SVAN 958

FOUR CHANNELS SOUND & VIBRATION LEVEL METER & ANALYSER

(draft version)

USER'S MANUAL

SVANTEK Sp. z o.o.
WARSAW, April 2008

Notice: *This user's manual presents the software revision named 3.01.0 / 3.05.1 (cf. the description of the* ***UNIT LABEL*** *– path: MENU / DISPLAY / UNIT LABEL). 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

LIST OF FIGURES

1 INTRODUCTION

The **SVAN 958** is digital, four channels 0.5 Hz to 20 kHz signal analyser including Type 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 958** 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 958** 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 958**. The instrument can be fully remotely controlled.

The instrument is powered by four AA standard or rechargeable batteries (separate charger is required). The powering of the instrument from the external DC power source or the USB interface is also provided.

Robust case and light weight design accomplish the exceptional features of this new generation instrument.

1.1 SVAN 958 as Sound Level Meter & Analyser

- Noise measurements (**SPL**, **LEQ**, **SEL**, **Lden**, **Ltm3**, **Ltm5** and statistics) with Type 1 accuracy (IEC 61672-1:2002) in the frequency range 10 Hz ÷ 20 kHz (with the **SV 22** microphone)
- 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
- Measurement range: 17 dBA RMS ÷ 140 dBA Peak

- **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)
- Internal noise level less than 17 dBA RMS

1.2 SVAN 958 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)
- 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
- **W_d**, **W_k**, **W_c**, **W_j**, **W_m**, **W_b**, **W_g** (ISO 2631), **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)
- Measurement range: 0.003 ms^{-2} RMS ÷ 500 ms^{-2} Peak (for the accelerometer with the sensitivity equal to 100 mV/g)

1.3 General features of SVAN 958

- 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 09** - I/O cable
- **SC 16** - USB 1.1 cable
- **SC 61** - integrated connector (TNC to BNC)
- four **AA standard** (alkaline) batteries
- **SvanPC** for Windows 95/98/NT/2000/XP

1.5 Accessories available

- **SV 22** - (Type 1) prepolarised condenser microphone ½", sensitivity 50 mV/Pa
- **SV 22L** - **SV 22** microphone selected for the 1 Hz (-1 dB) low frequency response
- **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 39A/L** - seat accelerometer with the nominal sensitivity 10 mV / ms^{-2} (100 mV / g) for Whole Body measurements
- **SV 3143M1** - IEPE type triaxial accelerometer from DYTRAN with the nominal sensitivity 10 mV / ms^{-2} (100 mV / g), **SC 38** cable required
- **SV 3233A** - IEPE type triaxial accelerometer from DYTRAN with the nominal sensitivity 100 mV / ms^{-2} (1000 mV / g); **SC 38** cable required
- **SV 3023M2** - IEPE type triaxial accelerometer from DYTRAN with the nominal sensitivity 1 mV / ms^{-2} (10 mV / g); **SC 38** cable required
- **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 242** - cable for **SV 207** accelerometer in hermetic mounting box and **SVAN 958** (3 m)
- **SV 48** - voltage to **IEPE** (**ICP**) converter
- **SV 50** - set for Hand-Arm measurements (**SV 3023M2** accelerometer with 10 mV/g sensitivity)
- **SV50_48** - Hand-Arm Vib. measurements set (**SV 3023M2**, **SC 38**, **SA 50**, **SA 51**, **SA 52**, small box for **SA 48**)
- **SV 207_SO** - Building Vibration Measurement set (**SV 3233A** accelerometer with hermetic mounting box and **SC 242** cable)
- **SV 55** - **RS 232** interface
- **SV 56** - **IrDA** interface
- **SV 60** - sound measurements set (**SV 22** 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 201A** - outdoor microphone kit
- **SA 46** - carrying belt-bag for **SVAN 94x** and **SVAN 95x** (leather)
- **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.)
- **SvanPC+ for Windows 98/2000/XP**

SVAN 958 instrument with the seat accelerometer and the acoustic dosimeter microphone

2 MANUAL CONTROL OF THE INSTRUMENT

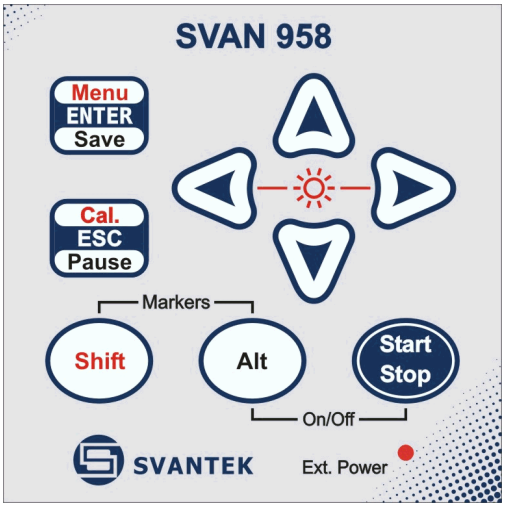
The control of the instrument is developed in the fully "conversational" way. The user can "programme" the operation of the instrument selecting the proper option from the MENU. Thanks to it, the number of the control push-buttons of the instrument is reduced to nine.

2.1 Control push-buttons on the front panel

On the front panel of the instrument, there are located the following control push-buttons:

1. **<ENTER>**, **(<Menu>)**, **[<Save>]**
2. **<ESC>**, **(<CAL>)**, **[<Pause>]**
3. **<Shift>**, [Markers]
4. **<Alt>**, [Markers]
5. **<▲>**
6. **<◀>**
7. **<▶>**
8. **<▼>**
9. **<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. The name given in square brackets […] denotes the push-button function which is available after pressing it in conjunction (or in a sequence) with the **<Alt>** push-button.



Control push-buttons of the SVAN 958 instrument

<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** in the keyboard; both push-button **must be pressed in parallel**
- as **2nd Fun**; this push-button can **be pressed and released before pressing the second one**

<Shift> pressed in conjunction with **<Alt>** enables the user to enter the MARKERS on the logger plots during the measurement.

Notice: *The operation of this push button can be set as the "**Shift**" mode or the "**2nd Fun**." mode in the **SHIFT MODE** (path: MENU / SETUP / KEYBOARD SETUP / SHIFT MODE), see Chapter with the **SETUP** list description.*

<Alt>

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

<Start / Stop>

This push-button enables one to start the measurement process, when the instrument is not measuring or to stop it, when the instrument is measuring. It is also possible to set such mode of this push-button, in which in order to start or stop the measurements the user has to press it simultaneously with the **<Shift>** one.

Notice: *The changing of the **<Start / Stop>** push-button mode is performed in the **START/STOP** (path: MENU / SETUP / KEYBOARD SETUP / START/STOP), see Chapter with the **SETUP** list description.*

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

<ENTER>

This push-button enables one to enter the selected operation mode or to confirm control options. Some additional functions of this push-button will be described in the following chapters.

(<Menu>)

This push-button (pressed together with the **<Shift>** one) enables the user to enter the main list containing six sub-lists: **FUNCTION**, **INPUT**, **DISPLAY**, **FILE**, **SETUP** and **AUXILIARY FUNCTIONS**. Each of the mentioned above sub-lists consists of the sub-lists, elements and data windows. These main sub-lists will be detailed described in the following chapters of the manual. Double pressed **<Menu>** push-button enters the **HISTORY** list containing eight last opened sub-lists. It often speeds up the control of the instrument.

[<Save>]

This push-button (pressed together with the **<Alt>** push-button) enables the user to save measurement results as a file in the internal instrument's memory or on the USB memory stick. There are two ways of saving a file: with **AUTO NAME** option - saving a file with the name automatically increased by one (e.g. JAN0, JAN1, JAN2) or save a file by editing its name in the **FILE NAME** position (see Chapter with the **FILE** list description).

<ESC>

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

[<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 one, in particular, to:

- select the options in an active position in the "horizontal direction" (e.g. filter: **LIN**, **A**, **C** or **G**, Integration period: **1s**, **2s**, **3s**, … etc.)
- select the measurement result to be displayed (e.g. **PEAK**, **MAX**, **MIN**, etc.) in one-channel and multi-channel modes of result's presentation)
- control the cursor in **SPECTRUM**, **LOGGER** and **STATISTICS** modes of result's presentation
- select the position of the character in the text edition (i.e. in the **FILE NAME** menu)
- switch on/off markers 2 and 3
- switch on/off the **BACKLIGHT** of the display (**<◄>**+ **<►>** pressed together)

(<◄>, <►>)

The **<◄>**, **<►>** push-buttons pressed in conjunction (or in sequence) with the **<Shift>** enable the user, in particular, 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*)
- insert or delete a character in the text edition modes
- change the statistics class (the number displayed after the letter **L**) in one-channel and multi-channel modes of result's presentation

Some other possible reactions of the instrument on the pressing of these push-buttons will be described in details in the following chapters.

<▲>, **<▼>**

The **<▲>**, **<▼>** push-buttons enable one, in particular, to:

- change the mode of result's presentation
- select the proper character from the list in the text edition mode
- switch the active sub-list in a list
- programme the Real Time Clock (**RTC**) and **TIMER**
- switch on/off markers 1 and 4

Some other possible reactions of the instrument on the pressing of these push-buttons will be described in details in the following chapters.

(<▲>, <▼>)

The **<▲>**, **<▼>** push-buttons pressed in conjunction (or in sequence) with the **<Shift>** enable one, in particular, to:

- change the relation between the Y-axis and X-axis of all plots presented on the screen
- switch the channels and profiles in one-channel and **STATISTICS** modes of result's presentation
- switch the active channel in multi-channels mode of result's presentation

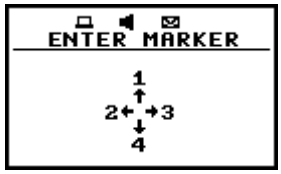
Some other possible reactions of the instrument on the pressing of these push-buttons will be described in details in the following chapters.

[Markers]

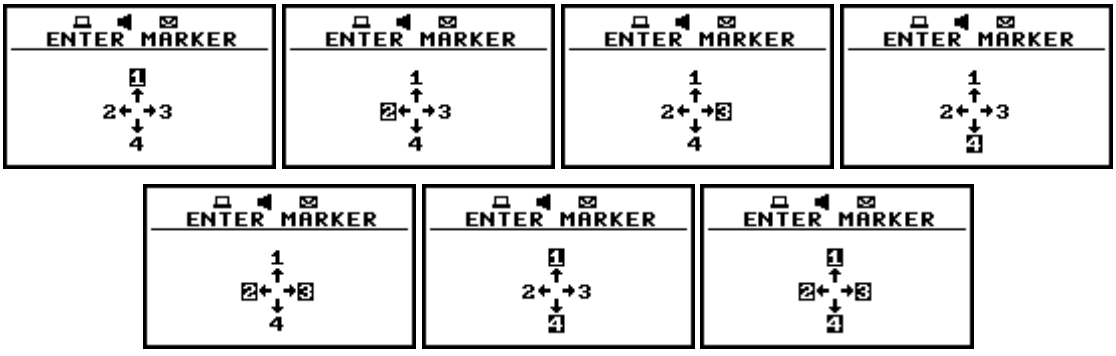
The **Markers** enable the user to mark the special events, which occurred during the performed measurements (i.e. the airplane flight, the dog's barking, the train's drive etc.). In order to enter the markers the logger has to be switched on (*path: MENU / INPUT / LOGGER SETUP / LOGGER MODE: ON*) and 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 the user must press **<Shift>** and **<Alt>** push-buttons simultaneously during the measurement. The **ENTER MARKER** window opens and there are four available marker numbers. To choose marker number 1 the user must press **<▲>** push button (number 2 - **<◄>**, number - 3 **<►>** and number 4 - **<▼>**).

The **ENTER MARKER** window 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 open the **ENTER MARKER** window 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's file and can be used to show them using dedicated presentation software.

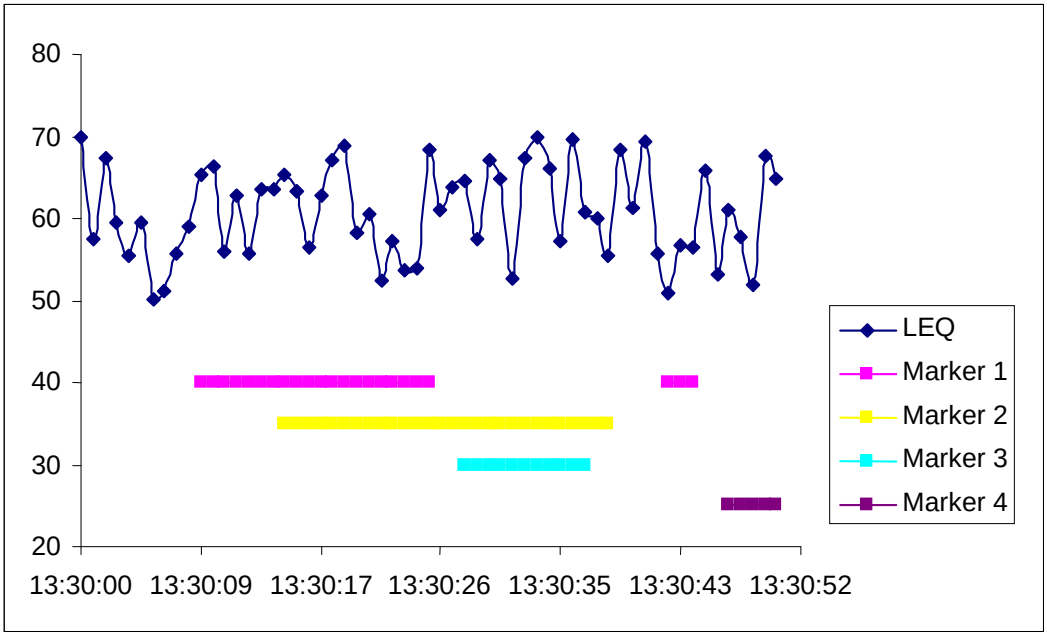


Display with the "MARKERS" (after pressing <Alt> and <Shift> together)



Displays with the activated markers

The exemplary presentation of the markers on the time-history plot is shown below (to view a plot with the markers the user has to transfer data to the proper software).



Time-history plot with the indication of the active markers

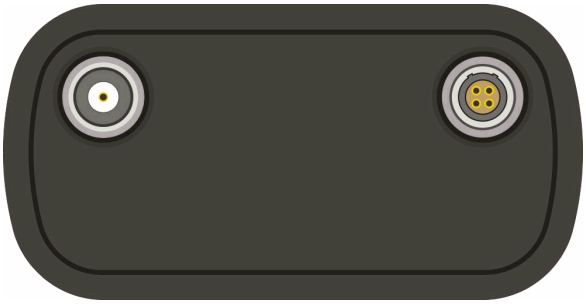
2.2 Input and output sockets of the instrument

The measurement inputs, called **Channels**, are placed on the top cover of the instrument. There are 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** one 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**.

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

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



Top cover of the SVAN 958 instrument in 1:1 scale

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**.

Bottom cover of the SVAN 958 instrument in 1:1 scale

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.

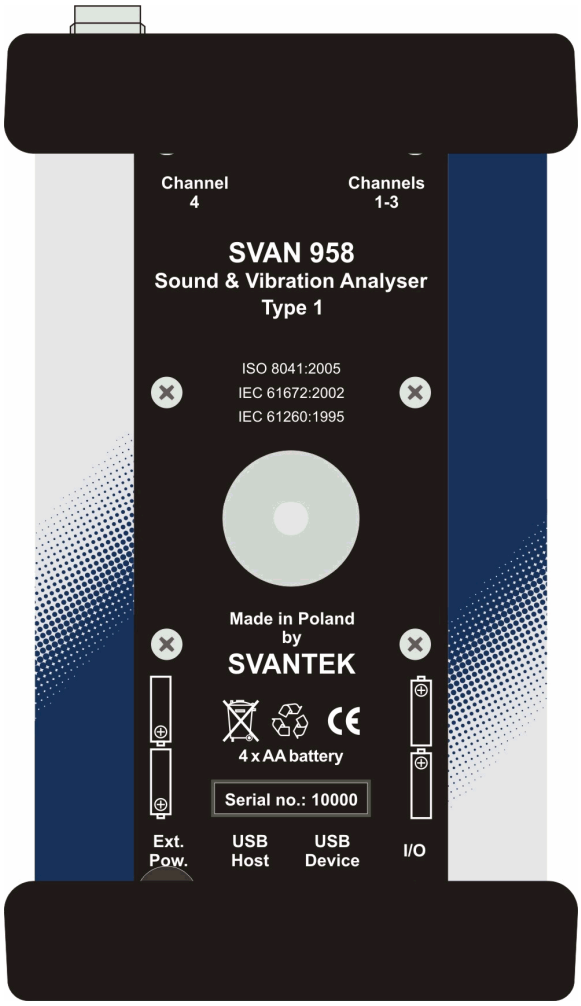
The **Ext. Pow.** socket located on the bottom cover of the instrument is Marushin MJ-14 compatible socket, dedicated for the standard Φ 5.5 / 2.1 mm plug (the right one in the Fig. above). The user can connect the external mains adapter (110 V / 230 V) which furnishes the proper DC level. The instrument 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 958 instrument in 1:1 scale



Rear panel of the SVAN 958 instrument in 1:1 scale

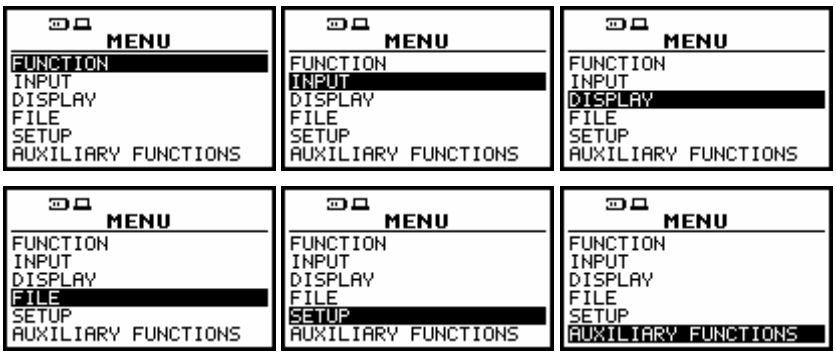
3 SETTING THE INSTRUMENT

In order to perform the measurements using the instrument the user has only to plug-in the preamplifier with the microphone or the proper accelerometer and to switch the power on.

Notice: The user has to press the <Pause> and <Start / Stop> push-buttons in parallel in order to switch the power On/Off.

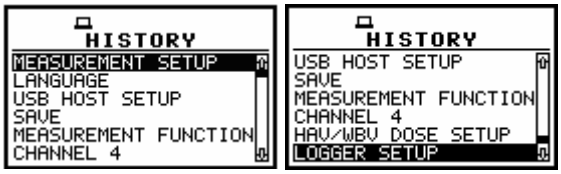
3.1 Basis of the instrument's control

The instrument is controlled by means of nine push-buttons of the keyboard. Using these push-buttons one can access all available functions. The functions are placed in the system of lists and sub-lists. The main list contains the headers of six lists, which also contain sub-lists or positions (elements). The main list is opened after pressing the **<Menu>** push-button. This list contains the following elements: **FUNCTION**, **INPUT**, **DISPLAY**, **FILE**, **SETUP** and **AUXILIARY FUNCTIONS**. The elements of each list are described in details in the consecutive Chapters. Only one list can be accessed in a time, this one which name is highlighted (displayed inversely). The change of the highlighted line is done after pressing the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons.



Displays with the highlighted elements of the main list

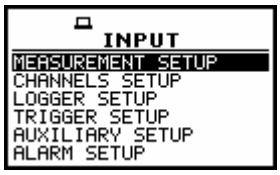
After double pressing of the **<Menu>** push-button the **HISTORY** list, containing eight sub-lists lately accessed by the user, appears on the display. The example of this list is presented below. Such solution enables one to access very fast eight, the most frequently used, lists without the necessity of passing the whole path.



Displays with the sub-lists which were lately accessed by the user (after double pressing of the <Menu> push-button)

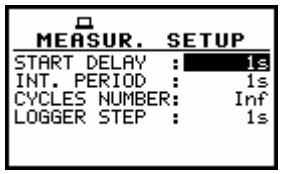
After the selection of the desired list (the **<▲>** or **<▼>** push-buttons), the user has to press the **<ENTER>** push-button in order to enter it. After this new sub-lists, positions (elements) or various data specification appear on the display.

a)


b)


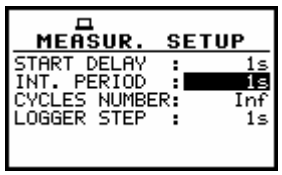
Displays with the main list (a) and the elements of INPUT list (b)

Next pressing of the **<ENTER>** push-button enables one to access mentioned above sub-lists.



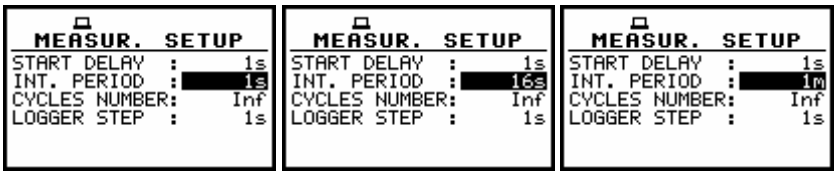
MEASUREMENT SETUP window

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



MEASUREMENT SETUP window with INT. PERIOD accessible

The change of the value in a selected position is performed by pressing the **<◄>** or **<►>** push-buttons.



Displays with the accessed INT. PERIOD after pressing the <◄> or <►> push-buttons

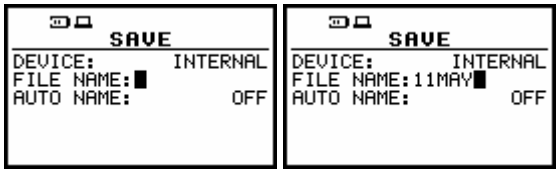
The **<ENTER>** push-button is used for the confirmation of the selection in a position and for closing the opened sub-list. The sub-list is closed ignoring any changes made in a window by pressing the **<ESC>** push-button.

Displays after three consecutive pressing of the <ESC> push-button from MEASUREMENT SETUP window

As it was mentioned, some of the sub-lists end with the windows informing the user about the state of the instrument, available memory, not existing files or loggers, standards fulfilled by the unit, etc.

Displays during and after the accessing FREE SPACE window

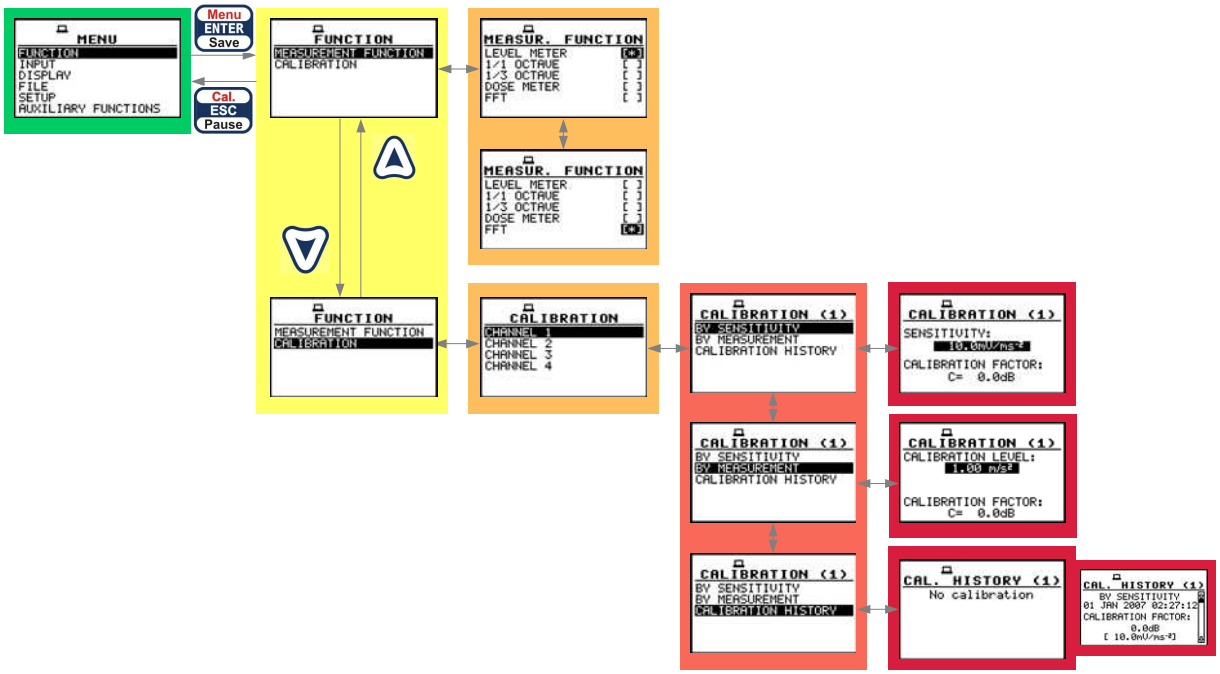
In order to close such window the user has to press the **<ESC>** push-button. In the instrument, there are also windows, which are used for entering text (i.e. the name of the file).



Edition of the text, which has to be a name of the file saved in instruments memory

Below the structure of the elements of the main list is presented. The more detailed description of the **FUNCTION**, **INPUT**, **DISPLAY**, **FILE**, **SETUP** and **AUXILIARY FUNCTIONS** lists is given in the following chapters.

- **FUNCTION** (one of the main lists available after pressing the **<Menu>** push-button)
  - **MEASUREMENT FUNCTION**
    - **LEVEL METER**; available values: **[ ]** / **[*]**
    - **1/1 OCTAVE**; available values: **[ ]** / **[*]**
    - **1/3 OCTAVE**; available values: **[ ]** / **[*]**
    - **DOSIMETER**; available values: **[ ]** / **[*]**
    - **FFT**; available values: **[ ]** / **[*]**
    - **RT60**; available values: **[ ]** / **[*]**
  - **CALIBRATION**
    - **CHANNEL x**
      - **BY SENSITIVITY**
        - **SENSITIVITY**; available values of the calibration level:
          - **10 µV / ms^{-2} .. 10 V / ms^{-2}** (in the case of vibration measurements) and
          - **50 µV / Pa .. 50 V / Pa** (in the case of sound measurements)
        - **CAL. FACTOR**; it displays the automatically calculated calibration factor
      - **BY MEASUREMENT**
        - **CAL. LEVEL**; available values of the calibration level:
          - **100 mm / s^2 .. 1 km / s^2** in the case of vibration measurements (or **100 dB .. 180 dB** if the reference level was set to **1 µm / s^2** and the **LOG** (logarithmic) scale was selected in the **DISPLAY SCALE** sub-list)
          - **54dB .. 134dB** in the case of sound measurements
        - **CAL. FACTOR**; it displays after the measurement the calculated calibration factor
      - **CALIBRATION HISTORY**; it enables the user to view last calibration record in chosen channel



Control diagram of FUNCTION list

❖ **INPUT** (one of the main lists available after pressing the **<Menu>** push-button)

➢ **MEASUREMENT SETUP**

- **START DELAY**; available values of the delay before starting the execution of the measurements: **1s .. 60s**
- **INT.PERIOD**; available values of the integration time: **1s .. 24h**
- **CYCLES NUMBER**; available values for the measurement cycles, which has to be repeated: **Inf**, **1 .. 1000**
- **LOGGER STEP**; available values of the step with which the measurement results are saved in an instrument's logger: **2ms .. 1h**

➢ **CHANNELS SETUP**

- **CHANNEL x** (**x** = 1, 2 ,3 or 4)
  - **MODE**; available types of the channel's mode used in the channels during the measurements:
    - o **VIBRATION** - in the case of vibration measurements
      - **RANGE**; available range of the measurements: **17.8m/s^2** or **316m/s^2**
      - **FILTER**; available types of the digital weighting filter used in the channels during the measurements: **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10**, **KB**, **Wk**, **Wd**, **Wc**, **Wj**, **Wm**, **Wh**, **Wg**, **Wb**
      - **DETECTOR**; available values of the detector time constant used in the channels: **100ms**, **125ms**, **200ms**, **500ms**, **1.0s**, **2.0s**, **5.0s**, **10.0s**
    - o **SOUND** - in the case of sound measurements
      - **RANGE**; available range of the measurements: **105dB** or **130dB**
      - **MICROPHONE CORRECTION**
        - o **DIFFUSE FIELD**; available values: **[ ]** / **[√]**
        - o **OUTDOOR**; available values: **[ ]** / **[√]**

- **PROFILE x** (**x** = 1, 2 or 3)
  - **FILTER**; available values: **LIN**, **A**, **C**, **G**
  - **DETECTOR**; available values: **FAST**, **SLOW**, **IMP.**

➢ **LOGGER SETUP**; available types of measurement results which has to be saved in the instrument's logger from the channels:

▪ **LOGGER MODE**

- **ON**
  - **CHANNEL x** (**x** = 1, 2 ,3 or 4)
    - **PROFILE y** (**y** = 1, 2 or 3)
      - **PEAK**, **P–P**, **MAX**, **RMS**, **VDV** in the case of vibration measurements (there is only one profile in each channel in the case of vibration measurements)
      - **PEAK**, **MAX**, **MIN**, **RMS** in the case of sound measurements
  - **AUXILIARY**
    - **VECTOR**; available values: **[ ]** / **[√]**
    - **RPM**; available values: **[ ]** / **[√]**
- **TIME**
  - **SAMPLING RATE**; available values: **150 Hz**, **187 Hz**, **300 Hz**, **375 Hz**, **600 Hz**, **750 Hz**, **1200 Hz**, **1500 Hz**, **2400 Hz**, **3000 Hz**
  - **RPM**; available values: **[ ]** / **[√]**
  - **CHANNEL x** (**x** = 1, 2 ,3 or 4); available values: **[ ]** / **[√]**

➢ **1/1 OCTAVE SETUP** or **1/3 OCTAVE SETUP**; this sub-list is not available in the case of the **SLM** or **VLM**; it appears on the display in the case of **1/1 OCTAVE** or **1/3 OCTAVE** analyser

▪ **CHANNEL x** (**x** = 1, 2 ,3 or 4)
- **ENABLED**; available values: **[ ]** / **[√]**
- **FILTER**; available types of the digital weighting filter used during **1/1 OCTAVE** or **1/3 OCTAVE** analysis in the case of sound measurements: **HP**, **LIN**, **A**, **C**; in the case of vibration measurements: **HP**
- **BAND**; available values: **FULL**, **AUDIO** in the case of sound measurements; **FULL** in the case of vibration measurements
- **LOGGER**; available values: **None**, **RMS**

➢ **DOSIMETER SETUP**

▪ **EXPOSURE TIME**; available values: **00h01 .. 08h00**

▪ **CRITERION LEVEL**; available values of the permitted steady state noise level: **80 dB**, **84 dB**, **85 dB**, **90 dB**

▪ **THRESHOLD LEVEL**; available values of the noise threshold: **None**, **75 dB**, **80 dB**, **85 dB**, **90 dB**

▪ **EXCHANGE RATE**; available values of the exchange range (the amount by which the permitted noise level may increase if the exposure time is halved): **2 dB**, **3 dB**, **4 dB**, **5 dB**

➢ **FFT SETUP**

▪ **CHANNEL x** (**x** = 1, 2 ,3 or 4)
- **ENABLED**; available values: **[ ]** / **[√]**
- **FILTER**; available values: **HP**, **LIN**, **A**, **C** in the case of sound measurements, **HP** in the case of vibration measurement
- **BAND**; available values: **87.5 Hz .. 22.4 kHz**
- **WINDOW**; available values: **HANNING**, **RECTANGLE**, **FLAT TOP**, **KAISER-BESSEL**
- **LINES**; available values: **480**, **960**, **1920**

- **LOGGER**; available values: **None**, **RMS**
- **AVERAGING**; available values: **LINEAR**

➢ **RT60 SETUP**
- **RT60 OPTIONS**
  - **SMOOTHING**; available values: **1 .. 15**
  - **NOISE MARGIN**; available values: **0.0 ... 20.0 dB**
- **RT60 RESULTS**; available values: **31.5 Hz .. 10 kHz**; **[E] / [ ]**, **[2] / [ ]**, **[3] / [ ]**
- **RT60 AVERAGING**
  - **AVERAGE RESULTS**; available values: **[ ]** / **[√]**
  - **CLEAR AVERAGES**; available values: **[ ]** / **[√]**
  - **AVERAGED RES.**; it informs the user about number of averaged results

➢ **TRIGGER SETUP**; contextual list which defines the conditions the triggering is performed

- **TRIGGER**; available values: **Off**, **SLOPE +**, **SLOPE –**, **LEVEL +**, **LEVEL –**, **LOGGER**, **GRAD+**, **RTC**
- **SOURCE**; it informs the user about the source of the triggering signal:
  - **VECTOR**, **VEC/SND**, **RMS(1)**, **125Hz**, **250Hz**, **500Hz**, **...**, **16kHz**, **EXT. I/O** - depending on the selected function and trigger mode**CHANNEL**; it defines the channel from which the signal for trigger purpose is coming from
- **LEVEL**; available values of the triggering level
  - **1.00mm/s^2 .. 10.0km/s^2** - in the case of vibration measurements (or **60dB .. 200dB** if the reference level was set to **1 µm/s^2** and the **LOGARITHM** was selected in the *MENU / DISPLAY / DISPLAY SETUP / CHANNEL x / DISPLAY SCALE*)
  - **24dB .. 136dB** - in the case of sound measurements
- **GRADIENT**; available only for **GRAD+** with the values from **1dB/msec.** to **100dB/msec.**
- **RTC START**; available for **RTC**, used for starting measurements at the time set in this position
- **RTC STEP**; available for **RTC**, defines the repetition of the measurement selecting **CYCLE TIME** (which corresponds to **INT. PERIOD**) or a value from 1 sec to 24 hour
- **VEC. LEVEL**; available only for **VECTOR** and **VEC/SND** source with the values from **1mm/s^2** to **10km/s^2**
- **PRE/POST TRIGGER**; number of the records with the results saved in the **LOGGER** before the triggering and after the moment in which the signal is below the desired level
  - **PRE**; available number of records: **0 .. 20**
  - **POST**; available number of records: **0 .. 200**

➢ **AUXILIARY SETUP**
- **RPM SETUP**; it enables the user to switch on and set parameters of **RPM** (rotation per minute function)
  - **ENABLED**; it enables the user to switch on the RPM function available values: **[ ] / [√]**
  - **PULSES/ROTATION**; available values: **1 .. 360**
  - **UNIT**; available values: **RPM** (revolutions / rotations per minute), **RPS** (revolutions / rotations per second)
  - **LOGGER**; available values: **[ ] / [√]**
- **"SEAT" SETUP**
  - **ENABLED**; available values **[ ]** / **[√]**
  - **SEAT CHANNEL**; available values: **1**, **2**, **3**, **4**
  - **BASE CHANNEL**; available values: **1**, **2**, **3**, **4**
- **VECTOR SETUP**
  - **CHANNEL x** (**x** = 1, 2 ,3 or 4); available values: **0**; **0.01 .. 1.99**; **2**; available values **[ ] / [√]**
- **HAV/ WBV DOSE SETUP**

- **ENABLED**; available values **[ ] / [√]**
- **EXPOSURE TIME**; available values: **1min**, **.. 24h**
- **X AXIS**; available channels: **1**, **2**, **3**, **4** the filter chosen in selected channel appears also in this position, available filters **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10**, **KB**, **Wk**, **Wd**, **Wc**, **Wj**, **Wm**, **Wh**, **Wg**, **Wb** or **A**, **C**, **LIN**, **G**
- **Y AXIS**; available channels: **1**, **2**, **3**, **4** the filter chosen in selected channel appears also in this position, available filters **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10**, **KB**, **Wk**, **Wd**, **Wc**, **Wj**, **Wm**, **Wh**, **Wg**, **Wb** or **A**, **C**, **LIN**, **G**
- **Z AXIS**; available channels: **1**, **2**, **3**, **4** the filter chosen in selected channel appears also in this position, available filters **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10**, **KB**, **Wk**, **Wd**, **Wc**, **Wj**, **Wm**, **Wh**, **Wg**, **Wb** or **A**, **C**, **LIN**, **G**
- **STANDARDS**; it enables the user to choose limits of **HA EAV**, **HA ELV**, **WB EAV**, **WB ELV** parameters in a selected country (available standards: **U.K.**, **ITALY**, **POLAND**, **FRENCH**) or introduce own parameters limits (**USER**)

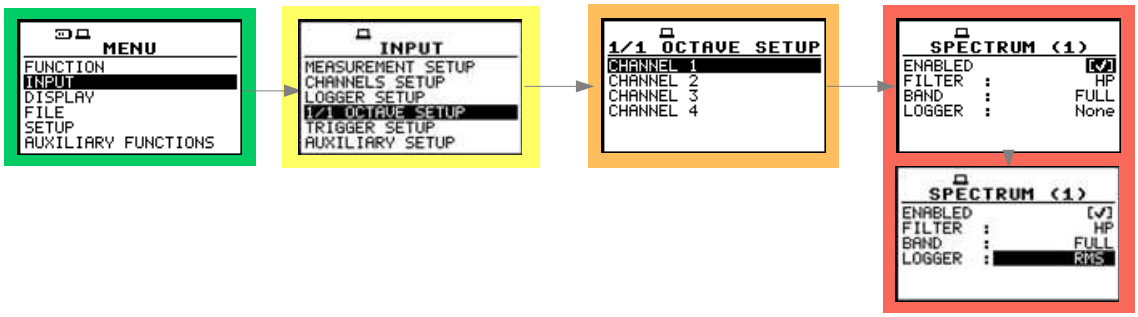
➢ **ALARM SETUP** it enables the user to set the parameters for alarms triggering (the instrument sends the different messages when the measured signal overpasses the selected levels)

▪ **CHANNEL x**; (**x** = 1, 2, 3 or 4)

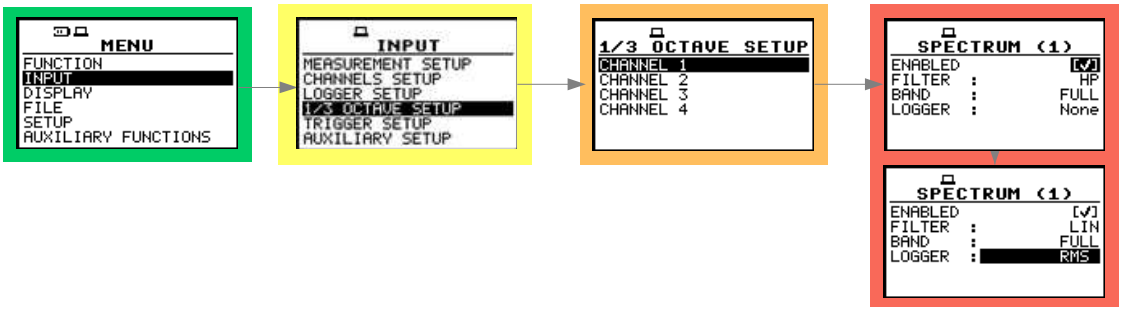
- **PROFILE x**; (**x** = 1, 2 or 3), in the case of vibration measurements only one profile (**PROFILE 1**) is available
  - o **TRIGGER**
    - ♦ **OFF**, **LEVEL +**, **LEVEL –**
    - ♦ **INTEGR.**; available values: **LOGGER STEP**, **100 ms**, **1.0s**, **MEASUR.TIME**
    - ♦ **SOURCE**; available values: **PEAK**, **P–P**, **MAX**, **MIN**, **RMS**, **VDV** in the case of vibration measurements and **PEAK**, **MAX**, **MIN**, **RMS** in the case of sound measurements
    - ♦ **LEVEL**; available values **1 mm/s^2 .. 10 km/s^2** in the case of vibration measurements and **24.0 dB .. 136 dB** in the case of sound measurements
  - o **TRIGGER**
    - ♦ **OFF**, **LEVEL +**, **LEVEL –**
    - ♦ **INTEGR.**; available values: **LOGGER STEP**, **100 ms**, **1.0s**, **MEASUR.TIME**
    - ♦ **SOURCE**; available values: **PEAK**, **P–P**, **MAX**, **MIN**, **RMS**, **VDV** in the case of vibration measurements and **PEAK**, **MAX**, **MIN**, **RMS** in the case of sound measurements
    - ♦ **LEVEL**; available values **24.0 dB .. 136 dB**
- **1/1 OCTAVE SETUP**; it appears only in the case of **1/1 OCTAVE** analysis function and enables setting parameters of the third alarm triggered by the RMS result from one of the central frequencies of **1/1 OCTAVE** function selected in **SOURCE**
  - o **TRIGGER**
    - ♦ **OFF**, **LEVEL +**, **LEVEL –**
    - ♦ **INTEGR.**; available values: **LOGGER STEP**, **100 ms**, **1.0s**, **MEASUR.TIME**
    - ♦ **SOURCE**; available values: **1.00 Hz**, **2.00Hz**, **4.00Hz**, **8.00 Hz**, **16.00 Hz**, **31.5 Hz**, **63.00 Hz**, **125 Hz**, **250 Hz**, **500 Hz**, **1.00 kHz**, **2.00 kHz**, **4.00 kHz**, **8.00 kHz**, **16.0 kHz**
    - ♦ **LEVEL**; available values **1 mm/s^2 .. 10 km/s^2** in the case of vibration measurements and **24.0 dB .. 136 dB** in the case of sound measurements

▪ **VECTOR**

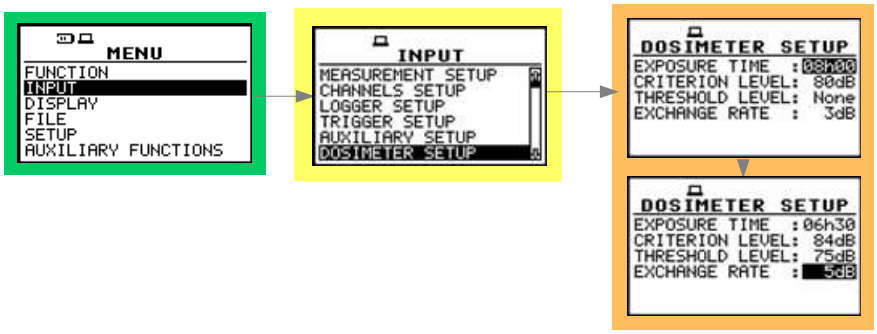
- **TRIGGER**
  - ♦ **INTEGR.**; available values: **LOGGER STEP**, **100 ms**, **1.0s**, **MEASUR.TIME**
  - ♦ **LEVEL**; available values **1 mm/s^2 .. 10 km/s^2**



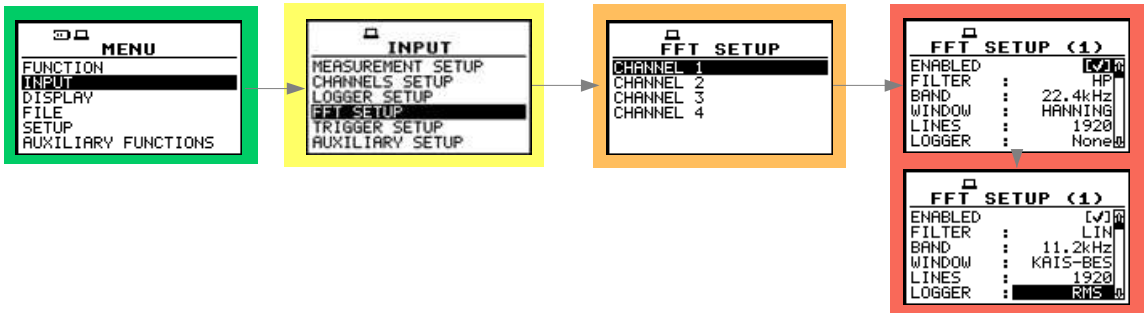
Control diagram of INPUT list in 1/1 OCTAVE mode (vibration)



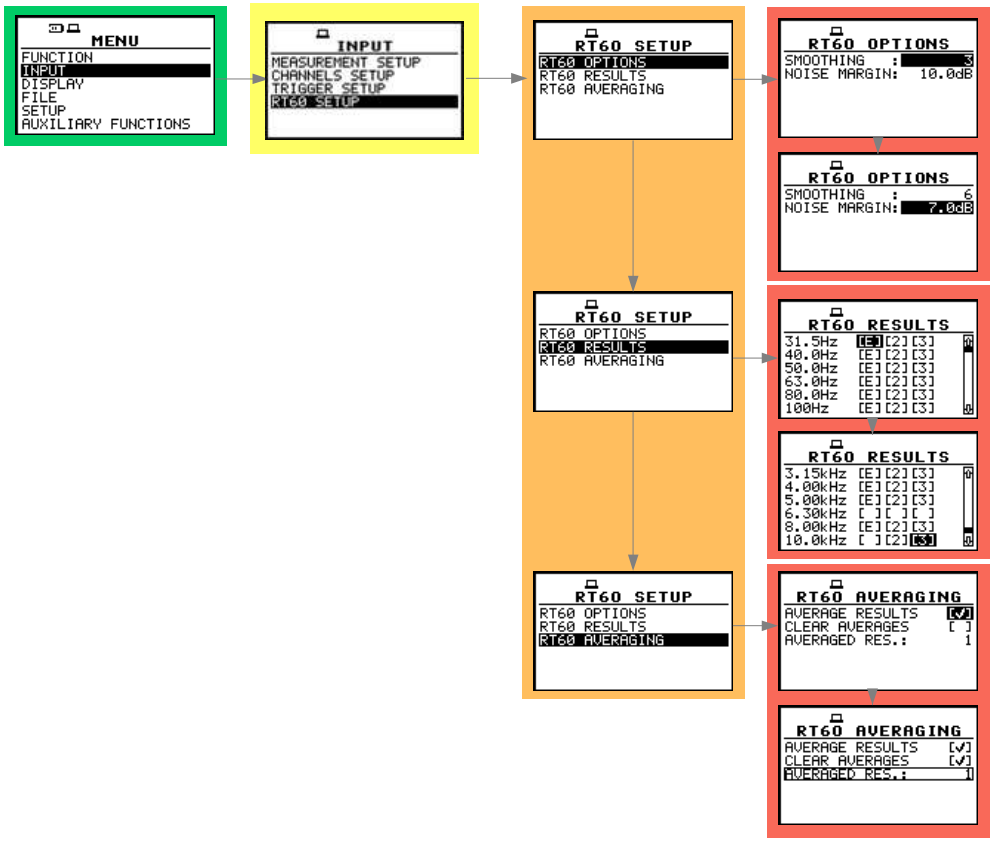
Control diagram of INPUT list in 1/3 OCTAVE mode (sound)



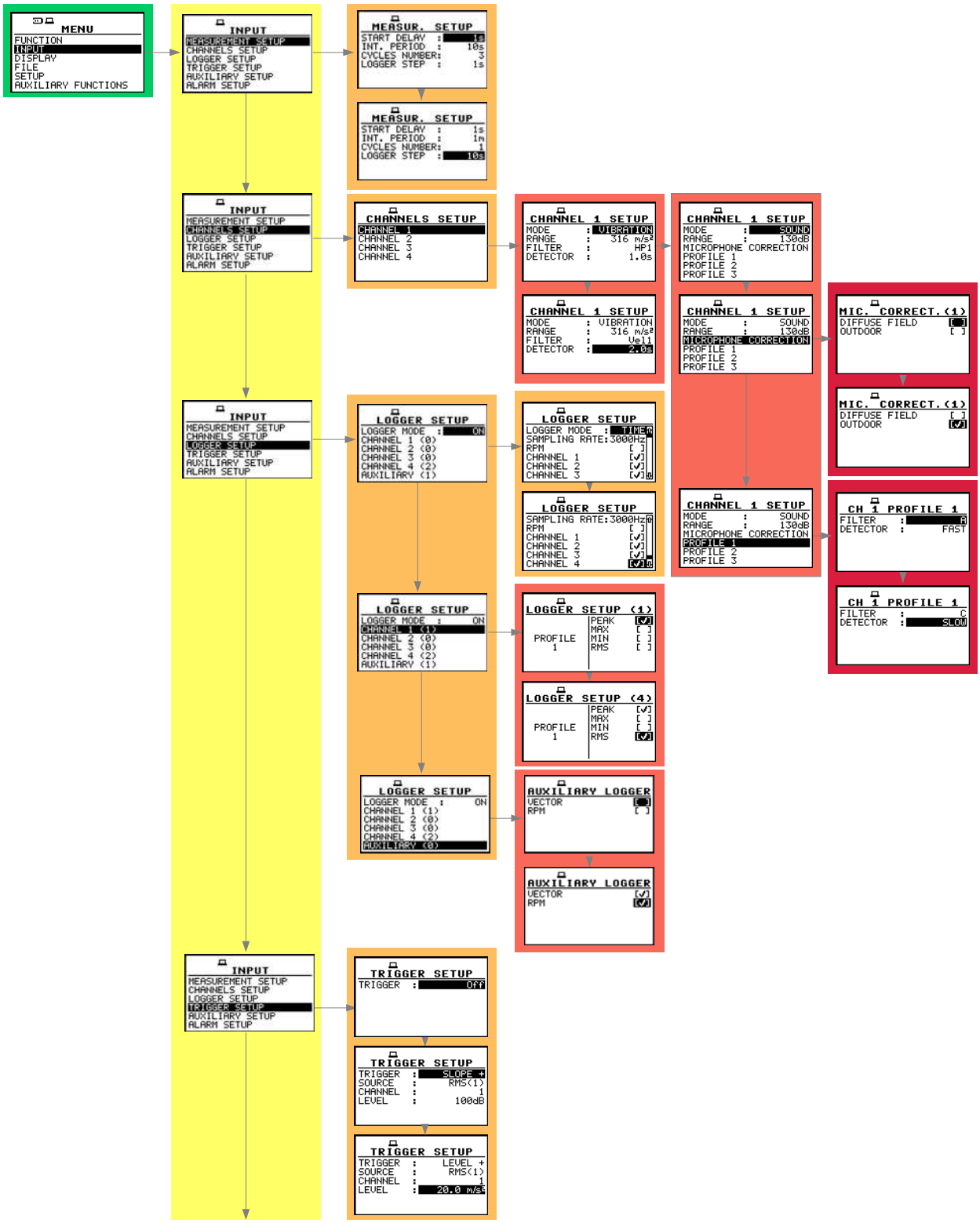
Control diagram of INPUT list in the acoustic DOSIMETER mode

