SVANTEK

USER MANUAL

SVAN 958A

SOUND & VIBRATION ANALYSER

Warsaw, May 2015

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Notice: *This user's manual presents the software revision named for Level Meter Ver: 4.01.1 and for Analyzer Ver: 4.04.1 (cf. the description of the* ***Unit Label*** *position of the* ***Instrument*** *list). The succeeding software revisions (marked with the bigger numbers) can slightly change the view of some displays presented in the text of the manual.*

CONTENTS

1. INTRODUCTION

The **SVAN 958A** is digital, four channels 0.5 Hz to 20 kHz signal analyser including class 1 sound level meter (meeting **IEC 61672-1:2002**) and vibration meter (meeting **ISO 8041:2005**). It is an ideal choice for the "Human Vibration" (according to the **ISO 2631-1**, **2 & 5** and **ISO 5349-1 & 2** standards) and noise measurements in the occupational health and safety monitoring tasks. All required weighting filters, transducers and adapters for **triaxial Whole-Body** and **triaxial Hand-Arm** vibration measurements (**VM**) are available with this instrument.

Each of four channels can work simultaneously with independently configured input (transducer type), filters and RMS detector time constants (e.g. simultaneous three-axis measurement of the Whole-Body vibration and noise dose).

Four channels allow parallel measurements with independently defined filters and RMS detector time constants in every channel. Additionally, in the case of sound measurements (**SM**), each channel calculates simultaneously the results in three independent profiles. Each channel (and profile for **SM**) provides "multidimensional" analysis of measured signal (like **LEQ**, **LMax**, **LMin**, **LPeak**, **SPL**, **SEL** in the case of **SM** or **RMS**, **PEAK**, **PEAK–PEAK** (**P–P**), **VDV**, **MTVV** in the case of **VM**). Advanced time-history logging, in non-volatile **32 MB** internal memory, 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.

Using computational power of its digital signal processor the **SVAN 958A** instrument can perform advanced frequency analysis simultaneously to the meter mode:

- real time **1/1** or **1/3 octave** analysis including statistical calculations
- **FFT** analysis including cross spectra.

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 the **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 38V 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 61672-1:2002) in the frequency range 10 Hz ÷ 20 kHz (with the **SV 22** microphone)
- Measurement range: 17 dBA RMS ÷ 140 dBA Peak

- 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) - 15 filters with the centre frequencies from 1 Hz to 16 kHz, Type 1 - IEC 1260 and 45 filters with the centre frequencies from 0.8 Hz to 20 kHz, Type 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 (option)
- Reverberation Time analysis (**RT 60**) in 1/3 octave bands (option)
- **Cross Spectrum** function (option)
- **Sound Intensity** function (option)
- **Wave** recorder function (option)

1.2. SVAN 958A as Vibration Meter & Analyser

- Vibration measurements according to ISO 2631-1, 2 & 5 and ISO 5349-1 & 2 with Type 1 accuracy (ISO 8041:2005) in the frequency range 0.5 Hz÷3 kHz (with **SV 39A/L** accelerometer) or 2 Hz÷ 10 kHz (with **SV 3023 M2** accelerometer)
- Measurement range: 0.003 ms^{-2} RMS ÷ 500 ms^{-2} Peak (for the accelerometer with the sensitivity equal to 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) - 15 filters with the centre frequencies from 1 Hz to 16 kHz, Type 1 - IEC 1260 and 45 filters with the centre frequencies from 0.8 Hz to 20 kHz, Type 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 (option)
- **RPM** rotation speed measurements parallel to the vibration measurement (1 ÷ 99999) (option)
- **Wave** recorder function (option)
- **Ground Vibrations** function (option)
- **Cross Spectrum** function (option).

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)
- four **AA standard** (alkaline) batteries
- **SvanPC++** - download and viewing software for Windows 2000/XP/Vista/Win 8 operating systems

1.5. Accessories available

- **SV MK255** - Microtech Gefell Prepolarised condenser microphone cartridge 1/2' (stainless steel microphone), 50 mV/Pa
- **SV 12L** - microphone preamplifier
- **SA 08** - gooseneck for the microphone preamplifier
- **SC 26** - extension cable for the microphone preamplifier
- **SV 25** - (Type 2), dosimeter, ceramic ½" microphone with integrated preamplifier
- **SV 207_SO** - Building Vibration Measurement set (**SV 84** Outdoor accelerometer, mounting adapter with special levelling system, cable not included)
- **SV 38** - Whole-Body Seat Accelerometer for SVAN 958/A instrument
- **SV 3023M2** - IEPE type triaxial accelerometer from DYTRAN with the nominal sensitivity 10 mV / g (10 mV / g); **SC 38** cable required
- **SV 111** - Vibration calibrator for HVM
- **SC 50Z** - car cigarette plug to external power supply plug
- **SC 27** - TNC (plug) to TNC (plug) coil cable
- **SC 38** - 4-pins Microtech to LEMO 4-pins cable (2.7m) (for **SV 3023M2**, **SV 3233A**, **SV 3143M1**)
- **SC 39P** - LEMO 4-pins (plug) to 3 * BNC sockets cable
- **SC 49** - LEMO 4-pins (plug) to 3 * TNC sockets (0.7 m)
- **SC 282** - cable for **SV 207B** accelerometer in hermetic mounting box and **SVAN 958A** (5 m)
- **SV 48** - voltage to **IEPE** (**ICP**) converter
- **SV 50** - set for Hand-Arm measurements (**SV 3023M2** accelerometer with 10 mV/g sensitivity)
- **SV 55** - **RS 232** interface

- **SV 60** - sound measurements set (**SV MK255** microphone, **SV 12L** preamplifier **SA 08** goseneck and **SA 22** windscreen)
- **SA 17A** - external battery pack
- **SA 15** - power supply unit
- **SA 22** - windscreen
- **SA 277** - outdoor microphone kit
- **SA 270D** - desiccator for outdoor protection kits SA271, SA277, SA279
- **SA 47**- carrying bag (fabric material)
- **SA 48** - carrying case (waterproof)
- **SA 50** - Hand-Arm measurements adapter, shaped base (for **SV 3023M2** acceler.)
- **SA 51** - Hand-Arm measurements adapter, flat base (for the **SV 3023M2** acceler.)
- **SA 52** - Hand-Arm measurements , adapter, direct (for the **SV 3023M2** acceler.)
- **SA 154** - Calibration adapter for SV 84
- **SvanPC+ for Windows 98/2000/XP**

SVAN 958A instrument with the SV 207B building vibration kit

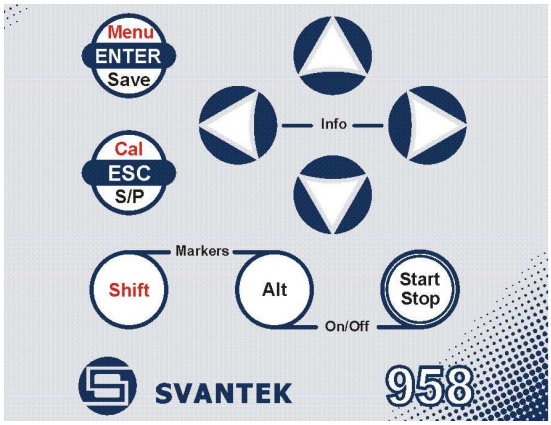
2. MANUAL CONTROL OF THE INSTRUMENT

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 push-buttons of the instrument has been reduced to nine for ease of use and convenience.

2.1 Control push-buttons on the front panel

The following control push-buttons 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 push-button function which is available after pressing it in conjunction (or in sequence) with the **<Shift>** push-button. For the first two push-buttons the name given in square brackets […] denotes also the third push-button function which is available after pressing it in conjunction (or in sequence) with the **<Alt>** push-button.

<Shift> The second function of a push-button (written in red colour on a push-button) can be used when the **<Shift>** push-button is pressed. This push-button 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 push-button must be pressed together (two finger operation);
- as **2nd Fun**; this push-button 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 push-button (one finger operation).

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

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

Notice: *Simultaneously pressing the **<Alt>** and **<Start/Stop>** push-buttons switches the instrument on or off.*

<Start/Stop> This push-button 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 push-button such that in order to start or stop the measurements the user has to press it simultaneously with the **<Shift>** push-button.

Notice: *Changing the **<Start/Stop>** push-button mode is performed in the **Keyboard Settings** list of the **Instrument** list (see description of the **Instrument** list).*

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

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

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

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

<◀>, <▶> These push-buttons 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 **<◀>**, **<▶>** push-buttons 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 **<◀>**, **<▶>** push-buttons 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 **<▲>**, **<▼>** push-buttons 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 **<▲>**, **<▼>** push-buttons 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.

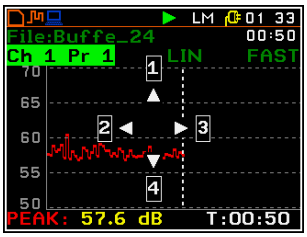
[<▲>, <▼>] The **<▲>**, **<▼>** push-buttons pressed in conjunction (or in sequence) with **<Alt>** enable the user specifically to:

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

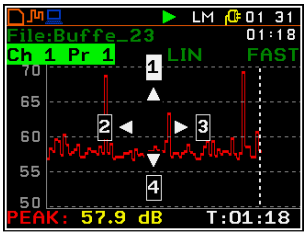
[Markers] The **Markers** enable the user to mark the special events, which occurred during the performed measurements (i.e. the airplane flight, the dog's barking, the train's drive etc.). In order to enter the markers the logger has to be switched on (*path: Menu / Input / Logger Setup / Logger Mode: 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>** push-buttons 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 - **<▼>**).

<Shift> / <Alt>



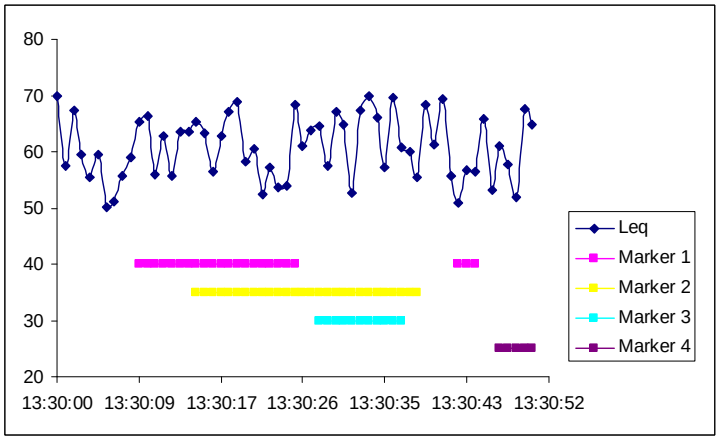
<▲>



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 push-button, 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.

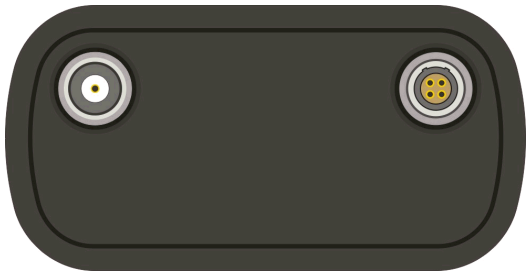
An example presentation of the markers on the time history plot is shown below (to view a plot with markers the user has to transfer data to the appropriate software such as SvanPC++).



2.2 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.

Notice: *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.

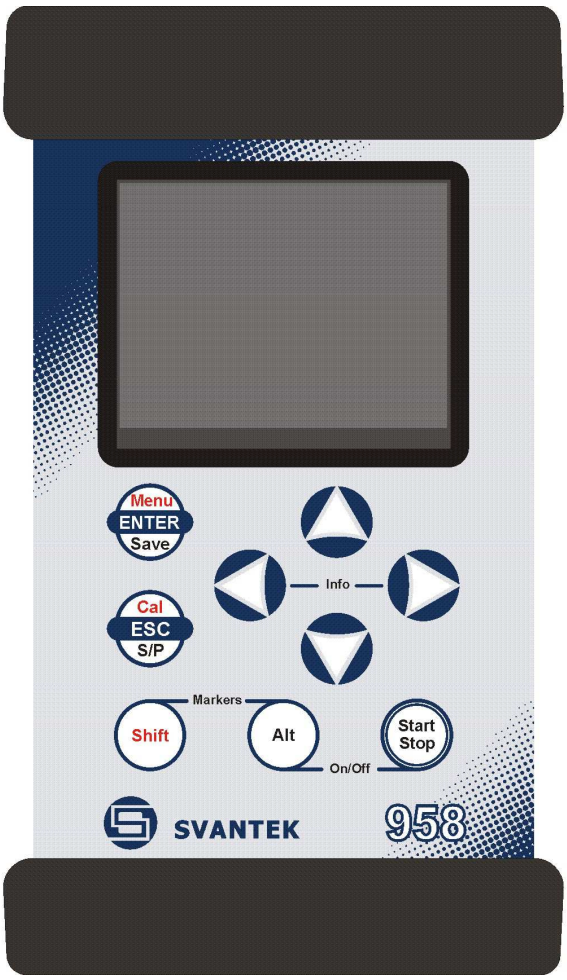
The additional input / output socket, called **I/O**, is 1-pin LEMO compatible socket type ERN.00.250 (the left one in the Fig. above). The function of this socket can be selected from menu *(path: <Menu> / Setup / EXT. I/O Setup / Mode).* The socket can be used as:

- 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)

Notice: *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

3. SETTING THE INSTRUMENT

In order to perform measurements using the instrument the user only has to connect the proper transducer(s) and to switch the power on by means of the **<Alt>** and **<Start/Stop>** push-buttons at the same time.

3.1. Basics of the instrument's control

The instrument is controlled by means of nine push-buttons on the keyboard. Using these push-buttons the user can access all available functions and change the value of all available parameters. The functions are placed in a system of lists and sub-lists.

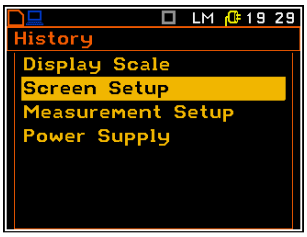
The instrument's menu consists of different type of windows, which include: main menu list, sub-menu list, option list, parameter list, text editor window, information window and file manager window with file command list.

Main menu

The main list contains the headers of seven lists, which also contain sub-lists or positions. The main list is opened after pressing the **<Menu>** push-button. This list contains the following sub-lists: **Function**, **Input**, **Display**, **File**, **Setup** and **Auxiliary Functions**.

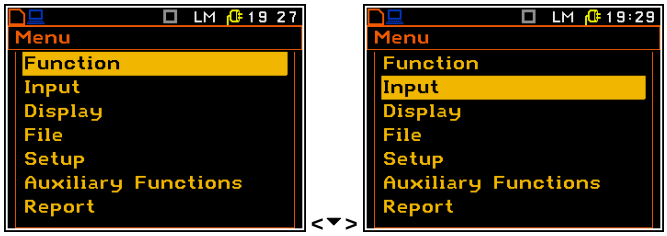
Recent Items list

The double pressing of the **<Menu>** push-button opens the **History** list, list of recently accessed menu items. This enables the user to access the most frequently used lists quickly, without the necessity of passing through the whole menu path.



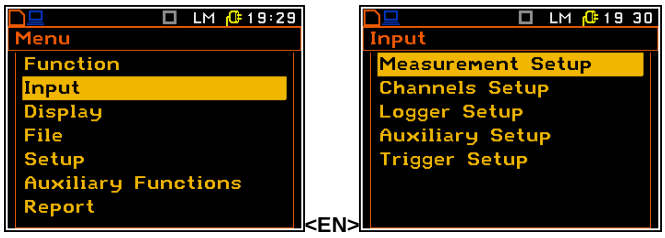
Position selection

The desired position in menu list is selected by means of the **<▲>** or **<▼>** push-button.



Entering position

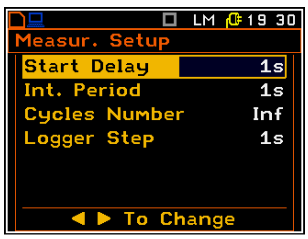
After the selection of the desired position in the menu list, the user has to press the **<ENTER>** push-button in order to enter it. After this operation a new sub-menu, option list, parameter list or information window appears on the display.



List of parameters

The parameter list contains parameters for which the user may select the value from the available range. Pressing the **<ENTER>** push-button enables the user to access the above mentioned sub-lists.

- The desired position in a list is accessed after pressing the **<▲>** or **<▼>** push-button.

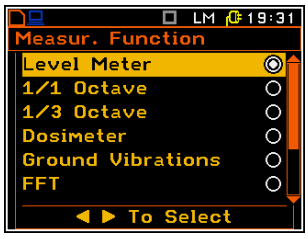


- The change of the value in a selected position is performed by the **< ◀ >** or **< ▶ >** push-buttons (or pressed together with **<Shift>**).

If the parameter has a numerical value the user may keep pressing the **< ◀ >** or **< ▶ >** push-buttons (or pressed together with **<Shift>**) longer than 1 second to speed up the selection. In this case the parameter starts to change automatically until the user releases the pressed buttons.

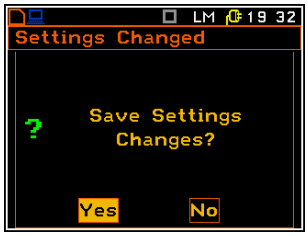
The user may change the numerical parameter value with a larger step (usually 10, 20) by means of the **< ◀ >** or **< ▶ >** push-buttons pressed together with **<Shift>**.

Option list



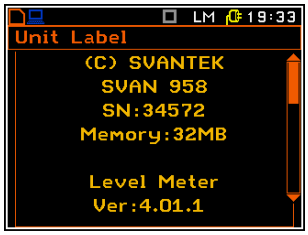
The option list consists of different options, from which only one may be selected. The selection of the option is performed as follows. The user has to highlight the desired option by means of the **<▲>** or **<▼>** push-buttons, mark it by **< ▶ >** push-button and then press **<ENTER>**. This option becomes active and the list is closed. When the user re-enters this list again, the last selected option will be marked.

In all cases the **<ENTER>** push-button is used for confirmation of the selection in a position and for closing the opened sub-list.



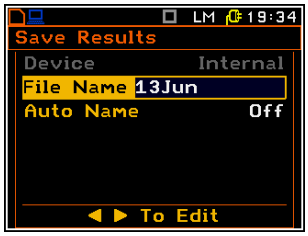
The sub-list is closed ignoring changes made in the list by pressing the **<ESC>** push-button with the user confirmation.

Information window



Some windows inform the user about the state of the instrument, available memory, none existing files or loggers, standards fulfilled by the unit, etc. In order to scroll through the list, the user has to use the **<▲>** or **<▼>** push-buttons. In order to close such a window, the user has to press **<ESC>**.

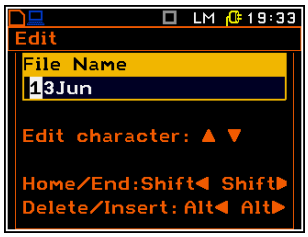
Text edition window



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 **< ◀ >**, **< ▶ >** push-buttons.
- The available ASCII characters can be changed using the **<▲>** or **<▼>** push-button. 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 push-buttons.
- One can insert or delete the position in the edited text using the **< ◀ >**, **< ▶ >** push-buttons pressed together with **<Alt>**.

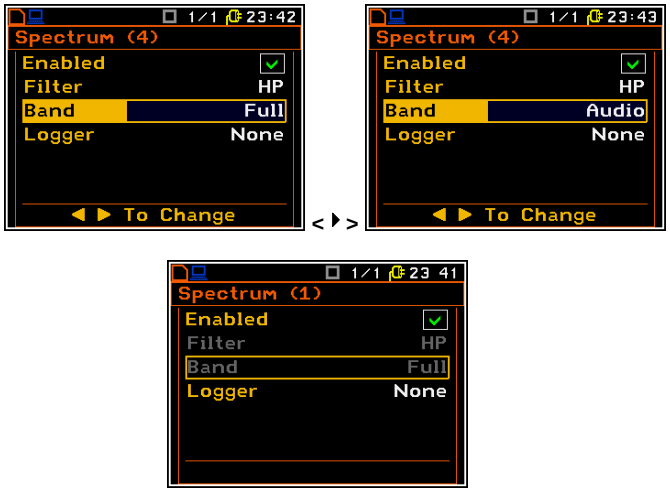
< ▶ >



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 not active.

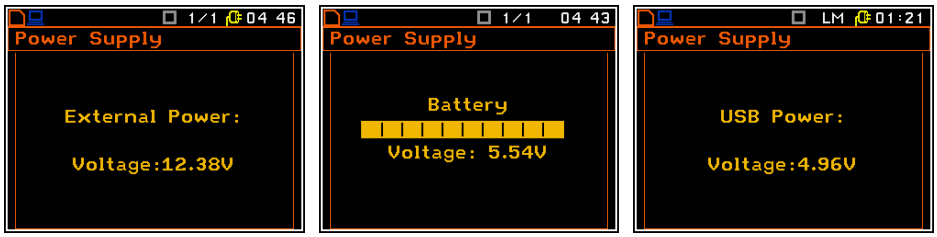


3.2. Powering of the instrument

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.

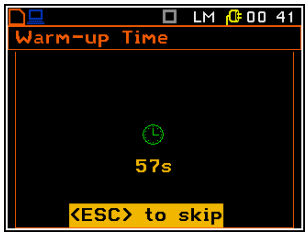
When there is a connection to the USB interface (USB Device socket is connected by means of the cable to a PC or a USB power supply), the **"Computer"** icon is presented on the top of the display and in the **Power Supply** list there is the message **USB Power: 0.00V**.

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)*.

Notice: *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!*

3.3. Initial Setup of the instrument

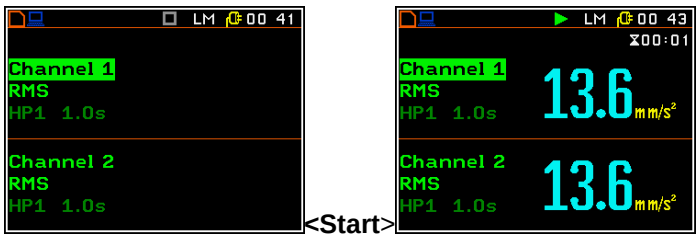
Switching the instrument on



To switch the power on the user should press the **<Alt>** and **<Start/Stop>** push-buttons at the same time. The instrument goes the self-test routine after switching on (displaying the manufacturer and the name of the instrument) and then it enters one of the indication mode (depending on which mode was used during the instrument's switch off).

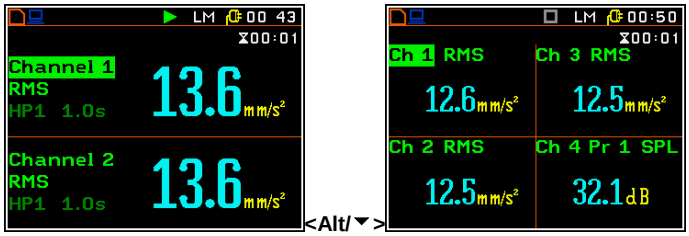
Press **<ESC>** to bypass the warm up time and go straight to the measurement start if required.

Starting measurement



To start a measurement the user has to press the **<Start/Stop**> push-button. The results of the measurement are displayed in the different measurement view modes. Two channel vew mode is always available for most Functions of the instrument.

Presentation modes



The results of the measurements can be also presented in the **4 -View**, **Statistics** and **Logger** modes. The user can switch the presentation modes by means of the **<▲>**, **<▼>** push-buttons pressed together with **<Alt>**.

The real time clock (analog clock) and the measurement time (hourglass) are presented in the upper right corner of the display. The measurement time is displayed in minutes and seconds in the range from 1 sec. to 39 minutes and 59 seconds. After this limit, the hours and minutes are shown (i.e. 00:59).

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

Default settings measurements:

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; **130 dB** 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*

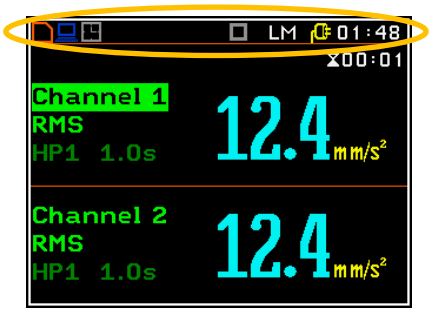
Channels Setup / Channel x). The instrument remembers all made changes. Return to the default settings (set up by the manufacturer) is possible after the execution of the **Factory Settings** position available in the **Auxiliary Setup** list.

3.4. 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:

	**"play"** icon is displayed when the measurement is started.		**"plug"** icon is displayed when the instrument is powered from the external source.
	**"stop"** icon is displayed when the measurement is stopped.		**"Internal memory"** icon is displayed when internal memory is assigned for file saving.
	**"pause"** icon is displayed when the measurement is paused.		**"Shift"** icon is displayed when the **<Shift>** push-button is pressed.
	**"antenna"** icon is displayed when the wireless transmission is active (**GPRS** is active).		**"RS232"** icon is displayed when the RS232 port is activated.
	**"computer"** icon is displayed when there is a successful USB connection with the PC.		**"curve"** icon is presented when the current measurement results are logged in the instrument's logger file.
	**"arrow up"** icon is displayed when overload appears.		**"Trigger Level +"** icon is displayed when the trigger condition is set up to „**Level+**". The icon appears alternately with the „play" icon.
	**"arrow down"** icon is displayed when under range appears.		**"Trigger Level –"** icon is displayed when the trigger condition is set up to „**Level-**".
	**"interface"** icon is displayed when USB disc is assigned for file saving. USB disc is connected and activated.		**"Trigger Slope +"** icon is displayed when the trigger condition is set up to „**Slope+**".
	**"tone"** icon is displayed during wave recording and event recording.		**"Trigger Slope –"** icon is displayed when the trigger condition is set up to „**Slope-**"
	**"Trigger Gradient"** icon is displayed when the trigger condition is set up to „**Gradient**"		**"Trigger RTC"** icon is displayed when the trigger condition is set up to „**RTC**"

	**"clock"** icon is displayed when the timer is **On**. Is active when the instrument is waiting for the measurement start up to occur. When the measurement start up is close, the icon changes its colour to green and starts to blink.		**"battery"** icon is displayed when the instrument is powered from the internal batteries. 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.

Notice: *In* ***SVAN 958A "Battery"*** *icon is displayed if we use an internal battery device (four AA batteries). When the meter is powered by external power supply, the* ***"Battery"*** *icon is not displayed on the screen.*

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

INDICATOR	105 dB range	130 dB 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

The 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 $\mu m/s^2$):

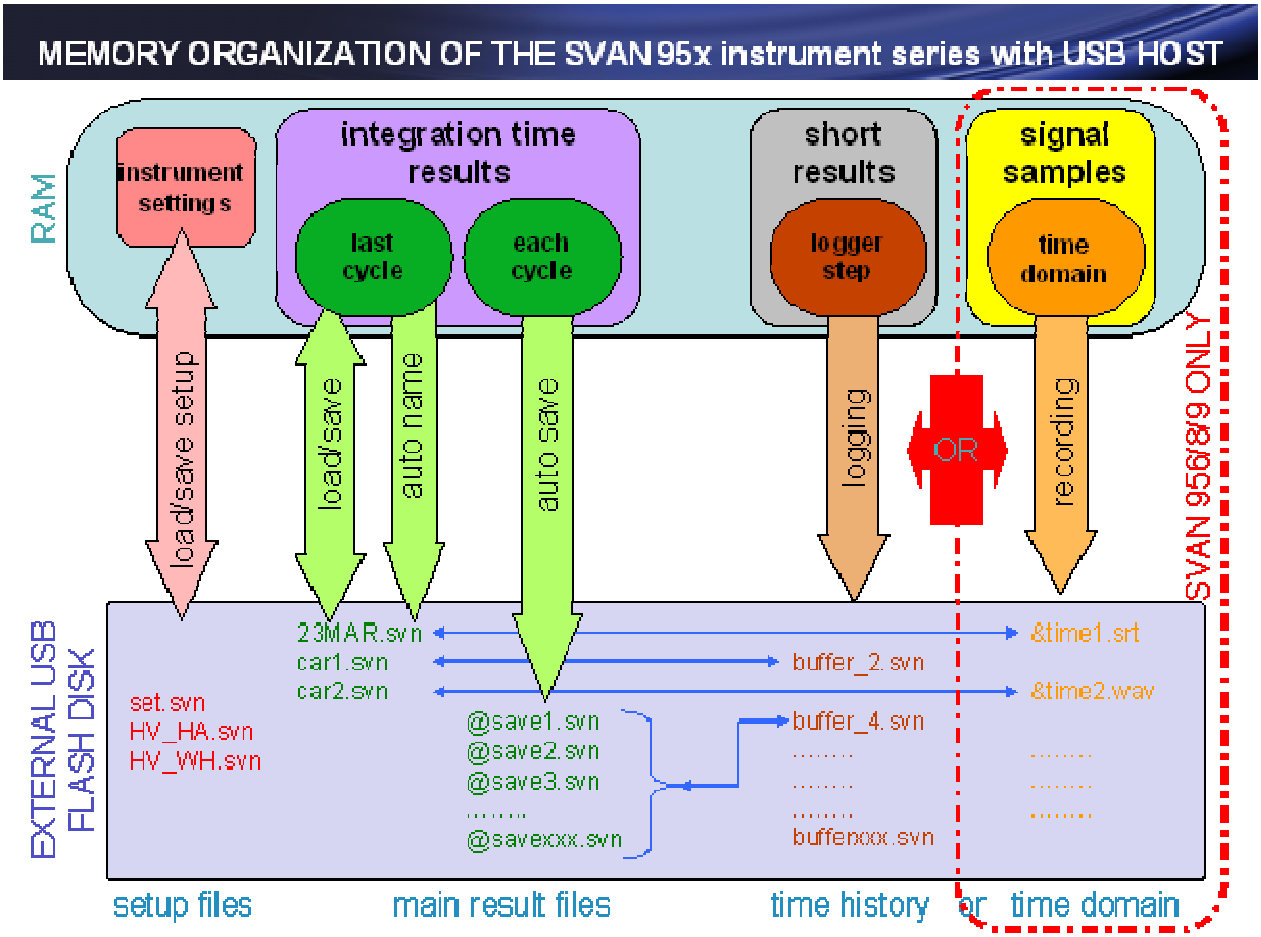
INDICATOR	**VLM**, **1/1 Octave**, **1/3 Octave** or **FFT ANALYSIS**	
	17.8 m/s² range **145 dB range**	**316 m/s² range** **170 dB range**
	≥ 53.1 m/s² ≥ 154.5 dB	≥ 750 m/s² ≥ 177.5 dB

Notice: *In* ***SVAN 958A "Battery"*** *icon is displayed if we use an internal battery device (four AA batteries). When the meter is powered by external power supply, the* ***"Battery"*** *icon is not displayed on the screen.*

3.5. 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.

