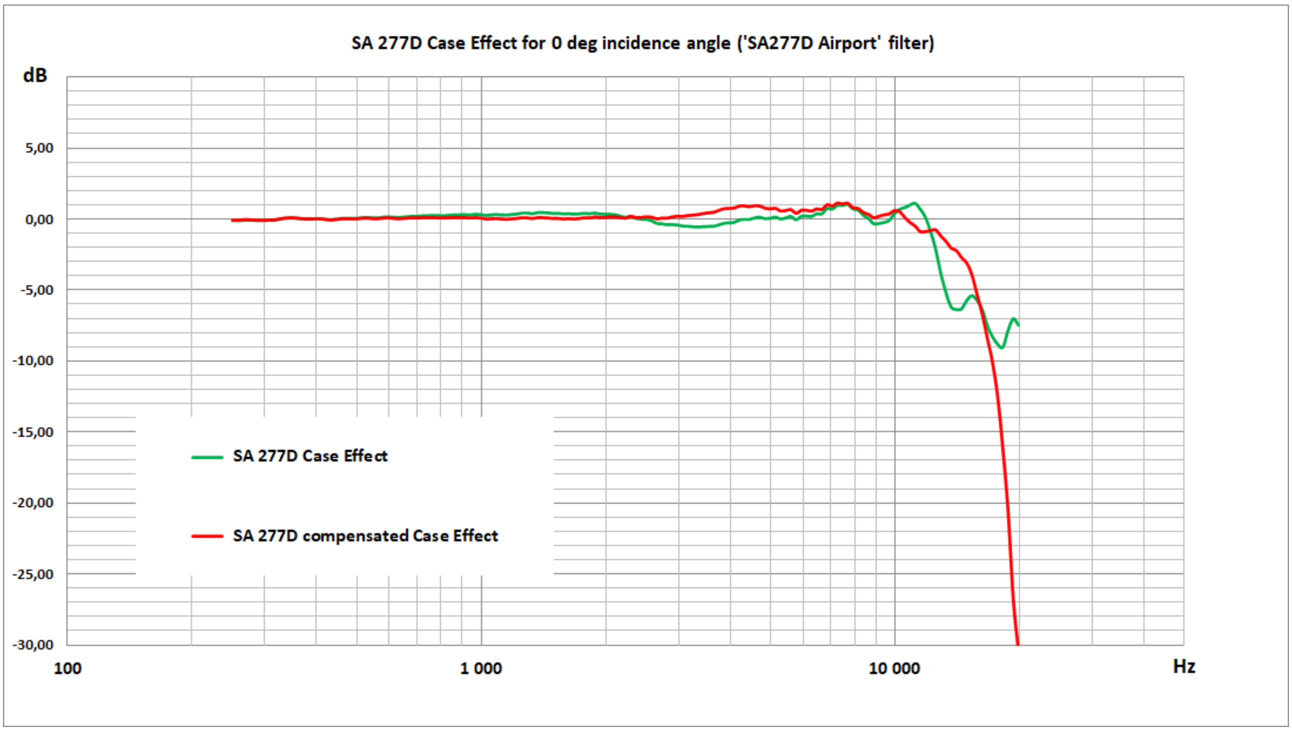


Table C.8.11. Typical Free Field frequency characteristics of SVAN 958A with SA 277D for 0 deg incidence angle

Frequency	Compensation filter for 0 deg incidence angle " SA277D Airport"	Typical compensated response of SVAN 958A with SA 277D for 0 deg incidence angle	Compensated Case Effect of SA 277D for 0 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
251	-0.03	-0.07	-0.11	0.25
259	-0.03	-0.08	-0.10	0.25
266	-0.03	-0.08	-0.08	0.25
274	-0.03	-0.09	-0.07	0.25
282	-0.03	-0.10	-0.09	0.25
290	-0.03	-0.10	-0.10	0.25
299	-0.04	-0.10	-0.11	0.25
307	-0.04	-0.07	-0.09	0.25
316	-0.04	-0.05	-0.08	0.25
325	-0.04	-0.01	-0.03	0.25
335	-0.04	0.02	0.04	0.25
345	-0.05	0.03	0.06	0.25
355	-0.05	0.03	0.05	0.25
365	-0.05	0.01	0.02	0.25

Frequency	Compensation filter for 0 deg incidence angle " SA277D Airport"	Typical compensated response of SVAN 958A with SA 277D for 0 deg incidence angle	Compensated Case Effect of SA 277D for 0 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
376	-0.06	-0.02	-0.02	0.25
387	-0.06	-0.05	-0.02	0.25
398	-0.06	-0.06	-0.01	0.25
410	-0.07	-0.07	-0.02	0.25
422	-0.07	-0.06	-0.06	0.25
434	-0.07	-0.05	-0.09	0.25
447	-0.08	-0.04	-0.06	0.25
460	-0.08	-0.02	-0.01	0.25
473	-0.09	-0.01	-0.01	0.25
487	-0.09	-0.01	-0.02	0.25
501	-0.10	-0.01	-0.01	0.25
516	-0.10	0.00	0.03	0.25
531	-0.11	0.00	0.04	0.25
546	-0.11	0.00	0.00	0.25
562	-0.12	0.01	-0.01	0.25
579	-0.13	0.01	0.04	0.25
596	-0.13	0.01	0.06	0.25
613	-0.14	0.01	0.02	0.25
631	-0.15	0.00	0.00	0.25
649	-0.15	-0.01	0.02	0.25
668	-0.16	0.00	0.05	0.25
688	-0.17	0.02	0.06	0.25
708	-0.18	0.03	0.06	0.25
729	-0.19	0.04	0.08	0.25
750	-0.20	0.05	0.08	0.25
772	-0.21	0.04	0.07	0.25
794	-0.22	0.03	0.06	0.25
818	-0.23	0.02	0.05	0.25
841	-0.24	0.03	0.07	0.25
866	-0.25	0.03	0.09	0.25
891	-0.26	0.04	0.08	0.25
917	-0.27	0.04	0.08	0.25
944	-0.28	0.04	0.05	0.25
972	-0.29	0.03	0.08	0.25
1 000	-0.30	0.01	0.05	0.25
1 029	-0.32	-0.02	-0.02	0.25
1 059	-0.33	-0.03	0.00	0.25

Frequency	Compensation filter for 0 deg incidence angle " SA277D Airport"	Typical compensated response of SVAN 958A with SA 277D for 0 deg incidence angle	Compensated Case Effect of SA 277D for 0 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
1 090	-0.34	-0.03	0.01	0.25
1 122	-0.35	-0.03	-0.02	0.25
1 155	-0.36	-0.02	-0.04	0.25
1 189	-0.37	-0.02	-0.02	0.25
1 223	-0.38	-0.01	0.01	0.25
1 259	-0.39	0.01	0.07	0.25
1 296	-0.40	0.03	0.06	0.25
1 334	-0.41	0.04	0.01	0.25
1 372	-0.41	0.07	0.08	0.25
1 413	-0.42	0.08	0.07	0.25
1 454	-0.42	0.05	0.05	0.25
1 496	-0.42	0.05	0.01	0.25
1 540	-0.42	0.06	0.01	0.25
1 585	-0.42	0.07	-0.02	0.25
1 631	-0.41	0.08	0.00	0.25
1 679	-0.41	0.09	-0.02	0.25
1 728	-0.39	0.11	0.00	0.25
1 778	-0.38	0.13	0.06	0.25
1 830	-0.36	0.15	0.05	0.25
1 884	-0.34	0.14	0.12	0.25
1 939	-0.31	0.17	0.08	0.25
1 995	-0.28	0.15	0.09	0.25
2 054	-0.25	0.12	0.12	0.25
2 113	-0.21	0.08	0.12	0.25
2 175	-0.17	0.05	0.08	0.25
2 239	-0.12	0.03	0.04	0.25
2 304	-0.06	0.05	0.17	0.25
2 371	-0.01	0.00	0.08	0.25
2 441	0.06	-0.04	0.08	0.25
2 512	0.12	-0.07	0.13	0.25
2 585	0.19	-0.10	0.11	0.25
2 661	0.26	-0.14	-0.01	0.25
2 738	0.33	-0.13	0.03	0.25
2 818	0.41	-0.11	0.04	0.25
2 901	0.48	-0.08	0.12	0.25
2 985	0.55	-0.06	0.17	0.25
3 073	0.62	-0.04	0.16	0.25

Frequency	Compensation filter for 0 deg incidence angle " SA277D Airport"	Typical compensated response of SVAN 958A with SA 277D for 0 deg incidence angle	Compensated Case Effect of SA 277D for 0 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
3 162	0.69	-0.03	0.22	0.25
3 255	0.75	-0.03	0.25	0.25
3 350	0.81	-0.03	0.29	0.25
3 447	0.86	-0.02	0.36	0.25
3 548	0.90	0.00	0.41	0.25
3 652	0.93	0.05	0.45	0.25
3 758	0.95	0.12	0.57	0.25
3 868	0.96	0.20	0.69	0.25
3 981	0.96	0.24	0.73	0.25
4 097	0.95	0.32	0.74	0.35
4 217	0.92	0.40	0.89	0.35
4 340	0.89	0.40	0.89	0.35
4 467	0.84	0.37	0.85	0.35
4 597	0.79	0.37	0.91	0.35
4 732	0.73	0.26	0.89	0.35
4 870	0.67	0.18	0.73	0.35
5 012	0.61	0.13	0.69	0.35
5 158	0.55	0.07	0.73	0.35
5 309	0.50	0.00	0.54	0.35
5 464	0.46	-0.01	0.57	0.35
5 623	0.42	-0.07	0.64	0.35
5 788	0.39	-0.16	0.38	0.35
5 957	0.36	-0.18	0.59	0.35
6 131	0.34	-0.17	0.59	0.35
6 310	0.31	-0.13	0.53	0.35
6 494	0.29	-0.12	0.69	0.35
6 683	0.25	0.01	0.65	0.35
6 879	0.20	0.12	0.98	0.35
7 079	0.15	0.23	0.89	0.35
7 286	0.10	0.24	1.10	0.35
7 499	0.05	0.30	1.04	0.35
7 718	0.02	0.19	1.08	0.35
7 943	0.02	0.12	0.77	0.35
8 175	0.06	-0.13	0.72	0.35
8 414	0.13	-0.23	0.44	0.35
8 660	0.24	-0.47	0.30	0.35
8 913	0.36	-0.53	0.07	0.35

Frequency	Compensation filter for 0 deg incidence angle " SA277D Airport"	Typical compensated response of SVAN 958A with SA 277D for 0 deg incidence angle	Compensated Case Effect of SA 277D for 0 deg incidence angle	Uncertainty (IEC 62585:2012)
[Hz]	[dB]	[dB]	[dB]	[dB]
9 173	0.46	-0.58	0.17	0.35
9 441	0.48	-0.38	0.27	0.35
9 716	0.40	-0.23	0.33	0.35
10 000	0.16	-0.06	0.56	0.35
10 292	-0.23	-0.08	0.49	0.35
10 593	-0.74	-0.39	0.10	0.35
10 902	-1.28	-0.70	-0.26	0.35
11 220	-1.66	-1.02	-0.51	0.35
11 548	-1.64	-1.23	-0.90	0.35
11 885	-1.07	-1.29	-0.91	0.35
12 232	0.00	-1.02	-0.84	0.35
12 589	1.33	-1.10	-0.79	0.35
12 957	2.61	-1.41	-1.22	0.35
13 335	3.59	-1.93	-1.60	0.35
13 725	4.11	-2.22	-2.07	0.35
14 125	4.10	-2.50	-2.25	0.35
14 538	3.56	-2.73	-2.74	0.35
14 962	2.59	-3.16	-3.13	0.35
15 399	1.42	-3.96	-3.95	0.35
15 849	0.38	-5.23	-5.33	0.35
16 312	-0.35	-6.81	-6.71	0.35
16 788	-0.91	-8.54	-8.42	0.35
17 278	-1.84	-10.38	-10.12	0.35
17 783	-3.75	-12.80	-12.56	0.35
18 302	-7.21	-16.47	-16.22	0.35
18 836	-12.73	-20.62	-20.57	0.35
19 387	-19.71	-27.10	-26.71	0.35
19 953	-22.89	-30.55	-30.34	0.35

Table C.8.12. SVAN 958A with SA 277D combined Free Field corrections with the use of the electrostatic actuator for 0 deg incidence angle (microphone corrections + compensated Case Effect)

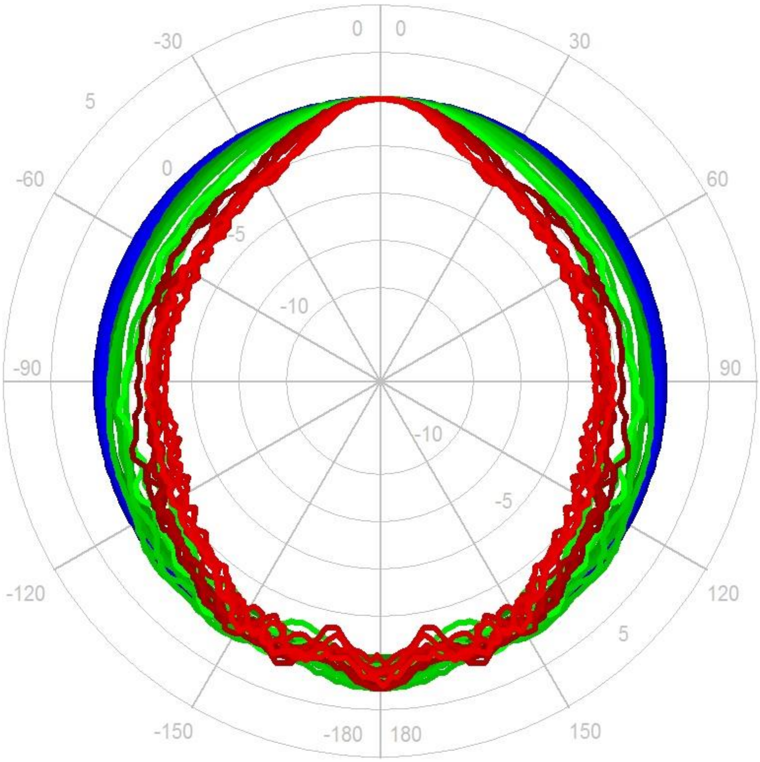
[dB]	Frequency [Hz]																
	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800
Correction factors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.16	-0.08	-0.04	-0.08	-0.17	-0.04
Complex uncertainty	--	--	--	--	--	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35

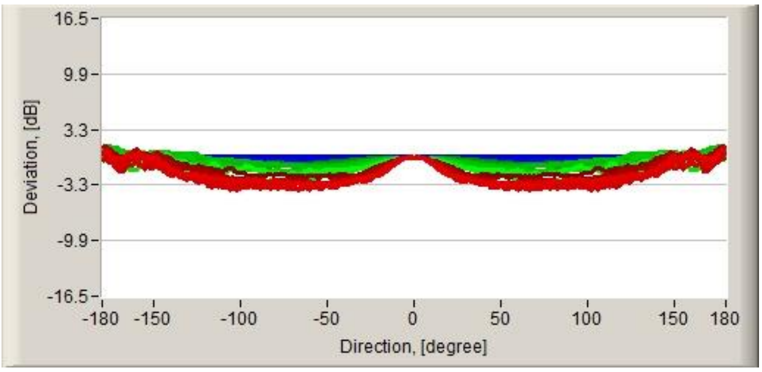
[dB]	Frequency [Hz]													
	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	12500	16000	20000
Correction factors	0.18	0.28	-0.32	0.38	0.06	0.90	1.70	2.15	3.01	4.17	5.77	6.10	3.89	-18.52
Complex uncertainty	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.49	0.49	0.49	0.49	0.61	0.61	0.61

Free Field Directional characteristics of SVAN 958A with SA 277D

Directional response of SVAN 958A with the MK 255 microphone, SV 12L preamplifier and SA 277D outdoor microphone kit for specified frequencies.