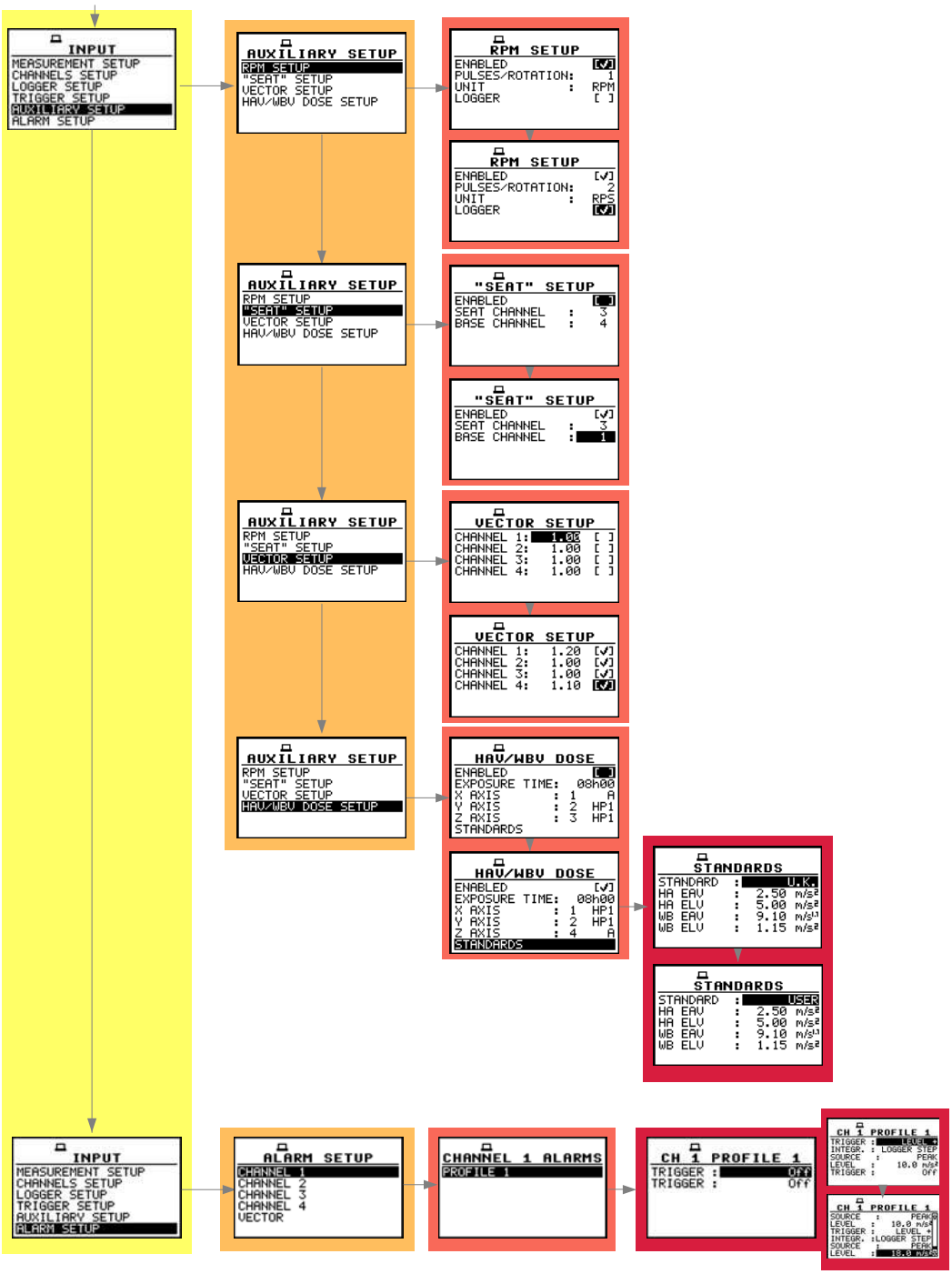


Control diagram of INPUT list in FFT mode



Control diagram of INPUT list in RT 60 mode


MENU
FUNCTION
INPUT
DISPLAY
FILE
SETUP
AUXILIARY FUNCTIONS
INPUT
MEASUREMENT SETUP
CHANNELS SETUP
LOGGER SETUP
TRIGGER SETUP
AUXILIARY SETUP
ALARM SETUP
MEASUR. SETUP
START DELAY : 1s
INT. PERIOD : 10s
CYCLES NUMBER: 3
LOGGER STEP : 1s
CHANNELS SETUP
CHANNEL 1
CHANNEL 2
CHANNEL 3
CHANNEL 4
CHANNEL 1 SETUP
MODE : VIBRATION
RANGE : 316 m/s²
FILTER : HP1
DETECTOR : 1.0s
CHANNEL 1 SETUP
MODE : SOUND
RANGE : 130dB
MICROPHONE CORRECTION
PROFILE 1
PROFILE 2
PROFILE 3
MIC. CORRECT.(1)
DIFFUSE FIELD
OUTDOOR
CH 1 PROFILE 1
FILTER : A
DETECTOR : FAST
LOGGER SETUP
LOGGER MODE : ON
CHANNEL 1 (0)
CHANNEL 2 (0)
CHANNEL 3 (0)
CHANNEL 4 (2)
AUXILIARY (1)
LOGGER SETUP (1)
PROFILE 1
PEAK
MAX
MIN
RMS
LOGGER SETUP (4)
AUXILIARY LOGGER
VECTOR
RPM
TRIGGER SETUP
TRIGGER : Off
SOURCE : RMS(1)
CHANNEL : 1
LEVEL : 100dB



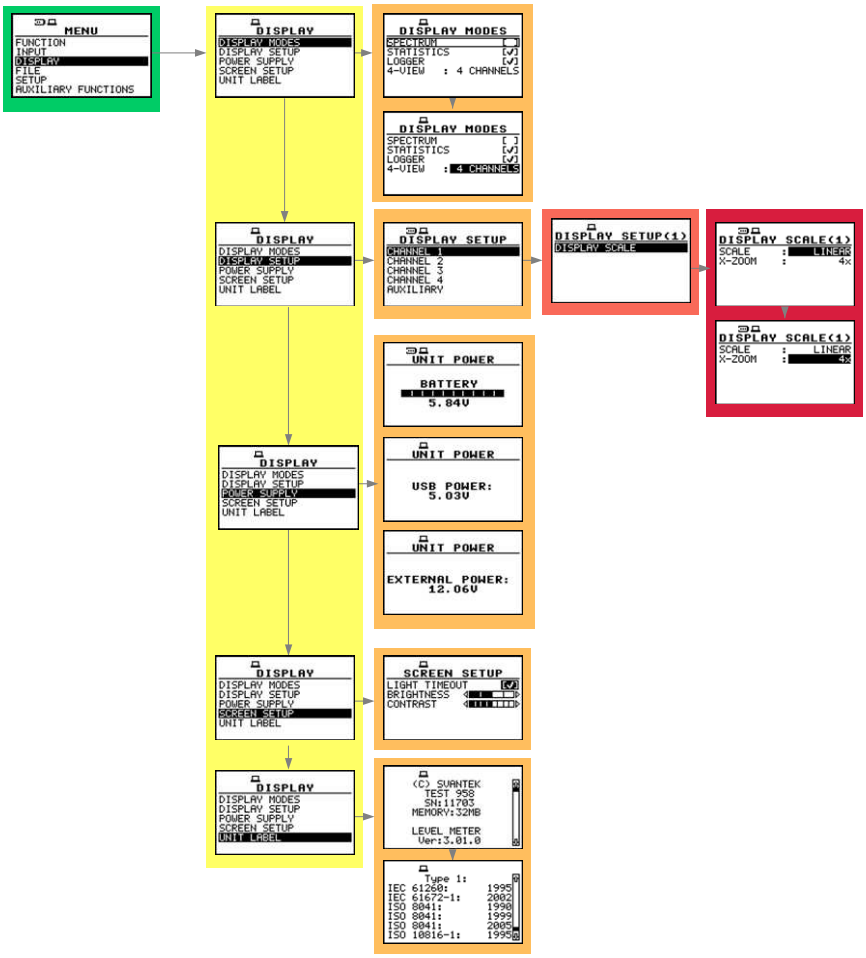
Control diagram of INPUT list

- **DISPLAY** (one of the main lists available after pressing the **<Menu>** push-button)
  - **DISPLAY MODES**; it enables the user to activate (**[√]**) or switch off (**[ ]**) the available modes of result's presentation
    - **SPECTRUM**; available values: **[√]** or **[ ]**; this position is not active in the **SLM** or **VLM** mode
    - **STATISTICS**; available values: **[√]** or **[ ]**
    - **LOGGER**; available values: **[√]** or **[ ]**
    - **4–VIEW**; available values: **4 CHANNELS**
  - **DISPLAY SETUP**
    - **CHANNEL x** (**x** = 1, 2, 3 or 4)
      - **DISPLAY SCALE**
        - **SCALE**; available values of the scale of graphical modes of the result's presentation:
          - **LINEAR**, **LOGARITHM** (logarithmic) - in the case of vibration measurements and
          - **LOGARITHM** (logarithmic) - in the case of sound measurements
        - **DYNAMIC** (it appears on the display in the case of **LOGARITHM** scale); available values of the dynamics of graphical modes of the result's presentation: **80dB**, **40dB**, **20dB**, **10dB**
        - **X–ZOOM**; it informs the user about the multiplier for the horizontal axis of the graphical modes of the result's presentation): **1x**, **2x**, **.. 10x** (**2x .. 10x** in the case of **1/3 OCTAVE** analysis, **3x .. 10x** in the case of **1/1 OCTAVE** analysis mode)
      - **SPECTRUM VIEW**
        - **VIEW**; available values of the **VIEW**: **AVERAGED**, **INSTANTANEOUS**, **MAXIMUM**, **MINIMUM**
        - **TYPE**; available values:
          - **ACCELERATION**, **VELOCITY**, **DISPLACEMENT** - in vibration measurements and
          - **RMS** - in the case of sound measurements
        - **FILTER**; available values: **None**
        - **MINIMUM**; available values: **[ ] / [√]**
        - **MAXIMUM**; available values: **[ ] / [√]**
      - **TOTAL VALUES**; it appears on the display in **1/1 OCTAVE** and **1/3 OCTAVE** analyser
        - **FILTER**; available values of the weighting filters:
          - in the case of sound measurements: **A**, **SUSR1**, **SUSR2**, **SUSR3** or any other sent to the unit by means of the interface
          - in the case of vibration measurements: **HP**, **VUSR1**, **VUSR2**, **VUSR3** or any other sent to the unit by means of the interface
        - **TYPE** (it is available only for vibration measurements); available values if **VUSR1**, **VUSR2** or **VUSR3** was selected in the previous position: **ACC**, **VEL** and **DIL**; if the **HP** filter was selected this position is not displayed
        - **CAL. FACTOR** (it is available only for vibration measurements); accessible if **VUSR1**, **VUSR2** or **VUSR3** was selected in the **FILTER** position; if the **HP** filter was selected (the filter which was set in the 1st channel) this position is not displayed; available values from **-60.0dB** to **60.0dB** with **0.1dB** or **1 dB** step
        - **FILTER**; available values of the weighting filters:
          - in the case of sound measurements: **C**, **SUSR1**, **SUSR2**, **SUSR3** or any other sent to the unit by means of the interface
          - in the case of vibration measurements: **CH**, **VUSR1**, **VUSR2**, **VUSR3** or any other sent to the unit by means of the interface

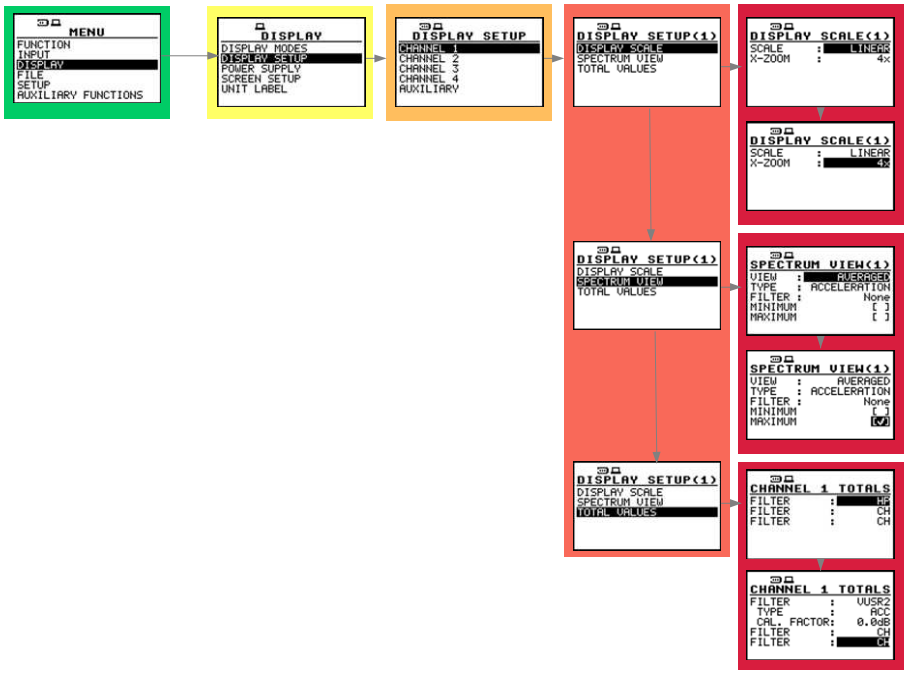
- **TYPE** (it is available only for vibration measurements); available values if **VUSR1**, **VUSR2** or **VUSR3** was selected in the previous position: **ACC**, **VEL** and **DIL**; if the **CH** filter was selected (the filter which was set in the 2nd channel) this position is not displayed
- **CAL. FACTOR** (it is available only for vibration measurements); accessible if **VUSR1**, **VUSR2** or **VUSR3** was selected in the **FILTER** position; if the **CH** filter was selected (the filter which was set in the 2nd channel) this position is not displayed; available values from **-60.0dB** to **60.0dB** with **0.1dB** or **1 dB** step
- **FILTER**; available values of the weighting filters:
  - in the case of sound measurements: **LIN**, **SUSR1**, **SUSR2**, **SUSR3** or any other sent to the unit by means of the interface
  - in the case of vibration measurements: **CH**, **VUSR1**, **VUSR2**, **VUSR3** or any other sent to the unit by means of the interface
- **TYPE** (it is available only for vibration measurements); available values if **VUSR1**, **VUSR2** or **VUSR3** was selected in the previous position: **ACC**, **VEL** and **DIL**; if the **CH** filter was selected (the filter which was set in the 3rd channel) this position is not displayed
- **CAL. FACTOR** (it is available only for vibration measurements); accessible if **VUSR1**, **VUSR2** or **VUSR3** was selected in the **FILTER** position; if the **HP** filter was selected (the filter which was set in the 3rd channel) this position is not displayed; available values from **-60.0dB** to **60.0dB** with **0.1dB** or **1 dB** step

- **AUXILIARY**
  - **SCALE**; available values: **LINEAR**, **LOGARITHM**
  - **DYNAMIC** (only for **LOGARITHM SCALE**); available values: **80dB**, **40dB**, **20dB**, **10dB**
  - **X–ZOOM**; available values: **1x**, **2x .. 10x**

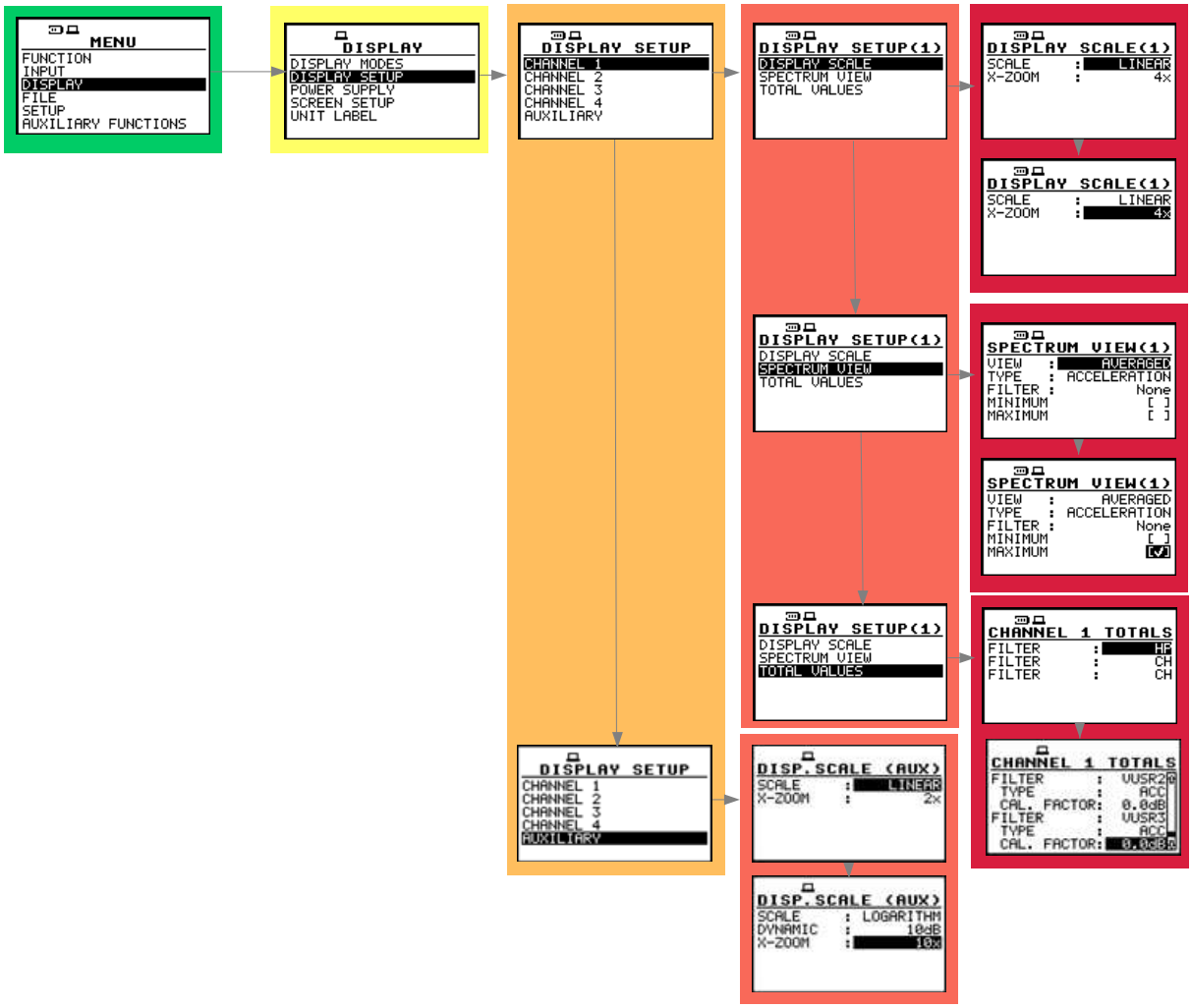
- **POWER SUPPLY**; it informs the user about the source of powering of the instrument and current power supply voltage; available messages: **BATTERY**, **USB POWER** and **EXTERNAL POWER**
- **SCREEN SETUP**
  - **LIGHT TIMEOUT**; available values: **[√]** or **[ ],** if **[√]** is chosen it will cause the self-made backlight switching off in the case when the keyboard is not used during the last 30 seconds. If it happened the first pressing of any push-button switches the backlight on
  - **BRIGHTNESS**; it enables the user to select one from four possibilities of the brightness of the display's backlight
  - **CONTRAST**; it enables the user to select one from 21 possibilities of the contrast of the instrument's display
- **UNIT LABEL**; it informs the user about the serial number of the unit, the internal software version, the internal memory size and the standards which the instrument fulfils



Control diagram of DISPLAY list



Control diagram of DISPLAY list in 1/1 OCTAVE and 1/3 OCTAVE analysis of vibration



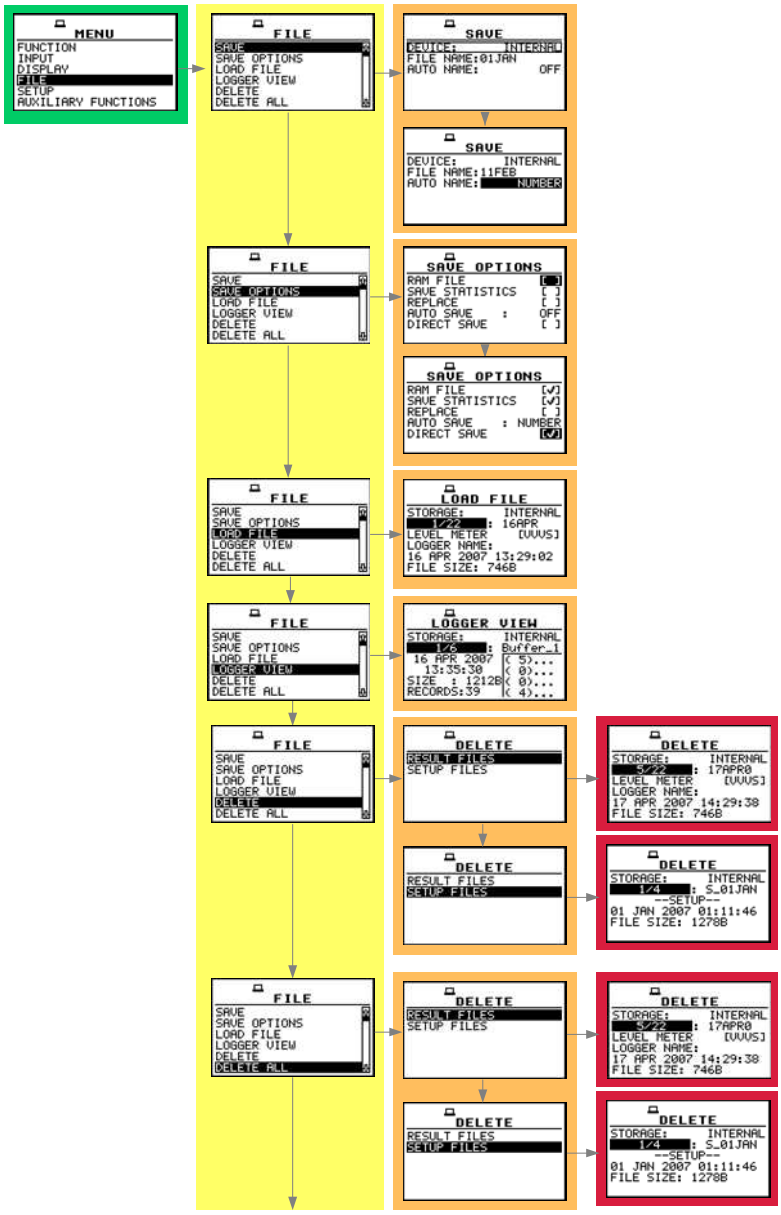
Control diagram of DISPLAY SETUP sub-list in 1/1 OCTAVE and 1/3 OCTAVE analysis

❖ **FILE** (one of the main lists available after pressing the **<Menu>** push-button)

- **SAVE**
  - **DEVICE**; **INTERNAL** in the case when the file will be saved in the internal memory of the instrument or **EXTERNAL** in the case when the external USB memory stick is connected to the instrument
  - **FILE NAME**; the name of the file can be fully edited by pressing the **<▲>**, **<▼>** and **<◀>**, **<▶>** push-buttons together with **<Shift>**
  - **AUTO NAME: OFF**, **NUMBER**, the instrument will give automatically the name for the file with the number increased by one
  - the **NO RESULTS TO SAVE** text is displayed in the case when the instrument did not perform any measurement
- **SAVE OPTIONS**
  - **RAM FILE**; it 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 "RAM file"), this option is useful when remote reading is necessary, e.g. during the long term monitoring; the results are saved all the time in the same space of the units memory; available values: **[√]** or **[ ]**
  - **SAVE STATISTICS**; it enables the user to save or not to save along with the measurement results the calculated statistics; available values: **[√]** or **[ ]**; it is available only in the sound meter mode; in the vibration meter mode it is taken off from the menu
  - **REPLACE**; it enables the user to replace the existing files in the instrument's memory by the files having the same name; available values: **[√]** or **[ ]**
  - **AUTO SAVE**; it enables the user to save the measurement results in the instrument's memory without entering **SAVE** (in order to perform this operation the **INT. PERIOD** should be set to at least **10 s**); available values: **[√]** or **[ ]**
  - **DIRECT SAVE**; it enables the user saving the results with the automatically incremented name after pressing the **<ENTER>** and **<Alt>** push-buttons together
- **LOAD FILE**; it enables the user to verify the list of files in the memory and to load into operation memory of the instrument the selected one; the **NO FILES** text is displayed in the case when the instrument's memory is empty
- **LOGGER VIEW**; it enables the user to view the logger files; in the window appear following information: type of **STORAGE** (**INTERNAL** or **EXTERNAL**), number of the selected logger file and number of the files in the logger memory (e.g.**1/ 37**), name of the file (e.g.: **Buffer_1**) date and time of the record (e.g.: **01 JAN 2007**, **19:30:15**), file's **SIZE** (e.g.: **862 B**) and number of **RECORDS** in the selected logger file (e.g.: **36**)
- **DELETE**; it enables the user to verify the list of files in the memory and to delete the selected one from **RESULT FILES** or **SETUP FILES**; the **NO FILES** text is displayed in the case when the instrument's memory is empty
- **DELETE ALL**; it enables the user to delete all files saved in the instrument's memory; the user can choose to delete either **RESULT FILES**, **LOGGER FILES** or **SETUP FILES**; the confirmation is required before the erasing of all files
  - **Are you sure?**
- **DEFRAGMENTATION**; it enables the user to recover the memory which was previously used by the deleted files; the confirmation is required before the execution of this operation
  - **Are you sure?**

  The text **Defragmentation …unnecessary PRESS ANY KEY** is displayed when the instrument's memory was empty before trial of the defragmentation
- **CATALOGUE**; it enables the user to verify the list of files in the memory; the **NO FILES** text is displayed in the case when the instrument's memory is empty

- **FREE SPACE**; it informs the user about the size of the available memory for saving the measurement results in the files and the **TOTAL AVAILABLE** bytes of the memory (the number displayed in the **FREE SPACE** increased by the memory which was previously used by the deleting files)
- **SAVE SETUP**; saves the current settings of the instrument; one can edit name (in the **FILE NAME** position) of the setup file or switch on **AUTO NAME** option (the name of the file increases by one)
- **SETUP OPTIONS**; it enables he user to activate the **SAVE USER FILTER** option; available values: **[√]** or **[ ]**
- **LOAD SETUP**; it enables the user to verify the list of setup files in the memory and to load the previously saved settings of the instrument; the **NO FILES** text is displayed in the case when there is no setup files



Control diagram of FILE list

❖ **SETUP** (one of the main lists available after pressing the **<Menu>** push-button)

- **LANGUAGE**; it allow the user to choose the instrument's interface language; available values: **ENGLISH**, **RUSSIAN** (**NEDERLAND-B**, **FRENCH**, **ITALIAN**, **SPANISH -** under development)
- **CLEAR SETUP**; it enables the user to return to the factory made settings of the instrument; the confirmation has to be done before the execution of this function
  - **Are you sure?**
- **DAY TIME LIMITS**; it specifies the time limits for the calculation of **Lden** result; available values: **6h-18h**, **7h-19h**
- **EXT. I/O SETUP**; it enables the user to connect the instrument with other device and define the working mode of **I/O** socket
  - **MODE**
    - **ANALOG**; in this mode the meter can give signals to the output device from the selected **CHANNEL**; the user has the possibility to choose between **CHANNEL 1**, **2**, **3** and **4**
    - **DIGITAL IN**; in this mode the meter is connected to the output device, which triggers it to undertake measurements and the instrument works in the **EXT. TRIGGER** function

- **DIGITAL OUT**; in this mode the meter is connected to the input device, which triggers it to undertake measurements and the instrument works in the **TRIGGER PULSE** or **ALARM PULSE** function
  - **POLARISATION**; it appears in the case of **TRIGGER PULSE** mode; available options: **POSITIVE** and **NEGATIVE**
  - **ACTIVE LEVEL**; it appears in the case of **ALARM PULSE** mode; available options: **HIGH**, **LOW**

- **KEYBOARD SETUP**
  - **SHIFT MODE**; available modes: **Shift** or **2nd Fun.**
  - **START/STOP**; available modes: **Normal** or **Inverse**
  - **KEYLOCK**; available values: **[ ]** / **[√]**
- **MENU LOCK**
  - **NO LOCK**; available values: **[ ]** / **[*]**
  - **PARTIAL**; available values: **[ ]** / **[*]**
  - **FULL LOCK**; available values: **[ ]** / **[*]**
- **REFERENCE LEVELS**; this list contains the following positions:
  - **ACCELERATION**; it enables the user to set the reference level of the acceleration for the logarithmic scale when the results are expressed in **dB** - decibels, available levels are from **1 µm/s^2** to **100 µm/s^2**
  - **VELOCITY**; it enables the user to set the reference level of the velocity for the logarithmic scale (the results expressed in **dB** - decibels), available levels are from **1 nm/s** to **100 nm/s**
  - **DISPLACEMENT**; it enables the user to set the reference level of the displacement for the logarithmic scale (the results expressed in dB - decibels), available levels are from **1 pm** to **100 pm**
  - **SOUND**; it informs the user about reference level value in the case of sound measurements it is equal to **20 µPa**
- **RMS INTEGRATION**
  - **LINEAR**; available values: **[ ]** / **[*]**
  - **EXPONENTIAL**; available values: **[ ]** / **[*]**
- **RTC**
  - **RTC**; it enables the user to set the internal real time clock of the instrument
- **STATISTICAL LEVELS**; available only for the sound measurements. In the position the user can select ten values **Ni**, i = 1,…, 10, of the statistics **LN** to be saved, together with the main results, in a file (cf. the description of the files in App. B)
- **N1 =**; the first value of the **LN** statistics which has to be saved together with the main results in a file; available values: any number from 1 to 99
  - **…**
  - **N10 =**; the tenth value of the **LN** statistics which has to be saved together with the main results in a file; available values: any number from 1 to 99
- **TIMER**; it enables the user to set time of the self switching on of the instrument
  - **TIMER MODE**; available values: **Off**, **SINGLE**, **REGULAR**
  - **START DAY**; specifies the date of automatic power on
  - **START TIME**; specifies the time of automatic power on
  - **REPEAT TIME**; specifies time after which next automatic measurement will be executed
- **USB HOST SETUP**; it enables the user to choose with [*] proper functionality of USB-HOST socket
  - **OFF**; available values: **[ ]** / **[*]**
  - **RS232**; available values: **[ ]** / **[*]**
  - **USB DISK**; available values: **[ ]** / **[*]**, **function under development**
  - **SRT RECORDING**; available values: **[ ]** / **[*]**, **function under development**

- **WAVE RECORDING**; available values: **[ ]** / **[*]**, **function under development**
- **EVENT RECORDING**; available values: **[ ]** / **[*]**, **function under development**

➢ **USER FILTERS SETUP**

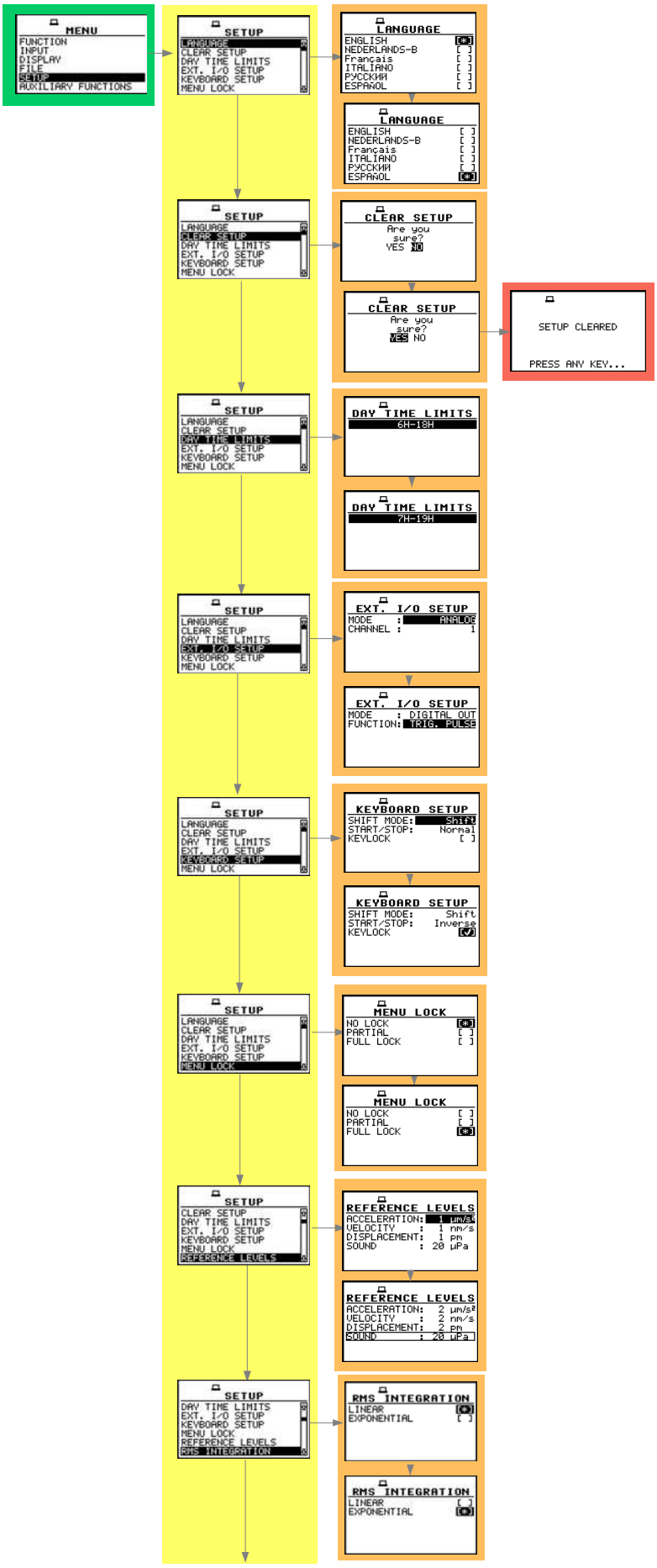
- **MODE: VIBRATION**
  - **FILTER**; available values: **VUSR1**, **VUSR2**, **VUSR3**
  - **VIEW**; it enables the user to select which filter should be viewed; the available options are **VUSR1**, **VUSR2**, **VUSR3** and any other transmitted to the instrument from a PC by means of the interface
    After pressing the **<ENTER>** push-button another sub-list opens containing the values of filters used in **1/1 OCTAVE** or **1/3 OCTAVE** analysis and saved under the name **USER1**, **USER2**, **USER3** or any other
  - **EDIT**; it enables the user to select which filter should be edited; the available options are **VUSR1**, **VUSR2**, **VUSR3** and any other transmitted to the instrument from a PC by means of the interface
    After pressing the **<ENTER>** push-button another sub-list opens containing the values of the filters used in **1/1 OCTAVE** or **1/3 OCTAVE** analysis; the user can set the values of correcting coefficients for all **1/3 OCTAVE** filters:
    - **0.80 Hz**: available values of 0.8 Hz centre frequency filter:**-INF**, **-100.0dB .. 100.0dB**
    - …
    - **20.0kHz**: available values of 20 kHz centre frequency filter: **-INF**, **-100.0dB .. 100.0dB**
  - **CLEAR**; it enables the user to clear selected filter; the confirmation has to be done before the execution of this function
    - **Are you sure?**
- **MODE: SOUND**
  - **FILTER**; available values: **SUSR1**, **SUSR2**, **SUSR3**
  - **VIEW**; it enables the user to select which filter should be viewed; the available options are **SUSR1**, **SUSR2**, **SUSR3** and any other transmitted to the instrument from a PC by means of the interface
    After pressing the **<ENTER>** push-button another sub-list opens containing the values of filters used in **1/1 OCTAVE** or **1/3 OCTAVE** analysis and saved under the name **USER1**, **USER2**, **USER3** or any other
  - **EDIT**; it enables the user to select which filters should be edited; the available options are as follows: **SUSR1**, **SUSR2**, **SUSR3** or any other transmitted to the instrument from a PC by means of the interface
    After pressing the **<ENTER>** push-button another sub-list opens containing the values of the filters used in **1/1 OCTAVE** or **1/3 OCTAVE** analysis; the user can set the values of correcting coefficients for all **1/3 OCTAVE** filters:
    - **0.80 Hz**: available values of 0.8 Hz centre frequency filter: **-INF**, **-100.0dB .. 100.0dB**
    - …
    - **20.0kHz**: available values of 20 kHz centre frequency filter: **-INF**, **-100.0dB .. 100.0dB**
  - **CLEAR**; it enables the user to clear selected filter; the confirmation has to be done before the execution of this function
    - **Are you sure?**

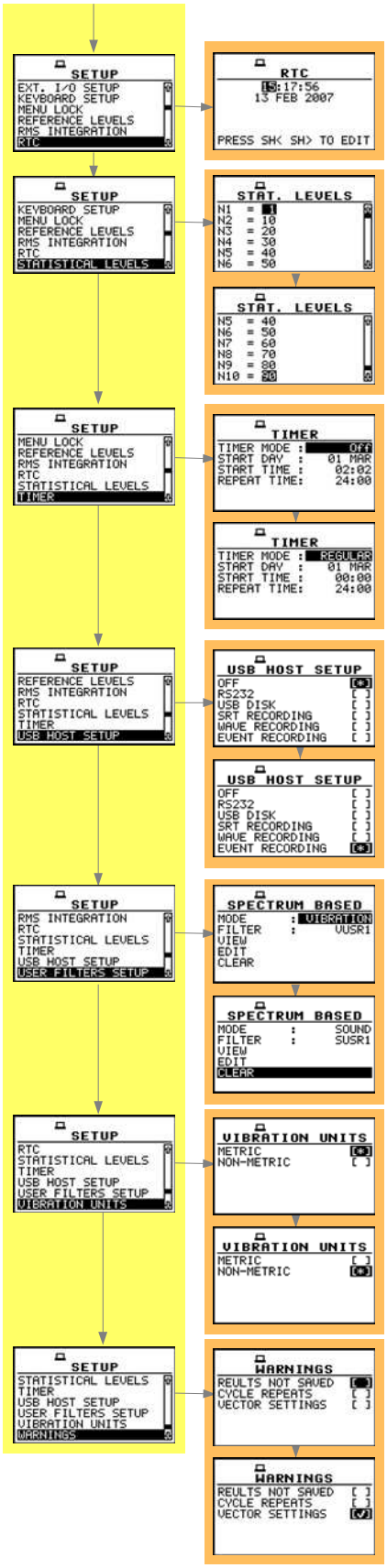
➢ **VIBRATION UNITS** (it is available only for vibration measurements)

- **METRIC** (e.g. **m/s^2**, **m/s**, **m**); available values: **[ ]** / **[*]**
- **NON-METRIC** (e.g. **g**, **ips**, **mil**); available values: **[ ]** / **[*]**

➢ **WARNINGS**

- **RESULTS NOT SAVED**; it enables the user to switch on or off the warning that the results of the measurement were not saved in the memory; available values: **[√]** or **[ ]**
- **VECTOR SETTINGS**; it enables the user to switch on or off warning when the user changes channel mode into sound and this channel was included to the vibration vector calculations; available values: **[√]** or **[ ]**

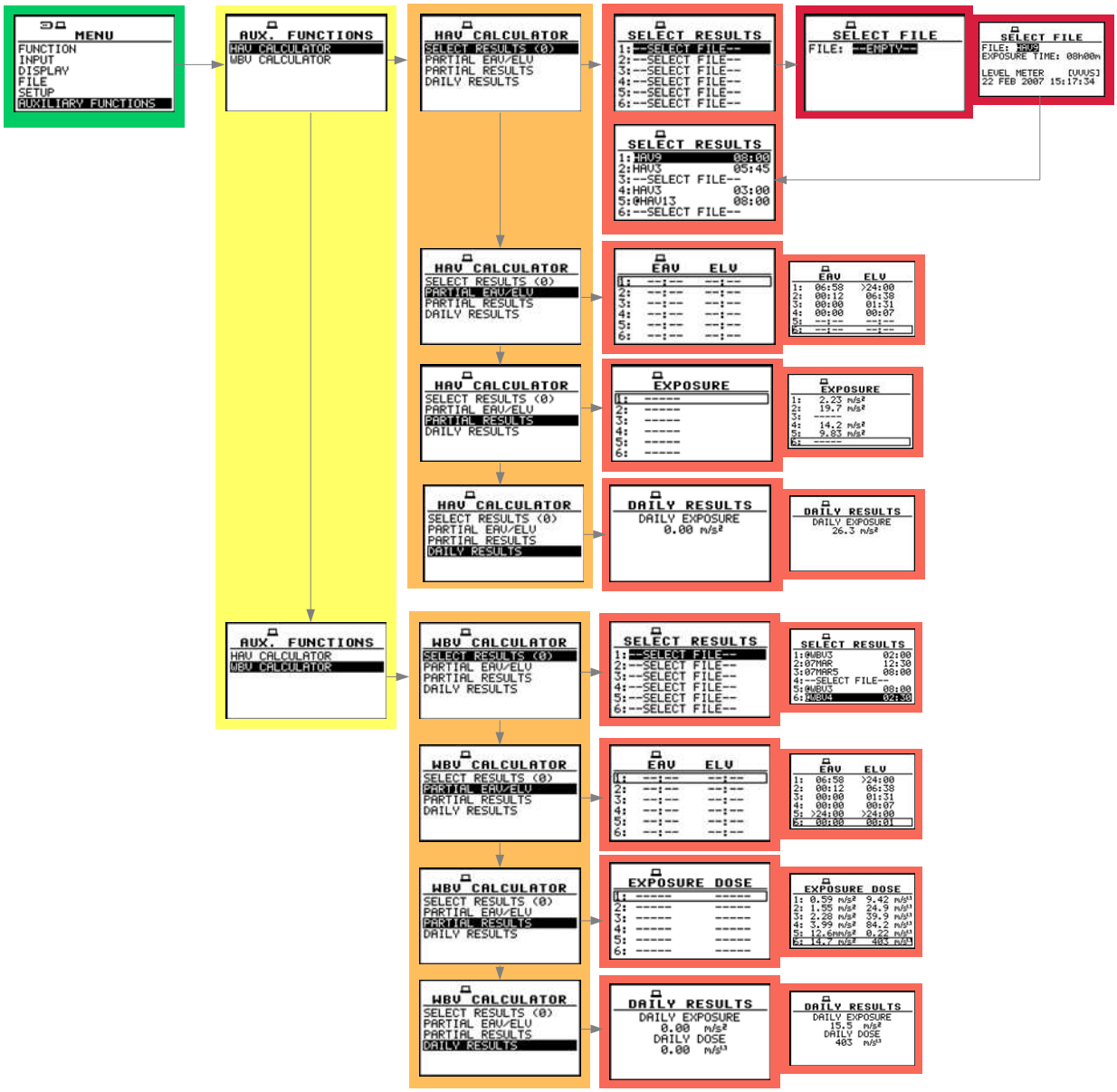

MENU
FUNCTION
INPUT
DISPLAY
FILE
SETUP
AUXILIARY FUNCTIONS
SETUP
LANGUAGE
CLEAR SETUP
DAY TIME LIMITS
EXT. I/O SETUP
KEYBOARD SETUP
MENU LOCK
LANGUAGE
ENGLISH [*]
NEDERLANDS-B [ ]
Français [ ]
ITALIANO [ ]
РУССКИЙ [ ]
ESPAÑOL [ ]
LANGUAGE
ENGLISH [ ]
NEDERLANDS-B [ ]
Français [ ]
ITALIANO [ ]
РУССКИЙ [ ]
ESPAÑOL [*]
SETUP
LANGUAGE
CLEAR SETUP
DAY TIME LIMITS
EXT. I/O SETUP
KEYBOARD SETUP
MENU LOCK
CLEAR SETUP
Are you sure?
YES NO
CLEAR SETUP
Are you sure?
YES NO
SETUP CLEARED
PRESS ANY KEY...
SETUP
LANGUAGE
CLEAR SETUP
DAY TIME LIMITS
EXT. I/O SETUP
KEYBOARD SETUP
MENU LOCK
DAY TIME LIMITS
6H-18H
DAY TIME LIMITS
7H-19H
SETUP
LANGUAGE
CLEAR SETUP
DAY TIME LIMITS
EXT. I/O SETUP
KEYBOARD SETUP
MENU LOCK
EXT. I/O SETUP
MODE : ANALOG
CHANNEL : 1
EXT. I/O SETUP
MODE : DIGITAL OUT
FUNCTION: TRIG. PULSE
SETUP
LANGUAGE
CLEAR SETUP
DAY TIME LIMITS
EXT. I/O SETUP
KEYBOARD SETUP
MENU LOCK
KEYBOARD SETUP
SHIFT MODE: Shift
START/STOP: Normal
KEYLOCK [ ]
KEYBOARD SETUP
SHIFT MODE: Shift
START/STOP: Inverse
KEYLOCK [*]
SETUP
LANGUAGE
CLEAR SETUP
DAY TIME LIMITS
EXT. I/O SETUP
KEYBOARD SETUP
MENU LOCK
MENU LOCK
NO LOCK [*]
PARTIAL [ ]
FULL LOCK [ ]
MENU LOCK
NO LOCK [ ]
PARTIAL [ ]
FULL LOCK [*]
SETUP
CLEAR SETUP
DAY TIME LIMITS
EXT. I/O SETUP
KEYBOARD SETUP
MENU LOCK
REFERENCE LEVELS
REFERENCE LEVELS
ACCELERATION: 1 µm/s²
VELOCITY : 1 nm/s
DISPLACEMENT: 1 pm
SOUND : 20 µPa
REFERENCE LEVELS
ACCELERATION: 2 µm/s²
VELOCITY : 2 nm/s
DISPLACEMENT: 2 pm
SOUND : 20 µPa
SETUP
DAY TIME LIMITS
EXT. I/O SETUP
KEYBOARD SETUP
MENU LOCK
REFERENCE LEVELS
RMS INTEGRATION
RMS INTEGRATION
LINEAR [*]
EXPONENTIAL [ ]
RMS INTEGRATION
LINEAR [ ]
EXPONENTIAL [*]



Control diagram of SETUP list

❖ **AUXILIARY FUNCTIONS** (one of the main lists available after pressing the **<Menu>** push-button)

- **HAV CALCULATOR**; it enables to calculate the various **H–A** parameters: **PARTIAL EAV/ELV**, **PARTIAL EXPOSURE** and **DAILY EXPOSURE** of vibration. All results are counted according to the selected standard
  - **SELECT RESULTS (x)**; it enables the user to select files with measurement's results. It is possible to select 6 files, which include measurement's results with **H–A** data
    - **SELECT FILE**; it enables the user to select up to 6 files with **H–A** data; in the window there are also:
      - **FILE**; it contains the name of the selected file
      - **EXPOSURE TIME**; it enables to read out the period during which the measurement results were taken
      - measurement function (e.g. **LEVEL METER**) and the sets in channels (e.g. **[VVVS]**)
      - the date and time of the measurements
  - **PARTIAL EAV/ELV**; it displays the partial result of dose: the **EAV** results and **ELV** results
  - **PARTIAL RESULTS**; it displays the **EXPOSURE** results, for each selected file separately
  - **DAILY RESULTS**; it displays the result of **DAILY EXPOSURE** results, for all selected files; the result is counted relatively to **EXPOSURE TIME**
- **WBV CALCULATOR**; it is used to calculate the various **WBV** parameters: **PARTIAL EAV/ELV**, **PARTIAL EXPOSURE**, **DAILY EXPOSURE** and **DAILY DOSE** of vibration; all results are calculated according to the selected standard
  - **SELECT RESULTS (x)**; it enables the user to select files with measurement's results. It is possible to select 6 files, which include measurement's results with **WBV** data
    - **SELECT FILE**; it enables the user to select up to 6 files with **WBV** data; in the window there are also:
      - **FILE**; it contains the name of the selected file
      - **EXPOSURE TIME**; it enables to read out the period during which the measurement results were taken
      - measurement function (e.g. **LEVEL METER**) and the sets in channels (e.g. **[VVVS]**)
      - the date and time of the measurements
  - **PARTIAL EAV/ELV**; it displays the partial result of dose: the **EAV** results and **ELV** results
  - **PARTIAL RESULTS**; it displays the **EXPOSURE** results, for each selected file separately
  - **DAILY RESULTS**; it displays the result of **DAILY EXPOSURE** and **DAILY DOSE** results for all selected files; the result is counted relatively to **EXPOSURE TIME**



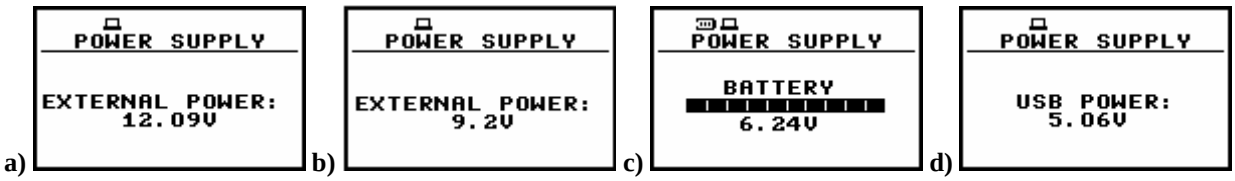
Control diagram of AUXILIARY FUNCTION list

3.2 Powering of the instrument

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

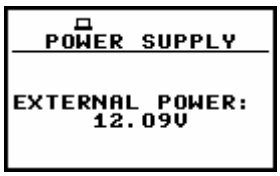
- **External DC power** source, **SA 15** – 6 V DC ÷1 5 V DC (1.5 W)
- **SA 17A external battery pack** – operation time > 24 h (option)
- Four AA standard internal **batteries**. In the case of alkaline type, fully charged set can operate more than 12 h (6.0 V / 1.6 Ah). Instead of the ordinary, four AA rechargeable **batteries** can be used (for charging them the separate charger is required). 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** window (*path: MENU / DISPLAY / POWER SUPPLY*) looks differently, depending on the current powering source.