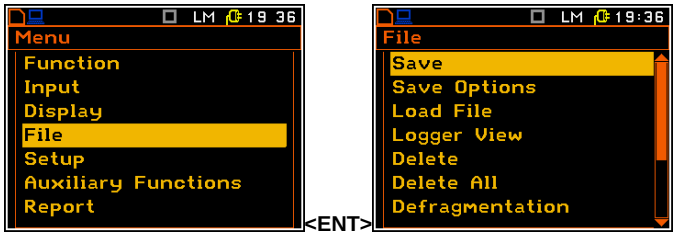


The instrument supports several file types: for main results, for logger results, for wave and for the instrument settings. More detailed the file sytem of the instrument is described in the **File** menu chapter.

Notice: *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).*

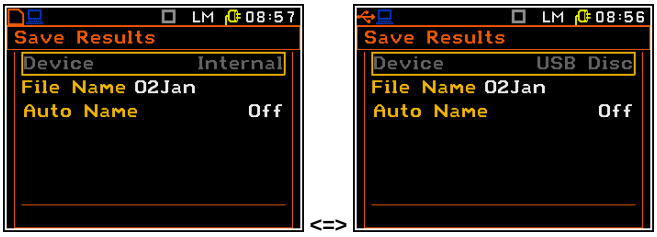
Notice: *The* ***logger*** *files are created automatically (the usage of the* ***Save*** *is not required).*

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.

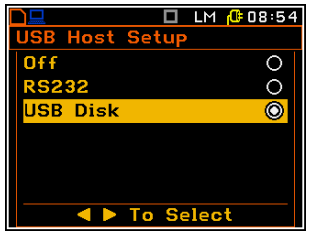


The **Device** position in the **Save** list (*path: <Menu> / File / Save*) shows the memory type currently active in the instrument.

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*).

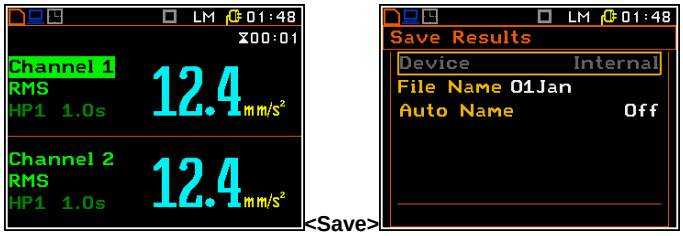


Notice: *The USB disk when connected to the* ***USB Host*** *socket switches off the instrument's internal flash memory. All file functions and remote commands are redirected to the USB disk. The internal flash memory is activated after disconnecting the USB disk from the instrument.*

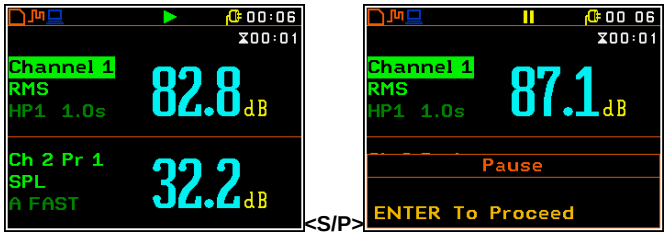
Notice: *The disconnection of the USB disk during the data transmission can cause the lost of data saved in the USB disk as well as in the instrument's internal flash memory.*

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

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



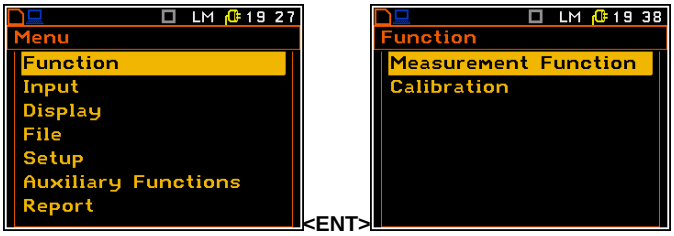
The **<S/P>** push-button, pressed during the measurement run activates pause. To continue the measurement the user should press **<ENTER>**.



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

4. 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>** push-button, select the **Function** text and press **<ENTER>**.



The **Function** list consists of:

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

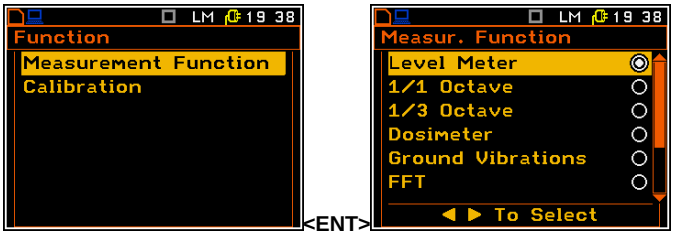
Calibration enables the user to perform a calibration of instrument's measurement channels.

4.1. 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.



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

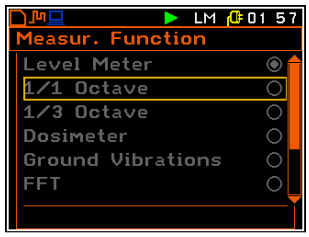
- ***LM*** ***Level Meter***,
- ***1/1*** ***1/1 Octave***,
- ***1/3*** ***1/3 Octave***,
- ***FFT*** ***FFT***,

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.

- ***Dos*** ***Dosimeter***,
- ***GV*** ***Ground Vibrations***,
- ***C-S*** ***Cross Spectrum***,
- ***INT*** ***Sound Intensity***,
- ***RT60*** ***RT60***,
- ***Wave*** ***Wave Recorder***.

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

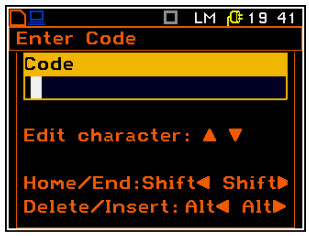
Notice: *It is not possible to change the measurement function during a measurement run. In this case all other functions are blocked. In order to change the mode of the instrument the current measurement in progress must be finished!*



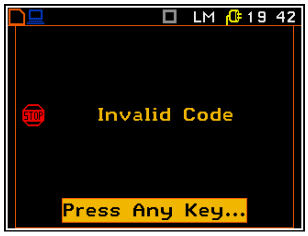
4.2. Activation of optional functions

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 in the first essay of its execution (after pressing the **<ENTER>** push-button). 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>** push-button. 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>** push-button the information that the function is not available is displayed and the instrument once more waits for the reaction of the user.

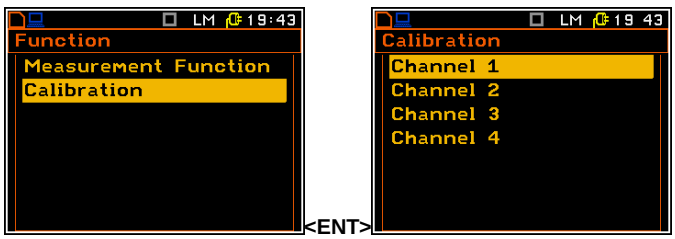


Notice: *The number of the attempts for the access code entering is limited. After three unsuccessful essays, the possibility is blocked.*

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

4.3. 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. In order to select the calibration function the user has to enter the **Calibration** sub-list.

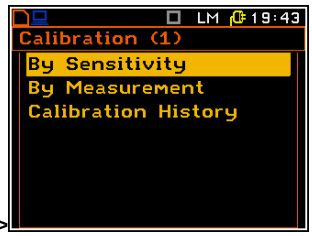


The **Calibration** list consists of four positions: **Channel 1**, **Channel 2**, **Channel 3** and **Channel 4**, which are used for the individual calibration of each channel of the instrument.

4.3.1. Calibration of the instrument channels – Channel x

The **Channel x** sub-list consists of three positions: **By Sensitivity**, **By Measurement**, which are used to perform the calibration and used for checking the parameters of the previous calibrations.

<ENT>



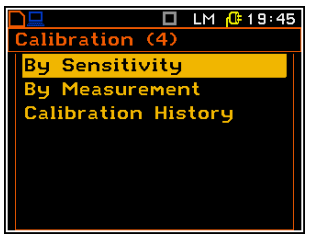
Notice: *The calibration factor is always added to the results in all instrument function.*

Notice: *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).*

Notice: *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!*

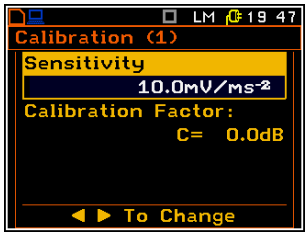
4.3.2. Calibration by transducer's sensitivity – By Sensitivity

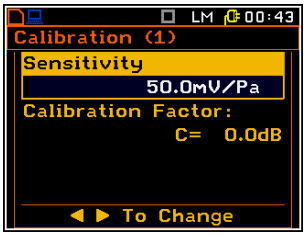
Calibration by introducing the transducer's (microphone or accelerometer) individual sensitivity can be performed in the following way:



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

2. Set the sensitivity of the transducer using information taken from its calibration certificate using the **< ◀ >, < ▶ >** push-buttons (or combination of the **<Shift>** and **< ◀ >, < ▶ >** push-buttons).

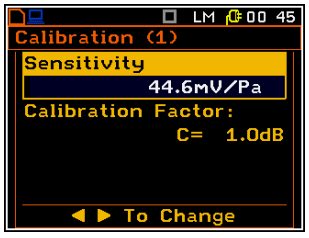




In case of accelerometer the calibration factor is calculated automatically, in the relation to **10.0mV/ms^{-2}**.

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.

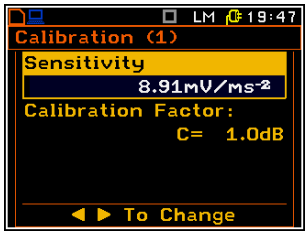


The lowest applicable value of the sensitivity to be introduced is equal to **50.0µV/Pa** (it conforms to the calibration factor equal to **60.0dB**) and the greatest one – **50.0V/Pa** (calibration factor equal to **-60.0dB**).

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.

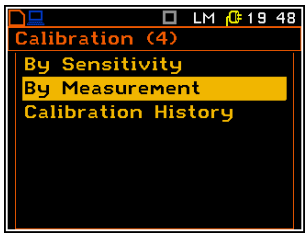
The lowest applicable value of the sensitivity to be introduced is equal to **10.0µV/ms^{-2}** (it conforms to the calibration factor equal to **60.0dB**) and the highest one is equal to **10.0V/ms^{-2}** (calibration factor equal to -**60.0dB**).



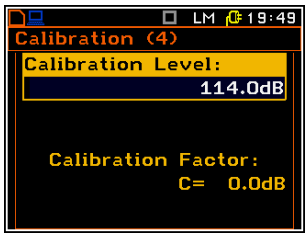
3. Press **<ENTER>** to save the selected calibration factor. Press **<ESC>** to return to the **Calibration** sub-list without saving any changes made in this list.

4.3.3. Calibration by measurement –By Measurement

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

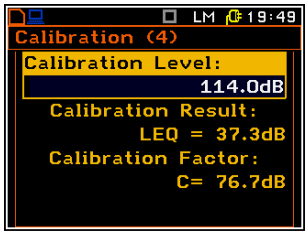


1. Select the calibration by measurement (highlight the **By Measurement** text) from the **Calibration/Channel x** sub-list and press **<ENTER>**.



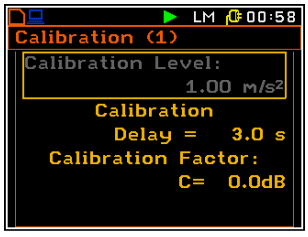
2. Mount the the instrument's accelerometer to vibration calibrator or attach the acoustic calibrator **SV 30A** (or equivalent 114 dB / 1000 Hz) to the instrument's microphone.
3. Switch on the calibrator and wait approximately 30 seconds before starting the calibration measurement.

<Start>



4. Start the calibration measurement by pressing the **<Start/Stop>** push-button.

Notice: *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 <◄>, <►> push-buttons) 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/s^2).*



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>** push-buttons do not operate but it is possible to stop the measurement using the **<Start/Stop>** push-button. 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.

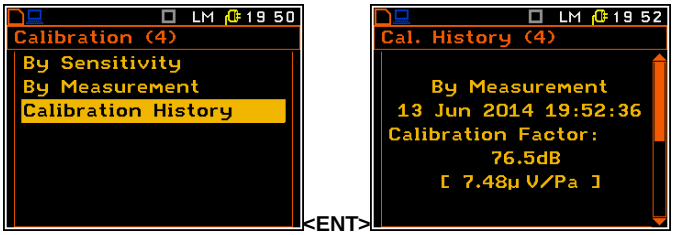
Notice: *During the calibration measurement, the external disturbances (vibrations or acoustic noise) should not exceed a value of 100 dB.*

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

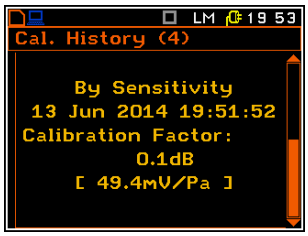
The calibration factor is calculated, stored and displayed after pressing the **<ENTER>** push-button.

4.3.4. History of the calibrations – Calibration History

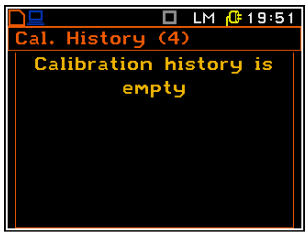
The **Calibration History** position opens the **Cal. History** list, which displays up to ten last calibration records for the selected channel.



In order to review the calibration record, the user has to use the **<▲>**, **<▼>** push-buttons. 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.

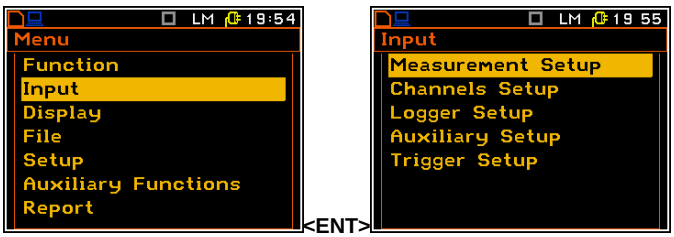


If calibration measurements were not performed the **Cal. History** list does not contain any records. The content of this list is cleared after the **Clear Setup** operation.

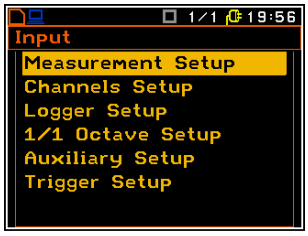


5. MEASUREMENT PARAMETERS SETTING – Input

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>** push-button, selecting the **Input** text and pressing **<ENTER>**.



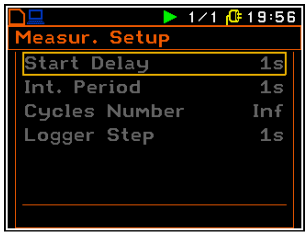
The **Input** list content depends on the function selected in the **Measurement Function** list and some additional positions appears if **1/1 Octave**, **1/3 Octave**, **Dosimeter**, **FFT** or **RT60** are selected respectively: **1/1 Octave Setup**, **1/3 Octave Setup**, **Dosimeter Setup**, **FFT 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 1/1 octave analysis. Position appears only when **1/1 Octave** function is selected;
1/3 Octave Setup	enables the user to set the parameters of 1/3 octave analysis. Position appears only when **1/3 Octave** function is selected;
FFT Setup	enables the user to set the parameters of FFT analysis. Position appears only when **FFT** function is selected;
RT60 Setup	enables the user to set the parameters of reverberation time measurement. Position appears only when **RT60** function is selected;
Dosimeter Setup	enables the user to set the parameters of dosimeter function. Position appears only when **Dosimeter** 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.

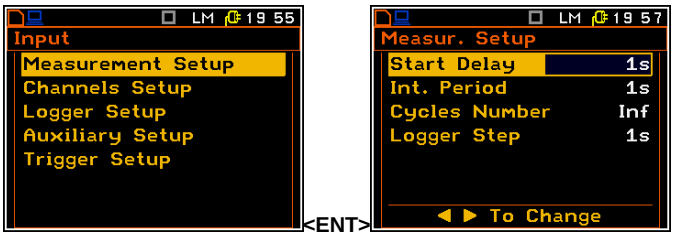
Notice: *Any parameter in the lists of the* ***Input*** *menu can be changed only when the instrument is not making a measurement. The parameters are displayed in a frame and any change of it is impossible. The "****play****" icon in the top line indicates that the instrument is performing the measurements.*



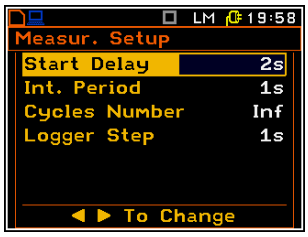
Notice: *The vibration parameters can be presented in* ***Logarithmic*** *(decibels) or* ***Linear*** *(m/s^2) units. It depends on the* ***Display Scale*** *position value (path: <Menu> / Display / Display Setup / Channel x / Display Scale), e.g. 10 m/s^2 can be presented as 140 dB.*

5.1 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**).



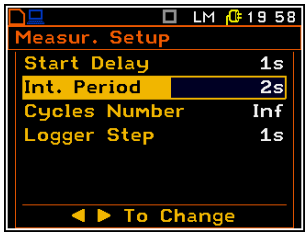
Setting time delay before the start of measurements



The **Start Delay** parameter defines the delay period from the moment the **<Start/Stop>** push-button 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**.

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

Setting the 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).

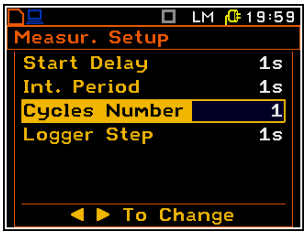
It is also possible to set **Inf** value. The **Inf** value denotes the infinite integration of the measurements (until the **<Start/Stop>** push-button is pressed again or after receiving the remote control code).

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 **< ◄ >** push-button or **< ◄ >** with **<Shift>**; these values are placed in the sequence mentioned above on the left in relation to **1 s**).

Notice: *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.

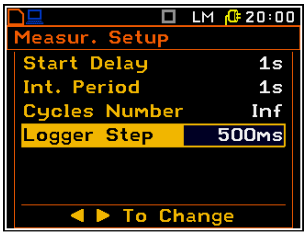
Setting the number of repetition of measurement cycles



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>** push-button or after receiving the remote control code).

Setting 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.

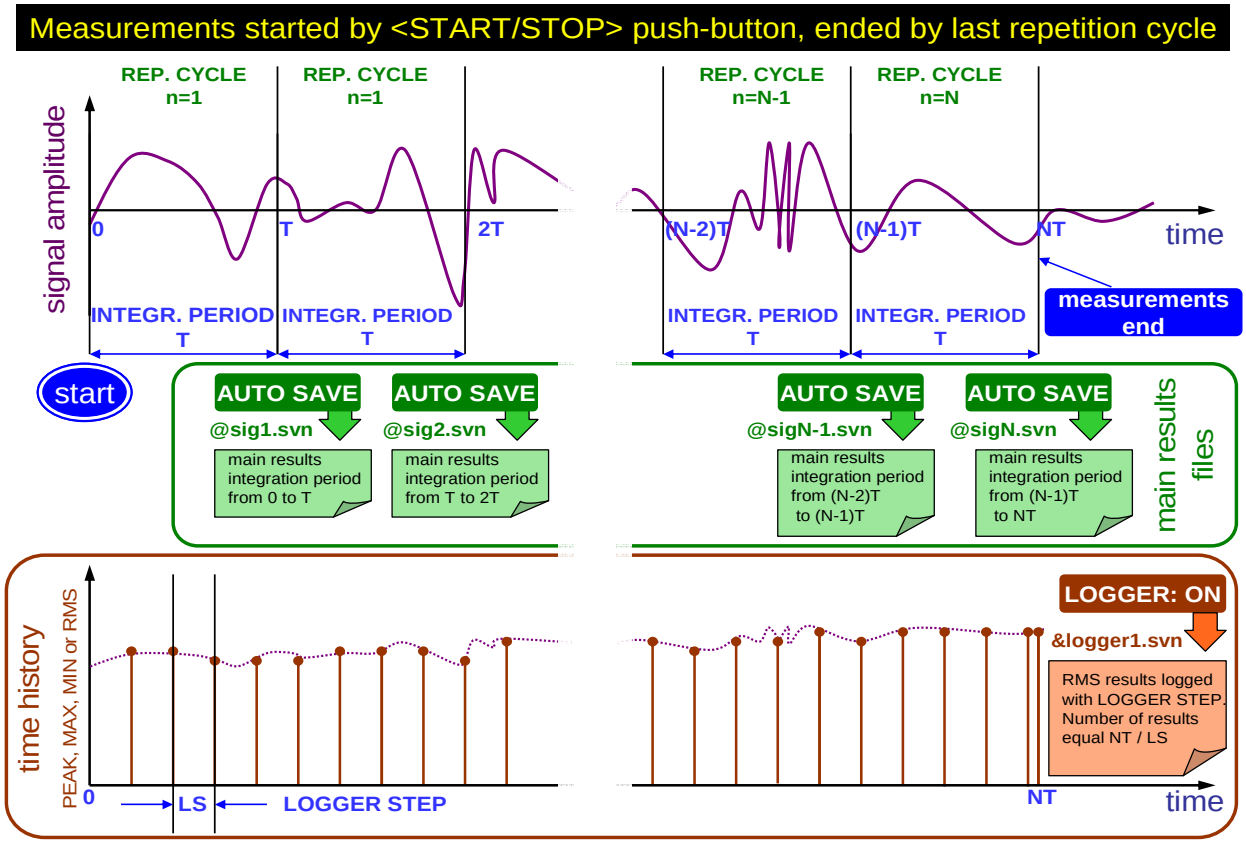
The main measurement results (depending on the sound or vibration mode measurements) can be saved in the result files of the instrument's memory by means of the **Save** or **Auto Name** function (*path: <Menu> / File / Save*). The structure of the files is described in App. B. In case when **Int. Period** 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.

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 **<Start/Stop>** or after stopping the measurement process remotely.

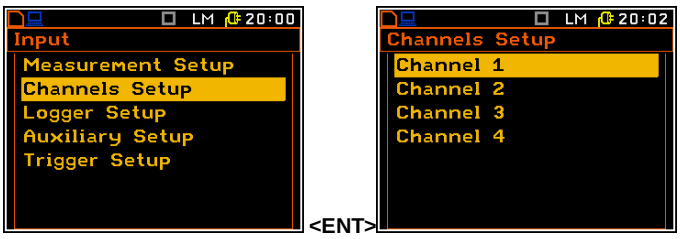


Relations between Measurement Cycle (Integration Period) and Logger Step

5.2 Setting parameters in a channels – Channels Setup

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

In the **Channel x** sub-list the following parameters can be programmed independently for each channel: **Mode** (**Sound** or **Vibration**) and measurement range (**Range**).

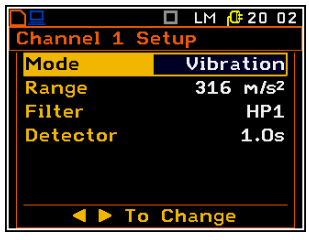


Notice: *Changing the channel parameters is not possible when the measurement is started. The user has to finish the current measurement.*

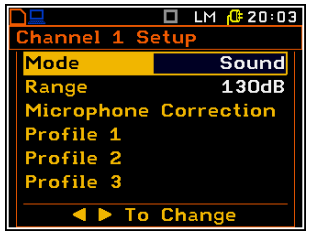
Selection of measurement mode for sound or vibration

In the **Mode** the user can select the mode of measurements for selected channel. Two modes are available: **Vibration** and **Sound**.

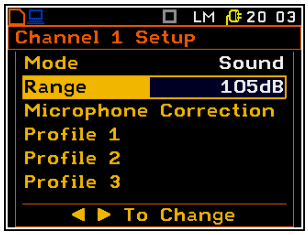
In case of vibration mode, the user can select measurement range (**Range**), weighting filter (**Filter**) and detector time constant (**Detector**) in the same list.

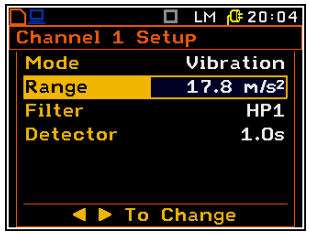


In case of sound mode, the user can select measurement range (**Range**), correction for used microphone (**Microphone Correction**) and to set weighting filter (**Filter**) and detector time constant (**Detector**) for three profiles in a special list (**Profile x**).



Measurement range setting



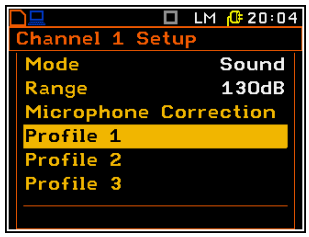


The **Range** is used to set one of the available measurement ranges in the instrument:

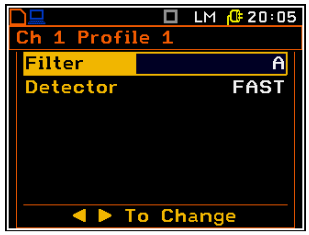
- for acustic sygnal: 24dB – 115dB (**105dB**) or 45dB – 140dB (**130dB**);
- for vibration sygnal: **17.8 m/s²** и **316 m/s²**.

More detailed the ranges are described in the Appendix C.

Weighting filter selection in a profile



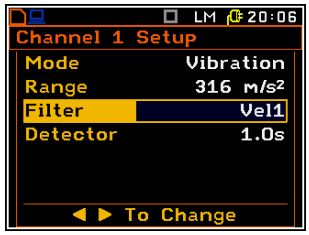
<ENTER>



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** type 1 according to the IEC 61672-1 standard,
- **A** type 1 according to the IEC 651 and IEC 61672-1 standards,
- **C** type 1 according to the IEC 651 and IEC 61672-1 standards,
- **G** type 1 according to the ISO 7196 standard.



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

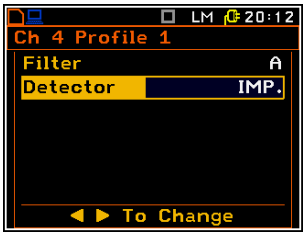
- **HP1**, **HP3**, **HP10**, **W-Bxy**, **W-Bz**, **H-A**, **W-Bc**, **KB**, **Wk**, **Wd**, **Wc**, **Wj**, **Wm**, **Wh**, **Wg**, **Wb** and **Wv** (for acceleration measurement);

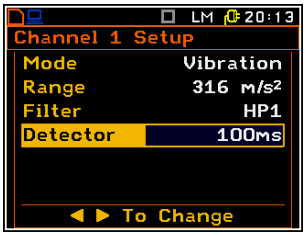
- **Vel1**, **Vel3**, **Vel10** and **VelMF** (for velocity measurement);

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

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

RMS detector selection



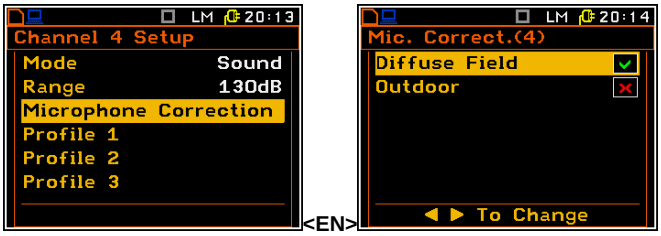


The following RMS detectors are available:

- **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).

Setting the parameters of microphone

This position is available in **Sound** mode and opens a list which enables the user to select **Diffuse Field** or **Outdoor** filter correction.

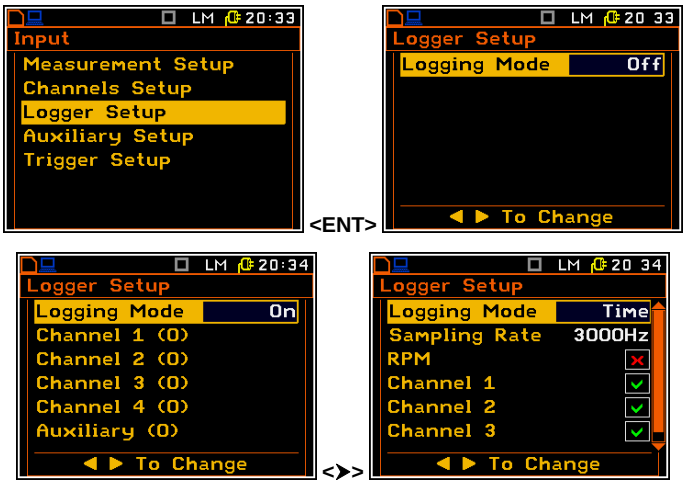


5.3 Setting the data logging functionality – Logger Setup

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.

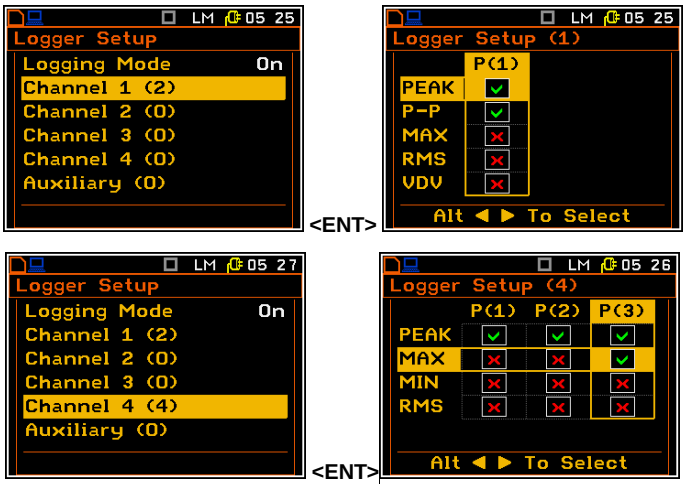
Time mode activates low sampling rate time-domain signal recording to the logger file. This option is additional and usually requires a special activation code.



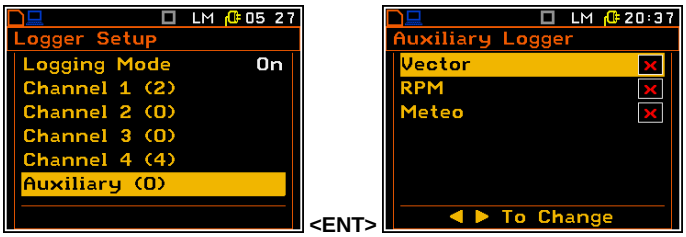
Selection of time-history results to be logged

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**.