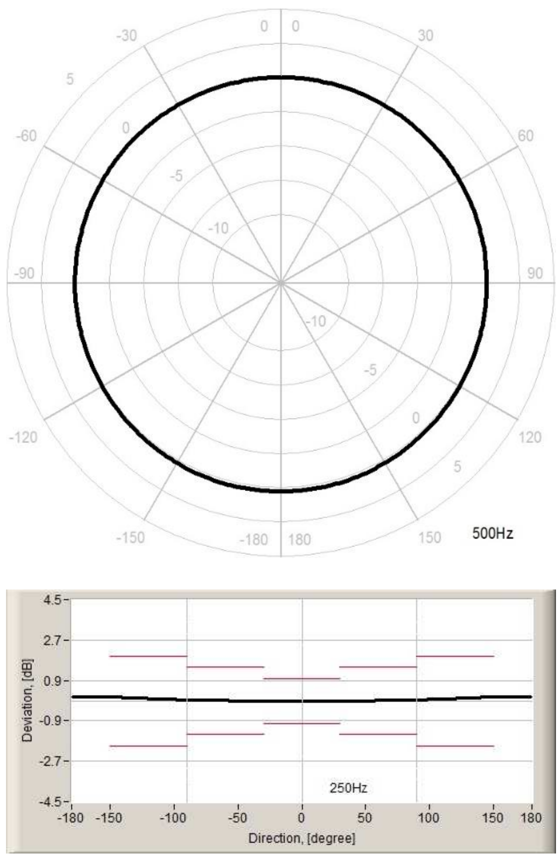
Combined typical directional characteristics



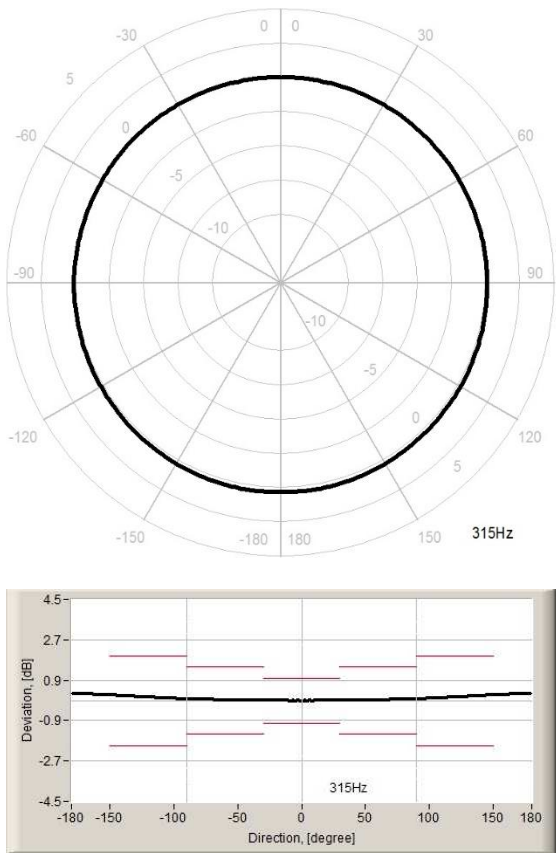


The round charts show the typical directional characteristics and the charts below shows the errors for 0 deg and 90 deg incidence angles.