BATTERY windows with different sources powering the instrument: SA 15 external DC power adapter (a), SA 17A external battery pack (b), internal batteries (c) and USB power (d)

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** window *(path: MENU / DISPLAY / POWER SUPPLY*).

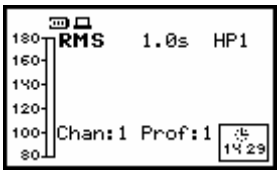


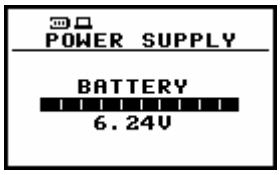
POWER SUPPLY window when the instrument is powered from external source

When the instrument is powered from batteries, the **"Battery"** icon is presented on the top of the display. When voltage of the batteries is too low, the icon is flashing. To change the batteries the user has:

- to switch off the instrument
- to take off the black bottom cover of the instrument
- to unscrew battery cover
- to change the batteries and
- to reassemble the parts of the instrument.

The fully charged battery ensures more than 12 hours of the continuous work 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 display by means of the **"Battery"** icon.

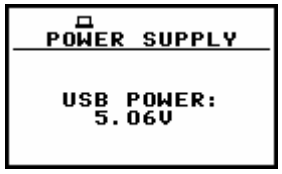
a) 

b) 

Displays with the "Battery" icon (a) and in the POWER SUPPLY window (b)

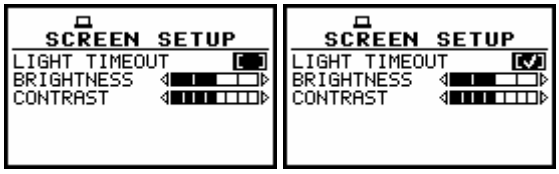
Notice: *In the case when **"Battery"** icon is flashing it is strongly recommended to use as soon as possible the external power adapter, USB interface or replace the batteries. In the other case the instrument after a while will be switched off by itself!*

When there is a connection to USB interface (**USB Device** socket is connected by means of the cable to a PC) the **"Computer"** icon is presented on the top of the display and in the **POWER SUPPLY** window there is the **USB POWER** message.



Display with the "Computer" icon and in the POWER SUPPLY window

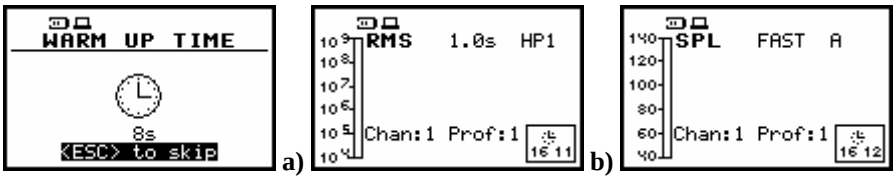
The backlight of the display can be activated by means of the **<◄>** + **<►>** push-buttons pressed together. For saving the power of the battery, in the normal "day-light" operation it is recommended to **keep the backlight off**. The user can set the **LIGHT TIMEOUT** (*path: MENU / DISPLAY / SCREEN SETUP / LIGHT TIMEOUT*), which will cause the self-made backlight switching off in the case when the keyboard is not used during the last 30 seconds. If it happened the first pressing of any push-button switches the backlight on.



Displays during activation of LIGHT TIMEOUT option

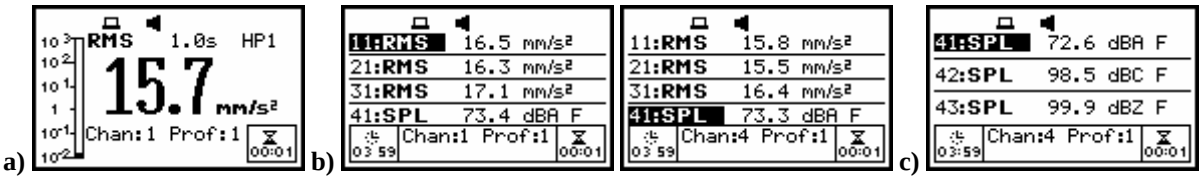
3.3 Initial setup of the instrument

The instrument passes the self-test after switching on (in this time the producer and the name of the instrument is displayed on the display) and then it enters the sound or vibration mode for channel 1 (depending on which mode was used during the instrument's switch off). The default display mode for result's presentation is one profile (see Chapter describing **DISPLAY** list).

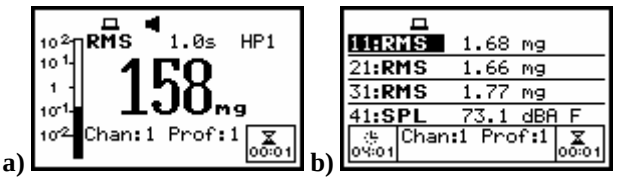


Displays after switching on the instrument in VLM (a) and in SLM (b)

To start the measurements the user has to press the **<Start / Stop>** push-button. The result of the measurement is displayed with the unit of the measurement in so-called one profile mode. On the left side of the display, the vertical analogue-like indicator is presented. On the bottom of the display, there is a channel and a profile from which comes the measurement (**Chan:1**, **Chan:2**, **Chan:3** or **Chan:4** and **Prof: (1)**, **Prof: (2)** or **Prof:(3)**). On the top of the display (under the icons line) there are the following data: the function name (**SPL**, **LEQ**, **SEL**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **Lxx**, **OVL**, **PEAK**, **MAX**, **MIN** in the case of sound measurements or **RMS**, **VDV**, **OVL**, **PEAK**, **P–P**, **MTVV** in the case of vibration measurements), the detector time constant (**IMP.**, **FAST**, **SLOW** or **100 ms**, **125 ms**, **.. 10.0 s**, **..** - when the detector is exponential or **Lin** when the detector is linear) and the weighting filter (**A**, **C**, **LIN** or **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10**, **KB**, **Wk**, **Wd**, **Wc**, **Wj**, **Wm**, **Wh**, **Wg**, **Wb**). The real time clock (time of the measurement) is presented in the bottom right corner of the display.



Displays in one-channel (a) four channels (b) and 3 PROFILES display mode (c)



Displays in one profile (a) and four channels (b) display mode with the vibration measurement (NON-METRIC units)

The results of the measurements can be presented in one profile, in **4 CHANNELS**, in **4-VIEW**, in **STATISTICS** and in **LOGGER** (these are the available display modes set by the producer; cf. the description of the **DISPLAY MODES** – *path: MENU / DISPLAY / DISPLAY MODES*). It is possible to change the display mode pressing the **<▲>** or **<▼>** push-buttons. In so-called **4 CHANNELS** display mode, the results of the measurement from all channels are displayed simultaneously. The units, weighting filter and detector time constant are also shown. The default settings (set up by the producer) for the channels, in the case of sound measurements, there are as follows:

CHANNEL 1 - **VIBRATION** mode; **316 m/s^2** range; **HP1** weighting filter (**FILTER: HP1**), **1.0 s** RMS detector (**DETECT.: 1.0s**);

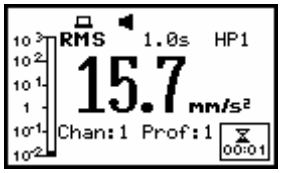
CHANNEL 2 - **VIBRATION** mode; **316 m/s^2** range; **HP1** weighting filter (**FILTER: HP1**), **1.0 s** RMS detector (**DETECT.: 1.0s**);

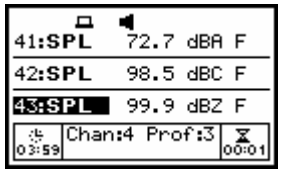
CHANNEL 3 - **VIBRATION** mode; **316 m/s^2** range; **HP1** weighting filter (**FILTER: HP1**), **1.0 s** RMS detector (**DETECT.: 1.0s**);

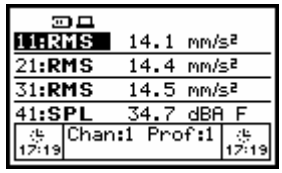
CHANNEL 4 - **SOUND** mode; **130 dB** range; **MICROPHONE CORRECTION**: no **DIFFUSE FIELD [ ]**, no **OUTDOOR [ ]**; **PROFILE 1: A** weighting filter (**FILTER: A**), **FAST** type of the RMS detector (**DETECTOR: FAST**); **PROFILE 2: C** weighting filter (**FILTER: C**), **FAST** type of the RMS detector (**DETECTOR: FAST**); **PROFILE 3**: **LIN** weighting filter (**FILTER: LIN**), **FAST** type of RMS detector.

The user can change all mentioned above settings using **CHANNEL x** (*path: MENU / INPUT CHANNELS SETUP / CHANNEL x*). The instrument remembers all changes. The return to the default settings (set up by the producer) is possible after the execution of the **CLEAR SETUP** (*path: MENU / SETUP / CLEAR SETUP*).

The instrument can be used not only as the sound (**SLM**) or vibration level meter (**VLM**) but also as **1/1 OCTAVE**, **1/3 OCTAVE**, **DOSIMETER**, **FFT** analyser and **RT60** analyser. In order to distinguish the **SLM** (or **VLM**) mode of the unit from the others in **4 CHANNELS** / **3 PROFILES** display mode, continuous horizontal lines are used to separate the measurement results from different channels or profiles of a channel. In other modes than **SLM** (or **VLM**) the mentioned above lines are doted.

a) 

b) 

c) 

Displays in one profile (a) and 3 PROFILES display mode (b) 4 CHANNEL display mode (c)

Notice: *See the following Chapters for more details concerning different settings.*

More data about the instrument's state are given by means of the icon's row visible in the top of the display (**"Paper sheet"**, **"Battery"**, **"Computer"**, **"Antenna"** (**"Tree"**), **"Loudspeaker"**, **"Headphone"**, **"Envelope"**, **"Bell"**, **"Timer"** and **"Arrows"**). The meanings of the icons are as follows:

Display with all available icons

"Paper sheet" icon is displayed when the USB disk or IrDA is connected to the instrument.

Display with "Paper sheet" icon

"Battery" is displayed when the instrument is powered from the batteries, icon corresponds to the batteries **state** (three, two, one or none vertical bars in side of the icon). When voltage of batteries is too low, the icon is flashing.

Display with "Battery" icon

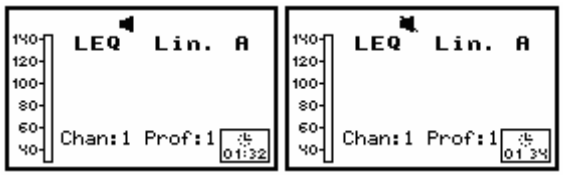
"Computer" is displayed when there is a USB connection with the PC; the icon is flashing during RT (Real Time) transmission.

Display with "Computer" icon

"Antenna" (**"Tree"**) icon is displayed in a flashing mode together with the "**Loudspeaker**" when the measurement is started, the trigger is switched on and the level of the signal is too low to start the registration.

Display with "Antenna" ("Tree") icon

"Loudspeaker" icon is displayed when the measurement is started and executed. The crossed out loudspeaker means measurement is paused (Pause).



Display with "Loudspeaker" icon

"Headphone" is displayed when RS 232 (**SV 55**) interface is connected to the instrument.

Display with "Headphone" icon

"Envelope" icon is presented when the current **measurement results are logged** in the instrument's logger file. Together with this icon the **"Loudspeaker"** icon is always displayed. In the case when the **"Envelope"** icon starts flashing, it means that the whole logger memory of the instrument is filled out. The new measurement result is not saved in it. If the user wants to save

these results, he has to **DELETE** some logger files and execute **LOGGER DEFRAGMENTATION** (*path: MENU / FILE / DEFRAGMENTATION / LOGGER DEFRAGMENTATION*).

Display with "Envelope" icon

"Bell" is displayed when overload has taken place during the last measurement cycle (the icon is displayed also after the measurement and after loading the file with the overloaded results).

Display with "Bell" icon

"Timer" icon flashing means that the instrument's **Timer** is switched on and the instrument is waiting for the set time of the measurement. When the measurement was started by the **Timer**, the icon is presented without flashing.

Display with "Timer" icon

"Arrows" are flashing after pressing the **<Alt>** or **<Shift>** push-button when the **2nd Fun** is selected in the **SHIFT MODE** (*path: MENU / SETUP / SHIFT MODE / SHIFT / 2nd FUN*), that means other push-buttons have second or third meaning (i.e. after pressing the **<Shift>** the meaning of **<ENTER>** push-button is **<Menu>**; after pressing the **<Alt>** the meaning of **<ESC>** push-button is changed into **<Pause>**).

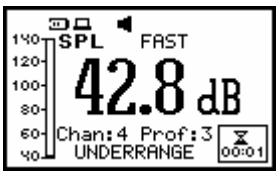
Display with "Arrows" icon

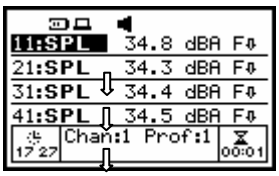
Notice: *The time of the measurement is displayed* ***in minutes and seconds*** *in the range from* ***1 sec. to 39 minutes and 59 seconds****. After this limit, the hours and minutes are shown (i.e. 00:40).*

In the case when the level of the measured signal is too low in the relation to the measuring range (when the level of the input signal is under the linearity of the range declared in App. C, so-called **UNDERRANGE**) in one profile mode the message is displayed on the bottom of the display. The arrow directed down is used for this reason in **4 CHANNELS** mode.

Notice: *The* ***UNDERRANGE*** *is indicated only in the case of sound measurements. It does not occur in the case of vibration measurements.*

Notice: The "Bell" icon is used as an indicator of an overload*.*

a) 

b) 

Displays when the level of the signal is too low during the measurements of the sound -UNDERRANGE text on the bottom of the display (a) and the arrows directed down in 4 CHANNELS mode (b)

Table 3.1. The limits of the signal causing the different icon's indication in the case of sound measurements

INDICATOR	105 dB range	130 dB range
"Bell"	≥ 114.5 dB	≥ 137.5 dB
UNDERRANGE	< 24.0 dB A	< 44.0 dB A
UNDERRANGE	< 24.0 dB C	< 42.0 dB C
UNDERRANGE	< 30.0 dB	< 48.0 dB

Table 3.2. 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 µm/s^2)

INDICATOR	VLM, 1/1 OCTAVE, 1/3 OCTAVE or FFT ANALYSIS	
	17.8 m/s^2 range 145 dB range	316 m/s^2 range 170 dB range
"Bell"	≥ 53.1 m/s^2 ≥ 154.5 dB	≥ 750 m/s^2 ≥ 177.5 dB

Notice: *The time of the measurement 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. 00:40).*

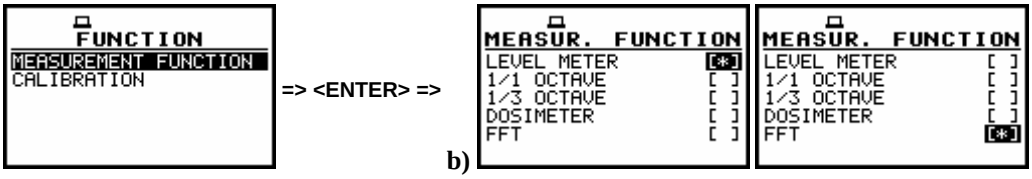
Notice: *In all modes of the instrument, the* ***"REAL TIME CLOCK"*** *is always displayed on the display.*

Notice: *In* ***SVAN 958 "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 most of the pictures in this manual were made when the meter was powered by external power supply that is why there are not the "Battery" icons on them).*

Notice: THE USER DYNAMICALLY MODIFIES THE DEFAULT SETUP. *The last set-up of the instrument (during the power off) is stored and is available after power on.*

3.4 Activation of optional functions

The **1/1 OCTAVE**, **1/3 OCTAVE**, acoustic **DOSIMETER**, **FFT**, **RT60** and **Time-history Data LOGGER**, **RPM**, **time-domain signal recording** are the optional functions broadening the applications of the instrument. Some of the additional functions are specified in the **MEASUREMENT FUNCTION** window (*path: MENU / FUNCTION / MEASUREMENT FUNCTION*) others – in the other lists.



FUNCTION list opened, MEASUREMENT FUNCTION selected (a) and MEASUR. FUNCTION sub-list opened (b)

Notice: Time-domain Signal Recording *(**WAVE**, **SRT**, **EVENT**) function is under development.*

A function is selected by placing the special character in the line with the function's name. The position of the character can be changed using the **<▲>**, **<▼>** and **<◀>**, **<▶>** push-buttons. After placing the character in the line with the function's name the user has to press the **<ENTER>** push-button. The window for entering the access code to a function is opened in the first essay of its execution (after pressing the **<ENTER>** push-button) in the case when a function was not purchased together with the instrument.

Displays during the entering of the access code to a function

The introduction of the access code is performed in the same way as the edition of the other text variables using the **<◀>**, **<▶>** push-buttons (the selection of the character's position), the **<Shift>** and **<▶>** push-buttons (the **Insert** function), the **<Shift>** and **<◀>** push-buttons (the **Delete** function) and the **<▲>**, **<▼>** push-buttons (the codes of characters). 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.

Display after the unsuccessful verification of the access code

After pressing the **<ENTER>** or the **<ESC>** push-button the instrument returns to the **FUNCTION** list displaying the list of the functions implemented in the unit (cf. the first Figure in this chapter). After successful verification of the access code, the windows described above are no more displayed. Once activated function is always available.

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

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 (when the optional **USB–HOST** controller is installed in the instrument).

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 without the **USB–HOST** controller is presented below.

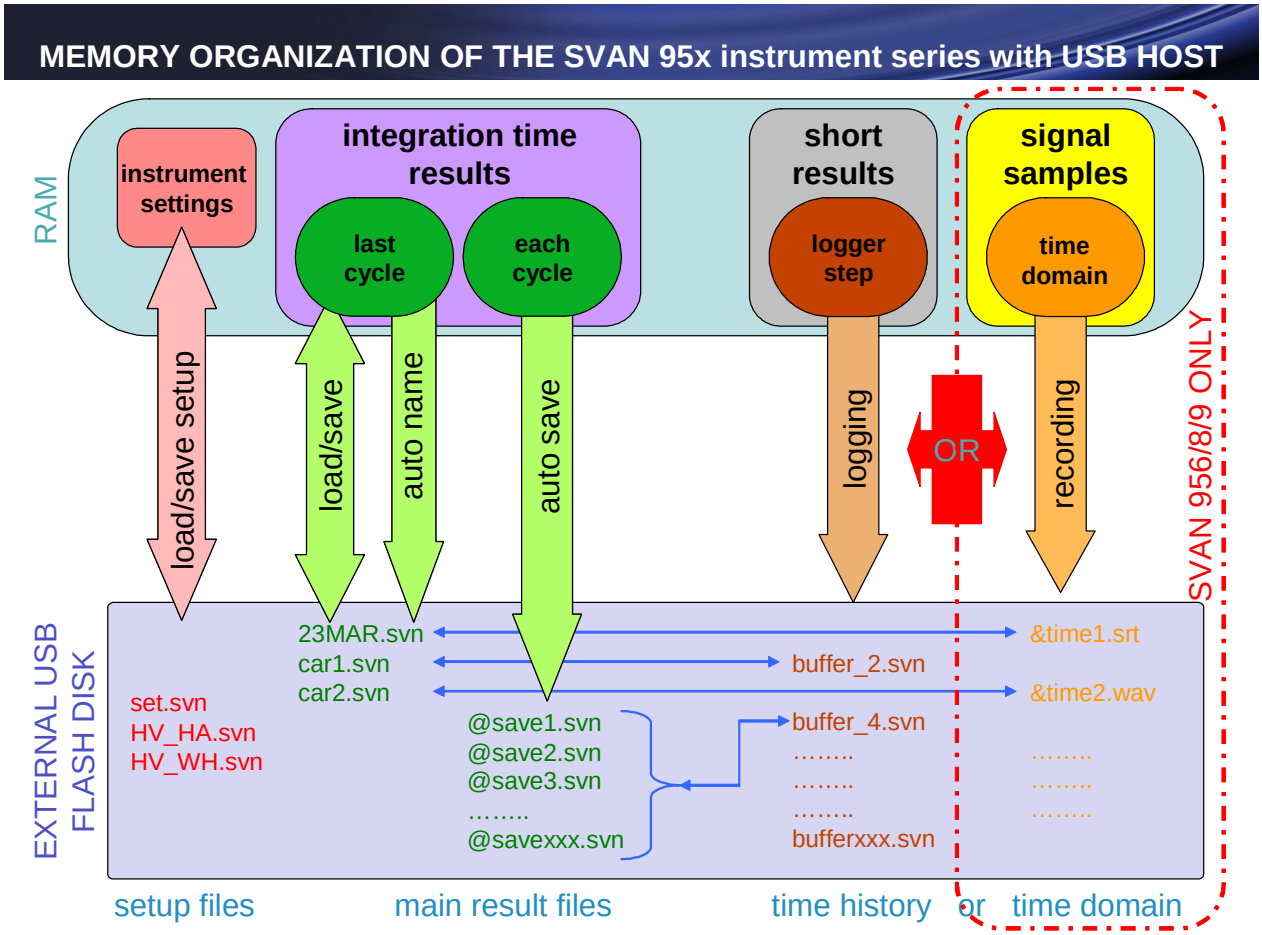
Notice: The instrument's logger memory is independent from the results and setup memory. *The capacity of the available memory is equal to 32 MB and is divided between logger (*15 728 156 *bytes) and results and setup settings (*16 121 360 *bytes).*

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

When the user connects to the instrument the **USB memory stick**, the data storing in the internal instrument's memory is not available any more. The user can only copy or move data from the internal memory of the device and store new data in the **USB memory stick**. The scheme of the memory organization of the instrument with the USB memory stick connected is presented below.

Notice: *The connection to the* ***USB Host*** *socket the USB disk switches off the instrument's internal flash memory. Only copying and moving the files to the USB stick is possible. 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.*

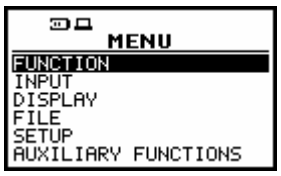
Notice: *The disconnection of the USB disk during the data transmission can cause the lost of data saved in the USB disk as well as in the instrument's internal flash memory.*

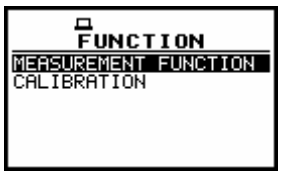


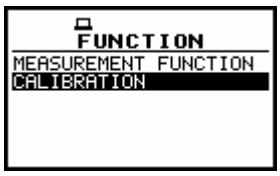
Scheme of the instrument memory organisation with the USB–HOST and memory stick connected

4 FUNCTIONS OF THE INSTRUMENT - FUNCTION

In order to select the **FUNCTION** list one has to press the **<Menu>** push-button, select by means of the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons the **FUNCTION** text and press the **<ENTER>**. The **FUNCTION** list contains two elements: **MEASUREMENT FUNCTION** and **CALIBRATION** windows. The list is closed and the instrument returns to the presentation mode after pressing the **<ESC>** push-button.

a)


b)


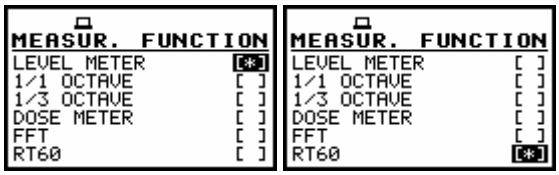
c)


Displays with the main list with FUNCTION text selected (a) and FUNCTION window with MEASUREMENT FUNCTION selected (b) and CALIBRATION selected (c)

4.1 Measurement functions of the instrument - MEASUREMENT FUNCTION

In order to select the required function the user has to enter the **MEASUREMENT FUNCTION** window (to select the **MEASUREMENT FUNCTION** text using the **<▲>**, **<▼>** or **<◄>**, **<►>** push-buttons and press the **<ENTER>** one, when this text is displayed inversely).

After entering the **MEASUREMENT FUNCTION** window, the set of the available functions appears on the display (**LEVEL METER**, **1/1 OCTAVE**, **1/3 OCTAVE**, **DOSIMETER**, **FFT**, **RT60)**. The special character marks currently active function.



MEASUREMENT FUNCTION window with all available functions

Displays during the activation of the optional function

The main function of the instrument is the **measurement of vibration level** (in the case of vibration signal) and the **measurement of sound level** (in the case of acoustic signal). The other functions are optional and they broaden the applications of the instrument. They can be supported by the producer or purchased later. The producer activates the optional function bought with the instrument. The user should activate by itself (by entering a special code) the function purchased later.

The **sound LEVEL METER** (**SLM**) **mode** provides the user with the functions of the **SLM** meeting the IEC 61672:2002 standard for Type 1 accuracy and the functions of **VLM** meeting the ISO 8041:2005 standard. The instrument can also be used for the long-term acoustic monitoring using for this purpose the huge logger, in which the measurement results are stored.

The required function is selected by placing the special character in the line with the proper text. The position of the character can be changed using the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons.

After placing the character in the line with the function's name the user has to press the **<ENTER>** push-button, which closes the **MEASUREMENT FUNCTION** window.

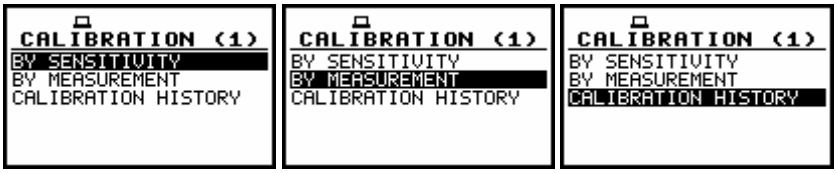
***Notice**: It is not possible to change the mode / measurement function during the measurements. The instrument displays in this case for about 2 seconds the text: **"MEASUREMENT IN PROGRESS"**. In order to change the mode of the instrument the measurement must be finished!*

4.2 Instrument's calibration - CALIBRATION

The instrument is factory calibrated with the supplied accelerometer and microphone for standard environmental conditions. Each of four channels should be calibrated separately. In the case when the absolute vibration or sound level value is important, a calibration of the measurement channel has to be done. This is because the accelerometer or microphone sensitivity is a function of temperature, ambient pressure and humidity.

In order to select a calibration function the user has to enter the **CALIBRATION** window (to select the **CALIBRATION** text using the **<▲>**, **<▼>** or **<◀>**, **<▶>** push-buttons and press the **<ENTER>** one, when this text is displayed inversely) and then select the **CHANNEL** to be calibrated. All four channels of the instrument are calibrated independently.

In this window three options are available: the calibration of the measurement channel by the introduction of the accelerometer's or microphone's sensitivity from theirs calibration cards (**BY SENSITIVITY**) or by performing the calibration measurement (**BY MEASUREMENT**). Third option is **CALIBRATION HISTORY**, which enables the user to view last calibration result in the chosen channel.



CALIBRATION windows in CHANNEL 1

***Note:** The calibration level and the calibration result is expressed in different units depending on the settings of the instrument. The metric or non-metric vibration units are set in the **VIBRATION UNITS** (path: MENU / SETUP / VIBRATION UNITS). Additionally, the linear or logarithmic units are set in the **DISPLAY SCALE** (path: MENU / DISPLAY / DISPLAY SETUP / CHANNEL x / DISPLAY SCALE).*

4.2.1 Calibration by the sensitivity introduction

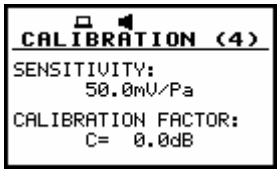
Calibration BY SENSITIVITY in the case of acoustic signal

The calibration by the microphone's sensitivity introduction (*path: MENU / FUNCTION / CALIBRATION / CHANNEL x / BY SENSITIVITY*) can be conducted in the following way:

1. **Select this type of the calibration** (highlight the **BY SENSITIVITY** text) **from the CALIBRATION window and press the <ENTER> push-button.**

CALIBRATION windows with the selected calibration mode and after entering this mode

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



CALIBRATION window with SENSITIVITY positions not accessible

2. Set the sensitivity of the microphone taken from its calibration card using the <◄>, <►> push-buttons and then press the <ENTER> one.

The calibration factor is calculated automatically in the relation to **50.0 mV / Pa**. The confirmation of the introduced **SENSITIVITY** is made after pressing the **<ENTER>** push-button. For the sensitivity of the microphone greater than 50.0 mV / Pa, the calibration factor is negative.

CALIBRATION window with the sensitivity greater than 50.0 mV / Pa and calculated calibration factor

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

CALIBRATION window with the sensitivity smaller than 50.0 mV / Pa and calculated calibration factor

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

In order to return to the **CALIBRATION** window the user has to press the **<ESC>** push-button.

a) 

b) 

CALIBRATION windows with the lowest possible sensitivity and the greatest calibration factor (a) and the greatest sensitivity and the lowest calibration factor (b)

Notice: *The calibration factor is always added to the results of sound level measurements and the analysis of sound signal.*

Calibration BY SENSITIVITY in the case of vibration signal

The calibration by the accelerometer's sensitivity introduction (*path: MENU / FUNCTION / CALIBRATION / CHANNEL x / BY SENSITIVITY*) can be conducted in the following way:

1. **Select this type of the calibration** (highlight the **BY SENSITIVITY** text) **from the CALIBRATION window and press the <ENTER> push-button.**

CALIBRATION windows with the selected calibration mode and after entering this mode

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

CALIBRATION windows with SENSITIVITY positions not accessible

2. **Set the sensitivity of the accelerometer taken from its calibration card using the <◄>, <►> push-buttons and then press the <ENTER> one.**

The calibration factor is calculated automatically, in the relation to **10.0 mV / ms^{-2}**. The confirmation of the introduced **SENSITIVITY** is made by pressing the **<ENTER>** push-button. For the sensitivity of the accelerometer greater than 10.0 mV / ms^{-2}, the calibration factor is negative.

CALIBRATION window during setting the sensitivity greater than 10.0 mV / ms^{-2}

For the sensitivity of the accelerometer smaller than 10.0 mV / ms$^{-2,}$ the calibration factor is positive.

CALIBRATION window during setting the sensitivity smaller than 10.0 mV / ms^{-2}

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

In order to return to the **CALIBRATION** window the user has to press the **<ESC>** push-button.

a)


b)


CALIBRATION windows with the lowest possible sensitivity and the greatest calibration factor (a) and the greatest sensitivity and the lowest calibration factor (b)

Note: *The calibration factor is always added to the results of the vibration measurements and the analysis of the vibration signal.*

4.2.2 Calibration by the measurement

Calibration BY MEASUREMENT in the case of acoustic signal

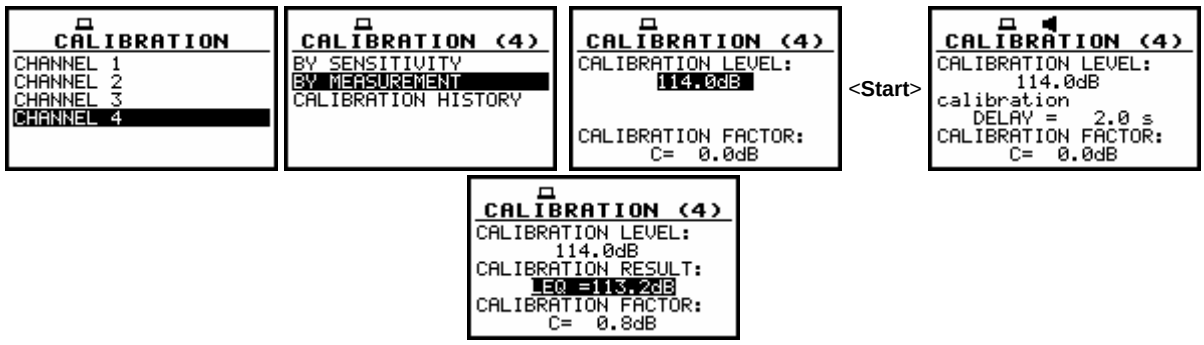
The calibration for the sound measurements (*path: MENU / FUNCTION / CALIBRATION / CHANNEL x / BY MEASUREMENT*) can be done in the following way:

1. **Select the calibration by measurement** (highlight the **BY MEASUREMENT** text) **from the CALIBRATION window and press the <ENTER> push-button.**
2. **Attach the acoustic calibrator SV 30A** (or equivalent **114 dB / 1000 Hz**) **to the microphone of the instrument**.

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 (**CAL. LEVEL** position in **BY MEASUREMENT** window), which is usually stated in the calibration certificate of the unit (the value of the **CAL. LEVEL** set by the producer of **SVAN 958** is equal to 114 dB).*

3. **Switch on the calibrator and wait ca 30 seconds before starting the calibration measurement.**
4. **Start the calibration measurement by pressing the <Start / Stop> push-button.**

The measurement time is set to 5 seconds with 5 seconds delay. During the calibration measurement the **<ESC>** and **<Pause>** push-buttons do not operate but it is possible to stop the measurement using the **<Start / Stop>** one. It is not recommended to stop the calibration measurement before programmed 5 seconds period!



CALIBRATION windows during the calibration measurement

Waiting for the start of the measurements the **DELAY** is counted down on the display. After the end of the measurement, its result is displayed on the display in the bottom line.

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

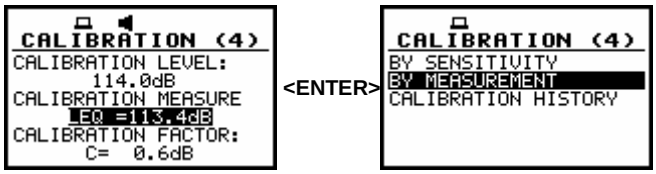
- the calibrator is not properly attached to the instrument,
- there are external disturbances,
- the calibrator or the measurement channel (the microphone, the preamplifier or the instrument itself) are damaged.

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

5. Press the <ENTER> push-button in order to accept the measurement result.

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

Notice: *The user has to press the* ***<ESC>*** *push-button in order to quit the calibration procedure without saving the calibration factor.*

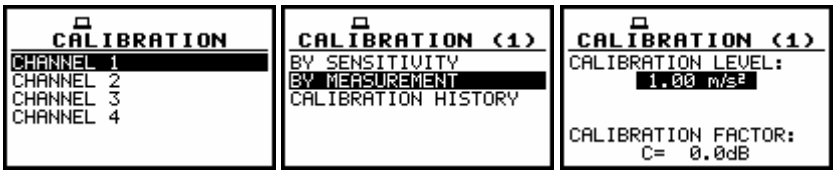


CALIBRATION windows after the measurements and after the acceptance of the calibration factor value

Calibration BY MEASUREMENT in the case of vibration signal

The calibration by measurements (*path: MENU / FUNCTION / CALIBRATION / CHANNEL x / BY MEASUREMENT*) can be conducted in the following way:

1. Select the calibration by measurement (highlight the **BY MEASUREMENT** text) **from the CALIBRATION window and press the <ENTER> push-button.**



CALIBRATION windows with the selected calibration mode and after entering this mode

2. **Attach the vibration calibrator to the instrument's accelerometer.**
3. **Switch on the calibrator and wait approximately 30 seconds before starting the calibration measurement.**
4. **Start the calibration measurement by pressing the <Start / Stop> push-button.**

The measurement starts after 5 seconds delay. The 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, the result is displayed on the display in the bottom line.

CALIBRATION windows during and after the calibration measurements

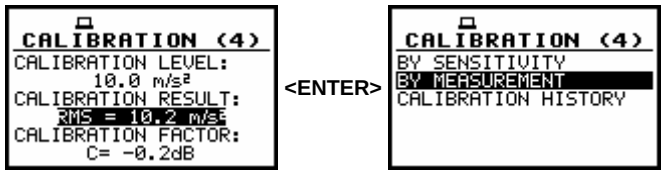
The calibration procedure should be repeated a few times to ensure the integrity of the calibration. The obtained results should be almost identical (with ±0.1 dB difference). The reasons for unstable results are as follows:

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

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

5. **Press the <ENTER> push-button in order to accept the measurement result.**

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



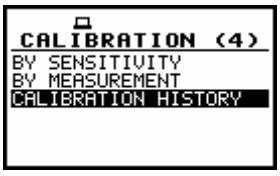
Confirmation of calibration result by pressing the <ENTER> push-button

Note: *The calibration factor is always added to the measurement results in the level meter mode and to those coming from the frequency analysis.*

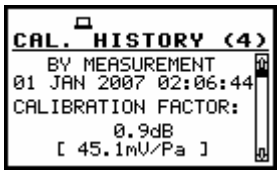
4.2.3 View on the last calibration result - CALIBRATION HISTORY

In **CALIBRATION HISTORY** window the user can view up to 10 last calibration records. In order to enter the **CALIBRATION HISTORY** (*path: MENU / FUNCTION / CALIBRATION / CHANNEL x / CALIBRATION HISTORY*) the user has to select the **CALIBRATION HISTORY** text in the **CHANNEL x** window using the **<▲>**, **<▼>** push-buttons and press the **<ENTER>** one.

a)

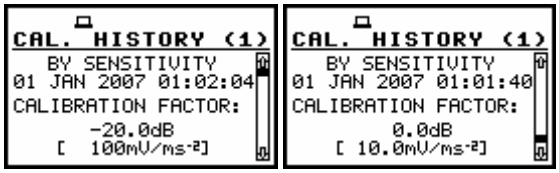


b)



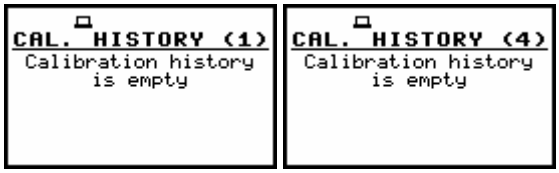
CALIBRATION window with CALIBRATION HISTORY text selected (a) CALIBRATION HISTORY window opened with the last calibration result (b)

The opened **CALIBRATION HISTORY** window contains list of last calibration records. Each calibration is described by the way the calibration was done (**BY SENSITIVITY** or **BY MEASUREMENT**), the date and time of the performed calibration measurement, the obtained calibration factor (**CAL. FACTOR**) and the calibration result.



CALIBRATION HISTORY windows with the last calibration records

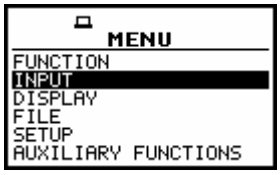
In the case when the calibration measurements were not performed, the **CALIBRATION HISTORY** window does not contain any records. The window is cleared after the **CLEAR SETUP** operation.



CALIBRATION HISTORY windows for the first (1) and fourth (4) channel

5 MEASUREMENT PARAMETERS SETTING - INPUT

The profile parameters can be set in the **INPUT** list, which can be entered after pressing the **<Menu>** push-button, then selecting by means of the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons the **INPUT** text and finally pressing the **<ENTER>** one.



Main list with INPUT text selected

The **INPUT** list in the **LEVEL METER** contains the elements that enable one:

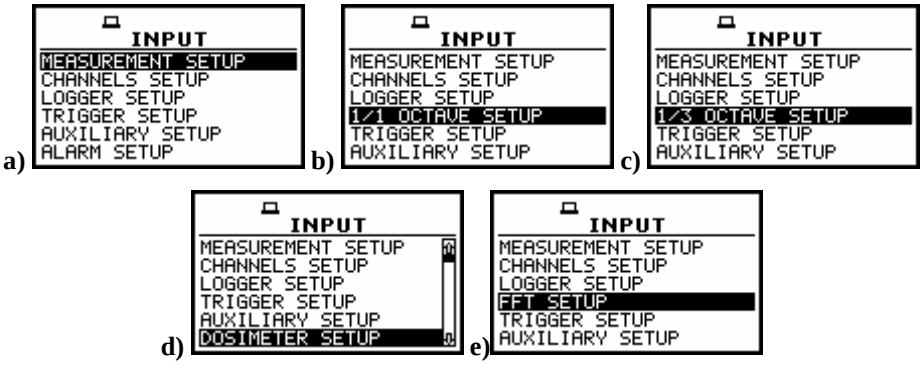
- the independent programming of the measurement parameters (**MEASUREMENT SETUP**),
- settings in channels (**CHANNELS SETUP**),
- settings in logger (**LOGGER SETUP**),
- trigger function (**TRIGGER SETUP**) and
- auxiliary functions (**AUXILIARY SETUP**).

In the case of **1/1 OCTAVE** and **1/3 OCTAVE**, on the display appears **1/1 OCTAVE SETUP** or **1/3 OCTAVE SETUP**.

In the case of the **DOSIMETER** function selected, there is **DOSIMETER SETUP**.

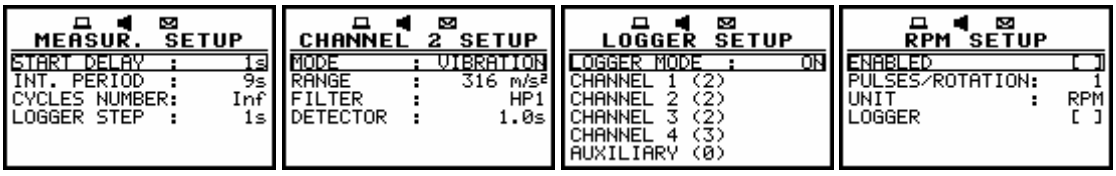
In the case of **FFT analyser**, on the display appears **FFT SETUP**.

In the case of **RT60** function, the special position appears in the **SETUP** list.



INPUT list in LEVEL METER (a), in 1/1 OCTAVE analyser (b), 1/3 OCTAVE analyser (c), in DOSIMETER (d) and in FFT analyser (e)

Notice: *The user can change any parameter in the* ***INPUT*** *list only when the* ***instrument does not execute a measurement****. Parameter's field, which is displayed inversely, signals the possibility of a change. Moreover, the parameter in the frame means that it cannot be changed. The* ***"Loudspeaker" icon*** *indicates that the* ***instrument is performing the measurements****.*



Displays with not active sub-lists of INPUT list during the measurement

Notice: *In the case of settings for vibration measurements, the parameters can be presented in LOGARITHMIC (decibels) or LINEAR (m/s^2) units. It depends on the* ***DISPLAY SCALE*** *setting (path: MENU / DISPLAY / DISPLAY SETUP / DISPLAY SCALE / LOG or LIN), e.g. 10 m/s^2 can be presented as 140 dB.*

5.1 Selection of measurement parameters - MEASUREMENT SETUP

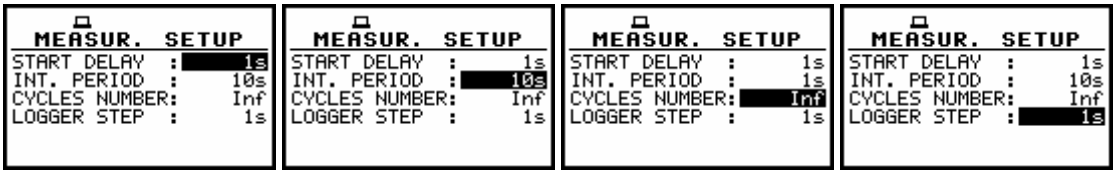
The **MEASUREMENT SETUP** is opened after the selection of the **MEASUREMENT SETUP** text from the **INPUT** list by means of the **<▲>**, **<◄>** (or **<▲>**, **<◄>** with **<Shift>**) push-buttons and pressing the **<ENTER>** one.

The **MEASUREMENT SETUP** consists of the parameters, which can be set, namely:

- delay of the start of measurements (**START DELAY**), the integration period (**INT. PERIOD**),
- number of the measurement cycles (**CYCLES NUMBER**) and
- logging period (**LOGGER STEP**).

The selection of the line with the parameter to be changed is made with **<▲>**, **<▼>** push-buttons. The selection of the required parameter value is made with **<◄>**, **<►>** push-buttons. The confirmation of any change made in the sub-list requires pressing the **<ENTER>** push-button, which simultaneously closes the sub-list.

The **MEASUREMENT SETUP** is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.



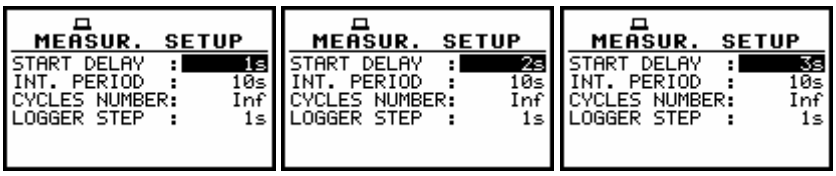
MEASUREMENT SETUP window

5.1.1 Setting time delay before the start of measurements - START DELAY

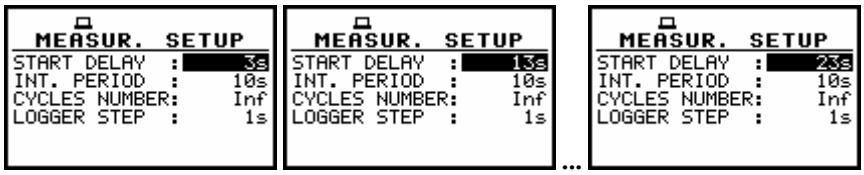
The **START DELAY** defines the delay period from the **<Start / Stop>** push-button pressing to the start of the measurements (the digital filters of the instrument analyse constantly the input signal even when the measurements are stopped).

The delay period can be set from **0 second** to **60 seconds** with 1-second step (by means of the **<◄>**, **<►>** push-buttons) or with 10-seconds step (with the **<◄>**, **<►>** push-buttons pressed together with the **<Shift>** one).

The **<ENTER>** push-button must be pressed for the confirmation of the selection, which closes simultaneously the **MEASUREMENT SETUP** window.



MEASUREMENT SETUP windows; the setting of START DELAY with 1-second step



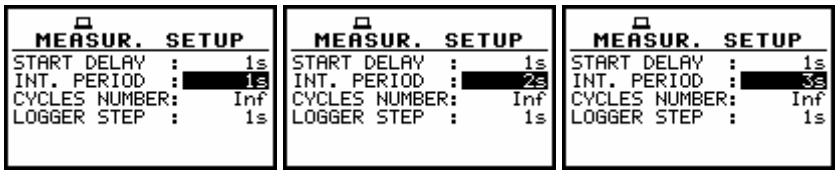
MEASUREMENT SETUP windows; the setting of START DELAY with 10-seconds step

Notice: *The minimum delay period is equal to 0 second but in the* ***CALIBRATION*** *mode, the delay period is equal to 5 seconds.*

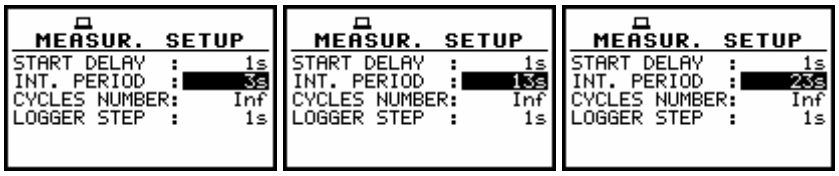
5.1.2 Setting integration period - INT. PERIOD

The **INT. PERIOD** defines the period in which the signal is being averaged during the measurements (cf. App. D for the definitions of the measurement results and integration period). The required value of this parameter can be set by means of the **<◀>**, **<▶>** (or by pressing the **<◀>** or **<▶>** with **<Shift>** push- buttons) and confirmed by the **<ENTER>** push-button:

- from **1 s** to **59 s** (with **1-second** or **10-seconds** step).