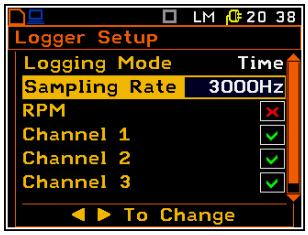
Up to five measurement results: **PEAK**, **P–P**, **MAX**, **RMS**, **VDV** in case of vibration measurements and up to four results from each profile: **PEAK**, **MAX**, **MIN** and **RMS** in case of sound measurements can be saved in the logger's file of the instrument.



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

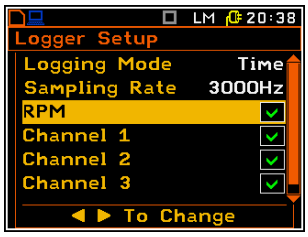


Selecting parameters of low sampling rate time-domain signal recording



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: **48 kHz, 12 kHz, 6 kHz, 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.

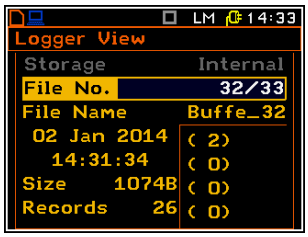


It is also possible to save **RPM** results switching on the **RPM** position.

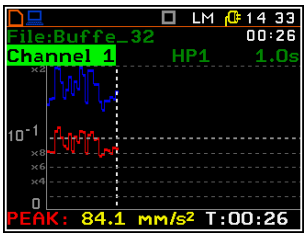
To save **RPM** measurement results the user has to enable the **RPM** function in the **Auxiliary Setup** list (*path: Menu / Input / Auxiliary Setup / RPM Setup / Enabled: [x]*) and change **Ext.I/O** settings into **Digital In** (*path: <Menu> / Setup / Ext. I/O Setup / Mode: Digital In*).

Positions **Channel x** enable the user to select the channels from which the time-domain signal is to be recorded.

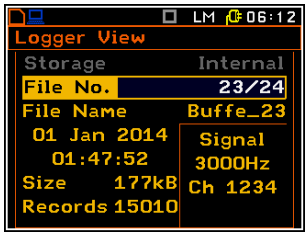
The results from selected channels are recorded in the logger files, which can be viewed in the **Logger View** list (*path: <Menu> / File / Logger View*).



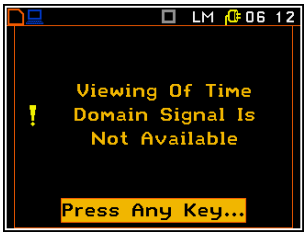
<ENT>



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.

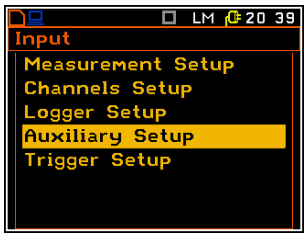


<ENT>

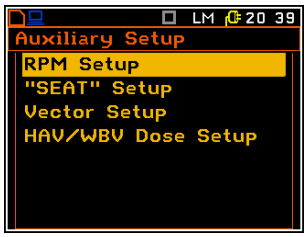


5.4 Setting parameters of auxiliary functions - Auxiliary Setup

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**).

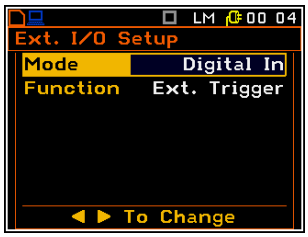


<ENT>

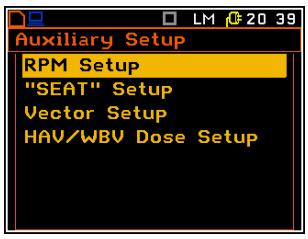


5.4.1 Setting the RPM measurement - RPM Setup

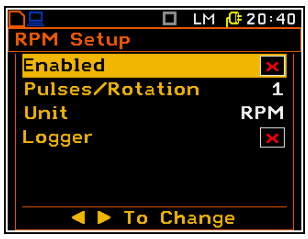
To perform the RPM measurement the RPM probe should be connected to the **I/O** socket and the I/O mode should be defined as **Digital In** (*path: <Menu> / Setup / Ext. I/O Setup / Mode*).



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

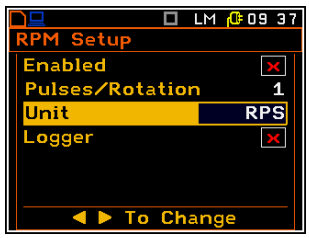


<ENT>

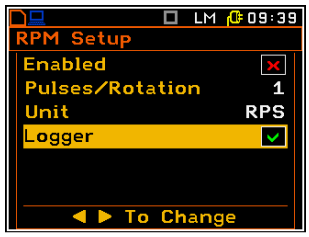


The **Pulses/Rotation** enables the user to select the number of pulses / rotations during **RPM** measurement. Available values are as follows: **1**, **2**, **.. 360**.

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.

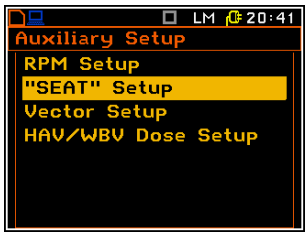


The **RPM** measurement results can be saved in the logger's file of the instrument. The activation is made by switching on the **Logger** position. The activation is possible when the **Logger** functionality is switched on in the **Measurement Setup** list *(path: <Menu> / Input / Measurement Setup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



5.4.2 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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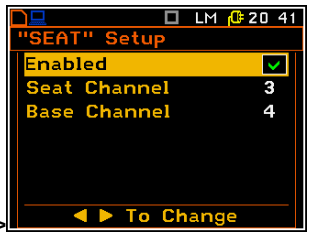
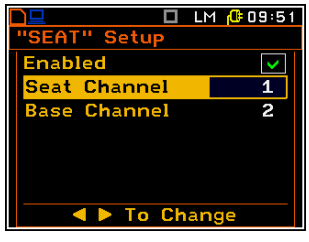


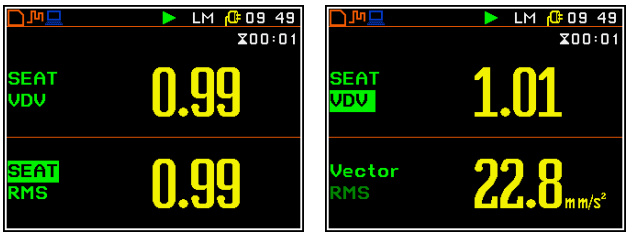
In the **Seat Channel** position the user can select the "seat" channel for attenuation measurements.

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



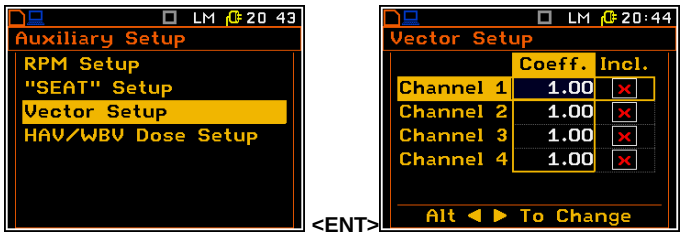
The **SEAT** results are presented in the double results presentation mode. The results are calculated by dividing **RMS** or **VDV** result from **Seat Channel** by **RMS** or **VDV** result from **Base Channel**.

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



5.4.3 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**.



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

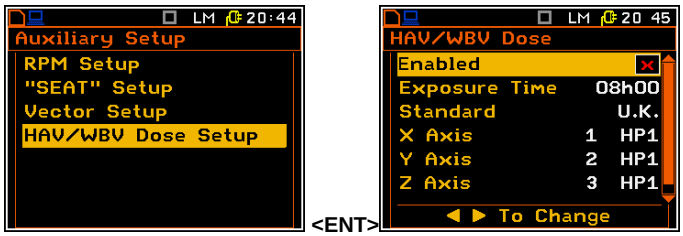
$$\text{VECTOR} = \sqrt{k_1 x_1^2 + k_2 x_2^2 + k_3 x_3^2 + k_4 x_4^2}$$

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.

5.4.4 Setting the parameters for dose measurements - HAV/WBV Dose Setup

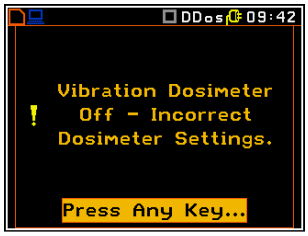
The **HAV/WBV Dose Setup** position enables the user to set the parameters of hand-arm and whole-body vibration dose measurements.

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.



Notice: *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:

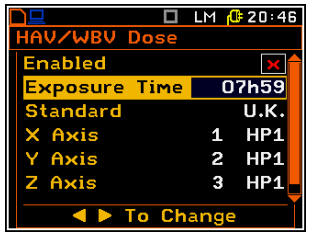
Hand-Arm vibration dose:

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

Whole-Body vibration dose:

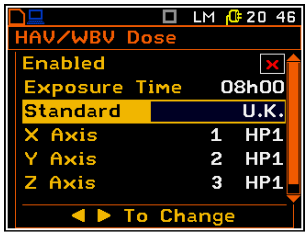
- **Wd** for **X** axis
- **Wd** for **Y** axis
- **Wk** for **Z** axis.

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].

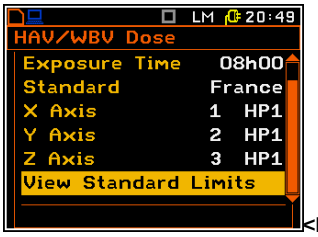


The **Standards** position enables the user to set the standards for the measurements of the **HAV/WBV Dose** results. The available values of this position are **U.K.**, **Italy**, **Poland**, **France** and **User**.

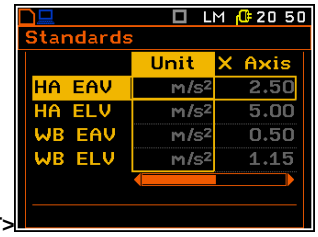
The **X Axis**, **Y Axis**, **Z Axis** positions enable setting of proper channels to be taken for calculation of the **HAV/WBW Dose** results.



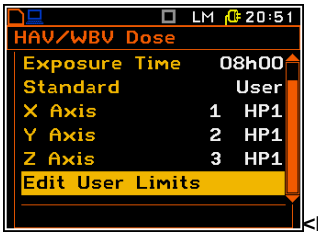
The **View Standatd Limits** position enables the user to see what are the limits used by selected country standard.



<ENT>



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



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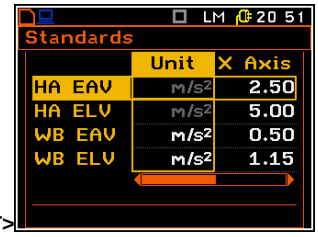
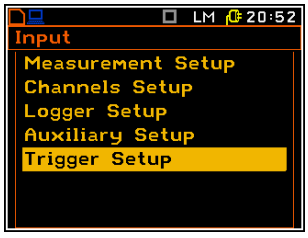
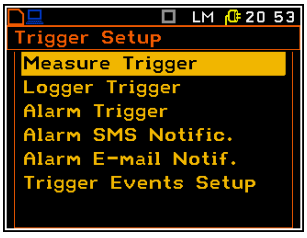


5.5 Triggering mode and parameters selection - Trigger Setup

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



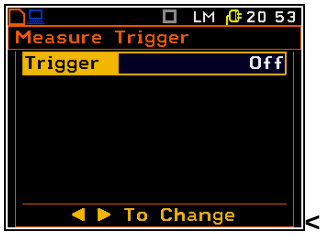
<ENT>



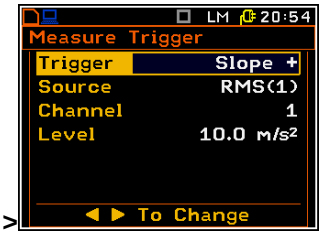
5.5.1 Measurement trigger setup – Measure Trigger

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

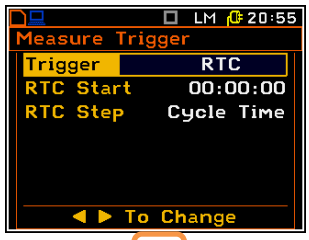
the conditions set in the **Measurement Setup** sub-list are fulfilled, after pressing the **<Start / Stop>** push-button or after receiving the proper control code remotely.

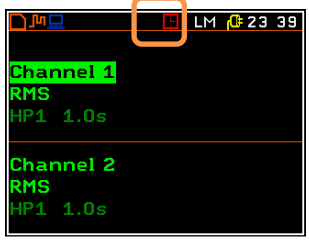
In case the **Level +** is selected, in each second of the measurement the triggering condition is checked; the measurement is registered only when the **Source** value has the greater level than this determined by the **Level** position and in other cases the measurement result is skipped.

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*).

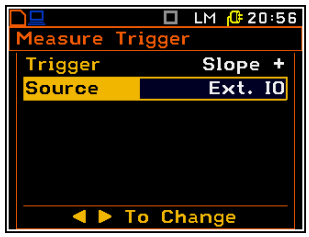




Notice: *If the instrument works with the switched on triggering, the appropriate icon will appear in the upper the displayline and an icon will stay untill the triggering condition fulfilled.*

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**.

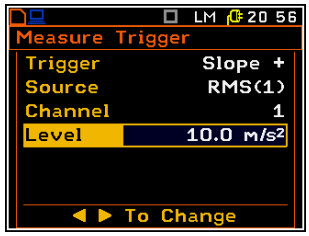


In case of **Grad +** mode only the output signal from the RMS detector coming from the first profile of the selected channel can be used as a source of triggering signal (**RMS(1)**).

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.

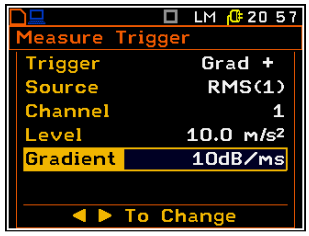


Setting the level of the triggering signal

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/s²** to **10.0 km/s²** for vibration signals.

Setting the speed of the triggering signal changes

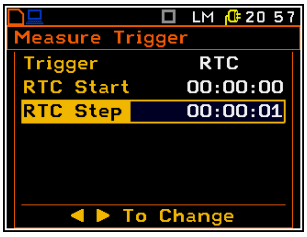
The speed of the triggering signal changes (**Gradient**) can be set in the range of **1 dB/ms** to **100 dB/ms**.



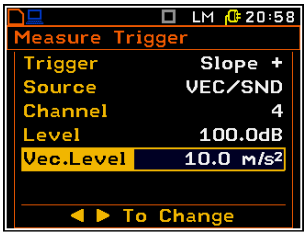
Setting the start time of triggered measurement

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*).



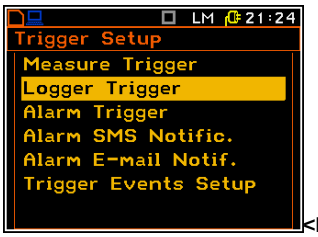
In case the **VEC/SND** is selected as a trigger **Source** the **Vec.Level** position defines the level of the triggering source.



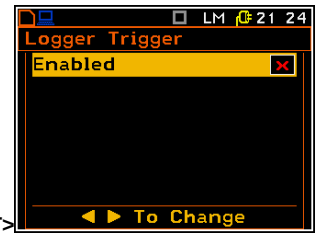
5.5.2 Logger trigger setup – Logger Trigger

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

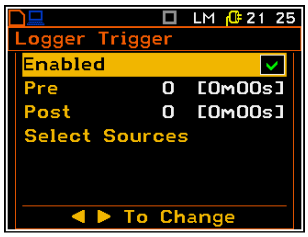
The **Logger Trigger** parameters define the way the measurement results are saved in the logger.



<ENT>



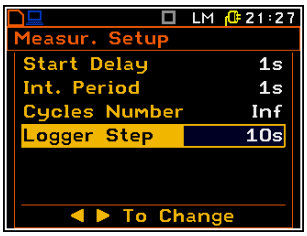
In the **Logger Trigger** sub-list the user may switch off or on (**Enabled**) the logger triggering, determine the parameters of the triggering signal (**Select Source**), select the number of the results saved in the logger before the fulfilment of the triggering condition (**Pre**) and the number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



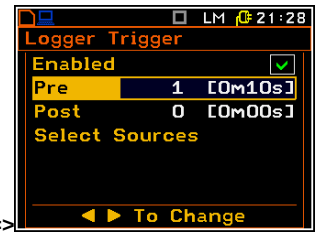
- the measurement results registered directly before the fulfilment of the triggering condition. Time of this recording can be calculated by multiplying the value set in the **Pre** position by the time period taken from the **Logger Step** position (*path: <Menu> / Input / Measurement Setup*);
- all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

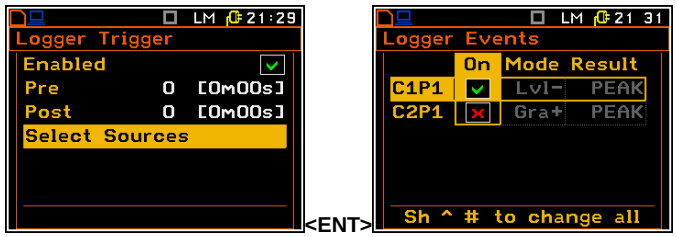


=>



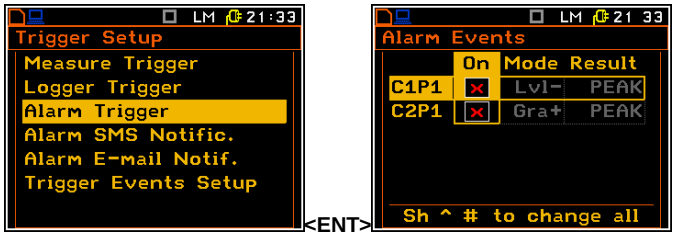
Triggerring conditions selection

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>**.

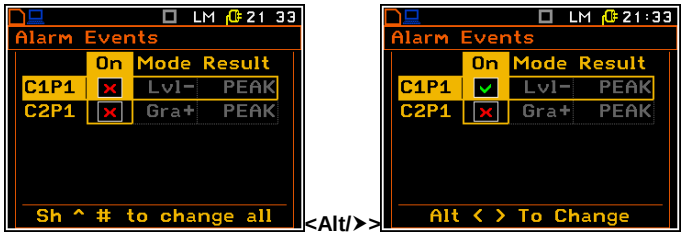


5.5.3 The alarm trigger setting – Alarm Trigger

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**.



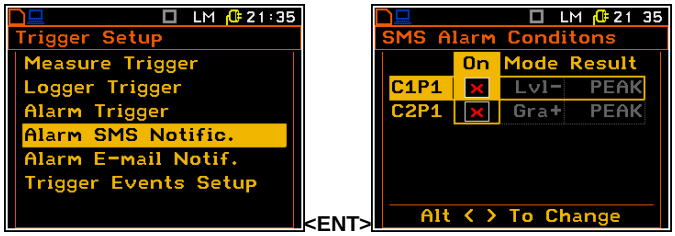
The **Alarm Trigger** position opens the list with alarm events that can be used as a triggering conditions for alarm pulse. The alarm events are defined in the **Trigger Events** setup list (*path: <Menu> / Input / Trigger Setup / Trigger Events Setup*).



5.5.4 The alarm on SMS trigger setting – Alarm SMS Notific.

The **Alarm SMS Notific.** position enables the user to program the trigger, which generates alarm SMS.

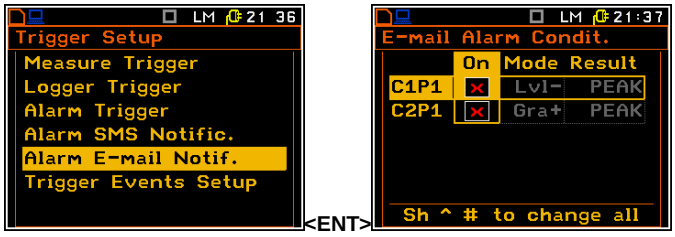
The **Alarm SMS Notific.** position opens the list with alarm events, defined in the **Trigger Events Setup** list, that can be used as a triggering conditions for alarm SMS.



5.5.5 The alarm on e-mail trigger setting – Alarm E-mail Notif.

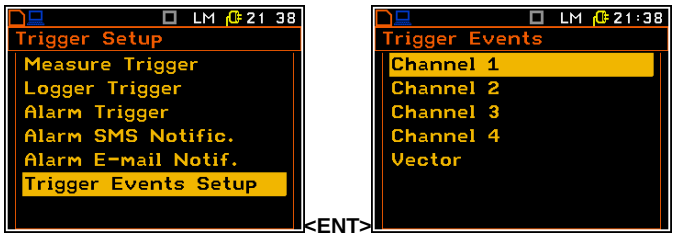
The **Alarm E-mail Notif.** position enables the user to program the trigger, which generates alarm on e-mail.

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 for alarm e-mail.



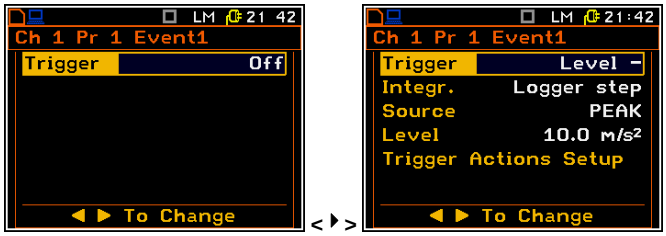
5.5.6 Definition of triggering conditions for logger and alarms – Trigger Events Setup

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.



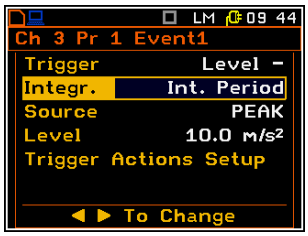
It is possible to define two trigger events for each profile (vibration input has only one profile!).

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:



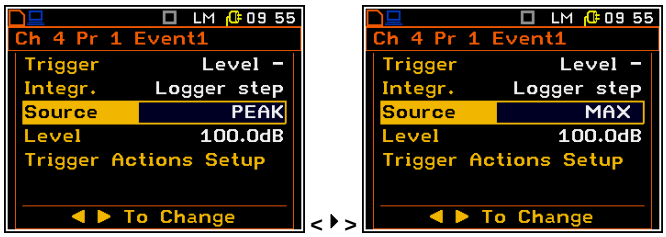
- if **Level +** is selected, the triggering condition is fulfilled only when **Source** has the greater value than determined by **Level**, otherwise the triggering condition is not fulfilled.
- if **Level –** is selected, the triggering condition is fulfilled only when **Source** has the lower value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

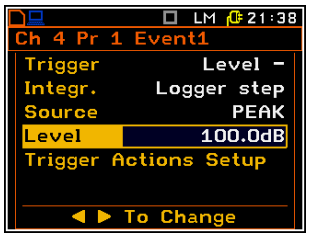


The **Source** position enables the user to select the type of source for triggering condition calculation – result calculated for the selected profile:

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

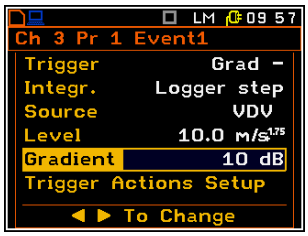
- **PEAK**, **P-P**, **MAX**, **MIN**, **RMS** or **VDV** for vibration input.

Threshold definition



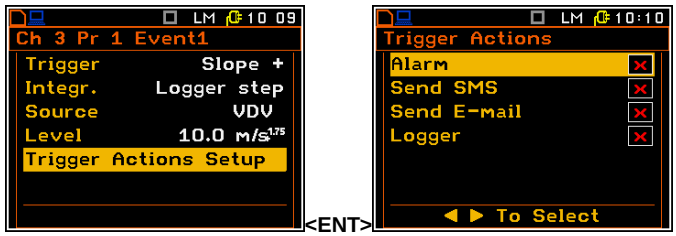
The **Level** position enables the user to select the value of threshold for triggering condition in therange of **60 dB** to **200 dB** for Sound input and of **1.00 mm/s²** to **10.0 km/ s²** for vibration input. The vibration units can be set in the **Display Scale** window (*path: <Menu> / Display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

Selection the trigger actions

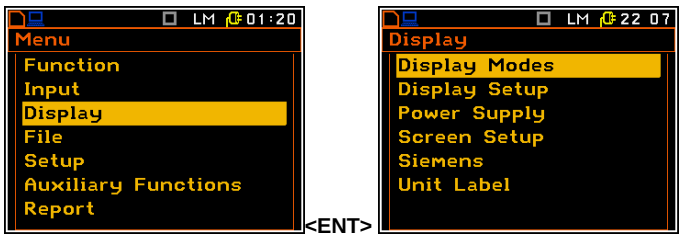


The **Trigger Actions Setup** position enables the user to select the trigger actions for defined condition: **Alarm**, **Send SMS**, **Send E-mail** and **Logger**.

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

6. 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>** push-button, select the **Display** text and press **<ENTER>**.



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;

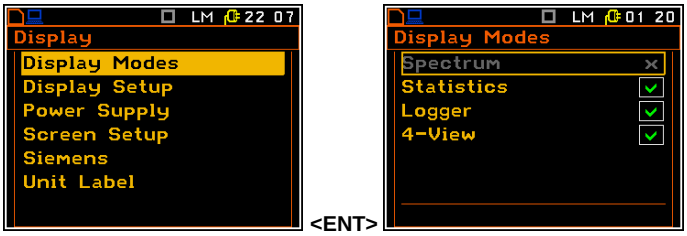
Screen Setup enables the user to set the brightness and the contrast of the display screen;

Siemens shows the status of the Siemens modem. This position is active only when GPRS function is swithed 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.

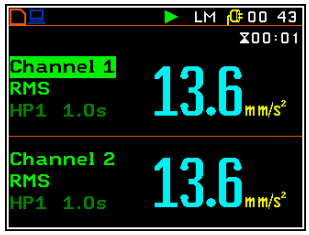
6.1 Selection of the modes of measurement results presentation - Display Modes

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.



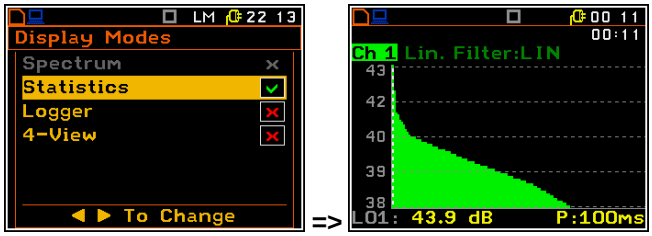
Two results of main presentation mode is always active and it is not possible to switch it off.

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 **<▲>**, **<▼>** push-buttons gives no results.

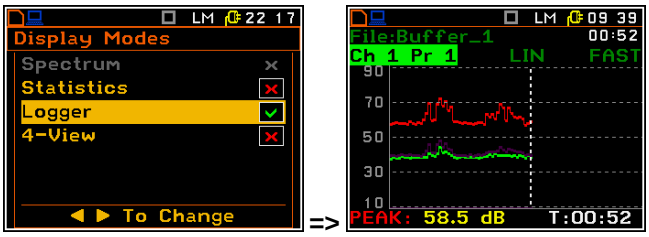


Statistics presentation mode

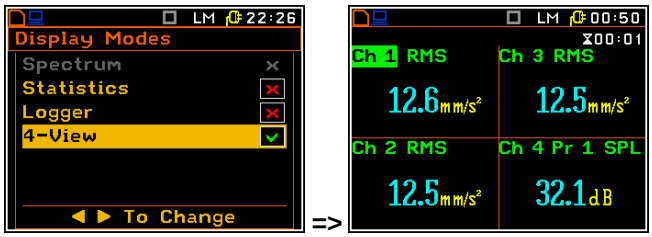
Statistics are calculated only for **Profile 1** of each sound channel.



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



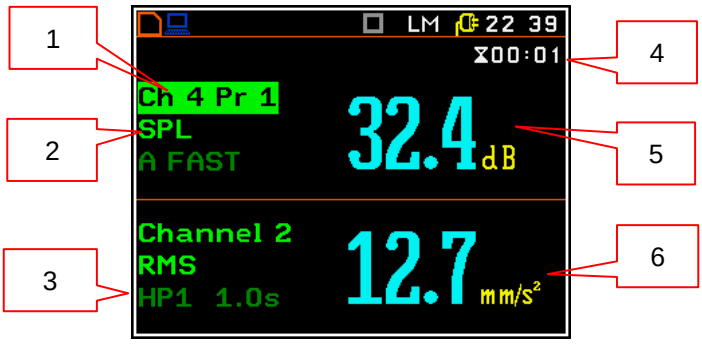
The **4-View** presentation mode shows simultaneously results for all four channels.



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 **<▲>**, **<▼>** push-buttons.

6.1.1 Main presentation mode

Fields description of the two results 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:

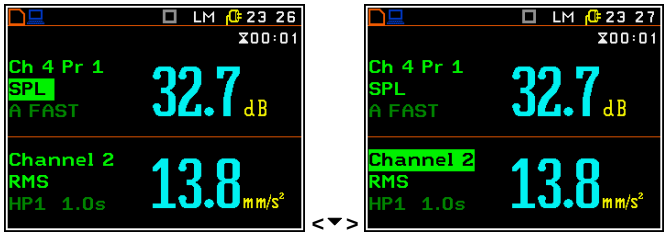
- for vibration input the used filters are: **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10**, **W-Bxy**, **W-Bz**, **H-A**, **W-Bc**, **KB**, **Wk**, **Wd**, **Wc**, **Wj**, **Wm**, **Wg**, **Wh**, **Wg**, **Wb**, **Wv**;

- 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.

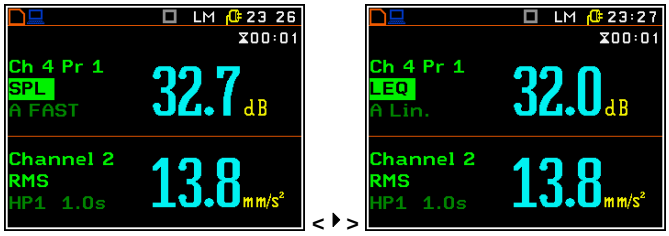
Changing the active fields

Jumping between positions is made by means of the **<▲>** or **<▼>** push-buttons.