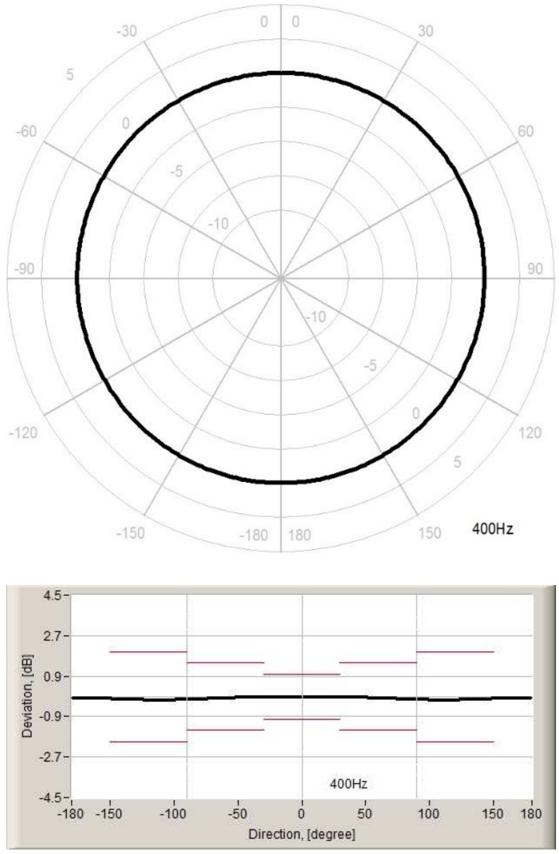
250 Hz



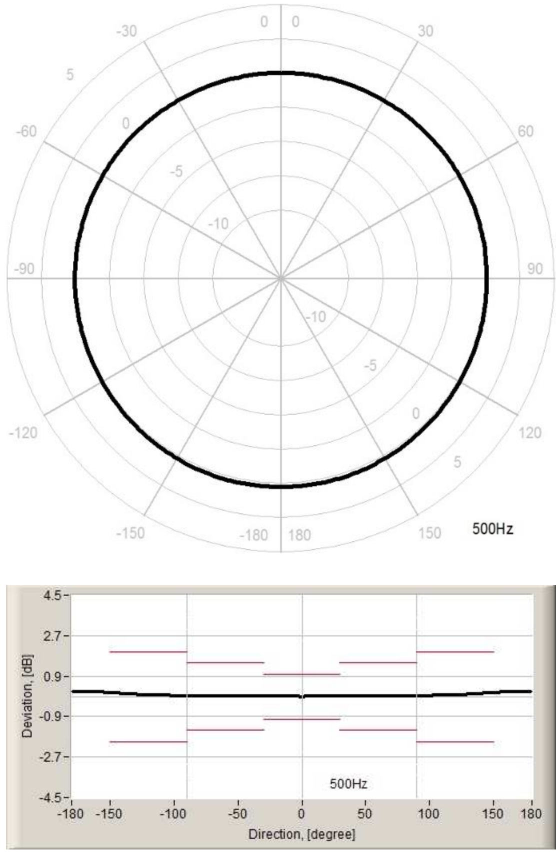
315 Hz



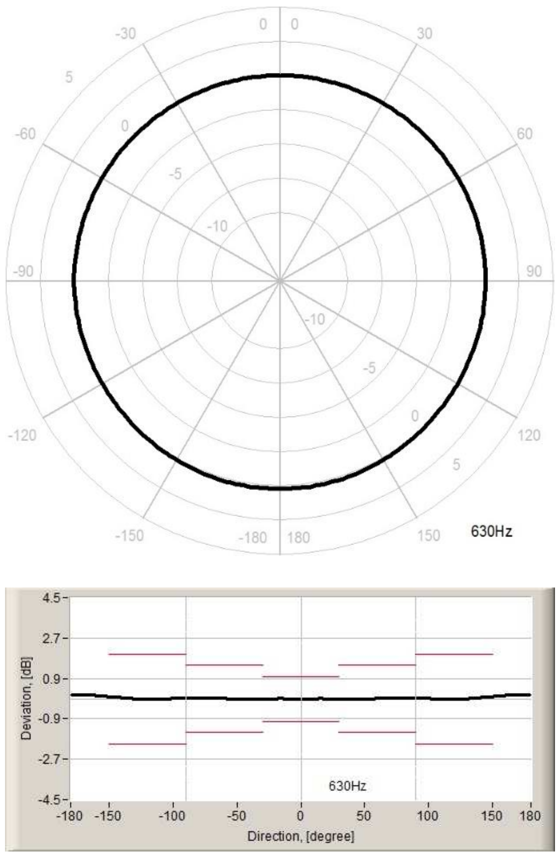
400 Hz



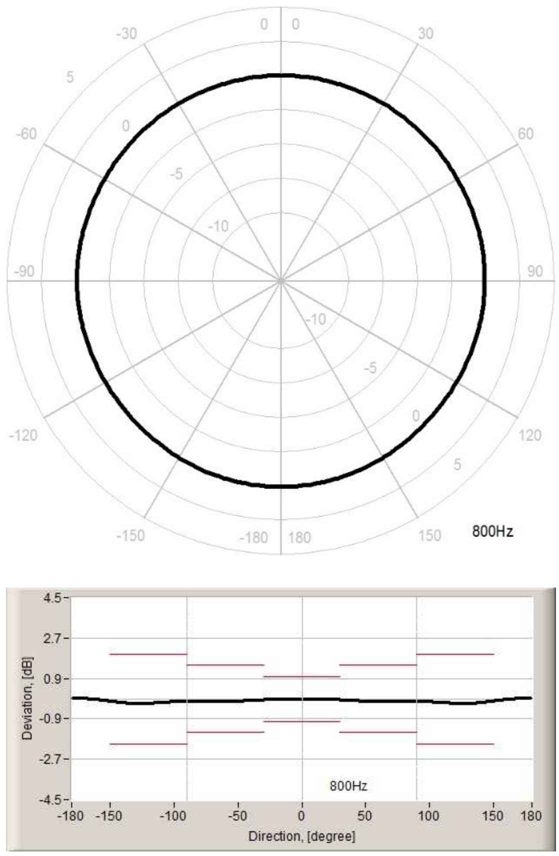
500 Hz



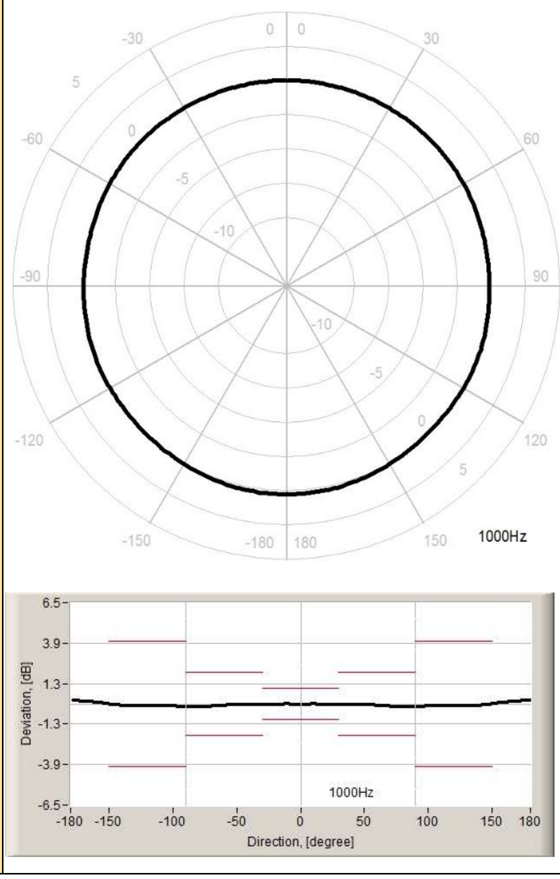
630 Hz



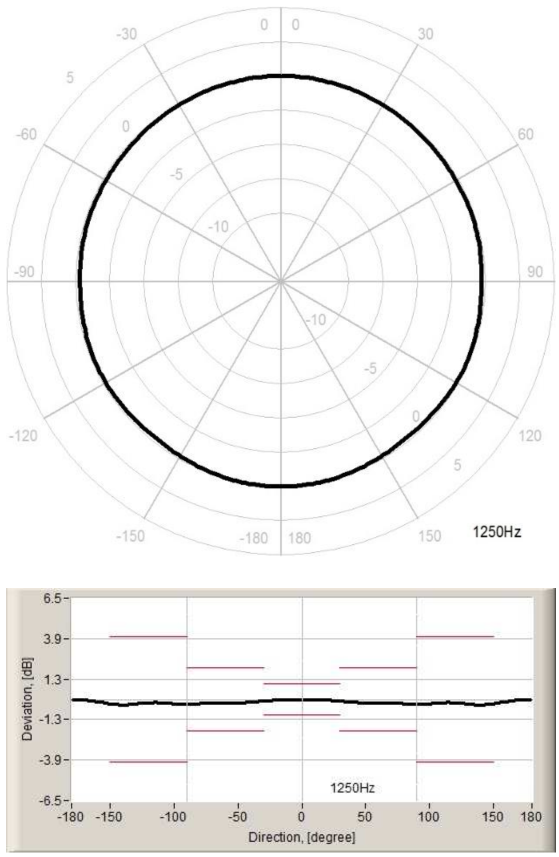
800 Hz



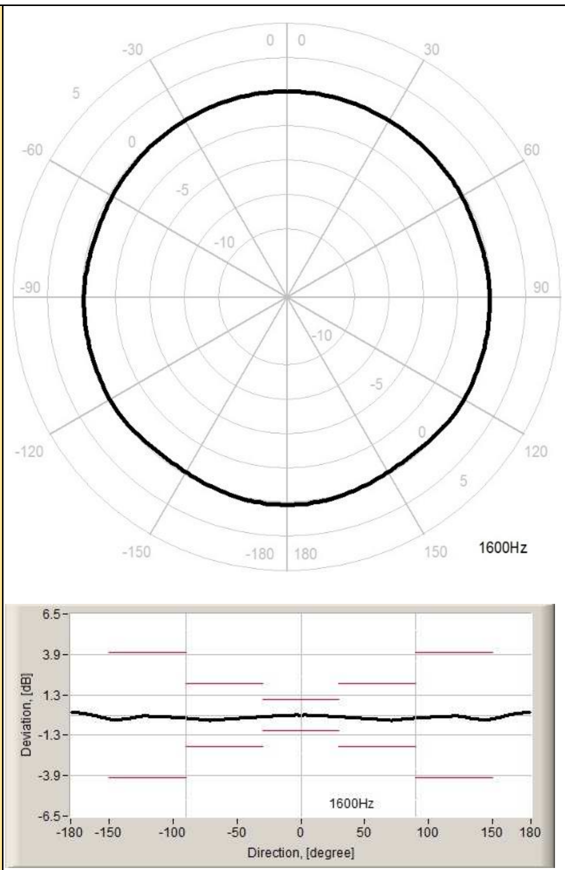
1000 Hz



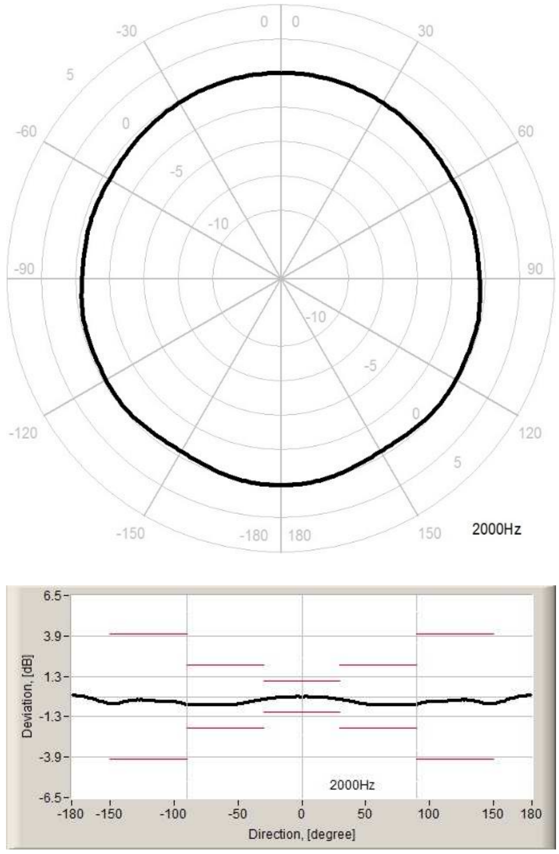
1250 Hz



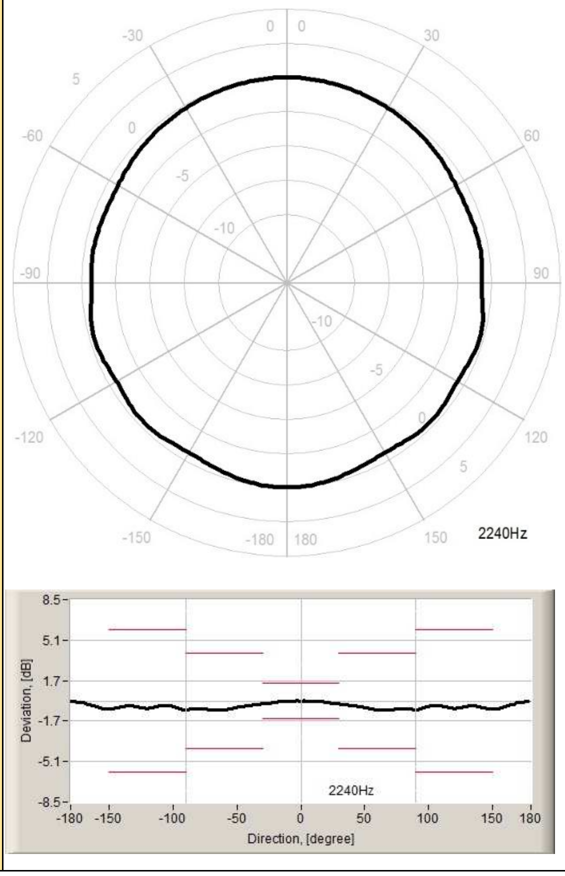
1600 Hz



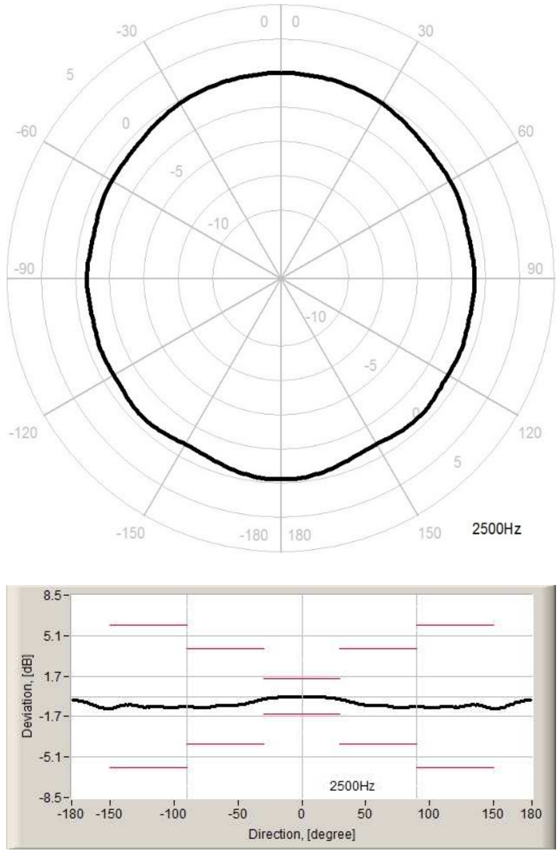
2000 Hz



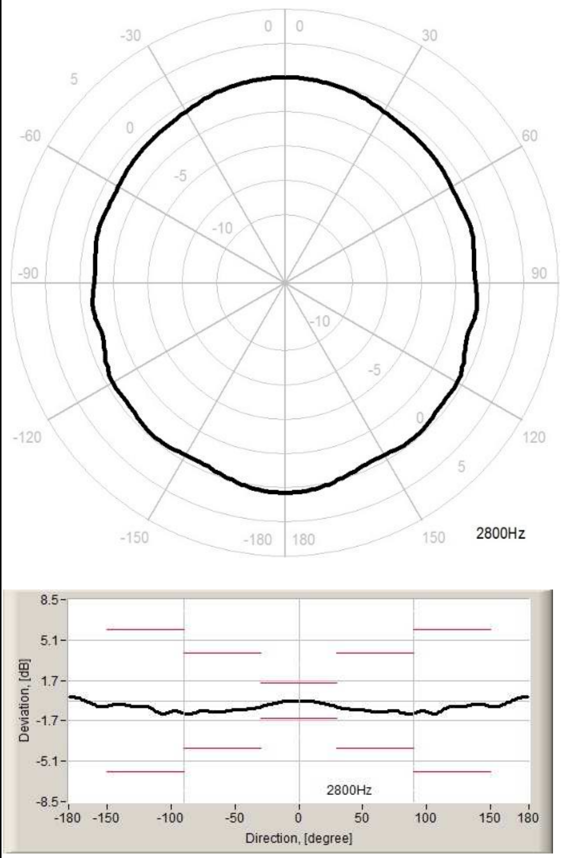
2240 Hz



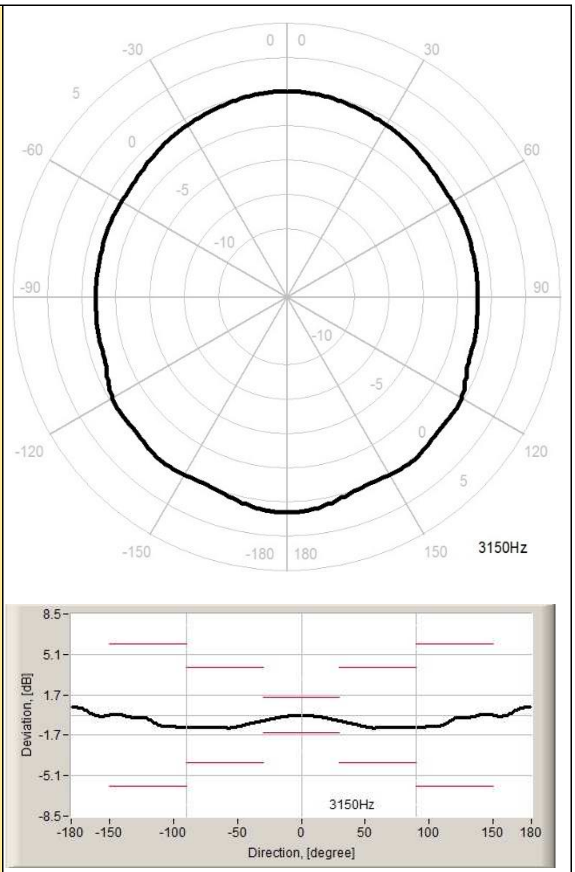
2500 Hz



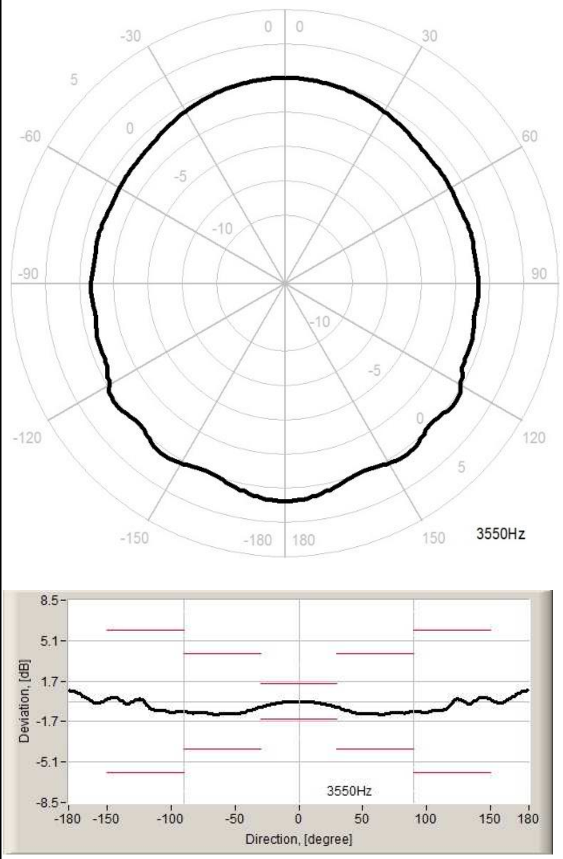
2800 Hz



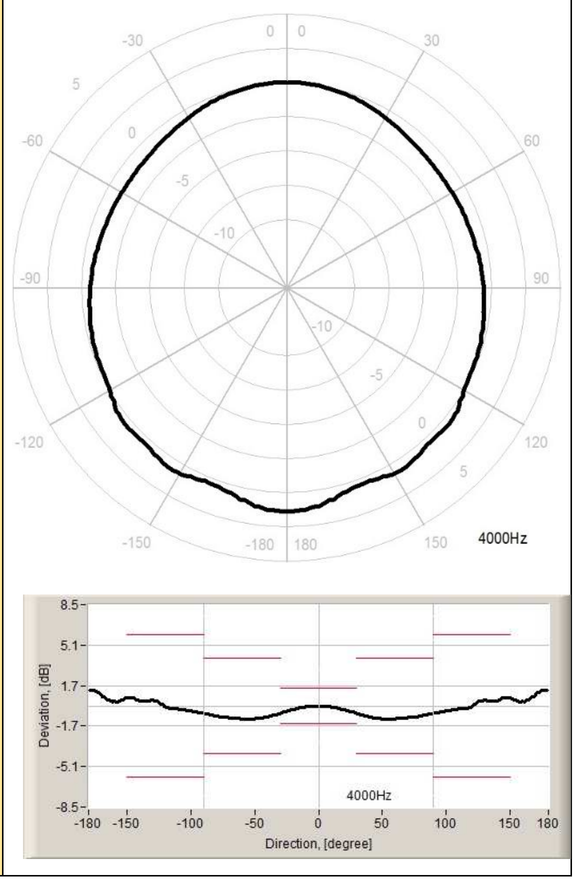
3150 Hz



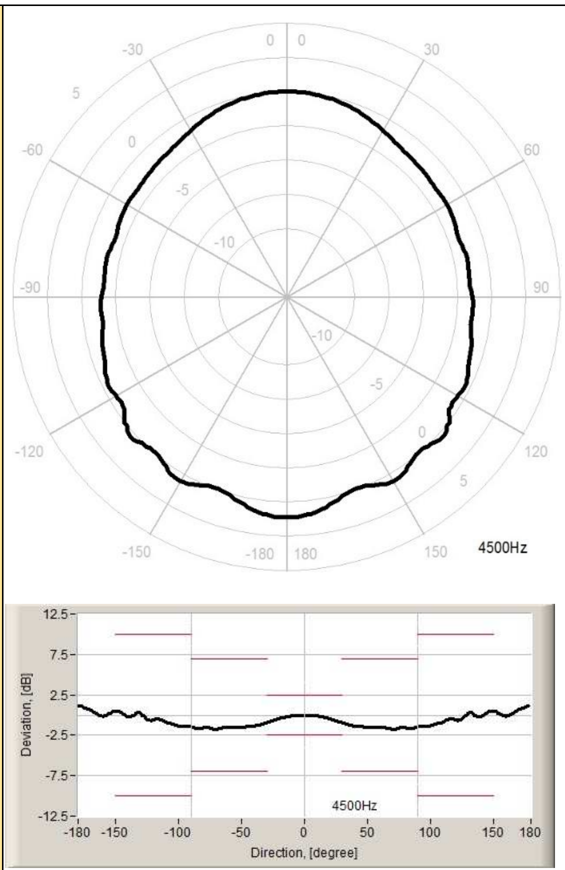
3550 Hz



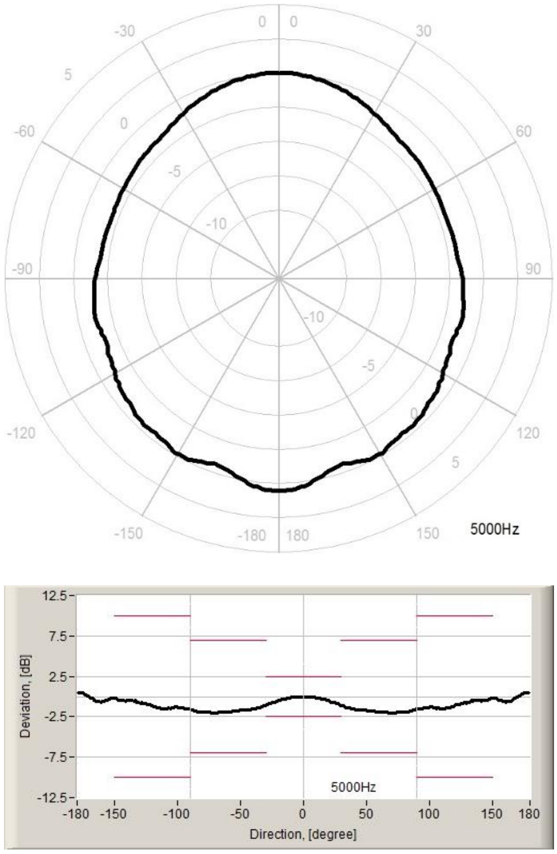
4000 Hz



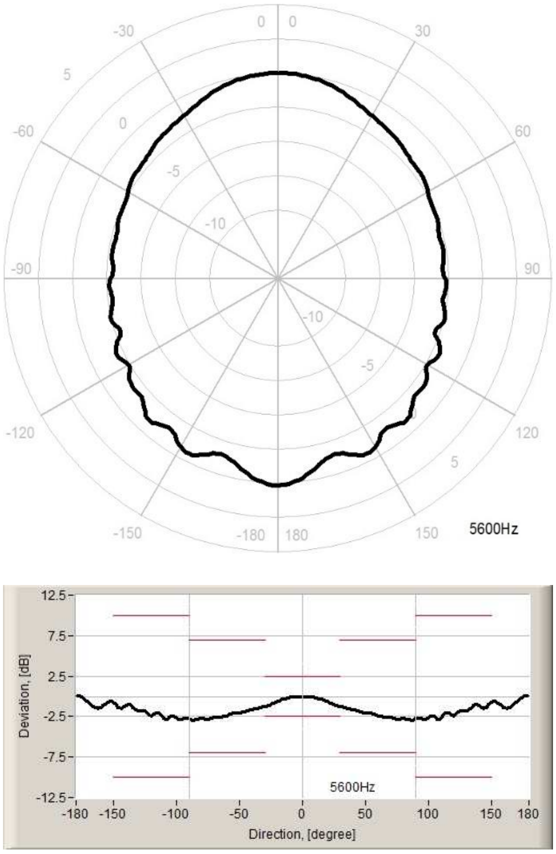
4500 Hz



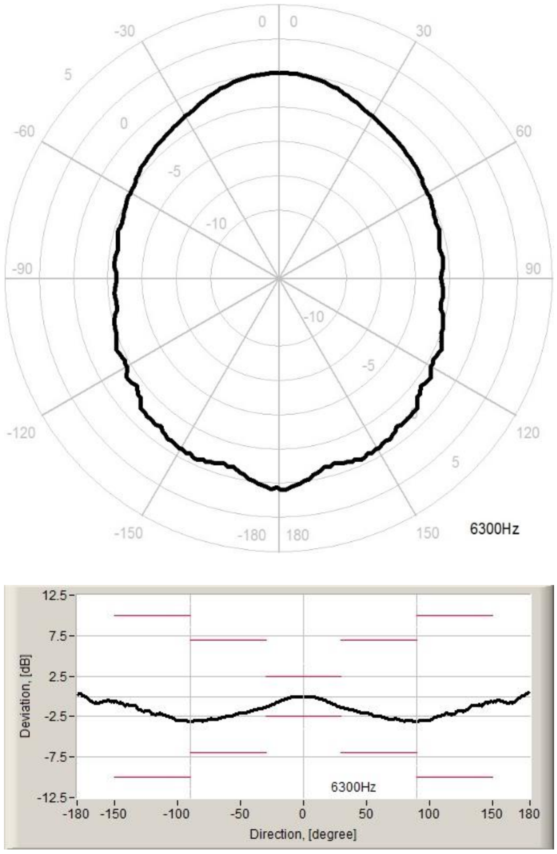
5000 Hz



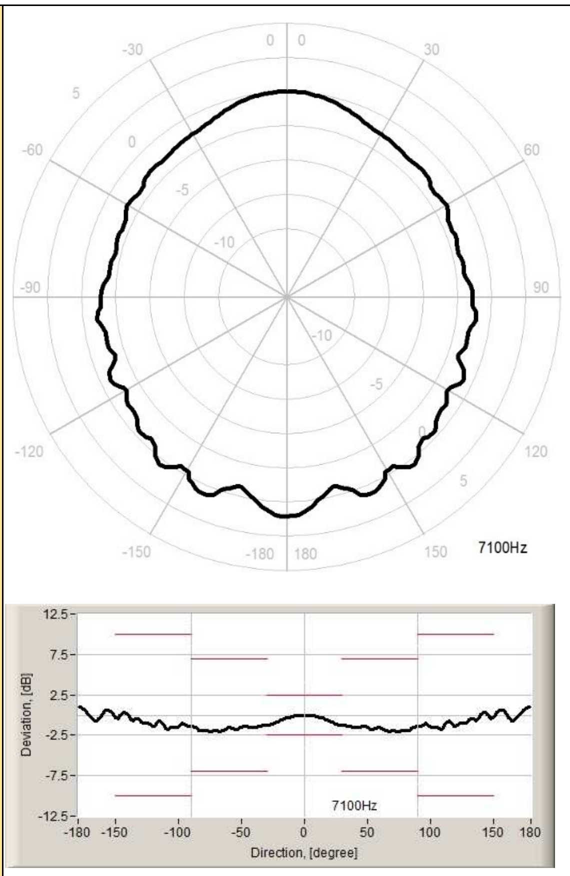
5600 Hz



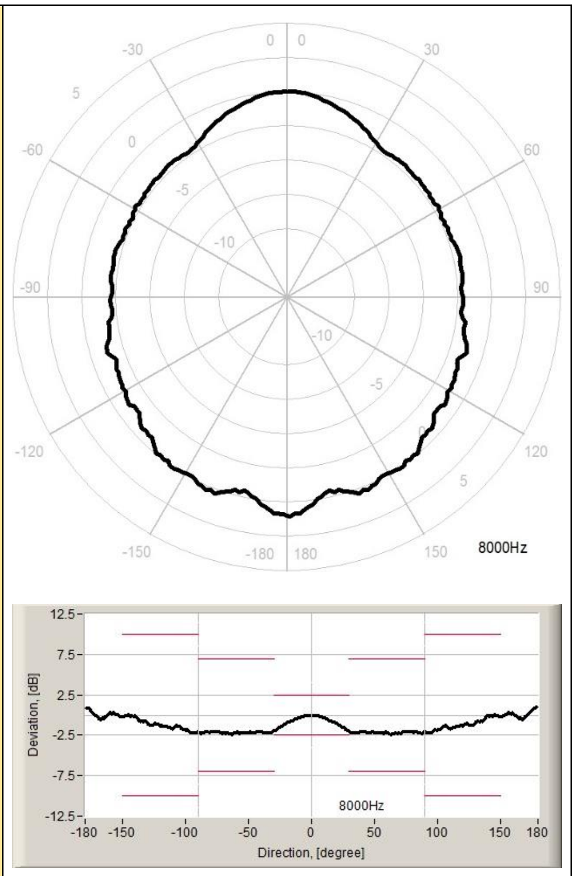
6300 Hz



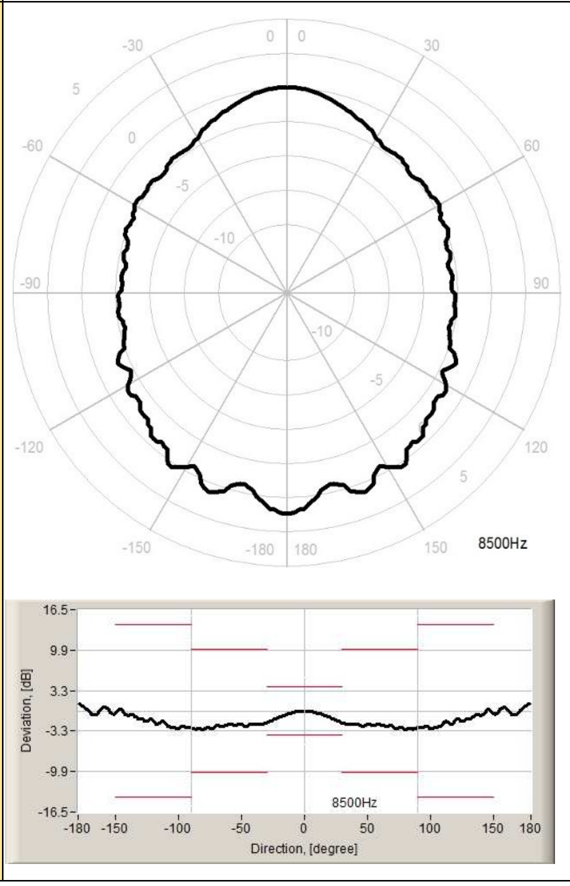
7100 Hz



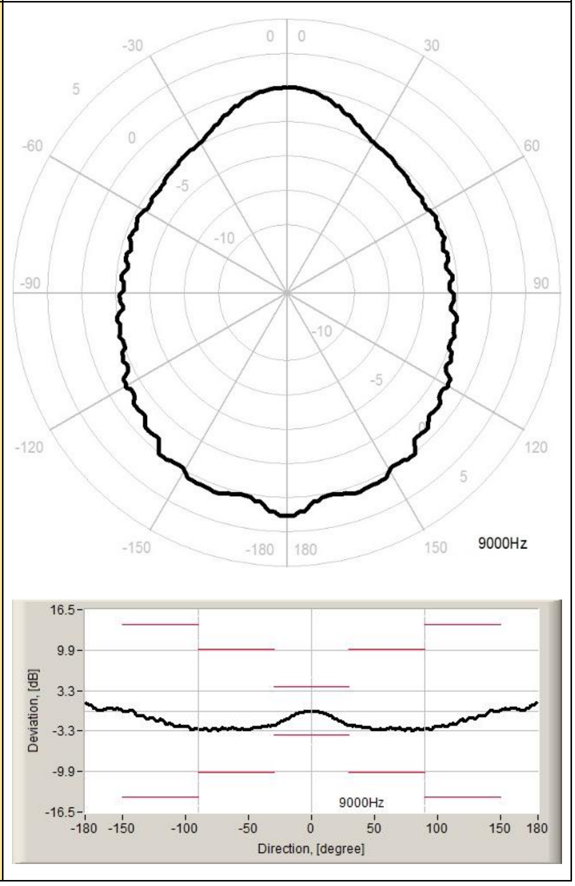
8000 Hz



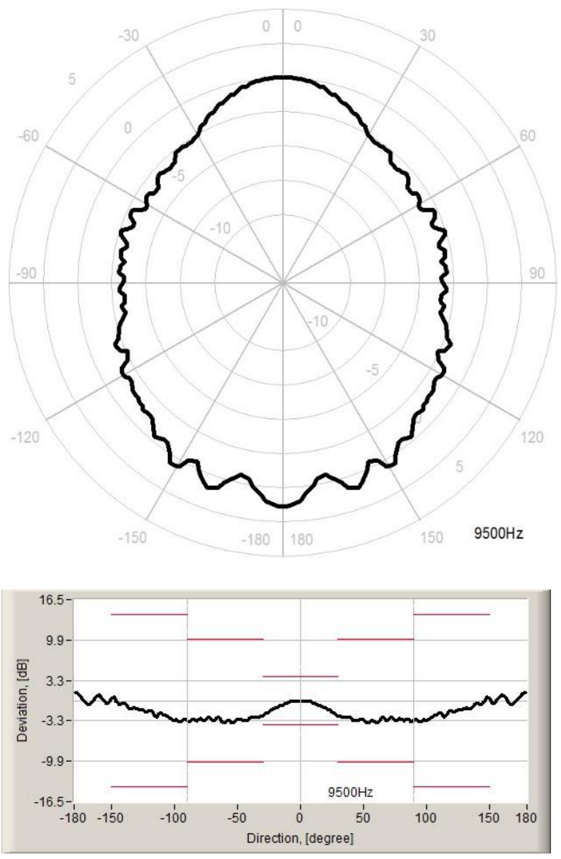
8500 Hz



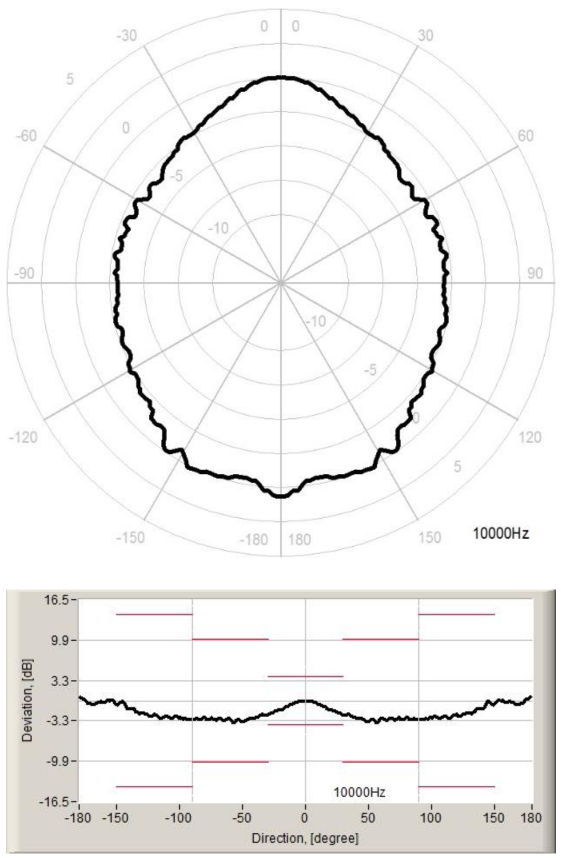
9000 Hz



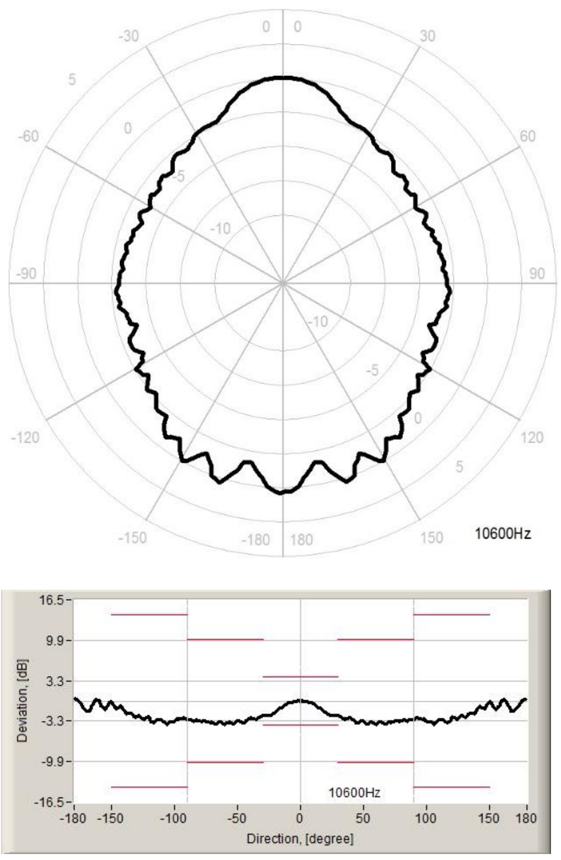
9500 Hz



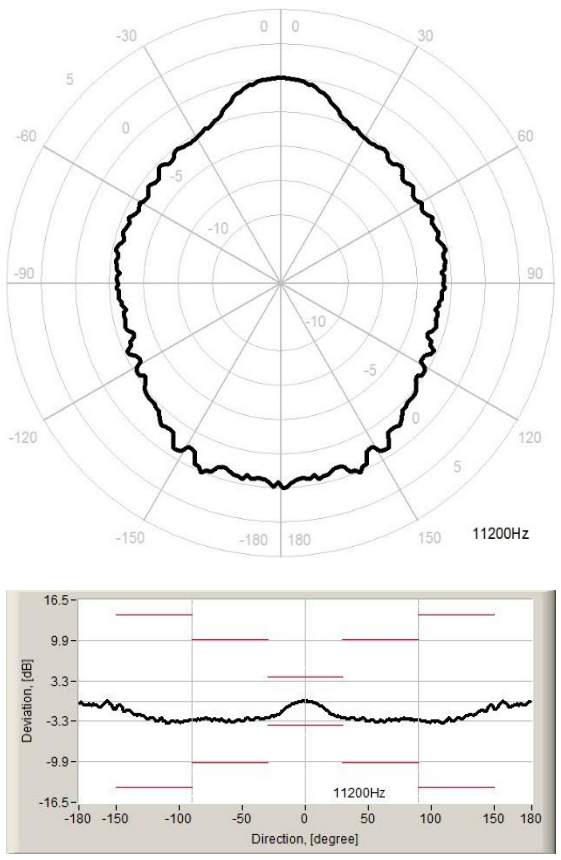
10000 Hz



10600 Hz



11200 Hz



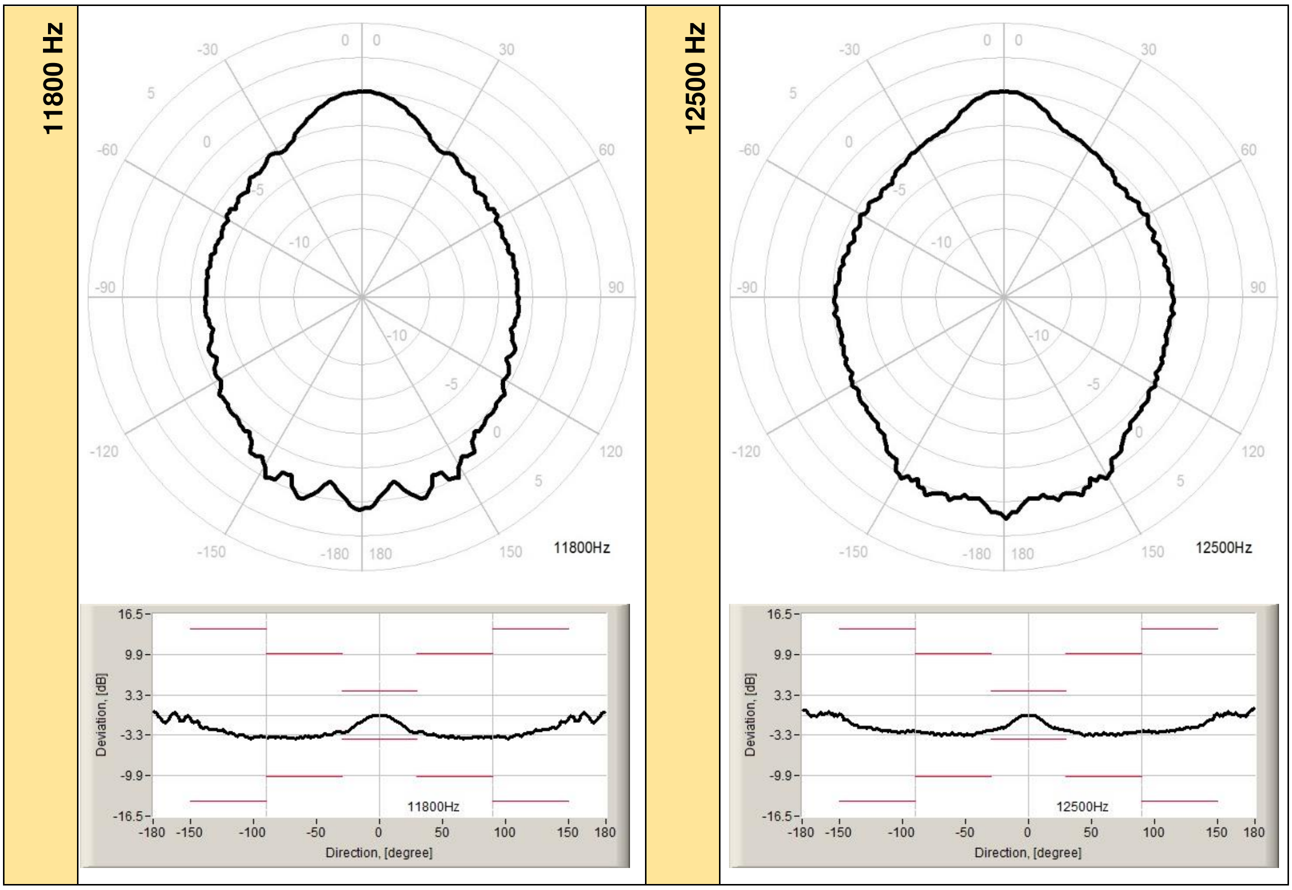


Table C.8.13. Typical directional response of SVAN 958A with SA 277D

Frequency	Angle [°]									
[Hz]	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
250	-0.02	-0.03	-0.04	-0.04	-0.03	-0.03	-0.02	-0.01	0.01	0.03
315	0.00	0.01	0.02	0.02	0.04	0.04	0.06	0.07	0.09	0.11
400	0.00	0.00	-0.01	-0.03	-0.04	-0.07	-0.09	-0.12	-0.14	-0.16
500	0.01	0.02	0.03	0.04	0.05	0.05	0.06	0.06	0.07	0.07
630	0.00	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.03	0.02
800	-0.01	-0.03	-0.06	-0.10	-0.13	-0.15	-0.15	-0.14	-0.13	-0.16
1 000	0.02	0.04	0.05	0.06	0.06	0.05	-0.04	-0.08	-0.09	-0.07
1 250	-0.01	-0.05	-0.10	-0.17	-0.21	-0.22	-0.22	-0.29	-0.33	-0.33
1 600	0.01	-0.05	-0.10	-0.15	-0.21	-0.28	-0.35	-0.34	-0.25	-0.20
2 000	-0.01	-0.07	-0.19	-0.35	-0.48	-0.51	-0.48	-0.50	-0.51	-0.35
2 240	-0.02	-0.09	-0.21	-0.35	-0.53	-0.73	-0.76	-0.71	-0.76	-0.74
2 500	-0.03	-0.11	-0.26	-0.59	-0.72	-0.71	-0.92	-0.97	-0.86	-0.94
2 800	-0.05	-0.25	-0.52	-0.69	-0.77	-0.92	-0.93	-0.96	-1.09	-0.93
3 150	-0.12	-0.35	-0.52	-0.80	-1.02	-1.03	-0.96	-0.96	-1.03	-0.97
3 550	-0.03	-0.20	-0.44	-0.73	-0.91	-0.94	-0.95	-0.86	-0.85	-0.83

4 000	-0.12	-0.38	-0.64	-0.93	-1.04	-1.03	-0.90	-0.81	-0.60	-0.44
4 500	-0.09	-0.41	-0.92	-1.35	-1.48	-1.52	-1.67	-1.65	-1.51	-1.29