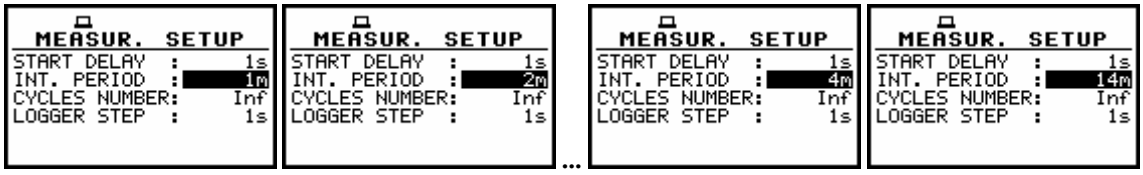


MEASUREMENT SETUP windows; the setting of INT. PERIOD with 1-second step



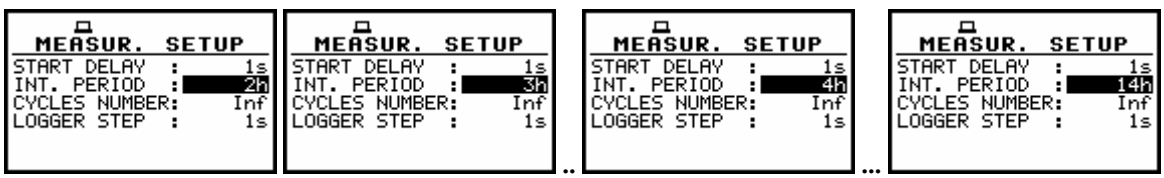
MEASUREMENT SETUP windows; the setting of INT. PERIOD with 10-seconds step

- from **1 m** (min) to **59 m** (with **1 minute** or **10 minutes** step).



MEASUREMENT SETUP windows; the setting of INT. PERIOD with 1-minute and 10-minutes step

- from **1 h** to **24 h** (with **1-hour** or **10-hours** step). It is also possible to set **Inf** value.



MEASUREMENT SETUP windows; the setting of INT. PERIOD with 1-hour and 10-hours step

Notice: *In the case of switching on* ***AUTO SAVE*** *function, the minimum value of the integration period should be equal to 10 seconds.*

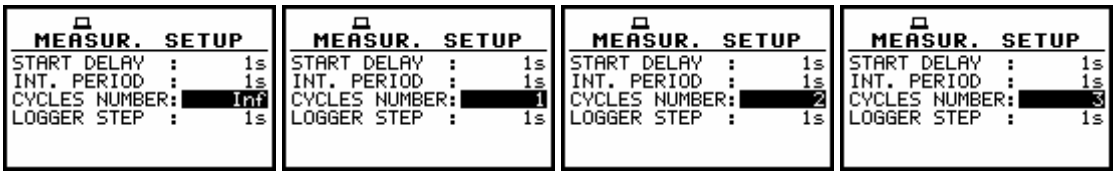
If the user wants to switch on **AUTO SAVE** option *(path: MENU / FILE / SAVE OPTIONS / AUTO SAVE)* the integration period value has to be equal or greater than 10 seconds. When **AUTO SAVE** option was switched on and new entered integration period value is less than 10 seconds, **AUTO SAVE** option switches off and **AUTO SAVE DISABLED / INTEGRATION PERIOD TOO SHORT** message appears on the display.

Display, when the INTEGRATION PERIOD is too short for AUTO SAVE option

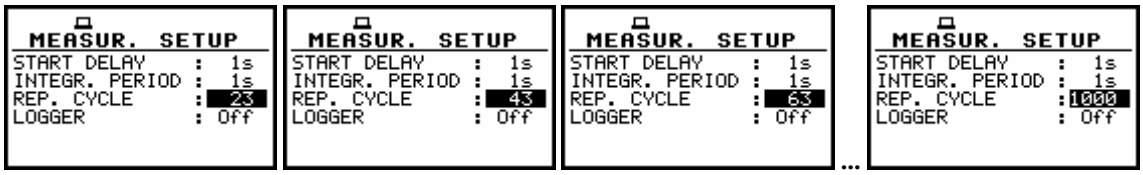
5.1.3 Setting the number of repetition of measurement cycles - CYCLES NUMBER

The **CYCLES NUMBER** defines the number of cycles (with the measurement period defined in the **INT. PERIOD**) which should be performed by the instrument. The required parameter can be set by means of the **<◄>**, **<►>** push-buttons (with the step equal to 1) or by means of the **<◄>**, **<►>** push-buttons pressed together with the **<Shift>** one (with the step equal to 20).

The selected value is accepted by pressing the **<ENTER>** push-button, which closes the **MEASUREMENT SETUP** window. The **Inf** value denotes the infinite repetition of the measurements (until pressing the **<Start / Stop>** push-button or after receiving the remote control code). The **REP. CYCLE** number values are within the limits [1, 1000].



CYCLES NUMBER setting with the step equal to one

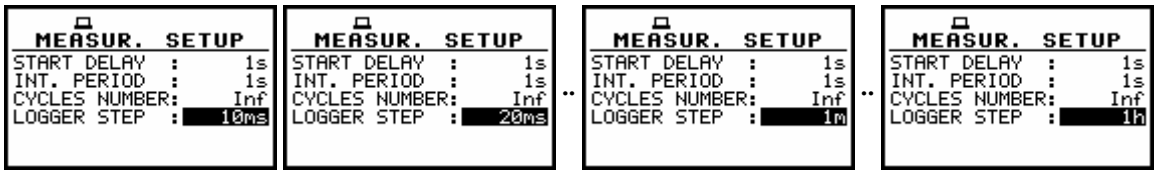


CYCLES NUMBER setting with the step equal to 20

5.1.4 Setting time period between two writings to the logger's file - LOGGER STEP

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.

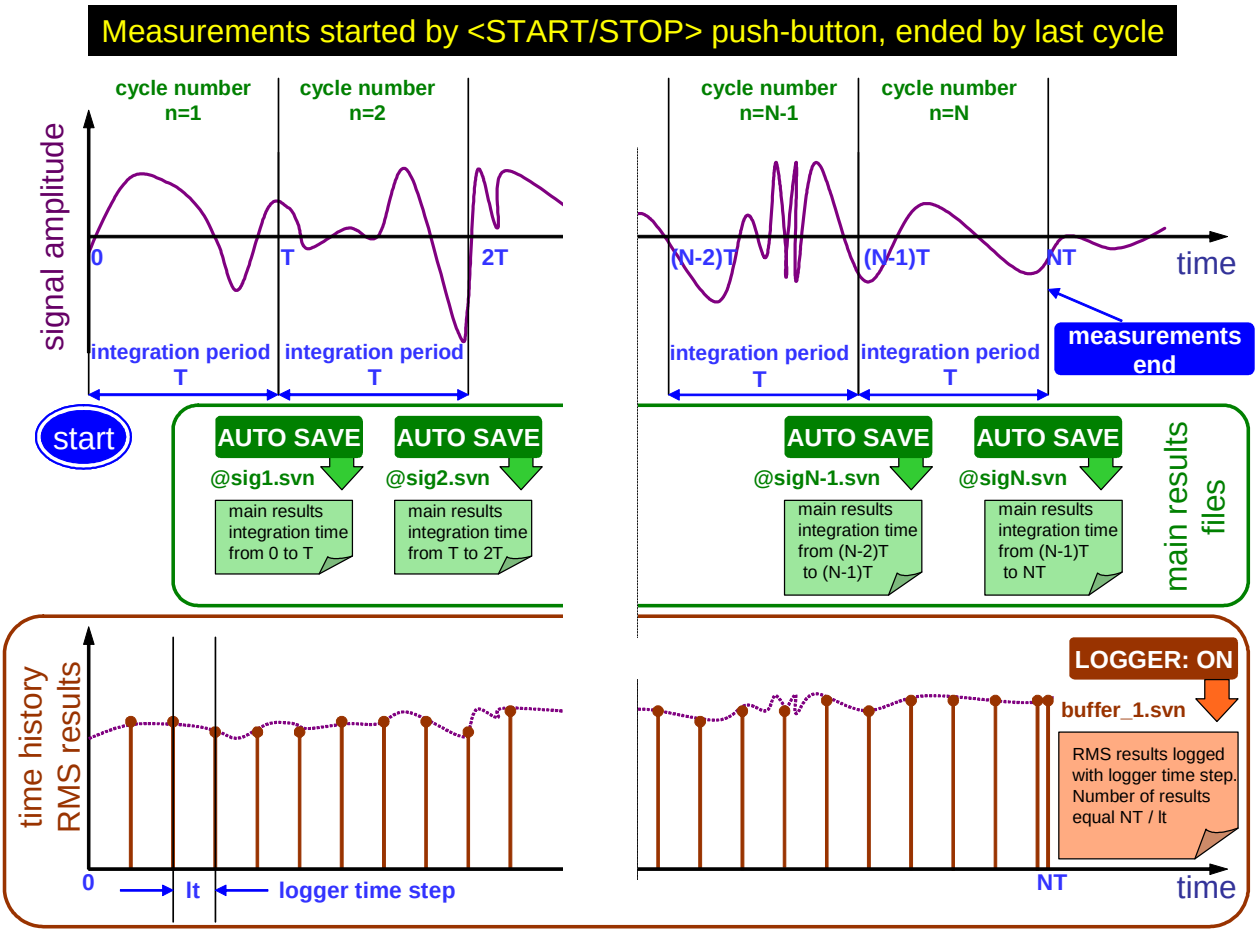
The required parameter can be set by means of the **<◄>**, **<►>** push-buttons with the single step and by means of the **<◄>**, **<►>** with **<Shift>** with the incremented one. The selection is accepted by the **<ENTER>** one, which closes simultaneously the **MEASUREMENT SETUP** window. Any changes are ignored after pressing the **<ESC>** push-button.



MEASUR. SETUP windows, LOGGER STEP selection

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 the case when the **INT. PERIOD** is greater than 9 seconds, it can be done also by means of the **AUTO SAVE** operation. The name of the file for that operation is set in the **FILE NAME** window (*path: MENU / FILE / AUTO SAVE / FILE NAME*). In the 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 in the period set in the **LOGGER STEP**. During sound measurements, from each profile of the channel, the user can select up to four results (**PEAK** / **MAX** / **MIN** / **RMS**) to be logged with logger step down to 10 ms. So, up to 48 results can be logged simultaneously from four channels of the instrument and from each profile (*path: MENU / INPUT / PROFILE y*, *where y = 1, 2 and 3*)).



Relations between INTEGR. PERIOD and LOGGER STEP

During vibration measurements, from each channel, the user can select up to five results. (**PEAK** / **P–P** / **MAX** / **RMS** / **VDV**). Additionally, two **AUXILIARY** results can be also logged in this mode, namely **VECTOR** and **RPM**. So, up to 22 results can be logged simultaneously from four channels of the instrument. These results are saved in one logger's file of the instrument's memory in the **SOUND** or **VIBRATION LEVEL METER** as well as for other functions. The name of the file is predefined. The registration in the logger's memory is stopped after the period, which is equal to **INT. PERIOD** multiplied by **CYCLES NUMBER**, after pressing the **<Start / Stop>** or after stopping the measurements remotely.

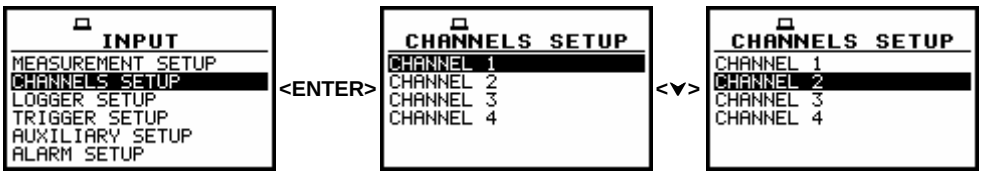
5.2 Setting parameters in channels - CHANNELS SETUP

The user enters the **CHANNELS SETUP** after pressing the **<ENTER>** push-button on the displayed inversely **CHANNELS SETUP** text, which has to be selected by means of the **<▲>**, **<▼>**. In the **CHANNELS SETUP** window the user has to select channel number (**CHANNEL x**) using **<▲>**, **<▼>** push-buttons and press **<ENTER>**.

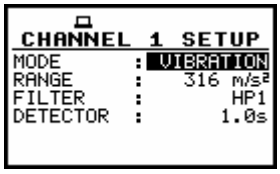
In the **CHANNEL x** sub-list the following parameters can be programmed independently for each channel: **MODE** (**SOUND** or **VIBRATION**) and measurement range (**RANGE**).

In the case of vibration mode, the user can select weighting filter (**FILTER**) and detector time constant (**DETECTOR**).

In the case of sound mode, it is possible to set parameters for microphone (**MICROPHONE CORRECTION**) and to set parameters in profiles (**PROFILE y**).



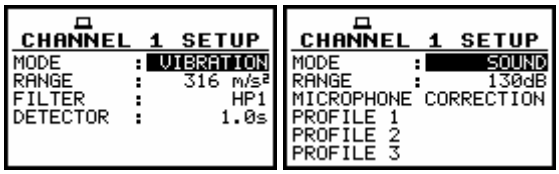
INPUT list with CHANNELS SETUP selected and channel selection



CHANNEL 1 SETUP window in vibration mode

5.2.1 Selection of measurement mode for sound or vibration - MODE

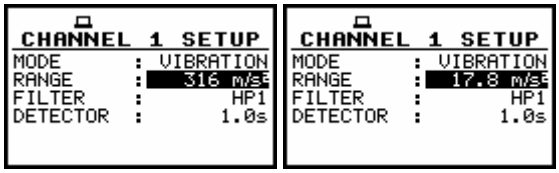
In the **MODE** the user can select the mode of measurements for selected channel. Two modes are available: **VIBRATION** and **SOUND**. The selection is made by **<◄>**, **<►>** push-buttons and pressing the **<ENTER>** one.



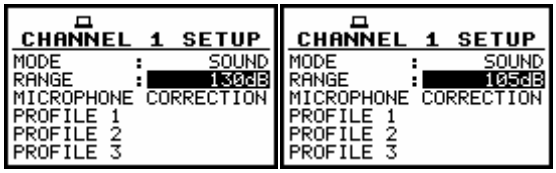
CHANNEL 1 SETUP windows with MODE selection

5.2.2 Measurement range setting - RANGE

The **RANGE** is used to set one of the available measurement ranges in the instrument. The **RANGE** selection is made by means of the **<◄>**, **<►>** push-buttons. The confirmation is made by pressing the **<ENTER>** one.



CHANNEL 1 SETUP windows in VIBRATION MODE with RANGE selection

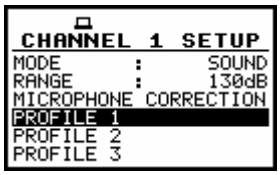


CHANNEL 1 SETUP windows in SOUND MODE with RANGE selection

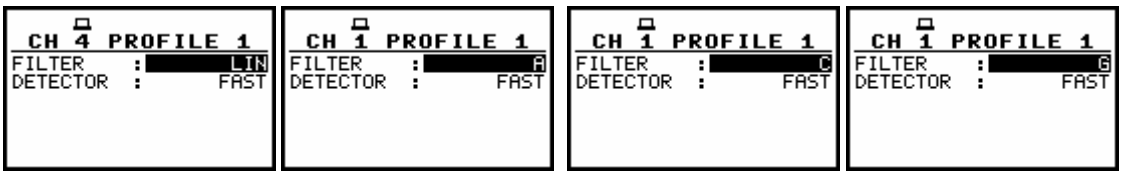
5.2.3 Weighting filter selection in a profile - FILTER

The weighting filters are different for the available measurement modes of the instrument. In the case of sound measurements the filter is selected in the **CH x PROFILE y** window (*path: MENU / INPUT / CHANNELS SETUP / CHANNEL x SETUP / PROFILE y / FILTER)* where the following filters are selectable:

- **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.

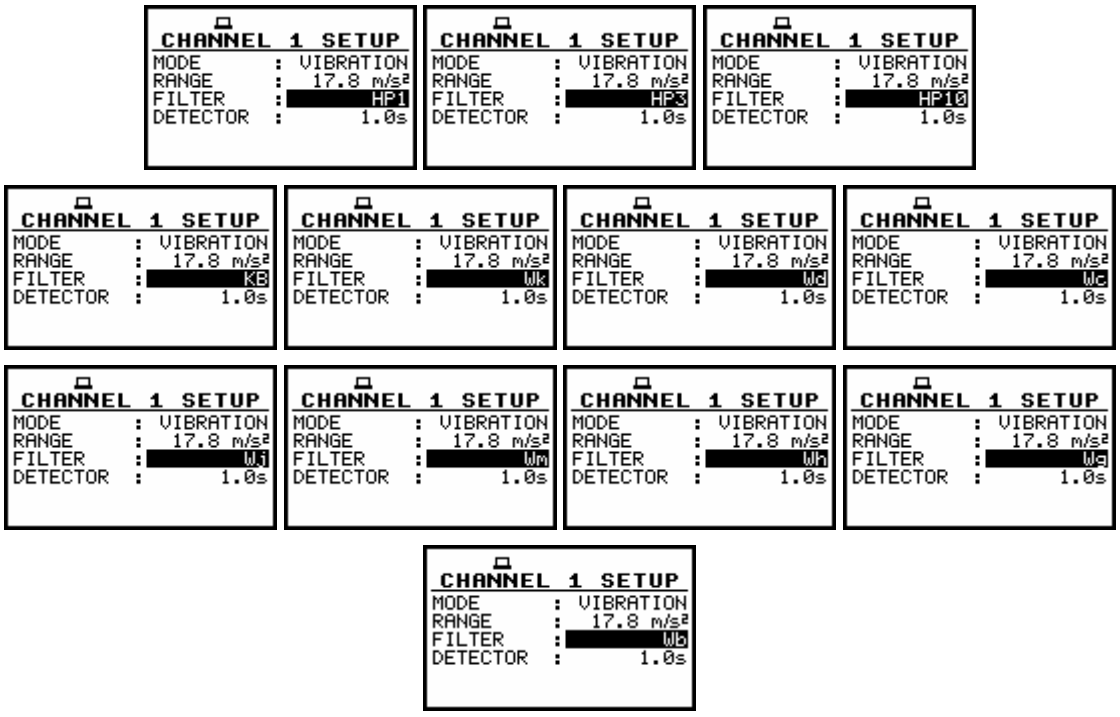


CHANNEL 1 SETUP with PROFILE 1 text highlighted



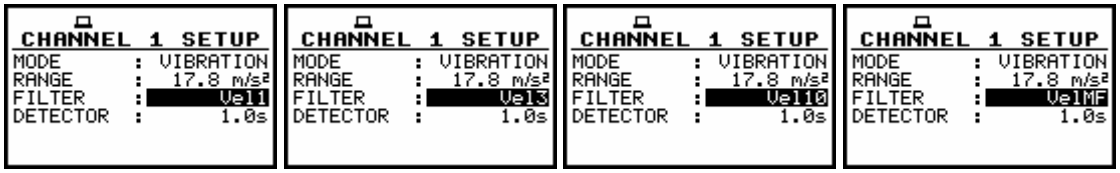
CH x PROFILE y windows with the selection of the weighting filter in SM

In the case of the acceleration measurements (vibration) the following filters are available in the **FILTER** position (*path: MENU / INPUT / CHANNELS SETUP / CHANNEL x SETUP / FILTER)*: **HP1**, **HP3**, **HP10**, **KB**, **Wk**, **Wd**, **Wc**, **Wj**, **Wm**, **Wh**, **Wg** and **Wb**.



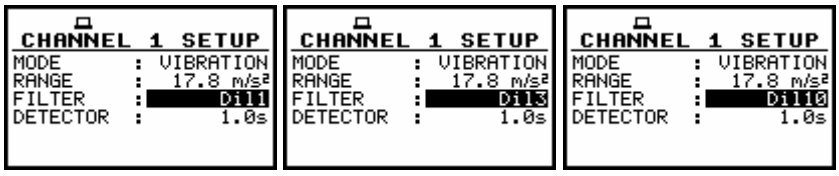
CHANNEL 1 SETUP windows with the selection of the weighting filter in acceleration measurements

In the case of the velocity measurements (vibration) the following filters are available in the **FILTER** position (*path: MENU* / *INPUT* / *CHANNELS SETUP* / *CHANNEL x SETUP* / *FILTER)*: **Vel1**, **Vel3**, **Vel10** and **VelMF**.



CHANNEL 1 SETUP windows with the selection of the weighting filter in velocity measurements

In the case of the displacement measurements (vibration) the following filters are available in the **FILTER** position (*path: MENU* / *INPUT* / *CHANNELS SETUP* / *CHANNEL x SETUP* / *FILTER)*: **Dil1**, **Dil3** and **Dil10**.



CHANNEL 1 SETUP windows with the selection of the weighting filter in displacement measurements

The characteristics of the filters are given in App. C. The selection of the required filter is made with the **<◀>**, **<▶>** push-buttons.

After pressing the **<ENTER>** push-button any changes made in the sub-list are confirmed and it is closed.

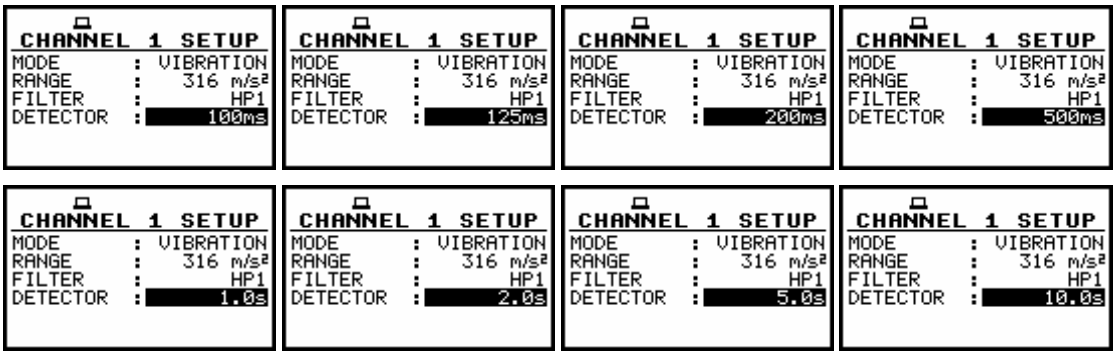
The return to the previous list ignoring any changes made in the sub-list is made after pressing the **<ESC>** push-button.

5.2.4 RMS detector selection - DETECTOR

In the instrument, the following RMS detectors are available: **IMPULSE**, **FAST** and **SLOW** (in the case of sound measurements) and **100ms**, **125ms**, **200ms**, **500ms**, **1.0s**, **2.0s**, **5.0s**, **10.0s** (in the case of vibration measurements).

The selection of the required detector is made with the **<◄>**, **<►>** push-buttons. In the case of sound mode the user can enter the **DETECTOR** line in the **PROFILE y** sub-list pressing the **<▲>**, **<▼>** push-buttons. After pressing the **<ENTER>** push-button any changes made in the sub-list are confirmed and it is closed. The return to the previous list ignoring any changes made in the sub-list is made after pressing the **<ESC>** push-button.

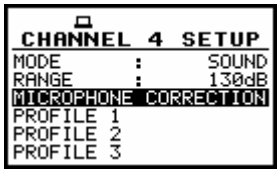
CHANNEL x PROFILE y windows (SM) with the selection of the RMS detector



CHANNEL x PROFILE y windows (VM) with the selection of the RMS detector

5.2.5 Setting the parameters of microphone (SM) - MICROPHONE CORRECTION

It enables the user to switch on/off **DIFFUSE FIELD** correction or **OUTDOOR** filter correction. In order to enter the window the user has to select the **MICROPHONE CORRECTION** text in the **SETUP** list, using the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons and press the **<ENTER>** one. The characteristics of those filters are given in Appendix C.



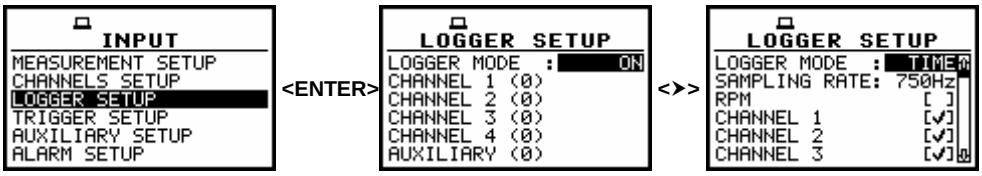
CHANNEL 4 SETUP, MICROPHONE CORRECTION text selected

The selection of required compensation filter is made with **<◄>**, **<►>** and the confirmation is made by pressing **<ENTER>**.

MICROPHONE CORRECTION window, DIFFUSE FIELD selection and OUTDOOR selection

5.3 Results selection for saving in a logger's file - LOGGER SETUP

In the **LOGGER SETUP**, it is possible to select logger results to be saved in the logger memory (when in the logger mode position is selected **ON**) and to set parameters of time-domain signal recording (**TIME** mode). In order to enter the **LOGGER SETUP** window the user has to select the **LOGGER SETUP** text in the **INPUT** list and press **<ENTER>**.



LOGGER SETUP option selected and available LOGGER MODES

5.3.1 Selecting results to be saved in instrument's logger memory - LOGGER MODE

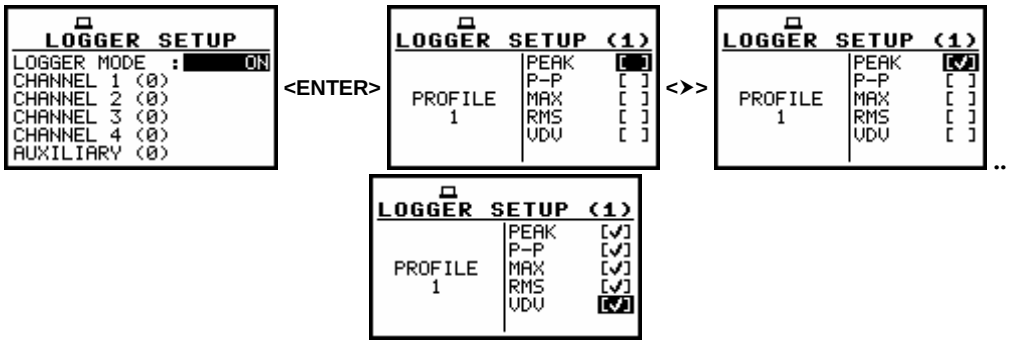
In **LOGGER MODE** position, it is possible to select **OFF**, **ON**, **TIME** modes. In the **OFF** mode the logger functionality is switched off. When **ON** is selected, it is possible to choose logger results to be saved in memory of the instrument. Selecting **TIME** mode activates low sampling rate time-domain signal recording. Activation of this option requires introduction of a special code.

5.3.2 Selecting time-history results to be saved in the memory - LOGGER MODE: ON

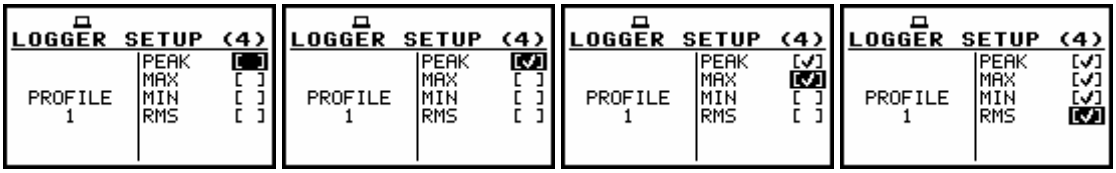
Up to five measurement results from each profile can be saved in the logger's file of the instrument **PEAK**, **P–P**, **MAX**, **RMS**, **VDV** in the case of vibration measurements and four results: **PEAK**, **MAX**, **MIN** and **RMS** in the case of sound measurements.

In order to save the required results (cf. the definition in App. D) the user has to choose the proper channel and place special characters in the lines with the names of results using the **<◄>**, **<►>** push-buttons.

After pressing the **<ENTER>** push-button any changes made in the window are confirmed and it is closed. The return to the **INPUT** list ignoring any changes made in the window is made after pressing the **<ESC>** push-button.



LOGGER SETUP windows (VM) with the selection of the results to be saved or saved in a logger's file



LOGGER SETUP windows (SM) with the selection of the results to be saved in a logger's file

It is also possible to save **VECTOR** calculation and **RPM** measurement results in a logger file. In order to save the required results the user has to enter the **AUXILIARY** window and place special characters in the lines with the names of results using the **<◄>**, **<►>** push-buttons.

After pressing the **<ENTER>** push-button any changes made in the window are confirmed and it is closed.

The return to the **INPUT** list ignoring any changes made in the window is performed after pressing the **<ESC>** push-button.

AUXILIARY LOGGER window with the selection of VECTOR and RPM result to be saved in a logger's file

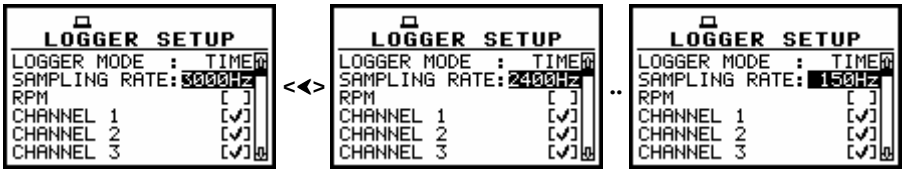
5.3.3 Selecting parameters of low sampling rate time-domain signal recording (svn format) in memory of the instrument - LOGGER MODE: TIME

The time-domain signal can be stored in the logger memory of the instrument with a sampling rate from **150 Hz** to **3000 Hz**.

The selection of the **SAMPLING RATE** is made with the **<◄>**, **<►>** push-buttons. Available options in this position are as follows: **3000 Hz**, **2400 Hz**, **1500 Hz**, **1200 Hz**, **750 Hz**, **600 Hz**, **375 Hz**, **300 Hz**, **187 Hz**, **150 Hz**.

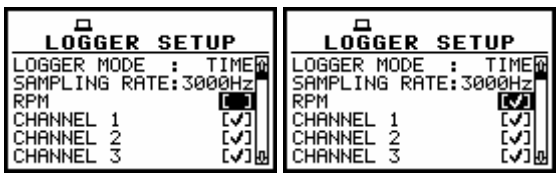
The confirmation of the selection requires pressing the **<ENTER>** push-button.

It is also possible to save **RPM** result and to select the channels from which the time-domain signal is to be recorded.



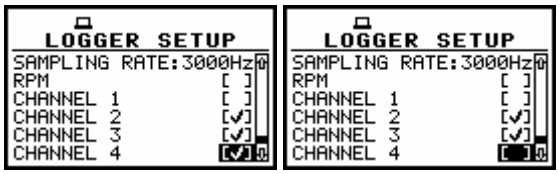
LOGGER SETUP window, SAMPLING RATE selection

To save **RPM** measurement results the user has to place a special character in the line with **RPM** text and also has to enable the **RPM** function in **AUXILIARY SETUP** window (*path: MENU / INPUT / AUXILIARY SETUP / RPM SETUP / ENABLED: [√]*) and change **EXT.I/O** settings into **DIGITAL IN** (*path: MENU / SETUP / EXT. I/O SETUP / MODE: DIGITAL IN*).



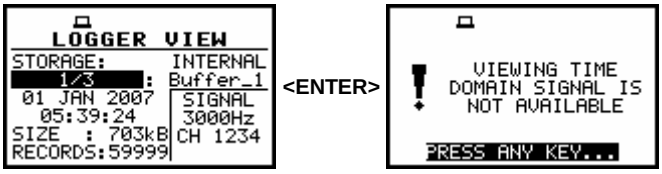
LOGGER SETUP window, RPM selection

The selection of the channels for recording time-domain signal from them is made with **<◄>**, **<►>** push-buttons. The confirmation of the selection made in the window requires pressing the **<ENTER>** push-button.



LOGGER SETUP window, CHANNEL 4 deactivation

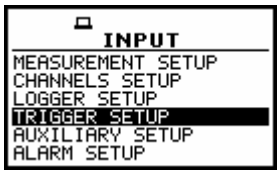
The results from selected channels are recorded in the logger memory and the files are visible in the **LOGGER VIEW** (*path: MENU / FILE / LOGGER VIEW*) window. The results of the time-domain signal are not available in the instrument - they are available in svn format and can be examined after downloading them to a PC using SvanPC software.



LOGGER VIEW window with the file with time-domain signal recorded and message on the display after attempt to open the file

5.4 Triggering mode and parameters selection - TRIGGER SETUP

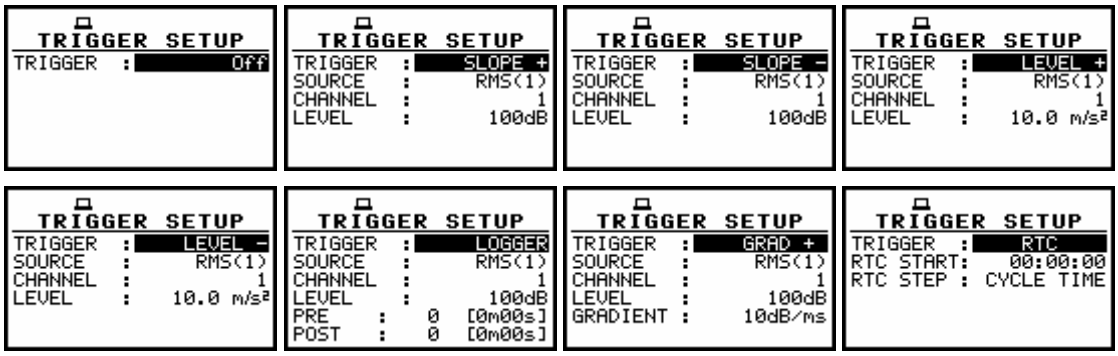
The **TRIGGER SETUP** sub-list enables the user to set the triggering parameters. This sub-list is opened after the selection of the **TRIGGER SETUP** text from the **INPUT** list by means of the **<◄>**, **<►>** push-buttons and pressing the **<ENTER>** one.



INPUT window with TRIGGER SETUP text selected

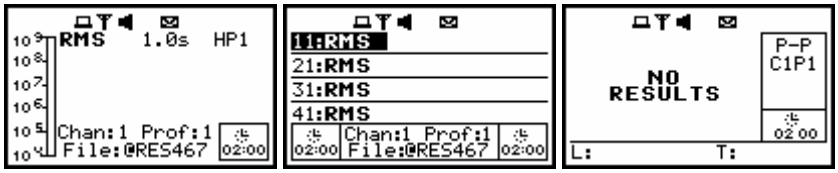
5.4.1 Switching the triggering on and off - TRIGGER

The triggering of the measurements (**TRIGGER**) can be switched off/on using the **<◄>**, **<►>** push-buttons. The triggering is switched on if one of its seven modes is selected: **SLOPE +**, **SLOPE –**, **LEVEL +**, **LEVEL –**, **LOGGER**, **GRAD +** or **RTC**. The selection of the triggering mode is made using the **<◄>**, **<►>** push-buttons. The confirmation is made by pressing **<ENTER>**.



TRIGGER SETUP window with TRIGGER mode selection

If the instrument works with the triggering switched on, the **"Antenna"** icon is flashing on the display in the case when the triggering condition was not fulfilled.



Displays during the measurements while the triggering condition is not fulfilled

In the case when the **SLOPE +** is selected, the measurement starts when the arising signal will pass the level determined in the **LEVEL**. In the case when the **SLOPE –** is selected, the measurement starts when the falling down signal will pass the level determined in the **LEVEL**. 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 the case when the **LEVEL +** is selected, in each second of the measurement the triggering condition is checked; the measurement is registered only when the signal has the greater level than this determined in the **LEVEL** and in the other case the measurement result is skipped.

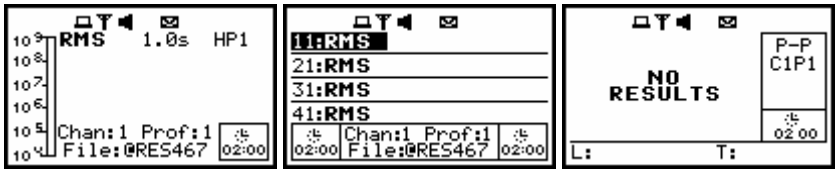
In the case when the **LEVEL –** is selected, in each second of the measurement the triggering condition is checked; the measurement is registered only when the signal has the lower level than this determined in the **LEVEL** and in the other case the measurement result is skipped.

In the case when the **LOGGER** is selected, in each logger step of the measurement the triggering condition is checked; the measurement is registered only when the signal has the greater level than this determined in the **LEVEL** and in the other case, the measurement result is skipped. The user can set also **PRE** and **POST** parameters. In the **PRE** line the number of the results registered in the logger's file before the fulfilment of the triggering condition can be set. In the **POST** line, the user can set the number of the results registered in the logger's file after the fulfilment of the triggering condition.

In the case when the **GRAD +** is selected, in each second of the measurement the triggering condition is checked; the measurement is registered only when the signal has the greater level than this determined in the **LEVEL** and the speed of the signal changes is not less than that selected in the **GRADIENT**. In the other case the measurement result is skipped.

In the case when **RTC** (**R**eal **T**ime **C**lock) is selected, the trigger condition is the time set in **RTC START**. The measurement is repeated with the step selected in **RTC STEP**. The number of repetition is equal to **CYCLE NUMBER** (*path: MENU / INPUT / MEASUREMENT SETUP / CYCLE NUMBER*). The user has to press **<Start>** push-button and the measurement will be triggered on time selected in **RTC START**.

If the instrument works with the triggering switched on, the **"Antenna"** icon is flashing on the display in the case when the triggering condition was not fulfilled.



Displays during the measurements while the triggering condition is not fulfilled

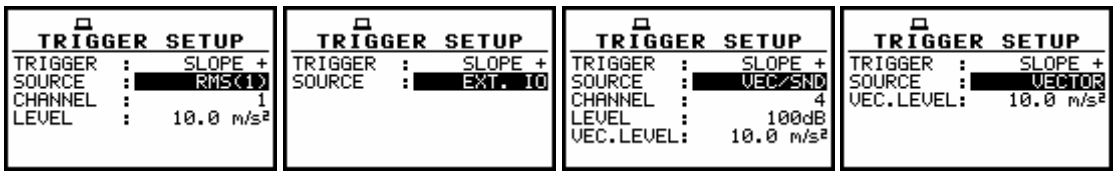
5.4.2 Selection of the triggering signal - SOURCE

In the **SOURCE** position four options are available: **RMS(1)**, **EXT. IO** (in the case of **SLOPE +** and **SLOPE –**), **VEC/SND**, **VECTOR**.

In the 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 the 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**.

The selection of the source of the triggering signal is performed using the **<◄>**, **<►>** push-buttons. The confirmation is made with **<ENTER>**.



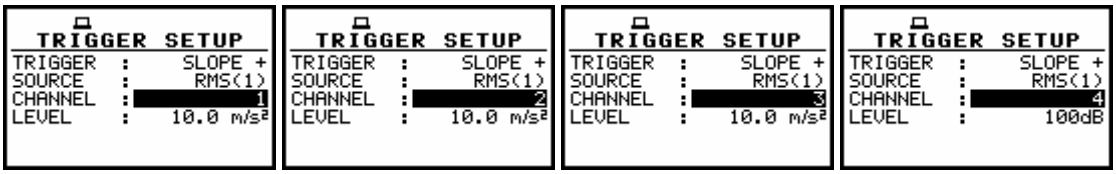
TRIGGER SETUP windows with SOURCE selection

Notice: *Only one signal measured in the instrument - the RMS detector in the first profile of selected channel - can be used as the triggering signal.*

*Additionally, the signal from **Ext. I/O** can be also used as the trigger source in the **SLOPE +** and **SLOPE –** modes.*

5.4.3 Selection of channel for triggering condition - CHANNEL

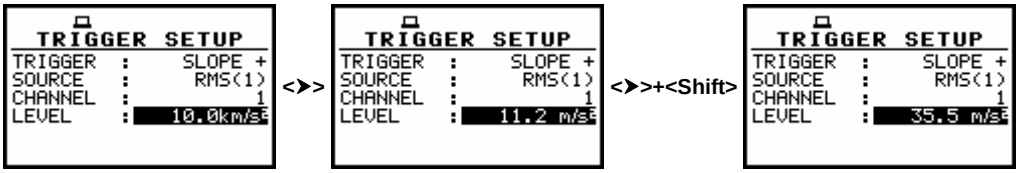
In the **CHANNEL,** the user can select the **CHANNEL** for triggering condition. The selection is made using **<◄>**, **<►>** push-buttons. To confirm the selection the user has to press **<ENTER>**.



TRIGGER SETUP windows with CHANNEL selection

5.4.4 Setting the level of the triggering signal - LEVEL

The level of the triggering signal (**LEVEL**) can be set in 1 dB step (or 10 dB steps) from 24 dB to 136 dB range or from 1 mm/s^2 to 10.0 km/s^2 using the **<◄>**, **<►>** push-buttons (or **<◄>**, **<►>** with **<Shift>**).

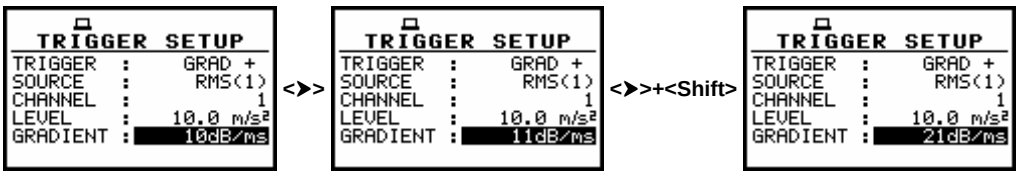


TRIGGER SETUP windows with LEVEL selection in VM

Notice: *The **LEVEL** value of the triggering signal refers to the instantaneous value of the RMS result from the first profile in selected channel calculated during the period depending on selected **DETECTOR** (path: MENU / INPUT / CHANNELS SETUP / CH x PROFILE y / DETECTOR).*

5.4.5 Setting the speed of the triggering signal changes - GRADIENT

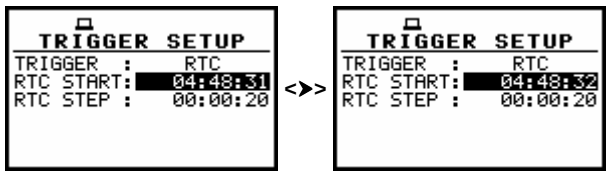
The speed of the triggering signal changes (**GRADIENT**) can be set in 1 dB/millisecond step (or 10 dB/millisecond steps) from 1 dB/ms to 100 dB/ms range using the **<◄>**, **<►>** push-buttons (or **<◄>**, **<►>** with **<Shift>**).



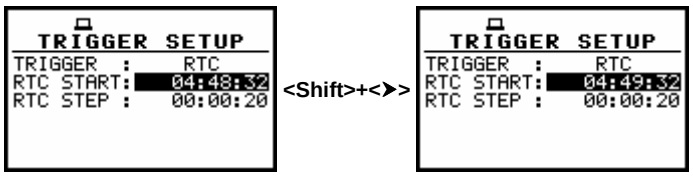
TRIGGER SETUP windows with GRADIENT selection (1 dB/ms and 10 dB/ms step up)

5.4.6 Setting the start of time-triggered measurement - RTC START

The measurement can be triggered with the time selected in **RTC START**. The selection of the required time is made with **<◄>**, **<►>** push-buttons (with 1-second step) or by pressing **<◄>**, **<►>** push-buttons together with **<Shift>** (with 1-minute step). The confirmation of the selection requires pressing the **<ENTER>** push-button, which simultaneously closes the sub-list. In order to activate waiting for trigger time the user has to press the **<Start>** push-button.



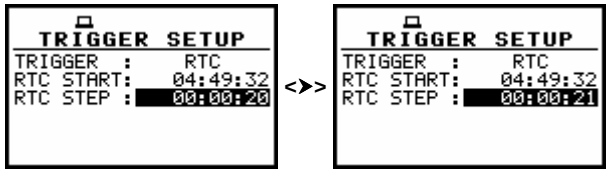
TRIGGER SETUP windows with RTC START selection with 1-second step



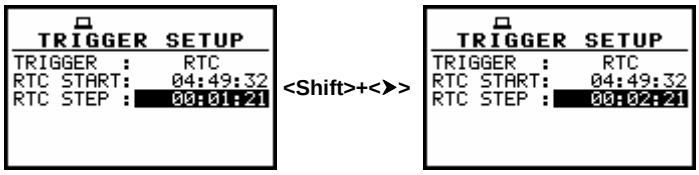
TRIGGER SETUP windows with RTC START selection with 1-minute step

5.4.7 Setting the step for repetition of time-triggered measurement - RTC STEP

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*). The selection of the required time is made with **<◄>**, **<►>** push-buttons (with 1-second step) or by pressing **<◄>**, **<►>** push-buttons together with **<Shift>** (with 1-minute step). The confirmation of the selection requires pressing the **<ENTER>** push-button, which simultaneously closes the sub-list. The **"Antenna"** icon on the top of the display indicates that the instrument waits for the next measurement.



TRIGGER SETUP windows, RTC STEP selection with 1-second step



TRIGGER SETUP windows, RTC STEP selection with 1-minute step

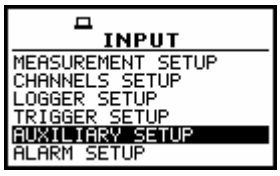
5.5 Setting parameters of auxiliary functions - AUXILIARY SETUP

The **AUXILIARY SETUP** is opened after the selection of the **AUXILIARY SETUP** text from the **INPUT** list by means of the **<▼>**, **<➤>** (or **<▼>**, **<➤>** with **<Shift>**) push-buttons and pressing the **<ENTER>** one.

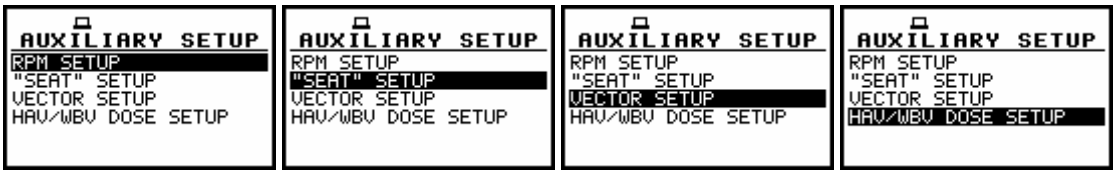
The **AUXILIARY SETUP** consists of four positions, namely: the **RPM SETUP**, **"SEAT" SETUP**, **VECTOR SETUP** and **HAV/WBV DOSE SETUP**. The selection of the line with the option to be set is made with **<▲>**, **<▼>** push-buttons.

The selection of the required parameter value is made with **<▲>**, **<▼>** and **<◄>**, **<➤>** push-buttons. The confirmation of any change made in the sub-list requires pressing the **<ENTER>** push-button, which simultaneously closes the sub-list.

The **AUXILIARY SETUP** is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.



INPUT list with AUXILIARY SETUP text highlighted (displayed inversely)



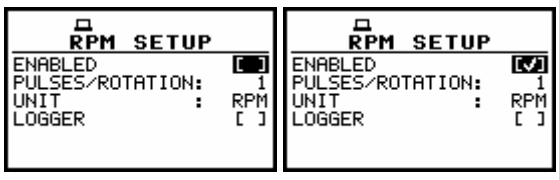
AUXILIARY SETUP windows with all available positions

5.5.1 Setting the parameters of RPM function - RPM SETUP

5.5.1.1 Enabling the RPM measurement - ENABLED

Placing a special character **[√]** in the line with **ENABLED** text allows one to switch on the **RPM** function. The selection is made by means of the **<◄>**, **<➤>** push-buttons.

The confirmation of the activation requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **RPM** window is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.

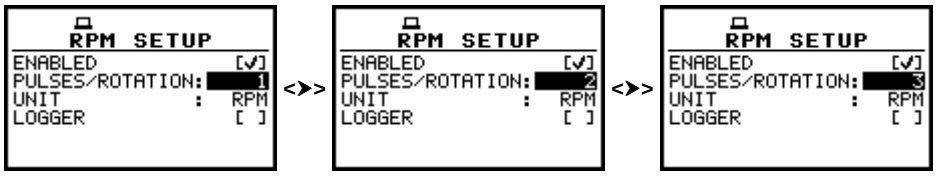


RPM SETUP window with enabling RPM function

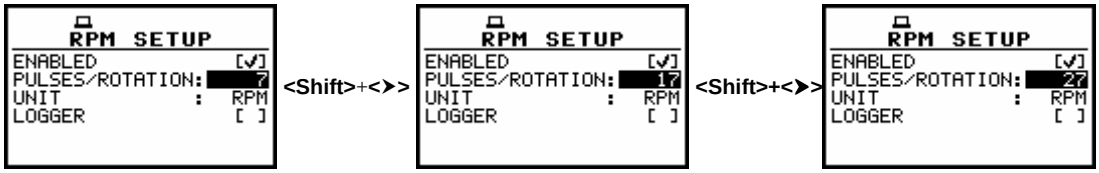
5.5.1.2 Selecting the number of pulses / rotations - PULSES / ROTATION

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 required parameter can be set by means of the **<◄>**, **<►>** push-buttons (with the step equal to 1) or by means of the **<◄>**, **<►>** push-buttons pressed together with the **<Shift>** one (with the step equal to 10).