Changing the field content

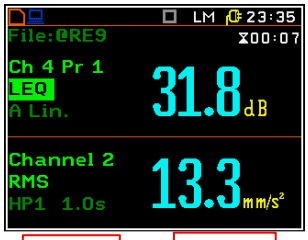
When Profile or Function position is chosen, then the profile number or function name is changed by means of the <◄> and <►> push-buttons.



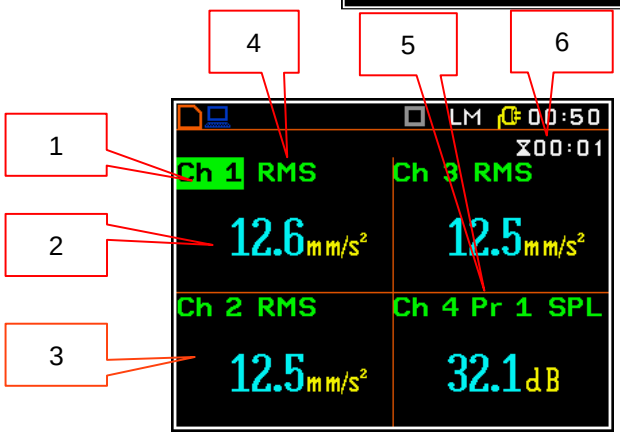
Changing the presentation mode

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

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



Presentation mode for all channels



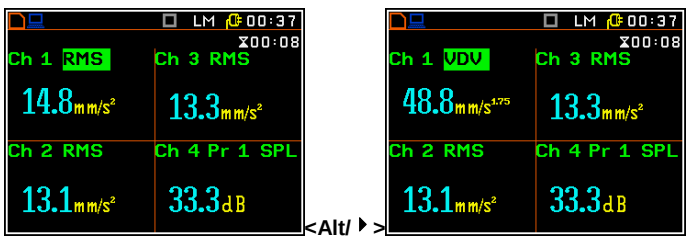
1. Channel 1 abbreviation.
2. Result for Channel 1 and measurement units.
3. Channel 2 field.
4. Function name: **RMS**, **VDV**, **CRF**, **OVL**, **PEAK**, **P–P**, **MTVV** for vibration input; **SPL**, **LEQ**, **SEL**, **Ln**, **Ltm3**, **Ltm5**, **L01**, **OVL**, **PEAK**, **MAX**, **MIN** for 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 <◄>, <►> push-buttons.

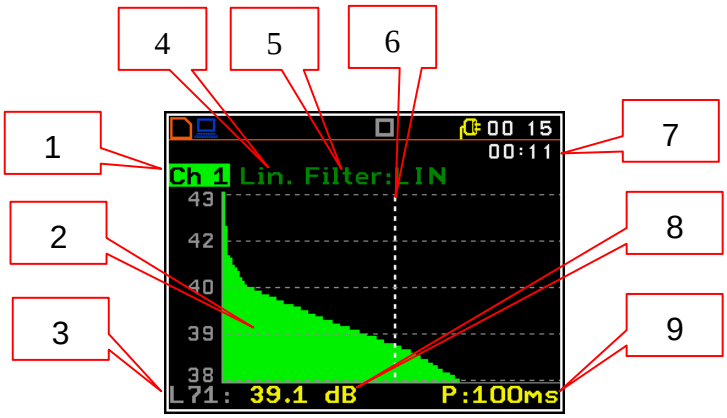
Changing the field content

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

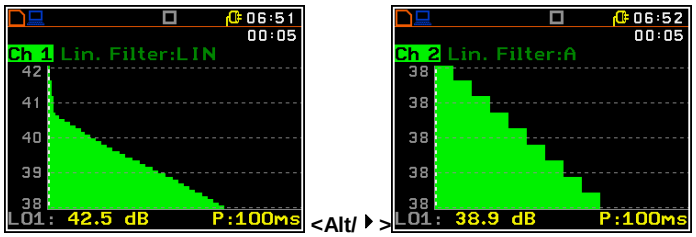


Field description of the Statistics view

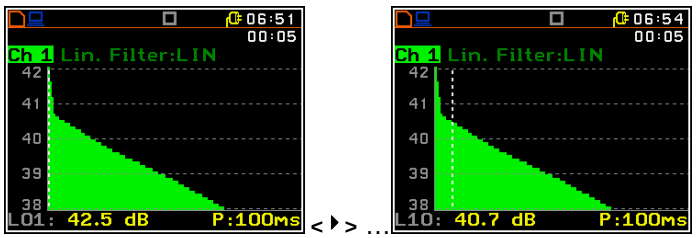
1. Channel number
2. Statistics plot
3. Statistical level (LN% percentile value) for the active cursor position
4. RMS detector (**Lin.**, or **Exp.**: **Fast**, **Slow** or **Imp**.)
5. Frequency filter used (**A**, **C** or **Z**)
6. Cursor position
7. Elapsed time shows the current second of the measurement 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).



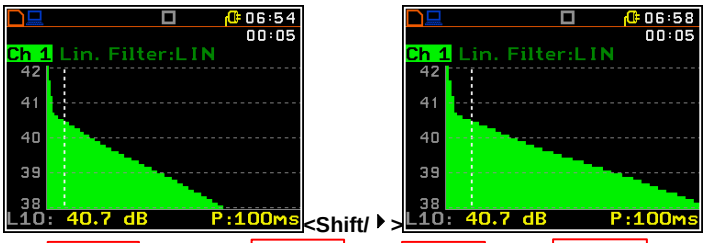
The channel is changed by pressing the **< ◀ >** and **< ▶ >** push-buttons simultaneously with **<Alt>**.



The cursor position is changed using the **< ◀ >**, **< ▶ >** push-buttons. The statistical level (%) and appropriate (dB) value are presented in the line below the plot.



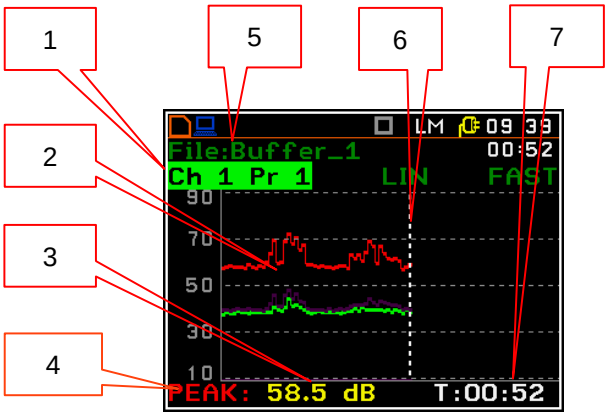
Press the **< ◀ >**, **< ▶ >** push-buttons with the <**Shift**> button to extend the X axis.



Presentation mode for logger view

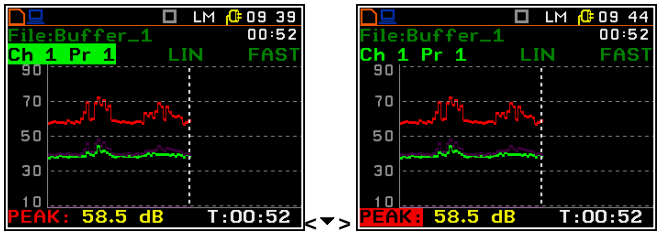
The time history of results saved in the logger can be presented in the special **Logger** mode. The **Logger** mode can be activated or deactivated in the **Display Modes** list.

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



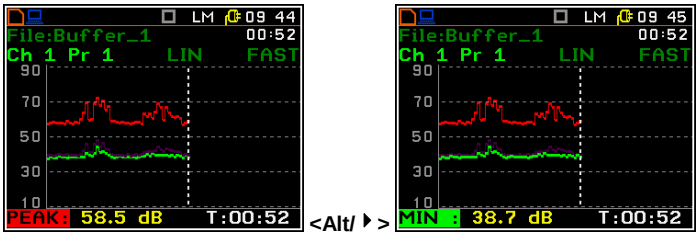
Changing the active fields

Jumping between positions is made by means of the <▲> or <▼> push-buttons.



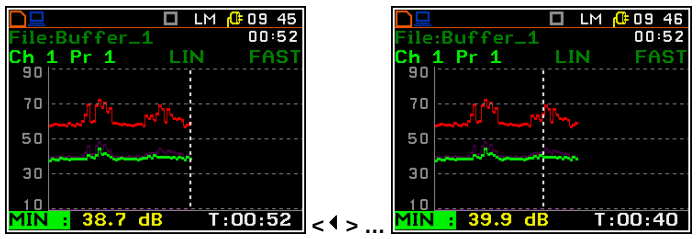
Changing the field content

When Profile or Function position is chosen, then the profile number or function name is changed by means of the <◀> and <▶> push-buttons.



Changing the cursor position

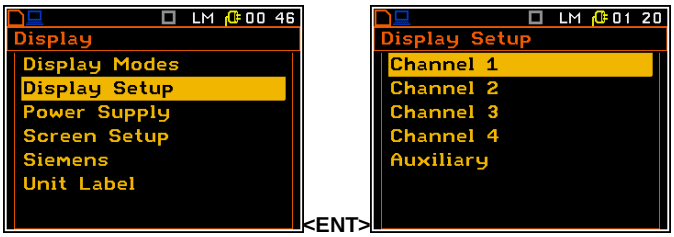
The user may change the cursor position by means of the <◀>, <▶> push-buttons. The appropriate value is presented in the line below the plot.



6.2 Setting the parameters of graphical presentations – Display Setup

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

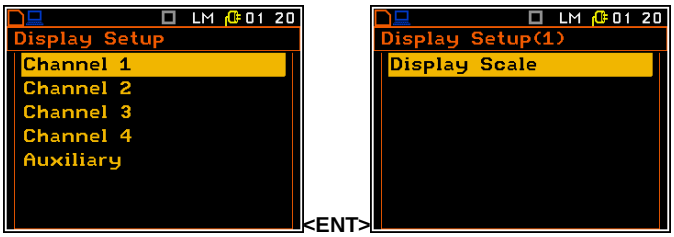
In the **Display Scale** window the user may adjust the scale in the available modes of graphical presentation of the measurement results (time-history in the **Logger** and spectra in the **Spectrum** mode).



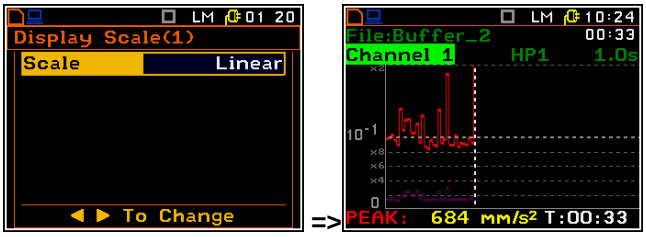
Setting the scale of the logger presentation

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

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

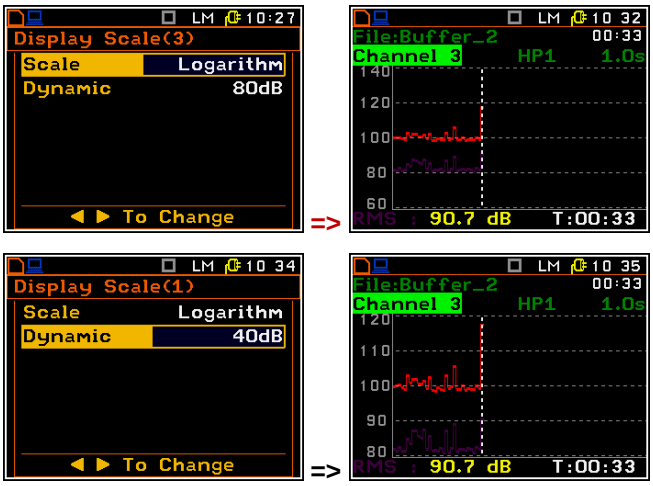


In case of **Linear** scale the graphical presentation and the units are linear. In case of **Logarithm** scale the graphical presentation is given in the logarithmic scale and the measurement results are expressed in decibels (the results are related to the values set up in the **Reference Levels**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



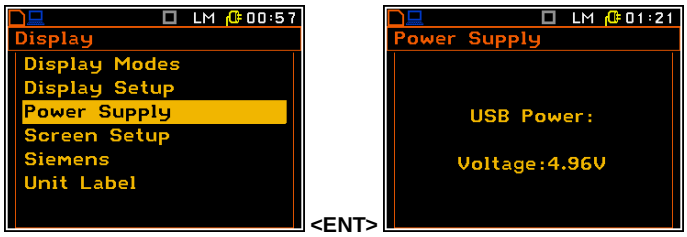
Scaling the vertical axis

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).

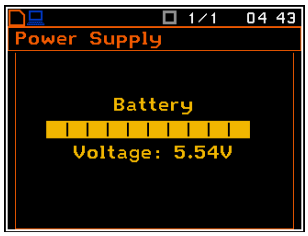


6.3 Checking the instrument powering – Power Supply

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.



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).

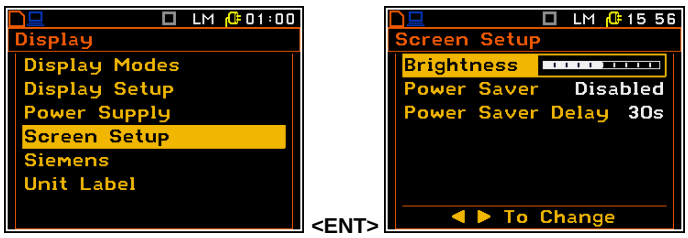


6.4 Setting the display brightness and power saver- Screen Setup

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

Setting the brightness of the display

The **Brightness** enables the user to set the proper brightness of the display by means of the **<◄>**, **<►>** push-buttons. The user can select 20 different values of this parameter.

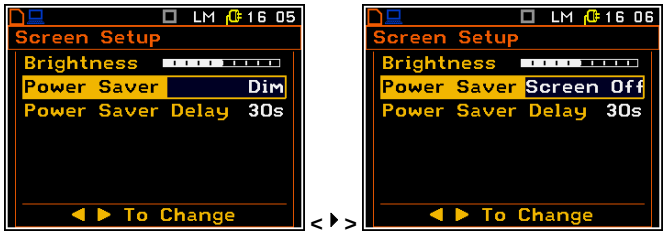


Notice: *The new value of the brightness is confirmed after each press of the <◄> or <►> push-buttons (new value is selected without any confirmation from the* ***<ENTER>*** *push-button).*

Setting the power saver function

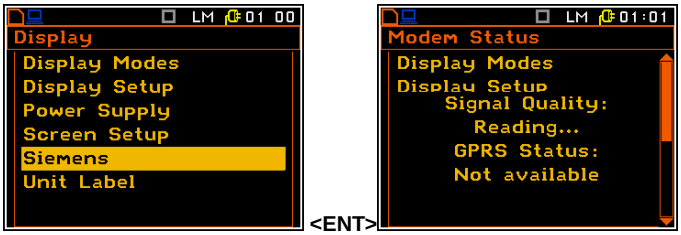
Saving the internal source of the instrument's power can be achieved by reducing the brightness of the screen whenever possible.

There are two types of the **Power Saver** functions. The screen may be switched off (**Screen Off**) or dimmed (**Dim**). When eit the **Pover Saver** functions is active, after a delay, set by the parameters **Power Saver Delay**, from pressing any push-button the screen is dimmed or switched off. If it happens while in use, the first press of any push-button will cause the screen to switch back on again.



6.5 Checking the modem status - Siemens

The **Siemens** position is active only 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 **<▼>**.

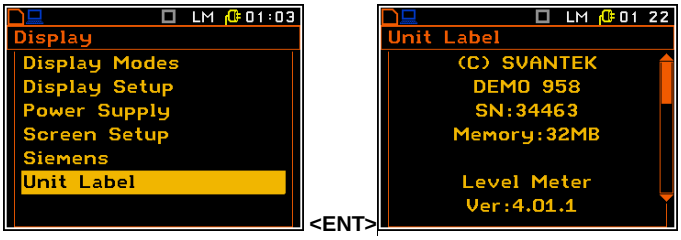


Notice: *Before swith on the GPRS modem it is necessary to swith on the RS232 interface (path: <Menu> / Setup / USB Host Setup).*

6.6 Checking the specification of the instrument - Unit Label

The **Unit Label** 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 **<▼>**.



Notice: *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.*

7. 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:

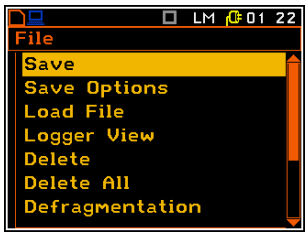
- measurement results from **Level Meter**;
- measurement results from **1/1 Octave** analysis; (available as option)
- measurement results from **1/3 Octave** analysis; (available as option)
- measurement results from **FFT** analysis; (available as option)
- logger results (measurement time history),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

Notice: *Notice: 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:

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

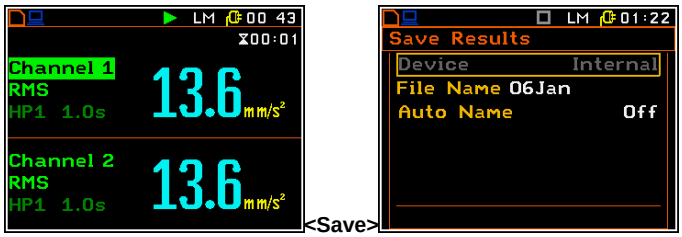
7.1 Saving files in the instrument's memory or external memory

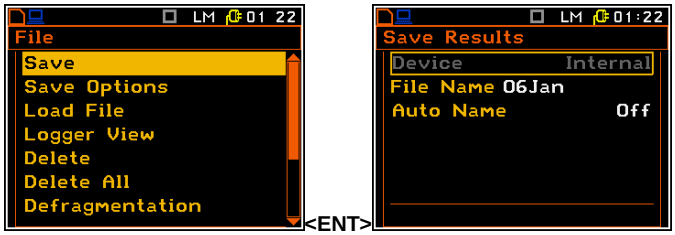
There are two options for storing result data in the internal or external memory.

One option is to press the **<Save>** push-button right after the measurement stop.

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

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





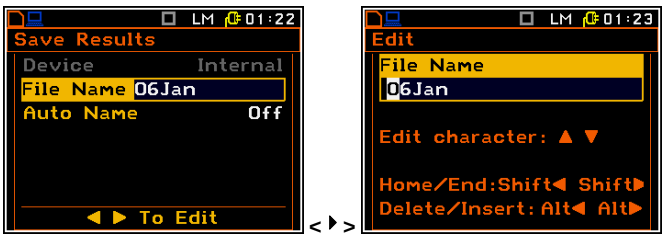
There are two available options for saving files in the **Save Results** window: with the edited name, or with the name automatically changed with the name number increasing by one every time the save function is used. These options can be selected in the position **Auto Name**. If **Auto Name** is switched 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 **< ▶ >** push-button. 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.

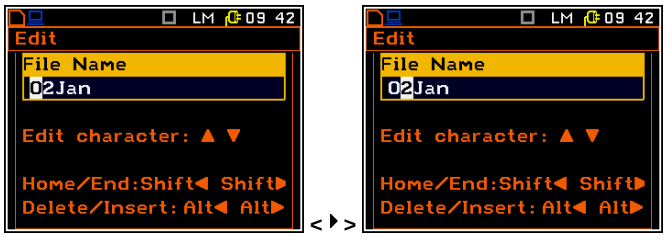
The user can skip editing the file's name and start saving the file by pressing the **<ENTER>** push-button or return to the **File** list or measurement display by pressing **<ESC>**.

To start file editing the user has to select the File name position and to press **< ◀ >** or **< ▶ >** push-button. After that the special window with editing function opens. The editing process is presented on the Figure to the right.



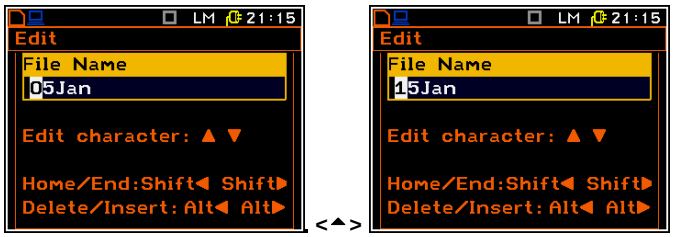
Selection of the character's position to be edited

Select the position of the character in the edited text using the **< ◀ >**, **< ▶ >** push-buttons. For the current position the character can be changed, position can be deleted or inserted.



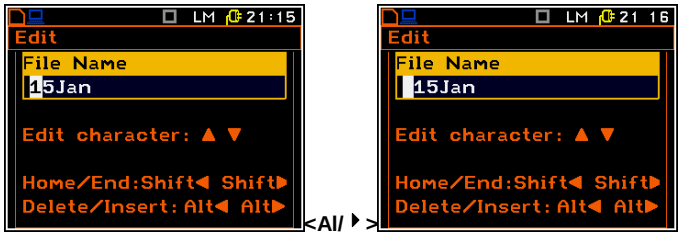
Changing the edited character

The available ASCII characters can be changed using the <▲> (or <▼>) push-button. The subsequent digits, letters and other characters appear on the display in the inversely displayed position after each press of the above mentioned push-buttons.



Position insertion, deletion

The user can delete or insert the position in the edited text using the <◀>, <▶> push-buttons, pressed together with **<Alt>**.



The edited name is accepted and the instrument returns to the **Save Results** list after pressing **<ENTER>**. Pressing the **<ENTER>** push-button 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 push-button should be pressed except **<Shift>** or **<Alt>**).

Notice: *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).*

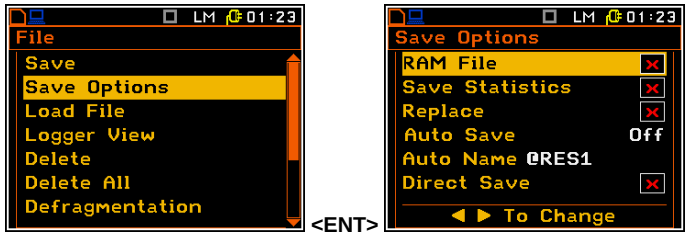
Saving is not possible when the instrument is measuring the signal. The message “Measurement in progress!” is displayed for about 3 seconds.

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 push-button should be pressed except **<Shift>** or **<Alt>**) and after pressing a push-button it returns to the **Save Results** list.

Notice: *Direct access to the* ***Save Results*** *list is possible after pressing the* ***<ENTER>*** *and* ***<Alt>*** *push-buttons 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 push-buttons, 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 RAM memory (the name of the file is defined as a “RAMfile”).

Saving statistics

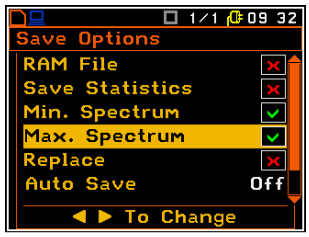
The **SAVE STATISTICS** is used to set self-saving, together with the sound measurement results, the statistics of the measurements. Together with the sound measurements, 100 statistics are calculated (the

values named from **L01** to **L99**).

The statistics are not calculated for the vibration measurements.

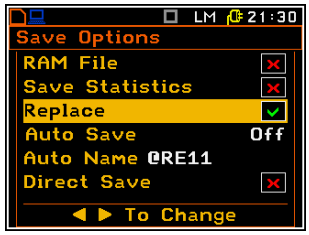
Notice: *This position was created to save the memory of the instrument in the case when the knowledge of the statistics is not necessary. Each registration of the statistics requires 600 bytes of the memory!*

Saving minimum and maximum values in the spectrum



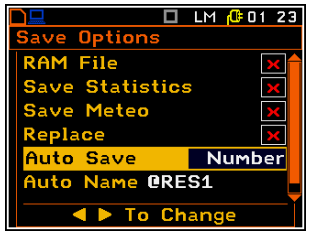
The **Min Spectrum** or/and **Max Spectrum** appears on the display in case of **1/1 Octave** and **1/3 Octave** mode and it enables the user to save the lowest or/and highest values of the instantaneous spectrum (calculated with 100-milliseconds time step), which occurred during the **Int. Period**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

Replacement of the 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 of the 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>** push-button 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.

Notice: *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.*

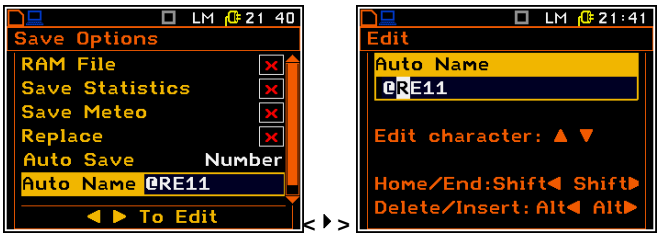
When the **Int. Period** is too short for the **Auto Save** option or the **Repetition No.** is not equal to one the following message appears on the display.

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

Another measurement is started after pressing the **<Start/Stop>** push-button 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.

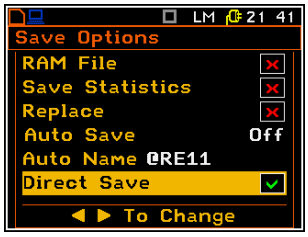
Edition the name of the Auto Save file

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 **< ▸ >** push-button. The text editing window is opened.



Direct access to the Save function

The **Direct Save** option enables the user to select the instrument's next operation after simultaneously pressing the **<ENTER>** and **<Alt>** push-buttons at the end of a measurement. If this option is not active, after pressing these push-buttons, the **Save** list is accessed (if the measurements are not performed). If the option is active, after pressing the **<ENTER>** and **<Alt>** push-buttons the results are saved in the file with the automatically incremented name.



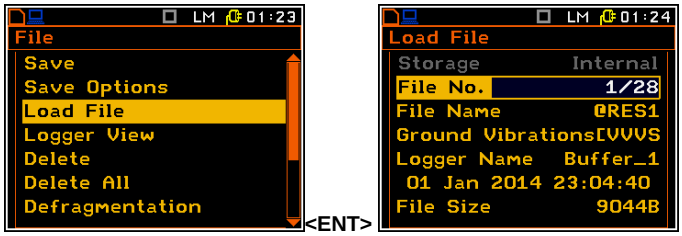
Press the **<ENTER>** and **<Alt>** push-buttons during the execution of a measurement causes, disregarding the option set in the **Direct Save** position, the message "Measurement in Progress" to be displayed.

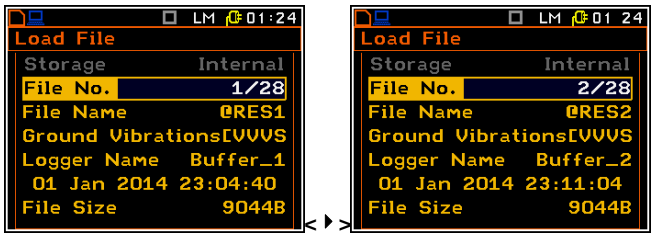
7.3 Loading files with the measurement results – Load File

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.

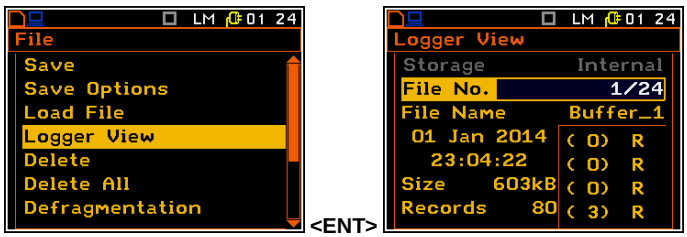
To change the file the user has to press the **< ◂ >**, **< ▸ >** push-buttons. To jump to the first file the user has to press the **< ◂ >** with **<Shift>** push-button , and to the last one - the **< ▸ >** with **<Shift>** push.





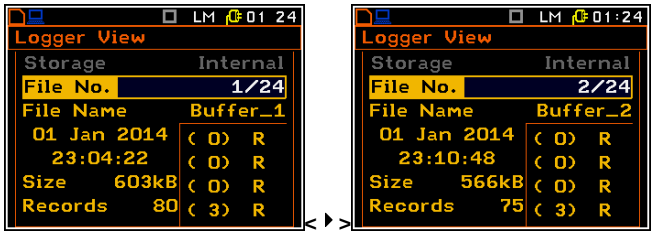
7.4 Checking the contents of the loaded file – Logger View

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



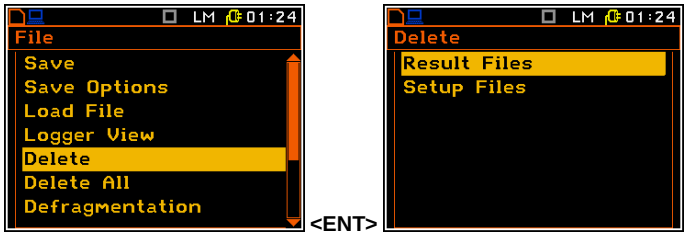
The **Logger View** window displays logger file basic information: in what memory file was saved, current number of the file and total number of the saved files, logger file name, date and time of the **Save** operation, size of the file, number of records (one record is saved after each period equal 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 **< ◀ >**, **< ▶ >** push-buttons. To jump to the first file the user has to press the **< ◀ >** with **<Shift>** push-button , and to the last one - the **< ▶ >** with **<Shift>** push.

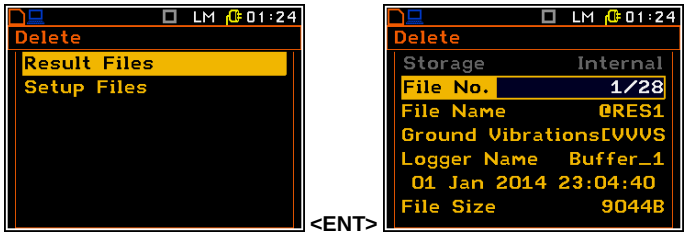


7.5 Removing file with the measurement results – Delete

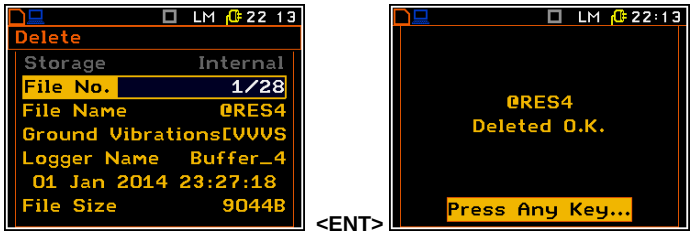
The **Delete** list consists of two elements: the **Result Files** with the measurement results and the **Setup Files** with the saved setups of the instrument.