5 000	-0.27	-0.73	-1.29	-1.76	-1.78	-2.07	-2.07	-2.05	-1.88	-1.44
5 600	-0.16	-0.69	-1.17	-1.63	-2.03	-2.49	-2.69	-2.81	-2.86	-2.75
6 300	-0.29	-0.90	-1.55	-1.84	-2.28	-2.70	-2.97	-3.05	-3.13	-2.98
7 100	-0.11	-0.75	-1.09	-1.47	-1.57	-1.89	-2.11	-2.15	-1.95	-1.53
8 000	-0.61	-1.47	-2.35	-2.51	-2.33	-2.30	-2.53	-2.30	-2.34	-2.22
8 500	-0.33	-1.07	-1.98	-2.30	-2.69	-2.38	-2.53	-3.03	-2.89	-2.62
9 000	-0.76	-1.79	-2.54	-2.87	-3.18	-3.24	-3.14	-3.07	-2.93	-2.66
9 500	-0.41	-1.37	-2.80	-3.04	-3.49	-3.65	-3.65	-3.55	-3.56	-3.34
10 000	-0.96	-1.73	-2.54	-3.30	-3.76	-3.65	-3.55	-3.23	-3.64	-3.54
10 600	-0.49	-2.10	-2.38	-3.28	-3.88	-4.05	-4.05	-3.69	-3.35	-3.32
11 200	-0.93	-2.90	-3.03	-3.23	-3.35	-3.62	-3.15	-3.21	-3.01	-3.97
11 800	-0.61	-1.98	-3.02	-3.24	-3.57	-3.99	-3.95	-3.94	-3.62	-3.51
12 500	-1.30	-2.15	-2.68	-2.99	-3.40	-3.25	-3.51	-3.11	-2.97	-3.10
f [Hz]	**100-110**	**110-120**	**120-130**	**130-140**	**140-150**	**150-160**	**160-170**	**170-180**	**180-190**	**190-200**
250	0.05	0.06	0.08	0.11	0.12	0.13	0.13	0.13	0.13	0.12
315	0.14	0.17	0.20	0.23	0.26	0.28	0.29	0.30	0.29	0.28
400	-0.16	-0.16	-0.16	-0.14	-0.12	-0.10	-0.08	-0.06	-0.05	-0.06
500	0.08	0.10	0.12	0.16	0.19	0.22	0.23	0.23	0.22	0.21
630	-0.02	-0.02	-0.02	0.04	0.09	0.14	0.17	0.19	0.18	0.17
800	-0.21	-0.24	-0.24	-0.22	-0.16	-0.08	0.02	0.03	0.03	-0.05
1 000	-0.02	-0.02	-0.06	-0.06	0.04	0.14	0.20	0.23	0.22	0.18
1 250	-0.23	-0.25	-0.35	-0.37	-0.36	-0.23	-0.10	-0.02	-0.10	-0.20
1 600	-0.16	-0.13	-0.15	-0.30	-0.31	-0.23	0.11	0.18	0.18	0.10
2 000	-0.29	-0.27	-0.26	-0.45	-0.48	-0.36	-0.09	0.09	-0.12	-0.34
2 240	-0.40	-0.62	-0.61	-0.50	-0.70	-0.69	-0.42	-0.13	-0.15	-0.52
2 500	-0.90	-0.91	-0.89	-0.86	-1.07	-1.01	-0.62	-0.38	-0.58	-0.99
2 800	-1.07	-0.76	-0.47	-0.38	-0.46	-0.50	-0.23	0.33	0.33	-0.34
3 150	-0.92	-0.40	-0.25	0.22	0.18	0.15	0.64	0.75	0.67	0.19
3 550	-0.75	-0.65	0.24	0.21	0.40	-0.13	0.56	0.89	0.88	0.44
4 000	-0.29	-0.28	0.66	0.72	0.87	0.44	1.20	1.38	1.27	0.54
4 500	-1.13	-0.59	-0.56	0.41	0.61	0.51	0.62	1.10	1.08	0.42
5 000	-1.71	-1.48	-1.01	-0.63	-0.54	-0.71	-0.49	0.59	-0.43	-0.82
5 600	-2.77	-2.26	-2.26	-1.56	-1.39	-1.33	-1.46	-0.69	-0.69	-1.55
6 300	-2.63	-2.44	-1.79	-1.42	-1.26	-1.17	-1.13	0.56	-1.14	-1.14
7 100	-1.94	-1.47	-1.47	-0.68	-0.41	0.75	-0.73	1.03	0.99	-0.74
8 000	-1.90	-1.52	-1.48	-0.55	0.46	0.67	-0.68	1.08	-0.77	-0.63
8 500	-2.80	-2.20	-1.54	-1.23	-0.57	0.68	-0.67	1.11	1.05	-0.74
9 000	-2.51	-1.77	-1.33	-0.78	0.63	1.15	0.75	1.55	0.97	0.93
9 500	-3.15	-2.46	-1.67	-1.23	-0.61	1.05	0.89	1.32	1.25	0.83
10 000	-3.27	-2.78	-2.35	-1.91	-0.75	-0.75	-1.18	0.93	-1.26	0.61