The confirmation of the change made in the position requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **RPM** window is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.



RPM SETUP window with PULSES/ROTATION selection with 1-unit step



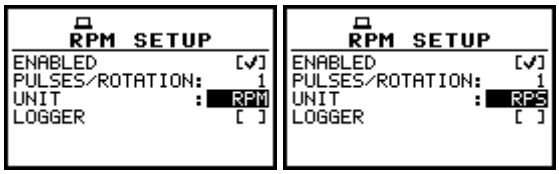
RPM SETUP window with PULSES/ROTATION selection with 10-units step

5.5.1.3 Selecting the unit of RPM measurement - UNIT

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 selection of the unit is made by means of the **<◄>**, **<►>** push-buttons.

The confirmation of the change made in the position requires pressing the **<ENTER>** push-button, which simultaneously closes the window.

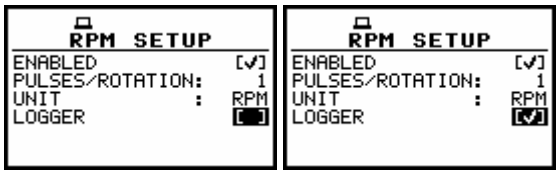
The **RPM SETUP** window is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.



RPM SETUP window; the UNIT selection

5.5.1.4 Activation of logger for RPM measurements - LOGGER

The **RPM** measurement results can be saved in the logger's file of the instrument. The activation is made by placing a special character in the **LOGGER** position. The activation is possible when the **LOGGER** functionality is switched on in the **MEASUREMENT SETUP** window *(path: MENU / INPUT / MEASUREMENT SETUP / LOGGER)*. If the **LOGGER** functionality is switched off, the position is not accessible. The confirmation of the change made in the position requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **RPM SETUP** window is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.



RPM SETUP windows with LOGGER activation

5.5.2 Setting the parameters of attenuation measurements - "SEAT" SETUP

The **"SEAT" SETUP** option may be used for attenuation measurements 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).

The **"SEAT" SETUP** is opened after the selection of the **"SEAT" SETUP** text from the **AUXILIARY SETUP** list by means of the **<▲>**, **<▼>** push-buttons and pressing the **<ENTER>** one.

The **"SEAT" SETUP** consists of three positions, namely: **ENABLED**, **SEAT CHANNEL**, **BASE CHANNEL**. The selection of the line with the option to be set is made with **<▲>**, **<▼>** push-buttons. The selection of the required parameter value is made with **<◄>**, **<►>** push-buttons.

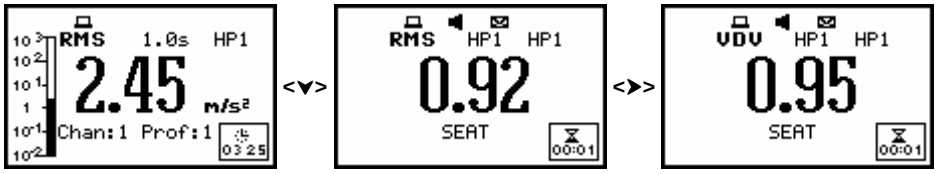
The confirmation of any change made in the sub-list requires pressing the **<ENTER>** push-button, which simultaneously closes the sub-list. The **"SEAT" SETUP** is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.

AUXILIARY SETUP window with "SEAT" SETUP text highlighted

The **SEAT** result is presented in one profile presentation mode. It is calculated by dividing **RMS** result from **SEAT CHANNEL** by **RMS** result from **BASE CHANNEL**.

Additionally, if **VDV** result is available for filters selected in **CHANNELS SETUP** window, the **SEAT** result is calculated by dividing **VDV** result from **SEAT CHANNEL** by **VDV** result from **BASE CHANNEL**.

The **SEAT** result is available after pressing **<▼>** and **<►>** push-buttons in one profile view.

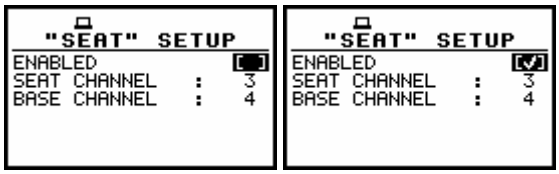


Selection of SEAT results presentation

5.5.2.1 Enabling the attenuation measurements - ENABLED

Placing a special character **[√]** in the line with **ENABLED** text means that the **"SEAT" SETUP** settings are activated. The change is made by means of the **<◄>**, **<►>** push-buttons.

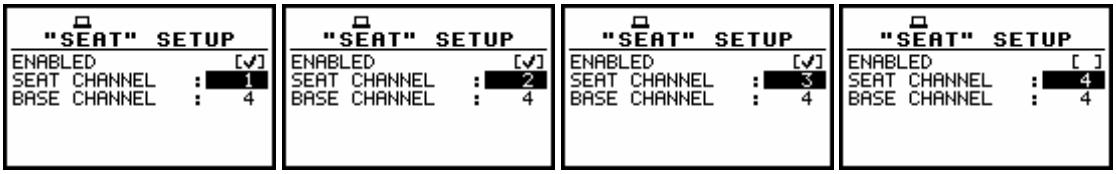
The confirmation of the activation/deactivation requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **"SEAT" SETUP** window is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.



"SEAT" SETUP windows with the enabling of the function

5.5.2.2 Selection of the seat channel for attenuation measurements - SEAT CHANNEL

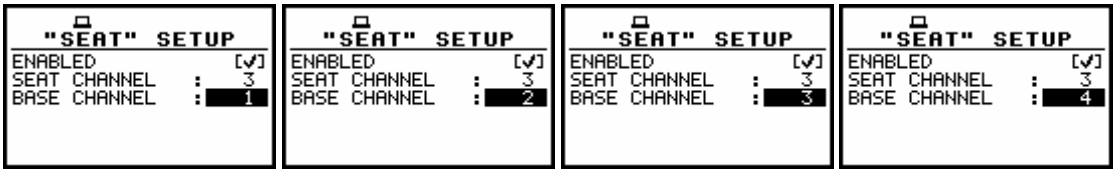
In the **SEAT CHANNEL**, the user can select the "seat" channel for attenuation measurements. The selection is made with **<◄>**, **<►>** push-buttons. The confirmation of the selection requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **"SEAT" SETUP** window is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.



"SEAT" SETUP windows with SEAT CHANNEL selection

5.5.2.3 Selection of the base channel for attenuation measurements - BASE CHANNEL

In the **BASE CHANNEL**, the user can select the base channel for attenuation measurements. The selection is made with **<◄>**, **<►>** push-buttons. The confirmation of the selection requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **"SEAT" SETUP** window is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.



"SEAT" SETUP windows with BASE CHANNEL selection

5.5.3 Settings for vector calculations - VECTOR SETUP

In **VECTOR SETUP** window, 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**.

In order to enter **VECTOR SETUP** window the user has to select **VECTOR SETUP** text in **AUXILIARY SETUP** window and press **<ENTER>**.

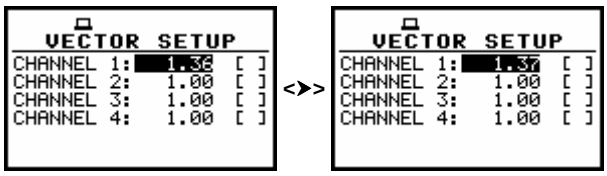
AUXILIARY SETUP window with VECTOR SETUP text highlighted

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

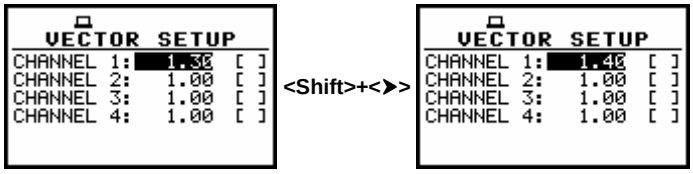
$$\mathbf{VECTOR} = \sqrt{k_1 x_1^2 + k_2 x_2^2 + k_3 x_3^2 + k_4 x_4^2}$$

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.

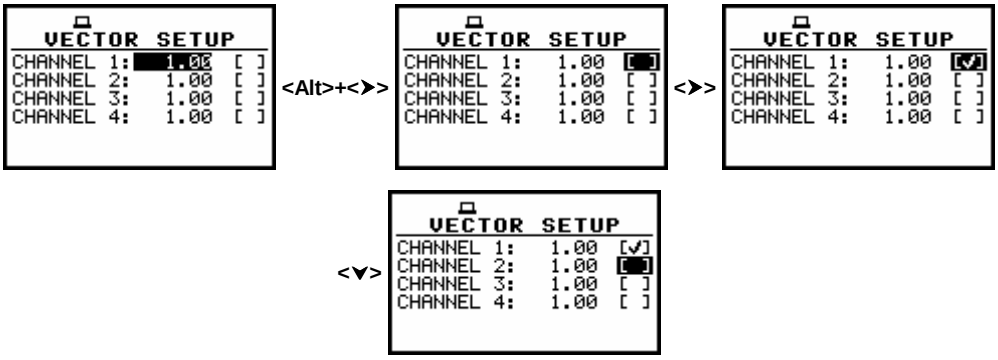
The coefficient selection is made with the **<◄>**, **<►>** push-buttons. The confirmation of the selection requires pressing the <**ENTER>** push-button, which simultaneously closes the window. The **VECTOR SETUP** window is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.



VECTOR SETUP windows with the coefficient selection with 1-unit step



VECTOR SETUP windows with the coefficient selection with 10-units step



VECTOR SETUP windows with the selection of results from channels for vector calculation

If **HAV/WBV DOSE** option is also enabled and the filters set in **CHANNELS SETUP** are incorrect for dose calculation (c.f. part 5.5.4) the message **"VIBRATION DOSIMETER OFF - INCORRECT DOSIMETER SETTINGS"** appears on the display after pressing **<Start>** push-button. It has no influence on vector calculation – after pressing a push-button the measurement will be started.

Display in the starting measurements when user selects incorrect filters for HAV/WBV calculations

5.5.4 Setting the parameters for dose measurements - HAV/WBV DOSE SETUP

The **HAV/WBV DOSE SETUP** is opened after the selection of the **HAV/WBV DOSE SETUP** text from the **AUXILIARY SETUP** list by means of the **<▲>**, **<◄>** (or **<▲>**, **<◄>** with **<Shift>**) push-buttons and pressing the **<ENTER>** one.

The **HAV/WBV DOSE SETUP** consists of three positions, namely: **ENABLED**, **EXPOSURE TIME**, **X** (**Y**, **Z**) **AXIS**. The selection of the line with the option to be set is made with **<▲>**, **<▼>** push-buttons. The selection of the required parameter value is made with **<◄>**, **<►>** push-buttons.

The confirmation of any change made in the sub-list requires pressing the **<ENTER>** push-button, which simultaneously closes the sub-list. The **HAV/WBV DOSE SETUP** is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.

AUXILIARY SETUP window with HAV/WBV DOSE SETUP text selected

For the **HAV/WBV DOSE** measurements the user should switch on **HAV/WBV DOSE** option (*path: MENU / INPUT / AUXILIARY SETUP / HAV/WBV DOSE / ENABLED: [√]*), select three from four possibilities and select suitable filters in **CHANNELS SETUP**. If the user selects all k-vectors, the result will be incorrect.

If the wrong filters are selected, the **"VIBRATION DOSIMETER OFF- INCORRECT DOSIMETER SETTINGS"** message appears on the display and the **VIBRATION DOSIMETER** is switched off automatically.

Correct filters in the case of Hand-Arm vibration dose measurements are as follows:

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

Commonly used filters for Whole-Body vibration dose are as follows:

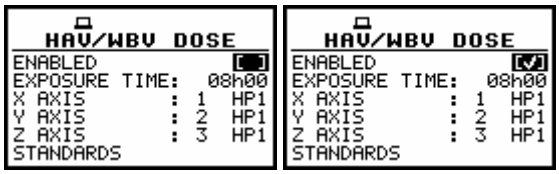
- **Wd** for **X** axis
- **Wd** for **Y** axis
- **Wk** for **Z** axis

Display after starting measurements when user selected incorrect filters for HAV/WBV DOSE calculations

5.5.4.1 Enabling HAV/WBV settings - ENABLED

The placing a special character **[√]** in the line with **ENABLED** text means that the **HAV/WBV DOSE** settings are activated. The change is made by means of the **<◄>**, **<►>** push-buttons.

The confirmation of the activation/deactivation requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **HAV/WBV DOSE SETUP** window is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.

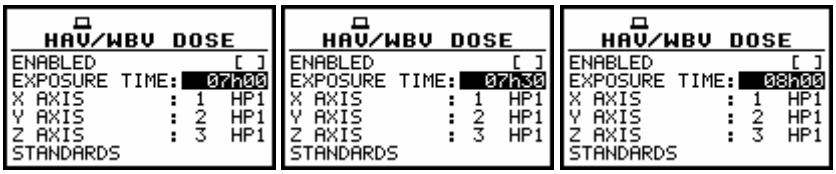


HAV/WBV DOSE windows with the enabling of the option

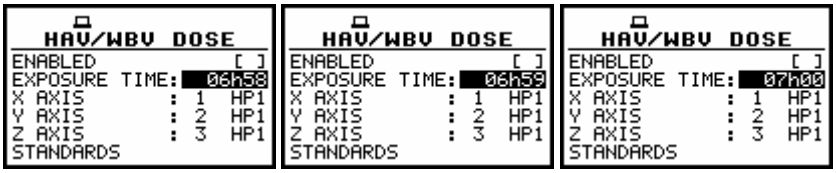
5.5.4.2 Setting the time of exposure - EXPOSURE TIME

The **EXPOSURE TIME** enables the user to set the desired value of the exposure time that is used for the calculation **HAV/WBV DOSE** results. The **EXPOSURE TIME** values are within the range [00h01, 24h00]. The required value can be set using the **<◄>**, **<►>** push-buttons with one minute step. The step can be decremented / incremented up to 30 minutes after pressing the **<◄>**, **<►>** push-buttons together with the **<Shift>** one.

The window is closed and the instrument returns to the **INPUT** list after pressing the **<ENTER>** (with the confirmation of a change made in the position) or **<ESC>** push-buttons (ignoring a change made in the position).



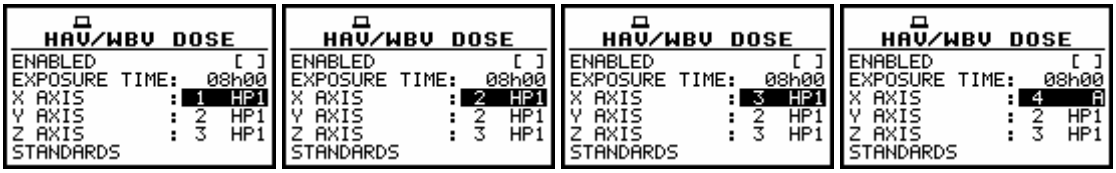
HAV/WBV DOSE windows with EXPOSURE TIME selection with 30-minutes step



HAV/WBV DOSE windows with EXPOSURE TIME selection with 1-minute step

5.5.4.3 Selection of channels for HAV/WBV DOSE calculation - X AXIS, Y AXIS, Z AXIS

The **X AXIS**, **Y AXIS**, **Z AXIS** positions enable setting of proper channels to be taken for calculation of **HAV/WBW DOSE** results. The selection is made with the **<◄>**, **<►>** push-buttons. The confirmation is made by pressing the **<ENTER>** one. The window is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.



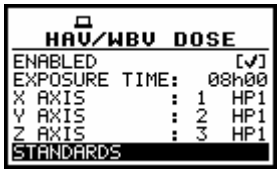
HAV/WBV DOSE windows with the selection of the channel for X AXIS

5.5.4.4 Standards selection for HAV/WBV dose calculation - STANDARDS

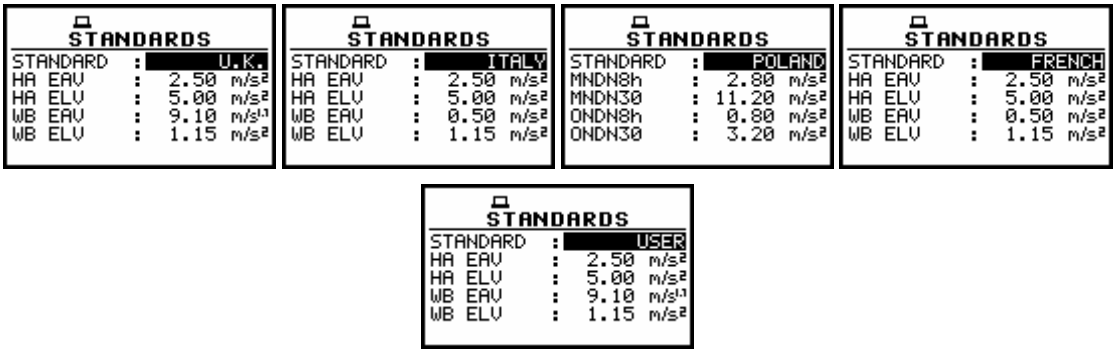
The **STANDARDS** position enables the user to set the standards for the measurements of the **HAV/WBV DOSE**. The available values of this position are **U.K.**, **ITALY**, **POLAND**, **FRENCH** and **USER**. The proper standard can be selected by means of the **<◄>**, **<►>** push-buttons.

The confirmation of a selection is made by pressing the **<ENTER>** push-button, which simultaneously closes the window. The **STANDARDS** is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button. In the case of **USER** option, it is possible

to select required parameters. The selection is made with the **<◄>**, **<►>** push-buttons. The confirmation is made by pressing **<ENTER>**.



HAV/WBV DOSE windows with STANDARDS text highlighted



STANDARDS windows with STANDARD selection

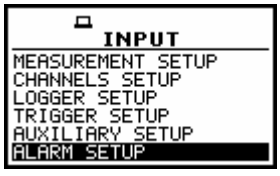
In the case of **USER** option, it is possible to select the required parameters. The selection is made with the **<◄>**, **<►>** push-buttons. The confirmation is made by pressing the **<ENTER>** one.

5.6 Selection of parameters for alarm triggering - ALARM SETUP

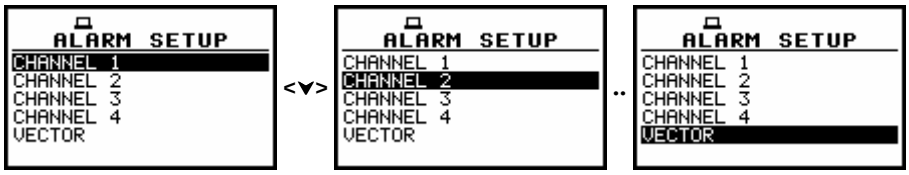
There is a possibility to set two alarms which trigger sending message to the user about over-passing (in plus or in minus) the sound or vibration signal level. In case of **1/1 OCTAVE** or **1/3 OCTAVE** analysis mode it is possible to set third alarm which also triggers sending message to the user if the signal from one of the central frequencies of **1/1 OCTAVE** or **1/3 OCTAVE** mode fulfils the triggering condition.

The alarms work independently from each other. In order to set the alarm parameters the user has to select **ALARM SETUP** text in the **INPUT** list with **<◄>**, **<►>** push-buttons and press **<ENTER>**. Then the user has to select **CHANNEL** respectively, to made settings and, if the vector result is to be a source for triggering, to do settings also for **VECTOR**. Next the user has to select **PROFILE x** or, in the case of **1/1 OCTAVE** or **1/3 OCTAVE** analysis, select **1/1 OCTAVE SETUP** or **1/3 OCTAVE SETUP** text.

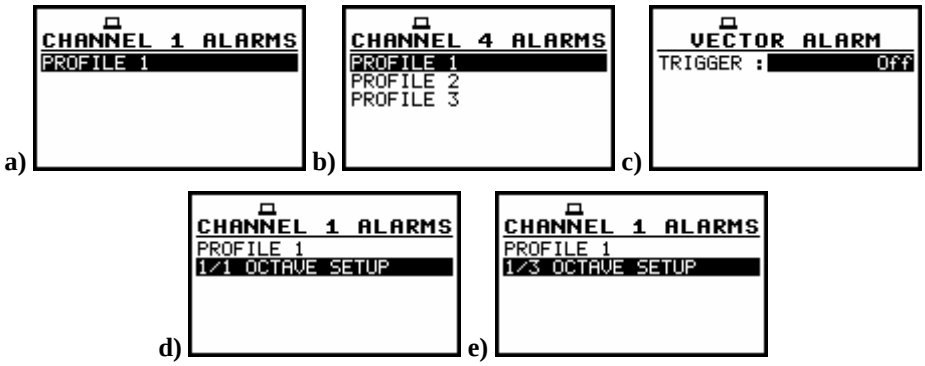
In the window the user can select such parameters as **TRIGGER** mode (**LEVEL +**, **LEVEL –**), **INTEGR**. (integration period with **LOGGER STEP**, **100 ms**, **1.0 s**, **MEASUR. TIME**), **SOURCE** (**PEAK**, **P–P**, **MAX**, **MIN**, **RMS**, **VDV**), **LEVEL** (from **1mm/s^2** to **10 km/s^2** in the case of vibration measurements and from **24.0 dB** to **136 dB** in the case of sound measurements).



INPUT list, ALARM SETUP text highlighted



ALARM SETUP windows, CHANNEL 2 or VECTOR selection

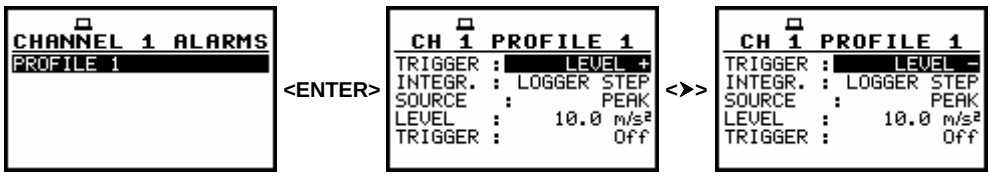


Vibration channel opened in LM (a), sound channel opened in LM (b) VECTOR ALARM window opened in LM (c) vibration channel opened in 1/1 OCTAVE (d) and 1/3 OCTAVE (e) analysis mode

The triggering is switched on if one of its two modes is selected: **LEVEL +**, **LEVEL** –. In the case when the **LEVEL +** is selected, the triggering condition is checked for the time set in **INTEGR.** position; the alarm is switched on. The user receives the message only when the signal has the greater level than this determined in the **LEVEL**.

In the case when the **LEVEL –** is selected, the triggering condition is checked for the time set in **INTEGR.**. The measurement is registered only when the signal has the lower level than this determined in the **LEVEL**.

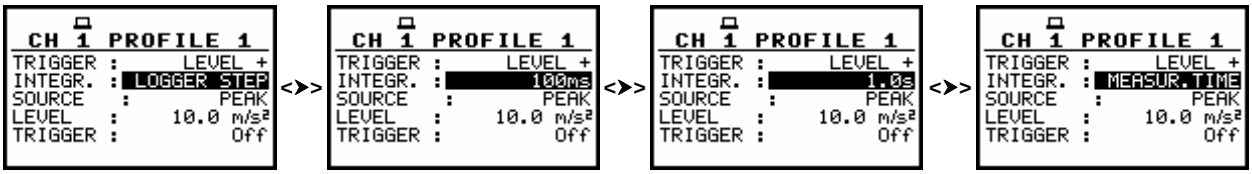
The selection of the triggering mode is performed using the **<◄>**, **<►>** push-buttons.



Setting ALARM conditions, TRIGGER mode selection

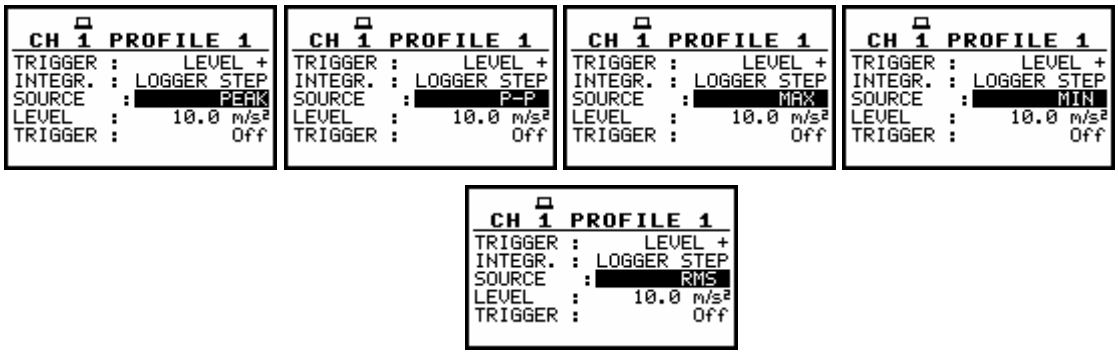
In the **INTEGR.** (integration period) position the user can select the period from which the result is checked with the trigger conditions. Available options are as follows: **LOGGER STEP**, **100 ms**, **1.0 s** and **MEASUR. TIME**.

If the **MEASUR. TIME** is set in the **INTEGR**. position the alarm condition will be checked in each second of the performed measurement.

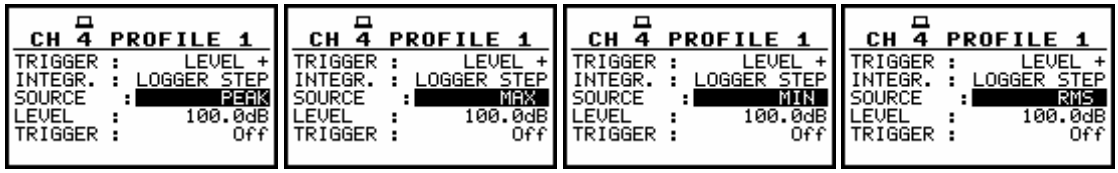


Setting ALARM conditions, INTEGRATION period selection

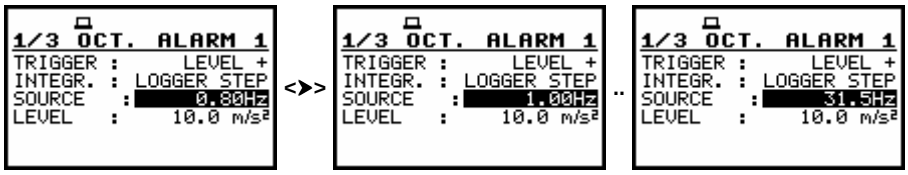
In **SOURCE**, the user sets the source from which the result is taken as an alarm condition.



Source selection in the case of vibration mode



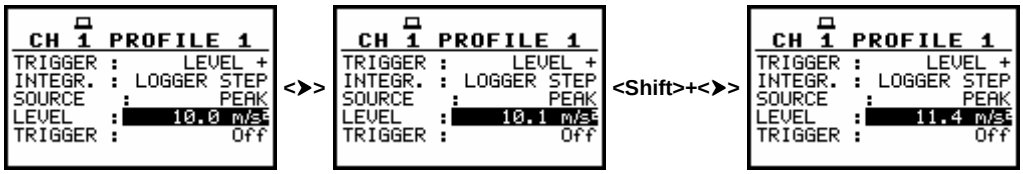
Source selection in the case of sound mode



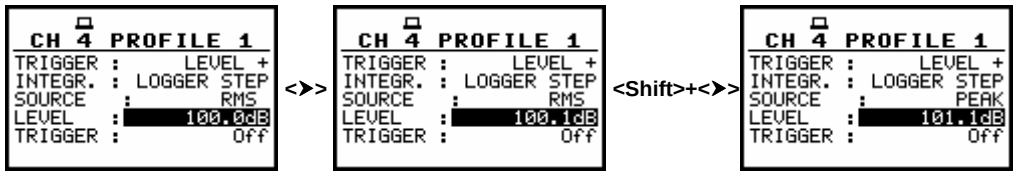
SOURCE selection for 1/3 OCTAVE option

In the **LEVEL** position, the user can select the level of the signal, which activates alarm and causes sending message to the user.

The available values are from **1mm/s^2** to **10 km/s^2** in the case of vibration measurements and from **24.0 dB** to **136 dB** in the case of sound measurements. The selection is made with **<◄>**, **<►>**. Pressing **SHIFT** with **<◄>**, **<►>** increases the step 10 times.



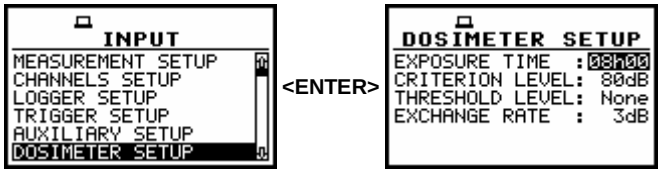
LEVEL selection with 0.1dB step and with 1dB step in the vibration channel/mode



LEVEL selection with 0.1dB step and with 1dB step in sound channel/mode

5.7 Selection of dosimeter parameters - DOSIMETER SETUP

The **DOSIMETER SETUP** is accessible in the **INPUT** when the acoustic **DOSIMETER** function is selected in **MEASUREMENT FUNCTION** window (*path: MENU / FUNCTION / MEASUREMENT FUNCTION / DOSIMETER*). This window is opened after the selection of the **DOSIMETER SETUP** text from the **INPUT** list by means of the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and pressing the **<ENTER>** one. 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).

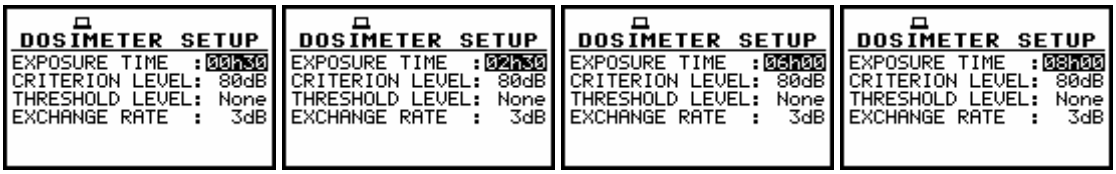


DOSIMETER SETUP selected in INPUT list and DOSIMETER SETUP window

5.7.1 Setting the exposure time - EXPOSURE TIME

The **EXPOSURE TIME** 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 required value can be set using the **<◀>** / **<▶>** push-buttons – after each pressing the exposure time is decremented / incremented by one second. The step can be decremented / incremented up to 30 minutes after pressing the **<◀>** / **<▶>** push-buttons together with the **<Shift>** one.

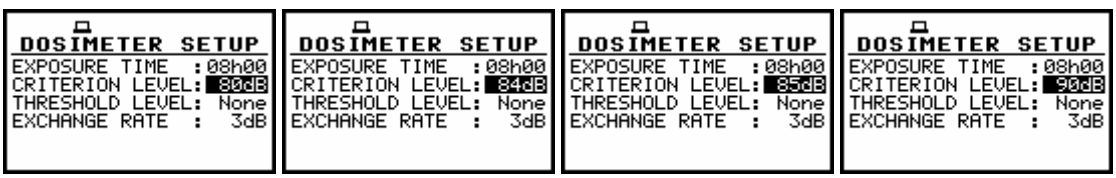
The window is closed and the instrument returns to the **INPUT** list after pressing the **<ENTER>** (with the confirmation of a change made in the position) or **<ESC>** push-buttons (ignoring a change made in the position).



DOSIMETER SETUP windows with EXPOSURE TIME selection

5.7.2 Setting criterion sound level - CRITERION LEVEL

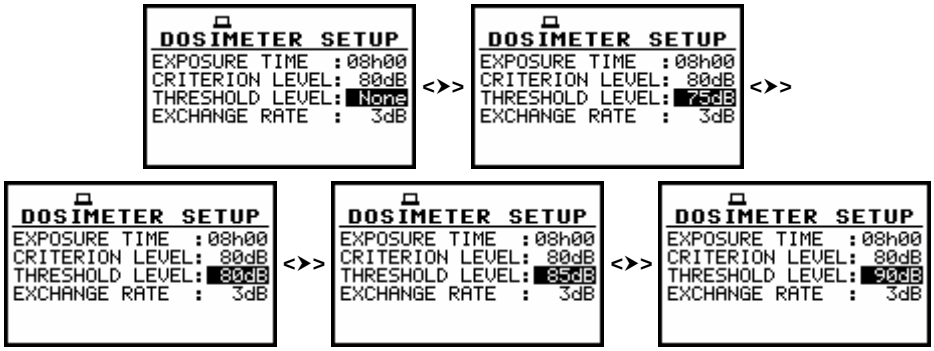
The criterion sound level influences the calculations of the **DOSE** and **D_8h** results. The **CRITERION LEVEL** line is accessible after pressing the **<▲>**, **<▼>** push-button in the **DOSIMETER SETUP** window. The available values are as follows: **80 dB**, **84 dB**, **85 dB** or **90 dB**. They can be selected by means of the **<◀>**, **<▶>** push-buttons. The confirmation of any change made in the line requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **DOSIMETER SETUP** is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.



DOSIMETER SETUP windows with CRITERION LEVEL selection

5.7.3 Setting threshold level - THRESHOLD LEVEL

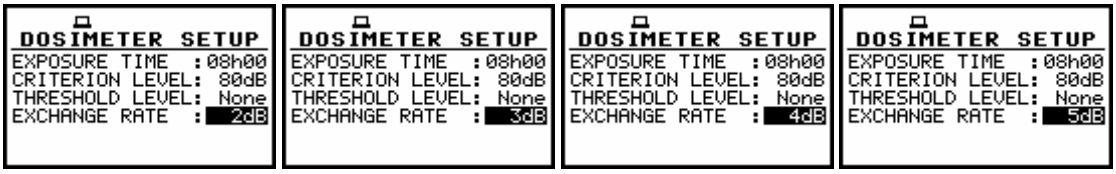
The threshold level influences the calculations of the dosimeter results, namely **DOSE**, **D_8h** and **LAV**. The **THRESHOLD LEVEL** line is accessible after pressing the **<▲>**, **<▼>** push-buttons in the **DOSIMETER SETUP** window. The available values are as follows: **None**, **75 dB**, **80 dB**, **85 dB** or **90 dB**. They can be selected by means of the **<◄>**, **<►>** push-buttons. The confirmation of any change made in the line requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **DOSIMETER SETUP** is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.



DOSIMETER SETUP windows with THRESHOLD LEVEL selection

5.7.4 Setting exchange rate - EXCHANGE RATE

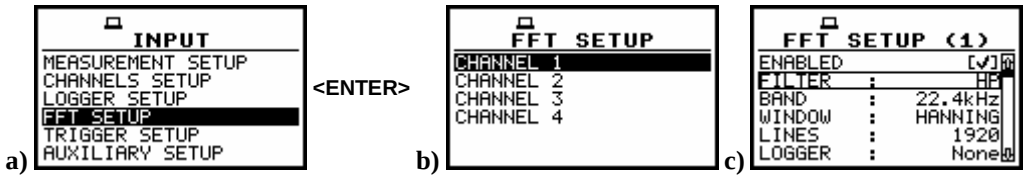
The exchange rate influences the calculations of the dosimeter results, namely **DOSE**, **D_8h** and **LAV**. The exposure rate equal to three complies with ISO R 1999 “Assessment of Occupational Noise Exposure for Hearing Conservation Purposes”, while equal to five - complies with the American “Occupational 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**. They can be selected by means of the **<◄>**, **<►>** push-buttons. The confirmation of any change made in the line requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **DOSIMETER SETUP** is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.



DOSIMETER SETUP windows with EXCHANGE RATE selection

5.8 Selection of FFT analysis parameters - FFT SETUP

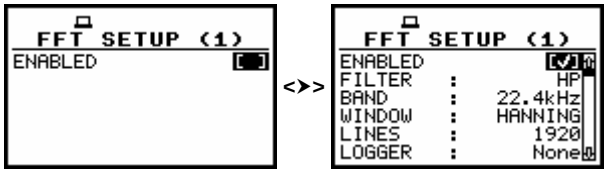
The **FFT SETUP** is accessible in the **INPUT** list when the **FFT** function is selected in the **MEASUREMENT FUNCTION** window (*path: MENU / FUNCTION / MEASUREMENT FUNCTION / FFT*). This sub-list is opened after the selection of the **FFT SETUP** text from the **INPUT** list by means of the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons and pressing the **<ENTER>** one. The **FFT** consists of the parameters, which influence the calculation and logging the results of the **FFT** analysis: **ENABLED**, **FILTER**, **BAND**, **WINDOW**, **LINES** and **LOGGER**. The **FFT** window is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.



FFT SETUP selected in INPUT list (a), FFT SETUP window (b) and opened FFT SETUP (1) window (c)

5.8.1 Enabling the FFT analysis - ENABLED

Placing a special character **[√]** in the line with **ENABLED** text means that the **FFT** analysis in selected channel can be performed. The change is made by means of the **<◄>**, **<►>** push-buttons. The confirmation of the activation/deactivation requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **FFT SETUP** window is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.

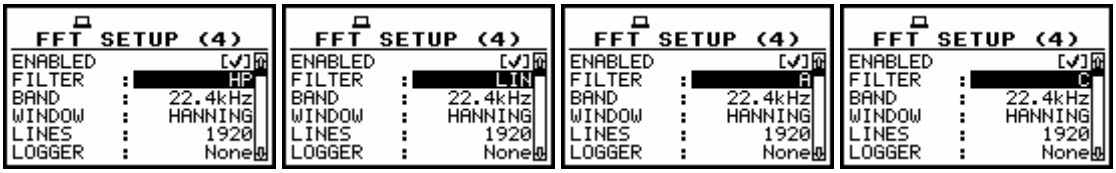


FFT SETUP window in channel 1, enabling FFT analysis

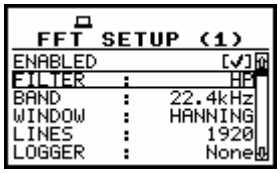
5.8.2 Selecting the weighting filter during the FFT analysis - FILTER

The **FILTER** influences the calculations of the **FFT**. 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** window. The frequency characteristics of those filters mentioned above are given in Appendix C.

The selection of this parameter is made by means of the **<◄>**, **<►>** push-buttons. The confirmation of the change made in the line requires pressing the **<ENTER>** push-button, which simultaneously closes the window.



FFT SETUP (4) window with FILTER selection in sound mode

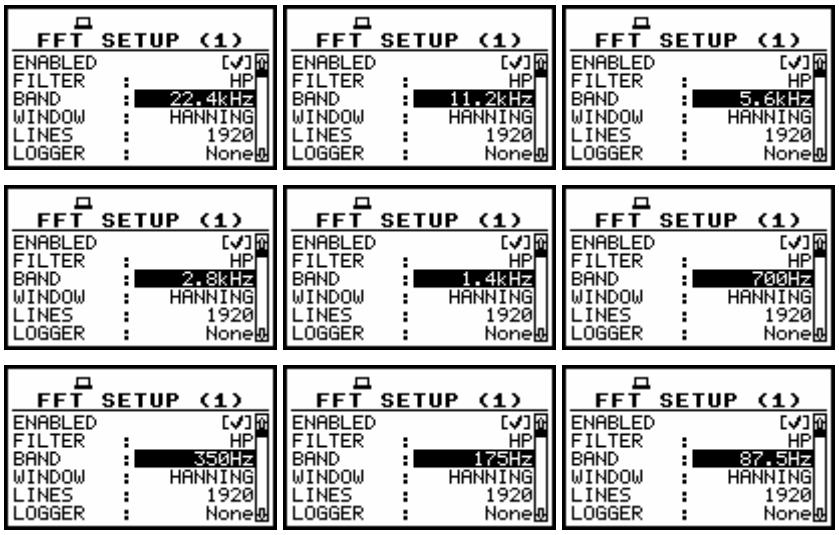


FFT SETUP (1) window with FILTER position not accessible in vibration mode

5.8.3 Selecting the analysis band of the signal - BAND

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

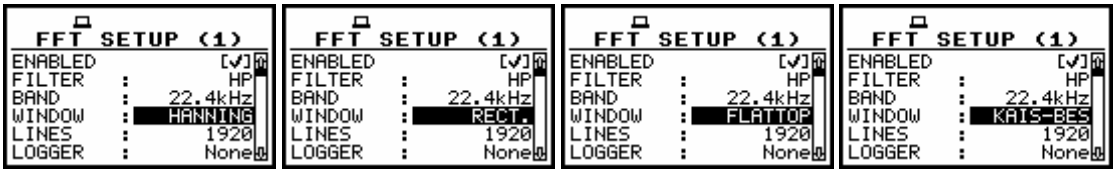
by means of the **<◄>**, **<►>** push-buttons. The confirmation of the change made in the line requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **FFT** window is closed ignoring any changes made in there, after pressing any moment the **<ESC>** push-button.



FFT SETUP (1) window with BAND selection

5.8.4 Selecting the time window for the FFT analysis - WINDOW

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**, **RECTANGLE**, **FLAT TOP**, **KAISER-BESSEL**. The selection of the window is made by means of the **<◄>**, **<►>** push-buttons. The confirmation of the change made in the line requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **FFT SETUP (x)** window is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.



FFT SETUP (1) window with WINDOW selection

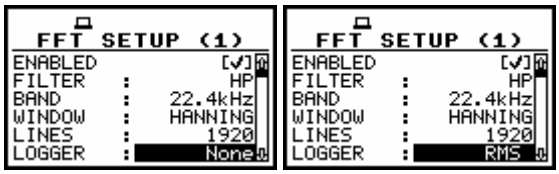
5.8.5 Selecting the number of the lines in FFT analysis - LINES

The **LINES** enables the user to select the number of lines in the FFT analysis. There are three values available: **1920**, **960** and **480**. The selection of the value is made by means of the **<◄>**, **<►>** push-buttons. The confirmation of the change made in the position requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **FFT SETUP (x)** window is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.

FFT SETUP (1) window with LINES selection

5.8.6 Enabling the FFT spectra time-history logging - LOGGER

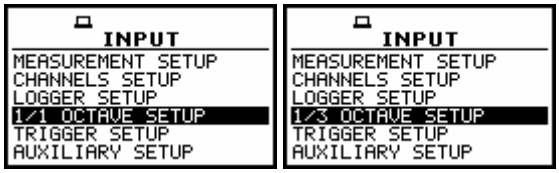
The **LOGGER** enables to record spectra of the **FFT** analysis in the logger file. In order to switch on the logger of **FFT** analysis the user has to select **RMS** text in **LOGGER** position using the **<➤>** push-button and the **<ENTER>** one. If instead of the **<ENTER>** push-button the **<ESC>** one is pushed, the selection is ignored and the **FFT** sub-list is closed.



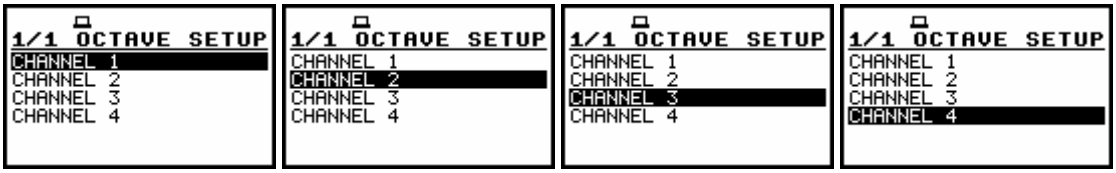
FFT SETUP (x) window with LOGGER activation

5.9 Selection of 1/1 and 1/3 octave spectrum parameters - 1/1 OCTAVE SETUP and 1/3 OCTAVE SETUP

The **1/1 OCTAVE SETUP** (**1/3 OCTAVE SETUP**) appears in the **INPUT** list when the **1/1 OCTAVE** (**1/3 OCTAVE**) function is selected in the **MEASUREMENT FUNCTION** list (*path: MENU / FUNCTION / MEASUREMENT FUNCTION / 1/1 OCTAVE or 1/3 OCTAVE*). This sub-list is opened after the selection of the **1/1 OCTAVE SETUP** (**1/3 OCTAVE SETUP**) text from the **INPUT** list by means of the **<▲>**, **<▼>** (or **<◄>**, **<➤>**) push-buttons and pressing the **<ENTER>** one. Then the user has to select the channel and press **<ENTER>**. The **SPECTRUM** consists of the parameters, which influence the calculation and enable logging the results of **1/1 OCTAVE** or **1/3 OCTAVE** analysis: **ENABLE**, **FILTER**, **BAND** and **LOGGER**. The **SPECTRUM** window is closed ignoring any changes made in there, after pressing any moment the **<ESC>** push-button.



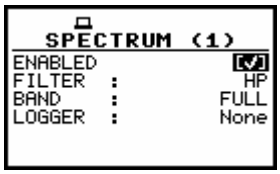
INPUT windows in the case of 1/1 OCTAVE mode and in 1/3 OCTAVE mode



1/1 OCTAVE SETUP windows with CHANNEL selection

5.9.1 Enabling 1/1 OCTAVE or 1/3 OCTAVE spectrum settings - ENABLED

Placing a special character **[√]** in the line with **ENABLED** text allows making settings in the **SPECTRUM (x)** window. The selection is made by means of the **<◄>**, **<➤>** push-buttons. The confirmation of the activation requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **SPECTRUM (x)** window is closed ignoring any changes made in there, after pressing any moment the **<ESC>** push-button.

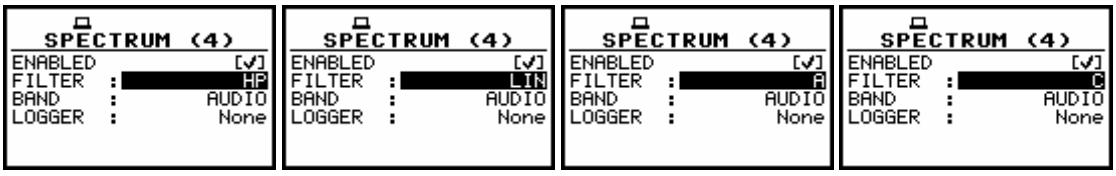


SPECTRUM window opened for channel 1

5.9.2 Selecting the weighting filter during 1/1 OCTAVE or 1/3 OCTAVE analysis - FILTER

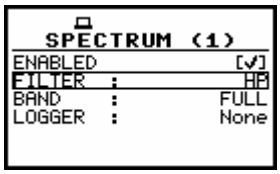
The **FILTER** influences the calculations of **1/1 OCTAVE** or **1/3 OCTAVE** analysis. In the case of sound measurements there are **HP**, **LIN**, **A** and **C** filters available. In the case of vibration measurements, only **HP** filter is available and the position is not accessible after entering the **SPECTRUM** window. The frequency characteristics of the filters mentioned above are given in Appendix C.

The selection of **FILTER** is made by means of the **<◄>**, **<►>** push-buttons. The confirmation of the change made in the line requires pressing the **<ENTER>** push-button, which simultaneously closes the window.



SPECTRUM (4) windows with FILTER selection in sound mode

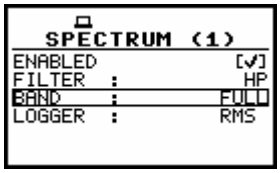
In the case of vibration mode, during **1/1 OCTAVE** or **1/3 OCTAVE** analysis only the **HP** filter is available (cf. Appendix C).

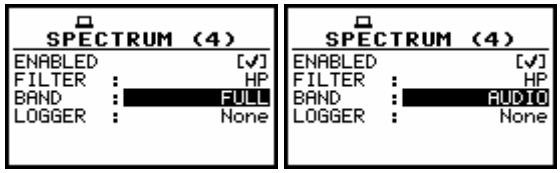


SPECTRUM (1) window with FILTER position not accessible in vibration mode

5.9.3 Selecting the band during 1/1 OCTAVE or 1/3 OCTAVE analysis - BAND

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 the case of sound measurements, **FULL** in the case of vibration measurements. The selection of this parameter is made by means of the **<◄>**, **<►>** push-buttons. The confirmation of the change made in the line requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **SPECTRUM** window is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.

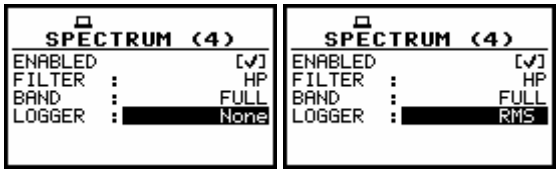
a) 

b) 

SPECTRUM windows with BAND not accessible in VM (a) and BAND selection in SM (b)

5.9.4 Activation of logger for 1/1 OCTAVE or 1/3 OCTAVE analysis results - LOGGER

The **RMS** result from **1/1 OCTAVE** or **1/3 OCTAVE** 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**. (If the **LOGGER** functionality has been switched off, the position is not accessible). The confirmation of the change made in the position requires pressing the **<ENTER>** push-button, which simultaneously closes the window. The **SPECTRUM** window is closed ignoring any changes made in there, after pressing any time the **<ESC>** push-button.