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

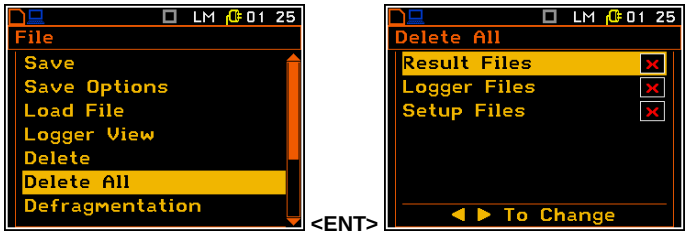


The delete function is then confirmed by the instrument.



7.6 Removing all files with measurement results from memory – Delete All

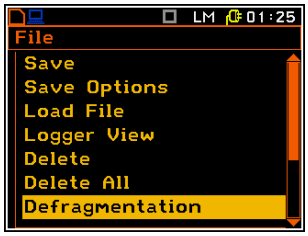
The **Delete All** position is used to remove all files of certain type (**Result Files**, **Logger Files** and **Setup Files**) from the memory.



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.

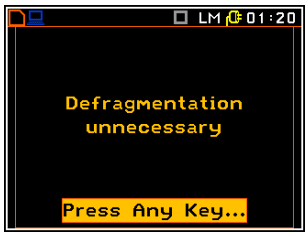


<ENT>

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.

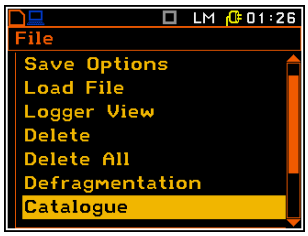
After pressing the **<ENTER>** push-button on the active **Yes** option, the instrument checks whether the used result and setup files memory is continuous or not. If this memory is continuous, the **Defragmentation** operation is not executed and the special message is displayed. The instrument waits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



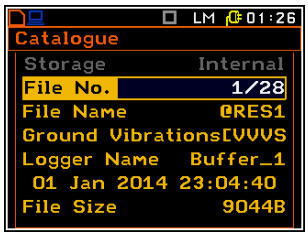
If there are conditions to execute the **Defragmentation** operation the current progress of defragmentation is shown on the display. After successful defragmentation, the special message is displayed and the instrument waits for the reaction of the user. Any push-button should be then pressed except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



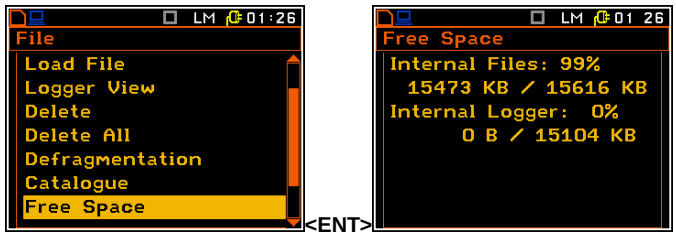
<ENT>



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.

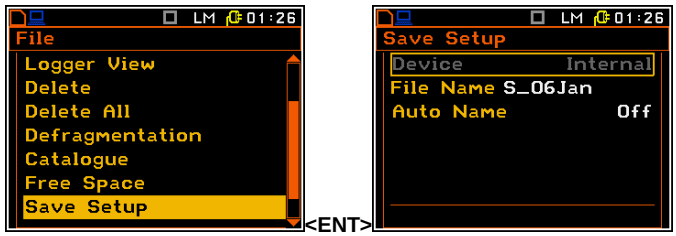
The memory of the instrument is divided into two separate parts. One part is dedicated for saving the result and setup files and its size is equal to 15616 Kbytes. The second part is used for saving the logger files and its size is equal to 15104 Kbytes



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.

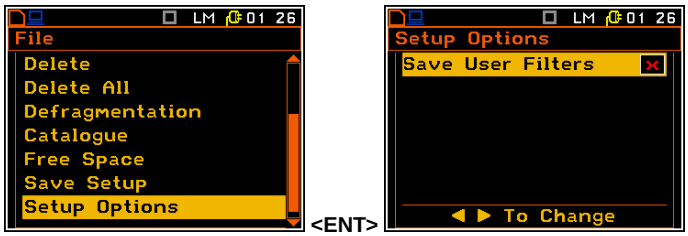
The **Save Setup** window content is similar to the **Save Results** one.



7.11 Options for setup files – Setup Options

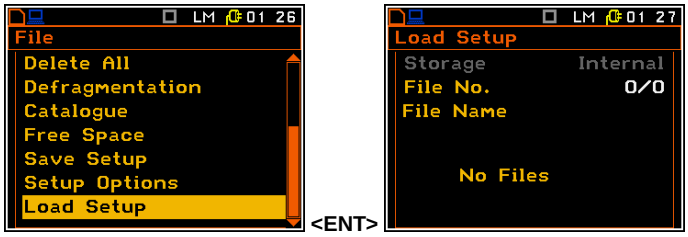
The **Setup Options** sub-list is used for the selection of the options for storing setup files.

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



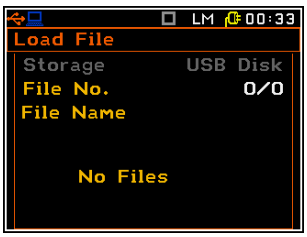
7.12 Loading the files with the configuration – Load Setup

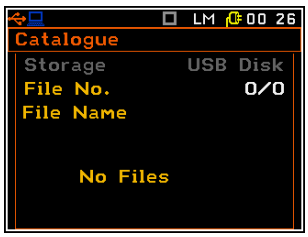
The **Load Setup** position is used for loading data file from the FLASH DISC to the .



7.13 Checking the contents of the USB memory disk - USB Directory

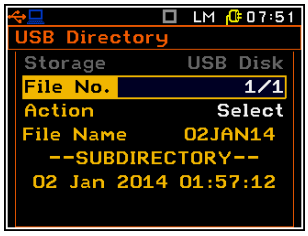
When **USB Disk** is connected and activated (*path: <Menu> / Setup / USB Host Setup*) the Internal memory became not active and all newly created files will be saved on the **USB Disk**. The **Storage** position in the **Load File**, **Catalogue**, **Delete** and **Load Setup** windows will be changed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





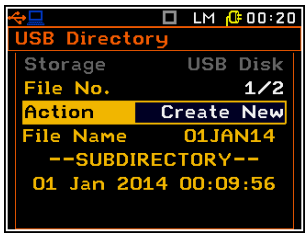
The **USB Directory** position is used for checking the contents of the USB memory disk, creating new catalogues and selecting the working catalogue for saving new created files.

<ENT>

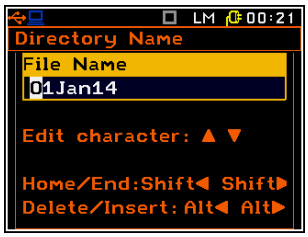


To assigne the working catalogue for saving of newly created files the user should select the required **File No.** with the name in the **File Name** position (catalogue name) and then use **Action**: **Select**. From this time all newly created file will be saved in this USB Directory.

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.



<ENT>



8. 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>** push-button, select the **Auxiliary Setup** position and press **<ENTER>**.

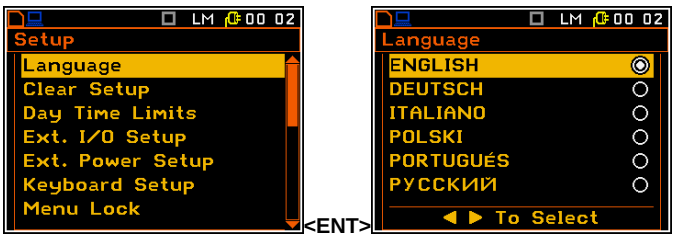
In the **Setup** list the following items are available:

Language	enables the user to select the language of the user interface.
Clear Setup	enables the user to return to the default, factory settings.
Dat 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>** push-buttons.
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.

8.1. Setting the language of the user interface – Language

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

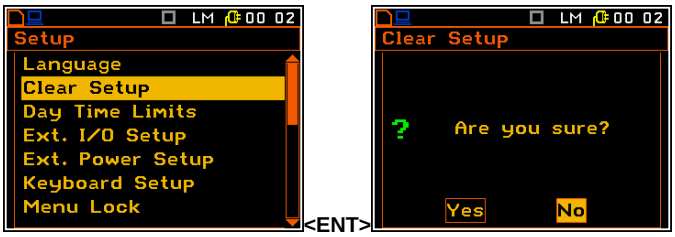
For activation of the Russian version of the user interface, a special code has to be entered.



8.2. 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>** push-buttons pressed together.

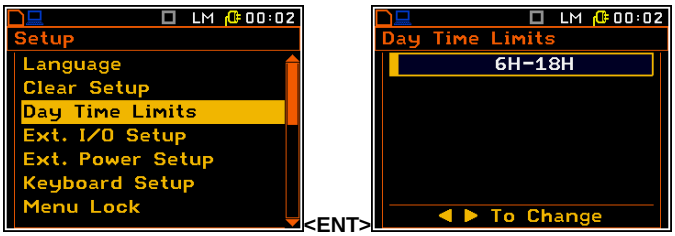


During the clearing process the message **WAIT...** is displayed. The following message is displayed after return to the default settings and the instrument waits for the user's reaction to press any key to continue.

8.3. 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.

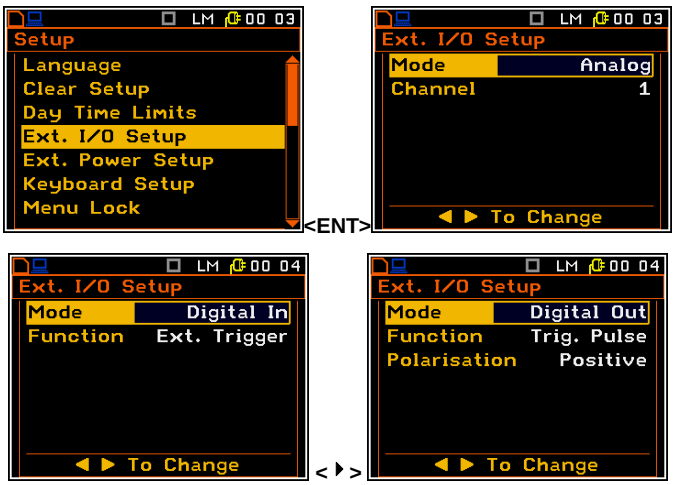
Two options are available: **6H–18H** and **7H-19H**.



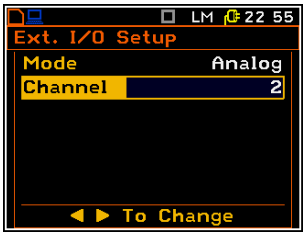
8.4. Selection of the extended mode - Ext. I/O Setup

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:

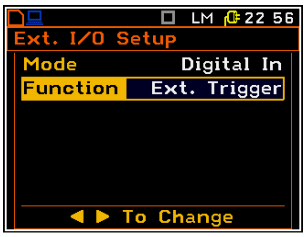
- the output of the analogue signal (**Analog**) transmitted from the input of the instrument to its output without any digital processing (i.e. frequency filtering);
- the input of the digital signal used as an external trigger to start the measurements (**Digital In**) in the instrument, acting in 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).



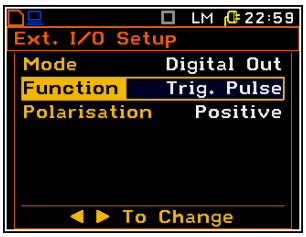
In the **Analog** mode, the meter can send signals to the output device. For example, the signal can be observed on the oscilloscope from the selected **Channel**. The user has the opportunity to choose between **Channel 1**, **2**, **3** and **4**.



In the **Digital In** mode the meter is connected to the output device, which triggers it. The measurement starts when there is a triggering impulse on the instrument's input. In this mode the **Ext. I/O** function is set to **Ext. Trigger**.



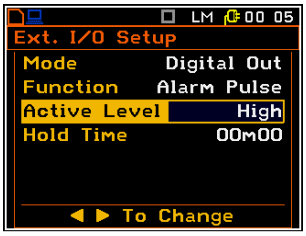
In the **Digital Out** mode the meter is connected to the output device, which has to be triggered. In this mode the socket can be used as the source of the trigger pulse (**Trig. Pulse**) which starts the measurement in another "slave instrument" linked to the "master instrument" or as an alarm signal which appears there after fulfilling certain measurement conditions (**Alarm Pulse**).



The case of **Trig. Pulse** the **Polarisation** position appears, which enables the user to select which polarisation of the signal (negative or positive) will be applied.

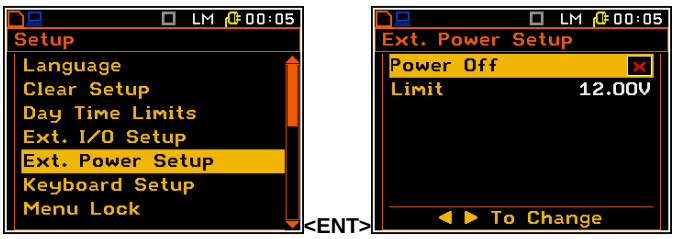
The case of **Alarm Pulse** the **Active Level** position appears, which enables the user to select which level of the signal should be treated as a valid one ("negative" or "positive" logic): **Low** or **High**.

The **Hold Time** position enables the user to select the minimum duration of alarm signal.



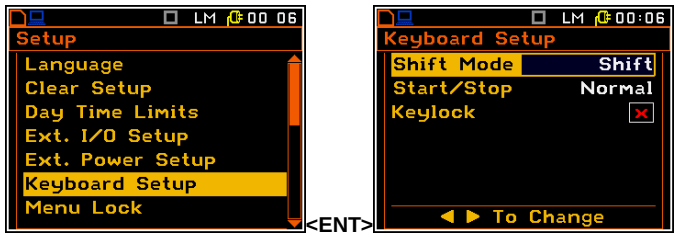
8.5. Setting the external power parameters - Ext. Power Setup

The **External Power** position enables the user to select the minimum voltage of the external dc power source (**SA 15**), when the instrument should be switched off automatically. This window appears automatically after switching on the instrument when the instrument is connected to the external dc power source (**SA 15**).

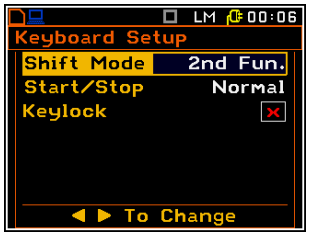


8.6. Selection of keyboard modes – Keyboard Setup

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

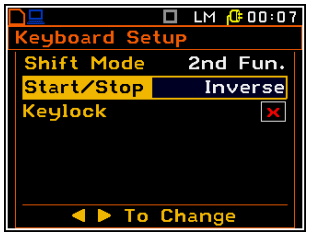


<Shift> / <Alt> push-button mode



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

<Start/Stop> push-button working mode selection



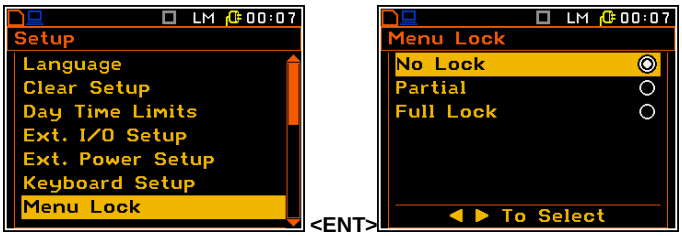
In the **Start/Stop** position the user can choose between **Normal** and **Inverse**. When the **Normal** option is selected the instrument reacts on each of the **<Start/Stop>** push-button pressing, starting or stopping the measurements.

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

8.7. Locking the menu - Instrument Lock

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

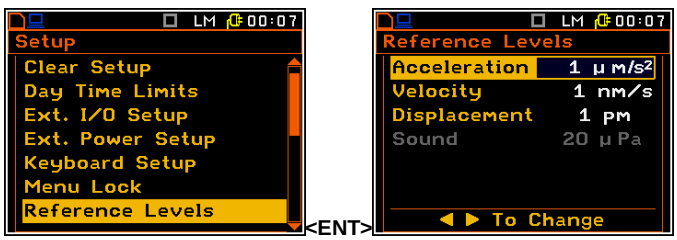
In the case of default **No Lock** option all available positions in the menu are accessible due to the settings, which were made.



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.

8.8. 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).



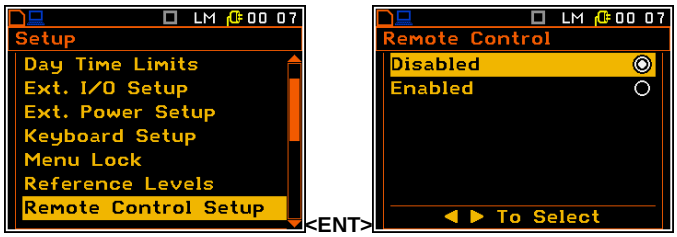
In the **Acceleration** position the user can set the reference level of the acceleration signal from **1 µms^{-2}** to

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.

8.9. Activating the remote control error confirmation – Remote Control Setup

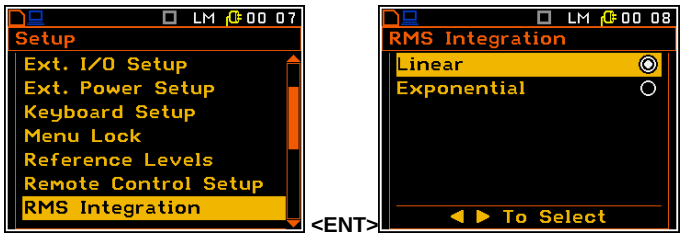
The **Remote Control Setup** position enables the user to activate or deactivate error confirmation function. If **Remote Control Setup** function is **Enabled** then the instrument confirms warnings after 5 seconds and the user reaction is not required. This function is very useful when the instrument 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.



8.10. 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).

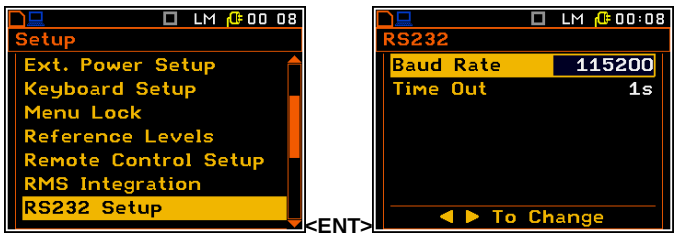
Two options are available: **Linear** and **Exponential**.



When **Linear** option is selected in case of sound measurements, the value of the **LEQ** and **SEL** function does not depend on the detector time constant (the results are displayed **without** the indicator of the detectors selected in the profiles).

8.11. 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**).



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 **<◀>**, **<▶>** push-buttons. The setting here should be the same as in the connected instrument or computer to ensure successful data transfer.

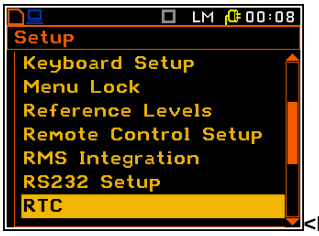
The other RS 232 transmission parameters are fixed to **8 bits for data**, **No parity** & **1 Stop bit**.

Setting time limit for the performance of serial interface operation

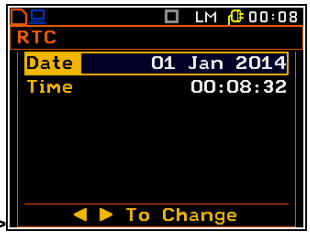
The default value of the parameter **Time Out** is equal to one second but this may be too short for some slower printers, which may not be fast enough. In such cases, the **Time Out** parameter may have to be increased to a higher value.

8.12. 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.

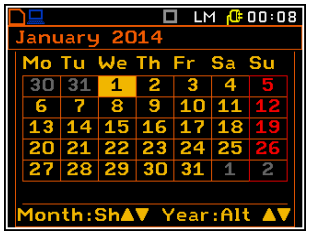


<ENT>



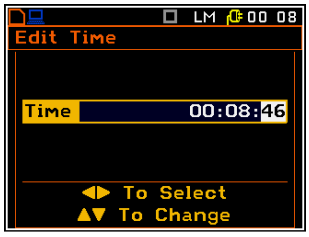
The window is closed and the instrument returns to the **Instrument** list after pressing the **<ENTER>** or **<ESC>** push-button.

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



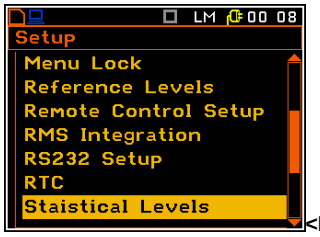
In order to set data the user has to select its position by means of the **<◄>**, **<►>** and **<▲>, <▼>** push button and then press **<ENTER>** to set the chosen value.

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

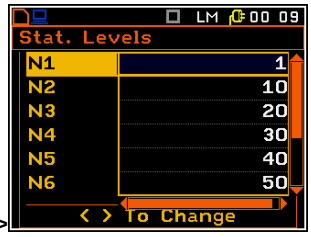


8.13. Selection of statistics levels to be saved in a file – Statistical Levels

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.



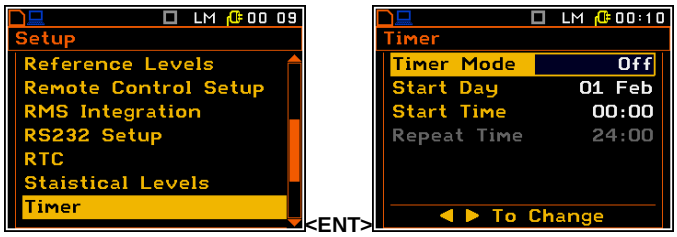
<ENT>



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.

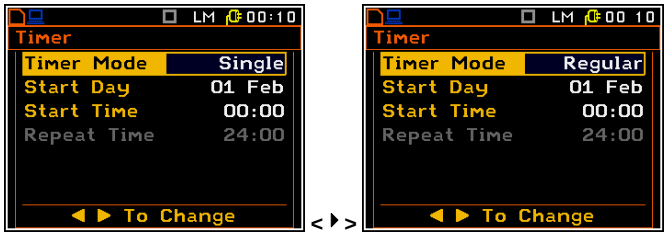
8.14. Programming the instrument's internal timer – Timer

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



Selecting the mode of the timer function

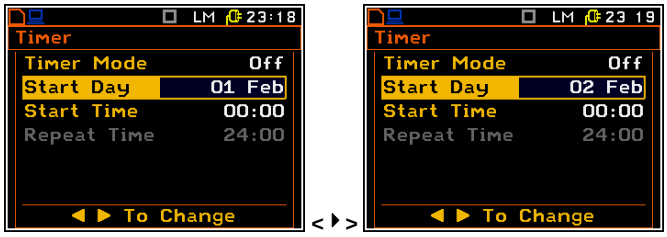
The timer can be switched off (**Off**), switched on only once (**Single**), or switched on many times regularly (**Regular**) with the period between two consecutive measurements set in the **Repeat Time** line as 24 hours. It means that the instrument will be switched on once a day at the same time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

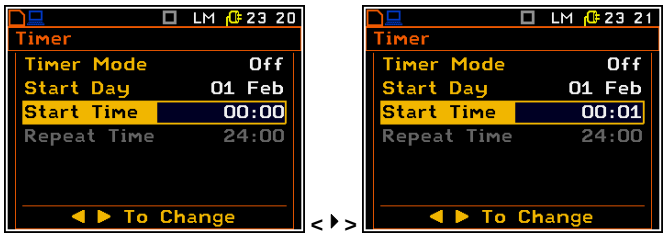
Setting the day for the measurement to start

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 **< ◀ >**, **< ▶ >** push-buttons.



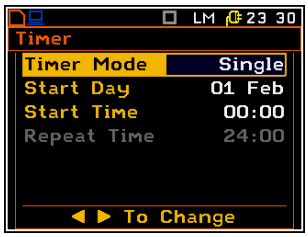
Setting the time for the measurement to start

The **Start Time** position determines the time for the measurement to start. The required hour and minute can be selected by means of the **< ◀ >**, **< ▶ >** push-buttons.



Description of an example timer function execution

The **Timer** function is used to programme the instrument to switch on at the desired time and perform the measurements with the parameters set in the **Measurement** sub-list.



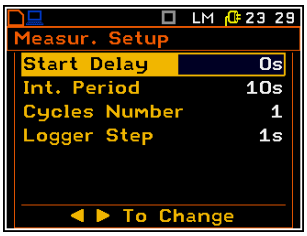
Let us assume that the user wants to switch on the instrument on the 1st of February, at 00:00, make measurement during 10 seconds without using logger and save the results in a file named @RE11.

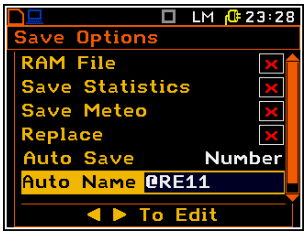
In order to do this the user has to set the parameters of the **Timer** function (*path: <Menu> / Setup / Timer*), the measurement parameters (*path: <Menu> / Input / Measurement Setup*), activate the **Auto Save** function (*path: <Menu> / File / Save Options*), name the file (the **File Name** list 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.

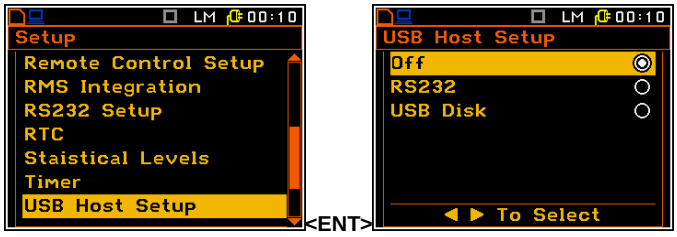
After warming up the instrument and the pre-set **Start Delay** time, the measurements will be performed for a period of ten seconds. Then, the results will be saved in the previously named file and finally – the instrument will switch off.





8.15. 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**.

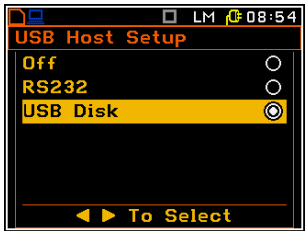


The socket **USB Host** can be used to serve as the input of the different interfaces: **RS 232** or **USB Disk**. The **RS 232** interface in the **SVAN 95x** instrument is available as a hardware option (a special interface, named as the **SV 55**, with a dedicated microprocessor has to be attached 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.

Notice: *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.

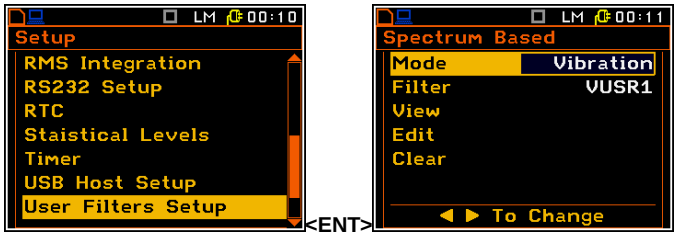
To activate the USB memory stich the user should switch on the **USB Disk** option in the **USB Host Setup** list (*path: <Menu> / Setup / USB Host Setup*).



Notice: *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.*

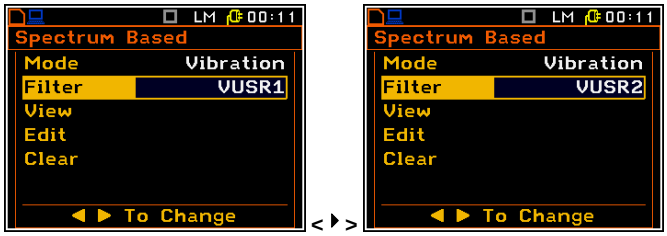
8.16. Setting user filter coefficients for 1/1 Octave and 1/3 Octave analysis – User Filters

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.

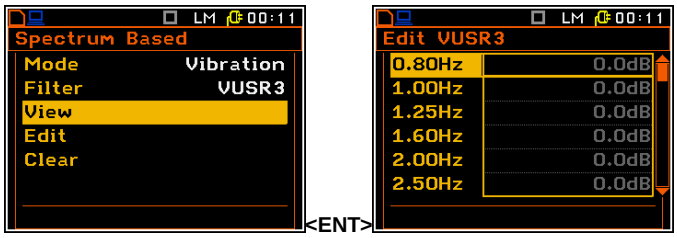


In the **Mode** position it is possible to select signal type: **Vibration** or **Sound**.

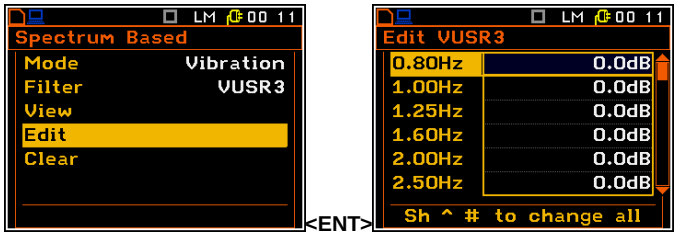
In the **Filter**, there are **VUSR1**, **VUSR2**, **VUSR3** in the case of vibration measurements and **SUSR1**, **SUSR2**, **SUSR3** in the case of sound measurements.



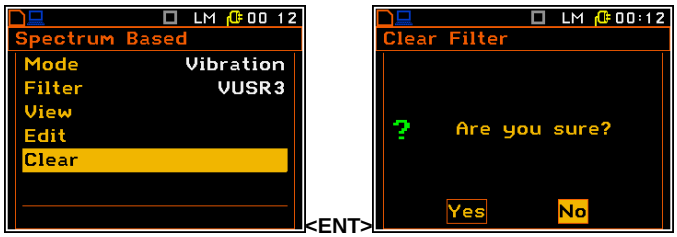
The **View** position opens the window with the table of filter coefficients.



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



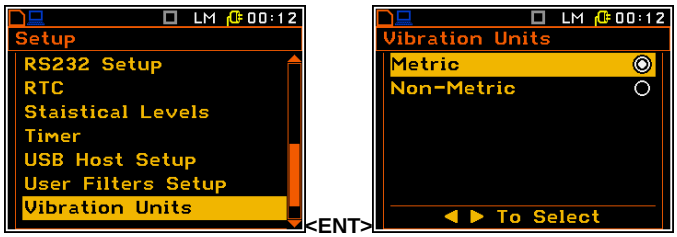
The **Clear** position opens the window with a warning before deleting the user filter coefficients. In case of a positive answer, all coefficients of the selected filter will be zeroed.



8.17. Selection of the Vibration units - Vibration Units

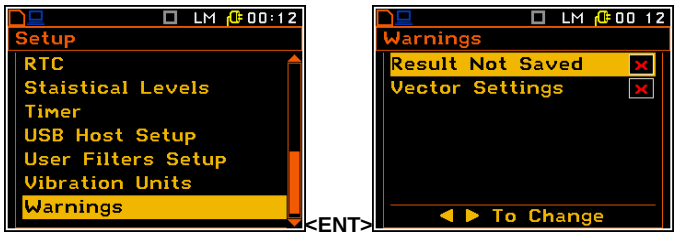
The **Vibration Units** sub-list enables the user to select the units for the Vibration measurements.