10 600	-3.90	-3.46	-3.06	-2.51	-1.48	-1.40	-1.74	-1.37	-1.73	-1.68
11 200	-3.63	-3.38	-2.54	-1.96	-1.21	-1.14	-1.49	-0.50	-1.46	-1.37
11 800	-3.82	-3.31	-2.82	-2.19	-1.94	-0.97	-1.33	-1.33	-1.31	-1.06
12 500	-2.99	-2.52	-2.03	-1.79	0.89	1.12	0.77	1.26	-0.94	0.81
f [Hz]	**200-210**	**210-220**	**220-230**	**230-240**	**240-250**	**250-260**	**260-270**	**270-280**	**280-290**	**290-300**
250	0.11	0.09	0.07	0.04	0.01	-0.03	-0.05	-0.07	-0.08	-0.09
315	0.25	0.22	0.20	0.15	0.12	0.10	0.07	0.05	0.03	0.02
400	-0.08	-0.10	-0.11	-0.13	-0.13	-0.13	-0.12	-0.11	-0.10	-0.08
500	0.17	0.14	0.10	0.06	0.04	0.02	0.01	0.00	-0.01	-0.01
630	0.13	0.08	0.03	-0.02	-0.02	-0.01	0.01	0.01	0.01	-0.01
800	-0.14	-0.19	-0.20	-0.21	-0.18	-0.14	-0.10	-0.11	-0.13	-0.13
1 000	0.09	-0.09	-0.14	-0.15	-0.15	-0.20	-0.26	-0.28	-0.27	-0.22
1 250	-0.32	-0.35	-0.34	-0.26	-0.24	-0.36	-0.37	-0.34	-0.28	-0.29
1 600	-0.22	-0.27	-0.24	-0.09	-0.07	-0.10	-0.15	-0.22	-0.31	-0.30
2 000	-0.51	-0.50	-0.26	-0.33	-0.34	-0.45	-0.59	-0.58	-0.58	-0.63
2 240	-0.67	-0.67	-0.48	-0.62	-0.61	-0.44	-0.74	-0.73	-0.75	-0.80
2 500	-1.09	-0.94	-0.88	-0.98	-0.96	-1.01	-0.93	-1.04	-1.02	-0.82
2 800	-0.55	-0.48	-0.56	-0.60	-1.02	-1.19	-1.16	-1.19	-0.97	-1.03
3 150	-0.18	-0.26	-0.40	-0.69	-1.13	-1.13	-1.22	-1.13	-1.14	-1.16
3 550	-0.19	0.28	-0.30	-0.43	-0.87	-1.13	-1.13	-1.16	-1.21	-1.26
4 000	0.83	0.76	0.64	0.38	-0.35	-0.49	-0.79	-1.03	-1.13	-1.25
4 500	0.43	0.43	-0.29	-0.83	-1.01	-1.44	-1.55	-1.77	-1.81	-1.76
5 000	-0.40	-0.85	-1.24	-1.79	-1.83	-1.44	-1.67	-1.88	-1.94	-1.93
5 600	-1.26	-1.62	-1.92	-2.52	-2.77	-3.01	-3.02	-3.05	-2.83	-2.55
6 300	-1.27	-1.59	-1.67	-2.28	-2.56	-3.21	-3.21	-3.07	-3.07	-2.67
7 100	0.65	-0.47	-0.64	-1.37	-1.43	-1.66	-1.37	-1.90	-1.99	-1.86
8 000	-0.61	-0.65	-1.25	-1.64	-1.99	-2.14	-2.23	-2.19	-2.58	-2.53
8 500	-0.74	-0.87	-1.38	-2.19	-2.34	-3.13	-3.11	-3.15	-2.97	-2.63
9 000	0.46	-1.05	-1.43	-1.87	-2.83	-2.90	-3.24	-3.44	-3.31	-2.99
9 500	-0.60	-0.76	-1.50	-1.94	-2.80	-3.35	-3.51	-3.42	-3.13	-3.56
10 000	-0.99	-1.83	-2.34	-2.79	-3.24	-2.81	-2.84	-2.71	-3.15	-3.17
10 600	-1.43	-2.16	-2.78	-3.26	-3.78	-3.99	-3.01	-3.33	-3.51	-3.81
11 200	-1.44	-2.34	-2.57	-3.87	-3.64	-3.77	-3.42	-3.43	-3.22	-3.67
11 800	-1.17	-2.47	-2.76	-3.35	-3.75	-4.00	-4.00	-3.97	-4.03	-3.87
12 500	-0.72	-2.20	-2.38	-2.68	-2.72	-2.76	-2.77	-2.97	-3.34	-3.14
f [Hz]	**300-310**	**310-320**	**320-330**	**330-340**	**340-350**	**350-360**				
250	-0.10	-0.11	-0.11	-0.11	-0.11	-0.11				
315	0.01	0.01	-0.01	-0.01	-0.02	-0.02				
400	-0.06	-0.04	-0.02	0.01	0.01	0.01				
500	-0.01	-0.02	-0.02	-0.02	-0.01	-0.01				
630	-0.02	-0.02	-0.02	-0.01	-0.01	0.00				
800	-0.12	-0.10	-0.07	-0.04	-0.02	-0.01				