SPECTRUM (4) windows with LOGGER selection

6 DATA AVAILABLE ON THE DISPLAY - DISPLAY

In order to open the **DISPLAY** list the user has to:

- press the **<Menu>** push-button,
- select from the main list, using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons, the **DISPLAY** text (highlight it inversely),
- press the **<ENTER>** push-button.

Pressing the **<Shift>** and **<▲>** (or **<Shift>** and **<◀>**) results in a movement to the first position of the opened list and pressing the **<Shift>** and **<▼>** (or **<Shift>** and **<▶>**) results in a movement to the last position of the opened list.

Main list with DISPLAY text highlighted (displayed inversely)

The **DISPLAY** list is used for setting the various parameters, which are mainly dedicated for the control of the display. The following items are present on this list:

DISPLAY MODES enables one to select the mode of the measurement results presentation;

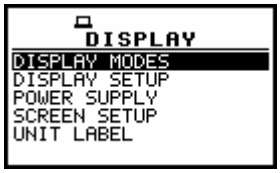
DISPLAY SETUP enables one to change the scale in the graphical modes of result's presentation, to select the results presented as Total values, to choose the type of the presented spectrum for each channel separately;

POWER SUPPLY informs the user about the source of powering of the instrument and current power supply voltage;

SCREEN SETUP enables one to set the contrast and to switch on/off the backlight timeout of the instrument's display and its brightness;

UNIT LABEL informs the user about the serial number of the instrument, the version of the internal software and the standards to which conform the measurement results.

In each available position any change is performed by means of the **<◀>**, **<▶>** push-buttons. In order to confirm the selection the **<ENTER>** push-button has to be pressed. After this confirmation, the opened window or list is closed. In order to ignore any changes made in the opened window or list the user has to press the **<ESC>** push-button.



DISPLAY window

6.1 Selection of the modes of measurement results presentation - DISPLAY MODES

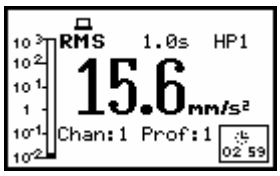
The **DISPLAY MODES** enables one to select the currently available modes of displaying the results of measurement. The selection is made by placing or replacing the special character in the inversely displayed position of the **DISPLAY MODES** by means of the **<◀>**, **<▶>** push-buttons. In order to confirm the selection the user has to press the **<ENTER>** push-button. The mode

of the displaying the results is related with the selection of the instrument's function (**Sound Level Meter** (**SLM**) or **Vibration Level Meter** (**VLM**), **1/1 OCTAVE**, **1/3 OCTAVE** or **FFT** analyser). Only One Profile mode cannot be switched off in all modes of the instrument.

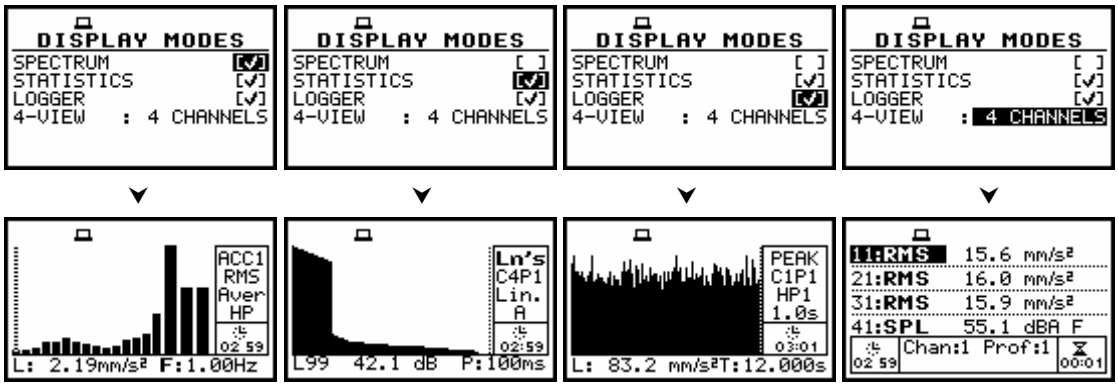
For the **SLM** or **VLM** the following possibilities of the measurement results presentation are available:

- **One Profile**,
- **STATISTICS** (in case of sound measurements),
- **LOGGER** (time-history),
- **4–VIEW** (four-channels view).

The **SPECTRUM** presentation mode is available additionally for the frequency analysis (**1/1 OCTAVE**, **1/3 OCTAVE**, **FFT**) of the measured signal (for **SLM** or **VLM** this position is not accessible).

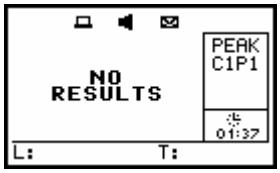


One-profile presentation mode



DISPLAY MODES widows and available presentation modes

The **LOGGER** mode of results presentation is available if, and only if, the data from at least one profile are logged in the logger's file. If the **LOGGER** position is switched on (**[√]**) but there was nothing stored in the logger's file (in the selected profile there were **selected results** (**PEAK**, **MAX**, **MIN** or **RMS** in the case of **SM** and **PEAK**, **P–P**, **MAX**, **RMS** or **VDV** in the case of **VM**) but the instrument still **waits** for the logger results, i.e. the **LOGGER STEP** is long, the **NO RESULTS** text is displayed. When the **LOGGER** is selected as active and the **LOGGER** positions in all profiles are not selected, the **LOGGER** mode of results presentation is skipped.

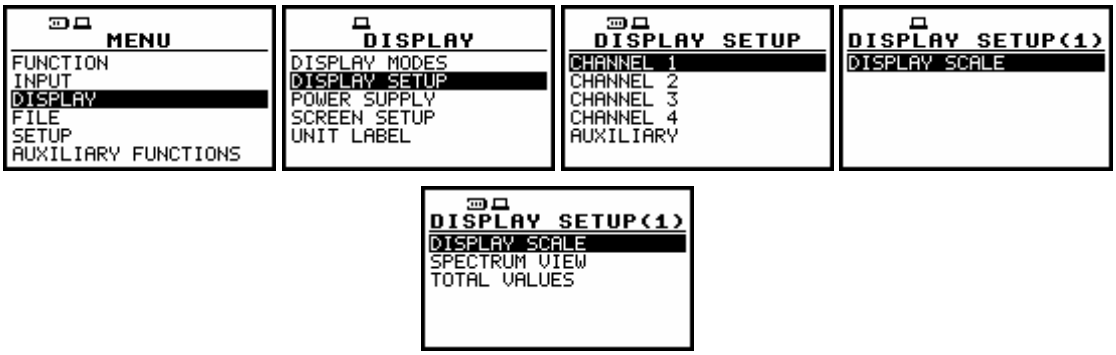


LOGGER mode when there is nothing in the logger to be displayed (after setting LOGGER as active)

Each position of the **DISPLAY MODES** window can be switched on or off independently. The window is closed and the instrument returns to the **DISPLAY** list after pressing the **<ESC>** or **<ENTER>** push-button (in the first case without taking into account any changes made in the **DISPLAY MODES** window and in the latter case - confirming all changes done in the window).

6.2 Selection of the parameters in graphical results presentations - DISPLAY SETUP

The **DISPLAY SETUP** *(path: MENU / DISPLAY / DISPLAY SETUP)* enables the user to change several parameters of the graphical results presentations **for each channel separately** as well as for the auxiliary functions. Namely, one can select, using the **DISPLAY SCALE**, the scale in the available modes of graphical presentation of the measurement results (time-history in the **LOGGER** and so-called spectra in the **SPECTRUM**). Using the **TOTAL VALUES** it is possible to select the weighting filters used in the calculation of the Total values. This window appears on the display only in the case of **1/1 OCTAVE** or **1/3 OCTAVE** analyser. Using the **SPECTRUM TYPE**, it is possible to select the type of the spectrum, which has to be presented during vibration measurements. This window appears on the display only in the case of the **VIBR. METER** mode selection. In order to enter the **DISPLAY SETUP** the user has to press the **<ENTER>** push-button on the inversely displayed **DISPLAY SETUP** text of the **DISPLAY** list. The **DISPLAY SETUP** is closed and the instrument returns to the **DISPLAY** list after pressing the **<ESC>** push-button, which ignores any changes in the window or the **<ENTER>** push-button, which confirms the changes.

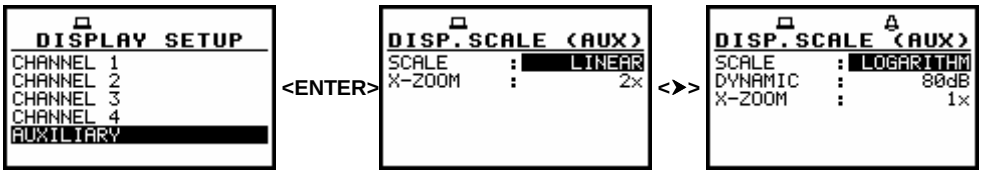


MENU, DISPLAY, DISPLAY SETUP and DISPLAY SETUP (1) windows

The **DISPLAY SCALE** *(path: MENU / DISPLAY / DISPLAY SETUP / CHANNEL x / DISPLAY SCALE)* sub-list enables the user to change the scale in the available modes of graphical presentation of the measurement results (time-history in the **LOGGER** and so-called spectra in the **SPECTRUM**). It can be done in the **SCALE** position of the **DISPLAY SCALE**. The user can set the parameters for each channel separately. It is also possible to change the "dynamics" of the vertical axis by means of the **DYNAMIC** position. In order to enter the list one has to press the **<ENTER>** push-button on the inversely displayed **DISPLAY SCALE** text of the **DISPLAY SETUP (x)** list. The **DISPLAY SCALE** window is closed and the instrument returns to the **DISPLAY SETUP (x)** list after pressing the **<ESC>** push-button, which ignores any changes in the window or the **<ENTER>** push-button, which confirms the changes.

DISPLAY SETUP windows with DISPLAY SCALE text highlighted

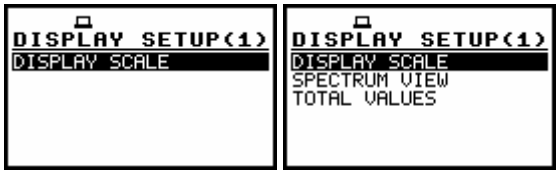
The parameters of **DISPLAY SCALE** for auxiliary function (for **"SEAT"** function in **1/1 OCTAVE** or **1/3 OCTAVE** analysis mode or for **VECTOR** when it is in logger presentation mode) can be set after opening **AUXILIARY** window. The parameters setting is analogical as for the other results - see description of **DISPLAY SCALE**, **DYNAMIC** and **X–ZOOM** options in the next part of this chapter.



DISPLAY SETUP window, AUXILIARY text selected, and scale selection in the opened window

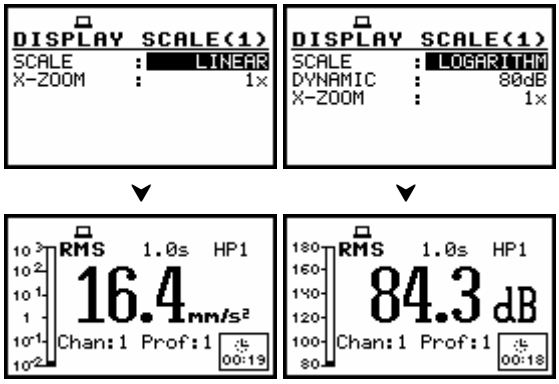
6.2.1 Selection of the scale in graphical results presentations - DISPLAY SCALE

The **DISPLAY SCALE** (*path: MENU / DISPLAY / DISPLAY SETUP / CHANNEL x / DISPLAY SCALE*) enables the user to change the scale in the available modes of graphical presentation of the measurement results (time-history in the **LOGGER** and so-called spectra in the **SPECTRUM**). It is possible to change the scale of the vertical axis only. In order to enter the list one has to press the **<ENTER>** push-button on the inversely displayed **DISPLAY SCALE** text of the **DISPLAY SETUP (x)** window. The **DISPLAY SCALE** window is closed and the instrument returns to the **DISPLAY SETUP (x)** window after pressing the **<ESC>** push-button, which ignores any changes in the window or the **<ENTER>** push-button, which confirms the changes.



DISPLAY SETUP (1) windows with DISPLAY SCALE text highlighted

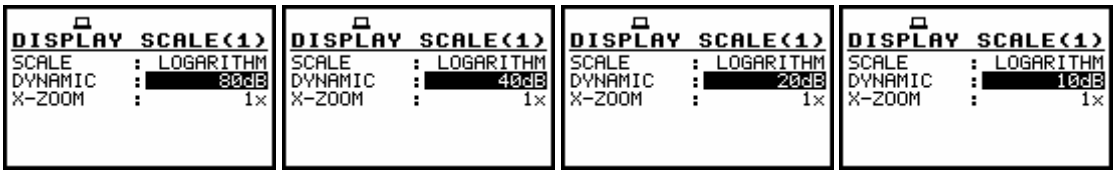
The **SCALE** is available only in the case of vibration measurements (when in the **MODE** the **VIBRATION** text is selected (*path: MENU / INPUT / CHANNELS SETUP / CHANNEL x / MODE: VIBRATION*)). Two options are available: **LINEAR** and **LOGARITHM**. In the case of the first one, the graphical presentation and the units both are linear. In the latter case, the graphical presentation is given in the logarithmic scale and the measurement results are expressed in decibels (the result is related to the values set in the **REFERENCE LEVEL**). It is possible to set the required option using the **<◄>**, **<►>** push-buttons. The confirmation of the selection is made by pressing the **<ENTER>** push-button. The return without taking into account any change is made after pressing the **<ESC>** push-button.



Displays with the possible options of the SCALE in vibration mode

6.2.2 Scaling of the vertical axis of the graphical presentation - DYNAMIC

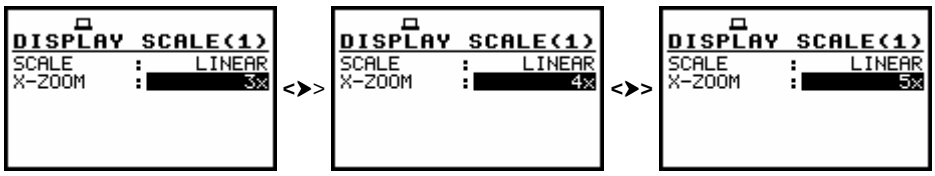
In the case of the vertical axis the user can obtain the double, four times and eight times expansion (as the default the vertical axis corresponds to 80 dB, after expansion it corresponds to 40 dB, 20 dB and 10 dB – respectively) using the **<◄>**, **<►>** push-buttons. This setting is always valid only for the measurements of sound and for vibrations if the **logarithmic** scale was selected.



Displays with the possible values of the vertical axis in LOGGER and SPECTRUM presentations

6.2.3 Scaling of the horizontal axis of the graphical presentation - X–ZOOM

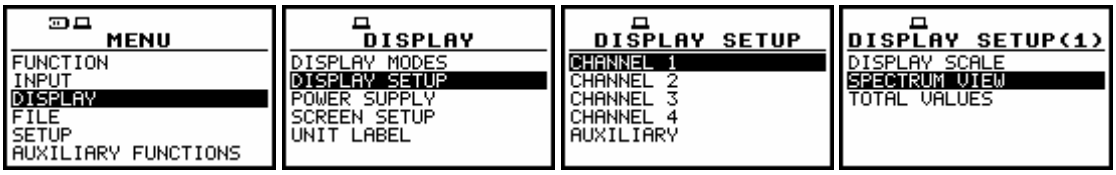
The **X–ZOOM** enables the user to change the horizontal axis in the **SPECTRUM** presentation mode. This parameter is set by means of the **<◄>**, **<►>** push-buttons. In order to confirm the selection the user has to press the **<ENTER>** push-button, which closes also the **DISPLAY SCALE** window. The window can be also closed after pressing the **<ESC>** push-button but the settings made there are ignored.



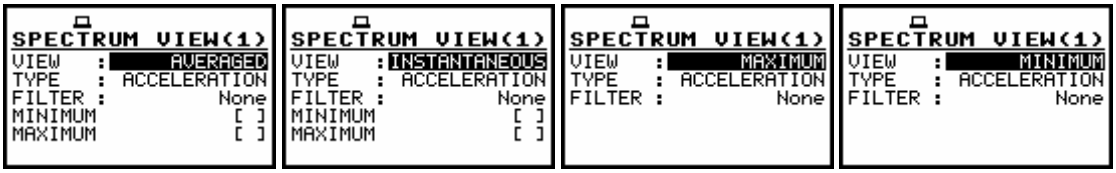
DISPLAY SCALE (1) windows with X–ZOOM selection

6.2.4 Selection of the parameters of the SPECTRUM - SPECTRUM VIEW

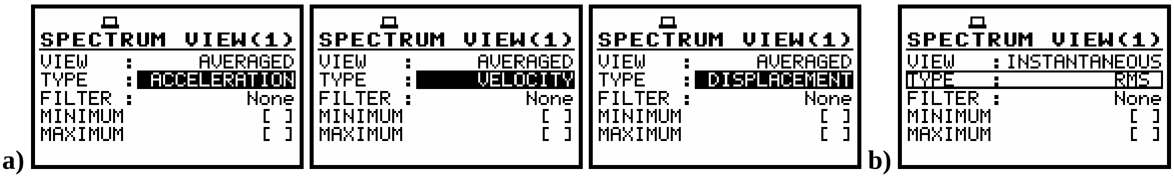
The **SPECTRUM VIEW** (*path: MENU / DISPLAY / DISPLAY SETUP / CHANNEL x / SPECTRUM VIEW*) enables the user to change the parameters of the presentation of the spectrum: **VIEW** (settings: **AVERAGED**, **INSTANTANEOUS**, **MAXIMUM** or **MINIMUM**), **TYPE** (settings for **VM**: **ACCELERATION**, **VELOCITY** and **DISPLACEMENT** and in the case of **SM**: **RMS** – for filter **LIN** and **C**, **LEQ** – for filter **A**), **FILTER** (settings: **None**, **VUSRi**, **SUSRj**) and contextually: **MINIMUM** and **MAXIMUM**. In order to enter the list one has to press the **<ENTER>** push-button on the inversely displayed **SPECTRUM VIEW** text of the **DISPLAY SETUP (x)**. The **SPECTRUM TYPE** is closed and the instrument returns to the **DISPLAY SETUP (x)** after pressing the **<ESC>** push-button, which ignores any changes in the window or the **<ENTER>** push-button, which confirms the changes.



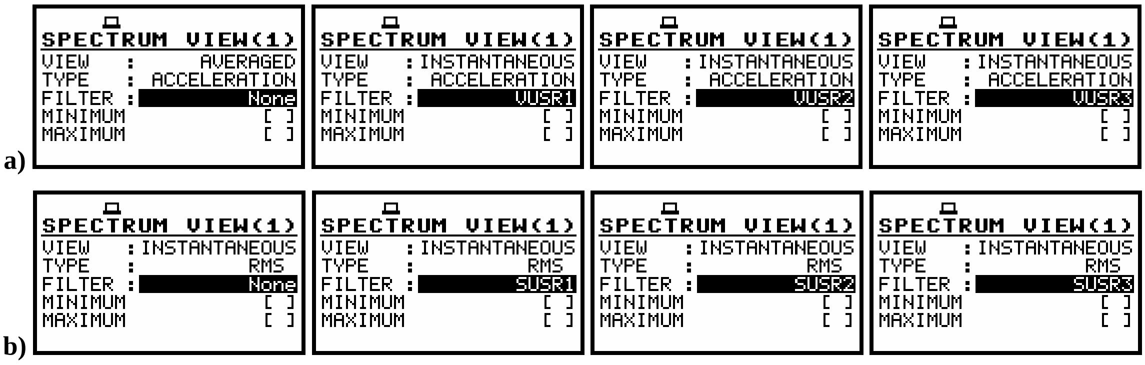
MENU, DISPLAY, DISPLAY SETUP and DISPLAY SETUP (1) windows



SPECTRUM VIEW windows with VIEW selection

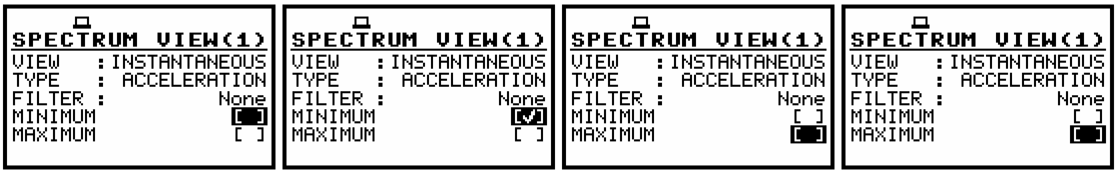


SPECTRUM VIEW windows with TYPE for vibration measurements (a) and for sound measurements (b)



SPECTRUM VIEW windows with FILTER for vibration measurements (a) and for sound measurements (b)

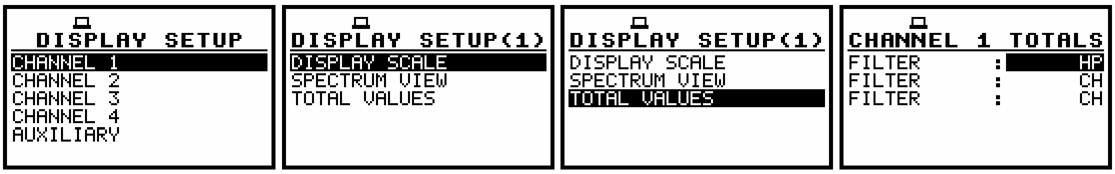
In the **MINIMUM** / **MAXIMUM** the corresponding spectrum can be selected (by means of the **<◄>**, **<►>** push-buttons) to be presented on the display in the graphical presentation modes.



SPECTRUM VIEW windows with MINIMUM / MAXIMUM spectrum selection

6.2.5 Selection of the weighting filters - TOTAL VALUES

The **TOTAL VALUES** (*path: MENU / DISPLAY / DISPLAY SETUP / CHANNEL x / TOTAL VALUES*) which is available only in **1/1 OCTAVE** or **1/3 OCTAVE** analysis; enables the user to select the weighting filters for the calculation of total values. In order to enter the list one has to press the **<ENTER>** push-button on the inversely displayed **TOTAL VALUES** text of the **DISPLAY SETUP (x)** window. The **CHANNEL x TOTALS** is closed and the instrument returns to the **DISPLAY SETUP (x)** after pressing the **<ESC>** push-button.



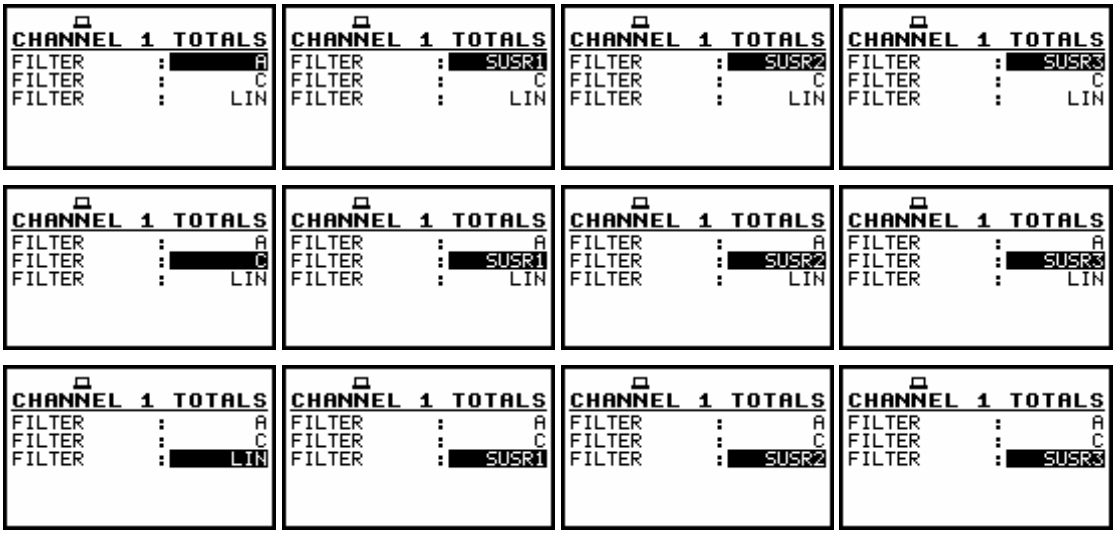
DISPLAY SETUP windows with TOTAL VALUES text highlighted and CHANNEL x TOTALS entered

6.2.5.1 Selection of the weighting filters for the profiles - FILTER

In the first line the user can select the weighting **FILTER** to be used for the calculation of the **TOTAL1** value (**TOTAL** value calculated with the selected filter). In the case of vibration measurements, it is also possible to determine the type (**TYPE**) of the filter and the calibration factor (**CAL. FACTOR**).

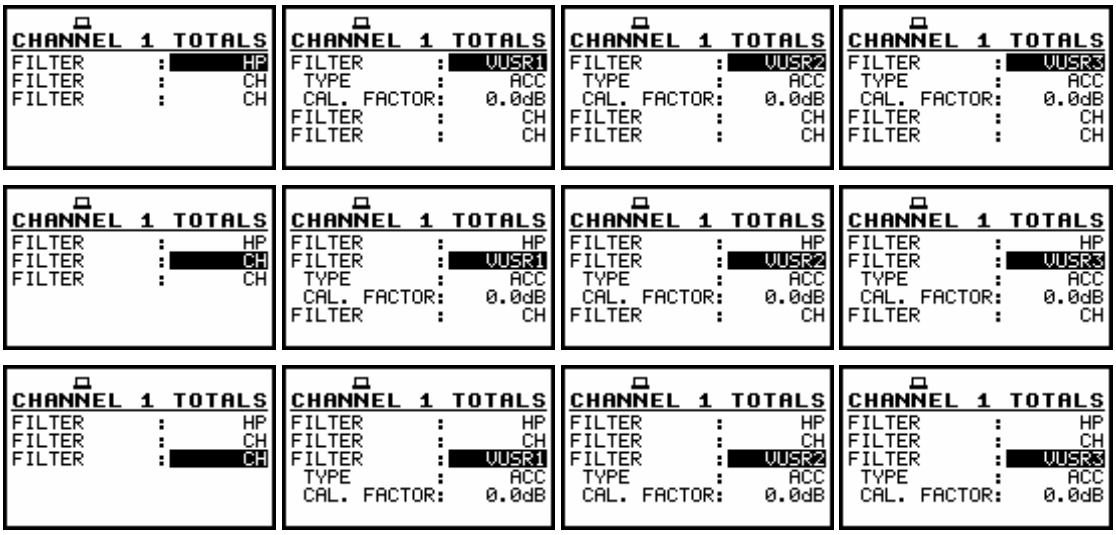
❖ **FILTER**: available values of the weighting filters:

- in the case of sound measurements: **A** (for the first **TOTAL** value), **C** (for the second **TOTAL** value), **LIN** (for the third **TOTAL** value), **SUSR1**, **SUSR2**, **SUSR3** or any other sent to the unit by means of the interface,



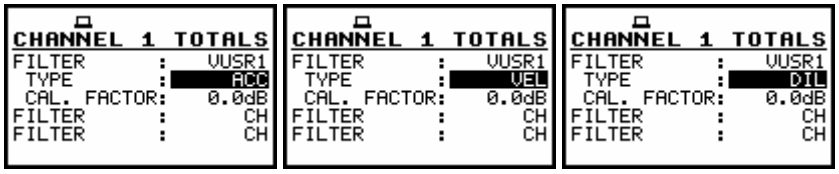
CHANNEL 1 TOTALS windows in the case of sound measurements with filter selection

- in the case of vibration measurements: **HP** (for the first **TOTAL** value), **CH** (for the second and third **TOTAL** value the filter selected in the current channel), **VUSR1**, **VUSR2**, **VUSR3** or any other sent to the unit by means of the interface.



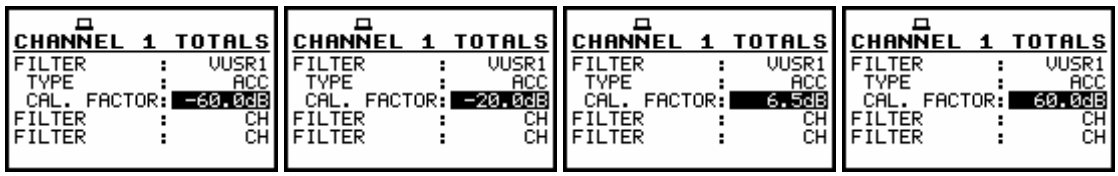
CHANNEL 1 TOTALS windows in the case of vibration measurements with FILTER selection

❖ **TYPE:** (only for vibration measurements); available values if **VUSR1**, **VUSR2**, or **VUSR3** was selected in the **FILTER** position: **ACC**, **VEL** and **DIL**; if the **HP** filter was selected this position is not displayed.



CHANNEL 1 TOTALS windows in the case of vibration measurements with TYPE selection

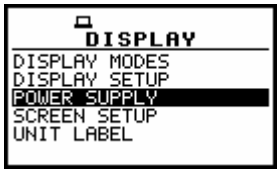
- **CAL. FACTOR:** (only for vibration measurements); accessible if **VUSR1**, **VUSR2**, or **VUSR3** was selected in the **FILTER** position; if the **HP** filter was selected this position is not displayed; available values (from **-60.0dB** to **60.0dB** with **0.1dB** step by pressing the **<◄>**, **<►>** push-buttons or with **1 dB** step by pressing **<Shift>** with **<◄>**, **<►>** push-buttons).



CHANNEL 1 TOTALS windows in the case of vibration measurements with calibration factor setting

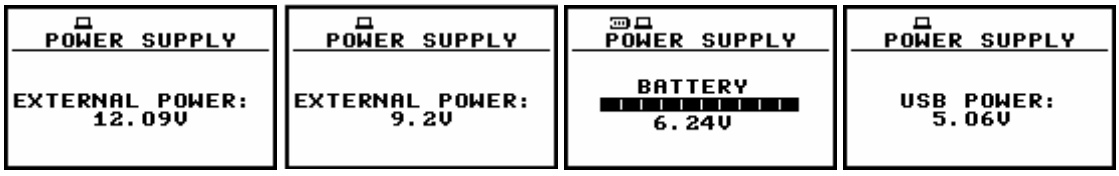
6.3 Checking the state of the internal battery - POWER SUPPLY

The **POWER SUPPLY** enables the user to check the internal battery condition. In order to enter the window one has to press the **<ENTER>** push-button on the inversely displayed **POWER SUPPLY** text of the **DISPLAY** list. The **POWER SUPPLY** window is closed and the instrument returns to the **DISPLAY** list after pressing the **<ESC>** or the **<ENTER>** push-button.



DISPLAY window with POWER SUPPLY text highlighted

The instrument can be powered from the external power supplier, from the external battery pack, from four AA standard or AA rechargeable batteries or from the USB interface when its USB Device socket is connected by means of the cable to a PC. The view presented on the display in each case is different. The current battery voltage is displayed together with its approximate state (in the graphical form).



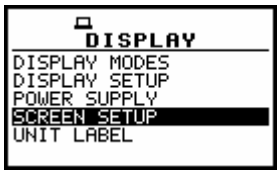
POWER SUPPLY windows for different sources powering the instrument

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

6.4 Setting the parameters of the display - SCREEN SETUP

The **SCREEN SETUP** window enables the user to set the backlight's automatic switch off (after a 30-seconds period), the brightness of the backlight and the proper contrast of the display. In order to enter the window one has to press the **<ENTER>** push-button on the inversely displayed **SCREEN SETUP** text of the **DISPLAY** list.

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

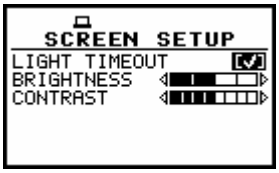


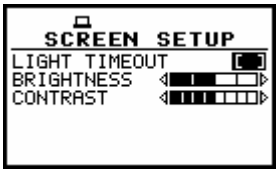
DISPLAY window with SCREEN SETUP text highlighted

6.4.1 Automatic switch off of the backlight - LIGHT TIMEOUT

Taking into account the saving of the internal source of the instrument power the backlight should be used relatively rare. It is possible to set the backlight's automatic switch off. In the case when this option is set, after 30 seconds from pressing **any push-button** the backlight is switched off. If it happened, the first pressing of any push-button would cause the switch on of the backlight.

The confirmation of the selection is made by pressing the **<ENTER>** push-button. The return without taking into account any change is made after pressing the **<ESC>** push-button.

a) 

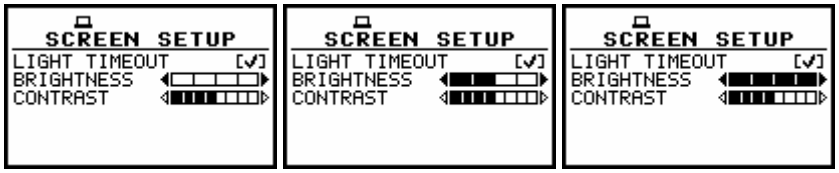
b) 

SCREEN SETUP windows with LIGHT TIMEOUT active (a), and not active (b)

6.4.2 Setting the brightness of the backlight - BRIGHTNESS

It is possible to change the **BRIGHTNESS** of the backlight using the **<◄>**, **<►>** push-buttons. The user can select five different values of this parameter.

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



SCREEN SETUP windows with BRIGHTNESS position active

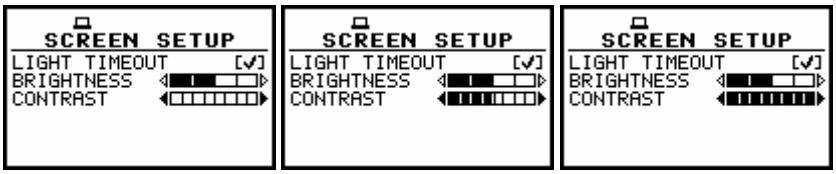
The **SCREEN SETUP** window is closed and the instrument returns to the **DISPLAY** list after pressing the **<ESC>** or **<ENTER>** push-button.

6.4.3 Setting the contrast of the display - CONTRAST

The **CONTRAST** enables the user to set the proper contrast of the display (by means of the **<◄>**, **<►>** push-buttons). The position is opened after pressing the **<ENTER>** push-button on the highlighted (displayed inversely) **CONTRAST** text. The user can select 21 different values of this parameter.

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

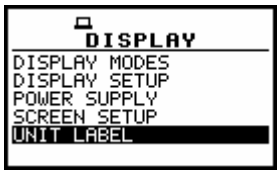
The window is closed and the instrument returns to the **DISPLAY** list after pressing the **<ESC>** or **<ENTER>** push-button.



SCREEN SETUP windows with CONTRAST setting

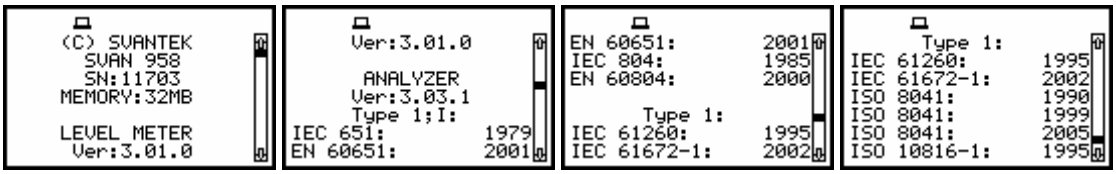
6.5 Checking specification of the instrument - UNIT LABEL

The **UNIT LABEL** enables the user to check **the type of the instrument**, **its serial number** and **the current software version installed in it** and **the standards**, **which the instrument fulfils.** In order to enter the list one has to press the **<ENTER>** push-button on the inversely displayed **UNIT LABEL** text of the **DISPLAY** list. The **UNIT LABEL** sub-list is closed and the instrument returns to the **DISPLAY** list after pressing the **<ESC>** or the **<ENTER>** push-button.



DISPLAY window with UNIT LABEL text highlighted

After pressing the **<◄>**, **<►>** (or **<▲>**, **<▼>**) push-buttons the displayed text is scrolled on the display and the user can check the number of the standard fulfilled by the instrument and the current software version. The window is closed and the instrument returns to the **DISPLAY** list after pressing the **<ESC>** or **<ENTER>** push-button.



UNIT LABEL windows opened and after scrolling with the <▲>, <▼> push-buttons

Notice*:* ***The contents of the UNIT LABEL*** *should be always transmitted to the service of the SVANTEK company in the case of any problems faced by the user during the instrument's operation.*

7 SAVING MEASUREMENT RESULTS - FILE

The registration of the measurement results is an essential task for the efficient use of the instrument. All available measurement results can be stored in the FLASH type 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 files of the logger.**

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

Saving files

In the case of the **SVAN 958** instrument there are few different types of files containing data:

- from **S**ound **L**evel **M**eter mode;
- from **V**ibration **L**evel **M**eter mode;
- from **1/1 OCTAVE** analysis;
- from **1/3 OCTAVE** analysis;
- from **FFT** analysis;
- from **RT60** measurements;
- stored in the instrument's logger.

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

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 channels;
- the marker of the end of the file.

The other elements of the file structure depend on the type of the file (**SLM**, **VLM**, **1/1 OCTAVE** or **1/3 OCTAVE** analysis, logger) and on the setting of **SAVE STATISTIC** (*path: MENU / FILE / SAVE OPTIONS / SAVE STATISTIC*). These elements are as follows:

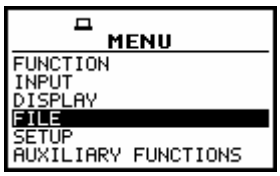
- the main results;
- the results coming from **1/1 OCTAVE** analysis;
- the results coming from **1/3 OCTAVE** analysis;
- the results from **FFT** analysis;
- the results from **RT60** mode;
- the statistics header;
- the results of statistical analysis;
- the header of the statistical analysis performed in **1/1 OCTAVE** or **1/3 OCTAVE** analysis;
- the results of the statistical analysis performed in **1/1 OCTAVE** or **1/3 OCTAVE** analysis;
- the header of the logger's file;

- the data stored during the measurements in the files of the logger.

Notice: *The detailed description of all types of file structures is given in the Appendix B.*

Storing the measurement results as files in the instrument's FLASH DISC can be done by means of the **FILE** list. In order to open this list the user has to:

- press the **<Menu>** push-button,
- select from the main list, using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons, the **FILE** text (highlight it inversely),
- press the **<ENTER>** push-button.

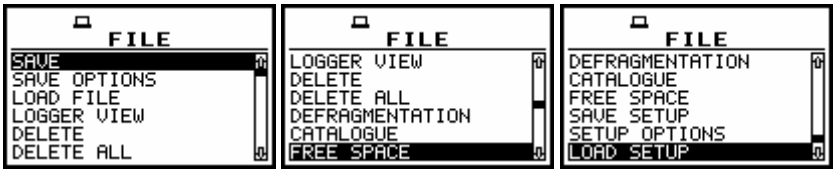


Main list with FILE text highlighted (displayed inversely)

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

SAVE	enables one to save the measurement results as a file in the instrument memory;
SAVE OPTIONS	enables one to set the options of the measurement result savings;
LOAD FILE	enables one to load to the working space of the instrument's memory the measurement results saved in a file;
LOGGER VIEW	enables one to select and present the results stored in the logger's files;
DELETE	enables one to delete a selected file from the instrument's memory;
DELETE ALL	enables one to delete all files from the instrument's memory;
DEFRAGMENTATION	enables one to recover the memory, which was used by the deleting files;
CATALOGUE	enables one to overview the catalogue of the files saved in the instrument's memory;
FREE SPACE	informs the user about the capacity of the instrument's memory still available for storing the measurement results;
SAVE SETUP	enables one to set the configuration of the meter;
SETUP OPTIONS	enables one to switch on the saving of user filters coefficients;
LOAD SETUP	enables one to load to the configuration saved in a file.

Pressing the **<Shift>** and **<▲>** (or **<Shift>** and **<◀>**) results in a movement to the first position of the opened list and pressing the **<Shift>** and **<▼>** (or **<Shift>** and **<▶>**) results in a movement to the last position of the opened list.



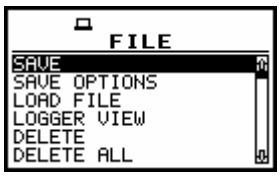
FILE list

In each available position any change is performed by means of the **<◀>**, **<▶>** push-buttons. In order to confirm the selection the **<ENTER>** push-button has to be pressed. After this confirmation, the opened window or list is closed. In order to ignore any changes made in the opened window or list the user has to press the **<ESC>** push-button.

7.1 Saving files in the instrument's memory - SAVE and AUTO NAME

The **SAVE** *(path: MENU / FILE / SAVE)* is used for storing data in the internal non-volatile (FLASH DISC) memory as a file (see Appendix B for the file formats).

In order to enter the position the user has to select the **SAVE** text in the **FILE** list, using the **<▲>** (or **<◄>**) push-button (the window is opened also by pressing **<Alt>** together with **<ENTER>** after the measurement). After the selection the **<ENTER>** push-button must be pressed.



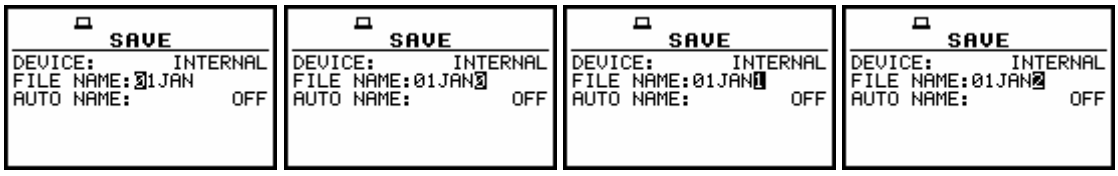
FILE list with SAVE text highlighted (displayed inversely)

The additional function for results saving - **AUTO NAME** (save a file with the name increased by one) is available after selecting the **AUTO NAME** text (with **<▲>**, **<▼>** push-buttons) and switching it on (using **<►>** push-button). The return to the **FILE** list is possible after pressing the **<ESC>** push-button.

SAVE window opened

The name of the file, in which the measurements or the analysis results are to be saved, is displayed in the second line (**FILE NAME**). The default name for a file is displayed in the case of the first entering to this position (after power on) and the last saved file's name – in the case of the next entering. It is possible to edit this name in two ways: full and with **AUTO NAME** option.

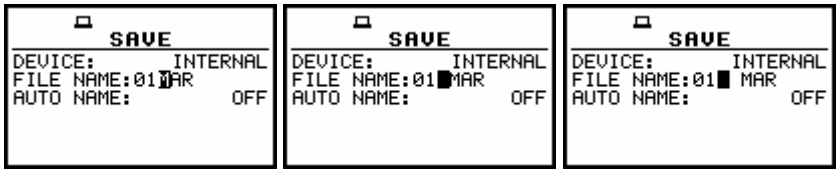
The **SAVE** window with **FILE NAME** edition is presented on the Figure below. The displayed inversely character is currently edited. The **<▲>**, **<▼>**, **<◄>**, **<►>** and **<Shift>** push-buttons are used for editing the name which cannot exceed 8 characters.



Displays during the file's name edition

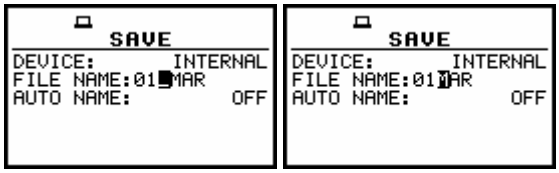
The user can select the proper position of the character in the edited text using the **<◄>**, **<►>** push-buttons. The available ASCII characters can be changed using the **<▲>**, **<▼>** push-buttons. The subsequent big letters, digits, space and underline appear on the display in the inversely displayed position after each pressing of the mentioned above push-buttons.

The empty space is created for the introduction of a new character in the edited name (the **Insert** operation is executed) when the **<Shift>** push-button is pressed together with the **<►>**.



Displays in FILE NAME edition after pressing <Shift> and <►> push-buttons

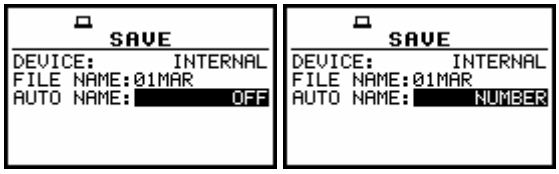
The character, which is highlighted (displayed inversely), is deleted from the edited name (the **Delete** operation is executed) when the **<Shift>** and **<◄>** push-buttons are pressed.



Displays in FILE NAME edition after pressing <Shift> and <◄> push-buttons

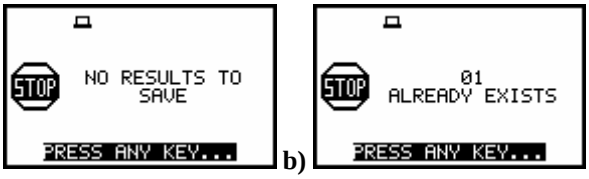
The edited name is accepted and the file is saved after pressing the **<ENTER>** push-button (cf. the description of the **AUTO NAME** function). The instrument waits then for a reaction of the user (any push-button should be pressed except the **<Shift>** and **<Alt>**). All changes introduced to the file name during the edition are ignored after pressing the **<ESC>** push-button. This pressing causes the return to the list from which the **SAVE** option was entered.

The simplified edition consists in the addition at the end of the file name the natural number, increased by one after each saving. This option is available after selecting the **AUTO NAME** text (with **<▲>**, **<▼>** push-buttons) and switching it on (using **<►>** one).



SAVE window with AUTO NAME function selection

The presented below message (Fig. a) is displayed after pressing the **<ENTER>** push-button in the case when no measurements were performed and there are no results to be saved. The operation cannot be done also in a case when the file of the selected name already exists in the instrument's memory (Fig. b). The instrument then waits for the reaction of the user (any push-button should be pressed except the **<Shift>** one) and after pressing a push-button it returns to the **SAVE** position.



a) **b)**

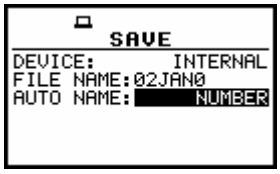
Displays after SAVE operation when there is no results to save (a) and the file with the selected name already exists in the instrument's memory (b)

The data are saved in the file with the name increased by one in relation to the name displayed after switching on of the **AUTO NAME** option and after pressing the **<ENTER>** push-button (if the instrument is not measuring and there are the results to be stored).

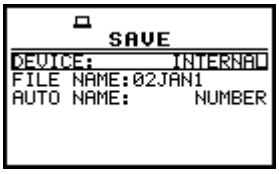
The following message containing the name of the file and the operation performed is displayed after the saving of the file:

Display after the execution of SAVE operation

Another message is displayed after successful saving of the file in the memory and then the instrument waits for the reaction of the user (any push-button should be pressed except the **<Shift>** and **<Alt>**) and after pressing a push-button it returns to the **FILE** list. The assumptive file's name is displayed after repeated enter to the **SAVE** position of the **FILE** list (after pressing the **<ENTER>** push-button).

a) 

b) 

c) 

SAVE window AUTO NAME option selected (a), after saving the file with the increased name (b) and after repeated enter to SAVE window (c)

It is not possible to store the data in the file, which already exists, when the **REPLACE** position is not active (**[ ]**). The presented below message is displayed after pressing the **<ENTER>** push-button in the case when during the name edition process the user selected the name which was used before. The instrument then waits for the reaction of the user (any push-button should be pressed except the **<Shift>** and **<Alt>**) and after pressing a push-button it returns to the **FILE** list.

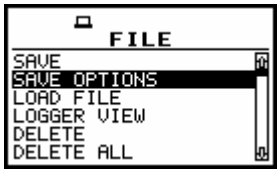
a) 

b) 

Displays after the file's name selection (a) and with the message if REPLACE option is not active (b)

7.2 Controlling the data storing in the instrument's memory - SAVE OPTIONS

The **SAVE OPTIONS** *(path: MENU / FILE / SAVE OPTIONS)* is used for the selection of the options of data storing in the **FLASH DISC** memory of the instrument. The window is opened after pressing the **<ENTER>** push-button when the **SAVE OPTIONS** text in the **FILE** list is displayed inversely (selected using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons). The return to the **FILE** list is possible after pressing the **<ESC>** push-button.



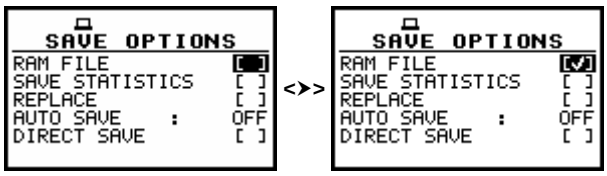
FILE list with SAVE OPTIONS text highlighted (displayed inversely)

It is possible to replace the existing in the memory file by the new one with the same name (the **REPLACE** position), to add to the results the statistics of the measurements (the **SAVE STATISTICS** position, valid only for sound measurements) and to save automatically the results of the measurements (the **AUTO SAVE** position). The position of the sub-list is changed after pressing the **<▲>**, **<▼>** push-buttons.