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.).



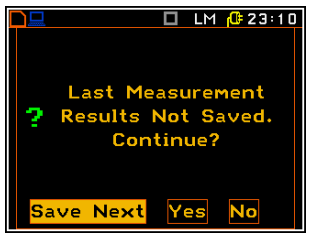
8.18. Warnings selection – Warnings

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



The measurement results are not saved in a file

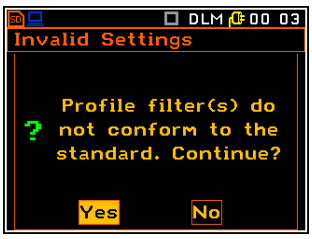
When the **Results Not Saved** position is swithed on the special warning is displayed after pressing the **<Start/Stop>** push-button if the result of the previous measurement was not saved in a file.



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.

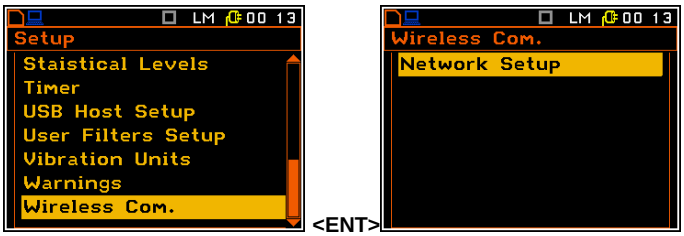
The vector settings warning

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.



8.19. Parameters of remote communication – Wireless Com.

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

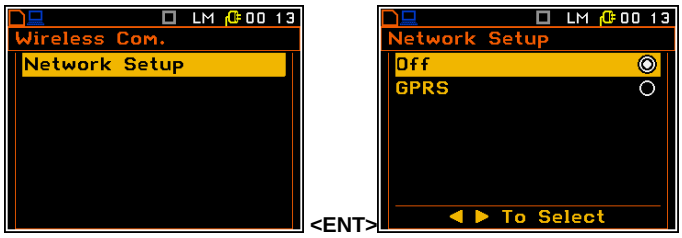


8.19.1. Selection of the network type – Network Setup

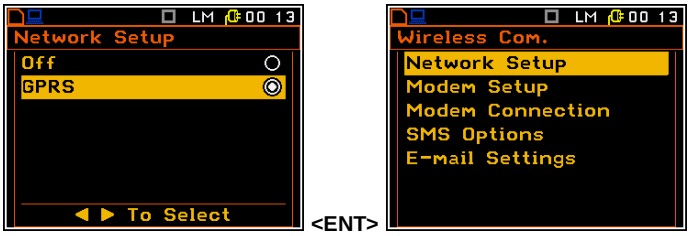
In the **Network Setup** window the user may select one of the three options: **Off**, **GPRS** and **Modbus**.

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**.



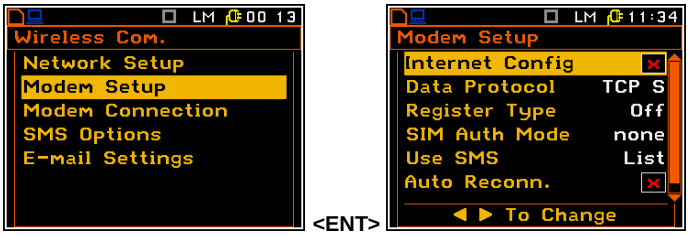
If the **GPRS** network was selected the **Wireless Com.** window will have five positions: **Network Setup**, **Modem Setup**, **Modem Connection**, **SMS Options** and **E-mail Settings**.



Communication between modem and SVAN instruments is described in Appendix J.

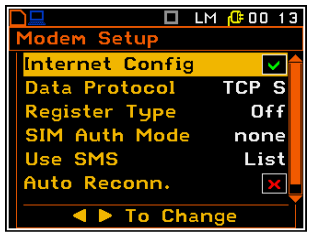
8.19.2. Configuration of modem basic settings – Modem Setup

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

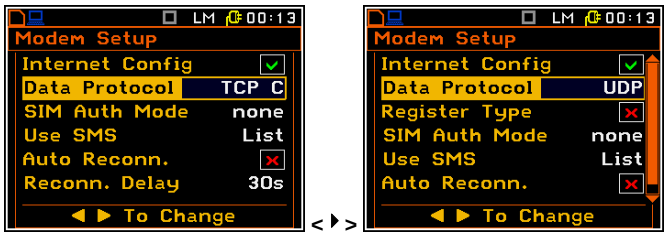


The **Modem Setup** window contains the following options:

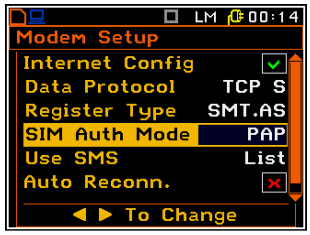
- **Internet Config** – selecting this option ensures that the device is set to automatically configure the modem. When the device is turned off with this option set, it will attempt to configure the modem after the next turn on. More about this option is written in Appendix J (Configuration and Registration).



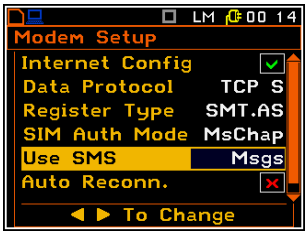
- **Data Protocol** – defines connection type for data exchange. Available types are **TCP S** (server mode), **TCP C** (client mode) and **UDP**.



- **Register Type** – selecting this option ensures that the device instantly attempts to register the station provided the modem is already configured. More about the registration is written in Appendix J (Configuration and Registration). 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.

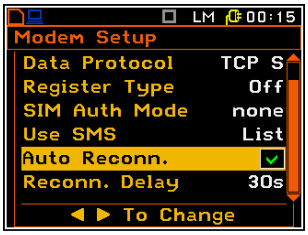


- **Use SMS** – selecting this option will configure SMS service by the modem.



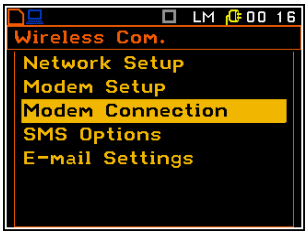
- **Auto Reconn.** – selecting this option will make the device attempt to reconnect the modem in the case of errors or sudden disconnection. More about this option is written in Appendix J (Error handling).

- **Reconn. Delay** – time between each reconnection attempt.

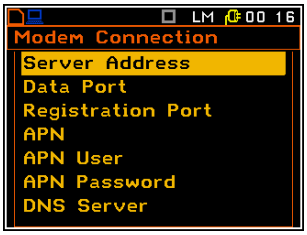


8.19.3. Setting of support modem options - Modem Connection

The **Modem Connection** position enables the user to configure several supporting options required by SIEMENS modem to establish internet connection. More about this option is written in Appendix J (Configuration and Registration).

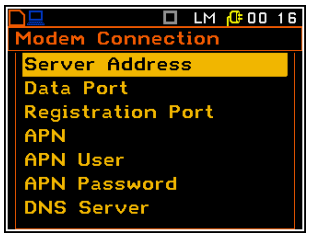


<ENT>

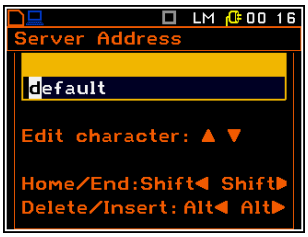


The **Modem Connection** window contains the following positions, which can be edited after pressing the **<ENTER>** push-button:

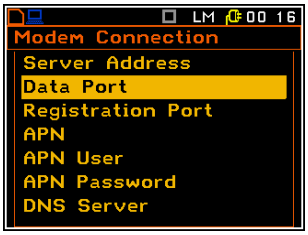
- **Server Address** – allows the user to enter up to 32 characters of either IP or domain address, where the registration data will be sent during the registration process (**Data Protocol: TCP S** or **UDP**) or to which the modem will connect to (**Data Protocol: TCP C)**.



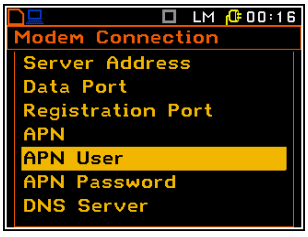
<ENT>



- **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).



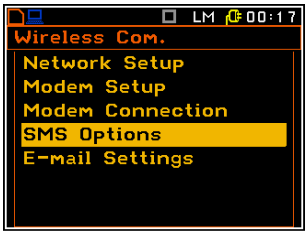
- **APN** – allows the user to enter up to 20 characters of APN name of the SIM card used with the modem.
- **APN User** – allows the user to enter up to 20 characters of user name used for verification by the SIM card used with the modem.
- **APN Password** – allows entering up to 20 characters of password 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



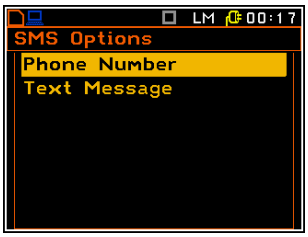
entered.

8.19.4. Configuration of SMS service - SMS Option

The **SMS Options** position allows the user to configure SMS service used for alarm notification. For more information about alarm notification see Appendix J (Alarm notification).



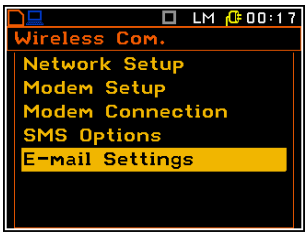
The **SMS Options** window contains the following positions, which can be edited after pressing the **<ENTER>** push-button:



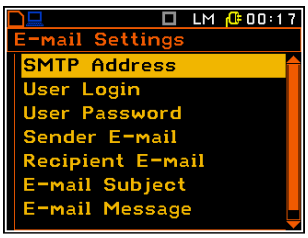
- **Phone Number** – allows the user to enter up to 20 characters of the phone number where the text messages will be sent.
- **Text Message** – allows the user to enter up to 20 characters of additional text, which will be appended into a standard alarm message template.

8.19.5. Configuration of e-mail service - E-mail

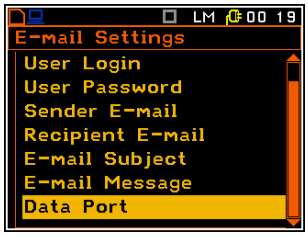
The **E-mail Settings** position allows the user to configure the e-mail service used for alarm notification. For more information about alarm notification see Appendix J (Alarm notification).



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



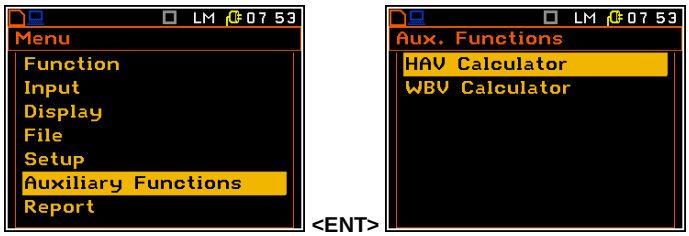
- **SMTP Address** – allows the user to enter up to 32 characters of SMTP server address which will be used to send e-mail messages.
- **User Login** – allows the user to enter up to 20 characters of user login text used to establish verified connection with SMTP server.
- **User Password** – allows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

9. CALCULATION OF DOSE PARAMETERS – Auxiliary Functions

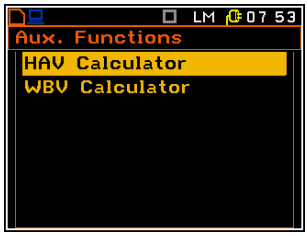
The **Auxiliary Functions** list is used to calculate the various parameters, which are mainly dedicated for the control of the vibration measurements. This sub-list contains two positions: **HAV Calculator** and **WBV Calculator**, which are used to calculate the characteristic parameters for Hand-arm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



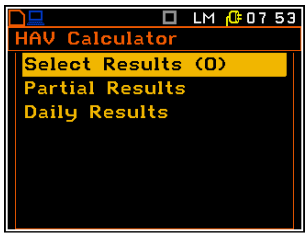
It enables to calculate the **HAV** and **WBV** value, **Partial Results** (partial exposure) and **Daily Results** (daily exposure).

9.1. 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:



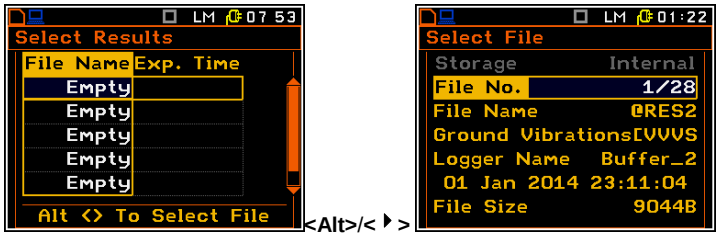
Select Results that enables the user to select files of measurement results with hand-arm / whole-body data;

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 **< ▸ >** push-buttons the user can select the files to be used for calculation of the dose value.

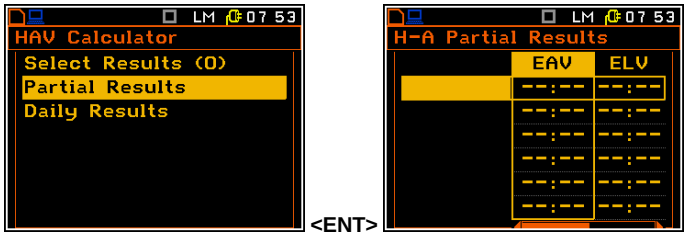


It is possible to select 6 files with hand-arm / whole-body results. The **Exp. Time** defines the period during which the measurement results are extrapolated.

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

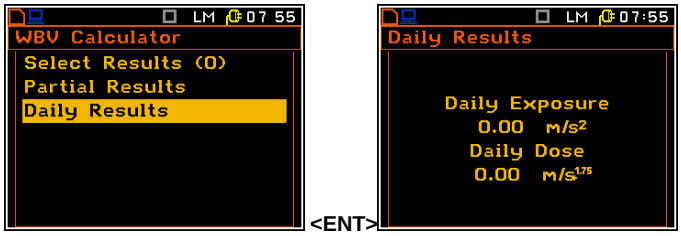
Selection of the partial results

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.



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**.



10. REPORTS PRINTING – Report

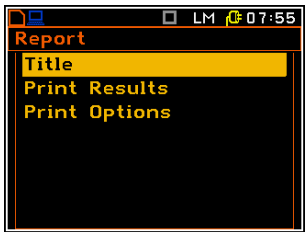
The printed reports of the Sound or Vibration measurement results in the predefined format can be obtained by means of the **Report** list. The **Report** list contains the following elements:

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.

<ENT>

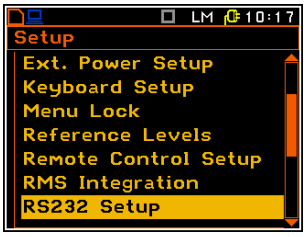


In order to obtain the report the user has to connect the instrument to the printer's RS 232 port using the **SV 55** RS 232 interface. This hardware interface is hidden in the Cannon type, 9-pin RS 232 plug-in. On the other end of the **SV 55** interface, which itself looks like a cable, there is the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

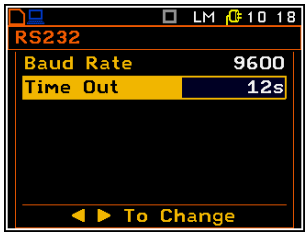
It is also possible to connect the instrument to the USB port of a PC using the proper cable. Measurement results can be easy downloaded to any PC (using the **SC 16** USB interface cable and SvanPC software) and printed out on the printer attached to a PC.

Notice: *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.*

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**.



<ENT>



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.

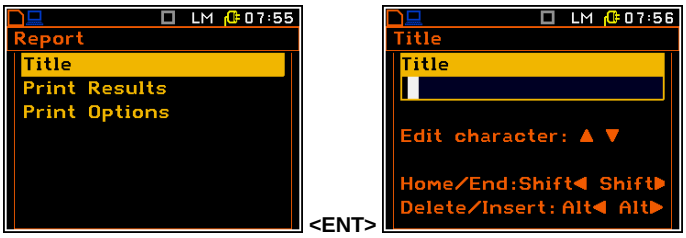
Printers, which have only a USB interface, are currently not driven by the instrument.

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

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

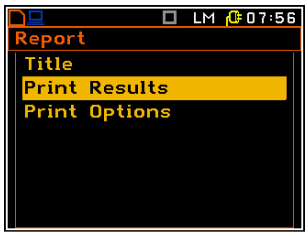
10.1. Edit the user title of the report - Title

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>** push-button.



10.2. 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.

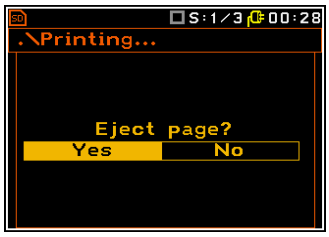


After pressing the **<Enter>** push-button the instrument checks its current state. If the measurements are running, printing is not possible and the appropriate message is displayed. If no results were recorded the next message is displayed.

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.

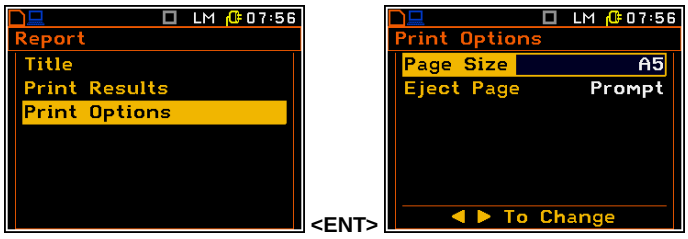
The following confirmation question is displayed after the printing, if the **Prompt** parameter was selected in the **Eject Page** position (*path: <Menu> / Report / Options*). The user has to answer in this case if the paper in the printer has to be ejected to the new page.



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 push-button should be pressed except **<Shift>** and **<Alt>**) and after pressing a push-button it returns to the **Report** list.

10.3. 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**).



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.

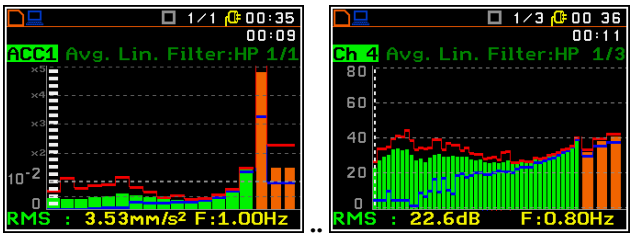
The request is displayed after printing the measurement results if the **Prompt** parameter was selected in the **Eject Page** position. The user has to answer in this case if the paper in the printer has to be ejected to the new page. After pressing **<ENTER>** the instrument returns to the **Report** 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 push-button should be pressed except **<Shift>**) and after pressing a push-button it returns to the **Report** list.

11. 1/1 AND 1/3 OCTAVE ANALYSER

The instrument operates as the **1/1 Octave** or **1/3 Octave** analyser in a very similar way to the **Level Meter** mode and, in addition, 1/1-octave or 1/3-octave analysis is performed in parallel with the **Level Meter** operations. All 1/1-octaves (15 octaves with the centre frequencies from 16 kHz down to 1 Hz; in base two system) and 1/3-octaves (45 1/3 octaves with the centre frequencies from 20 kHz down to 0.80 Hz; in base two system) digital pass-band filters work in real-time with the **HP** weighting filter (type 1 according to the IEC 61672-1 standard; the filter characteristics are given in Appendix D) and the linear RMS detector.

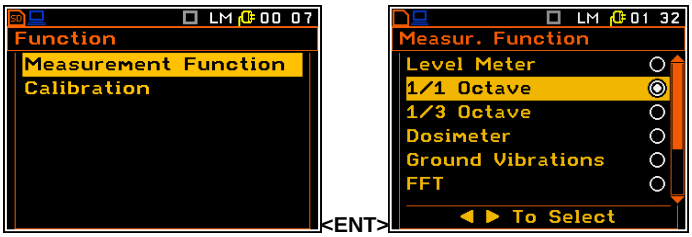
The results of **1/1 Octave** and **1/3 Octave** analysis (also called spectrum analysis) can be examined by the user on a display in the **Spectrum** presentation mode. The availability of this mode can be switched on or off by the user (*path: <Menu> / Display / Display Modes*).



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** mode.

11.1. Selection of 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>** push-button, 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 **< ▸ >** push-button and then press **<ENTER>**.

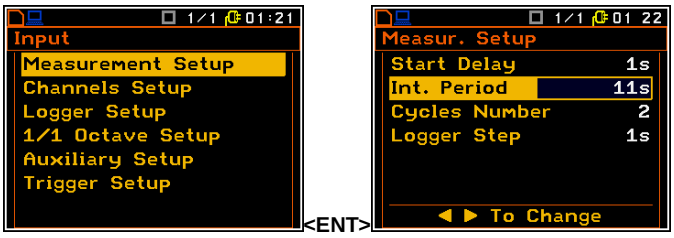


Notice: *It is not possible to change the current function while a measurement is taking place. In this case the instrument displays for about 2 seconds the text* ***"Measurement in Progress"****. In order to change the current measurement function the instrument must be stopped!*

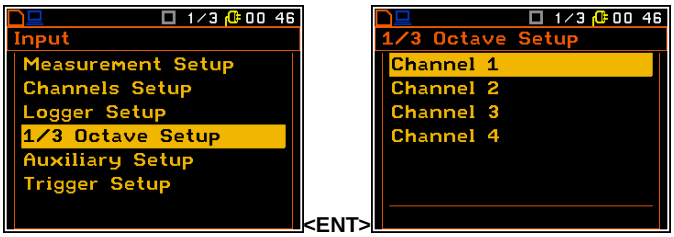
11.2. Setting the parameters of 1/1 Octave and 1/3 Octave analysis

Additionally to the pass band RMS results three Total values are measured during 1/1 and 1/3 octave analysis. Total values parameters (weighting filter, type of integration filer for acceleration, velocity or displacement results and additional calibration factor) are setting up in the **Total Values** list (*path: <Menu> / Display / Display Setup / Channel x / Total Values*).

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.

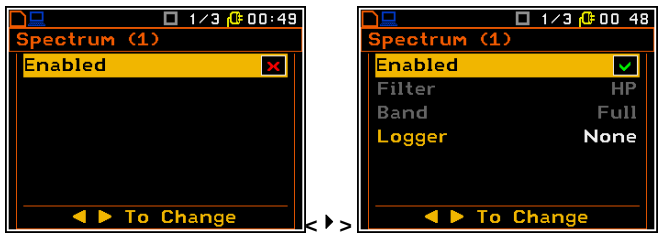


The **1/1 Octave Setup** (**1/3 Octave Setup**) position appears in the **Input** list when the **1/1 Octave** (**1/3 Octave**) function is selected in the **Measurement Function** list and enales the user to select the parameters for 1/1 and 1/3 octave spectrum calculation for each channel: weigting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



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

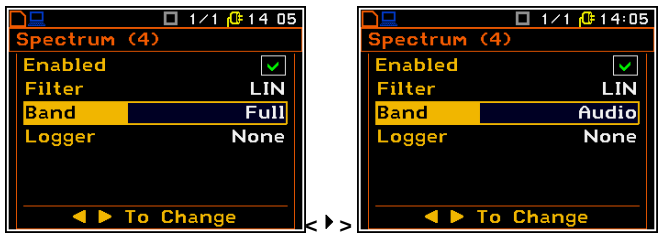
In case of **Vibration** input the **Filter** and **Band** parameters cannot be changed and the default values are **HP** and **Full** accordingly.



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.

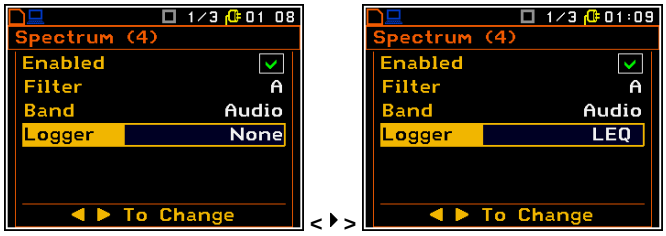
The frequency characteristics of the filters mentioned above are given in Appendix C.

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.

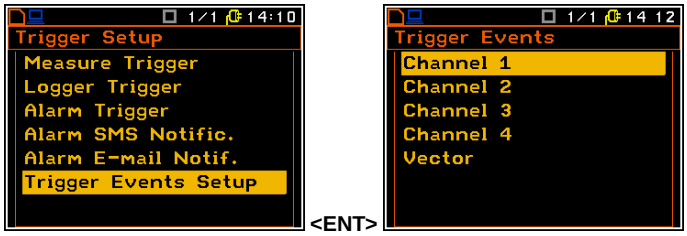
The **Logger** position enables the user to save the spectrum if **RMS** value is selected in case of **Vibration** input, and **RMS** or **LEQ** (with **A** filter) value is selected in case of **Sound** input.



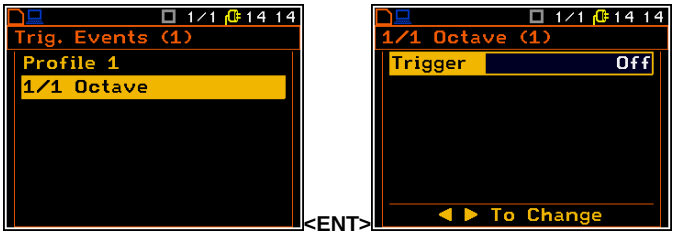
11.3. Selection of 1/1 Octave and 1/3 Octave bandpass results as triggering source

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**.

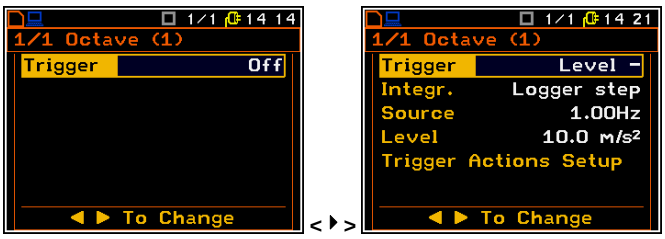


For the **1/1 Octave** or **1/3 Octave** functions additional **1/1 Octave** or **1/3 Octave** position appears in the **Trigger Events** list. These positions enable the user to define additional trigger events with the use of result of 1/1 or 1/3 analysys.



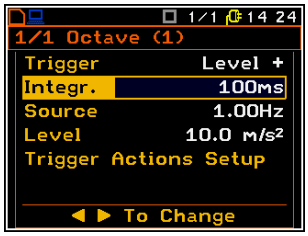
The **Trigger** position enables the user to switch the trigger on and select the trigger type: **Level -**, **Level +**, **Slope -**, **Slope +**, **Grad -** and **Grad +**.

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

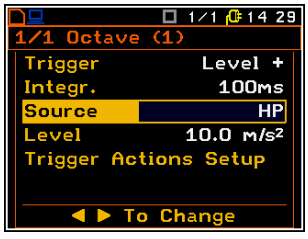


- if **Level +** is selected, the triggering condition is fulfilled only when **Source** has the greater value than determined by **Level**, otherwise the triggering condition is not fulfilled.
- if **Level –** is selected, the triggering condition is fulfilled only when **Source** has the lower value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



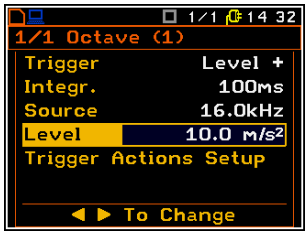
The **Integr.** position enables the user to select time (integration period) for condition evaluation: equal to **Logger step** (*path: <Menu> / Input / Data Logging / Logger Setup*), **100ms**, **1.0s**, and equal to current measurement time calculated from measurement start - **Meas. Time** (*path: <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

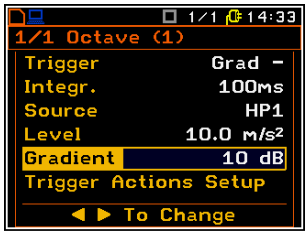
HP/filter of Profil(1)/filter of Profil(1) for Vibration channel.

Threshold definition



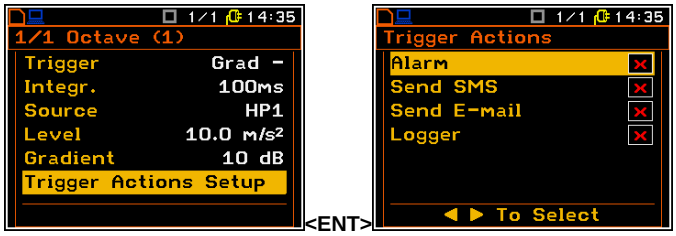
The **Level** position enables the user to select the value of threshold for triggering condition in therange of **60 dB** to **200 dB** for Sound input and of **1.00 mm/s²** to **10.0 km/ s²** for vibration input. The vibration units can be set in the **Display Scale** window (*path: <Menu> / Display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

Selection the trigger actions

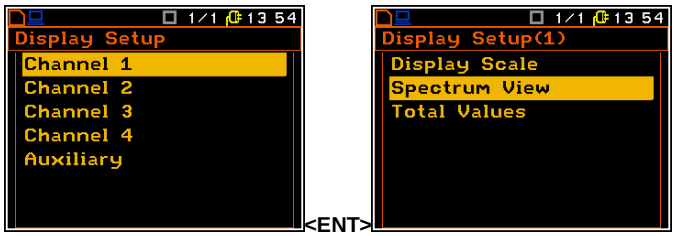


The **Trigger Action Setup** position enables the user to select the trigger actions for defined condition: **Alarm**, **Send SMS**, **Send E-mail** and **Logger**.