1 000	-0.15	-0.11	-0.07	-0.06	-0.03	0.01				
1 250	-0.29	-0.26	-0.20	-0.11	-0.06	-0.02				
1 600	-0.23	-0.19	-0.13	-0.08	-0.03	0.03				
2 000	-0.60	-0.48	-0.29	-0.16	-0.09	-0.03				
2 240	-0.74	-0.55	-0.40	-0.23	-0.12	0.02				
2 500	-0.83	-0.73	-0.44	-0.21	-0.09	-0.03				
2 800	-0.93	-0.79	-0.72	-0.47	-0.24	-0.03				
3 150	-1.15	-0.93	-0.63	-0.38	-0.18	0.01				
3 550	-1.19	-1.17	-0.92	-0.49	-0.28	-0.07				
4 000	-1.25	-1.10	-0.91	-0.47	-0.23	-0.03				
4 500	-1.59	-1.50	-1.34	-0.97	-0.44	-0.10				
5 000	-1.69	-1.60	-1.30	-0.71	-0.31	0.03				
5 600	-2.17	-2.00	-1.63	-1.17	-0.61	-0.08				
6 300	-2.19	-1.84	-1.58	-0.98	-0.47	-0.02				
7 100	-1.73	-1.64	-1.60	-1.36	-0.77	-0.17				
8 000	-2.32	-2.18	-2.08	-1.39	-0.62	0.05				
8 500	-2.27	-2.33	-2.17	-1.67	-1.09	-0.28				
9 000	-3.08	-2.95	-2.58	-1.82	-0.90	0.06				
9 500	-3.55	-3.09	-2.55	-1.99	-1.14	-0.14				
10 000	-3.35	-3.15	-2.52	-1.86	-1.12	0.06				
10 600	-3.72	-3.20	-2.75	-2.26	-1.72	-0.38				
11 200	-3.53	-3.25	-2.55	-2.39	-0.81	0.06				
11 800	-3.65	-3.77	-3.37	-2.87	-1.71	-0.46				
12 500	-3.32	-3.39	-2.86	-2.31	-1.69	-0.12				

Appendix D. DEFINITIONS AND FORMULAE OF MEASURED VALUES

D.1. SOUND LEVEL METER

D.1.1 Basic terms and definitions (SLM mode)

T Current time period of the measurement in seconds.

$\mathbf{T_1}$ The last second of the measurement.

$\mathbf{T_e}$ Exposure time in seconds (time period during which a person is exposed to the action of noise). This parameter can be set in the **Exposure Time** setup (**Measurement** menu). The available values are from 1 minute to 12 hours with 1 minute step.

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

τ Exponential time constant in seconds for the giving time-weighting. Three time constant are available: **Slow** (1000 ms), **Fast** (125 ms), **Impulse** (35 ms, but on falling values a longer time constant of 1500 ms is applied).

W Frequency-weighting filter (**A**, **C, B** or **Z**).

$p_W(t)$ Instantaneous frequency-weighted sound pressure with the weighting filter **W**. Sound pressure is expressed in pascals (Pa).

$p_{W\tau}(t)$ Instantaneous frequency and time-weighted sound pressure with the weighting filter **W** and time constant τ calculated from the equation:

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

where: ξ – variable of integration.

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

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

$\mathbf{p_0}$ Reference value (20 µPa).

$\log(x)$ Represents the logarithm of x to the base 10.

L_T Threshold sound level, set in the **Threshold Level** (*path: Menu / Input / Dosimeter Setup*). The available values are as follows: **None**, **75dB**, **80dB**, **85dB** or **90dB**.

L_C Criterion sound level, set in the **Criterion Level** (*path: Menu / Input / Dosimeter Setup*). The available values are as follows: **80dB**, **84dB**, **85dB** or **90dB**.

Q Exchange rate in decibels equal to 2, 3, 4 or 5, set in the **Exchange Rate** position (*path: Menu / Input / Dosimeter Setup*). The value of **Q** influences the calculations of acoustic dose meter results, namely **DOSE**, **D_8h** and **LAV**. The exposure rate equal to 3 complies with ISO R 1999 "Assessment of Occupational Noise Exposure for Hearing Conservation Purposes", while Q equal to 5 complies with the American "Occupational Safety and Health Act" – OSHA. The value of q used in the calculations of **DOSE**, **D_8h** and **LAV** is taken from the formula:

$$q = \begin{cases} \dfrac{Q}{\log 2} & \text{for } Q \neq 3 \\ 10 & \text{for } Q = 3 \end{cases}$$

L(t) Sound level (a function of time) measured with the selected time constant **Impulse**, **Fast** or **Slow** (*path: Menu / Input / Channels Setup / Channel x Setup*) and the weighting filter (**A**, **C**, **Z** or **G**)

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

$L_d(t)$ Sound level (a function of time), depends on the selected threshold level.

In case when the **None** option was selected

$$L_d(t) = L(t)$$

In other cases (when the **Threshold Level** is equal to **75dB**, **80dB**, **85dB** or **90dB**)

$$L_d(t) = \begin{cases} L(t) & \text{for } L(t) \geq L_T \\ -\infty & \text{for } L(t) < L_T \end{cases}$$

D.1.2 Definitions and formulas of the results (SLM mode)

OVL Percentage of the overloaded input signal, which occurred during the current time period of the measurement (**T**)

PEAK Peak sound level is calculated for the given **T**

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

MAX Maximal value of the time-weighted sound pressure level for current time period of the measurement (**T**). The **MAX** result for the 1 second period is equal to the value of the **Spl** result

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

MIN Minimal value of the time-weighted sound pressure level for current time period of the measurement (**T**)

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

SPL Maximal value of the frequency and time-weighted sound pressure level for the last second of the measurement

$$\mathbf{SPL} = 10\log\left(\max_{T_1} \frac{p_{W\tau}^2(t)}{p_0^2}\right)$$

LEQ Time-averaged sound level for current time period of the measurement (**T**)

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

SEL Sound Exposure Level 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**)

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

Ltm3 and **Ltm5** The **Ltm3** and **Ltm5** 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

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.

L(den) Only one result from: **Ld**, **Le**, **Ln**, **Lde**, **Len**, **Lnd**, and **Lden** is available in the instrument. It depends on the day and night time in which the measurement was performed. Day and night time depend on the <**Day Time Limits**> option (**6h-18h** or **7h-19h**).

If <**6h-18h**> option is selected for the <**Day Time Limits**> in the instrument then:

$\mathbf{T_d}$ (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.

Ld

Ld is calculated for: $\mathbf{T_d} \neq 0$, $\mathbf{T_e} = 0$, $\mathbf{T_n} = 0$.

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

Le

Le is calculated for: $\mathbf{T_d} = 0$, $\mathbf{T_e} \neq 0$, $\mathbf{T_n} = 0$.

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

Ln

Ln is calculated for: $\mathbf{T_d} = 0$, $\mathbf{T_e} = 0$, $\mathbf{T_n} \neq 0$.

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

Lde

Lde is calculated for: $\mathbf{T_d} \neq 0$, $\mathbf{T_e} \neq 0$, $\mathbf{T_n} = 0$.

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

Len

Len is calculated for: $\mathbf{T_d} = 0$, $\mathbf{T_e} \neq 0$, $\mathbf{T_n} \neq 0$.

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

Lnd

Lnd is calculated for: $\mathbf{T_d} \neq 0$, $\mathbf{T_e} = 0$, $\mathbf{T_n} \neq 0$.

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

Lden

Lden is calculated for: $\mathbf{T_d} \neq 0$, $\mathbf{T_e} \neq 0$, $\mathbf{T_n} \neq 0$.

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

D.1.3 Definitions and formulas of the additional Dosimeter function results

DOSE

Quantity of noise received by the worker, expressed as the percentage of the whole day acceptable value

$$\mathbf{DOSE} = \frac{100\%}{T_{8h}} \int_0^T 10^{\frac{L_d(t)-L_c}{q}} dt$$

D_8h

Quantity of noise received by the worker during 8 hours

$$\mathbf{D\_8h} = \frac{100\%}{T} \int_0^T 10^{\frac{L_d(t)-L_c}{q}} dt = \frac{T_{8h}}{T} \cdot \mathbf{DOSE}$$

LAV

Average level of the acoustic pressure for the given time period of the measurement (**T**).

In the case of Q (the exchange rate) equal to 3 the **LAV** result has the same value as **LEQ** if the **Exponential** option is selected (*path: Menu / Setup / RMS Integration*).

$$\mathbf{LAV} = q \cdot \log\left(\frac{1}{T} \int_0^T 10^{\frac{L_d(t)}{q}} dt\right)$$

SEL8

SEL result corresponding to the integration time equal to 8 hours

$$\mathbf{SEL8} = \mathbf{LEQ} + 10 \log \frac{T_{8h}[s]}{1[s]}$$

PSEL

(individual Sound Exposure Level)

Standing sound level in a measurement period

$$\mathbf{PSEL} = \mathbf{LEQ} + 10 \log \frac{T}{T_{8h}}$$

E

(Exposition)

Amount of the acoustical energy received by the worker

$$E = \frac{T[s]}{3600} p_o^2 \cdot 10^{\frac{LEQ}{10}}$$

E_8h

(Exposition in 8 hours)

Amount of the acoustical energy received
by the worker during 8 hours. The **E_8h** result is expressed in the linear units [Pa²h].

$$E\_8h = 8[h] \cdot p_o^2 \cdot 10^{\frac{LEQ}{10}}$$

D.2. VIBRATION LEVEL METER

D.2.1 Basic terms and definitions (VLM mode)

T Current time period of the measurement in seconds.

T_0 Reference duration of 28 800 seconds (8 hours)

T_E Exposure time

τ Exponential time constant in seconds for the giving time-weighting. The following time constants are available: **100 ms**, **125 ms**, **200 ms**, **500 ms**, **1.0 s**, **2.0 s**, **5.0 s**, **10.0 s.**

W Frequency-weighting filter (**HP**, **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10**, or **Wh**).

$a_W(t)$ Instantaneous frequency-weighted signal with the weighting filter **W**.

$a_{W\tau}(t)$ Instantaneous frequency and time-weighted signal with the weighting filter **W** and time constant τ calculated from the equation:

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

where: ξ – variable of integration.

$v(t)$ Instantaneous vibration signal depends on the <**RMS Integration**> parameter:

$$v(t) = \begin{cases} a_W(t) & \textbf{RMS Integration} = \textbf{Lin} \\ a_{W\tau}(t) & \textbf{RMS Integration} = \textbf{Exp} \end{cases}$$

AEQ Acceleration Equivalent Vector of **RMS** values taken from three axis (equivalent to **a_{hv}** when **Wh** filter is applied)

$$\mathbf{AEQ} = \sqrt{\mathbf{RMS}_x^2 + \mathbf{RMS}_y^2 + \mathbf{RMS}_z^2}$$

VDV_{WB} Vibration dose value for Whole-body

$$\mathbf{VDV_{WB}} = \max\{1{,}4VDV_x, 1.4VDV_y, VDV_z\}$$

RMS_{WB} Root Mean Square for Whole-body

$$\mathbf{RMS_{WB}} = \max\{1{,}4RMS_x, 1.4RMS_y, RMS_z\}$$

EAV **E**xposure **A**ction **V**alue – constant value defined by local standards

expressed in $\frac{\mathbf{m}}{\mathbf{s^2}}$ or in $\frac{\mathbf{m}}{\mathbf{s^{1.75}}}$

ELV **E**xposure **L**imit **V**alue – constant value defined by local standards expressed in $\frac{m}{s^2}$ or in $\frac{m}{s^{1.75}}$

D.2.2 Definitions and formulas of the results (VLM mode)

OVL Percentage of the overloaded input signal, which occurred during the current time period of the measurement (**T**)

PEAK Maximum absolute value of the signal calculated for the given **T**

$$PEAK = max_T | a_W(t) |$$

P–P Peak-to-peak (**P-P**) result is the difference between highest and lowest value of the signal calculated for the given **T**

$$P - P = max_T(0, a_W(t)) - min_T(0, a_W(t))$$

RMS **RMS** (root mean square) result for current time period of the measurement (**T**)

$$RMS = \left(\frac{1}{T}\int_0^T a_W^2(t)\,dt\right)^{1/2}$$

VDV Vibration Dose Value result expressed in m/s$^{1.75}$

$$VDV = \left(\int_0^T a_W^4(t)\,dt\right)^{1/4}$$

CRF **CRF** value (**Cr**est **F**actor) is obtained from the proportion **PEAK**/**RMS**

MTVV Maximum Transient Vibration Value, saved as the main result, is defined (according to the **ISO 8041** standard)

$$MTVV = max_T(p_W(t))$$

D.2.3 Definitions of the Hand-Arm vibration results available in the vibration mode

CExp Current Exposure to vibration measured from the measurement start

$$CExp = AEQ\sqrt{\frac{T}{T_0}}$$

A(8) Daily Exposure to vibration measured based on the T_E exposure time

$$A(8) = AEQ\sqrt{\frac{T_E}{T_0}}$$

EAV Total **T**ime — Time to reach Exposure Action Value from beginning of measurement

$$EAV_{TT} = T_0\left(\frac{EAV}{AEQ}\right)^2$$

EAV Time **L**eft — Current time to reach Exposure Action Value during the measurement

$$EAV_{TL} = EAV_{TT} - T$$

ELV Total **T**ime — Current time to reach Exposure Limit Value during the measurement

$$ELV_{TT} = T_0\left(\frac{ELV}{AEQ}\right)^2$$

ELV Time **L**eft — Current time to reach Exposure Action Value during the measurement

$$ELV_{TL} = ELV_{TT} - T$$

D.2.4 Definitions of the Whole-Body vibration results available in the vibration mode

CExp — Current Exposure to vibration measured from the measurement start

$$CExp = RMS_{WB}\sqrt{\frac{T}{T_0}}$$

A(8) — Daily Exposure to vibration measured based on the T_E exposure time

$$A(8) = RMS_{WB}\sqrt{\frac{T_E}{T_0}}$$

DDose — Daily Dose - VDV exposure to vibration measured based on the T_E exposure time

$$DDose = VDV_{WB}\sqrt[4]{\frac{T_E}{T}}$$

EAV Total **T**ime — Time to reach Exposure Action Value from beginning of measurement

$$EAV_{TT} = \begin{cases} EAV_{TTA} \text{ if EAV limit is in } \frac{m}{s^2} \\ EAV_{TTV} \text{ if EAV limit is in } \frac{m}{s^{1.75}} \end{cases}$$

where $$EAV_{TTA} = T_0\left(\frac{EAV_A}{RMS_{WB}}\right)^2 \qquad EAV_{TTV} = T\left(\frac{EAV_V}{VDV_{WB}}\right)^4$$

EAV Time Left Current time to reach Exposure Action Value during the measurement

$$EAV_{TL} = EAV_{TT} - T$$

ELV Total Time Current time to reach Exposure Limit Value during the measurement

$$ELV_{TT} = \begin{cases} ELV_{TTA} \text{ if ELV limit is in } \frac{m}{s^2} \\ ELV_{TTV} \text{ if ELV limit is in } \frac{m}{s^{1.75}} \end{cases}$$

where

$$ELV_{TTA} = T_0 \left(\frac{ELV_A}{RMS_{WB}} \right)^2 \qquad ELV_{TTV} = T \left(\frac{ELV_V}{VDV_{WB}} \right)^4$$

ELV Time Left Current time to reach Exposure Action Value during the measurement

$$ELV_{TL} = ELV_{TT} - T$$

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:

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

where: Δt_i - time intervals, in which the noise level $L(t) \in \langle L_k, L_k + \Delta L \rangle$ occurs,

ΔL - so-called class interval or distribution class of the series,

P - total observation period.