In order to confirm the selection the **<ENTER>** push-button has to be pressed. Such pressing closes also the opened window.

7.2.1 Saving files in RAM memory - RAM FILE

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"). The activation or deactivation of the **RAM FILE** is done by pressing the **<◄>**, **<►>** push-buttons. This option is useful when remote reading is necessary; available values: **[√]** or **[ ]**.

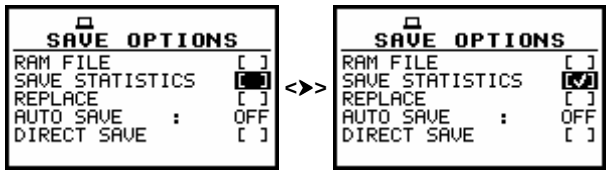


SAVE OPTIONS windows with the selection of RAM FILE parameters

7.2.2 Controlling of the measurement statistics savings - SAVE STATISTICS

The **SAVE STATISTICS** is used to set self-saving, together with the sound measurement results, the statistics of the measurements (**[√]**) or to switch off (**[ ]**) this possibility. Together with the sound measurements, 100-class statistics is performed (the values named from **L01** to **L99**). The statistics are not calculated for the vibration measurements. The activation or deactivation of the **SAVE STATISTICS** is done by pressing the **<◄>**, **<►>** push-buttons.

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!***



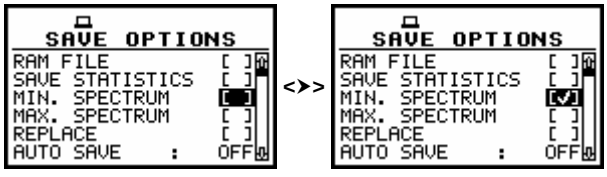
SAVE OPTIONS windows with the selection of SAVE STATISTICS

After pressing the **<ENTER>** push-button the selections made in any position of the list (in particular also in the **SAVE STATISTIC**) are confirmed and the window is closed.

7.2.3 Saving minimum values in the spectrum - MIN SPECTRUM

The **MIN SPECTRUM** appears on the display in the case of **1/1 OCTAVE** and **1/3 OCTAVE** mode and it enables the user to save the lowest 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 / INT. PERIOD*).

The activation or deactivation of the **MIN SPECTRUM** is done by pressing the **<◄>**, **<►>** push-buttons. After pressing the **<ENTER>** push-button the activation is confirmed. The **SAVE OPTION** window is closed ignoring all settings made in it after pressing the **<ESC>** push-button.



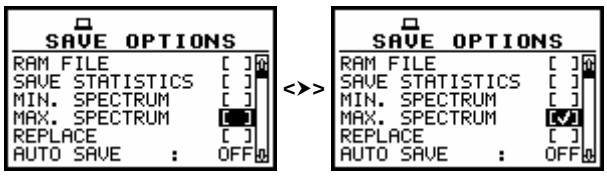
SAVE OPTIONS windows with the selection of MIN. SPECTRUM saving

To see the **MINIMUM** values on the display during the real time **1/1 OCTAVE** or **1/3 OCTAVE** analysis the user has to activate the option in the **DISPLAY** list (*path: MENU / DISPLAY / DISPLAY SETUP / CHANNEL x / SPECTRUM VIEW / MINIMUM*).

7.2.4 Saving maximum values in the spectrum - MAX SPECTRUM

The **MAX SPECTRUM** appears on the display in the case of **1/1 OCTAVE** and **1/3 OCTAVE** mode and it enables the user to save the 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 / INT. PERIOD*).

The activation or deactivation of the **MAX SPECTRUM** is done by pressing the **<◄>**, **<►>** push-buttons. After pressing the **<ENTER>** push-button the activation is confirmed. The **SAVE OPTION** window is closed ignoring all settings made in it after pressing the **<ESC>** push-button.

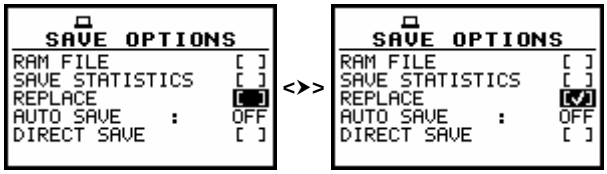


SAVE OPTIONS windows with the selection of MAX. SPECTRUM saving

To see the **MAXIMUM** values on the display during the real time **1/1 OCTAVE** or **1/3 OCTAVE** analysis the user has to activate the option in the **DISPLAY** list (*path: MENU / DISPLAY / DISPLAY SETUP / CHANNEL x / SPECTRUM VIEW / MAXIMUM*).

7.2.5 Replacement of the existing files by the new ones - REPLACE

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**. 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 the case when this position is not active (**[ ]**) – cf. the description of the **SAVE**. The activation or deactivation of the **REPLACE** is done by pressing the **<◄>**, **<►>** push-buttons.



SAVE OPTIONS windows with the selection of REPLACE

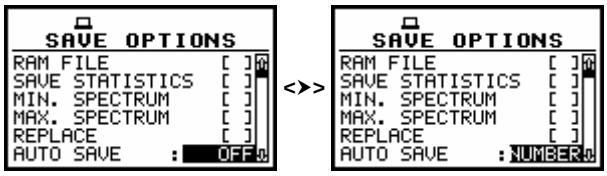
After pressing the **<ENTER>** push-button the selections made in any position of the window (in particular also in the **REPLACE** position) are confirmed and the sub-list is closed. In the case when the **AUTO SAVE** option was active (**[√]**), after pressing the **<ENTER>** push-button the **FILE NAME** window is opened for editing the names for **AUTO SAVE** files.

The **SAVE OPTION** window is closed ignoring all settings made in it after pressing the **<ESC>** push-button.

The next position from the **SAVE OPTIONS** window becomes available after pressing the **<▼>** push-button.

7.2.6 Controlling of the measurement results savings - AUTO SAVE

Using the **AUTO SAVE** one can set the self-saving of the measurement results (**[√]**) or to switch off (**[ ]**) this possibility. The activation or deactivation of the **AUTO SAVE** position is done by pressing the **<◄>**, **<►>** push-buttons. This position was also established in order not to waste too much memory of the instruments when the self-saving is not necessary.



SAVE OPTIONS windows with the selection of AUTO SAVE parameters

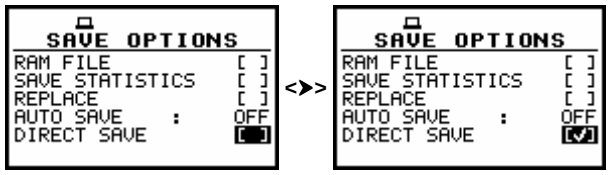
The window for the edition of the base name for the self-saved files is opened (the **AUTO FILE NAME**) after pressing the **<ENTER>** push-button in the case when the **AUTO SAVE** position is activated. The name of the **AUTO SAVE** files is up to eight characters long starting with the special character @.

Displays after entering FILE NAME edition mode for the files saved with AUTO SAVE option active (after pressing <ENTER> push-button in SAVE OPTIONS window, AUTO SAVE switched on)

When the **AUTO SAVE** option is not active (**OFF**), after pressing the **<ENTER>** push-button the instrument returns to the **FILE** list.

7.2.7 Direct access to SAVE / AUTO NAME function - DIRECT SAVE

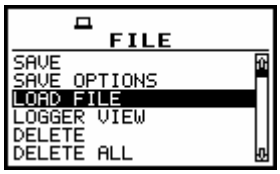
The **DIRECT SAVE** enables one to save measurement results by the simultaneous pressing of the **<ENTER>** and **<Alt>** push-buttons after measurement. If this option is not active (**[ ]**), after pressing these push-buttons the **SAVE** window is accessed (if the measurements are not performed). 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 and the proper message is displayed for a few seconds. The proper setting of the **DIRECT SAVE** is done by pressing the **<◄>**, **<►>** push-buttons.



SAVE OPTIONS windows with the selection of DIRECT SAVE

7.3 Loading the files with the measurement results - LOAD FILE

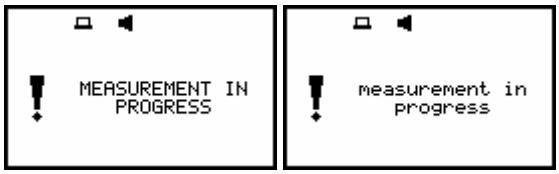
The **LOAD** *(path: MENU / FILE / LOAD)* is used for loading data file from the FLASH DISC (e.g. for the verification or comparison). The position is opened after pressing the **<ENTER>** push-button when the **LOAD** text in the **FILE** list is displayed inversely (selected using the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons). The return to the **FILE** list is possible after pressing the **<ESC>** push-button.



FILE list with LOAD FILE text highlighted (displayed inversely)

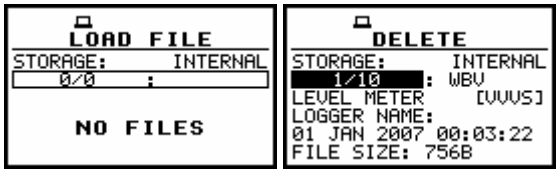
Notice: It is not possible to load the file during the execution of the measurements. *On such attempt the message:* ***„measurement in progress / MEASUREMENT IN PROGRESS"*** *is displayed for about 2 seconds.*

After pressing the **<ENTER>** push-button the instrument checks its current state. In the case when the measurements are performed, the file loading is impossible. In such case, the message with the changing letters is displayed (see below) and the instrument returns after few seconds to the list from which the **LOAD** was called.



Displays with the message stating the reason for unfeasibility of the required operation

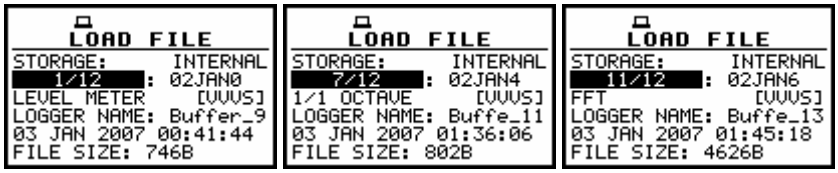
In the case when the instrument memory is empty (no file is stored), the **NO FILES** text is displayed after entering **LOAD** and the instrument waits for the reaction of the user. The user should press then the **<ESC>**, **<ENTER>** or **<Start / Stop>** push-button.



Displays during the execution of LOAD FILE operation

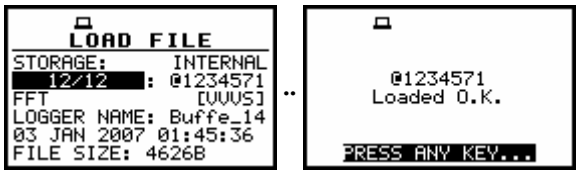
The text informing the user that file was loaded from the internal memory of the instrument is given in the first line. The current number of the file and the total number of the saved files is displayed inversely in the second line together with the name of the file. The type of the current file (**LEVEL METER**, **1/1 OCTAVE**, **1/3 OCTAVE** etc.) and measure mode in each of four channels (**S**ound or **V**ibration) are given in the third line. If the file contains the results from the logger, the name of the logger file is displayed at the right end of the fourth line. Date and time of the **SAVE** operation is displayed in the fifth line. The size of the loaded file is given in the sixth line.

The change of the current file with the unit step can be done after pressing the **<◄>**, **<►>** push-buttons. After pressing the **<◄>** with **<Shift>** push-button the first file is available and after pressing the **<►>** with **<Shift>** push-button - the last one is displayed.



Displays during the overview of the file list

The name of the file is accepted and the file is loaded after pressing the **<ENTER>** push-button. After successful end of loading operation instrument waits for the reaction of the user (any push-button should be pressed except the **<Shift>** and **<Alt>**) and after pressing a push-button it returns to the **FILE** list.



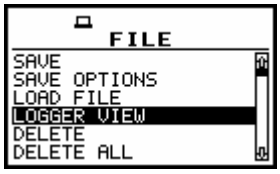
Execution of the LOAD FILE operation

The next message is displayed after successful end of loading operation. The instrument waits for the reaction of the user (any push-button should be pressed except the **<Shift>** one) and after pressing a push-button it returns to the **FILE** list.

7.4 Checking the contents of the loaded file - LOGGER VIEW

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

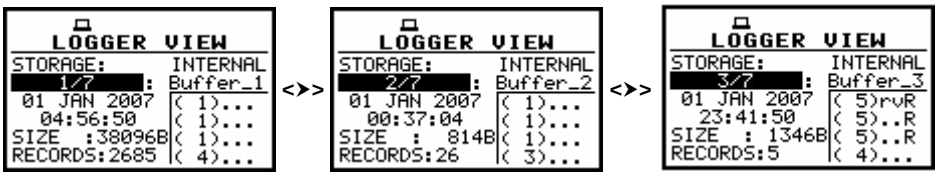
In order to open the window the user has to press the **<ENTER>** push-button when the **LOGGER VIEW** text is displayed inversely.



FILE list with LOGGER VIEW text highlighted

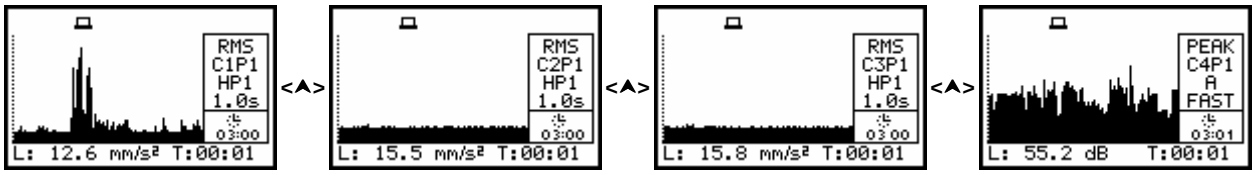
The storage type (**INTERNAL**) is displayed in the first line. The current number of the logger file, the total number of the saved files and the name of the file are displayed in the second line. After pressing the **<◄>** with **<Shift>** push-button the first file is available and after pressing the **<►>** with **<Shift>** push-button - the last one is displayed.

Date and time of the **SAVE** operation is displayed in the third and fourth line. The size of the file is displayed in the fifth line. The number of records (one record is saved after each period equal to logger step) is displayed in the last line. The change of the current file with the unit step can be done after pressing the **<◄>**, **<►>** push-buttons. In the right corner, in the brackets, the number of saved logger results in each channel is displayed (e.g.: **(5)rvR** in the first line 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).



LOGGER VIEW windows with the selection of the logger file to be viewed

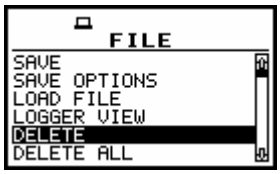
The results from logger's file, coming from different channels, are changed after pressing the **<▲>** or **<▼>** push-buttons – after each pressing the result from the next channel is displayed.



Selection of the logger plot from different channels

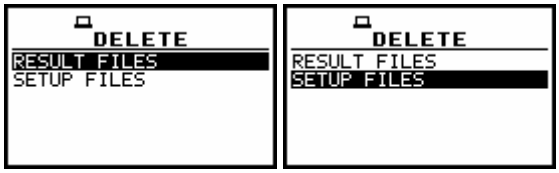
7.5 Removing a file with the measurement results from memory - DELETE

The **DELETE** *(path: MENU / FILE / DELETE)* is used to remove a file from memory. After pressing the **<ENTER>** push-button the instrument checks its current state. In the case when the measurements are performed, the **DELETE** position entering is impossible. In such case, the message with the changing letters is displayed (see below) and the instrument returns after few seconds to the list from which the **DELETE** was called.



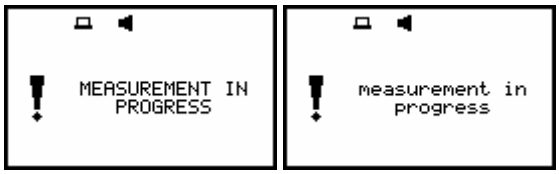
FILE list with DELETE text highlighted (displayed inversely)

In the **DELETE** window, there are two elements: the **RESULT FILES** with the measurement results and the **SETUP FILES** with the saved setups of the instrument. In order to enter the selected sub-list the user has to select the proper text (to display it inversely) using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and then press the **<ENTER>** one. The **DELETE** window is closed and the instrument returns to the **FILE** list after pressing the **<ESC>** one.



DELETE windows opened with RESULT FILES and SETUP FILES selected

After pressing the **<ENTER>** push-button the instrument checks its current state. In the case when the measurements are performed, the **RESULT FILES** or **SETUP FILES** entering is impossible. In such case, the message is displayed and the instrument returns after few seconds to the **DELETE** window.



Displays with the message stating the reason for unfeasibility of the required operation

In the case when the instrument memory is empty (no file is stored), the **NO FILES** text is displayed after entering **DELETE** and the instrument waits for the reaction of the user. The user should press then the **<ESC>**, **<ENTER>** or **<Start / Stop>** push-button.

DELETE window when the memory of the instrument is empty

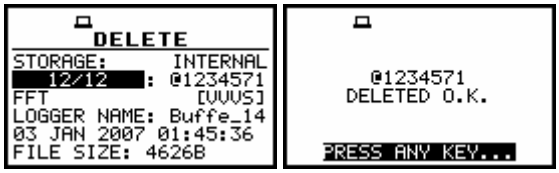
The same data about the existing in the instrument files as in the **LOAD** window are displayed on the display after successful opening the **DELETE** window (pressing the **<ENTER>** push-button). In the consecutive lines of the display the memory in which the results are saved in (**INTERNAL**), the current file number, the total number of the files, the file name, the file type, date and period of registration and the file size are presented.

The change of the current file with the unit step can be done pressing the **<◄>**, **<►>** push-buttons. After pressing the **<◄>** with **<Shift>** push-button the first file is available and after pressing the **<►>** with **<Shift>** push-button - the last one is displayed.

The return to the **FILE** list is possible after pressing the **<ESC>** push-button.

DELETE windows with the selection of the file to be deleted

The name of the file is accepted and the file is deleted after pressing the **<ENTER>** push-button. The message is displayed after the successful end of the operation. The instrument waits for the reaction of the user (any push-button should be pressed except the **<Shift>** one) and after pressing a push-button it returns to the **FILE** list.



Execution of DELETE operation

After the execution of the result files removing from the memory usually the **FILES FREE** memory (*path: MENU / FILE / FREE SPACE*) rests the same as before the deletion but **TOTAL AVAILABLE** memory is increased. It is because erased file was located somewhere inside the file's space. The file is no longer accessible but the recuperated memory is still unused for the next saving. All new files are stored starting at the end of the last saved file.

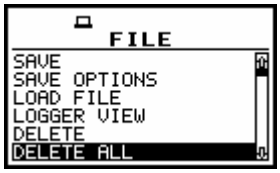
The memory becomes available after the defragmentation process (*path: MENU / FILE / DEFRAGMENTATION)* in which all files are moved to the continuous space. In order to illustrate it let us consider the result file named 02JAN5 file, which is 746 bytes long. The **TOTAL AVAILABLE** is increased after the **DELETE** operation but the **LOGGER FREE** rests unchanged.

T

Execution of the 02JAN5 file deletion and the influence of this process on the memory space

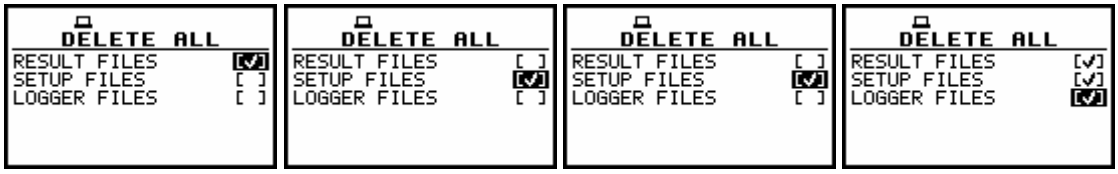
7.6 Removing all files with measurement results from memory - DELETE ALL

The **DELETE ALL** *(path: MENU / FILE / DELETE ALL)* is used to remove all files from memory. In order to enter the position the user has to select the **DELETE ALL** text in the **FILE** list, using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and press the **<ENTER>**.



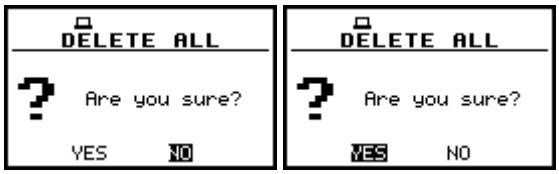
FILE list with DELETE ALL text highlighted (displayed inversely)

It is possible to select **RESULT**, **SETUP** and **LOGGER** files to be deleted. The selection is made with **<◀>**, **<▶>**) push-buttons. The confirmation is made with pressing **<ENTER>**.



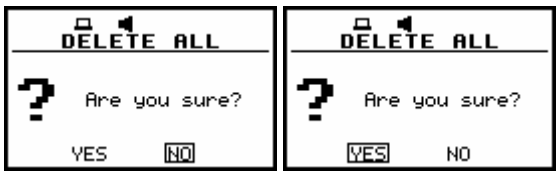
DELETE ALL windows and the selection of the files to be deleted

The instrument requests the confirmation of the operation after entering this position (after pressing the **<ENTER>** push-button). The next pressing of the **<ENTER>** push-button, when the **NO** option is selected, causes the closing of the position and the return to the **FILE** list. The selection of the **NO** or **YES** option is possible using the **<◀>**, **<▶>** push-buttons. The return to the **FILE** list is possible after pressing the **<ESC>** push-button.



Displays during the execution of DELETE ALL operation

After pressing the **<ENTER>** push-button the instrument checks its current state. In the case when the measurements are performed, the execution of the **DELETE ALL** operation is not possible. In such case, the message with the changing letters is displayed (see below) and the instrument returns after few seconds to the list from which the **DELETE ALL** was called.



Displays with the not possible confirmation of DELETE ALL order during the measurement

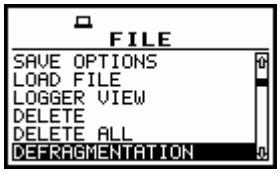
The **<ENTER>** push-button pressing, when the **YES** option is selected and the instrument is not performing the measurements, deletes all existing files. In this case, the text displayed below is presented. In this time, the instrument recovers and clears the memory, which was used by saved files.

Displays during the execution of DELETE ALL operation and after this execution

The message is displayed after the successful execution of the operation. The instrument waits for the reaction of the user (any push-button should be pressed except the **<Shift>** and **<Alt>**) and after pressing a push-button it returns to the **FILE** list.

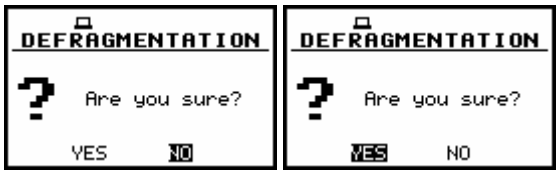
7.7 Memory merging - DEFRAGMENTATION

The **DEFRAGMENTATION** (*path: MENU / FILE / DEFRAGMENTATION*) is used to merge the blocks of the memory which were released after the delete operation. In order to enter the position the user has to select the **DEFRAGMENTATION** text in the **FILE** list, using the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons and press the **<ENTER>**.



FILE list with DEFRAGMENTATION text highlighted

The instrument requests the confirmation of the operation after entering this position (after pressing the **<ENTER>** push-button). The next pressing of the **<ENTER>** push-button, when the **NO** option is selected, causes the closing of the window and the return to the **FILE** list. The selection of the **NO** or **YES** option is possible using the **<◄>**, **<►>** push-buttons. The return to the **FILE** list is possible after pressing the **<ESC>** push-button.

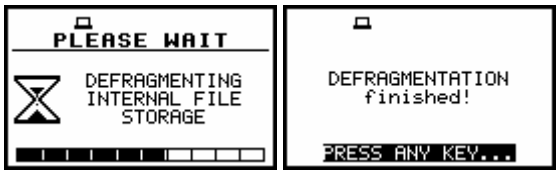


Displays before the execution of DEFRAGMENTATION operation

The **<ENTER>** push-button pressing, when the **YES** option is selected and the instrument is not performing the measurements, merges the memory. The presented below message is displayed in the case when the operation is not required. The instrument waits for the reaction of the user (any push-button should be pressed except the **<Shift>** and **<Alt>**) and after pressing a push-button it returns to the **FILE** list. The operation is not executed in a case when **FREE SPACE** is equal to **TOTAL AVAILABLE**.

Display in the case when DEFRAGMENTATION operation is not required

In the case when the **DEFRAGMENTATION** operation is performed, the following texts are displayed (see below).



Displays during the execution of DEFRAGMENTATION operation

In this time, the instrument recovers, clears and merges in one block the memory, which was used by the deleted files. The presented below message is displayed after successful memory merging (see Fig. c). The instrument waits for the reaction of the user (any push-button should be pressed except the **<Shift>** and **<Alt>**) and after pressing a push-button it returns to the **FILE** list. The result of the **DEFRAGMENTATION** operation is visible below in Fig. d (**FILES FREE** space is increased), while the state of the memory before the execution of this operation is given in Fig. b and before **DELETE** operation - in Fig. a.

a)


b)


c)


d)


Displays with the state of the file's memory before DELETE operation (a), after DELETE operation (b) after the execution of DEFRAGMENTATION operation (c) and the state of the memory after the execution of the operation (d)

7.8 Checking the contents of the memory - CATALOGUE

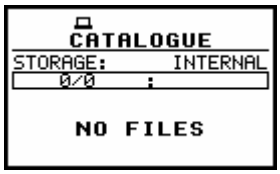
The **CATALOGUE** is used for checking the contents of the memory (the list of the files). In order to enter the window the user has to select the **CATALOGUE** text in the **FILE** list, using the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons and press the **<ENTER>**.

FILE list with CATALOGUE text highlighted

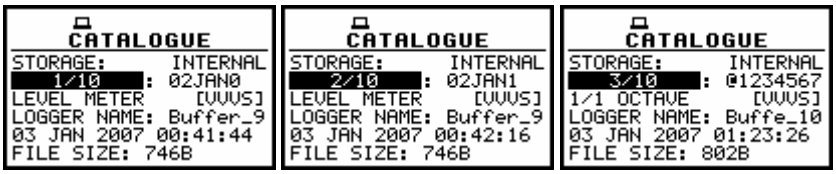
In the case when the instrument memory is empty (no file is stored or after **DELETE ALL** operation), the **NO FILES** text is displayed after entering the **CATALOGUE** window and the instrument waits for the reaction of the user. The user should press then the **<ESC>**, **<ENTER>** or **<Start / Stop>** push-button.

The same data about the existing in the instrument files as in the **LOAD FILE** window are displayed on the display after opening **CATALOGUE**. In the consecutive lines of the display, the memory in which the results are saved, the current file number, the total number of the files, the file name, the file type, date and time of registration are presented. The change of the current file with the unit step can be done pressing the **<◄>**, **<►>** push-buttons.

After pressing the **<◄>** with **<Shift>** push-button the first file is available and after pressing the **<►>** with **<Shift>** push-button - the last one is displayed. The return to the **FILE** list is possible after pressing the **<ESC>** or **<ENTER>** push-button.



Displays with the contest of CATALOGUE operation when the memory is empty



Exemplary contents of CATALOGUE window

7.9 Checking the free space in the memory - FREE SPACE

The **FREE SPACE** *(path: MENU / FILE / FREE SPACE)* is used to read out the free space in the FLASH DISC memory of the instrument. In order to enter the position the user has to select the **FREE SPACE** text in the **FILE** list, using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and press the **<ENTER>**. The return to the **FILE** list is possible after pressing the **<ESC>** or **<ENTER>** push-button.

FILE list with FREE SPACE text highlighted (displayed inversely)

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 16121360 bytes. The second part is used for saving the logger files and its size is equal to 15728156 bytes.

The **FREE SPACE** window in the instrument after the execution of the **DELETE ALL** operation is presented below.

FREE SPACE window after the execution of the DELETE ALL operation

The **FREE SPACE** window contains three numbers. First two, named **FILES FREE** and **TOTAL AVAILABLE**, characterise the result and setup files memory.

The files are always saved starting from the beginning of the continuous memory space. The size in bytes of this space is given in the **FILES FREE** window.

If the result and setup files were not deleted from the memory the number of bytes displayed in the **TOTAL AVAILABLE** window is the same as in the **FILES FREE SPACE**. However, if some of them were deleted, assuming that they were not the last saved, the memory used by them is empty but it does not increase the continuous space.

In such case, the number given in the **TOTAL AVAILABLE** window is greater than that in the **FILES FREE**. The **DEFRAGMENTATION** operation, which merges files, should be used to increase the **FILES FREE** space.

FREE SPACE window with the number depending on the measurements and operations performed

7.10 Saving setup in the instrument's memory - SAVE SETUP

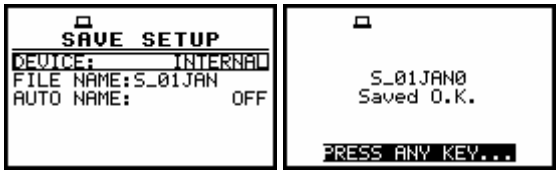
The **SAVE SETUP** *(path: MENU / FILE / SAVE SETUP)* is used for storing data in the FLASH DISC memory of the instrument as a file (see Appendix B for the file formats).

In order to enter the position the user has to select the **SAVE SETUP** text in the **FILE** list, using the **<▲>** (or **<◄>**) push-button. After the selection the **<ENTER>** push-button must be pressed.

The additional function for results saving (the **AUTO NAME** – save a file with the name automatically increased by one) is available after selection of the **NUMBER** text in **AUTO NAME** line.

The return to the **FILE** sub-list is possible after pressing the **<ESC>** push-button.

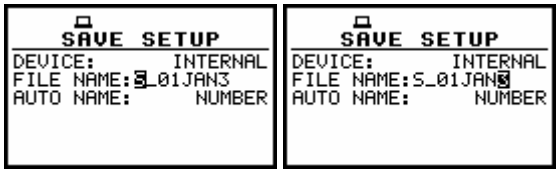
FILE list with SAVE SETUP text highlighted (displayed inversely)



SAVE SETUP window

The name of the file, in which the configuration of meter is saved, is displayed in the second line. The default name for a file is displayed in the case of the first entering to this position (after power on) and the last saved file's name – in the case of the next entering. It is possible to edit this name or to save a file using **AUTO NAME** option (save a file with the name automatically increased by one).

The edition of the **FILE NAME** is made using the **<▲>**, **<▼>** push-buttons pressed together with **<Shift>**. One can select the character to be edited using the **<◄>**, **<►>** push-buttons.



Displays during the process of setting the character in the edited name

The empty space is created for the introduction of a new character in the edited name (the **Insert** operation is executed) when the **<Shift>** push-button is pressed together with the **<➤>**.

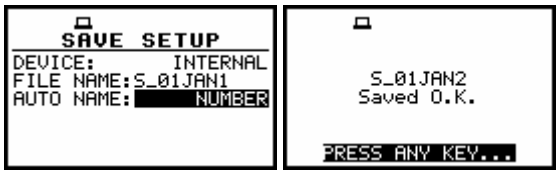
Displays in FILE NAME edition after pressing <Shift> and <➤> push-buttons

The character, which is displayed inversely, is deleted from the edited name (the **Delete** operation is executed) when the **<Shift>** and **<◄>** push-buttons are pressed.

Displays in FILE NAME edition after pressing <Shift> and <◄> push-buttons

The edited name is accepted and the file is saved after pressing the **<ENTER>** push-button (cf. the description of the **AUTO NAME** function). The instrument waits then for a reaction of the user (any push-button should be pressed except the **<Shift>** and **<Alt>**). All changes introduced to the file name during the edition are ignored after pressing the **<ESC>** push-button. This pressing causes the return to the list from which the **SAVE SETUP** option was entered.

The **AUTO NAME** function consists in saving data in the file with the name increased by one in relation to the name displayed in the **FILE NAME** window. Switching on the function is made by selection of **NUMBER** text in **AUTO NAME** line. The confirmation is made by pressing **<ENTER>**. The number can be changed from 0 to N, when the only limitation of the N value is the length of the file name, which cannot be longer than 8 characters.



Displays with AUTO NAME function switched on and after saving the file with the increased name

The presented below message is displayed after pressing the **<ENTER>** push-button in the case when the file with the selected name already exists in the instrument's memory and the **REPLACE** option is not active (*path: MENU / FILE /SAVE OPTIONS / REPLACE*). The instrument then waits for the reaction of the user (any push-button should be pressed except the **<Shift>** and **<Alt>**) and after pressing a push-button it returns to the **FILE** list. In such case the user can edit a new "start number" of a file and then save it using **AUTO NAME** option.

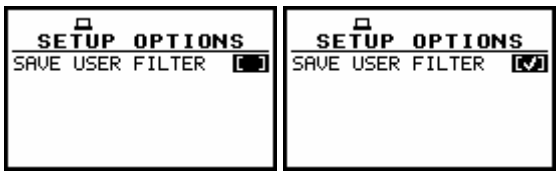
Displays after SAVE operation when the file with the selected name already exists in the instrument's memory (with the message if REPLACE is not active)

7.11 Enabling of saving user filter option - SETUP OPTIONS

The **SETUP OPTIONS** *(path: MENU / FILE / SETUP OPTIONS)* is used for disabling or enabling the **SAVE USER FILTER** option. In order to enter the position the user has to select the **SETUP OPTIONS** text in the **FILE** list, using the **<▲>**, **<▼>** push-buttons. After the selection the **<ENTER>** push-button must be pressed. The return to the **FILE** sub-list is possible after pressing the **<ESC>** push-button.

FILE list with SETUP OPTIONS text highlighted

The activation or deactivation of the option is done by pressing the **<◄>**, **<►>** push-buttons. The confirmation is made by pressing the **<ENTER>** one.



SETUP OPTIONS window with SAVE USER FILTER selection

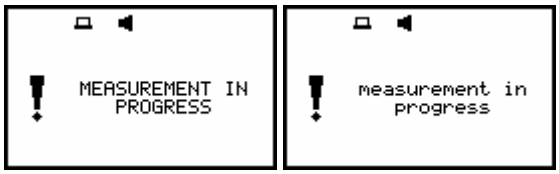
7.12 Loading the files with the configuration - LOAD SETUP

The **LOAD SETUP** *(path: MENU / FILE / LOAD SETUP)* is used for loading data file from the FLASH DISC. The position is opened after pressing the **<ENTER>** push-button when the **LOAD SETUP** text in the **FILE** list is displayed inversely (selected using the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons). The return to the **FILE** list is possible after pressing the **<ESC>** push-button.

FILE list with LOAD SETUP text highlighted (displayed inversely)

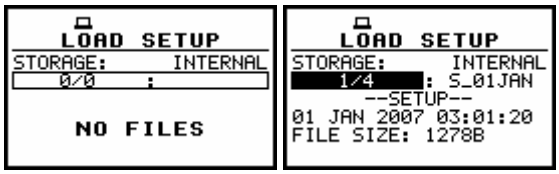
Notice: It is not possible to load the file during the execution of the measurements. *On such attempt the message: **„measurement in progress / MEASUREMENT IN PROGRESS”** is displayed for about 2 seconds.*

After pressing the **<ENTER>** push-button the instrument checks its current state. In the case when the measurements are performed, the file loading is impossible. In such case, the message with the changing letters is displayed (see below) and the instrument returns after few seconds to the list from which the **LOAD** was called.



Displays with the message stating the reason for unfeasibility of the required operation

In the case when the instrument memory is empty (no file is stored), the **NO FILES** text is displayed after entering the **LOAD SETUP** window and the instrument waits for the reaction of the user. The user should press then the **<ESC>**, **<ENTER>** or **<Start / Stop>** push-button.



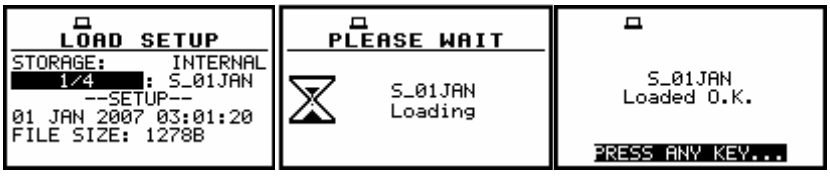
Displays during the execution of LOAD SETUP operation

The text informing the user that file was loaded from the internal memory of the instrument is given in the first line. The current number of the file and the total number of the saved files are displayed inversely in the second line together with the name of the file. The **SETUP** type of the current file is given in the third line. Date and time of the **SAVE** operation is displayed in the fourth line. The file size is given in the fifth line.

The change of the current file with the unit step can be done after pressing the **<⮜>**, **<⮞>** push-buttons. After pressing the **<⮜>** with **<Shift>** push-button the first file is available and after pressing the **<⮞>** with **<Shift>** push-button - the last one is displayed.

Displays during the overview of the file list

The name of the file is accepted and the file is loaded after pressing the **<ENTER>** push-button. The special message is displayed with the name of the selected file during the execution of the operation (see below).



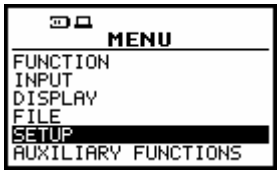
Display during and after the execution of LOAD SETUP operation

The next message is displayed after successful end of loading operation. The instrument waits for the reaction of the user (any push-button should be pressed except the **<Shift>** one) and after pressing a push-button it returns to the **FILE** list.

8 SETUP MENU - SETUP

The **SETUP** (*path: MENU / SETUP*) list contains different windows and positions. Some of them are directly related with sound measurements, some of them depend on the mode of the instrument (sound or vibration meter) and some are related with the settings of the instrument's hardware components. In order to open the **SETUP** list the user has to:

- press the **<Menu>** push-button,
- select from the main list, using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons, the **SETUP** text (highlight it inversely),
- press the **<ENTER>** push-button.



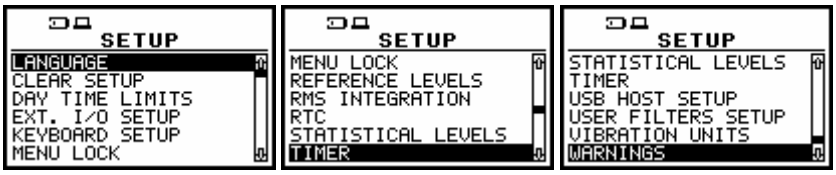
Main list with SETUP text highlighted (displayed inversely)

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

LANGUAGE	it enables the user to set language of the user interface;
CLEAR SETUP	it enables the user to return to the producer's set-up, except the coefficients set in the **USER FILTERS**;
DAY TIME LIMITS	it enables the user to select the hours limiting day and night for the calculation of the **Lden** result;
EXT. I/O SETUP	it enables one to connect meter with other device;
KEYBOARD SETUP	it enables the user to set the operating mode of the **<Shift>** and **<Start / Stop>** push-buttons and to switch on the **KEYLOCK**;
MENU LOCK	it enables the user to lock the menu;
REFERENCE LEVELS	it enables the user to select the reference level for the vibration measurements and it informs the user about the reference level in the sound measurements;
RMS INTEGRATION	it enables the user to select the way of integration for the **RMS** measurement in the case of vibration meter or the **LEQ** measurement in the case of sound level meter;
RTC	it enables the user to set the Real Time Clock;
STATISTICAL LEVELS	window available only in the sound meter mode. It enables the user to select ten statistics results to be saved in a file together with the main results (cf. the description of the files in App. B). This position is taken off from the menu in the vibration meter mode;
TIMER	it enables the user to set the Timer function;
USB HOST SETUP	it enables the user to select the functionality of the **USB Host** port;
USER FILTERS SETUP	it enables the user to select, switch on or off and set the correcting values for all 1/1 and 1/3 octave filters in the case of sound measurements; in the case of vibration measurements the weighting filters are always switched on, the user can set the correcting coefficients;
VIBRATION UNITS	it enables the user to select the vibration units in which the results of the measurements are to be given;
WARNINGS	it enables the user to switch on or off the warnings, which can be displayed during the operation of the instrument.

Pressing the **<Shift>** and **<▲>** (or **<Shift>** and **<◀>**) push-buttons results in a movement to the first position of the opened list and pressing the **<Shift>** and **<▼>** (or **<Shift>** and **<▶>**) – results in a movement to the last position of the opened list.

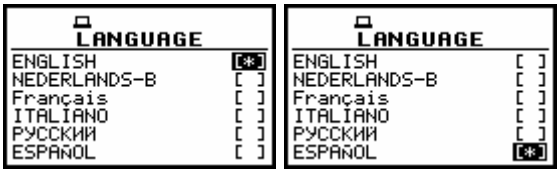
In each available position any change is performed by means of the **<◀>**, **<▶>** push-buttons. In order to confirm the selection the **<ENTER>** push-button has to be pressed. After this confirmation the opened window or list is closed. In order to ignore any changes made in the opened window or list the user has to press the **<ESC>** push-button.



Displays with SETUP list

8.1 Setting the language of the user interface - LANGUAGE

The **LANGUAGE** enables one to select the language of the user interface. In order to enter the list one has to press the **<ENTER>** push-button on the inversely displayed **LANGUAGE** text of the **SETUP** list. The selection is made by placing a special character by means of the **<▲>**, **<▼>**, **<◀>**, **<▶>** push-buttons in the line with the selected language. Pressing the **<Shift>** and **<▲>** (or **<Shift>** and **<◀>**) push-buttons results in a movement to the first position of the opened list and pressing the **<Shift>** and **<▼>** (or **<Shift>** and **<▶>**) – results in a movement to the last position of the opened list. The selection is confirmed and the list is closed after pressing the **<ENTER>** push-button. The list is closed without any confirmation after pressing the **<ESC>** push-button.



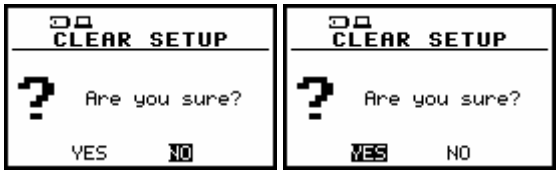
Displays with LANGUAGE list

8.2 Return to the factory made settings - CLEAR SETUP

The **CLEAR SETUP** *(path: MENU / SETUP / CLEAR SETUP)* enables the user to return to the producer's set-up of the instrument. In order to enter the window the user has to select the **CLEAR SETUP** text in the **SETUP** list, using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and press the **<ENTER>**. After entering this position, the request for the confirmation is displayed. The position is closed without any action and the instrument returns to the **SETUP** list after pressing the **<ESC>** push-button.

SETUP list with CLEAR SETUP text highlighted (displayed inversely)

After entering the window, the request for the confirmation is displayed. The proper answer for the request is selected by means of the **<◄>**, **<►>** push-buttons. The instrument returns to the default set-up after pressing the **<ENTER>** push-button in the case when the answer **YES** was chosen.



Displays with the request for the confirmation for CLEAR SETUP execution

During the clearing process, the message **"CLEARING SETUP"** is displayed. The **SETUP CLEARED** message is displayed after the return to the default settings and the instrument waits for the user's reaction.

Display after the execution of CLEAR SETUP function

The window is closed and the instrument returns to the **SETUP** list after pressing any push-button with an exception of the **<Shift>** and **<Alt>**.

8.3 Day time limits selection - DAY TIME LIMITS

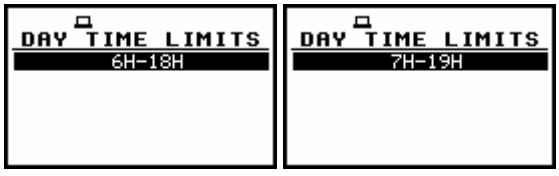
The **DAY TIME LIMITS** enables the user to select the required by the local standards determination of the day and night. These limits are used for the calculation of the **Lden** function (cf. App. D for the definition).

In order to enter the window the user has to select the **DAY TIME LIMITS** text in the **SETUP** list, using the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons and press the **<ENTER>**.

SETUP list with DAY TIME LIMITS text highlighted (displayed inversely)

Two options are available: **6H–18H** and **7H–19H**. The required limits can be selected by means of the **<◄>**, **<►>** push-buttons.

The window is closed and the instrument returns to the **SETUP** list after pressing the **<ENTER>** (with the confirmation of a change made in the position) or **<ESC>** push-button (ignoring any change made there).



Displays with the available DAY TIME LIMITS

8.4 Selection of the extended mode - EXT. I/O SETUP

The **EXT. I/O SETUP** *(path: MENU / SETUP / EXT. I/O SETUP)* enables the user to select the output or input device. The additional output socket, called **EXT I/O**, **enables one to connect meter with another device**. On this socket, the signal from the input or output of the analogue / digital converter (before the correction) is available. This signal can be registered using the magnetic recorder, can be observed on the oscilloscope or can be used for triggering measurements. It is possible to select three different modes: **ANALOG**, **DIGITAL IN** and **DIGITAL OUT**.

This position enables the user to set the proper parameters of the extended I/O output. In order to enter the window the user has to select the **EXT. I/O SETUP** text in the **SETUP** list, using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons, and press the **<ENTER>**.

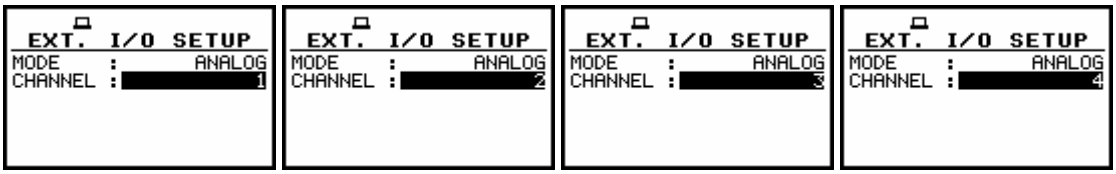
SETUP list in sound measurements with EXT. I/O SETUP text highlighted (displayed inversely)

In the **MODE** position of **EXT. I/O SETUP** window three options are available: **ANALOG**, **DIGITAL IN** and **DIGITAL OUT**. In order to select the proper mode the user has to press the **<◀>**, **<▶>** push-buttons. The window is closed and the instrument returns to the **SETUP** list after pressing the **<ENTER>** (with the confirmation of a change made in the window) or **<ESC>** push-button (ignoring a change made there).

EXT. I/O SETUP windows with the different I/O devices selection

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**.

The selected channel is being connected to the extended I/O port. In order to enter this position the user has to select the **CHANNEL** text in the **EXT. I/O SETUP** list, using the **<▲>**, **<▼>** push-buttons. After selection of the **CHANNEL** the user has to press the **<◀>**, **<▶>** push-buttons. The window is closed and the instrument returns to the **SETUP** list after pressing the **<ENTER>** (with the confirmation of a change made in the window) or **<ESC>** push-button (ignoring a change made there).



EXT. I/O SETUP windows with the channel selection for output signal

In the **DIGITAL IN** mode the meter is connected to the output device, which triggers it. The measurements are started, when on this input there is a triggering impulse. In this mode the instrument works in **EXT.TRIGGER** function.

In the **DIGITAL OUT** mode the meter is connected to the output device, which has to be triggered. In this mode the instrument works in **TRIGGER PULSE** function. It is especially useful in the multi-channel, simultaneous, synchronised measurements.

8.5 Selection of few push-buttons modes - KEYBOARD SETUP

The **KEYBOARD SETUP** *(path: MENU / SETUP / KEYBOARD SETUP)* enables one to programme the operation mode of the **<Shift>**, **<Start / Stop>** push-buttons and to set the **KEYLOCK** option.

SETUP list with KEYBOARD SETUP text highlighted (displayed inversely)

In order to enter the window the user has to select the **KEYBOARD SETUP** text in the **SETUP** list, using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and press the **<ENTER>**. The selection of a parameter in all positions is done by means of the **<◀>**, **<▶>** push-buttons and confirmed by the **<ENTER>** one.

8.5.1 Selection of the working mode of <Shift> / <Alt> push-buttons - SHIFT MODE

In the **SHIFT** the user can choose between **Shift** and **2nd Fun.** When the **Shift** text is selected, the push-button with this name operates as in the keyboard of a computer – in order to achieve the desired result the second push-button has to be pushed in conjunction with the **<Shift>** or **<Alt>**.

When the **2nd Fun.** text is selected the **<Shift>** push-button operates in the sequence with the other one. This mode is additionally signalled by the flashing **"Arrows"** icon on the top of the display which appears after pressing **<Shift>** or **<Alt>** push-button in this mode and is flashing until any other push-button with double meaning is pressed.

In order to select a desired mode of the **<Shift>** push-button the **<◀>**, **<▶>** should be pressed. In order to confirm the selection the **<ENTER>** push-button has to be pressed. Such pressing closes the window. After pressing the **<ESC>** push-button the window is also closed but all changes, which were made, are ignored.

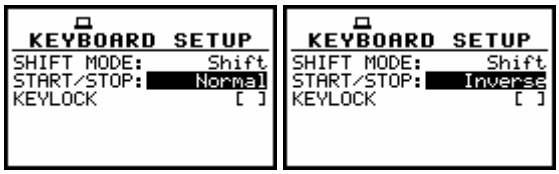
KEYBOARD SETUP windows with the available settings in SHIFT MODE

8.5.2 Selection of the working mode of <Start / Stop> push-button - START/STOP

In the **START/STOP** *(path: MENU / SETUP / KEYBOARD SETUP)* the user can choose between **Normal** and **Inverse**. When the **Normal** text is selected the **<Start / Stop>** push-button operates as it is described in Chapter 2 – the instrument reacts on each of its pressing, starting or stopping the measurements.