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

11.4. 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:

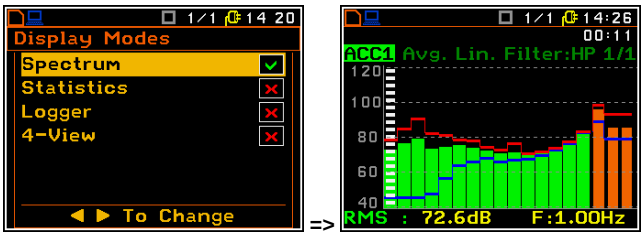


Display Modes	enables the user to switch on the spectrum presentation mode;
Display Setup / Channel x	enables the user to select options for spectrum presentation:
Display Scale	to change the scale of the vertical axis of the graphical presentation;
Spectrum View	to choose the type of the spectrum to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

11.5. Presentation of 1/1 Octave and 1/3 Octave analysis results

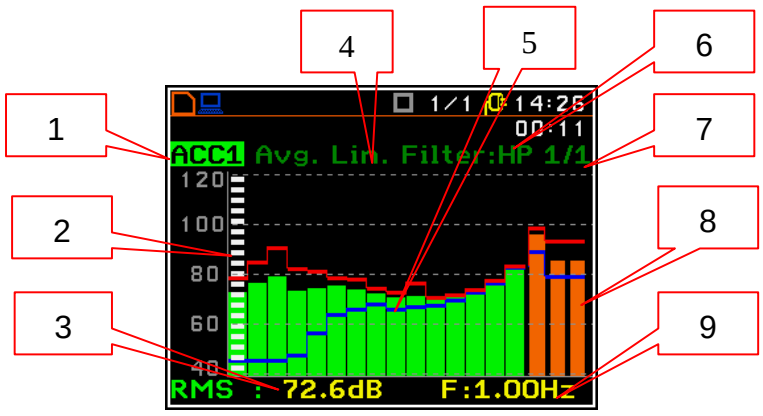
The **Spectrum** position of the **Display Modes** list is accessible with **1/1 Octave** and **1/3 Octave** functions.

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

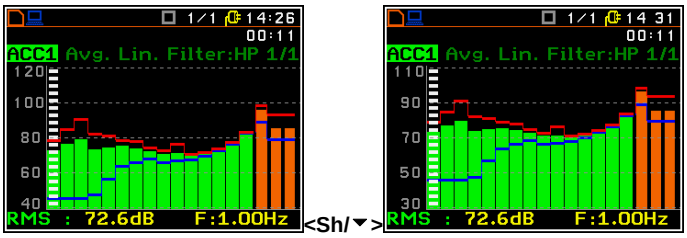


Field description of the Spectrum view

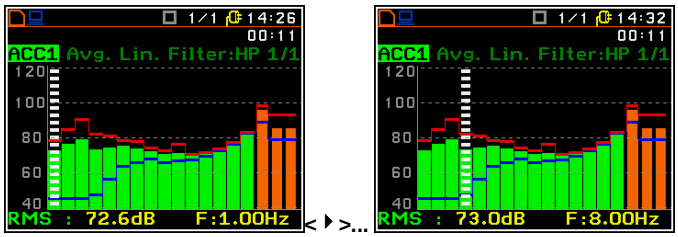
1. Spectrum type/Channel number
2. Cursor position
3. Value for the cursor position
4. Used averaging
5. Spectrum plot
6. Used weighting filter
7. Type of spectrum
8. Total values
9. Central frequency for the cursor position.



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

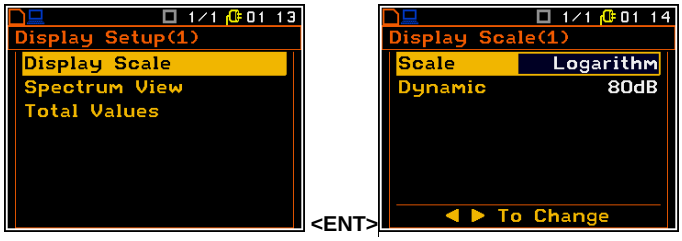


The user may change the cursor position by means of the **<◀>**, **<▶>** push-buttons. The frequency and appropriate value are presented in the line below the plot.



11.6. 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.

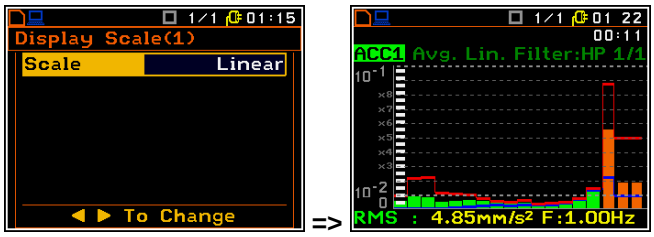


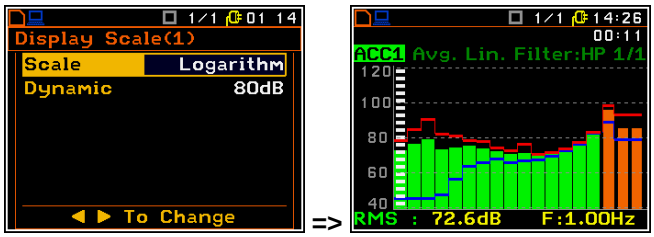
Setting the scale of the measurement results presentation

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

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

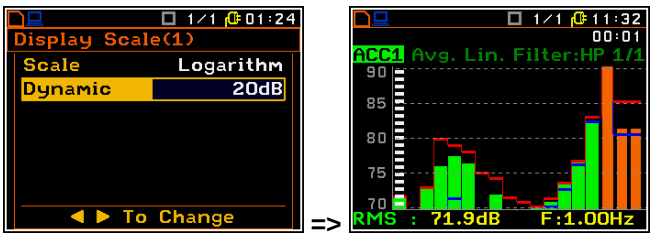
In case of **Logarithm** the Y-scale of spectrum presentation is logarithmic and the measurement results are expressed in decibels (the results are related to the values set up in the **Reference Level** sub-list (*path: <Menu> / Auxiliary Setup / Reference Levels*).





Scaling the vertical axis

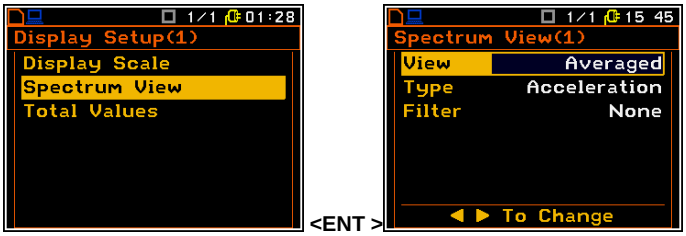
If **Scale** is set to **Logarithmic** then the **Dynamic** position enables the user to select the required dynamic range scaling of the graphical presentation mode. The user can obtain double, four and eight times expansion of the vertical axis (the default vertical axis corresponds to **80 dB**, after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

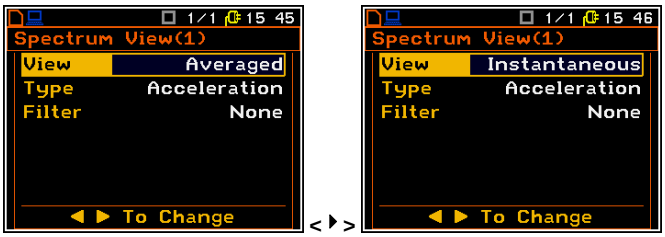


11.7. Setting parameters of the spectrum presentation - Spectrum View

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**).

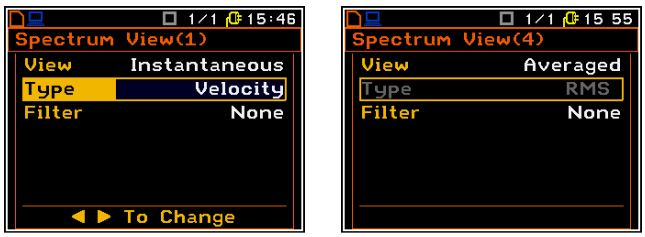
In the **View** position the user can select the different type of spectrum such as: **Averaged** or **Instantaneous**.



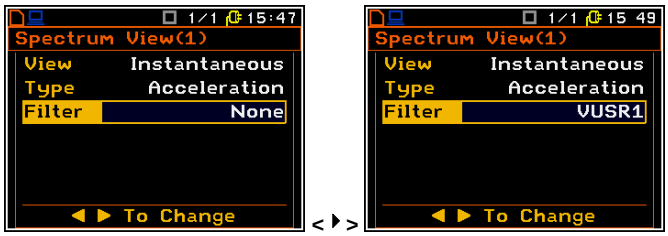


The spectrum **Type** can be selected only for vibration inputs and available values are: **Acceleration**, **Velocity** and **Displacement**.

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

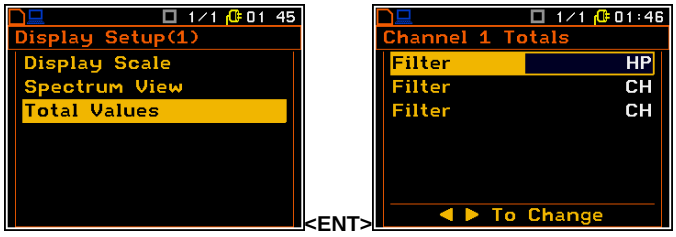


Filter position defines additional user defined weighning filter to be imposed on spectrum, measured with defined **HP**, **LIN**, **A** or **C** filters. As soon as any user filter is defined for **Total Values** calculation (*path: <Menu> / Display / Display Setup / Channel x / Total Values*) this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



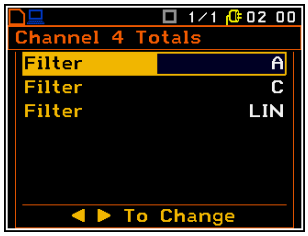
11.8. Setting parameters for total values – Total Values

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.

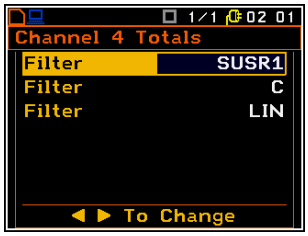


By default:

- 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.



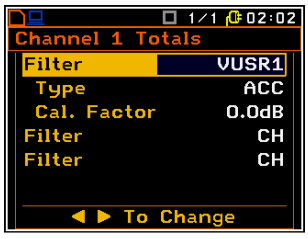
It is also possible to select three user filters: **FUSR1**, **FUSR2** and **FUSR3** for vibration input as well as **SUSR1**, **SUSR2** and **SUSR3** for sound input. When user filter for vibration input is selected, two additional positions appear: **Type** and **Cal. Factor**.



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**).

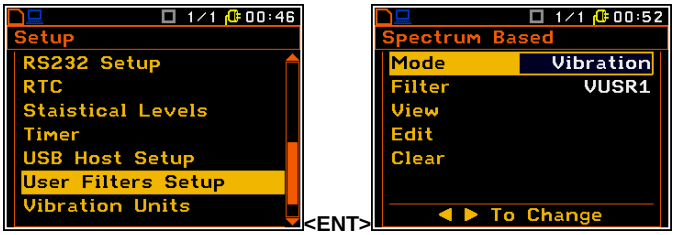
In the **Cal. Factor** position the user can define any additional calibration factor which will be applied to the calculation of Total value.

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



11.9. Setting user filter coefficients for 1/1 Octave and 1/3 Octave analysis – User Filters Setup

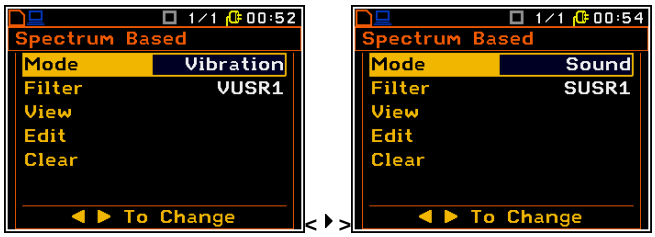
The **User Filters Setup** position enables the user to introduce the values of the user frequency filters coefficients. This position is active only in **1/1 Octave** and **1/3 Octave** modes. The **User Filters Setup** position opens the list in which the user can view, edit or clear the filter coefficients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



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

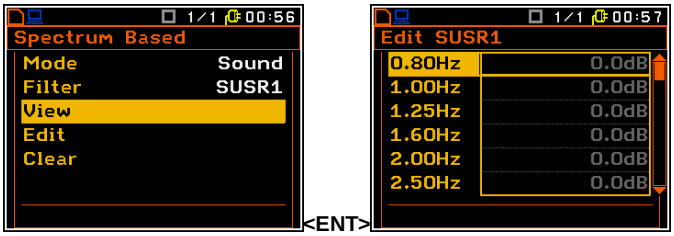
With each mode a three user defined filters (**Filter**) are connected:

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

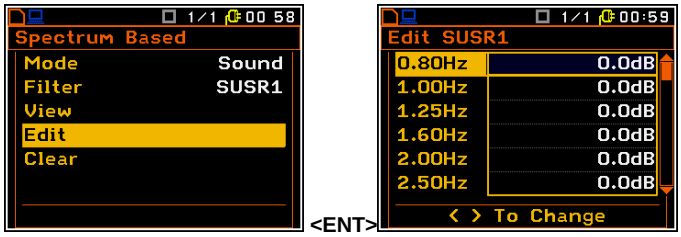


The **View** position opens the window with the table of filter coefficients.

The values of these positions cannot be changed.



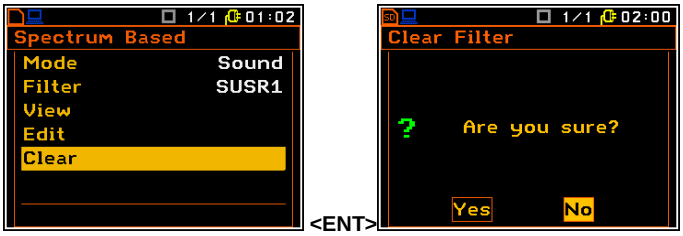
The **Edit** position opens the list with the table of filter coefficients. All positions in this table can be edited by the user.



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.



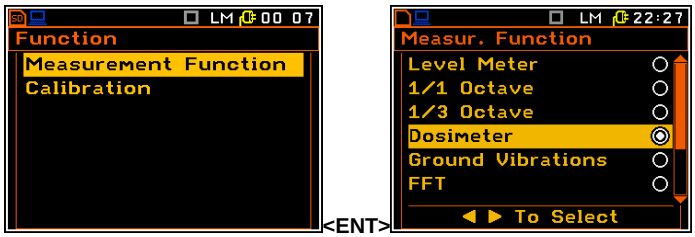
12. DOSIMETER

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

Below additional settings related with the **Dosimeter** function are described.

12.1. Selection of Dosimeter function

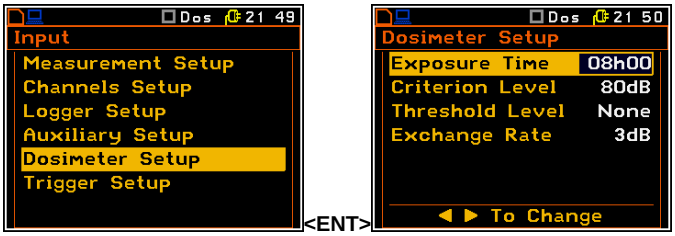
In order to select the **Dosimeter** function the user has to enter the **Function** list by pressing the **<Menu>** push-button, then select the **Measurement Function** position and open it by pressing **<ENTER>**. In the **Measur. Function** list the user has to highlight the **Dosimeter** option, mark it by **<▶>** push-button and then press **<ENTER>**.



Notice: *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!*

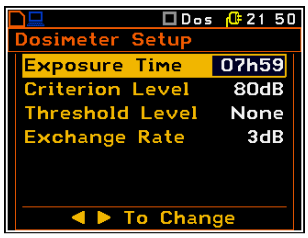
12.2. Selection of dosimeter parameters - Dosimeter Setup

The **Dosimeter Setup** is accessible in the **Input** when the acoustic **Dosimeter** function is selected in the **Measurement Function** list (*path: <Menu> / Function / Measurement Function / Dosimeter*). During vibration measurements the sound dosimeter functions are disabled.

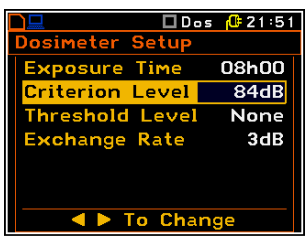


The **Dosimeter Setup** consists of the parameters, which influence the calculation of the dosimeter results: **Exposure Time**, **Criterion Level**, **Threshold Level** and **Exchange Rate** (the definitions of the dosimeter results are given in App. D).

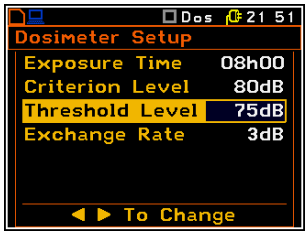
The **Exposure Time** position enables the user to set the desired value of the exposure time that is used for the calculation of different **Dosimeter** functions as well as **LEPd** that is also calculated in the **Level Meter** mode (cf. App. D for the definitions of the functions). The **Exposure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



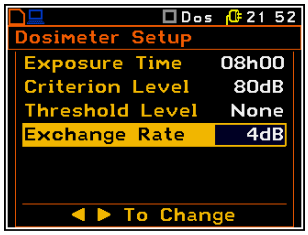
The criterion sound level influences the calculations of the **DOSE** and **D_8h** results. The **Criterion Level** line is accessible after pressing the **<▲>**, **<▼>** push-button in the **Dosimeter Setup** list. The available values are as follows: **80 dB**, **84 dB**, **85 dB** or **90 dB**.



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 **<▲>**, **<▼>** push-buttons in the **Dosimeter Setup** list. The available values are as follows: **None**, **75 dB**, **80 dB**, **85 dB** or **90 dB**.



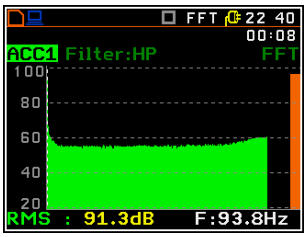
The exchange rate influences the calculations of the dosimeter results, namely **DOSE**, **D_8h** and **LAV**. The exposure rate equal to three complies with ISO R 1999 “Assessment of Occupational Noise Exposure for Hearing Conservation Purposes”, while equal to five - complies with the American “Occupational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



13. FFT ANALYSER

The instrument operates as **FFT** analyser in a very similar way to the **Level Meter** mode and, in addition, **FFT** analysis is performed in parallel with the **SLM** or **VLM** operations.

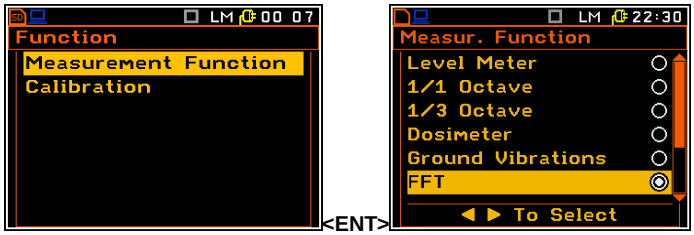
The results of **FFT** analysis (spectra) can be examined by the user on a display in the **Spectrum** presentation mode. The availability of this mode can be switched on or off by the user (*path: <Menu> / Display / Display Modes)*.



FFT spectra with the single **Total** overall value measured with preselected frequency weighting filters and windows are presented in the **Spectrum** mode if selected in the spectrum display menu. The read-out of the value of interest in the spectrum can be done using a vertical cursor on the screen.

13.1. Selection of FFT analysis mode

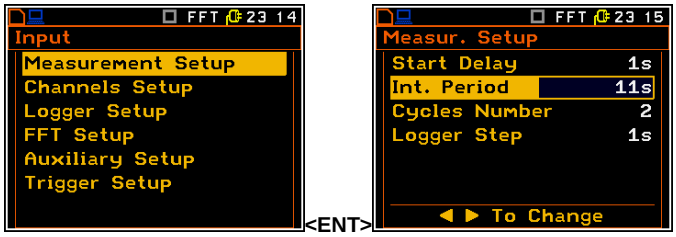
In order to select the **FFT** function the user has to enter the **Function** list by pressing the **<Menu>** push-button, then select the **Measurement Function** position and open it by pressing **<ENTER>**. In the **Measur. Function** list the user has to highlight the **FFT** option, mark it by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



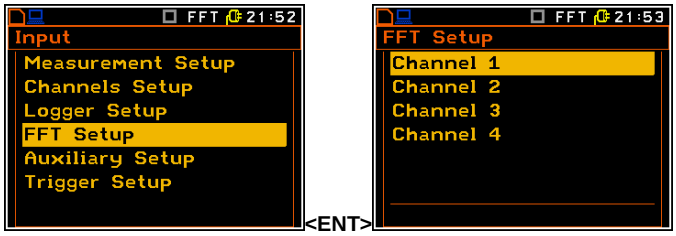
Notice: *It is not possible to change the current function while a measurement is taking place. In this case the instrument displays for about 2 seconds the text* ***"Measurement in Progress"****. In order to change the current measurement function the instrument must be stopped!*

13.2. Selection of FFT analysis parameters - FFT Setup

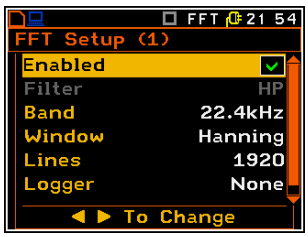
The execution of the **FFT** analysis depends on settings made in the **Measurement Setup** list. The Spectra are averaged during the period defined by **Int. Period** and repeated as defined in the **Cycles Number** position.



The **FFT Setup** position appears in the **Input** list when the **FFT** function is selected in the **Measurement Function** list (*path: <Menu> / Function / Measurement Function*) and enables the user to select the parameters for FFT spectrum calculation for each channel: filter, frequency band, weighting window and number of spectrum lines.

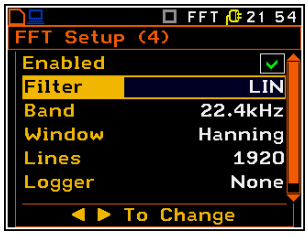


Activavtion of spectrum calculation in the channel



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

Weighting filter selection

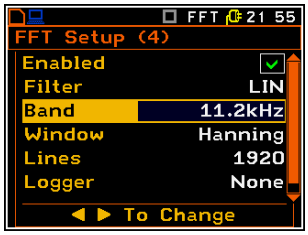


In the case of sound measurements there are **HP**, **LIN**, **A** and **C** filters available.

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

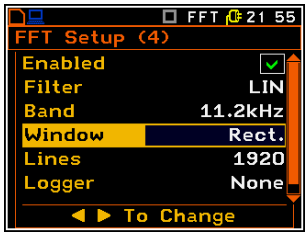
The frequency characteristics of the filters mentioned above are given in Appendix C.

Band selection



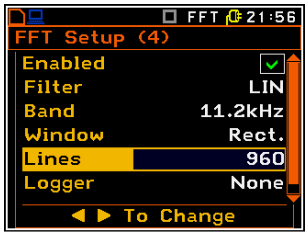
The **Band** position enables the user to select the band in which the narrow-band analysis of the signal has to be performed. The user has the following possibilities: **22.4 kHz**, **11.2 kHz**, **5.6 kHz**, **2.8 kHz**, **1.4 kHz**, **700 Hz**, **350 Hz**, **175 Hz** and **87.5 Hz**.

Selecting the time window for the FFT analysis



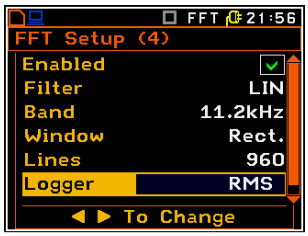
The **Window** position enables the user to select the coefficients of time window, which are used in the **FFT** analysis. Available time windows of the **FFT** analysis are as follows: **Hanning**, **Rect.**, **Flattop**, **Kais-Bes**.

Selecting the number of the lines in FFT spectra



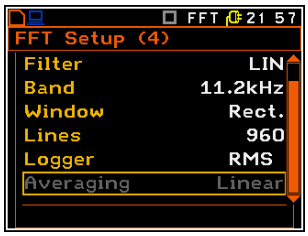
The **Lines** enables the user to select the number of lines in the FFT analysis. There are three values available: **1920**, **960** and **480**.

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).

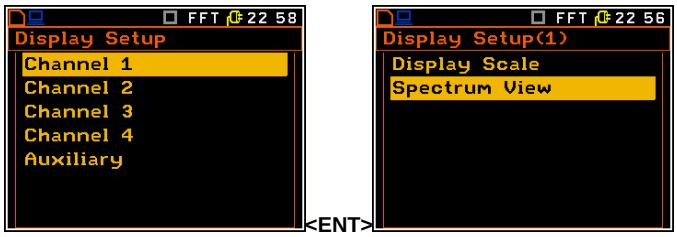
The type of averaging



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

13.3. 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;

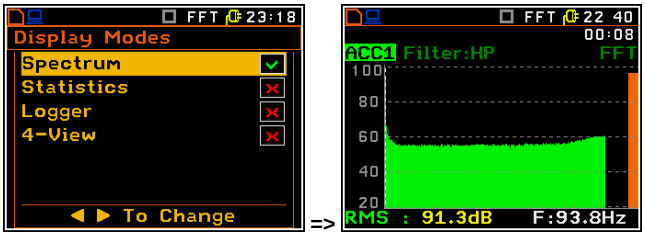
Display Setup / Channel x enables the user to select options for spectrum presentation:

- **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.

13.4. Presentation of FFT analysis results

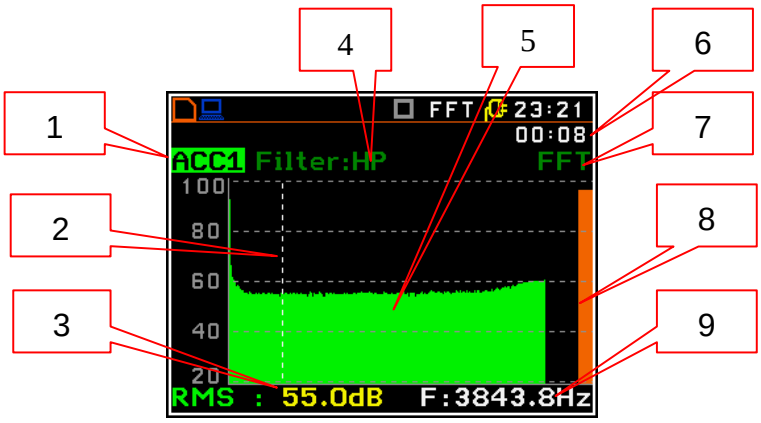
The **Spectrum** position of the **Display Modes** list is accessible with **FFT** function.

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

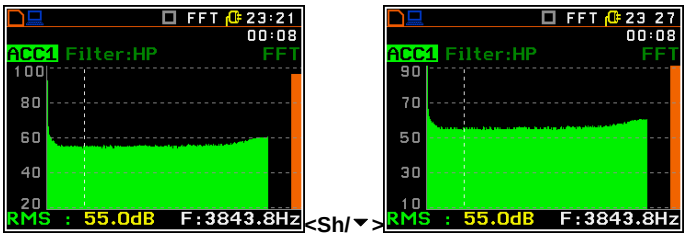


Field description of the Spectrum view

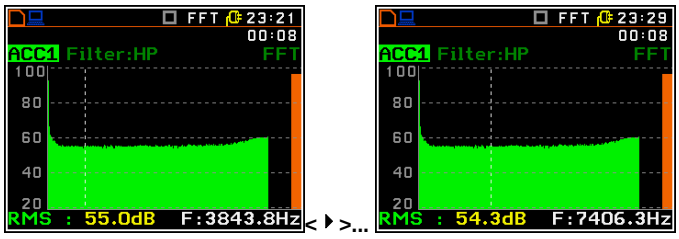
1. Channel numer and sygnal type
2. Cursor position
3. Value for the cursor position
4. Used weighting filter
5. Spectrum plot
6. Elapsed time, the current second of the measurement
7. Type of spectrum
8. Total value
9. Central frequency for the cursor position



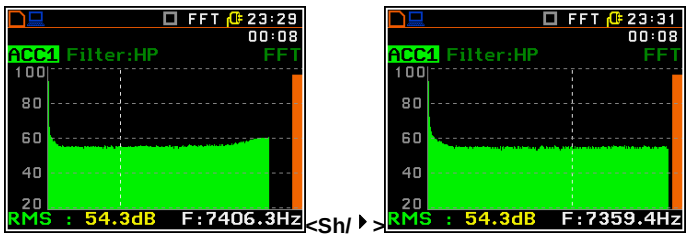
The user may shift the Y-axis during the spectrum presentation by means of the **<Shift>** and **<▲>** (or the **<Shift>** and **<▼>**) push-buttons.



The user may change the cursor position by means of the **<◄ >**, **< ►>** push-buttons. The frequency and appropriate value are presented in the line below the plot.

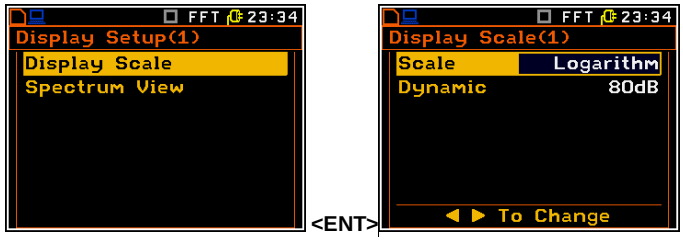


The user may zoom in/out the frequency scale at the cursor position by means of the **<◄ >**, **< ►>** push-buttons, pressed with **<Shift>**.



13.5. Setting the scale of the spectrum results presentation – Display Scale

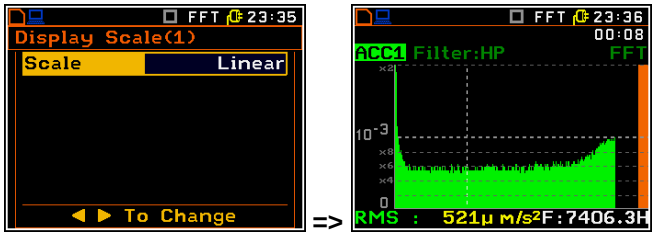
The **Display Scale** sub-list enables the user to change the Y-axis scale in the spectrum presentation mode for each channel separately.



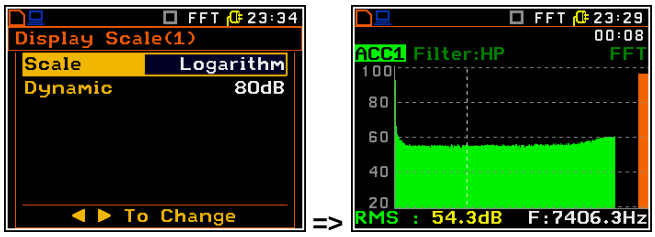
Setting the scale of the measurement results presentation

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

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

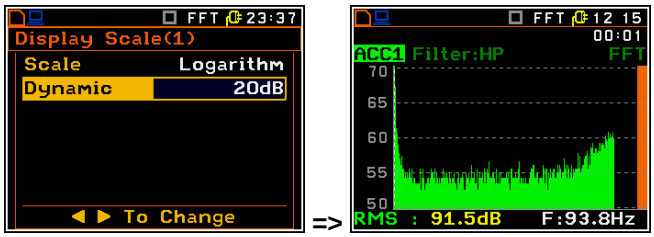


In case of **Logarithm** the Y-scale of spectrum presentation is logarithmic and the measurement results are expressed in decibels (the results are related to the values set up in the **Reference Level** sub-list (*path: <Menu> / Setup / Reference Levels*).