In case when the class interval approaches infinity, the probability of **L(t)** tends to the probability of L_k. In practice, ΔL value is strictly determined and it depends mainly on the dynamics of the measurements performed in the instrument. There are 120 classes in the instrument and the width of each class is equal to 1 dB. The histogram is the set of the class density values calculated for all classes.

The statistical distribution function, which determines the probability (expressed in %) of the noise occurrence on the level equal or less than $L_k + \Delta L$ is given by the formulae:

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

The cumulative density function, expressed by the equation:

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

is directly used to determine so-called statistical levels **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.

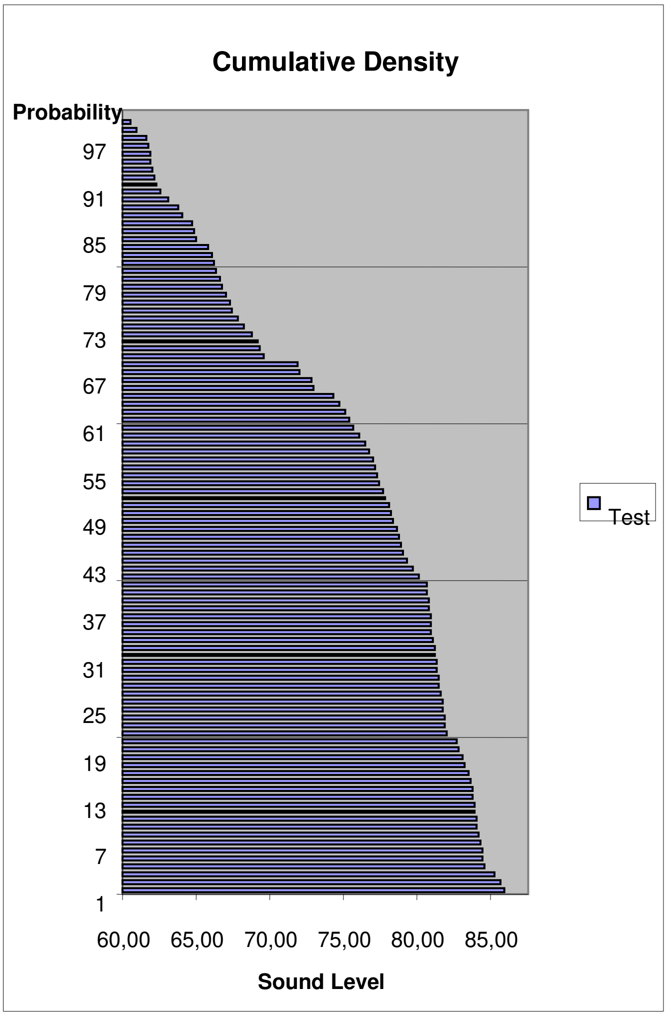
Example:

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 has to draw the horizontal cursor and find out the crossing point between the cumulative density function and the cursor. In the instrument the user can determine 10 statistical levels - from **L01** to **L99** (1% step of observation period).

The display in the instrument presents only first statistical level N1 (set to: L01 up to L99).

The statistical level **LN%** value, the profile's number the statistics are taken from, the RMS detector (**Lin.**, or **Exp.**: **Fast**, **Slow** or **Imp.**), the filter's name (**A**, **C** or **Z**) and real time are displayed in the top-right side of the display in one-result view mode.



Exemplary cumulative density

APPENDIX E. REVERBERATION TIME CALCULATIONS

E.1. INTRODUCTION

If an impulsive sound is generated in a room with reflecting boundaries, repeated reflections at the boundaries result in the rapid establishment of a more or less uniform sound field. This field then decays as the sound energy is absorbed by the bounding materials. The rate at which the sound energy decays is determined by the absorptive properties of the reflecting surfaces and the distances between them. The time taken for the sound intensity or the sound pressure level to decay by 60 dB is called the **reverberation time** (RT). The values of RT may range from fractions of a second to a few seconds and depend upon the size of the room and the nature of the materials used in its construction.

The graphs below present the reverberation time nature (in the case when only one frequency is emitted):

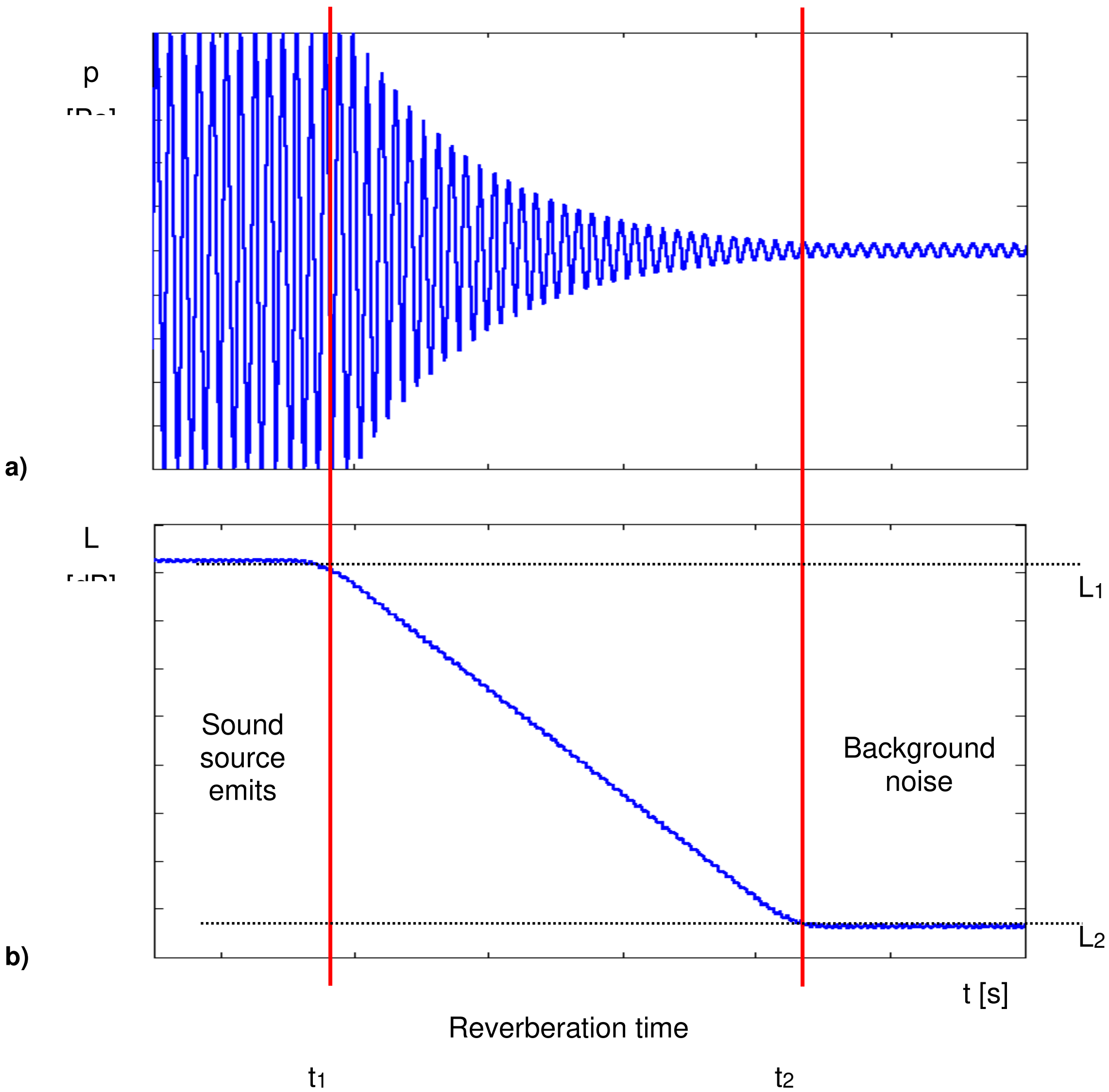


Fig 1. Acoustic pressure versus time (a) and value of the sound pressure level versus time, so-called decay curve (b)

The marker t_1 indicates the moment when the sound source was switched off. From this moment the acoustic sound pressure / acoustic power (reflected waves propagate in the room) decreases till the moment indicated by the marker t_2. The lower graph presents so-called the **decay curve**. The reverberation time value is equal to $t_2 – t_1$ when the difference between sound pressure levels L_1 and L_2 is 60 dB. The 60 dB dynamic condition is impractical in real measurements (very difficult to fulfil) hence the reverberation time (RT 60) is obtained using the slope coefficient of the decay curve. The type of the definition from which slope coefficient is calculated (EDT, RT 20, RT 30 or user defined) depends on the difference between levels L_1 and L_2 (the difference between background noise level and sound source level) of the decay curve and it depends on significantly from the acoustic source ability. If the level difference is larger than 45 dB, the RT 60 parameter can be calculated using three definitions: EDT, RT 20 and RT 30.

The real measurement results are not as smooth as the curves presented on graphs in Figure 1. In order to point out the interesting decay curve region (the position of the markers t_1 and t_2) some measurement data processing (in general signal smoothing by averaging) need to be applied.

E.2. RT 60 REVERBERATION TIME DEFINITION AND CALCULATION

- **EDT (early decay time):**

The EDT decay curve region is pointed out by markers t_1 and t_3 (cf. Fig. 2). It is checked whether the selected decay curve region has proper dynamics for the EDT calculation:

$$\mathbf{L_1 – L_2 >= 10\ dB}$$

$$\mathbf{L_2 – L_3 >= noise\ margin}$$

It is recommended by the ISO-3382 standard to set 10 dB value for noise margin.

In case of the **impulse method**, the sound pressure level values between points t_1 (with L_1 level) and t_2 (with L_2) are approximated with the straight line ($y = a \cdot x + b$) by the linear regression. Before approximation the EDT value is calculated using the slope coefficient ‘a’ according to the formula:

$$\mathbf{EDT = – 60.0 / a}$$

In case of the **decay method**, the EDT value is calculated according to the formula:

$$\mathbf{EDT = 6 \cdot (t_2 – t_1)}$$

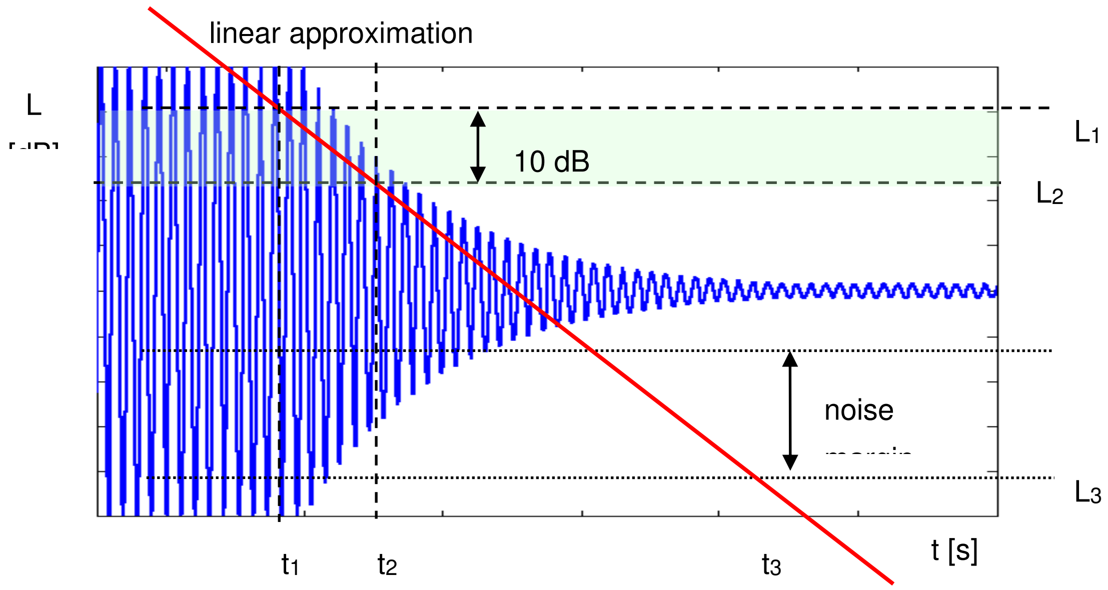


Fig 2. EDT evaluation

➢ **RT 20 (reverberation time calculated with 20 dB dynamics):**

The RT 20 decay curve region is pointed out by markers t_1 and t_4 (cf. Fig. 3). It is checked whether the selected decay curve region has proper dynamics for the RT 20 calculation:

$$\mathbf{L_1 - L_4 > 5\ dB + 20\ dB + noise\ margin}$$

It is recommended by the ISO-3382 standard to set 10 dB value for noise margin.