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

In order to select a desired mode of the **<Start / Stop>** push-button the **<◀>**, **<▶>** should be pressed. In order to confirm the selection the **<ENTER>** push-button has to be pressed. Such pressing closes the window. After pressing the **<ESC>** push-button the window is also closed but all changes, which were made, are ignored.



KEYBOARD SETUP windows with the available settings in START/STOP

8.5.3 Locking the keyboard - KEYLOCK

The **KEYLOCK** is switched on after placing the special character (**[√]**) in the inversely displayed position in the line with the **KEYLOCK** text. In order to confirm the selection the **<ENTER>** push-button has to be pressed. Such pressing closes the window. After pressing the **<ESC>** push-button the window is also closed but all changes, which were made, are ignored.

KEYBOARD SETUP window with the activation of KEYLOCK option

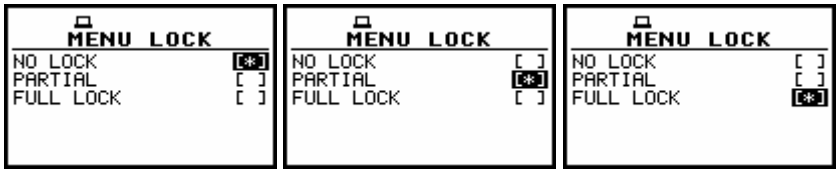
8.6 Locking the MENU- MENU LOCK

The **MENU LOCK** (*path: MENU* / *SETUP* / *MENU LOCK*) enables the user to lock **MENU** partially or fully. In order to enter the window, the user has to select the **MENU LOCK** text in the **SETUP** list, using the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons and press the **<ENTER>**.

SETUP list with MENU LOCK text highlighted (displayed inversely)

In this window, three options are available **NO LOCK**, **PARTIAL** and **FULL LOCK**. 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** window appears on the display. The **MENU** is available after unlocking it.

In order to activate the required option the user has to place, by means of the **<◄>**, **<►>** push-buttons, the special character **[*]** in the proper position. In order to confirm the selection, the **<ENTER>** push-button has to be pressed. Such pressing closes the window. After pressing the **<ESC>** push-button the window is also closed but all changes, which were made, are ignored.



MENU LOCK windows with available options

8.7 Setting the reference signal in vibration measurements - REFERENCE LEVELS

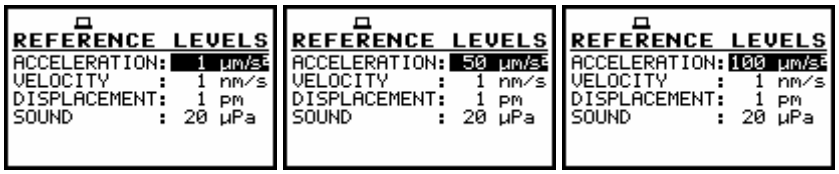
The **REFERENCE LEVELS** (*path: MENU / SETUP / REFERENCE LEVELS*) enables the user to set the reference level of the signal in vibration or sound measurements. The values, which are set here, are taken into account during the calculations of the measurement results expressed in the logarithmic scale (with the dB as the units).

In order to enter the window the user has to select the **REFERENCE LEVELS** text in the **SETUP** list, using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and press the **<ENTER>**. The selection of a parameter which level has to be set is done by means of the **<▲>**, **<▼>** push-buttons.

SETUP list with REFERENCE LEVELS text highlighted (displayed inversely)

8.7.1 Setting the reference level of the acceleration signal - ACC

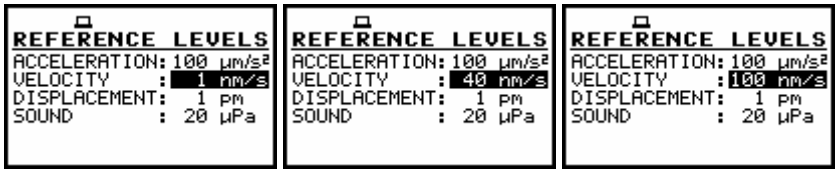
In the **ACC**, the user can set the reference level of the acceleration signal. It is possible to set the level from 1 μms^{-2} to 100 μms^{-2} with 1 μms^{-2} step pressing the **<◀>**, **<▶>** push-buttons. The step can be increased to 10 μms^{-2} pressing the **<Shift>** with the **<◀>**, **<▶>** push-buttons. In order to confirm the setting the **<ENTER>** push-button has to be pressed. Such pressing closes the window. After pressing the **<ESC>** push-button the window is also closed but all changes, which were made, are ignored.



REFERENCE LEVELS windows with the reference level setting of acceleration signal

8.7.2 Setting the reference level of the velocity signal - VEL

In the **VEL**, the user can set the reference level of the velocity signal. It is possible to set the level from 1 nms^{-1} to 100 nms^{-1} with 1 nms^{-1} step pressing the **<◀>**, **<▶>** push-buttons. The step can be increased to 10 nms^{-1} pressing the **<Shift>** with the **<◀>**, **<▶>** push-buttons. In order to confirm the setting the **<ENTER>** push-button has to be pressed. Such pressing closes the window. After pressing the **<ESC>** push-button the window is also closed but all changes, which were made, are ignored.

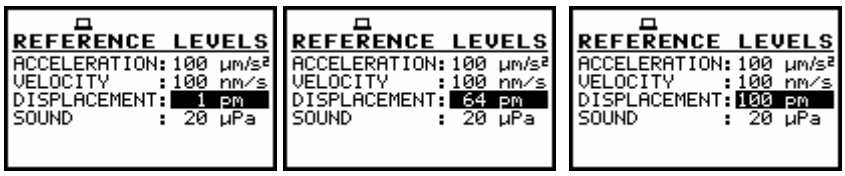


REFERENCE LEVELS windows with the reference level setting of velocity signal

8.7.3 Setting the reference level of the displacement signal - DIL

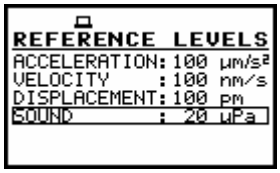
In the **DIL**, the user can set the reference level of the displacement signal. It is possible to set the level from 1 pm to 100 pm with 1 pm step pressing the **<◀>**, **<▶>** push-buttons. The step can be increased to 10 pm pressing the **<Shift>** with the **<◀>**, **<▶>** push-buttons. In order to confirm the setting

the **<ENTER>** push-button has to be pressed. Such pressing closes the window. After pressing the **<ESC>** push-button the window is also closed but all changes, which were made, are ignored.



REFERENCE LEVELS windows with the reference level setting of displacement signal

In the case of sound measurements the **REFERENCE LEVELS** window is used only to inform the user that the reference level of the acoustic signal is equal to 20 µPa. After pressing the **<ESC>** or **<ENTER>** push-buttons the window is closed.



REFERENCE LEVELS window with the reference level of the acoustic signal

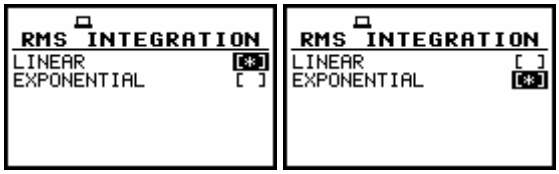
8.8 Selection of detector's type in the LEQ (RMS) calculations - RMS INTEGRATION

The **RMS INTEGRATION** (*path: MENU / SETUP / 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). In order to enter the window the user has to select the **RMS INTEGRATION** text in the **SETUP** list, using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and press the **<ENTER>**.

SETUP list with RMS INTEGRATION text highlighted (displayed inversely)

Two options are available: **LINEAR** and **EXPONENTIAL**. The required parameter can be selected by means of the **<◀>**, **<▶>** push-buttons. The window is closed and the instrument returns to the **SETUP** list after pressing the **<ENTER>** (with the confirmation of a change made in the window) or the **<ESC>** push-button (ignoring a change made there).

The expressions used for the **LEQ** or **RMS** calculations are given in Appendix D. When this option is selected in the 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).

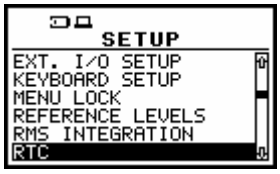


Displays with the available options of RMS INTEGRATION

When the **EXPONENTIAL** option is selected in the case of sound measurements, the value of the **LEQ** and **SEL** function depends on the detector time constant (the results are displayed **with** the indicator of the detectors selected in the profiles).

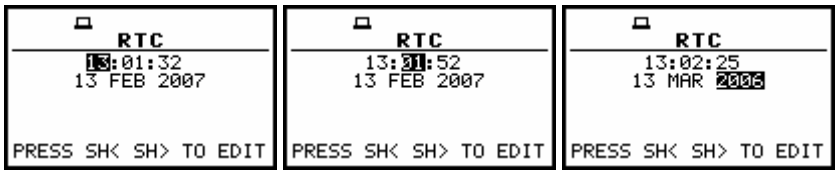
8.9 Programming of the instrument's internal Real Time Clock - RTC

The **RTC** (*path: MENU / SETUP / RTC*) enables one to programme the internal **Real Time Clock**. This clock is displayed in the top right corner of the instrument's display. In order to enter the window the user has to select the **RTC** text in the **SETUP** list, using the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons and press the **<ENTER>**.



SETUP list with RTC text highlighted (displayed inversely)

The operation of the **RTC** setting is performed in the same way as it was described in the case of the **FILE NAME** window. The selection of the setting parameter is performed using the **<◄>**, **<►>** push-buttons and the change of its value – using the **<▲>**, **<▼>** push-buttons. The parameter, which value has to be changed, is flashing.



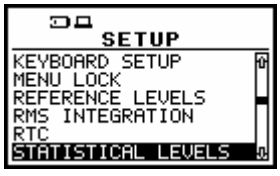
RTC window

Notice: *The new value of a parameter is confirmed after each pressing of the* **<▲>**, **<▼>** *(new value is selected without any confirmation from the* ***<ENTER>*** *push-button).*

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

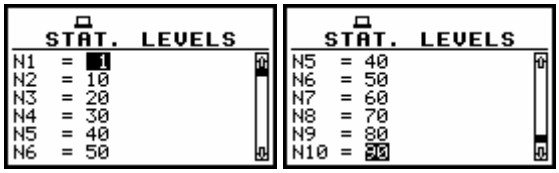
8.10 Selection of statistics levels to be saved in a file - STATISTICAL LEVELS

The **STATISTICAL LEVELS** (*path: MENU / SETUP / STATISTICAL LEVELS*) enables the user to select ten statistics from one hundred calculated in the instrument to be saved in a file together with the main results of the measurements.



SETUP list with STATISTICAL LEVELS text highlighted (displayed inversely)

In order to enter the window, the user has to select the **STATISTICAL LEVELS** text in the **SETUP** list, using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and press the **<ENTER>** one.

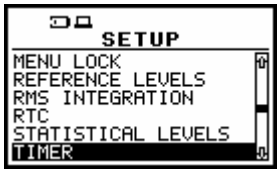


STATISTICAL LEVELS windows

The selection of the position in the window (the proper **Ni**, where i = 1,…, 10) is performed by means of the **<▲>**, **<▼>** push-buttons. The selection of a number from 1 to 99 in all ten **Ni** positions is done by means of the **<◀>**, **<▶>** push-buttons (with the step equal to 1) or by means of the **<◀>**, **<▶>** push-buttons together with the **<Shift>** one (with the step equal to 10). The window is closed and the instrument returns to the **SETUP** list after pressing the **<ENTER>** (with the confirmation of all settings made in the window) or **<ESC>** push-button (ignoring all settings made there).

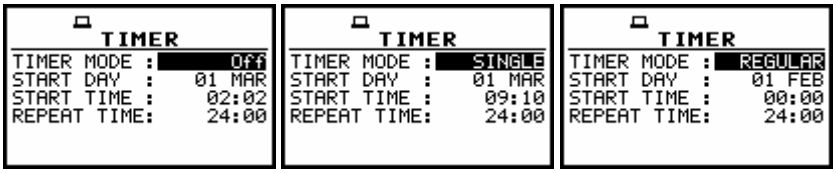
8.11 Programming of the instrument's internal timer - TIMER

The **TIMER** (*path: MENU / SETUP / TIMER*) enables one to programme the internal timer. The instrument can be switched on by itself in the programmed time and can perform the measurements using the set-up, which was used before its switching off. In order to enter the window the user has to select the **TIMER** text in the **SETUP** list (using the **<▲>** or **<◀>** push-buttons) and press the **<ENTER>**.



SETUP list with TIMER text highlighted (displayed inversely)

The operation of the **TIMER** (*path: MENU / SETUP / TIMER*) setting is performed using the **<◀>**, **<▶>** push-buttons and the change of its value – using the **<◀>**, **<▶>** push-buttons pressed together with the **<Shift>**.



TIMER window

Notice: *The new value of a parameter is confirmed after each pressing of the* **<◀>** *or* **<▶>** *together with the* ***<Shift>*** *push-buttons (new value is selected without any confirmation from the* ***<ENTER>*** *push-button).*

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

8.12 Selection the USB–HOST port functionality - USB–HOST PORT

The **USB–HOST PORT** enables one to programme the functionality of the instrument's socket named **USB Host**. This function is under development.

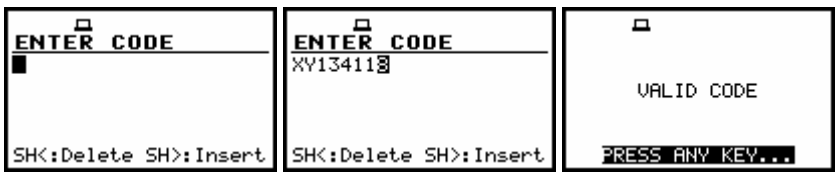
SETUP list with USB–HOST PORT text highlighted (displayed inversely)

The socket **USB Host** can be used to serve as the input of the different interfaces: **RS 232** or **USB**. 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.

In order to enter the window the user has to select the **USB–HOST PORT** text in the **SETUP** list, using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and press the **<ENTER>** one.

USB–HOST SETUP window

The selection of the socket's functionality is made with the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons which move the special character between the available options. The selection is confirmed after pressing the **<ENTER>** push-button which closes the window and returns to the **SETUP** list. The return to this list is also possible after pressing the **<ESC>** push-button but the selection is not confirmed. The USB host interface can be used to control the external USB memory disk (**USB DISK**) with the FAT16 or FAT32 file systems or IrDA (Infra Red Data Association) interface (**USB IrDA**) based on the dedicated circuit STIr4200. The first selection of the USB interface requires the introduction of the activation code (after pressing the **<ENTER>** push-button, the **ENTER CODE** window appears on the display). The next selection does not require any code.



Displays during the activation of USB host's functions

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.*

Notice: *The USB disk 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 the disconnection between USB disk and the instrument.*

8.13 Introduction the filter coefficients for 1/1 OCTAVE and 1/3 OCTAVE analysis – USER FILTERS SETUP

The **USER FILTERS SETUP** (*path: MENU / SETUP / USER FILTERS*) enable the user to introduce the values of the correcting coefficients taken into account in **1/1 OCTAVE** or **1/3 OCTAVE** analysis. The results of the analysis can be modified by the introduced factors and so calculated **TOTAL** values for one or two active (set to **On**) sets of the filters presented on the display. In order to enter the window the user has to select the **USER FILTERS SETUP** text in the **SETUP** list, using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and press the **<ENTER>**. The texts which appear after pressing **<ENTER>** depends on the position set in the **MODE** window.

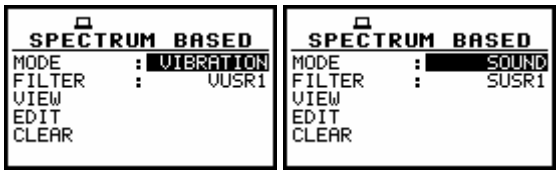
SETUP list with USER FILTERS SETUP text highlighted (displayed inversely)

USER FILTERS SETUP

- **MODE**
  - **VIBRATION**
  - **SOUND**
- **FILTER**
  - **VUSR1**, **VUSR2**, **VURS3** in the case of vibration measurements
  - **SUSR1**, **SUSR2**, **SUSR3** in the case of sound measurements
- **VIEW**
  - **0.80 Hz:** available values of 0.8 Hz centre frequency filter: **-INF**,**-100.0dB .. 100.0dB**
  - **1.00 Hz:** available values of 1 Hz centre frequency filter: **-INF**,**-100.0dB .. 100.0dB**
  -
  - **...**
  - **…**
  - **20.0kHz:** available values of 20 kHz centre frequency filter: **-INF**,**-100.0dB .. 100.0dB**
- **EDIT**
  - **0.80 Hz:** available values of 0.8 Hz centre frequency filter: **-INF**, **-100.0dB .. 100.0dB**
  - **1.00 Hz:** available values of 1 Hz centre frequency filter: **-INF**, **-100.0dB .. 100.0dB**
  -
  - **...**
  - **…**
  - **20.0kHz:** available values of 20 kHz centre frequency filter: **-INF**, **-100.0dB .. 100.0dB**
- **CLEAR**
  - **Are you sure?**

8.13.1 Selecting the mode for introduction of user filter coefficients - MODE

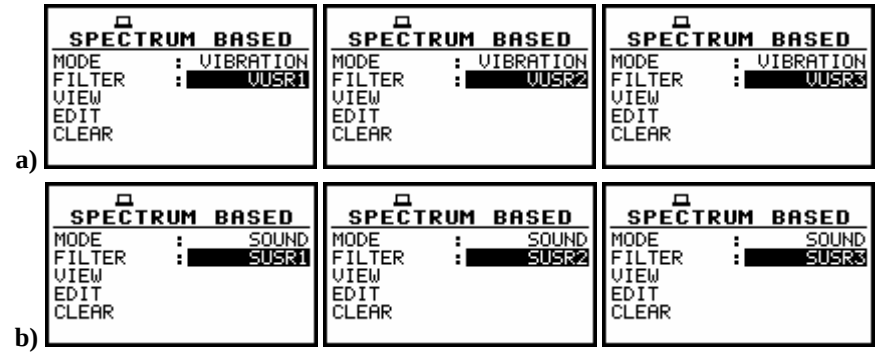
In the **MODE** it is possible to select **VIBRATION** or **SOUND**. The selection is made with **<◄>**, **<►>** push-buttons.



SPECTRUM BASED windows with MODE selection

8.13.2 Selecting the filter to be viewed, edited or cleared - FILTER

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 selection of a filter is made with the **<◄>**, **<►>** push-buttons.



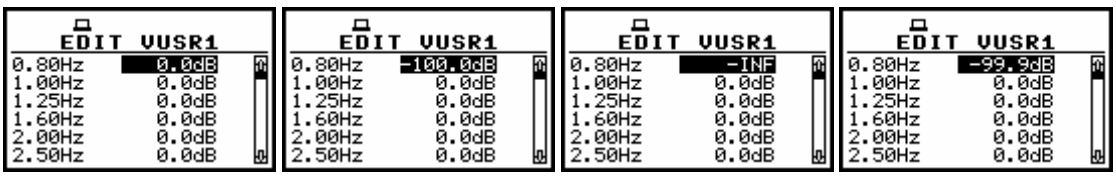
SPECTRUM BASED windows with the filter selection for vibration (a) and for sound (b)

8.13.3 Setting the coefficients of the user filters set - EDIT

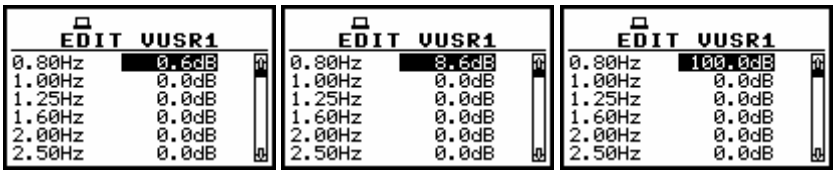
After pressing the **<ENTER>** push-button when the **VUSR1** (in the **EDIT**) text is displayed inversely, the window containing the status of the selected set and the values of the coefficients for all **1/3 OCTAVE** filters is opened. The status position informs the user that the set is switched on. It is not possible to change the status.

SPECTRUM BASED windows with EDIT selected

The selection of the position in the set is performed by means of the **<▲>**, **<▼>** push-buttons. The value is introduced by pressing the **<◄>**, **<►>** push-buttons. The window is closed and the instrument returns to the **USER FILTERS SETUP** window after pressing the **<ENTER>** (with the confirmation of all settings made in the window) or **<ESC>** push-button (ignoring all settings made there).



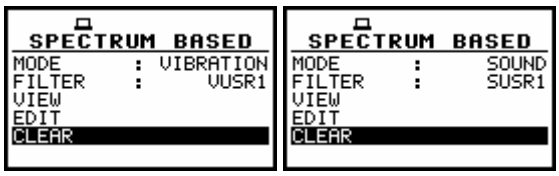
EDIT windows with the setting of the filter's coefficient



EDIT windows with the setting of the filter's coefficient (cont.)

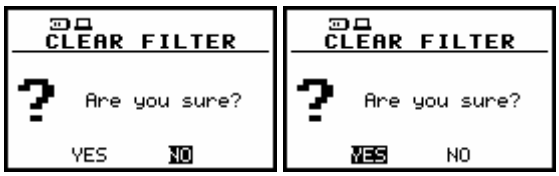
8.13.4 Clearing the coefficients of the user filters - CLEAR

The **CLEAR** enables the user to clear the values of the user coefficients of the selected octave or third octave filter. In order to execute the **CLEAR** operation the user has to highlight the **CLEAR** text and press **<ENTER>**.



SPECTRUM BASED windows with CLEAR selected

The **ARE YOU SURE?** question appears on the display. The coefficients of a set (or sets) are cleared after the selection of **YES** by means of the **<◄>**, **<►>** push-buttons and after pressing the **<ENTER>** one. After clearing the instrument returns to the **SPECTRUM BASED** window.



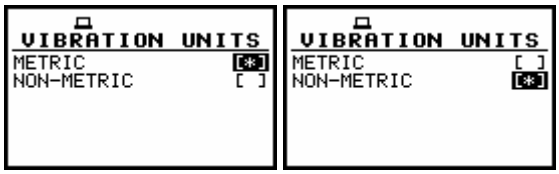
Displays with the request for the confirmation for CLEAR FILTER execution

8.14 Selection of the vibration units - VIBRATION UNITS

The **VIBRATION UNITS** (*path: MENU / SETUP / VIBRATION UNITS*) enables the user to select the units for the vibration measurements. In order to enter the window the user has to select the **VIBRATION UNITS** text in the **SETUP** list, using the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons and press the **<ENTER>**.

SETUP list with VIBRATION UNITS text highlighted (displayed inversely)

It is possible to select the **METRIC** units (e.g. m/s^2, m/s, m etc.) or **NON-METRIC** units (e.g. g, ips, mil etc.). The selection is done by means of the **<◄>**, **<►>** push-buttons. In order to confirm the selection the **<ENTER>** push-button has to be pressed. Such pressing closes the window. After pressing the **<ESC>** push-button the window is also closed but all changes, which were made, are ignored.



VIBRATION UNITS windows

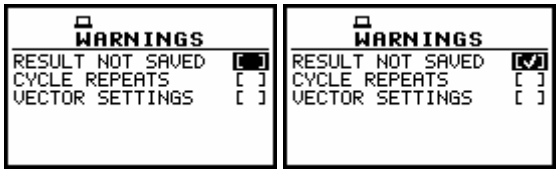
8.15 Warnings selection - WARNINGS

The **WARNINGS** (*path: MENU / SETUP / WARNINGS*) enables the user to select the messages which could be displayed during the operation of the instrument. In order to enter the window the user has to select the **WARNINGS** text in the **SETUP** list, using the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons and press the **<ENTER>**.

SETUP list with WARNINGS text highlighted (displayed inversely)

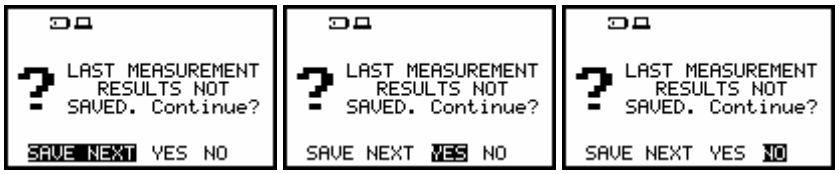
8.15.1 Saving the measurement results in a file - RESULTS NOT SAVED

In order to switch on the displaying of the message the user has to place, by means of the **<◄>**, **<►>** push-buttons, the special character in the warning's position. The window is closed and the instrument returns to the **SETUP** list after pressing the **<ENTER>** (with the confirmation of a change made in the window) or **<ESC>** push-button (ignoring a change made there).



WARNINGS windows with RESULT NOT SAVE selected

When the position is set to be active the special warning can be displayed on the display after pressing the **<Start / Stop>** push-button. It will happen in a case when the result of the previous measurement was not saved in a file of the instrument. The warning, which will appear on the display, is presented below.



Displays with the warning that the previous results were not saved and the confirmation

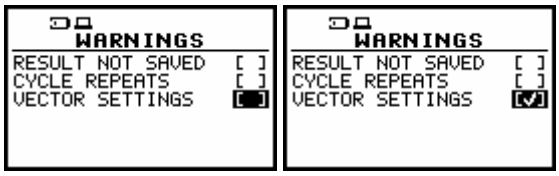
The default value of this position is **SAVE NEXT**. After pressing **<ENTER>** the instrument saves last measurement result. The number of the file is increased by one in the comparison to the last saved file. Using the **<◄>**, **<►>** push-buttons one can change the value of the position to **YES** or **NO**. To confirm the change the **<ENTER>** should be pressed. After the selection of **YES** the instrument returns to the active mode of measurement result's presentation starting the new measurement process.

After the selection of **NO** push-button the instrument returns to the active mode of measurement result's presentation without starting the new measurement process.

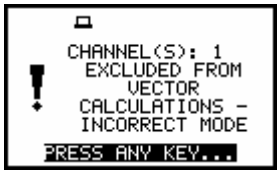
8.15.2 Excluding channel from vector calculations - VECTOR SETTINGS

The **VECTOR SETTINGS** warning appears on the display when the user changes mode of the channel from **VIBRATION** into **SOUND** (*path: MENU / INPUT / CHANNELS SETUP / MODE: VIBRATION ➧SOUND*) and the channel was included to the vector calculations (*path: MENU / INPUT / AUXILIARY SETUP / VECTOR SETUP / CHANNEL x: [√]*).

In order to switch on the displaying of the message the user has to place, by means of the **<➤>**, **<➤>** push-buttons, the special character in the warning's position. The window is closed and the instrument returns to the **SETUP** list after pressing the **<ENTER>** (with the confirmation of a change made in the window) or **<ESC>** push-button (ignoring a change made there).



WARNINGS windows with the selection of VECTOR SETTINGS



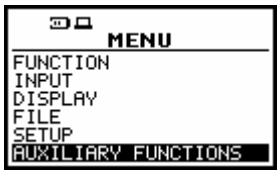
Display with the warning that CHANNEL x has been excluded from vector calculation

9 CALCULATION OF DOSE PARAMETERS - AUXILIARY FUNCTIONS

In order to open the **AUXILIARY FUNCTIONS** list the user has to:

- press the **<Menu>** push-button,
- select from the main list, using the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons, the **AUXILIARY FUNCTIONS** text (highlight it inversely),
- press finely the **<ENTER>** push-button.

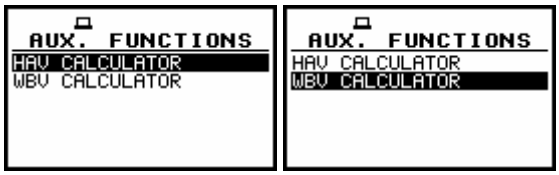
Pressing the **<Shift>** and **<▲>** (or **<Shift>** and **<◄>**) results in a movement to the first position of the opened list and pressing the **<Shift>** and **<▼>** (or **<Shift>** and **<►>**) results in a movement to the last position of the opened list.



Main list with AUXILIARY FUNCTIONS text highlighted (displayed inversely)

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 these measurements. It enables to calculate the **HAV** and **WBV** value, **PARTIAL RESULTS** (**PARTIAL EXPOSURE**) and **DAILY RESULTS** (**DAILY EXPOSURE**).

In order to confirm the selection the **<ENTER>** push-button has to be pressed. After this confirmation, the opened window or list is closed. In order to ignore any changes made in the opened window or list the user has to press the **<ESC>** push-button.



AUXILIARY FUNCTIONS windows

9.1 Selection of the calculation results - HAV CALCULATOR

The **HAV CALCULATOR** (*path: MENU / AUXILIARY FUNCTIONS / HAV CALCULATOR)* is used to calculate the various **HAND–ARM** 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 counted according to the standard selected in the **STANDARD** (*path: MENU / INPUT / AUXILIARY SETUP / HAV/WBV DOSE SETUP / STANDARDS).* In order to enter the sub-list the user has to select the **HAV CALCULATOR** text in the **AUXILIARY FUNCTIONS** list, using the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons and press the **<ENTER>** one. The selection of a parameter which level has to be set is done by means of the **<▲>**, **<▼>** push-buttons.

This function is available only in **VLM** mode.

In the **HAV CALCULATOR** list, the following items are available:

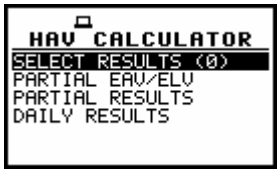
SELECT RESULTS that enables the user to select files with measurement's results with **HAND–ARM** data;

PARTIAL EAV/ELV that displays the partial result of dose;

PARTIAL RESULTS that displays the result of exposure;

DAILY RESULTS that displays the result of daily exposure.

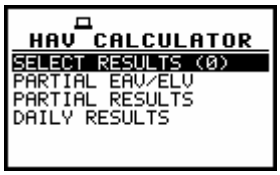
The user can select available position from the main list, using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons, the display text is highlighted inversely. In order to confirm the selection the **<ENTER>** push-button has to be pressed. After this confirmation, the opened window or list is closed. In order to ignore any changes made in the opened window or list the user has to press the **<ESC>** push-button.



HAV CALCULATOR window

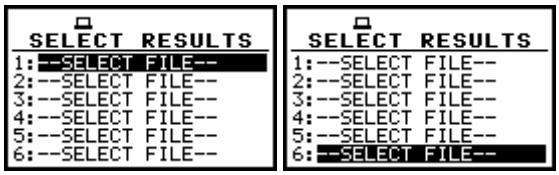
9.1.1 Selection of the file with result of measurement - SELECT RESULTS

The **SELECT RESULT** *(path: MENU / AUXILIARY FUNCTIONS / HAV CALCULATOR / SELECT RESULTS)* is used to load data file from the FLASH DISC (memory of the instrument). User selects which files of measurement should be used to determine results of measurements. It is possible to select 6 files, which include measurement's results with **HAND–ARM** data. The position is opened after pressing the **<ENTER>** push-button when the **SELECT RESULTS** text in the **HAV CALCULATOR** list is displayed inversely (selected using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons). The return to the **AUXILIARY FUNCTIONS** list is possible after pressing the **<ESC>** push-button.

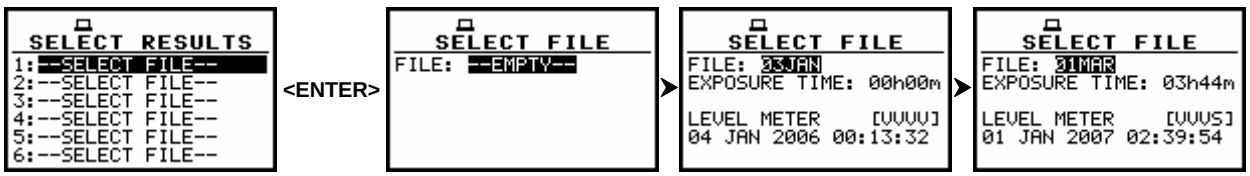


HAV CALCULATOR window with SELECT RESULTS text highlighted (displayed inversely)

After pressing the **<ENTER>** push-button the window is closed and the instrument opens new sub-list. It consists of six positions. In order to enter the file the user has to select it using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and press the **<ENTER>**.



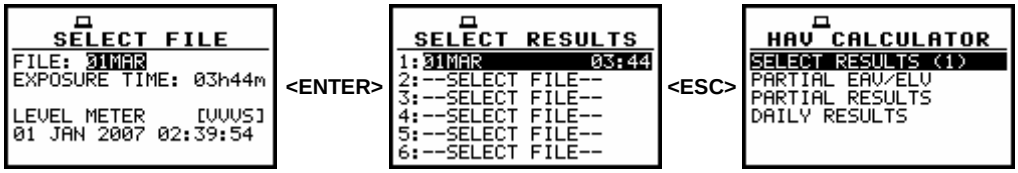
SELECT RESULTS list



Displays during the selection of the files

The current file is displayed in the first line. The **EXPOSURE TIME** is displayed in the second line. The change of the current file with the unit step can be done after pressing the **<◀>**, **<▶>** push-buttons. After pressing the **<◀>** with **<Shift>** push-button the first file is available and after pressing the **<▶>** with **<Shift>** push-button - the last one is displayed.

The name of the file is accepted and the file is loaded after pressing the **<ENTER>** push-button. The name of this file appears in a list as it is presented below.

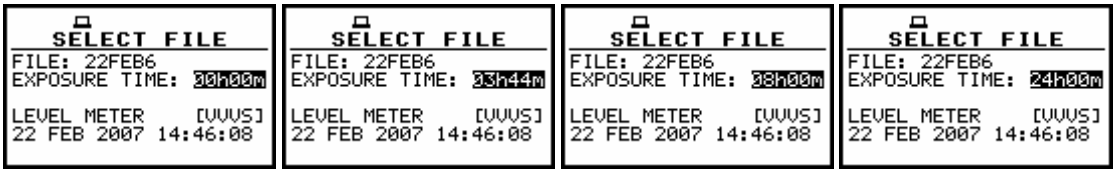


Display with the selecting file and after the execution of the operation

The figure in the brackets on the right side of the **SELECT RESULTS** indicates the number of selected files.

The message is displayed when the selected file does not include **HAND–ARM** data. The instrument waits for the reaction of the user until pressing any push-button except the **<Shift>** and **<Alt>**. After that, it returns to the **SELECT RESULTS** list.

Display after checking the contents of the file without HAND–ARM data

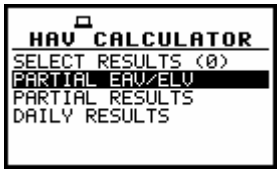


SELECT FILE windows during the execution of the setting EXPOSURE TIME operation

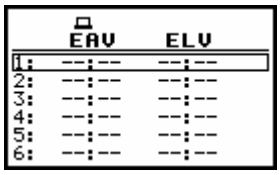
The **EXPOSURE TIME** defines the period during that the measurement results are extrapolated. The required parameter can be set by means of the **<◀>**, **<▶>** and confirmed by the **<ENTER>** push-button. The integration time (**EXPOSURE TIME**) can be set (from **00h00m** to **24h00m** with **1m** step by pressing the **<◀>**, **<▶>** push-buttons or with **30m** step by pressing **<Shift>** with **<◀>**, **<▶>** push-buttons). The user can set the **EXPOSURE TIME** for each file separately.

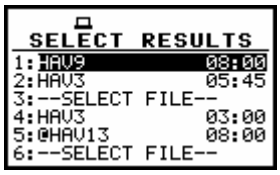
9.1.2 Selection of the partial results - PARTIAL EAV/ELV

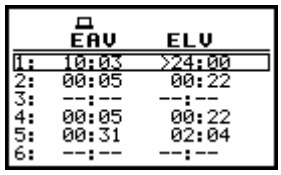
The **PARTIAL EAV/ELV** *(path: MENU / AUXILIARY FUNCTIONS / HAV CALCULATOR / PARTIAL EAV/ELV*) is used to display partial results, for each file separately. The results are displayed in two columns – the first column for **EAV** results and the second for **ELV** results. The position is opened after pressing the **<ENTER>** push-button when the **PARTIAL EAV/ELV** text in the **HAV CALCULATOR** sub-list is displayed inversely (selected using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons). The return to the **HAV CALCULATOR** sub-list is possible after pressing the **<ESC>** push-button.



HAV CALCULATOR window with PARTIAL EAV/ELV text highlighted (displayed inversely)

a)


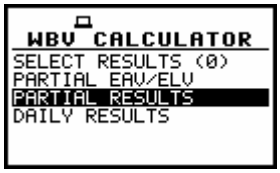
b)


c)


Displays with the empty partial result list (a), the selecting file in SELECT RESULTS window (b) and PARTIAL EAV/ELV results for selected files (c)

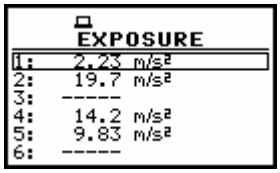
9.1.3 Selection of the partial results - PARTIAL RESULTS

The **PARTIAL RESULTS** (*path: MENU / AUXILIARY FUNCTIONS / HAV CALCULATOR / PARTIAL RESULTS.*) is used to display **EXPOSURE** results, separately for each selected file. The results are displayed in one column; there are six lines - one for each file. The window is opened after pressing the **<ENTER>** push-button when the **PARTIAL RESULTS** text in the **HAV CALCULATOR** sub-list is displayed inversely (selected using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons). The return to the **HAV CALCULATOR** sub-list is possible after pressing the **<ESC>** push-button.



HAV CALCULATOR window with PARTIAL RESULTS text highlighted (displayed inversely)

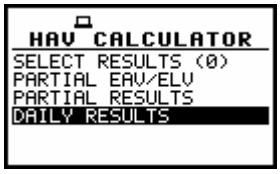
The return to the **HAV CALCULATOR** window is possible after pressing the **<ESC>** push-button.



EXPOSURE results for selected files

9.1.4 Selection of the daily exposure - DAILY RESULTS

The **DAILY RESULTS** *(path: MENU / AUXILIARY FUNCTIONS / HAV CALCULATOR / DAILY RESULTS)* is used to display **DAILY EXPOSURE** results for all selected files. The result is counted relatively to **EXPOSURE TIME**. The window is opened after pressing the **<ENTER>** push-button when the **DAILY RESULTS** text in the **HAV CALCULATOR** list is displayed inversely (selected using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons). The return to the **HAV CALCULATOR** sub-list is possible after pressing the **<ESC>** push-button.



HAV CALCULATOR window with DAILY RESULTS text highlighted (displayed inversely)

DAILY RESULTS window with the result for selected files

9.2 Selection of the calculation results - WBV CALCULATOR

The **WBV CALCULATOR** (*path: MENU / AUXILIARY FUNCTIONS / WBV CALCULATOR)* is available in **VLM** mode and used to calculate the various **WBV** parameters. It enables to analyse results based on data saved in files. There are calculated the **PARTIAL EAV/ELV**, **PARTIAL EXPOSURE**, **DAILY EXPOSURE** and **DAILY DOSE** of vibration. All results are calculated according to the standard selected in **STANDARD** (*path: MENU / INPUT / AUXILIARY SETUP / HAV/WBW DOSE SETUP / STANDARDS).*

In order to enter this sub-list the user has to select the **WBV CALCULATOR** text in the **HAV/WBV CALC.** list, using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and press the **<ENTER>**. The selection of a parameter which level has to be set is done by means of the **<▲>**, **<▼>** push-buttons.

In the **WBV CALCULATOR** sub-list, the following items are available:

SELECT RESULTS that enables the user to select files with measurement results;

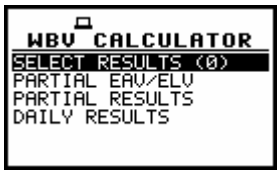
PARTIAL EAV/ELV that displays the partial result of dose;

PARTIAL RESULTS that displays the result of partial exposure;

DAILY RESULTS that displays the results of daily exposure and daily dose.

The user can select available position select from the main list, using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons, the display text is highlighted inversely. In order to confirm the selection the **<ENTER>** push-button has to be pressed. After this confirmation, the opened window is closed.

In order to ignore any changes made in the opened window or list the user has to press the **<ESC>** push-button.

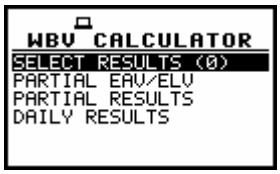


WBV CALCULATOR window

9.2.1 Selection of the file with result of measurement - SELECT RESULTS

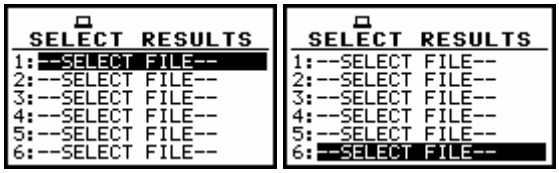
The **SELECT RESULTS** *(path: MENU / AUXILIARY FUNCTIONS / WBV CALCULATOR / SELECT RESULTS.)* is used to load data file from the FLASH DISC. User selects which data files should be used to determine results of measurements. It is possible to select up to 6 files, which include measurements results with **WBV** data.

The window is opened after pressing the **<ENTER>** push-button when the **SELECT RESULTS** text in the **WBV CALCULATOR** list is displayed inversely (selected using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons). The return to the **AUXILIARY FUNCTIONS** list is possible after pressing the **<ESC>** push-button.



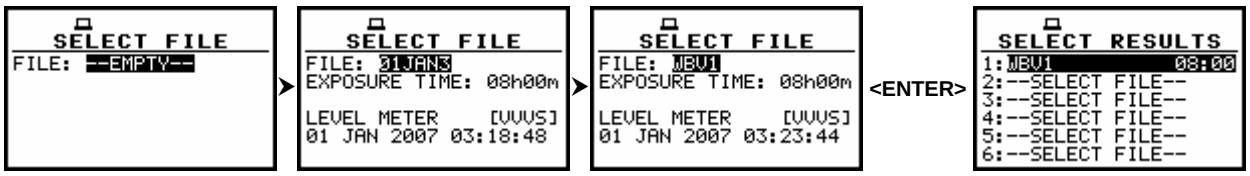
WBV CALCULATOR window with SELECT RESULTS text highlighted (displayed inversely)

After pressing the **<ENTER>** push-button the window is closed and the instrument opens new sub-list. It consists of six positions. The user can rewind the list using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and select the position after pressing **<ENTER>**.



Displays in the SELECT RESULTS list

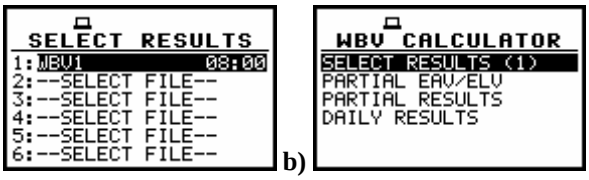
In order to enter the file the user has to select it using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and press the **<ENTER>**.



SELECT FILE windows with the selection of the file

The current file is displayed in the first line. The name of the file is displayed inversely in the second line. The change of the current file with the unit step can be done after pressing the **<◀>**, **<▶>** push-buttons. After pressing the **<◀>** with **<Shift>** push-button the first file is available and after pressing the **<▶>** with **<Shift>** push-button - the last one is displayed.

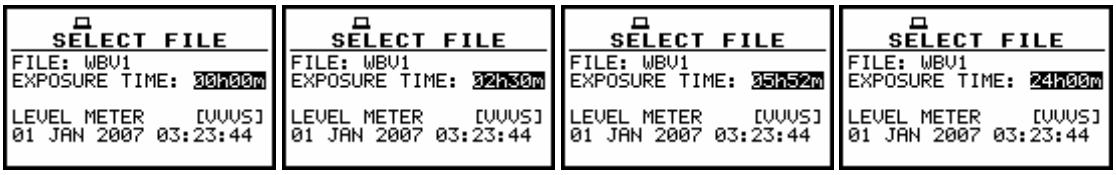
The name of the file is accepted and the file is loaded after pressing the **<ENTER>** push-button. The name of this file appears in a list presented below.



Displays with the selected file (a) and after the execution of the operation (b)

The figure in the brackets on the right side of the **SELECT RESULTS** indicates number of selected files. The message below is displayed when the selected file does not include **WBV** data. After pressing any push-button except the **<Shift>** one it returns to the **SELECT RESULTS** sub-list.

Display after the execution of loading a file without WBV data

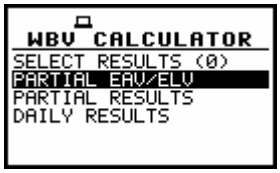


Displays during the execution of the setting EXPOSURE TIME operation

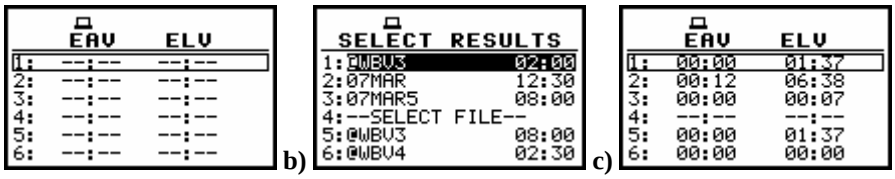
The **EXPOSURE TIME** defines the period for the extrapolation of measurement results. The required parameters can be set by means of the **<◄>**, **<►>** and confirmed by the **<ENTER>** push-button. The integration time (**EXPOSURE TIME**) can be chosen from **00h00m** to **24h00m** with **1m** step by pressing the **<◄>**, **<►>** push-buttons or with **30m** step by pressing **<Shift>** with **<◄>**, **<►>** push-buttons. The user can set the **EXPOSURE TIME** for each file separately.

9.2.2 Selection of the partial results - PARTIAL EAV/ELV

The **PARTIAL EAV/ELV** *(path: MENU / AUXILIARY FUNCTIONS / WBV CALCULATOR / PARTIAL EAV/ELV*) is used to display partial results, for each file separately. The results are displayed in two columns – the first column for **EAV** results and the second for **ELV** results. The position is opened after pressing the **<ENTER>** push-button when the **PARTIAL EAV/ELV** text in the **WBV CALCULATOR** sub-list is displayed inversely (selected using the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons). The return to the **WBV CALCULATOR** sub-list is possible after pressing the **<ESC>** push-button.



WBV CALCULATOR window with PARTIAL EAV/ELV text highlighted (displayed inversely)



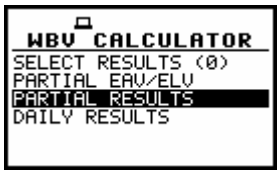
a) **b)** **c)**

Displays with the empty partial result list (a), the selecting file in SELECT RESULT sub-list (b) and PARTIAL EAV/ELV results for selected files (c)

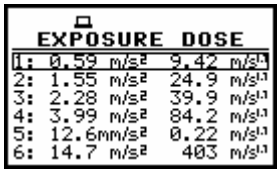
The user can rewind the **SELECT RESULTS** sub-list and **PARTIAL EAV/ELV** list using the **<▲>**, **<▼>** push-buttons. The return to the **WBV CALCULATOR** sub-list is possible after pressing the **<ESC>** push-button.

9.2.3 Selection of the partial results - PARTIAL RESULTS

The **PARTIAL RESULTS** *(path: MENU / AUXILIARY FUNCTIONS / WBV CALCULATOR / PARTIAL RESULTS*) is used to display **PARTIAL EXPOSURE** results. The results are displayed in one column and represented by six positions for each file separately. The window is opened after pressing the **<ENTER>** push-button when the **PARTIAL EXP.** text in the **WBV CALCULATOR** sub-list is displayed inversely (selected using the **<▲>**, **<▼>** (or **<◄>**, **<►>**) push-buttons). The return to the **WBV CALCULATOR** window is possible after pressing the **<ESC>** push-button.



WBV CALCULATOR window with PARTIAL RESULTS text highlighted (displayed inversely)

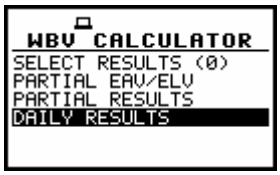


PARTIAL RESULTS with EXPOSURE DOSE for selected files

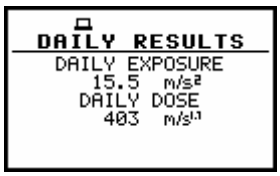
The return to the **WBV CALCULATOR** window is possible after pressing the **<ESC>** push-button.

9.2.4 Selection of the daily results - DAILY RESULTS

The **DAILY RESULTS** *(path: MENU / AUXILIARY FUNCTIONS / WBV CALCULATOR / DAILY RESULTS*) is used to display **DAILY EXPOSURE** and **DAILY DOSE** results for all selected files. The result is calculated relatively to **EXPOSURE TIME**. The window is opened after pressing the **<ENTER>** push-button when the **DAILY RESULTS** text in the **WBV CALCULATOR** sub-list is displayed inversely (selected using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons). The return to the **WBV CALCULATOR** window is possible after pressing the **<ESC>** push-button.



WBV CALCULATOR window with DAILY RESULTS text highlighted (displayed inversely)



DAILY EXPOSURE and DAILY DOSE results for selected file