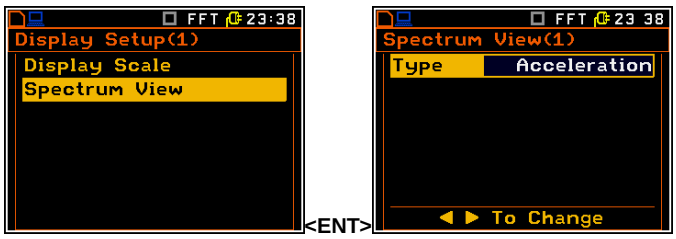
Scaling the vertical axis

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).



13.6. 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**).



14. 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-spectrum.

The **Cross Spectrum** function is used to measure the cross-spectrum. This spectrum is calculated for the two signals (channels). On the basis of this spectrum instrument calculates and presents on the display:

- the Transfer Function, which shows how the signal amplitude is changed between two channels,

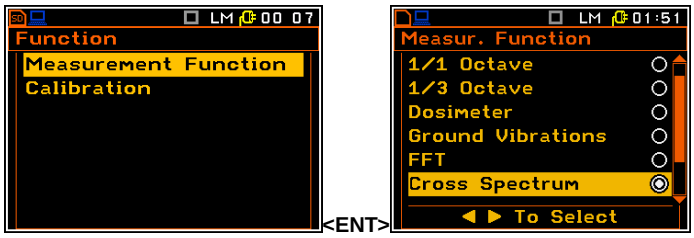
- the phase function, which shows how the signal phase is changed between two channels,

- the gamma function (or correlation), which shows how trustworthy is the result of Transfer Function.

In the settings the reference channel is selected, which measures the signal source, and that is the first of the pair needed to calculate the cross-spectrum, as well as secondary channels, for which the cross-spectra will be calculated.

14.1. Selection of Cross Spectrum function

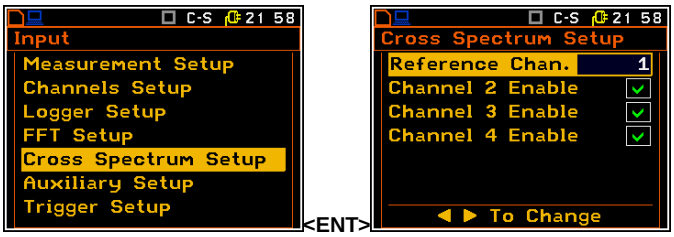
In order to select the **Cross Spectrum** function the user has to enter the **Function** list by pressing the **<Menu>** push-button, then select the **Measurement Function** position and open it by pressing **<ENTER>**. In the **Measurement Function** list the user has to highlight the **Cross Spectrum** option, mark it by **< ▸ >** push-button and then press **<ENTER>**.



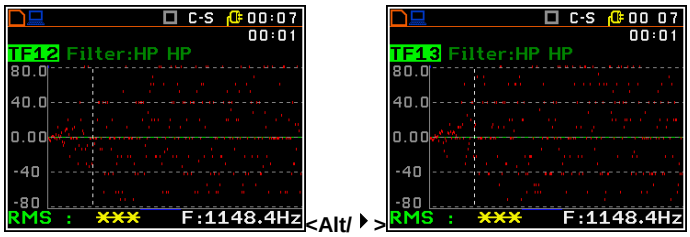
Notice: *It is not possible to change the current function while a measurement is taking place. In this case the instrument displays for about 2 seconds the text* ***"Measurement in Progress"****. In order to change the current measurement function the instrument must be stopped!*

14.2. Selection of channels for cross-spectrum analysis - Cross Spectrum Setup

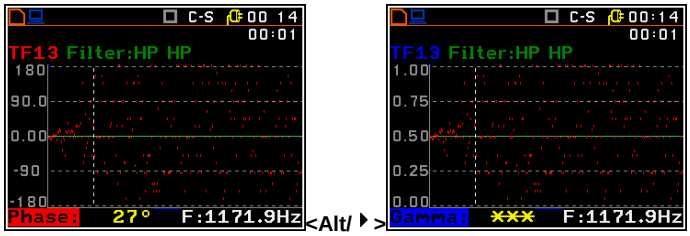
When the **Cross Spectrum** function is selected in the **Measurement Function** list (*path: <Menu> / Function / Measurement Function*) the **Cross Spectrum Setup** position appears in the **Input** list. This position enales the user to select the reference channel and channels, for which the cross-spectra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



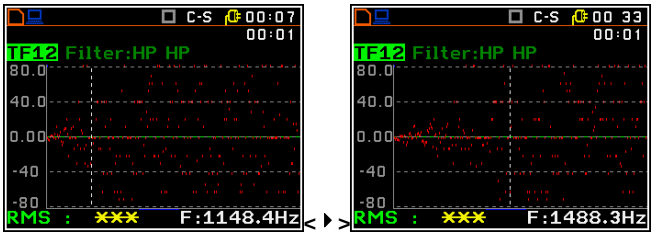
To change presentation of transfer function (**TF**) calculated for another channels the user has to activate the TF field and then press the **< ◂ >**, **< ▸ >** push-buttons with **<Alt>**.



To display another than RMS transfer function the user has to change the active **RMS/Phase/Gamma** field by means of **<▲>** or **<▼>** push-buttons and change the function by means of the **<◀>**, **<▶>** push-buttons, pressed with **<Alt>**.



The cursor position can be change by means of the **<◀>**, **<▶>** push-buttons.



15. SOUND INTENSITY

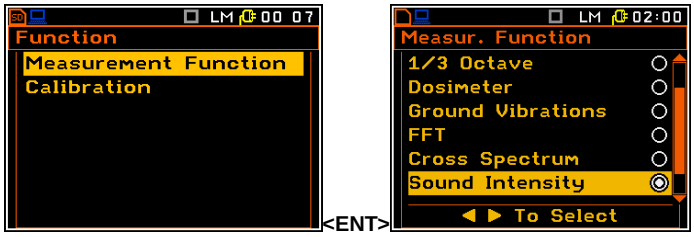
If the **Sound intensity** function is selected the instrument operates as the **FFT** analyser and the **Level Meter** and in addition performs calculation of crosspower spectrum.

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.

15.1. Selection of Sound Intensity function

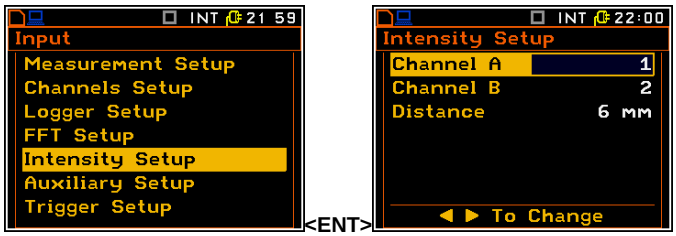
In order to select the **Sound Intensity** function the user has to enter the **Function** list by pressing the **<Menu>** push-button, then select the **Measurement Function** position and open it by pressing **<ENTER>**. In the **Measurement Function** list the user has to highlight the **Sound Intensity** option, mark it by **< ▸ >** push-button and then press **<ENTER>**.



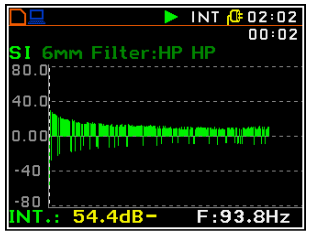
Notice: *It is not possible to change the current function while a measurement is taking place. In this case the instrument displays for about 2 seconds the text* ***"Measurement in Progress"****. In order to change the current measurement function the instrument must be stopped!*

15.2. Selection of parameters for sound intensity analysis - Intensity Setup

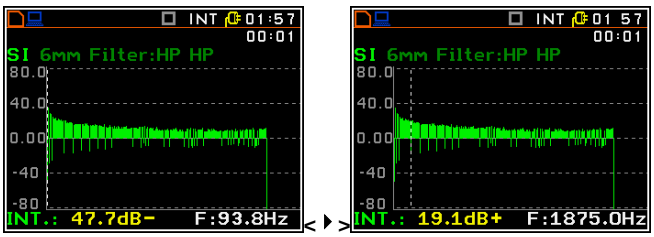
When the **Sound Intensity** function is selected in the **Measurement Function** list (*path: <Menu> / Function / Measurement Function*) the **Intensity Setup** position appears in the **Input** list. This position enales the user to select the channel for A and B microphones and to define the distance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



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 **< ◂ >**, **< ▸ >** push-buttons.



16. RT 60 MEASUREMENT OF THE REVERBERATION TIME

The **RT 60** analysis mode is an optional function of the SVAN 979 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 979 instrument fulfil the ISO 3382 standard.

The reverberation time of the room can be obtained with the use of the SVAN 979 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 H.

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

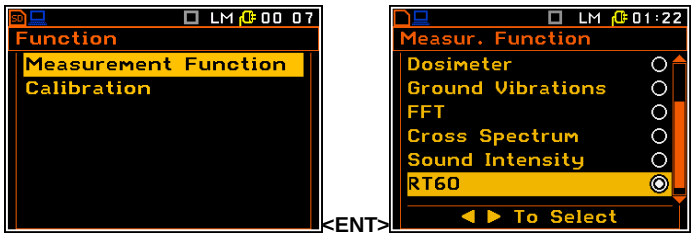
1. The measurement part during which the acoustic response of the room is registered.
2. The calculation part during which the reverberation time (**EDT**, **RT 20**, **RT 30** and **RT User**) is calculated for the measured room response.

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

16.1. Selection of RT 60 function

The **RT 60** analysis mode 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.

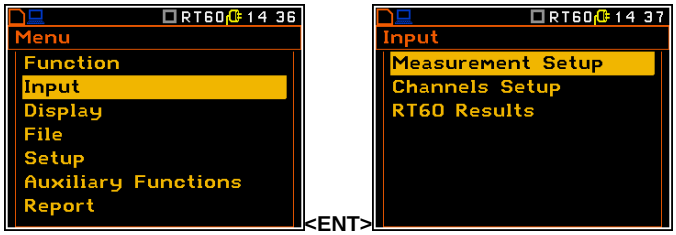
In order to select the **RT 60** function the user has to enter the **Function** list by pressing the **<Menu>** push-button, then select the **Measurement Function** position and open it by pressing **<ENTER>**. In the **Measurement Function** list the user has to highlight the **RT 60** option, mark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



Notice: *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. Selection of RT 60 parameters

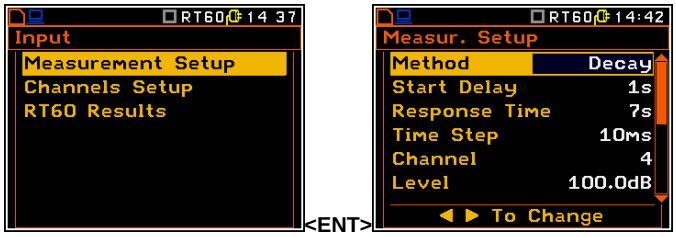
The execution of the **RT 60** analysis depends on settings made in the **Input** list, which consists of three positions: **Measurement Setup**, **Channels Setup** and **RT60 Results**.



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

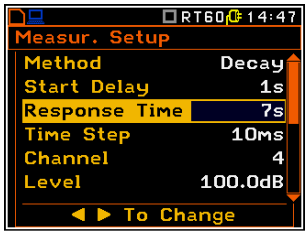
1. The measurement part during which the acoustic response of the room is registered.
2. The calculation part during which the reverberation time (**EDT**, **RT 20**, **RT 30** and **RT User**) is calculated for the measured room response.

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



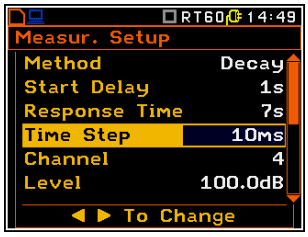
The **Method** position enables the user to choose the method for **RT60** calculation: **Decay** or **Impulse**. Both methods are described in the Appendix H.

The **Start Delay** position defines the delay period from the moment the **<Start/Stop>** push-button 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.

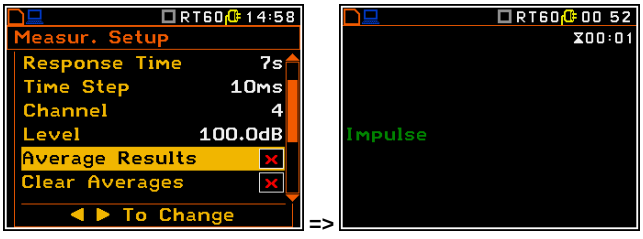
The **Level** position defines the level for triggering the measurement.

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).

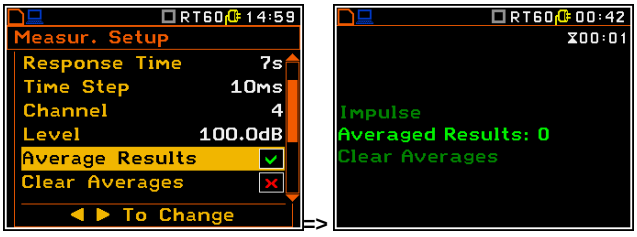
In the **Decay** method the **Leq** level defined by the **Level** parameter must be reached to start time history recording. The **RT60** measurement starts when the 1 second **Leq** (**A** weighted) level value decreases by **10 dB**. The RT60 Decay algorithm uses 50 samples pre-trigger, defined by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

The **Averaging** 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.

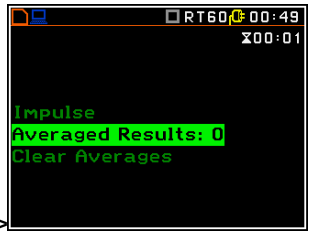


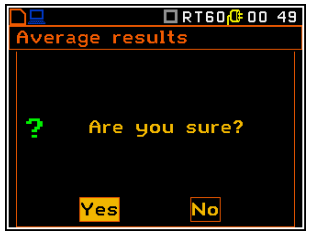
When this option is swithed on the initial RT screen will inform the user also about number of averaged results and the user will be able to average new results with the previous one or to clear averages.

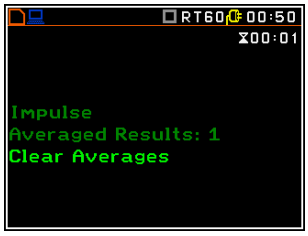


To make averaging of the performed measument results with the calculated before averaged results the

user should select the field **Averaged Results**, press the **<ENTER>** push-button, select in the confirmation window **Yes** and press **<ENTER>** again. In the field **Averaged Results: x** the value **x** will be increased by one.

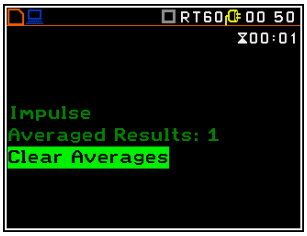
<Start> 

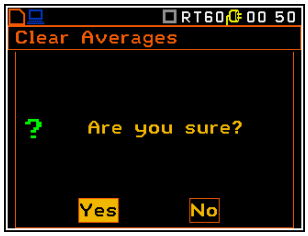
<ENT> 

<ENT> 

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

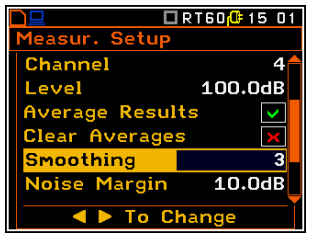
To clear averaging the user should select the field **Clear Averages: x** and press the **<ENTER>** push-button, select in the confirmation window **Yes** and press **<ENTER>** again.



<ENT> 

<ENT> 

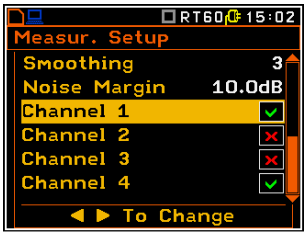
The **Smoothing** position enables the user to set the number of samples, which are taken to averaging process of the sound pressure level decay curve. **Notice: this parameter influences the reverberation time results.** The parameter can be set in the range **0** ÷ **15** with **1** sample step (default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



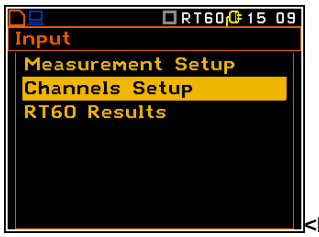
The **Noise Margin** position enables the user to set the margin value to the calculated noise level (for more detail see **Appendix H**). This parameter can be set in the range **0 ÷ 20 dB** with **0.1 dB** step (default value is **10 dB**).

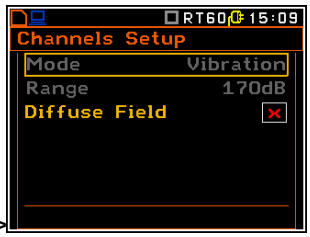
Notice: *If the measurement have to fulfilled the* ***ISO 3382*** *standard requirements the noise margin is required to be set to 10 dB (or greater value).*

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

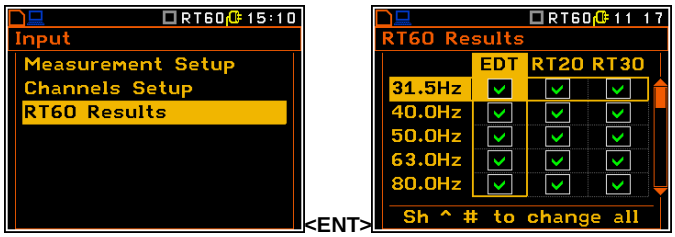


The **Channels Setup** list enables the user to swith the **Diffuse Field** correction filter.



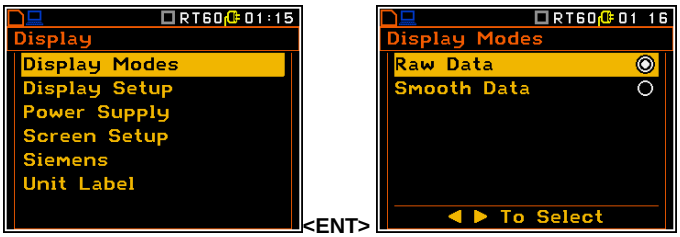
<ENT> 

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.

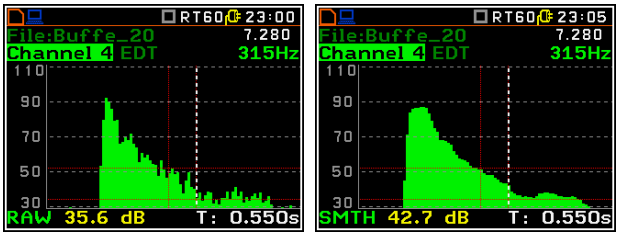


16.3. Setting the result display mode

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

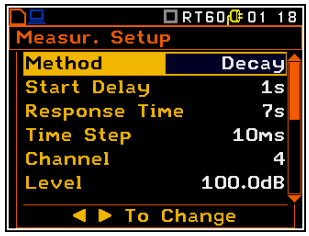


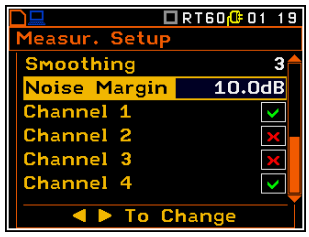
Time data can be viewed as a **Raw Data**, **Smooth Data** (or **Integrated Data** in case of **Impulse** method).



16.4. Start RT60 measurements

Measurements with the use of Decay method

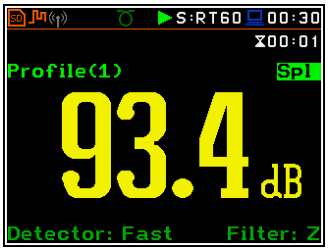




1. Set parameters for **Decay** RT60 measurements. Most used setup is presented below.
   - **Method:** **Decay**
   - **Response Time:** **7s**
   - **Time Step:** **10ms**
   - **Averaging:** **On**
   - **Smoothing:** **3**
   - **Noise Margin:** **10.0dB**
2. Place the sound power source in the measured 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).

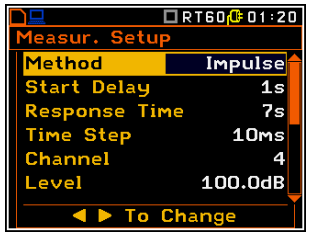
Notice*: *The default measurement time of the decay curve registering (**Recording Time**) is 7 seconds. It can be insufficient in some applications. It is recommended to set this value to be at least two times longer than expected reverberation time. For details see Appendix H.

4. Switch on the sound power source.
5. Start the measurement process by pressing the **<Start/Stop>** push-button. 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>** push-button or use the **File** menu option.



Notice*:** *It is necessary to switch on the sound source before starting the measurement because of the trigger requirements (for more details see Appendix H). 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**

Notice*:** *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. For details see Appendix H.*

***Notice*:** *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>** push-button. 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>** push-button or use the **File** menu option.

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

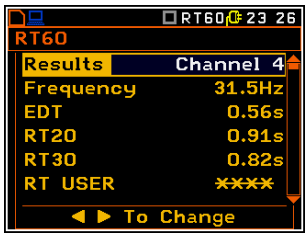
16.5. Visualization of the RT 60 measurements results

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

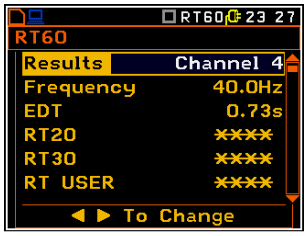
1. Table of **EDT**, **RT20**, **RT30** and **User** results;
2. Bar plot of **EDT**, **RT20**, **RT30** and **User** results;
3. Plot of sound pressure level decay curves.

The user may switch between the presentation modes by means of the **<Alt>** and **<▲>**, **<▼>** push-buttons.

Table of RT60 results



<▼>



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

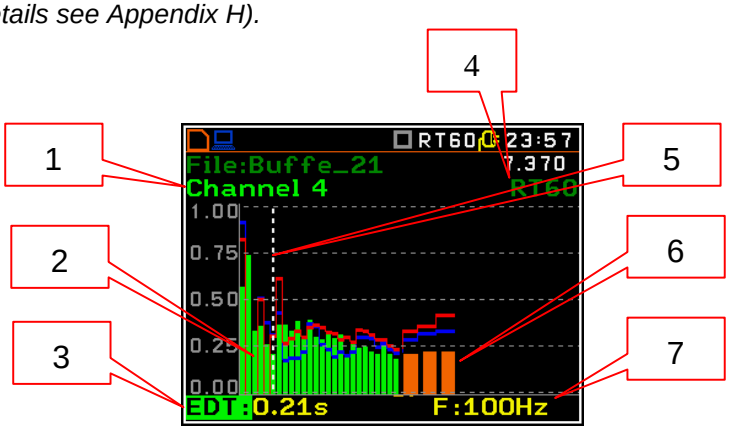
- **EDT** - early decay time;
- **RT 20** - reverberation time calculated with 20 dB dynamics;
- **RT 30** - reverberation time calculated with 30 dB dynamics;
- **User** - reverberation time, calculated with the user defined dinamics.

The user may scroll all results of the RT60 analysis with the use of **<▲>**, **<▼>** push-buttons.

Notice: *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 (for more details see Appendix H).*

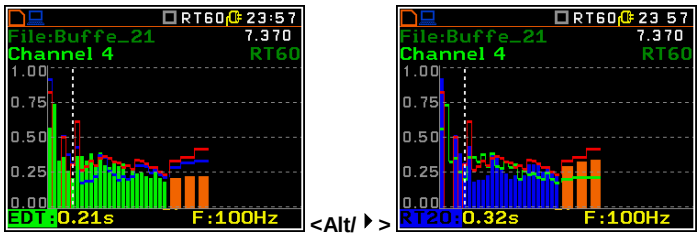
Bar plot of RT60 results

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)



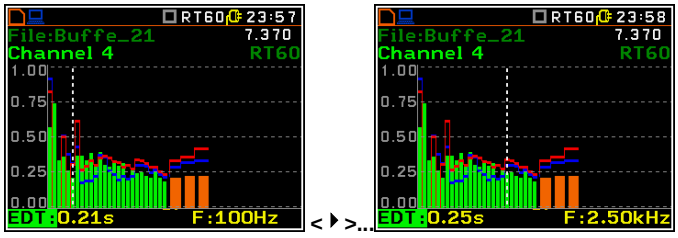
Changing the RT result

When the field 3 is active the **RT60** analisys result can be changed after pressing the **<◀>** and **<▶>** push-buttons together with **<Alt>**.

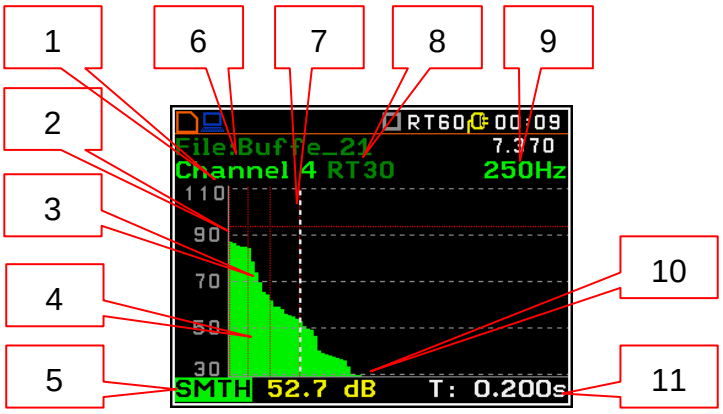


Changing the cursor position

The user may change the cursor position by means of the **<◀>**, **<▶>** push-buttons.



Sound pressure decay curve plot



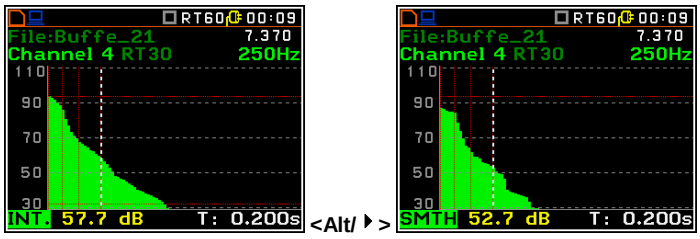
1. Channel number
2. T0 marker position
3. Decay curve plot
4. T1 marker position
5. Type of data displayed: **RAW**, **SMNH** or **INT.**
6. Name of the logger file
7. Cursor position
8. RT result (**RT30**, **RT20**, **EDT** and **RT User**) with calculated reverberation time
9. Central frequency of 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.

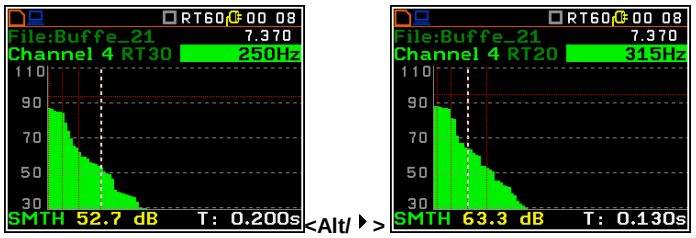
Changing the data type

When the field 5 is active the type of data displayed (**RAW**, **SMTH** or **INT.**) can be changed after pressing the **< ◀ >** and **< ▶ >** push-buttons together with **<Alt>**.



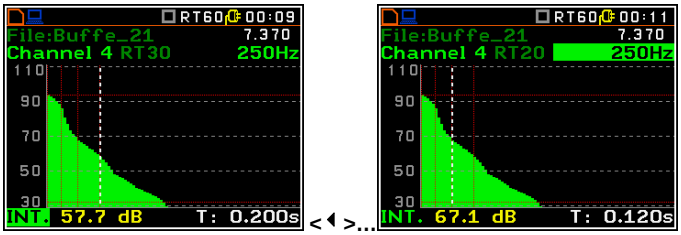
Changing the 1/3 octave band

When the field 9 is active the central frequency of 1/3 octave band can be changed after pressing the **< ◀ >** and **< ▶ >** push-buttons together with **<Alt>**.



Changing the cursor position

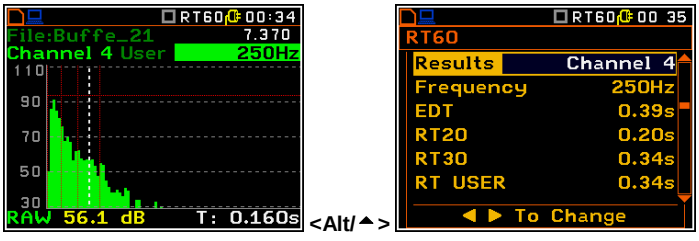
Ehe user may change the cursor position by means of the **< ◀ >**, **< ▶ >** push-buttons.



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 presenter in the table of RT result for 250Hz band.



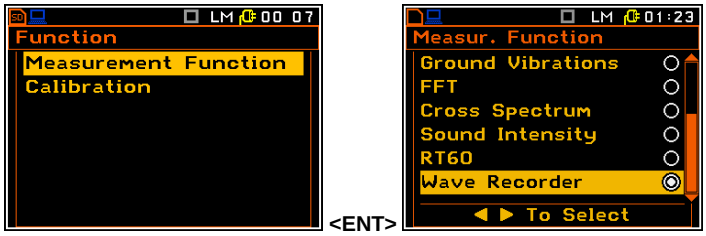
17. WAVE RECORDER

The **Wave Recorder** mode is an optional function of the **SVAN 958A** instrument, which is working in parallel with the **Level Meter** function and additionally provides signal recording directly on the USB disc in the common used file format.

Below additional settings related with the **Wave Recorder** function are described.

17.1. Selection of Wave Recorder function

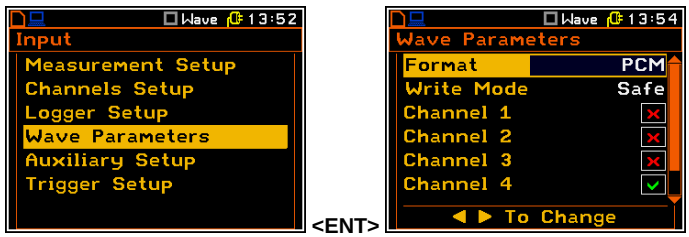
In order to select the **Wave Recorder** function the user has to enter the **Function** list by pressing the **<Menu>** push-button, then select the **Measurement Function** position and open it by pressing **<ENTER>**. In the **Measurement Function** list the user has to highlight the **Wave Recorder** option, mark it by **< ▶ >** push-button and then press **<ENTER>**.



Notice: *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!*

17.2. Selection of 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.



The position **Wave Parameters** opent 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**).