In case of the **impulse method**, the sound pressure level values between points t_2 and t_3 are approximated with the straight line ($y = a \cdot x + b$) by the linear regression. The RT 20 value is calculated using the slope coefficient 'a' according to the formula:

$$\mathbf{RT\ 20 = -\ 60.0\ /\ a}$$

In case of the **decay method**, the RT 20 value is calculated according to the formula:

$$\mathbf{RT\ 20 = 3 \cdot (t_3 - t_2)}$$

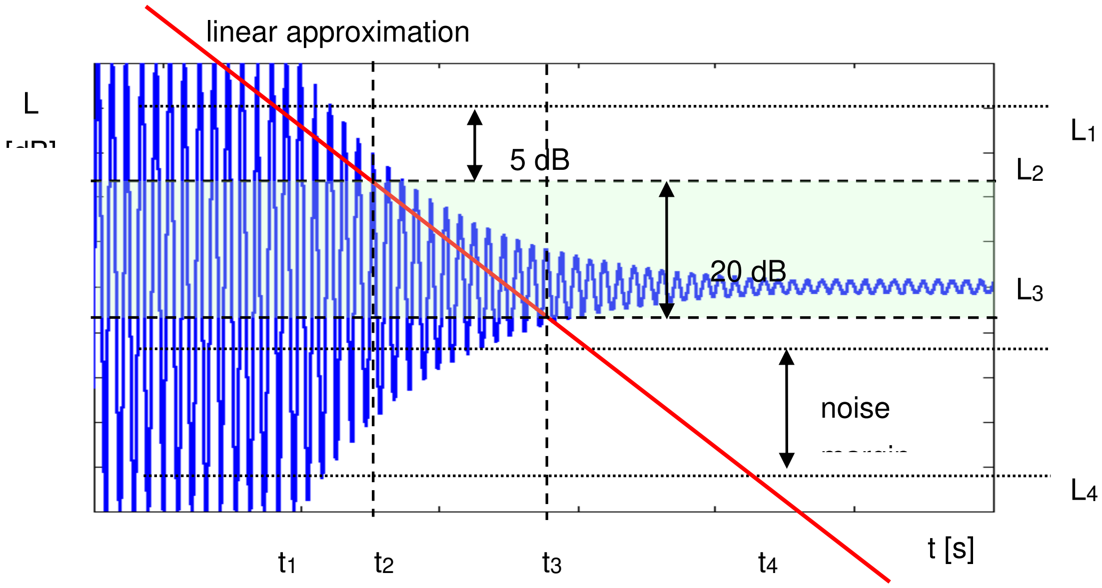


Fig 3. RT 20 evaluation

➢ **RT 30 (reverberation time calculated with 30 dB dynamics):**

The RT 30 decay curve region is pointed out by markers t_1 and t_4 (cf. Fig. 4). It is checked whether the selected decay curve region has proper dynamics to the RT 30 calculation:

$$\mathbf{L_1 - L_4 > 5 + 30\ dB + noise\ margin}$$

It is recommended by the ISO-3382 standard to set 10 dB value for noise margin.

In case of the **impulse method**, the sound pressure level values between points t_2 and t_3 are approximated with the straight line ($y = a \cdot x + b$) by the linear regression. The RT 30 value is calculated using the slope coefficient 'a' according to the formula:

$$\mathbf{RT\ 30 = -\ 60.0\ /\ a}$$

In case of the **decay method**, the RT 30 value is calculated according the formula

$$\mathbf{RT\ 30 = 2 \cdot (t_3 - t_2)}$$

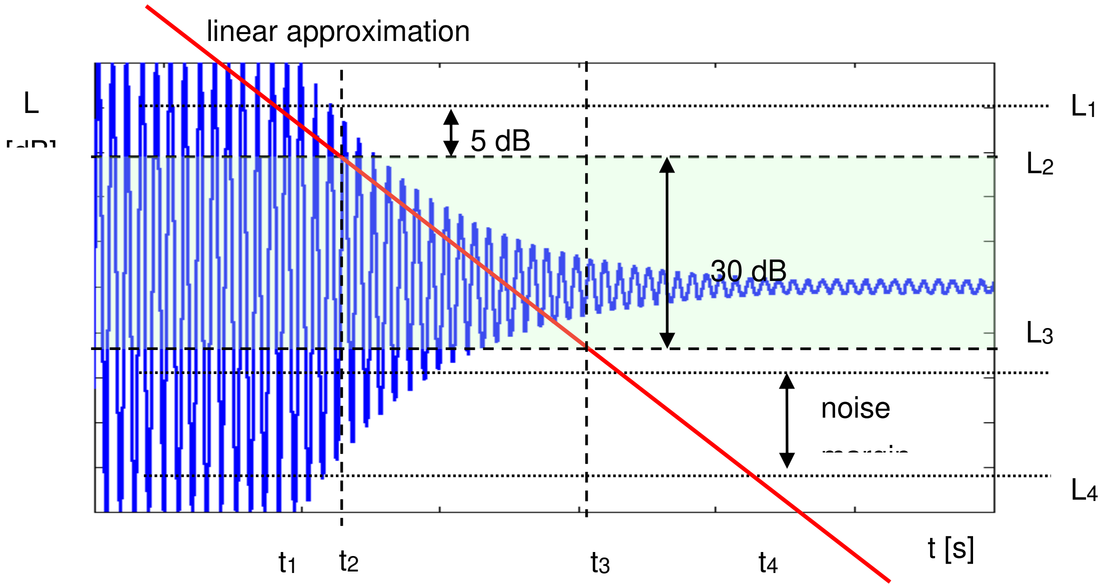


Fig 4. RT 30 evaluation

E.3. Description of the decay curve recording in different measurement methods

➢ **DECAY method**

This RT 60 measurement method requires omnidirectional sound source which emits pink noise in appropriate frequency band. The most critical parameter of the omnidirectional sound source is emitted sound pressure level as it was mentioned in the beginning of the appendix.

The graphical illustration of the data recording in this method is presented in Figure 5.

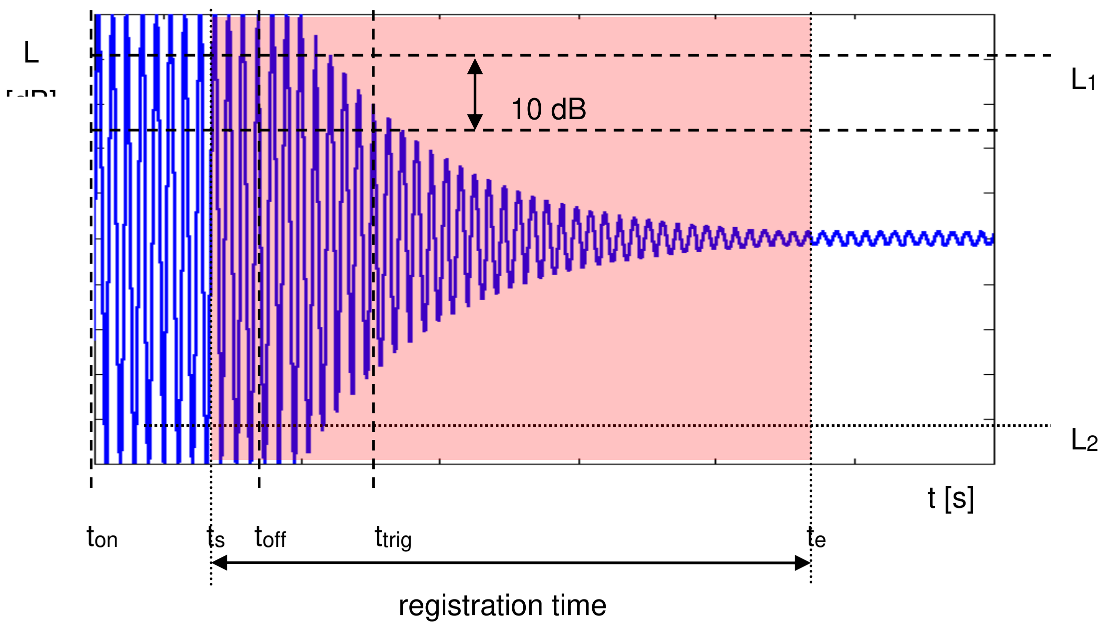


Fig 5. Data recording in the decay method of the reverberation time evaluation

The measurement time in this method consists of:

- The time between markers t_{on} and t_{off} in which the omnidirectional sound source emits acoustic power and the SVAN 958A instrument measures the actual sound pressure level.
- The time between markers t_{off} and t_{trig} in which the omnidirectional sound source is switched off and the SVAN 958A instrument waits for trigger condition fulfilment.
- The time between markers t_s and t_{trig} registered since the trigger condition fulfilment back till point t_s to allow recognising the beginning of the decay region. In the SVAN 958A instruments this time is equal to **Time Step** (*path: <Menu> / Input / RT60 Results*) parameter value multiplied by 50.
- The time between markers t_{trig} and t_e registered since t_{trig} forward to record whole decay curve together with significantly long period of the noise level. This time in SVAN 958A instruments is adjusted by **Recording Time** (*path: <Menu> / Input / RT60 Results*) parameter.

The above graph shows that the proper setting of the **Recording Time** value is very important. The registration time has to be long enough to acquire sufficient number of background noise level values. In other case the decay curve region could not be properly analysed or decay region could not fulfil the dynamic condition mentioned above. It is recommended to set the **Recording Time** parameter two times longer than expected reverberation time.

➢ **IMPULSE method**

In the Impulse method, Reverberation Time is computed by using the reverse-time integrated impulse response. This way of measuring sound decay was introduced firstly by M. R. Schroeder in two historical articles:

- New Method of Measuring Reverberation Time, *Journal of Acoust. Soc. Am.1965*
- Integrated-Impulse Method Measuring Sound Decay without Using Impulses, *Journal of Acoust. Soc. Am. Vol. 66(2) 1979*

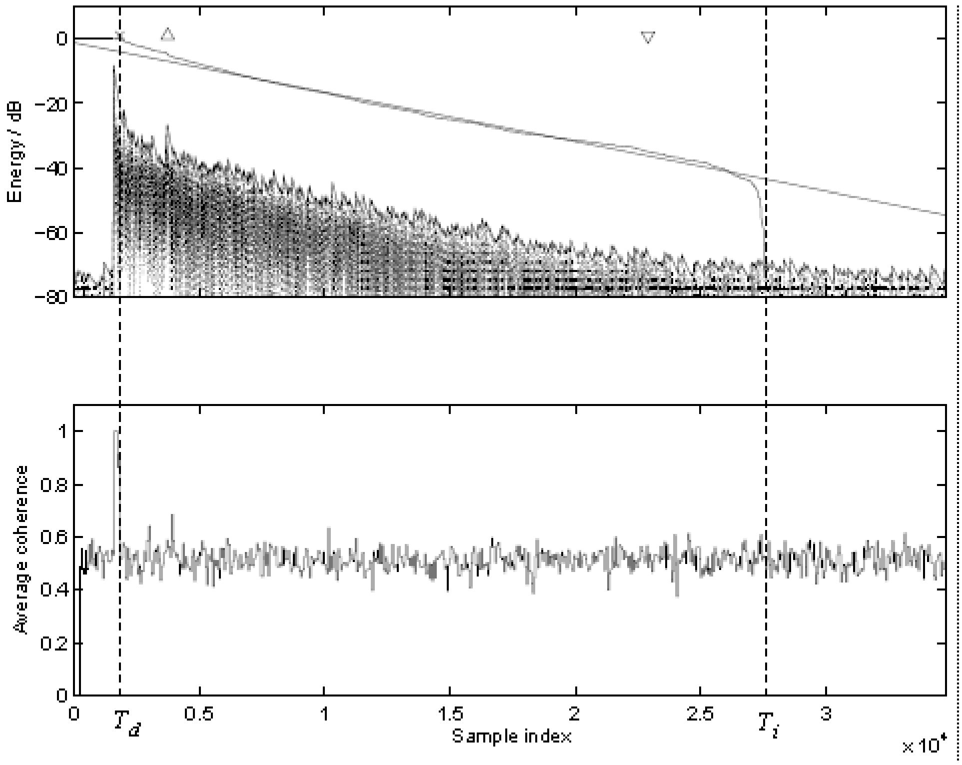


Fig. 6 Example of Schroeder integration with the limits Ti and Td

This RT 60 measurement method requires impulse sound source like pistol, petard or other sound source which emits impulse signal with very high sound pressure level.

The graphical illustration of data registering in this method is presented in Figure 7.

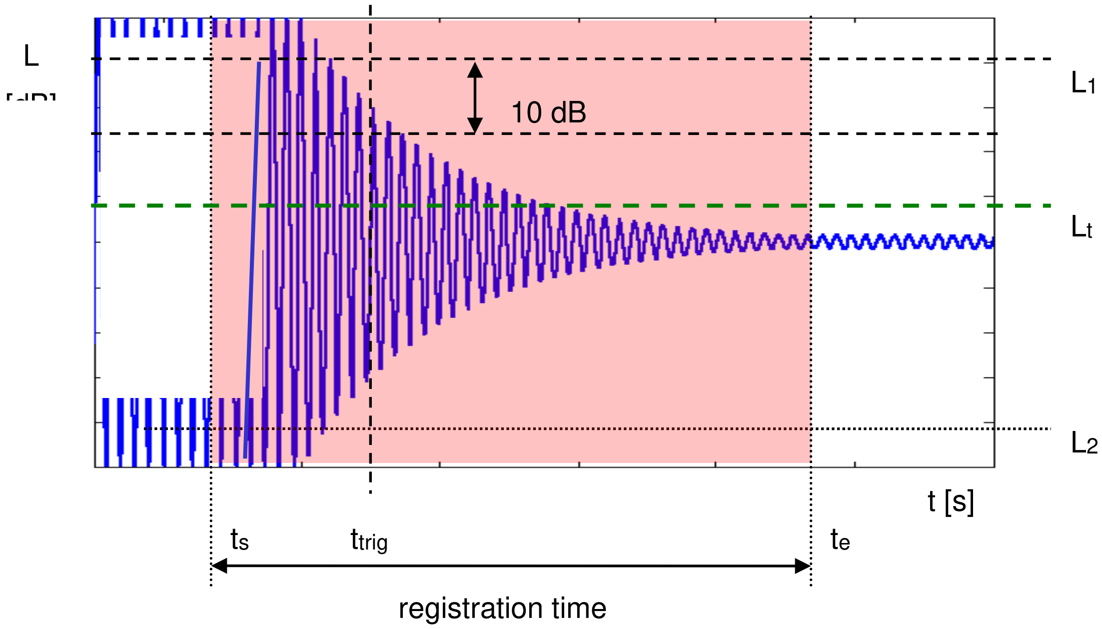


Fig 7. Data recording in the impulse method of the reverberation time evaluation

The measurement time in this method consists of:

- The time before marker t_{trig} in which the SVAN 958A analyser measures the actual sound pressure level and waits for the very high impulse sound pressure level which will fulfil the trigger condition. The trigger conditions will be fulfilled only when emitted impulse has maximal sound pressure level higher than L_t level (cf. Fig. 6). The L_t level in the SVAN 958A analyser is adjusted by parameter **Level** (*path: <Menu> / Input / RT60 Results*).
- The time between markers t_s and t_{trig} registered since the trigger condition fulfilment back till point t_s to allow recognising the beginning of the decay region. In the SVAN 958A instruments this time is equal to the **Time Step** (*path: <Menu> / Input / RT60 Results*) parameter value multiplied by 50.
- The time between markers t_{trig} and t_e registered since t_{trig} forward to record whole decay curve together with significantly long period of the noise level. This time in SVAN 958A instruments is adjusted by **Recording Time** (*path: <Menu> / Input / RT60 Results*) parameter.

The above graph shows that the proper setting of the **Recording Time** value is very important. The registration time has to be long enough to acquire sufficient number of background noise level values. In other case the decay curve region could not be properly analysed or decay region could not fulfil the dynamic condition mentioned above. It is recommended to set the **Recording Time** parameter two times longer than expected reverberation time.